

SINAMICS DCC V16

Configuring SINAMICS DCC

Configuration Manual

<u>Safety information</u>	1
<u>General information</u>	2
<u>General and requirements</u>	3
<u>Overview</u>	4
<u>Structure of the SINAMICS DCC user interface</u>	5
<u>Configuration steps</u>	6
<u>Monitoring and tracing configuration online</u>	7
<u>Creating a template</u>	8
<u>Library handling</u>	9
<u>Openness</u>	10
<u>Additional information</u>	11
<u>Appendix A: Abbreviations</u>	A

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

DANGER

indicates that death or severe personal injury **will** result if proper precautions are not taken.

WARNING

indicates that death or severe personal injury **may** result if proper precautions are not taken.

CAUTION

indicates that minor personal injury can result if proper precautions are not taken.

NOTICE

indicates that property damage can result if proper precautions are not taken.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified personnel are those who, based on their training and experience, are capable of identifying risks and avoiding potential hazards when working with these products/systems.

Proper use of Siemens products

Note the following:

WARNING

Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be complied with. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

Table of contents

1	Safety information.....	7
1.1	Fundamental safety instructions	7
1.1.1	General safety instructions.....	7
1.1.2	Warranty and liability for application examples	7
1.1.3	Industrial security	8
1.2	Industrial Security Manual	10
1.3	Unsafe operating states due to manipulation of the Safety Integrated parameters after the acceptance test.....	11
1.4	Data security for libraries	12
1.5	Extraction of the configuration for protection against modifications if projects are transferred unprotected	13
1.6	Project consistency after importing from unknown or untrustworthy sources	14
2	General information	15
2.1	Compliance with the General Data Protection Regulation	15
2.2	Use of OpenSSL	17
2.3	Display of the information system for Chinese user interface language	18
2.4	SINAMICS documentation	19
3	General and requirements	23
3.1	Introduction to SINAMICS DCC	23
3.2	DCC editor	26
3.3	Requirements	28
4	Overview.....	31
5	Structure of the SINAMICS DCC user interface	33
5.1	View and representation	33
5.2	Tooltips.....	37
5.3	TIA information system	38
5.4	Online help for blocks in SINAMICS DCC.....	39
6	Configuration steps.....	41
6.1	Editing projects.....	41
6.2	Device configuration.....	42
6.3	Working with charts.....	43
6.3.1	General	43
6.3.2	Creating charts	43
6.3.3	Chart properties	44

6.3.4	Copying charts	46
6.3.5	Deleting charts	47
6.3.6	Export charts	48
6.3.7	Importing charts	49
6.4	Chart contents	52
6.4.1	General	52
6.4.2	Libraries	52
6.4.3	Handling blocks	52
6.4.3.1	Inserting blocks	52
6.4.3.2	Copying blocks	56
6.4.3.3	Deleting blocks	57
6.4.3.4	Block properties	57
6.4.3.5	Block connectors	59
6.4.3.6	Publishing block connectors/pins as SINAMICS parameters	61
6.4.4	Preparing a connection to the drive object	66
6.4.4.1	Overview	66
6.4.4.2	Calculating a chart with per-unit variables	67
6.4.4.3	Calculating a chart with absolute variables	68
6.4.4.4	Interconnecting DCC signals with the components of the drive	70
6.4.5	Interconnections	70
6.4.5.1	Interconnecting with block connectors	70
6.4.5.2	Interconnecting with SINAMICS parameters	72
6.4.5.3	Text references	74
6.4.6	Text boxes	77
6.4.6.1	Inserting text boxes	77
6.4.7	Handling subcharts	78
6.4.7.1	Chart structure	78
6.4.7.2	Inserting subcharts	78
6.4.7.3	Inserting the contents of subcharts	79
6.4.7.4	Copying subcharts	79
6.5	Execution sequence for blocks and charts	81
6.5.1	Execution sequence	81
6.5.2	Changing the execution sequence of the blocks	81
6.5.3	Defining the predecessor for newly inserted blocks	82
6.5.4	Changing the execution sequence of the charts	83
6.6	Clock cycles and sampling times	84
6.6.1	Clock cycles	84
6.6.2	Setting the sampling time	97
6.7	Establishing an online connection	99
6.8	Load to device	102
6.9	Loading from a device	105
6.9.1	Loading project data from the drive unit into the TIA Portal	105
6.9.2	Uploading to SINAMICS STARTER	106
6.10	System restrictions	107
7	Monitoring and tracing configuration online	109
7.1	Overview	109
7.2	Testing configuration with the "Monitoring" function	110

7.3	Tracing the configuration with the trace function.....	113
8	Creating a template	117
9	Library handling	119
9.1	Introduction	119
9.2	Displaying versions of the DCB libraries	120
9.3	DCB Standard	122
9.3.1	Provision of DCC standard blocks	122
9.3.2	DCC standard blocks	122
9.4	DCB Extension	123
9.4.1	Provision of DCB Extension library blocks	123
9.4.2	Editing DCB Extension libraries	124
9.4.3	Library compatibility	125
10	Openness	127
11	Additional information	129
A	Appendix A: Abbreviations	131
A.1	List of abbreviations	131
	Index.....	133

Safety information

1.1 Fundamental safety instructions

1.1.1 General safety instructions

WARNING

Danger to life if the safety instructions and residual risks are not observed

If the safety instructions and residual risks in the associated hardware documentation are not observed, accidents involving severe injuries or death can occur.

- Observe the safety instructions given in the hardware documentation.
- Consider the residual risks for the risk evaluation.

WARNING

Malfunctions of the machine as a result of incorrect or changed parameter settings

As a result of incorrect or changed parameterization, machines can malfunction, which in turn can lead to injuries or death.

- Protect the parameterization against unauthorized access.
- Handle possible malfunctions by taking suitable measures, e.g. emergency stop or emergency off.

1.1.2 Warranty and liability for application examples

Application examples are not binding and do not claim to be complete regarding configuration, equipment or any eventuality which may arise. Application examples do not represent specific customer solutions, but are only intended to provide support for typical tasks.

As the user you yourself are responsible for ensuring that the products described are operated correctly. Application examples do not relieve you of your responsibility for safe handling when using, installing, operating and maintaining the equipment.

1.1.3 Industrial security

Note

Industrial security

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, systems, machines and networks.

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Products and solutions from Siemens constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the Internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. using firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that can be implemented, please visit:

Industrial security (<https://www.siemens.com/industrialsecurity>)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they become available, and that only the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customer's exposure to cyber threats.

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed at:

Industrial security (<https://www.siemens.com/industrialsecurity>)

Further information is provided on the Internet:

Industrial Security Configuration Manual (<https://support.industry.siemens.com/cs/ww/en/view/108862708>)

**WARNING****Unsafe operating states resulting from software manipulation**

Software manipulations, e.g. viruses, Trojans, or worms, can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Keep the software up to date.
- Incorporate the automation and drive components into a holistic, state-of-the-art industrial security concept for the installation or machine.
- Make sure that you include all installed products into the holistic industrial security concept.
- Protect files stored on exchangeable storage media from malicious software by with suitable protection measures, e.g. virus scanners.
- On completion of commissioning, check all security-related settings.
- Protect the drive against unauthorized changes by activating the "Know-how protection" converter function.

1.2 Industrial Security Manual

Industrial Security Manual

Additional information can be found in the configuration manual "Industrial Security" for SINAMICS, SINUMERIK and SIMOTION at this address.

Pay particular attention to the explanatory notes regarding the cell protection concept in the section "General security measures - network segmentation".

1.3 Unsafe operating states due to manipulation of the Safety Integrated parameters after the acceptance test

WARNING

Unsafe operating states due to manipulation of the Safety Integrated parameters after the acceptance test

Incorrect parameter changes to Safety Integrated Functions after an acceptance test can result in unwanted motion with subsequent severe injury or death.

- To prevent access to your plants and systems by unauthorized persons, implement access restrictions and take the precautions described in the security information.
- To avoid incorrect changes to the configuration and parameters of the Safety Integrated Functions, take the precautions described in the "Acceptance test" chapter of the SINAMICS S120 Safety Integrated Function Manual.
- Check the safety log book of SINAMICS Safety Integrated at regular intervals. Verify that no changes have been made to the parameters since the last acceptance test was performed.
- If any changes have been made and they are intentional, repeat the acceptance test for the Safety Integrated Functions affected. The purpose of the acceptance test is to ensure and document safe operation of the plant. Correct any unintentional changes back to the original values and repeat the acceptance test.

1.4 Data security for libraries

Note

Data security for libraries

In order to guarantee data security for global libraries and project libraries (e.g. imported DCB Extension libraries generated with DCB Studio), only use a secure data storage and work only with libraries from secure sources, e.g. from signed e-mails or from SIOS. Do not load any data from unknown servers.

1.5 Extraction of the configuration for protection against modifications if projects are transferred unprotected

Note

Extraction of the configuration for protection against modifications if projects are transferred unprotected

The parameters of the SINAMICS drives also contain the configuration for protection against modifications for some drive functions like Safety Integrated. After an upload from the device this configuration is stored in the project. If a project is transferred unencrypted via unprotected channels (e.g. email) or stored in an unencrypted form (e.g. in cloud storage), unauthorized persons can extract this configuration from the project files.

- Activate the project protection in SINAMICS Startdrive to encrypt all drive parameters in the Startdrive project.
 - Alternatively you can encrypt the project files with some other software.
-

Note

Protecting parameters in the SINAMICS drive memory

To protect the parameters saved in the SINAMICS drive so that they cannot be read out by unauthorized persons, in addition to the project protection or the specific encryption of project files, you must also activate know-how protection.

If setting up know-how protection is not an option, as an alternative, prevent unauthorized persons from accessing your plants and systems. To do this, implement access restrictions and take the precautions and measures described in the security information.

1.6 Project consistency after importing from unknown or untrustworthy sources

Note

Project consistency after importing and downloading files from unknown or untrustworthy sources

After downloading project files or importing files (e.g. from EPLAN) from unknown or untrustworthy sources into your Startdrive project, always check whether the offline and online configuration of your plant is consistent. For the consistency check, use functions such as "Flash LED" in the "Go online" dialog or the parameter comparison in the parameter view.

General information

2.1 Compliance with the General Data Protection Regulation

Siemens respects the principles of data privacy, in particular the data minimization rules (privacy by design).

For the SINAMICS Startdrive product – including the installed SINAMICS DCC option package – this means the following:

The product only sends personal data to SIEMENS AG if the user explicitly requests this. This occurs in the following cases:

- If the SINAMICS Startdrive program and the SINAMICS DCC option package end unexpectedly, then the user is given the opportunity to send diagnostics information to SIEMENS AG for analysis. If the user avails themselves of this option, then their email address will be collected, transmitted and saved so that they can be contacted in the event of queries.
- The Totally Integrated Automation UPDATER enables the user to check whether updates are available for SINAMICS Startdrive and the SINAMICS DCC option package and to install them. The user can manually check for available updates or activate the corresponding setting in the TIA UPDATER for automatic updating. If the TIA Automation Update Server is used for verification or installation purposes, the IP address of the device used will be transmitted for technical reasons.

Beyond the previously mentioned information, the product only saves personal data in the project. The user is therefore responsible for ensuring compliance with the statutory data protection provisions. This applies in particular to the transfer of projects.

The following data must be taken into account.

- **Windows login**
In the standard configuration, the product saves the login details of the Windows user together with technical function data (e.g. time stamp) in the project. The specified data is saved in order to trace changes in large configurations.
For SINAMICS Startdrive and the SINAMICS DCC option package, reference to specific persons can be established via the project and all elements contained within it (e.g. devices and diagrams).
The specified data can be viewed in the properties of the project and the elements in SINAMICS Startdrive and the SINAMICS DCC option package ("Author" property) and, with the exception of the most recent change to the project, subsequently modified.
- **Usernames in the user administration**
The product only processes and saves additional personal data when the user explicitly enables one of the following functions.
Usernames created by the user are saved by the user administration (security settings) to be able to verify them during subsequent authentication.
- **Login for multi-user engineering**
For multi-user engineering, various technical function data (e.g. time stamp) are saved together with the login of the Windows user concerned in order to be able to trace project changes.

2.1 Compliance with the General Data Protection Regulation

For the three previously mentioned points, the details relating to the specified functions must be observed in the relevant chapter in the information system of SINAMICS Startdrive and the SINAMICS DCC option package.

By generating the login or username, personal data can be pseudonymized for the functions. Deleting the project will cause all personal data saved within it to be deleted too. The particularities of multi-user engineering should be taken into consideration here (e.g. that the project not only needs to be deleted locally from the user's PC, but also from the server used).

2.2 Use of OpenSSL

Use of OpenSSL

This product contains software that has been developed by the OpenSSL project for use in the OpenSSL toolkit.

This product contains cryptographic software created by Eric Young.

This product contains software developed by Eric Young.

2.3 Display of the information system for Chinese user interface language

Incorrect display of texts under Windows 7 SP1

If you install Startdrive or the SINAMICS DCC option package under Windows 7 SP1 and set the user interface language to Chinese, errors in the display of texts in the information system may occur. This incorrect display of texts is known i.a. as mojibake.

Remedy: Installation of Internet Explorer 11

Install Microsoft Internet Explorer 11 or later to ensure the texts are displayed correctly in the information system.

2.4 SINAMICS documentation

SINAMICS documentation

The SINAMICS documentation is organized in the following categories:

- General documentation/catalogs
- User documentation
- Manufacturer/service documentation

Additional information

You can find information about the following topics at the following address (<https://support.industry.siemens.com/cs/de/en/view/108993276>):

- Ordering documentation / documentation overview
- Additional links to download documents
- Using documentation online (find and browse in manuals/information)

Please send any questions about the technical documentation (e.g. suggestions for improvement, corrections) to the following e-mail address (<mailto:docu.motioncontrol@siemens.com>).

Siemens MySupport/Documentation

At the following address (<https://support.industry.siemens.com/My/ww/en/documentation>), you can find information on how to create your individual documentation based on Siemens' content, and adapt it for your own machine documentation.

Training

At the following address (<http://www.siemens.com/sitrain>), you can find information about SITRAIN (Siemens training on products, systems and solutions for automation and drives).

FAQs

You can find Frequently Asked Questions in the Service&Support pages at Product Support (<https://support.industry.siemens.com/cs/de/en/ps/faq>).

SINAMICS

You can find information about SINAMICS at the following address (<http://www.siemens.com/sinamics>).

Usage phases and their documents/tools (as an example)

Usage phase	Document/tool
Orientation	SINAMICS S Sales Documentation
Planning/configuring	<ul style="list-style-type: none"> • SIZER Engineering Tool • Configuration Manuals, Motors
Deciding/ordering	SINAMICS S120 catalogs <ul style="list-style-type: none"> • SINAMICS S120 and SIMOTICS (Catalog D 21.4) • SINAMICS Converters for Single-Axis Drives and SIMOTICS Motors (Catalog D 31) • SINUMERIK 840 Equipment for Machine Tools (Catalog NC 62)
Installation/assembly	<ul style="list-style-type: none"> • SINAMICS S120 Manual for Control Units and Additional System Components • SINAMICS S120 Manual for Booksize Power Units • SINAMICS S120 Manual for Booksize Power Units C/D Type • SINAMICS S120 Manual for Chassis Power Units, Air-cooled • SINAMICS S120 Manual for Chassis Power Units, Liquid-cooled • SINAMICS S120 Manual for AC Drives • SINAMICS S120 Manual Combi • SINAMICS S120M Manual Distributed Drive Technology • SINAMICS HLA System Manual Hydraulic Drive
Commissioning	<ul style="list-style-type: none"> • Startdrive Commissioning Tool • STARTER Commissioning Tool • SINAMICS S120 Getting Started with Startdrive • SINAMICS S120 Getting Started with STARTER (up to SINAMICS V5.1) • SINAMICS S120 Commissioning Manual with Startdrive • SINAMICS S120 Commissioning Manual with STARTER (up to SINAMICS V5.1) • SINAMICS S120 CANopen Commissioning Manual (up to SINAMICS V5.1) • SINAMICS S120 Function Manual Startdrive Drive Functions (as of SINAMICS V5.2) • SINAMICS S120 Function Manual Drive Functions (up to SINAMICS V5.1) • SINAMICS S120 Safety Integrated Function Manual • SINAMICS S120 Function Manual Startdrive Communication (as of SINAMICS V5.2) • SINAMICS S120/S150 List Manual • SINAMICS HLA System Manual Hydraulic Drive
Usage/operation	<ul style="list-style-type: none"> • SINAMICS S120 Commissioning Manual with Startdrive • SINAMICS S120 Commissioning Manual with STARTER (up to SINAMICS V5.1) • SINAMICS S120/S150 List Manual • SINAMICS HLA System Manual Hydraulic Drive
Programming Drive Control Charts	<ul style="list-style-type: none"> • Configuring SINAMICS DCC (V16) • Programming SINAMICS DCC (V3.4) • SINAMICS DCC standard blocks

Usage phase	Document/tool
Maintenance/servicing	<ul style="list-style-type: none">• SINAMICS S120 Commissioning Manual with Startdrive• SINAMICS S120 Commissioning Manual with STARTER (up to SINAMICS V5.1)• SINAMICS S120/S150 List Manual
References	<ul style="list-style-type: none">• SINAMICS S120/S150 List Manual

Target group

This documentation is intended for machine manufacturers, commissioning engineers, and service personnel who use the SINAMICS drive system.

Benefits

This manual provides all of the information, procedures and operator actions required for the particular usage phase.

Standard scope

The scope of the functionality described in this document can differ from that of the drive system that is actually supplied.

- Other functions not described in this documentation might be able to be executed in the drive system. However, no claim can be made regarding the availability of these functions when the equipment is first supplied or in the event of service.
- The documentation can also contain descriptions of functions that are not available in a particular product version of the drive system. The functionality of the supplied drive system should only be taken from the ordering documentation.
- Extensions or changes made by the machine manufacturer must be documented by the machine manufacturer.

For reasons of clarity, this documentation does not contain all of the detailed information about all of the product types, and cannot take into consideration every conceivable type of installation, operation and service/maintenance.

Technical Support

Country-specific telephone numbers for technical support are provided in the Internet at the following address (<https://support.industry.siemens.com/sc/ww/en/sc/2090>) in the "Contact" area.

General and requirements

3.1 Introduction to SINAMICS DCC

SINAMICS Drive Control Chart (SINAMICS DCC) is part of the Advanced Technology Function in the SINAMICS drive system and expands the scope of device functions by means of freely available closed-loop control, arithmetic and logic blocks. SINAMICS DCC so offers a means by which proprietary technological functions can be graphically configured in the SINAMICS drive system. In addition, local data processing in the drive supports the implementation of modular machine concepts and results in an increase in the overall machine performance.

SINAMICS DCC gives users a new dimension for adapting systems to the specific functions of their machines. SINAMICS DCC does not limit the number of functions that can be used. The number of functions is limited only by the performance capability of the Control Unit.

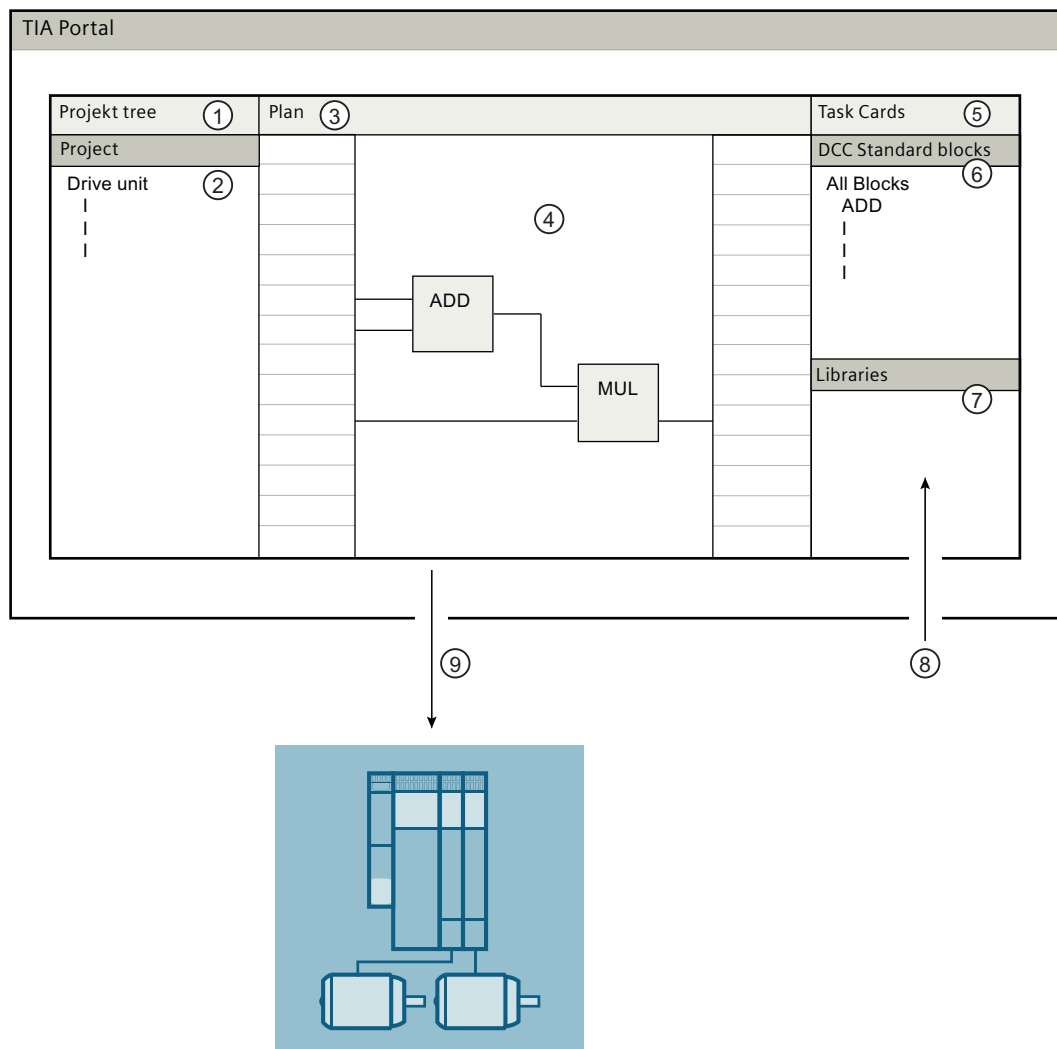
The user-friendly DCC editor based on the popular CFC Editor enables an easy graphical configuration and a clear representation of control loop structures as well as a high degree of reusability of existing charts.

To define the open-loop and closed-loop control functions, multi-instance-capable blocks are selected from the "DCC standard blocks" task card (DCB Standard) or from the "Libraries" task card (DCB Extension libraries: Libraries imported from "SINAMICS DCB Studio") and graphically linked to one another and the SINAMICS drive system by dragging and dropping.

Monitoring and trace functions allow the program behavior to be verified and, in the case of a fault, the cause identified. Two types of DCB libraries are available, **DCB Standard** and **DCB Extension**. The DCB standard blocks (DCB Standard) supplied with SINAMICS DCC contain a large selection of closed-loop control, arithmetic and logic blocks, as well as comprehensive open-loop and closed loop control functions.

For combining, analyzing and acquiring binary signals, all commonly used logic functions are available for selection (AND, XOR, on/off delay, RS flipflop, counter, etc.). Numerous arithmetic functions, such as summation, division and minimum/maximum evaluation are available for monitoring and evaluating numeric variables. In addition to the drive control, axial winder functions, PI controllers, ramp-function generators or sweep generators can be configured simply and without problem.

The following figure shows the data flow of the configuration data when configuring with SINAMICS DCC.



- ① Project navigation
The project navigation provides access to all components and project data.
- ② Drive unit
- ③ Chart
- ④ Configuring
You create a new chart configured with the DCC editor by adding, parameterizing and interconnecting blocks from the "DCC standard blocks" task card (DCB Standard) or from the "Libraries" task card (imported libraries from "SINAMICS DCB Studio").
- ⑤ Task cards
- ⑥ "DCC standard blocks" task card
- ⑦ "Libraries" task card

- ⑧ Importing DCB libraries
The block scope can be extended by importing further DCB libraries, the so-called DCB libraries (DCB Extension).
- ⑨ Loading
Load with the Startdrive your configuration into the drive system where the configuration is executed.

Figure 3-1 Data flow and configuration data

Characteristics and features of SINAMICS DCC

- SINAMICS DCC can be activated simultaneously on several drive objects (**DO**) on a drive unit.
- Several charts can be created for each drive object.
- A block library with administration, arithmetic, control, logic and system blocks is available in the "DCC standard blocks" task card (DCB Standard).
- Extensions to the block library are possible via DCB Extension.
- Graphical interconnection editor with various edit, help and print functions
- Simple and drive-related configuration of axial winder functions, PI controller, ramp-function generator or sweep generator
- Integration of the created technology functions in the SINAMICS base system via BICO technology, whereby the technology functions can be set via configured parameters.
- Diagnostics environment with the "Monitoring" function in the chart and the trace function
- Scalable with various performance features and quantity structures for SINAMICS DCC.
- Openness functionality in conjunction with SINAMICS DCC.

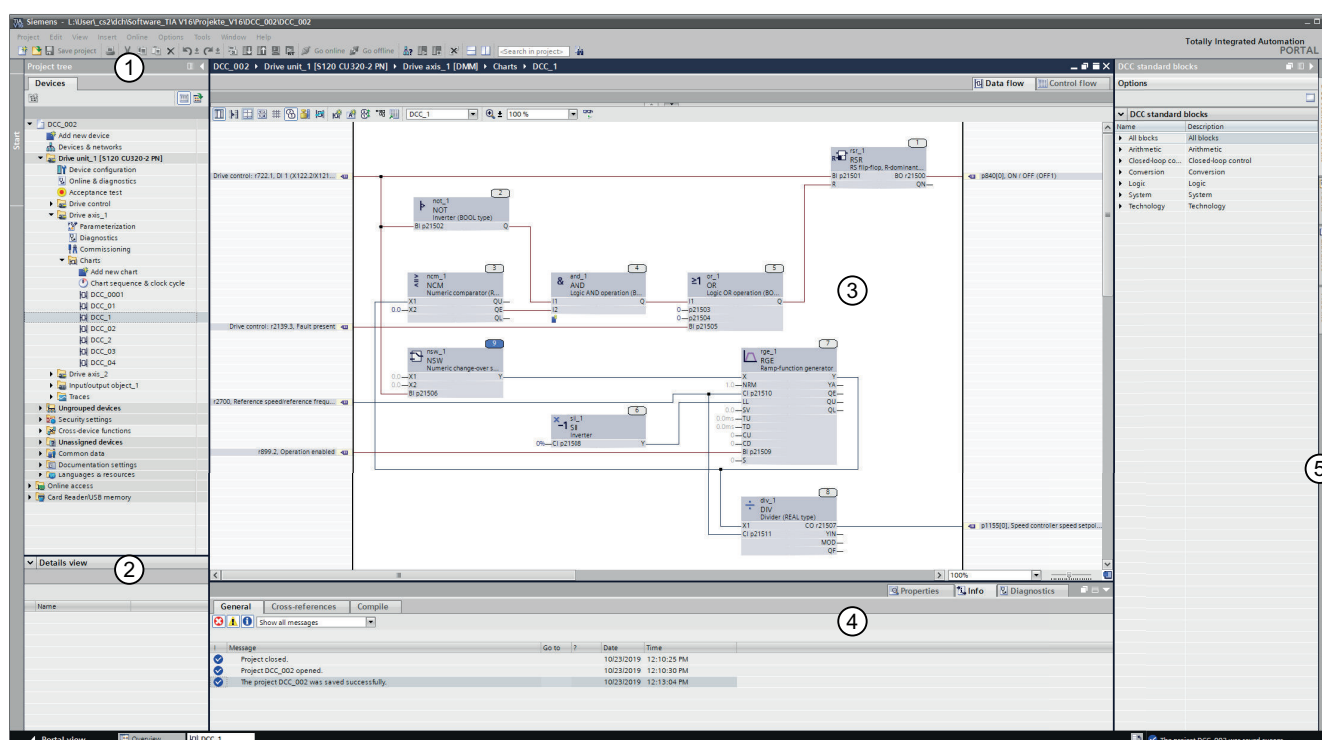
3.2 DCC editor

The user-friendly DCC editor enables easy graphical configuration and a clear representation of control loop structures as well as a high degree of reusability of existing diagrams.

To define the open-loop and closed-loop control functions, multi-instance-capable blocks (**Drive Control Blocks - DCB**) are selected from the DCC standard blocks (**DCB Standard**) or from an imported block (**DCB Extension**) and graphically connected to each other using drag-and-drop. Monitoring and trace functions allow the program behavior to be verified and, in the case of a fault, the cause identified.

The DCC standard blocks (DCB Standard) comprise a large selection of control, arithmetic and logic function blocks, as well as comprehensive open-loop and closed-loop control functions. For linking, analyzing and acquiring binary signals, all common logic functions are available for selection (AND, XOR, on/off delay, RS flipflop, counter, etc.). Numerous arithmetic functions, such as summation, division and minimum/maximum evaluation are available for monitoring and evaluating numeric variables. In addition to the drive control, axial winder functions, PI controllers, ramp-function generators or sweep generators can be configured simply and without problem.

DCB Extension libraries (**DCB Extension**) can be imported into the project library within the "Libraries" task card. See also "Provision of DCB Extension library blocks (Page 123)"



- ① **Project navigation**
The project navigation provides access to all components and project data. You can perform the following actions in the project navigation, for example:
 - Add new components
 - Edit existing components
 - Query and change the properties of existing components
- ② **Details window**
The details view shows specific contents of a selected object in the project navigation.
- ③ **Working area**
Various task cards appropriate for the edited or selected object allow further actions to be performed.
- ④ **Inspector window**
The inspector window shows properties for a selected object in the working area. For example, the SINAMICS parameters for the marked block connector.
- ⑤ **Task cards**
Various task cards appropriate for the edited or selected object allow further actions to be performed, e.g.:
 - Selecting blocks from "DCC standard blocks" (DCB Standard)
 - Importing DCB Extension libraries (DCB Extension)

Figure 3-2 DCC editor in the TIA Portal

3.3 Requirements

Software packages

The software requirements for SINAMICS DCC are the same as those for SINAMICS Startdrive.

Check whether the following software packages are installed:

- Totally Integrated Automation Portal, Version V16
Options:
 - TIA Portal Openness, Version V16
- SINAMICS Startdrive, Version V16
Options:
 - SINAMICS DCC, Version V16

Supported SINAMICS drive units with firmware V5.2

SINAMICS DCC is available only for the following SINAMICS devices:

- SINAMICS G130
- SINAMICS G150
- SINAMICS MV
- SINAMICS S120
 - CU310-2 PN (for single drives)
 - CU320-2 PN (for multi-axis drives)
- SINAMICS S150

The DCC standard blocks of SINAMICS DCC are identical in the STARTER environment and DCC TIA environment.

Query in the TIA Portal

To query the installed software, proceed as follows:

1. Open the portal view.
2. Select "Installed software".
The installed software packages are displayed.
3. Click the "Further information about the installed software" link to obtain further details on the installed software packages.

Requirements for working with the software packages

The user requires knowledge of TIA Portal and SINAMICS Startdrive.

Viewing the installed software in the project view

To view the installed software in the project view, proceed as follows:

1. Switch to the "Project view".
2. Select the "Help > Installed software..." menu.

The "Installed software" dialog opens.

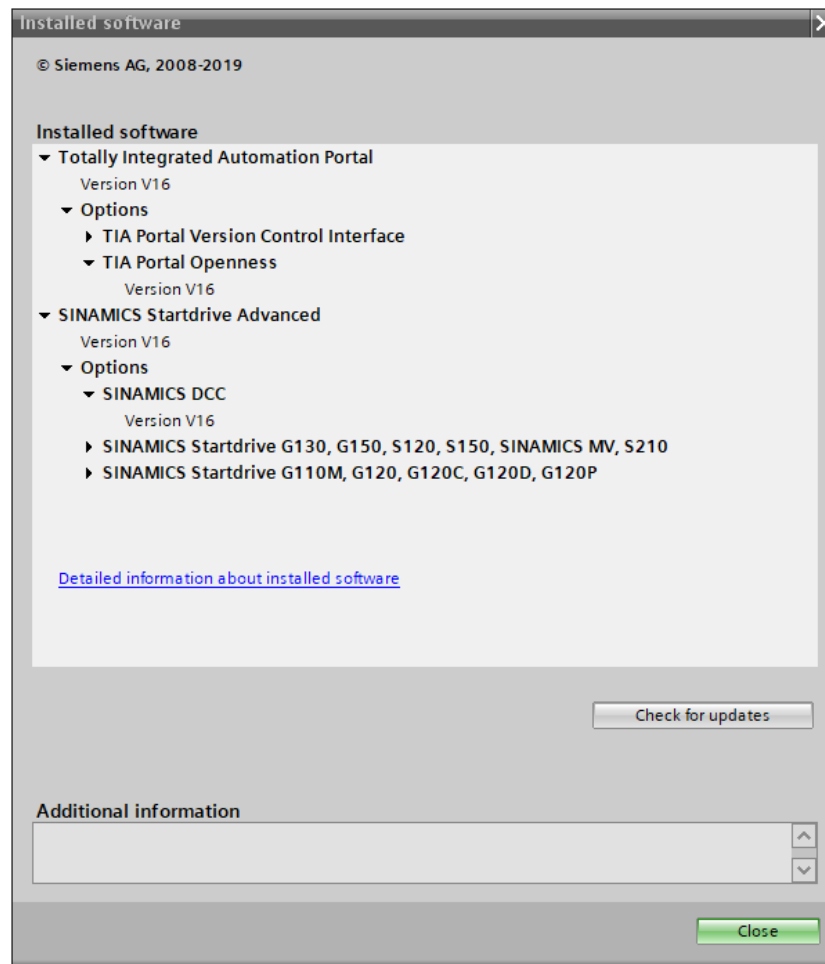


Figure 3-3 Example: Installed software in the project view

Further information about the installed software

You can call additional information on the installed software. Proceed as follows:

1. Click the "Further information about the installed software" link in the "Installed software" dialog.

The "Further information" dialog opens.

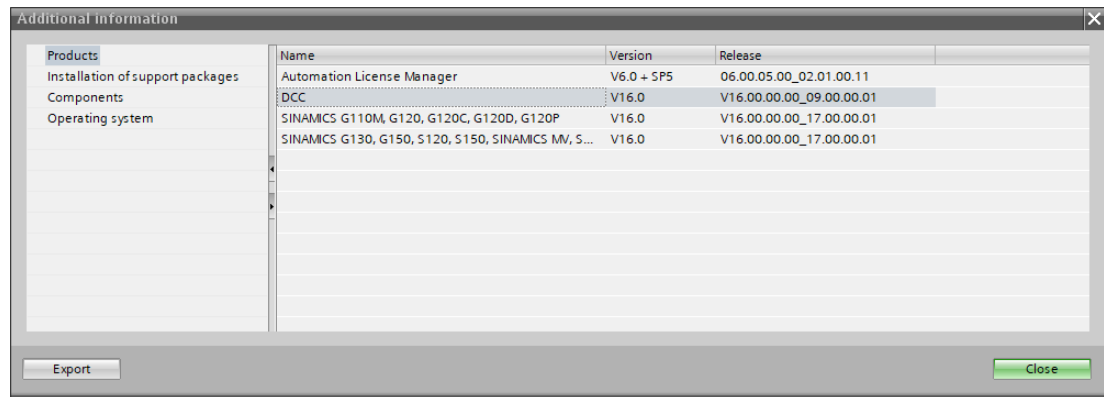


Figure 3-4 Example: Detailed information about the installed software

The displayed information from all detail areas can be exported as an Excel file in CSV format.

Search for updates

You can search for updates for your installed software. This function is supported by SINAMICS DCC.

For further information, refer to the information system of the TIA Portal at "Check and install availability of updates and support packages".

Licensing

A SINAMICS DCC V16 Engineering License is required for configuring charts with "SINAMICS DCC Combo V16".

Licensing is performed via the Automation License Manager (ALM)..

Information about ordering, licensing or installing the SINAMICS DCC can be found at SIOS (Siemens Industry Online Support).

A 21-day trial license can be used for training purposes.

Overview

When using the configuration software SINAMICS DCC, which is integrated in SINAMICS Startdrive and in the TIA Portal, the functionality of SINAMICS drive units can be extended.

The following tasks (configuring steps) can be executed.

Overview of the tasks

Step	Description
1	Editing projects (Page 41) Create a new project for drive-specific solutions or open an existing project to add further data.
2	Device configuration (Page 42) Insert drive units in the projects as single drives or link the drive units to higher-level controllers. Here you configure the drive units by adding the deployed power units, motors and encoders to the device configuration.
3	Working with charts (Page 43) In this step, you create charts and add any required subcharts or upload a chart from the drive unit.
4	Chart contents (Page 52) In this step, you insert chart contents (e.g. blocks or text boxes as describing elements).
5	Publishing block connectors/pins as SINAMICS parameters (Page 61) Define the properties of the block connections (e.g. publication as SINAMICS parameter)
6	Interconnecting with block connectors (Page 70) Interconnections within a chart, interconnections to another chart or interconnections to parameters of the drive (publication as BICO parameters).
7	Clock cycles and sampling times (Page 84) Define the execution sequence within a chart. Adapt the sampling time of a chart.
8	Establishing an online connection (Page 99) Establish an online connection between the programming device and the drive unit (e.g. for "Load in device").
9	Load to device (Page 102) Download the device configuration to the drive unit. The charts are also transferred.
10	Loading project data from the drive unit into the TIA Portal (Page 105) Upload the data from the drive unit to the programming device.
11	Monitoring and tracing configuration online (Page 109) You use the "Monitoring" function to check the signal states in the chart and the trace function for checking the signal characteristic in the chart.

Further information

Because the DCC editor is based on CFC, you can also find additional information for operating the editor in the information system of the TIA Portal at "Technological configuring > Configuring CFCs". Note, however, that the functionality of the DCC editor can differ from the CFC functionality in certain aspects.

Structure of the SINAMICS DCC user interface

5.1 View and representation

Charts can be displayed and edited in the following two views:

- Data flow
- Control flow

Data flow

You can graphically configure a chart in the "Data flow" view. You can freely arrange blocks from the "DCC standard blocks" task card and other chart contents, and view/change the interconnections between the block connectors.

Further information can be found in the information system of the TIA Portal at "CFC editor".

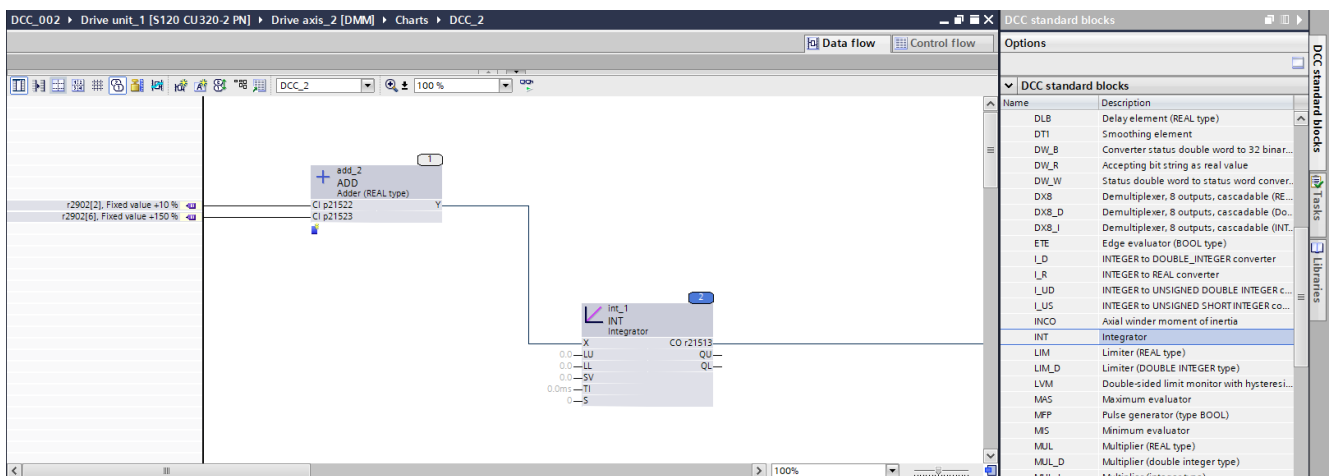


Figure 5-1 View of data flow for a chart

Toolbar in the "Data flow" view



- ① Toggle sidebar view
Toggles between the chart views:
 - Chart with fixed sheet bars
 - Chart with dynamic sheet bars
 - Chart without sheet bars
- ② One-line/two-line sidebar entries
Toggles the display of the sidebar entries from one-line to two-line and vice versa.
- ③ Sheet limits on/off
Displays or hides the sheet limits (possible only for disabled sidebar view).
- ④ Page numbers on/off
Displays or hides the page numbers in the chart.
- ⑤ Grid on/off
Displays or hides the grid in the chart.
- ⑥ Execution sequence on/off
Displays or hides the execution position for the blocks.
- ⑦ Display of the units at the block connector on/off
Displays or hides the unit at the block inputs (provided a unit was defined in the I/O pin properties).
- ⑧ Highlight for signal flow
Highlights the signal flow to/from the block in online mode / monitoring when the associated block is selected.
- ⑨ Insert new subchart
Inserts a new subchart at the cursor position in the chart to give the complete chart a logical structure.
- ⑩ Insert text box
Activates the cursor as a cross-hair to insert a text box.
- ⑪ Optimize chart
Optimizes the execution sequence of the blocks within a chart according to the data flow.
- ⑫ Position blocks according to the data flow
Positions the blocks according to the execution sequence.
- ⑬ Display selected object in the control flow
Opens the "Control flow" tab. The selected object is marked in the list.
- ⑭ Zoom functions
 - Enlarge: Enlarge the view in stages
 - Adapt the chart to the size of the working area
 - Adapt the selection to the size of the working area
 - Reduce: Reduce the view in stages
- ⑮ Change the zoom factor of the working area
Drop-down list for selecting the zoom factor.
- ⑯ Monitoring on/off
Switches the "Online monitoring" function on or off.

Figure 5-2 Data flow toolbar

Control flow

In the "Control flow" view, the blocks and block connectors are displayed in list form.

In this view, you can change the execution sequence of the blocks by moving the individual rows in the table with drag-and-drop and also interconnect block connectors.

To monitor the values of a connector in online mode, they must be selected in the "For test" column in the "Control flow" view. The values cannot be edited.

Run sequence	Object/parameter	Operand	For test	Task	Additional tasks
1	+ ADD	add_2		DCC_2	
2	CI p21522	:= r2902[2], Fixed value +10 %	<input type="checkbox"/>		
3	CI p21523	:= r2902[6], Fixed value +150 %	<input checked="" type="checkbox"/>		
4	Y	:= 0.0	<input type="checkbox"/>		
5	INT	int_1		DCC_2	
6	X	:= .../add_2.Y	<input type="checkbox"/>		
7	LU	:= 0.0	<input type="checkbox"/>		
8	LL	:= 0.0	<input type="checkbox"/>		
9	SV	:= 0.0	<input type="checkbox"/>		
10	TI	:= 0.0ms	<input type="checkbox"/>		
11	S	:= 0	<input type="checkbox"/>		
12	CO r21513	:= 0.0	<input type="checkbox"/>		
13	QU	:= 0	<input type="checkbox"/>		
14	QL	:= 0	<input type="checkbox"/>		

Figure 5-3 View of control flow of a chart

Proceed as follows to find a parameter in the "Data flow" view of the chart:

1. Select the line which contains the parameter in the "Control flow".
2. In the context menu, select "Go to data flow".

The "Data flow" view opens and the corresponding parameter is selected.

Toolbar in the "Control flow" view



- ① Display top elements
Hides all lower-level elements (e.g. inputs) and displays only the top elements (e.g. block).
- ② Display lower-level elements
Displays all lower-level elements (e.g. inputs).
- ③ Display selected object in the data flow
Switches to the "Data flow" display. The associated object is selected there.
- ④ Optimize chart
Optimizes the execution sequence of the blocks within a chart according to the data flow.
- ⑤ Monitoring on/off
Switches the "Online monitoring" function on or off.

Figure 5-4 Control flow toolbar

Further information

Further information about the data flow and control flow can be found in the information system of the TIA Portal at "CFC" editor.

5.2 Tooltips

Further information about a user interface element can be displayed with tooltips and tooltip cascades.

Using tooltips

After a short dwell time with the cursor over a user interface element, the associated tooltip is displayed automatically and any cascades opened (provided activated in the TIA settings).

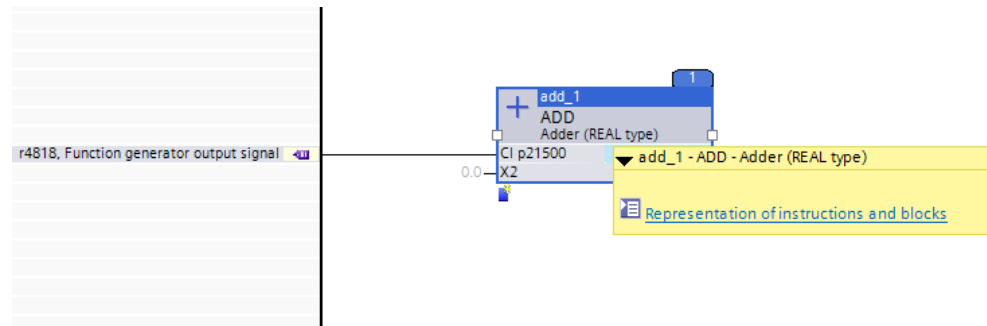


Figure 5-5 Tooltip for block (example)

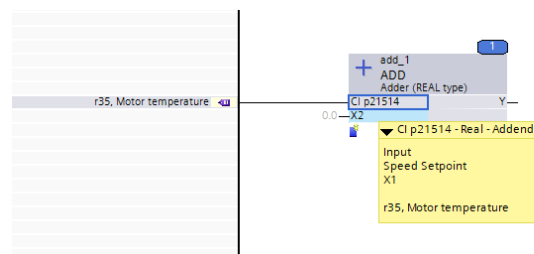


Figure 5-6 Tooltip for block connector (example)

Links included in the tooltips will direct you to the TIA information system, which provides additional information.

See also TIA information system (Page 38).

5.3 TIA information system

Information regarding cross-system topics can be obtained in the TIA information system with the following references.

Device configuration

Search, for example, for "Device configuration".

Continue to "Execution of a device configuration".

or

Search, for example, for "Configuring drives"

Continue to "Configuring SINAMICS S/G/MV drives" > "Drive systems SINAMICS S120, S150, G150, G130, MV" > "SINAMICS S120".

Parameter list

Search, for example, for "Parameter list".

Continue to "Parameter view" and "Edit parameters".

or

Search, for example, for "Configuring drives"

Continue to "Alarms, parameters and function diagrams" > "Alarms, parameters and function diagrams SINAMICS S120" > "Parameters SINAMICS S120".

Trace

Search, for example, for "Trace".

Continue to "Use trace and logic analyzer function" > "Description" > "Recording measured values with the trace function".

Know-how protection

Search, for example, for "Know-how protection".

Continue to "Write and know-how protection (S120 only)" > "Know-how protection (KHP)" > "Configuring know-how protection".

Online mode

Search, for example, for "Connecting devices online".

Continue to "General information on online mode".

5.4 Online help for blocks in SINAMICS DCC

Help for DCC standard blocks can be called in the tooltip using the block name, see Tooltips (Page 37).

Help for blocks from a DCB Extension library can be called as an HTML page.

Requirement

The following requirements must be fulfilled to ensure that the help can be called as an HTML page for blocks from a DCB Extension library.

- A DCB Extension library must be imported in the project library.
- A block from the DCB Extension library for which help is to be called must be contained within a chart.

Calling the help for DCB blocks

To call the help for a block from a DCB Extension library, proceed as follows:

1. Within the project library, select the block from a DCB Extension library for which the help is to be called.
2. Press Shift + F1.

Note

Display of the help for a block from a DCB Extension library

The help function of a block from a DCB Extension library is displayed outside of the TIA Portal with the tool linked to the *.htm file type. The assignment of the *.htm file type to a suitable tool, e.g. Internet Explorer, is done in the control panel.

If an HTML or text editor is assigned here, only the HTML code is displayed.

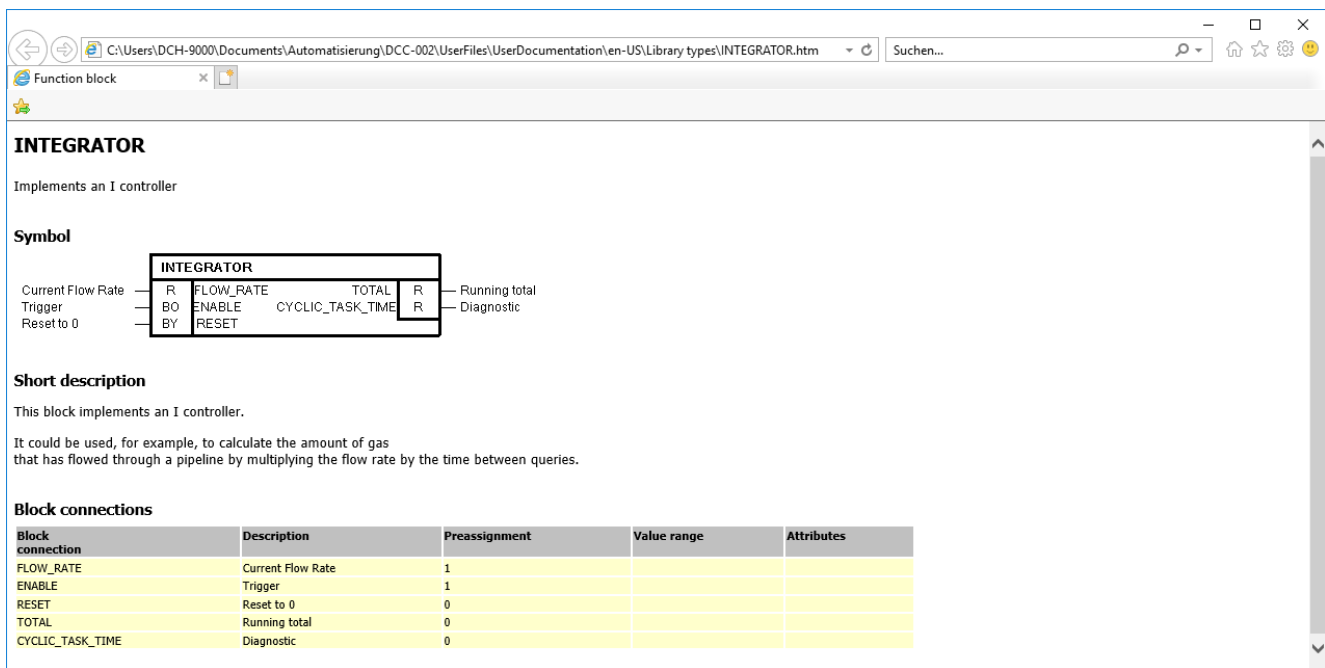


Figure 5-7 Block help in Internet Explorer

Result

There are three different types of constellation:

- If a chart contains blocks from the DCC standard blocks and blocks from a DCB Extension library, only the help for blocks from the DCB Extension library is opened as a web page in Internet Explorer.
- If a chart contains blocks from multiple DCB Extension libraries with the same name, the help is opened as a web page in Internet Explorer for the block which was last imported.
- If a chart contains blocks with the same name from the DCC standard blocks and from a DCB Extension library, only the help for blocks from the DCB Extension library is opened as a web page in Internet Explorer.

Note

In the event that there is no help available for blocks from a DCB Extension library, the following information is displayed: "No user-defined documentation found".

Configuration steps

6.1 Editing projects

Procedure

SINAMICS DCC is integrated in SINAMICS Startdrive and in the TIA Portal. This causes SINAMICS DCC to use the same procedure for the project editing as the TIA Portal. A detailed description of the procedure for the individual editing steps can be found in the information system of the TIA Portal at "Editing projects".

The "Search in project" function is not currently supported by SINAMICS DCC.

Compatibility of projects

The TIA Portal can be used to open existing projects that were created with the same product version or with a different scope of installation.

Projects from the predecessor version are upgraded to the current version before being opened. Projects from earlier versions cannot be opened directly. In the following, you will learn what you should observe when opening projects from earlier product versions.

Opening projects from earlier product versions

The following table illustrates the behavior of the TIA Portal when opening projects from an earlier product version:

Product version of the TIA Portal (File extension of the respective version)	Behavior when opening projects with the current product version
V15.1 (.ap15)	Update is started The project is upgraded to Version V16 (.ap16)

See also "Opening a project of an older version".

Upgrading projects

A project xxx.ap15 which was created and stored in TIA Portal Version V15.1 is upgraded and opened as project xxx_V16.ap16.

See also "Upgrading projects".

Backward compatibility of the current product version

Projects that were saved with the current version of the TIA Portal are not backward compatible due to the expanded functions compared to older versions. Projects that were saved with TIA Portal V16 can only be opened with TIA Portal V16 or later.

6.2 Device configuration

Procedure

SINAMICS DCC extends the functionality of a SINAMICS drive using charts for the drive objects. The device configuration as well as the handling and the creation of SINAMICS drives based on Startdrive. For this reason, the required information about this topic can be found in the information system of the TIA Portal at "Configuring drives".

Note

Templates for drive units

If a drive unit has already been configured and stored as a template in "Global libraries", this template can be used as a basis for the current configuration.

See also "Creating a template (Page 117)".

Know-how protection for devices

With SINAMICS DCC, the know-how protection can only be activated for drive units.

Refer also to the information system of the TIA Portal under "Know-how protection (KHP)".

6.3 Working with charts

6.3.1 General

Charts

Charts extend the functionality of a SINAMICS drive. The handling and creation of charts is based on the handling and creation of CFCs. For this reason, the further information about this topic can be also found in the information system of the TIA Portal at "Configuring CFCs".

Interface

The interface between chart and drive unit are the internal DCC parameters which are published as SINAMICS parameters, as well as the interconnection to the drive unit via BICO parameters.

Structuring charts

To structure charts in accordance with their functionality, they can be displayed in the project navigator in a subfolder (group).

To create a new group, proceed as follows:

1. Select the "Charts" folder.
2. Select the context menu "Add new group".

Subfolder "Group_1" is created in the folder "Charts".

The subfolder can be renamed, e.g. based on the functionality of the charts. Corresponding charts can be moved into the subfolder with drag and drop.

See also

Inserting subcharts (Page 78)

6.3.2 Creating charts

Requirement

A drive object for which a chart can be created must be added to a project.

Procedure

To create a chart, proceed as follows:

1. In the "Project navigation" window, navigate to the drive object for which you would like to create a chart.
2. In the "Drive object" subfolder, open the "Charts" folder.
3. Double-click the "Add new chart" command there.

Result

A new chart with the default name "CFC-x" is added to the "Charts" folder. Where "x" is a consecutive number, beginning with 1. The chart is visible as "CFC_1" and the chart opens.

A chart can be renamed at any time, e.g. as "DCC_1", see "Chart properties (Page 44)".

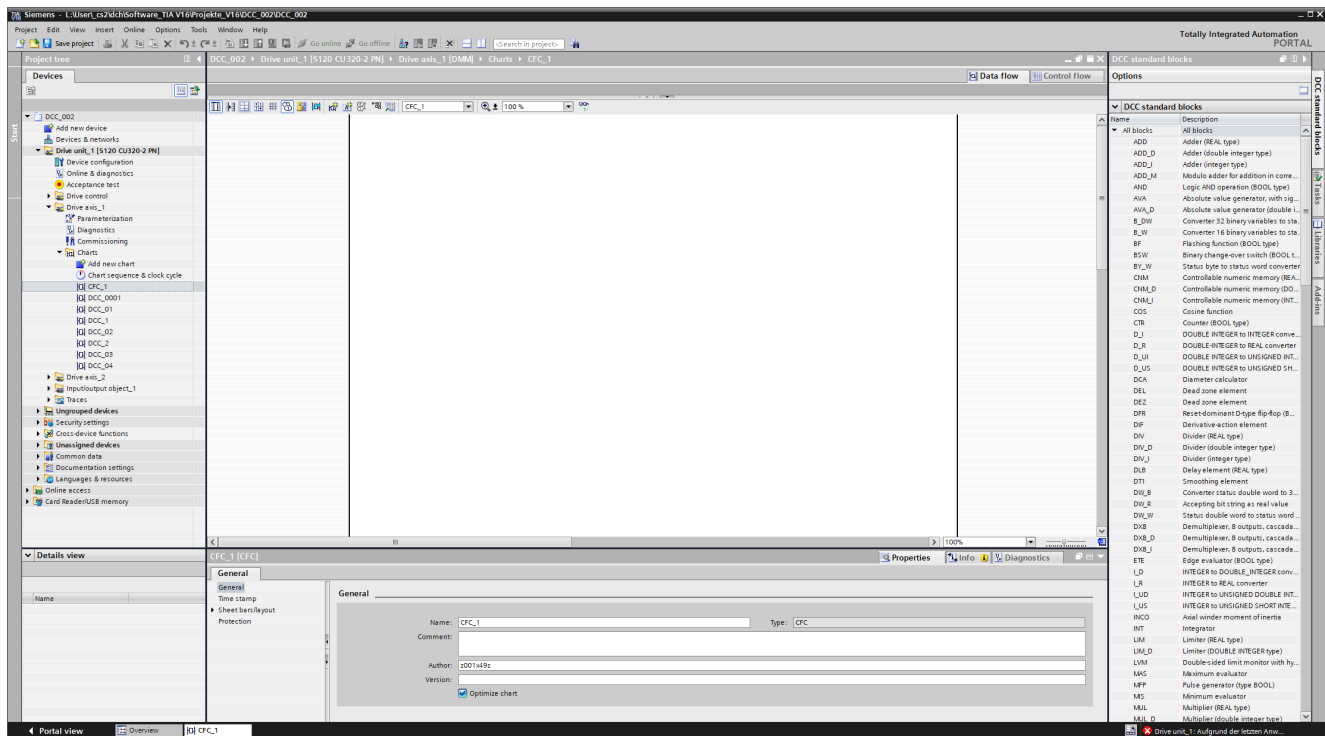


Figure 6-1 Creating a chart

The opened chart has 4 sheets (2 horizontal, 2 vertical). The number of sheets can be extended via the Properties/Layout of the chart to max. 20 sheets. See also "General (Page 52)" (Chart properties - Sidebar/layout).

6.3.3 Chart properties

When a chart is opened, the properties of the chart are displayed in the Inspector window.

The following property areas are differentiated:

- General
- Time stamp
- Sidebars/layout
- Protection

General properties

The name of the chart is specified (by default "CFC_x") in the general properties. See also "Creating charts (Page 43)". The name of a chart can be modified here, or renamed entirely.

A comment can also be specified and, if required, a version specified for the chart.

The activation of "Optimize chart" optimizes the block sequence according to the data flow.

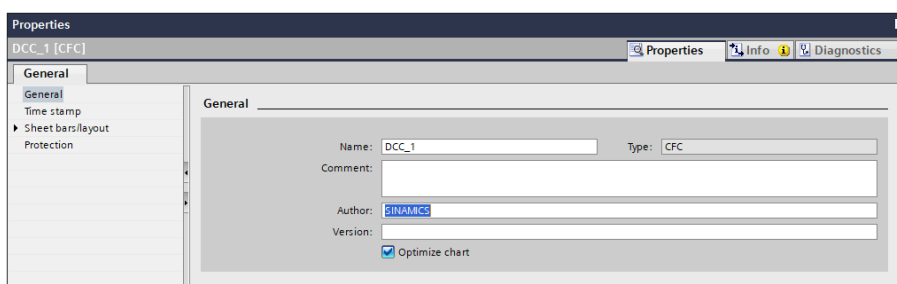


Figure 6-2 Properties of a chart - General

Note

Changing the author in "Properties/General" of a chart does not affect the entry in "Properties/Time stamp" in the "Changed by:" field. The name with which the user logged in to the system is always displayed here

Properties - Time stamp

The time when the chart was created is stored in the "Time stamp" properties window. For each change, the associated date and time are stored in the time stamp.

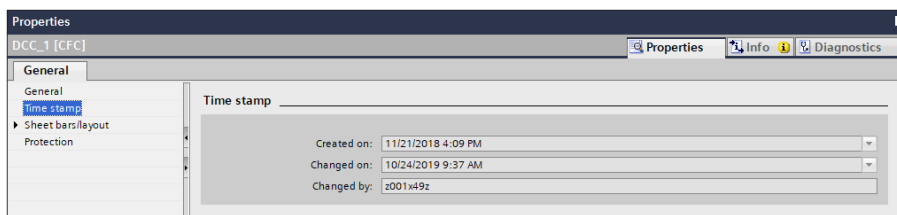


Figure 6-3 Properties of a chart - Time stamp

Properties - Sidebars/layout

In the "Sheet bars" properties window, the type of the sheet bar is determined, its appearance defined and its width specified.

The number of individual horizontal/vertical sheets that should contain a chart are specified in the "Layout" properties window. The paper format is also defined.

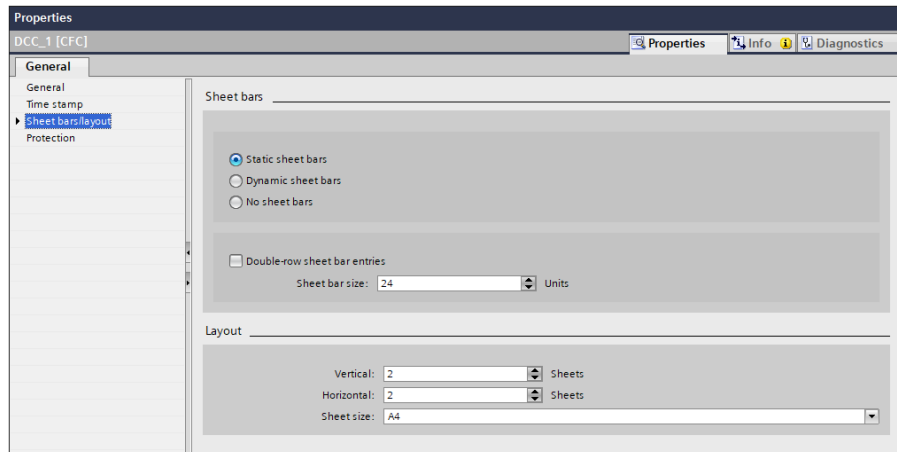


Figure 6-4 Properties of a chart - Sheet bars/layout

Properties - Protection

This function is not available in SINAMICS DCC.

6.3.4 Copying charts

Rules for copying charts

- If the inserted parameter number exists already, it is adapted automatically and the first free parameter number is assigned.
- A text reference is generated rather than a BICO interconnection wherever there is no interconnection partner (BICO output parameter) available.
- Text references are resolved when the associated parameters are available.
- When copying a device, the associated charts are also copied.
- Cross-chart interconnections of block connections are lost if
 - a global interconnection existed
 - the interconnection partner (local input parameter) is not available
 - a cross-chart interconnection partner (output parameter) is not available
- The interconnection is overwritten if the interconnection partner (local input parameter) is already connected with another parameter.

Procedure

Copying charts within a project

Proceed as follows to copy a chart within a project:

1. Navigate to the chart that you want to copy.
2. Select the "Copy" command in the context menu.
3. Navigate to the "Charts" folder of the drive object.
4. Select the "Insert" command in the context menu.

Or drag and drop the chart into the "Charts" folder of a different drive object.

Copying charts from different projects (reference projects)

Existing charts can be displayed and opened in the project navigator as reference projects.

Charts from the reference project can thus be copied into the opened project:

- Drag and drop charts into the "Charts" folder to store a copy there
or
- Drag and drop charts into an opened chart to insert the copy there as a subchart.

Further information can be found in the information system of the TIA Portal under "Using reference projects".

Result

A copy of the chart is added to the target drive unit.

Note

After copying, check whether the interconnections of published block connectors in the chart copy have to be adapted to another drive object as a result of the copying.

6.3.5 Deleting charts

If a chart is deleted, all interconnections are deleted. For interconnections to BICO parameters, the values are set to the default values.

Requirement

Charts have been created within a project.

Procedure

To delete a chart, proceed as follows:

1. Navigate to the chart that you want to delete.
2. Select the chart.

3. Select the "Delete" command in the context menu.
4. Confirm the prompt with "Yes" if you want to completely delete the chart.

Result

The chart has been deleted.

6.3.6 Export charts

A chart is to be exported from SINAMICS DCC, for example, to forward the chart to a commissioning engineer independent of the project or to archive the chart. All chart information (except the DCB Extension) is contained for the export so that the chart can be reimported completely.

Note

Blocks in the charts which originate from the DCB Extension libraries are included in the export. The DCB Extension library itself, however, is not included in the export.

Individual charts or all charts of a "Charts" folder can be exported.

Requirement

At least one chart is created.

Procedure

Exporting individual charts

To export an individual chart, proceed as follows:

1. In the project window, select the chart to be exported.
2. Select "Export Drive Control Chart..." in the context menu.
The "Export Drive Control Chart" dialog opens.
3. Navigate in Windows Explorer to the folder in which the exported chart should be saved.
4. Use the previous file name for the chart to be exported.
The format is specified automatically with ".dcc".
Changing the file name, however, affects the exported file name. For the import, the chart is reimported with the original name.
5. Click "Save".

Exporting all charts in the "Charts" folder

To export all charts in the "Charts" folder, proceed as follows:

1. In the project window, select the "Charts" folder whose content is to be exported.
2. Select "Export Drive Control Chart(s)..." in the context menu.
The "Export Drive Control Chart" dialog opens.

3. Navigate in Windows Explorer to the folder in which the exported charts should be saved.
4. Use a file name (e.g. Charts_1) for the charts to be exported.
The format is specified automatically with ".dcc".
5. Click "Save".

Exporting subcharts

Subcharts cannot be exported individually.

An export is possible only as base chart or of all charts by exporting the "Charts" folder.

6.3.7 Importing charts

Charts can be imported from the STARTER or TIA environment, they then also have the same functionality in the target device.

Rules for importing charts

- If the inserted parameter number exists already, it is adapted automatically and the first free parameter number is assigned.
- A text reference is generated rather than a BICO interconnection wherever the interconnection partner (BICO output parameter) is affiliated with the same drive object, however, is not available.
 - The interconnection partner is not available
 - The interconnection partner is an input BICO parameter and already has an interconnection partner
- Text references from a chart of the STARTER environment are also imported as text reference.
- Interconnections are lost if
 - it is a global interconnection
 - the interconnection partner (local input parameter) is not available
 - a cross-chart interconnection partner (output parameter) is not available
- The interconnection is overwritten if the interconnection partner (local input parameter) is already connected with another parameter.

When importing charts from the STARTER environment, the following conditions must be considered:

See <https://support.industry.siemens.com/cs/ww/en/view/109764320>

- The charts may contain just one execution group.
- If the charts contain blocks from a DCB library (DCB Extension), they can be imported only when the associated libraries have been installed in SINAMICS DCC in the TIA environment.
- The charts must not have any know-how protection.

6.3 Working with charts

- The charts must not contain any DCB libraries (Typicals).
- The charts must be able to be compiled error-free in STARTER V5.3 and SINAMICS DCC V3.3 or higher and be available for export in XML format.
- When subcharts are used, the execution sequence of the blocks must be contiguous within the subchart. No blocks of this execution sequence of the subchart may lie outside it. See also "Handling subcharts (Page 78)".

Requirement

A chart has been exported from SINAMICS DCC-TIA and is available in dcc format

or

A chart with the observed conditions has been exported from the STARTER environment and is available in XML format.

Procedure

To import a chart in SINAMICS DCC in the TIA environment, proceed as follows:

1. In the project window, select a "Charts" folder into which the chart should be imported.
2. Select "Import Drive Control Chart(s)..." in the context menu.
The "Import Drive Control Chart" dialog opens.
3. Select the "Drive Control Chart (*.dcc)" format (import from the TIA environment)
or
Select the "Drive Control Chart (*.xml)" format (import from the STARTER environment)
4. Navigate in Windows Explorer to the folder in which the chart is stored.
5. Select the chart and click "Open".
One or more charts are inserted in the "Charts" folder.
6. If necessary, after importing the charts from the STARTER environment, the charts must be revised in the TIA Portal!

Note

Import from STARTER

After importing charts from the STARTER environment, smaller charts are represented as an individual chart and larger charts as multiple charts. If blocks were not visible in the STARTER environment (e.g. overlapping), they will remain so in the TIA environment.

The charts from STARTER environment are divided into several charts in the TIA Portal in accordance with the chart limitations so that all function blocks are visible. One base chart partition is created for each three subcharts in SINAMICS DCC-TIA. If, for example, a chart in the STARTER environment consists of the subcharts A, B, C, D and E, base charts "<chart name>_ABC" and "<chart name>_DE" are created in SINAMICS DCC-TIA.

As preparation for a traceable import of charts from the STARTER environment, the following must be considered:

If the sequence of the blocks in the charts in the STARTER environment is contiguous within the three subcharts (e.g. A, B and C or D and E, ...), each three subcharts are grouped to form a chart as described for the import. If the sequence of the blocks within three subcharts (A, B and C) is not contiguous, i.e. one block was configured to one of the other subcharts (D, E, ..), two charts ("<chart name>_ABC_1" and "<chart name>_ABC_2") are created for the import.

6.4 Chart contents

6.4.1 General

An important part of the charts are the blocks used in them and their interconnections. In addition, you can use further elements in charts. The list below provides an overview of the available contents for the chart:

- Blocks (Page 52)
- Subcharts (Page 78)
- Text boxes (Page 77)

6.4.2 Libraries

The following block libraries are available:

- DCB standard blocks (DCC Standard)
- Importing DCB Extension libraries (DCB Extension created with SINAMICS DCB Studio)

DCB standard blocks (DCC Standard)

All DCC standard blocks are available when SINAMICS DCC is installed.

The DCC standard blocks can be opened as "Task card" in the TIA Portal and are available for further use in the chart.

DCB Extension libraries (DCB Extension)

The DCB Extension libraries (DCB Extension) are imported into the project library via the "Libraries" task card and are then available for the opened project in the "Types" folder. The imported DCB Extension libraries (DCB Extension) are saved with the project.

See also "Library handling (Page 119)".

6.4.3 Handling blocks

6.4.3.1 Inserting blocks

Requirement

A chart is opened in the editor.

Procedure

To insert a block in a chart, proceed as follows:

1. Open the "DCC standard blocks" task card
or an imported DCB Extension library in the "Types" folder in the "Libraries" task card.
2. Navigate to the block that you want to insert.
3. You have several options for inserting the block in the chart:
 - Drag and drop the block to the desired point in the chart.
 - Double-click the block.
 - Select the block and press the [Enter] key.

Note

DCB Extension library

Blocks from a DCB Extension library can only be inserted in the chart using drag and drop.

Result

The block has been inserted in the chart.

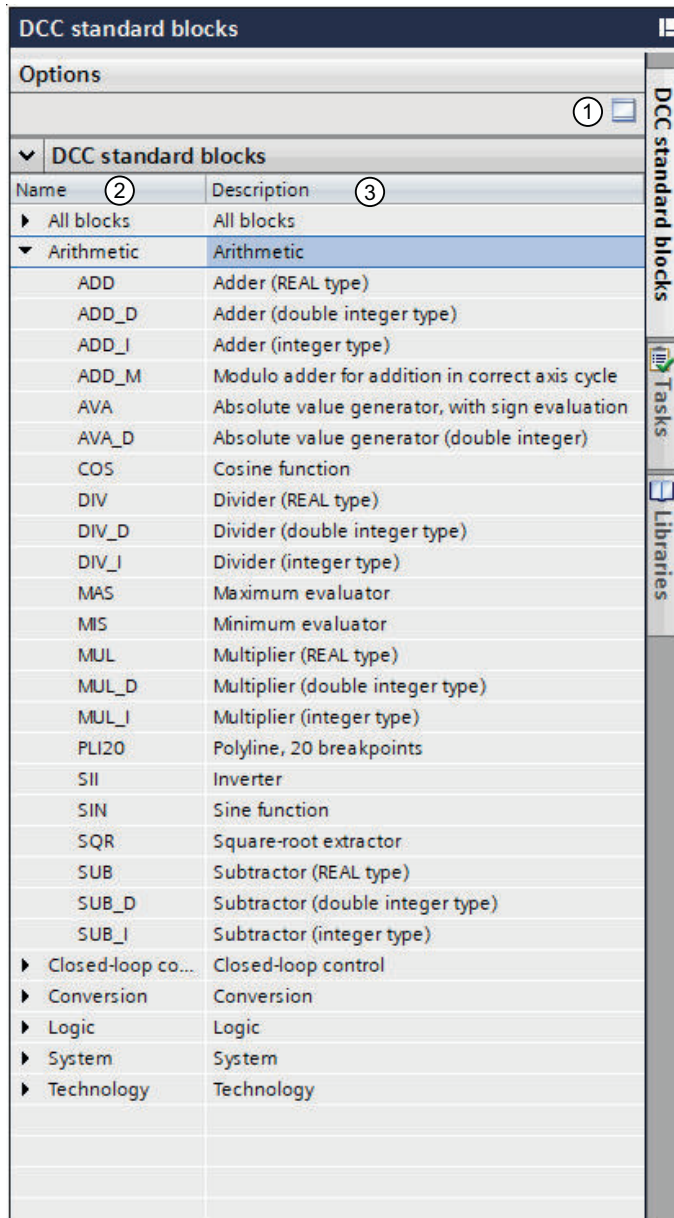
Superimposed blocks for inserting

If blocks are superimposed on the chart with other elements, the superimposed block is displayed in red and its information (e.g. connectors) is not visible.

To ensure a view of all block information, the blocks must be repositioned or the size of the block adapted.

"DCC standard blocks" task card

A separate task card is available for the DCC standard blocks. All of the available function blocks or a specific selection can be displayed here and can be used for configuring in the chart.

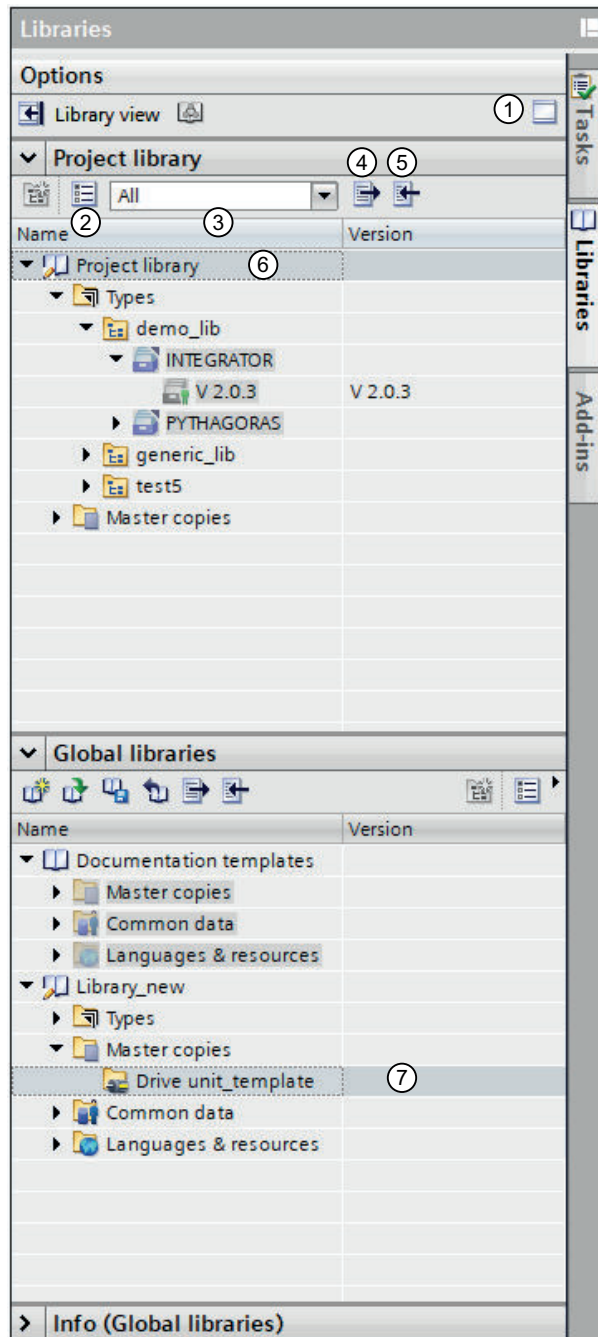


- ① Change the pallet mode
Displays or hides the individual pallets.
- ② Organization of the library into various categories,
e.g. arithmetic
- ③ The contained blocks with name and description are displayed when a category is opened.
These blocks can be used in a chart.

Figure 6-5 "DCC standard blocks" task card

"Libraries" task card

The content of the "project library" and of the "global libraries" is displayed in the "Libraries" task card.



- ① Change the pallet mode
Displays or hides the individual pallets.
- ② Open or close element view
Opens the "Elements" pallet in which the elements of the global library are displayed.

6.4 Chart contents

- ③ Selection field
Filters the elements using the appropriate criteria.
- ④ Export texts
Not supported by SINAMICS DCC.
- ⑤ Import texts
Not supported by SINAMICS DCC.
- ⑥ **Project library**
Importing DCB Extension libraries
- ⑦ **Global libraries**
Copying a drive unit as a template in a new global library

Figure 6-6 "Libraries" task card

To execute functions, in addition to the icons, the following context menus are available:

- Import of DCB Extension libraries (DCB Extension) into the project library, see also "Provision of DCB Extension library blocks (Page 123)".

6.4.3.2 Copying blocks

Rules for copying/inserting blocks

- If the inserted parameter number exists already, it is adapted automatically. The parameter number is changed to the first free parameter number.
- Text references are created rather than BICO interconnections if the interconnection partner is not available.
If the interconnection partner is an input BICO parameter and already has an interconnection partner, the BICO interconnection is overwritten and is then once again valid.
Charts that contain text references cannot be downloaded to the drive unit. An appropriate error message is issued during the download.
- Cross-chart interconnections of block connectors are lost when the interconnection partners are not also copied.
- Local BICO interconnections are retained as such after copying/inserting, see also "Interconnecting with block connectors (Page 70)"
- Global BICO interconnections are retained as such after copying/inserting, see also "Interconnecting with block connectors (Page 70)"

Requirement

A chart is opened in the editor.

Procedure

To copy a block in a chart, proceed as follows:

1. Select the block that you want to copy.
2. Select the "Copy" command in the context menu.

3. Navigate with the cursor to the position in the same chart or in a different chart where the copied block should be inserted and select the "Insert" command in the context menu. The copied block is inserted in the opened chart and interconnections established to the sheet bars.
4. Check the automatically created interconnections to the sidebars and update the text references.

Result

The copied block is inserted in the chart and connected correctly with the sheet bars.

6.4.3.3 Deleting blocks

If a block is deleted, all interconnections are deleted. For interconnections to additional subsequent blocks or BICO parameters, the values are set to the default values.

Requirement

The following requirements must be satisfied:

- A chart is opened in the editor.
- The chart already contains one or more blocks.

Procedure

To delete a block in a chart, proceed as follows:

1. Select the block that you want to delete.
2. Select the "Delete" command in the context menu.
The block and the connections to other blocks or the sheet bar are deleted.
The numbering of the blocks (execution sequence) is updated automatically.

Result

The block and the interconnections to other blocks or the sheet bar are deleted.

6.4.3.4 Block properties

Blocks have type data, instance data, interface information and information about hidden interconnections.

Properties - General

Instance data contains values that you specifically set for each individual block in the chart. For example, you can assign the name or the comment.

The maximum number of generic inputs is configured in the associated block. For the DCC standard blocks, the number of inputs is always 4, whereas the blocks of a DCB Extension

library (DCB Extension) may also have more than 4 inputs. The number of inputs is displayed in the "Properties" dialog and can be changed.

Type data is preset data for the associated block type. This includes, for example, the block type itself or a predefined comment.

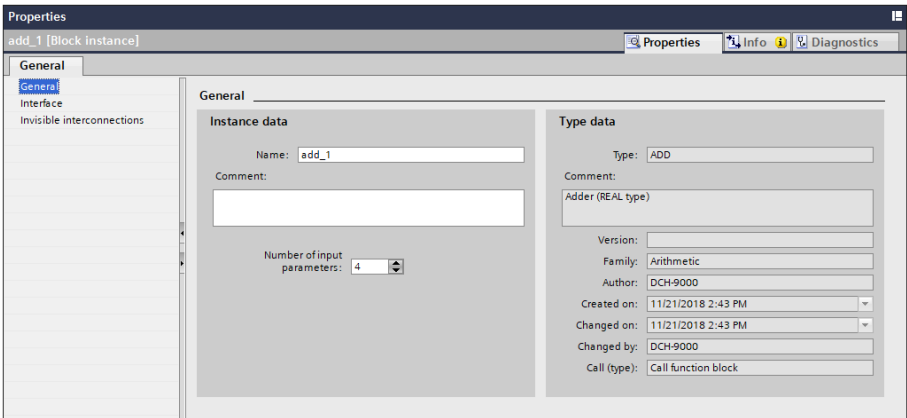


Figure 6-7 Block properties - General

Properties - Interface

The interface of a block encompasses its inputs and outputs, and contains information about the value and the data type. In this window, the interfaces (block interfaces) can be configured as invisible or activated for the test so that the interface values can be monitored online.

If a bus connection is marked as "invisible", it is hidden in the "Data flow" view.

Further information is available at "Block connectors (Page 59)".

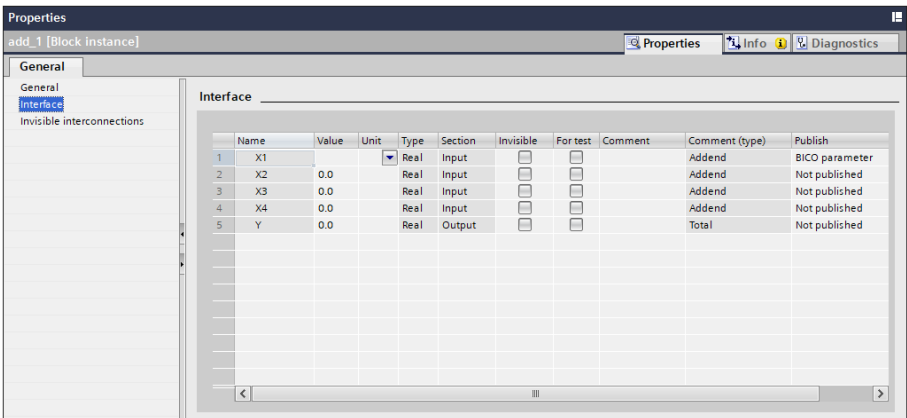


Figure 6-8 Block properties - Interface

Properties - Hidden interconnections

If block connections have been marked as "hidden", the associated interconnections are also hidden.

Since these connectors are not visible in the DCC Editor, you can check whether invisible interconnections exist in the block properties.

Further information is available at "Block connectors (Page 59)".

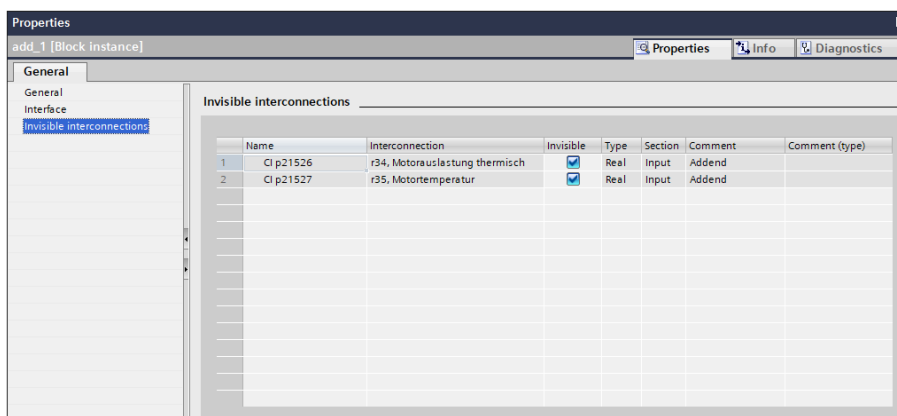


Figure 6-9 Block properties - Hidden interconnections

6.4.3.5 Block connectors

There are two types of block connector (inputs and outputs), each of which has a distinct function and is edited in a particular way.

Block connector properties

Block connectors have type data and instance data. You can also publish block connectors as SINAMICS parameters.

Type data is preset data for the associated block connector type. This includes, for example, the data type for "Type", the default value for "Value", a predefined comment or the section for the definition as input or output.

Instance data contains values that you specifically set for each individual connector. For example, you can assign the value or the comment or specify the unit for the connector.

Procedure

To display the properties of a block connector, proceed as follows:

1. Select a block connector in the chart.
2. Open the Inspector window. You can view and edit the properties of the block connector at "Properties".

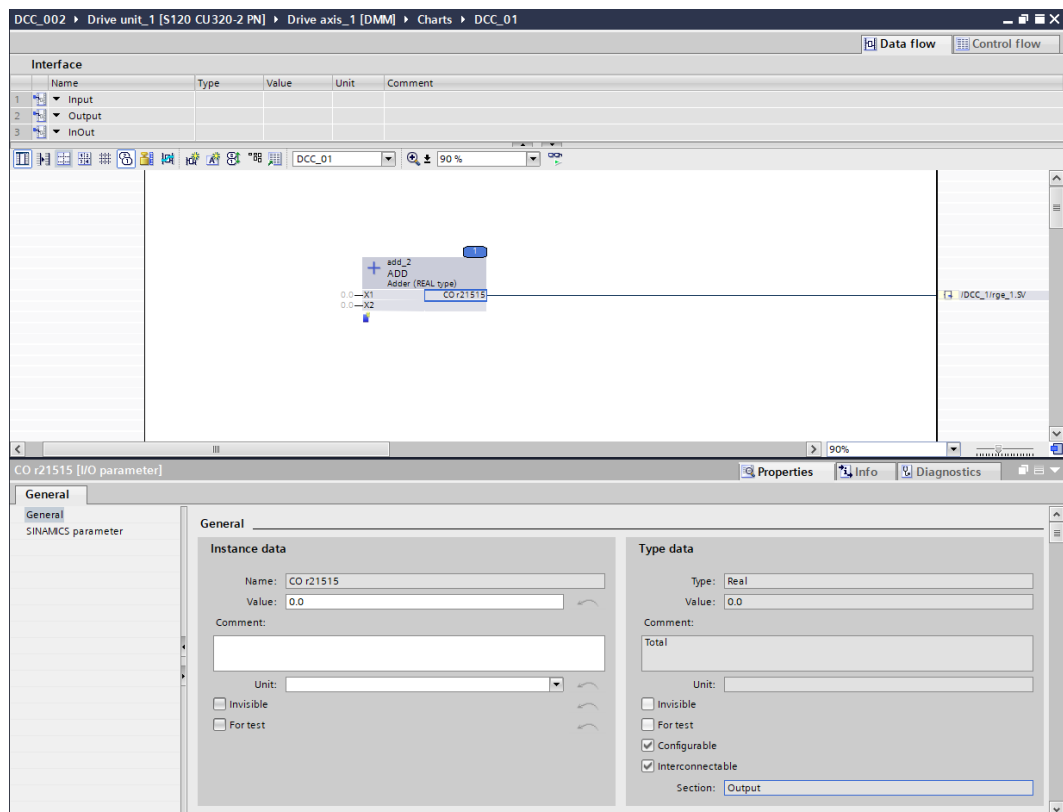


Figure 6-10 General properties of a block connector

If you do not define values in the instance data, they are imported from the type data. This is illustrated by the arrow icons on the right-hand edge of the instance data area. Once you overwrite instance data, the arrow icon is enabled for the relevant value. Then click the arrow icon if you want to import the value again from the type data.

Input values

At block inputs, you can specify an input value in the "Value" input field of the instance data. This value is always used for an input that is not interconnected. With interconnected blocks, the output value of the upstream block always applies in the initialization phase and in the first cycle.

Output values

An output value issued in the initialization phase can be specified at the block outputs in the "Value" entry field for the instance data. In the first cycle the specified value is then overwritten by the calculated value.

Visibility of connectors

In the DCC editor, you can hide block connectors to improve the clarity of the configured charts. However, the hidden block connectors remain active in SINAMICS DCC, and their values are still evaluated.

Number of connectors

For generic blocks (e.g. ADD, AND, MUL) in the DCC editor, you can change the number of block connectors.

Units of connectors

The units of the block connectors that you can set in the instance data have a purely commentary character in the DCC editor. The values are not converted automatically and are not displayed in the parameter list.

Further information

Information about the properties of inputs and outputs can be found in the information system of the TIA Portal at "Default setting of attributes for input and output parameters".

6.4.3.6 Publishing block connectors/pins as SINAMICS parameters

Input and output connectors of blocks in a chart can be published as parameters in SINAMICS DCC. "Publish" means that users create the parameters themselves with parameter numbers and parameter text. The published parameters are then visible as new SINAMICS parameters in the parameter view of the base system.

This is the requirement to

- interconnect the block connectors via BICO parameters to the base system.
- specify the values of block inputs as setting parameters in the parameter view of the base system.
- monitor the values of block outputs as display parameters in the parameter view of the base system.

Parameter view

Double-click on "Parameterization" in the project navigation and select the "Parameter view" tab.

The "Parameter view" provides a clearly organized representation of the parameters available for the device (parameter list).

Published parameters are inserted in the parameter list with parameter numbers 21500 to 25999. "DCC parameter" is specified as preset parameter text.

Note

DCC parameters

Published parameters should be designated a descriptive name. The name can be changed in the parameters of the block connector with the SINAMICS parameters in the parameter text.

The published parameters are displayed in the access level "Standard parameters" or "Extended parameters" under "All parameters".

Number	Parameter text	Value	Unit	Data set	Minimum	Maximum
p21100[0]	DCC_1: Clock cycle	[1001] T = 1 * r21003				
r21101[0]	DCC_1: Sampling time	0.00000	ms			
r21102[0]	DCC_1: Computing time load	0.0	%			
p21105[0]	DCC_2: Clock cycle	[1001] T = 1 * r21003				
r21106[0]	DCC_2: Sampling time	0.00000	ms			
r21107[0]	DCC_2: Computing time load	0.0	%			
p21110[0]	DCC_01: Clock cycle	[1001] T = 1 * r21003				
r21111[0]	DCC_01: Sampling time	0.00000	ms			
r21112[0]	DCC_01: Computing time load	0.0	%			
p21115[0]	DCC_02: Clock cycle	[1001] T = 1 * r21003				
r21116[0]	DCC_02: Sampling time	0.00000	ms			
r21117[0]	DCC_02: Computing time load	0.0	%			
p21120[0]	DCC_03: Clock cycle	[1001] T = 1 * r21003				
r21121[0]	DCC_03: Sampling time	0.00000	ms			
r21122[0]	DCC_03: Computing time load	0.0	%			
p21125[0]	DCC_04: Clock cycle	[1001] T = 1 * r21003				
r21126[0]	DCC_04: Sampling time	0.00000	ms			
r21127[0]	DCC_04: Computing time load	0.0	%			
p21130[0]	DCC_0001: Clock cycle	[1001] T = 1 * r21003				
r21131[0]	DCC_0001: Sampling time	0.00000	ms			
r21132[0]	DCC_0001: Computing time load	0.0	%			
p21135[0]	CFC_1: Clock cycle	[1001] T = 1 * r21003				
r21136[0]	CFC_1: Sampling time	0.00000	ms			
r21137[0]	CFC_1: Computing time load	0.0	%			
p21500	DCC-Parameter	OH				
p21501	DCC-Parameter	Drive control: r722.1, CU digital inputs status,...				
p21502	DCC-Parameter	Drive control: r722.1, CU digital inputs status,...				
p21503	DCC-Parameter	OH				
p21504	DCC-Parameter	OH				
p21505	DCC-Parameter	Drive control: r2139.3, Status word faults/alar...				
p21506	DCC-Parameter	Drive control: r722.1, CU digital inputs status,...				
r21507	DCC-Parameter	0.000				
p21508	DCC-Parameter	0%				

Figure 6-11 Parameter view - All parameters

The DCC-specific parameters are displayed in the access level "Standard parameters" or "Extended parameters" under "Technology functions > Drive Control Chart".

Number	Parameter text	Value	Unit	Data set	Minimum	Maximum
p21130[0]	DCC_0001: Clock cycle	[1001] T = 1 * r21003				
r21131[0]	DCC_0001: Sampling time	0.00000	ms			
r21132[0]	DCC_0001: Computing time load	0.0	%			
p21135[0]	CFC_1: Clock cycle	[1001] T = 1 * r21003				
r21136[0]	CFC_1: Sampling time	0.00000	ms			
r21137[0]	CFC_1: Computing time load	0.0	%			
p21500	DCC-Parameter	OH				
p21501	DCC-Parameter	Drive control: r722.1, CU digital inputs status,...				
p21502	DCC-Parameter	Drive control: r722.1, CU digital inputs status,...				
p21503	DCC-Parameter	OH				
p21504	DCC-Parameter	OH				
p21505	DCC-Parameter	Drive control: r2139.3, Status word faults/alar...				
p21506	DCC-Parameter	Drive control: r722.1, CU digital inputs status,...				
r21507	DCC-Parameter	0.000				
p21508	DCC-Parameter	0%				
p21509	DCC-Parameter	899.2, Status word sequence control, Operati...				
p21510	DCC-Parameter	r2700, Reference speed/reference frequency				
p21511	DCC-Parameter	r2700, Reference speed/reference frequency				
p21512	DCC-Parameter	0.000			-3.40282E+38	3.40282E+38
p21513	DCC-Parameter	0.000				
p21514	DCC-Parameter	r1024, Fixed speed setpoint effective				
p21515	DCC-Parameter	r1024, Fixed speed setpoint effective				
r21516	Main setpoint	0.000				
p21517	DCC-Parameter	r1024, Fixed speed setpoint effective				
p21518	DCC-Parameter	r2700, Reference speed/reference frequency				
p21519	DCC-Parameter	0.000			-3.40282E+38	3.40282E+38
r21520	Main setpoint	0.000				
p21521	DCC-Parameter	r2700, Reference speed/reference frequency				
p21522	DCC-Parameter	r1024, Fixed speed setpoint effective				
p21523	DCC-Parameter	r1024, Fixed speed setpoint effective				
p21524	DCC-Parameter	0.000				
p21525	DCC-Parameter	r26, DC link voltage smoothed				

Figure 6-12 Parameter view - Technology functions_Drive Control Chart

Representation of the BICO parameters

For binary block connectors, the output BICO parameters are designated with "BI p2xxxx" and the output BICO parameters with "BO r2xxxx".

For analog block connectors, the input BICO parameters are designated with "CI p2xxxx" and the output BICO parameters with "CO r2xxxx".

Requirement

A chart is opened in the editor and at least one block is inserted in the chart.

Procedure

To publish a block connector as a SINAMICS parameter, proceed as follows:

Via context menu on the block connector

1. Select the block connector to be published.
2. Select in the "Publish as setting parameter" context menu (for a block input) or "Publish as monitoring parameter" (for a block output).

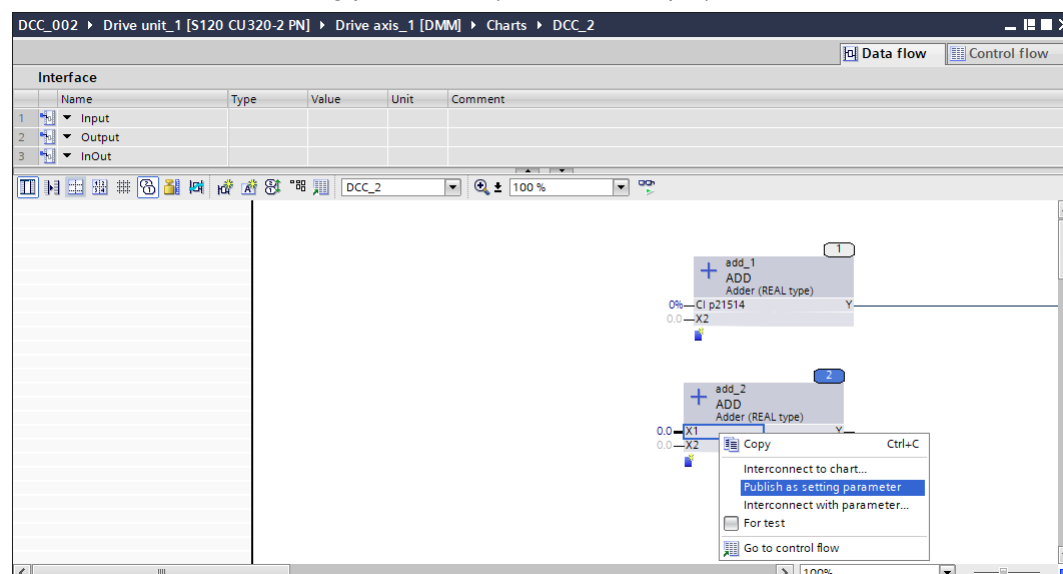


Figure 6-13 Publish as SINAMICS parameter via the context menu at the block connector

The connection is identified as a DCC parameter (for example, for inputs p21504, for outputs r21505)

When creating a BICO interconnection to the base system

1. Select the block connector to be published.
2. Drag a connection from the block connector to the sidebar.

3. Select a parameter from the base system in the "Interconnect DCC parameter with parameter" dialog.

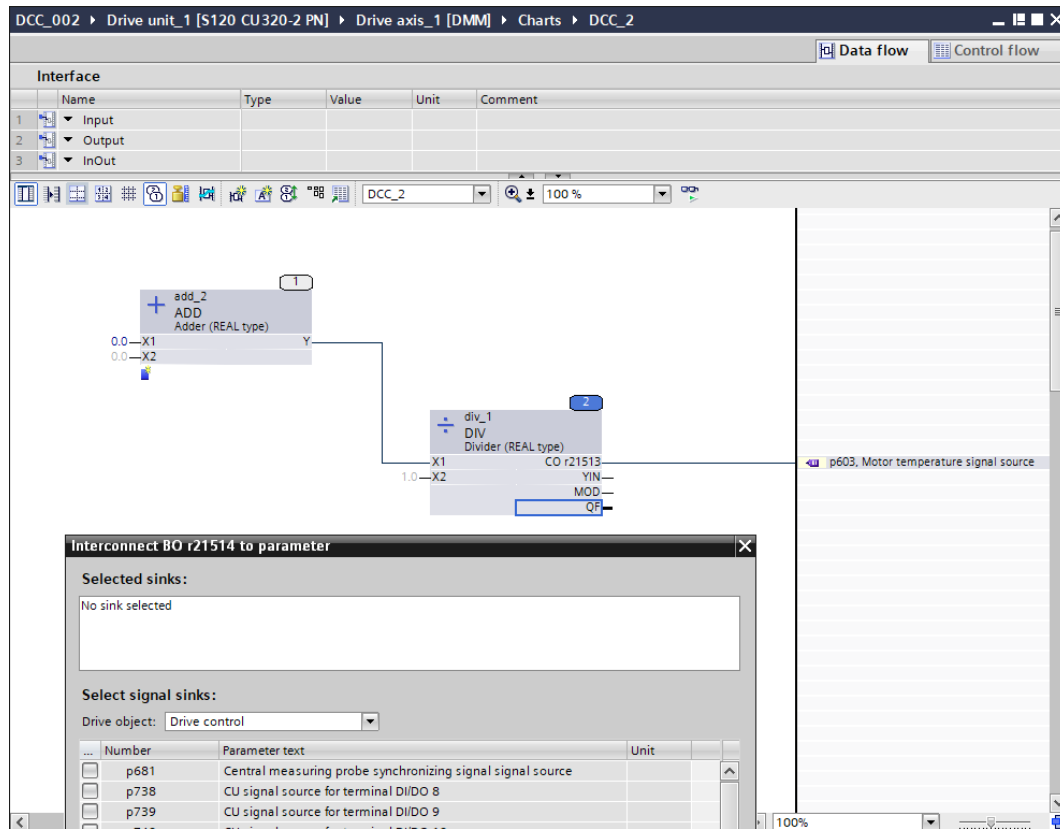


Figure 6-14 Publish as SINAMICS parameter by setting a BICO interconnection to the base system

4. The BICO interconnection is established and the connector is identified as DCC parameter (for example, for inputs CI p21504, for outputs CO r21505)

Note

For dynamic sheet bars, or if the sheet bars have been hidden, you create the BICO interconnection via the "Interconnect with parameter..." context menu.

Via the properties of the block connector

1. Select the block connector to be published.
2. Open the Inspector window. At "Properties > General > SINAMICS parameters", activate the option:
 - Publish block connector as **setting parameter** / **monitoring parameter** or
 - Publish block connector as **BICO parameter**.

The set option is marked.

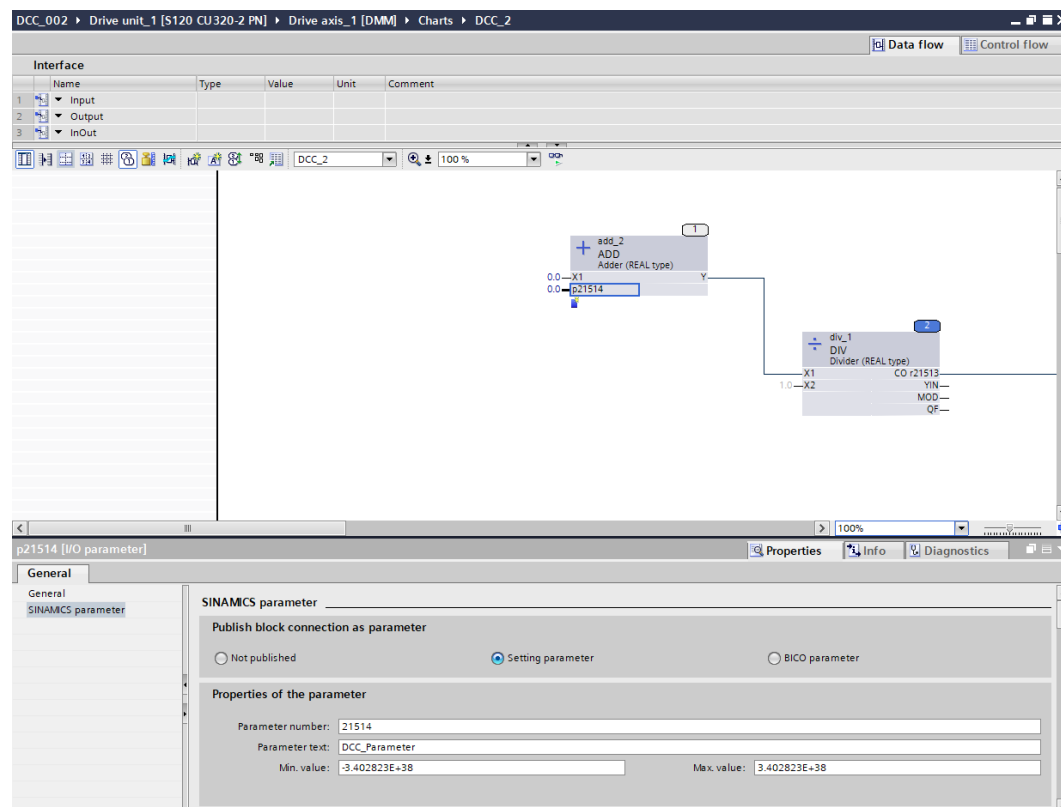


Figure 6-15 Publish as SINAMICS parameter via the properties of the block connector

3. Change the parameter number or the parameter text as required. The minimum and maximum values can also be changed for some parameters.

Via the properties of the block

1. Select the block connector to be published.
2. Open the Inspector window.
All data of the block connectors is displayed in a table at "Properties > General > Interface".

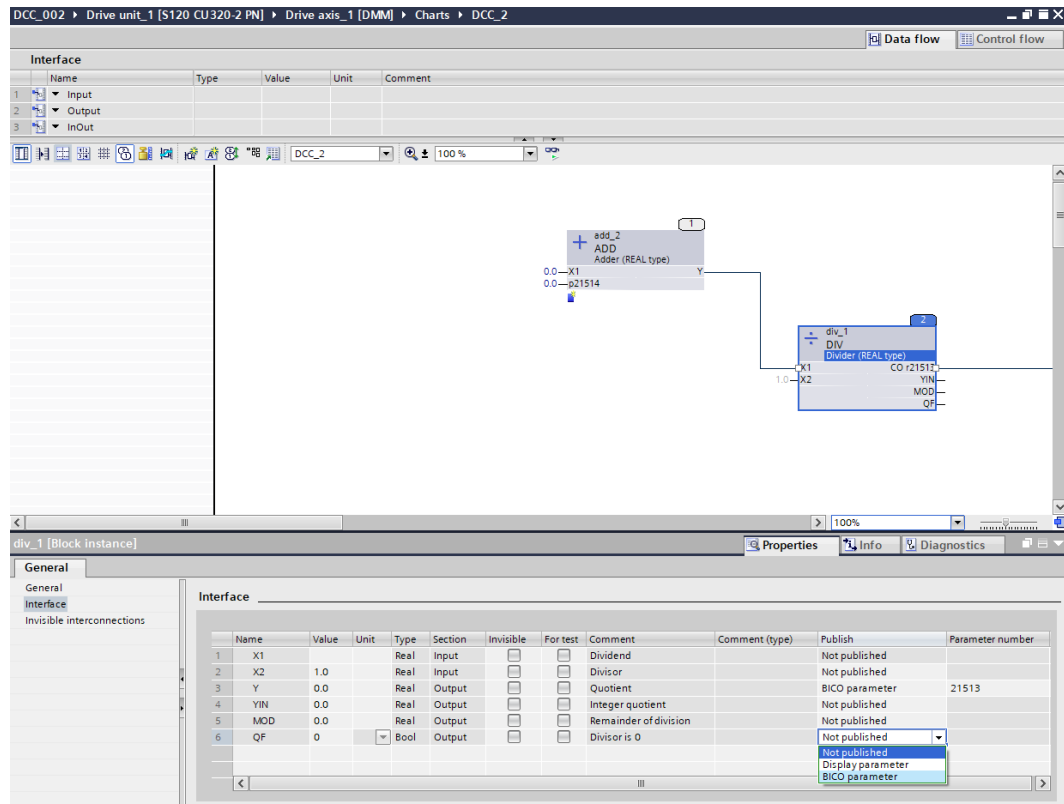


Figure 6-16 Publish as SINAMICS parameter via the properties of the block

3. Set in the "Publish" column via a drop-down list whether the connector should be published as "Setting parameter / monitoring parameter" or as "BICO parameter".

Automatic publishing of block connectors

If a block output is interconnected with a BICO parameter, the block output is published automatically as BICO output parameter.

6.4.4 Preparing a connection to the drive object

6.4.4.1 Overview

Only block connections of a chart declared as BICO parameters can be connected to the connector inputs (CI) and connector outputs (CO) of the drive.

All block connections of data type REAL that are published as BICO parameters are **per-unit variables**. This means that calculations within SINAMICS DCC are only carried out with per-unit signal values (1.0 = 100%). The specification of values via setting parameters must therefore

also be carried out per unit. Conversion to the connectors of the drive with associated units is performed automatically in accordance with reference variables from r2700 to r2707.

With all other data types, no conversion to a per-unit variable takes place.

If calculations are to be performed in the chart with absolute variables, then variables of the BICO interconnections to and from the chart must be converted. Examples of per-unit and absolute variables are described in the following sections.

6.4.4.2 Calculating a chart with per-unit variables

Interconnecting the input value

If the connector inputs of a REAL type block are interconnected with the parameters associated with units in the base system, the interconnection is calculated automatically as per-unit variables in the chart.

This example shows that the fixed speed setpoint is specified as 1500 rpm. In this case, the reference variable r2700 is 6000 rpm. The input value of the block add_1 and add_2 is therefore specified as 0.25 in the chart, relative to the reference variable of the speed. The value 0.25 thus corresponds with a speed of 1500 rpm.

In order to continue processing of the signal, processing must be carried out on the basis of per-unit variables, refer to block add_2. The value of 0.25 is added here to the per-unit fixed setpoint of 0.25. This results in a value of 0.5, which in turn yields a speed value of 3000 rpm relative to the reference speed.

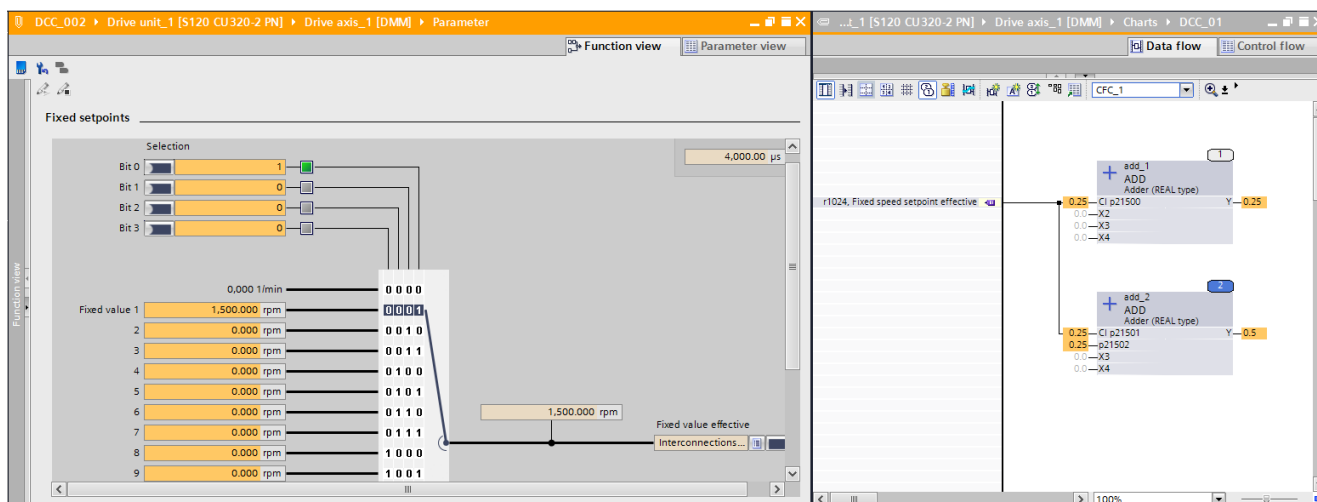


Figure 6-17 Calculating with per-unit variables: Interconnecting the input value

Interconnecting the output value

If the connector output of a REAL type block is interconnected with the parameters associated with units in the base system, the interconnection is transferred automatically to the base system as a per-unit variable.

This example shows that the output value of the block is 0.25. With a reference speed of 6000 rpm, the value totals 1500 rpm. This value continues to be processed as a reference

variable in the base system with interconnection to parameter p1070 "Main setpoint". Effective at the "Main setpoint" parameter, which is also converted to an absolute variable, the expected 1500 rpm becomes evident once again.

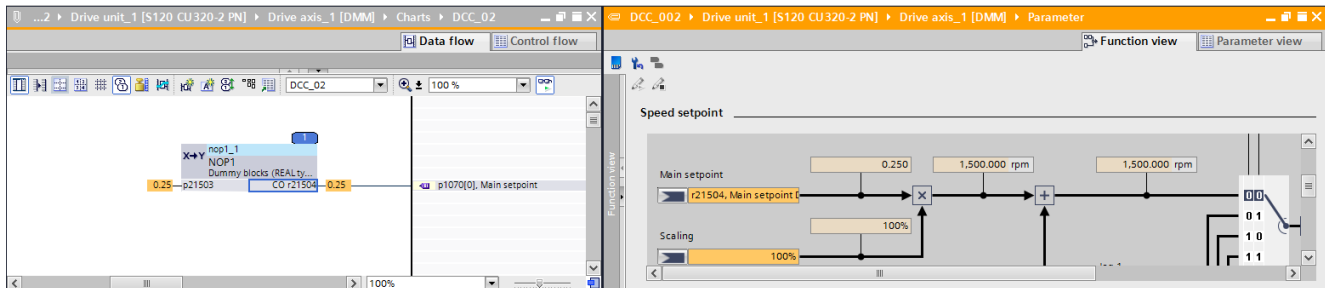


Figure 6-18 Calculating with per-unit variables: Interconnecting the output value

For BICO interconnections to the base system, always check whether you are working in SINAMICS DCC with absolute variables or with per-unit variables, as the connector output of a chart always works with per-unit variables for interconnection with a connector input of the base system associated with units.

6.4.4.3 Calculating a chart with absolute variables

Interconnecting the input value

Should you wish to perform calculations in a chart with absolute variables, the variables of the drive must be converted to per-unit variables. This conversion is achieved by multiplying the units-related parameter from the base system with its per-unit variable. This yields an absolute variable.

In this example, the fixed speed setpoint of 0.25 in the chart is converted to 1500 rpm by multiplying the reference speed of 6000 with no units by the MUL block. This allows you to also perform calculations in the chart with absolute variables, as shown in the example with the addition of 1500 rpm for block add_1.

For SINAMICS DCC, the reference variables are provided as monitoring parameters r2700... r2707 which have no units and can be interconnected. Parameters r2700... r2707 have the special feature that the value is transferred 1:1 to SINAMICS DCC without being divided by the reference variable.

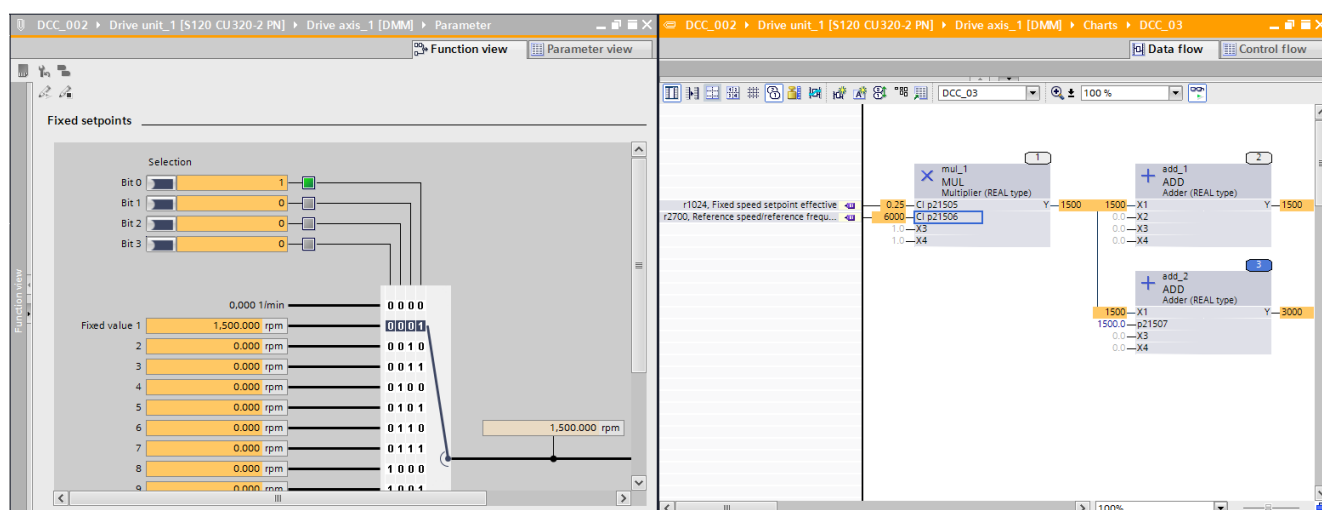


Figure 6-19 Calculating with absolute variables: Interconnecting the input value

Interconnecting the output value

If a calculation is performed in the chart with absolute variables, the calculated variable must be converted to a per-unit variable again when interconnecting with the base system to a parameter associated with units.

If no conversion is performed on a per-unit variable, the base system interprets the variable as a per-unit variable.

In this example, the absolute variable of 1500 rpm is converted to a per-unit variable by dividing the reference speed with no units by the DIV block. This value continues to be processed as a reference variable in the base system with interconnection to parameter p1070 "Main setpoint". Effective at parameter p1070 "Main setpoint", which is also converted to an absolute variable, the 1500 rpm expected becomes evident once again.

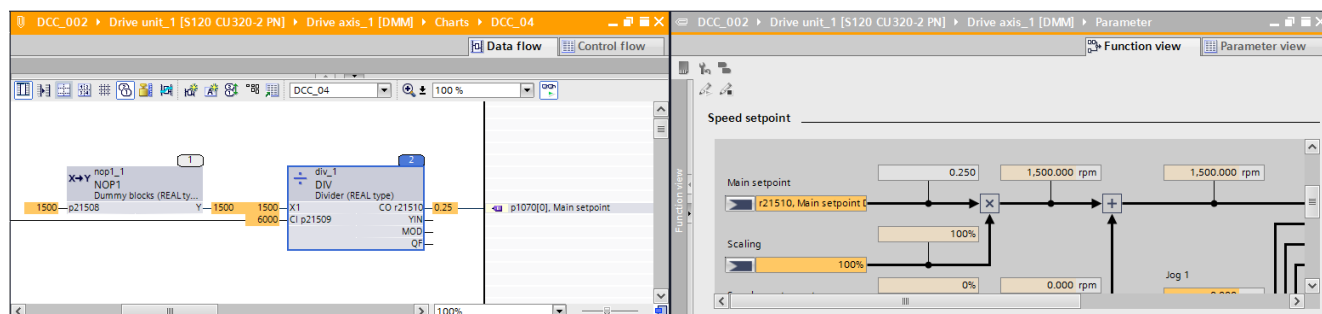


Figure 6-20 Calculating with absolute variables: Interconnecting the output value

Note

If the connection at the second input of the divider (division by 0) is disconnected, extremely high setpoints (REAL-max) can occur at the outputs.

6.4.4.4 Interconnecting DCC signals with the components of the drive

Preliminary remark

The basic system can be connected to process data interfaces IF1 and IF2 via free telegram configuration using BICO (p0922 = 999) or via (standard) telegrams depending on p0922. To interconnect with the basic system, the block connections needed must be published as BICO parameters.

Interconnecting received process data with DCC

When interconnecting the received PZD data (see SINAMICS S Parameter Manual, function block diagrams 9206 and 9204), the particular way in which the connector outputs (COs) of PZD processing behave (for IF1 r2050, r2060 and for IF2 r8850 and r8860) should be noted. These COs (connector outputs) can either provide their signals in whole numbers (integers) or as floating point values (REAL). The data type provided is determined by the first signal linked to this CO. This can also be determined by a standard message frame having been selected (p0922 = 999) on a drive object. The PZD COs are thereby automatically interconnected according to the definition of the message frame selected. This interconnection is not canceled when resetting p0922 = 999 == free message frame configuration with BICO.

Procedure

1. Set p1070 = 2060[2], for example.
r2060[2] (PZD received word 3 and 4) is thereby connected to the main setpoint (in function block diagram 3030) of a REAL variable of the basic system. This means that only connector inputs from DCC with the REAL signal data type can be interconnected on r2060[2].

Note

Connections to integer inputs can be made both online and offline in the DCC editor; a corresponding error message is only issued when the chart is downloaded.

Interconnecting sent process data with DCC

The send data is interconnected as with any other BICO connection.

Detailed descriptions about this topic are contained in the *SINAMICS S120 function manual*.

6.4.5 Interconnections

6.4.5.1 Interconnecting with block connectors

The fundamental steps for interconnecting two block connectors can be found in the CFC help at "Interconnecting of input and output parameters".

Interconnections within a chart

The interconnections within a chart are made between the outputs (e.g. "Q" or "Y") and the inputs (e.g. "I" or "X").

Procedure

1. Drag-and-drop an interconnection from the output (with a blue border) of a block to the input (highlighted in green when it is a valid interconnection) of another block.

Interconnections to another chart

If the charts are located within a drive object, you can perform the interconnection via the "Interconnect to chart..." context menu.

If charts should be interconnected in different drive objects, this is not possible via a pin-pin connection, but rather only via a BICO interconnection.

Procedure

1. Select the block connector that you want to interconnect.
2. Select "Interconnect to chart..." in the context menu.
A selection list displayed at the position of the block connector which allows the charts to be selected with the list icon or to open the "Picker" dialog with the arrow icon:
3. Select within the associated chart the block with which an interconnection should be established.
The available block connectors are displayed in the right-hand area of the "Picker" dialog.
4. Select the desired block connector and acknowledge with the green "OK" button.

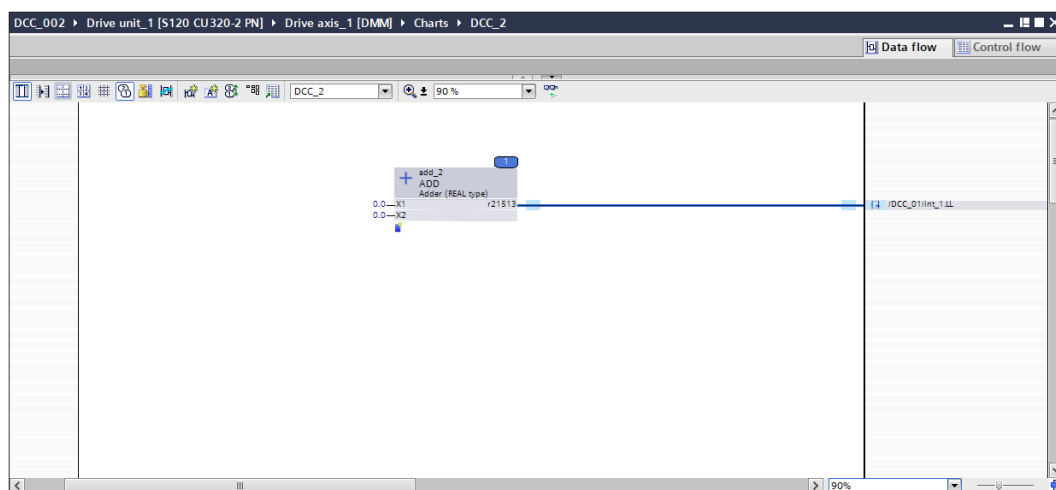


Figure 6-21 Connection to the DCC_01 chart is established

The connection was made to the chart whose "Integrator" block is established on block connector LL (e.g. to \DCC_01\int_1.LL).

Interconnection by drag-and-drop

If more than one chart is displayed in the TIA Portal (split editor area), the interconnection can also be performed via drag-and-drop.

Compatibility of block connectors

The data types of the block connectors to be interconnected must be compatible. Compatibility exists if the data types are identical or can be automatically converted to each other. The table below provides an overview of the possible data type conversions:

Table 6-1 Conversions

Input	Output	Description
WORD	INT	Interconnection of a word variable to an integer variable
INT	WORD	Interconnection of an integer variable to a word variable
DWORD	DINT	Interconnection of a double word variable to a double integer variable
DINT	DWORD	Interconnection of a double integer variable to a double word variable
BYTE	SINT	Interconnection of a byte variable to a short integer variable
SINT	BYTE	Interconnection of a short integer variable to a byte variable
USINT	BYTE	Interconnection of an unsigned short integer variable to a byte variable
BYTE	USINT	Interconnection of a byte variable to an unsigned short integer variable
USINT	SINT	Interconnection of an unsigned short integer variable to a short integer variable
SINT	USINT	Interconnection of a short integer variable to an unsigned short integer variable
UINT	WORD	Interconnection of an unsigned integer variable to a word variable
WORD	UINT	Interconnection of a word variable to an unsigned integer variable
UINT	INT	Interconnection of an unsigned integer variable to an integer variable
INT	UINT	Interconnection of an integer variable to an unsigned integer variable
UDINT	DWORD	Interconnection of an unsigned double integer variable to a double word variable
DWORD	UDINT	Interconnection of a double word variable to an unsigned double integer variable
UDINT	DINT	Interconnection of an unsigned double integer variable to a double integer variable
DINT	UDINT	Interconnection of a double integer variable to an unsigned double integer variable
SDTIME	REAL	Interconnection of an SDTime variable to a real variable

6.4.5.2 Interconnecting with SINAMICS parameters

Interconnect a block input with SINAMICS parameters

When interconnecting a block input with SINAMICS parameters of the drive object, the input is published automatically as BICO parameter.

Procedure

To interconnect a **block input** with SINAMICS parameters, proceed as follows:

1. Select the block input that you want to interconnect.
2. Select "Interconnect with parameter..." in the context menu or drag a connection from the block input to the left-hand margin area.
The "Interconnect CI p2xxxx with parameter" dialog opens.
The "Interconnect BI p2xxxx with parameter" dialog opens for binary blocks.
3. Select the drive object and the signal source for the object.
4. Confirm the signal source with "OK".
The interconnection is established. A SINAMICS parameter with the name "DCC parameter" has been published as BICO parameter for the block input.

Interconnecting a block output with SINAMICS parameters

When interconnecting a block output with SINAMICS parameters of the drive object, the output is published automatically as BICO parameter.

Procedure

To interconnect a **block output** with SINAMICS parameters, proceed as follows:

1. Select the block output that you want to interconnect.
2. Select "Interconnect with parameter..." in the context menu or drag a connection from the block output to the right-hand margin area.
The "Interconnect CO r2xxxx with parameter" dialog opens.
The "Interconnect BO r2xxxx with parameter" dialog opens for binary blocks.
3. Select the drive object and one or more signal sinks for the object.
4. Confirm the signal sinks with "OK".
The interconnection is established. A SINAMICS parameter with the name "DCC parameter" has been published as BICO parameter for the block output.

Local BICO interconnection

If a published BICO parameter is connected with a parameter of the same (local) drive object, the BICO interconnection contains only the parameter.

Format in the sheet bar of the chart or in the parameter view: <parameter number>, <parameter text>, e.g. **r63, actual speed value smoothed**

For local BICO interconnections in charts and subcharts, the block name, and possibly the DCC chart, is also specified differently on the sheet bar.

For example, if p21500 in CFC_1 is connected with r21501 in CFC_2, the connection is represented in the sidebar:

- in CFC_1: /CFC_2/add_1.CO r21501
- in CFC_2: /CFC_1/add_1.CI p21500

Global BICO interconnection

If a published BICO parameter is connected with a parameter of a different (global) drive object, the BICO interconnection contains the parameter and also the drive object. This makes a cross-BICO interconnection between two drive objects (global BICO interconnection) immediately obvious.

Format in the sidebar: <drive object name:<parameter number>, >parameter text>, e.g. **Driveaxis_2:r63, Actual speed value smoothed**

6.4.5.3 Text references

Representation of text references

Text references in SINAMICS DCC provide information about an unknown interconnection if:

- the interconnection partner (e.g. BICO input parameter) is already used, or
- the interconnection partner does not exist.

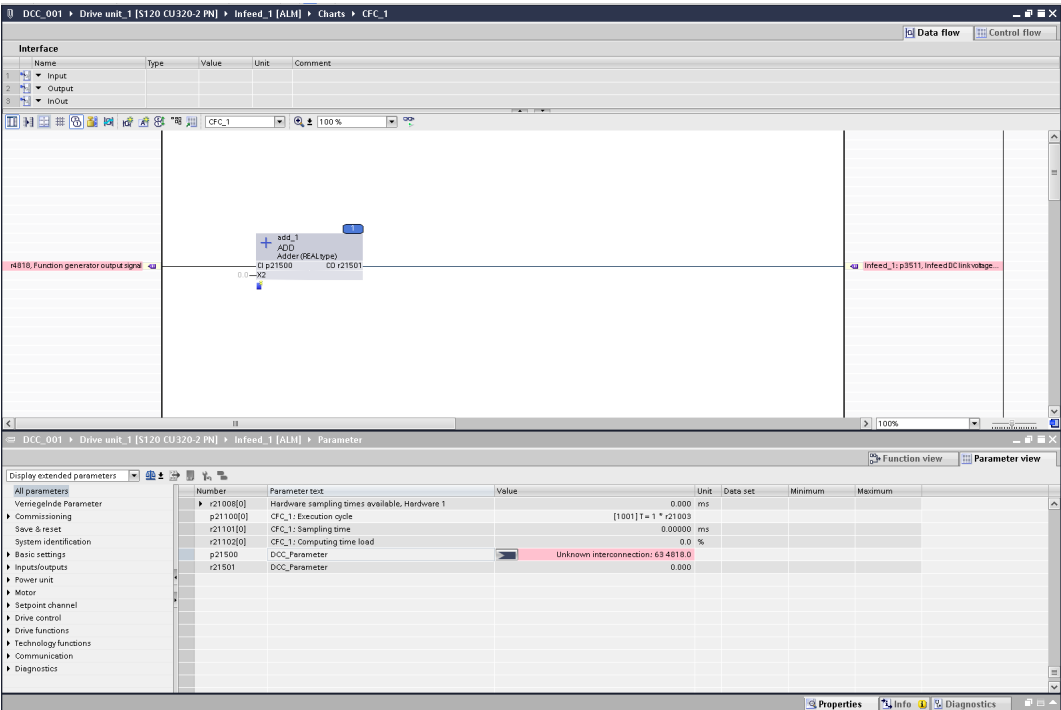


Figure 6-22 Representation of a text reference

Resolution of text references

Automatic check for the resolution of text references

When a chart is imported or "copied/pasted", a check is performed whether text references can be resolved.

Manual resolution of text references

A text reference can be resolved manually via the interconnection dialog.

- BICO input parameter (e.g. CI p21503): Interconnect DCC parameter with parameter

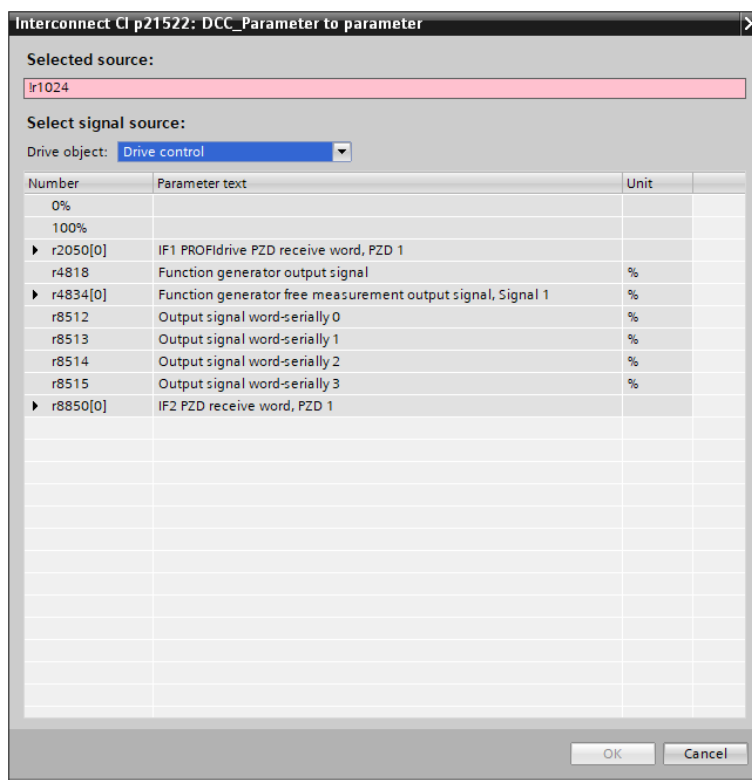


Figure 6-23 Text reference when interconnecting with a BICO input parameter

Resolution when a correct BICO interconnection partner is selected.

- BICO output parameter (e.g. CO r21500): Interconnect DCC parameter with parameter

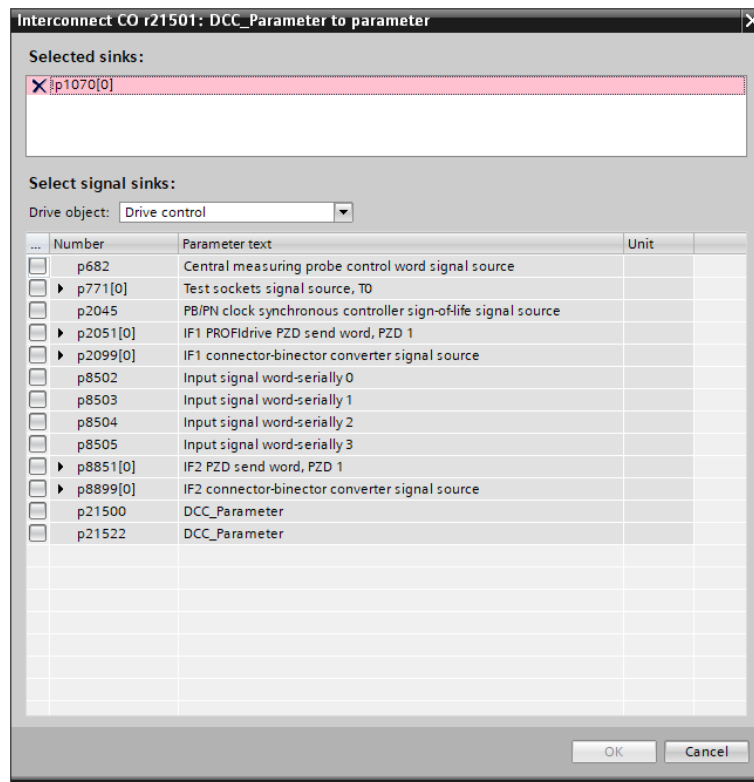


Figure 6-24 Text reference when interconnecting with a BICO output parameter

Resolution when a correct BICO interconnection partner is selected. The text reference must then be deleted.

Loading to the device with text references

When loading to the device, a check is performed whether a text reference is located within the drive unit. In this case, an error message is issued, e.g. in the Inspector window as in the following figure (Info > Compile):

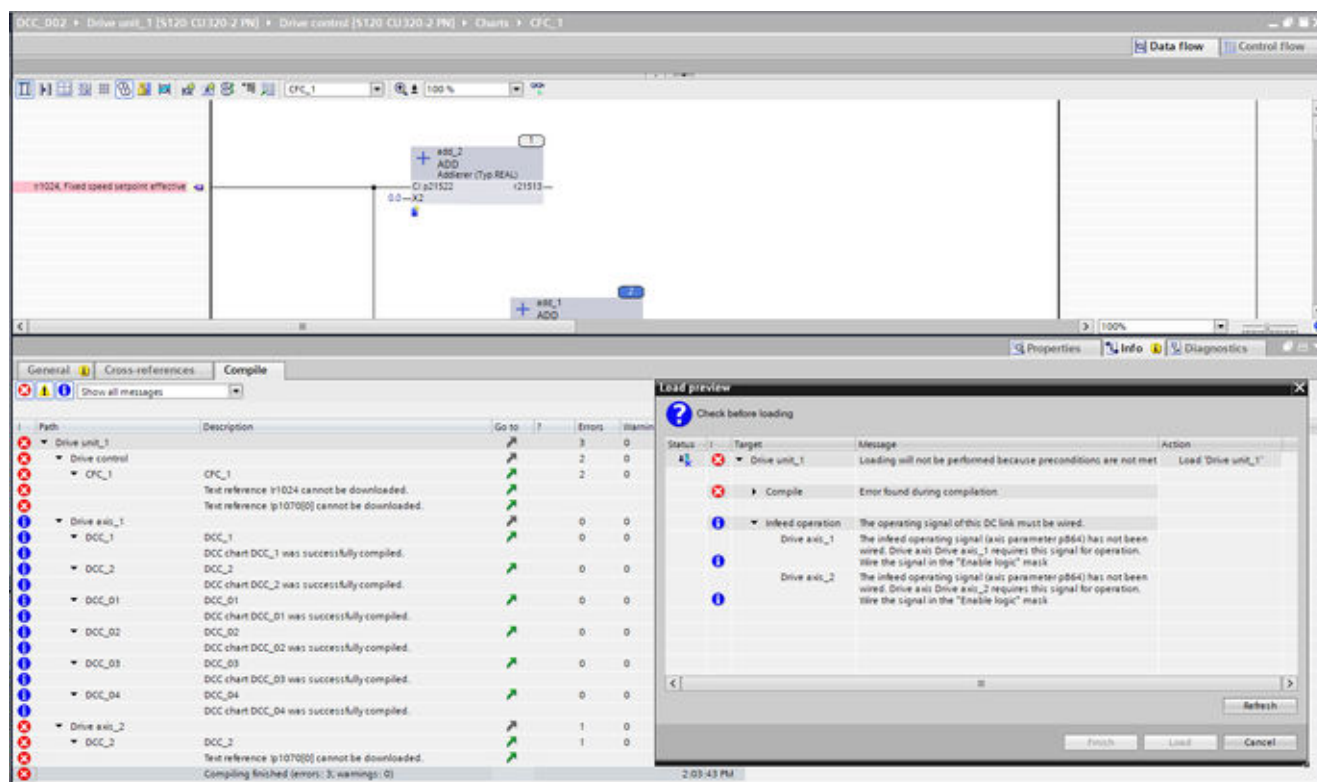


Figure 6-25 Error message when loading to the device with text reference

6.4.6 Text boxes

6.4.6.1 Inserting text boxes

You can add comments to a chart that you enter in text boxes. You can place these at any free position in the chart.

Requirement

A chart is opened in the editor.

Procedure

To insert a text box in a chart, proceed as follows:

1. Select the "Insert text box" command or right-click on a free space in the chart and select the "Insert new text box" command in the context menu in the toolbar of the editor.
2. Change the size of the text box to your requirements by selecting the white rectangles at the corners and the edges of the text box and dragging them to the desired size.
3. To change the comment, click on the text box and enter the required text.
Line breaks can be inserted with key combination <Ctrl+Return>.

Further properties can be found in the information system of the TIA Portal at "Insert text box in CFC chart".

6.4.7 Handling subcharts

6.4.7.1 Chart structure

A subchart can be inserted in a chart (base chart) (chart-in-chart technique). Hierarchical structures can be formed. Each chart that is inserted can be opened and modified. A subchart can be encapsulated for further use, i.e. chart connectors added. It is possible to individually define which block connectors are made available on the chart connectors.

6.4.7.2 Inserting subcharts

The insertion of subcharts allows large charts to be structured logically. This also allows the functionality to be extended with more block instances.

Any number of subcharts (e.g. DCC_10_x) can be inserted in a chart (base chart, e.g. DCC_10). The hierarchy, including the base chart, may have maximum 8 levels.

Requirement

A chart or a subchart within a base chart is opened in the editor.

Procedure

To insert a subchart in a chart, proceed as follows:

Inserting a subchart using the toolbar of the chart

1. Click the "Insert new subchart" icon in the toolbar of the chart.
2. Place the cursor at the position in the chart where the subchart should be created and drag a rectangle for the new subchart.

or

Inserting a subchart via the context menu

1. Place the cursor at the position in the chart where the subchart should be created and select "Insert new subchart" in the context menu.
The new subchart is inserted at the cursor position.

Result

The subchart was inserted in the chart, e.g. DCC_1. In the project window, a folder with the name of the chart is created in which this chart with the name "Chart" and subordinate subcharts (e.g. DCC_1_1, DCC_1_2) are created. Each hierarchy level is identified with an underscore and is numbered automatically. The name of the subcharts can be changed later.

6.4.7.3 Inserting the contents of subcharts

With the insertion of content in a subchart, you define a specific functionality that can also be reused in other charts.

Requirement

A subchart (e.g. DCC_3_1) is created within a base chart (e.g. DCC_3) and opened in the editor.

Procedure

To insert chart contents and interconnect blocks, proceed as follows as described at "Chart contents (Page 52)" and "Handling blocks (Page 52)".

Result

Blocks are inserted in the subchart and interconnected with parameters.

6.4.7.4 Copying subcharts

Rules for copying subcharts

- A subchart cannot be inserted as base chart.
- If the inserted parameter number exists already, it is adapted automatically and the first free parameter number is assigned.
- A text reference, rather than a BICO interconnection, is generated when:
 - The interconnection partner is not available
 - The interconnection partner is an input BICO parameter and already has an interconnection partner
- Cross-chart interconnections of block connectors are lost when the interconnection partners are not also copied.

Requirement

A subchart is created within a base chart.

Procedure

To copy a subchart, proceed as follows:

1. Select a subchart that you want to copy.
2. Select the "Copy" command in the context menu.
3. Navigate to the chart or to the subchart into which the copied subchart should be inserted.
4. Select the "Insert" command in the context menu.

Note

After copying, you must check whether the interconnections of published block connectors in the chart copy have to be adapted to another drive object as a result of the copying. During copying, no automatic adaptation of the interconnections of the chart copy is made to the base system or to other charts.

Result

A copy of the subchart is added to the target drive unit.

6.5 Execution sequence for blocks and charts

Figure 6-26 New execution sequence for the blocks

The new numbering can be seen in the "Data flow" view with the marked block RGE (number 3).

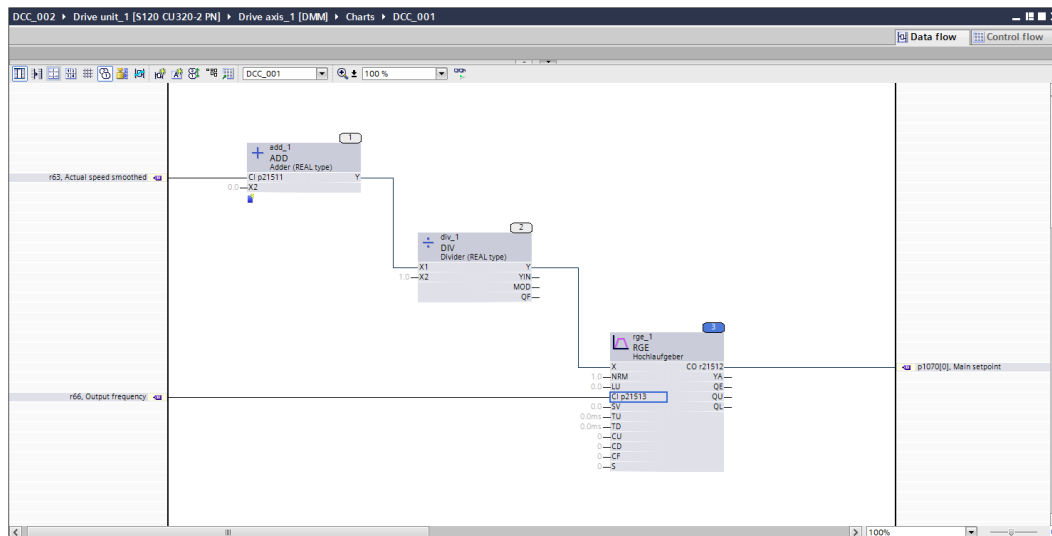


Figure 6-27 New execution sequence for the blocks with new number 3

6.5.3 Defining the predecessor for newly inserted blocks

If you want to insert a new block at a specific position in the execution sequence, you can define an existing block as the predecessor. The new block is then placed behind this block in the execution sequence.

Requirement

A chart is opened in the "Data flow" view.

Procedure

To define a block as a predecessor, proceed as follows:

1. In the chart, click a block to select it.
2. Select the "Predecessor for execution sequence" command in the context menu.

Result

The block is defined as a predecessor in the execution sequence for the next inserted block.

Inserting further blocks

After you have inserted an additional block, it automatically becomes the predecessor for the next block to be inserted.

6.5.4 Changing the execution sequence of the charts

The charts are executed in the same sequence in which they were created. The sequence can be changed manually later.

Requirement

At least two charts have been created.

Procedure

To change the execution sequence of the charts, proceed as follows:

1. Double-click the "Chart sequence & clock cycle" subitem in the "Charts" folder in the project navigator.
All created charts are displayed with the current execution sequence in the working area.
2. Select a chart (e.g. DCC_1) and drag-and-drop it to a new location in the list to specify the new execution sequence.

Result

The new execution sequence is displayed in the "Chart sequence & clock cycle" dialog.

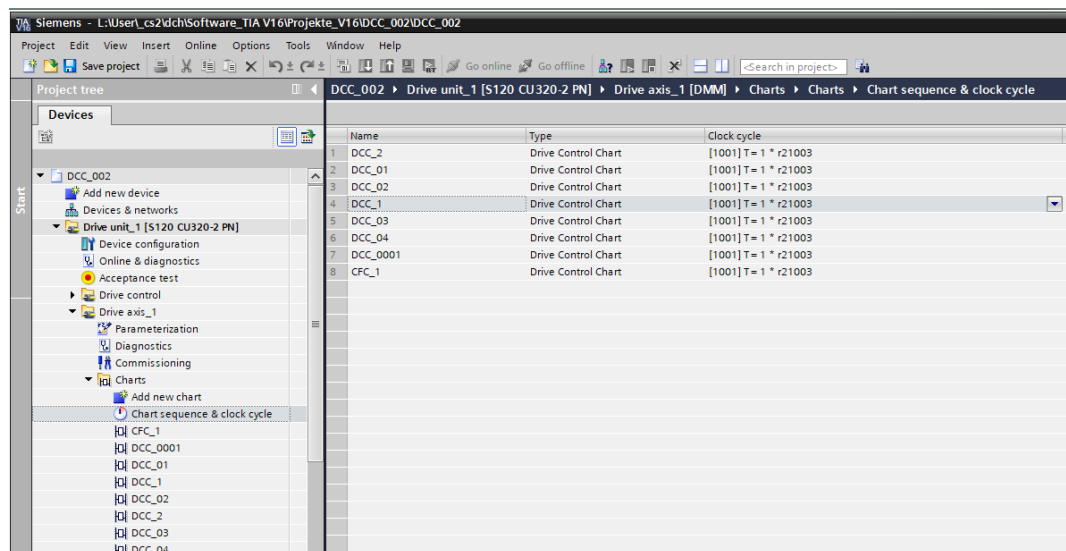


Figure 6-28 Changed chart sequence

6.6 Clock cycles and sampling times

6.6.1 Clock cycles

Clock cycles

The blocks in the chart are started in a defined sequence with a specified clock cycle and are calculated cyclically in the resulting sampling time. The deterministic processing of the blocks allows control-loop tasks, in particular, to be implemented well.

A clock cycle can be set in the DCC editor for each drive object, and thus for each chart.

The following parameters are created for each chart:

- Clock cycle (e.g. p21100[0] - DCC_1:Clock cycle), value (e.g. [1002] $T = 1 * r21003$)
- Sampling time (e.g. r21101[0] - DCC_1:Sampling time), value (e.g. 8.0 ms)
- CPU time load (e.g. r21102[0] - DCC_1:CPU time load), value (e.g. 1.2 %)

The sequence of the parameters depends on the chart sequence of the charts.

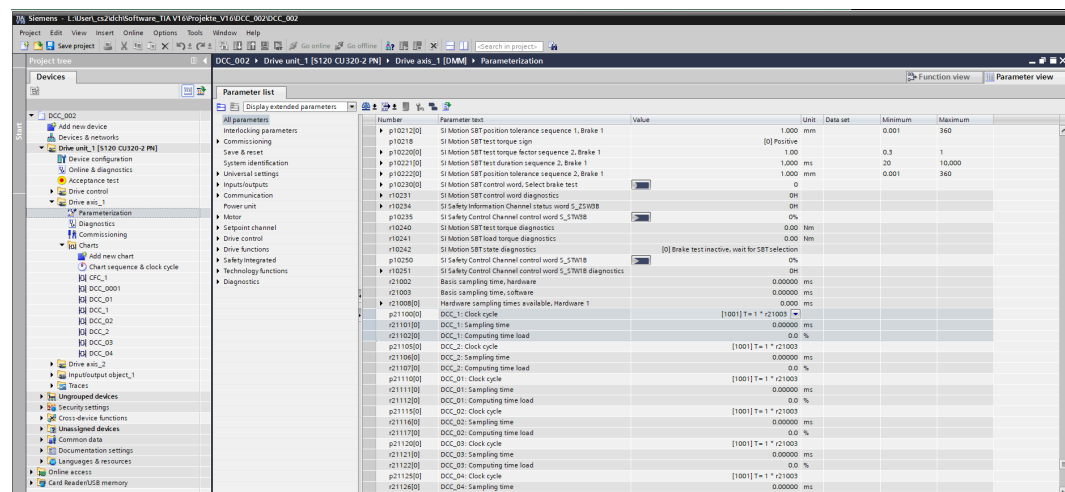


Figure 6-29 Parameters for each chart

Note

For users of SINAMICS DCC in the STARTER environment, the term "Execution group" corresponds with the term "Clock cycle" for SINAMICS DCC in the TIA environment.

Parameter p21000 is no longer available for SINAMICS DCC in the TIA environment. Instead, the clock cycles are set as described above.

There are two clock cycles:

- Fixed clock cycles
- Free clock cycles

Fixed clock cycles

A "fixed clock cycle" is called at a fixed position in the system execution using the sampling time of the associated system function.

The following "fixed clock cycles" are available:

- **Import AFTER digital inputs**
This clock cycle is called after the current values of the digital inputs have been imported to this drive object type and the corresponding binector outputs have been written.
The sampling time of this clock cycle matches the sampling time of the CU inputs/outputs (p0799) or the digital inputs/outputs of the TB30, TM31 and TM41 (p4099[0]).
- **Output BEFORE digital outputs**
This clock cycle is called before writing to the analog outputs.
The sampling time of this clock cycle matches the sampling time of the inputs/outputs of the TB30, TM31 and TM41 (p4099[1]).
- **Import AFTER analog inputs**
This clock cycle is called after the current values of the analog inputs have been imported to this drive object type and the corresponding binector outputs have been written.
The sampling time of this clock cycle matches the sampling time of the inputs/outputs of the TB30, TM31 and TM41 (p4099[1]).
- **Output BEFORE analog outputs**
This clock cycle is called before writing to the analog outputs.
The sampling time of this clock cycle matches the sampling time of the inputs/outputs of the TB30, TM31 and TM41 (p4099[1]).
- **BEFORE speed controller**
This clock cycle is called before the speed controller additional setpoint values "n_reg n_set1" (p1155) and "n_reg n_set2" (p1160) are imported into FP3080. The sampling time of the speed controller (p0115[1]) produces the call, but a minimum sampling time of 1 ms is required.
- **BEFORE speed setpoint channel**
This clock cycle is called before function diagrams 3010, 3020, 3030, 3040 and subsequent charts are calculated, if the setpoint channel has been activated (p0108.8 = 1). If no setpoint channel has been configured (p0108.8 = 0), calculation takes place before function diagram 3095. The setpoint channel sampling time produces the call (p0115[3]).
- **BEFORE position controller**
This clock cycle is called after the actual position value preparation (function diagram 4010) has been calculated and before the position controller (function diagrams 4015, 4020 and 4025) is calculated. The sampling time of this clock cycle matches the sampling time of the position controller (p0115[4]).
- **BEFORE actual position value**
This clock cycle is called before the actual position value preparation (function diagram 4010) and the position controller (function diagrams 4015, 4020, and 4025) are calculated. The sampling time of this clock cycle matches the sampling time of the position controller (p0115[4]).
- **BEFORE basic positioner**
This clock cycle is called before the basic positioner function module (function diagrams 3610 to 3650) is calculated. The sampling time of this clock cycle matches the sampling time of the basic positioner function module (p0115[5]).

6.6 Clock cycles and sampling times

- **BEFORE standard technology controller**

This clock cycle is called before the technology controller function module is calculated ($p0108.16 = 1$) (function diagrams 7950, 7954 and 7958). The sampling time of this clock cycle matches the sampling time of the technology controller ($p0115[6]$).

- **Receive AFTER IF1 PROFIdrive PZD**

This clock cycle is called after cyclic process data has been received via communication interface IF1 and output to connector outputs r2050[...], r2060[...], binector outputs r2090 - r2093, and connector-binector converters r2094 and r2095.

The sampling time of this clock cycle matches the PROFIdrive PZD sampling time.

Parameter p0092 can be used to set whether the utilization calculation (r9976) evaluates the clock cycle for isochronous operation (p0092 = 1) or non-isochronous operation (p0092 = 0) during SINAMICS ramp-up.

Non-isochronous operation (r2043.1 = 0):

The PROFIdrive data is received and sent at two separate times. The process data is received at the start of the IF1 PROFIdrive PZD sampling time set in p2048. In the case of non-isochronous cyclic communication at the IF1 communication interface, the clock cycle is cyclically calculated with the sampling time of the IF1 communication interface (p2048) after receiving the data, i.e. after writing the connector outputs for the process data (PZD) r2050[...], r2060[...], r2090 - r2093 and after calculating the connector-binector converter r2094 and r2095.

For calculating the utilization of system r9976 correctly, p092 must be = 0 (== factory setting) in non-isochronous operation.

Isochronous operation (r2043.1 = 1):

In isochronous operation, the times at which the data is received from the master (T_o), the data is sent to the master (T_i) and the DP cycle time (T_{DP})¹⁾ are configured in the master. Internally, the calls to T_o and T_i are realized using a state machine that is called cyclically with sampling time T_{zu} , e.g. for standard servo drive objects with the current controller sampling time of 125 μ s. The sampling time T_{zu} = 125 μ s, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 μ s, 375 μ s or 500 μ s).

This means only integer multiples of $T_{zu} \geq 125 \mu$ s can be set as times T_i and T_o for the drive.

→ $T_i = n_i \cdot T_{zu}$:

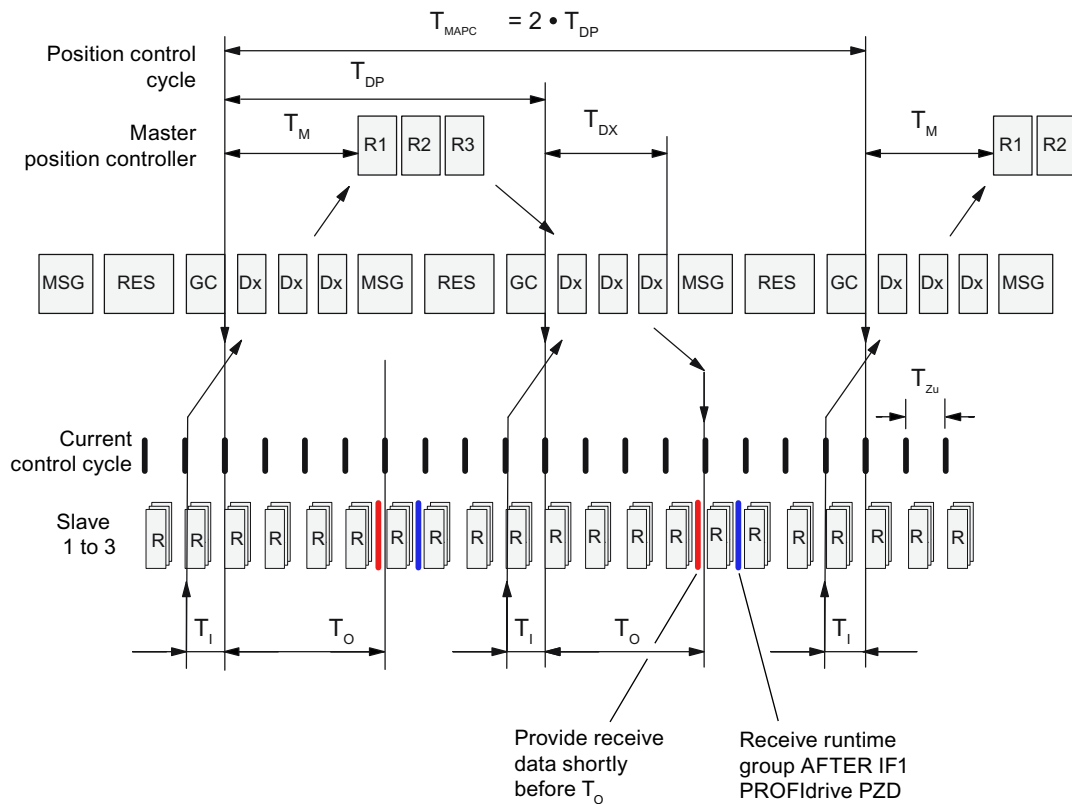


Figure 6-30 Calling the "Receive AFTER IF1 PROFdrive PZD" or "Receive AFTER IF2 PROFdrive PZD" clock cycle for isochronous PROFIBUS communication

Receive data (sent by the master) is always processed and made available at the end of the sampling time $(n_o - 1) T_{Zu}$, so that the received process data remains valid until the start of the next sampling period at the time $T_o = n_o \cdot T_{Zu}$ at r2050[...], r2060[...], r2090 - r2093. Thus, in the last sampling time T_{Zu} before T_o . The "Receive AFTER IF1 PROFdrive PZD" clock cycle is then calculated in the following first sampling time T_{Zu} after T_o .

Note

Please take note that the 2 connector-binector converters (function diagram 2468: p2099, r2094, r2095) are NOT called synchronously in isochronous operation, but may be processed within sampling time p2048 at any time depending on the computation time utilization.

The calculation must be completed within the sampling time T_{Zu} ; otherwise, alarm A01053 "System overload detected" or a time-slice overflow (F01205) will occur. For this reason, only the absolute minimum number of DCBs that are necessary for the required function should be calculated in this clock cycle.

The computation time available for this clock cycle decreases the more drive axes are calculated on the CU since the current controllers (and also the speed controllers for the servo) of the drive axes are also calculated in the sampling time $p0115[0] = T_{Zu} (\geq 125 \mu s)$. If the utilization calculation is to be executed during ramp-up of the CU for isochronous operation (unfavorable case regarding degree of utilization), $p092 = 1$ must be set. Otherwise ($p092 = 0$) the utilization in r9976 is updated only after switchover to isochronous

operation. The increased maximum overall utilization in isochronous operation is displayed only in r9976.

If you want to calculate a larger number of DCBs, check whether it would not be better to configure this using the "Receive AFTER IF1 PROFIdr. flexible PZD" clock cycle.

Note

For this clock cycle, note that the higher computation time load that applies in isochronous operation is not actually taken into account in the utilization calculation until the time of the transition to isochronous operation. After the drive unit has ramped up, this means the utilization of the complete system initially still lies within the valid range and it is only when the transition is made to isochronous operation that the drive unit shuts down with fault F1054 (system limits exceeded).

- **Send BEFORE IF1 PROFIdrive PZD**

This clock cycle is called before cyclic process data is sent via communication interface IF1, i.e. before calculating the connector-binector converter p2080 – p2084 and reading in the connector inputs p2051[..], p2061[..].

The sampling time of this clock cycle matches the PROFIdrive PZD sampling time.

Parameter p0092 can be used to set whether the utilization calculation (r9976) evaluates the set clock cycle for isochronous operation (p0092 = 1) or non-isochronous operation (p0092 = 0) during SINAMICS ramp-up.

Non-isochronous operation (r2043.1 = 0):

the PROFIdrive data is received and sent at two separate times. The "Send BEFORE IF1 PROFIdrive PZD" execution group is processed at the end of the IF1 PROFIdrive PZD sampling time before the complete data is still sent at the end of the sampling time. For the non-isochronous (cyclical) communication at the communications interface IF1, the execution group is calculated cyclically with the sampling time of the interface IF1 (p2048) (before sending the data), i.e. also before calculating the connector binector transformer p2080 – p2084 and reading in the connector inputs p2051[.], p2061[.]. For calculating the utilization of system r9976 correctly, p092 must be = 0 (== factory setting) in non-isochronous operation.

Isochronous operation ($r_{2043.1} = 1$):

In isochronous operation, the times at which the data is received from the master (T_o), the data is sent to the master (T_i) and the DP cycle time (TDP) ¹⁾ are configured in the master. Internally, the calls to T_o and T_i are realized using a state machine that is called cyclically with sampling time T_{zu} , e.g. for standard servo drive objects with the current controller sampling time of 125 μ s. The sampling time $T_{zu} = 125 \mu$ s, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 μ s, 375 μ s or 500 μ s). This means only integer multiples of $T_{zu} \geq 125 \mu$ s can be set as times T_i and T_o for the drive ¹⁾.

$$\rightarrow T_i = n_i \cdot T_{Zu} \text{ and } T_{DP} = n_{DP} \cdot T_{Zu}$$

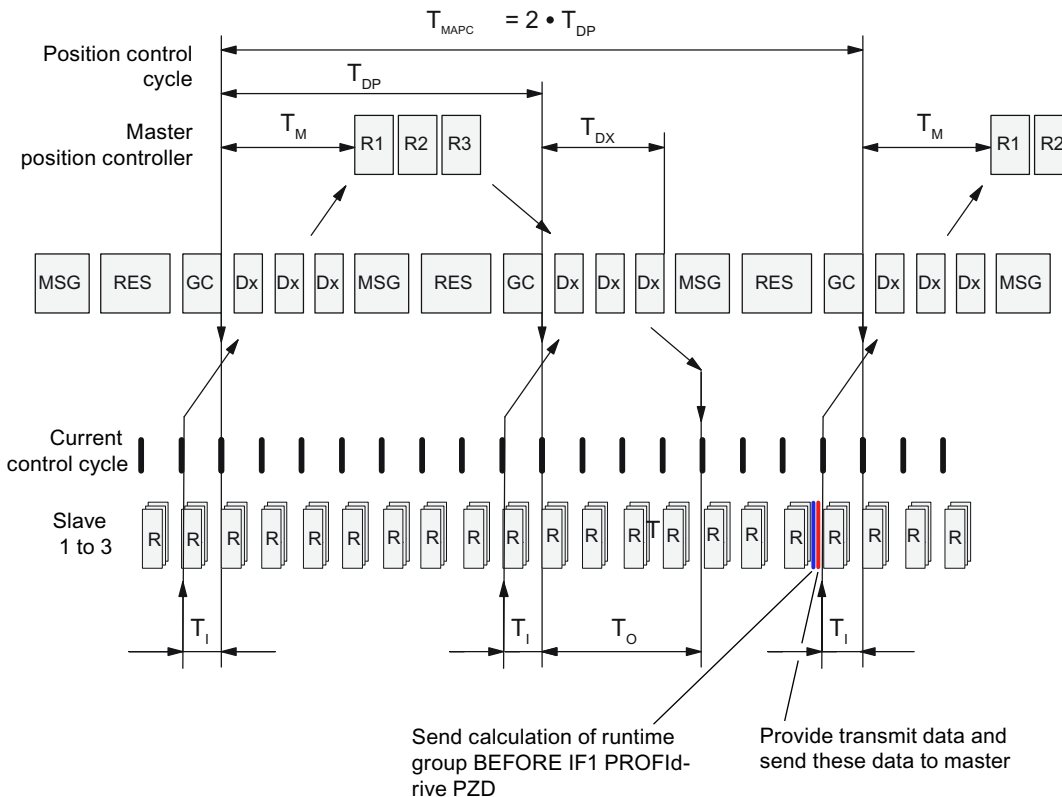


Figure 6-31 Send BEFORE IF1 PROFIdrive PZD

The "Send BEFORE IF1 PROFIdrive PZD" execution group is calculated in the last sampling time T_{zu} before the data is sent to the master and before T_i and reading in the connector inputs p2051[...], p2061[...].

Note

Please take note that the 5 connector-binector converters (function diagram 2472: p2080 ..., r2089) are also NOT called synchronously in isochronous operation but may be processed within sampling time p2048 at any time depending on the computing time utilization.

The calculation of the execution group must be completed within sampling time T_{zu} ; otherwise, a fault F1054 "System limit exceeded" or a time-slice overflow (F01205) occurs. For this reason, only the absolute minimum number of DCBs that are necessary for the required function should be calculated in this execution group. The computing time available for this clock cycle decreases as the number of drive axes calculated on the CU increases, since the current controller (and the speed controllers for the servo) of the drive axes are also calculated in sampling time $p0115[0] = T_{zu}$. If the utilization calculation during the ramp-up of the CU has already executed the isochronous operation (the more unfavorable configuration regarding the utilization of the CU), then p092 must be set to = 1. Otherwise (p092 = 0) the utilization in r9976 is updated only after switchover to isochronous operation. The increased maximum overall utilization in isochronous operation is displayed only in r9976.

Note

For this execution group, note that the higher computation time load that applies in isochronous operation is not actually taken into account in the utilization calculation until the time of the transition to isochronous operation. After the drive unit has ramped up, this means the utilization of the complete system initially still lies within the valid range and it is only when the transition is made to isochronous operation that the drive unit shuts down with fault F1054 (system limits exceeded).

- **Receive AFTER IF1 PROFIdrive flexible PZD**

This clock cycle is called after cyclic process data has been received via communication interface IF1 (e.g. via the integrated PROFIBUS interface) and output to connector outputs r2050[...], r2060[...], binector outputs r2090 - r2093 and connector-binector converters r2094 and r2095.

The sampling time of this clock cycle matches the PROFIdrive PZD sampling time. The only difference to the Receive AFTER IF1 PROFIdrive PZD clock cycle is the way in which the clock cycle behaves in isochronous operation.

Even in isochronous mode this clock cycle is called using the PROFIdrive PZD sampling time configured in the master as with any other sampling time. This means that initially all shorter sampling times are called at time T_0 depending on the validity of the receive data (current controller; speed controller if applicable). This clock cycle is called first only when the T_{DP} sampling time starts to be processed. You basically do not know how often the shorter sampling times with higher priority of the current and speed controller are calculated before this clock cycle starts to be processed. In addition, processing of this clock cycle is interrupted due to shorter sampling times. This clock cycle should only be used if IF1 is usually operated in isochronous mode. The benefit of this clock cycle is that considerably more blocks can be calculated than in the Receive AFTER IF1 PROFIdrive PZD clock cycle because the calculation does not have to be completed after current controller sampling time p0115[0]. However (due to the higher priority and interruption caused by shorter sampling times), there is no longer a fixed synchronism between T_0 and the time the clock cycle is called.

- **Receive AFTER IF2 PZD**

The integrated PROFINET interface (see description p8839, p8815) on the CU can serve as communication interface IF2. This clock cycle is available only on the CU_S, CU_G, CU_GM, CU_GL, SERVO, VECTOR, VECTORMV, VECTORSL and VECTOR_GL drive object types.

Non-isochronous operation (PROFINET):

The clock cycle called once the connectors r8850[...], r8860[...], r8890 - r8893 have been described with the receive data and the calculation of the connector-binector converters (function block diagram 2485.7: r8894 and r8895) has been executed. The sampling time of this clock cycle corresponds to the IF2 PZD sampling time in p8848.

Isochronous operation (r2043.1 = 1):

In isochronous operation, the times at which the data is received from the master (T_o), the data is sent to the master (T_i) and the DP cycle time (T_{DP})¹⁾ are configured in the master. Internally, the calls to T_o and T_i are realized using a state machine that is called cyclically with sampling time T_{zu} , e.g. for standard servo drive objects with the current controller sampling time of 125 μ s. The sampling time $T_{zu} = 125 \mu$ s, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 μ s, 375 μ s or 500 μ s). This means only integer multiples of $T_{zu} \geq 125 \mu$ s can be set as times T_i and T_o for the drive¹⁾.

$$\rightarrow T_i = n_i \cdot T_{zu} \text{ and } T_{DP} = n_{DP} \cdot T_{zu}$$

See figure for Receive AFTER IF1 PZD Receive data (sent by the master) is always processed and made available at the end of the sampling time ($n_o - 1$) T_{zu} , so that the received process data remains valid until the start of the next sampling period at the time $T_o = n_o \cdot T_{zu}$ at r8850[...], r8860[...], r8890 - r8893 (function block diagram 2485). Thus, in the last sampling time T_{zu} before T_o . The "Receive AFTER IF2 PZD" clock cycle is then calculated in the following first sampling time T_{zu} after T_o .

Note

Please take note that the 2 connector-binector converters (function diagram 2485: p8899, r8894, r8895) are NOT called synchronously in isochronous mode but may be processed within sampling time p8848 at any time depending on the computing time utilization.

The calculation must be completed within the sampling time T_{zu} ; otherwise, alarm A01053 "System overload detected" or a time-slice overflow (F01205) will occur. For this reason, only the absolute minimum number of DCBs that are necessary for the required function should be calculated in this execution group. The computation time available for this execution group decreases the more drive axes are calculated on the CU since the current controllers (and also the speed controllers for the servo) of the drive axes are also calculated in the sampling time $p0115[0] = T_{zu} (\geq 125 \mu$ s). If the utilization calculation is to be executed during ramp-up of the CU for isochronous operation (unfavorable case regarding degree of utilization), $p092 = 1$ must be set. Otherwise ($p092 = 0$) the utilization in r9976 is updated only after switchover to isochronous operation. The increased maximum overall utilization in isochronous operation is displayed only in r9976.

If you want to calculate a larger number of DCBs, check whether it would be more practical to configure this using the "Receive AFTER IF2 PROFIdr. flexible PZD" clock cycle.

Note

For this clock cycle, note that the higher computation time load that applies in isochronous operation is not actually taken into account in the utilization calculation until the time of the transition (specified by the PROFIdrive master) to isochronous operation. After the drive unit has ramped up, this means the utilization of the complete system initially still lies within the valid range and it is only when the transition is made to isochronous operation that the drive unit shuts down with fault F1054 (system limits exceeded).

- **Send BEFORE IF2 PZD**

The integrated PROFINET interface (see description p8839, p8815) on the CU can serve for the communication interface IF2. This clock cycle is available only on the CU_S, CU_G, CU_GM, CU_GL, SERVO, VECTOR, VECTORMV, VECTORSL and VECTOR_GL drive object types.

Non-isochronous operation (PROFINET):

The clock cycle is called before the binector connector transformers p8880 – p8884 are calculated and the before connector inputs p8851[.], p8861[.] with the send data are read. The sampling time of this clock cycle corresponds to the IF2 PZD sampling time in p8848. See function block diagrams 2487 and 2493.

Isochronous operation (r2043.1 = 1):

In isochronous operation, the times at which the data is received from the master (T_o), the data is sent to the master (T_i) and the DP cycle time (T_{DP})¹⁾ are configured in the master. Internally, the calls to T_o and T_i are realized using a state machine that is called cyclically with sampling time T_{zu} , e.g. for standard servo drive objects with the current controller sampling time of 125 μ s. The sampling time $T_{zu} = 125 \mu$ s, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 μ s, 375 μ s or 500 μ s). This means only integer multiples of $T_{zu} \geq 125 \mu$ s can be set as times T_i and T_o for the drive¹⁾.

$$\rightarrow T_i = n_i \cdot T_{zu} \text{ and } T_{DP} = n_{DP} \cdot T_{zu}$$

See also the figure for Receive BEFORE IF1 PROFIdrive

The "Send BEFORE IF2 PZD" execution group is calculated in the last sampling time T_{zu} before the data is sent to the master and before T_i and reading in the connector inputs p8851[.], p8861[.].

Note

Please take note that the 5 connector-binector converters (function diagram 2489: p8880 ..., r8889) are NOT called synchronously in isochronous mode but may be processed within sampling time p8848 at any time depending on the computing time utilization.

The calculation of the execution group must be completed within sampling time T_{zu} ; otherwise, a fault F1054 "System limit exceeded" or a time-slice overflow (F01205) occurs. For this reason, only the absolute minimum number of DCBs that are necessary for the required function should be calculated in this clock cycle. The computing time available for this clock cycle decreases as the number of drive axes calculated on the CU increases, since the current controller (and the speed controllers for the servo) of the drive axes are also calculated in sampling time p0115[0] = T_{zu} .

- **Receive AFTER IF2 flexible PZD**

This clock cycle is called after cyclic process data (PZD) has been received via communication interface IF2 (e.g. via the integrated PROFIBUS interface) and output to connector outputs r8850 [..], r8860[.], binector outputs r8890 - r8893 and connector-binector converters r8894 and r8895. The sampling time of this clock cycle corresponds to the PROFIdrive PZD sampling time. The only difference to the Receive AFTER IF2 PROFIdrive PZD clock cycle is the way in which the clock cycle behaves in isochronous operation. Even in isochronous mode this clock cycle is called using the PROFIdrive PZD sampling time configured in the master as with any other sampling time. This means that initially all shorter sampling times are called at time T_o depending on the validity of the receive data (current controller; speed controller if applicable). This clock cycle is called first only when the T_{DP} sampling time starts to be processed. You basically do not know how often the shorter sampling times with higher priority of the current and speed controller are calculated before this clock cycle starts to be processed. In addition, processing of this clock cycle is interrupted due to shorter sampling times. This clock cycle should only be used if IF2 is usually operated in isochronous mode. The benefit of this clock cycle is that considerably

more blocks can be calculated than in the Receive AFTER IF1 PROFIdrive PZD clock cycle because the calculation does not have to be completed after current controller sampling time p0115[0]. However (due to the higher priority and interruption caused by shorter sampling times), there is no longer a fixed synchronism between T_o and the time the clock cycle is called.

- 1) The behavior for T_{DP} , T_i and T_o also applies analogously for TDC, TIO_Input and TIO_Output. The formulas and limit values listed in the Communication Function Manual under Designations and Descriptions for Motion Control in the table "Time settings and meanings" apply for these times.

Free clock cycles

The "free clock cycles" are defined only by their sampling time ($p211xx = 1$ to 256 and $p211xx = 1001$ to 1096). The sampling times are provided centrally for all drive objects on a SINAMICS drive unit. A sampling time can be used simultaneously by several drive objects. The sampling times are created in two ways. The two methods have different limits for the maximum possible number of different sampling times.

- **Free clock cycles whose sampling times are created in the hardware:**

With the hardware sampling times, in $p211xx$ each integer multiple of the basic sampling time (in $r21002$) ranging from $1 * r21002$ to $256 * r21002$ can be generated with the following limits:

- Minimum sampling time = 1 ms
- Maximum sampling time = $(r21003 - r21002) < r21003$ (approx. 8 ms)
- The number of hardware sampling times on a drive unit is limited. The number of available hardware sampling times can be fetched from $r7903$.

Note

With regard to the offline configuration with the Startdrive commissioning software, values 0 - 256 can be entered in $p211xx$, even if this violates the limits stated above for the hardware sampling times from 1 ms ... $< r21003$. This is detected only after the Control Unit has been downloaded, and results in the use of a substitute value and the F51004 fault. If the set value is too short, 1 ms is set as substitute value; if it is too long, the next longer SW sampling time is set.

- On the drive objects of the CU, TB30, TM15 DIDO, TM 31 and TM41, the sampling time for additional functions $p0115[0] = 4$ ms is preset. If you want to configure a sampling time on these drive objects, you should first set the sampling time for the additional functions $p0115[0]$ on this drive object to the value of the shortest desired sampling time. To do this, $p0009 = 3$ must first be set. Only then is it possible to change $p0115[0]$. For the new value for $p0115[0]$ to take effect, $p0009 = 0$ must be reset.

- **Free clock cycles whose sampling times are created in the software:**

The software sampling times are generated as an integer multiple of the basic value for software sampling times (can be fetched from parameter $r21003$). The possible set values for the software sampling times ($1 * r21003... 96 * r21003$) can be taken from the parameter description for $p211xx$.

WARNING

Online change of the sampling time

The START methods for the block is called for online change of the clock cycle. Initializations in the START method can result in jumps in the signal characteristic.

Changing the clock cycles in the chart



WARNING

Changing the clock cycles in the chart during operation of the drive unit

If the clock cycle of a chart is changed, the respective chart is first logged off during the time slice management and then logged on again with the new assignment. The clock cycle is not calculated during the period between unregistering and reregistering. The log-on and log-off take place in a background process of the drive unit; the duration is therefore not defined and is determined by the current computation time load of the drive unit. (This affects the path of the output signal in the case of time-dependent blocks, e.g. the DIF differentiator.) Prior to the first calculation cycle after logging back on, internal status variables of the blocks are partially reset. For both of these reasons, this can result in jumps in the output signal of blocks, which for example can affect the torque/force setpoint and (in the case of operated axes) also the torque/actual force value. Logic signals can also assume an unexpected state at this point of operation.

If the change to the clock cycle also results in a change to the sampling time, internal constants or factors are automatically adjusted for time-dependent blocks (BF, DCA, DIF, DT1, INT, MFP, PCL, PDE, PDF, PIC, PST, PT1, RGE, RGJ, WBG). If you use these blocks in the chart, you must assign parameter p2048 the value of the isochronous master clock:

- Receive AFTER IF1 PROFIdrive PZD
- Send BEFORE IF1 PROFIdrive PZD
- Receive AFTER IF1 PROFIdrive flexible PZD
- Receive AFTER IF2 PZD
- Send BEFORE IF2 PZD
- Receive AFTER IF2 flexible PZD

6.6.2 Setting the sampling time

The sampling time can be set for each chart.

Requirement

At least one chart has been created.

Procedure

To set the sampling time for a chart, proceed as follows:

Selection in the "Chart sequence & clock cycle" dialog

1. Double-click the "Chart sequence & clock cycle" subitem in the "Charts" folder in the project navigator.
All created charts are displayed in the working area.
2. Select the desired sampling time in the "Clock cycle" column.

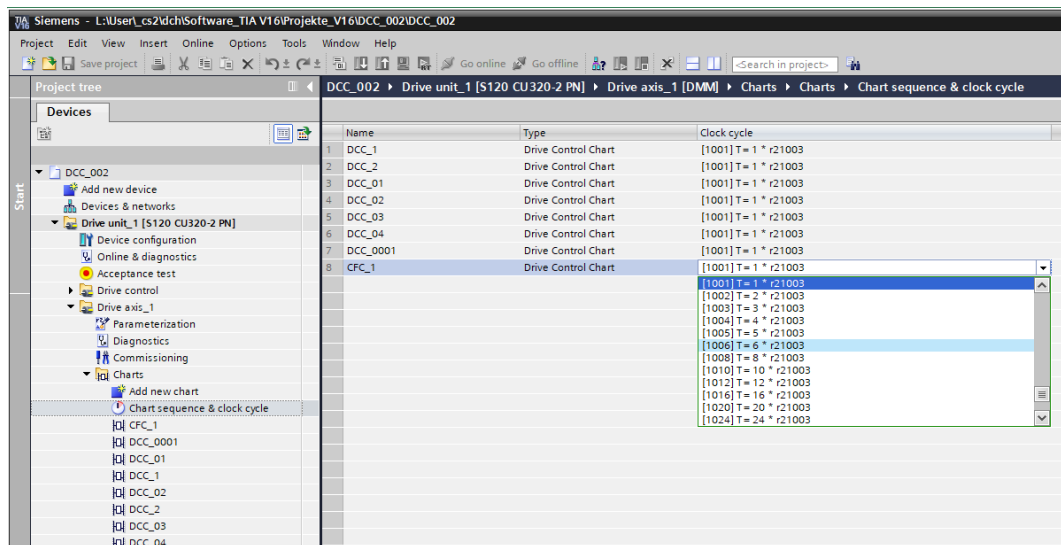


Figure 6-32 Setting the sampling time

Result

The set sampling time is adopted for the corresponding chart.

Sampling time in the "Parameter view"

1. Open the "Parameter view" for the drive object to which the chart belongs.
The parameter for each chart starts at parameter number 21100, e.g. "DCC_1: Clock cycle" and "DCC_1: Execution time".

6.7 Establishing an online connection

Procedure

Once SINAMICS DCC is part of the drive unit, the online connection is established in the same way as without the SINAMICS DCC option. For this reason, all required information about this topic can be found in the TIA Portal help at "Connecting device online".

Check of software objects for consistency

The left column in the project navigation shows the diagnostic status for hardware objects in online mode in the form of icons.

The right column in the project navigation shows the comparison status (data in the device / data in the current project) for software objects in online mode in the form of icons. DCC-relevant data is checked here for consistency and displayed for the folders Charts, Individual charts and Chart sequence & clock cycle accordingly.

The following data is compared and displayed at the corresponding chart:

- Name of the block
- Block connections
- Default values
- Interconnections
- Position of the block in the chart
- Comments
- Block sequence

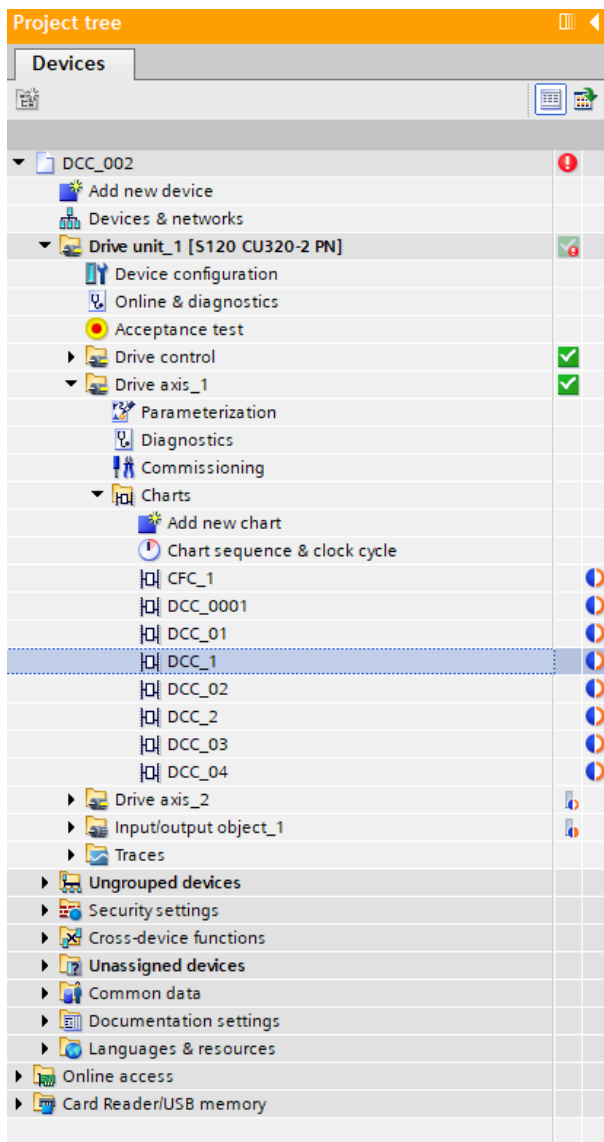
Note

The following data is excluded from the comparison:

- Block connections which are selected for the test
 - BICO interconnections
 - Published set values
-

The following data is compared and displayed at "Chart sequence & clock cycle":

- Chart sequence



The online and offline charts are identical



The online chart and offline chart or the chart sequence differ



The connection is established, however, the status of the chart is currently being determined or is not known.

No display No comparison possible as the device know-how protection is activated or due to commissioning with a previous version of SINAMICS DCC.

Figure 6-33 Consistency check of the charts in online mode

Note

The comparison status is updated automatically as soon as a change is implemented in the charts.

Comparison of parameters

The comparison of parameters can be applied to supplement the check of software objects for consistency.

Requirement

- A chart has been created
- An online connection has been established
- The parameter view is displayed

Procedure

To perform a parameter comparison, proceed as follows:

1. Select a DCC parameter
2. Click on the symbol



3. Select "Comparison online/offline" in the sub-menu.

Result

The current parameters for this drive object are compared with another parameter set. With the factory settings as standard in offline mode, and with the offline settings in online mode.

Note

"Computation time load" DCC parameters can be compared with one another.

6.8 Load to device

In addition to configuring the device when loading to the device, the configured charts, and where necessary the DCB libraries being used, are also transferred.

Note

Know-how protection

The device's know-how protection should be activated as protection against manipulation of the charts.

Requirement

The following requirements must be satisfied to download the configuration from the programming device to the drive unit.

- An online connection has been established.
- No text reference may exist in the charts of the drive unit, see also "Text references (Page 74)".

Procedure

To download the named configuration data to the drive unit, proceed as follows:

1. Click the "Download to device" icon.
The "Load preview" dialog opens and loading is prepared.

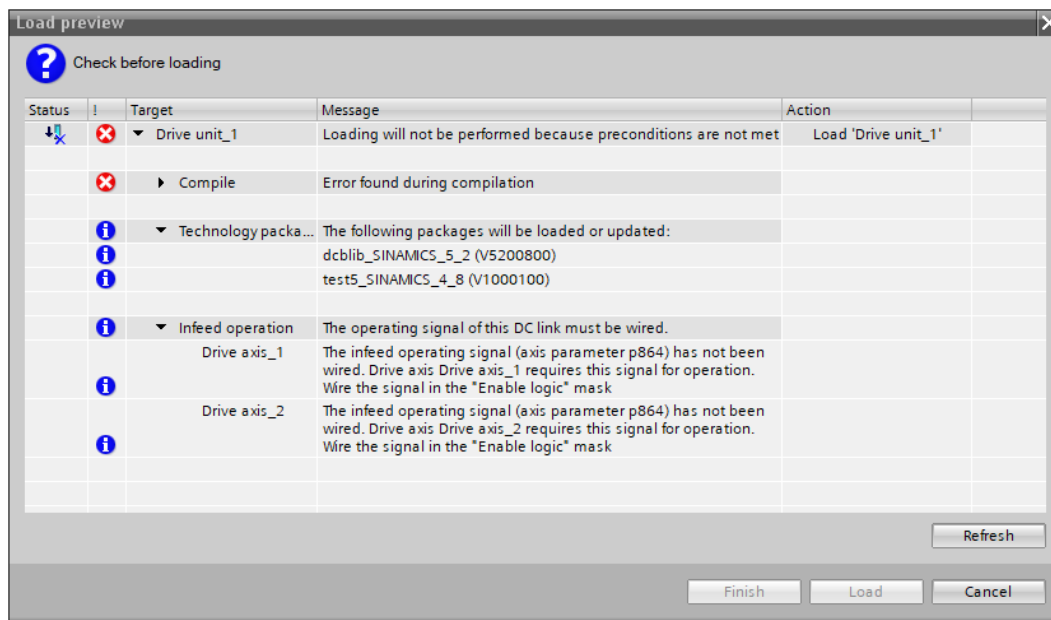


Figure 6-34 Loading to the device - Loading a preview

Errors which prevent loading are displayed in this dialog. This dialog also displays when the DCB library is being implicitly loaded.

The "Load" button is only enabled if the configuration is correct.

2. After checking, click "Load".
The configuration data is loaded to the device.
3. After the configuration data has been completely loaded,
 - the "Load preview" and "Load configuration" dialogs are closed
 - or you confirm the process by clicking on "Finish".

Result

All drive modules are marked with a green check mark (OK).

It is now possible to configure parameters "online", for example.

Note

Alarm messages

Alarm messages may be issued following loading in the drive unit as of F51000, with regard to the set clock cycles/runtime groups for the charts. The term "Runtime group" is used in the descriptions, this corresponds with the term "Clock cycle" for SINAMICS DCC in the Startdrive environment. Moreover, alarm messages which relate to configuration in the chart may be issued as of F51050/A51060 with a configured STM block (triggering of a fault/warning message).

6.9 Loading from a device

6.9.1 Loading project data from the drive unit into the TIA Portal

Loading from the drive unit which was configured with SINAMICS DCC in the TIA environment is described here.

Note

Drive units configured with STARTER and contain charts cannot be uploaded with Startdrive and SINAMICS DCC.

Requirement

- The SINAMICS DCC option package is installed.
- A project is open.
- A drive unit with a project, including chart, that was uploaded with Startdrive and SINAMICS DCC is available.
- An online connection has been established.

Procedure

To upload a configuration from the target device to the project, proceed as follows:

1. Click the "Upload from device" icon.
The "Load preview" dialog opens and loading is prepared.
2. After checking, click "Load".
The configuration is loaded.
3. After the configuration has been completely loaded,
 - the "Load preview" and "Load configuration" dialogs are closed
 - or confirm the process by clicking on "Finish".

Result

The project data was uploaded from the drive unit into the project

Note

DCB Extension

DCB Extension libraries (DCB Extension) are not uploaded to the TIA Portal with "Load from device".

If the project to be uploaded contains a DCB Extension library, it must be available in the offline project, because otherwise the online project cannot be uploaded.

6.9.2 Uploading to SINAMICS STARTER

NOTICE
An upload of a DCC project to SINAMICS STARTER is not possible! A project that was created with SINAMICS DCC in the TIA Portal and has been downloaded to the target device can no longer be uploaded back to SINAMICS in the STARTER environment.

Uploading to SINAMICS STARTER

NOTICE
Backup the STARTER project As the upload can modify the STARTER project opened in the PG, the existing STARTER project must be backed up prior to uploading.

If, despite this, an upload is performed, a message is issued that the upload is not possible.

To continue working with SINAMICS in the STARTER environment, the following tasks must be performed:

- Reset the factory settings and copy from RAM to ROM
- Restart the target device
- Download the STARTER project to the target device

6.10 System restrictions

To avoid impairing the system speed unnecessarily, the following restrictions must be observed:

Blocks per drive unit

The number of blocks depends on the SINAMICS system utilization and on the memory requirement of the SINAMICS DCC software version.

The blocks and parameters present in the charts occupy memory in the drive unit. A maximum of 1500 blocks and 1500 published parameters per device may be configured in SINAMICS DCC on SINAMICS S120, S150, G130, G150 and MV.

The 1500 blocks/1500 parameters should be distributed over several charts to ensure that any impairment of the processing speed is kept to an absolute minimum.

Charts per drive object

A maximum of 30 charts per drive object can be processed in SINAMICS DCC.

Charts per drive unit

A maximum of 75 charts per drive unit can be processed in SINAMICS DCC.

Monitoring and tracing configuration online

7.1 Overview

Procedure

See also "SINAMICS Startdrive diagnostic functions".

In addition to the provided diagnostic functions for Startdrive, SINAMICS DCC allows:

- The diagnosis and analysis of a DCC chart with "Monitoring" function
- The diagnosis and analysis of published and unpublished block connectors with the trace function.

7.2 Testing configuration with the "Monitoring" function

You can test your configuration via "online monitoring" of the data flow in a chart.

Requirement

The following requirements are essential for the "Monitoring" function:

- The configured chart is open
- "Data flow" is displayed in the working area
- The online connection is established to the drive unit
- The project has been downloaded to the target device

Procedure

To test configuration with the "Monitoring" function, proceed as follows:

Selecting the block connectors for the test

1. Select the desired block.
2. In the Inspector window, activate at "Interface" the "For test" option for the desired input and output parameters.
or
Mark "For test" via the context menu at the block connector.

Activating the "Monitoring" function

To test the configured function, perform the following steps:

1. Activate the "Monitoring" function with the "Monitoring on" icon.
2. Enable the required function.

Result

When an online connection is established, all input and output parameters selected for the test are supplied with the current values from the device and color-highlighted.

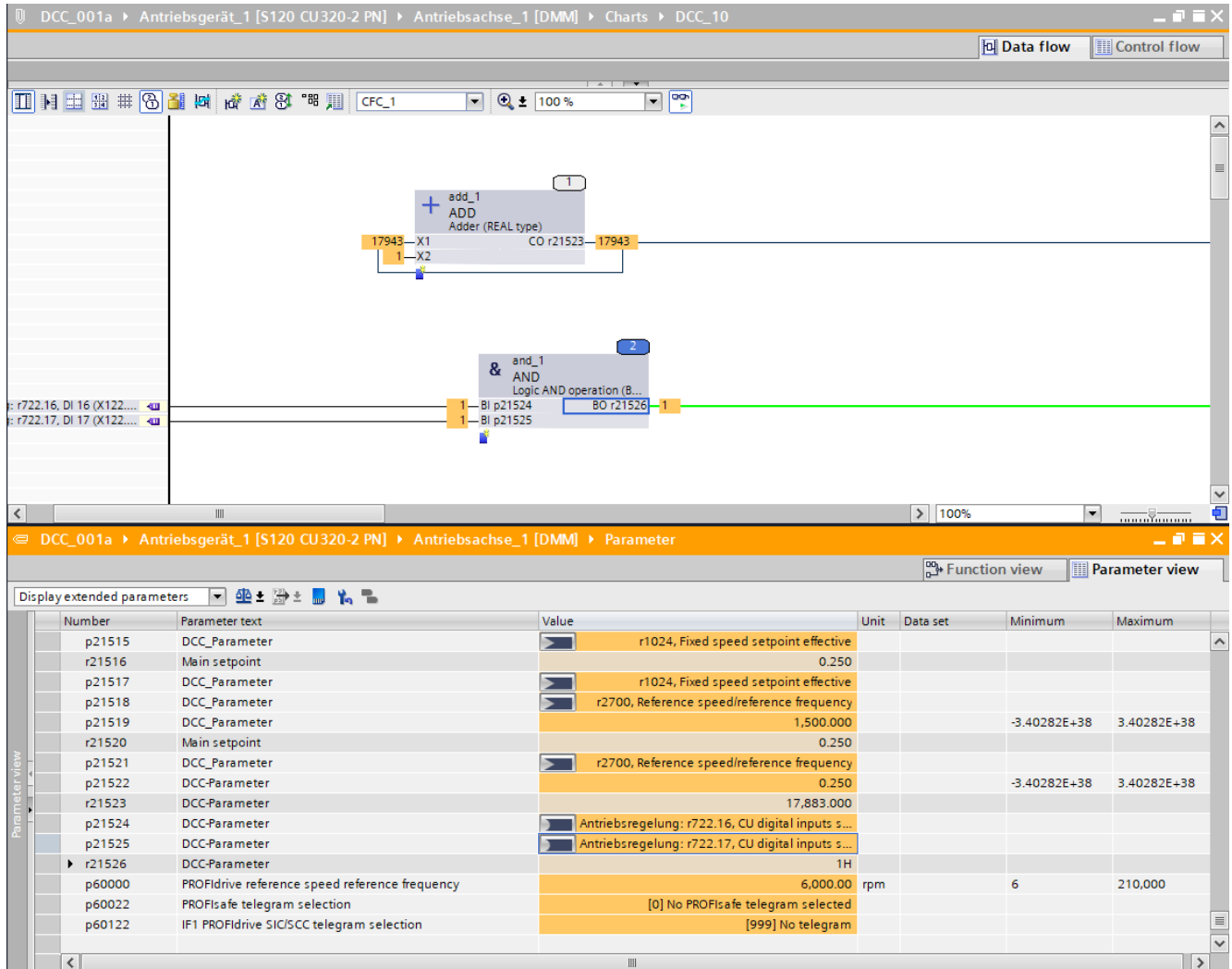


Figure 7-1 "Monitoring" function with current values in the data flow and representation in the parameter view

Note

Know-how protection

If the know-how protection (KHP) is active and the "Monitoring" function is activated, an error message appears in the info window.

If the know-how protection (KHP) is activated while the "Monitoring" function is active, the values are displayed as ###.

Note

Utilization of sub-charts

In a base chart which includes subcharts, the values are now displayed at the block connectors with the "Monitoring" function. The values for blocks of the subchart are now displayed in the opened subchart.

7.3 Tracing the configuration with the trace function

The trace function records the diagnosis and analysis of drive parameters, published and unpublished block connectors of the drive unit, and evaluates the traces. The traces are saved in the drive unit. The recorded values are overwritten for a new trace.

Requirement

- A chart has been created
- A connection between block connectors or a BICO interconnection has been created.

Procedure

Adding a trace configuration

The signals to be traced, the tracing duration and the trigger condition are defined in the trace configuration.

In order to "trace" a parameter, the following steps must be performed for the trace configuration:

1. Add a new trace in the project navigator at "Traces".
The configuration window for "Trace_1" opens.

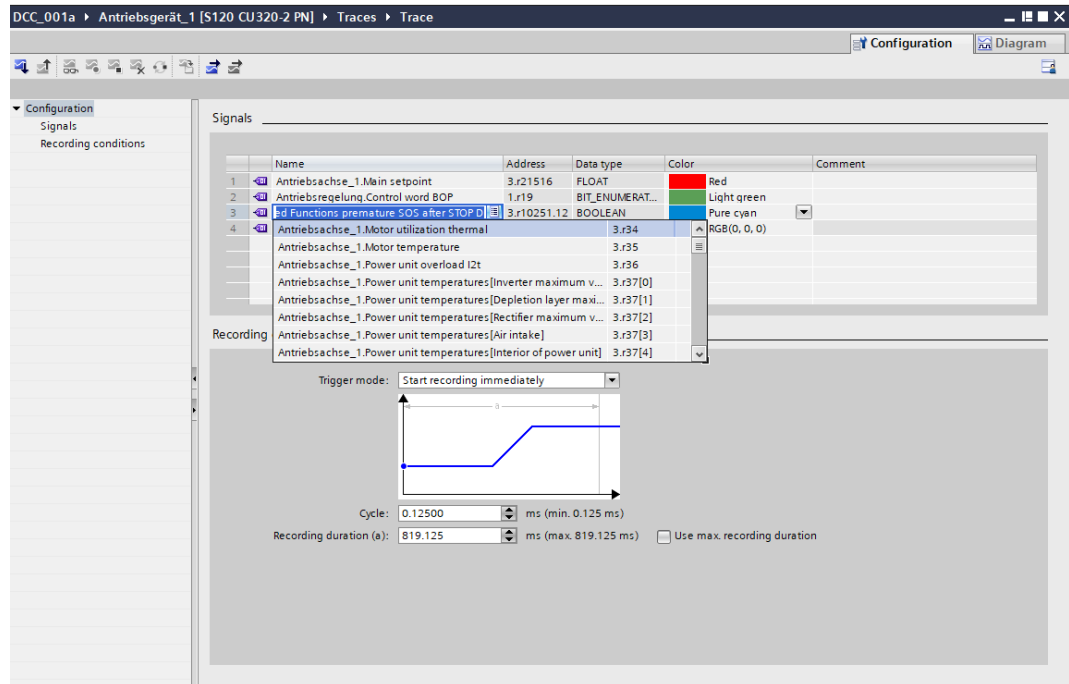


Figure 7-2 Trace configuration

2. Insert the DCC parameters whose signals should be recorded at "Signals".

Inserting interconnections for the trace:

Only the output parameters can be traced for published interconnections.

- Insert the BICO parameter of the block connector in the signal list that you want to trace.
- In the drop-down list, first select the drive object (e.g. Drive_axis_1) and then the DCC parameter (e.g. r21503).
- Insert any further required DCC parameters in the list.

Inserting block connections for the trace:

Only the outputs can be traced for published block connections.

- Insert in the signal list the block connector of the output that you want to trace.
- In the drop-down list, first select the drive object (e.g. Drive_axis_1) and then the dcc
the chart (e.g. DCC_10)
the block (e.g. add_1)
the block input/output (e.g. Y)
- Insert any further required block connectors in the list.

3. Set the trigger mode under "Trace conditions", e.g. to "Start trace immediately".
4. Specify the trace duration.

Transferring the trace configuration to the device

If an online connection exists, transfer the complete trace configuration to the device.

Start recording

If the trace configuration is activated in the device, the trace starts when the trigger condition is satisfied. The trace can also be started and stopped manually.

Evaluating and managing the measurement

The curve diagram and the signal table provide many options for evaluating the measurement. Various representation forms are possible, e.g. a bit representation for binary signals.

Signal characteristics from different measurements can be grouped as overlaid measurement and compared with each other.

Measurements can also be exported and imported as file.

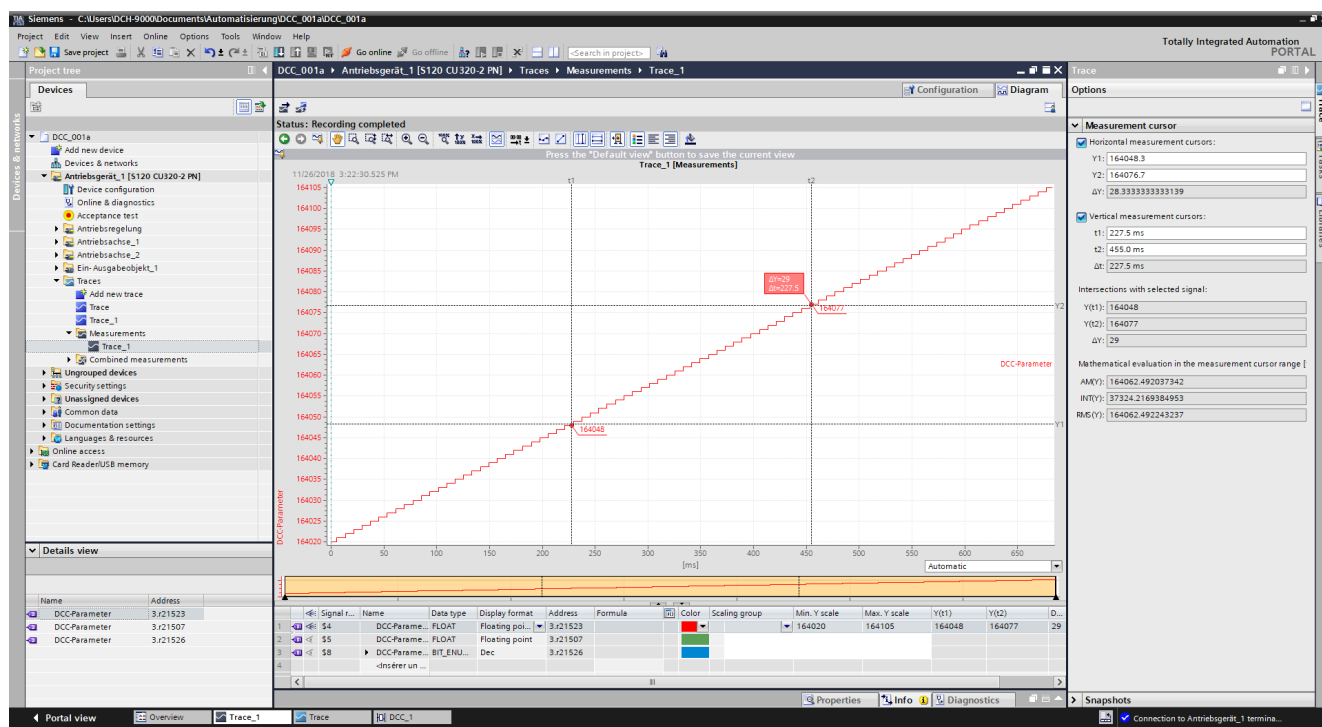


Figure 7-3 Trace function - Measurement completed and evaluated

Saving the measurement

When saving the measurement in the project, the measurement is saved in the opened project of the TIA Portal. Saving the measurement is independent of when the measurement was actually made and can also be made any time after completion of the trace.

Creating a template

Requirement

A drive unit is completely configured and saved.

Procedure

To store a configured drive unit as a template, proceed as follows:

1. Open the "Libraries" task card.
2. Create a global library with the name, e.g. "Library1", using the "Create new global library" icon.
3. Open the global library with the arrow symbol.
The subfolders, e.g. "Master copies", are displayed.
4. Drag a configured drive unit from the project navigation into the "Master copies" folder of the new global library using drag and drop.
A copy of the drive unit is created.
5. Rename the created template, e.g. to "Drive unit_Template".

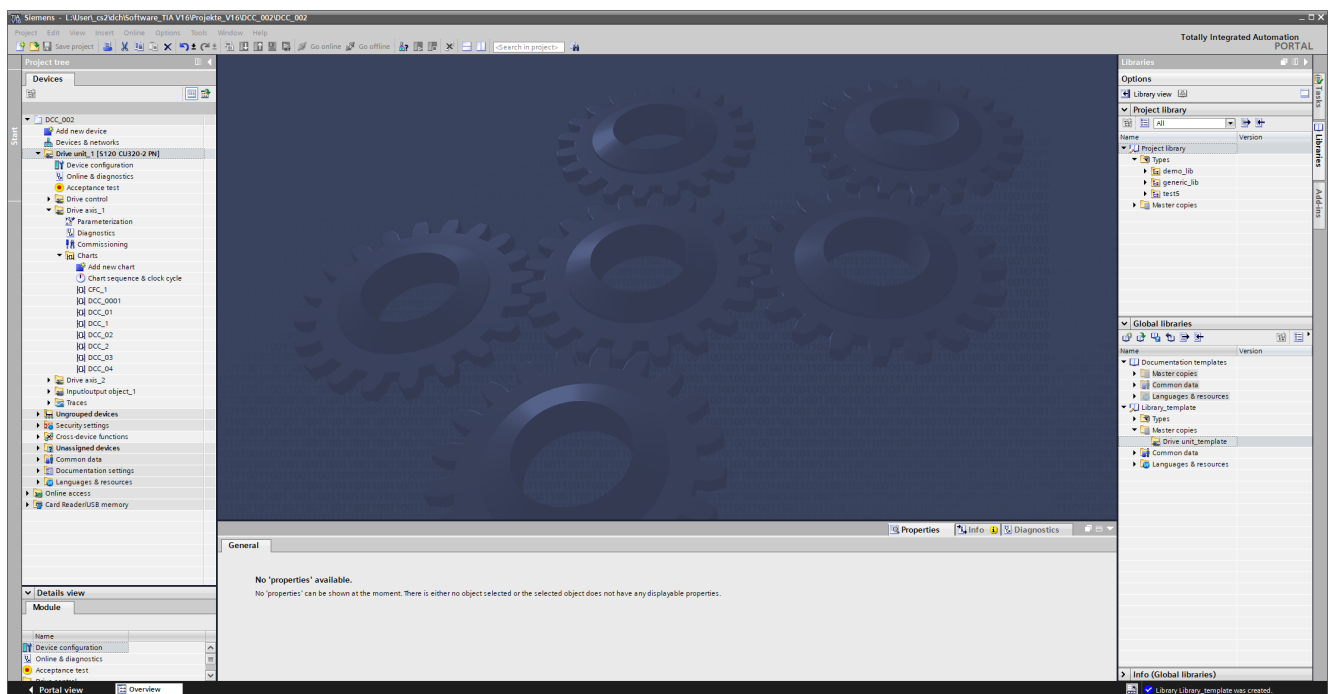


Figure 8-1 Created template "Drive unit_Template"

Each template of a drive unit can be used again in a new project as the basis for the configuration:

To do this, drag and drop the "Drive unit_Template" into the project navigation onto "Add new device".

Library handling

9.1 Introduction

To define the open-loop and closed-loop control functions, multi-instance-capable blocks (Drive Control Blocks (DCBs)) are selected from a DCB library and graphically connected to each other using the drag-and-drop feature.

There are two types of DCB libraries: the DCC standard blocks (**DCB Standard**) and DCB Extension libraries from "SINAMICS DCB Studio" (**DCB Extension**). The DCC standard blocks are included as standard with installation of SINAMICS DCC.

The DCC standard blocks provide a large selection of closed-loop, arithmetic and logic function blocks, as well as comprehensive open-loop and closed-loop control functions that are offered via the "DCC standard blocks" task card. The DCC standard blocks can be included in the DCC charts using drag and drop.

SINAMICS DCC also allows the use of blocks from "SINAMICS DCB Studio", the DCB Extension libraries (**DCB Extension**). This extends the block scope and is used as additional, independent libraries in the DCC editor. These include the GMC and Math Extended libraries supplied as application example by Siemens at the Siemens Support pages.

As well as the option of using the libraries made available by DCB Extension, DCB Extension proprietary libraries can also be created with custom-programmed blocks. These blocks and libraries are programmed with the separate "SINAMICS DCB Studio" development tool in the C/C++ high-level language that can be used as your own DCB Extension library in the DCC editor.

The DCB Extension libraries are imported via the **project library** and saved within a project so that the imported DCB Extension libraries are available in a transferred project.

Completely configured drive units can be stored in **global libraries** as master copy and can be reused as a basis for a new project.

Note

Data security for libraries

In order to guarantee data security for global libraries and project libraries (e.g. imported DCB Extension libraries generated with DCB Studio), only use a secure data storage and work only with libraries from secure sources, e.g. from signed e-mails or from SIOS. Do not load any data from unknown servers.

When is a DCB Extension library "not available"?

- A DCB Extension library is used in the current device, however, is not loaded in the drive unit.
- A DCB Extension library is loaded in the drive unit, however, is not used in the current device.
- The device's know-how protection is activated.

When is the online version different from the offline version?

The project loaded in the drive unit uses a different version of the DCB library than the current project.

Conditions for the displayed data

- The display only changes if new charts are loaded to the device that contain DCB Extension libraries.
- Only one version of a DCB library being used in the current project can be displayed at any given time.

9.3 DCB Standard

9.3.1 Provision of DCC standard blocks

In the TIA Portal

The installation of SINAMICS DCC installs automatically the DCB Standard library dcblib V5.2, which includes the DCC standard blocks.

These DCC standard blocks are then available for configuring in the charts via the "DCC standard blocks" task card. An explicit selection of this DCB library is not necessary.

In the drive unit

When DCC standard blocks are used, a check is made for the download to the drive unit whether the associated DCB library of the DCC standard blocks is present in the drive unit. If the DCB library of the DCC standard blocks is not available in the drive unit, or if a different version is installed, this will be loaded automatically during the download.

9.3.2 DCC standard blocks

The DCB Standard library contains a large number of DCC standard blocks.

The "DCC standard blocks" task card contains the directories of the block families, e.g. "Arithmetic" or "Logic", as well as the "All blocks" folder that contains all blocks of the DCB standard library.

The functional descriptions of the DCC standard blocks are described in the online help and at "SINAMICS DCC standard blocks" in the manual.

9.4 DCB Extension

9.4.1 Provision of DCB Extension library blocks

In the TIA Portal

For a project, you can import a DCB Extension library into the project library. This makes the associated blocks available in the project and allows them to be inserted in the charts. Details for the structure of the "Libraries" task card can be found at "Libraries (Page 52)"

When a newer version of a DCB Extension library is imported, the new version is added for each block.

The different versions of the blocks can be displayed in the Library view.

Requirement

A DCB Extension library was generated with "SINAMICS DCB Studio" and stored as ZIP file in the folder system.

Procedure

To import a DCB Extension library into a project library, proceed as follows:

1. Open the "Libraries" task card.
2. Select the "Project library" folder.
3. Select the entry "Import DCB Extension library..." in the shortcut menu.

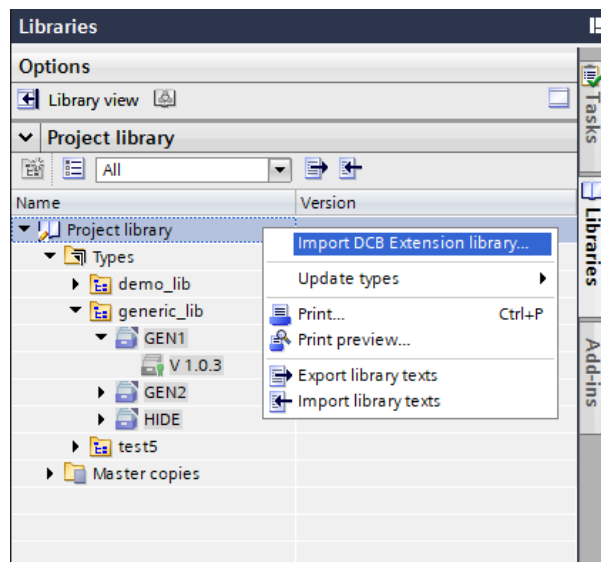


Figure 9-2 "Import DCB Extension library" context menu

The "Import DCB Extension library" dialog opens.

4. Navigate to the DCB Extension library (in ZIP format) that you want to import.

5. Click the "Open" button.
The DCB Extension library is imported into the project library, unpacked, and stored in the "Types" folder.
6. **Using blocks from the DCB Extension library:**
Drag the associated block from the DCB Extension library to the DCC editor to create a block instance there.
When a newer version of a DCB Extension library is added, the blocks used in the chart are not updated automatically.
When adding a block of another version than that already present, a prompt is made whether this block should be replaced by the currently inserted version, as only one version of a DCB Extension library can be used in the drive unit at any given time.

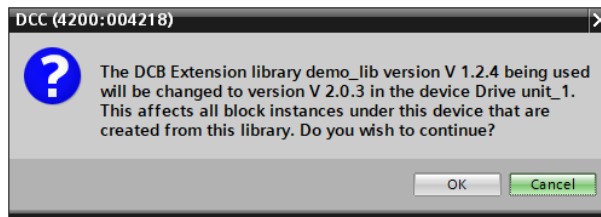


Figure 9-3 Prompt whether the block version of the inserted DCB Extension library should be accepted.

7. **Configuring:**
Continue the configuring of the blocks. There are no restrictions for the configuring of the blocks compared with the DCC standard blocks.

In the drive unit

When blocks of the DCB Extension library are used, a check is made for the download to the drive unit whether the associated DCB Extension library is present in the drive unit. If the DCB Extension library is not available in the drive unit or if a different version is available, this will be loaded automatically during the download.

9.4.2 Editing DCB Extension libraries

A DCB Extension library (DCB Extension) cannot be edited in the TIA Portal.

To change the DCB Extension library, it must be edited in "SINAMICS DCB Studio". The resulting ZIP file can then be reimported into the project library.

The different versions of a block are then displayed in the "Libraries" task card.

9.4.3 Library compatibility

Compatibility

The following table shows which DCB libraries (DCB Standard) are supported by which version, and which DCB Extension libraries (DCB Extension) can be imported and deployed.

SINAMICS firmware version	DCB Standard version	DCB Extension version
SINAMICS V5.2	dcblib V5.2	generates for the SINAMICS version dcblib V4.6 - V5.2

Openness

Introduction

With TIA Portal Openness V16, you program applications that are automated in TIA Portal engineering.

Openness functions in conjunction with SINAMICS DCC

The following functions have been implemented in Version V16:

- Open project
- Import charts
- Export one chart or export all charts ("Charts" folder)
- Import DCB Extension libraries into the project library
- Find charts in the "Charts" folder based on the chart names
- Search for charts/find based on the chart name
- Delete charts from the "Charts" folder
- Define the run sequence of charts
- Optimize the block execution sequence in a chart
- Load projects to the device

Note

Subcharts

Charts which contain subcharts can be imported with Openness. However, it is not possible to access subcharts with Openness.

Software components

Software package	Remark
TIA Portal, Version V16 <ul style="list-style-type: none"> • SINAMICS Startdrive, Version V16 • SINAMICS DCC, Version V16 	
TIA Portal Openness, Version V16	Included in the scope of delivery for TIA Portal, Version V16

See also "Requirements (Page 28)".

In TIA Portal, Version V16, TIA Portal Openness is available without charge on the associated product DVDs. The installation of TIA Portal, Version V16, is a precondition for use.

TIA Portal Openness provides you with DLLs, which allow you to access the TIA Portal platform.

Further information

See TIA information system "Openness: Automate project creation".

Additional information

If you encounter any problems working with SINAMICS DCC, the additional information is to support you in troubleshooting.

Further information

Detailed information regarding the topic of "SINAMICS DCC" can be obtained online on the SIEMENS web page "Industry Online Support".

Corresponding information for SINAMICS DCC can be found under Startdrive by adding the search term "DCC":

- Product announcements: <https://support.industry.siemens.com/cs/us/en/ps/13438/pm>
- FAQs: <https://support.industry.siemens.com/cs/us/en/ps/13438/faq>
- Application examples: <https://support.industry.siemens.com/cs/us/en/ps/13438/ae>
- Manuals: <https://support.industry.siemens.com/cs/us/en/ps/13438/manDownloads>: <https://support.industry.siemens.com/cs/us/en/ps/13438/dl>

Appendix A: Abbreviations

A.1 List of abbreviations

Abbreviation	Description
ALM	A utomation L icense M anager
(Block) connector	General term for block input or block output
BI parameter	B inector I nput parameter. The parameter is used for the interconnection of a binector to a sink signal that can only have the states 0 or 1
BICO	B inector- C onnector that designates an interconnectable parameter in the drive
BO parameter	Binector parameter (also B inector O utput parameter). The parameter can be used as a binary signal source (0 or 1)
CFC	D rive C ontrol C hart
CI parameter	C onnector I nput parameter. The parameter is used for the interconnection of a connector to a sink signal
CO parameter	Connector parameter (also C onnector O utput parameter). The parameter can be used as a signal source
CSV	C omma S eparated V alue, text format for column-oriented data
DCB	D rive C ontrol B lock
DCC	D rive C ontrol C hart
DO	D rive O bject
OEM	O riginal E quipment M anufacturer
PG	Programming device
SIOS	S iemens I ndustry O nline S upport
TIA	T otally I ntegrated A utomation

Index

B

- BICO parameters, 63
- Block
 - insert, 52
 - Properties, 57
- Block connector
 - Interconnecting, 70
 - Properties, 59
 - publish, 61
- Block properties, 57
- Blocks
 - Copy/insert, 56
 - delete, 57
 - insert, 53

C

- Chart
 - Control flow, 33
 - copy, 47
 - Copy/insert, 46
 - create, 44
 - Data flow, 33
 - delete, 47
 - Export, 48
 - Import, 50
 - Insert subcharts, 78
 - Properties, 44
 - Representation, 33
 - Sidebars/layout, 46
 - Time stamp, 45
 - View, 33
- Chart contents, 52
- Chart properties, 44
- Charts
 - Copy/insert, 46
 - create, 44
 - delete, 47
 - export, 48
 - import, 50
- Clock cycles
 - fixed, 85
 - Free, 96
- Configuration steps, 31
- Control flow, 33, 35

D

- Data flow, 33
- DCB Extension, 26, 52
 - edit, 124
 - import, 123
- DCB library, 119, 122
- DCB Standard, 26, 52, 122
- DCC block
 - Compatibility of data types, 70
 - General, 59
 - Generic blocks, 59
 - Inputs, 59
 - Interconnect connectors, 70
 - Number of connectors, 59
 - Outputs, 59
 - Pins, 59
 - Units, 59
- DCC chart
 - Inserting text boxes, 77
- DCC charts, 43
- DCC editor, 23, 25
- DCC standard blocks, 54, 122
- Diagnostics, 109

E

- Execution sequence, 81
 - Define predecessor, 82
- Exporting charts, 48

I

- Importing charts, 50
- Inserting text boxes, 77
- Installed software, 29
- Interconnections, 71
 - Hidden, 58
- Internet Explorer 11, 18

L

- Libraries, 52
 - Compatibility, 125
- Library, 119

M

- Measurement, 115
- Mojibake
 - Error, 18
- Monitoring, 110

P

- Parameter definitions, 63
- Performing a download, 103
- Properties
 - Block connections, 59
 - Blocks, 57
 - Interface, 58
- Publish connector, 61

S

- SINAMICS DCC, 23
- SINAMICS parameters, 63
- Software requirements, 28
- Subcharts
 - copy, 79
 - insert, 78
 - Inserting content, 79

T

- Task card
 - DCC standard blocks, 54
 - Libraries, 55
- Text references, 74
- Tooltips, 37
- Trace configuration, 113
- Trace function, 113

U

- Upload
 - SINAMICS DCC, 105
 - SINAMICS STARTER, 106
- User interface language
 - Chinese, 18

W

- Windows 7
 - Windows 7 SP1, 18