SIEMENS

SINAMICS DCC V18

Configuring SINAMICS DCC

Configuration Manual

Safety information 1

General information 2

General and requirements 3

Overview 4

Structure of the SINAMICS DCC user interface 5

Configuration steps 6

Online Engineering 7

Monitoring and tracing configuration online 8

Creating a template 9

Library handling 10

Openness 11

SIMATIC Drive Controller 12

Additional information 13

Appendix A: Abbreviations A

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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.

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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.

Siemens AG
Digital Industries
Postfach 48 48
90026 NÜRNBERG
GERMANY

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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 Security information 7
1.2 Industrial Security Manual 8
1.3 Unsafe operating states due to manipulation of the Safety Integrated parameters after the acceptance test 9
1.4 Protection of sensitive data in Startdrive project and drive configuration 9
1.5 Unsafe configuration after importing and downloading files from unknown or untrustworthy sources 10
1.6 Data security for libraries 11

2 General information 13

2.1 Compliance with the General Data Protection Regulation 13
2.2 Display of the information system for Chinese user interface language 14
2.3 General information about SINAMICS documentation 15
2.4 Usage phases and their documents/tools 17

3 General and requirements 19

3.1 Introduction to SINAMICS DCC 19
3.2 DCC editor 21
3.3 Requirements 23
3.4 Version overview/upgrading the firmware 25

4 Overview 27

5 Structure of the SINAMICS DCC user interface 29

5.1 View and representation 29
5.2 Tooltips 32
5.3 TIA information system 33
5.4 Online help for blocks in SINAMICS DCC 34

6 Configuration steps 37

6.1 Editing projects 37
6.1.1 Project new/open 37
6.1.2 Archiving/dearchiving a project 38
6.2 Device configuration 39

6.3 Working with DCC charts ... 39
6.3.1 General ... 39
6.3.2 Creating DCC charts ... 40
6.3.3 Chart properties ... 42
6.3.4 Copying DCC charts ... 45
6.3.5 Deleting DCC charts ... 46
6.3.6 Exporting DCC charts ... 47
6.3.7 Import DCC charts ... 48
6.3.8 Know-how protection for DCC charts ... 50
6.3.8.1 General information ... 50
6.3.8.2 Activating/deactivating know-how protection for DCC charts ... 52

6.4 Chart contents ... 55
6.4.1 General ... 55
6.4.2 Libraries ... 55
6.4.3 Handling blocks ... 55
6.4.3.1 Inserting blocks ... 55
6.4.3.2 Copying blocks ... 61
6.4.3.3 Deleting blocks ... 61
6.4.3.4 Block properties ... 62
6.4.3.5 Block connectors ... 64
6.4.3.6 Publishing block connectors/pins as SINAMICS parameters ... 66
6.4.4 Preparing a connection to the drive object ... 71
6.4.4.1 Overview ... 71
6.4.4.2 Calculating a chart with per-unit variables ... 72
6.4.4.3 Calculating a chart with absolute variables ... 73
6.4.4.4 Interconnecting DCC signals with the components of the drive ... 74
6.4.5 Interconnections ... 75
6.4.5.1 Interconnecting with block connectors ... 75
6.4.5.2 Interconnecting with SINAMICS parameters ... 79
6.4.5.3 Properties of interconnections ... 80
6.4.5.4 Deleting interconnections ... 81
6.4.5.5 Text references ... 82
6.4.6 Text boxes ... 85
6.4.6.1 Inserting text boxes ... 85
6.4.7 Handling subcharts ... 86
6.4.7.1 Chart structure ... 86
6.4.7.2 Inserting subcharts ... 86
6.4.7.3 Inserting the contents of subcharts ... 87
6.4.7.4 Copying subcharts ... 87

6.5 Execution sequence for blocks and charts ... 88
6.5.1 Execution sequence ... 88
6.5.2 Changing the execution sequence of the blocks ... 88
6.5.3 Defining the predecessor for newly inserted blocks ... 90
6.5.4 Changing the run sequence of the DCC charts ... 90

6.6 Clock cycles and sampling times ... 91
6.6.1 Clock cycles ... 91
6.6.2 Setting the sampling time ... 104

6.7 Establishing an online connection ... 105

6.8 Load to device ... 108

6.9 Loading from a device ... 110
6.9.1 Loading project data from the drive unit into the TIA Portal ... 110
6.9.2 Uploading to SINAMICS STARTER ... 112
6.10 System restrictions ... 113
7 Online Engineering ... 115
7.1 General information ... 115
7.2 Inserting blocks online ... 117
7.3 Deleting blocks online ... 119
7.4 Inserting a block connection online ... 119
7.5 Deleting a block connection online ... 119
7.6 Change value of a block connection online ... 120
7.7 Change run sequence of blocks online ... 120
7.8 Arranging blocks online automatically ... 121
7.9 Editing text blocks online ... 121
7.10 Saving online changes ... 121
8 Monitoring and tracing configuration online ... 123
8.1 Overview ... 123
8.2 Testing configuration with the "Monitoring" function ... 123
8.3 Tracing the configuration with the trace function ... 125
9 Creating a template ... 129
10 Library handling ... 131
10.1 Introduction ... 131
10.2 Displaying versions of the DCB libraries ... 132
10.3 DCB Standard ... 134
10.3.1 Provision of DCC standard blocks ... 134
10.3.2 DCC standard blocks ... 134
10.4 DCB Extension ... 134
10.4.1 Provision of DCB Extension library blocks ... 134
10.4.2 Editing DCB Extension libraries ... 137
10.4.3 Structuring DCB Extension libraries ... 137
10.4.4 Library compatibility ... 138
11 Openness ... 139
12 SIMATIC Drive Controller ... 141
13 Additional information ... 143
A Appendix A: Abbreviations ... 145
A.1 List of abbreviations ... 145
Index ... 147

Safety information

1

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 Security information

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. Siemens' products and solutions 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. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit
https://www.siemens.com/industrialsecurity (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 are available and that 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 under
https://www.siemens.com/cert (https://www.siemens.com/cert).

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.

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 Protection of sensitive data in Startdrive project and drive configuration

Note

Extraction of sensitive data for unprotected transfer of projects

The parameters of the SINAMICS drives contain your know-how and sensitive configuration data as well as 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.
- Encrypt the exported files and project files with some other software.
- To prevent access to relevant data memory by unauthorized persons, implement access restrictions (e.g. password protection) and take the precautions described in the security information.

NOTICE

Protecting parameters in the SINAMICS drive memory

The parameters stored in the SINAMICS drive can be read out by unauthorized third parties without protection. Unauthorized persons can therefore cause damage.

- In addition to the project protection or the specific encryption of project files, also activate the know-how protection of the SINAMICS drive.
- If setting up know-how protection is not an option, as an alternative, prevent unauthorized persons from accessing your plants and systems. Implement access restrictions and take the precautions described in the security information.

1.5 Unsafe configuration after importing and downloading files from unknown or untrustworthy sources

⚠ WARNING

Unsafe configuration after importing and downloading files from unknown or untrustworthy sources

If you use project files or files (e.g. from EPLAN, Microsoft Excel) from unknown or untrustworthy sources or import such files into your Startdrive project, inconsistencies in the project or malfunctions of Startdrive may result. If the appropriate safety precautions are not observed, any untested changes in the system can cause unsafe operating states in your system that may lead to death, serious injury, and property damage.

If project files or imported files are transferred unsigned via unprotected channels (e.g. email) or stored without access protection (e.g. in cloud memories or local memories), unauthorized persons can change the system configuration, thus causing unsafe operating states in your system that may lead to death, serious injury, and property damage.

- Only use projects and files from sources that you know to be trustworthy.
- For the consistency check, use functions such as "Flash LED" in the "Go online" dialog or the parameter comparison in the parameter view.
- Check whether the machine behavior with the changed system configuration meets your expectations and perform an acceptance test of the Safety Integrated Functions to ensure and document the safe operation of the system.
- Take the precautions described in the security information.

1.6 Data security for libraries

Note

Data security for libraries

In order to ensure data security for global libraries and project libraries (e.g. imported DCB Extension libraries generated with SINAMICS DCB Studio), only use 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.

General information 2

2.1 Compliance with the General Data Protection Regulation

Siemens complies with the principles of the **General Data Protection Regulation (EU),** in particular the principle of data minimization ("privacy by design"). For the SINAMICS Startdrive product – including the installed SINAMICS DCC option package – this means:

Windows login, user management and access control (UMAC)

The product processes or stores the following personal data:

- 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 DCC charts).
  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.
- Windows login in multiuser engineering
  For multi-user engineering, various items of 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.
- User management and access control (UMAC)
  The product processes or stores the following personal data:
  - Login data for user management and access control:
    User name, group, password, role, rights.

The product stores personal data only 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. 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).

The data for user management and access control (UMAC) can also be stored explicitly by the user in a connected converter so that it can be checked during a subsequent authentication.

Support data

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 TIA Administrator enables the user to check whether updates are available for SINAMICS Startdrive and the SINAMICS DCC option package and to install them. As the TIA Automation Update Server is used for verification and installation purposes, the IP address of the device used is transmitted for technical reasons.
- Feedback and diagnostics data is collected when using SINAMICS Startdrive and the SINAMICS DCC option package. This data, also including the IP address of the device used, is transmitted to a SIEMENS server. For more information on this topic, refer to the Online Help in the "Notes on the TIA Portal" chapter, keywords "Collecting feedback and diagnostics data".

The above-mentioned personal data and the associated use are required for Windows login, user management and access control (UMAC) and for the support function. The storage of this data is appropriate and limited to what is necessary, as it is essential to identify the authorized users and service contact.

The above-mentioned personal data cannot be stored anonymously or pseudonymized, as it serves the purpose of identifying the operating personnel. The anonymization or pseudonymization, e.g. of the login data, must be performed using suitable login names and contact data by the user of the product.

Our product does not provide any functions for automatically deleting personal data.

2.2 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.

Operating systems

SNAMICS DCC does not to support the Windows 7 operating system.

Refer to the SINAMICS Startdrive online help for information about the operating systems that are supported.

2.3 General information about SINAMICS documentation

SINAMICS documentation

The SINAMICS documentation is organized in the following categories:

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

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. Please refer to the ordering documentation only for the functionality of the supplied drive system.
- 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 on all of the product types, and cannot take into consideration every conceivable type of installation, operation and service/maintenance.

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.

Siemens MySupport/Documentation

You can find information on how to create your own individual documentation based on Siemens content and adapt it for your own machine documentation at the following address.

Additional information

You can find information on the topics below at the following address:

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

Questions relating to the technical documentation

Please send any questions about the technical documentation (e.g. suggestions for improvement, corrections) to the following email address.

FAQs

You can find Frequently Asked Questions about SINAMICS under Product Support.

Siemens Support while on the move

With the "Siemens Industry Online Support" app, you can access more than 300,000 documents for Siemens Industry products – any time and from anywhere. The app supports you in the following areas, for example:

- Resolving problems when executing a project
- Troubleshooting when faults develop
- Expanding a system or planning a new system

Furthermore, you have access to the Technical Forum and other articles that our experts have drawn up:

- FAQs
- Application examples
- Manuals
- Certificates
- Product announcements and much more

The "Siemens Industry Online Support" app is available for Apple iOS and Android.

Data matrix code on the rating plate

The data matrix code on the rating plate contains the specific device data. This code can be read-in with any smartphone and technical information for the appropriate device can be displayed via the "Siemens Industry Online Support" mobile app.

Websites of third-party companies

This document includes hyperlinks to websites of third-party companies. Siemens is not responsible for and shall not be liable for these websites or their content, as Siemens has not checked the information contained in the websites and is not responsible for the content or information they provide. The use of such websites is at the user's own risk.

2.4 Usage phases and their documents/tools

Usage phase	Document/tool
Orientation	SINAMICS S Sales Documentation
Planning/configuration	• SIZER Engineering Tool • Configuration Manuals, Motors
Deciding/ordering	SINAMICS S120 catalogs • SINAMICS S120 and SIMOTICS (Catalog D 21.4) • SINAMICS Converters for Single-Axis Drives and SIMOTICS Motors (Catalog D 31) • SINAMICS Converters for Single-Axis Drives – Built-In Units (D 31.1) • SINAMICS Converters for Single-Axis Drives – Distributed Converters (D 31.2) • SINAMICS S210 Servo Drive System (D 32) • SINUMERIK 840 Equipment for Machine Tools (Catalog NC 62)
Installation/assembly	• SINAMICS S120 Equipment Manual for Control Units and Supplementary System Components • SINAMICS S120 Equipment Manual for Booksize Power Units • SINAMICS S120 Equipment Manual for Chassis Power Units, Air-cooled • SINAMICS S120 Equipment Manual for Chassis Power Units, Liquid-cooled • SINAMICS S120 Equipment Manual for Chassis Power Units, Water-cooled for common cooling circuits • SINAMICS S120 Equipment Manual for AC Drives • SINAMICS S120 Equipment Manual Combi • SINAMICS S120M Equipment Manual Distributed Drive Technology • SINAMICS HLA System Manual Hydraulic Drives
Programming Drive Control Charts	• SINAMICS DCC Configuring (TIA V18) • SINAMICS DCC Getting Started (TIA V16) • SINAMICS DCC standard blocks
Commissioning	• Startdrive Commissioning Tool • SINAMICS S120 Getting Started with Startdrive • SINAMICS S120 Commissioning Manual with Startdrive • SINAMICS S120 Function Manual Drive Functions • SINAMICS S120 Safety Integrated Function Manual • SINAMICS S120 Function Manual Communication • SINAMICS S120/S150 List Manual • SINAMICS HLA System Manual Hydraulic Drives

Usage phase	Document/tool
Usage/operation	• SINAMICS S120 Commissioning Manual with Startdrive • SINAMICS S120/S150 List Manual • SINAMICS HLA System Manual Hydraulic Drives
Maintenance/servicing	• SINAMICS S120 Commissioning Manual with Startdrive • SINAMICS S120/S150 List Manual
References	• SINAMICS S120/S150 List Manual

General and requirements 3

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.

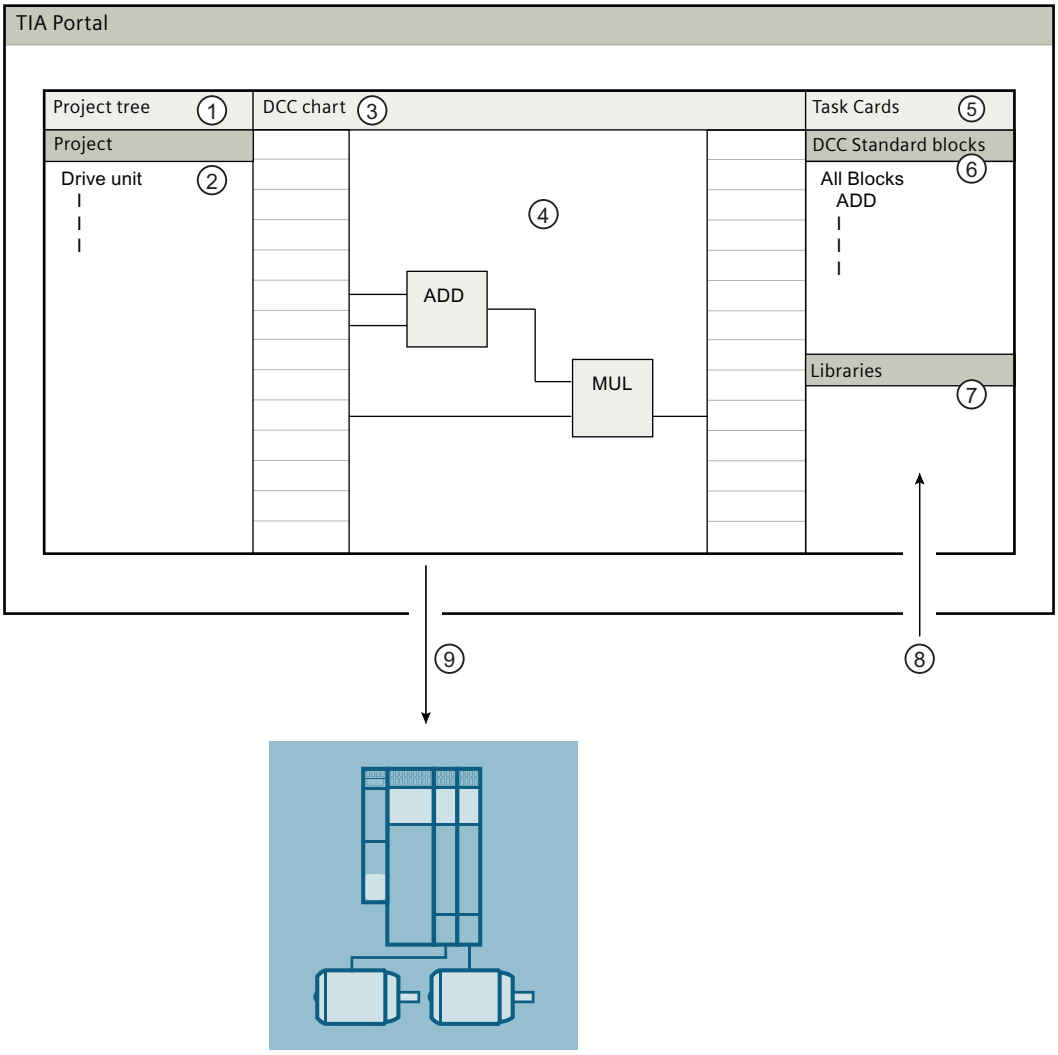
The user-friendly DCC Editor based on the popular CFC editor enables easy graphical configuration and a clear representation of control loop structures as well as a high degree of reusability of existing DCC charts.

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 tree

The project tree provides access to all components and project data.

② Drive unit

③ DCC chart

④ Configuring

You create a new DCC 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 DCC 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.
- Online Engineering (online editing of DCC charts)
- Know-how protection of DCC charts
- Diagnostics environment with the "Monitoring" function in the DCC chart and the trace function
- Scalable with various performance features and quantity structures for SINAMICS DCC
- Openness functionality in conjunction with SINAMICS DCC

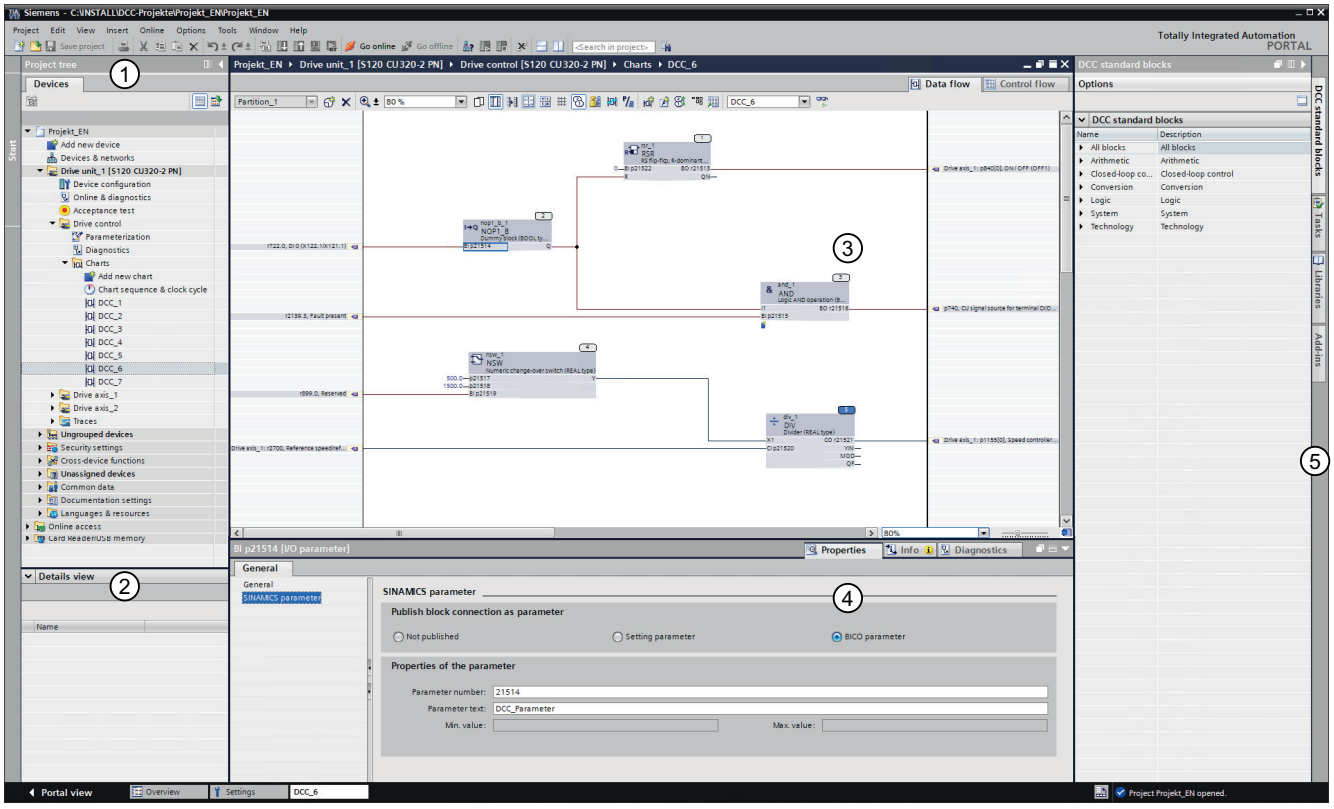
3.2 DCC editor

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 DCC charts.

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 134)"



① Project tree

The project tree provides access to all components and project data. You can perform the following actions in the project tree, for example:

- Add new components
- Edit existing components
- Query and change the properties of existing components

② Details window

The detail view shows specific contents of an object selected in the project tree.

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 V18
  Options:
  - TIA Portal Openness, Version V18
- SINAMICS Startdrive Advanced, Version V18

Supported SINAMICS devices

SINAMICS DCC is available for the following SINAMICS devices:

SINAMICS drives	SINAMICS device	Firmware without Online Engineering From version	Firmware with Online Engineering From version	Firmware for SIMATIC CPU From version
SINAMICS G	SINAMICS G130	V5.2	V5.2.3	---
	SINAMICS G150	V5.2	V5.2.3	---
SINAMICS S	SINAMICS S120	V5.2	V5.2.3	---
	SINAMICS S120 Integrated for SIMATIC	---	V5.2.3	V2.9 V3.0
	SINAMICS S150	V5.2	V5.2.3	---
	SINAMICS S210 [1])	---	---	---
SINAMICS MV	SINAMICS MV	V5.2.1 V5.2.2 V5.2.4	V5.2.5 V5.2.7	---

[1]) Not supported by SINAMICS DCC.

- SINAMICS S120
  - CU310-2 PN (for single drives, PROFINET)
  - CU320-2 PN (for multi-axis drives, PROFINET)
  - CU320-2 DP (for multi-axis drives, PROFIBUS)
- SINAMICS S120 Integrated for SIMATIC Drive Controller
  - S120 for the CPU 150xD

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 "More 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.

More information about the installed software

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

1. Click the "More information about the installed software" link in the "Installed software" dialog.
   The "More information" dialog opens.
   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 more information, refer to the information system of the TIA Portal at "Check and install availability of updates and support packages".

Licensing

A "SINAMICS DCC Combo V18" Engineering License is required for configuring DCC charts with SINAMICS DCC V18.

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.

3.4 Version overview/upgrading the firmware

SINAMICS DCC software versions

Refer to the online help for SINAMICS Startdrive to find out which software versions of SINAMICS Startdrive + SINAMICS DCC support which devices with the corresponding firmware.

Upgrading the firmware

A firmware update is required if you want to use a new firmware version with an extended range of functions.

More information can be found in the information system of the TIA Portal under "Configuring SINAMICS drives > Updating the firmware"

Overview

4

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	Project new/open (Page 37) Create a new project for drive-specific solutions or open an existing project to add further data.
2	Device configuration (Page 39) 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 DCC charts (Page 39) In this step, you create DCC charts and add any required chart partitions or upload a DCC chart from the drive unit.
4	Chart contents (Page 55) 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 66) Define the properties of the block connections (e.g. publication as SINAMICS parameter)
6	Interconnecting with block connectors (Page 75) Interconnections within a DCC chart, interconnections to another DCC chart or interconnections to parameters of the drive (publication as BICO parameters).
7	Clock cycles and sampling times (Page 91) Define the run sequence within a chart. Adapt the sampling time of a DCC chart.
8	Establishing an online connection (Page 105) Establish an online connection between the programming device and the drive unit (e.g. for "Load in device").
9	Load to device (Page 108) Download data of the device configuration to the drive unit. The DCC charts are also transferred in the process
10	Loading project data from the drive unit into the TIA Portal (Page 110) Upload the data from the drive unit to the programming device.
11	Monitoring and tracing configuration online (Page 123) Use the "Monitoring" function to check the signal states in the DCC chart and the trace function to check the signal characteristic in the DCC 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

5.1 View and representation

DCC charts can be displayed and edited in the following two views:

- Data flow
- Control flow

Data flow

You can graphically configure a DCC 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".

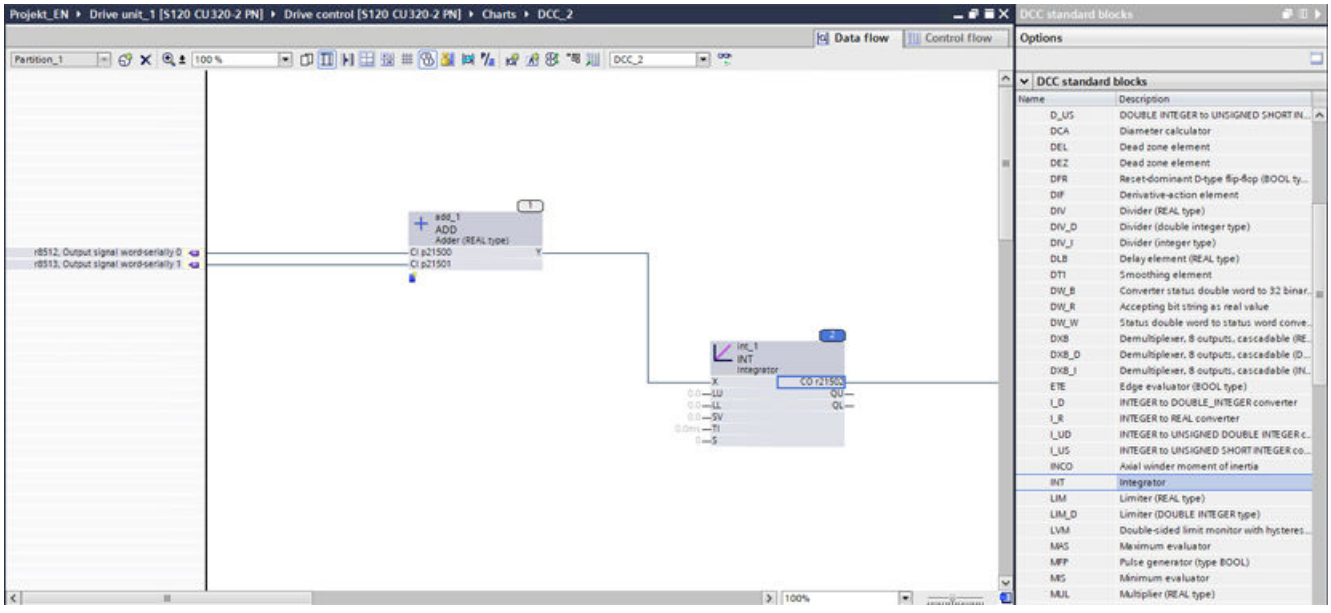


Figure 5-1 View of data flow of a DCC chart

Toolbar in the "Data flow" view

① Changes to another chart partition
Display of the current chart partition

② Adds a chart partition
Adds an additional chart partition to the DCC chart with the number of sheets as set in the layout.

③ Deletes the currently displayed chart partition
Deletes the currently displayed partition from the DCC chart.

④ Zoom functions
- Enlarge: Enlarge the view in stages
- Adapt the DCC chart to the size of the work area
- Adapt the selection to the size of the working area
- Reduce: Reduce the view in stages

Change the zoom factor of the work area
Drop-down list for selecting the zoom factor / the adaptation

⑤ Opens the DCC chart in a second window
Duplicate display of a DCC chart, e.g. to view two chart partitions.

⑥ Toggle sidebar view
Toggles between the chart views:
- DCC chart with fixed sheet bars
- DCC chart with dynamic sheet bars
- DCC chart without sheet bars

⑦ One-line/two-line sidebar entries
Toggles the display of the sidebar entries from one-line to two-line and vice versa.

⑧ Sheet limits on/off
Displays or hides the sheet limits (possible only for disabled sidebar view).

⑨ Sheet numbering on/off
Displays or hides the numbering of individual sheets in the DCC chart.

⑩ Grid on/off
Displays or hides the grid in the DCC chart.

⑪ Execution sequence on/off
Displays or hides the execution position for the blocks.

⑫ 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).

⑬ Highlight for signal flow
Highlights the signal flow to/from the block in online mode / monitoring when the associated block is selected.

⑭ Switchover between connector names and parameter number/parameter text
Labeling of the block connection: Switchover between the display of the connector name and the parameter number/ parameter text
To display the complete parameter text, the block can be enlarged by dragging it horizontally.

⑮ Insert new chart partition
Inserts a new chart partition at the cursor position in the DCC chart to give the complete chart a logical structure.

⑯ Insert text box
Activates the cursor as a cross-hair to insert a text box.

⑰ Optimize DCC chart
Optimizes the run sequence of the blocks within a DCC chart according to the data flow.

⑱ Position blocks according to the data flow
Positions the blocks according to the run sequence.

⑲ Display selected object in the control flow
Opens the "Control flow" tab. The selected object is marked in the list.

⑳ 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 run sequence of the blocks by moving the individual rows in the table with drag-and-drop and also interconnect block connections.

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.

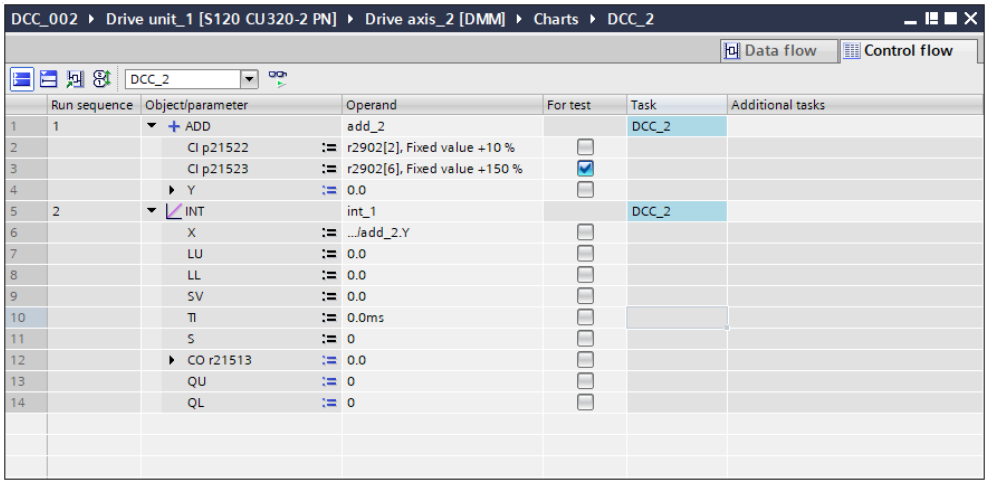


Figure 5-3 View of control flow of a DCC chart

Proceed as follows to find a parameter in the "Data flow" view of the DCC 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 run sequence of the blocks within a DCC 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).

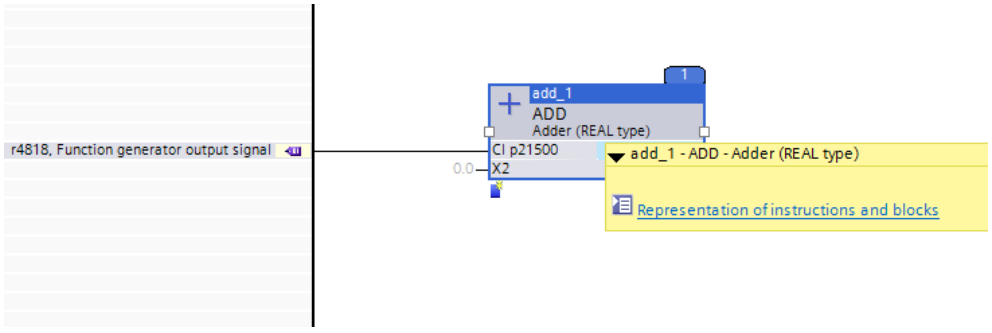


Figure 5-5 Tooltip for block (example)

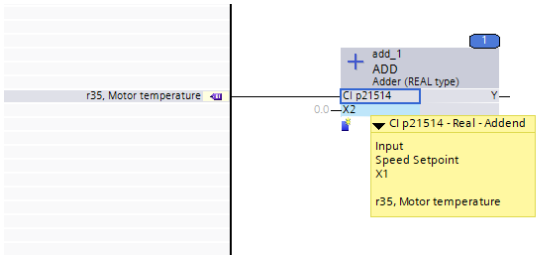


Figure 5-6 Tooltip for block connector (example)

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

See also TIA information system (Page 33).

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

Calling the online help for the DCC standard blocks and DCB Extension blocks is different.

The online help for DCC standard blocks can be called in the tooltip using the block name and is available in the TIA information system; see Tooltips (Page 32).

The online help for DCB Extension blocks can be called via HTML pages or as PDF file, for example, depending on which format is saved for the block.

Requirement

The following requirements must be fulfilled to ensure that the online 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 the online help is to be called must be contained in a DCC chart.

Calling help for DCB Extension 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 Totally Integrated Automation Portal using 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.

If a PDF file is created as help for the block and this format is assigned to the "Adobe Acrobat" program, for example, the help page can be displayed in PDF format.

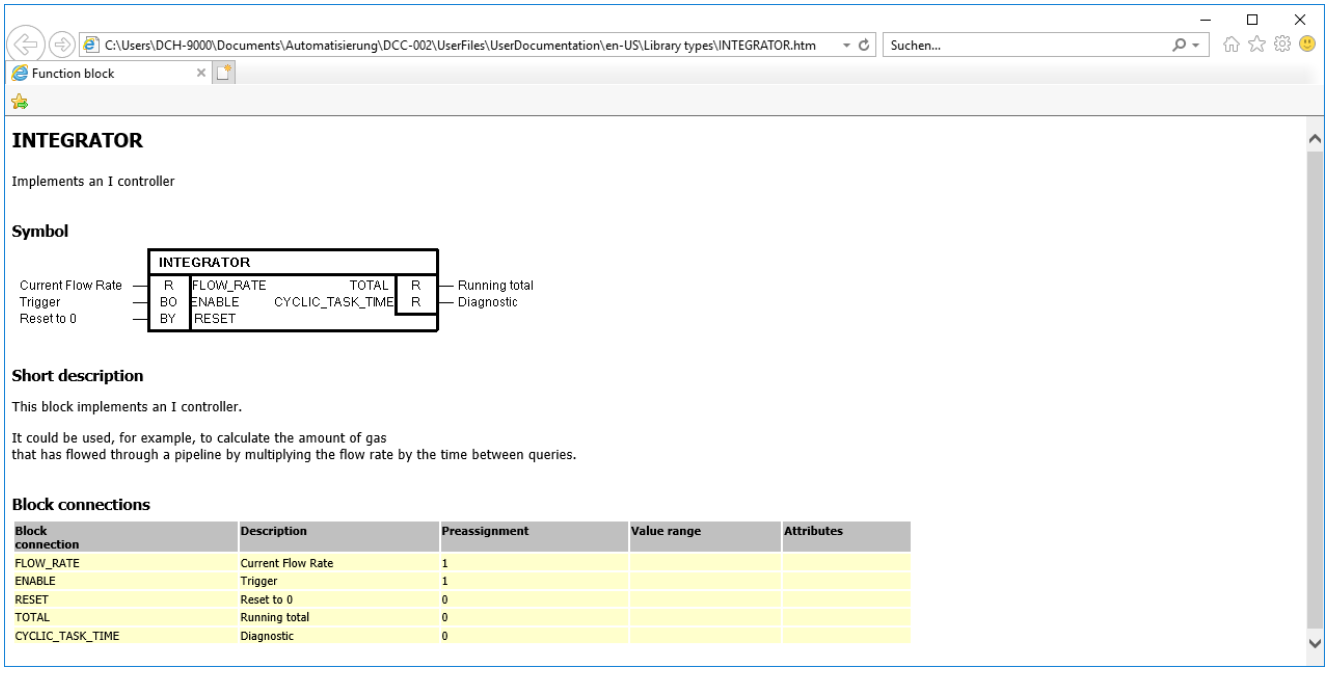


Figure 5-7 Block help in the Internet Explorer in the HTML format

Result

There are three different types of constellation:

- If a DCC 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, e.g. as HTML page in Internet Explorer or in another format saved for this block.
- If a DCC chart contains blocks from multiple DCB Extension libraries with the same name, the help is opened for the block that was imported last.
- If a DCC chart contains blocks with the same name from the DCC standard blocks and from a DCB Extension library, only the help for the block from the DCB Extension library is opened.

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

6.1 Editing projects

6.1.1 Project new/open

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_1) V16 (.ap16)	Once you confirm, the project is upgraded to project version V18 upon opening and gets the file extension ".ap18". DCC charts from an older TIA version can contain max. 20 pages. DCC charts from version V17 contain max. 6 pages. If an older project contains DCC charts with more than 6 pages, additional partitions are created in the DCC chart to which the remaining pages are written.
V17 (.ap17)	Once you confirm, the project is upgraded to project version V18 upon opening and gets the file extension ".ap18".

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 V18 can only be opened with TIA Portal V18 or later.

6.1.2 Archiving/dearchiving a project

Archiving a project

A project can be archived in a compressed file and stored in a folder, e.g. "Project archive".

Requirement

A project has been completed and saved.

Procedure

To archive a project, proceed as follows:

1. In the project view, select menu "Project > Archive..."
2. In the dialog window, select "Archive":
   - the settings for archiving ("Archive as compressed file" and "Add date and time to the target names")
   - the target path
3. Confirm your entries with "Archive".
   The project is saved in the target path under file format .zapxx (actual TIA version).

Result

The project is stored as a compressed file (FileName.zapxx) in the project archive folder.

Dearchiving a project

An archived project can be unpacked, and restored to the original project structure.

Requirement

No projects are open.

Procedure

To unpack a project, proceed as follows:

1. Close the TIA Portal.
2. Navigate to the directory in which the archived projects were saved.
3. Double-click on the file <project name>.zapxx.
4. The project is opened using the TIA Portal, or select the program (TIA Portal), with which the project should be opened.
5. Create a folder or select a folder in which the de-archived project should be saved.
   The de-archived project is opened in a new TIA program window.

Result

The project is dearchived and opened in the "Project view".

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 129)".

Know-how protection for devices

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

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

6.3 Working with DCC charts

6.3.1 General

DCC charts

DCC charts extend the functionality of a SINAMICS drive. The handling and creation of DCC charts is based on the handling and creation of CFC charts. 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 internal DCC parameters which are published as SINAMICS parameters, as well as the interconnection to the drive unit via BICO parameters, represent the interface between a DCC chart and the drive unit.

Structuring DCC charts

To structure DCC charts in accordance with their functionality, they can be displayed in the project tree 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 DCC charts. Corresponding DCC charts can be moved into the subfolder with drag-and-drop.

See also

Inserting subcharts (Page 86)

6.3.2 Creating DCC charts

Requirement

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

Procedure

To create a DCC chart, proceed as follows:

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

Result

A new DCC chart with the default name "DCC-x" is added to the "Charts" folder. Where "x" is a consecutive number, beginning with 1. The DCC chart is visible as "DCC_1" in the project tree and the DCC chart opens.

A DCC chart can be renamed at any time, e.g. to "DCC_x"; see "Chart properties (Page 42)" (Chart properties - General).

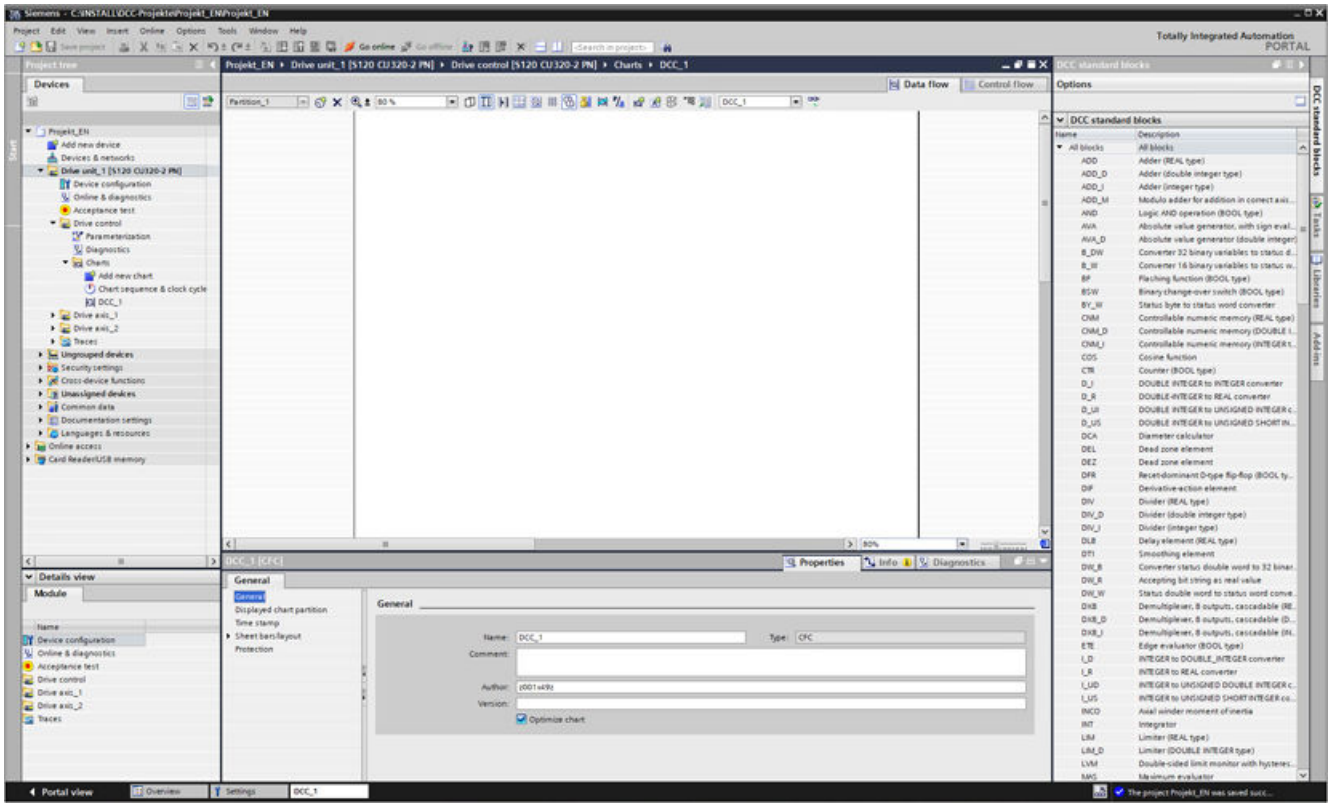


Figure 6-1 Creating a DCC chart

The opened DCC chart contains 4 sheets (2 horizontal, 2 vertical). The number of sheets can be extended via the Properties/Layout of the chart to max. 6 sheets. See also "Chart properties (Page 42)" (Chart properties - Sheet bars/layout).

Partitions in DCC charts

A new DCC chart is created without partitions. Partitions can be inserted to structure the DCC chart. Max. 10 partitions are possible per DCC chart. Each partition can contain a max. of 6 sheets.

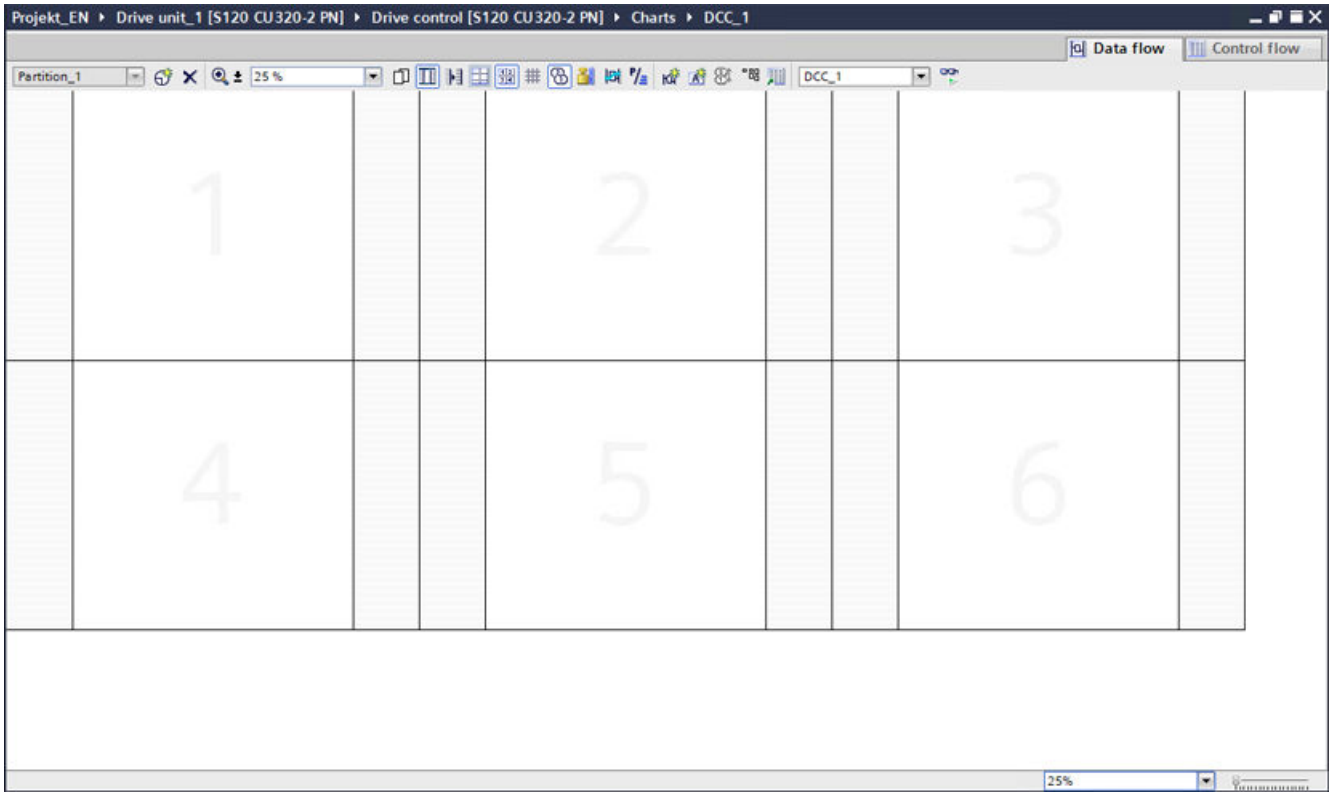


Figure 6-2 DCC chart with partitions

The sheet numbers of the individual sheets of a partition can be shown for a better overview.

Zooming in or out is possible with a double-click on the relevant sheet number.

Blocks are moved from one partition to another partition of a DCC chart or different DCC charts with "Cut/Paste". Interconnections are also cut/pasted in the process. Blocks are copied between individual partitions accordingly with "Copy/Paste".

6.3.3 Chart properties

The properties of the DCC chart are displayed in the Inspector window when a DCC chart is opened.

The following property areas are differentiated:

- General
- Displayed chart partition
- Time stamp
- Sheet bars/layout
- Protection

General properties

The name of the DCC chart is specified (by default "DCC_x") in the general properties. See also "Creating DCC charts (Page 40)". You can modify the name of a DCC chart or rename it here.

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

When the "Optimize chart" check box is selected, the possibility to optimize this chart is offered in the editor with the "Optimize chart" button. However, selecting the check box does not yet result in optimization being performed.

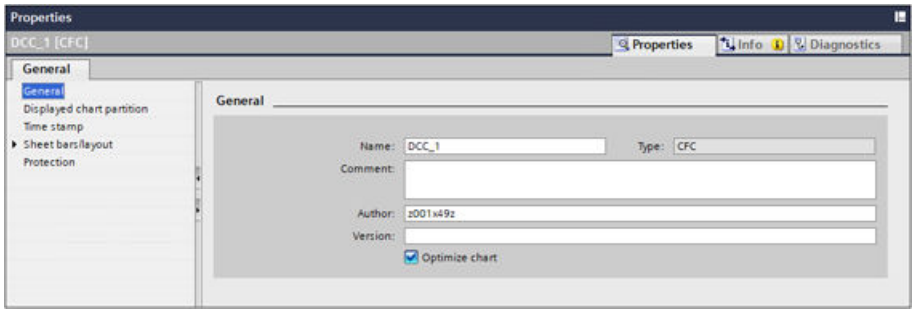


Figure 6-3 Properties of a DCC chart - General

Note

Changing the author in "Properties/general" of a DCC 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 - Displayed chart partition

The properties of the currently displayed partition of the DCC chart are shown in the "Displayed chart partition" property window. A comment can be inserted for each partition.

Figure 6-4 Properties of a DCC chart - Displayed chart partition

Properties - Time stamp

The time when the DCC 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.

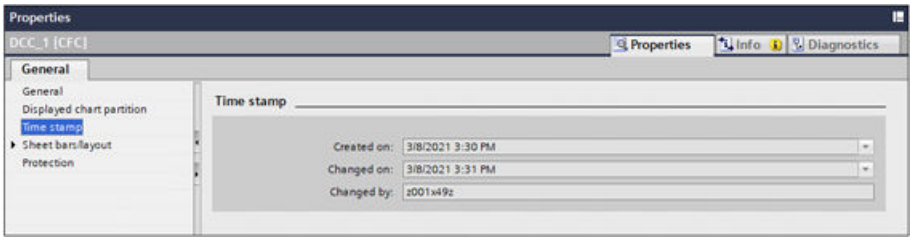


Figure 6-5 Properties of a DCC chart - Time stamp

Properties - Sheet bars/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 (max. 6, e.g. vertical 2, horizontal 3) that should contain a DCC chart are specified in the "Layout" properties window. The paper format is also defined.

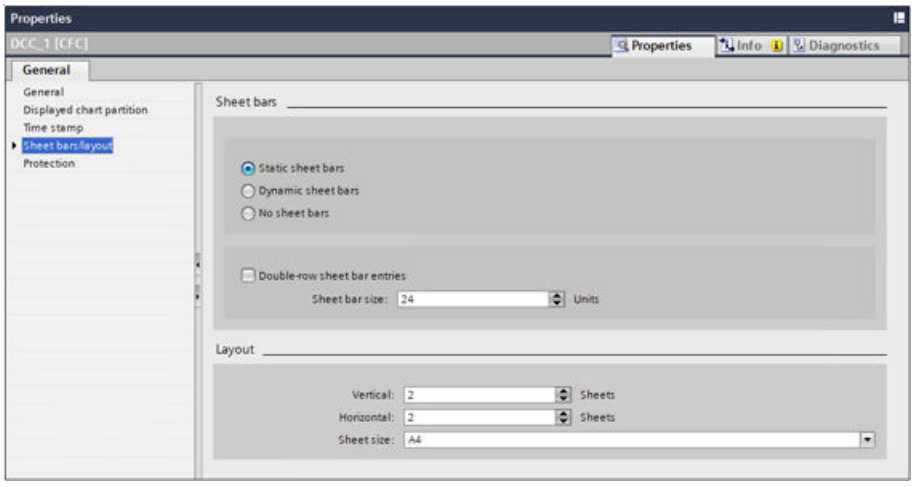


Figure 6-6 Properties of a DCC chart - Sheet bars/layout

Note

The "Sheet bars/layout" properties window is not visible when know-how protection is activated for the DCC chart.

Properties - Protection

In the "Protection" properties window, you can query whether or not the DCC chart is know-how protected.

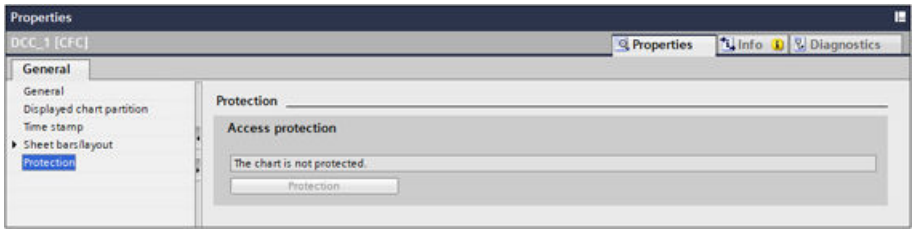


Figure 6-7 Properties of a DCC chart - Protection

6.3.4 Copying DCC charts

Rules for copying DCC 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 DCC 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 DCC charts within a project

Proceed as follows to copy a DCC chart within a project:

1. Navigate to the DCC 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 DCC chart into the "Charts" folder of a different drive object.

Copying DCC charts from different projects (reference projects)

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

DCC charts from the reference project can thus be copied into the opened project:

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

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

Result

A copy of the DCC chart has been 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 DCC charts

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

Requirement

DCC charts have been created within a project.

Procedure

To delete a DCC chart, proceed as follows:

1. Navigate to the DCC chart that you want to delete.
2. Select the DCC chart.
3. Select the "Delete" command in the context menu.
4. Confirm the prompt with "Yes" if you want to permanently delete the DCC chart.

Result

The DCC chart has been deleted.

6.3.6 Exporting DCC charts

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

Note

Blocks in the DCC 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 DCC charts or all DCC charts of a "Charts" folder can be exported.

Requirement

At least one DCC chart is created.

Procedure

Exporting individual DCC charts

To export an individual DCC chart, proceed as follows:

1. In the project window, select the DCC 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 DCC chart should be saved.
4. Use the previous file name for the DCC 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 DCC chart is re-imported with the original name.
5. Click "Save".

Exporting all DCC charts in the "Charts" folder

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

1. In the project window, select the "Charts" folder with the content 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 DCC charts should be saved.
4. Use a file name (e.g. Charts_1) for the DCC charts to be exported.
   The format is specified automatically with ".dcc".
5. Click "Save".

Exporting chart partitions

Subcharts cannot be exported individually.

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

6.3.7 Import DCC charts

DCC charts can be imported from the STARTER or TIA environment; they then also have the same functionality in the target device.

Rules for importing DCC 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 DCC 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.

Importing DCC charts from an older TIA version (V16 or V15.1)

If DCC charts from an older TIA version that can contain max. 20 pages are imported into TIA version V17, the DCC charts are converted as follows:

DCC charts of version V17 contain max. 6 pages.
If an imported DCC chart contains more than 6 pages, additional partitions are created to which the remaining pages are written.

Importing DCC charts into an older TIA version (V16 or V15.1)

If DCC charts (version V17) are imported into a TIA environment (version V15.1 or V16), the following must be observed:

- The DCC charts contain one partition:
  All blocks are transferred to the first sheet of the DCC chart.
- The DCC charts contain more than one partition:
  An import is possible, but the blocks may overlap because the contents of all partitions are written to a single DCC chart.

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

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

- The charts may contain just one runtime group.
- If the DCC 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 DCC charts must not have any know-how protection.
- The DCC charts must not contain any DCB libraries (Typicals).
- The DCC 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 chart partitions are used, the run sequence of the blocks must be contiguous within the chart partition. No blocks of this run sequence of the chart partition may lie outside it. See also "Handling subcharts (Page 86)".

Requirement

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

or

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

Procedure

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

1. In the project window, select a "Charts" folder into which the DCC 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 DCC chart is stored.
5. Select the DCC chart and click "Open".
   One or more DCC charts are inserted in the "Charts" folder.
6. After importing DCC charts from the STARTER environment, the DCC charts in the TIA Portal may need to be revised.

Note

Import from STARTER

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

The DCC charts from the STARTER environment are divided into several DCC 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 chart partitions in SINAMICS DCC-TIA. If, for example, a DCC chart in the STARTER environment consists of the chart partitions A, B, C, D and E, base charts "<chart name>_ABC" and "<chart name>_DE" are created in SINAMICS DCC-TIA.

In preparation for a traceable import of DCC charts from the STARTER environment, the following must be considered:
If the sequence of the blocks in the DCC charts in the STARTER environment is contiguous within three chart partitions (e.g. A, B and C or D and E, etc.), three chart partitions are grouped to form a DCC chart in each case, as described for the import. If the sequence of the blocks within three chart partitions (A, B and C) is not contiguous, i.e. one block was configured on one of the other chart partitions (D, E, ..), two DCC charts ("<chart name>_ABC_1" and "<chart name>_ABC_2") are created for the import.

6.3.8 Know-how protection for DCC charts

6.3.8.1 General information

With the know-how protection for DCC charts, the user can prevent unauthorized persons from reading, changing or manipulating confidential know-how on configuring in the DCC chart. Know-how protection is activated by assigning a password.

DCC charts with know-how protection cannot be opened to read or edit. However, they can be exported, imported, loaded onto the device or from the device, just like unprotected DCC charts.

To be able to make changes or view the content of a DCC chart, know-how protection must be deactivated. It must be deactivated using the same password with which it was activated.

Requirements

The following requirements must be met to be able to activate know-how protection for DCC charts:

- TIA-Portal V17 or higher

Restrictions

NOTICE
Password If a DCC chart was know-how protected with a password, its contents are encrypted. This means that the contents of the DCC chart cannot be restored if the password is lost or forgotten.

Undoing operations

It is only possible to undo activation or deactivation of know-how protection or to restore the previous state by entering the corresponding password.

Operating steps that were performed before the activation/deactivation of the know-how protection can no longer be undone and the previous state cannot be restored.

Blocks from a DCB Extension library

If the DCC chart is know-how protected, the blocks contained in it from a DCB Extension library are also know-how protected.
However, the DCB Extension library imported in the project is not know-how protected.

Copying/inserting or exporting/importing know-how protected DCC charts that contain BICO connections to other charts

Inserting and importing are not possible, if:

- the chart name already exists
- the block name (SAV_1, SAV_2) already exists

  Note

  The path for the SAV function blocks (Chart/subchart/.../block) must match on the corresponding drive device.

- a parameter number already exists

Remedy: for example Changing the chart name or parameter number before inserting/ importing.

Importing DCC charts from the STARTER environment

When DCC charts are imported from the STARTER environment, know-how protection should be deactivated beforehand.

6.3.8.2 Activating/deactivating know-how protection for DCC charts

Enabling know-how protection

Requirements

The following requirements must be met to be able to successfully activate know-how protection:

- The user must have sufficient rights to be able to configure drive objects.
- A DCC chart cannot be invalid, i.e. it must be successfully compiled to be able to perform a "Download to device":
  - No text interconnections are contained (these occur when blocks are copied from a BICO interconnection)
  - The DCC chart may not contain any blocks from a DCB Extension library that originate from a DCB Extension library which was deleted in the project.
- If there is a BICO connection between two DCC charts, the know-how protection can only be activated for both charts together.
  In the event of BICO connections to another drive unit, the know-how protection can only be activated for this DCC chart.

Procedure

Know-how protection can be activated for individual DCC charts or for multiple DCC charts at the same time.

Proceed as follows to successfully activate know-how protection for a DCC chart:

1. Select one or more DCC charts in the project tree.
2. Select the "Know-how protection..." shortcut menu.
   The dialog for entering a password opens.
3. Enter a strong password (at least 8 characters) and the password confirmation and start encryption with "OK".
   Know-how protection is activated.
   The chart symbol is marked with a padlock.

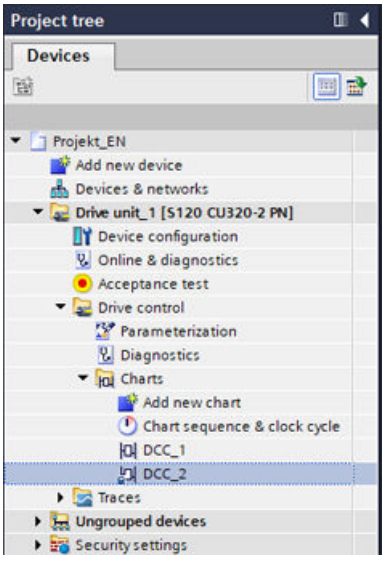


Figure 6-8 Know-how protection for DCC_2 is activated

Know-how protection for a DCC chart is activated

- "Chart properties - Protection" shows: "The chart is protected".
- The content of the DCC chart is hidden. The content is only visible again when know-how protection is deactivated.
  Temporary inactivation is not possible.
- The know-how protected DCC chart cannot be opened
- Monitoring mode cannot be run for this DCC chart.
- The know-how protected DCC chart cannot be modified in the offline project or with Online Engineering.
- The know-how protected DCC chart cannot be renamed.
- The properties of a know-how protected DCC chart cannot be changed.
- A know-how protected DCC chart can be copied/pasted.
  No DCC charts with chart names that already exist can be pasted!

- If multiple DCC charts are protected with a shared password, they can only be copied/pasted together.

  Note

  If not all DCC charts that contain connections and have been know-how protected together are selected for Copy&Paste, the DCC charts are copied and pasted, but the chart sequence is different!

- Only when multiple DCC charts are know-how protected at the same time can they be deleted together.
- A know-how protected DCC chart is still know-how protected after an export.
- A know-how protected DCC chart can be loaded into the device. Although the contents are not visible, all parameters are loaded and the values are calculated.
- A know-how protected DCC chart can be loaded from the device. To open it, the password must be known.

Disabling know-how protection

Requirements

The following conditions must be met to be able to successfully deactivate know-how protection:

- The user must have sufficient rights to be able to configure drive objects.
- A correct password must be defined and known to the user.

Procedure

Deactivating know-how protection takes place in a similar way to the activation.

Follow these steps to deactivate the know-how protection of a DCC chart:

1. Select one or more DCC charts in the project tree.
2. Select the "Know-how protection..." shortcut menu.
   The dialog for entering a password opens.
3. Enter the correct password with which the DCC chart or multiple DCC charts were know-how protected and confirm with "OK".
   Know-how protection is deactivated. This can take several seconds.
   The "Padlock" icon at the chart symbol disappears and a message is output in the info window. The contents of the DCC chart are now visible again and be edited in the usual way.
   If any errors occur during deactivation, corresponding messages are presented in the info window.

6.4 Chart contents

6.4.1 General

An important part of the DCC charts are the blocks used in them and their interconnections with one another. You can also use additional elements in DCC charts. The list below provides an overview of the available contents for the chart:

- Blocks (Page 55)
- Subcharts (Page 86)
- Text boxes (Page 85)

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 131)".

6.4.3 Handling blocks

6.4.3.1 Inserting blocks

Requirement

A DCC chart is opened in the editor.

Procedure

To insert a block in a DCC 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 DCC chart:
   - Drag-and-drop the block to the desired position in the DCC chart.
   - Double-click the block.
   - Select the block and press the [Enter] key.
   - Copy the block with <Ctrl C> and then insert it into the DCC chart with <Ctrl V>.

Note

DCB Extension library

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

Result

The block is inserted in the DCC chart.

Superimposed blocks for inserting

If blocks are superimposed on the DCC 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

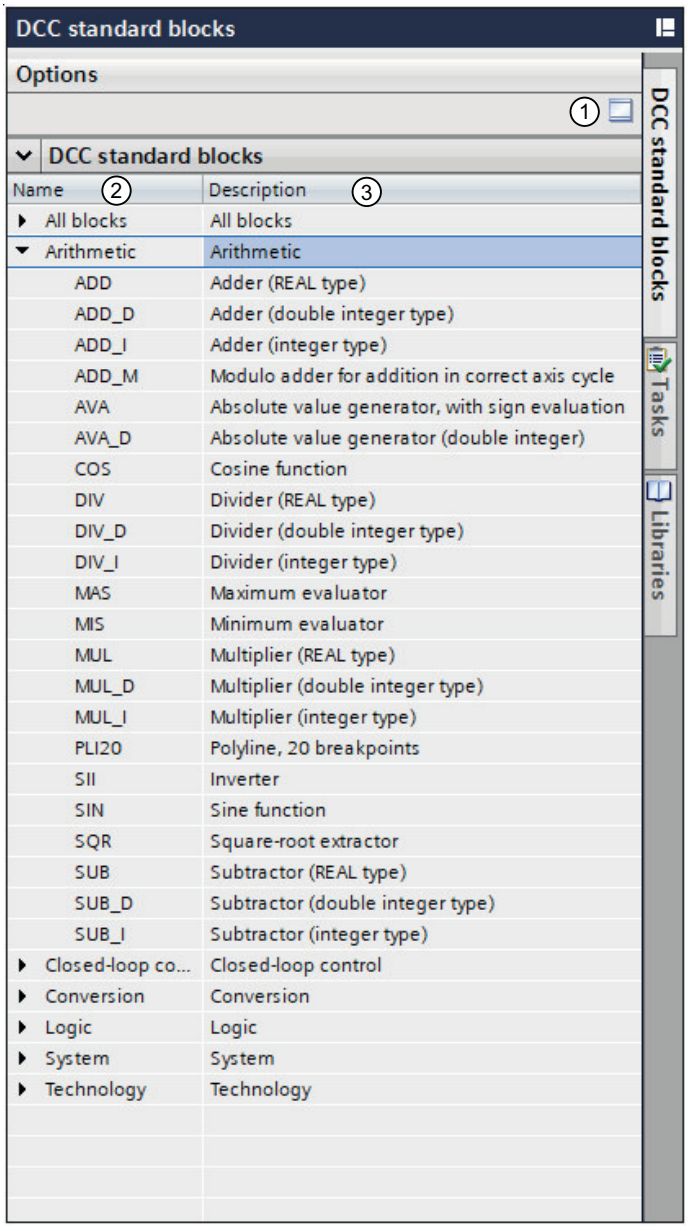
A separate task card is available for the DCC standard blocks. All of the available function blocks or a specific selection can be displayed here and can be used for configuring in the chart.

Note

Searching for DCC standard blocks

To find a DCC standard block faster, open the "DCC standard blocks" task card and enter the first letter of the abbreviation (e.g. "A") or the entire abbreviation (e.g. "ADD") of the block via the keyboard.

The first block with the entered start letter or the desired block is selected and can be inserted into the DCC chart.



① Change the pallet mode
Displays or hides the individual pallets.

② Organization of the library into various categories,
e.g. arithmetic

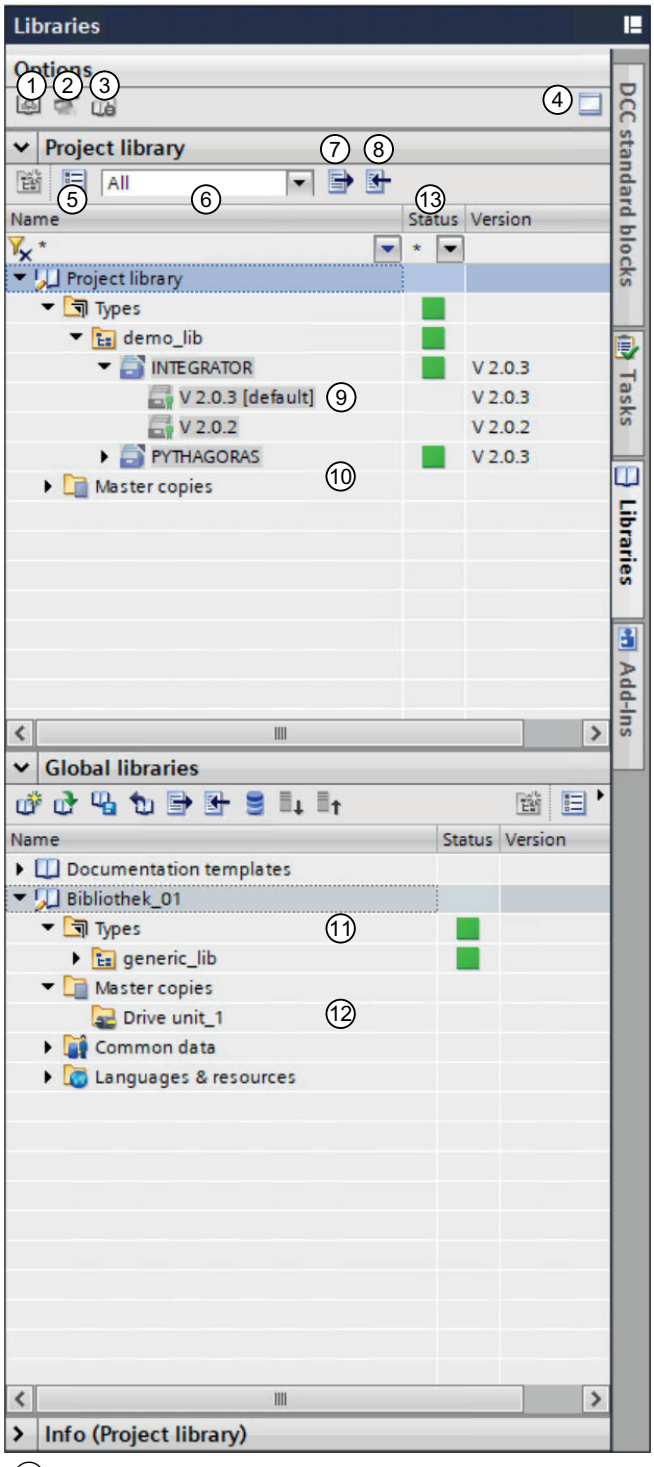
③ The contained blocks with name and description are displayed when a category is opened. These blocks can be used in a chart.

Figure 6-9 "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.

The "Status" display ("Status" column) is not supported by SINAMICS DCC.
The version number ("Version" column) reflects the version of a block in the "Name" column.



① Open the library management

Opens the library management. The library management shows the relationships between types and copy templates as well as where types are used in the project.

② Perform library housekeeping

Deletes all types and versions from the library that are not connected to an instance in the project.

③ Harmonize project
Synchronizes the names of instances in the project with the names of the associated types in the library. In addition, the path structures in the project are adapted to the path structures in the library.

④ Change the pallet mode
Displays or hides the individual pallets.

⑤ Open or close element view
Opens the "Elements" pallet in which the elements of the global library are displayed.

⑥ Selection field
Filters the elements using the appropriate criteria.

⑦ Export texts
Not supported by SINAMICS DCC.

⑧ Import texts
Not supported by SINAMICS DCC.

Project library

⑨ Import DCB Extension libraries

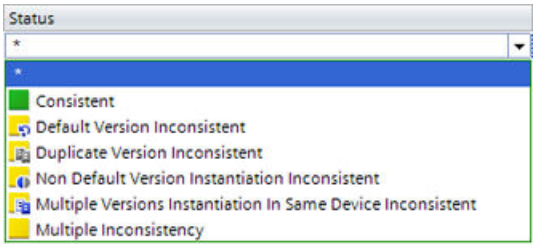
⑩ Set the default setting for versions of a DCB Extension library

Global libraries

⑪ Copy the "Types" folder (DCB Extension libraries) from the project library to a global library

⑫ Copy a drive unit into a global library as template

⑬ Display the "Status" of the libraries
The status of the libraries can only be displayed in SINAMICS DCC.



Status of the libraries

Figure 6-10 "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
- Set the default setting for versions of a DCB Extension library.
  See also Provision of DCB Extension library blocks (Page 134).
  You can find more information in the information system of the TIA Portal under "Setting version as "default"".

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.
  DCC 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 75)"
- Global BICO interconnections are retained as such after copying/inserting, see also "Interconnecting with block connectors (Page 75)"

Requirement

A DCC chart is opened in the editor.

Procedure

To copy a block in a DCC 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 DCC chart or in a different DCC chart where the copied block should be inserted and select the "Paste" command in the shortcut menu.
   The copied block is inserted in the opened DCC 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 into the DCC 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 DCC chart is opened in the editor.
- The DCC chart already contains one or more blocks.

Procedure

To delete a block in a DCC 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 (run 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 DCC 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 max. 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 - General" 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. The "Version" field displays the current version of the DCB standard library.

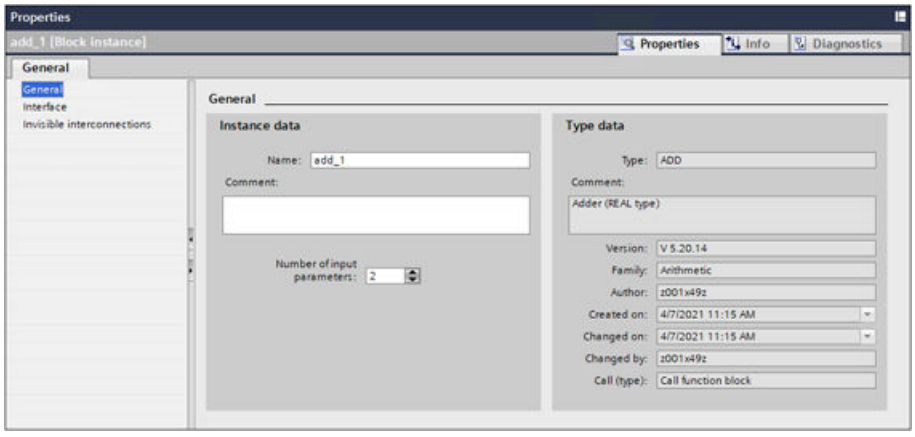


Figure 6-11 Block properties - General

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 64)".

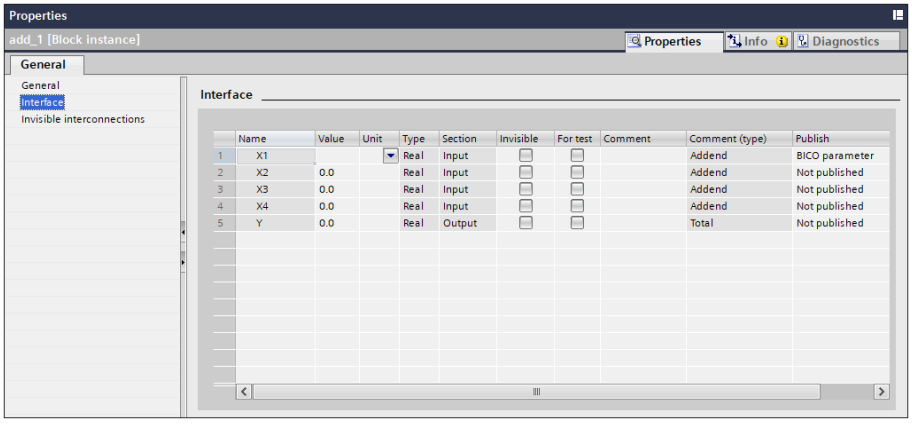


Figure 6-12 Block properties - Interface

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 64)".

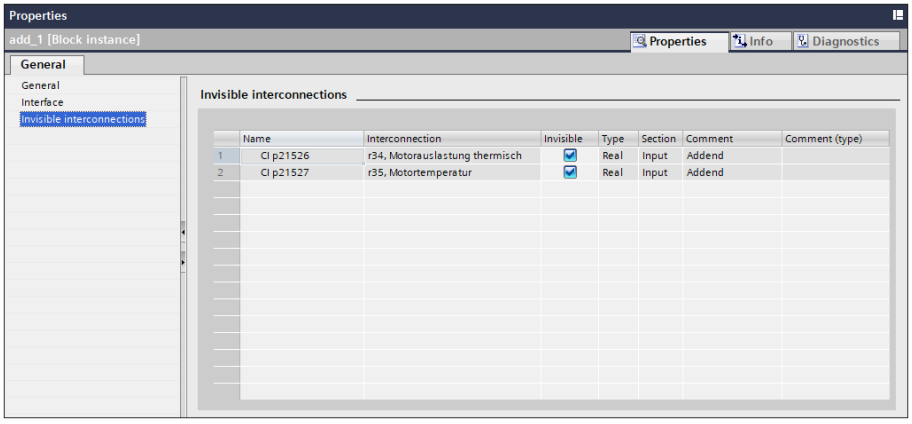


Figure 6-13 Block properties - Hidden interconnections

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

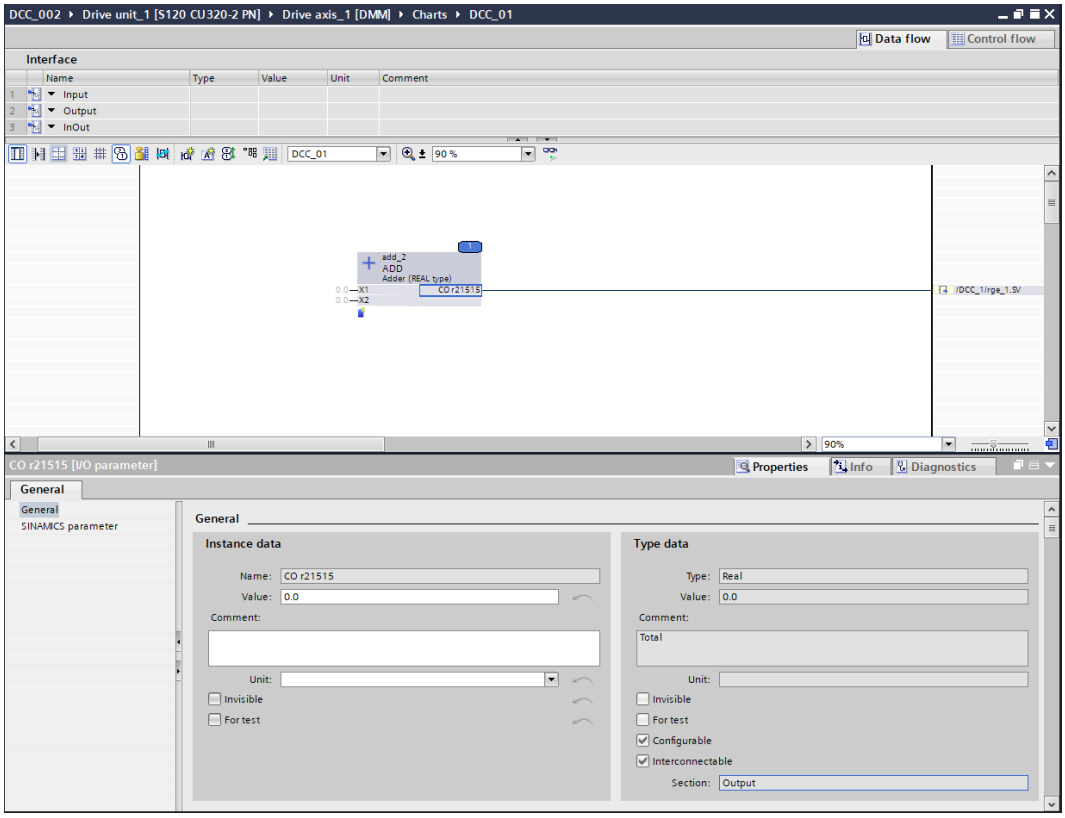


Figure 6-14 General properties of a block connector

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 connections to improve the clarity of the configured DCC 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 connections.

Units of connectors

The units of the block connections 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 DCC 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 tree 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".

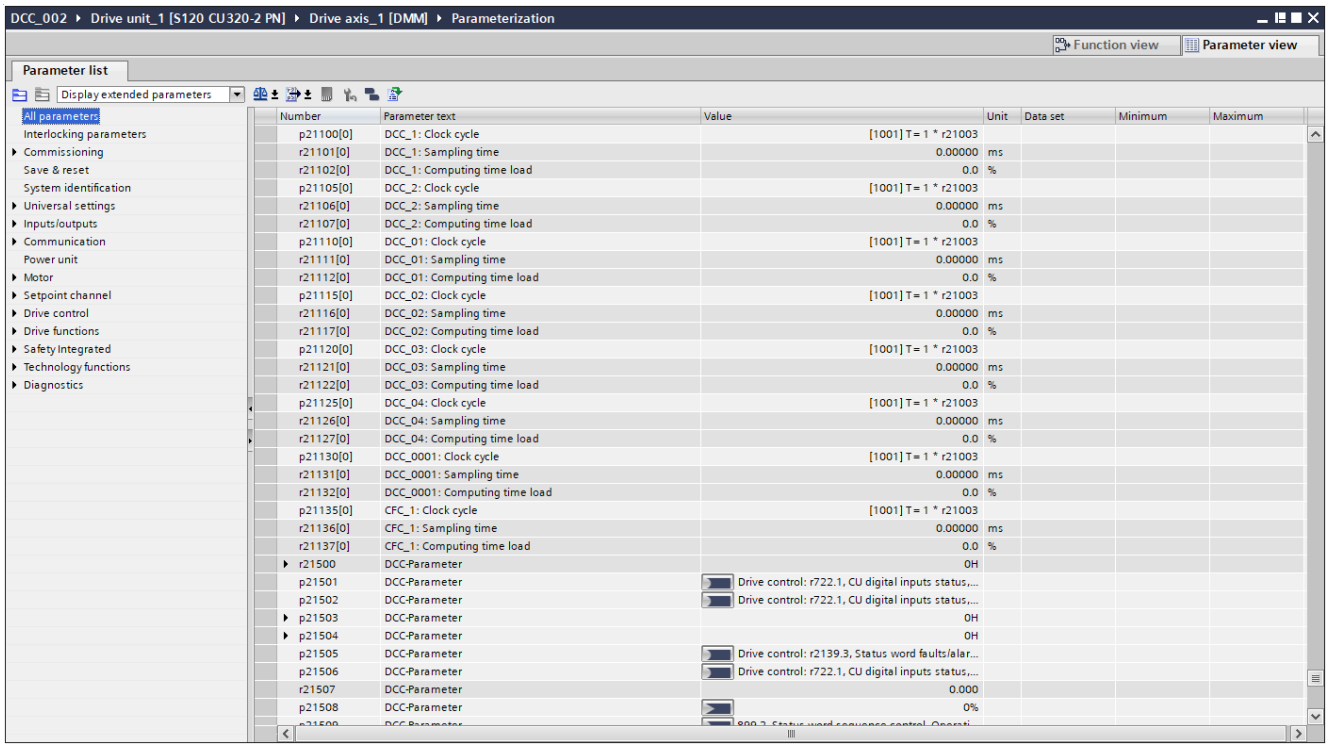


Figure 6-15 Parameter view - All parameters

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

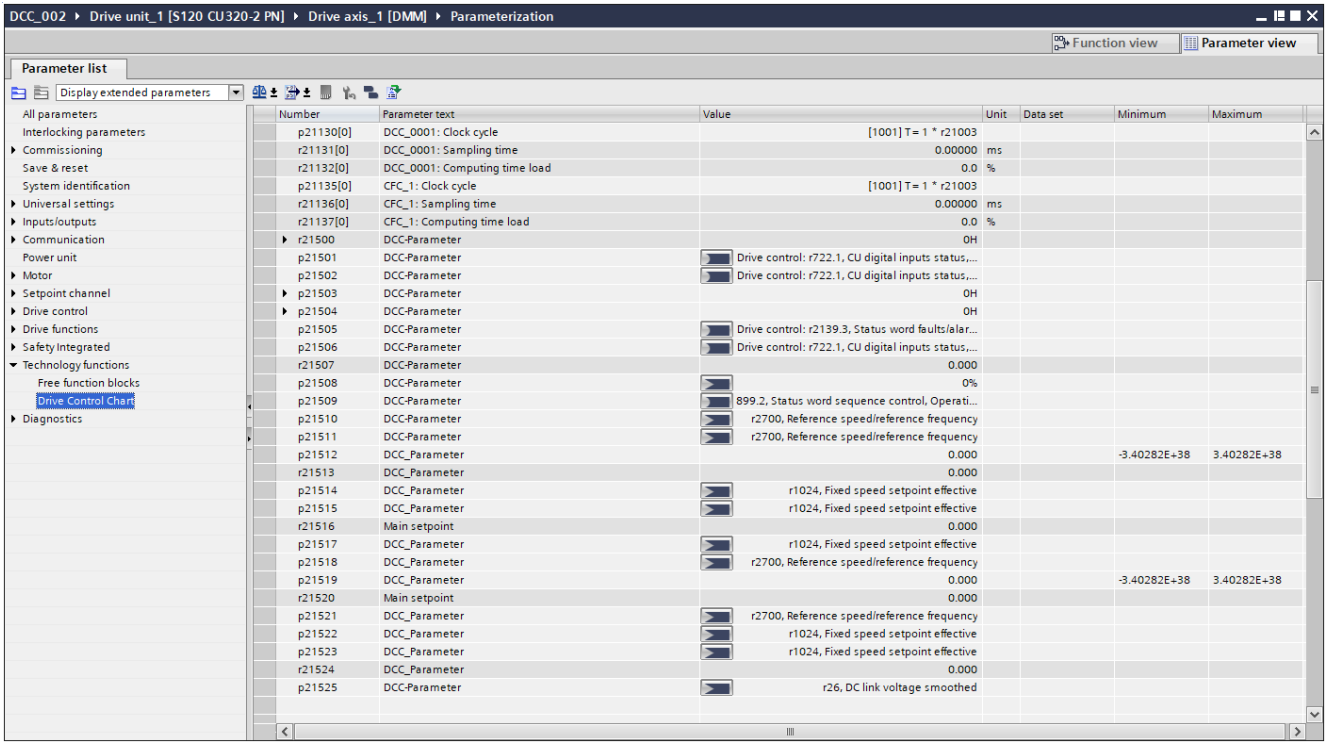


Figure 6-16 Parameter view - Technology functions_Drive Control Chart

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 DCC chart is opened in the editor and at least one block is inserted into the DCC 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).

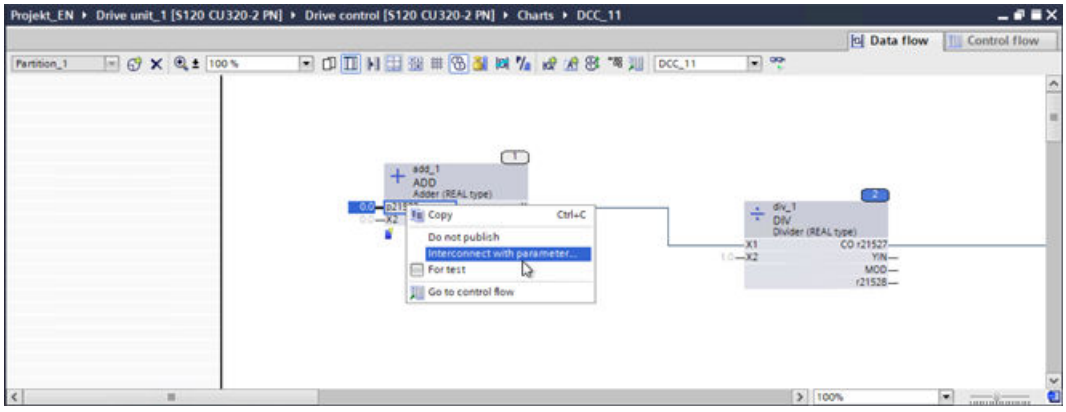


Figure 6-17 Publish as SINAMICS parameter via the context menu at the block connector

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.

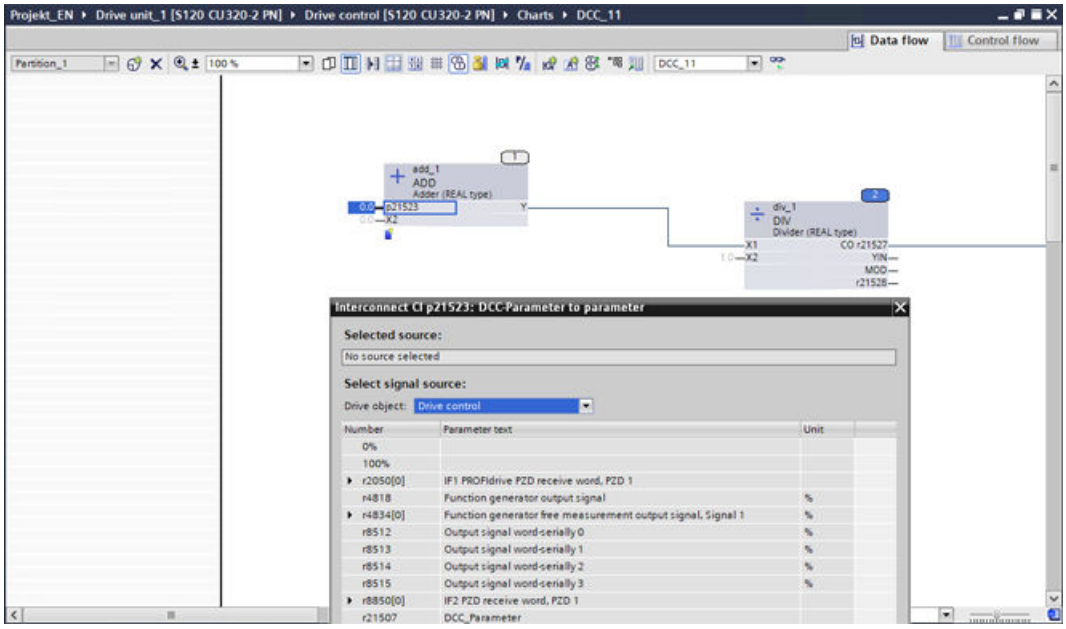


Figure 6-18 Publish as SINAMICS parameter by setting a BICO interconnection to the base system

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.

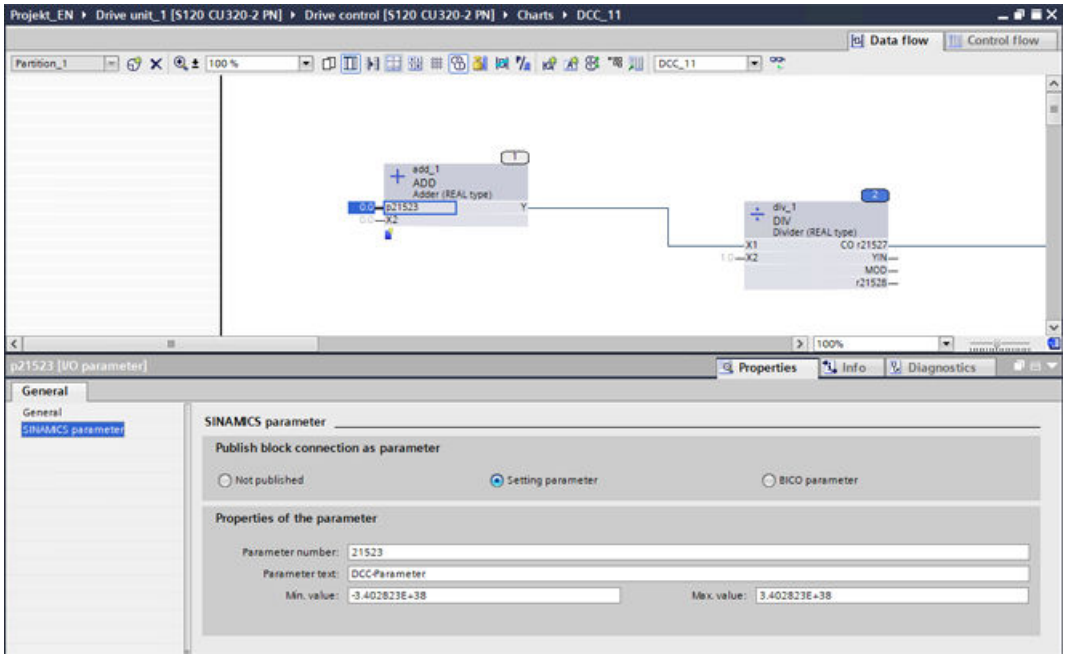


Figure 6-19 Publish as SINAMICS parameter via the properties of the block connector

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".

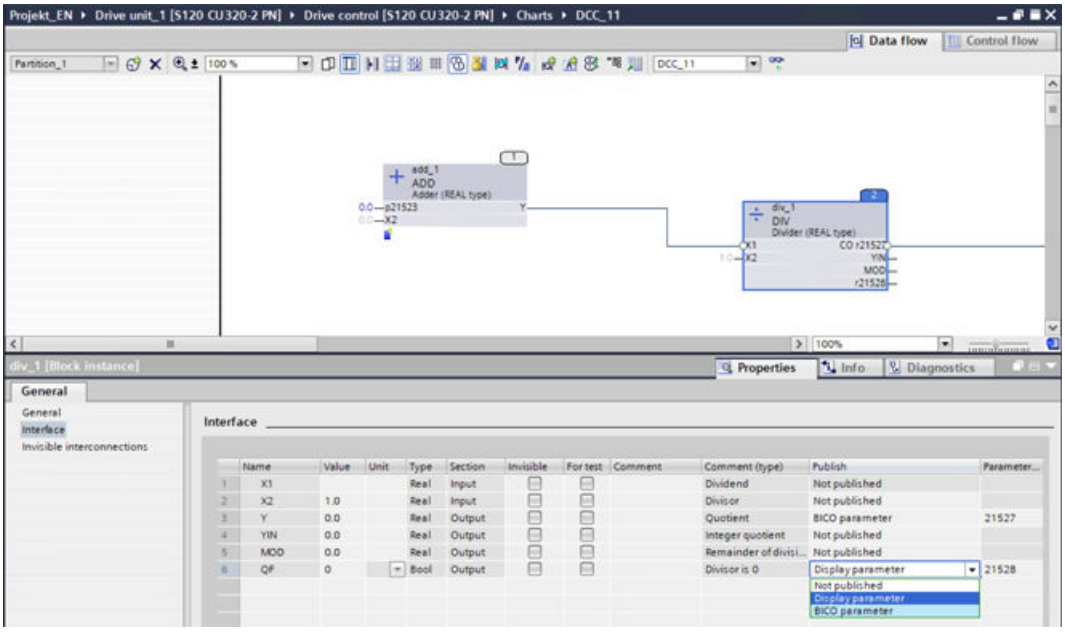


Figure 6-20 Publish as SINAMICS parameter via the properties of the block

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 DCC 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 DCC chart with absolute variables, variables of the BICO interconnections to and from a DCC 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 DCC 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 DCC 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.

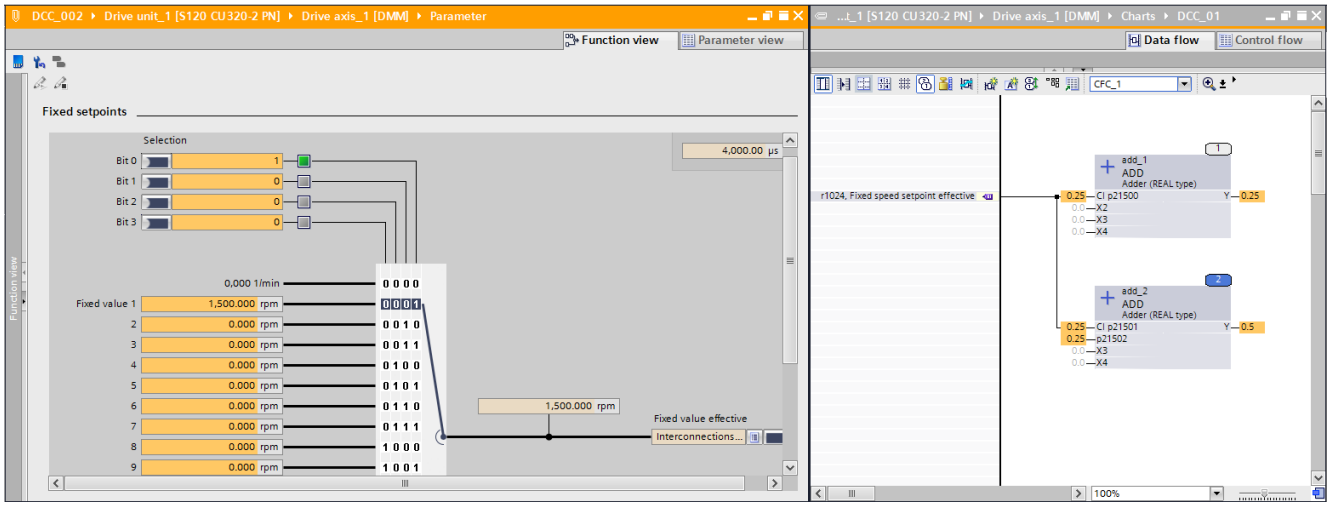


Figure 6-21 Calculating with per-unit variables: Interconnecting the input value

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.

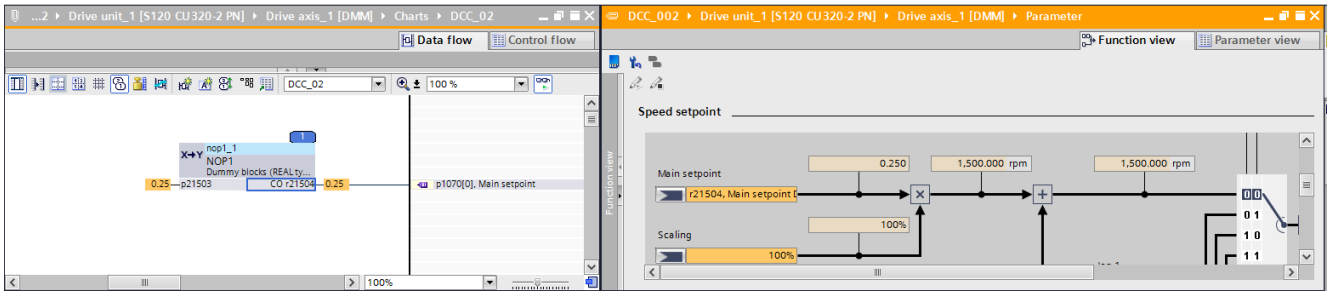


Figure 6-22 Calculating with per-unit variables: Interconnecting the output value

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 DCC 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 DCC 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 DCC 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 DCC 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.

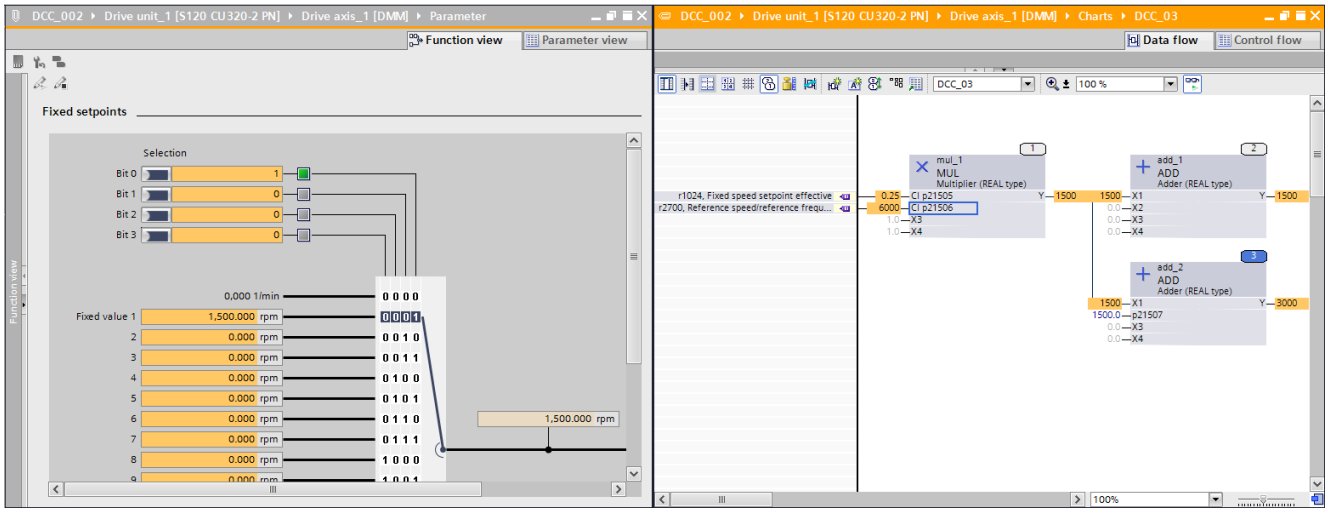


Figure 6-23 Calculating with absolute variables: Interconnecting the input value

Interconnecting the output value

If a calculation is performed in the DCC 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.

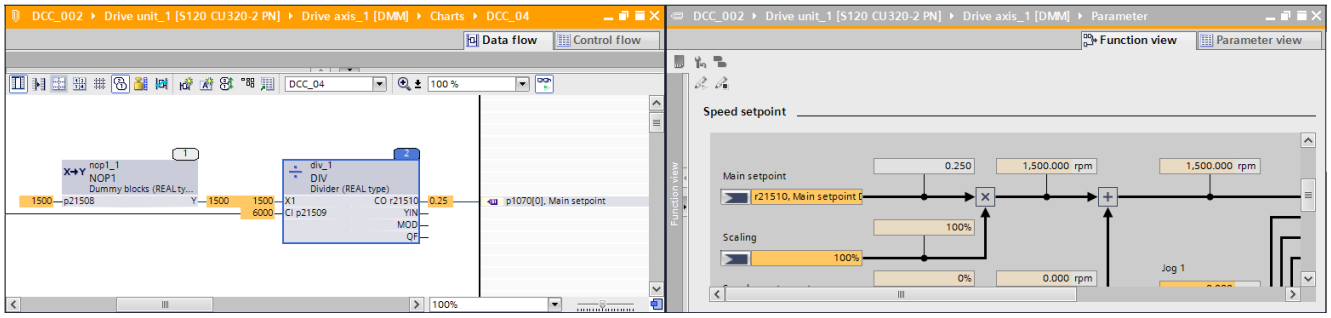


Figure 6-24 Calculating with absolute variables: Interconnecting the output value

Note

Before loading to the device, check the reference variable at the X2 input of the divider, because large values may occur for further signal processing:

- Is the input to the reference variable interconnected correctly?
- Is the value of the reference variable set correctly?

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 DCC 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 DCC chart

The interconnections within a DCC 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 DCC chart

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

If DCC 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 is displayed at the position of the block connection which allows the DCC charts to be selected with the list icon or the "Picker" dialog to be opened with the arrow icon:
3. Select within the associated DCC 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.

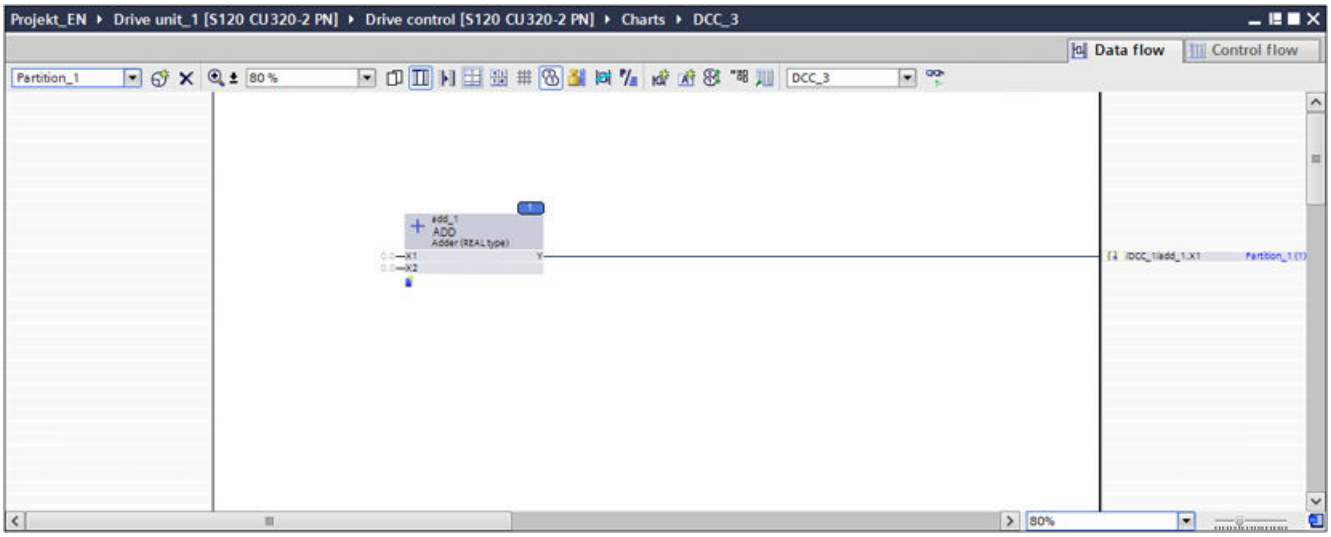


Figure 6-25 Connection to the DCC_01 DCC chart is established

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

Additional interconnection options

If more than one DCC chart is displayed in the TIA Portal (split editor area), the interconnection can be made as follows:

- By drag-and-drop
  Drag a connection from the output of a block in DCC chart 1 to the input of a block in DCC chart 2.
- By copy (Ctrl C) and paste (Ctrl V)
  Select the output of a block in DCC chart 1 and enter <Ctrl C>, then select the input of a block in DCC chart 2 and enter <Ctrl V>.
- With click-clack interconnection
  Click on the connector of a block output. The output is shown selected in magenta and a double arrow is attached to the mouse cursor.
  Move the mouse cursor over a block input so that it is selected in green and click on this block input.
  The connection is established.

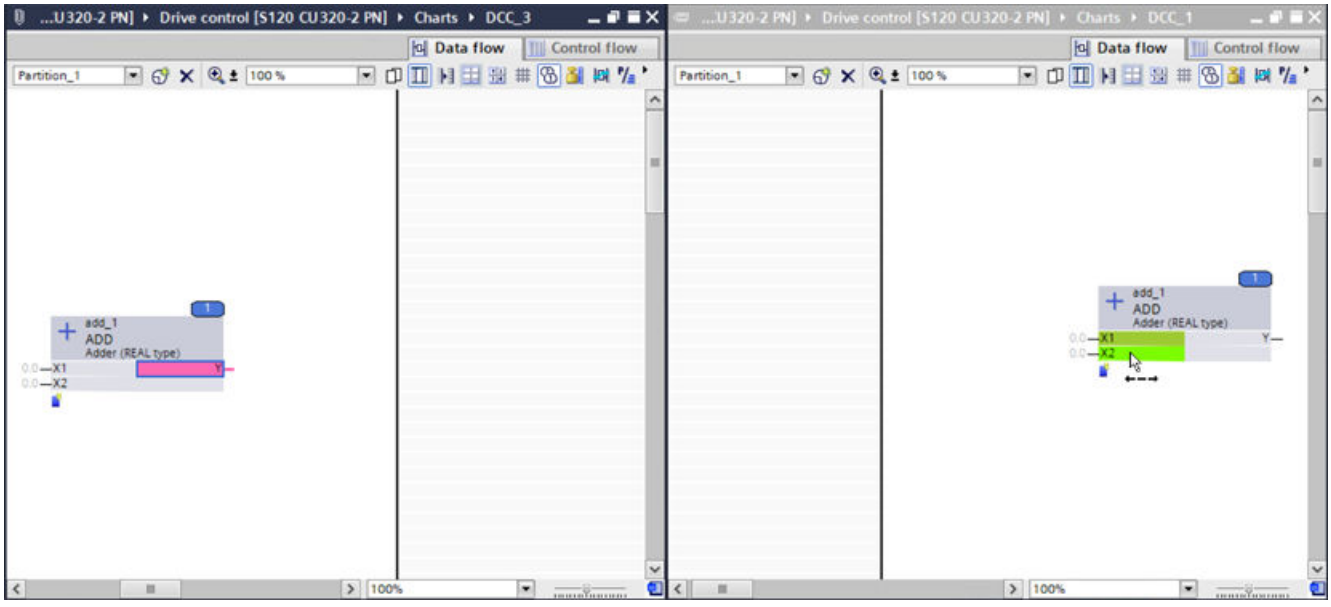


Figure 6-26 Click-clack interconnection

Interconnections between chart partitions of a DCC chart

Interconnections can be established between blocks in individual chart partitions in the familiar way:

- Between partitions within a DCC chart and
- Between partitions in different DCC charts

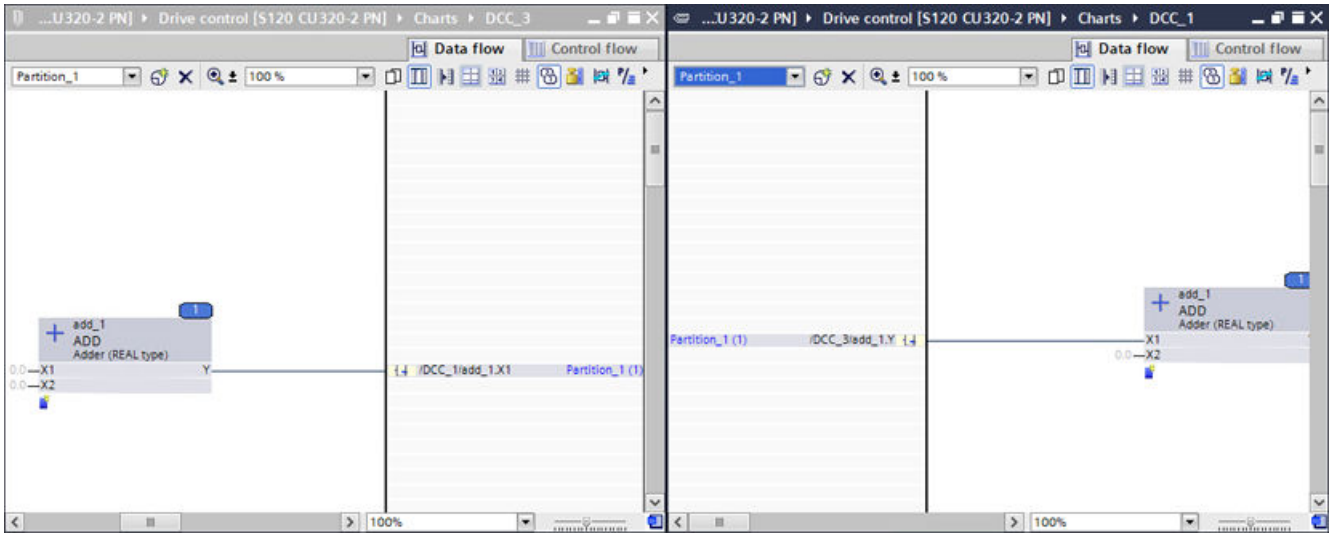


Figure 6-27 Interconnection between chart partitions (partitions)

The partitions are shown in the sheet bar.

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

Input	Output	Description
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 DCC chart or in the parameter view: <parameter number>, <parameter text>, e.g. **r63, actual speed smoothed**

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

For example, if p21500 in DCC_1 is connected with r21501 in DCC_2, the connection is represented in the sheet bar:

- in DCC_1: /DCC_2/add_1.CO r21501
- in DCC_2: /DCC_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 Properties of interconnections

When an interconnection is selected, the properties of the interconnection are displayed in the Inspector window.

The following information is available in the "General" property area:

The path and the parameter text of source and target (sink) are displayed in the general properties.

Note

If the parameter text is changed, this change is applied to the properties of the interconnection immediately.

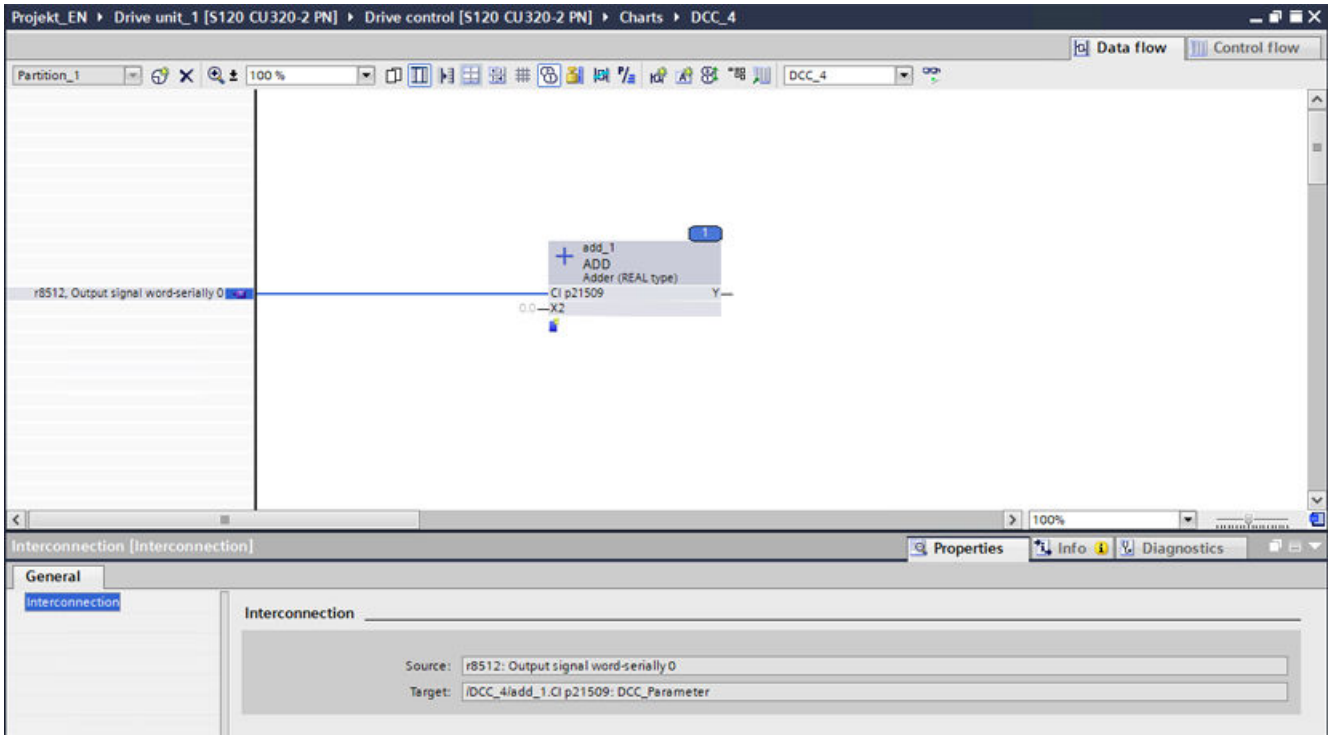


Figure 6-28 Properties of an interconnection

6.4.5.4 Deleting interconnections

Various options are available to delete interconnections when the interconnection is selected:

- Delete the interconnection with the "Delete" icon.
- Delete the interconnection using the "Edit > Delete" menu.
- Delete the interconnection using the "Delete" shortcut menu.
- Delete the interconnection with the <Del> key.

Deleting an interconnection via the block connection

One or more interconnections can be deleted via the block connection. Follow the steps outlined below:

1. Select the block connection whose interconnection(s) should be deleted.
2. Select the "Delete connection(s)" shortcut menu.
   All interconnections to this block connection are deleted.

Note

The shortcut menu is only available if interconnections to a selected block connection exist.

6.4.5.5 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.

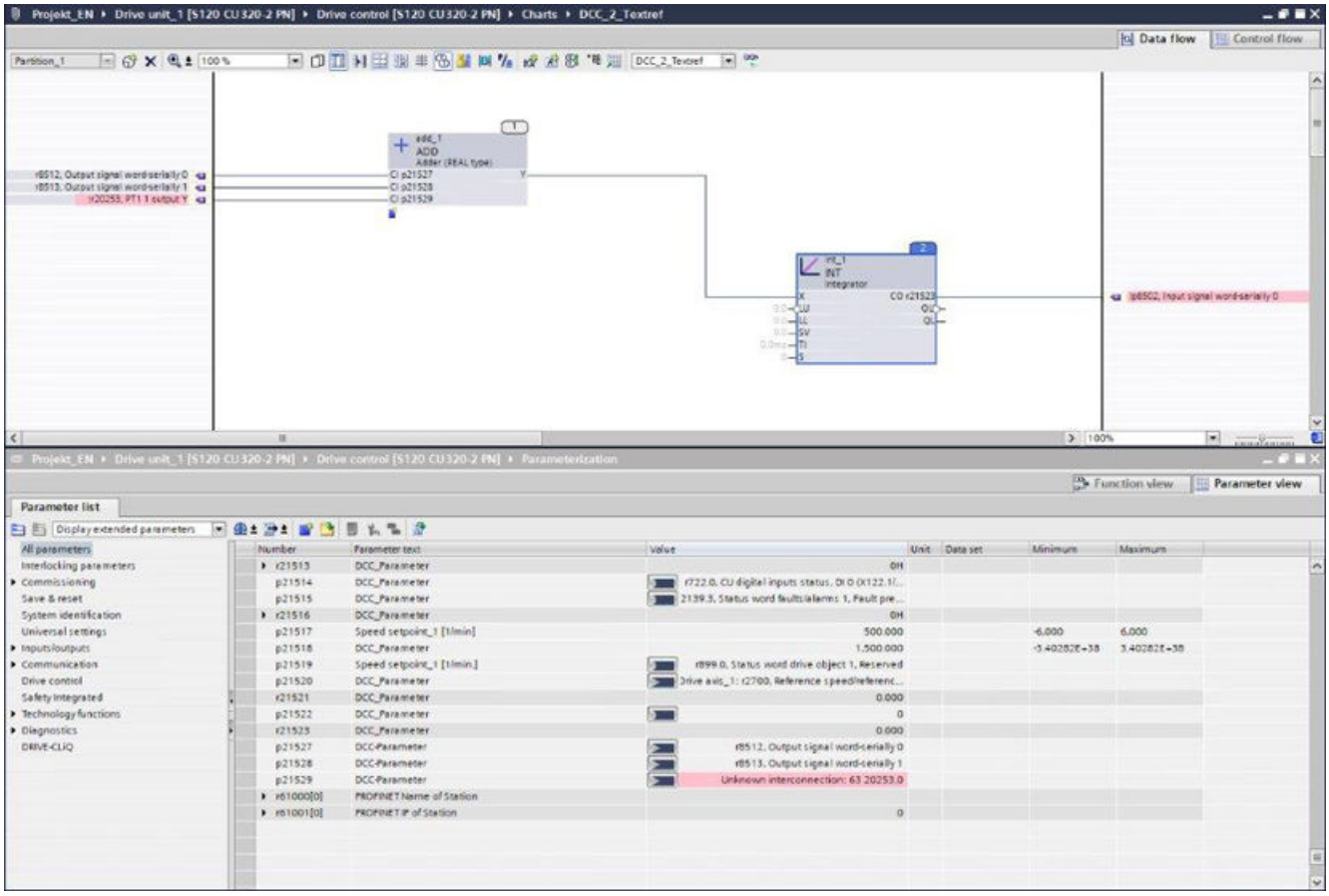


Figure 6-29 Representation of a text reference

Resolution of text references

Automatic check for the resolution of text references

When a DCC chart is imported or "copied/pasted", a check is performed as to 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 p215xx): Interconnect DCC parameter with parameter

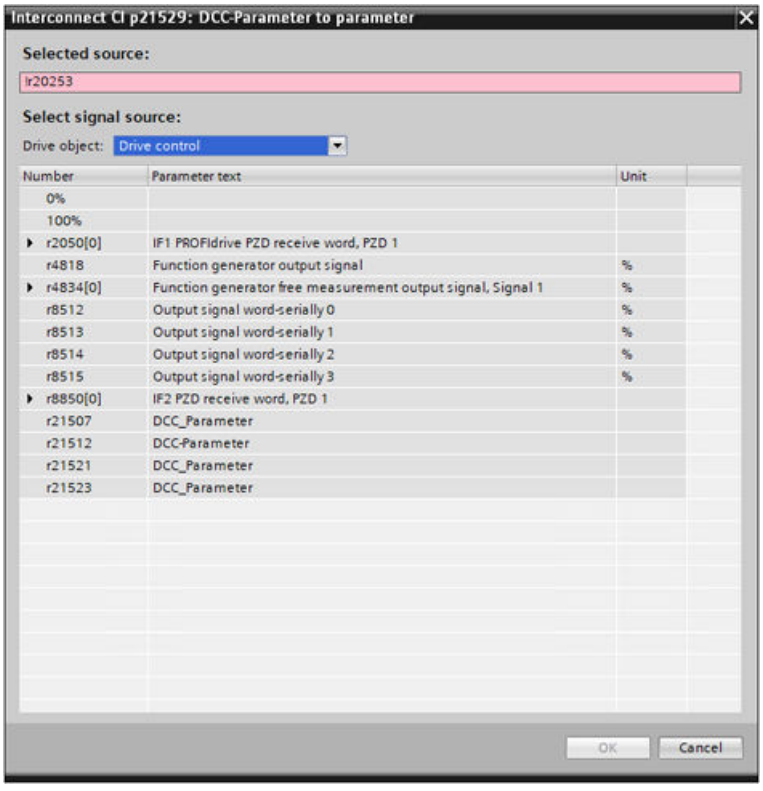


Figure 6-30 Text reference when interconnecting with a BICO input parameter

Resolution when a correct BICO interconnection partner is selected.

- BICO output parameter (e.g. CO r215xx): Interconnect DCC parameter with parameter

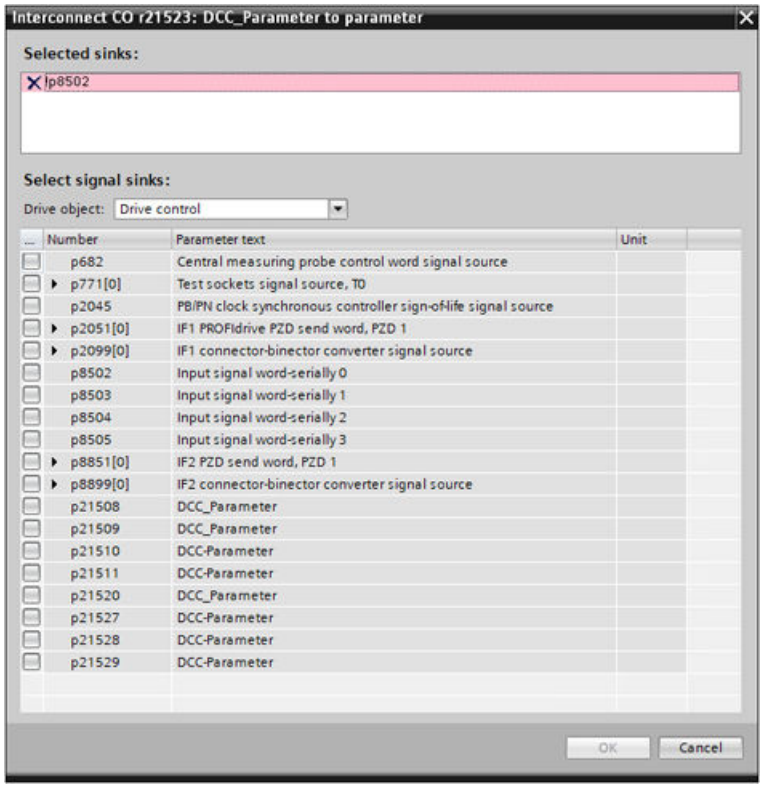


Figure 6-31 Text reference when interconnecting with a BICO output parameter

Resolution occurs 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):

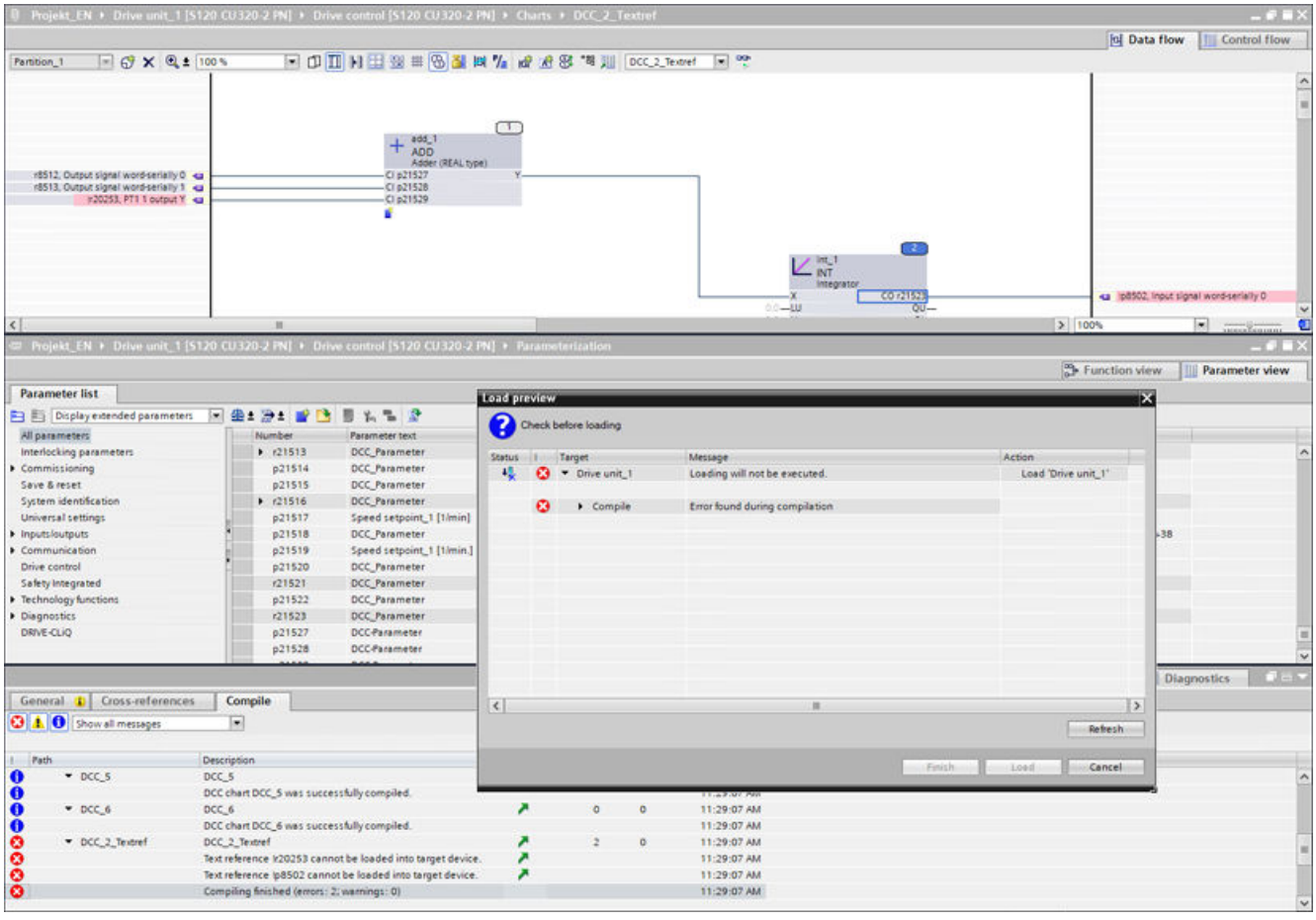


Figure 6-32 Error message when loading to the device with text reference

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 DCC chart is opened in the editor.

Procedure

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

1. Select the "Insert text box" command in the shortcut menu in the toolbar of the editor or right-click on a free space in the DCC chart and select the "Insert new text box" command.
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 chart partition can be inserted into a DCC chart (base chart) (nested chart technique). Hierarchical structures can be formed. Each chart partition that is inserted can be opened and modified. A chart partition 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 chart partitions allows large DCC charts to be structured logically. This also allows the functionality to be extended with more block instances.

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

Requirement

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

Procedure

To insert a chart partition in a DCC chart, proceed as follows:

Inserting a chart partition via the toolbar of the DCC chart

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

or

Inserting a chart partition via the shortcut menu

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

Result

The chart partition was inserted in the DCC chart, e.g. DCC_1. In the project window, a folder with the name of the DCC chart was converted in which this DCC chart with the name "Chart" and subordinate chart partitions (e.g. DCC_1_1, DCC_1_2) are now created. Each hierarchy level is identified with an underscore. Numbering takes place automatically. The name of the chart partitions 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 55)" and "Handling blocks (Page 55)".

Result

Blocks are inserted in the subchart and interconnected with parameters.

6.4.7.4 Copying subcharts

Rules for copying chart partitions

- A chart partition 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 chart partition is created within a base chart.

Procedure

To copy a chart partition, proceed as follows:

1. Select a chart partition that you want to copy.
2. Select the "Copy" command in the context menu.
3. Navigate to the DCC chart or to the chart partition into which the copied chart partition 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 DCC charts.

Result

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

6.5 Execution sequence for blocks and charts

6.5.1 Execution sequence

All blocks that are inserted into a DCC chart are automatically executed in this sequence.

You can adapt the run sequence of the blocks within a DCC chart and the run sequence of the DCC charts themselves. In addition, you can have the run sequence of the blocks optimized automatically.

When creating a DCC chart, the sequence is configured so that it works with the standard sampling time.

6.5.2 Changing the execution sequence of the blocks

The run sequence of the blocks within a DCC chart is specified by the sequence with which they were created. The sequence can be changed manually later.

Requirement

At least two blocks have been created in a DCC chart.

Procedure

To change the run sequence of the blocks within a DCC chart, proceed as follows:

1. Open the "Control flow" view of a chart.
   All created blocks of this DCC chart are displayed in the current run sequence in the work area.
2. Select a block and drag-and-drop it to a new location in the list to specify the new run sequence (e.g. INT at the first position).

Result

The new run sequence is displayed in the "Control flow" view in the working area.

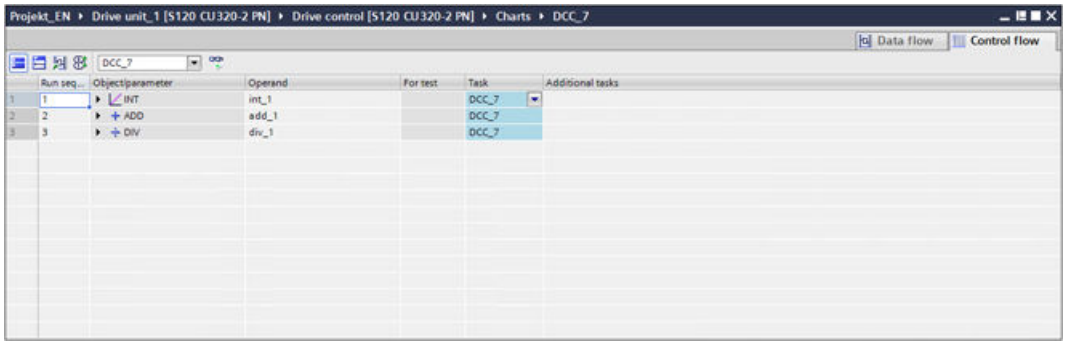


Figure 6-33 New run sequence for the blocks

The new numbering can be seen in the "Data flow" view with the marked block INT (number 1).

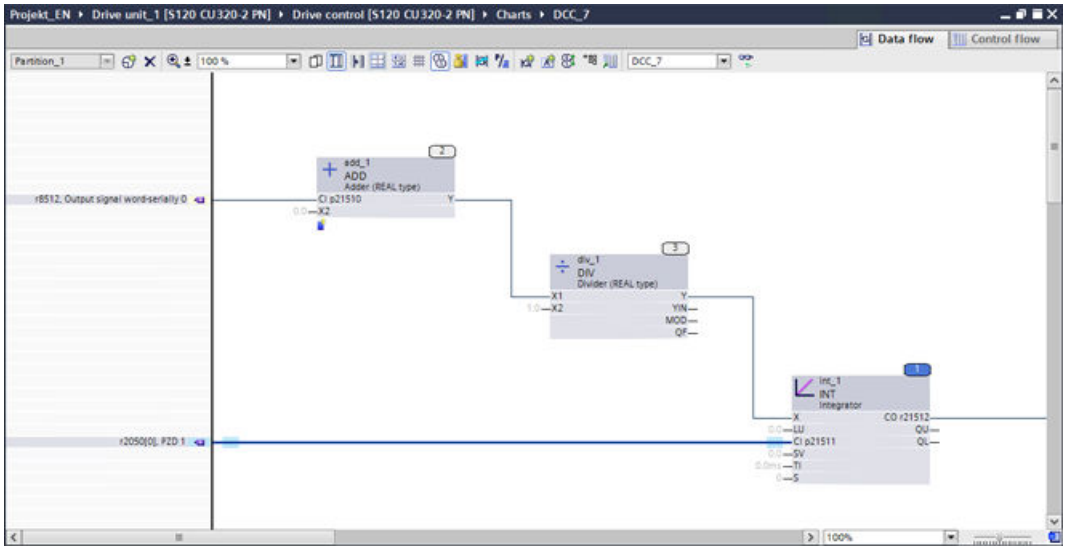


Figure 6-34 New run sequence for the blocks with new number 1

6.5.3 Defining the predecessor for newly inserted blocks

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

Requirement

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

Procedure

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

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

Result

The block is defined as a predecessor in the run 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 run sequence of the DCC charts

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

Requirement

At least two DCC charts have been created.

Procedure

To change the run sequence of the DCC charts, proceed as follows:

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

Result

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

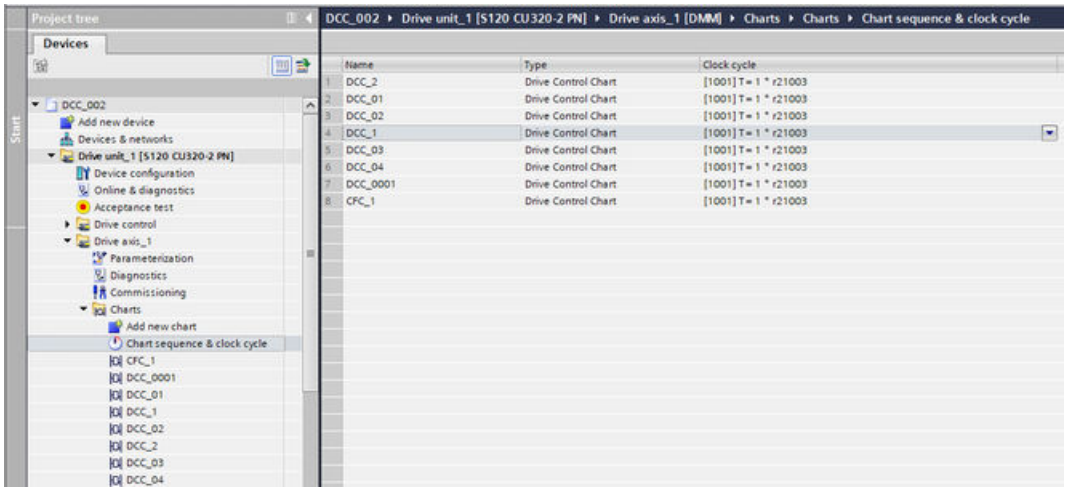


Figure 6-35 Changed chart sequence

6.6 Clock cycles and sampling times

6.6.1 Clock cycles

Clock cycles

The blocks in the DCC 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 DCC chart.

The following parameters are created for each DCC 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 DCC charts.

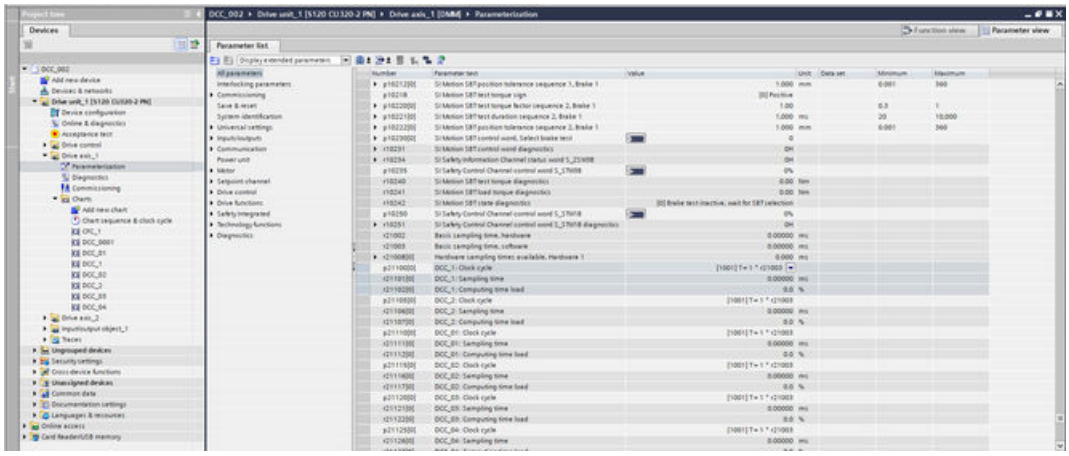


Figure 6-36 Parameters per DCC chart

Note

For users of SINAMICS DCC in the STARTER environment, the term "Runtime 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]).
- **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 µs. The sampling time T_{Zu}= 125 µs, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 µs, 375 µs or 500 µs).
  This means only integer multiples of $T_{Zu} \geq 125$ µs can be set as times T_i and T_o for the drive.
  $\rightarrow T_i = n_i \bullet T_{Zu}$:

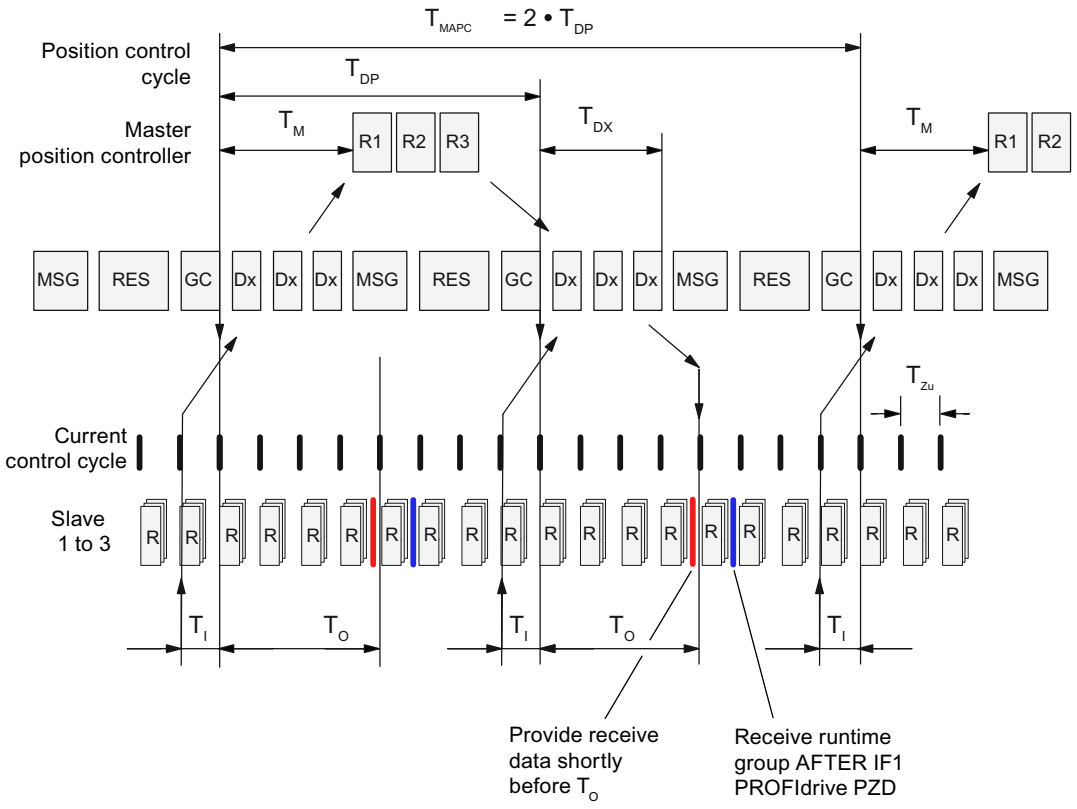


Figure 6-37 Calling the "Receive AFTER IF1 PROFIdrive PZD" or "Receive AFTER IF2 PROFIdrive PZD" clock cycle for isochronous PROFIBUS communication

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 $T_o = n_o \bullet T_{Zu}$ at r2050[..], r2060[..], r2090 - r2093. Thus, in the last sampling time T_{Zu} before T_o. The "Receive AFTER IF1 PROFIdrive 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} (≥ 125 µs).
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" runtime 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 runtime 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 (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 (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 µs. The sampling time T_{Zu} = 125 µs, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 µs, 375 µs or 500 µs). This means only integer multiples of $T_{Zu} \geq 125$ µs can be set as times T_i and T_o for the drive [1].
  → $T_i = n_i \bullet T_{Zu}$ and $T_{DP} = n_{DP} * T_{Zu}$

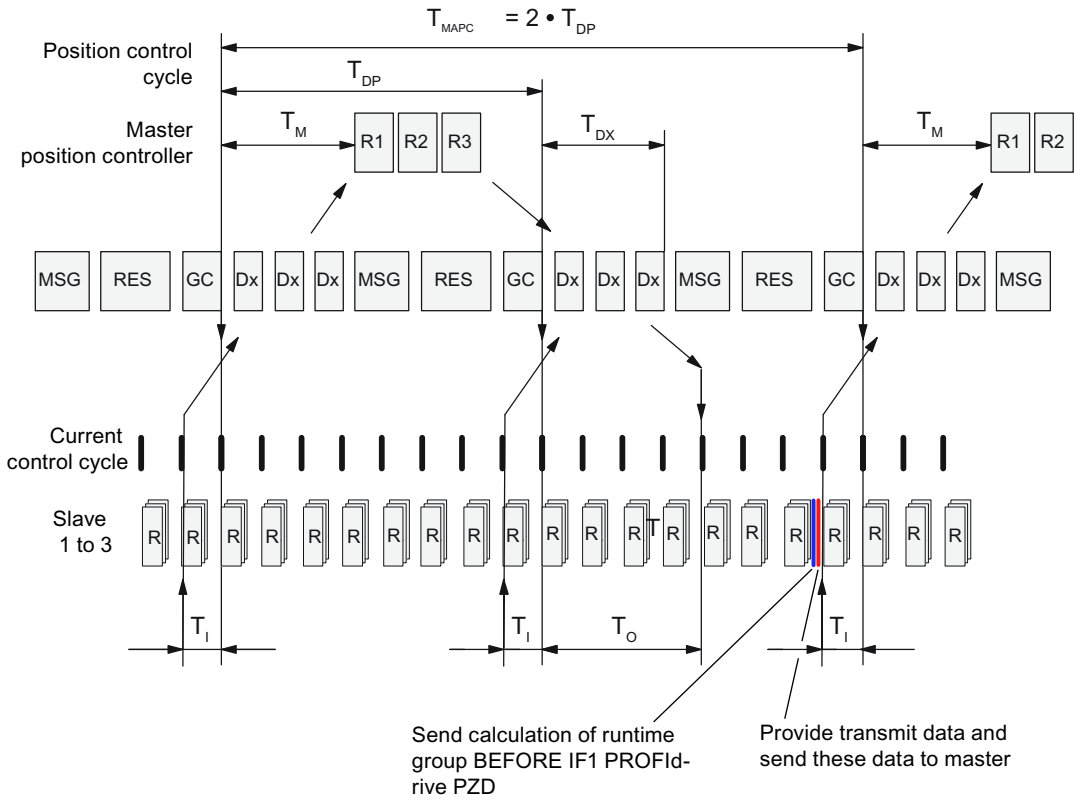


Figure 6-38 Send BEFORE IF1 PROFIdrive PZD

The "Send BEFORE IF1 PROFIdrive PZD" runtime 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 runtime 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 runtime 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 runtime 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_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 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_o 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 µs. The sampling time T_{Zu} = 125 µs, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 µs, 375 µs or 500 µs). This means only integer multiples of $T_{Zu} \geq 125$ µs can be set as times T_i and T_o for the drive [1].
  → $T_i = n_i \bullet T_{Zu}$ and $T_{DP} = n_{DP} * T_{Zu}$
  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) TZu, so that the received process data remains valid until the start of the next sampling period at the time $T_o = n_o \bullet T_{Zu}$ 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 runtime group. The computation time available for this runtime 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} (≥ 125 µs). 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 µs. The sampling time T_{Zu} = 125 µs, however, is at least as long as the longest current controller sampling time (e.g. for the vector, 250 µs, 375 µs or 500 µs). This means only integer multiples of $T_{Zu} \geq 125$ µs can be set as times T_i and T_o for the drive [1].
  → $T_i = n_i \bullet T_{Zu}$ and $T_{DP} = n_{DP} * T_{Zu}$
  See also the figure for Receive BEFORE IF1 PROFIdrive
  The "Send BEFORE IF2 PZD" runtime 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 runtime 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 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 DCC chart

⚠ WARNING

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

If the clock cycle of a DCC chart is changed, the respective DCC 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 DCC 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 DCC chart.

Requirement

At least one DCC chart has been created.

Procedure

To set the sampling time for a DCC 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 tree.
   All created DCC charts are displayed in the work area.
2. Select the desired sampling time in the "Clock cycle" column.

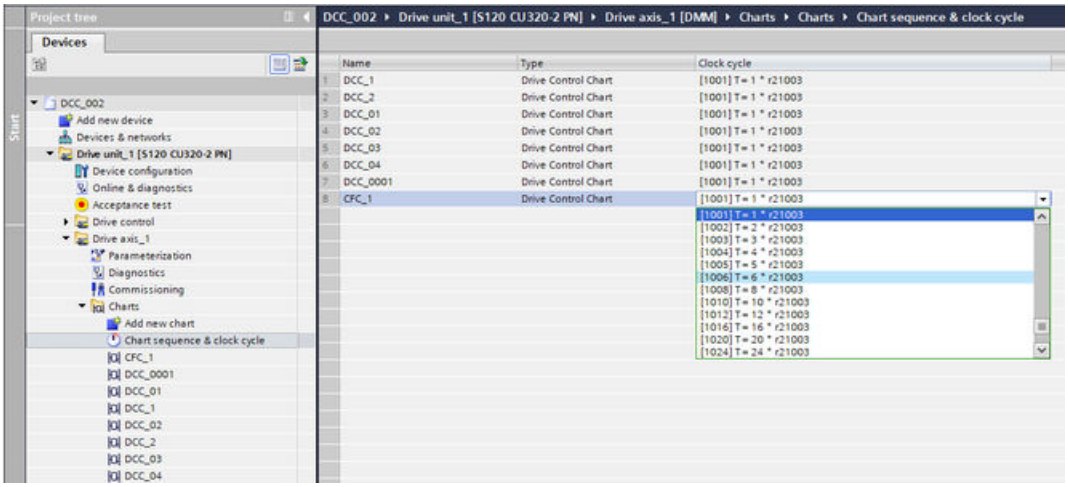


Figure 6-39 Setting the sampling time

Result

The sampling time set is adopted for the corresponding DCC chart.

Sampling time in the "Parameter view"

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

Note

The number of hardware sampling times is limited to five per device.

In online mode, this limit can be exceeded by settings in the "Chart sequence & clock cycle" dialog.

If this setting is saved retentively, an error message is generated after a restart.

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 tree shows the diagnostic status for hardware objects in online mode in the form of icons.

The right column in the project tree 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 DCC chart
- Comments
- Block sequence

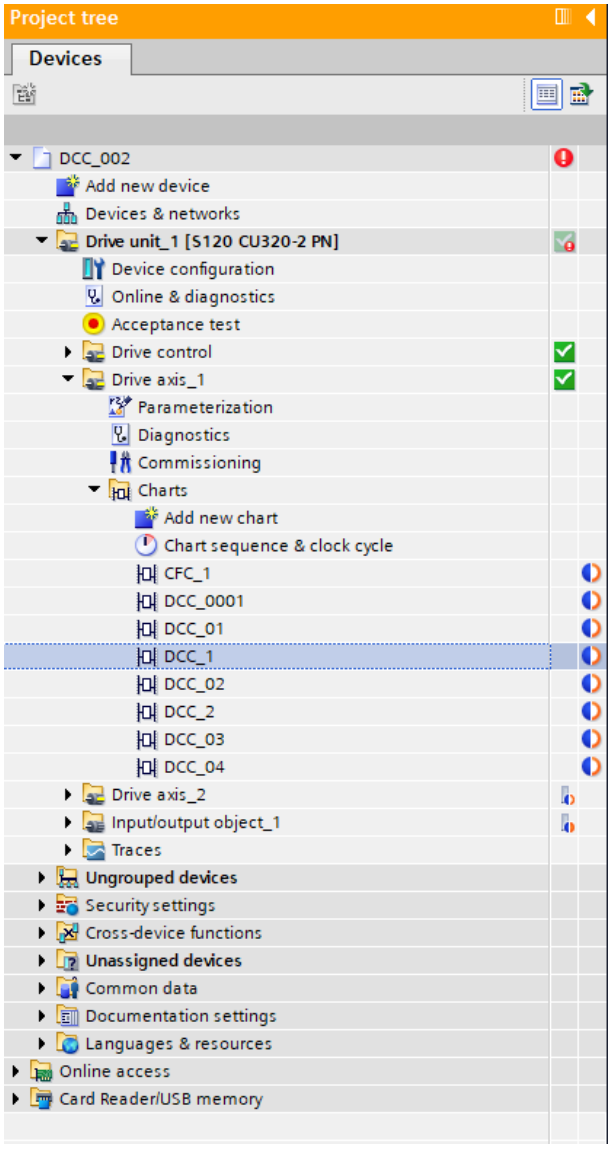
Note

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 DCC charts are identical.
	The DCC chart is available online and offline, but the contents are different.
	The DCC chart is only available offline.
	The connection is established, but the status of the DCC chart is currently being determined or is not known.
	The configuration in the device was loaded with an older TIA version. Loading from device and loading to device converts the configuration to the new version so that it is consistent again.
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 6-40 Consistency check of the DCC charts in online mode

Note

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

Comparison of parameters

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

Requirement

- A DCC 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 icon.

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

The DCC charts configured and, where necessary, the DCB libraries being used are downloaded to the drive unit along with the device configuration.

Note

Know-how protection

To protect the DCC charts from manipulation, the device know-how protection and the know-how protection for DCC charts should be activated (see also "Know-how protection for DCC charts (Page 50)").

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.
- There may be no text reference in the DCC charts of the drive unit, see also "Text references (Page 82)".

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.

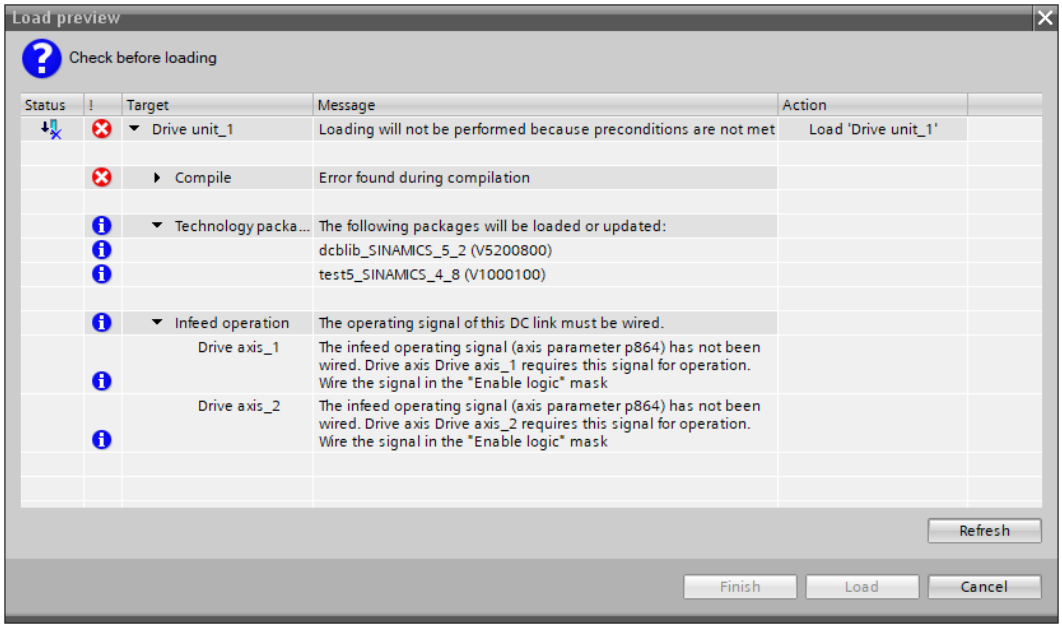


Figure 6-41 Loading to the device - Loading a preview

   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).

Downloading to devices with older TIA versions

When downloading a project created with the current TIA version to a device with an older TIA version, note the following:

Current TIA version (in PG)	TIA version (in the drive unit)	Remark	The informational DCC chart contains the following information
V18	V15.1 V16	An informational DCC chart is loaded in the drive unit and displayed in the project tree.	`"The SINAMICS DCC application on the device was created with TIA V17. The DCC application cannot be loaded in the engineering system. Use TIA version V17 or newer to load the DCC application into the engineering system."`
	V17	No restrictions	

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.

Loading from the device (when loading to the device with the TIA environment)

Requirement

- The SINAMICS DCC option package is installed.
- A project is open.
- A drive unit with a project, including DCC 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. Select the drive unit.
2. Click the "Upload from device" icon.
   The configuration is loaded from the device into the programming device.

Result

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

Note

DCB Extension libraries

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.

Loading from the device (with TIA V18) into an older TIA version (V15.1, V16)

Loading DCC charts from devices containing online changes or which are know-how protected

If there are DCC charts on a device that were created with TIA version V18 and contain online changes or are know-how protected, they cannot be loaded into the programming device.

In this case, an informational DCC chart containing the error information appears in the project tree of the programming device.

Loading DCC charts containing chart partitions from the device

If DCC charts (version V17) are loaded from a device into a TIA environment (version V15.1 or V16), the following must be observed:

- The DCC charts in the device contain one partition
  The DCC charts are loaded into the programming device unchanged.
- The DCC charts in the device contain more than one partition
  - Loading from the device is possible provided no online changes have been made in the DCC chart. However, the blocks may overlap because the contents of all partitions are written to a single DCC chart.
  - Loading from the device is **not** possible if a DCC chart contains online changes or is know-how protected.

Loading from the device (when loading to the device with the Starter environment)

DCC Starter charts configured in TIA environment V18 can be loaded to an appropriate device if

- A standard library with version V4.8 or higher is included and
- The device in the TIA environment has firmware version 5.2 or higher.

It is not possible to load the corresponding project, if:

- The project contains a DCC chart, which is know-how protected
- Changes were made in the device using online engineering
- The device was loaded without the chart sources
- Typicals were used in the device
- More than one runtime group was used
- The DCB Extension library, which is used in the device, is not installed in the TIA environment
- The chart sequence is different
- There is a connection from a drive object to the interfaces of a subchart.

Note

Inconsistency after loading device

After loading the device, a download in the TIA environment is required to update the standard library and establish consistency between the project in the device and in the TIA Portal. Online engineering is now also possible.

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 DCC 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, S120 for SIMATIC DC, S150, G130, G150 and MV.

The 1500 blocks/1500 parameters should be distributed over several DCC charts to avoid a significant impact on the processing speed.

Charts per drive object

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

Charts per drive unit

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

Online Engineering

7

7.1 General information

With the "Online Engineering" function in SINAMICS DCC, it is possible to change DCC charts online in a running system without having to run a complete "Download to device".

A range of functions are supported by Online Engineering, e.g.:

- Change value of a block connection online
- Insert blocks into a DCC chart online
- Delete blocks in the DCC chart online
- Insert block connections online
- Delete block connections online
- Change run sequence of blocks online

Note

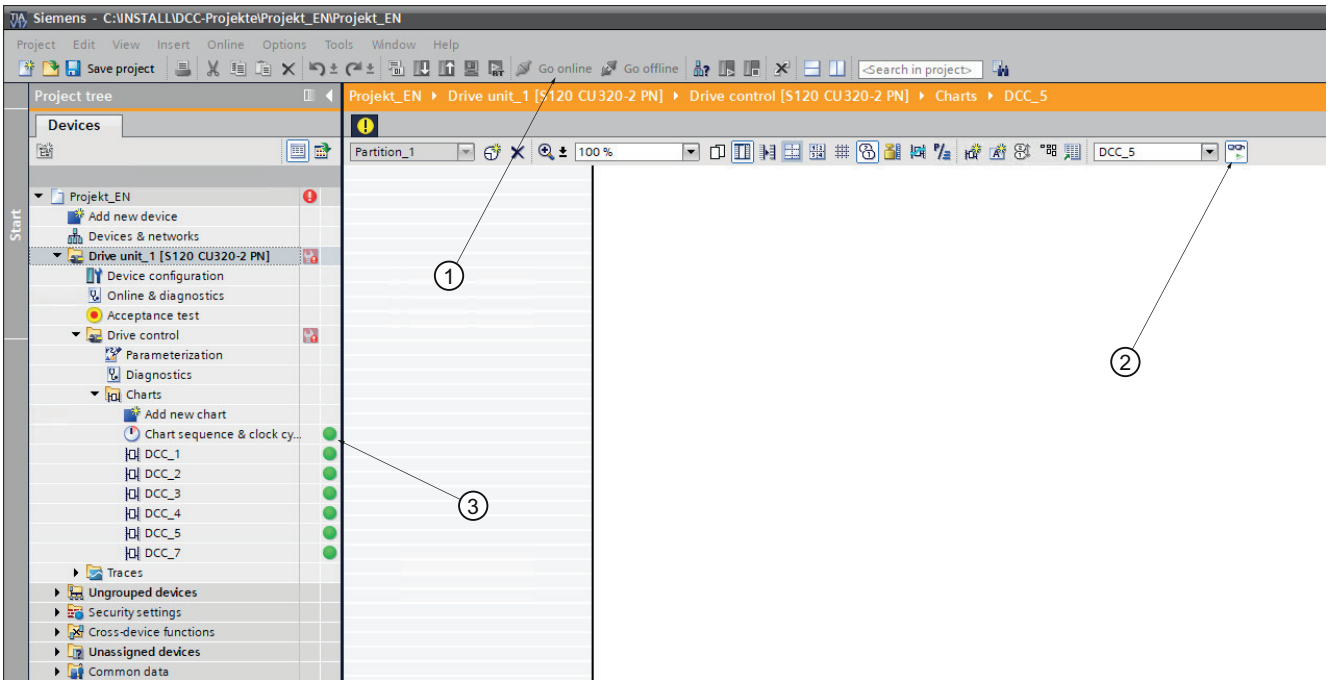
With Online Engineering, you intervene online in the configured function of the DCC chart, i.e. each change takes effect immediately and cannot be undone. Please make changes with caution.

Observe the corresponding error messages!

Requirements

The following requirements must be met to be able to make online changes in a DCC chart:

1. An online connection to the device must be established.
2. A DCC chart must be opened and monitoring mode switched on.
3. The online and offline version of the corresponding DCC chart must match.



① Establish online connection
② Switch on monitoring mode
③ Check if online and offline version match

Figure 7-1 Requirements for Online Engineering

Additional requirements:

- The device must contain firmware and a standard library dcblib that supports the "DCC online changes" function.
  Refer to the following table for the dependencies between device, firmware and TIA version:

Device type	Firmware version	TIA version	Online Engineering possible
MV	V5.2.1 V5.2.2 V5.2.4	V15.1	No
	V5.2.5 V5.2.7	V17, SP1	Yes
S120	V5.2	V15.1 and higher	No
S120	V5.2 SP3	V16	No
S120	V5.2 SP3	V17 and higher	Yes

- The DCC chart cannot be know-how protected.
- The device cannot be write-protected.

NOTICE
Data backup
Back up your project before you make changes with Online Engineering!

Restrictions

- Online changes **cannot** be undone or restored. However, if the offline changes are not saved in the DCC chart (i.e. the project is closed without saving), the changes are undone.
- Parameters cannot be added, changed or deleted online.
  Parameters must be edited online and then downloaded to the device.
- Parameters cannot be published online and publication cannot be revoked online.
- Partitions cannot be inserted into or deleted from a DCC chart online.
- Multiple connections cannot be deleted online.
- Online changes in DCC charts are not possible online with Openness in connection with SINAMICS DCC.

7.2 Inserting blocks online

Inserting blocks

With Online Engineering, you can insert blocks from the standard library dcblib or from an Extension library.

To insert a block in a DCC 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 DCC chart:
   - Drag-and-drop the block to the desired position in the DCC chart.
   - Double-click the block.
   - Select the block and press the [Enter] key.
   - Copy the block with <Ctrl C> and then insert it into the DCC chart with <Ctrl V>.

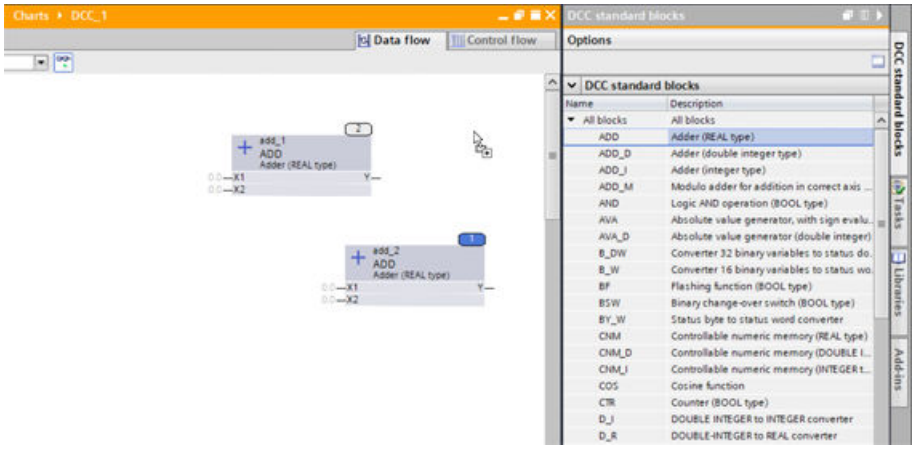


Figure 7-2 Online Engineering - Inserting blocks

Restrictions for DCC standard blocks

Some DCC standard blocks cannot be inserted with Online Engineering, e.g. SAV, RDP, WRP.

You can see in the online help of the block (configuration data) whether the block can be inserted into the DCC chart with Online Engineering (loadable online: No).

Restrictions for blocks from DCB Extension libraries

The setting to determine whether a block from a DCB Extension library can be inserted online is made during creation in SINAMICS DCB Studio and a corresponding entry is made in the online help of the block.

You can see in the online help of the block (Shift+F1) whether the block can be inserted into the chart with Online Engineering.

If blocks from a DCB Extension library are to be inserted into the DCC chart with Online Engineering, the DCB Extension library first needs to have been imported into the project and a block of this library inserted into the DCC chart offline, so that the DCB Extension library is loaded in the device.

The function "Import DCB Extension library" using Online Engineering is currently not available for SINAMICS DCC.

Note

If blocks cannot be inserted online, the run sequence also cannot be changed online.

Editing blocks

Renaming blocks

You can rename blocks with Online Engineering.

Note

Blocks with a non-volatile memory cannot be renamed, e.g. SAV.

Comment

You can add a comment to the block properties with Online Engineering.

Block connections

You can add a comment to the block connection properties with Online Engineering.
The value of the block connection can be edited online (see also "Change value of a block connection online (Page 120)").

7.3 Deleting blocks online

Deleting blocks

With Online Engineering, you can delete existing DCC standard blocks or existing blocks from a DCB Extension library in the usual way from a DCC chart.

Special conditions / restrictions

- The block connections cannot be published as parameters (see also General requirements).
- There can be no connections to the block. Existing connections to a block that is to be deleted need to be deleted beforehand (see "Deleting a block connection online (Page 119)").
- Blocks that cannot be inserted online also cannot be deleted online.

7.4 Inserting a block connection online

Inserting a block connection

With Online Engineering, you can create a connection between DCC block connections in the usual way. Connections can be changed or connections can be established with the sheet bar. Connections to chart partitions are also possible.

Special conditions / restrictions

When inserting a block connection online, note that the value at the block input is applied. However, online changes cannot be undone.

A connection between a consistent DCC chart and an inconsistent DCC chart is not possible.

BICO connections are only possible online via the parameter list.

7.5 Deleting a block connection online

Deleting a block connection

With Online Engineering, you can delete unpublished connections between DCC block connections in the usual way.

However, individual connections can also be deleted online via a selected block connection and the "Delete connection(s)" shortcut menu.

The value that is pending at the source at the time of deletion is assigned to the block connection (sink), which is now no longer connected. This takes place both in the online DCC chart and in the offline DCC chart to guarantee a smooth transition. The last calculated value remains visible.

Special conditions / restrictions

Deleting multiple connections is not permitted and is prevented. Delete the connections individually.

Only connections to unpublished block connections can be deleted. BICO connections can only be deleted offline via the parameter list.

Connections to the connectors of a chart partition cannot be deleted online.

7.6 Change value of a block connection online

Changing values online

Values at the block input can be changed with Online Engineering. Changes to values cannot be undone.

Special conditions / restrictions

Only values at unpublished block inputs can be changed online.
Published input values can only be changed in the parameter view.

7.7 Change run sequence of blocks online

Changing the run sequence

The run sequence of blocks within a DCC chart can be changed online with Online Engineering. The run sequence of blocks can only be changed individually.

Note

When the run sequence is changed, only the block types that can be inserted online can be moved
(SAV, RDP, WRP, for example, cannot be inserted).

Special conditions / restrictions

The position of the chart partitions within the run sequence cannot be changed online. The chart partition can only be moved within a DCC chart.

The order of the DCC charts cannot be changed online.

7.8 Arranging blocks online automatically

Arranging blocks

With Online Engineering, one or more blocks can be moved within the DCC chart or you can switch to "Position automatically" to position the blocks automatically:

1. Select one or more blocks.
   The selected blocks are marked with a green frame.
2. Select the "Position automatically" shortcut menu.
   The blocks are arranged in a specific pattern.

7.9 Editing text blocks online

Editing text blocks

Text blocks can be inserted into a DCC chart with Online Engineering. The text blocks can be changed or deleted online.

7.10 Saving online changes

Changes that were made with Online Engineering are performed synchronously both online (in the device) and offline.

The following options are available to save the changes permanently:

Saving changes online

To save changes that were made with Online Engineering in the device permanently, proceed as follows:

1. The changes have been made and have already been saved temporarily in the RAM of the device.
2. Select the drive unit in online mode and select the "RAM to ROM" shortcut menu.
   The configuration data is transferred from the RAM to the ROM of the device and saved on the CF card.

Note

If the configuration data is not transferred from the RAM to the ROM of the device, the changes are lost when the device is restarted.

Saving changes offline

To save changes that were made with Online Engineering offline permanently, proceed as follows:

1. Save the project.

Reconstructing a DCC chart

If changes were made with Online Engineering that need to be undone, proceed as follows:

1. Close the project without saving.

or

1. Switch off monitoring mode.
2. Change to offline mode.
3. Delete the "Charts" folder in the project tree.
4. Restart the device.
5. Perform "Upload from device" to load the configuration data from the device into the current project.
6. Save the current project.

Monitoring and tracing configuration online

8

8.1 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.

8.2 Testing configuration with the "Monitoring" function

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

Requirement

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

- The configured DCC chart is open.
- "Data flow" or "Control flow" is shown in the work 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.

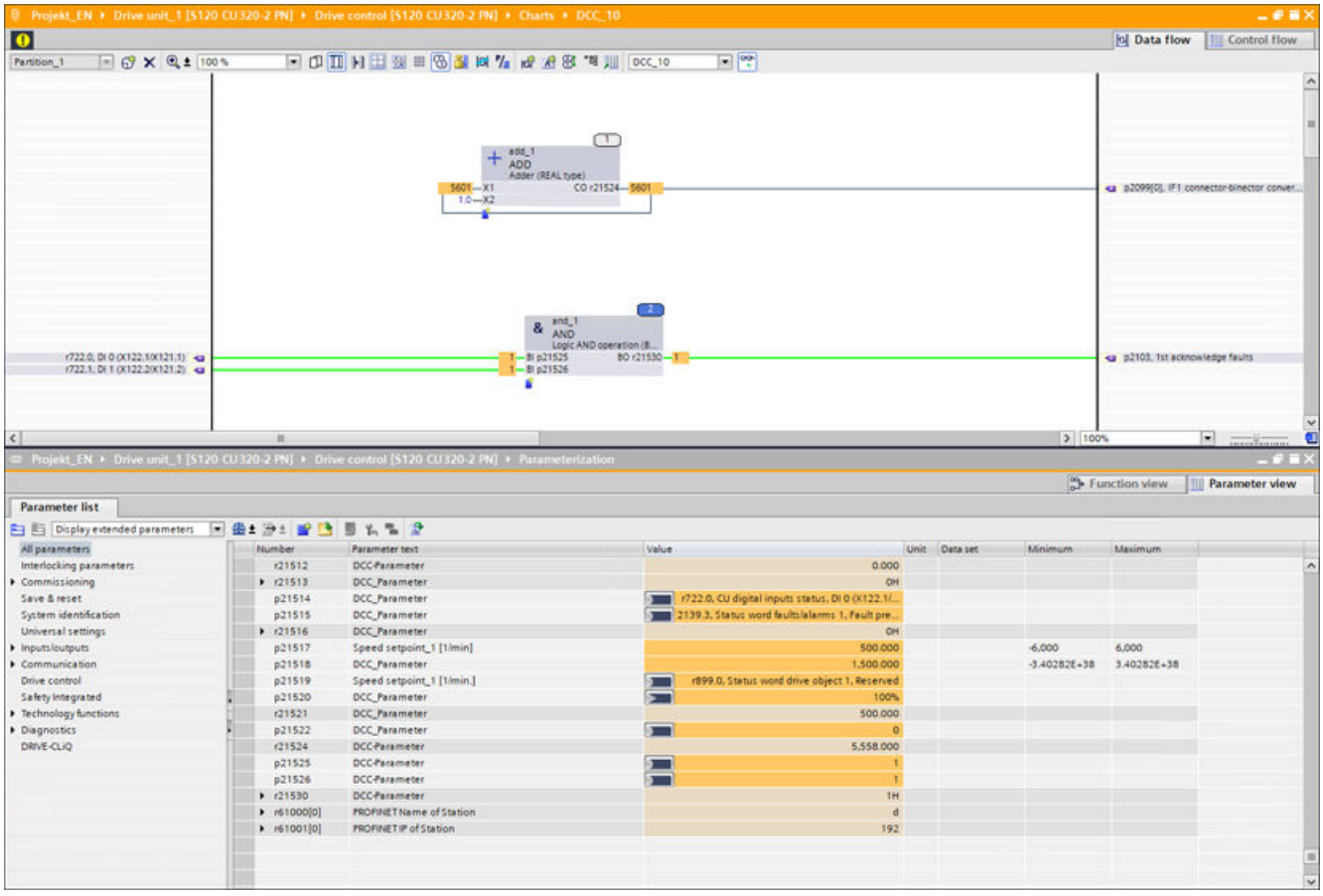


Figure 8-1 "Monitoring" function with current values in the data flow and representation in the parameter view

Note

Know-how protection for devices

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

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

Note

Consistency check

If a consistency check is performed during the "Monitoring" function (chart sequence or blocks inconsistent), incorrect values are displayed.

Note

Utilization of sub-charts

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

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

Procedure

Adding a trace configuration

You define the signals to be recorded, the tracing duration and the trigger condition in the trace configuration.

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

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

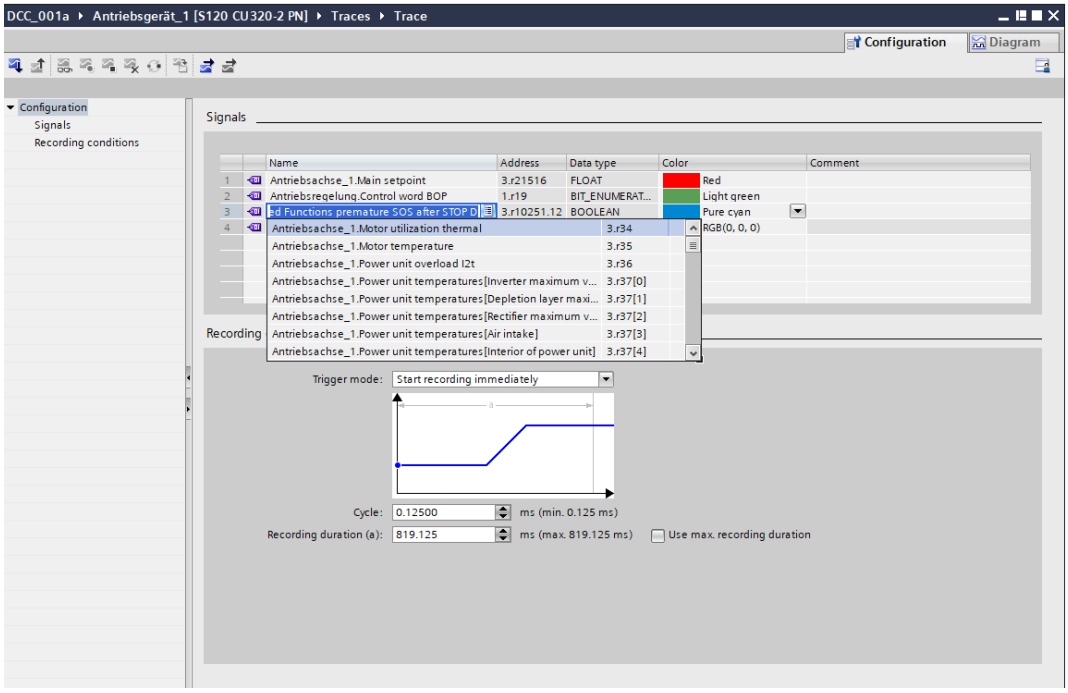


Figure 8-2 Trace configuration

2. Insert the DCC parameters whose signals should be recorded at "Signals".
   Inserting BICO interconnections for the trace:
   Only the output parameters can be traced for BICO 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:
   The inputs and outputs can be traced with published block connections.
   - Insert the block connection of the output that you want to trace into the signal list.
   - 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 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, recording 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.

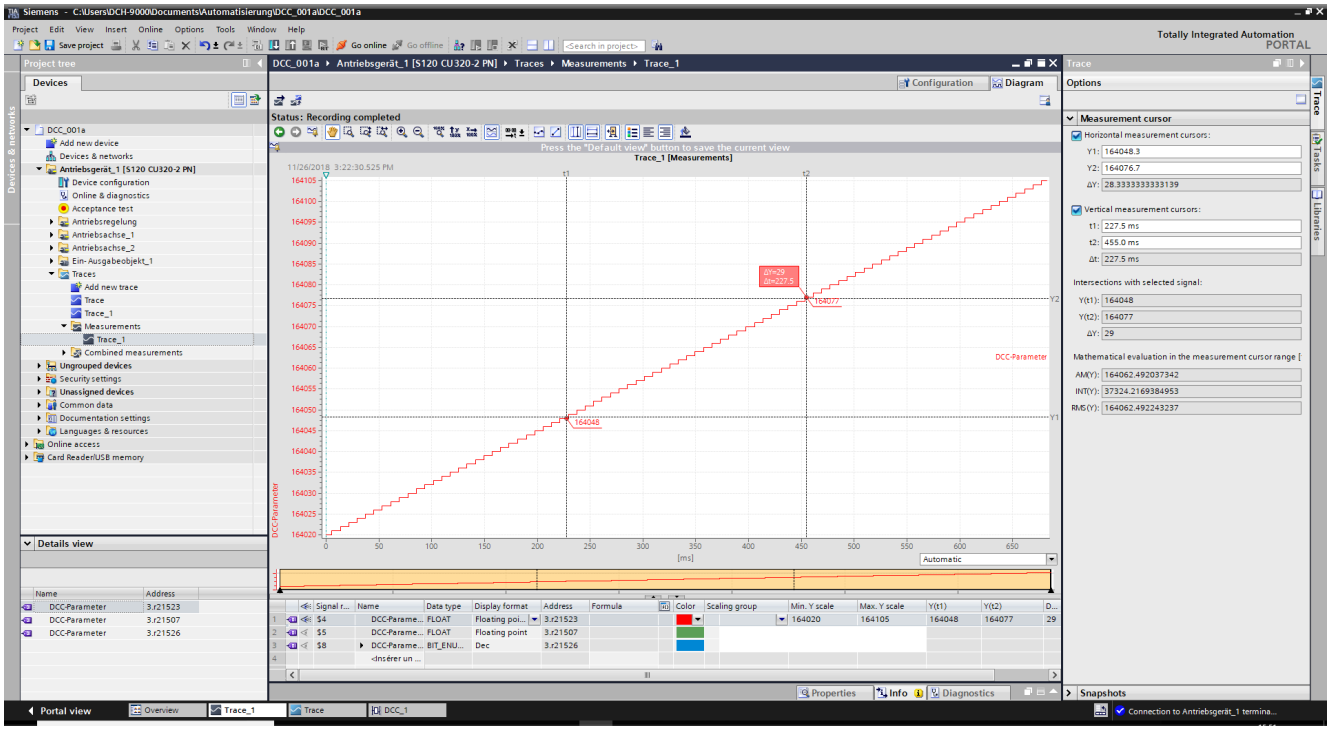


Figure 8-3 Trace function - Measurement completed and evaluated

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

9

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 tree 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".

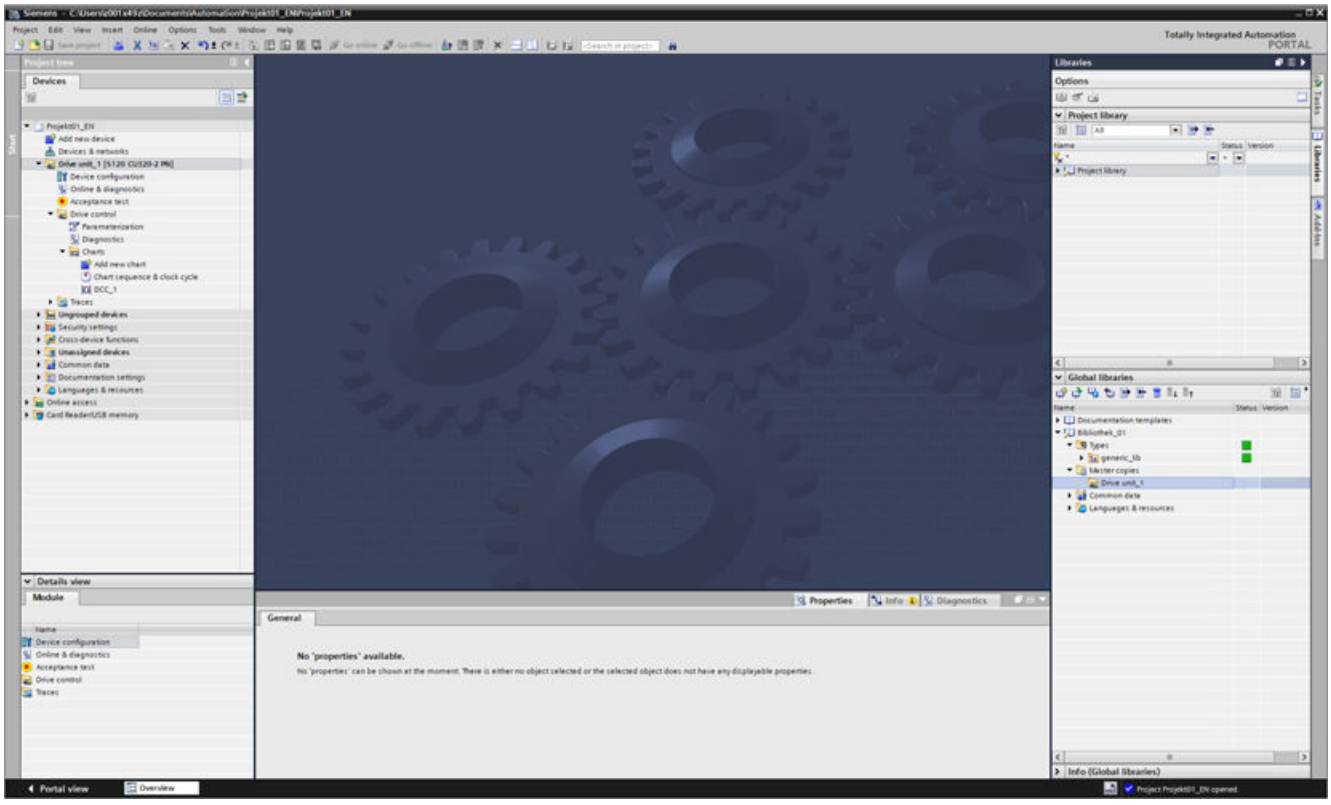


Figure 9-1 Created template "Drive unit_1"

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

To do this, in the project tree, drag template "Drive unit_1" in the global library and drop onto "Add new device".

Library handling 10

10.1 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.

Project library

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

If multiple versions of a DCB Extension library and thus multiple versions of a block are imported, the default setting can be set for a version (usually the latest one) (shortcut menu: "Set as default"). If a DCB Extension library is imported with a version higher than the default, the default is automatically set to the highest version.

When a new instance of a block is inserted with the default version, instances already contained in the chart are updated. The DCB Extension library can also be updated via the shortcut menu "Update types > Project...". All instances used in the chart are updated to the default version.

You can find additional information in the TIA Portal information system under "Updating the project to the latest versions" or "Updating the project to the latest type versions".

Global libraries

Fully configured drive units can be stored in global libraries as master copy and can be reused as a basis for a new project (see Creating a template (Page 129)).

The "Types" folder contains the DCB Extension libraries. The complete "Types" folder or individual DCB Extension libraries can be coped from the project library to a global library and vice versa using drag-and-drop.

The DCB Extension library can also be updated via the shortcut menu "Update types > Library..." (when a DCB Extension library is selected in the project library).

You can find additional information in the information system of the TIA Portal under "Updating library with the types of another library".

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.

10.2 Displaying versions of the DCB libraries

Requirement

To display the versions of the DCB libraries that are used in the DCC charts of a drive unit, the following requirements must be met:

- DCB Extension libraries must have been imported into the project library of the project.
- Blocks from the DCB Extension library are used in a DCC chart.
- An online connection is established to the drive unit.

Displaying versions of the DCB libraries

Proceed as follows to display the versions of the DCB libraries:

1. Select the "Charts" folder in the project tree.
2. Select the entry "DCB library versions..." in the context menu.
   The dialog "Version overview - DCB libraries" opens.

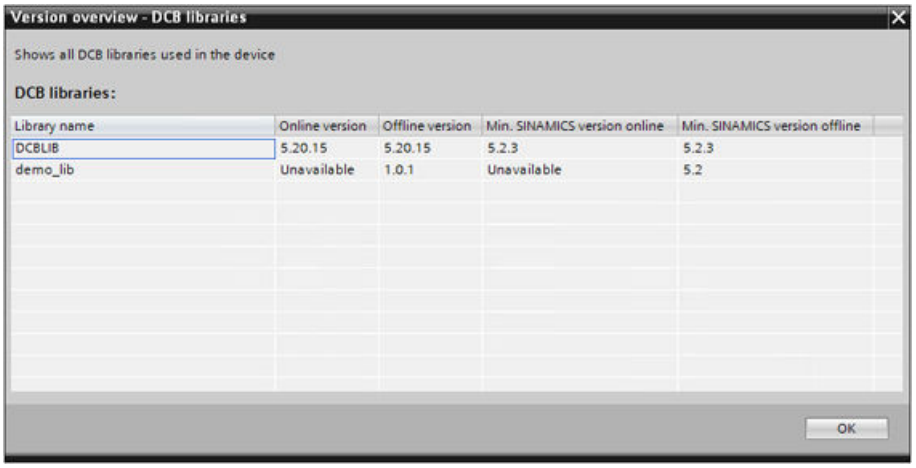


Figure 10-1 Display of the DCB libraries used

The DCB libraries which are used in the drive unit (online version) are compared in the dialog with the DCB libraries in the current project (offline version) and the corresponding versions are displayed.

Note

DCB standard libraries (standard blocks)

The DCB standard library is included in each new project during the installation of SINAMICS DCC and is always displayed in the first line of the dialog.

3. Click "OK" to close the dialog.

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

10.3 DCB Standard

10.3.1 Provision of DCC standard blocks

In the TIA Portal

The installation of SINAMICS DCC automatically installs the DCB Standard library, dcblib V5.2 or higher, which includes the DCC standard blocks. The version of the installed DCB standard library depends on the firmware version of the device.

These DCC standard blocks are then available for configuring in the DCC 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.

10.3.2 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.

10.4 DCB Extension

10.4.1 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 DCC charts. Details for the structure of the "Libraries" task card can be found at "Libraries (Page 55)"

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.

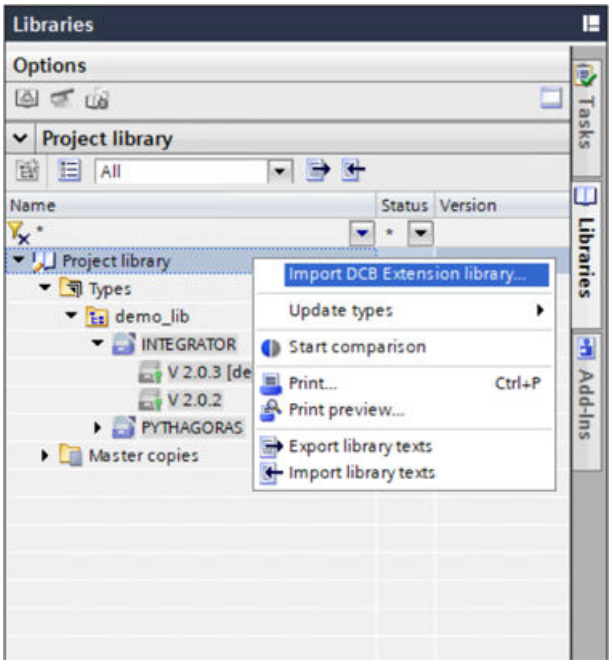


Figure 10-2 "Import DCB Extension library" context menu

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.
7. **Changing the default setting of the blocks from the DCB Extension library:**
   The selected version of a DCB Extension block can be set as default via the "Set as default" shortcut menu.
   This means that when a block of this version (default) is added, a prompt appears asking whether all instances this block should be replaced by the inserted version, since only one version of a DCB Extension library can be used in the drive unit at any given time.
   If a newer or higher version of the DCB Extension library is imported, the default is automatically set to the highest version.

8. **Updating blocks from the DCB Extension library:**
   When a newer version of a DCB Extension library is added, the blocks used in the DCC chart are not updated automatically.
   When a block of this version (default) is added, a prompt appears asking whether all instances of the block should be replaced by the inserted version.

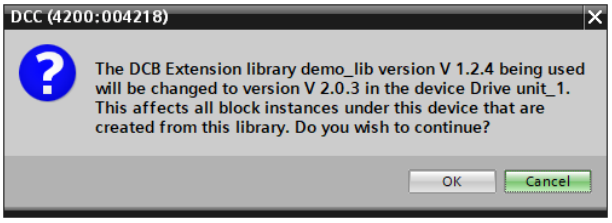


Figure 10-3 Prompt whether the block version of the inserted DCB Extension library should be accepted.

   or
   A DCB Extension library can also be updated via the shortcut menu "Update types > Project...". All instances used in the chart are updated to the default version.

   Note

   The following option should be disabled for DCB Extension libraries:

   "Delete unused type versions without the "Default" identifier from the library".

9. **Configuration:**
   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.

DCB Extension library was deleted

If a block from the DCB Extension library was used in the DCC chart, however the library was deleted, then it is no longer possible to load into the device or export.

Remedy

The DCB Extension library must be re-imported into the project library or copied from the global library into the project library.

The function blocks used in the DCC chart are automatically updated.
The DCB Extension library can now be loaded into the device or exported again.

NOTICE
DCB Extension library
A DCB Extension library should not be deleted from the project library if you are not certain that blocks were used in the DCC charts.

10.4.2 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.

10.4.3 Structuring DCB Extension libraries

You can create a structure to more transparently list DCB Extension libraries in the project library.

Requirement

Several DCB Extension libraries have already been inserted in the project library.

Structuring DCB Extension libraries

To create a structure for DCB Extension libraries in the project library, proceed as follows:

Create a folder

1. In the project library, select folder Types.
2. Select the Add folder shortcut menu.
3. Name the new folder.

Subfolders can also be correspondingly created.

Move the libraries

Complete DCB Extension libraries can be moved into the newly created folder/subfolder of the project library:

- By dragging & dropping
- By cutting out using CtrlX and inserting in the selected folder using CtrlV.

Complete DCB Extension libraries can be copied from the project library and placed in the global library:

1. In the project library, select the appropriate DCB Extension library.
2. Copy the DCB Extension library using CtrlC.
3. Create a new library in the global library.
4. Here, select folder Types.
5. Using CtrlV insert the copied library.

Moving individual function blocks

SINAMICS DCC does not support this function.

Deleting complete DCB Extension libraries

A complete DCB Extension library can be deleted in the project library or the global library:

- Delete the selected DCB Extension library using CtrlX or
- Delete the selected DCB Extension library using Del

10.4.4 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
SINAMICS V5.2.3	dcblib V5.2.3	Generates for the SINAMICS version dcblib V4.6 - V5.2.3

Openness

11

Introduction

You program applications that automate engineering in the TIA Portal using TIA Portal Openness V18.

Openness functions in conjunction with SINAMICS DCC

Detailed information about Openness is provided in the online help for SINAMICS Startdrive.

The following functions are implemented in SINAMICS DCC Version V18:

Projects

- Open project
- Load projects to the device

DCC charts

- Add new DCC chart/subchart
- Delete DCC chart/subchart
- Import DCC charts
- Rename DCC charts/subcharts
- Rename comments in DCC charts
- Change parameter numbers in DCC charts
- Change DCC parameter texts in DCC charts
- Export one or all DCC charts ("Charts" folder)
- Find DCC charts in the "Charts" folder based on the chart names
- Search for/find DCC charts based on the chart name
- Delete DCC charts from the "Charts" folder
- Define/change run sequence of DCC charts
- Display run sequence in DCC charts
- Optimize DCC charts

Function blocks

- Insert function blocks from the standard and Extension library
- Delete function blocks
- Rename function blocks
- Change comments
- Search/find function blocks/subcharts

- Change number of generic connections of a block
  - Make connection invisible/visible
  - Set connection "for test"
  - Set value
  - Set type of DCC parameter (adjustable parameters, BICO parameters)
- Change connection name value
- Select function block as predecessor for the insert position
- Change run sequence of the function blocks
- Publish block connections

DCB Extension libraries

- Import DCB Extension libraries into the project library
- Check DCB Extension library

Software components

Software package	Remark
TIA Portal, Version V18 • SINAMICS Startdrive, Version V18 • SINAMICS DCC, Version V18	
TIA Portal Openness, Version V18	Included in the scope of delivery for TIA Portal, Version V18

See also "Requirements (Page 23)".

In TIA Portal, Version V18, TIA Portal Openness is available on the associated product DVDs without charge. TIA Portal, Version V18 must be installed 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".

SIMATIC Drive Controller

12

The full functionality of SINAMICS DCC is now also available for SIMATIC Drive Controller.

Requirement

The following firmware constellations are released:

Device	FW version SIMATIC device	FW version SINAMICS device
S120 integrated for SIMATIC Drive Controller	V2.9 V3.0	V5.2.3

To achieve the full functionality of SINAMICS DCC on a SIMATIC Drive Controller, it is necessary to upgrade to V2.9 / V5.2.3 or higher. The firmware of the SIMATIC CPU and the SINAMICS drive unit can be upgraded separately from one another.

Functionality

If the requirements in relation to the firmware are met, all SINAMICS DCC functions are available under SIMATIC Drive Controller.

You can find additional information in the information system of the TIA Portal under "Configuring SIMATIC Drive Controller drives".

Additional information

13

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/man
- Downloads: https://support.industry.siemens.com/cs/us/en/ps/13438/dl

Appendix A: Abbreviations

A

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	**Bi**nector-**Co**nnector 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**otaly **I**ntegrated **A**utomation

Index

A

Archiving a project, 38

B

BICO parameters, 68
Block
  insert, 55
  Properties, 62
Block connector
  Interconnecting, 75
  Properties, 64
  publish, 66
Block properties, 62
Blocks
  Copy/insert, 61
  delete, 62
  insert, 56

C

Chart
  delete, 46
  Insert chart partitions, 86
Chart contents, 55
Chart properties, 42
Charts
  create, 40
Clock cycles
  fixed, 92
  Free, 103
Configuration steps, 27
Control flow, 29, 31

D

Data flow, 29
DCB Extension, 21, 55
  edit, 137
  import, 135
DCB library, 131, 134
DCB Standard, 21, 55, 134
DCC block
  Compatibility of data types, 75
  General information, 64
  Generic blocks, 64
  Inputs, 64
  Interconnect connectors, 75
  Number of connectors, 64
  Outputs, 64
  Pins, 64
  Units, 64
DCC chart
  Control flow, 29
  copy, 45
  Copy/insert, 45
  create, 40
  Data flow, 29
  Export, 47
  Import, 49
  Inserting text boxes, 85
  Partitions, 43
  Properties, 42
  Representation, 29
  Sheet bars/layout, 44
  Time stamp, 44
  View, 29
DCC charts, 39
  Copy/insert, 45
  delete, 46
  export, 47
  import, 49
DCC Editor, 19, 21
DCC standard blocks, 56, 134
Dearchiving a project, 38
Diagnostics, 123

E

Execution sequence, 88
  Define predecessor, 90
Export of DCC charts, 47

I

Importing DCC charts, 49
Inserting text boxes, 85
Installed software, 24
Interconnections, 75
  Hidden, 63
Internet Explorer 11, 14

L

Libraries, 55
    Compatibility, 138
Library, 131

M

Measurement, 127
Mojibake
    Error, 14
Monitoring, 123

P

Parameter definitions, 68
Performing a download, 109
Properties
    Block connections, 64
    Blocks, 62
    Interface, 63
Publish connector, 66

S

SINAMICS DCC, 19
SINAMICS parameters, 68
Software requirements, 23
Subcharts
    copy, 87
    insert, 86
    Inserting content, 87

T

Task card
    DCC standard blocks, 56
    Libraries, 57
Text references, 82
Tooltips, 32
Trace configuration, 125
Trace function, 125

U

Upload
    SINAMICS DCC, 111
    SINAMICS STARTER, 112
User interface language
    Chinese, 14

W

Windows 7
    Windows 7 SP1, 14