

SIEMENS

DIGSI 5 Software Description

V07.50

Help

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Open Source Software	
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NOTE

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Preface

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To do this, the following steps are necessary:

- Switch to online mode.
- Select the device.
- Select **Online** in the menu bar.
- Click **Show open source software information**.



NOTE

To read the Readme_OSS file, a PDF viewer must be installed on the computer.
In order to operate SIPROTEC 5 devices, a valid DIGSI 5 license is required.

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1 Introduction

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1.1 What is DIGSI 5?

DIGSI 5 is the configuration and operation tool for all SIPROTEC 5 devices. With DIGSI 5, you create system topologies, configure hardware and communication networks, set function settings and perform many further tasks.

You perform all configuration tasks offline from your PC without the need for a SIPROTEC 5 device. You transmit all data online to the SIPROTEC 5 device later on – for example, directly through a communication network. For communication, DIGSI 5 and SIPROTEC 5 are based on current standards such as IEC 61850 and proven technologies such as Ethernet.

There are 3 different variants of DIGSI 5:

- For simple applications using individual SIPROTEC 5 devices, select **DIGSI 5 Compact**. With this variant, you deal with most standard tasks such as setting parameters or reading out process data. In addition, this variant also includes the CFC editor and the DIGSI 5 test suite for testing SIPROTEC 5 devices and functions. CFC offline and online debugging is supported to verify the created logic before downloading it to the device.
- The **DIGSI 5 Standard** variant has an extended scope of functions. This variant includes, among others, a display editor which you can now also use to create your own symbols. With DIGSI 5 Standard, you simulate the topology of a system as a 1-phase representation and you configure hardware and networks on a graphical basis. DIGSI 5 Standard offers full IEC 61850 support, including system configuration.
- **DIGSI 5 Premium** is the high-end variant of DIGSI 5. You analyze fault records with SIGRA and you use the advantages of flexible engineering and functional naming for IEC 61850.

You will find a detailed overview of the features of the 3 variants in the Help topic entitled **Features of the Different DIGSI 5 Variants**.

Related Topics

[2.1.1 Features of the Different DIGSI 5 Variants](#)

1.2 Information Scope of the DIGSI 5 Help

DIGSI 5 Help offers you comprehensive assistance to enable you to understand the functionality of all DIGSI 5 modules. DIGSI 5 Help also contains more in-depth reference information and practically oriented examples. The following structure will provide you with a first impression of the scope of information that DIGSI 5 Help offers:

- **Introduction**

The current topic is part of this topic block, where you also find out more about the DIGSI 5 information system. Further topics are **Using DIGSI 5 Help** and **Safety notes**.

- **First Steps**

This topic block allows you to get to know DIGSI 5 for the first time. For example, you are informed about the diverse DIGSI 5 variants and you get answers to questions on how to migrate from DIGSI 4 to DIGSI 5.

- **Basic Operation**

This topic block provides the information you need to quickly familiarize yourself with the newly designed DIGSI 5 user interface. It includes not only explanations of the basic structure of the user interface and how to adapt it to your requirements, but also information on working with projects and libraries.

- **Projects**

In this topic block, you find all the information for creating a project and for other actions that are necessary for working with projects.

- **Devices**

This topic block contains information about inserting offline configurations in the project for the SIPROTEC 5 devices. You find out how to configure the hardware of SIPROTEC 5 devices and how to generate display pages for them.

- **Single-Line Configuration**

In this topic block, you learn how to map a system as a single-line configuration using the single-line editor. With the symbol editor, you can also generate your own symbols for the single-line configuration.

- **Applications and functions**

The topics in this block describe how to configure the application for a SIPROTEC 5 device. For this purpose you will receive the necessary information to adjust the scope of functionality of a SIPROTEC 5 device, and to set a parameter to the project thereafter.

- **Signals**

This topic block provides an overview to signals such as measured values or commands. Additionally, you will receive information about other actions that are necessary for working with signals.

- **IEC 61850 Structure**

With the information in this topic block you find access to the IEC 61850 structure. You will find out how to access the structure and adjust it to meet your requirements.

- **Information Routing**

In this topic block, you will learn how to route information on device components, such as inputs and outputs on a buffer.

- **Function Charts (CFC)**

With CFC (Continuous Function Chart), you extend a SIPROTEC 5 device to add functions for interlockings, measured-value tasks, and other task cards. This topic block explains how to configure and then test CFC functions in function charts with complete function blocks. It also provides you with additional information on all function blocks.

- **Test Sequences**

The test sequences test the protection functions. This topic block provides the information for generating and editing test sequences.

- **Communication**

Besides describing general communication characteristics of SIPROTEC 5 devices, this topic block also tells you how to configure a communication connection and communicate with a SIPROTEC 5 device. Attention is focused particularly on communication in compliance with IEC 61850.

- **Commissioning and Operation**

In this topic block, you find information on all test and diagnostics functions of the DIGSI 5 Test suite and on the process data. The other topics discuss, for example, the transmission of configurations or updating the device function.

- **Export and Import**

The topics in this block provide you with all information on archiving, importing, and exporting data. It therefore provides you further with an insight into how to also make data available to other programs through the DIGSI 5 open interfaces.

- **Documentation**

DIGSI 5 includes an extensive documentation function. This topic block is therefore devoted to designing and printing the project documentation.

- **Properties**

This topic block informs you about global elements and characteristics that are not unique to one specific device type. For example, these can be communication settings or characteristics of library elements.

- **User Interface**

The descriptions of all user interface elements are grouped together in this topic block. Here, you find out all you need to know about editors, tabs in the task card, matrices, tables, various input, and selection areas and also dialogs and icon bars.

Related Topics

[1.1 What is DIGSI 5?](#)

[4.1 Overview on the DIGSI 5 Information System](#)

[4.2 Using DIGSI 5 Help](#)

[1.3 Safety Notes](#)

1.3 Safety Notes

Safety Notes

This Help does not constitute a complete index of all required safety measures for the use of DIGSI 5. Special operational conditions may require additional measures. However, the Help does contain important information that must be noted for purposes of personal safety as well as for avoiding material damage. If a warning points out the danger of personal injury with a triangle sign, attention may additionally be drawn within the same warning to the risk of material damage.

Electrotechnically Qualified Staff

The associated SIPROTEC 5 device or system may only be configured and operated in conjunction with this documentation. Only qualified electrical engineering personnel may commission and operate the SIPROTEC 5 device or system. Qualified electrical engineering personnel are persons who are authorized to commission, ground and tag SIPROTEC 5 devices, systems, and circuits in compliance with the safety standards.

Exclusion of Liability

Siemens has checked the content of the Help files for conformity with the hardware and software described. Nevertheless, Siemens cannot rule out discrepancies and so Siemens does not assume any warranty for complete conformity. The information in this Help text is checked regularly and later editions will contain necessary corrections.

2 First Steps

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2.1 Important Information in Advance

2.1.1 Features of the Different DIGSI 5 Variants

The following table provides an overview of the features of the 3 DIGSI 5 variants in detail.

	Compact	Standard	Premium
Project Editing			
Working simultaneously with several SIPROTEC 5 devices in one project	-	X	X
Incorporating new SIPROTEC 5 devices with product code	o One SIPROTEC 5 device per project	X Unrestricted	X Unrestricted
Graphical hardware and network configuration	o Device view only	X Network and device view	X Network and device view
Copying and pasting all elements	X	X	X
Multilingual support	X	X	X
Single-Line Configuration and Display Pages			
Graphical single-line editor	-	X	X
Graphical connection of voltage and current transformers	-	X	X
ANSI and IEC libraries available	-	X	X
Ready-made templates for protection and control scenarios	-	X	X
Automatic creation of display pages based on single-line configurations	-	X	X
Creating display pages and display icons	-	X	X
Setting Parameters and Routing Information			
Routing information	X	X	X
Intelligent filtering and sorting	X	X	X
All settings visible and modifiable	X	X	X
Graphical display of protection settings	-	X	X
Compare device configurations (offline/offline - online/offline)	o online/offline only	X offline/offline and online/offline	X offline/offline and online/offline
Graphically Configurable Functions (CFC)			
Function chart (CFC) editor with IEC 61131 support	X	X	X

CFC offline and online analysis	X	X	X
Communication			
Communication mapping for all protocols	X	X	X
Network view	-	X	X
Support of Editions 1 and 2 of IEC 61850	-	o Basic	X Advanced
Configuration of GOOSE messages	-	X	X
IEC 61850 – Flexible engineering and functional naming	-	-	X
Device access via Ethernet and USB interface	X	X	X
Online			
Reading, viewing, and saving measured values, metered values, and messages	X	X	X
Reading, viewing, and saving logs and reports	X	X	X
Displaying fault records	X ComTrade viewer	X ComTrade viewer (SIGRA is available as an optional package) ¹	X ComTrade viewer SIGRA ¹
Loading settings into the SIPROTEC 5 device and updating the firmware	X For one SIPROTEC 5 device only	X For all SIPROTEC 5 devices in the project	X For all SIPROTEC 5 devices in the project
Testing and Commissioning			
Creating and executing multiple-step test sequences without an external testing unit	X	X	X
Test views for testing the device configuration	X	X	X
Control functions Circuit-breaker test	X	X	X
Export and Import			
IEC 61850 formats: SCD, ICD, IID, MICS	-	X	X
TEA-X	o For one SIPROTEC 5 device only	X For all SIPROTEC 5 devices in the project	X For all SIPROTEC 5 devices in the project
SIPROTEC 5 devices (completely or partly)	X	X	X
Settings of the system interface	X	X	X

¹ The number of SIGRA licenses is identical to the number of DIGSI licences (1 PC, 5 PCs, or 10 PCs).

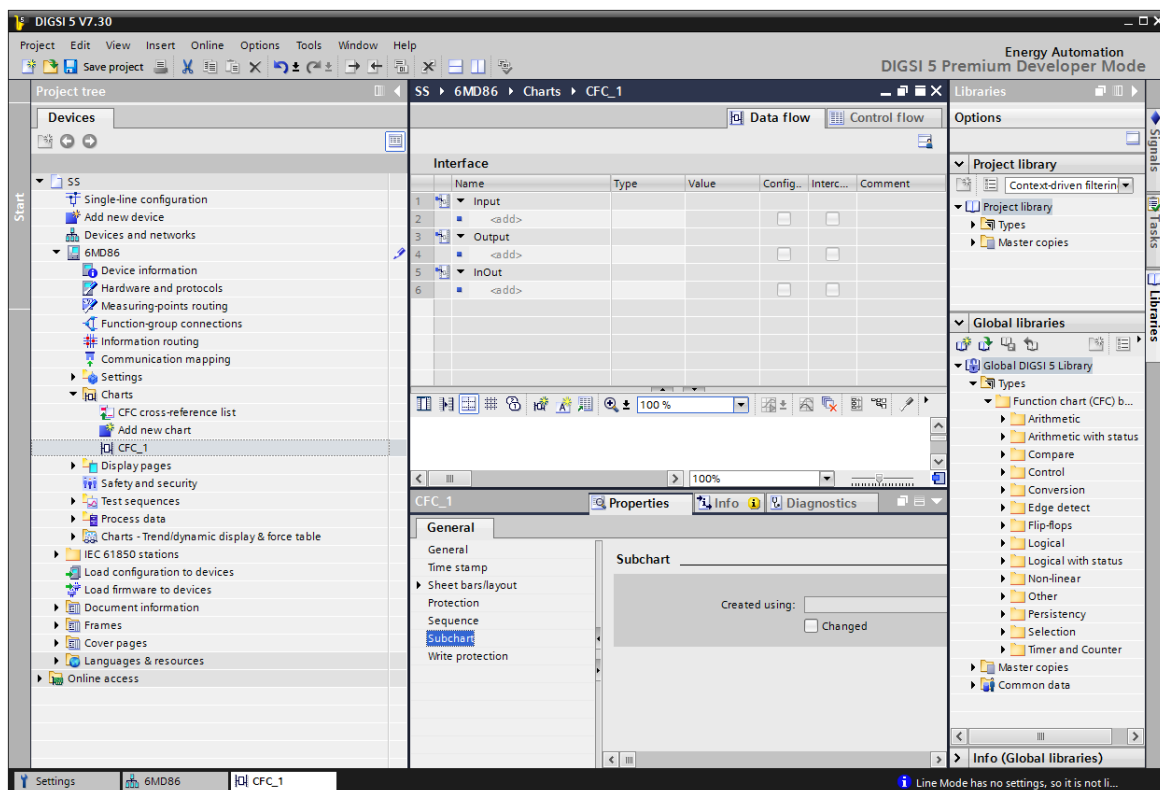
Single-line configuration/ topology	-	o WMF export only	X Export as WMF, SCD, SSD Import as ELCAD, SCD, SSD
Display pages	-	X	X
Protection settings for OMICRON test unit (RIO)	X	X	X
Documentation			
Printing and exporting project documentation	X	X	X
Printing and exporting online and test views	X	X	X
Creating your own print templates	X	X	X
Safety			
Standard security by confirmation IDs and connection password	X	X	X
Full NERC compatibility	X	X	X
Legend			
Feature available			X
Feature available, but with restrictions. Restrictions are described.			o
Feature not available			-

Related Topics

[1.1 What is DIGSI 5?](#)

2.1.2 User Interface, Project, and Project Tree

Everything you need to configure and operate SIPROTEC 5 devices is seamlessly integrated in the user interface of DIGSI 5. The interface consists of several windows.



[sc_digsi_user_interface, 2, en_US]

DIGSI 5 displays all editing tools such as the Function chart (CFC) editor or the Display editor within the working area. You use buttons in the object bar to switch between the open tools by clicking with the mouse. You see the task card on the right-hand side of the user interface. This is where you find context-related tasks or functions. The **Libraries** task card has a special significance. The library contains a large number of elements that you can drag and drop into the project. Among other things, such elements can be function blocks for a function chart or also icons for equipment that you need for a single-line configuration or a display page.

Inspector and information cards will help you further if you are interested more in a specific element. Depending on the element selected, these windows immediately provide you with the suitable display and input options without any need to open any additional dialogs.

Project

DIGSI 5 manages the components of a system and all the data associated with it in relation to the project. Topology, SIPROTEC 5 devices, settings values, communication settings, process data and much more are grouped together and saved under a project name. In other words, you only open one project file to have access to all data. Conversely, all changes are saved simply by saving the project file.

Project Tree

The project tree is positioned on the left side of the user interface and is the central element when working with DIGSI 5. Its individual icons give you access to all data and tools. One double click each suffices, and you will display settings of protection functions, start actions such as loading firmware into SIPROTEC 5 devices or open one of the editors.

Related Topics

[5.1.2 Creating a Project](#)

[5.1.3 Opening a Project](#)

2.1.3 Working Offline and Online

There are 2 modes in DIGSI 5: offline and online.

In the offline mode, entire data of a SIPROTEC 5 device to be edited is available in the files. There is no connection to a physically existing SIPROTEC 5 device. You can work with an offline configuration of a SIPROTEC 5 device. You can work in this mode to prepare the settings or to evaluate the stored process data. Validation of the text entered in DIGSI 5 while renaming any element is based on the number of characters and also on the number of pixels. If the entered text exceeds the allowed limit, an error message is displayed. You must resolve the inconsistencies to proceed further.

In the online mode, there is a physical connection between DIGSI 5 and a SIPROTEC 5 device. You work in this mode to transmit settings from DIGSI 5 to the SIPROTEC 5 device or to read process data of it, for instance.

In DIGSI 5, you can work with both modes in parallel. You can edit project data offline and at the same time monitor SIPROTEC 5 devices that can be accessed online.

The following list provides an overview of the tasks you can deal with, among others, in the offline mode:

- Creating a topology as a single-line configuration
- Incorporating SIPROTEC 5 devices into the topology
- Configuring hardware of a SIPROTEC 5 device
- Defining the functional scope of a SIPROTEC 5 device
- Defining individual function settings
- Routing information
- Editing display pages
- Configuring function charts (CFC)
- Configuring the communication network and setting communication settings
- Displaying saved measured values and indications
- Displaying saved fault records and evaluating them with SIGRA
- Exporting and printing data
- Creating test sequences

The following list provides an overview of the tasks you can deal with, among others, in the online mode:

- Transmitting settings values from DIGSI 5 to the SIPROTEC 5 device
- Transmitting settings values from the SIPROTEC 5 device to DIGSI 5 and saving them in files
- Transmitting indications, measured values, and fault records from the SIPROTEC 5 device to DIGSI 5 and saving them in files
- Setting limiting values
- Testing SIPROTEC 5 devices and functions
- Controlling equipment
- Initial startup or restart of the SIPROTEC 5 device
- Setting the date and time of the SIPROTEC 5 device

Related Topics

[15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)

2.1.4 Languages in DIGSI 5

The following languages are distinguished in DIGSI 5:

- **User Interface Language**

The DIGSI 5 user interface is available in various languages. You can select one of these languages as the user interface language. The designations of all device-independent operating elements and information are then displayed in the selected language.

- **Project Language**

Select the languages to be used as project language from a series of country-specific languages. The languages in which a project is to be later edited are designated as project languages.

- **Editing Language**

Define a language as an editing language from the selected project languages. All newly entered or edited texts are then also saved together with the texts of the editing language currently set.

- **Reference Language**

Define a language as reference language from the selected project languages. This language serves as a reference basis when compiling project texts.

- **On-Site Operation Panel Language**

Information in the display of the SIPROTEC 5 device is shown in the country-specific language that is set as the language of the on-site operation panel. This information includes designations of entries in the menu tree as well as the names of parameters and their settings. You can select different languages for operation at the SIPROTEC 5 device. You can select the language for each SIPROTEC 5 device independently of other SIPROTEC 5 devices.

Related Topics

[2.2.2 Selecting the User Interface Language](#)

[5.2.3 Selecting or Deselecting Project Languages](#)

[5.2.4 Defining the Editing Language and the Reference Language](#)

[6.1.6 Setting the On-Site Operation Panel Language](#)

2.2 Adjust DIGSI 5

2.2.1 Starting DIGSI 5

You have 2 ways of starting DIGSI 5:

- ✧ In the Start menu under **Siemens Energy**, select the program entry for the current DIGSI 5 version.
- or -
- ✧ Double-click a project file with the **.dp5vx** file extension. **x** indicates the DIGSI 5 version number. Project files in DIGSI 5 version V1 have the file extension **.dp5v1**.



NOTE

Use of DIGSI 5 is based on single-user licenses in various versions. If you do not possess a valid license, or if your license is damaged, the [20.6.1 No License](#) dialog is displayed during the start of DIGSI 5. With this dialog, you can decide how to proceed.

Checking for New DIGSI 5 Version

After starting DIGSI 5, you can check whether the current version installed on your PC is the latest DIGSI 5 version or if any higher version is available. To verify, proceed as follows:

- ✧ In the **Help** menu, select **Check for new version**.

The **Check for new version** dialog displays information about the availability of the new DIGSI 5 version.

- ✧ You can follow the instructions in this dialog to proceed further.
- or -
- ✧ Click **OK** to close this dialog.



NOTE

DIGSI 5 needs an active internet connection to verify the status of the installed DIGSI 5 version.

Additional Steps upon First Time Use of DIGSI 5

When you use DIGSI 5 for the first time, take the following additional steps:

- ✧ Select your interface language.
- ✧ Select optionally your individual start settings.
- ✧ Make sure to import the device drivers.

Related Topics

- ✧ [2.2.10 Using DIGSI 5 Licenses](#)
- ✧ [2.1.2 User Interface, Project, and Project Tree](#)
- ✧ [2.2.2 Selecting the User Interface Language](#)
- ✧ [2.2.3 Defining Start Settings](#)
- ✧ [2.2.7 Importing Device Drivers](#)

2.2.2 Selecting the User Interface Language

The installation language selected when installing DIGSI 5 is set as the default UI language after a newly created project is opened. The user interface is available in different languages. You can select one of these

languages as the user interface language. The designations of all device-independent operating elements and information are then displayed in the selected language.

Selecting the Language for the User Interface

- ✧ In the **Options** menu, click **Settings**.

The [20.5.12 Settings](#) view is displayed in the working area.

- ✧ Select the group [20.5.13 General](#).

- ✧ In the **General Settings** area, open the **User interface language** list box and select the required language.

The selected language is set immediately as the user interface language. Since the user interface language and the project language are coupled, the selected language is also set as the project language.

Related Topics

- ✧ [2.1.4 Languages in DIGSI 5](#)

2.2.3 Defining Start Settings

DIGSI 5 can execute various actions when starting up. You can define these actions with the aid of various options:

- **User interface language**
With this option you can select a language for the user interface of DIGSI 5. The designations of all user-interface elements and information are displayed in the language selected. The user interface of DIGSI 5 is updated immediately after changing the language with any restart of the DIGSI 5 tool.
- **Show list of recently used projects**
The names of the projects last used can be displayed in the Project menu. This list box is used to set how many of the projects last used are displayed in the project list of the [20.6.3 Open Project](#) dialog.
- **Load most recent project during startup**
When you activate this option, the window settings that you saved last are loaded for the startup.
- **Show truncated texts completely**
When you activate this option, the truncated texts for tooltips are displayed.
- **Show tooltips (context-sensitive help is available)**
When you activate this option, the tooltips are displayed.
- **Open cascade automatically in tooltips**
When you activate this option, the tool tips will automatically open and show further information after a few seconds.

Selecting Startup Options

- ✧ In the **Options** menu, click **Settings**.

The [20.5.12 Settings](#) view is displayed in the working area.

- ✧ Select the group [20.5.13 General](#).

- ✧ Select the required options in the **General settings** area.

The defined start settings apply the next time you open DIGSI 5.

Related Topics

- ✧ [2.2.4 Defining Storage Locations](#)

2.2.4 Defining Storage Locations

You can save the storage locations for new projects and libraries in DIGSI 5. Thus, you avoid manual selection of storage locations when creating projects and libraries.

Defining Storage Locations for Projects and Libraries

- ✧ In the **Options** menu, click **Settings**.

The [20.5.12 Settings](#) view is displayed in the working area.

- ✧ Select the group [20.5.13 General](#).

- ✧ In the **Storage settings** area, select either **Recently used storage location** or **Specify default setting for storage location**.

- ✧ If you have selected the **Specify default setting for storage location** option, enter the storage locations for new projects and libraries.

- or -

- ✧ Click **Browse** to find an existing storage location or to create a new folder.

The **Browse for folder** dialog will open.

- ✧ Navigate to the required directory.

- ✧ Click **Make New Folder** if you wish to do that.

A new folder is created. The name is displayed in a text box and is highlighted in color.

- ✧ Enter a name for the new folder.

- ✧ Click **OK**.

The storage location you have defined is used the next time you create a project or a library.

Related Topics

- ✧ [2.2.3 Defining Start Settings](#)

2.2.5 Defining Storage Locations for Data Exchange

You can select the storage locations for data exchange in DIGSI 5.

Defining Storage Locations for Data Exchange

- ✧ In the **Options** menu, click **Settings**.

The [20.5.12 Settings](#) view is displayed in the working area.

- ✧ Select the group [20.5.13 General](#).

In the **Data exchange** area, the default storage location is displayed.

- ✧ Click **Browse** to find an existing storage location or to create a new folder.

The **Browse for folder** dialog opens.

- ✧ Navigate to the required directory.

- ✧ Click **Make New Folder** if you wish to do that.

A new folder is created. The name is displayed in a text box and is highlighted in color.

- ✧ Enter a name for the new folder.

- ✧ Click **OK**.

The storage location is defined. It is used as the default location until you update the storage path once again.

Related Topics

- ✧ [2.2.3 Defining Start Settings](#)

2.2.6 Selecting a Standard Unit System

The units of all values can be displayed in compliance with the US standard or SI standard.

In the basic settings of DIGSI 5, you can select one of both unit systems. SIPROTEC 5 devices newly added to the project and all existing SIPROTEC 5 devices take over the selected unit system.

You can change the unit system of each individual SIPROTEC 5 device separately.

Selecting Unit System in the Basic Settings of DIGSI 5

- ✧ In the **Options** menu, click **Settings**.

The [20.5.12 Settings](#) view is displayed in the working area.

- ✧ Select the [20.5.14 DIGSI 5 User Preferences](#) group.
- ✧ From the list box **Standard unit system**, select one of the settings **SI units** or **US units**.

All values are displayed in compliance with the newly selected standard.

Changing Unit System of an Individual SIPROTEC 5 Device

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration of the respective device.
- ✧ Open the **Settings** folder.
- ✧ Double-click **Device settings** in this folder.

In the working area, the Parameter editor is opened and the device settings are displayed.

- ✧ With the **Unit system** list box, select one of the settings **SI units** or **US units**.

All values are displayed in compliance with the newly selected standard.

2.2.7 Importing Device Drivers

For you to be able to incorporate and edit SIPROTEC 5 devices of a specific type in a project, install a device driver for this type. Device drivers are files in the **DDD** (DIGSI 5 Device Driver) format.

One DDD file can contain various data:

- Several versions of one device type
- Parameter set
- Firmware for SIPROTEC 5 devices
- Firmware for communication modules
- Communication protocols
- Communication mappings
- Library elements
- Elements for the hardware catalog

In a file dialog, select one or more DDD files first. If you have selected one or more DDD files, an installation dialog shows the elements contained in the files. These are, for example, communication protocol and individual versions of device types. The device types are structured hierarchically in the form **Protection application > device type > version number**. With the installation dialog, you can select the displayed elements to be installed. To do this, you can also filter the display. With the installation dialog, you can also select one or more other DDD files.

Before installation, you can use a preview function to check whether you have selected the right elements. If so, then start installation. As soon as you have installed a device driver, an entry for the associated device type is created in the global DIGSI 5 library. You can then access the associated data of the device type in all projects.

**NOTE**

Using DIGSI 5 V6.00 or later, you can import a maximum number of 15 DDD files at a time. An error message is displayed if the Device drivers exceed the allowed import limit.

Selecting a Device Driver

- ✧ Click in the **Tools** menu on **Import device drivers**.

The **Select Files** dialog opens.

- ✧ Use this dialog to select one or more files in the **DDD** format.
- ✧ Click **Open**.

The **Select Files** dialog closes. The [20.6.11 Import Device Drivers](#) dialog is opened. The **Device-driver versions** list box contains the elements that are available for installation.

Selecting Different Device Drivers

- ✧ The names and paths of the currently selected files are displayed in the **Device-driver file(s)** text box. To open one or more other files, click the button .

The default file dialog **Select Files** opens again.

- ✧ Use this dialog to select the required files in the **DDD** format.
- ✧ Click **Open**.

The **Select Files** dialog closes. The information displayed in the **Device-driver versions** list box is updated.

Adapting the Display

- ✧ Click the arrow icons to show or hide levels in the displayed structure.
- ✧ Mark the **Show new versions** check box if you want to display new elements only. Additionally, remove the marking from the **Show imported versions** check box.
- ✧ Mark the **Show imported versions** check box if you only want to display elements already installed. Additionally, remove the marking from the **Show new versions** check box.
- ✧ If you want to display already installed elements and also new ones, mark both the **Show imported versions** and the **Show new versions** check boxes.

Selecting or Deselecting Elements to Be Imported

- ✧ To select or deselect an element, click the relevant check box in the **Device-driver versions** list box.

If an element contains further levels, these are also selected or deselected.

- ✧ To select or deselect all data categories, click **Select all** check box in the **Device-driver versions** list box.

If an element contains further levels, these are also selected or deselected.

**NOTE**

At least 1 element must be selected to start the import. You can only select elements that have not yet been imported. Icons on the right of the entries indicate that an element has already been imported.

Displaying the Preview

- ✧ Click **Preview**.

The [20.6.12 Preview](#) dialog opens. This dialog shows all elements that are to be imported based on the current selection. In this way, you can check whether your selection is correct.

Starting the Import and Checking the Result

- ✧ Click **Import** either in the **Preview** dialog or in the **Import device drivers** dialog.

All dialogs close. The import starts. Status reports will show the progress of the import. As soon as the import is complete, a [20.6.25 Status Dialog](#) opens. You find more information about the status dialog under [3.4 Using the Status Dialog](#).

- ✧ Click **OK**.

DIGSI 5 ends and restarts then. You can save changes to the project before exiting. You can now access the imported elements in the global DIGSI 5 library.

2.2.8 Managing Device Drivers

Device drivers are files in the DDD format (DIGSI 5 Device Driver). You can manage imported device drivers by viewing the status of the DDD information. The status of the DDDs is displayed as **Installed** or **Withdrawn** in the [20.1.32 Manage Device Drivers View](#) editor.

You can also view the status of the withdrawn DDD information under the following conditions:

- **DIGSI startup**
During DIGSI startup, a dialog appears displaying the list of withdrawn DDDs that are currently installed in DIGSI. For additional information about the withdrawn DDDs displayed in this dialog, you can refer to the [20.1.32 Manage Device Drivers View](#) editor.
- **Connection to an online device**
While connecting to a target device from DIGSI, a dialog appears if the firmware component version or the configuration version in the target device is withdrawn. This dialog is displayed while connecting to the project/online device and performing any operation, for example, loading the configuration, loading the firmware to the device, initializing the device, connecting to the device, reading logs, and records.
- **Updating firmware**
Upon opening the **Load firmware to devices (standard view)**, the withdrawn firmware components are indicated with a warning icon. Additionally, a tooltip at the warning icon displays the relevant information regarding the withdrawn DDD. If the firmware components under the current version are displayed as **Withdrawn**, you can schedule a version which is not withdrawn and you can update the firmware.
- **Selecting an application template**
While adding a new device in DIGSI using the [20.6.5 Add New Device](#) dialog, the selected **Configuration version** and the **Communication configuration** version are displayed with a warning icon if any DDD is withdrawn. Additionally, a tooltip at the warning icon displays the relevant information regarding the withdrawn DDD. You can select an appropriate version which is not withdrawn and you can add the device.
- **Upgrading device configuration**
While upgrading the device in DIGSI using the [20.6.29 Upgrade Configuration Version](#) dialog, the selected **Configuration version** and the **Communication configuration** version are displayed with a warning icon if any DDD is withdrawn. You can select an appropriate version which is not withdrawn and upgrade the device. After upgrading the device configuration, the CFC-block version is also upgraded by default based on the availability of the new version of the respective block.

Viewing Installed/Withdrawn Device Drivers

- ✧ Open the **Tools** menu.
- ✧ Select **Manage device drivers**.

The [20.1.32 Manage Device Drivers View](#) editor opens. This editor displays the imported device drivers in DIGSI under the **Installed** tab view. It displays the status of the withdrawn device drivers and withdrawn file version details.

Uninstalling Device Drivers

- ✧ Click **Uninstall device drivers** in the [20.7.39 Toolbar of the Manage Device Drivers View Editor](#).

All the imported DDDs in DIGSI are uninstalled.

Updating Manage Device Drivers View

- ✧ Click **Refresh** in the [20.7.39 Toolbar of the Manage Device Drivers View Editor](#).

DIGSI 5 connects to the SIPROTEC 5 download area and updates the status of the imported DDDs. A text box adjacent to the refresh button displays the last updated date and the withdrawn file version details.



NOTE

DIGSI 5 PC needs an active internet connection to update the status of the imported DDDs.

Related Topics

- ✧ [2.2.7 Importing Device Drivers](#)
- ✧ [2.2.1 Starting DIGSI 5](#)
- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)
- ✧ [20.6.5 Add New Device](#)
- ✧ [15.7.1 Overview for Updating Firmware and Protocols](#)
- ✧ [20.6.29 Upgrade Configuration Version](#)

2.2.9 Exit DIGSI 5

You can exit DIGSI 5 in every phase of the configuration.

Exit DIGSI 5

- ✧ In the **Project** menu, click **Exit**.

If you have changed the project since the last save, the confirmation prompt is displayed. Select one of the following options.

- ✧ To save changes in the current project and to close DIGSI 5, click **Yes**.
- or -
- ✧ To close DIGSI 5 without saving the last changes in the project, click **No**.
- or -
- ✧ Click **Cancel** if you wish to cancel the exit operation. In this case DIGSI 5 remains open.



NOTE

A security query also appears if you have made changes to online devices and have not yet saved them.

Related Topics

- ✧ [5.1.5 Saving a Project](#)

2.2.10 Using DIGSI 5 Licenses

Licenses control the scope of DIGSI 5 functions that you can use. For example, you do not need a license if you work with DIGSI 5 Compact. However, you can only use a considerably restricted scope of functions. If you need the functional scope of DIGSI 5 Standard or DIGSI 5 Premium, install the relevant license on your computer. You can then use the additional functionality immediately. Like when using the different variants of DIGSI 5, also activate some optional functions and features with additional licenses. SIGRA is an example of this.

You install, update, transfer, or delete licenses with the Automation License Manager. This is installed on your computer together with DIGSI 5. Automation License Manager has its own help files, which inform you in detail about the possibilities and methods.

Use of DIGSI 5 is based on single-user licenses. You cannot use one single DIGSI 5 license concurrently on several computers. You can, however, transfer a license from one computer to another. You can do that via a network or with a USB stick (flash drive).



NOTE

If you do not have a license, you can activate the Premium variant of DIGSI 5 with a test license. This test license is valid for 30 days and can only be used once. The [20.6.1 No License](#) dialog is displayed if DIGSI 5 does not detect a valid license on starting. Use this dialog to select the next steps.



NOTE

Unlike with DIGSI 4, you cannot correct loss of a license by calling Siemens. Damaged licenses can be repaired, however. As a transitional measure, you can use an emergency license in the event of a defect or a loss of a license. This emergency license is valid for 14 days and can only be used once. The [20.6.1 No License](#) dialog is displayed if DIGSI 5 does not detect a valid license on startup. Use this dialog to select the next steps.

Starting the Automation License Manager

- ✧ In the Windows Start menu, click **Siemens Energy > DIGSI 5 > Automation License Manager**.
Automation License Manager starts.

Launching the Automation License Manager Help

- ✧ To launch the table of contents for Help, select the **Help** menu in the **Help for License Manager Automation** menu.
- or -
- ✧ Press the <F1> key to display the Help matching the current context.

Related Topics

- ✧ [2.2.1 Starting DIGSI 5](#)

2.3 Switching from DIGSI 4 to DIGSI 5

2.3.1 Where Do I Find the DIGSI 4 Manager?

In DIGSI 4, the Manager is the initial platform for editing individual devices, modem connections and more. Instead of the DIGSI 4 Manager, DIGSI 5 has a common user interface for all required tools. Working with several overlapping cards is now a thing of the past. The [3.1.2 Project Tree](#) is now your control center. If you prefer a similar representation as in the DIGSI 4 Manager, open the [3.1.6 Overview Window](#). You can view the individual objects with details, as a list or as icons.

**NOTE**

The DIGSI 4 Manager is not integrated in DIGSI 5.

Related Topics

[3.1.1 DIGSI 5 User Interface](#)

2.3.2 What Happened to the MLFB (Order Number)?

Instead of an MLFB (machine-readable product designation), SIPROTEC 5 devices have a product code, in both a long and a short form.

The long product code corresponds to the order number of a SIPROTEC 5 device. You find this number in your order documents. DIGSI 5 can directly interpret this long product code, as every character of the code can be assigned uniquely to a property of the SIPROTEC 5 device.

For easier handling, there is the short product code, which uniquely identifies a long product code. The short product code can be configured directly in DIGSI 5. You can find the short product code on the name plate of the SIPROTEC 5 device and it is also available during ordering.

Related Topics

[6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#)

2.3.3 How Do I Open a SIPROTEC 5 Device for Editing?

To edit a device in DIGSI 4, you had to open this device with the device editing function. This is no longer necessary in DIGSI 5.

In the [3.1.2 Project Tree](#), you find one entry for each SIPROTEC 5 device offline configuration. This entry summarizes all actions and access points that you need to edit this offline configuration.

Thus, for example, you display the [20.3.2 Information Routing](#) matrix by double-clicking to route information in the working area. This also works parallel for several offline configurations.

Related Topics

[6.1.1 Overview of SIPROTEC 5 Devices](#)

2.3.4 How Do I Set the Functional Scope of a SIPROTEC 5 Device?

In DIGSI 4, you had to open a device for editing and you had to adapt the scope of functions of the device in the DIGSI 4 device editing function. This is now no longer necessary. In DIGSI 5, you already select a so-called application template when adding a new SIPROTEC 5 device.

Application templates make further project planning simpler for a SIPROTEC 5 device. Each template contains the most important functions that are required for a specific application. Examples of such applications are line protection, motor, and transformer protection.

Selecting a certain application template consequently determines the basic functional scope of a SIPROTEC 5 device. You can change this by adding and removing functions. You can do this with drag and drop in [20.1.2 Single-Line Editor](#), in the [20.3.2 Information Routing](#) matrix or also within the [3.1.2 Project Tree](#).

Related Topics

[8.1.1 Overview of Applications](#)

2.3.5 Why Can I Not Route to CFC and the Display in the Information Routing?

In DIGSI 4, you must route to CFC in the matrix the information that you need for a CFC function, or which is generated as a result of a CFC function. The same applies to information that you need in the display.

All information that is listed in the information routing is automatically at your disposal in the [20.1.10 Function-Chart \(CFC\) Editor](#) and the [20.1.13 Display Editor](#) of DIGSI 5. It is no longer necessary to route to CFC or the display.

The columns for CFC and for the display in the [20.3.2 Information Routing](#) matrix serve only to indicate whether an item of information is used within a function chart (CFC) or the display. The display appears automatically as soon as you link an item of information with a function block or an element on a display page.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[6.5.1 Overview of Display Pages](#)

2.3.6 How Do I Edit the Basic Display and the Control Display?

There is no longer any distinction between the main display and the control display, and there are now only display pages in SIPROTEC 5 and DIGSI 5.

In DIGSI 5 Standard and DIGSI 5 Premium, for every SIPROTEC 5 device you can generate up to 10 display pages with graphics, text and measured values and can save them into the SIPROTEC 5 device. You use the Display editor to generate this. You yourself decide for which operating state you use which display page.

Related Topics

[6.5.1 Overview of Display Pages](#)

3 Basic Operation

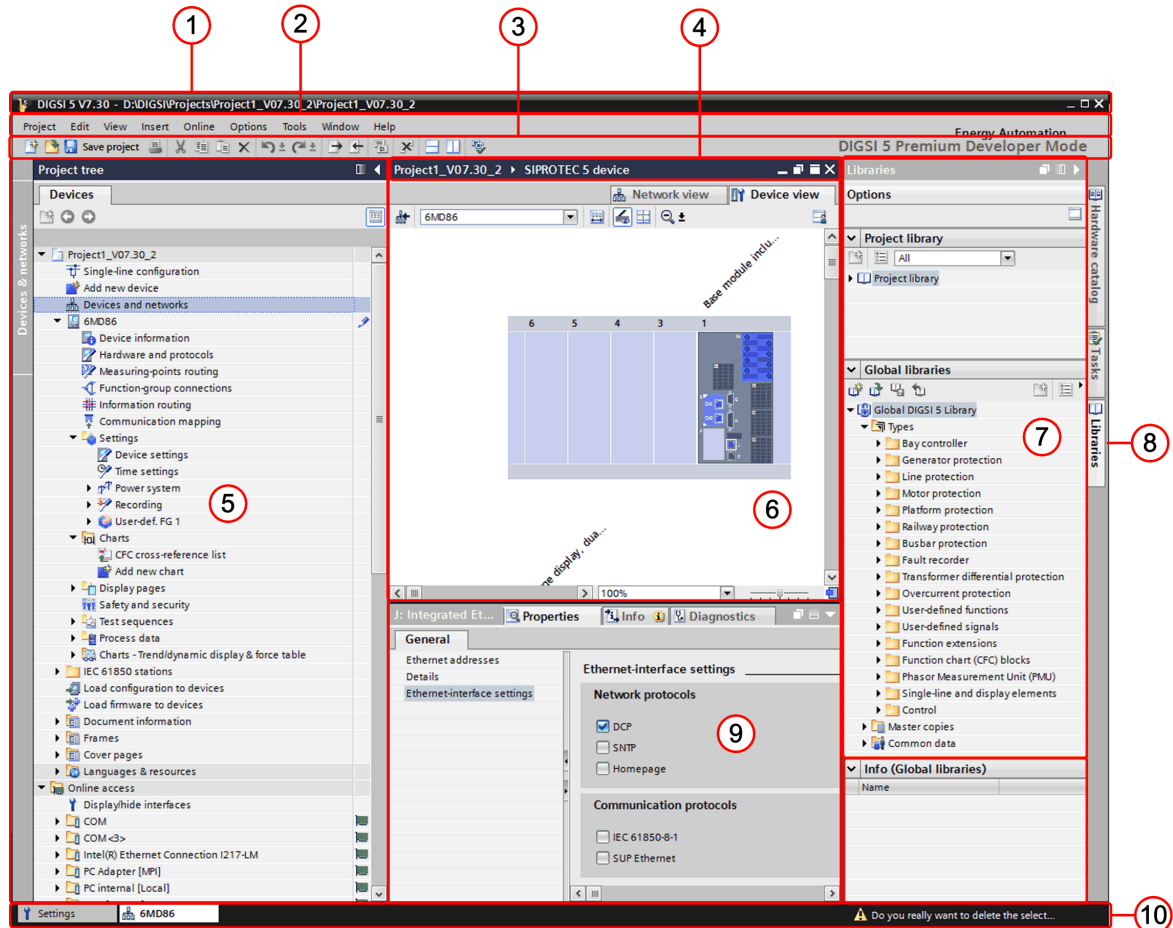
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3.1 Getting to Know the User Interface

3.1.1 DIGSI 5 User Interface

Everything you need to configure and operate SIPROTEC 5 devices is seamlessly integrated in the user interface of DIGSI 5. The user interface of DIGSI 5 consists of several windows.

The following figure shows an example of the components of the DIGSI 5 user interface:



[sc_digsi_ui_2, en_US]

Figure 3-1 DIGSI 5 UI - Sample

The user surface of DIGSI 5 is structured as follows:

No.	Element	Description
1	Title bar of DIGSI 5	The title bar shows the name of the project. Here you also find the default operator elements for closing DIGSI 5 and for minimizing and maximizing the DIGSI 5 user interface.
2	Menu bar	The menu bar contains commands that you need frequently for your work.
3	Toolbar	The 20.7.1 DIGSI 5 Toolbar permits fast access to actions and settings.
4	Title bar of the working area	The title bar of the working area names the open object including the path.

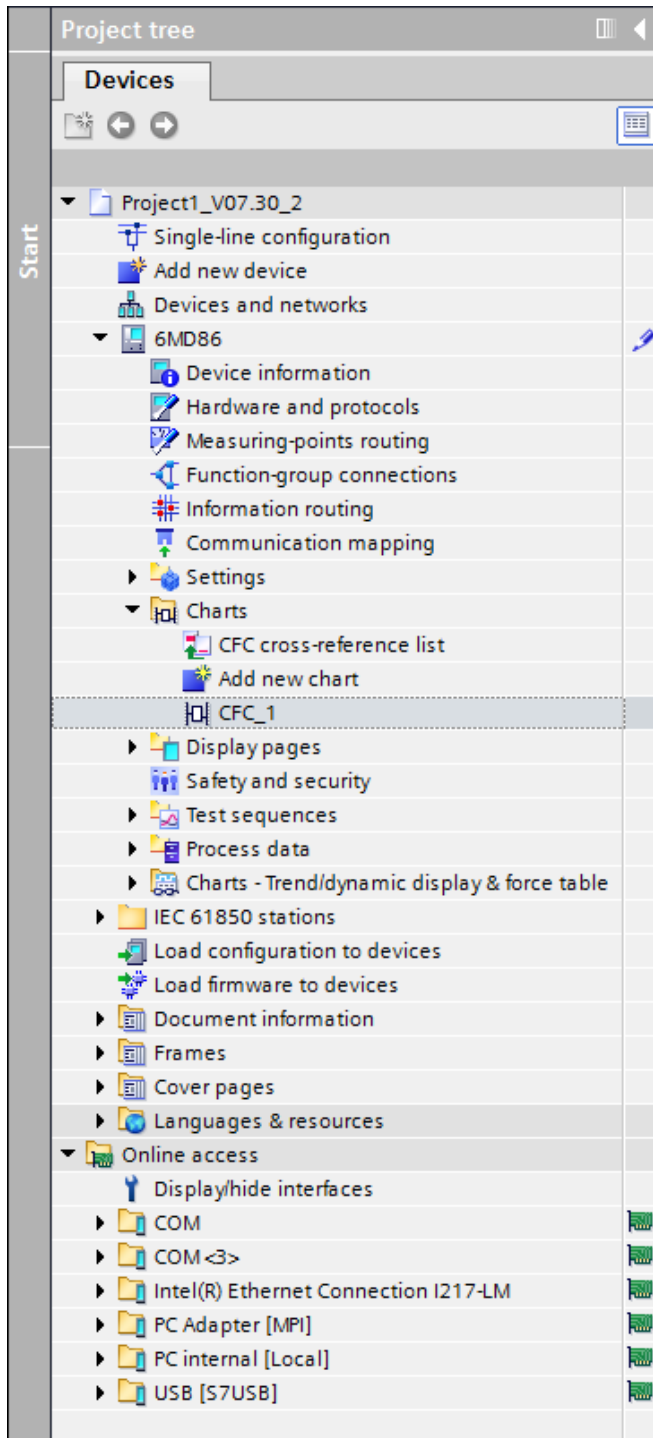
5	Project tree	The 3.1.2 Project Tree is the central element when working with DIGSI 5. The individual project-tree icons give access to all data and tools.
6	Working area	The 3.1.3 Working Area displays open objects such as, for example, editors, views, tables, or the 3.1.6 Overview Window . The working area is blank if you have not opened any of these objects.
7	Tabs	This area displays the tabs that are available for the work situation respectively. If you click on a tab, it gets opened and its content is displayed in the task card. The following tabs are available: • 20.2.5 Signals • 20.2.1 Tasks • 20.2.4 Hardware Catalog • 20.2.3 Libraries • 20.2.6 Online Certain tabs contain the Information palette. If you highlight an element, for example in the library, this palette shows detailed information about this element.
8	Task card	The 3.1.5 Task Card contains the contents of various tabs depending on the content of the working area. These tabs enable actions such as searching, or contain structured elements in libraries and catalogs, for example blocks for function charts (CFC).
9	Inspector window	The 3.1.4 Inspector Window shows additional information about an element highlighted in the working area or on actions executed. This information includes the properties of an element, for example.
10	Object bar	The 3.1.7 Object Bar contains buttons for all open editors, tables, input and output areas. You can switch swiftly between open tools with these buttons.

Related Topics

[3.2.1 Adjusting Working Area](#)

3.1.2 Project Tree

DIGSI 5 manages the components of a system and all the data associated with it in relation to the project. The project tree gives you access to all data and tools. The following figure shows the project tree.



[sc_digsi_projecttree, 2, en_US]

The figure shows the symbol for a SIPROTEC 5 device of the type 6MD86. Further entries are subordinate to this, giving you access to device data. Double-clicking on the symbol in the lowermost level of a branch opens an editor or a setting sheet or executes a certain action in the working area.

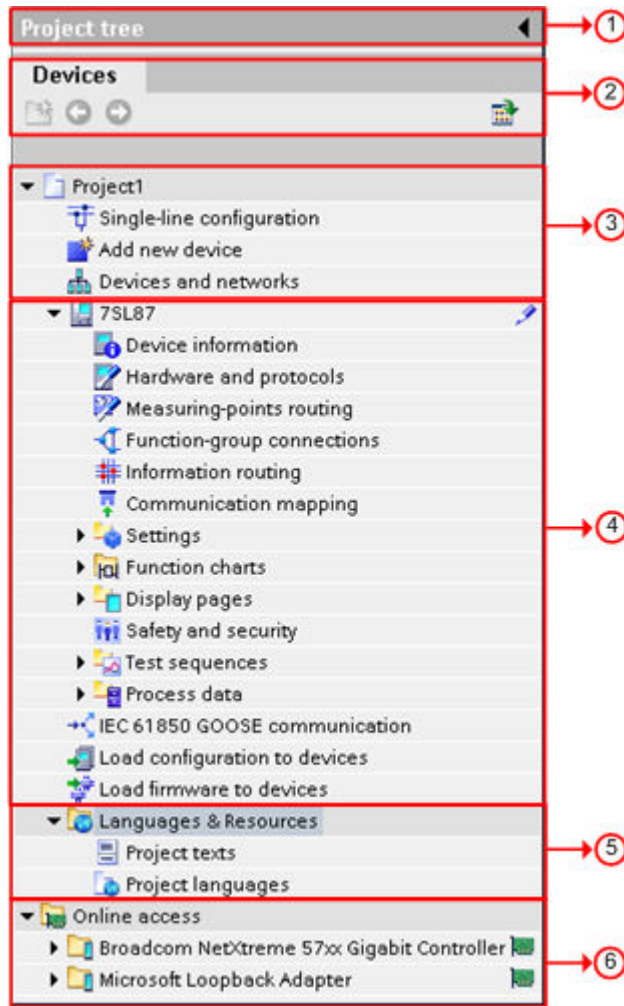
Some examples will explain these mechanisms:

- The **Single-line configuration** entry is an access point to an editor. Double clicking this entry opens the [20.1.2 Single-Line Editor](#).
- The entries in the **Settings** area are access points to function settings. Double-clicking one of these entries opens the setting sheet associated with the function.
- The **Add new device** entry is an action. This lets you open a dialog enabling you to add a new SIPROTEC 5 device.

Among other things, you can perform the following actions with the project-tree function:

- Open the [20.1.2 Single-Line Editor](#) to create the topology of a system and to define the functional scope of a SIPROTEC 5 device.
- Open the [20.1.7 Device View](#) to configure the hardware of a SIPROTEC 5 device.
- Display the link [20.1.9 Settings Editor](#) to define individual function settings.
- Open the [20.3.2 Information Routing](#) to route information.
- Open the [20.1.13 Display Editor](#) to edit display pages.
- Open the [20.1.10 Function-Chart \(CFC\) Editor](#) to configure additional functions such as interlockings.
- Open the [20.1.6 Network View](#) to configure a communication network.
- Display saved measured values and indications.
- Display saved fault records.
- Export and print data.
- Transfer indications, measured values, and fault records from the SIPROTEC 5 device to a PC.
- Test SIPROTEC 5 devices and functions.
- Control equipment
- Find and edit SIPROTEC 5 devices connected to a network.

The following figure shows an example of the components comprising the project tree:



The project tree is structured as follows:

No.	Element	Description
1	Title bar	The title bar of the project tree contains the button for closing the project tree. After closing, the button positions itself on the left-hand margin. It changes from a left-pointing arrow to a right-pointing arrow. You can reopen the project tree by clicking this arrow.
2	Toolbar	You can create a new user folder for function charts (CFC) in the project structure with the folder icon on the left-hand margin. With the icon on the right-hand margin, you can show the overview in the working area. As a result, the underlying objects and actions of the elements are hidden in the project tree. Minimize the overview to show them again.
3	Project	You find all objects and actions relevant to the project in the Project folder.
4	Offline configuration	Each SIPROTEC 5 device added to the project has its own folder with the project-specific name for the device. Objects and actions associated with offline configuration of the SIPROTEC 5 device are structured within this folder.
5	Languages and resources	In this folder, you select the project languages and you edit the project texts.

6	Online accesses	This folder contains a subdirectory for each interface of the PC. You can search for SIPROTEC 5 devices connected to an Ethernet interface or a USB interface. A separate folder is generated for each SIPROTEC 5 device found. This folder contains objects and actions with which you can read the process data out of a SIPROTEC 5 device, for example.

Related Topics

[3.1.1 DIGSI 5 User Interface](#)

[3.2.1 Adjusting Working Area](#)

[5.1.1 Overview of Projects](#)

3.1.3 Working Area

The tools that you open to edit elements are displayed within the working area:

- Editors
- Matrices and tables
- Input, display, and selection areas
- Overview window

You can open several tools simultaneously in the working area. The [3.1.7 Object Bar](#) then contains one button for each opened tool. You can switch between the individual tools with these buttons.

You can split the working area horizontally or vertically. In this way, you can display 2 tools simultaneously in the working area. You find more information about this under [3.2.1 Adjusting Working Area](#).

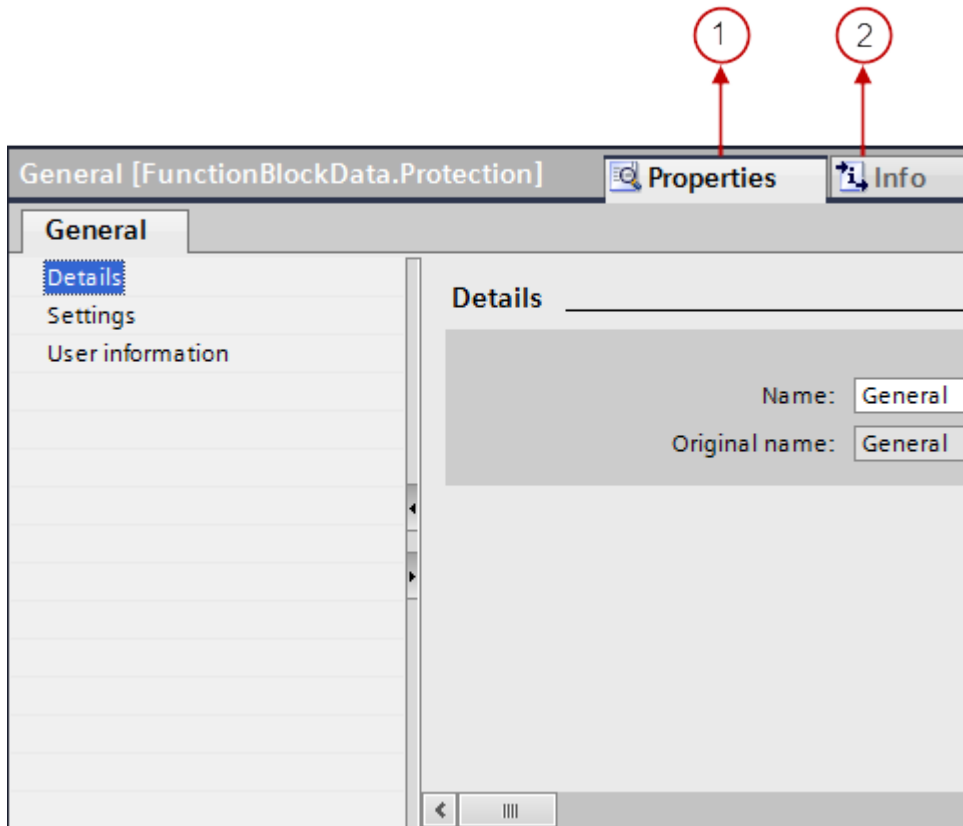
Related Topics

[3.1.1 DIGSI 5 User Interface](#)

3.1.4 Inspector Window

Additional information about a selected element or actions executed is displayed in the Inspector window.

The following figure shows the components of the Inspector window:



The Inspector window has the following structure:

No.	Element	Description
1	Properties tab	The properties of the selected element are displayed in this tab. Here, you can modify editable properties of the element.
2	About tab	Further information about the selected element and indications regarding the actions executed are displayed on this tab.

Related Topics

[3.1.1 DIGSI 5 User Interface](#)

[3.2.1 Adjusting Working Area](#)

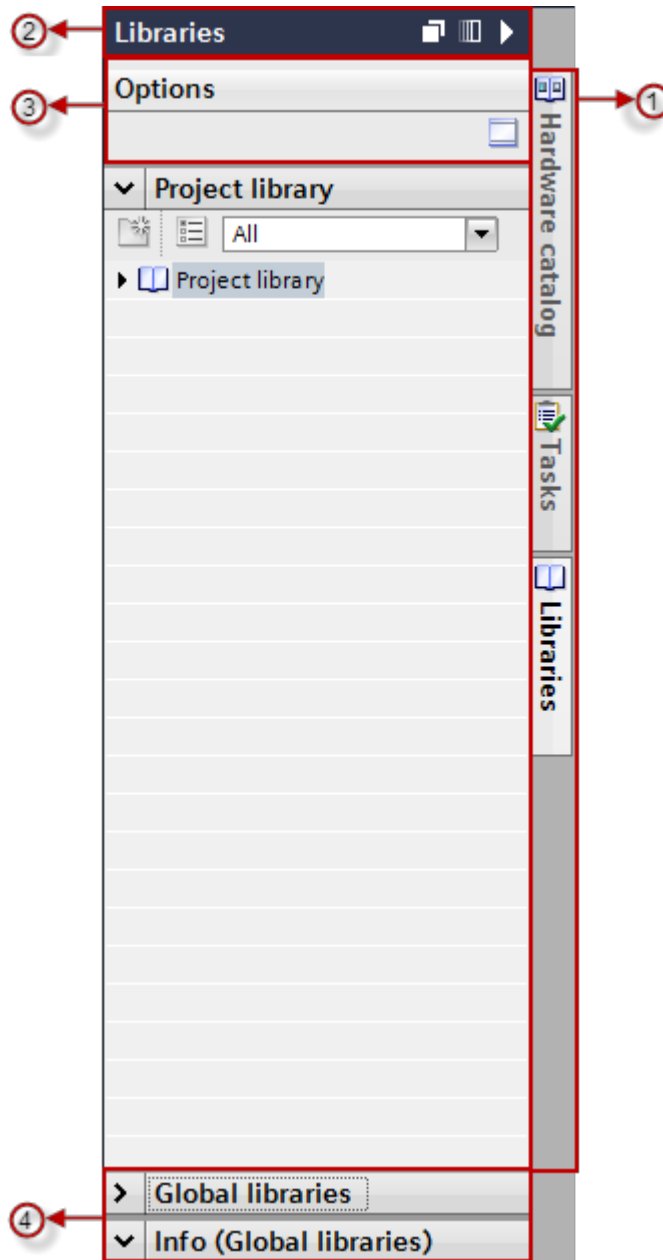
3.1.5 Task Card

Depending on the object edited or selected, tabs are available in the task card for execution of further actions. Here are a few examples:

- Selecting elements from a library or from the hardware catalog
- Finding elements in the project
- Selecting signals and assigning them to an element

You find the tabs in a bar on the right edge of the screen. You can collapse and expand the tabs with these tabs. More complex tabs are subdivided into palettes, which you can also collapse and expand.

The following figure shows an example of the components in the task card:



The task card has the following structure:

No.	Element	Description
1	Tabs	The tabs are located on the right-hand edge of the task card. These are always visible, even when the task card is collapsed.
2	Title bar	The title bar of the tabs contains the button for closing the task card. After closing, the button positions itself on the right-hand margin. It changes from a right-pointing arrow to a left-pointing arrow. You can reopen the task card by clicking this arrow.
3	Toolbar	An icon bar of the tab permits fast access to actions and settings.

4	Palette	Palettes subdivide complex tabs. You find the arrow for closing the palette in its title bar. After closing, it changes from a downward-pointing arrow to a right-pointing arrow and serves to open the palette.

The following tabs are available depending on the relevant working situation:

- [20.2.5 Signals](#)
- [20.2.1 Tasks](#)
- [20.2.3 Libraries](#)
- [20.2.4 Hardware Catalog](#)
- [20.2.6 Online](#)

Related Topics

[3.1.1 DIGSI 5 User Interface](#)

[3.2.1 Adjusting Working Area](#)

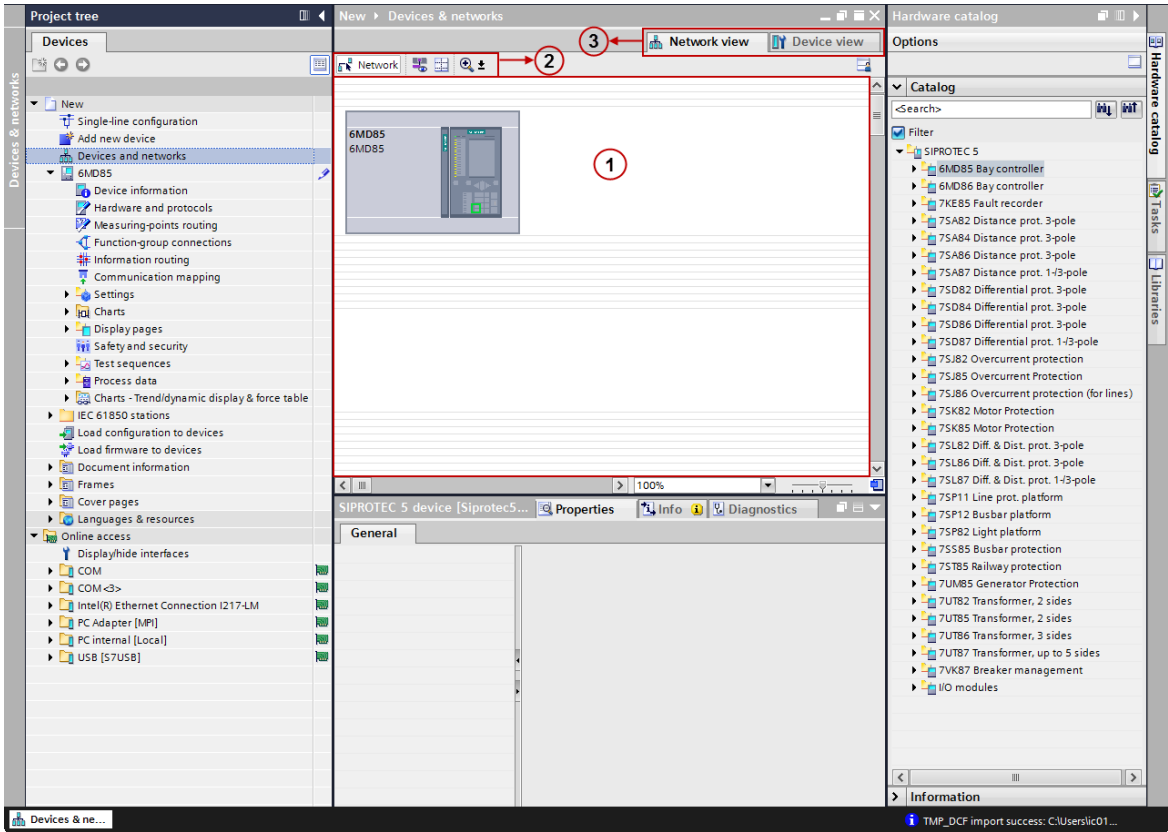
3.1.6 Overview Window

The overview window supplements the [3.1.2 Project Tree](#). When the overview window is open, the content of the folder currently selected in project tree is displayed in the [3.1.3 Working Area](#).

You can perform the following actions in the overview window:

- Opening objects
- Displaying properties of objects in the Inspector window
- Renaming objects
- Launching object-specific actions via the context menu

The following figure shows an example of the components in the overview window:



The overview window has the following structure:

No.	Element	Description
1	Detailed view	This view displays the details of the object selected in the project tree. The details displayed can be modified in this view.
2	Toolbar view	This view displays the tools, which can be used in the detailed view.
3	Tab view	This view displays the tabs relevant to the object selected in the project tree.

Related Topics

- [3.1.1 DIGSI 5 User Interface](#)
- [3.2.1 Adjusting Working Area](#)

3.1.7 Object Bar

The object bar contains one button for each tool opened in the [3.1.3 Working Area](#). In certain cases, the object bar groups several buttons into one single button, for example when you have opened several display pages. A list box expands when you click such a button. Out of this list box, you can then select the required content and display it in the working area.

The following figure shows an example of the object bar:



Related Topics

- [3.1.1 DIGSI 5 User Interface](#)
- [3.2.1 Adjusting Working Area](#)

3.2 Adjusting View of User Interface and Contents

3.2.1 Adjusting Working Area

You can adapt the [3.1.3 Working Area](#) to your needs.

You can do this in one of the following ways:

- **Maximizing the working area**

You can minimize the [3.1.5 Task Card](#), the [3.1.2 Project Tree](#), and the [3.1.4 Inspector Window](#) with one click. This maximizes the working area.

- **Minimizing working-area objects**

You can minimize the open working area objects, for example, editors, tables, or other input and selection areas. A minimized object stays open, however. You can quickly maximize it again via the object bar.

- **Splitting the working area vertically or horizontally**

If you wish to view 2 objects simultaneously in the working area, you can split it vertically or horizontally.

- **Separating objects from the working area**

You can also completely separate objects from the working area and thus open them in a new window. You can drag them to a 2nd monitor, for example.

- **Restoring the working area**

After maximizing the working area or after separating objects, you can cancel maximizing or separation again with one click.

Maximizing the Working Area

- ✧ Open an object, for example an editor or a table.

The object is displayed in the working area.

- ✧ Click **Maximize** button in the title bar of the object.

The task card, the project tree, and the Inspector windows are collapsed. The working area is shown in its maximum size.

Minimizing the Working Area

- ✧ Click the **Restore** button in the displayed title bar of the object.

The task card, the project tree, and the Inspector windows are expanded.

Minimizing Objects in the Working Area

- ✧ Click the **Minimize** button in the title bar of the object to minimize an object in the working area.

The object is minimized. It remains available via the object bar.

- or -

- ✧ To minimize all objects at the same time, click **Minimize all** in the **Window** menu.

All objects are minimized. They remain available via the object bar.

Maximizing Working-Area Objects

- ✧ Click the associated button in the object bar.

The object is maximized and is displayed in the working area.

Splitting the Working Area Horizontally

- ✧ Click in the [20.7.1 DIGSI 5 Toolbar](#) on the button .

The object displayed in the working area before clicking, and the object that corresponds to the next button in the object toolbar are displayed among each other.

Splitting the Working Area Vertically

- ✧ Click in the [20.7.1 DIGSI 5 Toolbar](#) on the button .

The object displayed in the working area before clicking, and the object that corresponds to the next button in the object toolbar are displayed among each other.

Separating an Object from the Working Area

- ✧ Click the **Separate** button in the displayed title bar of the object.

The object is separated from the working area and is displayed in a window of its own. You can position the window freely. If you minimize the window, you can restore it via the object bar.

Fixing an Object in the Working Area

- ✧ Click the **Fix** button in the separated title bar of the object.

The object is displayed in the working area again.

Related Topics

- ✧ [3.1.1 DIGSI 5 User Interface](#)

3.2.2 Adjusting Rows and Columns

You can adjust the columns and rows of tables and matrices in different ways:

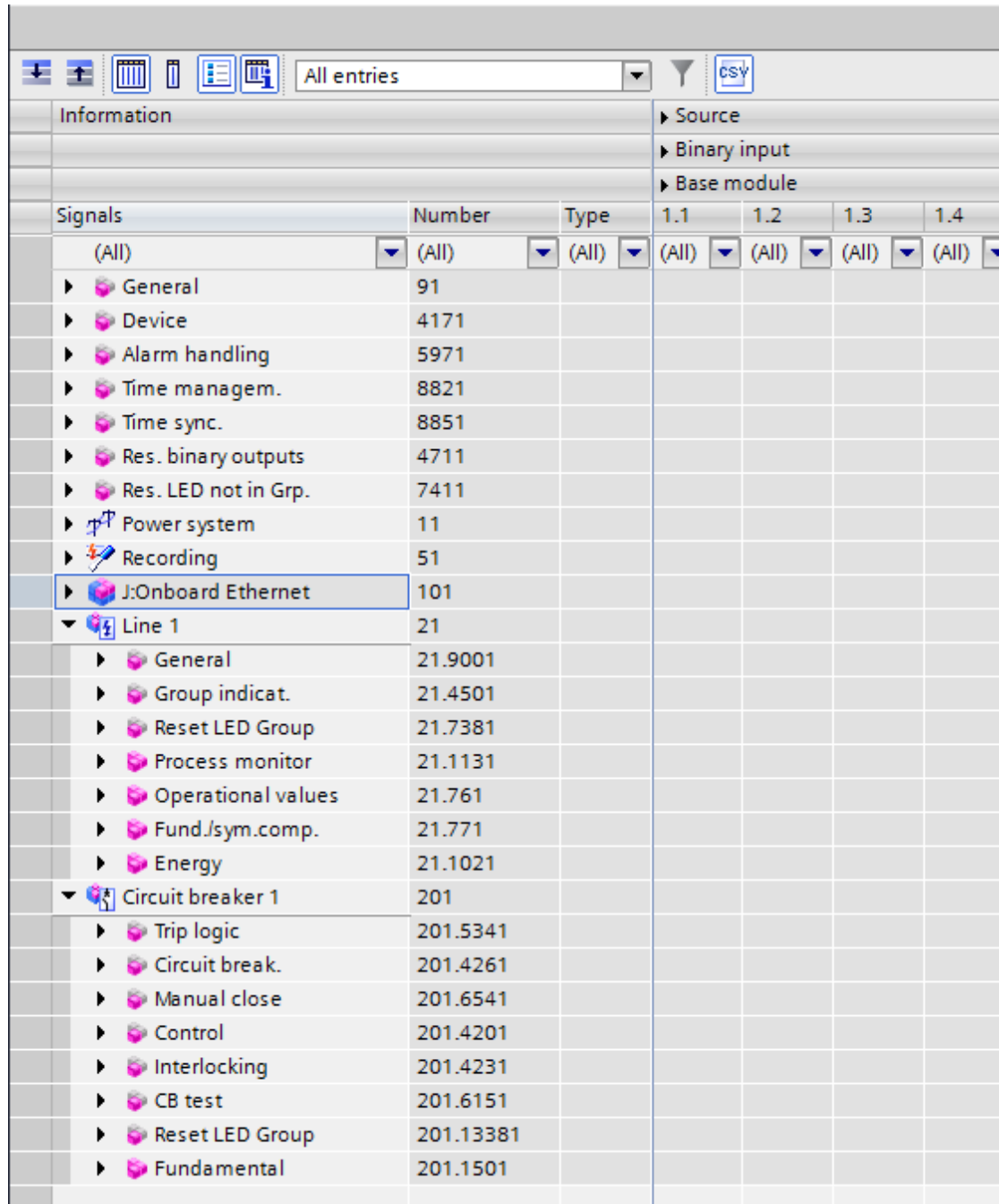
- **Adjusting column width**

In all tables and matrices, you can change the column width as required or you can optimize it. When you use the 2nd method, the column width is adjusted automatically so that the widest content of the column is displayed completely.

- **Hiding and showing rows**

When content is structured hierarchically, comparable to what is used for [3.1.2 Project Tree](#), you can collapse and expand the rows. After a row has been collapsed, it is no longer visible. After it is expanded, the row is displayed as it was originally shown.

The following figure shows an example of hidden rows:



Information			Source			
			Binary input			
			Base module			
Signals	Number	Type	1.1	1.2	1.3	1.4
(All) ▾	(All) ▾	(All) ▾	(All) ▾	(All) ▾	(All) ▾	(All) ▾
▶ General	91					
▶ Device	4171					
▶ Alarm handling	5971					
▶ Time managem.	8821					
▶ Time sync.	8851					
▶ Res. binary outputs	4711					
▶ Res. LED not in Grp.	7411					
▶ Power system	11					
▶ Recording	51					
▶ J:Onboard Ethernet	101					
▼ Line 1	21					
▶ General	21.9001					
▶ Group indicat.	21.4501					
▶ Reset LED Group	21.7381					
▶ Process monitor	21.1131					
▶ Operational values	21.761					
▶ Fund./sym.comp.	21.771					
▶ Energy	21.1021					
▼ Circuit breaker 1	201					
▶ Trip logic	201.5341					
▶ Circuit break.	201.4261					
▶ Manual close	201.6541					
▶ Control	201.4201					
▶ Interlocking	201.4231					
▶ CB test	201.6151					
▶ Reset LED Group	201.13381					
▶ Fundamental	201.1501					

The following figure shows an example of unhidden rows:

Project1_V07.30_2 > 7SP11 > Information routing

All entries

Information			Source		
			Binary input		
			Basismodul		
Signals	Number	Type	1.1	1.2	1.3
(All)	(All)	(All)	(All)	(All)	(All)
Line 1	21				
General	21.9001				
Group indicat.	21.4501				
Pickup	21.4501.55	ACD			
general		SPS			
phs A		SPS			
phs B		SPS			
phs C		SPS			
gnd		SPS			
1-phase		SPS			
2-phase		SPS			
2-phase + gnd		SPS			
3-phase		SPS			
forward		SPS			
backward		SPS			
unknown		SPS			
both		SPS			
Operate	21.4501.57	ACT			
general		SPS			
phs A		SPS			
phs B		SPS			
phs C		SPS			
Reset LED Group	21.7381				
Process monitor	21.1131				
Closure detec.	21.1131.4681				

When columns are combined in groups, you can collapse and expand such a column group. When it is collapsed, such a column group is reduced to one column. When they are expanded, all columns in a group are again displayed in their original width.

[illegible][illegible]

- ✧ Move the mouse pointer in the header of the table to the right-hand separating line of the column whose width you wish to change.

The mouse pointer changes to a vertical line with one left arrow and one right arrow.

- ✧ Click the separating line and, with the mouse button pressed, drag it to the left or right.
- ✧ Release the mouse button as soon as the separating line has reached the desired column width.

The column width is updated.

Optimizing the Column Width

- ✧ Move the mouse pointer in the header of the table to the right-hand separating line of the column whose width you wish to optimize.

The mouse pointer changes to a vertical line with one left arrow and one right arrow.

- ✧ Double-click the separating line.

The column width is adjusted to the widest column content.

Showing and Hiding Rows

- ✧ To show or hide subordinate rows belonging to a row, click the tip of the arrow on the left-hand margin of the row.

The subordinate rows are shown if the arrow tip points to the right before clicking. The subordinate rows are hidden if the arrow tip points down before clicking.

- ✧ To show or hide all rows, right-click any point within the matrix or table.
- ✧ In the context menu, click **Expand all rows** or **Collapse all rows**.

If you select **Expand all rows**, the rows belonging to all hierarchy levels are displayed. If you select **Collapse all rows**, now only the rows belonging to the top hierarchy levels are displayed.

Expanding and Collapsing Columns

- ✧ Click the arrow tip on the left of the group name to show or hide columns grouped together.

The columns are hidden if the arrow tip points to the right before clicking. The columns are shown if the arrow tip points down before clicking.

- ✧ To show or hide the columns of all groups, right-click any point within the matrix or table.
- ✧ In the context menu, click **Expand all columns** or **Collapse all columns**.

If you select **Expand all columns**, the columns belonging to all groups are displayed. If you select **Collapse all columns**, now only one column per group is displayed.

Related Topics

- ✧ [3.2.3 Sorting Column Content](#)
- ✧ [3.2.4 Filtering Column Content](#)

3.2.3 Sorting Column Content

You can sort the content of tables and matrices. To do this, select a column as the reference. You can select an alphabetically ascending or descending sort order for the content of this column. The order of the rest of the column content is adjusted automatically. You cannot sort columns independently from one another.

Sorting Column Content in Ascending Order

- ✧ Click the header of an unsorted column or of one that is sorted in descending order.

The content is sorted in alphabetically ascending order.

Sorting Column Content in Descending Order

- ✧ Click the header of a column that is sorted in ascending order.

The content is sorted in alphabetically descending order.

Related Topics

- ✧ [3.2.4 Filtering Column Content](#)
- ✧ [3.2.2 Adjusting Rows and Columns](#)

3.2.4 Filtering Column Content

You can filter the content of tables and matrices. Filtered tables and matrices show only the rows that comply with the selected criteria. Each column has a column filter of its own. You can therefore filter the entire data on the basis of several columns. The filters are additive. This means that each column filter used further restricts the subset of the data.

You have the following possibilities for filtering the content of a column:

- Filtering according to column content
With this filtering mode, you select as the filter criterion a value that can occur in the column. For example, for the **Signal type** column, you can select the **PLC** type as the filter criterion. As the result, now only those rows are displayed that contain signals of the **PLC** type.
- Filtering according to user-defined criteria
With this filtering mode, you select as the filter criterion a value that can occur in the column and you add a condition to it. For example, you can reduce the display to those rows that **do not** contain the **PLC** data type. You can also combine several values with the logical **AND** or **OR** operators in one overall criterion. For details of how to do this, refer to [3.2.5 Creating a User-Defined Filter](#).



NOTE

It is not possible to filter according to the user-defined criteria via the [20.6.24 Custom Filter](#) option in the [20.1.20 IEC 61850 Structure Editor](#). The filters are AND-connected.

Filtering According to Column Content

- ✧ In the column you wish to filter, click in the cell underneath the column header.

The cell changes to a list box.

- ✧ Open the list box and select the required filter criterion.

All rows that do not correspond to the selected criterion are hidden.

Filtering According to User-Defined Criteria

- ✧ In the column you wish to filter, click in the cell underneath the column header.

The cell changes to a list box.

- ✧ Open the list box and select **Custom filter...**

The [20.6.24 Custom Filter](#) dialog opens.

- ✧ Create a user-defined filter as described in [Creating a user-defined filter](#).

- ✧ Click **OK**.

The **Custom filter** dialog closes. The display of the content is updated in relation to the filter you have created.

Canceling Filtering

- ✧ In the column you wish to filter, click in the cell underneath the column header.

The cell changes to a list box.

- ✧ Open the list box and select **All**.

The filter criterion for this column is canceled. The display of the content is updated.

Related Topics

- ✧ [3.2.5 Creating a User-Defined Filter](#)
- ✧ [3.2.3 Sorting Column Content](#)
- ✧ [3.2.2 Adjusting Rows and Columns](#)

3.2.5 Creating a User-Defined Filter

In the case of a table or a matrix, you can select [3.2.4 Filtering Column Content](#), also with a user-defined filter. To do this, create column-specific filters with the **Custom filter** dialog. A filter consists at least of a condition and a value which, together, result in a so-called expression. Examples of such expressions are **Equal to 20** and **Does not contain block**.

You can select from the following conditions:

- Equals
- Does not equal
- Begins with
- Does not begin with
- Ends with
- Does not end with
- Contains
- Does not contain

The values available for selection correspond to the values that can occur in the column to be filtered. These values are identical with those that are contained in the column's filter selection list. However, you can also enter other values such as digits or letters.

You can combine several values with the logical **AND** or **OR** operators in one filter. One example of this is **Does not contain Block OR contains S**.

A filter is active only until you select a different filter criterion in the filter selection list of the column or you deactivate the filter. In both cases, the user-defined filter is deleted.

Opening the Dialog

- ✧ In the column you wish to filter, click in the cell underneath the column header.

The cell changes to a list box.

- ✧ Open the list box and select **Custom filter....**

The [20.6.24 Custom Filter](#) dialog opens.

Creating Expressions and Adding Them to the Filter

- ✧ Select a condition from the left-hand list box.
- ✧ Select a value from the right-hand list box.
- or -
- ✧ Enter a value in the text box of the list box.
- ✧ Click **Add to filter**.

The expression is displayed in the **Filter expression** field.

- ✧ If you wish to add a further expression to the filter, select a further condition and an associated value as described in the previous sections.
- ✧ Select the operator with which you wish to combine the new expression with the existing ones.
- ✧ Click **Add to filter**.

The expression is displayed in the **Filter expression** field in combination with the selected operator plus the existing expressions.

Deleting Expressions

- ✧ Click **Clear filter**.

All expressions in the **Filter** field are deleted.

Applying a Filter

- ✧ Click **OK**.

The **Create user-defined filter** dialog closes. The display of the content is updated in relation to the filter you have created.



NOTE

The **OK** button is not active until you have created at least one expression and have added it to the filter.

Related Topics

- ✧ [3.2.4 Filtering Column Content](#)

3.2.6 Marking Ranges

If you wish to copy data within DIGSI 5 or into other applications such as Excel, you must mark these data. In a table or matrix, you can select cells, ranges, rows, or columns.

You have the following possibilities:

- Marking a single cell
- Marking a range of cells
- Marking all cells
- Marking one or more columns
- Marking one or more rows

Marking a Single Cell

- ✧ Click inside the cell.
- or -
- ✧ Navigate to the cell with the aid of the arrow keys.

Marking a Range of Cells

- ✧ Click inside the first cell of the range you wish to mark and extend the marking with the mouse button pressed.
- ✧ Release the mouse button once the marking covers all required cells.
- or -
- ✧ Press the shift button and keep it pressed.
- ✧ Press the arrow keys.
- or -
- ✧ Click inside a different cell.

The marking is extended in both cases.

- ✧ Release the shift button once the marking covers all required cells.

Marking All Cells

- ✧ Click inside the cell on the left of the column headers.

Signals	Number	Type	1.4	2.1	2.2	2.3		1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8	1.9	1.10	1.11	2.1	2.2
(All)	(All)	(All)	(All)	(...)	(All)	(All)	(All)	...	...	...	...	...	...	...	...	...	...	...	...	...
▶ General	91																			
▶ Device	4171																			
▶ Alarm handling	5971																			
▶ Time managem.	8821																			
▶ Time sync.	8851																			
▶ Res. binary outputs	4711																			
▶ Res. LED not in Grp.	7411																			
▶ Power system	11																			
▶ Recording	51																			
▶ J:Onboard Ethernet	101																			
▼ Line 1	21																			
▶ General	21.9001																			
▶ Group indicat.	21.4501																			
▼ Pickup	21.4501.55	ACD																		
▶ general		SPS																		
▶ phs A		SPS																		
▶ phs B		SPS																		
▶ phs C		SPS																		
▶ gnd		SPS																		
▶ 1-phase		SPS																		
▶ 2-phase		SPS																		
▶ 2-phase + gnd		SPS																		
▶ 3-phase		SPS																		
▶ forward		SPS																		
▶ backward		SPS																		

Marking One or More Columns

- ✧ Move the mouse pointer to the top edge of the column until the mouse pointer changes into a vertical arrow.
- ✧ Press the left mouse button.

The column is marked.

- ✧ Press the shift button and keep it pressed to extend the marking.
- ✧ Move the mouse pointer to the top edge of the column that is to limit the marked range.
- ✧ Press the left mouse button when the mouse pointer changes to a vertical arrow.

The marking is extended.

- ✧ Release the shift button.

Marking One or More Rows

- ✧ Move the mouse pointer to the left edge of the row until the mouse pointer changes into a horizontal arrow.
- ✧ Press the left mouse button.

The row is marked.

- ✧ Press the shift button and keep it pressed to extend the marking.
- ✧ Move the mouse pointer to the left edge of the row that is to limit the marked range.
- ✧ Press the left mouse button when the mouse pointer changes to a horizontal arrow.

The marking is extended.

- ✧ Release the shift button.

3.3 Working with Libraries and Elements

3.3.1 Overview of Libraries

Libraries allow you to work efficiently in DIGSI 5. They contain elements that you drag and drop to a specific destination in your project. For example, this destination can be a function chart (CFC), the single-line configuration or a display page. Libraries are grouped together on the [20.2.3 Libraries](#) tab. This tab is part of the task card.

Library Types

DIGSI 5 distinguishes 2 library types:

- **Project Library**

Each project has its own library. The elements in this library are available only within the open project. If you set up a plug-and-play connection with a SIPROTEC 5 device, all elements that do not exist in the global DIGSI 5 library are placed in the project library. You can find out more about this in the **Plug and Play** subject block. The project library is always opened, saved, and closed together with the current project.

- **Global DIGSI 5 Library**

The global DIGSI 5 library is independent of a certain project. This library is installed on your computer together with DIGSI 5. You can use this library for all projects. However, you cannot modify it.

The global DIGSI 5 library contains the following elements:

- Measuring points
- Function groups
- Functions
- Functional stages
- Function blocks for function charts (CFC)
- User-defined functions
- User-defined signals
- Elements for the single-line configuration and display pages

You can find previously defined signals on the [20.2.5 Signals](#) tab and components for hardware configuration on the [20.2.4 Hardware Catalog](#) tab.

- **User-Defined Global DIGSI 5 Library**

The user-defined global DIGSI 5 library allows you to save the complete device configuration as a device master copy in the library. The device master copy serves as a template to create a new device/new devices with the same configuration in the same project or a different project. Further, the user-defined global DIGSI 5 library can be shared between different users and different DIGSI 5 installations.

The device master copy in the user-defined DIGSI 5 library does not contain the following elements:

- GOOSE configuration (Sender)
- GOOSE configuration (Receiver)
- IEC 61850 reporting configuration (for example, for SICAM PAS)
- Connection to the SLE elements
- Process data (records, logs)
- Diagnostic data
- Assignment to the IEC station

For additional information about the User-defined global DIGSI 5 library, refer to [3.3.3 Working with the User-Defined Global DIGSI 5 Library](#).

Related Topics

- [3.3.2 Opening the Libraries Tab](#)
- [3.3.6 Filtering the View](#)
- [3.3.4 Displaying Elements According to ANSI or IEC](#)
- [3.3.5 Using Elements of the Global DIGSI 5 Library](#)
- [3.3.3 Working with the User-Defined Global DIGSI 5 Library](#)
- [20.7.40 Toolbar of the Global Libraries Palette](#)

3.3.2 Opening the Libraries Tab

There are several ways you can open the [20.2.3 Libraries](#) tab:

- You can open it with the aid of the tab bar on the right-hand edge of the task area.
- You can open it with the aid of the context menus out of the [20.1.2 Single-Line Editor](#) or the [20.1.13 Display Editor](#).

Using the Tab Bar

- ✧ In the tab bar, click **Libraries** on the right-hand edge of the task card.

The **Libraries** tab is displayed in the task card.

Using the Context Menu

- ✧ In the single-line editor or in the display editor, right-click the single-line configuration or on the Display page.
- ✧ Click **Insert elements from library** in the context menu.

The **Libraries** tab is displayed in the task card.

Related Topics

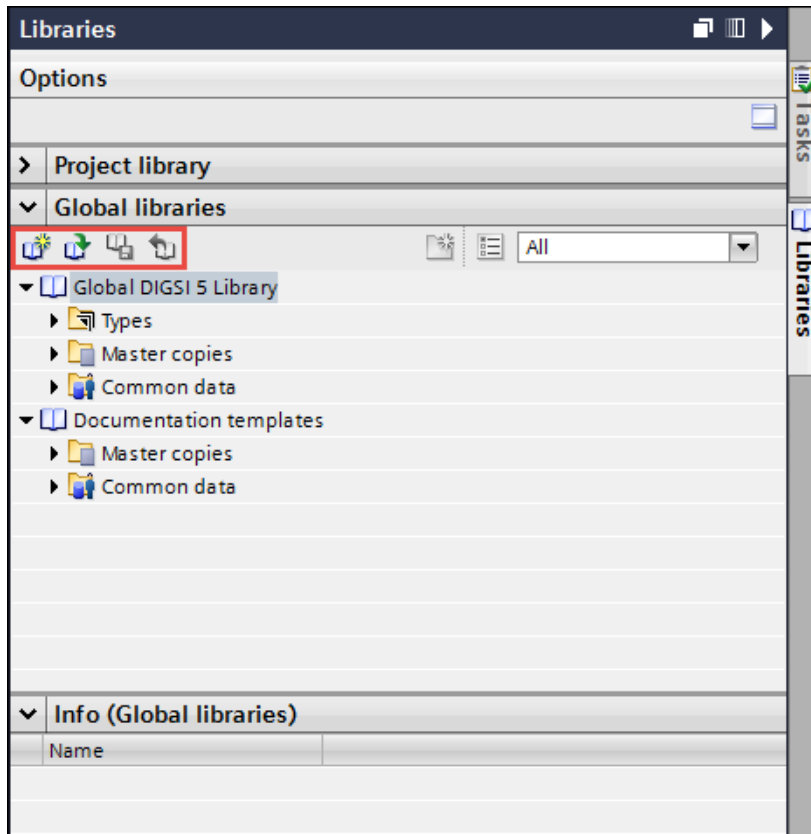
- ✧ [3.3.4 Displaying Elements According to ANSI or IEC](#)
- ✧ [3.3.6 Filtering the View](#)
- ✧ [3.3.5 Using Elements of the Global DIGSI 5 Library](#)
- ✧ [3.3.1 Overview of Libraries](#)
- ✧ [3.3.3 Working with the User-Defined Global DIGSI 5 Library](#)
- ✧ [20.7.40 Toolbar of the Global Libraries Palette](#)

3.3.3 Working with the User-Defined Global DIGSI 5 Library

The user-defined global DIGSI 5 library allows you to save the complete device configuration as a device master copy in the DIGSI 5 library. Further, the user-defined global DIGSI 5 library with the respective device master copies can be stored on any storing device (for example, a USB stick or a network drive) and transferred to a new location. It can be opened from any project from where the storage path is accessible.

Creating User-Defined Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.

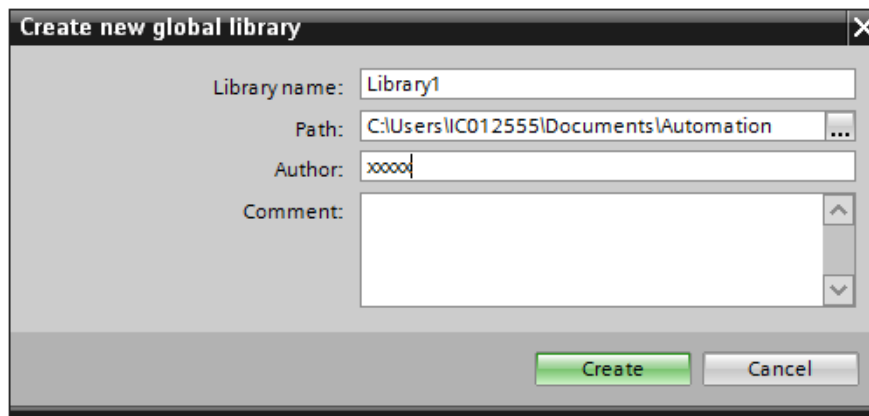


[sc_digsi_globallibraries, 1, en_US]



In the [20.7.40 Toolbar of the Global Libraries Palette](#), click the  button.

The **Create new global library** dialog opens.

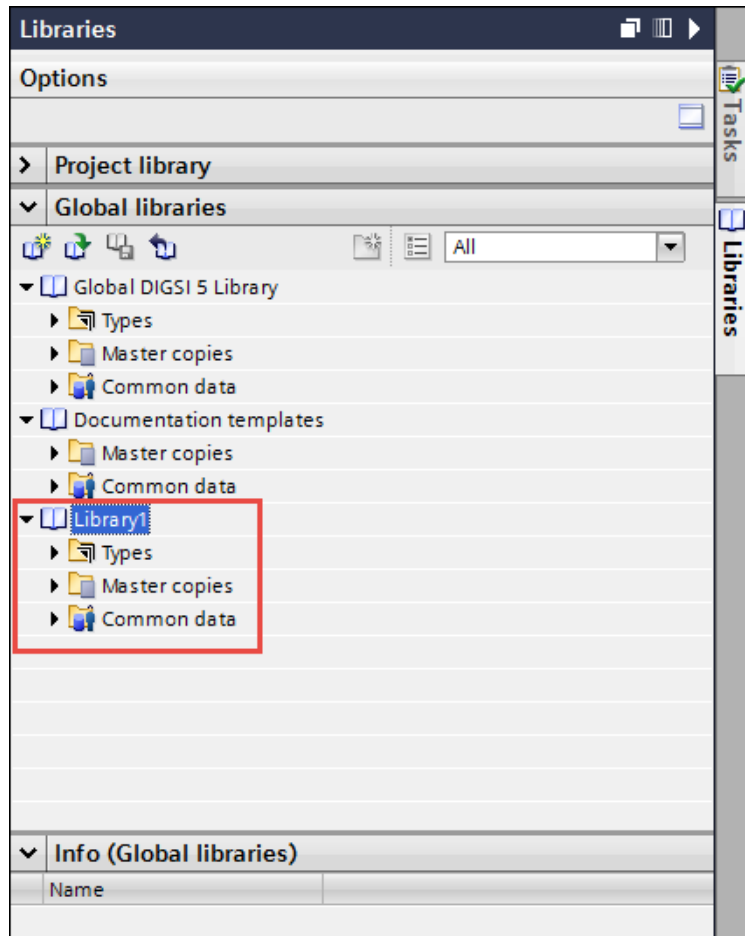


[sc_digsi_createnewlibrary, 1, en_US]

This dialog displays the default value for **Library name**, **Path**, **Author** and an empty text box for the **Comment** field.

- ✧ Enter the desired values.
- ✧ Click **Create**.

The **Creating library** dialog displays the progress status of the creation of the library. After successful completion, the library is created and displayed in the **Global libraries** palette with 3 subfolders (**Types**, **Master copies**, and **Common data**).



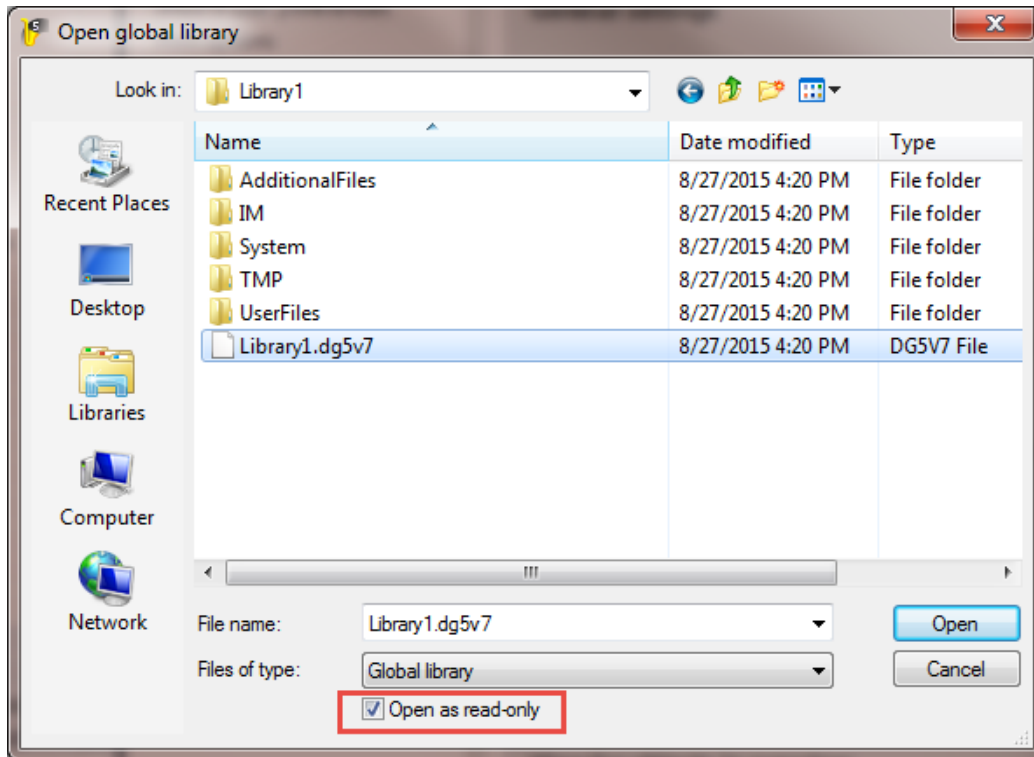
[sc_digsi_library, 1, en_US]

Opening the User-Defined Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ In the [20.7.40 Toolbar of the Global Libraries Palette](#), click the  button.

The **Open new global library** dialog opens.

- ✧ Navigate to the desired library folder and select the file with the file extension **.dg5vx** (x indicates the DIGSI 5 version). Project files in DIGSI 5 V7.00 have the file extension **.dg5v7**.



[sc_digsi_openlibrary, 1, en_US]

**NOTE**

To edit and work with the library file, uncheck the option **Open as read-only** before opening any library file.

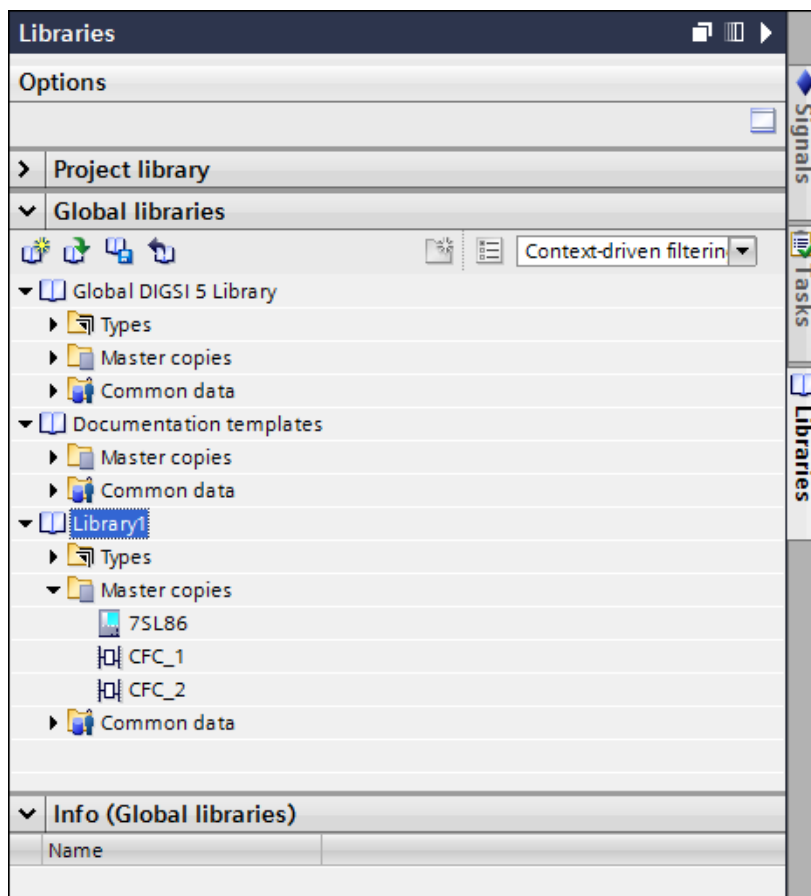
- ✧ Click **Open**.

The **Loading library** dialog displays the progress status of the opening of the library file. After completion, the library file is successfully added and displayed in the **Global libraries** palette.

Creating a Device Master Copy of the Project Device/CFC chart

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ Select any project device or a CFC chart.
- ✧ Drag and drop the project device and/or CFC chart over the desired user-defined library in the **Master copies** folder.
- or -
- ✧ Copy the project device and/or CFC chart from the project tree and paste it in the **Master copies** folder using the context menu option.

The **Insert master copy** dialog displays the progress status and after completion, the device master copy of the project device/CFC chart is created and displayed in the **Global libraries** palette.



[sc_digsi_create_mastercopy, 1, en_US]

**NOTE**

You can select only one project device at a time for creating the respective device master copy. It is possible to select multiple CFC charts at a time in the project tree and to paste them as a single device master copy with the context menu **Paste as a single master copy**.

Adding a Device in the Project Tree from the User-Defined Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ Select the desired device master copy from the **Master copies** folder under the user-defined library.
- ✧ Drag and drop the device master copy from the **Master copies** folder to the project tree.
- or -
- ✧ Copy the device master copy from the **Master copies** folder and paste it in the project tree using the context menu.

The device is added and displayed in the project tree with the default name.

Deleting a Master Device Copy from the User-Defined DIGSI 5 Global Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette which contains the user-defined libraries with the device master copies.
- ✧ Right-click the device master copy from the **Master copies** folder in the user-defined library.

- ✧ Click **Delete** in the context menu.

A confirmation prompt appears to confirm deletion.

- ✧ Click **Yes**.

The **Delete** dialog displays the progress status of deletion. After completion, the device master copy is deleted.

Saving the Changes in the User-Defined Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette which contains the user-defined libraries with the device master copies.
- ✧ In the [20.7.40 Toolbar of the Global Libraries Palette](#), click the  button. This button is enabled only if you modify any user-defined library in the **Global libraries** palette.

Changes are saved and the button is disabled until any further modification is done in the user-defined library.

Closing the User-Defined Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette which contains the user-defined libraries.
- ✧ Select any user-defined library.
- ✧ In the [20.7.40 Toolbar of the Global Libraries Palette](#), click the  button. This button is enabled only if there are user-defined libraries in the **Global libraries** palette.

The user-defined library closes and it is removed from the **Global libraries** palette.

Related Topics

- ✧ [3.3.1 Overview of Libraries](#)
- ✧ [3.3.6 Filtering the View](#)
- ✧ [3.3.5 Using Elements of the Global DIGSI 5 Library](#)

3.3.4 Displaying Elements According to ANSI or IEC

All graphical elements, for example for the single-line configuration or the display pages, can be displayed in compliance with either the ANSI or IEC standard. You can select at any time which of the 2 representations are to be active. However, both of them can never be active at the same time.

You make a cross-project selection. It affects display of the elements in the libraries, but also those inserted in the single-line configuration. By contrast, icons on display pages do not change. This enables you to create display pages for 2 different standards.

Changing Over the Display

- ✧ In the **Options** menu, click **Settings**.
- The [20.5.12 Settings](#) view is displayed in the working area.
- ✧ Select the [20.5.14 DIGSI 5 User Preferences](#) group.
 - ✧ From the list box **Standard for symbols**, select the other standard.

All graphical elements are displayed in compliance with the newly selected standard.

Related Topics

- ✧ [3.3.1 Overview of Libraries](#)

3.3.5 Using Elements of the Global DIGSI 5 Library

You use the elements of a library at different points in a project, for example in the [20.1.10 Function-Chart \(CFC\) Editor](#) or in the [20.1.2 Single-Line Editor](#).

If you mark an element in a library, the information window will show detailed information on this element.

Using Elements

- ✧ Open the global DIGSI 5 library so that you can see the elements of the library.
- ✧ Select the applicable element in it and drag it to the required point of use.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button.

The element is inserted if the selected point of use is permitted.

Related Topics

- ✧ [3.3.4 Displaying Elements According to ANSI or IEC](#)
- ✧ [3.3.1 Overview of Libraries](#)
[3.3.3 Working with the User-Defined Global DIGSI 5 Library](#)
[20.7.40 Toolbar of the Global Libraries Palette](#)

3.3.6 Filtering the View

You can apply a context-related filter to the display to increase the clarity of extensive libraries. In this way, you reduce the display to those elements that you need for the object that is currently active in the working area. When you are editing a display page, for example, and context-related filtering is active, the library shows the elements for single-line configuration and display pages only.

Selecting Filter Options

- ✧ Open either the **Project Library** palette or the **Global Libraries** palette, regardless of which library you wish to select a filter option for.
- ✧ From the list box in the relevant palette, select the **Context-driven filtering** option.

The library shows only those elements that match the active object in the working area.

- ✧ To display all elements again, select the **All** option.

The library again shows all elements regardless of the active object in the working area.

Related Topics

- ✧ [3.3.1 Overview of Libraries](#)
- ✧ [3.3.3 Working with the User-Defined Global DIGSI 5 Library](#)
- ✧ [20.7.40 Toolbar of the Global Libraries Palette](#)

3.4 Using the Status Dialog

[20.6.25 Status Dialog](#) is opened if certain processes, for example, the transmission of configurations are completed.

The result of the process is displayed as plaintext in the top section of the dialog. The **Overview** tab contains status indications on the progress of the process. When the process has been completed successfully, the corresponding status indication is marked with a green symbol. If it was not successful, the corresponding status report is marked with a red symbol. If faults have occurred, the **Fault** tab is also displayed. This tab contains a detailed description of the errors.

You can save the displayed indications in a log file.

Save Displayed Indications

- ✧ To save the displayed indications in a text file, click **Save log**.

The **Save as** dialog is opened.

- ✧ Select a location and a file name with this dialog.

- ✧ Click **Save**.

The **Save as** dialog is closed.

- ✧ Click **OK**.

The status dialog is closed.

Related Topics

- ✧ [4.1 Overview on the DIGSI 5 Information System](#)

4 Assistance

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4.1 Overview on the DIGSI 5 Information System

To enable you to perform individual activities swiftly and efficiently, DIGSI 5 offers you diverse variants of information.

The entire DIGSI 5 information system is composed of several components:

- **DIGSI 5 Help**, which you currently have open before you
- **Tooltips and rollouts**, which help you while entering values
- **Info tab**, which displays messages to monitor current actions
- **Icons in the project tree**, which indicate different states
- **Information window**, which displays details about elements from the library or from the catalogs
- **Search function in the task area** for finding information in editors, tables, and matrices
- **Status dialog**, which displays messages about completed procedures
- **Tutorial** with visual explanations for all SIPROTEC 5 and DIGSI 5 core areas

DIGSI 5 Help

In the form of the Help function, DIGSI 5 offers you an extensive information package that describes the functionality of all modules. DIGSI 5 Help also contains more in-depth reference information and practically oriented examples. To launch DIGSI 5 Help, select the **Show help** menu item in the **Help** menu.

DIGSI 5 Help opens in a window that does not cover up the working area. You can vary the size of this window. You can display a table of contents or an index in addition to the content. To find information about a module or an activity, you can search through the Help for a topic or a keyword. You find more information about this under [4.2 Using DIGSI 5 Help](#).

Tooltips and Rollouts

There are tooltips for the elements belonging to the user interface of the software that explain each function of the element. For some self-explanatory elements such as **Open** or **Save**, DIGSI 5 does not offer any tooltips. To display a tooltip, position the mouse pointer on the element. This provides you, for instance, with additional information about the contents of a table as soon as you position the mouse on the title of a column.

In areas containing text and list boxes, for example for the function settings, DIGSI 5 displays rollouts. A rollout informs you about the range of values and data types that are required for input or selection.

Info Tab

The [20.5.19 Info](#) tab displays messages with which you can monitor states, sequences, and results of actions. An icon classifies each message in the **Info** tab. You find more information about this icons under [4.4 Icons in the Info Tab](#).

The messages in the **Info** tab are divided thematically into 5 further tabs:

- [20.5.20 General](#)
- [20.5.21 Compile](#)
- Cross-references
- [20.5.22 Inconsistencies](#)
- Search results

Icons in the Project Tree

In the [3.1.2 Project Tree](#), various icons indicate different states. For example, the icon  tells you that the offline configuration was changed since the last time it was loaded into the SIPROTEC 5 device. The icon  draws attention to inconsistencies in the offline configuration. You find more information about icons under [4.3 Icons in the Project Tree](#).

Information Window

If you mark an element, for example in the library, the Information window displays detailed information about this element.

The information window is available for the following task-card tabs:

- Libraries
- Hardware catalog
- Signal catalog

Search Function in the Task Area

The **Tasks** tab assists you with a search function. With this function, you can search for information in a matrix, a table, or an editor. Matrix, table, or editor must be displayed in the working area. The search function offers a series of additional options. Selection of additional options depends on the matrix, the table, or the editor. The search results are displayed directly in the working area or in the **Search results** tab, depending on the information being searched.

Status Dialog

When certain procedures, for example, the transmission of configurations, are completed, the [20.6.25 Status Dialog](#) opens.. This dialog displays information about the completed procedure. You find more information about this under [3.4 Using the Status Dialog](#).

Tutorial

On the **SIPROTEC 5 and DIGSI 5 Tutorial** DVD, you find a detailed animated Start-Up for DIGSI 5. Ask your Siemens contact person for this DVD.

4.2 Using DIGSI 5 Help

Opening Help

- ✧ To launch the table of contents for the Help, select **Show help** in the **Help** menu.
 - or -
- ✧ Press the <F1> key to display the help matching the current context.

Navigating with the Toolbar

- ✧ In order to hide and unhide the navigation ranges with table of contents and search functions, click the button  in the DIGSI 5 toolbar.
 - or -
- ✧ To redisplay help topics already displayed, click the button in the DIGSI 5 help toolbar  and .
- or -
- ✧ To get to the Help homepage, click the button in the DIGSI 5 toolbar .

Searching Help Topics According to Keywords

- ✧ Open the **Index** tab.
- ✧ Mark the search term in the list of keywords and click **Display**.

Full Text Search

- ✧ Open the **Search** tab.
- ✧ Enter the search term in the text box.
- ✧ Narrow your search by additional criteria. Information about this can be found in section **Additional Criteria for the Search**
- ✧ Optionally, you can use logical operations. To do this, click the arrow key on the right of the search box. Information about this can be found in section **Logical Combinations for the Search**.
- ✧ Click **List Topics**.

The search starts. The results are then listed with their title, location, and rank. The **Location** column contains the section in which you will find the help topic you are looking for.

Additional Search Criteria

- ✧ Select **Search previous results** to start a new search run, but within your last search results only.
- ✧ Select **Match similar words** to also find words that deviate only slightly from your search term.
- ✧ To obtain only results that contain your search term in the title, select **Search titles only**. The content of the Help topics is then ignored during the search.

Logical Combinations for the Search

- ✧ Combine 2 or more search terms with the **AND** operator to find only Help topics that contain all words in the text that you are looking for.
- ✧ Combine 2 or more search terms with the **OR** operator to find only Help topics that contain one of the words in the text that you are looking for.
- ✧ Combine 2 or more search terms with the **NEAR** operator to find only Help topics in which the search terms are directly related (8 words).

- ✧ To exclude Help topics that contain a certain word from the search, place the **NOT** operator before the word.

Printing Information

- ✧ Click the **Print** button.

The table of contents opens in a window of its own.

- ✧ In **Print help topics dialog**, mark the folders and help topics you want to print with a checkmark.
- ✧ Click the **Print** button.

The marked information is printed.

Related Topics

- ✧ [4.1 Overview on the DIGSI 5 Information System](#)
- ✧ [1.2 Information Scope of the DIGSI 5 Help](#)

4.3 Icons in the Project Tree

In the [3.1.2 Project Tree](#), various icons indicate different states. The icons are placed on the right side of the project tree.

- Icon 
This icon indicates a change to the offline configuration since the last time it was transferred into the SIPROTEC 5 device. The icon is displayed in the project next to the name of the offline configuration.
After a successful transmission of the offline configuration into the associated SIPROTEC 5 device, the icon disappears. When you make the first change to the offline configuration, the icon reappears.
- Icon 
This icon indicates inconsistencies in an offline configuration. The icon is displayed in the project next to the name of the offline configuration.
To find out in which areas inconsistencies exist, open the offline configuration. All folders and functions that contain inconsistencies are each identified with their own icon.
- Icon 
This icon indicates an operational and active online access. The icon is displayed in the list of online accesses next to the name of the online access.
- Icon 
This icon indicates an online access that is not operational. The icon is displayed in the list of online accesses next to the name of the online access.
- Icon 
This icon indicates an active connection between DIGSI 5 and a SIPROTEC 5 device. The icon is displayed in the list of online accesses next to the name of the online configuration belonging to the SIPROTEC 5 device.
If you manually disconnect the connection, the icon is hidden. If, for example, an error in the line interrupts the connection, the icon is replaced by the icon .
- Icon 
This icon indicates an interrupted connection between DIGSI 5 and a SIPROTEC 5 device. The icon is displayed in the list of online accesses next to the name of the online configuration belonging to the SIPROTEC 5 device.
When you reactivate the connection, the icon is replaced by the icon .

Related Topics

[4.1 Overview on the DIGSI 5 Information System](#)

4.4 Icons in the Info Tab

An icon classifies each entry in the [20.5.19 Info](#) tab. DIGSI 5 uses the following icons.

- Icon 

This icon indicates the message pertaining to a total action that is completed normally. An example of such a message is **Project Manhattan South opened**. The icon is used in the [20.5.20 General](#) tab and in the [20.5.21 Compile](#) tab.

- Icon 

This icon indicates the message to a partial action. The partial action can occur successfully. An example is **Device 7SL87 is added to life list via USB**. The partial action can also occur unsuccessfully. An example is **Fallback language is not available**. The icon, however, always identifies a non-critical procedure or state. The icon is used in the **General, Compile, and Search results** tabs.

- Icon 

This icon indicates the message to a critical procedure or state. An example of such a message is **The number of used function points (404) exceeds the available limit (200)**. The icon is used in the **General** and **Compile** tabs.

- Icon 

This icon indicates a group that pools all messages belonging to a SIPROTEC 5 device. The icon is used in the [20.5.22 Inconsistencies](#) tab.

- Icon 

This icon indicates an inconsistency message or a location where a search result can be found. An example of an inconsistency message is **Invalid measuring point routing voltage (3ph)**. An example of a location is **Routing**. The icon is used in the **Inconsistencies** and **Search results** tabs.

Related Topics

[4.1 Overview on the DIGSI 5 Information System](#)

4.5 Identifying and Eliminating Inconsistencies

An automatic consistency check is implemented in DIGSI 5. If, for example, you enter an invalid value in the Settings editor, a tooltip appears with a comment. So that you can continue working, you must immediately correct the value.

Other inconsistencies are more complex. They can, for example, originate during a configuration procedure by adding or deleting different objects. As a consequence, the following inconsistencies can result, for example:

- Incorrectly set value
- Not yet set value
- Missing measuring point
- Missing hardware
- Hardware that is not routed
- Invalid assignment of function blocks

You recognize these inconsistencies through the following indications:

- **Icons in the Project Tree**

In the [3.1.2 Project Tree](#), icons of the type  identify the areas with inconsistencies. At the same time, all parent areas are also indicated with these icons. When the icon, for example, identifies the function **Stub-fault prot** as inconsistent, the higher-level function group, the folder **Settings**, and the entire offline configuration are also indicated with the icon. When you eliminate an inconsistency, the associated icon is automatically hidden. You find more information about icons under [4.3 Icons in the Project Tree](#).

- **Messages in the Inconsistencies Tab**

For each inconsistency, a message is displayed in the [20.5.22 Inconsistencies](#) tab. The message describes the location and the type of inconsistency. With a double-click, you open the editor or matrix needed for editing. When you eliminate an inconsistency, the associated message is automatically deleted from the tab.

- **Pink Highlighted Input and Selection Elements**

In an editor or a matrix, input and selection elements of inconsistent values or routings are highlighted in pink color. When you eliminate an inconsistency, the associated input or selection element is displayed in grey.

You must eliminate all inconsistencies before loading an offline configuration into a SIPROTEC 5 device. To perform this operation, follow the guidelines described. When you have eliminated all inconsistencies, you can manually start a consistency check as a precaution.

To do so, click  button in the toolbar of DIGSI 5. When no icons are displayed in the project tree and no messages are displayed in the **Inconsistencies** tab, the offline configurations are consistent.

DIGSI 5 checks the offline configuration once more directly before loading into the SIPROTEC 5 device. If the offline configuration is inconsistent, DIGSI 5 aborts the loading process.

Related Topics

[4.1 Overview on the DIGSI 5 Information System](#)

4.6 Copying and Deleting Messages

You can copy messages in the [20.5.20 General](#), [20.5.21 Compile](#), [20.5.22 Inconsistencies](#), and **Search Results** tabs and insert these messages, for example, in a text document. You can copy individually marked messages or all messages of a tab at the same time.

You can manually delete the messages in the **General**, **Compile**, and **Search Results** tabs. You can only delete all messages of a tab at the same time. You cannot manually delete messages pertaining to inconsistencies. When you eliminate an inconsistency, the associated message is also deleted.

Copying Individual Messages in a Tab

- ✧ In the tab concerned, select one or more messages.
- ✧ Right-click on one of the messages.
- ✧ In the context menu click **Copy**.

The selected messages are copied to the clipboard.

Copying All Messages in a Tab

- ✧ In the tab concerned, right-click on a message.
- ✧ In the context menu, click **Copy all**.

All messages in the tab are copied to the clipboard.

Deleting All Messages in a Tab

- ✧ In the tab concerned, right-click on a message.
- ✧ In the context menu, click **Clear all**.

All messages in the tab are deleted.

Related Topics

- ✧ [4.1 Overview on the DIGSI 5 Information System](#)

4.7 Using the Status Dialog

[20.6.25 Status Dialog](#) is opened if certain processes, for example, the transmission of configurations are completed.

The result of the process is displayed as plaintext in the top section of the dialog. The **Overview** tab contains status indications on the progress of the process. When the process has been completed successfully, the corresponding status indication is marked with a green symbol. If it was not successful, the corresponding status report is marked with a red symbol. If faults have occurred, the **Fault** tab is also displayed. This tab contains a detailed description of the errors.

You can save the displayed indications in a log file.

Save Displayed Indications

- ✧ To save the displayed indications in a text file, click **Save log**.

The **Save as** dialog is opened.

- ✧ Select a location and a file name with this dialog.

- ✧ Click **Save**.

The **Save as** dialog is closed.

- ✧ Click **OK**.

The status dialog is closed.

Related Topics

- ✧ [4.1 Overview on the DIGSI 5 Information System](#)

5 Projects

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5.1 Managing Projects

5.1.1 Overview of Projects

DIGSI 5 manages the components of a system and all the data associated with it in relation to the project. Topology, SIPROTEC 5 devices, settings values, communication settings, process data, and much more are grouped together and saved under a project name. In other words, only open 1 project file to have access to all data. Conversely, all changes are saved simply by saving the project file. If you have opened a project, the project will be displayed in a hierarchical structure in the [3.1.2 Project Tree](#). The symbols and text boxes in the project tree provide you with access to all of the project data and the actions associated with it.

Advantages of Working with Projects

You can also change device data with DIGSI 5 without the project. You can find out more about this in the subject block **Communication**. However, Siemens recommends that you always change device data using projects. Directly changing device data can lead to deviations in the settings that cannot be resolved. These deviations can become apparent, above all, when replacing a device.

Working with projects gives you additional advantages:

- You can version projects.
- You can archive projects.
- You can exchange projects between different planners.
- You can compare and copy the data of several SIPROTEC 5 devices within a project.

Related Topics

[5.1.2 Creating a Project](#)

[5.1.3 Opening a Project](#)

[5.1.5 Saving a Project](#)

[5.1.8 Deleting a Project](#)

[5.1.9 Printing Project Data](#)

[5.1.10 Project Data in Windows Explorer](#)

[5.1.11 Plug and Play Project](#)

5.1.2 Creating a Project

You require a project to be able to edit data relating to devices and systems. You can create as many projects as you wish.

Creating a New Project

- ✧ In the **Project** menu, click **New**.

- or -

- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

The **Create a New Project** dialog opens. For additional information, refer to [20.6.2 Create a New Project](#).

- ✧ Enter the desired project name and path or accept the data suggested.
- ✧ Click **Create**.

A new project is created and saved in the standard directory for projects. The project is then displayed in the [3.1.2 Project Tree](#).

Related Topics

- ✧ [5.1.1 Overview of Projects](#)

5.1.3 Opening a Project

Open the relevant project to be able to edit data relating to devices and systems.



NOTE

You can never open more than one project at a time with 1 DIGSI 5. If you open a project, another project currently open will be closed. However, you can open several instances of DIGSI 5 and in this way work on several projects simultaneously.

Opening a Project

- ✧ In the **Project** menu, click **Open**.
- or -
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

The **Open project** dialog opens. This contains a list box of the projects last used. For additional information, refer to [20.6.3 Open Project](#).

- ✧ Mark a project name in this list box and click **Open**.
- or -
- ✧ If the desired project is not in the list box, click **Browse**.

A standard file dialog is opened.

- ✧ Navigate to the desired project folder and open the project file with the file extension **.dp5vx**. **x** indicates the DIGSI 5 version number. Project files in DIGSI 5 version V1 have the file extension **.dp5v1**.

The project opens in the [3.1.2 Project Tree](#).



NOTE

If DIGSI 5 has not yet started, you can also double-click a project file with the file extension **.dp5vx**. DIGSI 5 then starts and the project opens.

Related Topics

- ✧ [5.1.1 Overview of Projects](#)

5.1.4 Converting a Project



NOTE

An IEC station is not assigned automatically to the System configurator project. You must select the path of the SCD file used by the System configurator in the related project. This project and SCD file should be created before the project conversion starts.

Projects created using older DIGSI versions before V6.00 do not contain the **IEC Stations** node in the project tree. The **IEC Stations** node is created automatically during project conversion. If the converted project contains IEC enabled devices, these devices are automatically added to the new IEC station.

The project converter feature enables you to upgrade a project created with an older version to the current installed DIGSI 5 version. This upgrade makes the project structure compatible to work on projects that were created using earlier versions.

DIGSI 5 versions earlier than DIGSI 5 V6.00 also served as system configurator. The projects created with such versions also contained the complete IEC 61850 configurations for their devices. Starting from V6.00, however, DIGSI 5 does not support this functionality. Instead, an external system configurator tool (IEC System Configurator) is used for managing the IEC 61850 configurations.

Apart from this, new elements like the **IEC 61850 stations** folder, and **IEC station** is introduced in V6.00 to group the IEC configured devices for the system configurator. Each station can be assigned to a System Configurator project in order to provide a smooth interaction between DIGSI 5 and IEC 61850 System Configurator tool to maintain the configuration.

Converting a Project

- ✧ In the **Project** menu, click **Open**.
- or -
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

The **Open project** dialog appears displaying a list of the projects recently used. For additional information, refer to [20.6.3 Open Project](#).

- ✧ Mark any project name which is created using earlier version than the current version from this list and click **Open**.

- or -

- ✧ If the desired project is not displayed in this list, click **Browse**.

A standard file dialog opens.

- ✧ Navigate to the desired project folder and open the project file which is created using earlier version.
- ✧ Click **Open**.
Any currently opened project in DIGSI is closed and the **Upgrade project** dialog appears for confirmation.
- ✧ Click **OK**.

The conversion starts and the **Upgrade log** dialog displays the upgrade progress status. After successful conversion, the newly created project is ready to be used in the current DIGSI 5 version installed on your PC. If the earlier project had IEC, another dialog appears when the newly converted project is opened. Here, you must attach the IEC Station to a System Configurator project. Else, the DIGSI 5 project is closed again. During the conversion process, the station folder and station node are created and all IEC configured devices are added to the IEC station. A confirmation prompt appears to register IEC station to a System Configurator project.



NOTE

Only the projects created with DIGSI 5 V4.00 or higher version are supported for conversion in the current installed DIGSI 5 version on your PC. If you select any other source project for conversion, which is not compatible with the current installed version, an error message is displayed.

To open any project created with DIGSI 5 V3.00, you must first open and upgrade the project with DIGSI 5 V4.00 or DIGSI 5 V5.00. After successful upgrade, you can perform a further upgrade with the same project using the current installed DIGSI 5 version on your PC and work on it.

Related Topics

- ✧ [5.1.1 Overview of Projects](#)
- ✧ [14.10.14 Migrating the IEC 61850 Configuration from earlier DIGSI 5 Versions](#)
- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)

5.1.5 Saving a Project

You can save a project at any time either with the same name or any another name. You can also save projects that still contain erroneous elements.

Saving a Project

- ✧ In the **Project** menu, click **Save**.
- or -
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

All changes in the project are saved under the current project name.

Save Project As

- ✧ In the **Project** menu, click **Save as**.
- The **Save current project as** dialog is opened.
- ✧ Select the desired project folder from the **Save in** list box.
 - ✧ Enter the new project name in the **File name** text box.
 - ✧ Click **Save**.

The project is saved under the new name.

Related Topics

- ✧ [5.1.1 Overview of Projects](#)

5.1.6 Archiving/Retrieving a Project

In order to save a project as a backup file and retrieve it later, you can archive the project created in DIGSI with the same name or any another name in the desired location. Further, after archiving any current opened project in DIGSI, you can continue working on the project without closing it. At any point of time, you can always retrieve the archived version of the project and start working on it, if required.

Archiving a Project

- ✧ In the **Project** menu, click **Archive**.
- The **Archive current project as...** dialog opens with the default **File name**.
- ✧ Select the desired project folder from the **Save in** list box.
 - ✧ Enter the new project name in the **File name** text box, if required.
 - ✧ Click **Save**.

A progress dialog appears displaying the archive status and the archived project file is saved in the desired location with the file extension **.dz5**.

Retrieving an Archived Project

- ✧ In the **Project** menu, click **Retrieve**.
- A confirmation prompt appears to confirm the retrieval.
- ✧ Click **Yes**.
- The **Retrieve archived project** dialog opens.
- ✧ Enter the new project name in the **File name** text box.
 - ✧ Select the archived project with the file extension **.dz5** from the respective folder.

The file name is displayed in the **File name** text box.

- ✧ Click **Open**.

The **Browse For Folder** dialog opens.

- ✧ Select the target directory.
- ✧ Click **OK**.

A progress dialog appears displaying the project retrieval status and the retrieved project is displayed in the [3.1.2 Project Tree](#).

Related Topics

- ✧ [5.1.1 Overview of Projects](#)

5.1.7 Closing a Project

You can close a project during any phase of the project planning.

Closing a Project

- ✧ In the **Project** menu, click **Close**.

If you have changed the project since last saving it, a confirmation prompt appears. Select one of the following options:

- ✧ If you save changes in the current project and wish to close the project, click **Yes**.
- or -
- ✧ If you wish to close the project without saving the last changes in the project, click **No**.
- or -
- ✧ If you wish to cancel closing the project, click **Cancel**. In this case the project remains open.

Related Topics

- ✧ [5.1.1 Overview of Projects](#)

5.1.8 Deleting a Project

You can delete projects with all the data they contain. A project that is to be deleted must not be open.



NOTE

All the data associated with it are lost irrecoverably when deleting a project. You cannot undo the action of deleting a project.

Deleting a Project

- ✧ In the **Project** menu, click **Delete project**.

The dialog **Delete project** opens. This contains a list of the projects last used. For additional information, refer to [20.6.4 Delete Project](#).

- ✧ Select the project name from the list box.
- or -
- ✧ If the desired project is not in the list box, click **Search**. In the file-selection dialog that opens then, navigate to the desired project folder and select the project file with the file extension **.dp5vx**. **x** indicates the DIGSI 5 version number. Project files in DIGSI 5 version V1 have the file extension **.dp5v1**.
- ✧ When you have selected a project from the list or via the file-selection dialog, click **Delete**.

A confirmation prompt opens.

✧ If you really wish to delete the project, click **Yes**.

- or -

✧ If you do not wish to delete the project, click **No**.

If you have responded to the confirmation prompt with **Yes**, the entire project folder will be deleted from the file system.

Related Topics

✧ [5.1.1 Overview of Projects](#)

5.1.9 Printing Project Data

You can print out all project data or data from individual categories.

Before starting the printing process, you can create and adapt print templates with the Documentation function. You can prepare project data as a standardized circuit manual and give it a uniform layout. Read the [17.1.1 Overview for Designing and Printing Documents](#) to learn more about this.

Starting the Printing

✧ Open the [3.1.2 Project Tree](#).

✧ Select the project name in the project tree.

✧ In the **Project** menu, click **Print**.

The [20.6.23 Print](#) dialog opens.

✧ Determine the scope of printing with this dialog. You will find more information on this under [17.2.2 Determining the Scope of Printing](#).

✧ Use this dialog to select a printer, the document layout, and the properties. You will find more information on this under [17.2.3 Selecting Print Options](#).

✧ Click **Print**.

The **Select print options** dialog closes and the selected data is printed.

Related Topics

✧ [5.1.1 Overview of Projects](#)

5.1.10 Project Data in Windows Explorer

Projects are structured as folders in Windows. You can find the project folders under **My Files\Automation**. A folder with the name of the project is created for each project. If you open a folder, you find the project file with the file extension **.dv5vx** where **x** stands for the DIGSI 5 version number. Project files in DIGSI 5 version V1 have the file extension **.dv5v1**. This file is used to open a project.

This type of structuring allows a range of options:

- You can copy and move project folders.
- You can compress project folders in a zip file and then send them by email, for example.
- You can create a link to the project file with the file extension **.dv5vx** on the Windows desktop. You can start DIGSI 5 by double-clicking the project file.

However, you must not delete or move any files within the project structure.

Related Topics

[5.1.1 Overview of Projects](#)

5.1.11 Plug and Play Project

When you create a device in project using plug and play, the entire station is not available in the project, but only the plug and play devices are available. The project then created is known as the plug and play project. There is an icon in project-navigation view that indicates if a project is a plug and play project.

You cannot load the configuration of plug and play project to a device, as GOOSE communication to devices that are not part of the project are lost. There are settings in DIGSI that are not only device related but also project related. It applies specially to GOOSE configuration, which is about sending messages between devices. This means GOOSE connections cannot be resolved in plug and play projects.

Furthermore, in the properties of the project you find a check box, which indicates if the project is a plug and play project or not.

Related Topics

[5.1.1 Overview of Projects](#)

[15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device](#)

[15.2.5 Copying Online Configuration into the Project](#)

5.2 Working with Multilingual Projects

5.2.1 Overview of Project Languages and Project Texts

Project texts are texts relating to the content of a project.

Categories

The project texts include the following texts:

- Names of CFC function blocks
- Names of information such as indications or commands
- Comments
- Names of function groups and function blocks

Selecting Project Texts

In DIGSI 5, Siemens provides project texts in a number of languages. You can compile all project texts into any language. You can also compile and save your own project texts in various languages.

In DIGSI 5, project texts are displayed in one of the current selected project languages. This is done using the [20.5.1 Project-Language Selection](#).

Proceed as follows for this:

- Select the languages to be used as project languages from a series of country-specific languages. The languages in which a project is to be later edited are designated as project languages.
- Define a language as an editing language from the selected project languages. All project texts are then displayed in this language in DIGSI 5. All newly entered or edited texts are then also saved together with the texts of the editing language currently set.
- Define a language as reference language from the selected project languages. This language serves as a reference basis when compiling project texts.

Editing Project Texts

You edit project texts with the [20.1.8 Project Texts Editor](#).

Related Topics

[5.2.2 Opening the Project-Language Selection View](#)

[5.2.3 Selecting or Deselecting Project Languages](#)

[5.2.4 Defining the Editing Language and the Reference Language](#)

[5.2.5 Opening the Project-Texts Editor](#)

[5.2.6 Adapting the View in the Project Texts Editor](#)

[5.2.7 Editing Texts](#)

[5.2.8 Finding Texts in the Project](#)

5.2.2 Opening the Project-Language Selection View

The [20.5.1 Project-Language Selection](#) allows you to carry out the following actions:

- Selecting the project languages for the project
- Removing project languages from the project
- Specifying the editing language for the project
- Specifying the reference language for the project

To open the project-language selection, use the [3.1.2 Project Tree](#).

Opening Project-Language Selection Using the Project Tree

- ✧ Open the **Languages & Resources** folder in the project tree.
- ✧ Double-click **Project languages** in this folder.

Project-language selection editor is displayed in the working area.

Related Topics

- ✧ [5.2.3 Selecting or Deselecting Project Languages](#)
- ✧ [5.2.4 Defining the Editing Language and the Reference Language](#)
- ✧ [5.2.5 Opening the Project-Texts Editor](#)
- ✧ [5.2.1 Overview of Project Languages and Project Texts](#)

5.2.3 Selecting or Deselecting Project Languages

The installation language selected when installing DIGSI 5 is set as the default project language after a newly created project is opened. Since the project language and the user interface language are coupled, the selected language is also set as the user interface language. You can select other languages as project languages and deselect them again. At least one project language must always be selected. The [20.5.1 Project-Language Selection](#) must be open in order to select or deselect a project language.

Selecting Project Languages

- ✧ The **Languages** list box shows the languages that can currently be selected. At least one language is marked. Optionally select other languages as project languages. Mark the relevant check box for this.

The selected project language is added to the **Editing language** and **Reference language** list boxes as well as to the [20.1.8 Project Texts Editor](#).

Deselecting a Project Language

- ✧ Click the marked check box for the relevant project language.

The selected project language is removed from the **Editing language** and **Reference language** list boxes as well as from the Project-texts editor.

Related Topics

- ✧ [5.2.4 Defining the Editing Language and the Reference Language](#)
- ✧ [5.2.1 Overview of Project Languages and Project Texts](#)

5.2.4 Defining the Editing Language and the Reference Language

If you have selected further project languages after creating a new project, you can define another language as an editing language or reference language.

- **Editing Language**

All project texts are displayed in the language selected as the editing language in DIGSI 5. All newly entered or edited texts are then also saved together with the texts of the editing language currently set.

- **Reference Language**

The texts in the language selected as reference language serve as a basis for comparison when translating the project texts. If, for example, the project texts are completed in German and are to be translated into English, select German as the reference language.

The [20.5.1 Project-Language Selection](#) must be open in order to select the editing and reference language.

Selecting the Editing Language

- ✧ Open the **Editing language** list box.

The list box contains all languages that are selected as project languages.

- ✧ Select one of the languages as the editing language.

If different languages are set for the editing language and reference language, the editing language is identified in the [20.1.8 Project Texts Editor](#). A pen symbol is shown in the column header of the relevant language. If you select any available language as the **Editing language** in DIGSI, the same language is set as **User interface language**.

Selecting the Reference Language

- ✧ Open the **Reference language** list box.

The list box contains all languages that are selected as project languages.

- ✧ Select one of the languages as the reference language.

The column with the texts of the reference language is displayed on the far left in the Project-texts editor.

Related Topics

- ✧ [5.2.3 Selecting or Deselecting Project Languages](#)
- ✧ [5.2.1 Overview of Project Languages and Project Texts](#)

5.2.5 Opening the Project-Texts Editor

The [20.1.8 Project Texts Editor](#) displays a table containing all of the texts of all selected project languages. All texts in a given language are displayed in the same column.

To open the Project-texts editor, use the [3.1.2 Project Tree](#).

Opening the Project-Texts Editor Using the Project Tree

- ✧ Open the **Languages & Resources** folder in the project tree.
- ✧ Double-click **Project texts** in this folder.

The Project-texts editor opens with the project texts in the working area.

Related Topics

- ✧ [5.2.6 Adapting the View in the Project Texts Editor](#)
- ✧ [5.2.7 Editing Texts](#)
- ✧ [5.2.8 Finding Texts in the Project](#)
- ✧ [5.2.2 Opening the Project-Language Selection View](#)
- ✧ [5.2.1 Overview of Project Languages and Project Texts](#)

5.2.6 Adapting the View in the Project Texts Editor

You can use the [20.1.8 Project Texts Editor](#) to combine identical texts in groups in the reference language column. At the same time, the text group is reduced to display a single instance of the text occurring multiple times. You can then edit the content in the combined cells.

You can also filter out the text lines containing empty text cells. Which lines are hidden depends on the column marked.

Combining Identical Texts and Splitting up Groups

- ✧ Click the  button in the [20.7.3 Toolbar of the Project-Texts Editor](#).

Identical texts in the column of the reference language are combined to form a group. If texts are currently combined in groups, split up the grouping by your action.

Showing or Hiding Text Lines

- ✧ Mark the column whose empty text cells are to be used as a filter criterion.
- ✧ Click the  button in the toolbar of the Project texts editor.

All lines containing an empty text cell in the highlighted column are hidden. If lines are currently hidden, you show these again by your action.

Related Topics

- ✧ [5.2.1 Overview of Project Languages and Project Texts](#)

5.2.7 Editing Texts

The left column of the [20.1.8 Project Texts Editor](#) table always contains the texts of the reference language. If different languages are set for the editing language and reference language, the column of the editing language is identified with a pen symbol.

You can edit all texts in any order. To save time, you can group identical texts in the column of the reference language. That means you can edit these texts at the same time.



NOTE

The entered texts are not checked for orthography or their language. For example, you can also enter German texts in the column for English texts.

Entering Text

- ✧ Double-click in the cell in which you wish to enter text.
- ✧ Enter the text.
- ✧ Click outside the cell.
- or -
- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The text entered is accepted.

Grouping Identical Texts

- ✧ Click the  button in the [20.7.3 Toolbar of the Project-Texts Editor](#).

Identical texts in the column of the reference language are combined to form a group.

Related Topics

- ✧ [5.2.8 Finding Texts in the Project](#)
- ✧ [5.2.1 Overview of Project Languages and Project Texts](#)

5.2.8 Finding Texts in the Project

You can switch directly from the [20.1.8 Project Texts Editor](#) to the location where a text is used.

Changing to the Location Where a Text Is Used

- ✧ In the Project-texts editor, right-click the relevant text.
- ✧ Select **Go to** from the context menu.

The location where a text is used is displayed in the working area, for example a definite editor or a table.

Related Topics

- ✧ [5.2.7 Editing Texts](#)
- ✧ [5.2.1 Overview of Project Languages and Project Texts](#)

6 Devices

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6.1 Managing Devices in Projects

6.1.1 Overview of SIPROTEC 5 Devices

A SIPROTEC 5 device in a DIGSI 5 project corresponds to the offline parameter set of a SIPROTEC 5 device. An entry in the [3.1.2 Project Tree](#) represents this parameter set within the project. This entry is the access point to all data and actions related to the SIPROTEC 5 device.

Options for Adding a SIPROTEC 5 Device

Several options are available for adding a SIPROTEC 5 device to a project:

- You can add a SIPROTEC 5 device using a valid product code. Everything specified by this product code is created later in DIGSI 5.
- You can decide for manual configuration while adding. With this option, a basic configuration of a SIPROTEC 5 device is added to the project. Extend the hardware of this basic configuration afterwards.
- You can import preconfigured SIPROTEC 5 devices data from another project that was exported from DIGSI 5 in DEX5 format.

Product Code

Each SIPROTEC 5 device has a long and short product code. A SIPROTEC 5 device is specified completely in DIGSI 5 by entering one of the 2 codes. After selecting an application template, you can immediately start to parameterize the SIPROTEC 5 device. Further changes to the configuration of the SIPROTEC 5 device are not necessary.

The long product code corresponds to the order number of a SIPROTEC 5 device. You will find this long product code in your order documents. You also receive a long product code if you configure a SIPROTEC 5 device with the SIPROTEC 5 configurator. You can copy this product code and paste it into DIGSI 5. DIGSI 5 can directly interpret the long product code, as every character of the code can uniquely be assigned to a property of the SIPROTEC 5 device.

A short product code is provided to make things easier. The short product code refers uniquely to a long product code. The SIPROTEC 5 configurator automatically creates a short product code for each new long product code. You can find this short product code on the name plate of the SIPROTEC 5 device.

CPU Type

From DIGSI 5 V7.00 on, a new CPU-type known as the CP300 is introduced for all modular devices except for the 7SA84 and 7SD84 devices. By default, the CP300 device is created when you drag and drop any modular device from the [20.2.4 Hardware Catalog](#) into the [20.1.6 Network View](#). You can add the modular devices with the CPU-type CP200 or CP300 using the respective product code via the [20.6.5 Add New Device](#) dialog. You can change the CPU-type of the configured project device from CP200 to CP300 or vice versa using the list-box option **CPU type** in the [20.5.4 Device Information](#) editor. It is not possible to change the CPU-type of any online device displayed under the **Online access** folder in the project tree.

The following scenarios explain the respective behavior on modifying the CPU-type in DIGSI:

- For any communication workflow, the CPU-type of the target device should match the CPU-type of the configured device in DIGSI. If you change the CPU-type from CP200 to CP300, then the communication with the CP200 target device is not possible. If you change the CPU-type from CP300 to CP200, then the communication with the CP300 target device is not possible. If the CPU-type mismatch occurs, the **Product code mismatch** dialog is displayed during the communication workflow.
- For a CP300 device activated with GOOSE on Port J, if the CPU-type is changed to CP200, then the Port J functionality of the device will be downgraded from GOOSE to IEC 61850 reporting only.

- For a CP300 device activated only with IEC 61850 reporting on Port J, if the CPU-type is changed to CP200, then there is no change in the Port J functionality.
- For a CP200 device activated only with IEC 61850 reporting on Port J, if the CPU-type is changed to CP300, then there is no change in the Port J functionality, but an additional option **DIGSI 5 connection and IEC 61850 inclusive GOOSE** is listed in the list-box option **Integrated Ethernet interface (port J)** in the [20.5.10 Device Settings](#) editor.



NOTE

Henceforth, from DIGSI 5 V7.00, 7KE devices with CPU-type CP200 are not supported.

Basic Configuration

To configure a SIPROTEC 5 device manually, select a device type and the basic configuration from the Hardware catalog of the [20.1.5 Device and Networks Editor](#). Examples of device types are **7SD86** and **7SL87**. There are different basic configurations for each device type.

Selecting a certain basic configuration consequently determines the basic hardware scope of a SIPROTEC 5 device. You can change this during the project planning by adding or deleting hardware components. In this way, you can customize the hardware of the SIPROTEC 5 device precisely to your requirements by deleting hardware components in the device view of the [20.1.5 Device and Networks Editor](#).

Application Template

The Global DIGSI 5 library provides application templates for the applications of the devices. The following are some of the functions of the application template:

- Supports the fast realization of complete protection solutions for applications
- Contains the basic configuration for the use case
- Contains functions and default settings for the use case

When using an application template, note the following:

- Adapt the application template to your specific use (check/adapt default settings, delete/add functions).
- Check the routing of binary outputs regarding fast and normal relays.
- Check the CFC charts for the group-warning indications and group-fault indications.

Application templates make further project planning simpler for a SIPROTEC 5 device. Each template contains the most important functions required for a specific application. The line protection is an example of such applications. Selecting a certain application template consequently determines the basic functional scope of a SIPROTEC 5 device. You can change this during the project planning by adding or deleting functions.



NOTE

The availability of certain settings and setting options depends on the device type and on the functions available in the device.

Related Topics

- [6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#)
- [6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#)
- [6.1.5 Renaming a SIPROTEC 5 Device](#)
- [6.1.6 Setting the On-Site Operation Panel Language](#)
- [6.1.7 Deleting a SIPROTEC 5 Device](#)
- [6.1.8 Printing Device Data](#)
- [6.1.9 Opening Device Information](#)

6.1.2 Offline Configuration

The offline configuration is the configuration saved in a project for a real SIPROTEC 5 device. Each SIPROTEC 5 device added to the project has its own offline configuration, represented by a device icon with the project-specific name for the device. Data and actions associated with the offline configuration of the SIPROTEC 5 device are structured within this folder.

You can transmit the offline configuration into the applicable real SIPROTEC 5 device. For additional information regarding this topic, refer to [15.2.1 Overview for Transmitting Configurations](#).

Offline Configuration

The offline configuration contains the following entries in the [3.1.2 Project Tree](#):

- **Device information**
With this entry, you open the [20.5.3 Device Information](#) of the SIPROTEC 5 device associated with the offline configuration. For additional information regarding this topic, refer to [6.1.9 Opening Device Information](#).
- **Hardware and protocols**
With this entry, you open the [20.1.5 Device and Networks Editor](#). With this Editor, you configure the hardware of a SIPROTEC 5 device and the structure of an Ethernet network. For additional information regarding this topic, refer to [6.3.1 Overview of the Hardware Structure](#) and under [14.1.4 Communication Using Ethernet](#).
- **Measuring-points routing**
With this entry, you open the [20.3.8 Measuring-Points Routing](#) matrix. With this matrix, you route logic measuring points of the application to the physical power and voltage inputs of the SIPROTEC 5 device. For additional information regarding this topic, refer to [8.1.5.1 Overview of Measuring Points](#).
- **Function-group connections**
With this entry, you open the [20.3.4 Function-Group Connections](#) matrix. For additional information regarding this topic, refer to [8.1.4.1 Overview of Connections](#).
- **Information routing**
With this entry, you open the [20.3.2 Information Routing](#) matrix. With this matrix, you assign information to sources and destinations. For additional information regarding this topic, refer to [11.1 Overview for Information Routing](#).
- **Communication mapping**
With this entry, you open the [20.3.1 Communication Mapping](#) matrix. With this matrix, you assign internal signals to serial protocols in order to transmit them over the communication interfaces of a SIPROTEC 5 device. For additional information regarding this topic, refer to [14.9.1 Overview of Communication Mapping](#).

- **Settings**

This folder contains the following entries:

- **Device settings**
With this entry, you open the [20.5.10 Device Settings](#). The device settings summarize different device-specific settings and actions (for example, rated frequency, OSOP language, and so on). For additional information regarding this topic, refer to [6.1.10 Opening Device Settings](#).
- **Time settings**
With this entry, you open the [20.5.11 Time Settings](#). With the time settings, you can select various [14.6.2 Time Sources](#). For additional information regarding this topic, refer to [14.6.3 Processing Time Settings](#).
- **Power System**
This folder contains 1 entry for general settings and 1 entry for each measuring point. With these entries, you open the [20.1.9 Settings Editor](#). With this Editor, you edit the general settings or the settings of the measuring points. For additional information regarding this topic, refer to [8.1.5.4 Selecting a Measuring Point for Setting Parameters](#).
- **Recording**
With this entry, you open the [20.1.9 Settings Editor](#). With this Editor, you edit the settings of the fault recorder. For additional information regarding this topic, refer to [15.5.3.2 Configuring and Setting Parameters for Fault Recording](#).
- **<Several function groups>**
Each function group folder contains 1 entry for each function associated with the function group. With these entries, you open the [20.1.9 Settings Editor](#). With this Editor, you edit the settings of a selected function. For additional information regarding this topic, refer to [8.2.2.1 Selecting a Function for Setting Parameters](#).

- **Function charts**

This folder contains entries to add new function charts and to open existing function charts.

- **Add new chart**
With this entry, you open the dialog [20.6.7 Add New Chart](#). With this dialog, you add a new function chart. For additional information regarding this topic, refer to [12.1.2.1 Adding a CFC](#).
- **<Several function charts>**
With these entries, you open the [20.1.10 Function-Chart \(CFC\) Editor](#) showing an existing function chart. With this Editor, you edit this function chart. For additional information regarding this topic, refer to [12.1.2.2 Opening a CFC](#).

- **Display pages**

This folder contains entries to add new display pages and to open existing display pages. There is another entry for the fault-display configuration.

- **Add new display page**
With this entry, you open the [20.1.13 Display Editor](#) showing a new display page. With this Editor, you edit the new display page. For additional information regarding this topic, refer to [6.5.2.2 Adding a Display Page](#) and [6.5.1 Overview of Display Pages](#).
- **<Several display pages>**
With these entries, you open the [20.1.13 Display Editor](#) showing an existing display page. With this Editor, you edit the existing display page. For additional information regarding this topic, refer to [6.5.2.1 Opening a Display Page](#).
- **Fault-display configuration**
With this entry, you open the [20.1.16 Fault-Display Configuration Editor](#). With this Editor, you configure 1 fault display for each circuit breaker in the application. For additional information regarding this topic, refer to [6.5.6.2 Opening the Fault Display Editor and Adjusting the View](#) and [6.5.6.1 Overview of Fault Displays](#).

- **Safety and security**

This entry opens the **Safety and security** Editors:

- Operations safety and access control Editor
This entry opens the [18.2 Operations Safety and Access Control](#). With the Operations safety and access control Editor, you can activate, deactivate, and change the connection password and the confirmation IDs. For additional information regarding this topic, refer to [15.8.6 Activating and Deactivating a Connection Password](#) and [15.8.4 Changing the Connection Password](#).
- Security Event Logging Editor
This entry opens the [18.3 Security Event Logging Editor](#). With the Security event logging Editor, you can configure the server connection settings for logging the events to the server. For additional information regarding this topic, refer to [18.3 Security Event Logging Editor](#).

- **Test sequences**

This folder contains entries to add new test sequences and to open existing test sequences.

- **Add new test sequence**
With this entry, you open the [20.1.21 Test-Sequences Editor](#) showing a new test sequence. With this Editor, you edit the new test sequence. For additional information regarding this topic, refer to [13.2.2 Adding a Test Sequence](#) and [13.1 Overview of Test Sequences](#).
- **<Several test sequences>**
With these entries, you open the [20.1.21 Test-Sequences Editor](#) showing an existing test sequence. With this Editor, you edit the existing test sequence. For additional information regarding this topic, refer to [13.2.1 Opening the Test Sequence](#).

- **Process data**

This folder contains entries for the various process data.

- **Get all data from device**
With this entry, you transmit the device configuration from the SIPROTEC 5 device connected online into the DIGSI 5 PC. For additional information regarding this topic, refer to [15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC](#).
- **Logs**
This folder contains other entries for the various logs:
 - Operational log
 - Fault log
 - Ground fault log
 - Setting-history log
 - User log 1
 - User log 2

With these entries, you open the table [20.4.1 Log](#) for displaying the log contents. For additional information regarding this topic, refer to [15.5.4.3 Opening the Logs Table](#).
- **Records**
With this entry, you open the table [20.4.2 Records](#) for displaying the fault records. For additional information regarding this topic, refer to [15.5.3.4 Opening the Records Table](#).
- **Indication snapshots**
With this entry, you open the table [20.4.3 Indications](#) for displaying the indications. For additional information regarding this topic, refer to [15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#).
- **Measured-value snapshots**
This folder contains 1 entry for each function group. With these entries, you open the table [20.4.5 Measurements](#) for displaying the measured and metered values. For additional information regarding this topic, refer to [15.5.1.3 Opening the Measured Value Table and Reading Values](#).

Related Topics

- [2.1.3 Working Offline and Online](#)
- [15.1.5 Online Configuration](#)

6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code

If you know the product code for a real SIPROTEC 5 device, you can create the offline configuration using this product code and add the corresponding SIPROTEC 5 device in DIGSI 5.

With this method, the following options are available to add any device in DIGSI 5:

- You can add any device using the [3.1.2 Project Tree](#). You can use this option irrespective of which tool is currently active in the working area.
- If the single-line configuration is displayed in the working area, you can use it together with the global DIGSI 5 library to add any device. The advantage of this option is that the SIPROTEC 5 device is placed at the correct position in the single-line configuration after being added.

The further procedure is identical for both options: Enter the product code and select an application template. You can specify the SIPROTEC 5 device with the long or the short product code (TNS). If you use the short product code, DIGSI 5 searches in the short product code (TNS) list for the associated long product code. If DIGSI 5 cannot find an appropriate long product code, this list is possibly no longer current. In this case, update the list. For this, the DIGSI 5 PC requires an active Internet connection.

Selecting the highest significant feature of the variant while specifying the product code to add a busbar device (for example, 7SS device type), allows you to configure and work with the lower significant feature variants. Whereas, you cannot work with highest significant feature variants, if you add a lower significant variant. By default, DIGSI verifies the type of variants with significant features depending on the entered product code. The device hardware is displayed accordingly.

Starting to Add Using the Project Tree

- ✧ Double-click **Add new device** in the project tree.

The [20.6.5 Add New Device](#) dialog opens.

- ✧ Enter the product code, specify the device characteristics, and select an application template.

Starting to Add Using the Single-Line Configuration and the Library

- ✧ Right-click the single-line configuration in the working area.
- ✧ Select **Insert elements from library** from the context menu.

In the [20.2.3 Libraries](#) tab of the task card, the folder **Global DIGSI 5 Library** is displayed. The folder **Single-line and display elements** opens in this library.

- ✧ Select the **SIPROTEC 5** element and drag this element onto the single-line configuration while pressing the mouse button.
- ✧ Release the mouse button.

The **Add new device** dialog opens.

- ✧ Enter the product code, specify the device characteristics, and select an application template.

Entering the Product Code and Selecting an Application Template

- ✧ Enter the long or short product code in the relevant text box in the **Add new device** dialog.
- ✧ Click **Verify**.

The product code entered is checked. If the product code is valid, the **Selection of the application template** list box is activated. If the product code is invalid, you receive specific error indications. Correct the product code in accordance with the error indications.

- ✧ Select the name of the application to be used as a basis for your project planning in the **Select application template** list box.

- ✧ Click **OK**.

The **Add new device** dialog closes. The required device data is loaded and the specified SIPROTEC 5 device is added to the project. You can now find the device icon for the corresponding SIPROTEC 5 device added in the project tree. A symbol for the SIPROTEC 5 device is also placed in the single-line configuration and in the [20.1.6 Network View](#).

**NOTE**

If you have entered a short product code, DIGSI 5 searches for the corresponding long product code. If this is not found, an error message is displayed. In this case, enter the long product code.

Update Short Product Code (TNS) List

- ✧ Double-click **Add new device** in the project tree.

The [20.6.5 Add New Device](#) dialog opens.

- ✧ Click **Update short product code (TNS) list**.

If the DIGSI 5 PC can establish a connection to the Internet, the list is updated. If a connection to the Internet is not possible, you get an error message. The list is not updated.

Related Topics

- ✧ [6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#)
- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)

6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device

If you have not previously decided on a definite device variant, you will not yet have a product code. The hardware of the SIPROTEC 5 device must be configured manually so that a SIPROTEC 5 device can also be added to a project, wherein DIGSI creates the product code based on your selection.

With this method, the following options are available to start adding a device in DIGSI 5:

- You can start adding any device with the [3.1.2 Project Tree](#). You can use this option irrespective of which tool is currently active in the working area.
- If the single-line configuration is displayed in the working area, you can use it together with the library to start adding any device.
- If the [20.1.6 Network View](#) is displayed in the working area, you can use it together with the [20.2.4 Hardware Catalog](#) to start adding any device.

The further procedure is identical for all options:

- Select a basic configuration using the Hardware catalog. The names of all basic configurations are arranged in a hierarchical tree structure in the Hardware catalog. The highest level is designated with **SIPROTEC 5**. The level below arranges all SIPROTEC 5 devices regarding their application area, for example, **Overcurrent protection** or **Line differential protection**. A level further lower contains the device types available for each application, for example, **7SL87** or **7SD86**. Each device type is represented by a folder with the name of the basic configurations that can be selected.
- Use dialog [20.6.5 Add New Device](#) to specify the device characteristics and select an application template.
- Configure the hardware of the SIPROTEC 5 device and extend it by the components still missing. You require the [20.1.7 Device View](#) for this. Here too, use the Hardware catalog, which structures the names of all configurable components.

Adding a Device Using the Project Tree

- ✧ Double-click **Add new device** in the project tree.

The **Add new device** dialog opens.

- ✧ Click **Configure**.

The **Add new device** dialog closes. The **Network view** is displayed in the working area. In the **Hardware catalog** tab of the task card, the folder **SIPROTEC 5** is displayed.

- ✧ Select a basic configuration, specify the device characteristics, and select an application template.

Adding a Device Using the Single-Line Configuration and the Library

- ✧ Right-click the single-line configuration in the working area.
- ✧ Select **Insert elements from library** from the context menu.

In the [20.2.3 Libraries](#) tab of the task card, the folder **Global DIGSI 5 Library** is displayed. The folder **Single-line and display elements** is opened in this library.

- ✧ Mark the **SIPROTEC 5** element and drag this element into the working area with the mouse button pressed.
- ✧ Release the mouse button.

The **Add new device** dialog opens.

- ✧ Click **Configure**.

The **Add new device** dialog closes. The **Network view** is displayed in the working area. In the **Hardware catalog** tab of the task card, the folder **SIPROTEC 5** is displayed.

- ✧ Select a basic configuration, specify the device characteristics, and select an application template.

Adding a Device Using the Network View and the Hardware Catalog

- ✧ Click in the **Network view** with the right mouse button.
- ✧ In the context menu, click **Show catalog**.

In the **Hardware catalog** tab of the task card, the folder **SIPROTEC 5** is displayed.

- ✧ Select a basic configuration, specify the device characteristics, and select an application template.

Selecting Basic Configuration, Specifying Device Characteristics, and Selecting Application Template

- ✧ In the Hardware catalog, open in succession the **SIPROTEC 5** folder, and then the folder with the device types.

The names of the basic configurations possible for these device types are displayed.

- ✧ Select the name of the basic configuration you wish to use as a basis for your project planning.

A figure as well as a descriptive text for the basic configuration selected is shown as help in the **Information** area.

- ✧ Drag the marked name to the **Network view** with the mouse button pressed.
- ✧ Release the mouse button.

The **Add new device** dialog opens.

- ✧ Specify the device characteristics using the list boxes in **Select device characteristics**.
- ✧ Mark the name of the application you wish to use as a basis for your configuration in the **Select application template** list box. If you cannot find a template suitable for your application in the list, select the best matching application template. You can then add functions that are missing or delete superfluous ones.
- ✧ Click **OK**.

The **Add new device** dialog closes. The required device data is loaded and the specified SIPROTEC 5 device is added to the project. You will now find a folder for the SIPROTEC 5 device in the project tree. A symbol for the SIPROTEC 5 device is also placed in both the single-line configuration and in the **Network view**.

Extending Hardware by Missing Components

- ✧ You can find a detailed description for this in the topic [Configuring Device Hardware](#).

Related Topics

- ✧ [6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#)
- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)
- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.1.5 Renaming a SIPROTEC 5 Device

A SIPROTEC 5 device is given a name when added to the project. This name comprises the designation of the device type and a consecutive numbering, that is, for example **7SL82_1**. You can change the name of a SIPROTEC 5 device in the [3.1.2 Project Tree](#).

Changing the Name of the SIPROTEC 5 Device in the Project Tree

- ✧ Click the device name you wish to change with the right mouse button in the project tree.
- ✧ Click **Rename** in the context menu.

The name is displayed in a text box and is highlighted in color.

- ✧ Enter a new name for the SIPROTEC 5 device.
- ✧ Click outside the text box.

- or -

- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The name entered is accepted.

Related Topics

- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)

6.1.6 Setting the On-Site Operation Panel Language

The display of the SIPROTEC 5 device shows information in the country-specific language, which is set as the on-site operation panel language. The default operation panel language is **English**. This information includes designations of entries in the menu tree as well as the names of settings and their values. You can select different languages for operation at the SIPROTEC 5 device. You can set the language for each SIPROTEC 5 device separately.

Language Selection

- ✧ In [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to set the on-site operation panel language.
- ✧ Double-click **Device information** in this folder.

Several options are displayed in the working area.

- ✧ Select the [20.5.4 Device Information](#) tab.
- ✧ Select the **Properties** tab.
- ✧ Select the option **Settings** under the group **General** in the **Properties** tab.

The device settings are displayed under the **Device settings** area.

- ✧ Open the **Operation-panel language** list box and select a language from this list.

Transmit the device settings from DIGSI 5 to the SIPROTEC 5 device so that the selected language is used to display texts in the SIPROTEC 5 device.

Related Topics

- ✧ [2.1.4 Languages in DIGSI 5](#)
- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)

6.1.7 Deleting a SIPROTEC 5 Device

SIPROTEC 5 devices are always deleted from a project with the [3.1.2 Project Tree](#). You can also delete several SIPROTEC 5 devices at once during this process.



NOTE

When deleting a SIPROTEC 5 device, all device-relevant data is lost. For example, all settings and all data involving relations to other SIPROTEC 5 devices is also lost. This includes connections within the GOOSE communication and network connections.

Deleting SIPROTEC 5 Devices from the Project Tree

- ✧ Right-click the name of the SIPROTEC 5 device you wish to delete in the project tree.
- or -
- ✧ If you wish to delete several SIPROTEC 5 devices at the same time, mark the corresponding names and then click one of these names with the right mouse button.
- ✧ Click **Delete** in the context menu.

A confirmation prompt is displayed.

- ✧ Click **Yes** to confirm.

This confirms your action.

The selected SIPROTEC 5 devices are deleted from the project and their names removed from the project tree.

Related Topics

- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)

6.1.8 Printing Device Data

You can print the data of a SIPROTEC 5 device.

Starting the Printing Process by Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
 - ✧ Mark the device name in the project.
 - ✧ In the **Project** menu, click **Print**.
- The [20.6.23 Print](#) dialog opens.
- ✧ Determine the scope of printing with this dialog. You find more information about this under [17.2.2 Determining the Scope of Printing](#).
 - ✧ Use this dialog to select a printer, a document layout, and the properties. You find more information about this under [17.2.3 Selecting Print Options](#).
 - ✧ Click **Print**.

The **Print** dialog closes and the selected data is printed.

Starting the Printing Process without Selecting the Print Options

- ✧ Open the project tree.

- ✧ Mark the device name in the project.
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

The **Print** dialog is displayed.

- ✧ Determine the scope of printing with this dialog. You find more information about this under [17.2.2 Determining the Scope of Printing](#).
- ✧ Click **Print**.

The **Print** dialog closes.

The printout starts.

Related Topics

- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)

6.1.9 Opening Device Information

Various information and setting options are assigned to each SIPROTEC 5 device, which is summarized as [20.5.3 Device Information](#).

For the offline configuration of a SIPROTEC 5 device, the information and settings are distributed on the following tabs:

- [20.5.4 Device Information](#)
- [20.5.5 Resource Consumption](#)
- [20.5.7 Logs](#)
- [20.5.9 Diagnostic Information](#)

If DIGSI 5 is connected online to a SIPROTEC 5 device, you can read and display additional information from this device. This information is distributed on the following tab:

- [20.5.8 Time Information](#)

Displaying Device Information for Offline Configuration

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to display the device information.
- ✧ Double-click **Device information**.

The described tabs are displayed in the working area.

Displaying Device Information for Online Configuration

- ✧ Open the project tree.
- ✧ Open the affected online device in the list of online accesses.
- ✧ Double-click **Device information**.

The described tabs are displayed in the working area.

Related Topics

- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)
- ✧ [15.4.8 Reading Device-Diagnosis and Security Log](#)
- ✧ [14.6.5 Setting Date and Time in the SIPROTEC 5 Device](#)
- ✧ [15.4.9 Reading Diagnostics Information](#)

6.1.10 Opening Device Settings

The [20.5.10 Device Settings](#) summarizes different device-specific settings and actions.

To open the device settings, depending on your current working situation, you have the following options:

- You can open the device settings with the [3.1.2 Project Tree](#). The device settings are then displayed with the [20.1.9 Settings Editor](#) in the working area.
- If you have already opened the Parameter editor for editing a function, you can open the device settings directly from the Parameter editor. The device settings are then displayed with the Parameter editor in the working area.
- You can open the device settings using the device symbols in the single-line configuration, in the [20.1.7 Device View](#), or in the [20.1.6 Network View](#). The device settings then appear in the Inspector window.

Opening the Device Settings via the Project Tree

- ✧ In the project tree, open the folder of the offline configuration in which you want to modify the number of settings groups.
- ✧ Open the **Settings** folder.
- ✧ Double-click **Device settings** in this folder.

In the working area, the Parameter editor is opened and the device settings are displayed.

Opening the Device Settings from the Parameter Editor

- ✧ Click in the [20.7.12 Toolbar of the Settings Editor](#) on the  button.

The device settings are displayed in the Parameter editor.

Opening the Device Settings via the Device Symbols

- ✧ In the single-line configuration, the Device view, or the Network view, select the SIPROTEC 5 device for which you want to change the number of settings groups.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.2.2 Settings](#) group.

The device settings are displayed in the **Properties** tab.

Related Topics

- ✧ [6.1.1 Overview of SIPROTEC 5 Devices](#)

6.2 Managing Devices in a Folder Structure

6.2.1 Overview of Folder Structure in DIGSI 5

DIGSI 5 enables you to manage devices in a project in the desired manner by creating a folder structure. This folder structure makes it easy for you to keep an overview over your substation configuration or to search a specific device in the project. SIPROTEC 5 devices which contain the settings values, communication settings, process data, and much more can be grouped together and saved under a folder name in a project.

In other words, you can open only 1 folder in a project to have access to all the devices in a particular project. Conversely, all changes done in the folder are saved simply by saving the project file. If you have opened a project, the folder structure in the project will be displayed in a hierarchical structure in the [3.1.2 Project Tree](#). The symbols and text boxes in the project tree provide you with access to the project data, folders, and the actions associated with it.

Related Topics

- [6.2.2 Creating a Folder Structure](#)
- [6.2.3 Adding a Device in the Folder Structure](#)
- [6.2.4 Deleting a Folder Structure](#)
- [6.2.5 Moving Folders in the Folder Structure](#)
- [6.2.6 Moving Devices in the Folder Structure](#)
- [6.2.7 Copying a Folder Structure](#)
- [6.2.8 Copying Devices in the Folder Structure](#)
- [6.2.9 Renaming a Folder Structure](#)

6.2.2 Creating a Folder Structure

You can create folder structure in a project to manage devices in the desired manner.

Creating a New Folder Structure

- ✧ In the [3.1.2 Project Tree](#), right-click the project name.
The context menu appears.
- ✧ Select **Add group**.
The group is added with continually numbered standard name (for example, **Group_1**) and displayed in the project tree. You can optionally enter a different name for the group.

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.2.3 Adding a Device in the Folder Structure

- ✧ In the [3.1.2 Project Tree](#), right-click the group name.
The context menu appears.
- ✧ Select **Add new device**.
[20.6.5 Add New Device](#) dialog opens.
- ✧ Enter the required details.
- ✧ Click **OK**.

The device is added under the selected folder/group.

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.2.4 Deleting a Folder Structure

- ✧ In the [3.1.2 Project Tree](#), right-click the group name.

The context menu appears.

- ✧ Select **Delete**.

A pop-up appears to confirm deletion.

- ✧ Click **Yes**.

The folder is deleted along with all its contents (for example, the device/devices and the sub folder/folders).

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.2.5 Moving Folders in the Folder Structure

- ✧ In the [3.1.2 Project Tree](#), select any group to be moved.

- ✧ Drag and drop the selected folder over the target folder.

The folder is moved and added as sub folder in the target folder.



NOTE

If there are any conflicts, you can rename and paste the folder or replace the existing folder and move the folder structure.

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.2.6 Moving Devices in the Folder Structure

- ✧ In the [3.1.2 Project Tree](#), select any device you wish to move from one folder another folder.

- ✧ Drag and drop the selected device over the target folder.

The device is moved and displayed in the destination folder in the project tree.

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.2.7 Copying a Folder Structure

- ✧ In the [3.1.2 Project Tree](#), right-click any group name.

The context menu appears.

- ✧ Select **Copy**.

- ✧ Right-click on the group name of the target folder.

The context menu appears.

- ✧ Select **Paste**.

The folder is added and displayed as the sub folder.

**NOTE**

If there are any conflicts, you can rename and paste the folder or replace the existing folder and copy the folder structure.

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.2.8 Copying Devices in the Folder Structure

- ✧ In the [3.1.2 Project Tree](#), right-click any device name.

The context menu appears.

- ✧ Select **Copy**.
- ✧ Right-click on the group name of the target folder.

The context menu appears.

- ✧ Select **Paste**.

The device is added in the destination folder.

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.2.9 Renaming a Folder Structure

- ✧ In the [3.1.2 Project Tree](#), right-click any folder you wish to rename.

The context menu appears.

- ✧ Select **Rename**.

The name is displayed in a text box and is highlighted in color.

- ✧ Enter a new name for the folder.
- ✧ Click outside the text box.

- or -

- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The name entered is accepted if it is unique at its level, else an error prompt is displayed to indicate that the name is not unique.

Related Topics

- ✧ [6.2.1 Overview of Folder Structure in DIGSI 5](#)

6.3 Configuring Device Hardware

6.3.1 Overview of the Hardware Structure

The SIPROTEC 5 series includes both modular and non-modular devices.

Modular devices consist of a base module (1/3 of 19 inches) and can be expanded with expansion modules (1/6 of 19 inches). The device-type identifier for modular devices is XXX85, XXX86, or XXX87, for example, 7SA86.

Type xxx84 devices have the same hardware properties as the modular devices, but they cannot be expanded with expansion modules.

All non-modular devices consist of just a base module (1/3 of 19 inches) and **cannot** be expanded with expansion modules (1/6 of 19 inches). The device-type identifier for non-modular devices is 7XX82, for example, 7SJ82.

Modular System for Modular Devices

The system is based on a modular structure. The modules can be selected according to hardware characteristics. These characteristics are:

- Module size
- Type of construction
- Fastening of the on-site operation panel
- Creation of the on-site operation panel
- Input and output module
- Plug-in modules

The modules are available in 2 sizes:

- Base module (1/3 of 19 inches)
- Expansion module (1/6 of 19 inches)

The devices are available in the following 3 designs:

- Flush-mounting devices with on-site operation panel fitted directly on the device
- Surface-mounted devices with integrated on-site operation panel
- Surface-mounted devices with detached on-site operation panel

The base modules always contain the power-supply module PS201 and an input and output module IO2XX.

The expansion modules contain an input and output module IO2XX or a plug-in module assembly with integrated power supply CB202. The 1st expansion module in the 2nd device row always contains the power-supply module PS203.

The plug-in modules are available for various applications. Plug-in modules can be installed in 1 base module or in 1 expansion module with 1 plug-in module assembly with integrated power supply CB202.

A base module with an on-site operation panel is an autonomous SIPROTEC 5 device, which is also functional without expansion modules. You can extend a base module with up to 4 expansion modules to gain additional functionality and more process connections. This maximum extension results in a 19-inch wide overall device. At this maximum expansion level, you can implement functionality, such as the **1 1/2 circuit-breaker** application.

The term **Device** always refers to the totality of all base, expansion, and plug-in SIPROTEC 5 modules as well as the relevant on-site operation panels. A SIPROTEC 5 device must always contain exactly 1 base module for this. The following figures show a 1-line sample configuration with 1 base module and 4 expansion modules, viewed from the front and the rear.



[sc_digsi_front_view, 1, --,--]



[sc_digsi_rear_view, 1, --, --]

Hardware Characteristics of Non-Modular Devices (7xx82)

The modules can be selected according to hardware characteristics. These characteristics are:

- Module size:
1/3 of 19 inches
- Type of construction:
Flush-mounting devices with on-site operation panel fitted directly on the device

You can select one of the following variants of on-site operation panels:

- With a large display, keypad, and 16 two-colored LEDs
- With a small display, keypad, and 16 two-colored LEDs

The module always contains the power-supply module PS101 and an input and output module IO10X. The input and output module IO10X includes the terminals for current and voltage transformers. Optionally, the module can be equipped with an additional input and output module IO110 for extra binary inputs and outputs.

The plug-in modules are available for various applications.

Basic and Expansion Modules

Base and expansion modules are distinguished first by their width. A base module takes up a third of the width of a 19-inch frame, while an expansion module takes up a sixth. Twice the width of the base module creates space on the rear for both process connections and plug-in modules. The expansion module can provide either additional process connections or additional communication connections. The 2nd row is available with slots numbered from 7 to 12. The 1st slot of the 2nd row with slot number 7 is dedicated for power supply (**PS 203**). The slots numbered from 8 to 12 can accommodate IO modules without LEDs. The type and number of

process connections of a basic or expansion module depend on the choice of a particular input/output module. The modular system contains a large number of different input/output modules.

If you require additional communication connections, you can use the CB202 expansion module. The CB202 expansion module does not have any direct process connections, but it has 3 slots for additional plug-in modules instead. You can equip the CB202 expansion module with 2 communication modules and 1 plug-in module for measured-value conversion.

The IO 230 and IO 233 expansion modules enhance the capability of the SIPROTEC device to configure many binary inputs. It allows you to configure up to 48 binary inputs (12 groups with each group containing 4 channels) in a single IO module. Similarly, the IO 231 expansion module enhances the capability of the SIPROTEC device to configure many binary inputs and binary outputs. It allows you to configure 24 binary inputs (6 groups with each group containing 4 channels) and 24 binary outputs in a single IO module.

For the IO 230 or IO 231 expansion modules, the threshold value applied to the first channel of any group is also applied to the other 3 channels of the same group. The IO 233 expansion module has a fixed threshold value – **Low: 85 V, High: 105 V** – and it does not change even if you change the value for the **Binary input threshold** option in the [20.5.10 Device Settings](#) Editor. The threshold value in the **Properties** tab of the [20.3.2 Information Routing](#) Editor in the [20.1.5 Device and Networks Editor](#) is always read-only. Any or all of the available 9 IO slots that are numbered from 3 to 6 or 8 to 12 can be configured with the IO 230, IO 231, or with the IO 233 expansion module. In the hardware configuration, you can create a device with this module by using the product code, or you can drag and drop the IO 230, IO 231, or the IO 233 expansion module from the **Hardware catalog** to the available IO slots. After hardware synchronization, you can configure the binary inputs and/or the binary outputs for the respective IO modules in the [20.3.2 Information Routing](#) editor.

For the IO expansion module PB 201, you can select the desired configuration via the **Properties** tab. You can select the following options from the list box for **SMV channel selection** option under the **Configuration** area in the **I/O modules and expansion modules** under the **Properties** tab of PB 201:

- 12 current and 12 voltage channels
- 24 current channels



NOTE

On switching the configuration options, the device becomes inconsistent and a confirmation prompt appears to synchronize the device with the hardware. To proceed further, synchronize the device with the hardware.

The on-site operation panel with push buttons is equipped with 8 LEDs and 8 function keys. It can be used as an on-site operation panel by all IO modules except for IO 230, IO231, and IO 233. The push-button module must be mounted in the first row at position 3. If the device has a key switch, it must be mounted at position 4. 1 push-button module is allowed per device.

On-Site Operation Panel

The on-site operation panel is an autonomous hardware component within the SIPROTEC 5 modular system. Depending on requirements, this allows you to combine a base or expansion module with a suitable on-site operation panel. The modular system offers 3 different on-site operation panels for selection, both for base modules and for expansion modules.

For base modules, you can select one of the following 3 variants of the on-site operation panels:

- With a large display, keypad, and 16 two-colored LEDs
- With a small display, keypad, and 16 two-colored LEDs
- Without a display, without a keypad (standard), but with 16 two-colored LEDs

For expansion modules, you can select one of the following 4 variants of the on-site operation panels:

- With 16 monochrome LEDs and 2 key switches
- With 16 monochrome LEDs
- With 8 LEDs and 8 function keys
- Without display elements

The on-site operation panels are also available in the versions US, Chinese, and Standard. These versions differ in the color of the control keys and lettering of the keys.

Plug-In Modules

Each base module and the expansion module CB202 has slots for plug-in modules. Plug-in modules allow you to optimally integrate a SIPROTEC 5 device in a system environment and adapt it to the relevant process situation.

Plug-in modules are available for the areas of communication and measured-value acquisition.

- **Plug-In Modules for Communication**

The communication plug-in modules from the SIPROTEC 5 modular system allow you to optimally integrate the SIPROTEC 5 device in all common system environments. This is made possible by the many interface variants and different protocols.

- **Plug-In Module for Measured-Value Acquisition**

This plug-in module records analog measured values from external instrument transformers and sensors. Each module has 4 current inputs for measured values in the range from 0 mA to 20 mA. The SIPROTEC 5 device converts the recorded value to the actual measured value variable via a programmable factor.

Related Topics

[6.3.2 Opening the Device View](#)

6.3.2 Opening the Device View

You can check and change the configuration of an individual SIPROTEC 5 device in the [20.1.7 Device View](#).

The following options are available to open the Device view:

- You can open the Device view with the [3.1.2 Project Tree](#).
- You can change to the Device view from the [20.1.6 Network View](#).
- You can open the Device view from the [20.1.2 Single-Line Editor](#).

The Device view is shown in the working area for all alternatives.

Opening the Device View Using the Project Tree

- ✧ Open the folder of the offline configuration whose device configuration you wish to display in the **Device view** in the project tree.
- ✧ Double-click **Hardware and protocols** in this folder.

The **Device view** is displayed in the working area.

Changing from the Network View to the Device View

- ✧ In the **Network view**, select the SIPROTEC 5 device for which the current configuration is to be displayed.
- ✧ Select the **Device view** tab in the Network view.
- or -
- ✧ In the **Network view**, double-click the SIPROTEC 5 device for which the current configuration is to be displayed.

The **Device view** is displayed in the working area in both cases.

Opening the Device View from the Single-Line Configuration

- ✧ In the single-line configuration, right-click on the SIPROTEC 5 device for which the current configuration is to be displayed.
- ✧ In the context menu, click **Hardware configuration**.

The **Device view** is displayed in the working area.

Related Topics

- ✧ [6.3.3 Scaling the View in the Device View](#)
- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.3 Scaling the View in the Device View

You can change the display size of the [20.1.7 Device View](#) and hence adapt it to the relevant working situation.

The following options are available for scaling the view:

- You can scale the view in predefined stages.
- You can scale the view as percentage.
- You can select a defined end state.
- You can enlarge a square section of the view.

You can also navigate quickly to certain areas of the Device view using an overview navigation.

View Scaling in Predefined Stages

- ✧ Click the arrow button in the [20.7.5 Toolbar of the Device View](#).

A submenu with further buttons is displayed.

- ✧ Click any one of the 2 buttons  or  in this submenu.



NOTE

The relevant button becomes inactive once the maximum or minimum display size is reached.

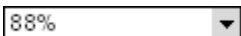
The front and rear views of the SIPROTEC 5 device are shown larger or smaller.

View Scaling as a Percentage

- ✧ Open the list box  in the toolbar of the Device view.
- ✧ Select a percentage.
- or -
- ✧ Enter an integral percentage value from 50 to 500 in the entry field of the list box.
- ✧ Click outside the entry field.
- or -
- ✧ Press the <Enter> key.

The front and rear views of the SIPROTEC 5 device are shown in the selected or entered percentage size.

Selecting Defined End State

- ✧ Open the list box  in the toolbar of the Device view.
- ✧ Select one of the 3 defined end states.

The front and rear views of the SIPROTEC 5 device are shown in the desired end state.

Using the Overview Navigation

- ✧ The bottom right corner of the working area will have a symbol as long as the Device view is visible in the working area. Click this symbol with the mouse.

A small window opens. The window shows a smaller display of the Device view. The mouse pointer changes to a square viewfinder.

- ✧ Move the viewfinder onto the area of the Device view to be displayed in the working area.

The Device view is updated at the same time as the mouse moves.

- ✧ Release the mouse button as soon as you have reached the desired display.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.4 Changing between Different Device Configurations

The [20.1.7 Device View](#) always only shows the configuration of an individual SIPROTEC 5 device. Use the list box in the [20.7.5 Toolbar of the Device View](#) to change between the configurations of different SIPROTEC 5 devices.

Changing between Device Configurations with the List Box

- ✧ Open the device list box in the toolbar of the Device view.

The list shows the names of all SIPROTEC 5 devices in the project.

- ✧ From this list, select the name of the SIPROTEC 5 device whose configuration is to be displayed in the Device view.

The hardware configuration of the selected SIPROTEC 5 device is displayed in the Device view.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.5 Showing and Hiding Hardware-Component Designations

Base modules, expansion modules, and on-site operation panels have designations. You can show or hide designations jointly for all these hardware components in the [20.1.7 Device View](#).

Showing Hardware-Component Designations

- ✧ In the [20.7.5 Toolbar of the Device View](#), click the  button.

All hardware component designations are shown.

Hiding Hardware-Component Designations

- ✧ Click the  button in the toolbar of the Device view.

All hardware component designations are hidden.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.6 Using the Clipboard

Below the [20.7.5 Toolbar of the Device View](#) is an area referred to as the clipboard. You can temporarily store hardware components that are not being used in the clipboard.

The following options are available with the clipboard:

- You can move hardware components from the Hardware catalog or device configuration to the clipboard.
- You can move hardware components from the clipboard to the device configuration.
- You can copy hardware components from the clipboard to the device configuration.

The advantage of this is that all settings for a hardware component are retained. You can even change the settings for a hardware component while it is on the clipboard. For example, you can place a hardware component that is required repeatedly on the clipboard, set parameters there, and then copy it to the respective installation positions in the device configuration.

The clipboard is hidden as standard. You can show the clipboard and hide it again.

Displaying the Clipboard

- ✧ Click the  button in the toolbar of the Device view.

The clipboard is displayed.

Hiding the Clipboard

- ✧ Click the  button in the toolbar of the Device view.

The clipboard is hidden.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.7 Adding a Hardware Component from the Hardware Catalog

The Hardware catalog contains hardware components with which you can expand the current device configuration.

The following options are available for adding a hardware component from the [20.2.4 Hardware Catalog](#) of the device configuration or clipboard:

- You can add the hardware component by drag and drop.
- You can add the hardware component by double-clicking.
- You can add the hardware component with **Copy** and **Paste**.

The Hardware catalog must be open for adding any component.

If you highlight an element in the Hardware catalog, the Information window shows detailed information on this element. This information is provided in text and also graphic form, for example as a diagram of a communication module.

Opening the Hardware Catalog

- ✧ Select the **Hardware catalog** in the task card.
- or -
- ✧ Right-click on the device in the Device view.
- ✧ In the context menu, click **Display catalog**.

The Hardware catalog is displayed in the task card.

Adding a Hardware Component by Drag and Drop

- ✧ Select the desired hardware component in the Hardware catalog. Then drag this to the clipboard or to the desired installation position in the [20.1.7 Device View](#), keeping the mouse button pressed.

If adding at a point is not permitted, the mouse pointer will change to a crossed-out circle.

- ✧ Release the mouse button at a permissible location.

The hardware component is placed in the desired installation position or on the clipboard.

Adding a Hardware Component by Double-Clicking

- ✧ In the Device view, mark a free installation position suitable for the hardware component or mark the clipboard.
- ✧ Double-click the hardware component designation in the Hardware catalog.

If the marked installation position is permissible, the hardware component will be placed there. If you have marked the clipboard, the hardware component will be inserted into the clipboard.



NOTE

If you do not mark an installation position, the hardware component will be placed in the first free installation position suitable for the hardware component.

Adding a Hardware Component with Copy and Paste

- ✧ Right-click the designation of the desired hardware component in the Hardware catalog.
- ✧ In the context menu, click **Copy**.
- ✧ Click the desired installation position or on the clipboard with the right mouse button in the Device view.
- ✧ Click **Paste** in the context menu. This menu item is only active if the installation position is permissible or if you wish to insert the hardware component into the clipboard.

- or -

- ✧ Mark the designation of the desired hardware component in the Hardware catalog.
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.
- ✧ In the Device view, mark a free installation position suitable for the hardware component or mark the clipboard.
- ✧ Click the  button in the DIGSI 5 toolbar. This button is only active if the mounting position is permissible or if you wish to insert the hardware component into the clipboard.

In both cases, the hardware component is placed in the desired installation position or in the clipboard.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.8 Searching for a Hardware Component in the Hardware Catalog

If you know the name of the hardware component to be inserted, the search function will help you find the hardware component in the [20.2.4 Hardware Catalog](#).

Searching for a Hardware Component by Name in the Catalog

- ✧ Enter the name of the hardware component you are looking for in the text box at the top of the Hardware catalog.

- ✧ Click any one of the 2 buttons  or .

If you have clicked the  button, the catalog will be searched from the top down. If you have clicked the  button, the catalog will be searched from the bottom up. If a hardware component with the name entered is present in the catalog, the catalog directory opens at the corresponding point with the name highlighted.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.9 Moving a Hardware Component

The following options are available for moving a hardware component:

- Within a SIPROTEC 5 device
- Between SIPROTEC 5 device and clipboard
- Between 2 SIPROTEC 5 devices

Use drag and drop for the 1st and 2nd option, and use **Copy** and **Paste** for the third option.



NOTE

If you move a connected communication module to the clipboard or another SIPROTEC 5 device, the module is disconnected from the network. However, the settings are retained, for example the selection of a particular protocol.

Moving Hardware Components within a SIPROTEC 5 Device or between the SIPROTEC 5 Device and the Clipboard

- ✧ Select the hardware component you wish to move in the clipboard or in a SIPROTEC 5 device.
- ✧ Drag the hardware component to the new installation position in the SIPROTEC 5 device or to the clipboard, keeping the mouse button pressed.

If adding at a point is not permitted, the mouse pointer will change to a crossed-out circle.

- ✧ Release the mouse button at a permissible installation position or in the area of the clipboard.

The hardware component is placed in the desired installation position or on the clipboard.

Moving a Hardware Component between 2 SIPROTEC 5 Devices

- ✧ Right-click the hardware component you wish to move in a SIPROTEC 5 device.
- ✧ In the context menu, click **Cut**. This menu item is only active if the hardware component can be cut.
- ✧ Open the device list box in the toolbar of the Device view. From this list, select the name of the SIPROTEC 5 device into which you wish to insert the hardware component.

The hardware configuration of the selected SIPROTEC 5 device is displayed in the Device view.

- ✧ Right-click the desired installation position.
- ✧ In the context menu, click **Paste**. This menu item is only active if the installation position is permissible.

The cut hardware component is deleted from the original location and pasted at the destination location.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.10 Copying a Hardware Component

The following options are available for copying a hardware component:

- Within a SIPROTEC 5 device
- Between SIPROTEC 5 device and clipboard
- Between 2 SIPROTEC 5 devices

Use drag and drop for the 1st and 2nd option, and use **Copy** and **Paste** for the third option.



NOTE

If you copy a connected communication module to the clipboard or another SIPROTEC 5 device, the copied module is disconnected from the network. However, the settings are retained, for example the selection of a particular protocol.

Copying Hardware Components within a SIPROTEC 5 Device or from the SIPROTEC 5 Device to the Clipboard

- ✧ Select the hardware component you wish to copy in the clipboard or in a SIPROTEC 5 device.
- ✧ Keep the <Ctrl> key pressed and drag the marked hardware component to the new installation position in the SIPROTEC 5 device or to the clipboard, keeping the mouse button pressed.

If adding at a point is not permitted, the mouse pointer will change to a crossed-out circle.

- ✧ Release the mouse button and the <Ctrl> key at a permissible installation position or in the area of the clipboard.

The hardware component is placed in the desired installation position or on the clipboard.

Copying a Hardware Component between 2 SIPROTEC 5 Devices

- ✧ Right-click the hardware component you wish to move in a SIPROTEC 5 device.
- ✧ Click **Copy** in the context menu. This menu item is only active if the hardware component can be copied.
- ✧ Open the device list box in the toolbar of the Device view. From this list, select the name of the SIPROTEC 5 device into which you wish to insert the hardware component.

The hardware configuration of the selected SIPROTEC 5 device is displayed in the Device view.

- ✧ Right-click the desired installation position.
- ✧ Select **Paste** from the context menu. This menu item is only active if the installation position is permissible.

The copied hardware component is pasted into the destination location.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.11 Deleting a Hardware Component

You can delete hardware components that are installed in the SIPROTEC 5 device or located on the clipboard. You can also delete several hardware components at the same time.

You can delete the following hardware components:

- Communication modules
- Current terminals
- On-site operation panel

**NOTE**

When deleting a hardware component, all data relating to the hardware component is lost, for example all settings of a communication module. All data involving connections with other hardware components or SIPROTEC 5 devices is also lost. This includes connections within the GOOSE communication and network connections.

Deleting a Hardware Component from a SIPROTEC 5 Device or the Clipboard

- ✧ Right-click the hardware component you wish to delete in the SIPROTEC 5 device or in the clipboard. If you wish to delete several hardware components at the same time, mark these first and then right-click one of the hardware components.

- ✧ In the context menu, click **Delete**.

A confirmation prompt is displayed.

- ✧ Click **Yes**. This confirms your action.

The marked hardware components are deleted from the project.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.12 Editing Hardware Component Property Values

Each hardware component has properties whose values you can check or change.

The following list shows a few examples:

- The color of the LEDs of the on-site operation panel
- Labels for terminals, LEDs, and function keys
- Communication and protocol settings for communication modules

Accessing Properties

- ✧ Select the hardware component whose properties you wish to check or edit in the clipboard or a SIPROTEC 5 device.

- ✧ Open the [3.1.4 Inspector Window](#).

- ✧ Select the **Properties** tab.

- ✧ Select the desired group.

The properties and their values are displayed.

- ✧ Check the current values and change these, if necessary.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.3.13 Printing the Hardware Configuration

You can print the hardware-configuration information displayed in the [20.1.7 Device View](#).

Before starting the printing process, you can create and adapt print templates with the Documentation function. In this way, you can ensure a uniform layout for the printout. Read the [17.1.1 Overview for Designing and Printing Documents](#) to learn more about this.

Starting the Printing Process by Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).

- ✧ In the project, open the offline configuration for which you want to print the hardware configuration.
- ✧ In this offline configuration, mark the entry **Hardware and protocols**.
- ✧ In the **Project** menu, click **Print**.

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document template, and a cover page. You will find more information on this under [17.2.3 Selecting Print Options](#).
- ✧ Click **Print**.

The **Print** dialog closes and the selected data is printed.

Starting the Printing Process without Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to print the hardware configuration.
- ✧ In this offline configuration, mark the entry **Hardware and protocols**.
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

Printing starts using the settings last selected.

Related Topics

- ✧ [6.3.1 Overview of the Hardware Structure](#)

6.4 Synchronizing Device Hardware with DIGSI

6.4.1 Overview of Device Hardware Synchronization

This feature enables you to synchronize changes made in device hardware with DIGSI. The inconsistencies in the device hardware and DIGSI can occur due to the changes made in the hardware.

You can synchronize the hardware changes made in DIGSI using any of the following editors in the

[3.1.2 Project Tree](#):

- **Devices and networks**
With this entry, you open the [20.1.5 Device and Networks Editor](#) of the SIPROTEC 5 device associated with the offline configuration. The **Inconsistencies** tab under **Info** tab displays an inconsistency warning message, if you have done any changes in the hardware. You must double-click this message to start hardware synchronization.
- **Device information**
With this entry, you open the [20.5.3 Device Information](#) of the SIPROTEC 5 device associated with the offline configuration. You find more information about this under [6.1.9 Opening Device Information](#). If you have done any changes in the hardware, this editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. Click **Synchronize hardware** in the orange bar to start hardware synchronization.
- **Hardware and protocols**
With this entry, you open the [20.1.5 Device and Networks Editor](#). With this editor, you configure the hardware of a SIPROTEC 5 device and the structure of an Ethernet network. You find more information about this under [6.3.1 Overview of the Hardware Structure](#) and under [14.1.4 Communication Using Ethernet](#). If you have done any changes in the hardware, this editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. Click **Synchronize hardware** in the orange bar to start hardware synchronization.
- **Measuring-points routing**
With this entry, you open the [20.3.8 Measuring-Points Routing](#) matrix. With this matrix, you route logic measuring points of the application to the physical power and voltage inputs of the SIPROTEC 5 device. You find more information about this under [8.1.5.1 Overview of Measuring Points](#). If you have done any changes in the hardware, this editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. Click **Synchronize hardware** in the orange bar to start hardware synchronization..
- **Function-group connections**
With this entry, you open the [20.3.4 Function-Group Connections](#) matrix. You find more information about this under [8.1.4.1 Overview of Connections](#). If you have done any changes in the hardware, this editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. Click **Synchronize hardware** in the orange bar to start hardware synchronization.
- **Information routing**
With this entry, you open the [20.3.2 Information Routing](#) matrix. With this matrix, you assign information to sources and destinations. You find additional information about measured values, process signals, and so on, under [11.1 Overview for Information Routing](#). If you have done any changes in the hardware, this editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. Click **Synchronize hardware** in the orange bar to start hardware synchronization.

- **Communication mapping**

With this entry, you open the [20.3.1 Communication Mapping](#) matrix. With this matrix, you assign internal signals to serial protocols in order to transmit them over the communication interfaces of a SIPROTEC 5 device. You find more information about this under [14.9.1 Overview of Communication Mapping](#). If you have done any changes in the hardware, this editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. Click **Synchronize hardware** in the orange bar to start hardware synchronization.

- **Task Card**

Open the [20.2.5 Signals](#) tab in the task card of the [20.1.10 Function-Chart \(CFC\) Editor](#) or [20.1.13 Display Editor](#). If you have done any changes in the hardware, this editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. Click **Synchronize hardware** in the orange bar to start hardware synchronization.

Related Topics

[20.1.5 Device and Networks Editor](#)

[20.5.3 Device Information](#)

[6.3.1 Overview of the Hardware Structure](#)

[20.3.8 Measuring-Points Routing](#)

[20.3.4 Function-Group Connections](#)

[20.3.2 Information Routing](#)

[20.3.1 Communication Mapping](#)

[20.1.10 Function-Chart \(CFC\) Editor](#)

[20.1.13 Display Editor](#)

6.4.2 Synchronizing Device Hardware with DIGSI

✧ Open the folder of the offline configuration whose device configuration has been changed.

✧ Double-click any routing editor.

The editor is displayed in the working area with an orange color bar with a warning message and an option **Synchronize hardware**. You can also view the warning message in the **Inconsistencies** tab under **Info** tab in the **Inspector** window.



NOTE

The inconsistencies can occur, if you modify any I/O module, terminal block or communication module configured with routings or if any changes are done in the hardware. The editors with inconsistencies are not available for editing until synchronization is done.

✧ Click **Synchronize hardware** in the orange color bar in the working area.

Synchronizing hardware dialog opens for confirmation.

✧ Click **Yes**.

- or -

✧ Open the **Inconsistencies** tab under **Info** tab in the **Inspector** window.

The **Inconsistencies** tab under **Info** tab displays an inconsistency warning message.

✧ **Double-click** this error message

Synchronizing hardware dialog opens for confirmation.

✧ Click **Yes**.

A progress window **Synchronizing DIGSI with hardware** opens indicating synchronization progress. After synchronization is complete, orange color bar is cleared and synchronization is complete.



NOTE

If there are further any inconsistencies, you must resolve the inconsistency warnings from the **Inconsistencies** tab automatically or manually in the corresponding editor.

✧ [6.4.1 Overview of Device Hardware Synchronization](#)

6.5 Processing Display Pages

6.5.1 Overview of Display Pages

A display can show different information, depending on the device version:

- Text
- Signals
- Static and dynamic graphics

The set of all information displayed at any one moment is termed a display page. With the [20.1.13 Display Editor](#), you can design up to 10 different display pages for each SIPROTEC 5 device in your project. This is done by positioning various elements on a display page. These elements include graphical elements, text, and placeholders for signal values that will be displayed later during operation and updated cyclically.

Graphical elements represent equipment items such as busbars or circuit breakers. A library offers you a large selection of predefined graphical elements. All graphical elements are available for display according to ANSI or IEC.

You can design your own graphical elements to add to the predefined graphical elements. A graphical element consists of up to 4 symbols that visualize different states. You define graphical elements and their symbols using the [20.1.15 Symbol Editor](#). This provides you with different drawing tools for this purpose. You can use these to design the symbols and enter a name of your selection for the graphical element.

You can connect dynamic graphical elements to process information. In this way, you can visualize the states of equipment items, for example, the position of a switch, on the display page.

Related Topics

- [6.5.2.1 Opening a Display Page](#)
- [6.5.5.1 Opening the Symbol Editor](#)
- [3.3.4 Displaying Elements According to ANSI or IEC](#)

6.5.2 Managing Display Pages

6.5.2.1 Opening a Display Page

To open a display page, use the [3.1.2 Project Tree](#). The display page will be shown in the working area.

Opening a Display Page Using the Project Tree

- ✧ In the project tree, open the folder of the offline configuration for which you want to display a display page.
- ✧ Double-click **Display pages** in this folder.

You will see the names of all available display pages.

- ✧ Double-click the name of the display page you want to open.

The selected display page will be shown in the working area.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.2.2 Adding a Display Page

You can create up to 10 display pages in DIGSI 5 for each SIPROTEC 5 device. A consecutively numbered default name is assigned to each display page that is added. You can change this name at any time. The new display page does not contain any elements other than this name.

Adding a New Display Page Using the Project Tree

- ✧ In the [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to add a new display page.
- ✧ In the **Display pages** folder of this unit, double-click **Add new display page**.

A new, empty display page will be added and shown in the working area.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.2.3 Renaming a Display Page](#)
- ✧ [6.5.2.4 Changing a Sequence of Display Pages](#)
- ✧ [6.5.2.5 Defining a Display Page as Standard Page](#)

6.5.2.3 Renaming a Display Page

You can give each display page an individual name. This name will also be shown on the display of the SIPROTEC 5 device. However, the display can only show a limited number of characters in the header. The name you assign can be longer than this. Excess characters will be truncated on the display, but still shown in the text box.

You can change the name of a display page in one of the following ways:

- You can modify the name in the [3.1.2 Project Tree](#).
- You can modify the name on the display page.
- You can change the name in the properties of the display page.

Changing the Name of the Display Page in the Project Tree

- ✧ In the project tree, open the folder of the offline configuration in which you want to rename a display page.
- ✧ Double-click **Display pages** in this folder.

You will see the names of all available display pages.

- ✧ Right-click the name of the display page you want to modify.
- ✧ Select **Rename** from the context menu.

The name will be shown in a text box and highlighted in a color.

- ✧ Enter a new name for the display page.
- ✧ Click outside the text box.

- or -

- ✧ Press the **<Enter>** key.

You confirm your entry with these 2 actions.

The new name for the display page will be applied.

Modifying the Display Page Name on the Display Page

- ✧ Select the current name in the header of the display page.
- ✧ Enter a new name for the display page.
- ✧ Click another area of the display page.

- or -

- ✧ Press the **<Enter>** key.

You confirm your entry with these 2 actions.

The new name for the display page will be applied.

Changing the Name of the Display Page in the Properties

- ✧ In the working area, show the display page whose name you want to change.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Select the [19.3.1 Display Page – Details](#) group.
- ✧ Enter a new name for the display page in the **Name** text box.
- ✧ Click outside the text box.
- or -
- ✧ Press the **Enter** key.

You confirm your entry with these 2 actions.

The new name for the display page will be applied.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.2.4 Changing a Sequence of Display Pages

You can modify the sequence of the display pages in the [3.1.2 Project Tree](#).



NOTE

In the SIPROTEC 5 device, you can switch between the available display pages in a defined sequence using forward and backward keys. The sequence of the names in the project tree defines this display sequence. Modifying the sequence of the names in the project tree also modifies the display sequence in the SIPROTEC 5 device.

Modifying the Sequence of the Display Pages in the Project Tree

- ✧ In the project tree, open the folder of the offline configuration in which you want to modify the sequence of the display pages.
 - ✧ Double-click **Display pages** in this folder.
- You will see the names of all available display pages.
- ✧ In the project tree, select the name of the display page that you wish to move.
 - ✧ Drag the selected name vertically, holding the mouse button down.

A horizontal line between 2 existing entries identifies the permissible position.

- ✧ Release the mouse button as soon as you have reached the desired position.

If the selected position is permissible, the name will be placed at the selected position.



NOTE

Each display page automatically contains a page number that identifies the exact position in the sequence. You can check this page number in the properties of a display page in the [19.2.1 Device – Details](#) group.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.2.5 Defining a Display Page as Standard Page](#)

6.5.2.5 Defining a Display Page as Standard Page

DIGSI 5 defines the first display page to be added as the default page. This default page will be shown in the display when the SIPROTEC 5 device is first switched on or restarted.

If there is more than one display page, you can also define another display page as the default page. You can ascertain whether or not a display page is the default page of the SIPROTEC 5 unit in the properties, where you can also modify this setting.

Specifying a Default Page

- ✧ In the working area, show the display page that you want to define as the default page.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Select the [19.3.1 Display Page – Details](#) group.
- ✧ Select the **Default page** check box.

The current display page will be defined as the default page. The selection on the previous default page will automatically be removed.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.2.4 Changing a Sequence of Display Pages](#)

6.5.2.6 Deleting a Display Page

You can delete display pages of a SIPROTEC 5 device. You always delete display pages via the project tree. It is also possible to delete multiple display pages simultaneously.



NOTE

If you have unintentionally deleted one or more display pages, you can close the project without saving to recover those display pages. After you have opened the project, the display pages will be present again. However, all changes to data that you made since the last time you saved the project will have been lost.

Deleting Display Pages via the Project Tree

- ✧ In the project tree, open the folder of the offline configuration from which you want to delete a display page.
- ✧ Double-click **Display pages** in this folder.

You will see the names of all available display pages.

- ✧ Right-click the name of the display page you want to delete. If you wish to delete multiple display pages at the same time, first select the names of all of these display pages and then right-click one of these names.
- ✧ Select **Delete** from the context menu.

A confirmation prompt will be displayed.

- ✧ Click **Yes**.

This confirms your action.

The selected display pages will be deleted and their name removed from the project tree.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.2.7 Printing a Display Page

You can print an individual display page, a selected number of display pages, or all display pages of a SIPROTEC 5 device.

Selecting Display Pages

- ✧ Open the [3.1.2 Project Tree](#).
 - ✧ In the project, open the offline configuration for which you want to print the display pages.
 - ✧ In this offline configuration, double-click **Display pages**.
- You see the names of all available display pages.
- ✧ To print an individual display page, select the name of this display page.
 - or -
 - ✧ To print multiple display pages, select the names of these display pages. This is done by holding down either the SHIFT key or the <Ctrl> key, depending on the selection method.
 - or -
 - ✧ To print all display pages, select the **Display pages** folder.

Starting the Printing Process by Selecting the Print Options

- ✧ Select the display pages to be printed.
 - ✧ From the **Project** menu, select **Print**.
- The [20.6.23 Print](#) dialog opens.
- ✧ Use this dialog to select a printer, a document template, and a cover page. You will find more information on this under [17.2.3 Selecting Print Options](#).
 - ✧ Click **Print**.
- The **Print** dialog closes and the selected data is printed.

Starting the Printing Process without Selecting the Print Options

- ✧ Select the display pages to be printed.
 - ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.
- Printing will start using the settings last selected.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [17.1.1 Overview for Designing and Printing Documents](#)

6.5.3 Inserting Elements

6.5.3.1 Hiding and Showing Grids in a Display Page

A grid helps you visually align the elements on the display page. You can show and hide this grid.

Hiding the Grid

- ✧ Right-click the display page.
- ✧ Click **Grid off** in the context menu.
- or -

- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click the  button.

In either case, the grid will be hidden.

Showing the Grid

- ✧ Right-click the display page.
- ✧ Click **Grid on** in the context menu.
- or -
- ✧ Click the  button on the toolbar of the Display editor.

In either case, the grid will be shown.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.3.2 Inserting a Graphical Element in a Display Page

Graphical elements represent equipment items such as disconnecter switches or circuit breakers. All graphical elements are to be found in the global DIGSI 5 library. You can insert them into the display page by drag and drop.



NOTE

The symbols on the display page correspond to the standard that is selected during creation, that is, ANSI or IEC. If you select the other standard, the symbols on the display pages will **not** change. This enables you to create display pages for 2 different standards. For more information, see [3.3.4 Displaying Elements According to ANSI or IEC](#).

Inserting Graphical Elements into the Display Page

- ✧ Right-click the display page.
- ✧ Click on **Insert elements from library** in the context menu.

On the [20.2.3 Libraries](#) tab in the task card, the **Single-line and display elements** directory opens. This contains the elements for all equipment.

- ✧ In the library, select the element you require.
- ✧ Drag the element to the insert position on the display page.

If insertion is not allowed at this position, the mouse pointer will change to a crossed-out circle.

- ✧ Release the mouse button at a permissible position.

The element will be placed at the selected position.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.3.5 Connecting Graphical Elements in a Display Page with a Signal](#)
- ✧ [6.5.4.6 Connecting Display Elements](#)
- ✧ [6.5.3.6 Creating Display Pages from a Single-Line Configuration](#)
- ✧ [6.5.3.3 Inserting Text to a Display Page](#)
- ✧ [6.5.3.4 Inserting a Signal in a Display Page](#)

6.5.3.3 Inserting Text to a Display Page

A display page can contain static text. Static text is information that you can add to the display page. This information is independent of influences. It is added by creating a text box and entering the text information in this box.

Inserting a Static Text to a Display Page

- ✧ Right-click a free position on the display page.
- ✧ Click **Insert text** in the context menu.
- or -
- ✧ Click the  button on the toolbar of the Display editor.

In either case, the mouse pointer will change to a letter.

- ✧ Click the desired insert position on the display page.

A text box will be inserted into the display page.

- ✧ Double-click in this text box and enter the desired text.
- ✧ Click outside the text box.
- or -
- ✧ Press the **<Enter>** key.

You confirm your entry with these 2 actions.

The text entered will be applied on the display page.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.3.4 Inserting a Signal in a Display Page](#)
- ✧ [6.5.3.2 Inserting a Graphical Element in a Display Page](#)

6.5.3.4 Inserting a Signal in a Display Page

SIPROTEC 5 devices can dynamically show signals such as measured values, metered values, binary values on the display. The SIPROTEC 5 device therefore cyclically updates these values. In DIGSI 5, insert the signals whose values you want to be displayed into the display page.

With the dynamic value display, you can implement direct visual assignment of equipment and process information on the display page. For example, you can place a current value directly next to the symbol of the associated current transformer on the display page. You can also display the decimal places and the unit for the values of analog signals. For binary signals, values defined by the system will be displayed depending on the state of the signal, for example, **ON** or **OFF**.

There are 2 ways of inserting a signal to the display page:

- You insert a dynamic field into the display page and then connect this field to the desired signal.
- You drag the signal directly onto the display page. With this method, a dynamic field is automatically created and connected to the signal.

Displaying in different colors assists you when you connect a dynamic field to a signal:

- The color **red** identifies a free dynamic field that is not connected to any signal.
- The color **green** indicates all dynamic fields that are suitable as a target as soon as you drag a signal onto the display page.
- The color **blue** indicates that a dynamic field is already connected to a signal.

You can insert signals from the signal catalog in the display page with drag and drop. If the SIPROTEC 5 device currently being worked on is able to communicate with other SIPROTEC 5 devices through the GOOSE service of IEC 61850, the signal catalog also contains the signals from these other SIPROTEC 5 devices. In a list box,

you select a SIPROTEC 5 device whose signals will be displayed in the signal catalog. Without the GOOSE service, the signal catalog only contains the signals of the SIPROTEC 5 device currently being worked on. The signals are structured in a hierarchical manner. Like in the project tree, you can navigate through the structure and show or hide individual levels. With 2 list boxes, you can filter the displayed signals according to signal names and signal types.

**NOTE**

If you connect a signal from a different SIPROTEC 5 device, a GOOSE connection will automatically be created. You find more information about this under [9.6.4 External Signals in the Signal Catalog](#).

List of Supported Signals for the Display Page

- Binary Analog Controllable (BAC)
- Binary Counter Reading (BCR)
- Binary Controlled Step Position Information (BSC)
- Complex Measured Value (CMV)
- 3-phase Measured Value Delta Connection (DEL)
- Double-point Controllable (DPC)
- Double-point Indication (DPS)
- Enumerated Setting Controllable (ENC)
- Enumerated Status Health (ENS)
- Status of a Whole Number (INS)
- Measured Value (MV)
- Single-point Controllable (SPC)
- Single-point Indication (SPS)

Opening the Signal Catalog and Selecting a Signal

- ✧ In the task card, go to the [20.2.5 Signals](#) tab.

The signals of the selected SIPROTEC 5 device are displayed in the signal catalog.

- ✧ Open further levels in the signal structure until you are able select the desired signal.

Inserting a Dynamic Field and Connecting It with a Signal

- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click the  button.

The mouse pointer will change to a letter icon.

- ✧ Click the desired insert position on the display page.

The dynamic field will be inserted. It consists of 4 rhombuses for the value of the signal and a text box for the signal name. You can move the dynamic field just like any other element on the display page.

- ✧ Select the signal in the signal catalog.
- ✧ Drag the signal onto the display page, holding the mouse button down.

All dynamic fields that have not yet been connected appear green.

- ✧ Continue to drag the signal onto one of these dynamic fields.
- ✧ Release the mouse button.

If the connection is permissible, the signal will be connected to the dynamic field. The 4 rhombuses will appear blue. The text box will contain the name of the connected signal. The signal name, signal type, and signal path will be shown in the properties of the dynamic field.

Inserting a Signal Directly

- ✧ Select the signal in the signal catalog.
- ✧ Drag the signal onto a free position on the display page, holding the mouse button down.
- ✧ Release the mouse button.

If insertion is permissible, a dynamic field will be created and the signal will be connected to this field. The 4 rhombuses will appear blue. The text box will contain the name of the connected signal. The signal name, signal type, and signal path will be shown in the properties of the dynamic field.

Connecting a Dynamic Field with a Signal

- ✧ Select the signal in the signal catalog.
- ✧ Drag the signal onto a dynamic field that is already connected to a signal, holding the mouse button down.
- ✧ Release the mouse button.

If the connection is permissible, the connection will be disconnected from the original signal and the new signal will be connected to the dynamic field. The text box will contain the name of the reconnected signal.

Deleting a Connection

- ✧ Right-click a dynamic field that is connected to a signal.
- ✧ Click **Disconnect signal** in the context menu.

The connection between the dynamic field and the signal will be deleted. The 4 rhombuses will appear red.

Editing the Properties for an Analog Signal

- ✧ On the display page, select the dynamic field that is connected to the analog signal.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Go to the [19.3.3 Dynamic Field – Details](#) group.
- ✧ Optionally set the decimal places with the **Number of decimal points** list box. This is done by clicking the arrow buttons of the list box. You can set 0 to 6 decimal places.
- ✧ Optionally select the **Display with unit** check box. The value will now appear with its unit on the display of the SIPROTEC 5 device.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.3.3 Inserting Text to a Display Page](#)
- ✧ [6.5.3.2 Inserting a Graphical Element in a Display Page](#)

6.5.3.5 Connecting Graphical Elements in a Display Page with a Signal

You can connect a graphical element having 2 or 4 states to a signal from the signal catalog. In this way, you can control the states of the graphical element on the display depending on the state of the signal.

For example, you can connect the graphical element for a circuit breaker to the **Position** signal of the corresponding circuit breaker. If the circuit breaker is closed, the display on the device will show the closed circuit-breaker symbol. If the circuit breaker is open, the display on the device will show the open circuit-breaker symbol. This also applies to the undefined and disturbed position of the circuit breaker.

Connecting is performed according to the following rules:

- You cannot connect a graphical element having only one state to signals.
- You can connect a graphical element having 2 states only to signals of type **SPC** or **SPS**.
- You can connect a graphical element having 4 states only to signals of type **DPC** or **DPS**.

Display in different colors helps you when you connect a graphical element to a signal:

- The color **red** identifies a free graphical element that is not connected to any signal.
- The color **green** indicates all dynamic fields that are suitable as a target as soon as you drag a signal onto the display page.
- The color **blue** indicates that a graphical element is already connected to a signal.

You can insert signals from the signal catalog in the display page with drag and drop.

The signals are structured in a hierarchical manner. Like in the project tree, you can navigate through the structure and show or hide individual levels. With 2 list boxes, you can filter the displayed signals according to signal names and signal types.

Opening the Signal Catalog and Selecting a Signal

- ✧ In the task card, go to the [20.2.5 Signals](#) tab.

The signal catalog will be displayed.

- ✧ Select from the **Select device** list box the SIPROTEC 5 device from which you want to interconnect a signal.

The signals of the selected SIPROTEC 5 device are displayed in the signal catalog.

- ✧ Open further levels in the signal structure until you are able to select the desired signal.

Inserting the Graphical Element and Connecting It to a Signal

- ✧ Insert a graphical element into the display page as described in [6.5.3.2 Inserting a Graphical Element in a Display Page](#).
- ✧ Select the signal in the signal catalog.
- ✧ Drag the signal onto the display page, holding the mouse button down.

All graphical elements that have not yet been connected appear green.

- ✧ Drag the signal onto one of these graphical elements.
- ✧ Release the mouse button.

If the connection is permissible, the signal will be connected to the graphical element. The graphical element appears in blue. The signal name, signal type, and signal path will be shown in the properties of the graphical element.

Deleting a Connection

- ✧ Right-click a graphical element that is connected to a signal.
- ✧ Click **Disconnect signal** in the context menu.

The connection between the graphical element and the signal will be deleted. The graphical element appears in red.

Reconnecting a Graphical Element

- ✧ Select the signal in the signal catalog.
- ✧ Drag the signal onto a graphical element that is already connected, holding the mouse button down.
- ✧ Release the mouse button.

If the connection is permissible, the connection will be disconnected from the original signal and the new signal will be connected to the graphical element.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.3.6 Creating Display Pages from a Single-Line Configuration

You can generate display pages directly from a single-line configuration. There are 2 ways of doing this:

- You can generate one display page for one selected bay. The bay must be connected to a SIPROTEC 5 device.
- You can generate one display page each for all bays connected to a SIPROTEC 5 device.

If at least one element of the bay is connected to a busbar, the busbar will also be included on the display page.



NOTE

The symbols on the display page conform to the standard that is selected during creation, that is, ANSI or IEC. If you select the other standard, the symbols on the display pages will **not** change. This enables you to create display pages for 2 different standards. For more information, see [3.3.4 Displaying Elements According to ANSI or IEC](#).

Creating a Display Page from 1 Bay

- ✧ Show the single-line configuration in the working area.
- ✧ In the single-line configuration, select one bay and no more than one that is connected to a SIPROTEC 5 device.

In the [20.7.2 Toolbar of the Single-Line Editor](#), the **Create display** button will be activated.

- ✧ Click the  button on the toolbar of the single-line editor.

In the **Display pages** folder of the relevant SIPROTEC 5 device, a new display page will be added and displayed in the working area. The display page contains the elements and connections of the selected bay. If at least one element of the bay is connected to a busbar, the display page will also contain the busbar.

Creating Display Pages from All Connected Bays

- ✧ Show the single-line configuration in the working area.
- ✧ Select one SIPROTEC 5 device in the single-line configuration.

In the [20.7.2 Toolbar of the Single-Line Editor](#), the **Create display** button will be activated.

- ✧ Click the  button on the toolbar of the single-line editor.

In the **Display pages** folder of the selected SIPROTEC 5 device, one or more new display pages will be added and displayed in the working area. The number of display pages corresponds to the number of bays connected to the SIPROTEC 5 device. The display pages contain the elements and connections of the bays. If at least one element of a bay is connected to a busbar, the display page in question will also contain the busbar.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [6.5.3.3 Inserting Text to a Display Page](#)
- ✧ [6.5.3.4 Inserting a Signal in a Display Page](#)
- ✧ [6.5.3.2 Inserting a Graphical Element in a Display Page](#)

6.5.4 Editing Elements

6.5.4.1 Renaming a Graphical Element in a Display Page

You can give each graphical element an individual name. However, the display can only show a limited number of characters of the name. The number of displayable characters also depends on the position of the element on the display page. The name you assign can be longer than this. Excess characters will be truncated on the display, but still shown in the text box.

You can change the name of a graphical element in one of the following ways:

- You can modify the name on the display page.
- You can change the name in the properties of the graphical element.

Changing the Name of the Graphical Element on the Display Page

- ✧ Right-click the graphical element that you wish to rename.
- ✧ Select **Rename** from the context menu.

The name will be shown in a text box and highlighted in a color.

- ✧ Enter a new name for the element.
- ✧ Click outside the text box.

- or -

- ✧ Press the **Enter** key.

You confirm your entry with these 2 actions.

The new name will be applied.

Changing the Name of the Graphical Element in the Properties

- ✧ Select the graphical element that you want to rename.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Select the [19.3.2 Graphical Element – Details](#) group.
- ✧ Enter a new name for the graphical element in the **Name** text box.
- ✧ Click outside the text box.

- or -

- ✧ Press the **Enter** key.

You confirm your entry with these 2 actions.

The new name will be applied and updated on the display page.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.4.2 Marking a Display Element

You can select an individual element or a group of elements. A colored border identifies each selected element.

Selecting an Individual Element

- ✧ Click the element.

The element will be selected.

Selecting a Group of Elements

- ✧ Click a free area of the display page.
 - ✧ Drag open a rectangle, holding the mouse button down.
 - ✧ Release the mouse button once the rectangle has reached the desired size.
- All elements within the rectangle will be selected.

Selecting All Elements

- ✧ In the **Edit** menu, click **Select All**.
- All elements within the display page will be selected.

Deselecting

- ✧ Click an unselected area of the display page.
- or -
- ✧ Select a different element.



NOTE

You can mark additional elements or remove an existing selection. To do so, hold down the <Ctrl> key while you click the elements in question.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.4.3 Rotating a Display Element

You can rotate the elements of equipment added in the display page 90 degrees clockwise or counterclockwise.



NOTE

Elements of the type **busbar** cannot be rotated. Instead, one horizontal and one vertical busbar is available as separate elements in the library.

Only the symbol of the equipment item is rotated, not the associated text box with the element names.

Rotating an Element

- ✧ Right-click a single rotatable element.
- ✧ In the context menu, click either **Rotate element 90 degrees counterclockwise** or **Rotate element 90 degrees clockwise**.
- or -
- ✧ Select a single rotatable element.
- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click either of the 2 buttons  or .

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.4.2 Marking a Display Element](#)

6.5.4.4 Moving a Display Element

You can move, and therefore reposition elements and links on a display page. Tie lines between the elements will be adapted automatically. You can move the name of an equipment item independently of the symbol. The symbol and the name remain a single unit.

There are 2 ways of moving elements:

- You can move elements with the mouse.
- You can move elements with the keyboard.



NOTE

You cannot move elements beyond the boundaries of the display page.

Moving Elements Using the Mouse

- ✧ Select an individual element or a group of elements.
- ✧ Click a selected element and hold the mouse button down.
- ✧ Move the element or the group of elements.

Moving Elements Using the Keyboard

- ✧ Select an individual element or a group of elements.
- ✧ Press the arrow keys on the keyboard.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.4.2 Marking a Display Element](#)

6.5.4.5 Deleting, Copying, or Pasting Display Elements

You can apply the following standard edit functions to the elements of a display page:

- Copy
- Paste
- Delete

Copying Elements

- ✧ Select an individual element.
 - ✧ Right-click a selected element and then select **Copy** from the context menu.
- or -

- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

All selected elements will be copied to the clipboard.

Pasting Elements

- ✧ Right-click the desired insertion position on the display page.
 - ✧ Select **Paste** from the context menu.
- or -

- ✧ Click the button in the DIGSI 5 toolbar .

All elements from the clipboard are inserted in the display page.



NOTE

You can paste elements copied from one display page to another display page of the same device, or another device, and also from one project to another project opened in another instance of DIGSI.

Deleting Elements

- ✧ Select an individual element or a group of elements.
- ✧ Right-click a selected element and then select **Delete** from the context menu.
- or -
- ✧ Click the button in the DIGSI 5 toolbar .

All selected elements will be deleted.



NOTE

You can delete label of elements and signals in a display page.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.4.2 Marking a Display Element](#)

6.5.4.6 Connecting Display Elements

Lines connect graphical elements such as **disconnecter switches**, **current or voltage transformers**, and **circuit breakers** with each other and with a busbar. You define which elements are to be interconnected. The line routing is defined automatically and will be optimally corrected when you move elements.

While connecting more than 2 elements using the connection lines, a junction point in the shape of a square is created. From this junction point, all the links are connected to the respective elements. You can move the junction point to the desired location using the mouse or the keyboard.

With the keyboard, you can select and move the junction point precisely by holding down the <CTRL> and <ARROW> keys together or move the junction point swiftly by using the <ARROW> keys. The connection is possible only from an element to an existing connection line and not from the junction point to an element. Upon selection, the connection line that connects connecting points is highlighted in green color.

Drawing a Line

- ✧ Position the mouse pointer on the connection point of an element. This connection point marks the start of the line.

The mouse pointer is in the correct position when it changes to a hand.

- ✧ Press the left mouse button and drag a direct line to the connection point of a 2nd element. This connection point marks the end of the line.

As soon as you come close to the connection point, the line will snap to the element. Busbars are highlighted by a border.

- ✧ Release the mouse button.

If the desired connection is permissible, a line will be drawn horizontally and/or vertically.

Changing a Connection

- ✧ Click the existing connecting line.

The line will be selected with colored connection points at both ends.

- ✧ Place the mouse pointer on the connection point of the line end that you want to connect to a different connector.

The mouse pointer is in the correct position when it changes to a hand.

- ✧ Press the left mouse button and drag the line end to the new connection point.

As soon as you come close to the connection point, the line will snap to the element. Busbars are highlighted by a border.

- ✧ Release the mouse button.

If the connection is permissible, the line will be redrawn.

Canceling Drawing

- ✧ To cancel drawing a line, release the mouse button outside the snap-to area of a connection point.

Deleting a Line

- ✧ Right-click the line that you wish to delete.
- ✧ Select **Delete** from the context menu.
- or -
- ✧ Select the line that you want to delete.
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

In either case, the selected line will be deleted.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.5 Creating Graphical Elements

6.5.5.1 Opening the Symbol Editor

With the [20.1.15 Symbol Editor](#), you create the symbols for elements that you can then use on the display page. You have the following possibilities:

- You can create the symbols for a new element.
- You can modify the symbols of an element inserted on the display page.
- You can copy and paste a symbol from one state to another state.

Creating Symbols for a New Element

- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click the  button.

The Symbol editor opens in the working area. The editing areas for the individual symbols are empty.

Modifying the Symbols of an Element Inserted on the Display Page

- ✧ On the display page, double-click the symbol that you want to modify.

The [20.1.15 Symbol Editor](#) opens in the working area. The editing areas display the individual graphical representatives of the element. It is possible to zoom in or zoom out the content of the drawing area up to 3 levels in the [20.1.15 Symbol Editor](#).



NOTE

Your entries in the [20.1.15 Symbol Editor](#) will not be applied, until you close the Symbol editor by clicking **OK**. You can also leave all the states empty without including any elements.

Closing the Symbol Editor

- ✧ If you want to apply the symbols you have created as a new element, click **OK**.

The Symbol editor closes. A new element is inserted on the display page.

- or -

- ✧ If you do not want to apply the symbols you have created, click **Cancel**.

The Symbol editor closes. No new element is inserted on the display page. The symbols created so far are retained in the Symbol editor. When you reopen the Symbol editor, you will be able to continue to work on the symbols.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.5.2 Using Display Elements from the Library as Template

You can use an element from the DIGSI 5 library as a template.

Using an Element as a Template

- ✧ Open the DIGSI 5 library
- ✧ Open the **Single-line and display elements** directory. This contains the elements for all equipment.
- ✧ In the library, select the element you require.
- ✧ Drag the element into the Symbol editor, holding the mouse button down.
- ✧ Release the mouse button.

All symbols of the selected element will be shown in the Symbol editor. You can now edit the elements.



NOTE

The element in the library is not modified by editing.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.5.3 Renaming a User-Defined Display Element

By default, the name **New Element** is assigned to each element you create. You can also give the element an individual name.

However, the display can only show a limited number of characters of the name. The number of displayable characters also depends on the position of the element on the display page. However, the name you assign can be longer than this. Excess characters will be truncated on the display, but still shown in the text box.

Renaming an Element

- ✧ Enter a name for the element in the **Name** text box.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.5.4 Selecting a Dynamic or Static Element

With the [20.1.15 Symbol Editor](#), it is possible to create static and dynamic elements. A static element only has one state and therefore also only one symbol. A dynamic element has up to 4 states and has one symbol for each state.

You can connect a dynamic element to an information item such as a double-point indication. On the SIPROTEC 5 device, one symbol visualizes each possible state of the double-point indication.

Define a basic state for all dynamic graphical elements. It is therefore you who define which symbols will be displayed in the Display editor. The **Off** state is selected as the default and corresponds to the first state of the 4 symbols.

Defining Possible States of the Element

- ✧ To define a static element with only one state, select the **Static symbol** option.
- or -
- ✧ To define a dynamic element with 2 states, select the **Dynamic symbol for single-point indications** option.
- or -
- ✧ To define a dynamic element with 4 states, select the **Dynamic symbol for single-point indications** option.

Defining a Basic State for an Element

- ✧ From the **Standard symbol** list box, select one of the values **Off**, **On**, **Intermediate position**, or **Disturbed position** as the basic state of the graphical element.



NOTE

You can modify the number of states at any time. For example: If an element has 4 symbols and you select the **Static Element** option, states 2 through 4 will be ignored. In this case, the basic state will automatically have the value **Off**. The other states to which settings are assigned, however, are not lost.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.5.5 Determining the Size of a Display Element

You can define the maximum size of the element in the range 10 to 80 pixels. The height and width can be set independently. The element size determines the size of the plotting areas for the 4 symbols of an element and therefore the maximum extent of the symbols.

Siemens recommends setting the element size before you start drawing symbols. Even if you have created one or more symbols already, you can still modify the element size. If you change the width and height of the symbol lesser than the boundary of already drawn symbol, then all state views are cleared automatically. These parts will later not be displayed on the display page. These parts are, however, still present in the Symbol editor.

The preview area is positioned on the left side of the drawing area and the editor displays the drawing area and the symbol in its original size.

Defining the Size for the Element and All 4 Drawing Areas

- ✧ Select a value for the width of the graphical element from the **Width** list box.
- ✧ Select a value for the height of the graphical element from the **Height** list box.

The same size that you selected is now set in all 4 plotting areas.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.5.6 Drawing Lines, Ellipses, and Rectangles

In the Symbol editor, you can access basic graphical elements like in a drawing program. These basic elements include lines, ellipses, and rectangles. A separate tool is available to you for each basic element.

Drawing a Straight Line

- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click the  button.
- ✧ Click the starting point of the line inside the symbol area.
- ✧ Drag the mouse pointer to the end point of the line.
- ✧ Release the mouse button.

Drawing Single Points or a Free-Hand Line

- ✧ Click the  button on the toolbar of the Display editor.
- ✧ To draw a single point, single-click inside the symbol area.
- or -
- ✧ To draw a free-hand line, click the starting point of the line inside the symbol area.
- ✧ Drag the mouse pointer along a path corresponding to the shape of the free-hand line you wish to draw.
- ✧ Release the mouse button.

Drawing an Ellipse or Circle

- ✧ Click the  button on the toolbar of the Display editor.
- ✧ Click the starting point of the ellipse inside the symbol area.
- ✧ Drag an ellipse while holding the mouse button.
- or -
- ✧ To draw a circle, additionally hold the SHIFT key down while dragging open the ellipse.
- ✧ Release the mouse button.

Drawing a Rectangle or a Square

- ✧ Click the  button on the toolbar of the Display editor.
- ✧ Click the starting point of the rectangle inside the symbol area.
- ✧ Drag open the rectangle, holding the mouse button down.
- or -
- ✧ To draw a square, additionally hold the SHIFT key down while dragging open the rectangle.
- ✧ Release the mouse button.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.5.11 Inserting Connection Points](#)

6.5.5.7 Inserting Curves, Triangles, and Circle Segments

Separate tools are available to you for inserting curves, triangles, and circle segments.

Inserting Curves, Triangles, or a Circle Segment

- ✧ Open one of the 3 list boxes **Curves**, **Triangles**, or **Circle segments** on the toolbar of the Display editor, depending on the type of polygon you require.
- ✧ Click one of the 4 standard shapes in the list box.
- ✧ Click the symbol area into which you want to insert the selected shape.

The shape will be inserted into the symbol area at the position of the mouse pointer.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.5.11 Inserting Connection Points](#)

6.5.5.8 Marking Symbol Parts

Selection mode must be active before you can select the symbol parts. In this mode, the mouse pointer has its regular arrow shape. If the mouse pointer is shown as cross-hairs, drawing mode is active.

Symbol parts can be selected singly or as a group. A colored border identifies selected symbol parts.

Activating Selection Mode

- ✧ Right-click a free area of the symbol area.
- or -
- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click the  button.

If the mouse pointer has its regular arrow shape, selection mode is active.

Selecting a Single Symbol Part

- ✧ Click the symbol part.
- The symbol part will be selected.

Selecting a Group of Symbol Parts

- ✧ Click a free area of the symbol area.
 - ✧ Drag open a rectangle, holding the mouse button down.
 - ✧ Release the mouse button once the rectangle has reached the desired size.
- All symbol parts within the rectangle will be selected.

Selecting All Symbol Parts

- ✧ Right-click a free area of the symbol area.
 - ✧ Click **Select All** in the context menu.
- All symbol parts within the symbol area will be selected.

Deselecting

- ✧ Click a free area of the symbol area.
- or -
- ✧ Select a different symbol part.



NOTE

You can select additional symbol parts or remove an existing selection. To do so, hold down the <Ctrl> key while you click the symbol parts in question.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)

6.5.5.9 Modifying the Size and Curve Shape of Symbol Parts

You can scale all symbol parts such as lines and rectangles. For circular symbol parts, such as curves or circle segments, you can additionally modify the curve shape. The symbol parts have square edge points or curve points for modifying the size and curve shape. You can only ever modify symbol parts individually.

Scaling Symbol Parts

- ✧ Select the symbol part that you want to scale.
- 8 edge points of the same color will be displayed around the symbol part.
- ✧ Click one of these edge points and hold the mouse button down.
- ✧ Drag the mouse until the symbol part has reached the desired size.
- ✧ Release the mouse button.

Modifying the Curve Shape of Circular Symbol Parts

- ✧ Select the circular symbol part whose curve shape you want to modify.
- Curve points will be displayed in addition to the edge points.
- ✧ Click one of these curve points and hold the mouse button down.
- ✧ Drag the mouse until the symbol part has the desired shape.
- ✧ Release the mouse button.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.5.8 Marking Symbol Parts](#)

6.5.5.10 Filling an Area

You can fill the area of a symbol part. The fill color is always black.

Filling the Area of a Symbol Part with Black

- ✧ Select the symbol part whose surface you want to fill by right-clicking it.
- ✧ Select **Fill** from the context menu.
- or -
- ✧ Select the symbol part whose surface you want to fill by left-clicking it.
- ✧ Click in the [20.7.8 Toolbar of the Display and Symbol Editor](#) on the button .

In either case, the area will be filled with black.

Removing the Filling

- ✧ Select a filled symbol part by right-clicking it.
- ✧ Select **Fill** from the context menu.

- or -

- ✧ Select a filled symbol part by left-clicking it.
- ✧ Click in the [20.7.8 Toolbar of the Display and Symbol Editor](#) on the button .

In either case, the filling will be removed.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.5.8 Marking Symbol Parts](#)

6.5.5.11 Inserting Connection Points

Before graphical connecting lines can be drawn between 2 graphical elements, both graphical elements must have connection points. Tie lines can only be attached to these connection points.

To enable a graphical element defined by you to be connected to other graphical elements, insert connection points into the symbols of the element. You can insert the connection point into any of the 4 symbol areas. The connection points will automatically be added to the other symbol areas at the same position.

If you move the connection point of a symbol, the corresponding connection points of the other symbols will also be moved. The same applies if you delete a connection point. This also deletes the corresponding connection points of the other symbols.

Inserting Connection Points into the Symbol Area

- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click the  button.
- ✧ Click the position at which you want to place the connection point in one of the 4 symbol areas.

A connection point is inserted at the nearest intersection point of the grid lines.



NOTE

Connection points must always be located at one of the edges of a symbol. For that reason, a connection point is automatically positioned at the edge nearest to the position on which you clicked.

6.5.5.12 Moving Symbol Parts

You can move symbol parts within the symbol area.



NOTE

You cannot move symbol parts beyond the boundaries of the symbol area.

Moving Symbol Parts

- ✧ Select an individual symbol part or a group of symbol parts.
- ✧ Click a selected symbol part and hold the mouse button down.
- ✧ Move the symbol part or group to the desired position.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.5.8 Marking Symbol Parts](#)

6.5.5.13 Deleting, Copying, or Pasting Symbol Parts

You can apply the following standard edit functions to the symbol parts of an element:

- Copy
- Paste
- Delete

Copying Symbol Parts

- ✧ Select an individual symbol part or a group of symbol parts.
- ✧ Right-click a selected symbol part.
- ✧ Select **Copy** from the context menu.
- or -
- ✧ Select an individual symbol part or a group of symbol parts.
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

In either case, all selected symbol parts will be copied into the clipboard.

Pasting Copied Symbol Parts

- ✧ Right-click the desired insert position in the symbol area.
- ✧ Select **Paste** from the context menu.
- or -
- ✧ Click the button in the DIGSI 5 toolbar .

In either case, all symbol parts will be inserted from the clipboard into the symbol area.



NOTE

You can insert the symbol parts into another symbol of the same element or into a symbol of another element.

Deleting Symbol Parts

- ✧ Select an individual symbol part or a group of symbol parts.
- ✧ Right-click a selected symbol part.
- ✧ Select **Delete** from the context menu.
- or -
- ✧ Select an individual symbol part or a group of symbol parts.
- ✧ Click the button in the DIGSI 5 toolbar .

In either case, all selected symbol parts will be deleted.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.5.8 Marking Symbol Parts](#)

6.5.5.14 Rotating Symbol Parts

You can rotate symbol parts counterclockwise or clockwise in steps of 22.5 degrees.

Rotating Symbol Parts Counterclockwise or Clockwise in Steps of 22.5 Degrees

- ✧ Select an individual symbol part or a group of symbol parts.
- ✧ Right-click a single symbol part.
- ✧ In the context menu, click either **Rotate element 22.5 degrees counterclockwise** or **Rotate element 22.5 degrees clockwise**.
- or -
- ✧ Select a single symbol part.
- ✧ In the [20.7.8 Toolbar of the Display and Symbol Editor](#), click either of the 2 buttons  or .

In either case, the symbol will be rotated 22.5 degrees, either counterclockwise or clockwise.

**NOTE**

If you perform the action described 16 times, the symbol part will return full circle to its original position.

Related Topics

- ✧ [6.5.1 Overview of Display Pages](#)
- ✧ [6.5.5.8 Marking Symbol Parts](#)

6.5.6 Using Fault Records**6.5.6.1 Overview of Fault Displays**

After a fault, indications and measured values can automatically be displayed in the SIPROTEC 5 device display. The totality of this displayed information in a display page is designated as a fault display. With the [20.1.16 Fault-Display Configuration Editor](#), you can configure, for each circuit breaker configured in the application, 1 fault display.

Preparing Fault Displays

The indications and measured values are specified. For each display line within the fault display, you can select one of these specified details. Thus you can adjust the order of the information displayed to your priorities. Alternatively, you can also specify that, within a line, no information is displayed. You find more information about this under [6.5.6.3 Configuring Fault Displays](#).

The following indications and measured values are available for selection:

- **Pickup Indication**
If you select an indication, the name of the function stage that was picked first, in the event of a fault, is displayed. The displayed indication can also contain additional information for phases, grounding, and direction.
- **T Pickup**
If you select these measured values, the entire pickup duration of the fault is displayed.
- **Operate Indication**
If you select this indication, the name of the position level that was picked up first, in the event of a fault, is displayed. The displayed indication can also contain additional information for phases.
- **T Tripping**
If you select this measured value, the operate time is related to the start of the fault (pickup start)
- **Fault Distance**
If you select this measured value, then the measured distance to the fault location is displayed.

With the parameter **Fault display**, you specify a criterion for the fault display. You can select if fault displays should be displayed at every pickup or only for pickup with trip command. You will find more information on this under [6.5.6.4 Selecting a Criterion for a Fault Display](#).

Fault Displays in the Display

If a fault occurs, the SIPROTEC 5 device display automatically shows the applicable fault display. The fault display for a certain circuit breaker always shows the information about the last fault that occurred. If you have configured the fault displays for several circuit breakers, then several fault displays can be saved in the device after faults. In this case, the information of the last fault that occurred is displayed.

The SIPROTEC 5 device saves fault displays until they are acknowledged. You can do that directly in the device, or using DIGSI 5. Further information can be found under [6.5.6.5 Acknowledging a Fault Display](#).

Related Topics

[6.5.6.2 Opening the Fault Display Editor and Adjusting the View](#)

6.5.6.2 Opening the Fault Display Editor and Adjusting the View

With the [20.1.16 Fault-Display Configuration Editor](#), you configure 1 fault display each for every circuit breaker configured in the application.

The following standard functions are available to adapt the view of the Fault-display editor:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.3 Sorting Column Content](#)

Opening the Fault-Display Editor

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration of the SIPROTEC 5 device for which you want to configure the fault displays.
- ✧ Open the **Display pages** folder.
- ✧ Double-click **Fault-displays** in this folder.

The Fault-display editor opens in the working area.

Related Topics

- ✧ [6.5.6.1 Overview of Fault Displays](#)
- ✧ [6.5.6.3 Configuring Fault Displays](#)

6.5.6.3 Configuring Fault Displays

You can configure, for each circuit breaker configured in the application, 1 fault display. A fault display contains a pool of selected indications and measured values, specified by you.

When configuring you will complete the following actions:

- Select the circuit breaker, for which a fault display will be displayed in the SIPROTEC 5 device display.
- For each of the 5 display lines, select within the fault display one of the specified information lines, that is indications or measured values.

Selecting a Circuit Breaker

- ✧ To select or deselect a circuit breaker, click in the **Display** column on the applicable check box.
- or -
- ✧ In order to select all circuit breakers, click the button  in the [20.7.9 Toolbar of the Fault-Display Configuration Editor](#).

- or -



In order to select all circuit breakers, click the button  in the toolbar of the Fault-display editor.

If a check box is marked, then a fault display can be displayed for the applicable circuit breaker. You do not need to highlight the check box. In this case, no fault displays are displayed in the SIPROTEC 5 device display.

Selecting Information for Display Lines

- ✧ You will select all circuit breakers, for which a fault display shall be displayed in the SIPROTEC 5 device display.
- ✧ From the list box in the column **Displayed information**, select, for each display line, the information to be displayed.

- or -

- ✧ If a display line must remain empty, select from the applicable list box the setting **None**.

Related Topics

- ✧ [6.5.6.1 Overview of Fault Displays](#)
- ✧ [6.5.6.4 Selecting a Criterion for a Fault Display](#)

6.5.6.4 Selecting a Criterion for a Fault Display

With the **Fault display** parameter, you can specify whether the display of a SIPROTEC 5 device should show a configured fault display for every pickup or only for pickups with trip command.

To change the settings, first open the [20.5.10 Device Settings](#). You will find more information on this under [6.1.10 Opening Device Settings](#).

Selecting a Criterion

- ✧ Open the device settings.
- ✧ Select the setting from the **Fault display** list box.

Related Topics

- ✧ [6.5.6.1 Overview of Fault Displays](#)

6.5.6.5 Acknowledging a Fault Display

The fault display for a certain circuit breaker always shows the information about the last fault that occurred. If you have configured the fault displays for several circuit breakers, then several fault displays can be saved in the device after faults. In this case, the information of the last fault that occurred is displayed.

The SIPROTEC 5 device saves fault displays until they are acknowledged. You can do that directly in the device or with DIGSI 5.

- **On the SIPROTEC 5 device**

There are several options to acknowledge fault displays directly in the SIPROTEC 5 device. The following section describes one of them. Other options are found in the respective Device manual.

- **With DIGSI 5**

To acknowledge fault displays with DIGSI 5, use the function to reset the LEDs. Here **all** fault displays are acknowledged.



NOTE

Resetting the LEDs will also lead to resetting all binary device-output contacts.

On the SIPROTEC 5 Device

- ✧ Press the softkey button **Quit** in the base bar of the display page.

The fault display is deleted irrevocably.

- ✧ Repeat this step until no other fault display appears in the device display.

Once you have acknowledged all fault displays, the display page visible before the last fault display is shown.

With DIGSI 5

- ✧ Open the [3.1.2 Project Tree](#).

- ✧ In the list of online accesses, open the online device which represents the affected SIPROTEC 5 device.

- ✧ Double-click **Device information**.

The device information is displayed in the working area.

- ✧ Click in the [20.7.25 Toolbar of the Device Information](#) the button .

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes. The LEDs, the binary inputs, and all fault displays are reset.

The display page visible last before the fault displays is shown.

Related Topics

- ✧ [6.5.6.1 Overview of Fault Displays](#)

7 Single-Line Configuration

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7.1 Overview of the Single-Line Configuration

The single-line configuration is a 1-pole representation of a substation and it applies across projects. You can therefore create one and no more than one single-line configuration within a project. This is done using the [20.1.2 Single-Line Editor](#).

Essential Steps

The following list shows the essential steps:

- Using the Single-line editor, you position various elements on a drawing pane. These elements represent equipment such as busbars or circuit breakers.
- You then interconnect these elements with lines.
- You set parameters for the equipment directly in the single-line configuration.

Elements

Each element has a symbol, a name, and further properties. You will find a large selection of predefined elements in the global DIGSI 5 library. This library also contains ready-made templates for various standard configurations, for example, for the 1 1/2 circuit-breaker layout. You insert these templates from the library into the single-line configuration by drag and drop exactly as you would with individual elements. You can then adapt the templates to your requirements.

All elements for the single-line configuration can be displayed according to ANSI or according to IEC. You can switch between these 2 types of display at any time. If you modify the display, the change will not only affect the element symbols in the library. All symbols in the single-line configuration are also adapted to the selected standard.

An element is automatically inserted into the single-line configuration for each SIPROTEC 5 device within the project. This element represents not only the SIPROTEC 5 device but also the application of the SIPROTEC 5 device. To make the connection between the application and the substation, connect the function groups of an application with the equipment. The device element has different connections for this purpose.

Reusing the Single-Line Configuration

You can use parts of the configuration again when creating display pages. With the export function, you also make the single-line configuration available to other IEC 61850-compliant applications, for example, to SICAM PAS or WinCC. Conversely, you can also import ELCAD data, for example, and use it as the base for the single-line configuration.

Related Topics

[3.3.4 Displaying Elements According to ANSI or IEC](#)

[7.2.1 Opening a Single-Line Configuration](#)

[16.1.1 Overview of Formats](#)

[7.6 Setting Parameters for Equipment and Synchronizing Current or Voltage-Transformer Values](#)

7.2 Basic Procedures

7.2.1 Opening a Single-Line Configuration

To open a single-line configuration, use the [3.1.2 Project Tree](#). The single-line configuration will be shown in the working area.



NOTE

A new project initially does not contain a single-line configuration. An empty space will be shown in the working range instead.

Opening a Single-Line Configuration Using the Project Tree

- ✧ In the project tree, double-click **Single-line configuration**.
- The single-line configuration will appear in the working area.

Related Topics

- ✧ [7.2.3 Scaling the Single-Line Configuration View](#)
- ✧ [7.1 Overview of the Single-Line Configuration](#)

7.2.2 Printing the Offline and Online Single-Line Configuration

You can print the offline and online single-line configuration.

Starting Print Process in the Offline Mode Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, mark the entry **Single-line configuration**.
- ✧ From the **Project** menu, select **Print**.

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document template, and a cover page. You can find more information about this dialog under [17.2.3 Selecting Print Options](#).
- ✧ Click **Print**.

The **Print** dialog is closed and the selected data is printed.

Starting Print Process in the Online Mode Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project tree with the configured 7SS device under the **Online access** folder, double-click **Single-line supervision**.

The configured topology is displayed in the **Single-line supervision** view.

- ✧ In the **Project** menu, select **Print**.

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document template, and a cover page. You can find more information about this dialog under [17.2.3 Selecting Print Options](#).
- ✧ Click **Print**.

The **Print** dialog is closed and the selected data is printed.

Starting Print Process in the Offline Mode without Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project tree, mark the entry **Single-line configuration**.
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

Printing will start using the settings last selected.

Starting Print Process in the Online Mode without Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project tree with configured 7SS device under the **Online access** folder, double-click **Single-line supervision**.

The configured topology is displayed in the **Single-line supervision** view.

- ✧ In the project tree, mark the entry **Single-line supervision**.
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

Printing will start using the last settings selected.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [17.1.1 Overview for Designing and Printing Documents](#)

7.2.3 Scaling the Single-Line Configuration View

You can change the display size of the single-line configuration and thus adjust it to the particular situation.

You can scale the view in one of the following ways:

- You can scale the view in predefined stages.
- You can scale the view by entering a percentage.
- You can return to the 100-percent display.



NOTE

If you select an element before scaling, this element will remain positioned in the center of the scaled area.

Scaling a View in Stages

- ✧ Right-click any position in the single-line configuration. Then click **Zoom in** or **Zoom out** in the context menu.

- or -

- ✧ In the [20.7.2 Toolbar of the Single-Line Editor](#), click one of the 2 buttons  or .

In either case, the single-line configuration will be shown larger or smaller.



NOTE

If the maximum or minimum display size has been reached, the corresponding menu item and button will be inactive.

Scaling a View by Entering a Percentage

- ✧ Click the list box on the toolbar of the single-line editor .
- ✧ Select a percentage value.
 - or -
- ✧ Enter an integral percentage value from 50 to 500 in the text box of the list box.
- ✧ Click outside the text box.
 - or -
- ✧ Press the <Enter> button.

The single-line configuration will be shown with the size you have set.

Returning to the 100-Percent View

- ✧ Click the button on the toolbar of the single-line editor .

The single-line configuration will be shown at 100 percent.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)

7.2.4 Saving the Single-Line Configuration as a Vector Graphic

You can save the current view of the single-line configuration in the working area as a vector graphic. The view will be saved in **WMF** (Windows Metafile) format. In this format, you can import the single-line configuration into many other programs, for example, into text processors such as Microsoft Word. This program can open WMF files without any problem and include them in text documents. This provides you with another way of creating substation documentation.

Saving the Single-Line Configuration as a WMF File

- ✧ In the [20.7.2 Toolbar of the Single-Line Editor](#), click the  button.

A standard file dialog opens.

- ✧ Enter a name for the file and select a storage location.
- ✧ Click **OK**.

The single-line configuration will be saved as a vector graphic in WMF format.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)

7.3 Inserting Elements

7.3.1 Inserting and Scaling a Busbar from the Library

The global DIGSI 5 library contains elements that represent equipment and which you can insert into the single-line configuration. These elements also include busbars. The global DIGSI 5 library contains one element each for a vertical and a horizontal busbar. After insertion, you can modify the length of a busbar. You can insert a busbar from the global DIGSI 5 library into the single-line configuration in one of the following ways:

- You can insert the busbar by drag and drop.
- You can insert the busbar with **Copy** and **Paste**.

Before you can do this, the global DIGSI 5 library must be open.

If you select an element in the DIGSI 5 library, the information window shows detailed information on this element. This information is provided in text and also graphical form, for example, as a diagram of an equipment.

All elements for the single-line configuration can be displayed according to ANSI or according to IEC. You can switch between these 2 types of display at any time. If you modify the display, the change will not only affect the element symbols in the library. All symbols in the single-line configuration are also adapted to the selected standard.



NOTE

If you insert an element from the library, the element symbol will be shown in the currently set standard, ANSI or IEC. If you select the other standard, the selection not only affects the element symbols in the library. All symbols in the single-line configuration are also adapted to the selected standard. For more information, see [3.3.4 Displaying Elements According to ANSI or IEC](#).

Opening the Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ In the global DIGSI 5 library, open the **Single-line and display elements** directory.
- or -
- ✧ Right-click the single-line configuration.
- ✧ Click **Insert elements from library** in the context menu.

On the **Libraries** tab in the task card, the **Single-line and display elements** directory will open.

Inserting a Busbar by Drag and Drop

- ✧ Select the element you require in the global DIGSI 5 library.
 - ✧ Drag the element to the insertion position in the single-line configuration.
- If insertion is not allowed at this position, the mouse pointer will change to a crossed-out circle.
- ✧ Release the mouse button at a permissible position.

The element will be placed at the selected position.

Adding a Busbar by Copy and Paste

- ✧ Right-click the name of the element you require in the global DIGSI 5 library.
- ✧ Select **Copy** from the context menu.
- ✧ Right-click the desired insertion position in the single-line configuration.
- ✧ Select **Paste** from the context menu. This menu item is only active if the insertion position is permissible.

The element will be inserted at the selected insertion position.

Scaling a Busbar

- ✧ Left-click the start or end point of the busbar and hold the mouse button down.
- ✧ Drag the mouse pointer horizontally or vertically, depending on the orientation of the busbar.
- ✧ When the busbar has the length you require, release the mouse button.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.3.2 Inserting Further Equipment from the Library](#)
- ✧ [7.3.4 Using a Template from the Library](#)

7.3.2 Inserting Further Equipment from the Library

You insert equipment such as disconnecter switches or circuit breakers from the global DIGSI 5 library into the single-line configuration by drag and drop, in exactly the same way as busbars. Before you can do this, the global DIGSI 5 library must be open.

If you select an element in the DIGSI 5 library, the information window will show you detailed information on this element. This information is provided in text and also graphical form, for example, as a diagram of an equipment.

You can insert an equipment into an existing bay or create a new bay as you insert it. A bay is identified by a colored area in the single-line configuration. All elements within the colored area belong to the same bay. Busbars cannot be part of a bay. Like an equipment, a bay has a name that you can modify.



NOTE

If you insert an element from the library, the element symbol will be shown in the currently set standard, ANSI or IEC. If you select the other standard, the selection not only affects the element symbols in the library. All symbols in the single-line configuration are also adapted to the selected standard. For more information, see [3.3.4 Displaying Elements According to ANSI or IEC](#).

Opening the Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ In the global DIGSI 5 library, open the **Single-line and display elements** directory.
- or -
- ✧ Right-click the single-line configuration.
- ✧ Click **Insert elements from library** in the context menu.

On the **Libraries** tab in the task card, the **Single-line and display elements** directory will open.

Inserting an Equipment into an Existing Bay

- ✧ Select the element you require in the global DIGSI 5 library.
- ✧ Drag the element into the colored area of the bay.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button at a permissible position.

The added element is now part of the bay. The size of the bay area will be adjusted automatically if necessary.

Creating a New Bay on Insertion

- ✧ Select the element you require in the global DIGSI 5 library.

- ✧ Drag the element into a free area of the single-line configuration.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button at a permissible position.

A new bay area will be created. This contains the inserted element.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.3.1 Inserting and Scaling a Busbar from the Library](#)
- ✧ [7.3.4 Using a Template from the Library](#)

7.3.3 The SIPROTEC 5 Device in the Single-Line Configuration

A device symbol is shown in the single-line configuration for each offline configuration in the project. This symbol represents the SIPROTEC 5 device and its application and gives direct access to further data.

Function Groups

The device symbol contains the function groups that represent a part of the primary equipment, for example, a line or a circuit breaker. There are also further function groups, for example, for fault recording, but these are not shown in the device symbol. Each function group is represented by a rectangle and the name of the function group. Clicking the arrow icon reduces an opened function group to its name. If the function group is connected to equipment, reducing the function group in this way causes the lines to be shown shortened. A further click the arrow icon opens the rectangle of the function group again, showing the name of all the functions contained in it. Tie lines are then again shown in their entirety.

Functions

Each rectangle that represents a function group contains the names of all functions that are part of this function group. Clicking the arrow icon next to the function name shows the names of the associated function blocks. A further click on the arrow icon reduces the function to its name.

Function Blocks

A function can consist of multiple function blocks. For example, a function block can be a stage, but also a zone.

Interfaces

Different functions require measured values as input signals or provide commands as output signals. Function groups have interfaces to enable you to connect these input and output signals to the corresponding equipment.

A function group can have the following interfaces:

- **Current inputs (green)**

You can connect current inputs to the outputs of current transformers.

- **Voltage inputs (turquoise)**

You can connect voltage inputs to the outputs of voltage transformers.

- **Trip outputs (black)**

You can connect trip outputs to the control connectors of circuit breakers.

- **Control outputs (black)**

You can connect control outputs to the control connections of disconnector switches and other controllable equipment items, but not to circuit breakers.

To keep the configuration clear, you connect a transformer directly to the interface of a function group in the single-line configuration. In fact, the transformers are connected to the analog inputs of the SIPROTEC 5 device and the analog inputs are connected to the logical measuring points. These measuring points are then assigned to the interfaces of the function groups.

You can make the assignment between the measuring point and the function group, for example, directly in the function group. In list boxes, you can select the measuring point from which the interface is to receive the measurand. You can find out more about this in the chapter **Configuring Applications**.

By assigning a measuring point, you create the condition for synchronizing transformer data in the single-line configuration with the transformer data in the offline configuration of a SIPROTEC 5 device.

Related Topics

[7.1 Overview of the Single-Line Configuration](#)

[7.6 Setting Parameters for Equipment and Synchronizing Current or Voltage-Transformer Values](#)

[8.1.1 Overview of Applications](#)

[8.1.4.1 Overview of Connections](#)

7.3.4 Using a Template from the Library

Several templates for complete bays are available to you to speed up your work. You can insert these into a single-line configuration and adapt them to your requirements. You will find all the templates in the global DIGSI 5 library. Before you can insert a template, the global DIGSI 5 library must be open.



NOTE

If you insert an element from the library, the element symbol will be shown in the currently set standard, ANSI or IEC. If you select the other standard, the selection not only affects the element symbols in the library. All symbols in the single-line configuration are also adapted to the selected standard. For more information, see [3.3.4 Displaying Elements According to ANSI or IEC](#).

Opening the Global DIGSI 5 Library

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ In the global DIGSI 5 library, open the **Single-line and display elements** directory.
- or -
- ✧ Right-click the single-line configuration.
- ✧ Click **Insert elements from library** in the context menu.

On the **Libraries** tab in the task card, the **Single-line and display elements** directory opens.

Inserting a Template by Drag and Drop

- ✧ Open one of the 2 tabs **Protection templates** or **Control templates**.
- ✧ Select the required template in the relevant folder.
- ✧ Drag the template into a free area of the single-line configuration.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button at a permissible position.

A new bay area will be created. It contains the elements and connections of the template you selected.

Related Topics

✧ [7.1 Overview of the Single-Line Configuration](#)

✧ [7.3.1 Inserting and Scaling a Busbar from the Library](#)

✧ [*7.3.2 Inserting Further Equipment from the Library*](#)

7.4 Editing Elements

7.4.1 Marking Single-Line Elements

You can select an individual element or a group of elements. In this case, the elements include equipment, bays, and devices. Colored borders identify the selected elements.

Selecting an Individual Element

- ✧ Click the element.
- The element will be selected.

Selecting a Group of Elements

- ✧ Click a free area of the single-line configuration.
 - ✧ Drag open a rectangle, holding the mouse button down.
 - ✧ Release the mouse button once the rectangle has reached the desired size.
- All elements within the rectangle will be selected.

Selecting All Elements

- ✧ In the **Edit** menu, click **Select all**.
- All elements of the single-line configuration will be selected.

Undoing a Selection

- ✧ Click an unselected area of the single-line configuration.
- or -
- ✧ Select a different element.



NOTE

You can mark additional elements or remove an existing selection. To do so, hold down the <Ctrl> key while you left-click the corresponding elements.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)

7.4.2 Rotating Single-Line Elements

You can rotate elements of equipment inserted into the single-line configuration 90 degrees clockwise or counterclockwise.



NOTE

Elements of the type **busbar** cannot be rotated. Instead, one horizontal and one vertical busbar are available as separate elements in the library. Only the symbol of the equipment is rotated, not the associated text box with the element names.

Rotating an Element

- ✧ Right-click a single rotatable element.
- ✧ In the context menu, click either **Rotate element left** or **Rotate element right**.

- or -

- ✧ Select a single rotatable element.
- ✧ In the [20.7.2 Toolbar of the Single-Line Editor](#), click either of the 2 buttons  or .

In either case, the symbol will be rotated 90 degrees, either counterclockwise or clockwise.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.1 Marking Single-Line Elements](#)

7.4.3 Reversing the Grounding Direction of the Symbol

You can reverse the grounding direction of the symbol towards line or bus of a current transformer in the single-line configuration.

Reversing the Grounding Direction of the Symbol

- ✧ In the project tree with the configured [20.1.2 Single-Line Editor](#), right-click any current transformer in the topology.
- ✧ Click **Reverse grounding dir. of symbol** in the context menu.

The grounding symbol of current transformer is reversed.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.1 Marking Single-Line Elements](#)

7.4.4 Moving Single-Line Elements

You can move, and therefore reposition, elements such as equipment, bays, and devices within a single-line configuration. Tie lines between the elements will be adapted automatically. You can move the name of an equipment independently of the symbol. The symbol and the name remain a single unit.

There are 2 ways of moving elements:

- You can move elements with the mouse.
- You can move elements with the keyboard.

Moving Elements with the Mouse

- ✧ Select an individual element or a group of elements.
- ✧ Left-click a selected element and hold the mouse button down.
- ✧ Drag the element or group of elements to the target position and release the mouse button.

Moving Elements with the Keyboard

- ✧ Select an individual element or a group of elements.
- ✧ Press the arrow keys on the keyboard.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.1 Marking Single-Line Elements](#)

7.4.5 Deleting, Cutting, Copying, or Inserting Single-Line Elements

You can apply the following standard edit functions to the elements of a single-line configuration:

- Copy
- Cut
- Paste
- Delete

Copying Elements

- ✧ Select an individual element or a group of elements.
- ✧ Right-click a selected element and then select **Copy** from the context menu.
- or -
- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

All selected elements will be copied to the clipboard.

Cutting Elements

- ✧ Select an individual element or a group of elements.
- ✧ Right-click a selected element and then select **Cut** from the context menu.
- or -
- ✧ Click the button in the DIGSI 5 toolbar .

All selected elements will be deleted and copied to the clipboard.

Inserting Elements

- ✧ Right-click on the desired insertion position in the template.
- ✧ Select **Add** from the context menu.
- or -
- ✧ Click the button in the DIGSI 5 toolbar .

All elements from the clipboard are inserted in the display page.



NOTE

You can also paste elements that you copy in the single-line configuration into a display page.

Deleting Elements

- ✧ Select an individual element or a group of elements.
- ✧ Right-click a selected element and then select **Delete** from the context menu.
- or -
- ✧ Click the button in the DIGSI 5 toolbar .

All selected elements will be deleted.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.1 Marking Single-Line Elements](#)

7.4.6 Renaming Single-Line Elements

You can give every element, whether it is an equipment or bay, an individual name.

You can change the name of an element in one of the following ways:

- You can change the name directly in the single-line configuration.
- You can change the name in the properties of the element.

Changing the Element Name Directly in the Single-Line Configuration

- ✧ Right-click the element that you wish to rename.
 - ✧ Select **Rename** from the context menu.
- The name will be shown in a text box and highlighted in a color.
- ✧ Enter a new name for the element.
 - ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

You confirm your entry with these 2 actions.

The new name will be applied.

Changing an Element Name in the Properties

- ✧ Select the element that you wish to rename.
 - ✧ Open the Inspector window.
 - ✧ Go to the **Properties** tab.
 - ✧ Go to the **Details** group.
 - ✧ Enter a new name for the element in the **Name** text box.
 - ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

You confirm your entry with these 2 actions.

The new name will be applied. The display in the template selection list is updated.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.1 Marking Single-Line Elements](#)

7.4.7 Connecting Single-Line Elements Among Each Other

An automatic connection function is active while you insert elements into the single-line configuration. As soon as you have placed a new element into the adjacent cell of an existing element connection, this function connects the symbols of the 2 elements. The automatic connection function considers whether a connection between the 2 elements is meaningful. To complete the single-line configuration, interconnect manually all unconnected elements. This includes interconnecting individual equipment, such as circuit breakers, discon-

connector switches, or busbars. Connect the elements with lines. Define which elements are to be interconnected. The line routing is defined automatically and will be updated when you move elements.

Drawing a Line

- ✧ Position the mouse pointer on the connection point of an element. This connection point marks the start of the line.

The mouse pointer is in the correct position when it changes to a hand.

- ✧ Press the left mouse button and drag a direct line to the connection point of a 2nd element. This connection point marks the end of the line.

As soon as you come close to the connection point, the line will snap to the element. Busbars are highlighted by a border.

- ✧ Release the mouse button.

If the desired connection is permissible, a line will be drawn horizontally and/or vertically.

Canceling Drawing

- ✧ To cancel drawing a line, release the mouse button outside the snap-to area of a connection point.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.9 Connecting Single-Line Element with SIPROTEC 5 Devices](#)
- ✧ [7.4.10 Adjusting a Single-Line Connection](#)

7.4.8 Selecting Measuring Points for Function Groups

A function group must be connected to measuring points to supply the functions within a function group, with current and voltage values. For this purpose, you select a measuring point for each interface of a function group. The interfaces are represented with colored connection points.

You have the following options for connecting the function groups to measuring points:

- You can use the [20.1.2 Single-Line Editor](#). The description is given in the following section.
- You can use the [20.3.4 Function-Group Connections](#) matrix. You can find more information under [8.1.4.3 Connecting Measuring Points to Function Groups](#).

Selecting Measuring Points with the Single-Line Editor

- ✧ In the device symbol, position the mouse pointer on the cell to the right of the respective connection point.
- ✧ Double-click inside the cell.

A list box opens. The list box shows the names of all measuring points, which are compatible with the respective connection point.

- ✧ Select the name of a measuring point from the list box.
- ✧ Click outside the cell.

- or -

- ✧ Press the <Enter> button.

The name of the selected measuring point is entered into the cell.

Related Topics

- ✧ [8.1.4.1 Overview of Connections](#)
- ✧ [8.1.5.5 Adding Measuring Points](#)

7.4.9 Connecting Single-Line Element with SIPROTEC 5 Devices

It is not only necessary to interconnect elements but also to connect certain equipment to SIPROTEC 5 devices. For this purpose, the SIPROTEC 5 devices have logical inputs and outputs in the single-line configuration. The current and voltage transformers can be connected to the SIPROTEC 5 devices via inputs. Circuit breakers and other controllable equipment can be connected to the SIPROTEC 5 devices via the outputs.

You make the connections between the elements with lines. You define which elements are to be interconnected. The line routing is defined automatically and will be updated when you move elements. Moreover, different colors and line types are used for currents, voltages, and control signals.

While connecting more than 2 elements using connection lines, a junction point in the shape of a square is created. From this junction point, all the links are connected to the respective elements. You can move the junction point to the desired location using the mouse or the keyboard. With the keyboard, you can select and move the junction point precisely by holding down the <CTRL>, <SHIFT>, and <ARROW> keys together or move the junction point swiftly by using only the <ARROW> keys. The connection is possible only from an element to an existing connection line and not from the junction point to an element. Upon selection, the connection line that connects connecting points is highlighted in green color. By default, a newly created connection line is also highlighted in green color.

Drawing a Line

- ✧ Position the mouse pointer on the connection point of an element. This connection point marks the start of the line.

The mouse pointer is in the correct position when it changes to a hand.

- ✧ Press the left mouse button and drag a direct line to the connection point on the SIPROTEC 5 device. This connection point marks the end of the line.

If the connection point is suitable for the connection, the line will snap to the connection point. The connection point will also be highlighted in color.

- ✧ Release the mouse button.

If the desired connection is permissible, a line will be drawn horizontally and/or vertically. The selected line is highlighted in green color to identify the connection.



NOTE

Connection points on the input side (green or turquoise) each correspond to one transformer. If a transformer with connection points corresponds to multiple function groups, lines will also be drawn to these connection points.

Canceling Drawing

- ✧ To cancel drawing a line, release the mouse button outside the snap-to area of a connection point.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.10 Adjusting a Single-Line Connection](#)
- ✧ [7.4.7 Connecting Single-Line Elements Among Each Other](#)

7.4.10 Adjusting a Single-Line Connection

You can adapt connections in one of the following ways:

- You can route a connection to another element.
- You can move lines.
- You can delete lines and therefore the associated connection.

Routing a Connection to a Different Element

- ✧ Click the relevant tie line.

The line will be selected with colored connection points at both ends.

- ✧ Place the mouse pointer on the connection point of the line end that you want to connect to a different connection.

The mouse pointer is in the correct position when it changes to a hand.

- ✧ Press the mouse button and drag the line end to the new connection point.

As soon as you come close to the connection point, the line will snap to the element. Busbars are highlighted by a border.

- ✧ Release the mouse button.

If the connection is permissible, the line will be redrawn.

Moving a Line

- ✧ Click the relevant tie line.

The line will be selected with colored connection points at both ends.

- ✧ Place the mouse pointer in the center of the line.

The mouse pointer is in the correct position when it changes to a two-headed arrow.

- ✧ Press the mouse button here and drag the line section horizontally or vertically.
- ✧ Release the mouse button.

The actual degree of freedom you have when moving the line will depend on the current line route.

Deleting a Line

- ✧ Right-click the line that you wish to delete.

- ✧ Select **Delete** from the context menu.

- or -

- ✧ Select the line that you want to delete.

- ✧ Click in the [20.7.1 DIGSI 5 Toolbar](#) on the  button.

In either case, the line will be deleted.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.9 Connecting Single-Line Element with SIPROTEC 5 Devices](#)
- ✧ [7.4.7 Connecting Single-Line Elements Among Each Other](#)

7.5 Using the Topology Tree

7.5.1 Overview of Topology

The topology presents another view of a single-line configuration and provides an overview of the hierarchical structure of the station. The topology is updated as soon as you modify the single-line configuration. You cannot change the topology directly. However, you can change the name of the topology elements and add user labels to each individual topology element. You can also set parameters for equipment with the topology.

Structure

The topology is embedded in a 3-column table:

- **Name**
This column contains the name and symbols of all topology elements in a hierarchical arrangement. These include, for example, voltage levels and bays. You can show or hide levels of the topology tree with the arrow icons.
- **Path**
This column shows, for each topology element within a bay, whether the element is connected to one or more function groups or not. The connection to a function group is shown in the form **<device name>/<function group name>**. If the topology element is not connected to any function group, the cell is empty.
- **Comment**
In this column, you can enter a comment on each topology element.

Elements

The topology elements can be divided into 4 categories:

- **Substation**
In DIGSI 5, one project corresponds to 1 station. For that reason, the station is the top level of the topology. All other topology elements are subordinate to this level.
- **Voltage level**
The topology tree contains a voltage level for each busbar arrangement. For example, if you have configured 2 independent busbar arrangements in the single-line configuration, the topology will contain 2 voltage levels.
- **Bay**
A bay is assigned to the voltage level to which it was first connected. Let us look at an example to explain this. A bay contains both circuit breakers QB1 and QB2. First connect circuit breaker QB2 with busbar arrangement 1 and then circuit breaker QB1 with busbar arrangement 2. Then the bay is subordinate to the voltage level of busbar arrangement 1. If a bay is not connected to any busbar arrangement, it is in the topology on the same hierarchic level as the voltage levels.
- **Equipment**
Busbars are always directly subordinate to the voltage level. All other equipment is assigned to a bay.

Related Topics

[7.1 Overview of the Single-Line Configuration](#)

[7.6 Setting Parameters for Equipment and Synchronizing Current or Voltage-Transformer Values](#)

[7.5.2 Displaying Topology](#)

7.5.2 Displaying Topology

The topology is part of the single-line configuration and is a different view of the single-line configuration. You can switch directly between the single-line configuration and the topology. The topology will be displayed in form of a table in the working area.



NOTE

If the single-line configuration does not contain any elements, the table in the **Topology** tab will remain empty.

Display Topology

- ✧ If the single-line configuration is not open, double-click **Single-line configuration** in the project tree.
The single-line configuration will appear in the working area.
- ✧ Click the [20.1.4 Topology Information](#) tab.
The table with the topology will be shown in the working area.

Related Topics

- ✧ [7.5.1 Overview of Topology](#)

7.5.3 Renaming Topology Element

You can give each topology element an individual name.

You can change the name of an element in one of the following ways:

- You can change the name directly in the topology.
- You can change the name in the properties of the element.

If there is a corresponding element for the topology element in the single-line configuration, its name will also change.



NOTE

You cannot rename the voltage level element in the single-line configuration.

Changing Topology Name Element Directly in the Topology

- ✧ Double-click the current name of the topology element in the **Name** column.
The name will be shown in a text box and highlighted in a color.
- ✧ Enter a new name for the topology element.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

You confirm your entry with these 2 actions.

The new name will be applied.

Changing the Name of the Topology Element in the Properties

- ✧ Select the topology element that you wish to rename in any column.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.

- ✧ Go to the **Details** group.
- ✧ Enter a new name for the topology element in the **Name** text box.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

You confirm your entry with these 2 actions.
The new name will be applied.

Related Topics

- ✧ [7.5.1 Overview of Topology](#)

7.5.4 Adding a Comment in the Topology

You can add an individual comment to each topology element. The comment will be displayed directly next to the path name in the topology table.

You can add a comment in one of the following ways:

- You can add the user label directly in the topology.
- You can add the comment in the properties of the topology element.

If there is a corresponding element for the topology element in the single-line configuration, a comment will be added for this, too.

Adding a Comment Directly in the Topology

- ✧ Double-click the cell in which you want to enter a comment in the **Comment** column.
- The cell will turn into a text box and be highlighted in a color.
- ✧ Enter a comment for the topology element.
 - ✧ Click outside the text box.
 - or -
 - ✧ Press the <Enter> key.

You confirm your entry with these 2 actions.
The comment will be applied.

Adding a Comment to the Properties

- ✧ Select the topology element to which you want to add a comment.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Go to the **User Information** area.
- ✧ Enter a comment on the topology element in the **Comment** text box.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

You confirm your entry with these 2 actions.
The comment will be applied.

Related Topics

✧ [7.5.1 Overview of Topology](#)

7.6 Setting Parameters for Equipment and Synchronizing Current or Voltage-Transformer Values

Most of the equipment items entered have properties for which settings can be assigned. The rated current of the current transformer or the phase sequence of the busbar are examples of such properties. You can assign settings for these properties using the single-line configuration or the topology tree.

You can assign settings for the equipment properties not only via the single-line configuration and the topology tree but also in the function settings of the particular SIPROTEC 5 device. Furthermore, you can enter different values for the same parameter. DIGSI 5 does not automatically synchronize these values. However, you can synchronize some values of the current and voltage transformers with a mouse click. The values defined in the single-line configuration are applied to the function settings of the relevant SIPROTEC 5 device. If you do not synchronize the values, the values defined in the function settings are always applied.

Synchronize the transformer values separately for each SIPROTEC 5 device. In doing so, only transformers that are connected to a SIPROTEC 5 device will be taken into account.

Setting Parameters for Equipment

- ✧ In the single-line configuration, select the equipment element for which the setting is to be assigned.
- or -
- ✧ Select the name of the equipment to be parameterized in any column of the topology tree.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Go to the **Details** group.
- ✧ Check the present settings and change them, if needed.
- ✧ To apply the change to the function settings, synchronize the current or voltage-transformer values.

Synchronizing the Transformer Values Using the Single-Line Configuration

- ✧ Make sure that all transformers whose values you wish to synchronize are connected to the corresponding SIPROTEC 5 device.
- ✧ Select the SIPROTEC 5 device for whose connected transformers the values are to be synchronized.

If at least one transformer is connected to the selected SIPROTEC 5 device, the **Synchronize** button will be active in the [20.7.2 Toolbar of the Single-Line Editor](#).

- ✧ Click the  **Synchronize** button on the toolbar of the **Single-Line Editor**.

Synchronization will start.

Related Topics

- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.5.1 Overview of Topology](#)
- ✧ [8.2.2.1 Selecting a Function for Setting Parameters](#)

7.7 Configuring Topology and Busbar Device (7SS8 Device Type)

To configure the topology and busbar device, configure the device with the required function groups in the [20.1.2 Single-Line Editor](#) and assign the measuring points to the device. After configuring the device, create and connect the topology with the configured device.

Configuring the Busbar Device

- ✧ In the project tree, add a busbar device (for example, 7SS8 device type).
- ✧ Double-click **Single-line configuration**.

The [20.1.2 Single-Line Editor](#) is displayed in the working area.

- ✧ Drag and drop the **Bay** element from the **7SS device type** under the **Global DIGSI 5 Library** over the device in the **Single-Line Editor**.
- ✧ Drag and drop the required function groups (for example, **Circuit breaker**, **Current transformer**, and **Disconnecter**) over the bay of the device in the **Single-Line Editor**.

The device is configured.



NOTE

You can configure multiple bays and function groups according to the significant feature of the variants in the **Single-Line Editor**.

Creating Topology for a Busbar Device

- ✧ In the project tree, double-click **Single-line configuration**.

The [20.1.2 Single-Line Editor](#) is displayed in the working area.

- ✧ Drag and drop the desired elements from the **Single-line and display elements** under the **Global DIGSI 5 Library** to the **Single-Line Editor**.

- or -

- ✧ Drag and drop the desired predefined template (for example, **Double-busbar line feeder**) from the **Single-line and display elements** under the **Global DIGSI 5 Library** to the **Single-Line Editor**.

The desired substation created using predefined templates is displayed.

- ✧ Connect the elements and the busbar to create the desired single-line diagram.

The desired topology is created.

Assigning Color to a Busbar

With this feature in DIGSI, you can assign the desired color to a busbar in the **Single-Line Editor** (offline mode). By default, the busbar color in the offline mode is black. The colors assigned to the busbars are used to represent the protection view in the **Single-line monitoring** view (online mode).

- ✧ In the project tree with the configured **Single-Line Editor**, select any busbar in the topology.
- ✧ Go to the **Properties** tab.
- ✧ Select the **Details** group.

The busbar properties are displayed.

- ✧ Open the **Online color** list box.

The available colors are displayed in the list view.

- ✧ Select the desired color.

The selected color is assigned to the busbar. You can view the assigned busbar color only in the **Single-line monitoring** view.

**NOTE**

It is not possible to edit the list box or select multiple colors from the list view. If you export/import the TEA-X file or copy and paste any busbar, then the respective busbar retains the color assigned to it. If the color of the busbar available in any file imported by DIGSI is not available in the list of 56 colors in the list view, then the **Online color** list box displays the color in the RGB color format with no preview of the colors.

Assigning Measuring Points to the Function Group of the Device

- ✧ Add measuring points in the **Measuring-points routing** editor. For additional information, refer to [7.4.8 Selecting Measuring Points for Function Groups](#)
- ✧ Select the function group of the **Bay** in the **Single-Line Editor**.
- ✧ Double-click inside the cell.

A list box opens displaying the names of all measuring points which are compatible with the respective connection point.

- ✧ Select the name of a measuring point from the list box.
- ✧ Click outside the cell.
- or -
- ✧ Press the <Enter> key.

The measuring point is assigned to the selected function group.

Connecting Topology to Device

- ✧ In the project tree, open the **Single-Line Editor** with the configured topology and busbar device.

The [20.1.2 Single-Line Editor](#) is displayed in the working area.

- ✧ Connect the required topology elements to the connecting points of the respective function groups in the **Bay** of the device in the **Single-Line Editor**.

The connection between the topology and the device is established.

Synchronizing the Device with a Current Transformer and a Topology Bay

- ✧ In the project tree with the configured **Single-Line Editor**, select any current transformer in the topology.
- ✧ Go to the **Properties** tab.
- ✧ Select the **Details** group.

The current transformer properties are displayed.

- ✧ Enter and Edit the properties as per your requirement.
- ✧ Modify the topology by renaming any elements, bay name, or busbar name.
- ✧ Select the device.

- ✧ Click  **Synchronize** in the [20.7.2 Toolbar of the Single-Line Editor](#).

The device is synchronized with the changes made in the topology.

Normalizing Current in a Busbar Device

With this feature in DIGSI, you can normalize the current in the entire busbar system.

- ✧ In the project tree, double-click **Busbar protection** under **Busbar**, in the **Settings** group.

Busbar protection settings are displayed in the working area.

- ✧ Enter and Edit the **Rated object current IrObj** value.

The current is normalized as per the configured settings.

The change in normalizing current can be verified or viewed in measured value boxes in the Busbar protection (BBP) offline view. The normalization current can be set independently from the existing feeder rated currents, and if no setting is done, the largest feeder rated current is assumed as the normalization current.

Related Topics

- ✧ [7.2.1 Opening a Single-Line Configuration](#)
- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.3.4 Using a Template from the Library](#)
- ✧ [7.4.9 Connecting Single-Line Element with SIPROTEC 5 Devices](#)
- ✧ [6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#)
- ✧ [6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#)
- ✧ [7.5.1 Overview of Topology](#)
- ✧ [8.2.2.1 Selecting a Function for Setting Parameters](#)

7.8 Chart Validation and Busbar Protection (BBP) View

With this feature in DIGSI, you can validate the topology connected to the configured busbar device and you can see the busbar view of the created valid topology.

This validation interprets the following to the device:

- Type of the bay
- Type of the coupler
- Type of the disconnector in the feeder or the coupler bay
- Position of the current transformer
- Disconnector image

Validating and Viewing a Busbar Device

- ✧ In the project tree, with the configured 7SS device and the topology, double-click **Single-line configuration**.

The [20.1.2 Single-Line Editor](#) is displayed in the working area.

- ✧ Select the busbar device from the list box in the [20.7.2 Toolbar of the Single-Line Editor](#).

The filtered Busbar Protection (BBP) view is displayed containing valid topology and elements connected to the busbar device. The following offline measured value boxes are displayed:

- Current transformer
- Coupler zone
- Bus zone
- Check zone

If the configuration is invalid, an error message is displayed. You must resolve the inconsistencies to proceed further.



NOTE

The list box to see the filtered BBP view is visible only if you add any busbar device in the [20.1.2 Single-Line Editor](#). You cannot edit any value in the filtered BBP view. You must reset the filter to make the desired changes.

Validating a Busbar Device

- ✧ In the project tree, with the configured 7SS device and the topology, double-click **Single-line configuration**.

The [20.1.2 Single-Line Editor](#) is displayed in the working area.

- ✧ Click the  button in the [20.7.1 DIGSI 5 Toolbar](#) to check the consistency of the busbar device.

If the configuration is invalid, an error message is displayed in the **Inconsistencies** tab view under the **Info** tab. You must resolve the inconsistencies to proceed further.

Viewing an Online Single-Line Configuration

- ✧ In the project tree, with the configured 7SS device and the topology, double-click **Single-line configuration**.

The [20.1.2 Single-Line Editor](#) is displayed in the working area.

- ✧ Load the configuration to the target device.
- ✧ Right-click on the configured busbar device.

The context menu appears.

- ✧ Select **Connect to device** from the context menu.

- or -

- ✧ Select **Connect to device and retrieve data** from the context menu.

The device is connected and displayed in the **Online access** folder.

- ✧ In the project tree, with the configured online 7SS device, double-click **Single-line monitoring**.

The configured topology is displayed in the **Single-line monitoring** view.



NOTE

You can view the busbar color that is assigned in the **Single-Line Editor** (offline mode). The extent of the color displayed for a bus zone depends on the state of the switches and the current-transformer functions connected to the respective busbar. You can view the current status of the switches (for example, circuit breakers and disconnectors) in the **Single-line monitoring** view, if the binary input is assigned or configured for those switches in the [20.3.2 Information Routing](#) editor.

Viewing Online Measured Value Boxes

- ✧ In the project tree, with the configured online 7SS device, double-click **Single-line monitoring**.

The configured topology is displayed in the **Single-line monitoring** view.

Online measured value boxes of the current transformer, the coupler zone, the bus zone, and the check zone are displayed. You can click  to view or hide the measured value boxes.



NOTE

It is possible to view the ongoing status of the current values in the following measured value boxes:

- Check zone
- Coupler zone
- Bus zone
- Feeder and bay current

If the current value is changed in the substation, the current value in measured value boxes is automatically updated.

Related Topics

- ✧ [7.2.1 Opening a Single-Line Configuration](#)
- ✧ [7.1 Overview of the Single-Line Configuration](#)
- ✧ [7.4.9 Connecting Single-Line Element with SIPROTEC 5 Devices](#)
- ✧ [7.5.1 Overview of Topology](#)
- ✧ [15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device](#)
- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)

8 Applications and Functions

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8.1 Configuring Applications

8.1.1 Overview of Applications

With the new application-oriented functional concept, you have to select an application template at the start of the project configuration, for example, line protection. With this, you have defined the entire functional scope of the SIPROTEC 5 device. For in many cases, you can use the selected application without any changes. But in addition you have the means to optimize the functional scope of the application, and thus of the SIPROTEC 5 device, exactly to fit your specific needs. For many functions, you can also determine the number of steps. Thus you adapt the functions exactly to individual protection concepts.

Details on Applications

In one application, individual functions are grouped together to form logic function groups. A function group usually reflects a part of the primary installation, for example, a line, circuit breaker, or a transformer. But a function group does not necessarily have to contain protection functions. Function groups also exist for fault records or installation data. Every function group has interfaces for raising and clearing information. With these interfaces, the function groups, and thus the functions, can exchange information among each other. But an application not only defines the scope of the functions and their connections among each other. An application is only really complete when it has logical measuring points. These measuring points serve as interfaces to the process and conduct the current and voltage values supplied by the transformers to the function groups. You can freely configure the connections between measuring points and function groups. Thus the measured values of each function are available within a function group. There is no more permanent wiring between input and function.

Optimizing Applications

If your application requires it, add new function groups to the application template. In doing so, you can rely on predefined function groups such as **Line** or **Circuit breaker**. You can also set up the same function group several times within one application. You can thereby now protect several pieces of equipment, which you previously each had to protect with one device, with only a single SIPROTEC 5 device.

However, a function group itself is not a rigid structure as such. You can copy or shift functions from one function group to another. And you can add additional functions. SIPROTEC 5 puts a number of modular functions at your disposal. From of this supply of functions, you select the functions that you need to supplement your application.

In SIPROTEC 5, the same functions are structured identically in all device types. For example, the **Overcurrent protection** function works in a 7SL exactly like in a 7SD. This gives you the possibility to copy already parameterized functions from one device to another.

Related Topics

[8.1.2.1 Overview of Functions and Function Groups](#)

[8.1.5.1 Overview of Measuring Points](#)

[8.1.4.1 Overview of Connections](#)

8.1.2 Adjusting the Functional Scope

8.1.2.1 Overview of Functions and Function Groups

For SIPROTEC 5, function groups summarize individual functions into logical units.

Functions

You can supplement your SIPROTEC 5 device by individual functions, or remove functions from the device. For this purpose add functions to the respective offline configuration in DIGSIG 5, or delete functions from the offline configuration. If you transmit an offline configuration processed this way to the SIPROTEC 5 device, then the changed functional scope is effective in the device.

If you delete or add functions, points are credited to or deducted from your function-point account. The current function-points status of an offline configuration can be read in the [20.5.5 Resource Consumption](#) tab.

Function Groups

A function group is assigned to a primary object, for example, a line, a transformer or circuit breaker.

The function groups bundle functions regarding the following basic tasks:

- Assigning functions via measuring points to current and/or voltage transformers and thus to the safety installation
- Information exchange between functions

When a function is inserted into a function group, it automatically works with the measuring points assigned to the function group. Accordingly, the interfaces of the function groups automatically forward the function output signals to other function groups and ultimately, other functions.

SIPROTEC 5 distinguishes between 2 types of function groups:

- **Protection Function Groups**

Protection function groups summarize functions that are assigned to a safety installation, for example, a line. Depending on the SIPROTEC 5 device type and the type of protected object, there are different types of protection function groups:

- Line
- Feeder
- Transformer
- Motor
- And other

- **Switch Function Groups**

Switch function groups summarize functions that are assigned to the local circuit breakers and disconnector switches. Such functions are, for example, the tripping, the circuit-breaker failure protection or the automatic reclosing.

Depending on the SIPROTEC 5 device type and the current application, the number and types of the function groups differ in the respective application templates. You can add, copy, or even delete function groups for a specific application.

Function-Points

In SIPROTEC 5, you do not buy a rigid function package, but so-called function-points. Because with SIPROTEC 5, functions have a certain value, which is expressed in function-points.

For example: To configure a function A, you require 5 function-points, while, on the other hand, 10 points are required for function B. In total, you need to have at least 15 points on your function-points account. For this you can also configure a function C, which has a value of 15 points.

If your function-point account is depleted, you can order new function-points.

Related Topics

[8.1.1 Overview of Applications](#)

[8.1.2.3 Adding a Function](#)

[8.1.2.2 Adding a Function Group](#)

[8.1.2.4 Adding a User-defined Function Block](#)

[8.1.2.6 Copying Function Group, Function, or Function Block](#)

[8.1.2.7 Deleting Functions or Functions Groups](#)

[8.1.3.4 Checking the Function-points Consumption](#)

8.1.2.2 Adding a Function Group

An application template has several function groups according to the scope of the application. As soon as you have assigned an application template to a SIPROTEC 5 device, you can add further function groups to the application. The global DIGSI 5 library is used for this. The library contains various predefined function-group types.

Depending on your respective working situation, you can add a function group in different areas:

- **In the Single-Line Configuration of the Project**

To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).

- **In the Information Routing of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).

- **In the Communication Mapping of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).

- **In the Project Structure**

To use this version, open the [3.1.2 Project Tree](#).

If you add new function groups to one of the above-mentioned areas, then these subsequently exist in other areas. Additionally, the function group also exists in the function group connections.

To add a function group, drag and drop a function-group element from the function group folder in the global DIGSI 5 library.



NOTE

For certain function group types there is also a maximum number permitted within one application. If insertion of a function group is not allowed at this position, the mouse pointer will change to a crossed-out circle.

Opening the Global DIGSI 5 Library and Marking the Function-Group Element

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ Open the **Global DIGSI 5 Library** folder.
- ✧ Open one folder at a time for the device type and function group you want to insert.

Other folders with functions and an element are displayed for the function group. The function-group element is found at the top position and has the name of the function group, for example **Cable**.

- ✧ Mark the function-group element.

Adding a Function Group to the Single-Line Configuration

- ✧ You can open the single-line configuration.
- ✧ Drag the marked function-group element from the global DIGSI 5 library to the single-line configuration.
- ✧ Drag the function-group element to the device symbol of the affected offline configuration.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the new function group will be added into the application.

Adding a Function Group in the Information Routing

- ✧ Open the information routing.
- ✧ Drag the marked function-group element from the global DIGSI 5 library to the information routing.

- ✧ Position the function-group element in the area of the already existing function groups.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the new function group will be added into the application.

Adding a Function Group in the Communication Mapping

- ✧ Open the communication mapping.
- ✧ Drag the marked function-group element from the global DIGSI 5 library to the communication mapping.
- ✧ Position the function-group element in the area of the already existing function groups.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the new function group will be added into the application.

Adding a Function Group in the Project Structure

- ✧ Open the project tree.
- ✧ Drag the marked function-group element from the global DIGSI 5 library to the project tree.
- ✧ Position the function-group element on the name of the offline configuration or the **Settings** folder.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the new function group will be added into the application.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)
- ✧ [8.1.2.5 Renaming Functions or Function Groups](#)
- ✧ [8.1.2.7 Deleting Functions or Functions Groups](#)
- ✧ [8.1.2.3 Adding a Function](#)

8.1.2.3 Adding a Function

An application template has several functions according to the scope of the application. Functions are summarized in function groups. As soon as you have assigned an application template to a SIPROTEC 5 device, you can add further functions to the application. The global DIGSI 5 library is used for this. The library contains various predefined function types.

Depending on your respective working situation, you can add a function in different areas:

- **In the Single-Line Configuration of the Project**
To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).
- **In the Information Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **In the Communication Mapping of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).
- **In the Project Structure**
To use this version, open the [3.1.2 Project Tree](#).

If you add new function to one of the above-mentioned areas, then these subsequently exist in other areas. Additionally, the function group is also available in the matrix [20.3.11 Circuit-Breaker Interaction](#). You find more information about this under [8.1.4.5 Configuring the Circuit-Breaker Interaction for Protection Groups](#).

To add a function, use a function element from the function folder in the global DIGSI 5 library. Therefore you will always insert a function into a function group.



NOTE

Not every function type can be inserted in any function group. For certain function types there is also a maximum number permitted within one function group. If insertion of a function is not allowed at this position, the mouse pointer will change to a crossed-out circle.

Opening the Global DIGSI 5 Library and Marking the Function Element

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ Open the **Global DIGSI 5 Library** folder.
- ✧ Open one folder at a time for the device type, the function group, and the function you want to insert.

An element for the function is displayed. The function element is named after the function, for example, **47 overcurrent protection**.

- ✧ Mark this function element.

Adding a Function to the Single-Line Configuration

- ✧ You can open the single-line configuration.
- ✧ Drag the marked function element from the global DIGSI 5 library to the single-line configuration.
- ✧ Drag the function element to the device symbol of the affected offline configuration.
- ✧ Position the function element on the rectangle of the function group into which the function is to be inserted.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function will be inserted into the function group.

Adding a Function in the Information Routing

- ✧ Open the information routing.
- ✧ Drag the marked function element from the global DIGSI 5 library to the information routing.
- ✧ Position the function element on the name of the function group into which the function is to be inserted.
- or -
- ✧ If the function group is opened, position the function element at any place within the indicated function group contents.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function will be inserted into the function group.

Adding a Function in the Communication Mapping

- ✧ Open the communication mapping.
- ✧ Drag the marked function element from the global DIGSI 5 library to the communication mapping.
- ✧ Position the function element on the name of the function group into which the function is to be inserted.
- or -
- ✧ If the function group is opened, position the function element at any place within the indicated function group contents.

- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function will be inserted into the function group.

Adding a Function in the Project Structure

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration for which you want to add the function.
- ✧ Double-click **Settings** in this folder.

The names of all available function groups are listed.

- ✧ Drag the marked function element from the global DIGSI 5 library to the project tree.
- ✧ Position the function element within the **Settings** folder on the name of the function group to which you want to add the function.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function will be inserted into the function group.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)
- ✧ [8.1.2.5 Renaming Functions or Function Groups](#)
- ✧ [8.1.2.7 Deleting Functions or Functions Groups](#)
- ✧ [8.1.3.4 Checking the Function-points Consumption](#)

8.1.2.4 Adding a User-defined Function Block

You can supplement the application with user-defined function blocks. With a user-defined function block, you group user-defined signals, for example, sorted according to tasks and topics. You can, for example, insert individual indications routed to binary inputs in a user-defined function block and name this function block with process indications.

You can insert user-defined function blocks into function groups as well as into functions. The global DIGSI 5 library is used for this.

Depending on your respective working situation, you can add a function block in different areas:

- **In the Single-Line Configuration of the Project**
To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).
- **In the Information Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **In the Communication Mapping of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).
- **In the Project Structure**
To use this version, open the [3.1.2 Project Tree](#).

If you add a new function block to one of the above-mentioned areas, then this function block subsequently exist in other areas. User-defined function blocks are not visible in the project structure.

Opening the Global DIGSI 5 Library and Marking the Function Block

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.

- ✧ Open the **Global DIGSI 5 Library** folder.
- ✧ Open the folder **User-defined functions**.

The element **User-defined function block** is displayed.

- ✧ Mark this element.

Adding a Function Block to the Single-Line Configuration

- ✧ Open the single-line configuration.
- ✧ Drag the marked function block element from the global DIGSI 5 library to the single-line configuration.
- ✧ Drag the function block element to the device symbol of the affected offline configuration.
- ✧ Position the function block element on the rectangle of the function group or the function into which the function block is to be inserted.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function block is inserted into the function group.

Adding a Function Block in the Information Routing

- ✧ Open the information routing.
- ✧ Drag the marked function block element from the global DIGSI 5 library to the information routing.
- ✧ Position the function block element on the name of the function group or the function into which the function block is to be inserted.

- or -

- ✧ If the function group is opened, position the function block element at any place within the indicated function group.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function block is inserted into the function group.

Adding a Function Block in the Communication Mapping

- ✧ Open the communication mapping.
- ✧ Drag the marked function block element from the global DIGSI 5 library to the communication mapping.
- ✧ Position the function block element on the name of the function group or the function into which the function block is to be inserted.

- or -

- ✧ If the function group is opened, position the function block element at any place within the indicated function group.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function block is inserted into the function group.

Adding a Function Block in the Project Structure

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration for which you want to add the function block.
- ✧ Double-click **Settings** in this folder.

The names of all available function groups are listed.

- ✧ Drag the marked function element from the global DIGSI 5 library to the project tree.
- ✧ Position the function block element within the **Settings** folder on the name of the function group to which you want to add the function block.

- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function block is inserted into the function group.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)
- ✧ [8.1.2.5 Renaming Functions or Function Groups](#)
- ✧ [8.1.2.7 Deleting Functions or Functions Groups](#)

8.1.2.5 Renaming Functions or Function Groups

Each function and each function group has a name and an original name. The original name identifies the type of the function or function group and cannot be changed. Examples of original names are **47 overcurrent protection** for a function and **Line** for a function group. For example, to distinguish several functions of the same type, you can also change their names.

Depending on your respective working situation, you can rename a function or function group in different areas:

- **Directly in the Circuit-Breaker Interaction of a Function Group**
To use this version, open the affected function group in the [20.3.11 Circuit-Breaker Interaction](#) matrix. You find more information about this under [8.1.4.5 Configuring the Circuit-Breaker Interaction for Protection Groups](#).
- **Directly in the Information Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **Directly in the Communication Mapping of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).
- **In the Project Structure**
To use this version, open the [3.1.2 Project Tree](#).
- **In the Properties of the Function or Function Group**
To use this version, also open the [3.1.4 Inspector Window](#).

Changing the Name Directly in an Area or in the Project Structure

- ✧ Select one of the mentioned matrices or in the project tree the current name of the function or function group.
 - ✧ Click again the name.
- The existing text is highlighted.
- ✧ Enter a new name.
 - ✧ Click outside of the text box.
- or -
- ✧ Press the <Enter> button.

You confirm your entry with these 2 actions.

The entered name is accepted.

Changing the Name in the Properties

- ✧ Mark in one of the mentioned matrices, the current name of the function or function group.
- ✧ In the Inspector window, go to the **Properties** tab.

- ✧ Go to the **Details** group.
- ✧ Enter a new name for the function or function group in the **Name** text box.
- ✧ Click outside of the text box.
- or -
- ✧ Press the <Enter> button.

You confirm your entry with these 2 actions.
The entered name is accepted.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)

8.1.2.6 Copying Function Group, Function, or Function Block

You have the following possibilities for copying the function group, function, or the function block:

- You can copy the function group, function, or the function block within an offline configuration.
- You can copy the function group, function, or the function block between offline configurations.

Depending on your respective working situation, you can copy the function group, function, or the function block in different areas:

- **In a Single-Line Configuration of the Project**
To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).
- **In the Information Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **In the Communication Mapping of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).
- **In the Project Structure and Settings Editor**
You can copy the function block from the [20.1.9 Settings Editor](#) and paste it in the [3.1.2 Project Tree](#).
You can copy the function group or the function from the [3.1.2 Project Tree](#) and paste it in the desired destination in the [3.1.2 Project Tree](#).



NOTE

Using the context menu option or the drag and drop option, you can copy the function group or the function from the project tree and paste it in the desired destination in the project tree, the [20.3.2 Information Routing](#) editor, or the [20.3.1 Communication Mapping](#) editor. You can copy and paste the function block in the [20.3.2 Information Routing](#) editor or in the [20.3.1 Communication Mapping](#) editor only via the context menu option.

Selecting the Function Group, Function, or the Function Block

- ✧ In order to copy the function group, function, or the function block, mark the name of the respective function group, function, or the function block.

Copying the Function Group, Function, or the Function Block within an Offline Configuration

- ✧ Right-click the marked function group, function, or the function block.
- ✧ Click **Copy** in the context menu.

The marked function group, function, or the function block is copied to the clipboard.

- ✧ Right-click the respective destination under the **Settings** folder.

- ✧ Click **Paste** in the context menu.

A copy of the original function group, function, or the function block is inserted in the selected destination respectively.

Copying the Function Group, Function, or the Function Block between Offline Configurations

- ✧ Right-click the marked function group, function, or the function block.
- ✧ Click **Copy** in the context menu.

The marked function group, function, or the function block is copied to the clipboard.

- ✧ For example, in the project tree, open the target-configuration folder.

- or -

- ✧ For the target configuration, open any one of the matrices.
- ✧ Right-click the respective destination under the **Settings** folder.
- ✧ Click **Paste** in the context menu.

A copy of the original function group, function, or the function block is inserted in the selected target.



NOTE

If you copy and paste a function group, a function, or a function block, the GOOSE inputs configured will also be copied and displayed in the **Unassigned** folder under the **External Signals** folder. The name of the GOOSE inputs will not change.

The following rules apply for the IEC 61850 system configurator properties while copying and pasting a device:

Configura- tion	Action				
		Copy Device	Device Master Copy	Remove Device from IEC Station	Include in DEX Export
	Reporting	Copy	Copy	Delete	Yes
	GOOSE source	Copy	Copy	Delete	Yes
	GOOSE inputs in DIGSI V07.50 or higher	Copy	Copy	Keep	Yes
	GOOSE inputs in DIGSI V07.50 or higher, link to GOOSE source	Delete	Delete	Delete	No
	GOOSE inputs in DIGSI V07.40 or lower	Delete	Delete	Delete	No

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)

8.1.2.7 Deleting Functions or Functions Groups

You have the following possibilities of deleting functions or function groups:

- You can delete one or more individually selected functions.
- You can delete one or more function groups using functions.

Depending on your respective working situation, you can delete a function or function group in different areas from an application:

- **In a Single-Line Configuration of the Project**

To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).

- **In the Information Routing of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).

- **In the Communication Mapping of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).

- **In the Project Structure**

To use this version, open the [3.1.2 Project Tree](#).



NOTE

If you delete one function or a function group, inconsistencies can be created in the application and the parameterization.

Selecting Functions and Function Groups

- ✧ In order to delete an individual function, select the name of this function.
- or -
- ✧ In order to delete a number of functions, mark the names of these functions. This is done by holding down either the shift key or the <CTRL> key, depending on the selection method.
- or -
- ✧ In order to delete a function group along with all the functions contained therein, mark the name of this function group.
- or -
- ✧ In order to delete several function groups along with all the functions contained therein, mark the name of these function groups. This is done by holding down either the shift key or the <CTRL> key, depending on the selection method.

Deleting Functions and Functions Groups

- ✧ Right-click a marked function or function group.
- ✧ Click **Delete** in the context menu.

A confirmation prompt is displayed.

- ✧ Click **Yes** to confirm.

This confirms your action.

The marked functions or functions groups are deleted from the application.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)

8.1.3 Managing Function Points

8.1.3.1 Overview of Function-points

Each SIPROTEC 5 device has a basic functionality dependent on its type. The SIPROTEC 5 device is already operational and functional with this basic functionality. You can, however, expand the basic functionality of a SIPROTEC 5 device by additional functions.

A key feature of SIPROTEC 5 is that additional functions are deducted via your function-point credit. Because in SIPROTEC 5, functions have a certain value, which is expressed in function-points. The value of a function, or whether the function can be used without calculation, is detailed in the device manual in the **Applications** chapter. It is possible that one and the same function can have a different function-point value with different device types.

Before ordering a SIPROTEC 5 device, you configure it on the Siemens Internet site using the SIPROTEC 5 configurator. During this process, you also select a function-point class that covers the function-points required for your application. Siemens delivers the SIPROTEC 5 device along with the acquired function-point class.

Base+200 is an example of a function-point class. **Base** indicates that the basic functionality specified through the device type is covered. **200** is the number of function-points, which you purchase. This function-point number corresponds to your function-point credit. This function-point credit is available to you for the expansion of the SIPROTEC 5 device by additional functions.

One advantage of this method is that the additional functionality does not have to be determined in detail during product selection. You can add every required additional function in the later engineering phase. For this, you insert the required functions from the global DIGSI 5 library into the offline configuration of the SIPROTEC 5 device in DIGSI 5. Then, you load the offline configuration into the SIPROTEC 5 device.

An offline configuration can only be loaded within the function-point credit available in the SIPROTEC 5 device. The more functions you use for your application the higher the need for function-points in the SIPROTEC 5 device.

If the required number of points of the configured function scope is larger than the function-point credit, you cannot load the affected offline configuration into the SIPROTEC 5 device. You must either remove functions or upgrade the function-point credit of the SIPROTEC 5 device. You find more information about this under [15.6.1 Overview of Updating the Device Functionality](#).

With DIGSI 5, you can configure the functional scope regardless of the actual function-point credit. You can order missing function-points later on.

Related Topics

[8.1.3.4 Checking the Function-points Consumption](#)

[8.1.3.2 Determining the Function-point Class for a SIPROTEC 5 Device](#)

[8.1.3.3 Determining the Function-point Class for the Offline Configuration of a SIPROTEC 5 Device](#)

[8.1.3.5 Ordering Function-points and Loading Them into the SIPROTEC 5 Device](#)

8.1.3.2 Determining the Function-point Class for a SIPROTEC 5 Device

Before ordering a SIPROTEC 5 device, you configure it on the Siemens Internet site using the SIPROTEC 5 configurator. During this process, you also select a function-point class that covers the function-points required for your application.

The SIPROTEC 5 configurator is a Web application that you can execute with the browser on your PC. Your Siemens contact explains to you how to find the SIPROTEC 5 configurator.

A function-point calculator supports you in the selection of the applicable point class. All functions that are available in the selected SIPROTEC 5 device are listed in this function-point calculator. Select an application template and you can see which functions you require for it. You can now select additional functions or deselect highlighted functions. The function-point calculator immediately calculates the necessary function-points.

Related Topics

[8.1.3.1 Overview of Function-points](#)

[8.1.3.4 Checking the Function-points Consumption](#)

- [8.1.3.3 Determining the Function-point Class for the Offline Configuration of a SIPROTEC 5 Device](#)
- [8.1.3.5 Ordering Function-points and Loading Them into the SIPROTEC 5 Device](#)

8.1.3.3 Determining the Function-point Class for the Offline Configuration of a SIPROTEC 5 Device

When inserting a SIPROTEC 5 device into the project, you determine the function-point class for the offline configuration of this device. The function-point classes in the SIPROTEC 5 device and the associated offline configuration must match. If you require a higher function-point class, you can order function-points later on and load them in the SIPROTEC 5 device. You find more information about this under [15.6.1 Overview of Updating the Device Functionality](#).

To determine the function-point class for the offline configuration, you have the following possibilities:

- **Determine via Product Code**

If you specify the SIPROTEC 5 device during inserting via a valid product code, the function-point class is already coded in this product code. You cannot change the function-point class during inserting.

- **Determine Manually**

If you manually configure the SIPROTEC 5 device during inserting, you can also manually determine the function-point class. You can select it with the selection list **Select function-point class** in the dialog **Add new device**. The minimum function-point class is **Base**. When you select this function-point class, your function-point credit equals 0. You can only use the basic functionality of the SIPROTEC 5 device. The maximum function-point class that can be selected for adding a device with the version V4.00 DDDs is **Base+1400**, whereas, for adding a device with the DDDs prior to the version V4.00, the maximum function-point class that can be selected is **Base+500**. The device is credited with the function-points based on the selection of the function-point class.

Regardless of the determined function-point class and the actual function-point credit, you can configure the function scope any way you like with DIGSI 5. But if the required number of points of the configured function scope is larger than the function-point credit, you cannot load the affected offline configuration into the SIPROTEC 5 device.

Related Topics

- [8.1.3.1 Overview of Function-points](#)
- [8.1.3.4 Checking the Function-points Consumption](#)
- [8.1.3.2 Determining the Function-point Class for a SIPROTEC 5 Device](#)
- [8.1.3.5 Ordering Function-points and Loading Them into the SIPROTEC 5 Device](#)

8.1.3.4 Checking the Function-points Consumption

At any time, you can check the current function-points consumption.

Checking the Current Function-points Consumption

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Open the relevant offline configuration in the project.
- ✧ Double-click **Device information** in this folder.

The [20.5.3 Device Information](#) is displayed in the working area.

- ✧ Select the tab [20.5.5 Resource Consumption](#).

The current usage of function-points is displayed in the **Function-points** area.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)
- ✧ [8.1.3.1 Overview of Function-points](#)
- ✧ [8.1.3.5 Ordering Function-points and Loading Them into the SIPROTEC 5 Device](#)

8.1.3.5 Ordering Function-points and Loading Them into the SIPROTEC 5 Device

If the current number of function-points is inadequate for the device application, you can purchase additional function-points for the SIPROTEC 5 device. With the SIPROTEC 5 configurator, you select a higher function-points class for this purpose. You do not select additional points individually, but instead, a function-points class that covers the number of function-points required. However, you need to pay only for the difference between the new and the current function-points class.

After the payment, you receive a signed license file with the additional device functionality either by downloading it or via e-mail. Use the DIGSI 5 to load the license file with the device functionality into the SIPROTEC 5 device.

You find more information about this procedure under [15.6.1 Overview of Updating the Device Functionality](#).

Related Topics

[8.1.3.1 Overview of Function-points](#)

[8.1.3.4 Checking the Function-points Consumption](#)

[8.1.3.2 Determining the Function-point Class for a SIPROTEC 5 Device](#)

[8.1.3.3 Determining the Function-point Class for the Offline Configuration of a SIPROTEC 5 Device](#)

8.1.4 Adapting Connections

8.1.4.1 Overview of Connections

An application not only defines the functional scope but also the connections between the functions groups and measuring points.

Edit these function-group connections with the [20.3.4 Function-Group Connections](#) matrix. The **Function-group connections** matrix is a device-oriented tool. A separate function-group connection matrix is available for each offline configuration present in a project.

Connection Categories

You can freely define the following connections in an application:

- **Connections between Measuring Points and Protection Groups**

You find more information about this under [8.1.4.3 Connecting Measuring Points to Function Groups](#).

- **Connections between Protection and Circuit-Breaker Function Groups**

You find more information about this under [8.1.4.4 Connecting Protection Groups with Circuit-Breaker Functions Groups](#).

- **Connections between Protection Groups and Protection Groups**

You find more information about this under [20.3.7 Connecting Protection-Function Group to Protection-Function Group](#).

Circuit-Breaker Interaction

If a Protection group is connected with a Circuit-breaker function group, then you can configure this connection in detail. For this purpose, specify individually which functions or function blocks of the Protection group have an effect on the Circuit-breaker function group. You find more information about this under

[8.1.4.5 Configuring the Circuit-Breaker Interaction for Protection Groups](#).

Related Topics

[8.1.1 Overview of Applications](#)

[8.1.4.2 Opening a Function-Group Connection Matrix and Adjusting a View](#)

8.1.4.2 Opening a Function-Group Connection Matrix and Adjusting a View

With the [20.3.4 Function-Group Connections](#) matrix, you can edit the connections within an application. Such connections exist between the function groups and between the function groups and measuring points.

Function-group connections are device-oriented. Therefore, the function-group connections inside the project structure are always assigned to the offline configuration of a SIPROTEC 5 device.

You can adjust the view of the **Function-group connections** matrix. For this purpose, you have the following standard functions available:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.4 Filtering Column Content](#)

In addition to the standard functions, you can change the size of the 3 windows of the **Function-group connection** matrix. The **Function-group connection** matrix has the following windows:

- [20.3.5 Connecting Measuring Points to Function Group](#)
- [20.3.6 Connecting Function Group to Circuit-Breaker Groups](#)
- [20.3.7 Connecting Protection-Function Group to Protection-Function Group](#)

Opening a Function-Group Connection Matrix

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to edit its application.
- ✧ Double-click **Function-group connections**.

The **Function-group connections** matrix is displayed in the working area.

Resetting a Column Filter

- ✧ Click the  button in the [20.7.37 Toolbar of the Function-Group Connections Matrix](#).

All column filters are reset and the standard view is restored. Here the columns are set to the original width.

Related Topics

- ✧ [8.1.4.1 Overview of Connections](#)
- ✧ [8.1.4.3 Connecting Measuring Points to Function Groups](#)
- ✧ [8.1.4.4 Connecting Protection Groups with Circuit-Breaker Functions Groups](#)

8.1.4.3 Connecting Measuring Points to Function Groups

The number of measuring points and the connections between measuring points and function groups are specified by the selected application template. Therefore, this specifies, for all functions within the function group, which measuring points and which derived measurands you are working with.

You can modify the specified connections. If you have added new measuring points, you can also produce new connections to function groups.

You can adapt connections in one of the following ways:

- You can use the [20.1.2 Single-Line Editor](#).
In the Single-line editor, connect a measuring point with a function group with help from the list box. Such list boxes are positioned directly in the function groups of a device symbol. You find more information about this under [7.4.8 Selecting Measuring Points for Function Groups](#).
- You can use the [20.3.4 Function-Group Connections](#) matrix.
In the [20.3.5 Connecting Measuring Points to Function Group](#) window of the **Function-group connections** matrix every measuring point is presented by a line. Each Protection group is displayed by 1 or 2 columns each for current and voltage. Circuit-breaker function groups are displayed by the respective columns. The columns match the current and voltage inputs of the function group.
If you route a measuring point to a column of a function group in the window **Connect measuring points with function groups**, then the measuring point and the function group are connected to each other. The detailed procedure is described in the following sections.

Routing Measuring Points to Function Groups

- ✧ In the **Function-group connections** matrix, open the offline configuration for which you want to edit its application. You find more information about this under [8.1.4.2 Opening a Function-Group Connection Matrix and Adjusting a View](#).
- ✧ In the window **Connect measuring points with function groups**, check if a measuring point can or must be routed to a function group. If the common cell of the measuring point line and the target column is light gray, then the measuring point can be routed to the column. If the common cell is dark gray, the measuring point cannot be routed on the relevant column.
If one or more lines in a column are not consistent, then one more measuring point must be routed on this column.
- ✧ Right-click in the editable cell.
- ✧ Click **X (Routed)** in the context menu.

The value **X** is entered into the cell and the measuring point is connected to the function group.

- or -

- ✧ Click **X (Routed – CT neutr. point towards object)** in the context menu to route a 3-phase current measuring point to the protection function group.

The value **X** is entered into the cell and the measuring point is connected in a direction towards protection function group.

- or -

- ✧ Click **I (Routed – CT neutr. point away from the object)** in the context menu to route a 3-phase current measuring point to the protection function group.

The value **I** is entered into the cell and the measuring point is connected in a direction away from the protection function group.



NOTE

The context menu options **X (Routed – CT neutr. point towards object)** and **I (Routed – CT neutr. point away from the object)** are available for selection only if you are routing a 3-phase current measuring point to the protection function group.

- ✧ Repeat this process for all other measuring points to be connected and the function groups.

As soon as the measuring points are correctly routed, the color-highlighting is hidden.



NOTE

You find more options for routings under [11.2 Basic Principles of Routing](#).

Removing the Routing

- ✧ Click with the right mouse button in the cell from which the routing is removed.
- ✧ Click **_ (not routed)** in the context menu.

The routing in the cell is removed.



NOTE

You find further possibilities for removing routings under [11.2 Basic Principles of Routing](#).

Related Topics

- ✧ [8.1.4.1 Overview of Connections](#)
- ✧ [8.1.5.5 Adding Measuring Points](#)

8.1.4.4 Connecting Protection Groups with Circuit-Breaker Functions Groups

The connections between Protection groups and Circuit-breaker function groups are specified by the selected application template of the specific application. These connections specify which actions can be executed by the Protection functions of the connected Protection groups:

- Tripping of the circuit breaker
- Starting of the **Circuit-breaker failure protection** function if it is configured in the Circuit-breaker function group.
- Starting of the **Automatic reclosing** function if it is available in the Circuit-breaker function group.

You cannot change the specified connections. If you have added new function groups, you can also produce new connections between function groups.

For adjusting the connections, use the [20.3.4 Function-Group Connections](#) matrix. In the [20.3.6 Connecting Function Group to Circuit-Breaker Groups](#) window of this matrix, every Circuit-breaker function group is presented by a column. Every measuring point is presented by a line. If you route, in this window, a Protection group to the column of a Circuit-breaker function group, then both functions groups are connected to each other.

You can configure the connection between a Protection group and a Circuit-breaker function group. In detail, you can find more information about this under [8.1.4.5 Configuring the Circuit-Breaker Interaction for Protection Groups](#).



NOTE

If you add a new Circuit-breaker function group, it is automatically connected to the existing Protection groups. This also applies in reverse, if you add a new Protection group.

Routing Protection Groups to Circuit-Breaker Function Groups

- ✧ In the **Function-group connections** matrix, open the offline configuration for which you want to edit its application. You find more information about this under [8.1.4.2 Opening a Function-Group Connection Matrix and Adjusting a View](#).
- ✧ In the **Connect protection groups with circuit-breaker function groups** window, right-click in the editable cell of the Protection group and Circuit-breaker function group.
- ✧ Click **X (Routed)** in the context menu.

An X is entered into the cell. The Protection group is now connected to the Circuit-breaker function group.

- ✧ Repeat this process for all other function groups to be connected.



NOTE

You find more options for routings under [11.2 Basic Principles of Routing](#).

Removing the Routing

- ✧ Click with the right mouse button in the cell from which the routing is removed.
- ✧ Click **_ (not routed)** in the context menu.

The routing in the cell is removed.



NOTE

You find further possibilities for removing routings under [11.2 Basic Principles of Routing](#).

Related Topics

- ✧ [8.1.4.1 Overview of Connections](#)

✧ [8.1.2.2 Adding a Function Group](#)**8.1.4.5 Configuring the Circuit-Breaker Interaction for Protection Groups**

If a Protection group is connected with a Circuit-breaker function group, then you can configure this connection in detail. For this purpose, specify individually which functions or function blocks of the Protection group have an effect on the Circuit-breaker function group.

The configuration of the circuit-breaker interaction is function group-oriented. Therefore, the circuit-breaker interaction is filed within the offline configuration in the folder of the respective Protection group.

For configuring the circuit-breaker interaction, use the [20.3.11 Circuit-Breaker Interaction](#) matrix. In this matrix, every Circuit-breaker function group is presented by a column. Every function is presented by a line. Additionally, below the function line there is 1 other line each for every function block of the function. Clicking the arrow icon next to the function name shows or hides the lines of the function blocks.

In this way, a function or a function block has an effect on the Circuit-breaker function group, the function, or function block must be routed to the column of the Circuit-breaker function group.

**NOTE**

A newly added function is automatically routed to all Circuit-breaker function groups. All existing functions are automatically routed to a newly added Circuit-breaker function group.

You can adjust the view of the **Circuit-breaker interactions** matrix. For this purpose, you have the following standard functions available:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.4 Filtering Column Content](#)

Opening a Circuit-Breaker Interaction Matrix

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to edit its application.
- ✧ Open the **Settings** folder.
- ✧ In the folder of the Protection group, open the circuit-breaker interaction you want to edit.
- ✧ Double-click **Circuit-breaker interaction**.

In the working area, the **Circuit-breaker interaction** matrix is displayed.

Routing a Protection Function or Function Block to the Circuit-Breaker Function Groups

- ✧ To route an entire protection function, right-click in the common cell of protection function and Circuit-breaker function group.
- ✧ Click **X (Routed)** in the context menu.

In the selected cell and in the cells below it of all function blocks of the protection function, enter an X. The complete protection function has an effect on the behavior of the circuit breaker.

- or -

- ✧ To route individual function blocks, right-click in the common cell of the function block and Circuit-breaker function group.
- ✧ Click **X (Routed)** in the context menu.

An X is entered into the selected cell. The selected function block has an effect on the behavior of the circuit breaker.

An * is entered in the common cell of the Protection function and Circuit-breaker function group. This character means that at least 1, but not all, function block(s) of the Protection function are routed on the Circuit-breaker function group. As soon as all function blocks are routed, the * is replaced by an X.



NOTE

You find more options for routings under [11.2 Basic Principles of Routing](#).

Removing the Routing

- ✧ With the right mouse button, click in the common cell of Protection function and Circuit-breaker function groups from which the routing is removed.
- ✧ Click **_ (not routed)** in the context menu.

The routing is removed from the cell and the cells below it of all function blocks of the Protection function. The complete Protection function has no further effect on the behavior of the circuit breaker.

- or -

- ✧ With the right mouse button, click in the cell of a Protection function from which the routing is removed.
- ✧ Click **_ (not routed)** in the context menu.

The routing in the cell is removed. The selected function block has no further effect on the behavior of the circuit breaker.



NOTE

You find further possibilities for removing routings under [11.2 Basic Principles of Routing](#).

Related Topics

- ✧ [8.1.4.1 Overview of Connections](#)
- ✧ [8.1.4.4 Connecting Protection Groups with Circuit-Breaker Functions Groups](#)

8.1.5 Adjusting and Routing Measuring Points

8.1.5.1 Overview of Measuring Points

Measuring points as part of the application are the binding link between the physical inputs of a SIPROTEC 5 device and the function groups of an application. Measuring points forwards the current and voltage values delivered by transformers to the functions in the function groups.

You can specify the assignment between inputs and function groups. To do so, route the inputs of a measuring point to the physical inputs of the SIPROTEC 5 device. The output of the measuring point is connected to one or more function groups. More information is available from [8.1.5.3 Routing Measuring Points to Physical Inputs](#) and [8.1.4.3 Connecting Measuring Points to Function Groups](#).

You edit the measuring-point routing of a SIPROTEC 5 device with the [20.3.8 Measuring-Points Routing](#) matrix. The **measuring-point routing** matrix is a device-oriented tool. A separate measuring-point routing matrix is available for each offline configuration present in a project.

Related Topics

- [8.1.1 Overview of Applications](#)
- [8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View](#)
- [8.1.5.3 Routing Measuring Points to Physical Inputs](#)
- [8.1.5.5 Adding Measuring Points](#)

8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View

The [20.3.8 Measuring-Points Routing](#) matrix is used to route logic measuring points of the application to the physical power and voltage inputs of the SIPROTEC 5 device. This allows you to meet the requirement for establishing a connection between the functions and the process.

The measuring-point routing is device-oriented. Therefore, the measuring-point routing inside the project structure is always assigned to the offline configuration of a SIPROTEC 5 device.

You can adjust the view of the **Measuring-point routing** matrix. For this purpose, you have the following standard functions available:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.4 Filtering Column Content](#)

As well as the standard functions, you can also change the size of the 2 windows of the **Measuring-point routing** matrix. The **Measuring-point routing** matrix has the following windows:

- [20.3.9 Current-Measuring Points](#)
- [20.3.10 Voltage-Measuring Points](#)

Opening a Measuring-Point Routing Matrix

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Open the offline configuration in the project of the relevant SIPROTEC 5 device.
- ✧ Double-click **Measuring-point routing**.

The **Measuring-point routing** matrix is displayed in the working area.

Resetting a Column Filter

- ✧ Click the  button in the [20.7.38 Toolbar of the Measuring-Points Routing Matrix](#).

All column filters are reset and the standard view is restored. Here the columns are set to the original width.

Related Topics

- ✧ [8.1.5.1 Overview of Measuring Points](#)
- ✧ [8.1.5.3 Routing Measuring Points to Physical Inputs](#)
- ✧ [8.1.5.5 Adding Measuring Points](#)

8.1.5.3 Routing Measuring Points to Physical Inputs

The assignment of measuring points to the physical inputs of the SIPROTEC 5 device is initially specified by selecting an application template and the current and voltage inputs. However, you can also change this assignment. To do so, route the inputs of a measuring point to the other physical inputs of the SIPROTEC 5 device. For routing measuring points, use the [20.3.8 Measuring-Points Routing](#) matrix. Open it as described under [8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View](#).

Every terminal block at the SIPROTEC 5 device has 4 inputs, each consisting of 1 terminal pair. In the **Measuring-point routing** matrix, one column block made of 4 columns represents such a terminal block. One column corresponds to the terminal pair of an input. The column blocks are divided by base and expansion modules.

Every measuring point is presented by a line. The number of measuring-point inputs depend on the selected connection type. Adjust a measuring point to a three-wire or four-wire system as well as to a star or delta connections with the connection types. A 1-phase measuring point always has only one single input. A 3-phase measuring point however has 3 or 4 inputs depending on the connection type.

An example for the connection type of a current-measuring point is **3-phase**. This connection type is suitable for a three-wire system. Measuring points with this connection type have therefore 3 inputs **IA**, **IB**, and **IC**. An example for the connection type of a voltage-measuring point is **3 ph-to-ph volt. +VN**. This connection type is suitable for a four-wire system. Therefore, measuring points with this connection type have 4 inputs **V AB**, **V BC**, **V CA**, and **VN**.

The connection type is initially specified by the application template and the current and voltage inputs. However, you can also change this connection type. You must select a connection type for a newly added measuring point.

You route the inputs as usual using the context menu. In the context menu the descriptions of the possible measuring point inputs are visible, for example, **IA**, **IB**, and **IC**. The **Measuring-point routing** only allows unit routings. If routing an already routed measuring point input to another physical input, then the original routing is automatically removed.

Selecting a Connection Type

- ✧ In the connection-type column, open the list box to a 3-phase measuring point.
- ✧ Select the required connection type.

The previous routings can be deleted depending on the previously set connection type.

Routing Measuring Points

- ✧ In the windows [20.3.9 Current-Measuring Points](#) and [20.3.10 Voltage-Measuring Points](#), check to see if the measuring points can or must be routed on current or voltage inputs. If the common cell of the measuring-point line and the input column is light gray, this means that the measuring point is routed to the column. If the common cell is dark gray, the measuring point cannot be routed on the relevant input. If one or more lines in a column are highlighted in color, then one more measuring point must be routed on this input.
- ✧ Click in the common cell with the right mouse button.
- ✧ In the context menu, click the desired routing, for example, **V AB**.

The selected routing is entered in the cell. If the routing was already available for another input, the original routing will be removed automatically.

- ✧ Repeat this process for all other measuring points to be routed.

As soon as the measuring points are correctly routed, the color highlighting is hidden.



NOTE

You find more options for routings under [11.2 Basic Principles of Routing](#).

Removing the Routing

- ✧ Click with the right mouse button in the cell from which the routing is removed.
- ✧ Click **_ (not routed)** in the context menu.

The routing in the cell is removed.



NOTE

You find further possibilities for removing routings under [11.2 Basic Principles of Routing](#).

Related Topics

- ✧ [8.1.5.1 Overview of Measuring Points](#)

8.1.5.4 Selecting a Measuring Point for Setting Parameters

You can set parameters for each measuring point, suitable for the connected transformer. You can synchronize some of the settings using the transformer settings in the single-line configuration. You find more information about this under [7.6 Setting Parameters for Equipment and Synchronizing Current or Voltage-Transformer Values](#).

All measuring points are combined in the function group **System data**. The measuring points themselves are treated like functions when setting parameters. The required information can be found under [8.2.2.1 Selecting a Function for Setting Parameters](#).

Related Topics

- ✧ [8.1.5.1 Overview of Measuring Points](#)

8.1.5.5 Adding Measuring Points

An application template has several measuring points according to the scope of the application. As soon as you have assigned an application template to a SIPROTEC 5 device, you can add further measuring points to the application.

You must uniquely assign the input of a measuring point to a physical pair of terminals. You are not able to route the input of a measuring point to more than one pair of terminals at the same time. If you add an expansion module with current or voltage inputs to the SIPROTEC 5 device, you will require additional measuring points. You then route these measuring points to the physical inputs of the expansion module. Only then, you can use the other inputs in the application. Additional information about routing measuring points can be found under [8.1.5.3 Routing Measuring Points to Physical Inputs](#).

Depending on your respective working situation, you can add a measuring point in different areas:

- **In the Information Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **In the Communication Mapping of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).
- **In the Project Structure**
To use this version, open the [3.1.2 Project Tree](#).
- **In the Measuring-Point Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.8 Measuring-Points Routing](#) matrix. You find more information about this under [8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View](#).

To use one of the first 3 options, use a measuring-point element from the measuring-point folder in the global DIGSI 5 library.

If you add new measuring points to one of the areas mentioned above, these will then be available to other areas. These measuring points are also available in the function-group connections and in the single-line configuration. More information is available from [8.1.4.3 Connecting Measuring Points to Function Groups](#) and [7.4.8 Selecting Measuring Points for Function Groups](#).

Opening the Global DIGSI 5 Library and Marking the Measuring-Point Element

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ Open the **Global DIGSI 5 Library** folder.
- ✧ Open the folder for the device type.
- ✧ Open the 2 folders **measuring points** one by one.

1 folder for each of the measuring points types **Voltage 1-phase**, **Voltage 3-phase**, **Current 1-phase**, and **Current 3-phase** is displayed.

- ✧ Open the folder of the required measuring point type.

An element for the measuring point is displayed.

- ✧ Mark this measuring-point element.

Adding a Measuring Point in the Information Routing

- ✧ Open the Information routing.
- ✧ Drag the marked measuring-point element from the Global DIGSI 5 Library to the Information routing.

- ✧ Position the measuring-point element on the name of the function group **System data**.
- or -
- ✧ If the function group opens, position the measuring-point element at any place within the indicated function group contents.
- ✧ Release the mouse button.

If insertion is allowed at the selected position, the new measuring-point element will be added into the application.

Adding a Measuring Point in the Communication Mapping

- ✧ Open the Communication mapping.
- ✧ Drag the marked measuring-point element from the Global DIGSI 5 Library to the Communication mapping.
- ✧ Position the measuring-point element on the name of the function group **System data**.
- or -
- ✧ If the function group opens, position the measuring-point element at any place within the indicated function-group contents.
- ✧ Release the mouse button.

If insertion is allowed at the selected position, the new measuring-point element will be added into the application.

Adding a Measuring Point in the Project Structure

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration to whose application you want to add the measuring point.
- ✧ Double-click **Settings** in this folder.

The names of all available function groups are listed.

- ✧ Drag the marked measuring-point element from the Global DIGSI 5 Library to the project tree.
- ✧ Position the measuring-point element within the folder **Settings** on the name of the function group **System data**.
- ✧ Release the mouse button.

If insertion is allowed at the selected position, the new measuring-point element will be added into the application.

Adding a Measuring Point in the Measuring-Point Routing

- ✧ Open the measuring-point routing.
- ✧ To add a current-measuring point, click the **Add** button in the [20.3.9 Current-Measuring Points](#) window.

The [20.6.26 Create Current-Measuring Point](#) dialog opens.

- ✧ To add a voltage-measuring point, click the **Add** button in the [20.3.10 Voltage-Measuring Points](#) window.

The [20.6.27 Create Voltage-Measuring Point](#) dialog opens.

- ✧ Mark in the respective dialog the desired process tag type, for example, **1-phase** or **3-phase**.
- ✧ Enter the count value in the **Count** field to add the desired number of measuring points.
- ✧ Click **OK**.

The measuring point is inserted in the respective window below the previously existing measuring points.

**NOTE**

For 7SS device types, the measuring points are routed automatically to the physical inputs of the SIPROTEC 5 device depending on the allowed count limit and existing configuration.

Related Topics

- ✧ [8.1.5.1 Overview of Measuring Points](#)

8.1.5.6 Renaming Measuring Points

Each measuring point has a name and an original name. The original name identifies the type of measuring point and cannot be changed. An example of this is **Measuring point I-3ph**. You can also change the names of measuring points to distinguish several measuring points of the same type.

Depending on your respective working situation, you can rename a measuring point in different areas:

- **Directly in the Measuring-Point Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.8 Measuring-Points Routing](#) matrix. You find more information about this under [8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View](#).
- **Directly in the Information Routing of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **Directly in the Communication Mapping of an Offline Configuration**
To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).
- **In the Project Structure**
To use this version, open the [3.1.2 Project Tree](#).
- **In the Properties of the Measuring Point**
To use this version, also open the [3.1.4 Inspector Window](#).

Changing the Name Directly in an Area or in the Project Structure

- ✧ In one of the named matrices or in the project tree, mark the current name of the measuring point.
- ✧ Click again the name.

The name will be highlighted in color.

- ✧ Enter a new name.
- ✧ Click outside of the text box.
- or -

- ✧ Press the <Enter> button.

You confirm your entry with these 2 inputs.
The name entered is accepted.

Changing the Name in the Properties

- ✧ In one of the named matrices, highlight the current name of the measuring point.
- ✧ In the Inspector window, select the **Properties** tab.
- ✧ Go to the **Details** group.
- ✧ Enter a new name for the function or function group in the **Name** text box.
- ✧ Click outside of the text box.

- or -

- ✧ Press the <Enter> button.

You confirm your entry with these 2 inputs.

The name entered is accepted.

Related Topics

- ✧ [8.1.5.1 Overview of Measuring Points](#)

8.1.5.7 Copying Measuring Points

You have the following possibilities for copying measuring points:

- You can copy the measuring points of an offline configuration.
- You can copy the measuring points between offline configurations.

Depending on your particular working situation, you can copy measuring points into various areas:

- **In the Measuring-Point Routing of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.8 Measuring-Points Routing](#) matrix. You find more information about this under [8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View](#).

- **In the Information Routing of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).

- **In the Communication Mapping of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).

- **In the Project Structure**

To use this version, open the [3.1.2 Project Tree](#).

You can also copy between the listed areas.

Selecting Measuring Points

- ✧ Open one of the listed editing tools.
- ✧ In order to copy an individual measuring point, mark the name of this measuring point.
- or -
- ✧ In order to copy several measuring points, highlight the names of these measuring points. This is done by holding down either the shift key or the <CTRL> key, depending on the selection method.

Copying Measuring Points by Drag and Drop

- ✧ Open the project tree.
- ✧ Open the folder of the offline configuration into whose application you want to insert the measuring points from another offline configuration.
- ✧ Drag the marked measuring points to the **System data** folder in the target-offline configuration.
- ✧ Release the mouse button.

Copies of the original measuring points are inserted in the selected target.



NOTE

You can also drag measuring points from the project tree to one of the matrices mentioned above.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)

8.1.5.8 Deleting Measuring Points

You can delete one or more individually selected measuring points.

Depending on your particular working situation, you can delete a function or function group in different areas from an application:

- **In the Measuring-Point Routing of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.8 Measuring-Points Routing](#) matrix. You find more information about this under [8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View](#).

- **In the Information Routing of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).

- **In the Communication Mapping of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).

- **In the Project Structure**

To use this version, open the [3.1.2 Project Tree](#).



NOTE

If you delete a measuring point, inconsistencies be created in the application and the settings assignment.

Selecting Measuring Points

- ✧ Open one of the listed editing tools.
- ✧ In order to delete an individual measuring point, mark the name of this measuring point.
- or -
- ✧ In order to delete several measuring points, mark the names of these measuring points. This is done by holding down either the shift key or the <CTRL> key, depending on the selection method.

Deleting Measuring Points

- ✧ Right-click the marked measuring point.
- ✧ Click **Delete** in the context menu.

A confirmation prompt is displayed.

- ✧ Click **Yes** to confirm.

This confirms your action.

The marked measuring points will be deleted from the application.

Related Topics

- ✧ [8.1.2.1 Overview of Functions and Function Groups](#)

8.2 Setting Functions

8.2.1 Using Settings Groups

8.2.1.1 Overview of Settings Groups

Different operating cases can require different function settings. To save and use the protection function settings for different operating cases, you use settings groups. In a settings group, you can set the settings specifically for an operating case.

Transmit the various settings groups into the SIPROTEC 5 device. During operation, you can then switch between settings groups. For example, the result of a CFC function can cause a switchover between 2 settings groups.

All SIPROTEC 5 devices support up to 8 independent settings groups. You can determine how many of these will actually be used. Some protection settings are independent of settings groups. In [20.1.9 Settings Editor](#), these settings are labeled with the symbol . But the settings of CFC functions and the settings of communication functions, too, are not part of a settings group.

Related Topics

[8.2.1.2 Changing the Number of Settings Groups](#)

[8.2.1.3 Activating a Settings Group](#)

[8.2.1.4 Copying a Settings Group](#)

[8.2.2.5 Selecting a Settings Group for Comparison or Editing](#)

8.2.1.2 Changing the Number of Settings Groups

A SIPROTEC 5 device supports up to 8 independent settings groups. However, the number of settings groups actually used can be smaller. When you insert a SIPROTEC 5 device into a project, it will initially only use one settings group. You can increase or decrease the number of settings groups used.



NOTE

Each time you decrease the number of settings groups, the last settings group in the list of available settings groups will be deleted. All the settings in this settings group will be lost.

To change the number of settings groups, first open the [20.5.10 Device Settings](#). You find more information about this under [6.1.10 Opening Device Settings](#).

Increasing the Number of Settings Groups

- ✧ Open the [20.5.10 Device Settings](#) editor.
- ✧ Select the required number of settings groups from the **Number of settings groups** list box.

The number of settings groups will be increased.

Reducing the Number of Settings Groups

- ✧ Select the required number of settings groups from the **Number of settings groups** list box.

If the new number of settings groups is smaller than the original number, a confirmation query will be displayed.

- ✧ Click **Ok**.

This confirms your action.

Depending on the selection, the number of settings groups will be increased or reduced. In the latter case, the superfluous settings groups will be deleted with all the settings they contain.

Related Topics

- ✧ [8.2.1.1 Overview of Settings Groups](#)

8.2.1.3 Activating a Settings Group

The SIPROTEC 5 device uses the settings that are defined in the active settings group.

There are 3 ways of selecting a settings group:

- **Selecting an Active Settings Group Manually**

You can select one of the existing settings groups in DIGSI 5. Transmitting the parameter set into the SIPROTEC 5 device activates the chosen settings group.

- **Defining a Settings Group via an Indication at the Binary Input**

In this case, an indication at a binary input is activated at a certain settings group. You then define which indication at which binary input causes the switchover in the [20.3.2 Information Routing](#) matrix.

- **Defining Using a Protocol**

With this alternative, a certain settings group will be activated via the system interface under the control of a telegram.

So that you can select the setting for the active settings group, first open the [20.5.10 Device Settings](#). You find more information about this under [6.1.10 Opening Device Settings](#).

Selecting the Setting for an Active Settings Group

- ✧ Open the device settings.
- ✧ Open the **Active settings group** list box.
- ✧ If you want to select the active settings group manually, select one of the existing settings groups.
- or -
- ✧ If you want to define the active settings group via an input signal, select the **over binary input** setting.
- or -
- ✧ If you want to define the active settings group under the control of a telegram, select the **over protocol** setting.

Related Topics

- ✧ [8.2.1.1 Overview of Settings Groups](#)

8.2.1.4 Copying a Settings Group

If at least 2 settings groups are used, you can copy all values of a settings group into another settings group of the same offline configuration. To be able to copy a settings group, first open the [20.5.10 Device Settings](#). You find more information about this under [6.1.10 Opening Device Settings](#).

Copying Settings Groups within an Offline Configuration

- ✧ Open the device settings.
- ✧ Select the settings group whose values you want to copy from the **Source-settings Group** list box.
- ✧ Select the settings group into which you want to insert the values from the **Target-settings Group** list box.
- ✧ Click **Copy**.

The values of the settings group defined as a source are copied into the settings group defined as a target.

Related Topics

- ✧ [8.2.1.1 Overview of Settings Groups](#)

8.2.2 Processing Functions

8.2.2.1 Selecting a Function for Setting Parameters

Which protection function you can select for setting parameters depends on the functional scope defined. The settings of the individual functions are initially assigned default values. You can adapt these values to the real circumstances and requirements.

You can select a function for setting parameters in one of the following ways, depending on your current working situation:

- You can select the function with the [3.1.2 Project Tree](#). Settings and values of the function will then be displayed with the [20.1.9 Settings Editor](#) in the working area. You can then switch to the preceding or to the next function in the same function group using the navigation arrows. Functions so far not selected open automatically and are shown with the Settings editor.
- If the single-line configuration is shown in the working area, you can use it to select a function block. Depending on the procedure, settings and values of the function block are shown with the Settings editor in the working area or as properties in the [3.1.4 Inspector Window](#).
For this version, only Protection function groups and Circuit-breaker function group can be selected for parameter setting.

To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).

- If the Information routing or Communication mapping is shown in the working area, you can use it to select a function. Settings and values of the function will then be displayed as properties in the [3.1.4 Inspector Window](#).

To use this version, open the matrix [20.3.2 Information Routing](#) or the matrix [20.3.1 Communication Mapping](#). You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#) and under [11.3.1 Opening the Information Routing Matrix](#).

If the settings are shown in the Settings editor, all edit functions for settings are available for you to use them.

- Selecting a settings group for editing
- Selection of settings group for comparison of values
- Copying settings
- Printing settings
- Exporting and importing settings
- Displaying settings of special functions graphically
- Showing and hiding settings numbers

If the settings are displayed as properties, only limited edit functions for settings are available to you. Only the values of the active settings group are displayed, reference values are not shown. You cannot use copy functions either.

Selecting a Function via the Project Tree

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration for which you want to set parameters to a function.
- ✧ Open the **Settings** folder.

The names of all available function groups are listed.

- ✧ Open the function group that contains the required function.

The names of all functions contained in this function group are displayed.

- ✧ Double-click the name of the required function.

The Settings editor opens in the working area. This shows the settings and the values of the selected function.

Selecting a Function Using the Single-Line Configuration – Settings-Editor Version

- ✧ You can open the single-line configuration.
- ✧ In the single-line configuration, select the device symbol of the offline configuration in which you want to set parameters for a function.
- ✧ In this device symbol, open the function group that contains the required function.

The names of all functions contained in this function group are displayed.

- ✧ Right-click the name of the desired function.
- ✧ Click on **Settings** in the context menu.

The Settings editor opens in the working area. This shows the settings and the values of the selected function.

Selecting a Function Using the Single-Line Configuration – Properties Version

- ✧ You can open the single-line configuration.
- ✧ In the single-line configuration, select the device symbol of the offline configuration in which you want to set parameters for a function.
- ✧ In this device symbol, open the function group that contains the required function.

The names of all functions contained in this function group are displayed.

- ✧ Open the desired function.

The names of all function blocks contained in this function group are displayed.

- ✧ Select the function block that you want to edit.
- ✧ Open the Inspector window.
- ✧ Go to the **Properties** tab.
- ✧ Go to the **Settings** group.

The settings and values of the active settings group will be shown for the selected function block.

Selecting a Function Using a Matrix

- ✧ For the affected offline configuration open the matrix **Information routing** or the matrix **Communication mapping**
- ✧ In this device symbol, open the function group that contains the required function.

The names of all functions contained in this function group are displayed.

- ✧ Open the desired function.

The names of all function blocks contained in this function group are displayed.

- ✧ Select the function block that you want to edit.
- ✧ Open the Inspector window.
- ✧ Go to the **Properties** tab.
- ✧ Go to the **Settings** group.

The settings and values of the active settings group will be shown for the selected function block.

Using Navigation Arrows in the Toolbar of the Settings Editor

- ✧ In the [20.7.12 Toolbar of the Settings Editor](#), click the  button.

The settings and values of the preceding function inside the current function group will be displayed in the Settings editor. If the settings of the first function are already displayed when you click, clicking will have no effect.

- or -

- ✧ Click the  button in the toolbar of the Settings editor.

The settings and values of the next function inside the current function group will be displayed in the Settings editor. If the settings of the last function are already displayed when you click, clicking will have no effect.

Related Topics

- ✧ [8.2.2.3 Selecting between Secondary Values, Primary Values, or Percentage Values](#)
- ✧ [8.2.2.5 Selecting a Settings Group for Comparison or Editing](#)
- ✧ [8.2.2.2 Editing Text and Decimal Parameters](#)
- ✧ [8.2.3.3 Resizing the Width of the Graphics Window](#)
- ✧ [8.2.2.6 Adding or Deleting a Function Block](#)
- ✧ [8.2.2.7 Copying Settings](#)
- ✧ [8.2.2.8 Printing Settings](#)

8.2.2.2 Editing Text and Decimal Parameters

Some parameters can only take on defined values, for example, **On** or **Off**. Such parameters are termed **Text parameters**. Other parameters are defined by a numerical value. Such parameters are termed **Decimal parameters**.

Editing Text Parameters

- ✧ Click the arrow button of the relevant list box in the [20.1.9 Settings Editor](#) or in the [3.1.4 Inspector Window](#).
- ✧ Select a value for the parameter from the list box.

Editing Decimal Parameters

- ✧ Position the mouse pointer in the parameter text box of the Settings editor or the Inspector window.

A tooltip will be displayed showing the permissible range of values.

- ✧ Enter a numerical value without a unit. The unit of the value is already defined. For some parameters, the setting value **Inactive** is also permissible. Enter this value as the character string **oo** (2 lower-case o's).

If the entered value is outside the permissible range of values, an error message appears. In this case, correct the entered value.

- or -

- ✧ Click the arrow keys to the right of the text box.

The value shown in the text box will be incremented or decremented in defined steps.

Related Topics

- ✧ [8.2.2.1 Selecting a Function for Setting Parameters](#)
- ✧ [8.2.2.3 Selecting between Secondary Values, Primary Values, or Percentage Values](#)
- ✧ [8.2.2.5 Selecting a Settings Group for Comparison or Editing](#)
- ✧ [8.2.2.7 Copying Settings](#)
- ✧ [8.2.2.8 Printing Settings](#)

8.2.2.3 Selecting between Secondary Values, Primary Values, or Percentage Values

You can enter and display setting values as primary values, secondary values, or as percentage values. For that reason, state in DIGSI 5 whether the values entered will be interpreted and displayed as primary, secondary, or percentage values.

Before you can select an edit mode, first open the [20.5.10 Device Settings](#). You find more information about this under [6.1.10 Opening Device Settings](#).

Selecting a Mode

- ✧ Open the device settings.
- ✧ Open the **Edit Mode** list box and select one of the modes **Primary**, **Secondary**, or **Percent**.

The selected edit mode is immediately active. The name of the mode will be displayed in the [20.7.12 Toolbar of the Settings Editor](#).

Related Topics

- ✧ [8.2.2.1 Selecting a Function for Setting Parameters](#)

8.2.2.4 Showing or Hiding Settings Numbers

In SIPROTEC 5, each setting has a unique number. With the [20.1.9 Settings Editor](#), you can show or hide the settings numbers for all settings together.

Showing or Hiding Settings Numbers

- ✧ In the [20.7.12 Toolbar of the Settings Editor](#), click the  button.

If the settings numbers were previously hidden, they will be shown. If the settings numbers were previously shown, they will be hidden.

Related Topics

- ✧ [8.2.2.1 Selecting a Function for Setting Parameters](#)

8.2.2.5 Selecting a Settings Group for Comparison or Editing

The [20.1.9 Settings Editor](#) offers the values of the active settings group for editing by default. However, you can also select another settings group for editing. You can additionally select a further settings group whose values will be displayed for comparison.

Selecting a Settings Group for Editing

- ✧ Select the **Values for change** list box in the Settings editor.
- ✧ From the list box, select the settings group whose values you want to edit.

Selecting a Settings Group for Comparison

- ✧ Select the **Values for comparison** list box in the Settings editor.
- ✧ From the list box, select the settings group whose values will be displayed for comparison.

Related Topics

- ✧ [8.2.2.1 Selecting a Function for Setting Parameters](#)

8.2.2.6 Adding or Deleting a Function Block

A function can consist of multiple function blocks. For example, a function block can be a step, but also a zone. You can add additional function blocks to the existing function blocks or delete function blocks. Depending on your respective working situation, you can add or delete a function block in different areas:

- In single-line configuration of the project
- In the project structure
- In the function of the affected offline configuration

To add a function group, use a function-block element for the 1st and 2nd option from the global DIGSI 5 library.

If you add new function blocks to one of the above-mentioned areas, then these subsequently exist also in other areas. Additionally, function blocks are also available in the matrix [20.3.11 Circuit-Breaker Interaction](#). You find more information about this under [8.1.4.5 Configuring the Circuit-Breaker Interaction for Protection Groups](#).



NOTE

You can only add matching function-block types to a function. There is also a maximum number of function blocks within a function. If insertion of a function block is not allowed at this position, the mouse pointer will change to a crossed-out circle.

Opening the Global DIGSI 5 Library and Function-Block Folder

- ✧ In the task area, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ Open the **Global DIGSI Library** folder.
- ✧ Open the folder for the device type, then the folder for the function group, then the folder for the function category, and finally the folder for the function.

If there are addable function blocks for the selected function, you see a further folder. For example, it can have the name **Step types** or **Zone types**.

- ✧ Open this folder.

One or more elements for the function blocks are displayed. Every function-block element has the name of its type, for example **Zone [MHO 3-pole]**.

Adding a Function Block to the Single-Line Configuration

- ✧ Open the [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).
- ✧ Mark the function-block element from the function folder in the global DIGSI 5 library.
- ✧ Drag the function-block element to the device symbol of the relevant offline configuration in the single-line configuration.
- ✧ Place the function-block element on the rectangle of the function into which the function block will be inserted.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the new function block will be inserted into the function.

Adding a Function Block in the Project Structure

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to add a function block.
- ✧ Double-click **Settings** in this folder.

The names of all available function groups are listed.

- ✧ Open the function group that contains the required function.

The names of all functions contained in this function group are displayed.

- ✧ Mark the function-block element from the function folder in the global DIGSI 5 library.
- ✧ Drag the function-block element to the relevant name of the affected function in the project tree.
- ✧ Release the mouse button.

If insertion is permissible at the chosen position, the new function block will be inserted into the function.

Adding a Function Block in the Function

- ✧ With [20.1.9 Settings Editor](#), open the function to which you want to add a function block. You find more information about this under [8.2.2.1 Selecting a Function for Setting Parameters](#).
- ✧ In the Settings editor, click one of the **Add new stage** buttons.

If more than one function block type is available to be selected, the [20.6.13 List of Permissible Function-Block Types](#) dialog will be shown.

- ✧ Select the required function-block type and click **OK**.

The function block is inserted at the lowest level, after all other previously available function blocks.

Deleting a Function Block

- ✧ Right-click the name of the function block in the single-line configuration and then select **Delete** from the context menu.

- or -

- ✧ In the Settings editor click below the function block to be deleted **Delete stage**.

In either case, a confirmation query will be shown.

- ✧ Click **Yes**.

The function block will be deleted including all settings.



NOTE

If a function block contains connected GOOSE inputs, it cannot be deleted.

Related Topics

- ✧ [8.2.2.1 Selecting a Function for Setting Parameters](#)
- ✧ [8.1.2.3 Adding a Function](#)
- ✧ [8.1.2.2 Adding a Function Group](#)

8.2.2.7 Copying Settings

To save time, you can copy settings. You can do this in one of the following ways:

- **Copying Setting Values of a Function Block between the Settings Groups of an Offline Configuration**

With the [20.1.9 Settings Editor](#), you copy the values of a complete function block from the reference settings group into the same function block of the settings group selected for editing. As a condition, the number of settings groups used must be greater than 1.

- **Copying a Complete Settings Group within an Offline Configuration**

In the [20.5.10 Device Settings](#), you can copy the values of a complete settings group into another settings group of the same offline configuration. As a precondition, the number of settings groups used must be greater than 1.

For the first 2 options, open the affected functions using the Settings editor. You find more information about this under [8.2.2.1 Selecting a Function for Setting Parameters](#).

For the 3rd option, open the device settings for the affected offline configuration. You find more information about this under [6.1.10 Opening Device Settings](#).

Copying Setting Values of a Function Block between the Settings Groups of an Offline Configuration

- ✧ With the Settings Editor open, you can copy the setting values of a function block between settings groups.
- ✧ From the **Values for comparison** list box, select the settings group from which you wish to copy values.

This defines the source for the copy operation. The values of the reference settings group will be shown.

- ✧ From the **Values for change** list box, select the settings group into which you wish to copy the values.

This defines the target for the copy operation. The values of the settings to be edited will be shown.

- ✧ Select the function block whose values you want to copy. This is done by clicking a place inside the gray area at which no operating elements are located.

The function block is framed.

- ✧ In the [20.7.12 Toolbar of the Settings Editor](#), click the  button.

The settings of the selected function block will be copied from the comparison settings group into the target settings group. The updated values will be shown in the function block of the target settings group.

Copying a Complete Settings Group within an Offline Configuration

- ✧ Open the device settings.
- ✧ Select the settings group whose values you want to copy from the **Source-Settings Group** list box.
- ✧ Select the settings group into which you want to insert the values from the **Target-Settings Group** list box.
- ✧ Click **Copy**.

All settings from the source-settings group will be copied into the target-settings group.

Related Topics

- ✧ [8.2.2.5 Selecting a Settings Group for Comparison or Editing](#)

8.2.2.8 Printing Settings

You can print the settings of a single function, one or more function groups, or all function settings.

Selecting Functions

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to print the function settings.
- ✧ In this offline configuration, double-click **Settings**.

The names of all available function groups are listed.

- ✧ To print the settings of a single function, open the function group in the project tree and select the name of the function.

- or -

- ✧ To print several functions, select the names of these functions in the project tree. This is done by holding down either the shift key or the <CTRL> key, depending on the selection method.

- or -

- ✧ To print all settings of a function group, select the name of this function group in the project tree.

- or -

- ✧ To print the settings of several function groups, select the names of these function groups in the project tree. This is done by holding down either the shift key or the <CTRL> key, depending on the selection method.

- or -

- ✧ To print all settings, select the **Settings** folder in the project tree.

Starting the Printing Process by Selecting the Print Options

- ✧ From the **Project** menu, select **Print**.

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document template, and a cover sheet.
- ✧ Click **Print**.

The **Print** dialog closes and the selected data is printed.

Starting the Printing Process without Selecting the Print Options

- ✧ In the [20.7.1 DIGSI 5 Toolbar](#), click the  button.

Printing will start using the settings last selected.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)

8.2.3 Visualizing Functions Graphically

8.2.3.1 Overview of Graphical Representation of Functions

Certain functions, for example, for distance protection or tripping, can be visualized graphically with the [20.1.9 Settings Editor](#).

The graphics include:

- Zone diagrams
- Operate curves

The graphics are displayed in the Graphics window of the Settings editor. The Graphics window is anchored on the right-hand side of the Settings editor. You can modify the width of the Graphics window. You can also hide the Graphics window completely.

Related Topics

- [8.2.3.3 Resizing the Width of the Graphics Window](#)
- [8.2.3.6 Copying or Saving Graphics in Graphics Window](#)
- [8.2.3.7 Printing a Graphic in the Graphics Window](#)
- [8.2.3.4 Showing and Hiding Grids in the Graphics Window](#)
- [8.2.3.5 Scaling View in the Graphics Window](#)
- [8.2.3.3 Resizing the Width of the Graphics Window](#)

8.2.3.2 Showing and Hiding Graphics Window

In the [20.1.9 Settings Editor](#), you can show and hide the Graphics window. After showing, the Graphics windows covers half of the settings area. If you modify the size of the Graphics window manually, this change will be lost when it is hidden again.

Showing and Hiding Graphics Window

- ✧ Click the  button in the [20.7.12 Toolbar of the Settings Editor](#).

If the Graphics window is hidden, your action will show the Graphics window. If the Graphics window is shown, your action will hide the Graphics window.

Related Topics

- ✧ [8.2.3.1 Overview of Graphical Representation of Functions](#)
- ✧ [8.2.3.3 Resizing the Width of the Graphics Window](#)
- ✧ [8.2.3.4 Showing and Hiding Grids in the Graphics Window](#)

✧ [8.2.3.5 Scaling View in the Graphics Window](#)

8.2.3.3 Resizing the Width of the Graphics Window

In order to change the width of the Graphics window in the [20.1.9 Settings Editor](#), you have the following options:

- You can modify the width of the Graphics window continuously.
- You can modify the width of the Graphics window in defined steps.

If you zoom in on the Graphics window, it will cover the settings area of the Settings editor.

Modifying the Graphics Window Continuously

- ✧ Place the mouse pointer on the vertical separator between the settings area and the Graphics window.

The mouse pointer will change shape.

- ✧ Click the separator while holding the mouse button down.

- ✧ To enlarge the width, drag the mouse to the left.

- or -

- ✧ To reduce the width, drag the mouse to the right.

- ✧ When the Graphics window has the required width, release the mouse button.

Changing the Width of the Graphics Window in Defined Steps

- ✧ To enlarge the width, click the vertical separator on the left-pointing arrow.

- ✧ To reduce the width, click the vertical separator on the right-pointing arrow.

The width of the window will be maximized or minimized. If you have modified the width of the Graphics window manually, this width setting will be used as an intermediate step.

Related Topics

- ✧ [8.2.3.1 Overview of Graphical Representation of Functions](#)

- ✧ [8.2.3.3 Resizing the Width of the Graphics Window](#)

- ✧ [8.2.3.5 Scaling View in the Graphics Window](#)

8.2.3.4 Showing and Hiding Grids in the Graphics Window

A grid assists in interpreting the presentation in the Graphics window of the Settings editor. You can show and hide this grid.

Showing and Hiding the Grid in the Graphics Window

- ✧ Right-click in [20.1.9 Settings Editor](#) anywhere within the Graphics window. Then select **Turn grid on/off** from the context menu.

- or -

- ✧ In the [20.7.13 Toolbar of the Graphics Window](#), click the  button.

If the grid is hidden, your action will show the grid. If the grid is shown, your action will hide the grid.

Related Topics

- ✧ [8.2.3.1 Overview of Graphical Representation of Functions](#)

8.2.3.5 Scaling View in the Graphics Window

You can change the display size of the graphic in predefined steps and thus adjust it to the particular situation.

Enlarging a View in Steps

- ✧ Right-click in [20.1.9 Settings Editor](#) anywhere within the Graphics window. Then click **Zoom in** in the context menu.
- or -
- ✧ In the [20.7.13 Toolbar of the Graphics Window](#) , click the  button.

The graphic will be displayed larger.



NOTE

If the maximum display size has been reached, the corresponding menu item and button will be inactive.

Reducing the View in Steps

- ✧ Right-click in the Settings editor anywhere within the Graphics window. Then click **Zoom out** in the context menu.
- or -
- ✧ Click the  button on the toolbar of the Graphics window.

The graphic will be displayed smaller.



NOTE

If the minimum display size has been reached, the corresponding menu item and button will be inactive.

Related Topics

- ✧ [8.2.3.1 Overview of Graphical Representation of Functions](#)
- ✧ [8.2.3.3 Resizing the Width of the Graphics Window](#)

8.2.3.6 Copying or Saving Graphics in Graphics Window

You can copy a graphic displayed in the Graphics window of the Settings editor to the clipboard or save it as a graphics file. You can import the graphic into many other programs, for example, text processors like Microsoft Word. This program can open graphics files and include them in text documents. This provides you with another way of documenting settings.

Copying a Graphic into the Clipboard

- ✧ Right-click in [20.1.9 Settings Editor](#) anywhere within the Graphics window. Click **Copy** in the context menu.
- or -
- ✧ In the [20.7.13 Toolbar of the Graphics Window](#) , click the  button.

In either case, the graphic will be copied to the clipboard as a bitmap.

- ✧ Open the program with which you want to further process the graphic.
- ✧ Open an existing file or create a new file.
- ✧ Select the **Paste** command in the target program.

The graphic will be inserted from the clipboard into the target file.

Saving a Graphic as a Bitmap File

- ✧ Right-click anywhere within the Graphics window in [20.1.9 Settings Editor](#). Then click **Save as image** in the context menu.
- or -

- ✧ Click the  button in the toolbar of the Graphics window.

In either case, a standard file dialog opens.

- ✧ Enter a name for the file and select a storage location.
- ✧ Select one of the storage formats **BMP** or **JPG**.
- ✧ Click **Save**.

The graphic will be saved.

Related Topics

- ✧ [8.2.3.1 Overview of Graphical Representation of Functions](#)
- ✧ [8.2.3.7 Printing a Graphic in the Graphics Window](#)

8.2.3.7 Printing a Graphic in the Graphics Window

You can print the graphic displayed in the Graphics window of the Settings editor.

Printing Graphics

- ✧ Click the  button in the [20.7.13 Toolbar of the Graphics Window](#) .

The [20.6.22 Print Preview](#) dialog opens.

- ✧ Use this dialog to select a document template and a cover sheet. You find more information about this under [17.3.4 Selecting Preview Options](#).
- ✧ Click **Preview**.

The **Select preview option** dialog closes. The [20.5.2 Print Preview](#) is displayed in the working area. If you are satisfied with the expected print result, you can start the printout directly from the print preview.

- ✧ Click the  button in the [20.7.34 Toolbar of the Print Preview](#) .

The [20.6.23 Print](#) dialog will open.

- ✧ Select the printer from the **Name** list box that must be used for the printout. The list contains the names of all output devices for which the respective drivers are installed.
- ✧ You can optionally click **Advanced**. The Windows standard dialog for **Print** is displayed. With this dialog, you can set up other print-specific settings or open other dialogs.
- ✧ Click **Print**.

The **Select print options** dialog closes and the selected data is printed.

Related Topics

- ✧ [8.2.3.1 Overview of Graphical Representation of Functions](#)
- ✧ [8.2.3.6 Copying or Saving Graphics in Graphics Window](#)

8.2.4 Comparing Parameters of Different Devices

The comparing-parameters feature allows you to compare the parameters of 2 devices of the same device type in the offline-offline, offline-online, online-offline, and online-online mode.

You can compare and view the differences with respect to the following parameters:

- Settings
- Protocols
- CFC
- Information routing
- IEC 61850 structure
- Device information
- Safety and security

You can perform selective comparison of the parameters by using the filter option. The [20.5.16 Device Comparison](#) view displays the differences between the settings of the compared devices.

The **Secondary edit** mode is always considered for comparison. The result of comparison is displayed in **SI units** and can be saved in **CSV** (Comma Separated Values) and **TXT** formats. Most spreadsheet programs can open the files in **CSV** format. It enables you to sort and evaluate the result values according to the various criteria.

Comparing Parameters of Different Devices

- ✧ Select any offline or online device in the [3.1.2 Project Tree](#).
- ✧ Right-click the device and select **Compare Devices** from the context menu.
- or -
- ✧ Select **Compare Devices** in the **Edit** menu.

The [20.6.6 Compare Devices](#) dialog opens.

- ✧ Select the desired option **Offline device** or **Online device** in the **Compare with** area.

A list of one or more devices of the same device type available for comparison is displayed.



NOTE

If there are no devices of the same device type available for comparison, a respective message is displayed in the device list box of the **Compare with** field. Retrieve the process data of any online device before initiating the comparison.

- ✧ Select the desired device for comparison from the device list box.
- ✧ In the **Content of comparison** field, select the desired parameters (for example, **Settings**, **Protocols**, **CFC**, **Information routing**, **IEC 61850 structure**, **Device information**, and **Safety and security**) for comparison.
- ✧ Click **OK** to start the compare operation.

The **Compare devices** dialog opens and displays the progress status of the comparison.

After successful comparison, the result is displayed in the [20.5.16 Device Comparison](#) view.

The **General** tab under the **Info** tab displays the status message and the number of differences based on the result of the comparison in the **Device comparison** view.



NOTE

If you change the IEC settings in an offline configuration of the device without activating the IEC 61850 protocol and then load the configuration to the device, the settings are not transferred to the online device. In this scenario, the [20.5.16 Device Comparison](#) view will not display any differences for IEC settings between the offline configuration and the online configuration in the compare result as the IEC settings are not loaded.

- ✧ Expand the collapsed node to view the comparison result.



NOTE

The **Device comparison** view only displays the latest comparison result. It does not save the result.

If there are no differences after comparison, the  button is disabled.

-
- ✧ Click  to save the value of the comparison result.

The **Save as** dialog opens.

- ✧ Enter the file name, path, and format and click **Save** to save the value of the comparison result.

Related Topics

- ✧ [20.5.10 Device Settings](#)
- ✧ [20.6.6 Compare Devices](#)
- ✧ [20.5.16 Device Comparison](#)

8.3 Setting Special Parameters

8.3.1 Editing Device Data

You can edit the device data of an offline configuration. The device data include the following settings:

- Rated frequency
- Minimum trip duration
- Setting format for the ground-current compensation

You can find out about the precise scope of the device data in the Manual or the Help of the SIPROTEC 5 device in question.

To process the device data, first open the [20.5.10 Device Settings](#). You find more information about this under [6.1.10 Opening Device Settings](#).

Setting Device Data

- ✧ Open the device settings for the offline configuration for which you want to edit the device information.
- ✧ Set the individual settings.

Related Topics

- ✧ [8.2.2.2 Editing Text and Decimal Parameters](#)
- ✧ [8.2.2.4 Showing or Hiding Settings Numbers](#)

8.3.2 Parameterizing and Activating Chatter Blocking

Equipment connected to binary inputs can generate binary signals based on faults that constantly change their states. Chatter blocking detects and blocks such binary signals. Chatter blocking thus prevents generation of indications in the SIPROTEC 5 device that cannot be evaluated.

You can control the effect of the chatter blocking with the following settings:

- **No. Permis. State Changes**
This number defines how many times the state of a binary signal is permitted to change within the chatter-test time and the chatter-check time. If the number of status changes exceeds the defined value, the binary input is blocked or remains blocked.
- **Initial Test Time**
Within the chatter-test time, the chatter blocking monitors the number of status changes of a binary signal. The time starts when the signal is first pending at the binary input.
- **No. of Chatter Tests**
This number defines the maximum number of check cycles that are executed before the chatter blocking definitively blocks the binary input.
- **Chatter Idle Time**
If the status changes of a binary signal exceed the defined value within the chatter-test time or chatter-check time, the chatter-dead time will start. The relevant binary input is blocked within this time.
- **Subsequent Test Time**
Within the chatter-check time, the chatter blocking again monitors the number of status changes. The time begins when the chatter-dead time expires. If the number of status changes is within the permissible limits, the binary input is released. Otherwise, a further dead time begins unless the maximum number of chatter checks has been reached.

The settings for the chatter blocking are part of the device settings. The parameter settings apply globally to all binary signals. However, you can activate or deactivate the chatter blocking for individual signals. This is done with the matrix [20.3.2 Information Routing](#).

Parameterizing the Chatter Blocking

- ✧ Open the device settings for the offline configuration for which you want to assign parameters to the chatter blocking. You find more information about this under [6.1.10 Opening Device Settings](#).
- ✧ Set the individual settings.

Activating or Deactivating the Chatter Blocking for a Binary Signal

- ✧ You can use the matrix **Information routing**. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#) and under [11.3.1 Opening the Information Routing Matrix](#).
- ✧ Select the row of the relevant binary signal.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Select the group for the signal settings.
- ✧ Click the **Chatter-blocking** check box.

If the **Chatter-blocking** check box is selected, the chatter block will be activated for this binary signal. If the **Chatter-blocking** check box is not selected, the chatter block will be deactivated for this binary signal.

Related Topics

- ✧ [8.2.2.2 Editing Text and Decimal Parameters](#)
- ✧ [8.2.2.4 Showing or Hiding Settings Numbers](#)

8.3.3 Setting the LED Color

The LEDs of the base modules can optionally be red or green when they light up. You can define one of the 2 colors for each LED in DIGSI 5. This is done with the matrix [20.3.2 Information Routing](#).

Defining the Color of the LED with the Information-Routing Matrix

- ✧ You can use the matrix **Information routing**. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#) and under [11.3.1 Opening the Information Routing Matrix](#).
- ✧ Select the column of the relevant LED.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Select the [19.2.7 LED Settings](#) group.
- ✧ Select one of the 2 colors from the **LED color** list box.

Related Topics

- ✧ [6.3.12 Editing Hardware Component Property Values](#)
- ✧ [6.3.1 Overview of the Hardware Structure](#)

9 Signals and Settings

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9.1 Overview of Signals

For SIPROTEC 5 signals are divided into the following categories:

- Measured values
- Metered values
- Indications
- Commands

For every signal category there are different signal types. Examples of signal types are the double command (DPC) in the **Commands** category or the single-point indication (SPS) in the **Indications** category.

Signal Names

For every signal there are 3 different signal names:

- **Original name**

The original name identifies the original signal. An example for this is **>Block function**. You cannot change the original name. With help from the original name you can always identify the original signal, even if the name of the signal has changed.

- **Name**

The name of a signal is identical in the original state to the original name. In the example shown, the name is therefore **>Block function**. You can change the name of a signal to distinguish several signals with the same original name.

You can change the name of all signals, for example, the name of predefined as well as user-defined signals. A changed signal name is only visible in the signal list and thus in the following areas:

- In the signal catalog of the [20.2.5 Signals](#) tab
- In the [20.3.2 Information Routing](#) matrix
- In the [20.3.1 Communication Mapping](#) matrix

- **IEC 61850 name**

The IEC 61850 name represents the signal according to the specifications of the **IEC 61850** standard. In the stated example, the IEC 61850 name is called **BlkReset**. You can change the IEC 61850 name for user-defined signals only.

The IEC 61850 name is only in the IEC 61850 structure and thus visible in the following areas:

- In the properties when IEC 61850 is not activated
- In the [20.1.20 IEC 61850 Structure Editor](#)

- **Alternative name**

You can define alternative names for signals under the **Alternative name** column in the Information routing Editor. The allowed character limit to enter the alternative signal name differs based on the language selected because the limit is calculated based on the number of bytes used by the character. In this case, the maximum allowed limit of the byte size is 57 bytes. Each character can range from 1 bytes to 4 bytes depending on the language. For example, in English, each character is equal to a single byte, whereas, in Chinese, each character is equal to 3 bytes to 4 bytes. While entering the alternative name, the count of characters is displayed on the right side of the text box. A rollout displays the relevant message on exceeding the allowed limit.

If you select the check box **Use Signal alternative names** in the [20.7.35 Toolbar of the Information Routing Matrix](#), the defined alternative names for the signals are used in the logs and records instead of the hierarchical names. Using the  icon, you can show or hide the **Alternative name** column. Alternative names are always unique in the respective device.

- The alternative name defined in one language for any signal remains the same in the other languages on changing the user-interface language if the corresponding alternative name is not defined in other languages.
- If the alternative name is defined for a signal in more than one language, then the respective alternative name is displayed on changing the user interface language.
- By default, the alternative name defined for a signal is displayed in English language on changing the user interface language if the alternative names are not defined in other languages.

You can delete the alternative names by selecting the option **Delete alternative names** in the context menu of the **Alternative name** column.

The alternative name of the signal is displayed in the following areas:

- In the **Properties** tab of the [20.3.1 Communication Mapping](#) matrix
- Under the **Alternative name** column and in the **Properties** tab of the [20.3.2 Information Routing](#) matrix
- Under the **Alternative name** column and in the **Properties** tab of the [20.1.35 Signal Order Editor](#) matrix
- In the **Properties** tab of the [20.1.20 IEC 61850 Structure Editor](#) matrix

Signals in the IEC 61850 Structure

In the IEC 61850 structure a data object represents the signal. This data object is always presented with the following path information:

Logical device/Logical node/Data object

During the data transmission using IEC 61850, the signals are always transferred embedded in datasets.

Further information about signals in the IEC 61850 structure can be found under [10.1 Overview of the IEC 61850 Structure](#).

Related Topics

[9.5.1 Adding a User-Defined Signal to the Application](#)

[9.5.3 Deleting Signals from the Application](#)

[9.6.1 Overview of the Signal Catalog](#)

[9.6.2 Open the Signal Catalog and Adjust View](#)

9.2 Overview of Settings in the Signal Task Card

You can select settings from their respective function blocks from the signal task card. The following fields of the setting are displayed in the **Information** section of the signal task card:

- **Name**
- **Original name**
- **Parameter number**
- **Type**
- **Description**



NOTE

This feature is only applicable for DIGSI V7.50 and higher.

A setting node cannot be edited, renamed, or deleted from the signal task card.

Select the **Show settings** check box in the signal task card to view the settings which can be used in a function chart.

9.3 Signal Types

The SIPROTEC 5 system uses signals of different types. The signal types can be divided into 2 categories:

- **Signal types as part of functions**
Many signal types are always a fixed part of functions. You cannot individually add signals of this type category to the application. Signals of this type category are automatically generated, when you add the function concerned to the application. You find more information on adding functions under [8.1.2.3 Adding a Function](#).
- **Signal types for user-definable signals**
Some signal types are not only a fixed part of functions, but are also available as user-defined signals. The folder **User-defined Signals** in the global DIGSI 5 library pools these signal types. You find more information on adding user-defined signals under [9.5.1 Adding a User-Defined Signal to the Application](#).

Signal Types as Part of Functions

- **Binary-Controlled Step Position Information (BSC)**
This signal type describes a transformer tap position. The group [19.9.5 BSC – Details](#) contains the properties of a signal of type **BSC**.
- **Binary Counter Reading (BCR)**
This signal type describes a pulse metered value or an energy metered value.
Pulse metered values are not preconfigured. If you want to use the function of pulse metering, you have to insert it from the library into the relevant function group of the type **Circuit Breaker** or **Line**. You find more information on adding this function under [15.5.1.9 Adding Metered Values](#).
Energy metered values are already preconfigured. They are available in the **User-defined functions** folder of the DIGSI 5 global library.
The group [19.9.4 BCR – Details](#) contains the properties of a signal of type **BCR**.
- **Enumerated Setting Controllable (ENC)**
This signal type describes a command. With a signal of this type, you can set a predefined value. The group [19.9.9 ENC – Details](#) contains the properties of a signal of type **ENC**.
- **Phase-To-Ground Related Measured Value of a 3-Phase System (WYE)**
This signal type describes a measured value. The group [19.9.18 WYE – Details](#) contains the properties of a signal of type **WYE**.
- **Phase-To-Phase Related Measured Value of a 3-Phase System (DEL)**
This signal type describes a measured value. The group [19.9.7 DEL – Details](#) contains the properties of a signal of type **DEL**.
- **Sequence (SEQ)**
This signal type describes a sequence. The group [19.9.17 SEQ – Details](#) contains the properties of a signal of type **SEQ**.
- **Complex Measured Value (CMV)**
This signal type describes a complex measured value. The group [19.9.6 CMV – Details](#) contains the properties of a signal of type **CMV**.
- **Binary Analog Controllable (BAC)**
This signal type describes a command with or without feedback. With a signal of this type, you can control an arc suppression coil. The signal can be output as a higher command, lower command, and stop command. You can monitor the output command through an analog value as feedback.

Signal Types for User-Definable Signals

- **3-Phase Measured Value Delta Connection (DEL)**
This signal type describes a measured value. You can, for example, connect the output of a CFC function block **BUILD_DEL** and the input of a CFC function block **SPLIT_DEL** to a signal of the type **DEL**. The group [19.9.7 DEL – Details](#) contains the properties of a signal of type **DEL**.

- **3-Phase Measured Value Y Connection (WYE)**
This signal type describes a measured value. You can, for example, connect the output of a CFC function block **BUILD_WYE** and the input of a CFC function block **SPLIT_WYE** to a signal of the type **WYE**. The group [19.9.18 WYE – Details](#) contains the properties of a signal of type **WYE**.
- **Binary-Controlled Step Position Information (BSC)**
This signal type describes a controllable which can be used for higher and lower commands. The group [19.9.5 BSC – Details](#) contains the properties of the signal type **BSC**.
- **Controllable Analog Process Value (APC)**
This signal type describes a controllable with an analog process value. With a signal of this type, you can output a command for analog values. You can monitor the command with a feedback build in CFC (**BUILD_XMV**). The group [APC details](#) contains the properties of the signal type **APC**.
- **Complex Measured Value (CMV)**
This signal type describes a complex measured value. You can, for example, connect the output of a CFC function block **BUILD_CMV** and the input of a CFC function block **SPLIT_CMV** to a signal of the type **CMV**. You can insert this signal in the Display page of a SIPROTEC 5 device and with it show the result of the function block on the device display. The group [19.9.6 CMV – Details](#) contains the properties of a signal of type **CMV**.
- **Single-Point Indication (SPS)**
This signal type describes a single-point indication. You can, for example, connect the output of a CFC function block **BUILD_SPS** and the input of a CFC function block **SPLIT_SPS** to a signal of the type **SPS**. With a signal of this type, you can, for example, record the status of a binary input or pass on the binary result of a function chart (CFC). The group [19.9.16 SPS – Details](#) contains the properties of a signal of type **SPS**.
- **Marker Command (SPC)**
This signal type describes a marker command. You can use a signal of this type for simple signaling as a command without feedback or as an internal variable. The group [19.9.15 SPC \(Marker Command\) – Details](#) contains the properties of a signal of type **SPC**.
- **Integer Status (INS)**
This signal type describes an integer value. You can, for example, connect the output of a CFC function block of the type **ADD_D** to a signal of the type **INS**. You can insert this signal in the Display page of a SIPROTEC 5 device and with it show the result of the function block on the device display. The group [19.9.12 INS – Details](#) contains the properties of a signal of type **INS**.
- **Enumerated Status (ENS)**
The data type **ENS** can be used to create a whole number which can have predefined values to signal the health. You must use the CFC block **BUILD_ENS** to set this signal (**Allowed values: ok = 1, warning = 2, alarm = 3**). The group [19.9.10 ENS – Details](#) contains the properties of a signal of type **ENS**.
- **Controllable Single-Point (SPC)**
This signal type describes a controllable single indication. With a signal of this type, you can output a command to 1 or more relays. You can monitor the command with 1 single feedback. The group [19.9.14 SPC \(Controllable Single Point\) – Details](#) contains the properties of a signal of type **SPC**.
- **Controllable Double-Point (DPC)**
This signal type describes a command with double feedback. With a signal of this type, you can output a command to 1 or more relays. You can monitor the command with a double feedback. The group [19.9.8 DPC – Details](#) contains the properties of a signal of type **DPC**.
- **Controllable Integer Status (INC)**
This signal type describes a controllable with an integer status type. With a signal of this type, you can output a command to 1 or more relays. The group [19.9.11 INC – Details](#) contains the properties of the signal type **INC**.

- **Measured Value (MV)**
This signal type describes a measured value. You can, for example, connect the output of a CFC function block of the type **SQRT_R** to a signal of the type **MV**. You can insert this signal in the Display page of a SIPROTEC 5 device and with it show the result of the function block on the device display. The group [19.9.13 MV – Details](#) contains the properties of a signal of type **MV**.
- **Protection Activation Information (ACT)**
This signal type describes information about a protection activation. Protective functions use signals of this type to signalize a trigger. The group [19.9.3 ACT – Details](#) contains the properties of a signal of type **ACT**.
- **Directional Protection-Activation Information (ACD)**
This signal type describes information about a protection activation with direction specification. Protective functions use signals of this type to signalize a trigger. The group [19.9.1 ACD – Details](#) contains the properties of a signal of type **ACD**.

9.4 Setting Types

The SIPROTEC 5 system uses settings of different types.

Setting Types

- **Single Point Setting (SPG)**

This is a Boolean type setting. You can connect an **SPG** type setting to a **BOOL** type block input in the function chart.

- **Integer Status Setting (ING)**

This is an integer type setting. You can connect an **ING** type setting to a **DINT** or **UINT** type block input in the function chart.



NOTE

The SIPROTEC 5 device setting which contains a time value is an integer (**ING**) type, but is displayed as floating-point numbers in the DIGSI Settings Editor. For example, **Operate delay** in SIPROTEC 5 is displayed as **0.30 ms** in DIGSI. In a function chart, the integer values are not converted to floating-point numbers, they are used as integer values only, as in the IEC 61850 device.

- **Analog Setting (ASG)**

This is a floating-point type setting. You can connect an **ASG** type setting to the **REAL** type block input in the function chart.

- **Enumerated Status Setting (ENG)**

You can connect an Enumerated Status Setting type only to an **EQ_E** block input in the function chart. The **EQ_E** block can be used to compare the actual value of an **ENG** type with the 2nd input value. Using an **EQ_E** block, you can select a value for comparison directly from the list box at the 2nd input. You can also connect another **ENG** type from the signal task card.

9.5 Processing Signals

9.5.1 Adding a User-Defined Signal to the Application

You can add user-defined signals of the following types to the application:

- 3-phase measured value delta connection (DEL)
- 3-phase measured value Y connection (WYE)
- Binary-controlled step position information (BSC)
- Complex measured value (CMV)
- Controllable analog process value (APC)
- Controllable double point (DPC)
- Controllable integer status (INC)
- Controllable single point (SPC)
- Directional protection-activation information (ACD)
- Double-point indication (DPS)
- Enumerated status health (ENS)
- Integer status (INS)
- Marker command (SPC)
- Measured value (MV)
- Protection-activation information (ACT)
- Single-point indication (SPS)
- Single-point indication, not stored (SPS)



NOTE

From the current version on, the primary value is always considered instead of the percentage value for CFC charts created with signals of type **Measured value (MV)**. For signals of type **Measured value (MV)** defined via an older version, you must upgrade the CFC chart to the DIGSI version currently installed on your PC to ensure the use of the primary value of the signals in CFC instead of the percentage value. Using the current version, you can create new user-defined signals of type MV, CMV, DEL, and WYE. You can also create CFC charts with the new blocks to process the user-defined signals (MV, CMV, DEL, and WYE).

Depending on your respective work situation, you can add a user-defined signal in different areas:

- **In the IEC 61850 structure of an offline configuration**
To use this version, open the affected offline configuration in the [20.1.20 IEC 61850 Structure Editor](#). You find more information about this under [10.3 Opening and Adjusting the IEC 61850 Structure Editor](#).
- **In the information routing of an offline configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **In the signal catalog**
To use this version, open the [20.2.5 Signals](#) tab. You find more information about this under [9.6.2 Open the Signal Catalog and Adjust View](#).

Adding a User-Defined Signal in the IEC 61850 Structure or Information Routing

- ✧ Open the IEC 61850 structure editor or **Information routing** matrix.

- ✧ Select the tab [20.2.3 Libraries](#) in the task card and open the **Global libraries** palette.
 - ✧ Open the **Global DIGSI 5 Library** folder.
 - ✧ Open the **User-defined signals** folder.
 - ✧ In this folder, highlight the signal type that you want to add.
 - ✧ Drag the highlighted element in the IEC 61850 structure editor and there to a logical node.
- or -
 - ✧ Using the mouse button, drag the highlighted element into the **Information routing** matrix and there to a function group, a function, or a function block.
- If insertion is not allowed at this position, the cursor will change to a crossed-out circle.
- ✧ Release the mouse button.

If insertion is allowed at the selected position, the new signal will be added to the application. You can now rename the signal. You will find more information about this under [9.5.2 Renaming a Signal](#).

Adding a User-Defined Signal in the Signal Catalog

- ✧ In the task card, open the [20.2.5 Signals](#) tab. You find more information about this under [9.6.2 Open the Signal Catalog and Adjust View](#).
- ✧ In the signal catalog, select a function or function block as the target for the user-defined signal.
- ✧ Right-click the function or function block.
- ✧ Click **Add new signal** in the context menu.

The [20.6.14 Add New Signal](#) dialog opens.

- ✧ Enter a name for the signal in the text box.

If you do not enter a name, the suggested name will be used. You can also change the name and the IEC 61850 name of the signal at a later point. You will find more information about this under [9.5.2 Renaming a Signal](#).

- ✧ In the list box **User-defined signals**, highlight the required signal type.
- ✧ Click on **OK**.

The dialog is closed.

Name and signal type are adopted and added to the application.

Related Topics

- ✧ [9.1 Overview of Signals](#)
- ✧ [9.6.1 Overview of the Signal Catalog](#)
- ✧ [9.5.3 Deleting Signals from the Application](#)

9.5.2 Renaming a Signal

There are different signal names for each signal: You find more information about this under [9.1 Overview of Signals](#).

You can change the following signal names:

- **Name**
You can change the name of a predefined or user-defined signal.
- **IEC 61850 name**
You can change the IEC 61850 name only for user-defined signal.



NOTE

Every signal has an original name. You cannot change the original name. The length of the function block name and the name of any subordinated signal together must not exceed 42 characters.

Depending on your respective work situation, you can rename a signal name in different areas:

- **Directly in the IEC 61850 structure of an offline configuration**

With this version you can change the IEC 61850 name of a signal. To use this version, open the affected offline configuration in the [20.1.20 IEC 61850 Structure Editor](#). You find more information about this under [10.3 Opening and Adjusting the IEC 61850 Structure Editor](#).

- **Directly in the information routing of an offline configuration**

You can use this version to change the name of a predefined or user-defined signal. To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).

- **Directly in the communication mapping of an offline configuration**

You can use this version to change the name of a predefined or user-defined signal. To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).

- **In the signal catalog**

You can use this version to change the name of a predefined or user-defined signal. To use this version, open the [20.2.5 Signals](#) tab. You find more information about this under [9.6.2 Open the Signal Catalog and Adjust View](#).

- **In the properties of the signal**

With this version you can change the IEC 61850 name of a user-defined signal and the name of a predefined or user-defined signal. To use this version, also open the [3.1.4 Inspector Window](#).

Changing the Name Directly in an Area

- ✧ Open an editor or matrix.
- ✧ Highlight the current name or IEC 61850 name of the signal.
- ✧ Click again on the name.

The name will be highlighted in color.

- ✧ Enter a new name.
- ✧ Click outside of the text box.

- or -

- ✧ Press the <Enter> button.

You confirm your entry with these 2 actions.

The name entered is accepted.

Changing the Name in the Signal Catalog

- ✧ In the task card, open the **Signals** tab.
- ✧ Select from the signal catalog the signal whose name you want to change. You will find more information about this under [9.6.3 Selecting a Signal or a Setting in the Signal Catalog](#).
- ✧ Right-click the signal.
- ✧ Click **Rename** in the context menu.

The [20.6.28 Rename Signal](#) dialog opens.

- ✧ Enter a name for the signal in the text box.

- ✧ Click **OK**.

The dialog is closed.

The name is accepted and updated in all utilization points.

Changing Name or IEC 61850 Name in the Properties

- ✧ Open an editor or matrix.
- ✧ Highlight the signal.
- ✧ In the Inspector window, select the **Properties** tab.
- ✧ Go to the **Details** group.
- ✧ In the text box **Name**, enter a new name for the signal.
- ✧ If the signal is user-defined, in the text box **IEC 61850 Name**, enter a new IEC 61850 name for the signal.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> button.

Confirm your actions with your entries.

The name and the IEC 61850 name are accepted and all utilization points are updated.

Related Topics

- ✧ [9.6.1 Overview of the Signal Catalog](#)

9.5.3 Deleting Signals from the Application

You can delete every user-defined signal. You can only delete predefined signals together with the respective function or function group, or the respective function block. More information can be found under [8.1.2.7 Deleting Functions or Functions Groups](#) and under [8.2.2.6 Adding or Deleting a Function Block](#).

Depending on your respective work situation, you can delete a user-defined signal in different areas:

- **In the IEC 61850 structure of an offline configuration**
To use this version, open the affected offline configuration in the [20.1.20 IEC 61850 Structure Editor](#). You find more information about this under [10.3 Opening and Adjusting the IEC 61850 Structure Editor](#).
- **In the information routing of an offline configuration**
To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).
- **In the communication mapping of an offline configuration**
To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).
- **In the signal catalog**
To use this version, open the [20.2.5 Signals](#) tab. You find more information about this under [9.6.2 Open the Signal Catalog and Adjust View](#).

Deleting a User-Defined Signal

- ✧ Open the IEC 61850 structure editor, one of the 2 matrices or the signal catalog.
- ✧ Highlight the signal.
- ✧ Right-click the signal.
- ✧ Click **Delete** in the context menu.

A confirmation prompt is displayed.

✧ Click **Yes** to confirm.

This confirms your action.

The highlighted signal is deleted from the application.



NOTE

If you delete a signal, inconsistencies may be created in the application and the parameterization.

Related Topics

- ✧ [9.1 Overview of Signals](#)
- ✧ [9.6.1 Overview of the Signal Catalog](#)
- ✧ [9.5.1 Adding a User-Defined Signal to the Application](#)

9.6 Working with the Signal Catalog

9.6.1 Overview of the Signal Catalog

The signal catalog contains the application signals and settings of all offline configurations in the project. The signals and settings are structured hierarchically by function groups and functions. As in the project tree, you can navigate through the structure and show or hide the individual levels.

The signal catalog also contains external signals created by the GOOSE communication. These external signals are structured hierarchically by offline configurations.

They require the signal catalog for the following tasks:

- [6.5.3.4 Inserting a Signal in a Display Page](#)
- [6.5.3.5 Connecting Graphical Elements in a Display Page with a Signal](#)
- [12.1.5.3 Interconnecting a Block with a Signal or a Setting](#)
- [9.5.1 Adding a User-Defined Signal to the Application](#)

You can add signals from the signal catalog to the display page or the function chart via drag and drop. Settings can be added only to the function charts.

Related Topics

- [9.1 Overview of Signals](#)
- [9.6.2 Open the Signal Catalog and Adjust View](#)
- [9.6.3 Selecting a Signal or a Setting in the Signal Catalog](#)
- [9.6.4 External Signals in the Signal Catalog](#)

9.6.2 Open the Signal Catalog and Adjust View

The signal catalog is part of the [20.2.5 Signals](#) tab. This tab is available if one of the following project components is opened in the working area:

- **Display page of an offline configuration**
You will find more information about this under [6.5.2.1 Opening a Display Page](#).
- **Function chart of an offline configuration**
You will find more information about this under [12.1.2.2 Opening a CFC](#).

The following standard functions are available to adapt the view of the signal catalog:

- [3.2.4 Filtering Column Content](#)
- [3.2.3 Sorting Column Content](#)
- [3.2.2 Adjusting Rows and Columns](#)

You can also show and hide the **Information** section.

Opening the Signal Catalog

- ✧ Open one of the listed project components in the working area.

The **Signals** tab is displayed if the task card is already opened.

- ✧ If the task card is closed, at the border of the task area, click on **Signals**.

The task card is opened and the **Signals** tab is displayed.

- ✧ If you need information about an element highlighted in the signal catalog, show the **Information** section. Do so by clicking the top arrow in the title bar.
- ✧ If you need more room for displaying the signals and settings, hide the **Information** section. Do so by clicking the top arrow in the title bar.

Related Topics

- ✧ [9.6.1 Overview of the Signal Catalog](#)
- ✧ [9.6.3 Selecting a Signal or a Setting in the Signal Catalog](#)

9.6.3 Selecting a Signal or a Setting in the Signal Catalog

In order to use a signal in a display page or a function chart, you must select the signal from the signal catalog in the [20.2.5 Signals](#) tab. Use drag and drop to add signals from the signal catalog to the display page or the function chart. A setting can be used only in a function chart. You can find information about this in the following topics:

- [6.5.3.4 Inserting a Signal in a Display Page](#)
- [6.5.3.5 Connecting Graphical Elements in a Display Page with a Signal](#)
- [12.1.5.3 Interconnecting a Block with a Signal or a Setting](#)

Selecting a Signal or a Setting

- ✧ Select the **Show settings** check box in the signal task card to view the settings which can be used in a function chart.
- ✧ In the task card, open the [20.2.5 Signals](#) tab. You find more information about this under [9.6.2 Open the Signal Catalog and Adjust View](#).

The signals of the respective device to which a display page or a function chart is associated are displayed in the signal catalog, embedded in the signal list. Settings to which a function chart is associated are displayed in the signal catalog.

- ✧ If necessary, use the list boxes at the top of the columns **Signal** and **Type** to filter the signals or the settings by name or type. You find more information about this under [3.2.4 Filtering Column Content](#).

The display is restricted to the function groups, the functions, and the function blocks containing the selected name or type.

- ✧ Open further levels in the signal list until you are able to select the desired signal or setting.
- ✧ Highlight the required signal or setting.

You can now drag the highlighted signal or setting to the function chart. You can also drag the highlighted signal to the display page.

Related Topics

- ✧ [9.6.1 Overview of the Signal Catalog](#)
- ✧ [9.6.4 External Signals in the Signal Catalog](#)

9.6.4 External Signals in the Signal Catalog

In an offline configuration A, if you use a signal from an offline configuration B, the offline configuration A generates a signal automatically. This signal represents the signal used from offline configuration B. The newly generated signal using IEC 61850 System Configurator is described as an external signal.

Processes

An external signal is always generated, when you manually generate a GOOSE connection. The source signal is from offline configuration B, the destination node is from offline configuration A.

Requirement

To generate a GOOSE connection between 2 different offline configurations, a GOOSE capable communication connection must be projected in the IEC 61850 System Configurator tool. This communication connection must have the following features:

- A GOOSE-enabled Ethernet interface must be present as a communication module in the hardware configurations of both offline configurations. The integrated Ethernet interface (Port J) is not suitable for GOOSE communication, whereas, for non-modular devices (for example, 7**82 device type), it is suitable.
- For each connected interface, the communication protocol **IEC 61850-8-1** must be set.
- The interfaces are located in the same subnetwork.

Example

The following example illustrates the mechanism when generating external signals using IEC 61850 System Configurator. For this purpose a signal from the offline configuration B is connected with a building block in a function chart of the offline configuration A:

- If there is no GOOSE application, a new GOOSE application will be generated.
- A GOOSE connection is generated in the GOOSE application. The signal from the offline configuration B is the source, a node from the offline configuration A is the target.
- An external signal is generated in offline configuration as a representative for the signal from offline configuration B.
- If no external signals are available in offline configuration A, the folder **External signals** is created. This folder is found in the signal list of the offline configuration A on the function-group level. You can find this folder in the [20.3.1 Communication Mapping](#) matrix, in the [20.3.2 Information Routing](#) matrix and in the signal catalog of the [20.2.5 Signals](#) tab.
- In the **External signal** folder another folder is created with the name of the offline configuration B. The newly generated external signal is stored in this folder. If you generated more connections with signals from the offline configuration, the applicable external signals are also filed in this folder. If you generate connections with signals from other offline configurations, new folders are created for these external signals.
- If you delete the GOOSE connection or the complete GOOSE application, the external signal will be deleted too. If no other signal exists in the folder of the offline configuration, this folder will also be deleted. If no other signal exists in the folder **External signals**, this folder will also be deleted.

Related Topics

- [9.1 Overview of Signals](#)
- [9.6.1 Overview of the Signal Catalog](#)
- [9.6.2 Open the Signal Catalog and Adjust View](#)
- [9.6.3 Selecting a Signal or a Setting in the Signal Catalog](#)

9.7 Quality

9.7.1 Overview of Quality

The IEC 61850 standard defines certain quality attributes for data objects (DO). The SIPROTEC 5 system automatically processes these quality attributes. In order to satisfy different applications, you can influence certain quality attributes and also the values of the data objects depending on these quality attributes.

Supported Quality Attributes

The following quality attributes are automatically processed within the SIPROTEC 5 system.

- **Validity**
The **Validity** quality attribute uses the values **good** or **invalid**.
The **Validity** quality attribute shows if an object transferred through a GOOSE message is received (valid) or not received (invalid). The **invalid** state can be suppressed in the receiver device by setting a substitute value for the object not received. The substitute value is forwarded to the functions.
The values **reserved** and **questionable** are not created in the SIPROTEC 5 system and are not processed further. If the device receives one of these values, it is replaced by the **invalid** value and processed further as **invalid**.
If a detailed quality attribute has the value **TRUE**, then **Validity** is set to the **invalid** value, unless it was already done at the sender end.
- **Test**
The **Test** quality attribute uses the values **TRUE** or **FALSE**.
The **Test** quality attribute indicates to the receiving device that the object received through the GOOSE message is created under test conditions and not operating conditions.
- **OperatorBlocked**
The **OperatorBlocked** quality attribute uses the values **TRUE** or **FALSE**.
The **OperatorBlocked** quality attribute indicates whether an object transferred through GOOSE message originates from a SIPROTEC 5 device, that is in a **functional logoff** state. If the sending device is switched off, the object is no longer being received and assumes the **invalid** state. However, since the **OperatorBlocked** quality was identified on the receiving device, the object may be treated different at the receiving end. At the receiving end, the object may be treated like a dropped signal.

Influencing Quality by the Operating Modes

In addition to the normal operation, the equipment also supports further operating modes that affect the quality:

- **Test mode of the SIPROTEC 5 device**
You can switch the entire SIPROTEC 5 device to test mode. In this case, all data objects generated in the SIPROTEC 5 device (state values and measured values) receive the quality attribute **Test = TRUE**.
The function charts (CFC) are also in test mode and all output data receive the quality attribute **Test = TRUE**.
- **Test mode for individual functions, tripping stages, or function blocks**
You can switch individual functions, tripping stages, or function blocks into test mode. In this case, all data objects generated by the function, tripping stage, or function block (state values and measured values) receive the quality attribute **Test = TRUE**.

- **Functional logoff of the SIPROTEC 5 device**

If you take the SIPROTEC 5 device out of service and want to isolate it from the supply voltage, you can functionally log off the SIPROTEC 5 device. Once you functionally log off the SIPROTEC 5 device, all data objects generated in the SIPROTEC 5 device receive the quality attribute **OperatorBlocked = TRUE**. Also, the output from function charts receives the quality attribute **OperatorBlocked = TRUE**.

If objects are transferred through a GOOSE message, the receiver devices can assess the quality. The receiver device identifies a functional logoff of the sending device. After shutting down the sending device, the receiver device identifies that the sending device has been logged off operationally and did not fail. Now the receiving objects can automatically be set to defined conditions.

Influencing the Quality Through Hardware Monitoring

Supervision functions monitor the device hardware. If the supervision functions identify failures in the data acquisition of the device, all recorded data receive the quality attribute **Validity = invalid**.

Influencing the Quality by the User

You can influence the processing of data and their quality differently:

- For GOOSE connections using the [20.3.2 Information Routing](#) editor.
- In function charts using the [20.1.10 Function-Chart \(CFC\) Editor](#)
- For binary input signals of device-internal functions using the [20.3.2 Information Routing](#) matrix

Related Topics

- [9.7.1 Overview of Quality](#)
- [9.7.2 Processing Quality in Function Charts \(CFC\)](#)
- [9.7.4 Processing Quality of GOOSE Connections](#)
- [9.7.3 Processing Quality of SPS Type Signals](#)

9.7.2 Processing Quality in Function Charts (CFC)

With function charts (CFC), you have to make a distinction between the general processing of quality and certain function blocks, that are especially designed for the quality processing.

General Processing

Most of the function blocks do not have an explicit quality processing. For these function blocks, the following general mechanisms apply:

- **Quality Attribute Validity**

If only an *invalid* data is received in the case of CFC input data, **all** CFC output data are also set to *invalid*, provided they come from blocks without explicit quality processing. The quality is not processed sequentially from block to block, but the output data are set lump sum. An exception is the CFC output data that originate from function blocks with explicit quality processing.

- **Quality Attribute Test**

If the function chart is in **normal** state, CFC input data with the **Test = TRUE** attribute are ignored. If the function chart is executed, the data value that was valid before the **Test = TRUE** attribute is worked with. Also the quality of this **old** value is processed. That means, the test attribute can never become **TRUE** at the output end.

If the function chart is in **test** state and executed, the attribute **Test = TRUE** is set for all data leaving the function chart.

- **Quality Attribute OperatorBlocked**

If the function chart is in **normal** state, for raising data the **OperatorBlocked** attribute is ignored.

If the function chart is in **functionally logged off** state, for raising data the **OperatorBlocked** attribute is ignored. All CFC output data are labeled as functionally logged off.



NOTE

A function chart can assume the **test** state because of the following reasons:

- The entire SIPROTEC 5 device is in a test state and thus also all function charts and all functions.
- Using the function block **CHART_STATE**, an individual chart is switched to the test state.
- Using the IEC 61850 communication functions, an individual function chart is switched to the test state.

Quality Processing Function Blocks (Condition Processing)

The first 3 function blocks (x_SPS) process the quality automatically according to the stated logic. The other function blocks are used to isolate the quality from a data object and, after a separate logical processing, to add them back.

- [12.2.9.1 OR_SPS](#)
- [12.2.9.2 AND_SPS](#)
- [12.2.9.3 NEG_SPS](#)
- [12.2.5.25 SPLIT_SPS](#)
- [12.2.5.22 SPLIT_DPS](#)
- [12.2.5.27 SPLIT_XMV](#)
- [12.2.5.24 SPLIT_Q](#)
- [12.2.5.11 BUILD_Q](#)
- [12.2.5.12 BUILD_SPS](#)
- [12.2.5.8 BUILD_DPS](#)
- [12.2.5.14 BUILD_XMV](#)
- [12.2.5.9 BUILD_ENS](#)

Related Topics

[9.7.1 Overview of Quality](#)

[9.7.2 Processing Quality in Function Charts \(CFC\)](#)

[9.7.4 Processing Quality of GOOSE Connections](#)

[9.7.3 Processing Quality of SPS Type Signals](#)

9.7.3 Processing Quality of SPS Type Signals

With the [20.3.2 Information Routing](#) matrix, you can influence the quality processing of **SPS** type signals.

Processing Quality of SPS Type Signals

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration for which you want to process the Quality of an **SPS** type signal.
- ✧ Double-click **Information routing** in the folder of this offline configuration.

The **Information routing** matrix is displayed in the working area.

- ✧ In the **Information routing** matrix, select the respective signal.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.9.16 SPS – Details](#) group.
- ✧ In the area **Processing of quality attributes**, change the settings to meet your requirements

Related Topics

- ✧ [9.7.1 Overview of Quality](#)
- ✧ [9.7.2 Processing Quality in Function Charts \(CFC\)](#)
- ✧ [9.7.4 Processing Quality of GOOSE Connections](#)

9.7.4 Processing Quality of GOOSE Connections

With the [20.3.2 Information Routing](#), you can influence the data value and quality of all data types. The setting options work for the device receiving the data.

Processing Quality of GOOSE Connections

- ✧ Open the project tree.
 - ✧ Double-click **Information routing**.
- The [20.3.2 Information Routing](#) Editor is displayed in the working area.
- ✧ Expand the **External signals** folder until the external signals are visible.
 - ✧ Select any of the external signals.
 - ✧ Open the [3.1.4 Inspector Window](#).
 - ✧ Select the **Properties** tab.
 - ✧ Select the [19.10.2 Processing Quality Attributes](#) group.
 - ✧ Change the settings to meet your requirements.

Related Topics

- ✧ [9.7.1 Overview of Quality](#)
- ✧ [9.7.2 Processing Quality in Function Charts \(CFC\)](#)
- ✧ [9.7.3 Processing Quality of SPS Type Signals](#)

10 IEC 61850 Structure

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10.1 Overview of the IEC 61850 Structure

The IEC 61850 structure indicates the hierarchical arrangement of the IEC 61850 elements in an application. You can use the [20.1.20 IEC 61850 Structure Editor](#) to access the structure and adjust it to meet your requirements. This process is also called **Flexible Engineering**.

Application Structure and IEC 61850 Structure

The following table illustrates the assignment between the application structure and the IEC 61850 structure:

Application Structure	IEC 61850 Structure
Communication interface	Access point
Function group FG	Logical device(s) (LD)
Function FN	Logical device(s) (LD)
Function block FB	Logical node(s) LN
Data object DO	Data object DO

An application in SIPROTEC 5 devices is organized into function groups and functions. The functions are arranged within a function group. Functions can consist of one or more function blocks. This application structure can be viewed for example in the matrix [20.3.2 Information Routing](#).

The IEC 61850 structure is created by generically converting the application structure:

- The function group and function form the logical device. From a function group **Line1** with the function **87 Line diff.prot.**, the logical device becomes **Ln1_87LineDiffProt** in the IEC 61850 structure.
- The function blocks of the function are mapped as logical nodes. In the example above, these are the logical nodes **I_PDIF1** and **IF_PDIF2**. The prefix and suffix of a logical node are predefined. However, the prefix and suffix can be changed.
- The settings and supervisory indications, for example, group indications, are contained in logical nodes **GAPC1** and **PDIF_PTRC1**.

This IEC 61850 structure corresponds to the SIPROTEC 5 view. The SIPROTEC 5 view is the preset view for the Edition mode of IEC 61850.

Another view is the SIPROTEC 4 similar view. This view is used in the Edition 1 mode. In the SIPROTEC 4 similar view, the IEC 61850 structure is arranged similar as in the SIPROTEC 4 devices. The logical devices **PROT**, **CTRL**, **MEAS**, and **DR** are predefined as fixed values. In the logical devices the function blocks are logical nodes. A generic assignment of function groups and functions to the IEC 61850 structure is no longer available in this view. Logical nodes and the superordinate controlling nodes are, however, displayed in the correct sequence (Logical device, Logical node, Data object and Data attributes).

The IEC 61850 structure editor allows you to switch between the 2 views. You find more information about this under [10.4 Switching between Different Views](#).

Options

The following tasks can be performed with the IEC 61850 structure editor:

- Switch between the SIPROTEC 5 view and the SIPROTEC 4 similar view
- Adding logical nodes
- Renaming logical devices and logical nodes
- Adding signals
- Transmitting and deleting structure elements

Applications

The following describes 3 example applications for working with the IEC 61850 structure editor:

- To avoid a high flexible engineering effort when using a specification with few Logical Devices, you can switch from the SIPROTEC 5 structure to the SIPROTEC 4 structure using the IEC 61850 structure editor.
- If you want to adapt the structure and designations of the elements and devices regardless of the manufacturer, this can be done using the IEC 61850 structure editor. You can, for example, name a device according to its location or intended use. In the process, and also for all other elements, you can adapt the name to comply with the terminology used within your company. This type of structural adaptation is also called [10.2 Functional Naming and Flexible Product Naming](#).
- If you are familiar with IEC 61850, you can make all changes to the functionality in the IEC 61850 structure editor. Instead of adding a function to a single-line configuration, you can add a user-defined logical node or user-defined signals directly to the IEC 61850 structure.

Advantages

The variability of the IEC 61850 structure provides advantages including the following:

- Exchangeability of devices at communication level
- Typification of the device configuration independent of the device manufacturer
- Reduction of lifecycle engineering costs
- Longevity of the configuration data generated

Related Topics

[10.3 Opening and Adjusting the IEC 61850 Structure Editor](#)

[10.5 Adding a Logical Node and Selecting a Class](#)

[9.5.1 Adding a User-Defined Signal to the Application](#)

[14.10.6 Selecting the IEC 61850 Edition](#)

10.2 Functional Naming and Flexible Product Naming

The engineering concept **Functional naming and flexible product naming** allows the device replacements at the communication level. The configuration of the device communication interfaces ensures, that scope of information to be transferred and the naming between devices of different versions and manufacturers appears the same.

Definitions

- **Functional naming**

A data model with functional structure based on SCL is manufacturer-independent and standardized. In IEC 61850, this function-oriented naming is called **Functional Naming** (function-related addressing). A system model according to IEC 61850 is formed by the modeling of the primary system structure with the following elements:

- Logical nodes for the equipment
- Distributed functions
- Type classes of the logical nodes, data objects, and attributes

- **Flexible product naming**

The data models of the devices reflect the implemented functions of bay and protection devices of the individual manufacturers. The product naming describes the actual configuration of the IEC 61850 naming, that means the object tree structure of the IEC 61850 data model. According to this naming, telegrams are formed and sent via the communication interface configured for IEC 61850.

It means that IEC 61850 address is vendor-dependent:

- Logical Devices
- Function allocation between IEDs

Product Naming

With flexible product naming, you can change the object tree structure. You have the following possibilities:

- **Flexibility of the implemented device data models**

You can define the structures of logical devices by adding user-defined logical devices.

- **Adding logical nodes**

You can add user-defined logical nodes and completely use all data classes in IEC 61850.

- **Custom naming**

The attribute **LDname** is used instead of the combination of the attributes **IEDname** and **LDinst** as part of the address in a GOOSE or report communication only in Edition 2 and the standard solution for functional naming.

You can define the IED name, the instance name of the logical device, the prefix, and the suffix.

Related Topics

[10.1 Overview of the IEC 61850 Structure](#)

10.3 Opening and Adjusting the IEC 61850 Structure Editor

A separate IEC 61850 structure editor is available for each offline configuration within a project.

Opening the IEC 61850 Structure Editor

In the project, open the folder of the affected offline configuration and double-click **IEC 61850 structure**. The IEC 61850 structure editor is displayed in the working area.

Adjusting the IEC 61850 Structure Editor

You can adjust the view of the IEC 61850 structure editor. For this purpose, the following standard functions are available:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.4 Filtering Column Content](#)
- [3.2.3 Sorting Column Content](#)



NOTE

It is not possible to filter the columns according to the user-defined criteria (for example, the [20.6.24 Custom Filter](#) option is not available in the IEC 61850 structure editor.

Related Topics

- [10.1 Overview of the IEC 61850 Structure](#)
- [10.4 Switching between Different Views](#)
- [9.5.1 Adding a User-Defined Signal to the Application](#)
- [10.7 Deleting Elements](#)
- [10.8 Moving Elements](#)
- [14.10.6 Selecting the IEC 61850 Edition](#)

10.4 Switching between Different Views

With the [20.1.20 IEC 61850 Structure Editor](#), you can switch between the SIPROTEC 5 view and the SIPROTEC 4 similar view. Selecting a different view can have an impact on all areas in DIGSI 5 in which IEC 61850 elements are displayed.



NOTE

Siemens recommends to decide for a preferred view, before you configure the offline configuration.

Selecting a View

- ✧ Open the list box for the view in the IEC 61850 structure editor toolbar.
- ✧ Select one of the following settings **SIPROTEC 5 View** or **SIPROTEC 4 similar view**.

The view in the structure list of the IEC 61850 structure editor is updated.

Related Topics

- ✧ [10.1 Overview of the IEC 61850 Structure](#)

10.5 Adding a Logical Node and Selecting a Class

You can use the [20.1.20 IEC 61850 Structure Editor](#) to add user-defined logical nodes to a logical device. The global DIGSI 5 library is used for this.

A new logical node added contains the following elements:

- Beh (state)
- Health (readiness)
- NamPlt (name)
- Mod (mode)

A newly added logical node has the class **USER**. The class defines the function of the node. The class **PDIS**, for example, represents distance protection. You can change the class assigned to the logical node you have added in its properties.

Adding a Logical Node

- ✧ Select the tab [20.2.3 Libraries](#) in the task card and open the **Global libraries** palette.
- ✧ Open the folder **Global DIGSI 5 Library** and the folder **User-defined functions**.
- ✧ Mark in the **User-defined functions** folder the **User-defined function block** element.
- ✧ Hold down the mouse button and drag the element to the name of the logical device concerned in the structure list of the IEC 61850 structure editor.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button.

If insertion is allowed at the selected position, the new logical node will be inserted into the logical device.

Selecting the Class of a User-Defined Logical Node

- ✧ Highlight the logical node whose class you want to change in the structure list of the IEC 61850 structure editor.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.7.1 Logical Node](#) group.
- ✧ Select a class for the logical node using the **Logical node class (InClass)** list box.

Related Topics

- ✧ [10.1 Overview of the IEC 61850 Structure](#)
- ✧ [10.6 Renaming a Logical Device and a Logical Node](#)
- ✧ [9.5.1 Adding a User-Defined Signal to the Application](#)
- ✧ [10.7 Deleting Elements](#)
- ✧ [10.8 Moving Elements](#)

10.6 Renaming a Logical Device and a Logical Node

You can use the [20.1.20 IEC 61850 Structure Editor](#) to rename logical devices and logical nodes.

You can change the following names for a logical device:

- **Instance name**
The instance name is the name of the logical device within the IEC 61850 structure, for example **Application** or **CTRL**.
- **Communication name**
The communication name is the name of the logical device that is transmitted when communicating with other devices. If you do not specify a communication name, one will be generated automatically. This communication name is a concatenation of the device name and the name of the logical device.

You can change the following name parts for a logical node:

- **Prefix**
Different prefixes are used to group logical nodes according to their function. If, for example, you want to configure switchgear interlocking protection, you can assign the prefix **SFS** to all of the logical nodes required for this function. Adding a prefix also enables logical nodes to be located more easily.
- **Instance (inst)**
You can use several instances of the same logical node. Each instance of a logical node must be assigned an instance number. If you use the same prefix for several logical nodes in the same class (LN class), assign different instance numbers to these logical nodes. If you use the same instance number for several logical nodes in the same class, the logical nodes must be differentiated by their prefixes.

The combination of prefix, class, and instance number must be unambiguous within a SIPROTEC 5 device in case DIGSI checks it at a certain point of time during the configuration.

Renaming a Logical Device

- ✧ Highlight the logical device you want to rename in the structure list of the IEC 61850 structure editor.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.7.3 Logical Device \(LD\)](#) group.
- ✧ Enter the value for **Instance** and **Name** in the relevant text box.

Renaming a Logical Node

- ✧ Highlight the logical node you want to rename in the structure list of the IEC 61850 structure editor.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.7.1 Logical Node](#) group.
- ✧ Enter a prefix and an instance number in the relevant text box. Be sure to observe the limitations described in the introduction.



NOTE

If a logical node contains connected GOOSE inputs it cannot be renamed.

Related Topics

- ✧ [10.1 Overview of the IEC 61850 Structure](#)

10.7 Deleting Elements

You can use the [20.1.20 IEC 61850 Structure Editor](#) to delete elements from the IEC 61850 structure.

You can delete the following elements:

- User-defined logical device
- User-defined logical node
- User-defined signal

You cannot delete the following elements:

- Predefined logical device
- Predefined logical node
- Class **LLNO** logical nodes contained within the user-defined logical device
- Predefined signal
- Default element contained within the user-defined logical node

Deleting Elements

- ✧ Mark one or more elements that you want to delete in the structure list of the IEC 61850 structure editor.
- ✧ Click in the [20.7.1 DIGSI 5 Toolbar](#) on the  button.
 - or -
- ✧ Press the <Del> button.
 - or -
- ✧ Right-click on the element that you want to delete in the structure list of the IEC 61850 structure editor.
- ✧ Click **Delete** in the context menu.



NOTE

The element(s) is / are deleted without further confirmation prompts. You can delete any logical device in this view as long as it has only an LNO with no user-defined signals. You can delete user-defined signals and logical nodes only if they are not involved in the GOOSE communication.

Related Topics

- ✧ [10.1 Overview of the IEC 61850 Structure](#)

10.8 Moving Elements

You can use the [20.1.20 IEC 61850 Structure Editor](#) to move elements within the IEC 61850 structure.

You can move the following elements:

- Logical node
- Signal

You cannot move the following elements:

- Logical device
- Logical node, if a logical node with the same combination of prefix, class and instance number already exists in the logical target device and if the logical node contains connected GOOSE inputs
- Class **LLNO** logical node
- Signal, if a signal with the same IEC 61850 name already exists in the destination node
- External signals

Moving an Element

- ✧ Mark the element that you want to move in the structure list of the IEC 61850 structure editor.
- ✧ Hold down the mouse button and drag the marked element to a suitable target.

If a target is not suitable for the marked element, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button at a permissible destination.

The marked element is moved.

Related Topics

- ✧ [10.1 Overview of the IEC 61850 Structure](#)

11 Information Routing

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11.1 Overview for Information Routing

Routing means to assign a piece of information to a source and/or a destination. For this purpose, various types of information, sources, and destinations are available to you.

If you route a piece of information to a source, it means that a specific event will trigger this information. If you route a piece of information to a destination, it means that the piece of information will be transmitted or cause a reaction. When routing, you not only determine the assignment, but also the type of assignment. For example, you can route an indication as **H (active with voltage)** (where **H** means high) or as **L (active without voltage)** (where **L** means low) to a binary input.

For routing information, use the [20.3.2 Information Routing](#) matrix. With the information matrix, you can assign information to the listed sources and targets. Every information is assigned to one line in this matrix. For the sources and targets, the matrix contains columns that are combined into column blocks. The **Information routing** matrix is a device-oriented tool. A separate **Information routing** matrix is available for each offline configuration present in a project.

Signals transmitted through DNP3, IEC 60870-5-103, IEC 60870-5-104, Modbus TCP, PROFINET IO, or a protection interface are routed in DIGSI 5 using the [20.3.1 Communication Mapping](#) matrix.



NOTE

You cannot edit the labels for terminals, LEDs, and function keys in the properties of the Information Routing editor. This can only be done in the properties of the respective hardware in the Hardware and protocols editor.

Information

The following information types are available:

- Different signal types for measured values
- Different signal types for metered values
- Different signal types for indications
- Different signal types for commands
- Menus in the device display

Sources

The following sources are available:

- Binary inputs
- Function keys

Destinations

The following destinations are available:

- Binary outputs
- LEDs
- Fault records
- Logs
 - Operational log
 - Fault log
 - Ground fault log
 - User log 1
 - User log 2

- Device menu
 - Measurement
 - Control
- Display

Columns with Exclusive Display Function

Additionally, the **Information routing** matrix shows columns for CFC and display. The columns for CFC indicate whether a signal is being used in a function chart (CFC). In DIGSI 5, to be able to use a signal in a function chart, you no longer need to route it to CFC. Thus these columns only serve as displays. The same applies to the **Display** column. It shows if a signal is used in a display page.

Routing Signals to Communication Interfaces

You route signals to communication interfaces with the [20.3.1 Communication Mapping](#) matrix.

You find further information for routing signals to communication interfaces under [14.9.5 Routing Signals for Communication](#).

Related Topics

[11.3.1 Opening the Information Routing Matrix](#)

[11.2 Basic Principles of Routing](#)

[9.1 Overview of Signals](#)

11.2 Basic Principles of Routing

To route the information, use the [20.3.2 Information Routing](#) matrix. Position the mouse pointer on the cell that forms the intersection between the information line and the source or destination column. Crosshair lines will assist you in finding the cell. Then select one of the available routing types from the context menu of the selected cell. The routing type depends on the piece of information, source, and destination.

Determining If Routing Is Possible

If the selected cell is light gray, this means that the information can be routed. If the common cell is medium or dark gray, then the information cannot be routed. When clicking a light gray cell, the cell turns white. Medium gray or dark gray cells do not turn white when clicking them.

Routing Information with the Context Menu

- ✧ Position the cursor in the cell in question.
- ✧ Right-click the cell.

The context menu lists entries for several routing types. The specific available routing types depend on the information type and on the type of source or destination.

- ✧ Click one of these entries.

The routing abbreviation, which describes the type of selected routing, is entered into the cell.

Removing Individual Routings from a Cell

- ✧ Position the cursor in the cell in question.
- ✧ Right-click the cell.

Each context menu offers the **Not routed** entry.

- ✧ Click this menu item.

The routing is removed from the selected cell.

Removing Routings by Columns

- ✧ To remove all deletable routings in one column at the same time, mark the column.
- ✧ Right-click the marked column.
- ✧ Click **Delete routings** in the context menu.

All deletable routings in this column are deleted, even the currently hidden routings.

Entering Routing Manually

- ✧ Double-click the affected cell.
- ✧ Enter the abbreviation for the routing into the cell.
- ✧ Click outside the cell.
- or -
- ✧ Press the <Enter> key.

You confirm your entry with these 2 inputs.

A plausibility check will issue an error indication if the routing is inadmissible. In all other cases, the routing abbreviation is accepted.

Related Topics

- ✧ [11.1 Overview for Information Routing](#)

11.3 Basic Operation

11.3.1 Opening the Information Routing Matrix

To open the [20.3.2 Information Routing](#) matrix, depending on your current working situation, you have the following options:

- You can open the **Information routing** matrix using the [3.1.2 Project Tree](#).
- If the single-line configuration is shown in the working area, you can use it to open the **Information routing** matrix.

To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).

Opening the Information Routing Matrix with the Project Tree

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration for which you want to edit the information routing.
- ✧ Double-click **Information routing** in this folder.

The **Information routing** matrix is displayed in the working area. This will display the information and routings of the offline configuration.

Opening the Information Routing Matrix from the Single-Line Configuration

- ✧ Open the single-line configuration.
- ✧ In the single-line configuration, select the device symbol of the offline configuration in which you want to edit the information routing.
- ✧ In this device symbol, open the function group that contains the required function.

The names of all functions contained in this function group are displayed.

- ✧ Right-click the name of one of these functions.
- ✧ Click **Information routing** in the context menu.

The **Information routing** matrix is displayed in the working area. This displays the information and routings of the offline configuration. The function group opened in the device symbol is also opened in the **Information routing** matrix. The function selected in the device symbol is highlighted in the opened function group.

Related Topics

- ✧ [11.1 Overview for Information Routing](#)
- ✧ [11.2 Basic Principles of Routing](#)
- ✧ [11.3.2 Adjusting the Information Routing View](#)

11.3.2 Adjusting the Information Routing View

The following standard functions are available to adapt the view of the information routing:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.4 Filtering Column Content](#)
- [3.2.3 Sorting Column Content](#)

You also have the following options:

- **Showing or Hiding Signal Numbers**

Every predefined signal has a unique number. The signal numbers are shown by default. You can hide and show the signal numbers together for all signals. Information for this purpose can be found in the **Showing and hiding signal numbers** section.

- **Showing or Hiding Display Columns**

The columns **CFC** and **Display** are display-only. In the [20.3.2 Information Routing](#) matrix, you cannot route information to these columns. The columns are shown by default. You can show and hide the columns. Relevant information can be found in the **Showing or hiding display columns** section.

- **Filter Information Routing with Predefined Display Profiles**

You can filter the scope of the displayed information, sources, and destinations using predefined display profiles. You find more information about this in the [11.3.3 Filtering Information Routing with Predefined Display Profiles](#) section.

- **Switch between Condensed Column View**

Switching from the expanded to the reduced column view reduces the number of columns displayed. You find more information about this in the [11.3.4 Switching between Condensed Column View](#) section.

Showing or Hiding Signal Numbers



Click in the [20.7.35 Toolbar of the Information Routing Matrix](#) the  button.

If the signal numbers were shown, this action hides these numbers. If the numbers were hidden, this action shows these numbers.

Showing or Hiding Display Columns



In the toolbar of the **Information routing** matrix, click the  button.

If the display columns were shown, this action hides the display columns. If the display columns were hidden, this action shows the display column.

Related Topics

- ✧ [11.1 Overview for Information Routing](#)
- ✧ [11.2 Basic Principles of Routing](#)

11.3.3 Filtering Information Routing with Predefined Display Profiles

You can filter the scope of the displayed information, sources, and destinations using predefined display profiles. The following display profiles are available:

- **All Entries**

There is no constraint regarding the display of pieces of information, sources and destinations.

- **Trips**

Only signals connected with tripping are displayed. All other information is hidden. This also applies to complete function groups, if these do not contain at least one signal that is connected to tripping. All sources and destinations are displayed.

- **Measured and Metered Values**

Only measured and metered values are displayed. All other information is hidden. This applies also to entire function groups, unless these contain at least one measured or metered value.

The following sources are displayed:

- GOOSE
- CFC

The following destinations are displayed:

- Fault records
- Event log buffer
- Menus in the device display
- CFC
- Display

All other sources and destinations are hidden.

- **Device I/O**

Only input and output signals of the SIPROTEC 5 device are displayed. All other information is hidden. This applies also to entire function groups, unless these contain at least one input and output signal.

The following sources are displayed:

- Binary inputs
- GOOSE

The following destinations are displayed:

- Binary outputs

All other sources and destinations are hidden.

- **Configuration of the Device Menu**

Only the device menu levels are displayed. All other information is hidden. This also applies to all function groups. Only the source **Function keys** are displayed. All other sources and destinations are hidden.

The default setting when opening the information routing is **All entries**.



NOTE

You cannot switch to the reduced column view if a filtered view is selected. You find more information about this under [11.3.4 Switching between Condensed Column View](#).

Selecting a Filtered View

- ✧ In the [20.7.35 Toolbar of the Information Routing Matrix](#), open the list box for the display profiles.
- ✧ Select the needed display profile.

The view of the information routing is adjusted according to the display profile selected.

Restoring the Standard View

- ✧ Open the **Information routing** list box for display profiles in the matrix toolbar.
- ✧ Select the display profile **All entries**.

- or -

- ✧ In the toolbar of the **Information routing** matrix, click the  button.

The information routing is displayed in the standard view.

Related Topics

- ✧ [11.1 Overview for Information Routing](#)
- ✧ [11.2 Basic Principles of Routing](#)
- ✧ [11.3.2 Adjusting the Information Routing View](#)

11.3.4 Switching between Condensed Column View

The selection between expanded and reduced column view has an effect on the display of the following column blocks:

- Binary inputs
- Function keys
- Binary outputs
- LEDs

The expanded and reduced column view has the following differences:

- **Expanded Column View**

In the expanded column view you have access to all columns of the listed column blocks.

- **Reduced Column View**

In the reduced column view the [20.3.2 Information Routing](#) matrix shows one collective column each for the listed column blocks. Within the individual cells of a collective column, abbreviations provide information about the type of routing of a specific information. The abbreviation **L5** in a cell of the **BI** collective column means, for example, that the accompanying information with the **Active without voltage** option is routed to binary input 5.

If a specific piece of information is routed to several destinations, the abbreviations of all destinations are displayed. In this case the various abbreviations are separated by commas. Widen the column to see all abbreviations. You find more information about this under [3.2.2 Adjusting Rows and Columns](#).

Short view has the advantage that you can route information quickly via text input. You find more information about this under [11.2 Basic Principles of Routing](#).



NOTE

You can only switch to a reduced column view if the display profile **All entries** has been selected. You find more information about this under [11.3.3 Filtering Information Routing with Predefined Display Profiles](#).

Selecting the Reduced Column View

- ✧ Click in the [20.7.35 Toolbar of the Information Routing Matrix](#) on the  button.

The information routing is displayed in the Reduced column view.

Selecting the Expanded Column View

- ✧ In the toolbar of the **Information routing** matrix, click on the  button.
- or -
- ✧ Using the display profile list box, select one of the display profiles **Trips**, **Measured/metered values**, **Device I/O**, or **Configuration of menu levels**.

The information routing is displayed in the Expanded column view.

Related Topics

- ✧ [11.1 Overview for Information Routing](#)

- ✧ [11.2 Basic Principles of Routing](#)
- ✧ [11.3.2 Adjusting the Information Routing View](#)

11.3.5 Printing Information Routing

You can print out the information routing.

Starting the Printing Process by Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to print the information routing.
- ✧ In the project, highlight in this offline configuration the entry **Information routing**.
- ✧ In the **Project** menu, click **Print**.

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document template, and a cover sheet. You find more information about this under [17.2.3 Selecting Print Options](#).
- ✧ Click **Print**.

The **Print** dialog closes and the selected data is printed.

Starting the Printing Process without Selecting the Print Options

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to print the information routing.
- ✧ In the project, highlight in this offline configuration the entry **Information routing**.
- ✧ Click in the [20.7.1 DIGSI 5 Toolbar](#) the  button.

Printing will start using the settings last selected.

Related Topics

- ✧ [11.1 Overview for Information Routing](#)
- ✧ [11.2 Basic Principles of Routing](#)
- ✧ [17.1.1 Overview for Designing and Printing Documents](#)

11.4 Sources and Destinations

11.4.1 Routing to Binary Inputs

You can route the signals of the following types to binary inputs:

- Binary Controlled Step Position Information (BSC)
- Single-Point indication (SPS)
- User-defined Controllable Single-Point Indication (SPC)
- Command with Double-Point Feedback (DPC)

A binary input serves as source for a routed signal. The [20.3.2 Information Routing](#) matrix contains one column for each binary input. The routed signals for the binary inputs are displayed in the SIPROTEC 5 device display.

Routing a Binary Controlled Step Position Information (BSC) to a Binary Input

Signals of the **BSC** type are used exclusively for the **Tap changer** function. This function is assigned to the **Position** signal, which has the type **BSC**.

The **Position** signal requires input information from which the **Tap changer** function derives position commands for the tap changer. The signal can receive this input information through a CFC function or through signals at binary inputs. If the input information should be provided through the binary inputs, you must route the **Position** signal to the relevant binary inputs.

Depending on the number of transformer taps and the selected coding, the **Position** signal must be routed to several consecutive binary inputs. You edit these properties of the **Position** signal in the group [19.9.5 BSC – Details](#).

Of the entire sequence of binary inputs, you only have to route the binary input with the lowest number. The next-higher binary inputs are automatically routed. If there are not enough binary inputs available, a message is displayed. Confirm this message and route a binary input with a lower number.

To route a binary controlled step position information to a binary input, select one of the following options:

- **X (routed)**
The signal is routed to the binary input.
- **Not routed**
The signal is not routed to the binary input.

Routing a Single-Point Indication (SPS) to a Binary Input

You may route a single-point indication to exactly one source. If a single-point indication is already routed to a function key, CFC, or another binary input, you must not route this single-point indication to an additional binary input. If you try to route the signal a further time, all routings of this signal are highlighted in color. Delete all routings but one.

To route a single-point indication to a binary input, select one of the following options:

- **H (Active with voltage)**
When a signal is present at the binary input, the single-point indication is generated.
- **L (Active without voltage)**
When no signal is present at the binary input, the single-point indication is generated.
- **Not routed**
The single-point indication is not routed to the binary input.

Routing a User-defined Controllable Single-Point Indication (SPC) to a Binary Input

You can route a user-defined controllable single-point indication to exactly one binary input. If you route the user-defined controllable single-point indication to a further binary input, the already existing routing is automatically deleted.

To route a user-defined controllable single-point indication to a binary input, select one of the following options:

- **H (Active with voltage)**
When a signal is present at the binary input, the user-defined controllable single-point indication is generated.
- **L (Active without voltage)**
When no signal is present at the binary input, the user-defined controllable single-point indication is generated.
- **Not routed**
The user-defined controllable single-point indication is not routed to the binary input.

Routing a Command with Double-Point Feedback (DPC) to a Binary Input

The 2 single-point indications **Open** and **Closed** are assigned to every command with double-point feedback. You can route the command in such a way that each single-point indication is assigned to exactly one binary input. If you route the command to a further binary input, the already existing routing of the same type is automatically deleted

To route a command with double-point feedback to a binary input, select one of the following options:

- **OH (Open (Active with voltage))**
When a signal is present at the binary input, the single-point indication **Open** is generated.
- **OL (Open (Active without voltage))**
When no signal is present at the binary input, the single-point indication **Open** is generated.
- **CH (Closed (Active with voltage))**
When a signal is present at the binary input, the single-point indication **Closed** is generated.
- **CL (Closed (Active without voltage))**
When no signal is present at the binary input, the single-point indication **Closed** is generated.
- **Not routed**
The respective single-point indication is not routed to the binary input.

Related Topics

- [11.1 Overview for Information Routing](#)
- [11.2 Basic Principles of Routing](#)
- [11.4.9 Editing the Properties of Sources and Destinations](#)
- [9.5.1 Adding a User-Defined Signal to the Application](#)

11.4.2 Routing to Function Keys

You can route the signals of the following types to function keys:

- Single-Point Indication (SPS)
- Controllable Single-Point Indication (SPC)
- Command with Double-Point Feedback (DPC)

A function key serves as the source for a routed signal. The [20.3.2 Information Routing](#) matrix contains one column for each function key.



NOTE

A function key can already be occupied because it is parameterized for the selection of an operating level in the SIPROTEC 5 device.

Routing a Single-Point Indication (SPS) to a Function Key

You may route a single-point indication to exactly one source. If a single-point indication is already routed to a binary input, to CFC or another function key, you must not route this single-point indication to an additional function key. If you try to route the signal a further time, all routings of this signal are highlighted in color. Delete all routings but one.

To route a single-point indication to a function key, select one of the following options:

- **T (toggle)**
When the function key is pressed, the routed single-point indication is generated and stays. When the function key is pressed once more, the routed single-point indication is canceled.
- **P (trigger pulse)**
When the function key is pressed, the routed single-point indication is generated and stays. A renewed pressing of the function key has no effect.
- **Not routed**
The single-point indication is not routed to the function key.

Routing a Controllable Single-Point Indication (SPC) to a Function Key

You can route a controllable single-point indication to several function keys. For this, select one of the following options:

- **T (toggle)**
When the function key is pressed, the routed controllable single-point indication is set to **On**. When the function key is pressed once more, the routed controllable single-point indication is set to **Off**.
- **On (on)**
When the function key is pressed, the routed controllable single-point indication is set to **On**.
- **Off (off)**
When the function key is pressed once more, the routed controllable single-point indication is set to **Off**.
- **Not routed**
The controllable single-point indication is not routed to the function key.



NOTE

Depending on the actual controllable single-point indication, less or even none of the options named can be available for selection.

Routing a Command with Double-Point Feedback (DPC) to a Function Key

You can route a command with double-point feedback to several function keys. For this, select one of the following options:

- **T (toggle)**
When the function key is pressed, the command is sent as an On command. When the function key is pressed once more, the command is sent as a trip command.
- **On (on)**
When the function key is pressed, the command is sent as an On command.
- **Off (off)**
When the function key is pressed once more, the command is sent as a trip command.
- **Not routed**
The command is not routed to the function key.



NOTE

Depending on the function of the command with double-point feedback, less or even none of the options named can be available for selection.

Related Topics

- [11.1 Overview for Information Routing](#)
- [11.2 Basic Principles of Routing](#)
- [11.4.9 Editing the Properties of Sources and Destinations](#)

11.4.3 Routing to Binary Outputs

You can route the signals of the following types to binary outputs:

- Single-Point Indication (SPS)
- User-defined Marker Command (SPC)
- User-defined Controllable Single-Point Indication (SPC)
- User-defined Command with Double-Point Feedback (DPC)

A binary output serves as destination for a routed signal. The [20.3.2 Information Routing](#) matrix contains 1 column for each binary output. The routed signals for the binary outputs are displayed in the SIPROTEC 5 device display.

Routing a Single-Point Indication (SPS) or a User-defined Marker Command (SPC) to a Binary Output

You can route a single-point indication or a user-defined marker command to several binary outputs. For this, select one of the following options:

- **L (latched)**
The single-point indication or the user-defined marker command is stored and routed to the binary output. The relay of the binary output latches as soon as the single-point indication or the user-defined marker command is pending. Even if the respective signal is no longer pending, the relay remains latched. You must manually reset the relay on the SIPROTEC 5 device. You find more information about this in the respective device manual.
- **U (unlatched)**
The single-point indication or the user-defined marker command is not stored and routed to the binary output. The relay of the binary output latches as soon as the respective signal is pending. As soon as the single-point indication or the user-defined marker command is no longer pending, the relay also unlatches.
- **Not routed**
The single-point indication or the user-defined marker command is not routed to the binary output.

Routing a Command with Double-Point Feedback (DPC) or a User-defined Controllable Single-Point Indication (SPC) to a Binary Output

You can route a command with double-point feedback or a user-defined controllable single-point indication (SPC) to several binary outputs. For this, select one of the following options:

- **On (on)**
The command or the controllable single-point indication is routed as an On command to this binary output.
- **Off (off)**
The command or the controllable single-point indication is routed as a trip command to this binary output.
- **BF (command busy flag)**
This binary output is specified as a signal relay. The signal relay is controlled as long as the command or the controllable single-point indication is output. You can route several commands or controllable single-point indications to the same signal relay and connect this relay, for example, to a control setup.

- **CC (common contact)**

This binary output is specified as a common contact. You can assign several commands or controllable single-point indications to a common binary output as a common contact and save binary outputs. Prerequisite is that the signals at the common contact have the same potential. An application example is a common ground potential.

- **Not routed**

The command or the controllable single-point indication is not routed to the binary output.

Related Topics

[11.1 Overview for Information Routing](#)

[11.2 Basic Principles of Routing](#)

[11.4.9 Editing the Properties of Sources and Destinations](#)

[9.5.1 Adding a User-Defined Signal to the Application](#)

11.4.4 Routing to LEDs

You can route the signals of the following types to LEDs:

- Single-Point Indication (SPS)
- User-defined Marker Command (SPC)

An LED serves as destination for a routed signal. The [20.3.2 Information Routing](#) matrix contains 1 column for each LED. The routed signals for the LEDs are displayed in the SIPROTEC 5 device display.



NOTE

LEDs associated with the push-button module are displayed according to the position of the IO module in the **Devices and Network** editor.

Routing a Single-Point Indication (SPS) or a User-defined Marker Command (SPC) to an LED

You can route a single-point indication or a user-defined marker command to several LEDs. For this, select one of the following options:

- **L (latched)**

The single-point indication or the user-defined marker command is stored and routed to the LED. The LED lights up as soon as the single-point indication or the user-defined marker command is pending. Even if the respective signal is no longer pending, the LED continues to be lit. You must manually reset the LED on the SIPROTEC 5 device. You find more information about this in the respective device manual.

- **U (unlatched)**

The single-point indication or the user-defined marker command is routed to the LED and not stored. The LED lights up as soon as the respective signal is pending. As soon as the single-point indication or the user-defined marker command is no longer pending, the LED goes dark.

- **NT (latched only with trip)**

The single-point indication or the user-defined marker command is first of all stored. When a trip command eliminates the cause for the signals, the stored state is retained. If the initiation of the signal relapses without the trip command, then the state displayed before the initiation is reestablished.

The behavior of NT changes according to the options set as **with pickup** or **with trip** for the parameter **Fault-display** under **Spontan.indic** group in the [20.5.10 Device Settings](#) editor.

The following scenarios clarify the behavior of NT:

- Scenario 1:
Select the option **with pickup** as the default value for the **Fault-display** parameter in the [20.5.10 Device Settings](#) editor and route the **pickup signal** with NT. Perform a fault and release the **pickup signal** without the **operate signal**. After clearing the fault, the state of the pickup LED is **On**. In this situation, the pickup LED remains active even if there is no **operate signal**.
- Scenario 2:
Select the option **with trip** for the **Fault-display** parameter in the [20.5.10 Device Settings](#) editor and route the pickup signal with NT. Perform a fault and release the **pickup** signal without the **operate** signal. After clearing the fault, the state of the pickup LED is **Off** at the end.
- Scenario 3:
Select the option **with trip** for the **Fault-display** parameter in the [20.5.10 Device Settings](#) editor and route the **pickup** signal with NT. Perform a fault and release the **pickup** and **operate** signal. After clearing the fault, the pickup LED remains active.

- **Not routed**

The single-point indication or the user-defined marker command is not routed to the LED.

Related Topics

- [11.1 Overview for Information Routing](#)
- [11.2 Basic Principles of Routing](#)
- [11.4.9 Editing the Properties of Sources and Destinations](#)
- [9.5.1 Adding a User-Defined Signal to the Application](#)

11.4.5 Routing to Fault Records

You can route the signals of the following types to fault records.

- Measured Value (MV)
- Single-Point Indication (SPS)

Fault records serve as the destination for a routed signal.

The [20.3.2 Information Routing](#) matrix contains the following 2 columns for fault records:

- **Signals**
Signals routed to this column are recorded in a fault record.
- **Trigger**
- Signals routed to this column serve as triggers for fault recording. This column is shown, if you have selected the setting **User-defined** for the **Fault recording** parameter. You find this parameter in the fault recorder settings.

Routing Signals to Fault Records

You can route several signals to the column **Signals** and with that to fault records. For this, select one of the following options:

- **X (routed)**
The signal is routed to fault records and will be recorded.

- **Not routed**
The signal is not routed to fault records.

Routing Signals as Triggers

You can route several signals to the column **Trigger**. All signals routed to this column serve as triggers for fault recording. Select one of the following options:

- **X (routed)**
The signal is routed as trigger for fault recording.
- **Not routed**
The signal is not routed as trigger for fault recording.

Routing Signals as Triggers (for 7KE Device Type)

You can route the signals of type **SPS** to the **Fast-scan** column and/or to the **Slow-scan** column under the **Recorder** function group in the [20.3.2 Information Routing](#) editor. Select one of the following options:

- **X (routed)**
The signal routed using this option will be available in the created **Fast-scan** record or **Slow-scan** record.
- **T (trigger)**
The signal routed using this option will act as the trigger input for record creation. A change in the status (value) of this signal will start record generation.
- **XT (routed+trigger)**
The signal routed using this option will act as the trigger input to generate **Fast-scan** records or **Slow-scan** records. It is also available in the records generated by different triggering sources.
- **Not routed**
The signal is not routed as trigger for fault recording.

Related Topics

[11.1 Overview for Information Routing](#)
[11.2 Basic Principles of Routing](#)
[11.4.9 Editing the Properties of Sources and Destinations](#)
[15.5.3.2 Configuring and Setting Parameters for Fault Recording](#)

11.4.6 Routing to Logs

You can route signals to the following logs:

- Operational Log
- Fault Log
- Ground Fault Log
- User Log 1 and 2

A log serves as the destination for a routed signal. The [20.3.2 Information Routing](#) matrix contains 1 column for each log.

You can route the signals of the following types to the logs:

- Protection Activation Information with Direction (ACD)
- Protection Activation Information (ACT)
- Binary Controlled Step Position Information (BSC)
- Command with Double-Point Feedback (DPC)
- Enumerated Setting Controllable (ENC)
- Enumerated Status (ENS)

- Controllable Integer Status (INC)
- Status of a Whole Number (INS)
- Marker Command (SPC)
- Controllable Single-Point Indication (SPC)
- Single-Point Indication (SPS)

Routing Signals to Logs

You can route signals to several logs. For this, select one of the following options:

- **X (routed)**
The signal is routed to the log.
- **Not routed**
The signal is not routed to the log.

Related Topics

- [11.1 Overview for Information Routing](#)
- [11.2 Basic Principles of Routing](#)
- [11.4.9 Editing the Properties of Sources and Destinations](#)

11.4.7 Routing to Device Menu Measurement

You can route user-defined signals of the following types to the device menu **Measurement** of a SIPROTEC 5 device:

- Status of a Whole Number (INS)
- Measured Values (MV)

The device menu **Measurement** serves as the destination for a routed signal. All routed signals are shown in the measurement window in the display of the SIPROTEC 5 device. The [20.3.2 Information Routing](#) matrix contains 1 column for the device menu **Measurement**.

Routing Signals to Device Menu Measurement

You can route several signals to the device menu **Measurement**. For this, select one of the following options:

- **Measured Values**
The signal is routed to the device menu **Measurement**. This option is available only for user-defined signals of type **Measured Values (MV)**.
- **Metered Values**
The signal is routed to the device menu **Measurement**. This option is available only for user-defined signals of type **Status of a Whole Number (INS)**.
- **Not configured**
The signal is not routed to the device menu **Measurement**.

Related Topics

- [11.1 Overview for Information Routing](#)
- [11.2 Basic Principles of Routing](#)
- [11.4.9 Editing the Properties of Sources and Destinations](#)
- [9.5.1 Adding a User-Defined Signal to the Application](#)

11.4.8 Routing to Device Menu Control

You can route user-defined signals of the following types to the device menu **Control** of a SIPROTEC 5 device:

- Single-Point Indication (SPS)
- Controllable Single-Point Indication (SPC)
- Marker Command (SPC)
- Command with Double-Point Feedback (DPC)

The device menu **Control** serves as the destination for a routed signal. All routed signals are shown in the control window in the display of the SIPROTEC 5 device. The [20.3.2 Information Routing](#) matrix contains 1 column for the device menu **Control**.

Routing Signals to Device Menu Control

You can route several signals to the device menu **Control**. For this, select one of the following options:

- **X (routed)**
The signal is routed to the device menu **Control**.
- **Not routed**
The signal is not routed to the device menu **Control**.

Related Topics

- [11.1 Overview for Information Routing](#)
- [11.2 Basic Principles of Routing](#)
- [11.4.9 Editing the Properties of Sources and Destinations](#)
- [9.5.1 Adding a User-Defined Signal to the Application](#)

11.4.9 Editing the Properties of Sources and Destinations

Some sources and destinations have properties that can be edited.

Displaying and Editing Properties

- ✧ In the [20.3.2 Information Routing](#) matrix, select the column of the source concerned or of the destination concerned.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the **Settings** group.
- ✧ Edit the settings concerned.



NOTE

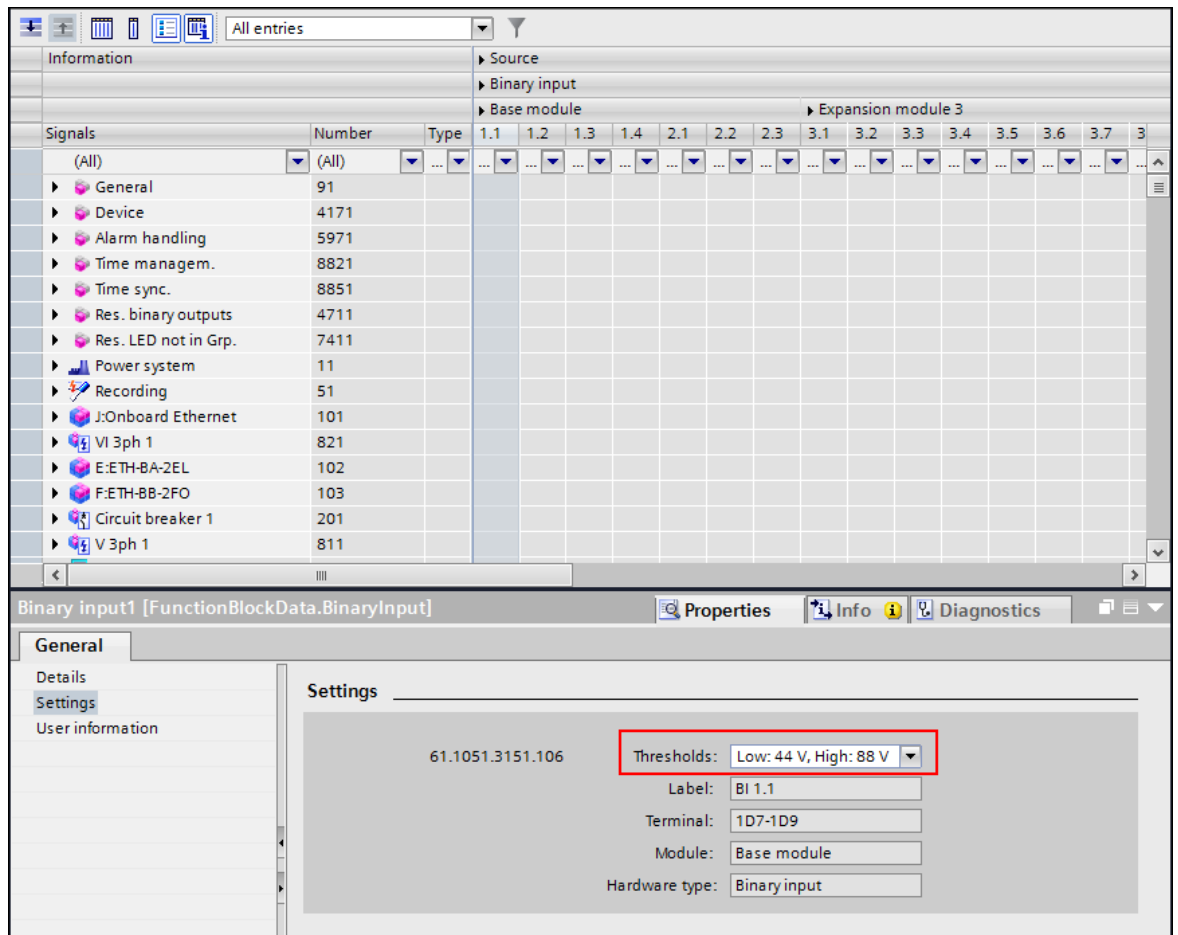
You can also edit the properties of hardware components, for example, of binary inputs or LEDs from the **Properties** tab of the **Devices and networks** editor.

Editing Threshold value of the Binary Input Column via Properties

With this feature, you can set the binary input operating voltage separately for each binary input.

- ✧ In the [20.3.2 Information Routing](#) matrix, select the binary-input column of the source concerned.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the **Settings** group.

The settings of the binary-input column are displayed. You can edit the threshold value of the binary-input column via the **Thresholds** list box.



[sc_digsi_binary_input, 1, en_US]

Related Topics

- ✧ [11.1 Overview for Information Routing](#)
- ✧ [11.2 Basic Principles of Routing](#)

11.4.10 Editing the Properties of User-Defined Signals

You can edit the properties of the user-defined signals of the following types:

- Measured value (MV)
- Complex measured value (CMV)
- 3-phase measured value delta connection (DEL)
- 3-phase measured value Y connection (WYE)

Editing the Signal Properties

- ✧ In the [20.3.2 Information Routing](#) matrix, select a user-defined signal of type MV, CMV, DEL, or WYE.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the **Details** group.

- ✧ Edit the settings concerned.

Related Topics

- ✧ [9.1 Overview of Signals](#)
- ✧ [9.5.1 Adding a User-Defined Signal to the Application](#)
- ✧ [11.1 Overview for Information Routing](#)
- ✧ [11.2 Basic Principles of Routing](#)

11.5 Routable Signals

11.5.1 Routing Signals of Type ACD

You can route signals of type **ACD (Directional protection information)** to 1 type of destination.

Destination

You can route signals of type **ACD** to logs.

Related Topics

[9.3 Signal Types](#)

[11.4.6 Routing to Logs](#)

11.5.2 Routing Signals of Type ACT

You can route signals of type **ACT (Protection activation information)** to 1 type of destination.

Destination

You can route signals of type **ACT** to logs.

Related Topics

[9.3 Signal Types](#)

[11.4.6 Routing to Logs](#)

11.5.3 Routing Signals of Type BSC

You can route signals of type **BSC (Binary controlled step position information)** to 1 type of source and 1 type of destination.

Source

You can route signals of type **BSC** to binary inputs.

Destination

You can route signals of type **BSC** to logs.

Related Topics

[9.3 Signal Types](#)

[11.4.1 Routing to Binary Inputs](#)

[11.4.6 Routing to Logs](#)

11.5.4 Routing Signals of Type DPC

You can route signals of type **DPC (Double-point controllable)** to different sources and destinations.

Sources

You can route signals of type **DPC** to the following sources:

- Binary inputs
- Function keys

Destinations

You can route signals of type **DPC** to the following destinations:

- Binary outputs
- Logs
- Device menu control

Related Topics

[9.3 Signal Types](#)

[11.4.1 Routing to Binary Inputs](#)

[11.4.2 Routing to Function Keys](#)

[11.4.3 Routing to Binary Outputs](#)

[11.4.6 Routing to Logs](#)

[11.4.8 Routing to Device Menu Control](#)

11.5.5 Routing Signals of Type ENC

You can route signals of type **ENC (Enumerated setting controllable)** to 1 type of destination.

Destination

You can route signals of type **ENC** to logs.

Related Topics

[9.3 Signal Types](#)

[11.4.6 Routing to Logs](#)

11.5.6 Routing Signals of Type ENS

You can route signals of type **ENS (Enumerated status)** to 1 type of destination.

Destination

You can route signals of type **ENS** to logs.

Related Topics

[9.3 Signal Types](#)

[11.4.6 Routing to Logs](#)

11.5.7 Routing Signals of Type INC

You can route signals of type **INC (Controllable integer status)** to 1 type of destination.

Destination

You can route signals of type **INC** to logs.

Related Topics

[9.3 Signal Types](#)

[11.4.6 Routing to Logs](#)

11.5.8 Routing Signals of Type INS

You can route signals of type **INS (Integer status)** to different destinations.

Destinations

You can route signals of type **INS** to the following destinations:

- Logs
- Device menu measurement

Related Topics

[9.3 Signal Types](#)

[11.4.6 Routing to Logs](#)

[11.4.7 Routing to Device Menu Measurement](#)

11.5.9 Routing Signals of Type SPS

You can route signals of type **SPS (single-point indication)** to different sources and destinations.

Sources

You can route signals of type **SPS** to the following sources:

- Binary inputs
- Function keys

Destinations

You can route signals of type **SPS** to the following destinations:

- Binary outputs
- LEDs
- Fault records
- Logs
- Device menu control

Related Topics

[9.3 Signal Types](#)

[11.4.1 Routing to Binary Inputs](#)

[11.4.2 Routing to Function Keys](#)

[11.4.3 Routing to Binary Outputs](#)

[11.4.4 Routing to LEDs](#)

[11.4.5 Routing to Fault Records](#)

[11.4.6 Routing to Logs](#)

[11.4.8 Routing to Device Menu Control](#)

11.5.10 Routing Signals of Type SPC

You can route signals of type **SPC (Single-point controllable)** to different sources and destinations.

Sources

You can route signals of type **SPC** to the following sources:

- Binary inputs
- Function keys

Destinations

You can route signals of type **SPC** to the following destinations:

- Binary outputs
- Logs
- Device menu control

Related Topics

[9.3 Signal Types](#)

[11.4.1 Routing to Binary Inputs](#)

[11.4.2 Routing to Function Keys](#)

[11.4.3 Routing to Binary Outputs](#)

[11.4.6 Routing to Logs](#)

[11.4.8 Routing to Device Menu Control](#)

11.5.11 Routing Signals of Type SPC

You can route signals of type **SPC (Marker command)** to 1 type of source and different destinations.

Source

You can route signals of type **SPC** to function keys.

Destinations

You can route signals of type **SPC** to the following destinations:

- Binary outputs
- LEDs
- Logs
- Device menu control

Related Topics

[9.3 Signal Types](#)

[11.4.3 Routing to Binary Outputs](#)

[11.4.4 Routing to LEDs](#)

[11.4.6 Routing to Logs](#)

[11.4.8 Routing to Device Menu Control](#)

11.5.12 Routing Signals of Type MV

You can route signals of type **MV (Measured value)** to different destinations.

Destinations

You can route signals of type **MV** to the following destinations:

- Fault records
- Device menu measurement

Related Topics

[9.3 Signal Types](#)

[11.4.5 Routing to Fault Records](#)

[11.4.7 Routing to Device Menu Measurement](#)

11.5.13 Routing Signals of Type CMV

You can route signals of type **CMV (Measured value)** to different destinations.

Destinations

You can route user-defined signals of type **CMV** to the following destinations:

- Device menu **Measurement**

You can route subsignals of type **MV** to the following destinations:

- Fault records

Related Topics

[9.3 Signal Types](#)

[11.4.5 Routing to Fault Records](#)

[11.4.7 Routing to Device Menu Measurement](#)

11.5.14 Routing Signals of Type DEL

You can route signals of type **DEL** to different destinations.

Destinations

You can route user-defined signals of type **DEL** to the following destinations:

- Device menu **Measurement**

You can route subsignals of type **MV** to the following destinations:

- Fault records

Related Topics

[9.3 Signal Types](#)

[11.4.5 Routing to Fault Records](#)

[11.4.7 Routing to Device Menu Measurement](#)

11.5.15 Routing Signals of Type WYE

You can route signals of type **WYE** to different destinations.

Destinations

You can route user-defined signals of type **WYE** to the following destinations:

- Device menu **Measurement**

You can route subsignals of type **MV** to the following destinations:

- Fault records

Related Topics

[9.3 Signal Types](#)

[11.4.5 Routing to Fault Records](#)

[11.4.7 Routing to Device Menu Measurement](#)

12 Function Charts (CFC)

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12.1 Configuring Function Charts (CFC)

12.1.1 Brief Introduction to Function Charts (CFC)

12.1.1.1 Meaning of CFC

CFC stands for **Continuous Function Chart**. With a CFC, you can configure additional functions for the SIPROTEC 5 device.

These functions take care of, for example, the following tasks:

- Interlockings
- Formation of group indications
- Fault indications
- Derivation of new dimensions from measured indicated and metered values

With the [20.1.10 Function-Chart \(CFC\) Editor](#), you can create function charts (CFC). For this, you use a library with preassembled blocks that you interconnect for the overall function. This eliminates the programming of blocks and reduces the frequency of errors.

In order to create the connection to the process or also to other CFC functions, you can use either so-called connectors or sidebars. Through these 2 elements, you can interconnect blocks with signals or settings from the signal catalog. On the one hand, signals and settings serve as input information for the CFC function. On the other hand, only signals act as output indications that are created as the result of a CFC function.

When you have completely configured the function charts, DIGSI 5 creates an executable program from them for the SIPROTEC 5 device.

Related Topics

[12.1.1.3 Function Chart](#)

[12.1.1.4 Block](#)

[12.1.1.7 Naming Conventions](#)

[12.1.1.6 Flow Model](#)

[12.1.1.5 Configuration Strategies](#)

[12.1.1.9 Basic Procedure](#)

12.1.1.2 Handling of New and Changed Blocks in CFC

During SIPROTEC 5 lifetime, new CFC blocks will be created or CFC blocks will be changed, for example, by adding a new interface. Therefore, CFC blocks have an own version which is identical to the device configuration (CFG) version where the block has been created or changed. You can check the CFC-block version in the **Properties** tab of the CFC block.

The DIGSI CFC-block library always shows the blocks of all imported device DDDs. If a CFC block is available in 2 different versions, the CFC block is shown only once in the DIGSI CFC-block library.

If you instantiate a CFC block from the DIGSI CFC-block library into a function chart (CFC), the correct CFC-block version will automatically be used related to the device-configuration version. New CFC blocks can only be used if the device-configuration version is equal to or higher than the CFC-block version. In devices with an older configuration version, the new CFC block cannot be used. Changed CFC blocks are usable in the new version only if the device-configuration version is equal to or higher than the CFC-block version, too. In devices with older configuration version, the old CFC-block version is used.

If you paste a CFC block or a function chart (CFC) which contains CFC blocks into a device configuration, the CFC-block version is checked. If a CFC-block version is not allowed for the device-configuration version, an error message is shown and pasting is canceled. If you upgrade the configuration, the CFC-block version is taken into account and the CFC block with the correct version is used automatically.

12.1.1.3 Function Chart

You can always create CFC functions within a Continuous Function Chart. Such a CFC can consist of a number of sheets. The sheet size is also variable. You can also distribute CFC functions as partial functions over multiple CFCs and interconnect them with user-defined signals and subcharts.

A Continuous Function Chart (CFC) always belongs to one particular SIPROTEC 5 device. The CFCs of a SIPROTEC 5 device are hence, saved within the project structure in the device folder. Here, you find the **Charts** folder. All function charts are saved in this folder.

Related Topics

- [12.1.1.1 Meaning of CFC](#)
- [12.1.1.7 Naming Conventions](#)
- [12.1.1.5 Configuration Strategies](#)
- [12.1.1.9 Basic Procedure](#)

12.1.1.4 Block

For the configuration of a Continuous Function Chart, you use predefined function blocks. You can use various block types for this purpose.

Block Type

A block type is a type-coded block that can be used multiple times. A block receives all the required data to complete its task from the block inputs. The block algorithm processes the input values and displays the returned results as the output.

Each block type has a type definition, which contains the following:

- **Type name**
The type name describes the function of the block. For example, **ADD_R** is used for adding values.
- **Algorithm**
The algorithm is a sequence of instructions for processing a task, for example, adding multiple values.
- **Inputs and outputs**
Input and output values of the block

Block Instance

A block instance is the use of a block type in the Continuous Function Chart. You can create multiple blocks from a single block type in consideration of the resource consumption. Each block instance receives a unique name within a CFC. The block instance inherits the default settings of the block type as a standard, for example, the initial values of the inputs.

During configuration, you have the following possibilities:

- Enter individual initial values
- Change the name of the block instance
- Interconnect the block instances

For more information, see [12.1.7.2 Checking Resource Consumption](#).

Displaying the Block

A block consists of the block header and the block interface. The size of the block is determined based on the number of block interfaces. You can show and hide these. A symbol on the lower edge of the block shows that connections are hidden. The width of the block can be adjusted continuously.

The block header can contain the following content:

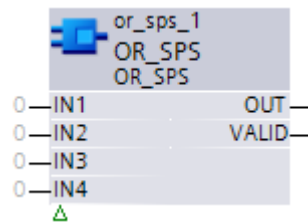
- Name of the block instance
- Name of the block type

- Comments about the block instance
- Block position within the task sequence

The block interface contains the connections of the block:

- Left: block inputs
- Right: block outputs

The block inputs have the parameter values of the block type by default. Each block connection has a name and a data type. The name of the block connection is displayed either in its full length or shortened depending on the block width. The following figure displays an OR block with a status as an example.



Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.7 Naming Conventions](#)

[12.1.1.6 Flow Model](#)

[12.1.1.9 Basic Procedure](#)

12.1.1.5 Configuration Strategies

You can configure charts graphically via the drag and drop feature.

Configuring CFCs Graphically

With graphical configuring, you can add the blocks from the block library into the Continuous Function Chart. You can interconnect the block connections via drag and drop. You can document the CFC with additional text boxes. In order to configure the CFC graphically, use the [20.1.11 Data Flow](#) view.

The graphical configuration offers the following advantages compared to the textual configuration:

- Simple wiring of connections with drag and drop
- Graphical display of the signal profile

Configuring CFCs Textually

During textual configuration, add the blocks as instructions in a list. Instead of interconnecting the connections, assign values to the settings. In order to configure the CFC textually, use the [20.1.12 Control Flow](#) view.

The textual configuration offers the following advantages compared to the graphical configuration:

- Simple adjustment of the task sequence
- Clear parameterization

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.3 Function Chart](#)

[12.1.1.9 Basic Procedure](#)

12.1.1.6 Flow Model

The execution model describes when and in which order the configured blocks in the Continuous Function Charts are executed.

2 factors characterize the execution model:

- The task level of the CFC function
- The task sequence of the block within a function

Task Level of the CFC Function

A CFC and its configured CFC functions run on the SIPROTEC 5 device on only one of the 4 task levels. A CFC is event-triggered or processed cyclically and the process is selected automatically depending on the task level. You can select between the following task levels:

- **Fast Event-Triggered**
Use this task level for time-critical tasks only, for example, if a signal should block a protection function within 2 ms to 3 ms. Functions on this task level are processed in an event-triggered way with the highest priority. Each change to a logic input signal is immediately processed. Processing can disrupt the execution of protection functions and functions on the **Event-triggered** task level.
- **Event-Triggered**
Use this task level preferably for the logical functions that do not need to be executed with the highest priority. Functions on this task level are typically processed within a maximum of 15 ms. This process can be disrupted by protection functions or CFC functions on the **Fast Event-Triggered** task level.
- **Measurement**
Use this task level for the processing of measured values. Functions on this task level are processed with low priority cyclically every 500 ms. This process can be disrupted by protection functions or CFC functions with higher priority.
- **Interlocking**
Use this task level preferably for logical functions that need to be executed with low priority. Functions on this task level are processed in an **Event-Triggered** way. Processing can be disrupted by protection functions or CFC functions with higher priority.
If the available TICKS of the **Event-Triggered** task level are sufficient for the required CFC functionality, you do not need to use the Interlocking task level.



NOTE

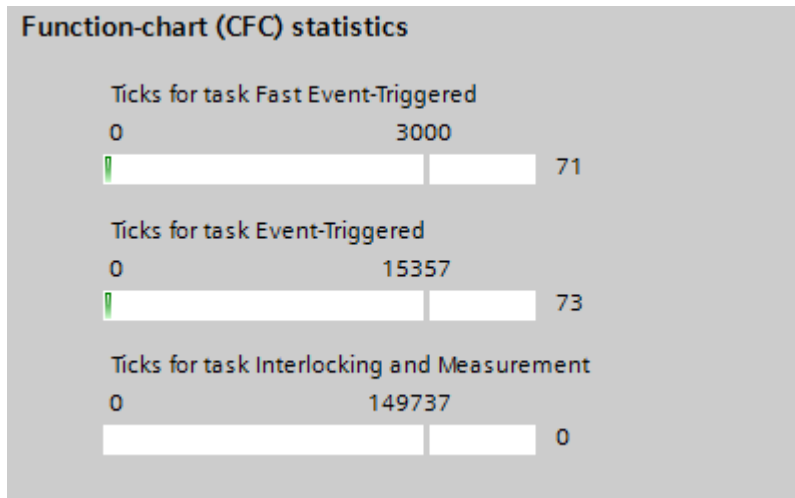
In the **Measurement** task level, no event-based triggering of the plan execution is done. Siemens does not recommend using the **Measurement** task level for the event-based blocks (for example, control blocks) as the behavior of the blocks may differ in comparison to the other task levels.

All function blocks can be assigned to all task levels. CFC function blocks are always available for all the devices. If enough TICKS are available, you can create all function plans in the same task level. A TICK is a measure for the performance requirement of the CFC blocks.

The number of available TICKS per task level is calculated depending on the created device configuration. This calculation is based on the load model and is described in the Device Manual (chapter **Resource-Consumption Supervision**). Siemens recommends creating all selected functions and user-defined signals first and starting the configuration of the function charts afterwards. Thus, it is possible to calculate a realistic value for the remaining system capacity for function charts.

With the load model, exceeding the typical response time is avoided by limiting the number of CFC function blocks in the corresponding task level via the available number of TICKS.

The following figure shows an example for function-plan capacities calculated with the load model in DIGSI. The TICKS available per task level are displayed. The green bars show the used TICKS in the task levels. You can view this information in the [20.5.5 Resource Consumption](#) tab under [20.5.3 Device Information](#) editor.



[sc_digsi_cfcstatistics, 2, en_US]

Figure 12-1 Resource Consumption - CFC

**NOTE**

Fast Event-Triggered function charts are executed with a higher priority than the other task levels. A considerably lower number of TICKS is available for this task level than for the other task levels. Siemens recommends configuring only high-priority logics in this task level and configuring everything else in one of the other task levels.

**NOTE**

Empty function charts and unused subcharts consume resources and they also contribute to the system resource consumption. Siemens recommends deleting empty function charts and unused subcharts.

Task Sequence of the Blocks within a Function

The task sequence determines in which order the SIPROTEC 5 device processes the individual blocks within a function. The following rule applies for this: A 1st block, whose output is connected with the input of a 2nd block, must be processed before this 2nd block.

The task sequence initially results from the sequence of the insertion of the individual blocks. You can recognize the sequence of the execution on the so-called sequence number in the blue field of a block. You can change the task sequence in the **Control flow** view. Moreover, you can have the task sequence of the block

automatically optimized by clicking the  icon in the toolbar.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.3 Function Chart](#)

[12.1.1.4 Block](#)

[12.1.1.9 Basic Procedure](#)

12.1.1.7 Naming Conventions

All special characters and umlauts are permissible in the Continuous Function Chart and block names, except for the comma (,).

Control Characters for Path and Hierarchy Specifications

Control characters are reserved for path and hierarchy specifications, which you use, for example, in the **Control flow** view or in connectors.

The following table shows the reserved control characters:

Control Characters		Comment
Dot	.	The characters are reserved for path and hierarchy specifications. The dot marks connections to blocks. The slash illustrates hierarchy relationships. Example: The expression Chart_1\Block_1.IN_1 addresses the input IN_1 in the block Block_1 , which is configured in the CFC Chart_1 .
Slash	/ and \	
Quotation marks	"	This character is reserved for the introduction and completion of any type delimiter.
Percent sign	%	This character is reserved for the introduction of address areas.
Dollar sign	\$	This character is reserved as an alignment character. The following control character is then interpreted as a permissible character.

The control characters are exclusively relevant for path and hierarchy specifications. Other than in this context, the control characters are interpreted as permissible components of a name.

Control Characters as a Component of a Name

If you edit CFC and component names with control characters in path or hierarchy specifications, use the following syntax:

- Enter the name in quotation marks, for example, "Motor1.Temperature".
- Place the control characters in the front with the alignment key \$, for example, "Motor1\$.Temperature".

Example:

In the **TempControl** CFC, the block **Motor1.Temperature** for the temperature regulation of a motor is configured. The naming conventions of the operator see the period as a delimiter character.

In the **Control flow**, in order to address the output **OUT** of the block, the following formats are permissible:

- TempControl"Motor1.Temperature".OUT
- TempControl\Motor1\$.Temperature.OUT

Related Topics

- [12.1.1.1 Meaning of CFC](#)
- [12.1.1.3 Function Chart](#)
- [12.1.1.4 Block](#)
- [12.1.1.9 Basic Procedure](#)

12.1.1.8 Processing Quality in Function Charts (CFC)

With function charts (CFC), you have to make a distinction between the general processing of quality and certain function blocks, that are especially designed for the quality processing.

General Processing

Most of the function blocks do not have an explicit quality processing. For these function blocks, the following general mechanisms apply:

- **Quality Attribute Validity**

If only an *invalid* data is received in the case of CFC input data, **all** CFC output data are also set to *invalid*, provided they come from blocks without explicit quality processing. The quality is not processed sequentially from block to block, but the output data are set lump sum. An exception is the CFC output data that originate from function blocks with explicit quality processing.

- **Quality Attribute Test**

If the function chart is in **normal** state, CFC input data with the **Test = TRUE** attribute are ignored. If the function chart is executed, the data value that was valid before the **Test = TRUE** attribute is worked with. Also the quality of this **old** value is processed. That means, the test attribute can never become **TRUE** at the output end.

If the function chart is in **test** state and executed, the attribute **Test = TRUE** is set for all data leaving the function chart.

- **Quality Attribute OperatorBlocked**

If the function chart is in **normal** state, for raising data the **OperatorBlocked** attribute is ignored.

If the function chart is in **functionally logged off** state, for raising data the **OperatorBlocked** attribute is ignored. All CFC output data are labeled as functionally logged off.

**NOTE**

A function chart can assume the **test** state because of the following reasons:

- The entire SIPROTEC 5 device is in a test state and thus also all function charts and all functions.
- Using the function block **CHART_STATE**, an individual chart is switched to the test state.
- Using the IEC 61850 communication functions, an individual function chart is switched to the test state.

Quality Processing Function Blocks (Condition Processing)

The first 3 function blocks (x_SPS) process the quality automatically according to the stated logic. The other function blocks are used to isolate the quality from a data object and, after a separate logical processing, to add them back.

- [12.2.9.1 OR_SPS](#)
- [12.2.9.2 AND_SPS](#)
- [12.2.9.3 NEG_SPS](#)
- [12.2.5.25 SPLIT_SPS](#)
- [12.2.5.22 SPLIT_DPS](#)
- [12.2.5.27 SPLIT_XMV](#)
- [12.2.5.24 SPLIT_Q](#)
- [12.2.5.11 BUILD_Q](#)
- [12.2.5.12 BUILD_SPS](#)
- [12.2.5.8 BUILD_DPS](#)
- [12.2.5.14 BUILD_XMV](#)
- [12.2.5.9 BUILD_ENS](#)

Related Topics

- [9.7.1 Overview of Quality](#)
- [9.7.2 Processing Quality in Function Charts \(CFC\)](#)
- [9.7.4 Processing Quality of GOOSE Connections](#)
- [9.7.3 Processing Quality of SPS Type Signals](#)

12.1.1.9 Basic Procedure

The configuration of function charts comes after the planning phase. In this planning phase, you also determine how the loop control is structured in the function charts. For example, you can create a separate function chart for every measuring point. This enables you to react flexibly to expansions in the system.

In order to configure a CFC function, take the following steps:

- [12.1.2.1 Adding a CFC.](#)
- [12.1.4.2 Adding a Block in a CFC from the Block Library .](#)
- [12.1.5.2 Interconnecting Blocks .](#)
- [12.1.6.3 Adjusting the Running Sequence of Blocks Manually](#)

Related Topics

[12.1.1.1 Meaning of CFC](#)

12.1.2 Managing Function Charts

12.1.2.1 Adding a CFC

You can add function charts to every offline configuration. A new function-block diagram does not yet contain any blocks or interconnections. To add a new function chart, use the [3.1.2 Project Tree](#).

Adding a New CFC via the Project Tree

- ✧ In the project tree, open the **Charts** folder of the offline configuration to which you want to add a Continuous Function Chart.
- ✧ Double-click **Add new chart** in this folder.

The dialog [20.6.7 Add New Chart](#) opens.

- ✧ The text box **Name** contains a continually numbered standard name for the Continuous Function Chart. You can optionally enter a different name for the CFC.
- ✧ From the list box **Select function chart (CFC) task**, select one of the task levels **Fast Event-triggered**, **Event-triggered**, **Measurement**, or **Interlocking**. The task level decides the priority of the CFC functions and if the processing is event-based or cyclic.
- ✧ In order to enter additional information that needs to be stored with the CFC, click **Additional information**.

The dialog is expanded vertically by the additional text boxes.

- ✧ In these text boxes, you can optionally enter a comment, the version number, your name, and the function family, for example, line protection.
- ✧ Optionally mark the check box **Add and open**. In this case, the CFC opens in the working area directly after it is added.
- ✧ Click **OK**.

The new CFC is created. The CFC name is added within the **Charts** folder. If you marked the check box **Add and open**, the CFC will be displayed in the working area.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.4 Copying a CFC](#)
- ✧ [12.1.2.5 Deleting CFCs](#)

12.1.2.2 Opening a CFC

CFCs are related to the device. That is why a function chart within the project structure is always filed in a device folder. To open a function chart, use the [3.1.2 Project Tree](#).

Opening a CFC via the Project Tree

- ✧ In the project tree, open the **Charts** folder of the offline configuration for which you want to open a Continuous Function Chart.

You will see the names of all available function charts (CFC).

- ✧ Double-click the name of the CFC that you want to open.

The CFC is displayed in the working area.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.3.2 Scaling the View](#)
- ✧ [12.1.3.1 Adjusting the Layout Manually in the CFC Data Flow View](#)

12.1.2.3 Renaming a Function Chart (CFC)

If you add a function chart (CFC), it is automatically given a consecutively numbered default name. You can change the CFC name in the **Properties** tab of the function chart or directly in the project tree. The names of function charts (CFC) must be unique within an offline configuration.

Changing the Name in the Project Tree

- ✧ Right-click the function-chart name that you wish to change.
- ✧ Click **Rename** in the context menu.

The name is displayed in a text box and is marked in color.

- ✧ Enter a new name.
- ✧ Confirm your entry by pressing the <Enter> key or by clicking outside of the text box.

Changing the Name in the Properties

- ✧ Show the CFC whose name you wish to change in the working area.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the group **General**.
- ✧ Enter a name for the CFC in the **Name** text box.
- ✧ Confirm your entry by pressing the <Enter> key or by clicking outside of the text box.

The name you enter will be applied and also updated in the [3.1.2 Project Tree](#).

Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.1 Adding a CFC](#)

12.1.2.4 Copying a CFC

You have the following possibilities of copying Continuous Function Charts:

- You can copy the function charts within an offline configuration.
- You can copy the function charts between offline configurations.

Function charts are always copied using the [3.1.2 Project Tree](#).

Selecting Function Charts

- ✧ In the project tree, open the **Charts** folder in the offline configuration from which you want to copy the function charts.

You see the names of all available function charts (CFC).

- ✧ In order to copy an individual CFC, mark the name of this CFC.

- or -

- ✧ In order to copy several CFCs, mark the names of these CFCs. This is done by holding down either the SHIFT key or the <CTRL> key, depending on the selection method.

Copying Function Charts within an Offline Configuration

- ✧ In the project tree, right-click a marked function chart (CFC).

- ✧ Click **Copy** in the context menu.

The CFCs are copied to the clipboard.

- ✧ Right-click the **Charts** folder.

- ✧ Click **Paste** from the context menu.

- or -

- ✧ Keep the <CTRL> key pressed and drag the marked function charts (CFC) to the **Charts** folder.

- ✧ Release the mouse button and the <CTRL> key.

Copies of the original function charts (CFC) are added in the **Charts** folder. The added CFCs get new names automatically in order to preserve the uniqueness of the names.



NOTE

If you use the **Cut** option from the context menu to move the CFCs, the CFC is deleted from the source destination before being pasted to the target destination. For a protected function chart, you can use the **Copy/Paste** option, but it is not possible to use the **Cut** option.

Copying Function Charts between Offline Configurations

- ✧ In the project tree, right-click a marked function chart (CFC).

- ✧ Click **Copy** in the context menu.

The CFCs are copied to the clipboard.

- ✧ In the project tree, open the **Charts** folder in the offline configuration into which you want to copy the CFCs.

- ✧ Right-click the folder and click **Paste** from the context menu.

- or -

- ✧ Keep the <CTRL> key pressed and drag the marked function charts (CFC) to the **Charts** folder of the offline configuration into which you want to insert the function charts.

- ✧ Release the mouse button and the <CTRL> key.

Copies of the original function charts (CFC) are added to the **Charts** folder. If a function chart with same name already exists, a dialog is opens. You can select between automatically renaming the copied function charts or replacing the existing charts in order to preserve the uniqueness of the names.



NOTE

Instead of the **Copy** command, you can also use the **Cut** command. The function charts (CFC) are then deleted from the source device.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)

12.1.2.5 Deleting CFCs

You can delete one or more function charts (CFC) that have been selected. Always delete function charts using [3.1.2 Project Tree](#).

Selecting CFCs

- ✧ In the project tree, open the **Charts** folder in the offline configuration from which you want to delete function charts.

You see the names of all available function charts (CFC).

- ✧ In order to delete an individual CFC, mark the name of this CFC.
- or -
- ✧ In order to delete a number of CFCs, mark the names of these CFCs. This is done by holding down either the SHIFT key or the <CTRL> key, depending on the selection method.

Deleting CFCs

- ✧ In the project tree, right-click a marked function chart (CFC).
- ✧ Click **Delete** in the context menu.

A confirmation prompt is displayed.

- ✧ Click **Yes**.

This confirms your action.

The marked function charts (CFC) are deleted from the project.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.1 Adding a CFC](#)

12.1.2.6 Printing a CFC

You can print a single function chart, a selected number of function charts, or all function charts of an offline configuration.

**NOTE**

To utilize the print space efficiently and to avoid printing any blank pages, you can adjust the layout settings in the **General** group before printing. You can find these settings under the **Properties** tab of the function chart. For additional information regarding this topic, refer to [12.1.3.1 Adjusting the Layout Manually in the CFC Data Flow View](#).

Starting the Printing Process by Selecting the Print Options

- ✧ Select the function charts to be printed.
- or -
- ✧ Select the **Charts** folder to print all the function charts.
- ✧ Click the  icon in the [20.7.1 DIGSI 5 Toolbar](#).

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document layout, and the properties. You find more information about this under [17.2.3 Selecting Print Options](#).

- ✧ Click **Print**.

The **Print** dialog closes and the selected data is printed.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)

12.1.3 Adjusting Function Chart and Chart View

12.1.3.1 Adjusting the Layout Manually in the CFC Data Flow View

You can change the values for the sheet count and sheet size in the properties of the function chart.



NOTE

If you reduce the sheet size or the sheet count again, all objects from non-available areas are automatically positioned on the remaining area. If the area is not adequate for all objects, the objects are placed in the upper left of the CFC. In this case, expand the sheet count and manually place the objects.

Adjusting the Sheet Count Automatically

- ✧ If the number of available sheets in your function chart is not adequate for all required blocks or interconnections, you can easily select a block in the CFC and move the block beyond the sheet border. The sheet count is automatically increased up to max. 20 in horizontal and also in vertical direction.

Displaying Properties If the CFC Is Opened

- ✧ Click in an open area in the function chart.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the group [19.4.3 Sidebars/Layout](#).

Changing Sheet Size and Sheet Count in Properties

- ✧ In the **Layout** area, set the desired values for the vertical and horizontal sheet count. You can select between values from 1 to 20.

The sheet count is changed.

- ✧ Select the desired sheet size from the **Sheet size** list box.

All available sheets are adjusted to the new size.

Showing/Hiding Lines for the Sheet Borders

- ✧ Click the  button in the [20.7.6 Toolbar of the Data Flow](#).

Depending on the current state, border lines will be shown or hidden.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.3.2 Scaling the View](#)

12.1.3.2 Scaling the View

You can change the display size of the Continuous Function Chart and thus adjust it to the respective situation.

You have the following possibilities for scaling the view:

- You can scale the CFC in predefined stages.
- You can scale the CFC by percentage.
- You can adjust the CFC to fit the size of the working area.

Scaling the CFC in Predefined Stages

- ✧ Click the arrow button in the [20.7.6 Toolbar of the Data Flow](#).

A submenu with 2 more buttons is displayed.

- ✧ Click one of the 2 buttons  or  in this submenu.



NOTE

If the maximum or minimum display size is reached, the respective button is inactive.

The CFC is displayed in a larger or smaller manner.

Scaling the CFC by Percentage

- ✧ In the **Data flow** view in the toolbar, open the list box .
- ✧ Select a percentage value or enter a whole number percentage value between 10 and 200 in the entry field of the list box.
- ✧ Confirm your entry by pressing the <Enter> key or clicking outside the list box.

The CFC is displayed in the percentage size selected or entered.

Additionally to the list box in the toolbar, there are a list box and a slider right beside the horizontal scroll bar



Herewith, you can also change the scaling of the function chart from 20 % to 200 % with a step size of 10 %.

Adjusting the CFC to Fit the Size of the Working Area

- ✧ In the toolbar list box, you can also select **Fit to screen**, **Fit to width**, or **Fit to height**. The function chart is adjusted and the corresponding percentage value is shown in the list box automatically.

Using an Overall Plan

- ✧ As soon as the CFC is visible in the working area, an icon  is shown in the lower right corner of the working area. Click this icon and hold the mouse button pressed.

A small window opens. The window displays a smaller view of the CFC. The mouse pointer changes into a rectangular searcher.

- ✧ Move the searcher to the area of the CFC that should be displayed in the working area.

The CFC is immediately updated by moving the mouse.

- ✧ Release the mouse button as soon as you have reached the desired display.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.3.2 Scaling the View](#)
- ✧ [12.1.3.1 Adjusting the Layout Manually in the CFC Data Flow View](#)
- ✧ [12.1.3.3 Overview of Sidebars](#)

12.1.3.3 Overview of Sidebars

If you interconnect blocks with sidebars, you link the function with signals or settings.
For the display of sidebars, you can select between the following variants:

- Static sidebars
- Dynamic sidebars
- No sidebars

You can select the sidebar variant by clicking the toggle button  in the function-chart toolbar or in the properties of the function chart. The width of the sidebars is variable but all sidebars within a function chart always have the same width. You can change the width directly using the mouse or by setting the value in the properties of the function chart. Sidebars can be shown in one or within 2 lines. You can change these settings

by clicking the toolbar button  or in the properties of the function chart.

An icon representing the type of function is displayed on the right side of the name of the linked function when a static or a dynamic sidebar is used. The  icon represents a signal and the  icon represents a setting. When no sidebar is used, **Setting** is displayed on the left side of the name of the linked setting function.

Static Sidebars

An area is reserved at the right and left in every sheet of the function chart for the sidebars. This area is exclusively for sidebar entries.

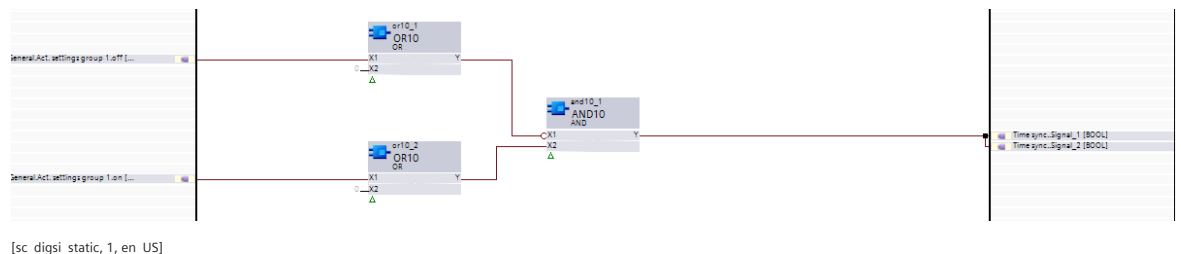


Figure 12-2 CFC with Fixed Sidebars



NOTE

Connections between blocks which cross a sheet area are split and shown in the sidebar as cross-sheet

interconnections



Dynamic Sidebars

A CFC with dynamic sidebars displays sidebar entries only if necessary.

A CFC configured in this way differs from a CFC with fixed sidebars by way of the following properties:

- You can place blocks or text boxes in the sidebar area.
- The sidebar area is not marked.

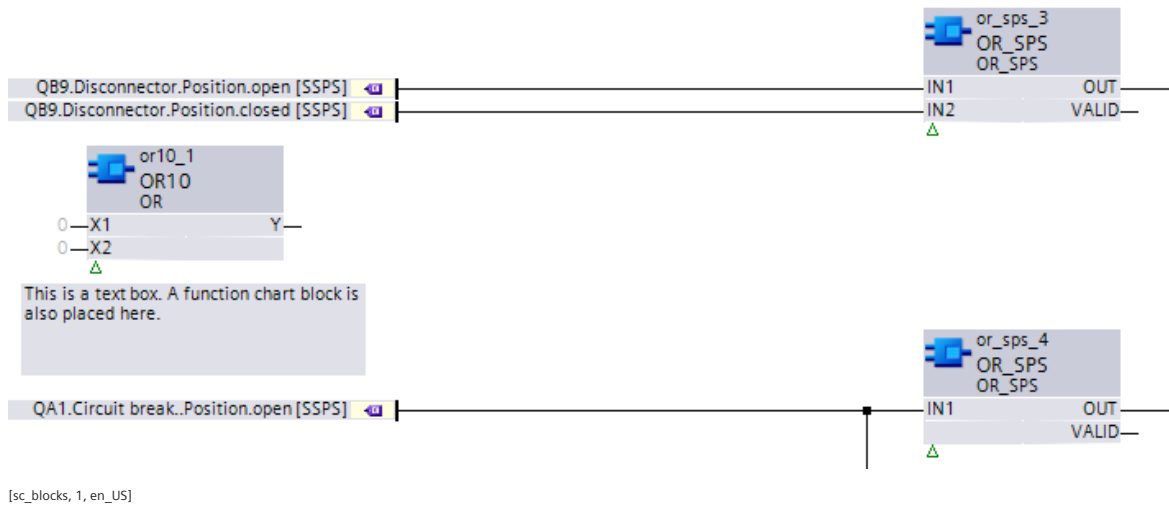


Figure 12-3 CFC with Dynamic Sidebars

No Sidebars

The CFC is shown without sidebars. Instead, so-called connectors show the interconnections to the signals or to the settings. The connectors are placed next to the block interface. Cross-sheet interconnections are displayed as if they are on one sheet.



NOTE

Blocks on sheet borders are not completely illustrated when printed. Thus, when configuring without sidebars, make sure that you did not place blocks on sheet borders. In order to do so, show the sheet borders when configuring.

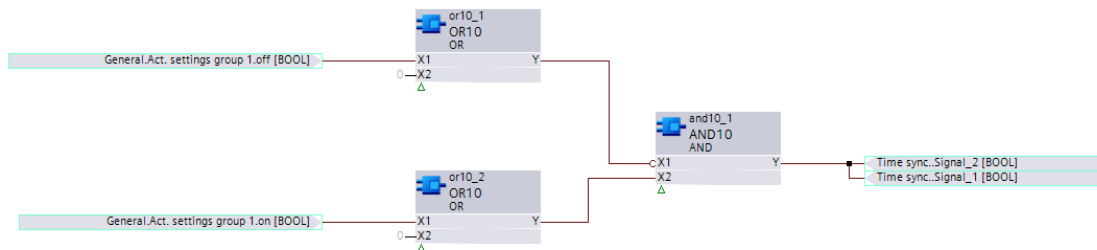
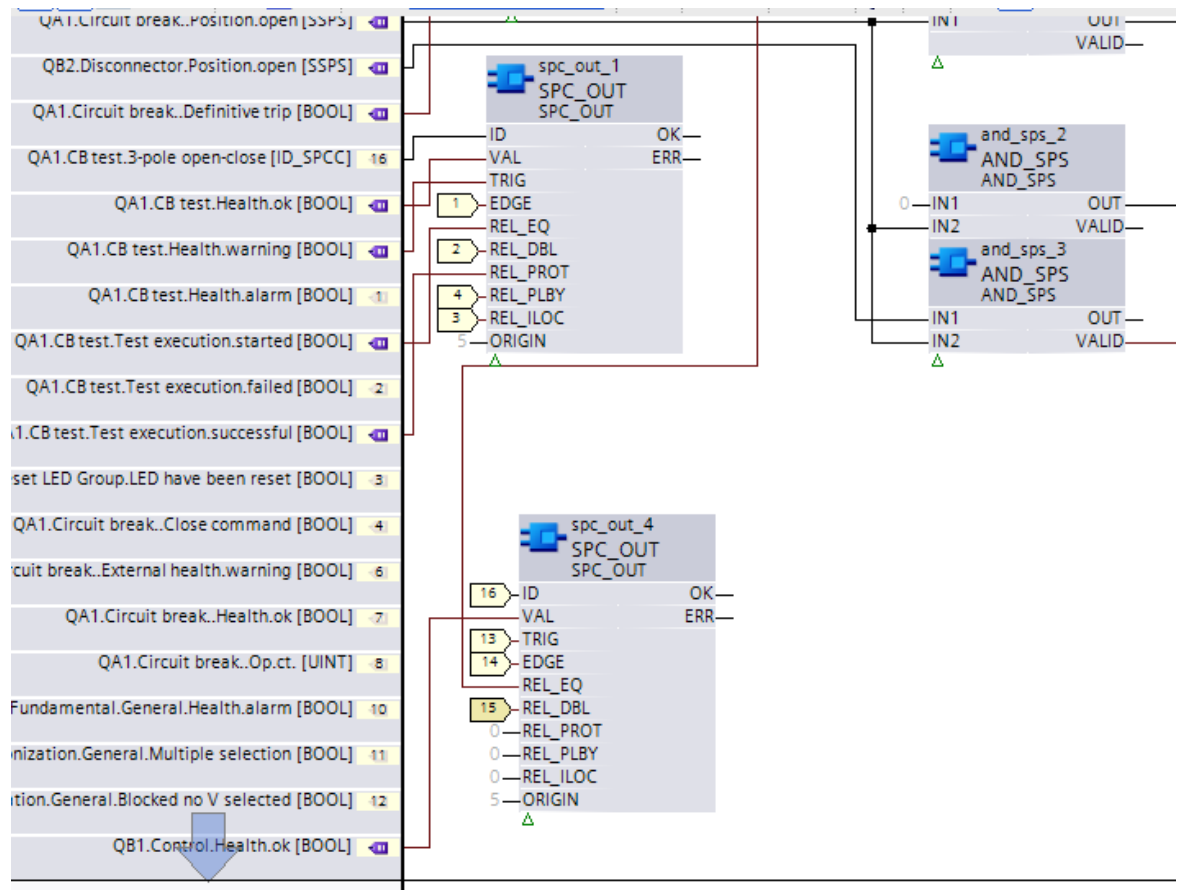


Figure 12-4 CFC without Sidebars

Sidebar Expansion

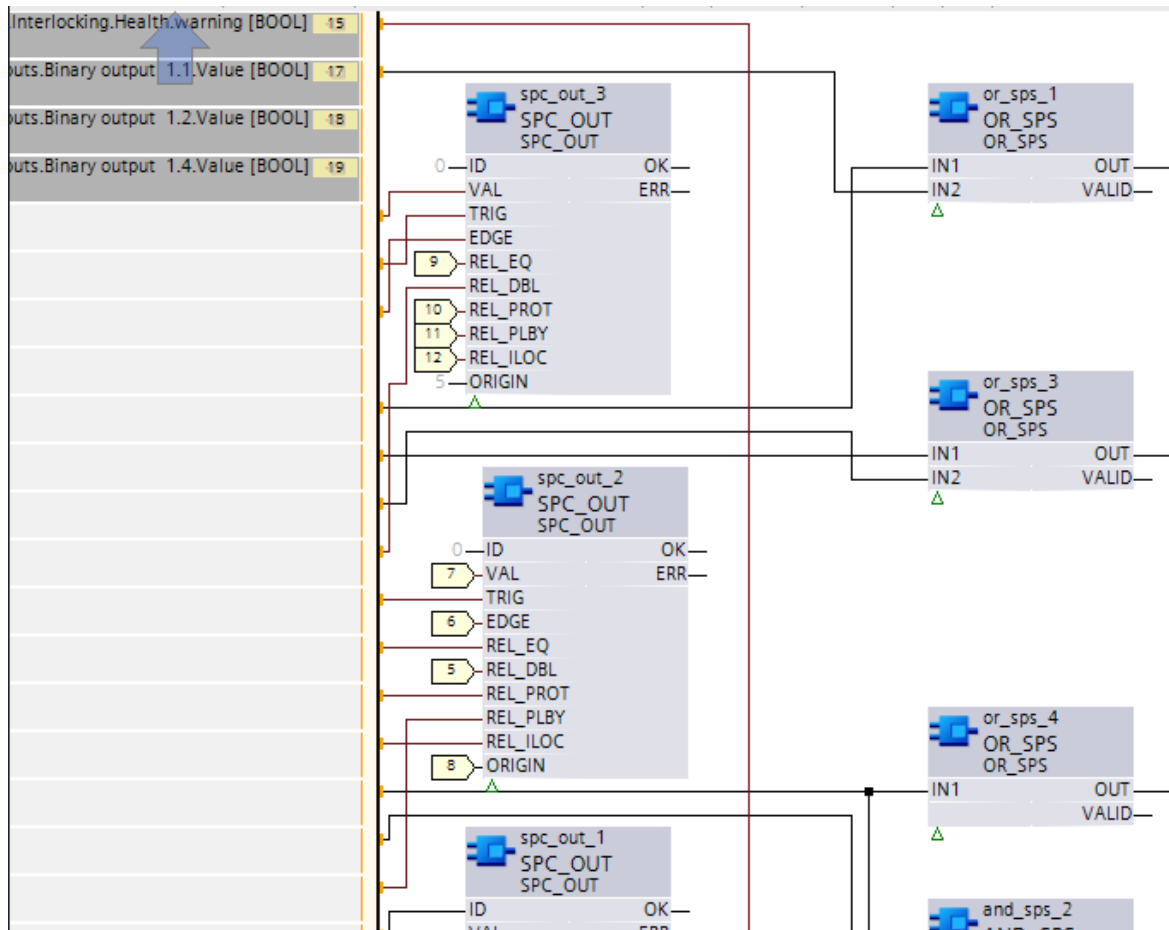
If you create more sidebar entries than there is space in the sidebar, this is automatically expanded. An arrow is shown in the sidebar on the lower edge. The following figure shows a sidebar with sidebar expansion.



[sc_expans, 1, en_US]

Figure 12-5 Sidebar with Sidebar Expansion

By clicking the arrow, you change to the sidebar expansion. The sidebar expansion is displayed slightly offset from the sidebar.



[sc_expan2, 1, en_US]

Figure 12-6 Offset from the Sidebar Expansion

In order to return to the sidebar, click the arrow on the upper edge.

Related Topics

[12.1.1.3 Function Chart](#)

12.1.4 Adding and Processing Elements in the Function Chart

12.1.4.1 Block Library

The block library contains all block types that you can use to create the Continuous Function Chart for a CFC function.

The block types are summarized in the following categories:

- Arithmetic
- Arithmetic with status
- Compare
- Control
- Conversion
- Edge detect
- Flip-flops

- Logical
- Logical with status
- Non-linear
- Other
- Persistency
- Selection
- Timer and Counter

Detailed information about the individual block types is found in the topic area [12.2 Block Types](#).

Related Topics

[12.1.4.2 Adding a Block in a CFC from the Block Library](#)
[12.2 Block Types](#)

12.1.4.2 Adding a Block in a CFC from the Block Library

The block library contains all blocks that you can use to create the Continuous Function Chart for a CFC function.

You have the following possibilities of adding a block from the block library in the CFC **Data flow** view:

- You can add the block via drag and drop.
- You can add the block with **copy** and **paste**.

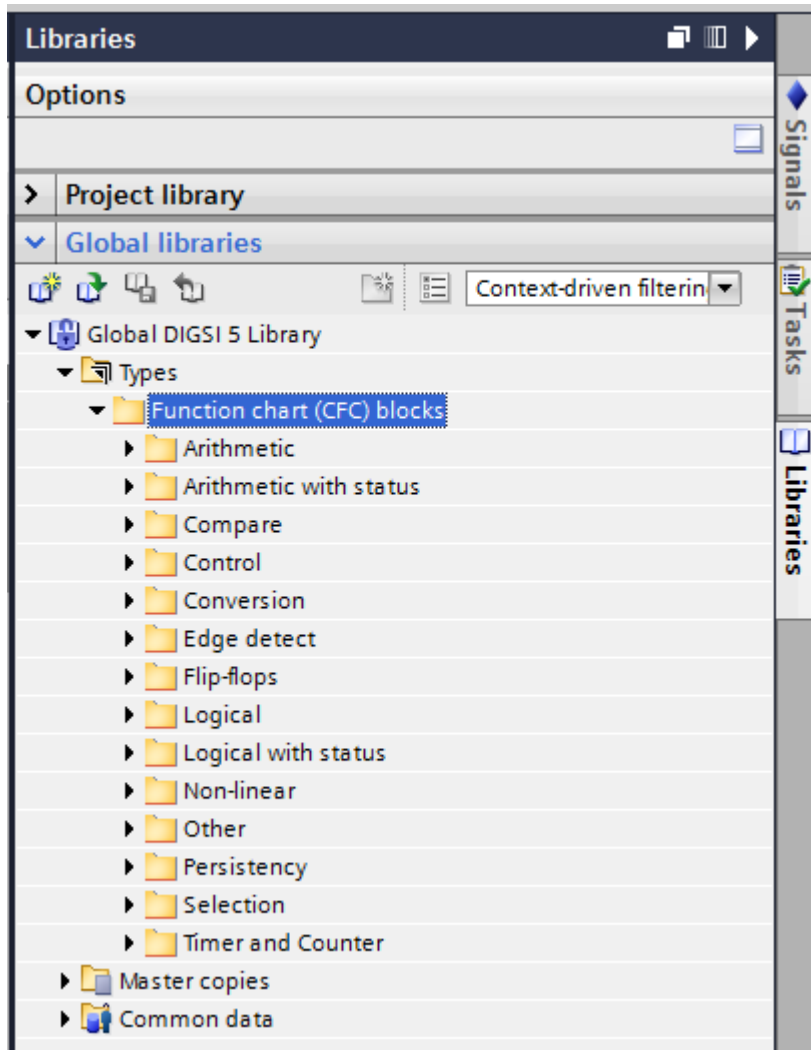
In both cases, the block library must be opened as a prerequisite.

You can select a position in the CFC during insertion of the block.

Opening the Block Library

- ✧ Select the [20.2.3 Libraries](#) tab in the task card and open the **Global libraries** section.
- ✧ Open the **Function chart (CFC) blocks** folder.

The folders of all block categories are displayed.



[sc_librar, 1, en_US]

Adding a Block by Drag and Drop

- ✧ Select the respective block in the block library.
- ✧ Click and drag the selected block to the insertion position in the **Data flow** view.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button at a permissible position.

The block is placed at the selected position.

Adding a Block with Copy and Paste

- ✧ Right-click the desired block in the block library. Click **Copy** in the context menu.
- ✧ Right-click the desired insertion position in the **Data flow** view and click **Paste** in the context menu. This menu item is only active if the insertion position is permissible.

The block is placed at the selected position.

Positioning Blocks Automatically

- ✧ Right-click the respective block in the **Data flow** view. Activate the check box option **Position automatically** in the context menu.

The selected block is automatically positioned and surrounded by color.

Removing Automatic Positioning

- ✧ Move the respective block in the **Data flow** view or right-click the block and deactivate the check box **Position automatically** in the context menu.

The automatic positioning of the block is disabled. The block is no longer surrounded by color. Without automatic positioning, blocks can be arranged in an overlapping manner.



NOTE

Blocks are displayed under the following conditions without interconnections and in a different color:

- With automatic positioning: There is not enough space in the sheet of a CFC for all the blocks.
- With manual placement: You can position blocks on top of each other or on an interconnection.

Interconnections to incompletely displayed blocks are executed as connectors. If blocks are on top of each other, the lowest block is displayed completely. All of the blocks above this are partially displayed.

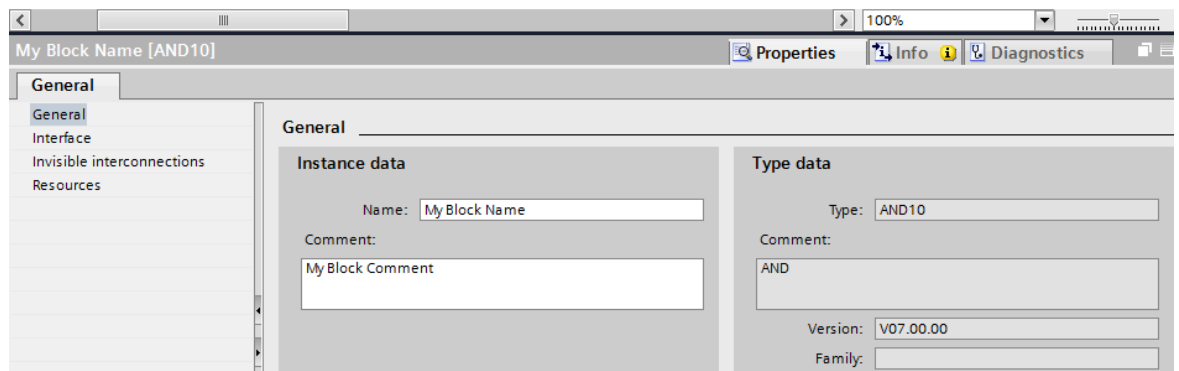
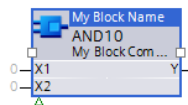
Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.7.3 Considering Function Points](#)
- ✧ [12.1.4.3 Renaming a Block or Adding a Block Comment](#)
- ✧ [12.1.4.7 Deleting Elements from the CFC](#)
- ✧ [12.1.4.6 Aligning Elements in the Data Flow View in the CFC](#)

12.1.4.3 Renaming a Block or Adding a Block Comment

Each block name must be unique in a function chart. When a block is renamed, the **Type** name remains unchanged.

In the CFC chart, in the **Data Flow** view, you can change the block name and the block comment by double-clicking the field in the block or in the properties of the block.



[sc_rename, 1, en_US]

Figure 12-7 Block Renaming

The changed block name is updated automatically in the block and all references.

Related Topics

- ✧ [12.1.4.1 Block Library](#)

12.1.4.4 Copying a Block

CFC elements like blocks or text boxes can be copied within a CFC, to a different CFC of the same or of a different SIPROTEC 5 device.

If there is a block with the same name at the destination, the added block automatically receives a new name. If you select more than one block, all selected blocks are copied and interconnections between the blocks are copied, too. Connections to external signals or settings are not copied. In that case, you have to copy the function chart itself.

Copying Elements

- ✧ Right-click one of the selected elements and click **Copy** from the context menu.

The elements are copied to the clipboard.

- ✧ Right-click an open area in the CFC and click **Paste** from the context menu.

- or -

- ✧ Mark all elements in the CFC that you wish to copy.
- ✧ Press the <CTRL> key, drag the marked elements to the CFC folder or to the destination group in this folder, and release the mouse button and the <CTRL> key.

Copies of the original elements are added in the CFC. The added elements automatically receive new names in order to preserve the uniqueness of the names.

Related Topics

- ✧ [12.1.4.1 Block Library](#)

12.1.4.5 Adding and Editing a Text Box in a CFC in the Data Flow View

Use the text boxes in order to add additional information to the CFC. With this, for example, you can document a signal characteristic.

You have the following possibilities to configure a text box:

- Changing the size of the text box
- Placing the text box in the background
- Setting the borders of the text box
- Filling the text box with colors or a background image
- Entering text in the text box and formatting the text

You can set the size of the text box interactively. All other settings can be taken care of in the properties of the text box.

Adding a Text Box in the CFC

- ✧ Click the  button in the [20.7.6 Toolbar of the Data Flow](#).

This activates the text-box tool.

- ✧ Left-click in an open area of the CFC. Drag open a rectangle, holding the mouse button down.
- ✧ Release the mouse button as soon as the rectangle reaches the desired size.

The text box is added in the predefined size.

- or -

- ✧ Right-click in an open area of the CFC. Then click in the context menu on **Add** text box.

The text box is added in the predefined standard size.

Changing the Size of the Text Box

- ✧ Mark the text box.

8 white corner points will be displayed around the text box.

- ✧ Click one of these corners, keep the mouse button pressed and change the size of the text box by moving the mouse.

Displaying the Properties of the Text Box

- ✧ Mark the text box.
- ✧ Open the Inspector window and select the **Properties** tab.

Placing the Text Box in the Background

- ✧ In the **Properties** tab select the [19.4.4 Text Box – General](#) group.
- ✧ Mark the check box **Text box in background**.

The text box is now in the background level. Thus, you can also position interconnections and blocks through the text box.

Setting the Borders of the Text Box

- ✧ In the **Properties** tab, select the **General** group.
- ✧ In the **Border Width** text box, enter a value between 0 and 20 or set a value from 0 to 20 with the slider next to the text box.

The border width is adjusted.

- ✧ From the Border color list box, select a color for the border.

The border color is adjusted.

Filling the Text Box with Color or a Background Image

- ✧ In the **Properties** tab, select the group **Background**.
- ✧ Select a fill color for the text box from the **Background color** list box or select a background image of your own by clicking the button **Select image**. If a background image is selected, an additional button **Remove image** is shown and the **Background color** list box is hidden. You can remove the image by clicking the button **Remove image**.

The background of the text box is adjusted.

Entering a Text in the Text Box and Formatting the Text

- ✧ In the **Properties** tab select the group **Text**.
- ✧ In the text box **Text**, enter the text that should be displayed in the text box.
- ✧ Press the <SHIFT> and <ENTER> keys to add a new line in the text box.
- ✧ Click outside of the text box or press the <Enter> key.

The entered text is displayed in the text box.

- ✧ Format the text if necessary. You can set the font, font size, text color, alignment, and select the check box to wrap lines automatically.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.4.7 Deleting Elements from the CFC](#)

✧ [12.1.4.6 Aligning Elements in the Data Flow View in the CFC](#)**12.1.4.6 Aligning Elements in the Data Flow View in the CFC**

You can align and place elements such as blocks and text boxes together in the CFC.

For this, mark at least 2 elements and select one of the following possibilities:

- Align left
- Center horizontally
- Align right
- Align top
- Center vertically
- Align bottom

Mark at least 3 elements and select one of the following possibilities:

- Distribute horizontally
- Distribute vertically

The reference element which is used for orienting the other elements is automatically determined.

The following criteria apply:

- **Aligning**
The marked elements are aligned together. The element whose position is closest to the desired alignment is used as a reference element. Example: If you wish to align the 3 elements to the right, the elements are aligned to that element which is furthest to the right.
- **Distributing**
The marked elements are distributed equally. The position average of all marked elements is used as a base value.

Aligning Elements

- ✧ Mark at least 2 elements in the CFC.
- ✧ Right-click a marked element. Click **Align** in the context menu.

A submenu is displayed.

- ✧ Select one of the actions listed from this submenu.

The marked elements are aligned or distributed.

Related Topics

- ✧ [12.1.1.3 Function Chart](#)

12.1.4.7 Deleting Elements from the CFC

You can delete blocks in the [20.1.11 Data Flow](#) and in the [20.1.12 Control Flow](#). You can only delete text boxes in the **Data flow** view.

**NOTE**

If you delete an interconnected block, you also delete the interconnections. The interfaces of the originally interconnected blocks are set to the standard values of the block type.

Deleting Blocks or Text Boxes from the CFC

- ✧ Right-click the element that you wish to delete. If you wish to delete a number of elements at the same time, mark these and then right-click one of the elements.
- ✧ Click **Delete** in the context menu.

The marked elements are deleted from the CFC.

Related Topics

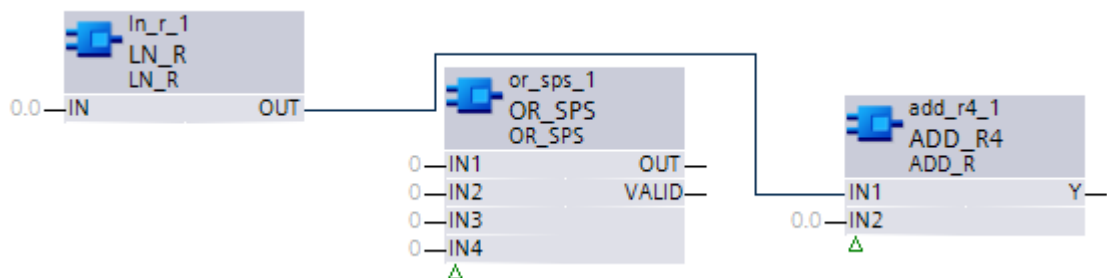
✧ [12.1.1.3 Function Chart](#)

12.1.5 Interconnection of Blocks in the Data Flow View

12.1.5.1 Displaying Interconnections

When configuring interconnections, you only determine which block output is interconnected with which block input. The exact route is created automatically. Other elements in the CFC are bypassed in the process. If you have specified a text box as **Text box in background**, this will be ignored during routing of the connection line. The connection lines can also be above this text box. If you move interconnected blocks, the automatic routing adjusts the interconnections.

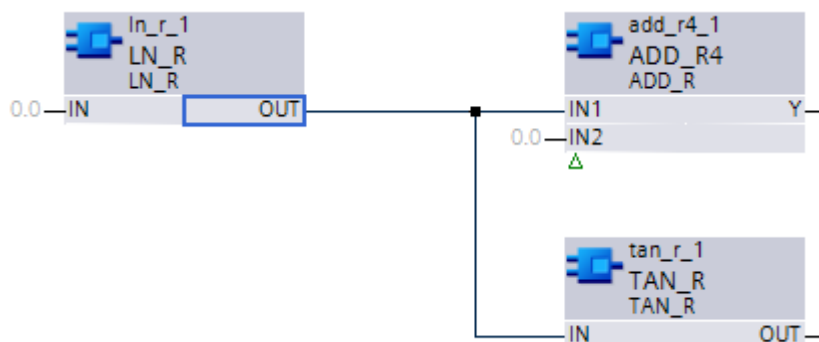
The following figure displays the routing of an interconnection around a 3rd block:



Interconnections from a Block Output to Multiple Block Inputs

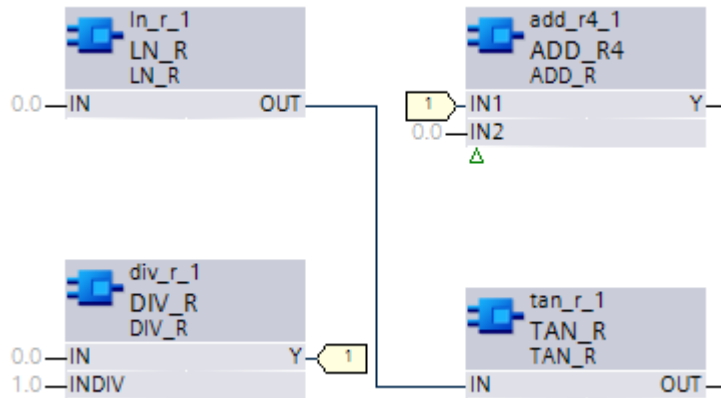
You can connect a block output to one or more block inputs. An interconnection node is added for each junction point to a block input. An interconnection node corresponds with an interconnection on the block output. If you move an interconnection node with drag and drop to a block output, this connects all of the interconnections coming from this node with this block output.

The following figure displays an interconnection of a block output to 2 block inputs with one interconnection node:



Incompletely Displayed Interconnections

Each block and each interconnection requires space in the CFC. Automatic connectors are used for incompletely displayed interconnections. The following figure shows an incompletely displayable interconnection between 2 blocks:



Connectors with the same numbers represent the interconnection. With multiple connectors, the numbers are numbered continually.

Signal Tracking for Interconnections

If you click a connection line, the interconnection will be highlighted in color. If the block outputs are multiply interconnected, the click position is decisive for which interconnection is highlighted. Depending on the click position, all interconnections or only some of them will be highlighted.

12.1.5.2 Interconnecting Blocks

If you interconnect 2 blocks, then you always interconnect a block output with a block input. If you keep your mouse pointer on a block during the interconnection, possible destination positions are marked in green color.



[sc_inter2, 1, --]

You can interconnect a block output with several block inputs. In order to create such multiple interconnections, connect the block output with the different inputs of the destination blocks. One or more interconnection nodes arise depending on the positions of the destination blocks. You can interconnect a block input only once.

A block output and a block input can be connected if their data types are the same or compatible. Compatible data types are not the same, but they can be converted. The conversion of compatible data types takes place automatically. Other information about data types and its conversion are found under [12.1.5.7 Converting Data Types](#).

You can interconnect the blocks by drag and drop or by double-clicking the block input or output and clicking the destination output or input.

Related Topics

- ✧ [12.1.5.1 Displaying Interconnections](#)
- ✧ [12.1.5.4 Negating a Block Input](#)
- ✧ [12.1.5.3 Interconnecting a Block with a Signal or a Setting](#)
- ✧ [12.1.5.7 Converting Data Types](#)

12.1.5.3 Interconnecting a Block with a Signal or a Setting

Signals or settings from the signal catalog can be connected to a block. Settings can only be used as inputs. Signals can be used as inputs and outputs.

You can add signals and settings from the signal catalog in the function chart via drag and drop.

The signals and settings are structured in a hierarchical manner. In the project tree, you can navigate through the structure and show or hide individual levels. With 2 list boxes, you can filter the displayed signals and settings according to name and type. With the check box **Show settings**, you can show or hide settings in the list.



NOTE

Signals of the type MV (measured value), CMV (complex measured value), DEL (3-phase measured value in delta connection), and WYE (3-phase measured value in Y connection) used as input signals in CFC are used in percentage values only.

List of Supported Signal Types for the Function Chart

- Directional Protection-Activation Information (ACD)
- Protection-Activation Information (ACT)
- Controllable Analog Process Value (APC)
- Binary Counter Reading (BCR)
- Binary Controlled Step Position Information (BSC)
- Complex Measured Value (CMV)
- 3-Phase Measured Value Delta Connection (DEL)
- Controllable Double Point (DPC)
- Double-Point Indication (DPS)
- Enumerated Status Health (ENS)
- Controllable Integer Status (INC)
- Integer Status (INS)
- Measured Value (MV)
- Sequence (SEQ)
- Controllable Single Point (SPC)
- Single-Point Indication (SPS)
- 3-Phase Measured Value Y Connection (WYE)

List of Supported Setting Types for the Function Chart

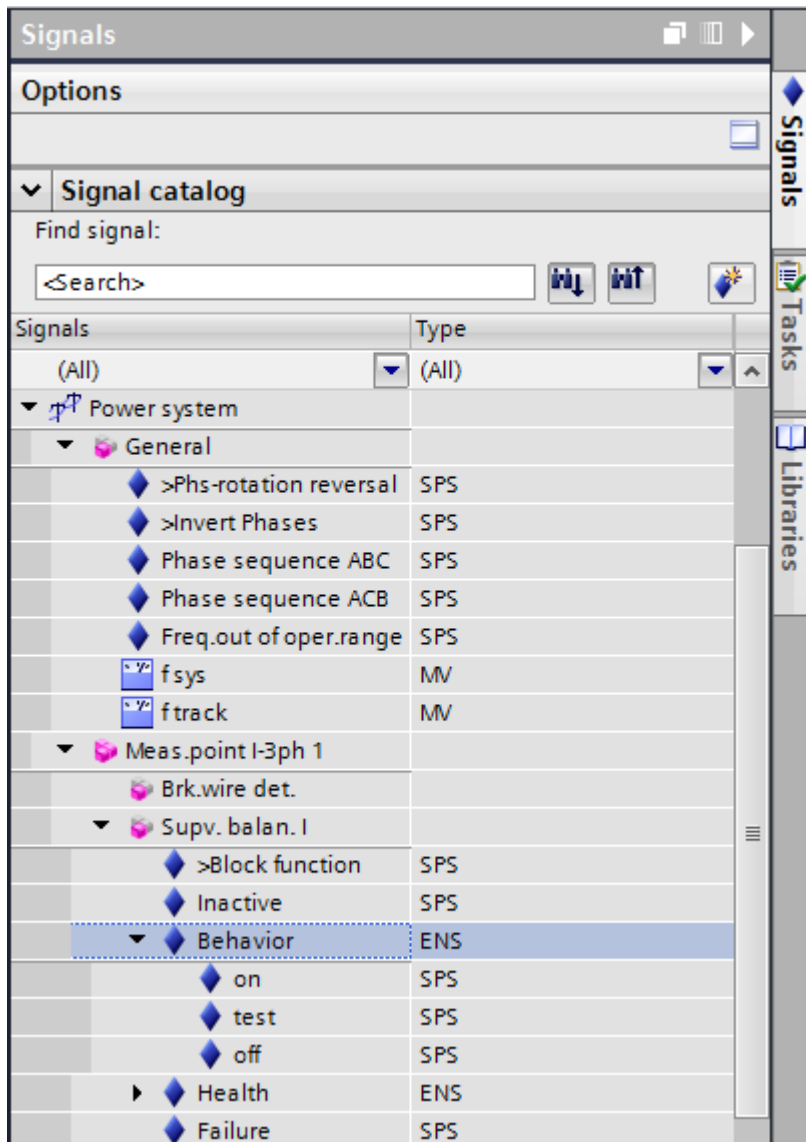
- Enumerated Status Setting (ENG)
- Analog Setting (ASG)
- Single-Point Setting (SPG)
- Integer Status Setting (ING)

Opening the Signal Catalog and Selecting a Signal or a Setting

✧ Open CFC and in the task card, go to the [20.2.5 Signals](#) tab.

The signals and settings of the corresponding SIPROTEC 5 device are displayed in the signal catalog.

✧ Open further levels in the signal or setting structure until you are able select the desired signal or setting.



[sc_signal, 1, en_US]

Interconnecting a Block with a Signal or a Setting

- ✧ Mark the desired signal or setting in the signal catalog.
- ✧ Drag this into the CFC by pressing the mouse and then moving it to the input or output of the respective block.

If the signal or setting can be interconnected with the selected connection, the connection will be highlighted in color. If the interconnection is not possible, the mouse pointer will change into a crossed-out circle.

- ✧ Release the mouse button.

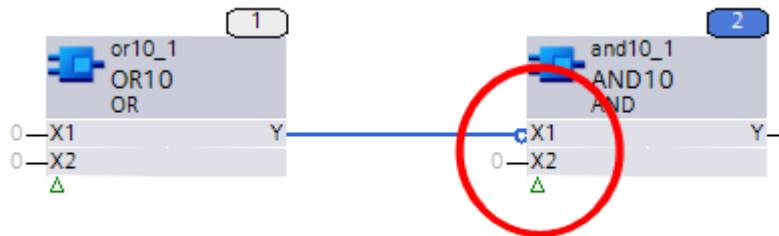
If the interconnection is permissible, the signal or setting of the block will be interconnected with the input and its output respectively. An interconnection line connects the sidebar cell with the block interface.

Related Topics

- ✧ [12.1.5.1 Displaying Interconnections](#)

12.1.5.4 Negating a Block Input

You can negate a block input of type **BOOL**. The block must be interconnected as a prerequisite. If you move or copy the negated interconnection, the negation remains intact. You can deactivate the negation at any time.



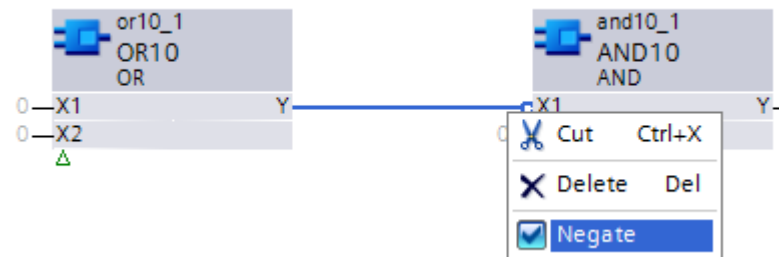
[digscre-110310-27.png, 4, --]

Figure 12-8 Example of Negated Interconnection

You can enable or disable the negation in the context menu or in the properties.

Enabling or Disabling a Negation with the Context Menu of an Interconnection

- ✧ Right-click the interconnection. Click **Negate** in the context menu.

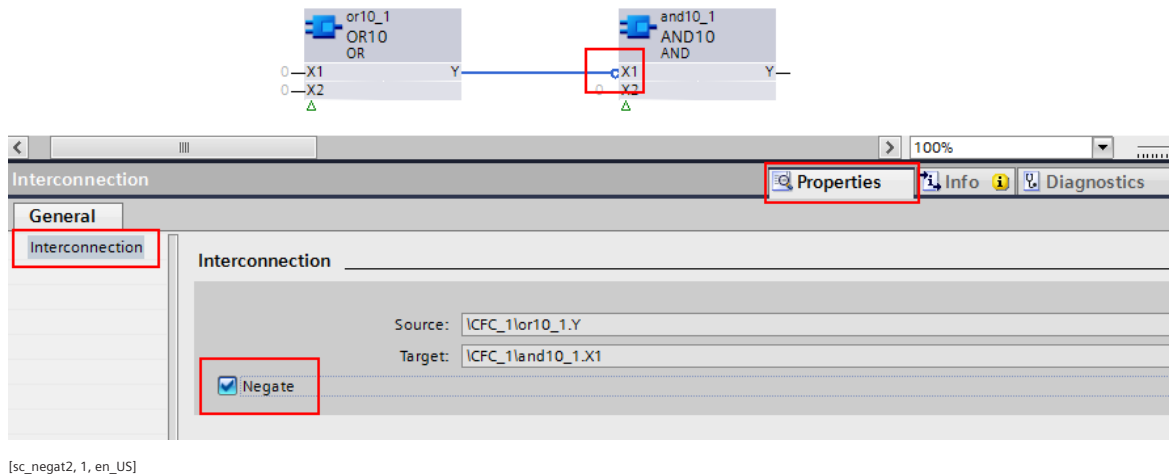


[sc_negat1, 1, en_US]

Depending on the check-box state, the block input will be negated or the negation will be disabled.

Enabling or Disabling a Negation in the Properties of an Interconnection

- ✧ Mark the interconnection.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the group [19.4.11 Interconnection](#).
- ✧ Click the **Negate** check box.



Depending on the check-box state, the block input will be negated or the negation will be disabled.

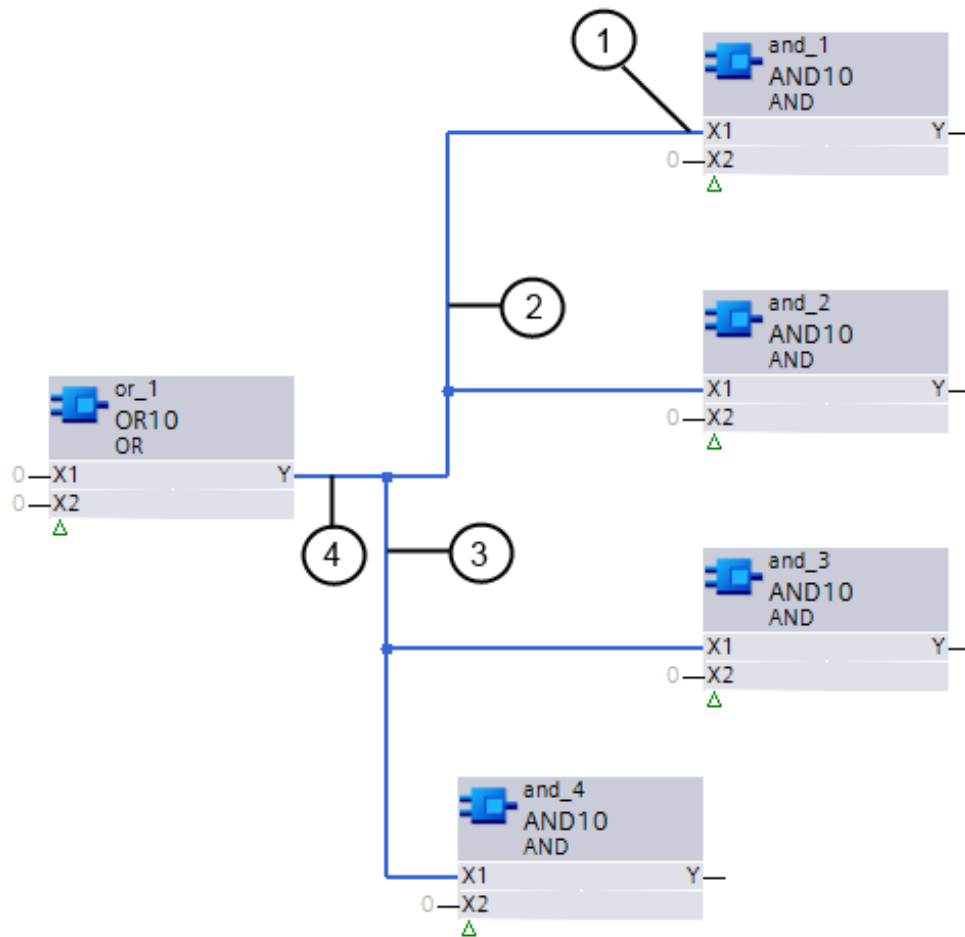
Related Topics

- ✧ [12.1.5.1 Displaying Interconnections](#)

12.1.5.5 Changing Block Interconnections

You can change the interconnections afterwards. In order to change an interconnection, use the processing areas of the interconnection. If you place the mouse on an interconnection, these processing areas will be automatically marked.

The following figure shows the processing areas for a multiple interconnection:



1) Represents the Interconnection of the Block AND_1 Input

In order to place this interconnection on a different block input, click this processing area and drag it to the other block input.

2) Represents the Interconnection of the Output of the OR_1 Block

In order to place this interconnection on a different block output, click this processing area and drag it to the other block output. The interconnection no longer belongs to the multiple interconnection.

3) Represents a Part of the Interconnection of the Output of the OR_1 Block

If multiple interconnection nodes exist, these will be divided in a hierarchical manner. In order to place all interconnections connected with this node onto a different block output, click this processing area and drag it to the other block output. The interconnection no longer belongs to the multiple interconnection.

4) Represents all Interconnections of the Output of the OR_1 Block

In order to interconnect all block inputs with a different block output, click this processing area and drag it to the other block output.

Related Topics

[12.1.5.1 Displaying Interconnections](#)

12.1.5.6 Deleting a Block Interconnection

You can delete an individual block interconnection or multiple block interconnections simultaneously by using the context menu or clicking the  button in the DIGSI 5 toolbar. The deletion of an interconnection disables the negation of a block input.

Related Topics

✧ [12.1.5.1 Displaying Interconnections](#)

12.1.5.7 Converting Data Types

Typically, you can connect data types only to the same type. But for better usability, some conversions are done automatically by adding an invisible conversion block. So for example, an output of type DINT can be connected to an input of type REAL and the other way round. The following type conversions for basic types are supported:

- DINT to REAL or UINT
- UINT to DINT
- REAL to DINT

Additional conversions are available for measured values. You will find more information about this under [12.8.1 Basic Data Types](#).

If you wish to connect 2 connections with different data types to each other, there is an automatic test to see if a type conversion is possible. If that is the case, you can connect both of the connections with each other. You do not have to add a conversion block. The data types are automatically converted during the compilation of the CFC.

When connecting, green markings show that a conversion is possible. If a data type cannot be converted into a different type, you also cannot combine the corresponding connections with each other.

Related Topics

[12.1.5.2 Interconnecting Blocks](#)

12.1.6 Changing Sequence

12.1.6.1 Changing the Task Level

If you add a new Continuous Function Chart, also determine a task level for the CFC.

You can change the task level in the properties of the CFC. The CFC can still be visible in the working area. However, the CFC must not be opened. In this case, use the project tree in order to display the properties.



NOTE

Nested function charts get the same task level as the CFC they are used in. You cannot set the task level of nested function charts in the **Properties** tab.

Displaying Properties If the CFC Is Opened

- ✧ Click in an open area in the CFC.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the **Sequence** group.

Showing Properties via the Project Tree

- ✧ In the project tree, right-click the CFC whose task level you wish to change.

- ✧ Click **Properties** in the context menu.
- The property dialog for the CFC opens.
- ✧ Select the **Sequence** group.



NOTE

If you execute the following changes in the properties dialog, confirm this with **OK**.

Changing Task Level

- ✧ Open the **Task** list box.
- ✧ Select one of the 4 task levels **Fast event-triggered**, **Event-triggered**, **Measurement**, or **Interlocking**.

Related Topics

- ✧ [12.1.1.6 Flow Model](#)
- ✧ [12.1.1.3 Function Chart](#)

12.1.6.2 Optimizing the Running Sequence Automatically

The running sequence can be optimized automatically. Automatic optimization of the running sequence is based on the fact that blocks whose output values serve as input values for different blocks are executed first. The order in which you add the blocks in the CFC determines the running sequence within the overall function. The CFC recognizes the running sequence by the so-called sequence number, which can be displayed in the block. You can show or hide these numbers for all blocks in general.

If you add blocks in a different sequence than that in which these blocks must be processed, this also changes the running sequence accordingly.

Optimizing the CFC Running Sequence of all Function Charts

- ✧ In the project tree, right-click a CFC.
- ✧ Click **Optimize chart(s)** from the context menu.

All function charts that are not excluded from optimization in the **Properties** tab of the CFC are optimized in the sequence order.

Selecting the CFC for Optimization

- ✧ In the project tree, right-click the CFC that should be optimized.
- ✧ Click **Properties** in the context menu.

The property dialog for the CFC opens.

- ✧ Select the **Optimize chart(s)** check box and click **OK**.

- or -

- ✧ Open the CFC that is to be optimized in the working area.
- ✧ Click in an open area in the CFC.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the **General** group.
- ✧ Mark the **Optimize chart** check box.

The CFCs are selected for optimization.

Related Topics

- ✧ [12.1.1.6 Flow Model](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.6.3 Adjusting the Running Sequence of Blocks Manually](#)

12.1.6.3 Adjusting the Running Sequence of Blocks Manually

You can change the running sequence manually in the [20.1.12 Control Flow](#).

You can identify a block in the running sequence as the position for the block insertion. Newly added blocks are then integrated in the running sequence after this block position.

Showing or Hiding the Sequence Number in the Block

- ✧ Click the  button in the [20.7.6 Toolbar of the Data Flow](#).

Depending on the current state, the sequence numbers in the blocks are shown or hidden.

Changing the Running Sequence of a Block

- ✧ Mark the respective block in the **Control flow** view.
 - ✧ Drag the block with pressed mouse button in a vertical direction to the position of a different block.
- If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.
- ✧ Release the mouse button at a permissible position.

The block is moved to the new position.

Related Topics

- ✧ [12.1.1.6 Flow Model](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.6.2 Optimizing the Running Sequence Automatically](#)

12.1.7 Checking and Finishing Function Chart**12.1.7.1 Checking Consistency**

The consistency of many actions during the creation of a function chart is checked during the the execution of the action itself. For example, you are able to connect signals to block inputs or outputs only with matching type. But some consistency checks can only be done during compilation of the function chart. Information about inconsistencies from these checks is shown as warnings or error messages in the **Compile** tab in the **Inspector** window.

The following list shows possible warning or error messages:

- The function chart (CFC) contains a feedback loop between the blocks. Optimize the chart and compile again.
- Signal connected to the CFC block is invalid or deleted. Replace it with an appropriate signal.
- Connection of the signal to the CFC block is invalid. The signal is already connected with another source. Remove this connection or remove connection(s) to the other source for this signal.
- Subchart interface is unassigned.
- The CHART_STATE block is not allowed in a subchart.
- Only one instance of the CHART_STATE block can be used in a function chart (CFC).
- Comma (,) is not supported in the CFC chart name.
- Comma (,) is not supported in the CFC block name.

- The function-chart name exceeds the allowed character limit of 100 characters. Correct it and compile again.
- The length of the text in the **Comment** area under the **General** group in the **Properties** tab of the CFC block exceeds the allowed size (300 characters).
- The length of the text in the **Comment** area under the **General** group in the **Properties** tab of the function chart exceeds the allowed size (300 characters).
- CFC blocks are configured, but only 32 000 CFC blocks are allowed for a device. Limit the number of CFC blocks within 32 000.
- Number of ticks configured for the task exceed the allowed limit. Limit the number of the used ticks in the task within the allowed limit.
- The CFC block is incompatible with the device version. Use another suitable block.

Displaying the List with Warnings and Error Indications

- ✧ Open the **Inspector** window.
- ✧ Select the **Info** tab.
- ✧ Select the **Compile** tab.

The list with warning and error indications is displayed.

Related Topics

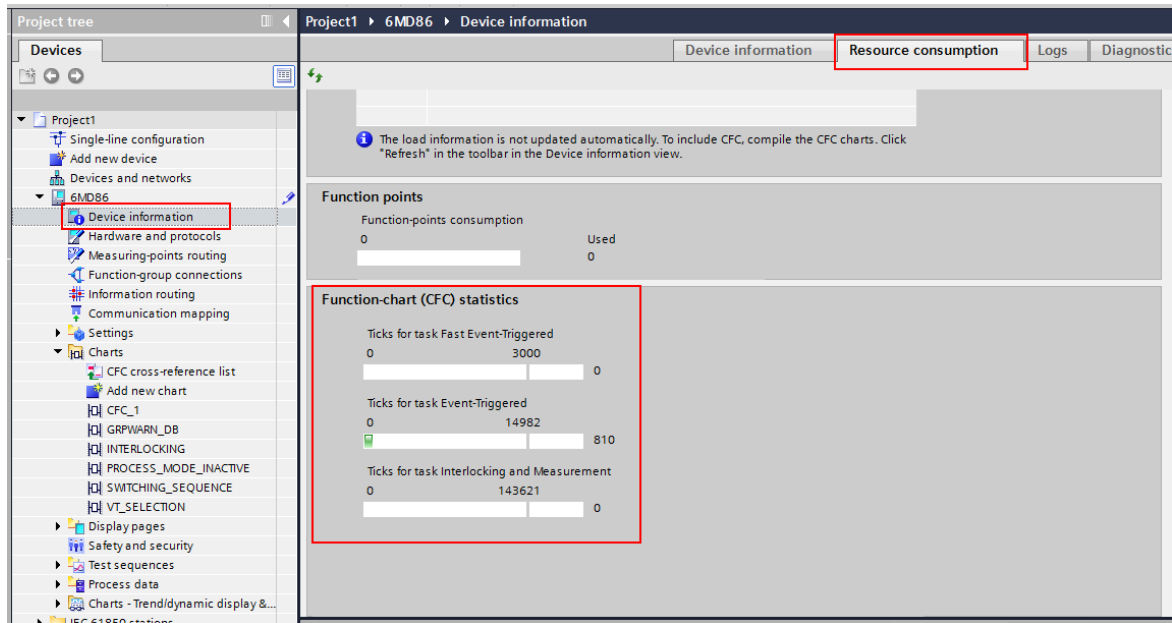
- ✧ [12.1.7.4 Compiling the CFC](#)
- ✧ [12.1.7.2 Checking Resource Consumption](#)

12.1.7.2 Checking Resource Consumption

The CPU and the memory of a SIPROTEC 5 device determine the maximum scope of the individual CFC functionality of the SIPROTEC 5 device. If you add CFCs and blocks, this reduces the available system resources. When creating CFCs, consider the following factor:

- **Ticks**
A tick is the smallest system-time unit and describes a certain time period in milliseconds. Each block in a CFC requires a certain number of ticks for processing. The number of ticks depends on the block type, the signals, and the settings connected to the block. The maximum number of ticks available for each of the 4 task levels will change dynamically based on the device configuration.
 - **Fast Event-Triggered**
 - **Event-Triggered**
 - **Interlocking and Measurement**

In order to determine if the CFC functions are found within the permissible borders, you can check the current resource consumption. You can view the resource consumption in the **Resource consumption** tab via the **Device information** node in the project tree.



[sc_rescon, 1, en_US]

The respective resource consumption has 2 scales. The left scale begins with the value 0. On the right edge of the scale you see the value for the maximum permissible number. A green bar within the scale displays the currently used number. Additionally, the currently used number is displayed numerically next to the right-hand, smaller scale. A red bar in the right-hand scale informs you that the maximum permissible number has been exceeded.

In order to reduce resource consumption, proceed as follows:

- Check if you have nested function charts in the root of the **Chart** folder or other useless function charts.
- Check your function charts if you can optimize your logic.
- Check if you can use a different task level where free ticks are available.
- Check if you can replace blocks for creating constant values by setting the constant value directly at the block input.
- Check if you can remove instantiated protection functions.

Displaying Resource Consumption

- ✧ Double-click the **Device information** node in the project tree.

In the working area, multiple tabs with information and setting possibilities will be displayed.

- ✧ Select the tab [20.5.5 Resource Consumption](#).

The current resource consumption is displayed.



NOTE

If you change CFCs while the **Resource consumption** tab is open, update the resource-consumption display manually by clicking the **Refresh** button

Related Topics

- ✧ [12.1.7.3 Considering Function Points](#)

12.1.7.3 Considering Function Points

Function charts in bay control and railway bay control devices are for free. For all other devices, 40 function points are required if an **Arithmetic** or **Arithmetic with status** block from the library is used. If you add an **Arithmetic** or **Arithmetic with status** block for the first time, the function points will be added. The function points are added for CFC only once.



NOTE

The **Arithmetic** blocks ABS_D and ABS_R are for free.

You can check the actual function-point status in the **Resource Consumption** tab in the **Device information**. You find more information about this under [15.6.3 Determining the Function-Points Class Required](#).

12.1.7.4 Compiling the CFC

To use CFC in the device, the function charts have to be compiled into an executable program and transferred to the device as part of the configuration.

You can compile all functions charts by clicking **Compile** in context menu in the folder **Charts** in the project tree. If you load the configuration to the device, the compilation of the function charts is also done automatically if it is needed.

During compilation, consistency checks are done. If any inconsistency is found, an error message is added in the **Compile** tab in the **Info** window and the compilation is canceled. A device configuration with inconsistencies in function charts cannot be loaded to the device.

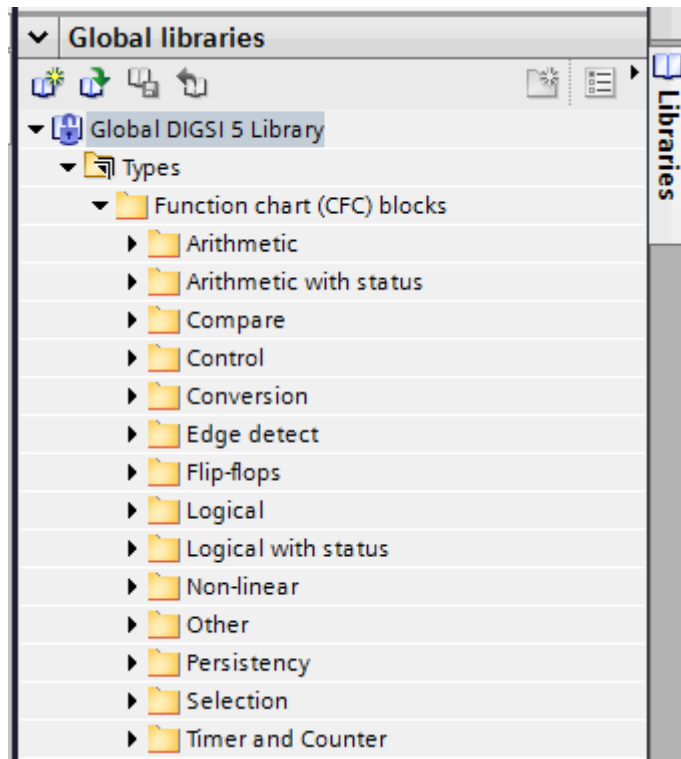
Starting Compilation

- ✧ In the project tree, open the folder of the offline configuration in which you want to compile the CFCs.
- ✧ Right-click in this folder on **Plans**.
- ✧ Click in the context menu on **Compile**.

The compilation process starts. Possible error messages are listed in the **Compile** tab of the **Info** window.

12.2 Block Types

Open the CFC you want to change in the working area. Open the **Global Libraries** section in the **Libraries** tab of the task card. The **Global DIGSI 5 library > Types > Function charts (CFC) blocks** folder contains a folder structure for all CFC blocks available for all SIPROTEC 5 devices.



[scgliballib, 1, en_US]

Figure 12-9 Folder Structure for all CFC Blocks

12.2.1 Arithmetic

12.2.1.1 ADD_D

The **ADD_D** block adds 4 whole-number input values (summands).

Connections and Explanations

You can find explanations for the terminals of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN1	DINT	Summand 1
	IN2	DINT	Summand 2
	IN3	DINT	Summand 3
	IN4	DINT	Summand 4
Output	Y	DINT	Result of function $Y = IN1 + IN2 + IN3 + IN4$

For the connectivity of inputs/outputs of the basic data type, refer to [12.8.1 Basic Data Types](#).

Once the block has been inserted into the chart, only 2 of the 4 inputs are visible. If you need more inputs, select the block. In the [3.1.4 Inspector Window](#) unmark the **Invisible** check boxes in the **Interface** group of the **Properties** tab.

Detailed Description

The block adds the values at the inputs **IN1** to **IN4**. The result of the addition is available at the **Y** output.

Alternative Block Types

- If you want to add floating-point numbers, use the **ADD_R** block instead of **ADD_D**.
- If the quality information of the input values is to be taken into account, use the **ADD_XMV** block instead of **ADD_D**.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.2 ADD_R](#)
[12.2.2.1 ADD_XMV](#)
[12.8.1 Basic Data Types](#)

12.2.1.2 ADD_R

The **ADD_R** block adds 4 floating-point numbers (summands).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN1	REAL	Summand 1
	IN2	REAL	Summand 2
	IN3	REAL	Summand 3
	IN4	REAL	Summand 4
Output	Y	REAL	Result of function $Y = IN1 + IN2 + IN3 + IN4$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Once the block has been inserted into the chart, only 2 of the 4 inputs are visible. If you need more inputs, select the block and in the [3.1.4 Inspector Window](#) unmark the **Invisible** check boxes in the **Interface** group of the block **Properties** tab.

Detailed Description

The block adds the values at the inputs **IN1** to **IN4**. The result of the addition is available at the **Y** output.

Alternative Block Types

- If you only want to add whole numbers, Siemens recommends the **ADD_D** block instead of the **ADD_R** block.
- If the quality information of the input values is to be taken into account, use the **ADD_XMV** block instead of **ADD_R**.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.1 ADD_D](#)
[12.2.2.1 ADD_XMV](#)
[12.8.1 Basic Data Types](#)

12.2.1.3 SUB_D

The **SUB_D** block subtracts a whole-number input value (subtrahend) from a 2nd whole-number input value (minuend).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN	DINT	Minuend
	INSUB	DINT	Subtrahend
Output	Y	DINT	Result of function $Y = IN - INSUB$

For the connectivity of inputs/outputs of basic data type please refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block subtracts the value at the **INSUB** input from the value at the **IN** input. The result of the subtraction is available at the **Y** output.

Alternative Block Types

- If you want to subtract floating-point numbers, use the **SUB_R** block instead of **SUB_D**.
- If the quality information of the input values is to be taken into account, use the **SUB_XMV** block instead of **SUB_D**.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.4 SUB_R](#)
[12.2.2.2 SUB_XMV](#)
[12.8.1 Basic Data Types](#)

12.2.1.4 SUB_R

The **SUB_R** block subtracts a floating-point number (subtrahend) from a 2nd floating-point number (minuend).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN	REAL	Minuend
	INSUB	REAL	Subtrahend
Output	Y	REAL	Result of function $Y = IN - INSUB$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block subtracts the value at the **INSUB** input from the value at the **IN** input. The result of the subtraction is available at the **Y** output.

Alternative Block Types

- If you only want to subtract whole numbers, Siemens recommends the **SUB_D** block instead of the **SUB_R** block.
- If the quality information of the input values is to be taken into account, use the **SUB_XMV** block instead of **SUB_R**.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.3 SUB_D](#)

[12.2.2.2 SUB_XMV](#)[12.8.1 Basic Data Types](#)**12.2.1.5 MUL_D**

The **MUL_D** block multiplies 4 whole-number input values (factors).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN1	DINT	Factor 1
	IN2	DINT	Factor 2
	IN3	DINT	Factor 3
	IN4	DINT	Factor 4
Output	Y	DINT	Result of function $Y = IN1 \times IN2 \times IN3 \times IN4$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Once the block has been inserted into the chart, only 2 of the 4 inputs are visible. If you need more inputs, select the block and in the [3.1.4 Inspector Window](#) unmark the **Invisible** check boxes in the **Interface** group of the block **Properties** tab.

Detailed Description

The block multiplies the values at the inputs **IN1** to **IN4**. The result of the multiplication is available at the **Y** output.

Alternative Block Types

- If you want to multiply floating-point numbers, use the **MUL_R** block instead of **MUL_D**.
- If the quality information of the input values is to be taken into account, use the **MUL_XMV** block instead of **MUL_D**.

Related Topics[12.1.1.4 Block](#)[12.2.1.6 MUL_R](#)[12.2.2.3 MUL_XMV](#)[12.8.1 Basic Data Types](#)**12.2.1.6 MUL_R**

The **MUL_R** block multiplies 4 floating-point numbers (factors).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN1	REAL	Factor 1
	IN2	REAL	Factor 2
	IN3	REAL	Factor 3
	IN4	REAL	Factor 4
Output	Y	REAL	Result of function $Y = IN1 \times IN2 \times IN3 \times IN4$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Once the block has been inserted into the chart, only 2 of the 4 inputs are visible. If you need more inputs, select the block and in the [3.1.4 Inspector Window](#) unmark the **Invisible** check boxes in the **Interface** group of the block **Properties** tab.

Detailed Description

The block multiplies the values at the inputs **IN1** to **IN4**. The result of the multiplication is available at the **Y** output.

Alternative Block Types

- If you only want to multiply whole numbers, Siemens recommends the **MUL_D** block instead of the **MUL_R** block.
- If the quality information of the input values is to be taken into account, use the **MUL_XMV** block instead of **MUL_R**.

Related Topics

[12.1.1.4 Block](#)

[12.2.1.5 MUL_D](#)

[12.2.2.3 MUL_XMV](#)

[12.8.1 Basic Data Types](#)

12.2.1.7 DIV_D

The **DIV_D** block divides a whole-number input value (numerator) by a 2nd whole-number input value (denominator).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN	DINT	Numerator
	INDIV	DINT	Denominator
Output	Y	DINT	Result of function $Y = IN / INDIV$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block divides the value at the **IN** input (numerator) by the value at the **INDIV** input (denominator). The result of the division is available at the **Y** output as whole-number, that means decimal places are cut. If you are interested in the remainder of a whole-number division you can use **MOD_D** block.

Alternative Block Types

- If you want to divide floating-point numbers, use the **DIV_R** block instead of **DIV_D**.
- If the quality information of the input values is to be taken into account, use the **DIV_XMV** block instead of **DIV_D**.

Related Topics

[12.1.1.4 Block](#)

[12.2.1.8 DIV_R](#)

[12.2.2.4 DIV_XMV](#)

[12.2.1.9 MOD_D](#)

[12.8.1 Basic Data Types](#)

12.2.1.8 DIV_R

The **DIV_R** block divides a floating-point number (numerator) by a 2nd floating-point number (denominator).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN	REAL	Numerator
	INDIV	REAL	Denominator
Output	Y	REAL	Result of function $Y = IN / INDIV$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block divides the value at the **IN** input (numerator) by the value at the **INDIV** input (denominator). The result of the division is available at the **Y** output.

Alternative Block Types

- If you only want to divide whole numbers, Siemens recommends the **DIV_D** block instead of the **DIV_R** block.
- If the quality information of the input values is to be taken into account, use the **DIV_XMV** block instead of **DIV_R**.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.7 DIV_D](#)
[12.2.2.4 DIV_XMV](#)
[12.8.1 Basic Data Types](#)

12.2.1.9 MOD_D

The **MOD_D** block calculates the modulo from 2 whole-number input values. Modulo is a remainder operation which generates the whole-number remainder from a whole-number division. For example, with 10 modulo 3 the remainder is 1.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	IN	DINT	Numerator
	INMOD	DINT	Denominator
Output	Y	DINT	Result of function $Y = IN \text{ mod } INMOD$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block divides the value at the **IN** input (numerator) by the value at the **INMOD** input (denominator) and outputs the remainder of the division. The result of the modulo function is available at the **Y** output. You can use the modulo function to check, for example whether a number is even. If $x \text{ mod } 2 = 0$, then x is even.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.7 DIV_D](#)

12.8.1 Basic Data Types

12.2.1.10 ABS_D

The **ABS_D** block calculates the absolute value of a whole-number input value.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	DINT	Input value
Output	OUT	DINT	Result of function abs(IN)

For the connectivity of inputs/outputs of basic data type see [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the absolute value of the value at the **IN** input. The result of the function is available at the **OUT** output.

Alternative Block Types

If you want to calculate the absolute value of a floating-point number, use the **ABS_R** block instead of **ABS_D**.

Related Topics

[12.1.1.4 Block](#)

[12.2.1.11 ABS_R](#)

[12.8.1 Basic Data Types](#)

12.2.1.11 ABS_R

The **ABS_R** block calculates the absolute value from a floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Input value
Output	OUT	REAL	Result of function abs(IN)

For the connectivity of inputs/outputs of basic data type see [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the absolute value of the value at the **IN** input. The result of the function is available at the **OUT** output.

Alternative Block Types

If you want to calculate only the absolute value of a whole number, Siemens recommends using the **ABS_D** block instead of the **ABS_R** block.

Related Topics

[12.1.1.4 Block](#)

[12.2.1.10 ABS_D](#)

[12.8.1 Basic Data Types](#)

12.2.1.12 LOG_R

The **LOG_R** block calculates the common logarithm of a floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Input value
Output	OUT	REAL	Result of function $\log_{10}(\text{IN})$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the common logarithm of the value at the **IN** input. The common logarithm is the logarithm with base **10**. The result of the logarithm function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.13 LN_R](#)
[12.2.1.14 EXP_R](#)
[12.2.1.15 EXPT_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.13 LN_R

The **LN_R** block calculates the natural logarithm of a floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Input value
Output	OUT	REAL	Result of function $\text{LN}(\text{IN})$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the natural logarithm of the value at the **IN** input. The natural logarithm is the logarithm with base **e**. The result of the logarithm function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.12 LOG_R](#)
[12.2.1.14 EXP_R](#)
[12.2.1.15 EXPT_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.14 EXP_R

The **EXP_R** block calculates the natural exponential function of a floating-point number (exponent).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Exponent
Output	OUT	REAL	Result of function exp(IN)

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The **EXP_R** block calculates the natural exponential function of the value at the **IN** input. The natural exponential function is the exponential function with base **e**. The result of the exponential function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)

[12.2.1.13 LN_R](#)

[12.2.1.12 LOG_R](#)

[12.2.1.15 EXPT_R](#)

[12.8.1 Basic Data Types](#)

12.2.1.15 EXPT_R

The **EXPT_R** block calculates the exponential of a floating-point number (exponent) to a 2nd floating-point number (base).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Inputs	INBASE	REAL	Base
	IN_EXP	REAL	Exponent
Output	OUT	REAL	Result of the function pow (INBASE, IN_EXP)

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the exponential function of the exponent **IN_EXP** to the base **INBASE**. The result of the exponential function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)

[12.2.1.13 LN_R](#)

[12.2.1.12 LOG_R](#)

[12.2.1.14 EXP_R](#)

[12.8.1 Basic Data Types](#)

12.2.1.16 SQRT_R

The **SQRT_R** block calculates the square root of a floating-point number (radicand).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Radicand
Output	OUT	REAL	Result of function sqrt(IN)

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the square root of the value at the **IN** input. The result of the square-root extraction is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.14 EXP_R](#)
[12.2.1.15 EXPT_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.17 SIN_R

The **SIN_R** block calculates the sine of a floating-point number (angle).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Angle in degrees
Output	OUT	REAL	Result of function sin(IN)

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the sine of the value at the **IN** input. The result of the sine function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.19 COS_R](#)
[12.2.1.21 TAN_R](#)
[12.2.1.18 ASIN_R](#)
[12.2.1.20 ACOS_R](#)
[12.2.1.22 ATAN_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.18 ASIN_R

The **ASIN_R** block calculates the arcsine of a floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Input value (-1.0 to 1.0)
Output	OUT	REAL	Result of function asin(IN) in degrees

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the arc sine of the value at the **IN** input. The arc sine is the inverse function of the restricted sine function. The result of the arc-sine function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.17 SIN_R](#)
[12.2.1.19 COS_R](#)
[12.2.1.21 TAN_R](#)
[12.2.1.20 ACOS_R](#)
[12.2.1.22 ATAN_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.19 COS_R

The **COS_R** block calculates the cosine of a floating-point number (angle).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Angle in degrees
Output	OUT	REAL	Result of function cos(IN)

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the cosine of the value at the **IN** input. The result of the cosine function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.17 SIN_R](#)
[12.2.1.21 TAN_R](#)
[12.2.1.18 ASIN_R](#)
[12.2.1.20 ACOS_R](#)
[12.2.1.22 ATAN_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.20 ACOS_R

The **ACOS_R** block calculates the arccosine of a floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation
Input	IN	REAL	Input value (-1.0 to 1.0)
Output	OUT	REAL	Result of function acos(IN) in degrees

For the connectivity of inputs/outputs of basic data type see [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the arc cosine of the value at the **IN** input. The arccosine is the inverse function of the restricted cosine function. The result of the arccosine function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)

[12.2.1.17 SIN_R](#)
[12.2.1.19 COS_R](#)
[12.2.1.21 TAN_R](#)
[12.2.1.18 ASIN_R](#)
[12.2.1.22 ATAN_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.21 TAN_R

The **TAN_R** block calculates the tangent of a floating-point number (angle).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Angle in degrees
Output	OUT	REAL	Result of function $\tan(\text{IN})$

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the tangent of the value at the **IN** input. The result of the tangent function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.17 SIN_R](#)
[12.2.1.19 COS_R](#)
[12.2.1.18 ASIN_R](#)
[12.2.1.20 ACOS_R](#)
[12.2.1.22 ATAN_R](#)
[12.8.1 Basic Data Types](#)

12.2.1.22 ATAN_R

The **ATAN_R** block calculates the arctangent of a floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation
Input	IN	REAL	Input value
Output	OUT	REAL	Result of function $\text{atan}(\text{IN})$ in degrees

For the connectivity of inputs/outputs of basic data type refer to [12.8.1 Basic Data Types](#).

Detailed Description

The block calculates the arc tangent of the value at the **IN** input. The arc tangent is the inverse function of the restricted tangent function. The result of the arc-tangent function is available at the **OUT** output.

Related Topics

[12.1.1.4 Block](#)
[12.2.1.17 SIN_R](#)
[12.2.1.19 COS_R](#)

[12.2.1.21 TAN_R](#)

[12.2.1.18 ASIN_R](#)

[12.2.1.20 ACOS_R](#)

[12.8.1 Basic Data Types](#)

12.2.2 Arithmetic with Status

12.2.2.1 ADD_XMV

The **ADD_XMV** block adds up to 4 measured values (summands). The quality of the inputs is taken into account. With additional input, a floating-point number without quality information is added, which can be used for an offset.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1 IN2 IN3 IN4	STRUCT	Measured value	Value: 0.0 Quality: 0 (GOOD)
	IN_C	REAL	Additional summand (value without quality information)	0.0
	VALDESC	STRUCT	Value description for the measurement output value	none
Output	OUT	STRUCT	Result of function $OUT = IN1 + IN2 + IN3 + IN4 + IN\_C$ - Result of function $OUT = IN1 + IN2 + IN3 + IN4 + IN\_C$ - Quality information of the inputs IN1 to IN4 combined with the logical OR function.	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block adds the measured values at input **IN1** to **IN4** and an additional floating-point number at the **IN_C** input. The result of the addition is available at the **OUT** output. The quality information at the output is built from the quality information of the inputs **IN1** to **IN4** combined with the logical OR function.

Additionally to the preferred signals of type **MV**, you can connect also signals of type **INS** or block outputs of compatible type (for example, REAL) to input **IN1** to **IN4**.

On the output side, you can connect a user-defined signal of the type **MV** or **APC** or you can connect other block inputs with compatible type (for example, **REAL**) for further processing.

Measured values are handled in CFC as percentage values only. Therefore the **OUT** output contains information for the conversion to primary/secondary values including the unit. This information is read from the **VALDESC** input, where you can directly connect the corresponding measuring signal from which the value description shall be used. If you do not connect the **VALDESC** input, the signal connected at the **OUT** output cannot be converted. That means primary and secondary values of the signal are the same as the percentage value.



NOTE

For the user-defined signals of the type **MV**, **CMV**, **DEL**, **WYE**, and **APC**, you can overwrite the multiplier and the unit (for example, **kV**) for primary and secondary representation in the **Properties** tab of the signal in the **Information Routing** matrix. If **Define Unit** is selected, the multiplier and the unit are used from the properties of a signal, instead of the multiplier and the unit set in the CFC given by the **VALDESC** input. This feature allows you, for example, to change the multiplier and the unit of a user-defined signal from **kV** to **V**. Nevertheless, for the value conversion from the CFC-internal percentage value to a primary or secondary value, the **VALDESC** input has to be connected.

Related Topics

[12.1.1.4 Block](#)

12.2.2.2 SUB_XMV

The **SUB_XMV** block subtracts a measured value (subtrahend) from a 2nd measured value (minuend). The quality of the inputs is taken into account.

With an additional input, a floating-point number without quality information is added. It can be used for an offset.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	STRUCT	Measured value (Minuend)	Value: 0.0 Quality: 0 (GOOD)
	IN_SUB	STRUCT	Measured value (Subtrahend)	Value: 0.0 Quality: 0 (GOOD)
	IN_C	REAL	Additional summand (value without quality information)	0.0
	VALDESC	STRUCT	Value description for the measured output value	None

	Name	Data Type	Explanation	Default
Output	OUT	STRUCT	- Result of function: $\text{OUT} = \text{IN} - \text{IN\_SUB} + \text{IN\_C}$ - Quality information of the inputs IN and IN_SUB combined with the logical OR function	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block subtracts the measured value at the **IN_SUB** input from the measured value at the **IN1** input and adds an additional floating-point value at **IN_C** input. The result of the calculation is available at the **OUT** output. The quality information at the output is built from the quality information of the inputs **IN** and **IN_SUB** combined with the logical OR function.

Additionally to the preferred signals of the type **MV**, you can connect also signals of the type **INS** or block outputs of compatible types (for example, REAL) to input **IN** to **IN_SUB**.

On the output side, you can connect a user-defined signal of the type **MV** or **APC** or you can connect other block inputs with compatible types (for example, REAL) for further processing.

Measured values are handled in CFC as percentage values only. Therefore the **OUT** output contains information for the conversion to primary/secondary values including the unit. This information is read from the **VALDESC** input, where you can directly connect the corresponding measuring signal from which the value description shall be used. If you do not connect the **VALDESC** input, the signal connected at the **OUT** output cannot be converted. That means primary and secondary values of the signal are the same as the percentage value.



NOTE

For the user-defined signals of the type **MV**, **CMV**, **DEL**, **WYE**, and **APC**, you can overwrite the multiplier and the unit (for example, **kV**) for primary and secondary representation in the **Properties** tab of the signal in the **Information Routing** matrix. If **Define Unit** is selected, the multiplier and the unit are used from the properties of a signal, instead of the multiplier and the unit set in the CFC given by the **VALDESC** input. This feature allows you, for example, to change the multiplier and the unit of a user-defined signal from **kV** to **V**. Nevertheless, for the value conversion from the CFC-internal percentage value to a primary or secondary value, the **VALDESC** input has to be connected.

Related Topics

[12.1.1.4 Block](#)

12.2.2.3 MUL_XMV

The **MUL_XMV** block multiplies 2 measured values and an additional floating-point factor. The quality information of the measured values at the inputs **IN1** and **IN2** will be taken into account.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	STRUCT	Measured value with quality information (factor 1)	Value: 0.0 Quality: 0 (GOOD)
	IN2	STRUCT	Measured value with quality information (factor 2)	Value: 0.0 Quality: 0 (GOOD)
	IN_C	REAL	Additional factor (value without quality information)	1.0
	VALDESC	STRUCT	Value description	none
Output	OUT	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DEC: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DEC: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DEC: 3 QLTY: 16#0000

Detailed Description

The block multiplies the measured values at input **IN1** and **IN2** and an additional floating-point value at **IN_C** input. The result of the multiplication is available at the **OUT** output. The quality information at the output is built from the quality information of the inputs **IN1** and **IN2** combined with the logical OR function.

Additionally to the preferred signals of type **MV**, you can connect also signals of type **INS** or block outputs of compatible type (for example, **REAL**) to input **IN1** and **IN2**.

On output side, you can connect a user-defined signal of the type **MV** or **APC** or you can connect other block inputs with compatible type (for example, **REAL**) for further processing.

Measured values are handled in CFC as percentage values only. Therefore the **OUT** output contains information for the conversion to primary/secondary values including the unit. This information is read from the **VALDESC** input, where you can directly connect the corresponding measuring signal from which the value description shall be used. If you do not connect the **VALDESC** input, the signal connected at the **OUT** output cannot be converted. That means primary and secondary values of the signal are the same as the percentage value.



NOTE

For the user-defined signals of the type **MV**, **CMV**, **DEL**, **WYE**, and **APC**, you can overwrite the multiplier and the unit (for example, **kV**) for primary and secondary representation in the **Properties** tab of the signal in the **Information Routing** matrix. If **Define Unit** is selected, the multiplier and the unit are used from the properties of a signal, instead of the multiplier and the unit set in the CFC given by the **VALDESC** input. This feature allows you, for example, to change the multiplier and the unit of a user-defined signal from **kV** to **V**. Nevertheless, for the value conversion from the CFC-internal percentage value to a primary or secondary value, the **VALDESC** input has to be connected.

Related Topics

[12.1.1.4 Block](#)

12.2.2.4 DIV_XMV

The **DIV_XMV** block divides a measurement value (numerator) by a 2nd measurement value (denominator) and multiplies it with an additional floating-point number without quality information. The quality of the measurement inputs are taken into account.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	STRUCT	Measured value (Numerator)	Value: 0.0 Quality: 0 (GOOD)
	IN_DIV	STRUCT	Measured value (Denominator)	Value: 0.0 Quality: 0 (GOOD)
	DIV_C	REAL	Additional factor (value without quality information)	1.0
	VALDESC	STRUCT	Value description for the measurement output value	none
Output	OUT	STRUCT	- Result of function $OUT = (IN * DIV\_C) / IN\_DIV$ - Quality information of the inputs IN and IN_DIV combined with the logical OR function.	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block divides the measured value at input **IN** by the measured value at input **IN2** and multiplies the result with an additional floating point value at the **DIV_C** input. The result of the calculation is available at the **OUT** output. The quality information at the output is built from the quality information of the inputs **IN** and **IN_DIV** combined with the logical OR function.

Additionally to the preferred signals of type **MV**, you can connect also signals of type **INS** or block outputs of compatible type (for example, **REAL**) to input **IN** and **IN_DIV**.

On output side, you can connect a user-defined signal of the type **MV** or **APC** or you can connect other block inputs with compatible type (for example, **REAL**) for further processing.

Measured values are handled in CFC as percentage values only. Therefore the **OUT** output contains information for the conversion to primary/secondary values including the unit. This information is read from the **VALDESC** input, where you can directly connect the corresponding measuring signal from which the value description shall be used. If you do not connect the **VALDESC** input, the signal connected at the **OUT** output cannot be converted. That means primary and secondary values of the signal are the same as the percentage value.



NOTE

For the user-defined signals of the type **MV**, **CMV**, **DEL**, **WYE**, and **APC**, you can overwrite the multiplier and the unit (for example, **kV**) for primary and secondary representation in the **Properties** tab of the signal in the **Information Routing** matrix. If **Define Unit** is selected, the multiplier and the unit are used from the properties of a signal, instead of the multiplier and the unit set in the CFC given by the **VALDESC** input. This feature allows you, for example, to change the multiplier and the unit of a user-defined signal from **kV** to **V**. Nevertheless, for the value conversion from the CFC-internal percentage value to a primary or secondary value, the **VALDESC** input has to be connected.

Alternative Block Types

If quality information and value description must not be taken into account, Siemens recommends using the **DIV_R** or **DIV_D** blocks instead of the **DIV_XMV** block. The **DIV_R** and **DIV_D** blocks consume less CPU load.

Related Topics

[12.1.1.4 Block](#)

12.2.3 Compare

12.2.3.1 LT_D

The **LT_D** block compares 2 whole-number input values. If input value 1 is less than input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	0
	IN2	DINT	Input value 2	0
Outputs	OUT	BOOL	1 (TRUE): IN1 < IN2 0 (FALSE): IN1 >= IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is less than the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).

Alternative Block Types

If you want to compare floating-point numbers, use the **LT_R** block instead of **LT_D**.

Related Topics

[12.1.1.4 Block](#)

[12.2.3.2 LT_R](#)

[12.2.3.3 LE_D](#)

[12.2.3.4 LE_R](#)

[12.2.3.6 GE_R](#)

[12.2.3.7 GT_D](#)

[12.2.3.8 GT_R](#)

[12.2.3.9 EQ_D](#)

[12.2.3.11 EQ_R](#)

[12.2.3.12 NE_D](#)

[12.2.3.13 NE_R](#)

[12.8.1 Basic Data Types](#)

12.2.3.2 LT_R

The **LT_R** block compares 2 floating-point input values. If input value 1 is less than input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	0.0
	IN2	REAL	Input value 2	0.0
Outputs	OUT	BOOL	1 (TRUE): IN1 < IN2 0 (FALSE): IN1 >= IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is less than the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).



NOTE

If you connect a signal (for example, measured values of type MV) at the input **IN1** or **IN2**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Alternative Block Types

If you want to compare only whole numbers, Siemens recommends that you use the **LT_D** block instead of **LT_R**.

Related Topics

[12.1.1.4 Block](#)

[12.2.3.1 LT_D](#)

[12.2.3.3 LE_D](#)

[12.2.3.4 LE_R](#)

[12.2.3.6 GE_R](#)

[12.2.3.7 GT_D](#)

[12.2.3.8 GT_R](#)
[12.2.3.9 EQ_D](#)
[12.2.3.11 EQ_R](#)
[12.2.3.12 NE_D](#)
[12.2.3.13 NE_R](#)
[12.8.1 Basic Data Types](#)

12.2.3.3 LE_D

The **LE_D** block compares 2 whole-number input values. If input value 1 is less than or equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	0
	IN2	DINT	Input value 2	0
Outputs	OUT	BOOL	1 (TRUE): N1 <= IN2 0 (FALSE): IN1 > IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is less than or equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).

Alternative Block Types

If you want to compare floating-point numbers, Siemens recommends that you use the **LE_R** block instead of **LE_D**.

Related Topics

[12.1.1.4 Block](#)
[12.2.3.1 LT_D](#)
[12.2.3.2 LT_R](#)
[12.2.3.4 LE_R](#)
[12.2.3.6 GE_R](#)
[12.2.3.7 GT_D](#)
[12.2.3.8 GT_R](#)
[12.2.3.9 EQ_D](#)
[12.2.3.11 EQ_R](#)
[12.2.3.12 NE_D](#)
[12.2.3.13 NE_R](#)
[12.8.1 Basic Data Types](#)

12.2.3.4 LE_R

The **LE_R** block compares 2 floating-point input values. If input value 1 is less than or equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	0.0
	IN2	REAL	Input value 2	0.0
Outputs	OUT	BOOL	1 (TRUE): IN1 <= IN2 0 (FALSE): IN1 > IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is less than or equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).



NOTE

If you connect a signal (for example, measured values of type MV) at the input **IN1** or **IN2**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Alternative Block Types

If you want to compare only whole numbers, Siemens recommends that you use the **LE_D** block instead of **LE_R**.

Related Topics

[12.1.1.4 Block](#)

[12.2.3.1 LT_D](#)

[12.2.3.2 LT_R](#)

[12.2.3.3 LE_D](#)

[12.2.3.6 GE_R](#)

[12.2.3.7 GT_D](#)

[12.2.3.8 GT_R](#)

[12.2.3.9 EQ_D](#)

[12.2.3.11 EQ_R](#)

[12.2.3.12 NE_D](#)

[12.2.3.13 NE_R](#)

[12.8.1 Basic Data Types](#)

12.2.3.5 GE_D

The **GE_D** block compares 2 whole-number input values. If input value 1 is greater than or equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	0
	IN2	DINT	Input value 2	0
Outputs	OUT	BOOL	1 (TRUE): IN1 >= IN2 0 (FALSE): IN1 < IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is greater than or equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).

Alternative Block Types

If you want to compare floating-point numbers, Siemens recommends that you use the **GE_R** block instead of **GE_D**.

Related Topics

[12.1.1.4 Block](#)
[12.2.3.1 LT_D](#)
[12.2.3.2 LT_R](#)
[12.2.3.3 LE_D](#)
[12.2.3.4 LE_R](#)
[12.2.3.6 GE_R](#)
[12.2.3.7 GT_D](#)
[12.2.3.8 GT_R](#)
[12.2.3.9 EQ_D](#)
[12.2.3.11 EQ_R](#)
[12.2.3.12 NE_D](#)
[12.2.3.13 NE_R](#)
[12.8.1 Basic Data Types](#)

12.2.3.6 GE_R

The **GE_R** block compares 2 floating-point input values. If input value 1 is greater than or equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	0.0
	IN2	REAL	Input value 2	0.0
Outputs	OUT	BOOL	1 (TRUE): IN1 >= IN2 0 (FALSE): IN1 < IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is greater than or equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).



NOTE

If you connect a signal (for example, measured values of type MV) at the input **IN1** or **IN2**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Alternative Block Types

If you want to compare only whole numbers, Siemens recommends that you use the **GE_D** block instead of **GE_R**.

Related Topics

[12.1.1.4 Block](#)
[12.2.3.1 LT_D](#)
[12.2.3.2 LT_R](#)
[12.2.3.3 LE_D](#)

[12.2.3.4 LE_R](#)[12.2.3.7 GT_D](#)[12.2.3.8 GT_R](#)[12.2.3.9 EQ_D](#)[12.2.3.11 EQ_R](#)[12.2.3.12 NE_D](#)[12.2.3.13 NE_R](#)[12.8.1 Basic Data Types](#)

12.2.3.7 GT_D

The **GT_D** block compares 2 whole-number input values. If input value 1 is greater than input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	0
	IN2	DINT	Input value 2	0
Outputs	OUT	BOOL	1 (TRUE): IN1 > IN2 0 (FALSE): IN1 <= IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is greater than the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).

Alternative Block Types

If you want to compare floating-point numbers, Siemens recommends that you use the **GT_R** block instead of **GT_D**.

Related Topics

[12.1.1.4 Block](#)[12.2.3.1 LT_D](#)[12.2.3.2 LT_R](#)[12.2.3.3 LE_D](#)[12.2.3.4 LE_R](#)[12.2.3.6 GE_R](#)[12.2.3.8 GT_R](#)[12.2.3.9 EQ_D](#)[12.2.3.11 EQ_R](#)[12.2.3.12 NE_D](#)[12.2.3.13 NE_R](#)[12.8.1 Basic Data Types](#)

12.2.3.8 GT_R

The **GT_R** block compares 2 floating-point input values. If input value 1 is greater than input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	0.0
	IN2	REAL	Input value 2	0.0
Outputs	OUT	BOOL	1 (TRUE): IN1 > IN2 0 (FALSE): IN1 <= IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is greater than the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).



NOTE

If you connect a signal (for example, measured values of type MV) at the input **IN1** or **IN2**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Alternative Block Types

If you want to compare only whole numbers, Siemens recommends that you use the **GT_D** block instead of **GT_R**.

Related Topics

[12.1.1.4 Block](#)
[12.2.3.1 LT_D](#)
[12.2.3.2 LT_R](#)
[12.2.3.3 LE_D](#)
[12.2.3.4 LE_R](#)
[12.2.3.6 GE_R](#)
[12.2.3.7 GT_D](#)
[12.2.3.9 EQ_D](#)
[12.2.3.11 EQ_R](#)
[12.2.3.12 NE_D](#)
[12.2.3.13 NE_R](#)
[12.8.1 Basic Data Types](#)

12.2.3.9 EQ_D

The **EQ_D** block compares 2 whole-number input values. If input value 1 is equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	0
	IN2	DINT	Input value 2	0
Outputs	OUT	BOOL	1 (TRUE): IN1 = IN2 0 (FALSE): IN1 <> IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).

Alternative Block Types

If you want to compare floating-point numbers, Siemens recommends that you use the **EQ_R** block instead of **EQ_D**.

Related Topics

- [12.1.1.4 Block](#)
- [12.2.3.1 LT_D](#)
- [12.2.3.2 LT_R](#)
- [12.2.3.3 LE_D](#)
- [12.2.3.4 LE_R](#)
- [12.2.3.6 GE_R](#)
- [12.2.3.7 GT_D](#)
- [12.2.3.8 GT_R](#)
- [12.2.3.11 EQ_R](#)
- [12.2.3.12 NE_D](#)
- [12.2.3.13 NE_R](#)
- [12.8.1 Basic Data Types](#)

12.2.3.10 EQ_E

The **EQ_E** block compares 2 settings of the type **ENG**. If input value 1 is equal to input value 2, the block sets the output to 1 (TRUE).

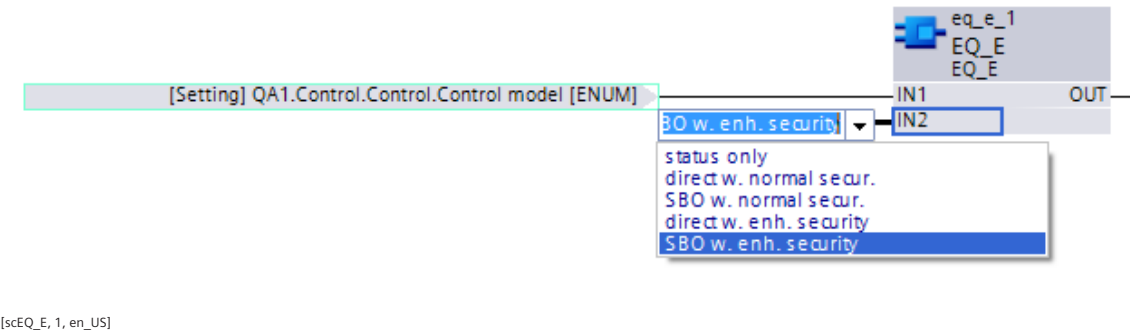
Connections and Explanations

You can find explanations for the connections of the block in the following table:

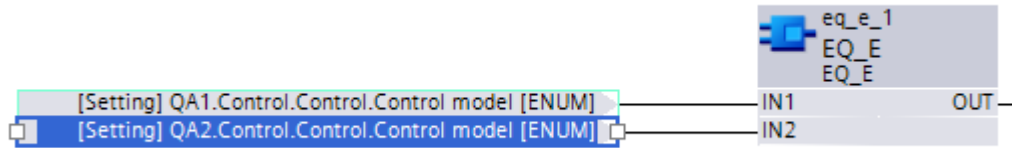
	Name	Data Type	Explanation	Default
Inputs	IN1	ENUM	Input value 1	0
	IN2	ENUM	Input value 2	0
Outputs	OUT	BOOL	1 (TRUE): IN1 == IN2 0 (FALSE): IN1 <<<<>>>> IN2	

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).
If you connect a setting of type **ENG** at input **IN1** or **IN2** a list of all possible setting values is available automatically at the other input. You can select the setting value for the comparison directly at the input by selecting the value in the drop-down list.



If the settings have the same setting list, you can also connect an extra setting of the type **ENG** at the 2nd input, instead of selecting a value.



[scEQ_E2, 1, en_US]

Related Topics

- [12.1.1.4 Block](#)
- [12.8.1 Basic Data Types](#)

12.2.3.11 EQ_R

The **EQ_R** block compares 2 floating-point input values. If input value 1 is equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	0.0
	IN2	REAL	Input value 2	0.0
Outputs	OUT	BOOL	1 (TRUE): IN1 = IN2 0 (FALSE): IN1 <> IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).



NOTE

If you connect a signal (for example, measured values of type MV) at the input **IN1** or **IN2**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Alternative Block Types

If you want to compare only whole numbers, Siemens recommends that you use the **EQ_D** block instead of **EQ_R**.

Related Topics

- [12.1.1.4 Block](#)
- [12.2.3.1 LT_D](#)
- [12.2.3.2 LT_R](#)
- [12.2.3.3 LE_D](#)
- [12.2.3.4 LE_R](#)
- [12.2.3.6 GE_R](#)
- [12.2.3.7 GT_D](#)
- [12.2.3.8 GT_R](#)
- [12.2.3.9 EQ_D](#)
- [12.2.3.12 NE_D](#)
- [12.2.3.13 NE_R](#)

12.8.1 Basic Data Types

12.2.3.12 NE_D

The **NE_D** block compares 2 whole-number input values. If input value 1 is not equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	0
	IN2	DINT	Input value 2	0
Outputs	OUT	BOOL	1 (TRUE): IN1 <> IN2 0 (FALSE): IN1 = IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is not equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).

Alternative Block Types

If you want to compare floating-point numbers, Siemens recommends that you use the **NE_R** block instead of **NE_D**.

Related Topics

[12.1.1.4 Block](#)

[12.2.3.1 LT_D](#)

[12.2.3.2 LT_R](#)

[12.2.3.3 LE_D](#)

[12.2.3.4 LE_R](#)

[12.2.3.6 GE_R](#)

[12.2.3.7 GT_D](#)

[12.2.3.8 GT_R](#)

[12.2.3.9 EQ_D](#)

[12.2.3.11 EQ_R](#)

[12.2.3.13 NE_R](#)

[12.8.1 Basic Data Types](#)

12.2.3.13 NE_R

The **NE_R** block compares 2 floating-point input values. If input value 1 is not equal to input value 2, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	0.0
	IN2	REAL	Input value 2	0.0
Outputs	OUT	BOOL	1 (TRUE): IN1 <> IN2 0 (FALSE): IN1 = IN2	0

Detailed Description

The block compares the value at the **IN1** input with the value at the **IN2** input. If the value at the **IN1** input is not equal to the value at the **IN2** input, the block sets the **OUT** output to 1 (TRUE).



NOTE

If you connect a signal (for example, measured values of type MV) at the input **IN1** or **IN2**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Alternative Block Types

If you want to compare only whole numbers, Siemens recommends that you use the **NE_D** block instead of **NE_R**.

Related Topics

[12.1.1.4 Block](#)
[12.2.3.1 LT_D](#)
[12.2.3.2 LT_R](#)
[12.2.3.3 LE_D](#)
[12.2.3.4 LE_R](#)
[12.2.3.6 GE_R](#)
[12.2.3.7 GT_D](#)
[12.2.3.8 GT_R](#)
[12.2.3.9 EQ_D](#)
[12.2.3.11 EQ_R](#)
[12.2.3.12 NE_D](#)
[12.8.1 Basic Data Types](#)

12.2.3.14 LIML_R

The **LIML_R** block compares a floating-point number with a programmable limiting value. If the limiting value is not reached, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	REAL	Input value	0.0
	LIMIT	REAL	Limiting value	0.0
	HYS	REAL	Hysteresis (in percent)	5.0
Outputs	EXC	BOOL	1: Limiting value not reached 0: Hysteresis value exceeded	0

Detailed Description

The block compares the value at the **IN** input with a limiting value at the **LIMIT** input. If the input value is smaller than the limiting value, the block sets the **EXC** output to 1 (TRUE). You can use the value at the **HYS** input to parameterize a hysteresis so that, if the limiting value is exceeded, the block does not set the output to 0 (FALSE) immediately. Instead, the block resets the output only if the input value exceeds the percentage value ($100 + \text{value at the HYS input}$) of the value at the **LIMIT** input. For example, if the **HYS** input has a default setting of 5, the block resets the output if 105 % of the value at the **LIMIT** input is exceeded.

**NOTE**

If you connect a signal (for example, measured values of type MV) at the input **IN**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Related Topics

[12.1.1.4 Block](#)

[12.2.3.15 LIMU_R](#)

[12.8.1 Basic Data Types](#)

12.2.3.15 LIMU_R

The **LIMU_R** block compares a floating-point number with a programmable limiting value. If the limiting value is exceeded, the block sets the output to 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	REAL	Input value	0.0
	LIMIT	REAL	Limiting value	0.0
	HYS	REAL	Hysteresis (in percent)	5.0
Outputs	EXC	BOOL	1 (TRUE): Limiting value exceeded 0 (FALSE): Hysteresis value not reached	0

Detailed Description

The block compares the value at the **IN** input with a limiting value at the **LIMIT** input. If the input value exceeds the limiting value, the block sets the **EXC** output to 1 (TRUE). You can use the value at the **HYS** input to parameterize a hysteresis so that, if the input value falls below the limiting value, the block does not set the output to 0 (FALSE) immediately. Instead, the block resets the output only if the input value falls below the percentage value (100 - value at the **HYS** input) of the value at the **LIMIT** input. For example, if the **HYS** input has a default setting of 5, the block resets the output if the input value falls below 95 % of the limiting value.

**NOTE**

If you connect a signal (for example, measured values of type MV) at the input **IN**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Related Topics

[12.1.1.4 Block](#)

[12.2.3.14 LIML_R](#)

[12.8.1 Basic Data Types](#)

12.2.3.16 DRAGI_R

The **DRAGI_R** saves the maximum or minimum value present at an input as a floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default

Inputs	IN	REAL	Input value	0.0
	MIN	BOOL	Select type of saving 0: Block saves maximum input value 1: Block saves minimum input value	0
	RESET	BOOL	1: Block deletes the saved value	0
Outputs	OUT	REAL	Saved value	0.0

Detailed Description

If the **MIN** input is 0 (FALSE), the block saves the maximum value at the **IN** input. If the **MIN** input is 1 (TRUE), the block saves the minimum value. The saved value is available at the **OUT** output. To reset the saved value, set the **RESET** input to 1 (TRUE). If the **RESET** input is 1 (TRUE), the value at the **OUT** output is set to value at the input **IN**.



NOTE

If you connect a signal (for example, measured values of type MV) at the input **IN**, take into account that there is no quality handling in the block and that measured values in CFC are always used as percentage values only.

Related Topics

[12.1.1.4 Block](#)

[12.8.1 Basic Data Types](#)

12.2.4 Control

12.2.4.1 APC_DEF

You can use the block **APC_DEF** to prepare a switching command for an output by the block **APC_EXE**.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default
Inputs	ID	ID_APCC	ID (handle) of APC to be controlled	0
	EN_I	BOOL	Enable action. Ongoing action is stopped, if EN is reset.	1
	VAL	REAL	Value input	0
	SELECT	UINT	Select command 1: Select >1: Select with a value from the VAL input	0
	OPERATE	BOOL	Operate command	0
	TRIG	BOOL	Trigger command; trigger for start of switching	0
	EDGE	BOOL	Triggering policy: 0: Trigger on rising edges of TRIG only. 1: Trigger on every change of TRIG.	0
	ORIGIN	UINT	Source of cause for the command 0: Value is not permitted 1: Value is not permitted 2: Field control 3: Substation control 4: Remote control 5: Automatic field 6: Automatic system 7: Remote automatic operation 8: Maintenance 9: Process >9: Values are not permitted	5
Outputs	ID_OUT	ID_APCC	Command ID output to chain to an APC_EXE block. This just mirrors the ID input.	0
	EN_O	BOOL	Enable out (mirrors input)	0

Detailed Description

A time-activated operation, which is described in IEC 61850 is not used in SIPROTEC CFC.

The block **APC_DEF** allows you to specify if a switching command selects, switches, or selects and switches a voltage controller. You can then forward the command at the input **ID** to the output **ID_OUT**. Connect this output with the input **ID** of the **APC_EXE** block. The block **APC_EXE** then issues the command. You can find more information about this under [12.2.4.2 APC_EXE](#).

Related Topics

[12.1.1.4 Block](#)

12.2.4.2 APC_EXE

With the block **APC_EXE**, you issue a switching command to the voltage controller that you have prepared with the block **APC_DEF**.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default
Inputs	ID	ID_APCC	ID (handle) of APC to be controlled	0
	EN_I	BOOL	Enable action. Ongoing action is stopped, if EN is reset.	1
	CANCEL	BOOL	Cancel command execution	0
	REL_EQ	BOOL	Force release for set point = actual	0
	REL_DBL	BOOL	Force release of double command blocking	0
	REL_PLBY	BOOL	Force release of bay or substation interlocking	0
	REL_ILOC	BOOL	Force release of interlocking	0
	PT	UINT16	Delay time for output OK (in milliseconds)	10
Outputs	EN_O	BOOL	Enable out (mirrors input)	0
	ACTIVE	BOOL	Indicates that the command is active	0
	SEL_OK	BOOL	Indicates the successful selection of APC (always set, if no separate selection specified in APC_DEF).	0
	OK	BOOL	Indicates that the command has completed successfully. May be delayed with input PT .	0
	ERR	BOOL	Indicates that the command has completed with a failure.	0

Detailed Description

With the block **APC_EXE**, issue a switching command that you have prepared with block **APC_DEF**. For this purpose, connect the input **ID** of the block **APC_EXE** with the output **ID_OUT** of the block **APC_DEF**. You can find more information about preparing the switching command under [12.2.4.1 APC_DEF](#).

Changes for APC types are made against DPC_EXE/SPC_EXE in the following items:

- Some inputs are set invisible (for example, RQ_SYNC).
- All of these inputs do not make sense now in conjunction with control of system variables of type APC, but they are left invisible for possible future extensions.

Related Topics

[12.1.1.4 Block](#)

12.2.4.3 BSC_DEF

You are using the block **BSC_DEF** to prepare a switching command for an output by the block **BSC_EXE**.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default

Inputs	ID	ID_BSCC	Signal Position (type BSC)	0
	EN_I	BOOL	Release of command output 1: Command output is possible 0: Current command execution is canceled, further command outputs are not possible	1
	VAL	BOOL	Switching direction 1: One step higher 0: One step lower	0
	SELECT	UINT	Selecting the tap changer 0: Tap changer should not be selected 1: Tap changer should be selected >1: Tap changer should be selected with a value from the VAL input	0
	OPERATE	BOOL	Switching the tap changer 1: Tap changer should be switched higher or lower 0: Tap changer should not be switched	0
	TRIG	BOOL	Command output A status change to this input forwards the command to the output ID_OUT . The value at the EDGE input determines the type of the status change.	0
	EDGE	BOOL	Type of status change 1: Every status change forwards the command to the output ID_OUT . 0: Every status change from 0 to 1 forwards the command to output ID_OUT .	0
	ORIGIN	UINT	Source of cause for the command 0: Value is not permitted 1: Value is not permitted 2: Field control 3: Substation control 4: Remote control 5: Automatic field 6: Automatic system 7: Remote automatic operation 8: Maintenance 9: Process >9: Values are not permitted	5
Outputs	ID_OUT	ID_BSCC2	Command forwarded from input ID	0
	EN_O	BOOL	Enabling signal forwarded from EN_I	0

Detailed Description

The block **BSC_DEF** allows you to specify if a switching command selects, switches, or selects and switches a tap changer. You can then forward the command at the input **ID** to the output **ID_OUT**. Connect this output with the input **ID** of the **BSC_EXE** block. The block **BSC_EXE** then issues the command. You find more information about this under [12.2.4.4 BSC_EXE](#).

For function charts, there is the rule that input signals on the left-hand side of the block and output signals on the right-hand side of the block are connected. According to this rule, if you show the sidebar, the input signals will be in the left-hand sidebar and the output signals in the right-hand sidebar. A command should actually be considered the output signal for the process. However, since a command presents an input signal for the **BSC_DEF** block, the command is connected to the input side of the block. The command is therefore also found in the left sidebar. If the block **BSC_DEF** forwards the command to the block **BSC_EXE**, the block

BSC_EXE will receive the information as to which command it will issue. Therefore, for the command output, the block **BSC_EXE** requires no further connection to the right sidebar. However, the block receives feedback. These can be processed further in the function chart, or switched as output signals using the right sidebar. Please observe the following procedure to prepare a command using the **BSC_DEF** block and for forwarding to the **BSC_EXE** block:

- **Controlling Command Release**

You can release or block the command output via the value at the **EN_I** input. The **BSC_DEF** block can forward a command to the **ID_OUT** output only if the input is set to 1. The state of the **EN_I** input is forwarded to the **EN_O** output. However, you can use these 2 connections to interrupt a switching sequence. You can find more information about this under [12.2.4.4 BSC_EXE](#) in section **Realize operating sequence**.

- **Specifying the Switching Direction**

The value at the **VAL** input specifies whether the tap changer should be switched higher or lower.

- **Specifying the Type of Command**

Using the inputs **SELECT** and **OPERATE**, specify whether the command shall select or switch the tap changer.

If the input **SELECT** is set, the tap changer is selected. A block **BSC_EXE** connected to the block **BSC_DEF** receives a feedback signal about whether the selection was successful or not.

If the input **OPERATE** has been set, the tap changer is switched in the direction specified via the **VAL** input.

Simultaneously setting both inputs results in a select-before-operating sequence that is defined in IEC 61850. Here the tap changer is selected first. The tap changer is switched only if the feedback signal to the **BSC_EXE** is positive.

If neither of the 2 inputs are set, when forwarding the command to the output **ID_OUT**, the output **EN_O** is automatically reset to 0.

- **Adding Source of Cause**

You can assign a certain source of the cause to the switching command using the value at the **ORIGIN** input. If for example you use the value 4, the command is treated like a remote-control command during processing. The source of the cause is also an additional item of information in the indication log. The source of the cause has no influence on the functionality of the block.

- **Forwarding Command to Output**

A status change at the **TRIG** input forwards the command at the input **ID** to the output **ID_OUT**. The value at the input **EDGE** specifies the required status change. If the **EDGE** input is set to 1, then every status change forwards the command. If the input **EDGE** is set to 0 then only a status change from 0 to 1 is enough to forward the command.

Related Topics

[12.1.1.4 Block](#)

12.2.4.4 BSC_EXE

With the block **BSC_EXE**, you issue a switching command to the tap changer that you have prepared with the block **BSC_DEF**.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default

Inputs	ID	ID_BSCC2	Switching command to issue	0
	EN_I	BOOL	Release of command output 1: Command output is possible 0: Current command execution is canceled, further command outputs are not possible	1
	CANCEL	BOOL	1: Current command execution is canceled	0
	REL_DBL	BOOL	1: Double-activation blocking is released	0
	REL_PLBY	BOOL	1: Substation or bay interlocking is released	0
	REL_ILOC	BOOL	1: Interlocking is released	0
	PT	UINT16	Time delay in milliseconds for output OK	0
Outputs	EN_O	BOOL	Enabling signal forwarded from EN_I	0
	ACTIVE	BOOL	1: Command execution is active	0
	SEL_OK	BOOL	1: Tap changer has been selected successfully	0
	OK	BOOL	1: Command was executed successfully	0
	ERR	BOOL	1: Unsuccessful command execution	0

Detailed Description

With the block **BSC_EXE**, issue a switching command that you prepared with block **BSC_DEF**. For this purpose, you connect the input **ID** of block **BSC_EXE** with the output **ID_OUT** of the block **BSC_DEF**. More information about preparing the switching command can be found under [12.2.4.3 BSC_DEF](#).

For function charts, there is the rule that input signals on the left-hand side of the block and output signals on the right-hand side of the block are connected. According to this rule, if you show the sidebar, the input signals will be in the left-hand sidebar and the output signals in the right-hand sidebar. A command should actually be considered the output signal for the process. However, since the command forwarded by block **BSC-DEF** presents an input signal for the **BSC_EXE** block, the command is connected to the input side of the block. As a result, the block **BSC_EXE** receives the information as to which command it will issue. Therefore, for the command output, the block **BSC_EXE** requires no further connection to the right sidebar. However, the block receives feedback. These can be processed further in the function chart, or switched as output signals using the right sidebar.

Follow this procedure to issue a command using the block **BSC_EXE**:

- **Controlling a Command Release**

You can release or block the command output via the value at the **EN_I** input. The **BSC_EXE** block can issue a command only if the input is set to 1. The state of the **EN_I** input is forwarded to the **EN_O** output. However, you can use these 2 connections to interrupt an operating sequence. You can find more information about this in the **Realize operating sequence** section.

- **Canceling a Current Command Execution**

If you set the **CANCEL** input to 1, then the current command execution is canceled.

- **Removing Interlocking**

Use the inputs **REL_DBL**, **REL_PLBY**, and **REL_ILOC** to remove the interlocking conditions. If you set one of these inputs to 1, the applicable interlocking condition will be put out of operation.

- **Evaluating Feedback**

Use the outputs **ACTIVE**, **SEL_OK**, **OK** and **ERR** to evaluate different feedbacks. You can use these outputs, for example, for realizing an operating sequence or routing indications or LEDs.

The 2 outputs **OK** and **ERR** will keep their condition until the next command execution. The 2 outputs **ACTIVE** and **SEL_OK** are reset after the command execution.

Implement Switching Sequence

You can implement the switching sequence if you successively switch several block combinations **BSC_DEF** and **BSC_EXE**.

For a switching sequence, switch the output **OK** of the block **BSC_EXE** of the 1st block combination with the input **TRIG** of the block **BSC_DEF** of the 2nd block combination, and so on. By connecting the inputs **EN_I** and outputs **EN_O**, you can centrally control the release of the switching sequence. You only need to set the input **EN_I** of the 1st block **BSC_DEF** to 0 - the switching sequence is no longer executed.

Related Topics

[12.1.1.4 Block](#)

12.2.4.5 SPC_DEF and DPC_DEF

You are using the blocks **SPC_DEF** and **DPC_DEF** to prepare a switching command for an output by the blocks **SPC_EXE** or **DPC_EXE**.

Depending on the command type, use the following block combinations:

- Block combination **SPC_DEF** and **SPC_EXE** for single commands.
- Block combination **DPC_DEF** and **DPC_EXE** for double commands.

You can implement the switching orders by successively switching several of the block combinations.



NOTE

The functionality of the blocks **SPC_DEF** and **DPC_DEF** as well as **SPC_EXE** and **DPC_EXE** are identical. The descriptions for these blocks are therefore combined. The blocks **SPC_DEF** and **DPC_DEF** are described in the following as **xPC_DEF**. The blocks **SPC_EXE** and **DPC_EXE** are described in the following as **xPC_EXE**.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default

Inputs	ID	ID_SPCC (Single command) ID_DPCC (Double command)	Switching command to issue	0
	EN_I	BOOL	Release of command output 1: Command output is possible 0: Current command execution is canceled, further command outputs are not possible	1
	VAL	BOOL	Switching direction 1: Switch on 0: Switch off	0
	SELECT	UINT	Selecting the switching device 0: Switching device should not be selected 1: Switching device should be selected >1: Switching device should be selected with a value from the VAL input	0
	OPERATE	BOOL	Switching the switching device 1: Switching device will be switched on or off. 0: Switching device should not be switched	0
	TRIG	BOOL	Command output A status change to this input forwards the command to the output ID_OUT . The value at the EDGE input determines the type of the status change.	0
	EDGE	BOOL	Type of status change 1: Every status change forwards the command to the output ID_OUT . 0: Every status change from 0 to 1 forwards the command to output ID_OUT .	0
	ORIGIN	UINT	Source of cause for the command 0: Value is not permitted 1: Value is not permitted 2: Field control 3: Substation control 4: Remote control 5: Automatic field 6: Automatic system 7: Remote automatic operation 8: Maintenance 9: Process >9: Values are not permitted	5
Outputs	ID_OUT	ID_SPCC (Single command) ID_DPCC (Double command)	Command forwarded from input ID	0
	EN_O	BOOL	Enabling signal forwarded from EN_I .	0

Detailed Description

The block **xPC_DEF** allows you to specify if a switching command selects, switches or selects and switches a switching device. You can then forward the command at the input **ID** to the output **ID_OUT**. Connect this output with the input **ID** of the **xPC_EXE** block. The block **xPC_EXE** then issues the command. You find more information about this under [12.2.4.6 SPC_EXE and DPC_EXE](#).

For function charts, there is the rule that input signals on the left-hand side of the block and output signals on the right-hand side of the block are connected. According to this rule, if you show the sidebar, the input signals will be in the left-hand sidebar and the output signals in the right-hand sidebar. A command should actually be considered the output signal for the process. However, since a command presents an input signal for the **xPC_DEF** block, the command is connected to the input side of the block. The command is therefore also found in the left sidebar. If the block **xPC_DEF** forwards the command to the block **xPC_EXE**, then the block **xPC_EXE** will execute the received command. Therefore, for the command output, the block **xPC_EXE** requires no further connection to the right sidebar. However, the block receives feedback. These can be processed further in the function chart, or switched as output signals using the right sidebar.

Please observe the following procedure to prepare a command using the **xPC_DEF** block and for forwarding to the **xPC_EXE** block:

- **Controlling Command Release**

You can release or block the command output via the value at the **EN_I** input. The **xPC_DEF** block can forward a command to the **ID_OUT** output only if the input is set to 1. The state of the **EN_I** input is forwarded to the **EN_O** output. However, you can use these 2 connections to interrupt a switching sequence. You can find more information about this under [12.2.4.6 SPC_EXE and DPC_EXE](#) in section **Realize operating sequence**.

- **Specifying the Switching Direction**

The value at the **VAL** input specifies whether the switching device should be switched on or off.

- **Specifying the Type of Command**

Using the inputs **SELECT** and **OPERATE**, specify whether the command shall select or switch the switching device.

If the input **SELECT** is set, the switching device is selected. A block **xPC_EXE** connected to the block **xPC_DEF** receives a feedback signal about whether the selection was successful or not.

If the input **OPERATE** has been set, the switching device is switched in the direction specified via the **VAL** input.

Simultaneously setting both inputs results in a select-before-operating sequence that is defined in IEC 61850. Here the switching device is selected first. The switching device is switched only if the feedback signal to the **xPC_EXE** is positive.

If neither of the 2 inputs are set, when forwarding the command to the output **ID_OUT**, the output **EN_O** is automatically reset to 0.

- **Adding Source of Cause**

You can assign a certain source of the cause to the switching command using the value at the **ORIGIN** input. If for example you use the value 4, the command is treated like a remote-control command during processing. The source of the cause is also an additional item of information in the indication log. The source of the cause has no influence on the functionality of the block.

- **Forwarding Command to Output**

A status change at the **TRIG** input forwards the command at the input **ID** to the output **ID_OUT**. The value at the input **EDGE** specifies the required status change. If the **EDGE** input is set to 1, then every status change will forward the command. If the input **EDGE** is set to 0 then only a status change from 0 to 1 is enough to forward the command.

Alternative Block Types

If you neither want to realize the operating sequence nor require a separate **Select** and **Switch**, Siemens recommends the block [12.2.4.8 SPC_OUT and DPC_OUT](#).

Related Topics

[12.1.1.4 Block](#)

12.2.4.6 SPC_EXE and DPC_EXE

With the blocks **SPC_EXE** and **DPC_EXE**, you issue a switching command to the switching device that you have prepared with the blocks **SPC_DEF** or **DPC_DEF**.

Depending on the command type, use the following block combinations:

- Block combination **SPC_DEF** and **SPC_EXE** for single commands.
- Block combination **DPC_DEF** and **DPC_EXE** for double commands.

You can implement the switching orders by successively switching several of the block combinations.

**NOTE**

The functionality of the blocks **SPC_DEF** and **DPC_DEF** as well as **SPC_EXE** and **DPC_EXE** are identical. The descriptions for these blocks are therefore combined. The blocks **SPC_DEF** and **DPC_DEF** are described in the following as **xPC_DEF**. The blocks **SPC_EXE** and **DPC_EXE** are described in the following as **xPC_EXE**.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default
Inputs	ID	ID_SPCC (Single command) ID_DPCC (Double command)	Switching command to issue	0
	EN_I	BOOL	Release of command output 1: Command output is possible 0: Current command execution is canceled, further command outputs are not possible	1
	CANCEL	BOOL	1: Current command execution is canceled	0
	REL_EQ	BOOL	1: Interlocking Setpoint = Actual is released	0
	REL_DBL	BOOL	1: Double-activation blocking is released	0
	REL_PROT	BOOL	1: Blocking is released	0
	REL_PLBY	BOOL	1: Substation or bay interlocking is released	0
	REL_ILOC	BOOL	1: Interlocking is released	0
	RQ_SYNC	BOOL	1: Switching with synchro-check is executed (only for DPC_EXE)	0
	PT	UINT16	Delay time in milliseconds for output OK	0
Outputs	EN_O	BOOL	Enabling signal forwarded from EN_I .	0
	ACTIVE	BOOL	1: Command execution is active	0
	SEL_OK	BOOL	1: Switching device has been selected successfully.	0
	OK	BOOL	1: Command was executed successfully	0
	ERR	BOOL	1: Unsuccessful command execution	0

Detailed Description

With the block **xPC_EXE**, issue a switching command that you prepared with block **xPC_DEF**. For this purpose, you connect the input **ID** of block **xPC_EXE** with the output **ID_OUT** of the block **xPC_DEF**. More information about preparing the switching command can be found under [12.2.4.5 SPC_DEF and DPC_DEF](#).

For function charts, there is the rule that input signals on the left-hand side of the block and output signals on the right-hand side of the block are connected. According to this rule, if you show the sidebar, the input signals will be in the left-hand sidebar and the output signals in the right-hand sidebar. A command should actually be considered the output signal for the process. However, since the command forwarded by block **xPC-DEF** presents an input signal for the **xPC_EXE** block, the command is connected to the input side of the block. As a result, the block **xPC_EXE** receives the information as to which command it will issue. Therefore, for the command output, the block **xPC_EXE** requires no further connection to the right sidebar. However, the block receives feedback. These can be processed further in the function chart, or switched as output signals using the right sidebar.

Follow this procedure to issue a command using the block **xPC_EXE**:

- **Controlling a Command Release**

You can release or block the command output via the value at the **EN_I** input. The **xPC_EXE** block can issue a command only if the input is set to 1. The state of the **EN_I** input is forwarded to the **EN_O** output. However, you can use these 2 connections to interrupt an operating sequence. You can find more information about this in the **Realize operating sequence** section.

- **Canceling a Current Command Execution**

If you set the **CANCEL** input to 1, then the current command execution is canceled.

- **Removing Interlocking**

Use the inputs **REL_EQ**, **REL_DBL**, **REL_PROT**, **REL_PLBY**, and **REL_ILOC** to remove the interlocking conditions. If you set one of these inputs to 1, the applicable interlocking condition will be put out of operation.

- **Evaluating Feedback**

Use the outputs **ACTIVE**, **SEL_OK**, **OK** and **ERR** to evaluate different feedbacks. You can use these outputs, for example, for realizing an operating sequence or routing indications or LEDs.

The 2 outputs **OK** and **ERR** will keep their condition until the next command execution. The 2 outputs **ACTIVE** and **SEL_OK** are reset after the command execution.

Implement Switching Sequence

You can implement the switching sequence if you successively switch several block combinations **xPC_DEF** and **xPC_EXE**.

For a switching sequence, switch the output **OK** of the block **xPC_EXE** of the 1st block combination with the input **TRIG** of the block **xPC_DEF** of the 2nd block combination, and so on. By connecting the inputs **EN_I** and outputs **EN_O**, you can centrally control the release of the switching sequence. You only need to set the input **EN_I** of the 1st block **xPC_DEF** to 0 - the switching sequence is no longer executed.

Alternative Block Types

If you neither want to realize the switching sequence nor require a separate **Select** and **Switch**, Siemens recommends the block [12.2.4.8 SPC_OUT and DPC_OUT](#).

Related Topics

[12.1.1.4 Block](#)

12.2.4.7 SPC_INFO and DPC_INFO

The blocks **SPC_INFO** and **DPC_INFO** provide information of a control service request.

Use the following block depending on the command type:

- Block **SPC_INFO** for single commands
- Block **DPC_INFO** for double commands



NOTE

The functionality of **SPC_INFO** and **DPC_INFO** blocks is identical. The descriptions for these blocks are therefore combined.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default
Input	ID	ID_SPCC ID_DPCC	Command through which information is required	0
	VAL	BOOL	Desired state of the switching device after switching 1: On 0: Off	0
Outputs	DOSEL	BOOL	1: Command selects currently the switching device	0
	DOOPR	BOOL	1: Command switches currently the switching device	0
	DOCNC	BOOL	1: Command is currently being canceled	0
	PEND_ON	BOOL	1: Command is a switch-on command	0
	PEND_OFF	BOOL	1: Command is a switch-off command	0
	RQ_ILOC	BOOL	1: Switching is executed with interlocking	0
	RQ_SYNC	BOOL	1: Switching is executed with synchro-check	0
	ORIGIN	ENUM	Number of the source cause for this command 2: Field control 3: System control 4: Remote control 5: Automatic field 6: Automatic system 7: Remote automatic operation 8: Maintenance 9: Process	0
	ADDCAUSE	DINT	0: No failure occurred > 0: Reason for failure of negative control service response	0
	CTLNUM	UINT	Control sequence number of the last control service	0

Detailed Description

You can use this block to query information about the current command.

The block delivers the information summarized in the previous table, regardless if the command was actually executed or not. Therefore, this block does not provide any information about the process.

Before the 1st command output, the output **VAL** is equal to 0. During the command output the output is set to the value which corresponds to the desired switching state **On** or **Off**. After the command output, the output keeps this value until the next command output.

During the output of a command for switching, the output **DOOPR** and the outputs **PEND_ON** or **PEND_OFF** are set. The outputs are reset as soon as the command output is completed.

The output **DOSEL** is set by selecting the switching devices, and is only reset after the command output has expired.

ADDCAUSE:

- 0: Unknown
- 1: Not-supported
- 2: Blocked-by-switching-hierarchy

- 3: Select-failed
- 4: Invalid-position
- 5: Position-reached
- 6: Parameter-change-in-execution
- 7: Step-limit
- 8: Blocked-by-Mode
- 9: Blocked-by-process
- 10: Blocked-by-interlocking
- 11: Blocked-by-synchrocheck
- 12: Command-already-in-execution
- 13: Blocked-by-health
- 14: 1-of-n-control
- 15: Abortion-by-cancel
- 16: Time-limit-over
- 17: Abortion-by-trip
- 18: Object-not-selected
- 19: Object-already-selected
- 20: No-access-authority
- 21: Ended-with-overshoot
- 22: Abortion-due-to-deviation
- 23: Abortion-by-communication-loss
- 24: Blocked-by-command
- 25: None
- 26: Inconsistent-parameters
- 27: Locked-by-other-client



NOTE

A block **SPC_INFO** or **DPC_INFO** can only process a single command. Therefore, for every command for which you need information, it must be switched with its own block **SPC_INFO** or **DPC_INFO** block.

Related Topics

[12.1.1.4 Block](#)

12.2.4.8 SPC_OUT and DPC_OUT

The blocks **SPC_OUT** and **DPC_OUT** allow the direct command output without selecting the switching device in advance.

Use the following block depending on the command type:

- Block **SPC_OUT** for single commands
- Block **DPC_OUT** for double commands

These blocks are not suitable for operating sequences.



NOTE

The functionality of the block **SPC_OUT** and **DPC_OUT** is identical. The descriptions for these blocks are therefore combined. The blocks **SPC_OUT** and **DPC_OUT** are described in the following as **xPC_OUT**.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	ID	ID_SPCC (Single command) ID_DPCC (Double command)	Switching command to issue	0
	VAL	BOOL	Switching direction 1: Switch on 0: Switch off	0
	TRIG	BOOL	Command output A state change to this input forwards the command to the output ID_OUT . The value at the EDGE input determines the type of state change.	0
	EDGE	BOOL	Type of status change 1: Every status change forwards the command to output ID_OUT . 0: Only a status change from 0 to 1 switches the command to output ID_OUT .	0
	REL_EQ	BOOL	1: Non-interlocking (Setpoint = Actual)	0
	REL_DBL	BOOL	1: Non-interlocking the double-activation blocking	0
	REL_PROT	BOOL	1: Non-interlocking the blocking	0
	REL_PLBY	BOOL	1: Non-interlocking the substation or bay interlocking	0
	REL_ILOC	BOOL	1: Interlocking is released	0
	RQ_SYNC	BOOL	1: Switching with synchro-check is executed	1
	ORIGIN	UINT	Source of cause for the command 0: Value is not permitted 1: Value is not permitted 2: Field control 3: System control 4: Remote control 5: Automatic field 6: Automatic system 7: Remote automatic operation 8: Maintenance 9: Process >9: Values are not permitted	5
Outputs	OK	BOOL	1: Command was executed successfully	0
	ERR	BOOL	1: Unsuccessful command execution	0

Detailed Description

You can use the block **xPC_OUT** to issue a switching command directly to the switching device without having to define the command as **Selecting** or **Switching**. Therefore, the block is suitable for switching tasks with less security requirements.

For function charts, there is the rule that input signals on the left-hand side of the block and output signals on the right-hand side of the block are connected. According to this rule, if you show the sidebar, the input signals will be in the left-hand sidebar and the output signals in the right-hand sidebar. A command should actually be considered as an output signal for the process. Since the command to be output presents an input signal for the **xPC_OUT** block, the command is switched to the input side of the block. As a result, the block **xPC_OUT** receives the information as to which command it will issue. Therefore, for the command output, the block **xPC_OUT** needs no further connection to the right sidebar. However, the block receives feedback. These can be processed further in the function chart, or switched as output signals using the right sidebar.

In order to issue a command using block **xPC_OUT**, please follow this procedure:

- **Specifying the Switching Direction**

The value at the **VAL** input specifies whether the switching device should be switched on or off.

- **Removing Interlocking**

Use the inputs **REL_EQ**, **REL_DBL**, **REL_PROT**, **REL_PLBY**, and **REL_ILOC** to remove the interlocking conditions. If you set one of these inputs to 1, the applicable interlocking condition will be put out of operation.

- **Adding Source of Cause**

You can assign a certain source of the cause to the switching command using the value at the **ORIGIN** input. If for example you use the value 4, the command is treated like a window control command during processing. The source of the cause is also an additional item of information in the indication log. The source of the cause has no influence on the functionality of the block.

- **Issuing Command**

A condition change at the input **TRIG** issues the command to the switching device. The value at the input **EDGE** specifies the required status change. If the **EDGE** input is set to 1, every condition change forwards the command. If the input **EDGE** is set to 0 then only a condition change from 0 to 1 issues the command.

- **Evaluating Feedback**

The outputs **OK** and **ERR** tell you whether the command execution was successful or unsuccessful. You can route the outputs for example to indications or LEDs. The 2 outputs **OK** and **ERR** will keep their state until the next command execution.

Alternative Block Types

If you want to realize switching sequences, or need a separate **Selection** and **Switching**, use blocks [12.2.4.5 SPC_DEF and DPC_DEF](#) in combination with blocks [12.2.4.6 SPC_EXE and DPC_EXE](#).

Related Topics

[12.1.1.4 Block](#)

12.2.4.9 APC_INFO, BSC_INFO and INC_INFO

The blocks **APC_INFO**, **BSC_INFO**, and **INC_INFO** provide information of a control service request. Use the following block depending on the command type:

- Block **APC_INFO** for **Controllable analogue process value (APC)** service request
- Block **BSC_INFO** for **Binary controlled step position information (BSC)** service request
- Block **INC_INFO** for a **Controllable integer status (INC)** service request



NOTE

The functionality of **APC_INFO**, **BSC_INFO**, and **INC_INFO** blocks is identical. The descriptions for these blocks are therefore combined.

Connections and Explanations

You can find explanations for connections to blocks in the following table.

	Name	Data Type	Explanation	Default
Input	ID	ID_APCI ID_BSCI ID_INCI	Command through which information is required	0

	Name	Data Type	Explanation	Default
Outputs	VAL	REAL (APC) UINT (BSC) DINT (INC)	Desired value of the control service request For BSC, the following is the meaning: 0: stop 1: lower 2: higher 3: reserved >3: not valid	0
	DOSEL	BOOL	1: Command selects the switching device	0
	DOOPR	BOOL	1: Command switches the switching device	0
	DOCNC	BOOL	1: Command is currently being canceled	0
	PEND	BOOL	1: Command is pending, operate request excepted	0
	RQ_ILOC	BOOL	1: Switching is executed with interlocking	0
	RQ_SYNC	BOOL	1: Switching is executed with synchronization check	0
	ORIGIN	ENUM	Number of the source cause for this command 2: Field control 3: System control 4: Remote control 5: Automatic field 6: Automatic system 7: Remote automatic operation 8: Maintenance 9: Process	0
	ADDCAUSE	DINT	0: No failure occurred > 0: Reason for failure of negative control service response, see definition in 61850-8-1	0
	CTLNUM	UINT	Control sequence number of the last control service	0

Detailed Description

You can use this block to query information about the current command. The block delivers the information summarized in the previous table, regardless if the command was actually executed or not. Therefore, this block does not provide any information about the process.

Before the 1st command output, the **VAL** output is equal to 0. During the command output, the output is set to the value which corresponds to the desired control service request. After the command output, the output keeps this value until the next control service request.

During the output of a command for switching, the output **DOOPR** and the output **PEND** are set. The outputs are reset as soon as the command output is completed.

The output **DOSEL** is set by selecting the switching devices and is only reset after the command output has expired.

ADDCAUSE:

- 0: Unknown
- 1: Not-supported
- 2: Blocked-by-switching-hierarchy
- 3: Select-failed
- 4: Invalid-position
- 5: Position-reached
- 6: Parameter-change-in-execution
- 7: Step-limit
- 8: Blocked-by-Mode
- 9: Blocked-by-process
- 10: Blocked-by-interlocking
- 11: Blocked-by-synchrocheck
- 12: Command-already-in-execution
- 13: Blocked-by-health
- 14: 1-of-n-control
- 15: Abortion-by-cancel
- 16: Time-limit-over
- 17: Abortion-by-trip
- 18: Object-not-selected
- 19: Object-already-selected
- 20: No-access-authority
- 21: Ended-with-overshoot
- 22: Abortion-due-to-deviation
- 23: Abortion-by-communication-loss
- 24: Blocked-by-command
- 25: None
- 26: Inconsistent-parameters
- 27: Locked-by-other-client

The blocks **APC_INFO**, **BSC_INFO**, or **INC_INFO** can process only a single command. Therefore, for every command for which you need information, it must be switched with its own **APC_INFO**, **BSC_INFO**, or **INC_INFO** block.

Related Topics

[12.1.1.4 Block](#)

12.2.5 Conversion

12.2.5.1 BOOL_CNT

The **BOOL_CNT** block counts binary inputs with the value 1 (TRUE).

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN1	BOOL	Input 1	0 (FALSE)
	IN2	BOOL	Input 2	0 (FALSE)
	IN3	BOOL	Input 3	0 (FALSE)
	IN4	BOOL	Input 4	0 (FALSE)
	IN5	BOOL	Input 5	0 (FALSE)
	IN6	BOOL	Input 6	0 (FALSE)
	IN7	BOOL	Input 7	0 (FALSE)
	IN8	BOOL	Input 8	0 (FALSE)
	IN9	BOOL	Input 9	0 (FALSE)
	IN10	BOOL	Input 10	0 (FALSE)
	IN11	BOOL	Input 11	0 (FALSE)
	IN12	BOOL	Input 12	0 (FALSE)
	IN13	BOOL	Input 13	0 (FALSE)
	IN14	BOOL	Input 14	0 (FALSE)
	IN15	BOOL	Input 15	0 (FALSE)
	IN16	BOOL	Input 16	0 (FALSE)
	IN17	BOOL	Input 17	0 (FALSE)
	IN18	BOOL	Input 18	0 (FALSE)
	IN19	BOOL	Input 19	0 (FALSE)
	IN20	BOOL	Input 20	0 (FALSE)
Output	OUT	DINT	Output	0

Once the block has been inserted into the chart, only 2 of the 20 inputs are visible. If you need more inputs, select the block and in the [3.1.4 Inspector Window](#), unmark the **Invisible** check boxes in the **Interface** group of the block in the **Properties** tab.

Detailed Description

BOOL_CNT counts all inputs with the value 1 (TRUE), and sets the output to result in integer.

Related Topics

[12.1.1.4 Block](#)[12.2.5.2 BOOL_INT](#)[12.8.1 Basic Data Types](#)

12.2.5.2 BOOL_INT

The **BOOL_INT** block forms a positive integer value from 4 binary values. You can select between 3 different modes.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN1	BOOL	Input value 1	0 (FALSE)
	IN2	BOOL	Input value 2	0 (FALSE)
	IN3	BOOL	Input value 3	0 (FALSE)
	IN4	BOOL	Input value 4	0 (FALSE)
	MOD	UINT	Selection value for the mode: 1, 2, or 3	1
Output	OUT	UINT	Output value 0 to 15, see value tables	0

Detailed Description

The block forms from 4 binary values at the **IN1**, **IN2**, **IN3**, and **IN4** inputs a positive integer value from 0 to 15 at the **OUT** output. Via the **MOD** input you can select between 3 different modes of how the output value shall be formed from the input values. If the **MOD** input has the value 1, 2, or 3, then the output value is formed according to the following value tables. If the **MOD** input has a different value, then the output value is set to 0 regardless of the values at the inputs **IN1** to **IN4**.

Value Tables

In the following table, you find the output values depending on the input values, if the **Mode equals 1**. In this mode, the output value is specified by a single input value. The priority of the input value is decreasing from input **IN1** to input **IN4**. If, for example, input **IN1** has the value 1 (TRUE), the output value also is 1, regardless of the values of the remaining inputs.

IN1	IN2	IN3	IN4	OUT
1	Not relevant	Not relevant	Not relevant	1
0	1	Not relevant	Not relevant	2
0	0	1	Not relevant	3
0	0	0	1	4

In the following table, you find the output values depending on the input values, if the **Mode equals 2**. In this mode, the output value is specified by a single input value. The priority of the input values is increasing from input **IN1** to input **IN4**. If for example input **IN4** has the value 1 (TRUE), the output value is 4, regardless of the values of the remaining inputs.

IN1	IN2	IN3	IN4	OUT
1	0	0	0	1
Not relevant	1	0	0	2
Not relevant	Not relevant	1	0	3
Not relevant	Not relevant	Not relevant	1	4

In the following table, you find the output values depending on the input values, if the **Mode equals 3**. For this mode the output value is created by the binary coding of the input values.

IN1	IN2	IN3	IN4	OUT
0	0	0	0	0
1	0	0	0	1
0	1	0	0	2
1	1	0	0	3
...				
0	1	1	1	14
1	1	1	1	15

Related Topics

[12.1.1.4 Block](#)
[12.2.5.1 BOOL_CNT](#)
[12.8.1 Basic Data Types](#)

12.2.5.3 BUILD_ACD

The **BUILD_ACD** block is used to create an ACD object (directional protection activation information) from the corresponding input values.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	PHSA	BOOL	Phase A, activation flag	0 (FALSE)
	PHSB	BOOL	Phase B, activation flag	0 (FALSE)
	PHSC	BOOL	Phase C, activation flag	0 (FALSE)
	GND	BOOL	Ground, neutral phase, activation flag	0 (FALSE)
	FWRD	BOOL	Forward, directional information flag	0 (FALSE)
	BWRD	BOOL	Backward, directional information flag	0 (FALSE)
	GOOD	BOOL	Good quality (VALID)	1 (TRUE)
	BAD	BOOL	Bad quality (INVALID)	0 (FALSE)
Output	OUT	STRUCT	Directional protection activation information (ACD)	PHS: 0 DIR: 0 QLTY: 16#0000

Detailed Description

The block creates a structured value at the **OUT** output from the inputs. At the output side, you can connect a user-defined signal of the type **ACD** (subtype **pickup**). No other subtypes can be built with this block. The internal output structure contains phase, direction, and quality information.

If at least 1 of the phase inputs **PHSA**, **PHSB**, **PHSC**, or **GND** is set, the **general** flag will be set additionally at the output side.

The directional information at the inputs **FWRD** and **BWRD** is applied to all affected phases. If the forward and backward inputs are not set or both inputs are set, the direction information is set to **unknown** at the output side.

The quality of the output is built from the quality information located at the **GOOD** and **BAD** inputs. If the input **BAD** is 1 (TRUE), the quality at the output side is set to **invalid**. If the input **BAD** is 0 (FALSE) and the input **GOOD** is 1 (TRUE), the quality at the output side is set to **valid**. If both inputs are 0 (FALSE), the quality at the output side is set to **questionable**.



NOTE

If the inputs **BAD** and **GOOD** are not connected and default values are used, the quality at the output side is set to **valid**.



NOTE

In order to avoid an inconsistent signal, the **general**, **unknown**, and **both** flags cannot be set directly. According to **IEC 61850-7-3**, it is not allowed to assign the direction information to **both** for a single-phase.

Related Topics

[12.1.1.4 Block](#)

12.8.1 Basic Data Types

12.2.5.4 BUILD_ACT

The **BUILD_ACT** block is used to create an ACT object (protection activation information) from the corresponding input values.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	PHSA	BOOL	Phase A, activation flag	0 (FALSE)
	PHSB	BOOL	Phase B, activation flag	0 (FALSE)
	PHSC	BOOL	Phase C, activation flag	0 (FALSE)
	GND	BOOL	Ground, neutral phase, activation flag	0 (FALSE)
	GOOD	BOOL	Good quality (VALID)	1 (TRUE)
	BAD	BOOL	Bad quality (INVALID)	0 (FALSE)
Output	OUT	STRUCT	Protection activation information (ACT)	PHS: 0 QLTY: 16#0000

Detailed Description

The block creates a structured value at the **OUT** output from the inputs. At the output side you can connect a user-defined signal of the type **ACT**. The internal output structure contains phase and quality information.

If at least 1 of the phase inputs **PHSA**, **PHSB**, **PHSC**, or **GND** is set, the **general** flag will be set additionally at the output side. In order to avoid an inconsistent signal, the **general** flag cannot be set directly.

The quality of the output is build from the quality information located at the **GOOD** and **BAD** inputs. If the input **BAD** is 1 (TRUE) the quality at the output side is set to **invalid**. If the input **BAD** is 0 (FALSE) and the input **GOOD** is 1 (TRUE) the quality at the output side is set to **valid**. If both inputs are 0 (FALSE) the quality at the output side is set to **questionable**.



NOTE

If the inputs **BAD** and **GOOD** are not connected and default values are used, the quality at the output side is set to **valid**.

Related Topics

[12.1.1.4 Block](#)

[12.8.1 Basic Data Types](#)

12.2.5.5 BUILD_BSC

The **BUILD_BSC** block is used to create a BSC object (Binary Controlled Step Position Information) from the corresponding input values.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	POS	INT	Current step position	0
	BUSY	BOOL	Indicated that a switching step is ongoing (transient state)	0
	QL	STRUCT	Quality	0 (GOOD)

Output	OUT	STRUCT	Binary controlled step position information (BSC)	POS: 0 BUSY: 0 QLTY: 16#0000

Detailed Description

The block creates a structured value at the **OUT** output from the inputs. At the output side, you can connect a user-defined signal of the type **BSC**. The internal output structure contains position, busy, and quality information.

The valid range for the step position at the input **POS** is limited according to the range defined by the standard **IEC 61850-7-3 Ed. 2.0**. The defined range covers the values from -64 and +63.

If the value at the input **POS** does not exceed the limits, the output values for position, busy, and quality is set to the corresponding input values.

If the value at the input exceeds these limits, the output value for position is set to -64, the output value for busy is set to 0 (FALSE) and the output value for quality is set to **invalid**.



NOTE

The **BUILD_BSC** block does not perform any switching commands. The user-defined signal of the type **BSC** connected to the **OUT** output can be assigned to the corresponding switching object.

Related Topics

[12.1.1.4 Block](#)

[12.8.1 Basic Data Types](#)

12.2.5.6 BUILD_CMV

The **BUILD_CMV** block is used to create a **CMV** object (complex measured value) from the corresponding input values.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	MAG	REAL	Magnitude	0.0
	ANG	REAL	Angle	0.0
	VALDESC	STRUCT	Value description	No value description (EXIST = 0 (FALSE))
	QL	STRUCT	Quality information	16#0000

Output	OUT	STRUCT	Complex measured value (CMV)	MAG: 0.0 ANG: 0.0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block creates a complex measured value **CMV** at the **OUT** output from the inputs **MAG** (magnitude) and **ANG** (angle). The output contains the quality information located at the **QL** input. If the **QL** input is not connected and the default value is used, the quality is set to **valid**.

At the output side, you can connect a user-defined signal of the type **CMV**.

Measured values are handled in CFC as percentage values only. Therefore the **OUT** output contains information for the conversion to primary/secondary values including the unit. This information is read from the **VALDESC** input, where you can directly connect the corresponding measuring signal from which the value description shall be used. If you do not connect the **VALDESC** input, the signal connected at the **OUT** output cannot be converted. That means primary and secondary values of the signal are the same as the percentage value.



NOTE

For the user-defined signals of the type **MV**, **CMV**, **DEL**, **WYE**, and **APC**, you can overwrite the multiplier and the unit (for example, **kV**) for primary and secondary representation in the **Properties** tab of the signal in the **Information Routing** matrix. If **Define Unit** is selected, the multiplier and the unit are used from the properties of a signal, instead of the multiplier and the unit set in the CFC given by the **VALDESC** input. This feature allows you, for example, to change the multiplier and the unit of a user-defined signal from **kV** to **V**. Nevertheless, for the value conversion from the CFC-internal percentage value to a primary or secondary value, the **VALDESC** input has to be connected.

Related Topics

[12.1.1.4 Block](#)

[12.8.1 Basic Data Types](#)

12.2.5.7 BUILD_DEL

The **BUILD_DEL** block is used to create a DEL object (3-phase measured value, delta connection) from the corresponding input values.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	PHS_AB_MAG	REAL	Phase AB magnitude	0.0
	PHS_AB_ANG	REAL	Phase AB angle	0.0
	PHS_AB_QL	STRUCT	Phase AB quality information	0 (GOOD)
	PHS_BC_MAG	REAL	Phase BC magnitude	0.0
	PHS_BC_ANG	REAL	Phase BC angle	0.0
	PHS_BC_QL	STRUCT	Phase BC quality information	0 (GOOD)
	PHS_CA_MAG	REAL	Phase CA magnitude	0.0
	PHS_CA_ANG	REAL	Phase CA angle	0.0
	PHS_CA_QL	STRUCT	Phase CA quality information	0 (GOOD)
	VALDESC	STRUCT	Value description	no value description (EXIST = 0 (FALSE))
Output	OUT	STRUCT	3-phase measured value delta connection (DEL)	PHS_AB_MAG: 0.0 PHS_AB_ANG: 0.0 PHS_AB_QLTY: 16#0000 PHS_BC_MAG: 0.0 PHS_BC_ANG: 0.0 PHS_BC_QLTY: 16#0000 PHS_CA_MAG: 0.0 PHS_CA_ANG: 0.0 PHS_CA_QLTY: 16#0000 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3

Detailed Description

The block creates a 3-phase measured value delta connection **DEL** at the **OUT** output from the magnitude, angle, and quality input of each phase.

If a quality input is not connected and the default value is used, the quality of the corresponding phase is set to **Valid**. At output side, you can connect a user-defined signal of type **DEL**.

Measured values are handled in CFC as percentage values only. Therefore the **OUT** output contains an information for the conversion to primary / secondary values including the unit. This information is read from **VALDESC** input, where you can directly connect the corresponding measurement signal the value description shall be used from. If you do not connect the **VALDESC** input the signal connected at **OUT** output cannot be converted. That means primary and secondary values of the signal are same as percentage value.

**NOTE**

For the user-defined signals of the type **MV**, **CMV**, **DEL**, **WYE**, and **APC**, you can overwrite the multiplier and the unit (for example, **kV**) for primary and secondary representation in the **Properties** tab of the signal in the **Information Routing** matrix. If **Define Unit** is selected, the multiplier and the unit are used from the properties of a signal, instead of the multiplier and the unit set in the CFC given by the **VALDESC** input. This feature allows you, for example, to change the multiplier and the unit of a user-defined signal from **kV** to **V**. Nevertheless, for the value conversion from the CFC-internal percentage value to a primary or secondary value, the **VALDESC** input has to be connected.

Related Topics

[12.1.1.4 Block](#)

[12.8.1 Basic Data Types](#)

12.2.5.8 BUILD_DPS

The **BUILD_DPS** block is used to create a DPS object (double point status) from the corresponding input values.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IS_ON	BOOL	Input value 1	0 (FALSE)
	IS_OFF	BOOL	Input value 2	0 (FALSE)
	BAD_00	BOOL	0 (FALSE): If the values at the inputs IS_ON and IS_OFF are both 0 (FALSE), the output value is set to intermediate position. 1 (TRUE): If the values at the inputs IS_ON and IS_OFF are both 1 (TRUE), the output value is set to disturbed position.	0 (FALSE)
	QL	STRUCT	Quality information	0 (GOOD)
Output	OUT	STRUCT	Double point status (DPS)	DP: 16#0000 Q: 16#0000

Detailed Description

The block creates a structured value at the **OUT** output from the inputs. At output side, you can connect a user-defined signal of type **DPS**. The internal output structure contains a value and a quality information.

The output value is built from the values at inputs **IS_ON** and **IS_OFF**. If both inputs are 1 (TRUE), the output value is set to disturbed position. If both inputs are 0 (FALSE), the output value is set to disturbed position or intermediate position depending to the value at input **BAD_00**, see value table below.

The output quality is set to the value at the input **QL**. If the input **QL** is not connected and the default value is used, the quality at the output side is set to **valid**.

Value Table

In the following table, you find the values of the double-point status (DPS) created, depending on the values found at the inputs of the block.

IS_ON	IS_OFF	BAD_00	OUT
0 (FALSE)	0 (FALSE)	0 (FALSE)	0 (Intermediate position)
0 (FALSE)	1 (TRUE)	0 (FALSE)	1 (Off)
1 (TRUE)	0 (FALSE)	0 (FALSE)	2 (On)

1 (TRUE)	1 (TRUE)	0 (FALSE)	3 (Disturbed position)
0 (FALSE)	0 (FALSE)	1 (TRUE)	3 (Disturbed position)
0 (FALSE)	1 (TRUE)	1 (TRUE)	1 (Off)
1 (TRUE)	0 (FALSE)	1 (TRUE)	2 (On)
1 (TRUE)	1 (TRUE)	1 (TRUE)	3 (Disturbed position)

Related Topics

[12.1.1.4 Block](#)

[12.8.1 Basic Data Types](#)

12.2.5.9 BUILD_ENS

The **BUILD_ENS** block is used to create an **ENS** object (enumerated status) from the corresponding input values.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default

Inputs	STRICT	BOOL	Taking the signal quality into account 0 (FALSE): The value at input IN1 to IN6 is used independent from the quality. 1 (TRUE): The value 1 (TRUE) at input IN1 to IN6 is used only if the quality is Valid .	0
	IN1	STRUCT	Single-point indication 1	Value: 0 (FALSE) Quality: 0 (GOOD)
	VL1	INT	The value assigned to the IN1 input.	1
	IN2	STRUCT	Single-point indication 2	Value: 0 (FALSE) Quality: 0 (GOOD)
	VL2	INT	The value assigned to the IN2 input.	2
	IN3	STRUCT	Single-point indication 3	Value: 0 (FALSE) Quality: 0 (GOOD)
	VL3	INT	The value assigned to the IN3 input.	3
	IN4	STRUCT	Single-point indication 4	Value: 0 (FALSE) Quality: 0 (GOOD)
	VL4	INT	The value assigned to the IN4 input.	4
	IN5	STRUCT	Single-point indication 5	Value: 0 (FALSE) Quality: 0 (GOOD)
	VL5	INT	The value assigned to the IN5 input.	5
	IN6	STRUCT	Single-point indication 6	Value: 0 (FALSE) Quality: 0 (GOOD)
	VL6	INT	The value assigned to the IN6 input.	6
	Output	OUT	Enumerated status (ENS)	VAL: 0 Q: 16#0000

Detailed Description

The block creates a structured value at the **OUT** output from the inputs. At output side, you can connect a user-defined signal of type **ENS** (enumerated status), **INS** (integer status), or **INC** (controllable integer status). The internal output structure contains a value and a quality information.

The output value is built from the values at inputs **VL1** to **VL6** depending to values at inputs **IN1** to **IN6**.

The inputs **IN** and **VL** with same number are combined with each other. At the input **IN**, you can connect a signal of type **SPS** (single point status). If the input **IN** has the value 1 (TRUE), the value at output **OUT** is set to the value of the corresponding **VL** input.

Because more than one input **IN1** to **IN6** can have value 1 (TRUE) at the same time, the inputs are prioritized. **IN1/VL1** have highest priority, **IN6/VL6** have lowest priority

Via the **STRICT** input, you can select if the quality of the input signals should be taken into account for selecting the assigned value or not. If you set the **STRICT** input to 1 (TRUE), signals with **Invalid** or **Questionable** quality will be ignored. The output quality is used from the same input the output value is used from. If

the output value cannot be set from an input (for example, all **IN** inputs are 0 (FALSE)), the output is set to value 0 and quality 0 (**GOOD**).

**NOTE**

You have to set the **VL** input values directly at the block inputs by selecting the value and enter the value.

**NOTE**

User-defined signals of type **ENS** are available for health only with enumerated values ok (1), warning (2), alarm (3).

**NOTE**

There is no corresponding SPLIT_ENS block in the library, but for signals of type **ENS**, you can use the SPLIT_INS block.

**NOTE**

With the BUILD_INS block, an additional BUILD block is available where user-defined signals of type **ENS** (enumerated status), **INS** (integer status), or **INC** (controllable integer status) can be connected at output side. Check which block is best for your use case.

Related Topics

[12.1.1.4 Block](#)

[12.8.1 Basic Data Types](#)

12.2.5.10 BUILD_INS

The **BUILD_INS** block creates an integer status value from the input value and the quality.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	VAL	DINT	Input value	0
	QL	QUAL	Quality information	16#0000
Output	OUT	INS_STRUCT	Integer status value (INS)	VAL: 0 QLTY: 16#0000

Detailed Description

The block creates an integer status value at the **OUT** output from the input value. The output contains the quality information located at the **QL** input. If the **QL** input is not connected, the quality is set to **Valid**.

Related Topics

[12.1.1.4 Block](#)

12.2.5.11 BUILD_Q

The **Build_Q** block creates, from 2 binary input values, the **Valid**, **Questionable**, or **Invalid** quality information.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	GOOD	BOOL	Input value for the Valid quality information	1
	BAD	BOOL	Input value for the Invalid quality information	0
Output	QL	QUAL	Created quality information (see value table)	16#0000

Detailed Description

The block creates, from 2 binary values at the inputs **GOOD** and **BAD**, the quality information **Valid**, **Questionable**, or **Invalid** at the **QL** output.

If the input **GOOD** is set to 1, the block creates the quality information **Valid** at the **QL** output. A 1 at the **BAD** input leads to an **Invalid** quality information at the **QL** output. With a 0 at both inputs the block generates a **Questionable** quality information at the **QL** output.

The **BAD** input has priority over the **GOOD** input. If both inputs are set to 1, the block creates the quality information **Invalid** at the **QL** output.

Value Table

In the following table, you will find the quality information created from the values at the inputs of the block.

GOOD	BAD	QL
0	0	Questionable
0	1	Invalid
1	0	Valid
1	1	Invalid

Related Topics

[12.1.1.4 Block](#)

12.2.5.12 BUILD_SPS

The **BUILD_SPS** block creates a single-point indication from a single binary value.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	VAL	BOOL	Input value	0
	QL	QUAL	Quality information for the single-point indication to be created	16#0000
Output	OUT	SSPS	- Value of the created single-point indication On: VAL = 1 Off: VAL = 0 - Quality of the created single-point indication	SP: 0 Q: 16#0000

Detailed Description

The block creates a single-point indication from the binary value at the **VAL** input. The single-point indication is available at the **OUT** output. The single-point indication contains the quality information located at the **QL** input. If the **QL** input is not connected, the quality of the created single-point indication has a **Valid** value.

Related Topics

[12.1.1.4 Block](#)

12.2.5.13 BUILD_WYE

The BUILD_WYE block creates a 3-phase measured value, Y connection, from single inputs.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	PHS_A_MAG	REAL	Phase A magnitude	0.0
	PHS_A_ANG	REAL	Phase A angle	0.0
	PHS_A_QL	QUAL	Phase A quality information	16#0000
	PHS_B_MAG	REAL	Phase B magnitude	0.0
	PHS_B_ANG	REAL	Phase B angle	0.0
	PHS_B_QL	QUAL	Phase B quality information	16#0000
	PHS_C_MAG	REAL	Phase C magnitude	0.0
	PHS_C_ANG	REAL	Phase C angle	0.0
	PHS_C_QL	QUAL	Phase C quality information	16#0000
	RES_MAG	REAL	Residual magnitude	0.0
	RES_ANG	REAL	Residual angle	0.0
	RES_QL	QUAL	Residual quality information	16#0000
	NEUT_MAG	REAL	Phase neutral magnitude	0.0
	NEUT_ANG	REAL	Phase neutral angle	0.0
	NEUT_QL	QUAL	Phase neutral quality information	16#0000
	NET_MAG	REAL	Net magnitude	0.0
	NET_ANG	REAL	Net angle	0.0
	NET_QL	QUAL	Net quality information	16#0000
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 1.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DEC: 3 SEC.EXIST: 0 SEC.SCALE: 1.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DEC: 3 PCT.EXIST: 0 PCT.SCALE: 1.0 PCT.UNIT: -7 PCT.MUL: 0 PCT.DEC: 3

	Name	Data Type	Explanation	Default
Output	OUT	WYE_STRUCT	3-phase measured value Y connection (WYE)	PHS_AB_MAG: 0.0 PHS_AB_ANG: 0.0 PHS_AB_QITY: 16#0000 PHS_BC_MAG: 0.0 PHS_BC_ANG: 0.0 PHS_BC_QITY: 16#0000 PHS_CA_MAG: 0.0 PHS_CA_ANG: 0.0 PHS_CA_QITY: 16#0000 RES_MAG: 0.0 RES_ANG: 0.0 RES_QITY: 16#0000 NEUT_MAG: 0.0 NEUT_ANG: 0.0 NEUT_QITY: 16#0000 NET_MAG: 0.0 NET_ANG: 0.0 NET_QITY: 16#0000 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3

Detailed Description

The block creates a 3-phase measured value Y connection **WYE** at the **OUT** output from the magnitude, angle, and quality input of each phase.

If a quality input is not connected, the quality of the corresponding phase is set to **Valid**. If the signal connected to the output **OUT** becomes a value description from a predefined signal, the **VALDESC** input must be connected to the output **VALDESC** of a **SPLIT_WYE** block, where the predefined 3-phase measured value is connected as the input signal.

The unit is part of the value description. For user-defined signals, the unit can be defined in the properties task card of the signal object in the **Information Routing** editor. If this is configured, the values from the properties have higher priority. They will overwrite the unit values from the value description (**VALDESC** input).

Related Topics

[12.1.1.4 Block](#)

12.2.5.14 BUILD_XMV

The **BUILD_XMV** block creates a whole number, a floating-point number, a metered value, a measured value (MV), or a controllable analog process value (APC).

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN_R	REAL	Floating-point number and input value	0.0
	IN_I	DINT	Input value as a whole number	0
	IS_REAL	BOOL	Selecting the output value 1: A measured value is created from the floating-point number. 0: A metered value is created from the floating-point number.	0
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 1.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DECP: 3 SEC.EXIST: 0 SEC.SCALE: 1.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DECP: 3 PCT.EXIST: 0 PCT.SCALE: 1.0 PCT.UNIT: -7 PCT.MUL: 0 PCT.DECP: 3
	QL	QUAL	Quality information of the measured or metered value	16#0000

	Name	Data Type	Explanation	Default
Output	OUT	SXMV	Measured value (MV), metered value, or controllable analog process value (APC)	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block creates a measured value from the floating-point number at the **IN_R** input at the **OUT** output. Alternatively, the block creates a metered value from an integer value at the **IN_I** input at the **OUT** output.

You can control via the **IS_REAL** input if a measured value is created from the floating-point number or a metered value from the whole number. If you set the input to 1, the block creates a measured value. If you set the input to 0, the block creates a metered value at the output.

The measured or metered value contains the quality information located at the **QL** input. If the **QL** input is not connected, the quality of the created measured or metered value is set to **Valid**.

If the signal connected to the output **OUT** becomes a value description from a predefined measured signal, the **VALDESC** input must be connected to the output **VALDESC** of a **SPLIT_XMV** block, where the predefined measured value is connected as the input signal.

The unit is part of the value description. For user-defined signals, the unit can be defined in the properties task card of the signal object in the **Information Routing** editor. If this is configured, the values from the properties have higher priority. They will overwrite the unit values from the value description (**VALDESC** input).

Related Topics

[12.1.1.4 Block](#)

12.2.5.15 CMP_DPS

The **CMP_DPS** block compares the value of a double-point indication with a value specified by 2 binary input signals. If both values are the same, the block sets the output to 1.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default

Inputs	IN	SDPS	Double-point indication	DP: 16#0000 Q: 16#0000
	C_ON	BOOL	Comparable value for On	0
	C_OFF	BOOL	Comparable for Off	0
	STRICT	BOOL	Taking the indication quality into account 1: The Y output can be set to 1 if the quality of the double-point indication at the IN input has a Valid value. 0: The quality of the double-point indication at the IN input is not included.	0
Output	Y	BOOL	1: The value of the double-point indication at the IN input is equal to the value specified by the binary input signals at the C_ON and C_OFF inputs (see value table).	0

Detailed Description

The block compares the value of the double-point indication at the **IN** input with the value specified by the binary input signals at the **C_ON** and **C_OFF** inputs. If both values are the same, the block puts the **Y** output to 1. Therefore, with this block you can sort out one of the 4 possible values of a double-point indication.

With the 2 inputs **C_ON** and **C_OFF**, you can create the following 4 comparable values:

- Intermediate position (C_ON = 0, C_OFF = 0)
- Off (C_ON = 0, C_OFF = 1)
- On (C_ON = 1, C_OFF = 0)
- Disturbed position (C_ON = 1, C_OFF = 1)

Via the **STRICT** input you can control if the quality of the double-point indication should be included or not. If you set this input to 1, the **Y** output can only be set to 1 if the quality of the double-point indication at the **IN** input has a **Valid** value.

Value Table

In the following table, you find the values of the double-point indication created, depending on the values found at the inputs of the block.

IN	C_ON	C_OFF	Y
Intermediate Position	0	0	1
Off	0	0	0
On	0	0	0
Disturbed position	0	0	0
Intermediate position	0	1	0
Off	0	1	1
On	0	1	0
Disturbed position	0	1	0
Intermediate position	1	0	0
Off	1	0	0
On	1	0	1
Disturbed position	1	0	0
Intermediate position	1	1	0
Off	1	1	0
On	1	1	0
Disturbed position	1	1	1

Related Topics

[12.1.1.4 Block](#)

12.2.5.16 DPS_SPS

The **DPS_SPS** block breaks down a double-point indication into 4 single-point indications.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	DPS	SDPS	Double-point indication	DP: 16#0000 Q: 16#0000
Outputs	IS_ON	SSPS	Single-point indication for On	SP: 0 Q: 16#0000
	IS_OFF	SSPS	Single-point indication for Off	SP: 0 Q: 16#0000
	IS_00	SSPS	Single-point indication for Intermediate Position	SP: 0 Q: 16#0000
	IS_11	SSPS	Single-point indication for Disturbed Position	SP: 0 Q: 16#0000

Detailed Description

The block breaks down a double-point indication into 4 single-point indications. 1 single-point indication is assigned to each possible value of the double-point indication. If the double-point indication accepts the value assigned to the single-point indication, the applicable single-point indication will have a value of 1. If a double-point indication is at the input, exactly one of the single-point indications will have a value of 1. The other 3 single-point indications each have a value of 0.

Value Table

In the following table, you find the values of the 4 single-point indications for **ON**, **OFF**, **Intermediate Position**, and **Disturbed Position**, depending on the value of the double-point indication at the **DPS** input.

Double-Point Indication	Single-Point Indication for On	Single-Point Indication for Off	Single-Point Indication for Intermediate Position	Single-Point Indication for Disturbed Position
On	1	0	0	0
Off	0	1	0	0
Intermediate position	0	0	1	0
Disturbed position	0	0	0	1

Related Topics

[12.1.1.4 Block](#)

12.2.5.17 SPLIT_ACD

SPLIT_ACD splits SACD type signal into its Boolean flags according to subtype **pickup**.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default

Inputs	IN	SACD	Struct of type SACT	PHS: 0 DIR: 0 QLTY: 16#0000
Output	GEN	BOOL	General activation flag	0
	PHSA	BOOL	Phase A activation flag	0
	PHSB	BOOL	Phase B activation flag	0
	PHSC	BOOL	Phase C activation flag	0
	GND	BOOL	Ground, neutral phase activation flag	0
	FWRD	BOOL	Forward, directional activation flag	0
	BWRD	BOOL	Backward, directional activation flag	0
	UNKN	BOOL	Unknown, directional activation flag	0
	Both	BOOL	Both, directional activation flag	0
	PHS1	BOOL	1 Phase affected	0
	PHS2	BOOL	2 Phases affected	0
	P2GND	BOOL	2 Phases, GND, and neutral phase affected	0
	PHS3	BOOL	3 phases affected	0
	VALID	BOOL	Quality code, signal validity	0
	QL	QUAL	Quality structure	VAL: 16#0000

Detailed Description

The general flag is set, whenever one of the 3 phases or GND are set. Directional information is not directly assigned to a particular phase but indicates that there is an activation in this particular direction. If forward as well as backward are activated, then both flags will be set. If the forward or backward are not set, the unknown flag is being activated. PHS1 indicates that one of the phases A, B or C is affected. PHS2 indicates that 2 out of the 3 phases A, B, C are affected. P2GND indicates that 2 out of 3 phases of A, B, C AND additionally GND (neutral phase) are affected. PHS3 indicates that all of the 3 phases A, B, and C are affected. VALID indicates the signals validity. QL is a signal of type quality, that can be split into its flags with a SPLIT_Q block. If necessary, connect Quality output to input of SPLIT_Q block. For further descriptions of Quality, refer to SPLIT_Qs description.



NOTE

GEN is set as soon as one/more of the 3 phases A, B, C, or GND are activated.

SACD is CFC-internal type, when connecting ACD signal to SPLIT_ACD, signal will be converted to CFC-internal SACT.

Related Topics

[12.1.1.4 Block](#)

12.2.5.18 SPLIT_ACT

SPLIT_ACT splits SACT type signal into its flags.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN	SACT	Struct of type SACT	PHS: 0 QLTY: 16#0000

Output	GEN	BOOL	General, activation flag	0
	PHSA	BOOL	Phase A, activation flag	0
	PHSB	BOOL	Phase B, activation flag	0
	PHSC	BOOL	Phase C, activation flag	0
	GND	BOOL	Ground, Neutral phase, activation flag	0
	VALID	BOOL	VALID, quality code	0
	QL	QUAL	Structure quality	16#0000

Detailed Description

The General flag is activated as soon as at least one of the 4 phases is activated.

QL is a Quality-type signal that can be decomposed further with usage of a SPLIT_Q block. Connect Quality output to input of SPLIT_Q block. For further descriptions of Quality, refer to SPLIT_Qs description. SACT is CFC-internal type, when connecting ACT signal to SPLIT_ACT, signal will be converted to CFC-internal SACT.

Related Topics

[12.1.1.4 Block](#)

12.2.5.19 SPLIT_BSC

The **SPLIT_BSC** block breaks down the signal **Position** into different status and quality information.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	ID_BSCC	Signal Position (type BSC)	0
Outputs	POS	INT	Current tap position	0.0
	BUSY	BOOL	1: Indicating ongoing switching step (transient state)	0
	VALID	BOOL	Indicator for the quality of the signal Position 1: The quality has a value of Valid 0: The quality has another value or the tap position is not set (value -64)	0
	QL	QUAL	Quality information of the signal Position	16#0000

Detailed Description

The block splits a signal **Position** (type **BSC**) at the **IN** input into status information at the **POS** output and the **BUSY** output.

The value at the **VALID** output indicates whether the quality of the signal is **Valid** or not. This contains the information if the signal **Position** is set or not. If **Position** is not set (value -64) then the value at the **VALID** output indicates **Invalid** independent of the signal quality. The quality information of the signal is available at the **QL** output.

Related Topics

[12.1.1.4 Block](#)

12.2.5.20 SPLIT_CMV

The **SPLIT_CMV** block breaks down a complex measured value into magnitude and angle. Additionally, the value description and the quality information are available as outputs.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	CMV_STRUCT	Complex measured value (CMV)	MAG: 0.0 ANG: 0.0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 0.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 0 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 0.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 0 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 0.0 VALDESC.PCT.UNIT: 0 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 0 QLTY: 16#0000
	MAG	REAL	Magnitude	0.0
	ANG	REAL	Angle	0.0
	VALID	BOOL	Indicator for the quality of the input signal 1: The quality has a value of Valid . 0: The quality has another value.	0
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 0.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DECP: 0 SEC.EXIST: 0 SEC.SCALE: 0.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DECP: 0 PCT.EXIST: 0 PCT.SCALE: 0.0 PCT.UNIT: 0 PCT.MUL: 0 PCT.DECP: 0
Outputs	QL	QUAL	Quality information of the input signal	16#0000

Detailed Description

The block issues the value of a complex measured value at the **IN** input as a floating-point number for the magnitude at the **MAG** output and for the angle at the **ANG** output.

The value at the **Valid** output indicates whether the quality of the complex measured value is **Valid** or not. The quality information of the complex measured value is available at the **QL** output.

The output **VALDESC** is the value description of the signal connected to the **IN** input. If a user-defined signal is connected to the **OUT** output of a **BUILD_CMV** block, the **VALDESC** output of the **SPLIT_CMV** block must be connected to the **VALDESC** input of a **BUILD_CMV** block to get the same value description.

Related Topics

[12.1.1.4 Block](#)

12.2.5.21 SPLIT_DEL

The **SPLIT_DEL** block breaks down 3-phase measured value, delta connection into magnitude, angle, and quality of each phase. Additionally, the value description of the input signal is available as output.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN	DEL_STRUCT	3-phase measured value delta connection (DEL)	PHS_AB_MAG: 0.0 PHS_AB_ANG: 0.0 PHS_AB_QITY: 16#0000 PHS_BC_MAG: 0.0 PHS_BC_ANG: 0.0 PHS_BC_QITY: 16#0000 PHS_CA_MAG: 0.0 PHS_CA_ANG: 0.0 PHS_CA_QITY: 16#0000 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 0.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DEC: 0 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 0.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DEC: 0 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 0.0 VALDESC.PCT.UNIT: 0 VALDESC.PCT.MUL: 0 VALDESC.PCT.DEC: 0

	Name	Data Type	Explanation	Default
Outputs	PHS_AB_MAG	REAL	Phase AB magnitude	0.0
	PHS_AB_ANG	REAL	Phase AB angle	0.0
	PHS_AB_QL	QUAL	Phase AB quality information	16#0000
	PHS_BC_MAG	REAL	Phase BC magnitude	0.0
	PHS_BC_ANG	REAL	Phase BC angle	0.0
	PHS_BC_QL	QUAL	Phase BC quality information	16#0000
	PHS_CA_MAG	REAL	Phase CA magnitude	0.0
	PHS_CA_ANG	REAL	Phase CA angle	0.0
	PHS_CA_QL	QUAL	Phase CA quality information	16#0000
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 0.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DEC: 0 SEC.EXIST: 0 SEC.SCALE: 0.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DEC: 0 PCT.EXIST: 0 PCT.SCALE: 0.0 PCT.UNIT: 0 PCT.MUL: 0 PCT.DEC: 0

Detailed Description

The block splits a 3-phase measured value delta connection at the **IN** input into a floating-point number for the magnitude and the angle and additionally the quality information for each phase.

The output **VALDESC** is the value description of the signal connected to the **IN** input. If a user-defined signal is connected to the **OUT** output of a **BUILD_DEL** block, the **VALDESC** output of the **SPLIT_DEL** block must be connected to the **VALDESC** input of a **BUILD_DEL** block to get the same value description.

Related Topics

[12.1.1.4 Block](#)

12.2.5.22 SPLIT_DPS

The **SPLIT_DPS** block breaks down a double-point indication into individual binary values and delivers the applicable quality information.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	SDPS	Double-point indication	DP: 16#0000 Q: 16#0000

Outputs	IS_ON	BOOL	1: The considered double-point indication has the value of On .	0
	IS_OFF	BOOL	1: The considered double-point indication has the value of Off .	0
	IS_00	BOOL	1: The considered double-point indication has the value of Intermediate Position .	0
	IS_11	BOOL	1: The considered double-point indication has the value of Disturbed Position .	0
	VALID	BOOL	Indicator for double-point indication quality 1: Quality has the value of Valid 0: Quality has another value.	0
	QL	QUAL	Quality information of the double-point indication	16#0000

Detailed Description

The block issues the value of the double-point indication supporting the **IN** input as a 4 binary values at the **IS_ON**, **IS_OFF**, **IS_00**, and **IS_11** outputs. If there is a double-point indication at the input, exactly one of these outputs has a value of 1. The other 3 outputs each have a value of 0. The value at the **VALID** output is the indicator if the quality of the double-point indication is **Valid** or not. The quality information of the double-point indication is available at the **QL** output.

Value Table

In the following table, you find the values of the 4 outputs **IS_ON**, **IS_OFF**, **IS_00**, and **IS_11**, depending on the value of the double-point indication at the **IN** input.

IN	IS_ON	IS_OFF	IS_00	IS_11
On	1	0	0	0
Off	0	1	0	0
Intermediate position	0	0	1	0
Disturbed position	0	0	0	1

Alternative Block Types

If you require only a certain value of the double-point indication for your function, for example the **On** value, then Siemens recommends using the **CMP_DPS** block instead of the **CMP_DPSD** block. This block requires fewer system resources.

Related Topics

[12.1.1.4 Block](#)

12.2.5.23 SPLIT_INS

The **SPLIT_INS** block breaks down an integer status value into value and quality.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	INS_STRUCT	Integer status value (INS)	VAL: 0 QLTY: 16#0000

	Name	Data Type	Explanation	Default
Outputs	VAL	VAL	Value	0
	VALID	BOOL	Indicator for the quality of the input signal 1: The quality has a value of Valid . 0: The quality has another value.	0
	QL	QUAL	Quality information of the input signal	16#0000

Detailed Description

The block splits an integer status value at the **IN** input into the value and the quality. The value at the **Valid** output indicates whether the quality of the integer status value is **Valid** or not. The quality information of the integer status value is available at the **QL** output.

Related Topics

[12.1.1.4 Block](#)

12.2.5.24 SPLIT_Q

The **SPLIT_Q** block breaks down quality information into its basic components.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	QL	QUAL	Quality information	16#0000
Outputs	GOOD	BOOL	1: The quality information contains the Valid value.	0
	BAD	BOOL	1: The quality information contains the Invalid value.	0
	TEST	BOOL	1: The quality information contains a TEST value.	0
	OFF	BOOL	1: The quality information contains an OFF value.	0
	OBLK	BOOL	1: The quality information contains an OPERATOR-BLOCKED or FunctionalLockout value.	0

Detailed Description

The block issues the value of the quality information supporting the **QL** input as 5 binary values at the **GOOD**, **BAD**, **TEST**, **OFF**, and **OBLK** outputs. If one of these outputs has a value of 1 then the quality information contains the applicable value. If **GOOD** and **BAD** outputs both have a value of 0 then the quality information is **Questionable**.

You can use this block to select signals for further processing from the quality information, or to exclude signals from further processing.

Related Topics

[12.1.1.4 Block](#)

12.2.5.25 SPLIT_SPS

The **SPLIT_SPS** block breaks down a single-point indication into binary values and one floating-point number.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default

Input	IN	SSPS	Single-point indication	SP: 0 Q: 16#0000
Outputs	VAL	BOOL	Value of the single-point indication 1: The single-point indication has a value of On . 0: The single-point indication has a value of Off .	0
	VALID	BOOL	Indicator for the quality of a single-point indication 1: The quality has a value of Valid . 0: The quality has another value.	0
	QL	QUAL	Quality information of the single-point indication	16#0000

Detailed Description

The block issues the value of the single-point indication at the **IN** input as a binary value at the **VAL** output. The value at the **VALID** output indicates whether the quality of the single-point indication is Valid or not. The quality information of the single-point indication is available at the **QL** output.

Related Topics

[12.1.1.4 Block](#)

12.2.5.26 SPLIT_WYE

The **SPLIT_WYE** block breaks down 3-phase measured value, Y connection into magnitude, angle, and quality of each phase. Additionally, the value description of the input signal is available as output.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN	WYE_STRUCT	3-phase measured value Y connection (WYE)	PHS_A_MAG: 0.0 PHS_A_ANG: 0.0 PHS_A_QLTY: 16#0000 PHS_B_MAG: 0.0 PHS_B_ANG: 0.0 PHS_B_QLTY: 16#0000 PHS_C_MAG: 0.0 PHS_C_ANG: 0.0 PHS_C_QLTY: 16#0000 RES_MAG: 0.0 RES_ANG: 0.0 RES_QLTY: 16#0000 NEUT_MAG: 0.0 NEUT_ANG: 0.0 NEUT_QLTY: 16#0000 NET_MAG: 0.0 NET_ANG: 0.0 NET_QLTY: 16#0000 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 0.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 0 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 0.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 0 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 0.0 VALDESC.PCT.UNIT: 0 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 0

	Name	Data Type	Explanation	Default
Outputs	PHS_A_MAG	REAL	Phase A magnitude	0.0
	PHS_A_ANG	REAL	Phase A angle	0.0
	PHS_A_QL	QUAL	Phase A quality information	16#0000
	PHS_B_MAG	REAL	Phase B magnitude	0.0
	PHS_B_ANG	REAL	Phase B angle	0.0
	PHS_B_QL	QUAL	Phase B quality information	16#0000
	PHS_C_MAG	REAL	Phase C magnitude	0.0
	PHS_C_ANG	REAL	Phase C angle	0.0
	PHS_C_QL	QUAL	Phase C quality information	16#0000
	RES_MAG	REAL	Residual magnitude	0.0
	RES_ANG	REAL	Residual angle	0.0
	RES_QL	QUAL	Residual quality information	16#0000
	NEUT_MAG	REAL	Phase neutral magnitude	0.0
	NEUT_ANG	REAL	Phase neutral angle	0.0
	NEUT_QL	QUAL	Phase neutral quality information	16#0000
	NET_MAG	REAL	Net magnitude	0.0
	NET_ANG	REAL	Net angle	0.0
	NET_QL	QUAL	Net quality information	16#0000
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 0.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DECP: 0 SEC.EXIST: 0 SEC.SCALE: 0.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DECP: 0 PCT.EXIST: 0 PCT.SCALE: 0.0 PCT.UNIT: 0 PCT.MUL: 0 PCT.DECP: 0

Detailed Description

The block splits a 3-phase measured value Y connection at the **IN** input into the floating-point number for the magnitude and the angle and additionally the quality information for each phase. If the input signal does not support **RES**, **NEUT**, or **NET**, the responding quality is set to **Invalid**.

The output **VALDESC** is the value description of the signal connected to the **IN** input. If a user-defined signal is connected to the **OUT** output of a **BUILD_WYE** block, the **VALDESC** output of the **SPLIT_WYE** block must be connected to the **VALDESC** input of a **BUILD_WYE** block to get the same value description.

Related Topics

[12.1.1.4 Block](#)

12.2.5.27 SPLIT_XMV

The **SPLIT_XMV** block breaks down a measured value into one floating-point number or metered value into one whole value or a controllable analogue process value (APC) and delivers the applicable quality information.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	SXMV	Measured value or metered value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 0.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 0 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 0.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 0 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 0.0 VALDESC.PCT.UNIT: 0 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 0 QLTY: 16#0000

	Name	Data Type	Explanation	Default
Outputs	VAL_R	REAL	Value of the input signal as floating-point number	0.0
	VAL_I	DINT	Value of the input signal as a whole number	0
	IS_REAL	BOOL	Selecting the output value 1: Input signal from type floating-point number (see output VAL_R). 0: Input signal from a whole number (see output VAL_I).	0
	VALID	BOOL	Indicator for the quality of the of the input signal 1: The quality has a value of Valid . 0: The quality has another value.	0
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 0.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DECP: 0 SEC.EXIST: 0 SEC.SCALE: 0.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DECP: 0 PCT.EXIST: 0 PCT.SCALE: 0.0 PCT.UNIT: 0 PCT.MUL: 0 PCT.DECP: 0
	QL	QUAL	Quality information of the input signal	16#0000

Detailed Description

The block issues the value of a measured value at the **IN** input as a floating-point number at the **VAL_R** output. Alternatively, the block issues the value of a metered value at the **IN** input as a whole number at the **VAL_I** output.

The value at the **Valid** output indicates whether the quality of the measurement or metered value is **Valid** or not. The quality information of the measured or metered value is available at the **QL** output.

The output **VALDESC** provides the value description of the signal connected to the **IN** input. If a user-defined signal is connected to the **OUT** output of a **BUILD_XMV** block, the **VALDESC** output of the **SPLIT_XMV** block must be connected to the **VALDESC** input of a **BUILD_XMV** block to get the same value description.

Related Topics

[12.1.1.4 Block](#)

12.2.6 Edge Detection

12.2.6.1 R_TRIG

The **R_TRIG** block detects the rising edge of a binary signal at the input and sets the output to 1. This block also detects very brief state changes.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	CLK	BOOL	Input value	0
Outputs	Q	BOOL	1: From 0 to 1 following a state change	0

Detailed Description

When there is a state change from 0 to 1 at the **CLK** input, the block sets output **Q** to 1. The output retains the value 1 until the block is processed again during the chart run. At this point the block sets the output back to 0, irrespective of what value is present at the input at that time.

The time that elapses before the block is processed again depends on the task level selected for the block or chart. With cyclic **Measurement** task level, the time is 500 ms. With event-triggered task levels, the time cannot be forecast.

Alternative Block Types

If a function is also to process state changes from 0 to 1 that take place between 2 cyclic chart runs, use the **R_TRGM** block instead of **R_TRIG**.

Related Topics

[12.1.1.4 Block](#)

12.2.6.2 R_TRGM

The **R_TRGM** block detects the rising edge of a binary signal at the input and sets the output to 1. This block also detects very brief state changes. In addition, the block detects and saves rising edges that occur at the input between 2 cyclic runs.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	CLK	BOOL	Input value	0
Outputs	Q	BOOL	1: From 0 to 1 following a state change	0

Detailed Description

When there is a state change from 0 to 1 at the **CLK** input, the block sets output **Q** to 1. If the state change takes place between 2 cyclic chart runs, the block saves the change until the next chart run.

The output retains the value 1 until the block is processed again during the chart run. At this point the block sets the output back to 0, irrespective of what value is present at the input at that time.

The time that elapses before the block is processed again depends on the task level selected for the block or chart. With cyclic **Measurement** task level, the time is 500 ms. With event-triggered task levels, the time cannot be forecast.



NOTE

You can only interconnect the block input with a signal, not with the output of a different block.

Alternative Block Types

If a function is not to process state changes from 0 to 1 that take place between 2 cyclic chart runs, Siemens recommends using **R_TRIG** block instead of **R_TRGM**. With this block, you are also able to interconnect the input with the output of a different block.

Related Topics

[12.1.1.4 Block](#)

12.2.6.3 F_TRIG

The **F_TRIG** block detects the falling edge of a binary signal at the input and sets the output to 1. This block also detects very brief state changes.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	CLK	BOOL	Input value	0
Outputs	Q	BOOL	1: From 1 to 0 following a state change	0

Detailed Description

When there is a state change from 1 to 0 at the **CLK** input, the block sets output **Q** to 1. The output retains the value 1 until the block is processed again during the chart run. At this point the block sets the output back to 0, irrespective of what value is present at the input at that time.

The time that elapses before the block is processed again depends on the task level selected for the block or chart. With cyclic **Measurement** task level, the time is 500 ms. With event-driven task levels, the time cannot be forecast.

Alternative Block Types

If a function is also to process state changes from 1 to 0 that take place between 2 cyclic chart runs, use the **F_TRGM** block instead of **F_TRIG**.

Related Topics

[12.1.1.4 Block](#)

12.2.6.4 F_TRGM

The **F_TRGM** block detects the falling edge of a binary signal at the input and sets the output to 1. This block also detects very brief state changes. In addition, the block detects and saves falling edges that occur at the input between 2 cyclic runs.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	CLK	BOOL	Input value	0
Outputs	Q	BOOL	1: From 1 to 0 following a state change	0

Detailed Description

When there is a state change from 1 to 0 at the **CLK** input, the block sets output **Q** to 1. If the state change takes place between 2 cyclic chart runs, the block saves the change until the next chart run.

The output retains the value 1 until the block is processed again during the chart run. At this point the block sets the output back to 0, irrespective of what value is present at the input at that time.

The time that elapses before the block is processed again depends on the task level selected for the block or chart. With cyclic **Measurement** task level, the time is 500 ms. With event-driven task levels, the time cannot be forecast.

**NOTE**

You can only interconnect the block input with a signal, not with the output of a different block.

Alternative Block Types

If a function is not to process state changes from 1 to 0 that take place between 2 cyclic chart runs, Siemens recommends using the **F_TRIG** block instead of **F_TRGM**. With this block, you are also able to interconnect the input with the output of a different block.

Related Topics

[12.1.1.4 Block](#)

12.2.7 Flip-Flops

12.2.7.1 FF_D

The **FF_D** block is a bistable function block.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	D	BOOL	Input value	0
	CLK	BOOL	Clock signal	0
Outputs	OUT	BOOL	State of the signal at the D input at the time when the rising edge of the clock signal occurs	0

Detailed Description

The **FF_D** block transmits the value at the **D** input with the rising edge of the clock signal at the **CLK** input to the **OUT** output. The value is retained at the output until the block detects the next rising edge at the **CLK** input. When the SIPROTEC 5 device is restarted, the value at the output is lost.

Alternative Block Types

If the value at the output still needs to be available after a restart, use the **FF_D_MEM** block instead of **FF_D**.

Related Topics

[12.1.1.4 Block](#)

12.2.7.2 FF_SR

The **FF_SR** block is a bistable function block with a dominant set.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	S	BOOL	1: Sets the OUT output	0
	R	BOOL	1: Resets the OUT output	0
Outputs	OUT	BOOL	0 or 1	0

Detailed Description

If a 1 is present at the **S** input, the block sets the **OUT** output to a value of 1. This value is retained until the **R** input adopts a value of 1. The block also sets the output if the **S** and **R** inputs adopt a value of 1 at the same time. When the SIPROTEC 5 device is restarted, the value at the output is lost.

Alternative Block Types

If the value at the output still needs to be available after a restart, use the **FF_SR_MEM** block instead of **FF_SR**.

Related Topics

[12.1.1.4 Block](#)

12.2.7.3 FF_RS

The **FF_RS** block is a bistable function block with a dominant reset.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	R	BOOL	1: Resets the OUT output	0
	S	BOOL	1: Sets the OUT output	0
Outputs	OUT	BOOL	0 or 1	0

Detailed Description

If a 1 is present at the **S** input, the block sets the **OUT** output to a value of 1. This value is retained until the **R** input adopts a value of 1. The block also resets the output if the **S** and **R** inputs adopt a value of 1 at the same time. When the SIPROTEC 5 device is restarted, the value at the output is lost.

Alternative Block Types

If the value at the output still needs to be available after a restart, use the **FF_RS_MEM** block instead of **FF_RS**.

Related Topics

[12.1.1.4 Block](#)

12.2.8 Logic

12.2.8.1 OR

The **OR** block links binary input values via the logical OR function.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	X1	BOOL	Input value 1	0
	X2	BOOL	Input value 2	0
	X3 to X10	BOOL	Input value 3 to input value 10	0
Output	Y	BOOL	Input values combined with the logical OR function	0

Once the block has been inserted into the chart, only 2 of the 10 inputs are visible. If you need more inputs, uncheck the relevant boxes in the **Hidden** column in the block properties.

**NOTE**

Inputs that are not used must be assigned a default value of 0.

Detailed Description

The block connects the values at the inputs **X1** to **X10** with the logical OR function. The block then displays a 1 at the **Y** output only if the value of at least one input is 1. Only if the values of all inputs are 0 then also the **Y** output is 0.

Value Table

Input X1	Input X2	Output Y
0	0	0
0	1	1
1	0	1
1	1	1

Alternative Block Types

- **OR_SPS**

If instead of binary input values the values of single-point indications must be linked with quality information using the OR function, use instead of the block **OR** the block **OR_SPS**.

- **OR_DYN**

If you need an OR logical operation with additional information about the state changes of the inputs, use the **OR_DYN** block instead of **OR**. This block also takes quality information into account.

Related Topics

[12.1.1.4 Block](#)

12.2.8.2 OR_DYN

The **OR_DYN** block links binary input values via the logical OR function. The block takes every change of value at one of the inputs into account and displays them at the output in the form of double-point indications. This block can also process quality information.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1 to IN5	BOOL	Input value 1 to input value 5	0
	CHAIN	WORD	Connection to an output of a different block of type OR_DYN	16#0000
Outputs	OUT	STRUCT	• Input values combined with the logical OR function as a double-point indication (DP) • Quality (Q)	DP: 16#0000 Q: 16#0000

The block has 5 inputs. If you need more than 5 inputs, you can interconnect several blocks of the **OR_DYN** type in series. In doing so, interconnect the **OUT** output of one block with the **CHAIN** input of the following block.

**NOTE**

Inputs that are not used must be assigned a default value of 0.

Detailed Description

The block connects the values at the inputs **IN1** to **IN5** with the logical OR function. The result of the operation is available at the **OUT** output in the form of a double-point indication.

The block behaves as follows:

- During device startup, the block displays the double-point indication **Disturbed position** (bit string 11, decimal value 3) at the **OUT** output.
- If all values at the inputs are 0 during the chart run, the block outputs the double-point indication **OFF** (bit string 01, decimal value 1).
- If the value of at least one input is 1 during the chart run, the block outputs the double-point indication **ON** (bit string 10, decimal value 2).
- If the block detects a change of value from 0 to 1 at one of the inputs, it sets the **OUT** output to **Disturbed position** (bit string 11, decimal value 3) for 1 chart run. The block does not output the result of the OR function until the next chart run, which enables you to detect a change of value even if the results are identical before and after the change. The block does not respond to an input fallback, as long as the OR result is not affected.

Alternative Block Types

- **OR**

If you require a pure OR logical operation, Siemens recommends using the **OR** block instead of the **OR_DYN** block.

- **OR_SPS**

If you need quality information in addition to the OR logical operation, use the **OR_SPS** block instead of the **OR_DYN** block.

Related Topics

[12.1.1.4 Block](#)

12.2.8.3 XOR

The **XOR** block links binary input values via the logical XOR function.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	X1	BOOL	Input value 1	0
	X2	BOOL	Input value 2	0
Output	Y	BOOL	Input values combined with the logical XOR function	0

Detailed Description

The block connects the values at the inputs **X1** and **X2** with the logical XOR function. The block then displays a 1 at the **Y** output only if just 1 input has an input value of 1. Otherwise, the **Y** output is 0.

Value Table

Input X1	Input X2	Output Y
0	0	0
0	1	1
1	0	1
1	1	0

Related Topics

[12.1.1.4 Block](#)

12.2.8.4 NOR

The **NOR** block links binary input values via the logical NOR function.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	X1	BOOL	Input value 1	0
	X2	BOOL	Input value 2	0
	X3 to X10	BOOL	Input value 3 to input value 10	0
Output	Y	BOOL	Input values combined with the logical NOR function	0

Once the block has been inserted into the chart, only 2 of the 10 inputs are visible. If you need more inputs, uncheck the relevant boxes in the **Hidden** column in the block properties.



NOTE

Inputs that are not used must be assigned a default value of 0.

Detailed Description

The block connects the values at the inputs **X1** to **X10** with the logical NOR function and displays the output value **Y** as 1 only if the input values of all inputs are 0. Otherwise, the **Y** output value is 0.

Value Table

Input X1	Input X2	Output Y
0	0	1
0	1	0
1	0	0
1	1	0

Related Topics

[12.1.1.4 Block](#)

12.2.8.5 AND

The **AND** block links binary input values via the logical AND function.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	X1	BOOL	Input value 1	0
	X2	BOOL	Input value 2	0
	X3 to X10	BOOL	Input value 3 to input value 10	1
Output	Y	BOOL	Input values combined with the logical AND function	0

Once the block has been inserted into the chart, only 2 of the 10 inputs are visible. If you need more inputs, uncheck the relevant boxes in the **Hidden** column in the block properties.



NOTE

Inputs that are not used must be assigned a default value of 1.

Detailed Description

The block connects the values at the inputs **X1** to **X10** with the logical AND function. The block then displays a 1 at the **Y** output only if the input values of all inputs are 1. Otherwise, the **Y** output is 0.

Value Table

Input X1	Input X2	Output Y
0	0	0
0	1	0
1	0	0
1	1	1

Alternative Block Types

If instead of binary input values the values of single-point indications must be linked with quality information using the AND function, use the = **AND_SPS** block instead of the **AND** block.

Related Topics

[12.1.1.4 Block](#)

12.2.8.6 NAND

The **NAND** block links binary input values via the logical NAND function.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	X1	BOOL	Input value 1	0
	X2	BOOL	Input value 2	0
	X3 to X10	BOOL	Input value 3 to input value 10	1
Output	Y	BOOL	Input values combined with the logical NAND function	0

Once the block has been inserted into the chart, only 2 of the 10 inputs are visible. If you need more inputs, uncheck the relevant boxes in the **Hidden** column in the block properties.



NOTE

Inputs that are not used must be assigned a default value of 0.

Detailed Description

The block connects the values at the inputs **X1** to **X10** with the logical NAND function and displays the output value **Y** as 1 only if either one or all input values of the inputs are 0. Otherwise, the **Y** output value is 0.

Value Table

Input X1	Input X2	Output Y
0	0	1
0	1	1

1	0	1
1	1	0

Related Topics

[12.1.1.4 Block](#)

12.2.8.7 NEG

The **NEG** block inverts the binary input value with the logical NOT function.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Input	IN	BOOL	Input value	0
Output	OUT	BOOL	Negated input value	0

Value Table

Input X1	Output Y
0	1
1	0

Alternative Block Types

If instead of a binary input value the value of single-point indications must be negated with quality information use the **NEG** block instead of the **NEG_SPS** block.

Related Topics

[12.1.1.4 Block](#)

12.2.9 Logic with Status

12.2.9.1 OR_SPS

The **OR_SPS** block combines 4 separate single-point indications to only one single-point indication. The block combines the values of the 4 single-point indications and also the quality-related information using the OR function.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default

Inputs	IN1	SSPS	Single-point indication 1	SP: 0 Q: 16#0000
	IN2	SSPS	Single-point indication 2	SP: 0 Q: 16#0000
	IN3	SSPS	Single-point indication 3	SP: 0 Q: 16#0000
	IN4	SSPS	Single-point indication 4	SP: 0 Q: 16#0000
	STRICT	BOOL	Control signal for processing the quality 1: The output indication has the value On only if at least 1 input indication has both the value On and the quality Valid . 0: The quality-related information has no impact on the value of the output indication.	0
Outputs	OUT	SSPS	- Values of the single-point indications combined with the logical OR function - Quality information of the single-point indications combined with the logical OR function	SP: 0 Q: 16#0000
	VALID	BOOL	Indicator for the quality of the output indication 1: The quality has a value of Valid . 0: The quality has another value.	0

After adding the block to the chart the **STRICT** input is not visible. If you need this input, remove the marking of the associated check box in the **Invisible** column in the properties of the block.

**NOTE**

When an input **INx** is not used, the value **SP** must be preset with 0.

Detailed Description

The block combines the values of the single-point indications at the inputs **IN1** to **IN4** using the logical OR function. The value of the single-point indication at the output **OUT** is **On** if the value of at least one input indication is **On**. Only if the values of all the input indications are **Off**, then the value of the output indication also **Off**.

The block combines the quality information of the single-point indications at the inputs **IN1** to **IN4** using the logical OR function. The quality of the single-point indication at the output **OUT** is **Valid** if the quality of all the input indications is **Valid** or at least one input indication with the value **On** is **Valid**. The value at the output **VALID** is an indicator of whether the quality of the single-point indication is **Valid** or not.

You can use the **STRICT** input to control whether the quality of the input indications should affect the value of the output indication or not.

- Input **STRICT** equal to 0
The value of the single-point indication at the output **OUT** is then **On** only if the value of at least one input indication is **On**. The quality of the input indications has no impact on the value of the output indication.
- Input **STRICT** equal to 1
The value of the single-point indication at the **OUT** output is **On** exactly when the value of at least one input indication is **On** and when, at the same time, the quality information of this input indication is **Valid**.

Alternative Block Types

If you need to combine only binary input values, instead of single-point indications, with the OR function without the quality-related information, Siemens recommends using the **OR** block instead of **OR_SPS** block.

Related Topics

[12.1.1.4 Block](#)

12.2.9.2 AND_SPS

The **AND_SPS** block combines 4 separate single-point indications to one single-point indication. The block combines the values of 4 separate single-point indications via the logical AND function and the quality information via the logical OR function.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN1	SSPS	Single-point indication 1	SP: 0 Q: 16#0000
	IN2	SSPS	Single-point indication 2	SP: 0 Q: 16#0000
	IN3	SSPS	Single-point indication 3	SP: 0 Q: 16#0000
	IN4	SSPS	Single-point indication 4	SP: 0 Q: 16#0000
	STRICT	BOOL	Control signal for processing the quality 1: The output indication has the value On only if all input indications have both the value On and the quality Valid . 0: The quality-related information has no impact on the value of the output indication.	0
Outputs	OUT	SSPS	- Values of the single-point indications combined with the logical AND function - Quality information of the single-point indications combined with the logical OR function	SP: 0 Q: 16#0000
	VALID	BOOL	Indicator for the quality of the output indication 1: The quality has a value of Valid . 0: The quality has another value.	0

After adding the block to the chart the **STRICT** input is not visible. If you need this input, remove the marking of the associated check box in the **Invisible** column in the properties of the block.

**NOTE**

When an input **INx** is not used, the value **SP** must be preset with 1.

Detailed Description

The block combines the values of the single-point indications at the inputs **IN1** to **IN4** using the logical AND function. The value of the single-point indication at the output **OUT** is **On** only if the values of all input indications are **On**. Otherwise, the value at the output indication is **Off**.

The block combines the quality information of the single-point indications at the inputs **IN1** to **IN4** using the logical OR function. The quality of the single-point indication at the output **OUT** is **Valid** only if the quality of all input indications is **Valid** or at least one input indication with value **Off** is **Valid**. The value at the output **VALID** is an indicator of whether the quality of the single-point indication is **Valid** or not.

You can use the **STRICT** input to control whether the quality of the input indications should affect the value of the output indication or not.

- Input **STRICT** equal to 0

The value of the single-point indication at the output, **OUT** is then **On** only if the values of all input indications are **On**. The quality of the input indications has no impact on the value of the output indication.

- Input **STRICT** equal to 1

The value of the single-point indication at the **OUT** output is **On** exactly when the values of all input indications are **On** and when, at the same time, the quality information of all input indications are **Valid**.

Alternative Block Types

If you need to combine only binary input values, instead of single-point indications, with the AND function and without the quality-related information, Siemens recommends using the **AND** block instead of the **AND_SPS** block.

Related Topics

[12.1.1.4 Block](#)

12.2.9.3 NEG_SPS

The **NEG_SPS** block inverts the value of a single-point indication with the logical NOT function and leaves the quality-related information of this single-point indication unchanged.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	SSPS	Single-point indication	SP: 0 Q: 16#0000
Outputs	OUT	SSPS	• Negated value of the single-point indication • Unchanged quality-related information of the single-point indication	SP: 0 Q: 16#0000
	VALID	BOOL	Indicator for the quality of the output indication 1: The quality has a value of Valid . 0: The quality has another value.	0

Detailed Description

The block inverts the value of a single-point indication at the input **IN** with the logical NOT function. The quality of the single-point indication remains unchanged. The inverted value of the single-point indication is available at the **OUT** output. The value **VALID** at the output is an indicator of whether the quality of the single-point indication is **Valid** or not.

Alternative Block Types

If, instead of the value of a single-point indication, you need to invert the value of a binary input value without the quality-related information, Siemens recommends using the **NEG** block in place of **NEG_SPS**.

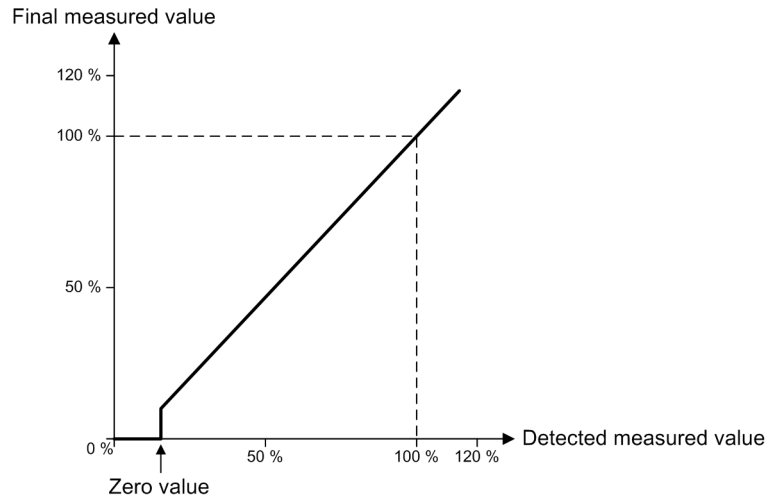
Related Topics

[12.1.1.4 Block](#)

12.2.10 Non-Linear

12.2.10.1 NL_ZP

The block **NL_ZP** (non linear zero point) sets the measured value at the output side to the measured value on the input side, except the value is below a parameterizable zero-point value. If the input value is below the parameterizable zero-point value, the output value is set to 0. Using this block, measuring compensation can be done for inaccuracies or transformer tolerances.



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Figure 12-10 Example of a Characteristic Curve for NL_ZP

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000
	XZ	REAL	X-coordinate of the moved zero point as a percentage value.	0.0
	MAX_XP	REAL	Maximum input value in percent	500.0

	Name	Data Type	Explanation	Default
Output	OUT	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block maps a measured value at the input **IN** via the characteristic curve of a measured value with constant gradient at the output **OUT**. For this characteristic curve a value is determined via the input **XZ**, under which all input values are set to 0. The gradient of the characteristic curve is not influenced by this moved zero point.

On the output side of the block, for example, a user-defined signal of the type measured value (MV) can be connected. The user-defined measured value gets automatically the value description from the input signal which is connected to the **IN** input of the block. You can overwrite the multiplier, the unit, and the decimal points for primary and secondary representation in the properties of the user-defined signal. For more information, refer to [19.9.13 MV – Details](#).

To set parameters to a characteristic curve, following these rules:

- **Determining Maximum Range**

If you use the floating-point numbers at the **MAX_XP** input, determine the maximum range in percent. The measured values at the input **IN** and output **OUT** are also percent values.

- **Determining the Zero Point**

The value at the input **XZ** specifies the x-coordinate of the zero-point value. The value must be within the range of 0 % to 30 %. If the value is below 0 %, the block automatically sets the value to 0%. If the value is above 30 %, the block automatically sets the value to 30 %.

The quality of the measured values at the output side is set to the quality of the input signal. If the input signal is not **Invalid**, the quality of the output signal depends on the following factors:

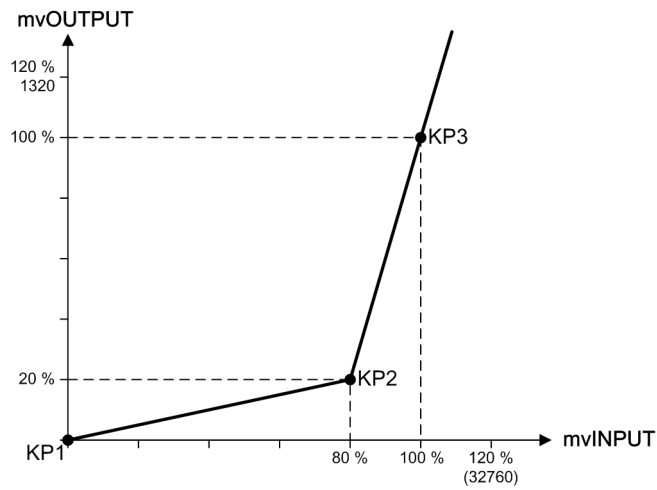
- If the value of the input **XZ** is not within the range from 0 % to 30 %, then the output measured value becomes the quality **Questionable**.
- If the input value exceeds the range defined by **MAX_XP**, then the output measured value becomes the quality **Questionable**.

Related Topics

[12.1.1.4 Block](#)

12.2.10.2 NL_MV

The **NL_MV** block calculates a new measured value from a measured value using the characteristic curve. You can determine the course of this characteristic curve using different input settings.



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Figure 12-11 Example of a Characteristic Curve for NL_MV

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000
	CNT	UINT	Number of break points used The minimum number is 2, the maximum number is 5.	2
	SYM	UINT	Extension of the defined characteristic curve in the coordination system 0: For positive y-coordinates, the characteristic curve is found in the 1st quadrant and for negative y-coordinates in the 4th quadrant. 1: The characteristic curve is furthermore reflected via the zero point in the 3rd quadrant. For negative y-coordinates the characteristic curve is also reflected in the 2nd quadrant. 2: The characteristic curve is furthermore reflected via the y-axis in the 2nd quadrant. For negative y-coordinates the characteristic curve is also reflected in the 3rd quadrant.	0
	MAX_XP	REAL	Maximum input value in percent	500.0
	MAX_YP	REAL	Maximum output value in percent	500.0
	X1	REAL	X-coordinates of the break point KP1 in percent	0.0
	Y1	REAL	Y-coordinates of the break point KP1 in percent	0.0
	X2	REAL	X-coordinates of the break point KP2 in percent	100.0
	Y2	REAL	Y-coordinates of the break point KP2 in percent	100.0
	X3	REAL	X-coordinates of the break point KP3 in percent	0.0

	Name	Data Type	Explanation	Default
	Y3	REAL	Y-coordinates of the break point KP3 in percent	0.0
	X4	REAL	X-coordinates of the break point KP4 in percent	0.0
	Y4	REAL	Y-coordinates of the break point KP4 in percent	0.0
	X5	REAL	X-coordinates of the break point KP5 in percent	0.0
	Y5	REAL	Y-coordinates of the break point KP5 in percent	0.0
Output	OUT	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

With the block you can set parameters to a non-linear characteristic curve. The measured value at the input **IN** is then mapped via this characteristic curve to a measured value at the output **OUT**. You can then for example, linearize the output characteristic curve of a non-linear transformer, and at the same time, adjust the resolution of different measuring ranges. You can do this in one of the following ways:

- Stretching or compressing the characteristic-curve range
- Changing the characteristic-curve slope
- Moving the zero point

On the output side of the block, for example, a user-defined signal of the type measured value (MV) can be connected. The user-defined measured value gets automatically the value description from the input signal which is connected at the **IN** input of the block. You can overwrite the multiplier, the unit, and the decimal points for primary and secondary representation in the properties of the user-defined signal. For more information, refer to [19.9.13 MV – Details](#).

To set parameters to a characteristic curve, following these rules:

- **Determining Maximum Input and Output Range**

If you use the floating-point numbers at the **MAX_XP** and **MAX_YP** inputs, determine the maximum input and output range in percent. The measured values at the input **IN** and the output **OUT** are also percent values.

- **Determining the Number of Break Points**

The value at the input **CNT** specifies the number of break points of the characteristic curve. The minimum number is 2, the maximum number is 5.

- **Determining the Coordinates for the Break Points**

You determine the coordinates for the maximum 5 break points via the input pairs **X1/Y1** to **X5/Y5**.

Switch the inputs in a continuous sequence using percent values. If for example you need 3 break points, the input pairs **X1/Y1**, **X2/Y2**, and **X3/Y3** must be switched with values. All percent values for the x-coordinates must be positive and issued in ascending order. $X_{n+1} > X_n$ must apply. If the x-coordinate of the 1st break point is not equal to 0, the block automatically sets the input values from 0 up to the value of the x-coordinates to 0.

The percent values for the y-coordinates can also be negative, and must be within the range **-MAX_YP** to **+MAX_YP**.

- **Reflecting Characteristic Curve**

If the input **SYM** is set to 0 and all y-coordinates are positive, then the characteristic curve is only in the 1st quadrant of the coordinate system. If the y-coordinates are negative, then the characteristic curve also runs in the 4th quadrant. With values 1 or 2 at the input **SYM**, you reflect the characteristic curve via the zero point or the y-axis to the other quadrants. As a result the block can also process negative input values. If the input **SYM** is set to 0, then the block sets negative input values automatically to 0.

If the input **SYM** value is greater than 2, the symmetry 0 is used for the calculation inside the block.

The quality of the measured values at the output side is set to the quality of the input signal. If the input signal is not **Invalid**, the quality of the output signal depends on the following factors:

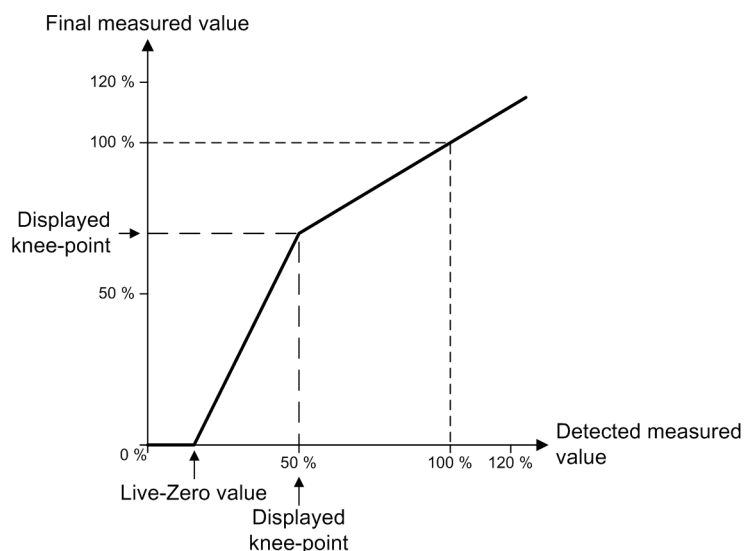
- If the values of the inputs X_n or Y_n violate the previously mentioned rules, then the output measured value receives the quality **Invalid**.
- If the input **SYM** is 0 and the input value is negative, then the quality becomes **Questionable**.
- If an input or output value exceeds the ranges specified by **MAX_XP** and **MAX_YP**, then the output measured value receives the quality **Questionable**.

Related Topics

[12.1.1.4 Block](#)

12.2.10.3 NL_LZ

The block **NL_LZ** issues an alarm indication for measured values below a live-zero value. This allows you to identify failures of the measuring transducer or the wiring. For this purpose, the block shifts the parameterizable zero point of a characteristic curve through the x-axis. With a parameterizable break point, you can divide the characteristic curve into 2 areas with different slopes.



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Figure 12-12 Example of a Characteristic Curve for NL_LZ

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Inputs	IN	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000
	LZ	REAL	X-coordinate of the live-zero value in percent	0.0
	XK	REAL	X-coordinates of the break point KP in percent	0.0
	YX	REAL	Y-coordinates of the break point KP in percent	0.0
	MAX_XP	REAL	Maximum input value in percent	500.0
	MAX_YP	REAL	Maximum output value in percent	500.0

	Name	Data Type	Explanation	Default
Output	OUT	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000
	ALERT	BOOL	Live-zero value is underrun (connection broken)	0

Detailed Description

The block maps a measured value at the input **IN** via the characteristic curve of a measured value at the output **OUT**. For this characteristic curve a live-zero value is determined via the input **LZ**, under which all input values are set to 0. With a break point that you determine via the inputs **XK** and **YX**, you can divide the characteristic curve into 2 areas with different slopes. When moving the live-zero value on the x-axis, only the slope of the bottom character curve area changes. The slope at the top character curve area remains constant.

If the measured value at the input falls below 90 % of the live-zero value, then the block sets the output **ALERT** to 1. The hysteresis prevents resetting the output immediately to 0 if exceeding. The hysteresis automatically adapts to the live-zero value. For a live-zero value greater than 10 %, the hysteresis is 5 % of the live-zero value. That means the alarm is reset only if the input value is greater than 95 % of the live-zero value. For a live-zero value less than 10 %, the alarm is reset to 0 only if the input value is greater than 90 % of the live-zero value plus 0.5 % offset.

On the output side of the block, for example, a user-defined signal of the type measured value (MV) can be connected. The user-defined measured value gets automatically the value description from the input signal which is connected to the input **IN** of the block. You can overwrite the multiplier, the unit, and the decimal points for primary and secondary representation in the properties of the user-defined signal. For more information, refer to [19.9.13 MV – Details](#).

To set parameters to a characteristic curve, following these rules:

- Determining Maximum Input and Output Range**

If you use the floating-point numbers at the **MAX_XP** and **MAX_YP** inputs, determine the maximum input and output range in percent. The measured values at the input **IN** and the output **OUT** are also percent values.

- Determining the Live-Zero Value**

The value at the input **LZ** specifies the x-coordinate of the live-zero value. The value must be within the range from 0 % up to the value at the input **XK**. If the value is below 0 %, the block automatically sets the value to 0 %. If the value is larger than the value at input **XK**, the block automatically sets the value to the value at the input **XK**.

- **Determining the Coordinates for the Break Points**

You determine the coordinates for the break point via the pair of inputs **XK** and **YK**. The value for input **XK** must be within the range from 0 % to 100 %. The value for input **YK** must be within the range of 0 % to 200 %. If the value is below 0 %, the block automatically uses value 0 %. If the value is above the permitted maximum value, then the block automatically uses the maximum value.

The quality of the measured values at the output side is set to the quality of the input signal.

If the input signal is not **Invalid**, the quality of the output signal depends on the following factors:

- If the value of the input **LZ** is less than 0 % or greater than **XK**, the quality becomes **Questionable**.
- If the value of the input **XK** is less than 0 % or greater than 100 %, the quality becomes **Questionable**.
- If the value of the input **YK** is less than 0 % or greater than 200 %, the quality becomes **Questionable**.
- If an input or output value exceeds the ranges specified by **MAX_XP** and **MAX_YP** then the output measured value receives the quality **Questionable**.

Related Topics

[12.1.1.4 Block](#)

12.2.11 Other

12.2.11.1 CONNECT

The **CONNECT** block connects a single-point indication (SPS) at the input with a single-point indication at the output. The block does not change the value of the single-point indication.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	SSPS	Single-point indication	SP: 0 Q: 16#0000
Output	OUT	SSPS	Single-point indication	SP: 0 Q: 16#0000

Detailed Description

The block reproduces the value of a single-point indication at the **IN** input at the single-point indication at the **OUT** output. The value of the single-point indication is not changed.

Related Topics

[12.1.1.4 Block](#)

12.2.11.2 CON_ACD

The **CON_ACD** block connects a directional protection information (ACD) at the input with a directional protection information at the output. The block does not change the value of the directional protection information.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default

Input	IN	SACD	Directional protection information	PHS: 0 DIR: 0 QLTY: 16#0000
Output	OUT	SACD	Directional protection information	PHS: 0 DIR: 0 QLTY: 16#0000

Detailed Description

The block forwards the value of a directional protection information at the **IN** input to the directional protection information at the **OUT** output. The value of the directional protection information is not changed.

Related Topics

[12.1.1.4 Block](#)

12.2.11.3 CON_ACT

The **CON_ACT** block connects a protection activation information (ACT) at the input with a protection activation information at the output. The block does not change the value of the protection activation information.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	SACT	Protection activation information	PHS: 0 DIR: 0 QLTY: 16#0000
Output	OUT	SACT	Protection activation information	PHS: 0 DIR: 0 QLTY: 16#0000

Detailed Description

The block forwards the value of a protection activation information at the **IN** input to the protection activation information at the **OUT** output. The value of the protection activation information is not changed.

Related Topics

[12.1.1.4 Block](#)

12.2.11.4 CHART_STATE

The **CHART_STATE** block enables setting, retrieving, and displaying the execution state of a function-block diagram. The execution states possible are **On**, **Off**, **Test**, and **Error**.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default

Inputs	COFF	BOOL	Control signal to disable the function-block diagram 1: The function-block diagram is disabled by the block 0: The function-block diagram is not disabled by the block	0
	TEST	BOOL	Control signal to enable the test state 1: The test state is enabled by the block 0: The test state is not enabled by the block	0
Outputs	LED	SSPS	Single-point indication that changes its value depending on the state of the function-block diagram The quality of this single-point indication is always valid .	SP: 0 Q: 16#0000
	BAD	BOOL	Indicator for the state of the function-block diagram or the quality of signals 1: Error state of the function-block diagram or signal with the quality questionable or invalid 0: No error state and all signals with the quality valid	0
	ERR	DINT	Detailed information about the state of the function-block diagram: 0x0000: Chart state is valid . Either, the automatic quality handling is used and all the signals have the quality valid , or the manual quality handling is set. 0x0011: Chart state is invalid . The automatic quality handling is used and there is a signal with the invalid quality at the block input in the function-block diagram. 0x0012: Chart state is questionable . The automatic quality handling is used and there is a signal with the questionable quality at the block input in the function-block diagram. 0x0013: Chart state is invalid and questionable . 0x0100: Chart state is off . In most cases, an execution error changes the state of the function-block diagram to off . 0x0200: CFC is not working as the signals are not initialized. 0x0400: CFC is not working due to an execution error. 0x0800: Chart state is in the test mode.	0

Detailed Description

You have the following options with this block:

- With the help of the **COFF** and **TEST** inputs, you can disable the function-block diagram or put it in the test state.
- You can use the **LED** output to indicate the execution state at the SIPROTEC 5 device using an LED.
- The **BAD** and **ERR** outputs provide information about the current execution state of a function-block diagram.



NOTE

A function-block diagram can be put in the **Off** or **Test** state only when the **CHART_STATE** block has been processed. This is why Siemens recommends that you place this block as the first block to be executed in the function-block diagram.

The inputs and outputs of the block are explained in the following.

- **COFF Input**
A 1 at this input puts the function-block diagram in the **off** state. In this state, the output values of the blocks are no longer changed. All outputs retain the values that were current just before the state changed to **off**. The quality of the output signals, however, is set to **invalid**. When both the **COFF** and **TEST** inputs are set to 1 simultaneously, the function-block diagram state is set to **off**. You can find more information about this in the **Values table** section.
- **TEST Input**
A 1 at this input puts the function chart in the **Test** state. The function chart continues to be executed. In this state, however, all output signals are marked with the additional information **Test**. When both the **COFF** and **TEST** inputs are set to 1 simultaneously, the function-block diagram state is set to **off**. You can find more information about this in the **Priority scheme** section.
- **LED Output**
As long as the function-block diagram is being executed, the value of this output changes cyclically. If you route this output to an LED of the SIPROTEC 5 device, you can indicate the execution state of the function-block diagram visually.
 - When everything is okay, the output value changes every 3 seconds. The LED is, thus, switched on for 3 seconds and then switched off for 3 seconds. As a result, there is a low flashing frequency.
 - If the function-block diagram is in the test state, the value changes at different time intervals. The LED is then switched on for 0.5 seconds and then switched off for 3 seconds.
 - If the block detects a major problem, the value changes in equal and short time intervals. The LED is then switched on and off for 0.5 seconds respectively. A major problem is, for example, a block input without a defined input value.
 - In most cases, an execution error changes the state of the function-block diagram to **Off**. In this case, the **LED** output is set to 0. The LED then remains off.
- **BAD Output**
This output is set to 1 when the signal qualities are invalid or questionable. If the block detects invalid signal qualities for short periods of time, it sets the **BAD** output to 1 for a minimum time range of 0.5 seconds.
The output is set to 1 even in case of an execution error of the function-block diagram. The prerequisite for this is that the function-block diagram continues to be executed. In most cases, an execution error changes the state of the function-block diagram to **Off**. The **BAD** output then has the value 0 like the other outputs.
- **ERR Output**
This output provides detailed information about the state of the function-block diagram. The information is coded as hexadecimal values. The possible values and the associated meaning are given in the **Connections and Explanations** section.

Values Table

The state of a function-block diagram can be controlled by both the **CHART_STATE** block and via the IEC 61850 indications. The function-block diagram can, for example, be disabled, although the signal at the **COFF** input is equal to 0. The following table illustrates the dependencies between the possible input signals and IEC 61850 indications and the corresponding result.

TEST - Input	TEST - IEC 61850	OFF - Input	OFF - IEC 61850	Function-Block Diagram State
Not relevant	Not relevant	Not relevant	1	OFF
Not relevant	Not relevant	1	0	OFF
Not relevant	1	0	0	TEST
1	0	0	0	TEST

Related Topics

[12.1.1.4 Block](#)

12.2.11.5 LOOP

The **LOOP** block enables the feed back of a binary output signal to another block having a smaller sequence number in the same function-block diagram.

Connections and Explanations

You can find explanations for the connections of the block in the following table.

	Name	Data Type	Explanation	Default
Input	IN	BOOL	Input value: Corresponds to the signal to be fed back from the block with the higher sequence number.	0
Outputs	OUT	BOOL	Output value: Is connected through from the IN input and must be connected with the input of the block with the lower sequence number.	0
	ERR	BOOL	Indicator for an error/fault 1: The signal is fed back more than 5 times through the LOOP block 0: No error/fault	0

Detailed Description

Using the **LOOP** block, you can feed the output signal of a block with a higher sequence number (block A) back to the input of a block with a lower sequence number (block B). To do this, connect the output of the block A with the input of the **LOOP** block. Connect the output of the **LOOP** block with the input of the block B. The function-block diagram with the signal fed back is executed once again after one signal has run through. New input signals, which are present at the blocks in the meantime, are not taken into consideration. With the repeated execution of the function-block diagram, all input signals remain the same except the one that the **LOOP** block provides as a feedback.

In order to prevent indefinite feedback, a signal is fed back maximum 5 times via the **LOOP** block. When this number is exceeded, the **LOOP** block sets the **ERR** output to 1 and interrupts the feedback.



NOTE

By optimizing the running sequence, the sequence number of the blocks are possibly changed so that the **LOOP** block finally no longer works correctly. Hence, do not optimize the running sequence of function-block diagrams that contain these blocks.

Related Topics

[12.1.1.4 Block](#)

12.2.11.6 SUBST_B

The **SUBST_B** block replaces a binary value by a predefined binary value. The output is a single-point indication. A specified condition must be fulfilled for the replacement of the input value.

Connections and Explanations

The following table contains the explanations for the connections of the **SUBST_B** block.

	Name	Data Type	Explanation	Default
Inputs	IN	BOOL	Binary input value	0
	SVAL	BOOL	Binary substitute value	0
	COND	UINT	Value for selection of a condition to replace the input value You can find more information about this topic in the Conditions section.	1
Output	OUT	SSPS	Single-point indication	SP: 0 Q: 16#0000

Detailed Description

The block **SUBST_B** sets the single-point indication at the output **OUT** to the binary value from the input **IN**. If the condition specified at the input **COND** is fulfilled, the binary value at the input **SVAL** is used instead of the binary value from input **IN**.

The quality of the single-point indication at the output **OUT** becomes the quality from the function-block diagram. You can use the **CHART_STATE** block to check the function-block diagram quality.

If the value is substituted, the quality of the single-point indication at the output **OUT** becomes **Valid** and **Substituted**.

Conditions

In the following table, you will find the permitted conditions and the applicable values.

Value at the COND Input	Condition
0	Never
1	Quality of the input signal is Invalid
10	Function-block diagram operating condition is Functional logout
100	Function-block diagram state is Off
11	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
101	Quality of the function-block diagram is Invalid or function-block diagram state is Off
110	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
111	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout or function-block diagram state is Off

12.2.11.7 SUBST_BQ

The **SUBST_BQ** block replaces a single-point indication by a predefined binary value. The output is a single-point indication. A specified condition must be fulfilled for the replacement of the input value.

Connections and Explanations

The following table contains the explanations for the connections of the **SUBST_B** block.

	Name	Data Type	Explanation	Default
Inputs	IN	SSPS	Single-point indication	SP: 0 Q: 16#0000
	SVAL	BOOL	Binary substitute value	0
	COND	UINT	Value for selection of a condition to replace the input value You can find more information about this in the Conditions section.	1
Output	OUT	SSPS	Single-point indication	SP: 0 Q: 16#0000

Detailed Description

The block **SUBST_BQ** sets the single-point indication at the output **OUT** to the value and the quality from the single-point indication at the input **IN**. If the condition specified at the input **COND** is fulfilled, the binary value at the input **SVAL** is used instead of the binary value from single-point indication at input **IN**.

If the value is substituted, the quality of the single-point indication at the output **OUT** becomes **Valid** and **Substituted**.

Conditions

In the following table, you will find the permitted conditions and the applicable values.

Value at the COND Input	Condition
0	Never
1	Quality of the input signal is Invalid
10	Function-block diagram operating condition is Functional logout
100	Function-block diagram state is Off
11	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
101	Quality of the function-block diagram is Invalid or function-block diagram state is Off
110	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
111	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout or function-block diagram state is Off

12.2.11.8 SUBST_D

The **SUBST_D** block replaces an integer value by a predefined integer value. The output is a measured value. A specified condition must be fulfilled for the replacement of the input value.

Connections and Explanations

The following table contains the explanations for the connections of the **SUBST_D** block.

	Name	Data Type	Explanation	Default
Inputs	IN	DINT	Integral input value	0
	SVAL	DINT	Integral substitute value	0
	COND	UINT	Value for selection of a condition to replace the input value You can find more information about this topic in the Conditions section.	1
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 1.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DECP: 3 SEC.EXIST: 0 SEC.SCALE: 1.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DECP: 3 PCT.EXIST: 0 PCT.SCALE: 1.0 PCT.UNIT: -7 PCT.MUL: 0 PCT.DECP: 3
Output	OUT	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block **SUBST_D** sets the measured value at the output **OUT** to the value from the input **IN**. If the condition specified at the input **COND** is fulfilled, the value at the input **SVAL** is used instead of the value from input **IN**.

The quality of the measured value at the output **OUT** becomes the quality from the function-block diagram. You can use the **CHART_STATE** block to check the function-block diagram quality.

If the value is substituted, the quality of the output measurement signal becomes **Valid** and **Substituted**.

If a user-defined signal is connected at the output **OUT**, it gets the value description from the input **VALDESC**, where for example, a predefined measured signal can be connected to. You can overwrite the multiplier, the unit, and the decimal points for primary and secondary representation in the properties of the user-defined signal. For more information, refer to [19.9.13 MV – Details](#).

Conditions

In the following table, you will find the permitted conditions and the applicable values.

Value at the COND Input	Condition
0	Never
1	Quality of the input signal is Invalid
10	Function-block diagram operating condition is Functional logout
100	Function-block diagram state is Off
11	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
101	Quality of the function-block diagram is Invalid or function-block diagram state is Off
110	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
111	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout or function-block diagram state is Off

12.2.11.9 SUBST_R

The **SUBST_R** block replaces a floating-point number by a predefined floating-point number. The output is a single a measured value. A specified condition must be fulfilled for the replacement of the input value.

Connections and Explanations

The following table contains the explanations for the connections of the **SUBST_R** block.

	Name	Data Type	Explanation	Default
Inputs	IN	REAL	Floating-point number as the input value	0.0
	SVAL	REAL	Floating-point number as the substitute value	0.0
	COND	UINT	Value for selection of a condition to replace the input value You can find more information about this topic in the Conditions section.	1
	VALDESC	VALDESC_MV	Value description	PRIM.EXIST: 0 PRIM.SCALE: 1.0 PRIM.UNIT: 0 PRIM.MUL: 0 PRIM.DECP: 3 SEC.EXIST: 0 SEC.SCALE: 1.0 SEC.UNIT: 0 SEC.MUL: 0 SEC.DECP: 3 PCT.EXIST: 0 PCT.SCALE: 1.0 PCT.UNIT: -7 PCT.MUL: 0 PCT.DECP: 3
Output	OUT	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block **SUBST_R** sets the measured value at the output **OUT** to the value from the input **IN**. If the condition specified at the input **COND** is fulfilled, the value at the input **SVAL** is used instead of the value from input **IN**.

The quality of the measured value at the output **OUT** becomes the quality from the function-block diagram. You can use the **CHART_STATE** block to check the function-block diagram quality.

If the value is substituted, the quality of the output measuring signal becomes **Valid** and **Substituted**.

If a user-defined signal is connected at the output **OUT**, it gets the value description from the input **VALDESC**, where for example, a predefined measured signal can be connected to. You can overwrite the multiplier, the unit, and the decimal points for primary and secondary representation in the properties of the user-defined signal. For more information, refer to [19.9.13 MV – Details](#).

Conditions

In the following table, you will find the permitted conditions and the applicable values.

Value at the COND Input	Condition
0	Never
1	Quality of the input signal is Invalid
10	Function-block diagram operating condition is Functional logout
100	Function-block diagram state is Off
11	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
101	Quality of the function-block diagram is Invalid or function-block diagram state is Off
110	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
111	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout or function-block diagram state is Off

12.2.11.10 SUBST_XQ

The **SUBST_XQ** block replaces a measured value by a predefined floating-point number. The output is a measured value. A specified condition must be fulfilled for the replacement of the input value.

Connections and Explanations

The following table contains the explanations for the connections of the **SUBST_XQ** block.

	Name	Data Type	Explanation	Default
Inputs	IN	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000
	SVAL	REAL	Floating-point number as the substitute value	0.0
	COND	UINT	Value for selection of a condition to replace the input value You can find more information about this topic in the Conditions section.	1
Output	OUT	SXMV	Measured value	VAL_I: 0 VAL_R: 0.0 IS_REAL: 0 VALDESC.PRIM.EXIST: 0 VALDESC.PRIM.SCALE: 1.0 VALDESC.PRIM.UNIT: 0 VALDESC.PRIM.MUL: 0 VALDESC.PRIM.DECP: 3 VALDESC.SEC.EXIST: 0 VALDESC.SEC.SCALE: 1.0 VALDESC.SEC.UNIT: 0 VALDESC.SEC.MUL: 0 VALDESC.SEC.DECP: 3 VALDESC.PCT.EXIST: 0 VALDESC.PCT.SCALE: 1.0 VALDESC.PCT.UNIT: -7 VALDESC.PCT.MUL: 0 VALDESC.PCT.DECP: 3 QLTY: 16#0000

Detailed Description

The block **SUBST_XQ** sets the measured value at the output **OUT** to values from the input **IN**. If the condition specified at the input **COND** is fulfilled, the floating-point number at the input **SVAL** is used instead of the value from input **IN** (**IN.VAL_I**, **IN.VAL_R**).

If the value is substituted, the quality of the output measuring signal becomes **Valid** and **Substituted**.

If a user-defined signal is connected at the output **OUT**, it gets the value description from the input **IN**. You can overwrite the multiplier, the unit, and the decimal points for primary and secondary representation in the properties of the user-defined signal. For more information, refer to [19.9.13 MV – Details](#).

Conditions

In the following table, you will find the permitted conditions and the applicable values.

Value at the COND Input	Condition
0	Never
1	Quality of the measured value at the input IN is Invalid
10	Function-block diagram operating condition is Functional logout
100	Function-block diagram state is Off
11	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
101	Quality of the function-block diagram is Invalid or function-block diagram state is Off
110	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout
111	Quality of the function-block diagram is Invalid or function-block diagram operating condition is Functional logout or function-block diagram state Off

Related Topics

[12.1.1.4 Block](#)

12.2.12 Persistency

12.2.12.1 MEMORY_D

The **MEMORY_D** block saves a whole number in such a way that it remains available even after a restart.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	DINT	Input value	0
	STORE	BOOL	Trigger signal for saving the input value	0
	START	DINT	Start value for the output OUT	0
Outputs	OUT	DINT	Saved input value or start value	At initial start: 0 or start value After restart: Value prior to the restart

Detailed Description

This module transmits the value at the **IN** input with the rising edge of the signal at the **STORE** input to the **OUT** output. The value is retained at the output until the block detects the next rising edge at the **STORE** input. You can use a value at the **START** input to preset the **OUT** output on the initial start.

Prior to restarting the SIPROTEC 5 device, the block saves the value at the output. After the restart, the block restores the saved value.

Alternative Block Types

- If the value at the output of the block does not have to be available after a restart, Siemens recommends using the **HOLD_D** block instead of **MEMORY_D** block. This block requires fewer system resources.
- If you have to process floating-point numbers, use the **Memory_R** block instead of **MEMORY_D** block.

Related Topics

[12.1.1.4 Block](#)

12.2.12.2 MEMORY_R

The **MEMORY_R** block saves the value of a floating-point number in such a way that it remains available even after a restart.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	REAL	Input value	0.0
	STORE	BOOL	Trigger signal for storing the input value	0
	START	REAL	Start value for output OUT	0.0
Outputs	OUT	REAL	Saved input value or start value	At initial start: 0 or start value After restart: Value prior to the restart

Detailed Description

This module transmits the value at the **IN** input with the rising edge of the signal at the **STORE** input to the **OUT** output. The value is retained at the output until the block detects the next rising edge at the **STORE** input. You can use a value at the **START** input to preset the **OUT** output on the initial start.

Prior to restarting the SIPROTEC 5 device, the block saves the value at the output. After the restart, the block restores the saved value.

Alternative Block Types

- If the value at the output of the block does not have to be available after a restart, Siemens recommends using the **HOLD_R** block instead of the **MEMORY_R** block. This block requires fewer system resources.
- If you only have to process whole numbers, Siemens recommends using the **MEMORY_D** block instead of the **MEMORY_R** block. This block provides better accuracy for higher values.

Related Topics

[12.1.1.4 Block](#)

12.2.12.3 FF_D_MEM

The **FF_D_MEM** block is a bistable function block with additional save function. The block saves a value in such a way that it remains available even after a restart.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	D	BOOL	Input value	0
	CLK	BOOL	Clock signal	0
Outputs	OUT	BOOL	State of the signal at the D input at the time when the rising edge of the clock signal occurs.	At initial start: 0 After restart: Value prior to the restart

Detailed Description

On a rising edge of the clock signal at the **CLK** input, the **FF_D_MEM** block transmits the value at the **D** input to the **OUT** output. The value is retained at the output until the block detects the next rising edge at the **CLK** input.

Prior to restarting the SIPROTEC 5 device, the block saves the value at the output. After the restart, the block restores the saved value.

Alternative Block Types

If the value at the output of the block does not have to be available after a restart, Siemens recommends using the **FF_D** block instead of the **FF_D_MEM** block. This block requires fewer system resources.

Related Topics

[12.1.1.4 Block](#)

12.2.12.4 FF_SR_MEM

The **FF_SR_MEM** block is a bistable function block with a dominant set and additional save function. The block saves a value in such a way that it remains available even after a restart.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	S	BOOL	1: Sets the OUT output	0
	R	BOOL	1: Resets the OUT output	0
Outputs	OUT	BOOL	0 or 1	On initial start: 0 After restart: Value prior to the restart

Detailed Description

If a 1 is present at the **S** input, the block sets the **OUT** output to a value of 1. This value is retained until the **R** input adopts a value of 1. The block also sets the output if the **S** and **R** inputs adopt a value of 1 at the same time.

Prior to restarting the SIPROTEC 5 device, the block saves the value at the output. After the restart, the block restores the saved value.

Alternative Block Types

If the value at the output of the block does not have to be available after a restart, Siemens recommends using the **FF_SR** block instead of the **FF_SR_MEM** block. This block requires fewer system resources.

Related Topics

[12.1.1.4 Block](#)

12.2.12.5 FF_RS_MEM

The **FF_RS_MEM** block is a bistable function block with a dominant reset and additional save function. The block saves a value in such a way that it remains available even after a restart.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	R	BOOL	1: Resets the OUT output	0
	S	BOOL	1: Sets the OUT output	0
Outputs	OUT	BOOL	0 or 1	On initial start: 0 After restart: Value prior to the restart

Detailed Description

If a 1 is present at the **S** input, the block sets the **OUT** output to a value of 1. This value is retained until the **R** input adopts a value of 1. The block also resets the output if the **S** and **R** inputs adopt a value of 1 at the same time.

Prior to restarting the SIPROTEC 5 device, the block saves the value at the output. After the restart, the block restores the saved value.

Alternative Block Types

If the value at the output of the block does not have to be available after a restart, Siemens recommends using the **FF_RS** block instead of the **FF_RS_MEM** block. This block requires fewer system resources.

Related Topics

[12.1.1.4 Block](#)

12.2.13 Selection

12.2.13.1 MIN_D

The **MIN_D** block uses up to 4 whole-number input values to determine the minimum value.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	2147483645
	IN2	DINT	Input value 2	2147483645
	IN3	DINT	Input value 3	2147483645
	IN4	DINT	Input value 4	2147483645
Outputs	OUT	DINT	Minimum value present at the inputs IN1 to IN4	0

**NOTE**

You can also interconnect signals of data types **UINT** and **INT** with this block. The block converts these data types into the **DINT** data type automatically.

Detailed Description

The block determines the minimum value from those at the inputs **IN1** to **IN4**. This minimum value is then available at the **OUT** output.

Alternative Block Types

If you have to process floating-point numbers, use the **MIN_R** block instead of **MIN_D**.

Related Topics

[12.1.1.4 Block](#)

12.2.13.2 MIN_R

The **MIN_R** block uses up to 4 floating-point numbers present at the inputs to determine the minimum value.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	10 ²³
	IN2	REAL	Input value 2	10 ²³
	IN3	REAL	Input value 3	10 ²³
	IN4	REAL	Input value 4	10 ²³
Outputs	OUT	REAL	Minimum value present at the inputs IN1 to IN4	0.0

Detailed Description

The block determines the minimum value from those at the inputs **IN1** to **IN4**. This minimum value is then available at the **OUT** output.

Alternative Block Types

If you only have to process whole numbers, Siemens recommends using the **MIN_D** block instead of **MIN_R**.

Related Topics

[12.1.1.4 Block](#)

12.2.13.3 MAX_D

The **MAX_D** block uses up to 4 whole-number input values to determine the maximum value.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default

Inputs	IN1	DINT	Input value 1	- 2147483645
	IN2	DINT	Input value 2	- 2147483645
	IN3	DINT	Input value 3	- 2147483645
	IN4	DINT	Input value 4	- 2147483645
Outputs	OUT	DINT	Maximum value present at the inputs IN1 to IN4	0

**NOTE**

You can also interconnect signals of data types **UINT** and **INT** with this block. The block converts these data types into the **DINT** data type automatically.

Detailed Description

The block determines the maximum value from those at the inputs **IN1** to **IN4**. This maximum value is then available at the **OUT** output.

Alternative Block Types

If you have to process floating-point numbers, use the **MAX_R** block instead of **MAX_D**.

Related Topics

[12.1.1.4 Block](#)

12.2.13.4 MAX_R

The **MAX_R** block uses up to 4 floating-point numbers present at the inputs to determine the maximum value.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	- 10 ²³
	IN2	REAL	Input value 2	- 10 ²³
	IN3	REAL	Input value 3	- 10 ²³
	IN4	REAL	Input value 4	- 10 ²³
Outputs	OUT	REAL	Maximum value present at the inputs IN1 to IN4	0.0

Detailed Description

The block determines the maximum value from those at the inputs **IN1** to **IN4**. This maximum value is then available at the **OUT** output.

Alternative Block Types

If you only have to process whole numbers, Siemens recommends using the **MAX_D** block instead of **MAX_R**.

Related Topics

[12.1.1.4 Block](#)

12.2.13.5 MUX_D

Depending on a selection value, the **MUX_D** block transmits exactly one out of up to 4 whole-number input values to the output.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	DINT	Input value 1	0
	IN2	DINT	Input value 2	0
	IN3	DINT	Input value 3	0
	IN4	DINT	Input value 4	0
	K	UINT	Selection value	1
Outputs	OUT	DINT	Value selected using the selection value	0



NOTE

You can also interconnect signals of data types **UINT** and **INT** with this block. The block converts these data types into the **DINT** data type automatically.

Detailed Description

The block displays exactly one of the values at the inputs **IN1** to **IN4** at the **OUT** output, depending on the selection value at input **K**. If a selection value of 1 is present at the **K** input, the value at input 1 is transmitted. If a selection value of 2 is present, the value at input 2 is transmitted, and so on. If a value lower than 1 is present, the value at input 1 is transmitted. If a value greater than 4 is present, the value at input 4 is transmitted.

Alternative Block Types

If you have to process floating-point numbers, use the **MUX_R** block instead of **MUX_D**.

Related Topics

[12.1.1.4 Block](#)

12.2.13.6 MUX_R

Depending on a selection value, the **MUX_R** block outputs exactly one out of up to 4 floating-point numbers present at the input.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN1	REAL	Input value 1	0.0
	IN2	REAL	Input value 2	0.0
	IN3	REAL	Input value 3	0.0
	IN4	REAL	Input value 4	0.0
	K	UINT	Selection value	1
Outputs	OUT	REAL	Value selected using the selection value	0.0

Detailed Description

The block displays exactly 1 of the values at the inputs **IN1** to **IN4** at the **OUT** output, depending on the selection value at input **K**. If a selection value of 1 is present at the **K** input, the value at input 1 is transmitted. If a selection value of 2 is present, the value at input 2 is transmitted, and so on. If a value lower than 1 is present, the value at input 1 is transmitted. If a value greater than 4 is present, the value at input 4 is transmitted.

Alternative Block Types

If you only have to process whole numbers, Siemens recommends using the **MUX_D** block instead of **MUX_R**.

Related Topics

[12.1.1.4 Block](#)

12.2.13.7 HOLD_D

The **HOLD_D** block can save a whole number present at the input. The save function can be activated by either a rising or a falling edge.

Connections and Explanations

The following table lists the connections of the block and provides corresponding explanations:

	Name	Data Type	Explanation	Default
Inputs	IN	DINT	Input value	0
	HOLD	BOOL	Rising or falling edge as criterion for saving the input value	0
	INVH	BOOL	1: Falling edge at the HOLD input saves the value at the IN input 0: Rising edge at the HOLD input saves the value at the IN input	0
Outputs	OUT	DINT	Saved value	0



NOTE

You can also interconnect signals of data types **UINT** and **INT** with this block. The block converts these data types into the **DINT** data type automatically.

Detailed Description

If the **INVH** input is not set, on a rising edge at the **HOLD** input, the block saves the value present at that time at the **IN** input. If the **INVH** input is set, on a falling edge at the **HOLD** input, the block saves the value present at that time at the **IN** input. The saved value is available at the **OUT** output. The output of the block remains at 0 as long as there is no rising or falling signal edge.

Alternative Block Types

If you have to process real numbers, use the **HOLD_R** block instead of **HOLD_D**.

Related Topics

[12.1.1.4 Block](#)

12.2.13.8 HOLD_R

The **HOLD_R** block can save the value of a floating-point number present at the input. The save function can be activated by either a rising or a falling edge.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	REAL	Input value	0.0
	HOLD	BOOL	Rising or falling edge as criterion for saving the input value	0
	INVH	BOOL	1: Falling edge at the HOLD input saves the value at the IN input 0: Rising edge at the HOLD input saves the value at the IN input	0

Outputs	OUT	REAL	Saved value	0.0

Detailed Description

If the **INVH** input is not set, on a rising edge at the **HOLD** input, the block saves the value present at that time at the **IN** input. If the **INVH** input is set, on a falling edge at the **HOLD** input, the block saves the value present at that time at the **IN** input. The saved value is available at the **OUT** output. The output of the block remains at 0 as long as there is no rising or falling signal edge.

Alternative Block Types

If you only have to process whole numbers, Siemens recommends using the **HOLD_D** block instead of **HOLD_R**.

Related Topics

[12.1.1.4 Block](#)

12.2.14 Timer and Counter

12.2.14.1 TSHORT

The **TSHORT** block is a timer for short-time intervals in the second range.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data type	Explanation	Default
Inputs	START	BOOL	State change from 0 to 1 starts the time interval	0
	RESET	BOOL	State change from 0 to 1 resets the QT and Q outputs to 0	0
	Tx1ms	DINT	Length of the time interval in milliseconds (resolution 1 ms)	1000
Outputs	Q	BOOL	1: At least 1 time interval has elapsed 0: Time interval is still ongoing or has not been started	0
	QT	BOOL	1: Time interval running 0: Time interval not elapsing	0

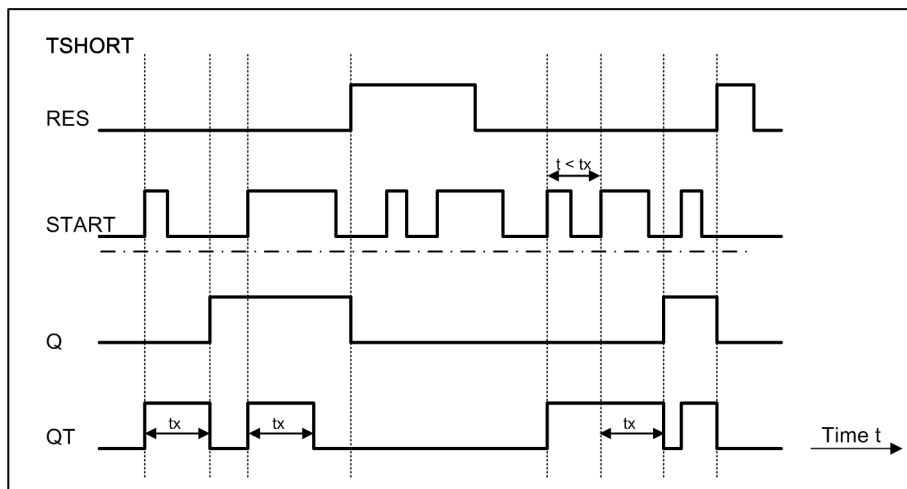
Detailed Description

You set the length of the time interval at the **Tx1ms** input with a resolution of 1 ms.

A state change from 0 to 1 at the **START** input starts the time interval **T**. The **QT** output adopts a value of 1; the **Q** output remains at 0. A state change from 0 to 1 at the **START** input cancels an ongoing time interval and starts it again. The **Q** output retains its state.

Once the time interval has elapsed, the **QT** output is set to 0 and the **Q** output to 1. Only a value of 1 at the **RESET** input can reset the **Q** output to 0. This also cancels an ongoing time interval and sets the **QT** output to 0. Both outputs remain at 0 as long as the **RESET** input has a value of 1.

The following figure illustrates the way in which the block works:



Alternative Block Types

If you only need time intervals of hours, use the **TLONG** block instead of **TSHORT**.

Related Topics

[12.1.1.4 Block](#)

12.2.14.2 TLONG

The **TLONG** block is a timer for long-time intervals in the hour range.

Connections and Explanations

The following table lists the connections of the block and provides corresponding explanations:

	Name	Data Type	Explanation	Default
Inputs	START	BOOL	State change from 0 to 1 starts the time interval	0
	RESET	BOOL	State change from 0 to 1 resets the QT and Q outputs to 0	0
	HOUR	UINT	Length of the time interval - Value for hours	0
	MIN	UINT	Length of the time interval - Value for minutes	0
	MS100	UINT	Length of the time interval - Value for milliseconds (resolution 100 ms)	10
Outputs	Q	BOOL	1: At least 1 time interval has elapsed 0: Time interval is still ongoing or has not been started	0
	QT	BOOL	1: Time interval elapsing 0: Time interval not elapsing	0

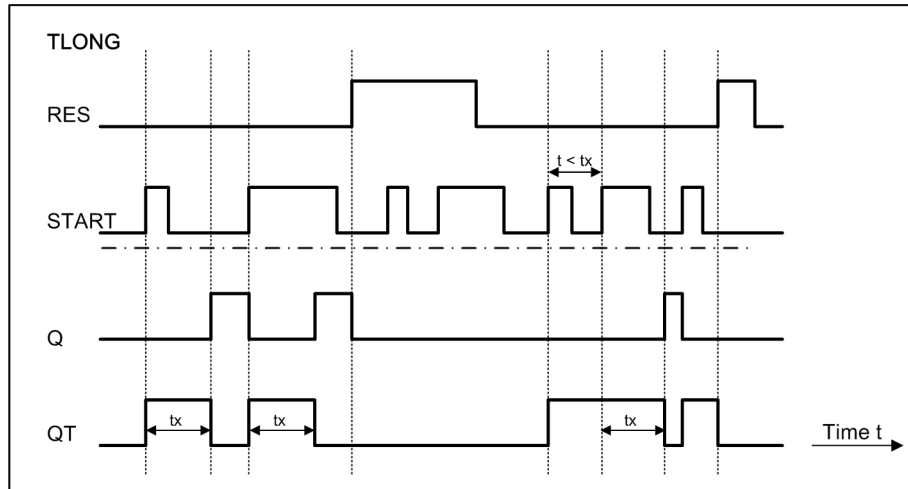
Detailed Description

You can set the length of the time interval separately for hours, minutes and milliseconds, using the **HOUR**, **MIN** and **MS100** inputs.

A state change from 0 to 1 at the **START** input starts the time interval **T**. The **QT** output adopts a value of 1; the **Q** output remains at 0. A state change from 0 to 1 at the **START** input cancels an ongoing time interval and starts it again. The **Q** output retains its state.

Once the time interval has elapsed, the **QT** output is set to 0 and the **Q** output to 1. A value of 1 at the **RESET** input resets the **Q** output to 0. This also cancels an ongoing time interval and sets the **QT** output to 0. Both outputs remain at 0 as long as the **RESET** input has a value of 1. The first time the block is started, the **Q** output is also set to 0.

The following figure illustrates the way in which the block works:



Alternative Block Types

If you only need time intervals of seconds, Siemens recommends using the **TSHORT** block instead of **TLONG**.

Related Topics

[12.1.1.4 Block](#)

12.2.14.3 TOF

The **TOF** block delays falling edges of a binary signal in the millisecond range.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

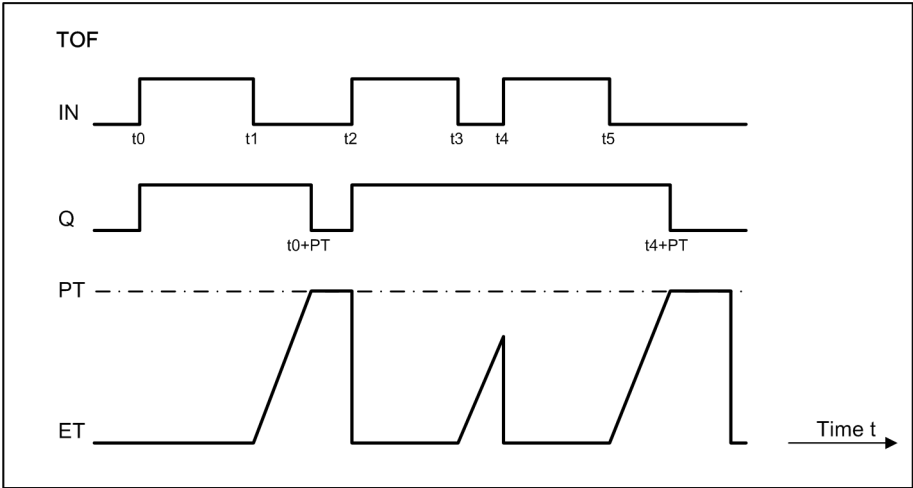
	Name	Data Type	Explanation	Default
Inputs	IN	BOOL	State change from 1 to 0 starts the time delay	0
	PT	DINT	Value for the time delay, in milliseconds	100
Outputs	Q	BOOL	0: Time delay has elapsed 1: Time delay is still ongoing or has not been started	0
	ET	DINT	Elapsed time delay	0

Detailed Description

The block forwards a state change from 0 to 1 at the **IN** input to the **Q** output directly. The block displays a state change from 1 to 0 at the **Q** output, delayed by time **PT**. If the **IN** input adopts a value of 1 again while the time delay is still ongoing, the **Q** output remains at 1.

The block has an additional **ET** output. You can use this output to check the time delay which has already elapsed. The value at the **ET** output increases in small stages during the **PT** time delay from 0 up to the **PT** value. One stage and, consequently, the rate of increase in the value depend on the cycle time. This dependency means that you may only interconnect this output in cyclic task levels.

The following figure illustrates the way in which the block works:



Related Topics
[12.1.1.4 Block](#)

12.2.14.4 TON

The **TON** block delays rising edges of a binary signal in the millisecond range.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

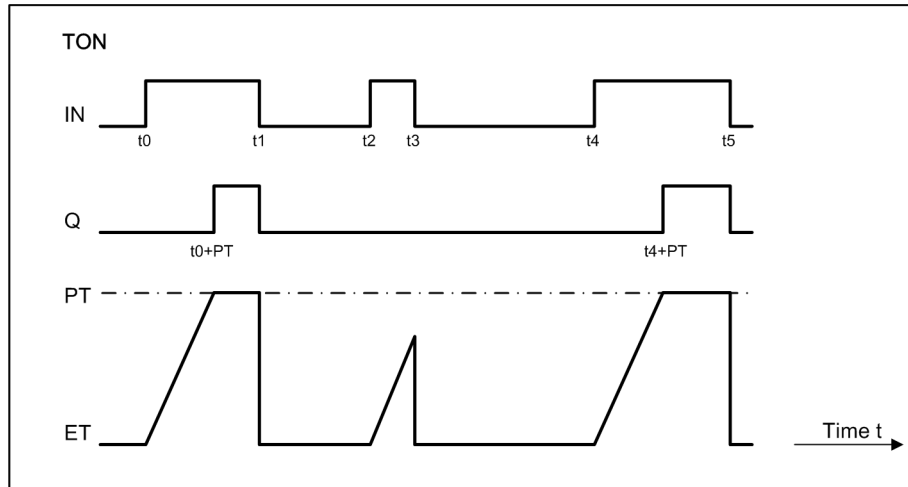
	Name	Data Type	Explanation	Default
Inputs	IN	BOOL	State change from 0 to 1 starts the time delay	0
	PT	DINT	Value for the time delay, in milliseconds	100
Outputs	Q	BOOL	1: Time delay has elapsed 0: Time delay is still ongoing or has not been started	0
	ET	DINT	Elapsed time delay	0

Detailed Description

A state change from 0 to 1 at the **IN** input is displayed by the block at the **Q** output, delayed by time **PT**. The block forwards a state change from 1 to 0 to the **Q** output directly. If the **IN** input adopts a value of 0 again while the time delay is still ongoing, the **Q** output remains at 0.

The block has an additional **ET** output. You can use this output to check the time delay which has already elapsed. The value at the **ET** output increases in small stages during the **PT** time delay from 0 up to the **PT** value. One stage and, consequently, the rate of increase in the value depend on the cycle time. This dependency means that you may only interconnect this output in cyclic task levels.

The following figure illustrates the way in which the block works:



Related Topics

[12.1.1.4 Block](#)

12.2.14.5 TP

The **TP** block is a timer for short-time intervals in the second range that cannot be interrupted.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	IN	BOOL	State change from 0 to 1 starts the time interval	0
	PT	DINT	Length of the time interval in milliseconds (resolution 1 ms)	100
Outputs	Q	BOOL	1: Time interval elapsing 0: Time interval not elapsing	0
	ET	DINT	Elapsed time	0

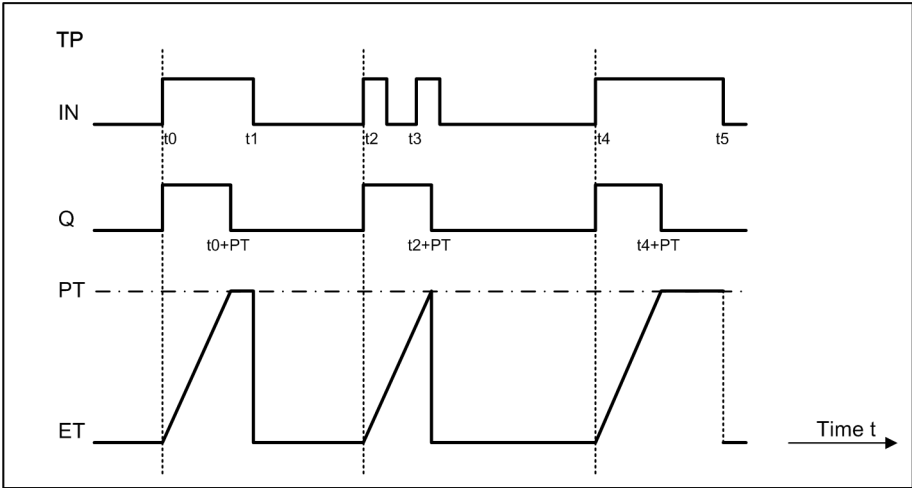
Detailed Description

You set the length of the time interval at the **PT** input with a resolution of 1 ms.

A state change from 0 to 1 at the **IN** input starts the time interval **PT**. The **Q** output adopts a value of 1. A further state change at the **IN** input does not affect the progress of the time interval. Once the time interval has elapsed, the **Q** output is set to 0. Only then can you start a new time interval.

The block has an additional output **ET**. You can use this output to check the time which has already elapsed. The value at the **ET** output increases in small stages during the **PT** time interval from 0 up to the **PT** value. A stage and, consequently, the rate of increase in the value depend on the cycle time. This dependency means that you may only interconnect this output in cyclic task levels.

The following figure illustrates the way in which the block works:



Alternative Block Types

If you need time intervals of seconds that can be interrupted, use the **TSHORT** block instead of **TP**.

Related Topics

[12.1.1.4 Block](#)

12.2.14.6 BLINK

The **BLINK** block generates a continuous state change from 0 to 1 and from 1 to 0 at the output. Therefore, the block is suitable for controlling LEDs which are intended to flash, for example.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	START	BOOL	1: State changes at the Q output 0: No state changes at the Q output	0
	TH	DINT	Length of On phase in milliseconds (resolution 100 ms)	10 (equates to 1 s)
	TL	DINT	Length of Off phase in milliseconds (resolution 100 ms)	10 (equates to 1 s)
Outputs	Q	BOOL	If 1 is present at the START input, there is a state change in accordance with the set times	0

Detailed Description

The block always starts with the ON phase. As long as the **START** input has a value of 1, the **Q** output changes its state from 0 to 1 and from 1 to 0 in accordance with the set times.

You can set the lengths for the ON and OFF phases separately. In order to do this, use the **TH** and **TL** inputs.



NOTE

The resolution for the lengths of the ON and OFF phases is 100 ms. This means that, depending on the start time, the first ON phase can follow up to 99 ms after the set **TH** value.
If a cyclic task level has been set for the block, the minimum possible phase length corresponds to the duration of 1 cycle.

Related Topics

[12.1.1.4 Block](#)

12.2.14.7 ALARM

The **ALARM** block signals that an alarm time defined with different input variables has been reached. You can define a single or cyclic alarm time with the following input values:

- Year
- Month
- Day
- Hour
- Minute
- Second

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	YEAR	UINT	Alarm time - Value for a year	1970
	MNTH	UINT	Alarm time - Value for a month	1
	DAY	UINT	Alarm time - Value for a day	1
	HOURL	UINT	Alarm time - Value for an hour	0
	MIN	UINT	Alarm time - Value for a minute	0
	SEC	UINT	Alarm time - Value for a second	0
	CYCLE	UINT	Value for repetition mode: 0: Single 1: Every minute 2: Every hour 3: Every day 4: Every week 5: Every month 6: Every year 9: Compatible with SIPROTEC 4 (see the following table) 10: Last day of the month 11: Penultimate day of the month 12: Day before the penultimate day of the month	0
	START	BOOL	1: Block is activated 0: Block is not activated	0
Outputs	Q	BOOL	1: Alarm time has just been reached 0: Alarm time has not yet been reached or has already passed	0
	ERR	BOOL	1: Invalid alarm time 0: Valid alarm time	0

You can use the value at the **CYCLE** input to specify a repetition mode for the alarm. This input also enables you to set a compatibility mode with SIPROTEC 4. To do this, assign a value of 9 to the input.

In compatibility mode, you can parameterize alarm repetitions as with SIPROTEC 4. The following table shows the entries for the SIPROTEC 4-compatible repetition mode.

Name	Explanation

YEAR	0: Every year
MNTH	0: Every month
DAY	0: Every day
HOUR	24: Every hour
MIN	60: Every minute

**NOTE**

If you parameterize several input values, the shortest repetition period always takes precedence.

Detailed Description

The block is only active if a value of 1 is always present at the **START** input.

The block uses a state change from 0 to 1 at the **Q** output to signal that the alarm time defined with the input values has been reached. The **Q** output remains set for 1 second, after which the **Q** output adopts a value of 0 again. If you define an invalid alarm time, for example February 31, the **ERR** output is set instead of **Q**. The **ERR** output remains set until you define a valid alarm time.

**NOTE**

The block does not take the switchover from standard time to daylight-saving time, or from daylight-saving time to standard time into account. If the alarm time falls within this period, the block either outputs no alarm or a double alarm.

If the input values change dynamically, the block must be reactivated with a state change from 0 to 1 at the **START** input. This then causes the block to adopt the modified input values.

Examples

With the following values, the block sets its output **Q** to 1 at the beginning of the 2011-11-03.

YEAR	MNTH	DAY	HOUR	MIN	SEC	CYCLE	START
2011	11	3	0	0	0	0	1

With the following values, the block sets its output **Q** to 1 every month, beginning on the 2010-04-05.

YEAR	MNTH	DAY	HOUR	MIN	SEC	CYCLE	START
2010	4	5	0	0	0	5	1

With the following values, the block runs in SIPROTEC compatible mode. The block sets its output **Q** to 1 at the beginning of the 5th hour of each day.

YEAR	MNTH	DAY	HOUR	MIN	SEC	CYCLE	START
0	0	0	5	0	0	9	1

Related Topics

[12.1.1.4 Block](#)

12.2.14.8 CTD

The **CTD** (Count Down) block counts down, starting at a defined start value. The current counter value decreases by 1 with every counting step. You can select from various tripping criteria to start the count.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default

Inputs	CD	BOOL	Counter pulse for counting down Depending on the value at the EDGE input, a continuous 1 or a state change decreases the metered value by 1	0
	R	BOOL	State change from 0 to 1 resets the CV and Q outputs to 0	0
	LD	BOOL	State change from 0 to 1 adopts the value at the PV input as the start value	0
	PV	DINT	Start value	0
	EDGE	UINT	0: Block counts on rising edge at the CU input 1: Block counts on every state change at the CU input (rising or falling edge) 2: Block counts when CU is set static to 1 each time the chart is executed	0
Outputs	CV	DINT	Current counter value	0
	Q	BOOL	1: The value at the CV output is less than or equal to 0 0: The value at the CV output is greater than 0	0

Detailed Description

The value at the **PV** input equates to the start value. As soon as the value at the **LD** input is 1, the block adopts this start value as the value for the **CV** output. The downward-counting procedure is controlled using the **CD** input. If the value at the **R** input is 1, the block stops the count and sets all outputs to 0.

The value at the **EDGE** input determines the counting criterion. You can select from the following counting criteria:

- **EDGE = 0**

The block increases the metered value each time there is a state change from 0 to 1 (rising edge) at the **CU** input.

- **EDGE = 1**

The block increases the metered value each time there is a state change at the **CU** input.

- **EDGE = 2**

The block increases the metered value each time a chart is executed. On a cyclic task level, therefore, the metered value changes with every cycle. As a precondition for this tripping criterion, the value at the **CU** input must be static 1.

If the value 0 is reached when counting down, the block sets the **Q** output to 1. However, the count continues as long as all criteria are met. The block has a counting range which is defined by the **PV_{min}** and **PV_{max}** limiting values and which you cannot change. Once the lower limiting value **PV_{min}** is reached, the block cannot count down any further. However, the current counter value at the **CV** output is retained until the value at the **R** input is 1.

Related Topics

[12.1.1.4 Block](#)

12.2.14.9 CTU

The **CTU** (Count Up) block counts up to a defined final value, starting at 0. The current counter value increases by 1 with every counting step. You can select from various tripping criteria to start the count.

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	CU	BOOL	Counter pulse for counting up Depending on the value at the EDGE input, a continuous 1 or a state change increases the counter value by 1	0
	R	BOOL	State change from 0 to 1 resets the CV and Q outputs to 0	0
	PV	DINT	Final value	0
	EDGE	UINT	0: Block counts on rising edge at the CU input 1: Block counts on every state change at the CU input (rising or falling edge) 2: Block counts when CU is set static to 1 each time the chart is executed	0
Outputs	CV	DINT	Current counter value	0
	Q	BOOL	1: The value at the CV output is greater than or equal to the final value at the PV input 0: The value at the CV output is less than the final value at the PV input	0

Detailed Description

The value at the **PV** input equates to the final value. The upward counting procedure is controlled using the **CU** input. If the value at the **R** input is 1, the block stops the count and sets all outputs to 0.

The value at the **EDGE** input determines the counting criterion. You can select from the following counting criteria:

- **EDGE = 0**

The block increases the metered value each time there is a state change from 0 to 1 (rising edge) at the **CU** input.

- **EDGE = 1**

The block increases the metered value each time there is a state change at the **CU** input.

- **EDGE = 2**

The block increases the metered value each time a chart is executed. On a cyclic task level, therefore, the metered value changes with every cycle. As a precondition for this tripping criterion, the value at the **CU** input must be static 1.

If the final value is reached when counting up, the block sets the **Q** output to 1. However, the count continues as long as all criteria are met. The block has a counting range which is defined by the **PV_{min}** and **PV_{max}** limiting values and which you cannot change. Once the upper limiting value **PV_{max}** is reached, the block cannot count up any further. However, the current counter value at the **CV** output is retained until the value at the **R** input is 1.

Related Topics

[12.1.1.4 Block](#)

12.2.14.10 CTUD

The **CTUD** (Count Up and Down) block counts up starting from 0 or down starting from a definable start value. You can specify the step value per counting step. In addition, you can select from various tripping criteria to start the count..

Connections and Explanations

You can find explanations for the connections of the block in the following table:

	Name	Data Type	Explanation	Default
Inputs	CU	BOOL	Counter pulse for counting up Depending on the value at the EDGE input, a continuous 1 or a state change increases the counter value by the delta value DL	0
	CD	BOOL	Counter pulse for counting down Depending on the value at the EDGE input, a continuous 1 or a state change decreases the counter value by the delta value DL	0
	R	BOOL	State change from 0 to 1 resets the CV , QU , and QD outputs to 0	0
	LD	BOOL	State change from 0 to 1 adopts the value at the PV input as the start value for counting down	0
	PV	DINT	Final value when counting up Start value when counting down	0
	DL	DINT	Delta value which is added or subtracted in each counting step	1
	EDGE	UINT	0: Block counts on rising edge at the CU input 1: Block counts on every state change at the CU input (rising or falling edge) 2: Block counts when CU is set static to 1 each time the chart is executed	0
Outputs	CV	DINT	Current counter value	0
	QU	BOOL	Only relevant for counting up 1: The value at the CV output is greater than or equal to the final value at the PV input 0: The value at the CV output is less than the final value at the PV input	0
	QD	BOOL	Only relevant for counting down 1: The value at the CV output is less than or equal to 0 0: The value at the CV output is greater than 0	0

Detailed Description

If the block is to count up, the value at the **PV** input equates to the final value. If the block is to count down, the value at the **PV** input equates to the start value. As soon as the value at the **LD** input is 1, the block adopts this start value.

The upward counting procedure is controlled using the **CU** input. The downward counting procedure is controlled using the **CD** input.

The value at the **EDGE** input determines the counting criterion. You can select from the following counting criteria:

- **EDGE = 0**

The block increases the metered value each time there is a state change from 0 to 1 (rising edge) at the **CU** input.

- **EDGE = 1**

The block increases the metered value each time there is a state change at the **CU** input.

- **EDGE = 2**

The block increases the metered value each time a chart is executed. On a cyclic task level, therefore, the metered value changes with every cycle. As a precondition for this tripping criterion, the value at the **CU** input must be static 1.

If the final value is reached when counting up, the block sets the **QU** output to 1. If the value 0 is reached when counting down, the block sets the **QD** output to 1. However, in both cases the count continues as long as all criteria are met. The block has a counting range which is defined by the **PV_{min}** and **PV_{max}** limiting values and which you cannot change. Once the lower limiting value **PV_{min}** is reached, the block cannot count down any further. Once the upper limiting value **PV_{max}** is reached, the block cannot count up any further. However, the current counter value at the **CV** output is retained until the value at the **R** input is 1.

Under the following conditions, the block does not count up or down:

- The value at the **R** input is 1. In this case, the value at the **CV** output is 0.
- The value at the **R** input is 0 and the value at the **LD** input is 1. In this case, the **CV** output adopts the value at the **PV** input.
- The values at the **R** and **LD** inputs are 0 and the values at the **CD** and **CU** inputs are 1.

Related Topics

[12.1.1.4 Block](#)

12.3 Function Charts (CFC) Cross-Reference List

The CFC Cross-reference list editor in DIGSI 5 provides a complete overview about the signals and the settings that are used in the function charts configured for a particular SIPROTEC 5 device in a tabular format. Using this feature, you can perform the following tasks:

- You can view the signals and the settings assigned to the respective blocks.
- You can navigate from the Cross-reference list editor to the block pin where the signal or the setting is connected in the CFC editor.

Opening the CFC Cross-Reference List Editor

- ✧ In the project tree of an offline configuration, in the folder **Charts**, double-click the **CFC cross-reference list** node.

The [20.1.1 CFC Cross-Reference List](#) is displayed in the working area with all the signals and the settings used in all function charts of the configured device.

Signal name	Number	Type	Chart name	IN/OUT	Chart element	Data type	Block type	Comment
(All)	(All)	(All)	(All)	(All)	(All)	(All)	(All)	(All)
Circuit breaker 1.Circuit break.>Reset switch statist.	201.4261.502	SPS	CFC_1	OUT	and10_1.Y	Bool	AND10	
Alarm handling.>Group Warning	5971.504	SPS	CFC_2	IN	and10_1.X1	Bool	AND10	
General.Test support.Activate device test mode	91.150	SPG	CFC_2	IN	or10_1.X1	Bool	OR10	
Power system.General.>Invert Phases	11.2311.501	SPS	CFC_2	OUT	or10_1.Y	Bool	OR10	
Binary IO.Binary outputs.Binary output 1.5.Value	61.1061.3185.500	SPS	CFC_2	OUT	and10_1.Y	Bool	AND10	
General.Change group.Blk.setting change	91.162	SPG	CFC_2	IN	and10_1.X2	Bool	AND10	
General.Measurements.Energy restore by A.time	91.121	SPG	CFC_2	IN	or10_1.X2	Bool	OR10	
Time managem..Daylight saving time	8821.300	SPS	CFC_2	IN	and_sps_1.IN1	Struct	AND_SPS	
Res. bin. out.BO have been reset	4711.320	SPS	CFC_2	IN	and_sps_1.IN2	Struct	AND_SPS	
Power system.General.Phase sequence ABC	11.2311.319	SPS	CFC_2	IN	and_sps_1.IN3	Struct	AND_SPS	
Power system.Meas.point V-3ph 1.Supv. sum V.inactive	11.941.2461.54	SPS	CFC_2	IN	and_sps_1.IN4	Struct	AND_SPS	
Binary IO.LEDs.LED 1.2.>Value	61.1071.7052.500	SPS	CFC_2	OUT	and_sps_1.VALID	Bool	AND_SPS	
Binary IO.Binary outputs.Binary output 1.3.Value	61.1061.3183.500	SPS	CFC_2	OUT	and_sps_1.OUT	Struct	AND_SPS	

[sc_digsi_cfccrossreference, 2, en_US]

Figure 12-13 Signals and Settings in CFC Cross-Reference List

Updating the CFC Cross-Reference List Editor View

With the refresh button, you can update the cross-reference list content. For example, if you delete a signal or a setting from the CFC chart without closing the [20.1.1 CFC Cross-Reference List](#), the deleted signal or setting is still displayed in the CFC cross-reference list until you refresh the view.

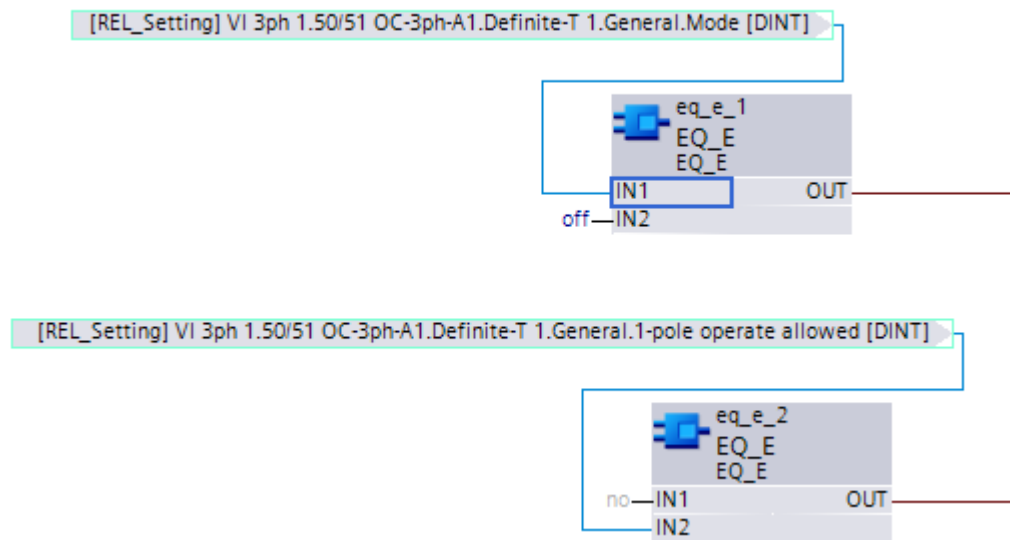
- ✧ Click the refresh button.

The list is updated to reflect the latest changes.

Navigating to CFC Charts from the Cross-Reference List Editor

- ✧ Double-click a signal or a setting in the cross-reference list.

The **CFC** window opens in the working area and the block terminal to which the signal or the setting is connected is highlighted.



[sc_sethighlight, 1, en_US]

Figure 12-14 Highlighted Block Terminal

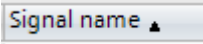
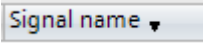
Exporting the Content from CFC Cross-Reference List View

- ✧ Click the  button in the [20.7.41 Toolbar of the CFC Cross-Reference List Editor](#), to export the CFC Cross-Reference List content in CSV format.

The table with the content is exported in **CSV** format.

Sorting the Column Content of the CFC Cross-Reference List

You can sort the content of the table in alphabetically ascending or descending order for any column by clicking the column title. If the table is sorted, a small symbol for the sort order is shown in the column title.

- : Table sorted in alphabetically ascending order.
- : Table sorted in alphabetically descending order.

- ✧ Click the title of a column if the list is unsorted.

The content is sorted in alphabetically ascending order.

- ✧ Click the title of a column if the list is sorted in alphabetically ascending order.

The content is sorted in alphabetically descending order.

- ✧ Click the title of a column if the list is sorted in alphabetically descending order.

The content is unsorted.

Filtering the Column Content of the CFC Cross-Reference List

You can filter the content of the table according to the column content or according to user-defined criteria. The filtered table shows only the rows that comply with the selected criteria. Each column has its own column filter. You can therefore filter the entire data based on several columns. The filters are additive. This means that each column filter used further restricts the subset of the data.

- ✧ In the column you wish to filter, click in the cell underneath the column title.

The cell changes to a list box where the options **All**, **Custom filter**, and all the texts from each cell from this column is shown.

- ✧ Select a text entry or the **Custom filter** option.

If you click the **Custom filter** option, the [20.6.24 Custom Filter](#) dialog opens.

- ✧ Create a user-defined filter as described in [3.2.5 Creating a User-Defined Filter](#) and click **OK**.

The **Create user-defined filter** dialog closes. The display of the content is updated in relation to the filter you have created.

Deactivate Filtering of the CFC Cross-Reference List View

- ✧ In the column for which you want to deactivate the filter, click in the cell underneath the column title.

The cell changes to a list box.

- ✧ Select the option **All**.

The filter criterion for this column is canceled. The display of the content is updated.



NOTE

If you close and reopen the cross-reference list, the filters are reset.

Related Topics

- ✧ [12.1.1.1 Meaning of CFC](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.1.5 Configuration Strategies](#)
- ✧ [12.1.2.1 Adding a CFC](#)
- ✧ [12.1.2.2 Opening a CFC](#)

12.4 Analyzing Function Charts (CFC)

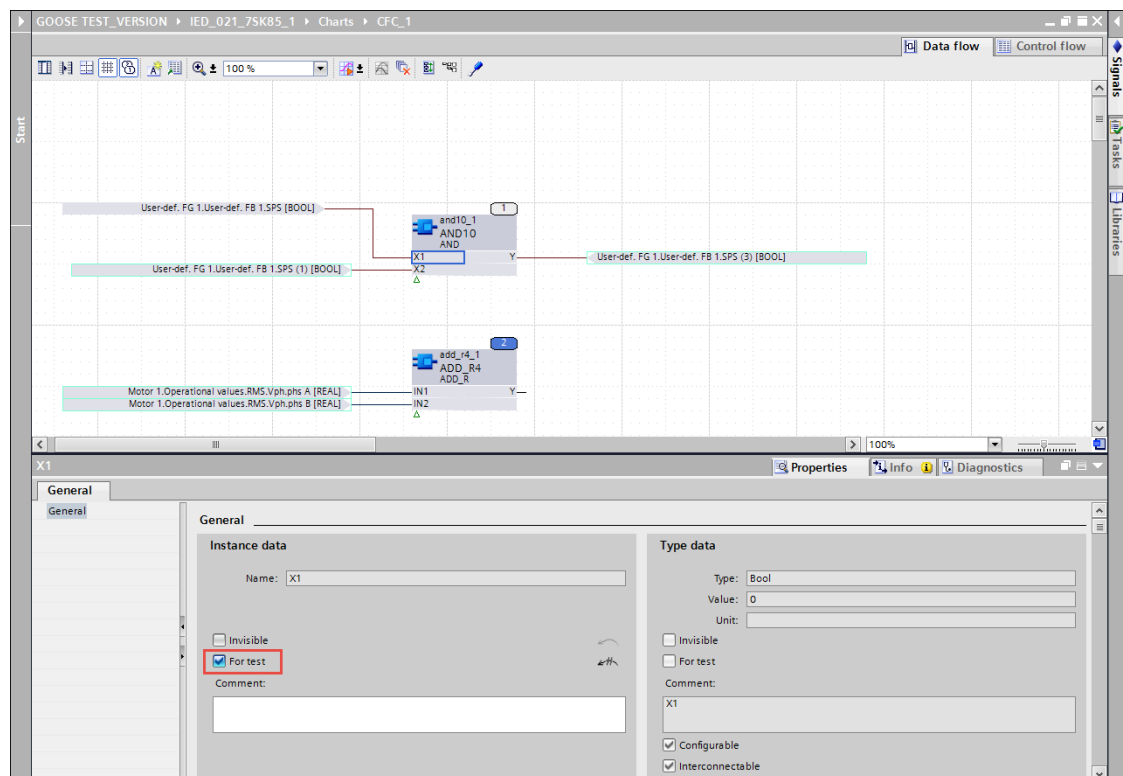
Function charts (CFC) analysis in DIGSI allows you to verify the created CFC logic for the SIPROTEC 5 device. Using this feature, you can watch the values available at respective inputs and/or output of the configured CFC blocks. You can analyze the CFC charts via **Offline analysis** or **Online analysis**.

Offline Analysis of Function Charts (CFC)

With the function charts (CFC) offline analysis, you can verify the CFC logic in DIGSI without connecting to the device. This analysis helps to avoid logical errors at the runtime.

- ✧ In the project tree of an offline configuration, open any configured function chart (CFC).
- ✧ Select any CFC block for offline analysis.
- ✧ Select the **For Test** option of the input/output variable to watch its runtime value in the following ways:

You can select the individual terminal and select the option **For Test** under the **General** group in the **Properties** tab.



[sc_digsi_terminal, 1, en_US]

You can select the **For Test** option from the **Control flow** editor for the respective terminal.

The screenshot displays the CFC editor interface. The top window shows a control flow table with the following data:

Run seq...	Object/parameter	Operand	For test
1	AND10	and10_1	
2	X1	:= User-def.FG 1.User-def.FB 1.SPS [BOOL]	☒
3	X2	:= User-def.FG 1.User-def.FB 1.SPS (1) [BOOL]	☐
4	Y	⇒ 0	☐
5		⇒ User-def.FG 1.User-def.FB 1.SPS (3) [BOOL]	
6	ADD_R4	add_r4_1	
7	IN1	:= Motor 1.Operational values.RMS.Vph.phs A [REAL]	☐
8	IN2	:= Motor 1.Operational values.RMS.Vph.phs B [REAL]	☐
9	Y	⇒ 0.0	☐

The bottom window shows the properties for terminal X1. The 'General' tab is active, displaying the following settings:

- Instance data:** Name: X1
- Type data:** Type: Bool, Value: 0, Unit:
- Properties:**
 - ☐ Invisible
 - ☒ For test
 - Comment:
 - ☒ Configurable
 - ☒ Interconnectable

[sc_digsi_controllflow, 1, en_US]

You can select the entire block and select the option **For Test** under the **Interface** group in the **Properties** tab.

The screenshot shows the CFC editor interface. The main workspace displays a function chart with two blocks: 'and10_1 [AND10]' and 'add_r4_1 [ADD_R4]'. The 'and10_1' block has two inputs, X1 and X2, both connected to 'User-def. FG 1.User-def. FB 1.SPS (1) [BOOL]'. Its output Y is connected to 'User-def. FG 1.User-def. FB 1.SPS (3) [BOOL]'. The 'add_r4_1' block has two inputs, IN1 and IN2, both connected to 'Motor 1.Operational values.RMS.Vph.phs A [REAL]'. Its output Y is connected to 'Motor 1.Operational values.RMS.Vph.phs B [REAL]'. The bottom panel shows the 'Properties' tab for the 'and10_1 [AND10]' block. The 'Interface' section contains a table with the following data:

Name	Value	Unit	Type	Section	Invisible	For test	Comment	Comment (type)
1 X1			Bool	Input	☐	☒		X1
2 X2			Bool	Input	☐	☒		X2
3 X3			Bool	Input	☐	☒		X3
4 X4	1		Bool	Input	☐	☒		X4
5 X5	1		Bool	Input	☐	☒		X5
6 X6	1		Bool	Input	☐	☒		X6
7 X7	1		Bool	Input	☐	☒		X7
8 X8	1		Bool	Input	☐	☒		X8
9 X9	1		Bool	Input	☐	☒		X9
10 X10	1		Bool	Input	☐	☒		X10
11 Y	0		Bool	Output	☐	☐		Y

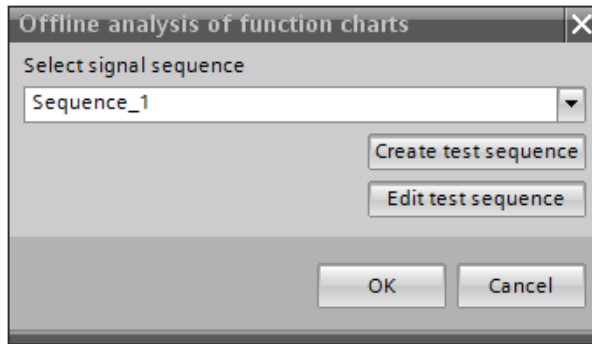
NOTE

You can select a maximum number of 20 terminals for test before starting the CFC offline analysis and more than 20 terminals while CFC offline analysis is in progress. Even if you do not select the **For Test** option, you can still probe the terminal to view the runtime values while analyzing, by positioning the mouse pointer over the respective terminal. For structured type variables, the 1st item of the selected variable value is always displayed as the default runtime value.

You must create a test sequence before starting the CFC offline analysis and assign the desired values for the configured signals in function charts (CFC).

For additional information to create a test sequence, refer to [13.2.2 Adding a Test Sequence](#).

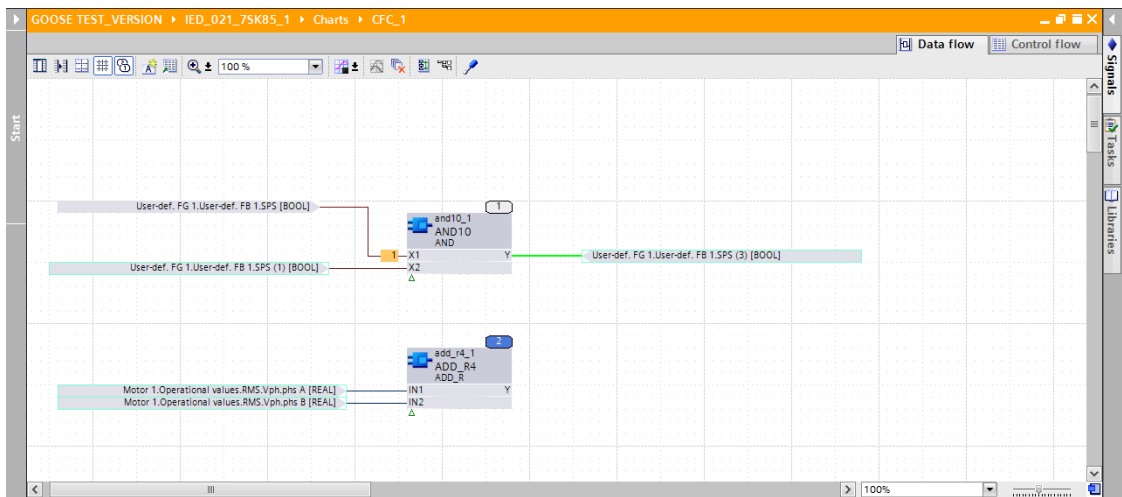
- ✧ To start the CFC offline analysis, click the  button in the [20.7.6 Toolbar of the Data Flow](#).
 - or -
 - ✧ Select **Start function chart (CFC) analysis > Offline analysis** from the **Tools** menu.
- The **Offline analysis of function charts** window is displayed for selecting the test sequence.



[sc_digsi_sequence, 1, en_US]

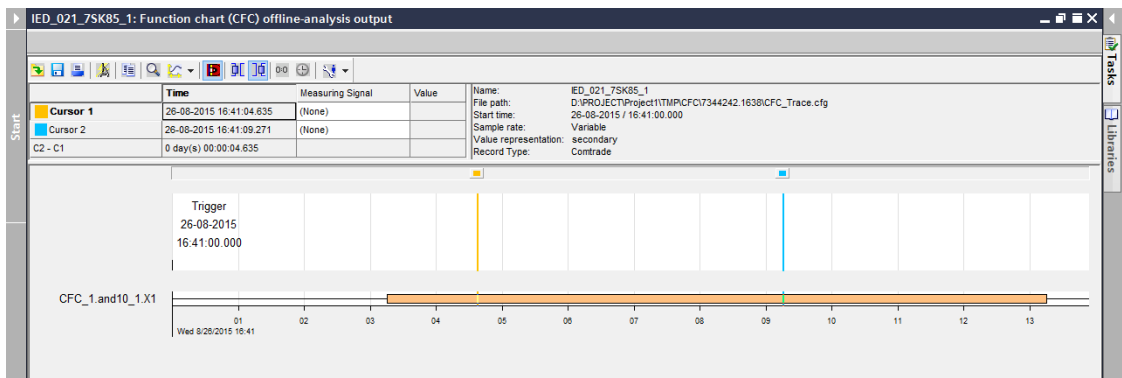
- ✧ Select the desired sequence from the **Select signal sequence** list box.
- ✧ Click **OK**.

The **Offline analysis for function charts (CFC)** window displays the progress status of the analysis and closes after completion. Values for input/output terminals are displayed in the working area. The title bar changes to orange color indicating that the offline analysis is in progress. This display remains until the test-sequence execution is completed or you stop the analysis. While the CFC offline analysis is in progress, you can still add or remove the terminals for the offline analysis and view the values available at the terminal.



[sc_digsi_watching, 1, en_US]

After executing all the steps of the test sequence, the CFC offline analysis stops automatically and displays the trace output file. This action is possible only if the CFC chart is configured for tracing by enabling the **For Test** option. The name of trace output file is device-specific. It displays the graphical representation of variables set for watching.



[sc_digsi_tracefile, 1, en_US]

- ✧ Click  to save the trace output file in the CFG format in the desired location.

Online Analysis of Function Charts (CFC)

With the CFC online analysis, you can verify the configured CFC logic in DIGSI by connecting to the SIPROTEC device. You can view real-time values or states of any inputs/outputs of the CFC blocks. This is a continuous process and you can stop the operation at any point of time. Unlike offline analysis, no test sequences are required for this workflow.

Prerequisites:

- This analysis can be performed on all SIPROTEC devices with firmware version V7.00 or higher version.
- The device must be running in Process, Simulation, or Commissioning mode.
- The configuration must be loaded to the device before starting the Online analysis.
- ✧ In the project tree of an offline configuration, open any configured function chart (CFC) and select any CFC block which needs to be analyzed.
- ✧ Select the **For Test** option of the input/output variable to watch its runtime value in the following ways:
You can select the individual terminal and select the option **For Test** under the **General** group in the **Properties** tab.
You can select the **For Test** option from the **Control flow** editor for the respective terminal.
You can select the entire block and select the option **For Test** under the **Interface** group in the **Properties** tab.



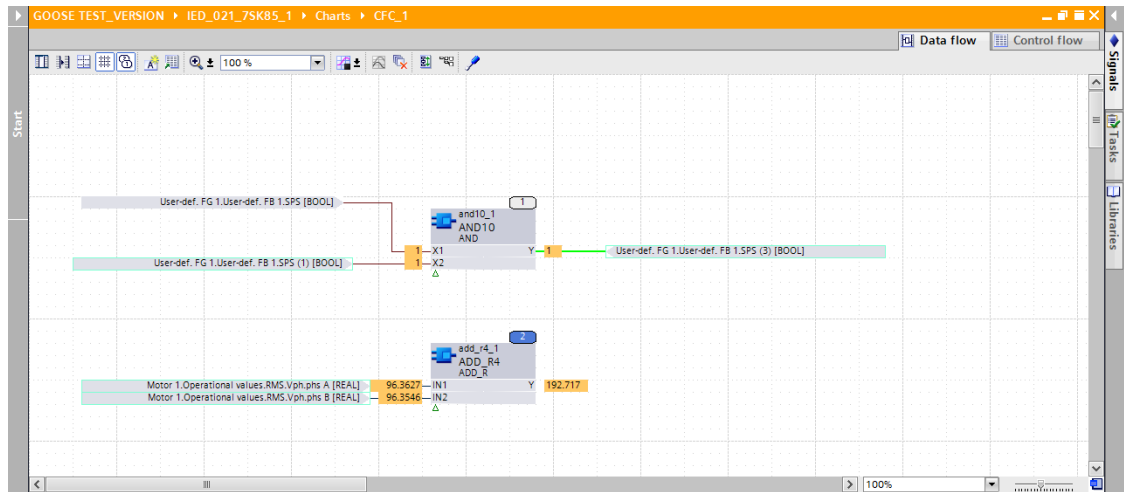
NOTE

You can select up to 100 terminals for CFC online analysis. If you exceed the limit, the online analysis is not starting, an error message is shown instead. By default, the connection between output terminals with Boolean values is also considered for the CFC Online analysis even if not selected for watching. During runtime of the CFC Online analysis, you still can add or remove terminals for test. If you exceed the limit of 100 terminals during runtime, some values may be shown as "?".

During runtime of the CFC Online analysis, you still can probe a terminal by positioning the mouse pointer over the terminal.

-
- ✧ Open the configured CFC chart.
 - ✧ To start CFC online analysis, click the  button in the [20.7.6 Toolbar of the Data Flow](#).
 - or -
 - ✧ Select **Start function chart (CFC) analysis > Online analysis** from the **Tools** menu.

The **Online test of function charts** window displays the progress status and after completion, the values for input/output terminals are displayed in the working area. The title bar changes to orange color indicating that the editor is in the online mode. The real time values from the device are displayed at the terminals continuously until you stop the analysis.



[sc_digsi_cfc_analysis, 1, en_US]

Figure 12-15 CFC Online Analysis - Sample View



NOTE

For structured type interfaces, always the 1st item of the structure is displayed as the runtime value.

You can probe to see the complete structure values or you must select the items of the structure for test and watch them in the block or terminal **Properties** or in the **Control flow** view.

For the CFC Online analysis of measuring values (MV), it can be confusing, because a measuring value is a real value which is visible in the 2nd structure item (VAL_R) of the structure SXMV. The first item shown as runtime value is the integer value (VAL_I) which is normally 0.

Also take into account that measuring values (MV, CMV, DEL, WYE) are always used as percentage values in CFC analysis.

While the CFC Online analysis is in progress, you can still add or remove the terminals for the online analysis and you can view the values available at the terminal. Other CFC operations like creating a new logic and the modification of any existing logic are not possible, while CFC Online analysis is in progress.

- ✧ Click the **Control flow** tab to add/remove multiple values for watching at a time and also watch the values for already added terminals in the tabular view.

Run seq...	Object/parameter	Operand	Online val.	For test
1	AND10	and10_1		
2	X1	User-def. FG 1.User-def. FB 1.SPS [BOOL]	1	☒
3	X2	User-def. FG 1.User-def. FB 1.SPS (1) [BOOL]	1	☒
4	Y	0	1	☒
5		User-def. FG 1.User-def. FB 1.SPS (3) [BOOL]		
6	ADD_R4	add_r4_1		
7	IN1	Motor 1.Operational values.RMS.Vph.phs A [REAL]	96.3509	☒
8	IN2	Motor 1.Operational values.RMS.Vph.phs B [REAL]	96.3431	☒
9	Y	0.0	192.694	☒

[sc_digsi_tabview, 1, en_US]

Figure 12-16 Add/Remove Values for Watching



Stop the CFC Online analysis by clicking  in the CFC toolbar or select **Stop function chart (CFC) analysis** from the **Tools** menu.

Related Topics

- ✧ [12.1.1.1 Meaning of CFC](#)

- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.1.5 Configuration Strategies](#)
- ✧ [12.1.2.1 Adding a CFC](#)
- ✧ [12.1.2.2 Opening a CFC](#)

12.5 Configuring Function Subcharts and Templates

12.5.1 Brief Introduction to Function Subcharts and Templates

The feature is intended to structure the CFC logic in a better way to reduce the complexity of the function charts (CFC), and increase the modularity and reusability of the function chart. It allows you to configure and use a function chart inside another function chart. A chart within another chart is known as the subchart. A subchart used inside another chart appears like a function block. Subcharts must have interfaces configured. These interfaces are the entry points to the subcharts. A function chart with interfaces (subchart) can be added to another function chart. The inputs and outputs of a subchart are connected to interfaces, whereas for a parent chart they are connected to signals. Similar to function charts, subcharts can also be copied, pasted, and deleted. A configured function subchart can be saved as template in the Project library and the Global libraries so that it can be used across different projects or by different users. For additional information how to create a master copy of a function subchart, refer to [3.3.3 Working with the User-Defined Global DIGSI 5 Library](#). If you add a function subchart inside another function chart from the library or by copy and paste, always a copy of the function subchart is created. Any modification later in this subchart does not affect the original subchart.

A subchart will be executed if the parent function chart is executed within the parameterized run sequence and the task level of the parent chart. After execution of a subchart, the outputs from the subchart are available via the output interfaces. These outputs can be used for further processing in the parent chart.



NOTE

Subcharts can only be configured for devices V07.30 or higher.



NOTE

Subcharts must not use signals or settings inside.



NOTE

The task level for subcharts will be set automatically to the parent chart task level to which it is copied. If for example, a subchart with the task level **Event triggered** is copied to a parent chart with the task level **Interlocking**, the task level of the subchart will be set to **Interlocking**, too.



NOTE

It is possible to use subcharts in subcharts also up to the maximum depth of 8.

Related Topics

[12.1.1.3 Function Chart](#)

[12.1.2.5 Deleting CFCs](#)

[12.1.2.3 Renaming a Function Chart \(CFC\)](#)

[12.1.2.2 Opening a CFC](#)

[12.1.2.4 Copying a CFC](#)

[20.1.11 Data Flow](#)

12.5.2 Adding a Subchart

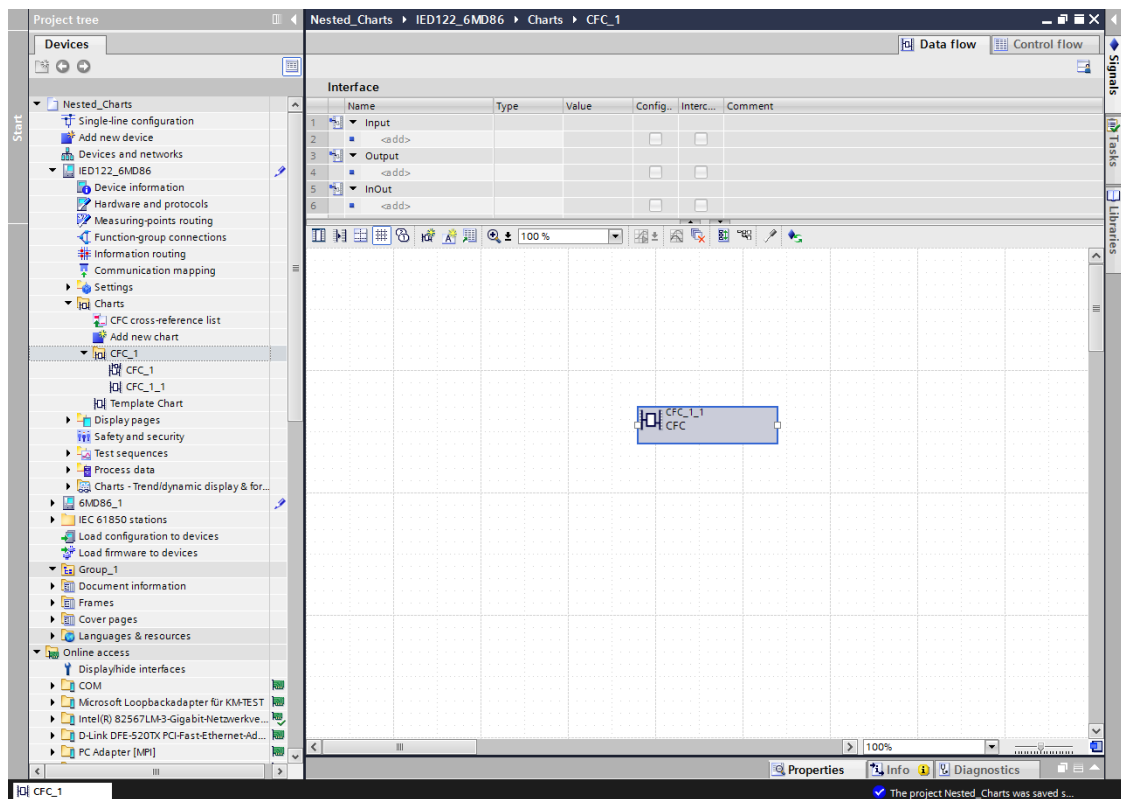
There are several ways to add a subchart into a function chart, which itself also can be a subchart.

To add an existing subchart, you can select an existing chart that has no signals and settings or a subchart from the project tree and drag and drop it into the working area of another chart. A copy of the function chart or subchart is created as a subchart.

If you already created a CFC master copy in the DIGSI global library, (see [12.5.6 Creating a Master Copy of a Subchart](#)), you can add subcharts from the library per drag and drop. To add a new subchart, proceed as follows:

- ✧ Click the **Insert a new subchart** button  in the [20.7.6 Toolbar of the Data Flow](#).
- OR -
- ✧ Right-click in the function chart area and select the option **Insert new subchart** in the context menu.
- OR -
- ✧ Select the **Insert** menu item in the [20.7.1 DIGSI 5 Toolbar](#) and select the **Insert a new subchart** option and click anywhere in the function chart area.

The new subchart (for example, **CFC_1_1**) is created and displayed in the working area. It is listed under the parent chart (for example, **CFC_1**) in the project tree. You can rename the subchart.



[sc_digsi_nestedchart, 1, en_US]

Related Topics

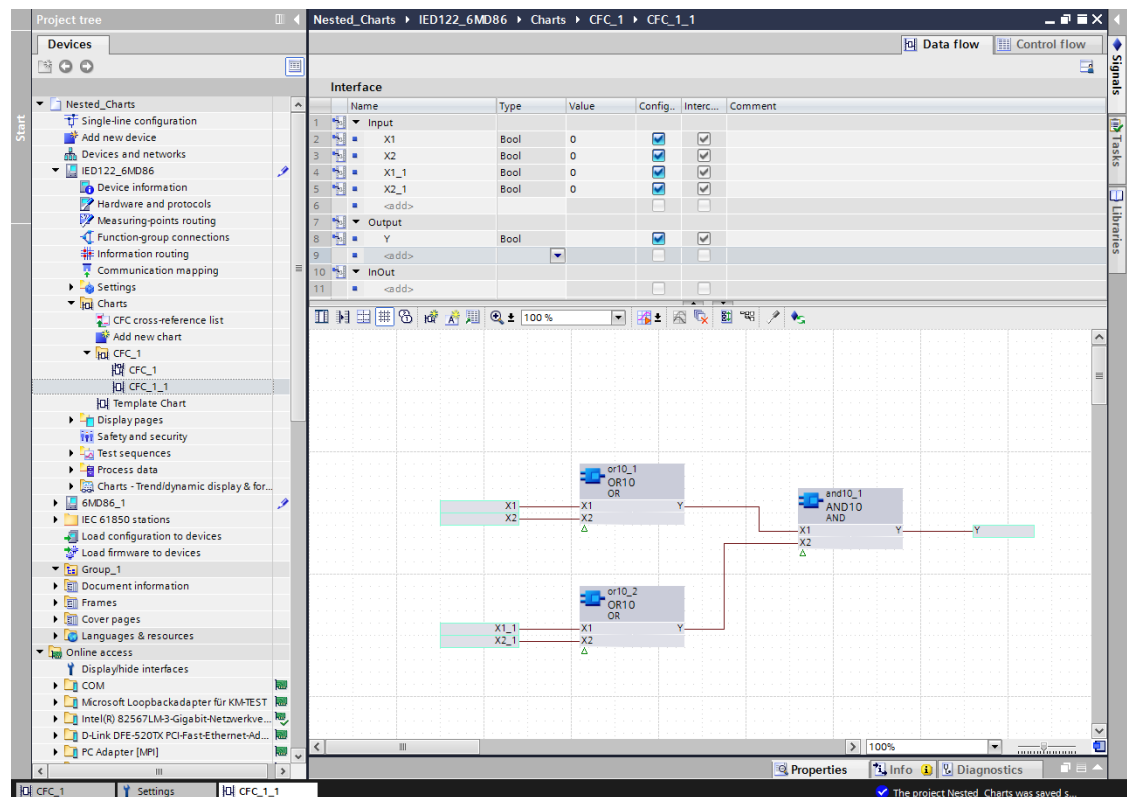
- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.5.3 Opening a Subchart

To open a subchart, proceed as follows:

- ✧ Double-click the subchart in the project tree.
- or -
- ✧ Double-click the subchart in the **Data flow view** of the parent function chart.
- or -
- ✧ Right-click the subchart in the **Data flow view** of the parent function chart and select **Open** in the context menu.

The subchart (for example, **CFC_1_1**) is displayed in the working area.



[sc_digsi_subchart, 1, en_US]

Related Topics

- ✧ [12.5.2 Adding a Subchart](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.5.4 Defining the Interfaces of a Subchart

To define the interfaces of a subchart, proceed as follows:

- ✧ In the CFC **Data Flow** view of the CFC you want to use as subchart, click the button above the toolbar to show the **Interface** section.
- ✧ Assign the block inputs you want to use as subchart interface inputs into the **Input** list of the **Interface** section by Drag and Drop.
- ✧ Assign the block outputs you want to use as subchart interface outputs into the **Output** list of the **Interface** section by Drag and Drop.

**NOTE**

Drag and Drop of block inputs or outputs of structured types is not possible. For more information on how to add an interface of a structured type, refer to [12.5.5 Defining Subchart Interfaces of Structured Types](#).

The interfaces are created with the default name and the matching data type.

**NOTE**

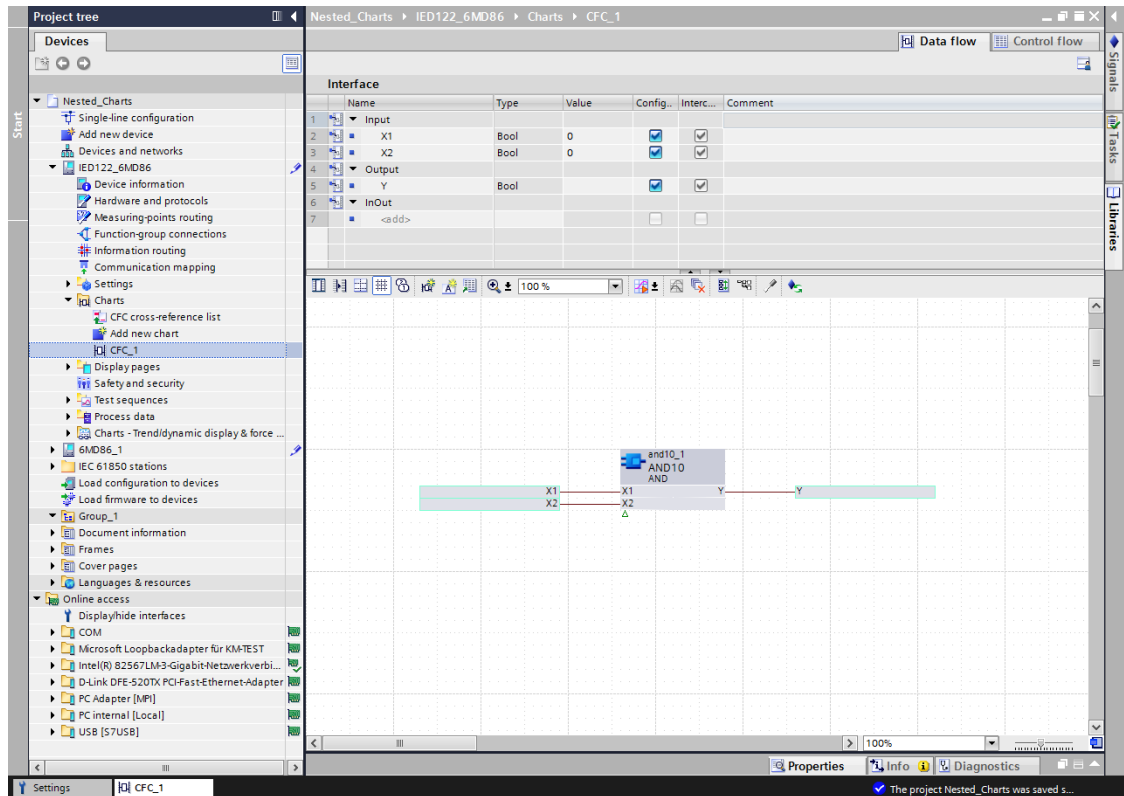
You can assign more than one block input to a subchart interface, but a subchart interface output can only be assigned to one block output. If you want to remove a subchart interface, right-click the interface in the **Interface** section and select **Delete** in the context menu.

Interface sections:

- **Interface Name**
The interface can be renamed if the name is selected. The interface names has to be unique for the subchart. Therefore the name is expanded automatically by adding a number if the added or changed name is already used. The name must not contain commas.
- **Interface Type**
The **Type** of the interface is set automatically, if you assign the interface to the block terminal via Drag and Drop. You can change the interface **Type** only if no terminal is assigned.
- **Interface Value**
In column **Value**, you can set a default value for the interface. The default value is used if the interface is not connected in the parent function chart. If the interface is already connected in the parent function chart, the **Value** is shown as empty and you cannot set the **Value**.
- **Interface Configurable**
If you deselect the **Configurable** check box, the interface value is not changeable. Neither in the subchart **Interface** section nor in the parent chart where the subchart is used in. So in the parent chart, the input value of the subchart interface cannot be changed but a signal or setting of matching type is still connectible.
- **Interface Interconnectable**
If you deselect the **Interconnectable** check box, the interface is not usable anymore. You cannot assign a block terminal to the interface in the subchart. Also in parent chart, you cannot connect a signal or setting to the block interface. If the interface is already assigned, you cannot deselect the **Interconnectable** check box.
- **Interface Comment**
In the **Comment** field, you can add a comment to the subchart interface which may be helpful if the subchart is used as a template. If you select the subchart in the parent chart, you can see the interface **Comment** in the **Interface** tab of the **Properties** page. The interface **Comment** is also shown if you select the terminal of the subchart in the parent chart in the **General** tab of the **Properties** page.

**NOTE**

You can also add a comment for the subchart itself in the **General** tab of the **Properties** page.



[sc_digsi_interface, 1, en_US]

Figure 12-17 Defining a CFC as Subchart

Related Topics

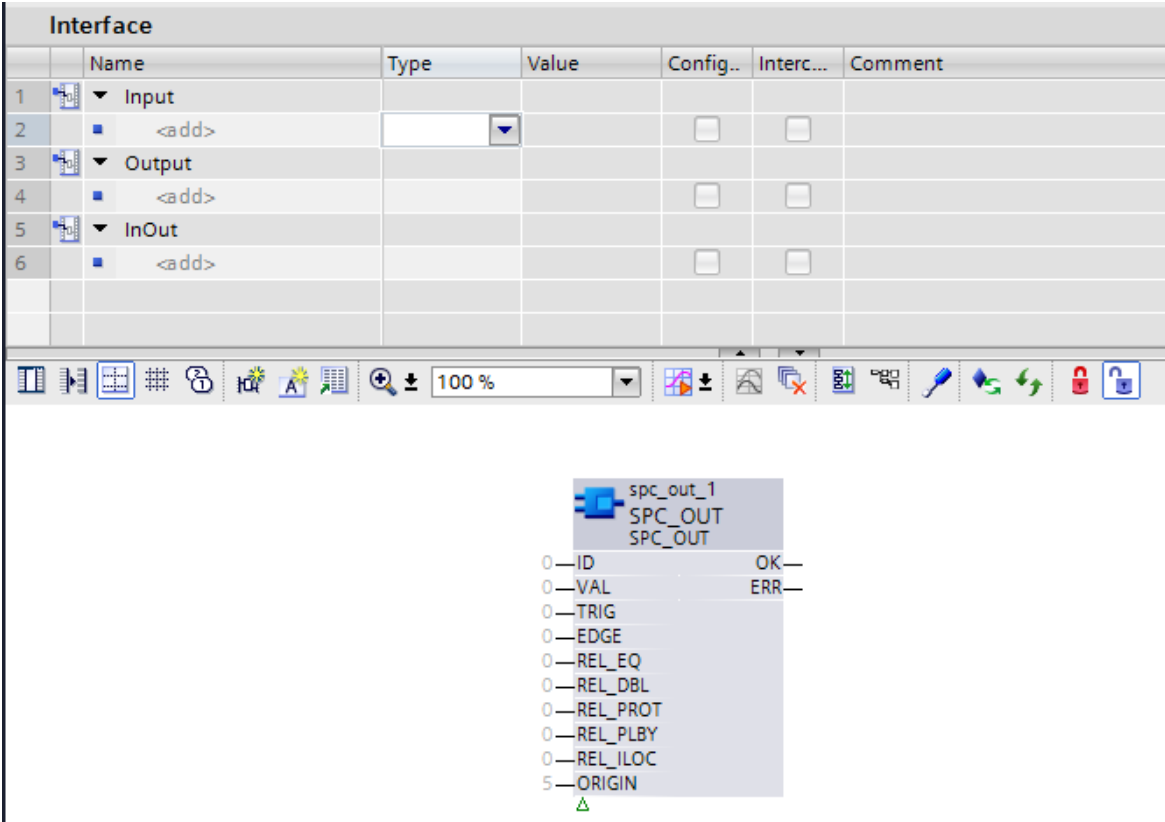
- ✧ [20.1.11 Data Flow](#)
- ✧ [12.5.2 Adding a Subchart](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.5.5 Defining Subchart Interfaces of Structured Types

Block inputs or outputs of the structured types cannot be assigned to subchart interfaces by Drag and Drop as described in [12.5.4 Defining the Interfaces of a Subchart](#). Structured interfaces have to be configured manually.

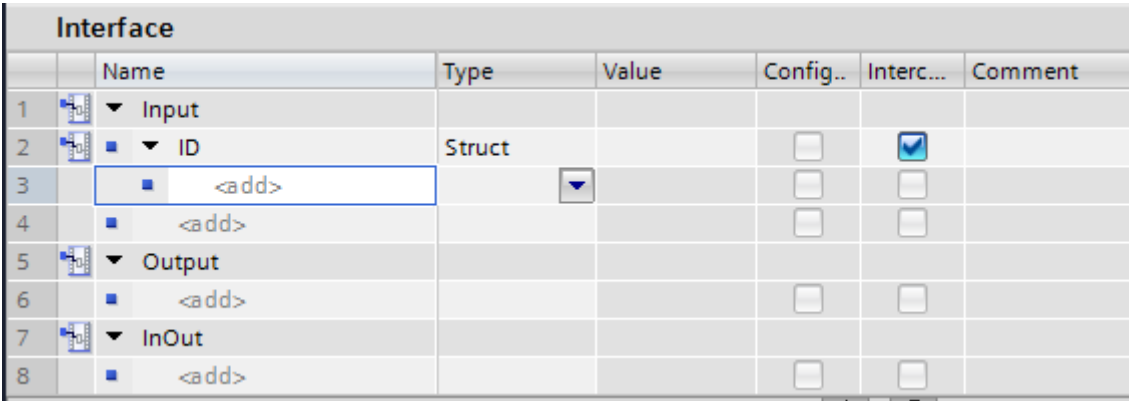
To configure structured type interfaces, proceed as follows:

- ✧ In the CFC **Data Flow** view of the CFC you want to use as subchart, click the button above the toolbar to show the **Interface** section.



[sc_subchart1, 1, en_US]

- ✧ Click interface **Name** shown as **<add>** and name your interface as you like.
- ✧ Select **Struct** as **Type** in the list box. A new indented interface line **<add>** is added.



[sc_subchart2, 1, en_US]

- ✧ Click the indented **Name** shown as **<add>** and name your interface as the first element of the block terminal structure you want to assign is named. A new interface line **<add>** is added.
- ✧ As **Type** select the type in the list box which the first element of the block terminal structure has you want to assign.

Interface						
	Name	Type	Value	Config..	Interc...	Comment
1	▼ Input					
2	▼ ID	Struct		☐	☒	
3	■ IDX	DInt	0	☒	☒	
4	■ <add>			☐	☐	
5	■ <add>			☐	☐	
6	▼ Output					
7	■ <add>			☐	☐	
8	▼ InOut					

[sc_subchart3, 1, en_US]

Continue in same way until all elements of the block terminal structure you want to assign have a representation in the interface structure. Then, assign a block terminal to the subchart interface by drag and drop.

The screenshot illustrates the process of connecting a block terminal to a subchart interface. The top part shows the 'Interface' table with the 'ID' element highlighted. A red arrow points from 'ID' to a block terminal 'ID' in the bottom part. The block terminal is connected to a subchart 'sfc_out_1' which has a list of outputs: VAL, TRIG, EDGE, REL_EQ, REL_DBL, REL_PROT, REL_PLBY, REL_ILOC, and ORIGIN.

[sc_subchart4, 1, en_US]

Figure 12-18 Connecting the Block Terminal to the Defined Interface Definition of the Structured Element ID



NOTE

For assigning a structured block terminal to a subchart interface, the interface definition must fit in the order of the structured elements, the names, and the types.



NOTE

Interfaces can be renamed but the interface names may not contain commas. With the context menu option via the Interface group, you can add or insert a line in the input or output section respectively. The **Struct** type block terminals can be assigned only if all interface sub members are matching. You can create the sub interface members with the matching data type and name.

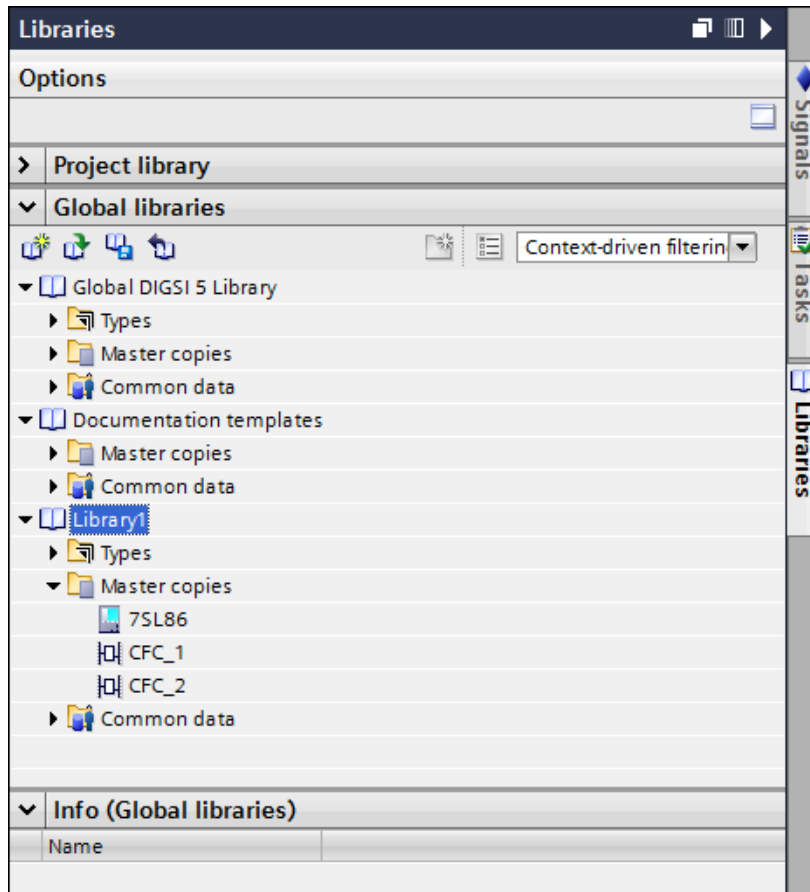
Related Topics

- ✧ [20.1.11 Data Flow](#)
- ✧ [12.5.2 Adding a Subchart](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.5.6 Creating a Master Copy of a Subchart

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ If the global library is not available where you want to add function subcharts to, import a global library by clicking the  icon. You can also create a new global library by clicking the  icon in the **Global libraries** toolbar.
- ✧ Select the function subchart which you want to add to the library as a template subchart for the device in the **Project Tree**.
- ✧ Drag and drop the function subchart to the desired user-defined library in the **Master copies** folder.
- or -
- ✧ Copy the CFC from the project tree and paste it in the **Master copies** folder using the context menu option.

The **Insert master copy** dialog displays the progress status and after completion, the master copy of the CFC chart is created and displayed in the **Global libraries** palette.



[sc_digsi_create_mastercopy, 1, en_US]

Figure 12-19 Creating Function Chart Master Copies in a User-Defined Library



NOTE

You can select multiple function charts at a time in the device **Project Tree** and paste them as a single master copy with the context menu option **Paste as a single master copy**. You can change the name of the master copy by selecting **Rename** in the context menu.

Related Topics

- ✧ [3.3.3 Working with the User-Defined Global DIGSI 5 Library](#)
- ✧ [20.1.11 Data Flow](#)
- ✧ [12.5.2 Adding a Subchart](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.5.7 Replacing a Subchart

To replace a subchart, proceed as follows:

- ✧ Select an existing subchart configured with any logic from the **Project tree**, from the **Master copies** folder in the **Libraries**, or from the working-area section.
- ✧ Right-click the selected subchart and click **Copy** from the context menu.
- ✧ Open the required CFC chart in which you want to replace an existing subchart.
For additional information on CFC charts, refer to chapter [12 Function Charts \(CFC\)](#).
- ✧ Right-click the subchart and click **Paste** from the context menu.
- or -
- ✧ Drag and drop the source subchart from the **Project tree**, from the **Master copies** folder in the **Libraries**, or from the working area to the destination subchart in the opened CFC chart.
A confirmation prompt is displayed.
- ✧ Click **Yes**, to confirm your action.
The subchart is replaced.

**NOTE**

The internal logic is transferred from the source subchart to the destination subchart, but the name of the destination subchart is not changed.

The name of the source subchart is displayed in the **Properties** tab of the subchart, in the **Subchart** section, in the **Created using** field.

12.6 Configuring CFC Trend View

12.6.1 Brief Introduction to CFC Trend View

During the analysis of CFC charts via **Offline analysis** or **Online analysis**, the value at the CFC block terminals changes continuously depending on the value of the input signal or status. The Trend View editor allows you to view the continuous changes at the block terminals in the form of graphical representation and simulate the various conditions based on a changing input-signal value and status. With this editor, you can select the CFC terminal block and view the signal or value status at the terminal block during the CFC analysis. You can monitor multiple static and online values.

You must configure the trend display by assigning the terminals in the [20.1.34 Trend Display Editor](#) or the [20.1.14 Dynamic Display Editor](#). Based on this configuration, you can view the continuous changes in the configured trends. Trend display allows you to visualize multiple values in a trend chart. Dynamic display allows you to visualize multiple values in a table. The compilations of selected tags/parameters are stored for reuse.

Overview of the Trend Display

- The trend display configured in the editor window consists of the following objects:
 - Definition table
 - Trend window with operator controls and trend chart
- The parameters to be monitored can be added to the trend display as follows:
 - Using drag and drop with trend display opened in the editor window, or using copy/paste to the definition table. The parameter inserted by you can be assigned directly to an axis.
 - If the trend display is not open, you can drag and drop the parameter to the trend display in the project tree. In this case, the parameter is assigned automatically to an appropriate axis (digital/analog). If it does not yet exist, the axis is generated automatically.
- The values are assigned to digital and analog axes and displayed. A trend display may contain several digital and analog axes.
- You can print the trend display.
 - The table of axis and trend definitions is printed when the trend display from the project tree is printed.
 - The trend chart can be printed when the trend display is open.
- The values of the trend chart can be exported or imported in CSV format.

Overview of the Dynamic Display

- The parameters to be monitored can be added to the dynamic display as follows:
 - Using drag and drop with dynamic display opened in the editor window, or using copy/paste to the definition table.
 - If the dynamic display is not open, you can drag and drop the parameter to the corresponding dynamic display in the project tree.
- You can print the dynamic display from the project tree. In the offline mode, the offline values are printed, while the online mode prints the online values.

12.6.2 Adding a Trend Display

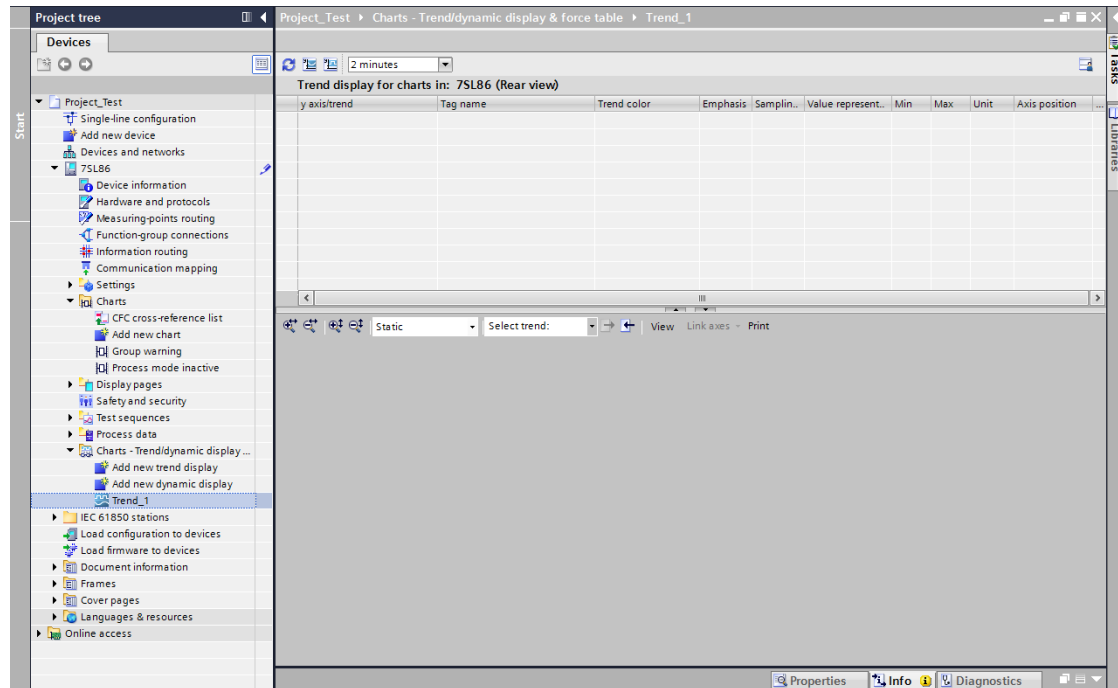
To add a new trend display, proceed as follows:

- ✧ Open the project tree.
- ✧ Double-click the **Charts - Trend/dynamic display & force table** display folder.

The element **Add new trend display** is displayed.

- ✧ Double-click **Add new trend display**.

The new trend display is created successfully with the default name **Trend_1**.



[sc_digsi_trenddisplay, 1, en_US]

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.3 Adding a Dynamic Display

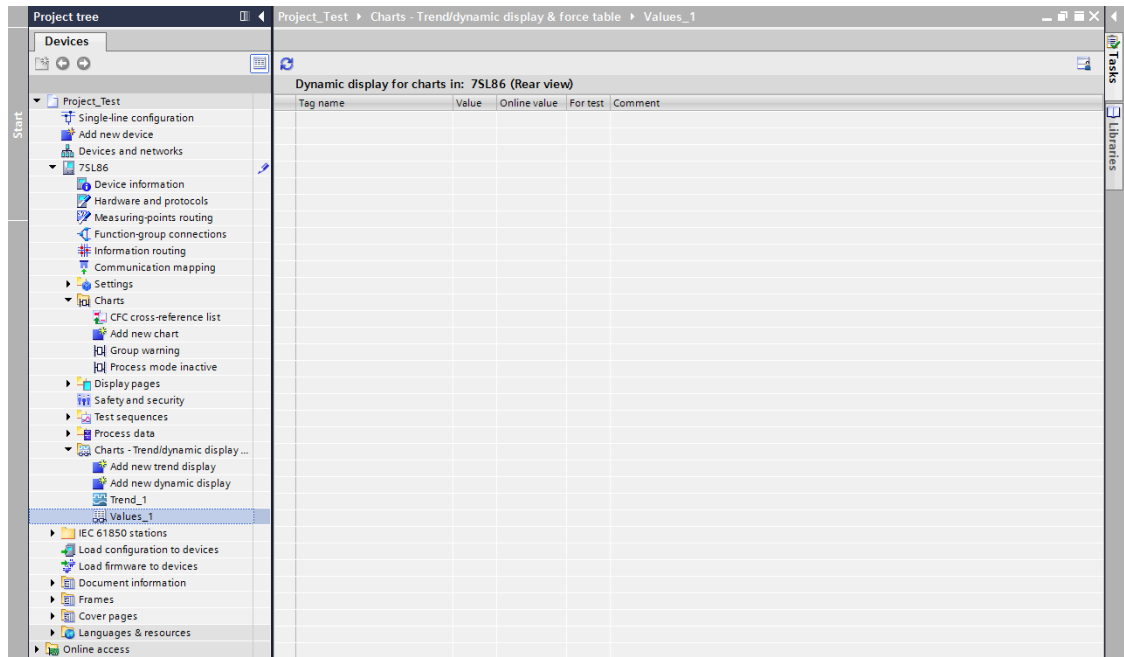
To add a new dynamic display, proceed as follows:

- ✧ Open the project tree.
- ✧ Double-click the **Charts - Trend/dynamic display & force table** display folder.

The element **Add new dynamic display** is displayed.

- ✧ Double-click **Add new dynamic display**.

The new dynamic display is created successfully with the default name **Values_1**.



[sc_digsi_dynamicdisplay, 1, en_US]

Related Topics

- ✧ [20.1.14 Dynamic Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.4 Adding Analog Axis in the Trend Display Editor

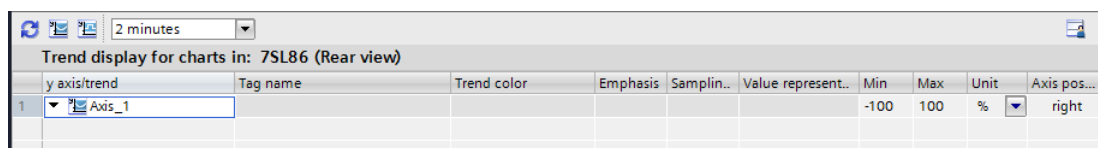
To add an analog axis in the [20.1.34 Trend Display Editor](#) editor, proceed as follows:

- ✧ Open the Trend display editor configured with a trend display (for example, **Trend_1**).

The Trend view is displayed in the working area

- ✧ Double-click the  button.

The analog axis is created and displayed with the default name **Axis_1**.



[sc_digsi_analogaxis, 1, en_US]

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)

- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.5 Adding a Digital Axis in the Trend Display Editor

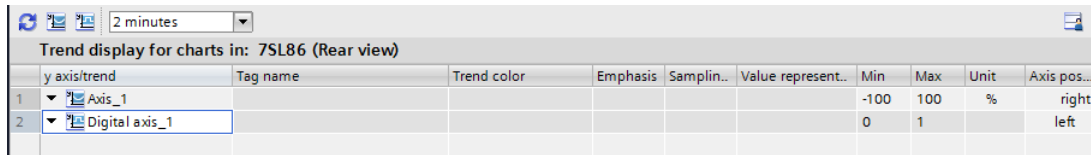
To add the digital axis in the [20.1.34 Trend Display Editor](#), proceed as follows:

- ✧ Open the trend display editor configured with a trend display (for example, **Trend_1**).

The Trend view is displayed in the working area.

- ✧ Double-click the  button.

The digital axis is created and displayed with the default name **Digital axis_1**.



Trend display for charts in: 7SL86 (Rear view)										
	y axis/trend	Tag name	Trend color	Emphasis	Samplin...	Value represent..	Min	Max	Unit	Axis pos...
1	 Axis_1						-100	100	%	right
2	 Digital axis_1						0	1		left

[sc_digsi_digitalaxis, 1, en_US]

Related Topics

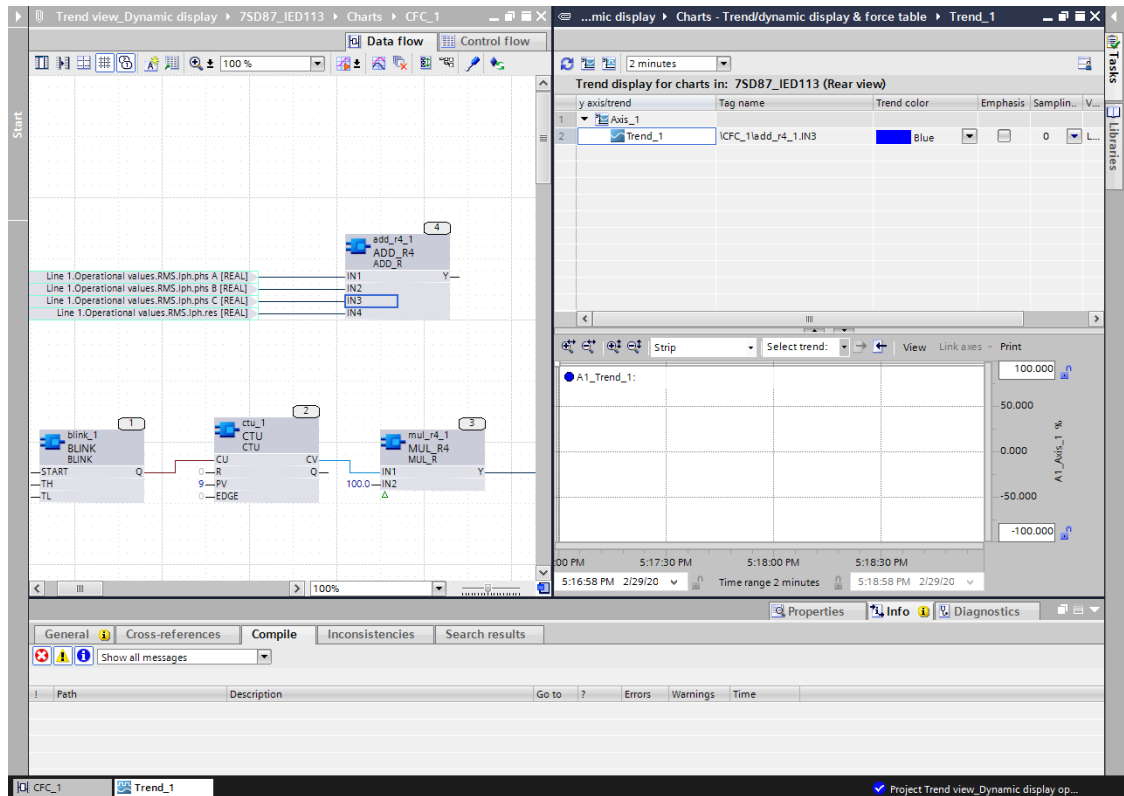
- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.6 Assigning Analog IO terminals of a CFC block to a Trend Display

To assign analog IO terminals of a CFC block to a digital axis, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) containing analog axis (for example, **Axis_1**).
- ✧ Click the  button in the DIGSI 5 toolbar to view and work with the Trend display editor and with the CFC chart editor simultaneously.
- ✧ Add a new CFC chart and instantiate the CFC blocks which have the analog type terminals.
- ✧ Connect compatible analog signals or settings to the CFC block IO terminals.
- ✧ Drag and drop the analog terminals from the CFC blocks to the analog axis in the Trend display editor.

Analog IO terminals are successfully added to the analog axis.



[sc_digsi_analog_trend, 1, en_US]



NOTE

You cannot add analog IO terminals to the digital axis in the [20.1.34 Trend Display Editor](#). You can assign the analog IO terminals directly from the **Properties** tab of the Inspector window or the **Control Flow** editor. You can configure a maximum number of 30 terminals in a single trend display.

Related Topics

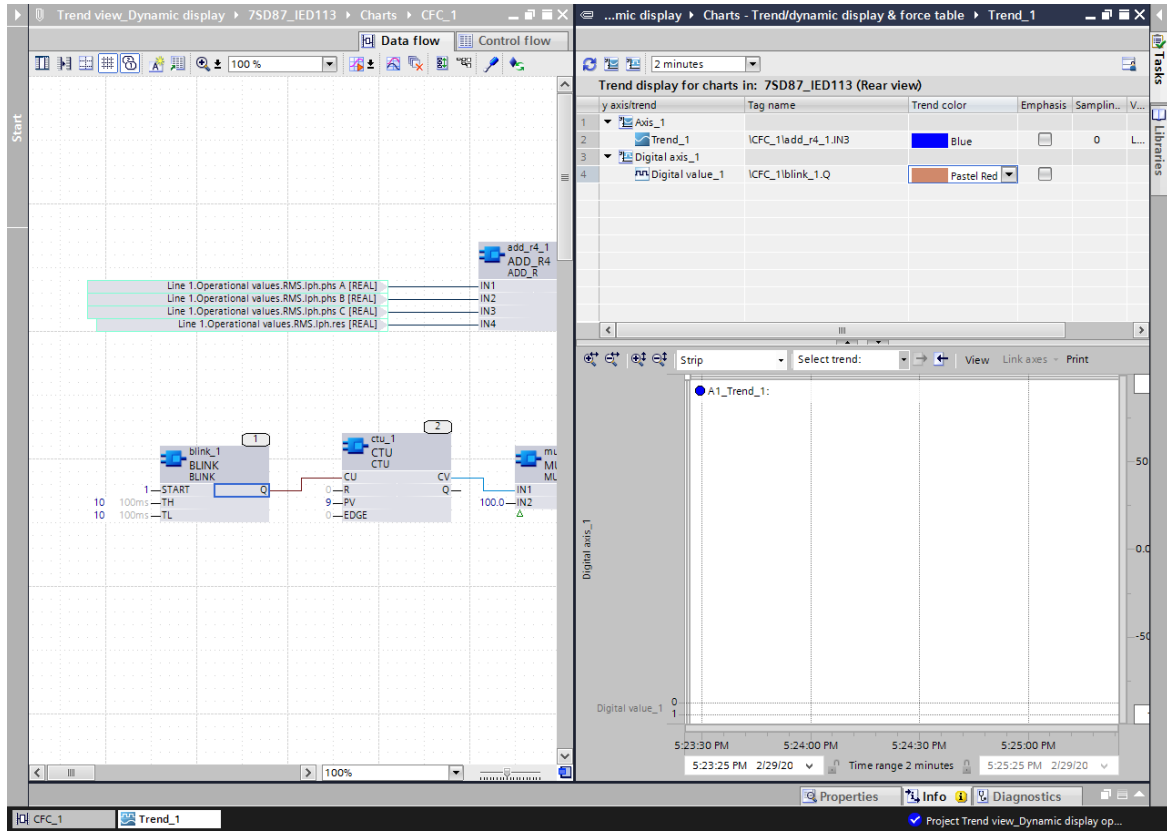
- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.7 Assigning Digital IO terminals of a CFC block to a Trend Display

To assign digital IO terminals of a CFC block to a digital axis, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) containing a digital axis (for example, **Digital axis_1**).
- ✧ Click the  button in the DIGSI 5 toolbar to view and work with the Trend display editor and with the CFC chart editor simultaneously.
- ✧ Add a new CFC chart and instantiate the CFC blocks which have the digital type terminals.
- ✧ Connect compatible digital signals or settings to the CFC block IO terminals.

- ✧ Drag and drop the digital terminals from the CFC blocks to the digital axis in the trend display editor.
- Digital IO terminals are successfully added to the digital axis.



[sc_digsi_digital_trend, 1, en_US]



NOTE

You cannot add digital IO terminals to the analog axis in the [20.1.34 Trend Display Editor](#). You can assign the digital IO terminals directly from the **Properties** tab of the Inspector window or the **Control Flow** editor. You can configure a maximum number of 30 terminals in a single trend display.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.8 Assigning Struct Type terminals of a CFC block to a Trend Display

To assign struct type IO terminals of a CFC block to a trend display, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) containing an analog or digital axis.
- ✧ Click the  button in the DIGSI 5 toolbar to view and work with Trend display editor and with the CFC chart editor simultaneously.

- ✧ Add a new CFC chart and instantiate the CFC blocks which have the struct type terminals.
- ✧ Connect compatible struct signals or settings to the CFC block IO terminals.
- ✧ Open the **Properties** tab via the **Inspector** window.
- ✧ Drag and drop the subterminals of the struct type IO from the **Properties** tab of the CFC block to the analog or digital axis in the [20.1.34 Trend Display Editor](#) depending on the type of the signal or setting.

Struct type IO terminals are successfully added to the analog axis or to the digital axis.

The screenshot displays the Siemens STEP 7 software interface. The main window shows the CFC editor with a function chart. The 'Trend Display Editor' is open, showing a trend display for 'Trend_1'. The 'Properties' tab is active, displaying a table of terminals for the trend display.

Name	Value	Unit	Type	Section	Invisible	For test	Comment	Comment (type)
1	IN1		Struct	Input				
2	VAL_L		Dint	Input				X1
3	VAL_R		Real	Input				
4	IS_REAL		Bool	Input				
5	QTY		Word	Input				
6	IN2		Struct	Input				X2
7	IN3		Struct	Input				X3

[sc_digsi_structtype_trend, 1, en_US]



NOTE

You can add struct type IO terminals to the analog axis in the [20.1.34 Trend Display Editor](#) only via the **Properties** tab of the Inspector window. You can configure a maximum number of 30 terminals in a single trend display.

Related Topics

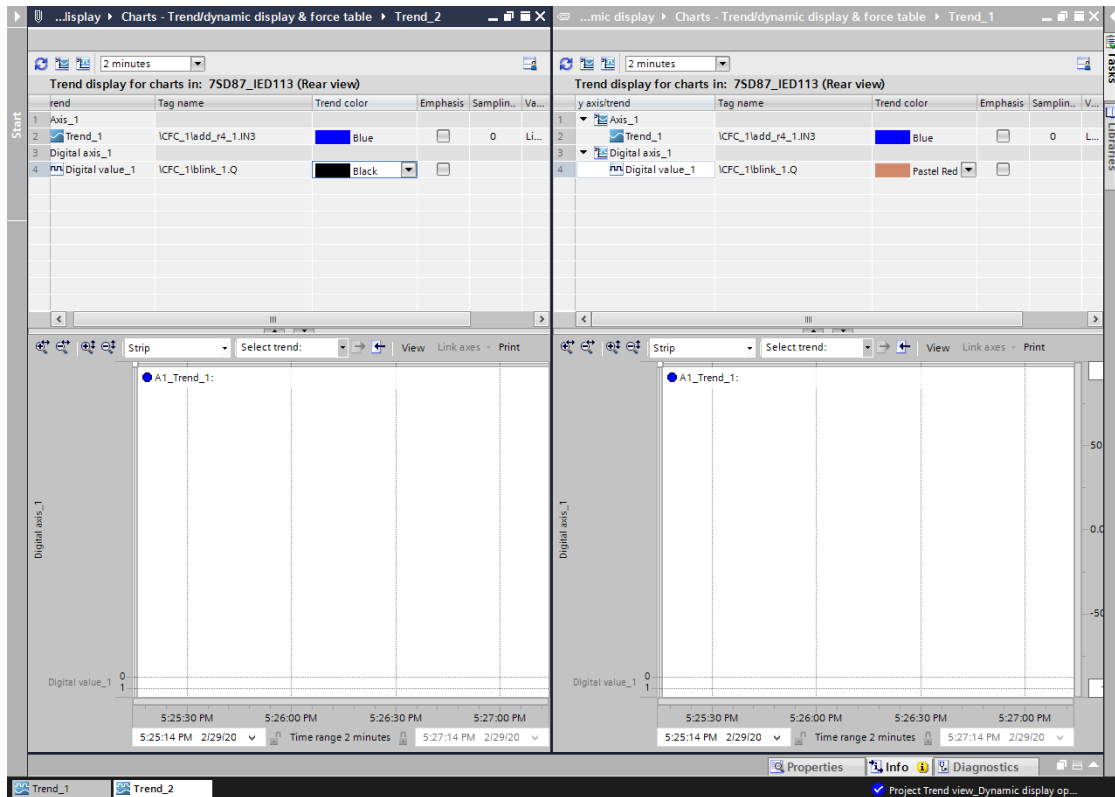
- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.9 Assigning IO Terminals between Trend Displays

To assign IO terminals from one trend display to another trend display, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) configured with 2 or more trend displays (for example, **Trend_1** and **Trend_2**) with the respective analog axis and digital axis assigned with IO terminals.
- ✧ Click the  button in the DIGSI 5 toolbar to work with 2 open Trend display editor windows simultaneously.
- ✧ Drag and drop any assigned IO terminal from the **Trend_1** display to the **Trend_2** display.

IO terminals are successfully moved from the source trend display to the target trend display.



[sc_digsi_trenddisplays, 1, en_US]

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.10 Assigning IO Terminals between Trend Displays via Project Tree

To assign IO terminals from one trend display to another trend display via the project tree, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) configured with 2 or more trend displays (for example, **Trend_1** and **Trend_2**) with the respective analog axis and digital axis assigned with IO terminals.
- ✧ Click the  button in the DIGSI 5 toolbar to work with 2 open Trend display editor windows simultaneously.

- ✧ Drag and drop the assigned IO terminals from the **Trend_1** display in the trend display to the **Trend_2** node in the project tree.

IO terminals are successfully copied from the source trend display to the target trend display and displayed in the Trend display editor.

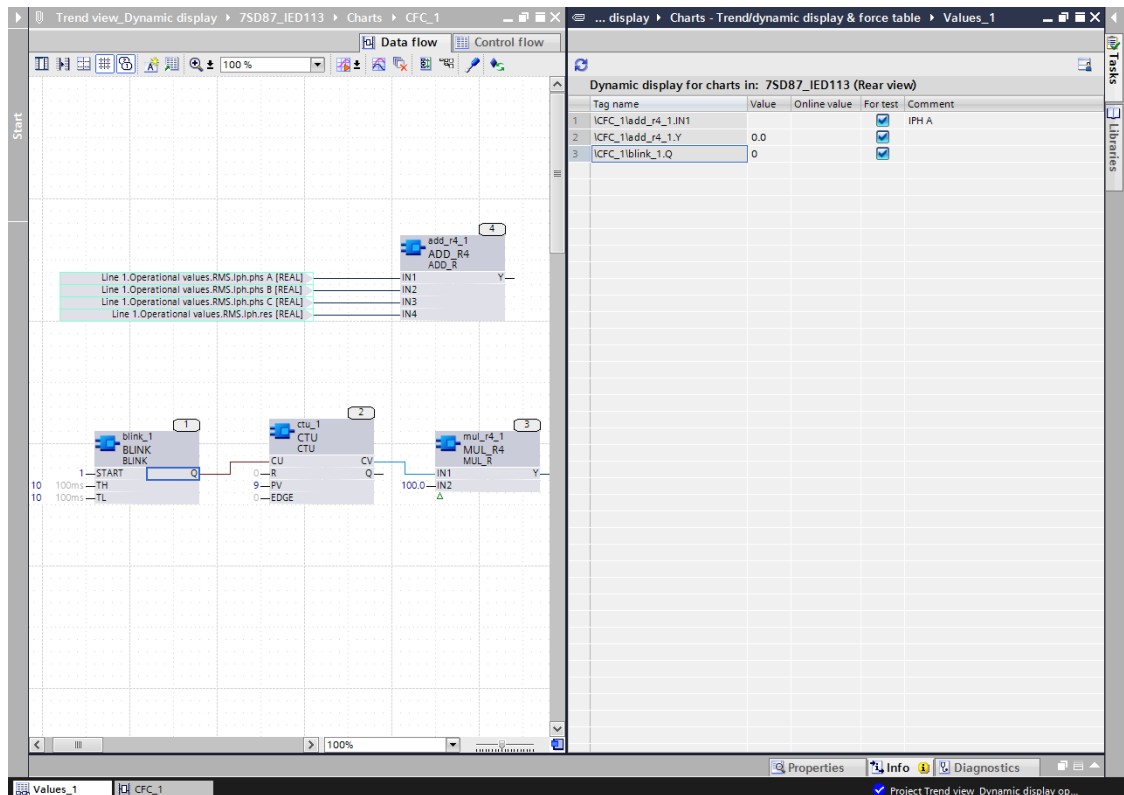
- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.11 Assigning IO Terminals of a CFC block to the Dynamic Display Editor

To assign IO terminals of a CFC block to a Dynamic display, proceed as follows:

- ✧ Open the [20.1.14 Dynamic Display Editor](#).
- ✧ Click the  button in the DIGSI 5 toolbar to view and work with the Trend display editor and with the CFC chart editor simultaneously.
- ✧ Add a new CFC chart and instantiate the CFC blocks with the respective terminals.
- ✧ Connect compatible signals or settings to the CFC block IO terminals.
- ✧ Drag and drop the analog or digital IO terminals from the CFC block to the [20.1.14 Dynamic Display Editor](#).

IO terminals are successfully assigned and displayed in the [20.1.14 Dynamic Display Editor](#).



[sc_digsi_dynamic_analog_digital, 1, en_US]



NOTE

You can add struct type IO terminals in the [20.1.14 Dynamic Display Editor](#) only via the **Properties** tab. You can also assign the IO terminals directly from the **Properties** tab of the Inspector window or the **Control Flow** editor.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.12 Deleting CFC Block/CFC Chart after Assigning their Terminals to the Trend Display/Dynamic Display Editor

To confirm deletion of the CFC block or CFC chart after assigning their IO terminal to the trend display or dynamic display, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) or [20.1.14 Dynamic Display Editor](#) assigned with IO terminals of CFC blocks or charts.
- ✧ Right-click the CFC block or chart whose IO terminals are assigned to the trend display or the dynamic display.
- ✧ Click **Delete** in the context menu.

The CFC block or the chart along with the assigned terminals in the [20.1.34 Trend Display Editor](#) or [20.1.14 Dynamic Display Editor](#) is deleted.

Related Topics

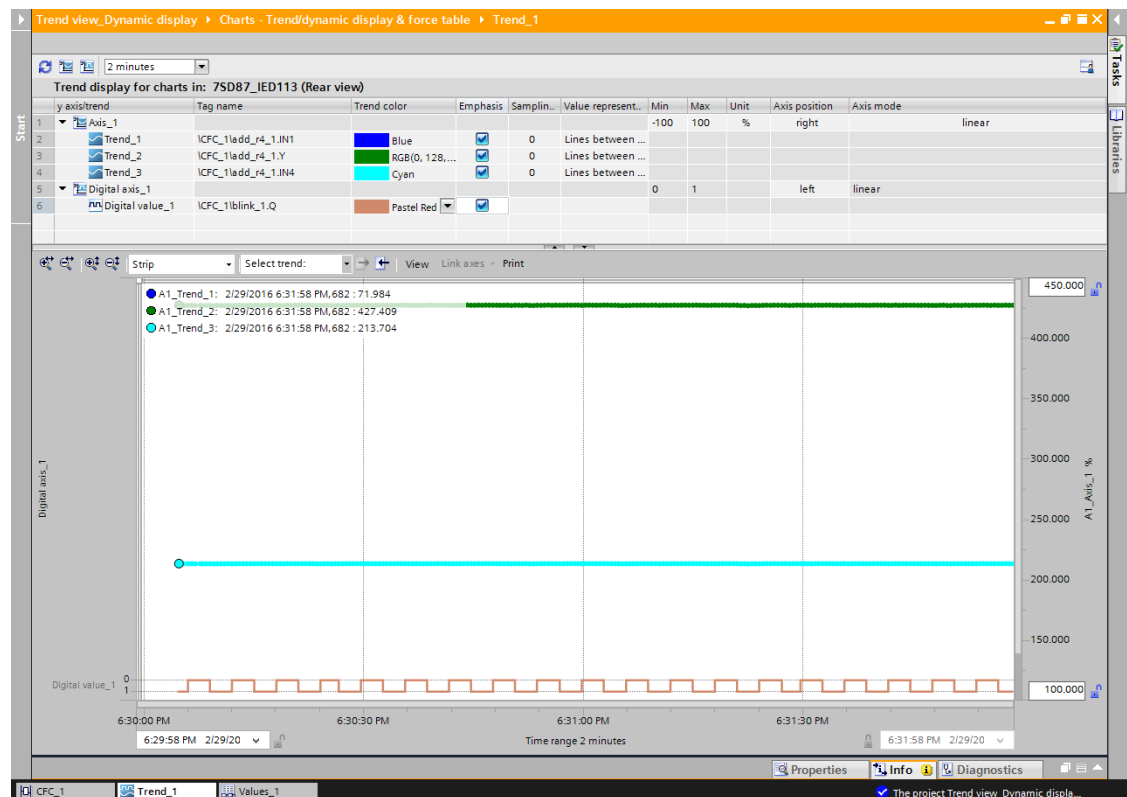
- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.13 Watching Values in Trend/Dynamic Display while CFC Online Analysis is in Progress

To watch values in the Trend/Dynamic display while CFC online analysis is in progress, proceed as follows:

- ✧ In the project tree of an offline configuration, open a configured function chart (CFC).
- ✧ Create the trend display and/or dynamic display.
- ✧ Configure the trend display/dynamic display with the respective CFC block IO terminals.
- ✧ Load the configuration to the device.
- ✧ Start the online analysis of the Function Charts (CFC).

The values for the configured IO terminals are displayed in the [20.1.34 Trend Display Editor](#) or in the [20.1.14 Dynamic Display Editor](#).



[sc_digsi_trenddisplayonline, 1, en_US]

Figure 12-20 Trend Display with CFC Online Analysis in Progress - Sample

Trend view_Dynamic display ▶ Charts - Trend/dynamic display & force table ▶ Values_1

Dynamic display for charts in: 7SD87_IED113 (Rear view)

Tag name	Value	Online value	For test	Comment
1 CFC_1ladd_r4_1.IN1		71.986	☒	IPH A
2 CFC_1lblink_1.Q	0	0	☒	
3 CFC_1ladd_r4_1.Y	0.0	427.402	☒	

[sc_digsi_dynamicdisplay_online, 1, en_US]

Figure 12-21 Dynamic Display with CFC Online Analysis in Progress - Sample

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.14 Watching Values in the Trend/Dynamic Display while CFC Offline Analysis is in Progress

To watch values in the Trend/Dynamic display while CFC offline analysis is in progress, proceed as follows:

- ✧ In the project tree of an offline configuration, open a configured function chart (CFC).
- ✧ Create the trend display and/or dynamic display.
- ✧ Configure the trend display/dynamic display with the respective CFC block IO terminals.
- ✧ Configure the test sequences.
- ✧ Start the offline analysis of the Function Charts (CFC).

The values for the configured IO terminals are displayed in the [20.1.34 Trend Display Editor](#) or in the [20.1.14 Dynamic Display Editor](#).

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.15 Customizing Trend View Display

12.6.15.1 Overview of Customization

In the [20.1.34 Trend Display Editor](#), you can customize the parameters like axis position, axis mode, trend color, value representation, select trend, and display mode, view and so on to have the desired graphical view.

12.6.15.2 Renaming Axis in the Trend Display

To rename the axis in the [20.1.34 Trend Display Editor](#), proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) with the configured trend display.
- ✧ Right-click the desired axis to be renamed.
- ✧ Select the option **Rename** in the context menu.
- ✧ Enter the desired name.



NOTE

You cannot use the same name for different axes. You cannot rename the **Tag name**.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.15.3 Changing the Color of the Trend in the Trend View Display

To change the color of the trend in the [20.1.34 Trend Display Editor](#), proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) with the configured trend display.
- ✧ Select the desired color in the **Trend color** column.
- ✧ Start the CFC online/offline analysis

The trend graph appears with the selected color in the trend view display.



NOTE

If you select the check box option under the **Emphasis** column for any trend, the trend graph gets highlighted in bold.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.15.4 Zooming Trend View Vertically and Horizontally

To zoom in or zoom out the trend view display horizontally or vertically, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) with a configured trend display.
- ✧ Select the Zoom in and/or Zoom out buttons.

The Trend view display is increased and/or decreased horizontally and vertically as per the clicks on the Zoom in and Zoom out toolbar options.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.15.5 Deleting Trend Display from the Project Tree

To delete the trend display from the project tree, proceed as follows:

- ✧ Select the already created trend display in the project tree.
- ✧ Right-click and select **Delete** from the context menu.
- or -
- ✧ Click  in the DIGSI 5 toolbar.

The Trend display is deleted.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.15.6 Printing the Trend View Graph

To print the Trend view from the project tree, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) with the configured trend display.
- ✧ Start the CFC online/offline analysis.

Trend view display in the [20.1.34 Trend Display Editor](#) starts monitoring of the configured CFC block terminals.

- ✧ Click the **Print** button in the trend view display.

The **Print** dialog opens.

- ✧ Click **Print**.

Print dialog opens again.

- ✧ Enter the printer details.
- ✧ Click **OK**.

The trend view graph will be printed.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.15.7 Exporting the Trend View

To export the trend view graph, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) with a configured trend display.
- ✧ Start the CFC online/offline analysis.

Trend view display in the [20.1.34 Trend Display Editor](#) starts monitoring of the configured CFC block terminals.

- ✧ Select a trend from the **Select trend** list box.

The **Export as csv file** button is enabled.

- ✧ Click **Export as csv file** after the online/offline analysis of CFC charts has finished.

The Trend view will be exported.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)

- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.6.15.8 Importing the Trend View

To import the trend view graph, proceed as follows:

- ✧ Open the [20.1.34 Trend Display Editor](#) .
- ✧ Click the **Import csv file** button in the trend view display.

The **Open .csv file** dialog opens.

- ✧ Select the desired file for import.
- ✧ Click **Open**.

The selected file is imported and displayed in the trend view display.

Related Topics

- ✧ [20.1.34 Trend Display Editor](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.3 Renaming a Function Chart \(CFC\)](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.7 Protecting Function Charts (CFC)

12.7.1 Brief Introduction to Protecting Function Charts (CFC)

With this feature, you can set the protection level for function charts and secure each function chart with a defined password. The following protection levels for function charts are possible:

- **Access protection**
This protection level allows you to set an access protection for a CFC with a password and to restrict the display of the content.
- **Write protection**
This protection level allows you to set a write access protection for a CFC with a password and to restrict the modification of the content.

Protected function charts can be copied but not deleted. If a protected function chart is copied, the protection is still valid for the copied chart. If you want to delete a protected function chart, you must remove the protection first. Deleting a complete device in the project tree of an offline configuration with protected function charts is possible.



NOTE

CFC protection is very important. If you do not remember the password, you cannot access protected charts or change **Write-protected** charts anymore.

Related Topics

- [12.1.1.3 Function Chart](#)
- [12.1.2.2 Opening a CFC](#)
- [12.1.2.5 Deleting CFCs](#)
- [12.1.2.4 Copying a CFC](#)
- [20.1.11 Data Flow](#)

12.7.2 Configuring the Access Protection for the Function Charts (CFC)

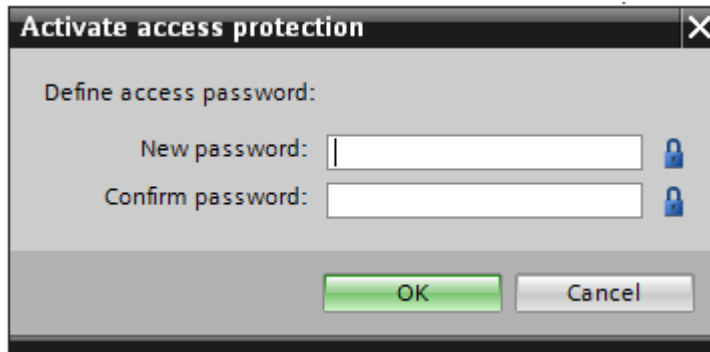
12.7.2.1 Setting the Access Protection for a CFC

To set the access protection for a CFC, proceed as follows:

- ✧ After opening the **Properties** dialog via the context menu of the function chart (CFC) in the project tree, select the **Protection** node under the **General** tab and click the **Protection** button in the **Access protection** area.
- or -
- ✧ In the **Properties** tab of the **Inspector** window under the **General** tab, select the **Protection** node and click the **Protection** button in the **Access protection** area.
- or -
- ✧ Right-click the function chart (CFC) in the project tree and select the **Access protection** option in the context menu.

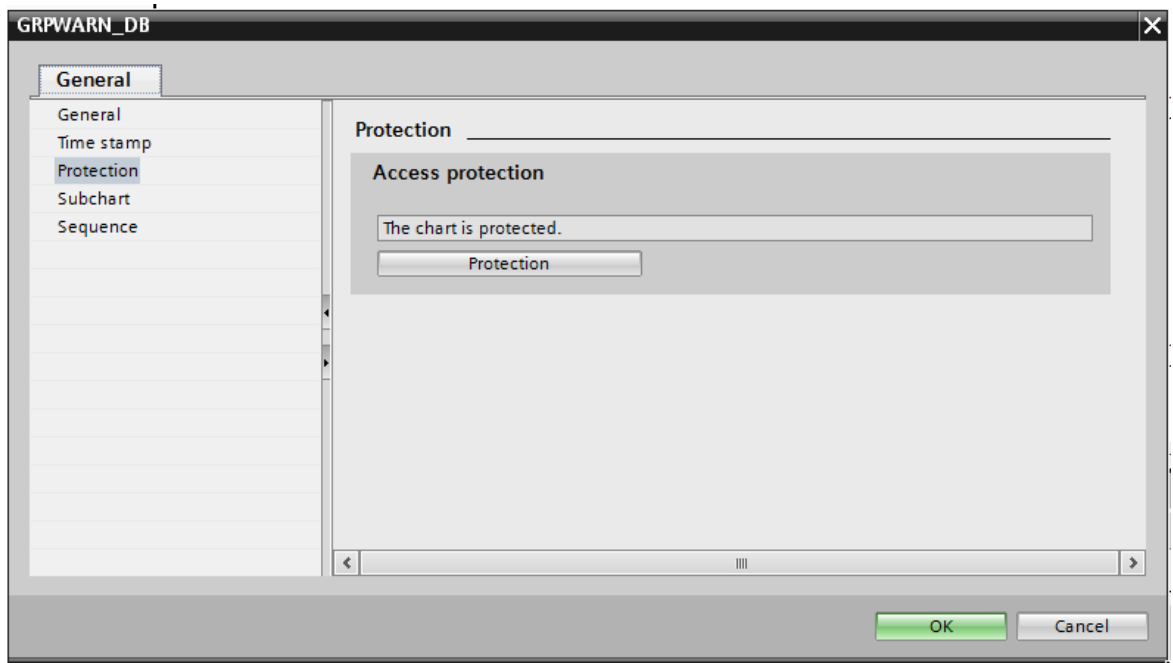
The **Activate access protection** dialog is displayed.

- ✧ Enter the password in the **New password** text box.
- ✧ Re-enter the same password in the **Confirm password** text box.
- ✧ Click **OK**.



[sc_activate_prot, 1, en_US]

The **Activate access protection** dialog closes and the chart is protected. The respective protection status message is also displayed in the Protection area under the **Properties** tab and in the **Properties** dialog of the function chart.



[sc_protected, 1, en_US]

Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.7.2.2 Opening an Access-Protected CFC

To open an access-protected function chart (CFC), proceed as follows:

- ✧ In the project tree of an offline configuration, open any configured function chart (CFC) which is access-protected.

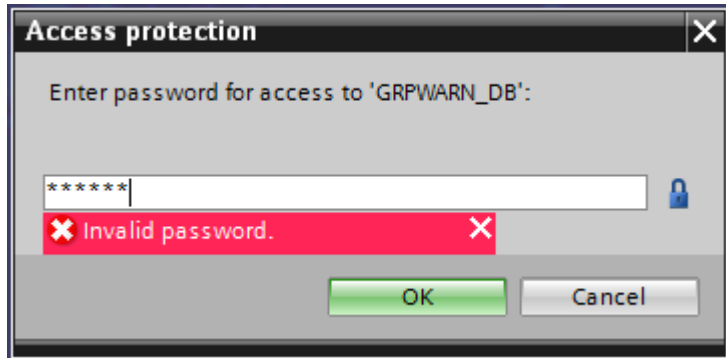
The **Access protection** dialog appears.

- ✧ Enter the valid password to access the CFC.

- ✧ Click **OK**.

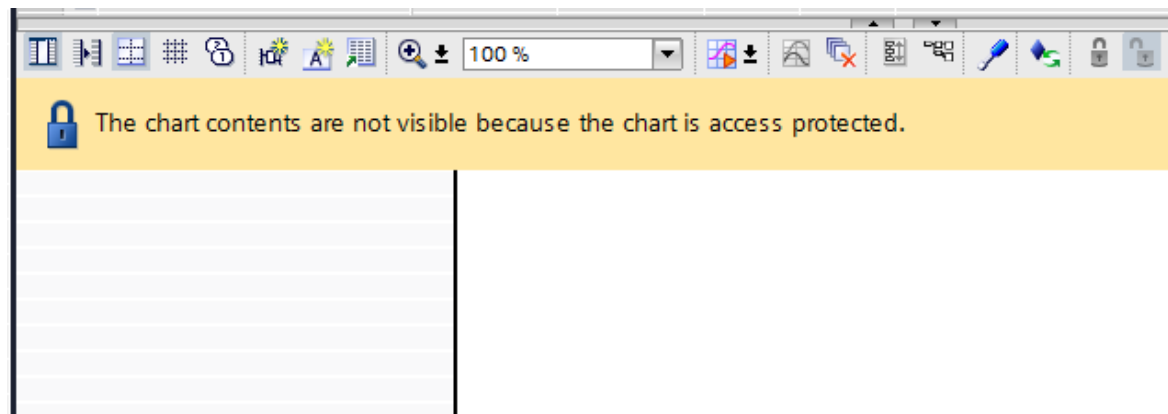
The access-protected CFC is displayed in the working area.

- ✧ If you enter a wrong password, the indication **Invalid password** is displayed.



[sc_wrongpass, 1, en_US]

- ✧ If you click **Cancel** the function chart is opened, but the content is not shown.



[sc_nocontent, 1, en_US]

- ✧ An access-protected function chart is displayed in the project tree with the following symbol: .

Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.7.2.1 Setting the Access Protection for a CFC](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.7.2.3 Modifying the Access Protection Password of a CFC

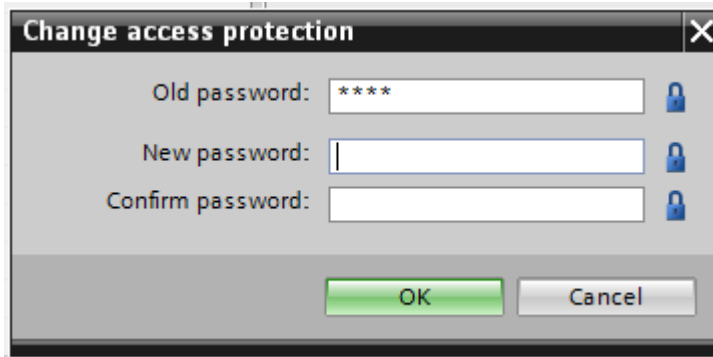
To modify the access protection for a function chart, proceed as follows:

- ✧ Right-click the function chart (CFC) in the project tree and select the **Access protection** option in the context menu.
- or -
- ✧ In the **Properties** tab of the **Inspector** window of a CFC under the **General** tab, select the **Protection** node and click the **Protection** button in the **Access protection** area.

- or -

- ✧ In the **Properties** dialog opened via the context menu of the function chart (CFC) in the project tree, select the **Protection** node under the **General** tab and click the **Protection** button in the **Access protection** area.

The **Change access protection** dialog is displayed.



- ✧ Enter the old password in the **Old password** text box.
- ✧ Enter the new password in the **New password** text box.
- ✧ Re-enter the new password in the **Confirm password** text box.
- ✧ Click **OK**.

The **Change access protection** dialog closes and the access-protection password is modified.

Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.7.2.1 Setting the Access Protection for a CFC](#)
- ✧ [12.7.2.2 Opening an Access-Protected CFC](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.7.2.4 Removing the Access-Protection of a CFC

To remove the access-protection of a function chart, open the **Change access protection** dialog as described in [12.7.2.3 Modifying the Access Protection Password of a CFC](#) and proceed as follows:

- ✧ Enter the old password in the **Old password** text box in this dialog.
- ✧ Leave the text box fields for **New password** and **Confirm password** empty.
- ✧ Click **OK**.

The **Change access protection** dialog closes and the access-protection password is removed.

Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.7.2.1 Setting the Access Protection for a CFC](#)
- ✧ [12.7.2.2 Opening an Access-Protected CFC](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)

- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.7.3 Configuring the Write Protection for the Function Charts (CFC)

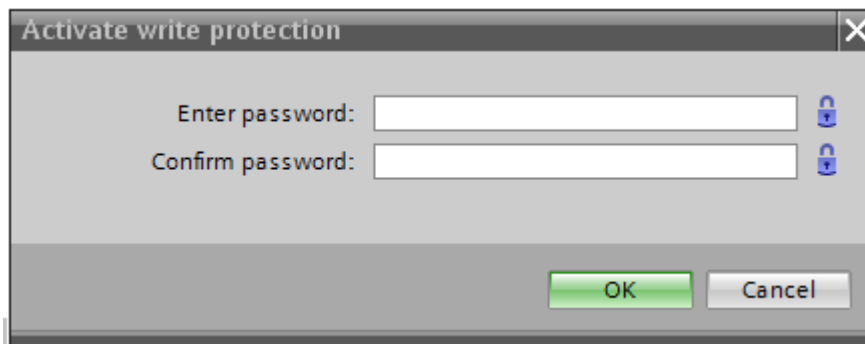
12.7.3.1 Setting the Write Protection for a CFC

To set the write protection for a CFC plan, proceed as follows:

- ✧ In the **Properties** tab of the **Inspector** window of a CFC under the **General** tab, select the **Write protection** node and click the **Protection** button in the **Write protection** area.
- or -
- ✧ Right-click the function chart (CFC) in the project tree and select the **Write protection** option in the context menu.
- or -
- ✧ Click  in the [20.7.6 Toolbar of the Data Flow](#) editor.

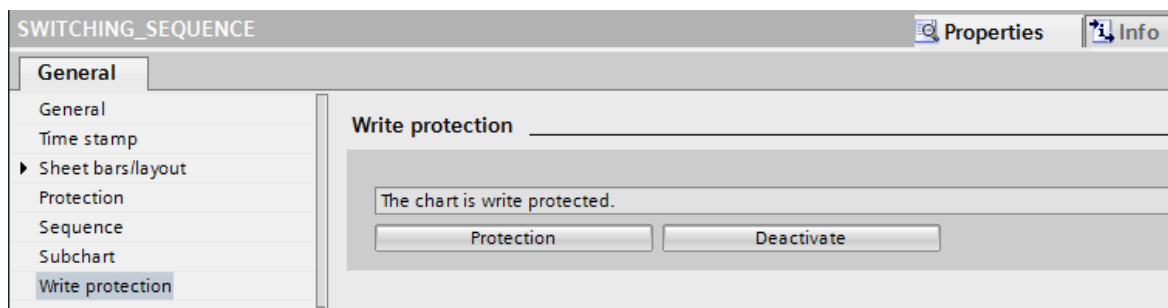
The **Activate write protection** dialog is displayed.

- ✧ Enter the password in the **Enter Password** text box.
- ✧ Re-enter the same password in the **Confirm password** text box.
- ✧ Click **OK**.



[sc_act_writeprot, 1, en_US]

The **Activate write protection** dialog closes and the chart is write-protected. The respective protection-status message is also displayed in the **Write protection** area under the **Properties** tab.



Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)

- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.7.3.2 Opening a Write-Protected CFC

You can open a write-protected function chart like a not protected function chart.



NOTE

To edit the CFC, you do not need to deactivate the write-protection password. You can click the unlock icon  in the **Data flow** view toolbar of the function chart and enter the correct password in the following dialog. The function chart is editable now but still keeps the write protection in general. After closing the function-chart window or by clicking the  icon in the toolbar, the function chart is no longer editable.

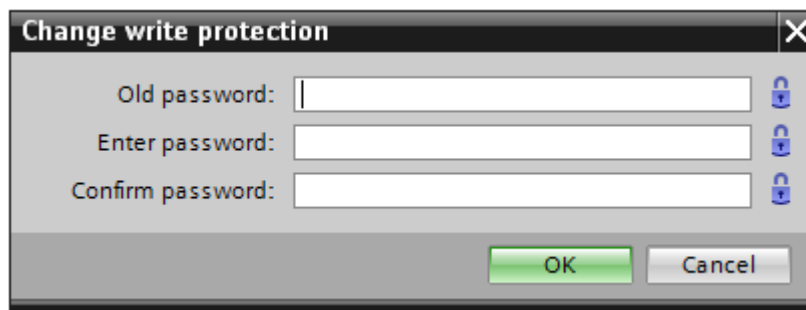
Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.7.3.1 Setting the Write Protection for a CFC](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.7.3.3 Modifying the Write-Protection Password of a CFC

To modify the write-protection password for a function chart (CFC), proceed as follows:

- ✧ Right-click the write-protected function chart (CFC) in the project tree and select the **Write protection** option in the context menu.
 - or -
 - ✧ In the **Properties** tab of the **Inspector** window under the **General** tab, select the **Write protection** node and click the **Protection** button in the **Write protection** area.
- The **Change write protection** dialog is displayed.
- ✧ Enter the old password in the **Old password** text box.
 - ✧ Enter the new password in the **Enter password** text box.
 - ✧ Re-enter the new password in the **Confirm password** text box.
 - ✧ Click **OK**.



[sc_chg_writeprot, 1, en_US]

The **Change write protection** dialog closes and the write-protection password is modified.

Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.7.3.1 Setting the Write Protection for a CFC](#)
- ✧ [12.7.3.2 Opening a Write-Protected CFC](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

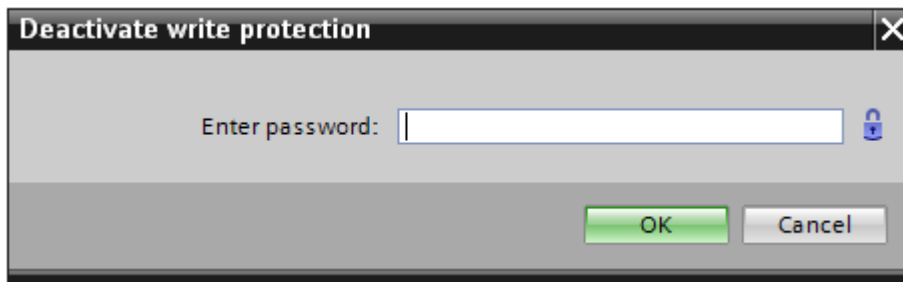
12.7.3.4 Deactivating the Write Protection of a CFC

To deactivate the write-protection password of a function chart, proceed as follows:

- ✧ Right-click the write-protected function chart (CFC) in the project tree and select the **Deactivate write protection** option in the context menu.
- or -
- ✧ In the **Properties** tab of the **Inspector** window under the **General** tab, select the **Write protection** node and click the **Deactivate** button in the **Write protection** area.

The **Deactivate write protection** dialog is displayed.

- ✧ Enter the password in the **Enter password** text box.
- ✧ Click **OK**.



[sc_deact_writeprot, 1, en_US]

The **Deactivate write protection** dialog closes and the write-protection password is removed. The respective protection-status message is also displayed in the **Protection** area under the **Properties** tab and in the **Properties** dialog of the function chart.

Related Topics

- ✧ [12.7.1 Brief Introduction to Protecting Function Charts \(CFC\)](#)
- ✧ [12.7.3.1 Setting the Write Protection for a CFC](#)
- ✧ [12.7.3.2 Opening a Write-Protected CFC](#)
- ✧ [12.7.3.3 Modifying the Write-Protection Password of a CFC](#)
- ✧ [12.1.1.3 Function Chart](#)
- ✧ [12.1.2.2 Opening a CFC](#)
- ✧ [12.1.2.5 Deleting CFCs](#)
- ✧ [12.1.2.4 Copying a CFC](#)

12.8 Data Types and Data Structures

12.8.1 Basic Data Types

CFC uses the following basic data types:

Data Type	Number of Bits	Explanation
BOOL	1	2 states: TRUE or FALSE
WORD	16	Bit field
INT	16	Signed number
DINT	32	Signed number
UINT	16	Unsigned number
REAL	32	Floating-point number

In CFC, the following connections for block inputs and outputs of basic data types are allowed:

Block Input Type	Connectable Block Output Types
BOOL	BOOL
DINT	DINT, REAL, UINT
UINT	DINT, UINT
REAL	DINT, REAL

In CFC, the following signal and setting types can be connected to block inputs of basic data types:

Block Input Type	Connectable Signal/Setting Types
BOOL	SPS
DINT	MV, INS, BCR, ING, ASG
UINT	INS, ING
REAL	MV, ASG

In CFC, the following signal types can be connected to block outputs of basic data types:

Block Output Type	Connectable Signal Types
BOOL	SPS
DINT	MV, INS, INC
UINT	INS, INC
REAL	MV

12.8.2 Data Structures

12.8.2.1 CMV_STRUCT

This data structure is used for retrieving information of signals of the type **CMV (complex measured value)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **CMV_STRUCT**:

Name	Data Type	Explanation
MAG	REAL	Magnitude
ANG	REAL	Angle
VALDESC	VALDESC_MV	Value description
Q	WORD	Quality

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.2 DEL_STRUCT

This data structure is used for retrieving information of signals of the type **DEL (3-phase measured value delta connection)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **DEL_STRUCT**:

Name	Data Type	Explanation
PHS_AB	SCMVVAL	Phase AB
PHS_BC	SCMVVAL	Phase BC
PHS_CA	SCMVVAL	Phase CA
VALDESC	VALDESC_MV	Value description

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.3 ID_APCI

This data structure is used for retrieving information of signals of the type **APC (controllable analogue process value)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_APCI**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.4 ID_BSCC

This data structure is used for controlling signals of the type **BSC (Binary controlled step position information)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_BSCC**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.5 ID_BSCC2

This data structure is used for controlling signals of the type **BSC (Binary controlled step position information)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_BSCC2**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

12.8.2.6 ID_BSCI

This data structure is used for retrieving information of signals of the type **BSC (controlled step position information)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_BSCI**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

12.8.2.7 ID_DPCI

This data structure is used for retrieving information of signals of the type **DPC (Double-point controllable)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_DPCI**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

12.8.2.8 ID_INCI

This data structure is used for retrieving information of signals of the type **INC (Controllable integer status)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_INCI**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.9 ID_SPCC

This data structure is used for controlling signals of type **SPC (Single-point controllable)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_SPCC**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.10 ID_SPCI

This data structure is used for retrieving information of signals of the type **SPC (Single-point controllable)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_SPCI**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.11 ID_DPCC

This data structure is used for controlling signals of type **DPC (Double-point controllable)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **ID_DPCC**:

Name	Data Type	Explanation
IDX	DINT	Signal ID

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.12 INS_STRUCT

This data structure is used for retrieving information of signals of the type **INS (Integer status)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **INS_STRUCT**:

Name	Data Type	Explanation
VAL	DINT	Integer value

Q	WORD	Quality

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

12.8.2.13 MV_STRUCT

This data structure is used for processing signals of the types **MV (Measured value)**, **BCR (Binary counter reading)**, and **APC (Controllable analog process value)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **MV_STRUCT**:

Name	Data Type	Explanation
VAL_I	DINT	Metered value (BCR)
VAL_R	REAL	Measured value (MV) or Controllable analog process value (APC)
IS_REAL	BOOL	1: A REAL representation is used for the value. 0: An INT32 representation is used for the value.
QL	WORD	Quality

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

12.8.2.14 SACD

This data structure is used for processing signals of type **ACD (Directional protection information)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **SACD**:

Name	Data Type	Explanation
PHS	DINT	Activation information 3 phases and neutral
DIR	DINT	Direction information 3 phases and neutral
QLTY	WORD	Quality

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

12.8.2.15 SACT

This data structure is used for processing signals of the type **ACT (Protection activation information)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **SACT**:

Name	Data Type	Explanation
PHS	DINT	Activation information 3 phases and neutral
QLTY	WORD	Quality

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.16 SCMVVAL

This data structure is used for phase information in the data structure **DEL_STRUCT/WYE_STRUCT**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **SCMVVAL**:

Name	Data Type	Explanation
MAG	REAL	Magnitude
ANG	REAL	Angle
Q	WORD	Quality

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.17 SDPS

This data structure is used for processing the double-point indications of signals of the type **DPC (Double-point controllable)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **SDPS**:

Name	Data Type	Explanation
DP	WORD	Indication value
Q	WORD	Quality

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.18 SSPS

This data structure is used for processing signals of the type **SPS (single-point indication)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **SSPS**:

Name	Data Type	Explanation
SP	BOOL	Indication value
Q	WORD	Quality

Related Topics

[9.3 Signal Types](#)
[12.8.1 Basic Data Types](#)

12.8.2.19 SXMV

This data structure is used for processing signals of the types **MV (Measured value)**, **BCR (Binary counter reading)**, and **APC (Controllable analog process value)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **SXMV**:

Name	Data Type	Explanation
VAL_I	DINT	Metered value (BCR)
VAL_R	REAL	Measured value (MV) or Controllable analogue process value (APC)
IS_REAL	BOOL	1: A REAL representation is used for the value. 0: A DINT representation is used for the value.
VALDESC	VALDESC_MV	Measured-value description for primary, secondary, percentage conversion and representation
QL	WORD	Quality

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

12.8.2.20 WYE_STRUCT

This data structure is used for retrieving information of signals of the type **WYE (3-phase measured value Y connection)**.

Individual Structure Elements

The following table provides information about the individual elements of the data structure **WYE_STRUCT**:

Name	Data Type	Explanation
PHS_A	SCMVVAL	Phase AB
PHS_B	SCMVVAL	Phase BC
PHS_C	SCMVVAL	Phase CA
RES	SCMVVAL	Residual
NEUT	SCMVVAL	Phase neutral
NET	SCMVVAL	Net
VALDESC	VALDESC_MV	Value description

Related Topics

[9.3 Signal Types](#)

[12.8.1 Basic Data Types](#)

13 Test Sequences

13.1	Overview of Test Sequences	514
13.2	Managing Test Sequences	516
13.3	Creating Test Sequences	519

13.1 Overview of Test Sequences

The test sequences test the protection functions. Test sequences are always assigned to an offline configuration and therefore a certain SIPROTEC 5 device.

Creating Test Sequences

You create the test sequences with the [20.1.21 Test-Sequences Editor](#). You can do this in one of the following ways:

- Set parameters for analog test signals for the phases of each measuring point
- Set values of binary input signals
- Set values for function charts (CFC) input signals

A test sequence can consist of a maximum of 20 states. For each state, you can define different values. A state ends after a set duration. The next state is then automatically executed. All the states of a test sequence are stored in the **CSV** format in a file.

Managing Test Sequences

You manage test sequences with the [3.1.2 Project Tree](#). You can do this in one of the following ways:

- Opening a test sequence
- Adding a test sequence
- Renaming a test sequence
- Copying test sequences
- Deleting test sequences

Testing Protection Functions

To test the effect of protection functions in the SIPROTEC device, you previously had to work with signals from the process or with external test equipment. Now, you can test these protection functions with **Test sequences** you have developed yourself because every SIPROTEC 5 device has an integrated test generator. This test generator disconnects the analog and binary inputs from the process and replaces the process values by the values provided in the test sequence. The test sequence simulates the functions of the SIPROTEC 5 device just like real progression of the values at the binary and analog inputs. The values in the test sequence can change over time, just like values in normal operation.

The analog and binary values are routed directly to the logical measuring points. These forward the values to the functions, depending on the particular application.

With test sequence for protection functions, you have the following options:

- You can configure 1 analog test signal for each phase of a measuring point.
- You can set 1 starting value for magnitude, phase angle, and frequency for each analog test signal.
- With the ramp function you can achieve the raising or reducing signal profiles.
- You can define a binary input signal for each binary input.

If the SIPROTEC 5 device is in simulation mode, the test sequence can be started. You have the following options for this purpose:

- You can start the test sequence manually with DIGSI 5.
- A signal at a binary input can start the test sequence. This method is especially suitable for testing the interaction between multiple SIPROTEC 5 devices.

Information about the use of test sequences can be found under [15.4.5 Testing Protection Functions](#) or [15.4.2 Testing Analog Inputs](#).

Related Topics

[13.2.2 Adding a Test Sequence](#)

13.2.1 Opening the Test Sequence

13.3.1 Configuring States for the Test Sequence

13.3.5 Configuring Analog Test Signals for Measuring Points

13.3.9 Setting the Value of Binary Input Signals

13.3.10 Saving Settings of a Test Sequence in a File

13.2 Managing Test Sequences

13.2.1 Opening the Test Sequence

Test sequences are always assigned to an offline configuration and therefore a certain SIPROTEC 5 device. Therefore, a test sequence within the project structure will always be stored in the folder of an offline configuration. The test sequence is opened using the [3.1.2 Project Tree](#).



NOTE

If you add a new test sequence, it is automatically opened.

Opening the Test Sequence with the Project Tree

- ✧ In the project tree, open the offline configuration for which you want to open a test sequence.
- ✧ Double-click **Test sequences** in this folder.

You will see the names of all available test sequences.

- ✧ Double-click the name of the test sequence you want to open.

In the working area, the [20.1.21 Test-Sequences Editor](#) opens and the settings of the selected test sequence are shown.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)

13.2.2 Adding a Test Sequence

You can create as many test sequences as you like for each offline configuration. A consecutively numbered default name is assigned to each test sequence that is added. You can change this name. The new test sequence contains 1 state. The settings for this state are preset to default values. The test sequence is added using the [3.1.2 Project Tree](#).

Adding a New Test Sequence via the Project Tree

- ✧ In the project tree, open the offline configuration for which you want to add a test sequence.
- ✧ Double-click **Add new test sequence** in this folder.

The name of the newly added test sequence is added in the **Test sequences** folder. The test sequence is created. In the working area, the [20.1.21 Test-Sequences Editor](#) opens and the settings of the new test sequence are shown.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.2.3 Renaming a Test Sequence](#)
- ✧ [13.2.5 Copying Test Sequences](#)
- ✧ [13.2.4 Deleting Test Sequences](#)

13.2.3 Renaming a Test Sequence

When you add a test sequence, it is automatically given a consecutively numbered default name. You can change this name. The name of a test sequence must be unique within a SIPROTEC 5 device. You can modify the name of a test sequence in the [3.1.2 Project Tree](#).

Changing the Name of the Test Sequence in the Project Tree

- ✧ Right-click the name you want to change. Then click **Rename** in the context menu.

The name is displayed in a text box and is highlighted in color.

- ✧ Enter a new name.

- ✧ Click outside the text box.

- or -

- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The entered name will be applied.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)

13.2.4 Deleting Test Sequences

To delete a test sequence, use the [3.1.2 Project Tree](#). You can simultaneously delete a single test sequence or multiple test sequences.

Deleting Single or Multiple Test Sequences

- ✧ Right-click the test sequence you want to delete in the project tree.

- or -

- ✧ If you want to delete multiple test sequences simultaneously, select them in the project tree. Then right-click the selected test sequence.

- ✧ Click **Delete** in the context menu.

A confirmation prompt will be displayed.

- ✧ Click **Yes**. This confirms your action.

The selected test sequences will be deleted from the project.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)

13.2.5 Copying Test Sequences

You can copy test sequences within an offline configuration or between offline configurations. Test sequences are always copied using the [3.1.2 Project Tree](#). It is also possible to copy multiple test sequences simultaneously.



NOTE

DIGSI 5 does not check whether the test sequences copied are compatible with the destination configuration. You must ensure this yourself.

Copying Test Sequences within an Offline Configuration

- ✧ In the project tree, open the offline configuration for which you want to copy test sequences.

- ✧ Double-click **Test sequences** in this folder.

You will see the names of all available test sequences.

- ✧ Right-click the name of the test sequence you want to copy.

- or -

- ✧ If you want to copy multiple test sequences simultaneously, first select their names. This is done by holding either the SHIFT key or the <Ctrl> key down, depending on the selection procedure. Then right-click one of these names.
- ✧ Click **Copy** in the context menu.

The test sequences will be copied to the clipboard.

- ✧ Right-click the **Test sequences** folder.
- ✧ Click **Paste** in the context menu.

The names of the copied test sequences will be displayed under the **Test sequences** folder.

Copying Test Sequences between Offline Configurations

- ✧ In the project tree, open the offline configuration for which you want to copy test sequences.
- ✧ Double-click **Test sequences** in this folder.

You will see the names of all available test sequences.

- ✧ Right-click the name of the test sequence you want to copy.

- or -

- ✧ If you want to copy multiple test sequences simultaneously, first select their names. This is done by holding either the SHIFT key or the <Ctrl> key down, depending on the selection procedure. Then right-click one of these names.
- ✧ Click **Copy** in the context menu.

The test sequences will be copied to the clipboard.

- ✧ In the project tree, open the offline configuration into which you want to copy the test sequences.
- ✧ Right-click the **Test sequences** folder.
- ✧ Click **Paste** in the context menu.

The names of the copied test sequences will be displayed under the **Test sequences** folder.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.2.3 Renaming a Test Sequence](#)

13.3 Creating Test Sequences

13.3.1 Configuring States for the Test Sequence

A test sequence consists of at least 1 and a maximum of 20 states. For each state you can set the various values for the analog test signals, function-chart (CFC) input signals and binary input signals. For configuring the states, you have the following possibilities:

- You can change the number of states.
- You can rename the states.
- You can set the duration of each state.

Related Topics

[13.1 Overview of Test Sequences](#)

[13.3.2 Changing the Number](#)

[13.3.3 Renaming a State](#)

[13.3.4 Setting Duration for a State](#)

13.3.2 Changing the Number

A test sequence can consist of up to 20 states. For each state, you can define different values. A state ends after a set duration. The next state is then automatically executed.

You can add states to or delete states from a test sequence with the [20.1.21 Test-Sequences Editor](#).

Adding a New State

- ✧ On the [20.7.10 Toolbar of the Test-Sequences Editor](#), click the  button.

A new state will be added to the test sequence. This state has a consecutively numbered default name. The name is entered in the list box on the toolbar. The default settings of the state are displayed in the working area.

Deleting a Single State

- ✧ Select the state you want to delete in the list box on the toolbar of the Test-sequence editor.

The settings of the state will be displayed in the working area.

- ✧ Click the  button on the toolbar of the Test-sequence editor.

The state will be deleted with all its settings.

Related Topics

✧ [13.1 Overview of Test Sequences](#)

✧ [13.3.1 Configuring States for the Test Sequence](#)

13.3.3 Renaming a State

When you add a state, it is automatically given a consecutively numbered default name. You can change this name with the [20.1.21 Test-Sequences Editor](#). The name of a state must be unique within a test sequence.

Changing the Name of the State

- ✧ Select the current name in the **State name** text box.

The name will be highlighted in a color.

- ✧ Enter a new name.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The entered name will be applied.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.3.1 Configuring States for the Test Sequence](#)

13.3.4 Setting Duration for a State

A state of the test sequence ends after a settable duration. The next state is then automatically executed. After a new state has been created, a duration of 10 s is preset. You can change this value with the [20.1.21 Test-Sequences Editor](#).

Entering a Value for the Duration of a State

- ✧ Position the mouse pointer in the text box **Execute this state for**.
- ✧ Input a value for the duration in seconds.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible range of values, an error message will appear. In this case, correct your entry.

- or -
- ✧ Click the arrow keys to the right of the text box.

The value shown in the text box will be incremented or decremented in defined states.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.3.1 Configuring States for the Test Sequence](#)
- ✧ [13.3.10 Saving Settings of a Test Sequence in a File](#)

13.3.5 Configuring Analog Test Signals for Measuring Points

In the area **Indicate value for secondary analog input signals for this state**, you can configure for each state separately, test signals for each measuring point. Doing this you can configure one measuring point for 1 test signal for each phase. You can do this in one of the following ways:

- You can set start values for the analog test signals.
- You can use the ramp function.
- You can configure the harmonic.

Related Topics

- [13.1 Overview of Test Sequences](#)
- [13.3.6 Setting Starting Values for Analog Test Signals](#)
- [13.3.7 Using the Ramp Function](#)
- [13.3.8 Configuring Harmonic](#)

13.3.6 Setting Starting Values for Analog Test Signals

You can set the starting value for each analog test signal with the [20.1.21 Test-Sequences Editor](#) within a state. If you use the ramp function, the value of the analog test signal will be incremented or decremented starting from this starting value. If you do not use the ramp function, the analog test signal is assigned the defined starting value permanently during a state.

The analog test signals are supplied directly to the logical measuring points. You can configure 1 test signal for each phase of a configured measuring point.

You can define starting values for the following physical quantities:

- Magnitude
- Phase angle
- Frequency

You can set the magnitude and phase angle for each analog test signal individually. However, the frequency must be identical for all analog test signals that are routed to one measuring point. Therefore, set 1 frequency value per measuring point. This is automatically applied to all relevant analog test signals.

With only 1 mouse click, you can take over the final values of the previous state as starting values for the current state. With this functionality, you can create a continuous signal flow from several states. For this purpose, the following conditions must be met:

- At least 2 states must be available.
- State 1 must not be selected.

All settings for the analog test signals are summarized in the area **Specify values for secondary analog-input signals for this state**. To show this area, click the arrow next to the name of the area.

Setting the Starting Value for Magnitude or Phase Angle

- ✧ Double-click the cell in the row containing the name of the phase.
- ✧ Enter a permissible value in the cell.
- ✧ Click outside the cell.
- or -
- ✧ Press the <Enter> key.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible range of values, an error message appears. In this case, correct your entry.

- or -
- ✧ Double-click the cell in the row containing the name of the phase.
- ✧ Click the arrow keys to the right of the cell.

The value shown in the cell will be incremented or decremented in defined states.

Setting the Starting Value for Frequency

- ✧ Double-click the cell in the row containing the name of the measuring point.
- ✧ Enter a permissible value in the cell.
- ✧ Click outside the cell.

- or -

- ✧ Press the <Enter> key.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible range of values, an error message appears. In this case, correct your entry.

- or -

- ✧ Double-click the cell in the row containing the name of the measuring point.
- ✧ Click the arrow keys to the right of the cell.

The value shown in the cell will be incremented or decremented in defined states.

Taking over the Final Value of the Previous State as a Starting Value for the Current State

- ✧ Select the state to be processed with the list box in the [20.7.10 Toolbar of the Test-Sequences Editor](#).
- ✧ Click the  button in the toolbar of the Test-sequences editor.

The final values of the previous state are taken over as starting values for the selected state.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.3.5 Configuring Analog Test Signals for Measuring Points](#)
- ✧ [13.3.9 Setting the Value of Binary Input Signals](#)
- ✧ [13.3.1 Configuring States for the Test Sequence](#)
- ✧ [13.3.10 Saving Settings of a Test Sequence in a File](#)

13.3.7 Using the Ramp Function

The [20.1.21 Test-Sequences Editor](#) provides a ramp function. With the ramp function, within a state either the magnitude, the phase angle, or the frequency of an analog test signal is gradually increased or decreased. This is done by defining the step duration and a delta value. As soon as the step duration has elapsed, the value of the selected setting (**magnitude**, **phase angle**, or **frequency**) will be incremented or decremented by the step value. This process is performed repeatedly until the state duration has elapsed.

To increment a value, enter a positive state value. To decrement a value, enter a negative state value. You cannot both increment and decrement a value at the same time within a state. For example, if you want first to increment a value and then decrement it again, implement this behavior in 2 consecutive states.

You select one of the settings **magnitude**, **phase angle**, or **frequency** always for the measuring point and therefore for all conductors of a measuring point. You can set a different state value for each analog test signal. The step duration, on the other hand, applies to all analog test signals.

Proceed with configuring the step function in the following sequence:

- Define a step duration.
- Select one of the settings **Magnitude**, **Phase angle**, or **Frequency** for the measuring point.
- Optionally change the predefined delta value.

All settings for the ramp function are summarized in the area **Specify values for secondary analog-input signals for this state**. To show this area, click the arrow next to the name of the area.

Defining the Step Duration for all Analog Test Signals

- ✧ Position the mouse pointer into the text box **Duration of each step**.
- ✧ Input a value for the step duration in seconds.
- ✧ Click outside the text box.

- or -

- ✧ Press the <Enter> key.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible range of values, an error message appears. In this case, correct your entry.

- or -

- ✧ Click the arrow keys to the right of the text box.

The value shown in the text box will be incremented or decremented in defined states.

As well as the text box, the resulting step quantity is shown.



NOTE

If the step duration is 0 ms, you cannot configure the ramp function. In this case, all analog signals remain at its current value.

Selecting Settings for Measuring Points

- ✧ In the **Settings** column, click the cell that belongs to the relevant measuring point.

A list box opens.

- ✧ Select one of the settings **Magnitude**, **Phase angle**, or **Frequency**.

The selected setting is entered in the cell. The neighboring cell in the **Delta** column is activated and contains the default value 0.1.



NOTE

If you do not select a setting, you cannot enter a delta value.

Changing a Delta Value for Phase

- ✧ Double-click the cell that belongs to the relevant phase in the **Delta** column.

- ✧ Enter a permissible value in the cell.

- ✧ Click outside the cell.

- or -

- ✧ Press the <Enter> key.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible range of values, an error message appears. In this case, correct your entry.

- or -

- ✧ Double-click the cell that belongs to the relevant phase in the **Delta** column.

- ✧ Click the arrow keys to the right of the cell.

The value shown in the cell will be incremented or decremented in defined states.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.3.5 Configuring Analog Test Signals for Measuring Points](#)
- ✧ [13.3.9 Setting the Value of Binary Input Signals](#)
- ✧ [13.3.1 Configuring States for the Test Sequence](#)
- ✧ [13.3.10 Saving Settings of a Test Sequence in a File](#)

13.3.8 Configuring Harmonic

You can configure up to 3 harmonics for each analog test signal with the [20.1.21 Test-Sequences Editor](#). A harmonic is an integer multiple of a fundamental frequency. The harmonic exhibits a purely sinusoidal progression over time.

You can influence the following settings for each harmonic:

- Magnitude
- Phase angle
- Factor

The factor denotes whether the harmonic is a 3rd-order harmonic or a 7th-order harmonic, for example. You can configure numbers in the range 2 through 10.

All settings for the harmonic are summarized in the area **Specify values for secondary analog-input signals for this state**. To show this area, click the arrow next to the name of the area. Within this area, the 3 settings mentioned are summarized to a column range. Since you can set settings for 3 harmonics, 3 column ranges are provided. After you have created a new state, the individual columns of a column range and therefore the settings will be hidden. To show the individual columns, click the arrow next to the term **Harmonic**. The relevant individual columns will then be shown.

Entering a Value for the Magnitude, Phase Angle, or Factor

- ✧ Double-click the cell whose value you want to modify in one of the 3 columns **Magnitude, Phase angle, or Factor**.
- ✧ Enter a permissible value in the cell.
- ✧ Click outside the cell.

- or -

- ✧ Press the <Enter> key.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible range of values, an error message appears. In this case, correct your entry.

- or -

- ✧ Double-click the cell whose value you want to modify in one of the 3 columns **Magnitude, Phase angle, or Factor**.
- ✧ Click the arrow keys to the right of the cell.

The value shown in the cell will be incremented or decremented in defined states.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.3.5 Configuring Analog Test Signals for Measuring Points](#)
- ✧ [13.3.9 Setting the Value of Binary Input Signals](#)
- ✧ [13.3.1 Configuring States for the Test Sequence](#)
- ✧ [13.3.10 Saving Settings of a Test Sequence in a File](#)

13.3.9 Setting the Value of Binary Input Signals

You can define the value of each binary input signal within a state separately. To do this the [20.1.21 Test-Sequences Editor](#) contains a check box for each binary input which you can activate or deactivate.

If you want a binary input signal to have the value 1 first and then the value 0, implement this behavior using 2 consecutive states.

All check boxes for the binary inputs are summarized in the area **Specify status of binary-input signals for this state**. To show this area, click the arrow next to the name of the area.

Setting a Value of a Binary Input Signal to 1

- ✧ Click on the check box not yet marked of the relevant binary input.

A check mark appears in the check box. The binary input signal will have the value 1 during the current state.

Setting a Value of a Binary Input Signal to 0

- ✧ Click on the check box now marked of the relevant binary input.

The marking of the check box is removed. The binary input signal will have the value 0 during the current state.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)
- ✧ [13.3.5 Configuring Analog Test Signals for Measuring Points](#)
- ✧ [13.3.1 Configuring States for the Test Sequence](#)
- ✧ [13.3.10 Saving Settings of a Test Sequence in a File](#)

13.3.10 Saving Settings of a Test Sequence in a File

You can store the settings of all states of a test sequence with the [20.1.21 Test-Sequences Editor](#) regardless of the usual project data in one of the external files. The settings are saved in the **CSV**(Comma Separated Values) format. With this format, data is generated to a file row by row, separated by semicolons. Most of the spreadsheet programs can open the files in CSV format. Therefore you have the possibility of documenting and archiving the test sequences.

Saving settings

- ✧ Click the  button in the [20.7.10 Toolbar of the Test-Sequences Editor](#).

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The settings for all states of the test sequence are saved in a file.

Related Topics

- ✧ [13.1 Overview of Test Sequences](#)

14 Communication

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14.1 Overview Communication

14.1.1 Integrated Interfaces and Slots

SIPROTEC 5 offers a range of interfaces and slots for communication.

USB Interface

With USB interface in the on-site operation panel of the base module, it is possible to connect to every modern PC. The USB interface is used to exchange local data bi-directionally between the SIPROTEC 5 device and DIGSI 5. For this, connect the notebook on which DIGSI 5 is installed and the SIPROTEC 5 device using a conventional USB cable.

Integrated Ethernet Interface

Each base module has an integrated Ethernet interface (Port J) installed on the rear of the module. The default IP address for Port J in the device is 172.16.60.60. It must be changed with DIGSI 5 before the device is connected to an Ethernet network. This interface is used to operate your SIPROTEC 5 device with DIGSI 5 using an Ethernet network. If you use a switch, you can communicate with several SIPROTEC 5 devices simultaneously using the same PC.

The integrated Ethernet interface is optionally available with the IEC 61850 protocol. The interface then supports client-server communication to the control system. For modular devices, GOOSE messages are not supported with Port J. For non-modular devices (for example, 7SJ82) GOOSE messages are supported.

Slots for Communication Modules

Each base module has 2 slots into which you can insert communication modules or plug-in modules (for example, 20 mA inputs). These communication modules are available in different versions, for serial and Ethernet-based transmission. If 2 slots are not sufficient for your requirements, you can extend a SIPROTEC 5 device with the CB202 expansion module. This gives you extra slots for up to 2 further communication modules. The CB202 expansion module also has its own power supply. This ensures that shutting down the base module of a SIPROTEC 5 device in a multipoint-ring configuration does not interrupt communication via the Ethernet modules.

Interface for Time Synchronization

If you connect an external time receiver to the interface for time synchronization, the SIPROTEC 5 devices can be synchronized with the time protocols IRIG-B or DCF77. You can also couple a second pulse with an accuracy of 1 µs using this interface. Special functions in the SIPROTEC 5 device require this pulse.

The interface for the external time synchronization is pin-compatible with SIPROTEC 4. You can continue using the previous time receivers, converters, and cables.

Related Topics

[14.1.2 Communication Modules](#)

[14.6.1 Overview of Time Synchronization](#)

[14.1.4 Communication Using Ethernet](#)

[15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)

14.1.2 Communication Modules

Plug-in modules for serial or Ethernet-based communication ensure flexibility in terms of system communication. The modules are available in various optical and electrical versions. Each module has its own processor with its own firmware. This means that the communication applications are strictly separated from the remaining applications such as protection or control. The communication modules are not bound to a definite protocol or communication application. Instead you can select a protocol to suit your requirements, configure it and load it to the module with DIGSI 5.

You find more information about configuration of communication protocols in the respective manuals. For the configuration of DNP, IEC 60870-5-103, IEC 60870-5-104, and IEC 61850, you will find additional information in the specific manuals.

Serial Communication Modules

You can configure up to 2 communication applications in parallel and independently of one another on a serial communication module. For example, you can transfer data with the IEC 60870-5-103 protocol and use the module simultaneously as an autonomous protection interface.

Serial modules in the electrical version have interfaces to RS485 with RJ45 connections. This allows you to use conventional Ethernet patch cables for the cabling.

The optical variants of the serial communication modules are equipped with 820-nm interfaces and ST connections. Use multimode optical fibers with 62.5/125 µm for the cabling. These are compatible with the cabling of SIPROTEC 4 devices.

Special modules are available for long transmission routes using single-mode optical fibers and distances up to 100 km. Use these modules as a protection interface. The protection interface allows you to exchange differential protection data or binary data using point-to-point connections between a maximum of 6 SIPROTEC 5 devices.

Ethernet-Based Communication Modules

Ethernet-based communication modules allow you to integrate a SIPROTEC 5 device as a server in an IEC 61850 system. The SIPROTEC 5 device can transmit its data to up to 6 clients and communicate with other devices using GOOSE.

The Ethernet-based communication modules are also available for 2 various transmission modes:

- Electrical data transmission for shorter distances up to 20 m
- Optical data transmission for greater distances up to 2 km

The connections in both variants are compatible with SIPROTEC 4.

The physical interfaces are duplicated in all versions. At the same time, only one of the 2 interfaces is always active, the other being monitored passively. If the active interface is disrupted, the module automatically switches to the previously passive interface within a few milliseconds. Redundant characteristics can be established with this feature with external switches.

Each Ethernet module has an integrated switch. You can also use both interfaces to relay signals. The switch function works as a linking element between the SIPROTEC 5 device and the 2 interfaces. Therefore, you can implement a ring topology without external switches.

Information is routed from participant to participant in the ring until it reaches its intended destination. If the ring structure shown is cut at a point, this becomes a multipoint line. Communication continues to function almost without interruption. The improved RSTP log provides fast recovery time. You can connect up to 40 SIPROTEC 5 devices to one another in such a ring. Complete the ring with 1 or 2 switches. These switches also have to support the RSTP ring redundancy protocol.

Redundant Network Topologies

You can also implement redundant protocol applications for serial protocols with the new communication modules. You can use the same protocol twice on one module and send the information redundantly on 2 transmission routes independently of one another. Alternatively, the protocol can also be run simultaneously on 2 modules. If one module fails, the 2nd module is still available with the protocol application.

Related Topics

[14.1.1 Integrated Interfaces and Slots](#)

[14.1.3 Communication Using Protection Interfaces](#)

[14.1.4 Communication Using Ethernet](#)

[15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)

14.1.3 Communication Using Protection Interfaces

A protection interface enables data exchange between SIPROTEC 5 devices using synchronous, serial point-to-point connections. You can use such connections for differential protection or transmission of other data, for instance. You can configure each optical version of the serial communication module as a protection interface. As each SIPROTEC 5 device can be equipped with each communication module, all device types can be fitted with a protection interface in SIPROTEC 5. At the same time, you can select whether the interface is to be used for differential protection or for the transmission of data between SIPROTEC 5 devices. The SIPROTEC 5 devices 7SD8 and 7SL8 can also transmit other data in addition to the differential protection application.

An effective topology consists of 2 to 6 SIPROTEC 5 devices. These exchange indications, measured values, and other protection data including the necessary time synchronization using the protection interface. The connection is continuously monitored for data faults and failure, and the delay time of the data is also measured.

An effective connection can result directly between 2 SIPROTEC 5 devices. Alternatively, you can also implement ring topologies and chain structures. A ring topology tolerates the outage of one communication connection. The communication then continues using the remaining sequence.

You can typically use an existing communication network as a transmission medium. However, Siemens recommends optical connections using fiber optical cables. Therefore, you can bridge distances up to 100 km and reach transmission rates up to 2 MBit/s.

Related Topics

[14.1.2 Communication Modules](#)

[14.1.1 Integrated Interfaces and Slots](#)

[14.1.5 Protocols and Standards](#)

14.1.4 Communication Using Ethernet

Many substation automation protocols, for example, IEC 61850, IEC 60870-5-104, Modbus TCP, PROFINET IO, or DNP 3 TCP are transmitted using Ethernet. DIGSI 5 also uses Ethernet as a mode of communication. With a degree of dispersion of more than 90 %, Ethernet is the most modern type of connection between computers and their peripherals in a local network. Ethernet is therefore the current mainstream communication medium.

Compatibility

Selecting Ethernet as a transmission medium gives you access to a reasonably priced product range and often to an existing infrastructure as well. Ethernet is also backwards and forwards compatible. Thus a 10-MBit network can be integrated in a 100-MBit network and the latter in a 1 GBit network.

Flexible Cabling

A further advantage is the simple and standardized cabling in comparison to the use of parallel transmission routes. A mixture of different conductor technologies is also possible: Electrical or optical, coaxial cables, twisted-pair cables, or optical fibers. Optical fibers and shielded CAT-5 cables fulfill all the high EMC requirements for applications in substation control and protection equipment.

Unique Addressing

Each SIPROTEC 5 device is given its own IP address so that the individual users can communicate with one another within a subnetwork. Every other user can address the SIPROTEC 5 device using this. The IP address is unique within a subnetwork. However, SIPROTEC 5 devices can also communicate with one another in different subnetworks. The subnetworks are connected using routers for this. Both subnetworks and routers also receive unique addresses.

Related Topics

[14.1.2 Communication Modules](#)

[14.1.1 Integrated Interfaces and Slots](#)

[14.1.5 Protocols and Standards](#)

14.1.5 Protocols and Standards

With SIPROTEC 5, a communication module is not bound to a particular communication protocol. Instead, you can select between a number of communication protocols. For Ethernet interfaces, you can also activate several network protocols in addition to the main communication protocol. The following overview provides some basic information on the available protocols.

Network Protocols

Network protocols perform certain tasks within an Ethernet network. The network protocol SNTP is typically responsible for the time synchronization.

You can activate one or more of the following network protocols separately for each Ethernet interface:

- **DHCP**
The Dynamic Host Configuration Protocol (DHCP) is activated if the IP address is set to 0.0.0.0. In this case, the IP address of the Ethernet interface is given by a DHCP server in the network.
- **DCP**
The Discovery and Basic Configuration Protocol (DCP) is used for automatic recognition of devices without a configured IP address. DIGSI 5 can find all SIPROTEC 5 devices in the network using DCP.
- **SNTP**
The Simple Network Time Protocol (SNTP) synchronizes the date and time in a network. An SNTP timer which provides the binding date and binding time is necessary for this. The connected devices access this timer using the network and set their clocks accordingly. SIPROTEC 5 devices support the redundant time query using 2 independent timers.
- **Line**
Line is used for a direct connection to an Ethernet switch. One or two ports can be connected. If two ports are used, they must be connected to different switches.
- **RSTP**
The Rapid Spanning Tree Protocol (RSTP) serves for reorganization of the network structure in the event of a network fault. In other words, RSTP reroutes the data to another path after the failure of a network path.
- **PRP**
Parallel redundancy protocol is used for highly available Ethernet networks. Parallel network structure is supported and data is sent and received over both networks. Data duplicates are removed by the device. Number of devices is limited to 512.
- **HSR**
High Availability Seamless Redundancy Protocol (HSR) is used for ring networks. There is no reconfiguring time due to loss of one connection with HSR. It allows to build high available ring network structures up to 50 per ring and 512 in total in the network.
- **SNMP**
The Simple Network Management Protocol (SNMP) is used for network supervision. SIPROTEC 5 devices employ special variables for network supervision that can be used to monitor the network continuously. These data are accessible as MIB files. The secure version 3 of SNMP is used.
- **SUP-Ethernet**
This protocol is used to connect the external RTD units or 20 mA units to a SIPROTEC 5 device over Ethernet. This proprietary protocol based on a Modbus protocol request works only with the special units provided by Siemens as an accessory equipment.

- **Homepage**

The homepage for communication modules is used for diagnostic purposes. On the homepage, you can find information on the communication module as well as the network and communication protocols that run on the communication modules.

The homepage is physically accessible using a Web browser via external Ethernet interfaces, for example, `http://<Module-IP>:Port`. The following list provides the port configuration details:

- Port J: `http://IP:8080`
- Port E: `http://IP:8081`
- Port F: `http://IP:8082`
- Port N: `http://IP:8083`
- Port P: `http://IP:8084`

- **IEEE 1588**

The IEEE 1588 protocol is used for time synchronization through network communication. IEEE 1588 is available in all Ethernet communication modules as a time receiver (slave only clock, one-step, two-step). A runtime measurement (IEEE Standard Profile for use of IEEE 1588™ Precision Time Protocol in Power System Applications) is not supported. The direct Ethernet Transport through Multicast Ethernet MAC address according to Annex F of the standard IEEE 1588 is used (Annex F Transport of PTP over IEEE 802.3 /Ethernet). The reception of frames with the IEEE 802.1Q flag (VLAN tag, only single tagged) is supported.

Communication Protocols for Substations

Communication protocols ensure a standardized data exchange between devices in the substation. These communication protocols are specially designed for transmitting data securely from the protection and control system.

With SIPROTEC 5 there are communication protocols for serial transmission using Ethernet.

- **DNP3**

SIPROTEC 5 supports DNP3 for both serial and Ethernet-based data transmission. That means you can also use DNP3 in an optical Ethernet ring. In the same way as IEC 60870-5-103, DNP3 can also be operated redundantly, either on a single serial communication module or with 2 separate serial modules. DNP3 is also suitable for the transmission of UTC (Universal Coordinated Time). The time information communicated using the bus is then converted to local time in the SIPROTEC 5 devices.

- **Synchrophasor**

The synchrophasor process measures complex voltage and current phasors simultaneously at various locations and then compares these. The process only provides reliable statements if the measurement is actually performed simultaneously. The synchrophasor process thus uses the 1-second pulse as a time reference. GPS provides this pulse with an accuracy of 1 µs. SIPROTEC 5 devices transmit these values using Ethernet to a data concentrator, which saves and evaluates the synchrophasors of different SIPROTEC 5 devices.

- **IEC 60870-5-103**

SIPROTEC 5 fully supports the IEC 60870-5-103 serial protocol. With SIPROTEC 5, you can now also change protection settings directly using the communication protocol. You do not need DIGSI 5 for this. Redundant operation with IEC 60870-5-103 is also new. For this, configure the communication protocol either on both channels of a communication module, or use 2 separate communication modules.

- **IEC 60870-5-104 (T104)**

SIPROTEC 5 fully supports the IEC 60870-5-104 (T104) protection and control protocol. T104 can run in parallel to IEC 61850 (for example, GOOSE) on one Ethernet module. Two T104 master stations are allowed and one Ethernet module in the device can be configured with the T104 protocol option.

- **Modbus TCP**

SIPROTEC 5 supports the Modbus TCP protocol. Modbus TCP can run in parallel to IEC 61850 (for example, GOOSE) on one Ethernet module. 2 independent Modbus TCP masters are allowed and 1 Ethernet module in the device can be configured with the Modbus TCP protocol option.

- **PROFINET IO**

SIPROTEC 5 supports the PROFINET IO protocol. Only 1 Ethernet module in the device can be configured with the PROFINET IO protocol option. Apart from the signal types supported in the earlier versions (SPS, DPS, SPC, DPC, and MV), DIGSI 5 V7.50 supports the following signal types for PROFINET IO:

- BCR
- APC
- BSC

- **IEC 61850-8-1**

IEC 61850 covers the process, field, and station level as the station-control protocol and defines comprehensively the data exchange between devices within a switchgear. Here the individual participants communicate between the levels or using GOOSE (Generic Object Oriented Substation Event) on one level.

The GOOSE service enables rapid data exchange between devices and can therefore replace the cross-wiring between devices by communication connections. As another IEC 61850 service, SIPROTEC 5 supports the static or dynamic reporting. The greatest benefit of IEC 61850 is the seamless interoperability of devices of different type and origin.

SIPROTEC 5 supports Edition 1 and Edition 2 of IEC 61850. In fact, the internal data model used in a SIPROTEC 5 device is based on IEC 61850.

Related Topics

[14.1.2 Communication Modules](#)

[14.1.1 Integrated Interfaces and Slots](#)

[14.5.2 Selecting and Configuring Network Protocols](#)

[14.5.2 Selecting and Configuring Network Protocols](#)

14.2 Configuring Ethernet Network

14.2.1 Opening Network View

The [20.1.6 Network View](#) shows the front views of all SIPROTEC 5 devices in the project. Colored squares mark the Ethernet interfaces of a SIPROTEC 5 device. These interfaces can be connected to one another by drag and drop. In this way, you can establish different Ethernet-based communication connections between the SIPROTEC 5 devices. The Ethernet interfaces connected to one another form a common subnetwork.

The following options are available to open the Network view:

- You can open the Network view with the [3.1.2 Project Tree](#).
- You can change to the Network view from the [20.1.7 Device View](#).

The Network view is shown in the working area for both alternatives.

Opening Network View from the Project Tree

- ✧ Double-click **Devices and networks** in the project tree.

The Network view is displayed in the working area.

Changing from the Device View to the Network View

- ✧ Select the **Network view** tab in the Device view.
- or -
- ✧ Click the  button in the toolbar of the Device view.

The Network view is displayed in the working area in both cases.

Related Topics

- ✧ [14.2.2 Scaling the Network View](#)

14.2.2 Scaling the Network View

You can change the display size of the [20.1.6 Network View](#) and hence adapt it to the relevant working situation.

The following options are available for scaling the view:

- You can scale the view in predefined stages.
- You can scale the view as a percentage.
- You can select a definite end state.
- You can enlarge a square section of the view.

View Scaling in Predefined Stages

- ✧ Click the arrow button in the [20.7.4 Toolbar of the Network View](#).

A submenu with further buttons is displayed.

- ✧ Click any one of the 2 buttons  or  in this submenu. These buttons only become active if the maximum or minimum display size is not yet reached.

The network plan is shown larger or smaller.

View Scaling as a Percentage

- ✧ Open the list box  in the toolbar of the Network view.
- ✧ Select a percentage.
- or -
- ✧ Enter an integral percentage value between 25 and 500 in the text box of the list box.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The Network plan is shown in the selected or entered percentage size.

Selecting a Defined End State

- ✧ Open the list box  in the toolbar of the Network view.
- ✧ Select one of the 3 defined end states.

The Network plan is shown in the desired end state.

14.2.3 Showing and Hiding IP Addresses in Network View

Each Ethernet interface has an IP address. You can show or hide these IP addresses jointly for all interfaces in the [20.1.6 Network View](#).

Showing IP Addresses

- ✧ Click the  button in the toolbar of the Network view.

All IP addresses are shown.

Hiding IP Addresses

- ✧ In the [20.7.4 Toolbar of the Network View](#), click the  button.

All IP addresses are hidden.

Related Topics

- ✧ [14.1.4 Communication Using Ethernet](#)

14.2.4 Connecting Interfaces Using a New Subnetwork

You can connect 2 Ethernet interfaces that are not yet connected to a subnetwork by dragging and dropping in the [20.1.6 Network View](#). A new subnetwork is automatically created here. This new subnetwork connects the interfaces to one another.

You can cancel the connection process at any time.



NOTE

If you wish to exchange information between SIPROTEC 5 devices with the GOOSE Service, connect these SIPROTEC 5 devices to one another using a subnetwork. Only then is the information concerning the relevant SIPROTEC 5 devices displayed in the editors required for the GOOSE communication.

Connecting Interfaces by Drag and Drop

- ✧ Position the mouse cursor on the interface you wish to connect with another interface.

If the interface square is highlighted by a frame, this means that the mouse cursor is positioned correctly.

- ✧ Click the mouse button and keep it pressed.
- ✧ Move the mouse cursor and release the mouse button.

The mouse cursor now shows the locked symbol, which only disappears over a valid target position.

- ✧ Drag the mouse cursor onto the interface of the target device.

As soon as you position the mouse cursor over a suitable target this will show the networking symbol.

- ✧ Click the interface square.

A new subnetwork is created. This subnetwork connects the interfaces to one another. At the same time, the address parameters of the interface are automatically set consistently.

Canceling Connection

- ✧ Double-click a free area inside the Network view.
- or -
- ✧ Press the <Esc> key.

The connection process is canceled with these 2 actions.

Related Topics

- ✧ [14.2.5 Connecting an Interface to an Existing Subnetwork](#)

14.2.5 Connecting an Interface to an Existing Subnetwork

You can connect an Ethernet interface to an existing subnetwork in the [20.1.6 Network View](#).

The following options are available for this:

- You can connect the interface to a subnetwork by drag and drop.
- You can connect the interface to a subnetwork in its properties.



NOTE

If you wish to exchange information between SIPROTEC 5 devices with the GOOSE service, connect these SIPROTEC 5 devices to one another using a subnetwork. Only then, the information concerning the relevant SIPROTEC 5 devices is displayed in the editors required for the GOOSE communication.

Connecting an Interface to a Subnetwork by Drag and Drop

- ✧ Position the mouse cursor on the interface you wish to connect with a subnetwork.

If the interface square is highlighted by a frame, this means that the mouse cursor is positioned correctly.

- ✧ Click the mouse button and keep it pressed.
- ✧ Move the mouse cursor and release the mouse button.

The mouse cursor now shows the locked symbol, which only disappears over a valid target position.

- ✧ Drag the mouse cursor onto the line visualizing the subnetwork.

- or -

- ✧ Drag the mouse cursor onto the subnetwork name.

- or -

- ✧ Drag the mouse cursor onto an interface connected to the subnetwork.

If you position the mouse cursor over a suitable target this will show the networking symbol.

- ✧ Click the destination.

The interface and subnetwork are connected to one another. At the same time, the address settings of the interface are automatically set consistently.

Connecting an Interface with a Subnetwork in Its Properties

- ✧ Right-click the interface you wish to connect with a subnetwork.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.4 Ethernet Addresses](#) group.
- ✧ Go to the **Subnet** list box to select the name of the subnetwork to which you wish to connect the interface.

The interface and subnetwork are connected to one another. At the same time, the address settings of the interface are automatically set consistently.

Related Topics

- ✧ [14.2.7 Manually Creating a Subnetwork](#)
- ✧ [14.2.4 Connecting Interfaces Using a New Subnetwork](#)

14.2.6 Changing Connections

The following options are available in the [20.1.6 Network View](#) to change connections between a subnetwork and interfaces:

- You can delete a subnetwork. The links to all interfaces connected to this are deleted as a consequence.
- You can interrupt the connection of an interface to a subnetwork.
- You can connect the interface to another subnetwork.

Deleting a Subnetwork

- ✧ Right-click the name field of the subnetwork or on the line visualizing the subnetwork.
- ✧ Click **Delete** in the context menu.

A confirmation prompt is displayed.

- ✧ Click **Yes** if you wish to delete the subnetwork.

The subnetwork and the links to all interfaces connected to it are deleted.

Interrupting the Connection of an Interface to a Subnetwork

- ✧ Right-click the interface whose connection to a subnetwork you wish to remove.
- ✧ Click **Delete** in the context menu.
- or -
- ✧ Click the interface whose connection to a subnetwork you wish to remove using the right mouse button.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.4 Ethernet Addresses](#) group.
- ✧ From the list box, select the entry **Not connected** from the **Subnetwork**.

The connection between the interface and subnetwork is removed.

Connecting an Interface to Another Subnetwork

- ✧ Mark the interface that you want to connect with another subnetwork.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.4 Ethernet Addresses](#) group.
- ✧ Go to the **Subnet** list box to select the name of the subnetwork to which the interface is to be connected.

The original connection between the interface and subnetwork is removed. The interface is connected to the newly selected subnetwork. At the same time, the address settings of the interface are automatically set consistently.

14.2.7 Manually Creating a Subnetwork

If you connect 2 interfaces that are not connected to a subnetwork to one another, a new subnetwork will automatically be created. You can also create subnetworks manually in the [20.1.6 Network View](#).

This is done in one of the following ways:

- You can create a subnetwork using the Properties of an interface. If the interface is not connected to a subnetwork, the new subnetwork is automatically connected to the interface.
- You can create a subnetwork with **Copy** and **Paste**. The new subnetwork is positioned on the network plan in this case and is not connected to an interface.

Creating a Subnetwork Using the Properties of an Interface

- ✧ Highlight an interface.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.4 Ethernet Addresses](#) group.
- ✧ Click **Add new subnet**.

A subnetwork is created. If the selected interface is not connected to a subnetwork, the new subnetwork is automatically connected to the interface.

Creating a Subnetwork with Copy and Paste

- ✧ Right-click the name field or the connection line of a subnetwork.
- ✧ Click **Copy** in the context menu.

The subnetwork is copied to the clipboard.

- ✧ Right-click a free point of the Network view.
- ✧ Click **Paste** in the context menu.

A subnetwork is created. The name field of the new subnetwork is positioned in the top left corner of the Network view.

Related Topics

- ✧ [14.2.5 Connecting an Interface to an Existing Subnetwork](#)

14.2.8 Renaming a Subnetwork

A subnetwork receives a consecutively numbered standard name such as **PN/IE_1** when added. You can change this name.

Changing a Subnetwork Name

- ✧ In the [20.1.6 Network View](#), mark the name field of the subnetwork or the line visualizing the subnetwork.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.6 Subnet – Details](#) group.

The properties of the subnetwork are displayed.

- ✧ Enter a name for the subnetwork in the **Name** text box.
- ✧ Click outside the text box.
- or -
- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The name entered is adopted in the Network view.

14.2.9 Setting Ethernet Addresses

If the IP protocol is used for communication using the Ethernet, all users must be correctly addressed. The following addresses are relevant in this context:

- **IP address**
The IP address of a SIPROTEC 5 device must be unique within a subnetwork. If a SIPROTEC 5 device has several Ethernet modules, each module must be given its own unique IP address. The integrated Ethernet interface also requires its own IP address.
- **Subnetwork mask**
2 stations communicating with one another can use the subnetwork mask to determine whether they are located in the same subnetwork or in different subnetworks. The IP addresses must have been assigned consistently as a prerequisite for this.
- **Router address**
You require a router for the transition from one subnetwork to another. A router is treated as a normal user and therefore also has a unique IP address. If a particular router is to be used for the communication, indicate its IP address.



NOTE

The IP address and router address have the format **x.y.y.x** (x = 1 to 254, y = 0 to 254). Subnetwork masks have the format **x.y.y.z** (x = 1 to 255, y = 0 to 255, z = 0 to 254). At the same time, it must be noted that not every possible combination is permissible within the value range. Impermissible exceptions are rejected with a corresponding indication.

You can manually address a user. In this case, enter an IP address and an address for the subnetwork. If you require a router, you also have to enter its address. The **Ethernet addresses** group must be visible in the Inspector window and the IP protocol activated as a prerequisite.

Displaying Group Ethernet Addresses and Activating the IP Protocol

- ✧ Mark the Ethernet interface to be parameterized either in the [20.1.6 Network View](#) or in the [20.1.7 Device View](#).
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.4 Ethernet Addresses](#) group.

- ✧ Open the **Ethernet addresses** group and activate the check box option **Use IP protocol**.

The interface elements are now active and you can set the parameters.

Setting Ethernet Addresses Manually

- ✧ Open the **Ethernet addresses** group and activate the check box option **Use IP protocol**.
- ✧ Select the option **Use the following IP address**.

The entry field is activated.

- ✧ The **IP address** entry field shows the current IP address of the interface. Check this address for uniqueness and change the address if necessary.
- ✧ The **Subnet mask** entry field shows the current subnetwork mask set for the selected interface. You can retain the preset subnetwork mask **255.255.255.0** for operation with only one subnetwork. If interfaces are assigned to different subnetworks, you must enter different subnetwork masks for the interfaces.
- ✧ If you require a router for communication, select the **Use IP router** check box.

The **Router address** entry field is activated.

- ✧ Enter the address of the router to be used in the **Router address** entry field.

Obtaining an Ethernet Address from the DHCP Server

- ✧ Open the **Ethernet addresses** group and activate the check box option **Use IP protocol**.
- ✧ Select the option **Obtain IP address automatically (from DHCP server)**.

The entry field for the **Client ID** is activated.

- ✧ Enter the required details and load the offline configuration to the device.
- ✧ Right-click on the project device and select the option **Remove assignment** from the context menu.
- ✧ Open the online device from the **Online access** folder through which the SIPROTEC 5 device is connected with DIGSI 5.
- ✧ Double-click **Update accessible devices**.
- ✧ Double-click **Refresh device data**.
- ✧ Double-click **Device Information** in this folder.

In the working area, multiple tabs with information and setting possibilities are displayed.

- ✧ Select the [20.5.9 Diagnostic Information](#) tab.
- ✧ Expand all nodes under the **Mainboard** node.
- ✧ Select the option **Onboard ETH** under **IP-Configuration**

The Ethernet IP address obtained from the DHCP server is displayed. You can use this new IP address to set the Ethernet addresses manually. For additional information, refer to [Setting Ethernet Addresses Manually, Page 540](#).

Related Topics

- ✧ [14.1.4 Communication Using Ethernet](#)

14.3 Selecting Device IP Address for Communication

A SIPROTEC 5 device can be equipped with more than one Ethernet interface:

- 1 always existing integrated Ethernet interface
- Up to 4 optional Ethernet communication modules

Each Ethernet interface must have its own IP address. Therefore, a SIPROTEC 5 device can be accessible through several IP addresses. To create a communication connection to a SIPROTEC 5 device, DIGSI 5 must know which IP address of the SIPROTEC 5 device is to use for the communication. To do that you have to set one of the IP addresses as a communication address for DIGSI 5 in the offline configuration of the SIPROTEC 5 device. This is completed in [20.5.10 Device Settings](#)

To do this, you have the following possibilities depending on your relevant working situation:

- You can open the device settings with the [3.1.2 Project Tree](#). The device settings are then displayed with the [20.1.9 Settings Editor](#) in the working area.
- If the [20.1.3 Single-Line](#) tab or the [20.1.6 Network View](#) tab is shown in the working area, you can use it to open the device settings. The device-setting parameters are then displayed as properties in the [3.1.4 Inspector Window](#).

In the settings editor, all device-setting parameters are displayed. In the tab **Properties** only a partial quantity of the settings are displayed.

Opening the Device Settings via the Project Tree

- ✧ Open the offline configuration of the SIPROTEC 5 device in the project tree, for which you want to select one of the IP addresses.
- ✧ Open the **Settings** folder.
- ✧ Double-click **Device settings** in this folder.

In the working area, the settings editor is opened and the device settings are displayed.

Opening the Device Settings with the Single-Line Configuration or Network View

- ✧ Mark the single-line configuration of the SIPROTEC 5 device, for which you want to select one of the IP addresses.
- or -
- ✧ Mark the network view of the base module of the SIPROTEC 5 device, for which you want to select one of the IP addresses.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Go to the **Settings** group.

The settings of the device settings are displayed in the **Properties** tab.

Selecting the IP Address

- ✧ Open the **DIGSI 5 uses the following IP address** list box.

You will see all the IP addresses which are project-engineered for the offline configuration. By selecting the option **Enter IP address (User defined)** from the list box, you can also enter user-defined IP address in the IP address entry field. The IP address of the integrated Ethernet interface is provided with the addition (**Main-Board**). IP addresses from Ethernet communication modules can be detected on the addition (**COMn**). The placeholder **n** stands for the numbers 1 to 4 here.

Related Topics

- ✧ [14.1.4 Communication Using Ethernet](#)
- ✧ [14.2.9 Setting Ethernet Addresses](#)

14.4 Defining Functionality of the Integrated Ethernet Interface

Each base module has an integrated Ethernet interface (Port J), which is installed on the rear of the module. When you order the base module, you can select one of the following functionalities for the integrated Ethernet interface:

- **Only DIGSI 5 Connection**

With this functionality, the SIPROTEC 5 device can only communicate with DIGSI 5 through the integrated Ethernet interface.

- **DIGSI 5 Connection and IEC 61850 Reporting**

With this functionality, the SIPROTEC 5 device can communicate with DIGSI 5 through the integrated Ethernet interface and also send IEC 61850 reports.

- **DIGSI 5 Connection and IEC 61850 Reporting inclusive GOOSE**

This feature is available only for non-modular devices (for example, 7**82 device type). With this functionality, the SIPROTEC 5 device can communicate with DIGSI 5 through the integrated Ethernet interface and also send IEC 61850 reports along with supporting GOOSE communication

When you add a SIPROTEC 5 device to a project, you must also define the functionality of the integrated Ethernet interface in DIGSI 5.

You can expand the functionality of the integrated Ethernet interface from **Only DIGSI 5 connection** to **DIGSI 5 connection and IEC 61850 reporting** later on. In this case, you must also change the functionality in the offline configuration of the SIPROTEC 5 device.



NOTE

You cannot reverse a change of the functionality in the offline configuration. Before you change the functionality, check whether your SIPROTEC 5 device supports the expanded functionality.

You cannot change the functionality from **DIGSI 5 connection and IEC 61850 reporting** to **Only DIGSI 5 connection**.

Defining Functionality when Setting Up a SIPROTEC 5 Device

- ✧ Begin by setting up a new SIPROTEC 5 device, as described in [6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#) and in [6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#).

If the product code does not yet determine the functionality of the integrated Ethernet interface, select the functionality manually.

- ✧ In the area **Step 2: Select Device Properties**, open the **Integrated Ethernet interface (port J)** list box.
- ✧ Select the functionality which you have ordered for the integrated Ethernet interface.
- ✧ Continue with the setting up of a new SIPROTEC 5 device as described in [6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#) and in [6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#).

Changing Functionality in the Offline Configuration of the SIPROTEC 5 Device

- ✧ Open the project tree.
- ✧ In the project, open the offline configuration of the respective SIPROTEC 5 device.
- ✧ Open the **Settings** folder.
- ✧ In this folder, double-click **Device settings**.

In the working area, the Parameter editor is opened and the device settings are displayed.

- ✧ With the **Integrated Ethernet interface** list box, select the functionality **DIGSI 5 connection and IEC 61850 reporting**.

A confirmation prompt is displayed.

✧ If you really want to change the functionality, click **Yes**, else click **No**.

If you click **Yes**, the functionality is changed. The **Integrated Ethernet interface** list box is inactive. If you click **No**, the functionality remains unchanged.

Related Topics

- ✧ [14.1.1 Integrated Interfaces and Slots](#)
- ✧ [14.1.4 Communication Using Ethernet](#)

14.5 Selecting and Configuring Protocols

14.5.1 Selecting and Configuring a Communication Protocol

With SIPROTEC 5, a communication module is not bound to a particular communication protocol. Instead, you can select among a number of protocols. Other settings are displayed as soon as you select a protocol. These settings can be used to configure the communication protocol to suit your requirements.

You first have to mark the interface so that you can select a communication protocol. You can mark Ethernet interfaces in both the [20.1.6 Network View](#) and the [20.1.7 Device View](#). You can mark serial interfaces only in the Device view.



NOTE

If you cancel the protocol selection, all the settings for this protocol will be lost irrecoverably.

Selecting a Communication Protocol

- ✧ Mark the interface.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the required group for channel settings.
- ✧ Go to the **Selected protocol** list box to select a protocol to be used for communication.

Depending on the selected protocol, further settings are shown:

- Settings for [19.6.9 DNP3 Settings](#)
- Settings for [19.6.12 IEC 60870-5-103 Settings](#)
- Settings for [19.6.13 IEC 60870-5-104 Settings](#)
- Settings for [19.6.14 Modbus TCP](#)
- Settings for [19.6.15 PROFINET IO](#)
- Settings for [19.6.16 PMUX](#)

If you have selected the **Protection Interface** protocol, you have to select a constellation for the protection-data communication as a next step. You find more information about this under [14.7.3 Configuring the Communication Channel as a Protection Interface](#)

Canceling a Protocol Selection

- ✧ Display the required group for the channel settings, as described in the previous section.
- ✧ Go to the **Selected protocol** list box to select the setting **<Select>**.

A confirmation prompt will appear.

- ✧ If you wish to cancel the current protocol selection, click **Yes**.

The additional protocol settings are hidden. All settings for the protocol originally selected are deleted.

Related Topics

- ✧ [14.1.5 Protocols and Standards](#)

14.5.2 Selecting and Configuring Network Protocols

Network protocols perform certain tasks within an Ethernet network. You can activate one or more of the following network protocols separately for each Ethernet interface:

- DCP
- SNMP
- SNTP
- SUP-Ethernet
- Homepage
- IEEE 1588

If you select the network protocols **SNTP** or **SNMP**, further settings will be displayed. These settings can be used to configure the network protocol to suit your requirements.



NOTE

All services are deactivated for safety reasons. Activate these manually, if necessary. The Communication manuals contain further information about configuring the network protocols.

Selecting a Network Protocol

- ✧ Mark the Ethernet interface to be parameterized either in the [20.1.6 Network View](#) or in the [20.1.7 Device View](#).
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Once you have marked an Ethernet module, select the group [19.5.3 Ethernet Module – Channel x Settings](#).
- or -
- ✧ Once you have marked the integrated Ethernet interface, select the group [19.5.5 Settings of the Ethernet Interface](#).
- ✧ Mark the check box for the network protocols which are to be connected to the Ethernet block.

Depending on the network protocols selected, additional protocol settings will be shown:

- Settings for [19.6.2 SNTP Settings](#)
- Settings for [19.6.3 RSTP Settings](#)

Canceling a Protocol Selection

- ✧ Show the **Channel settings** group or the **Integrated node settings** group, as described in the previous section.
- ✧ Click a marked check box.

The relevant network protocol is no longer used. The additional protocol settings are hidden.

Related Topics

- ✧ [14.1.5 Protocols and Standards](#)

14.6 Set Time Settings

14.6.1 Overview of Time Synchronization

Timely recording of process data requires precise time synchronization of the devices. Every SIPROTEC 5 device maintains an internal device time with date. Within a system, or even beyond, it is necessary to record the time of process data accurately and to have exact time synchronization of all devices. You can meet this requirement using parent, external time sources.

With SIPROTEC 5, you can select 2 time sources independent of each other for each device. In doing so, time source 1 has priority over time source 2, for example, time source 2 is effective for synchronization of the device time only if time source 1 fails. If only one time source is configured, the SIPROTEC 5 device will continue, whose outage desynchronizes the internal time.

The time sources available with SIPROTEC 5 can be divided into the following types of synchronization:

- **Internal**
The SIPROTEC 5 device functions without any external time synchronization. The integrated data/time synchronization allows the exact time mapping of events to an internally conducted device time. Internal time synchronization is monitored cyclically.
A clock module internal to the device and having battery backup is synchronized cyclically with the current device time so that the right device time is available and used even in case of auxiliary voltage failure. At the same time, this permits hardware-supported supervision of the device time.
- **Communication Protocol**
The protocols, for example, **IEC 60870-5-103**, **IEC 60870-5-104**, **Modbus TCP**, **PROFINET IO**, or **DNP 3** take over the time synchronization over the configured communication interfaces.
- **Radio Clock**
An internal IRIG-B- or DCF 77 receiver provides for time synchronization. These external times can be connected to Port G of the SIPROTEC 5 device.
- **Network Protocol**

SNTP

The time synchronization is done over the Ethernet-based SNTP (Simple Network Time Protocol), for example with IEC 61850 stations. You can address 2 timers independent of each other, which feed their time signals into the Ethernet network. The SNTP service must be enabled for the configuration of Ethernet interfaces, so that it is available as an option for the time synchronization.

Inside the SNTP settings, if one IP address is set for the SNTP server, and the other IP address is set to 0.0.0.0, only one server is requested. If both the IP addresses are not set to zero, then the servers will be requested 2 times. SNTP always gives UTC time. Local time will be calculated by the device.

IEEE 1588

For time synchronization through Ethernet systems, you can use the protocol IEEE 1588. In this case, besides the clocks, all other power-system components must also support IEEE 1588, for example, switches as transparent clock (TC) or boundary clock (BC).

There must be a timing master in the system. If there are several timing masters in the system, the actual master is set according to the IEEE 1588 best-master-clock algorithm (BMC).

The actual timing master transmits the time using Ethernet multicast to the receivers. The SIPROTEC 5 device is such a receiver and subscribes to the multicast address while the IEEE 1588 option is activated. The transmission can be done with or without VLAN tag.

- **Timing Master in Protection Topology**
Inside a protection topology, you can configure one of the SIPROTEC 5 devices involved as a timing master. The timing master provides the protection connections and the protection interfaces of the other devices for the correct time synchronization. The timing master itself is synchronized, depending on configuration, through a selectable time source, for example SNTP or IRIG-B.

The SIPROTEC 5 device generates status and supervision indications. During commissioning and when operating the device, these indications provide important notes to the correct configuration of the time sources and the state of the internal time keeping. Important synchronization processes, the status of the time sources and faults detected are reported. A device time that has become invalid will be marked so that affected functions can go to a safe state.

Related Topics

[14.6.2 Time Sources](#)

[14.6.3 Processing Time Settings](#)

[14.6.4 Displaying Time Information](#)

[14.6.5 Setting Date and Time in the SIPROTEC 5 Device](#)

[14.6.6 Configuring Time Synchronization of the Protection Interface](#)

[14.6.7 Configuring Time Synchronization Using SNTP](#)

14.6.2 Time Sources

You can select 2 time sources independent of each other for each SIPROTEC 5 device in the time settings. Depending on the device and communication configuration, you have the following selection options:

Time Source	Description
None	An external time source is not configured. The time component inside the device takes on the time synchronization.
IRIG-B	An external IRIG-B receiver connected to port G takes on the time synchronization. This time source is always available for selection, independent of the device and communication configuration. SIPROTEC 5 devices support several protocol variants of the IRIG-B standards: • IRIG-B 002(003) The control function bits of the signal are not occupied. The missing year is formed from the current device time. In this case, it is possible to set the year via the online access in DIGSI 5. • IRIG-B 006(007) The bits for the calendar year are not equal to 00. The calendar year is set automatically by the time protocol. • IRIG-B 005(004) with extension according to IEEE C37.118-2005 If in the time signal, other control function bits are occupied in addition to the calendar year, then the SIPROTEC 5 device takes the additional information into consideration for leap seconds, daylight saving time, time offset (zone, daylight saving time), and time accuracy.
DCF77	An external DCF 77 receiver connected to port G takes on the time synchronization. DCF 77 is only available in central Europe.
PI	Inside a protection topology, one of the devices involved can take on time synchronization as a timing master. The time synchronization is done via the protection connections and the configured protection interfaces of the SIPROTEC 5 devices. Signal runtimes of the protection communication are calculated automatically. This time source is only available for selection under the following prerequisites: • In the SIPROTEC 5 device, at least 1 communication channel is configured as a protection interface. • The SIPROTEC 5 device is not the timing master. This prerequisite is met if the parameter Local device is device in the group 19.6.4 Device Combination Settings has a value that is not 1 (value 1 is the index of the timing master). The SIPROTEC 5 device is not the timing master. This prerequisite is met if the parameter Local device is device in the group Device Combination Settings has a value that is not 1 (value 1 is the index of the timing master).

Time Source	Description
SNTP	The time synchronization is done via the Ethernet-based SNTP (Simple Network Time Protocol), for example with IEC 61850 stations. You can address 2 timers independent of each other in the group 19.6.2 SNTP Settings, which feed their time signals into the Ethernet network. The time synchronization is done via the Ethernet-based SNTP (Simple Network Time Protocol), for example with IEC 61850 stations. You can address 2 timers independent of each other in the group SNTP Settings, which feed their time signals into the Ethernet network. SIPROTEC 5 devices support both Edition 1 and Edition 2 in accordance with IEC 61850-7-2. In Edition 2, the logical attributes LeapSecondsKnown, ClockFailure, ClockNotSynchronized, and the value TimeAccuracy are maintained in each time stamp. In Edition 1, these signals contain default values. Thus, the interoperability for station-control technologies is ensured for both editions. The SNTP service must be activated in the configuration of the Ethernet interface in the group 19.5.3 Ethernet Module – Channel x Settings, so that this service can be selected as a time source. The SNTP service must be activated in the configuration of the Ethernet interface in the group Ethernet Module – Channel x Settings, so that this service can be selected as a time source.
IEEE 1588	For time synchronization via Ethernet systems, you can use the protocol IEEE 1588. In this case, besides the clocks, all other power-system components must also support IEEE 1588, for example, switches as transparent clock (TC) or boundary clock (BC). There must be a timing master in the system. If there are several timing masters in the system, the actual master is set according to the IEEE 1588 best-master-clock algorithm (BMC). The actual timing master transmits the time to the receivers using Ethernet multicast. The SIPROTEC 5 device is such a receiver and subscribes to the multicast address while the IEEE 1588 option is activated. The transmission can be done with or without VLAN tag. Clock-Failure Indication If the timing master is not available or receivable anymore, synchronization does not take place anymore. After expiration of a set supervision time (parameter Fault indication after), the device indicates a time-synchronization failure (Clock failure indication). From this point in time, the status Clock failure is set in the time stamp of all indications. The bit Clock Error in the Standard IEC 61850-8-1 is set in the time stamp of the data object.
IEC 60870-5-103	The time is synchronized via telegram with an appropriately configured communication interface in accordance with the IEC 60870-5-103 protocol.
IEC 60870-5-104	The time is synchronized via telegram with an appropriately configured communication interface in accordance with the IEC 60870-5-104 protocol.
Modbus TCP	The time is synchronized via telegram with an appropriately configured communication interface in accordance with the Modbus TCP protocol.
DNP3	The time is synchronized via telegram with the appropriately configured communication interface in accordance with the DNP 3 protocol. SIPROTEC 5 devices support 2 instances: • Time synchronization via UTC • Time synchronization with local time The daylight saving time status is not transmitted. The device assumes that the DNP3 master follows the same rules for the start and end of the daylight saving time as those that were set for the device.

Related Topics

- [14.6.1 Overview of Time Synchronization](#)
- [14.6.3 Processing Time Settings](#)
- [14.6.6 Configuring Time Synchronization of the Protection Interface](#)
- [14.6.7 Configuring Time Synchronization Using SNTP](#)

14.6.3 Processing Time Settings

For each SIPROTEC 5 you can select 2 time sources independent of each other for each device. Depending on device and communication configuration, you can select the various [14.6.2 Time Sources](#). In operation, time source 1 has priority over time source 2, for example, time source 2 is effective for synchronization of the device time only if time source 1 fails.

You can separately establish for each time source, whether their time zone corresponds to world time (UTC) or the time zone of the device. To compare signal runtimes you can define a delay time for each time source, which is added to the times received.

The date format can be adjusted. For the usual local representation of the date format, you have the following options available:

- Day.Month.Year: For example 24.12.2009
- Month/Day/Year: For example 12/24/2009
- Year-Month-Day: For example 2009-12-24

The internal device time is maintained in world time (UTC). To represent time stamps, you can yourself define the local time zone of the SIPROTEC 5 device including the applicable daylight saving time rules. This allows the local time to be displayed. You also have the possibility of taking on time zones and daylight-saving time settings from the PC.

To process the explained settings manually, you must first open the [20.5.11 Time Settings](#). To do this, you have the following possibilities depending on your relevant working situation:

- You can open the time settings with the [3.1.2 Project Tree](#). The time settings are then displayed with the [20.1.9 Settings Editor](#) in the working area.
- If the matrix [20.3.2 Information Routing](#) or the matrix [20.3.1 Communication Mapping](#) is shown in the working area, you can use it to open the time settings. The time-setting parameters are then displayed as properties in the [3.1.4 Inspector Window](#).

In the settings editor, all time-setting parameters are displayed. In the tab **Properties**, only a partial quantity of the settings is displayed.



NOTE

Make sure that the settings for the time sources coincide with the actual hardware configuration of your SIPROTEC 5 device. At any rate, misadjustments cause the status indications of time sources to respond.

Opening the Time Settings with the Project Tree

- ✧ Open the offline configuration of the SIPROTEC 5 device in the project tree, the time settings of which you want to process.
- ✧ Open the **Settings** folder.
- ✧ Double-click in this folder on **Time settings**.

In the working area, the settings editor is opened and the time settings are displayed.

Opening Time Settings with a Matrix

- ✧ Select in the matrix **Information routing** or in the matrix **Communication mapping** one of the function groups **Time managem.** or **Time sync**.
- ✧ Open the Inspector window.

- ✧ Select the **Properties** tab.
- ✧ Go to the **Settings** group.

The time-setting parameters are shown for the selected function group.

Processing Time Settings

- ✧ Select the needed representation of the date with the **Date format** list box.
- ✧ Select one of the available [14.6.2 Time Sources](#) from the **Time source 1** list box. If you keep the **none** setting, the time component inside the device takes on the time-keeping.
- ✧ Select a time zone for the time source and optionally a time delay (latency).
- ✧ If you want to configure a second time source for redundancy reasons, also conduct the last 2 instructions for the second time source as well.
- ✧ Optionally, change the preset time value for sending a failure indication.
- ✧ Adjust the settings for the time zone and the daylight-saving time switching to your requirements.



NOTE

SIPROTEC 5 devices automatically consider, in the formation of the internal device time in UTC format, if time sources transfer the status of daylight saving time switching. In doing so, the daylight-saving time differential time is considered in the SIPROTEC 5 device. However, in contrast, the settings of **Start of daylight saving time** and **End of daylight saving time** are ignored when converting into the device internal UTC format.

Related Topics

- ✧ [14.6.1 Overview of Time Synchronization](#)
- ✧ [14.6.4 Displaying Time Information](#)
- ✧ [14.6.5 Setting Date and Time in the SIPROTEC 5 Device](#)

14.6.4 Displaying Time Information

If DIGSI 5 online is connected to a SIPROTEC 5 device, you can read and display information on the time synchronization from the device. Part of this information is, for example, the configured type of time source and the status of time synchronization. All information displayed is constantly updated.



NOTE

All times displayed, also those of the time sources, take into consideration the local time settings (zone and daylight saving time of the device) in the form of a numerical offset for UTC (World time).

Displaying Time Information

- ✧ Open the **Online access** folder.
- ✧ Open the Online access folder through which the SIPROTEC 5 device is connected online with DIGSI 5.
- ✧ Open the online device in this folder.
- ✧ Double-click **Device information**.

In the working area, multiple tabs with various information and setting possibilities will be displayed.

- ✧ Select the tab [20.5.8 Time Information](#).

In the working area, the information on both time sources and the device time are displayed.

Related Topics

- ✧ [14.6.1 Overview of Time Synchronization](#)
- ✧ [14.6.5 Setting Date and Time in the SIPROTEC 5 Device](#)
- ✧ [14.6.3 Processing Time Settings](#)

14.6.5 Setting Date and Time in the SIPROTEC 5 Device

If DIGSI 5 online is connected to a SIPROTEC 5 device, you can set the date and time in the device. You find the controls for setting in the tab [20.5.8 Time Information](#).

Displaying Time Information

- ✧ Open the **Online access** folder.
- ✧ Open the Online access folder through which the SIPROTEC 5 device is connected online with DIGSI 5.
- ✧ Open the online device in this folder.
- ✧ Double-click **Device information**.

In the working area, multiple tabs with various information and setting possibilities will be displayed.

- ✧ Select the **Time information** tab.

In the working area, the information on both time sources and the device time are displayed.

Setting Date and Time

- ✧ Click the **Process time** button.

The time and date list box is activated.

- ✧ Click the time and date list box.

A calendar is displayed.

- ✧ Select the month from the month list box.
- ✧ Select the year from the year list box.
- ✧ Select the day from the day list box.
- ✧ If you want to accept the current date for the device time, click the button **Today**.
- ✧ If the device time will be managed without a date, click the button **Without date**.
- ✧ Click the **Set time** button.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The selected date and time are transmitted to the SIPROTEC 5 device.

Related Topics

- ✧ [14.6.1 Overview of Time Synchronization](#)
- ✧ [14.6.4 Displaying Time Information](#)
- ✧ [14.6.3 Processing Time Settings](#)

14.6.6 Configuring Time Synchronization of the Protection Interface

All devices of a topology can be time-synchronized with one another. In this way, all events in the devices of the protection topology are recorded with the same time and are time-synchronized even across different substations. This simplifies fault analysis and the fault records are taken with the same timestamp in all devices.

The synchronization is done precisely to the millisecond directly over the protection connections. The synchronization works independently of the protection function and is exclusively for simultaneous time-keeping in the devices of a protection topology.

The device with the lowest device index, such as device 1 in the protection topology, is the timing master. If the timing master is logged off and switched off, the device with the next highest device index takes on the function of the timing master.

The timing master synchronizes the clocks of the other devices of this topology via the protection links. The time of the timing master is, for example, synchronized over a network protocol such as SNTP or through a timer connected to Port G. To do that, you must set the corresponding time source as the 1st time source in the timing master. Optionally, you can also select a 2nd time source, which takes over time-keeping if the 1st time source fails. In the other devices of protection topology, set the protection interface as the 1st time source.



NOTE

You find additional information on time synchronization in the Device manual in chapter **System functions** > **Protection-data communication**.

Setting SIPROTEC 5 Device as Timing Master

- ✧ Open the offline configuration of the relevant SIPROTEC 5 device [3.1.2 Project Tree](#).
- ✧ Double-click **Hardware and protocols**.

The [20.1.7 Device View](#) is displayed in the working area.

- ✧ In the Device view, mark the communication module, the communication channel of which is configured as protection interface.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Open the group for the relevant communication channel, such as **Channel 1 settings** or **Channel 2 settings**.

The names of other groups are shown under the group opened.

- ✧ Select the [19.6.4 Device Combination Settings](#) group.

The settings of this group are displayed in the properties window.

- ✧ Set the value 1 with the **Local device is device** list box.

The current (local) SIPROTEC 5 device is now the timing master. If you have configured another communication channel as protection interface in the same SIPROTEC 5 device, the value 1 is also automatically set for this one. Ensure that none of the other devices inside the protection topology is set to the value 1.

Selecting Protection Interface as a Time Source for Other Devices

- ✧ Open the offline configuration of another device of the protection topology in the project tree.
- ✧ Open the **Settings** folder.
- ✧ Double-click in this folder on **Time settings**.

In the working area, the settings editor opens and the time settings are displayed.

- ✧ Select **PI** for **Protection Interface** as time source from the **Time source 1** list box.

- ✧ If the protection topology comprises other SIPROTEC 5 devices, repeat the previous steps for these devices too.

Related Topics

- ✧ [14.7.1 Overview of the Protection-Data Communication](#)
- ✧ [14.6.1 Overview of Time Synchronization](#)
- ✧ [14.6.2 Time Sources](#)
- ✧ [14.1.5 Protocols and Standards](#)

14.6.7 Configuring Time Synchronization Using SNTP

The Simple Network Time Protocol (SNTP) synchronizes the date and time in a network. An SNTP time server which provides date and time is necessary for it. The connected devices access this timer using the Ethernet network and set their clocks accordingly. SIPROTEC 5 devices support the redundant time query using 2 independent SNTP time server.



NOTE

You must configure the time servers using the IEC 61850 System Configurator. You can find additional information about configuring the time servers in the IEC 61850 System Configurator manual.

Proceed in the following sequence:

- For the SIPROTEC 5 device, activate and configure the SNTP protocol.
- In the time settings, select SNTP as the time source. You find more information about this under [14.6.7 Configuring Time Synchronization Using SNTP](#).

Activating and Configuring SNTP Protocol

- ✧ In the Network view, mark the Ethernet interface of the SIPROTEC 5 device for which you want to configure SNTP as time source.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.3 Ethernet Module – Channel x Settings](#) group.
- ✧ Mark the check box **SNTP** in the **Network protocols** area.

The group **SNTP settings** is shown with additional settings.

- ✧ Select the [19.6.2 SNTP Settings](#) group.
- ✧ Enter the IP address of the SNTP time server in the **Time source 1** text box.
- ✧ If a second SNTP timer is connected to the Ethernet network, enter its IP address into the **Time source 2** text box. Otherwise, set this IP address to zero (0.0.0.0.).
- ✧ If necessary, change the other settings.

Related Topics

- ✧ [14.6.2 Time Sources](#)
- ✧ [14.6.1 Overview of Time Synchronization](#)
- ✧ [14.1.5 Protocols and Standards](#)

14.6.8 Configuring Time Synchronization Using IEEE 1588

For time synchronization through Ethernet systems, you can use the IEEE 1588 protocol. Runtimes and operating times in the components are transmitted within the protocol. These correction times can be considered in the end device and improve the time synchronization of the end devices. IEEE 1588 is deactivated by default. If time synchronization should be done using IEEE 1588, you must activate the IEEE 1588 check box of the Ethernet communication module. IEEE 1588 is not available for the integrated Ethernet interface.

Activating and Configuring IEEE 1588 Protocol

For time synchronization, activate IEEE 1588 on the Ethernet communication module.

- ✧ To activate IEEE 1588 on the Ethernet module, select the Ethernet communication module in the device view in the **Hardware and Protocols** editor.
- ✧ Under **Channel 1 settings**, activate the IEEE 1588 check box in the Network protocols area.
- ✧ If you need the Diagnostics function, you must also activate the Homepage check box and set the **Homepage Mode** to **on** under the **Homepage settings**.
- ✧ Under **Settings**, select the **Time settings** editor.

Here, you can select IEEE 1588 as a time source for **Time source 1** as well as for **Time source 2**.

If you select the time source IEEE 1588, set the corresponding **Time zones** for both time sources to UTC.

With the **Fault indication after** option, you can set the time after expiration for which a time source is considered to be faulty. After expiration of this time, with a faulty **Time source 1**, a switchover to the redundant **Time source 2** takes place.

Related Topics

- ✧ [14.6.2 Time Sources](#)
- ✧ [14.6.1 Overview of Time Synchronization](#)
- ✧ [14.1.5 Protocols and Standards](#)

14.7 Configuring Communication via Protection Interface

14.7.1 Overview of the Protection-Data Communication

A protection-data communication from SIPROTEC 5 enables data exchange between SIPROTEC 5 devices using synchronous, serial point-to-point connections. You use such connections typically for the differential protection or with the teleprotection method for distance protection and ground-fault protection. The protection-data communication comprises all functionalities required to exchange data via the protection interface. In this, SIPROTEC 5 manages up to 2 protection interfaces for each device. In SIPROTEC 5 you can configure protection connections in all devices and then use them for further protection applications. At the same time, any binary information and measured values can be transferred between devices.



NOTE

You will find additional information on protection-data communication in the Device manual, in chapter **System functions > Protection-data communication**.

Structure of Protection-Data Communication

The protection-data communication consists of 3 functional components that you can see:

- **Topology recognition**

The **Topology recognition** component determines the protection topology of a device connection, such as the way in which the devices are connected to each other. The communication is controlled on this basis.

- **Constellation measured values**

The **Constellation measured values** component ensures the exchange of predefined data and measured values of all devices connected to one another via protection interfaces. In this way, you can access data and measured values of other devices in the local device. The measured values exchanged here are time-synchronized.

- **Remote data**

If you route a signal or a measured value to the protection interfaces, the **Remote data** component is created. The protection interface then attends to sending and receiving this remote data. The available bandwidth determines the maximum quantity of remote data.

A connection is automatically created between the protection-data communication and the **Line** function group. Binary signals, measured values, and other data are automatically exchanged using this connection.

Functional Overview of the Protection Interface

The protection interface of a SIPROTEC 5 device enables data exchange between devices using synchronous, serial point-to-point connections. Bit rates of 64 kBit/s to 2 MBit/s are possible here. These connections may be optical fiber or another communication medium, such as leased lines or communication networks, for example. All devices connected to each other produce the protection topology.

A protection topology consists of 2 to 6 devices which communicate via protection connections. The protection topology can be set up either as a redundant ring or as a chain structure. Within a protection topology, the protection connections can have different bandwidths. Depending on the bandwidth, a certain amount of binary information and measured values can be transmitted bi-directionally between the devices. The connection with the lowest bandwidth establishes this quantity. All protection connections are continuously monitored for data faults and failure, and the runtime of the data is measured.

The following significant information for the operation of the protection interface is also transmitted:

- Topology data and values are exchanged for monitoring and testing the link.
- Protection data, for example, differential protection data or binary data of the signal-transmission method, is transmitted for distance protection and ground-fault protection.

A time synchronization of the devices is possible directly over the protection connection, whereby a device of the protection topology assumes the role of the timing master.

Time Synchronization of the Protection Interface

All devices of a topology can be time-synchronized with one another. The synchronization is done precisely to the millisecond directly over the protection connections. The synchronization works independently of the protection function, for example, differential protection, and is used exclusively for simultaneous time-keeping in the devices of a protection topology.

For the time synchronization, a device of the protection topology is established as timing master. The timing master synchronizes the clocks of the other devices of this topology via the protection connections. A network protocol such as SNTP or a timer connected to a plug-in module position G synchronizes the time of the timing master.

Related Topics

[14.7.2 Inserting a Communication Module in the SIPROTEC 5 Device](#)

[14.7.3 Configuring the Communication Channel as a Protection Interface](#)

[14.7.4 Configuring the Protection-Data Communication](#)

[14.7.5 Mapping Signals for Protection Interface](#)

[14.6.6 Configuring Time Synchronization of the Protection Interface](#)

14.7.2 Inserting a Communication Module in the SIPROTEC 5 Device

To prepare a SIPROTEC 5 device for protection communication, you must insert at least one suitable communication module in the offline configuration of the device. To do that, you can use all the serial communication modules in the optical version. You can recognize these communication modules by their model description **USART** and by the name extension **FO**. Some of these communication modules have 2 communication channels. On such communication modules you can configure 2 protection interfaces.

To insert a communication module use the [20.1.7 Device View](#) with the tab [20.2.4 Hardware Catalog](#). Open the Device view for the offline configuration of the relevant SIPROTEC 5 device. All the available communication modules are found in the tab **Hardware catalog**. Communication modules can be placed at the plug-in module position E and the plug-in module position F of the base module and at the plug-in module position N and the plug-in module position P of the extension module CB202.



NOTE

You may be able to plug up to 4 serial communication modules into 1 SIPROTEC 5 device, However, you can only configure a total of 2 communication channels as protection interface.

Opening the Device View

- ✧ Open the offline configuration of the relevant SIPROTEC 5 device [3.1.2 Project Tree](#).
- ✧ Double-click **Hardware and protocols**.

The Device view is displayed in the working area.



NOTE

You find other options for opening the Device view under [6.3.2 Opening the Device View](#).

Selecting and Inserting a Communication Module

- ✧ Select the **Hardware catalog** in the task card.
- ✧ In the palette **Catalog** open the folders **SIPROTEC 5** and **Communication** one after the other.

You see the descriptions of all the available communication modules.

- ✧ Select the needed communication module and drag this with the mouse button held down to the needed plug-in module position on the Device view.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button at a permissible position.

The communication module is placed on the selected plug-in module position.



NOTE

You find more possibilities for inserting a communication module or another hardware component under [6.3.7 Adding a Hardware Component from the Hardware Catalog](#).

Related Topics

- ✧ [14.7.1 Overview of the Protection-Data Communication](#)
- ✧ [14.7.3 Configuring the Communication Channel as a Protection Interface](#)

14.7.3 Configuring the Communication Channel as a Protection Interface

You can configure up to 2 communication channels of a SIPROTEC 5 device as protection interface. To do this, select the protocol **Protection interface** for the communication channel(s). Both communication channels can be on a single communication module or on 2 separate communication modules. As soon as you have configured 2 communication channels as a protection interface, this option is deactivated for the communication channels of the other modules plugged in.

For each communication channel established as a protection interface, you then have to select a constellation, for example, **3 device prot. communication**. With this selection you establish how many devices are taking part in the protection-data communication. If you change the constellation to another communication channel, the constellation of the other communication channel is also automatically changed. As soon as you have selected a constellation for a communication channel, the other settings with which you can parameterize the communication channel to fit your requirements are shown.



NOTE

If you change the constellation, all settings for the protection-data communication are reset to default values. In the process, the communication mapping created for the constellation selected previously is deleted.

To configure a communication channel as a protection interface, use the [20.1.7 Device View](#) with the Properties window. Open the Device view for the offline configuration of the relevant SIPROTEC 5 device.

Opening the Device View

- ✧ Open the offline configuration of the relevant SIPROTEC 5 device [3.1.2 Project Tree](#).
- ✧ Double-click **Hardware and protocols**.

The Device view is displayed in the working area.



NOTE

You find other options for opening the Device view under [6.3.2 Opening the Device View](#).

Selecting the Protocol and the Constellation

- ✧ In the Device view, mark the communication module, the communication channel of which you want to configure.
- ✧ Open the [3.1.4 Inspector Window](#).

- ✧ Select the **Properties** tab.
- ✧ Select the group for the desired communication channel, such as **Channel 1 settings** or **Channel 2 settings**.
- ✧ Go to the **Selected protocol** list box to select the setting **Protection interface**.

The **Select constellation** list box opens.

- ✧ Select the suitable constellation for the protection-data communication, from the **Select constellation** list box, so that is the number of accessing devices. If you have already configured another communication channel, select the same constellation as for this other communication channel.

Other settings are shown by which you can configure the protection-data communication. These settings are summarized into the following groups:

- [19.6.4 Device Combination Settings](#)
- [19.6.5 Protection-Interface Settings](#)
- [19.6.6 Protection Interface 1 Settings](#)
- [19.6.7 Fallback Times for Priority Levels](#)
- [19.6.8 HDLC Loop Test Settings](#)

Changing Constellation

- ✧ Display, as described in the first section, the group for the needed communication channel.
- ✧ Select another constellation from the **Select constellation** list box.

A confirmation prompt appears to confirm if you wish to keep the communication mappings of the previous constellation.

- ✧ If you want to keep the communication mappings of the previous constellation and change the constellation for this communication channel, click **Yes**.

The mappings/settings configured in the previous constellation are moved to the newly selected constellation.

- ✧ If you want to change the constellation for this communication channel without keeping the communication mappings of the previous constellation, click **No**.

The mappings/settings configured as protection interface are reset to the default values.

Canceling Constellation Selection

- ✧ Display, as described in the first section, the group for the needed communication channel.
- ✧ Go to the **Select constellation** list box to select the setting **<Select>**.

A confirmation prompt appears.

- ✧ If you wish to cancel the constellation selection, click **Yes**.

The additional settings for the protection-data communication are hidden. All settings for this communication channel are deleted. The settings for a communication channel configured other than for a protection interface are not affected.

Canceling a Protocol Selection

- ✧ Display, as described in the first section, the group for the needed communication channel.
- ✧ Go to the **Selected protocol** list box to select the setting **<Select>**.

A confirmation prompt appears.

- ✧ If you cancel the protocol selection and therefore want to activate the protection interface for the communication channel, click **Yes**.

The additional settings for the protection-data communication are hidden. All settings for this communication channel are deleted. The settings for a communication channel configured other than for a protection interface are not affected.

Related Topics

- ✧ [14.7.1 Overview of the Protection-Data Communication](#)
- ✧ [14.7.2 Inserting a Communication Module in the SIPROTEC 5 Device](#)

14.7.4 Configuring the Protection-Data Communication

As soon as you have selected a constellation for a communication channel, other settings are shown. With these parameters, you can configure the protection-data communication for this communication channel. The settings are summarized into the following groups:

- [19.6.4 Device Combination Settings](#)
- [19.6.5 Protection-Interface Settings](#)
- [19.6.6 Protection Interface 1 Settings](#)
- [19.6.7 Fallback Times for Priority Levels](#)
- [19.6.8 HDLC Loop Test Settings](#)

The settings of some parameters are valid for all communication channels configured as a protection interface. If you change the value of such a parameter in a communication channel, the value for the other communication channel configured as a protection interface is also changed. The device addresses or the dropout times for the priority levels are among these parameters, for example.

To configure the protection-data communication, use the [20.1.7 Device View](#) with the Properties window. Open the Device view for the offline configuration of the relevant SIPROTEC 5 device.



NOTE

You find additional information on protection-data communication in the Device manual, in chapter **System functions > Protection-data communication**.

Opening the Device View

- ✧ Open the offline configuration of the relevant SIPROTEC 5 device [3.1.2 Project Tree](#).
- ✧ Double-click **Hardware and protocols**.

The Device view is displayed in the working area.



NOTE

You find other options for opening the Device view under [6.3.2 Opening the Device View](#).

Displaying Settings for the Protection-Data Communication

- ✧ In Device view, mark the communication module, the communication channel of which you want to configure for the protection-data communication.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Open the group for the desired communication channel, such as **Channel 1 settings** or **Channel 2 settings**.

The names of other groups are shown under the group opened.

- ✧ Select the desired group.

The settings of the selected group are displayed in the properties window.

- ✧ If you want to parameterize another communication channel for the protection-data communication, select its group.

- ✧ For this 2nd communication channel, proceed as described.

Related Topics

- ✧ [14.7.5 Mapping Signals for Protection Interface](#)
- ✧ [14.7.1 Overview of the Protection-Data Communication](#)

14.7.5 Mapping Signals for Protection Interface

Between the devices of a protection topology, a data bar is exchanged which can be written or read by the devices. This data bar is for exchanging various signals between the devices. To do this, the data bar has individual data fields. In this case, a data field corresponds to 1 bit. Depending on its type, each signal accepts a certain number of data fields and therefore bits.

The data bar is divided into 3 priority levels. The priority level decides on how often it is transmitted.

- **Priority level 1**

Signals in the priority level 1 are sent with each telegram, that is, at least every 20 ms (at 64 kBit/s). Priority level 1 is therefore preferably used for the transmission of fast signals, for example, release for breaker intertripping. A strictly deterministic, fast transmission is required there.

- **Priority level 2**

Signals of priority level 2 are transmitted with at least every 2nd telegram. For bit rates greater than 256 kBit/s there are no transmission differences between priority 1 and priority 2.

- **Priority level 3**

Signals in priority level 3 are transmitted at least every 100 ms. This priority level is used for the transmission of measured and metered values or slow binary events.

Each priority level has a different number of data fields. The number of data fields depends on the value of the parameter **Lowest appearing bit rate**. You find this setting in the group [19.6.4 Device Combination Settings](#).

Mapping signals to the data bar comprises the following actions:

- **Routing the Signal for Data Exchange**

If a signal is to be exchanged through the protection interface with other devices, route this signal in the send or receive direction. Signals which are routed to a data box x of the priority level, must be routed in the device which reads this information, on a signal of the same type. Otherwise they will be processed incorrectly on the receiving side.

- **Mapping a Signal to a Priority Level**

Map each routed signal to a priority level. Check that the mapping is sensible to be able to use the performance of the system optimally.

- **Setting Bit Position for Signal**

Set a bit position in the data bar for each routed signal. Note that some signal types need more than one bit. Also take care to ensure that a bit position is not already assigned to a signal of another device.

- **Selecting Fallback Value for Signal Received**

Select a fallback value for every signal received. The fallback value decides what passes with the value of a signal if the connection is interrupted. Depending on the signal type, various fallback values can be selected. For example, the signal value can be set to a secure state or the last value received is retained. The signal only accepts the fallback value after a configurable fallback time. You can set 1 fallback time for each priority level in the group [19.6.7 Fallback Times for Priority Levels](#).

For mapping the signals, use the [20.3.1 Communication Mapping](#) matrix. Open this for the offline configuration of the relevant SIPROTEC 5 device.



NOTE

You will find additional information for mapping the signals in the Device manual, in chapter **System functions > Protection-data communication**.

Opening the Communication-Mapping Matrix

- ✧ Open the offline configuration of the relevant SIPROTEC 5 device [3.1.2 Project Tree](#).
- ✧ Double-click **Communication mapping**.

The **Communication mapping** matrix is displayed in the working area.

Routing the Signal for Data Exchange

- ✧ Check whether a signal can be routed to column R (Receive) or column T (Transmit). If the common cell of the signal line and the column R is light gray, the signal can be routed to **Receive**. If the common cell of the signal line and the column T is light gray, the signal can be routed to **Transmit**. If the common cell is dark gray, the signal cannot be routed on the relevant column.
- ✧ Click in the common cell with the right mouse button.
- ✧ Click **X (Routed)** in the context menu.

An X is entered into the cell. The signal is routed to Receive or Send.



NOTE

You will find further information for routing signals under [11.2 Basic Principles of Routing](#).

Mapping a Signal to a Priority Level

- ✧ If the signal is routed to **Receive**, double click in the column group **Receive** in the common cell of the signal cell and the column **Priority level**.
- or -
- ✧ If the signal is routed to **Transmit**, double click in the column group **Send** in the common cell of the signal cell and the column **Priority level**.
- ✧ In the cell, enter one of the values **1, 2, or 3**.
- ✧ Click outside the cell.
- or -
- ✧ Press the <Enter> button.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible value range, an error message will appear. In this case, correct your entry.

Setting the Bit Position for the Signal

- ✧ If the signal is routed to **Receive**, double click in the column group **Receive** in the common cell of the signal cell and the column **Bit position**.
- or -
- ✧ If the signal is routed to **Transmit**, double click in the column group **Transmit** in the common cell of the signal cell and the column **Bit position**.
- ✧ Enter a permissible value in the cell.
- ✧ Click outside the cell.
- or -
- ✧ Press the <Enter> button.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible value range, an error message will appear. In this case, correct your entry.

Selecting a Fallback Value for Signal Received

✧ Double click in the common cell of the signal line and the column **Fallback value**.

A list box opens.

✧ Select a fallback value.

The selected fallback value is entered in the cell.

Related Topics

- ✧ [14.7.4 Configuring the Protection-Data Communication](#)
- ✧ [14.7.1 Overview of the Protection-Data Communication](#)

14.8 Configuring Phasor Measurement

14.8.1 Overview of Phasor Measurement

Phasor measurement is a measurement method for energy systems. With this method, Phasor Measurement Units (PMU) measure complex voltage and current phasors, even in large and widely distributed networks, simultaneously at various locations. The PMUs transfer these values via Ethernet to a Phasor Data Concentrator (PDC) that stores and evaluates the phasors of different PMUs.

Phasor Measurement Unit (PMU)

You can configure up to 4 PMUs in 1 SIPROTEC 5 device according to the IEEE standard C37.118.1. PMU quality criteria and the data formats are defined in this standard.

Each PMU receives measured values from the measuring points assigned to it. The PMU processes these measured values to phasors for current, voltage, and frequency and sends these phasors to up to 3 PDCs. With 4 configured PMUs, the support of up to 12 PDCs with only 1 SIPROTEC 5 device is possible.

For each PMU, the SIPROTEC 5 device requires a separate Ethernet communication module.

Phasor Data Concentrator (PDC)

A PDC continuously receives the data of 1 or more PMUs. The PDC can switch on and off the PMUs and read their configurations and channel identifiers. The data received is visualized and, if needed, written into a file.

PMU Function Group

Each configured PMU is represented by its own function group in the application of the SIPROTEC 5 device. If you select the **IEEEC37.118** protocol for an Ethernet communication module, a function group of the type **PMU** is automatically generated. You cannot manually insert this function group. A function group of the type **PMU** is not available in the global DIGSI 5 library. The function group **PMU** is not visible in the project tree.

A function group of the type **PMU** works independent of all other existing function groups in the application.

Time Synchronization

Only when the measurement is carried out simultaneously, the phasor measurement method delivers reliable information. For that reason, the method phasor measurement requires exact time synchronization with GPS. The high accurate pulse per second (PPS) is required, which is provided by special GPS receivers together with the IRIG-B telegram. Also, a separate PPS input can be used on time synchronization port G.

To receive the GPS signal, you use a GPS receiver that supports the time quality characteristics defined in the synchrophasor standard IEEE C37.118. You connect the receiver to the SIPROTEC 5 device via the time-synchronization interface.

Data Communication

The phasor measurement communication is a Client-Server communication. Here, the PDC works as client and the PMU, that is, the SIPROTEC 5 device, as server. The PDC switches on the measured data transmission of the PMU, requests the configuration and receives the measured data.

After the successful connection of a PDC to the PMU and after querying the PMU configuration data, the PDC starts the transfer of the synchrophasor data by sending an ON command to the PMU.

The PMU transfers the following data to the PDC:

- Current and voltage phasors
- Frequency
- The rate of change of the frequency

The PMU **does not** transfer binary data and measuring transducer data.

For 3-phase measuring points, the PMU can also transfer the positive sequence of current and voltage instead of 3 individual synchrophasors.

In addition, the PMU transfers the channel names of the routed measuring points. The relevant PMU function group generates these names itself. You cannot change these names.

The PMU transfers the data to the PDC continuously with the parameter-assignable reporting rate. Switching off the PDC or an interruption of the communication connection ends the data transmission.

Related Topics

[14.8.2 Inserting and Configuring a Communication Module](#)

[14.8.3 Setting the Phasor Measurement Units](#)

[14.8.4 Connecting Measuring Points to PMU Function Group](#)

14.8.2 Inserting and Configuring a Communication Module

To prepare a SIPROTEC 5 device for phasor measurement, you must insert at least one suitable communication module in the offline configuration of the device. To do that, you can use all the Ethernet communication modules.

You can recognize these communication modules by their model description.

- ETH-BA-2EL (electrical, RJ45)
- ETH-BB-2FO (optical, 2 km, LC duplex)

You need 1 communication module for each phasor measurement unit (PMU). All the available communication modules are found in the [20.2.4 Hardware Catalog](#).

Communication modules can be placed at the plug-in module position E and the plug-in module position F of the base module. Communication modules can also be placed at the plug-in module position N and the plug-in module position P of the extension module CB202.

You can configure up to 4 communication modules of a SIPROTEC 5 device for phasor measurement. To do that, select the protocol **IEEC37.118PMU** for the communication channels of the respective communication modules.

For each communication module established for phasor measurement, other parameters are shown. With these parameters, you can set the PMU.



NOTE

If you change the communication protocol, all settings for PMU are reset to default values.

Selecting and Inserting a Communication Module

- ✧ In the [3.1.2 Project Tree](#), open the offline configuration of the relevant SIPROTEC 5 device
- ✧ Double-click **Hardware and protocols**.

The Device view is displayed in the working area.

- ✧ Select the **Hardware catalog** in the task card.
- ✧ In the palette **Catalog**, open the folders **SIPROTEC 5** and **Communication**.

You see the descriptions of all the available communication modules.

- ✧ Select one of the Ethernet communication modules.
- ✧ Drag the module with the mouse button pressed to the needed plug-in module position on the Device view.

If insertion is not allowed at this position, the mouse pointer changes to a crossed-out circle.

- ✧ Release the mouse button at a permissible position.

The communication module is placed on the selected plug-in module position.



NOTE

You find more possibilities for inserting a communication module or another hardware component under [6.3.7 Adding a Hardware Component from the Hardware Catalog](#).

Selecting the Protocol IEEEC37.118PMU

- ✧ In the Device view, mark the communication module, which you want to configure.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.5.3 Ethernet Module – Channel x Settings](#) group.
- ✧ From the **Selected protocol** list box, select the protocol **IEEE37.118PMU**.

Other parameters for setting the PMU are displayed. These parameters are summarized into the [19.6.16 PMUx](#) group.

Canceling the Protocol Selection

- ✧ As described in section **Selecting and Inserting a Communication Module**, display the group for the respective communication module.
- ✧ Go to the **Selected protocol** list box to select the setting **<Select>**.

A confirmation prompt appears.

- ✧ If you want to cancel the protocol selection, click **Yes**.

The additional parameters for the PMU are hidden and the settings are deleted.

Related Topics

- ✧ [14.8.1 Overview of Phasor Measurement](#)
- ✧ [14.8.3 Setting the Phasor Measurement Units](#)
- ✧ [14.8.4 Connecting Measuring Points to PMU Function Group](#)

14.8.3 Setting the Phasor Measurement Units

When selecting the protocol **IEEE37.118PMU** for a communication module, other parameters are displayed. With these parameters, you can set the PMU for this communication channel. These parameters are summarized into the [19.6.16 PMUx](#) group.

Displaying Parameters for the PMU

- ✧ In the [3.1.2 Project Tree](#), open the offline configuration of the relevant SIPROTEC 5 device.
- ✧ Double-click **Hardware and protocols**.

The [20.1.7 Device View](#) is displayed in the working area.

- ✧ In Device view, mark the communication module, for which related PMU you want to set parameters.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Open the [19.5.3 Ethernet Module – Channel x Settings](#) group.

The [19.6.16 PMUx](#) group is displayed under the group opened. **X** stands for a digit from 1 to 4.

- ✧ Select this group.

The settings of the selected group are displayed in the properties window.

- ✧ Set the parameters according to your requirements.

Related Topics

- ✧ [14.8.1 Overview of Phasor Measurement](#)
- ✧ [14.8.2 Inserting and Configuring a Communication Module](#)
- ✧ [14.8.4 Connecting Measuring Points to PMU Function Group](#)

14.8.4 Connecting Measuring Points to PMU Function Group

When you select the **IEEE37.118** protocol for an Ethernet communication module, a function group of the type **PMU** is automatically generated. Each configured PMU is represented by its own function group in the application of the SIPROTEC 5 device.

To transfer the measured values through Ethernet interface, you must connect measuring points to the PMU function groups belonging to the interface.

You can connect the maximum following measuring points to 1 **PMU** function group:

- 2 measuring points **Voltage 3-phase**
- 2 measuring points **Current 3-phase**
- 2 measuring points **Voltage 1-phase**
- 2 measuring points **Current 1-phase**

You have to connect each **PMU** function group to at least 1 measuring point **Voltage 3-phase**. You can assign the other measuring points based on your requirement.

Check whether the hardware of the SIPROTEC 5 device has sufficient voltage and current inputs. If not, you have to expand the device with additional input and output modules. In this case, also expand the offline configuration and the application of the SIPROTEC 5 device with I/O modules and measuring points.

Proceed in the following sequence:

- If needed, expand the offline configuration with additional I/O modules, using the [20.1.7 Device View](#). You find more information about this under [6.3.7 Adding a Hardware Component from the Hardware Catalog](#).
- If needed, add additional measuring points to the application, using the [20.3.8 Measuring-Points Routing](#) matrix. You find more information about this under [8.1.5.5 Adding Measuring Points](#).
- With the [20.3.4 Function-Group Connections](#) matrix, connect the **PMU** function groups to the measuring points.

In the [20.3.5 Connecting Measuring Points to Function Group](#) window of the **Function-group connections** matrix, every measuring point is represented by a line. Each **PMU** function group is displayed by a column. When you route a measuring point to a **PMU** function group, the measuring point and the **PMU** function group are connected to each other. The detailed procedure is described in the following section.

Connecting Measuring Points with Function Groups

- ✧ In the [3.1.2 Project Tree](#), open the offline configuration of the relevant SIPROTEC 5 device.
- ✧ Double-click **Function-group connections**.

The **Function-group connections** matrix is displayed in the working area.

- ✧ In the window **Connecting measuring points to function groups**, check if a measuring point can or must be routed to the respective **PMU** function group. If the common cell of the measuring point line and the target column is light gray, then the measuring point can be routed to the column. If the common cell is dark gray, the measuring point cannot be routed on the relevant column.

If one or more cells in a column are color-highlighted, you must route one more measuring point to this column.

- ✧ Right-click the common cell..
- ✧ Click **X (routed)** in the context menu.

An X is entered into the cell. The measuring point is now connected to the **PMU** function group.

- ✧ Repeat this process for all other measuring points to be connected and the **PMU** function groups.

As soon as the measuring points are correctly routed, the color-highlighting of the cells is hidden.

Removing the Routing

- ✧ Right-click the cell from which you want to remove the routing.
- ✧ Click **Not routed** in the context menu.

The routing in the cell is removed.

Related Topics

- ✧ [14.8.1 Overview of Phasor Measurement](#)
- ✧ [14.8.2 Inserting and Configuring a Communication Module](#)
- ✧ [14.8.3 Setting the Phasor Measurement Units](#)

14.9 Configuring Communication Mapping for Protocols

14.9.1 Overview of Communication Mapping

With communication mapping, you establish for serial protocols which signals will be transmitted over the communication interfaces of a SIPROTEC 5 device. Depending on your model, you can also route signals in the send or receive direction for each individual communication type. You also have to set mapping settings for each signal routed, for example, the information number or the function type in the communication protocol **IEC 60870-5-103**, **IEC 60870-5-104**, **Modbus TCP**, and **PROFINET IO**.

To simplify engineering, you can select a default communication mapping for each communication channel. Routings for signals and settings for mapping settings are defined in a default communication mapping. You can accept these routings and settings or adapt them to your specific requirements.

You edit the communication mapping of a SIPROTEC 5 device with the [20.3.1 Communication Mapping](#) matrix. The **Communication mapping** matrix is a device-oriented tool. A separate communication-mapping matrix is available for each offline configuration present in a project.

Related Topics

[14.9.2 Selecting a Default Communication Mapping](#)

[14.9.3 Opening the Communication Mapping Matrix](#)

[14.9.5 Routing Signals for Communication](#)

[14.9.6 Setting Mapping Settings](#)

[14.9.7 Copying Settings for Mapping Settings](#)

14.9.2 Selecting a Default Communication Mapping

Routings for signals and mapping settings are defined in a default communication mapping. Regardless of the communication protocol selected, DIGSI 5 provides you with various default communication mappings.

When you select a default communication mapping, the predefined routings and settings are automatically accepted into the communication mapping of the offline configuration. You can then change these routings and settings using the [20.3.1 Communication Mapping](#) matrix.

The selection of a default communication mapping is optional. You can route signals and set mapping settings using the **Communication mapping** matrix even without the default communication mapping. The number of default communication mappings from which to select depends on the protocol selected.

To select a default communication mapping, first establish the communication protocol and to select the default communication mapping, use the properties window in the [20.1.7 Device View](#) for the relevant offline configuration.



NOTE

If you select a default communication mapping, this does not overwrite routings and settings already present in the communication mapping. Instead, the default communication mapping extends the communication mapping already present with the predefined routings and settings.

Opening the Device View

- ✧ Open the relevant offline configuration in the [3.1.2 Project Tree](#).
- ✧ Double-click **Hardware and protocols**.

The Device view is displayed in the working area.



NOTE

You find other options for opening the Device view under [6.3.2 Opening the Device View](#).

Selecting the Default Communication Mapping

- ✧ In the Device view, select the communication module to be configured.
 - ✧ Open the [3.1.4 Inspector Window](#).
 - ✧ Select the **Properties** tab.
 - ✧ Select the group for the needed communication channel, such as **Channel 1 settings** or **Channel 2 settings**.
 - ✧ Ensure that in the **Selected protocol** list box of a protocol, **DNP3**, **IEC 60870-5-103**, **IEC 60870-5-104**, **Modbus TCP**, or **PROFINET IO** is selected. Only then you will be able to select a default communication mapping.
 - ✧ Select the suitable default communication mapping from the **Default communication mapping** list box.
- The predefined routings and settings are accepted in the communication mapping of the offline configuration.

Related Topics

- ✧ [14.9.5 Routing Signals for Communication](#)
- ✧ [14.9.6 Setting Mapping Settings](#)
- ✧ [14.9.1 Overview of Communication Mapping](#)

14.9.3 Opening the Communication Mapping Matrix

Edit the communication mapping of a SIPROTEC 5 device using the [20.3.1 Communication Mapping](#) matrix. You therefore route the signals in the send or receive direction and set the mapping settings. Communication mappings are oriented to the device. Therefore, the communication mapping inside the project structure is always assigned to the offline configuration of a SIPROTEC 5 device.

Opening the Communication Mapping Matrix

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Open the offline configuration in the project of the relevant SIPROTEC 5 device.
- ✧ Double-click **Communication mapping**.

The **Communication mapping** matrix is displayed in the working area.

Related Topics

- ✧ [14.9.4 Adjusting the View of the Communication Mapping](#)
- ✧ [14.9.1 Overview of Communication Mapping](#)

14.9.4 Adjusting the View of the Communication Mapping

The following standard functions are available to adapt the view of the communication mapping:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.4 Filtering Column Content](#)
- [3.2.3 Sorting Column Content](#)

You can also reduce the amount of signals displayed with predefined display profiles. The following predefined display profiles can be selected:

- **All entries**
There is no restriction when displaying signals.

- **Measured/metered values**
Only measured and metered values are displayed. All other signals are not shown. This applies also to entire function groups, unless these contain at least one measured or metered value.
- **Device I/O**
Only input and output signals of the SIPROTEC 5 device are displayed. All other information is hidden. This applies also to entire function groups, unless these contain at least one input and output signal.
- **Settings**
Only settings are displayed. All other signals are not shown. This also applies to entire function groups, unless these contain at least one parameter.

The default setting when opening the [20.3.1 Communication Mapping](#) matrix is **All entries**.

With a further list box, you can reduce the number of columns displayed specific to the protocol. Depending on the protocols selected in the offline configuration, the list can contain the following entries:

- DNP3
- IEC 60870-5-103
- IEC 60870-5-104
- PROFINET IO
- Modbus TCP
- n devices protection-data communication (n = 2 to 6)

Selecting the Display Profile

- ✧ In the [20.7.36 Toolbar of the Communication Mapping Matrix](#), open the list box for the display profiles.
- ✧ Select the needed display profile.

The view of the communication mapping is adjusted according to the display profile selected.

- ✧ To restore the standard view, select the display profile **All entries**.
- or -
- ✧ In order to restore the standard view, in the toolbar of the **Communication mapping** matrix click the button .

Showing/Hiding Signal Numbers

- ✧ In the toolbar of the **Communication mapping** matrix, click the button .

If the signal numbers are hidden, your action shows the numbers. If the numbers are shown, your action hides the numbers.

Selecting the Protocol

- ✧ Open the **Show protocol** list box in the toolbar of the **Communication mapping** matrix.
- ✧ Select the needed protocol.

The columns for the other protocols are hidden, only the columns for the selected protocol are still visible.

- ✧ To restore the standard view, in the **Show protocol** list box select the setting **All Protocols**.

Related Topics

- ✧ [14.9.1 Overview of Communication Mapping](#)

14.9.5 Routing Signals for Communication

To transmit signals over a configured communication channel of the SIPROTEC 5 device, route these signals to **Receive** or **Transmit**. You can do this in one of the following ways:

- You can route output indications and measured values to **Transmit**.
- You can route input indications and commands to **Receive**.

To route the signals, use the [20.3.1 Communication Mapping](#) matrix. Open it for the offline configuration of the relevant SIPROTEC 5 device.



NOTE

If you route a signal, set the mapping settings belonging to this signal. The cells of the relevant mapping settings are highlighted in color in the **Communication mapping** matrix.

Routing the Signal

- ✧ Check whether a signal can be routed to column R (Receive) or column T (Transmit). If the common cell of the signal line and the column R is light gray, the signal can be routed to **Receive**. If the common cell of the signal line and the column T is light gray, the signal can be routed to **Transmit**. If the common cell is medium gray or dark gray, the signal cannot be routed on the relevant column.
- ✧ Click in the common cell with the right mouse button.
- ✧ Click **X (Routed)** in the context menu.

An X is entered into the cell. The signal is routed to **Receive** or **Transmit**.



NOTE

You find further possibilities for routing signals under [11.2 Basic Principles of Routing](#).

Removing the Routing

- ✧ Click with the right mouse button in the cell from which you want to remove the routing.
- ✧ Click **_ (not routed)** in the context menu.

The routing in the cell is removed. The settings of the mapping settings for this routing are kept.



NOTE

You find further possibilities for removing routings under [11.2 Basic Principles of Routing](#).

Related Topics

- ✧ [14.9.3 Opening the Communication Mapping Matrix](#)
- ✧ [14.9.6 Setting Mapping Settings](#)
- ✧ [14.9.1 Overview of Communication Mapping](#)

14.9.6 Setting Mapping Settings

If you route a transmission signal for the communication channel of a SIPROTEC 5 device, set the mapping settings for this signal. Examples of this are the information number or the function type in the communication protocol **IEC 60870-5-103**. The mapping settings to be set are dependent on the communication protocol selected for the relevant communication channel.

You can set the following protocol-specific mapping settings:

- Mapping settings for the **DNP3** protocol
- Mapping settings for the **IEC 60870-5-103** protocol
- Mapping settings for the **IEC 60870-5-104** protocol
- Mapping settings for the **Modbus TCP** protocol
- Mapping settings for the **PROFINET IO** protocol
- Mapping settings for protection-data communication

To set the mapping settings, use the [20.3.1 Communication Mapping](#) matrix. Open it for the offline configuration of the relevant SIPROTEC 5 device.

As soon as you route a signal, the cells of the relevant mapping settings are highlighted in color in the **Communication mapping** matrix. If you have correctly set a mapping setting, the colored marking of the cell is removed. However, you can also set mapping settings without the relevant signal being routed.

Some mapping settings can only accept defined values, for example, **yes** or **no**. For setting such settings, the relevant cell contains a list box. Other settings are defined by a numerical value. For this settings, the relevant cell contains a text box.

**NOTE**

Additional information for setting the mapping settings is found in the respective Communication protocol manual.

Setting Mapping Settings

- ✧ Position the mouse pointer on the cell of the mapping setting.

If a tooltip indicating the permitted value range is displayed, the cell contains a text box.

If no tooltip is displayed, the cell contains a list box.

- ✧ Double click inside the cell.

A list box opens or a text box is activated.

- ✧ Select a value from the list box.

- or -

- ✧ Enter a value in the text box.

- ✧ Click outside the cell.

- or -

- ✧ Press the <Enter> button.

If the value entered is permissible, it is accepted. If the entered value is outside the permissible value range, an error message will appear. In this case, correct your entry.

The selected or input value is entered into the cell.

Related Topics

- ✧ [14.9.7 Copying Settings for Mapping Settings](#)
- ✧ [14.9.5 Routing Signals for Communication](#)
- ✧ [14.9.1 Overview of Communication Mapping](#)

14.9.7 Copying Settings for Mapping Settings

You can copy settings for mapping settings from a communication channel to another communication channel. Both communication channels can also be configured in different offline configurations.

For copying and pasting, the following conditions apply:

- Both communication channels must be of the same type.
- You can insert copied settings of a certain transmission direction (send or receive) only in the mapping settings of the same transmission direction.
- You can copy settings from more than one column at the same time. However, the target area must comprise the same columns as the source area.
- If you copy settings between 2 offline configurations, these offline configurations must belong to the same SIPROTEC 5 device type.

Copying and Pasting Settings

- ✧ For the source communication channel, mark one or more channels, the settings of which you want to copy.
- ✧ Right-click the selected column range.
- ✧ Click **Copy** in the context menu.

The settings are copied to the clipboard.

- ✧ For the target communication channel, select the same columns as for the source communication channel.
- ✧ Right-click the selected column range.
- ✧ Click **Paste** in the context menu.

If the conditions mentioned above are met, the settings are pasted into the selected column range.

Related Topics

- ✧ [3.2.6 Marking Ranges](#)
- ✧ [14.9.6 Setting Mapping Settings](#)
- ✧ [14.9.1 Overview of Communication Mapping](#)

14.10 IEC Stations

14.10.1 Viewing the IEC Stations Node in DIGSI 5

DIGSI 5 versions earlier than DIGSI 5 V6.00 also served as system configurator. The projects created with such versions also contained the complete IEC 61850 configurations for their devices. Starting from V6.00, however, DIGSI 5 does not support this functionality. Instead, an external system configurator tool (IEC System Configurator) is used for managing the IEC 61850 configurations. Apart from this, new elements like the **IEC 61850 stations** folder, and **IEC station** is introduced in V6.00 to group the IEC configured devices for the system configurator. Each station can be assigned to a system configurator project in order to provide a smooth interaction between them to maintain the configuration.

You can view the **IEC Stations** node in the DIGSI 5 [3.1.2 Project Tree](#). The **IEC stations** folder is created automatically for newly created projects and also for projects that are converted and compatible with the current version of DIGSI 5. It is invisible in the DIGSI 5 Compact series. The **IEC stations** node cannot be deleted or copied.

Viewing the IEC Stations Node

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Create a new project or open any converted project.

The project with the **IEC 61850 stations** folder is displayed by default in the [3.1.2 Project Tree](#).

Related Topics

- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)
- ✧ [5.1.4 Converting a Project](#)

14.10.2 Adding an IEC Station

You can add an IEC station under the **IEC 61850 stations** folder in the DIGSI 5 [3.1.2 Project Tree](#).

Adding an IEC Station

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** is displayed.

- ✧ Double-click **Add new station**.

The new station (for example, **IEC station 1**) is created.



NOTE

You can add only 1 IEC station per project in DIGSI with a maximum number of 200 devices. You cannot cut, copy, or paste an IEC station.

Related Topics

- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)
- ✧ [16.1.6 SCD](#)

14.10.3 Opening an IEC Station

You can open an IEC station under the **IEC 61850 station** folder in the DIGSI 5 [3.1.2 Project Tree](#).

Opening an IEC Station

- ✧ Open the [3.1.2 Project Tree](#) that contains the IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Double-click any IEC station (for example, **IEC station 1**).

The [20.1.33 IEC Station](#) editor is displayed in the working area.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)

14.10.4 Viewing the Properties of an IEC Station

You can view the properties of an IEC station under the **IEC stations** folder in the DIGSI 5 [3.1.2 Project Tree](#).

Viewing the Properties of an IEC Station

- ✧ Open the [3.1.2 Project Tree](#) that contains the IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Right-click any IEC station (for example, **IEC station 1**).

The context menu of IEC station 1 is displayed.

- ✧ Click **Properties** in the context menu.

The [19.1.2 IEC 61850 Station](#) dialog displays the IEC station properties.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)
- ✧ [14.10.3 Opening an IEC Station](#)

14.10.5 Renaming an IEC Station

You can rename an IEC station in DIGSI 5.

Renaming an IEC Station via Project Tree

- ✧ Open the [3.1.2 Project Tree](#) that contains any IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Select any IEC station name (for example, **IEC station 1**) that you wish to rename in the project tree.
- ✧ Right-click the IEC station name.

The context menu of IEC station 1 is displayed.

- ✧ Click **Rename** in the context menu.

The name is displayed in a text box and is highlighted in color.

- ✧ Enter a new name for the IEC station name.
- ✧ Click outside the text box.

- or -

- ✧ Press the <Enter> key.

These 2 actions confirm your entry.

The name entered is accepted.

Renaming an IEC Station using Properties

- ✧ Open the [3.1.2 Project Tree](#) that contains IEC stations.
- ✧ Double-click the **IEC stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Select any IEC station name (for example, IEC station 1) you wish to rename in the project tree.
- ✧ Right-click the IEC station name.

The context menu of IEC station 1 is displayed.

- ✧ Click **Properties** in the context menu.

The [19.1.2 IEC 61850 Station](#) dialog with the properties is displayed.

- ✧ Under **Details** group, enter a new name for the **IEC station name**.
- ✧ Click **OK**.

The name entered is accepted.



NOTE

The IEC station name must be unique and the maximum allowed character limit is 128 characters. This name is used as the default IEC station name if a new System configurator project is created and it is not synchronized between the IEC 61850 System configurator and DIGSI 5.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [19.1.2 IEC 61850 Station](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)

14.10.6 Selecting the IEC 61850 Edition

SIPROTEC 5 devices support Edition 1 and Edition 2 of IEC 61850. To achieve complete compatibility with the existing devices of Edition 1, you can operate the SIPROTEC 5 device in the Edition 1 mode. If you want to use the benefits of Edition 2, for example, new data objects and longer character strings, then you must select the Edition 2 mode.

IEC Edition 1 is selected by default in DIGSI 5 V6.00 for SIPROTEC 5 devices. You can change the edition of the SIPROTEC 5 devices in the [20.5.4 Device Information](#) editor for those devices, which are not assigned to any

IEC station in DIGSI 5. You can also change the IEC Edition of a device in the properties using [19.1.2 IEC 61850 Station](#) dialog in DIGSI 5. You can change the edition from Edition 1 to Edition 2, but not vice versa. A change of edition using the IEC station properties will result in a change of the edition for all devices associated with this IEC station. The edition is taken from the SCD. That means, an edition change in the Configurator tool leads to an edition change of the IEC station when the SCD is imported.

Among others, Edition 2 offers the following benefits:

- Correction and clarity in the event of misunderstandings and interoperability problems that are documented in the Tissue database.
- Functional extensions in the engineering process, especially when exchanging configuration data between system configuration tools.
- Stronger test of SCL files during import. This test is implemented using another special SCL scheme.
- Extension of test equipment capabilities (data tracking and monitoring functions), device models, and character strings.
- Extension of the data model in terms of statistics data, power quality, conditional monitoring, hydro-power, distributed energy resources, wind power, and communication between substations.
- More standardized data classes (logical-node classes, CDC).

A selected edition is valid for only one device if the edition is changed in the **Device Information** editor. A selected edition is valid for all devices in an IEC station if the edition is changed in the properties of the IEC station. Edition 1 is preset for each newly created project. You can change the default setting in the properties of an IEC station.

Additionally, directly after selecting the protocol **IEC 61850** you can operate or change the default setting. For this purpose, the following conditions must be met:

- You have not yet changed the default setting in the IEC station properties.
- You select the **IEC 61850** protocol within the current project for the first time for a communication channel.

Changing the Edition in the Device Information Editor

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to display the device information.
- ✧ Double-click **Device information**.

The described tabs are displayed in the working area.

- ✧ Select the desired edition from the **Edition** list box under the **General** group in the [20.5.4 Device Information](#) tab.

A warning message is displayed.

- ✧ Click **Yes** to change the Edition.

The dialog closes and the selected edition will be used for the current SIPROTEC 5 device.

- ✧ Click **No** to cancel the process.

Changing the Edition using the IEC Station Properties

- ✧ Right-click the IEC station name in the project tree.
- ✧ Click **Properties** in the context menu.

The [19.1.2 IEC 61850 Station](#) dialog with the IEC station properties opens.

- ✧ Select the desired edition from the **IEC Edition** list box under the **Details** group.

A warning message is displayed.

- ✧ Click **Yes** to change the Edition.

The dialog closes and the selected edition will be used for all project SIPROTEC 5 devices.

- ✧ Click **No** to cancel the process

Related Topics

- ✧ [14.1.5 Protocols and Standards](#)
- ✧ [10.1 Overview of the IEC 61850 Structure](#)
- ✧ [19.1.2 IEC 61850 Station](#)

14.10.7 Viewing Devices in an IEC Station

You can view the list of devices available to be assigned to an IEC station in the [20.1.33 IEC Station](#) editor.

Viewing Devices in an IEC Station

- ✧ Open the [3.1.2 Project Tree](#) that contains any IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Double-click any IEC station (for example, **IEC station 1**).

The [20.1.33 IEC Station](#) Editor displays the list of available IEC station devices in the **Device name** column under **Available devices** group in the working area.



NOTE

The **Available devices** group displays the list of devices that provide the IEC communication (can be set in the properties of a communication module) and that have the correct IEC edition (an Edition 1 device can be added to an edition 1 or 2 station, an edition 2 device can be added to an edition 2 station).

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [14.10.3 Opening an IEC Station](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)

14.10.8 Assigning a SIPROTEC 5 Device to an IEC Station

You can assign a device to an IEC station from the list of **Available devices** in the [20.1.33 IEC Station](#) Editor in DIGSI 5.

Assigning a Device to an IEC Station

- ✧ Open the [3.1.2 Project Tree](#) that contains any IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Double-click any IEC station (for example, **IEC station 1**).

The [20.1.33 IEC Station](#) editor displays the list of devices in the **Device name** column under the **Available devices** group to be assigned to an IEC station.



NOTE

The following devices would be displayed under the **Available devices** group:

- Devices enabled with IEC.
- Devices that are not yet part of another IEC Station.
- For an IEC station with Edition 1, only devices with Edition 1 are displayed.
- For an IEC station with Edition 2, devices with Edition 1 and Edition 2 are displayed.

✧ Select one or more devices displayed under **Available devices**.

✧ Click the > button to assign a single device.

- or -

✧ Click the >> button to add all the devices to an **IEC station**.

IEC 61850 objects are validated (compatibility of the device configuration is checked) and the selected device or devices are added and displayed under the **Assigned devices** group in the **IEC station** Editor.

Related Topics

✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)

✧ [14.10.2 Adding an IEC Station](#)

✧ [14.10.3 Opening an IEC Station](#)

✧ [5.1.1 Overview of Projects](#)

✧ [3.1.2 Project Tree](#)

14.10.9 Removing the Assignment between a SIPROTEC 5 Device and an IEC Station

You can remove the assignment between a SIPROTEC 5 device and the IEC station from the list of assigned devices in the IEC station Editor.

Removing the Assignment between a SIPROTEC 5 Device and an IEC Station

✧ Open the [3.1.2 Project Tree](#) that contains any IEC stations.

✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

✧ Double-click any IEC station (for example, **IEC station 1**).

The [20.1.33 IEC Station](#) editor displays the list of assigned devices in the **Device name** column under the **Assigned devices** group.

✧ Select one or more devices displayed under the **Assigned devices** group to remove the assignment with the respective IEC station.

✧ Click the < button to remove the assignment of a single device from the IEC station.

- or -

✧ Click the << button to remove the assignment all the devices to the IEC station.

A confirmation prompt appears to confirm the deletion of the IEC 61850 configuration of the selected device/ devices.

✧ Click **Yes**.

The selected device or devices are removed from the **Assigned devices** group and displayed under the **Available devices** group in the [20.1.33 IEC Station](#) editor.



NOTE

The GOOSE configuration of the device is also deleted if you remove its assignment with the respective IEC station.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [14.10.3 Opening an IEC Station](#)
- ✧ [14.10.8 Assigning a SIPROTEC 5 Device to an IEC Station](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)

14.10.1 Deleting an IEC Station

You can delete an IEC station under the **IEC stations** folder in the DIGSI 5 [3.1.2 Project Tree](#).

Deleting an IEC Station in DIGSI 5

- ✧ Open the [3.1.2 Project Tree](#) that contains any IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Right-click any IEC station (for example, IEC station 1).

The context menu for IEC station is displayed.

- ✧ Click **Delete** in the context menu.

A confirmation prompt appears to confirm the deletion.

- ✧ Click **Yes**.

The IEC station is deleted.



NOTE

The GOOSE configuration of all the devices in the respective IEC station is also deleted.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)
- ✧ [16.1.6 SCD](#)

14.10.1 Associating a System Configurator Project with the DIGSI 5 IEC Station

With this functionality, you can associate a IEC 61850 System Configurator project with the DIGSI 5 IEC station. By creating an association between DIGSI 5 and the System Configurator project, DIGSI 5 synchronizes the data effectively and handles the device import and export functionalities automatically. The minimum criterion for this association is that DIGSI 5 should have at least one IEC station with a device or devices assigned to the stations, the availability of an IEC System Configurator project, and an SCD file.

Associating a System Configurator project with the DIGSI 5 IEC Station

- ✧ Open the [3.1.2 Project Tree](#) that contains any IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Right-click any IEC station (for example, IEC station 1) that has a device or devices assigned to the IEC station.

The context menu for the IEC station is displayed.

- ✧ Click **Export changes to IEC 61850 system configurator** in the context menu.

The **Opening in IEC system configurator** dialog displays the status message regarding the assignment of the selected station to an IEC station description file (SCD). You must create a new IEC station description file (SCD) or assign the devices of this station to an existing SCD file if the station is not assigned to any IEC station description file (SCD).

- or -

If the selected IEC station is already assigned to an IEC station description file (SCD), the IEC 61850 System Configurator tool opens displaying the IEC station.

The association between the System Configurator project and DIGSI 5 IEC station is complete.



NOTE

For additional information regarding IEC 61850 system configuration, select **Help topics** from the **Help** menu or press the <F1> key to open the IEC 61850 System Configurator manual.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [14.10.3 Opening an IEC Station](#)
- ✧ [14.10.8 Assigning a SIPROTEC 5 Device to an IEC Station](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)

14.10.1 Transferring the IEC Device Configurations to a System Configurator Project

With this functionality, you can start the synchronization roundtrip between DIGSI 5 and the IEC 61850 System Configurator project and then transfer the IEC device configurations to the System Configurator project. The synchronization ensures that DIGSI 5 recognizes the devices that are added, removed, changed, or renamed in the IEC 61850 station connected to any System Configurator project. When you open any IEC station in the IEC 61850 system configurator, DIGSI will check and confirm if any System Configurator project is already associated with it or if you need to specify any existing project or create a new project.

When a valid reference to an existing or new System Configurator project is created, DIGSI 5 exports all the necessary IIDs to be sent to System Configurator tool for any newly added devices and/or changed devices. For the devices that were removed from the IEC station or just renamed, DIGSI 5 sends the information to IEC System Configurator tool about the modified data. As soon as the devices have been exported to System Configurator, the corresponding icons in the **IEC Station** editor indicate the export status. The devices that are actually exported to System Configurator tool are indicated by the tooltip message of the icon in the status column for the corresponding devices under the **Assigned devices** group.

In order to support up to 200 devices per station, the file size of the IID export file can be reduced by excluding certain irrelevant data (Alternative Descriptions) from the export file (and include it only for the special cases where it is really needed). Alternative descriptions are the private tags which were added especially for SICAM PAS to provide a solution with respect to character sets that were not supported in the non-Western and/or non-European languages (for example, Russian or Chinese). The tags contain an English text which then can

be used by SICAM PAS instead of the original Russian text for the name to display for an element (Logical node (LN) or a Logical device (LD)).

From the current version, you can exclude these Alternative Descriptions (or alternative texts) from the IID export file. You can export the IEC 61850 descriptions in English language only if you select the check box option **Export IEC 61850 descriptions in English** under the **IEC 61850 settings** group in the project properties. In all other cases, they will not be exported, thus reducing the file size by approximately 10 %.

The size of the IID export file can be reduced by excluding objects that are not needed for export. You can hide some of these settings or SIPROTEC extensions by using the check box options **Hide settings in IEC 61850 structure** and/or **Hide SIPROTEC extensions in IEC 61850 structure** in the [20.5.10 Device Settings](#) editor.



NOTE

While exporting the changes from DIGSI 5 to the IEC 61850 System Configurator tool, the IP address configured in DIGSI 5 is not taken over into the IEC 61850 System Configurator tool. The IP addresses are taken into DIGSI 5 only while importing the changes from the IEC 61850 Configurator tool.

Transferring the IEC Device Configurations to a System Configurator project

- ✧ Open the [3.1.2 Project Tree](#) that contains any IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Right-click any IEC station (for example, IEC station 1) that is already associated with the IEC system configurator project.
- ✧ Click **Export changes to IEC 61850 System Configurator** in the context menu.

DIGSI 5 exports the relevant IIDs for the newly added devices or changed devices and the IEC 61850 System Configurator tool opens displaying the IEC station. The tooltip message of the icon under status column in the **Assigned devices** group in the [20.1.33 IEC Station](#) Editor indicates the synchronization status of the exported devices.



NOTE

Before exporting an IEC 61850 station configuration from DIGSI 5 to the System Configurator, close any opened instance of the IEC 61850 System Configurator tool. An error message is displayed if you try to export without closing the application.



NOTE

When an IEC 61850 change is done in DIGSI5, only the export functionality to the IEC 61850 System Configurator is possible and the option **Export changes to IEC 61850 System Configurator** is enabled. The option **Import changes from IEC 61850 System Configurator** is enabled only after synchronization with the SCD.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [14.10.3 Opening an IEC Station](#)
- ✧ [14.10.8 Assigning a SIPROTEC 5 Device to an IEC Station](#)
- ✧ [14.10.11 Associating a System Configurator Project with the DIGSI 5 IEC Station](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)

14.10.13 Transferring the IEC 61850 System Configurator Project Configuration to a DIGSI 5 IEC station

With this functionality, you can transfer the changes done in an IEC 61850 System Configurator project to the IEC station in DIGSI 5. The IEC 61850 System Configurator acts as a system configuration tool according to the standard IEC 61850.



NOTE

To achieve full project synchronization between SCD and DIGSI engineering, you must import the SCD changes (of the IEC 61850 System Configurator) before doing IEC 61850-relevant changes. Otherwise, dataset engineering can be synchronized incorrectly and can be lost.

You can perform the following functions using the System Configurator tool:

- Configure a network (including IP addresses)
- Configure GOOSE communication
- Configure static reporting
- Configure sampled and measured values (SMV)
- Create an SCL file containing the entire station configuration (SCD file)

For additional information regarding the IEC 61850 System Configurator tool, select **Help topics** from the **Help** menu or press the <F1> key to open the IEC 61850 System Configurator manual.

Transferring the IEC 61850 System Configurator Project Configuration to a DIGSI 5 IEC station

- ✧ Open the [3.1.2 Project Tree](#) that contains IEC stations.
- ✧ Double-click the **IEC 61850 stations** folder in the project tree.

The element **Add new station** along with the list of IEC stations is displayed.

- ✧ Right-click any IEC station (for example, IEC station 1) that is already associated with IEC system configurator project.
- ✧ Click **Import changes from IEC 61850 System Configurator** in the context menu.

The information regarding success or failure of the complete import is displayed.



NOTE

The IEC station in DIGSI 5 should be associated with the System Configurator project. In order to provide a convenient way of exchanging information between DIGSI 5 and the IEC System Configurator, a feedback message under **Inconsistencies** tab in DIGSI 5 indicates whether any change in the configuration in System Configurator tool has synchronized back into DIGSI 5. This feedback message indicates to reimport the configuration from the IEC 61850 System Configurator tool to DIGSI 5.

Related Topics

- ✧ [14.10.1 Viewing the IEC Stations Node in DIGSI 5](#)
- ✧ [14.10.3 Opening an IEC Station](#)
- ✧ [14.10.2 Adding an IEC Station](#)
- ✧ [14.10.8 Assigning a SIPROTEC 5 Device to an IEC Station](#)
- ✧ [14.10.12 Transferring the IEC Device Configurations to a System Configurator Project](#)
- ✧ [5.1.1 Overview of Projects](#)
- ✧ [3.1.2 Project Tree](#)

14.10.14 Migrating the IEC 61850 Configuration from earlier DIGSI 5 Versions

In order to work with the IEC 61850 configuration in a project created with an earlier version of DIGSI 5, you must migrate the IEC 61850 configuration.

Migrating IEC 61850 Configuration from earlier DIGSI 5 versions

- ✧ Open the project in the earlier version of DIGSI 5 with a consistent IEC configuration.
- ✧ Export the SCD file from the previously opened project.
- ✧ Import the SCD file into a new System Configurator project.
- ✧ Check and resolve any inconsistencies with the IEC 61850 configuration in the System Configurator project.
- ✧ Open the project in the current version of DIGSI 5.

The IEC station is created during the project conversion.



NOTE

When opening the converted DIGSI project, a dialog appears to attach the IEC Station to the new System Configurator project. If you click **Ok**, the IEC station is attached to the System Configurator project. If you click **Cancel**, DIGSI closes the project.

-
- ✧ Associate the previously created System Configurator project with the newly created IEC Station.
 - ✧ Import the data (SCD file) to the current version of DIGSI 5 using the IEC station context menu option **Import changes from IEC 61850 System Configurator**.

Related Topics

- ✧ [5.1.4 Converting a Project](#)
- ✧ [14.10.11 Associating a System Configurator Project with the DIGSI 5 IEC Station](#)
- ✧ [14.10.12 Transferring the IEC Device Configurations to a System Configurator Project](#)
- ✧ [14.10.13 Transferring the IEC 61850 System Configurator Project Configuration to a DIGSI 5 IEC station](#)

14.10.15 Later Binding

This feature allows you to configure inputs of a device so that they can be received via GOOSE.



NOTE

Later binding is possible only if you create GOOSE with the configuration version V07.50 or higher. To change from the old system to the new system, you must delete the old GOOSE connection and create it again with the configuration version V7.50 or higher.

Configuring External Signals via Libraries

- ✧ Open the desired project.
- ✧ Select a function group or create a new user-defined function group.
- ✧ Drag and drop the desired function block from the **Libraries** section to the function group.
- ✧ Drag and drop the desired signals from the **External Signals** folder under the **User-defined signals** folder to the function block.

The external signals are configured.

Configuring External Signals via the GOOSE Column in Information Routing

- ✧ Open a device which has GOOSE communication enabled.



NOTE

If GOOSE communication is not enabled in the device, the **GOOSE** column is not displayed in the **Information routing**.

- ✧ Double-click **Information routing** from the project tree.
The Information routing matrix is displayed in the working area.
- ✧ Select the desired signal.
- ✧ Click its **GOOSE** column cell and enter a number to configure an external signal.
A number is displayed in brackets.
The number outside the brackets indicates the number of inputs available for binding the GOOSE external sources via the IEC 61850 system configurator.
The number inside the brackets indicates the number of unconnected inputs.



NOTE

As long as the GOOSE inputs are not connected to a GOOSE source, you can decrease the number in the **GOOSE** column.

You can see the **External signal** and its **GOOSE source signal** in the **Properties** section in the **Received via GOOSE from** section.

Configuring GOOSE Inputs

To configure the GOOSE inputs, proceed as follows after the external signals are configured:

- ✧ Create a new IEC 61850 Edition 2 station from the **IEC 61850 stations** folder. For more information, refer to [14.10.2 Adding an IEC Station](#) and [14.10.6 Selecting the IEC 61850 Edition](#).
- ✧ Assign the desired available devices.
For additional information, refer to [14.10.8 Assigning a SIPROTEC 5 Device to an IEC Station](#).
- ✧ Save the project and export the changes to the IEC 61850 System Configurator.
The IEC Station Editor is displayed in the working area.
For additional information, refer to [14.10.12 Transferring the IEC Device Configurations to a System Configurator Project](#).
- ✧ In the IEC Station editor, click the **Network** tab from the toolbar.
The network view is displayed.
- ✧ Enter the desired **IP address** for the devices in the **Subnets** section.
- ✧ Click the **GOOSE** tab from the toolbar.
The **GOOSE** view is displayed.
- ✧ Right-click the IEC station in the **GOOSE messages** section and select **GOOSE application** from the context menu.
A GOOSE application is created in the IEC station.
- ✧ Drag and drop the desired node from the **Source catalog** section to the GOOSE application.
- ✧ Drag and drop the desired node from the **Destination catalog** to the newly created dataset.



NOTE

Only logical nodes or GOOSE inputs within a destination logical node are displayed in the **Destination catalog**.

- ✧ In the **Station** menu, click **Save** and close the IEC Station editor.
- ✧ In DIGSI, double-click the IEC station from the project tree.
- ✧ Import the changes to the IEC 61850 system configurator.
For additional information, refer to [14.10.12 Transferring the IEC Device Configurations to a System Configurator Project](#).
- ✧ Double-click **Information routing** from the project tree.
The **Information routing** matrix is displayed in the working area.
- ✧ Double-click the desired source-device folder in the **External Signals** folder.
The assigned signals are displayed.



NOTE

When a signal is assigned using the IEC Station Editor, it is moved from the **Unassigned** folder to the corresponding source-device folder.

- ✧ Select an assigned external signal from the **Signals** column.
In the **Properties** tab, you can see the GOOSE signal path displayed in the **GOOSE source signal** field.

14.10.16 System Implementation Conformance Statement (SICS)

		Mandatory or Optional	Value or Comments	Supported or Not?
ICD export		M/O		
I11	Fix ICD file (no adaptable export needed)	At least one (1)		Not applicable - no fix ICD
I12	Export of ICD file or IID file according to IED preconfiguration performed by tool	At least one (1)		Yes
I13	State the data model name space (61850-7-3 subclause 7.2) within ICD file (LLN0.NamPlt.IdNs value)	M		Yes, IEC 61850-7-4
I14	State the data-model version (61850-7-3 subclause 7.8.3) and any predefined/fixed configuration values within ICD file (9.5.4.4)	M		Yes, 2003, 2007
I15	Version 2003 export	O		Yes, if Edition 1 selected for the device
I16	Version 2007B export	GC_1 (2)	For example, 2007 for this version	Yes, if Edition 2 selected for the device
I17	Predefined datasets	O		Yes
I18	Predefined control blocks	O		Yes
I19	Substation bay template with IED part	O		Yes
I110	Communication section with default address	O		Yes
I111	Export correct valKind value (Table 46)	O	Read-only, Configurable	Yes
I112	Exports internal addresses as InRef or Input section (subclause 9.3.13)	O		Yes
I113	Exports internal addresses in Input section with expected serviceType (subclause 9.3.13)	O		Yes

		Mandatory or Optional	Value or Comments	Supported or Not?
I114	Exports in UTF-8 coding	M	Other XML codings?	Yes, no other coding
SCD import		M		
I21	Identify IED to be configured in the SCD file by IED name	M		Yes
I22	Configure LD name (at least via IdInst, dependent on the IED capabilities) and IED addresses from SCD	M	Support of IdName is stated as IED capability in ICD/IID file, also see I43	Yes
I23	Determine communication-side addresses of IED inputs from SCD	C1	If data from other IEDs can be received at all	Yes
I24	Determine and use clock communication addresses from SCD	C1	If time synchronization is supported	No
I25	Configure values of (existing) control block from SCD (9.3)	C3		Yes
I26	Prepare (new) control-block instances according to SCD file	C3		Yes
I27	Prepare/configure datasets according to SCD file	C3		Yes
I28	Modify predefined datasets according to SCD	C3		Yes
I29	Interpret client references in the control blocks of other IEDs to find the control-block instances allocated to this IED and data sent to this IED.	C1	If data from other IEDs can be received at all	Yes
I210	Set IED configuration values and parameter values as defined in the SCD file	O		No
I211	Support changed (reduced capability) valKind (for example, from Set to RO or to Conf) (Table 46)	O		No
I212	Support IdName on other IEDs (9.3.4)	M		Yes
I213	Interpret input-signal references to source control blocks (9.3.13)	O		Yes
I214	Imports UTF-8 coding of XML	M	Other coding supported?	Yes, no other coding
IID export after IED engineering		O		
I31	IED version and instance information: LPHD.PhyNam: hwRev, swRev, serNum, LLNO.NamPlt.configRev	O		Partly: hwRev, serNum are determined in the device. swRev, configRev, and model are known and exported from the IED tool
I32	Configuration values (fc = CF)	O		Yes
I33	Setting Parameter values (fc = SP, SG)	O		Yes
I34	SCL Header management (9.1)	C2		Yes

		Mandatory or Optional	Value or Comments	Supported or Not?
I35	Modify IED data model (add LN/Data object/LD, or remove unused LD/LN/Data object)	O	Removal of used (referenced) Data object/Control-block instances is not allowed	Yes
Tool functionality		M		
I41	Support MustUnderstand concept (8.2)	M		Yes
I42	Bind incoming IEC 61850 signals to IED-internal (input) signals	C1		Yes
I43	Use or create IED Input section for binding incoming (external) signals to internal signals to document this binding	O		Yes
I44	Create CID file for IED	O		Yes
I45	Support IdName for LD name specification	C3		Yes
I46	Modify LN prefixes or InInst	O	Specify the LN prefixes or InInst	Yes, both
C1 - Mandatory, if the IED can receive data from other IEDs, that is, it can be either client or subscriber.				
C2 - Mandatory, if any of the other features in this table section is supported.				
C3 - Mandatory, if the appropriate IED capability is claimed in PIXIT or IED capability section.				
GC_1 (n) - At least one of the elements of group n shall be available.				
O - Optional, should match the IED capability, that is, if an IED claims that RCBs can be configured by SCL, then the IED tool shall support it.				
M - Mandatory				

15 Commissioning and Operation

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15.1 Preparing, Connecting, and Disconnecting a Communication Connection

15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5

For DIGSI 5 and a SIPROTEC 5 device to exchange data, the DIGSI 5 PC and the SIPROTEC 5 device must be connected with a physical communication line or remotely using a satellite modem connection. A logical communication connection must also be established between the 2 communication participants.

The following information gives you some basics about the communication between DIGSI 5 and SIPROTEC 5. Additional information can be found in the various Communication manuals and in the Operating manual.

Physical connection

There are 4 ways to connect the DIGSI 5 PC to a SIPROTEC 5 device:

- Via USB
- Via the integrated Ethernet interface (Port J)
- Via one or more Ethernet communication modules
- Via remote connection using satellite modem

If you are using a USB connection between the DIGSI 5 PC and a SIPROTEC 5 device, only 1 device can be connected to the PC. If you are connecting other SIPROTEC 5 devices to additional free PC USB connections, then a communication connection cannot be established to any of these devices. Connect the DIGSI 5 PC and SIPROTEC 5 device directly to each other. If you are using a USB hub, then a communication connection between the DIGSI 5 PC and the SIPROTEC 5 device cannot be established. For connecting to the SIPROTEC 5 device use the top USB connection in the on-site operation panel of the base module.

If you are using an Ethernet connection between the DIGSI 5 PC and a SIPROTEC 5 device, you can use DIGSI 5 to simultaneously manage communication connections to several devices. For this purpose, connect the DIGSI 5 PC with the SIPROTEC 5 devices via a switch, for example.

If you are using a satellite modem, you can create a remote connection between the DIGSI 5 PC and the SIPROTEC 5 device by selecting the **Connection type** as **Remote** in the [20.5.14 DIGSI 5 User Preferences](#) under [20.5.12 Settings](#). This type of connection will address the satellite connections (low bandwidth and/or high latency).



NOTE

Loading firmware to device using the remote connection takes more than 180 minutes.

Logical Connection

For a data exchange between the 2 communication participants, a logical communication connection must be established. This connection can be temporary or permanent.

DIGSI 5 automatically establishes a temporary communication connection for certain processes. DIGSI 5 drops the connection once the process is completed. DIGSI 5 establishes a temporary communication connection for the following processes:

- **Initializing Device**

Before placing a SIPROTEC 5 device in operation, initialize it once using the offline configuration created for this device. During initialization, this offline configuration is transmitted from the DIGSI 5 PC to the SIPROTEC 5 device. Only once this is done you can put the SIPROTEC 5 device into operation and establish a permanent communication connection between the DIGSI 5 PC and the SIPROTEC 5 device. You find more information about this under [15.1.3 Initializing a SIPROTEC 5 Device](#).

- **Loading the Offline Configuration into the SIPROTEC 5 Device**

As soon as you have completed the offline configuration, you can load it into the applicable SIPROTEC 5 device. You find more information about this under [15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device](#).

- **Updating Firmware**

Load the updated firmware and protocols into the SIPROTEC 5 device before you can use the improved or new functionality. You find more information about this under [15.7.1 Overview for Updating Firmware and Protocols](#).

DIGSI 5 only establishes a permanent communication connection at your explicit command. The communication connection remains until it is explicitly disconnected, or the physical connection between the DIGSI 5 PC and the SIPROTEC 5 device is interrupted. You find more information about this under [15.1.4 Permanently Connecting to a SIPROTEC 5 Device](#).

An IP-based internal Siemens protocol is used for data transmission between DIGSI 5 and a SIPROTEC 5 device. DIGSI 5 and the SIPROTEC 5 device are authenticated via SSL (Secure Sockets Layer). You do not have to worry about the required certificate. This certificate is included in the SIPROTEC 5 device or DIGSI 5 upon delivery. A confirmation prompt is displayed if the renewal of this certificate is required or if there is any issue with the authentication of the certificate. You can proceed accordingly. The data sent between DIGSI 5 and the SIPROTEC 5 device is always encrypted.

Devices and Configurations

The project tree contains the project and the list of online accesses. The project includes offline configurations for different SIPROTEC 5 devices. As soon as you establish a communication connection to a SIPROTEC 5 device, this online device is displayed in the list of online accesses. The online device is found in the online-access folder through which the connection is established, for example, the Ethernet interface of the DIGSI 5 PC. You can use an online device to assign the represented SIPROTEC 5 device to a suitable offline configuration in the project. Assigning a SIPROTEC 5 device to a certain offline configuration is a requirement for certain processes and opens up additional editing possibilities. You find more information about this under [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#).

Additional entries are displayed if you open the online device in the list of online accesses. These entries represent the online configuration. The online configuration is the device configuration temporarily saved for an online device; the configuration read from a SIPROTEC 5 device. You find more information about this under [15.1.5 Online Configuration](#).

If you transmit the configuration from a SIPROTEC 5 device to the DIGSI 5 PC, initially the settings in the online configuration are identical to the settings in the device configuration. However, since you can edit the online configuration, the online configuration can differ from the device configuration. You find more information about this under [15.2.1 Overview for Transmitting Configurations](#).

Related Topics

[14.1.4 Communication Using Ethernet](#)

[14.1.1 Integrated Interfaces and Slots](#)

[14.1.2 Communication Modules](#)

15.1.2 Network Environment

DIGSI 5 uses HTTP connections for communication. Address conflicts and faulty proxy settings can block the communication. For USB and the offline analysis of CFC (debugging), the following IP-address bands are used:

- **USB:**
 - Network adaptor name: SIPROTEC 5 devices connected via USB
 - Address band: 192.168.2.*
 - Subnet mask: 255.255.255.0

- **Offline function chart (CFC) analysis (debugging):**
 - Network adaptor name: S2010_vHub
 - Address band: 192.168.100.*
 - Subnet mask: 255.255.255.0

These address bands must not be used by another active network adaptor. Otherwise, the USB connection to the device, or the offline analysis of CFC (debugging) will not work.

Proxy Settings

While connecting to the SIPROTEC 5 device via DIGSI 5, a communication error with the USB, Port J, and Port E can occur if the proxy server for the LAN on your PC is enabled. You must disable the proxy server or use the proxy server with exceptions to resolve this issue.



NOTE

You must ensure that the proxy settings match your network configuration. If the option **Use automatic configuration script** for LAN on your PC is enabled or if you are unable to edit the proxy settings, or for any further assistance, you must contact your network administrator.

You have the following possibilities to modify the proxy settings:

- **Disable the proxy server:**

To disable the proxy server, proceed as follows:

 - In the Internet Explorer, click **Tools > Internet options > Connections > LAN settings**.
 - Uncheck the option **Use a proxy server for your LAN**.
 - Restart DIGSI 5 and try to connect to the device.
- **Use the proxy server with exceptions:**

If you wish to use a proxy server, make sure that the IP-address bands are defined as exceptions in the proxy settings. To define the IP-address bands as exceptions, proceed as follows:

 - In the Internet Explorer, click **Tools > Internet options > Connections > LAN settings**.
 - Enable the option **Use a proxy server for your LAN**.
 - Click **Advanced**.
 - In the **Proxy Settings** dialog under **Exceptions**, enter the required IP-address bands.
 - Restart DIGSI 5 and try to connect to the device.

Related Topics

[14.1.4 Communication Using Ethernet](#)

[14.1.1 Integrated Interfaces and Slots](#)

[14.1.2 Communication Modules](#)

15.1.3 Initializing a SIPROTEC 5 Device

Before placing a SIPROTEC 5 device in operation, initialize it once using the offline configuration created for this device. During initialization, this offline configuration is transmitted from the DIGSI 5 PC to the SIPROTEC 5 device.

**NOTE**

For initialization, connect the SIPROTEC 5 device to the DIGSI 5 PC via a USB connection. Since the Ethernet interfaces of the device only receive their IP addresses during initialization, you cannot use this interface for initialization.

To connect the SIPROTEC 5 device to the DIGSI 5 PC, see notes under [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#).

With initialization, the offline configuration is assigned to the SIPROTEC 5 device. For this purpose the serial number of the SIPROTEC 5 device is entered in the offline configuration. You find more information about this under [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#).

**NOTE**

Certain operating conditions can necessitate reinitialization of the SIPROTEC 5 device, for example, if the device is permanently in supervision mode. When reinitializing, all configuration and process data in the device are deleted.

Further information about initializing a SIPROTEC 5 device can be found in the Operating manual.

Starting initialization

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Using your right mouse button, click in the project the name of the offline configuration that you want to use for initializing the SIPROTEC 5 device.
- ✧ Click **Initialize device** in the context menu. This menu item is only active if the SIPROTEC 5 device is connected through a USB connection to the DIGSI 5 PC.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) is opened.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

A confirmation prompt is displayed if DIGSI 5 recognizes a SIPROTEC 5 device connected via USB.

Several indications will inform you about the current status. After the initialization is complete, or if initialization failed, a [20.6.25 Status Dialog](#) opens. You find more information about the status dialog under [3.4 Using the Status Dialog](#).

- ✧ Click **OK**.

The status dialog closes.

**NOTE**

After initializing the SIPROTEC 5 device restarts.

Related Topics

- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)
- ✧ [15.1.5 Online Configuration](#)
- ✧ [15.2.1 Overview for Transmitting Configurations](#)
- ✧ [15.1.7 Removing the Assignment between a SIPROTEC 5 Device and an Offline Configuration](#)

15.1.4 Permanently Connecting to a SIPROTEC 5 Device

For DIGSI 5 and a SIPROTEC 5 device to exchange data, you must establish a permanent communication connection between the 2 communication participants. You can do this in one of the following ways:

- **Connecting via Offline Configuration**

You can establish the communication connection in the project via an offline configuration. You can decide whether to establish the connection to a SIPROTEC 5 device connected via USB or Ethernet. For a communication connection via Ethernet, the IP address specified in the offline configuration is used. After establishing a connection, an online device is displayed in the list of online accesses that contains the complete [15.1.5 Online Configuration](#). You then have immediate access to the SIPROTEC 5 device data.

- **Connecting Directly via a Certain Online Access**

With this version you can establish a communication connection to all SIPROTEC 5 devices available via a certain online access. An online device is displayed for every SIPROTEC 5 device that contains the reduced online configuration. To obtain access to the complete online configuration transmit, one-by-one, the device configuration for every device to the DIGSIC 5 PC.

To use this connection version, you do not need an offline configuration to the SIPROTEC 5 device in question. Also, a project does not need to be opened.

The above possibilities are described in the following sections.

Connecting via Offline Configuration

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, right click the name of the offline configuration that is assigned to the SIPROTEC 5 device to be connected.
- ✧ Click **Connect with device** in the context menu. This menu item is always active. If the device is already connected and you select the option **Connect with device**, then the connected online device is highlighted in the Project tree.

A confirmation prompt is displayed if DIGSI 5 recognizes a SIPROTEC 5 device connected via USB.

- ✧ If the SIPROTEC 5 device connected via USB is the requested device, click **Yes**, else click **No**.

The communication connection is established via USB if you click **Yes**. If you click **No**, DIGSI 5 will search via the Ethernet connection projected in the offline configuration for the assigned SIPROTEC 5 device. You will receive an error message if DIGSI 5 cannot find the device.

- ✧ Click **OK**. Check if the correct IP address is entered in the SIPROTEC 5 device offline configuration. Then repeat the process.

If DIGSI 5 finds the device, the communication connection is established via Ethernet. Several indications will inform you about the connection status.

If the connection is established, then in the list of online accesses, the folder for the online access used opens. The folder of the online access displays the connected SIPROTEC 5 device as an online device. The online device contains the complete online configuration.

Connecting Directly via a Certain Online Access

- ✧ Open the project tree.
- ✧ Open the affected online access in the folder of online accesses.
- ✧ Double-click **Update accessible devices** in this folder.

DIGSI 5 checks which SIPROTEC 5 devices are connected and available via the selected online access. The folder of this online access displays the available SIPROTEC 5 devices as online devices. Each of these online devices contains the reduced online configuration.

- ✧ If you want to access a complete online configuration, double-click **Get all data from device** in the online configuration.

Transmission of the device configuration from the SIPROTEC 5 device to the DIGSI 5 PC starts. Several indications inform you about the status of the transmission. After a successful transmission of the device configuration you now can see the complete online configuration.

- ✧ Repeat this process, if necessary, also for the other online configurations.

Related Topics

- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)
- ✧ [15.1.8 Disconnecting the Connection to the SIPROTEC 5 Device](#)
- ✧ [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#)

15.1.5 Online Configuration

An online device in the list of online accesses contains the online configuration of the SIPROTEC 5 device, which is represented by the online device.

If you transmit the configuration from a SIPROTEC 5 device to the DIGSI 5 PC, initially the settings in the online configuration are identical to the settings in the device configuration. However, since you can edit the online configuration, the online configuration can differ from the device configuration. You find more information about this under [15.2.1 Overview for Transmitting Configurations](#).

Depending on how you establish a communication connection to a SIPROTEC 5 device, the online device can contain the complete online configuration or the reduced online configuration. Additional information about establishing a connection can be found under [15.1.4 Permanently Connecting to a SIPROTEC 5 Device](#).

Complete Online Configuration

The complete online configuration contains the following entries in the [3.1.2 Project Tree](#):

- **Device Information**
With this entry, open the device information to the online connected SIPROTEC 5 device. You find more information about this under [6.1.9 Opening Device Information](#).
- **Get All Data From Device**
With this entry you can also transmit the online device configuration from the SIPROTEC 5 device into the DIGSI 5 PC. DIGSI 5 saves this configuration temporarily as the online configuration. You find more information about this under [15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC](#).
- **Logs**
This folder contains other entries for the various logs:
 - Operational log
 - Fault log
 - Setting-history log
 - User-defined log 1
 - User-defined log 2

With these entries, open the table [20.4.1 Log](#) for displaying the log contents. You find more information about this under [15.5.4.3 Opening the Logs Table](#).
- **Fault Records**
With this entry, open the table [20.4.2 Records](#) for displaying the fault records. You find more information about this under [15.5.3.4 Opening the Records Table](#).
- **Indications**
With this entry, open the table [20.4.3 Indications](#) for displaying the indications. You find more information about this under [15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#).

- **Measurements**

This folder contains one entry for each function group for which you can read measured and metered values from the SIPROTEC 5 device. With these entries you open the table [20.4.5 Measurements](#) for displaying the measured and metered values. You find more information about this under [15.5.1.3 Opening the Measured Value Table and Reading Values](#).

- **Test Suite**

This folder contains other entries for the different test functions of the test suite:

- Wiring
- Communication modules
- Analog inputs
- Control
- Circuit breaker
- Protection functions
- Protection interface
- Communication protocols

With these entries, open the respective Test editor. Information about the same is available in the help topics for the test functions.

Reduced Online Configuration

The reduced online configuration contains the following entries:

- Device information
- Query all device data
- Safety

Related Topics

[15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)

[2.1.3 Working Offline and Online](#)

[6.1.2 Offline Configuration](#)

15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration

You can assign a SIPROTEC 5 device to a certain offline configuration in the project. Assigning a SIPROTEC 5 device to a certain offline configuration is a requirement for the following processes:

- **Updating the Offline Configuration from Target Device**

You can update the offline configuration of the project device from the target device. This action enables the project device to be updated with the latest configuration data of the target device. You find more information about this under [15.2.4 Updating the Offline Configuration from Target Device](#).

- **Disconnecting the Communication Connection to the Device via the Offline Configuration**

If you want to disconnect a communication connection to a SIPROTEC 5 device via the offline configuration in the project, then the SIPROTEC 5 device must be assigned to this offline configuration. You find more information about this under [15.1.8 Disconnecting the Connection to the SIPROTEC 5 Device](#).

- **Generating a Snapshot of Measured and Metered Values**

You can save read measured and metered values from the SIPROTEC 5 device as snapshots. For a snapshot, the measured and metered values currently read for the entire function group are saved in the offline configuration of an assigned SIPROTEC 5 device. You find more information about this under [15.5.1.5 Creating Snapshots of Measured and Metered Values](#).

- **Generating snapshots of indications**

You can save indications as snapshots. When creating a snapshot, the indications currently displayed are saved in the offline configuration of the assigned SIPROTEC 5 device. You find more information about this under [15.5.2.6 Creating Snapshots of Spontaneous Indications](#).

An offline configuration is uniquely assigned to a SIPROTEC 5 device using the serial number of the SIPROTEC 5 device. This serial number is unique worldwide and is entered in the device information of an offline configuration.

There are the following possibilities for assigning a SIPROTEC 5 device to an offline configuration:

- **Establishing a Communication Connection via the Offline Configuration**

If you establish a communication connection to a SIPROTEC 5 device via an offline configuration, the SIPROTEC 5 device is automatically assigned to the offline configuration used. You find more information about this under [15.1.4 Permanently Connecting to a SIPROTEC 5 Device](#).

- **Initializing a SIPROTEC 5 Device**

If you initialize a SIPROTEC 5 device with an offline configuration, then the SIPROTEC 5 device is automatically assigned to the offline configuration used with the user confirmation. You find more information about this under [15.1.3 Initializing a SIPROTEC 5 Device](#).

- **Copying Online Configuration into the Project**

You can copy this online configuration of a SIPROTEC 5 device to a project. In the project, DIGSI 5 generates an offline configuration with all settings of the online configuration. Here, the SIPROTEC 5 device is automatically assigned to the new offline configuration, if it was not assigned to an existing offline configuration earlier. You find more information about this under [15.2.5 Copying Online Configuration into the Project](#).

- **Manually Enter the Serial Number**

You can enter the serial number manually in the device information of the affected offline configuration. For example, you can find the serial number on the name plate of the SIPROTEC 5 device. Further information can be found in the following sections.

- **Drag and Drop**

You can assign a SIPROTEC 5 device to an offline configuration via drag and drop. Further information can be found in the following sections.



NOTE

You can identify whether a SIPROTEC 5 device is assigned to an offline configuration or not by the corresponding online device in the list of online accesses. Depending on the status, the name of the online device has the add-on **Assigned** or **Not Assigned**.

Manually Entering the Serial Number

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration to which you want to assign the SIPROTEC 5 device.
- ✧ Double-click **Device Information** in this folder.

The [20.5.3 Device Information](#) are displayed in the working area.

- ✧ In the entry field **Serial number** enter the serial number of the SIPROTEC 5 device.
- ✧ Click outside the entry field.

- or -

- ✧ Press the <Enter> button.

You confirm your entry with these 2 inputs.

The SIPROTEC 5 device is now assigned to the offline configuration.

Drag and Drop

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, mark the name of the offline configuration the SIPROTEC 5 device will be allocated to. Next, by holding down the mouse button, drag the marker to the name of the online device that the assigned SIPROTEC 5 device represents.
- or -
- ✧ In the list of online accesses, highlight the name of the online device that represents the assigned SIPROTEC 5 device. Hold down the mouse button to drag the marker to the name of the offline configuration to which the SIPROTEC 5 device will be assigned.

If the assignment is not possible, the mouse pointer will change into a crossed-out circle.

- ✧ Release the mouse button.

If the SIPROTEC 5 device is already assigned to another offline configuration, or another SIPROTEC 5 device of the selected offline configuration, a confirmation prompt appears. The operation is canceled if you click **No**. If you click **Yes** the current assignment changes.

You will receive notice if the SIPROTEC 5 device is assigned to an offline configuration.

- ✧ Click **OK**.

Related Topics

- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)
- ✧ [15.1.7 Removing the Assignment between a SIPROTEC 5 Device and an Offline Configuration](#)

15.1.7 Removing the Assignment between a SIPROTEC 5 Device and an Offline Configuration

You can remove the assignment between a SIPROTEC 5 device and an offline configuration. For this purpose the serial number of the SIPROTEC 5 device is deleted in the device information of the offline configuration.

Removing an Assignment

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, right-click the name of the offline configuration that is assigned to the SIPROTEC 5 device to be disconnected.
- or -
- ✧ In the list of online accesses, right-click the name of the online device to be disconnected.
- ✧ In the context menu click **Remove assignment** from the assignment.

The assignment between the SIPROTEC 5 device and the offline configuration is removed.

Related Topics

- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)
- ✧ [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#)

15.1.8 Disconnecting the Connection to the SIPROTEC 5 Device

You have the following options for disconnecting the communication connection between a SIPROTEC 5 device and the DIGSI 5 PC:

- Via the context menu, issue the operation for disconnecting the communication connection.
- End DIGSI 5. The communication connection is then automatically disconnected.

Using the Context Menu

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, right-click the name of the offline configuration that is assigned to the SIPROTEC 5 device to be disconnected.
- or -
- ✧ In the list of online accesses, right-click the name of the online device that represents the SIPROTEC 5 device to be disconnected.
- ✧ Click **Disconnect connection to device** in the context menu.

If you changed the online configuration, you can transmit the changes to the SIPROTEC 5 device. A confirmation prompt is displayed for this purpose.

- ✧ In the online device, in order to transmit the settings in the online configuration, change to the SIPROTEC 5 device, click **Yes**, otherwise click **No**.

If you click **Yes**, the data are transmitted to the SIPROTEC 5 device. Several indications will inform you about the current status. If you click **No** the data are not transmitted.

If the SIPROTEC 5 device is assigned to an offline configuration in the project, then you can update this offline configuration with the changed online configuration. A confirmation prompt is displayed for this purpose.

- ✧ In order to copy the settings changed in the online configuration to the offline configuration, click **Yes**, otherwise click **No**.

If you click **Yes**, the data are copied to the offline configuration. Several indications will inform you about the current status. If you click **No** the data are not copied.

The online device is removed from the list of online accesses. The communication connection is disconnected.

Closing DIGSI 5

- ✧ In the **Project** menu, click **Exit**.

If you have changed the project since the last save, the confirmation prompt is displayed.

- ✧ To save changes in the current project and to close DIGSI 5, click **Yes**.

- or -

- ✧ To close DIGSI 5 without saving the last changes in the project, click **No**.

- or -

- ✧ Click **Cancel** if you wish to cancel closing.

The entire process is canceled by clicking **Cancel**. DIGSI 5 remains open and the communication connection is not disconnected.

If you click **Yes** or **No** and you have not changed the online configuration, DIGSI 5 closes and the communication connection is disconnected.

If you click **Yes** or **No** and you have changed the online configuration, you can transmit these changes to the SIPROTEC 5 device. A confirmation prompt is displayed for this purpose.

- ✧ In the online device, in order to transmit the settings in the online configuration, change to the SIPROTEC 5 device, click **Yes**, otherwise click **No**.

If you click **Yes**, the data are transmitted to the SIPROTEC 5 device. Several indications will inform you about the current status. If you click **No** the data are not transmitted.

If the SIPROTEC 5 device is assigned to an offline configuration in the project, then you can update this offline configuration with the changed online configuration. A confirmation prompt is displayed for this purpose.

- ✧ In order to copy the settings changed in the online configuration to the offline configuration, click **Yes**, otherwise click **No**.

If you click **Yes**, the data are copied to the offline configuration. Several indications will inform you about the current status. If you click **No** the data are not copied.

DIGSI 5 is terminated. The communication connection is disconnected.

Related topics

- ✧ [*15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5*](#)
- ✧ [*15.1.4 Permanently Connecting to a SIPROTEC 5 Device*](#)

15.2 Editing and Transmitting Configurations

15.2.1 Overview for Transmitting Configurations

With DIGSI 5 you work in the **Offline** and **Online** modes. As a result different configurations are found in the project, in the SIPROTEC 5 device and in the DIGSI 5 PC memory. These configurations can be transmitted in various ways.

Configurations

You must distinguish between 3 configurations:

- **Offline Configuration**

The offline configuration is the configuration saved in a project for a real SIPROTEC 5 device. You can transmit the offline configuration into the applicable real SIPROTEC 5 device.

- **Device Configuration**

The device configuration is the configuration saved in a real SIPROTEC 5 device. You can edit the device configuration directly on the SIPROTEC 5 device. You can also transmit the device configuration of the SIPROTEC 5 device to the DIGSI 5 PC. There the device configuration is saved temporarily as an online configuration.

As a requirement for the transmission, DIGSI 5 must be connected online to the SIPROTEC 5 device, and be visible in the list of online accesses. To better distinguish the real SIPROTEC 5 device, the SIPROTEC 5 device registered in the list of online accesses is designated as an online device.

- **Online Configuration**

The online configuration is the device configuration saved temporarily for an online device. If you transmit the configuration from a real SIPROTEC 5 device to the DIGSI 5 PC, then the settings in the online configuration are initially identical to the settings in the device configuration. However, since you can edit the online configuration, the online configuration may differ from the device configuration.

Transmission

You have the following ways to transmit the configuration:

- **Loading the Offline Configuration into the SIPROTEC 5 Device**

You can load the offline configuration saved in a project to the applicable SIPROTEC 5 device. You also have the option of loading several offline configurations for different SIPROTEC 5 devices at the same time. The individual offline configurations along with the firmware of the new protocol that is configured in the communication module are then loaded one after the other into the applicable SIPROTEC 5 device. You find more information about this under [15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device](#).

- **Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC**

You can also transmit the device configuration from the SIPROTEC 5 device into the DIGSI 5 PC. DIGSI 5 saves this configuration temporarily as an online configuration. You find more information about this under [15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC](#).

- **Updating Offline Configuration**

You can update the offline configuration of a SIPROTEC 5 device with the online configuration currently saved in the DIGSI 5 PC. When updating, all settings of the online configuration are copied into the existing project offline configuration. The settings in the offline configuration are overwritten. You find more information about this under [15.2.4 Updating the Offline Configuration from Target Device](#).

- **Copying Online Configuration into the Project**

You can copy the online configuration currently saved in the DIGSI 5 PC into a project. Here DIGSI 5 generates in the project an offline configuration and copies all settings of the online configuration into the new offline configuration. You find more information about this under [15.2.5 Copying Online Configuration into the Project](#).

- **Creating Offline Configuration on Hardware Basis**

A new offline configuration can be created based on the hardware configuration defined in the online configuration. You find more information about this under [15.2.6 Creating Offline Configuration on Hardware Basis](#).

Related Topics

[15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)
[2.1.3 Working Offline and Online](#)

15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device

As soon as you have completed the offline configuration, you can load it into the applicable SIPROTEC 5 device for a normal project. Here you can directly select an individual offline configuration and load it into the respective device. You can also load the firmware of the new protocol configured for the communication module while performing load configuration to the device.

The individual offline configurations along with the firmware of the new protocol that are configured in the communication module are loaded automatically one after the other into the applicable SIPROTEC 5 device. You can also use the [20.5.18 Configuration Selection](#) to select several offline configurations for different SIPROTEC 5 devices and start loading at the same time.

If you perform load configuration to the device after modifying only the settings of any project device of an offline configuration, only these specific changes are loaded to the target device instead of the complete configuration. A status message indicates the success or failure of loading the settings to the target device and enables you to proceed further.

If you have selected several offline configurations from the configuration selection, you do not need to transmit it immediately to the applicable SIPROTEC 5 device. When saving the project your selection is available after closing and reopening the project. Now you can prepare loading the configurations, while for example an employee starts loading the configurations in the system.

However, load configuration to devices is not allowed in [5.1.11 Plug and Play Project](#) as GOOSE connections may not be resolved, and all devices that take part in the GOOSE communication may not be a part of the project. If you are sure that the devices in the plug and play project are completely configured in the station, then you can disable the check box in the properties of the project, which indicates if the project is a plug and play project or not, and then load configuration to devices.

While performing this action, you are informed about the risk of loading the configuration in that project, but load configuration is possible again. A confirmation prompt is displayed if the firmware version of the device is not compatible with the offline configuration. Also the confirmation prompt is displayed if the firmware version of the configured communication modules on the device is not compatible with the offline communication configuration. You can proceed accordingly.

Before loading, check if all settings in an offline configuration are consistent. In the project tree, the symbols to the right of the offline configuration name provide information about the status. The symbol  means that the offline configuration contains inconsistencies.



NOTE

You are not able to load an inconsistent offline configuration in the SIPROTEC 5 device.

The following alternative requirements must be met for loading an offline configuration in a SIPROTEC 5 device:

- DIGSI 5 PC can reach the SIPROTEC 5 device via a USB connection.

or

- DIGSI 5 PC can reach the SIPROTEC 5 device via the offline-configuration Ethernet connection.

If a selected offline configuration contains IEC 61850 protocol data, you have to expect a longer loading time when you have a secure transmission. **Secure** means that during the transmission all protective and control functions of the SIPROTEC 5 device are active. All protective and control functions of the SIPROTEC 5 device

are deactivated before the loading process. The data can then be loaded faster into the SIPROTEC 5 device. When the loading process is completed, all protective and control functions are automatically reactivated.

Selecting Individual Offline Configurations

- ✧ Using your right mouse button click the name of the offline configuration that you want to load into the assigned SIPROTEC 5 device in [3.1.2 Project Tree](#).
- ✧ Click **Load configuration in device** in the context menu.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Continue as described in the section **Start query and transfer**.

Selecting Several Offline Configurations

- ✧ In the project tree, double-click **Load device configuration**.

The configuration selection is displayed in the working area.

- ✧ To select or deselect for loading an offline configuration click the appropriate check box in the column **Load**.

- or -

- ✧ In order to select all offline configurations, click the  button in the [20.7.23 Toolbar of the Load Configuration](#).

- or -

- ✧ In order to deselect all offline configurations, click the  button in the toolbar of the configuration selection.

If a check box is marked, the corresponding offline configuration is selected for loading. At least 1 offline configuration must be selected to start the loading.

- ✧ Click the  **Update device(s)** button in the configuration selection toolbar.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Continue as described in section **Start query and transfer**.

Completing Query and Starting the Transmission

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes. The current and all other loading processes are now released by entering the confirmation ID. When you close the project or disconnect the communication connection to the SIPROTEC 5 device, the release is removed.

If one or more of the selected SIPROTEC 5 devices contain IEC 61850 protocol data, a security prompt is displayed.

- ✧ If all protective and control functions of the SIPROTEC 5 device are to be deactivated for the benefit of a faster transmission, click on **Yes**. Otherwise, click on **No**.

A confirmation box is displayed if DIGSI 5 recognizes a SIPROTEC 5 device connected via USB.

- ✧ If the SIPROTEC 5 device connected via USB is the requested device, click **Yes**, else click **No**.

If clicking **Yes**, the offline configuration is transmitted via the USB connection to the connected SIPROTEC 5 device.

If you click **No**, DIGSI 5 searches via the Ethernet connection configured in the offline configuration for the assigned SIPROTEC 5 device. You receive an error message if DIGSI 5 cannot find the device.

- ✧ Click **OK**. Check if the correct IP address is entered in the SIPROTEC 5 device offline configuration. Then repeat the process.

If DIGSI 5 finds the device, the offline configuration is transmitted via the Ethernet connection to the connected SIPROTEC 5 device.

Several indications inform you about the transmission status. After concluding the transmission or if transmission was not successful, [20.6.25 Status Dialog](#) opens. You find more information about the status dialog under [3.4 Using the Status Dialog](#).

✧ Click **OK**.

The status dialog closes.



NOTE

After loading the offline configuration into the SIPROTEC 5 device, it restarts.

Related Topics

- ✧ [5.1.11 Plug and Play Project](#)
- ✧ [15.2.1 Overview for Transmitting Configurations](#)
- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)
- ✧ [15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC](#)

15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC

If you transmit the device configuration from one SIPROTEC 5 device into the DIGSI 5 PC, DIGSI 5 will save this configuration temporarily as an online configuration.

You then have the following option:

- You can save the online configuration as an offline configuration in a project. You find more information about this under [15.2.5 Copying Online Configuration into the Project](#).

To be able to transmit the device configuration, DIGSI 5 must be connected online with the SIPROTEC 5 device. The SIPROTEC 5 device must therefore be visible as an online device in the list of online accesses.



NOTE

Together with the device configuration, all data found in the SIPROTEC 5 device are transmitted, thus also the process data. DIGSI 5 supports transmission of device configuration from only 2 online devices at a time.

Selecting an Online Device and Starting the Transmission

- ✧ In the [3.1.2 Project Tree](#), open the online device which represents the affected SIPROTEC 5 device.
- ✧ Double-click **Get all data from device**.

The transmission starts. Several indications inform you about the transmission status. After successful transmission of the device configuration you will see more entries, for example for the logs, records, or the Test suite.

Related Topics

- ✧ [15.2.1 Overview for Transmitting Configurations](#)
- ✧ [15.1.4 Permanently Connecting to a SIPROTEC 5 Device](#)

15.2.4 Updating the Offline Configuration from Target Device

You can update the offline configuration of the project device from the target device. This action enables the project device to be updated with the latest configuration data of the target device. When updating, all the settings of the target device are copied into the existing project offline configuration. The settings in the offline configuration are overwritten.

Selecting the Project Device and Starting the Update

- ✧ Right-click the name of the project device in the [3.1.2 Project Tree](#).
- ✧ In the context menu, click **Update configuration from target device**.

A confirmation prompt is displayed.

- ✧ To copy the settings of the target device to the offline configuration, click **Yes**.

- or -

- ✧ Click **No** if you wish to cancel this operation.

If you click **Yes**, the updating starts. Several indications inform you about the update status.

Related Topics

- ✧ [15.2.1 Overview for Transmitting Configurations](#)

15.2.5 Copying Online Configuration into the Project

If you transmit the device configuration from one SIPROTEC 5 device into the DIGSI 5 PC, DIGSI 5 saves this configuration temporarily as an online configuration. You can only copy this online configuration to an empty project (with no devices in it) or to a [5.1.11 Plug and Play Project](#). Here DIGSI 5 generates in the project an offline configuration and copies all settings of the online configuration into the new offline configuration. You can then for example change the settings in DIGSI 5 and then load it again to a SIPROTEC 5 device. Or you use this function to archive online configurations in projects.

If you have not yet changed the online configuration, then this corresponds to the device configuration of the SIPROTEC 5 device connected online. In this case, you can use this function to archive, for example, the device configurations of several SIPROTEC 5 devices in one project.

If the online configuration is copied as an offline configuration to the project, then the offline configuration is automatically assigned to the online device and thus the SIPROTEC 5 device connected online.



NOTE

Offline configuration of plug and play project cannot be loaded into a device.

Selecting an Online Device and Starting the Copy Process

- ✧ Right-click with the mouse button the name of the online device in the [3.1.2 Project Tree](#).
- ✧ Click **Copy online device to project** in the context menu.

The copy process starts. Several indications inform you about the copy process status.



NOTE

If the menu item **Copy device configuration to project** is inactive then no project is open. In this case open an existing project or create a new project. Then repeat the process. You can copy online device only to an existing [5.1.11 Plug and Play Project](#) or an empty project with no devices in it.

Related Topics

- ✧ [5.1.11 Plug and Play Project](#)

- ✧ [15.2.1 Overview for Transmitting Configurations](#)
- ✧ [15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device](#)

15.2.6 Creating Offline Configuration on Hardware Basis

If you transmit the device configuration from one SIPROTEC 5 device into the DIGSI 5 PC, DIGSI 5 saves this configuration temporarily as an online configuration. A new offline configuration can be created in the project based on the hardware configuration defined in this online configuration. In contrast to copying an online configuration to the project, no function settings are taken into account but only the hardware configuration is adopted. For this hardware, specify additional main features and select an application template. Thereafter you can process the offline configuration as usual.

This function corresponds to adding a SIPROTEC 5 device to a project with help from the base configuration from the Hardware catalog. After selecting the base configuration, the dialog [20.6.5 Add New Device](#) opens. The product code is specified, matching the selected base configuration.

Selecting the Online Device and Creating an Offline Configuration

- ✧ Right-click with the mouse button the name of the online device in the [3.1.2 Project Tree](#).
- ✧ Click **Add new device** in the context menu.

The dialog [20.6.5 Add New Device](#) opens. The dialog shows the product code relevant for the hardware basis. You cannot change the product code.

- ✧ Using the list box, select the desired additional main features.

The list box for application templates is activated.

- ✧ Select the desired application template.
- ✧ Click **OK**.

The dialog closes.

The new offline configuration is added to the project.



NOTE

More information about adding an offline configuration can be found under [6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#) and [6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#).

Related Topics

- ✧ [15.2.1 Overview for Transmitting Configurations](#)

15.3 Managing Device Modes

15.3.1 Overview of Device Modes

A SIPROTEC 5 device can assume the following different device modes:

- **Process Mode**

When the SIPROTEC 5 device has started up without an error, the device is in process mode. Process mode is the normal operating state of the SIPROTEC 5 device. In process mode, all functions of the SIPROTEC 5 device are available. You can manually select the process mode.

- **Commissioning Mode**

In the commissioning mode, the SIPROTEC 5 device sets all functions to inactive. So the wiring can be tested without influencing the protection functions and other function blocks. Several test procedures are additionally possible in the commissioning mode, such as, the communication test and the HDLC loop test. You can manually select the commissioning mode.

- **Simulation Mode**

In the simulation mode, the SIPROTEC 5 device behaves as in the process mode. In addition, you can utilize test sequences for the test generator integrated in the SIPROTEC 5 device. You can manually select the simulation mode.

- **Fallback Mode**

If the SIPROTEC 5 device detects errors in the hardware or inconsistencies in the application or in the parameter settings, the device switches into the fallback mode. This can occur during device startup or in normal operation. The fallback mode is also the state which the SIPROTEC 5 device has until the first initialization.

The fallback mode is a safe device mode to prevent serious damages to the SIPROTEC 5 device. In the fallback mode, the outputs of the SIPROTEC 5 device are set to their initial state. Access to the hardware is not possible. In the fallback mode, protection functions or protocol services are not available. You cannot manually select the fallback mode.

Related Topics

[15.3.2 Changing Device Mode](#)

[15.3.3 Canceling Fallback Mode](#)

15.3.2 Changing Device Mode

You can change the current device mode for an online connected SIPROTEC 5 device and manually select one of the following device modes:

- Process mode
- Commissioning mode
- Simulation mode

Changing the device mode is always connected with a restart of the SIPROTEC 5 device. If you change the device mode from **Process** mode to **Commissioning** mode for devices with firmware version V06.00 and higher version, the target device will switch to **Commissioning** mode without any restart.

To change the device mode and to restart the SIPROTEC 5 device, you have the following possibilities depending on your respective work situation:

- You can change the device mode with one of the Test editors or with the **Online** tab. Depending on the respective test scenario and the currently set device mode, you can restart the SIPROTEC 5 device in another device mode.
- You can change the device mode with the **Device information** tab and then restart the SIPROTEC 5 device.
- You can perform the initial startup of the device by selecting the check-box option **Delete buffers during restart** and then by clicking **Restart** in the **Device Information** tab. All buffers in the SIPROTEC 5 device are deleted and the device restarts.

Change device mode with the Device information tab

- ✧ Open the project tree.
- ✧ Open the affected online device in the list of online accesses.
- ✧ Double-click **Device information**.

The [20.5.3 Device Information](#) are displayed in the working area.

- ✧ In the [20.5.4 Device Information](#) tab, with the **Change device mode** list box, select the new device mode.
- ✧ Click **Restart device**.

A confirmation prompt is displayed.

- ✧ Click **Yes** to start the device in the selected device mode. If you wish to cancel the process, click **No**.

If you click **Yes**, and the confirmation ID for Setting/Operation is activated, the [20.6.17 Enter Confirmation ID](#) dialog opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The SIPROTEC 5 device restarts and is now in the selected device mode.

Related topics

- ✧ [15.3.1 Overview of Device Modes](#)
- ✧ [15.3.5 Restarting the SIPROTEC 5 Device in Commissioning Mode](#)
- ✧ [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#)
- ✧ [15.3.6 Restarting the SIPROTEC 5 Device in Simulation Mode](#)
- ✧ [15.3.3 Canceling Fallback Mode](#)

15.3.3 Canceling Fallback Mode

When there is a serious device error, the SIPROTEC 5 device automatically switches into the fallback mode. The following identifiers signalize this device status:

- The life-contact of the SIPROTEC 5 device is terminated.
- The red ERROR-LED of the SIPROTEC 5 device lights up.
- The remark **Fallback Mode** appears in the display of the SIPROTEC 5 device.

You can try canceling the fallback mode and restarting the SIPROTEC 5 device in the process mode. Carry out the following steps:

- In the **Device information** tab, select the process mode and restart the SIPROTEC 5 device. You find more information about this under [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#). If the device is not in the process mode after restarting, carry out the next step.
- Reinitialize the SIPROTEC 5 device via the USB interface. You find more information about this under [15.1.3 Initializing a SIPROTEC 5 Device](#). If the device is not in the process mode after restarting, carry out the next step.
- Contact the repair service.

Related Topics

[15.3.1 Overview of Device Modes](#)

[15.3.2 Changing Device Mode](#)

15.3.4 Restarting the SIPROTEC 5 Device in Process Mode

If you have executed the test functions in commissioning or simulation mode and want to continue with the normal process mode, you have to restart the SIPROTEC 5 device in process mode.

Selecting Process Mode and Restart the SIPROTEC 5 Device

- ✧ Click **Display device mode** in the header of the respective Test editor.

The [20.5.3 Device Information](#) are displayed in the working area.

- ✧ In the [20.5.4 Device Information](#) tab, with the **Change device mode** list box, select **Process**.

- ✧ Click **Restart device**.

A confirmation prompt is displayed.

- ✧ Click **Yes** to start the device in process mode. If you wish to cancel the process, click **No**.

If you click **Yes**, and the confirmation ID for Setting/Operation is activated, the [20.6.17 Enter Confirmation ID](#) dialog opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.

- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The SIPROTEC 5 device restarts and is now in process mode.

Related Topics

- ✧ [15.3.5 Restarting the SIPROTEC 5 Device in Commissioning Mode](#)

- ✧ [15.3.6 Restarting the SIPROTEC 5 Device in Simulation Mode](#)

15.3.5 Restarting the SIPROTEC 5 Device in Commissioning Mode

For certain test functions, the SIPROTEC 5 device must be in commissioning mode. You need to restart the SIPROTEC 5 device in commissioning mode.

Restarting the SIPROTEC 5 Device in Commissioning Mode

- ✧ Click **Restart device** in the header of the respective Test editor.

A confirmation prompt is displayed.

- ✧ If the device needs to be started in commissioning mode, click **Yes**. If you wish to cancel the process, click **No**.

If you click **Yes**, and the confirmation ID for Setting/Operation is activated, the [20.6.17 Enter Confirmation ID](#) dialog opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The SIPROTEC 5 device is restarted and is now in commissioning mode.

Related topics

- ✧ [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#)
- ✧ [15.3.6 Restarting the SIPROTEC 5 Device in Simulation Mode](#)

15.3.6 Restarting the SIPROTEC 5 Device in Simulation Mode

For certain test functions, the SIPROTEC 5 device must be in Simulation mode. The SIPROTEC 5 device must be restarted in simulation mode.

Restarting the SIPROTEC 5 Device in Simulation Mode

- ✧ Click **Restart device** in the header of the respective Test editor.
- or -
- ✧ Click **Restart device in Simulation mode** in the **Test environment** palette in the [20.2.6 Online](#) tab.

A confirmation prompt is displayed.

- ✧ To start the device in simulation mode, click **Yes**. If you wish to cancel the process, click **No**.

If you click **Yes**, and the confirmation ID for Setting/Operation is activated, the [20.6.17 Enter Confirmation ID](#) dialog opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The SIPROTEC 5 device restarts and is then in simulation mode.

Related Topics

- ✧ [15.3.5 Restarting the SIPROTEC 5 Device in Commissioning Mode](#)
- ✧ [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#)

15.4 Using Testing and Diagnostics Functions

15.4.1 Testing Wiring

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

The [20.1.22 Test Editor for Wiring](#) allows you to carry out the following test functions:

- **Testing Binary Inputs, Binary Outputs and LEDs of the SIPROTEC 5 Device to be Tested**

You can change the current state of a binary input, binary output, or an LED, that is, from **On** to **Off** or from **Off** to **On**. If the state change is successful, the new state will be displayed in the Test editor for wiring.

If you close the Test editor for wiring, the last states of the binary inputs, binary outputs, and LEDs is restored.

The indications are saved in **CSV** (Comma-Separated Values) format. With this format, data is generated to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format.

In order to execute the test functions described above, the SIPROTEC 5 device to be tested must be in commissioning mode. You can check whether this requirement is met from the following:

- The header of the Test editor for wiring is yellow.
- The text **Wiring test can be executed** can be found in the header of the Test editor for wiring.
- The information **Commissioning** is periodically hidden and displayed in the SIPROTEC 5 device display.

If the Test editor for wiring is closed, the SIPROTEC 5 device remains in commissioning mode. You can then execute additional test functions - these require the commissioning mode. If you do not want to execute any more test functions and want to continue with process mode, restart the SIPROTEC 5 device in process mode. You can also click **Show device mode** to navigate to the Device information editor.

Opening the Test Editor for Wiring

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ Double-click **Wiring** in this folder.

The Test editor for wiring is displayed in the scope of operation.

Triggering the State Changes and Checking the Reactions

- ✧ Open the **Change states for binary inputs, binary outputs, and LEDs** in the Test editor for wiring.

In the **Binary inputs, binary outputs and LEDs** column, the window contains the **Binary inputs, binary outputs, or LEDs** groups.

- ✧ Open one of the groups, **Binary inputs, Binary outputs, or LEDs**.

The individual elements of the group are displayed, for example, all elements of type **LED**. In the **Current state** column, you can see the current state of the element, for example, **Off**.

- ✧ Click the button of that element whose state you want to change, in the **New status** column. The button is relabeled with the new state, for example, **On**.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes. The current and all other status changes are now released by the entry of the confirmation ID. When you close the project or disconnect the communication connection to the SIPROTEC 5 device, the release is cancelled.

The state of the selected element changes. The new state of the element is entered in the **Current state** column.

Saving Indications in a File

- ✧ If you want to save all indications, make sure that no individual indication is selected.
- or -
- ✧ If you want to save individual indications, select the relevant ones.
- ✧ Click the button in the toolbar of the Test editor for wiring .

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The indications are saved to a file.

15.4.2 Testing Analog Inputs

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Check the current and voltage values present on a SIPROTEC 5 device measuring points with the [20.1.24 Test Editor for Analog Inputs](#). This Test editor shows the current- and voltage-measured values as a percentage according to magnitude and phase. In this case, 100 % is equivalent to the rated current or rated voltage of a phase. The left window of the Test editor for analog inputs shows the current and voltage values of 3-phase measuring points as a phasor diagram. The right window of the Test editor shows the power and voltage values of all measuring points in a table as a numerical value.

This test function can be used differently depending on the selected source for current and voltage values:

- **Test Sequences as Source**

This method can be used to visualize the progression of a test sequence. It allows to check whether a test sequence behaves as required.

For this method, the SIPROTEC 5 device must be in Simulation mode too. Open the Test editor for analog inputs and then select a test sequence in the [20.2.6 Online](#) tab. A project must be open in order to select a test sequence. The online device that represents the SIPROTEC 5 to be tested must be assigned to an offline configuration in this project. This offline configuration must have at least 1 test sequence.

- **External Test Equipment as Source**

External test equipment is used with this method. Different operation modes are simulated with this test equipment. Connect the test equipment either directly to the SIPROTEC 5 device or further away, for example to the exchange terminals in the control cabinet. The following errors can be identified depending on the connection point of the test equipment:

- Incorrect routing between the measuring points and analog inputs
- Defective terminals
- Turner in the wiring
- Incorrect vector group
- Incorrect direction between current and voltage

For this method, the SIPROTEC 5 device can be in commissioning or process mode. Only open the Test editor for analog inputs. You will then be able to check the current and voltage values present at the measuring points immediately.

- **Process Values as Source**

Use this method to observe the current and voltage values present at the measuring points under real operating conditions. You can identify the errors described under **External test equipment as source**. For this method, the SIPROTEC 5 device must be in process mode. For this method, you need to open the Test editor for analog inputs. You will then be able to check the current and voltage values present at the measuring points immediately.

The SIPROTEC 5 device must either be in simulation mode, commissioning mode, or process mode, depending on the selected source. The following features show which device mode SIPROTEC 5 device is in:

- **Simulation Mode**

- The header for analog inputs of Test editors is orange.
- The instructions **Simulated values are displayed** can be found in the Test editor for the header of analog inputs.
- The information **Simulation mode** is periodically hidden and displayed in the SIPROTEC 5 device display.

- **Commissioning Mode**

- The header of Test editors for analog inputs is yellow.
- The instructions **Normal operating values are displayed** can be found in the Test editor for the header of analog inputs.
- The information **Commissioning** is periodically hidden and displayed in the SIPROTEC 5 device display.

- **Process Mode**

- The header of Test editors for analog inputs is yellow.
- The instructions **Normal operating values are displayed** can be found in the Test editor for the header of analog inputs.

If the SIPROTEC 5 device is in simulation mode or commissioning mode and the Test editor for analog inputs is closed, the SIPROTEC 5 device remains in current device mode. Additional test functions can be executed that require one of these device modes. If you do not want to execute any more test functions and want to continue with process mode, you must restart the SIPROTEC 5 device in process mode.

The following section describes the test method for testing test sequences.

Test Sequence

The test method consists of the following steps:

- Open the project that contains the offline configuration that belongs to the online device. You find more information about this under [5.1.3 Opening a Project](#).
- Make sure that the offline configuration that belongs to the online device contains at least one test sequence. If necessary, generate a new test sequence. You find more information about this under [13.1 Overview of Test Sequences](#).
- Make sure that the offline configuration that belongs to the online device is assigned. If necessary, assign the offline configuration to the online device. You find more information about this under [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#).
- Open the Test editor for analog inputs.
- If the SIPROTEC 5 device is not in simulation mode, restart the SIPROTEC 5 device in simulation mode. You find more information about this under [15.3.6 Restarting the SIPROTEC 5 Device in Simulation Mode](#).
- Select the test sequence and start the test.
- If you want to continue with the normal process, restart the SIPROTEC 5 device in process mode. You find more information about this under [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#).

Opening Test Editor for Analog Inputs

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Analog inputs**.

The Test editor for analog inputs is displayed in the scope of operation.

Selecting Test Sequence and Starting

- ✧ Open the **Online** tab.
- ✧ Open the **Test environment** palette in this tab.
- ✧ Select the test sequence with **Select test sequence** from the list box that should be tested. The list box contains the names of all the test sequences in the offline configuration that belongs to the online device.
- ✧ Select the **Immediately start test sequence** option.
- ✧ Click **Start**.

The test sequence starts.

A phasor diagram can be observed in the left window of the Test editor for analog inputs. Numerical values can be checked in the right-hand window of the Test editor.

15.4.3 Testing Circuit breakers

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

The switching performance of circuit breakers can be checked with the [20.1.26 Test Editor for Circuit Breakers](#) during the primary test. The prerequisite for performing **Circuit breaker test** successfully is that there should be no protection function in pick-up state and the initial Circuit breaker position should be closed.

The circuit breaker opens and then automatically closes during the test. Depending on the circuit-breaker type, the testing method applied can be either 1-pole or 3-pole. The circuit breaker is always switched in a non-interlocked way, regardless of the testing method selected. Spontaneous indications log the behavior of the circuit breaker.

You can save the indications independent of the other project data in external files. You can save all indications or specific and individually marked indications in a file. The indications are saved in **CSV** (Comma-Separated Values) format. With this format, data is generated to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate indications according to various criteria.

In order to be able to execute the described test function, the SIPROTEC 5 device to be tested must be in process mode. For instance, if the SIPROTEC 5 device is in commissioning or simulation mode on account of another test function, you must restart the SIPROTEC 5 device in process mode.

You can check whether this requirement and the recommendations are met from the following:

- The header of the Test editors for the circuit breaker is yellow.
- The instructions **Circuit-breaker test can be executed** can be found in the header of the Test editor of the circuit breaker.



NOTE

Do not use this test function for normal switching operations. Carry out normal switching operations with the on-site operation panel of the SIPROTEC 5 device or with a connected substation automation technology.

Test Sequence

The test sequence consists of the following steps:

- Open the Test editor for the circuit breaker.
- If the SIPROTEC 5 device is not in process mode, restart the SIPROTEC 5 device in process mode. You find more information about this under [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#).
- Start the test process for the circuit breaker and check the responses.
- Save optional indications in a file.



WARNING

Warning of danger due to unauthorized switching states.

Non-compliance with safety instructions means that death, serious injuries, or significant property damage can occur.

- ✧ Primary tests may be done only by personnel who are skilled electricians and who are familiar with the startup of protection systems, with the operation of the system and with safety regulations and provisions (switching, grounding, etc.).

Opening the Test Editor for Circuit Breakers

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Circuit breaker**.

The Test editor for the circuit breaker is displayed in the scope of operation.

Starting the Test Process and Checking the Responses

- ✧ Open the window **Test functions** in the Test editor for circuit breaker.

The window contains one group for every circuit-breaker in the column **Test functions**. As a prerequisite, the function group of a circuit breaker must have the **Circuit-breaker test** function.

- ✧ Open the group of the circuit breaker to be tested.

The group contains several test methods depending on the type of circuit breaker.

- ✧ To activate a specific testing method, click the **Start** key that belongs to the respective test method.

If the confirmation ID for Setting/Operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes. The current and all other state changes are now released by the entry of the confirmation ID. When you close the project or disconnect the communication connection to the SIPROTEC 5 device, the release is canceled. The test process starts.

Indications appear in the **Indication overview** window about the testing process state.

Saving Indications in a File

- ✧ If you want to save all indications, make sure that no individual indication is selected.
- or -
- ✧ If you want to save individual indications, select the relevant ones.

- ✧ Click the  button in the [20.7.19 Toolbar of the Test Editor for Circuit Breaker](#).

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click on **Save**.

The indications are saved to a file.

15.4.4 Testing Control Functions

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Using the [20.1.25 Test Editor for Control Functions](#), you can test the control functions for switching devices such as circuit breakers, tap changers, and disconnecter switches during a primary test. A requirement for this is that the function groups of the switching devices to be tested must contain the **Control** function.

In order to check a control function, change the current state of a circuit breaker or a disconnecter switch. Do so via **Open to Closed** or from **Closed to Open**. Or change the position of a tap changer with the commands **Higher** or **Lower**. If the changes are successful, the new states will be displayed in the Test editor for control functions. In addition, spontaneous indications log the response of the switching device.

You can save the indications independent of the other project data in external files. You can save all indications or specific and individually mark indications in a file. The indications are saved in **CSV** (Comma-Separated Values) format. With this format, data is generated to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate indications according to various criteria.

In order to be able to execute the described test function, the SIPROTEC 5 device to be tested must be in process mode or in simulation mode. For instance, if the SIPROTEC 5 device is in commissioning or simulation mode on account of another test function, restart the SIPROTEC 5 device in process mode.

In addition to this requirement, Siemens makes the following recommendations:

- Activate the test mode. All signals transmitted are now identified with a test bit.
- Leave the interlocking conditions activated.

You can check whether this requirement and the recommendations are met from the following:

- The header of the Test editors for control functions is yellow.
- The text indication **Test of the control functions can be carried out (Telegrams are sent with the test bit activated)** is given in the header of the Test editor for control functions.



NOTE

Do not use this test function for normal switching operations. Carry out normal switching operations with the on-site operation panel of the SIPROTEC 5 device or with a connected substation automation technology.

Test Sequence

The test sequence consists of the following steps:

- Opening the Test editor for control functions.
- If the SIPROTEC 5 device is not in process mode, restart the SIPROTEC 5 device in process mode. You find more information about this under [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#).
- Activating the identification of the signals with test bits (recommended).
- Optionally, deactivating the interlocking conditions (not recommended).
- Triggering state changes of the switching devices and check the responses.
- Saving optional indications in a file.



WARNING

Warning of danger due to unauthorized switching states.

Non-compliance with safety instructions means that death, serious injuries, or significant property damage can occur.

- ✧ Primary tests can be done only by personnel who are skilled electricians and who are familiar with the startup of protection systems, with the operation of the system and with safety regulations and provisions (switching, grounding, etc.).

Opening the Test Editor for Control Functions

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Control functions**.

The Test editor for control functions is displayed in the scope of operation.

Activating or Deactivating Test Mode

- ✧ To activate the test mode, in the header of the Test editor for control functions, click the **Activate test mode** button.

The test mode is activated. The header turns yellow. The button now has the designation **Deactivate test mode**.

- ✧ To deactivate the test mode, click the **Deactivate test mode** button in the header of the Test editor for control functions.

The test mode is deactivated. The header turns orange. The button now has the designation **Activate test mode**.

Activating / Deactivating Interlocking Conditions

- ✧ To deactivate interlocking conditions, click the **Ignore interlocking conditions** button in the header of the Test editor for control functions.

The interlocking conditions are deactivated. The header turns orange. The button now has the designation **Consider interlocking conditions**.

- ✧ To activate the interlocking conditions, in the header of the Test editor for control functions, click the **Consider interlocking conditions** button.

The interlocking conditions are activated. The header turns yellow. The button now has the designation **Ignore interlocking conditions**.

Triggering the State Changes and Check the Reactions

- ✧ Open the **Control functions** window in the Test editor for control functions.

One row is assigned to each switching device, whose function group contains the **Control** function. In the **Current state** column, you can see the current states of the switching devices, for example, **on** or **off**.

- ✧ In the **New state** column, open the list box of the switching device whose state you want to change.
- ✧ Select a new state for the switching device from this list box.
- ✧ Click the **Select** button in the row of the switching device.

If the confirmation ID for switching is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.

- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes. The current and all other state changes are now released by the entry of the confirmation ID. When you close the project or disconnect the communication connection to the SIPROTEC 5 device, the release is canceled. The switching device is now selected for the switching procedure.

- ✧ Click **Operate**.

The control function is executed.

The new state of the switching device is entered in the **Current state** column. Indications appear in the **indication overview** window about the progress of the test. Responses are based on the control model configured for the circuit breaker.

Saving Indications in a File

- ✧ If you want to save all indications, make sure that no individual indication is selected.

- or -

- ✧ If you want to save individual indications, select the relevant ones.

- ✧ Click the  button in the [20.7.18 Toolbar of the Test Editor for Control Functions](#).

The **Save as file** dialog opens.

- ✧ Enter a file name.

- ✧ Click **Save**.

The indications are saved to a file.

15.4.5 Testing Protection Functions

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Protection-function reactions can be checked for analog or binary input values with the [20.1.27 Test Editor for Protection Functions](#). This test function is helpful in optimizing protection function settings and to test-signal routing.

The following options are available to test a protection function:

- **Checking Protection Functions with Process Values**

With this method, the effectiveness of the protection functions is observed under real operating conditions in DIGSI 5. This method can be applied during startup or during operation. The SIPROTEC 5 device must be in process mode as well. In this mode, all switching devices are switched on the SIPROTEC 5 device.

The protection function to be tested only needs to be opened in the Test editor for protection functions with this method. The response of the protection function can then be immediately checked against the process values.

- **Checking Protection Functions with External Test Equipment**

External test equipment is connected to the SIPROTEC 5 device with this method. Different operating modes are simulated with this test equipment and the effectiveness of protection functions can be observed in DIGSI 5. This method can be applied before startup. The SIPROTEC 5 device must be in process mode as well. In this mode, all switching devices are switched on the SIPROTEC 5 device.

The protection function to be tested only needs to be opened in the Test editor for protection functions with this method. The response of the protection function can then be immediately checked against external test procedures.

- **Checking Protection Functions with Test Sequences**

In this method, use a test generator integrated into a SIPROTEC 5 device. When the device is in simulation mode, different values are simulated with the test sequences that are configured in DIGSI 5. The performance of protection functions can be observed in DIGSI 5. This method can be applied before or during startup. The SIPROTEC 5 device must be in simulation mode as well. In this mode, all activated protection functions are listed in test mode. Standard SIPROTEC 5 device relays are uncoupled from the functions. This means the switching devices connected to SIPROTEC 5 are **not** switched.

The protection function to be tested only needs to be opened in the Test editor for protection functions with this method and then a test sequence is selected in the [20.2.6 Online](#) tab. A project must be open in order to select a test sequence. The online device that represents the SIPROTEC 5 to be tested must be assigned to an offline configuration in this project. This offline configuration must have at least one test sequence.

During the protection function test execution, spontaneous Indications are logged. The indications are written in one common list for all protection functions. If this list is deleted, all spontaneous indications are deleted along with it.

Displayed spontaneous indications can be saved as snapshots. When generating a snapshot, the indications currently displayed are saved in the offline configuration of the online device. When each snapshot is generated, it is labeled with the current date and time automatically. You can create as many snapshots as you like and then use the time ID to select and display them in the [20.4.4 Indication Snapshot](#) table.

You can save the indications independent of the other project data in external files. You can save all indications or specific and individually marked indications in a file. The indications are saved in **CSV** (Comma-Separated Values) format. With this format, data is generated to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate indications according to various criteria.

Certain protection functions, for example, for distance protection or triggering, can be visualized graphically. These graphics include zone diagrams and trigger characteristic curves. If a protection function can be displayed graphically, performance can also be checked using the changes in this graphic. Different editing functions are available to adjust the graphic display or to copy, save or print the graphic. These editing functions are identical to the editing functions in the graphic window in [20.1.9 Settings Editor](#).

The SIPROTEC 5 device must either be in process mode or simulation mode, depending on the testing method selected. The following features show which device mode SIPROTEC 5 device is in:

- **Process Mode**

- The header of the Test editors for the Protection function is yellow.
- The instructions **Protection function test can be executed (normal operation values are displayed)** can be found in the header of the Test editor of the circuit-breaker for communication protocols.

- **Simulation Mode**

- The header of the Test editors for the Protection-function editor is orange.
- The instructions **Protection function test can be executed (simulated values are displayed)** can be found in the header of the Test editor of the Protection-function editor.
- The information **Simulation mode** is periodically hidden and displayed in the SIPROTEC 5 device display.

If the SIPROTEC 5 device is in simulation mode and you close the Test editor for protection functions, the SIPROTEC 5 device remains in simulation mode. Additional test functions can be executed - these require simulation mode. If you do not want to execute any more test functions and want to continue with process mode, restart the SIPROTEC 5 device in process mode.

The following section describes the test sequence for testing protection functions with test sequences.

Test Sequence

The test sequence consists of the following steps:

- Open the project that contains the offline configuration that belongs to the online device. You find more information about this under [5.1.3 Opening a Project](#).
- Make sure that the offline configuration that belongs to the online device contains at least one test sequence. If necessary, generate a new test sequence. You find more information about this under [13.1 Overview of Test Sequences](#).
- Make sure that the offline configuration that belongs to the online device is assigned. If necessary, assign the offline configuration to the online device. You find more information about this under [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#).
- Open the protection functions to be tested in the Test editor for protection functions.
- If the SIPROTEC 5 device is not in simulation mode, restart the SIPROTEC 5 device in simulation mode. You find more information about this under [15.3.6 Restarting the SIPROTEC 5 Device in Simulation Mode](#).
- Select the test sequence and start the test.
- Save spontaneous indications as indication snapshots.
- Save optional indications in a file.
- Use the optional editing functions for the graphic displayed.
- If you want to continue with the normal process, restart the SIPROTEC 5 device in process mode. You find more information about this under [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#).

Opening the Protection Function to be Tested in the Test Editor for Protection Functions

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ Open the **Protection functions** folder in this folder.
- ✧ In this folder, open the Protection group containing the protection function to be tested.
- ✧ In this folder, double-click the name of the protection function to be tested.

The Test editor for protection functions is displayed in the scope of operation. If the selected protection function can be displayed graphically, the Test editor diagram or characteristic curve will be displayed in the Graphic window.



NOTE

For the 7SS device type, it is possible to view the differential current (I_{diff}) and the restraint current (I_{restr}) on the characteristic curve by selecting the respective check-box options for check zone and bus zone in the test editor of the protection function.

Selecting the Test Sequence and Starting the Test

- ✧ Open the **Online** tab.
- ✧ Open the **Test environment** palette in this tab.
- ✧ From the **Select test sequence** list box, select the test sequence with which the test should be executed. The list box contains the names of all the test sequences in the offline configuration that belongs to the online device.
- ✧ If the test sequence should be executed immediately upon starting, select the **Immediately start test sequence** option.

- ✧ If the test sequence should be executed only after a specific binary input is set, select the **If following binary input is set** option. Next, select the binary input in question with the list box assigned to the option.
- ✧ Click **Start**.

When the **Immediately start test sequence** is selected, the test sequence starts immediately. After selecting the **If the following binary input is set** option, click the **Start** button to release the test sequence. The test sequence first starts when the selected binary input is set.

Generating Snapshots of Indications

- ✧ Click the  **Create snapshot** button in the [20.7.20 Toolbar of the Test Editor for Protection Functions](#).

The displayed indications are stored as snapshots in the assigned offline configuration in the project.

- ✧ In order to save the snapshot permanently, click the  button in the [20.7.1 DIGSI 5 Toolbar](#).

You can now view the saved snapshots in the **Indications snapshot** editor.

Saving Indications in a File

- ✧ If you want to save all indications, make sure that no individual indication is selected.
- or -
- ✧ If you want to save individual indications, select the relevant ones.
- ✧ Click the button in the Test editor for protection-functions toolbar .

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The indications are saved to a file.

Using Editing Functions for Graphics

- ✧ In order to save the displayed graphic, click the  button in the Test editor for the protection-functions toolbar. Information about additional progress of this procedure can be found under [8.2.3.6 Copying or Saving Graphics in Graphics Window](#).
- ✧ In order to copy the displayed graphic, click the  button in the Test editor for the protection-functions toolbar. Information about additional progress of this procedure can be found under [8.2.3.6 Copying or Saving Graphics in Graphics Window](#).
- ✧ To hide or display the grid in the Graphic window, click the  button in the Test editor for the protection-functions toolbar. Information about additional progress of this procedure can be found under [8.2.3.4 Showing and Hiding Grids in the Graphics Window](#).
- ✧ To print the displayed graphic, click the  button in the Test editor for the protection-functions toolbar. Information about additional progress of this procedure can be found under [8.2.3.7 Printing a Graphic in the Graphics Window](#).
- ✧ To scale the displayed graphic, use the button in the Test editor for the protection-functions toolbar  and  or the list box . Information about additional progress of this procedure can be found under [8.2.3.5 Scaling View in the Graphics Window](#).

15.4.6 Testing Communication Protocols

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

A default value can be set for signals and sent via the system interface with [20.1.28 Test Editor for Communication Protocols](#). Signals are identified as standard with a test bit. You cannot deactivate this identification. However, Siemens does recommend manual default signals be identified with a test bit.

In order to be able to execute the described test function, the SIPROTEC 5 device to be tested must be in Commissioning mode.

You can check whether this requirement is met from the following:

- The header of the Test editors for the communication protocol is yellow. As a prerequisite, the test bit must not be deactivated. If the test bit is deactivated, the header is orange, even if the SIPROTEC 5 device is in commissioning mode.
- The instructions **Communication-protocols test can be performed (telegrams are sent with test flag enabled)** can be found in the Test editor for the communication protocol.
- The information **Commissioning** is periodically hidden and displayed in the SIPROTEC 5 device display.

If the Test editor for communication protocols is closed, then the SIPROTEC 5 device will remain in commissioning mode. You can then execute additional test functions - these require the commissioning mode. If you do not want to execute any more test functions and want to continue with process mode, restart the SIPROTEC 5 device in process mode by clicking the **Activate process mode** button.

Test Sequence

The test sequence consists of the following steps:

- Open the Test editor for communication protocols.
- If the SIPROTEC 5 device is not in commissioning mode, restart the SIPROTEC 5 device in commissioning mode. You find more information about this under [15.3.5 Restarting the SIPROTEC 5 Device in Commissioning Mode](#).
- Optionally, the signal identification can be deactivated with test bits (not recommended).
- Select a value for a signal and send this via the system interface.
- If you want to continue with the normal process, restart the SIPROTEC 5 device in process mode. You find more information about this under [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#).

Opening the Test Editor for Communication Protocols

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Communication protocols**.

The Test editor for communication protocols is displayed in the scope of operation. The signal for selected online devices, embedded in the signal list, is displayed in the **Signal** column. Each signal type is displayed in the **Type** column.

Selecting Value for Signal and Sending via System Interface

- ✧ Filter the signals according to name or type with the list box at the upper end of the **Signals** and **Type** if necessary. Additional information can be found under [3.2.4 Filtering Column Content](#).

The display is restricted to the function groups, functions, and function blocks containing the selected signal name or signal type.

- ✧ Filter the signals according to a specific protocol with the list box **Select protocol** in the [20.7.21 Toolbar of the Test Editor for Communication Protocols](#) if necessary.

The display is reduced to signals that are transmitted with this protocol.

- ✧ Open additional levels in the signal list until the desired signal is displayed.

If the signal has a value, this value can then be seen in the **Current value** column.

- ✧ Click the cell in the **Simulated value** column that the signal belongs to.

A list box opens.

- ✧ Select a new value for the signal from this list box.
- ✧ Click the button that belongs to the signal in the **Set value** column.

A confirmation ID is requested for some signal types. If the associated confirmation ID is activated, the [20.6.17 Enter Confirmation ID](#) dialog opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes. The current and all other state changes for the respective signal type are now released by entering the confirmation ID. When you close the project or disconnect the communication connection to the SIPROTEC 5 device, the release is canceled.

The state of the selected signal is changed. A new signal value is entered in the **Current value** column.

15.4.7 Reading the Communication Log

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Every communication module inside the SIPROTEC 5 device and also the integrated Ethernet interface each have their own communication log. This SIPROTEC 5 device communication log can be read out with the [20.1.23 Test Editor for Communication Modules](#).

A communication log protocols the current communication-module state. Failures, test and diagnosis operation or communication capacity, for example, are included in the current state. Every change to the current state leads to a indication in the communication log.

A communication log saves up to 500 indications simultaneously. If a communication log has already saved 500 indications, then the oldest indication is deleted from the communication log if a new indication arrives. A communication log cannot be deleted.

You can save the indications read independently of the other project data in external files. You can save all indications or specific and individually highlighted indications in a file. The indications are saved in **CSV** (Comma-Separated Values) format. With this format, data is generated to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate indications according to various criteria.



NOTE

Additional information about individual indications can be found in the respective Communication manual and in the Operating manual.

Opening Test Editor for Communication Modules

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Communication modules**.

The Test editor for communication modules is displayed in the scope of operation. Information about communication modules is structured in groups on the left-hand window of this Test editor. Each group corresponds to a communication module as well as the integrated Ethernet interface of the SIPROTEC 5 device.

Reading the Communication Log

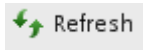
- ✧ In the left-hand window, open the communication module group for which the communication log should be read.

The communication module group contains one group per communication channel and the group **Communication log**.

- ✧ Mark the **Communication log** group.

The communication log is read. Indications from the communication log are displayed in the right-hand window of the Test editor for communication modules.

- ✧ To update a indication, in the [20.7.16 Toolbar of the Test Editor for Communication Modules](#), click the



button.

Saving Indications in a File

- ✧ To save all indications, mark the group **Communication log**.
- or -
- ✧ If you want to save individual indications, select the relevant ones.
- ✧ In the Test editor for communication modules toolbar, click the  button.

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The indications are saved to a file.

15.4.8 Reading Device-Diagnosis and Security Log

If a SIPROTEC 5 device is connected online with the DIGSI 5-PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Every SIPROTEC 5 device has a device-diagnosis log and a security log. Both logs can be read from the SIPROTEC 5 device with the [20.5.7 Logs](#) tab of the [20.5.3 Device Information](#).

Both logs have the following functions:

- **Security Log**

The security log protocols access to areas of the SIPROTEC 5 device with limited access rights. The security log also protocols failed and unauthorized access attempts. Each of the accesses mentioned lead to a indication in the security log.

- **Device-Diagnosis Log**

The device-diagnosis log saves indications for the following events:

- Required maintenance, for example battery replacement
- Identified hardware defect
- Compatibility problems

The indications are supplemented by practical instructions. For example, **Inform the repair service**. The device diagnosis log is especially required if the SIPROTEC 5 device is in supervision mode or is no longer ready for operation.

Both logs save up to 500 indications each simultaneously. If a log has already saved 500 indications, then the oldest indication is deleted from the log if a new indication arrives. You can delete the logs after you complete the operation **Get all data from device**. It is also possible to delete logs from the device.

You can save the indications read independently of the other project data in external files. You can save all indications or specific and individually marked indications in a file. The indications are saved in **CSV** (Comma-

Separated Values) format. With this format, data is generated to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate indications according to various criteria.



NOTE

You can download the logs from the **Logs** tab of the **Device information** editor of the project device, even if there is a product-code mismatch with the connected device.

Similarly for an online device, even if no connection can be established to the online device due to a product-code mismatch, you can still download the logs from the **Logs** tab of the **Device information** editor.

You can find additional information about individual indications in the respective Device manual and in the Operating manual.

Opening Device Information and Displaying Logs Tab

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Double-click **Device information**.

The device information is displayed in the scope of operation.

- ✧ Select the **Logs** tab.

There is one group per device-diagnosis log and every security log in the left-hand window.

Reading a Log

- ✧ Mark the log group in the left window that should be read.

The log is read. Indications from the log are displayed in the right-hand window of the **Logs** tab.

- ✧ To update a indication, in the [20.7.25 Toolbar of the Device Information](#) , click the button  **Refresh** .

Saving Indications in a File

- ✧ To save all log indications, mark the log group.
- or -
- ✧ If you want to save individual indications, select the relevant ones.
- ✧ Click the  button in the device information toolbar.

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The indications are saved to a file.

15.4.9 Reading Diagnostics Information

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Diagnosis information can be read from the SIPROTEC 5 device with the [20.5.9 Diagnostic Information](#) tab of the [20.5.3 Device Information](#). Diagnostics information is available for CPU, for IP configuration or for system time.

Opening the Device Information and Displaying Diagnostics Information Tab for an Online Device

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online access links, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Double-click **Device information**.

The device information is displayed in the scope of operation.

- ✧ Select the **Diagnostics information** tab.

There is 1 group per SIPROTEC 5 device mainboard in the left window and it is provided for every communication module inside the SIPROTEC 5 device.

Opening the Device Information and Displaying Diagnostics Information Tab for an Offline Device

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of available devices, open the offline device that represents the SIPROTEC 5 device to be tested.
- ✧ Double-click **Device information**.

The device information is displayed in the scope of operation.

- ✧ Select the **Diagnostics information** tab.

There is 1 group per SIPROTEC 5 device mainboard in the left window and provided for every communication module inside the SIPROTEC 5 device.

Reading Diagnostics Information

- ✧ Open or highlight a group.

If diagnostics information about this group is available, it will be read out and displayed in the right-hand window of the **diagnostics information** tab.

- ✧ To update a diagnostics information, click the  **Refresh** button in the [20.7.25 Toolbar of the Device Information](#) .

15.4.10 Checking Topology-Measured Values for Protection-Data Communication

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Topology-measured values for protection-data communication can be checked with the [20.1.29 Test Editor for Protection Topology](#). Topology-measured values are Siemens predefined current- and voltage-measured values. These measured values are recorded every 2 seconds by SIPROTEC 5 devices participating in the protection-data communication and are then sent to the other respective SIPROTEC 5 devices via protection interfaces. At the same time, current- and voltage- measured values of different devices are synchronized to one another.

The Test editor for protection topology has 2 tabs. To check the topology-measured values, select the [20.1.31 Phasors](#) tab. This shows the current- and voltage-measured values as a percentage according to magnitude and phase, separately for each SIPROTEC 5 device. In this case, 100 % is equivalent to the rated current or rated voltage of a phase. The left-hand window of the **Phasors** tab shows the measured values as a phasor diagram. The right-hand window of the tab shows the measured values in a table as numerical values.

Opening the Test Editor for Protection Topology and Checking Topology-Measured Values

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Protection topology**.

The Test editor for protection topology is displayed in the scope of operation.

✧ Select the **Phasors** tab.

Topology measured values are displayed as phasor diagrams and numerical values.

15.4.11 Checking Diagnosis Data for Protection-Data Communication

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

Different diagnosis data about protection-data communication can be checked with DIGSI 5. These diagnosis data is especially useful if data faults or other irregularities occur in a communication connection, for example runtime fluctuations.

Diagnosis data can be checked for the following areas of a protection-data communication:

- **Protection Topology**

Check diagnosis data for protection topology with the [20.1.29 Test Editor for Protection Topology](#). This Test editor shows comprehensive information about protection topology in the [20.1.30 Protection Topology](#) tab. This tab also contains the following diagnosis data, separately for every SIPROTEC 5 device participating in the protection communication:

- SIPROTEC 5 device address in the protection topology
- Circuit-breaker position
- Availability of protection communication within the last minute as a percentage
- Availability of protection communication within the last hour as a percentage
- Runtime between a local SIPROTEC 5 device and a neighboring SIPROTEC 5 device

- **Protection Interface**

Check diagnosis data for the protection interface with the [20.1.23 Test Editor for Communication Modules](#). This Test editor shows signal information of all SIPROTEC 5 device protection interfaces, for example transmission rates or average signal runtimes.

- **Protection Interfaces Protocol**

Check the diagnosis data for protection-interface protocol with the [20.5.3 Device Information](#). The [20.5.9 Diagnostic Information](#) tab contains information about the following areas:

- Interface status
- Media status
- COM link
- HDLC
- Interface settings



NOTE

Additional information about parameters and settings can be found in the corresponding Device manual.

Checking Diagnosis Data for Protection Topology

✧ Open the [3.1.2 Project Tree](#).

✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.

✧ Open the **Test Suite** folder for this online device.

✧ In this folder, double-click **Protection topology**.

The Test editor for protection topology is displayed in the scope of operation.

✧ Select the **Protection topology** tab.

Comprehensive topology information is displayed in the upper window of the tab. Device-specific information is structured in groups in the left window. Each group corresponds to one of the SIPROTEC 5 devices involved in the protection-data communication.

- ✧ Open the SIPROTEC 5 device group whose diagnosis data is to be checked.

Each device group contains the groups, **General** and **Protection interface**.

- ✧ Mark one of the groups.

Diagnosis data from the selected group is displayed in the right-hand window of the **Protection topology** tab.

Checking Diagnosis data for the Protection Interface

- ✧ Open the project tree.
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Communication modules**.

The Test editor for communication modules is displayed in the scope of operation. Diagnosis data is structured in groups in the left-hand window of this Test editor. Each group corresponds to a communication module as well as the integrated Ethernet interface of the selected SIPROTEC 5 device.

- ✧ Open the communication module group where the protection interface is configured.

The communication module group contains 1 group per communication channel and the group **Communication log**.

- ✧ Open the communication channel group that is configured as the protection interface.

The communication channel group contains the groups **Protection interface** and **HDLC loop test**.

- ✧ Mark the **Protection interface** group

Diagnosis data from the selected group is displayed in the right-hand window of the Test editor for the communication module.

Checking Diagnosis Data for Protection-Interface Protocol

- ✧ Open the project tree.
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Double-click **Device information**.

The device information is displayed in the scope of operation.

- ✧ Select the **Diagnostics information** tab.

Diagnosis data is structured in groups on the left window of this tab. The first group corresponds to the SIPROTEC 5 device mainboard. Additional groups correspond to the SIPROTEC 5 device slots, for example slot F.

- ✧ Open the communication-module slot group where the protection interface is configured.

The communication-channel group contains the groups **Channel 1**, **Channel 2**, and **ComBase**.

- ✧ Open the communication-channel group that is configured as the protection interface.

The communication-channel group contains the groups **Protection interface** and **HDLC loop test**.

- ✧ Open the **Protection interface** group.

The **Protection interface** group contains the groups **Media status**, **COM-Link**, **HDLC**, and **Settings**.

- ✧ Mark one of these groups.

Diagnosis data from the selected group is displayed in the right-hand window of the **Diagnostics information** tab.

15.4.12 Executing HDLC Loop Test for Protection-Data Communication

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can carry out various test and diagnostics functions for this SIPROTEC 5 device.

A HDLC loop test can be executed with the [20.1.23 Test Editor for Communication Modules](#). If a protection-interface connection cannot be established, then faulty or incorrectly configured components can be identified in the protection topology with the HDLC loop test. In the case of problems with existing protection connections, you can determine the quality of data transmission.

The fundamental principle of the HDLC loop test is based on the fact that you switch the data from the transmitting channel to the receiving channel at a point in the communication connection. When the loop test is activated, special data is transmitted with the expectation that the same data will also be received. When the HDLC loop test starts, normal telegram communication is interrupted. Test telegrams are sent with the set baud rates at the sent output. Test telegrams sent and received are counted and checked for parity. Telegrams received with errors are also displayed.

Additional information and examples about HDLC loop test can be found in the Operating manual.

In order to be able to execute the described test function, the SIPROTEC 5 device to be tested must be in commissioning mode.

You can check whether this requirement is met from the following:

- The header of Test editors for the communication module is yellow.
- The instructions **Loop test can be executed** can be found in the header of the Test editor for communication modules .
- The information **Commissioning** is periodically hidden and displayed in the SIPROTEC 5 device display.

If the Test editor for communication module is closed, then the SIPROTEC 5 device will remain in commissioning mode. You can then execute additional test functions. These require the commissioning mode. If you do not want to execute any more test functions and want to continue with process mode, restart the SIPROTEC 5 device in process mode.

Test Sequence

The test sequence consists of the following steps:

- Optionally, adjust the parameter for the HDLC loop test and load the offline configuration into the SIPROTEC 5 device.
- Open the Test editor for communication protocols and select the HDLC loop test.
- If the SIPROTEC 5 device is not in commissioning mode, restart the SIPROTEC 5 device in commissioning mode. You find more information about this under [15.3.5 Restarting the SIPROTEC 5 Device in Commissioning Mode](#).
- Set the duration of the HDLC loop test and start the loop test.
- If you do want to continue with the normal process, restart the SIPROTEC 5 device in process mode. You find more information about this under [15.3.4 Restarting the SIPROTEC 5 Device in Process Mode](#).

Adjusting the Parameter for the HDLC Loop Test and Loading into the SIPROTEC 5 Device

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Open the offline configuration in the project of the relevant SIPROTEC 5 device.
- ✧ Double-click **Hardware and protocols** in this offline configuration.

The [20.1.7 Device View](#) is displayed in the working area.

- ✧ Mark the communication module that is configured for the protection communication in the network view.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Select the **Properties** tab.
- ✧ Select the [19.6.8 HDLC Loop Test Settings](#) group for the respective communication channel.

- ✧ Adjust the currently set transmission rate if necessary with the list box **Transfer rate**.
- ✧ If the frequency of the telecommunication equipment connected is to be used for the HDLC loop test, select the setting **On** with the list box **Act. HDLC frequency recovery**. If you want the frequency to be generated by the communication module itself, select the setting **Off**.
- ✧ If you change at least one of the above settings, the offline configuration must be loaded into the SIPROTEC 5 device. You find more information about this under [15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device](#).

Opening Test Editor for Communication Modules and Selecting HDLC Loop Test

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the list of online accesses, open the online device that represents the SIPROTEC 5 device to be tested.
- ✧ Open the **Test Suite** folder for this online device.
- ✧ In this folder, double-click **Communication modules**.

The Test editor for communication modules is displayed in the scope of operation. One group is displayed in the left window of the Test editor for each communication module as well as for the integrated Ethernet interface of the SIPROTEC 5 device.

- ✧ Open the communication module group where the protection interface is configured.

The communication module group contains one group per communication channel and the group **Communication log**.

- ✧ Open the communication-channel group that is configured as the protection interface.

The communication-channel group contains the groups **Protection interface** and **HDLC loop test**.

- ✧ Highlight the **HDLC loop test** group.

Operating elements for the HDLC loop test are displayed in the right-hand window of the Test editor for the communication module.

Setting the Duration of the HDLC Loop Test and Starting the Loop Test

- ✧ Select the duration in seconds for the loop test with **Loop test duration** from the list box.
- ✧ To start the loop test, click **Start**.

The loop test is started and runs for the set loop-test duration.

- ✧ To cancel the loop test early, click **Stop**.

The loop test is canceled.

15.5 Managing Process Data

15.5.1 Measured and Metered Values

15.5.1.1 Overview of Measured and Metered Values

SIPROTEC 5 devices record and save a range of different measured and metered values. The SIPROTEC 5 device records measurands at measuring points and forwards them to the function groups. Within a function group, further measurands are calculated from the measured values, and are required for the protection functions of this function group. The values calculated in this way include mean values, for example.

Detailed information about measured and metered values are given in the respective Device manual.

Categories

The measurands recorded and calculated by SIPROTEC 5 devices can be divided into the following categories.

- **Operational Measured Value**

Operational measured value are RMS values, for example, for voltage and current. Further values are calculated from the operational measured values, such as the apparent power or the phase displacement $\cos \phi$.

- **Fundamental Components and Symmetrical Components**

The fundamental components are calculated from the instantaneous values through a Fourier filter (integration interval: 1 period). The results are phasor quantities that are described by way of the magnitude and phase. The symmetrical components are calculated from the voltage and current phasors. These are also phasor quantities.

- **Function-Specific Measured Values**

Protection functions require special function-specific measured values. These include, for example, thermal measured values of phases or operational reactances of phase loops.

- **Minimum, Maximum, and Mean Values**

Minimum, maximum, and mean values can be formed on the basis of different measurands or calculated variables, such as operational measured values, symmetrical components, or other selected values.

- **Energy Metered Values**

The SIPROTEC 5 device continually determines the values for the active and reactive energy from the power-measured values. The SIPROTEC 5 device calculates the energy output and the energy consumption. The summation over time begins immediately after the device has run up. You can set the energy value to 0 or to any other initial value you like. After one of these actions has been performed, the energy-value calculation continues with the new setting values.

- **Statistic Values**

The SIPROTEC 5 device can detect statistic values for motors (motor protection devices), circuit breakers and disconnector switches. These values include the number of times the motor has started, the circuit breaker has tripped or the number of switching procedures carried out by the disconnector switch.

- **User-Defined Measured and Metered Values**

You can define additional measured and metered values, such as pulse-metered values, through DIGSI 5 for user-specific applications.

Reading and Saving

You can use DIGSI 5 to read the measured and calculated values from the SIPROTEC 5 device and display them in the [20.4.5 Measurements](#) table. Tabs group the measurands together in the categories described above. Which categories and, as a result, which tabs the **Measurements** table actually contains depends on the type of the SIPROTEC 5 device and its functional scope. Each measurand occupies one row in the table and may be labeled with additional information, such as the quality, as well as the value itself.

You can use the **Measurements** table to perform the following actions:

- Read measured and metered values from the SIPROTEC 5 device
- Saving measured and metered values in a file
- Select the display mode for measured and metered values
- Save measured and metered values as snapshots in the offline configuration of the SIPROTEC 5 device
- Set and reset metered values and statistic values
- Reset minimum, maximum, and mean values

Snapshots

You can save values which have been read as snapshots in the offline configuration of the SIPROTEC 5 device. You can then display the values saved as snapshots in the [20.4.6 Measured-Value Snapshot](#) table, without any need for a communication connection with the SIPROTEC 5 device.

You can use the **Measured-value snapshots** table to perform the following actions:

- Select the snapshot and display relevant measured values
- Select the display mode for measured and metered values
- Save measured and metered values in a file

Related Topics

[15.5.1.2 Setting Parameters for Measured and Metered Value Processing](#)

[15.5.1.3 Opening the Measured Value Table and Reading Values](#)

[15.5.1.8 Saving Measured and Metered Values in a File](#)

[15.5.1.5 Creating Snapshots of Measured and Metered Values](#)

[15.5.1.4 Setting and Resetting Values in a SIPROTEC 5 Device](#)

15.5.1.2 Setting Parameters for Measured and Metered Value Processing

You have the following options for setting the parameters for measured-value and metered-value processing:

- You can set parameters for processing minimum, maximum, and mean values, as well as energy-metered values.
- You can set parameters for processing user-defined pulse-metered values.

Setting Parameters for Minimum, Maximum , and Mean Values as well as for Energy-Metered Values

- ✧ In [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to set parameters.
- ✧ Open the **Settings** folder.
- ✧ Double-click **Device settings**.

The Settings editor opens in the working area with the [20.5.10 Device Settings](#).

- ✧ Set the individual settings in the **Measurements** section.

Setting Parameters for User-Defined Pulse-Metered Values

- ✧ Open the [20.3.2 Information Routing](#).
- ✧ Open the function group which contains the **Pulse-metered value** function.
- ✧ Select the **Pulse-metered value** function.
- ✧ Open the [3.1.4 Inspector Window](#).
- ✧ Go to the **Properties** tab.
- ✧ Go to the **Settings** group.
- ✧ Set the parameters for the function.

- ✧ Select the metered value within the **Pulse-metered value** function.
- ✧ On the **Properties** tab, go to the **Details** group.
- ✧ Set the settings for the metered value.

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)
- ✧ [15.5.1.3 Opening the Measured Value Table and Reading Values](#)

15.5.1.3 Opening the Measured Value Table and Reading Values

To be able to read measured and metered values out from the SIPROTEC 5 device, to display them and to perform other actions, you will need to open the [20.4.5 Measurements](#) table. You can open this table for individual function groups of a SIPROTEC 5 device, for example for the **Line** function group. As a prerequisite, the SIPROTEC 5 device must have been entered in the online access list as an accessible device.

When you open the **Measurements** table, the measured and metered values of the function group are automatically read out from the SIPROTEC 5 device and displayed together with additional information about the measurands which have been read. The measurands are sorted into different categories on various tabs. Examples include **Operational measured values** or **Function values**. The value display is updated automatically at fixed cyclic intervals.

When the **Measurements** table is open, you can perform the following additional actions:

- Saving measured and metered values in a file
- Selecting the display mode for measured and metered values
- Saving measured and metered values as snapshots in the offline configuration of the SIPROTEC 5 device
- Setting and resetting metered values and statistic values
- Resetting minimum, maximum, and mean values

Opening the Measured-Values Table

- ✧ In the project tree, open the folder for the online device for which you wish to open the **Measured values** table.
- ✧ Open the **Measured values** folder.

You will see the names of all the function groups for which you can read measured and metered values from the SIPROTEC 5 device.

- ✧ Double-click the name of the function group for which you want to open the **Measured values** table.

The **Measured values** table is displayed in the working area.

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)
- ✧ [15.5.1.8 Saving Measured and Metered Values in a File](#)
- ✧ [15.5.1.7 Selecting the Display Mode](#)
- ✧ [15.5.1.5 Creating Snapshots of Measured and Metered Values](#)
- ✧ [15.5.1.4 Setting and Resetting Values in a SIPROTEC 5 Device](#)

15.5.1.4 Setting and Resetting Values in a SIPROTEC 5 Device

To be able to set and reset values in a SIPROTEC 5 device, open the [20.4.5 Measurements](#) table for the relevant function group of the SIPROTEC 5 device.

You can set values from the following categories to a definable value or reset them to 0:

- Minimum, maximum, and mean values: Reset
- Metered values: set and reset

You can set values to a definable value on an individual basis; however, you cannot reset values individually. You can either reset all the values in a category simultaneously or reset specific groups of values.

Resetting Values

- ✧ Go to the tab which contains the values to be reset.
- ✧ In the toolbar of the table, click on the **Measurements** table, on the  **Reset** button. This button is only active if the values displayed can be reset simultaneously. This button is not active, for example, if the **tab has been user defined. Values** is selected.

All values on the selected tab are reset.

- or -

- ✧ If you want to reset groups of metered values, click the **Reset** button assigned to the group.

The metered values in the relevant group are reset.

Setting Values

- ✧ Go to the tab which contains the values to be set.
- ✧ Click on the cell which forms the intersection between the measured value row and the **New value** column.
- ✧ Click the **Set** button assigned to the row.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The new value is displayed in the **Current value** column.

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)

15.5.1.5 Creating Snapshots of Measured and Metered Values

You can save the measured and metered values displayed in the [20.4.5 Measurements](#) table as snapshots. In creating a snapshot, the measured and metered values currently displayed for the entire function group are saved in the offline configuration of a SIPROTEC 5 device. When each snapshot is created, it is labeled with the current date and time automatically. You can create as many snapshots as you like and then use the time ID to select and display them in the [20.4.6 Measured-Value Snapshot](#) table. The snapshots are saved in the **Measured-value snapshots** group in the project structure, categorized according to their function group.

A prerequisite for a snapshot is that the relevant SIPROTEC 5 device from the list of online accesses must be assigned to a suitable offline configuration in an open project. If this requirement is not met, you cannot generate any snapshots for the SIPROTEC 5 device. You find more information about this under [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#).

Creating a Snapshot of Measured and Metered Values

- ✧ Click the  **Snapshot** button in the [20.7.30 Toolbar of the Measurements Table](#).

If the prerequisites are met, the measured and metered values for the entire function group are assigned in the form of a snapshot to the corresponding offline configuration in the project.

- ✧ Click on the button in the DIGSI 5 toolbar to permanently save the snapshot .

You can now display the snapshot in the **Measured-value snapshots** table. This continues to work after closing and reopening the project.

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)
- ✧ [15.5.1.6 Opening the Measured-Values Snapshots Table and Selecting a Snapshot](#)
- ✧ [15.5.1.8 Saving Measured and Metered Values in a File](#)

15.5.1.6 Opening the Measured-Values Snapshots Table and Selecting a Snapshot

If you have created [20.4.5 Measurements](#) snapshots of displayed measured values and metered values, you can then also display the snapshot values without communication connection to the SIPROTEC 5 device. To do this, open the [20.4.6 Measured-Value Snapshot](#) table.

The snapshots are saved in the **Measured-value snapshots** group in the project structure, categorized according to their function group. You find this group in the **Process data** folder of the associated offline configuration. If no snapshots have yet been created for a SIPROTEC 5 device, the **Measured-value snapshots** group is empty. As soon as you create the first snapshot, this group receives an entry, which has the same name as the function group for which the snapshot was created. All further snapshots for this function group are assigned to this same entry. If you go on to create a snapshot for a different function group, its name is added to the **Measured-value snapshots** group in the form of a new entry.

Displaying Measured-Value Snapshots

- ✧ In the project tree, open the folder of the offline configuration for which you want to display snapshots.
- ✧ Open the **Process data** folder.
- ✧ Open the **Measured-value snapshots** group.

You will see the names of the function groups for which measured-value snapshots are available.

- ✧ Double-click the name of the function group whose snapshots are to be displayed.

The **Measured-value snapshots** table is displayed in the working area. This table shows the measured and metered values for the most recent snapshot.

- ✧ To display the values of a different snapshot, in the **Measured-value snapshots** table toolbar open the **Snapshots** list box. The snapshots can be distinguished with their creation dates and times.
- ✧ Select a different snapshot.

The values in the **Measured-value snapshots** table are updated.

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)
- ✧ [15.5.1.5 Creating Snapshots of Measured and Metered Values](#)

15.5.1.7 Selecting the Display Mode

When the [20.4.5 Measurements](#) or [20.4.6 Measured-Value Snapshot](#) table is open, you can select a display mode for the values shown. You can select from the following modes **Primary**, **Secondary**, and **Percent**.

Selecting the Display Mode

- ✧ In the **Measurements** table toolbar, select the **Display mode** list box.
- ✧ Select one of the 3 settings **Primary**, **Secondary**, or **Percent**.

The displayed values are updated.

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)

15.5.1.8 Saving Measured and Metered Values in a File

You can save measured and metered values in external files independently of other project data. This can be done for values which have just been read from the SIPROTEC 5 device as well as for values you have saved as a snapshot. Depending on which type of value is involved, either the [20.4.5 Measurements](#) or [20.4.6 Measured-Value Snapshot](#) table must be open.

You can save individual measurands, groups of measurands, or the entire contents of a tab. All information displayed for a measurand are saved in the **CSV** (Comma Separated Values) format. With this format, data is written to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate measured and metered values according to various criteria.

Selecting Measurands

- ✧ Go to the tab containing the measured or metered values which you want to save.
- ✧ If you want to save the entire contents of the tab, make sure that no individual measurand is selected.
- or -
- ✧ If you want to save all the measurands within certain groups, select the headers of the groups in question.
- or -
- ✧ If you want to save individual measurands, select the rows of the measurands in question.

Saving Measurands

- ✧ Select the groups or individual measurands to be saved, as described in the previous section.
- ✧ In [20.7.30 Toolbar of the Measurements Table](#) or [20.7.33 Toolbar of the Measured-Value Snapshot Table](#), click the  button.

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The selected measurands are saved to a file.

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)
- ✧ [15.5.1.5 Creating Snapshots of Measured and Metered Values](#)

15.5.1.9 Adding Metered Values

For user-specific applications, you can add metered values for every SIPROTEC 5 device with DIGSI 5. A metered value is imbedded in the function **Pulse metered value** along with indications and parameters. In order to use this function, you must insert it in one of the function groups **Line** or **Circuit breaker** from the global DIGSI 5 library. You can also repeatedly insert this function in the 2 function groups. You can then individually set the functions and route the metered value and the indications for each function.

Proceed in the following sequence:

- In the offline configuration of the SIPROTEC 5 device concerned, add the function **Pulse metered value** in one of the 2 named function groups.
- Set the function **Pulse metered value**. You find more information about this under [8.2.2.1 Selecting a Function for Setting Parameters](#).
- Set the metered value. You find more information about this under [15.5.1.2 Setting Parameters for Measured and Metered Value Processing](#).
- Route the indications of the function. You find more information about this under [11.1 Overview for Information Routing](#).

Depending on your respective working situation, you can add the function **Pulse Metered Value** in different areas:

- **In the Single-Line Configuration of the Project**

To use this version, open the single-line configuration in [20.1.2 Single-Line Editor](#). You find more information about this under [7.2.1 Opening a Single-Line Configuration](#).

- **In the Information Routing of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.2 Information Routing](#) matrix. You find more information about this under [11.3.1 Opening the Information Routing Matrix](#).

- **In the Communication Mapping of an Offline Configuration**

To use this version, open the affected offline configuration in the [20.3.1 Communication Mapping](#) matrix. You find more information about this under [14.9.3 Opening the Communication Mapping Matrix](#).

- **In the Project Structure**

To use this version, open the [3.1.2 Project Tree](#).

If you add the function **Pulse Metered Value** to one of the above-mentioned areas, then the function subsequently exists in other areas.

Opening the Global DIGSI 5 Library and Marking the Function Element

- ✧ In the task card, go to the [20.2.3 Libraries](#) tab.
- ✧ Open the **Global libraries** palette.
- ✧ Open the **Global DIGSI 5 Library** folder.
- ✧ Open the folder for the device type.
- ✧ Open the folder **Measurements**.
- ✧ Open the folder **User-defined values**.
- ✧ Open the folder **Puls.met.val**.

The element **Puls.met.val** is displayed.

- ✧ Mark this function element.

Adding the Function in the Information Routing

- ✧ Open the information routing.
- ✧ Drag the marked function element from the global DIGSI 5 library to the information routing.
- ✧ Position the function element on the name of the function group into which the function is to be inserted.
- or -
- ✧ If the function group is opened, position the function element at any place within the indicated function group contents.
- ✧ Release the mouse button.

If insertion is permissible at the selected position, the function is inserted into the function group.



NOTE

You find more information about the other possibilities to add the function **Pulse Metered Value** under [8.1.2.3 Adding a Function](#).

Related Topics

- ✧ [15.5.1.1 Overview of Measured and Metered Values](#)

15.5.2 Indications

15.5.2.1 Overview of Indications

All raising indications are saved in the SIPROTEC 5 device in the form of spontaneous indications. Every time the state of an indication changes, this is detected and documented in the list of spontaneous indications.

Reading and Saving

You can read spontaneous indications from the SIPROTEC 5 device and display them in the [20.4.3 Indications](#) table. Each indication occupies one row in the table and may be labeled with additional information, such as the quality, as well as the value itself.

You can use the **Indications** table to perform the following actions:

- Reading spontaneous indications from the SIPROTEC 5 device
- Saving indications in a file
- Saving spontaneous indications as snapshots in the offline configuration of the SIPROTEC 5 device
- Deleting spontaneous indications from a SIPROTEC 5 device
- Defining a spontaneous indication as the relative-time reference

Snapshots

You can save spontaneous indications which have been read out as **snapshots**, whereby the indications are archived together in the offline configuration of the SIPROTEC 5 device. You can then display the indications saved as snapshots in the [20.4.4 Indication Snapshot](#) table, without any need for a communication connection with the SIPROTEC 5 device.

You can use the **Indication snapshots** table to perform the following actions:

- Selecting and displaying snapshot
- Saving indications in a file

Related Topics

[15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#)

[15.5.2.8 Saving Indications in a File](#)

[15.5.2.6 Creating Snapshots of Spontaneous Indications](#)

[15.5.2.4 Deleting Spontaneous Indications from a SIPROTEC 5 Device](#)

[15.5.2.5 Specifying an Indication as Reference for Relative Time](#)

15.5.2.2 Opening Indications Table and Reading Spontaneous Indications

To be able to read spontaneous indications from the SIPROTEC 5 device, to display them and to perform other actions, open the [20.4.3 Indications](#) table. A prerequisite is that the SIPROTEC 5 device must have been entered in the online-access list as an accessible participant.

When you open the **Indications** table, the indications are automatically read from the SIPROTEC 5 device and displayed. The indication display is updated automatically whenever a new indication appears or the state of an existing indication changes.

When the **Indications** table is open, you can perform the following additional actions:

- Saving indications in a file
- Saving spontaneous indications as snapshots in the offline configuration of the SIPROTEC 5 device
- Deleting spontaneous indications from a SIPROTEC 5 device
- Defining a spontaneous indication as the relative-time reference

Opening the Indications Table

- ✧ In the project tree, open the folder for the online device for which you wish to open the [20.4.3 Indications](#) table.

- ✧ Double-click **Indications**.

The **Indications** table is displayed in the working area.

Related Topics

- ✧ [15.5.2.1 Overview of Indications](#)
- ✧ [15.5.2.8 Saving Indications in a File](#)
- ✧ [15.5.2.6 Creating Snapshots of Spontaneous Indications](#)
- ✧ [15.5.2.4 Deleting Spontaneous Indications from a SIPROTEC 5 Device](#)
- ✧ [15.5.2.5 Specifying an Indication as Reference for Relative Time](#)

15.5.2.3 Activating the Auto-scrolling Behavior for the Indications Table

If all visible lines in the [20.4.3 Indications](#) table are filled with indications, then a new indication cannot be displayed in the table. In order to see the new indication, you must manually shift the table entries with the vertical scroll bar. So that the table entries are automatically shifted down when a new indication arrives, activate the auto-scrolling behavior. The new indication is then always visible as the top entry in the list.

Activating and Deactivating the Auto-scrolling Behavior

- ✧ Click the button  in the [20.7.31 Toolbar of the Indications Table](#).

If the auto-scrolling behavior is deactivated, your action activates the auto-scrolling behavior. If the auto-scrolling behavior is activated, your action deactivates the auto-scrolling behavior.

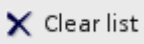
Related Topics

- ✧ [15.5.2.1 Overview of Indications](#)
- ✧ [15.5.2.8 Saving Indications in a File](#)
- ✧ [15.5.2.6 Creating Snapshots of Spontaneous Indications](#)
- ✧ [15.5.2.4 Deleting Spontaneous Indications from a SIPROTEC 5 Device](#)
- ✧ [15.5.2.5 Specifying an Indication as Reference for Relative Time](#)

15.5.2.4 Deleting Spontaneous Indications from a SIPROTEC 5 Device

You can delete spontaneous indications from a SIPROTEC 5 device, but all indications must be deleted simultaneously. To delete indications, the [20.4.3 Indications](#) table for the SIPROTEC 5 device must be open.

Deleting Indications

- ✧ Click the  button in the [20.7.31 Toolbar of the Indications Table](#).

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The indications are deleted in the SIPROTEC 5 device and in the **Indications** table.

Related Topics

- ✧ [15.5.2.1 Overview of Indications](#)
- ✧ [15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#)

15.5.2.5 Specifying an Indication as Reference for Relative Time

All indications are assigned a time stamp. In addition, a relative time is shown on the [20.4.3 Indications](#) tab for every indication. The relative time indicates the time difference between each individual indication and a indication that serves as a reference, which has a relative time of 0.

You can define any indication as the relative-time reference for the other indications. The reference indication is then assigned a time value of 0 ms. The relative times of the other indications are calculated from their respective time stamps. If a indication has a negative time value, then this indication is encountered in time before the reference indication. If a indication has a positive time value, then this indication is encountered in time after the reference indication.

Initially, the times are only displayed in milliseconds. If the time value exceeds a certain magnitude, the time will then be shown in seconds and milliseconds, in the format 00:000. As the time value increases, minutes, hours, and days will also be used.

To be able to define the relative-time reference, the [20.4.3 Indications](#) table must be open.

Defining the Relative-Time Reference

- ✧ Select the indication which you want to define as the relative-time reference.
- ✧ Click the  button in the [20.7.31 Toolbar of the Indications Table](#) .

The relative-time values are updated.

Related Topics

- ✧ [15.5.2.1 Overview of Indications](#)
- ✧ [15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#)

15.5.2.6 Creating Snapshots of Spontaneous Indications

You can save the spontaneous indications shown in the [20.4.3 Indications](#) table as snapshots. When creating a snapshot, the indications currently displayed are saved in the offline configuration of the SIPROTEC 5 device. When each snapshot is generated, it is labeled with the current date and time automatically. You can create as many snapshots as you like and then use the time ID to select and display them in the [20.4.4 Indication Snapshot](#) table.

A prerequisite for a snapshot is that the relevant SIPROTEC 5 device from the list of online accesses must be assigned to a suitable offline configuration in an open project. If this requirement is not met, you cannot generate any snapshots for this SIPROTEC 5 device. You find more information about this under [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#).

Creating Snapshots of Indications

- ✧ Click the  **Create snapshot** button in the [20.7.31 Toolbar of the Indications Table](#) .

If the prerequisites are met, the indications displayed are assigned in the form of a snapshot to the corresponding offline configuration in the project.

- ✧ In order to save the snapshot permanently, click the button in the [20.7.1 DIGSI 5 Toolbar](#) .

You can now display the snapshot in the **Indication snapshots** table. This continues to work after closing and reopening the project.

Related Topics

- ✧ [15.5.2.1 Overview of Indications](#)
- ✧ [15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#)
- ✧ [15.5.2.7 Opening Indication-Snapshots Table and Selecting and Showing Snapshots](#)
- ✧ [15.5.2.8 Saving Indications in a File](#)

15.5.2.7 Opening Indication-Snapshots Table and Selecting and Showing Snapshots

If you have created snapshots of displayed indications in the [20.4.3 Indications](#) table, you can also display these indications without any need for a communication connection with the SIPROTEC 5 device. To do this, open the [20.4.4 Indication Snapshot](#) table.

Displaying Indication Snapshots

- ✧ In the [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to display indication snapshots.
- ✧ Open the **Process data** folder.
- ✧ Double-click **Indication snapshots**.

The **Indication snapshots** table opens in the working area. This shows all the snapshots.

- ✧ To display the indications of a snapshot, click on the arrow to the left of the name of the snapshot.

The indications of the snapshot are displayed.

Related Topics

- ✧ [15.5.2.1 Overview of Indications](#)
- ✧ [15.5.2.6 Creating Snapshots of Spontaneous Indications](#)

15.5.2.8 Saving Indications in a File

You can save indications in external files independently of other project data. This can be done for indications, which have just been read from the SIPROTEC 5 device as well as for indications you have saved as a snapshot. Depending on which type of value is involved, either the [20.4.3 Indications](#) or [20.4.4 Indication Snapshot](#) table must be open.

The indications are saved in the **CSV** (Comma Separated Values) format. With this format, data is written to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate indications according to various criteria.

Selecting Indications

- ✧ If you want to save all indications, make sure that no individual indication is selected.
- or -
- ✧ If you want to save individual indications, select the relevant ones.

Saving Indications

- ✧ Select the indications to be saved, as described in the previous section.
- ✧ In [20.7.31 Toolbar of the Indications Table](#) or [20.7.32 Toolbar of the Indication-Snapshot Table](#), click the  button.

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The selected indications are saved to a file.

Related Topics

- ✧ [15.5.2.1 Overview of Indications](#)
- ✧ [15.5.2.6 Creating Snapshots of Spontaneous Indications](#)
- ✧ [15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#)
- ✧ [15.5.2.7 Opening Indication-Snapshots Table and Selecting and Showing Snapshots](#)

15.5.3 Fault Record

15.5.3.1 Overview of Fault Recording

Fault recording documents operations within the power system and the way in which SIPROTEC 5 devices respond to them. Furthermore, all SIPROTEC 5 devices have a fault memory in which fault records are retained securely, even after a high-voltage failure. A fault record contains the sampled values of the analog input channels of a SIPROTEC 5 device, device-specific measured values which have been calculated internally, and any binary signals (for example, pickup and trip signals of protection functions). Simply select an application template and fault recording is preconfigured and parameters are preset. You can individually adjust the configuration of the binary signals, configuration of different types of triggers (applicable for 7KE SIPROTEC 5 device types, and measured-value channels using the [20.3.2 Information Routing](#) matrix, [20.3.3 Trigger Routing](#) matrix, or [20.3.1 Communication Mapping](#) matrix. You can also change the fault recording parameter settings.

Sampling Frequency and Record Duration

For fault recording, the analog measuring channels are sampled at their own sampling rate. This sampling rate only applies to fault recording and does not affect protection functions or calculated measured values.

You can select frequencies of 1 kHz, 2 kHz, 4 kHz, and 8 kHz. At a sampling frequency of 8 kHz and with 24 analog channels to be recorded, a single fault recording process will take up to 20 s. Configurations involving a lower sampling rate or fewer analog channels can result in much longer record durations.

For device type (for example, 7KE), you can select frequencies of 1 kHz, 2 kHz, 4 kHz, 8 kHz, and 16 kHz. A single fault recording process takes up to 90 s. Configurations involving a lower sampling rate or fewer analog channels can result in much smaller record size.

The overall duration of a single fault recording process comprises the length of the configurable recording criterion, the pre-trigger time, and the seal-in time together. You can set the parameters for these components individually.

For device type (for example, 7KE) the overall duration of a single fault recording process comprises the length of the configurable recording criterion (maximum record time), the pre-trigger time, and the post trigger time together. You can set the parameters for these components individually.

If a recording criterion reoccurs during the seal-in time, the recording which is currently active is extended to include a new seal-in time.

For device type (for example, 7KE) if a recording criterion reoccurs during post trigger time before retrigger blocking time, the recording which is currently active is extended to include a new post trigger time.

Information about all settings for fault recording can be found in the respective Device manual.

Fault-Recording Memory

The SIPROTEC 5 device manages its available fault recording memory dynamically, so the maximum recording capacity is always available. When the fault recording memory is full, the oldest recordings are overwritten automatically. This means that the most recent recordings are always available. The sampling rate, type, and number of measured-value traces to be recorded are the crucial values when it comes to restricting the length and number of possible recordings. You can define a large number of binary signal traces, with no fixed upper limit.

For special device type (for example, 7KE), the flash memory size up to 16 GB (where 12 GB is ready for use and 4 GB is reserved) for all types of recorders like Fast scan record, Slow scan record, Continuous scan record, and Trend record can be defined using respective settings editor displayed under **Recording** function in the project tree.



NOTE

Changing the memory configuration of the 7KE device type will result in deletion of all available records in the device.

Numbering and Time Stamping

All saved fault recordings are automatically numbered in ascending order and assigned a real-time stamp for the start time. The fault record logs the fault with a relative time. The reference time is the start of the recording. Every fault record has a corresponding fault log with the same number, which ensures that the fault record can be uniquely assigned to the event log. The SIPROTEC 5 device synchronizes the fault record and the fault log. This ensures that the real time, relative time, and fault numbering data are synchronized. In the case of SIPROTEC 5 devices with line differential protection (7SD, 7SL), the time-management feature synchronizes the fault records of all line ends via the protection interfaces. This means that all fault records function on the same real-time and relative-time basis.

For special device type (for example, 7KE), all saved fault recordings are automatically numbered in ascending order for each type of recorder and assigned a real-time stamp for the start time.

Reading, Saving, Evaluating

You can use DIGSI 5 to read the fault records from the SIPROTEC 5 device and save them in COMTRADE format and DIGSI native format (for 7KE SIPROTEC 5 device). The **Records** table groups all saved fault records together. Each fault record occupies one row in the table and is labeled with a State, Record Id, Time stamp, and Recorder name:

You can use the [20.4.2 Records](#) table to perform the following actions:

- Displaying saved fault records
- Reading fault records out from the SIPROTEC 5 device
- Exporting fault records
- Deleting saved fault records and fault records in the device
- Saving fault record information in a file
- Tripping a test fault record
- Opening fault records for viewing only
- Opening fault records for viewing and evaluation

You can display the actual contents of fault records in DIGSI 5 directly or via the optional SIGRA program. In DIGSI 5, you can use the fault record view to see the history of the signals over time. With SIGRA, you can evaluate the fault records with additional display modes and calculation methods.

SIPROTEC 5 devices can also transmit fault data to a central device on request and in conformance with standards via existing communication connections (IEC 61850, IEC 60870-5-103, IEC 60870-5-104, and Modbus TCP). This central device can then take on the task of evaluating the contents of the fault records.

Related Topics

[15.5.3.2 Configuring and Setting Parameters for Fault Recording](#)

[15.5.3.5 Displaying Saved Fault Records](#)

[15.5.3.6 Reading Fault Records from the SIPROTEC 5 Device](#)

[15.5.3.18 Exporting Fault Records](#)

[15.5.3.20 Deleting Fault Records Saved in the Offline Configuration](#)

[15.5.3.21 Deleting Fault Records from a SIPROTEC 5 Device](#)

[15.5.3.19 Saving Fault Record Information in a File](#)

[15.5.3.14 Triggering Test Fault Records](#)

[15.5.3.15 Opening Fault Records for Viewing Only](#)

[15.5.3.16 Opening Fault Records for Viewing and Evaluating](#)

15.5.3.2 Configuring and Setting Parameters for Fault Recording

The following options are available to control fault recording:

- You can configure which signals are to be included in a fault record.
- You can set the fault recording parameters, for example, the recording duration or the sampling frequency. Information about all settings for fault recording can be found in the respective Device manual.
- You can set parameters to define other signals as fault recording triggers.

Configuring the Signals to be Recorded

- ✧ Open the [20.3.2 Information Routing](#) matrix for the relevant offline configuration.
- ✧ Route the signals to be recorded to the **Fault records** column.



NOTE

For a device type (for example, 7KE), you can route the signals (SPS and MV) for Fast scan, Slow scan, or Trend records under the **Recorder** column. You can route only the signals of MV type to be recorded to **Continuous** records column.

Setting Fault-Recording Parameters

- ✧ In [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to set the fault recording settings.
- ✧ Double-click **Settings** in this folder.

You see the names of all available function groups.

- ✧ Open the **Recorder** function group.
- ✧ Double-click **Fault recorder**.

In the working area, the [20.1.9 Settings Editor](#) opens with the settings for fault recording.

- ✧ Set the individual parameters.

Setting Fast Scan-Recording Parameters (for 7KE Device Type)

- ✧ In [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to set the Fast scan recording settings.
- ✧ Double-click **Settings** in this folder.

You see the names of all available function groups.

- ✧ Open the **Recording** function group.
- ✧ Double-click **Fast scan record**.

In the working area, the [20.1.9 Settings Editor](#) opens with the settings for Fast scan recording.

- ✧ Set the individual parameters.

Setting Slow Scan-Recording Parameters (for 7KE Device Type)

- ✧ In [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to set the Slow scan recording settings.
- ✧ Double-click **Settings** in this folder.

You see the names of all available function groups.

- ✧ Open the **Recorder** function group.
- ✧ Double-click **Slow scan record**.

In the working area, the [20.1.9 Settings Editor](#) opens with the settings for Slow scan recording.

- ✧ Set the individual parameters.

Setting Continuous Scan-Recording Parameters (for 7KE Device Type)

- ✧ In [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to set the Continuous scan recording settings.
- ✧ Double-click **Settings** in this folder.

You see the names of all available function groups.

- ✧ Open the **Recorder** function group.
- ✧ Double-click **Continuous scan record**.

In the working area, the [20.1.9 Settings Editor](#) opens with the settings for Continuous scan recording.

- ✧ Set the individual parameters.

Setting Trend Recorder Parameters (for 7KE Device Type)

- ✧ In the [3.1.2 Project Tree](#), open the folder of the offline configuration for which you want to set the trend recorder settings.
- ✧ Double-click **Settings** in this folder.

You see the names of all available function groups.

- ✧ Open the **Recorder** function group.
- ✧ Double-click **Trend**.

In the working area, the [20.1.9 Settings Editor](#) opens with the settings for trend recording.

- ✧ Set the individual parameters.

Configuring Recorders to Triggers (for 7KE Device Type)

- ✧ In the Project tree, open the function group (for example VI 3 ph) under **Settings** folder to configure triggers to different recording types.
- ✧ Double-click **Trigger routing**.

The [20.3.3 Trigger Routing](#) matrix is displayed in the working area.

- ✧ Route the triggers to Fast scan record and Slow scan record columns displayed under the recording group.
- ✧ Route the signals which are to be triggers for fault recording to the **Tr** column.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)

15.5.3.3 Configuring the Signal Order for Fault Recording

From DIGSI 5 V7.50 on, you can define the order of the signals in the fault record using the [20.1.35 Signal Order Editor](#) for the devices with firmware version V7.50 or higher. You can also define the order of the signals via the drag and drop option in the Signal order Editor. Based on the defined signal order in this Editor, the signals are generated in the fault record accordingly. You can view the defined signal order by opening the respective fault records via the following options:

- SIGRA
- Records Editor
- COMTRADE Viewer

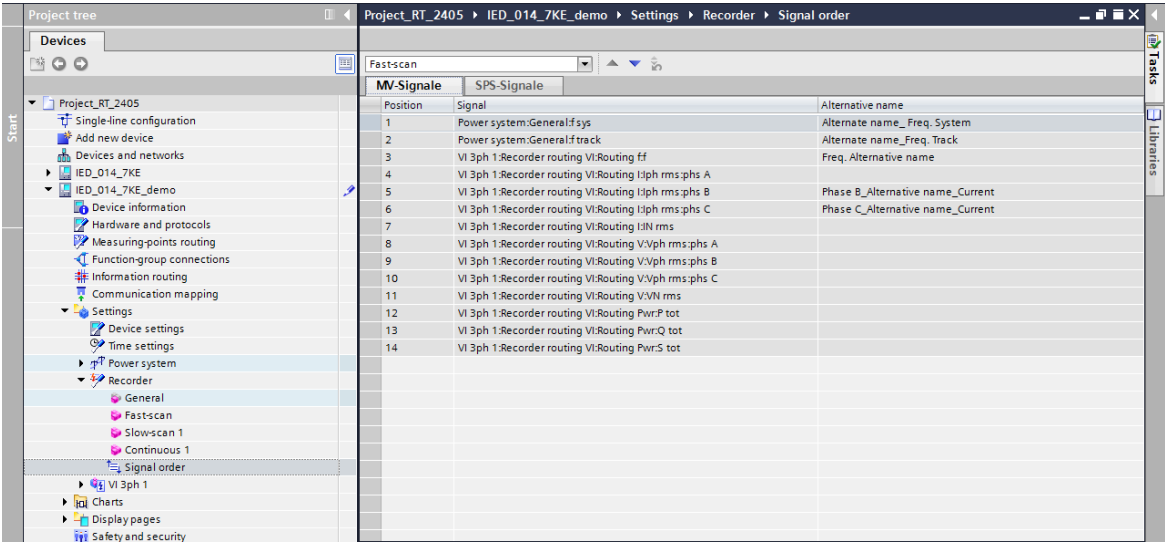
Opening Signal Order Editor

- ✧ In the [3.1.2 Project Tree](#), navigate to the offline device configuration for which you want to set the order of the signals in the fault record.
- ✧ Double-click **Settings** in this folder.

You see the names of all available function groups.

- ❖ Open the **Recorder** function group for the 7KE device type.
 - or -
- ❖ Open the **Recording** function group for device types other than the 7KE device type.
- ❖ Double-click **Signal order**.

In the working area, the [20.1.35 Signal Order Editor](#) opens with the default order of the signals for the fault recorder.



Position	Signal	Alternative name
1	Power system:General.f sys	Alternate name_Freq_System
2	Power system:General.f track	Alternate name_Freq_Track
3	VI 3ph 1:Recorder routing VI:Routing ff	Freq. Alternative name
4	VI 3ph 1:Recorder routing VI:Routing I1ph rms:phs A	
5	VI 3ph 1:Recorder routing VI:Routing I1ph rms:phs B	Phase_B_Alternative name_Current
6	VI 3ph 1:Recorder routing VI:Routing I1ph rms:phs C	Phase_C_Alternative name_Current
7	VI 3ph 1:Recorder routing VI:Routing I1N rms	
8	VI 3ph 1:Recorder routing VI:Routing V1Vph rms:phs A	
9	VI 3ph 1:Recorder routing VI:Routing V1Vph rms:phs B	
10	VI 3ph 1:Recorder routing VI:Routing V1Vph rms:phs C	
11	VI 3ph 1:Recorder routing VI:Routing V1VN rms	
12	VI 3ph 1:Recorder routing VI:Routing Pwr:P tot	
13	VI 3ph 1:Recorder routing VI:Routing Pwr:Q tot	
14	VI 3ph 1:Recorder routing VI:Routing Pwr:S tot	

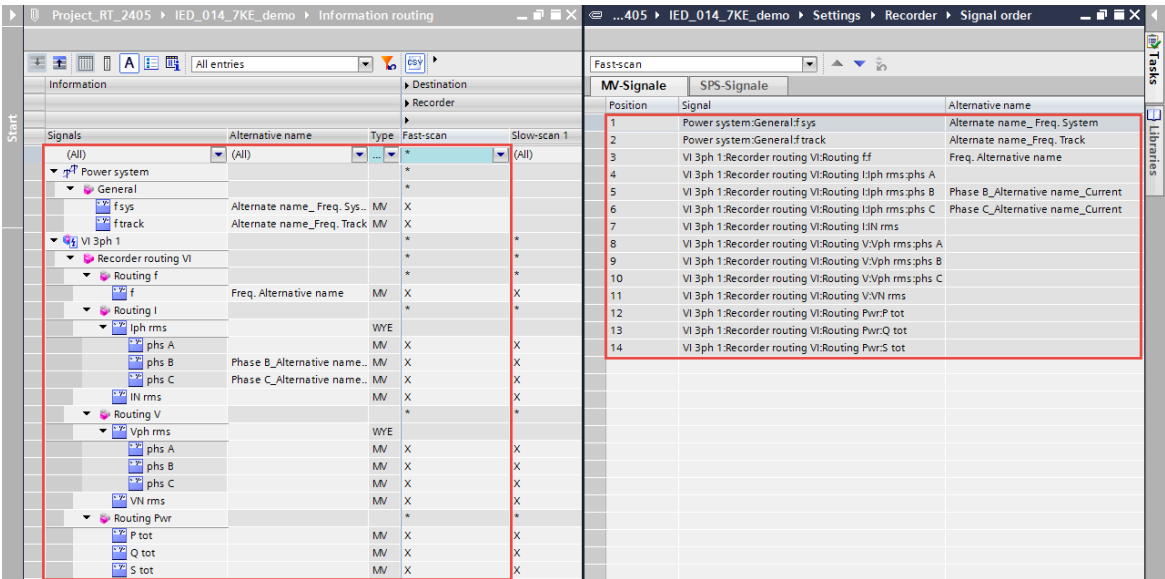
[sc_digsi_signalorder, 2, en_US]

Figure 15-1 Signal Order Editor



NOTE

Default signal order: The order of the signals in the [20.1.35 Signal Order Editor](#) matches the order of the signals routed to the **Recorder** column in the [20.3.2 Information Routing Editor](#).



Position	Signal	Alternative name
1	Power system:General.f sys	Alternate name_Freq_System
2	Power system:General.f track	Alternate name_Freq_Track
3	VI 3ph 1:Recorder routing VI:Routing ff	Freq. Alternative name
4	VI 3ph 1:Recorder routing VI:Routing I1ph rms:phs A	
5	VI 3ph 1:Recorder routing VI:Routing I1ph rms:phs B	Phase_B_Alternative name_Current
6	VI 3ph 1:Recorder routing VI:Routing I1ph rms:phs C	Phase_C_Alternative name_Current
7	VI 3ph 1:Recorder routing VI:Routing I1N rms	
8	VI 3ph 1:Recorder routing VI:Routing V1Vph rms:phs A	
9	VI 3ph 1:Recorder routing VI:Routing V1Vph rms:phs B	
10	VI 3ph 1:Recorder routing VI:Routing V1Vph rms:phs C	
11	VI 3ph 1:Recorder routing VI:Routing V1VN rms	
12	VI 3ph 1:Recorder routing VI:Routing Pwr:P tot	
13	VI 3ph 1:Recorder routing VI:Routing Pwr:Q tot	
14	VI 3ph 1:Recorder routing VI:Routing Pwr:S tot	

[sc_digsi_defaultorder, 2, en_US]

Figure 15-2 Default Signal Order - Comparison

Refreshing the Signal Order

The order of the signals in the respective fault record in [20.1.35 Signal Order Editor](#) is refreshed automatically based on the newly routed signals or on the removal of existing routing of signals under the **Recorder** column in the [20.3.2 Information Routing](#) Editor.

The display of signals in the [20.1.35 Signal Order Editor](#) is based on the following conditions:

- If you route any signal under the **Recorder** column in the [20.3.2 Information Routing](#) Editor without changing the default order in the [20.1.35 Signal Order Editor](#), the newly routed signal or signals are added and displayed according to the default order.

Position	Signal	Alternative name
1	Power system.General.fsys	Alternate name_ Freq_System
2	Power system.General.ftrack	Alternate name_ Freq_Track
3	VI 3ph 1:Recorder routing VI.Routing f	Freq. Alternative name
4	VI 3ph 1:Recorder routing VI.Routing Iph rms:phs A	
5	VI 3ph 1:Recorder routing VI.Routing Iph rms:phs B	Phase B_Alternative name_Current
6	VI 3ph 1:Recorder routing VI.Routing Iph rms:phs C	Phase C_Alternative name_Current
7	VI 3ph 1:Recorder routing VI.Routing Iph rms	
8	VI 3ph 1:Recorder routing VI.Routing VVph rms:phs A	
9	VI 3ph 1:Recorder routing VI.Routing VVph rms:phs B	
10	VI 3ph 1:Recorder routing VI.Routing VVph rms:phs C	
11	VI 3ph 1:Recorder routing VI.Routing VVN rms	
12	VI 3ph 1:Recorder routing VI.Routing Pwr.P tot	
13	VI 3ph 1:Recorder routing VI.Routing Pwr.Q tot	
14	VI 3ph 1:Recorder routing VI.Routing Pwr.S tot	

[sc_digsi_defaultorder, 2, en_US]

Figure 15-3 Default Signal Order - Compare View

- If you copy and paste any function group, function, or function block without changing the default order in the [20.1.35 Signal Order Editor](#), the signal or signals that were routed under the **Recorder** column in the [20.3.2 Information Routing](#) Editor are added and displayed according to the default order in the [20.1.35 Signal Order Editor](#).
- If you route any signal under the **Recorder** column after changing the default order in the [20.1.35 Signal Order Editor](#), the newly routed signal is added and displayed at the end of the respective signal group in the [20.1.35 Signal Order Editor](#).
- If you copy and paste any function group, function, or function block after changing the default order in the [20.1.35 Signal Order Editor](#), the signal or signals that were newly routed under the **Recorder** column in the [20.3.2 Information Routing](#) Editor are added and displayed at the end of the respective signal group in the [20.1.35 Signal Order Editor](#).



Click to reset the order of the signals to the default order.

Viewing Reordered Signals and Alternative Signal Names

You can view the defined signal order and alternative signal names by opening the respective fault records via the following options:

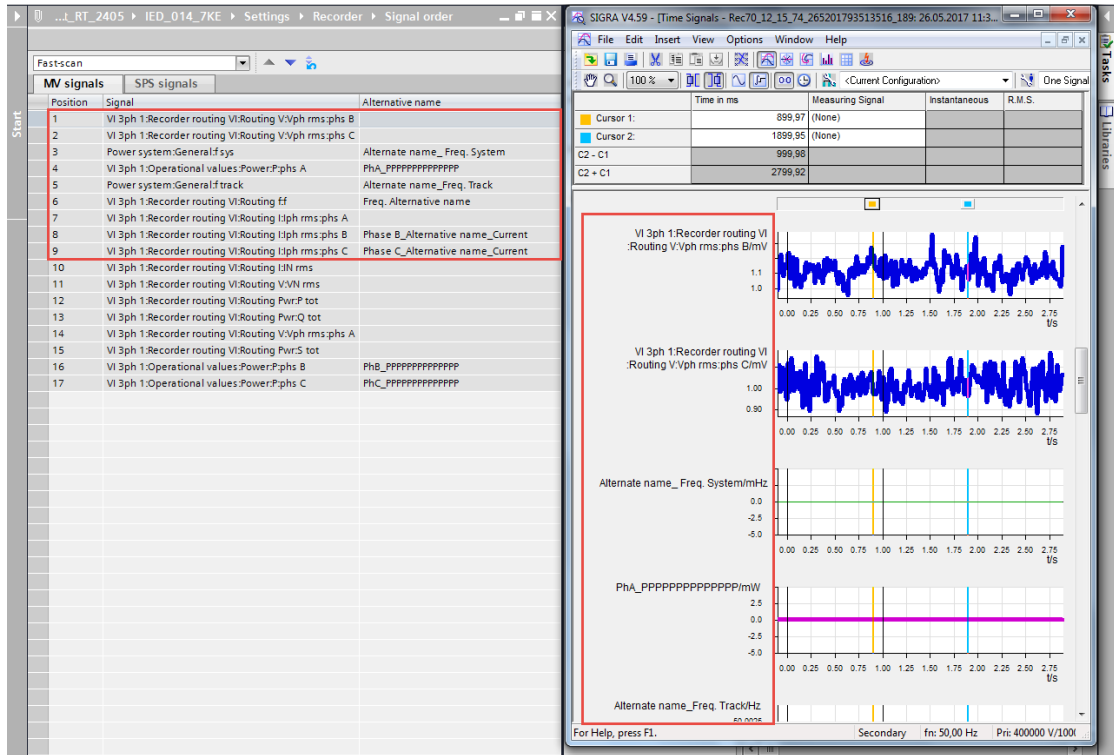
- SIGRA
- Records Editor
- COMTRADE Viewer



NOTE

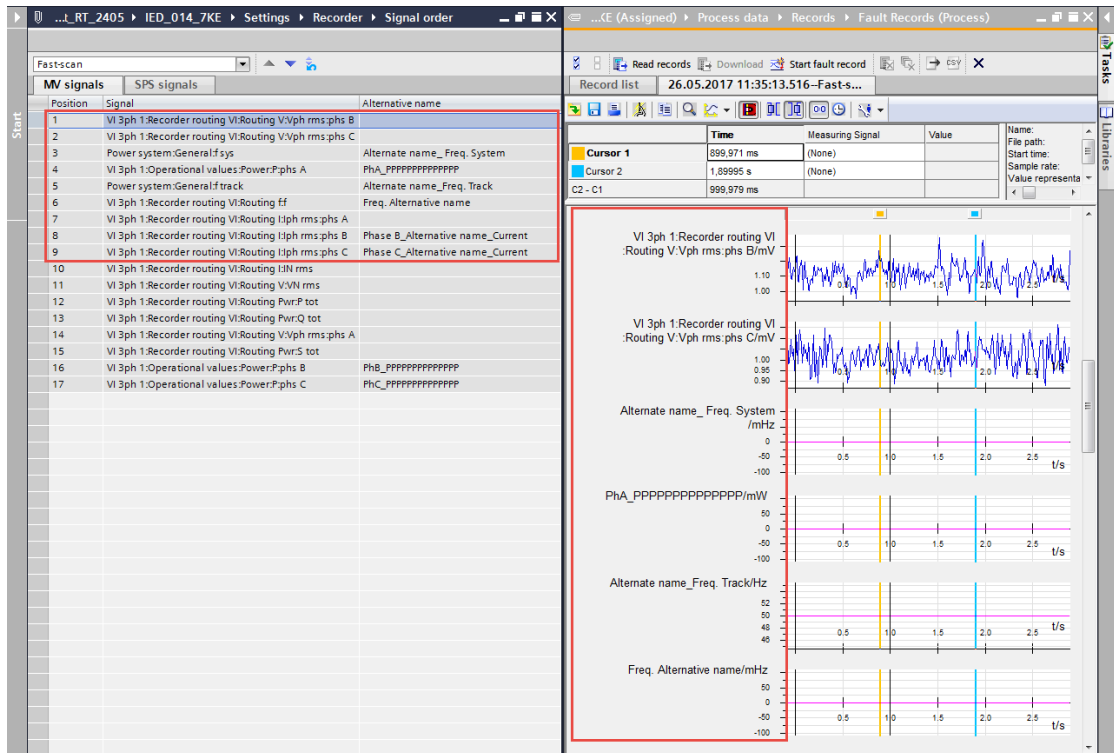
For more information, refer to [Signal Names, Page 242](#).

- ✧ Open the fault record via SIGRA to view the signal order:



- or -

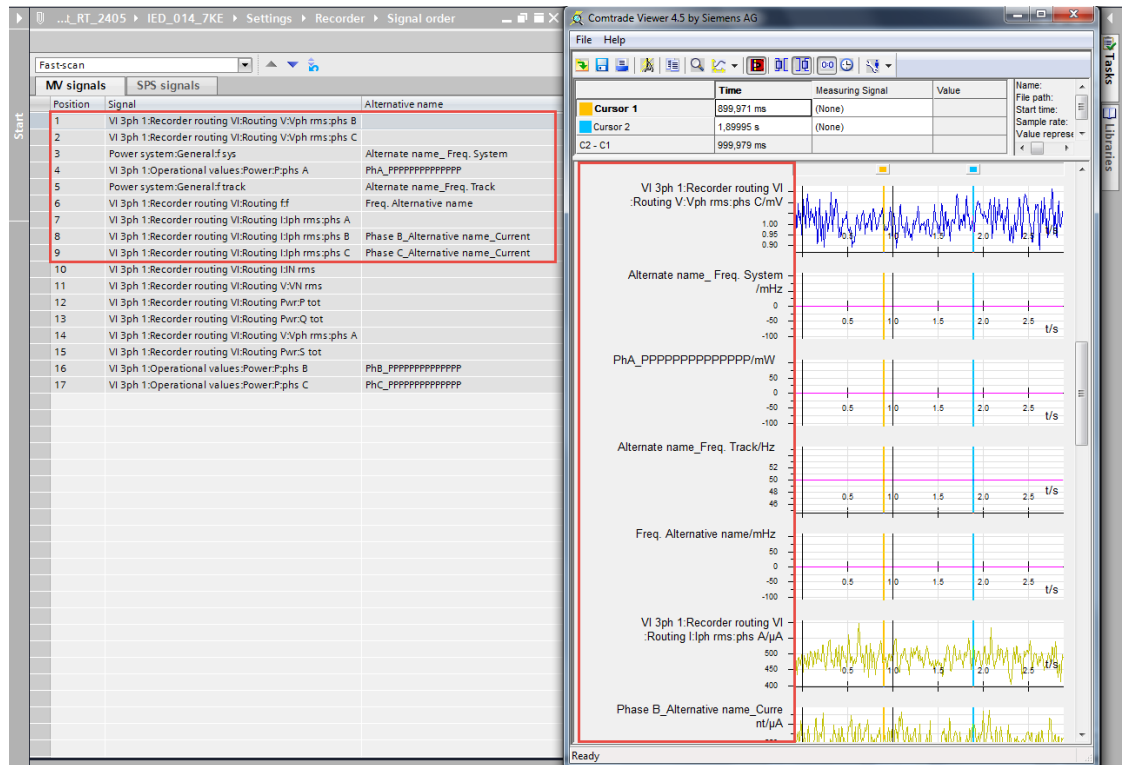
- ✧ Open the fault record via the [20.4.2 Records](#) Editor to view the signal order:



The fault record displays the SAV signals first and then the MV and SPS signals.

- or -

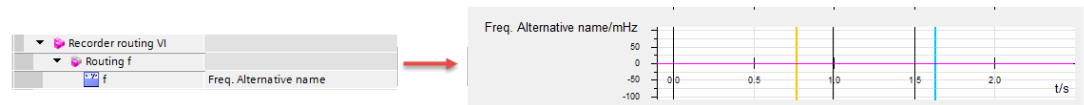
- ✧ Open the fault record via the COMTRADE Viewer to view the signal order:



The record displays the signal order similar to the default/defined order in the **Signal order** Editor.

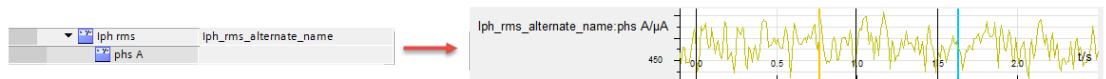
The alternative names of signals in the records can be displayed in the following ways:

- When the alternative name is defined for any signal:



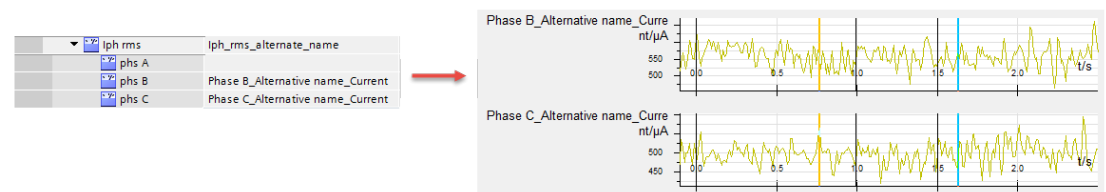
[sc_digsi_altname, 1, en_US]

- When the alternative name is not defined for the conversion signal, but defined for the parent signal:



[sc_digsi_altname_parent, 1, en_US]

- When the alternative name is defined for the conversion signal, but not defined for the parent signal:



[sc_digsi_altname_conversion, 1, en_US]

Comparing Devices with Signal Order

While comparing parameters of devices via the **Compare devices** option in DIGSI 5, the **Device comparison** view displays the compare result between devices regarding the Signal-order feature. .

- ✧ Select any offline or online device in the [3.1.2 Project Tree](#).
- ✧ Right-click the device and select **Compare Devices** from the context menu.
- or -
- ✧ Select **Compare Devices** in the **Edit** menu.



NOTE

For more information about comparing parameters of different devices, refer to [8.2.4 Comparing Parameters of Different Devices](#) .

The comparison result between devices regarding the signal-order feature is displayed in the following scenarios:

- Devices with the signal order and devices (older version) without the signal order.

The following message is displayed in this case:

Current device 7KE85_1		Compared device 7KE85	
Name	Value	Value	Name
Missing Information (40)			
General			
Device			
VI 3ph 1			
Main menu			
Signal order		Element not available	
Names (1)			
Values (4)			

[sc_digsi_compare1, 1, en_US]

- Devices with the default signal order.
- In this case, no differences are displayed in the [20.5.16 Device Comparison](#) view.

- Devices with the reordered signal order and devices with the default order.

The following message is displayed in this case:

Current device 7KE85		Compared device 7KE85_1	
Name	Value	Value	Name
Values (1)			
Settings			
Function settings			
Signal order			
Recorder			
Fast-scan			
MV signals	User-defined order	Default order	

[sc_digsi_compare2, 1, en_US]

- Devices with reordered signal order have the same signals routed to a recorder in the same order.
- In this case, no differences are displayed in the [20.5.16 Device Comparison](#) view.

- Devices with reordered signal order have a different set of signals routed to the recorder.
The following message is displayed in this case:

Current device 7KE85		Compared device 7KE85_1	
Name	Value	Value	Name
▼ Values (1)			
▼ Settings			
▼ Function settings			
▼ Signal order			
▼ Recorder			
▼ Fast-scan			
MV signals	User-defined order different from compared device		

[sc_digsi_compare3, 1, en_US]

Related Topics

- ✧ [20.1.35 Signal Order Editor](#)
- ✧ [20.3.2 Information Routing](#)

15.5.3.4 Opening the Records Table

To be able to read fault records, to display them and to perform other actions, open the [20.4.2 Records](#) table. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you open the **Records** table for an offline configuration in the project, you can perform the following actions:

- Displaying fault records saved in the offline configuration
- Deleting fault records saved in the offline configuration
- Exporting saved fault records and those which have just been read
- Saving saved fault records and those which have just been read as a file
- Opening saved fault records and those which have just been read for viewing and evaluation
- Reading fault records out from the associated SIPROTEC 5 device
- Deleting fault records from the associated SIPROTEC 5 device

For the last 2 actions, a communication connection must exist between the DIGSI 5 PC and the SIPROTEC 5 device.

If you open a **Records** table for a SIPROTEC 5 device in the list of online accesses, you can perform the following actions:

- Reading fault records out from the SIPROTEC 5 device
- Exporting fault records, which have just been read
- Saving fault records, which have just been read as a file
- Opening fault records, which have just been read for viewing and evaluation
- Deleting fault records from a SIPROTEC 5 device
- Triggering a fault record

Opening the Records Table

- ✧ In the project, open the folder of the offline configuration for which you want to open the **Records** table.
- or -
- ✧ In the project tree, open the folder for the online device for which you wish to open the **Records** table.
- ✧ Open the **Process data** folder.

- ✧ Double-click **Records**.

The **Records** table is displayed in the working area.

Opening the Records Table (for 7KE Device Type)

- ✧ In the project, open the folder of the offline configuration for which you want to open the **Records** table.
- or -
- ✧ In the project tree, open the folder for the online device for which you wish to open the **Records** table.
- ✧ Open the **Process data** folder.
- ✧ Double-click **Records**.

The nodes **Fast and Slow scan records** and **Continuous records** are displayed in the working area.



NOTE

The **Trend** node is displayed if you drag and drop the **Trend** function from the libraries to the **Recorder** group in the project tree.

-
- ✧ Double-click **Fast and slow scan records**, **Continuous records**, or **Trend records** to view the desired record table.

The respective **Records** table is displayed in the working area.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.5 Displaying Saved Fault Records](#)
- ✧ [15.5.3.20 Deleting Fault Records Saved in the Offline Configuration](#)
- ✧ [15.5.3.18 Exporting Fault Records](#)
- ✧ [15.5.3.19 Saving Fault Record Information in a File](#)
- ✧ [15.5.3.15 Opening Fault Records for Viewing Only](#)
- ✧ [15.5.3.16 Opening Fault Records for Viewing and Evaluating](#)
- ✧ [15.5.3.6 Reading Fault Records from the SIPROTEC 5 Device](#)
- ✧ [15.5.3.21 Deleting Fault Records from a SIPROTEC 5 Device](#)
- ✧ [15.5.3.14 Triggering Test Fault Records](#)

15.5.3.5 Displaying Saved Fault Records

All fault records saved in the offline configuration of a SIPROTEC 5 device are displayed together in the [20.4.2 Records](#) table.

Displaying Saved Fault Records

- ✧ In the project, open the folder of the offline configuration whose saved fault records you want to display.
- ✧ Open the **Process data** folder.
- ✧ Double-click **Records**.

The **Records** table is displayed in the working area. If saved fault records are available, they are shown in the table.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

Displaying Saved Fault Records (for 7KE Device Type)

- ✧ In the project, open the folder of the offline configuration whose saved fault records you want to display.
- ✧ Open the **Process data** folder.
- ✧ Double-click **Records**.

The nodes **Fast and Slow scan records** and **Continuous records** are displayed. The **Trend** node is displayed if you drag and drop the **Trend** function from the libraries to the **Recorder** group in the project tree.

- ✧ Double-click **Fast and slow scan records**, **Continuous records**, or **Trend records** to view the desired record table.

The respective **Records** table is displayed in the working area. If saved fault records are available, they are displayed in the table.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.6 Reading Fault Records from the SIPROTEC 5 Device

To be able to read fault records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. The fault records, which have been read are added to the fault records already displayed in the table. You can then save the fault records which have been read with the other project data.

If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the fault records without meeting any further requirements. The fault records, which have been read replace the fault records already displayed in the table, which are removed completely.

Reading Fault Records

- ✧ Click the  **Read records** button in the [20.7.29 Toolbar of the Records Table](#).

The SIPROTEC 5 device transmits the fault records to DIGSI 5. The fault records are displayed in the **Records** table.

- ✧ If you have opened the **Records** table in the project, you can save the fault records which have been read. Click the  button in the DIGSI 5 toolbar.

The fault records are saved. You can still display the saved fault records in the **Records** table after closing and reopening the project.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.7 Reading Fast and Slow Scan Records from the SIPROTEC 5 Device (7KE)

To be able to read fault records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. The fault records, which have been read are added to the fault records already displayed in the table.

If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the fault records without meeting any further requirements. The fault records which have been read replace the fault records already displayed in the table, which are removed completely.

Reading Fault Records

- ✧ Click the  **Read records** button in the [20.7.29 Toolbar of the Records Table](#) .

The SIPROTEC 5 device transmits the fault records overview to DIGSI 5. The fault records overview is displayed in the **Records** table with state as **New**. Under **Properties** tab, you can view the properties of the selected record (for example **Sampling rate**).

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.8 Reading Continuous Records from the SIPROTEC 5 Device (7KE)

To be able to read fault records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device.

If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the continuous records without meeting any further requirements.

Reading Continuous Records

- ✧ Click the  **Read records** button in the [20.7.29 Toolbar of the Records Table](#) .

The SIPROTEC 5 device transmits the configured **Continuous** recorder along with the data availability for each recorder to DIGSI 5. You can select a configured recorder from the list box and the data availability (specified by the **Available from** and **To** fields) for the selected recorder is displayed by default.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.9 Reading Trend Records from the SIPROTEC 5 Device (7KE)

To be able to read Trend records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. The following options to read a Trend record are possible:

- Opening the **Records** table for the offline configuration in the project
If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device.
- Opening the **Records** table for a SIPROTEC 5 device in the list of online accesses.
If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the trend records without meeting any further requirements.

Reading Trend Records

- ✧ Click the  **Read records** button in the [20.7.29 Toolbar of the Records Table](#) .

The SIPROTEC 5 device transmits the configured **Trend** recorder along with the data availability for each recorder to DIGSI 5. You can select a configured recorder from the list box and the data availability (specified by the **Available from** and **To** fields) for the selected recorder is displayed by default.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.10 Downloading Fault Records from the SIPROTEC 5 Device

To be able to download fault records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. The fault records, which have been read are added to the fault records already displayed in the table. The fault records which are read can be downloaded from SIPROTEC 5 device. You can then save the fault records which have been read with the other project data.

If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the fault records without meeting any further requirements. The fault records which have been read replace the fault records already displayed in the table, which are removed completely. The fault records which are read can be downloaded from SIPROTEC 5 device.

Download Selected Fault Records:

- ✧ Select the check box for the record you wish to download from the list of records displayed in the working area.
- ✧ Click the  **Download** button in the [20.7.29 Toolbar of the Records Table](#) .

The SIPROTEC 5 device transmits the fault records file for selected fault records to DIGSI 5. The fault records are displayed in the **Records** table with state as **Downloaded**.

- ✧ If you have opened the **Records** table in the project, you can save the fault records which have been downloaded. Click the  button in the DIGSI 5 toolbar.

The fault records are saved. You can still display the saved fault records in the **Records** table after closing and reopening the project.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.11 Downloading Fast and Slow Scan Records from the SIPROTEC 5 Device

To be able to download Fast and Slow scan records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. The fault records, which have been

read are added to the fault records already displayed in the table. The fault records which are read can be downloaded from SIPROTEC 5 device. You can then save the fault records, which have been read with the other project data.

If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the fault records without meeting any further requirements. The fault records which have been read replace the fault records already displayed in the table, which are removed completely. The fault records which are read can be downloaded from SIPROTEC 5 device.

Download Selected Fault Records:

- ✧ Select the check box for the record you wish to download from the list of records displayed in the working area.
- ✧ Click the  **Download** button in the [20.7.29 Toolbar of the Records Table](#) .

The SIPROTEC 5 device transmits the fault records file for selected fault records to DIGSI 5. The fault records are displayed in the **Records** table with state as **Downloaded**.

- ✧ If you have opened the **Records** table in the project, you can save the fault records which have been downloaded. Click the  button in the DIGSI 5 toolbar.

The fault records are saved. You can still display the saved fault records in the **Records** table after closing and reopening the project.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.12 Downloading Continuous Records from the SIPROTEC 5 Device

To be able to download continuous records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. The continuous records which are read can be downloaded by selecting the duration from SIPROTEC 5 device. You can then save the continuous records which have been downloaded with the other project data.

If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the continuous records without meeting any further requirements. The continuous records which are read can be downloaded by selecting the duration from SIPROTEC 5 device.

Download Selected Continuous Records:

- ✧ Click the  **Download** button in the [20.7.29 Toolbar of the Records Table](#) .

The SIPROTEC 5 device transmits the configured **Continuous** records along with the data availability for each recorder to DIGSI 5. You can select a configured recorder from the list box and the data availability (specified by the **Available from** and **To** fields) is displayed. The continuous records can be downloaded by selecting the duration (specified by the Download from and To fields) and are displayed in the **Records** table with state as **Downloaded**.

- ✧ If you have opened the **Records** table in the project, you can save the continuous records which have been downloaded. Click the  button in the DIGSI 5 toolbar.

The continuous records are saved. You can still display the saved continuous records in the **Records** table after closing and reopening the project.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.13 Downloading Trend Records from the SIPROTEC 5 Device

To be able to download trend records from a SIPROTEC 5 device, the [20.4.2 Records](#) table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Records** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. The trend records which are read can be downloaded by selecting the duration from SIPROTEC 5 device. You can save the trend records which have been downloaded with the other project data.

If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can read the trend records without meeting any further requirements. The trend records which are read can be downloaded by selecting the duration from SIPROTEC 5 device.

Download Selected Trend Records:

- ✧ Click the  **Download** button in the [20.7.29 Toolbar of the Records Table](#).

The SIPROTEC 5 device transmits the configured **Trend** records along with the data availability for each recorder to DIGSI 5. You can select a configured recorder from the list box and the data availability (specified by the **Available from** and **To** fields) is displayed. The trend records can be downloaded by selecting the duration (specified by the Download from and To fields) and are displayed in the **Records** table with the state as **Downloaded**.

- ✧ If you have opened the **Records** table in the project, you can save the trend records which have been downloaded. Click the  button in the DIGSI 5 toolbar.

The trend records are saved. You can still display the saved trend records in the **Records** table after closing and reopening the project.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.14 Triggering Test Fault Records

SIPROTEC 5 devices create fault records during a fault. However, for test purposes you can also use DIGSI 5 to trigger test fault records manually. A test fault record logs all the analog and binary signals, which are routed to a **Fault record** in [20.3.1 Communication Mapping](#) or [20.3.2 Information Routing](#). You can use the **Man. recording duration** setting to set the length of the fault record. The SIPROTEC 5 device creates the test fault record and then transmits it to DIGSI 5.

A test fault record is only triggered for a SIPROTEC 5 device in the list of online accesses. To do this, the [20.4.2 Records](#) table for this SIPROTEC 5 device must be open.

Triggering a Test Fault Record

- ✧ Make sure that the **Records** table for the SIPROTEC 5 device is opened in the list of online accesses.
- ✧ Click  **Start fault record** in the [20.7.29 Toolbar of the Records Table](#).

The SIPROTEC 5 device immediately records the routed signals in a test fault record (using the fault record length, which has just been set). The SIPROTEC 5 device then transmits the test fault record to DIGSI 5. The test fault record is displayed in the **Records** table.

Triggering a Fault Record (7KE)

- ✧ Make sure that the **Fast and slow scan records** table for the SIPROTEC 5 device is opened in the list of online accesses.
- ✧ Click the  **Start fault record** button in the [20.7.29 Toolbar of the Records Table](#) .

Start fault record dialog appears.

- ✧ Select the desired recorder from the **Select recorder** list box.
- ✧ Click **Create**.

The SIPROTEC 5 device records the routed signals in a fault record (using the fault record length, which has just been set) and the duration is based on the time configured in the recorder settings. The SIPROTEC 5 device then transmits the test fault record to DIGSI 5. The test fault record is displayed in the **Records** table with the status as **New** under the **State** column.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)
- ✧ [15.5.3.2 Configuring and Setting Parameters for Fault Recording](#)

15.5.3.15 Opening Fault Records for Viewing Only

You can use the fault record view to display the contents of fault records in DIGSI 5 directly. This view shows the history of analog signals over time and represents binary signals as binary signal traces.

To be able to open fault records for viewing, the [20.4.2 Records](#) table must be open. You can also open a number of fault records one after the other or at the same time. Every open fault record is displayed on a separate tab in the working area.

Displaying Fault Records with the Fault-Record View

- ✧ Double-click a cell, which belongs to the required fault record, in the **Time stamp** column for example.
- or -
- ✧ Right-click a cell, which belongs to the required fault record, in the **Time stamp** column for example.
- ✧ Click **Open** in the context menu.
- or -
- ✧ Select one cell or the entire row for each of the multiple fault records required.
- ✧ Right-click the selected section.
- ✧ Click **Open** in the context menu.

A tab is shown for each selected fault record. Within a tab, the fault record view displays the signals contained in the fault record.

Closing the Fault-Record View

- ✧ Select the tab, which is to be closed.
- ✧ Click the  button in the [20.7.29 Toolbar of the Records Table](#) .

The tab is closed.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

✧ [15.5.3.16 Opening Fault Records for Viewing and Evaluating](#)

15.5.3.16 Opening Fault Records for Viewing and Evaluating

If you require various display formats and want to evaluate fault records using different methods, open a fault record with SIGRA. SIGRA can represent the contents of a fault record, for example as time signals or as a locus diagram. In addition, SIGRA can be used to calculate a fault location, for example.

SIGRA is part of DIGSI 5 from the **Premium** version, but also optionally available to DIGSI 5 Standard and as a stand-alone version.

To be able to display fault records with SIGRA, the [20.4.2 Records](#) table must be open. You can also open a number of fault records one after the other or at the same time using SIGRA. Every open fault record is displayed in a separate window in SIGRA.

Opening Fault Records with SIGRA

- ✧ Right-click a cell, which belongs to the required fault record, in the **Time stamp** column for example.
- ✧ Click **Display in SIGRA** in the context menu.
- or -
- ✧ Select one cell or the entire row for each of the multiple fault records required.
- ✧ Right-click the selected section.
- ✧ Click **Display in SIGRA** in the context menu.

SIGRA opens. Every selected fault record is displayed in a window in SIGRA.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)
- ✧ [15.5.3.15 Opening Fault Records for Viewing Only](#)

15.5.3.17 Opening Fault Records for Viewing and Evaluating (7KE)

You can use the fault record view to display the contents of fault records in DIGSI 5 directly. This view shows the history of analog signals over time and represents binary signals as binary signal traces.

To be able to open fault records for viewing, the [20.4.2 Records](#) table must be open. You can also open a number of fault records one after the other or at the same time. Every open fault record is displayed on a separate tab in the working area using SIGRA plug-in.

Displaying Fault Records with the Fault-Record View

- ✧ Double-click a cell, which belongs to the required fault record, in the **Time stamp** column.
- or -
- ✧ Right-click a cell, which belongs to the required fault record, in the **Time stamp** column, for example.
- ✧ Click **Open** in the context menu.
- or -
- ✧ Select one cell or the entire row for each of the multiple fault records required.
- ✧ Right-click the selected section.
- ✧ Click **Open** in the context menu.

A tab is shown for each selected fault record. Within a tab, the fault record view displays the signals contained in the fault record.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)
- ✧ [15.5.3.16 Opening Fault Records for Viewing and Evaluating](#)

15.5.3.18 Exporting Fault Records

You can export the contents of fault records so that they can be processed further in analysis programs, for example. You can export the contents of all fault records or of individual, selected fault records simultaneously. The contents of fault records are exported in COMTRADE format and for device type 7KE, records are exported in DIGSI native format. COMTRADE is the standard format for fault recording.

The export procedure separates the data of each fault record into 2 files:

- **Configuration File**
The **configuration file**, which can be identified by its **.cfg** file extension, describes the fault record channels. The configuration file provides information about signal names, sampling rates, channel numbers and more.
- **Data File**
The actual measured values, that is, the sampled values of the fault record channels, are saved to the data file with the **.dat** file extension.

If you export several fault records at the same time, a dialog appears for each fault record. In case of device type (for example, 7KE) only one dialog appears irrespective of the number of records selected.

Exporting the Content of Fault Records

- ✧ If you want to export all fault records, make sure that no individual fault record is selected.
- or -
- ✧ If you want to export selected fault records, select the relevant rows in the table.
- ✧ Click  in the [20.7.29 Toolbar of the Records Table](#).

The **Export fault record** dialog opens.

- ✧ Enter a file name for the configuration file.
- ✧ Click **Save**.

The **Export fault record** dialog closes. If other fault records are being exported, the dialog opens again. Repeat these described actions until all fault records have been exported. Either all or only the selected fault records have been exported.

Exporting the Content of Records - 7KE

- ✧ If you want to export all records, make sure that all records are selected.
- or -
- ✧ Select the relevant rows by activating the check box.
- ✧ Click  in the [20.7.29 Toolbar of the Records Table](#).

The **Export** dialog opens.

- ✧ Enter the path in the text box or click **Browse** to navigate and select the valid path to export selected records.
- ✧ Click **Export** button.

The **Export** dialog closes and selected records are exported to specified location. Either all or only the selected fault records have been exported.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

Exporting the Content of Continuous Records or Trend Records - 7KE

- ✧ If you want to export all records, make sure that all records are selected.
- or -
- ✧ If you want to export selected records, select the relevant rows by activating the check box.
- ✧ Click  in the [20.7.29 Toolbar of the Records Table](#).

The **Export** dialog opens.

- ✧ Enter the path in the text box or click **Browse** to navigate. Select the valid path to export the required records.
- ✧ Select the desired format using the option **SIPROTEC Format** or **Power Quality Data Interchange Format (PQDIF)** to export the required records.
- ✧ Click **OK**.

The **Export** dialog closes and the selected records are exported to the specified location.
Either all or only the selected records have been exported.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.19 Saving Fault Record Information in a File

You can save the fault record information part of the entries in the [20.4.2 Records](#) table to external files. You can save all entries or individual, selected entries in a file.

The following information is saved for every selected fault record:

- Time stamp
- Fault number
- Name

The following information is saved for every record for 7KE device type:

- State
- Record Id
- Time stamp
- Duration
- Record type
- Recorder name
- Trigger name
- Trigger Description
- Size
- Test record

The fault information is saved in the **CSV** (Comma Separated Values) format. With this format, data is written to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This format enables you to sort and evaluate the table entries according to various criteria.



NOTE

On saving, only the information specified earlier is taken into account, not the data part of the fault records. If you want to save the contents of fault records so that they can be processed further in analysis programs, for example, export the fault records.

Saving Fault-Record Information in a File

- ✧ If you want to save the fault record information of all table entries, make sure that no individual table entry is selected.
- or -
- ✧ If you want to save the fault record information of selected table entries, select the relevant rows in the table.
- ✧ Click the button  in the [20.7.29 Toolbar of the Records Table](#) .

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The fault record information of all the table entries or only the selected ones is saved in a file.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)

15.5.3.20 Deleting Fault Records Saved in the Offline Configuration

You can delete the fault records saved in the offline configuration for a SIPROTEC 5 device. To do this, the [20.4.2 Records](#) table for the offline configuration must be open.

Deleting Fault Records Saved in the Offline Configuration

- ✧ Make sure that the **Records** table for the offline configuration is open.
- ✧ If you want to delete one individual fault record, right-click in the corresponding row of the table.
- or -
- ✧ If you want to delete a number of fault records simultaneously, select the relevant rows in the table. Then right-click the selected section.
- ✧ Click **Delete** in the context menu.

A confirmation prompt is displayed.

- ✧ Click **Yes** to confirm.

This step confirms your action.

The marked fault records are deleted from the offline configuration.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)
- ✧ [15.5.3.21 Deleting Fault Records from a SIPROTEC 5 Device](#)

15.5.3.21 Deleting Fault Records from a SIPROTEC 5 Device

You can delete fault records from a SIPROTEC 5 device, but all fault records must be deleted simultaneously. To delete fault records, the **Records** table for the relevant SIPROTEC 5 device must be open. There are 2 ways of performing this operation:

To delete the fault records, the **Records** table must be open. There are 2 ways of doing this:

- You can open the **Records** table for the offline configuration in the project.
- You can open a **Records** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the [20.4.2 Records](#) table for the offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. If you have opened the **Records** table for the SIPROTEC 5 device in the list of online accesses, you can delete the fault records without meeting any further requirements.

Deleting Fault Records from a SIPROTEC 5 Device

- ✧ Click the  button in the [20.7.29 Toolbar of the Records Table](#).

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The fault records are deleted from the SIPROTEC 5 device.



NOTE

For special device types (for example, 7KE) in fast and slow scan records, you can select the desired record/ records to be deleted using the check box option under the **Select** column. After deletion, the state of the record is displayed as **Deleted from device**.

Deleting Continuous Records from a SIPROTEC 5 Device (7KE Device Type)

- ✧ Click the  button in the [20.7.29 Toolbar of the Records Table](#).

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes and **Delete continuous record(s) from device** dialog appears.

- ✧ Select the desired recorder from the **Select recorder** list box.
- ✧ Click **Delete**.

A confirmation prompt is displayed.

- ✧ Click **Yes** to confirm.

This step confirms the deletion.

The continuous records are deleted from the SIPROTEC 5 device.



NOTE

The complete content of the selected continuous recorder is deleted from the SIPROTEC 5 device.

Deleting Trend Records from a SIPROTEC 5 Device (7KE Device Type)

- ✧ Click the  button in the [20.7.29 Toolbar of the Records Table](#).

If the confirmation ID for the setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes and **Delete trend record(s) from device** dialog appears.

- ✧ Select the desired recorder from the **Select recorder** list box.
- ✧ Click **Delete**.

A confirmation prompt is displayed.

- ✧ Click **Yes** to confirm.

This step confirms the deletion.

The continuous records are deleted from the SIPROTEC 5 device.



NOTE

The complete content of the selected trend recorder is deleted from the SIPROTEC 5 device.

Related Topics

- ✧ [15.5.3.1 Overview of Fault Recording](#)
- ✧ [15.5.3.4 Opening the Records Table](#)
- ✧ [15.5.3.20 Deleting Fault Records Saved in the Offline Configuration](#)

15.5.4 Logs

15.5.4.1 Overview of Logs

In a SIPROTEC 5 device, indications compiled into protocols are saved in buffers. Logs have a ring structure and are automatically managed. If the maximum capacitance of a log is exhausted, the oldest entries disappear before the newest entries. If the maximum capacity of the fault log or of the ground-fault log is reached, the number of the last fault is issued via the signal **Fault log is full**. During a supply-voltage failure, recorded data is securely held with battery buffering or storage in the flash memory. You can read and analyze the logs with DIGSI 5 from the SIPROTEC 5 device.

Different logs allow for a categorization of log protocols according to operating states and according to applications. In the following, you have an overview of the different log categories.

- **Operational Log**

An operational log protocols operating messages. Operational indications are information, which the SIPROTEC 5 device generates during operation. Included in this, for example, is information about the state of the device functions. Even the exceeding of or falling below limiting values are stored as an operational indication. The operational log saves up to 2000 indications simultaneously. You can delete the operational log.

For busbar devices (for example, 7SS device type), the current status of the switches (closed, open, intermediate, and disturbed) are displayed in a tabular format, if the switch status is assigned in [20.3.2 Information Routing](#), and fault occurs for the same switch.

- **Fault Log**

A fault log protocols fault indications. Fault indications are events which arise during a fault. They are logged in the fault log with real-time stamp and relative-time stamp. Faults are numbered consecutively in rising order. With fault recording engaged, a corresponding fault record with same number exists for every fault logged in the fault log. The fault log saves up to 1000 fault indications simultaneously. You can delete the fault log.

- **Ground Fault Log**

A ground fault log protocols ground fault indications. Ground fault indications are events which arise during a ground fault. They are logged in the ground fault log with real-time stamp and relative-time stamp. Ground faults are numbered consecutively in rising order. The maximum limit of ground fault log is 1000 entries with each log having of capacity of 100 entries. You can delete the ground fault log.

- **Motor Starting Log (7SK Device Type)**

A **Motor starting log** protocols the motor startup indications. These indications are the events (for example, the **Motor starting time**, the **Starting current**, the **Starting voltage** and the **Starting duration**) which arise during the startup of the motor. The **Motor starting logs** are numbered consecutively in the increasing order with the latest generated startup log being displayed first among the list of generated logs. The maximum limit of the **Motor starting logs** is 50 entries, with each log having a capacity of 4 entries for a single motor configured in the protection device. You can delete the **Motor starting log** from the device.

- **Sequence of Events**

A **Sequence of events** log protocols the operational messages. The **Sequence of events** log displays the information generated by the SIPROTEC 5 device during the operation. For example, exceeding of or falling below the limiting values are stored as a sequence of events log. The **Sequence of events** log saves up to 2000 indications simultaneously. You can delete the **Sequence of events** log.

- **User Log**

With 2 user logs, you can individually protocol indications. This is helpful, for example, for special monitoring tasks. You can also, for example, configure a separate fault log for a second protective object. A user log saves up to 200 indications simultaneously. You can delete the user log.

- **Settings-History Log**

The settings-history log protocols all individual settings changes and the downloaded files of entire setting records. That way, you can for example, clarify whether settings changes are associated with protocolled events. With fault analyses, you can also check whether the status of the settings actually corresponds to the status at the time of the fault. The settings-history log saves up to 200 indications simultaneously. You cannot delete the settings-history log.

- **Communication Log**

A communication log protocols the current communication-module state. Failures, test, and diagnosis operation or communication capacity, for example, are included in the current state. Every change to the current state leads to an indication in the communication log. Every communication module inside the SIPROTEC 5 device and also the integrated Ethernet interface each have their own communication log. A communication log saves up to 500 indications simultaneously. You cannot delete the communication log.

- **Security Log**

The security log protocols access to areas of the SIPROTEC 5 device with limited access rights. The security log also protocols failed and unauthorized access attempts. Each of the accesses mentioned lead to an indication in the security log. The security log saves up to 500 indications simultaneously. You cannot delete the security log.

- **Device-Diagnosis Log**

The device-diagnosis log saves indications for the following events:

- Required maintenance, for example battery replacement
- Identified hardware defect
- Compatibility problems

The indications are supplemented by practical instructions. For example, **Inform the repair service**. The device-diagnosis log is especially required if the SIPROTEC 5 device is in supervision mode or is no longer ready for operation. The device-diagnosis log saves up to 500 indications simultaneously. You cannot delete the device-diagnosis log.

15.5.4.2 Configuring Logging

You can use the [20.3.2 Information Routing](#) matrix to configure which indications are to be saved to which logs.

Logging

- ✧ Open the **Information routing** matrix for the relevant offline configuration.
- ✧ Route the indications to be logged to the columns in the **Logs** group.

Related Topics

- ✧ [11.3.1 Opening the Information Routing Matrix](#)

15.5.4.3 Opening the Logs Table

To be able to read indications from the logs, to display them and to perform other actions, use the [20.4.1 Log](#) table. Each log has a separate table, but the tables all have an identical structure.

There are 2 ways to open one of the **Logs** tables:

- You can open a **Logs** table for an offline configuration in the project.
- You can open a **Logs** table for a SIPROTEC 5 device in the list of online accesses.

If you open a **Logs** table for an offline configuration in the project, you can perform the following actions:

- Displaying indication logs saved in the offline configuration
- Defining an indication as the relative-time basis
- Deleting indication logs saved in the offline configuration
- Saving saved indication logs and those which have just been read as a file
- Reading indications logs out from the SIPROTEC 5 device
- Deleting indications logs from a SIPROTEC 5 device

For the last 2 actions, a communication connection must exist between the DIGSI 5 PC and the SIPROTEC 5 device.

If you open a **Logs** table for a SIPROTEC 5 device in the list of online accesses, you can perform the following actions:

- Reading indications logs out from the SIPROTEC 5 device
- Saving indications logs which have just been read as a file
- Deleting indications logs from a SIPROTEC 5 device

Opening the Logs Table

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ In the project, open the offline configuration for which you want to open a **Logs** table. Then open the **Process data** folder.
- or -
- ✧ In the online accesses list, open the online device for which you want to open a **Logs** table.
- ✧ Open the **Logs** folder.

You will see the names of the available indication types, such as **Operational indications** or **Fault logs**.

- ✧ Double-click the indication type for which you want to open the **Logs** table.

The **Logs** table for the selected indication type is displayed in the working area.

Related Topics

- ✧ [15.5.4.4 Displaying Indications Logs Saved in the Offline Configuration](#)

- ✧ [15.5.4.6 Specifying an Indication as reference for relative time](#)
- ✧ [15.5.4.7 Deleting Indications Logs Saved in the Offline Configuration](#)
- ✧ [15.5.4.9 Saving Indications Logs and Indications in a File](#)
- ✧ [15.5.4.5 Reading Indications Logs from the SIPROTEC 5 Device](#)
- ✧ [15.5.4.8 Deleting Indications Logs from a SIPROTEC 5 Device](#)

15.5.4.4 Displaying Indications Logs Saved in the Offline Configuration

All indication logs saved in the offline configuration for a particular indication type are displayed together in the corresponding [20.4.1 Log](#) table.

Displaying Saved Indications Logs

- ✧ In the project, open the offline configuration for which you want to display saved indication logs.
- ✧ Open the **Process data** folder.
- ✧ Open the **Logs** folder.

You will see the names of the available indication types, such as **Operational indications** or **Fault indications**.

- ✧ Double-click the indication type for which you want to open the **Logs** table.

The **Logs** table for the selected indication type is displayed in the working area. If saved indication logs are available, they are shown in the table.

Related Topics

- ✧ [15.5.4.3 Opening the Logs Table](#)

15.5.4.5 Reading Indications Logs from the SIPROTEC 5 Device

Indications are not read from a SIPROTEC 5 device individually; rather, they are always grouped together to form indications logs. To be able to read these indications logs from a SIPROTEC 5 device, the [20.4.1 Log](#) table for the relevant indication type must be open.

There are 2 ways to open the **Logs** table:

- You can open the **Logs** table for an offline configuration in the project.
- You can open a **Log** table for a SIPROTEC 5 device in the list of online accesses.

If you have opened the **Logs** table for an offline configuration in the project, a communication connection must exist between the DIGSI 5 PC and the associated SIPROTEC 5 device. The indications logs which have been read are added to the indications logs already displayed in the table. You can then save the indications logs which have been read with the other project data.

If you have opened the **Log** table for the SIPROTEC 5 device in the list of online accesses, you can read the indication logs without meeting any further requirements. The indications logs which have been read replace the indications logs already displayed in the table. The previously displayed indications logs are removed from the table.

Reading Indication Logs

- ✧ Click the  button in the [20.7.28 Toolbar of the Log Table](#).

The SIPROTEC 5 device transmits the indications logs to DIGSI 5. The logs are displayed in the **Logs** table.

- ✧ If you have opened the **Logs** table for an offline configuration, you can save the indication logs, which have been read. To do this, in [20.7.1 DIGSI 5 Toolbar](#) click the  button.

The indications logs are saved together with the other project data. The indications are now part of the project. When copying or exporting a project, the indications are also copied or exported. You can still display the saved indications logs in the **Logs** table after closing and reopening the project.

Related Topics

- ✧ [15.5.4.3 Opening the Logs Table](#)

15.5.4.6 Specifying an Indication as reference for relative time

All the indications in an indications log are assigned a time stamp. In addition, a relative time is shown for every indication. The relative time indicates the time difference between each individual indication and an indication in the log that serves as a reference, which has a relative time of 0.

You can define any indication in an indications log as the relative-time reference for the other indications. The reference indication is then assigned a time value of 0 ms. The relative times of the other indications are calculated from their respective time stamps. If an indication has a negative time value, then this indication is encountered in time before the reference indication. If an indication has a positive time value, then this indication is encountered in time after the reference indication.

Initially, the times are only displayed in milliseconds. If the time value exceeds a certain magnitude, the time will then be shown in seconds and milliseconds, in the format 00:000. As the time value increases, minutes, hours, and days will also be used.

To be able to define the relative-time reference, the [20.4.1 Log](#) table must be open.

Defining the Relative-Time Reference

- ✧ Show the indications in the indication logs. To do this, in the **Time stamp** column, click the arrow to the left of the real-time value for the indication logs.
- ✧ Select the row of the indication which you want to define as the relative-time reference.
- ✧ In [20.7.28 Toolbar of the Log Table](#), click the  button.

The relative-time values are updated.

Related Topics

- ✧ [15.5.4.3 Opening the Logs Table](#)

15.5.4.7 Deleting Indications Logs Saved in the Offline Configuration

You can delete the indication logs saved for an offline configuration. To do this, the [20.4.1 Log](#) table for the relevant indication type must be open for the offline configuration.

Deleting Indication Logs Saved in the Offline Configuration

- ✧ Make sure that the **Logs** table for the offline configuration is open.
- ✧ If you want to delete one individual indication logs, right-click in the header of the indication logs.
- or -
- ✧ If you want to delete a number of indication logs simultaneously, select the headers of the relevant indication logs. Then right-click the selected section.
- ✧ Click **Delete** in the context menu.



NOTE

The selected indication logs are deleted without another security prompt appearing.

Related Topics

- ✧ [15.5.4.3 Opening the Logs Table](#)
- ✧ [15.5.4.8 Deleting Indications Logs from a SIPROTEC 5 Device](#)

15.5.4.8 Deleting Indications Logs from a SIPROTEC 5 Device

You can delete indications logs from a SIPROTEC 5 device. All indications logs of the same indication type can be deleted all at once. To delete the indications logs, the [20.4.1 Log](#) table must be opened from the SIPROTEC 5 device in the list of online accesses.



NOTE

You cannot delete the logs from a SIPROTEC 5 device via offline configuration of the project.

Deleting Logs from a SIPROTEC 5 Device

- ✧ Click the  button in [20.7.28 Toolbar of the Log Table](#) of an online device.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.
- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes.

The logs are deleted from the SIPROTEC 5 device.

Related Topics

- ✧ [15.5.4.3 Opening the Logs Table](#)
- ✧ [15.5.4.7 Deleting Indications Logs Saved in the Offline Configuration](#)

15.5.4.9 Saving Indications Logs and Indications in a File

You can save indication logs and indications in the [20.4.1 Log](#) table to external files independently of other project data. You can save complete indication logs or individual, selected indications in a file.

The indications are saved in the **CSV** (Comma Separated Values) format. With this format, data is written to a file row by row, separated by semicolons. Most spreadsheet programs can open files in CSV format. This enables you to sort and evaluate indications according to various criteria.

Selecting Indication Logs and Indications

- ✧ If you want to save all indication logs together with all their indications, make sure that no individual indication is selected.
- or -
- ✧ If you want to save all the indications within selected indication logs, select the headers of the indication logs in question.
- or -
- ✧ If you want to save individual indications, select the relevant ones.

Saving Indication Logs and Indications

- ✧ Select the indication logs or indications to be saved, as described in the previous section.
- ✧ Click the  button in [20.7.28 Toolbar of the Log Table](#).

The **Save as file** dialog opens.

- ✧ Enter a file name.
- ✧ Click **Save**.

The selected indication logs or indications are saved to a file.

Related Topics

- ✧ [15.5.4.3 Opening the Logs Table](#)

15.6 Updating Device Functionality

15.6.1 Overview of Updating the Device Functionality

When you order a SIPROTEC 5 device, you select not only the hardware for this device but also certain functional characteristics. These functional characteristics include, for example, the function-points class, that is, the number of function points available for the device application. If you own a SIPROTEC 5 device, you can, if required, select, order, and finally load additional functionality into the device.

Functional Characteristics that Can Be Updated

You can update the following functional characteristics in the SIPROTEC 5:

- **Properties of the Integrated Ethernet Interface**

If you have been using the integrated Ethernet interface so far purely as an operating interface for DIGSI 5, you can extend the interface with the **IEC 61850 reporting** functionality. This update feature is available for all device types.

- **Function-Points Class**

If the current number of function points is inadequate for the device application, you can purchase additional function points for the SIPROTEC 5 device. You select a higher function-points class for this purpose. This update feature is available for all device types.

- **Significant Property**

For certain device types, for example, for the **7SL87** type, you can decide at the time of placing the order whether the SIPROTEC 5 device should be usable as a 2-ended protection, a 3-ended protection, or as a multi-ended protection. You can update this device functionality. You can extend a 2-ended protection to a 3-ended protection or a multi-ended protection, and a 3-ended protection to a multi-ended protection.

Device Functionality Linked to the Serial Number

You select and order additional device functionality always for a certain SIPROTEC 5 device. Hence, when selecting the device functionality, specify the serial number of the SIPROTEC 5 device. This means that you must already have a SIPROTEC 5 device in order to update its functionality. The additional device functionality supplied by Siemens is linked to the SIPROTEC 5 device, whose serial number you have specified when selecting the functionality. You cannot transmit the device functionality supplied to another SIPROTEC 5 device.

Basic Procedure

You can select, order and pay for the additional device functionality via Internet. Use the SIPROTEC 5 configurator to select the device functionality and the Siemens SAP system to order and pay for the same. You will then receive a signed license file from Siemens, which describes the extended device functionality. Load this license file with DIGSI 5 into the SIPROTEC 5 device.

Please proceed as follows in order to update the functionality of a SIPROTEC 5 device:

- **Determining the Serial Number of the SIPROTEC 5 Device**

You cannot obtain the serial number from the name plate on the SIPROTEC 5 device. If you cannot access the SIPROTEC 5 device, you can also read the serial number via a communication connection from the SIPROTEC 5 device using DIGSI 5. You find more information about this under [15.6.2 Determining the Serial Number of the SIPROTEC 5 Device](#).

- **Determining the Function-Points Class Required**

Use DIGSI 5 to determine the number of function points that you need for the current device configuration. You find more information about this under [15.6.3 Determining the Function-Points Class Required](#).

- **Selecting Additional Device Functionality**

Open the SIPROTEC 5 configurator in the Web browser and select the additional device functionality required for a specific SIPROTEC 5 device. Enter the serial number of the SIPROTEC 5 device. You receive a product code for the device functionality required by you. You find more information about this under [15.6.4 Selecting the Device Functionality](#).

- **Ordering, Paying for and Receiving Device Functionality**

Open the Siemens SAP system in the Web browser. Order the device functionality using the product code received. After the payment, you will receive a signed license file with the additional device functionality either by downloading it or via e-mail. Your Siemens contact provides you with more information.

- **Loading Device Functionality into the SIPROTEC 5 Device**

Use the DIGSI 5 to load the license file with the device functionality into the SIPROTEC 5 device with the matching serial number. You find more information about this under [15.6.5 Loading the Device Functionality into the SIPROTEC 5 Device](#).

- **Updating the Existing Offline Configuration**

If you have already created an offline configuration for the updated SIPROTEC 5 device in DIGSI 5, Siemens recommends that you update the device configuration of the SIPROTEC 5 device with this offline configuration. If an offline configuration is not yet available for the SIPROTEC 5 device, you can save the device configuration of the SIPROTEC 5 device as an offline configuration in a project. You find more information about this under [15.2.4 Updating the Offline Configuration from Target Device](#) or [15.2.5 Copying Online Configuration into the Project](#).

Related Topics

[8.1.3.4 Checking the Function-points Consumption](#)

15.6.2 Determining the Serial Number of the SIPROTEC 5 Device

You can order additional device functionality only for a specific SIPROTEC 5 device. The serial number of the device is used as the criterion for assignment to a specific device. You have the following options to determine the serial number of a SIPROTEC 5 device:

- If you cannot access the SIPROTEC 5 device physically, you can also read the serial number from the name plate on the SIPROTEC 5 device.
- If you cannot access the SIPROTEC 5 device physically, you can also read the serial number via a communication connection from the device. To do this, DIGSI 5 online must be connected with the SIPROTEC 5 device. The SIPROTEC 5 device is also visible as an online device in the list of online-access links.
- If you cannot access the SIPROTEC 5 device either physically or via a communication link, you can get the serial number from the offline configuration of the device. The SIPROTEC 5 device must already be initialized with the concerned offline configuration or must be assigned to it for this purpose. The serial number may, however, also have been entered manually in the offline configuration. This is why Siemens recommends that you obtain the serial number from the offline configuration only under exceptional circumstances, since the serial number may have been entered incorrectly.

Reading the Serial Number from the SIPROTEC 5 Device

- ✧ In the [3.1.2 Project Tree](#), open the **Online access** folder.
- ✧ Open the Online access folder with the help of which the SIPROTEC 5 device is connected online with DIGSI 5.
- ✧ Open the online device.
- ✧ Double-click **Device Information**.

The [20.5.3 Device Information](#) are displayed in the working area. In the **General** area, the serial number of the SIPROTEC 5 device is displayed in the **Serial number** field.

- ✧ Mark the serial number and click the marked entry with the right mouse button.
- ✧ Click **Copy** in the context menu.
- ✧ Insert the serial number to save it temporarily, for example, in a text file.
- or -
- ✧ Insert the serial number directly in the **Device serial number** text box in the SIPROTEC 5 configurator.

Get the serial number from the offline configuration

- ✧ Open the offline configuration of the SIPROTEC 5 device involved in the project navigation.
- ✧ Double-click **Device Information** in this folder.

The [20.5.3 Device Information](#) are displayed in the working area. Under the prerequisites mentioned at the beginning of this topic, the serial number of the SIPROTEC 5 device is displayed in the **Serial number** text box.

- ✧ Mark the serial number and click with the right mouse button on the marked entry.
- ✧ Click **Copy** in the context menu.
- ✧ Insert the serial number to save it temporarily, for example, in a text file.
- or -
- ✧ Insert the serial number directly in the **Device serial number** text box in the SIPROTEC 5 configurator.

Related Topics

- ✧ [15.6.1 Overview of Updating the Device Functionality](#)
- ✧ [15.6.3 Determining the Function-Points Class Required](#)
- ✧ [15.1.4 Permanently Connecting to a SIPROTEC 5 Device](#)
- ✧ [15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC](#)

15.6.3 Determining the Function-Points Class Required

The functional scope of an application and the CFC functions used determine the number of function points required for an offline configuration. Using the DIGSI 5 you can also create an offline configuration that needs more function points than those that are actually available in the SIPROTEC 5 device. If, however, you want to load the offline configuration in the SIPROTEC 5 device, it must have at least the number of function points required. If the number of function points currently available is not adequate, you must obtain the next higher function-points class that covers the requirement of function points.

Proceed as follows to determine the function-points class required:

- **Checking the Current Usage of Function Points**

Check the current usage of function points. No other steps are necessary if this lies within the current function-points class. Otherwise, carry out the next step.

- **Selecting a New Function-Points Class**

If, for example, you need at least 234 points for the application configured at present, but have, so far, only the function-points class **Basic + 200**, select the function-points class **Basic + 250**. You can also select a higher function-points class and thus, create spare capacity for additional functional expansions.

Checking the Current Usage of Function Points

- ✧ Open the offline configuration of the SIPROTEC 5 device involved in the project tree.
- ✧ Double-click **Device information** in this folder.

The [20.5.3 Device Information](#) are displayed in the working area.

- ✧ Select the tab [20.5.5 Resource Consumption](#).

The current usage of function points is displayed in the **Function points** area. Leave the tab open and carry out the instructions given in the next section.

Selecting a New Function-Points Class

- ✧ Open the **Settings** folder in the same offline configuration.
- ✧ Double-click **Device settings** in this folder.

The [20.5.10 Device Settings](#) are displayed in the working area.

- ✧ Click the  button in the [20.7.1 DIGSI 5 Toolbar](#).

The device settings and device information are displayed in the working area below one another.

- ✧ Select a function-points class that covers the present usage of function points in the device settings. To do this, use the **Function-points class** list box.

A confirmation box is displayed. This draws your attention to the fact that changing the function-points class changes the long product code.

- ✧ Click **Yes** to confirm.

The display of the function points used is updated in the device information. If a red bar is not displayed, the function-points class is suitable for the current requirement of function points.

Related Topics

- ✧ [15.6.1 Overview of Updating the Device Functionality](#)
- ✧ [15.6.2 Determining the Serial Number of the SIPROTEC 5 Device](#)

15.6.4 Selecting the Device Functionality

Use the SIPROTEC 5 configurator to select additional device functionality. The SIPROTEC 5 configurator is a Web application that you can execute with the browser on your PC. Your Siemens contact will explain to you how to find the SIPROTEC 5 configurator.

You select the additional device functionality for exactly one SIPROTEC 5 device. To do this, enter the serial number of the device during the selection process. Please take care to ensure that you enter the serial number correctly. If you enter the wrong serial number, you cannot load the additional device functionality into the SIPROTEC 5 device.

You can find the serial number on the housing of the basic module of a SIPROTEC 5 device. If you cannot access the concerned SIPROTEC 5 device physically, you can also read the serial number via a communication link from the SIPROTEC 5 device or take it from the associated offline configuration. For details of how to do this, refer to [15.6.2 Determining the Serial Number of the SIPROTEC 5 Device](#).

Selecting the Device Type and Entering the Serial Number

- ✧ Click on **Function enhancement** in the starting area of the SIPROTEC 5 configurator.

The **Function enhancement** area is displayed in the browser.

- ✧ Select the device type of the SIPROTEC 5 device to be updated from the **Device type** list box, for example, **7SL87 Diff. & Dist 1-/3-p.**

Depending on the device type selected, an additional list box is displayed for the relevant property.

- ✧ Enter the serial number of the SIPROTEC 5 device to be updated in the **Device serial number** text box. Please take care to ensure that you enter the serial number correctly.

Selecting the Device Functionality Required

- ✧ If you want to change the relevant property of the SIPROTEC 5 device to be updated, select the relevant property from **Relevant property** list box. You can select from the characteristics, **3-ended protection** and **Multi-ended protection**. The **Relevant property** list box is visible if the device type selected has the properties mentioned.

- ✧ If you need a higher function-points class for the SIPROTEC 5 device to be updated, select this from the **Function-points class** list box. You do not select additional points individually, but instead, a function-points class that covers the number of function points required. However, you need to pay only for the difference between the new and the current function-points class.
- ✧ If you would like to use the integrated Ethernet interface additionally for IEC 61850 reporting, select the setting **DIGSI 5 and IEC 61850** from the **Integrated Ethernet port** list box.

Selecting the Mode of Dispatch and Displaying the Result

- ✧ Use the **Mode of dispatch** list box to select how you would like to receive the signed license file with the information for expanded device functionality. The dispatch modes that you can select from are **Download** and **E-mail**.

When you select the **Download** mode of dispatch, you receive a link after the ordering and payment procedure, using which you can load the license file on your PC. If you select the **Email** mode of dispatch, the **E-mail address** text box is displayed.

- ✧ Enter a valid e-mail address in the **E-mail address** text entry field, to which the license file should be sent after completing the order placement and payment procedure.
- ✧ Click now on **Display result**.

The result of your selection is displayed in the browser.

- ✧ If you want to save the result as a PDF file, click on **Save result as PDF**.

A PDF file is generated and displayed in a separate browser window. You can then save the PDF file displayed on your PC.

- ✧ Now order and pay for the new device functionality.

Related Topics

- ✧ [15.6.1 Overview of Updating the Device Functionality](#)
- ✧ [15.6.5 Loading the Device Functionality into the SIPROTEC 5 Device](#)

15.6.5 Loading the Device Functionality into the SIPROTEC 5 Device

Load the signed license file into the SIPROTEC 5 device in order to be able to use the expanded device functionality in the device.

Selecting and Loading the License File

- ✧ In the [3.1.2 Project Tree](#), right-click the name of the offline device.
- ✧ Click **Upgrade device functionality** in the context menu.

The **Select device-functionality upgrade** dialog opens.

- ✧ Select the license file using this dialog. This has the file extension **DAF**.
- ✧ Click **Open**.

The dialog closes and the file selected is prepared for the loading operation. In the process, DIGSI 5 checks whether the serial number given in the license file matches that of the SIPROTEC 5 device. If the 2 serial numbers do not match the device functionality cannot be transmitted to the SIPROTEC 5 device. You receive an indication to this effect.

- ✧ Click **OK**.

The procedure is canceled. The new device functionality is not transmitted to the SIPROTEC 5 device.

If both the serial numbers match with one another, DIGSI 5 checks whether the device functionality to be loaded is newer than that present in the SIPROTEC 5 device. You get a confirmation box if the device functionality to be loaded is older than or as old as the one that is present.

- ✧ If you want to load the device functionality into the SIPROTEC 5 device, click **Yes**, otherwise click **No**.

The operation is canceled if you click **No**. The new device functionality is not transmitted to the SIPROTEC 5 device.

If you click **Yes**, the loading operation starts and the new device functionality is transmitted to the SIPROTEC 5 device.

Several indications inform you about the status of the transmission. After completion of the transmission or in case of failed transmission, a [20.6.25 Status Dialog](#) opens. More information about the status dialog is available under [3.4 Using the Status Dialog](#).

✧ Click **OK**.

The status dialog closes.

Related Topics

- ✧ [15.6.1 Overview of Updating the Device Functionality](#)
- ✧ [15.1.4 Permanently Connecting to a SIPROTEC 5 Device](#)
- ✧ [15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC](#)
- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)

15.7 Updating Firmware

15.7.1 Overview for Updating Firmware and Protocols

SIPROTEC 5 devices and applicable plug-in modules are constantly developed. Improved or new functionalities are anchored in changed firmware or changed protocols. You can receive information about new firmware and protocol versions and about differences to prior version statuses either at <http://www.siemens.com/siprotec5> or via your personal Siemens contact. So that you can use the improved or new functionality, load the updated firmware and protocols into the SIPROTEC 5 device.

Firmware and Protocols as Part of the DIGSI 5 Device Driver

Firmware and protocols are part of the DIGSI 5 device driver (DDD). For example, import such a device driver into DIGSI 5 immediately after installation. You then make the functionality of individual device types and different protocols in DIGSI 5 available. You find more information about this under [2.2.7 Importing Device Drivers](#).

If you want to update the firmware and protocols, first download the updated DIGSI 5 device driver, for example, via the previously mentioned Internet address and then import into DIGSI 5. The improved and new functionalities are then available to you also for configuration in DIGSI 5. With DIGSI 5 you will select the components to be updated and then load the respective firmware and protocols into the SIPROTEC 5 device.

Updatable Components

You can bring the following individual components to the most up-to-date status with the updated firmware or protocols:

- Mainboard
- Plug-in modules
- Operating system
- Boot System
- FPGA (Field Programmable Gate Array)
- In-/Output FPGA (Input/Output Field Programmable Gate Array)

Which components are actually available for selection for an update depends on the configuration of your SIPROTEC 5 device.

Options for Loading Firmware and Protocols

To prepare loading of firmware, and to subsequently start loading, use the [20.5.17 Firmware Selection](#). Protocols selected in the communication module and/or protocols available in the device are loaded along with the loading of firmware of the communication module. Depending on how you open the firmware and protocol selection, you have the following options:

- You can select firmware only for the components of an individual offline configuration and then load it into the applicable SIPROTEC 5 device.
- You can select protocols for the components of an individual offline configuration only in the communication module and then load it into the applicable SIPROTEC 5 device.
- You can prepare firmware and protocols for the components of several offline configurations. Firmware and protocols are then loaded automatically one after the other into the applicable SIPROTEC 5 device.

Additionally you can open the firmware and protocol selection in the standard view:

- **Standard View**

The standard view allows selecting firmware and protocols for base components. These include the mainboard of the SIPROTEC 5 device and the plug-in module. If you are working with the standard view, your selection is checked, before loading, for completeness and plausibility.

Basic Procedure

To update firmware and protocols of SIPROTEC 5 devices, please proceed in the following order:

- **Downloading the Device Driver from the Siemens Internet Page and Importing into DIGSI 5**

Find out from the Siemens Internet page which updated DIGSI 5 device drivers are relevant for you and download these. Import the device driver into DIGSI 5. Further information can be found under [15.7.2 Downloading Device Driver and Importing into DIGSI 5](#).

- **Opening Firmware and Protocol Selection**

Open the firmware selection in the Standard view. You find more information about this under [15.7.3 Opening Firmware and Communication-Module Selection and Adjusting the View](#).

- **Preparing Loading Firmware and Protocols**

Prepare loading the firmware and protocols. You will perform the following actions:

- Selecting components.
- For these components query the current firmware and communication module.
- Selecting for these components the planned versions.

You find more information about this under [15.7.4 Preparing Loading Firmware and Protocols](#).

- **Loading Firmware and Protocols in the SIPROTEC 5 Device(s)**

Load the firmware and protocols for the selected components into the applicable SIPROTEC 5 devices. You find more information about this under [15.7.5 Loading Firmware and Protocols in the SIPROTEC 5 Device\(s\)](#).

15.7.2 Downloading Device Driver and Importing into DIGSI 5

You can obtain the DIGSI 5 device driver at www.siemens.com/siprotec5. Download these and import them into DIGSI 5.

Downloading a Device Driver

- ✧ Open your Internet browser.
- ✧ Enter the address www.siemens.com/siprotec5 in the address entry field and confirm your input.

The starting area of SIPROTEC 5 is displayed in the browser.

- ✧ Select your country language.
- ✧ Go to the User Information area.
- ✧ Click the designation of the desired device driver.

Depending on your browser setting you will receive a safety warning.

- ✧ If you wish to cancel the process, click **Cancel**. Else, click **Save**.

If you click **Save**, the dialog is displayed.

- ✧ Select a saving location for the device driver with this dialog.
- ✧ Click **OK**.

The download is started and the device driver is saved to the selected location.

Importing a Device Driver to DIGSI 5.

- ✧ Click **Import device driver** in the **Tools** menu.

The **Select File** dialog opens.

- ✧ With this dialog, select one or more device driver files that you downloaded. The files have the extension **DDD**.
- ✧ Click **Open**.

The **Select File** dialog closes. The dialog [20.6.11 Import Device Drivers](#) opens. The **Device driver versions** list box contains the elements that are available for installation. You find more information about the process under [2.2.7 Importing Device Drivers](#).

Related Topics

- ✧ [15.7.1 Overview for Updating Firmware and Protocols](#)

15.7.3 Opening Firmware and Communication-Module Selection and Adjusting the View

With the firmware selection in the standard view and the protocol selection in the communication module, you can prepare the firmware and protocols and start the loading operation. You can select the protocol only in the communication module.

The following options are possible for the selection of the protocol and the firmware:

- In the standard view for one offline configuration
- In the standard view for several offline configurations
- In the standard view for one online device

For the variant with online configuration, the following requirements must be met:

- DIGSI 5 is connected online with the applicable SIPROTEC 5 device. The SIPROTEC 5 device is also visible as an online device in the list of online-access links. You find more information about this under [15.1.4 Permanently Connecting to a SIPROTEC 5 Device](#).
- The device configuration of the online device is transmitted to the DIGSI 5 PC. You find more information about this under [15.2.3 Transmitting the Device Configuration from the SIPROTEC 5 Device into the DIGSI 5 PC](#).

To adapt the firmware selection view, the following standard functions are available:

- [3.2.2 Adjusting Rows and Columns](#)
- [3.2.4 Filtering Column Content](#)

Opening the Firmware Selection in the Standard View for One Offline Configuration

- ✧ Right-click on the name of the offline configuration in the [3.1.2 Project Tree](#) for which you want to open into the firmware and protocol selection.
- ✧ Click **Load firmware to device** in the context menu.

In the working area, the Standard view of the firmware selection opens.

Opening the Firmware Selection in the Standard View for Several Offline Configurations

- ✧ In the project tree, double-click **Load firmware to devices**.

In the working area, the Standard view of the firmware and protocol selection opens.

Opening the Firmware Selection in the Standard View for One Online Device

- ✧ Open the **Online access** folder in the project tree.
- ✧ Open the online access folder through which the SIPROTEC 5 device is connected with DIGSI 5.
- ✧ Right-click on the name of the online device that you want to open into the firmware selection.
- ✧ Click **Load firmware to device** in the context menu.

In the working area, the Standard view of the firmware and protocol selection opens.

Related Topics

- ✧ [15.7.1 Overview for Updating Firmware and Protocols](#)

- ✧ [15.7.4 Preparing Loading Firmware and Protocols](#)
- ✧ [15.7.5 Loading Firmware and Protocols in the SIPROTEC 5 Device\(s\)](#)

15.7.4 Preparing Loading Firmware and Protocols

Before loading the firmware and protocols in one or more SIPROTEC 5 devices, prepare the loading. These include the following actions:

- **Selecting Components**

Select the components for which you are loading another firmware or protocol version, or for which you want to query the current versions.

- **Querying Current Versions**

To obtain an overview of the firmware and protocol versions to be updated, query the current versions for the selected components.

- **Selecting Planned Versions**

Select for all components to be updated the planned versions.

For querying the current versions, the following alternative requirements must be met:

- DIGSI 5 PC can reach the SIPROTEC 5 device via a USB connection.

or

- DIGSI 5 PC can reach the SIPROTEC 5 device via the Ethernet connection configured in the offline configuration. In this case, the SIPROTEC 5 device must be assigned to the offline configuration in the project.

You can prepare loading the firmware and protocols for only one single SIPROTEC 5 device. However, you can prepare loading for several SIPROTEC 5 devices. In this case, start the loading at the same time for all components to be updated. The affected SIPROTEC 5 devices are then processed one after the other during loading.

To prepare loading you will always use the [20.5.17 Firmware Selection](#). The components capable for updating are structured hierarchically. As in the project tree, you can navigate through the structure and show or hide individual levels.

When you have prepared loading, you do not need to immediately start loading. When saving the project your selection is available after closing and reopening the project. Now you can prepare loading, while for example an employee starts loading the system.

Selecting the Components

- ✧ In the column **Firmware components**, open the individual levels of the component structure until you can select the desired components.
- ✧ To select or deselect a component, click in the **Upgrade** column on the applicable check box.
- or -
- ✧ In order to select all components, click the button  in the [20.7.23 Toolbar of the Load Configuration](#).
- or -
- ✧ In order to deselect all components, click the button  in the firmware and protocol selection toolbar.

If a check box is selected, the corresponding component is selected for loading or the version query. To be able to start loading or the version query, at least one component must be selected.

Querying Current Versions

- ✧ Select the component for which you want to query the current version statuses of the firmware or protocols.

- ✧ In the firmware and protocol selection toolbar, click the  **Refresh** button.

A confirmation prompt is displayed if DIGSI 5 recognizes a SIPROTEC 5 device connected via USB.

- ✧ If the SIPROTEC 5 device connected via USB is the requested device, click **Yes**, else click **No**.

If you click **Yes**, the current versions are queried via the USB connection from the SIPROTEC 5 device.

If you click **No**, DIGSI 5 searches via the Ethernet connection configured in the offline configuration for the allocated SIPROTEC 5 device. You receive an error indication if DIGSI 5 cannot find the device.

- ✧ click **OK**. Check if the correct IP address is entered in the SIPROTEC 5 device offline configuration. Then repeat the process.

If DIGSI 5 finds the device, the current version is queried via the Ethernet connection from the SIPROTEC 5 device.

The selected version is displayed in the column **Current version**.

Selecting Planned Versions

- ✧ Select the component for which you want to load the current versions of the firmware or protocols into the SIPROTEC 5 device.
- ✧ From the list box in the **Scheduled version** column, select the versions for the firmware and protocols that should be loaded into the SIPROTEC 5 device.

Related Topics

- ✧ [15.7.1 Overview for Updating Firmware and Protocols](#)
- ✧ [15.7.5 Loading Firmware and Protocols in the SIPROTEC 5 Device\(s\)](#)

15.7.5 Loading Firmware and Protocols in the SIPROTEC 5 Device(s)

Once you have selected the components to be updated and the versions to be loaded, you can start loading. However, you do not have to immediately start loading. When saving the project your selection is available after closing and reopening the project. Now you can prepare loading, while for example an employee starts loading the system.

The firmware and protocols are always loaded in the supervision mode. In this mode the protection function of the SIPROTEC 5 device is disabled. Once loading is completed, the SIPROTEC 5 device will restart again in the Process mode.

If you have opened the Standard view of the firmware selection, your selection is checked before loading for completeness and plausibility. Thereafter, the firmware and protocols selected in the communication module are loaded.

The following alternative requirements must be met for loading firmware and protocols to a SIPROTEC 5 device:

- DIGSI 5 PC can reach the SIPROTEC 5 device via a USB connection.

or

- DIGSI 5 PC can reach the SIPROTEC 5 device via the Ethernet connection configured in the offline configuration.

Starting Loading

- ✧ Click the  **Update device(s)** button in the [20.7.24 Toolbar of Load Firmware to Devices](#).

A confirmation prompt is displayed. Click **Yes** to continue with the firmware update if you have already saved the device data. Click **No** to cancel the operation. You can then save the device data and start the firmware update again.

If the confirmation ID for setting/operation is activated, the dialog [20.6.17 Enter Confirmation ID](#) opens.

- ✧ Enter the associated confirmation ID in the **Enter confirmation ID** text box.

- ✧ Click **OK**.

The **Enter confirmation ID** dialog closes. The current and all other loading actions are now released by entering the confirmation ID. When you close the project or disconnect the communication connection to the SIPROTEC 5 device, the release is canceled.

A confirmation prompt is displayed if DIGSI 5 recognizes a SIPROTEC 5 device connected via USB.

- ✧ If the SIPROTEC 5 device connected via USB is the requested device, click **Yes**, else click **No**.

If clicking on **Yes**, the offline configuration is transmitted via the USB connection to the connected SIPROTEC 5 device.

If you click **No**, DIGSI 5 will search via the Ethernet connection configured in the offline configuration for the assigned SIPROTEC 5 device. You receive an error message if DIGSI 5 cannot find the device.

- ✧ Click **OK**. Check if the correct IP address is entered in the SIPROTEC 5 device offline configuration. Then repeat the process.

If DIGSI 5 finds the device, the offline configuration is transmitted via the Ethernet connection to the connected SIPROTEC 5 device.

Several indications inform you about the status of the transmission. After completion of the transmission or in case of failed transmission, a [20.6.25 Status Dialog](#) opens. You find more information about the status dialog under [3.4 Using the Status Dialog](#).

- ✧ Click **OK**.

Related Topics

- ✧ [15.7.1 Overview for Updating Firmware and Protocols](#)
- ✧ [15.1.1 Communication Overview between DIGSI 5 and SIPROTEC 5](#)

15.8 Using Confirmation IDs and Connection Password

15.8.1 Overview of Confirmation IDs and Connection Password

Confirmation IDs are used for protection against unintentional and unauthorized operation. If a confirmation ID is activated, enter it before the relevant action is enabled by the SIPROTEC 5 device. For this purpose, the confirmation ID is transmitted encrypted to the SIPROTEC 5 device, where it is checked.

A similar method is used for a communication connection between the DIGSI 5 and a SIPROTEC 5 device. To protect access to the SIPROTEC 5 device, there is a password for establishing the connection.

Confirmation IDs and the connection password can only be modified with DIGSI 5 but not with the SIPROTEC 5 device. You can also deactivate confirmation IDs and the connection password. However, Siemens recommends only using them for commissioning. During normal operation, confirmation IDs and the connection password are always activated.

Confirmation IDs and the connection password are activated, deactivated, and changed by the [18.2 Operations Safety and Access Control](#).

Confirmation IDs

A confirmation ID consists of no more and no fewer than 6 digits, which you can freely select.

For the following areas, you can assign different confirmation IDs:

- **Settings/operation**
This confirmation ID controls access to parameter settings and process data.
After installing DIGSI 5, the confirmation ID for this area has the default value 222222.
- **Operation with function keys and push buttons**
This confirmation ID controls the access to operate with function keys and push buttons. By default, the option **Operation with function keys and push buttons** is unchecked and you can activate or deactivate the option only when the option **Settings / operation** is enabled. Also, by default, the confirmation ID for this area is the same as the confirmation ID set for the **Settings / operation** option. If you change the confirmation ID for the **Setting / operation** area, then the new confirmation ID is automatically applicable for the **Operation with function keys and push buttons** area.
- **Switching (process)**
This confirmation ID controls access to the operational switching, in which the interlocking conditions are considered.
After installing DIGSI 5, the confirmation ID for this area has the default value 333333.
- **Switching (unlocked)**
This confirmation ID controls access to the non-interlocked switching, in which the interlocking conditions are ignored. Switching without interlocking can be a safety risk and requires precise knowledge of conditions in the substation. Before you can switch without interlocking with DIGSI 5, DIGSI 5 must have switching authority.
After installing DIGSI 5, the confirmation ID for this area has the default value 444444.
- **Switching authority**
This confirmation ID controls access for setting the switching authority. You can set the switching authority, such as on-site or remote operation, only with the key switch on the SIPROTEC 5 device. If the confirmation ID for the switching authority is activated, this is queried by activating the key switch on the SIPROTEC 5 device.
After installing DIGSI 5, the confirmation ID for this area has the default value 666666.

Connection Password

A connection password ensures secure remote access to a SIPROTEC 5 device. The password must meet certain requirements, including those of the NERC CIP standards. A password must therefore be at least 8 characters long. It must include at least 1 upper-case letter, 1 lower-case letter, 1 digit, and 1 special character. No connection password is configured in a SIPROTEC 5 device when it is delivered.

If a password is activated, it must be entered correctly before DIGSI 5 can access the SIPROTEC 5 device. An activated connection password applies to all interfaces of the SIPROTEC 5 device. Access by plug & play is also protected with the password.

Incorrect password entry is logged in the SIPROTEC 5 device. After 3 incorrect password entries, an alarm can be output via a binary output. The accessing DIGSI 5 is also blocked for further accesses for a few minutes.

Related Topics

[15.8.2 Opening the Operations Safety and Access Control Editor](#)

[15.8.3 Changing the Confirmation ID](#)

[15.8.5 Activating and Deactivating the Confirmation ID](#)

[15.8.4 Changing the Connection Password](#)

[15.8.6 Activating and Deactivating a Connection Password](#)

15.8.2 Opening the Operations Safety and Access Control Editor

With the [18.2 Operations Safety and Access Control](#), you change, activate, or deactivate the confirmation ID and the connection password of a SIPROTEC 5 device.

Opening the Operations Safety and Access Control Editor for Offline Configuration

- ✧ Open the [3.1.2 Project Tree](#).
- ✧ Open the relevant offline configuration in the project.
- ✧ Double-click **Operations safety and access control**.

The **Operations safety and access control** Editor is displayed in the working area.

Related Topics

✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)

✧ [15.8.3 Changing the Confirmation ID](#)

✧ [15.8.4 Changing the Connection Password](#)

15.8.3 Changing the Confirmation ID

You can change each of the confirmation IDs separately. To perform this function, a **Change** button is assigned to each working area in the [18.2 Operations Safety and Access Control](#). This button opens a dialog with which you can modify the current confirmation ID.

After installation of DIGSI 5, the individual confirmation IDs have the following default values:

- Settings/operation: 222222
- Switching (process): 333333
- Switching (unlocked): 444444
- Switching authority: 666666

Changing Confirmation IDs

- ✧ Click the relevant **Change** button in the **Confirmation ID** Editor.

The [20.6.15 Change Confirmation ID](#) dialog opens.

- ✧ Enter no more and no fewer than 6 digits in the **New confirmation ID**. The sequence of characters must be nonambiguous, so must not yet be assigned to another confirmation ID.

An asterisk is shown for each digit that you enter.

- ✧ Enter the same sequence of digits in the **Confirm new confirmation ID** text box to verify your entry.

An asterisk is shown for each digit that you enter. If both sequences of digits correspond, the **OK** button is activated.

✧ Click **OK**.

The new confirmation ID is stored in the offline configuration of the device and will be transmitted to the respective SIPROTEC 5 online device during the next load configuration operation.

Related Topics

- ✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)
- ✧ [15.8.5 Activating and Deactivating the Confirmation ID](#)

15.8.4 Changing the Connection Password

In the [18.2 Operations Safety and Access Control](#) operating mode **Connect DIGSI 5 to the SIPROTEC 5 device** is assigned to the **Change** button. This button opens a dialog in which you can modify the current connection password.

The following alternative requirements must be met for loading an offline configuration in a SIPROTEC 5 device:

- DIGSI 5 PC can reach the SIPROTEC 5 device via a USB connection.

Or

- DIGSI 5 PC can reach the SIPROTEC 5 device via the offline configuration projected Ethernet connection.



NOTE

The connection password is deactivated when a SIPROTEC 5 device is delivered.

Changing the Connection Password

- ✧ In the **Confirmation ID Editor**, click **Change** in the **Action** column of the connection password.

The [20.6.16 Change Connection Password](#) dialog opens.

- ✧ Enter a string of at least 8 characters in the **New connection password** text box. The string must include at least 1 upper-case letter, 1 lower-case letter, 1 digit, and 1 special character.

An asterisk is shown for each character that you enter.

- ✧ Enter the same character string in the **Confirm New Connection Password** text box to verify your entry.

An asterisk is shown for each character that you enter. If both character strings correspond, the **OK** button is activated.

- ✧ Click **OK**.

The new connection password is transmitted into the connected SIPROTEC 5 device.

Related Topics

- ✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)
- ✧ [15.8.6 Activating and Deactivating a Connection Password](#)
- ✧ [15.8.2 Opening the Operations Safety and Access Control Editor](#)

15.8.5 Activating and Deactivating the Confirmation ID

You can activate or deactivate each of the confirmation IDs separately. To do that, each working area has a check box in the **Active** column in the [18.2 Operations Safety and Access Control](#). You can only deactivate a confirmation ID for the current session. When DIGSI 5 is started again, the status of all confirmation IDs remain same as in the last session before restarting DIGSI.



NOTE

If a confirmation ID is deactivated, this is not queried before running the relevant action. This can result in unintended or unauthorized operating actions and even in material damage and personal injury!

Deactivating the Confirmation ID

- ✧ Click the check box of the relevant working area marked up until now in the **Active** column.
The check mark of the check box is removed. The confirmation ID for the working area is now deactivated.

Activating the Confirmation ID

- ✧ Click the check box of the relevant working area not marked up until now in the **Active** column.
A check mark appears in the check box. The confirmation ID for the working area is now activated.

Related Topics

- ✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)
- ✧ [15.8.3 Changing the Confirmation ID](#)

15.8.6 Activating and Deactivating a Connection Password

The connection password is deactivated when a SIPROTEC 5 device is delivered. You can activate or also deactivate the connection password. Use the [18.2 Operations Safety and Access Control](#) for this.

When you deactivate the connection password, the current password is deleted. When you activate the connection password, you have to create a new connection password.



NOTE

If the connection password is deactivated, it will not be queried before a connection is established. This enables unauthorized persons to establish a connection between DIGSI 5 and a SIPROTEC 5 device.

Activating the Connection Password

- ✧ In the **Confirmation ID Editor**, click the check box not marked up until now in the **Active** column of the connection password.
- or -
✧ In the **Confirmation ID Editor**, click **Activate** in the **Action** column of the connection password.

The [20.6.16 Change Connection Password](#) dialog opens.

- ✧ Enter a string of at least 8 characters in the **New connection password** text box. The string must include at least 1 upper-case letter, 1 lower-case letter, 1 digit, and 1 special character.

An asterisk is shown for each character that you enter.

- ✧ Enter the same character string in the **Confirm New Connection Password** text box to verify your entry.

An asterisk is shown for each character that you enter. If both character strings correspond, the **OK** button is activated.

- ✧ Click **OK**.

The **Change connection password** dialog closes. The new connection password is transmitted into the connected SIPROTEC 5 device. A check mark appears in the check box of the **Active** column. The name of the button **Activate** changes to **Change**. The connection password has now been activated.

Deactivating the Connection Password

- ✧ In the **Confirmation ID** Editor, click the check box marked up until now in the **Active** column of the connection password.

The check mark of the check box is removed. The connection password has now been deactivated.

Related Topics

- ✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)
- ✧ [15.8.4 Changing the Connection Password](#)
- ✧ [15.8.2 Opening the Operations Safety and Access Control Editor](#)

15.8.7 Entering a Connection Password

If the connection password has been activated, it is queried before a communication connection is established between DIGSI 5 and a SIPROTEC 5 device. For this purpose, the [20.6.18 Enter Connection Password](#) dialog opens in which you must enter the connection password correctly. If an incorrect connection password is entered, this is logged in the SIPROTEC 5 device. After 3 incorrect password entries, the accessing DIGSI 5 is blocked for further accesses for a few minutes.

Entering a Connection Password

- ✧ Enter the correct connection password in the **Connection password** text box.
- ✧ Click **OK**.

If the connection password has been entered incorrectly, an error message is displayed. If the connection password entered is correct, the communication connection is established.

Related Topics

- ✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)
- ✧ [15.8.6 Activating and Deactivating a Connection Password](#)

15.8.8 Entering a Confirmation ID

If a confirmation ID has been activated for a certain action, it is queried before this action is enabled. For this purpose, the [20.6.17 Enter Confirmation ID](#) dialog opens in which you must enter the confirmation ID correctly.

Entering a Confirmation ID

- ✧ Enter the correct confirmation ID in the **Confirmation ID for ...** text box.
- ✧ Click **OK**.

If the confirmation ID has been entered incorrectly, an error message is displayed. If the confirmation ID entered is correct, the relevant action is enabled.

Related Topics

- ✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)
- ✧ [15.8.5 Activating and Deactivating the Confirmation ID](#)

15.8.9 Reset Connection Password

When the prompt for the connection password is activated in a SIPROTEC 5 device, you cannot establish a connection to the device without inputting this password. When a confirmation ID is activated for a particular

operator handling, you cannot carry out the respective operator handling without this confirmation ID. In case the connection password or the confirmation ID is no longer available, you have to reset the connection password or the confirmation ID.

Proceed in the following sequence:

- On the SIPROTEC 5 device, reset the connection password.
- On the SIPROTEC 5 device, optionally deactivate the connection password.
- With DIGSI 5 deactivate the confirmation IDs in the offline configuration of the SIPROTEC 5 device. You find more information about this under [15.8.5 Activating and Deactivating the Confirmation ID](#).
- Initialize the SIPROTEC 5 device with the associated offline configuration. You find more information about this under [15.1.3 Initializing a SIPROTEC 5 Device](#).
- If required, assign new confirmation IDs and a new connection password and activate them in the SIPROTEC 5 device. You find more information about this under [15.8.3 Changing the Confirmation ID](#).

Resetting the Connection Password for Devices with Display

- ✧ Switch to the **Device functions** menu in the main menu of the SIPROTEC 5 device.
- ✧ Under the menu item **Security**, select **Password recovery**.
- ✧ Enter the confirmation ID 222222.
- ✧ Next, enter the following keyboard shortcut as recovery code:
<1>, <2>, <3>, <4>, <5>, <6>, <FN>+<1>, <FN>+<2>, <FN>+<3>, <FN>+<4>, <FN>+<5> and <FN>+<6>



NOTE

Always press the function key and digit simultaneously. Note that the time-out between key operations is 1 s.

Resetting the Connection Password for Devices Without Display or Devices in Fallback Mode

- ✧ Isolate the SIPROTEC 5 device from the auxiliary voltage.
- ✧ Remove the battery from the SIPROTEC 5 device.
- ✧ Wait for about 2 min.
- ✧ Insert the battery into the SIPROTEC 5 device.
- ✧ Reconnect the SIPROTEC 5 device to the power supply.

The connection password is reset.

Deactivating the Connection Password on the Device

- ✧ Switch to the **Device functions** menu in the main menu of the SIPROTEC 5 device.
- ✧ Under the menu item **Security**, select **Password switch**.
- ✧ Enter the confirmation ID 222222.
- ✧ Deactivate the connection password.

Related Topics

- ✧ [15.8.1 Overview of Confirmation IDs and Connection Password](#)

15.9 Other Operating Functions

15.9.1 Resetting LEDs and Binary Outputs

If a SIPROTEC 5 device is connected online with the DIGSI 5 PC, you can reset all LEDs and binary outputs of the SIPROTEC 5 device. LEDs and binary outputs are always reset simultaneously.

Reset LEDs and Binary Outputs

- ✧ Open the project tree.
- ✧ Open the affected online device in the list of online accesses.
- ✧ Double-click **Device information**.

The device information is displayed in the working area.

- ✧ Click the  button in the [20.7.25 Toolbar of the Device Information](#) .

All LEDs and binary outputs of the connected SIPROTEC 5 device are reset.

16 Export and Import

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16.1 Formats

16.1.1 Overview of Formats

The following table provides an overview of all data formats, which are supported by DIGSI 5.

Data Format	Meaning	Export Source		Import Target	
TEA-X	Data exchange format containing information of single or multiple devices (XML-based)	Device	Project	Device	Project
DEX5	Device archive with complete information about an individual SIPROTEC 5 device	Device	—	—	Project
DSP5	Display pages for an individual SIPROTEC 5 device	Device	—	Device	—
RIO	Protection settings for an individual SIPROTEC 5 device for use in test equipment	Device	—	—	—
ELCAD	Topology information from CAD diagrams	—	—	—	Project
SEQ5	Test sequences for an individual SIPROTEC 5 device	Device	—	Device	—
ST	DIGSI 4 function charts	—	—	Device	—
ICD	IED Capability Description	Device	—	Device	—
IID	Instantiated IED Description	Device	—	—	—
SCD	Substation Configuration Description	—	IEC Station	—	IEC Station
SSD	System-Specification Description	—	—	—	Project
MICS	Model Implementation Conformance Statement	Device	—	—	—
DIGT103	IEC 60870-5-103 protocol settings for SICAM PAS	Device	—	—	—
DIGT104	IEC 60870-5-104 protocol settings for SICAM PAS	Device	—	—	—
DIGMOD	Modbus TCP protocol settings for SICAM PAS	Device	—	—	—
DIGDNP	DNP3 protocol settings for SICAM PAS	Device	—	—	—
SIM	Simulation data format for single/multiple devices	Device	Project	—	—

16.1.2 TEA-X

Description

You can archive the data from individual SIPROTEC 5 devices or whole project in TEA-X format. This format is also suitable for data exchange between different applications, such as DIGSI 5 and TEA-X Plug-in for Microsoft Excel. The TEA-X format is based on XML.

File Content

A TEA-X file can contain information from the following categories:

- Application and device settings
- Communication mappings

- Display pages
- Function charts (CFC)
- Single-line configuration
- IEC 61850 structure
- Project folder structure
- Single-line configuration

You can import the desired data categories.

Related Topics

[16.1.1 Overview of Formats](#)

[16.2.2 Configuring the TEA-X Export](#)

[16.3.2 Configuring the TEA-X Import](#)

16.1.3 DEX5

Meaning

The abbreviation **DEX5** stands for **Device 5 Export Format**.

Description

You can archive the data from an individual SIPROTEC 5 device in DEX5 format.

File Content

A DEX5 file contains all device-specific data.

Transfer Direction

- You can export data from an individual SIPROTEC 5 device in DEX5 format.
- You can import data into a project in DEX5 format.

Related Topics

[16.1.1 Overview of Formats](#)

[16.3.4 Configuring the DEX5 Import](#)

16.1.4 SCL

Meaning

The abbreviation **SCL** stands for **Substation Configuration Description Language**.

Description

A description language standardized in IEC 61850, SCL is based on XML. This description language allows all information relevant to an IEC 61850 substation to be documented consistently. This format is therefore suitable for exchanging IEC 61850-specific data between different applications, even if these come from different manufacturers. The described import checks are basically done for all SCL formats, not only for SCD imports.

SCL is not an export or import format itself.

Instead, there are 6 export and import formats with contents formulated in SCL for different purposes:

- ICD: IED Capability Description
- SCD: Substation Configuration Description

- CID: Configured IED Description
- IID: Instantiated IED Description
- SED: System Exchange Description
- SSD: System Specification Description

File Content

A file which uses SCL as its language can contain information from the following categories:

- Configuration, function, and communication capabilities of the individual substation users (devices)
- Data links between the substation users
- Communication connections
- Substation topology (single-line diagram)

Related Topics

[16.1.1 Overview of Formats](#)

16.1.5 ICD

Meaning

The abbreviation **ICD** stands for **IED Capability Description**.

Description

Files in the ICD format describe the capabilities of the device within IEC 61850 independently of its concrete application in a project. To do this, the configuration, function, and communication capabilities of the device are formulated. The ICD format uses SCL as the description language for this purpose. Files in ICD format can be used to exchange data with external system configurators.

File Content

An ICD file contains information from the following categories:

- Configuration of the device
- Function capabilities of the device
- Communication capabilities of the device

Transfer Direction

- You can export data of a single SIPROTEC 5 device or another individual device (for example timer) in ICD format.
- You can import data into an individual SIPROTEC 5 device, or into another individual device or a project in ICD format.

Related Topics

[16.1.1 Overview of Formats](#)

[16.2.5 Configuring the ICD Export](#)

16.1.6 SCD

Meaning

The abbreviation **SCD** stands for **Substation Configuration Description**.

Description

Files in SCD format describe the version of an IEC 61850 substation. The ICD format uses SCL as the description language for this purpose.

You can exchange data between a system configurator and manufacturer-specific device configurators with SCD files. To do this, the workflow is as follows: In the system configurator, the ICD files are imported into a device present in the substation. Then the network and communications of the substation are configured with the system configurator. Then the substation is exported as an SCD file and returned to the manufacturer-specific tools.

File Content

An SCD file contains information from the following categories:

- Network structure of the IEC 61850 substation
- Assignment of devices to the primary equipment
- Substation-internal communication

Transfer Direction

- You can import data into an IEC station in SCD format.

Related Topics

[16.1.1 Overview of Formats](#)

[16.3.3 Configuring the SCD Import](#)

16.1.7 CID

Meaning

The abbreviation **CID** stands for **Configured IED Description**.

Description

A file in CID format describes how an ICD file represents the project-independent capabilities of a device within IEC 61850. A CID file reflects the parameter set of a device, expressed in SCL. In addition, the CID file contains all information which the device needs to know about substation-internal communication. If, for instance, the device receives a GOOSE message from another device, information about the transmitting device is contained in the CID.

File Content

A CID file contains information from the following categories:

- Configuration of the device
- Function capabilities of the device
- Communication capabilities of the device
- Data links to other devices

Related Topics

[16.1.1 Overview of Formats](#)

16.1.8 IID

Meaning

The abbreviation **IID** stands for **Instantiated IED Description**.

Description

Files in IID format are ICD files adapted for the concrete application in the project. This format is mainly suitable for exchanging data between DIGSI 5 and an external system configurator or also a substation automation system such as SICAM PAS. The ICD format uses SCL as the description language for this purpose.

From the current version, you can exclude the Alternative Descriptions (or alternative texts) from the IID export file. You can export the IEC 61850 descriptions in English language only if you select the check-box option **Export IEC 61850 descriptions in English** under the **IEC 61850 settings** group in the project properties. In all other cases, they will not be exported, thus reducing the file size by approximately 10 %.

File Content

An IID file contains information from the following categories:

- Configuration of the device
- Function capabilities of the device
- Communication capabilities of the device

Transfer Direction

- You can export data of a single SIPROTEC 5 device or another individual device (for example timer) in IID format.
- You can import data into an individual SIPROTEC 5 device, or into another individual device or a project in IID format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.9 SED

Meaning

The abbreviation **SED** stands for **System Exchange Description**.

Description

Files in SED format can be used to exchange interface information between DIGSI 5 projects and thus between substations. To do this, the project extracts the data for the other projects from the file during import and writes its own data in the same file during export. The contents of an SED file are formulated in SCL.

File Content

An SED file always contains information about the interface settings. The file can also contain information from other data categories.

Transfer Direction

- You can export data from an entire project in SED format.
- You can import data into a project in SED format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.10 SSD

Meaning

The abbreviation **SSD** stands for **System Specification Description**.

Description

Files in SSD format contain the complete specification of a station automation system, including a single-line configuration of the station. The assignment of logical nodes from IEC 61850 to primary equipment can also be described in SSD files. This allows device requirements to be defined in the SSD file so that the devices can be used in the substation. The contents of an SED file are formulated in SCL.

File Content

An SSD file contains information from the following categories:

- Substation
- Templates for data types
- Definitions of node types

Transfer Direction

You can import data into a project in SSD format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.11 RIO

Meaning

The abbreviation **RIO** stands for **Relay Information by OMICRON**.

Description

Files in RIO format can be used to exchange data between test systems from the OMICRON company and any other project-protection planning system. With DIGSI 5, you can export different settings from protection functions in RIO format, which the OMICRON test equipment 7VP15 can then continue to process. The relevant settings are described in the Test equipment manual.

You can test the following items of equipment and devices with the 7VP15 device:

- Devices for distance protection
- Devices for overcurrent protection
- Equipment and devices for differential protection
- Supervision relays
- Paralleling devices
- Measuring transducers

Files in RIO format can also be opened, displayed, and evaluated with SIGRA.

File Content

A RIO file contains information about protection settings.

Transfer Direction

You can export data from an individual SIPROTEC 5 device in RIO format.

Related Topics

[16.1.1 Overview of Formats](#)

[16.2.4 Configuring the RIO Export](#)

16.1.12 DIGT103

Meaning

The abbreviation **DIGT103** stands for **DIGSI 5 protocol settings for IEC 60870-5-103**.

Description

If the IEC 60870-5-103 protocol is configured for a system interface, you can export the protocol settings in DIGT103 format. The DIGT103 format is specially designed to transmit interface data from DIGSI 5 into the SICAM PAS substation automation system.

File Content

A DIGT103 file contains information from the following categories:

- Information objects, for example signals
- Mapping settings for IEC 60870-5-103
- Protocol settings for IEC 60870-5-103
- General information about the exported SIPROTEC 5 device

Transfer Direction

You can export data from an individual SIPROTEC 5 device in DIGT103 format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.13 DIGT104

Meaning

The abbreviation **DIGT104** stands for **DIGSI 5 protocol settings for IEC 60870-5-104**.

Description

If the IEC 60870-5-104 protocol is configured for a system interface, you can export the protocol settings in DIGT104 format. The DIGT104 format is specially designed to transmit interface data from DIGSI 5 into the SICAM PAS substation automation system.

File Content

A DIGT104 file contains information from the following categories:

- Information objects, for example, signals
- Mapping settings for IEC 60870-5-104
- Protocol settings for IEC 60870-5-104
- General information about the exported SIPROTEC 5 device

Transfer Direction

You can export data from an individual SIPROTEC 5 device in DIGT104 format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.14 DIGMOD

Meaning

The abbreviation **DIGMOD** stands for **DIGSI 5 protocol settings for Modbus TCP**.

Description

If the Modbus TCP protocol is configured for a system interface, you can export the protocol settings in DIGMOD format. The DIGMOD format is specially designed to transmit interface data from DIGSI 5 into the SICAM PAS substation automation system.

File Content

A DIGMOD file contains information from the following categories:

- Information objects, for example, signals
- Mapping settings for Modbus TCP
- Protocol settings for Modbus TCP
- General information about the exported SIPROTEC 5 device

The SICAM PAS version only supports the following CDC types with the function codes mentioned in the following table:

CDC Type	Function Code	Remarks
SPS (Tx) (Tx: transfer direction)	1, 2	
SPS (Tx)	3, 4	Only value and no quality bit in SICAM PAS
DPC (Tx)	1	
BSC (Tx)	4	
SPC (Rx) (Rx: receive direction)	5	
DPC (Rx)	15	
BSC (Rx)	5	
BCR (Tx)	3	

Transfer Direction

You can export data from an individual SIPROTEC 5 device in DIGMOD format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.15 DIGDNP

Meaning

The abbreviation **DIGDNP** stands for **DIGSI 5 protocol settings for DNP3**.

Description

If the DNP3 protocol is configured for a system interface, you can export the protocol settings in DIGDNP format. The DIGDNP format is specially designed to transmit interface data from DIGSI 5 into the SICAM PAS substation automation system.

File Content

A DIGDNP file contains information from the following categories:

- Information objects, for example, signals
- Mapping settings for DNP3
- Protocol settings for DNP3
- General information about the exported SIPROTEC 5 device

Transfer Direction

You can export data from an individual SIPROTEC 5 device in DIGDNP format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.16 DSP5

Meaning

The abbreviation **DSP5** stands for **DIGSI 5 Display Pages**.

Description

You can archive individual or all display pages of a SIPROTEC 5 device in DSP5 format. You can also use this format to exchange display pages between SIPROTEC 5 devices. The DSP5 format is based on XML.

File Content

A DSP5 file contains information about all display pages of a SIPROTEC 5 device.

Transfer Direction

- You can export data from an individual SIPROTEC 5 device in DSP5 format.
- You can import data into an individual SIPROTEC 5 device in DSP5 format.

Related Topics

[16.1.1 Overview of Formats](#)

[16.2.3 Configuring the DSP5 Export](#)

[16.3.6 Configuring the DSP5 Import](#)

16.1.17 ELCAD

Meaning

The abbreviation **ELCAD** stands for **Electrical CAD**.

Description

You can import the topology information contained in an ELCAD file into a project and use it as the basis for a single-line configuration. The other information contained in the ELCAD file is not included in this process.

File Content

An ELCAD file can contain information from the following categories:

- Substation topology (single-line configuration)
- Protection functions
- System interface
- Hardware configuration

Transfer Direction

You can import data into a project in ELCAD format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.18 ST

Meaning

The abbreviation **ST** stands for **Structured Text file**.

Description

You can import function charts (CFC) from DIGSI 4 in ST format. First, however, export your function charts from DIGSI 4.83 or higher.

File Content

An ST file contains information about one or more DIGSI 4 function charts.

Transfer Direction

You can import data into an individual SIPROTEC 5 device in ST format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.19 MICS

Meaning

The abbreviation **MICS** stands for **Model Implementation Conformance Statement**.

Description

You can export the entire IEC 61850 data structure of a SIPROTEC 5 device. The export creates a document in XML, which you can use for conformance tests, for example.

File Content

A MICS file contains the complete IEC 61850 data structure from a SIPROTEC 5 device.

Transfer Direction

You can export data from an individual SIPROTEC 5 device in MICS format.

Related Topics

[16.1.1 Overview of Formats](#)

16.1.20 SEQ5

Meaning

The abbreviation **SEQ5** stands for **DIGSI 5 Test Sequences**.

Description

You can archive individual or all test sequences of a SIPROTEC 5 device in SEQ5 format. You can also use this format to exchange test sequences between SIPROTEC 5 devices. The SEQ5 format is based on XML.

File Content

A SEQ5 file contains information about all test sequences of a SIPROTEC 5 device.

Transfer Direction

- You can export data from an individual SIPROTEC 5 device in SEQ5 format.
- You can import data into an individual SIPROTEC 5 device in SEQ5 format.

Related Topics

[16.1.1 Overview of Formats](#)

[16.2.8 Configuring the SEQ5 Export](#)

[16.3.7 Configuring the SEQ5 Import](#)

16.1.21 SIM

Meaning

The abbreviation **SIM** stands for **Simulation data format for single/multiple devices**.

Description

You can export the simulation-related files of a SIPROTEC 5 device in the SIM format. This new functionality in DIGSI 5 provides the ability to export the simulation data and simulate all the devices in the DIGSI 5 project for test and commissioning needs. The simulation is achieved by importing the simulation file into a signal processing and automation system which will then simulate the device/devices with the process data as in a real-time system. This feature also ensures the testing of a device for various real-time system conditions.

File Content

A SIM file contains information about the simulation data of a SIPROTEC 5 device.

Transfer Direction

- You can export the data from an individual SIPROTEC 5 device in the SIM format.

Related Topics

[16.1.1 Overview of Formats](#)

[16.2.9 Configuring the SIM Export](#)

16.2 Exporting Data

16.2.1 Preparing and Starting the Export

Before exporting data, you must decide if you wish to export the data from an individual SIPROTEC 5 device or data from the entire project. You can select from various data formats depending on the decision you have made. For instance, the **SCD** format can be used only to export entire projects, while the **DEX5** format can be used only for individual SIPROTEC 5 devices.

First select the data format with a dialog. Some data formats can be configured with additional export options. You also specify the name and file path for the export file with the export dialog. The file extension is preset for each data format.

Opening the Export Dialog

- ✧ Right-click on the device name in the project tree to export data from a specific SIPROTEC 5 device.
- or -
- ✧ Right-click on the project name in the project tree to export data from an entire project.

In both cases, the context menu opens.

- ✧ In the context menu, click **Export**.

The dialog [20.6.9 Export](#) opens.

Selecting Data Format and Export File

- ✧ The list box **Data formats** contains the names of the formats which can be selected for the export. Formats are enabled or disabled depending on which device name or project name you have entered from. Select a data format. To do this, mark the format name.

Other text boxes and list boxes are enabled or disabled depending on the selected format.

- ✧ The name under which the export file will be saved is displayed in the text box **File**. The file name is displayed along with its path. If the file is to be saved in another directory or under another name, click the ... button.

The default file dialog **Select destination file for export** opens.

- ✧ Select a different location or a different file name with this dialog.
- ✧ You have the option of entering a user label in the **Comment** text box. You can see this user label before importing these files. This text box is enabled for the **TEA-X**, **DEX5**, **DSP5**, **ICD**, **IID**, and **MICS** formats.

Configuring Export

- ✧ If you have selected one of the **TEA-X**, **DEX5**, **DSP5**, **RIO**, **ICD**, **IID**, or **MICS** formats, the **Export contents** prompt will be displayed. Click this prompt.

Additional options or settings will be displayed. These depend on the selected export format.

- ✧ You can configure the export with these options and settings. You can learn more about this in the following topic descriptions in this Help document.

Starting the Export

- ✧ Click **Export**.

The export starts. If there is an export file with the same name, you receive a prompt for confirmation.

- ✧ To overwrite the existing file with the new export data and to continue the export process, click **Yes**.

The export continues. Status reports will show the progress of the export. As soon as the export is finished, you receive another report.

Related Topics

- ✧ [16.2.2 Configuring the TEA-X Export](#)
- ✧ [16.2.3 Configuring the DSP5 Export](#)
- ✧ [16.2.4 Configuring the RIO Export](#)
- ✧ [16.2.5 Configuring the ICD Export](#)
- ✧ [16.2.6 Configuring the IID Export](#)
- ✧ [16.2.7 Configuring the MICS Export](#)

16.2.2 Configuring the TEA-X Export

If you select the TEA-X format in the [20.6.9 Export](#) dialog, you can view and select the list of device/devices in the **Devices to export** area under the **Export contents** field to be exported.

You can specify the scope of the export using these export options:

- You can specify which SIPROTEC 5 devices should be included in the export. To do this, use the **Devices to export** list box. If you wish to export an individual SIPROTEC 5 device, this list box contains the device name which you marked in the project tree. If you wish to export an entire project, this list box contains the names of all the SIPROTEC 5 devices within the project. All SIPROTEC 5 devices are selected as the default. You can deselect and reselect SIPROTEC 5 devices.

Specifying SIPROTEC 5 Devices for Export

- ✧ To select or deselect a SIPROTEC 5 device, click the relevant check box in the **Devices to export** list box.
- ✧ To select or deselect all SIPROTEC 5 devices, click the **Select all** check box in the **Devices to export** list box.



NOTE

If a check box is marked, the corresponding SIPROTEC 5 device is selected for export. At least one SIPROTEC 5 device must be selected to start the export. Only a consistent project or a device can be exported.



NOTE

All the GOOSE and report configurations are not exported with the TEA-X file.

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.2 TEA-X](#)

16.2.3 Configuring the DSP5 Export

If you select the DSP5 format in the [20.6.9 Export](#) dialog, you can show additional export options in the **Export contents** field. You can specify which display pages should be included for the export using these export options. To do this, use the **Display pages to export** list box. The names of all display pages of the selected SIPROTEC 5 device are displayed in this list box. All display pages are selected as the default. You can deselect and reselect display pages.

Selecting Display Pages for Export

- ✧ To select or deselect a display page, click the relevant check box in the **Display pages to export** list box.

- ✧ To select or deselect all display pages, click the **Select all** check box in the **Display pages to export** list box.



NOTE

If a check box is marked, the corresponding display page is selected for export. At least one display page must be selected to start the export.

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.16 DSP5](#)

16.2.4 Configuring the RIO Export

If you select the RIO format in the [20.6.9 Export](#) dialog, you can show additional export settings in the **Export contents** field.

You can set the following settings:

- Tolerance of time zones (TOL-T)
- Tolerance of impedances (TOL-Z)
- Absolute time tolerance (TIMEOMAX)

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.11 RIO](#)

16.2.5 Configuring the ICD Export

If you select the ICD format in the [20.6.9 Export](#) dialog, you can show additional export options in the **Export contents** field.

You can specify the type and scope of the export using these export options:

- You can specify which SIPROTEC 5 devices should be included in the export. The **Devices to export** list box displays the names of the SIPROTEC 5 devices for which at least one data record is selected for ICD export. You can set this marking during configuration of the GOOSE communication or of the reporting. All SIPROTEC 5 devices are selected by default. You can deselect and reselect SIPROTEC 5 devices.
- If you import the exported ICD file together with the additionally exported DEX5-Datei into a project, DIGSI 5 can generate the offline configuration of a SIPROTEC 5 device again from a combination of both files. However, if you only import the ICD file, DIGSI 5 integrates the data as an external device into the project.

Selecting SIPROTEC 5 Devices for Export

- ✧ To select or deselect a SIPROTEC 5 device, click the relevant check box in the **Devices to export** list box.
- ✧ To select or deselect all SIPROTEC 5 devices, click the **Select all** check box in the **Devices to export** list box.



NOTE

If a check box is marked, the corresponding SIPROTEC 5 device is selected for export. At least one SIPROTEC 5 device must be selected to start the export.

Selecting a Character Set

- ✧ Click the desired option **Use international character set** or **Use limited character set**.

Additionally Exporting Data in DEX5 Format

- ✧ Mark the **Include DEX5 export** check box.

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.5 ICD](#)

16.2.6 Configuring the IID Export

If you select the IID format in the [20.6.9 Export](#) dialog, you can show additional export options in the **Export contents** field.

You can specify the type and scope of the export using these export options:

- You can specify which SIPROTEC 5 devices should be included in the export. The **Devices to export** list box displays the names of the SIPROTEC 5 devices for which at least one data record is selected for IID export. You can set this marking during configuration of the GOOSE communication or of the reporting. All SIPROTEC 5 devices are selected by default. You can deselect and reselect SIPROTEC 5 devices.
- From the current version, you can exclude the Alternative Descriptions (or alternative texts) from the IID export file. You can export the IEC 61850 descriptions in English language only if you select the check box option **Export IEC 61850 descriptions in English** under the **IEC 61850 settings** group in the project properties. In all other cases, they will not be exported, thus reducing the file size by approximately 10 %.

Selecting SIPROTEC 5 Devices for Export

- ✧ To select or deselect a SIPROTEC 5 device, click the relevant check box in the **Devices to export** list box.
- ✧ To select or deselect all SIPROTEC 5 devices, click the **Select all** check box in the **Devices to export** list box.



NOTE

If a check box is marked, the corresponding SIPROTEC 5 device is selected for export. At least one SIPROTEC 5 device must be selected to start the export.

Selecting a Character Set

- ✧ Click the desired option **Use international character set** or **Use limited character set**.

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.8 IID](#)

16.2.7 Configuring the MICS Export

If you select the MICS format in the [20.6.9 Export](#) dialog, you can show additional export options in the **Export contents** field.

You can specify the type and scope of the export using these export options:

- You can specify which SIPROTEC 5 devices should be included in the export. The **Devices to export** list box displays the names of the SIPROTEC 5 devices for which at least one data record is selected for MICS export. You can set this marking during configuration of the GOOSE communication or of the reporting. All SIPROTEC 5 devices are selected by default. You can deselect and reselect SIPROTEC 5 devices.
- You can determine if an international character set or a restricted character set is to be used for the IEC 61850 device description. If you select the international character set, the description texts are exported in the set edit language. If you select the restricted character set, the description texts are always exported in English. When selecting a setting, take into consideration if the recipient of the export file, an automation system, for example, is able to interpret an international character set or only a restricted character set. The international character set is selected by default.

Selecting SIPROTEC 5 Devices for Export

- ✧ To select or deselect a SIPROTEC 5 device, click the relevant check box in the **Devices to export** list box.
- ✧ To select or deselect all SIPROTEC 5 devices, click the **Select all** check box in the **Devices to export** list box.



NOTE

If a check box is marked, the corresponding SIPROTEC 5 device is selected for export. At least one SIPROTEC 5 device must be selected to start the export.

Selecting a Character Set

- ✧ Click the desired option **Use international character set** or **Use limited character set**.

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.19 MICS](#)

16.2.8 Configuring the SEQ5 Export

If you select the SEQ5 format in the [20.6.9 Export](#) dialog, you can show additional export options in the **Export contents** field. You can specify which test sequences should be included for the export using these export options. To do this, use the **Test sequences to export** list box. The names of all test sequences of the selected SIPROTEC 5 device are displayed in this list box. All test sequences are selected as the default. You can deselect and reselect test sequences.

Selecting Test Sequences for Export

- ✧ To select or deselect a test sequence, click the relevant check box in the **Test sequences to export** list box.
- ✧ To select or deselect all test sequences, click the **Select all** check box in the **Test sequences to export** list box.



NOTE

If a check box is marked, the corresponding test sequence is selected for export. At least one test sequence must be selected to start the export.

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.20 SEQ5](#)

16.2.9 Configuring the SIM Export

If you select the SIM format in the [20.6.9 Export](#) dialog, you can view and select the device/devices in the **Devices to export** area under the **Export contents** field to be exported.

You can specify type and scope of the export using the following export options:

- This new functionality in DIGSI 5 provides the ability to export the simulation data and simulate all the devices in the DIGSI 5 project for test and commissioning needs. The simulation is achieved by importing the simulation file into a signal processing and automation system which will then simulate the device/devices with the process data as in a real-time system. This feature also ensures the testing of a device for various real-time system conditions.



NOTE

For exporting the simulation data, the device must be consistent along with the successful compilation of Function charts (CFC). Non-modular devices (for example, 7**82 device type) and devices configured with process-bus modules cannot be exported.

Selecting SIPROTEC 5 Devices for Export

- ✧ Select the desired device in the **Devices to export** area under the **Export contents** field in the **Export** dialog.
- ✧ Click **Export**.

The validation of the device configuration is performed. If the configuration is invalid, an error message is displayed. You must resolve the validation errors to proceed further. With a valid device configuration, the simulation data is successfully exported.



NOTE

If a check box is marked, the corresponding SIPROTEC 5 device is selected for export. At least one modular SIPROTEC 5 device must be selected to start the export.

Related Topics

- ✧ [16.2.1 Preparing and Starting the Export](#)
- ✧ [16.1.21 SIM](#)

16.3 Importing Data

16.3.1 Preparing and Starting the Import

Before importing data, you must decide if you wish to import the data into an individual SIPROTEC 5 device or into the project. You can select from various data formats depending on the decision you have made. For instance, the **ELCAD** format can be used to import entire projects, while the **DSP5** format can be used only for a single SIPROTEC 5 device.

First select the import file with a file dialog.

An import dialog then provides you with the following information about the selected file:

- **Date**
This field shows the date and the time when the data was exported.
- **Comment**
This field shows any comment, which was added during the export.
- **Contains**
This field gives an overview of the data contained in the file. It shows individual data categories, for example, **Primary topology** or **Routings**.
- **Target**
This field shows the target of the import, that is, the name of the project or of a SIPROTEC 5 device.

For some data formats, the import dialog offers you additional import options which you can configure. You can also select a different import file with the import dialog.

Selecting the Import File

- ✧ Right-click the device name in the project tree to import data into a specific SIPROTEC 5 device.
- or -
- ✧ Right-click the project name in the project tree to import data into an entire project.

In both cases, the context menu opens.

- ✧ In the context menu, click **Import**.

The default file dialog **Select import file** opens.

- ✧ Select the desired import file with this dialog.
- ✧ Click **Open**.

The default file dialog **Select import file** closes. The [20.6.10 Import](#) dialog opens.

Selecting a Different Import File

- ✧ The name and the path of the currently selected import file are displayed in the text box **File**. To open a different import file, click the ... button.

The default file dialog **Select import file** opens again.

- ✧ Select the desired import file with this dialog.
- ✧ Click **Open**.

The default file dialog **Select import file** closes. The information displayed in the dialog **Import** is updated.

Configuring the Import

- ✧ If you have selected one of the formats **SEQ5**, **TEA-X**, **DSP5**, **XRIO**, **SCD**, **SED**, or **ICD**, the prompt **Import contents** appears. Click on this prompt.

Additional options or settings will be displayed. These depend on the selected import format.

- ✧ You can configure the import with these options and settings. You can learn more about this in the following topic descriptions in this Help document.

Starting the Import and Checking the Result

- ✧ Click **Import**.

The import starts. If data which does not have an obvious connection to the import will be overwritten during the import, you receive a prompt for confirmation.

- ✧ To overwrite the existing data with the new data and to continue the import process, click **Yes**.

Status reports will show the progress of the import. As soon as the import is complete, the [20.6.25 Status Dialog](#) opens. You find information about this dialog under [3.4 Using the Status Dialog](#).

- ✧ Click **OK**.

The status dialog closes.

16.3.2 Configuring the TEA-X Import

When importing the data in DIGSI 5 in the TEA-X format, you can customize the import operation via additional import options in the respective **Import** dialogs.

TEA-X import involves 2 stages:

- Selecting the project and subset categories
- Selecting device/devices for import

Selecting SIPROTEC 5 Devices for Import

- ✧ Right-click the device name in the project tree to import data into a specific SIPROTEC 5 device.

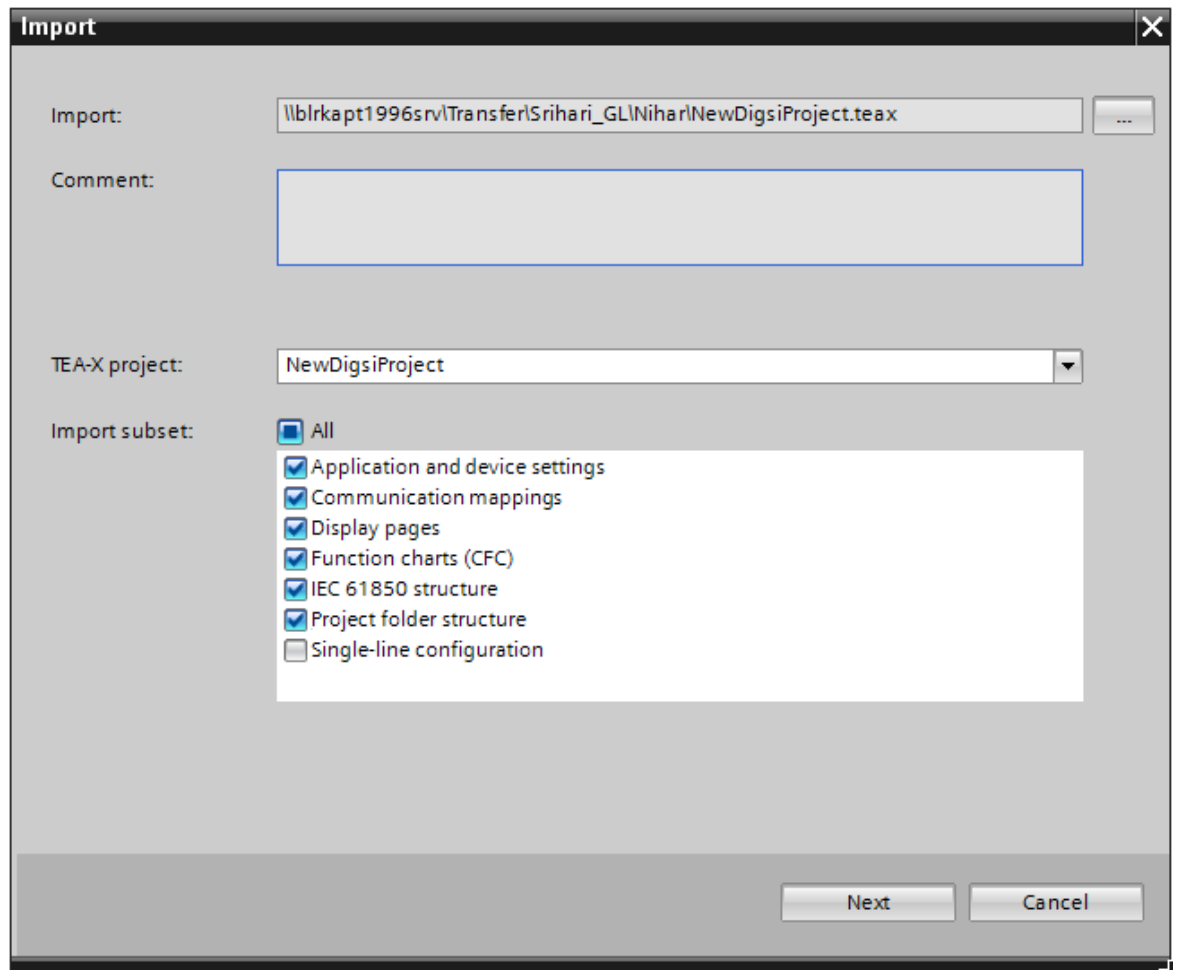
- or -

- ✧ Right-click the project name in the project tree to import data into a project.

In both the cases, the context menu opens.

- ✧ In the context menu, click **Import**.

The [20.6.30 Import](#) opens.



[sc_digsi_import, 2, en_US]

- ✧ Select the desired import file with this dialog.
- ✧ Select the specific project in the **TEA-X project** list box to view and select the desired project available for import.
- ✧ Select the desired data categories that must be included in the import. For additional information about the subset categories, refer to [Table 16-1](#).
- ✧ Click **Next**.

A second [20.6.31 Import TEA-X](#) dialog opens. Devices from the TEA-X file are listed in the list view in the **Devices in TEA-X file** column. If the project contains the devices that are available in the TEA-X file, they are automatically mapped. If the project does not contain the device available in the TEA-X file, the mapping is set to **new**. You can select to map a different device using the list-box option available in the **Devices in DIGSI 5 project** column.

[illegible]

- ✧ Select the desired device that must be included in the import.

NOTE

Importing data across different device types is not recommended. Device configuration must be verified after import as some settings might be changed to default values during the import operation. At least one SIPROTEC 5 device must be selected to start the import. You can import a maximum number of 100 devices at a time.

The following table provides a detailed explanation about the TEA-X import for a mapped device (update device) and an unmapped device (create new device) based on the selection of different subset categories.

Table 16-1 Import Subset Categories

Subset Categories	Subset-Category Content	New Device	Update Device
Application and device settings	• Application structure (AomBay, Function group (FG), Function (FN), Function block (FB), and Signal) • Settings • Function-group connections • Measuring-point connections • Circuit-breaker interaction or Recorder interaction • Information routings • Properties of hardware components • Protocol configuration	A new device is created based on the subset-category content.	The existing device configuration of the subset-category Application and device settings is overwritten by the corresponding configuration available in the TEA-X file.
Communication mappings	The communication mappings configured for the following protocols: • T103 • T104 • Protection interface • DNP3	A new device is created based on the subset-category content. By default, the Application and device settings subset-category is imported even if it is not selected.	The existing device configuration of the subset-category Communication mappings is overwritten by the corresponding configuration available in the TEA-X file.
Display pages	Display pages of the SIPROTEC 5 device	A new device is created with the Display pages available in the TEA-X file. By default, the Application and device settings subset-category is imported even if it is not selected.	The existing device configuration of the subset-category Display pages is overwritten by the corresponding configuration available in the TEA-X file.
Function charts (CFC)	Function charts of the SIPROTEC 5 device	A new device is created with the function charts available in the TEA-X file. By default, the Application and device settings subset-category is imported even if it is not selected.	The existing device configuration of the subset-category Function charts (CFC) is overwritten by the corresponding configuration available in the TEA-X file.
IEC 61850 structure	IEC 61850 Structure editor configuration of the SIPROTEC 5 device	A new device is created based on the subset-category content. By default, the Application and device settings subset-category is imported even if it is not selected.	The existing device configuration of the subset-category IEC 61850 structure is overwritten by the corresponding configuration available in the TEA-X file.

Subset Categories	Subset-Category Content	New Device	Update Device
Project folder structure	Project folder structure of the devices in the project tree	The project folder structure is created as per the TEA-X file. By default, the Application and device settings subset-category is imported even if it is not selected. It is possible to import the subset-category Project folder structure without importing any device. For more information about the project folder structure, refer to 6.2.1 Overview of Folder Structure in DIGSI 5.	The existing device configuration of the subset-category Project folder structure is overwritten by the corresponding configuration available in the TEA-X file.
Single-line configuration	Single-line configuration	A single-line configuration is created as available in the TEA-X file. It is possible to import the subset-category Single-line configuration without importing any device. By default, the Application and device settings subset-category is imported even if it is not selected.	The existing device configuration of the subset-category Single-line configuration is overwritten by the corresponding configuration available in the TEA-X file.

✧ Click **Import**.

The import operation starts based on your selection and displays the relevant status.



NOTE

All GOOSE inputs imported via the TEA-X file are unassigned.
If a TEA-X file is imported to the same device it was exported from, the existing assigned GOOSE inputs remain assigned.

Related Topics

- ✧ [16.3.1 Preparing and Starting the Import](#)
- ✧ [20.6.30 Import](#)
- ✧ [20.6.31 Import TEA-X](#)
- ✧ [16.1.2 TEA-X](#)

16.3.3 Configuring the SCD Import

When you import data in SCD format, you can show additional import options in the **Import contents** field of the dialog [20.6.10 Import](#).

You can import SCD files using the  icon in the toolbar of the [20.1.33 IEC Station](#) or using the IEC station context menu option **Import changes from IEC 61850 System Configurator** in the project tree. For a

successful import of the IEC 61850 file, the status of the following parameters is checked and displayed in the **Importing** dialog:

- Validating XML structure
- Validating against schema
- Validating IEC 61850 edition
- Checking consistency
- Resolving GOOSE references

In case of any errors or warnings, specific error messages are displayed. You must resolve these issues to proceed further.



NOTE

Using the IEC station context menu option **Import**, you can import any SCD file which is not created by the IEC 61850 System Configurator tool. If you import an SCD file manually with this option for any IEC station that is already associated with an IEC 61850 System Configurator project, the association and the existing configuration will be lost.

Selecting SIPROTEC 5 Devices for Import

- ✧ To select or deselect a SIPROTEC 5 device, click the relevant check box in the **Devices to import** list box.
- ✧ To select or deselect all SIPROTEC 5 devices, click the **Select all** check box in the **Devices to import** list box.



NOTE

If a check box is marked, the corresponding SIPROTEC 5 device is selected for import. At least one SIPROTEC 5 device must be selected to start the import.

Specifying the Processing of the Device Data

- ✧ Click the desired option **Create as new device(s)** or **Update matching device(s)**.

Importing SCD via IEC 61850 Station

- ✧ Double-click the **IEC stations** folder in the project tree.
- ✧ Right-click any IEC station (for example, IEC station 1) that is already associated with the System Configurator project.
- ✧ Click from the context menu.
- or -
- ✧ Click from the [20.1.33 IEC Station](#) editor.

A confirmation prompt appears.

- ✧ Select the desired option to start importing.

Related Topics

- ✧ [16.3.1 Preparing and Starting the Import](#)
- ✧ [16.1.6 SCD](#)

16.3.4 Configuring the DEX5 Import

When you import data in DEX5 format, you can show an additional import option in the **Import contents** field of the dialog [20.6.10 Import](#). You can use this import option to specify if the data of the primary topology should be imported. In this case, the existing topology will be overwritten. A precondition for this is that the import file must contain primary topology data.

You can import the data from a DEX5 file only into a project. In doing so, the device data is used to open a new SIPROTEC 5 device in the project.

Importing Primary Topology

- ✧ Mark the **Import topology** check box.

Related Topics

- ✧ [16.3.1 Preparing and Starting the Import](#)
- ✧ [16.1.3 DEX5](#)

16.3.5 Configuring the DIGSI 4 CFC Import

If you import data in the ST format (DIGSI 4 function charts), you can show the additional **Function charts (CFC) to import** list box in the **Import contents** field of the [20.6.10 Import](#) dialog. You can select the function charts which should be included in the import using this list box. This list box contains the names of all function charts whose data is located in the imported file. All function charts are selected as the default. You can deselect and reselect function charts.



NOTE

You can only import function charts which were exported with DIGSI 4 version 4.83 or higher.

Selecting Function Charts for Import

- ✧ To select or deselect a function chart, click the relevant check box in the **Function charts (CFC) to import** list box.
- ✧ To select or deselect all function charts, click the **Select all** check box in the **Function charts (CFC) to import** list box.



NOTE

If a check box is marked, the corresponding function chart is selected for import. At least one function chart must be selected to start the import.

Related Topics

- ✧ [16.3.1 Preparing and Starting the Import](#)
- ✧ [16.1.18 ST](#)

16.3.6 Configuring the DSP5 Import

When you import data in DSP5 format, you can show the additional **Display pages to import** list box in the **Import contents** field of the dialog [20.6.10 Import](#). With this list box, you select the display pages which should be included in the import. This list box contains the names of all display pages whose data is located in the imported file. All display pages are selected as the default. You can deselect and reselect display pages.

Selecting Display Pages for Import

- ✧ To select or deselect a display page, click the relevant check box in the **Display pages to import** list box.
- ✧ To select or deselect all display pages, click the **Select all** check box in the **Display pages to import** list box.



NOTE

If a check box is marked, the corresponding display page is selected for import. At least one display page must be selected to start the import.

Related Topics

- ✧ [16.3.1 Preparing and Starting the Import](#)
- ✧ [16.1.16 DSP5](#)

16.3.7 Configuring the SEQ5 Import

When you import data in SEQ5 format, you can show the additional **Test sequences to import** list box in the **Import contents** field of the dialog [20.6.10 Import](#). With this list box, you select the test sequences which should be included in the import. This list box contains the names of all test sequences whose data is located in the imported file. All test sequences are selected as the default. You can deselect and reselect test sequences .

Selecting Test Sequences for Import

- ✧ To select or deselect a test sequence, click the relevant check box in the **Test sequences to import** list box.
- ✧ To select or deselect all test sequences, click the **Select all** check box in the **Test sequences to import** list box.



NOTE

If a check box is marked, the corresponding test sequence is selected for import. At least one test sequence must be selected to start the import.

Related Topics

- ✧ [16.3.1 Preparing and Starting the Import](#)
- ✧ [16.1.20 SEQ5](#)

17 Documentation

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17.1 Designing Document Template

17.1.1 Overview for Designing and Printing Documents

With the documentation function of DIGSI 5, you can create and manage system documentation in printed form. You can prepare project data as a standardized circuit manual and design it in a uniform layout. You can print out the entire project data, a compact overview, or data from individual categories.

When designing and printing the document, you have the following possibilities:

- You can use one of the delivered templates for the cover sheet and the print layout. This includes templates for technical product documentation according to the ISO standard.
- You can create your own templates based on the delivered templates. You can adjust these, for example, to your company layout and integrate your company logo.
- You can determine the scope of the data that is to be printed.
- You can select a template for printing and examine the expected print result in the print preview.
- You can print the data.

Related Topics

[17.1.2 Opening the Document Information Editor](#)

[17.1.7.1 Opening a Template](#)

[17.2.2 Determining the Scope of Printing](#)

[17.3.2 Opening the Print Preview](#)

[17.2.1 Starting the Printing](#)

17.1.2 Opening the Document Information Editor

With [20.1.17 Document Information Editor](#), you can edit the layout of the project documentation.

Opening the Document Editor

- ✧ Double-click **Documentation information** in the project tree.
- ✧ Double-click **Add new documentation information**.

The [20.1.17 Document Information Editor](#) opens in the working area.

Related Topics

✧ [17.1.1 Overview for Designing and Printing Documents](#)

✧ [17.1.5 Using Document Information](#)

17.1.3 Opening the Frames Editor

With Frames editor, you can edit the layout of the project documentation.

Opening the Frames Editor

- ✧ Double-click **Frames** folder in the project tree.
 - ✧ Double-click **Add new frame**.
- [20.6.20 Add New Frame](#) dialog opens.
- ✧ Enter the required details.
 - ✧ Click **Add**.

The [20.1.18 Frames Editor](#) opens in the working area.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.5 Using Document Information](#)

17.1.4 Opening the Cover Pages Editor

With **Cover Pages** editor, you can edit the layout of the project documentation.

Opening the Cover Pages Editor

- ✧ Double-click **Cover Pages** folder in the project tree.
 - ✧ Double-click **Add new cover page**.
- [20.6.21 Add New Cover Page](#) dialog opens.
- ✧ Enter the required details.
 - ✧ Click **Add**.

The [20.1.19 Cover Pages Editor](#) opens in the working area.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.5 Using Document Information](#)

17.1.5 Using Document Information

For every project, you can enter document information, for example, the general information, the user details, and creation date/time. You can select the desired cover page and frame. This information applies for the complete project and is independent of certain templates. However, you can accept individual document information in templates with the help of auto texts. The information referenced in this manner is then added to the template when it is printed.

Entering Document Information

- ✧ Open [20.1.17 Document Information Editor](#).
- ✧ Enter the information relevant to you in the individual text boxes.
- ✧ Click **Save Project** in the [20.7.1 DIGSI 5 Toolbar](#).

The information entered is now saved and available as a template.

Adding Auto Text to the Template

- ✧ Open the [20.1.18 Frames Editor](#) or the [20.1.19 Cover Pages Editor](#) in the working area.
- ✧ Click **Toolbox** tab from the **Task** area.

The elements of the [20.2.2 Toolbox](#) tab are displayed.

- ✧ Drag and drop the element **Text box** in the working area.

The text box is inserted in the predefined size.

- ✧ Select the text box.
- ✧ In the context menu, click **Properties**.

The Inspector window opens.

- ✧ In the **Properties** tab, select the group **General**.

- ✧ Select an auto text variable from the list box.

The auto text variable is inserted into the text box during printing.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)

17.1.6 Customizing View

17.1.6.1 Scaling the Document

You can scale the view in the [20.1.18 Frames Editor](#) or [20.1.19 Cover Pages Editor](#) and thus change the display size of the opened template.

You have the following possibilities:

- You can scale the view in the predefined steps.
- You can enlarge a rectangular segment of the view.
- You can dynamically scale the view.
- You can scale the view by percent.
- You can select a defined final state.

Scale View in the Predefined Steps

- ✧ Open the **Frames** editor or the **Cover Pages** editor.
- ✧ Click on one of the 2 buttons  or  in the [20.7.22 Toolbar of the Documentation Settings Editor](#).

The template is displayed larger or smaller.



NOTE

If the maximum or minimum display size is reached, the respective button will become inactive.

Enlarging a Rectangular Segment of the View

- ✧ Open the **Frames** editor or the **Cover Pages** editor.
- ✧ Click the  button in the [20.7.22 Toolbar of the Documentation Settings Editor](#).

This enables the selection tool.

- ✧ Left-click the template and hold the mouse button down as you drag a rectangle.
- ✧ Release the mouse button as soon as the rectangle has reached the desired size.

The marked segment in the template will be enlarged in the working area.

Scaling a View Dynamically

- ✧ Open the **Frames** editor or the **Cover Pages** editor.
- ✧ Click the  button in [20.7.22 Toolbar of the Documentation Settings Editor](#).

This step enables the tool for dynamic scaling.

- ✧ Left-click the template and hold the mouse button. If you want to make the template smaller, move the mouse in the downward direction. If you want to make the template larger, move the mouse in the upward direction.

The template is enlarged or scaled down in the working area.

- ✧ Release the mouse button as soon as the template has reached the desired size.

The template will be displayed in the selected size in the working area.

Scaling a View by Percent

- ✧ Open the **Frames** editor or the **Cover Pages** editor.
- ✧ Open the list box for the scaling factor in the [20.7.22 Toolbar of the Documentation Settings Editor](#).
- ✧ Select a percent value.
 - or -
- ✧ Enter a whole number percent value from 10 to 800 into the text box of the list box.
- ✧ Click outside of the text box.
 - or -
- ✧ Press the <Enter> button.
 - or -
- ✧ You can use the zoom bar to change the display size.

The template is displayed in the selected or entered percent size.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.6.5 Using the Ruler](#)
- ✧ [17.1.6.3 Setting the Unit of Measurement](#)
- ✧ [17.1.6.4 Using the Grid](#)
- ✧ [17.1.6.2 Using the Hand Mode](#)

17.1.6.2 Using the Hand Mode

If the template cannot be displayed in the working area, you can also enable the hand mode as an alternative to the scroll bar. In hand mode, you can move the template with the mouse vertically and horizontally in the working area. You cannot mark any objects if the hand mode is enabled.

Enabling Hand Mode

- ✧ Click the  button in the [20.7.22 Toolbar of the Documentation Settings Editor](#).

The button in the toolbar is marked and the mouse pointer changes into a hand symbol.

Disabling Hand Mode

- ✧ Click the  button in the [20.7.22 Toolbar of the Documentation Settings Editor](#).

The button in the toolbar is marked and the mouse pointer changes into the standard arrow symbol.

Moving a Template in the Enabled Hand Mode

- ✧ Click on the template and hold the mouse button.
- ✧ Move the template in horizontal and vertical directions.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.6.1 Scaling the Document](#)

- ✧ [17.1.6.5 Using the Ruler](#)
- ✧ [17.1.6.3 Setting the Unit of Measurement](#)
- ✧ [17.1.6.4 Using the Grid](#)

17.1.6.3 Setting the Unit of Measurement

For work with the **Frames** editor and **Cover Pages** editor, you can select between 3 units of measurement:

- Millimeter
- Centimeter
- Inch

If a value relates to a unit of measurement, for example the width of an object, the value is automatically updated if you set a different unit of measurement.

The selection of a unit of measurement affects the following properties:

- The grid levels
- The linear classification
- The template size
- The size of the objects (entry box, form, and image field)
- The position of the objects (entry box, form, and image field)
- The frame width
- The borders within a text or image field

You can change the unit of measurement in the template properties.

Setting the Unit of Measurement

- ✧ Mark the template. In order to do this, click in an open area within the template or in the working area outside of the template.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the item **Rulers and grid** under the group [19.8.1 Document - General](#).
- ✧ Select the desired unit of measurement from the **Units** list box.

All correlating values are adjusted.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.6.1 Scaling the Document](#)
- ✧ [17.1.6.5 Using the Ruler](#)
- ✧ [17.1.6.4 Using the Grid](#)
- ✧ [17.1.6.2 Using the Hand Mode](#)

17.1.6.4 Using the Grid

A grid helps you with the visual alignment of objects in the template.

You have the following possibilities:

- You can show/hide this grid.
- You can enable or disable a function that automatically aligns the objects on the grid during scaling or moving.
- You can set the grid size.

Showing/Hiding the Grid in the Template

- ✧ Mark the template. In order to do this, click in an open area within the template or in the working area outside of the template.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the item **Rulers and grid** under the group [19.8.1 Document - General](#).
- ✧ Click on the **Show grid** check box.

If the grid is hidden, this action will show it. If the grid is shown, this action will hide it.

Activating or Deactivating Alignment on the Grid

- ✧ Mark the template. In order to do this, click in an open area within the template or in the working area outside of the template.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the item **Rulers and grid** under the group **General**.
- ✧ Click on the **Snap to grid** check box.

If the function is disabled, this action enables it. If the function is enabled, this action disables it.

Setting the Grid Size

- ✧ Mark the template. In order to do this, click in an open area within the template or in the working area outside of the template.
 - ✧ Open the Inspector window.
 - ✧ Select the **Properties** tab.
 - ✧ Select the item **Rulers and grid** under the group **General**.
 - ✧ In the **Grid steps** text box, enter a value larger than 0. This value corresponds with the distance between 2 grid lines. You will see the affiliated unit in the **Units** field in the list box.
 - ✧ Click outside of the text box.
- or -
- ✧ Press the <Enter> button.

With these 2 actions, you confirm your entry.

The grid distance is adjusted.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.6.1 Scaling the Document](#)
- ✧ [17.1.6.5 Using the Ruler](#)
- ✧ [17.1.6.3 Setting the Unit of Measurement](#)
- ✧ [17.1.6.2 Using the Hand Mode](#)

17.1.6.5 Using the Ruler

A horizontal and a vertical ruler help you align text boxes, forms, and image fields. The ruler scale depends on the set unit of measurement. You can show/hide the ruler.

Showing/Hiding the Ruler in the Working Area

- ✧ Mark the template. In order to do this, click in an open area within the template or in the working area outside of the template.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the item **Rulers and grid** under the group **General**.
- ✧ Click on the **Show rulers** check box.

If the ruler is hidden, this action will show it. If the ruler is shown, this action will hide it.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.6.1 Scaling the Document](#)
- ✧ [17.1.6.3 Setting the Unit of Measurement](#)
- ✧ [17.1.6.4 Using the Grid](#)
- ✧ [17.1.6.2 Using the Hand Mode](#)

17.1.7 Managing Templates

17.1.7.1 Opening a Template

In order to be able to edit a template, first open it in the working area. In order to save this permanently, save the project.

The templates are sorted into 4 categories:

- **Default Document Templates**
This category includes the layout templates for the document supplied with DIGSI 5.
- **Document information**
This category includes layout templates for the document information.
- **Cover Pages**
This category includes the layout templates for the cover pages delivered with DIGSI 5.
- **Frames**
This category includes layout templates for the frames.

First select a category and then a template from this category.

Opening a Document Information Template

- ✧ Double-click **Add new document information** in the project tree under **Document information** folder.
- The template opens and is displayed in the working area.

Opening a Frame Template

- ✧ Double-click **Add new frame** in the project tree under **Frames** folder.
- Add new frame** dialog opens.
- ✧ Enter the required details.
 - ✧ Click **Add**.

The template opens and is displayed in the working area.

Opening a Cover Page Template

- ✧ Double-click **Add new cover page** in the project tree under **Cover Pages** folder.

Add new cover page dialog opens.

- ✧ Enter the required details.
- ✧ Click **Add**.

The template opens and is displayed in the working area.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.7.2 Adding a Template](#)

17.1.7.2 Adding a Template

You can directly edit a template delivered with DIGSI 5 and save it together with the project. However, Siemens recommends saving a delivered template as a new template and then editing it. In this way, you will still have the delivered template available in its original state. You can also save a template you created in this way as a new template and then continue editing it.

Adding a Document Information Template

- ✧ Double-click **Add new document information** in the project tree under **Document information** folder.

The template opens and is displayed in the working area.

- or -

- ✧ Drag and drop the document information template from the **Document information** folder under the DIGSI 5 Global libraries to the **Document information** folder in the project tree.

The document information template is added and displayed in the project tree. By default, the respective templates for frame and cover page are also added and displayed in the project tree.

- ✧ Double-click the newly added template in the project tree under **Document information** folder.

The template opens and is displayed in the working area.

Adding a Frame Template

- ✧ Double-click **Add new frame** in the project tree under **Frames** folder.

[20.6.20 Add New Frame](#) dialog opens.

- ✧ Enter the required details.
- ✧ Click **Add**.

The template opens and is displayed in the working area.

- or -

- ✧ Drag and drop the frame template from the **Frames** folder under the DIGSI 5 Global libraries to the **Frames** folder in the project tree.

The frame template is added and displayed in the project tree.

- ✧ Double-click the newly added template in the project tree under **Frames** folder.

The template opens and is displayed in the working area.

Adding a Cover Page Template

- ✧ Double-click **Add new cover page** in the project tree under **Cover Pages** folder.

[20.6.21 Add New Cover Page](#) dialog opens.

- ✧ Enter the required details.
- ✧ Click **Add**.

The template opens and is displayed in the working area.

- or -

- ✧ Drag and drop the document information template from the **Cover Pages** folder under the DIGSI 5 Global libraries to the **Cover Pages** folder in the project tree.

The cover page template is added and displayed in the project tree.

- ✧ Double-click the newly added template in the project tree under **Cover Pages** folder.

The template opens and is displayed in the working area.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.7.1 Opening a Template](#)

17.1.8 Processing a Template

17.1.8.1 Inserting Placeholders for Metadata

You can provide placeholders on the cover page and in a frame. The placeholders are automatically filled with metadata from documentation information during printing, if they are placeholders for text. Alternatively, you can add non-modifiable data, such as free text or an image.

All elements are arranged in numbered Z-Orders. If objects overlap, you can determine in which sequence these are to be arranged.

Types of placeholders

- Text field
The text field stands as a placeholder for a text element from a document information. In the properties of the text field, you set which text from a document information should be automatically inserted during printing.
- Field for date and time
A date and time is inserted instead of the placeholder when printing. This can be the date of creation or the point in time when the last change was made to the project. In the properties of the Inspector window, you specify which date or time is printed.
- Page number
The correct page number is automatically applied when printing.
- Free text
You can enter freely selectable text in the properties of the text field. The text is static and is not influenced by the document information selected at the time of printing.
- Image
Select the graphic file in the properties of the placeholder in the Inspector window. Images in the formats BMP, JPEG, PNG, EMF or GIF are possible.

Inserting Placeholders for Metadata on the Cover Page or Frame

- ✧ Open [20.1.18 Frames Editor](#) or [20.1.19 Cover Pages Editor](#) in the working area.
- ✧ Drag and drop any element from the [20.2.2 Toolbox](#) tab in the task card to the working area.
- ✧ Mark the element
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.
- ✧ Select the metadata to be inserted during printing from the **Text** list box. Alternatively, you have the option of entering free text or selecting an image depending on the type of placeholder.

- ✧ In the Properties tab under the group General for position and size, you can specify the position of the placeholder on the X and Y axis and enter the width and height of the text box. You can specify the sequence of the objects in the Z-Order field, if these overlap. The smaller the value, the further down an object is located.

17.1.8.2 Adding and Editing a Text Box

In order to add additional text information to the template, use the element text box in the **Frames** editor or **Cover Pages** editor. This allows you to, for example, document additional system data. The elements **Date/Time** and **Page number** have properties similar to the element **Text box**.

In order to configure a text box, you have the following possibilities:

- Changing the name of the text box
- Changing the size of the text box
- Changing the position of the text box
- Setting the borders of the text box
- Filling the text box with color
- Entering text in the text box
- Adding auto text
- Formatting text
- Configuring text box as invisible for the printout

You can change the size and position with the mouse on the text box or you can set it in the text box properties. All other settings are made exclusively in the text box properties.

Adding a Text Box in the Template

- ✧ Open any frame template or cover page template.
- ✧ Click the **Toolbox** tab in the task card.

The elements of the [20.2.2 Toolbox](#) tab are displayed.

- ✧ Drag and drop the element **Text box** in the working area of the template.

The text box is added in the defined size.

Displaying Properties of the Text Box

- ✧ Mark the text box
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.

Changing the Text field of the Text Box

- ✧ In the **Properties** tab, select the group [19.8.2 Text Box – General](#).

The text field stands as a placeholder for a text element from a document information. In the properties of the text field, you can set which text from a document information should be automatically inserted during printing.

- ✧ Select the desired placeholder from the list box of the **text** field.
- ✧ Click outside of the text boxes.

- or -

- ✧ Press the <Enter> button.

With these 2 actions, you confirm your entry.

The text field of the text box is changed.

Changing the Size of the Text Box with the Mouse

- ✧ Mark the text box.
 - 8 white corners will appear around the text box.
 - ✧ Click on one of these corners, keep the mouse button pressed and drag the mouse.
- The text box is changed corresponding to your mouse movements.

Changing the Size of the Text Box in the Properties

- ✧ In the **Properties** tab, select the group **General**.
 - ✧ Enter the desired values in the **Width** and **Height** text boxes. Enter the values adapted to the currently set unit of measurement.
 - ✧ Click outside of the text boxes.
 - or -
 - ✧ Press the <Enter> button.
- With these 2 actions, you confirm your entry.
The size of the text box is updated.



NOTE

You can check and change the unit of measurement in the template properties.

Changing the Position of the Text Box with the Mouse

- ✧ Click on the text box and drag the text box to the desired position while the mouse button is pressed.
- ✧ Release the mouse button.

Changing the Position of the Text Box in the Properties

- ✧ In the **Properties** tab, select the group [19.8.2 Text Box – General](#).
 - ✧ Enter the desired values in the **x** and **y** text boxes. The position values relate to the upper left corner of the text box. Enter the values adapted to the currently set unit of measurement.
 - ✧ Click outside of the text boxes.
 - or -
 - ✧ Press the <Enter> button.
- With these 2 actions, you confirm your entry.
The position of the text box is updated.



NOTE

You can check and change the unit of measurement in the template properties.

Entering Text in the Text Box

- ✧ In the **Properties** tab, select the group **General**.
- ✧ In the text box for **Text**, select the text field that should be displayed in the text box.
- ✧ Click outside of the text box.
- or -
- ✧ Press the <Enter> button.

With these 2 actions, you confirm your entry.
The entered text will be displayed in the text box.

Adding Free Text in the Template

- ✧ Open any frame template or cover page template.
- ✧ Click the **Toolbox** tab in the task card.

The elements of the [20.2.2 Toolbox](#) editor are displayed.

- ✧ Drag and drop the element **Free Text** in the working area of the template.

The text box is added in the defined size.

- ✧ Mark the text box.
- ✧ In the **Properties** tab, select the group **General**.
- ✧ Enter the desired text in the **text** field under **Free text** in the **General** group.

The text is static and is not influenced by the document information selected at the time of printing.

Formatting Text

- ✧ In the **Properties** tab, select the group [19.8.3 Text - View](#).
- ✧ You can optionally change the appearance of the text. You can set the font, font style, the text size and select different markups.
- ✧ You can optionally change the distance of the text to the borders of the text box. In order to do this, enter values in the **Bottom**, **Top**, **Left**, **Center** and **Right** text boxes that match the currently set unit of measurement.
- ✧ You can optionally change the horizontal and vertical orientation of the text in the text box. In order to do this, use the **Horizontal** and **Vertical** list boxes.



NOTE

The selected settings are always valid for the entire text.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.8.3 Inserting and Editing the Image](#)
- ✧ [17.1.8.4 Marking an Object](#)
- ✧ [17.1.8.5 Changing the Sequence of Objects](#)
- ✧ [17.1.8.6 Deleting, Copying, or Pasting Objects](#)

17.1.8.3 Inserting and Editing the Image

You can insert images in the template. In order to do this, insert an image field and an image in this field.
In order to configure the image field and the image, you have the following possibilities:

- Changing the size mode
- Changing the size of the image field
- Changing the position of the image field
- Setting the borders of the image field
- Formatting the image field

You can change the size and position of the image field with the mouse or you can set it in the form properties. All other settings are made exclusively in the image-field properties.

Inserting the Image Field in the Template

- ✧ Open any frame template or cover page template.
- ✧ Click the [20.2.2 Toolbox](#) tab in the task card.

The elements of the **Toolbox** tab are displayed.

- ✧ Drag and drop the element **Image** in the working area of the template.

The image field is inserted in the predefined size. The image field does not yet contain an image.

Displaying the Properties of the Image Field

- ✧ Mark the image field.
- ✧ Open the Inspector window.
- ✧ Select the **Properties** tab.

Inserting an Image in the Image Field

- ✧ In the **Properties** tab, select the group **General**.
- ✧ Click **Browse** button for the **File** field.

A standard file dialog opens.

- ✧ Use this dialog to select a graphic file. You can select files in the following formats: **BMP, JPEG, TIFF, GIF, WMF**, and **PNG**. The file size may not exceed 50 KB.
- ✧ Click **Open**.

The selected image is inserted in the image field. If the image size does not match the size of the image field, the image will be scaled proportionately.

Changing the Size of the Image Field with the Mouse

- ✧ Mark the image field.
- 8 white corners appear around the form.
- ✧ Click on one of these corners and hold the mouse button.
 - ✧ Change the size of the image field by moving the mouse.



NOTE

Depending on the selected size mode, an image within the image field will be trimmed or scaled proportionately.

Changing the Size of the Image Field in the Properties

- ✧ In the **Properties** tab, select the group **General**.
- ✧ Enter the desired values in the **Width** and **Height** text boxes. Enter the values adapted to the currently set unit of measurement.
- ✧ Click outside of the text boxes.

- or -

- ✧ Press the <Enter> button.

With these 2 actions, you confirm your entry.

The size of the image field is updated.



NOTE

You can check and change the unit of measurement in the template properties. Depending on the selected size mode, an image within the image field will be trimmed or scaled proportionately.

Changing the Position of the Image Field with the Mouse

- ✧ Click on the image field and hold the mouse button.
- ✧ Drag the image field to the desired position while holding the pressed mouse button and release the mouse button.

Changing the Position of the Image Field in the Properties

- ✧ In the **Properties** tab, select the group **General**.
- ✧ Enter the desired values in the **x** and **y** text boxes. The position values relate to the upper left corner of the image field. Enter the values adapted to the currently set unit of measurement.
- ✧ Click outside of the text boxes.
- or -
- ✧ Press the <Enter> button.

With these 2 actions, you confirm your entry.
The position of the image field is updated.



NOTE

You can check and change the unit of measurement in the template properties.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.8.2 Adding and Editing a Text Box](#)
- ✧ [17.1.8.4 Marking an Object](#)
- ✧ [17.1.8.5 Changing the Sequence of Objects](#)
- ✧ [17.1.8.6 Deleting, Copying, or Pasting Objects](#)

17.1.8.4 Marking an Object

You can mark an individual object or a group of objects. In this case, the objects include text boxes, image fields, and forms. Every marked element is designated through limiting points.

Marking an Individual Object

- ✧ Left-click an object.
- The object is marked.

Marking a Group of Objects

- ✧ Left-click in an open area on the template. Press down the mouse button and drag a rectangle.
 - ✧ Release the mouse button as soon as the rectangle has reached the desired size.
- All objects within the rectangle are marked.

Removing a Marking

- ✧ Click in a non-marked area on the template.

- or -

- ✧ Mark a different object.

**NOTE**

You can mark additional objects or remove an existing marking. To do so, hold down the <CTRL> key while you left-click the corresponding objects.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.8.2 Adding and Editing a Text Box](#)
- ✧ [17.1.8.3 Inserting and Editing the Image](#)
- ✧ [17.1.8.5 Changing the Sequence of Objects](#)
- ✧ [17.1.8.6 Deleting, Copying, or Pasting Objects](#)

17.1.8.5 Changing the Sequence of Objects

When inserting a new object, this is always placed over all other objects. You can change this sequence by sending the object to the background or the foreground.

Changing the Sequence of the Objects

- ✧ Mark any object placed in the template of the working area.
 - ✧ In the **Properties** tab, select the group **General**.
 - ✧ Select the desired sequence order from the list box for the **Z-Order** field.
 - ✧ Click outside of the text boxes.
- or -
- ✧ Press the <Enter> button.

With these 2 actions, you confirm your entry.

The sequence order of the object is updated.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.8.2 Adding and Editing a Text Box](#)
- ✧ [17.1.8.3 Inserting and Editing the Image](#)
- ✧ [17.1.8.4 Marking an Object](#)
- ✧ [17.1.8.6 Deleting, Copying, or Pasting Objects](#)

17.1.8.6 Deleting, Copying, or Pasting Objects

You can use standard editing functions at all times for the objects of a template, like deleting, copying, or inserting objects.

Deleting Objects

- ✧ Mark an individual object or a group of objects.
 - ✧ Right-click a marked object and then click **Delete** in the context menu.
- or -

- ✧ Click the  button in the [20.7.1 DIGSI 5 Toolbar](#).

All marked objects are deleted.

Copying Objects

- ✧ Mark an individual object or a group of objects.
- ✧ Right-click a marked object and then click **Copy** in the context menu.

- or -

- ✧ Click the button  in the DIGSI 5 toolbar.

All marked objects are copied to the clipboard.

Inserting Objects

- ✧ Right-click on the desired insertion position in the template.
- ✧ Click **Paste** in the text menu.

- or -

- ✧ Click the button  in the DIGSI 5 toolbar.

All objects from the clipboard are inserted in the template.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.1.8.2 Adding and Editing a Text Box](#)
- ✧ [17.1.8.3 Inserting and Editing the Image](#)
- ✧ [17.1.8.4 Marking an Object](#)
- ✧ [17.1.8.5 Changing the Sequence of Objects](#)

17.2 Printing Data

17.2.1 Starting the Printing

Before starting the printing process, decide on one of the 3 basic possibilities:

- You want to print an individual data category, for example, the function settings or the single-line configuration. In this case, mark the assigned entry in the project tree. Some data categories must be displayed in the working area. You can find more information in the respective topic descriptions.
- You want to print a number of data categories or all data from a SIPROTEC 5 device. In this case, mark in the [3.1.2 Project Tree](#) the name of the concerned SIPROTEC 5 device.
- You want to print a number of data categories or all data from the current project. In this case you mark the project name in the project tree.

Starting the Printing Process for an Individual Data Category

- ✧ Open the project tree.
- ✧ Mark the affiliated entry in the project or open the data in the working area.
- ✧ Click **Print** in the **Project** menu.

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document layout, and the properties. You find more information about this under [17.2.3 Selecting Print Options](#).
- ✧ Click **Print**.

The **Print** dialog closes, the printing progress is displayed in the object bar and the selected data is printed.



NOTE

You can still cancel printing when it is in progress, by clicking the  button in the object bar.

Starting the Printing Process for the Data from a SIPROTEC 5 Device or from the Project

- ✧ Open the project tree.
- ✧ Mark the project name or a device name in the project.
- ✧ Click **Print** in the **Project** menu.

The [20.6.23 Print](#) dialog opens.

- ✧ Use this dialog to select a printer, a document layout, and the properties. You find more information about this under [17.2.3 Selecting Print Options](#).
- ✧ Click **Print**.

The **Print** dialog closes, the printing progress is displayed in the object bar and the selected data is printed.



NOTE

You can still cancel printing when it is in progress, by clicking the  button in the object bar.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)

17.2.2 Determining the Scope of Printing

If you want to print a number of data categories or all data from a SIPROTEC 5 device or from the project, you can determine the scope of printing. For this, you can use the dialog [20.6.23 Print](#). This dialog is displayed when you mark the project name or a device name in the [3.1.2 Project Tree](#) and then click **Print** in the **Project** menu.

Determining the Scope of Printing for Project Data

- ✧ Click **Options** in the DIGSI 5 toolbar.

The context menu opens.

- ✧ Select **Settings** from the context menu.

The **Settings** editor is displayed in the working area.

- ✧ Select [20.5.15 Print Options](#) in this editor.

The print options are displayed under the **Select print contents** area.

- ✧ The **Select print contents** area contains the names of the individual data categories. Select at least one data category. To do this, mark the relevant check box.
- ✧ You can optionally select other data categories. In order to select all data categories, click **Select all**.
- ✧ Click **Save Project**.

The scope for printing for project data is determined

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [17.2.3 Selecting Print Options](#)
- ✧ [20.5.15 Print Options](#)

17.2.3 Selecting Print Options

Before the printout is started, select a printer, a document template and a cover page. For this, you can use the dialog [20.6.23 Print](#).

This dialog is displayed after one of the following actions:

- You have marked an individual data category in the project tree or opened the data in the working area and then clicked **Print** in the **Project** menu.
- You have predefined the scope of printing and then clicked **Print** button from the DIGSI 5 toolbar.
- You have predefined the print options in the [20.5.15 Print Options](#) and then clicked **Print** button from the DIGSI 5 toolbar.

Setting up Printer and Document

- ✧ Select the printer from the **Name** list box that should be used for the printout. The names of all output devices are displayed for which the affiliated drivers are installed.
- ✧ You can optionally click **Advanced**. Windows standard dialog for **Print** is displayed. With this dialog, you can set up other print-specific settings or open other dialogs.
- ✧ Select the document layout. In order to do so, click the **Document information** list box.

An additional selection dialog is displayed.

- ✧ The template-list box contains the templates available for the selected category. The name, paper type, and orientation are displayed for every template.
- ✧ Mark the desired template in this list.

- ✧ Click .

The additional selection dialog closes.

- ✧ Select a check box option **Print cover page** to print the cover page, which is stored in the selected document information.
- ✧ Select a check box option **Print table of contents** to add a table of contents to the printout.
- ✧ Under **Properties** area, select the option **All** if you wish to print out the entire content of the editor.
- or -
- ✧ Select **Compact** if you wish to print out an abbreviated version of the project data.
- ✧ Click **Preview** to generate a print preview in advance.

A print preview is displayed in the working area.

- ✧ Click **Print**.

The **Print** dialog closes and the selected data is printed.



NOTE

The scope of print options available in the **Print** dialog vary depending on the elements to be printed.

Related Topics

- ✧ [17.1.1 Overview for Designing and Printing Documents](#)
- ✧ [20.5.15 Print Options](#)

17.2.4 Printing Labels for LEDs and Function Keys from DIGSI

This feature allows you to print the labels for LEDs and function keys displayed under the properties of the [20.1.5 Device and Networks Editor](#) in DIGSI instead of using an extra word template.

Printing LEDs and Function Keys

- ✧ Right-click **Hardware and Protocols** in the project tree.
- The context menu appears.
- ✧ Select **Print labeling strips**.
- The **Print labeling strips** dialog appears.
- ✧ Select the desired border and printer margin options with this dialog.



NOTE

By default, the check box option **Adjust printer margins** is disabled with the default printer margin settings. Activate the check box option to modify and enter the desired margin value for the **Top** and **Left** margins.

- ✧ Click **OK**.

The **Print** dialog of Windows appears.

- ✧ Click **Print**.

The **Print** dialog closes and the labels for LEDs and function keys configured in DIGSI are printed.

Related Topics

- ✧ [20.1.5 Device and Networks Editor](#)

17.3 Using Print Preview

17.3.1 Overview of the Print Preview

Before printing, you can check the expected print result with [20.5.2 Print Preview](#).

The print preview offers the following possibilities:

- You can scale the view of the displayed document.
- You can navigate in the document in different ways.
- You can start the document print directly from the print preview.

Related Topics

[17.3.2 Opening the Print Preview](#)

[17.3.5 Scaling a View](#)

[17.3.6 Navigating in the Print Preview](#)

[17.2.1 Starting the Printing](#)

17.3.2 Opening the Print Preview

Before opening [20.5.2 Print Preview](#), you must decide on one of the 3 basic possibilities:

- Use the print preview to check an individual data category, for example, the function settings or the single-line configuration. In this case, you mark the assigned entry in the project tree. In the case of a few data categories it is necessary to have the data displayed in the working area. More information about this can be found in the respective topic descriptions in this Help.
- You want to check a number of data categories or all data from a SIPROTEC 5 device with the print preview. In this case you mark the name of the SIPROTEC 5 device concerned in the project tree.
- You want to check a number of data categories or all data from the current project with the print preview. In this case you mark the project name in the project tree.

Checking Individual Data Categories with the Print Preview

- ✧ Mark the assigned entry in the [3.1.2 Project Tree](#) or open the data in the working area.
- ✧ Click **Print preview** in the **Project** menu.

The [20.6.22 Print Preview](#) dialog opens.

- ✧ Use this dialog to select a document layout and the properties. You find more information about this under [17.3.4 Selecting Preview Options](#).
- ✧ Click **Preview**.

The **Print preview** dialog closes. The print preview is displayed in the working area.

Checking the Data from a SIPROTEC 5 Device or the Project with the Print Preview

- ✧ Mark the project name or a device name in the project tree.
- ✧ Click **Print Preview** in the **Project** menu.

The [20.6.22 Print Preview](#) dialog opens.

- ✧ Determine the preview scope with this dialog. You find more information about this under [17.3.3 Determining the Preview Scope](#).
- ✧ Use this dialog to select the document layout and the properties. You find more information about this under [17.3.4 Selecting Preview Options](#).
- ✧ Click **Preview**.

The **Print preview** dialog closes. The print preview is displayed in the working area.

Related Topics

- ✧ [17.3.1 Overview of the Print Preview](#)
- ✧ [17.3.5 Scaling a View](#)
- ✧ [17.3.6 Navigating in the Print Preview](#)

17.3.3 Determining the Preview Scope

If you want to print a number of data categories or all data from a SIPROTEC 5 device or from the project, you can determine the preview scope. For this, you can use the dialog [20.6.22 Print Preview](#). This is displayed when you marking the project name or a device name in the [3.1.2 Project Tree](#) and then click **Print Preview** in the **Project** menu.

Determining the Preview Scope for Project Data

- ✧ Click **Print preview** in the **Project** menu.
- The [20.6.22 Print Preview](#) dialog opens.
- ✧ The **Document layout** area, enables you to select the **Document information** template and the options to select cover page and table of contents for printing. Select the desired information.
 - ✧ The **Properties** area, enables you to select the entire data or the compact data for printing
 - ✧ Click **Preview**.

The **Print preview** dialog closes. The print preview is displayed in the working area.

Related Topics

- ✧ [17.3.1 Overview of the Print Preview](#)

17.3.4 Selecting Preview Options

Before the print preview is started, select the document layout and the properties. For this, you can use the dialog [20.6.22 Print Preview](#).

This dialog is displayed after one of the following actions:

- You have marked an individual data category in the project tree and then clicked **Print preview** in the **Project** menu.
- You have marked the data in the working area and then clicked **Preview** in the **Project** menu.
- You have predefined the preview scope with the dialog [20.6.22 Print Preview](#) and then clicked **Preview**.

Setting up a Document for Print Preview

- ✧ Click **Print preview** in the **Project** menu.
- The [20.6.22 Print Preview](#) dialog opens.
- ✧ Select a document information template for the print preview. In order to do so, click the **Document information** list box.

An additional selection dialog is displayed.

- ✧ The template-list box contains the templates available for the selected category. The name, paper type, and orientation are displayed for every template.
- ✧ Mark the desired template in this list.
- ✧ Click .

The additional selection dialog closes.

- ✧ Select a check box option **Print cover page** to print the cover page, which is stored in the selected document information.
- ✧ Select a check box option **Print table of contents** to add a table of contents to the printout.
- ✧ Under **Properties** area, select the option **All** if you wish to print all configuration data of the selected objects..
- or -
- ✧ Select **Compact** if you wish to print out an abbreviated version of the project data.
- ✧ Click **Preview**.

The **Print preview** dialog closes. The print preview is displayed in the working area.

Related Topics

- ✧ [17.3.1 Overview of the Print Preview](#)

17.3.5 Scaling a View

You can scale the view of the [20.5.2 Print Preview](#) and thus change the display size of the document. You have the following possibilities:

- You can scale the view in predefined steps.
- You can enlarge a rectangular segment of the view.
- You can dynamically scale the view.
- You can scale the view on a percentage basis.
- You can select one defined final state.



NOTE

An enlarged or smaller view has no influence on the print result.

Scaling a View in the Predefined Steps

- ✧ Click one of the 2 buttons  or  in the [20.7.34 Toolbar of the Print Preview](#) .

The document is displayed larger or smaller.



NOTE

When the maximum or minimum display size is reached, the respective button becomes inactive.

Enlarging a Rectangular Segment of the View

- ✧ Click the  button in the **Print preview** toolbar.

This enables the selection tool.

- ✧ Left-click on the document and hold the mouse button down as you drag a rectangle.
- ✧ Release the mouse button as soon as the rectangle has reached the desired size.

The marked segment in the document will be enlarged in the working area.

Scaling a View Dynamically

- ✧ Click the  button in the **Print preview** toolbar.

This enables the tool for dynamic scaling.

- ✧ Left-click on the document and hold the mouse button. If you want to make the document smaller, move the mouse towards you. If you want to make the document larger, move the mouse away from you.

The document is enlarged or made smaller in the print preview.

- ✧ Release the mouse button as soon as the document has reached the desired size.

The document is displayed in the print preview in the selected size.

Scaling a View by Percent

- ✧ Open the list box for the scaling factor in the **Print preview** toolbar.
- ✧ Select a percent value.
- or -
- ✧ Enter a whole number percent value from 10 to 800 into the text box of the list box.
- ✧ Click outside of the text box.
- or -
- ✧ Press the <Enter> button.

The document will be displayed in the selected or entered percent size.

Selecting a Defined Final State

- ✧ Open the list box for the scaling factor in the **Print preview** toolbar.
- ✧ Select one of the defined final states.

The document is displayed in the desired final state.

Related Topics

- ✧ [17.3.1 Overview of the Print Preview](#)

17.3.6 Navigating in the Print Preview

In order to get from one page of the document to the next, you have the following possibilities:

- You can display a certain page directly.
- You can display the previous or next page.
- You can display the previous or next view.
- You can move the pages vertically with the scroll bar.
- You can move the pages vertically with the hand tool.



NOTE

Please observe the difference between the previous/next page and the previous/next view. For pages, the terms **Previous** and **Next** relate to the 2 bordering pages that are located before and after the currently visible page. With views, the terms relate to the previous display process. If you navigate through a document, the sequence of the displayed pages is documented in a list. With the **Previous view** and **Next view** actions, you can navigate within this list and display the corresponding pages.

Displaying a Page Directly

- ✧ Enter a whole number in [20.7.34 Toolbar of the Print Preview](#) in the text box **Current page**. The value must be less than or equal to the maximum page count.
- ✧ Click outside of the text box.
 - or -
- ✧ Press the <Enter> button.

The selected page is displayed in the print preview.

Displaying the Previous or the Next Page

- ✧ In order to display the previous page, click the  button in the Print preview toolbar.
 - or -
- ✧ In order to display the 1st page of the document, click the  button in the Print preview toolbar.
 - or -
- ✧ In order to display the next page of the document, click the  button in the Print preview toolbar.
 - or -
- ✧ In order to display the last page of the document, click the  button in the Print preview toolbar.

Corresponding with your respective action, the appropriate page is displayed in the print preview.

Displaying the Previous or the Next View

- ✧ In order to display the previous view, click the  button in the Print preview toolbar.
 - or -
- ✧ In order to display the next view, click the  button in the Print preview toolbar.

Corresponding with your respective action, the appropriate page is displayed in the print preview.

Moving Pages Vertically with the Scroll Bar

- ✧ Click on the vertical scroll bar in the display area and hold the mouse button.
- ✧ Move the scroll bar in a vertical direction.

The document is moved corresponding to your movement in the display area.

Moving Pages Vertically with the Hand Tool

- ✧ Click the  button in the Print preview toolbar.

The button in the toolbar is marked and the mouse pointer changes into a hand symbol.

- ✧ Click on the document in the display area and hold the mouse button.
- ✧ Move the document in a vertical direction.

Related Topics

- ✧ [17.3.1 Overview of the Print Preview](#)

17.3.7 Starting the Printout

If you are satisfied with the expected print result, you can start the printout directly from [20.5.2 Print Preview](#). Before the document is printed, select a printer.

Starting a Printout and Selecting a Printer

- ✧ Click the  button in the [20.7.34 Toolbar of the Print Preview](#) .
- The [20.6.23 Print](#) dialog opens.
- ✧ Select the printer from the **Name** list box that should be used for the printout. The list contains the names of all output devices for which the respective drivers are installed.
- ✧ You can optionally click **Advanced**. The Windows standard dialog for **Print** is displayed. With this dialog, you can set up other print-specific settings or open other dialogs.
- ✧ Click **Print**.

The **Print** dialog closes and the selected data is printed.

Related Topics

- ✧ [17.3.1 Overview of the Print Preview](#)
- ✧ [17.2.3 Selecting Print Options](#)

18 Safety and Security

18.1	Windows Event Log	746
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18.1 Windows Event Log

Overview

As per the cyber security standard IEEE 1686, DIGSI 5 needs to log the security events in the Windows event log and these logs can be viewed via the **Event Viewer**. A node named **DIGSI 5** is displayed in the **Event Viewer**. A group with the name **DIGSI 5 SECAUD** is displayed under the **Groups > Local Users and Groups** node in the **Computer Management** window on your computer.

The events are logged for the following operations performed in DIGSI 5:

- Opening DIGSI 5
- Closing DIGSI 5
- Loading configuration to the device
- Loading firmware to the device
- Updating DAF (Device Attribute File) to the device
- Refreshing the device data
- Updating configuration from the target device
- Copying the online device to the project

Reading Windows Event Log Entries

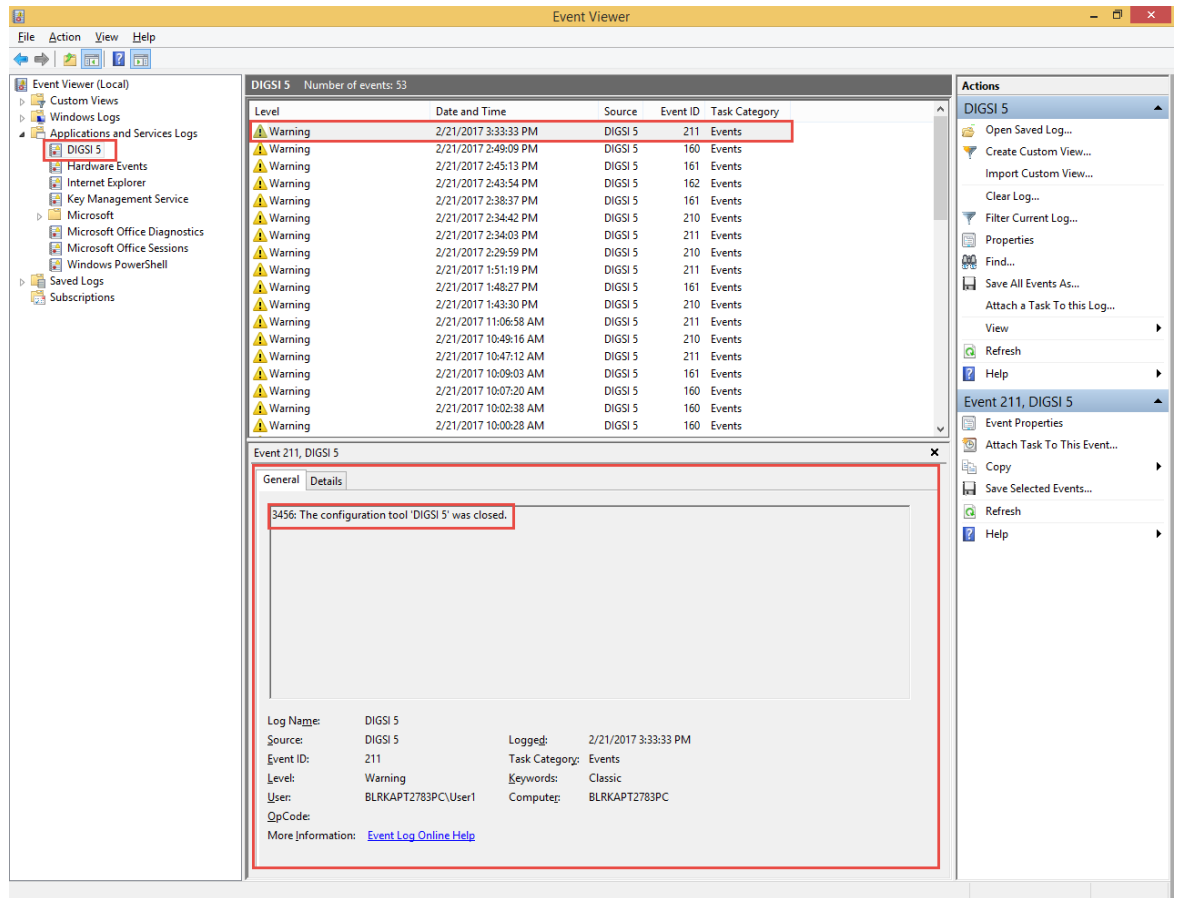
To read the entries of the Windows event log, proceed as follows:

- ✧ Click **Start > Control Panel > Administrative Tools > Event Viewer**.

- or -

- ✧ Select **Start > Run...** and enter **eventvwr** in the dialog.
- ✧ Click **OK**.

The **Event Viewer** dialog is displayed.



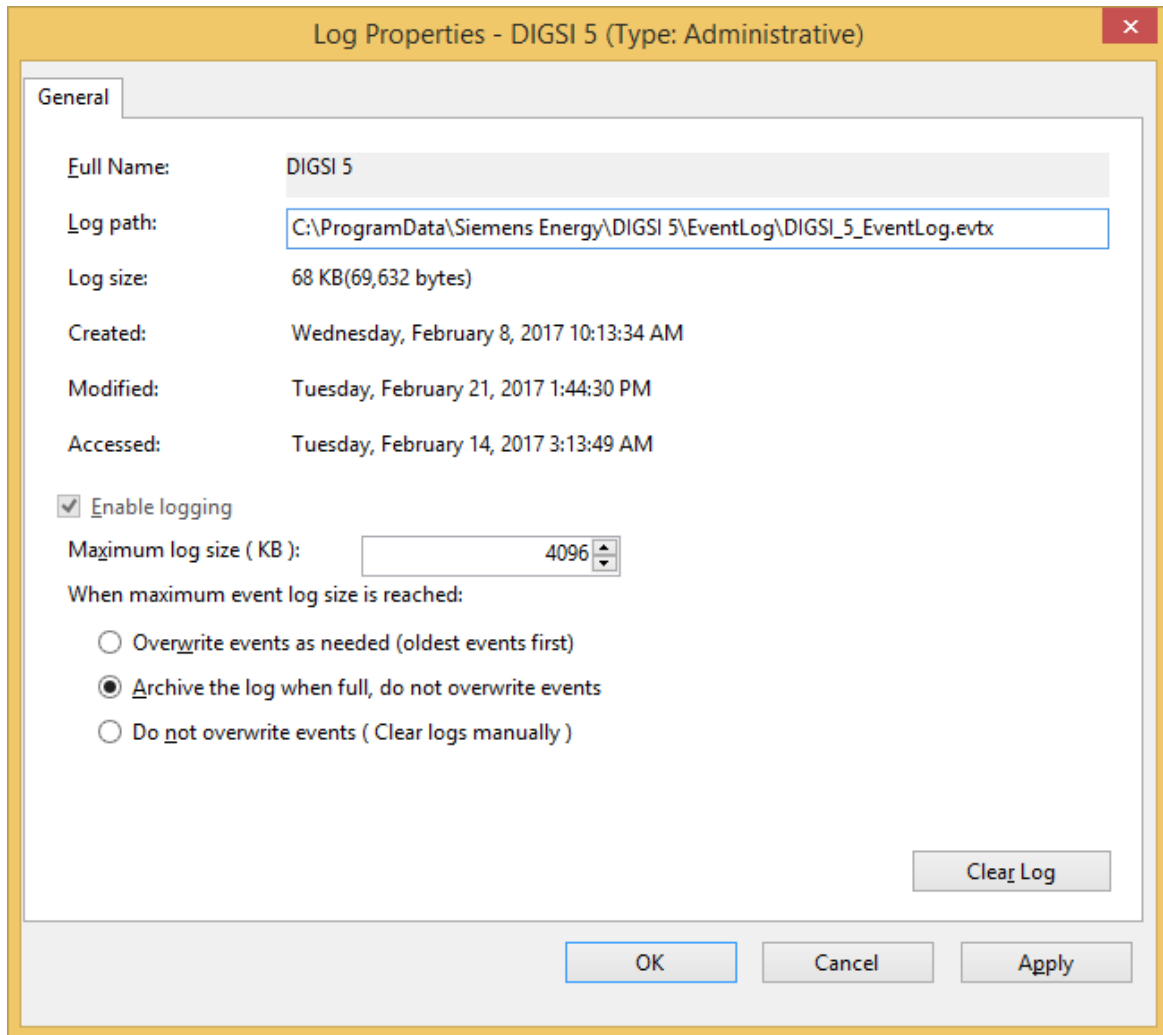
[sc_EventViewer, 1, en_US]

Figure 18-1 Event Viewer

The **General** tab displays the event properties to provide more information about the event logged. The ID displayed in the figure is the process ID of the DIGSI instance for which the event is logged.

Viewing Log Properties – DIGSI 5

- ✧ In the **Event Viewer** window, under the **Applications and Services Logs** folder, right-click the **DIGSI 5** node and select **Properties** from the context menu.
The **Log Properties - DIGSI 5** dialog is displayed.



[sc_EventViewer_Properties, 1, en_US]

Figure 18-2 Event Viewer - DIGSI 5 Log Properties

By default, the event logs are saved in the following location:

C:\ProgramData\Siemens Energy\DIGSI 5\EventLog\DIGSI_5_EventLog.evtx

The maximum log-size capacity is 4096 KB.

If the maximum log-size is reached, the option **Archive the log when full, do not overwrite events** is selected by default.

You can select the desired option as per your requirement.

18.2 Operations Safety and Access Control

The **Operations safety and access control** Editor can be used to change, activate, and deactivate the confirmation IDs and connection password for an individual SIPROTEC 5 device.

Elements and Explanations

You can find explanations for the elements of the **Operations safety and access control** Editor in the following table.

Element	Explanation
Toolbar	The 20.7.14 Toolbar of the Operations Safety and Access Control Editor allows fast access to actions and settings.
Entering Confirmation ID	
Active	The check boxes in this column are used to define whether a confirmation ID is activated or deactivated. Mark the check box to activate, and remove the marking to deactivate it.
Scope of operation	The Scope of operation describes the type of handling protected with a confirmation ID, for example, Switching (process) or Switching (unlocked) .
Action	The buttons in this column are used to open the 20.6.15 Change Confirmation ID dialog, which you can use to change the current confirmation ID.
Description	The fields in this column contain descriptions about the scope of operations.
Password for Secure Connection	
Active	The check boxes in this column are used to define whether the connection password is activated or deactivated. This button is active only after you have used the  Refresh button in the 20.7.14 Toolbar of the Operations Safety and Access Control Editor to retrieve the current status of the connection password from the SIPROTEC 5 device. As a prerequisite for this, DIGSI 5 online must be connected with the SIPROTEC 5 device. Mark the check box to activate the connection password. The 20.6.16 Change Connection Password dialog opens. You can define a new connection password in this manner. Remove the selection to deactivate the connection password. The 20.6.18 Enter Connection Password dialog opens. Enter the currently valid connection password in this dialog.
Operation type	The operation type describes the connection between DIGSI 5 and the SIPROTEC 5 device.
Action	The button in this column opens a dialog in which you can modify the current connection password. This button is active only after you have used the  Refresh button in the 20.7.14 Toolbar of the Operations Safety and Access Control Editor to retrieve the current status of the connection password from the SIPROTEC 5 device. As a prerequisite for this, DIGSI 5 online must be connected with the SIPROTEC 5 device.
Description	The field in this column contains a description of the connection password.

Linked Tabs in the Task Card

If the Security Editor is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, this is not needed for working with the Security Editor.
- [20.2.3 Libraries](#)
This tab is always displayed. However, this is not needed for working with the Security Editor.

Related Topics

[*15.8.1 Overview of Confirmation IDs and Connection Password*](#)

[*15.8.2 Opening the Operations Safety and Access Control Editor*](#)

18.3 Security Event Logging Editor

The **Security event logging** Editor provides configurable settings that enable the SIPROTEC 5 devices to log security events to the log server. Logging of security events to the server includes the creation of records and the automatical collection of data. The logging of security events can be started centrally on 1 or 2 selected protocol servers. With the help of log data, you can get a general overview of the equipment and can analyze and monitor the data. Apart from logging the safety-critical events and tracking their changes, the log data traces the attacks on the operated devices using these log data. The structure of these log data is compatible with the standard **IEC 62351-14**.

Elements and Explanations

You can find explanations for the elements of the **Security event logging** Editor in the following table.

Element	Explanation
Toolbar	The 20.7.42 Toolbar of the Security Event Logging Editor allows fast access to actions and settings.
General	
Capacity warning level at	With this text box, you can define the percentage value of the security log buffer at which a warning is logged in the device. The percentage value can be set between 5 % to 100 % at a step size of 5 %. You can set the value to 0 % if you do not want to log the warning in the device.
Connection to server A	
Enable logging	With this check box, you can enable or disable the logging of security events to the log servers. On selecting the check box option, the settings in the Configuration to server A group are enabled for configuring.
IP address	With this text box, you can enter the IP address of the log server A.
Server port	With this text box, you can enter the port number of the log server through which SIPROTEC 5 communicates with the server A.
Module port	With this list box, you can select the desired Ethernet port available in the device. It is the port of the SIPROTEC 5 device that logs the events to the server A.
Connection to server B	
Enable logging	With this check box, you can enable or disable the logging of security events to the log servers. On selecting the check box option, the settings in the Configuration to server B group are enabled for configuring.
IP address	With this text box, you can enter the IP address of the log server B.
Server port	With this text box, you can enter the port number of the log server through which SIPROTEC 5 communicates with the server B.
Module port	With this list box, you can select the desired Ethernet port available in the device. It is the port of the SIPROTEC 5 device that logs the events to the server B.

Linked Tabs in the Task Card

If the Security event logging Editor is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, this is not needed for working with the Security Editor.
- [20.2.3 Libraries](#)
This tab is always displayed. However, this is not needed for working with the Security Editor.

Related Topics

[*15.8.1 Overview of Confirmation IDs and Connection Password*](#)

[*15.8.2 Opening the Operations Safety and Access Control Editor*](#)

19 Properties

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19.1 Project

19.1.1 Project

This group contains the properties of a project.

Elements and Explanations

The following table provides explanations of the elements of the **Project** properties group.

Element	Explanation
Project	
Name	This field contains the name of the current project. You cannot change this name directly. The name changes when you save the project under another name.
Creation time	This field contains the date on which the project was created. You cannot change this date.
Last change	This field contains the date on which the project was modified. You cannot change this date directly. This data changes as soon as you save the project again.
Author	If you entered the name of an author when the project was created, it will be shown in this text box. You can modify the name of the author.
Last modified by	This field contains the user name by which you are logged on to DIGSI 5 when the change was made. You cannot change this name.
Version	You have the option of entering a version number in this text box.
Comment	If you entered a comment when the project was created, this will be shown in this text box. You can change the comment.
IEC 61850 settings	
IEC 61850 standard configRevmode	If you select this option, the NamPlt.configRev is incremented according to the IEC 61850 standard. Otherwise, it is incremented as rarely as possible (this option is relevant for the connection between SICAM PAS and the SIPROTEC 5 devices).
Export alternative descriptions	If you select this option, you can export alternative descriptions for LDs, LNs, DOIs (English text: Western Latin character set) so that the IEC 61850 System Configurator is able to replace descriptions containing non-Western Latin character set for SICAM PAS V08.05 and older versions.
Quality change-log settings	
Enable quality change log	When you activate this check-box option, the quality change of a signal will also be logged as an event in the logs of an offline configuration of a project or in the list of online accesses of a SIPROTEC 5 device.
Project history	
Event	This column displays the project creation/conversion details.
Log file	This column displays the project creation/conversion log details if applicable.
Date/time	This column displays the project creation/conversion time stamp.

Related Topics

[5.1.2 Creating a Project](#)

[2.2.3 Defining Start Settings](#)

19.1.2 IEC 61850 Station

This group contains the properties of an **IEC 61850 station**.

Elements and Explanations

The following table provides explanations of the elements of the **IEC station** dialog.

Element	Explanation
Details	
IEC station name	This text box displays the default IEC station name which is created when you add the IEC station in DIGSI 5. You can enter the desired IEC station name.
Edition	With this list box you select the edition for the IEC 61850 standard. Changing the IEC Edition is not possible if a Siemens IEC 61850 system configurator project is associated. SIPROTEC 5 devices support Edition 1 and Edition 2 of IEC 61850. To achieve complete compatibility with existing devices of Edition 1, you operate the SIPROTEC 5 device in the Edition 1 mode. If you want to use the benefits of Edition 2, for example new data objects and longer character strings, then select Edition 2. The selected edition is valid for all SIPROTEC 5 devices within the project. Edition 1 is the default setting preselected after generating a new project. Directly after selecting the protocol IEC 61850 you can confirm or change the default setting. For this purpose, the following condition must be met: You select the IEC 61850 protocol within the current project for the first time for a communication channel.
IEC 61850 station description file	This text box displays the SCD file location details.
Create new IEC 61850 station description (SCD)...	The button enables you to create a new system configurator project. If you click this button, the Create new IEC 61850 station description (SCD)... dialog opens with the Save button option to select the desired SCD file path.
	With this button, you can assign only an existing system configurator project. If you click this button, the Assign IEC 61850 station description (SCD) dialog opens with the Open button option.
OK	This button is used to accept the selection and close the dialog.
Cancel	This button is used to reject the settings and close the dialog.

Related Topics

[5.1.2 Creating a Project](#)

[14.10.6 Selecting the IEC 61850 Edition](#)

19.1.3 User Information

This group contains information about the user.

Elements and Explanations

The following table provides explanations of the elements of the **User information** group.

Element	Explanation
Author	This field contains the user name by which the creator of the object was logged on to DIGSI 5. You cannot change this name.
Created time	This field contains the date on which the object was created. You cannot change this date.
Last modified by	This field contains the user name by which you are logged on to DIGSI 5 when the change was made. You cannot change this name.
Modification time	This field contains the date on which the object was modified. You cannot change this date directly. It changes as soon as you modify the object again.
Comment	Enter a comment for the object into this text box.

Related Topics

[*5.1.2 Creating a Project*](#)

[*2.2.3 Defining Start Settings*](#)

19.2 Device and Hardware

19.2.1 Device – Details

This group contains detailed information about a SIPROTEC 5 unit.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
Name	This text box contains the name of the SIPROTEC 5 device in DIGSI 5. You can change the name.
IEC 61850 name	This text box contains the SIPROTEC 5 device name within the IEC 61850 structure. You can modify the name. The name must correspond to the IEC 61850 terminology: • The name may not be longer than 10 characters. • The 1st character must be a capital letter. • The other characters must be letters or numbers. • The name may not contain any spaces or special characters.
Type	This field contains the type of SIPROTEC 5 device, for example 7SA . You cannot change the type.
Serial number	Using the serial number, a unique connection between a real SIPROTEC 5 device and an offline configuration in DIGSI 5 is defined. As soon as you assign a SIPROTEC 5 device to an offline configuration or initialize a SIPROTEC 5 device with an offline configuration, the serial number of the SIPROTEC 5 device is entered in this text box. Alternatively, you can manually enter the serial number of the SIPROTEC 5 device into the text box.
Configuration version	This field contains the version number of the current device configuration, for example V01.00.00 . You cannot change the version number.
Product code	This field contains the long product code of the SIPROTEC 5 device. You cannot change the product code directly.

Related Topics

- [6.1.1 Overview of SIPROTEC 5 Devices](#)
- [6.1.6 Setting the On-Site Operation Panel Language](#)
- [14.3 Selecting Device IP Address for Communication](#)
- [15.1.6 Assigning a SIPROTEC 5 Device to an Offline Configuration](#)
- [15.1.3 Initializing a SIPROTEC 5 Device](#)

19.2.2 Settings

This group contains settings and actions for a SIPROTEC 5 device.

Elements and Explanations

The following table provides explanations of the elements of the **Settings** group.

Element	Explanation
Device Settings	
Edit mode	This list box is used to select one of the display modes Primary , Secondary , or Percent . Depending on your selection, all setting values will be shown as primary values, secondary values, or percentage values. Enter the values in the selected format.

Number of settings groups	With this list box, you define the number of settings groups used. The default value is 1. A SIPROTEC 5 device can manage a maximum of 8 settings groups.
Active settings group	With this list box, you define one of the settings groups as the active settings group. There are 3 ways of selecting a settings group: • Selecting an Active Settings Group Directly You can select one of the existing settings groups in DIGSI 5. Transmitting the parameter set into the SIPROTEC 5 unit activates the selected settings group. • Defining a Settings Group Using an Indication at the Binary Input In this case, an indication at a binary input will activate a certain parameter group. You then define which indication at which binary input will cause switch-over via the signal in the matrix 20.3.2 Information Routing. • Defining Using a Protocol With this alternative, a certain settings group will be activated via the system interface under the control of a telegram.
DIGSI uses the following IP address	You can use this list box to select any user-defined IP address, or the predefined IP address of the interface through which the DIGSI 5 PC is connected to the SIPROTEC 5 device. This list box can only be seen if you process the offline configuration of a SIPROTEC 5 device. The user-defined IP address entry field is activated only if you select the option Enter IP address (User defined) from the list box. If you change the IP address selection from user-defined IP address to any predefined IP address from the list box, then the user-defined IP address entry field is deactivated and set to 0 by default.
Operation-panel language	This list box is used to select the language in which the texts are to be shown in the display of the SIPROTEC 5 device. The device settings must be transmitted from DIGSI 5 to the SIPROTEC 5 device for your selection to become effective. This list box can only be seen if you process the offline configuration of a SIPROTEC 5 device.
Activate Device Functionality	
Voltage variant	With this list box you select the voltage variant that corresponds to the real SIPROTEC 5 device. For example, if you want to use for 2 SIPROTEC 5 devices an offline configuration with different supply voltages, you will change the voltage variant with this list box.
Integrated Ethernet interface (port J)	This list box is used to set the functional scope of the integrated Ethernet interface. If the new SIPROTEC 5 device is to communicate using this interface only with DIGSI 5, select Only DIGSI 5 connection . If the new SIPROTEC 5 device is also to send IEC 61850 indications using this interface, select DIGSI 5 connection and IEC 61850 reporting . To enable GOOSE communication on Port J for any non-modular devices (for example 7**82 device type), select DIGSI 5 connection and IEC 61850 inclusive GOOSE . If you downgrade the Integrated Ethernet interface (port J) value by changing the selection from DIGSI 5 connection and IEC 61850 reporting , or DIGSI 5 connection and IEC 61850 inclusive GOOSE to Only DIGSI 5 connection , the data associated with previous selection is lost. A confirmation prompt is displayed to confirm downgrade of the Integrated Ethernet interface (port J) value.
Significant feature	You can change the significant feature of the SIPROTEC 5 device using this list box. For example: The number of ends to be protected is a significant feature for line protection devices. If the current device does not have any significant features, the list box will not be active. If you downgrade the significant feature value, the data associated with previous selection is lost irrecoverably and the data related to the new selection is created. A confirmation prompt is displayed to confirm downgrade of the significant feature value.
Function-point class	With this list box you change the function-point class for a SIPROTEC 5 device. If the current number of function points is inadequate for the device application, you can purchase additional function points for the SIPROTEC 5 device. Thereafter, you will select a new function-point class from the list box.

Copy Settings Group for Device	
Source-settings group	This list box is used to select the settings group whose values are to be copied. You can only use the function if the offline configuration of the SIPROTEC 5 device contains more than one group of settings.
Target-settings group	This list box is used to select the settings group to which the values are to be added. You can only use the function if the offline configuration of the SIPROTEC 5 device contains more than one group of settings.
Copy	This button is used to start the copying procedure. The values of the settings group determined as a source are copied into the settings group determined as a target. You can only use the function if the offline configuration of the SIPROTEC 5 device contains more than one group of settings.

Related Topics

- [6.1.1 Overview of SIPROTEC 5 Devices](#)
- [8.2.2.3 Selecting between Secondary Values, Primary Values, or Percentage Values](#)
- [8.2.1.2 Changing the Number of Settings Groups](#)
- [8.2.1.3 Activating a Settings Group](#)
- [8.2.1.4 Copying a Settings Group](#)

19.2.3 Input/Output Module – Details

This group contains properties of an input/output module.

Elements and Explanations

The following table provides explanations of the elements of the **Module Information** in **Details** group.

Element	Explanation
Terminal	This field contains the names of the terminals. You cannot change these names.
User Label	If necessary enter in the text box a label for the input or output. The label is shown, for example, in the 20.3.2 Information Routing of a tool tip in the information matrix when the mouse pointer is placed on the column of the input or output.
Thresholds	With this list box, you can select the voltage for the threshold of a binary input. If a signal pending at the binary input does not reach or exceeds this threshold value, the signal is interpreted as a low or high signal.

Related Topics

- [6.3.1 Overview of the Hardware Structure](#)
- [6.3.12 Editing Hardware Component Property Values](#)

19.2.4 Current Transformer – Details

This group contains the properties of a current transformer.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
Terminal	This field contains the names of the terminals. You cannot change these names.
User label	If necessary, enter in the text box a label for the current input. The label is shown, for example, in a tool tip in the 20.3.2 Information Routing matrix when the mouse pointer is placed on the column of the current input.

Related Topics[6.3.1 Overview of the Hardware Structure](#)[6.3.12 Editing Hardware Component Property Values](#)**19.2.5 On-Site Operation Panel Base Module – Details**

This group contains properties of the on-site operation panel of a base module. The properties that are actually available depend on the on-site operation panel used.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
User label	If necessary, enter in the text box a label for the LED or function key. The label is shown, for example, in a tool tip in the 20.3.2 Information Routing matrix when the mouse pointer is placed on the column of the relevant element.
LED color	You use this list box to view the color that the LED will light up in. The LED can light up in the colors red or green .
Width	This field shows the horizontal display resolution in pixels. You cannot change this value.
Height	This field shows the vertical display resolution in pixels. You cannot change this value.

Related Topics[6.3.1 Overview of the Hardware Structure](#)[6.3.12 Editing Hardware Component Property Values](#)**19.2.6 On-Site Operation Panel Expansion Module – Details**

This group contains properties of the on-site operation panel of an expansion module. The properties that are actually available depend on the on-site operation panel used.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
User label	If necessary, enter in the text box a label for the LED. The label is shown, for example, in a tool tip in the 20.3.2 Information Routing matrix when the mouse pointer is placed on the column of the LED.

Related Topics[6.3.1 Overview of the Hardware Structure](#)[6.3.12 Editing Hardware Component Property Values](#)**19.2.7 LED Settings**

This group contains the properties of the LED.

Elements and Explanations

The following table provides explanations of the elements of the **Details - LEDs** group.

Element	Explanation

LED color	The LED can light up in the colors red or green . This list box is only available for LEDs of the on-site control unit of a basic module.
User label	If necessary, enter in the text box a label for the LED. The label is shown, for example, in a tool tip in the 20.3.2 Information Routing matrix when the mouse pointer is placed on the column of the LED.
Module	This field contains the information about the type of module in which the LED is installed, for example, the base module or expansion module. You cannot change this information.
Hardware type	This text box contains the name of the on-site operation panel in which the LED is installed. You cannot change the name.

Related Topics

- [6.3.1 Overview of the Hardware Structure](#)
- [6.3.12 Editing Hardware Component Property Values](#)

19.2.8 Binary Input – Settings

This group contains the properties of a binary input.

Elements and Explanations

The following table provides explanations of the elements of the **Settings** group.

Element	Explanation
Threshold	This field displays the threshold value of the binary input channels which are configured using the 20.5.10 Device Settings editor or 20.3.2 Information Routing editor.
Caption	If necessary enter in the text box a label for the binary input. The label is shown for example, in a tool tip in the 20.3.2 Information Routing matrix when the mouse pointer is placed on the column of the binary input.
Connection	This field contains the names of the terminals. You cannot change these names.
Module	This field contains the information about the type of module in which the binary input is installed, therefore the base module or expansion module. You cannot change this information.
Hardware type	This field contains the name of the input/output module in which the binary input is installed. You cannot change the name.

Related Topics

- [6.3.1 Overview of the Hardware Structure](#)
- [6.3.12 Editing Hardware Component Property Values](#)

19.2.9 Binary Output – Settings

This group contains the properties of a binary output.

Elements and Explanations

The following table provides explanations of the elements of the **Settings** group.

Element	Explanation
Caption	If necessary, enter in the text box a label for the binary output. The label is shown, for example, in a tool tip in the 20.3.2 Information Routing matrix when the mouse pointer is placed on the column of the binary output.
Connection	This field contains the names of the terminals. You cannot change these names.

Module	This field contains the information about the type of module in which the binary output is installed, therefore the base module or expansion module. You cannot change this information.
Hardware type	This field contains the name of the input/output module in which the binary output is installed. You cannot change the name.

Related Topics

[6.3.1 Overview of the Hardware Structure](#)

[6.3.12 Editing Hardware Component Property Values](#)

19.2.10 Function Key - parameter

This group contains the properties of a function key.

Elements and Explanations

The following table provides explanations of the elements of the **Settings** group.

Element	Explanation
User label	If necessary enter in the text box a label for the function key. The label is shown, for example, in a tool tip in the 20.3.2 Information Routing matrix when the mouse pointer is placed on the column of the function key.
Module	This field contains the information about the type of module in which the function key is installed, for example, the base module or expansion module. You cannot change this information.
Hardware type	This field contains the name of the on-site operation panel in which the function key is installed. You cannot change the name.

Related Topics

[6.3.1 Overview of the Hardware Structure](#)

[6.3.12 Editing Hardware Component Property Values](#)

19.3 Display Pages

19.3.1 Display Page – Details

This group contains detailed information about a display page.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
Name	This text box contains the current name of the display page. Enter another name for the display page if necessary. If you change the name in the text box, it will also change in the header of the display page and in the project tree. The display can only show a limited number of characters in the header. The name you assign can be longer than this. Excess characters will be truncated on the display, but still shown in the text box.
Page order	This field contains a page number which marks the position of the display page in the page sequence of all display pages. You cannot change this page number directly. Each display page automatically contains a page number. In the SIPROTEC 5 device, you can then switch between the available display pages in this defined sequence using forward and backward keys. You can modify the sequence of the display pages in the project tree. This also changes the display sequence in the SIPROTEC 5 device.
Default page	Selecting this check box defines the current display page as the standard displayed page. This automatically clears the selection in the display page previously selected as the standard page. This standard displayed page will be shown in the display when the SIPROTEC 5 device is first switched on or restarted.

Related Topics

- [6.5.1 Overview of Display Pages](#)
- [6.5.2.3 Renaming a Display Page](#)
- [6.5.2.4 Changing a Sequence of Display Pages](#)
- [6.5.2.5 Defining a Display Page as Standard Page](#)

19.3.2 Graphical Element – Details

This group contains detailed information about a graphical element.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
Element name	This text box contains the current name of the selected element. Enter another name for the element if necessary. However, the display can only show a limited number of characters of the element name. The number of displayable characters also depends on the position of the element on the display page. The name you assign can be longer than this. Excess characters will be truncated on the display, but still shown in the text box.
Signal name	This field contains the name of a connected signal, for example, Position . You cannot change the signal name. If you assign a different signal to the element, the signal name will be updated.

Signal type	This field contains the type of a connected signal, for example, Double-point indication . You cannot change the signal type. If you assign a different signal to the element, the signal type will be updated.
Signal path	This field contains the path of a connected signal, for example, SIP5_7SA85_Type_1\Application Base2010\Circuit-breaker 1\Circuit-breaker . You cannot change the signal path. You can see by the path from which device the signal originates and where you will find the signal in the signal catalog.
Connected device	If the element is connected to a signal, this field contains the name of the target device for the signal. You cannot change this name.
Default object	If this check box is marked, the element is selected when the display page is first shown in the display of the SIPROTEC 5 device. The marking of another element which was marked as a standard selected element is removed automatically by this action. The check box is only active for elements which can be selected in the display of the SIPROTEC 5 device.
Standard	This field contains the name of the currently set standard, that is, either IEC or ANSI . You cannot change this name. The selection of standard influences how elements will be displayed when inserted. However, changing the standard does not affect elements already inserted into a display page.

Related Topics

[6.5.1 Overview of Display Pages](#)

[6.5.4.1 Renaming a Graphical Element in a Display Page](#)

[6.5.3.5 Connecting Graphical Elements in a Display Page with a Signal](#)

[3.3.4 Displaying Elements According to ANSI or IEC](#)

19.3.3 Dynamic Field – Details

This group contains detailed information about a dynamic field.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
Signal name	This field contains the name of a connected signal, for example, Position . You cannot change the signal name. If you assign a different signal to the dynamic field, the signal name will be updated.
Signal type	This field contains the type of a connected signal, for example, Double-point indication . You cannot change the signal type. If you assign a different signal to the dynamic field, the signal type will be updated.
Number of decimal points	With this list box, you set the number of places behind the decimal point of the value. This list box is only active for analog signals. To change the number of decimal places, click the arrow buttons of the list box. Alternately, you can enter a value in the text box of the list box.
Display with unit	If you select this check box, not only will the analog value be shown on the display of the SIPROTEC 5 device but also its unit. This check box is only active for analog signals.
Display with angle	If you select this check box, not only will the analog value be shown on the display of the SIPROTEC 5 device but also its applicable angle. This check box is only active for measured values of zones of the distance protection.
Signal path	This field contains the path of a connected signal. You cannot change the signal path. If you assign a different signal to the dynamic field, the signal path will be updated.

Connected device	If the element is connected to a signal, this field contains the name of the target device for the signal. You cannot change this name.

Related Topics

[6.5.1 Overview of Display Pages](#)

[6.5.3.4 Inserting a Signal in a Display Page](#)

19.4 Function Charts (CFC)

19.4.1 Function Chart – General

This group contains the general properties of a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
Name	This text box contains the current name of the function-block diagram. Enter another name for the function-block diagram if necessary. If you change the name in the text box, the name also changes in the project tree.
Type	This field contains the type of the function-block diagram. The type is permanently set as CFC .
Comment	If you entered a comment when the function-block diagram was added, this will be shown in this text box. You can change the comment.
Task	With this list box, you change the currently set execution level. The execution level decides if a function will be executed cyclically or event-controlled. With the selection of an execution level, you also determine the priority in the processing of the CFC function. You can select between the following execution levels: Fast Event-Triggered Use this execution level for time-critical tasks, for example, if a signal should block a protection function within 2 ms to 3 ms. Functions on this execution level are processed in an event-controlled way with the highest priority. Each change to a logical input signal is immediately processed. The processing can disrupt the execution of a function on the Event-triggered execution level. Event-Triggered Use this execution level preferably for logical functions that need not be executed immediately. Functions on this execution level are processed within a maximum of 20 ms. Each change to a logical input signal is processed immediately but protection functions or functions on the Event-triggered fast execution level can interrupt processing. Measurement Use this execution level for the processing of measured values. Functions on this execution level are processed cyclically every 500 ms. Interlocking Use this execution level for functions that should activate a control command. Functions on this execution level are processed cyclically in the background. A CFC function fulfills a certain purpose in the application. Siemens therefore recommends only changing the execution level after precise consideration.
Version	If you entered a version number when the function-block diagram was added, this will be shown in this entry field. You can change this version number.
Author	If you entered the name of an author when the function-block diagram was added, this will be shown in this text box. You can modify the name of the author.
Optimize chart	If you highlight this check box, the function-block diagram will be included in the automatic optimization.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.3 Function Chart](#)

[12.1.2.3 Renaming a Function Chart \(CFC\)](#)

[12.1.1.6 Flow Model](#)

[12.1.6.2 Optimizing the Running Sequence Automatically](#)

19.4.2 Time Stamp

This group contains information about the timestamp of a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **Time stamp** group.

Element	Explanation
Created on	This field contains the date on which the function-block diagram was created. You cannot change this date.
Changed on	This field contains the date on which the function-block diagram was modified. You cannot change this date directly. This data changes as soon as you save the function-block diagram again.
Changed by	This field contains the user name by which you are logged on to the operating system when the change was made. You cannot change this name.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.3 Function Chart](#)

19.4.3 Sidebars/Layout

This group contains the properties of sidebars and the layout of a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **Sidebars/layout** group.

Element	Explanation
Sidebars	
Static sidebars	If you select this option, a permanent area will be reserved in the function-block diagram on the right and left. This area is exclusively for sidebar entries, for example for interconnections throughout the function-block diagram.
Dynamic sidebars	If you select this option, the sidebar entries will only be shown in the function-block diagram when necessary. A function-block diagram configured in this way differs from a function-block diagram with fixed sidebars by way of the following properties: - You can place blocks or text boxes in the sidebar area. - The sidebar area is not marked.
No sidebars	If you select this option, the function-block diagram will be displayed without margin bars. Instead, so-called connectors show the interconnections to other function-block diagrams or to operands. The connectors are placed next to the interconnected block connection. Cross-sheet interconnections are displayed as if they are on one sheet.

Double-row sidebar entries	With this check box, you select between 1-line and 2-line sidebar entries. This is how you make more space in the sidebar in the horizontal or vertical direction.
Sidebar size	With this list box, you set the width of the sidebars. This is done by clicking the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Layout	
Vertical	With this list box, you increase or reduce the number of sheets of the function-block diagram in the vertical direction. This is done by clicking the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Horizontal	With this list box, you increase or reduce the number of sheets of the function-block diagram in the horizontal direction. This is done by clicking the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Sheet size	With this list box, you select a sheet size. You can select between the formats A3 , A4 , and A5 .

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.3 Function Chart](#)

[12.1.3.3 Overview of Sidebars](#)

[12.1.3.1 Adjusting the Layout Manually in the CFC Data Flow View](#)

19.4.4 Text Box – General

This group contains the general properties of a text box in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
Layer	
Text box in the background	If you select this check box, the text box will be moved into the background. You can then position interconnections and blocks through the text box.
Background	
Background color	With this list box, you select a filling color for the text field.
Border	
Border width	This entry field contains the current line width in pixels. The default value after insertion of the text box is 0. To modify the width of the line, enter a value in the entry field.
Border color	With this list box, you can select a color for the border line.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.4.5 Adding and Editing a Text Box in a CFC in the Data Flow View](#)

19.4.5 Text

This group contains the text properties of a text box in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **Text** group.

Element	Explanation
Text	Enter the text in this text box that will appear in the text box.
Font	With this list box, you select a font for the text in the text box. The selected font applies to the entire text.
Text color	With this list box, you select a color for the text in the text box. The selected text color applies to the entire text.
Alignment	With this list box, you select an alignment of the text in the text box. The selected orientation applies to the entire text.
Font size	With this list box, you select a character size for the text in the text box. The selected character size applies to the entire text.
Wrap lines automatically	If this check box is selected, the text will be broken into lines depending on the width of the text box. If the check box is not selected, the text will be truncated if the text box is too narrow.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.4.5 Adding and Editing a Text Box in a CFC in the Data Flow View](#)

19.4.6 Block – General

This group contains the general properties of a block in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
Block-Instance Data	
Name	This text box contains a consecutively numbered default name for the block instance. Enter another name for the block instance if necessary.
Comment	You have the option of entering a comment in this text box.
Block-Type Data	
Type	This field contains the type of the block, for example, AND . You cannot change this block type.
Comment	This field contains a comment about the block that has been preset in the factory. You cannot change this comment.
Author	This field contains the user name by which you are logged on to the operating system when the insertion was made. You cannot change this name.
Version	This field contains a version number of the block that has been preset in the factory. You cannot change this version number.
Changed on	This field contains the date on which parameter values of the block were changed. You cannot change this date directly. It changes as soon as the settings change.
Created on	This field contains the date on which the block was inserted into the function-block diagram. You cannot change this date.

Changed by	This field contains the user name by which you are logged on to the operating system when the change was made. You cannot change this name.
Instruction	This field contains an instruction defined in the factory. You cannot change this instruction.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.4 Block](#)

[12.1.4.1 Block Library](#)

19.4.7 Parameters

This group contains the terminals properties of a component in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **Connections** group.

Element	Explanation
Name	This column contains the names of all block connections. You cannot change these names.
Value	This column contains the current values of all block connections. You can change these values. Click the entry field in question and enter a new value. A plausibility and syntax verification checks the value. If the value is permissible, it is accepted. Otherwise, you will receive a warning. The value will be synchronized with the value in the properties of the block connection. The values in the 2 text boxes are therefore always identical.
Unit	This column contains the units currently set for the block connections. You can change these units. This is done by clicking the cell in question. The cell changes into a list box. Select a new unit for the block connection from the list box. The unit will be synchronized with the unit in the properties of the block connection. The selected units are therefore always identical.
Type	This column contains the data types for the inputs and outputs of the block. You cannot change these data types. The following data types are possible: BOOL, BMEM, DINT, WORD, INT, REAL, and UINT.
Section	This column contains the information for each connection as to whether it is an input or an output. You cannot change this information.
Invisible	This column contains one check box for each block connection. If you select this check box, the connection will be hidden on the block. To show the block connection again, remove the selection. The check box will be synchronized with the check box in the properties of the block connection. The conditions of the 2 check boxes are therefore always identical.
For test	This column contains one check box for each block connection. If you select this check box, the connection will be taken into account during CFC tracing. The check box will be synchronized with the check box in the properties of the block connection. The conditions of the 2 check boxes are therefore always identical.
Comment	This column contains one text box for each connection. You have the option of entering a comment in this text box. The comment will be synchronized with the comment in the properties of the block connection. The contents of the 2 text boxes are therefore always identical.
Comment (type)	This field contains a comment preset in the factory. You cannot change this comment.

Related Topics

[12.1.1.1 Meaning of CFC](#)
[12.1.1.4 Block](#)

19.4.8 Invisible Interconnections

This group contains the general properties of invisible interconnections in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **Invisible Interconnections** group.

Element	Explanation
Name	This column contains the names of all invisible block connections. You cannot change these names.
Interconnection	This column contains invisible interconnections as text. For this purpose, the names of the function-block diagram, block, and connection of the interconnected partner are combined into an expression having the form: Plan name\block name.connection name . An example of this is CFC_Chart_3\AND_1.Y .
Invisible	This column contains one check box for each invisible interconnection. Because the interconnection is hidden, the check box is selected. To show the interconnection again, remove the selection.
Type	This column contains the data types for the inputs and outputs of the block. You cannot change these data types. The following data types are possible: BOOL, BMEM, DINT, WORD, INT, REAL, and UINT.
Section	This column contains the information for each connection as to whether it is an input or an output. You cannot change this information.
Comment	This column contains one text box for each connection. You have the option of entering a comment in this text box. The comment will be synchronized with the comment in the properties of the block connection. The contents of the 2 text boxes are therefore always identical.
Comment (type)	This field contains a comment preset in the factory. You cannot change this comment.

Related Topics

[12.1.1.1 Meaning of CFC](#)
[12.1.1.4 Block](#)

19.4.9 Resources

This group contains information on the resources of a component in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **Resources** group.

Element	Explanation
Ticks	This field informs you about how many ticks the block requires.
Non-volatile RAM	This field informs you about how much storage capacity the block occupies in the non-volatile RAM.
System timer	This field informs you about how many system timers the blocks requires.
Incompatible tasks	This field informs you about the incompatible tasks.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.4 Block](#)

[12.1.7.1 Checking Consistency](#)

19.4.10 Terminal – General

This group contains the general properties of a block connection in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
Instance Data	
Name	This field contains the name of the block connection. You cannot change this name.
Value	This entry field contains the current value of the block connection. You can change this value. Click the entry field and enter a new value. A plausibility and syntax verification checks the value. If the value is permissible, it is accepted. Otherwise, you will receive a warning. The value will be synchronized with the value in the properties of the block connection. The values in the 2 entry fields are therefore always identical. To the right of the entry field, there is a check box. If the value entered is valid, the selection of the check box will automatically be removed. If you select the check box again, the value of the block connection will be reset to the default value. The Value field in the Type data area shows the default value of the block connection.
Unit	With this list box, you can select a unit for the block connection. The unit will be synchronized with the unit in the properties of the block connection. The selected units are therefore always identical. To the right of the list box, there is a check box. As soon as you select a unit, the selection of the check box will automatically be removed. If you select the check box again, the unit of the block connection will be reset to the default unit. The Unit field in the Type data area shows the default value of the block connection.
Invisible	If you select this check box, the block connection will be hidden on the block. To show the block connection again, remove the selection. The check box will be synchronized with the check box in the connection properties of the block. The conditions of the 2 check boxes are therefore always identical. The Invisible check box in the Type data area shows the default value of the block connection.
For test	If you select this check box, the block connection will be taken into account in the CFC tracing. The check box will be synchronized with the check box in the connection properties of the block. The conditions of the two check boxes are therefore always identical. The For test check box in the Type data area shows the default value of the block connection.
Comment	You have the option of entering a comment in this text box. The comment will be synchronized with the comment in the connection properties of the block. The contents of the 2 text boxes are therefore always identical.
Type Data	
Type	This field contains the data type of the block connection. The following data types are possible: BOOL, BMEM, DINT, WORD, INT, REAL, and UINT.

Value	This field contains the default value of the block connection. If you insert a block into a function-block diagram, the block connection will be preset to the default value for the connection type. If the default value of the connection type changes, it will propagate the new value to the block connection in the function-block diagram. If you set parameters for the block connections, propagation of the standard value to the connection type will be interrupted. You can reactivate the propagation. This requires that you select the check box next to the Value field. The standard value of the connection instance then replaces the parameterized value again.
Unit	This field contains the default unit of the block connection. If you insert a block into a function-block diagram, the block connection will be preset to the default unit for the connection type. If the default unit of the connection type changes, it will propagate the new unit to the block connection in the function-block diagram. If you set parameters for the block connections, propagation of the standard unit to the connection type will be interrupted. You can reactivate the propagation. This requires that you select the check box next to the Unit field. The standard value of the connection instance then replaces the parameterized value again.
Invisible	The state of this check box indicates the default setting for the visibility of the block connection.
For test	The state of this check box indicates the default setting for the test of the block connection.
Comment	This field contains a comment about the block connection that has been preset in the factory.
Configurable	The state of this check box indicates the default setting for the parameterizability of the block connection.
Interconnectable	The state of this check box indicates the default setting for the interconnectability of the block connection.
Section	This field contains the information as to whether the block connection is an input or an output.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.4 Block](#)

19.4.11 Interconnection

This group contains the general properties of an interconnection in a function chart (CFC).

Elements and Explanations

The following table provides explanations of the elements of the **Interconnection** group.

Element	Explanation
Source	This field contains the source of an interconnection as text. For this purpose, the names of the function-block diagram, block, and connection of the source are combined into an expression having the form: Plan name\block name.connection name. An example for this is Chart_3\AND_1.Y.
Target	This field contains the target of an interconnection as text. For this purpose, the names of the function-block diagram, block, and connection of the target are combined into an expression having the form: Plan name\block name.connection name. An example for this is Chart_4\OR_2.X1.
Negated	If you select this check box, the target input of the interconnection will be negated. The check box is only active if the target input is of type BOOL .

Related Topics[12.1.1.1 Meaning of CFC](#)[12.1.5.1 Displaying Interconnections](#)[12.1.5.4 Negating a Block Input](#)**19.4.12 Signal – General**

This group contains the general properties of a signal.

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
Name	This field contains the path of the signal in the form Circuit-breaker 1.Spontaneous indication. Trip time [Bool] . You cannot change this path.
Data type	This field contains the data type of the signal. You cannot change this data type.

Related Topics[12.1.1.1 Meaning of CFC](#)[12.1.5.3 Interconnecting a Block with a Signal or a Setting](#)

19.5 Communication Modules and Network

19.5.1 Module Information

This group contains the general properties of a plug-in module or the integrated Ethernet interface.

Elements and Explanations

The following table provides explanations of the elements of the **Module information** as displayed in the **Details** group.

Element	Explanation
Plug-in module position	This field contains the code of the slot that is used for the module. The module slots consist of the code letters E, F, N, M, and P. The slots E, F, N, and P are provided for communication modules. The slot M is suitable for measuring-transducer modules and the arc-protection module. For the integrated Ethernet interface, the identification letter is always J. You cannot change the identification letters manually. The identification letter changes automatically as soon as you move the module to another slot.
Module name	This field contains the name of the module. Every module has a unique name, for example, ETH-BB-2FO. This name is printed on the module. For the integrated Ethernet interface, the module name is always Integrated Ethernet Interface. You cannot change the module names directly. The module name changes as soon as another module is inserted into the slot.
Module type	This field contains the module type, for example Ethernet or Serial. For the integrated Ethernet interface, the module type is always Ethernet, integrated, 1 x electric, RJ45. You cannot change the module type directly. The module type can change as soon as another module is inserted into the slot.

Related Topics

[14.1.2 Communication Modules](#)

[14.1.1 Integrated Interfaces and Slots](#)

[6.3.7 Adding a Hardware Component from the Hardware Catalog](#)

19.5.2 Serial Module - Channel x Settings

This group contains the settings for one channel of a serial communication module.

Elements and Explanations

The following table provides explanations of the elements of the **Channel 1 Settings** group.

Element	Explanation
Communication Protocols	
Selected protocol	With this list box, you select a communication protocol. Depending on the selected module, you can select the following communication protocols: • Protection Interface • IEC 60870-5-103 • DNP3 • SUP If you mark a module in the 20.2.4 Hardware Catalog tab, in the Information window you can read for which communication protocol this module is suitable. When you have selected a protocol, other settings will be displayed that you can use to configure the communication protocol to suit your requirements. The settings are summarized into the following groups: • For the protocol IEC 60870-5-103 in the group 19.6.12 IEC 60870-5-103 Settings. • For the protocol DNP3 in the group 19.6.9 DNP3 Settings. • For the protocol SUP in the group 19.6.11 SUP Settings. For the protection interface protocol, other settings will only be shown if you have selected a constellation for the protection communication with the Select constellation list box.
Default communication mapping	This list box is used to select a communication mapping. To adapt the communication mapping to your requirements, you can modify it using the 20.3.1 Communication Mapping matrix. If the list box does not offer a communication mapping, you will have to generate one yourself. This list box is only active if the IEC 60870-5-103 or DNP3 protocol has been selected. The list box is not active if the Protection interface protocol has been selected.
Protection Interface	
Select constellation	With this list box, you can select how many SIPROTEC 5 devices will participate in the communication. At least 2 devices must, and up to 6 can participate. This list box is only visible if the Protection interface protocol has been selected. If you have selected a constellation, other settings will be displayed, with which you can configure the protection interface to suit your requirements. The settings are summarized into the following groups: • 19.6.4 Device Combination Settings Group • 19.6.5 Protection-Interface Settings Group • 19.6.6 Protection Interface 1 Settings Group • 19.6.7 Fallback Times for Priority Levels Group • 19.6.8 HDLC Loop Test Settings Group

Related Topics

[14.1.2 Communication Modules](#)

[14.1.3 Communication Using Protection Interfaces](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.9.1 Overview of Communication Mapping](#)

19.5.3 Ethernet Module – Channel x Settings

This group contains the settings for one channel of an Ethernet communication module.

Elements and Explanations

The following table provides explanations of the elements of the **Channel 1 settings** group.

Element	Explanation
Network Protocols	
DCP	With this check box, you activate or deactivate the DCP network protocol. The Discovery and Configuration Protocol (DCP) is used for automatic recognition of devices without a configured IP address. Using DCP, DIGSI 5 can find all existing SIPROTEC 5 devices in the local network.
SNMP	With this check box, you activate or deactivate the SNMP network protocol. After you have selected the check box, other settings will be displayed, which you can use to configure the network protocol according to your requirements. The settings are summarized into the 19.6.1 SNMP Settings group. The Simple Network Management Protocol (SNMP) is used for network monitoring. SIPROTEC 5 devices employ special variables for network supervision that can be used to monitor the network continuously. These data are accessible as MIB files.
SNTP	With this check box, you activate or deactivate the SNTP network protocol. After you have selected the check box, other settings will be displayed which you can use to configure the network protocol according to your requirements. The settings are summarized into the 19.6.2 SNTP Settings group. The Simple Network Time Protocol (SNTP) synchronizes the date and time in a network. This requires a timer that provides the valid date and valid time. The connected devices access this timer over the network and set their clocks accordingly.
SUPEther	With this check box, you activate or deactivate the SUPEther network protocol. If you activate this check box, the function named RTD-box Mb.TCPx is added by default under Analog units in the project tree, where x stands for the instance number. You can view the relevant function settings by opening the function in the working area. The Slave Unit Protocol via Ethernet (SUPEther) is used for communication between RTD-box and SIPROTEC 5 device.
IEEE 1588	With this check box, you can activate or deactivate the IEEE 1588 network protocol. The IEEE 1588 protocol is used for time synchronization through network communication. IEEE 1588 is available in all Ethernet communication modules as a time receiver (slave only clock, one-step, two-step). Runtimes and operating times in the components are transmitted within the protocol. These correction times can be considered in the end device to improve the time synchronization of the end devices.
Network Redundancy Protocols	
RSTP	With this list box, you activate or deactivate the RSTP network protocol. After you have selected the check box, other settings will be displayed, which you can use to configure the network protocol according to your requirements. The settings are summarized into the 19.6.3 RSTP Settings group. The Rapid Spanning Tree Protocol (RSTP) enables the construction of Ethernet networks with a ring topology. If one device or one connection fails in the ring, the protocol ensures that the 2 parts of the broken ring continue to be available for undisturbed data exchange.

Communication Protocols	
Selected protocol	With this list box, you select the communication protocol that is used for data exchange with substation automation or a data concentrator. You can select the following communication protocols: • IEC 61850-8-1 • DNP3 Ethernet • IEEE37.118PMU • IEC 60870-5-104 • Modbus TCP • PROFINET IO Based on the selection, the respective settings are displayed. They can be used to configure the communication protocol according to your requirements. The settings are summarized into the following groups: • For the DNP3 protocol in the group 19.6.10 DNP3 Ethernet Settings • For the IEEE37.118PMU protocol in the group 19.6.16 PMUx • For the IEC 60870-5-104 protocol in the group 19.6.13 IEC 60870-5-104 Settings. • For the Modbus TCP protocol in the group 19.6.14 Modbus TCP.
Default communication mapping	This list box is used to select a communication mapping. To adapt the communication mapping to your requirements, you can modify it using the 20.3.1 Communication Mapping matrix. If the list box does not offer a communication mapping, you will have to generate one yourself. The list box will only be active if you have selected a communication protocol.

Related Topics

[14.1.2 Communication Modules](#)

[14.5.2 Selecting and Configuring Network Protocols](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.9.1 Overview of Communication Mapping](#)

19.5.4 Ethernet Addresses

This group contains the Ethernet addresses of an Ethernet communication module or the integrated Ethernet interface.

Elements and Explanations

The following table provides explanations of the elements of the **Ethernet addresses** group.

Element	Explanation
Interface Connected with	
Subnet	With this list box, you can select a subnetwork for the interface. If you want to disconnect an interface from a subnetwork, select Not connected .
Add new subnet	With this button, you create a new subnetwork. If the interface is not connected to a subnetwork, the new subnetwork is automatically connected to the interface. The name of the new subnet is entered in the Subnet list box.
IP Protocol	
IP protocol is used	With this check box, you activate or deactivate the IP protocol for the interface. After you have selected the check box, further settings will be displayed, with which you can configure the IP protocol to suit your requirements.

Use the following IP address	If you select this option, you can set the IP address of the interface yourself or have it set by DIGSI 5. You can then also set the subnet mask and the router address yourself. Alternately, you can select the Obtain an IP address automatically (from a DHCP server) option.
IP address	This text box contains the IP address for the interface. The text box is only active if you have selected the Use the following IP address option. The entry field is always preset to a default IP address after you have added the communication module. If you connect the interface with a subnet, the IP address will be checked for uniqueness within the subnetwork. If the IP address is already assigned, the IP address will be modified automatically. You can also modify the IP address manually in the entry field. If the interface is connected with a subnetwork, the IP address you entered will be checked for uniqueness within the subnetwork. If the IP address is already assigned, this will be indicated to you. In this case, you must change the IP address. The IP addresses have the format x.y.y.x (x = 1 to 254, y = 0 to 254). At the same time, it must be noted that not every possible combination is permissible within the range of value. Impermissible combinations will be indicated to you.
Subnet mask	This text box contains the subnetwork mask. The text box is only active if you have selected the Use the following IP address option. 2 stations communicating with one another can use the subnetwork mask to determine whether they are located in the same subnetwork or in different subnetworks. This requires that the IP addresses have been assigned consistently. This entry field is always preset to a default subnetwork mask after you have added the communication module. You can modify the subnetwork mask manually. If the subnetwork mask is already assigned, this will be indicated to you. In this case, you must change the subnetwork mask. Subnetwork masks have the format x.y.y.z (x = 1 to 255, y = 0 to 255, z = 0 to 254). At the same time, it must be noted that not every possible combination is permissible within the range of value. Impermissible combinations will be indicated to you.
Use IP router	If you require a router for communication with other networks, select this check box. This activates the Router Address text box. The check box is only active if you have selected the Use the following IP address option.
Router address	This entry field contains the IP address of the router, which is to be used for communication. The router connects different subnetworks. In the entry field, enter the IP address of the station that will function as the router. The entry field will only be active if you have selected the Use IP router check box. The IP addresses have the format x.y.y.x (x = 1 to 254, y = 0 to 254). At the same time, it must be noted that not every possible combination is permissible within the range of value. Impermissible combinations will be indicated to you.
Obtain an IP address automatically (from DHCP server)	If you select this option, the communication module will obtain the IP address from a DHCP server. For additional information, refer to Obtaining an Ethernet Address from the DHCP Server, Page 540 . As an alternative, you can select the Use the following IP address option.

Related Topics

[14.1.2 Communication Modules](#)

[14.2.5 Connecting an Interface to an Existing Subnetwork](#)

[14.2.7 Manually Creating a Subnetwork](#)

[14.2.9 Setting Ethernet Addresses](#)

19.5.5 Settings of the Ethernet Interface

This group contains the properties of the integrated Ethernet interface.

Elements and Explanations

The following table provides explanations of the elements of the **Ethernet-interface settings** group.

Element	Explanation
Network Protocols	
DCP	With this check box, you activate or deactivate the DCP network protocol. The Discovery and Configuration Protocol (DCP) is used for automatic recognition of devices without a configured IP address. Using DCP, DIGSI 5 can find all existing SIPROTEC 5 devices in the network.
SNTP	With this check box, you activate or deactivate the SNTP network protocol. After you have selected the check box, other settings will be displayed, which you can use to configure the network protocol according to your requirements. The settings are summarized into the 19.6.2 SNTP Settings group. The Simple Network Time Protocol (SNTP) synchronizes the date and time in a network. This requires a timer that provides the valid date and valid time. The connected devices access this timer over the network and set their clocks accordingly.
IEEE 1588	With this check box, you can activate or deactivate the IEEE 1588 network protocol. The IEEE 1588 protocol is used for time synchronization through network communication. IEEE 1588 is available in all Ethernet communication modules as a time receiver (slave only clock, one-step, two-step). Runtimes and operating times in the components are transmitted within the protocol. These correction times can be considered in the end device to improve the time synchronization of the end devices.
Communication Protocols	
IEC 61850-8-1	With this check box, you activate or deactivate the IEC 61850-8-1 communication protocol for the integrated Ethernet interface. This check box is only visible if you have selected the setting DIGSI 5 connection and IEC 61850 reports in the 20.6.5 Add New Device dialog.
MBSUPEther	With this check box, you activate the MBSUPEther network protocol. If you activate this check box, the function named RTD-box Mb.TCPx is added by default under Analog units in the project tree, where x stands for the instance number. You can view the relevant function settings by opening the function in the working area. The Slave Unit Protocol via Main Board Ethernet (SUPEther) is used for communication between the RTD-box (Temperature-relays which measure the temperature of up to 12 sensors and provide the data at an Ethernet interface for external evaluation) and the SIPROTEC 5 device.

Related Topics

[14.1.1 Integrated Interfaces and Slots](#)

[14.5.2 Selecting and Configuring Network Protocols](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.5.6 Subnet – Details

This group contains the properties of a subnet.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Element	Explanation
Name	This text box contains the current name of the subnetwork. Enter another name for the subnetwork, if required.
Utilized bandwidth	This bar shows the utilization rate of the communication channel in the worst case scenario.

Related Topics

[*14.2.8 Renaming a Subnetwork*](#)

[*14.2.7 Manually Creating a Subnetwork*](#)

19.6 Communication and Network Protocol

19.6.1 SNMP Settings

This group contains the properties for SNMP (Simple Network Management Protocol).

Elements and Explanations

The following table provides explanations of the elements of the **SNMP settings** group.

Element	Explanation
UDP port for SNMP agent	Select the number of the UDP port using this list box. Via the selected UDP port, a SIPROTEC 5 device SNMP client retrieves the data that is made available via the SNMP protocol. To change the UDP Port, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.2 Selecting and Configuring Network Protocols](#)

19.6.2 SNTP Settings

This group contains the properties for SNTP (Simple Network Time Protocol).

Elements and Explanations

The following table provides explanations of the elements of the **SNTP Settings** group.

Element	Explanation
Time source 1	Enter the IP address of the 1st SNTP timer in this text box.
Time source 2	Enter the IP address of the 2nd SNTP timer in this text box.
Time interval	With this list box, you select the time interval between 2 queries to the SNTP timer. You set the time interval in milliseconds.
Start time	With this list box, you set the delay for the first query to the SNTP timer. You set the delay in milliseconds. The delay starts as soon as the communication module is ready for operation. After the delay has elapsed, the communication module makes the first query to the SNTP timer.

Related Topics

[14.6.1 Overview of Time Synchronization](#)

[14.1.5 Protocols and Standards](#)

[14.5.2 Selecting and Configuring Network Protocols](#)

19.6.3 RSTP Settings

This group contains the properties for RSTP (Rapid Spanning Tree Protocol).

Elements and Explanations

The following table provides explanations of the elements of the **RSTP settings** group.

Element	Explanation

Bridge hello time	You use this list box to set the Bridge hello time monitoring time in seconds. If the communication module does not receive a test telegram within this monitoring time 3 times in succession, the connection is considered disturbed. To change the time value, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Bridge priority	With this list box, you select the priority for the switch integrated into the communication module. Each switch in the ring has a certain priority that is set identically for all switches by default. The set priority will be connected with the MAC address of the communication module so that in any case different priorities will result within the ring. The lowest priority determines the logical disconnection of the ring. There, the telegrams are taken out of the ring. The highest priority, identified by the value 0, marks the root switch. If telegrams are extracted or injected there, both logical lines must be of identical length. To change the priority, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box. You can only enter the following values: 0, 4096, 8192, 12 288, 16 384, 20 480, 24 576, 28 672, 32 768, 36 864, 40 960, 45 056, 49 152, 53 248, 57 344, and 61 440.
Bridge identifier	With this list box, you can select a value for the bridge identifier. With bridge identifiers, you can determine the position of alternate switches. To change the bridge identifier, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Bridge max. age time	With this list box, you set a time interval in seconds. If this time interval has elapsed, telegrams that are older than the time interval are removed from the network. To change the time interval, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Bridge forward delay	With this list box, you set a time interval in seconds within which the interfaces of the communication module will remain in one of the states discarding, learning, and forwarding. To change the time interval, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Port priority port 1/2	With these list boxes, you select the priority for each interface of the communication module. This priority will be connected with the interface number so that in any case different priorities will result within the ring. To change the priority, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Auto edge port 1/2	This list box is used to select a setting for the Auto Edge Ports 1 and 2. If the on setting is selected, you report the automatic transition of a port into Edge-Port state if no RSTP telegrams are received. Then after the fixed migration time of 3 secs, the ports go into the forwarding state. The selection of the on setting hides the risk of circulating telegrams. Therefore, Siemens recommends selecting the off setting.
Transmit hold count	With this list box, you select the maximum number of configuration indications that are transmitted in the case of a special event (structure reconfiguration). The set value must be larger than the number of switches in the ring. To change the number, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.2 Selecting and Configuring Network Protocols](#)

19.6.4 Device Combination Settings

This group contains the device combination properties of the protection interface.

Elements and Explanations

The following table provides explanations of the elements of the **Device combin. settings** group.

Element	Explanation
Address of device n	With these list boxes, you select a unique address for each SIPROTEC 5 device of the device grouping. There is one list box for each SIPROTEC 5 device in the device grouping. You can select the number of SIPROTEC 5 devices with the Select constellation list box. To change the address, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box. Make sure that each address is unique. DIGSI 5 does not check the uniqueness of the address assignment.
Local device is device	With this list box, you assign a number to one of the SIPROTEC 5 devices of the device grouping. This number must not be duplicated for the SIPROTEC 5 devices of the device grouping. DIGSI 5 does not check the number assignment because the other SIPROTEC 5 devices can also be part of other projects. The SIPROTEC 5 device with number 1 is automatically always the timing master for the protection topology. To select the number of a SIPROTEC 5 device, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box. The value must be greater than the number of SIPROTEC 5 devices in the protection-interface grouping.
Lowest appearing bit rate	With this list box, you select the lowest transmission rate occurring in the device grouping between 2 SIPROTEC 5 devices. The selected transmission rate directly influences the maximum number of remote data items for which settings can be set. The transmission rate is stated in kBit/s. You can only select defined transmission rates, such as 64 kBit/s or 2048 kBit/s.
Number of Devices	With this list box, you can select the number of devices required for communication via the Protection interface protocol. The allowed range for selecting the number of devices is based on the Select constellation value defined under the Protection interface group. This option is visible only if you select the constellation value for more than 2 devices via the Select constellation list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.7.4 Configuring the Protection-Data Communication](#)

19.6.5 Protection-Interface Settings

This group contains the properties of the protection interface.

Elements and Explanations

The following table provides explanations of the elements of the **Protection interface settings** group.

Element	Explanation
Connection via	With this list box, you select the transmission rate of the protection interface. The transmission rate is entered in kBit/s. You can select a defined value, for example, 2048 kBit/s, or you can select a transmission technology, such as fiber-optic cable. This indirectly determines the transmission rate.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.7.4 Configuring the Protection-Data Communication](#)

19.6.6 Protection Interface 1 Settings

This group contains the properties of the protection interface.

Elements and Explanations

The following table provides explanations of the elements of the **Prot. Interf. 1 settings** group..

Element	Explanation
Mode	With this list box, you define whether the protection interface will be activated or deactivated.
Max. error rate per hour	With this list box, you select a limit value for the maximum permissible hourly error rate for data transmission. The maximum permissible error rate is entered as a percentage. The error rate is calculated in 2 stages: • The data telegrams sent and received with an error are counted within a period. • The result is put into relation with the maximum number of data telegrams and extrapolated for one hour. If the calculated value exceeds the set limit, the Max. error rate per hour indication will be generated. To change the value for the maximum permissible error rate, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Max. error rate per min	With this list box, you select a limit value for the maximum permissible per-minute error rate for data transmission. The maximum permissible error rate is entered as a percentage. The error rate is calculated in 2 stages: • The data telegrams sent and received with an error are counted within a period. • The result is put into relation with the maximum number of data telegrams and extrapolated for one minute. If the calculated value exceeds the set limit, the Max. error rate per min indication will be generated. To change the value for the maximum permissible error rate, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Disturbance alarm after	With this list box, you can select the delay for a failure indication in milliseconds. After this delay has elapsed, erroneous and missing data telegrams will be reported as disturbed. For this purpose, the Control interface failure indication will be generated. To change the value for the delay, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Transm. fail. alarm after	With this list box, you can select the delay for a failure indication. After this delay has elapsed, a failure of communication will be reported. For this purpose, the Protection Interface Failure indication will be generated. The delay is stated in seconds. To change the value for the delay, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Delay time threshold	With this list box, you can select a value for the signal-propagation time threshold. The signal-propagation time threshold is stated in milliseconds. The signal-propagation time threshold is the maximum permissible propagation time of a data telegram from transmission to reception. The propagation time of a data telegram has a direct influence on the tripping time of a differential protection unit. If the propagation time exceeds the set signal-propagation time threshold, the Propagation Time Exceeded indication will be generated. To change the value for the signal-propagation time threshold, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.

PPS synchronization	With this list box, you select a setting for the pulse-per-second synchronization. In this way, you define whether an external synchronization pulse will synchronize the protection interface communication. For example, a GPS receiver can provide this synchronization pulse. If no synchronization pulse is available, select the PPS sync. off setting. If a synchronization pulse is used, select either telegr. and PPS or telegr. or PPS .

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.7.4 Configuring the Protection-Data Communication](#)

19.6.7 Fallback Times for Priority Levels

This group contains the fallback times for priority levels as properties of the protection interface.

Elements and Explanations

The following table provides explanations of the elements of the **Fallback times for priorities** group.

Element	Explanation
Remote data prio. 1, 2, 3	This list box is used to set a fallback time for each priority level. The fallback time is started when the protection connection is interrupted. After the fallback time has elapsed, the values of the signals received which are routed to the relevant priority level, are set to a configurable fallback value. To change the value for the fallback times, click the arrow buttons of the list boxes. Alternatively, you can enter a value in the relevant text box of the list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.7.4 Configuring the Protection-Data Communication](#)

[14.7.5 Mapping Signals for Protection Interface](#)

19.6.8 HDLC Loop Test Settings

This group contains the HDLC properties of the protection interface.

Elements and Explanations

The following table provides explanations of the elements of the **HDLC Loop Test Settings** group.

Element	Explanation
Baud rate	With this list box, you select a maximum baud rate. This corresponds to the transmission rate with which the loop test is started. If the loop test is not successful at this baud rate, a further attempt will be made with a lower baud rate. This procedure is repeated until the loop test has been successfully run or the starting value of the baud rate has been reached again. The baud rate is stated in baud. You can only select defined baud rates, for example, 4800 baud or 38 400 baud.
Act. HDLC clock recovery	With this list box, you select whether the loop test is to be performed with or without timing recovery.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.7.4 Configuring the Protection-Data Communication](#)

19.6.9 DNP3 Settings

This group contains the properties for the **DNP3** protocol.

Elements and Explanations

The following table provides explanations of the elements of the **DNP3 settings** group.

Element	Explanation
Slave address	This list box is used to select the device address of the SIPROTEC 5 device. To change the device address, click the arrow keys of the list box. Alternatively, you can enter an address in the range 1 to 65 535 in the text box of the list box.
Master address	With this list box, you select the address of the communication master. To change the master address, click the arrow buttons of the list box. Alternately, you can enter an address in the range 1 to 65 535 in the entry field of the list box.
Baud rate	With this list box, you select the transmission rate between the SIPROTEC 5 device and the substation automation. This is the transmission rate at which connection is first attempted. If this connection attempt is not successful, a further attempt will be made at a lower baud rate. This process is repeated until a connection has been successfully established or the start value of the baud rate has been reached again. The transmission rate is stated in baud. You can only select defined transmission rates, for example, 4800 baud or 38 400 baud.
Data bit	With this list box, you select the number of data bits. Data bits are the useful data (characters) in data transmission. For the DNP3 protocol, you must set 8 data bits. To change the number of data bits, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Stop bit	With this list box, you select the number of stop bits. Stop bits enable the receiver to synchronize with each transmitted character in asynchronous serial data transmission. The communication module supports 1 stop bit and 2 stop bits. To change the number of stop bits, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Parity	With this list box, you can select a value for the parity. The parity check is used to detect errors in transmitted bit sequences. For this purpose, a 0 or a 1 is added to the bit sequence to make the number of bits with the value 1 always even or always odd. You can select between an even and an odd number. If you do not wish to use a parity check, select None .
Light idle state (on/off)	With this list box, you select the state of the light in a fiber-optic connection that corresponds to the idle state (zero-voltage state) of the electrical signal.
Time zone	With this list box you select one of the time zones Local or UTC and thus the type of time synchronization. A DNP3 Master (serial) or DNP3 Client (Ethernet) can synchronize the SIPROTEC 5 device using the local time or the coordinated world time. If you select UTC, the SIPROTEC 5 device will convert the coordinated world time into a local time.

Superv.time com. failure	With this list box you set the connection supervision time. If the DNP3 Master or the DNP3 Client within this connection supervision time, cannot access the SIPROTEC 5 device, the SPIROTEC 5 device will generate an error message because of communication failure. To change the connection supervision time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Link retries	With this list box, you select the number of transmission attempts. If the communicating partner does not transmit a confirmation within the time interval Link acknowledgment timeout, a confirmation is not sent and a transmission is attempted again. To change the number of attempts, click the arrow buttons of the list box. Alternatively, you can enter a number in the text box of the list box.
Link confirm. required	This list box is used to select datasets in response to which the communicating partner will transmit confirmation. You can select from among the following options: • not for any frame • multiframe fragment • all frames
Link confirm. time-out	With this list box, you set the time interval during which the SIPROTEC 5 device is to wait for acknowledgment from the communication partner. The time interval is stated in milliseconds and starts with the transmission of the last byte. After the time interval has elapsed, the SIPROTEC 5 device transmits the last data record again. For this purpose, the following conditions must be met: • In the Link confirm. required list box, you must have selected one of the options multiframe fragment or all frames. • The maximum number of transmission attempts must not have been reached yet. To change the value for the time interval, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Appl. confirm. required	This list box is used to define the event for which the application layer will transmit an acknowledgment. You can select one of 2 options: • Event-Data Message The application layer transmits an acknowledgment if the messages contain change data. • Non-Final Fragments The application layer transmits an acknowledgment if telegrams of divided datasets are not the end of the dataset.
Appl. confirm. time-out	This list box is used to select the time interval within which the communication partner waits for confirmation of the previous acknowledgment. The time interval starts after transmission of the last byte. If you use the Appl. confirm. required option together with the Link confirm. required option, adjust the length of the time interval. Set the time interval in such a way that all transmissions can be completed. The following formula will help you select a suitable value: Appl. confirm. required > Link confirm. required * (Link retries +1)
Time sync. required	This list box is used to set a delay after which the internal Time synchronization required indication will be set. This indication signals to the master that it must resynchronize the time with the slave. The delay is stated in ms. The SIPROTEC 5 device transmits the value set here to the master with each feedback. If you set the value 0, the internal Time synchronization required indication will never be set. The master will therefore not perform time synchronization. To change the value for the time delay, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.

Time betw. sel. switch	With this list box, set the time interval within which a command has to be selected and executed. The time interval is stated in milliseconds. To change the value for the time interval, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Enable unsolicited trans	With this list box, you select a setting for unrequested transmission. You can select one of 2 options: • Off Unrequested transmission is not permitted. The master cannot activate this. • On Unrequested transmission is permitted. The master must permit this after the first unrequested response. The 4 parameters described below are only relevant if you select the on option.
Unsolicited events class 1/2/3	With these list boxes, you set a number of events separately for each class. If the number of events exceeds the set value within a class, an unrequested response will be transmitted. This parameter is a condition for the transmission of unrequested responses. You only have to set this parameter if you have selected the on option for the unrequested transmission.
Unsolicited time class 1/2/3	These list boxes are used to set a time value in ms separately for each class. If the elapsed time after an event matches this value or exceeds this value, a response will be transmitted unrequested. This parameter is a condition for the transmission of unrequested responses. You only have to set this parameter if you have selected the on option for the unrequested transmission. To change the time value, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Unsolicited retry	With this list box, you select the number of transmission attempts for unrequested responses. Transmission is attempted again if no unrequested response is transmitted within the time to unrequested transmission. To change the number of attempts, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Unsolic. confirm. time-out	This list box is used to set the time interval in milliseconds during which the SIPROTEC 5 device is to wait for acknowledgment of the unrequested response. The time interval starts after transmission of the last byte. After the time interval has elapsed, the SIPROTEC 5 device transmits the unrequested response again. If the SIPROTEC 5 device has received a read query in the meantime, the read query will be answered. The unrequested response is then not transmitted. To change the value for the time interval, click the arrow buttons of the list box. Alternately, you can enter a value in the text box of the list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.6.10 DNP3 Ethernet Settings

This group contains the properties for the **DNP3** protocol for Ethernet.

Elements and Explanations

The following table provides explanations of the elements of the **DNP3 Ethernet Settings** group.

Element	Explanation

Slave address	This list box is used to select the device address of the SIPROTEC 5 device. To change the device address, click the arrow keys of the list box. Alternatively, you can enter an address in the entry field of the list box.
Master address	With this list box, you select the address of the communication master. To change the master address, click the arrow keys of the list box. Alternatively, you can enter an address in the entry field of the list box.
Connection superv. time	With this list box you set the connection supervision time. If the DNP3 Master or the DNP3 Client within this connection supervision time, cannot access the SIPROTEC 5 device, the SPIROTEC 5 device will generate an error message because of communication failure. To change the connection supervision time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Time zone	With this list box you select one of the time zones Local or UTC and thus the type of time synchronization. A DNP3 Master (serial) or DNP3 Client (Ethernet) can synchronize the SIPROTEC 5 device using the local time or the coordinated world time. If you select UTC, the SIPROTEC 5 device will convert the coordinated world time into a local time.
Link retries	With this list box, you select the number of transmission attempts. If the communicating partner does not transmit a confirmation within the time interval Link confirm. time-out , a confirmation is not sent and a transmission is attempted again. To change the number of attempts, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Link confirm. required	With this list box, you select datasets in response to which the communicating partner will transmit confirmation. You can select from among the following options: • Not for any frame • Multiframe fragment • All frames
Link confirm. time-out	With this list box, you set the time interval during which the SIPROTEC 5 device is to wait for acknowledgment from the communication partner. The time interval is stated in milliseconds and starts with the transmission of the last byte. After the time interval has elapsed, the SIPROTEC 5 device transmits the last dataset again. For this purpose, the following conditions must be met: • In the Link confirm. required list box, you must have selected one of the options Multiframe fragment or All frames. • The maximum number of transmission attempts must not have been reached yet. To change the value for the time interval, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Appl. confirm.required	This list box is used to define the event for which the application layer will transmit an acknowledgment. You can select one of 2 options: • Event-Data Message The application layer transmits an acknowledgment if the messages contain change data. • Not end-of-message The application layer transmits an acknowledgment if telegrams of divided datasets are not the end of the dataset.
Appl. confirm. time-out	With this list box, you select the time interval within which the communication partner waits for confirmation of the previous acknowledgment. The time interval starts after transmission of the last byte. If you use the Appl. confirm. required option together with the Link confirm. required option, adjust the length of the time interval. Set the time interval in such a way that all transmissions can be completed. The following formula will help you select a suitable value: Appl. confirm. required > Link confirm. required * (Link retries +1)

Time sync. required	With this list box, you set a delay after which the internal Time synchronization required indication will be set. This indication signals to the master that it must resynchronize the time with the slave. The delay is stated in ms. The SIPROTEC 5 device transmits the value set here to the master with each feedback. If you set the value 0, the internal Time synchronization required indication will never be set. The master will therefore not perform time synchronization. To change the value for the delay, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Time betw. sel. switch.	This list box is used to set the time interval within which a command has to be selected and executed. The time interval is stated in milliseconds. To change the value for the time interval, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Enable unsolicited trans.	With this list box, you select a setting for unrequested transmission. You can select one of 2 options: • Off Unrequested transmission is not permitted. The master cannot activate this. • On Unrequested transmission is permitted. The master must permit this after the first unrequested response. The 4 parameters described below are only relevant if you select the On option.
Unsolicited events class 1/2/3	With these list boxes, you set a number of events separately for each class. If the number of events exceeds the set value within a class, an unrequested response will be transmitted. This parameter is a condition for the transmission of unrequested responses. You only have to set this parameter if you have selected the On option for the unrequested transmission.
Unsolicited time class 1/2/3	With these list boxes, you set a time value in ms separately for each class. If the elapsed time after an event matches this value or exceeds this value, a response will be transmitted unrequested. This parameter is a condition for the transmission of unrequested responses. You only have to set this parameter if you have selected the On option for the unrequested transmission. To change the time value, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.
Unsolicited retry	With this list box, you select the number of transmission attempts for unrequested responses. Transmission is attempted again if no unrequested response is transmitted within the time to unrequested transmission. To change the number of attempts, click the arrow buttons of the list box. Alternatively, you can enter a number in the text box of the list box.
Unsol. confirm. time-out	This list box is used to set the time interval in milliseconds during which the SIPROTEC 5 device is to wait for acknowledgment of the unrequested response. The time interval starts after transmission of the last byte. After the time interval has elapsed, the SIPROTEC 5 device transmits the unrequested response again. If the SIPROTEC 5 device has received a read query in the meantime, the read query will be answered. The unrequested response is then not transmitted. To change the value for the time interval, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.6.11 SUP Settings

This group contains the properties for the SUP protocol. If you activate the **SUP** network protocol from the list box for **Selected protocol** under Communication protocols, the function named RTD-box Mb.ser.x is added by default under Analog units in the Project tree, where x stands for the instance number. You can view the relevant function settings by opening the function in the working area. The Slave Unit Protocol (SUP) is used for communication between the RTD-box (Temperature-relays which measure the temperature of up to 12 sensors and provide the data at an interface RS485 for external evaluation) and the SIPROTEC 5 device.

Elements and Explanations

The following table provides explanations of the elements of the **SUP settings** group.

Element	Explanation
Baud rate	With this list box, you select the transmission rate between the SIPROTEC 5 device and the substation automation. This is the transmission rate at which connection is first attempted. If this connection attempt is not successful, a further attempt will be made at a lower baud rate. This process is repeated until a connection has been successfully established or the start value of the baud rate has been reached again. The transmission rate is stated in baud. You can only select defined transmission rates, for example, 4800 baud or 38 400 baud.
Data bit	With this list box, you select the number of data bits. Data bits are the useful data (characters) in data transmission. For the DNP3 protocol, you must set 8 data bits. To change the number of data bits, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Stop bit	With this list box, you select the number of stop bits. Stop bits enable the receiver to synchronize with each transmitted character in asynchronous serial data transmission. The communication module supports 1 stop bit and 2 stop bits. To change the number of stop bits, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Parity	With this list box, you can select a value for the parity. The parity check is used to detect errors in transmitted bit sequences. For this purpose, a 0 or a 1 is added to the bit sequence to make the number of bits with the value 1 always even or always odd. You can select between an even and an odd number. If you do not wish to use a parity check, select None .
Light idle state (on/off)	With this list box, you select the state of the light in a fiber-optic connection that corresponds to the idle state (zero-voltage state) of the electrical signal.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.6.12 IEC 60870-5-103 Settings

This group contains the properties of IEC 60870-5-103.

Elements and Explanations

The following table provides explanations of the elements of the **IEC 60870-5-103 settings** group.

Element	Explanation
Slave address	With this list box, you select a device address for the SIPROTEC 5 device. To change the device address, click the arrow buttons of the list box. Alternately, you can enter an address from 1 to 254 in the entry field of the list box.

Baud rate	With this list box, you select the transmission rate between the SIPROTEC 5 device and the substation automation. This is the transmission rate at which connection is first attempted. If this connection attempt is not successful, a further attempt will be made at a lower baud rate. This process is repeated until a connection has been successfully established or the start value of the baud rate has been reached again. The transmission rate is stated in baud. You can only select defined transmission rates, for example, 4800 baud or 38 400 baud.
Data bit	With this list box, you select the number of data bits. Data bits are the useful data (characters) in data transmission. You must set 8 data bits for the IEC 60870-5-103 protocol. To change the number of data bits, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Stop bit	With this list box, you select the number of stop bits. Stop bits enable the receiver to synchronize with each transmitted character in asynchronous serial data transmission. The communication module supports 1 stop bit and 2 stop bits. You must set 1 stop bit for the IEC 60870-5-103 protocol. To change the number of stop bits, click the arrow buttons of the list box. Alternately, you can enter a number in the entry field of the list box.
Parity	With this list box, you can select a value for the parity. The parity check is used to detect errors in transmitted bit sequences. For this purpose, a 0 or a 1 is added to the bit sequence to make the number of bits with the value 1 always even or always odd. You can select between an even and an odd number. If you do not wish to use a parity check, select none.
Light idle state (on/off)	With this list box, you select the state of the light in a fiber-optic connection that corresponds to the idle state (zero-voltage state) of the electrical signal.
Protect function (on/off)	With this list box, you define whether or not the protection function can be deactivated using the protocol. If you want to prevent the protection function from being deactivated, select the off setting.
Measure. standardization	With this list box, you can select a value for the measured value scaling. If measured value scaling is used, measured values refer to 1.2 times or 2.4 times the rated value. This improves the resolution of measured values, which are always below 1.2 times the rated value.
Superv.time com.failure	With this list box, you can set the delay for an error message. If no communication is performed with a master within this time, a communication failure will be reported. For this purpose, the Communication channel failure message will be generated. The delay is stated in ms. To change the value for the time delay, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Double command feedb.	This list box specifies if a command feedback should be compatible with protocol IEC 60870-5-103 or compatible with SIPROTEC 4.
Redundancy	With this list box, you define whether or not the SIPROTEC 5 device will communicate over a redundant connection. The 6 parameters described below are only visible if you select the on option.
Redundant slot	With this list box, you select the slot of the module on which the 2nd (redundant) protocol is parameterized. In the case of a serial double module, you can also configure the protocol redundantly on the same slot on the free channel.
Redundant channel	With this list box, you select the slot of the module channel on which the second (redundant) protocol is parameterized. To change the value for the module channel, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Number of masters	With this list box, you set the number of masters. The communication module supports connection with 1 or 2 masters. To change the number, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.

Primary channel	With this list box, select the channel that is to be used first for communication. To change the value for the primary channel, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Fct.type f.channel change	With this list box, you select a function type for switchover from the primary to the redundant channel. Only commands with the selected function type can switchover the channel. After switchover, the master will transmit an indication. This indication has the same function type. To change the function type, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.
Inf.no. channel change	With this list box, you select an information number for switchover from the primary to the redundant channel. Only commands with the selected information number can switchover the channel. After switchover, the master will transmit an indication. This indication has the same function type. To change the function type, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.6.13 IEC 60870-5-104 Settings

This group contains the properties of IEC 60870-5-104.

Elements and Explanations

The following table provides explanations of the elements of the **IEC 60870-5-104 settings** group.

Element	Explanation
Redundancy	With this list box, you can select the redundancy value. All the settings for the backup master are ignored when redundancy is off.
Enable time sync	With this list box, you can determine whether the SIPROTEC 5 device expects and evaluates time synchronization from the IEC 60870-5-104 master.
Measure time stamp	With this list box, you can determine whether the measured-value events are sent with time stamp or not.
Grouped trans. time	Indicates the time for measurement transmission as a group. Single changes of measurements are stored and commonly sent out after this time. Reduce of required bandwidth. 0 = deactivate group transmission To change the value of the grouped transmission time, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Common address	Indicates the IEC 60870-5-104 station address of the SIPROTEC 5 device. To change the value of common address, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Cyclic type	Enables the selection of measured-values transmission. To change the value of the cyclic type, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Cycle time	Indicates the time for sending cyclic data. Relevant if Cyclic type is Spontan. and cyclic or All . To change the value of the cycle time, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Main master IP	Ipv4 address 0.0.0.0 means that the slave can listen and contact every IP address.

Main master port	Indicates the TCP ports to listen on. To change the value of the main master port, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Main channel t1	Indicates the ASDU reply time-out. To change the value of the main channel t1, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Main channel t2	Indicates the wait next information transmission frame (I frame) time-out. $t2 < t1$ To change the value of the main channel t2, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Main channel t3	Indicates the idle time-out. To change the value of the main channel t3, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Backup master IP	Ipv4 address 0.0.0.0 means that the slave can listen and contact every IP address.
Backup master port	Indicates the TCP ports to listen on. It should be different from the main master port. To change the value of the backup master port, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Backup channel t1	Indicates the ASDU reply time-out. To change the value of the backup channel t1, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Backup channel t2	Indicates the wait next information transmission frame (I frame) time-out. $t2 < t1$ To change the value of the backup channel t2, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Backup channel t3	Indicates the idle time-out. To change the value of the backup channel t3, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.6.14 Modbus TCP

This group contains the properties of Modbus TCP.

Elements and Explanations

The following table provides explanations of the elements of the **Modbus TCP settings** group.

Element	Explanation
Port	Indicates the TCP ports to listen on. To change the value of the port, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Connection superv. time	With this list box you can set the connection supervision time. If the connection time is expired, the SIPROTEC 5 device closes the TCP connection.
Slave address	This list box is used to select the device address of the SIPROTEC 5 device. To change the device address, click the arrow keys of the list box. Alternatively, you can enter an address in the entry field of the list box. If the address is 255, the device does not check the request address from the master.
Master IP address 1	Ipv4 address 0.0.0.0 means that the slave can listen and contact every IP address.

Master IP address 2	Ipv4 address 0.0.0.0 means that the slave can listen to and can contact with every IP address.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.6.15 PROFINET IO

This group contains the properties of PROFINET IO.

Elements and Explanations

The following table provides explanations of the elements of the **PROFINET IO settings** group.

Element	Explanation
Software revision	This read-only field displays the software revision of the protocol.
Device name	The default device name is displayed in this text box. You can enter the desired device name.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

19.6.16 PMUx

This group contains the properties for the synchrophasor protocol **IEEE37.118PMU**.

Elements and Explanations

The following table provides explanations of the elements of the **PMUx** group.

Element	Explanation
Gen. settings	
PMU ID	With this list box, you select a unique identifier for the configured PMU. If several PMUs deliver measured values to one and the same PDC, each PMU must have a unique PMU-ID. To change the PMU identifier, click the arrow buttons of the list box. Alternately, you can enter a value in the range 1 to 65534 in the entry field of the list box.
Station name	In this text box, enter a name for the PMU station (SIPROTEC 5 device). The name does not have to be unique according to the standard. However, in order to be able to differentiate the PMU stations, Siemens recommends using unique names.
Transport	With this list box, you select the PMU transmission protocol. You can select TCP or UDP . Siemens recommends TCP as transmission protocol.
Access Control list	
IP address PDC1 to PDC3	With these entry fields, you can address up to 3 different PDCs to which the measured values of the PMU are transmitted. The IP addresses have the format x.y.z.x (x = 1 to 254, y = 0 to 254). Not every possible combination is permissible within the range of value.

Wildcard mask PDC1 to PDC3	With these entry fields, you can configure a range of IP addresses in which requests are accepted. The purpose of this feature is to allow access from any device or system located in the dedicated IP networks (for example, substation or control center systems) without restricting access to the level of single devices or systems. The wildcard mask character must include the value 1 consecutively at the bit level starting from the least significant bit. • Example 1: – Valid wildcard mask entry Wildcard mask PDC IP address: 0.0.0.63 Binary equivalent: 00000000.00000000.00000000.00111111 – Invalid wildcard mask entry Wildcard mask PDC IP address: 0.0.0.43 Binary equivalent: 00000000.00000000.00000000.00101011 Based on the above example, the valid numbers can be considered as 1, 3, 7, 15, 31, 63, 127, and 255. • Example 2: – If the IP address PDC1 is 192.172.16.1 and the corresponding value of the wildcard mask PDC1 is 0.0.0.127, then the device accepts requests from IP addresses of the range 192.172.16.1 to 192.172.16.127. • Example 3: – If the IP address PDC1 is 192.172.16.100 and the corresponding value of the wildcard mask PDC1 is 0.0.0.3, then the device accepts requests from IP addresses of the range 192.172.16.100 until 192.172.16.103.
Func. settings	
Mode	With this list box, you activate or deactivate the PMU. To activate the PMU, select On . To deactivate the PMU, select Off . If you select the setting Test , you activate the PMU in test mode. In test mode, the transferred measured values are identified with a test bit.
Class	With this list box, you select the class P or the class M . The class M has a higher exactness than the class P .
Reporting rate	With this list box, you select the number of telegrams that are formed every second and transferred to the PDC. You can select in defined steps between 1 frame/s and 100 frames/s.
Only positive sequence	With this list box, you set whether the positive sequence is transferred instead of 3 individual synchrophasors for 3-phase measuring points. The setting selected here is valid for all PMUs with 3-phase measuring points connected to 1 PDC.
Customized phasor names	With this check box, you can define the names for each PMU channel. When activating this option, DIGSI 5 displays measuring points routed to this PMU within the 20.3.4 Function-Group Connections matrix. If the setting Only positive sequence is set to Yes, then one phasor name for each 3-phase measuring point will appear.

Related Topics

[14.1.5 Protocols and Standards](#)

[14.5.1 Selecting and Configuring a Communication Protocol](#)

[14.8.1 Overview of Phasor Measurement](#)

19.7 IEC 61850 Structure

19.7.1 Logical Node

This group contains the properties of a logical node (LN).

Elements and Explanations

The following table provides explanations of the elements of the **Logical node (LN)** group.

Element	Explanation
Prefix (prefix)	In this text box you can enter a prefix for the name of the logical node. The whole name of the logical node consists of 3 parts Prefix , Group and Instance .
Class (InClass)	This field contains the name of the group. You cannot change this name.
Instance (inst)	This field contains the instance number. You can change these numbers.
Hierarchical path	This field contains the hierarchical path of the logical node. The hierarchical path is equivalent to the path in the IEC 61850 tree. This path consists of the IEC 61850 name of the SIPROTEC 5 device, the name of the logical device (LD) and the name of the logical node (LN).
Overwrite	This check box is used to activate or deactivate the Custom revision text box.
Custom revision	If you have selected the Overwrite check box, you can enter a Custom revision for the logical node in this text box. In this way, you overwrite the internally assigned configuration version.

Related Topics

[10.5 Adding a Logical Node and Selecting a Class](#)

[10.1 Overview of the IEC 61850 Structure](#)

19.7.2 Logical Node Zero (LLN0)

This group contains the properties of a logical node zero (LLN0).

Elements and Explanations

The following table provides explanations of the elements of the **Logical node zero (LN0)** group.

Element	Explanation
Class (InClass)	This field contains the name of the group. The name is always LLN0 . You cannot change this name.
Hierarchical path	This box contains the hierarchical path of the logical node zero. The hierarchical path is equivalent to the path in the IEC 61850 tree. This path consists of the IEC 61850 name of the SIPROTEC 5 device, the name of the logical device (LD) and the name of the logical node zero (ILN0).
Overwrite	With this check box, you activate or deactivate the Custom revision text box.
Custom configRev	If you have selected the Overwrite check box, you can enter a user-defined configuration number for the logical node zero in this text box. In this way, you overwrite the internally assigned configuration number.

Related Topics

[10.5 Adding a Logical Node and Selecting a Class](#)

[10.1 Overview of the IEC 61850 Structure](#)

19.7.3 Logical Device (LD)

This group contains the properties of a logical device (LD).

Elements and Explanations

The following table provides explanations of the elements of the **Logical device (LD)** group.

Element	Explanation
Instance name (IdInst)	This text box contains the instance name of the logical device, for example, Application or CTRL . Enter another instance name if necessary.
Communication name (IdName)	Optionally you can enter a name for the logical device in this text box which is transmitted when communicating with other devices. The name must be unique within the subnetwork. You can use this option especially if you want to adjust the IEC 61850 name to the terminology used in your company. If not entering a name, a unique communication name is automatically generated. This communication name is the chaining from the device name and the name of the logical device.

Related Topics

[10.1 Overview of the IEC 61850 Structure](#)

19.8 Documentation

19.8.1 Document - General

This group contains the general properties of a document template.

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
Document	
Name	This field contains the name of the currently selected template. You cannot change this name.
Orientation	The field tells you the orientation of the template, that is, portrait or landscape. You cannot change the orientation.
Paper size	This field shows the standardized name for the paper format of the template, for example, Letter or A4 . You cannot change this name.
Width	This field contains the current template width as a numerical value. You see the corresponding unit in the Rulers and grid group. If you select a different unit from the Unit list box there, the value for the width will be updated.
Height	This field contains the current template height as a numerical value. You see the corresponding unit of measurement in the Rulers and grid group. If you select a different unit of measurement from the Unit list box there, the value for the height will also be updated.
Rulers and Grid	
Units	In this list box, you select a unit of measurement for the grid and the rulers. If you select a different unit of measurement, all the values that refer to a unit of measurement will be updated. These include, for example, the values in the Height and Width fields.
Grid steps	This entry field contains the value for the current grid steps. You see the corresponding unit in the Units list box. If you select a different unit from this list box, the value for the grid step will be updated. To modify the grid step, enter a value greater than 0 in the entry field. If Centimeters is set as the unit, the maximum value is 5.
Show grid	If you select this check box, a grid will be shown on the template. To hide the grid again, remove the selection.
Snap to grid	If this check box is selected, objects will be aligned on the lines of the grid when they are moved or scaled. This function remains active if the grid is not visible.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.6.3 Setting the Unit of Measurement](#)

[17.1.6.4 Using the Grid](#)

19.8.2 Text Box – General

This group contains the general properties of a text box.

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation

Text Box	
Text	Enter the text in this text box that will appear in the text box.
Location and size	
X/Y	One position value in the X direction and one in the Y direction define the position of a text box in the template. The position values relate to the upper left corner of the text box. The 2 text boxes contain the current position values. You can enter new values into these text boxes. The position of the text box will then be updated in the template. Conversely, the values in the text boxes will be updated as soon as you move the text box manually. You see the unit for the values in the Rulers and grid group. If you select a different unit from the Unit list box there, the values for the position will also be updated.
Width/Height	The width and height define the size of a text box. The 2 text boxes contain the current values of these settings. You can enter new values into these text boxes. The size of the text box will then be updated in the template. Conversely, the values in the text boxes will be updated as soon as you scale the text box manually. You see the unit for the values in the Rulers and grid group. If you select a different unit from the Unit list box there, the values for the size will also be updated.
Z-order	You can specify the sequence of the objects in this field, if the objects overlap.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.8.2 Adding and Editing a Text Box](#)

[17.1.5 Using Document Information](#)

19.8.3 Text - View

This group contains the properties of the text in a text box.

Elements and Explanations

The following table provides explanations of the elements of the **Text** group.

Element	Explanation
Style	
Font	With this list box, you select a font for the text in the text box. The selected font applies to the entire text.
Font size	With this list box, you select a character size for the text in the text box. The selected character size applies to the entire text.
Font style	
Bold	If you select this check box, the entire text in the text box will be shown in bold type.
Italic	If you select this check box, the entire text in the text box will be shown in italics.
Underline	If you select this check box, the entire text in the text box will be shown underlined.
Orientation	With this list box, you select the orientation to Horizontal or Vertical for the text in the text box.
Alignment	
Horizontal	With this list box, you select the horizontal alignment of the text in the text box. The selected alignment applies to the entire text. You see the unit for the values in the Rulers and grid group. If you select a different unit from the Unit list box there, the values for the margins will also be updated.

Vertical	With these list boxes, you select the vertical alignment of the text in the text box. The selected alignment applies to the entire text.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.8.2 Adding and Editing a Text Box](#)

19.8.4 Image – General

This group contains the general properties of an image field.

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
Image	
Image	This field contains the name of the image that is located in the image field. When you insert a new image, the name will be updated automatically.
Browse...	With this button, you open a file selection dialog. In this dialog, you select the figure within which the image field is displayed. You can select files in the following formats: BMP , JPEG , TIFF , GIF , and ICO . The file can be up to 50 KB in size.
Location and size	
X/Y	One position value in the X direction and one in the Y direction define the position of an image field in the template. The position values relate to the upper left corner of the image field. The 2 text boxes contain the current position values. You can enter new values into these text boxes. The position of the image field will then be updated in the template. Conversely, the values in the text boxes will be updated as soon as you move the image field manually. You see the unit for the values in the Rulers and grid group. If you select a different unit from the Unit list box there, the values for the position will also be updated.
Width/Height	The width and height define the size of an image field. The 2 text boxes contain the current values of these settings. You can enter new values into these text boxes. The size of the image field will then be updated in the template. Conversely, the values in the text boxes will also be updated as soon as you scale the image field manually. The image field can be larger than the image it contains. How the image behaves when the image field is scaled depends on the selected size mode. You can change the size mode in this group. You see the unit for the values in the Rulers and grid group. If you select a different unit from the Unit list box there, the values for the size will also be updated.
Z-order	You can specify the sequence of the objects in this field, if the objects overlap.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.8.3 Inserting and Editing the Image](#)

19.9 Signals and Settings

19.9.1 ACD – Details

This group contains the properties of a signal of the type **ACD**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **ACD – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Pickup . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example Str . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.2 APC – Details

This group contains the properties of a signal of the type **APC**.

Elements and Explanations

The following table provides explanations of the elements of the **APC – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Position . You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example Pos . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.

IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Control model	With this list box, you select a control model. You can select between a status query and various combinations of the functions SBO and Feedback Monitoring. The function SBO (Select Before Operate) reserves the tap changer before switching. In that way, the tap changer is inhibited for further incoming commands. The feedback monitoring informs the initiator of the command about the completion of the command. • Status only Only the tap position is recorded. The tap changer is not switched. • Direct with normal security The tap changer is switched directly. The feedback monitoring is not activated. • SBO with normal security The tap changer is reserved before switching. The feedback monitoring is not activated. • Direct with enhanced security The tap changer is switched directly. The feedback monitoring is activated. • SBO with enhanced security The tap changer is reserved before switching. The feedback monitoring is activated.
SBO time-out	With this list box, you set a value for the SBO time-out in seconds. Within the set period, the circuit breaker must be switched. If not, the reservation is withdrawn. This list box is only active if you have selected one of the options SBO with normal security or SBO with enhanced security in the Control model list box. To change the SBO time-out, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Feedback monitoring time	With this list box, you set the time range for the feedback monitoring in seconds. Within the set period, a feedback to the command must take place. If not, the command is considered as failed. If the feedback arrives after the feedback monitoring time has expired, the feedback is saved as a spontaneous indication. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the feedback monitoring time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Unit	
Define Unit	By marking this check box, the unit, the multiplier and the number of decimal places for this signal can be defined. The selected values have priority against other values. For example, other values can be originated by CFC charts.
Unit	With this list box, you select the unit for the controllable. If the controllable is to correspond to 10 kWh, for example, you select the unit Wh from this list box.
Multiplier	With this list box, you select the multiplier for the unit. If the controllable is to correspond to 10 kWh, for example, you require the multiplier 1000 for the unit Wh. For this multiplier, select the entry 1E3 from the list box.
No. of decimal places	With this list box, you set the number of places behind the decimal point of the value. To change the number of decimal places, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.3 ACT – Details

This group contains the properties of a signal of the type **ACT**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **ACT – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Retrip T1 . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example OpIn . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.4 BCR – Details

This group contains the properties of a signal of the type **BCR**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **BCR – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Counter . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example CntRs1 . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.

IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Pulse multiplier	With this list box, you select the weighting for a pulse. If a pulse is to correspond to 10 kWh, for example, you select the value 10. You set the unit (Wh) and the multiplier for the unit (k = 1000) in the area Unit. To change the pulse multiplier, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Restore delta value	By marking this check box, the delta value is transmitted. The delta value is the difference between the current value and the value of the last transmit operation. If this check box is not marked, the current value is transmitted.
Unit	
Unit	With this list box, you select the unit for a pulse. If a pulse is to correspond to 10 kWh, for example, you select the unit Wh from this list box. The unit and the multiplier are displayed in addition to the list box Pulse multiplier.
Multiplier	With this list box, you select the multiplier for the unit. If a pulse is to correspond to 10 kWh, for example, you require the multiplier 1000 for the unit Wh. For this multiplier, select the entry 1E3 from the list box. The unit and the multiplier are displayed in addition to the list box Pulse multiplier.
Seal-in time	With this list box, you set the seal-in time for the feedback in seconds. The seal-in time is the time range in which the feedback is pending. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the seal-in time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.5 BSC – Details

This group contains the properties of a signal of the type **BSC**.

Elements and Explanations

The following table provides explanations of the elements of the **BSC – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, that is Position . You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, that is TapChg . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.

IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Maximum output time	With this list box, you set the output time of a higher or lower command in seconds. To change the maximum output time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Control model	With this list box, you select a control model. You can select between a status query and various combinations of the functions SBO and Feedback Monitoring. The function SBO (Select Before Operate) reserves the tap changer before switching. In that way, the tap changer is inhibited for further incoming commands. The feedback monitoring informs the initiator of the command about the completion of the command. • Status only Only the tap position is recorded. The tap changer is not switched. • Direct with normal security The tap changer is switched directly. The feedback monitoring is not activated. • SBO with normal security The tap changer is reserved before switching. The feedback monitoring is not activated. • Direct with enhanced security The tap changer is switched directly. The feedback monitoring is activated. • SBO with enhanced security The tap changer is reserved before switching. The feedback monitoring is activated.
SBO time-out	With this list box, you set a value for the SBO time-out in seconds. Within the set period, the tap changer must be switched. If not, the reservation is withdrawn. This list box is only active if you have selected one of the options SBO with normal security or SBO with enhanced security in the Control model list box. To change the SBO time-out, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Step size	With this list box, you select the step size for a tap changer. The step size is the number of steps by which 1 command switches the tap changer higher or lower in succession. The standard value for the step size is 1. You use values greater than 1 for tap changers with adjustable intermediate steps. If, for example, 4 intermediate steps result in one complete step for a tap changer, you select the value 4 for the step size. A command then switches the tap changer 4 intermediate steps higher or lower. To change the step size, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Feedback monitoring time	With this list box, you set the time range for the feedback monitoring in seconds. Within the set period, a feedback to the command must take place. If not, the command is considered to have failed. If the feedback arrives after the feedback monitoring time has expired, the feedback is saved as a spontaneous indication. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the feedback monitoring time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Minimum value	The Minimum value is calculated automatically and displayed based on the values entered for the parameters Tap-display offset , Number of tap positions , and Tap-coding type . You can modify the value for this parameter according to the defined calculated range. By default, this parameter value is reset to a new value if you modify the value for the parameters Tap-display offset , Number of tap positions , and Tap-coding type respectively. You can also modify the minimum value via the IEC Browser and the TEA-X file.
Maximum value	The Maximum value is calculated automatically and displayed based on the values entered for the parameters Tap-display offset , Number of tap positions , and Tap-coding type . You can modify the value for this parameter according to the defined calculated range. By default, this parameter value is reset to a new value if you modify the value for the parameters Tap-display offset , Number of tap positions , and Tap-coding type respectively. You can also modify the maximum value via the IEC Browser and the TEA-X file.
Tap display offset	With this list box, you select a display offset for the current transformer tap position. With the display offset, you can shift the displayed value of the transformer tap position in positive or negative direction in comparison to the actual value of the transformer tap position. The value set for the tap display offset is added to the current value of the transformer tap position. If the current transformer tap position is to be displayed, select the value 0 for the tap display offset. To change the tap display offset, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Number of bits for tap code	With this list box, you select the number of bits required for coding the transformer tap positions. The required number depends on the selected coding. For example, you require 3 bits for 8 binary-coded transformer tap positions. An existing routing can influence the selectable number of bits. To change the number of bits for tap code, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Number of tap positions	With this list box, you set the number of possible transformer tap positions. To change the number of tap positions, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Tap-coding type	With this list box, you select a coding for the input signals routed to the transformer tap function. The selected coding determines how the pending signals at the binary inputs are interpreted. You can select 1 of the following codings: • Binary The routed signals are interpreted as binary coding. The binary-coding for the transformer tap position 10 is 1010 and requires 4 binary inputs. • 1-of-n The routed signals are interpreted as 1-of-n coding. N bits are representing each transformer tap position, whereby n equals the number of possible transformer tap positions. Only 1 bit is set to 1; all other bits are set to 0. The 1-of-n-coding for the transformer tap position 10 is 1000000000 and requires 10 binary inputs. • BCD The routed signals are interpreted as BCD coding. Each digit of the transformer tap position is binary-coded separately. The BCD-coding for the transformer tap position 10 (digits 1 and 0) is 10000 and requires 5 binary inputs. • Table If you select the Table setting, the Code table area is displayed. In this area, you can define an individual binary assignment. • BCD signed The routed signals are interpreted as BCD signed coding. Each digit of the transformer tap position is binary-coded separately. The most significant bit indicates the sign of the tap position. For example, the BCD signed coding for the transformer tap position +5 is 0101, -5 is 1101, and both of them require 4 binary inputs. • Gray The routed signals are interpreted as gray coding. For example, the gray coding for the transformer tap position 10 is 1111 and requires 4 binary inputs.
Moving contact (highest binary input)	If you mark this check box, a tap position is only then recognized and accepted as valid when the position transit contact signals that the tap has been reached. As soon as you check the check box, the next-higher binary input is automatically routed in addition to the already routed binary inputs. This binary input must be connected to the position transit contact. When you remove the checkmark of the check box, the routing is also removed.
Code table With the table and the options in this area, you can define an individual binary assignment for the input signals of the routed binary inputs. This area is only visible if you have selected the Table setting in the Tap-coding type list box.	
Code table	The table contains 1 line for each transformer tap position defined with the Number of tap positions list box. In the Encoding column, you can define a value for each transformer tap position. By default, the values in the encoding column are reset to 0, which indicates inconsistency. You must configure the values in this column to any value other than 0. For this, double-click in the cell. Enter a number value appropriate for the currently selected number system (see Representation of encoding). The number of bits set with the Number of bits for tap code list box determines the maximum allowable number value.
Representation of encoding	With these options, you select a number system for the entry of values in the Encoding column. You can select one of the following number systems: • Binary (2 characters) • Octal (8 characters) • Decimal (10 characters) • Hexadecimal (16 characters) The values you enter in the Encoding column must be appropriate for the selected number system. If you select another number system, already entered values are converted to this number system.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.6 CMV – Details

This group contains the properties of a signal of type **CMV**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **CMV – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, lph:A . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example phsA . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Deadband for magnitude	With this list box, you set the deadband for the magnitude of the measured value in percent. The deadband determines the transmission frequency of measured values. If you select the value 0 for the deadband, each measured value is transmitted to the superordinate station. A deadband other than 0 causes all changes of measured values compared to the measured value transmitted last to be added. If the sum of the changes reaches the percent value set, a new measured value is transmitted at the next possible point in time. This measure prevents loading the communication path too much. To change the deadband, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Deadband for angle	With this list box, you set the deadband for the angle of the measured value in percent. The deadband determines the transmission frequency of measured values. If you select the value 0 for the deadband, each measured value is transmitted to the superordinate station. A deadband other than 0 causes all changes of measured values compared to the measured value transmitted last to be added. If the sum of the changes reaches the percent value set, a new measured value is transmitted at the next possible point in time. This measure prevents loading the communication path too much. To change the deadband, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Unit	
Define Unit	By marking this check box, the unit, the multiplier and the number of decimal places for this signal can be defined. The selected values have priority against other values. For example, other values can be originated by CFC charts.
Unit	With this list box, you select the unit for the controllable. If the controllable is to correspond to 10 kWh, for example, you select the unit Wh from this list box.
Multiplier	With this list box, you select the multiplier for the unit. If the controllable is to correspond to 10 kWh, for example, you require the multiplier 1000 for the unit Wh . For this multiplier, select the entry 1E3 from the list box.
No. of decimal places	With this list box, you set the number of places behind the decimal point of the value. To change the number of decimal places, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.

Related Topics

- [9.1 Overview of Signals](#)
- [9.3 Signal Types](#)

19.9.7 DEL – Details

This group contains the properties of a signal of the type **DEL**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **DEL – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Vpp . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example PPV . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
Unit	
Define Unit	By marking this check box, the unit, the multiplier and the number of decimal places for this signal can be defined. The selected values have priority against other values. For example, other values can be originated by CFC charts.
Unit	With this list box, you select the unit for the controllable. If the controllable is to correspond to 10 kWh, for example, you select the unit Wh from this list box.
Multiplier	With this list box, you select the multiplier for the unit. If the controllable is to correspond to 10 kWh, for example, you require the multiplier 1000 for the unit Wh . For this multiplier, select the entry 1E3 from the list box.

No. of decimal places	With this list box, you set the number of places behind the decimal point of the value. To change the number of decimal places, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.8 DPC – Details

This group contains the properties of a signal of the type **DPC**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **DPC – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Position 3-pole . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example Pos . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Control model	With this list box, you select a control model. You can select between a status query and various combinations of the functions SBO and Feedback Monitoring . The function SBO (Select Before Operate) reserves the switching device before switching. In that way, the switching device is inhibited for further incoming commands. The feedback monitoring informs the initiator of the command about the completion of the command. • Status only Only the circuit-breaker switch position is recorded. The circuit breaker is not switched. • Direct with normal security The circuit breaker is switched directly. The feedback monitoring is not activated. • SBO with normal security The circuit breaker is reserved before switching. The feedback monitoring is not activated. • Direct with enhanced security The circuit breaker is switched directly. The feedback monitoring is activated. • SBO with enhanced security The circuit breaker is reserved before switching. The feedback monitoring is activated.

SBO time-out	With this list box, you set a value for the SBO time-out in seconds. Within the set period, the circuit breaker must be switched. If not, the reservation is withdrawn. This list box is only active if you have selected one of the options SBO with normal security or SBO with enhanced security in the Control model list box. To change the SBO time-out, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Feedback monitoring time	With this list box, you set the time range for the feedback monitoring in seconds. Within the set period, a feedback to the command must take place. If not, the command is considered to have failed. If the feedback arrives after the feedback monitoring time has expired, the feedback is saved as a spontaneous indication. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the feedback monitoring time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Seal-in time	With this list box, you set the seal-in time for the feedback in seconds. The seal-in time is the time range in which the feedback is pending. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the seal-in time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Chatter Blocking	
Chatter blocking	With this check box, you activate or deactivate the chatter blocking for this signal. Equipment connected to binary inputs can generate signals based on faults that constantly change their states. Chatter blocking detects and blocks such signals. Chatter blocking prevents indications from being generated that cannot be used.
Software Filter	
Software filtering time	With this list box, you set the software filtering time in milliseconds. For the SIPROTEC 5 device to interpret the signal as an indication, the signal must be pending at least during the entire software filtering time. To change the software filtering time, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Retrigger filter	If you select this check box, the SIPROTEC 5 device will restart the filtering time after the signal has dropped out and is pending again.
Indication timestamp before filtering	With this check box, you influence the time at which the SIPROTEC 5 device generates an indication. If the check box is not selected, the indication is generated at the instant at which the filtering time expires. If the check box is selected, the indication is generated at the instant of the first indication change.
Suppress intermediate position	If you select this check box, the SIPROTEC 5 device suppresses the indication in case of an intermediate position.

Related Topics

- [9.1 Overview of Signals](#)
- [9.3 Signal Types](#)

19.9.9 ENC – Details

This group contains the properties of a signal of the type **ENC**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **ENC – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Mode (controllable) . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example Mod . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.10 ENS – Details

This group contains the properties of a signal of the type **ENS**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **ENS – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Behavior . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example Beh . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.11 INC – Details

This group contains the properties of a signal of the type **INC**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **INC – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Position 3-pole . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example Pos . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Control model	With this list box, you select a control model. You can select between a status query and various combinations of the functions SBO and Feedback Monitoring . The function SBO (Select Before Operate) reserves the switching device before switching. In that way, the switching device is inhibited for further incoming commands. The feedback monitoring informs the initiator of the command about the completion of the command. • Status only Only the circuit-breaker switch position is recorded. The circuit breaker is not switched. • Direct with normal security The circuit breaker is switched directly. The feedback monitoring is not activated. • SBO with normal security The circuit breaker is reserved before switching. The feedback monitoring is not activated. • Direct with enhanced security The circuit breaker is switched directly. The feedback monitoring is activated. • SBO with enhanced security The circuit breaker is reserved before switching. The feedback monitoring is activated.
SBO time-out	With this list box, you set a value for the SBO time-out in seconds. Within the set period, the circuit breaker must be switched. If not, the reservation is withdrawn. This list box is only active if you have selected one of the options SBO with normal security or SBO with enhanced security in the Control model list box. To change the SBO time-out, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Feedback monitoring time	With this list box, you set the time range for the feedback monitoring in seconds. Within the set period, a feedback to the command must take place. If not, the command is considered to have failed. If the feedback arrives after the feedback monitoring time has expired, the feedback is saved as a spontaneous indication. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the feedback monitoring time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Seal-in time	With this list box, you set the seal-in time for the feedback in seconds. The seal-in time is the time range in which the feedback is pending. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the seal-in time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Chatter Blocking	
Chatter blocking	With this check box, you activate or deactivate the chatter blocking for this signal. Equipment connected to binary inputs can generate signals based on faults that constantly change their states. Chatter blocking detects and blocks such signals. Chatter blocking prevents indications from being generated that cannot be used.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.12 INS – Details

This group contains the properties of a signal of the type **INS**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **INS – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Op. ct. . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example OpCnt . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.13 MV – Details

This group contains the properties of a signal of the type **MV**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **MV – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, R err/m . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example RxErrRateM . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Deadband for magnitude	With this list box, you set the deadband for the magnitude of the measured value in percent. The deadband determines the transmission frequency of measured values. If you select the value 0 for the deadband, each measured value is transmitted to the superordinate station. A deadband other than 0 causes all changes of measured values compared to the measured value transmitted last to be added. If the sum of the changes reaches the percent value set, a new measured value is transmitted at the next possible point in time. This measure prevents loading the communication path too much. To change the deadband, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Unit	
Define Unit	By marking this check box, the unit, the multiplier and the number of decimal places for this signal can be defined. The selected values have priority against other values. For example, other values can be originated by CFC charts.
Unit	With this list box, you select the unit for a pulse. If a pulse is to correspond to 10 kWh, for example, you select the unit Wh from this list box. The unit and the multiplier are displayed in addition to the list box Pulse multiplier .
Multiplier	With this list box, you select the multiplier for the unit. If a pulse is to correspond to 10 kWh, for example, you require the multiplier 1000 for the unit Wh . For this multiplier, select the entry 1E3 from the list box. The unit and the multiplier are displayed in addition to the list box Pulse multiplier .

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.14 SPC (Controllable Single Point) – Details

This group contains the properties of a signal of the type **SPC (Controllable Single Point)**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **SPC – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Pole A open-close . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example StrTstPhsA . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
General	
Control model	With this list box, you select a control model. You can select between a status query and various combinations of the functions SBO and Feedback Monitoring . The function SBO (Select Before Operate) reserves the switching device before switching. In that way, the switching device is inhibited for further incoming commands. The feedback monitoring informs the initiator of the command about the completion of the command. • Status only Only the circuit-breaker switch position is recorded. The circuit breaker is not switched. • Direct with normal security The circuit breaker is switched directly. The feedback monitoring is not activated. • SBO with normal security The circuit breaker is reserved before switching. The feedback monitoring is not activated. • Direct with enhanced security The circuit breaker is switched directly. The feedback monitoring is activated. • SBO with enhanced security The circuit breaker is reserved before switching. The feedback monitoring is activated.
SBO time-out	With this list box, you set a value for the SBO time-out in seconds. Within the set period, the circuit breaker must be switched. If not, the reservation is withdrawn. This list box is only active if you have selected one of the options SBO with normal security or SBO with enhanced security in the Control model list box. To change the SBO time-out, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.

Feedback monitoring time	With this list box, you set the time range for the feedback monitoring in seconds. Within the set period, a feedback to the command must take place. If not, the command is considered to have failed. If the feedback arrives after the feedback monitoring time has expired, the feedback is saved as a spontaneous indication. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the feedback monitoring time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Seal-in time	With this list box, you set the seal-in time for the feedback in seconds. The seal-in time is the time range in which the feedback is pending. This list box is only active if you have selected one of the options Direct with enhanced security or SBO with enhanced security in the Control model list box. To change the seal-in time, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Chatter Blocking	
Chatter blocking	With this check box, you activate or deactivate the chatter blocking for this signal. Equipment connected to binary inputs can generate signals based on faults that constantly change their states. Chatter blocking detects and blocks such signals. Chatter blocking prevents indications from being generated that cannot be used.
Software Filter	
Software filtering time	With this list box, you set the software filtering time in milliseconds. For the SIPROTEC 5 device to interpret the signal as an indication, the signal must be pending at least during the entire software filtering time. To change the software filtering time, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Retrigger filter	If you select this check box, the SIPROTEC 5 device will restart the filtering time after the signal has dropped out and is pending again.
Indication timestamp before filtering	With this check box, you influence the time at which the SIPROTEC 5 device generates an indication. If the check box is not selected, the indication is generated at the instant at which the filtering time expires. If the check box is selected, the indication is generated at the instant of the first indication change.

Related Topics

- [9.1 Overview of Signals](#)
- [9.3 Signal Types](#)

19.9.15 SPC (Marker Command) – Details

This group contains the properties of a signal of the type **SPC (Marker Command)**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **SPC – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Function logoff . The original name always indicates the type of the signal. You cannot change the original name.

IEC 61850 name	This field contains the IEC 61850 name of the signal, for example FunctLO . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
Initialization With the operating elements of this area, you define the value with which a marker command is to be initialized after a first start or a restart of the SIPROTEC 5 device.	
Initialization	With this list box, you define when the marker command is initialized. You can select one of the following options: • None The marker command is not initialized in an initial startup or in a restart. • Initial startup The marker command is initialized in an initial startup. • Restart The marker command is initialized in a restart. • Initial startup & restart The marker command is initialized in an initial startup and in a restart.
Initial start	With this list box, you define how the marker command is initialized in an initial startup. You can select one of the following options: • Invalid The marker command gets the quality invalid. • Value The marker command gets the value that you define with the list box Value for initial start. This list box is only active if you have selected one of the options Initial startup or Initial startup & restart in the Initialization list box.
Value for initial start	With this list box, you select On or Off as the new value for the marker command after an initial startup. This list box is only active if you have selected the option Value in the Initial start list box.
Restart	With this list box, you define how the marker command is initialized in a restart. You can select one of the following options: • Invalid The marker command gets the quality invalid. • Value The marker command gets the value that you define with the list box Value restart. • Stored value The marker command gets the value stored before the restart. This list box is only active if you have selected one of the options Restart or Initial startup & restart in the Initialization list box.
Value for restart	With this list box, you select On or Off as the new value for the marker command after a restart. This list box is only active if you have selected the option Value in the Restart list box.

Software Filter	
Software filtering time	With this list box, you set the software filtering time in milliseconds. For the SIPROTEC 5 device to interpret the signal as an indication, the signal must be pending at least during the entire software filtering time. To change the software filtering time, click the arrow buttons of the list box. Alternatively, you can enter a value in the entry field of the list box.
Retrigger filter	If you select this check box, the SIPROTEC 5 device will restart the filtering time after the signal has dropped out and is pending again.
Indication timestamp before filtering	With this check box, you influence the time at which the SIPROTEC 5 device generates an indication. If the check box is not selected, the indication is generated at the instant at which the filtering time expires. If the check box is selected, the indication is generated at the instant of the first indication change.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.16 SPS – Details

This group contains the properties of a signal of the type **SPS**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **SPS – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, >Open . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example VTmcb . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.

Initialization With the operating elements of this area, you define the value with which a marker command is to be initialized after a first start or a restart of the SIPROTEC 5 device.	
Initialization	With this list box, you define when the marker command is initialized. You can select one of the following options: • None The marker command is not initialized in an initial startup or in a restart. • Initial startup The marker command is initialized in an initial startup. • Restart The marker command is initialized in a restart. • Initial startup & restart The marker command is initialized in an initial startup and in a restart.
Initial start	With this list box, you define how the marker command is initialized in an initial startup. You can select one of the following options: • Invalid The marker command gets the quality invalid. • Value The marker command gets the value that you define with the list box Value for initial start. This list box is only active if you have selected one of the options Initial startup or Initial startup & restart in the Initialization list box.
Value for initial start	With this list box, you select On or Off as the new value for the marker command after an initial startup. This list box is only active if you have selected the option Value in the Initial start list box.
Restart	With this list box, you define how the marker command is initialized in a restart. You can select one of the following options: • Invalid The marker command gets the quality invalid. • Value The marker command gets the value that you define with the list box Value restart. • Stored value The marker command gets the value stored before the restart. This list box is only active if you have selected one of the options Restart or Initial startup & restart in the Initialization list box.
Value for restart	With this list box, you select On or Off as the new value for the marker command after a restart. This list box is only active if you have selected the option Value in the Restart list box.
Chatter Blocking	
Chatter blocking	With this check box, you activate or deactivate the chatter blocking for this signal. Equipment connected to binary inputs can generate signals based on faults that constantly change their states. Chatter blocking detects and blocks such signals. Chatter blocking prevents indications from being generated that cannot be used.
Software Filter	
Software filtering time	With this list box, you set the software filtering time in milliseconds. For the SIPROTEC 5 device to interpret the signal as an indication, the signal must be pending at least during the entire software filtering time. To change the software filtering time, click the arrow buttons of the list box. Alternately, you can enter a value in the entry field of the list box.

Retrigger filter	If you select this check box, the SIPROTEC 5 device will restart the filtering time after the signal has dropped out and is pending again.
Indication timestamp before filtering	With this check box, you influence the time at which the SIPROTEC 5 device generates an indication. If the check box is not selected, the indication is generated at the instant at which the filtering time expires. If the check box is selected, the indication is generated at the instant of the first indication change.
Processing of Quality Attributes	
Test attribute mismatch	With this list box, you determine how implausible test attributes is treated. You can select one of the following options: • block function The current function is blocked. • Keep valid value The current value is maintained, even if it is not plausible. • Set value to 0 The current value is replaced by 0. • Set value to 1 The current value is replaced by 1.
Processing of invalid data	With this list box, you determine how invalid data is treated. You can select one of the following options: • block function The current function is blocked. • Keep valid value The current value is maintained, even if it is invalid. • Set value to 0 The current value is replaced by 0. • Set value to 1 The current value is replaced by 1.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.17 SEQ – Details

This group contains the properties of a signal of the type **SEQ**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **SEQ – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Vseq . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example SeqV . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.

IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.9.18 WYE – Details

This group contains the properties of a signal of the type **WYE**. Not every signal of this type has all the properties shown in the following table.

Elements and Explanations

The following table provides explanations of the elements of the **WYE – Details** group.

Element	Explanation
Name	This text box contains the current name of the signal. Enter another name for the signal if necessary. If you modify the name in the text box, the name also changes in all the windows that contain this signal.
Original name	This field contains the original name of the signal, for example, Vph . The original name always indicates the type of the signal. You cannot change the original name.
IEC 61850 name	This field contains the IEC 61850 name of the signal, for example PhV . The IEC 61850 name represents the signal according to the specifications of the IEC 61850 standard. You can change the IEC 61850 name for user-defined signals only.
IEC 61850 path	This field contains the hierarchical IEC 61850 path of the signal. The path is equivalent to the path in the IEC 61850 tree. This path consists of the following elements: • IEC 61850 name of the SIPROTEC 5 device • Name of the logical device (LD) • Name of the logical node (LN) • IEC 61850 name of the signal You cannot change the IEC 61850 path.
Unit	
Define Unit	By marking this check box, the unit, the multiplier and the number of decimal places for this signal can be defined. The selected values have priority against other values. For example, other values can be originated by CFC charts.
Unit	With this list box, you select the unit for the controllable. If the controllable is to correspond to 10 kWh, for example, you select the unit Wh from this list box.
Multiplier	With this list box, you select the multiplier for the unit. If the controllable is to correspond to 10 kWh, for example, you require the multiplier 1000 for the unit Wh . For this multiplier, select the entry 1E3 from the list box.
No. of decimal places	With this list box, you set the number of places behind the decimal point of the value. To change the number of decimal places, click the arrow buttons of the list box. Alternatively, you can enter a value in the text box of the list box.

Related Topics

[9.1 Overview of Signals](#)

[9.3 Signal Types](#)

19.10 Miscellaneous

19.10.1 Functions – Details

This group contains the names and the original names of a function.

Elements and Explanations

The following table provides explanations of the elements of the **Details** group.

Property	Explanation
Name	This text box contains the current name of the function. Enter another name for the function if necessary. If you modify the name in the text box, the name will also change in all windows that contain this function.
Original name	This field contains the original name of the function, for example, Process monitor . The original name always indicates the type of the function. You cannot change the original name.

Related Topics

[8.2.2.1 Selecting a Function for Setting Parameters](#)

19.10.2 Processing Quality Attributes

This group contains quality settings for a GOOSE connection.

Elements and Explanations

The following table provides explanations of the elements of the **Processing Quality Attributes** group.

Element	Explanation
Replace invalid with good	If this check box is marked, the Validity attribute of the data object is set to good . The data value is set to the substitute value, which you have selected with the list box DO value at invalid .
DO value at invalid	With this list box, you select a substitute value for a data object, for which the Validity attribute is set to good . The possible substitute values depend on the data type. This list box is only active if you have marked the check box Replace invalid with good .
Reset operatorBlk state	If this check box is marked, the OperatorBlocked attribute of the data object is set to FALSE . The data value is set to the substitute value, which you have selected with the list box DO value at operatorBlk .
DO value at operatorBlk	With this list box, you select a substitute value for a data object, for which the OperatorBlocked attribute is set to FALSE . The possible substitute values depend on the data type. This list box is only active if you have marked the check box Reset operatorBlk state .

Data Substitute Values

Depending on the data type, different data substitute values can be used.

Data Type	Possible data substitute values
BOOLEAN	0 (False), 1 (True)

Data Type	Possible data substitute values
ENUM types (ENS, EN, ENG)	PLC output: 0 (False), 1 (True)
	INS output: -100 to 100 (depending on type, for definition see IEC 61850)
Measured values	$1,401298 \cdot 10^{-45}$ to $7.922 \cdot 10^{28}$

Interaction of the Quality Attribute Validity and OperatorBlocked

- **OperatorBlk check box is set and received OperatorBlocked = TRUE**

Regardless, if the **Replace invalid with good** check box is set or not, and regardless of the current validity, the **Validity** attribute is set to **good**. Also, the **OperatorBlocked** data object substitute value is set. The **OperatorBlocked** settings overwrite the **Validity** settings.

- **OperatorBlk check box is set and received OperatorBlocked = TRUE**

The **OperatorBlocked** attribute remains set and is forwarded. If the **Replace invalid with good** check box is set and the receipt of **Validity = invalid** is set, the respective data object substitute value is used.

Related Topics

[20.3.2 Information Routing](#)

20 User Interface

20.1	Editors	828
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20.1 Editors

20.1.1 CFC Cross-Reference List

Elements and Explanations

You can find explanations for the elements of the **CFC Cross-Reference List** editor in the following table.

Element	Explanation
Signal name	This column displays the name of the signal used in the CFC chart.
Number	Every predefined signal has a unique number. This column displays the signal number of the corresponding signal.
Type	This column displays the signal type.
Chart name	This column displays the name of the chart where the respective signal is used.
IN/OUT	This column indicates whether the signal is connected to the input or output side of the function block.
Chart element	This column displays the name of the block pin to which the signal is connected.
Data type	This column displays the type of the block pin to which the signal is connected.
Block type	This column displays the type of the function block to which the signal is connected.
Comment	This column displays the comment with respect to the block pin to which the signal is connected.

Related Topics

[12.1.1.9 Basic Procedure](#)

[20.1.10 Function-Chart \(CFC\) Editor](#)

20.1.2 Single-Line Editor

The Single-line editor is used to edit the single-line configuration and the topology tree.

Elements and Explanations

You can find explanations for the elements of the Single-line editor in the following table.

Element	Explanation
Single line	The 20.1.3 Single-Line tab is used for editing the single-line configuration. You can do this in one of the following ways: • Generating system configurations from individual equipment, which are compliant with IEC 61850 (substation-voltage level bay) • Using predefined application templates for complete bays • Select individual fields to use these for a display page • Linking equipment to function groups • Setting parameters for equipment • Adapting applications, function groups, and functions • Adding SIPROTEC 5 devices to the single-line configuration and hence to the offline configuration
Topology	You can edit the topology of the station in the 20.1.4 Topology Information tab. You can do this in one of the following ways: • Changing the name of the topology element • Adding comments to each individual topology element • Setting parameters for equipment

Linked Tabs in the Task Card

If the Single-line editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab to search for information within the Single-line editor.
- [20.2.3 Libraries](#)
This tab can typically be used to add equipment such as circuit breakers or busbars to the single-line configuration.

Related Topics

[7.1 Overview of the Single-Line Configuration](#)

[7.5.1 Overview of Topology](#)

20.1.3 Single-Line

You can use the **Single-Line** tab to edit the single-line configuration.

Elements and Explanations

You can find explanations for the elements of the **Single Line** tab in the following table.

Element	Explanation
Toolbar	The 20.7.2 Toolbar of the Single-Line Editor allows fast access to actions and settings.
Working area	This working area is used to generate the single-line configuration. Place the various elements from the library in the working area for this purpose. These elements represent equipment such as busbars or circuit breakers. Interconnect these individual elements with lines. The properties of all equipment are set parameters directly with the single-line configuration.

Related Topics

[7.1 Overview of the Single-Line Configuration](#)

[7.2.1 Opening a Single-Line Configuration](#)

[20.1.2 Single-Line Editor](#)

20.1.4 Topology Information

You can use the **Topology information** tab to edit the topology of the station.

Elements and Explanations

You can find explanations for the elements of the **Topology** tab in the following table.

Element	Explanation
Name	This column contains the name and symbols of all topology elements in a hierarchical arrangement. These include, for example, voltage levels and bays. You can show or hide levels of the topology with the arrow icons. You can give each topology element an individual name. If there is a corresponding element for the topology element in the single-line configuration, its name will also change.
Path	This column shows, for each topology element within a bay, whether or not the element is connected to one or more function groups. The connection to a function group is shown in the form <device name> <function group name>. If the topology element is not connected to any function group, the cell contains the text <Not connected>.

Comment	In this column, you can enter a comment on each topology element.

Related Topics

- [7.5.1 Overview of Topology](#)
- [7.5.2 Displaying Topology](#)
- [20.1.2 Single-Line Editor](#)

20.1.5 Device and Networks Editor

The Device and networks editor is used for editing the hardware configuration of a SIPROTEC 5 device and integrating the SIPROTEC 5 device into the network structure of the station.

Elements and Explanations

You can find explanations for the elements of the Device and networks editor in the following table.

Element	Explanation
Device view	The 20.1.7 Device View tab is used for editing the hardware configuration of a SIPROTEC 5 device. You can do this in one of the following ways: • Add hardware components, for example communication modules or on-site operation panels. • Deleting, copying and moving hardware components • Editing properties of hardware components • Set labels for LEDs, inputs, outputs and function keys
Network view	The 20.1.6 Network View tab is used for editing the Ethernet network structure of the SIPROTEC 5 devices in the project and thus, the Ethernet network structure of the station. You can do this in one of the following ways: • Adding communication connections between the communication interfaces of the SIPROTEC 5 devices • Changing communication connections • Editing properties of the communication connections and SIPROTEC 5 devices • Adding SIPROTEC 5 devices to the network configuration and hence to the project • Adding and renaming subnetworks

Linked Tabs in the Task Card

If the Device and networks editor is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab can be used to search for information within the Device and Networks view.
- [20.2.3 Libraries](#)
This tab is always displayed. However, you do not need this for working with the Device and networks editor.
- [20.2.4 Hardware Catalog](#)
This tab is used to add components to the Device view or basic configurations to the Network view.

Related Topics

- [6.3.1 Overview of the Hardware Structure](#)
- [14.1.4 Communication Using Ethernet](#)

20.1.6 Network View

You can use the **Network view** tab to edit the Ethernet network structure of the SIPROTEC 5 devices in the project, and thus, the Ethernet network structure of the station.

Elements and Explanations

You can find explanations for the elements of the **Network view** tab in the following table.

Element	Explanation
Toolbar	The 20.7.4 Toolbar of the Network View allows fast access to actions and settings.
Working area	The working area shows the front views of all SIPROTEC 5 devices available in the project. Colored squares mark the Ethernet interfaces of a SIPROTEC 5 device. These interfaces can be connected to one another by drag and drop. In this way, you can establish Ethernet-based communication connections between the SIPROTEC 5 devices.
Overview navigation	The bottom right corner of the working area has a symbol if the network view is visible in the working area. Clicking this symbol opens the overview navigation. You can use the overview navigation to navigate quickly to certain areas of the network view.

Related Topics

[14.2.1 Opening Network View](#)
[20.1.5 Device and Networks Editor](#)

20.1.7 Device View

You can use the **Device view** tab to edit the hardware configuration of a SIPROTEC 5 device.

Elements and Explanations

You can find explanations for the elements of the **Device view** tab in the following table.

Element	Explanation
Toolbar	The 20.7.5 Toolbar of the Device View allows fast access to actions and settings.
Working area	The working area shows the front view and rear view of the SIPROTEC 5 device selected. The SIPROTEC 5 device is installed in a rack in the figures. You can change the hardware configuration shown. You can delete existing components or add new ones for this purpose. Drag these new components from the Hardware Catalog to the working area and place them at a suitable insertion position there. Alternatively, you can also copy the components available in the configuration and insert them again. Set parameters to the properties of the components directly with the Device view.
Overview navigation	The bottom right corner of the working area will have a symbol if the Device view is visible in the working area. Clicking this symbol opens the overview navigation. You can use the overview navigation to navigate quickly to certain areas of the Device view.

Related Topics

[6.3.1 Overview of the Hardware Structure](#)
[6.3.2 Opening the Device View](#)
[20.1.5 Device and Networks Editor](#)

20.1.8 Project Texts Editor

With the Project texts editor you process and translate all the project texts.

Elements and Explanations

You can find explanations for the elements of the Project-text editor in the following table.

Element	Explanation
Toolbar	The 20.7.3 Toolbar of the Project-Texts Editor allows fast access to actions and settings.
Reference language	This column contains the texts of the reference language. This language serves as a reference basis when translating project texts. Double-click in the relevant line to add or modify a text. Then enter the text.
Category	This column informs you about the category of a text, for example comment or information. You cannot change the category.
Project languages	Each project language, in addition to the reference language, has its own column. If different languages are set for the editing language and reference language, the column of the editing language is identified with a pen symbol. Double-click in the relevant line to add or modify a text. Then enter the text.
Reference	This column informs you about the location where a text is used in the project. A complete path in the form <code>\\Projekt3\\SIPROTEC5 Device\\Front View\\</code> describes the location of use. You cannot change the reference.

Linked Tabs in the Task Card

If the Project-text editor is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, this is not needed for working with the Project-text editor.
- [20.2.3 Libraries](#)
This tab is always displayed. However, this is not needed for working with the Project-text editor.

Related Topics

[5.2.5 Opening the Project-Texts Editor](#)

20.1.9 Settings Editor

With the Settings editor you process the settings of parameters, for example of protection functions or the time synchronization.

Elements and Explanations

You can find explanations for the elements of the Settings editor in the following table.

Element	Explanation
Toolbar	The 20.7.12 Toolbar of the Settings Editor allows fast access to actions and settings.
Header The header contains operating elements which you can use to select one settings group each for editing and comparison.	
Values for change	This list box is used to select the settings group whose values you wish to edit. This list box is only present if more than 1 settings group is available.
Values for comparison	This list box is used to select the settings group whose values are to be displayed for comparison. This list box is only present if more than 1 settings group is available.

Function block The operating and display elements of this area provide the option of changing the parameter values and number of function blocks. The individual information elements for a parameter are displayed in columns in the following order: • Number • Name • Value • Info symbol • Unit	
Number	The numbers of the individual parameters are displayed in this column. These numbers serve for identification of the parameters and their description in the relevant device documentation. Press the  button in the toolbar of the Settings editor to show or hide the numbers for all settings together.
	If this icon is displayed against any individual parameter, it signifies that upon changing this setting value and loading the configuration to the device, the device will be rebooted and then the changes are updated in the target device.
	If this icon is displayed against any individual parameter, it signifies that this setting value is the same in all the settings groups.
Name	The names of the settings are displayed in this column.
Value	The current values of the settings are displayed in this column. Depending on the setting, entry fields or list boxes are available to edit a value. If you move the mouse pointer over the value, the value range of the setting is shown as a tool tip.
Unit	This column displays a unit, depending on the relevant value. The relevant cell of the column remains empty for values without a unit, for example On or Off .
Info symbols	Info symbols appear in this column. If you move the mouse pointer over an info symbol, further information on the settings are shown as a tool tip.
Add new stage	This button is used to add a new function block to the function. If the function block can be created only based on a single function block type, the function block is added directly after clicking on the button. If more than one function block type is available, however, the 20.6.13 List of Permissible Function-Block Types dialog opens. Select the type of function block to be used with this dialog.
Delete stage	This button is used to delete the function block to which the button is assigned. This button is only active if the function block is user-defined. Function blocks set at the factory cannot be deleted.
Graphics window Certain functions, for example, for distance protection or tripping, can be visualized graphically. The relevant diagrams and characteristic curve are displayed in the graphics window. You can hide or show the graphics window, for example, with the  button in the toolbar of the Settings editor.	
Toolbar	The 20.7.13 Toolbar of the Graphics Window allows fast access to actions and settings.
Display area	The operational action of the function is visualized graphically in this display area. You can access various visualization and editing options via a context menu.

Linked Tabs in the Task Card

If the Settings editor is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed.
- [20.2.3 Libraries](#)
This tab is always displayed.

Related Topics

- [8.2.2.1 Selecting a Function for Setting Parameters](#)
- [8.2.3.2 Showing and Hiding Graphics Window](#)
- [8.2.3.3 Resizing the Width of the Graphics Window](#)

20.1.10 Function-Chart (CFC) Editor

You can use the Function-chart editor to configure additional functions for the SIPROTEC 5 device. Use predefined blocks for this.

Elements and Explanations

You can find explanations for the elements of the Function-chart editor in the following table.

Element	Explanation
Data flow	The 20.1.11 Data Flow tab is used to configure the CFC function as a graphic function chart. You can do this in one of the following ways: • Adding modules from the global DIGSI 5 library to the function chart • Interconnecting modules by drag and drop • Documenting the function chart with text boxes • Optimizing the function chart for execution in the SIPROTEC 5 device
Control flow	Use the 20.1.12 Control Flow tab to change the execution order, if required. You can do this in one of the following ways: • Interconnecting modules by text • Changing running sequence of components • Observing values of the highlighted inputs and outputs during the function-chart tracking

Linked Tabs in the Task Card

If the Function-chart editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, you do not need this for working with the Function-chart editor.
- [20.2.3 Libraries](#)
This tab can be used to add function blocks to the function chart.
- [20.2.5 Signals](#)
This tab can be used to add signals to the function chart.

Related Topics

- [12.1.1.1 Meaning of CFC](#)
- [12.1.1.5 Configuration Strategies](#)

20.1.11 Data Flow

You can use the **Data flow** tab to configure the CFC function as a graphic function chart.

Elements and Explanations

You can find explanations for the elements of the **Data flow** tab in the following table.

Element	Explanation
Interface	
Name	This column displays the following sections: • Input This section displays the input pins and allows you to add the input terminals of the CFC block to configure the interface. • Output This section displays the output pins and allows you to add the output terminals of the CFC block to configure the interface.. • InOut This section displays the IO pins and allows you to add the IO terminals of the CFC block to configure the interface.
Type	This field contains the data type of the block connection. The following data types are possible: • Bool • Word • DWord • UInt • DInt • Real • Struct
Value	This field contains the default value of the block connection.
Configurable	The state of this check box indicates the default setting for the parameterization of the block connection.
Interconnectable	The state of this check box indicates the default setting for the interconnectability of the block connection.
Comment	This field contains a comment about the block connection that has been preset in the factory.
Toolbar	The 20.7.6 Toolbar of the Data Flow allows fast access to actions and settings.
Working area	This working area is used to generate the function chart for the CFC function. Place the blocks from the library in the working area for this purpose. Next, set parameters for the blocks and then interconnect them. Use the signals and settings from the signal catalog to establish the connection to the process or to internal functions.

Related Topics

[12.1.1.9 Basic Procedure](#)

[20.1.10 Function-Chart \(CFC\) Editor](#)

20.1.12 Control Flow

You can use the **Control flow** tab to configure the CFC function and change the running sequence, if required.

Elements and Explanations

You can find explanations for the elements of the **Control flow** tab in the following table.

Element	Explanation
Toolbar	The 20.7.7 Toolbar of the Control Flow allows fast access to actions and settings.
Run sequence	This column contains the numbering of the running sequence. This numbering indicates the order in which the modules are processed in the SIPROTEC 5 device. The control flow shows the modules in the order in which they will be processed.
Object/parameter	This column contains the names of all the CFC blocks and their interfaces in the function chart. You will see an arrow tip to the left of a block name. You can show or hide the block interfaces by clicking this arrow tip. Interfaces selected as Invisible are not displayed.
Operand	In the control flow, operands with a fixed syntax designate the interconnections between the modules. This column contains the operands to the module connections. An operand can be one of the following: • A value • An interconnection to another module • An interconnection to a signal You can also enter a value manually in this column.

Related Topics

- [12.1.1.9 Basic Procedure](#)
- [20.1.10 Function-Chart \(CFC\) Editor](#)

20.1.13 Display Editor

The Display editor is used to generate the display pages for displaying in a SIPROTEC 5 device.

Elements and Explanations

You can find explanations for the elements of the Display editor in the following table.

Element	Explanation
Toolbar	The 20.7.8 Toolbar of the Display and Symbol Editor allows fast access to actions and settings.
Header	The current name of the display page is shown in the header. You can change the name directly in the header. Consecutive numbering in the style 1/5 indicates the current page number (in the example 1) and the total number of pages (in the example 5).
Working area	This working area is used to generate the content for the display page. Place various elements from the global DIGSI 5 library in the working area for this purpose. These elements represent equipment items such as busbars or circuit breakers. You then interconnect these individual elements with lines. In addition, you can insert text and signals updated dynamically in the display page.

Linked Tabs in the Task Card

If the Display editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.5 Signals](#)
This tab can be used to add signals to the display page.
- [20.2.1 Tasks](#)
You can use this tab to search for information within the Display editor.
- [20.2.3 Libraries](#)
You can use this tab to add equipment items such as circuit breakers or busbars to the display page.

Related Topics

[6.5.1 Overview of Display Pages](#)
[6.5.2.1 Opening a Display Page](#)
[20.1.15 Symbol Editor](#)

20.1.14 Dynamic Display Editor

Elements and Explanations

You can find explanations for the elements of the **Dynamic display** editor in the following table.

Element	Explanation
Toolbar of the Dynamic Display	
	This button is used to update the dynamic display data.
Elements of the Dynamic Display editor	
Tag name	This column displays the block parameter/tag in the chart.
Value	This column displays the respective value.
Online value	This column displays the online value if the For Test option is set and if the address is available.
For test	This column enables you to select the For test option for the respective parameter.
Comment	This column displays the comment in the function block-terminal to which the signal is connected.

Related Topics

[12.1.1.9 Basic Procedure](#)
[20.1.10 Function-Chart \(CFC\) Editor](#)

20.1.15 Symbol Editor

You can use the Symbol editor to create symbols for user-defined elements, which you can then use on the display page.

Elements and Explanations

You can find explanations for the elements of the Symbol editor in the following table.

Element	Explanation
Toolbar	The 20.7.8 Toolbar of the Display and Symbol Editor allows fast access to actions and settings.
Name	This text box contains a consecutively numbered standard name for the element. Enter another name for the element, if required.
Width	Use this list box to define the maximum width of the graphic element in the range from 10 pixels to 80 pixels.
Height	Use this list box to define the maximum height of the graphic element in the range from 10 pixels to 80 pixels.
Default symbol	Select from this list box one of the values Off (01) , On (10) , Intermediate position (00) or Faulty position (11) as a basic state for the graphic element. The number of selectable settings depends on the settings in the area Only display states for .

Show only states for	Select the number of states for the graphic element in this area. A static graphic element only has one state and therefore also only one symbol. A dynamic graphical element has up to 4 states and has one symbol for each state. The following options are available: • Static element (1 symbol is used) • Dynamic element for single-point indications (2 symbols are used) • Dynamic element for double-point indications (4 symbols are used)
Symbol area	The symbol area is used to draw the symbol. Various drawing tools are available for this purpose. Each of the maximum 4 symbols has its own symbol area. The number of symbol areas that can be edited always corresponds to the option you have selected under Show only states for .
Symbol preview	You see the symbol in its original size in the symbol preview below each symbol area.
OK	This button is used to accept the symbols created and close the Symbol editor. The new element is added to the display page.
Cancel	This button is used to reject the symbols created and close the Symbol editor.

Linked Tabs in the Task Card

If the Symbol editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab to search for information within the Symbol editor.
- [20.2.3 Libraries](#)
You can use this tab to insert elements such as, for example, circuit breakers as the basis for your own elements in the Symbol editor.

Related Topics

[6.5.5.1 Opening the Symbol Editor](#)
[20.1.13 Display Editor](#)

20.1.16 Fault-Display Configuration Editor

You can use the Fault-display configuration editor to configure one fault display for each circuit breaker configured in the application.

Elements and Explanations

You can find explanations for the elements of the Fault-display configuration editor in the following table.

Element	Explanation
Toolbar	The 20.7.9 Toolbar of the Fault-Display Configuration Editor allows fast access to actions and settings.
Display	This column contains one check box for each circuit-breaker function group. You can use this check box to select the circuit breaker for which a fault display needs to be shown in the display of the SIPROTEC 5 device.
Function group	This column contains the names of all circuit-breaker function groups. The names of the 6 display lines are arranged below each circuit-breaker function group.

Displayed information	You can use the list boxes in this column to select one of the predefined information for each of the 6 display lines within the fault display, for example, indications or measured values. You can select the following information: Pickup indication If you select this indication, the name of the stage that was tripped first will be displayed in the event of a fault. The displayed indication can also contain additional information for phases, grounding and direction. PU time If you select this measured value, the entire pickup duration of the fault is displayed. Operate indication If you select this indication, the name of the position level that was triggered first will be displayed in the event of a fault. The displayed indication can also contain additional information for phases. Trip indication If you select this indication, the name of the control device or switching device which was tripped will be displayed in the event of a fault. The displayed indication can also contain additional information for phases. Trip time If you select this measured value, the tripping time is related to the start of the fault event (tripping start) Fault distance If you select this measured value, the measured distance to the fault point is displayed.

Linked Tabs in the Task Card

If the Fault-display configuration editor is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
 This tab is always displayed. However, these are not needed for working with the Fault-display configuration editor.
- [20.2.3 Libraries](#)
 This tab is always displayed. However, these are not needed for working with the Fault-display configuration editor.

Related Topics

[6.5.6.3 Configuring Fault Displays](#)

20.1.17 Document Information Editor

The Document information editor is used to create and edit masters for documentation of the device and project data.

Elements and Explanations

You can find explanations for the elements of the Document information editor in the following table.

Element	Explanation
General	
Name	This text box contains a consecutively numbered standard name for the document information set. You can optionally enter a different name for the template. The name appears in the project tree as an object. When printing, the document information set can be selected to use the data from it.

Element	Explanation
Document title	This text box enables you to enter the title for the printed documentation. The title is used automatically for printing out as soon as the document information is selected during print.
Frame & cover page	
Frame	This list box enables you to select the frame layout, which serves as the basis for the printout.
Cover page	This list box enables you to select the cover page, which serves as the basis for the printout.
User	
Owner	This text box enables you to specify the name of the person or company that created the project.
Edited by	This text box enables you to specify the name of the person or company that edited the project.
Designed by	This text box enables you to specify the designer of the frame and cover page.
Approved by	This text box enables you to specify the name of the person who released the document.
Checked by	This text box enables you to specify the name of the person who proofread the document.
Date/time	
Created date	This list box enables you to specify the date on which the project was created.
Review date	This list box enables you to specify the date on which the project was reviewed.
Approval date	This list box enables you to specify the date on which the project was approved.
Text	
Location (LID)	This text box enables you to specify the location where the project was created or edited.
1st view	This text box enables you to specify the notes about the view or appearance of the document to be printed using the document information.
1st description	This text box enables you to specify the 1st description of the project.
2nd description	This text box enables you to specify the 2nd description of the project.
Version	This text box enables you to specify the version of the current project.
User Defined	The text box for user-defined field enables you to enter freely selectable text that can be added to a printout.

Linked Tabs in the Task Card

If the Document editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Document editor.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Document editor.

Related Topics

- [17.1.1 Overview for Designing and Printing Documents](#)
- [17.1.2 Opening the Document Information Editor](#)

20.1.18 Frames Editor

The Frames editor is used to create frames for documentation of the device and project data.

Elements and Explanations

You can find explanations for the elements of the Frames editor in the following table.

Element	Explanation
Toolbar	The 20.7.22 Toolbar of the Documentation Settings Editor allows fast access to actions and settings.
Working area	This working area is used to generate and edit masters (frame templates). You can add or even delete text fields, forms and image fields and format the named objects for this purpose.
Rulers	A horizontal and a vertical ruler help you align objects in the master. Such objects are text fields, forms, and image fields. You can show/hide the ruler.

Linked Tabs in the Task Card

If the Frames editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Frames editor.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Frames editor.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.2 Opening the Document Information Editor](#)

20.1.19 Cover Pages Editor

The Cover pages editor is used to create frames for documentation of the device and project data.

Elements and Explanations

You can find explanations for the elements of the Cover pages editor in the following table.

Element	Explanation
Toolbar	The 20.7.22 Toolbar of the Documentation Settings Editor allows fast access to actions and settings.
Working area	This working area is used to generate and edit masters (print templates). You can add or even delete text fields, forms and image fields and format the named objects for this purpose.
Rulers	A horizontal and a vertical ruler help you align objects in the master. Such objects are text fields, forms, and image fields. You can show/hide the ruler.

Linked Tabs in the Task Card

If the Cover pages editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Cover pages editor.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Cover pages editor.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.2 Opening the Document Information Editor](#)

20.1.20 IEC 61850 Structure Editor

You can use the IEC 61850 structure editor to access the IEC 61850 structure of an offline configuration and adapt the structure to suit your requirements.

Elements and Explanations

You can find explanations for the elements of the IEC 61850 structure editor in the following table.

Element	Explanation
Toolbar	The 20.7.11 Toolbar of the IEC 61850 Structure Editor allows fast access to actions and settings.
Name	This column contains the IEC 61850 structure of the offline configuration selected. The structure is designed hierarchically in the form Logical device > Logical nodes > Data object. Depending on the setting currently selected, you see the SIPROTEC 5 view or the view similar to SIPROTEC 4. You can switch between these views using a list box in the toolbar of the IEC 61850 structure editor. Use the arrows to the left of the element names to filter for individual elements of the structure. Data objects displayed with the  icon in a cell under the Name column indicate that the respective data object is a setting. If the selected cell is displayed in light gray, it indicates that the element name is editable. If the selected cell is displayed in dark gray, it indicates that the element name is read-only. When selecting a light gray cell, the cell turns white. Medium gray or dark gray cells do not turn white when selecting them.
Active on interface	This column displays the current visibility of settings and SIPROTEC extensions in the IEC 61850 interface. The interface refers to the IEC 61850 port of the SIPROTEC 5 device. LNs and LDs which are not checked in this column are not transferred to the IEC 61850 System configurator (IID file) or to the SIPROTEC 5 device and therefore cannot be accessed over IEC 61850 (for example, using the IEC Browser). The check-box options (read-only and editable) under the Active on interface column for the respective objects in the Name column indicates different possibilities:
	Read-only check-box options:
	☒ Indicates that the data object cannot be hidden from the IEC 61850 interface. You cannot modify the check-box state. ☐ ☐
	Editable check-box options:
	☒ Indicates that the element is visible and is included for export in the IEC 61850 interface. You can modify the check-box state and select the desired option. ☐ Indicates that the element is hidden and excluded from export in the IEC 61850 interface. You can modify the check-box state and select the desired option. ☐ Indicates that the element is visible and is included for export in the IEC 61850 interface. In this case, some of the individual child object nodes are visible and some are hidden from export in the IEC 61850 interface. You can modify the check-box state and select the desired option.
Description	This column displays the association of an IEC 61850 element to a certain part of the SIPROTEC 5 signal list, for example, Line 1: External tripping 1: Stage 1: External tripping for phase 1 .
Comment	In this column, you can enter a comment for each IEC 61850 element.

Linked Tabs in the Task Card

If the IEC 61850 structure editor is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab to search for information within the IEC 61850 structure editor.
- [20.2.3 Libraries](#)
You can use this tab to add logical nodes and user-defined signals in the IEC 61850 structure editor.

Related Topics

[10.1 Overview of the IEC 61850 Structure](#)

[10.3 Opening and Adjusting the IEC 61850 Structure Editor](#)[20.7.11 Toolbar of the IEC 61850 Structure Editor](#)

20.1.21 Test-Sequences Editor

You can use the Test-sequences editor to generate test sequences for the internal test generator of a SIPROTEC 5 device.

Elements and Explanations

You can find explanations for the elements of the Test-sequences editor in the following table.

Element	Explanation
Toolbar	The 20.7.10 Toolbar of the Test-Sequences Editor allows fast access to actions and settings.
State name	This text box contains a consecutively numbered standard name for the state. Enter another name for the state, if required.
Execute this state for	A state of the test sequence ends after a previously defined duration. This list box is used to select a value for the duration in seconds. Alternatively, you enter a value in the text box of the list box.
Duration of each step	If you want to use the ramp function, use this list box to select a value for the state duration in seconds. Alternatively, you enter a value in the text box of the list box. After creating a state, the value is equal to 0.1. A value greater than 0 is required so that you can set the further parameters for the ramp function. With the ramp function, you can incrementally increase or reduce either the magnitude, the phase angle, or the frequency of an analog signal within a state. This is done by defining the step duration and a delta value. As soon as the state duration has expired, the value of the selected parameter (frequency or magnitude) will be increased or reduced by the delta value. This process is performed repeatedly until the duration of each step has expired.
Specify values for secondary analog-input signals for this state	In this area, you can set the values of the analog signals for the state currently selected. More information is provided by the following table, Specify values for secondary analog input signals for this state .
Specify status of binary-input signals for this state (Only first 25 binary inputs are supported)	In this area, you can define the status of each individual binary signal for the state currently selected. If a binary signal is to adopt the status High , mark the associated check box. If a binary signal is to adopt the status Low , remove the marking from the check box.
Specify values for signals used as inputs in function charts (CFC).	In the Signals column, this area displays the names of all signals that are used as input signals in the function charts of the current offline configuration. There is a list box for each signal in the Value column. These list boxes allow you select a value for each signal that should be used for the signal when the test sequence executes.

Specify values for secondary analog-input signals for this state Double-click on the cell with the value in order to change a value that can be set. The cell changes to a list box. To change the value, click on the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.	
Analog inputs This column block contains the names of the measuring points and the individual lines.	
Name	This column contains the names of all measuring points. You cannot change the names.
Phase	This column contains the names of the individual phases. You cannot change the names.
Start value You can define starting values for each analog signal in this column block. If you use the ramp function, the value of the analog signal will be incremented or decremented starting from this starting value. If you do not use the ramp function, the analog signal is assigned the defined starting value permanently during a state.	
Magnitude	This column contains the magnitudes of the individual analog signals.
Unit	This column contains the units for the magnitudes of the analog signals. You cannot change the units.
Phase angle	This column contains the values of the phase angles for the individual analog signals.
Frequency	This column contains the frequency values for the individual analog signals. The frequency must be identical for all analog signals routed to a measuring point. Hence, set a common frequency value per measuring point. This is automatically applied to all associated analog signals.
Ramping With the ramp function, you can incrementally increase or reduce either the magnitude, the phase angle or the frequency of an analog signal within a state. This column block is used to set these parameters for each analog signal.	
Parameter	This column contains a list box for each analog signal. This list box is used to select the settings that need to be changed with the ramp function. The magnitude, the phase angle, or the frequency are available for selection. The list box does not become active until a step duration greater than 0 is set. The list box is opened by clicking in the cell.
Delta	This column contains for each analog signal the delta value, which the ramp function is to use in order to change the setting selected. The value can be edited only if a setting is selected for the ramp function.
Approx. end value	This column contains the tentative final value for each analog signal, with the value being obtained from the remaining values specified. The final value is calculated automatically.
Unit	This column contains the units of the parameters selected. You cannot change the units.
Harmonic You can set parameters up to 3 harmonics for each analog signal. You can define the magnitude, phase angle, and factor for each harmonic. The 3 settings are combined together with the unit to one column range. Since you can set parameters for 3 harmonics, 3 column ranges are provided.	
Magnitude	This column contains the magnitudes of the individual harmonics.
Unit	This column contains the units for the magnitudes of the individual harmonics. You cannot change the units.
Phase angle	This column contains the values of the phase angles for the individual harmonics.
Factor	This column contains the factors of the individual harmonics, for example 3 for the 3rd harmonic. You can enter numbers in the range 2 through 40 for the factors.

Linked Tabs in the Task Card

If the Test-sequences editor is opened in the working area, the following tabs will be visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab to search for information within the Test-sequences editor.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test-sequences editor.

Related Topics

- [13.1 Overview of Test Sequences](#)
- [13.2.1 Opening the Test Sequence](#)

20.1.22 Test Editor for Wiring

You can select from the following test functions with the Test editor for wiring:

- Testing device components such as binary outputs and LEDs of a SIPROTEC 5 device

Elements and Explanations

You can find explanations for all the elements of the Test editor for wiring in the following table.

Element	Explanation
Toolbar	The 20.7.15 Toolbar of the Test Editor for Wiring allows fast access to actions and settings.
Header This area contains superordinate notes, instructions and operating elements. This area is orange if all the requirements for carrying out the test function have not yet been met. If the area is yellow, all requirements have been met and you can perform the test function.	
Restart the device	You can use this button to restart the SIPROTEC 5 device. The SIPROTEC 5 device is finally in commissioning mode. This mode is the requirement for carrying out the test functions. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens. This button is visible only if the SIPROTEC 5 device is not in commissioning mode.
Show device mode	This button is used to open the 20.5.3 Device Information in the working area. You can check and change the device mode in the 20.5.4 Device Information tab.
Change the Status of Binary Inputs, Binary Outputs and LEDs You can test the individual device components in this window. You can get information about the current status of the device components and set a specific destination status for this purpose. The window has a table-like structure. One row in the table contains the name of the device component together with other information. The information is arranged in columns.	
Binary inputs, binary outputs and LEDs	This column contains the following groups: • Binary inputs • Binary outputs • LEDs You can open or close the groups using the arrows to the left of the groups. If you open one of the groups, the names of the device components are displayed in this column and the other information is displayed in the other columns.
Routed to signals	This column contains the names of the signals that are routed to binary inputs, binary outputs or LEDs. Each signal is displayed with its complete path in the SIPROTEC 5 signal list, for example, Line 1: External tripping 1: Stage 1: External tripping for phase 1.

Terminal	This column contains the designations of the associated terminal pairs for binary inputs and binary outputs, for example, 3C2-3C1 .
Current state	This column contains the current states of the binary inputs, binary outputs or LEDs, that is On or Off .
New state	This column contains a button for each binary input, binary output and LED. The buttons are labeled with the current state respectively. If you click a button, the state of the associated device component is changed.

Linked Tabs in the Task Card

If the Test editor for wiring is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Test editor for wiring.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test editor for wiring.

Related Topics

[15.4.1 Testing Wiring](#)

20.1.23 Test Editor for Communication Modules

You can select from the following test and diagnostics functions with the Test editor for communication modules:

- Reading the communication protocol
- Displaying various pieces of information of the communication modules
- Executing HDLC loop test for protection-data communication

Elements and Explanations

You can find explanations for all the elements of the Test editor for communication modules in the following table.

Element	Explanation
Toolbar	The 20.7.16 Toolbar of the Test Editor for Communication Modules allows fast access to actions and settings.
Selection Information about communication modules is structured hierarchically in groups on the left side of the window of this Test editor. Each group corresponds to a communication module as well as the integrated Ethernet interface of the SIPROTEC 5 device. You can open or close the groups using the arrows to the left of the groups. Each group contains, depending on the respective communication module, other groups, for example, for the communication protocol.	
Communication Protocol If you mark the group of a communication protocol in the left window of the Test editor, the right window of the Test editor contains the contents of this communication protocol. The contents are structured in a tabular manner. One line in the table contains one indication together with other information. The information is arranged in columns.	
Time stamp	This column contains the date and time at the time of the occurrence of the indication, for example, 15.02.2011 22:33:06.352 . Indications are always summarized in an indication log. The indication log, too, has a time stamp. If you click on the arrow next to this time stamp on the left, the individual indications of the indication log are displayed.

Message number	This column contains a sequentially ascending numbering for all indications in the indication log. The most recent entry has the highest number.
Indication	This column contains the indication texts, for example, Starting the log successful .
HDLC Loop Test If you mark the HDLC loop test group in the left window of the Test editor, the right window of the Test editor contains the operating elements for the HDLC loop test.	
Restart the device	You can use this button to restart the SIPROTEC 5 device. The SIPROTEC 5 device is finally in commissioning mode. This mode is the requirement for carrying out the test functions. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens. This button is visible only if the SIPROTEC 5 device is not in commissioning mode.
Loop-test duration	This list box is used to set the time period for the HDLC loop test in seconds.
Start	This button is used to start the HDLC loop test.
Stop	This button is used to interrupt the HDLC loop test prematurely.
Further Information If you mark one of the other groups in the left window of the Test editor, the right window of the Test editor contains information pertaining to this group. An example of this is the signal information for the Protection interface group.	

Linked Tabs in the Task Card

If the Test editor for communication modules is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Test editor for communication modules.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test editor for communication modules.

Related Topics

[15.4.7 Reading the Communication Log](#)

[15.4.12 Executing HDLC Loop Test for Protection-Data Communication](#)

[15.4.11 Checking Diagnosis Data for Protection-Data Communication](#)

20.1.24 Test Editor for Analog Inputs

You can use the Test editor for analog inputs to check the current and voltage values present at the measuring points of a SIPROTEC 5 device.

Elements and Explanations

You can find explanations for all the elements of the Test editor for analog inputs in the following table.

Element	Explanation
Toolbar	The 20.7.17 Toolbar of the Test Editor for Analog Inputs allows fast access to actions and settings.

Header This area contains superordinate notes.	
Show device mode	This button is used to open the 20.5.3 Device Information in the working area. You can check and change the device mode in the 20.5.4 Device Information tab.
Phasor Diagrams The left window of the Test editor displays the current and voltage values as phasor diagrams for each SIPROTEC 5 device separately.	
Measured Values The right-hand window of the Test editor displays the current and voltage values as number values for each SIPROTEC 5 device separately. The window has a table-like structure. One line in the table contains the name and the values for one phase. The names and values are arranged in columns.	
Signals	This column contains one group for each SIPROTEC 5 device. You can open or close these groups using the arrows to the left of the groups. If you open one of the groups, the names of the phase, terminal, value and quality are displayed in the respective columns.
Terminal	This column contains the terminal values.
Value	This column contains the phase values separately for the magnitude and phase. The values are percentage values. In this case, 100 % is equivalent to the rated current or rated voltage of a phase.
Quality	This column contains the quality attributes of the analog inputs.

Linked Tabs in the Task Card

If the Test editor for analog inputs is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Test editor for analog inputs.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test editor for analog inputs.
- [20.2.6 Online](#)
You can use this tab to select and start the test sequences.

Related Topics

[15.4.2 Testing Analog Inputs](#)

20.1.25 Test Editor for Control Functions

You can use the Test editor for control functions to check the control functions for switching devices such as circuit breakers or disconnector switches.



NOTE

Follow the warning instructions given under [15.4.4 Testing Control Functions!](#)

Elements and Explanations

You can find explanations for all the elements of the Test editor for control functions in the following table.

Element	Explanation
Toolbar	The 20.7.18 Toolbar of the Test Editor for Control Functions allows fast access to actions and settings.
Header This area contains superordinate notes, instructions and operating elements. This area is orange if all the requirements or recommendations for carrying out the test function have not yet been met. If the area is yellow, all requirements have been met and you can perform the test function.	
Switch device to test mode (and send telegrams with test flags)	You can use this button to start the SIPROTEC 5 device. Afterwards, the SIPROTEC 5 device is in process mode. This mode is the requirement for carrying out the test functions. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens. This button is visible only if the SIPROTEC 5 device is not in process mode.
Operate switching devices directly	This button is used to activate test mode. All signals transmitted are now identified with a test bit. This button is visible only if test mode is deactivated.
Stop operating switching devices directly	This button is used to deactivate test mode. All signals are now transmitted without an identifier. This button is visible only if test mode is activated.
Ignore interlocking conditions	This button is used to deactivate interlocking conditions. This button is visible only if interlocking conditions are activated.
Consider interlocking conditions	This button is used to activate interlocking conditions. This button is visible only if interlocking conditions are deactivated.
Show device mode	This button is used to open the 20.5.3 Device Information in the working area. You can check and change the device mode in the 20.5.4 Device Information tab.
Control Functions In this window, you can test the individual switching devices. You can get information about the current state of the switching devices, set a new state and activate this state. The window has a table-like structure. One row in the table contains the name of a switching device together with operating elements and other information. The operating elements and information are arranged in columns.	
Switching functions	This column contains the names of all switching devices, whose particular function group contains the Control function.
Current value	This column contains the current states of the switching devices, for example, Open .
New value	This column contains a list box for each switching device. You can select a new state for the switching device with this list box.
Control operations	This column range contains 3 buttons for each switching device. You can use the Select button to select a switching device for change of state. You can use the Cancel button to cancel this selection. You can use the Operate button to switch a switching device that has been selected.
Interlocking condition	This column contains information about the state of the interlocking conditions, for example, Fulfilled .
Quality	This column contains the quality attributes of the control functions. The quality attributes possible are Valid , Questionable and Invalid .
Indication Overview Spontaneous indication log the switching procedures in this window. The window has a table-like structure. One line in the table contains one indication from several individual pieces of information. The information is arranged in columns.	
Time stamp	This column contains the date and time at the time of the occurrence of the indication, for example, 15.02.2011 22:33:06.352 .

Indication	This column contains the indication texts, for example, Circuit-breaker 1:Control: Command with feedback .
Value	This column contains the current states of the switching devices attained after switching operations, for example, Closed .
Additional information	This column contains additional information about the switching procedures, for example, about the cause or the initiator.
Quality	This column contains the quality attributes of the indications. The quality attributes possible are Valid , Questionable and Invalid .

Linked Tabs in the Task Card

If the Test editor for control functions is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Test editor for control functions.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test editor for control functions.

Related Topics

[15.4.4 Testing Control Functions](#)

20.1.26 Test Editor for Circuit Breakers

The switching performance of the circuit breakers can be checked with the Test editor for circuit breakers.



NOTE

Follow the warning instructions given under [15.4.3 Testing Circuit breakers!](#)

Elements and Explanations

You can find explanations for all the elements of the Test editor for circuit breaker in the following table.

Element	Explanation
Toolbar	The 20.7.19 Toolbar of the Test Editor for Circuit Breaker allows fast access to actions and settings.
Header This area contains superordinate notes, instructions and operating elements. This area is orange if all the requirements for carrying out the test function have not yet been met. If the area is yellow, all requirements have been met and you can perform the test function.	
Start	You can use this button to start the SIPROTEC 5 device. Afterwards, the SIPROTEC 5 device is in process mode. This mode is the requirement for carrying out the test function. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens. This button is visible only if the SIPROTEC 5 device is not in process mode.
Show device mode	This button is used to open the 20.5.3 Device Information in the working area. You can check and change the device mode in the 20.5.4 Device Information tab.

Test Functions You can start the testing method for the circuit breakers in this window. The window has a table-like structure. One line in the table contains the name of a testing method together with the information about the current state and the button to start the test. The information and button are arranged in columns.	
Test function	This column contains one group per circuit breaker, whose function group contains the Circuit-breaker test function. You can open or close the groups using the arrows to the left of the groups. If you open one of the groups, the names of the testing methods is displayed in this column and the information and buttons are displayed in the other columns.
Test state	This column contains the test states of the testing methods, for example, Started or Successful .
Start	This column contains a testing method for each button. If you click on a button, the respective testing method gets started.
Indication Overview Spontaneous indications log the switching procedures in this window. The window has a table-like structure. One line in the table contains one indication from several individual pieces of information. The information is arranged in columns.	
Time stamp	This column contains the date and time at the time of the occurrence of the indication, for example, 15.02.2011 22:33:06.352 .
Indication	This column contains the indication texts, for example, Circuit-breaker 1:Control: Command with feedback .
Value	This column contains the current states of the switching devices attained after switching operations, for example, Closed .
Additional information	This column contains additional information about the switching procedures, for example, about the cause or the initiator.
Quality	This column contains the quality attributes of the indications. The quality attributes possible are Valid , Questionable and Invalid .

Linked Tabs in the Task Card

If the Test editor for circuit breakers is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Test editor for circuit breakers.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test editor for circuit breakers.

Related Topics

[15.4.3 Testing Circuit breakers](#)

20.1.27 Test Editor for Protection Functions

Protection function reactions to analog or binary input values can be checked with the Test editor for protection functions.

Elements and Explanations

You can find explanations for all the elements of the Test editor for protection functions in the following table.

Element	Explanation

Toolbar	The 20.7.20 Toolbar of the Test Editor for Protection Functions allows fast access to actions and settings.
Header This area contains superordinate notes, instructions and operating elements. This area is yellow if the SIPROTEC 5 device is in the process mode. This area is orange if the SIPROTEC 5 device is in simulation mode. You can carry out the test function in both device modes.	
Active simulation mode	You can use this button to restart the SIPROTEC 5 device. If the SIPROTEC 5 device is in process mode before restarting, it goes to simulation mode after restarting and vice versa. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens.
Show device mode	This button is used to open the 20.5.3 Device Information in the working area. You can check and change the device mode in the 20.5.4 Device Information tab.
Graphics Window Certain protection functions, for example, for distance protection or triggering, can be visualized graphically. These graphics include zone diagrams and trigger characteristic curves. If a protection function can be displayed graphically, you can use this window to check how it is working, based on the changes in the graphic.	
Indication Overview Spontaneous indication log the response of the protection function in this window. The window has a table-like structure. One line in the table contains one indication from several individual pieces of information. The information is arranged in columns.	
Time stamp	This column contains the date and time at the time of the occurrence of the indication, for example, 15.02.2011 22:33:06.352 .
Relative time	This column contains the relative time of the indication. The relative time refers to the time difference with respect to the 1st indication. This indication has the relative time 0. An example of the relative time is 00:15:35.231 .
Indication	This column contains the indication texts, for example, Circuit-breaker 1:Control: Command with feedback .
Value	This column contains the respective value of an indication, for example, Test .
Additional information	This column contains additional information, for example, about the cause or the initiator.
Quality	This column contains the quality attributes of the indications. The quality attributes possible are Valid , Questionable and Invalid .

Linked Tabs in the Task Card

If the Test editor for protection functions is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Test editor for protection functions.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test editor for protection functions.
- [20.2.6 Online](#)
You can use this tab to select and start the test sequences.

Related Topics

[15.4.5 Testing Protection Functions](#)

20.1.28 Test Editor for Communication Protocols

You can use the Test editor for communication protocols to set values for signals and then transmit the signals via the system interface.

Elements and Explanations

You can find explanations for all the elements of the Test editor for communication protocols in the following table.

Element	Explanation
Toolbar	The 20.7.21 Toolbar of the Test Editor for Communication Protocols allows fast access to actions and settings.
Header This area contains superordinate notes, instructions and operating elements. This area is orange if all the requirements or recommendations for carrying out the test function have not yet been met. If the area is yellow, all requirements and recommendations have been met and you can perform the test function.	
Activate commissioning mode	You can use this button to restart the SIPROTEC 5 device. The SIPROTEC 5 device is finally in commissioning mode. This mode is the requirement for carrying out the test function. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens. This button is visible only if the SIPROTEC 5 device is not in commissioning mode.
Show device mode	You can use this button to display the 20.5.3 Device Information in the working area. You can check and change the device mode in the 20.5.4 Device Information tab.
Test Window Select a value for the signal in this window and send this via the system interface. The window has a table-like structure. One row in the table contains the name of a signal together with other information and operating elements. The information and operating elements are arranged in columns.	
Signals	This column contains the names of the signals. All signals are structured in a hierarchical manner according to function groups and functions. The structure is an image of the signal list. Click on the arrows to the left of the element names to show or hide individual elements of the structure.
Type	This column contains the type for each signal, for example, PLC .
Routed to interface	If a signal in the 20.3.1 Communication Mapping matrix is routed to a communication interface, this column contains a description of the destination, for example, F:USART-AE-2FO:Channel 2:IEC 60870-5-103 .
Current value	This column contains the current values of the signals, for example, Off or Ready .
Simulated value	This column contains a list box for each signal whose value can be changed. You can select a new value for the signal with this list box.
Set/reset value	You can use this button to send the signal with the value set via the system interface.

Linked Tabs in the Task Card

If the Test editor for communication protocols is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed working with the Test editor for communication protocols.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed working with the Test editor for communication protocols.

Related Topics

[15.4.6 Testing Communication Protocols](#)

20.1.29 Test Editor for Protection Topology

You can select from the following test and diagnostics functions with the Test editor for protection topology:

- Checking diagnostics data for protection-data communication
- Checking topology information measured values for protection-data communication

Elements and Explanations

You can find explanations for all the elements of the Test editor for protection topology in the following table.

Element	Explanation
Show device mode	This button is used to open the 20.5.3 Device Information in the working area. You can check and change the device mode in the 20.5.4 Device Information tab.
Phasors	Topology-measured values for protection data communication can be checked with the 20.1.31 Phasors tab.
Protection topology	Diagnostics data for protection-data communication can be checked with the 20.1.30 Protection Topology tab.

Linked Tabs in the Task Card

If the Test editor for protection topology is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
This tab is always displayed. However, these are not needed for working with the Test editor for protection topology.
- [20.2.3 Libraries](#)
This tab is always displayed. However, these are not needed for working with the Test editor for protection topology.

Related Topics

[15.4.10 Checking Topology-Measured Values for Protection-Data Communication](#)

[15.4.11 Checking Diagnosis Data for Protection-Data Communication](#)

20.1.30 Protection Topology

You can use the **Protection topology** tab to check the diagnostics data to the protection-data communication.

Elements and Explanations

You can find explanations for the elements of the **Protection topology** tab in the following table.

Element	Explanation
Topology information	This window contains the topology-independent information for the protection-data communication.
Selection	Device-specific information is structured in groups in this window. Each group corresponds to one of the SIPROTEC 5 devices involved in the protection-data communication. You can open or close the groups using the arrows to the left of the groups. Each device group contains the groups, General and Protection interface .
Information	If you mark a group in the left window of the tab, this window contains the information pertaining to this group.

Related Topics

[15.4.11 Checking Diagnosis Data for Protection-Data Communication](#)

20.1.31 Phasors

Topology-measured values for protection-data communication can be checked with the **Phasors** tab.

Elements and Explanations

You can find explanations for the elements of the **Phasors** tab in the following table.

Element	Explanation
Phasor Diagrams	
The left window of the Test editor shows the current and voltage values of the 3-phase measuring points as a phasor diagram.	
Measured Values	
The right window of the Test editor shows the current and voltage values of all measuring points as numerical values.	
The window has a table-like structure. One line in the table contains the name and the values of one measuring-point input as well as other information. The names, values and other information are arranged in columns.	
Signals	This column contains 1 group for each measuring point. You can open or close these groups using the arrows to the left of the groups. If you open one of the groups, the names of the measuring point inputs are displayed in this column and the other information is displayed in the other columns.
Value	This column contains the values present at the measuring point inputs, separately for the magnitude and phase. The values are percentage values. In this case, 100 % is equivalent to the rated current or rated voltage of a phase.

Related Topics

[15.4.10 Checking Topology-Measured Values for Protection-Data Communication](#)

20.1.32 Manage Device Drivers View

Elements and Explanations

You can find explanations for the elements of the **Manage device drivers view** editor in the following table.

Element	Explanation
Toolbar	The toolbar allows fast access to actions and settings.
Installed	This tab enables you to view the status of the imported device drivers in DIGSI.
Device drivers	This column displays all the imported devices drivers along with its versions.
FW	This column displays the firmware versions of all the imported devices drivers.
CFG	This column displays the configuration version of all the imported devices drivers.
Status	This column displays the status of the imported devices drivers (for example, Installed or Withdrawn).

Related Topics

[2.2.8 Managing Device Drivers](#)

20.1.33 IEC Station

Elements and Explanations

You can find explanations for the elements of the **IEC station** editor in the following table.

Element	Explanation
	The button allows you to export changes to the IEC System Configurator.
	The button allows you to import changes from the IEC System Configurator.
Available devices	
IEC 61850 name	This column displays the list of IEC 61850 names corresponding to the available devices.
Device name	This column displays the device name assigned to the IEC station.
	This button allows you to move all the devices from the Available devices group to the Assigned devices group.
	This button allows you to move a single device from the Available devices group to the Assigned devices group.
	This button allows you to move a single device from the Assigned devices group to the Available devices group.
	This button allows you to move all the devices from the Assigned devices group to the Available devices group.
Assigned devices	
Status	This column displays the status of the device corresponding to the IEC 61850 configuration.
IEC 61850 name	This column displays the list of IEC 61850 names corresponding to the assigned devices.
Device name	This column displays the list of device names assigned to the IEC station.

Related Topics

[14.10.2 Adding an IEC Station](#)

[14.10.8 Assigning a SIPROTEC 5 Device to an IEC Station](#)

[14.10.11 Associating a System Configurator Project with the DIGSI 5 IEC Station](#)

[14.10.7 Viewing Devices in an IEC Station](#)

20.1.34 Trend Display Editor

Elements and Explanations

You can find explanations for the elements of the **Trend display** editor in the following table.

Element	Explanation
Toolbar of the Trend Display	
	This button is used to update the trend data.
	This button enables you to add the analog axis.
	This button enables you to add the digital axis.
	This list box enables you to set the time range of the x-axis (input in minutes).
Elements of the Trend display editor	
y-axis/trend	This column displays the name of the y axis/name of the trend in the diagram.
Tag name	This column displays the block parameter/tag in the chart.

Element	Explanation
Trend color	This column displays the trend color.
Emphasis	This column displays the emphasis of the curve (thick/thin).
Sampling time	This column displays the sampling time in seconds. If you select the option as 0, then every received value is applied.
Value representation	This column displays the measured values connected by lines or only as points.
Min	This column displays the low value of the y axis.
Max	This column displays the high value of the y axis
Unit	This column displays the respective unit.
Axis position	This column displays the axis position (left or right).
Axis mode	This column displays the axis mode (linear or logarithmic).
Toolbar of the Trend Chart Display	
Zoom (icons)	The zoom icons can be used to zoom the horizontal and vertical axes separately. The toolbar provides a zoom in and a zoom out icon.
Display mode (selection box)	The display mode for the x time axis of the trend chart can be set up using the selection box of the toolbar. The following display modes are available: • Static You can select this option for a static time range display. The time interval is not refreshed. You can set any range. This mode can be used to visualize all logged values in detail. Siemens recommends using this display mode for static values. • Strip You can select this option for a dynamic display. The time axis always displays the current time at the far right. You can change the duration of the time interval. • Scope (jumping time range display) The time axis displays a fixed time interval. Once the trend values reach the right edge, the display changes so that the current time is shown at the left edge. • Sweep You can select this option for a sweep mode display. This mode is similar to the Scope mode. However, the values of the last sweep continue to be displayed until they are overwritten by the current values.
Trend manager (Select trend: selection field)	The trend manager visualizes the trend to axis assignments. You can hide trends by disabling the corresponding check box. Hidden trends are no longer recorded in the trend chart, but still displayed in the legend in dimmed mode. Select trends to be edited in the trend manager. In addition to a color code, the trends in the trend chart are also provided with a marker to enable their quick identification in the legend and trend manager.
Import/export (icons)	The trends can be exported or imported in CSV format. The export icon is enabled once you have selected a trend in the trend manager. Imported trends are visualized on separate x and y axes. You can improve the comparison of an imported trend with a trend from active logging by linking the x-axis of the imported trend with the existing axis.
Customizing the user interface (View menu)	This menu can be used to show and hide display elements such as the legends, rulers, or markers.
Linking x axes (Link axes selection field)	When a trend is imported, the new x-axis (axis B) can be linked to the existing x-axis (axis A). In the linked mode, axis B moves simultaneously with axis A, but can be adjusted without interfering with axis A. This mode allows you to compare history trends with the current trend.
Printing (Print icon)	The print dialog can be used to print the currently displayed trends of the trend chart. The printout can include a comment.

Element	Explanation
Trend Window Elements and Operating Options	
Maximum value	This field displays the maximum value of an analog axis. The access for editing depends on the state of the associated write protection - Write protection disabled state (open padlock icon): You can edit the value in the corresponding column of the definition table, or directly in this field. Changes to the cell in the definition table are transferred to the field of the y axis. However, changes to the field of the y axis are not transferred to the corresponding cell in the definition table. - Write protection enabled state (closed padlock icon): The value cannot be edited in the corresponding column of the definition table or in the y axis field. You can restore the configured minimum/maximum with double-click on the y axis.
Write protection for the input field	Using this icon, you can enable write protection for the input field next to the icon (closed padlock icon), or disable it (open padlock icon). - Write protection disabled state (open padlock icon): You can edit the value in the corresponding column of the definition table, or directly in this field. Changes to the cell in the definition table are transferred to the field of the y-axis. However, changes to the field of the y-axis are not transferred to the corresponding cell in the definition table. - Write protection enabled state (closed padlock icon): The value cannot be edited in the corresponding column of the definition table or in the y-axis field.
Y axis (here: analog axis)	The y-axis is labeled with the axis name and the configured physical unit.
Minimum value	This field displays the minimum value of an analog axis. The access for editing depends on the state of the write protection.
Time (right edge of the visualized trend range)	This field displays the time for the right edge of the x-axis. The write access depends on: - The state of the associated write protection - The selected display mode You can use the selection function to open a calendar and select a different day.
Time range of the x-axis	The time range of the x-axis is set in the definition table.
Time (left edge of the visualized trend range)	This field displays the time for the left edge of the x-axis. The write access depends on the following: - The state of the associated write protection - The selected display mode You can use the selection function to open a calendar and select a different day.
Digital trend names	The names of the digital trends are displayed outside of the trend chart. The position depends on the configured position of the digital axis.
Y axis (here: digital axis)	The y-axis is labeled with the axis names.
Legend (analog trends)	The legend displays the markers and names of the visualized analog trends. The corresponding values are displayed to the right of the trend name: - If there is no ruler, the last values added to the trend are displayed. - If at least one ruler is displayed, the associated values are displayed to the right of the trend name at the active ruler.
Analog trends	Analog trends are visualized in the upper area of the trend window. The names of the analog trends (F) are displayed in the legend of the trend chart. A tooltip is displayed for each visualized trend whenever you position the mouse pointer on the trend line. The tooltip first displays the trend name. Click this name to display the configured data source.
Markers	Markers help you to distinguish between several trends. You can enable the display of markers in the View menu.

Element	Explanation
Interpolated trend value	A value without underscore on the ruler indicates that this is an interpolated value. A defined online value is not available for this trend point.
Defined trend value	An underscored value on the ruler indicates that this is a defined online value.
Digital trends	Digital trends are visualized in the lower area of the trend window. The names of the digital trends are displayed outside of the trend chart. The position depends on the configured position of the digital axis. A tooltip is displayed for each visualized trend whenever you position the mouse pointer on the trend line. The tooltip first displays the trend name. Click this name to display the configured data source.
Ruler	A ruler displays the value of each trend at the ruler/trend intersections. Every ruler displays the associated time stamp with date and time. A trend chart may have several rulers. The active ruler is indicated by a yellow marker at its top end. The values at the active rulers are displayed in the legend (A) to the right of the trend name. • Adding rulers: You can drag and drop a new ruler from its docking position on the left edge of the trend chart to a specific position in the trend chart. • Copying rulers: Press <CTRL> and click the ruler to paste a copy thereof. • Deleting rulers: Drag the ruler to the left edge of the trend chart. Press <Alt> and click the ruler to be deleted.
Ratio display/scroll bar (y-axis)	This function depends on the selected display mode and only affects analog trends: • Scroll bar function along with the ratio display in the Static display mode. • Ratio display in all other display modes. Ratio display The scroll bar displays the approximate ratio between the configured and currently displayed range of values of the y-axis in the trend chart. Scroll bar The scroll bar can be used to shift the visible range of a trend in the trend chart if the displayed time range of the y-axis was modified in vertical direction, for example, by means of the zoom icons.
Ratio display/scroll bar (x-axis)	This function depends on the selected display mode and only affects analog trends: • Scroll bar function along with the ratio display in the Static display mode. • Ratio display in all other display modes. Ratio display The scroll bar displays the approximate ratio between the configured and currently displayed range of values of the x-axis in the trend chart. Scroll bar The scroll bar can be used to shift the visible range of a trend in the trend chart if the displayed time range of the x-axis was modified in horizontal direction, for example, by means of the zoom icons.

Related Topics

[12.5.1 Brief Introduction to Function Subcharts and Templates](#)

[12.1.1.9 Basic Procedure](#)

[20.1.10 Function-Chart \(CFC\) Editor](#)

20.1.35 Signal Order Editor

Elements and Explanations

You can find explanations for the elements of the **Signal order** Editor in the following table.

Element	Explanation
Toolbar of the Signal order editor	
	This list box allows you to select the following Fault recorder types for the 7KE device: • Fast-scan • Slow-scan • Continuous • Trend NOTE • For all device types other than the 7KE device, the list box is disabled and it displays the default recorder.
	This button allows you to move the selected signal or signals up by 1 row. Selection of single and multiple signals is possible.
	This button allows you to move selected signal or signals down by 1 row. Selection of single and multiple signals is possible.
	This button allows you to reset the order of the signals to the default order.
Elements of the Signal order Editor	
MV signals	This tab displays the MV signals routed to the Recorder column in the 20.3.2 Information Routing Editor. The following columns are available in the MV signals tab: • Signal: This column contains the names of the MV signals. All signals are structured in a hierarchical manner according to the function groups, functions, function blocks, and signal names separated by a colon. • Alternative name: This column displays the alternative name of the routed signal.
SPS signals	This tab displays the SPS signals routed to the Recorder column in the 20.3.2 Information Routing Editor. The following columns are available in the SPS signals tab: • Signal: This column contains the names of the SPS signals. All signals are structured in a hierarchical manner according to the function groups, functions, function blocks, and signal names separated by colon. • Alternative name: This column displays the alternative name of the routed signal.

Related Topics

[15.5.3.3 Configuring the Signal Order for Fault Recording](#)
[20.3.2 Information Routing](#)

20.2 Tabs in the Task Area

20.2.1 Tasks

The **Tasks** tab contains operating elements for the **Find and Replace** function. This function offers a range of additional options. The extra options that can be selected are dependent on the current tool opened in the working area, for example, editor or matrix.

Elements and Explanations

You can find explanations for the elements of the **Tasks** tab in the following table.

Element	Explanation
Find and Replace	
Find	Enter a search term in the text box of this list box. Alternatively, you can select one of the search terms last entered from the list box. You can also use placeholders in your search term. You can use an asterisk as a placeholder for any number of characters. If, for example, you search for all words beginning with Device, enter Device*. If, on the other hand, you wish to leave out an individual character, enter a question mark as a placeholder. To prevent the placeholder from being interpreted as a normal character, you have to mark the Use wildcards check box. You can also use regular texts as a search term. A regular text is a character string serving to describe quantities and used as a filter. You can perform complex search patterns in this way. To ensure that a regular text is recognized as such, mark the Use regular expressions check box.
Whole words only	Only whole words will be searched for if you mark this check box. Compound words containing the search term as a component of the word will be ignored.
Match case	The case (uppercase/lowercase) of the search term will be matched if you mark this check box.
Find in substructures	If you mark this check box, texts contained in a subordinate object will also be searched for.
Find in hidden texts	Texts that are currently hidden will also be included in the search if you mark this check box.
Use wildcards	If you mark this check box, the characters * and ? will be interpreted as a placeholder in your search term.
Use regular expressions	Regular texts can be used as a search term if you mark this check box.
Whole document	This option is used to define the scope of the search. Select Whole document if you wish to search through the entire editor content independently of the current selection.
From current position	This option is used to define the scope of the search. Select From current position if you wish to begin the search from the current selection.
Selection	This option is used to define the scope of the search. Select Selection if you wish to search within the current selection.
Down	This option is used to define the search direction. Select Down to search through the editor from top to bottom or from left to right.
Up	This option is used to define the search direction. Select Up to search through the editor from bottom to top or from right to left.

Element	Explanation
Find	This button is used to start the search. The first match is marked in the editor.
Replace with	Enter a substitute term with which you wish to replace the match in the text box of this list box. Alternatively, you can select one of the substitute terms last entered from the list box.
Replace	This button is used to replace the marked match by the specified substitute term. The next match is then automatically marked in the editor.
Replace all	This button is used to replace all matches at once.

Linked Tools in the Working Area

You can always access the **Tasks** tab, irrespective of which tool is opened in the working area.

20.2.2 Toolbox

Elements and Explanations

You can find explanations for the elements of the **Toolbox** tab in the following table.

Element	Explanation
Text box	This element enables you to insert a placeholder for the text element. The text selected automatically from a document information for printing can be set in the properties of the text field once it has been placed in the working area.
Date/Time	This element enables you to insert a placeholder for the date and time. The date and time selected automatically for printing can be set in the properties of the field, once it has been placed in the working area.
Page number	This element enables you to insert a field that is automatically filled with the current page number for printing.
Free Text	This element enables a text field for user-defined text. You can enter the text in the properties of the text field in the properties window.
Image	This element enables you to insert a placeholder for inserting an image. Images in the formats BMP, JPEG, PNG, EMF or GIF are possible.

Linked Tools in the Working Area

You can access the **Toolbox** tab, only if the **Frames** editor or the **Cover pages** editor is opened in the working area.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.8.2 Adding and Editing a Text Box](#)

[20.1.18 Frames Editor](#)

[20.1.19 Cover Pages Editor](#)

20.2.3 Libraries

The **Libraries** tab contains the global DIGSI 5 library and the project library. To create a single-line diagram or a display page, for example, use elements from the global DIGSI 5 library.

The **Libraries** tab is divided into 3 palettes:

- Project library
- Global libraries
- Information

Elements and Explanations

You can find explanations for the elements of the **Libraries** tab in the following table.

Element	Explanation
Project Library	
The project library is intended for future expansion.	
Global Libraries	
Toolbar	The 20.7.40 Toolbar of the Global Libraries Palette is used for fast access to actions and settings in the Global DIGSI 5 library palette to work with the user-defined global DIGSI 5 library.
List box	This list box is used to filter the display of the global DIGSI 5 library. To be able to see all elements, select the All settings. If you select the Context-based filtering setting, only those elements that you require for work with the active editor are displayed.
Library structure	Folders named Global DIGSI 5 library and Documentation templates with subfolders are displayed in the Global libraries palette. You can view the device types grouped under the respective device family. The device family is based on the type of protection device drivers imported in DIGSI 5. The content of this library is structured hierarchically. As in the project tree, you can navigate through the structure and show or hide individual levels.
Information	
Display area	This display area provides additional information on an element marked in the library. Such information is typically the type of element or a brief description regarding the use of the element.

Linked Tools in the Working Area

You can always access the **Libraries** tab, irrespective of which tool is opened in the working area.

Related Topics

[3.3.2 Opening the Libraries Tab](#)

[3.3.5 Using Elements of the Global DIGSI 5 Library](#)

[3.3.3 Working with the User-Defined Global DIGSI 5 Library](#)

20.2.4 Hardware Catalog

The **Hardware catalog** tab contains individual components of SIPROTEC 5 devices, for example communication modules, as well as preconfigured devices. The **Hardware catalog** tab is typically used, for example, to adapt offline configured hardware to its requirements.

The **Hardware catalog** tab is divided into 2 palettes:

- Catalog
- Information

Elements and Explanations

You can find explanations for the elements of the **Hardware catalog** tab in the following table.

Element	Explanation
Catalog	
Toolbar	The 20.7.26 Toolbar of the Hardware-Catalog Palette allows rapid access to actions and settings.

Catalog structure	The content of the catalog is structured hierarchically. The SIPROTEC 5 folder contains all components and preconfigured devices. The content of the folder is structured by categories with further folders, for example Communication modules or Input/output modules . As in the project tree, you can navigate through the structure and show or hide individual levels.
Information	
Display area	This display area provides additional information about a marked component in a hardware catalog: • Graphical representation • Order no. • Version • Description

Linked Tools in the Working Area

You can access the **Hardware Catalog** tab as soon as one of the following tools is open in the working area:

- [20.1.6 Network View](#)
- [20.1.7 Device View](#)

Related Topics

[6.3.8 Searching for a Hardware Component in the Hardware Catalog](#)

[6.3.7 Adding a Hardware Component from the Hardware Catalog](#)

[6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#)

20.2.5 Signals

The **Signals** tab contains the signals and the settings of all offline configurations in the project. The **Signals** tab is typically used to link elements on a display page to signals.

The **Signals** tab is divided into 2 sections:

- Signal catalog
- Information

Elements and Explanations

You can find explanations for the elements of the **Signals** tab in the following table.

Element	Explanation
Signal Catalog	
Toolbar	The 20.7.27 Toolbar of the Signal-Catalog Palette allows rapid access to actions and settings.
Signal and setting list	The signals and settings are structured in a hierarchical manner. As in the project tree, you can navigate through the structure and show or hide the individual levels. You can use a list box to filter the displayed signals and settings according to their names.
Type	This column contains the abbreviation of the type for each signal and setting. You can use a list box to filter the displayed signals and settings according to their types.
Information	
Display area	This display area provides additional information about a signal marked in the signal catalog: • Type • IEC 61850 name • IEC 61850 path • Description

Linked Tools in the Working Area

You can access the **Signals** tab as soon as one of the following tools is open in the working area:

- [20.1.13 Display Editor](#)
- [20.3.2 Information Routing](#)
- [20.1.11 Data Flow](#)
- [20.1.12 Control Flow](#)

Supported Signals

- [List of Supported Signals for the Display Page, Page 148](#)
- [List of Supported Signal Types for the Function Chart, Page 323](#)
- [List of Supported Setting Types for the Function Chart, Page 323](#)

Related Topics

- [9.6.1 Overview of the Signal Catalog](#)
- [6.5.3.5 Connecting Graphical Elements in a Display Page with a Signal](#)
- [12.1.5.3 Interconnecting a Block with a Signal or a Setting](#)

20.2.6 Online

The **Online** tab contains the **Test environment** palette. Test sequences can be used online with the DIGSI 5 PC connected SIPROTEC 5 device with elements of this palette.

Elements and Explanations

You can find explanations for the elements of the **Online** tab in the following table.

Element	Explanation
Test Environment	
Restart device in simulation mode	This button is used to start the online device in simulation mode. That is the requirement for executing test sequences. The button is not active if the online device is already in simulation mode.
Status of execution	This area shows indications about the current execution state: • No information received The online device is not in simulation mode. • Approved by The online device is ready for test-sequence execution. • Running The test sequence is currently being executed. • Stopped The last test sequence executed was manually stopped or has ended.
Select test sequence	Select the test sequence that should be executed with this list box. The list box contains the names of all the test sequences in the offline configuration that belongs to the online device. This list box is active only if the online device is in simulation mode.
If the following binary input is set	Select this option if the test sequence should be executed as soon as a specific binary input is set. Select the respective binary input with the list box assigned to the option. This option and this list box are active only if the online device is in simulation mode.
Immediately start test sequence	Select this option if the test sequence should be executed as soon as the Start button is clicked. The option is active only if the online device is in simulation mode.

Start	This button is used to start the test sequence. When the Immediately start test sequence is selected, then the test sequence will start immediately. After selecting the If the following binary input is set option, click the Start button to release the test sequence. The test sequence is first started when the selected binary input is set. The button is active only if the online device is in simulation mode and the test sequence has not started yet.
Stop	This button is used to prematurely stop the test sequence. The button is active only if the online device is in simulation mode and the test sequence has started.

Linked Tools in the Working Area

You can access the **Online** tab as soon as one of the following tools is open in the working area:

- [20.1.24 Test Editor for Analog Inputs](#)
- [20.1.27 Test Editor for Protection Functions](#)

Related Topics

[15.4.2 Testing Analog Inputs](#)

[15.4.5 Testing Protection Functions](#)

20.3 Matrices

20.3.1 Communication Mapping

You can use the **Communication mapping** to define the signals for serial protocols that are transmitted via the communication interface of a SIPROTEC 5 device. Depending on your model, you can also route signals in the transmit or receive direction for each individual communication channels. You also have to set mapping settings for each signal routed. The **Communication mapping** matrix has a table-like structure. One row in the table is assigned to each signal. The transmit and receive direction as well as the mapping settings are arranged in columns.



NOTE

Certain settings described in the following table can take up only defined values, for example, **Yes** or **No**. To configure such settings, the respective cell of the **Communication mapping** matrix contains a list box. Other settings are defined by a numerical value. For this settings, the relevant cell contains an entry field.

Elements and Explanations

You can find explanations for the elements of the **Communication mapping** matrix in the following table.

Element	Explanation
Toolbar	The Toolbar of the communication mapping matrix allows fast access to actions and settings.
Columns that are Always Present These columns are always present regardless of whether a protocol is configured or not, or which protocol is selected.	
Signals	This column contains the names of the signals. All signals are structured in a hierarchical manner according to function groups and functions. The structure is an image of the signal list. Click on the arrows to the left of the element names to show or hide individual elements of the structure.
Number	This column contains the unique number for each signal. If this column is not visible, click in the toolbar of the Communication mapping matrix on the following button: The column is shown.
Type	This column contains the type for each signal, for example, MV , INS .
Fault record	This column indicates whether a signal is routed to the fault record. If a signal is routed to the fault record, the cell pertaining to the signal has an X . The cell is empty if a signal is not routed. You can change the routing only in the 20.3.2 Information Routing matrix.
Columns Present for All Protocols These columns are available only for the IEC 60870-5-103 , IEC 60870-5-104 , Modbus TCP , PROFINET IO , and DNP3 protocols as well as for the protection-data communication protocol. The columns are not available if none of these protocols is configured.	
Receive	You can route the input indications and commands in the receive direction in this column. You can route signals using the context menu. You find details on this under 14.9.5 Routing Signals for Communication .
Transmit	You can route the output indications and measured values in the transmit direction in this column. You can route signals using the context menu. You find details on this under 14.9.5 Routing Signals for Communication .

IEC 60870-5-103 These columns are available only for the IEC 60870-5-103 protocol. The columns are not available if this protocol is not configured.	
Function type	Enter the number of a function type for a signal that has been routed in this column. The function type identifies the functionality of a device. Certain numbers are not used. You can use these numbers as you like, without affecting the IEC 60870-5-103 compatibility.
Information number	Enter an information number for a signal that has been routed in this column. The information number describes the signal category (Indication, metered value or command).
Data unit	Enter the number of a data unit (DU) for a signal that has been routed in this column. Depending on the signal type, you can select from different data units.
General interrogation	Specify in this column for an indication that has been routed, whether it is subject to general interrogation or not. You can select between Yes or No . If you select Yes , the indication is transmitted only within the scope of a general interrogation.
Position	Specify in this column the position in the measured value telegram for a measured value that has been routed. In a 3-frame DU, you can route up to 4 measured values. In a 9-frame DU, you can route up to 16 measured values. In total, you can route one 3-frame DU and two 9-frame DU.
Fault channel	In this column, you can route a measured value that has been routed to the analog channel of a fault record. Enter the number of the fault-record channel for this purpose.
IEC 60870-5-104 These columns are available only for the IEC 60870-5-104 protocol. The columns are not available if this protocol is not configured.	
IOA	With this column, you can specify the Information object address (IOA).
GI group	Specify in this column for an indication that has been routed, whether it is subject to General Interrogation group (GI group) or not.
Event of Protection	With this column, you can specify the Event of protection (EOP).
Threshold	Enter a measured-value threshold in percent for a measured value that has been routed in this column.
Modbus TCP These columns are available only for the Modbus TCP protocol. The columns are not available if this protocol is not configured.	
Register type	In this column, you can specify the Register type. It describes the function code to retrieve the data of the signal.
Register address	Enter a register address for a signal that has been routed in this column. The register address has a certain range for different signal categories.
Event of Protection	You can specify in this column whether an indication that has been routed is subject to an Event of Protection or not.
PROFINET IO These columns are available only for the PROFINET IO protocol. The columns are not available if this protocol is not configured.	
Value	In this column, you can specify the address for a signal that has been routed. The address has a certain range for different signal categories.

DNP3	
These columns are available only for the DNP3 protocol. The columns are not available if this protocol is not configured.	
Index	Enter an index number ranging from 1 to 1,000 for a signal that has been routed in this column.
Class	Assign one of 3 classes to a signal that has been routed in this column. The class 1 is reserved for critical events. You can assign the class 2 or 3 to the less critical events.
Threshold	Enter a measured-value threshold in percent for a measured value that has been routed in this column. The measured-value threshold determines the transmission frequency of measured values. If you select the value zero for the measured-value threshold, each measured value is transmitted to the superordinate station. A measured-value threshold other than zero causes all changes of new measured values compared to the measured value transmitted last to be added. If the sum of the changes reaches the percent value set, a new measured value is transmitted at the next possible point in time. This measure prevents loading the communication path too much.
Protection-Data Communication Protocol	
These columns are available only for the protection-data communication protocol. The columns are not available if this protocol is not configured.	
Priority level	Select one of 3 priority levels for a signal that has been routed in this column. The priority level decides on how often it is transmitted.
Bit position	Set a bit position in the data bar for each signal that has been routed in this column. Note that some signal types need more than one bit. Also take care to ensure that a bit position is not already assigned to a signal of another device.
Fallback value	Select a fallback value for a received signal in this column. The fallback value decides what passes with the value of a signal if the connection is interrupted. Depending on the signal type, various fallback values can be selected. For example, the signal value can be set to a secure status or the last value received is retained.
IEC 60870-5-103 and DNP3	
These columns are available only for the IEC 60870-5-103 and DNP3 protocols. The columns are not available if none of these protocols is configured.	
Object group	Enter the number of an object group for a parameter that has been routed in this column.
Scaling factor	Enter a value for the measured scaling for a measured value that has been routed in this column.

**NOTE**

Other information regarding the configuration of the mapping settings are given in the Device manual, in the manual for the respective protocol and in the protocol specifications.

Linked Tabs in the Task Card

If the **Communication mapping** matrix is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab within the **Communication mapping** to search for information.
- [20.2.3 Libraries](#)
You can use this tab to add function groups, functions and signals in the **Communication mapping** matrix, and thus, in the application.

Related Topics

[14.9.1 Overview of Communication Mapping](#)

[14.9.3 Opening the Communication Mapping Matrix](#)

20.3.2 Information Routing

You can use the **Information routing** matrix to route information to sources and destinations.

The **Information routing** matrix has a table-like structure. One row in the table is assigned to each information. The sources and destinations are arranged in columns.

Elements and Explanations

You can find explanations for the elements of the **Information routing** matrix in the following table.

Element	Explanation
Toolbar	The 20.7.35 Toolbar of the Information Routing Matrix allows fast access to actions and settings.
Information	
Signals	This column contains the names of the signals. All signals are structured in a hierarchical manner according to function groups and functions. The structure is an image of the signal list. Click on the arrows to the left of the element names to show or hide individual elements of the structure.
Alternative name	This column enables you to define the alternative names of the signals. The allowed character limit to enter the alternative signal name differs based on the language selected because the limit is calculated based on the number of bytes used by the character. In this case, the maximum allowed limit of the byte size is 57 bytes. Each character can range from 1 bytes to 4 bytes depending on the language. For example, in English, each character is equal to single byte, whereas, in Chinese, each character is equal to 3 bytes to 4 bytes. While entering the alternative name, the count of characters is displayed on the right side of the text box. A rollout displays the relevant message on exceeding the allowed limit.
Number	This column contains the unique number for each signal. If this column is not visible, click in the toolbar of the Information routing matrix on the  button. The column is shown.
Type	This column contains the type for each signal, for example, MV, INS .
Source	
Binary input	This column range contains 1 other column range for each base and expansion module provided with binary inputs. The number of columns in these column ranges is identical to the number of binary inputs of the individual modules.
Function keys	This column range contains 1 column each for each of the 8 function keys of a base module. This column range is visible only if the base module has function keys.
GOOSE	This column is used to route signals in order to receive input signals via the IEC 61850 GOOSE protocol. M indicates the number of inputs available for binding the GOOSE external sources via the IEC 61850 system configurator. N indicates the number of unconnected inputs. The tooltip displays the maximum number of inputs supported by the signal. The inputs can be OR connected.

CFC	This column indicates whether a signal is used in a function chart (CFC). In DIGSI 5, to be able to use a signal in a function chart (CFC), you no longer need to route it to CFC. That is why this column only has a display feature. You cannot route any information to this column. If this column is not visible, click in the toolbar of the Information routing matrix on the  button. The column is shown.
Destination	
Binary output	This column range contains one other column range for each base and expansion module of the SIPROTEC 5 device provided with binary outputs. The number of columns in these column ranges is identical to the number of binary outputs of the individual modules.
LEDs	This column range contains one other column range for each base and expansion module of the SIPROTEC 5 device provided with LEDs. The number of columns in these column ranges is identical to the number of LEDs in the individual modules.
Recorder	This column range contains the Signal and Trigger columns. The Fault record column is always visible. The Trigger column is visible only if you have selected the User-defined option for the settings of the Fault record . You find more information about this under 15.5.3.2 Configuring and Setting Parameters for Fault Recording .
Logs	This column range contains one column each for the following event-log buffers: • Operational log • Fault log • Ground fault log • User-defined log 1 • User-defined log 2
Device menu	This column range contains one column each for the Measurement and Control device menus. This column range is visible only if the base module is provided with a display unit.
CFC	This column indicates whether a signal is used in a function chart (CFC). In DIGSI 5, to be able to use a signal in a function chart (CFC), you no longer need to route it to CFC. That is why this column only has a display feature. You cannot route any information to this column. If this column is not visible, click in the toolbar of the Information routing matrix on the  button. The column is shown.
Display	This column indicates whether a signal is used in a display page. In order to be able to use a signal in a display page, you need not route it in DIGSI 5 to the display unit. That is why this column only has a display feature. You cannot route any information to this column. If this column is not visible, click in the toolbar of the Information routing matrix on the  button. The column is displayed only if the base module is provided with a display unit.

Linked Tabs in the Task Card

If the **Information routing** matrix is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab within the **Information routing** to search for information.
- [20.2.3 Libraries](#)
You can use this tab to add function groups, functions and signals in the **Information routing** matrix, and thus, in the application.
- [20.2.5 Signals](#)
You can use this tab to add signals from another offline configuration to the **Information routing** matrix, and use them to generate a GOOSE connection.

Related Topics

[11.1 Overview for Information Routing](#)
[11.2 Basic Principles of Routing](#)
[11.3.1 Opening the Information Routing Matrix](#)

20.3.3 Trigger Routing

You can use the **Trigger routing** matrix to route triggers to fast scan and slow scan records available under Recorder column.

Elements and Explanations

You can find explanations for the elements of the **Trigger routing** matrix in the following table.

Element	Explanation
Trigger	This column contains the names of all Triggers instantiated in the device. Click on the arrows to the left of the element names to show or hide individual elements of the structure.
Recorder	Each recorder, for example, the Fast scan record, and Slow scan record is represented by column respectively. Each column bears the name of the associated recorder type. You can use the context menu to route a trigger to recorders. The common cell of the respective line and column contains the value X .

Linked Tabs in the Task Card

If the **Trigger routing** matrix is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab within the **Trigger routing** matrix to search for information.
- [20.2.3 Libraries](#)
This tab is always displayed. However, you do not need this for working with the **Trigger routing** matrix.

Related Topics

[15.5.3.1 Overview of Fault Recording](#)

20.3.4 Function-Group Connections

You can use the **Function-group connections** to edit the connections between the function groups as well as between function groups and measuring points.

Elements and Explanations

You can find explanations for the elements of the **Function-group connections** matrix in the following table.

Element	Explanation
Toolbar	The 20.7.37 Toolbar of the Function-Group Connections Matrix allows fast access to actions and settings.
Connect measuring points to function groups	In the 20.3.5 Connecting Measuring Points to Function Group window, you can change the predefined connections between measuring points and protection groups. If you have added new measuring points, you can also produce new connections to function groups.
Connect protection group to circuit-breaker groups	In the 20.3.6 Connecting Function Group to Circuit-Breaker Groups window, you can change the predefined connections between protection groups and circuit-breaker function groups. If you have added new function groups, you can also produce new connections between function groups.
Connect protection-function group to protection-function group	In the 20.3.7 Connecting Protection-Function Group to Protection-Function Group window, you can change the predefined connections between protection groups. If you have added new protection function groups, you can also produce new connections between function groups.

Linked Tabs in the Task Card

If the **Function-group connections** matrix is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab within the **Function-group connections** matrix to search for information.
- [20.2.3 Libraries](#)
This tab is always displayed. However, you do not need this for working with the **Function-group connections** matrix.

Related Topics

[8.1.1 Overview of Applications](#)

[8.1.4.1 Overview of Connections](#)

[8.1.4.2 Opening a Function-Group Connection Matrix and Adjusting a View](#)

20.3.5 Connecting Measuring Points to Function Group

You can use the **Connect measuring points to function group** window to connect measuring points with one or more function group inputs. You can find the **Connect measuring points to function group** window in the [20.3.4 Function-Group Connections](#) matrix.

The **Connect measuring points to function group** window has a table-like structure. One line in the table contains one measuring point. The function group inputs are arranged in columns.

Elements and Explanations

You can find explanations for the elements of the **Connect measuring points with function groups** window in the following table.

Element	Explanation
Measuring point	This column contains the names of all measuring points.

Protection group 1 to n	Each Protection group is represented by one column range respectively. This column range bears the name of the protection group. Depending on the types of measuring points used, one protection group has up to 4 inputs. This is why one column range contains up to 4 columns: • Voltage 3-phase • Line current 3-phase • Ground-current parallel line • Transf. neutral-point current You can use the context menu to connect measuring points and function-group inputs. If a measuring point is connected with a function-group input, the common cell of the respective line and column contains an X. You find details on this under 8.1.4.3 Connecting Measuring Points to Function Groups.
Circuit-breaker function group 1 to n	Each circuit-breaker function group is represented by one column range respectively. A column range bears the name of the associated circuit-breaker function group. Depending on the types of measuring points used, one circuit-breaker function group has up to 3 inputs. This is why one column range contains up to 3 columns: • Voltage • Line current 3-phase • Sync. voltage You can use the context menu to connect measuring points and function-group inputs. If a measuring point is connected with a function-group input, the common cell of the respective line and column contains an X. You find details on this under 8.1.4.3 Connecting Measuring Points to Function Groups.

Related Topics

[8.1.1 Overview of Applications](#)
[8.1.4.1 Overview of Connections](#)

20.3.6 Connecting Function Group to Circuit-Breaker Groups

You can use the **Connect function group to circuit-breaker groups** window to connect protection groups with one or more circuit-breaker function groups. You can find the **Connect function group to circuit-breaker groups** window in the [20.3.4 Function-Group Connections](#) matrix.

The **Connect function group to circuit-breaker groups** window has a table-like structure. One line in the table contains one protection group. The circuit-breaker function groups are arranged in columns.

Elements and Explanations

You can find explanations of the elements of the **Connect function group to circuit-breaker groups** window in the following table.

Element	Explanation
Protection group	This column contains the names of all protection groups.
Circuit-breaker function group 1 to n	Each circuit-breaker function group is represented by one column respectively. Each column bears the name of the associated circuit-breaker function group. You can use the context menu to connect protection groups and circuit-breaker function groups. If a protection group is connected with a circuit-breaker function group input, the common cell of the respective line and column contains an X. You find details on this under 8.1.4.4 Connecting Protection Groups with Circuit-Breaker Functions Groups.

Related Topics

[8.1.1 Overview of Applications](#)
[8.1.4.1 Overview of Connections](#)

20.3.7 Connecting Protection-Function Group to Protection-Function Group

You can use the **Connect protection-function group to protection-function group** window to change the predefined connections between protection groups. You can find the **Connect protection-function group to protection-function group** window in the [20.3.4 Function-Group Connections](#) matrix.

Elements and Explanations

You can find explanations of the elements of the **Connect protection-function group to protection-function group** window in the following table.

Element	Explanation
Protection group	This column contains the names of all protection groups.
Protection function group 1 to n	Each protection function group is represented by one column respectively. Each column bears the name of the associated protection function group. You can use the context menu to connect protection groups and circuit-breaker function groups. If a protection group is connected with a protection function group input, the common cell of the respective line and column contains an X .

Related Topics

[8.1.1 Overview of Applications](#)

[8.1.4.1 Overview of Connections](#)

20.3.8 Measuring-Points Routing

You can use the **Measuring-points routing** matrix to route the inputs of current and voltage-measuring points to the physical inputs of a SIPROTEC 5 device.

Elements and Explanations

You can find explanations for the elements of the **Measuring-points routing** matrix in the following table.

Element	Explanation
Toolbar	The 20.7.38 Toolbar of the Measuring-Points Routing Matrix allows fast access to actions and settings.
Current-measuring points	You can use the 20.3.9 Current-Measuring Points window to route current-measuring points to the current inputs of a SIPROTEC 5 device.
Voltage-measuring points	You can use the 20.3.10 Voltage-Measuring Points window to route voltage-measuring points to the voltage inputs of a SIPROTEC 5 device.

Linked Tabs in the Task Card

If the **Measuring-points routing** matrix is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab within the **Measuring-points routing** matrix to search for information.
- [20.2.3 Libraries](#)
This tab is always displayed. However, you do not need this for working with the **Measuring-points routing** matrix.

Related Topics

[8.1.1 Overview of Applications](#)

[8.1.5.1 Overview of Measuring Points](#)

[8.1.5.2 Opening the Measuring-Point Routing and Adjusting the View](#)

20.3.9 Current-Measuring Points

You can use the **Current-measuring points** window to route the inputs of current-measuring points to the current inputs of a SIPROTEC 5 device. In addition, you can use the **Current-measuring points** window to add other current-measuring points in the application. You can find the **Current-measuring points** window in the [20.3.8 Measuring-Points Routing](#) matrix.

The **Current-measuring points** window has a table-like structure. One line in the table contains one current-measuring point. The current inputs of the SIPROTEC 5 device are arranged in columns.

Elements and Explanations

You can find explanations of the elements of the **Current-measuring points** window in the following table.

Element	Explanation
Measuring point	This column contains the names of all current-measuring points. In addition, this column contains the Add new button.
Add new	This button is used to open the 20.6.26 Create Current-Measuring Point dialog. You can use this dialog to select the type of a new current-measuring point and insert it finally into the application.
Connection type	This column contains a list box for each current-measuring point. You can use this list box to select the connection type of a current-measuring point. Adjust a current-measuring point to a three-wire or four-wire system as well as to a star or delta connection with the connection types. The connection type also determines the number of the measuring point inputs. A 1-phase measuring point always has only one single input. A 3-phase measuring point however has 3 or 4 inputs depending on the connection type.
Base module/Expansion module	One column range each is available for the base module and for each expansion module. Each of these column ranges contains 1 extra column range for each current terminal block on the respective module. Each current terminal block has 4 inputs consisting of 1 terminal pair respectively. This is why one column range contains 4 columns: One column corresponds to the terminal pair of a current input. You can use the context menu to route the inputs to the current-measuring points. While doing so, you can always see the names of the measuring-point inputs available. Details about routing of the measuring-point inputs can be found under 8.1.5.3 Routing Measuring Points to Physical Inputs .

Related Topics

[8.1.1 Overview of Applications](#)

[8.1.5.1 Overview of Measuring Points](#)

20.3.10 Voltage-Measuring Points

You can use the **Voltage-measuring points** window to route the inputs of voltage-measuring points to the voltage inputs of a SIPROTEC 5 device. In addition, you can use the **Voltage-measuring points** window to add other voltage-measuring points in the application. You can find the **Voltage-measuring points** window in the [20.3.8 Measuring-Points Routing](#) matrix.

The **Voltage-measuring points** window has a table-like structure. One line in the table contains one voltage-measuring point. The voltage inputs of the SIPROTEC 5 device are arranged in columns.

Elements and Explanations

You can find explanations for the elements of the **Voltage-measuring points** window in the following table.

Element	Explanation
Measuring point	This column contains the names of all voltage-measuring points. In addition, this column contains the Add new button.

Add new	This button is used to open the 20.6.27 Create Voltage-Measuring Point dialog. You can use this dialog to select the type of a new voltage-measuring point and insert it finally into the application.
Connection type	This column contains a list box for each voltage-measuring point. You can use this list box to select the connection type of a voltage-measuring point. Adjust a voltage-measuring point to a three-wire or four-wire system as well as to a star or delta connection with the connection types. The connection type also determines the number of the measuring point inputs. A 1-phase measuring point always has only one single input. A 3-phase measuring point however has 3 or 4 inputs depending on the connection type.
Base module/Expansion module	One column range each is available for the base module and for each expansion module. Each of these column ranges contains 1 extra column range for each voltage terminal block on the respective module. Each voltage terminal block has 4 inputs consisting of 1 terminal pair respectively. This is why one column range contains 4 columns: One column corresponds to the terminal pair of a voltage input. You can use the context menu to route the inputs to the current-measuring points. While doing so, you can always see the names of the measuring-point inputs available. Details about routing of the measuring-point inputs can be found under 8.1.5.3 Routing Measuring Points to Physical Inputs .

Related Topics

- [8.1.1 Overview of Applications](#)
- [8.1.5.1 Overview of Measuring Points](#)

20.3.11 Circuit-Breaker Interaction

You can use the **Circuit-breaker interaction** matrix to route functions or function blocks of a protection group selected to one or more circuit-breaker function groups.

Elements and Explanations

You can find explanations for the elements of the **Circuit-breaker interaction** matrix in the following table.

Element	Explanation
Protection function group	This column contains the names of all functions and function blocks of the protection group selected. Functions and function blocks are structured hierarchically in the form Function > Function block . Click on the arrows to the left of the element names to show or hide individual elements of the structure.
Circuit-breaker function group 1 to n	Each circuit-breaker function group is represented by one column respectively. Each column bears the name of the associated circuit-breaker function group. You can use the context menu to route a function or a function block to a circuit-breaker function group. If a Protection group is connected with a circuit-breaker function group input, the common cell of the respective line and column contains an X . You find details on this under 8.1.4.5 Configuring the Circuit-Breaker Interaction for Protection Groups .

Linked Tabs in the Task Card

If the **Circuit-breaker interaction** matrix is opened in the working area, the following tabs are visible in the task card:

- [20.2.1 Tasks](#)
You can use this tab within the **Circuit-breaker interaction** matrix to search for information.
- [20.2.3 Libraries](#)
This tab is always displayed. However, you do not need this for working with the **Circuit-breaker interaction** matrix.

Related Topics

[*8.1.1 Overview of Applications*](#)

20.4 Tables

20.4.1 Log

The **Logs** table displays the indications that have been read from the log. Each indication is displayed together with additional information.

Elements and Explanations

You can find explanations for the elements of the **Log** table in the following table.

Element	Explanation
Toolbar	The 20.7.28 Toolbar of the Log Table allows fast access to actions and settings.
Time stamp	This column contains the date and time at the time point of the occurrence of an event, for example, 15.02.2011 22:33:06.352 . Events are always summarized in an indication log. The indication log, too, has a time stamp. If you click on the arrow next to this time stamp, the individual events of the indication log are displayed.
Relative time	This column contains the relative time of the indication. The relative time indicates the time difference between each individual indication and a indication in the log that serves as a reference. This indication has the relative time 0. Examples of the relative time are 00:00:15:35.231 and -00:00:00:12.265 .
Fault number	This column contains the fault number of the fault indications of the associated fault record. This column is available only if fault indications are displayed.
Entry number	This column contains sequential and ascending numbering for all entries in the table. The most recent entry has the highest number.
Functions structure	This column displays the association of a indication to a certain part of the functions structure. Examples of this are Phase 1: External tripping 1: Stage 1 and fault recording: General .
Name	This column contains the name of the indication, for example Switching mode or Connection interrupted .
Value	This column contains the value of the indication, for example On or Off .
Quality	This column contains the quality attribute of the indication. The quality attributes possible are Valid , Questionable and Invalid .
Cause	This column contains the cause for the indication, for example Data change . Depending on the cause, the initiator of the cause or some additional information can be provided. An example of the initiator is Process . An example of additional information is Command cancellation . This additional information is separated from the initiator of the cause by slashes.
Number	This column contains a number that identifies the indication uniquely and clearly.

Related Topics

[15.5.4.3 Opening the Logs Table](#)

[15.5.4.5 Reading Indications Logs from the SIPROTEC 5 Device](#)

20.4.2 Records

The **Records** table shows all fault records read from the SIPROTEC 5 device. Each fault record is displayed together with additional information.

Elements and Explanations

You can find explanations for the elements of the **Records** table in the following table.

Element	Explanation

State	This column contains state of the records. For example, New , and Downloaded .
Toolbar	The 20.7.29 Toolbar of the Records Table allows fast access to actions and settings.
Time stamp	This column contains the date and time at the time of the occurrence of the fault, for example, 15.02.2011 22:33:06.352 .
Fault number	This column contains the fault number of the fault record. A number of fault records can be taken for one and the same fault. The consecutive fault number identifies a sequence of associated fault records.
Name	This column contains the name of the fault record, for example FRA00002 .
Applicable for 7KE Device Types	
State	This column contains state of the records. For example, New , Downloaded , Deleted from device .
Record ID	This column contains the fault number of the records. The consecutive fault number identifies a sequence of associated fault records.
Time stamp	This column contains the date and time at the time of the occurrence of the fault, for example, 15.02.2011 22:33:06.352 .
Duration	This column contains the information related to the duration of the recording time.
Record type	This column contains the information related to the type of the recorders.
Recorder name	This column contains the information related to the name of the recorders.
Trigger name	This column contains the information related to the triggering of the fault.
Trigger description	This column contains the detailed information related to the triggering of the fault.
Size	This column contains the information related to the size of the record, for example, 19000 KB .
Test record	This column contains the information related to the test fault records.

Related Topics

[15.5.3.1 Overview of Fault Recording](#)

[15.5.3.4 Opening the Records Table](#)

20.4.3 Indications

The **Indications** table shows the spontaneous indications read from the SIPROTEC 5 device. Each indication is displayed together with additional information.

Elements and Explanations

You can find explanations for the elements of the **Indications** table in the following table.

Element	Explanation
Toolbar	The 20.7.31 Toolbar of the Indications Table allows fast access to actions and settings.
Indication	This column contains the name of the indication, for example Switching mode or Connection interrupted .
Value	This column contains the value of the indication, for example On or Off .
Time stamp	This column contains the date and time at the time of the occurrence of an event, for example, 15.02.2011 22:33:06.352 . Events are always summarized in an indication log. The indication log, too, has a time stamp. If you click on the arrow next to this time stamp, the individual events of the indication log are displayed.
Relative time	This column contains the relative time of the indication. The relative time indicates the time difference between each individual indication and a indication in the log that serves as a reference. This indication has the relative time 0. Examples of the relative time are 00:00:15:35.231 and -00:00:00:12.265 .
Quality	This column contains the quality attribute of the indication. The quality attributes possible are Valid , Questionable and Invalid .

Additional information	This column contains additional information about the indication, for example Command cancellation .

Related Topics

[15.5.2.1 Overview of Indications](#)

[15.5.2.2 Opening Indications Table and Reading Spontaneous Indications](#)

20.4.4 Indication Snapshot

The **Indication snapshot** displays indications that have been saved in the project as indication snapshots. The indications are displayed together with additional information.

Elements and Explanations

You can find explanations for the elements of the **Indication snapshot** table in the following table.

Element	Explanation
Toolbar	The 20.7.32 Toolbar of the Indication-Snapshot Table allows fast access to actions and settings.
Time stamp	This column contains the date and time at the time point of the occurrence of the indication, for example, 15.02.2011 22:33:06.352 . The indications are always summarized for a particular indications snapshot. The indications snapshot, too, has a time stamp. If you click on the arrow next to this time stamp, the individual indications of the indications snapshot are displayed.
Relative time	This column contains the relative time of the indication. The relative time indicates the time difference between each individual indication and an indication in the indications snapshot that serves as a reference. This indication has the relative time 0. Examples of the relative time are 00:00:15:35.231 and -00:00:00:12.265 .
Indication	This column contains the name of the indication, for example Switching mode or Connection interrupted .
Value	This column contains the value of the indication, for example On or Off .
Quality	This column contains the quality attribute of the indication. The quality attributes possible are Valid , Questionable , and Invalid .
Additional information	This column contains additional information about the indication, for example Command cancellation .

Related Topics

[15.5.2.1 Overview of Indications](#)

[15.5.2.7 Opening Indication-Snapshots Table and Selecting and Showing Snapshots](#)

20.4.5 Measurements

The **Measurements** table shows measured and calculated values read from the SIPROTEC 5 device. Each value is displayed together with additional information.

Depending on the respective working situation, the **Measurements** table contains tabs for the following categories:

- Operational measured values
- Ground-fault measured values
- Fundamental component and symmetrical components
- Function-specific measured values
- Minimum, maximum and average values

- Energy-metered values
- Statistic values
- User-defined measured and metered values

The elements in these tabs can be divided into the following:

- Measured values
- Metered and statistic values
- Minimum, maximum, and average values

Elements and Explanations

You can find explanations for the elements of the **Measurements** table in the following table.

Element	Explanation
Toolbar	The 20.7.30 Toolbar of the Measurements Table allows fast access to actions and settings.
Fundamental	
Measurements	This column contains the name of the measurand for which a value has been measured, for example f1 or Vph:A .
Value	This column contains the measured value.
Quality	This column contains the quality of the measured value. The quality attributes possible are Valid , Questionable , and Invalid .
Number	This column contains a number that identifies the measured value uniquely and clearly.
Functional values	
Measurements	This column contains the name of the measurand for which a value has been measured, for example f1 or Vph:A .
Value	This column contains the measured value.
Quality	This column contains the quality of the measured value. The quality attributes possible are Valid , Questionable , and Invalid .
Number	This column contains a number that identifies the measured value uniquely and clearly.
Statistics	
Measurements	This column contains the name of the measurand for which a value has been recorded, for example Op.ct or Wp+ .
Current value	This column contains the metered or the statistic value.
Number	This column contains a number that identifies the metered or statistic value uniquely and clearly.
Set value	This column contains an entry field for every metered and statistic value. You can enter a value in this entry field. You can use the Set button to set the metered and statistic value to the value entered.
Set/reset value	This column contains buttons to set and reset metered and statistic values. You can use the Reset button to reset all metered and statistic values in a group, for example, those in the Energy group. You can use the Set button to set individual metered or statistic values to the value that you have entered in the Set value column.
User-def. values	
Measurements	This column contains the name of the measurand for which a value has been recorded, for example Op.ct or Wp+ .
Current value	This column contains the metered or the statistic value.
Number	This column contains a number that identifies the metered or statistic value uniquely and clearly.

Set value	This column contains an entry field for every metered and statistic value. You can enter a value in this entry field. You can use the Set button to set the metered and statistic value to the value entered.
Set/reset value	This column contains buttons to set and reset metered and statistic values. You can use the Reset button to reset all metered and statistic values in a group, for example, those in the Energy group. You can use the Set button to set individual metered or statistic values to the value that you have entered in the Set value column.
Measurements	This column contains the name of the measurand for which a value has been calculated.
Value	This column contains the minimum, maximum, or the average value.
Quality	This column contains the quality attributes.
Number	This column contains a number that identifies the minimum, maximum, or average value uniquely and clearly.

Related Topics

[15.5.1.1 Overview of Measured and Metered Values](#)

[15.5.1.3 Opening the Measured Value Table and Reading Values](#)

20.4.6 Measured-Value Snapshot

The **Measured-value snapshot** displays measured and calculated values that have been saved in the project as measured-value snapshots. Each value is displayed together with additional information.

Depending on the respective working situation the **Measured-value snapshot** table contains tabs for the following categories:

- Operational measured values
- Ground-fault measured values
- Fundamental component and symmetrical components
- Function-specific measured values
- Minimum, maximum, and average values
- Energy-metered values
- Statistic values
- User-defined measured and metered values

The elements in these tabs can be divided into the following:

- Measured values
- Metered and statistic values
- Minimum, maximum, and average values

Elements and Explanations

You can find explanations for the elements of the **Measured-value snapshot** table in the following table.

Element	Explanation
Toolbar	The 20.7.33 Toolbar of the Measured-Value Snapshot Table allows fast access to actions and settings.
Measured Values	
Measurand	This column contains the name of the measurand for which a value has been measured, for example f1 or Vph:A .
Value	This column contains the measured value.

Quality	This column contains the quality of the measured value. The quality attributes possible are Valid , Questionable , and Invalid .
Number	This column contains a number that identifies the measured value uniquely and clearly.
Metered and Statistic Values	
Measurand	This column contains the name of the measurand for which a value has been recorded, for example Op.ct or Wp+ .
Value	This column contains the metered or the statistic value.
Number	This column contains a number that identifies the metered or statistic value uniquely and clearly.
Minimum, Maximum, and Average values	
Measurand	This column contains the name of the measurand for which a value has been calculated.
Value	This column contains the minimum, maximum, or the average value.
Time stamp	This column contains the date and time at which the value has been calculated.
Number	This column contains a number that identifies the minimum, maximum, or average value uniquely and clearly.

Related Topics[15.5.1.1 Overview of Measured and Metered Values](#)[15.5.1.6 Opening the Measured-Values Snapshots Table and Selecting a Snapshot](#)

20.5 Entry, Selection, and Display Areas

20.5.1 Project-Language Selection

The project-language selection is used to select the language used in the project. You also define one language each as an editing language and as a reference language.

Elements and Explanations

You can find explanations for the elements of the project-language selection in the following table.

Element	Explanation
Editing language	This list box is used to select an editing language. All project texts are then displayed in this language in DIGSI 5. All newly entered or edited texts are then also saved together with the texts of the editing language currently set. All languages you have specified as project languages are available.
Reference language	This list box is used to select a reference language. Define a language as reference language from the selected project languages. This language serves as a reference basis when compiling project texts. All languages you have specified as project languages are available.
Project languages	You can select one or more project languages in this area. The languages in which a project is to be later edited are designated as project languages. At least one language is marked. Optionally select other languages as project languages. Mark the relevant check boxes for this. Each selected project language is added to the Editing language and Reference language list boxes as well as the Project texts table. To delete a project language, click on the check box of the relevant project language that is marked. A selected project language is removed from the Editing language and Reference language list boxes as well as from the Project Texts table. All project texts that are saved for the project language removed are also deleted.

Related Topics

[5.2.2 Opening the Project-Language Selection View](#)

20.5.2 Print Preview

The Print preview can be used to check the expected printing result before a printout.

Elements and Explanations

You can find explanations for the elements of the print preview in the following table.

Element	Explanation
Toolbar	The 20.7.34 Toolbar of the Print Preview allows fast access to actions and settings.
Display area	You can check the document to be printed in the display area. In order to get from one page of the document to the next, you have the following possibilities: - You can display a certain page directly with a text box in the symbol bar. - You can display the previous or next page with buttons in the toolbar. - You can display the previous or next view with buttons in the toolbar. - You can move the pages vertically with the scroll bar. - You can move the pages vertically with the hand tool.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.3.1 Overview of the Print Preview](#)

[17.3.2 Opening the Print Preview](#)

20.5.3 Device Information

The **Device information** section consists of several tabs with information and settings for the SIPROTEC 5 device. The scope of information and settings depend whether the device information is displayed for an offline configuration or an online device.

Elements and explanations

You can find explanations for the elements of the **Device Information** area in the following table.

Element	Explanation
Toolbar	The 20.7.25 Toolbar of the Device Information allows fast access to actions and settings.
Device information	The 20.5.4 Device Information tab contains general information about the SIPROTEC 5 device such as the product code or serial number. If DIGSI 5 is connected online with a SIPROTEC 5 device, the tab will then contain additional information and setting options, for example for test and operation.
Resource consumption	The 20.5.5 Resource Consumption tab contains information about the resource consumption. The resource consumption comprises the CPU and memory of a SIPROTEC 5 device as well as the function-point credit.
IO consumption	This tab is visible only for busbar devices (for example, 7SS device type). The 20.5.6 IO Consumption contains information about the IO consumption.
Logs	The 20.5.7 Logs tab contains safety and device diagnostic indications read from the online device.
Time information	The 20.5.8 Time Information tab contains information about the 2 time sources of a SIPROTEC 5 device. This tab is visible only if the device information is displayed for an online device.
Diagnostic information	The 20.5.9 Diagnostic Information tab contains diagnostic information for the main-board read from the SIPROTEC 5 device, and all blocks plugged into the SIPROTEC 5 device. This tab is visible only if the device information is displayed for an online device.

Related Topics

[6.1.1 Overview of SIPROTEC 5 Devices](#)

[6.1.9 Opening Device Information](#)

20.5.4 Device Information

This tab contains general information on the SIPROTEC 5 device. If DIGSI 5 is connected online with a SIPROTEC 5 device, the tab will then contain additional information and setting options for this online device.

Elements and Explanations

You can find explanations for the elements of the **Device information** tab in the following table.

Element	Explanation
General	
Name	This text box contains the name of the SIPROTEC 5 device in DIGSI 5. You can change the name.

IEC 61850 name	This text box contains the name of the SIPROTEC 5 unit in the IEC 61850 structure. You can modify the name. The name must correspond to the IEC 61850 terminology: • The name must not be longer than 10 characters. • The 1st character must be a capital letter. • The other characters must be letters or numbers. • The name must not contain any spaces or special characters.
Edition	With this list box, you select the edition for the IEC 61850 standard. SIPROTEC 5 devices support Edition 1 and Edition 2 of IEC 61850. To achieve complete compatibility with the existing devices of Edition 1, you can operate the SIPROTEC 5 device in Edition 1 mode. If you want to use the benefits of Edition 2, for example, new data objects and longer character strings, then select Edition 2. The selected edition is valid for all SIPROTEC 5 devices within the project. Edition 1 is a default setting preselected after generating a new project. Directly after selecting the protocol IEC 61850 you can confirm or change the default setting. For this purpose, the following condition must be met: • You select the IEC 61850 protocol within the current project for the first time for a communication channel.
Type	This field contains the type of SIPROTEC 5 device, for example 7SA . You cannot change the type.
Serial number	Using the serial number, a unique connection between a real SIPROTEC 5 device and an offline configuration in DIGSI 5 is defined. As soon as you assign a SIPROTEC 5 device to an offline configuration or initialize a SIPROTEC 5 device with an offline configuration, the serial number of the SIPROTEC 5 device is entered in this text box. Alternatively, you can manually input the serial number of the SIPROTEC 5 device into the text box. You can find the serial number on the enclosure of the SIPROTEC 5 device base module.
Configuration version	This field contains the version number of the current device configuration, for example V01.00.00 . You cannot change the version number.
Product code	This field contains the long product code of the SIPROTEC 5 device. You cannot change the product code directly.
Short product code	This field displays the short product code of the SIPROTEC 5 device which has a valid short product code. For a device without a valid short product code, this field is empty in DIGSI 5. If you load configuration to the device with a valid short product code, the Short product code value is displayed successfully under Device information of the device display allowing you to verify the ordered device. If you load configuration to the device in the absence of a valid short product code, then the symbol --- is displayed for Short product code under Device information in the device display.
CPU type	This option is displayed only for modular devices. With this list box, you can modify the CPU type of the device. The following CPU-type options can be set for the modular device: • CP200 • CP300
Protection Application This section only exists if the device information is displayed for an online device.	
PhyHealth	This field contains the value of the PhyHealth data attribute.
PwrUp	This field contains the value of the PwrUp data attribute.
Mod	This field contains the value of the Mod data attribute.

Device Mode This section only exists if the device information is displayed for an online device.	
Current device mode	This field contains the name of the device mode set currently. The following device modes can be set for the device: • Process • Commissioning • Simulation • Monitoring and supervision If the field contains the entry Unknown , it means that either the connection to the SIPROTEC 5 device is interrupted or that the SIPROTEC 5 device is just being restarted.
Change device mode	You can select a new device mode with this list box. You can use the Restart button to activate this device mode in the SIPROTEC 5 device. The following device modes are available: • Process • Commissioning • Simulation For devices with firmware version V06.00 and higher, if you change the device mode from Process mode to Commissioning mode, the target device will switch to Commissioning mode without any restart.
Delete buffers during restart	If you mark this check box and click Restart , all buffers in the SIPROTEC 5 device are deleted and the device restarts. This functionality is similar to the initial startup of the device wherein all the buffers are deleted.
Restart	You can use this button to restart the SIPROTEC 5 device. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens. If you have selected a new device mode using the Change device mode list box, it gets activated during restart. If you have marked the check-box option Delete buffers during restart , all the buffers in the SIPROTEC 5 device get deleted during the restart.

Related Topics

[20.5.3 Device Information](#)

[6.1.9 Opening Device Information](#)

20.5.5 Resource Consumption

This tab is used for monitoring the resource consumption. The resource consumption considers the CPU and memory of a SIPROTEC 5 device as well as the function-point status and the function charts (CFC).

Elements and Explanations

You can find explanations for the elements of the **Resource Consumption** tab in the following table.

Element	Explanation
Processor load	This area informs you whether the functionality selected for the SIPROTEC 5 device leads to an overload in the device. Such an overload can affect the protection capability of the SIPROTEC 5 device. The following factors, amongst others, affect the CPU load: • Protection functions • Function charts • Communication connections • Communication indications The resource consumption is shown separately for different areas. If one of the areas displayed is marked with a red symbol, reduce the scope of this area, for example, functions or function charts. The processor load is displayed in the device information for an offline and online configuration.
Function points	This area informs you about the maximum number of function points available and the number currently used.
Function-chart (CFC) statistics	This area informs you about the function chart (CFC) resources. The following information displays the number of maximum permitted and currently used CPU ticks for the following individual process levels: • Ticks for task Fast Event-Triggered • Ticks for task Event-Triggered • Ticks for task Interlocking and Measurement To create the CFC logic, you can add up to 32 000 function blocks for each device. There is no limitation for System timer and Flip-flop memory.

Related Topics

[20.5.3 Device Information](#)
[12.1.7.2 Checking Resource Consumption](#)
[15.4.12 Executing HDLC Loop Test for Protection-Data Communication](#)
[15.6.5 Loading the Device Functionality into the SIPROTEC 5 Device](#)
[8.1.3.4 Checking the Function-points Consumption](#)

20.5.6 IO Consumption

This tab is used for monitoring the IO consumption. This functionality displays information about the availability of the number of binary Inputs, binary outputs and analog inputs in the device and their consumption. Further, it allows you to plan for rest of the IOs available, and if required, to add new IOs.

Elements and Explanations

You can find explanations for the elements of the **IO consumption** tab in the following table.

Element	Explanation
Binary Inputs	Displays the available binary inputs in the Information routing and binary inputs used by the device.
Binary Outputs	Displays the available binary outputs in the Information routing and binary outputs used by the device.
Current Inputs	Displays the available current inputs in the Information routing and current inputs used by the device.

Related Topics

[20.5.3 Device Information](#)
[15.6.5 Loading the Device Functionality into the SIPROTEC 5 Device](#)

20.5.7 Logs

This tab contains **Device-diagnosis log** and **Security log** read from the online device.

Elements and Explanations

You can find explanations for the elements of the **Device-diagnosis log** under the **Logs** tab in the following table.

Element	Explanation
Logs	This column contains the indication categories that can be displayed and read. When you select an indication category, the applicable indications in the Time Stamp , Message Number , and Message columns are displayed.
Time stamp	This column contains the date and time when the event occurred.
Message number	This column contains a unique message number.
Indication	This column contains the indication in plain text, for example battery error: Please replace the device battery .

You can find explanations for the elements of the **Security log** under the **Logs** tab in the following table.

Element	Explanation
Logs	This column contains the indication categories that can be displayed and read. When you select an indication category, the applicable indications in the Time Stamp , Message Number , and Message columns are displayed.
Time stamp	This column contains the date and time when the event occurred.
Message number	This column contains a unique message number.
Severity	This column displays the severity of each security log via the following options: • Alert • Warning
Indication	This column contains the indication in plain text, for example battery error: Please replace the device battery .

Related Topics

[20.5.3 Device Information](#)

[15.4.8 Reading Device-Diagnosis and Security Log](#)

20.5.8 Time Information

This tab displays the details of time sources configured for the device. If you want to change settings, for example, the type of timer, you have to use the [20.5.11 Time Settings](#) settings. You must do the changes in offline mode and then transfer this configuration to the device.

However, you can set the date and time in the online device.

Elements and Explanations

You can find explanations for the elements of the **Time information** tab in the following table.

Element	Explanation
Time Source 1/Time Source 2	
Source time	This field contains the last time received.
Received at the system time	This field contains the time received of the last time telegram received.
Clock errors	This field contains an indication on a possible failure with the time synchronization. The 2 state values of this indication are Yes and No .

Clock not synchron-ized	This field contains an indication regarding the state of the time synchronization. The 2 state values of this indication are Yes and No .
Type of timer	This field contains the type of selected timer, for example IRIG-B or SNTP .
Device Time	
Time list box	This list box is used to show a calendar by which you can select a date. This list box is only active as soon as you click the Process time button.
Process time	This button is used to activate the time-list box. Click on the time list box to display the calendar for setting the time and date.
Set time	This button is used to transmit the date and the time into the SIPROTEC 5 device connected online. If the confirmation ID for setting/operation is activated, the dialog 20.6.17 Enter Confirmation ID opens.
Calendar	
Month list box	With this list box you select a month.
Year list box	With this list box you select a year
Day selection area	From this selection area you select a day.
No date	With this button you specify that the device time is managed without a date.
Today	With this button you will accept the current date for the device time.

Related Topics

- [20.5.3 Device Information](#)
- [14.6.1 Overview of Time Synchronization](#)
- [14.6.2 Time Sources](#)
- [14.6.4 Displaying Time Information](#)
- [14.6.5 Setting Date and Time in the SIPROTEC 5 Device](#)

20.5.9 Diagnostic Information

You can use this tab to read diagnostics information from an offline and online device. The diagnostic information is summarized in separate groups for the mainboard of the online device and every module plugged into the device.

Elements and Explanations

You can find explanations for the elements of the **Diagnostic information** tab in the following table.

Element	Explanation
Mainboard	This group contains diagnostic information about the mainboard of the online device. The diagnostic information is organized in more subgroups, for example Hardware information and IP configuration .
Port x	These groups contain diagnostic information about the modules plugged into the online device. A separate group is displayed for every plug-in module that is labeled with the name of the port used, for example Port F . The diagnostic information is organized in more subgroups, for example Channel and IP Configuration .

Related Topics

- [20.5.3 Device Information](#)
- [15.4.9 Reading Diagnostics Information](#)

20.5.10 Device Settings

The **Device settings** is a compilation of various, device-specific settings and actions. The device settings are shown in the function settings in the [20.1.9 Settings Editor](#). The scope of the settings and actions depends on whether the device settings being displayed are for an offline configuration or an online device.

Elements and Explanations

You can find explanations for the elements of the **Device settings** area in the following table.

Element	Explanation
Toolbar	The 20.7.12 Toolbar of the Settings Editor allows fast access to actions and settings.
Device Settings	
Edit mode	This list box is used to select one of the modes Primary , Secondary , or Percent . Depending on your selection, all parameter values will be shown as primary values, secondary values, or percentage values. You also have to enter the values in the selected format.
Number of settings groups	This list box allows you to increase or reduce the number of settings groups used. The default value is 1. A SIPROTEC 5 device can manage a maximum of 8 settings groups. You can change the number of settings groups only in the device settings for an offline configuration.
Active settings group	You can use this list box to define an option for the selection of a settings group as the active settings group. There are 3 ways of selecting a settings group as the active settings group: • Selecting an Active Settings Group Directly You can select one of the existing settings groups in DIGSI 5. Transmitting the parameter set into the SIPROTEC 5 device activates the selected settings group. • Defining a Settings Group via an Indication at the Binary Input In this case, an indication at a binary input will activate a certain settings group. You then define which indication at which binary input will cause switchover in the 20.3.2 Information Routing matrix. • Defining Using a Protocol With this alternative, a certain settings group will be activated via the system interface under the control of a telegram.
DIGSI 5 uses the following IP address	You can use this list box to select any user-defined IP address, or the predefined IP address of the interface through which the DIGSI 5 PC is connected to the SIPROTEC 5 device. This list box can only be seen if you process the offline configuration of a SIPROTEC 5 device. The user-defined IP address entry field is activated only if you select the option Enter IP address (User defined) from the list box. If you change the IP address selection from user-defined IP address to any predefined IP address from the list box, then the user-defined IP address entry field is deactivated and set to 0 by default. You can change the IP address only in the device settings for an offline configuration.
Operation-panel language	This list box is used to select the language in which the texts are to be shown in the display of the SIPROTEC 5 device. The device settings must be transmitted from DIGSI 5 to the SIPROTEC 5 device for your selection to become effective. This list box can only be seen if you process the offline configuration of a SIPROTEC 5 device.

Binary-input channel threshold	This list box is used to change the threshold values of all binary inputs. If you change the threshold value by selecting an option from the list box, the binary input channel threshold value is updated in the properties of the 20.1.5 Device and Networks Editor under the I/O module binary input group.
Used time stamp in GOOSE subscriptions	You can use this list box to configure the Used time stamp in GOOSE subscriptions attribute on the device level. This setting is available for the fault recorder 7KE85 with firmware version V06.00 and higher, as well as for all other device types with firmware version V07.50 and higher. The GOOSE time stamp attribute can be set to the following states: • On message reception If you select this option, the device receiving the GOOSE message uses its own time stamp when receiving the signal (for example, in logs and fault records). • Provided by GOOSE publisher If you select this option and if the signal contains the time stamp in the GOOSE telegram, the device receiving the GOOSE message uses the time stamp of the transmit sending signal. Notes: – Ensure that the publisher and subscriber device are time synchronized when using the option Provided by GOOSE publisher. Failure to comply with this note can result in missing or incorrect recording of fault records. – Regardless of the selected option of the GOOSE time stamp the trigger time stamp of a fault record always represents the trigger time of the subscriber/receiving device. – The sending time stamp is available only for signals with CDC types (ACD, BAC, BCR, INC, ISC BSC, SPS, SPC, INS, DPS, and DPC). For the signals types that are not supported, the device always uses the receiving time stamp regardless of the selected option.

Visibility of settings in IEC 61850 structure	You can use this list box to configure the visibility of settings in the IEC 61850 interface by selecting the following options: Hide all settings: If you select this option, the settings will not be included in the IID export file which is used for data exchange with the IEC 61850 System Configurator. By default, this option is enabled for all projects except the converted projects. This option saves the file space and time. Also, the hidden objects are indicated with an empty check box ☐ under the Active on interface column in the 20.1.20 IEC 61850 Structure Editor. You can hide all settings via the  icon in the 20.7.11 Toolbar of the IEC 61850 Structure Editor and also via the context menu option Hide all settings under the selected object for individual objects and logical nodes. Note: There are some restrictions as not all the elements can be hidden. For example, the elements that are used in GOOSE or referenced by IEC 61850 Datasets or their parents, mandatory elements, LLNOs are read-only and cannot be hidden or renamed. The icon  displayed against the parent object node indicates that some of the child object nodes are excluded and some are included for export. Show all settings: If you select this option, the settings will be included in the IID export file which is used for data exchange with the IEC 61850 System Configurator. On selecting the option Show all settings, the list box option for Visibility of SIPROTEC extensions in IEC 61850 structure changes from Hide all SIPROTEC extensions to Hide all SIPROTEC extensions (customized). This change is not reversed, even if you select the option Hide all settings as the settings and SIPROTEC extensions are hidden or displayed based on the last selection. Also, the now visible objects are indicated with a checked check box ☒. You can show all settings via the  icon in the toolbar of 20.7.11 Toolbar of the IEC 61850 Structure Editor and also via the context-menu option Show all settings under selected object for individual objects and logical nodes. Note: There are some restrictions as not all the elements can be excluded from import. The excluded objects and logical nodes are indicated with a empty check box ☐ under the Active on interface column in the 20.1.20 IEC 61850 Structure Editor. The icon  displayed against the parent object node indicates that some of the child object nodes are excluded and some are included for export.

Visibility of SIPROTEC extensions in IEC 61850 structure	You can use this list box to configure the visibility of SIPROTEC extensions in the IEC 61850 structure by selecting the following options: Hide all SIPROTEC extensions: If you select this option, Siemens-internal data objects and logical nodes information will not be included in the IID export file which is used for data exchange with the IEC 61850 System Configurator. By default, this option is enabled for all projects except the converted projects. This option saves the file space and time. Also, the hidden objects and logical nodes are indicated with an empty check box ☐ under the Active on interface column in the 20.1.20 IEC 61850 Structure Editor. You can hide all SIPROTEC extensions via the  icon in the 20.7.11 Toolbar of the IEC 61850 Structure Editor and also via the context-menu option Hide all SIPROTEC extensions under selected object for individual objects and logical nodes. On selecting the option Hide all SIPROTEC extensions, the list box option for Visibility of settings in IEC 61850 structure changes from Show all settings to Show all settings (customized). This change is not reversed, even if you select the option Show all SIPROTEC extensions as the settings and SIPROTEC extensions are hidden or displayed based on the last selection. Note: There are some restrictions as not all elements can be hidden. For example, elements that are used in GOOSE or referenced by IEC 61850 Datasets or their parents, mandatory elements, LLNOs are read-only and cannot be hidden or renamed. The icon  displayed against the parent object node indicates that some of the child object nodes are excluded and included for export. Show all SIPROTEC extensions: If you select this option, Siemens-internal data objects and logical nodes information will be included in the IID export file which is used for data exchange with the IEC 61850 System Configurator. On selecting the Show all SIPROTEC extensions option, the list box option for Visibility of settings in IEC 61850 structure changes from Hide all settings to Hide all settings (customized). This change is not reversed, even if you select the option Hide all SIPROTEC extensions as the settings and SIPROTEC extensions are hidden or displayed based on the last selection. Also, the now visible objects are indicated with a checked check box ☒. You can show all SIPROTEC extensions via the  icon in the toolbar of 20.7.11 Toolbar of the IEC 61850 Structure Editor and also via the context-menu option Show all SIPROTEC extensions under selected object for individual objects and logical nodes. Note: There are some restrictions as not all elements can be excluded from import. The excluded objects and logical nodes are indicated with an empty check box ☐ under the Active on interface column in the 20.1.20 IEC 61850 Structure Editor. The icon  displayed against the parent object node indicates that some of the child object nodes are excluded and some are included for export.
Use dynamic reporting	If you select this option, Buffered Report Control Block instances are added by DIGSI 5 for dynamic reporting. When this option is not checked, more memory is available for static buffered reports.

Use signal alternative names	If you select this option, the alternative names defined for the signals under the Alternative name column in the 20.3.2 Information Routing are used in the logs and records instead of the hierarchical names.
Block IEC 61850 settings changes	If you select this option, changes of individual settings over the IEC 61850 communication interface are blocked, only reading is possible. (Settings group switching is still possible).
Access point used in Edition 1	With this option, you can specify the access point that is required for communication when the IEC 61850 protocol is enabled in more than 1 module in the Edition 1 device.
Activate Device Functionality This area is visible only in the device settings for an offline configuration.	
Voltage variant	You can change the voltage variant of the SIPROTEC 5 device using this list box.
Integrated Ethernet interface (port J)	This list box is used to set the functional scope of the integrated Ethernet interface. If the new SIPROTEC 5 device is to communicate using this interface only with DIGSI 5, select Only DIGSI 5 connection . If the new SIPROTEC 5 device is also to send IEC 61850 indications using this interface, select DIGSI 5 connection and IEC 61850 reporting . To enable GOOSE communication on Port J for any non-modular devices (for example 7**82 device type), select DIGSI 5 connection and IEC 61850 inclusive GOOSE . If you downgrade the Integrated Ethernet interface (port J) value by changing the selection from DIGSI 5 connection and IEC 61850 reporting or DIGSI 5 connection and IEC 61850 inclusive GOOSE to Only DIGSI 5 connection , the data associated with the previous selection is lost. A confirmation prompt is displayed to confirm downgrade of the Integrated Ethernet interface (port J) value.
Significant feature	You can change the significant feature of the SIPROTEC 5 device using this list box. For example: The number of ends to be protected is a significant feature for line protection devices. If the current device does not have any significant features, the list box will not be active. If you downgrade the significant feature value, the data associated with previous selection is lost irreversibly and the data related to the new selection is created. A confirmation prompt is displayed to confirm the downgrade of the significant feature value.
Function point class	You can change the function-point class of the SIPROTEC 5 device using this list box.
Copy Settings Group for Device	
Source-settings group	This list box is used to select the settings group whose values are to be copied. You can use this function only when the number of settings groups for a SIPROTEC 5 device is greater than 1.
Target-settings group	This list box is used to select the settings group to which the values are to be added. You can use this function only when the number of settings groups for a SIPROTEC 5 device is greater than 1.
Copy	This button is used to start the copying. The values of the settings group defined as a source are copied into the settings group defined as a target. You can use this function only when the number of settings groups for a SIPROTEC 5 device is greater than 1.
Device You find more information about the settings in this section in the corresponding Device manual.	
Rated frequency	You can change the rated frequency with this list box. You can select between the frequency values of 50 Hz and 60 Hz .

Minimum operate time	You can select a minimum time period for tripping functions with this list box. Set a minimum time period that is long enough to ensure that the circuit breaker reliably reaches its open position after a control operation. You can change the minimum time period for the tripping by clicking on the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Set. format residu. comp.	You can select the settings format for residual compensation with this list box. By selecting a certain settings format you affect the visibility of other settings of the distance protection.
Block monitoring dir.	With this list box, you can enable or disable this option by selecting the options on or off.
Chatter Blocking To change the values of the settings for the chatter blocking, click on the arrow keys of the list box. Alternatively, you can also enter values in the entry fields of the list boxes.	
No. permis.state changes	With this list box you select the number of permitted state changes. This number defines how many times the state of a binary signal is permitted to change within the chatter-test time and the chatter-check time. If the number of state changes exceeds the defined value, the binary input is blocked or remains blocked.
Initial test time	This list box is used to set a chatter-test time in seconds. Within the chatter-test time, the chatter blocking monitors the number of state changes of a binary signal. The time starts when the signal is first pending at the binary input.
No. of chatter checks	With this list box, you select a number for the chatter tests. This number defines the maximum number of check cycles that are executed before the chatter blocking definitively blocks the binary input.
Chatter idle time	This list box is used to set a chatter idle time in minutes. If the state changes of a binary signal exceed the defined value within the chatter-test time or chatter-check time, the chatter idle time will start. The relevant binary input is blocked within this time.
Subsequent check time	This list box is used to set the chatter-test time in seconds. Within the chatter-test time, the chatter blocking again monitors the number of status changes. The time begins when the chatter idle time expires. If the number of state changes is within the permissible limits, the binary input is released. Otherwise, another chatter idle time begins unless the maximum number of chatter checks has been reached.
Measurements You find more information about the settings in this section in the corresponding Device manual.	
Energy restore interval	You can select a time value in minutes for the energy restore interval with this list box. The energy restore interval is the time period that expires until a metered value is made available once again at the communication interfaces of a SIPROTEC 5 device. By setting a value greater than zero for the energy restore interval, you disable the value selected for the Energy restore time from the list box. To change the energy restore interval, click the arrow keys of the list box. Alternatively, you can enter a value in the text box of the list box.
Energy restore time	You can select a value for the energy restore time with this list box. The energy restore time is the point in time at which a metered value is made available once again at the communication interfaces of a SIPROTEC 5 device. The energy restore time is a time value based in hours, for example, on the dot each hour or every half hour. By selecting a specific value for the energy restore time, you reset the Energy restore interval value set with the list box.

Energy restore	Select the value that needs to be transmitted with this list box. You can select between the following options: • Latest Value The current energy value is transferred. • Delta Value The difference in value between the current energy value and the energy value of the last transmit operation is transmitted.
Energy restore time by A.time	By marking this check box, the cyclic restoring after the set time of the parameter Energy restore interval is synchronized with the system time as well. Example: Energy restore interval = 30 min; current system time: 12:10 o'clock. First restore: 12:30 o'clock; next restore: 13:00 o'clock etc. If this parameter is activated, the following setting values are possible for the parameter Energy restore interval: • 1 min • 2 min • 3 min • 4 min • 5 min • 6 min • 10 min • 12 min • 15 min • 20 min • 30 min • 60 min
Control You find more information about the settings in this section in the corresponding Device manual.	
Enable sw. auth. station	By marking this check box, you activate the switching authority of the station.
Multiple sw. auth. levels	By marking this check box, the remote switching authority in the SIPROTEC 5 device permits switching commands from multiple command sources.
Specific sw. authorities	By marking this check box, an individual specific switching authority for this switching device is configured and additional parameters are displayed. This function is based on extending the switching-authority check by verifying the identifier of the command source (field Originator/orident of the switching command).
Spontan.indic.	
Fault-display	With this list box, you can set the value for the Fault-display parameter. You can select the options with pickup or with trip. These parameters affect the functionality of LED routing NT. For additional information, refer to 11.4.4 Routing to LEDs.
CFC	
CFC chart quality handling	With the CFC chart quality handling parameter, you can control whether you want to influence the quality of the CFC charts in a manual or automatic (default setting) manner. If you select the option automatic, the quality processing of the CFC charts is influenced from the quality of the input signals and the device mode. For additional information, refer to the corresponding Device manual. If you select the option manual, the CFC chart quality is always valid, regardless of the quality of the individual signals. The attribute Test is set for CFC chart quality only if the device is in test mode.

Test support	
Test support	With the Test support, indications issued via communication interfaces are labeled with an additional test bit, if this is supported by the protocol. With this test bit, you can determine that an indication is generated as a test and that all or individual functions of the device are in the test mode. In this way, the reactions that are necessary in normal operation due to an indication can be suppressed in other devices that receive these indications. You can also permit, for example, a trip command to close an energized binary output for test purposes. Siemens recommends deactivating the Test support again after the test phase. You can select between the following options under the Test support group: • Activate device test mode: With the Activate device test mode parameter, you can activate the test mode that adds a test bit to the issued indications. • Oper. bin.outputs under test: With the Oper. bin.outputs under test parameter, you can allow the closing of a binary output for test purposes.
Localization	
Unit system	With this list box, you change the unit system individually for the SIPROTEC 5 device. You can select between the SI units and US units .

Related Topics

- [8.2.2.3 Selecting between Secondary Values, Primary Values, or Percentage Values](#)
- [8.2.1.2 Changing the Number of Settings Groups](#)
- [8.2.1.3 Activating a Settings Group](#)
- [8.2.1.4 Copying a Settings Group](#)
- [8.3.2 Parameterizing and Activating Chatter Blocking](#)

20.5.11 Time Settings

The **Time settings** include settings for time synchronization and the time format. The various settings are displayed like the function parameters in the [20.1.9 Settings Editor](#). You can change the time settings only for the offline configuration of a SIPROTEC 5 device. You can only check the time settings when you display them for an online device.

Elements and Explanations

You can find explanations for the elements of the **Time settings** in the following table.

Element	Explanation
General	
Date format	This list box is used to select a time format. You can influence the visualization of the time indication in this way. You can select one of the following time formats: • YYYY:MM:DD • YYYY:DD:MM • DD:MM:YYYY Here D stands for the day, M for the month, and Y for the year.

Timer	
Time source 1/2	These list boxes are used to select 14.6.2 Time Sources for the time synchronization. You can select up to 2 different time sources. The entries in the list boxes depend on which interfaces and communication protocols you have configured for the SIPROTEC 5 device. For applications with PMU and differential protection, IRIG-B must be used the time source. The following rules apply when selecting a 2nd time source: • If you opt for the 1st time source for a device-internal time synchronization (None setting), you cannot select an additional 2nd time source. • You cannot connect 2 different time sources to one and the same port. • You cannot define one and the same time source as the 1st and 2nd time source at the same time.
Sync. latency of time src 1/2	These list boxes are used to correct the latency of the associated external time source. You can set the correction value with an accuracy of 1 µs. To change the correction value, click the arrow keys of the list box. Alternatively, you can enter a value in the entry field of the list box.
Time zone time source 1/2	This list box is used to select the time zones for the time sources. You can select between local time (local) and universal time coordinated (UTC).
Fault indication after	This list box is used to set a supervision time in seconds. This supervision time defines the maximum permissible time interval between 2 synchronization time points. If 2 synchronization time points do not follow in succession within the set time period, the SIPROTEC 5 device will issue a failure indication.
Time Zone and Daylight Saving Time	
Use PC time zone and daylight saving time	If you select this option, DIGSI 5 will adopt the required information from the PC. At the same time, you deactivate the further setting options in the Time zone and daylight saving time area.
Manually set daylight saving time	With this option you activate the setting possibilities in the area Time zone and daylight saving time. You can then manually set the parameters for the daylight saving time.
Time zone offset to GMT	This list box is used to set a time correction value for the time zone. This correction value is added to the time value received. In this way, you adapt the time value received within the applicable time zone to the relevant local time. To change the correction value, click on the arrow keys of the list box. In this case, the increment is 15 minutes. Alternatively, you can enter a value in the entry field of the list box. In this case, the permissible increment is 1 minute. This list box is only active if you have selected the Manually set daylight saving time option.
Switch daylight sav. time	If you mark this check box, you activate further setting options for the daylight saving time. You can then define your own daylight-saving time period. For this, define the beginning and end of the time period in the way shown in the following 2 examples. Start of daylight saving time: <Second> <Tuesday> in <April> at <2:15> hours End of daylight saving time: <Last> <Thursday> in <October> at <1:45> hours The Offset daylight sav. time list box is used to set the offset of the daylight saving time defined by you to Greenwich Mean Time. To change the correction value, click on the arrow keys of the list box. In this case, the increment is 15 minutes. Alternatively, you can enter a value in the entry field of the list box. In this case, the permissible increment is 1 minute. The check box is only active if you have selected the Manually set daylight saving time option.

Related Topics

[14.6.1 Overview of Time Synchronization](#)

[14.6.2 Time Sources](#)

[14.6.3 Processing Time Settings](#)

20.5.12 Settings

The **Settings** area consists of multiple groups with settings options for DIGSI 5.

Elements and Explanations

You can find explanations for the elements of the **Device information** area in the following table.

Element	Explanation
General	The 20.5.13 General group contains settings options, for example, for the user-interface language of DIGSI 5 or the storage location for saving projects.
DIGSI 5 user preferences	The 20.5.14 DIGSI 5 User Preferences group contains settings options for the user name and for the standards of symbols and the units system.
Print options	The 20.5.15 Print Options group contains the options to select the desired content for printing.

Related Topics

[6.1.1 Overview of SIPROTEC 5 Devices](#)

[6.1.9 Opening Device Information](#)

[17.2.2 Determining the Scope of Printing](#)

20.5.13 General

You can configure DIGSI 5 with the settings in this group. The settings are applicable to all projects.

Elements and Explanations

The following table provides explanations of the elements of the **General** group.

Element	Explanation
General Settings	
User interface language	With this list box you select a language for the user interface of DIGSI 5. The designations of all user-interface elements and information are then displayed in the language selected. The user interface of DIGSI 5 is immediately updated after changing the language. It is not necessary to restart DIGSI 5.

Mnemonic	This list box is not required for working with DIGSI 5.	
	In general, this setting has an impact on the string representation of addresses of the scopes S71200, S7300400, and S7200. There are 2 different mnemonics named German and International . They differ in the set of characters used to represent the address range:	
	German	International
	E	I
	A	Q
	M	
	T	
	Z	C
	DB	
	PE	PI
PA	PQ	
	For example, input addresses for both representations %EW42 and %IW42 are equivalent, which indicates that they point to exactly the same bits in the address space of plc. When parsing an entered address string, both mnemonics are accepted. The address string shown at the user interface (provided by the property adaptor <code>LogicalAddress</code> of the Tag Service) always conforms to the current mnemonic setting. The string attribute <code>ITagAddress.LogicalAddress</code> also contains the address string according to the mnemonic setting that was effective when the address has been set.	
Show list of recently used projects	The names of the projects last used can be displayed in the Project menu. With this list box you set how many of the projects last used are displayed in the project list of the 20.6.3 Open Project dialog.	
Load most recent project during startup	If you mark this check box, the window settings last used are restored when starting DIGSI 5.	
Tooltips		
Show truncated texts completely	If you mark this check box, the truncated texts are displayed.	
Show tooltips (context-sensitive help is available)	If you mark this check box, the tooltips are displayed.	
Open cascade automatically in tooltips	If you mark this check box, tooltips open automatically and show further information after a few seconds. If the check box is not marked, click the tooltip to receive additional information.	
Reset to default		
All application settings	Click the Reset to default button for this option to reset the application settings to the default value.	
Editor layouts	Click the Reset to default button for this option to reset the layout of the editors to the default state.	
Show all message windows	Click the Reset to default button for this option to reset the display of all message windows to the default state.	
View for objects in overview		
Details	If you select this option, the objects are displayed in the 3.1.6 Overview Window with details after starting DIGSI 5.	
List	If you select this option, the objects will be displayed as a list in the 3.1.6 Overview Window after starting DIGSI 5.	
Thumbnails	If you select this option, the objects will be displayed as symbols in the 3.1.6 Overview Window after starting DIGSI 5.	

Storage settings	
Recently used storage location	If you select this option, projects and libraries are always be saved in the memory location that was used the last time. Memory locations entered in the text boxes are ignored.
Specify default setting for storage location	If you select this option, you can enter memory locations for projects and libraries in the 2 text boxes.
Storage location for projects	Enter a valid memory location for projects in this entry field. This entry field is active only if you have selected the Specify default setting for storage location option.
Storage location for libraries	Enter a valid memory location for libraries in this entry field. This entry field is active only if you have selected the Specify default setting for storage location option.
Browse	This button is used to open the Search folder dialog. This dialog can be used to find an existing memory location or create a new folder.
Data exchange	
Storage location for data import	Enter a valid memory location for storing imported data in this entry field.
Storage location for data export	Enter a valid memory location for storing exported data in this entry field.
Storage location for support packages	Enter a valid memory location for storing the support packages in this entry field.
Storage location for log files	Enter a valid memory location for storing the log files in this entry field.
Browse	This button is used to open the Search folder dialog. This dialog can be used to find an existing memory location or create a new folder.

Related Topics

- [2.2.2 Selecting the User Interface Language](#)
- [2.2.3 Defining Start Settings](#)
- [2.2.4 Defining Storage Locations](#)
- [2.2.5 Defining Storage Locations for Data Exchange](#)

20.5.14 DIGSI 5 User Preferences

You can use this group to specify your user name and the default settings used for symbols and units. The settings are applicable to all projects.

Elements and Explanations

The following table provides explanations for the elements of the **DIGSI 5 user preferences** group.

Element	Explanation
User name	You can optionally enter a user name in this text box. This typically appears in the user information.
Standard for symbols	You can select a default display with this list box. All graphical elements, for example for the single-line configuration or the display pages, can be displayed in compliance with either the ANSI or IEC standard. If you change the standard, graphical elements added in the single-line configuration will also be updated. However, graphical elements on display pages are not updated. The standard selected during creation applies here.
Standard unit system	You can select a default for the unit system with this list box. You can select between the SI units and US units as the default. A SIPROTEC 5 device newly added to the project takes over the selected unit system.

Connection type	In this list box, you can select the connection type between DIGSI 5 and the SIPROTEC 5 device. The following options can be selected: • Direct/LAN • Remote When you open DIGSI 5 for the first time, the option Direct/LAN is displayed as default Connection type. You can change the connection type. When you reopen DIGSI, the connection type that was set before closing DIGSI is displayed as the current connection type.

Related Topics

[3.3.4 Displaying Elements According to ANSI or IEC](#)

20.5.15 Print Options

You can use this group to select print contents.

Elements and Explanations

The following table provides explanations for the elements of the **Print options** group.

Element	Explanation
Select all	If you mark this check box, all the options in the Select print contents group are selected for printing.
Device information	If you mark this check box, the contents of this field are selected for printing.
Measuring points routing	
Function group connections	
Information routing	
Communication mapping	
Settings	
Function charts	
Display pages	

Related Topics

[17.2.2 Determining the Scope of Printing](#)

[17.2.3 Selecting Print Options](#)

[17.1.1 Overview for Designing and Printing Documents](#)

20.5.16 Device Comparison

The **Device comparison** view displays the differences between the settings of the compared devices.

Elements and Explanations

You can find explanations for the elements in the **Device comparison** view in the following table.

Element	Explanation
	This button is used to expand all rows. This button is not active if all rows are already expanded.
	This button is used to collapse all rows. Only the uppermost level of the list is displayed. This button is not active if all rows are already collapsed.

Element	Explanation
	This button is used to open the Save as dialog. This dialog is used to define the name, path, and format of a file in which the test settings and results need to be saved. You can select between TXT and CSV formats. Click Save to save the data in the desired format.
	This button enables you to refresh and view the latest device-comparison results based on the parameters selected for comparison.
Current Device	Name This column displays only the parameters that are different between the 2 devices selected for comparison. Differences among the parameters of devices are displayed under the following different categories: • Missing Information (x) where x indicates the number of differences: – IEC 61850 structure • Names (x) where x indicates the number of differences: – IEC 61850 structure • Values (x) where x indicates the number of differences: – Settings – Protocols – CFC – Information routing – Device information – Safety and security • Alternative Names (x) where x indicates the number of differences: – Alternative signal name You must expand the nodes to view the result in detail. Value This column displays only the values of the current device parameters which are different after comparison with the compared device.
Compared device	Value This column displays only the values of the compared device parameters which are different after comparison with the selected device. Name This column displays only the parameters that are different in their names between the 2 devices.

Related Topics

[8.2.4 Comparing Parameters of Different Devices](#)

20.5.17 Firmware Selection

With the firmware selection you will select new firmware versions for individual components. You can load these into one or more SIPROTEC 5 devices.

Elements and Explanations

You can find explanations for the elements of the firmware and protocol selection from the following table.

Element	Explanation
Toolbar	The 20.7.24 Toolbar of Load Firmware to Devices allows fast access to actions and settings.
Upgrade	This column contains one check box for each component. If you select this check box, the component will be included in the loading.

Firmware components	This column list all components for which you can load current firmware in the SIPROTEC 5 device. The components are always subordinated to a definite SIPROTEC 5 device. You see an arrow tip to the left of a SIPROTEC 5 device name. You can show or hide the components of a SIPROTEC 5 device by clicking on this arrow tip.
Device type	This column contains the component type, for example 7SA85 for a SIPROTEC 5 device, or the type of information to be loaded, for example, Firmware or Protocol .
Status	This column displays the withdrawn status of the scheduled version of the firmware component.
Scheduled version	This list box is used to select the target version of the firmware component to be installed.
Status	This column displays the withdrawn status of the current version of the firmware component.
Current version	This column contains information about the current version numbers of the components. In order to display this information, you must retrieve the current version numbers from the SIPROTEC 5 device.

Related Topics

[15.7.1 Overview for Updating Firmware and Protocols](#)

[15.7.3 Opening Firmware and Communication-Module Selection and Adjusting the View](#)

20.5.18 Configuration Selection

With the configuration selection you will select the offline configurations in a project that will be loaded into the assigned SIPROTEC 5 devices. Thereafter, start loading the offline configurations.

Elements and Explanations

You can find explanations for the elements of the configuration selection in the following table.

Element	Explanation
Toolbar	The 20.7.23 Toolbar of the Load Configuration allows fast access to actions and settings.
Upgrade	This column contains one check box in project 1 for each offline configuration. If you select this check box, the offline configuration is loaded into the assigned SIPROTEC 5 device, after starting the loading.
Device name	This column contains the names of the offline configurations.
Device type	This column contains the type of the applicable SIPROTEC 5 device for each offline configuration, for example 7SA85 .
Result	This column contains the result of the last offline configuration transmission into the assigned SIPROTEC 5 device, for example, Successful or Unsuccessful .
Last transfer	This column contains the date and time of the last transfer of an offline configuration into the applicable SIPROTEC 5 device.

Related Topics

[15.2.1 Overview for Transmitting Configurations](#)

[15.2.2 Loading the Offline Configuration into the SIPROTEC 5 Device](#)

20.5.19 Info

The **Info** tab displays messages with which you can monitor states, sequences and results of actions. The messages are divided thematically into 5 further tabs.

Elements and Explanations

You can find explanations for the elements of the **Info** tab in the following table.

Element	Explanation
General	The 20.5.20 General tab displays status messages, warnings, and error messages on currently executed actions.
Cross-reference	The Cross-reference tab is not required for working with DIGSI 5.
Compile	The 20.5.21 Compile tab displays status messages, warnings, and error messages pertaining to the compilation of function charts (CFC).
Inconsistencies	The 20.5.22 Inconsistencies tab displays messages pertaining to inconsistencies in an offline configuration.
Search results	The Search results tab displays the results of a search started in the Tasks tab. Whether the search results are displayed in this tab or in the work area, depends on the information being searched.

Related Topics

[4.1 Overview on the DIGSI 5 Information System](#)

20.5.20 General

The **General** tab displays status messages, warnings, and error messages on currently executed actions. You can manually copy and delete the messages in this tab.

Each message is displayed with additional information that is divided into several columns.

Elements and Explanations

You can find explanations for the elements of the **General** tab in the following table.

Element	Explanation
!	This column contains one of the following icons:  You find more information about the icons under 4.4 Icons in the Info Tab.
Message	This column contains the message text. A message text identified with an arrow pools several subordinate messages. By clicking the arrow, you show or hide the subordinate messages.
Date	This column contains the date at the time of the action.
Time	This column contains the time-of-day at the time of the action.

Related Topics

[4.1 Overview on the DIGSI 5 Information System](#)

[4.6 Copying and Deleting Messages](#)

[20.5.19 Info](#) tab

20.5.21 Compile

If you manually start the compiling of function charts (CFC) of a SIPROTEC 5 device, all function charts are checked for consistency during the compiling. The **Compile** tab displays status messages, warnings, and error messages pertaining to the compilation.

You can manually copy and delete the messages in this tab. A newly started compilation automatically deletes all existing messages.

All messages belonging to an offline configuration are pooled in one group. The group is identified with the name of the offline configuration and an arrow. By clicking the arrow, you show or hide the messages. Each message is displayed with additional information that is divided into several columns.

Elements and Explanations

You can find explanations for the elements of the **General** tab in the following table.

Element	Explanation
!	This column contains one of the following icons:    You find more information about the icons under 4.4 Icons in the Info Tab .
Path	This column contains the name of an offline configuration.
Description	This column contains the message text.
Errors	This column contains the number of errors.
Warnings	This column contains the number of warnings.
Time	This column contains the time-of-day at the time of the action.

Related Topics

[4.1 Overview on the DIGSI 5 Information System](#)

[4.6 Copying and Deleting Messages](#)

[20.5.19 Info](#)

20.5.22 Inconsistencies

The **Inconsistencies** tab displays messages pertaining to inconsistencies in an offline configuration. All messages belonging to an offline configuration are pooled in one group. The group is identified with the icon , the name of the offline configuration, and an arrow. By clicking the arrow, you show or hide the messages.

You cannot directly delete messages pertaining to inconsistencies. When you eliminate an inconsistency, the associated message is also deleted.

Each message is displayed with additional information that is divided into several columns.

Elements and Explanations

You can find explanations for the elements of the **General** tab in the following table.

Element	Explanation
!	This column contains one of the icons  , or  . You find more information about the icons under 4.4 Icons in the Info Tab .
Result object	This column contains the names of an offline configuration or the identification of the location where you find the inconsistency.
Indication	This column contains the indication text.
Opens editor	This column contains the name of the editor that you can open by double-clicking the message.
Date	This column contains the date when the inconsistency occurs.
Time	This column contains the time-of-day when the inconsistency occurs.

Related Topics

[4.1 Overview on the DIGSI 5 Information System](#)

[4.6 Copying and Deleting Messages](#)

[20.5.19 Info](#)

20.6 Dialogs

20.6.1 No License

This dialog is used to select a license version.

Elements and Explanations

You can find explanations for the elements of the **No license** dialog in the following table.

Start DIGSI 5 Compact (no license required)	If you select this option and then click OK , the Compact version of DIGSI 5 starts. You do not need a license for DIGSI 5 Compact. However, DIGSI 5 Compact has a limited functional scope.
Install a DIGSI 5 Standard or Premium license on this computer	If you select this option and then click OK , the Automation License Manager opens. The Automation License Manager is used to install a license for DIGSI 5 Standard or DIGSI 5 Premium.
Test DIGSI 5 Premium for 30 days on this computer	If you select this option and then click on OK , the premium version of DIGSI 5 is installed as a 30-day test version on your computer. After 30 days has elapsed, this test version can no longer be run. You can only be considered for this test version precisely once.
Broken license?	If you click this information, additional options and information are displayed.
Activate DIGSI 5 emergency license	If a license is broken, you can temporarily use an emergency license. This emergency license is on the USB license stick supplied with DIGSI 5. The emergency license is valid for 14 days and can only be utilized once. To start DIGSI 5 with the emergency license, connect the USB stick to your computer and select the option Activate DIGSI 5 emergency license .
OK	This button is used to accept the selection and close the dialog. If you have selected the option Install a DIGSI 5 license on this computer , the Automation License Manager opens. If you have selected one of the 2 other options, DIGSI 5 starts.
End	This button is used to reject the selection and close the dialog.

Related Topics

[2.2.1 Starting DIGSI 5](#)

[2.2.10 Using DIGSI 5 Licenses](#)

20.6.2 Create a New Project

This dialog is used to create a new project.

Elements and Explanations

You can find explanations for the elements of the **Create a new project** dialog in the following table.

Element	Explanation
Project name	This text box contains a consecutively numbered standard name for the project. Enter another name for the project, if required.
Path	This text box contains the path in which the project is created. The path specified under Extras > Settings is default. If the project is to be created in another directory, click the ... button.
Author	You can optionally enter your name in this text box.
Comment	You can optionally enter a comment in this text box.
...	This button is used to open a further dialog. You can select a memory location different to that specified using this dialog.

Create	This button is used to accept the settings and close the dialog. A new project is created.
Cancel	This button is used to reject the settings and close the dialog.

Related Topics

[5.1.1 Overview of Projects](#)

[5.1.2 Creating a Project](#)

20.6.3 Open Project

This dialog is used to open a project.

Elements and Explanations

You can find explanations for the elements of the **Open project** dialog in the following table.

Element	Explanation
Recently used	This list box contains the names of all projects known to DIGSI 5. The project last opened is at the top of the list. Each entry in the list comprises the name of a project, its path, and the date of the last change. Select the project to be opened.
Browse	This button is used to open a standard file dialog. You can search for further projects with this dialog. Projects found in this way are then also offered in the list box.
Open	This button is used to accept the selection and close the dialog. The selected project is opened.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[5.1.1 Overview of Projects](#)

[5.1.3 Opening a Project](#)

20.6.4 Delete Project

This dialog is used to delete a project.

Elements and Explanations

You can find explanations for the elements of the **Delete project** dialog in the following table.

Element	Explanation
Recently used	This list box contains the names of all projects known to DIGSI 5. The project last opened is at the top of the list. Each entry in the list box comprises the name of a project, its path, and the date of the last change. Select the project to be deleted.
Browse	This button is used to open a standard file dialog. You can search for further projects with this dialog. Projects found in this way are then also offered in the list box.
Delete	This button is used to accept the selection and close the dialog. A safety prompt appears. If you confirm this with Yes , the selected project will be deleted.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[5.1.1 Overview of Projects](#)

[5.1.8 Deleting a Project](#)

20.6.5 Add New Device

This dialog is used to add a new offline configuration for a SIPROTEC 5 device to the project.

Elements and Explanations

You can find explanations for the elements of the **Add new device** dialog in the following table.

Element	Explanation
Step 1: Select Device Type You can carry out this step only if you have opened the dialog using Add new device .	
Enter short product code (TNS) or paste long product code	If you want to specify the offline configuration with a valid product code, enter either the short or the long product code in this entry field. If you want to configure the offline configuration manually, leave the entry field blank.
Verify	You can use this button to start checking the product code entered. If the product code is valid, the Select application template list box is activated. If the product code is invalid, you receive specific error messages. Correct the product code in accordance with the error messages. If DIGSI 5 cannot interpret the short product code, click the Update short product code (TNS) list button. DIGSI 5 then attempts to update the list of the short product codes via an Internet connection. If this does not succeed or DIGSI 5 cannot interpret the short product code despite having an updated list, enter the long product code in the entry field.
Configure	This button is used to close the current dialog and switch to the manual configuration mode. The 20.1.6 Network View is displayed in the working area for this purpose. If you want to configure the offline configuration manually, leave the Enter short product code (TNS) or paste long product code entry field empty.
Step 2: Select Device Properties You cannot carry out this step if the device characteristics have been specified completely by the product code.	
Optional input and output module	This option is displayed only if you wish to add a non-modular device (for example, 7**82 device type). This feature allows you to add a 2nd IO module in a non-modular device which does not have an IO103 as base module. You can select the options No module or IO module IO110 from the list box. The product code is then modified based on your selection. After device creation, the terminals are grouped under the categories Modular device and Non-modular device in the Hardware catalog of the Device view. You cannot add modular terminals to non-modular devices and vice versa. Note: For 7SK82 devices, a special Optional input and output module IO111 is used for temperature supervision. The IO111 module replaces the RTD-box. You can select this option from the list box.
Voltage variant	You can use this list box to select the voltage variant that matches the SIPROTEC 5 device.
Integrated Ethernet interface (port J)	You can use this list box to select the functional scope for the integrated Ethernet interface. If the new SIPROTEC 5 device is to communicate using this interface only with DIGSI 5, select Only DIGSI 5 connection. If the new SIPROTEC 5 device is also to send IEC 61850 indications using this interface, select DIGSI 5 connection and IEC 61850 reporting. To enable GOOSE communication on Port J for any non-modular device (for example 7**82 device type), select DIGSI 5 connection and IEC 61850 inclusive GOOSE.
Significant feature	You can use this list box to select the significant feature of the SIPROTEC 5 device. For example: The number of ends to be protected is a significant feature for line protection devices. If the current device does not have any significant features, the list box will not be active.

Select function-point class	You can use this list box to select the function-point class of the SIPROTEC 5 device.
Step 3: Select Application Template You can carry out this step only if you have selected the device type and the device characteristics.	
Application-template selection	Select the application template you wish to use as a basis for your configuration from this list box. Application templates of all versions are displayed in the list view for a CP200 device. Application templates starting from V06.00 and higher version are displayed in the list view for a CP300 device.
Step 4: Select Communication Versions You can carry out this step only if you have selected an application template.	
Communication configuration	This list box is provided for future updates.
Open Hardware and protocols editor after device creation	If you mark this check box, the Hardware and protocols editor opens in the working area directly after adding the offline configuration. This check box is visible only if you have opened the dialog via Add new device .
Update short product code (TNS) list	You can use this button to start updating the list of the short product codes. DIGSI 5 needs an Internet connection to update the list. This button can only be seen if you have opened the dialog via Add a new device .
OK	This button is used to accept the settings and close the dialog. The new offline configuration is inserted in the project.
Cancel	This button is used to reject the settings and close the dialog.

Related Topics

- [6.1.1 Overview of SIPROTEC 5 Devices](#)
- [6.1.4 Adding and Manually Configuring a SIPROTEC 5 Device](#)
- [6.1.3 Adding a SIPROTEC 5 Device and Specifying with Product Code](#)

20.6.6 Compare Devices

The **Compare devices** dialog displays the options to select the device and settings for comparison.

Elements and Explanations

You can find explanations for the elements of the **Compare devices** dialog in the following table.

Element	Explanation
Selected device	Displays the device name of the selected device for comparison.
Compare with	Displays the following options: • Offline device: You can select this option to view the offline devices available for comparison. • Online device: You can select this option to view the online devices available for comparison.

Element	Explanation
Content of comparison	Displays the following check box options for selecting the parameters for comparison: • All • Settings • Protocols • CFC • Information routing • IEC 61850 structure • Device information • Safety and security You can select the desired option for comparison and view the differences in the 20.5.16 Device Comparison.

Related Topics

[8.2.4 Comparing Parameters of Different Devices](#)

[20.5.16 Device Comparison](#)

20.6.7 Add New Chart

You can use this dialog to add an offline configuration to a new function chart (CFC).

Elements and Explanations

You can find explanations for the elements of the **Add new chart** dialog in the following table.

Element	Explanation
Name	This text box contains a consecutively numbered standard name for the function chart. Enter another name for the function chart if required.
Select function chart (CFC) task	This list box is used to change the task level currently set. The task level decides if a function will be executed cyclically or event-triggered. With the selection of a task level, you therefore also determine the priority in the processing of the function chart (CFC). You can select between the following task levels: • Fast Event-Triggered Use this task level for time-critical tasks, for example, if a signal should block a protection function within 2 ms to 3 ms. Functions on this task level are processed in an event-controlled way with the highest priority. Each change to a logical input signal is immediately processed. The processing can disrupt the execution of a function on the Event-triggered task level. • Event-Triggered Use this task level preferably for logic functions that need not be executed immediately. Functions on this task level are processed within a maximum of 20 ms. Each change to a logical input signal is immediately processed. But the protection functions or functions on the Fast event-triggered task level can disrupt the processing. • Measurement Use this task level for the processing of measured values. Functions on this task level are processed cyclically every 500 ms. • Interlocking Use this execution level for functions that should activate a control command. Functions on this execution level are processed cyclically in the background. A CFC function fulfills a definite application purpose. Siemens therefore recommends only changing the task level after careful consideration.
Additional information	If you click this information, the additional text boxes Comment , Version , Author , and Family will be displayed.

Comment	You can optionally enter a comment in this text box. Click Additional information to show or hide this text box.
Version	You can optionally enter a version number in this text box. Click Additional information to show or hide this text box.
Author	You can optionally enter your name in this text box. Click Additional information to show or hide this text box.
Family	You can optionally enter an identification for the affiliation of the function chart in this text box, for example Line protection . Click Additional information to show or hide this text box.
Add and open	If you mark this check box, the function chart will be opened in the working area directly after it is added.
OK	This button is used to accept the settings and close the dialog. The new function chart is added to the offline configuration.
Cancel	This button is used to reject the settings and close the dialog.

Related Topics

[12.1.1.1 Meaning of CFC](#)

[12.1.1.3 Function Chart](#)

[12.1.2.1 Adding a CFC](#)

20.6.8 Default Values of CFC Input Signals

Elements and Explanations

You can find explanations for the elements of the **Default values of CFC input signals** dialog in the following table.

Element	Explanation
Select function chart	You can select the desired function chart from this list box to view the default values of the CFC input signals.
Chart name	This column displays the chart names.
Terminal	This column displays the terminals.
Signal name	This column displays the signal names.
Type	This signal displays the signal type.
Default value	This column displays the default values.
OK	This button is used to accept the entry and close the dialog.

20.6.9 Export

This dialog is used to export the data of an individual offline configuration or an entire project.

Elements and Explanations

You can find explanations for the elements of the **Export** dialog in the following table.

Element	Explanation
Data formats	This list box is used to select the format in which the data is exported. The data-format selection depends on whether the data of an individual offline configuration or the entire project is to be exported. For more information, see 16.1.1 Overview of Formats. Depending on the data format selected, further interface elements are activated or deactivated.

File	This text box contains the name under which the export file is saved. The file name is displayed along with its path. The path refers to the current project directory as default. If the file is to be saved in another directory or under another name, click the ... button.
...	This button is used to open a file dialog. This dialog can be used to select a different storage location or a different file name.
Comment	You can enter a comment in this text box. This comment is displayed before the data is imported. Describe the content of the exported data in this comment, so that you can find the correct information again when importing. This text box is available for the following data formats. • TEA-X • DSP5 • SEQ5 • DEX5 • ICD • IID • RIO • IID • DIGT103 • DIGT104 • DIGMOD • DIGDNP • SIM
Export contents	If you click this information, additional interface elements will be displayed. The type of interface elements displayed depends on the data format selected. The information Export contents is available for the following data formats: • TEA-X • DSP5 • SEQ5 • RIO • ICD • IID • MICS • SIM
Devices to export	The check boxes in this area are used to define the offline configurations that are exported. This area is displayed under the following conditions: • You have selected one of the data formats TEA-X, ICD, IID, or MICS • You have clicked the information Export contents so that the additional interface elements are displayed. The area shows the names of the offline configurations that can be exported: • If you select one of the data formats, TEA-X, ICD, IID, or MICS and you wish to export a project, those are the names of all the offline configurations within the project. • If you select the TEA-X data format and you wish to export a single offline configuration, this is the name of the offline configuration that you have marked in the project tree. One check box is assigned to each name of an offline configuration. This check box can be used to select or clear offline configurations for export. All offline configurations are selected after opening the export dialog. Use the Select all check box to select or clear all offline configurations at once.

IEC 61850 device description	The options in this area are used to set whether an international character set or a restricted character set is to be used for the IEC 61850 device description. If you select the international character set, the description texts are exported in the set editing language. If you select a restricted character set, the description texts are always exported in the English language. If you select a setting, regardless of whether the receiver or export file, for example an automation system, an international character set or only a restricted character set can be interpreted. As standard, the international character set is selected. This area is displayed under the following conditions: - You have selected one of the data formats SCD, SED, ICD, IID, or MICS - You have clicked the information Export content so that the additional interface elements are displayed.
Display pages to export	The check boxes in this area are used to define the display pages of an offline configurations that are exported. This area is displayed under the following conditions: - You have selected the data format DSP5. - You have clicked the information Export content so that the additional interface elements are displayed. A check box is assigned to each display page. This check box can be used to select or deselect display pages for export. All display pages are selected after opening the Export dialog. Use the Select all check box to select or deselect all display pages at once.
Test sequences to export	The check boxes in this area are used to define the test sequences of an offline configurations that are exported. This area is displayed under the following conditions: - You have selected the data format SEQ5. - You have clicked the information Export content so that the additional interface elements are displayed. A check box is assigned to each test sequence. This check box can be used to select or deselect test sequences for export. All test sequences are selected after opening the Export dialog. Use the Select all check box to select or deselect all test sequences at once.
Enter RIO export settings	You can use the entry fields in this area to set parameters for the RIO export. All settings are set to 0 as default. You can set the following settings: - Tolerance of time zones (TOL-T) - Tolerance of impedances (TOL-Z) - Absolute time tolerance (TIMEOMAX) The additional parameters are displayed under the following conditions: - You have selected the data format RIO. - You have clicked the information Export contents so that the additional interface elements are displayed.
Integrating a DEX5 export	With this control box you set whether the data is also to be exported in DEX5 format. In this case, an additional DEX5 file will be saved in the same path and under the same name as the ICD file. Both files have different file extensions. The File field contains the name of the file along with the complete path. If you import the exported ICD file together with the additionally exported DEX5 file into a project, DIGSI 5 can generate an online configuration of a SIPROTEC 5 device again from the combination of both files. On the other hand, if you only import the ICD file, DIGSI 5 incorporates the data as an external device into the project. The check box is displayed under the following conditions: - You have selected the data format ICD. - You have clicked the information Export contents so that the additional interface elements are displayed.
Export	This button is used to accept the settings and close the dialog. The export starts.

Cancel	This button is used to reject the settings and close the dialog.

Related Topics

- [16.1.1 Overview of Formats](#)
- [16.2.1 Preparing and Starting the Export](#)
- [16.2.2 Configuring the TEA-X Export](#)
- [16.2.3 Configuring the DSP5 Export](#)
- [16.2.8 Configuring the SEQ5 Export](#)
- [16.2.4 Configuring the RIO Export](#)
- [16.2.5 Configuring the ICD Export](#)
- [16.2.6 Configuring the IID Export](#)
- [16.2.7 Configuring the MICS Export](#)

20.6.10 Import

This dialog is used to import data from a file in an offline configuration or a project.

Elements and Explanations

You can find explanations for the elements of the **Import** dialog in the following table.

Element	Explanation
File	This text box contains the name of the import file current selected. The file name is displayed along with the file path. If you wish to select another file, click the ... button.
...	This button is used to open a file dialog. You can select another import file with this dialog.
Date	This field contains the date on which the data in the selected file was exported.
Comment	This field contains a comment included in the import file.
Contains	This field contains information on the integral data categories, for example, Function setting or Routing settings .
Destination	This field contains the destination of the import, that is, the name of the project or an offline configuration.
Import contents	If you click this information, additional interface elements will be displayed. The type of interface elements displayed depends on the data format of the file selected. The information Import contents is available for the following data formats: • TEA-X • SCD • DEX5 • DIGSI 4-CFC (ST) • ICD • IID • ASC

Subsets to import	The check boxes in this area are used to define which data categories are imported. This area is displayed under the following conditions: - You have selected the data format TEA-X. - You have selected the information Import contents so that the additional interface elements are displayed. The following data categories are available: Application and device settings Communication mappings Display pages Folder structure Function charts (CFC) Single-line configuration IEC 61850 structure A check box is assigned to each data category. This check box can be used to select or deselect data categories for import. All data categories are selected after opening the Import dialog.
Devices to import	The check boxes in this area are used to define which SIPROTEC 5 devices are imported. This area is displayed under the following conditions: - You have selected a file with one of the data formats (for example, SCD). - You have clicked the information Import contents so that the additional interface elements are displayed. The area shows the names of the offline configurations that can be imported: - If you have selected a file with the respective data format and wish to import a project, this is the name for all offline configurations within the project. - If you have selected a file with the respective data format and wish to import a single offline configuration, this is the name of the offline configuration marked in the project tree. One check box is assigned to each name of an offline configuration. You can use this to select or clear an offline configurations for import. All offline configurations are selected after opening the import dialog. Use the Select all check box to select or clear all offline configurations at once.
Action	These options are used to select how the device data is processed during importing. Device data in an import file can either be saved as a new offline configuration in the project or imported into an existing offline configuration in the project. The option Create as new device(s) is selected as the default. A selected option is always valid for all offline configurations. If you wish to import data into an individual offline configuration, the option Update matching device(s) is preselected. If you wish to import the data of an individual offline configuration into a project, the option Create as new device(s) is preselected. This area is displayed under the following conditions: - You have selected a file with one of the data formats DEX 5, or SCD. - You have selected the information Import contents so that the additional interface elements are displayed.
Importing primary topology	If you activate this check box, the data from the primary topology will be imported. In this case, the existing topology will be overwritten. A precondition for this is that the import file must contain primary topological data. The check box is displayed under the following conditions: - You have selected a file with one of the data formats SCD or DEX5. - You have clicked the information Export content so that the additional interface elements are displayed. - The import file contains primary topological data.

Display pages to import	The check boxes in this area are used to define the display pages of an offline configuration that is imported. This area is displayed under the following conditions: • You have selected a file with the data format DSP5. • You have clicked the information Import contents so that the additional interface elements are displayed. A check box is assigned to each display page. This check box can be used to select or deselect display pages for import. All display pages are selected after opening the Importing dialog. Use the Select all check box to select or deselect all display pages at once.
Test sequences to import	The check boxes in this area are used to define the test sequences of an offline configuration that is imported. This area is displayed under the following conditions: • You have selected a file with the data format SEQ5. • You have clicked the information Import contents so that the additional interface elements are displayed. A check box is assigned to each test sequence. This check box can be used to select or deselect test sequences for import. All test sequences are selected after opening the Importing dialog. Use the Select all check box to select or deselect all test sequences at once.
Function charts to import	The check boxes in this area are used to define the function charts (CFC) of an offline configuration that are imported. This area is displayed under the following conditions: • You have selected a file with the data format DIGSI 4-CFC (ST). • You have clicked the information Import contents so that the additional interface elements are displayed. A check box is assigned to each function chart. This check box can be used to select or deselect function charts for import. All function charts are selected after opening the Importing dialog. Use the Select all check box to select or deselect all function charts at once.

Related Topics

[16.1.1 Overview of Formats](#)

[16.3.1 Preparing and Starting the Import](#)

20.6.11 Import Device Drivers

This dialog is used to import device drivers for DIGSI 5. Device drivers are required to add offline configurations of SIPROTEC 5 devices of a certain type to a project or establish an online connection to a certain device type. The device drivers imported are available for all projects.

Elements and Explanations

You can find explanations for the elements of the **Import device driver** dialog in the following table.

Element	Explanation
Device-driver file(s)	This text box contains the name and path of the selected driver files. If you wish to select an alternative or an additional file, click the ... button.
...	This button is used to open a standard file dialog. You can select another driver file with this dialog. You can also select several driver files, whose contents are then available for simultaneous import.

Device-driver versions	This list box contains the device-driver versions available for import. These are structured in a hierarchical manner. The scope of the display depends on the selection in the Filter area. As with the project tree, you can navigate through the structure and show or hide individual levels. A check box is located to the left of each entry. If you mark this check box, you thus select the associated device drivers or all device drivers belonging to a level for import. You can only select device drivers that are not yet imported. Symbols to the right of the entries indicate that a device driver is already imported.
Filter	This area contains 2 check boxes which you can use to filter the display in the Device-driver versions field. The following filter options are available: • Show new versions • Show imported versions Both check boxes are marked by default.
Preview...	This button is used to open the 20.6.12 Preview dialog. This shows a summary of the contents selected for import.
Import	This button is used to start the import. Different indications inform you about the current status of the import. As soon as the import is complete, the 20.6.25 Status Dialog opens. As soon as you close this, DIGSI 5 is terminated and then restarted. Changes to the project are saved before exiting.
Close	This button is used to reject the settings and close the dialog.

Related Topics

[2.2.7 Importing Device Drivers](#)

20.6.12 Preview

This dialog is used to check your selection of the device drivers to be installed and start the import.

Elements and Explanations

You can find explanations for the elements of the **Preview** dialog in the following table.

Element	Explanation
Display field	This field contains all elements selected for the import.
Install	Use this button to close the dialog and start the import. Different indications inform you about the current status of the import. As soon as the import is complete, the 20.6.25 Status Dialog opens. As soon as you close this, DIGSI 5 is terminated and then restarted. Changes to the project are saved before exiting.
Cancel	Use this button to close the dialog without starting the installation.

Related Topics

[2.2.7 Importing Device Drivers](#)

20.6.13 List of Permissible Function-Block Types

This dialog is used to select the type of function block.

Elements and Explanations

You can find explanations for the elements of the **List of permissible function-block types** dialog in the following table.

Element	Explanation

List of function block types	This list box contains the available function-block types. Mark the type that is to be used for the function block to be added.
OK	This button is used to accept the selection and close the dialog. A function block of the selected type is added.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[8.2.2.6 Adding or Deleting a Function Block](#)

20.6.14 Add New Signal

This dialog is used to add a new signal to the Signal catalog.

Elements and Explanations

You can find explanations for the elements of the **Add new signal** dialog in the following table.

Element	Explanation
Signal name	In this text box, enter a name for the signal which you want to add to the Signal catalog.
User-defined signals	This list box is used to select the signal type for the signal you wish to add to the Signal catalog.
Insert	This button is used to accept the selection and close the dialog. The signal is inserted in the Signal catalog at the marked point.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[9.5.1 Adding a User-Defined Signal to the Application](#)

20.6.15 Change Confirmation ID

This dialog is used to change the current confirmation ID.

Elements and Explanations

You can find explanations for the elements of the **Change confirmation ID** dialog in the following table.

Element	Explanation
New confirmation ID	Enter the new confirmation ID in this entry field. This must have exactly 6 digits.
Repeat new confirmation ID	Enter the new confirmation ID in this entry field a 2nd time.
OK	This button is used to accept the entry and close the dialog.
Cancel	This button is used to reject the entry and close the dialog.

Related Topics

[15.8.1 Overview of Confirmation IDs and Connection Password](#)

[15.8.3 Changing the Confirmation ID](#)

20.6.16 Change Connection Password

This dialog is used to change the connection password.

Elements and Explanations

You can find explanations for the elements of the **Change connection password** dialog in the following table.

Element	Explanation
New connection password	Enter the new connection password in this entry field. This must have exactly 8 characters. The connection password must include at least 1 upper-case letter, 1 lower-case letter, 1 digit and 1 special character.
Confirm new connection password	Enter the new connection password in this entry field a 2nd time.
OK	This button is used to accept the entry and close the dialog.
Cancel	This button is used to reject the entry and close the dialog.

Related Topics

[15.8.1 Overview of Confirmation IDs and Connection Password](#)

[15.8.4 Changing the Connection Password](#)

20.6.17 Enter Confirmation ID

This dialog is used to enter a confirmation ID.

Elements and Explanations

You can find explanations for the elements of the **Enter confirmation ID** dialog in the following table.

Element	Explanation
Confirmation ID	Enter the confirmation ID for the desired action in this text box. An asterisk is shown for each character that you enter.
OK	This button is used to accept the entry and close the dialog.
Cancel	This button is used to reject the entry and close the dialog.

Related Topics

[15.8.1 Overview of Confirmation IDs and Connection Password](#)

[15.8.8 Entering a Confirmation ID](#)

20.6.18 Enter Connection Password

This dialog is used to enter the connection password.

Elements and Explanations

You can find explanations for the elements of the **Enter connection password** dialog in the following table.

Element	Explanation
Connection password	Enter the current connection password in this entry field. An asterisk is shown for each character that you enter.
OK	This button is used to accept the entry and close the dialog.
Cancel	This button is used to reject the entry and close the dialog.

Related Topics

[15.8.1 Overview of Confirmation IDs and Connection Password](#)

[15.8.7 Entering a Connection Password](#)

20.6.19 Activate/Deactivate Connection Password

You can use this dialog to generate a new connection password and to activate the same.

Elements and Explanations

You can find explanations for the elements of the **Activate/deactivate connection password** dialog in the following table.

Element	Explanation
New connection password	Enter the new connection password in this entry field. This must have exactly 8 characters. The connection password must include at least 1 upper-case letter, 1 lower-case letter, 1 digit and 1 special character.
Repeat new connection password	Enter the new connection password in this entry field a 2nd time.
OK	This button is used to accept the entry and close the dialog.
Cancel	This button is used to reject the entry and close the dialog.

Related Topics

[15.8.1 Overview of Confirmation IDs and Connection Password](#)

[15.8.6 Activating and Deactivating a Connection Password](#)

20.6.20 Add New Frame

This dialog is used to add a new frame template.

Elements and Explanations

You can find explanations for the elements of the **Add new frame** dialog in the following table.

Element	Explanation
Name	This text box contains a consecutively numbered standard name for the frame. You can optionally enter a different name for the frame. The name appears in the project tree as an object after it is created. The new frame can then be used in the Document information editor when creating a new document information sets.
Paper type	This list box is used to select the paper size for the new frame. Usually, the page size of the frame and the cover page should match.
Orientation	This list box enables you to specify whether the frame should be created in Portrait or Landscape format. Usually, the orientation of the frame and the cover page should match.
Add	This button is used to accept the selection and close the dialog. The new frame is created and displayed in the project tree.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.1.7.1 Opening a Template](#)

20.6.21 Add New Cover Page

This dialog is used to add a new cover page template.

Elements and Explanations

You can find explanations for the elements of the **Add new cover page** dialog in the following table.

Element	Explanation
Name	This text box contains a consecutively numbered standard name for the cover page. You can optionally enter a different name for the cover page. The name appears in the project tree as an object after it is created. The cover page can then be used in the document information editor when creating a new document information sets.
Paper type	This list box is used to select the paper size for the new cover page. Usually, the page size of the cover page and the frame should match.
Orientation	This list box enables you to specify whether the cover page should be created in Portrait or Landscape format. Usually, the orientation of the cover page and the frame should match.
Add	This button is used to accept the selection and close the dialog. The new cover page is created and displayed in the project tree.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

- [17.1.1 Overview for Designing and Printing Documents](#)
- [17.1.7.2 Adding a Template](#)

20.6.22 Print Preview

You can specify the scope of preview using this dialog.

Elements and Explanations

You can find explanations for the elements of the **Print preview** dialog in the following table.

Element	Explanation
Document layout	
Document information	This list box is used to select a document template for the printout. If you click the list box, an additional selection dialog will be displayed. Select a category and hence a document template from this.
Print cover page	This check box is used to select a cover page for the printout.
Print table of contents	This check box is used to select the table of contents for the printout.
Properties	
All	This check box is used to select all the project data for the printout.
Compact	This check box is used to print the project data in the compact form.
Preview	This button is used to accept the selection and close the dialog. The Print preview opens in the working area.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

- [17.1.1 Overview for Designing and Printing Documents](#)
- [17.3.3 Determining the Preview Scope](#)

20.6.23 Print

This dialog is used to select a printer, a document template, and a cover page and then start the printout.

Elements and Explanations

You can find explanations for the elements of the **Print** dialog in the following table.

Element	Explanation
Printer	
Name	This list box is used to select the printer to be used for the printout. The list box contains the names of all output devices for which the respective drivers are installed.
Advanced...	This button is used to open the Print dialog. You can set further print-specific settings with this dialog.
Status	This field contains the status of the printer currently selected. The status indicates whether the printer is ready for printing or not.
Type	This field contains the name of the printer currently selected.
Location	This field contains information on the location which is saved in the printer properties.
Comment	This field contains a comment which is saved in the printer properties.
Document layout	
Document information	This list box is used to select a document template for the printout. If you click the list box, an additional selection dialog will be displayed. Select a category and hence a document template from this.
Print cover page	This check box is used to select a cover page for the printout.
Print table of contents	This check box is used to select the table of contents for the printout.
Properties	
All	This check box is used to select all the project data for the printout.
Compact	This check box is used to print the project data in the compact form.
Preview	This button is used to accept the selection and close the dialog. The Print preview opens in the working area.
Print	This button is used to accept the selection and close the dialog. The printing starts.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[17.1.1 Overview for Designing and Printing Documents](#)

[17.2.1 Starting the Printing](#)

20.6.24 Custom Filter

This dialog is used to generate a user-defined filter with which you can filter column contents. A filter consists of one or more expressions linked with logical operators.

Elements and Explanations

You can find explanations for the elements of the **Custom filter** dialog in the following table.

Element	Explanation
Cell	Use this list box to select a condition for an expression in the form condition - value. You can select from the following conditions: • Equals • Does not equal • Begins with • Does not begin with • Ends with • Does not end with • Contains • Does not contain

Value	Use this list box to select a value for an expression in the form condition - value . The values that can be selected correspond to the values that can occur in the column to be filtered. However, you can also specify other values, for example, digits or letters, directly in the entry field of the list box.
AND/OR	Select one of the logical operators AND and OR with which you wish to combine 2 expressions. If a filter consists only of a single expression, you do not have to select a logical operator.
Add to filter	This button is used to add an expression to the filter. The expression is displayed in the Filter field. The logical operator currently selected is not included in the 1st expression. With all further expressions, the logical operator currently selected is also added and displayed in the Filter field.
Filter expression	This field contains the current expression or the current combination of expressions.
Clear filter	This button is used to delete all expressions in the Filter field.
OK	This button is used to apply the filter created and close the dialog. The display of the content is updated in relation to the filter you have created. This button does not become active until you have created and added to the filter at least 1 expression.
Cancel	This button is used to reject the filter created and close the dialog.

Related Topics

[3.2.5 Creating a User-Defined Filter](#)

[3.2.4 Filtering Column Content](#)

20.6.25 Status Dialog

This dialog gives you information about the output of various operations, for example, the output of the import of device drivers or the output of device drivers or the output of loading offline configurations.

Elements and Explanations

You can find explanations for the elements of the status dialogs in the following table.

Element	Explanation
Overview	This tab contains status messages about the progress of the respective process.
Errors and warnings	This tab contains errors and warnings which are documented during the respective process.
Save log	This button is used to open a standard file dialog. Use this dialog to save the status, error and warning messages in a text file. You can analyze the saved log files with other programs such as Microsoft Excel.
OK	This button is used to close the dialog.

Related Topics

[3.4 Using the Status Dialog](#)

20.6.26 Create Current-Measuring Point

This dialog is used to select the type of current-measuring point.

Elements and Explanations

You can find explanations for the elements of the **Create current-measuring point** dialog in the following table.

Element	Explanation

Type	This list box contains the available measuring point types, for example 3-phase or 1-phase . Mark the type that is to be used for the current-measuring point to be added.
Count	This list box is used to enter the count for the number of current-measuring points to be added. To change the count value, click the arrow keys of the list box. Alternatively, you can enter a value in the entry field of the list box. Note: You can add multiple current-measuring points at a time depending on the allowed limit for the respective device and on the existing configuration.
OK	This button is used to accept the selection and close the dialog. A current-measuring point of the selected type is added.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[8.1.4.1 Overview of Connections](#)
[8.1.5.5 Adding Measuring Points](#)

20.6.27 Create Voltage-Measuring Point

This dialog is used to select the type of voltage-measuring point.

Elements and Explanations

You can find explanations for the elements of the **Create voltage-measuring point** dialog in the following table.

Element	Explanation
Type	This list box contains the available measuring point types, for example 3-phase or 1-phase . Mark the type that is to be used for the voltage-measuring point to be added.
Count	This list box is used to enter the count for the number of voltage-measuring points to be added. To change the count value, click the arrow keys of the list box. Alternatively, you can enter a value in the entry field of the list box. Note: You can add multiple voltage-measuring points at a time depending on the allowed limit for the respective device and on the existing configuration.
OK	This button is used to accept the selection and close the dialog. A voltage-measuring point of the selected type is added.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[8.1.4.1 Overview of Connections](#)
[8.1.5.5 Adding Measuring Points](#)

20.6.28 Rename Signal

With this dialog you change the name of a signal marked in the signal catalog.

Elements and Explanations

You can find explanations for the elements of the **Rename signal** dialog in the following table.

Element	Explanation

Text box	Enter a name for the new signal in this text box.
OK	This button is used to accept the entry and close the dialog. The signal is renamed.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[9.5.2 Renaming a Signal](#)

20.6.29 Upgrade Configuration Version

Elements and Explanations

You can find explanations for the elements of the **Update configuration version** dialog in the following table:

Element	Explanation
Update device-configuration version	This check box enables you to select the device configuration version for an upgrade.
Current version	Displays the current device configuration version of the selected device.
Available versions	Displays the list of compatible higher device configuration versions for upgrade.
Update communication-configuration version	This check box enables you to select the communication configuration version for upgrade.
Current version	Displays the current communication configuration version of the selected device.
Available versions	Displays the list of compatible higher communication configuration versions for upgrade.
Upgrade	This button enables you to upgrade the configuration version.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[2.2.8 Managing Device Drivers](#)

20.6.30 Import

This dialog is used to import data from a TEA-X file in an offline configuration or a project.

Elements and Explanations

You can find explanations for the elements of the **Import** dialog in the following table.

Element	Explanation
Import	This text box contains the name of the import file that is currently selected. The file name is displayed along with the file path. If you wish to select another file, click the ... button.
...	This button is used to open a file dialog. You can select another import file with this dialog.
Comment	This field contains a comment included in the import file.
TEA-X project	With this list box you select the desired project.

Element	Explanation
Subsets to import	With the check boxes in this area, you can define the desired data categories for import. This area is displayed if you have selected the data format TEA-X. The following data categories are available: • Application and device settings • Communication mappings • Display pages • Flexible engineering • Folder structure • Function charts (CFC) • IEC station • Single-line configuration A check box is assigned to each data category. You can use the check box to select or deselect data categories for import. All data categories are selected after opening the Import dialog.
Next	This button enables you to proceed further to the next dialog.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[16.1.1 Overview of Formats](#)[16.3.2 Configuring the TEA-X Import](#)
[16.3.1 Preparing and Starting the Import](#)

20.6.31 Import TEA-X

This dialog is used to import data from a TEA-X file in an offline configuration or a project.

Elements and Explanations

You can find explanations for the elements of the **Import** dialog in the following table.

Element	Explanation
Select and map devices for import:	This field displays the different options in a tabular format to select the devices for import.
All	This column displays the check box option to check or uncheck selection for displayed devices.
Devices in TEA-X file	This column displays the list of devices available in the project for import.
Devices in DIGSI 5 project	This column displays the mapping status of the devices and also allows you to change the mapping status of required device.
Status	This column displays the respective status (for example, Delete icon image) based on the configuration of the import file.
Back	This button enables you to go back to the previous dialog.
Import	This button is used to start the import. Different indications inform you about the current status of the import.
Cancel	This button is used to reject the selection and close the dialog.

Related Topics

[16.1.1 Overview of Formats](#)[16.3.2 Configuring the TEA-X Import](#)
[16.3.1 Preparing and Starting the Import](#)

20.7 Toolbars

20.7.1 DIGSI 5 Toolbar

This toolbar gives you fast access to actions and settings in the DIGSI 5.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to open the 20.6.2 Create a New Project dialog. This dialog is used to define key data for a new project.
	This button is used to open the 20.6.3 Open Project dialog. With this dialog, you select the projects last opened.
	This button is used to save the opened project. This button is only active if the data has changed.
	This button is used to print project and device data. If in 3.1.2 Project Tree the project name or an offline configuration is selected, the 20.6.23 Print dialog opens. Otherwise, the printout starts directly.
	This button is used to copy a marked object (element or value) to the clipboard. If you paste the object at another permissible location, it will be deleted at the current position. This button only becomes active if at least one suitable object is marked.
	This button is used to copy a marked object (element or value) to the clipboard. You can then paste a copy of the object at another permissible location. The original object is retained here. This button only becomes active if at least one suitable object is marked.
	This button is used to paste the content of the clipboard at another permissible location. This button only becomes active if the clipboard contains at least one suitable object.
	This button is used to delete a marked object (element or value).
	This button is used to undo the most recent change and revert back to the previous value. This button is active only if you modify any values in the 20.1.9 Settings Editor .
	This button is used to reverse the change made by the Undo operation. This button is active only if you perform the Undo operation in the 20.1.9 Settings Editor .
	This button is used to open the tab 20.2.1 Tasks . The Tasks tab contains operator elements for the Search/Replace function.
	This button is used to open the 20.6.9 Export dialog. This dialog is used to select a data format, determine additional format-relevant settings, and start the export. This button is active only if the name of either the project or a SIPROTEC 5 device is marked in the project tree.
	This button is used to open the Select file for import dialog. This dialog is used to select an import file and then open the 20.6.10 Import dialog. This button is active only if the name of the project is marked in the project tree or a offline configuration is marked.
	This button is used to start the compilation process for function charts (CFC). This button only becomes active if one of the following requirements is met: • The name of the offline configuration is marked in the project tree. • An element of the offline configuration is marked in the project tree. • The 20.1.10 Function-Chart (CFC) Editor opens in the working area.
	You can display the cross-reference list in the working area with this button. This button is only active if a project element is marked in the project tree.

	This button is used to divide the working area horizontally. This allows you to arrange 2 editors or editing tools below one another. This button only becomes active if exactly 2 editing tools are opened.
	This button is used to divide the working area vertically. This allows you to arrange 2 editors or editing tools next to one another. This button only becomes active if exactly 2 editing tools are opened.
	This button is used to start the consistency check. This button is active only if the name of the project or an element is marked in the project tree.

Related Topics

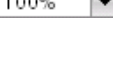
[3.1.1 DIGSI 5 User Interface](#)

20.7.2 Toolbar of the Single-Line Editor

This toolbar gives you fast access to actions and settings in the Single-line editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to open the Save as dialog. This dialog is used to define a name and path for a file. If you click on Save , the single-line configuration is saved in vector format in this file.
	This button is used to return to the 100 % view of the single-line configuration.
	This button is used to incrementally zoom out the display of the single-line configuration. This button is not active if you can no longer zoom out the display.
	This button is used to incrementally zoom in the display of the single-line configuration. This button is not active if you can no longer zoom in the display.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value or a definite final state. Alternatively, enter an integral percentage value between 50 and 500 in the entry field of the list box. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.
	This button is used to rotate an element marked in the single-line configuration by 90° clockwise. This button becomes active only if exactly 1 element is marked. You cannot rotate any device symbols or busbars.
	This button is used to rotate an element marked in the single-line configuration by 90° counterclockwise. This button becomes active only if exactly 1 element is marked. You cannot rotate any device symbols or busbars.
 Synchronize	This button is used to synchronize the transformer values set in the single-line configuration with the function settings. This button becomes active only if a device symbol is marked, to which at least 1 transformer is connected.
 Create display	This button is used to generate one or more display pages from one or more bays. This button becomes active only if either a bay or a device symbol with at least one connected bay is marked.
	This list box is visible only for busbar devices (for example, 7SS device type). This list box enables you to view the filtered view of the busbar device.
	This button is visible only for busbar devices (for example, 7SS device type). This button enables you to set/reset the filter for device specific view.
	This button is visible only for busbar devices (for example, 7SS device type). This button enables you to show/hide the measured value.

Related Topics

[20.1.2 Single-Line Editor](#)

20.7.3 Toolbar of the Project-Texts Editor

This toolbar gives you fast access to actions and settings in the Project-texts editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to group identical texts together in the column of the reference language. You can then edit the content in the combined cells.
	This button is used to hide the text lines containing empty text cells. Which lines are hidden depends on the column marked.

Related Topics

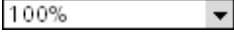
[20.1.8 Project Texts Editor](#)

20.7.4 Toolbar of the Network View

This toolbar gives you fast access to actions and settings in the Network view.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	By default, this button is enabled and it allows the graphical networking of interfaces.
	This button is used to show or hide the IP addresses of the individual Ethernet interfaces.
	This button is used to incrementally zoom in the display of the Network view. This button is not active if you can no longer zoom in the display.
	This button is used to activate the selection tool allowing you to select a definite section for zooming in. Then drag open a rectangle, holding the mouse button down in the Network view. The section defined in this way is zoomed in.
	This button is used to incrementally zoom out the display of the Network view. This button is not active if you can no longer zoom out the display.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value or a definite final state. Alternatively, enter an integral percentage value between 50 and 500 in the entry field of the list box. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.

Related Topics

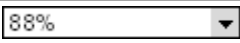
[20.1.6 Network View](#)

20.7.5 Toolbar of the Device View

This toolbar gives you fast access to actions and settings in the Device view.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to change from the Device view to the 20.1.6 Network View . This button becomes active only if a device configuration is displayed in the Device view.
	This list box shows the names of all offline configurations available in the project. From this list box, select the offline configuration whose hardware configuration is to be displayed in the Device view.
	This button is used to show or hide the archive for modules not used.
	This button is used to show or hide the designations of the individual modules.
	This button is used to incrementally zoom in the display of the Device view. This button is not active if you can no longer zoom in the display.
	This button is used to activate the selection tool allowing you to select a definite section for zooming in. Then drag open a rectangle, holding the mouse button down in the Device view. The section defined in this way is zoomed in.
	This button is used to incrementally zoom out the display of the Device view. This button is not active if you can no longer zoom out the display.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value or a definite final state. Alternatively, enter an integral percentage value between 50 and 500 in the entry field of the list box. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.

Related Topics

[20.1.7 Device View](#)

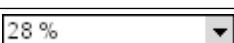
20.7.6 Toolbar of the Data Flow

This toolbar gives you fast access to actions and settings in the Data flow of a function chart (CFC).

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to toggle between the different views of the sheet bar. You can select the following views: • No sheet bars • Static sheet bars • Dynamic sheet bars
	This button is used to change between single and double numbers of rows in the sheet bar.
	This button can be used to show or hide the sheet borders.
	This button can be used to show or hide the grid in the function chart.
	This button can be used to show or hide the sequence order.

	This button is used to insert a new subchart in the CFC chart.
	This button is used to activate the tool for adding a text field.
	This button is used to change to the 20.1.12 Control Flow . The data of a block marked in the Data flow is emphasized by a colored area in the Control flow.
	This button is used to incrementally zoom in the display of the function chart. This button is not active if you can no longer zoom in the display.
	This button is used to incrementally zoom out the display of the function chart. This button is not active if you can no longer zoom out the display.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value. Alternatively, enter an integral percentage value between 10 and 200 in the entry field of the list box. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.
	This button enables you to start or stop the online analysis for the function charts (CFC).
	This button enables you to start or stop the offline analysis for the function charts (CFC).
	This button enables you to open the latest offline analysis output.
	This button enables you to delete all trace points in all the function charts (CFC) created under a device.
	This button is used to start the automatic optimization of the order of the blocks in the function chart.
	This button enables you to sort the objects according to the data flow. Siemens recommends saving the project before sorting.
	This button is used to display the default values assigned for the input signals in the function charts (CFC). You can view the default values of CFC input signals (for example, Chart name , Terminal , Signal name , Type , and Default value) by selecting the desired function chart.
	This button enables you to synchronize the signals between CFC and the 20.3.2 Information Routing editor. This function searches for the matching signals in the 20.3.2 Information Routing editor and resolves the inconsistency of the signal in CFC.
	This button enables you to lock the function charts (CFC) and make them read-only.
	This button unlocks the function charts (CFC) and enables editing.

Related Topics

[20.1.11 Data Flow](#)

[12.4 Analyzing Function Charts \(CFC\)](#)

20.7.7 Toolbar of the Control Flow

This toolbar gives you fast access to actions and settings in the Control flow.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to update the list of the Control flow.

	This button is used to show or hide the elements of a module in the list of the Control flow.
	This button is used to change to the 20.1.11 Data Flow . A block previously marked in the Control Flow is emphasized by a colored area in the Data flow.

Related Topics

[20.1.12 Control Flow](#)

20.7.8 Toolbar of the Display and Symbol Editor

This toolbar gives you fast access to actions and settings in the Display editor and in the Symbol editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
Display Editor	
	This button is used to open the Symbol editor.
	This button is used to show or hide the grid on the display page.
	This button is used to activate the text entry tool.
	This button is used to activate the tool for adding a dynamic field.
	This button is used to rotate a marked element clockwise. The rotation is 90° in the Display editor. This button becomes active only if exactly 1 element is marked.
	This button is used to rotate a marked element counterclockwise. The rotation is 90° in the Display editor. This button becomes active only if exactly 1 element is marked.
	This button is used to activate the tool for drawing lines.
	This button is used to activate the tool for drawing rectangles.
Symbol Editor	
	This button is used to rotate a marked element clockwise. The rotation is 90° on selecting all the elements in a state. The rotation is 22.5° on selecting a single element in a state. This button becomes active only if exactly 1 element is marked.
	This button is used to rotate a marked element counterclockwise. The rotation is 90° on selecting all the elements in a state. The rotation is 22.5° on selecting a single element in a state. This button becomes active only if exactly 1 element is marked.
	This button is used to activate the tool for selecting elements.
	This button is used to activate the tool for adding connecting points. You can connect the elements in the display page to lines via connecting points.
	This button is used to activate the tool for free-hand drawing.
	This button is used to activate the tool for drawing rectangles.
	This button is used to activate the tool for drawing lines.
	This button is used to activate the tool for drawing elliptical curves.

	This button is used to activate the tool for drawing polygons.
	This list box gives you access to curves in 4 defined alignments. Open the list box and select one of the 4 curves. This lets you activate the tool for adding the selected curve. The associated symbol is adopted in the toolbar.
	This list box gives you access to triangles in 4 defined alignments. Open the list box and select one of the 4 triangles. This lets you activate the tool for adding the selected triangle. The associated symbol is adopted in the toolbar.
	This list box gives you access to semicircles in 4 defined alignments. Open the list box and select one of the 4 semicircles. This lets you activate the tool for adding the selected semicircle. The associated symbol is adopted in the toolbar.
	This button is used to activate the tool for adding or removing a filling for a closed element, for example a circle.
	This button is used to incrementally zoom out the drawing area. This button is not active if you can no longer zoom out the display.
	This button is used to incrementally zoom in the drawing area. This button is not active if you can no longer zoom in the display.

Related Topics[20.1.13 Display Editor](#)[20.1.15 Symbol Editor](#)

20.7.9 Toolbar of the Fault-Display Configuration Editor

This toolbar gives you fast access to actions and settings in the Fault-display configuration editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to select all circuit-breaker function groups available in the list. This button is not active if all circuit-breaker function groups are selected.
	This button is used to deselect all circuit-breaker function groups available in the list. This button is not active if no circuit-breaker function group is selected.

Related Topics[20.1.16 Fault-Display Configuration Editor](#)

20.7.10 Toolbar of the Test-Sequences Editor

This toolbar gives you fast access to actions and settings in the Test-sequences editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This list box is used to select a state for editing. The settings of the state selected will be displayed in the working area.
	This button is used to add a new state to the test sequence. The new state contains a consecutively numbered standard name. The state is automatically selected for editing and its default settings are displayed in the working area.

	This button is used to delete the state currently displayed from the test sequence.
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which all states of a test sequence need to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.
	This button is used to accept the final values of the previous state as the initial values for the state selected currently. This button is not active if you have selected the 1st state.

Related Topics

[20.1.21 Test-Sequences Editor](#)

20.7.11 Toolbar of the IEC 61850 Structure Editor

This toolbar gives you fast access to actions and settings in the IEC 61850 structure editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to expand all the rows. All levels of the IEC 61850 structure are displayed. This button is not active if all rows are shown.
	This button is used to collapse all the rows. Only the uppermost level of the IEC 61850 structure is displayed. This level corresponds to the names of the logical devices. This button is not active if all rows are hidden.
	This button is used to show all elements in the IEC 61850 interface.
	This button is used to hide all elements in the IEC 61850 interface.
	This button is used to show all settings in the IEC 61850 interface. If you select this option, the settings will be included in the IID export file which is used for data exchange with the IEC 61850 System Configurator with some exceptions.
	This button is used to hide all settings in the IEC 61850 interface. If you select this option, the settings will be excluded from the IID export file which is used for data exchange with the IEC 61850 System Configurator with some exceptions.
	This button is used to show all SIPROTEC extensions in the IEC 61850 interface. If you select this option, Siemens-internal data objects and logical-node information will be included in the IID export file which is used for data exchange with the IEC 61850 System Configurator with some exceptions.
	This button is used to hide all SIPROTEC extensions in the IEC 61850 interface. If you select this option, Siemens-internal data objects and logical-node information will be excluded in the IID export file which is used for data exchange with the IEC 61850 System Configurator with some exceptions.
SIPROTEC 5 view	This list box is used to switch between the SIPROTEC 5 view and that similar to the SIPROTEC 4 view. The selection of a different view has an impact on all areas in DIGSI 5 in which the IEC 61850 objects are displayed.

Related Topics

[20.1.20 IEC 61850 Structure Editor](#)

20.7.12 Toolbar of the Settings Editor

This toolbar gives you fast access to actions and settings in the Settings editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to open the 20.5.10 Device Settings . You can change to edit mode in the device settings. The current edit mode is shown next to the toolbar of the Settings editor.
	This button is used to open the device settings. You can change the active settings group in the device settings. The current active settings group is shown next to the toolbar of the Settings editor.
	This button is used to navigate to the previous function in the same function group. A function not yet open is opened automatically and shown in the working area. This button is not active if no previous function is available.
	This button is used to navigate to the next function in the same function group. A function not yet open is opened automatically and shown in the working area. This button is not active if no subsequent function is available.
	This button can be used to show or hide the Graphics window of the Settings editor.
	This button is used to copy the settings of the selected comparison settings group to the parameters group selected for editing a marked function block. This button is active only if a comparison parameters group is selected.
	This button can be used to show or hide the settings numbers.

Related Topics

[20.1.9 Settings Editor](#)

20.7.13 Toolbar of the Graphics Window

This toolbar gives you fast access to actions and settings in the Graphics window of the Settings editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to incrementally zoom out the display of the Diagram window. This button is not active if you can no longer zoom out the display.
	This button is used to incrementally zoom in the display of the Diagram window. This button is not active if you can no longer zoom in the display.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value or a definite final state. Alternatively, enter an integral percentage value between 60 and 200 in the entry field of the list box. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the graphic displayed needs to be saved. You can select between the BMP and JPG formats. If you click on Save , the graphic is saved in the format selected.

	This button is used to copy the displayed graphic to the clipboard.
	This button is used to open the 20.6.22 Print Preview dialog. This dialog is used to select a document template and a cover page and finally start the print operation.
	This button can be used to show or hide the grid in the Graphics window.

Related Topics

[20.1.9 Settings Editor](#)

20.7.14 Toolbar of the Operations Safety and Access Control Editor

This toolbar gives you fast access to actions and settings in the **Operations Safety and Access Control** Editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
 Refresh	You can use this button to retrieve the status of the connection password from a SIPROTEC 5 device connected to the DIGSI 5 PC.

Related Topics

[18.2 Operations Safety and Access Control](#)

20.7.15 Toolbar of the Test Editor for Wiring

This toolbar gives you fast access to actions and settings in the Test editor for wiring.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the test settings and results needs to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.1.22 Test Editor for Wiring](#)

20.7.16 Toolbar of the Test Editor for Communication Modules

This toolbar gives you fast access to actions and settings in the Test editor for communication modules.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation

	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the test settings and results needs to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.1.23 Test Editor for Communication Modules](#)

20.7.17 Toolbar of the Test Editor for Analog Inputs

This toolbar gives you fast access to actions and settings in the Test editor for analog inputs.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
Show values as	This list box enables you to select the primary , secondary or percent values.
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the test settings and results needs to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.1.24 Test Editor for Analog Inputs](#)

20.7.18 Toolbar of the Test Editor for Control Functions

This toolbar gives you fast access to actions and settings in the Test editor for control functions.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the test settings and results needs to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.1.27 Test Editor for Protection Functions](#)

20.7.19 Toolbar of the Test Editor for Circuit Breaker

This toolbar gives you fast access to actions and settings in the Test editor for circuit breaker.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation

	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the test settings and results needs to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.1.26 Test Editor for Circuit Breakers](#)

20.7.20 Toolbar of the Test Editor for Protection Functions

This toolbar gives you fast access to actions and settings in the Test editor for protection functions.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the graphic displayed needs to be saved. You can select between the BMP and JPG formats. If you click on Save , the graphic is saved in the format selected.
	This button is used to copy the displayed graphic to the clipboard.
	This button can be used to show or hide the grid in the Diagram window.
	This button is used to incrementally zoom in the display of the Diagram window. This button is not active if you can no longer zoom in the display.
	This button is used to incrementally zoom out the display of the Diagram window. This button is not active if you can no longer zoom out the display.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value or a definite final state. Alternatively, enter an integral percentage value between 60 and 200 in the entry field of the list box. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.
Create snapshot	This button is used to create snapshot of currently shown indications in the assigned offline configuration.
Clear list	This button is used to clear the list of received spontaneous indications.
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the test settings and results needs to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.1.27 Test Editor for Protection Functions](#)

20.7.21 Toolbar of the Test Editor for Communication Protocols

This toolbar gives you fast access to actions and settings in the Test editor for communication protocols.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation

	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the test settings and results needs to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.1.28 Test Editor for Communication Protocols](#)

20.7.22 Toolbar of the Documentation Settings Editor

This toolbar gives you fast access to actions and settings in the Document editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to activate the tool for selecting objects.
	This button is used to activate the hand tool. This tool is used to move the template vertically and horizontally in the working area.
	This button is used to incrementally zoom in the display of the template. This button is not active if you can no longer zoom in the display.
	This button is used to incrementally zoom out the display of the template. This button is not active if you can no longer zoom out the display.
	This button is used to activate the selection tool allowing you to select a definite section for zooming in. Then drag open a rectangle, holding the mouse button down in the template. The section defined in this way is zoomed in.
	This button is used to activate the tool allowing you to dynamically scale the template. Then keep the mouse button pressed. If you move the mouse away from you the template will be zoomed in. If you move the mouse towards you the template will be zoomed out.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value or a definite final state. Alternatively, enter an integral percentage value between 10 and 800 in the entry field of the list box. If you click outside the box with the mouse or press the <Enter> key the display will be updated.

Related Topics

[20.1.17 Document Information Editor](#)

20.7.23 Toolbar of the Load Configuration

This toolbar gives you fast access to the actions and settings in the configuration selection.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
 Update device(s)	This button is used to start updating the device settings. All offline configurations selected in the list are transmitted to the SIPROTEC 5 devices assigned. This button is active only if at least 1 component is selected.
	This button is used to select all offline configurations in the list. This button is not active if all offline configurations are selected.

	This button is used to deselect all offline configurations in the list. This button is not active if no offline configuration is selected.

Related Topics

[20.5.18 Configuration Selection](#)

20.7.24 Toolbar of Load Firmware to Devices

This toolbar gives you fast access to actions and settings in the firmware and protocol selection.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to show all the rows. All levels of the component hierarchy are displayed. This button is not active if all rows are shown.
	This button is used to hide all the rows. Only the uppermost level of the component hierarchy is displayed. This level corresponds to the names of the offline configurations. This button is not active if all rows are hidden.
 Update device(s)	This button is used to start loading the components marked into the SIPROTEC 5 device(s). This button is active only if at least 1 component is selected.
 Refresh	This button is used to retrieve the current version numbers of the components marked. This button is active only if at least 1 component is selected.
	This button is used to select all components available for update in the list. This button is not active if all components are selected.
	This button is used to deselect all components available in the list. This button is not active if no component is selected.

Related Topics

[20.5.17 Firmware Selection](#)

20.7.25 Toolbar of the Device Information

This toolbar gives you fast access to actions and settings in the Device information tabs.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
 Refresh	This button is used to update the device information in DIGSI 5.
	This button is used to reset all LEDs and binary inputs of a SIPROTEC 5 device. This button is active only if you have opened the device information for an online device.
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the entries of the 20.5.7 Logs tab need to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.
 Delete	This button deletes all log entries of the selected type from the device after loading them into DIGSI 5.

Related Topics

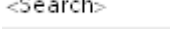
[20.5.4 Device Information](#)

20.7.26 Toolbar of the Hardware-Catalog Palette

This toolbar gives you fast access to actions and settings in the Hardware catalog.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
<Search> 	In this text box, enter the name of the hardware component you wish to find in the Hardware catalog.
	This button is used to start searching for the hardware component whose name you have entered in the Search text box. The Hardware catalog is searched through from top to bottom.
	This button is used to start searching for the hardware component whose name you have entered in the Search text box. The Hardware catalog is searched through from bottom to top.

Related Topics

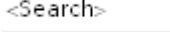
[20.2.4 Hardware Catalog](#)

20.7.27 Toolbar of the Signal-Catalog Palette

This toolbar gives you fast access to actions and settings in the Signal catalog.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
<Search> 	In this text box, enter the name of the signal you wish to find in the Signal catalog.
	This button is used to start searching for the signal whose name you have entered in the Search text box. The Signal catalog is searched through from top to bottom.
	This button is used to start searching for the signal whose name you have entered in the Search text box. The Signal catalog is searched through from bottom to top.
	This button is used to open the 20.6.14 Add New Signal dialog. You can add a new signal to the Signal catalog with this dialog.

Related Topics

[20.2.5 Signals](#)

20.7.28 Toolbar of the Log Table

This toolbar gives you fast access to actions and settings in the **Logs** table.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to request all indication logs from the SIPROTEC 5 device.

	This button is used to delete all indication logs in the SIPROTEC 5 device.
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the indication logs marked need to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.
	This button allows you to set a marked indication as a reference for the relative time of the usual indications. The marked indication then contains the relative time 0 ms. The relative times of the other indications are calculated from their respective timestamps. If a indication has a negative time value, then this indication is encountered in time before the reference indication. If a indication has a positive time value, then this indication is encountered in time after the reference indication. This button is active only if a indication is marked.
	This button can be used to show or hide the Alternative name column.
	This list box is used to select one of the display modes primary , secondary , or percent . Depending on your selection, all values are shown as primary, secondary, or percentages.

Related Topics

[20.4.1 Log](#)

20.7.29 Toolbar of the Records Table

This toolbar gives you fast access to actions and settings in the **Records** table.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
 Read records	This button is used to read all fault records and fault indications from the SIPROTEC 5 device.
 Download	This button is used to download the selected records from SIPROTEC 5 device.
	This button is used to select all displayed records in the list. This button is not active if all records are selected.
	This button is used to deselect all records in the list. This button is not active if no offline configuration is selected.
 Start fault record	This button is used to generate a test fault record. This button is active only if you have opened the Records table for an online device.
	This button is used to close the currently visible fault record window. The button only becomes active if a Fault-record window is opened.
	This button is used to delete all fault records and fault indications in the SIPROTEC 5 device.
	This button is used to delete all fault records and fault indications saved in the offline configuration.
	This button is used to open the Export fault record dialog. This dialog is used to define a name and path for a file. If you click on Export , a marked fault record is saved in COMTRADE format in this file. This button is active only if a fault record is marked.
	This button is used to open the Save as dialog. This dialog is used to define the name, path and format of a file in which the fault records displayed need to be saved. You can select between the TXT and CSV formats. If you click on Save , the data is saved in the format selected.

Related Topics

[20.4.2 Records](#)

20.7.30 Toolbar of the Measurements Table

This toolbar gives you fast access to actions and settings in the **Measurements** table.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
 Create snapshot	This button is used to generate a snapshot of the measured and metered values of an entire function group that has been read currently. As a prerequisite for this, the online device must be assigned to a suitable offline configuration in an open project.
 Reset	This button is used to reset all marked measured and metered values to their default values in the online device.
 primary ▼	This list box is used to select one of the display modes primary , secondary , or percent . Depending on your selection, all values are shown as primary, secondary, or percentages.
 CSV	This button is used to open the Save as dialog. This dialog is used to define the name, path, and format of a file in which the measured and metered values read need to be saved. You can select between TXT and CSV formats. If you click Save , the data is saved in the format selected.

Related Topics

[20.4.5 Measurements](#)

20.7.31 Toolbar of the Indications Table

This toolbar gives you fast access to actions and settings in the **Indications** table.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
 Create snapshot	This button is used to generate a snapshot of the spontaneous indications displayed. As a prerequisite for this, the online device must be assigned to a suitable offline configuration in an open project.
 Clear list	This button is used to delete all spontaneous indications in the online device.
	This button is used to activate or deactivate the auto-scrolling behavior. Activate the auto-scrolling behavior so that the table entries are automatically shifted down when a new indication arrives. The new indication is then always visible as the top entry in the list.
 CSV	This button is used to open the Save as dialog. This dialog is used to define the name, path, and format of a file in which the spontaneous indications displayed need to be saved. You can select between TXT and CSV formats. If you click Save , the data is saved in the format selected.

	This button allows you to set a marked indication as a reference for the relative time of the usual indications. The marked indication then contains the relative time 0 ms. The relative times of the other indications are calculated from their respective time stamps. If an indication has a negative time value, then this indication is encountered in time before the reference indication. If an indication has a positive time value, then this indication is encountered in time after the reference indication. This button only becomes active if an indication is marked.

Related Topics

[20.4.3 Indications](#)

20.7.32 Toolbar of the Indication-Snapshot Table

This toolbar gives you fast access to actions and settings in the **Indication snapshot** table.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button allows you to set a marked indication as a reference for the relative time of the usual indications. The marked indication then contains the relative time 0 ms. The relative times of the other indications are calculated from their respective time stamps. If an indication has a negative time value, then this indication is encountered in time before the reference indication. If an indication has a positive time value, then this indication is encountered in time after the reference indication. This button only becomes active if an indication is marked.
	This button is used to open the Save as dialog. This dialog is used to define the name, path, and format of a file in which the current (instantaneous) values of the indications displayed need to be saved. You can select between the TXT and CSV format. If you click Save , the data is saved in the format selected.

Related Topics

[20.4.4 Indication Snapshot](#)

20.7.33 Toolbar of the Measured-Value Snapshot Table

This toolbar gives you fast access to actions and settings in the **Measured-value snapshot** table.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This list box is used to select one of the display modes primary , secondary , or percent . Depending on your selection, all values are shown as primary, secondary, or percentages.
Snapshot	This button is used to save the snapshot of the current measured values in the assigned offline configuration.
Reset	This button is used to reset all values of the current view.
	This button is used to open the Save as dialog. This dialog is used to define the name, path, and format of a file in which the current (instantaneous) measured values displayed need to be saved. You can select between the TXT and CSV formats. If you click Save , the data is saved in the format selected.

Related Topics

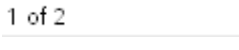
[20.4.6 Measured-Value Snapshot](#)

20.7.34 Toolbar of the Print Preview

This toolbar gives you fast access to actions and settings in the Print Preview.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to open the 20.6.23 Print dialog. This dialog is used to select a printer and then start the printing.
	This button is used to activate the hand tool. This tool is used to move the displayed document vertically and horizontally in the working area.
	This button is used to incrementally zoom in the display of the template. This button is not active if you can no longer zoom in the display.
	This button is used to incrementally zoom out the display of the template. This button is not active if you can no longer zoom out the display.
	This button is used to activate the selection tool allowing you to select a definite section for zooming in. Then drag open a rectangle, holding the mouse button down in the template. The section defined in this way is zoomed in.
	This button is used to activate the tool allowing you to dynamically scale the template. Then keep the mouse button pressed. If you move the mouse away from you the template will be zoomed in. If you move the mouse towards you the template will be zoomed out.
	This list box is used to scale the display in percent. For this, open the list box and select a specified percentage value or a definite final state. Alternatively, enter an integral percentage value between 10 and 800 in the entry field of the list box. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.
	If you navigate through a document, the sequence of the displayed pages is documented in a list. This button is used to change to the previous page in this list. The page is displayed in the Print preview. This button is not active if you have reached the start of the list.
	If you navigate through a document, the sequence of the displayed pages is documented in a list. This button is used to change to the next page in this list. This button is not active if you have reached the end of the list.
	This button is used to change to the first page of the document. This button is not active if the first page is displayed.
	This button is used to change to the previous page of the document. This button is not active if the first page is displayed.
	Enter the page number you wish to change to in this entry field. The entered value must be less than or equal to the maximum page number. If you click outside the list box with the mouse or press the <Enter> key the display will be updated.
	This button is used to change to the next page of the document. This button is not active if the last page is displayed.
	This button is used to change to the last page of the document. This button is not active if the last page is displayed.

Related Topics

[20.5.2 Print Preview](#)

20.7.35 Toolbar of the Information Routing Matrix

This toolbar gives you fast access to actions and settings in the **Information routing** matrix.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to show all rows. All levels of the signal list are displayed. This button is not active if all rows are shown.
	This button is used to hide all the rows. Only the uppermost level of the signal list is displayed. This level corresponds to the names of the function groups. This button is not active if all rows are hidden.
	This button is used to show the information routing in the extended column view.
	This button is used to show the information routing in the reduced column view.
	This button can be used to show or hide the Alternative name column.
	This button can be used to show or hide the Number column.
	This button can be used to show or hide the CFC and Display columns.
	You can use this list box to filter the scope of information displayed, sources and destinations with predefined display profiles. You can select from the following display profiles: • All entries There is no constraint regarding the display of pieces of information, sources and destinations. • Tripping Only signals connected with tripping are displayed. All other information is hidden. This also applies to complete function groups, if these do not contain at least one signal that is connected to tripping. All sources and destinations are displayed. • Measured/ metered values Only measured and metered values are displayed. All other information is hidden. This applies also to entire function groups, unless these contain at least one measured or metered value. Only a limited number of sources and destinations are displayed. • Device I/O Only input and output signals of the SIPROTEC 5 device are displayed. All other information is hidden. This applies also to entire function groups, unless these contain at least one input and output signal. Only a limited number of sources and destinations are displayed. • Configuration of the menu levels Only the device menu levels are displayed. All other information is hidden. This also applies to all function groups. Only the source Function keys are displayed. All other sources and destinations are hidden.
	This button is used to reset all column filters. The Information routing matrix is displayed in the standard view.

	This button is used to open the Save as dialog. This dialog is used to define the name, path, and format of a file in which the information routings or communication mappings need to be saved. You can select desired format (for example, TXT and CSV) and click Save to save the data in the desired location.
☐ Use signal alternative names	If you select this check box, the alternative names defined for the signals under the Alternative name column are used in the logs and records instead of the hierarchical names.

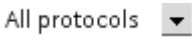
Related Topics[20.3.2 Information Routing](#)**20.7.36 Toolbar of the Communication Mapping Matrix**

This toolbar gives you fast access to actions and settings in the **Communication mapping** matrix.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to show all rows. All levels of the signal list are displayed. This button is not active if all rows are shown.
	This button is used to hide all the rows. Only the uppermost level of the signal list is displayed. This level corresponds to the names of the function groups. This button is not active if all rows are hidden.
	This button can be used to show or hide the column Number .
 All entries ▼	You can use this list box to filter the scope of the signals displayed with predefined display profiles. You can select from the following display profiles: • All entries There is no restriction when displaying signals. • Measured/metered values Only measured and metered values are displayed. All other signals are not shown. This applies also to entire function groups, unless these contain at least one measured or metered value. • Device I/O Only input and output signals of the SIPROTEC 5 device are displayed. All other signals are not shown. This applies also to entire function groups, unless these contain at least one input and output signal. • Settings Only settings are displayed. All other signals are not shown.
	This button is used to reset all column filters. The Communication mapping matrix is displayed in the standard view.

	You can use this list box to reduce the number of columns displayed specific to the protocol. Depending on the protocols selected in the offline configuration, the list may contain the following entries: • All protocols • DNP3 • IEC 60870-5-103 • IEC 60870-5-104 • Modbus TCP • PROFINET IO • n devices protection-data communication (n = 2 to 6)
	This button is used to open the Save as dialog. This dialog is used to define the name, path, and format of a file in which the information routings or communication mappings need to be saved. You can select desired format (for example, TXT and CSV) and click Save to save the data in the desired location.

Related Topics

[20.3.1 Communication Mapping](#)

20.7.37 Toolbar of the Function-Group Connections Matrix

This toolbar gives you fast access to actions and settings in the **Function-group connections** matrix.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to reset all column filters. The Function-group connections matrix is displayed in the standard view.

Related Topics

[20.3.4 Function-Group Connections](#)

20.7.38 Toolbar of the Measuring-Points Routing Matrix

This toolbar gives you fast access to actions and settings in the **Measuring-points routing** matrix.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to reset all column filters. The Measuring-points routing matrix is displayed in the standard view.

Related Topics

[20.3.8 Measuring-Points Routing](#)

20.7.39 Toolbar of the Manage Device Drivers View Editor

This toolbar gives you fast access to actions and settings in the **Manage device drivers view** editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to expand all rows. This button is not active if all rows are already expanded.
	This button is used to collapse all rows. Only the uppermost level of the list is displayed. This button is not active if all rows are already collapsed.
	This button is used to reset all column filters. This button is active if the column filter is set.
	This button enables you to download the withdrawn DDD information from the SIPROTEC 5 download area and to update the withdrawn status of the imported DDDs imported in DIGSI in the 20.1.32 Manage Device Drivers View editor. The text box next to the refresh button displays the last updated date and withdrawn file version details.
	This button enables you to delete all the imported DDDs.

Related Topics

[2.2.8 Managing Device Drivers](#)

[20.1.32 Manage Device Drivers View](#)

20.7.40 Toolbar of the Global Libraries Palette

This toolbar gives you fast access to actions and settings in the **Global libraries** palette.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to create a user-defined global DIGSI 5 library.
	This button is used to open a user-defined global DIGSI 5 library.
	This button is used to save a user-defined global DIGSI 5 library.
	This button is used to close a user-defined global DIGSI 5 library.
	This button is used to create a folder in the user-defined global DIGSI 5 library under the Types folder and/or Master copies folder. This button is active only if you select the Types folder and/or the Master copies folder. This button is also available in the Project library palette.
	With this list-box option, you can apply a context-related filter to the display to increase the clarity of extensive libraries. You can select the following options using this list box: • Documentation • All • Devices & networks • Context-driven filtering This button is also available in the Project library palette.

Related Topics

[3.3.1 Overview of Libraries](#)

[3.3.6 Filtering the View](#)

[3.3.5 Using Elements of the Global DIGSI 5 Library](#)

[3.3.3 Working with the User-Defined Global DIGSI 5 Library](#)

20.7.41 Toolbar of the CFC Cross-Reference List Editor

This toolbar gives you fast access to actions and settings in the CFC cross-reference list editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button is used to refresh and update the list of the CFC cross-reference list editor.
	This button enables you to export the table with contents in the CFC cross-reference list editor.

20.7.42 Toolbar of the Security Event Logging Editor

This toolbar gives you fast access to actions and settings in the **Security Event Logging** Editor.

Elements and Explanations

You can find explanations for the elements of the toolbar in the following table.

Element	Explanation
	This button can be used to show or hide the setting numbers.

Related Topics

[18.3 Security Event Logging Editor](#)

[18.2 Operations Safety and Access Control](#)

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