

SIEMENS

SIMOTION

SIMOTION SCOUT

Configuration Manual

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Preface

Scope and standards

This document is part of the **Engineering System Handling documentation package**.

Scope of validity

This manual applies to SIMOTION SCOUT in association with the SIMOTION CamTool option package for product version V4.1 SP4.

Sections in this manual

The following is a list of chapters included in this manual along with a description of the information presented in each chapter.

- Overview
This chapter contains an overview of the SIMOTION SCOUT Engineering System.
- Installing software
This chapter contains the system requirements for SIMOTION SCOUT, describes the procedure for installing and uninstalling it, and provides important information on the communications link to the SIMOTION device.
- Functions
This chapter describes the basic steps for operating SIMOTION SCOUT. The SIMOTION SCOUT workbench and HW Config are explained.
An important tool is provided in the form of the SIMOTION SCOUT online help, for example. This chapter contains basic information about this topic. Additional functions such as the licensing of the runtime components and the replacement of the SIMOTION device are also described.
- Product combinations
This chapter describes topics such as compatibility and storage media as well as STEP 7, NetPro, Drive ES, HMI, and other interfaces.
- Diagnostics
It also contains information about which diagnostic functions are available and how these are operated.
- FAQs
This chapter contains handling recommendations for service with SCOUT V4.1. It explains how projects are created and edited.
The process of inserting and commissioning drives is described. It contains general information and special applications.
- Index
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SIMOTION Documentation

An overview of the SIMOTION documentation can be found in a separate list of references.

This documentation is included as electronic documentation with the supplied SIMOTION SCOUT.

The SIMOTION documentation consists of 9 documentation packages containing approximately 80 SIMOTION documents and documents on related systems (e.g. SINAMICS).

The following documentation packages are available for SIMOTION V4.1 SP4:

- SIMOTION Engineering System
- SIMOTION System and Function Descriptions
- SIMOTION Service and Diagnostics
- SIMOTION Programming
- SIMOTION Programming - References
- SIMOTION C
- SIMOTION P350
- SIMOTION D4xx
- SIMOTION Supplementary Documentation

Hotline and Internet addresses

Siemens Internet address

The latest information about SIMOTION products, product support, and FAQs can be found on the Internet at:

- General information:
 - <http://www.siemens.de/simotion> (German)
 - <http://www.siemens.com/simotion> (international)
- Downloading documentation
Further links for downloading files from Service & Support.
<http://support.automation.siemens.com/WW/view/en/10805436>
- Individually compiling documentation on the basis of Siemens contents with the My Documentation Manager (MDM), refer to <http://www.siemens.com/mdm>
My Documentation Manager provides you with a range of features for creating your own documentation.
- FAQs
You can find information on FAQs (frequently asked questions) by clicking <http://support.automation.siemens.com/WW/view/en/10805436/133000>.

Additional support

We also offer introductory courses to help you familiarize yourself with SIMOTION.

For more information, please contact your regional Training Center or the main Training Center in 90027 Nuremberg, Germany.

Information about training courses on offer can be found at:

www.sitrain.com

Technical support

If you have any technical questions, please contact our hotline:

	Europe / Africa
Phone	+49 180 5050 222 (subject to charge)
Fax	+49 180 5050 223
€0.14/min from German wire-line network, mobile phone prices may differ.	
Internet	http://www.siemens.com/automation/support-request

	Americas
Phone	+1 423 262 2522
Fax	+1 423 262 2200
E-mail	mailto:techsupport.sea@siemens.com

	Asia / Pacific
Phone	+86 1064 757575
Fax	+86 1064 747474
E-mail	mailto:support.asia.automation@siemens.com

Note

Country-specific telephone numbers for technical support are provided under the following Internet address:

<http://www.automation.siemens.com/partner>

Questions about this documentation

If you have any questions (suggestions, corrections) regarding this documentation, please fax or e-mail us at:

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E-mail	mailto:docu.motioncontrol@siemens.com

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Description

1.1 Description

The SIMOTION SCOUT Configuration Manual is a general description of the software. Not all available software functions are described in this document. All detailed, subject-specific information can be found in the context-sensitive online help and the corresponding documentation.

Important notes and information on the SIMOTION Motion Control system are contained in the following catalog:

- SIMOTION, SINAMICS S120 and Motors for Production Machines, PM 21 Catalog

1.2 SIMOTION SCOUT Engineering System general

Introduction

While the Motion Control system SIMOTION provides a wide variety of preprogrammed functions, it is also parameterizable and programmable for individual requirements. High-performance tools, which provide optimum support and ease of use for the necessary engineering steps, are required for this.

The SIMOTION SCOUT Engineering System is the environment for the uniform automation of production machines with SIMOTION and integrates into the SIMATIC environment in accordance with TIA (Totally Integrated Automation).

SCOUT provides a uniform, function-oriented view for your automation task and at the same time is very easy to use.

The possible SIMOTION applications range from simple, parameterizable, speed-controlled single axes through to complex, mechatronically-coupled and programmable multi-axis machines. Therefore, SIMOTION SCOUT provides views adapted to the task and can be expanded with additional tools (e.g. tool for the graphic creation of cams).

SIMOTION SCOUT is the engineering system for SIMOTION. It is integrated into STEP 7 and provides all the required tools for the following functionalities:

- Configuration
- Parameterization
- Programming
- Testing
- Diagnostics.

The following tasks are graphically supported with operator guidance:

- Creation of the hardware and network configuration
- Creation, configuration and parameter assignment of technology objects such as axes, output cams and cams.

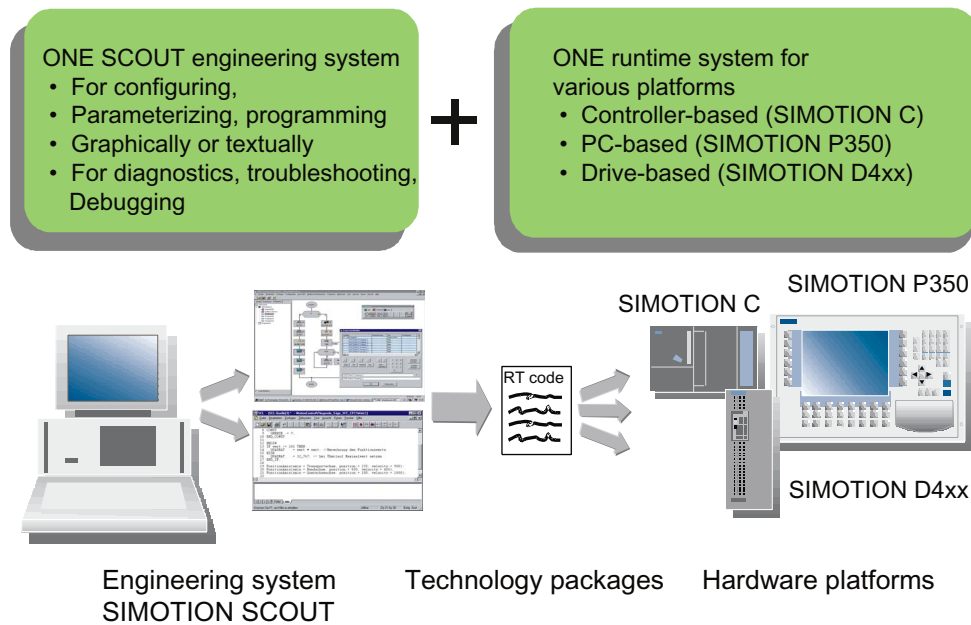


Figure 1-1 SIMOTION system overview

The automation topology is defined in the first engineering steps. The hardware and network configuration is created by parameterizing the required components and networks.

1.3 Procedure for creating the project

Steps to create a project

Machine automation is implemented step by step as the project is created:

- First create a new project.
- Create the device (SIMOTION D, SIMOTION C, SIMOTION P).
- Then, you create the system configuration that describes the structure of the automation topology:
 - Which hardware components (drives, SIMOTION hardware platform, I/O) are you going to use?
 - How are they interconnected?
- The basic parameterization of the hardware components and networks is then performed. SIMOTION SCOUT does this using two field-proven STEP 7 programs: HW Config and NetPro.
- In the next step, the technology objects are configured, supported by wizards.
- Select the programming language (MCC, ST, LAD/FBD or DCC).
- The download to the SIMOTION device is performed and
- test the machine application.

1.4 Workbench

What is the SIMOTION SCOUT workbench?

The workbench is the SIMOTION user interface and is, therefore, the common framework for all other tools in the Engineering System. The workbench is also the navigation center for the individual engineering steps. It is used to create and manage SIMOTION projects and provides a uniform and integrated view of all data and programs.

Workbench features

The workbench is:

- An integrated and intuitively operated engineering system
- Enables central data and program management, even for distributed systems
- A function-oriented, technological project structure with filterable views
- Enables quick access to individual engineering tools, such as configuration, programming, and commissioning.

You will find further information on the workbench at: Getting to know the workbench (Page 35)

1.5 Technology packages and technology objects

Technology packages in SIMOTION SCOUT

Technology packages combine software functions which are required for automation in mechanical engineering in various sectors.

The following standard technology packages are available for SIMOTION:

- TP CAM
contains the basic Motion Control technologies, such as drive axis, position axis, following axis, synchronous object, cam, output cam, cam track, and measuring input
- TP PATH
also contains the path interpolation technology
- TP CAM_EXT
contains additional objects for preparing technological data on the system level, e.g. addition object, formula object
- TControl
contains the temperature controller technology.
- DCC
contains interconnectable modules for drive-related controller functions
- More sector-specific technology packages are also available as separate products.

Access to the technology package functions is carried out via additional language commands and system variables. Programming of motional sequences is therefore simple and integrated.

The Motion Control Basic, Position and Gear technology packages were available for earlier versions.

As from SIMOTION SCOUT Version V3.2, they are contained in the Cam technology package.

Once the basic project structure has been created by the system configuration, the next step is to define the technology objects (axes, output cams, cams, etc.) required for the automation task. This defines the volume of project data that must be assigned parameters for the purpose of commissioning.

Technology objects in SIMOTION SCOUT

The technology objects (TOs) are inserted directly into the folders provided in the project navigator. These are completed with the associated parameterization tool or commissioning tool.

The next step is to program the SIMOTION devices. The SIMOTION SCOUT engineering system provides user-friendly and efficient programming languages to describe the individual functions of the machine process.

Additional references

Please refer to the following documents on these subjects

- Function Manual: SIMOTION Basic Functions
 - SIMOTION Motion Control, Basic Functions, Description of Functions for modular machines
 - Function Manual: SIMOTION Motion Control, TO Axis, Electric/Hydraulic, TO External Encoder
 - Function Manual: SIMOTION Motion Control, Synchronous Operation TO, TO Cam
 - SIMOTION Motion Control Output Cams and Measuring Inputs, Function Manual
 - Function Manual: SIMOTION Motion Control, Path Interpolation TO
 - System Manual: SIMOTION Communication
 - Function Manual: SIMOTION Motion Control, Supplementary Technology Objects
 - Configuration Manual: SIMOTION CamTool
- and the online help.

1.6 Programming languages

1.6.1 Programming languages in SIMOTION SCOUT

Access to the technology packages and functions is carried out in the same way as access to the SIMOTION Kernel via language commands from the user program.

The programming languages in SCOUT provide all of the language commands required to implement the functions simply and quickly. The SIMOTION runtime system also supports cyclic, sequential, time-controlled, and event-driven programming.

The programming languages are:

- Motion Control Chart (MCC)
If you want to program graphically, you can use MCC for sequential flowchart-oriented programming.
- Ladder Logic/Function Block Diagram (LAD/FBD)
The familiar programming methods using LAD/FBD are also available in the SCOUT Engineering System for user-friendly logic programming, supplemented with motion control functions via PLCopen function blocks.
- Structured Text (ST)
If you prefer a high-level language for your automation task, ST is available as an efficient and IEC 61131-3-compliant text-based language.
- Drive Control Chart (DCC)
Many applications require a combinatorial logic that combines several states (e.g. access control, plant states) to form a control signal (e.g. ON command) for controlling the drive system.
In addition to the logical operations, arithmetic operations and storing elements are increasingly required in drive systems.
This functionality is available as Drive Control Chart (DCC) on drive objects of the

SINAMICS drive system and the SIMOTION control system.

The Drive Control Chart Editor (DCC Editor), based on CFC, can be used to graphically configure SIMOTION controllers and SINAMICS drives.

For further information, see the chapter titled DCC Programming System (Page 100)

A variety of programming languages can be combined in a single project.

The user program is executed in various tasks. A task is a job which is executed in a certain chronological sequence. The advantage of the task system is that processes hung in the appropriate task levels can run in parallel.

The SIMOTION motion control system uses high-performance CPUs on which a realtime operating system suitable for fast control processes is implemented. Each task is allocated a slice of the computing time. The organization of the task sequences is performed by the operating system. A differentiation is made between user and system tasks that are independent of one another.

Various debug functions are possible in the programming languages. Please refer to the appropriate programming manuals for more detailed information.

1.6.2 Graphics-based flowchart programming with MCC

Motion Control Chart

The idea behind MCC is to formulate the process sequences in the machine using simple and logical expressions. The result is one or more flowcharts showing the chronological sequence of the individual actions. As production machines are primarily concerned with controlling the motion of a large number of individual axes, MCC particularly supports the simple description of these motion sequences with powerful Motion Control commands.

To control the machine, commands are available for awaiting the fulfillment of conditions and for formulating computations, as well as for executing various control structures, such as polling (IF), case determination (CASE), and loops (FOR, WHILE, UNTIL). Several MCC programs may be created to describe different process situations. For example, you can create one MCC program to bring the machine to a defined initial state when it is switched on, a second MCC program for the normal production sequence, and a third MCC program to specify what the machine is to do in the event of a fault.

All commands are available in toolbars, sorted according to command groups. Clicking a command in the toolbar automatically incorporates it at the position marked in the flow chart. Double-clicking a command in the flow chart opens a specific dialog box for assigning parameters to this command.

Performance features:

- Easy-to-use due to graphics-based representation in flowcharts.
- Hierarchical command library for Motion Control, PLC, and technology functions.
- Control structures (IF, WHILE, CASE, etc.)
- Conditions can be created in different languages. The chart can then be displayed in an arbitrary language. Plain text can be created in an MCC with the ST zoom.

- Structuring based on command modules, i.e. combination of command sequences to create a command module. Clicking the command module invokes the corresponding command sequence.
- Easy-to-use debug functions for online testing and diagnostics: E.g. single-step or program status mode for easier troubleshooting (debugging).

Additional references

Please refer to the following document on this subject

- SIMOTION MCC Motion Control Chart Programming and Operating Manual and the online help.

1.6.3 Graphics-based programming language with LAD/FBD

Ladder Logic / Function Block Diagram

LAD/FBD stand for ladder logic and function block diagram. LAD/FBD are graphics-based programming languages. The statement syntax corresponds to a circuit diagram. LAD/FBD enable simple tracking of the signal flow between power rails via inputs, outputs, and operations. LAD/FBD statements consist of elements and boxes, which are graphically connected to networks. LAD/FBD operations follow the rules of Boolean logic.

The programming language provides all the elements required for the creation of a complete user program. LAD/FBD features an extensive command set. This includes the various basic operations with a comprehensive range of operands and how to address them. The design of the functions and function blocks enables you to clearly structure the LAD/FBD program.

The LAD/FBD programming package is an integral part of the basic SIMOTION software.

Easy-to-use debug functions for online testing and diagnostics are available: E.g. monitoring of the variable values, program status and stopping points.

Additional references

Please refer to the following document on this subject

- SIMOTION LAD/FBD Programming and Operating Manual and the online help.

1.6.4 High-level language programming in ST

Structured Text

ST is a high-level, PASCAL-based programming language. This language is based on the IEC 61131-3 standard, which standardizes programming languages for programmable controllers (PLC).

The basic command scope is sufficient for the implementation of everything related to data management, arithmetic functions, control structures, and I/O access. The addition of technology packages for Motion Control expands the scope of commands by further comprehensive, extremely flexible Motion Control commands (e.g.: `_pos(..)` for axis positioning).

In addition, applications can be subdivided into any number of sections. Such a section might be a program allocated to a runtime level, an instantiatable function block with its own memory, or a function without its own memory. In this case, the function blocks and functions are not allocated to a runtime level, but are instead called in programs.

- Motion control, PLC and technology functions in a single language
- Well structured programs with comment capability
- High-performance editor functions, such as
 - Syntax coloring
 - Automatic indenting
 - Automatic completion
 - Bookmarks
 - Fold (show and hide blocks)
 - Display pairs of brackets
 - Select text, e.g. by column
 - Using the command library
- Easy-to-use debug functions for online testing and diagnostics: e.g. display of up-to-date variable content of the code sequence selected in the editor (program status) and stopping points.

Additional references

Please refer to the following document on this subject

- SIMOTION ST Structured Text Programming and Operating Manual and the online help.

1.7 CamEdit cam editor

CamEdit can be used to describe curves by means of either interpolation points or segments. A combination is not possible. If the curve is to be created from segments using polynomials, SIMOTION SCOUT provides the VDI wizard to assist in creation of the curve. Cam geometries are created in offline mode.

Information on the graphical creation of cams can be found in the CamTool (Page 100) section.

Installing software

2.1 System requirements

2.1.1 Installing the interface card

Installing the interface card in the PG/PC

An interface card must be installed in the PG/PC so that the SIMOTION device can communicate with the PG/PC. This applies only to PROFIBUS.

To use Ethernet, an Ethernet connection must be present on the PC.

The PG/PC is used for the configuration, parameterization and testing.

- Install the interface card in the PG/PC according to the installation guide provided.
- Install the appropriate drivers on the PG/PC.
- Connect the interface card to the interface of the SIMOTION device indicated below using a suitable cable.

Table 2- 1 Interface assignment for SIMOTION devices

SIMOTION device	Interface	As delivered
SIMOTION C2xx	X8 DP1 X9 DP2/MPI X7 (Ethernet)	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s IP address: 169.254.11.22 Subnet: 255.255.0.0
SIMOTION C240 PN	X8 DP1 X9 DP2/MPI X7 (Ethernet) X11 (1 PROFINET interface with 3 ports)	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s IP address: 169.254.11.22 Subnet: 255.255.0.0 Supplied without IP address and subnet.
SIMOTION P350	X101 DP1 X102 DP2/MPI Ethernet	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s IP address: 169.254.11.22
SIMOTION P350-3 PB	X101 DP1 X102 DP2/MPI Ethernet SS1 Ethernet SS2	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s IP address: 169.254.11.22 Subnet: 255.255.0.0 IP address: 192.168.214.1 Subnet: 255.255.255.0

2.1 System requirements

SIMOTION device	Interface	As delivered
SIMOTION P350-3 PN	X21 MCI-PN (1 PROFINET interface with 4 ports) Ethernet SS1 Ethernet SS2	Supplied without IP address and subnet. IP address: 169.254.11.22 Subnet: 255.255.0.0 IP address: 192.168.214.1 Subnet: 255.255.255.0
SIMOTION D4x5	X126 DP1, X136 DP2/MPI X120 IE1/OP (Ethernet) X130 IE2/NET (Ethernet) With optionally inserted CBE30: X1400 (1 PROFINET interface with 4 ports)	PROFIBUS address 2, baud rate 1.5 Mbit/s PROFIBUS address 2, baud rate 1.5 Mbit/s IP address: 192.168.214.1 Subnet: 255.255.255.0 IP address: 169.254.11.22 Subnet: 255.255.0.0 Supplied without IP address and subnet.
SIMOTION D410 DP	X21 DP	PROFIBUS address 2, baud rate 1.5 Mbit/s
SIMOTION D410 PN	X200 and X201 (1 PROFINET – interface with 2 ports)	Supplied without IP address and subnet.

2.1.2 Configuring the interface card

Configuring the interface card

Proceed as follows:

1. Start SIMOTION SCOUT.
2. Select the menu **Tools > Set PG/PC interface**.
The Set PG/PC Interface window opens.

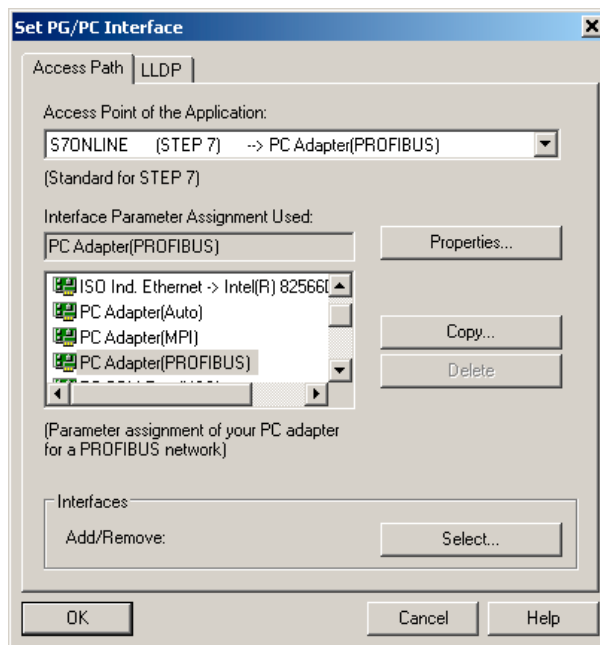


Figure 2-1 Set PG/PC interface (example)

3. Select the access point of the application.
4. Click **Select**.
The Install/Uninstall Interfaces window appears.

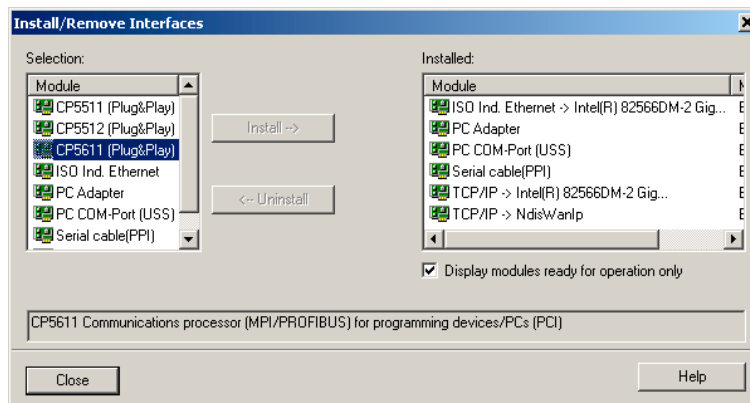


Figure 2-2 Installing / deinstalling interfaces

5. Select the module to be installed.

6. Click **Install**.
7. Click **Close** to exit the dialog.
8. Confirm the settings by clicking **OK**.

Installing / deinstalling other interfaces

Proceed as follows to install or uninstall additional interfaces:

1. In the **Set PG/PC Interface** window, select **S7ONLINE** as the access point of the application.
2. Click **Select** under **Add/remove interfaces**.
3. In the left-hand field, select the interface that you want to install and click **Install**.
Or select the interface that you want to uninstall in the right-hand field and click **Uninstall**.
4. Click **Close**.
5. Select the interface to be used in the **Used interface parameterization** field.

The list of the used interface parameterization will be taken from SIMATIC STEP 7.

With the PC Adapter (Auto) setting, the interface to which the PG/PC is connected is examined. This function automatically determines the current parameterization of the respective interface.

Detailed information on the individual interfaces of the SIMOTION devices can be found in the relevant commissioning manuals.

6. Click **Properties** to parameterize the interface.
7. Click **OK** to confirm.

2.1.3 Defining the interface

Defining the interface

The interface is defined uniquely when you insert a SIMOTION device. If you make changes to the project so that the interface is no longer unique, you can modify the setting.

Note

SIMOTION devices have two PROFIBUS connections. Defining the associated PROFIBUS connection speeds up online operation with the device.

Proceed as follows in offline mode:

1. Open the project.
2. Select the SIMOTION device, e.g. C230-2, in the project navigator.
3. Right-click and select **Target device > Online access...** in the context menu.
The **Properties - Program (Online)** window opens.
If you have defined the interface uniquely, you cannot make any settings in this window.
4. Select **Module Addresses** on the tab. The IP address of the SIMOTION device is displayed here.
5. Click **OK** to close the dialog.

2.1.4 Communication via PROFIBUS DP

PROFIBUS is a powerful, open, and robust bus system, which guarantees trouble-free communication. The system is fully standardized, which enables trouble-free connection of standardized components from a variety of manufacturers. Configuration, commissioning, and troubleshooting can be carried out from any side. This results in user-defined communication relationships that are very versatile, simple to implement, and easy to change.

The high-speed, cyclic exchange of data with field devices (distributed I/O) is carried out via the PROFIBUS DP protocol. Expansion of the protocol to include isochronous mode also integrates the drive components into communication via PROFIBUS DP. The individual components can be connected via the integrated interfaces, connections, interface modules or communications processors.

Important information on communication with PROFIBUS is contained in the following catalog:

SIMOTION, SINAMICS S120 and Motors for Production Machines, PM 21 Catalog

The following PROFIBUS DP subnet applications are possible:

- PROFIBUS DP isochronous

Compatible extension to the standard PROFIBUS DP:

- Equidistance (constant synchronous bus cycle clock) enables synchronized time slices for master/slave applications.
- Data exchange broadcast enables slave-to-slave communication.

Digital drives (e.g. SIMODRIVE 611U, MICROMASTER 4xx, SINAMICS) can be connected via PROFIBUS DP.

In order to be able to operate the SIMOTION device with two isochronous PROFIBUS DP subnets, isochronous mode and the same bus cycle must be set. The cycle clock of the subnet of the second PROFIBUS interface is synchronized to the cycle clock of the subnet of the first PROFIBUS interface.

If the bus cycle does not agree, the second PROFIBUS interface of the SIMOTION device will be operated as a PROFIBUS DP subnet.

- PROFIBUS DP (MPI)

Standard PROFIBUS DP with DP-V0 and optional DP-V1 or DP-V2 functionality.

- For the connection of distributed I/Os
- For connection to a higher-level automation system
- For the connection of HMI devices
- For connection to the SCOUT engineering system

2.1.5 Ethernet communication

SIMOTION devices can also be connected to a PG/PC via Industrial Ethernet. Industrial Ethernet is a communication network with a transmission rate of 100 Mbit/s.

For additional information, refer to the manual titled SIMATIC NET, Industrial Twisted Pair and Fiber Optic Networks. See the list of references for the order number.

Examples for the use of Industrial Ethernet:

- For the connection of HMI devices
- For connection to the SCOUT engineering system
- For communication via UDP (User Datagram Protocol)
- TCP/IP
- IT DIAG

2.1.6 Communication via PROFINET

SIMOTION devices can be connected to a PROFINET subnet via interface modules. With PROFINET IO IRT/RT, IT services can be performed in parallel to realtime communication via an Ethernet cable. The PROFINET modules CBE20, CBE30 and MCI-PN-BOARD are available. These PROFINET modules support the parallel operation of:

- IRT (isochronous realtime Ethernet)
- RT (realtime Ethernet)
- TCP/IP, UDP, http . . . (standard Ethernet services)
- For mixed operation of IRT and RT it has to be observed that the IRT-compatible devices must form an IRT domain, i.e. there must not be any non-IRT devices on the data transmission link between the IRT devices.

Additional references

Please refer to the following documents on this subject

- SIMOTION D4x5 Commissioning and Hardware Installation Manual
- SIMOTION D410 Commissioning Manual
- SIMOTION P, P350-3 and Panels Commissioning and Hardware Installation Manual
- SIMOTION C Operating Instructions
- System Manual: SIMOTION Communication

and the online help.

2.2 System requirements for SCOUT and SCOUT Standalone

Minimum requirements of the system

Table 2- 2 System requirements for SIMOTION SCOUT and SCOUT Standalone

	Minimum requirement
Programming device or PC	<ul style="list-style-type: none"> • Processor: Intel Pentium III or compatible, 1 GHz (Windows XP) • 512 MB RAM • Screen resolution: 1024 x 768 pixels • 16-bit color depth • * Main memory with at least 1 GB is recommended If you wish to process more comprehensive SIMOTION projects with several modules, you should use a programming device or PC with state-of-the-art performance. • When installing WinCC flexible (ES), observe the relevant system requirements and use a programming device or a PC with state-of-the-art performance. • One of the following cards must be used as software access point (CP5511, etc.): <ul style="list-style-type: none"> – A CP5611 PROFIBUS card for a standard PC – An integrated PROFIBUS card for a programming device or – An Ethernet connection
Operating system	<ul style="list-style-type: none"> • Microsoft Windows XP Professional with Service Pack 3 • Microsoft Windows Vista Business SP1
Software required for SIMOTION SCOUT	<ul style="list-style-type: none"> • Microsoft Internet Explorer Version 6.0 • SIMATIC STEP 7 Version 5.4 SP4 or SP5 • For PROFINET connection SIMATIC STEP 7 Version 5.4 SP4
Software required for SIMOTION SCOUT Standalone	<ul style="list-style-type: none"> • Microsoft Internet Explorer Version 6.0 • SIMATIC STEP 7 Version 5.4 SP5

Note

Simultaneous operation of SIMOTION SCOUT, Starter and SIMATIC S7-Technology on one PC is not intended and is not possible.

SIMATIC S7-Technology is integrated in SIMOTION SCOUT V4.0 and higher.

2.3 To install the software

2.3.1 Installing SIMOTION SCOUT

Requirements:

- SIMATIC STEP 7 is installed.
- You are logged on to the operating system with administrator rights.

Note

Read the readme file and important information on the Add-On CD supplied with SCOUT.

To install SIMOTION SCOUT

1. Insert the DVD 1 with SIMOTION SCOUT into the CD-ROM drive.
2. Start Windows Explorer and select the CD-ROM drive.
3. Open the root directory on the DVD.
4. Double-click **Setup.exe**.
5. Now follow the instructions in the installation program.

The installation program prompts you to insert or connect the supplied data medium which contains the authorization. You can install the authorization as part of this setup. Or install the authorization with the Automation License Manager after installing SIMOTION SCOUT.

Information on this can be found in the section "To install the authorization".

6. If a restart of the PC is required during the installation, carry this out.
After the restart of the operating system, log on at least as main user.
7. After the installation:
Restart the PC and log on at least as main user.

All users who are logged on as main user are now able to start and operate SIMOTION SCOUT.

Note

Simultaneous operation of SIMOTION SCOUT, STARTER and SIMATIC S7-Technology on one PC is not intended and is not possible.

Language setting of the SIMOTION SCOUT

SIMOTION SCOUT uses the language default setting in the SIMATIC Manager. You can make changes to this setting in the SIMATIC Manager via the **Options > Settings... > Language** menu.

German, English, French and Italian languages are currently available in SIMOTION SCOUT. If a different language is set in the SIMATIC Manager, SIMOTION SCOUT uses the English setting.

Note

Only those languages installed in STEP 7 are available.

2.3.2 Installing SIMOTION SCOUT Standalone

Requirements

- No SIMATIC STEP7 must be installed or
- a previous version of SIMOTION SCOUT Standalone is installed.
- You are logged on to the operating system with administrator rights.

Note

Read the readme file and important information on the Add-On CD supplied with SCOUT.

To install SIMOTION SCOUT Standalone

1. Insert DVD 1 with SIMOTION SCOUT Standalone into the CD-ROM drive.
2. Start Windows Explorer and select the CD-ROM drive.
3. Open the root directory on the DVD.
4. Double-click **Setup.exe**.
5. Now follow the instructions in the installation program.

The installation program prompts you to insert or connect the supplied data medium which contains the authorization. You can install the authorization as part of this setup. Or install the authorization with the Automation License Manager after installing SIMOTION SCOUT.

Information on this can be found in the section titled "How to install the authorization".

6. A restart of the PC is required during the installation, carry this out. You are requested to insert CD"/".
After the restart of the operating system, log on at least as main user.
7. After the installation:
Restart the PC and log on at least as main user.

All users who are logged on as main user are now able to start and operate SIMOTION SCOUT.

2.4 To install the authorization

Installing the authorization for SIMOTION SCOUT

A data medium containing the authorization is supplied along with the product CD so that you can use SIMOTION SCOUT. This contains the license key for the SIMOTION SCOUT Engineering System.

To install the authorization for SIMOTION SCOUT

1. Connect or insert the data medium containing the authorization and the license key.
2. Start the Automation License Manager:
 - Via the start menu
Start > SIMATIC > License Management > Automation License Manager or
 - Double-click the **Automation License Manager** icon
3. In the navigation area (left-hand window), select the drive where the data medium containing the authorization is located. The license key is displayed in the right-hand window.
4. Mark the license key and drag this with drag-and-drop to the target drive.
5. Exit the Automation License Manager.
6. Remove the data medium containing the authorization.

Note

Information on operating the Automation License Manager and transferring the license key can be found in the online help for the Automation License Manager.

To install the authorization for SIMOTION SCOUT Standalone

Install the authorization for SIMOTION SCOUT Standalone as described in the **Installing authorization for SIMOTION SCOUT** section.

To upgrade the authorization for SIMOTION SCOUT

As of Version 4.0, the authorization for SIMOTION SCOUT has been upgraded from authorization (*single license*) to the licensing procedure involving a *floating license*. The Automation License Manager program is used to manage the licenses.

1. Connect or insert the data medium containing the authorization and the upgrade license key.
2. Start the Automation License Manager:
 - Via the start menu
Start > SIMATIC > License Management > Automation License Manager or
 - Double-click on the **Automation License Manager** icon. A new window will open.

3. In the navigation area (left-hand window), select the drive where the authorization for the old version of SIMOTION SCOUT is located. Generally the authorization will be installed on a hard disk drive on the PC.
4. Transfer the authorization to the data medium containing the upgrade license key. To do this, select the license in the right-hand window and select **License key > Transfer...** via the menu.
5. In the **Transfer license key** dialog, select the connected data medium. Start the transfer by clicking **OK**.
The authorization and upgrade license key will then be located on the data medium.
6. Select **License key > Upgrade...** in the menu.
The previous authorization will be deleted and a new *floating license* will be available once the upgrade is complete.

Note

Do not interrupt the upgrade while it is in progress. Interrupting this process can lead to the license key being lost.

7. Now transfer the new floating license onto the hard disk drive. To do this, follow the same procedure as before: Via **License key > Transfer...** in the menu
8. After the transfer has completed successfully, remove the automation data medium.
9. Exit the Automation License Manager. SIMOTION SCOUT can now be operated without restrictions.

2.5 Saving and moving the license key

Saving and moving the license key

You can transfer the license key to a removable disk. This is useful when you want to save the license key when reinstalling a PC or when you want to use it on another PC. A copy of the license key is not created during this operation, it is moved.

Note

More detailed information on the license keys can be found in the online help for the Automation License Manager.

2.6 To uninstall the software

Requirements:

You are logged on to the operating system with administrator rights.

Note

Note that the SIMATIC STEP7 must be uninstalled separately.

To uninstall SIMOTION SCOUT from the hard disk

1. Open the system control via **Start > Settings > System control**.
2. Double-click **Software**.
3. Select **SIMOTION SCOUT x.x** and click **Change/Remove** or **Add/Remove**. Follow the instructions.
4. Once the above software has been uninstalled, restart the computer.

Uninstalling SIMOTION SCOUT Standalone

Uninstall SIMOTION SCOUT Standalone as described in the "How to uninstall SIMOTION SCOUT from the hard disk" section.

2.7 Software upgrade

Note

Install a SIMOTION SCOUT upgrade as described in the How to install the software (Page 30) section.

Functions

3.1 Getting to know the workbench

Additional references

Please refer to the following documents on this subject

- Function Manual: SIMOTION Basic Functions
- Function Manual: SIMOTION Motion Control, TO Axis, Electric/Hydraulic, TO External Encoder
- Function Manual: SIMOTION Motion Control, Synchronous Operation TO, TO Cam
- Function Manual: SIMOTION Motion Control, Supplementary Technology Objects
- Function Manual: SIMOTION Motion Control Output Cams and Measuring Inputs
- Function Manual: SIMOTION Motion Control, Path Interpolation TO
- Function Manual: SIMOTION Motion Control, Basic Functions for Modular Machines and the SIMOTION SCOUT online help.

Note

We recommend that you run through *Getting Started with SIMOTION SCOUT* in the online help. This is a series of guided steps which teaches you how to work with SIMOTION SCOUT. For example, how to create, compile and save a project, create a SIMOTION device, add and configure a technology object and create a program. When you have worked through all these steps, you will be able to create more complex projects.

Note

It is not recommended that you open **one** SIMOTION SCOUT project twice. This application case can result in malfunctions and is not supported by SIMOTION SCOUT. If you want to open two different projects, you must open SIMOTION SCOUT twice.

The SIMOTION workbench

The SCOUT workbench is the common framework for all other tools of the engineering system. The workbench is also the navigation center for the individual engineering steps. It is used to create and manage SIMOTION projects and provides a uniform and integrated view of all data and programs.

The SCOUT workbench offers a basic display split into three views:

- **Project navigator** (left Workbench area)
The project navigator shows the technical tree structure of the project.
- **Working area** (right-hand area of the workbench)
All editing tools of the engineering system, e.g. parameterization dialog boxes, program editors etc. are available in the working area as snap-ins.
A snap-in is a program that is automatically integrated in the working area of the SIMOTION SCOUT workbench. Snap-ins provide functions for the editing of SIMOTION SCOUT projects. Snap-ins are displayed in the working area of the workbench as working windows. Several snap-ins can be opened in order to be able to work in these. The opened snap-ins are displayed as tabs in the working area. The active snap-in is visible in the foreground. Examples are:
 - Program editors:
 - Wizards for the configuration of technology objects
 - Device diagnostics
 - Drive navigator
- **Detail view** (lower area of the workbench)
The detail view displays data and messages that vary according to the situation.

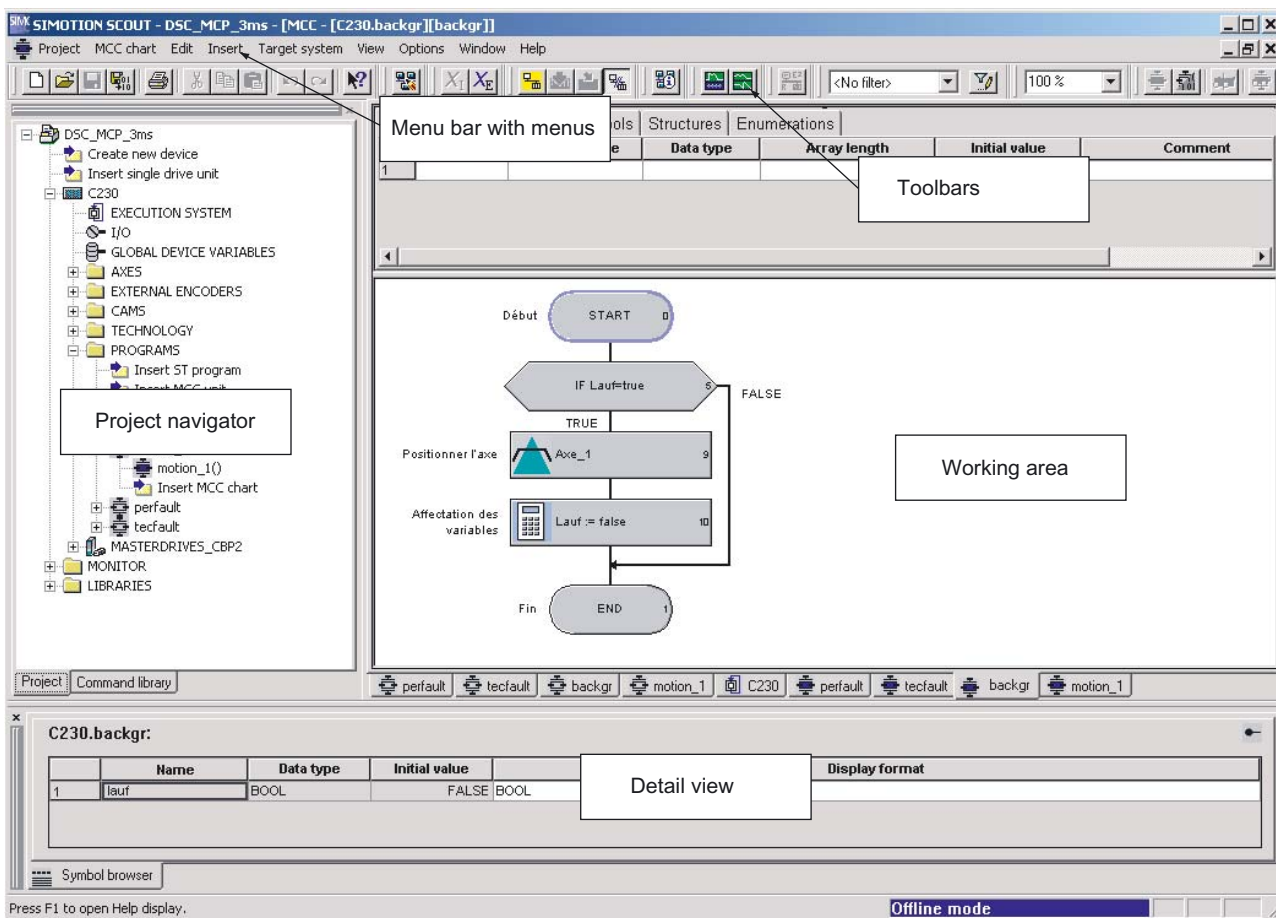


Figure 3-1 Workbench view

Workbench elements

The elements of the Workbench are:

- Menu bar:**
 You call the functions of SIMOTION SCOUT via the menus in the menu bar.
- Toolbars:**
 Frequently used menu commands are also available in toolbars, which can be activated or deactivated as required. These provide quick access to the functions. The toolbars can be undocked from the top and relocated to a different position (right, left, lower border or as a window).
- Project navigator:**
 The project navigator provides an overview of the entire project. All defined elements, such as devices, drives, axes, etc., are displayed here in a tree structure.

- Working area:**
 The task-specific windows are displayed in the working area. In these windows, you can perform the configuration with wizards for the axis configuration and drive configuration. You also create programs in the working area. Further information about the active window in the working area is provided in the detail view.
- Detail view**
 More detailed information about the element selected (marked) in the project navigator or the active window in the working area is displayed in the detail view. For example, variables of a program, system variables of a technology object or logs during the compilation of program sources.

3.2 Menu structure

3.2.1 Main menus

The SIMOTION SCOUT menus are divided into different main menus.

- Main menus that are primarily used to control the workbench or a project are always displayed. These main menus are also called static menus.
- In addition, the **Edit** and **Insert** main menus are continually displayed if a project has been loaded.
- The main menu in the second position, between **Project** and **Edit**, is a dynamic menu. Each snap-in supplies its own specific main menu to be displayed in this position. Always the main menu that has been selected in the project navigator and therefore active in the working area is displayed.
 In addition, each snap-in can incorporate its own menu items in the static main menus, primarily in the **Edit** and **Insert** main menus.

Table 3- 1 Structure of the menu bar

Menu	Comment
Project	Static menu, always visible
(Dynamic menu)	See Dynamic menus table
Edit	Static menu, visible only when project has been loaded
Insert	Static menu, visible only when project has been loaded
Target system	Static menu, always visible
View	Static menu, always visible
Options	Static menu, always visible
Window	Static menu, always visible
Help	Static menu, always visible

Table 3- 2 Dynamic menus

Dynamic menu	Comment
Axis	Visible only when a project has been loaded and the associated snap-in is active in the working area. Dynamic menus appear in the third position on the menu bar, between Edit and Insert.
Output cam	
Measuring input	
Synchronous operation	
Cam	
External encoder	
Sensor	
Controller object	
Drive	
Fixed gear	
Formula object	
Addition object	
Drive control panel	
Trace	
ST source file	
MCC unit	Visible only when a project has been loaded and the associated snap-in is active in the working area. Dynamic menus appear in the second position on the menu bar, between Project and Edit.
MCC chart	
LAD/FBD source	
LAD/FBD program	

3.2.2 Keyboard action and shortcuts

Note

There are various keyboard assignments and shortcuts for the menu items to facilitate your work in SIMOTION SCOUT.

The following table provides an overview of the keyboard assignments and shortcuts that you can use for SIMOTION SCOUT.

Table 3- 3 Keyboard action

Keyboard action / shortcuts	Meaning
Workbench: Change window...	
ALT+0	Project navigator
ALT+1	Working area
ALT+2	Detail view
CTRL+F6	Next window in the working area
CTRL+F11	Minimize/maximize working area in relation to the whole desktop
CTRL+F12	Minimize/maximize detail view in relation to the whole desktop

Project navigator	
Left mouse button	Selects the tree object at the cursor position; detail view displays the associated details
Double-click with left mouse button	Selects the tree object at the cursor position; detail view displays the associated details; corresponding snap-in is opened
Right mouse button	Selects the tree object at the cursor position; detail view displays the associated details; context menu is opened
UP/DOWN arrow keys	Selects the tree object at the cursor position
"Return"	Snap-in for the selected tree object opens
"Context menu key"	Context menu for the selected tree object opens

3.2.3 Menu items

You can use the shortcuts listed in the table to call the menu items available in SIMOTION SCOUT.

Table 3- 4 Menu items in SIMOTION SCOUT

Shortcuts	Menu item	Reaction
Project...		
CTRL+N	New	Creates a new project
CTRL+O	Open	Opens a project
Ctrl+S	Save	Saves a project
CTRL+ALT+K	Check consistency	Checks project consistency
CTRL+P	Print	Prints the selected window
ALT+F4	Exit	Exits the SIMOTION SCOUT program

Shortcuts	Menu item	Reaction
Edit...		
Ctrl+Z	Undo	Undoes the last action
Ctrl+Y	Redo	Redoes the last action
Ctrl+X	Cut	Cuts the selection
Ctrl+C	Copy	Copies the selection
Ctrl+V	Paste	Inserts the clipboard contents
Del	Delete	Deletes the selection
F2	Rename	Renames the selected tree object
ALT+Enter	Object properties	Displays the properties of an object in the project tree
CTRL+ALT+O	Open object	Opens a new object of the selected tree object
Ctrl+A	Select all	Selects the entire contents in the ST and MCC snap-ins

CTRL+F	Find	Opens the Find window
CTRL+SHIFT+F	Searching in the project	Opens the Find window

CTRL+H	Replace	Opens the Replace window
CTRL+J	Display next position	

Shortcuts	Menu item	Reaction
Target system...		
CTRL+L	Download / target device	Downloads to individual target device
CTRL+D Only possible in online mode	Device diagnostics	Opens device diagnostics
CTRL+I Only possible in online mode	Control operating mode	Opens the dialog box for control of the operating mode

Shortcuts	Menu item	Reaction
View...		
CTRL+F11	Maximize working area	Maximizes and minimizes the view of the working area
CTRL+F12	Maximize detail view	Maximizes and minimizes the view of the detail view
CTRL+Num+ (Plus key on the numeric keypad)	Zoom in	Magnifies the diagram in MCC
CTRL+Num- (Minus key on the numeric keypad)	Zoom out	Reduces the diagram in MCC
F5	Refresh	Refreshes the view

Shortcuts	Menu item	Reaction
Options...		
CTRL+ALT+E	Settings	Opens the Properties window

Shortcuts	Menu item	Reaction
Window...		
CTRL+SHIFT+F5	Arrange cascading	Arranges the opened windows in the working area
CTRL+SHIFT+F3	Arrange vertically	

Shortcuts	Menu item	Reaction
Snap-in menu...		
CTRL+F4	Close	Closes the selected window
CTRL+B	Accept and compile	Compiles the active object
CTRL+E	Expert list	Opens the expert list for the current technology object

Shortcuts	Menu item	Reaction
ST source file		
Ctrl+space		Automatic completion
Ctrl+F2		Set and delete bookmarks
Ctrl+F4	ST source file > Close	Close ST source file
Ctrl+F7	ST source file > Program status on/off	Switches the program status function on or off
Ctrl+Shift+F2		Delete all bookmarks in the ST source file
Ctrl+Shift+F3		Arrange windows, tile horizontally
Ctrl+Shift+F5		Arrange windows, tile vertically
Ctrl+Shift+F8		Format selected area
Ctrl+Shift+F9		Move cursor to the start of the current or higher-level block
Ctrl+Shift+F10		Move cursor to the end of the current block
Ctrl+Shift+F11		Move cursor to the start of the higher-level block, 1st level
Ctrl+Shift+F12		Move cursor to the start of the higher-level block, 2nd level
Ctrl+Alt+B		Display bracket pairs in the current ST source file
Ctrl+Alt+C		Folding: Hide all blocks of the current ST source file
Ctrl+Alt+D		Folding: Display all blocks of the current ST source file
Ctrl+Alt+F		Folding: Display or hide folding information in the current ST source file
Ctrl+Alt+I		Display indentation level in the current ST source file
Ctrl+Alt+L		Display or hide line numbers in the current ST source file
Ctrl+Alt+R		Folding: Display all subordinate blocks
Ctrl+Alt+T		Folding: Show/hide block.
Ctrl+Alt+V		Folding: Hide all subordinate blocks
Ctrl+Alt+W		Display or hide spaces and tabs in the current ST source file
Ctrl+ADD (numeric keypad)		Increase font size in the current ST source file

Shortcuts	Menu item	Reaction
ST source file		
Ctrl+MINUS (numeric keypad)		Decrease font size in the current ST source file
Ctrl+DIV (numeric keypad)		Increase font size in the current ST source file to 100%
Alt+Shift+arrow key		Select text by column
Alt+Shift+L		Change selected text to upper case
Alt+Shift+U		Change selected text to lower case

Shortcuts	Menu item	Reaction
MCC		
CTRL+F4	Close	Closes the MCC unit
ALT+Enter	Properties	Opens the MCC Unit Properties window
CTRL+R	Insert MCC chart	Insert a new MCC chart
CTRL+F7	Program status	Switches monitoring on/off
CTRL+F8	Monitor	
CTRL+F9	Single-step	
CTRL+F10	Next step	
Return	–	Opens the MCC configuration dialog
Arrow keys	–	Changes within the tab

Shortcuts	Menu item	Reaction
LAD/FBD (source or program)		
CTRL+F4	Close	Closes the MCC unit
ALT+Enter	Properties	Opens the MCC Unit Properties window
CTRL+R	LAD/FBD source: Insert LAD/FBD program LAD/FBD program: Insert network	Inserts a new LAD/FBD program
CTRL+L	Jump label On/Off	Switches jump labels on and off
CTRL+SHIFT+K	Display/comment On/Off	Switches comments on and off
CTRL+SHIFT+B	All box parameters	Displays all box parameters
CTRL+T	Symbol check and type update	Performs symbol check and type update
CTRL+F7	Program status	Switches monitoring on/off
F2 for LAD F2 for FBD	Insert element / Insert make contact element / AND box	Inserts a make contact Inserts an AND box
F3 for LAD F3 for FBD	Insert element / Insert break contact element / OR box	Inserts a break contact Inserts an OR box

3.2 Menu structure

Shortcuts	Menu item	Reaction
LAD/FBD (source or program)		
F7 for LAD	Add element/Add coil	Adds a coil
F7 for FBD	Add element/Assignment	Adds an assignment
F8 for LAD	Insert element / Insert Open branch element / Insert binary input	Inserts an Open branch
F8 for FBD	Insert element / Insert Open branch element / Insert binary input	Inserts a binary input
F9 for LAD	Insert element / Insert Close branch element / Invert binary input	Inserts a Close branch
F9 for FBD	Insert element / Insert Close branch element / Invert binary input	Inverts the binary input
ALT+F9	Insert element / empty box	
Ctrl + 3 Ctrl + 1	Switch to FBD Switch to LAD	Switches the display

Shortcuts	Menu item	Reaction
Help...		
SHIFT+F1	Context-sensitive help	Opens the context-sensitive help function for the selected object, parameter, etc.

Shortcuts	Menu item	Reaction
Hardware configuration...		
CTRL+U (In HW Config)	Address overview	Opens the Address Overview window
F4	Optimize layout	

Shortcuts	Menu item	Reaction
Drive control panel		
F8	Enable (bit 1 to bit 6) - PC	Enables or disables controller

3.2.4 Using context menus

The tree elements of the project navigator have context menus. These provide quick access to all major functions enabled for this tree element.

To call up a function for the tree element via context menus, proceed as follows:

1. Left-click the relevant tree element in the project navigator.
2. Right-click.
3. Left-click the appropriate menu item.

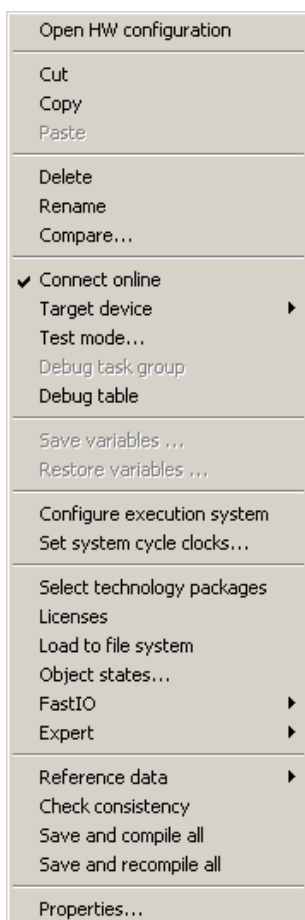


Figure 3-2 Example of a context menu

3.3 Project navigator

3.3.1 Using the project navigator

The project navigator in the SIMOTION SCOUT workbench

As standard, the project navigator has two tabs, the Project and Command library tabs.

The Project tab displays the entire project structure and is used for managing elements within the projects.

The commands and functions required for the programming are displayed in the Command library tab. You can search in the command library or set filters. You can use commands and functions in the ST, LAD/FBD and MCC programming languages, e.g. for the creation of conditions. In the MCC programming language, the functions are used, e.g. via the ST zoom or the system function call command.

3.3.2 Creating elements

Elements in SIMOTION SCOUT

There are two different ways to insert elements in the project navigator tree:

Inserting hardware

Integrate hardware using:

- SIMOTION device element: **Create new device**

Alternatively, you can also call up the **Insert > Hardware** menu.

- Drive element: **Insert single drive unit**

Note

You can insert a standalone drive (e.g. SINAMICS S120) with the **Insert single drive unit** element in the project navigator. It is commissioned using wizards in the working area of the workbench that contains the Starter functionality.

Elements within a SIMOTION device

Create the following elements within a SIMOTION device directly in the project navigator:

- Technology objects, e.g.:
Axes, external encoders, cams, measuring inputs, output cams, synchronous operation, temperature channels, path objects
- Programs:
 - Insert ST program
 - Insert MCC unit
 - Insert DCC charts
 - Insert LAD/FBD unit

Other elements are created automatically, e.g.

- When creating a project:
 - LIBRARIES: Insert library/DCC library
 - MONITOR: Insert watch table
- When inserting a SIMOTION device:
 - **AXES, EXTERNAL ENCODERS, PATH OBJECTS, CAMS, TECHNOLOGY, PROGRAMS** folders
 - EXECUTION SYSTEM, I/O, GLOBAL DEVICE VARIABLES elements
- When creating an axis:
 - **MEASURING INPUTS, OUTPUT CAMS** folders
 - Access to the configuration views
- Additionally when creating a following axis:
 - Synchronous operation element

Displaying the station level of a SIMOTION device

The function provides a better transparency in large SIMOTION SCOUT projects. A project with several SIMOTION devices and a large number of drives can be displayed in a structure. The assignment in station levels, as is well known from SIMATIC STEP7, is used.

Note

Optionally, the associated SIMATIC station of the SIMOTION device in the project navigator can be displayed. In this way, all drive units that are assigned to a SIMATIC station are also displayed in this structure.

Proceed as follows to activate or deactivate this function:

1. In the SIMOTION SCOUT, click the **Options > Settings** function.
2. Click the **Workbench** tab.
3. Activate/deactivate the **Display station level** function.
The project must be reopened for this to take effect.
When the function is activated, all drive units associated with a STEP7 station are also displayed under this station.
When the function is deactivated, all drive units are displayed under the project.
4. Click **OK** to confirm the change.

Opening HW Config of a SIMOTION device

To call up the hardware configuration of a previously inserted SIMOTION device:

- Select the required SIMOTION device in the project navigator and select **Insert > Hardware** in the menu, or
- In the project navigator, double-click the SIMOTION device whose hardware configuration you wish to open or
- Select the desired SIMOTION device in the project navigator, open the shortcut menu and click **Open HW configuration**.

Inserting a single drive unit

To open the **Insert single drive** element (e.g. MM4):

- In the project navigator, double-click **Insert single drive unit**.

Inserting elements within a SIMOTION device

To insert technology objects, source files, or watch tables:

1. Open the SIMOTION device under which the element is to be created.
2. Select the relevant folder (e.g. **AXES, PROGRAMS**).
3. Select the desired function, e.g.:
 - **Insert > Technology object > ...** menu or
 - **Insert > Program > ...** menu or
 - **Insert > Watch table** menu

3.3.3 Changing properties of the elements

You can change the properties of various elements as follows:

 CAUTION
--

Changing a name can have far-reaching consequences. References to the axis, particularly in programs, are lost. This can cause runtime errors in the program. Make sure that you also change all name references.

1. In the project navigator, select the element to be edited, e.g. a specific axis or a specific program.
2. Select the menu: **Edit > Object properties**.

Note

You define the hardware properties in the hardware configuration.

To rename an element:

1. Select the element you wish to rename in the project navigator.
2. Open the shortcut menu and select **Rename**.
3. Confirm the warning message.
4. Enter a new name and confirm the input by pressing the **Enter** key.

3.3.4 Wizards for configuration support

Wizards are provided to assist you in configuring axes and external encoders. The wizards guide you step-by-step through the configuration. Parameter interdependencies are taken into account.

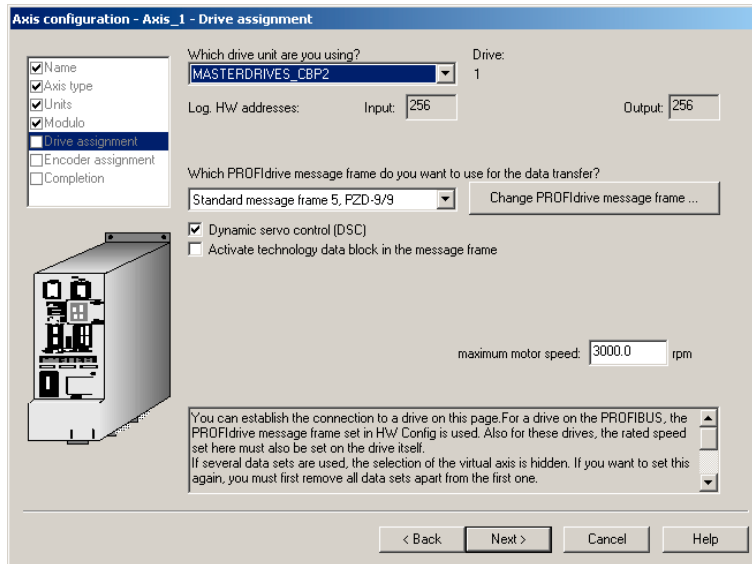


Figure 3-3 Axis configuration wizard - window for drive assignment

3.4 Using the working area

The workbench displays all of the snap-in working windows in the working area. Each snap-in provides its own working window. You can open multiple instances of these windows. You can, for example, open several programs at the same time for editing. For further information, refer to the online help.

Using windows in the working area

You can change the size of the windows in the working area:

Click on the edge of the window, hold down the left mouse button, and drag the window to the required size.

You can maximize or minimize each window using the shortcut CTRL+F11.

Each window opened in the working area can be accessed via a tab at the bottom edge of the working area. To bring a window into the foreground:

- Click on the relevant tab or
- Select the appropriate entry in the **Window** menu.

To close the window:

- Configuration dialog boxes: Click **Close**.
- Editors for MCC, ST and LAD/FBD:
Click the **X** button in the top right-hand corner.

3.5 Detail view

3.5.1 Using the detail view

When you select an element in the project navigator, the associated detail view will appear in the lower area of the workbench.

Various tabs are available depending on the element selected. The tabs available are determined by the project mode (offline/online) and the active snap-ins.

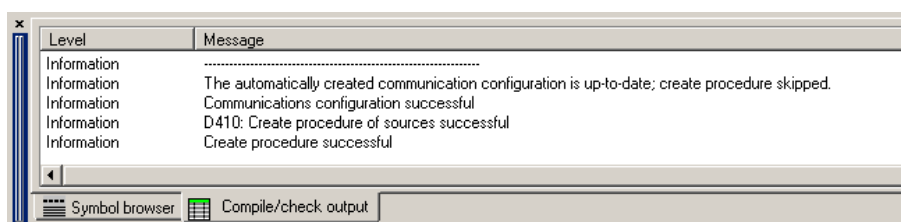


Figure 3-4 Example of detail view

You can maximize or minimize each tab using the shortcut CTRL+F12.

Each tab is opened only once, i.e.:

- The active tab shows the details of the selected element.
- The contents of the tab change when you select a different element.

3.5.2 Using the symbol browser

The symbol browser in the detail view.

The symbol browser is a tab in the detail view. It displays status values of the variables for the element selected in the project navigator.

To activate the symbol browser:

1. Select an element in the project navigator.
2. In the detail view, select the **Symbol browser** tab.

Continuous display of the symbol browser

To activate/deactivate the continuous display of the symbol browser:

Click the symbol at the top right of the the symbol browser (pin).

The active element is displayed continuously until this function is deactivated. To deactivate this function, click the pin again.

3.6 Adding add-ons to the workbench

Add-ons in SIMOTION SCOUT

SIMOTION provides you with the option of enhancing the functionality or accommodating customer-specific requirements. You can integrate add-ons. The CamTool add-on is currently available.

Note

More detailed information about the CamTool add-on is contained in the CamTool configuration manual or the associated online help.

Add-ons are added to the workbench and are displayed as fully integrated:

- Menus and toolbars appear at the appropriate position in the workbench. After installation of add-ons, the menus are visible and the toolbars are active.
- The working windows appear in the working area of the workbench and have tabs.
- The detail view of the workbench shows details about the currently active add-on. If the associated details are distributed over several tabs, you can select the relevant tab and place it in the foreground.

3.7 Online help

3.7.1 Structure of the online help

SIMOTION SCOUT has a comprehensive context-sensitive help. Examples of using the online help can be found under:
SIMOTION SCOUT > Help > Using help

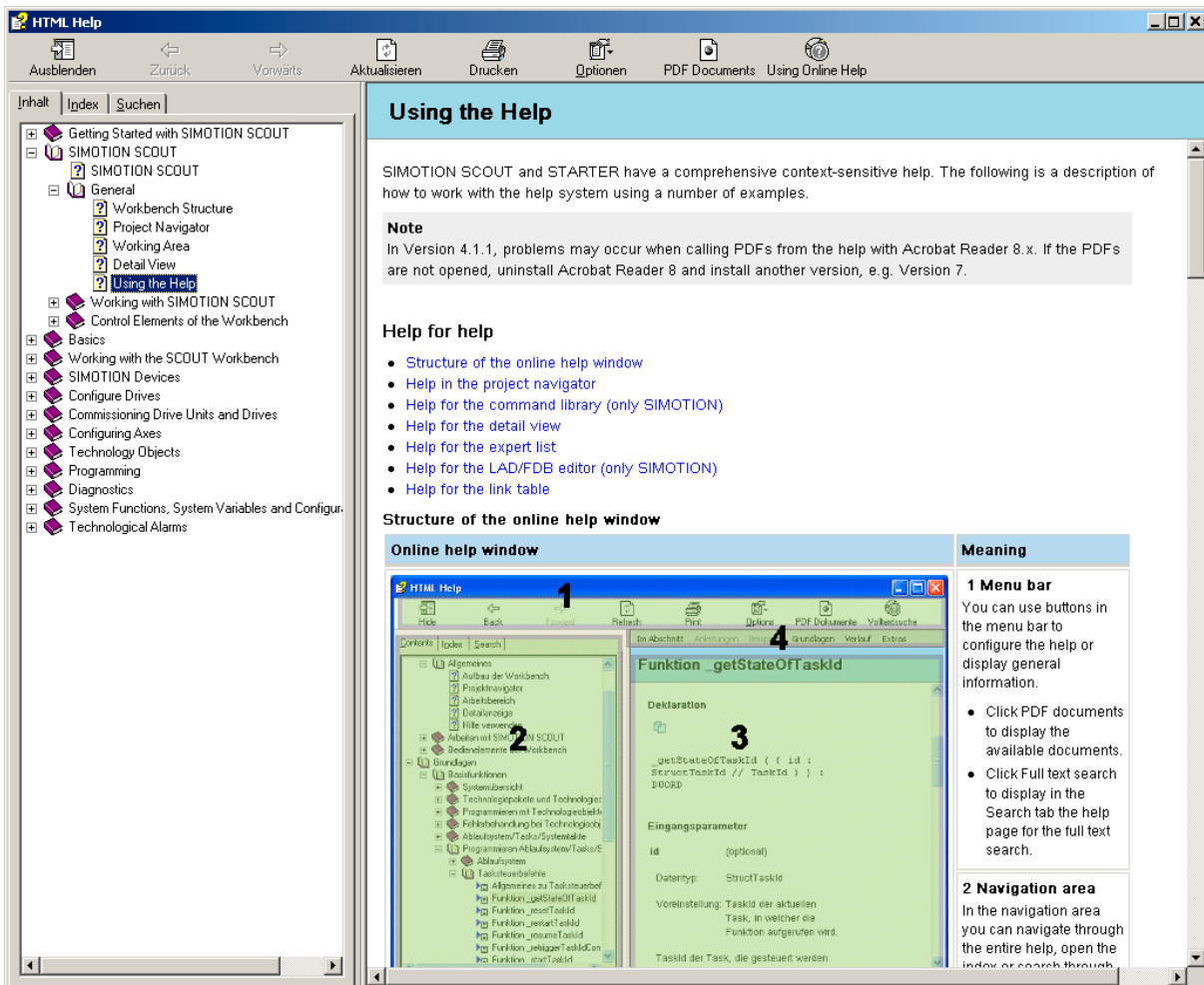


Figure 3-5 Help for online help

3.7.2 Types of online help

The following types of online help are available:

- **Entire help**

To open the entire help:

In the SIMOTION SCOUT menu bar, select **Help > Help topics** or press the **F1** key. The entire help is displayed.

- **Getting Started with SIMOTION SCOUT**

To open Getting Started:

In the menu bar, select **Help > Getting Started**.

All new functions for the current version are listed here in an overview. On the left-hand side, on the **Content** tab, select Getting Started with SIMOTION SCOUT.


- **Help button**

To open the help:

Click the **Help** button in the respective dialog box or window. The context-sensitive help for the dialog box is opened.

- **Context-sensitive help**

To open the context-sensitive help:

1. Press the **SHIFT+F1** keys, click the button  in the function bar or select **Help > Context-sensitive help** in the menu bar. The cursor changes to a question mark.
2. Use the mouse pointer to click on, e.g. dialogs, parameters, input fields, menu items, command libraries, expert lists, symbol browsers or objects in the project navigator. The context-sensitive help for the selected entry is displayed.

3.7.3 Searching in the online help

You can carry out a full-text search throughout the entire help in the Search tab.

With a full-text search, you have to consider certain points to ensure that the search is successful. A simple search according to subject consists of the word or expression that you want to find.

To refine your search, you can use wildcard expressions, nested expressions, Boolean operators, similar word hits, the previous result list or subject titles.

To carry out a full-text search:

1. In the menu bar, select **Help > Help topics** or press key **F1**. The entire help is displayed.
2. Click the Search tab and enter the search term. You can add Boolean operators by clicking the arrow next to the input field.

Note

If you enter the term *System*, this term is sought throughout the entire Help. Only the Help pages that contain the word System are found. Compound words, e.g. *Systemclock* are not found. Therefore it is usually more appropriate to search with wildcards if you are not searching for a definite term, e.g. **system** returns all the results that contain *system*.

3. Click **List subjects** to start the search. The search returns a maximum of the first 500 hits. If you want to sort the subject list, click Title, Position or Order.
4. Double-click the desired subject to display the Help page. The found terms are highlighted on the page.

Note

If the terms are not highlighted or you want to switch the highlighting off, click the **Options** button and select Activate/deactivate search term highlighting in the menu displayed.

You can also search just within the last result list, include similar word hits or only search the subject titles in the table of contents.

In the case of multiple matches, a clearer overview can be obtained by sorting them with **Position**, as the search results will then be arranged according to the associated topic.

Additional references

You can find more information about this subject in the online help.

3.7.4 Getting Started in SCOUT

Contents and settings in Getting Started with SIMOTION SCOUT

When SIMOTION SCOUT is opened, the online help offers a **New to SIMOTION** overview by default.

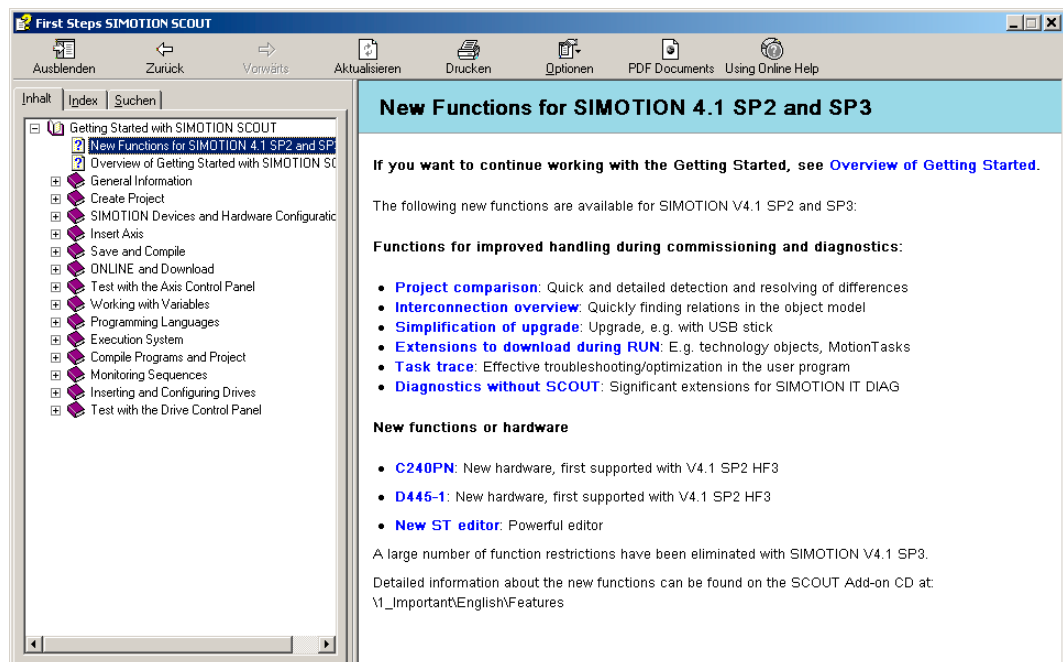


Figure 3-6 Online help

In the **Content** tab, select **Getting Started with SIMOTION SCOUT**. You can deactivate this function.

Getting Started provides a brief overview of how you can work with SIMOTION SCOUT. A typical example is used to show you the different steps required to create a project and introduces the configuration, programming, and diagnostic tools.

In addition, the right-hand window provides an overview of which new functionalities are available in the latest version of SIMOTION.

Deactivating the Getting Started with SIMOTION SCOUT online help

To deactivate the default setting that automatically opens the online help when you launch SIMOTION SCOUT:

1. In the menu bar, select **Options > Settings...**
2. Click the Workbench tab.
3. Uncheck the **Display "Getting started" at start** checkbox.
4. Click **OK**.

Opening the Getting Started online help

To reopen Getting Started at any time:

In the menu bar, select **Help > Getting Started**.

3.7.5 Error remedy

If error messages appear in the detail view in the SCOUT workbench, you can call up detailed information in the online help. This is possible for technology objects, alarms and alarms for drive units and I/O devices. To do this, click the **Help for event** button.

Otherwise, additional information about the error text can be found using the complete text search.

3.8 Project comparison

You can use the SIMOTION SCOUT/Project comparison starter function to compare objects within the same project and/or objects from different projects (online or offline) with one another.

Objects are devices, programs, technology objects (TOs) or drive objects (DOs), and libraries.

The project comparison is available with SIMOTION SCOUT and Starter. Comparing projects is useful if you need to carry out service work on the system.



1. Start the project comparison by clicking the **Start object comparison** button.
2. The **Select Comparison Partners** dialog is displayed. Select the projects to be compared.

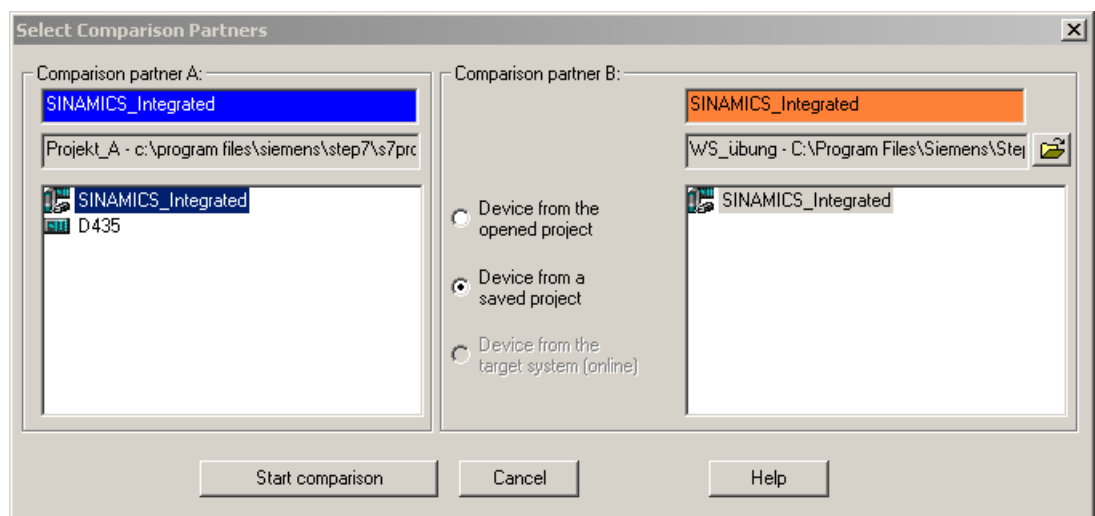


Figure 3-7 Select comparison partner dialog

References

For detailed information, refer to:

- Function Manual: SIMOTION Project Comparison
- SIMOTION SCOUT Online Help

3.9 Online multiuser mode

Thanks to the new project comparison, device upload and download with supplementary data functions, several users can exchange project data that has been modified via the target device, online. This allows them to synchronize the status of their own SIMOTION project with that of another one, thereby updating it.

In online multiuser mode, it is possible for two people to work online on the same SIMOTION device. The following functions can be performed:

- Reading and controlling of system variables and configuration data
- Execution of measuring functions and axis control panel
- Uploading of configuration data
- Uploading of programs or technology objects and other settings (e.g. execution system)
- Editing and downloading of programs (following prior alignment, if applicable)

The following graphic shows a schematic representation of online multiuser mode:

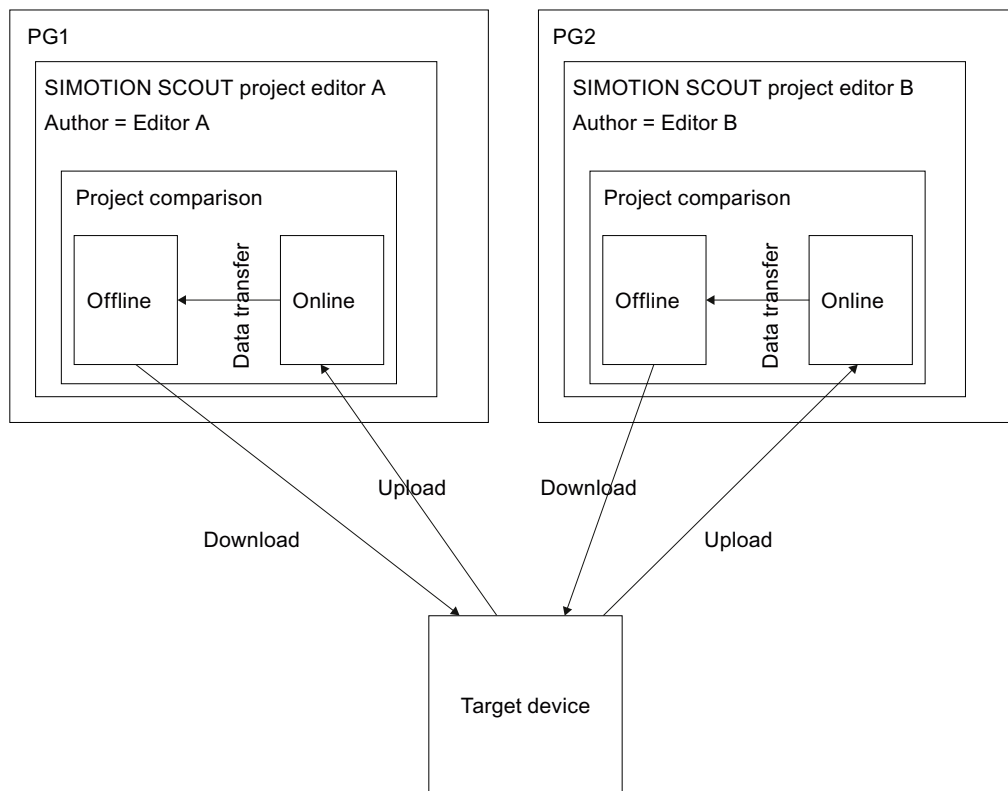


Figure 3-8 Schematic representation of online multiuser mode

Editors A and B are working on one SIMOTION project at the same time. Changes made by both editors are loaded to the target device. The project must be synchronized beforehand, otherwise parts of it could be found to be inconsistent and subsequently overwritten when the **Load project to target device** command is executed.

This means, for example, that **Editor A** must synchronize his project with **Editor B's** project before loading it to the target device. This can be done via the synchronization mechanism in the project comparison facility.

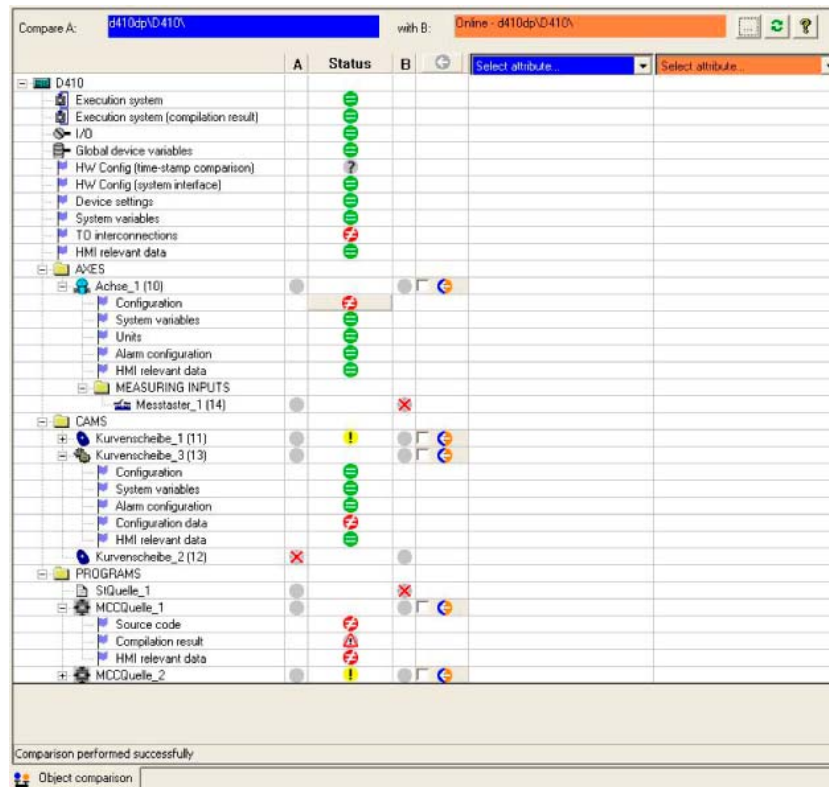


Figure 3-9 Synchronizing project data via the project comparison function

3.10 Basic steps

3.10.1 Overview

In order that the machine or plant can perform the desired tasks, you must carry out the following steps with SIMOTION SCOUT:

- Create a project:
The project is the generic term under which you store all of the relevant files.
- Configure hardware:
Provide the SIMOTION system with information about the hardware.
- Configure technology objects (TO):
Provide the SIMOTION system with information about the technologies used. SIMOTION SCOUT provides wizards for comprehensive assistance.
- Create and test open-loop and closed-loop control programs.
- Commission and optimize drives and axes.
- Test the system and utilize the diagnostic options.

SIMOTION SCOUT provides the workbench to enable you to perform these steps easily and efficiently.

3.10.2 Basic settings of SCOUT

In SCOUT, you have the possibility of predefining various basic settings via the **Options > Settings** menu. Detailed information on the individual tabs and settings is provided in the SIMOTION SCOUT online help.

1. Open SIMOTION SCOUT.
2. Click the **Options > Settings...** menu.
The Settings window is opened.
3. Select the desired tab.
4. Enter the settings.
5. Click **OK**.

3.10.3 SIMOTION SCOUT project

The project is the highest level in the data management hierarchy. SIMOTION SCOUT saves all data which belongs, for example, to a production machine, in the project directory. The project is therefore the sum of all data, programs, settings, etc.

The project encompasses all of the SIMOTION devices, drives, etc., that belong to a machine. The axes, external encoders, path objects, cams, technology, and programs are assigned hierarchically to the respective devices. This hierarchical structure is displayed in the project navigator.

3.10.4 Creating a new SCOUT project

Note

For further information, refer to the online help at: "Getting Started with SIMOTION SCOUT".

To create a new project:

1. Open SIMOTION SCOUT from the Start menu on the Windows desktop:
Start > SIMATIC > STEP 7 > SIMOTION SCOUT.
Or double-click the SIMOTION SCOUT icon on your PC desktop.
SIMOTION SCOUT starts the workbench and the HTMP help.
Getting Started with SIMOTION SCOUT is displayed.
2. In the workbench menu bar, select **Project > New.**
The **New Project** window opens.

Note

SIMOTION SCOUT creates a directory with the selected name. All files relevant to the project are stored in this directory.

Directory names and file names are shortened to 8 characters. If you assign longer names, these are displayed in SCOUT. However, these names are only managed with 8 characters in the Explorer.

Special characters may not be used.

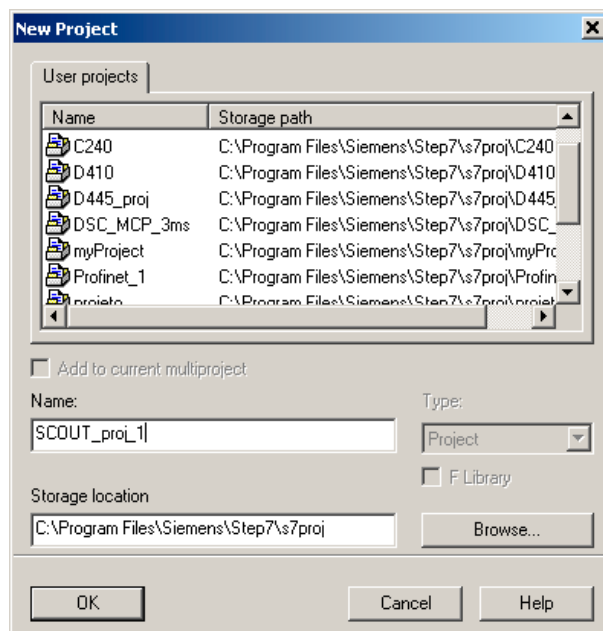


Figure 3-10 Creating a new project

3. Enter the following data in the dialog box:
 - **Name:**
Select a name for the project.
 - **Storage location (path):**
The default storage location (path), where the new project is to be stored, is displayed here.
4. Click **OK** to confirm.

The new project appears in the project navigator with an icon and its full name. The associated tree is expanded.

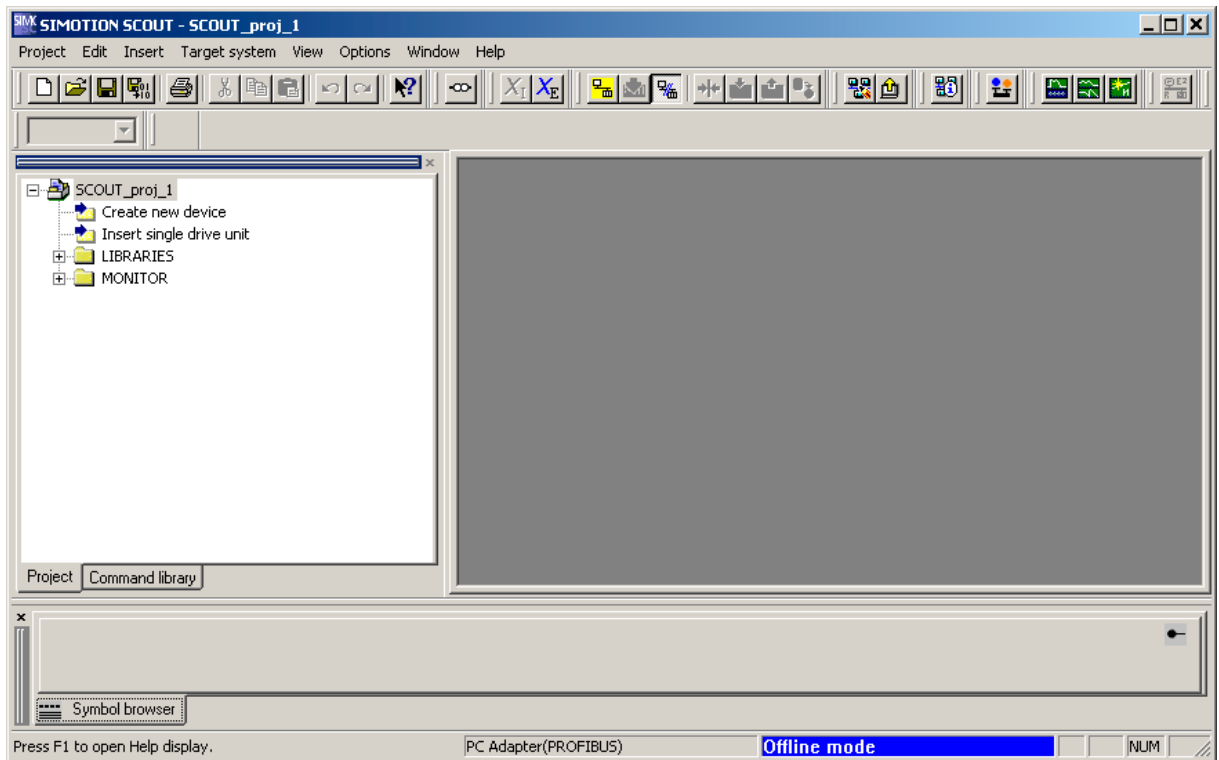


Figure 3-11 Workbench with new project

The following entries are located beneath the project name in the project navigator:

- **Create new device** element. Double-click on this symbol to select the required SIMOTION device, create and configure a new subnet and insert the new device in the HW Config program.
- **Insert single drive unit** element. Double-click on this symbol to insert and commission a stand-alone drive (e.g. MM4 Basic). Although this drive cannot be linked to or configured in the master system of the project using a PROFIBUS DP connection, it appears in the project navigator within the project.
- Folder labeled **LIBRARIES**
- Folder labeled **MONITORING**

3.10.5 Opening an existing project

To open a project saved on the hard disk of the PC:

You can open projects that SIMOTION SCOUT has stored locally (e.g. on the hard disk).

1. Select the **Project > Open** menu.
2. In the **User projects** tab, select the desired project.
If the project you want is not stored according to the default path: Click **Browse...** and follow the instructions on the screen.
3. Click **OK** to confirm.

If you want to open a project that was created in an older version, a message appears asking whether the project should be converted to the newer version. This function is available since SIMOTION SCOUT Version V3.1.

Note

The **Save as** function saves all previously made changes in either a new or in an existing project.

This means when you change an existing project and save with a different name, you must do this **before** you make any changes in the existing project.

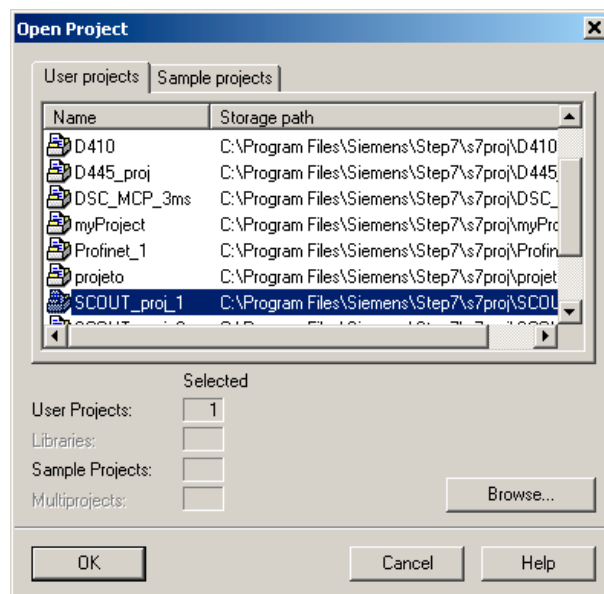


Figure 3-12 Opening a project stored on the hard disk

Note

The workbench displays one project at a time.

If you wish to display two projects at the same time, e.g. in order to copy/paste parts of a project, start SIMOTION SCOUT a second time.

3.10.6 Using program editors

Editors in SIMOTION SCOUT

Three editors are available for creating programs:

- Graphics-based editor for creating **MCC** charts.

You program by arranging symbolic program commands similar to a flow diagram and assigning parameters to these commands.

- Text-based editor for creating **ST** source files.

ST is a text-based programming language in compliance with IEC 1131-3, expanded to include motion commands (system functions for the technology objects). An ST source file can encompass several programs.

- Graphics-based editor for creating ladder and function block diagrams. (**LAD/FBD**)

The ladder logic statement syntax corresponds to a circuit diagram. LAD statements consist of elements and boxes, which are graphically connected to networks. The LAD operations work according to the rules of Boolean logic.

FBD uses the logic boxes familiar from Boolean algebra to map logic. You can represent complex functions (e.g. mathematical functions) directly in connection with the logical boxes.

FBD provides all the elements required for the creation of a complete user program. FBD features a powerful command set. This includes the various basic operations with a comprehensive range of operands and how to address them. The design of the functions and function blocks enables you to structure the FBD program clearly.

Optional editors

- CamTool for the easy creation of cams using a graphical editor
- DCC graphical editor based on CFC. SIMOTION controllers and SINAMICS drives can be configured graphically.

Additional references

Please refer to the following documents on this subject

- SIMOTION MCC Motion Control Chart Programming and Operating Manual
- SIMOTION ST Structured Text Programming and Operating Manual
- SIMOTION LAD/FBD Programming and Operating Manual
- Programming and Operating Manual SINAMICS/SIMOTION Editor description DCC and the SIMOTION SCOUT online help.

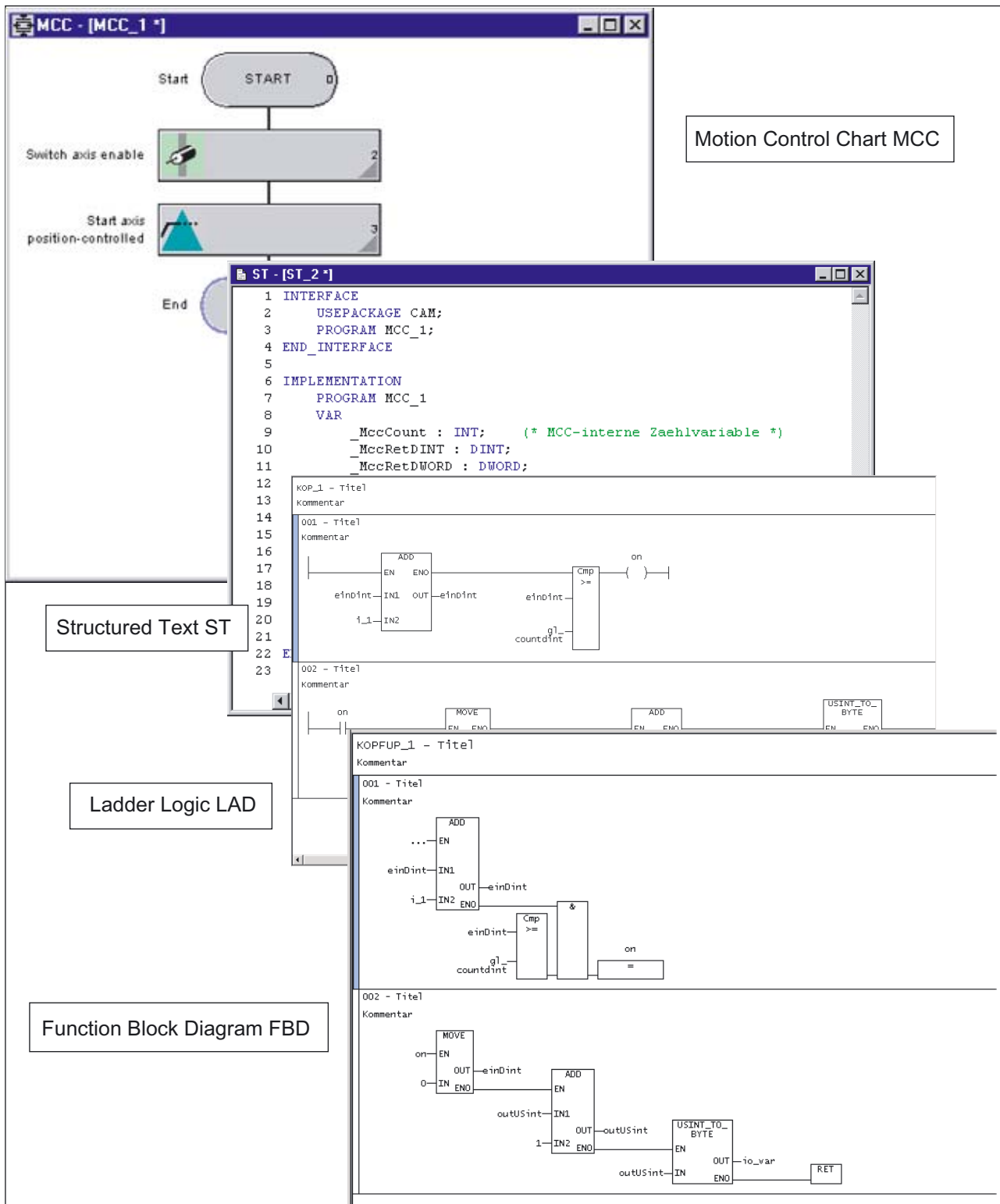


Figure 3-13 Program editors

3.11 HW Config

3.11.1 Inserting and configuring a SIMOTION device

Configure the hardware using the **HW Config** module. This informs the SIMOTION system which hardware is present, e.g.:

- Type of SIMOTION device
- Type of the I/O modules
- Type of the drives

In addition, you also specify which parameters the SIMOTION system should use, e.g.:

- Configuration of the SIMOTION device
- Configuration of PROFIBUS/PROFINET
- Assignment of the hardware to PROFIBUS/PROFINET

In this section, you learn how to use the **HW Config** tool:

- How to insert objects from the **hardware catalog**.
- How to edit objects.
- How to replace or delete objects.

3.11.2 Starting HW Config

HW Config can be started, e.g. to add a drive to the PROFIBUS.

To start HW Config:

- Double-click on the appropriate SIMOTION device in the project navigator or
- Select the appropriate device in the project navigator and confirm your selection in the **Open HW configuration** shortcut menu or
- Select the appropriate device in the project navigator and select the **Insert > Hardware** menu.

3.11.3 The HW Config program

The HW Config program is displayed as follows:

- A **hardware catalog** window
- A working window that is split into two:
 - In the upper half, you can see the rack or station frame with the CPU previously automatically inserted in slot 2 (example for C2xx). Insert the objects from the hardware catalog and edit them here.
 - In the lower half, you can see detailed information about the selected objects.

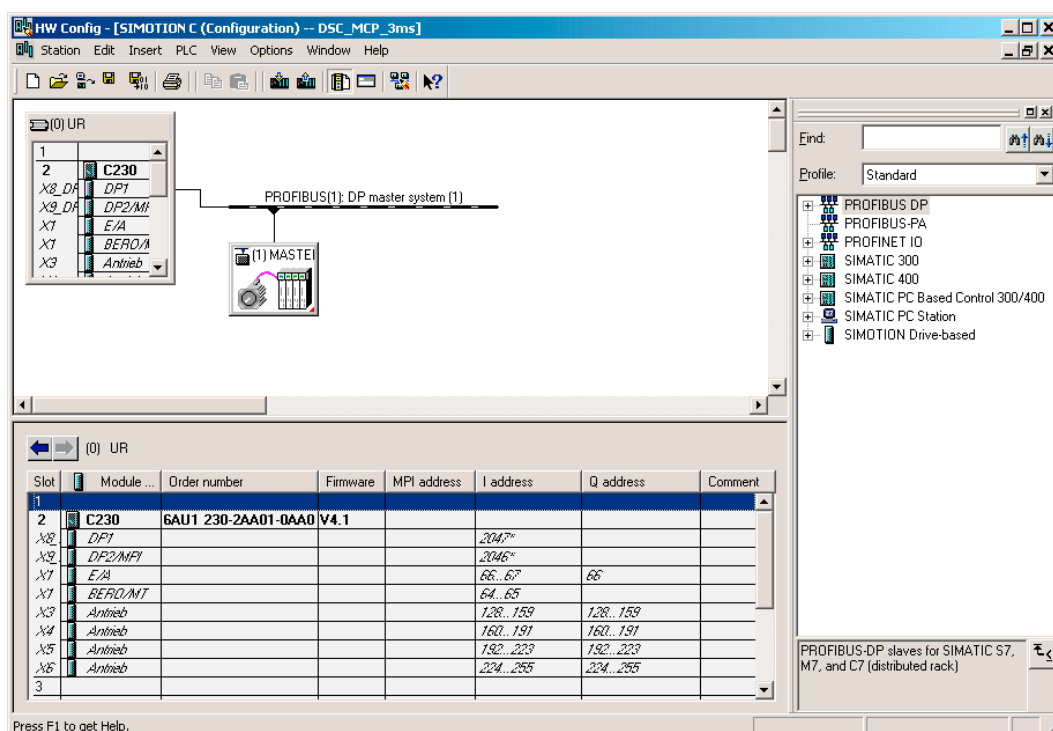


Figure 3-14 HW Config with opened hardware catalog and the CPU previously inserted in the module

3.11.4 HW Config: Opening the hardware catalog

You can open the hardware catalog in the following ways:

- Select the **Insert > Insert object** menu.
- Select the **View > Catalog** menu.

For additional information, see

Chapter Inserting drives (Page 144)

3.11.5 SIMOTION devices in the hardware catalog

You can find the SIMOTION devices in the corresponding directories of the hardware catalog.

Table 3- 5 SIMOTION device directories in the hardware catalog

SIMOTION device	SIMATIC station	Subdirectory
C230-2	SIMATIC 300	CPU-300\CPU C2x0\6AU1 230-2AA00-0AA0\V3.0 CPU-300\CPU C2x0\6AU1 230-2AA00-0AA0\V3.1 CPU-300\CPU C2x0\6AU1 230-2AA00-0AA0\V3.2
C230-2.1	SIMATIC 300	CPU-300\CPU C2x0\6AU1 230-2AA01-0AA0\V3.2 CPU-300\CPU C2x0\6AU1 230-2AA01-0AA0\V4.0 CPU-300\CPU C2x0\6AU1 230-2AA01-0AA0\V4.1
C240	SIMATIC 300	CPU-300\CPU C2x0\6AU1 240-1AA00-0AA0\V4.0 CPU-300\CPU C2x0\6AU1 240-1AA00-0AA0\V4.1 CPU-300\CPU C2x0\6AU1 240-1AA00-0AA0\V4.1 - PN V2.2
P350	SIMATIC PC station	SIMOTION P350\6AU1 350-XXXXX-XXX1\V3.0 SIMOTION P350\6AU1 350-XXXXX-XXX1\V3.1 SIMOTION P350\6AU1 350-XXXXX-XXX1\V3.2 SIMOTION P350\6AU1 350-XXXXX-XXX1\V4.0 - V2 box
P350-3	SIMATIC PC station	SIMOTION P350\6AU1 350-XXXXX-XXX2\V4.0 - V3 box SIMOTION P350\6AU1 350-XXXXX-XXX2\V4.1 - DP SIMOTION P350\6AU1 350-XXXXX-XXX2\V4.1 - DP/PN V2.1 SIMOTION P350\6AU1 350-XXXXX-XXX2\V4.1 - DP/PN V2.2 SIMOTION P350\6AU1 350-XXXXX-XXX2\V4.1 - PN V2.1 SIMOTION P350\6AU1 350-XXXXX-XXX2\V4.1 - PN V2.2
D410	Drive-based SIMOTION	SIMOTION D410\6AU1 410-0AA00-0AA0\V4.1 - SINAMICS S120 V2.5 (PROFIBUS interface) V4.1 SP1 SIMOTION D410\6AU1 410-0AB00-0AA0\V4.1 - PN V2.1 SINAMICS S120 V2.5(PROFINET interface) V4.1 SP1 SIMOTION D410\6AU1 410-0AB00-0AA0\V4.1 - PN V2.2 SINAMICS S120 V2.5(PROFINET interface) V4.1 SP1
D425	Drive-based SIMOTION	SIMOTION D425\6AU1 425-0AA00-0AA0\ V3.2 SINAMICS S120 V2.2 SIMOTION D425\6AU1 425-0AA00-0AA0\ V3.2 SINAMICS S120 V2.3 SIMOTION D425\6AU1 425-0AA00-0AA0\ V4.0 SINAMICS S120 V2.4 SIMOTION D425\6AU1 425-0AA00-0AA0\ V4.1 - PN V2.1 SINAMICS S120 V2.5 SIMOTION D425\6AU1 425-0AA00-0AA0\ V4.1 - PN V2.2 SINAMICS S120 V2.5

SIMOTION device	SIMATIC station	Subdirectory
D435	Drive-based SIMOTION	SIMOTION D435\6AU1 435-0AA00-0AA0\ V3.1 SINAMICS S120 V2.1 SIMOTION D435\6AU1 435-0AA00-0AA0\ V3.2 SINAMICS S120 V2.2 SIMOTION D435\6AU1 435-0AA00-0AA1\ V3.2 SINAMICS S120 V2.2 SIMOTION D435\6AU1 435-0AA00-0AA1\ V3.2 SINAMICS S120 V2.3 SIMOTION D435\6AU1 435-0AA00-0AA1\ V4.0 SINAMICS S120 V2.4 SIMOTION D435\6AU1 435-0AA00-0AA1\ V4.1 - PN V2.1 SINAMICS S120 V2.5 SIMOTION D435\6AU1 435-0AA00-0AA0\ V4.1 - PN V2.2 SINAMICS S120 V2.5
D445	Drive-based SIMOTION	SIMOTION D445\6AU1 445-0AA00-0AA0\ V3.2 SINAMICS S120 V2.2 SIMOTION D445\6AU1 445-0AA00-0AA0\ V3.2 SINAMICS S120 V2.3 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.0 SINAMICS S120 V2.4 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.0 SINAMICS SM150 V2.4 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.1 - PN V2.1 SINAMICS S120 V2.5 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.1 - PN V2.1 SINAMICS SM150 V2.5 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.1 - PN V2.2 SINAMICS S120 V2.5 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.1 - PN V2.2 SINAMICS SM150 V2.5 SIMOTION D445\6AU1 445-0AA00-0AA1\ V4.1 - PN V2.1 SINAMICS S120 V2.5 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.1 - PN V2.1 SINAMICS SM150 V2.5 SIMOTION D445\6AU1 445-0AA00-0AA1\ V4.1 - PN V2.2 SINAMICS S120 V2.5 SIMOTION D445\6AU1 445-0AA00-0AA0\ V4.1 - PN V2.2 SINAMICS SM150 V2.5

The version of the SIMOTION D4xx listed here must not be confused with the version of the drive firmware contained in SINAMICS integrated.

The SIMOTION D4xx is supplied with a specific version of the drive firmware. If you insert a SIMOTION D4xx into a project, this specific version is used as default version and displayed in the "Properties". When the SINAMICS integrated firmware is updated, the firmware must first be physically replaced and then the drive firmware version changed in the "Properties".

Add interfaces

After inserting the SIMOTION device, the **Properties - PROFIBUS DP Master Interface (R0/S2.1)** window appears. Create the PROFIBUS DP subnets and configure the SIMOTION device interfaces in this window.

Note

The **PCI integrated** PROFIBUS subnet is created and configured automatically for the SIMOTION D4xx. The user may neither configure nor select it!

When the SIMOTION device is inserted into the rack, all interfaces and the PROFIBUS subnets that you have created are displayed at the same time.

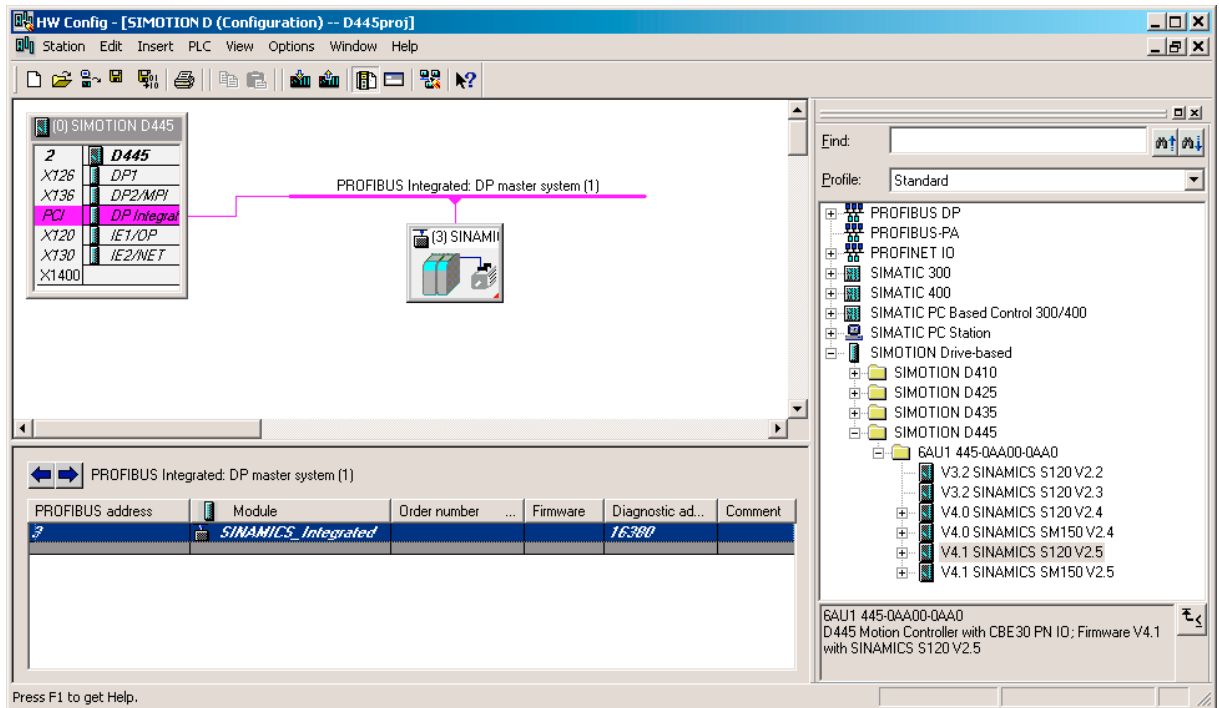


Figure 3-15 Hardware configuration of a D4x5

Detailed information on the configuration of the SIMOTION device is contained in the corresponding documentation for the SIMOTION devices.

3.11.6 Inserting a SIMOTION device in the rack

Example: How to insert the SIMOTION C240 in the rack:

1. Open the **SIMATIC 300>CPU-300 > CPU C2x0 > 6AU1 240-1AA00-0AA0 > V4.1** folder in the hardware catalog.
2. Use drag-and-drop to drag the required CPU version to rack slot 2.

Note

The slot rule is applied automatically. The SIMOTION C2xx can only be inserted into slot 2.

SIMOTION D4xx can not be added to slot 2, but needs to be fitted to the module holder (rack).

3.11.7 Changing the SIMOTION device

Prerequisite

You will only need to perform this operation if you intend to upgrade a kernel or change a platform within the same station type.

Swapping modules between SIMOTION families

A module replacement can be made within a device family (SIMOTION C2xx, P350, D4x5 or D410 devices).

Changing between the SIMOTION C2xx, P350, D4x5 and D410 families is only possible using an XML export.

For further information about replacing the device, see the section titled Replacing the SIMOTION device (Page 79)

3.12 Licensing

3.12.1 Licensing of the runtime components

3.12.1.1 Overview for the licensing

Functions can be licensed using the following software options:

- Motion control technology functions
The licensing is performed axis-specifically for:
 - POS - position; use of the technology functions for position axis
 - GEAR; use of the technology functions for following axis
 - CAM; use of the technology functions for cam axis

The GEAR technology function contains the POS technology function, while the CAM technology function contains the POS and GEAR technology functions.

The MultiAxes package permits a simple licensing of the Motion Control technology functions. It contains the license for the unlimited use of the CAM technology function on a SIMOTION device, e.g. a C240, a D4x5, or a P350.

- TControl technology function
The TControl technology package is licensed channel-specifically, in packages of 8 temperature channels.
- IT functions, IT-Diag and OPC XML-DA
The use of these functions is licensed for each SIMOTION device.

Note

Another option is to order SIMOTION memory cards (MMC and CF) and SIMOTION P350-3 with pre-installed runtime licenses.

Additional references

Further important information for the licensing of the runtime software and the ordering data can be found in:

- Catalog: SIMOTION, SINAMICS S120 and Motors for Production Machines
- PM 21 Catalog: Chapter 8 SIMOTION Runtime Software
- Configurator for SIMOTION Runtime Licenses in the A&D Mall (<http://mall.automation.siemens.com>)

3.12.1.2 Licenses and license key

Depending on the type and number of runtime components used in the project, licenses must be acquired as part of the licensing procedure for SIMOTION. The licenses required for a SIMOTION device are assigned to a license key. This license key is stored on the memory medium of the SIMOTION device during the licensing procedure.

There are two ways of ordering the licenses:

- Preinstalled licenses
The license key is already stored on the card.
- Ordered licenses (Certificate of License)
These licenses must be assigned to the storage medium using the Web-License-Manager. The determined license key is transferred to the hardware using SCOUT.

You require the following information to obtain the license key:

- The serial number of the SIMOTION device memory medium
You can obtain the serial number from the memory medium or have it displayed online in the SIMOTION SCOUT (licensing wizard).
- The serial number of the CoL (Certificate of License)
You have this number on paper.

Table 3- 6 The serial number on the SIMOTION hardware assigned to the SIMOTION device

SIMOTION device	Hardware serial number of module
SIMOTION C2xx	SIMOTION Micro Memory card
SIMOTION P350	SIMOTION IsoPROFIBUS-Board or SIMOTION MCI-PN board
SIMOTION D4xx	SIMOTION CompactFlash card

License keys can be generated separately from the licensing.

Note

When the SIMOTION memory card is deleted or formatted, the licensing data is also deleted. Archive the licensing data in order to be able to transfer it again to the memory medium in such a case. If the data is not backed up, you have to perform the licensing again. You can display the entered license key in the Web License Manager.

Additional information is available at:
Section License key is protected against deletion (as of kernel V4.1) (Page 76)

3.12.1.3 Determining licensing requirements

Note

Determine your license requirement only after you have completed the configuration! A license that has been assigned a license key cannot be withdrawn.

Once you have completed your project configuration with SIMOTION SCOUT and before you download it to the target device, you can determine the licenses required for the project. You have three options for determining license requirements. Before you begin, the project must have been saved and compiled. If you have not yet acquired any licenses, underlicensing is displayed.

Options for determining license requirements are as follows:

- **Offline mode** with open project
The required licenses are displayed.
- **Online mode** with open project
A comparison of the required and actual licenses is displayed.
- **Online mode** without project
The actual licenses of the selected SIMOTION device are displayed.

Proceed as follows:

1. Select the **SIMOTION device** in the project navigator.
2. Select **Licenses** in the context menu.
The required licenses for the project or a comparison of required and actual licenses are displayed.
3. You can close the window with **X** or continue with **Perform licensing...**

The license check, i.e. the inspection of the license keys, is carried out in the target system. Possible responses in the case of underlicensing are described in the Underlicensing section.

Note

Memory cards can be purchased with integrated runtime licenses, which do not require separate licensing.

3.12.1.4 Displaying existing licenses of the SIMOTION device

Displaying via accessible nodes

You can use the list of **Accessible nodes** to determine the specific licenses that have already been assigned to the SIMOTION device. You can access the data of the SIMOTION device directly.

Note

This step is not necessary if the required and actual licenses are displayed within a project.

Requirements:

- SIMOTION SCOUT is running
- SIMOTION SCOUT is in online mode
- **No** projects are open

Proceed as follows:

1. Select the **Project > Accessible nodes** menu.
The list of accessible nodes is displayed in the working area.
2. Select the relevant SIMOTION device.
3. Select **Licenses** in the shortcut menu.
The Licenses dialog box appears, showing the actual licenses for the selected SIMOTION device.
4. You can close the window with **X** or continue with **Perform licensing....**

3.12.1.5 Performing the licensing

To perform the licensing:

Once you have determined your actual license requirements, you can purchase the licenses and then generate the required license key.

Requirements:

- Configuration has been completed
- The project has been saved and compiled
- The required licenses have been determined
- The license key has been determined or the serial numbers of the memory medium and the CoL are available
- SIMOTION SCOUT is in online mode

Proceed as follows:

1. Select the relevant SIMOTION device in SIMOTION SCOUT.
2. Open the context menu and click Licensing.
3. In the Licenses dialog box, click **Perform licensing...**
If the Use wizard checkbox is activated, a wizard guides you through the licensing procedure.
If the checkbox is not activated, the window for the expert licensing is opened. You can enter the license key there without running through the wizard.
If you have not yet generated the license key, the wizard gives you the option to switch to the Web tool to generate one. Then switch back to the wizard.
4. If you have an online connection, continue with item 5.
Otherwise, you can establish an online connection with **Online** in the **Step 2 of 3** window.
5. Enter the license key in the **Step 3 of 3** window.
6. Click **Finish**.
The wizard is closed. Licensing is complete.

Note

The license key is written to the retentive memory when the project data is transferred to the target system.

3.12.2 Changing the license key

The license key is influenced by changes to the project such as expanding the axis technology from positioning to synchronous operation. This is why underlicensing is displayed when the project is downloaded and the SF LED flashes at 0.5 Hz.

After you have determined the actual requirement and purchased the necessary licenses, generate the license key again. Now replace the license key already entered with the newly generated one.

Note

Transition from Version V3.0 to > Version V3.0

In a project as of Version V3.1, the license key is stored in a different location than in a Version 3.0 project. You must re-enter the license key in order for Version V3.0 licenses to be recognized in a project as of V3.1.

3.12.3 License key is protected from being deleted (as from Kernel V4.1)

The license key is stored in the "KEYS" directory on the SIMOTION Memory Card.

When the controller starts up for the first time, the license key will be saved in the boot sector of the card and from this time is protected from being lost.

Operator actions cannot delete the license key in the boot sector. Also not by formatting the card or with the "Write boot sector..." function.

If the license key is no longer present on the card, it will be written again during the startup from the boot sector into the "KEYS" directory. This means that the system will repair any deletion on the "Key" file.

The license key can be changed at any time, for example, by relicensing. At the next startup, the license key will be saved again in the boot sector.

3.12.4 Licensing during hardware replacement

For the replacement of licensed SIMOTION components (MMC, CF, IsoPROFIBUS board or PN board), the associated license key must be assigned to the new SIMOTION component. In this case, contact the Customer Support for assistance.

3.12.5 Underlicensing

If SIMOTION SCOUT detects the presence of underlicensing during license verification, an entry is made in the diagnostics buffer. The verification is repeated every hour, and an entry is made in the diagnostics buffer each time underlicensing is detected.

The following information can be read from the diagnostics buffer entry:

- Number of required licenses
- Number of actual licenses
- Operating mode

As an additional warning signal, the SF LED flashes at 0.5 Hz as long as underlicensing is present on the system. Underlicensing will only be displayed if no acknowledgeable technological event is pending, as the same SF LED is used to indicate this as well.

3.13 Write rights for boot sector

There are various reasons why it might prove necessary to write a boot loader. Use the **Options > Write boot sector** menu in SIMOTION SCOUT to enable the boot sector on a memory card to be rewritten.

Additional references

For additional information on this topic, refer to:

- The D4x5 Commissioning and Hardware Installation Manual
- The D410 Commissioning Manual
- SIMOTION SCOUT Online Help

3.14 Searching in the project

In the open project, you can search all the project data for variables or any text.

If you select a variable search, you can also search within the ST sources. All global and local variables at the declaration and use points are recognized.

Open the dialog using **Edit > Search in project...** on the menu bar or by using the shortcut **Ctrl + Shift + F**.

The results are displayed in the search results tab of the detail view.

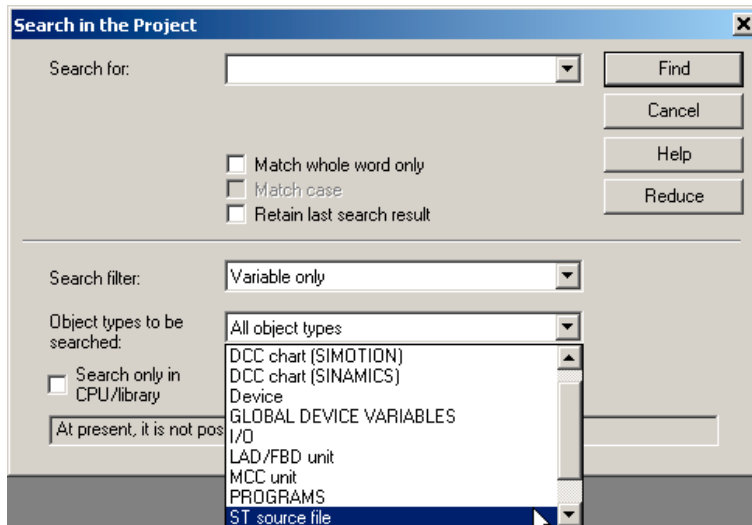


Figure 3-16 Searching in the project

Searching in CPU/Libraries only

If the "Search only in CPU/Library" checkbox is ticked, a selection list of all the CPUs and user-defined libraries in the project appears. You can select one to search in this CPU/Library only.

For more information regarding this topic, see the online help.

3.15 Replacing in the project

The **Replace in project** function is based on the **Search in project** function.

To open it, select **Edit > Replace in the project...** on the menu bar.

When you carry out a replacement, both the results found and the replacement term are displayed in the "Search result" tab of the "detail view". The text can be edited again here.

Use the **Replace** button to replace all search results selected using the check box.

Boundary conditions:

- Only text can be entered.
- Only texts in programs and script files are replaced (no variables in the IO or global device variables lists).
- Replaced texts cannot be undone.

More information on this topic is available in:

- Online help.

3.16 Changing a SIMOTION device

3.16.1 General information

In order that you can upgrade or replace a SIMOTION device and subsequently perform a TP upgrade, you must decide which of the following upgrade variants is needed:

- Upgrade within a platform and a station type
- Station change: An old station is replaced by a new type of station.
- Platform change: The platform is changed within the same SIMOTION version. For example, a SIMOTION C240 is replaced by a SIMOTION P350.

When the platform is changed, it may be necessary to change the station. In special cases, it may also be necessary to change a station within a platform. This is the case, for example, when upgrading from P350 V2.1 to P350 V3.0.

3.16.2 Changing a SIMOTION device followed by a TP upgrade

3.16.2.1 Upgrading within a platform and a station type

An upgrade is necessary when you want to replace the type or version of the SIMOTION device in your existing project. Perform this replacement in HW Config.

To replace a SIMOTION device:

1. Double-click the SIMOTION device to be replaced in the project navigator in SIMOTION SCOUT. HW Config is opened.
2. Open the appropriate folder structure in the hardware catalog:

Note

Ensure that the module/device (SIMOTION D) to be replaced **does not get deleted**. When you change to the new module/device using Drag&Drop, the old module will be updated.

3. Confirm the displayed dialog box with **Yes** if you want to replace the SIMOTION device.

3.16 Changing a SIMOTION device

4. Accept the changes made to the hardware configuration with **Station > Save and compile**.
5. Close the HW Config.

Note

The data for the SIMOTION device is immediately accepted in the SIMOTION SCOUT project and the **entire project** is saved. In this way, the project also accepts all changes in the project (e.g. axis configuration).

If you are using technology packages in your project, these will also need to be updated.

Upgrading technology packages

When modules are replaced or project data is imported, the versions of the technology packages (TP) assigned to the individual technology objects (TO) are not automatically upgraded to a version valid for the SIMOTION device. This upgrade requires a separate step.

Adapting the technology packages version of the new SIMOTION device

1. Select the required **SIMOTION device** in the project navigator.
2. In the shortcut menu, select **Select technology packages**.

Note

If the last step you performed was to replace the SIMOTION device, the **Unfamiliar Technology Package Version** dialog box appears. Confirm this by clicking **OK** in order to delete the existing links to the technology packages (TPs) , enabling new technology packages to be assigned. The **Select Technology Packages** dialog box will appear.

3. Activate the checkbox of the technology packages.
The technology packages must have the same version as the kernel. Consequently, in SIMOTION SCOUT V3.0 and higher, the same version as the kernel is automatically assigned to each technology package.
4. If TOs for your project indicating an incorrect version appear under **Incorrect version**, click **Update**. If this is not the case, continue with step 8.
5. The **Update Technology Packages** dialog box appears.
Confirm this with **OK**.
A message appears.
6. Click **OK** to confirm the message.
7. If the update is successful, a message appears. Click **OK** to confirm.
8. Click **OK** to confirm the **Select Technology Packages** dialog box.
The upgrade of the TPs is completed.

Note

If you are using libraries in the project, these must also have the same version as the SIMOTION device. You can only upgrade libraries that are not write-protected. Note also the information in the SIMOTION SCOUT online help.

Upgrade of libraries

When the version of a SIMOTION device and the technology packages changes, the libraries created in SIMOTION SCOUT must also be adapted.

1. Select a library in the project navigator.
2. Right-click and select **Properties...** in the context menu.
The Object Properties window opens.
3. Click in the **TPs/TOs** tab.
4. Select the appropriate device and the technology packages.
5. Click **OK** to confirm the changes.
6. Select the same library.
7. Right-click and select **Save and compile** in the context menu. The upgrade is completed.
8. Repeat the operations for all created libraries.

3.16.2.2 Changing a station

A station change is required if the station type changes.

This is the case, for example, if you want to change a platform between two of the following SIMOTION devices:

- SIMOTION C2xx
- SIMOTION P350 V2.1 and higher
- SIMOTION D4xx

Proceed as follows:

1. Export the SIMOTION CPU data to be replaced via the **Expert > Save project and export object** context menu.
2. Create a new SIMOTION device involving a different platform. This will be automatically inserted in the project navigator.
3. Insert a new SIMOTION device or several master systems and configure them.
The HW Config is opened. The new station and the created master systems are already inserted.
4. Also open the old station in the HW Config. Switch to the old station.
5. Copy the DP slaves.
6. Switch to the new station.
7. Insert the DP slaves in the new station.
8. Check the configuration of the elements of the new station.
9. Close the HW Config.

3.17 Saving and restoring variables after a platform replacement or version update

10. Delete the old device in the project navigator.
11. Carry out an object import on the new device with the previously exported data.

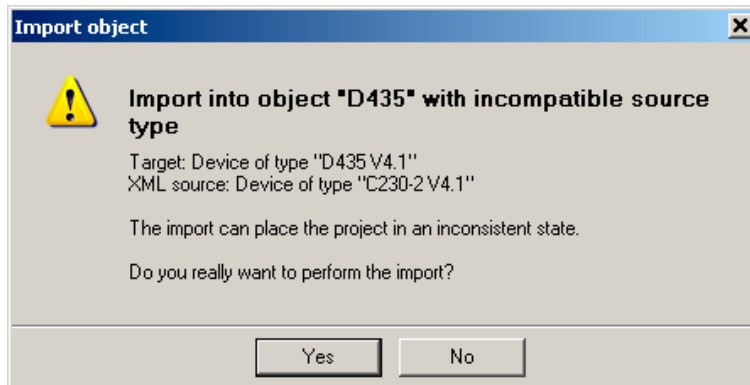


Figure 3-17 Example of importing an object with a station change

3.17 Saving and restoring variables after a platform replacement or version update

3.17.1 Saving and restoring variables from the device

Saving and restoring data with SCOUT

Using the SIMOTION SCOUT functions **Save variables** and **Restore variables** it is possible to save and then restore data (which has been changed during operation and is only saved in the SIMOTION device or on the memory card) to the hard disk. This can be used if a SIMOTION platform is changed or a version updated, for example.

The following types of data can be backed up:

- Remanent global device variables and unit variables, as well as TO retain data (V4.1 and higher) that are located in the SRAM/NVRAM of the control
- Data sets which have been backed up from the user program via `_saveUnitDataSet` or `_exportUnitDataSet` and are located on the memory card, including
 - Global unit variables of interface and implementation sections from program sources (ST, MCC or LAD/FBD sources):
 - Remanent variables (VAR_GLOBAL_RETAIN)
 - Non-remanent variables (VAR_GLOBAL)
 - Remanent and non-remanent global device variables (which have been backed up via `_saveUnitDataSet`).

The `_exportUnitDataSet` function backs up unit variables in a **version-independent** format (XML).

By contrast, data is backed up in a **version-dependent** format (binary) via the `_saveUnitDataSet` function and can, therefore, only be read back in on a device/unit of the same version (e.g. V3.2) via the `_loadUnitDataSet` function.

Data sets saved via `_saveUnitDataSet` are automatically converted into XML format using the **Save variables** function. The data sets are available in binary format for the new version once the **Restore variables** function has been executed.

Data backed up using **Save variables** are saved as version-independent XML files in a user-defined folder on the PC's hard disk.

In addition to the data backup functions provided by SIMOTION SCOUT, backup functions are also available in the runtime system.

Note

When performing an update with a kernel version that is $\geq V4.1$, the above SIMOTION SCOUT functions are only required for backing up and restoring unit data sets that have been created using `_saveUnitDataSet`.

Reason:

- Retain data remain valid after an update.
- Unit data backed up using `_exportUnitDataSet` also remain valid after an update.
- Retain data can also be backed up to a memory card **without the use of SIMOTION SCOUT**:
 - The `_savePersistentMemoryData` function saves **all** retain data from the SRAM/NVRAM; these can be remanent global unit variables in the interface or implementation sections of a source (VAR_GLOBAL_RETAIN) or remanent global device variables (RETAIN) and TO retain data
(For further information, see Parameter Manual: Device System Functions/Variables)
 - The **Back up diagnostic data** function (triggered via an appliance switch or IT DIAG) saves **all** retain data (as above, see `_savePersistentMemoryData`).
Subsequently executing the **Restore non-volatile data** function reactivates this backed up data.
(For further information, see the SIMOTION D4x5 Commissioning Manual)

A directory structure is created in the selected path using the **Save variables** function. This directory is assigned the name of the selected SIMOTION device or the selected unit, depending on whether the variables should be saved or restored for the entire device or just one unit.

The remanent global device variables are backed up in the file `unitdata.xml`. The number of subdirectories corresponds to the number of sources in the SIMOTION project. The names of the subdirectories correspond to the names of the sources. Every subdirectory contains a file named `unitdata.xml`, where the remanent unit variables are backed up. If required, another file is saved containing the non-remanent global variables for the source. This `DS*.xml` file is assigned the data set number as its name, which is transferred by specifying the parameter `ID` for the `_saveUnitDataSet` or `_exportUnitDataSet` function.

Additional references

Detailed information on this topic can be found in:

- Function Manual: SIMOTION Basic Functions, Data Backup from User Program
- SIMOTION SCOUT Online Help

Example of a folder structure when backing up on the device:

The folder structure is as follows:

```
<Folder device>, e.g. D435
  unitdataset.xml
  DS000001.xml
  <Folder device>, e.g. ST_UNIT1
    Unitdataset.xml
    DS000002.xml
```

3.17.2 Save variables function

Requirements:

- Backed up data, see section: Saving and restoring variables from the device
- The project has been downloaded to the target system.
- SIMOTION SCOUT is in online mode.
- Global unit variables and global device variables are backed up using system functions:
 - The system function **_saveUnitDataSet** or **_exportUnitDataSet** must be executed for every source, for example in the ST program, so that the global unit data is created as a data set in the SIMOTION device.
 - When executing the system function, the storage medium (RAM or memory card) must match the selection in the **Save variable** dialog window.

To save the variables:

1. Switch the SIMOTION device to STOP mode. This ensures that all the variable values have the same time stamp.
2. Select the SIMOTION device, e.g. C240, or the unit.
3. Right-click to open the shortcut menu.
4. Click **Save variables**.
The Save Variables window appears.

Note**Options in the dialog:**

Check the **Retain variables** checkbox if you want to save all remanent variables from the non-volatile data memory (SRAM/NVRAM).

Check the **Unit variables (ST)/global variables (MCC, LAD/FBD) saved via system functions** checkbox if you want to back up the previously saved or exported data sets.

Check the **TO Retain data (variables)** checkbox if you want to save these variables.

Select whether the data sets should be read from the **memory card** or from the **RAM disk**. Ensure that this selection corresponds to the storage location where the data sets were saved by the `_saveUnitDataSet/_exportUnitDataSet` function.

Detailed information can be found in
Function Manual: Basic Functions, Data Backup from User Program.

5. Make the required settings.
6. Click **OK**.
7. In the subsequent dialog, select the folder where the backup files are to be saved.
8. Select this folder.
Please note that these backed up variables can only be restored on this device.
9. Click **OK** to confirm.
The variables are saved.

3.17.3 Restore variables function

Requirements:

- The variables have been saved via the **Save variable** function.
- The project has been downloaded to the target system.
- The SIMOTION device is in the STOP mode.
- SIMOTION SCOUT is in online mode.

Note

Behavior when restoring tags if there are differences between the backup file and the project:

- If the unit variable or the global device variable exists in the backup file and on the unit or device and the data type is identical, then the contents of the variables from the backup file is transferred to the unit variable of the unit or to the global device variable on the device.
 - If the unit variable or the global device variable exists in the project, but not in the backup file, then the contents of the unit variable in the unit or the global device variable are retained unchanged.
 - If the unit variable or the global device variable exists in the backup file, but not in the unit or on the device, then the variable is ignored.
 - If the unit variable or the global device variable exists in the backup file and on the unit or device, but is of a different data type, then a type conversion is performed between ANY_INT <-> ANY_INT, ANY_INT <-> ANY_REAL, ANY_REAL <-> ANY_REAL. If a type conversion is possible, then the value in the backup file must fit in the new value range of the unit variable or global device variable, otherwise this is initialized. If a type conversion is not possible (e.g. date, time), then the UNIT variable or global device variable is initialized.
-

To restore variables:

1. Select the SIMOTION device, e.g. C240, or the unit.
2. Select the **Restore variables** function in the context menu.
3. Select the desired settings in the **Restore variables** dialog and click **OK**.

Note

Options in the dialog:

- Check the **Retain variables** checkbox if you want to restore all previously saved remanent variables in the non-volatile data memory (SRAM/NVRAM).
 - Check the **Unit variables (ST)/global variables (MCC, LAD/FBD) saved via system functions** checkbox if you want to restore the previously saved data sets.
 - Check the **TO retain data (variables)** checkbox if you want to restore these variables.
 - Select whether the data sets should be written to the memory card or to the RAM disk.
-

4. In the subsequent dialog, select the folder where the backup files have been saved.

Note

Do not select the folder that contains the device name in its name. Instead, select the folder one level higher, otherwise the restore will not work properly.

5. Click **OK** to confirm the following window.
6. Switch the SIMOTION device to RUN mode.
7. Execute the system function `_loadUnitDataSet` or `_importUnitDataSet` to initialize the variables with the values from the backup files.

Global unit variables and global device variables are backed up using system functions:

- The `_loadUnitDataSet` or `_importUnitDataSet` system functions must be executed for every source, for example in the ST program, so that the global unit data can be loaded into the SIMOTION device (RAM or memory card).
- When executing the system function, the storage medium (RAM or memory card) must match the selection in the **Restore variable** dialog window.

3.18 Exporting and importing projects

3.18.1 Exporting and importing a project in XML format

A log of the export or import is displayed in the **XML export/import status display** tab in the detail view. The XML export log also contains a link to the exported file. Double-click on this link to view the exported project data in the Internet browser.

Note

Projects are exported and imported version-neutral. However, if a project has version-specific properties, related errors may occur following import into another SCOUT version, e.g. when compiling of ST programs.

Exporting a project

Menu: **Project > Save and export**

The data format for exporting projects has been changed in SIMOTION SCOUT Version V2.1. Activate the Use V2.0 export format checkbox to export a project in V2.1 or higher with V2.0 format and re-import it with an older version of SIMOTION SCOUT (< V2.1). If you activate this checkbox, an optimized XML export is not possible.

SIMOTION SCOUT V3.0 and higher features an additional function. Projects can be exported more quickly using less memory. This is the default setting when you call the export.

For this, activate the checkbox Use optimized export format.

If neither checkbox is activated, all data in the SCOUT project is exported, even data not read back in during an import. This export is only required in exceptional cases.

Importing a project

Note

Projects can only be imported in offline mode and no projects should be open in SIMOTION SCOUT.

1. Select **Project > Import** in the menu bar.
The Import Project window and the XML export/import status display tab appear.
2. Under Source path and Source name of the import, select the XML file to be imported.
3. Click **Open** to confirm.
4. Click **OK**.
5. Enter the project name in the newly opened window and select a project directory by clicking Browse.
6. Click **OK**.
The import is started. On completion of the import, the successfully completed import, the project name and the target path are displayed in the XML export/import status display tab of the detail view. The new project is displayed in the project navigator.

Additional references

Please refer to the online help on this subject

Product combination

4.1 Compatibility

4.1.1 General compatibility

Different hardware and software combinations as well as different Kernel and SIMOTION SCOUT version combinations are possible when using SIMOTION.

These possible combinations can be found in the compatibility list on the SIMOTION SCOUT add-on CD (under 1_Important) as well as on the Internet at:

<http://support.automation.siemens.com/WW/view/de/18857317>

4.1.2 Software compatibility

Technology packages with Kernel

The SIMOTION kernel and the technology packages must always have the same version.
Example: Only a TP Cam Version V3.2 technology package will run on a SIMOTION Kernel Version V3.2.

Table 4- 1 SIMOTION SCOUT with SIMOTION Kernel

SCOUT version	Kernel version					
	V2.1.x	V3.0.x	V3.1.x	V3.2.x	V4.0	V4.1
SCOUT V2.1.x	x	-	-	-	-	-
SCOUT V3.0/SP1	x	x	-	-	-	-
SCOUT V3.1.x	x	x	x	-	-	-
SCOUT V3.2.x	x	x	x	x	-	-
SCOUT V4.0	-	x	x	x	x	-
SCOUT V4.1	-	x	x	x	x	x

x = supported; - = not supported

Project on memory card with SIMOTION Kernel

A project contains SIMOTION devices with a particular configured version. This exact SIMOTION kernel version must be available on the relevant SIMOTION device.

SIMOTION SCOUT with project version

A project with a version earlier than the installed version of SIMOTION SCOUT will be converted to the current version when it is opened. Only the data content of the SIMOTION project will be converted to the current version, but not the SIMOTION device version.

Example: If you have installed SIMOTION SCOUT V4.1 and wish to open a project created in SIMOTION SCOUT Version V4.0, the project is converted to V4.1 .

Table 4- 2 SIMOTION SCOUT with project version

SCOUT version	Project created with SCOUT version					
	V2.1.x	V3.0.x	V3.1.x	V3.2.x	V4.0	V4.1
SCOUT V2.1.x	x	-	-	-	-	-
SCOUT V3.0/SP1	x	x	x	x	x	x
SCOUT V3.1.x*	x	x	x	x	x	x
SCOUT V3.2.x*	x	x	x	x	x	x
SCOUT V4.0*	x	x	x	x	x	x
SCOUT V4.1*	x	x	x	x	x	x

x = supported; - = not supported

* As of SIMOTION SCOUT Version V3.1 SP1, a project can be saved in the project format of an older version (up to Version V3.0), and therefore opened and worked on with an older version of SIMOTION SCOUT.

To successfully convert a project to an older format, no devices or functions must be used which are not implemented in the desired version./

Detailed statements on combining products can be found in the compatibility lists (see section General compatibility (Page 89)).

4.2 Memory media of the SIMOTION devices

Storing on memory media

The online project comprising the technology package and the user data. It is stored on a memory medium secure against power loss. The data medium used will vary depending on the SIMOTION platform and SIMOTION version.

- SIMOTION C2xx: Micro memory card
- SIMOTION P350: Virtual memory card
Handling and functionality correspond to the micro memory card of the SIMOTION C2xx.
- SIMOTION D4xx: CompactFlash card

Note

The memory card must not be inserted or removed during operation. Removing the card in RUN mode triggers an overall reset, which results in the loss of stored data.

Additional references

More information on this topic is available in

- SIMOTION C Operating Instructions
- SIMOTION P350, SIMOTION P350-3 and Panels Commissioning and Hardware Installation Manual
- SIMOTION D4x5 Commissioning and Hardware Installation Manual
- SIMOTION D410 Commissioning Manual
- SIMOTION SCOUT Online Help

Persistent data backup

Persistent data storage is executed using a non-volatile memory integrated in the SIMOTION device, e.g. SRAM for D4xx. SuperCap and optionally a battery are used for buffering the non-volatile memory.

You can save data from the non-volatile memory in order to avoid loss of data in the event of a power failure. The following functions are possible:

- System function `_savePersistentMemoryData` for saving the non-volatile memory
- Restoration of the non-volatile memory during the ramp-up on detection of a power loss.

Additional references

More information on this topic is available in

- Function Manual: Basic Functions

4.3 STEP7

4.3.1 SIMATIC Manager

Open SIMOTION project

You can also open a project in the SIMATIC Manager and edit it with the tools provided. However, you do not have any direct access there to specific SIMOTION components, such as technology object and programs.

You can open the SIMOTION SCOUT from the CPU.

Note

You can use **File > Manage...** to show and hide the projects you have created in SIMOTION SCOUT in the SIMATIC Manager.

4.3.2 SIMATIC Logon

Overview

As of SIMOTION SCOUT V4.1, you have the option of assigning a project password to provide access protection for projects. This functionality requires the previous installation of the SIMATIC Logon STEP7 option.

This function makes it possible to restrict project creation to authorized personnel only and to track changes in versions created with SIMATIC Logon. It also therefore provides support for the validation process of a machine or system [as per FDA 21 CFR Part 11].

Installation / Prerequisites

The STEP7 V5.4 SP1 options SIMATIC Logon and Version Trail must be installed and licensed in addition to SIMOTION SCOUT V4.1.

Features

When SIMATIC Logon is installed, password protection can be activated for any project. A SCOUT project saved with SIMATIC Logon can only be opened and edited with password protection.

- If a project is opened in SCOUT that has an access protection set with **SIMATIC Logon**, the access dialog appears in which the project password must be entered. This means the correct password must be entered to open the project. If an incorrect password is entered, an error message will be issued and the project remains closed.
- Passwords are assigned in a separate administrator screen using a process configured according to the guidelines under FDA 21 CFR Part 11.
- Every file open and every change is automatically recorded in a revision log.
- SCOUT projects created with SIMATIC Logon can be archived, managed and their changes tracked in a clearly organized fashion using the SIMATIC Version Trail option.

Activate SIMATIC logon

When SIMATIC Logon is installed, password protection can be activated for any project. To do this, select **Options > Access Protection > Activate** in SIMATIC Manager.

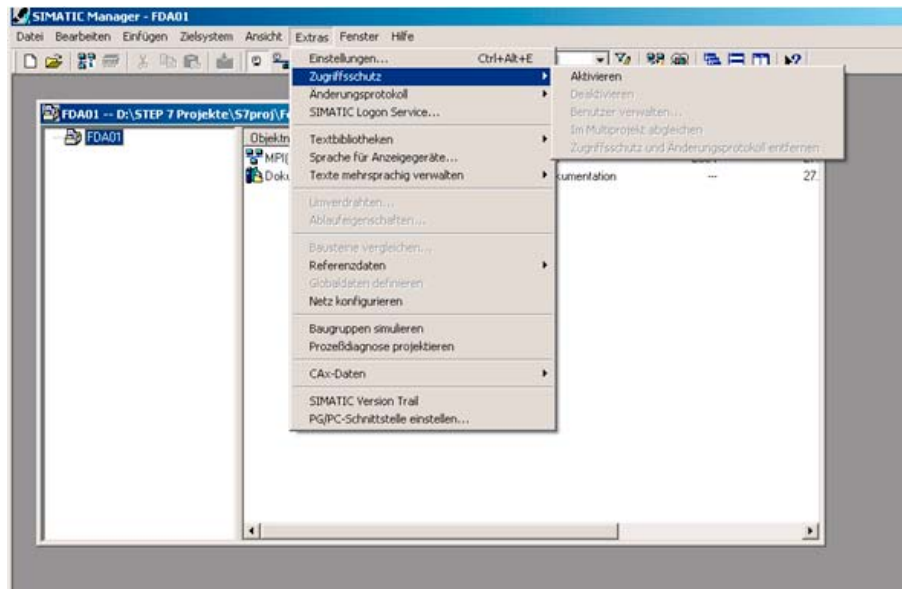


Figure 4-1 Activate SIMATIC Manager access protection

When access protection is activated, the SIMATIC Logon Service window opens. The administrator logs in here to assign a project password for this project.

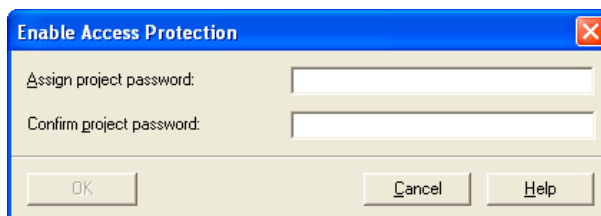


Figure 4-2 Activate access protection

Then the users are entered in the user administration for this project using drag&drop.

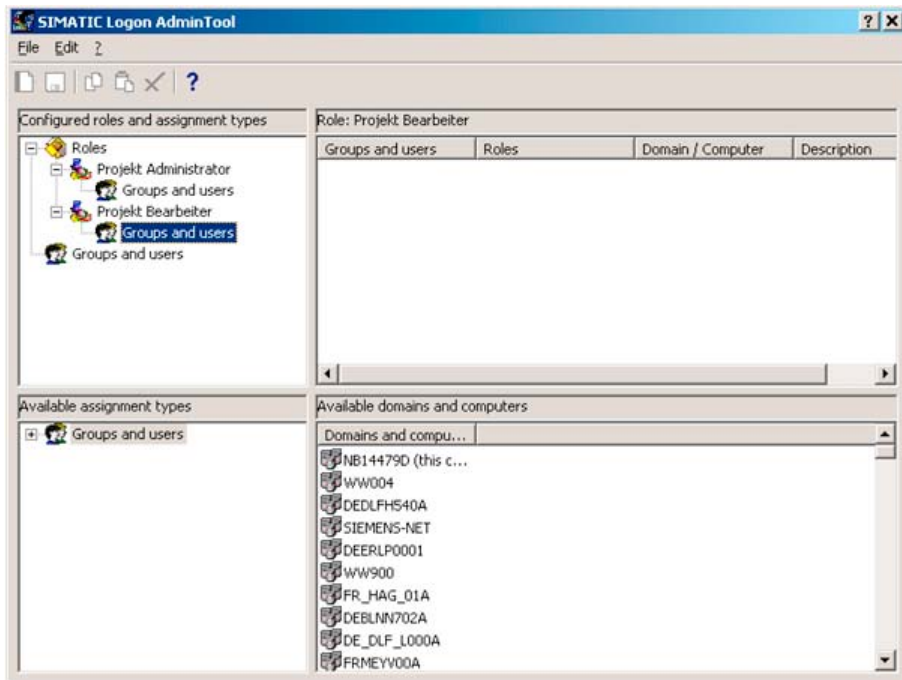


Figure 4-3 SIMATIC Logon AdminTool

Open protected project

When a protected project is opened, the following dialog box appears if SIMATIC Logon is installed. Enter your user name and password here.

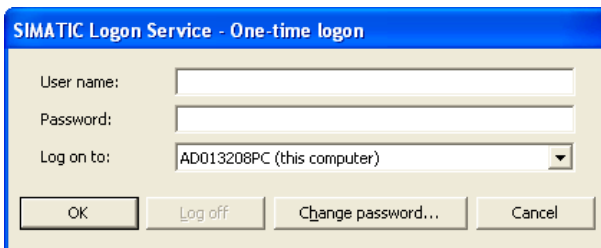


Figure 4-4 SIMATIC Logon service

If SIMATIC Logon is not installed, the project can also be set to open only with the project password using STEP7 V5.4.

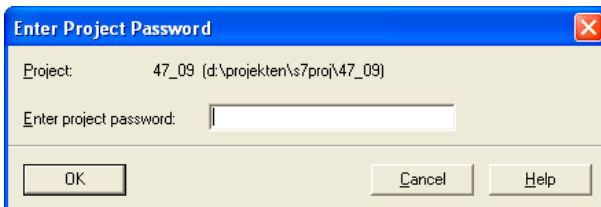


Figure 4-5 Enter the project password.

For more details on this topic, see the following document:

- SIMATIC Logon; SIMATIC Electronic Signature, Manual

4.3.3 SIMATIC Version Trail

Overview

SIMATIC Version Trail is a software option for SIMOTION engineering which, together with the SIMATIC Logon central user administration, can assign a version history to libraries and projects.

Installation / Prerequisites

SIMATIC Version Trail is an option in STEP7 V5.4 SP1 and must be installed and licensed in addition to SIMOTION SCOUT V4.1. SIMATIC Version Trail can only be used and licensed in a package together with SIMATIC Logon.

Function

When archiving, SIMATIC Version Trail creates a version history with the following information in association with SIMATIC Logon:

- Version
- Version name
- Date and time
- Users
- Comments

This version history can be displayed and printed. Individual versions can be retrieved from the version history, and used further. SIMATIC Logon organizes the access protection.

View of a SIMATIC Version Trail window, showing the project name, comments and versioning data. The versions created with SIMATIC Logon can be documented and managed in a clearly organized fashion after changes.

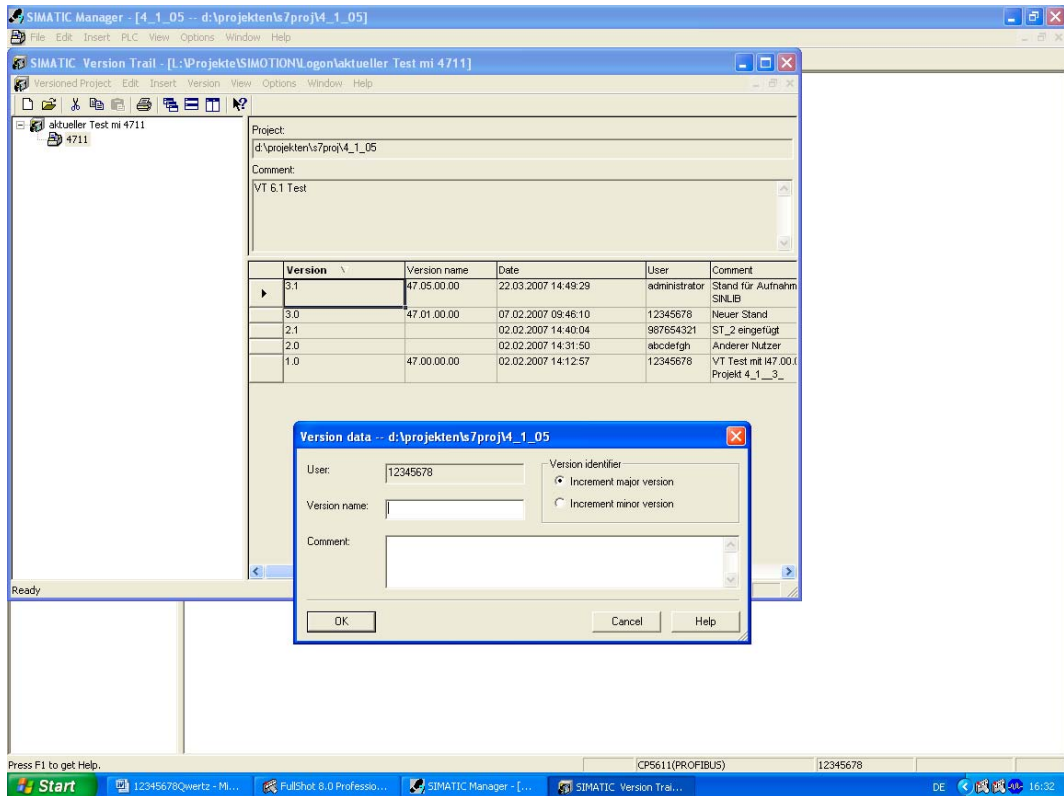


Figure 4-6 SIMATIC Version Trail - version data

Note

Please note that SIMATIC Version Trail cannot be used separately, but only in combination with SIMATIC Logon.

4.4 NetPro

NetPro in STEP7

NetPro is integrated in the STEP 7 basic package. NetPro is a supporting tool for STEP 7.

A time-controlled cyclical data transmission via MPI is possible with NetPro:

- Selection of the communication stations
- Entry of data source and data target in a table; the generation of all blocks (SDB) to be loaded and their complete transfer to all CPUs is performed automatically.

An event-driven data transmission is also possible with:

- Specification of the communication connections
- Selection of the communication/function blocks from the integrated function block library
- Parameter assignment of the selected communication/function blocks in the usual programming language.

Application for SIMOTION

So that network nodes can communicate, configure networks and/or subnets in NetPro. In NetPro, you create a graphic view of the networks and subnets and specify their properties or parameters. You can also define the node properties.

You can open NetPro via SIMOTION SCOUT; the NetPro application then opens as a separate window. Application cases for the SIMOTION project are, for example, the connection of the engineering system via network nodes and the creation of routing connections.

4.5 HMI

Overview

The Human Machine Interface (HMI) connects the world of automation with the individual demands of the operator. As part of TIA, SIMATIC HMI supports uniform engineering under Windows, accesses common data and communicates uniformly.

For efficient machine operation and monitoring in various performance classes, you can use the following panels recommended for SIMOTION as well as PC-based panel systems with membrane keyboards or touch screen operation:

- **Panels**
For efficient machine operation and monitoring in various performance classes, either text-based or graphics-capable with membrane keyboards or touch screen operation.
- **Multi-panels**
These can be used for operator control and monitoring in the same way as the panels, with operation by means of touch screens or membrane keyboards. Multi-panels (MP) also permit the installation of additional applications and therefore provide typical PC flexibility.
- **Panel PCs**
Are designed for demanding environmental conditions and provide the same degree of robustness and suitability for industry.

SIMATIC ProTool/Pro, a modern visualization software under Windows, and the WinCC flexible engineering software are available for the display of the user interface.

Additional references

Detailed information can be found in:

- Catalog: SIMOTION, SINAMICS S120 and Motors for Production Machines
- PM 21 Catalog.

SIMATIC ProTool/ ProTool/Pro

ProTool is the system-wide and uniform **configuration software** under Windows for all SIMATIC HMI operator panels.

SIMATIC ProTool covers the applications of the machine-related area with PC-based control and monitoring solutions for single-user systems based on ProTool/Pro through to the SIMATIC HMI operator panels. For the configuration of the ProTool/Pro runtime for PCs as well as SIMATIC HMI operator panels, the ProTool family has the uniform and scalable configuration tools ProTool/Lite, ProTool and ProTool/Pro CS.

ProTool/Pro is the visualization software under Windows for the PC-based HMI in the machine-related area. It allows quick response times and safe process control.

SIMATIC WinCC flexible

SIMATIC WinCC flexible is the innovative HMI software under Windows 2000/XP for all applications in the machine-related area. The engineering software enables the uniform configuration of all Windows-based SIMATIC HMI operator panels.

WinCC flexible Runtime provides basic HMI functionality on PCs, including messaging and logging systems and can be expanded when required via options. The runtime functions available on the SIMATIC HMI operator panels are dependent on the device class.

Existing ProTool projects can be accepted or converted. The WinCC flexible engineering software can be integrated in the central programming software of the SIMATIC world, SIMATIC STEP 7, and used for the configuration of all operator panels. The engineering software of SIMATIC HMI also accesses variable lists and message lists of the controller and uses their communication parameters.

OPC / OPC XML-DA

Open communications standard for automation components. The goal of the standard is to ensure a problem-free and standardized data exchange between controllers, operator control and monitoring systems, field devices and office applications from different manufacturers.

The OPC abbreviation previously means "OLE for Process Control", because the implementation is based on Microsoft's COM/DCOM technology. Nowadays, one uses the term "Openness, Productivity and Collaboration". Today, a number of standards defined by the OPC Foundation have evolved. The OPC Foundation is a grouping of many manufacturers from the automation technology area.

SIMOTION supports the OPC DA (Data Access) and OPC AE (Alarm & Event) standards with the SIMATIC NET Softnet package. This is based on the Windows COM technology.

SIMOTION also supports OPC XML-DA (Data Access based on XML). The OPC server is located in the SIMOTION device and is accessed from a partner station no longer using COM mechanisms but with Web services and their XML-coded function calls. This makes the partner stations independent of hardware and operating systems.

The client application on the partner station works with the symbolic SIMOTION variable names. There is no dependency on the SIMOTION SCOUT database, which means that no consistency problems arise, even when there is a switch in versions.

4.6 Drive ES

Drive ES engineering system

Drive ES is the engineering system used to integrate Siemens drive technology into the SIMATIC automation world easily, efficiently and cost-effectively in terms of communication, configuration and data management. The STEP 7 Manager user interface provides the basis for this procedure.

Drive ES Basic is the basic software for the parameterization of all drives, online and offline. With the Drive ES Basic software, the automation and the drives are edited on the user interface of the SIMATIC Manager. Drive ES Basic is the starting point for common data archiving from complete projects and for extending the use of the routing and SIMATIC teleservice to drives. Drive ES Basic provides the engineering tools for the new motion control functions - data exchange broadcast, equidistance and isochronous operation with PROFIBUS DP.

The following commissioning tools are contained in Drive ES:

- STARTER Standalone for SINAMICS is not required and cannot be used in conjunction with SIMOTION SCOUT because STARTER is integrated in SIMOTION SCOUT.
- SIMOCOM U for SIMODRIVE
- Drive Monitor for MASTERDRIVES

Note

Drive ES Basic is part of the delivery of SCOUT and SCOUT Standalone.

4.7 Commissioning drives (Starter)

The aim of STARTER is the simple and rapid commissioning, optimization and diagnostics of all Siemens drives of the new drive generation with only one tool.

The STARTER drive/commissioning tool supports the following drives:

- SINAMICS
- MICROMASTER 420/430/440
- MICROMASTER 411 / COMBIMASTER 411
- COMBIMASTER
- ET200pro FC
- ET200S FC ICU24

The following variants are available:

- STARTER Standalone:
STARTER as commissioning tool for applications without SIMOTION, but with integration of the new drives in SIMATIC S7. STARTER Standalone is not required in connection with SIMOTION SCOUT and cannot be used.
- STARTER integrated in SIMOTION SCOUT:
For SIMOTION applications, SIMOTION SCOUT contains the entire functionality of STARTER.

Performance characteristics:

- Wizards support new users by providing solution-oriented dialog guidance, whereby the uniform graphics-based display facilitates understanding.
- However, experts are also able to access the individual parameters quickly.

4.8 CamTool

Graphic creation of cams

Simple text-based editors are already integrated in the basic SIMOTION SCOUT package for the creation of cams. The CamTool V2.2 option package expands SIMOTION SCOUT with a powerful tool for the full graphical creation and optimization of cams. CamTool fully integrates into the SIMOTION SCOUT user interface. In SIMOTION CamTool, you can create, edit and optimize cams with the aid of a graphical user interface.

Additional references

Please refer to the following document on this subject

- Configuration Manual: SIMOTION CamTool

4.9 DCC programming system

Drive Control Chart

DCC enables SIMOTION and SINAMICS users to also implement and graphically configure drive-related tasks employing continuous closed-loop and open-loop control.

A set of Drive Control Blocks (DCB) is available in a library for this purpose. These function blocks can be graphically interconnected and configured in what are known as "charts" via a configuration tool (DCC editor).

A large number of Drive Control Blocks (DCB) are available for both DCC-SIMOTION and DCC-SINAMICS with identical functionality.

- Module library with administration, calculation, control, logic and complex modules.
- Graphical switching editor with various editing, macro, help, search, comparison and print functions.
- Sequence environment for SIMOTION with selectable, mixable scanning times and consistent data transfer between scanning periods.
- Sequence environment for SINAMICS with embedding of technology option in SINAMICS using the BICO technique, with the applications set using configured parameters
- Diagnostics environment with signal display, diagnostics and trace functions.
- Scalability with different performance features and project data volumes for DCC-SIMOTION and DCC-SINAMICS.

Additional references

More information on this topic is available in

- Programming and Operating Manual SINAMICS/SIMOTION Editor description DCC
- SINAMICS/SIMOTION DCC Module Description Function Manual
- SIMOTION SCOUT Online Help

Diagnostics

5.1 Controlling the target system

5.1.1 Overview

In online mode, you can control the SIMOTION device with SIMOTION SCOUT, e.g.:

- Change and compile program sources
- Download
- Control operating mode
- Set the internal clock of the SIMOTION device
- Change Configuration Data in RUN Mode
- Control variables in RUN
- Copy current data to RAM
- Copy RAM to ROM
- Delete the RAM of the SIMOTION device (overall reset)
- Archive project data

5.1.2 Controlling the operating mode with SIMOTION SCOUT

 **DANGER**

Danger to personnel and machine can result from an uncontrolled change of the operating mode.
Please note the safety regulations before you control a SIMOTION device via the mode selector in SIMOTION SCOUT.

1. Select the SIMOTION device in the project navigator.
2. Select the **Target system > Control operating mode** menu.

A software switch is displayed. This represents the mode selector on the SIMOTION device or the virtual hardware mode selector (SIMOTION P). The current operating mode is displayed with symbolized switch setting and LEDs.

3. Select the desired operating mode.
Click the corresponding button.

The switching options are dependent on the position of the mode selector on the SIMOTION device.

The operating mode can be monitored and switched with the device diagnostics.

Table 5- 1 Operating modes of a SIMOTION device

Operating mode	Description
STOP	<ul style="list-style-type: none"> • Technology objects inactive (enables deleted, no axis motion) • User program is not executed • Loading a user program is possible • All system services are active (communication, etc.) • All analog and digital outputs set to 0 • The I/O modules (signal modules) are in the safe state (SIMOTION D4xx)
STOP U	<ul style="list-style-type: none"> • Technology objects are active • Technology objects can execute jobs for testing and commissioning functions. • Otherwise identical to STOP operating mode • STOP U means stop user program • User program is not executed
RUN	<ul style="list-style-type: none"> • Technology objects are active • Execution of the user programs assigned to the execution system • Loading a user program is possible • Process image of the inputs and outputs is read or written
MRES	Overall reset <ul style="list-style-type: none"> • Switch setting for the overall reset of the SIMOTION C2xx, SIMOTION P350-3 and the SIMOTION D4xx
SERVICE	<ul style="list-style-type: none"> • Mode selector on SIMOTION device (!) must be in the STOP U or RUN position. • The mode is assumed when the control priority is fetched using the axis control panel.

Table 5- 2 The switching possibilities of the software switch depending on the position of the mode selector on the SIMOTION device (with regard to the SIMOTION D4xx, see the SIMOTION D4x5 Manual; SIMOTION D410 Manual)

Mode selector position of the SIMOTION device	Switching options of software switch in SIMOTION SCOUT
STOP	STOP STOP U MRES
STOP U	STOP U STOP
RUN	RUN STOP U STOP
MRES	MRES STOP

Table 5- 3 LEDs of the mode selector

LED	Description	Color	Meaning
5 VDC	Power OK	Green	Power supply 5 V <ul style="list-style-type: none"> Steady: Power supply functioning correctly. Flashing: Power supply defective
RUN	RUN	Green	RUN mode <ul style="list-style-type: none"> Steady: SIMOTION device is in RUN mode. Flashing: RUN mode is selected (by SIMOTION SCOUT or switch) and the SIMOTION device is on its way there. Flashing simultaneously with STOP U SIMOTION device is in SERVICE mode. Off: SIMOTION device is not in RUN mode.
STOP U	STOP User program	Orange	STOP U mode <ul style="list-style-type: none"> Steady: SIMOTION device is in STOP U mode. Flashing: STOP U mode is selected (by SIMOTION SCOUT or switch) and the SIMOTION device is on its way there. Flashing simultaneously with RUN SIMOTION device is in SERVICE mode. Off: SIMOTION device is not in STOP U mode.
STOP	STOP	Orange	STOP mode <ul style="list-style-type: none"> Steady: SIMOTION device is in STOP mode. Flashing: STOP mode is selected (by SIMOTION SCOUT or switch) and the SIMOTION device is on its way there. Flickering (fast flashing): Write access to the memory card Off: SIMOTION device is not in STOP mode.

Note

The LED displays on SIMOTION devices are described in the associated Manuals.

SIMOTION C2xx

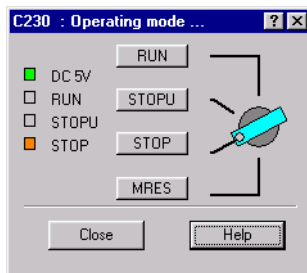


Figure 5-1 Mode selector

On the SIMOTION C2xx, the operating mode can also be set via a rotary switch on the device.

SIMOTION P350-3

Note

With SIMOTION P, the mode selector is displayed via the SIMOTION P Startup application. You can call this via **Start > Programs > SIMOTION P Startup**.

For more information, see the SIMOTION P Manual.

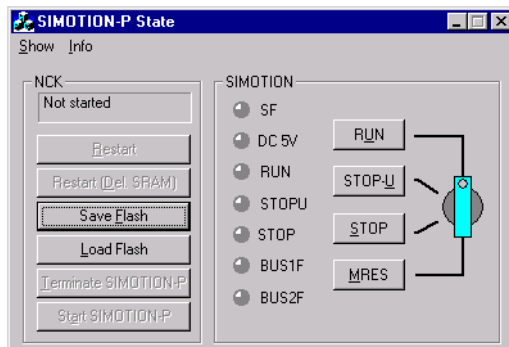


Figure 5-2 SIMOTION P state application

SIMOTION D4xx

Note

For the SIMOTION D4xx, it is recommended that the operating mode be switched with the SIMOTION SCOUT.

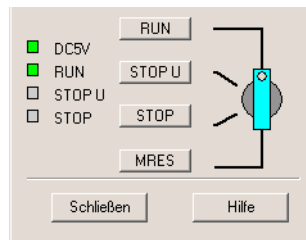


Figure 5-3 D4xx mode selector

Additional references

Please refer to the following documents on this subject

- Operating Instructions SIMOTION C2xx
 - SIMOTION P350-3 and Panels Commissioning and Hardware Installation Manual
 - SIMOTION D4x5 Commissioning and Hardware Installation Manual
 - SIMOTION D410 Commissioning Manual
- and the SIMOTION SCOUT online help.

5.1.3 Overall reset

Proceed as follows:

1. Start the software mode selector.
2. Click **MRES**.
3. Acknowledge the warning.

On the SIMOTION device, MRES automatically switches to the STOP mode once execution is completed.

References

For more information, please refer to

- SIMOTION C2xx Operating Instructions
- SIMOTION P SIMOTION P350-2 Product Manual and Panels Manual
- SIMOTION D4x5 Manual
- SIMOTION D410 Product Manual
- SIMOTION SCOUT Online Help

5.1.4 Setting the time of day

Proceed as follows:

1. Select the SIMOTION device in the project navigator.
2. Select the **Target system > Set time of day** menu.

The current date and the time of day of the PG/PC and the SIMOTION device are displayed.

3. Change the date and time of day of the SIMOTION device, if necessary:

If you want to accept the values from the PG/PC:

- Activate the **Accept from PG/PC** checkbox.

If you want to enter values:

- Deactivate the **Accept from PG/PC** checkbox.
- Enter the values in the corresponding fields (**Module**).

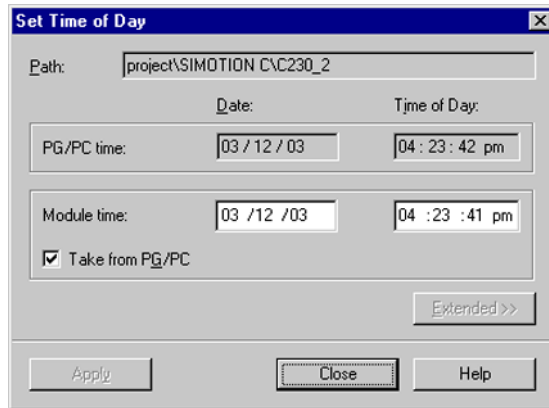


Figure 5-4 Setting the time of day

5.1.5 Changing configuration data

You can also change the configuration data of a technology object offline and online in the RUN mode.

You can change the configuration data in the configuration dialogs as well as in the expert list of the respective technology object, e.g. axis.

Proceed as follows:

1. Select the relevant technology object in the project navigator.
2. Open **Expert > Expert list** in the shortcut menu.
The expert list opens in the working area.
3. In the expert list, open the **Configuration data** subtree and, if required, other subtrees.

Parameter	Parameter text	Offline value	Unit	Data type	Minimum	Maximum
Execution	Arrangement of the interpolator task lev					
LeadScrew	Leadscrew pitch of a linear axis					
Modulo	Modulo settings of a rotary axis					
Restart	Mode for the restart of the technology o					
RestartCondition	Conditions for the restart of the technolo					
Simulation	Process coupling					
TypeOfAxis	Axis type-specific configuration					
ActualAccelerationM	Actual acceleration monitoring					
-enable	Activation of the actual acceleration mo	NO (91)	-	'EnumYesNo' = e		
-maximum	Maximum value of the permissible actual	0.0	mm/s ²	LREAL	-1E+012	1E+012
ActualVelocityMonito	Actual velocity monitoring					
-enable	Activation of the actual velocity monitori	NO (91)	-	'EnumYesNo' = e		
-maximum	Maximum value of the permissible actual	0.0	mm/s	LREAL	0	1E+012
CommandValueQuan	Quantification filter					
-enable	Activation of the quantification filter	NO (91)	-	'EnumYesNo' = e		
DecodingConfig	Command execution					
-behaviourAtTheEndO	Behavior at the end of the traversing pr	STOP_WHEN_PROFILE	-	'EnumEndBehavio		
-cyclicSetUpInForceLi	Cyclic continuation with position-related	NONE (0)	-	'EnumAxisCyclic		
-decodeSequentialMoti	Arrangement of sequential positioning c	IMMEDIATELY (0)	-	'EnumDecodeSeq		
-directionDynamic	Activation of the direction-dependent ac	NO (91)	-	'EnumYesNo' = e		
-disableMotionOperatio	Abort of stopped motion commands afte	YES (173)	-	'EnumYesNo' = e		
-numberOfImmediateC	Maximum number of active commands	6	-	DINT	6	100
-numberOfMaxBuffere	Maximum number of active command IDs	100	-	DINT	0	1000
-numberOfQueueCom	Maximum number of active commands	6	-	DINT	6	100
-profileDynamicsLimitin	Limitation of the dynamic response para	COMMAND_DYNAMICS	-	'EnumProfileDyna		
-speedModeSetPointZ	Resetting of the dynamic response valu	NO (91)	-	'EnumYesNo' = e		
-stopWithJerk	Local stop reactions with jerk limitation	NO (91)	-	'EnumYesNo' = e		
-transferSuperimpose	Reset coordinate system for superimpo	TRANSFER_STANDSTI	-	'EnumTransferSu		
DistributedMotion	Distributed motion control					

Figure 5-5 View of the expert list

Additional references

Note

The detailed procedure for changing the configuration data is described in:

Function Manual: SIMOTION Basic Functions

For additional information, see

- SIMOTION Lists Manuals
- SIMOTION SCOUT Online Help

5.1.6 Archive project data to memory card

The **Target system > Archive project on card...** function archives the complete SCOUT project on the MMC/CompactFlash card or hard disk of the P350.

The **Target system > Load project from card...** function loads the archived SCOUT project from the card or the hard disk.

A zip file is archived. This function is only possible in online mode. In addition to the zip file, an info file is saved. This can be read with the **Target system > Load project from card...** function. The following contents are written to the info file:

- The project name
- The size of the zipped project file
- The storage date

For additional information, see

- Handling Recommendations for Service with SCOUT V4.1 section

5.1.7 Loading data to the target system

You have to download the project data that you have created with SIMOTION SCOUT to the target system. The target system can consist of several CPUs (SIMOTION controllers).

The project data contains the programs (ST, MCC, LAD/FBD, and DCC) that you have created and compiled, the hardware configuration, and the technology packages that you have created and parameterized.

Additional references

The exact download procedure is described in:

- Function Manual: SIMOTION Basic Functions

5.2 Using diagnostic functions

5.2.1 Overview of the possible diagnostic functions

A wide range of diagnostic functions can be used for the operation of SIMOTION devices in the online mode. These diagnostic options are summarized in the diagnostics overview:

- The diagnostics overview is a tab in the detail view and is available by default in online mode. You can call up detail displays from here.
- An Alarms tab is also available in the detail view. This provides a tabular overview of
 - Technological alarms (from technology objects)
 - Alarm_S messages (from user programs)
The alarms can be acknowledged either individually or all together.
- Comprehensive diagnostic information (e.g. diagnostics buffer, system utilization, and task status, etc.) is accessible via Device Diagnostics as a window in the working area.
- You can record signal charts with the trace tool. The values of system variables can be recorded during runtime for diagnostic purposes.
- Program testing and debugging, e.g. variable control, program status, breakpoints

Additional diagnostic functions are available with SIMOTION V4.1 SP2 and higher. On the basis of simple operations (e.g. by setting the switch position) and without the need for the SIMOTION SCOUT engineering system, you can:

- Back up diagnostic data including non-volatile data (retain data) to CompactFlash Card (for SIMOTION D), MMC (for SIMOTION C) or hard disk (for SIMOTION P)
- Back up websites, including the most up-to-date content for diagnostic purposes, to the CompactFlash Card, MMC, or hard disk
- Restore backed up non-volatile data (retain data)

Further information can be found in the FAQs on the Utilities & Applications CD under: FAQs > Engineering > Backing up diagnostic data and non-volatile data

SIMOTION IT DIAG also offers comprehensive diagnostic options that can be easily accessed via an Internet browser.

References

For more information, please refer to

- SIMOTION ST Structured Text Programming and Operating Manual
- SIMOTION MCC Motion Control Chart Programming and Operating Manual
- SIMOTION LAD/FBD Programming and Operating Manual
- Diagnostics Manual: SIMOTION IT Ethernet-based HMI and Diagnostic Function
- SIMOTION SCOUT Online Help

5.2.2 Using the diagnostics overview

The diagnostics overview is available as a tab in the detail view when the project is in online mode.

- In the detail view, select the **Diagnostics overview** tab.

Device	Operati...	RAM disk occupied	RAM occupied	Memory card occupied	Retentive data occup...	CPU utilization
C230_2	STOP	78 KB (1.0 %)	765 KB (7.5 %)	9 MB (59.6 %)	520 Byte (4.2 %)	11 %

Figure 5-6 Diagnostics overview in the detail view (online mode)

The following are displayed for each accessible SIMOTION device:

- Operating mode
- Memory used (absolute and percentage display)
RAM disk, RAM, memory card, retentive data
- CPU utilization (percentage display)

The drive devices specified in the hardware configuration are also displayed. To obtain a detailed display of the individual devices, open the device diagnostics.

5.2.3 Device diagnostics

In online mode, the device diagnostics function enables you to obtain a comprehensive display of diagnostics results of the individual SIMOTION devices.

Proceed as follows:

1. Select the desired SIMOTION device in the project navigator.
2. Select the **Target system > Device diagnostics...** menu.

or

1. Double-click the SIMOTION device in the Diagnostics overview tab in the detail view.

Note

You may open the device diagnostics for several SIMOTION devices simultaneously. This allows you to compare different devices.

You can also access these device diagnostics via the **Accessible nodes** function.

The **Device Diagnostics** window appears in the working area of the workbench. This window provides you with the following information:

- General information
- Diagnostics buffer
- Slaves
- Task runtimes
- System utilization

- User log file
- Syslog file
- Version overview

You have the following options:

- Print:
Select the **Project > Print** menu.
- Save it as a text file:
Click **Save**.
- Refresh:
Click **Refresh** or press the **<F5>** function key.

You can also monitor and change the operating mode:

- Click **Control operating mode**.

5.2.4 Device diagnostics: General

This provides general information on the SIMOTION device:

- Select the **General** tab in the Device Diagnostics window.

The following information will be displayed:

- Name and system ID of the SIMOTION device
- Operating mode of the SIMOTION device
- MAC addresses
- IP addresses
- Subnet mask

- Standard gateway
- Order numbers and names of the components used, e.g. SIMOTION device, Motion Control technology package.

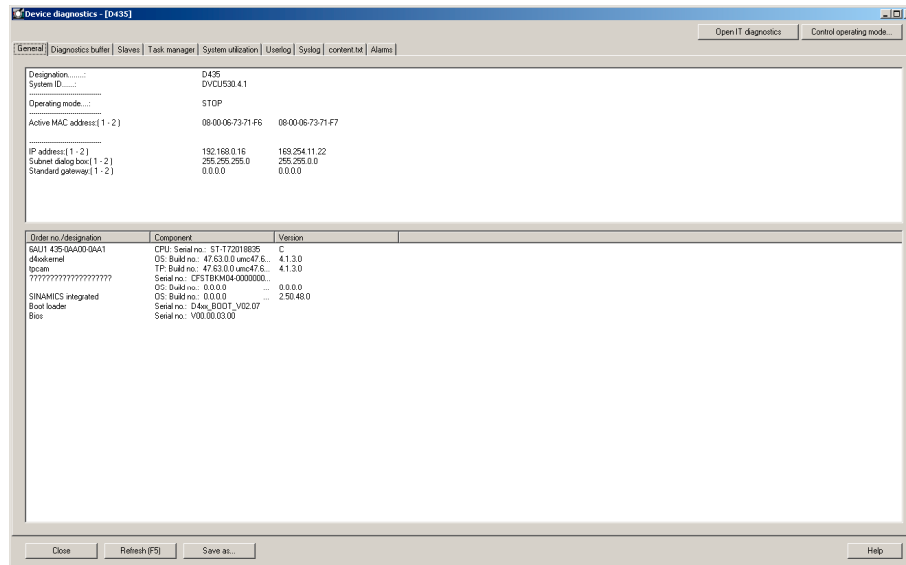


Figure 5-7 Display of general information in the device diagnostics

5.2.5 Device diagnostics: Diagnostics buffer

The diagnostics buffer is part of the system status list. It is possible to jump to the error position from the diagnostics buffer (as of V3.2). It logs important events (e.g. changes in module state) in the order in which they occur. These include the following:

- Faults in a module
- Faults in the process wiring
- System errors in the CPU
- CPU operating mode transitions
- Drive alarms
- Errors caused by the technology objects of SIMOTION
- Errors in the user program that caused an operating state transition (a double-click on the error message causes the cursor to jump to the error location in the program)
- User-defined entries with the `_writeAndSendMessage` function
- PMC error messages (SIMOTION D4x5)
- Compatibility errors, e.g. the drive software with SIMOTION (SIMOTION D4x5)

The SINAMICS Integrated diagnostics buffer is also displayed for the SIMOTION D4xx as of SIMOTION version V4.1 SP2.

To work with the diagnostics buffer:

1. In the **Device Diagnostics** window, select the **diagnostics buffer** tab. The saved events are displayed in tabular form.
2. Select the event for which you want to obtain more information.

Detailed information for the selected event is displayed in the lower pane of the window.

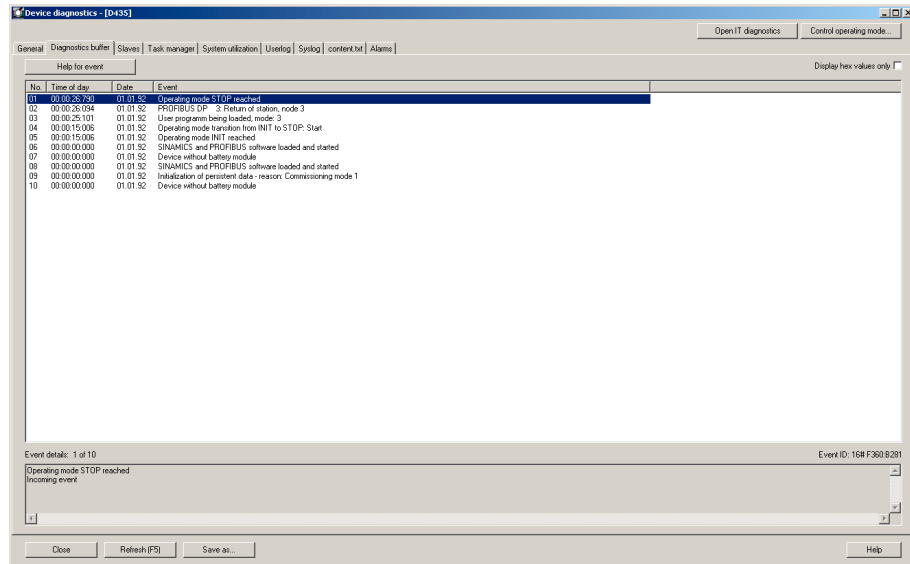


Figure 5-8 Example of the diagnostics buffer display in the device diagnostics

5.2.6 Device diagnostics: Slaves

The devices displayed in the Slaves tab of the device diagnostics are not identical to the display in the Accessible Nodes window.

Note

When you open the Slaves tab, you must refresh the display.

Click the **Update** button or press F5 on the keyboard.

After refreshing the view, the following devices are displayed in the Slaves tab:

- Devices configured in HW Config
- All devices that are configured in the Slaves function

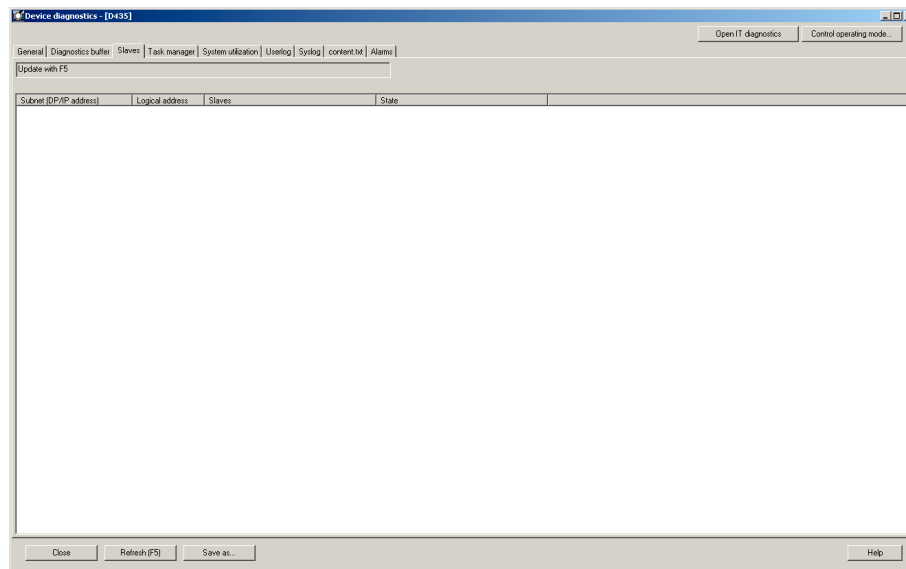


Figure 5-9 Example of the Slaves tab display in the device diagnostics

5.2.7 Device diagnostics: Task Manager

You can display the task runtimes and the status of the tasks set up in the project if you are connected online with the unit. The resolution of the displayed task runtimes is performed in the servo cycle clock.

Note

The task runtimes are calculated to the μ s and indicate the effective level runtime of the respective task (including the interrupt times). These thus correspond to the values of the **effectiveTaskruntime** device variables.

The following applies to SIMOTION Runtime versions < V4.1:

The display is calculated in the servo cycle clock and has only the resolution of the servo cycle clock. As the task runtime can be less than the servo cycle clock, e.g., for the ServoSynchronousTask or IPOSynchronousTask, the value 0 ms is displayed in this case.

Task	Task status	actual	min	max	Mean task
BackgroundTask	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
ControlPanelTask	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
ExecutionPanelTask	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
IPoSynchronousTask	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
IPoSynchronousTask_2	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_1	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_2	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_3	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_4	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_5	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_6	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_7	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_8	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_9	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_10	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_11	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_12	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_13	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_14	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_15	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_16	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_17	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_18	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_19	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_20	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_21	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_22	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_23	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_24	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_25	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_26	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_27	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_28	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_29	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_30	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_31	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
MotionTask_32	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
PeripheralsTask	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
ServoSynchronousTask	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms
ShutdownTask	STOPPED	0.000 ms	0.000 ms	0.000 ms	0.000 ms

Figure 5-10 Example of the task runtimes display in the device diagnostics

The display is refreshed according to the refresh rate selected. The status and the following values are then displayed:

- **Current runtime (current):**
Value of last polling
- **Minimum runtime (min.):**
Minimum value since last transition from STOP to RUN
- **Maximum runtime (max.):**
Maximum value since last transition from STOP to RUN
- **Mean runtime (mean value):**
Value averaged from the last 10 cycles

The runtimes measured include the interruptions by higher-priority tasks.

Meaning of the various status displays:

- **RUNNING (TASK_STATE_RUNNING)**
Task running, e.g.:
 - Via the `_startTask` function
 - As an active cyclic task
- **RUNNING_SCHEDULED (TASK_STATE_RUNNING_SCHEDULED)** (as of V4.1)
Task interrupted by system.
If the task status `RUNNING_SCHEDULED` remains pending for a long time, it identifies a long-runner in the user task, e.g., a programmed continuous loop.
- **STOP_PENDING (TASK_STATE_STOP_PENDING)**
Task has received signal to stop; it is in a state between `RUNNING` and `STOPPED`.
Actions may be performed until the task has stopped.

- **STOPPED** (TASK_STATE_STOPPED)
Task stopped (e.g. via the `_resetTask` function), completed or not yet started.
- **SUSPENDED** (TASK_STATE_SUSPENDED)
Task suspended by function `_suspendTask`.
Use `_resumeTask(name)` to cancel this command. The task then resumes from the point at which it was interrupted.
- **WAITING** (TASK_STATE_WAITING)
Task is waiting due to function `_waitTime` or `WAITFORCONDITION`.
- **WAITING_FOR_NEXT_CYCLE** (TASK_STATE_WAIT_NEXT_CYCLE)
TimerInterruptTask waiting for start trigger.
- **WAITING_FOR_NEXT_INTERRUPT** (TASK_STATE_WAIT_NEXT_INTERRUPT)
SystemInterruptTask or UserInterruptTask is waiting for the triggering event to occur. When an interrupt occurs, the SystemInterruptTasks are started and executed once. Up to 8 incoming interrupts can be stored in the buffer. If another interrupt occurs, the buffer overflows and the CPU goes into STOP mode.
- **LOCKED** (TASK_STATE_LOCKED)
Task locked by function `_disableScheduler`.
This status prevents the activation of all user tasks (except the IPOSynchronousTask and IPOSynchronousTask_2) until command `_enableScheduler` is called. It does not, however, affect system tasks. The time watchdog for cyclic tasks is **not** suspended.

Note

The also prevents the activation of the SystemInterruptTasks and UserInterruptTasks.

Controlling MotionTasks

It is possible to control MotionTasks via SIMOTION SCOUT without a user program that has been created by the user. Consequently, you can test programs and influence MotionTask sequences in a very specific way.

Selected MotionTasks can be stopped, and locked or restarted for the sequence.

This means that programs in MotionTasks can be downloaded in RUN mode. If you have made changes to sources and want to reload them in RUN mode, an active MotionTask can prevent this. To avoid this problem, you can terminate specific MotionTasks with SIMOTION SCOUT and then carry out the download in RUN mode.

Additional references

Further information on downloading in RUN mode can be found in:

- Function Manual: SIMOTION Basic Functions

5.2.8 Device diagnostics: Checking the system utilization

To display the system utilization:

- Select the **System utilization** tab in the device diagnostics.

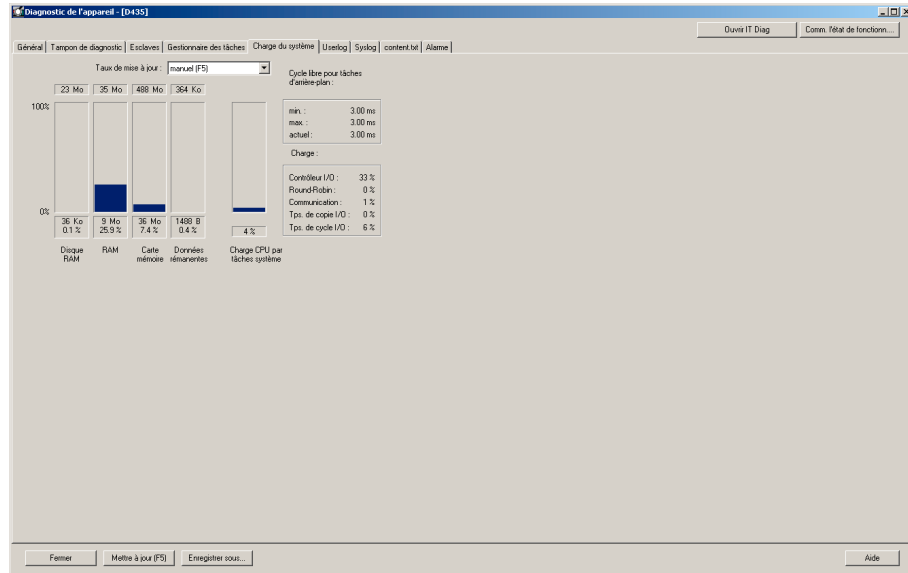


Figure 5-11 Example of the system utilization display in the device diagnostics

Additional references

Further information on this topic can be found in:

- Function Manual: SIMOTION Basic Functions, Chapter "Overview of Memory in Target Device"
- SIMOTION SCOUT Online Help

Display on system utilization tab

The utilization of the following system resources is displayed:

RAM disk

After the download, the RAM disk contains the hardware and device configuration, technology packages, configuration data of the technology objects, and the program units. Use **Copy RAM to ROM** to copy the contents of the RAM disk to the memory card and release the memory on the RAM disk. During subsequent downloads, only modified data is loaded to the RAM disk.

The RAM disk or the memory card also contains the user data that was created from the user program using file system functions. **Copy RAM to ROM** applies only to the project data from the download.

RAM

After the controller powers up, the RAM contains the code and the data of the technology objects (technology packages and data of the instanced technology objects) and the executable program units.

Memory card

Memory card (ROM) memory

Retentive files

Non-volatile memory of the SIMOTION device

CPU utilization due to system tasks

Here, the utilization due to system tasks (servo, IPO, IPO2, TControl, DCC) and due to synchronous user tasks (ServoSynchronousTask, IPOsynchronousTask, IPOsynchronoursTask_2).

Various problems arise with a CPU utilization of about 70% and higher, such as sporadic connection terminations with the PG. A utilization of 80% or higher is considered critical, as it can result in level overruns of important tasks (level overruns lead to CPU STOP with the operating mode transition or "BZU" blocked).

Note

Do not operate the SIMOTION device at more than 60% utilization in order to maintain a reserve for load fluctuations and peak loads.

The data listed above are displayed as:

- Diagram
- Absolute value for the maximum value
- Utilization (KB or bytes)
- Percentage value

Free cycle of the background level

The user cycle time for the background task is displayed in ms with the:

- Minimum value
- Maximum value
- Current value

The cycle time of the background task is a measure of one round of all active round-robin tasks (communication, motion tasks).

Utilization

The display in the utilization area contains additional information on the system utilization:

- **I/O controller:**

For C2xx and P350:

Displays the processor utilization of the integrated I/O controllers due to the cyclical and acyclical communication with the centralized and distributed peripherals as well as due to the communication with IBN and B&B devices.

Values > 90% are critical and indicate problems, due to, for example,

- the data volume of the configured process peripherals (centralized and distributed)
- the types of modules on the central peripherals
- the cycle times on the isochronous PROFIBUS segment
- the dynamic load with acyclical orders from the user program (`_read/writeRecord`, `_read/writeDriveParameter`, etc.)
- the dynamic load due to communication with IBN and B&B devices

For D4x5:

Displays the processor utilization of the integrated I/O controller.

Values > 90% are critical and indicate problems, due to, for example,

- the dynamic load with acyclical orders from the user program (`_read/writeRecord`, `_read/writeDriveParameter`, etc.)
- the dynamic load due to communication with IBN and B&B devices
- the drive regulation of the SINAMICS integrated (number of axes).

For D410:

Value has no relevance. The utilization due to cyclical and acyclical communication is included in the CPU utilization.

- **Round robin:**

Shows the computing time of the SIMOTION processor in the round robin level, in which the background task, motion tasks and some system tasks run.

Values > 90% are critical and indicate continuous loops in motion tasks or computing-intensive portions in the background task. As a result, communication and diagnostic functions and the HMI connection become very slow.

Solution:

MotionTasks, which run endlessly with a WHILE / REPEAT loop, and thus cyclically, place a burden on the round robin level. Each MotionTask thus takes up the entire servo cycle clock.

Alternatively, a `_waitTime(0ms)` should be inserted at the end of the loop. Then the MotionTask releases the computing time after one loop cycle to the next MotionTask or BackgroundTask and thus does not use it unnecessarily.

The control statement `WAITFORCONDITION` and the step enabling conditions for "Delay program execution" likewise release the computing time to the next round robin task.

The use of `_waitTime (0 ms)` can also be helpful with a computing-intensive background task.

- **Communication:**

The utilization of the communication buffer for the communication with IBN and B&B devices is displayed here, e.g., for SCOUT or HMI. 90% should not be exceeded here.

- **I/O copying time:**

For C2xx and P350:

Here, the time portion of the copying actions of the integrated I/O controller for the cyclical communication (centralized and distributed) is displayed in relation to the configured servo cycle clock.

The display value is calculated one time for each BZ transition and change in the peripheral arrangement (e.g., station failure/restore). For a value > 65% in the RUN operating mode or 55% in the STOP operating mode, a "cycle overload, reason n" diagnostic buffer entry will be triggered (n=1: RUN, n=2: STOP). In these cases, the system should be relieved by increasing the servo cycle clock.

For D4xx:

Value has no relevance.

- **I/O cycle time:**

For C2xx and P350:

The utilization of the I/O processor due to the cyclical communication is displayed and thus also the proportion of time of the configured PROFIBUS cycle clock required for a servo cycle clock cycle. This proportion of time includes the duration of the transfer of cyclical data (data exchange) on the synchronous PROFIBUS DP, the subsequent reading in of the input data, the runtime of the servo task in its regulating technology portion as well as the output of the output data (target values) to the peripheral interface and thus the preparation for the transport in the next DP cycle.

For D4xx:

The maximum utilization of a cycle is due to cyclical system tasks since activation is displayed here. High values (e.g., > 90%) with low CPU utilization indicate only sporadic loads due to system tasks. An IPO overrun should therefore be tolerated.

The following applies to all platforms:

If the I/O cycle time is greater than the cycle time of the isochronous PROFIBUS DP, then a diagnostics buffer entry "Error in cyclical operation, reason 5, note n" is triggered.

The indicating parameter n can have the values 1, 10, 100 and 1000 and thus signals the nth event of a cycle overrun. The frequency of the overruns can be calculated from the time interval of the entries. Isolated overruns in larger time intervals can be tolerated as long as they do not result in any negative effects on the technology.

In principle, however, the system should be relieved by increasing the DP cycle time.

5.2.9 Device diagnostics: User log file

With the Userlog file, you can store your own text strings in the RT system. This is necessary, for example, when changes, which are to be documented, are made in the SIMOTION system on a plant which has already been commissioned. Changes can be written in the SIMOTION SCOUT. These are loaded to the ROM of the target device. When required, the text strings can be read out again. The text editor for the Userlog file is integrated as a tab in the device diagnostics snap-in. This function is only available in online mode.

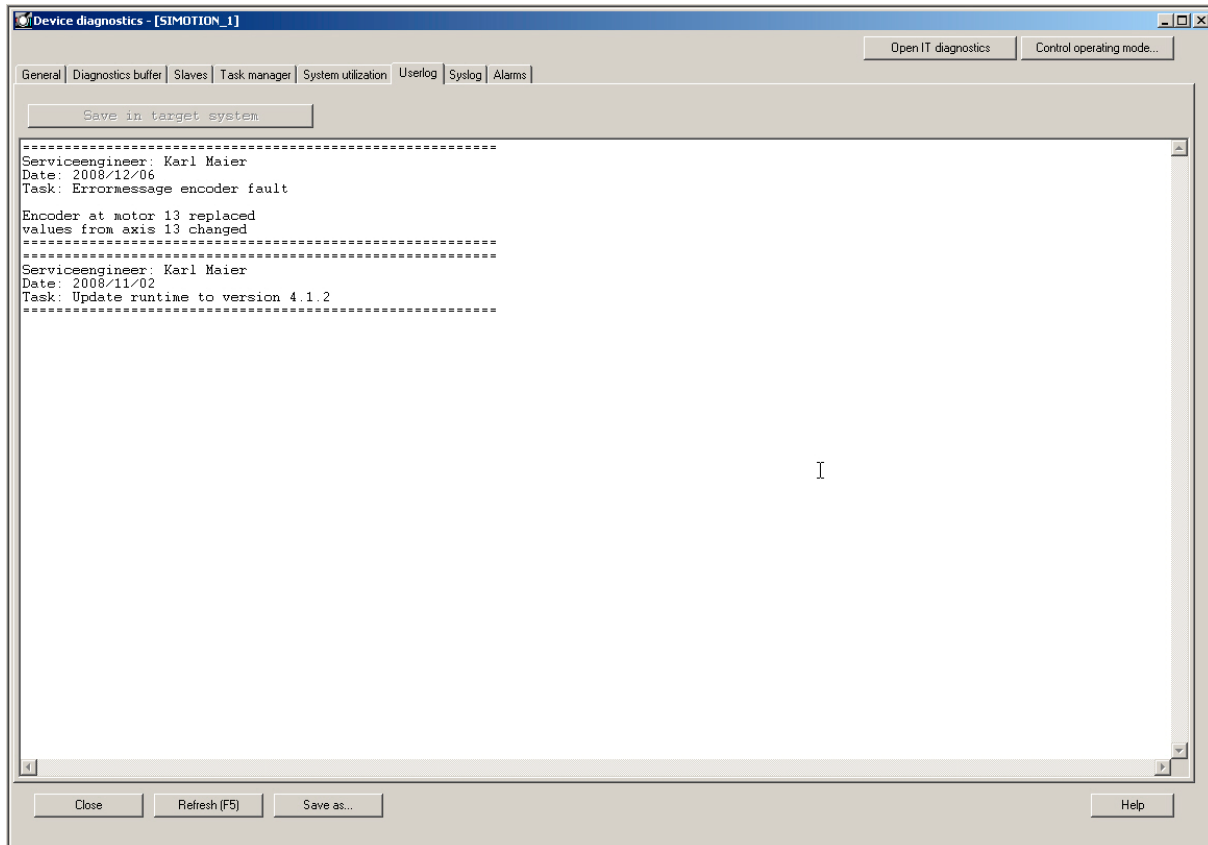


Figure 5-12 Example of the Userlog file display in the device diagnostics

How to work in the Userlog file

- Select the **Userlog** tab in the device diagnostics. The editor is in editing mode, i.e., you can immediately type or delete. The system adds no further system contents, such as date/time. You enter all of the necessary information.
- To save, click **Save as...** The Userlog file is stored as .txt. All text entries can be changed or deleted at any time. Access protection is not available.
- The Userlog file can also be read without a project. The online mode is required for this.
- The Userlog file remains after **user data are deleted**.

5.2.10 Device diagnostics: Syslog file

In addition to the user-defined Userlog file, the SIMOTION device also has a Syslog file. The ROM actions entered therein facilitate a subsequent diagnosis. This function is only available in online mode. The information of the Syslog file can also be read without a project.

The Syslog file logs the following actions:

- RAM2ROM
- Overall reset
- Formatting of the card from SIMOTION SCOUT

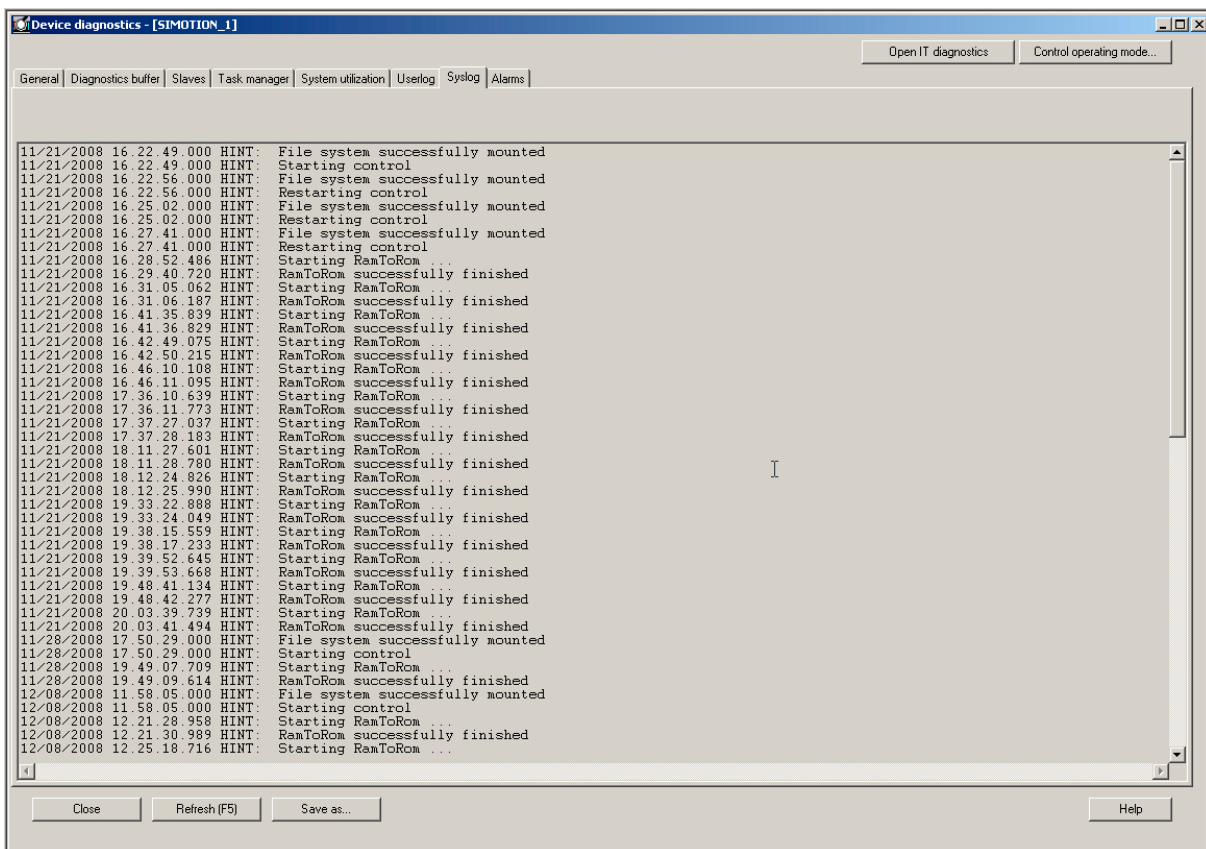


Figure 5-13 Example of the Syslog file display in the device diagnostics

5.2.11 Device diagnostics: Version overview

The version overview tab displays the SIMOTION version and the data of the SIMOTION device stored in the CompactFlash card.

The following data are displayed:

- SIMOTION version
- BIOS version
- Components
- Versions of the SINAMICS components
- Internal version / stamp
- Internal components

This information is relevant for any questions to the hotline.

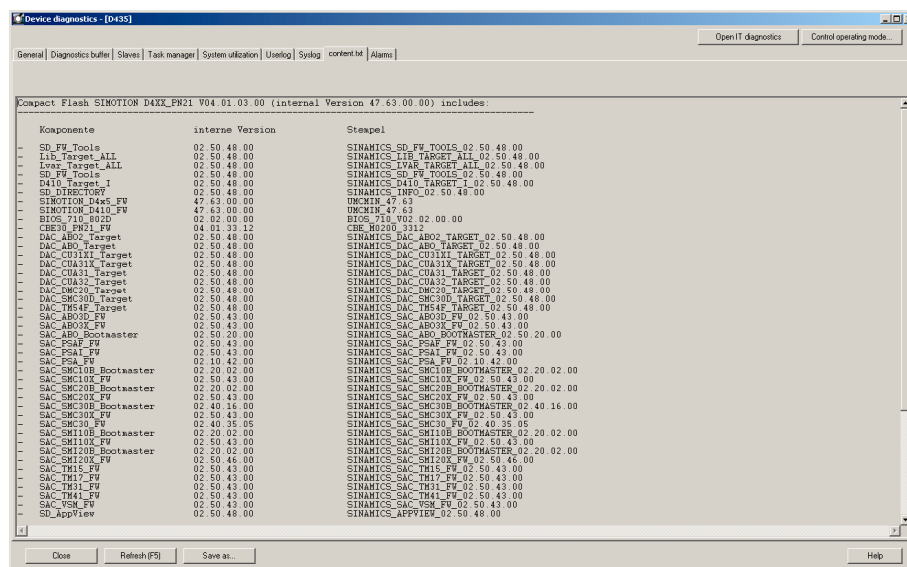


Figure 5-14 Example of the version overview display in the device diagnostics

5.2.12 Device diagnostics: Alarms

In the device diagnostics Alarms tab, pending alarms and configured messages are displayed in the same way as in the **Alarms** tab in the detail view.

Detailed information can be found in the SIMOTION online help, in the Alarms output window.

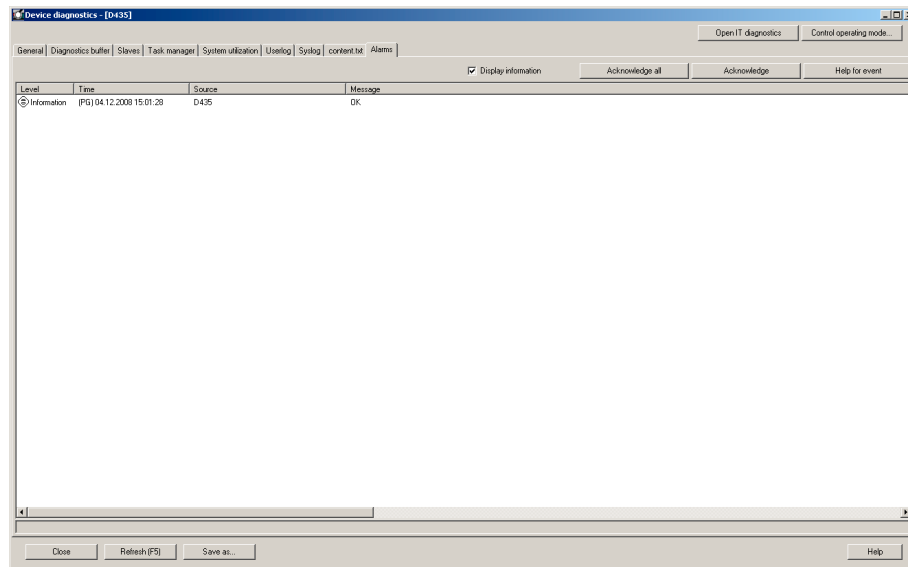


Figure 5-15 Device diagnostics - Alarms

5.2.13 Interconnection overview

The interconnection overview allows you to display all motion input and output interconnections of technology objects within the project. This overview is displayed in the SIMOTION SCOUT working area in the form of an interconnection tree.

The tree display enables the synchronous operation interconnections to be displayed in cascades. In the interconnection table below, you can see all the TOs interconnected on the input and output sides for the technology object selected in the interconnection tree.

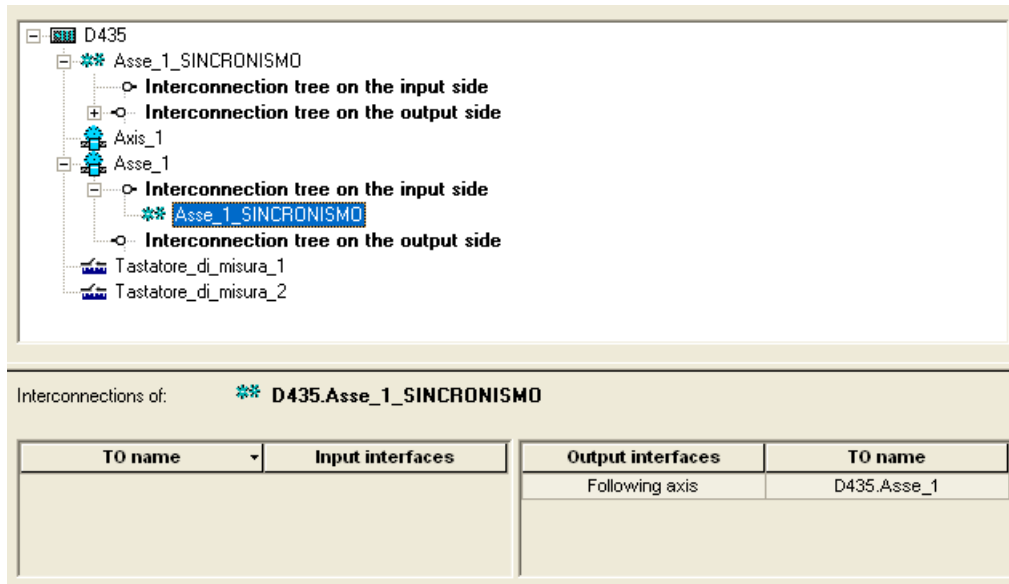


Figure 5-16 Example of an interconnection overview

Additional references

Further information on this topic can be found in:

- Function Manual: SIMOTION Basic Functions
- SIMOTION SCOUT Online Help

5.2.14 Service Overview

In online mode, the service overview shows a tabular complete overview of all configured axes in the project. The current state (including values from system variables) is displayed along with fault conditions.

The service overview is called up via the **Target system > Service overview** menu.

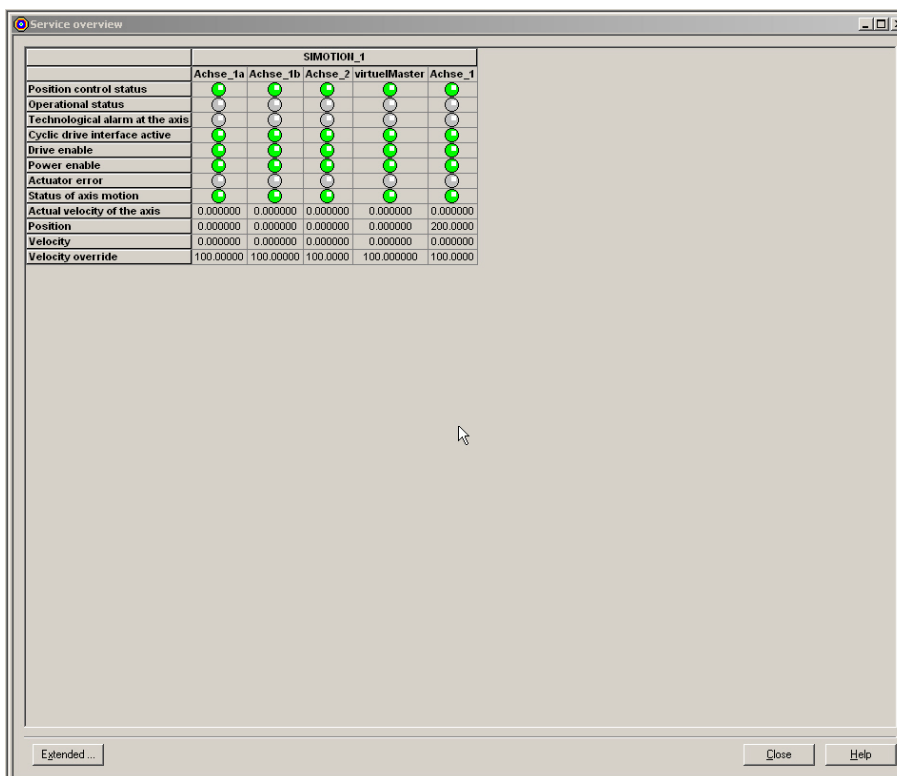


Figure 5-17 Service Overview

5.2.15 Task Trace

Application area

The SIMOTION Task Trace supports you when troubleshooting in the SIMOTION multitasking environment. The SIMOTION Task Trace records the sequence of individual tasks, identifies user events that you can generate via a program command, and displays these graphically.

Structure of the Task Trace

The SIMOTION Task Trace includes two main components:

- The **SIMOTION Task Tracer**, which writes the task change and events to a buffer on the target device, and
- The **SIMOTION Task Profiler**, an application for displaying the recorded data

Additional references

Further information on this topic can be found in:

- Function Manual: Task Trace
- Diagnostics Manual: SIMOTION IT Ethernet-based HMI and Diagnostic Function
- SIMOTION SCOUT Online Help

5.2.16 Accessible nodes

A list of the devices switched on and connected to the PG/PC is displayed via the **Accessible nodes** function in the SIMOTION SCOUT working area. The display is related to the PG/PC interface which is configured as the application access point in "Set PG/PC interface".

A SIMOTION project must **not** be open in order to use this function.

Proceed as follows:

1. Select the **Project > Accessible nodes** menu.
2. Select the corresponding node.
3. Right-click and select the following functions in the context menu.
 - Operating mode ...
 - Device diagnostics ...
 - Copy from RAM to ROM ...
 - Licenses
 - Log files
 - Archived project
 - SINAMICS Upload

Additional references

For additional information on this topic, refer to:

- SIMOTION SCOUT Online Help

5.2.17 Program testing and debugging

Comprehensive program testing and debugging functions are available in SIMOTION SCOUT. You can execute the following functions:

- Control variable
- Program status
- Breakpoints

Additional references

Please refer to the following documents on this subject:

- SIMOTION ST Structured Text Programming and Operating Manual
- SIMOTION MCC Motion Control Chart Programming and Operating Manual
- SIMOTION LAD/FBD Programming and Operating Manual
- SINAMICS/SIMOTION DCC Editor Description, Programming and Operating Manual and the SIMOTION SCOUT online help.

Update

6.1 Update device

Overview

SIMOTION offers a convenient solution for machine manufacturers and machine operators to update SIMOTION devices or SIMOTION projects.

Updating does not simply refer to an update to a higher version of firmware; rather, in general terms it refers to switching to a defined configuration, e.g. a project update. It is also possible to return (restore) to a previous configuration. Update or restore procedures can easily be performed on SIMOTION devices locally or remotely. The data can be imported to a SIMOTION device via a convenient and handy storage medium or a communication connection.

Update data and update media

The update data is created by SIMOTION SCOUT based on one or more SIMOTION projects. All information required for the update is contained in the update data. This includes:

- SIMOTION project
- Technology packages
- User data
- Firmware

After the update data has been created, it can be handled flexibly depending on the SIMOTION device in question (SIMOTION C, D, or P). The storage or update medium can take the form of:

- CF/MMC card
- USB memory stick or
- SIMOTION IT DIAG file

Update wizard and Device Update tool

Call up the update wizard via SIMOTION SCOUT. This will give you a step-by-step guide to creating the requested update data, which are then either saved in an update archive or imported directly to an update medium.

1. Select the **Project > Start device update tool** menu, either directly in SIMOTION SCOUT or in an open SIMOTION project.

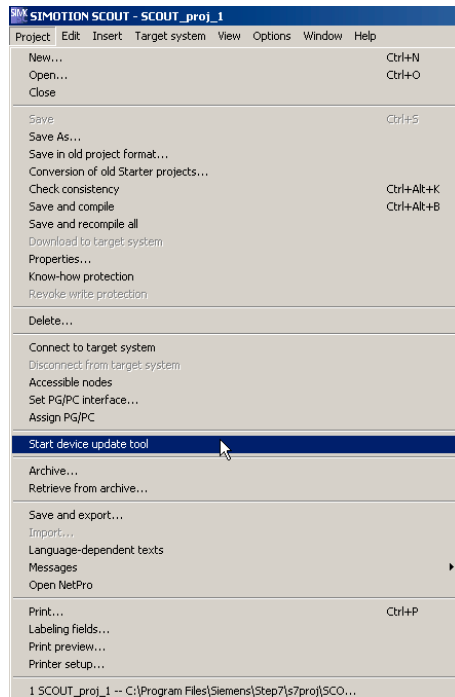


Figure 6-1 SIMOTION SCOUT - Starting the SIMOTION Device Update tool

2. The update wizard opens with the start screen . Now you can select the data for updating from the SIMOTION project to the SIMOTION device on a step-by-step basis, and specify whether you want to update subsets or the entire project.

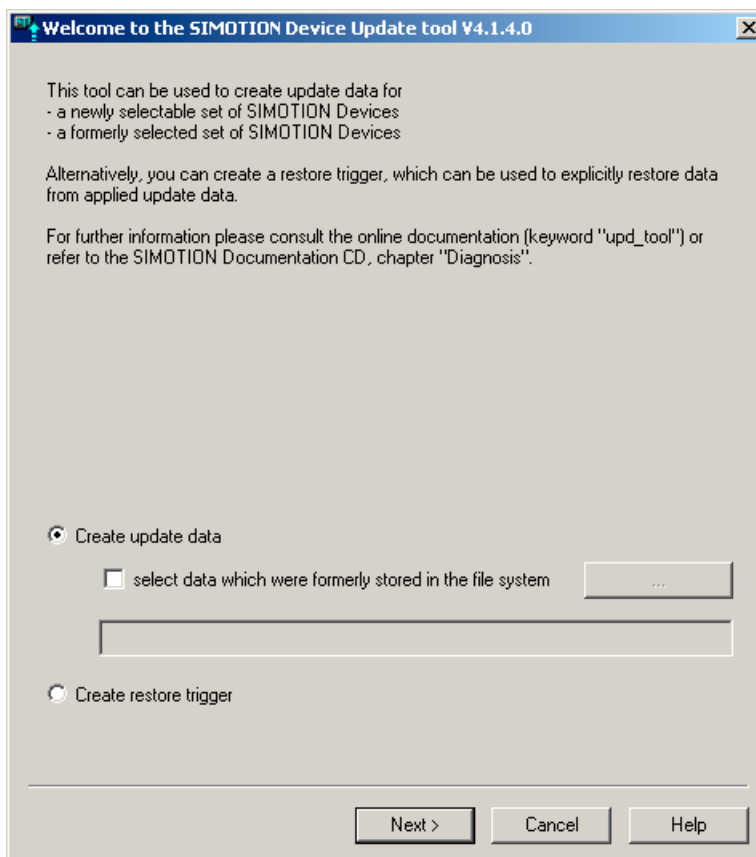


Figure 6-2 Wizard start page: Device Update tool

Additional references

A detailed overview of the update process can be found in:

- Operating Manual: Upgrading SIMOTION Devices
- SIMOTION SCOUT Online Help

FAQs

7.1 Handling Recommendations for Service with SCOUT V4.1

7.1.1 Selecting the right project with SCOUT V4.1

The observation of the following recommendations for the configuring simplifies maintenance work.

Working with the right project

In order to ensure that you are always working with the right project, save the revised and archived project as a zip file on the **CF card**.

Each time you work with the project, use only this zip file.

The project data can be archived on a memory card in SCOUT.

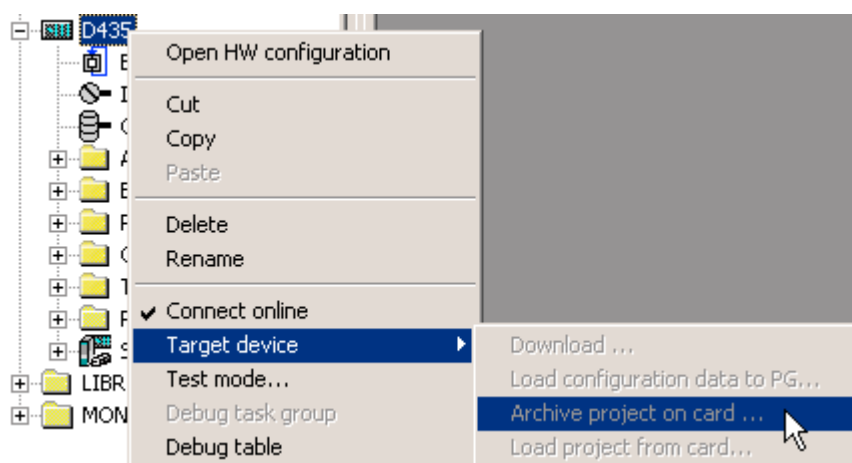


Figure 7-1 Archive SIMOTION project to card

The **accessible nodes** function can be used to determine on which CPU a Project.zip is stored.

Load the project from the memory card.

The project data archived on the memory card can be transferred to "PROJEKT.ZIP" on the hard disk of the PG/PC in the **Accessible Nodes** view via context menu (right mouse button). Alternatively, the SCOUT menu function is also available in the context menu

Load project from card... on the device. Next, the archive project transferred to the hard disk must be dearchived.

Use routing

The following must be considered in order to be able to use routing (e.g., for access to SINAMICS_Integrated with SIMOTION D4x5):

- If the project should be generated on another computer, a **PG/PC assignment** is necessary. The PG/PC has the unique "computer name" of the creation system and this must be adapted to the current system.



- This change can be made directly using the **Assign PG/PC** toolbar button.

The Log Files as Further Help

The **Syslog file** and the **Userlog file** are also available to help verify the project (as of Runtime V4.0). These files are stored on the memory card can be read out, for



example, without a project on the **PG/PC** using the SCOUT function **Accessible Nodes**.

The log files on the memory card are directly accessible from the dialog box (via context menu).

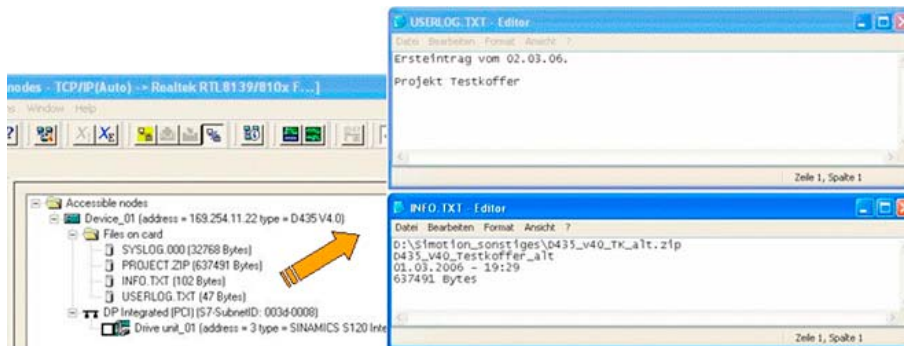


Figure 7-2 Log files via the context menu

- user\simotion\hmi\syslog\syslog.000
System logbook: The system makes an entry here when a RAM TO ROM, an overall reset or a reformatting of the memory card is carried out.
- user\simotion\hmi\prjlog\userlog.txt
Machine logbook: It is possible here to document the tasks carried out and the SCOUT version used for the next service worker. Call for editing from the SCOUT dialog box **Device diagnostics**.

Below are other data, which are stored on the memory card and can be accessed from this dialog box:

- USER/SIMOTION/HMI/PRJLOG/info.txt
is created with the archived ES project and contains the name, variable, save date.
- USER/SIMOTION/HMI/PRJLOG/project.zip
archived ES project. Max. 1 archived project can be archived on the memory card using SCOUT.

The above-named files visible in the dialog box also remain on the memory card after **Delete user data**.

For a detailed description, please refer to:

- SCOUT Online Help -> Device diagnosis: Syslog / Userlog
- Device Diagnosis section: User log file
- Device Diagnosis section: Syslog file

7.1.2 Project was created in Version V3.2 SP1 / V4.0

If the project was created in Version V3.2 SP1 / V4.0, remember the following points:

- When opening a project created in an older version of SCOUT using SCOUT V4.1, a conversion of the project to SCOUT's current internal data format is automatically requested.
Only the data content of the SCOUT project is converted to V4.1, not the SIMOTION device version.
- After the project conversion, the system asks whether the project should be opened write-protected.
If the project needs to be changed, the write protection can also be revoked later.
 - Select **Project > Revoke write protection** from the menu bar.

7.1.3 Project V3.2 SP1 / V4.0 was edited with SCOUT V4.1

If the project of versions V3.2 SP1 / V4.0 was edited with SCOUT V4.1, remember the following points:

- The project can be saved back in the original project version when closing the projects, exiting SCOUT or by selecting the SCOUT function **Save in old project format...** This makes it possible to edit the project later using the corresponding SCOUT version again.

Note

In case of a back-conversion to the V3.2 SP1 / V4.0 project format, the internal V4.1 conversion results of the **changed** sources are deleted!

This means that after the project has been opened again and the online connection made, the changed sources are inconsistent (shown in red).

Only after the compilation and download are completed are the sources consistent again (shown in green).

This is due to the editing with different SCOUT versions, which contain different compiler versions.

- If the project was opened write-protected for diagnostic purposes or if no changes were made in non-write protected mode, then it need not be saved.

Recommendation

After editing an old project version using SCOUT V4.1, the engineering project should remain in Version V4.1. This eliminates the need to back-saving in the old project format so that the project remains consistent at all times.

The engineering project is then **no longer** available in the old project version.

After the project changes are completed, they should be documented in the Userlog file.

The Userlog file is edited in the device diagnostics dialog box.

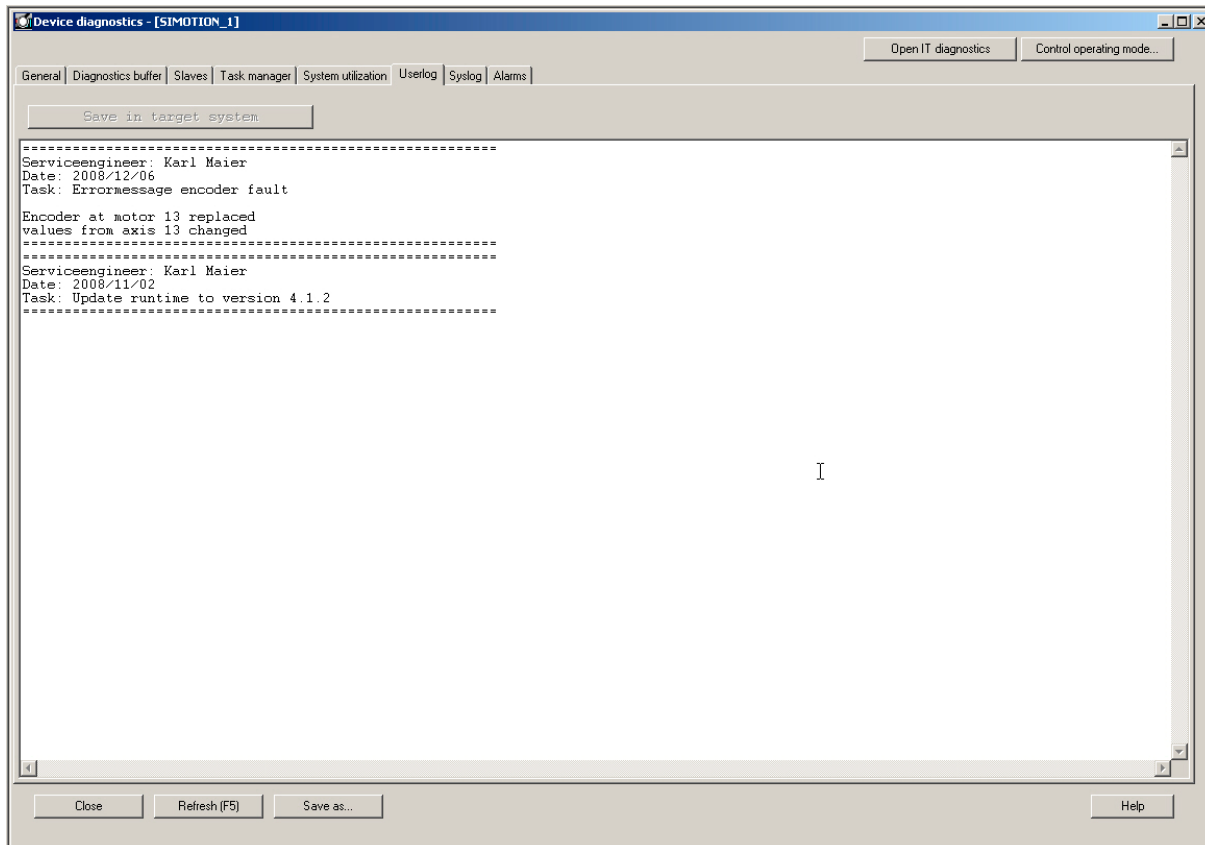


Figure 7-3 Example of the User log file display

7.1.4 Introduction of versioning with standard library and software components

It is possible to introduce versioning for any standard library and any software component during configuration, i.e., each component then has its own version identifier.

- For every unit and every library the version, author and a brief description in the comments field (offline version identifier) in the Properties dialog box in SIMOTION SCOUT.
- Each library and each software component can disclose its version identifier during runtime (online version identifier identical to offline version identifier).
 - Version identifier as constant(s) or
 - Version identifier as function return value, e.g. FCGetVersion.

- The version identifiers can be displayed separately on the available HMI systems, i.e., self-identification of all involved system components.
- A simple variant for applying versioning is in a date identifier as a constant in the format yyyy-mm-dd. This can be assigned to a variable, which is then, for example, passed on to HMI systems for the version display.

Example, date identifier:

```
VAR_GLOBAL CONSTANT
  APP_VERSION : UDINT := 20060612; // 12.06.2006
END_VAR
```

```
VAR_GLOBAL
  G_uAppVersion : UDINT := APP_VERSION;
END_VAR
```

7.2 Rules for the arrangement of the modules

Slot rules

Modules must be inserted in the rack without gaps.

Exception:

Slot 3 remains empty in the configuration table. This slot is reserved.

Note

The actual arrangement has no gaps, as otherwise the bus on the backplane would be interrupted.

Table 7- 1 Slot rule for SIMOTION rack 0

Slot 1:	Power supply only PS 307 xA (valid only for SIMOTION C2xx)
Slot 2:	CPU only (e.g. SIMOTION C2xx)
Slot 3:	Empty or interface module
Slots 4 to 11:	I/O modules or empty

SIMOTION SCOUT provides the following support when you configure a station:

- A message will appear if, for example, a module cannot be inserted into the desired slot.
- Address areas are also checked to prevent dual allocation of addresses.
- The status bar or messages displayed provide feedback, which you should pay attention to. Important information can also be found in the help.
- Temporary rules, that is, rules that apply only to a specific version, are not considered (such as restriction of the useable slots due to a functional restriction for individual modules).

Consult the documentation or the current product information for the modules.

Note

Modules that are installed but not configured are repeatedly addressed via the PROFIBUS. This requires additional computing time.

7.3 Routing

7.3.1 Operation of cross-subnet connections

Introduction

With SCOUT and STEP 7, it is possible to access SIMOTION, drives and S7 stations online via a PG/PC beyond the subnet boundaries, in order to, for example, load user programs or a hardware configuration or to perform test and diagnostics functions. You can connect this PG/PC to any position in the network and establish an online connection to all stations that can be reached via gateways.

For more details on this topic, see the following document:

- SIMOTION Communication, System Manual

7.3.2 Human Machine Interface system (HMI)

SIMOTION allows the end user to communicate with operating devices (Human Machine Interface systems) such as operator panels.

The following configuration is possible, for example, with the SIMOTION C240:

- HMI device is connected to the non-isochronous PROFIBUS of SIMOTION device 1.
- Four other SIMOTION devices are connected to the PROFIBUS DP (isochronous) of SIMOTION device 1.

SIMOTION automatically also establishes connections between the HMI device and SIMOTION devices 2 to 5 (routing). Therefore, the HMI device can also display variables, messages, and alarms for these devices.

Note

The number of routed connections depends on the device. Between 4 and 10 routed connections are possible. For more detailed information, see Data volume. A maximum of two gateways are possible. For more information, please contact your local Siemens representative.

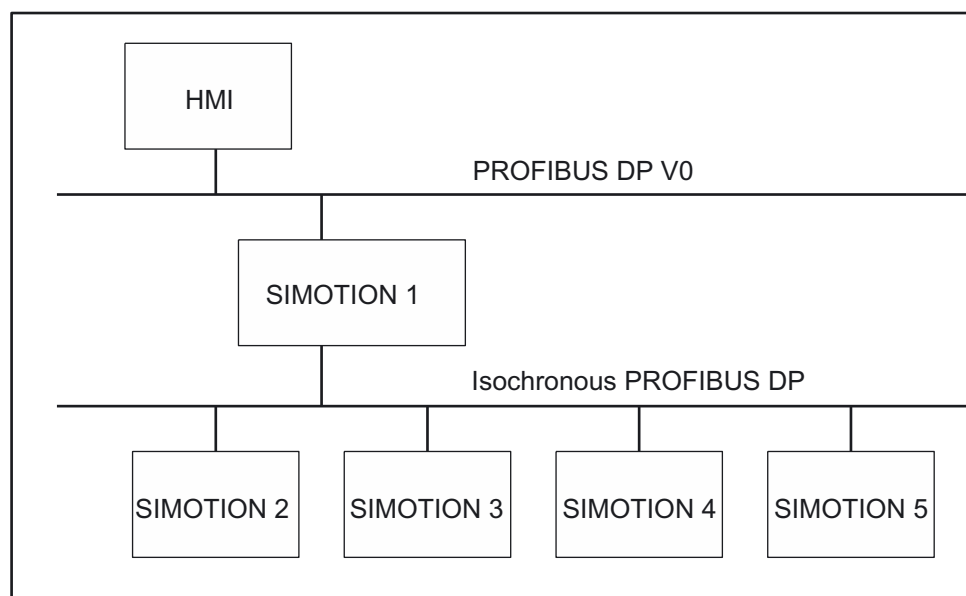


Figure 7-4 Example for the connection of an HMI device to a group of SIMOTION devices

Note

Routing via a controller, e.g. C2xx, P350 or D4x5, is only possible if the controller has been configured as active I-slave. However, please note that with an active I-slave, the PROFIBUS connection can no longer be operated isochronously.

7.3.3 Higher-level automation systems

A SIMOTION device can be connected to a higher-level automation system. Communication takes place via the MPI interface of the SIMATIC STEP 7 device or the non-isochronous PROFIBUS interface of the SIMOTION device.

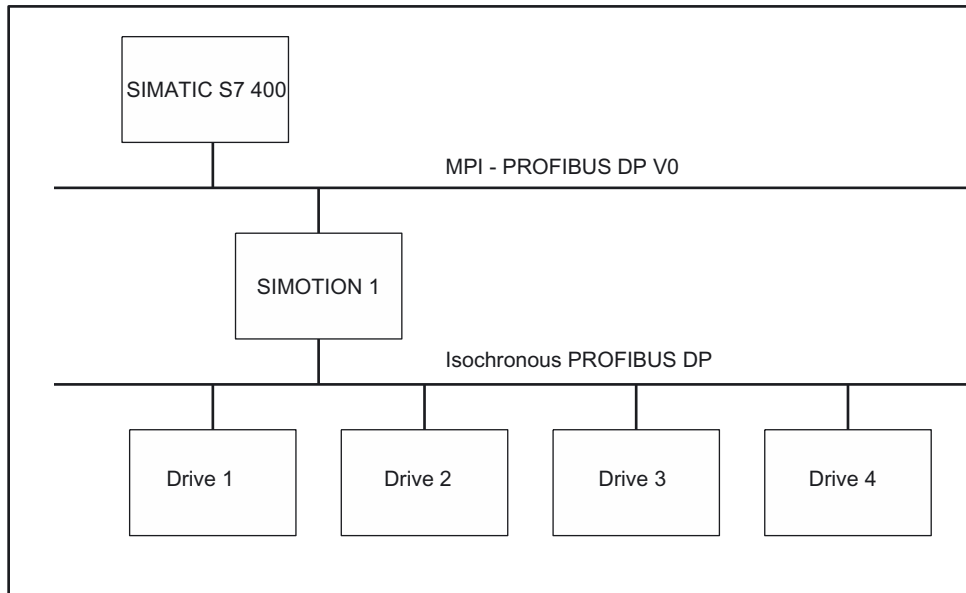


Figure 7-5 Higher-level automation system with SIMOTION device

7.4 Inserting drives

7.4.1 Drives with SIMOTION

Note the following:

Drives must be differentiated between:

- Drives that are connected to PROFIBUS/PROFINET
- Drives that are connected directly to the SIMOTION device

The following applies to drives connected to PROFIBUS/PROFINET:

- Only drives that meet the requirements of PROFIdrive profile V3.0 can be connected:
 - SINAMICS
 - MICROMASTER (PROFIBUS only)
 - COMBIMASTER 411 (PROFIBUS only)
 - MASTERDRIVES (MC, VC) (PROFIBUS only)
 - SIMODRIVE 611U (PROFIBUS only)
 - SIMODRIVE POSMO (CA, CD, SI) (PROFIBUS only)
 - ADI4 (analog drive interface for 4 axes)
 - IM 174 (Interface Module for 4 axes)
- These drives are taken into the hardware configuration.
- The drives of the SINAMICS and MICROMASTER drive families can be configured, assigned parameters, and commissioned with SIMOTION SCOUT.

All analog drives can be connected via one of the four analog interfaces on the SIMOTION C2xx or via the ADI4 PROFIBUS module.

- These drives are not taken into the hardware configuration.
- The SIMOTION device requires only the actual values from the encoder at the input and issues the setpoints at the analog output.
- The drives must be configured, assigned parameters, and commissioned directly on the corresponding device.

7.4.2 Inserting a SINAMICS drive on PROFIBUS DP

Starting point

- The SIMOTION device is created in SIMOTION SCOUT
- A PROFIBUS subnet has been configured, for example, as **PROFIBUS DP isochronous**.
- The subnet interface is the master on this subnet of the SIMOTION device

7.4 Inserting drives

Follow the steps outlined below:

1. Open the **PROFIBUS DP** folder in the hardware catalog.
2. Open the **SINAMICS** subfolder.
3. Use drag-and-drop to drag an entry to the isochronous PROFIBUS subnet of the SIMOTION device.

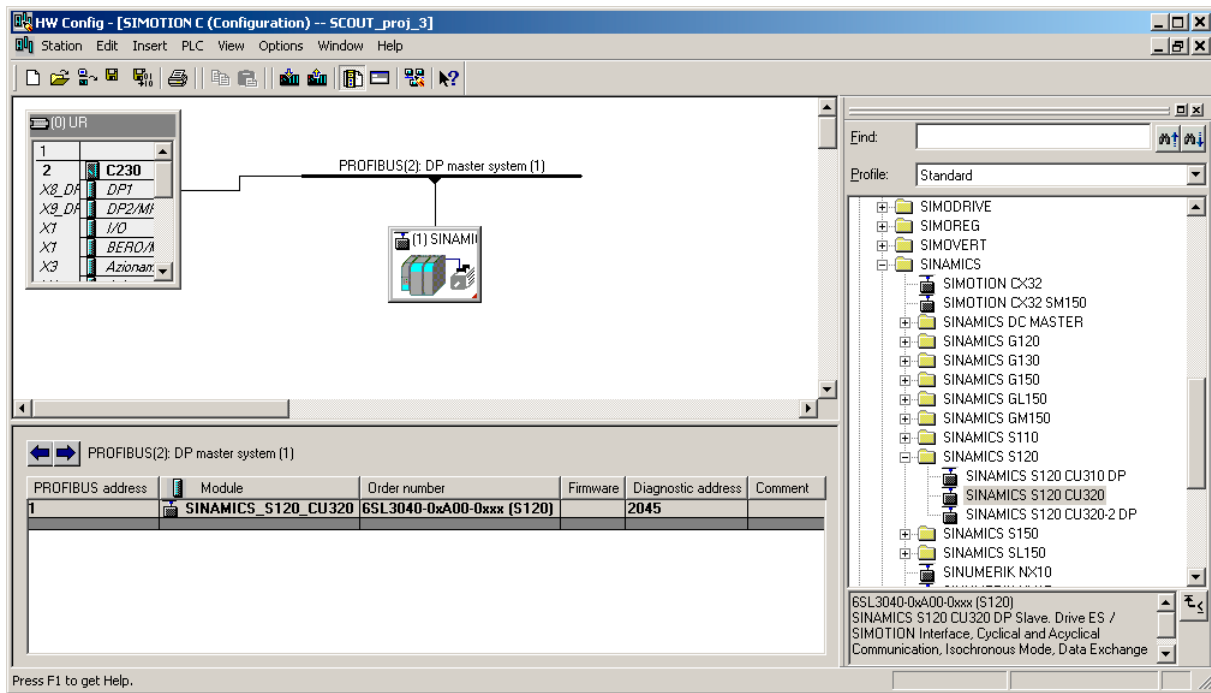


Figure 7-6 Inserting a SINAMICS drive

7.4.3 Inserting a SINAMICS drive on PROFINET IO

Starting point

- SIMATIC STEP 7 V5.4 SP2 is installed
- The SIMOTION D4x5 device with Ethernet IE2/NET (X130) interface selection has been created in SIMOTION SCOUT
- A PROFINET IO has been configured

Follow the steps outlined below:

1. Open the HW Config of the SIMOTION D4x5 device.
2. Open the **PROFINET IO/Drives/SINAMICS** folder in the hardware catalog.
3. Select the SINAMICS S120 CBE20 drive.
4. Use drag-and-drop to drag the drive to the PROFINET IO subnet of the SIMOTION device.

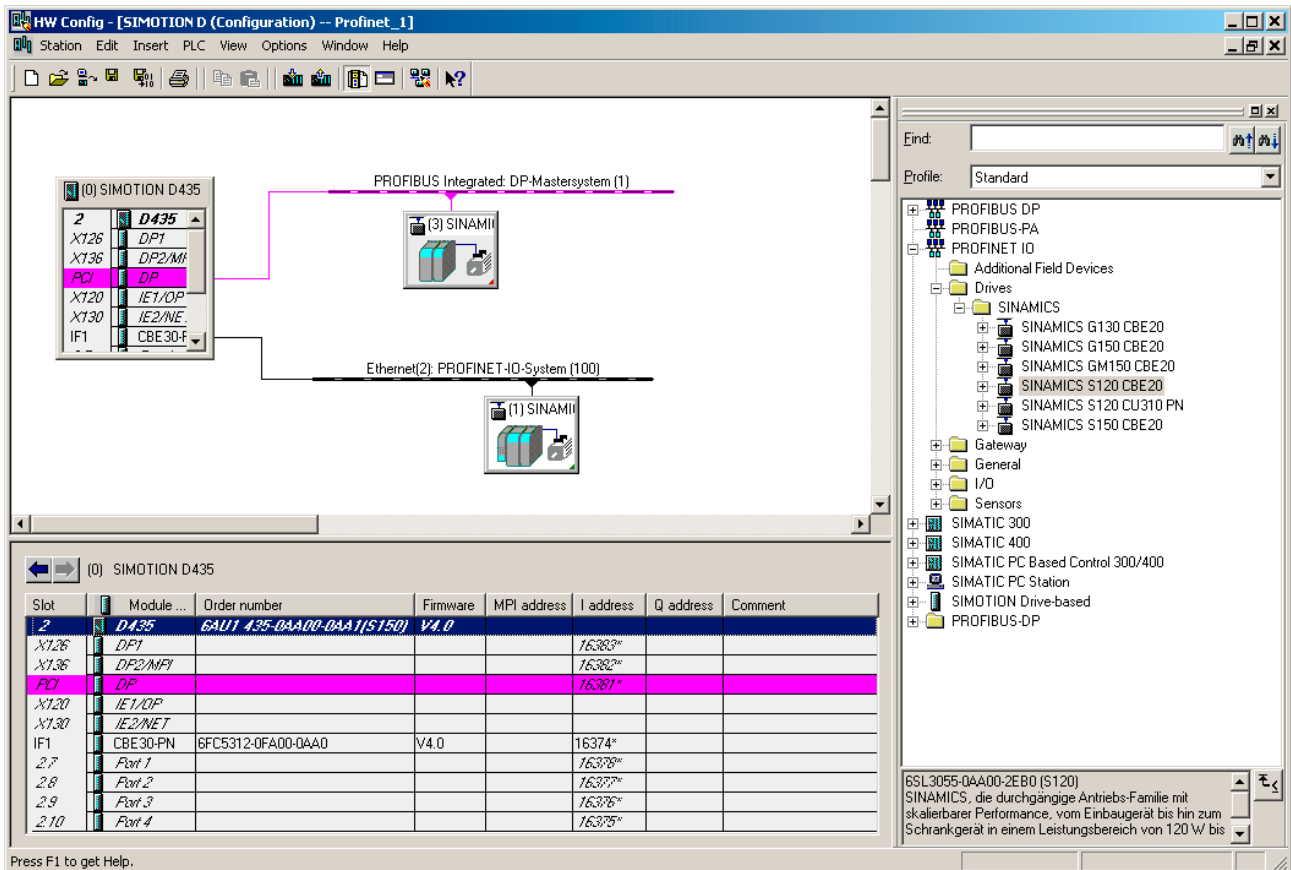


Figure 7-7 Inserting a SINAMICS drive with PROFINET

7.4.4 Inserting a MICROMASTER drive

Initial situation:

- The rack with the SIMOTION device has been inserted.
- A PROFIBUS subnet has been configured, for example, as **PROFIBUS DP isochronous**.
- The subnet interface is the master on this subnet of the SIMOTION device

Follow the steps outlined below:

1. Open the **PROFIBUS DP** folder in the hardware catalog.
2. Open the **SIMOVERT** subfolder and then the **MICROMASTER 4** subfolder.
3. Use drag-and-drop to drag an entry (e.g. **MICROMASTER 420**) to the isochronous PROFIBUS subnet.

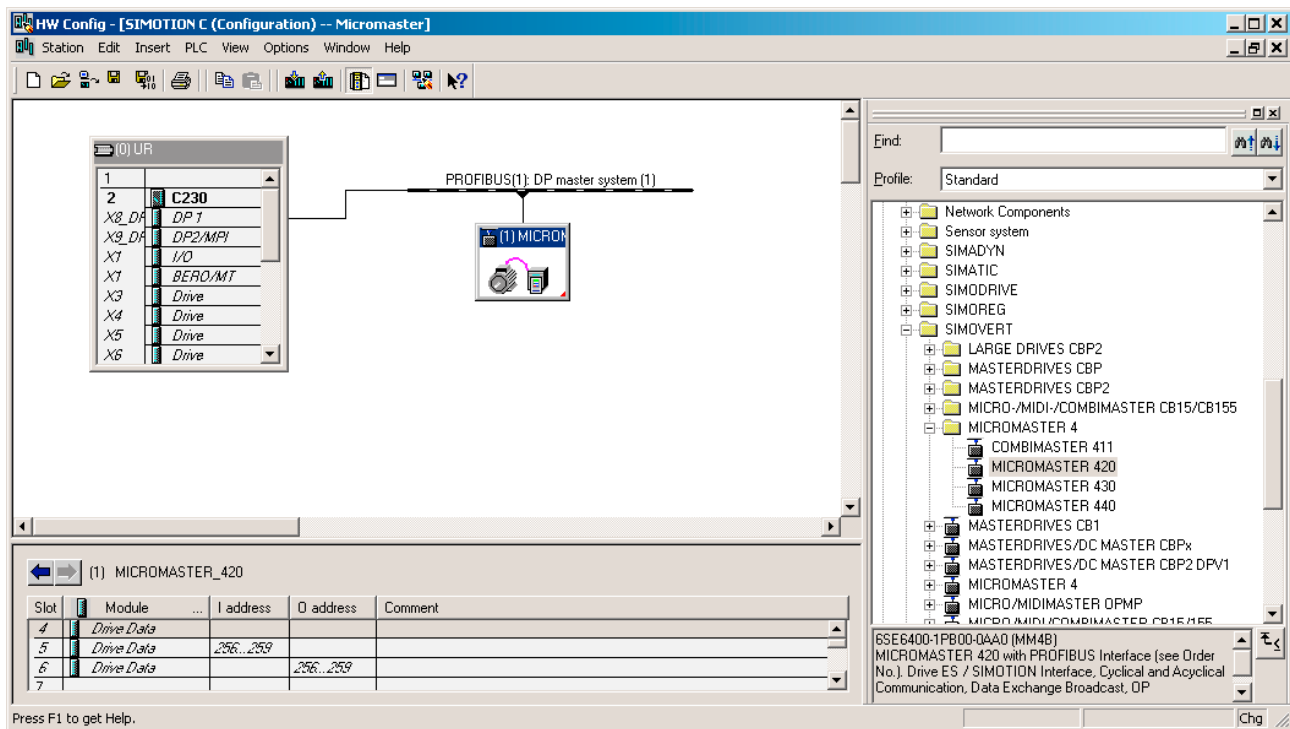


Figure 7-8 Inserting a MICROMASTER 4 drive

A window appears in which you can configure the PROFIBUS interface of the drive.

Note

Although the MICROMASTER 420 does not support isochronous operation, it **can** be operated on the isochronous PROFIBUS subnet. Note that the drives of all synchronous axes have to be connected to the same PROFIBUS subnet.

7.4.5 Inserting a MASTERDRIVES drive

Initial situation:

- The rack with the SIMOTION device has been inserted.
- A PROFIBUS subnet is configured as **PROFIBUS DP isochronous**.
- The PROFIBUS interface is the master on this subnet of the SIMOTION device.

Follow the steps outlined below:

1. Open the **PROFIBUS DP** folder in the hardware catalog.
2. Open the **SIMOVERT** subfolder.
3. Use drag-and-drop to drag an entry to the isochronous PROFIBUS subnet of the SIMOTION device.

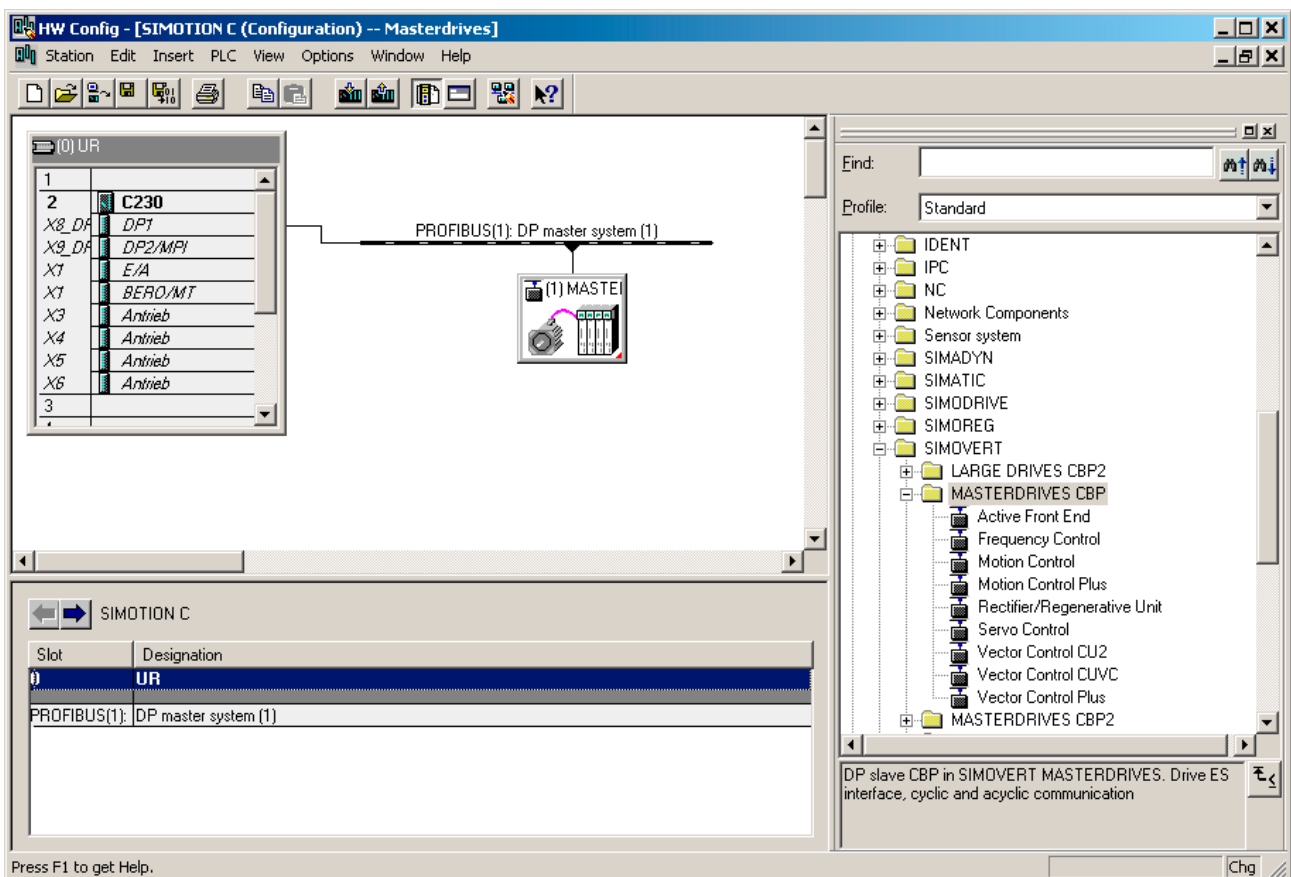


Figure 7-9 Inserting a MASTERDRIVES drive

7.4.6 Inserting a SIMODRIVE drive

Initial situation:

- The rack with the SIMOTION device has been inserted.
- A PROFIBUS subnet is configured as **PROFIBUS DP isochronous**.
- The PROFIBUS interface is the master on this subnet of the SIMOTION device.

Follow the steps outlined below:

1. Open the **PROFIBUS DP** folder in the hardware catalog.
2. Open the **SIMODRIVE** subfolder.
3. Use drag-and-drop to drag an entry to the isochronous PROFIBUS subnet of the SIMOTION device:
 - **SIMODRIVE 611 universal**
 - SIMODRIVE POSMO xx

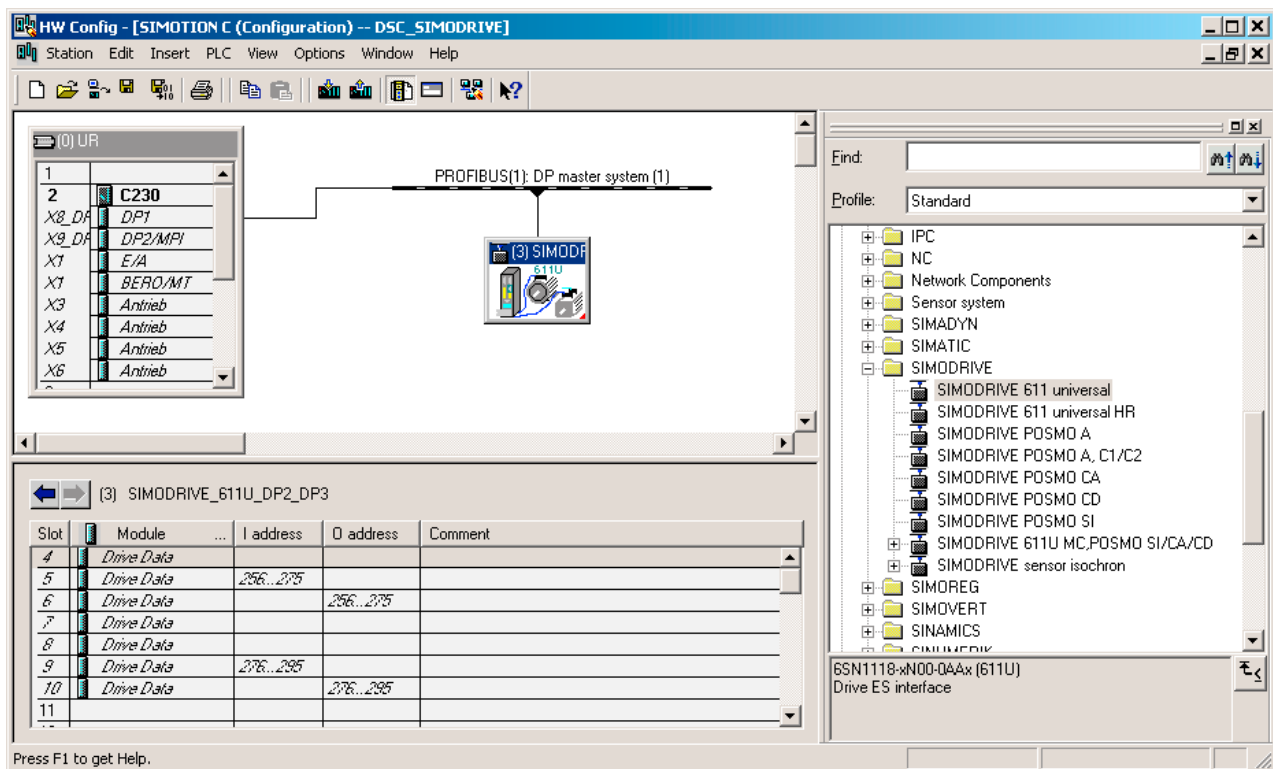


Figure 7-10 Inserting a SIMODRIVE 611U drive

A window appears in which you can configure the PROFIBUS interface of the drive.

7.4.7 Configuring an inserted drive as a slave on the PROFIBUS

Follow the steps outlined below:

Once you have inserted the drive, the following DP interface configuration window appears:

1. Specify the address.

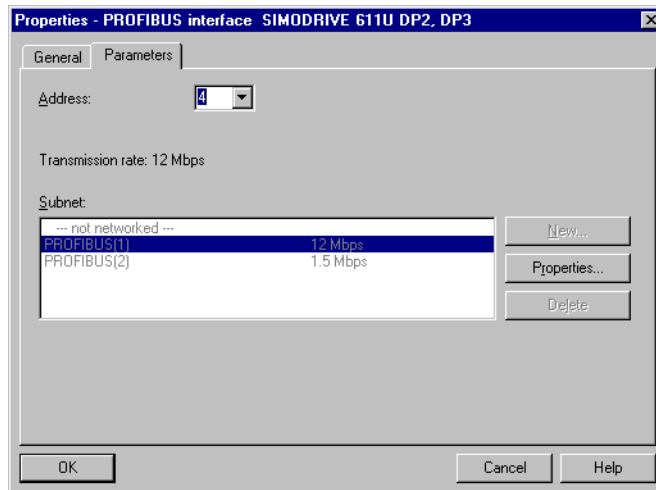


Figure 7-11 Configuring the PROFIBUS interface on the drive

2. Confirm with **OK**.
A further window for configuring the drive as a DP slave appears.

7.4 Inserting drives

3. Make the necessary settings.
4. Click **OK** to confirm.

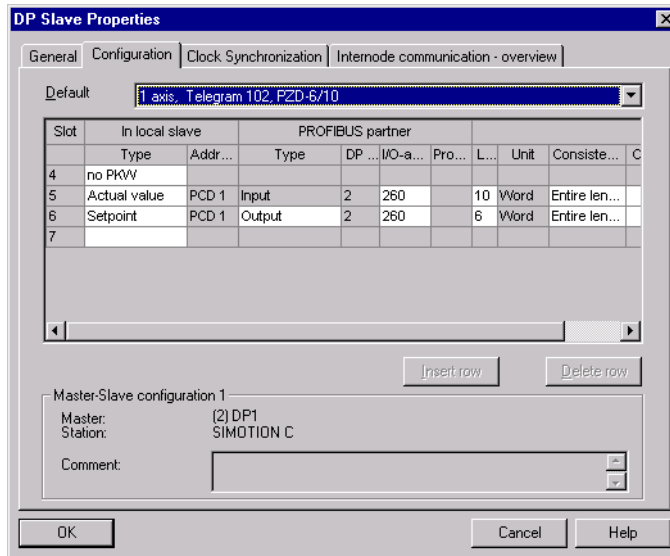


Figure 7-12 Configuring the SIMODRIVE 611U as a PROFIBUS slave

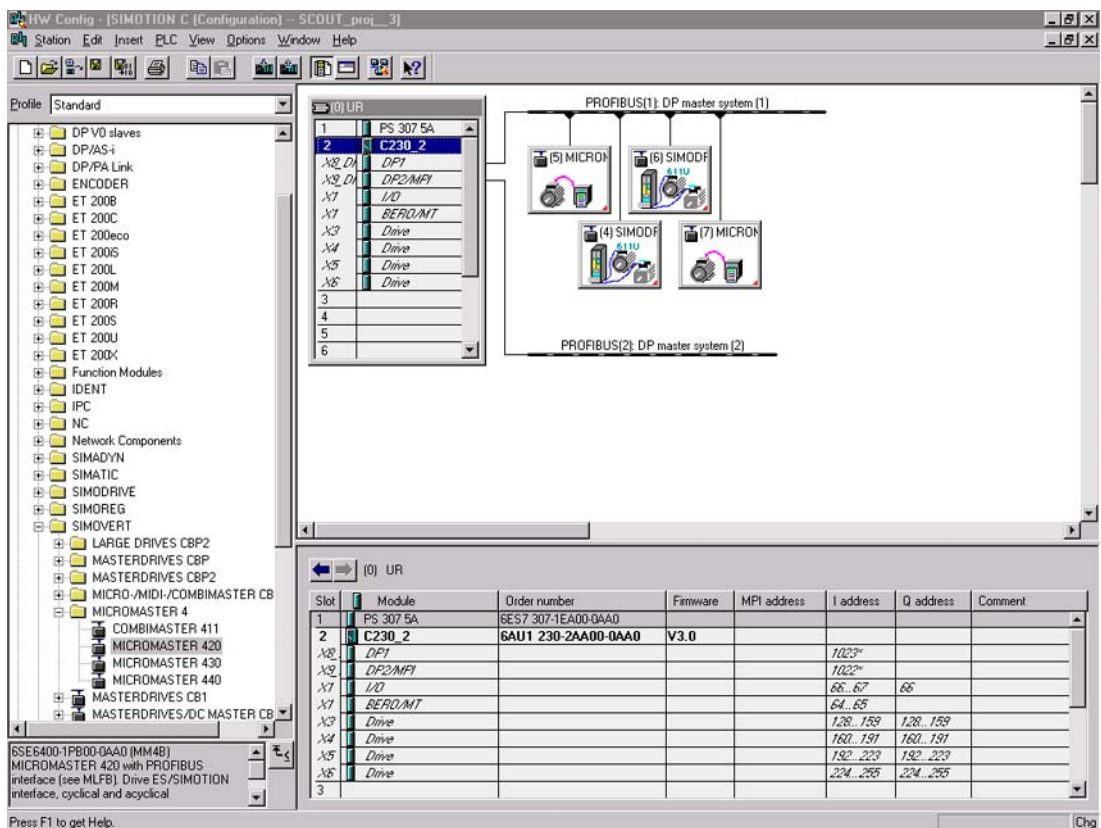


Figure 7-13 Example of a hardware configuration with 4 drives

7.5 Commissioning the drives

Drives that can be commissioned with SIMOTION SCOUT

You can use SIMOTION SCOUT to assign parameters to the following drives:

- SINAMICS
- MICROMASTER
- COMBIMASTER 411

For all other drives or for third-party drives, the appropriate commissioning program for the specific drive must be used (e.g. the SIMOCOM U program for SIMODRIVE 611U). If required, you must commission these drives directly on the drive.

Table 7- 2 Commissioning of various drives

Drive	Connection	Commissioning
SINAMICS S120, S150, G110 CPM100, G120, G130, G150, GM150	PROFIBUS DP or analog interface	With SIMOTION SCOUT or STARTER
SINAMICS S120	PROFINET	With SIMOTION SCOUT or STARTER
MICROMASTER 410	Analog interface	With SIMOTION SCOUT or DRIVE ES Basic or STARTER
MICROMASTER 420/430/440	PROFIBUS DP or analog interface	With SIMOTION SCOUT or DRIVE ES Basic or STARTER
COMBIMASTER 411	PROFIBUS DP or analog interface	With SIMOTION SCOUT or DRIVE ES Basic or STARTER
SIMODRIVE 611U	PROFIBUS DP or analog interface	With SIMOCOM U or DRIVE ES Basic
MASTERDRIVES MC, VC	PROFIBUS DP or analog interface	With SIMOVIS or DRIVE ES Basic
SIMODRIVE POSMO CA; CD, SI	PROFIBUS DP	With SIMOCOM U or DRIVE ES Basic
Third-party drives	Analog interface or PROFIBUS DP according to PROFIdrive profile V3.02	With commissioning tool supplied by the manufacturer

Note

If the Drive-ES Basic commissioning program is installed, it can be called by SIMOTION SCOUT in the project navigator via **Commissioning**.

7.6 SINAMICS on SIMOTION

7.6.1 SINAMICS S120 on SIMOTION

STARTER functionality in SIMOTION SCOUT

It is possible to parameterize drives directly with SIMOTION SCOUT. As an example, the following is a description of how a SINAMICS_Integrated drive is inserted in SIMOTION SCOUT.

Prerequisites:

- SIMOTION SCOUT has been installed on the PC/PG
- A SIMOTION SCOUT has been created

Note

You can create the SINAMICS drive with PROFIBUS or PROFINET.

You must execute the following steps:

- Insert SIMOTION device D4x5 or SIMOTION device D410
- Configure SINAMICS_integrated

Commissioning in SIMOTION SCOUT

1. Open the SIMOTION project in SIMOTION SCOUT.
2. Double-click **Create new device**.
3. Select a SIMOTION D4xx device.
4. Select the variant.
5. Deactivate the **Open HW Config** box.
6. Confirm with **OK**.
7. Select the PROFIBUS interface or Ethernet.
If you have selected Ethernet, select the interface parameterization of the PG/PC.
8. Confirm with **OK**.
9. Open the structure tree of the SIMOTION D4xx device in the project navigator.
10. Open the structure tree of the SINAMICS_Integrated drive in the project navigator.
11. Double-click **Configure drive unit**.
The Configuration - SINAMICS_Integrated - Option Module window opens.
The STARTER functionality now starts in SIMOTION SCOUT.

How to configure the SINAMICS_Integrated drive is described in detail in the following documents:

- SIMOTION D4x5 Commissioning Manual
- SIMOTION D4x5 Product Manual
- SIMOTION D410, Commissioning Manual

7.7 MICROMASTER on SIMOTION

7.7.1 Commissioning a MICROMASTER

STARTER functionality in the SIMOTION SCOUT

Drive parameters can be assigned directly using SIMOTION SCOUT (starter functionality in SIMOTION SCOUT). The commissioning of the MICROMASTER 420 is described as an example.

Requirements:

- SIMOTION SCOUT installed on PC/PG.
- PC/PG is connected to drive.
- SIMOTION SCOUT is in online mode.

 CAUTION
You can only commission the drive in online mode! All configuration data is stored in the drive RAM and is lost when the drive is switched off. You must therefore save this data to the drive ROM with Copy RAM to ROM . The appropriate drive must be selected.

7.7.2 Commissioning in SIMOTION SCOUT

7.7.2.1 Drive navigator

The drive navigator appears in the project navigator tree directly below the drive. It is designed as a snap-in. You can use the drive navigator for:

- Configuration
- Terminals/bus
- Limits

Proceed as follows:

1. Open the structure tree of the MICROMASTER_420 device in the project navigator.
2. Double-click drive navigator.
The snap-in opens in the working area of SIMOTION SCOUT.
3. Maximize the window view in the working area.


Note

The content displayed for the individual drive versions is the same in offline and online mode. Any options not available in a certain mode are grayed out. This function is then not active in that mode. This means that you have a complete overview of the possible functions at all times.

4. Configure the drive.

7.7.2.2 Configuring a drive

Configuring a drive

 CAUTION
Use the drive configuration wizard to directly edit the drive data. When you exit a window, the data is transferred to the drive immediately. A Cancel function is not available!

Requirement:

- You have inserted a drive into the project.

Proceed as follows:

1. Open the element (folder) for the drive unit in the project navigator.
2. Open the drive element below the folder.
3. Double-click the **Configuration** element.
The most important configuration data is displayed in the window.
4. Click **Reconfigure drive**.
A prompt appears asking you to confirm that you wish to reconfigure the drive.
5. Confirm the prompt with **Yes**.
The wizard for configuring the drive is started.

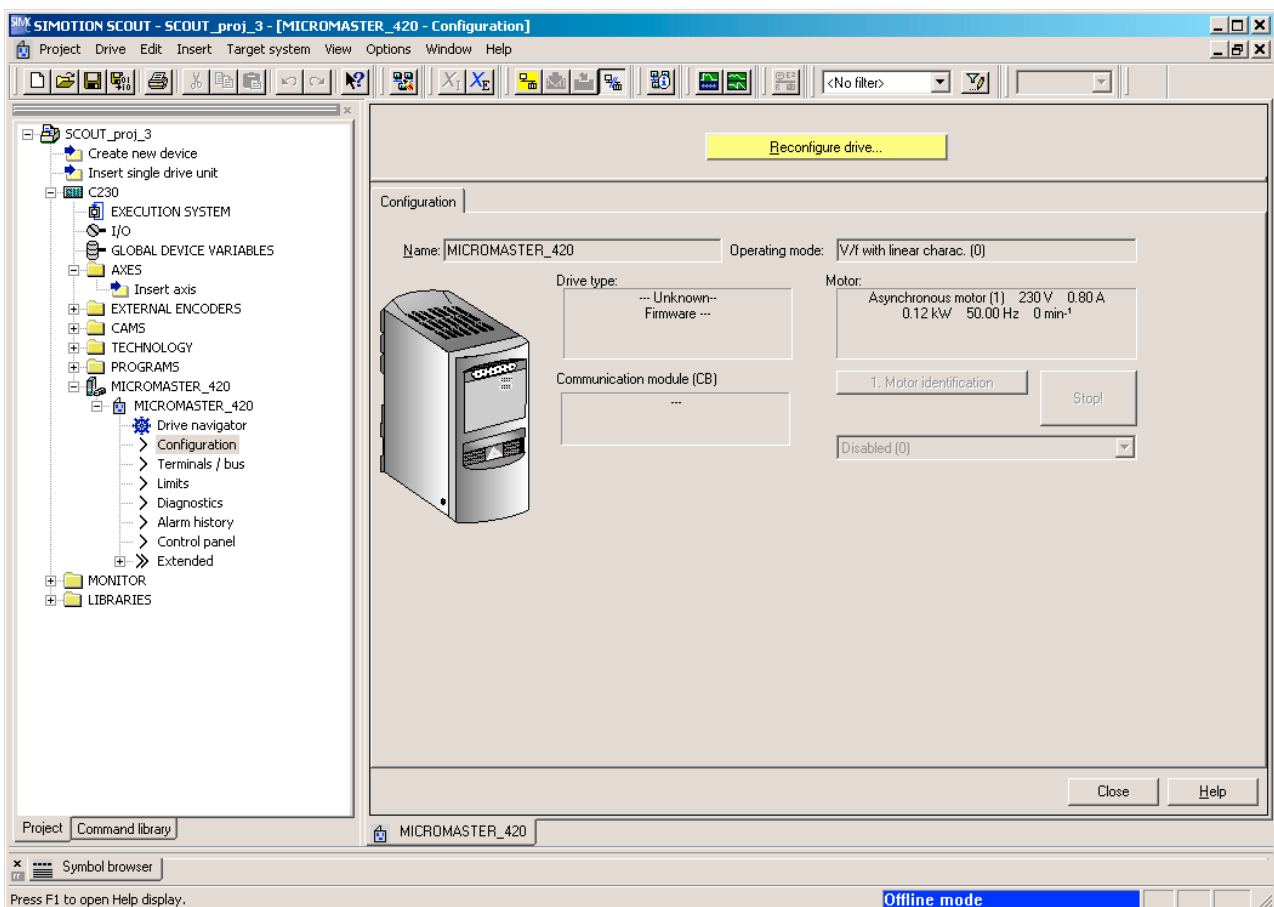


Figure 7-14 Configuring the MICROMASTER 420

You are now in the Drive Configuration - MICROMASTER 420 - Standard window:

6. Select the appropriate standard.
Default setting: **Europe [kW], standard frequency 50 Hz (0)**.
A message appears.
7. Read this message and click **OK** to confirm.
8. Click **Next >**.

You are now in the Drive Configuration - MICROMASTER_420 - Motor window:

9. Select the appropriate data.

10. If required, activate the **Additional motor data** function.

11. Click **Next >**.

You are now in the Drive Configuration - MICROMASTER_420 - Motor Data window:

12. Enter the appropriate data.

13. Click **Next >**.

You are now in the Drive Configuration - MICROMASTER_420 - Operating Mode window:

14. Select the appropriate operating mode.

15. Click **Next >**.

You are now in the Drive Configuration - MICROMASTER_420 - Command/Setpoint Source window:

Several sources may be offered simultaneously for selection of the speed setpoint. The meaning of the entries is as follows:

- First entry: Main setpoint
- Second entry: Additional setpoint

16. Select the appropriate data.

17. Click **Next >**.

A message appears.

18. Read this message and click OK to confirm.

You are now in the Drive Configuration - MICROMASTER_420 - Most Important Parameters window:

19. Enter the appropriate data.

20. Click **Next >**.

You are now in the Drive Configuration - MICROMASTER 420 window for completing the drive configuration:

21. Check the data entered.

22. Click **Finish**.

The drive configuration is completed.

23. Click **Close**.

7.7.2.3 Configuring the drive terminals/bus

Here you define the following:

- The assignment of the input and output terminals to the parameters of the drive.
- The calibration of the analog-digital converter and the digital-analog converter.
- When BICO parameter assignment is enabled, the Digital inputs tab is only used to display the connections. The interconnection itself is made with the appropriate function.
- In the Signal interconnection tab, assign the input parameters to the signal sources.

Proceed as follows:

1. Open the element (folder) for the drive unit in the project navigator.
2. Open the drive element below the folder.
3. Double-click **Terminals/Bus**.
4. Configure the inputs and outputs.
5. Configure the USS/PROFIBUS interface

CAUTION

The signal interconnection input window is intended only for use by experts who are familiar with BICO technology and the MM4 parameter assignment options.

Parameter changes are not checked for plausibility. Incorrect entries may affect the functioning of the drive.

6. Change the signal interconnection, if required.

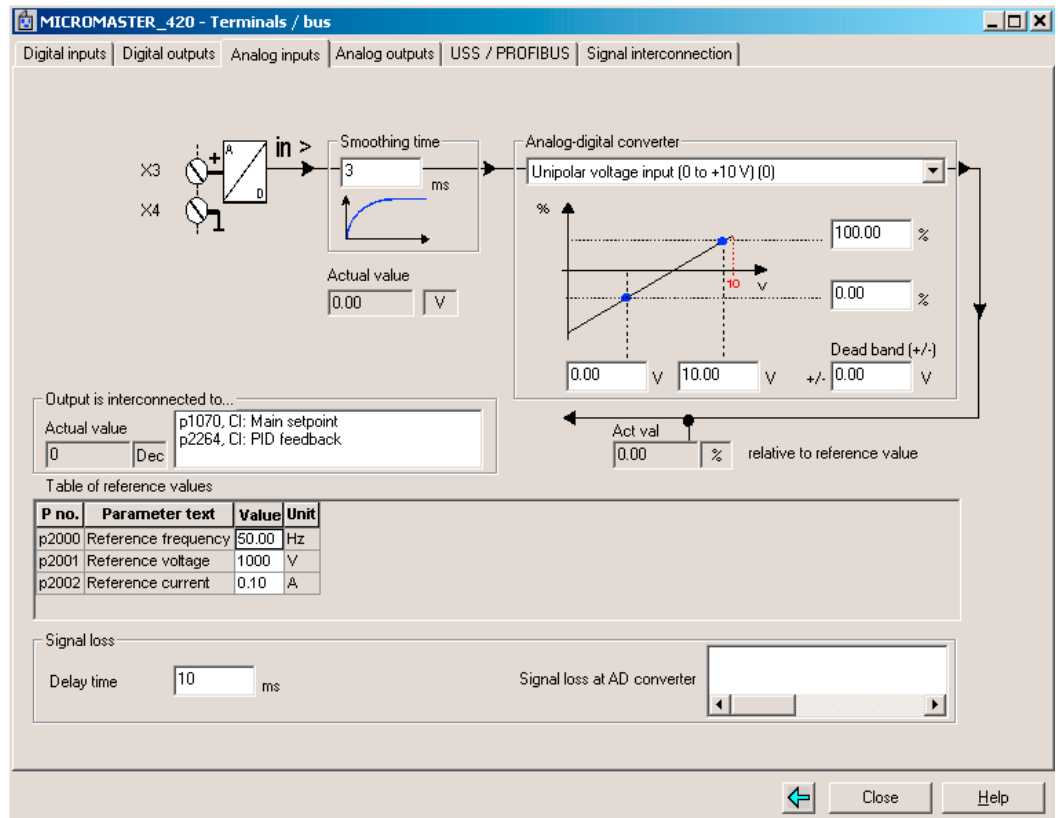


Figure 7-15 Configuring the drive interfaces

7.7.2.4 Configuring the USS and PROFIBUS interfaces

Use this tab to configure the interfaces only. You do not define whether they are used for communication.

Procedure for changing station addresses or baud rates.

If you have changed the station address or the baud rate of the interface used for communicating, test the communications.

Proceed as follows:

1. Disconnect the SIMOTION SCOUT from the target system.
2. If you:
 - Have changed the station address:
Change the station address of the drive in the Properties dialog box of the drive unit or in the hardware configuration.
 - Have changed the baud rate:
Select menu **Options > Set PG/PC interface** and configure the interface of your PC accordingly.
If you want to use the USS interface, you must install this.
In the **PG/PC Interface** window, click **Select** and **install** the **PC COM-Port (USS) module**.
3. Reconnect SIMOTION SCOUT to the target system.

7.7.2.5 Parameterizing setpoints and limits

The following submenus are used for the complete parameterization of setpoints and limits:


- Limits
- Extended
 - Motor potentiometer (MOP)
 - Fixed frequencies
 - PID controller
 - Setpoints
 - Shutdown functions
 - Start functions
 - Functions (slip compensation, programmable V/f characteristic)

Parameterizing limits

Deactivate the PID controller before parameterizing the ramp function generator. Otherwise this has no effect.

7.7.3 Controlling drives

You can use SIMOTION SCOUT to control the configured drive. Use the control panel for this purpose. This is displayed as a detail view tab. Drives can only be controlled in online mode.

 DANGER
<p>Before the motor turns for the first time, pay special attention to the following potential hazards:</p> <p>Make sure that the motor is connected correctly! Secure the surrounding area:</p> <p>Secure the motors! Do not release the magnetic motor brake of vertical axes without a safeguard!</p> <p>Set the limit values! Bring the axes to neutral position! Choose low velocities and speeds!</p> <p>Observe general accident prevention guidelines!</p> <p>The function is released exclusively for commissioning and service purposes. The safety shutdowns from the higher-level control have no effect.</p> <p>The function should only be used by authorized technicians.</p> <p>The "Emergency stop with space bar" function is not guaranteed in all operating modes. Therefore, there must be an EMERGENCY STOP circuit in the hardware. The appropriate measures must be taken by the user.</p>

Follow the steps outlined below:

1. Open the element (folder) for the drive unit in the project navigator.
2. Open the drive element below the folder.
3. Double-click the **Control panel** element.
The control panel is displayed in the detail view.

4. Select the drive that you want to control.
5. Select the relevant checkbox:
 - **Control:**
You switch the drive and control its speed.
 - **Enables and actual value:**
You monitor setpoints and actual values as well as enables and alarms.
 - **Links to status info:**
You can switch to the drive diagnostics.

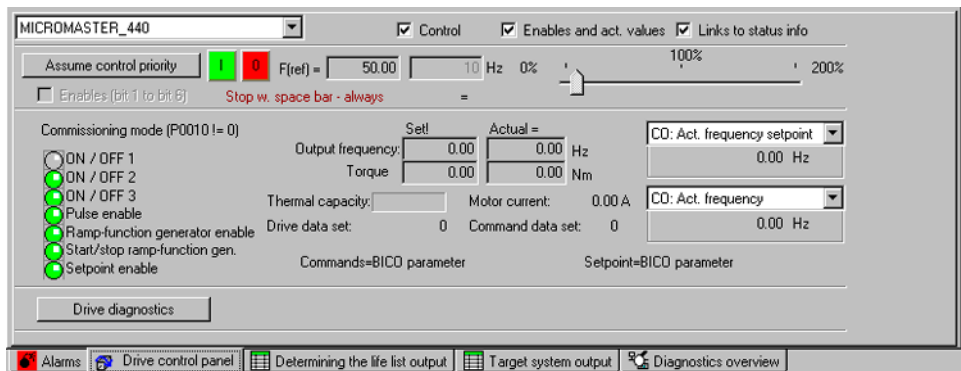


Figure 7-16 Controlling drives with SIMOTION SCOUT


Switching the drive and controlling its speed

Follow the steps outlined below:

1. Activate the **Control** checkbox.
2. Click **Assume control priority**.
3. Move the slider to the left.
4. Activate the **Enables (bit 1 to bit 6)** checkbox.
5. Switch on the drive: Click the **I** button.
6. Use the slider to control the speed.

To switch off the drive:

- Click the **O** button.
- Press the space bar.

 CAUTION
<p>Make sure that all windows in the working area are closed. Otherwise, delays may occur between the entry of the control command on the PC and its execution by the drive!</p>

Monitoring enables and actual values

- The speed setpoint and actual speed value are displayed constantly.
- Select two additional parameters for display. These parameters are displayed below the selection box.
- The enables and alarms are displayed.

7.7.4 Using the drive diagnostics

Diagnostics in SIMOTION SCOUT

You can use the drive diagnostics to check the communication connection between SIMOTION SCOUT and the drive and to display individual control words and status words as well as the operating mode.

You cannot change any system parameters. The display is only used for the diagnostics.

Proceed as follows:

1. Open the element (folder) for the drive unit in the project navigator.
2. Open the drive element below the folder.
3. Double-click **Diagnostics**.
4. Select the relevant tab.

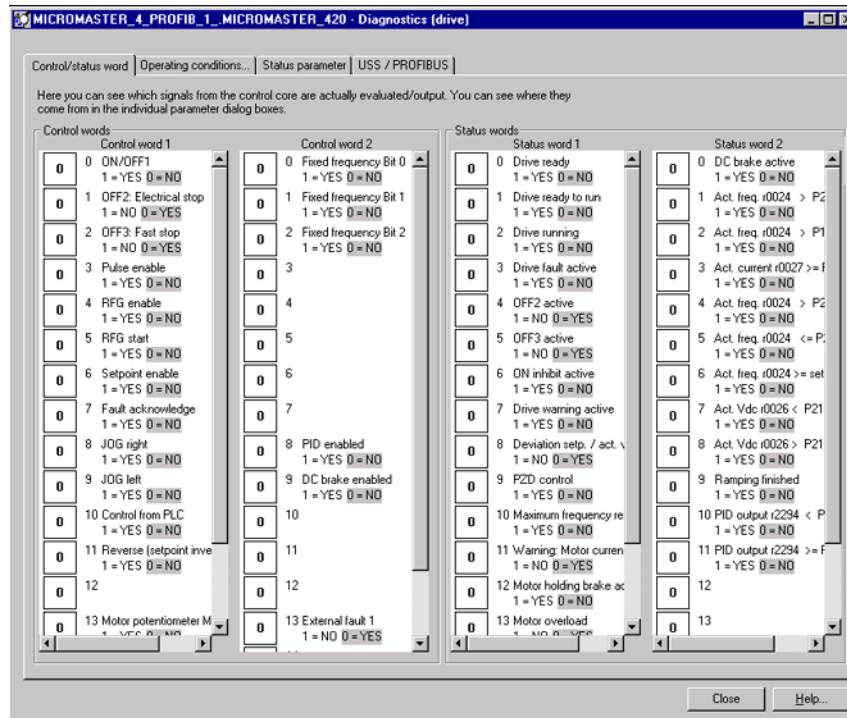


Figure 7-17 Drive diagnostics with SIMOTION SCOUT - Control/status word tab

Table 7-3 Drive diagnostics tabs

Tab	Meaning
Control/status word	Bit allocation of: <ul style="list-style-type: none"> Control word 1 Control word 2 Status word 1 Status word 2
Operating conditions	Important parameters and operating modes of the drive
Status parameters	Important system variables of the drive
USS/PROFIBUS	Define the communications interface in this tab; you can also monitor the values for the individual control words and status words.

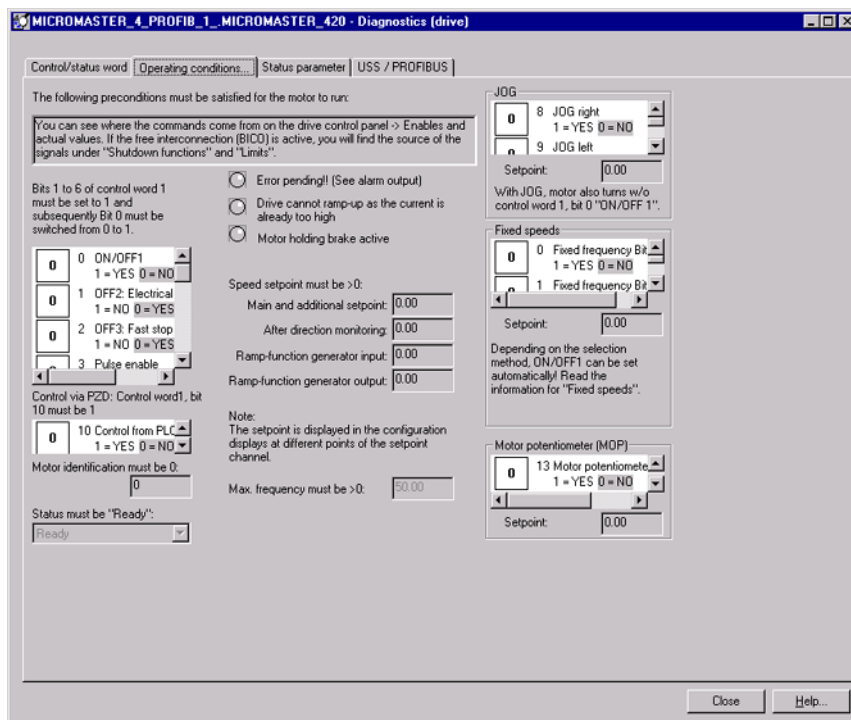



Figure 7-18 Drive diagnostics with SIMOTION SCOUT - Operating conditions tab

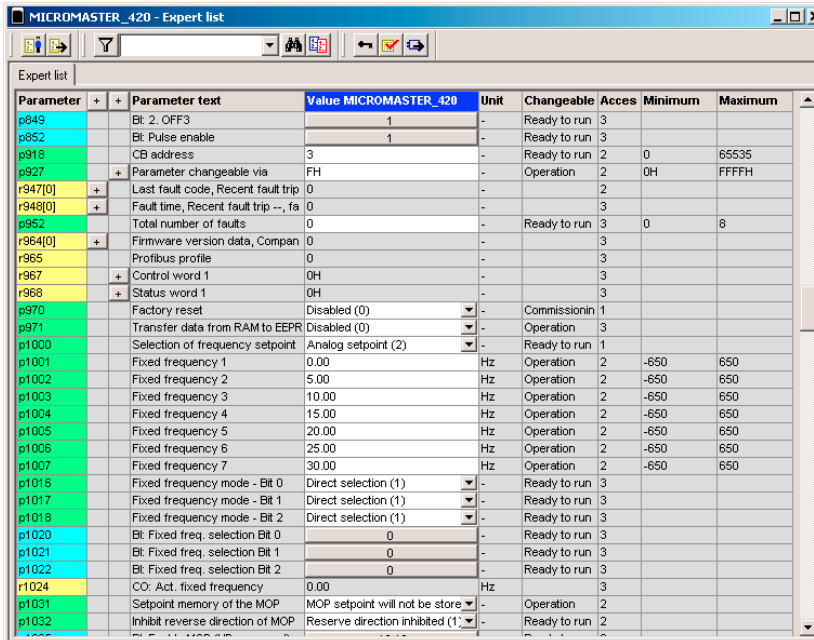
7.7.5 Using the expert list

Expert list for experienced users

 CAUTION
<p>The expert mode is intended for experienced users. Incorrect entries may affect the functioning of the drive.</p> <p>The system does not carry out any plausibility checks.</p>

The expert list for drives is different from the expert list for technology objects.

1. Open the element (folder) for the drive unit in the project navigator.
2. Open the drive element below the folder.
3. Select **Expert > Expert list** in the shortcut menu.
4. Enter the required values.



Parameter	Parameter text	Value MICROMASTER_420	Unit	Changeable	Acces	Minimum	Maximum
p849	Bit 2. OFF3	1		-	Ready to run	3	
p852	Bit Pulse enable	1		-	Ready to run	3	
p918	CB address	3		-	Ready to run	2	65535
p927	Parameter changeable via	FH		-	Operation	2	0H
r947[0]	Last fault code, Recent fault trip	0		-		2	
r948[0]	Fault time, Recent fault trip --, fa	0		-		3	
p952	Total number of faults	0		-	Ready to run	3	8
r964[0]	Firmware version data, Compan	0		-		3	
r965	Profibus profile	0		-		3	
r967	Control word 1	0H		-		3	
r968	Status word 1	0H		-		3	
p970	Factory reset	Disabled (0)		-	Commissionin	1	
p971	Transfer data from RAM to EEPROM	Disabled (0)		-	Operation	3	
p1000	Selection of frequency setpoint	Analog setpoint (2)		-	Ready to run	1	
p1001	Fixed frequency 1	0.00	Hz	Operation	2	-650	650
p1002	Fixed frequency 2	5.00	Hz	Operation	2	-650	650
p1003	Fixed frequency 3	10.00	Hz	Operation	2	-650	650
p1004	Fixed frequency 4	15.00	Hz	Operation	2	-650	650
p1005	Fixed frequency 5	20.00	Hz	Operation	2	-650	650
p1006	Fixed frequency 6	25.00	Hz	Operation	2	-650	650
p1007	Fixed frequency 7	30.00	Hz	Operation	2	-650	650
p1016	Fixed frequency mode - Bit 0	Direct selection (1)		-	Ready to run	3	
p1017	Fixed frequency mode - Bit 1	Direct selection (1)		-	Ready to run	3	
p1018	Fixed frequency mode - Bit 2	Direct selection (1)		-	Ready to run	3	
p1020	Bit Fixed freq. selection Bit 0	0		-	Ready to run	3	
p1021	Bit Fixed freq. selection Bit 1	0		-	Ready to run	3	
p1022	Bit Fixed freq. selection Bit 2	0		-	Ready to run	3	
r1024	CO. Act. fixed frequency	0.00	Hz			3	
p1031	Setpoint memory of the MOP	MOP setpoint will not be store		-	Operation	2	
p1032	Inhibit reverse direction of MOP	Reserve direction inhibited (1)		-	Ready to run	2	

Figure 7-19 Expert list for drive commissioning - display of an array

Additional references

Please refer to the following document on this subject

- Function Manual: SIMOTION Basic Functions
- The SIMOTION SCOUT online help

7.8 MICROMASTER in Conjunction with a Positioning Axis

Introduction

This section describes how to integrate the MICROMASTER MM4 as a drive in SIMOTION SCOUT.

In the following example, the MICROMASTER MM4 is controlled via standard message frame 1.

Communication from SIMOTION:

- Word 1, Control word
- Word 2, Speed setpoint

Communication to SIMOTION:

- Word 1, Status word
- Word 2, Actual speed value

7.8.1 Parameterization steps

This section describes how to integrate the MICROMASTER MM4 as a drive in SIMOTION SCOUT.

In the following example, the MICROMASTER MM4 is controlled via standard message frame 1.

Communication from SIMOTION:

- Word 1, Control word
- Word 2, Speed setpoint

Communication to SIMOTION:

- Word 1, Status word
- Word 2, Actual speed value

Integrating MICROMASTER MM4 in HW Config

1. Select the SIMOTION device in the project navigator.
2. Open HW Config.
3. Insert a MICROMASTER MM4 into a PROFIBUS subnet.
4. Once you have inserted the drive, select **Standard message frame 1, PZD-2/2**.
5. Save and compile the hardware configuration.
6. Download the hardware configuration to the SIMOTION device.
7. Create a TO axis in SIMOTION SCOUT.

Inserting a virtual axis

1. Insert a virtual axis into the project navigator of SIMOTION SCOUT. This will be converted to a real axis via the expert list when the axis wizard is completed.

Changes in the expert list

1. Select the virtual axis in the project navigator.
2. Open the expert list via the shortcut menu.
3. Open the following directory in the expert list:
ConfigurationData\TypeOfAxis
4. Make the following setting:
 - TypeOfAxis = REAL_AXIS (0)

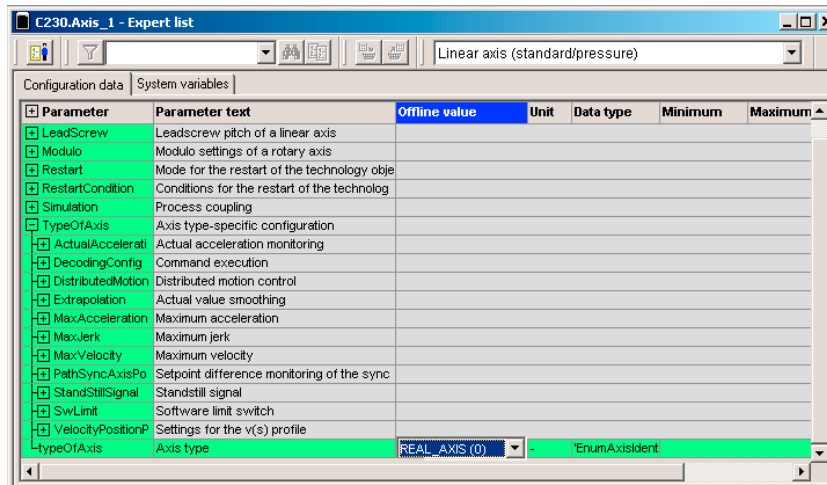


Figure 7-20 Axis setting in the expert list

Assigning encoders

- NumberOfEncoders/Encoder_1/encoderidentification = ONBOARD (1), set EncoderType, EncoderMode and EncoderSystem according to the encoder
- NumberOfEncoders/Encoder_1/DriverInfo/LogAddressIn = 128 (or 160, 192, 224)
- NumberOfEncoders/Encoder_1/DriverInfo/LogAddressOut = 128 (or 160, 192, 224)
- NumberOfEncoders/Encoder_1/DriverInfo/TelegramType = NO_TELEGRAM (0)
- NumberOfEncoders/Encoder_1/IncEncoder/incResolution = 1024 (or number of increments without pulse multiplication)

7.8 MICROMASTER in Conjunction with a Positioning Axis

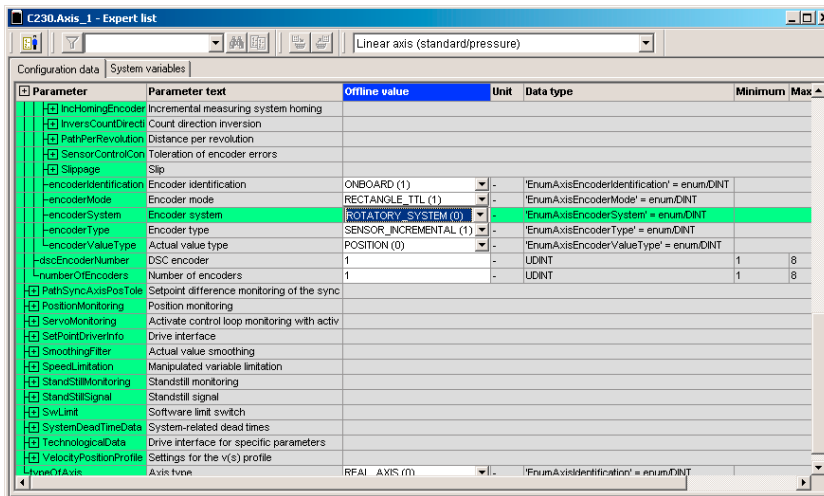


Figure 7-21 Expert list: Assigning encoders

Assigning the setpoint output

- SetPointDriverInfo/mode = DPMaster (2)
- SetPointDriverInfo/logAddressIn = 256 (or I address of DP slave)
- SetPointDriverInfo/logAddressOut = 256 (or O address of DP slave)
- SetPointDriverInfo/TelegramType = DP_TEL1_STANDARD (1) for 2 PZD words in input and output direction

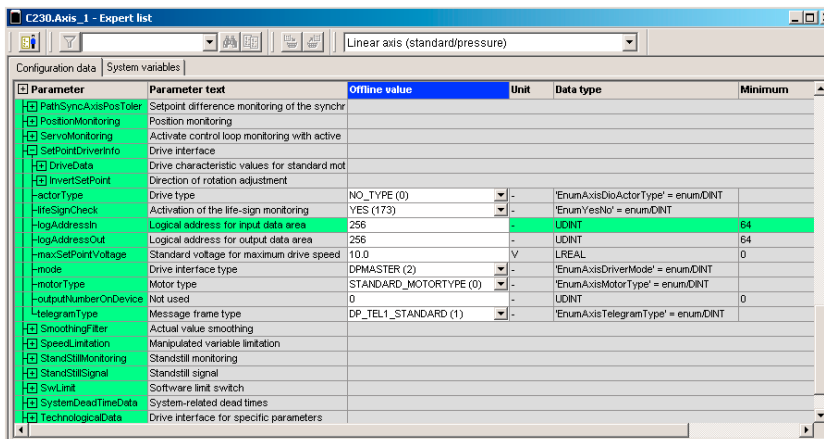


Figure 7-22 Expert list: Assigning the setpoint output

1. Commission the MICROMASTER MM4.

Note

The drive can now be addressed via SIMOTION SCOUT in conjunction with a positioning axis.

7.9 SIMOVERT MASTERDRIVES MC on SIMOTION

7.9.1 Connecting the SIMOVERT MASTERDRIVES MC

Converter requirements

Note

Derating has to be taken into account for compact devices as of 75 kW. This means that if a converter is operated with a pulse frequency greater than 5 kHz, the permissible rated current is reduced and the device can no longer be operated at its maximum rated power.

Software requirements

Personal computer minimum requirements

- Windows 2000 Professional Service Pack 3 or Windows XP Professional Service Pack 2
- SIMATIC STEP 7 V5.4 SP1
- Drive Monitor V5.4 HF1 or Drive ES V5.4 SP1
- SIMOTION SCOUT V4.1

Converter

Motion Control / Motion Control Compact PLUS (Standard / Performance2):

- Version V1.60 or higher; readable in the parameters r69.1 and r828.1

You can find a description of how to upgrade the converter firmware in the Motion Control compendium (Section 7.4 in the AC Edition)

PROFIBUS communication board (CBP2):

- Version V2.23 or higher; readable in the parameters r69.x and r828.x

PROFIBUS communication board (CBP2):

A CBP2 communication board must be inserted. This can be read out on the converter in the monitoring parameter r826.x:

If a CBP2 is connected, value 148 is output.

If a CBP1 is connected, value 143 is output.

Index *x* designates the slot in which the communication board is inserted:

Index 1 means the basic unit module,

Index 2, the module in slot A etc.

Further information is available in the parameter list in the Motion Control compendium.

7.9.2 Upgrading option cards firmware

Requirement

Note

A bootstrap file, e.g. CBP2_DL.hex and a program file CBP2_V223.hex of Version 2.23 or higher is required for the upgrade.

The Drive Monitor or Drive ES may access only the converter RAM for the upgrade of the firmware.

To upgrade the firmware of the option card:

The upgrade with the Drive Monitor software is described as an example.

1. Open the Drive Monitor

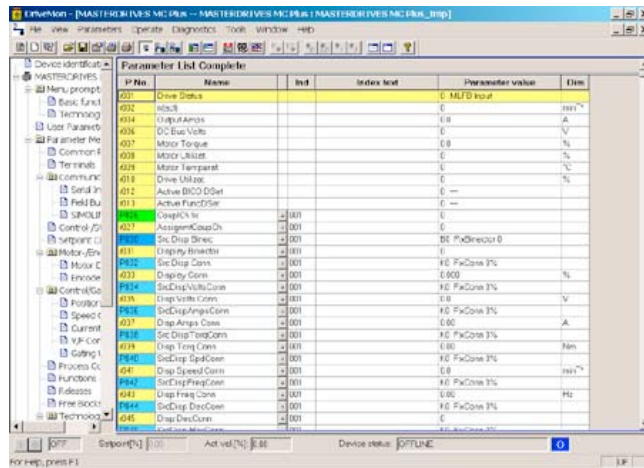


Figure 7-23 Drive Monitor accesses the RAM of the MC

2. Click File > Download > Option card firmware.

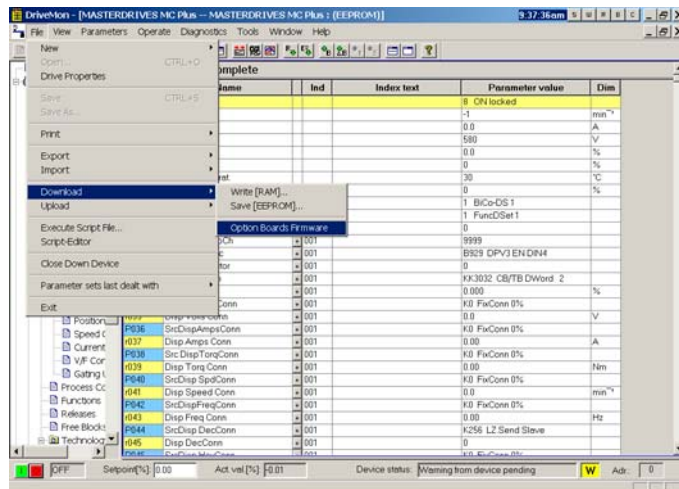


Figure 7-24 Opening the Option Card Download window

3. Enter the path for the bootstrap file, the program file and the slot in which the CBP2 is installed.
4. Activate the Activate diagnostics checkbox.

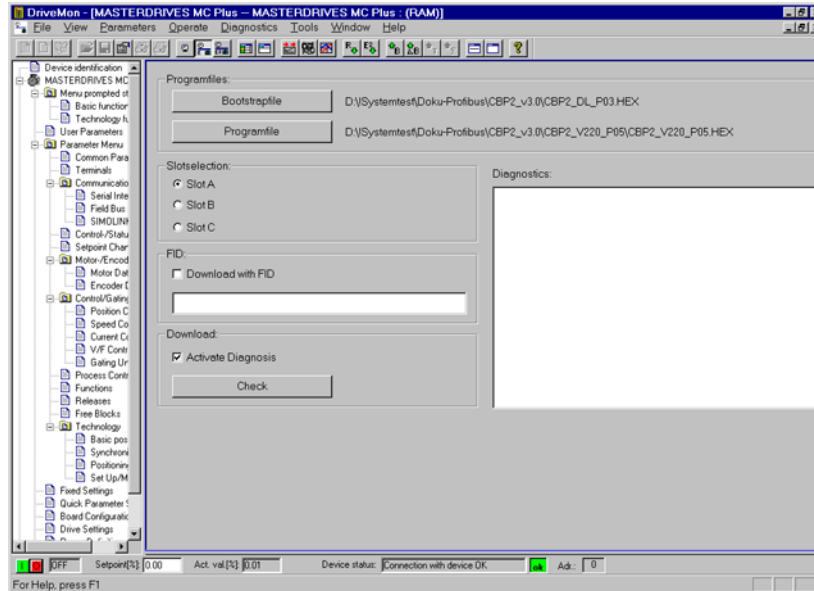


Figure 7-25 Settings in the Option Cards Download window

5. Right-click a free area of the screen. The following window opens:



Figure 7-26 Additional settings for the download

6. Enter a program length of 128 KB and 8 EEPROM blocks.
7. Click the **Check** button.

8. Click the **Start download** button.
The following window opens:

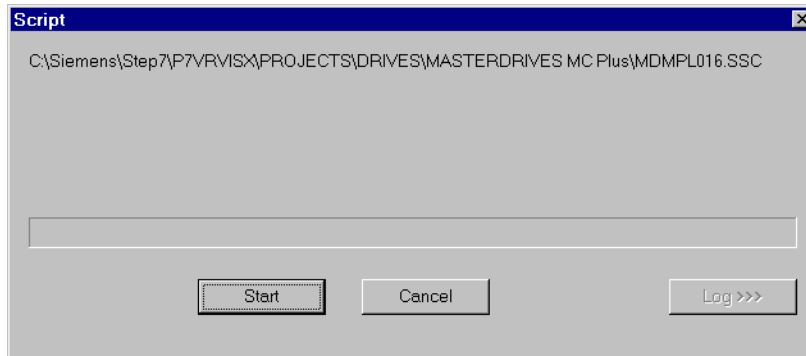


Figure 7-27 Start of the script file download

9. Click the **Start** button.
The download is started.

After the download, you can read out the new firmware version of the CBP2 from parameters r69.x and r828.x.

7.9.3 Commissioning MASTERDRIVES MC

7.9.3.1 Commissioning procedure

Note

This guide only describes how to set up the connection between the SIMOVERT MASTERDRIVES Motion Control converter/inverter and SIMOTION. The guide does not describe how to optimize the controller; it is assumed that this has already been carried out.

The commissioning procedure is divided into two parts:

- In the first part, a SIMOTION project is created and the SIMOTION SCOUT program and the hardware manager HW Config are used to enter the settings for the SIMOTION system. Settings which have to be made both in SIMOTION and in MASTERDRIVES MC are highlighted.
- In the second part of the commissioning procedure, the MASTERDRIVES MC is parameterized. The guided basic unit commissioning procedure and a preprogrammed script file for connection to SIMOTION are used for this purpose. After the commissioning of SIMOTION and MASTERDRIVES MC, a sample program is set up for an axis positioning.

Various parameter settings for MASTERDRIVES MC are derived from the SIMOTION settings. The following table contains an overview of the functions and settings which have to be entered in both SIMOTION and MASTERDRIVES MC. These settings are described separately in the following sections for the SIMOTION and MASTERDRIVES MC.

Table 7- 4 Settings required in SIMOTION and MASTERDRIVES MC

Required setting	Value
DP cycle	3 ms
Pulse frequency	5.3 kHz
Encoder type	Select (incremental encoder / absolute encoder)
Homing mode	Select
Measurement	Set (yes/no)
Select encoder resolution	In bits
Enter rated motor speed	6000 rpm
Ratio of position control cycle clock: DP cycle clock	1:2:2

Note

The script file for the connection of SIMOVERT MASTERDRIVES Motion Control to SIMOTION with standard message frame 5 is provided at no cost. It may be copied, modified and used or passed on to third-parties. However, in the case of it being passed on to a third party, it must be in its full and unmodified form, and all copyright conditions must be observed. The commercial distribution to a third party, for example, in share/freeware distribution is only permitted with the previous written agreement of the Siemens AG.

As this script file is provided free-of-charge, the authors and copyright holders cannot accept any liability for this file. Its use is the sole risk and responsibility of the user. The liability of the authors and copyright holders is restricted to damages arising from gross negligence or intent. All other claims are excluded. In particular, the authors and copyright holders cannot accept liability from any damages arising from defects or consequences arising from such defects.

7.9.3.2 Creating a SIMOTION project

Hardware configuration

In this step, the SIMOTION device, the bus system and the MASTERDRIVES MC are created and parameterized via SIMOTION SCOUT and HW Config.

1. Start SIMOTION SCOUT.
2. Click **Project > New**.
3. Enter a name, e.g. *DSC_MCP_3ms*.
4. Click **OK**.
A project is created.

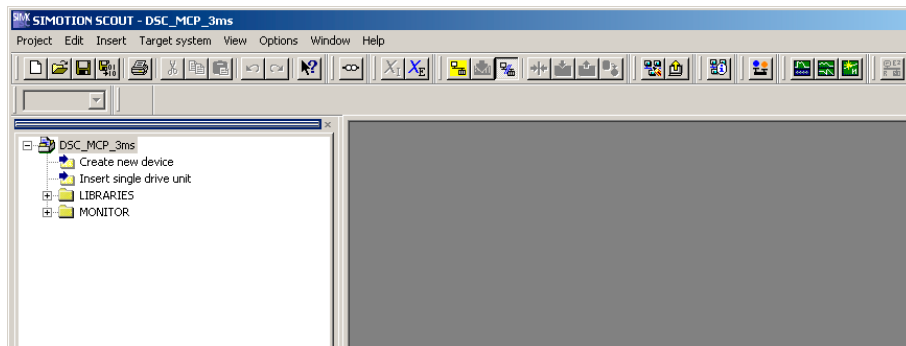


Figure 7-28 Creating a project

5. Double-click **Create new device**.

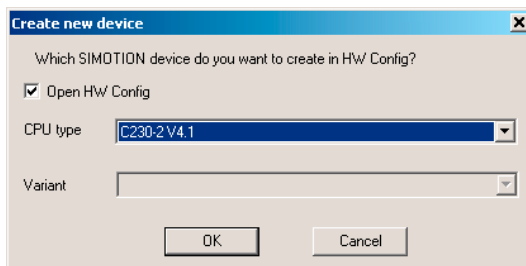


Figure 7-29 Open HW Config (example)

6. Select the desired SIMOTION device.
7. Click **OK**.

- Select the interface at the C230-2 V4.1 in the PG/PC for a connection between the PG/PC and the C230-2.

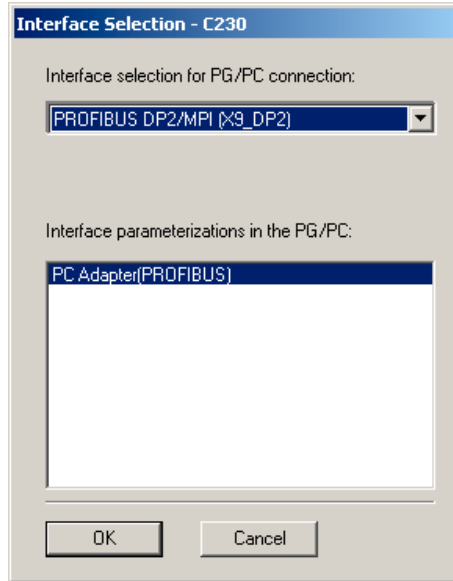


Figure 7-30 Selecting the interface

- Click **OK** in the Selection of the Interface - C230 window.

The **HW Config** application starts.

The rack with the SIMOTION C230 device is displayed.

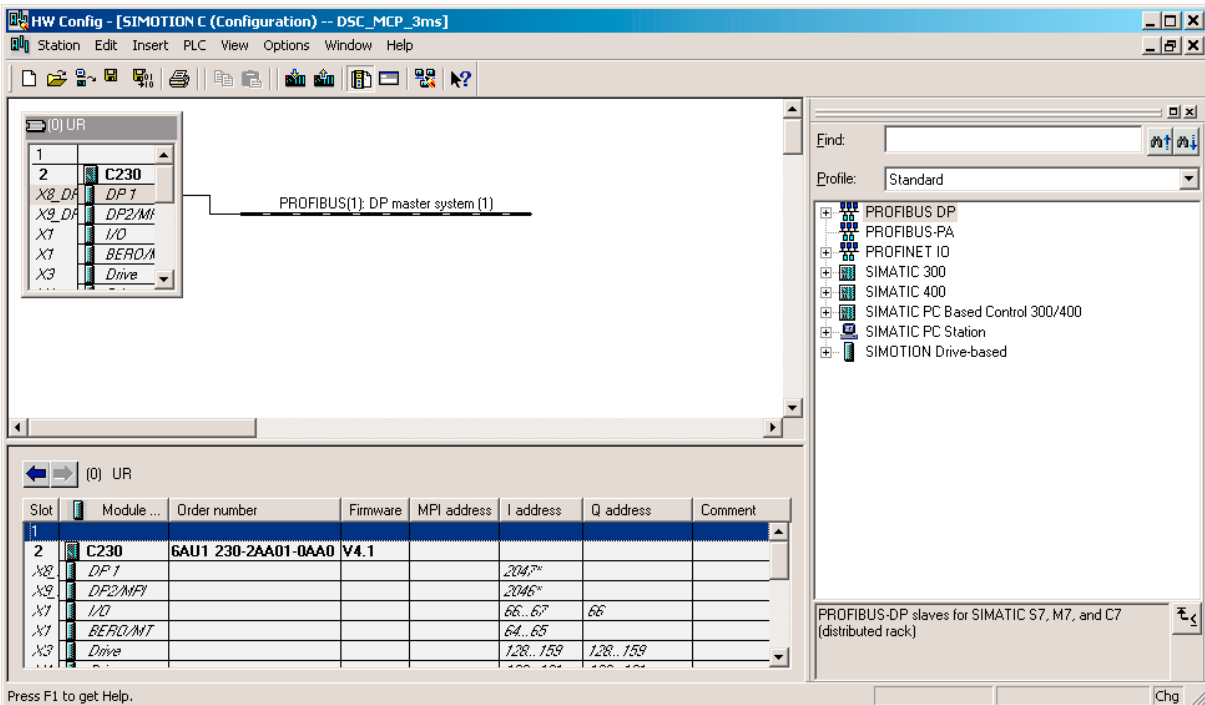


Figure 7-31 Rack with PROFIBUS DP Mastersystem

To create a PROFIBUS chain in the rack, proceed as follows:

10. Double-click **X8_DP1**.
11. Click the **Properties** button in the **Properties -DP1 - (R0/S2.1)** window in the General tab.
12. Click the **New** button in the Parameters tab.
13. Select the **Network Settings** tab.
14. Set **2** as the highest PROFIBUS address.
15. Select a transmission rate of **12 Mbit/s** on the bus and **DP** as profile.

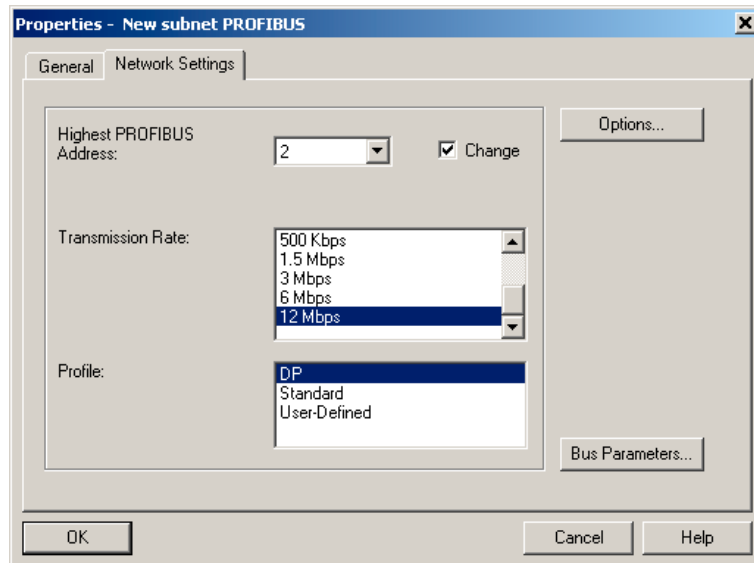


Figure 7-32 Configuration of PROFIBUS lines

16. Click the **Options** button.
17. Activate the **Activate isochronous bus cycle** checkbox in the **Isochronous mode** tab.
18. Enter the desired cycle time, e.g. 3 ms in the **Equidistant DP cycle** field.
The possible times can be taken from the **DP cycle time** table.
19. Confirm the settings by clicking **OK** four times.
All property windows are closed. A PROFIBUS DP master system has been created.
The other described settings are all shown for a DP cycle of 3 ms.
For 1.5 ms or 2 ms, the setting must be modified according to the *DP cycle* and *setting DP cycle time, pulse frequency, task* tables.

Note

The **X9-DP2** interface in the rack is not networked for this example. It is set by default for PROFIBUS communication at 1.5 Mbaud.

20. Open the PROFIBUS DP \ SIMOVERT \ MASTERDRIVES CBP2 directories in the hardware catalog.
21. Click the PROFIBUS line. This is displayed in black.

22. Double-click the type: Motion Control Plus.
The Properties - PROFIBUS Interface MASTERDRIVES CBP2 window appears.

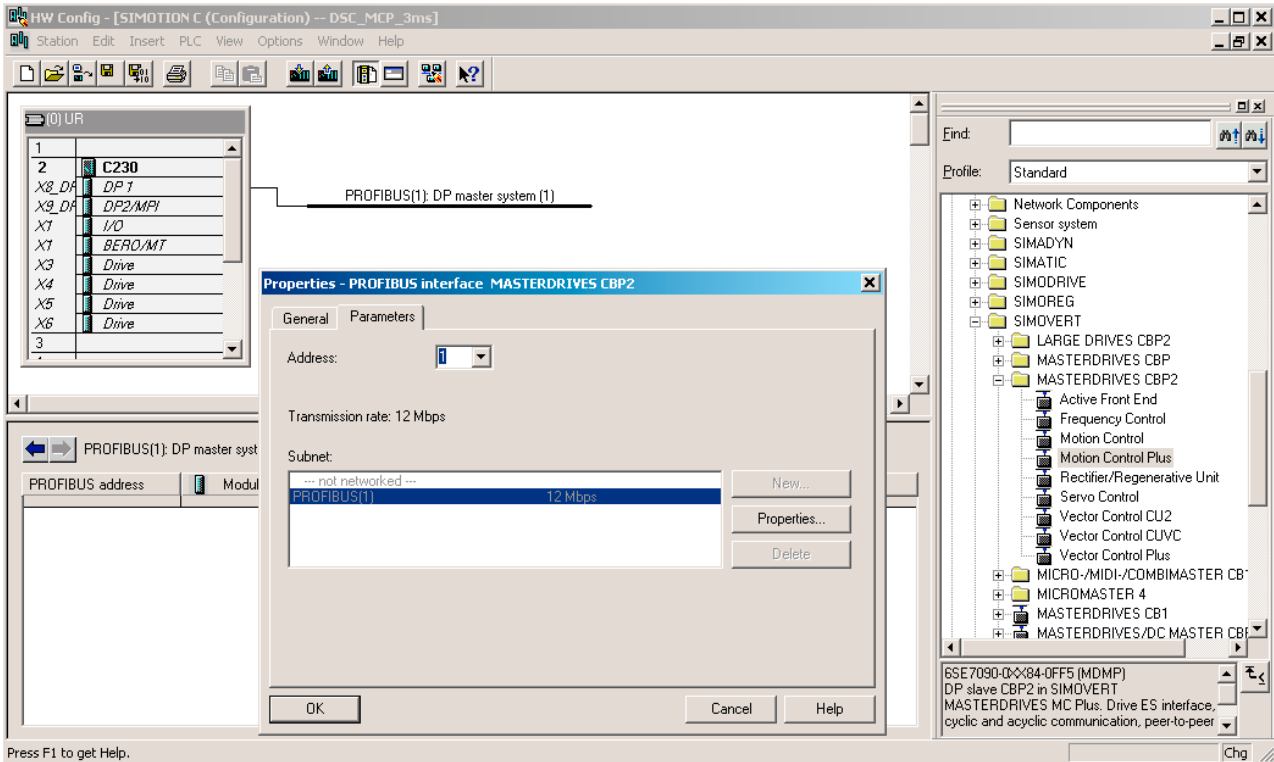


Figure 7-33 Attaching a MASTERDRIVES Motion Control Plus to the PROFIBUS

23. Click **OK**.
The Properties - Drive window appears.
24. Click **OK**.

- 25. In the **Configuration** tab of the **DP Slave Properties** window, select the **Standard message frame 5 PZD-9/9** as default.
- 26. In the **Clock Synchronization** tab, activate the **Synchronize drive with equidistant DP cycle** setting.

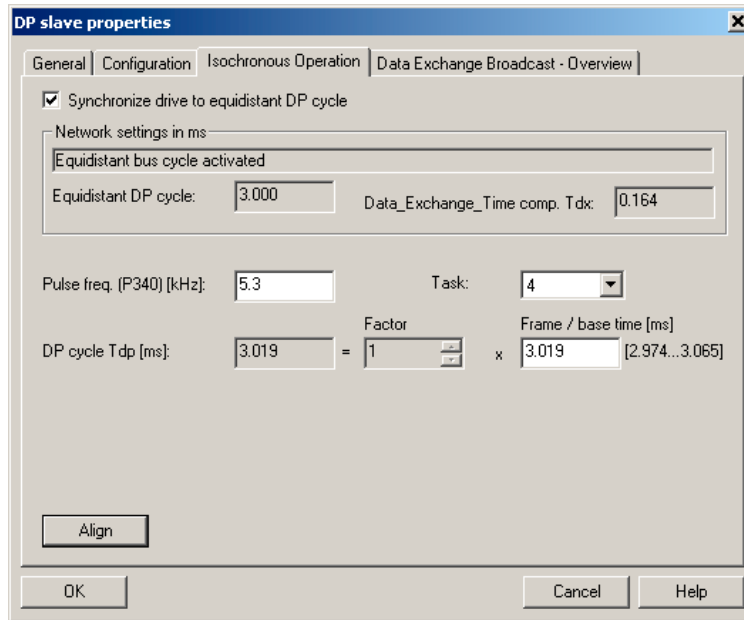


Figure 7-34 Selecting isochronous operation

Table 7- 5 DP cycle time

DP cycle time	Motion Control	Motion Control Performance 2
1.5 ms	-	Possible setting
2 ms	Possible setting	Possible setting
3 ms	Possible setting	Possible setting

The DP cycle must be set in SIMOTION and in the MASTERDRIVES MC.

Special settings: SIMOTION

- 27. Enter the value **5.3** in the Pulse frequency (P340) field.
- 28. Click the **Alignment** button.
A message appears.
- 29. Click **Yes**.
- 30. In the **DP cycle > Time frame/time base** field, enter the value **3.0**.
- 31. Click the **Alignment** button.
- 32. Click **OK** to confirm the changes.

Special settings: SIMOVERT MASTERDRIVES MC**Parameters:**

P340 (pulse frequency)

Meaning:

The pulse frequency must be matched to the DP cycle so that the converter/inverter can be synchronized with this. Frequencies from 5 to 8 kHz can be set.

The following relationships between DP cycle time, pulse frequency and task result:

Table 7- 6 Settings of DP cycle time, pulse frequency, task

DP cycle time	Pulse frequency	Task
1.5 ms	5.3 kHz	3 (only possible with Motion Control Performance 2)
2 ms	8 kHz	4
3 ms	5.3 kHz	4

33. Save and compile the project with **Station > Save and compile**.

34. Click **Station > Check consistency**.

35. Click **OK** to confirm the message.

36. Click **Target system > Load to module**.
The hardware configuration is completed.

37. Close HW Config.

Note

After loading the hardware configuration, the red BUS1F LED on the C230 may still flash. The toggle switch is in the STOP position. This bus error occurs if the PROFIBUS address and pulse frequency configured in the HW Config have not yet been set on the MASTERDRIVES MC.

If communication between the two devices is to be tested at this point, the basic functions of the MASTERDRIVES MC should be commissioned and the connection to MASTERDRIVES MC established.

If the settings in SIMOTION and MASTERDRIVES MC match, the BUS2F error does not occur and the LEDs on the PROFIBUS module of the MASTERDRIVES MC flash in synchronism.

7.9.3.3 Creating an axis in SIMOTION SCOUT

1. Open the **Axes** folder in the project navigator under C230.
2. Double click **Insert axis**.
The axis assistant opens and guides you through the configuration of the axis.

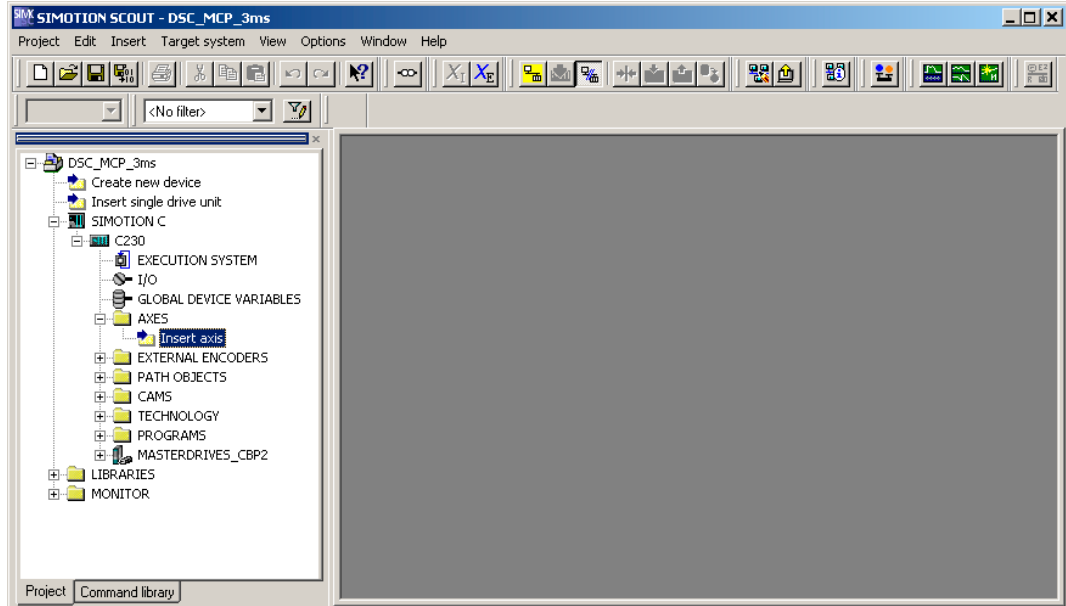


Figure 7-35 Inserting an axis

3. Enter a name for the axis.
4. Select the technology.
Speed regulation and positioning are already preset.
5. Click **OK**.
The Axis configuration - *Axis Name* - Axis type window is opened.

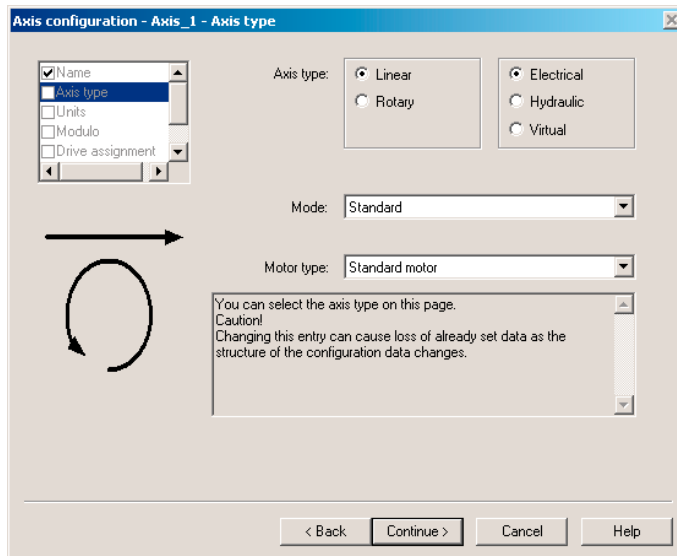


Figure 7-36 Axis configuration: Axis type

6. Specify the **axis type**.
In the example, the set linear axis remains selected.
Set **mode** and **motor type** are also transferred.
7. Click **Continue**.
The Axis configuration - *Axis name* - Units window is opened.
8. Click **Continue**.
The Axis configuration - *Axis name* - Modulo window is opened.
9. Click **Continue**.
The HW Config data is read out. The Axis configuration - *Axis name* - Drive assignment window is opened.

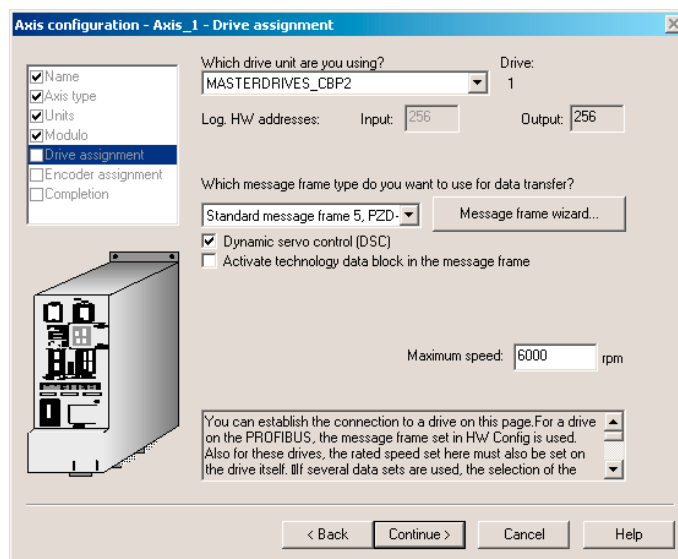


Figure 7-37 Axis configuration: Drive assignment

10. Select the **MASTERDRIVES CBP2** as drive unit. The standard message frame 5 is set automatically. If this is not the case, select standard message frame 5 in the field for the message frame type.
11. Enter the value **6000** in the Rated speed field.
12. Click **Continue**.
The Axis - Drive Relationship window is opened.
13. Read the note and click **OK**.
The online help is opened.
The Axis configuration - *Axis name* - Encoder assignment window is opened.
14. Select the appropriate properties.
In the example, **Incremental encoder** in the Encoder type field and **SINE** in the Encoder mode field are selected.

The encoder data settings required for SIMOTION are listed in the encoder settings table. Only the input values listed in the tables are evaluated for the respective encoder.

The encoder and resolution must be specified in SIMOTION and in MASTERDRIVES MC.
15. Click **Continue**.
The Axis configuration - Axis name - Encoder - Data window is opened.

You can find the encoder settings tables:

- in the online help or
- on the CD Utilities&Application under 2_FAQ\ENCODER_PARAMETERIZATION

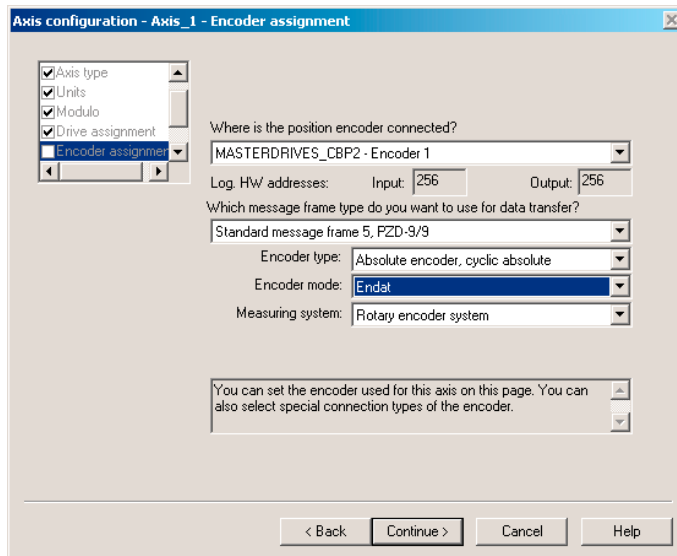


Figure 7-38 Example: Axis configuration - selecting the encoder type for an absolute encoder

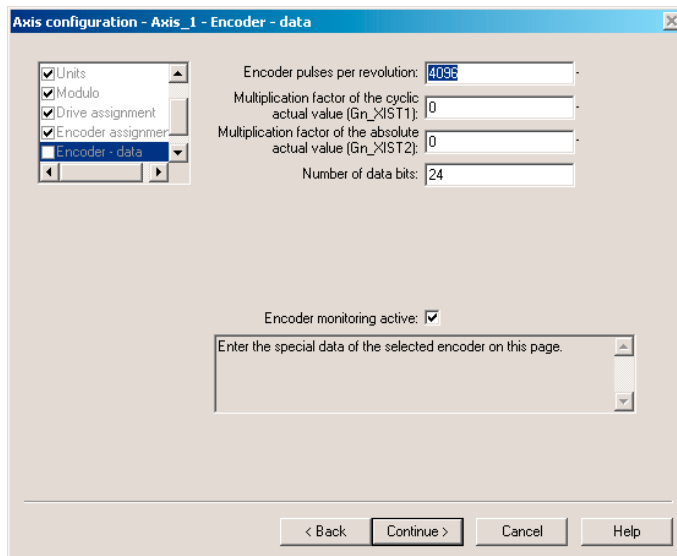


Figure 7-39 Example: Axis configuration - input of the resolution for an absolute encoder

Pulse encoders, resolvers and encoders must be configured according to the encoder settings tables. This results in the following settings, for example, for the encoder.

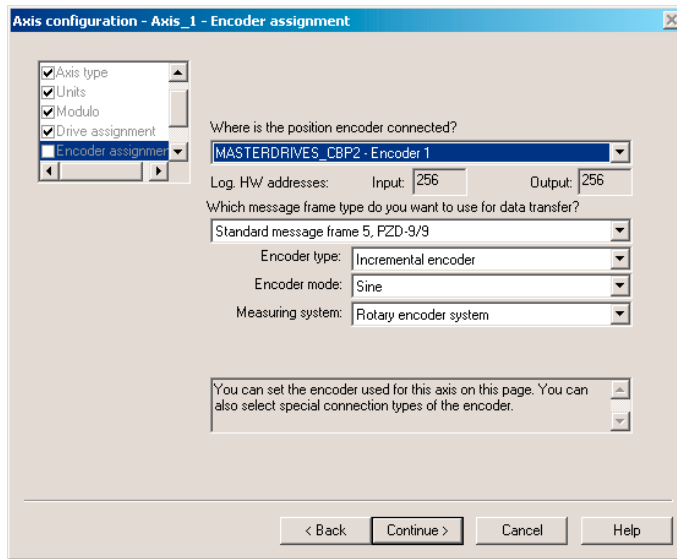


Figure 7-40 Example: Axis configuration - selecting the encoder type for an incremental encoder

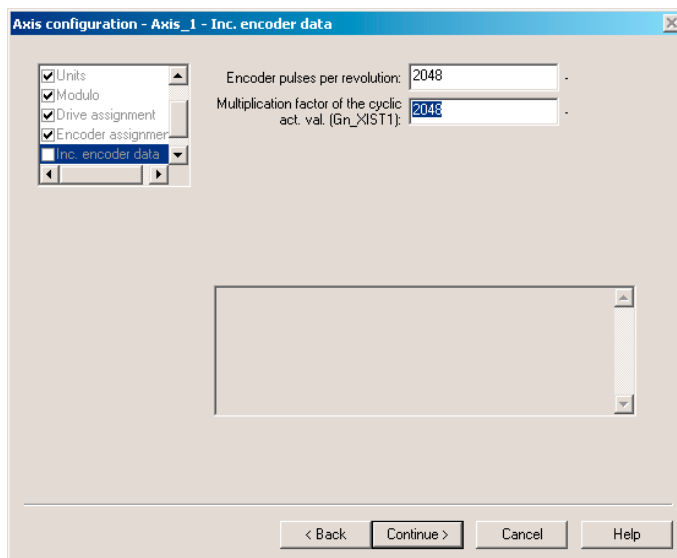


Figure 7-41 Example: Axis configuration - input of the resolution for an incremental encoder

Special settings: SIMOTION

The settings in **SIMOTION** are specified with the name of the configuration data and can be shown using the expert list. The following assignments apply to the axis configuration windows:

Encoder type

- `TypeOfAxis.NumberOfEncoders.Encoder_1.encoderType`

Encoder mode

- `TypeOfAxis.NumberOfEncoders.Encoder_1.encoderMode`

Resolution

- `TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolution`
- `TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolution`

Data width of absolute value without fine resolution

- `TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsDataLength`

Fine resolution

- `TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolution`
- `MultiplierCyclic`
- `TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolution`
- `MultiplierCyclic`

Fine resolution for absolute value in Gn_XIST2

- `TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolution`
- `MultiplierAbsolute`

Special settings: SIMOVERT MASTERDRIVES MC

The required settings of the parameters can be found in the following tables.

Parameters:

U922 index 1 (encoder actual values)

Meaning:

The actual position value is connected to the encoder interface via U922.i001. With an absolute encoder, the absolute value from the encoder is specified as the actual position value. Please note that it takes a moment to read this value after initialization of the Motion Control system.

Note

If a resolver or encoder is used, the connector KK120 (actual position value) is set in U922.i001(actual position value of the encoder interface). If, however, a multiturn encoder is used, the connector KK100 (absolute position) is set in U922.i001(actual position value of the encoder interface).

Parameters:

P183 index 1 (position measurement configuration)

Meaning:

The configuration of the position measurement is entered via this parameter. The last digit enables the position measurement.
xxx1 = resolver/encoder enabled
xxx2 = multiturn encoder enabled (x means not relevant)

Parameters:

P171 (position resolution)

Meaning:

In MASTERDRIVES, the position resolution, including a fine resolution (multiplication factor), is specified. The resolution is specified with a power of two.
The position resolution must be set as follows:
 $2^{P171} = \text{number of increments} * \text{multiplication factor of the cyclic encoder actual value}$
i.e. for incremental encoders: $\text{IncResolution} * \text{IncResolutionMultiplierCyclic}$
i.e. for absolute encoders: $\text{AbsResolution} * \text{AbsResolutionMultiplierCyclic}$

Differences between ABS and CYCLE_ABS:

- In the case of ABS, the absolute actual position of the encoder is assumed after switching on the C230 or following an encoder error.
- In the case of CYCL_ABS, overflows of the encoder areas are carried over in the NVRAM and taken into account when the cycle is resumed. With this setting, an overall reset must be carried out on the controller prior to initial loading of the project. Then, the encoder must be readjusted. If the settings for the absolute encoder are modified, the encoder must likewise be readjusted.
With the controller switched off, the encoder may only be moved a maximum distance \leq "half the encoder range" in both traversing directions in order to still be able to detect the exact position.

Completing the axis configuration

1. Click **Next**. The set data is displayed.

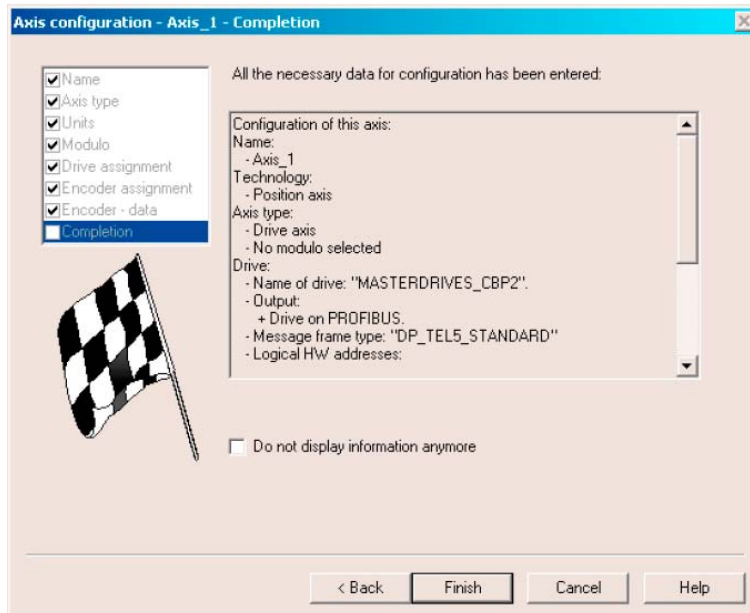


Figure 7-42 Last window of the axis configuration

2. Click **Finish**.
The settings are saved. An information window opens; read the information and confirm the window.
After creating the axis, several settings must still be made in order to optimize the interaction between SIMOTION and MASTERDRIVES MC.

7.9.3.4 Deactivating following error monitoring in SIMOTION SCOUT

To prevent the following error monitoring interrupting an axis motion, it can be set to a higher value or deactivated.

A high following error can occur, for example, as a result of a missing drive optimization.

1. In the project navigator, open the folder of the created axis.
2. Double-click **Monitoring**.
3. Click the **Following error monitoring** tab in the working area.
4. Deactivate the **Dynamic following error monitoring active** checkbox.
5. Click **Close**.

The following error monitoring must be matched to the requirements and mechanical system of the plant when commissioning an application.

WARNING

If the following error monitoring is increased or deactivated, larger incorrect motions can also occur on the axis in the case of an error (e.g. incorrect position control direction). This is particularly important, for example, when the axis only has a limited traversing range.

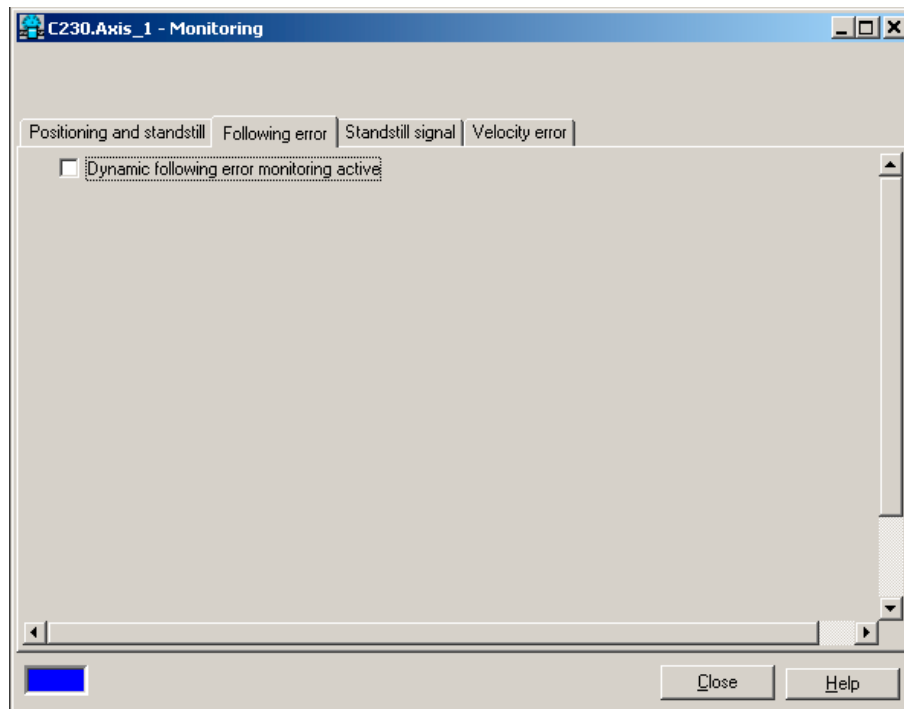


Figure 7-43 Deactivating the following error monitoring

7.9.3.5 Setting the position control configuration in SIMOTION SCOUT

1. In the project navigator, double-click **Control** under Axis.
2. Set the following data in the working area:

K_v factor: Enter

Speed precontrol: Activate

Fine interpolator: Select constant velocity interpolation

Dynamic drive control (DSC): Leave activated

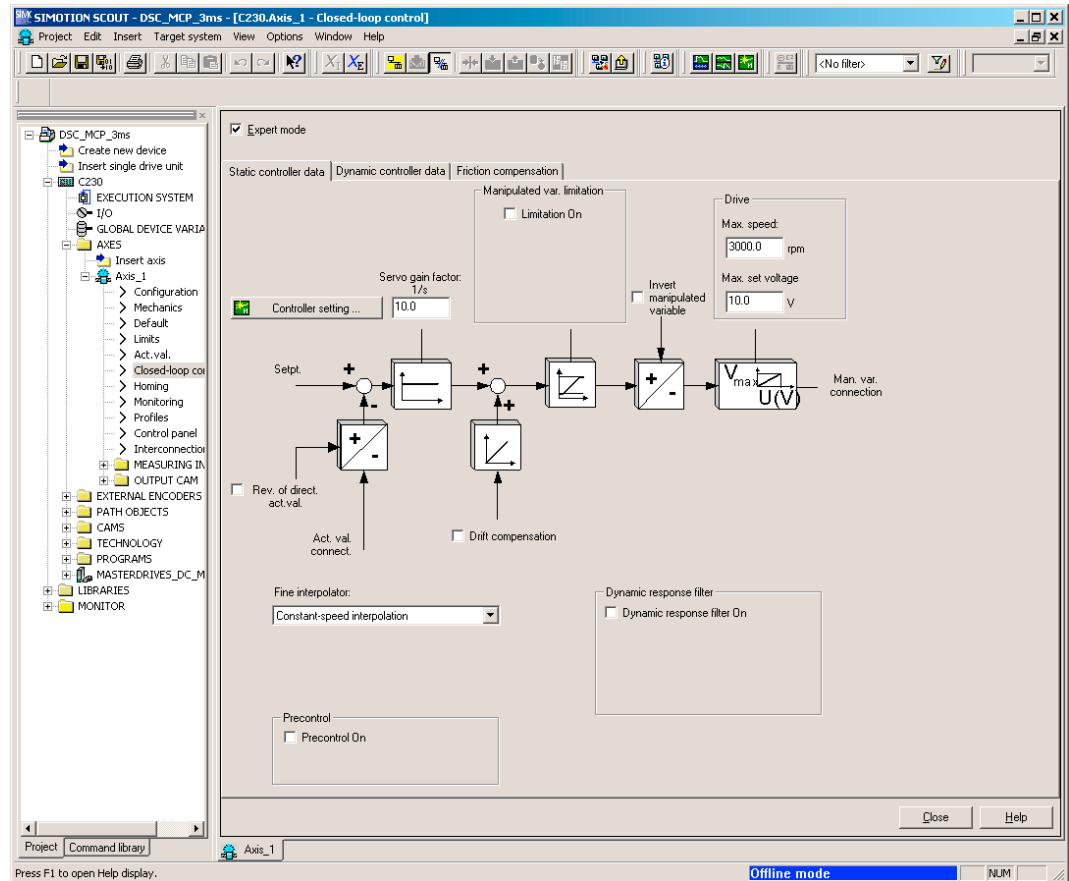


Figure 7-44 Position control configuration

3. Click **Close**.

7.9.3.6 Setting system cycle clocks in SIMOTION SCOUT

1. In the project navigator, right-click **Execution system** and select **Expert > Set system cycle clocks**.
2. Set the values.
3. Click **OK**.
A message appears, read the information and confirm with **OK**.

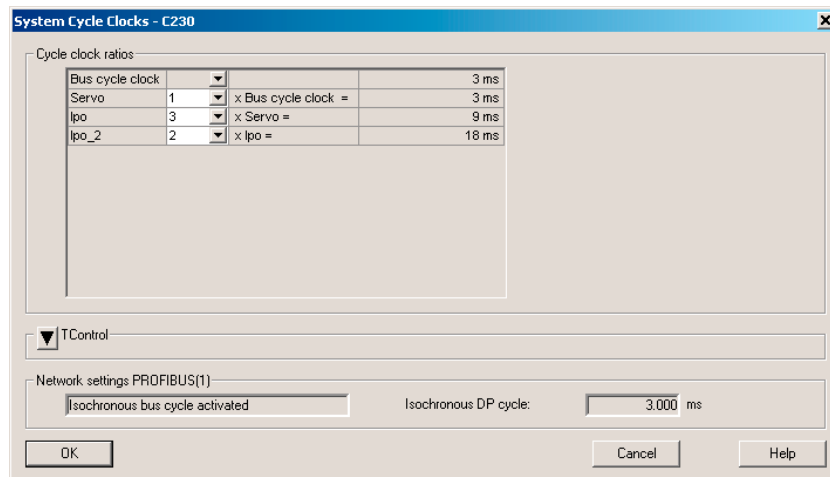


Figure 7-45 Set system cycle clocks

Specifying the system cycle clocks

The system cycle clock settings in SIMOTION affects the position setpoint adaptation in MASTERDRIVES MC.

Special settings: SIMOTION

The ratio of DP cycle clock to position control cycle clock and to interpolator cycle clock is set to 1:2:2, for example. This represents a DP cycle clock of 3 ms, a position controller cycle clock of 6 ms and an interpolator cycle clock of 12 ms.

For instructions on how to activate and use interpolator cycle clock 2, see the online documentation in SIMOTION SCOUT.

Special settings: SIMOVERT MASTERDRIVES MC

Parameters:

P770 (time slice interpolator)

Meaning:

The transition from the position control cycle clock (SIMOTION) to the sampling time of the position controller (Motion Control) is controlled by an interpolator which compensates for the transformation ratio.

- Up to MASTERDRIVES software Version V2.2

The transformation ratio can only be specified in the form position control cycle clock / DP cycle = $2^{(P770-1)}$.

I.e. if the DP cycle and the position control cycle clock are the same, then you must enter the value 1 in P770. If the position control cycle is double the DP cycle, you must set the value to 2.

- As of MASTERDRIVES software Version V2.2

The transformation ratio can only be specified in the form position control cycle clock / DP cycle = $2^{(P770-3)}$.

I.e. if the DP cycle and the position control cycle clock are the same, then you must enter the value 3 in P770. If the position control cycle is double the DP cycle, you must set the value to 4.

7.9.3.7 Correction of system-related dead times in SIMOTION SCOUT

1. Right-click the axis.
2. Right-click and select Expert > Expert List.
The expert list opens in the working area.
3. Click the **Configuration data** tab.
4. Open the structure under **typeOfAxis > SystemDeadTimeData**.
5. Enter the appropriate value in **additionalTime**.
In our example, the value 0.002625.
6. Confirm the input by pressing the **Enter** key.

Table 7- 7 Values of system-related dead times

DP cycle time	Motion control up to SW V2.2	Motion control as of SW V2.2
1.5 ms	0.003 s (only possible with Motion Control Performance 2)	0.001875 s
2 ms	0.002 s	0.001750 s
3 ms	0.003 s	0.002625 s

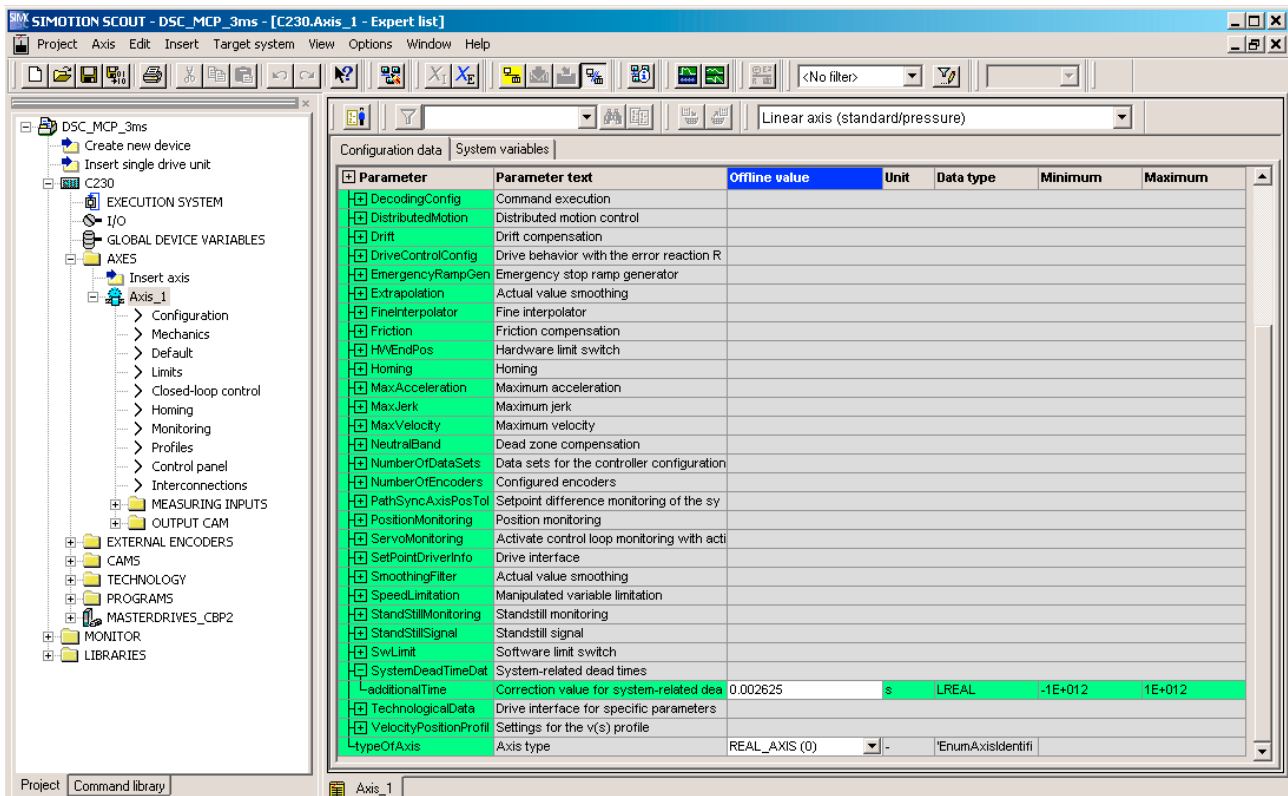


Figure 7-46 Input window for correction of the system-related dead time

7.9.3.8 Specify Homing Mode

Note

The statements with respect to the homing modes in this section and the screenshots only refer to the homing settings for axes on a C2xx in connection with a SIMOVERT MASTERDRIVES MC. The homing options depend on the respective drive.

If the connected axis is to be homed, the homing mode must be specified in both SIMOTION and SIMOVERT MASTERDRIVES MC.

1. In the project navigator, double-click **Homing** under **Axis**.
2. Enter the required homing mode and the appropriate data.
3. Click **Close**.

Additional references

Please refer to the following document on this subject

- Function Manual: SIMOTION Motion Control, TO Axis, Electric/Hydraulic, TO External Encoder

Homing mode "External zero mark only"

When a defined edge of the external zero mark is crossed, the position is accepted.

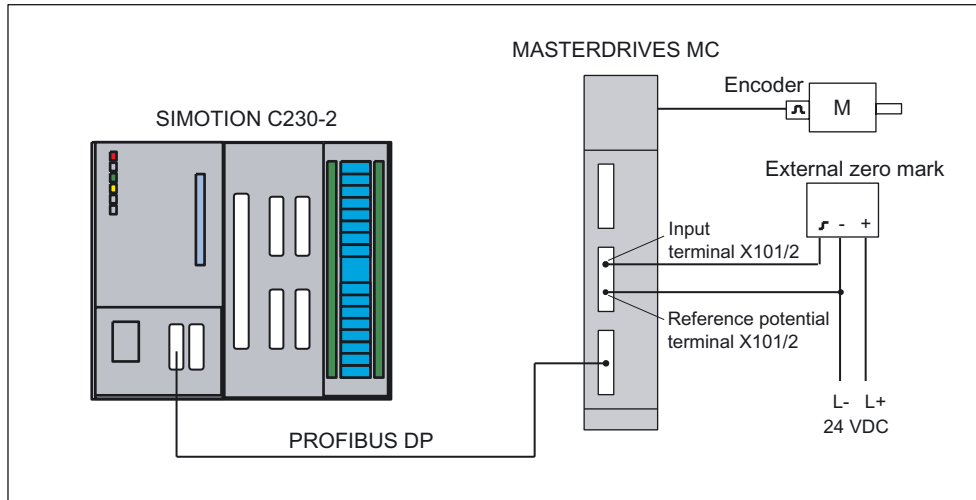


Figure 7-47 Hardware configuration: Homing (External zero mark only)

Special settings: SIMOTION

If External zero mark only is selected as the homing mode, the approach direction can be selected by means of homing direction.

Signal control and BERO edge are not significant, as the positive edge is always evaluated in Motion Control with the parameterization of the script file (e.g. "STDTLG5_T4_V21.ssc").

The homing external zero mark for Motion Control must be connected to digital input 4 (interrupt-capable inputs / terminal X101/6).

With the script file, the digital inputs 4 or 5 are configured as measuring input 1 and measuring input 2 and can be addressed via SIMOTION.

Digital input 4 can be used as external zero mark and as measuring input.

Digital input 5 can be used as measuring input.

The parameterization of U922.i005 and U923.i001 in Motion Control should be set to KK122 and B212 for SIMOVERT MASTERDRIVES MC in accordance with the description below.

As the zero position is of no significance here, the parameterization of the 2nd position of P183.i001 has no effect.

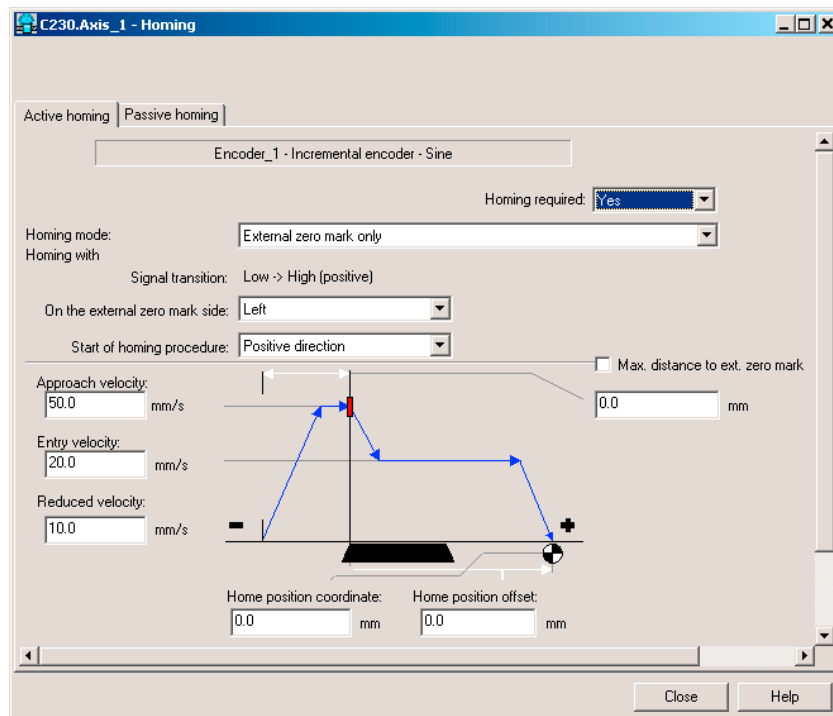


Figure 7-48 Axis homing in SIMOTION (homing mode External zero mark only)

Homing mode "Encoder zero mark only"

An external zero mark signal is not necessary. The position is accepted at the next zero mark of the encoder.

Special settings: SIMOTION

If encoder zero mark only is selected as the homing mode, the approach direction can be selected by means of homing direction.

This must be compatible with the parameterization of the 2nd digit of P183.i001 in the Motion Control.

If Zero mark in negative direction ... is selected in the window, P183.i001=xx2x must be entered in the Motion Control.

If Zero mark in positive direction ... is selected, P183.i001 = xx1x must be set in the Motion Control.

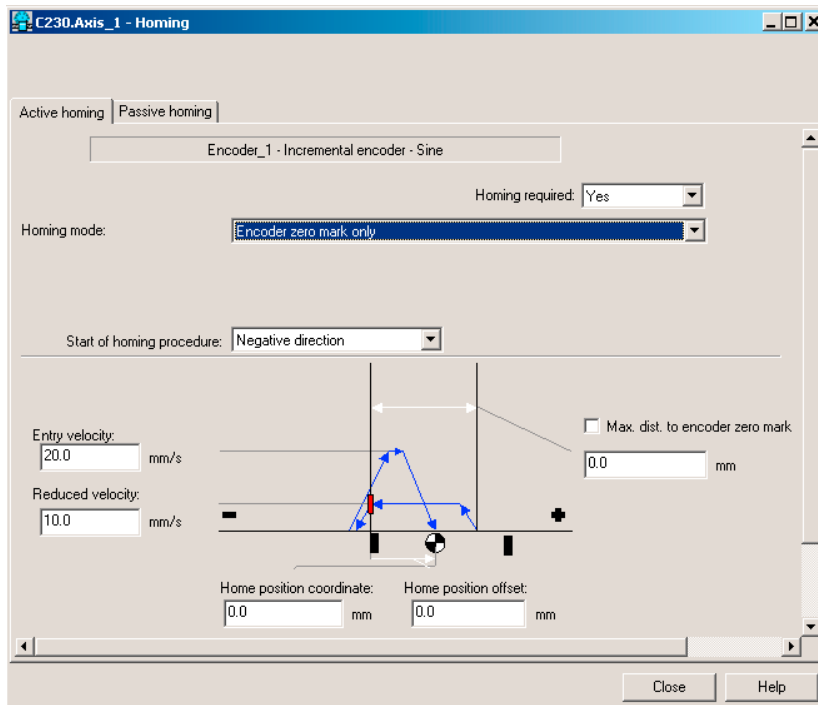


Figure 7-49 Axis homing in SIMOTION (homing mode Encoder zero mark only)

Homing mode "Homing output cam and encoder zero mark"

The axis traverses in the specified homing direction. Once the BERO signal is reached, the velocity of the axis switches from the homing approach velocity to the homing reduced velocity. Once the BERO is left, the axis is homed at the next detected zero mark of the encoder.

The homing BERO is connected to an unassigned SIMOTION I/O input.

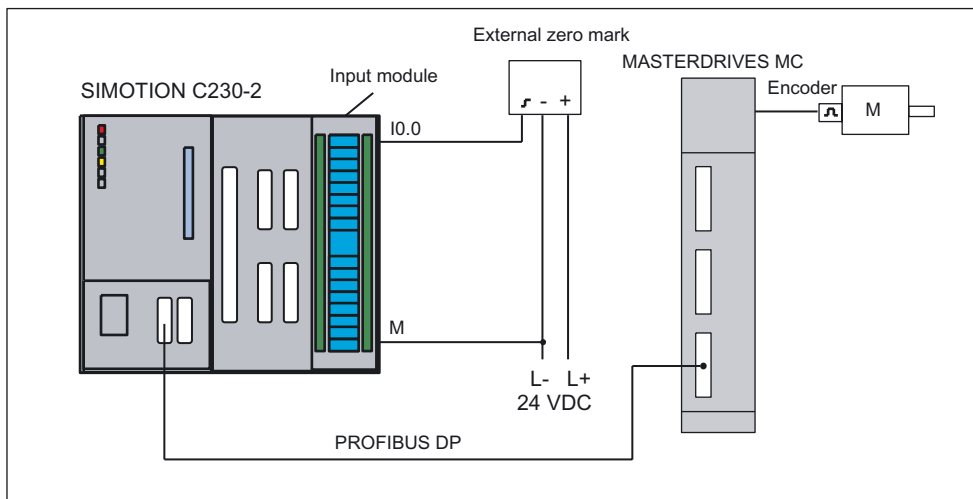


Figure 7-50 Hardware configuration: Homing (Homing output cam and encoder zero mark)

If Homing output cam and encoder zero mark is selected as the homing mode, the evaluation position of the zero mark and the approach direction as the homing direction can be selected via zero mark.

These must be compatible with the parameterization of the 2nd digit of P183.i001 in the Motion Control.

This means: If the negative direction is chosen as the homing direction in the window and the zero mark is "behind the home position switch", the setting P183.i001=xx2x must be configured in the Motion Control; if negative direction is selected and zero mark is "before the home position switch", the setting P183.i001=xx1x must be configured in the Motion Control.

If, however, the positive direction is chosen as the homing direction in the window and the zero mark is "behind the home position switch", the setting P183.i001=xx1x must be configured in the Motion Control; if positive direction is selected and zero mark is "before the home position switch", the setting P183.i001=xx2x must be configured in the Motion Control.

The homing external zero mark must be connected to a freely selectable digital input of SIMOTION which has been configured in the Home Axis window. When the external zero mark is reached, homing is enabled in the drive.

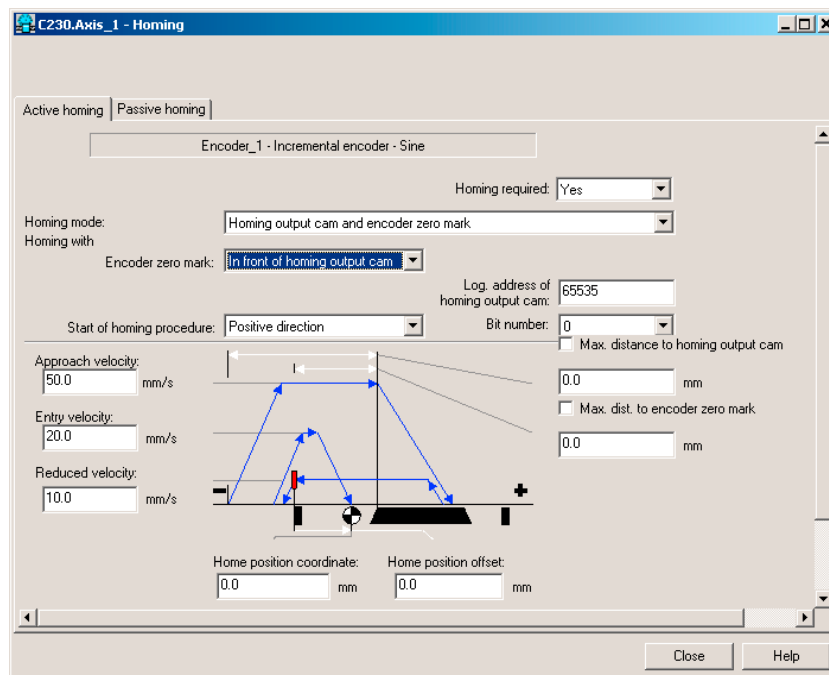


Figure 7-51 Axis homing in SIMOTION (homing mode Homing output cam and encoder zero mark)

Special settings: SIMOVERT MASTERDRIVES MC**Parameters:**

U922 index 5 (encoder actual values)

Meaning:

The homing value is connected to the encoder interface via U922.i005. If Homing output cam and encoder zero mark or Zero mark only are used for homing, the homing procedure is performed via the home position detection in the Motion Control. However, if External zero mark only is used for homing, the position measured value memory in Motion Control is used for the homing procedure.

If Homing output cam and encoder zero mark or Encoder zero mark only are used for homing, connector KK124 (home position measured value) should be set in U922.i005 (encoder interface homing value).

If External zero mark only is used for homing, connector KK122 (position measured value memory) should be set in U922.i005 (encoder interface homing value).

Parameters:

U923 index 1 (encoder checkback signal)

Meaning:

The "Reference point detected" feedback signal (acknowledgement) is connected to the encoder interface via U923.i001. If Homing output cam and encoder zero mark or Zero mark only are used for homing, the homing procedure is performed via the home position detection in the Motion Control. However, if External zero mark only is used for homing, the position measured value memory in Motion Control is used for the homing procedure.

If Home position switch and zero mark or Encoder zero mark only are used for homing, binector B210 (home position detected acknowledgement) should be set in U923.i001 (homing value detected checkback signal, encoder interface).

If, however, External zero mark only is used for homing, binector B212 (measured value valid acknowledgement) should be set in U923.i001 (homing value detected checkback signal, encoder interface).

Parameters:

P183 index 1 (position measurement configuration)

Meaning:

The position detection configuration is entered in this parameter.

xx1x=The 1st zero position to the right of the coarse pulse (external zero mark) is evaluated
xx2x=The 1st zero position to the left of the coarse pulse (external zero mark) is evaluated
(x means not relevant)

The SIMOTION project is now configured. The MASTERDRIVES MC is set in the next step.

7.9.3.9 "Measuring" function

The "Measuring" function can be used to determine the actual position of an axis at any time. A typical application is the acquisition of a print mark for the purpose of synchronizing the axis to this mark.

The measuring input must be connected to fast input X101/6 or X101/7. The input is isolated. This enables more than one input to be switched in parallel, whereby the reference potential of the 24 V supply of the measuring input (for example, from the network supply) must also be wired.

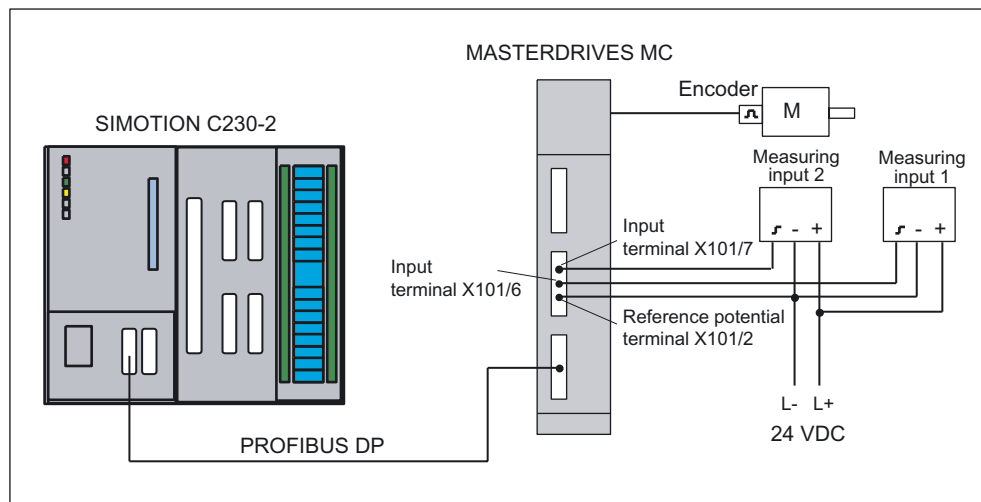


Figure 7-52 Hardware configuration: Measurement

Inserting a measuring input in SIMOTION SCOUT

1. Open the **Measuring inputs** folder in the project navigator.
2. Double-click **Insert measuring input**.
3. Enter a name for the measuring input.
4. Click **OK**.
5. Click **Close**.

Two measuring inputs can be connected to the MASTERDRIVES:

- Measuring input 1 to X101/6
- Measuring input 2 to X101/7

Only one measuring input can be activated at any time. For example, before you activate Measuring input 2, you must make sure that Measuring input 1 is not active.

The measuring input number is assigned as follows:

- Measuring input 1 ⇒ "1"
- Measuring input 2 ⇒ "2"

SIMOVERT MASTERDRIVES Motion Control

Settings in the Edge field (SIMOTION; calling the measuring function in the user program):

- Rising edge or
- Falling edge

If you select another setting, the last valid value is taken over (rising or falling).

Response times for the measuring function

In SIMOTION, measuring can be used in various configurations. Depending on the connection of the axis (via PROFIBUS DP) and the processing level (position control cycle clock or IPO cycle clock), you must take different response times for the measuring function into account in the application.

In the user program, measuring is started with the function call `_enableMeasuringInput`. You can specify when the measuring function is to be active during the call:

- Immediately (without measuring window)
MeasuringRangeMode = WITHOUT_SPECIFIC_AREA
- Within a position-dependent measuring window
MeasuringRangeMode = WITH_SPECIFIC_AREA

When **measuring without measuring window**, the measuring input is immediately activated with `_enableMeasuringInput`.

Before the measuring edge is evaluated at the hardware input, there is a configuration-dependent runtime. To be certain to detect the measuring edge, you must ensure that `_enableMeasuringInput` is executed earlier by this amount of runtime in the user program.

When **measuring with measuring window**, the job is first only registered in the system with `_enableMeasuringInput`. Only when the axis has reached the start of the measuring window is the measuring input activated.

From the time of reaching the start position of the measuring window on the axis (mechanical) until the evaluation of the measuring edge at the hardware input, there is a configuration-dependent runtime. In order that the measuring input is active when the start position of the measuring window on the axis is reached, you must move the start of the measuring window forward depending on the axis velocity and the response time during the function call.

This is also valid for the end of the measuring window. It is important that the measuring input is no longer active when the end of the measuring window on the axis (mechanical) is passed.

These runtimes can be compensated with the `MeasuringRange.activationTime` configuration data item.

Note

The runtimes are only compensated without error for constant axis velocity.

The offset of the measuring window only functions reliably when the axis velocity

- within the measuring window is constant and
- known before the function call.

You can determine the response times for your configuration using the following tables. The values in the tables refer to set system cycle clocks. By using the actual times, you can calculate the response time in milliseconds.

The following abbreviations are used in the tables:

- (IS) IPO cycle clock or position control cycle clock
(is dependent on whether the measuring input is processed in the IPO or position control cycle clock; can be selected during the configuration of the measuring input)
- (DP) Cycle time on the PROFIBUS DP
- (DR) Cycle time in the drive (time slice in which the measuring function is evaluated)

Tool calculates the anticipated response and rate times when using measuring inputs on different hardware More at:

- 4_TOOLSMEASURING_INPUT_CALCULATION

Table 7- 8 Measuring without measuring window

	MASTERDRIVES MC
_enableMeasuringInput Ready to detect the measuring edge	2 (IS) + 3 (DP) + 3 (DR)
Detection of the measuring edge Result in SIMOTION for further processing	2 (IS) + 8 (DP)
Total Minimum time between two measurements In addition, the restrictions of the respective system must be taken into account.	5 (IS) + 11 (DP) + 2 (DR)

Table 7- 9 Measuring with measuring window: Measuring edge is detected in the window

	MASTERDRIVES MC
_enableMeasuringInput Ready for the evaluation of the measuring range (start of the measuring window)	2 (IS)
Start of the measuring window on the axis (mechanical) reached Ready to detect the measuring edge	2 (IS) + 3 (DP) + 2 (DR)
Detection of the measuring edge Result in SIMOTION for further processing	2 (IS) + 8 (DP)
Total Minimum time between two measurements In addition, the restrictions of the respective system must be taken into account.	5 (IS) + 11 (DP) + 2 (DR)

Table 7- 10 Measuring with measuring window: No measuring edge in the window

	MASTERDRIVES MC
_enableMeasuringInput Ready for the evaluation of the measuring range (start of the measuring window)	2 (IS)
Start of the measuring window on the axis (mechanical) reached Ready to detect the measuring edge	2 (IS) + 3 (DP) + 2 (DR)

	MASTERDRIVES MC
Start of the measuring window on the axis (mechanical) reached Reset: "Ready to detect the measuring edge"	2 (IS) + 3 (DP) + 2 (DR)
Resetting of the ready to measure Checkback signal in SIMOTION for further processing	2 (IS) + 8 (DP)
Total Minimum time between two measurements In addition, the restrictions of the respective system must be taken into account.	7 (IS) + 14 (DP) + 4 (DR)

7.9.4 Basic commissioning of MASTERDRIVES MC

What has to be observed?

One of the commissioning tools, Drive Monitor or Drive ES, is used to commission the Masterdrives MC. If the connection is made via the serial interface USS, the bus address in Parameter P700 and the baud rate in Parameter P701

- 6 → 9600 baud
- 7 → 19200 baud
- 8 → 38400 baud

must match the settings in the commissioning tool used.

Setting the basic functions

The initial step in a guided commissioning procedure is to configure the hardware (used power unit, motor, encoder, etc.), the interfaces, etc. This is performed with one of the commissioning tools, Drive Monitor or Drive ES, by calling up the **Parameter > Guided commissioning > Basic functions** menu item.

1. Open the Configuration window.
2. Select for
 - Motion Control devices, the power unit according to the order no. of the converter and enter the supply voltage.
 - Motion Control Compact Plus devices, the supply voltage. The power unit of this device cannot be changed, it is automatically detected and displayed with a gray background (like the individual slot assignments).

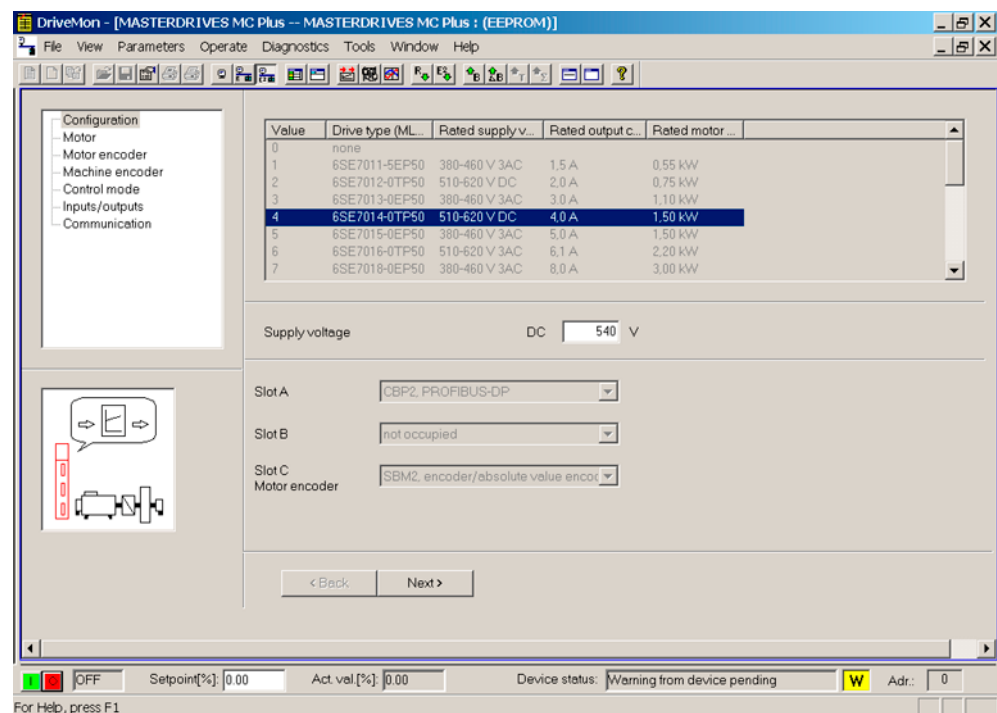


Figure 7-53 Guided commissioning of the basic device: Configuration window

3. Click **Next**.

4. Select the connected motor in the **Motor** window.

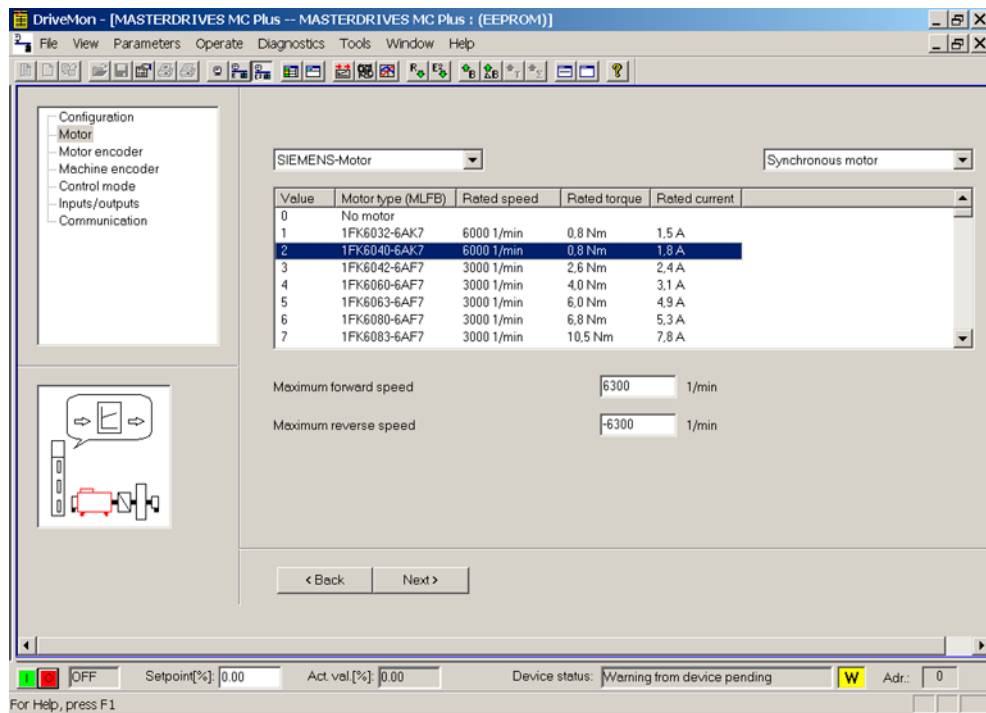


Figure 7-54 Guided commissioning of the basic device: Motor window

5. Click **Next**.
6. Select the connected motor encoder in the **Motor Encoder** window.

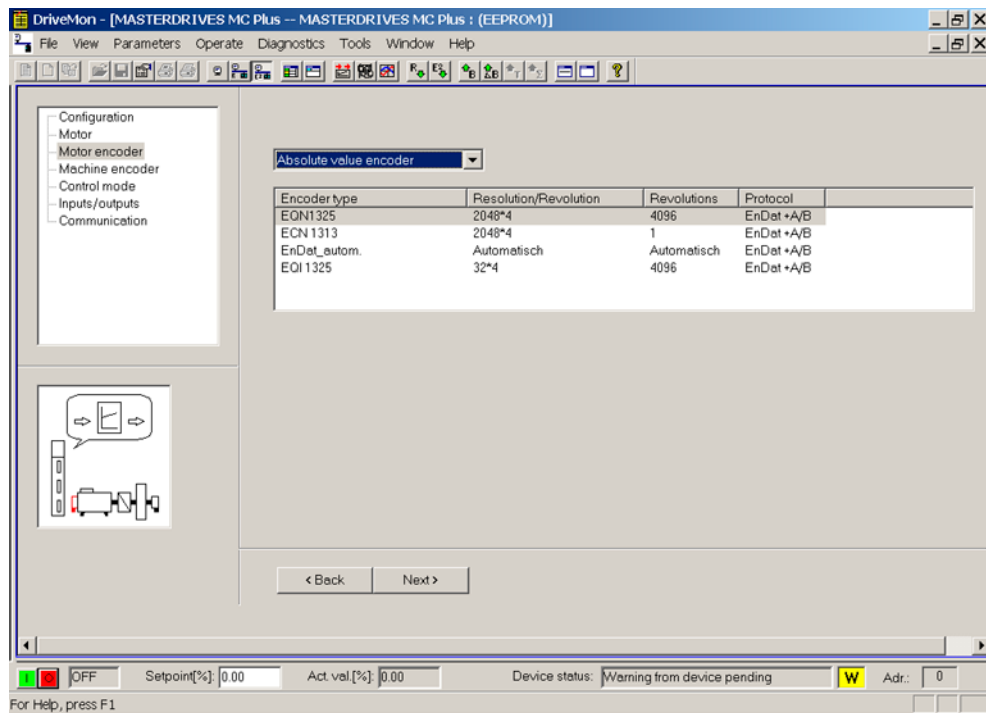


Figure 7-55 Guided commissioning of the basic device: Motor Encoder window

7. Click **Next**.
8. In the **Setpoints, Control Type** window, select the setting **PROFIBUS DP and terminal strip**.

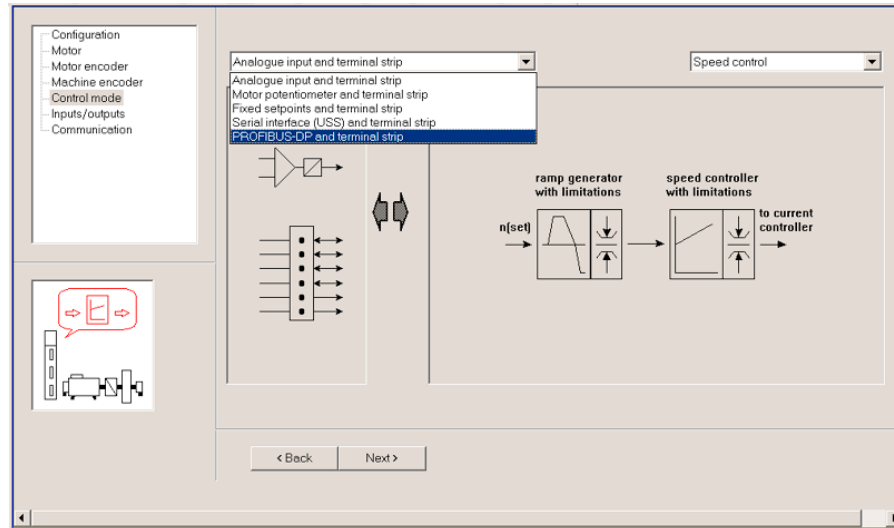


Figure 7-56 Guided commissioning of the basic device: Setpoints and Control Type window

9. Click **Next**.
10. In the **Closed-loop Control** window, enter the optimized speed controller parameters (K_p and T_n), torque limits, etc.
11. Click **Next**.
Do not make any settings in the following window.
12. Click **Next**.

13. Set the bus address in the **Communication** window.

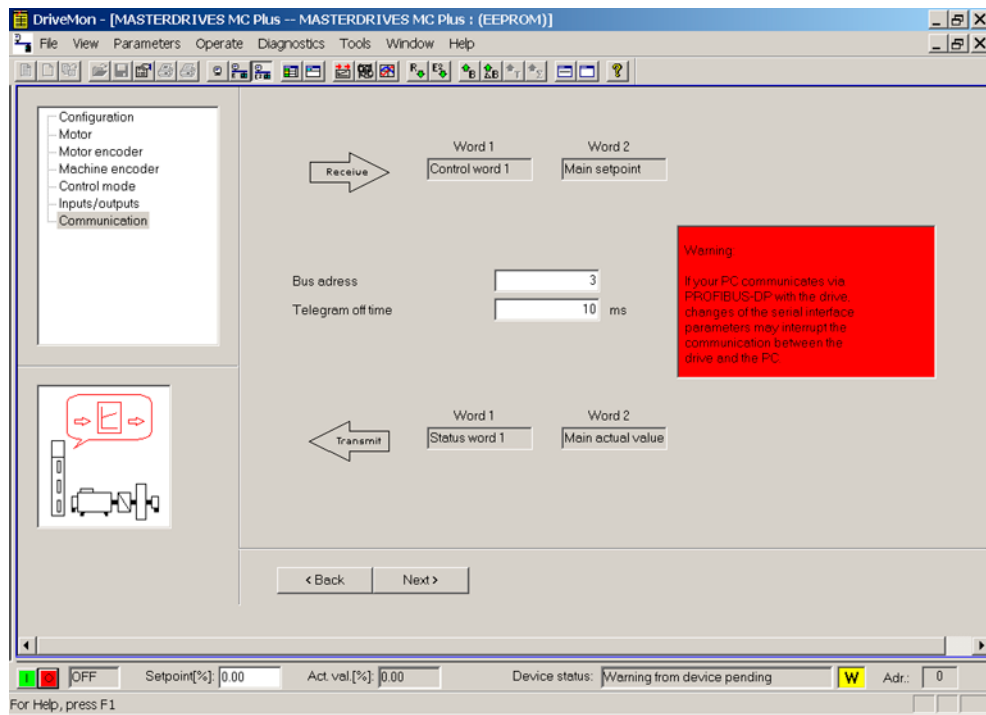


Figure 7-57 Guided commissioning of the basic device: Communication window

14. Click **Next**.

At the end of the guided commissioning, a summary of the parameterization is displayed.

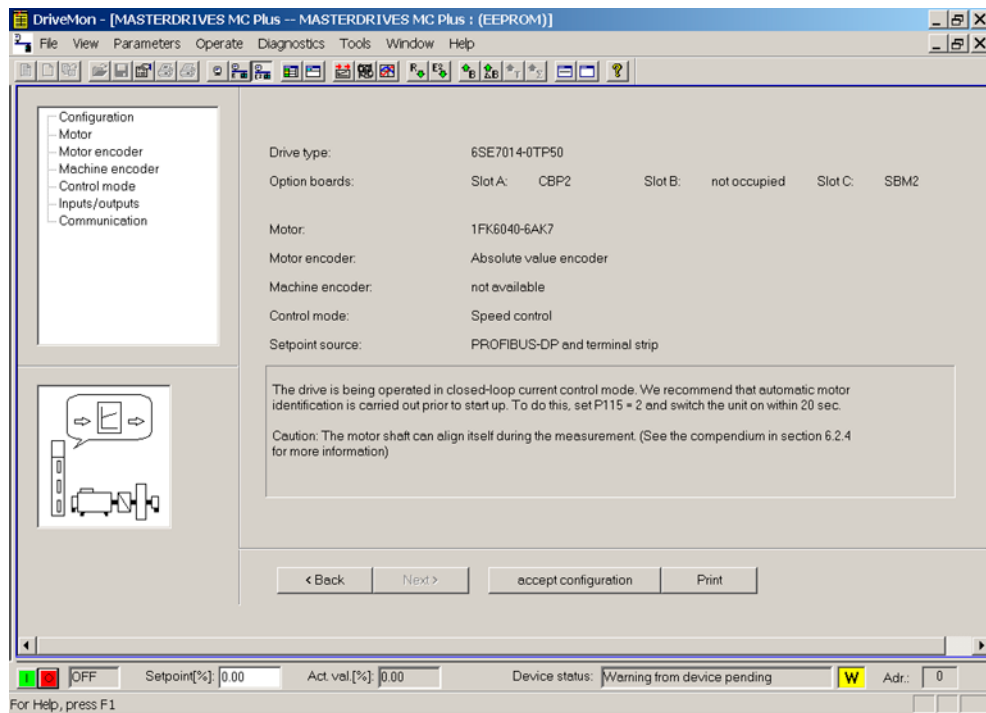


Figure 7-58 Guided commissioning of the basic device: Summary

15. When you click **Accept configuration** and confirm your entries with **OK** and **Next**, the parameterization is loaded to the converter.
A message window confirms that the parameterization has been successfully loaded.

16. Click **OK** to confirm the message.

The guided commissioning of the basic device is completed. You must now connect MASTERDRIVES MC to SIMOTION.

Connecting MASTERDRIVES MC to SIMOTION

In this step, the parameterization is performed for the connection of the Motion Control to SIMOTION for standard message frame type 5. This is performed with a script file in accordance with the DP cycle time. The script files are stored on the Add-On CD in folder 4_Accessories.

Table 7- 11 DP cycle times and associated script files

DP cycle time	Script file
1.5 ms	STDTLG5_T3_V21.ssc (only possible with Motion Control Performance 2)
2 ms	STDTLG5_T4_V21.ssc
3 ms	

The appropriate script file implements the following parameter assignments / functionalities on the Motion Control converter/inverter:

- All digital outputs and speed setpoint interconnections are reset.
- Instructions for setting application-dependent parameters are provided initially in a message box. The settings are configured in the next dialog box that is displayed. All application-dependent parameters have already been described in the "Creating a SIMOTION project" section. Examples are parameters U922 and U923 (encoder interface), which have to be modified etc. depending on the application (e.g. homing with zero mark or with External zero mark only).
- Errors occurring after Power On are acknowledged automatically.
- The SST1 interface is located in the T6 time slice.
- Motor potentiometer functionality is excluded from the time slice.
- The DSC kernel function is implemented with free blocks.
- Interconnection of free modules for the implementation of the functionalities homing with External zero mark only and measuring.
- Wiring of the standard message frame 5 process data in the converter/inverter.
- Wiring of the motor encoder interface. A wiring of the external encoder interface is not implemented.

The following section describes the procedure for the execution of script file STDTLG5_T4_V21.ssc. The procedure is the same for script file STDTLG5_T3_V21.ssc:

1. Open the Drive Monitor or Drive ES commissioning tool.
2. Click **File > Execute script file...** in the menu bar.

3. Select the STDTLG5_T4_V21.ssc script file for the standard message frame 5 and open it.

Note

The 6SE70MC converter/inverter must not be in the "RUN" mode (r001=14). The settings for the sources of the digital outputs which are possible via the menu **Parameters > Guided commissioning > Basic functions** are reset at the next **Execute script file...!**

You are now guided online via Windows windows.

4. Click the **Start** button.

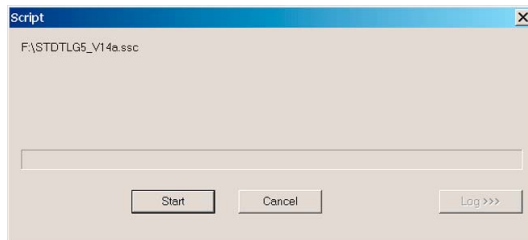


Figure 7-59 Starting the script file STDTLG5_T4_V21.ssc

5. Accept the exclusion of liability.
6. Confirm the connection of the Motion Control to SIMOTION for the standard message frame 5.

Note

You can stop the execution of the script file by clicking the Cancel button.

7. Read the contents of the message box with the setting information for the application-dependent parameter P340 (pulse frequency).
8. Click **OK** to confirm the message.

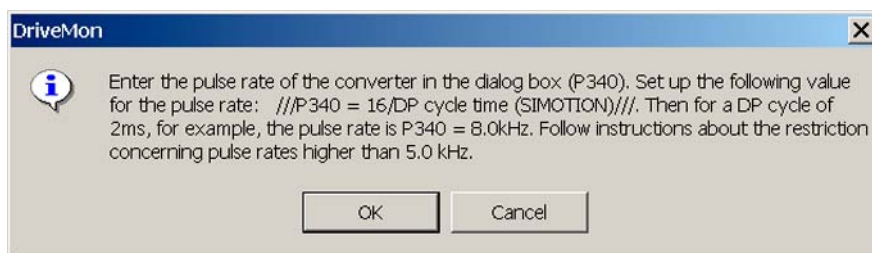


Figure 7-60 Message box with setting information for P340

- Set the required value for the application-dependent parameter P340 (pulse frequency).

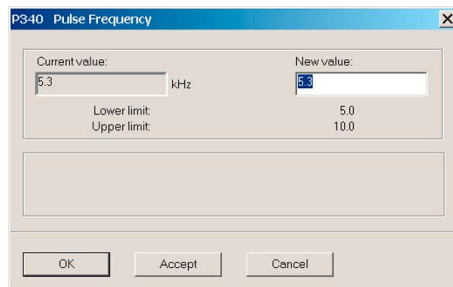


Figure 7-61 Dialog box for setting P340

- Read the contents of the message box with the setting information for the application-dependent parameter U922.i001 (actual position value of the encoder interface).
- Click **OK** to confirm the message.

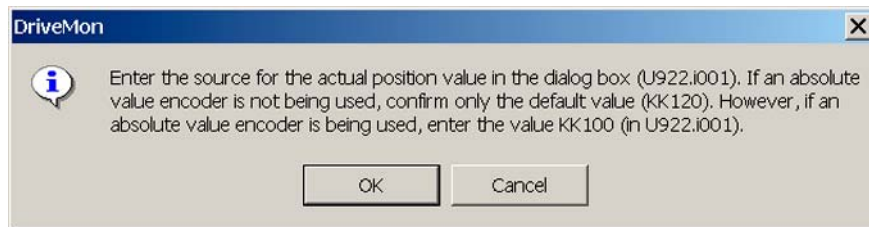


Figure 7-62 Message box with setting information for U922.i001

- Set the required value for the application-dependent parameter U922.i001 (actual position value of the encoder interface).

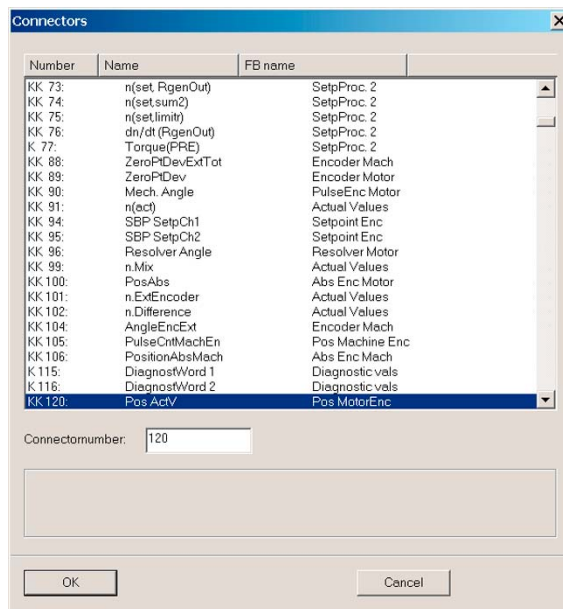


Figure 7-63 Dialog box for setting U922.i001

- Read the contents of the message box with the setting information for the application-dependent parameter U922.i005 (homing value of the encoder interface).

14. Click **OK** to confirm the message.

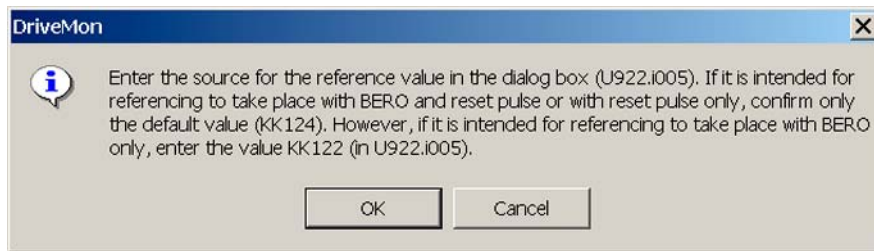


Figure 7-64 Message box with setting information for U922.i005

15. Set the required value for the application-dependent parameter U922.i005 (homing value of the encoder interface).

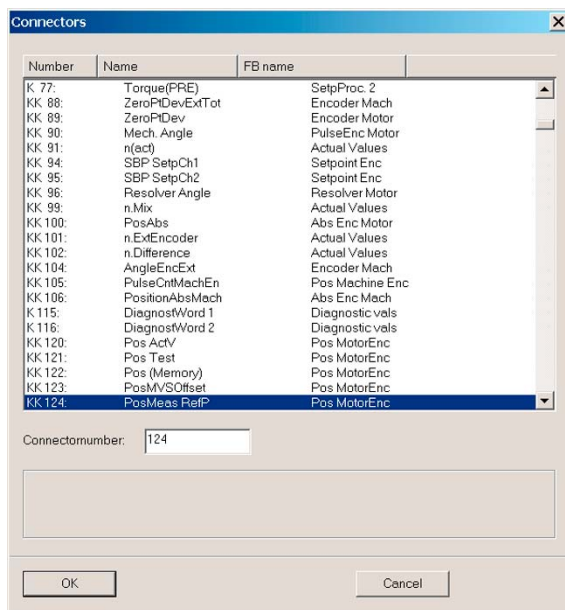


Figure 7-65 Dialog box for setting U922.i005

16. Read the contents of the message box with the setting information for the application-dependent parameter U923.i001 (home position checkback signal of the encoder interface).

17. Click **OK** to confirm the message.

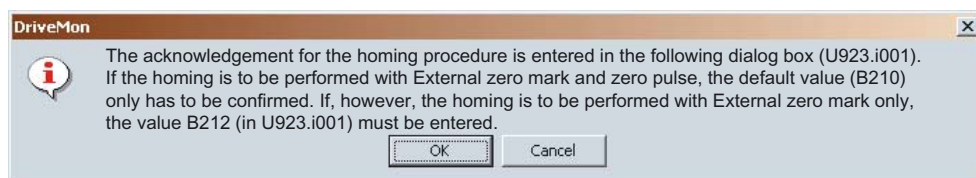


Figure 7-66 Message box with setting information for U923.i001

18. Set the required value for the application-dependent parameter U923.i001 (home position checkback signal of the encoder interface).

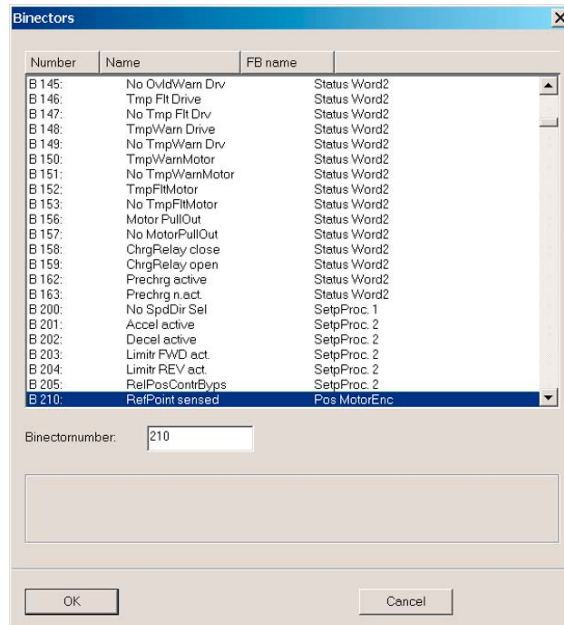


Figure 7-67 Dialog box for setting U923.i001

19. Read the contents of the message box with the setting information for the application-dependent parameter P171 (position resolution).
20. Click **OK** to confirm the message.



Figure 7-68 Message box with setting information for P171

21. Set the required value for the application-dependent parameter P171 (position resolution).

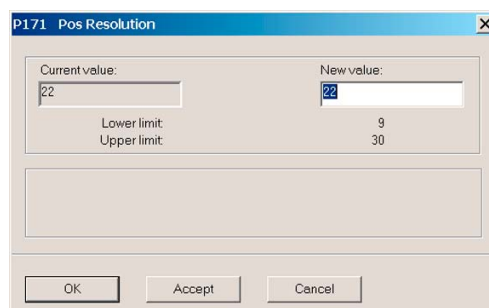


Figure 7-69 Dialog box for setting P171

22. Read the contents of the message box with the setting information for the application-dependent parameter P183.i001 (position measurement configuration).
23. Click **OK** to confirm the message.

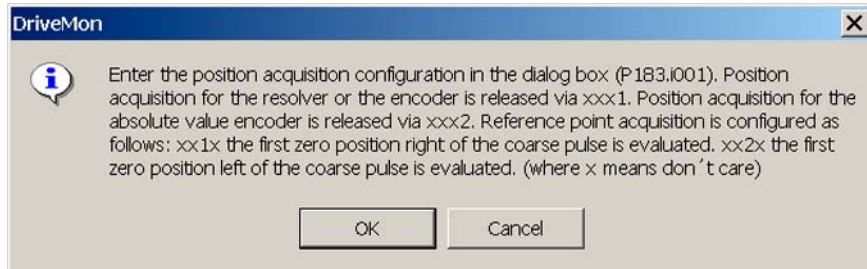


Figure 7-70 Message box with setting information for P183.i001

24. Set the required value in the dialog box for the application-dependent parameter P183.i001 (position measurement configuration):

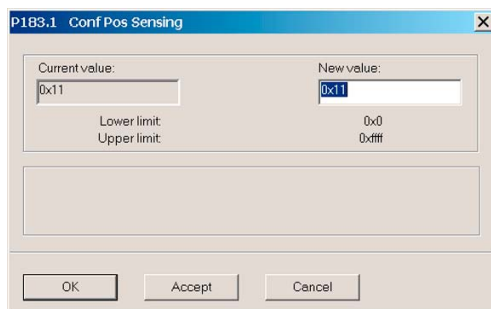


Figure 7-71 Dialog box for setting P183.i001

25. Read the contents of the message box with the setting information for the application-dependent parameter P205 (rated velocity).
26. Click **OK** to confirm the message.

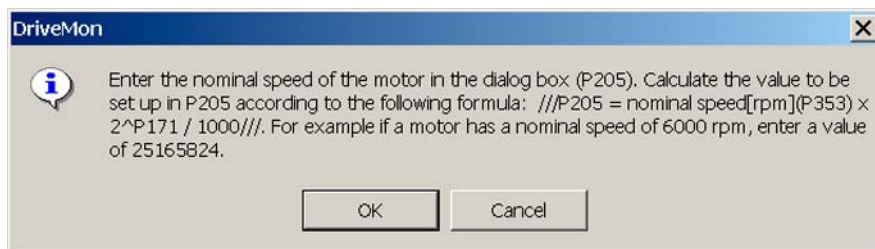


Figure 7-72 Message box with setting information for P205

27. Set the required value for the application-dependent parameter P205 (rated velocity).

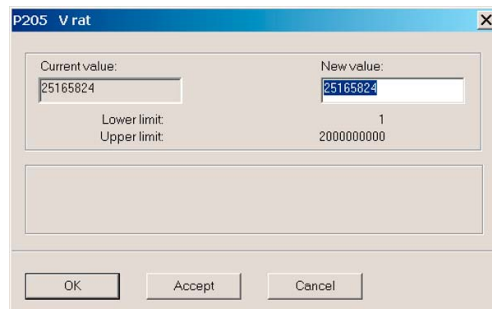


Figure 7-73 Dialog box for setting P205

28. Read the contents of the message box with the setting information for the application-dependent parameter P770 (interpolator).

29. Click **OK** to confirm the message.

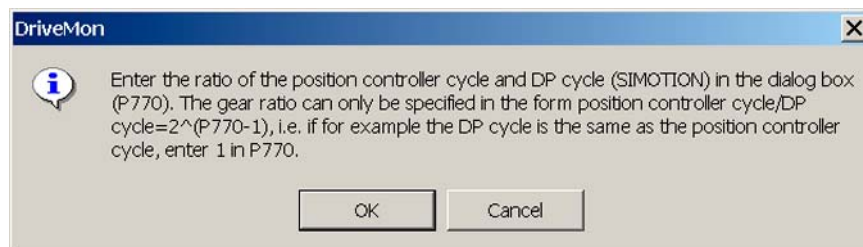


Figure 7-74 Message box with setting information for P770

30. Set the required value for the application-dependent parameter P770 (interpolator).

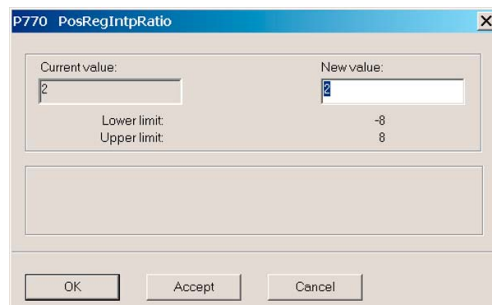


Figure 7-75 Dialog box for setting P770

31. Click **OK**.

A message appears after the successful commissioning. Confirm this with **OK**.

Note

If an "Error" message is also to appear, then open the associated LOG file (name the same as the script file but with the extension .LOG) either with the **Log** button or an editor for the troubleshooting. You can find the LOG file in the commissioning tool in the same directory as the script file.

After configuration, the green 5 VDC LED and the yellow STOP LED light up on the SIMOTION. The keyswitch is in the STOP position.

The 3 LEDs of the PROFIBUS module flash in synchronism on the MASTERDRIVES MC.

7.9.5 MASTERDRIVES MC commissioning tool

Commissioning tool

This section explains how to establish a connection to the MASTERDRIVES MC via a serial interface using the Drive Monitor or Drive ES commissioning tools.

The serial interface of the MASTERDRIVES MC is set to 9600 baud and the bus address is set to 0 at the factory. The bus address can be read out via parameter P700 on the PMU operator panel of the converter.

The baud rate is in parameter P701, whereby:

- 6 → means 9600 baud
- 7 → means 19200 baud
- 8 → means 38400 baud.

Communication via DRIVE ES

1. Open the SIMATIC Manager.
2. Insert a drive in the project directory via **Insert > Drive**.
3. Insert a MASTERDRIVES MC Plus with Version 01.6 and bus address 0.
4. Click **OK**.
5. Right-click the inserted drive and select **Target system > Drive > Overview** in the context menu.
6. Select **Options > Interface settings**.
7. Select *USS* in the **Bus type** tab.
8. Set 9600 baud in the COM interface used in the **Interface** tab.
9. Close the window.
10. In the menu bar, click **Target systems > Drive > Parameterization**.
11. Parameterize the drive.

Communication via Drive Monitor

1. Start the Drive Monitor.
2. Create a parameter set via the menu **File > New > Empty parameter set**.
3. Insert a MASTERDRIVES MC with Version 01.6 and bus address 0.
4. Click **OK**.
The file is saved and the parameter set is opened offline.
5. In the menu bar, click **View > Online (EEPROM)**.
The connection to the drive is established. If a connection cannot be established, you must set the interface via **Options > ONLINE settings**.

7.9.6 MASTERDRIVES VC in connection with an axis

Introduction

This section describes how to integrate the MASTERDRIVES Vector Control converter unit as a drive in the SIMOTION SCOUT program. This description is valid for the MASTERDRIVES VC connection to a drive axis or a position axis. With a position axis, you must also assign the encoders. This is noted at the appropriate position in this description.

In the following example, the converter unit is controlled via standard message frame 1.

Inserting a MASTERDRIVES VC in HW Config

1. In the project navigator, double-click the SIMOTION device. HW Config opens.
2. Insert the converter unit used from the HW catalog into the PROFIBUS subnet. To do this, use the following components from the HW catalog:

Note

The SIMOVERT/MASTERDRIVES CBP2/Vector Control CUVC has a front panel that can be swung open and behind this there is a plug-in card drawer unit with at least one plug-in card.

- SIMOVERT/MASTERDRIVES CBP2/Vector Control CUVC or
 - SIMOVERT/MASTERDRIVES CBP2/Vector Control Plus
3. Select the **standard message frame 1, PZD-2/2**.
 4. Click the **Save and compile** button.
 5. Click the **Load to module** button.
 6. Close HW Config.

Inserting and modifying a virtual axis in SIMOTION SCOUT

1. Insert a virtual axis into the project navigator of SIMOTION SCOUT.
2. Call the expert list.
3. Convert the virtual axis into a real axis.
4. Select the virtual axis in the project navigator.
5. Open the expert list via the shortcut menu.
6. Open the following directory in the expert list: **ConfigurationData\TypeOfAxis**.
7. Make the following setting:

- typeOfAxis = REAL_AXIS (0)

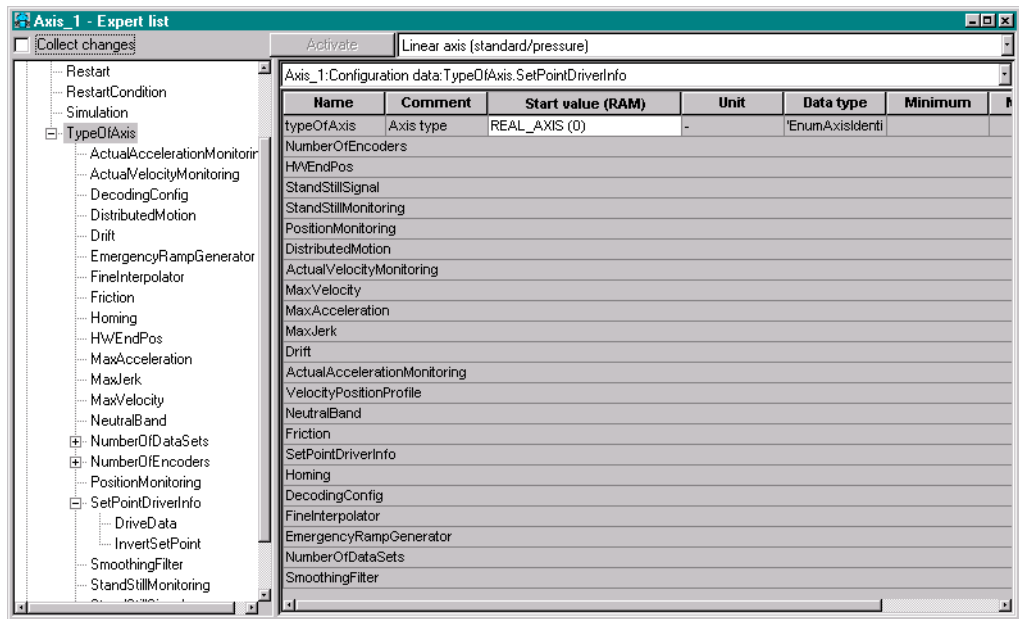


Figure 7-76 TypeOfAxis configuration data

Assigning encoders

- NumberOfEncoders/Encoder_1/encoderIdentification = ONBOARD (1), set EncoderType, EncoderMode and EncoderSystem according to the encoder installed
- NumberOfEncoders/Encoder_1/DriverInfo/logAddressIn = 128 (or 160, 192, 224)
- NumberOfEncoders/Encoder_1/DriverInfo/logAddressOut = 128 (or 160, 192, 224)

- NumberOfEncoders/Encoder_1/DriverInfo/telegramType = NO_TELEGRAM (0)
- NumberOfEncoders/Encoder_1/IncEncoder/incResolution = 1024 (or number of increments without pulse multiplication)

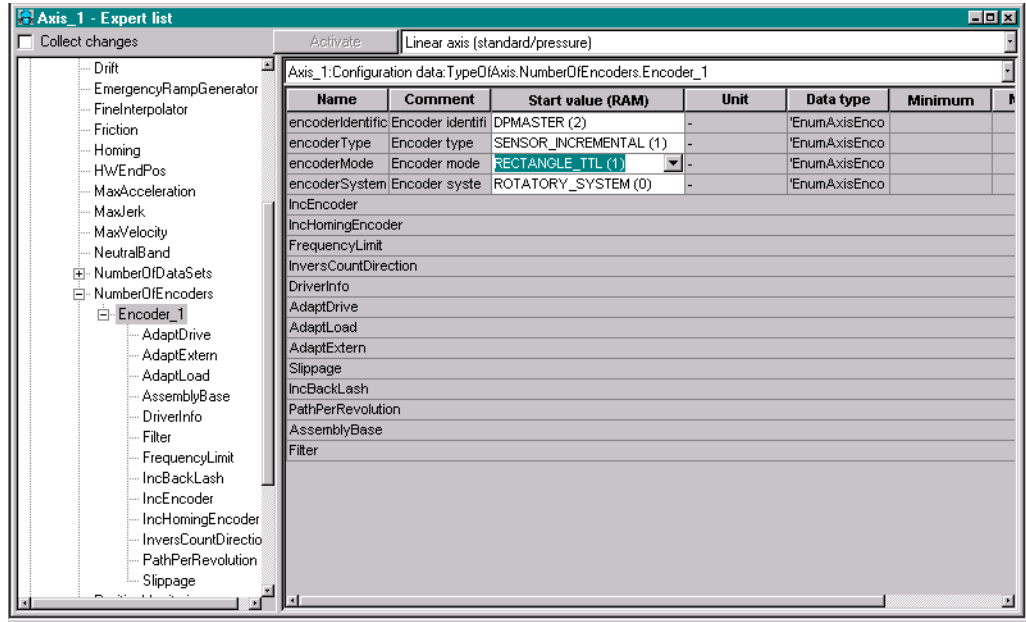


Figure 7-77 Encoder configuration data

Assigning the setpoint output

- SetPointDriverInfo/mode = DP MASTER (2)
- SetPointDriverInfo/logAddressIn = 256 (or I address of DP slave)
- SetPointDriverInfo/logAddressOut = 256 (or O address of DP slave)
- SetPointDriverInfo/telegramType = standard message frame 1 (1)

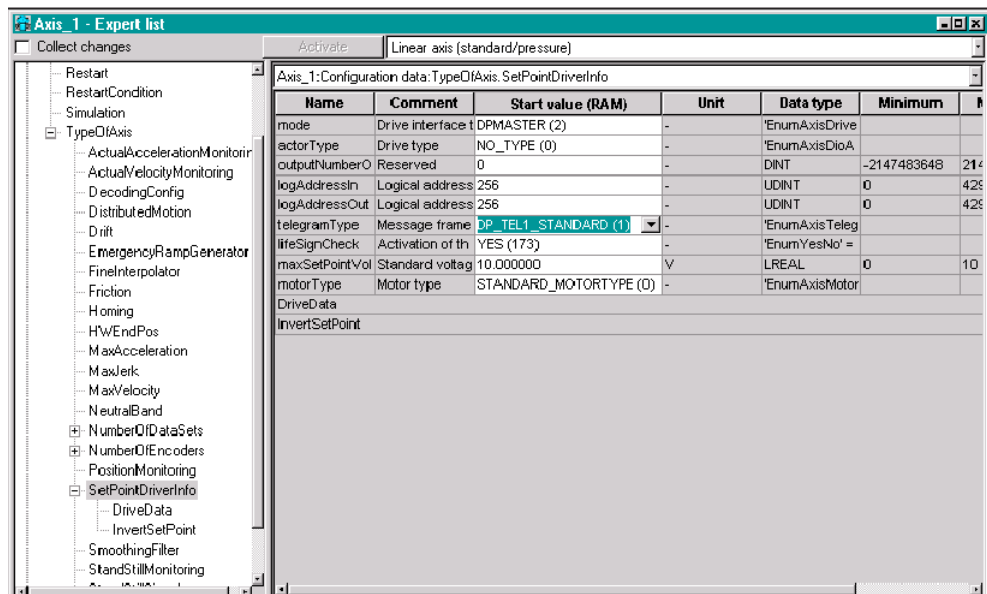


Figure 7-78 Setpoint output configuration data

Commissioning the MASTERDRIVES VC

The converter unit is commissioned with the Drive Monitor or Drive ES Basic program.

1. Establish an online connection to the converter unit.
2. Start the guided basic device commissioning via the menu item **Parameter > Basic device commissioning**.

With the guided basic device commissioning, you should have selected the following settings:

- **PROFIBUS DP and terminal strip** selection, parameterize all digital inputs without function
 - Without motor encoder:
Speed control without tachometer (F control)
 - With motor encoder connected to the Vector Control:
Speed control with tachometer (n control)
 - Setting the PROFIBUS address
 - Set the ramp-function generator according to the dynamic requirements (please make sure you have the correct units)
3. Adapt the following parameters. You can then address MASTERDRIVES Vector Control from SIMOTION via a PROFIBUS connection:
 - P571 = P572 = 1 (pos. and neg. direction of rotation)
 - P573 = P574 = 0 (motor potentiometer higher/lower)
 - P575 = 1 (external error, low-active)

7.10 SIMODRIVE 611U to SIMOTION

7.10.1 Connecting SIMODRIVE 611U to SIMOTION

Standard options when using the SIMODRIVE 611U

This section describes the most important standard options when using the SIMODRIVE 611U on SIMOTION. Although additional functions can be executed with the SIMODRIVE 611U, these must be examined on an individual basis.

This description does not replace the device documentation for the SIMODRIVE 611U. A complete functional description of the SIMODRIVE 611U can be found in the Description of Functions for SIMODRIVE 611 Universal "Closed-Loop Control Components for Closed-Loop Speed Control and Positioning".

POSMO C and POSMO S

POSMO C and POSMO S drives can also be used on SIMOTION. These drives belong to the SIMODRIVE 611U family and are parameterized with the same commissioning tools. The adaptation to SIMOTION is comparable to the approach described for the

SIMODRIVE 611U. However, the functional scope is different and is contained in the corresponding device description.

Note

The following sections refer only to the SIMODRIVE 611U. The described approach also applies to POSMO S and POSMO C.

Restrictions

The data exchange broadcast function of the SIMODRIVE 611U cannot yet be used in connection with SIMOTION.

If a double-axis module is used, either both axes must be created as a technology object (TO) or both axes must be addressed from the user program via the PZD interface. A mixed operation, in which one axis is operated as a TO axis and the other axis from the user program via the process data interface, is not possible.

Requirements of the 611U converter

- SIMODRIVE 611U closed-loop control module
- PROFIBUS DP3 option module for isochronous PROFIBUS DP

Closed-loop control module options:

2-axis for encoder sin/cos 1 Vpp n-set 6SN1 118-0NH0_-0AA_
2-axis for encoder sin/cos 1 Vpp positioning 6SN1 118-1NH0_-0AA_
2-axis for resolver n-set 6SN1 118-0NK0_-0AA_
2-axis for resolver positioning 6SN1 118-1NK0_-0AA_
1-axis for resolver n-set 6SN1 118-0NJ0_-0AA_
1-axis for resolver positioning 6SN1 118-1NJ0_-0AA_
PROFIBUS DP3 option module 6SN1 114-0NB01-0AA0

Note

As a general principle, a closed-loop control card for speed setpoint operation is sufficient for operation with SIMOTION. This is also the case when DSC is used.

If you want to use an external encoder on the axis, you must select a 2-axis closed-loop control module, whereby the second axis cannot be used to control a motor.

Software requirements

Personal computer minimum requirements

- Windows 2000 Professional Service Pack 3 or Windows XP Professional Service Pack 2
- SIMATIC STEP 7 V5.3 Service Pack 3
- SimoCom U V4.x
(depends on the firmware version of the SIMODRIVE 611U)
- SIMOTION SCOUT V3.0

Minimum converter requirements

- SIMODRIVE 611U firmware Version V4.x; can be read out in parameter P1799
- PROFIBUS V4.x option module; can be read out in parameter P1795

7.10.2 Upgrading the firmware

Proceed as follows:

1. Connect SimoCom U to the drive via the RS-232-C.

Note

SimoCom U may not be connected via PROFIBUS DP!

Do not cancel the downloading operation or interrupt the online connection to the SIMODRIVE 611U under any circumstances.

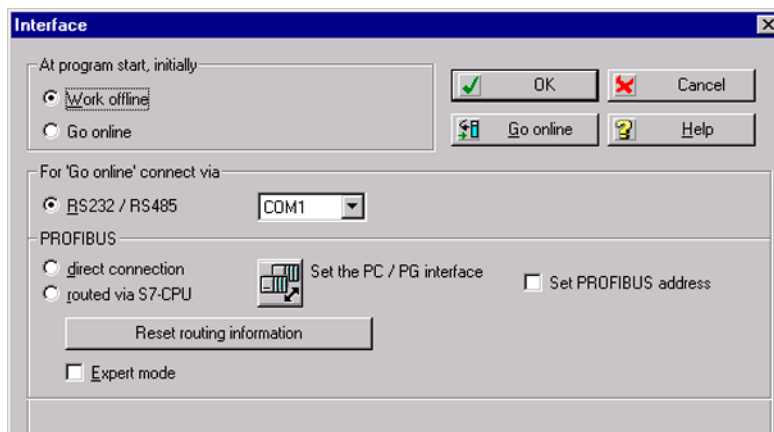


Figure 7-79 Firmware upgrade: Interface window

2. Open the commissioning tool.

- In the menu bar, click **Options >Service > . . .**

If you want to upgrade the drive, select **Firmware upgrade**.

If you want to upgrade the PROFIBUS module, select **Firmware upgrade of PROFIBUS option module**.

You are guided through the upgrade.

Note

This example shows the procedure for upgrading the firmware of the drive.

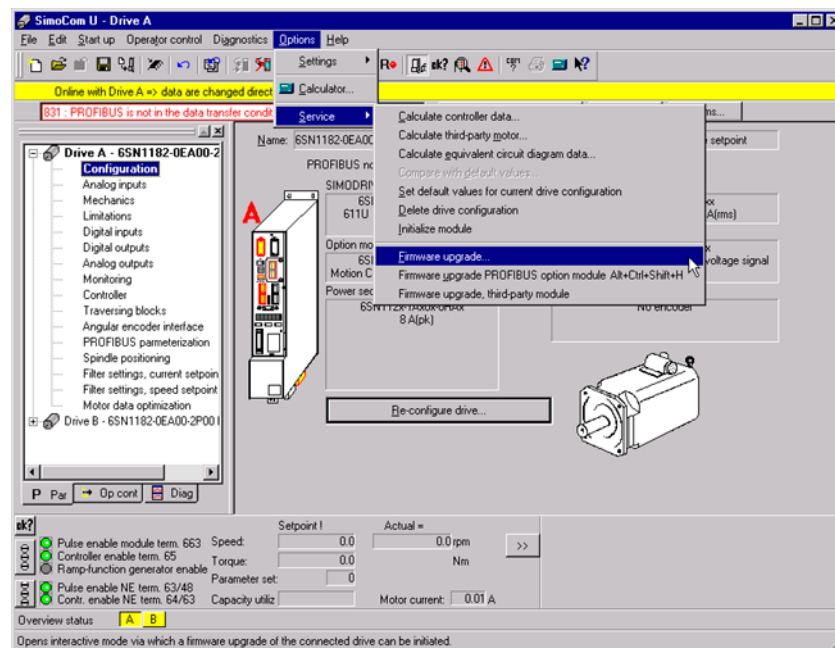


Figure 7-80 SimoCom U firmware upgrade

- Confirm the information message with **OK**.

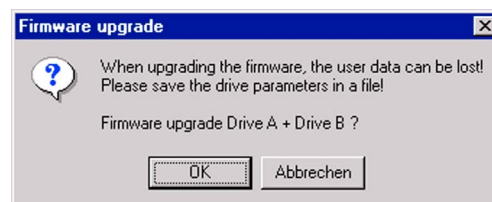


Figure 7-81 Firmware upgrade: Message window

5. Select the file with the desired firmware and confirm your input with **Open**.

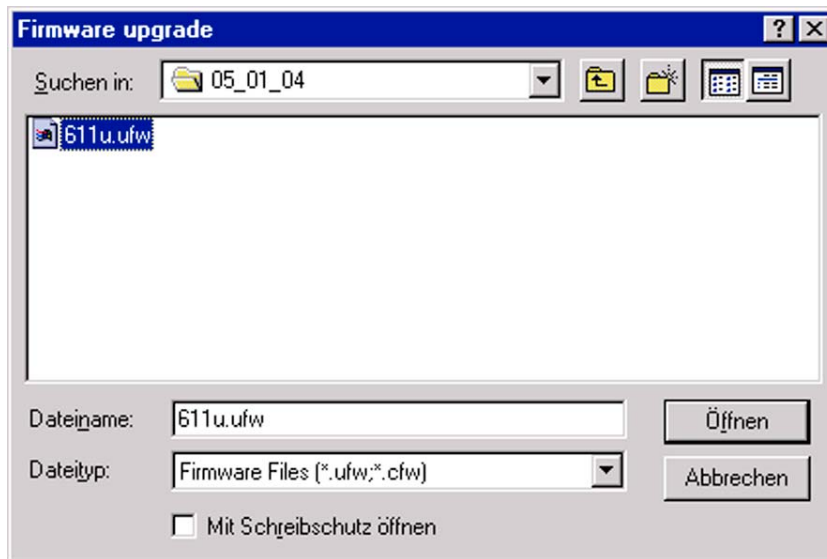


Figure 7-82 Firmware upgrade: Select file

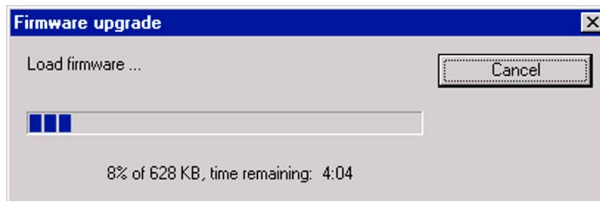


Figure 7-83 Firmware upgrade: Load window

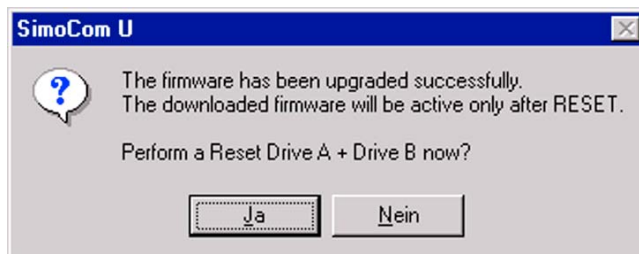


Figure 7-84 Firmware upgrade: SimoCom U window

6. Confirm the prompt with **Yes**. The drive executes a RESET.
7. The firmware upgrade for the drive is completed. If required, you can now perform the firmware upgrade for the PROFIBUS module.

7.10.3 Commissioning SIMODRIVE 611U

7.10.3.1 Commissioning procedure

Introduction

This section describes the standard commissioning procedure using a sample configuration. The settings required in SIMOTION and in the SIMODRIVE 611U are explained. The sample configuration is based on the control of two position-controlled axes with DSC. Control is via PROFIBUS message frame 105, and a SIMODRIVE611U double-axis module is used as drive.

If you use another axis or message frame type or another SIMODRIVE 611U closed-loop control module, the structure of the input windows may differ from those described below. However, the principle approach remains the same.

Moreover, you can use additional functions of the SIMODRIVE 611U in the user program (for example, reading of operating modes, etc.). Information on this can be found in the "Expert functions" section

Note

These instructions ensure only the connection of the SIMODRIVE 611U converter to SIMOTION. The guide does not describe how to optimize the controller; it is assumed that this has already been carried out.

Commissioning procedure

The commissioning procedure is divided into two parts:

- In the first part, a SIMOTION project is created and the SIMOTION SCOUT program and the hardware manager HW Config are used to enter the settings for the SIMOTION system. The settings that have to be made both in SIMOTION and in the SIMODRIVE 611U are given special attention.
- In the second part, the SIMODRIVE 611U is parameterized. The basic device commissioning for connection to SIMOTION is used for this.

After commissioning SIMOTION and the SIMODRIVE 611U, a sample program is set up for axis positioning.

Various parameter settings for the SIMODRIVE 611U are derived from the SIMOTION settings. The following table contains an overview of the functions and settings which have to be entered in both SIMOTION and in the SIMODRIVE 611U. These settings are described separately in the following sections for SIMOTION and the SIMODRIVE 611U.

Table 7- 12 Settings required in SIMOTION and SIMODRIVE 611U

Required setting	Sample values
DP cycle	2 ms
Pulse frequency	5.3 kHz
Select encoder type	Incremental encoder

Required setting	Sample values
Select homing mode	Homing output cam and encoder zero mark Encoder zero mark only External zero mark only
Measurement	Yes No
Rated motor speed / max. axis speed	6000 rpm
Master application cycle / position control cycle clock	Factor 1
Message frame type see selection table	2 axes, message frame 105, PZD-10/10
PROFIBUS address	...

By default, the SIMODRIVE 611U is connected to SIMOTION via PROFIBUS DP. Depending on the desired axis functionality, this connection can be made using various device-specific message frames. The following selection table shows the options for the individual message frame types:

Table 7- 13 Selection table

	Sign-of-life monitoring	1. encoder — Measurement	2. Encoders	Dynamic Servo Control (DSC)	Torque reduction (Mred)	Required message frame
Speed-controlled axis						1
	x					2
	x				x	101
Position-controlled axis / following axis	x	x				3
	x	x	x			4
	x	x		x		5
	x	x	x	x		6
	x	x			x	102
	x	x	x		x	103
	x	x		x	x	105
	x	x	x	x	x	106

Note

The message frame types < 100 are standard message frames. These are standardized via the PROFIdrive V3 profile. The message frame types > 100 are device-specific message frame types for the SIMODRIVE 611U.

7.10.3.2 Creating a SIMOTION project

Hardware configuration

In this step, the SIMOTION device, the bus system and the SIMODRIVE 611U are created and parameterized via SIMOTION SCOUT and HW Config.

1. Start SIMOTION SCOUT.
2. Click **Project > New**.
3. Enter a name, e.g. *DSC_SIMODRIVE*.
4. Click **OK**.
A project is created.

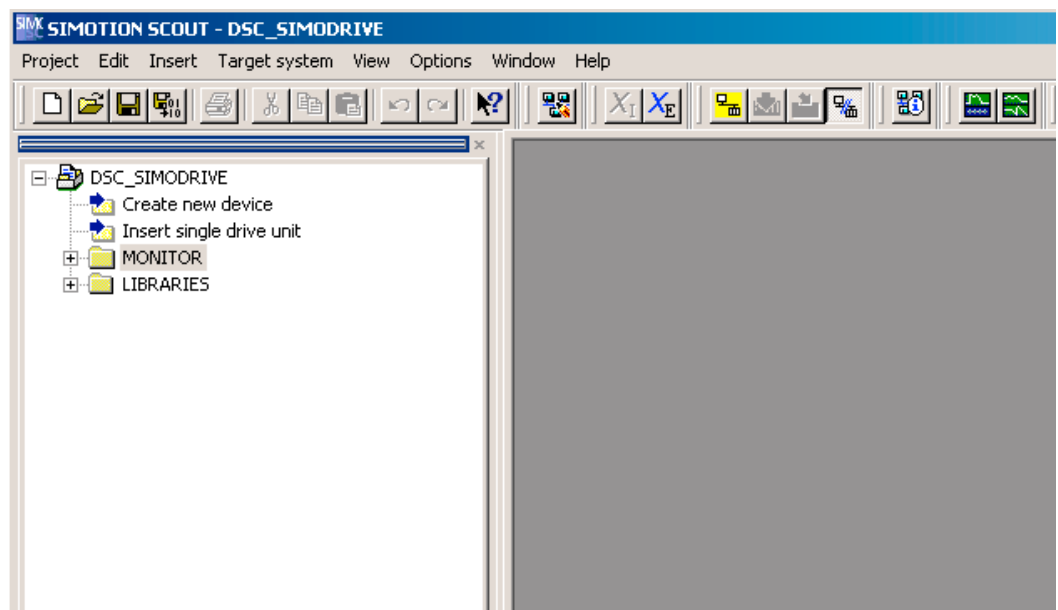


Figure 7-85 Project: Creating DSC_SIMODRIVE

5. Double-click **Create new device**.

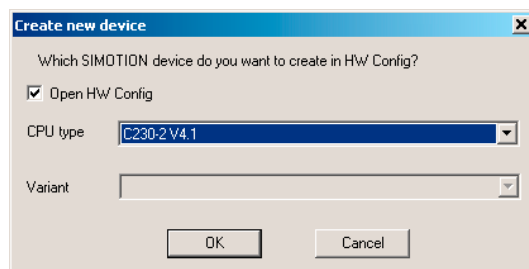


Figure 7-86 Open HW Config (example)

6. Select the desired SIMOTION device.
7. Click **OK**.
8. Click **Cancel** twice.
The scanning of the PROFIBUS interface properties can be skipped first of all as these are described in the following.

9. Click **OK** in the Selection of the Interface - C230 window.

The **HW Config** application starts. The rack with the SIMOTION C230 device is displayed.

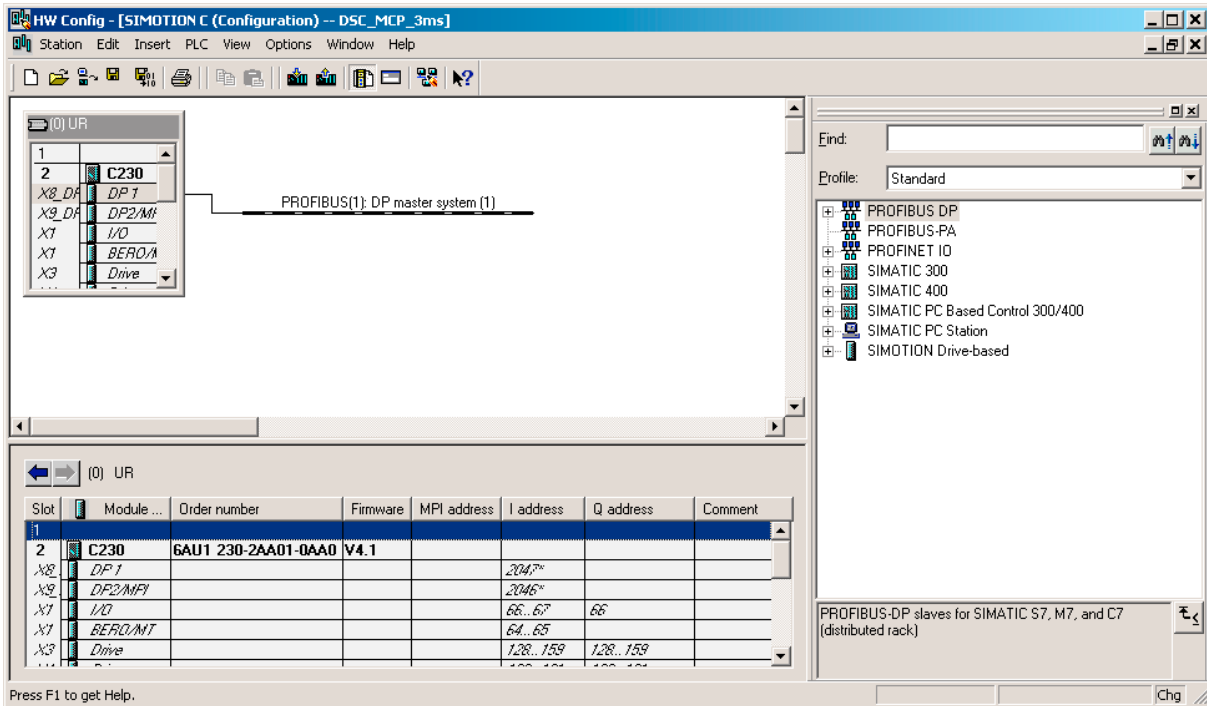


Figure 7-87 Rack

10. Double-click **X8_DP**.

The PROFIBUS line is created in the rack.

11. Click the **Properties** button in the **Properties -DP- (R0/S2.1)** window.

12. Click **New**.

13. Then select the **Network settings** tab.

14. Set a transmission rate of **12 Mbit/s** on the bus and **DP** as profile.

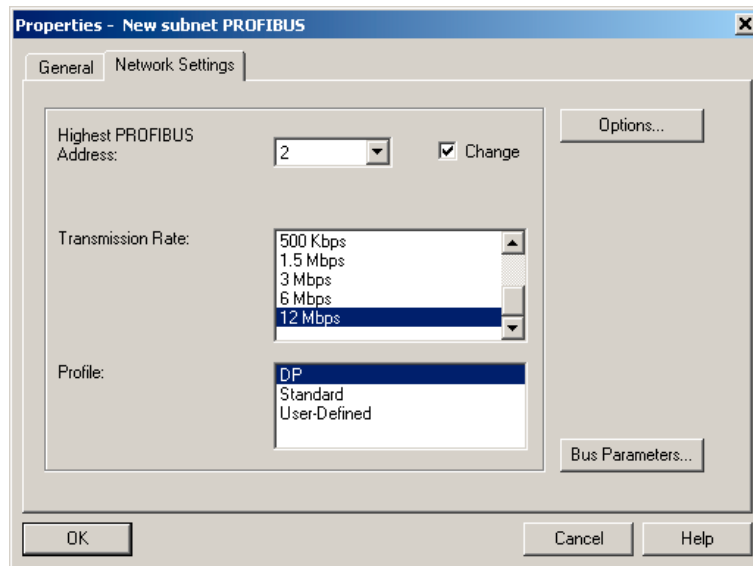


Figure 7-88 Configuration of PROFIBUS lines

15. Click the **Options** button.
16. Activate the **Activate isochronous bus cycle** checkbox in the **Isochronous mode** tab.
17. Enter the desired cycle time, e.g. 2 ms in the **Isochronous DP cycle** field.
18. Confirm the settings by clicking **OK** four times.
All property windows are closed. A PROFIBUS master system has been created.

Note

The **X9-DP** interface in the rack is not networked for this example. It is set by default for PROFIBUS communication at 1.5 Mbaud.

19. Open the PROFIBUS DP / SIMODRIVE directory in the hardware catalog.
20. Click the PROFIBUS line. This is displayed in black.
21. Double-click the type: SIMODRIVE 611 universal.

22. Enter the address ≥ 3 .

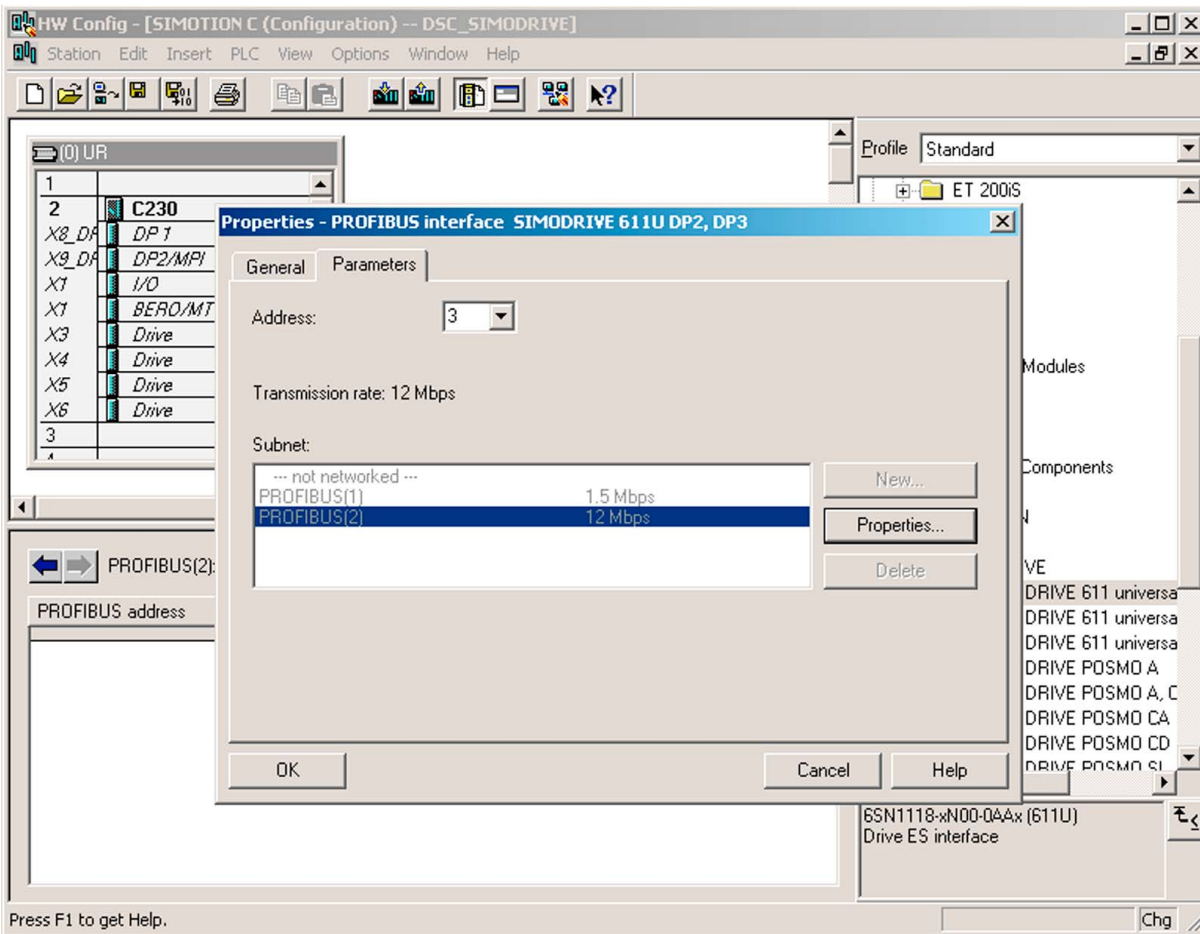


Figure 7-89 Attaching a SIMODRIVE 611U to the PROFIBUS

23. Click **OK**.

24. In the **Configuration** tab of the **DP Slave Properties** window, select the required PROFIBUS message frame for the connection. In this example, a 611U double-axis module connected via message frame 105 is selected. The subsequent axis motion will be position-controlled.

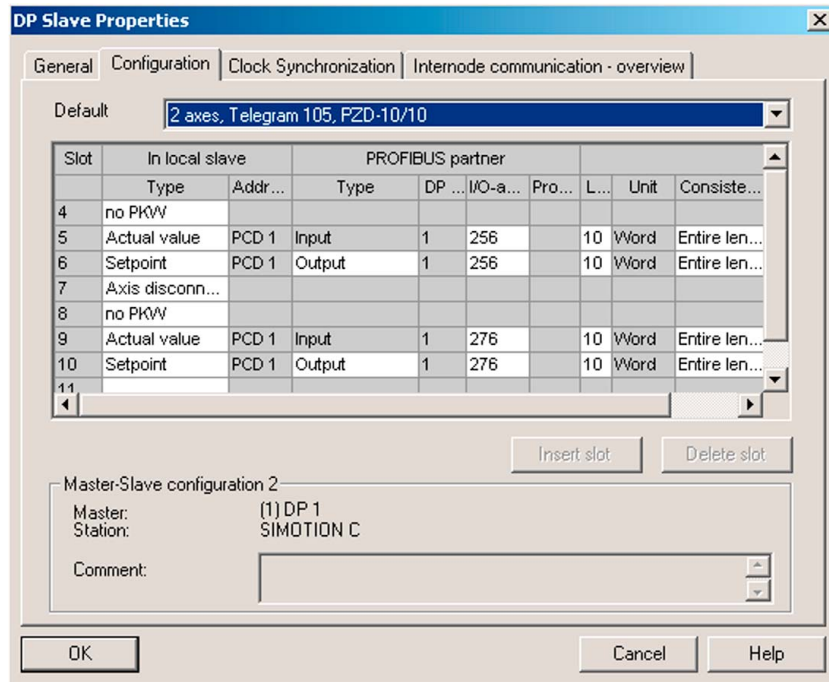


Figure 7-90 Setting standard message frame 105 on the slave

Special settings: SIMOTION

The message frame selected here is specified again when the axis is subsequently created. The setting is automatically taken over from the hardware configuration when the axis is created.

Special settings: SIMODRIVE 611U

The PROFIBUS address must be set in the 611U in parameter **P918**. The message frame selected here must be specified in parameter **P922** in the SIMODRIVE 611U. With SimoCom U, the entry can be made in the **PROFIBUS Parameterization** window.

1. Click the **Isochronous operation** tab.
2. Activate **Synchronize drive with equidistant DP cycle**.
3. Enter the following settings.

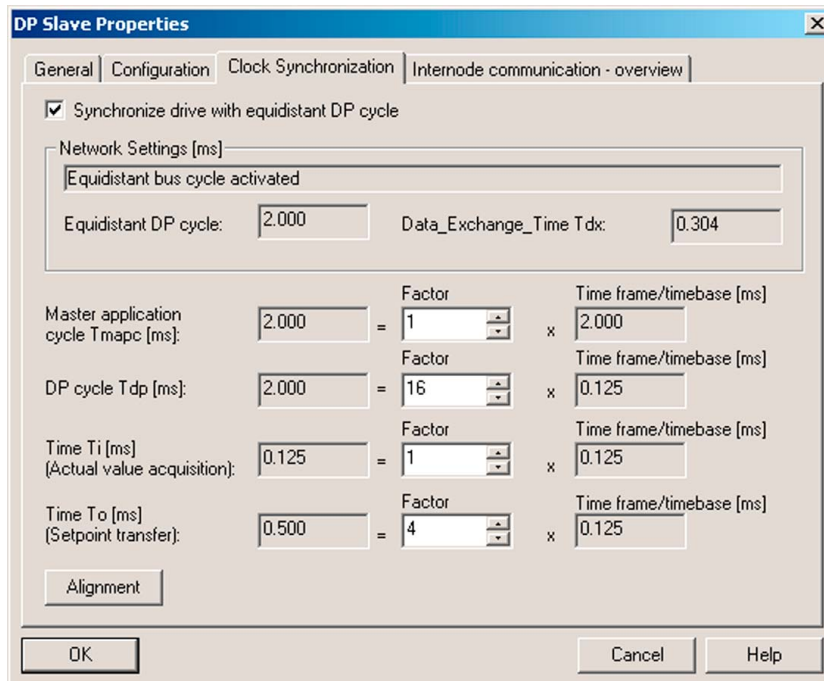


Figure 7-91 Selecting isochronous operation for SIMODRIVE 611U

– Master application cycle:

Here, you specify the cycle clock in which the master is to supply new values to the SIMODRIVE 611U. For SIMOTION, this is the position control cycle clock (servo). You must note this value and enter it later when configuring the **execution system as position control cycle clock** in SIMOTION SCOUT.

Note

It is mandatory that the master application cycle match the position control cycle clock of the CPU!

– DP cycle:

Bus cycle clock: It depends on the number of slaves (minimum of 1 ms for P350 and 1.5 ms for C230).

– Actual value acquisition:

Measured value is latched in the SIMODRIVE 611U as soon as possible before the DP cycle clock (Input 1: → 0.125 ms before the next DP cycle clock).

- Setpoint acceptance:

Setpoint is output in the SIMODRIVE 611U as soon as possible after the DP clock cycle. The time depends on the number of isochronous slaves. It must be ensured that the last slave has also received the setpoint values in the current DP cycle. Otherwise, the drive signals it is "not isochronous with the master".

- With several axis modules on the PROFIBUS, click **Align**.

4. Click **OK** to confirm the changes.
5. Save and compile the project with **Station > Save and compile**.
6. Click **Station > Check consistency**.
7. Click **OK** to confirm the message.
8. Click **Target system > Load to module**.
The hardware configuration is completed.
9. Close HW Config.

Note

After loading the hardware configuration, the red BUS1F LED on the C230 may still flash. The toggle switch is in the STOP position. The bus error occurs if the PROFIBUS address configured in HW Config and the selected message frame type have not yet been set in the SIMODRIVE 611U.

If communication between the two devices is to be checked at this point, then the basic functions of the SIMODRIVE 611U must have been commissioned.

If the settings in SIMOTION and the SIMODRIVE 611U match, the BUS1F error does not occur and the LED on the PROFIBUS module of the SIMODRIVE 611U is green.

7.10.3.3 Creating an axis in SIMOTION SCOUT

Creating an axis in SIMOTION SCOUT

1. Open the **Axes** folder in the project navigator under C230.
The axis wizard opens when you create an axis. This guides you through the configuration of the axis and cannot be aborted.

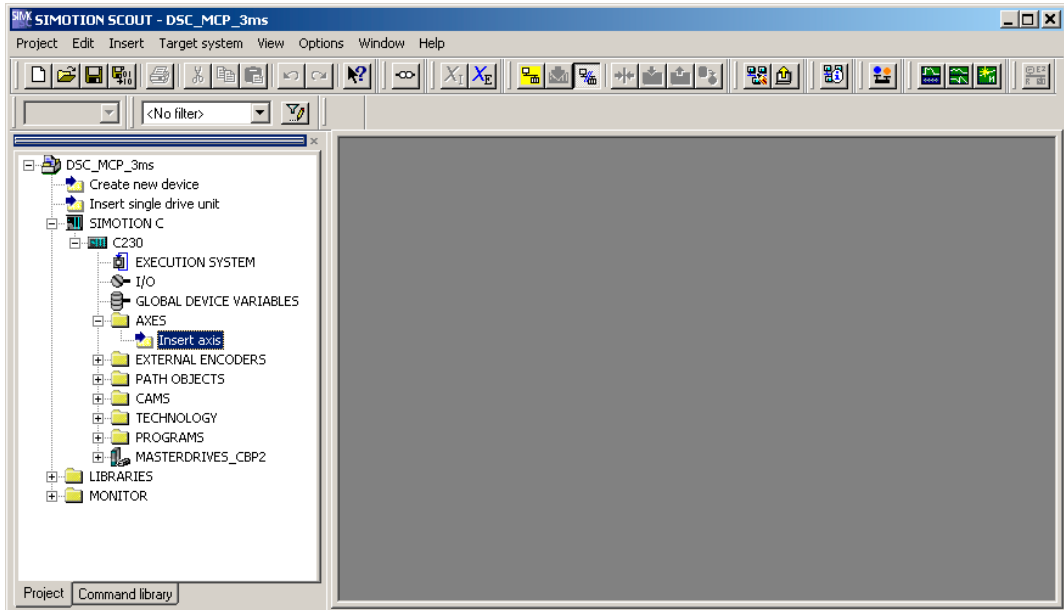


Figure 7-92 Inserting an axis

2. Double-click **Insert axis**.
3. Enter a name for the axis.
4. Click OK.
The Axis configuration - *Axis name* - Axis type window is opened.

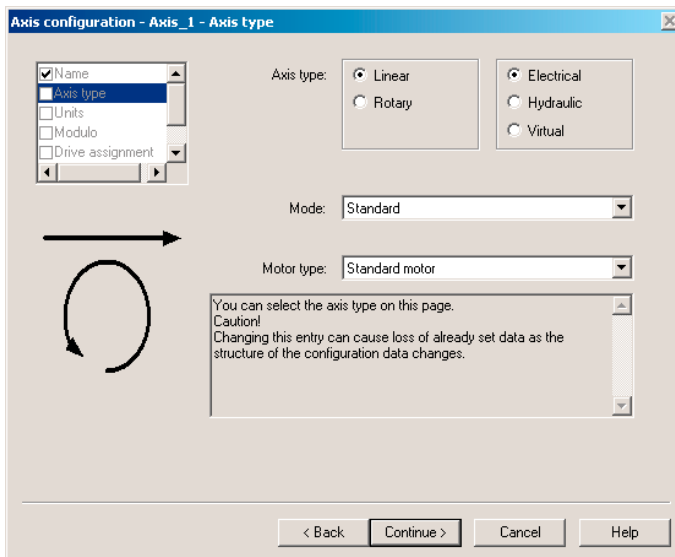


Figure 7-93 Axis configuration: Axis type

5. Specify the axis type.
In the example, the linear axis setting is retained.
6. Click **Continue**.
The Axis configuration - *Axis name* - Units window is opened.
7. Click **Continue**.
The Axis configuration - *Axis name* - Modulo window is opened.
8. Click **Continue**.
The HW Config data is read out. The Axis configuration - *Axis name* - Drive assignment window is opened.

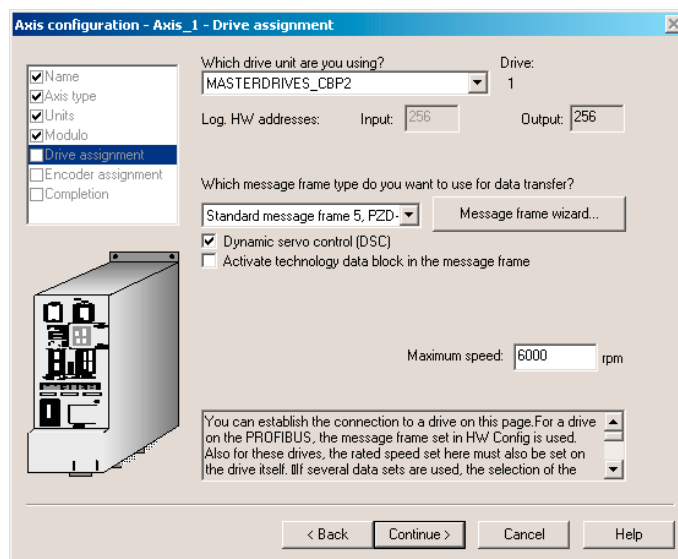


Figure 7-94 Axis configuration: Drive assignment

9. Select the **SIMODRIVE_611U_DP2_DP3** as drive unit. The message frame 105 should be set automatically. If this is not the case, select message frame 105 in the field for the message frame type.
10. Enter the value **6000** in the Rated speed field.
11. Click **Continue**.
The Axis - Drive Relationship window is opened.
12. Read the note and click **OK**.
The online help is opened.
The Axis configuration - *Axis name* - Encoder assignment window is opened.
13. Select the appropriate properties.
In the example, **Incremental encoder** in the Encoder type field and **Endat** in the Encoder mode field.

The encoder data settings required for SIMOTION are listed in the following table. Only the input values listed in the tables are evaluated for the respective encoder.

- The encoder and resolution must be specified in SIMOTION and in MASTERDRIVES MC.

The encoder settings tables can be found

- in the online help or
- on the CD Utilities&Application under 2_FAQ\ENCODER_PARAMETERIZATION

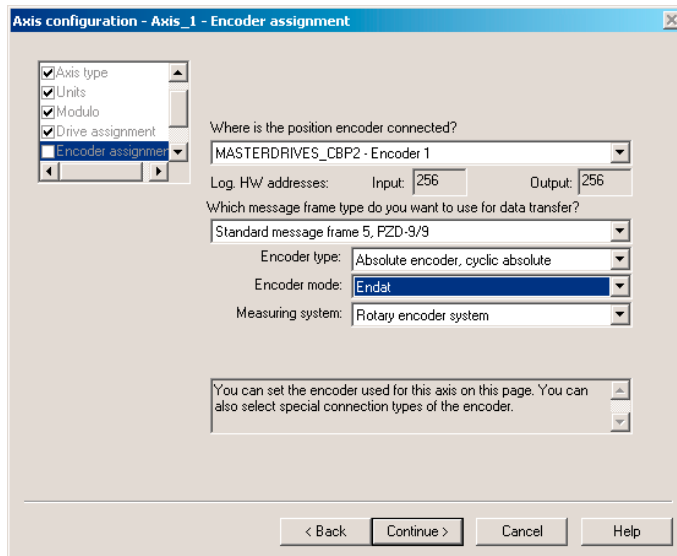


Figure 7-95 Example: Axis configuration - selecting the encoder type for an absolute encoder

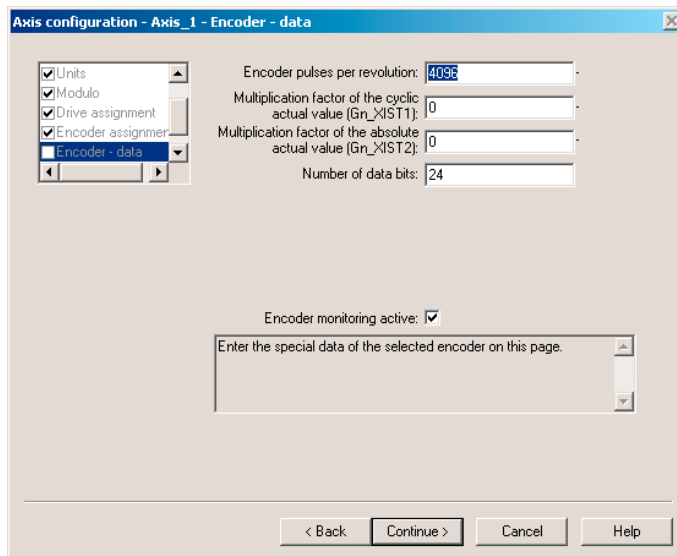


Figure 7-96 Example: Axis configuration - input of the resolution for an absolute encoder

Pulse encoders, resolvers and encoders must be configured according to the tables under "Encoder settings". This results in the following settings, for example, for the encoder.

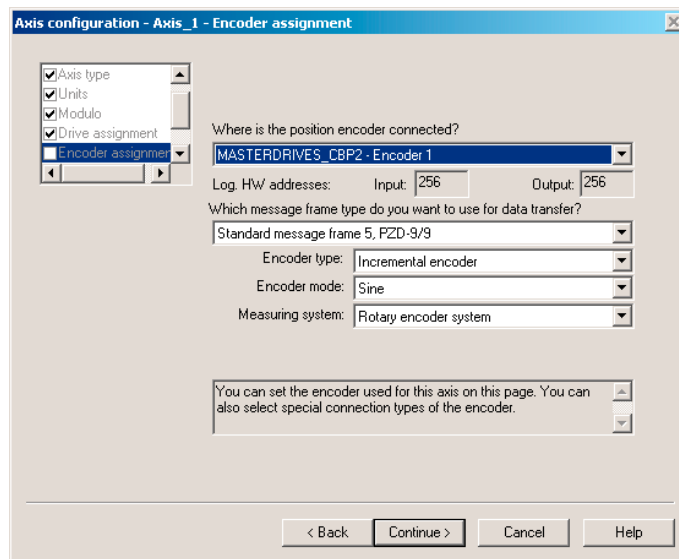


Figure 7-97 Example: Axis configuration - selecting the encoder type for an incremental encoder

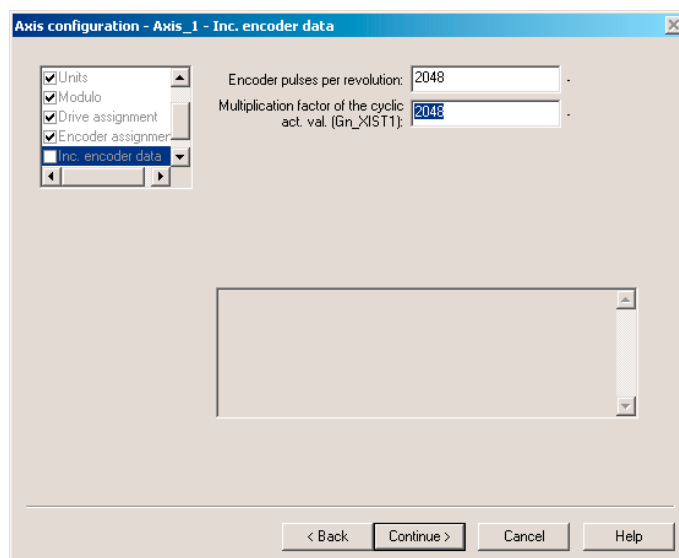


Figure 7-98 Example: Axis configuration - input of the resolution for an incremental encoder

The settings in **SIMOTION** are specified with the name of the configuration data and can be shown using the expert list.

The following assignments apply to the axis configuration windows:

Encoder type

TypeOfAxis.NumberOfEncoders.Encoder_1.encoderType

Encoder mode

TypeOfAxis.NumberOfEncoders.Encoder_1.encoderMode

Resolution

TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolution

TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolution

Number of data bits

TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsDataLength

Multiplication factor of the cyclical encoder actual value

TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolution

MultiplierCyclic

TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolution

MultiplierCyclic

Multiplication factor of the absolute encoder actual value

TypeOfAxis.NumberOfEncoders.Encoder_1.AbsEncoder.AbsResolution

MultiplierAbsolute

SIMODRIVE parameter bit P1011.2 = 0

Table 7- 14 SIMOTION settings

TypeOfAxis.NumberOfEncoders.Encoder_1.encoderType=INC TypeOfAxis.NumberOfEncoders.Encoder_1.encoderMode=RESOLVER TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolution =1024 (Resolver 2p) =2048 (Resolver 4p) =3072 (Resolver 6p) =4096 (Resolver 8p) TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolutionMultiplierCyclic=2048 (0)

SIMODRIVE parameter bit P1011.2 = 1

Table 7- 15 SIMOTION settings

TypeOfAxis.NumberOfEncoders.Encoder_1.encoderType=INC TypeOfAxis.NumberOfEncoders.Encoder_1.encoderMode=RESOLVER TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolution =4096 (Resolver 2p) =8192 (Resolver 4p) =12288 (Resolver 6p) =16384 (Resolver 8p) TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolutionMultiplierCyclic=2048 (0)

Comment:

For the encoders, a fine resolution of 0 (default value)

- in parameter TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolutionMultiplierCyclic means a fine resolution of $2^{11} = 2048$
- in parameter TypeOfAxis.NumberOfEncoders.Encoder_1.IncEncoder.IncResolutionMultiplierAbsolute means a fine resolution of $2^9 = 512$

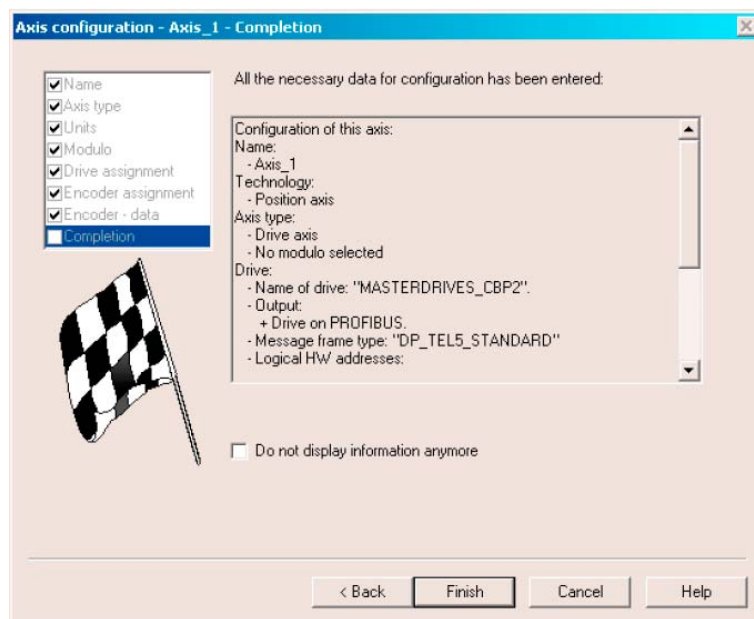
Differences between ABS and CYCLE_ABS:

- In the case of ABS, the absolute actual position of the encoder is assumed after switching on the C230 or following an encoder error.
- In the case of CYCL_ABS, overflows of the encoder areas are carried over in the NVRAM and taken into account when the cycle is resumed. With this setting, an overall reset must be carried out on the controller prior to initial loading of the project. Then, the encoder must be readjusted. If changes are made to the settings of the absolute encoder, the encoder must also be adjusted.
With the controller switched off, the encoder may only be moved a maximum distance $\hat{a}\%$ "half the encoder range" in both traversing directions in order to still be able to detect the exact position.

Completing the axis configuration

14. Click **Next** .

The set data is displayed.



15. Click **Finish**.

The settings are saved. A message appears, read the information and confirm this window.

After the axis is created, a few more settings have to be made to optimize the interaction between SIMOTION and SIMODRIVE 611U.

Figure 7-99 Last window of the axis configuration

7.10.3.4 Deactivating following error monitoring in SIMOTION SCOUT

To prevent the following error monitoring interrupting an axis motion, it can be set to a higher value or deactivated.

A high following error can occur, for example, as a result of a missing drive optimization.

1. In the project navigator, open the folder of the created axis.
2. Double-click **Monitoring**.
3. Click the **Following error monitoring** tab in the working area.
4. Deactivate the **Dynamic following error monitoring active** checkbox.
5. Click **Close**.

The following error monitoring must be matched to the requirements and mechanical system of the plant when commissioning an application.

WARNING

If the following error monitoring is increased or deactivated, larger incorrect motions can also occur on the axis in the case of an error (e.g. incorrect position control direction). This is particularly important, for example, when the axis only has a limited traversing range.

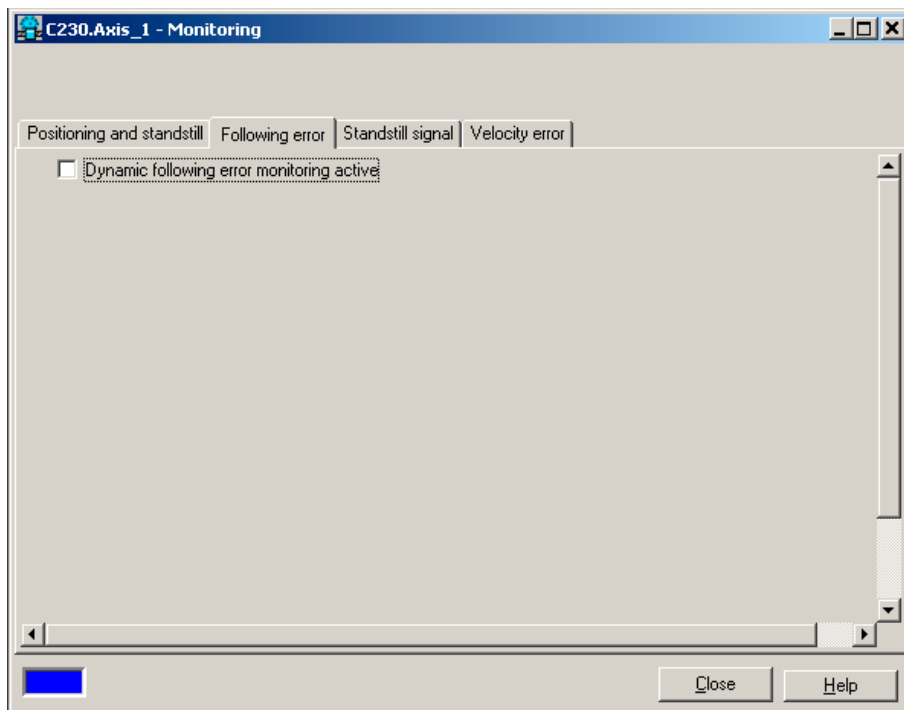


Figure 7-100 Deactivating the following error monitoring

7.10.3.5 Setting the position control configuration in SIMOTION SCOUT

1. In the project navigator, double-click **Control** under Axis.
2. Set the following data in the working area:

K_v factor: Enter

Speed precontrol: Activate

Fine interpolator: Select constant velocity interpolation

Dynamic drive control (DSC): Leave activated

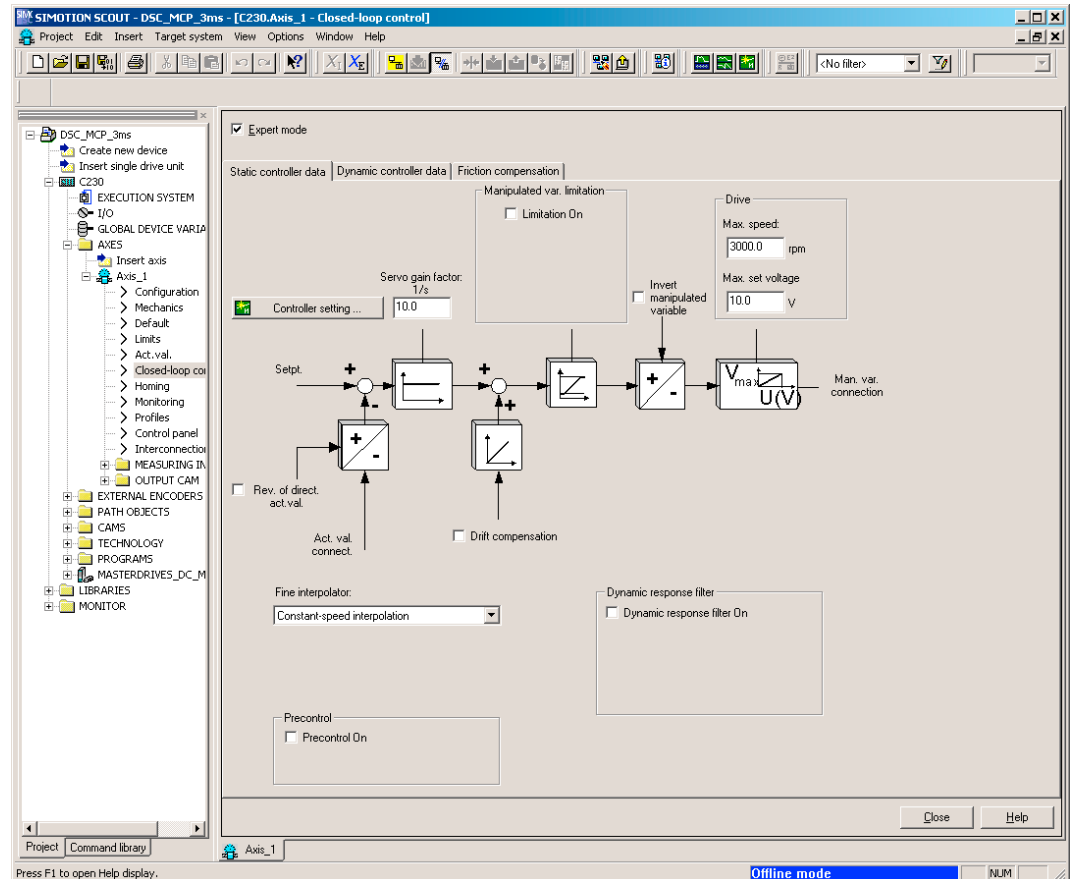


Figure 7-101 Position control configuration

3. Click **Close**.

7.10.3.6 Setting system cycle clocks in SIMOTION SCOUT

1. In the project navigator, right-click **Execution system** and select **Expert > Set system cycle clocks**.
2. Set the values.
3. Click **OK**.
A message appears, read the information and confirm with OK.

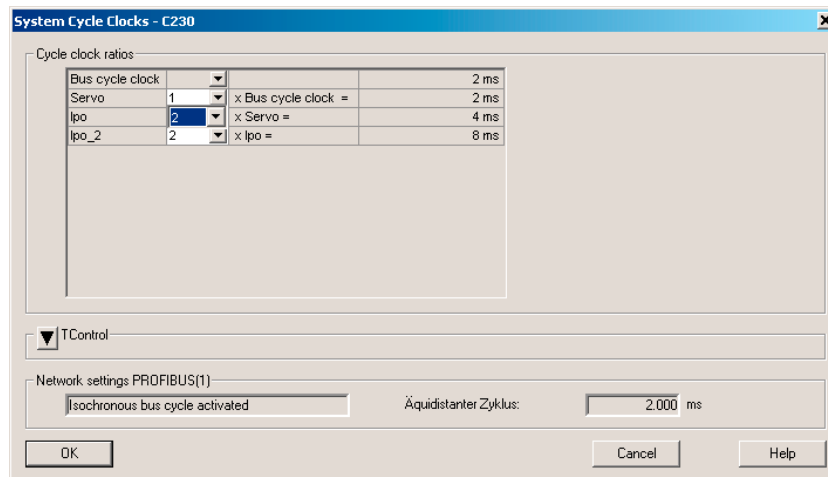


Figure 7-102 Setting system cycle clocks - SIMODRIVE 611U

Specifying the system cycle clocks

The specifications for system cycle clocks in SIMOTION affect the position setpoint adjustment in the SIMODRIVE 611U.

Special settings: SIMOTION

The ratio of DP cycle clock to position control cycle clock and to interpolator cycle clock is set to 1:2:2, for example. This represents a DP cycle clock of 2 ms, a position controller cycle clock of 4 ms and an interpolator cycle clock of 8 ms.

Note

Important: The position control cycle clock entered here must match the master application cycle in the **HW Config**!

For instructions on how to activate and use interpolator cycle clock 2, see the online documentation in SIMOTION SCOUT.

7.10.3.7 Specify Homing Mode

Note

The statements with respect to the homing modes in this section and the screenshots only refer to the homing settings for axes on a C2xx in connection with a SIMODRIVE 611U. The homing options depend on the respective drive.

If the connected axis is to be homed, the homing mode must be specified in SIMOTION SCOUT. Depending on the mode selected, settings may also be necessary in the SIMODRIVE 611U.

Additional references

Please refer to the following document on this subject

- SIMOTION Motion Control, TO axis, TO externalEncoder, Description of Functions

Follow the steps outlined below:

1. In the project navigator, double-click **Homing** under Axis.
2. Enter the required homing mode and the appropriate data.
3. Click **Close**.

Homing mode "External zero mark only"

When a defined edge of the external zero mark is crossed, the position is accepted.

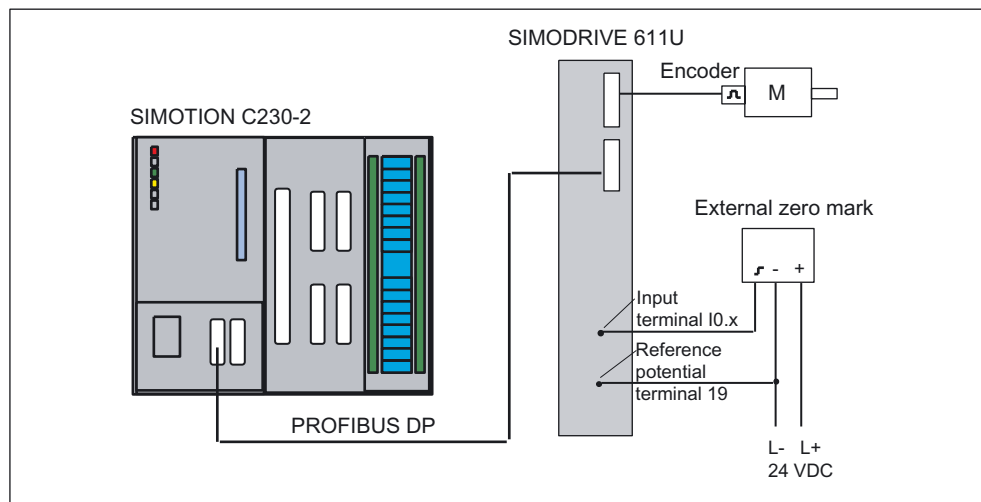


Figure 7-103 Homing (External zero mark only)

Special settings: SIMOTION

If **External zero mark only** is selected as the homing mode, the approach direction can be selected by means of **Homing direction**.

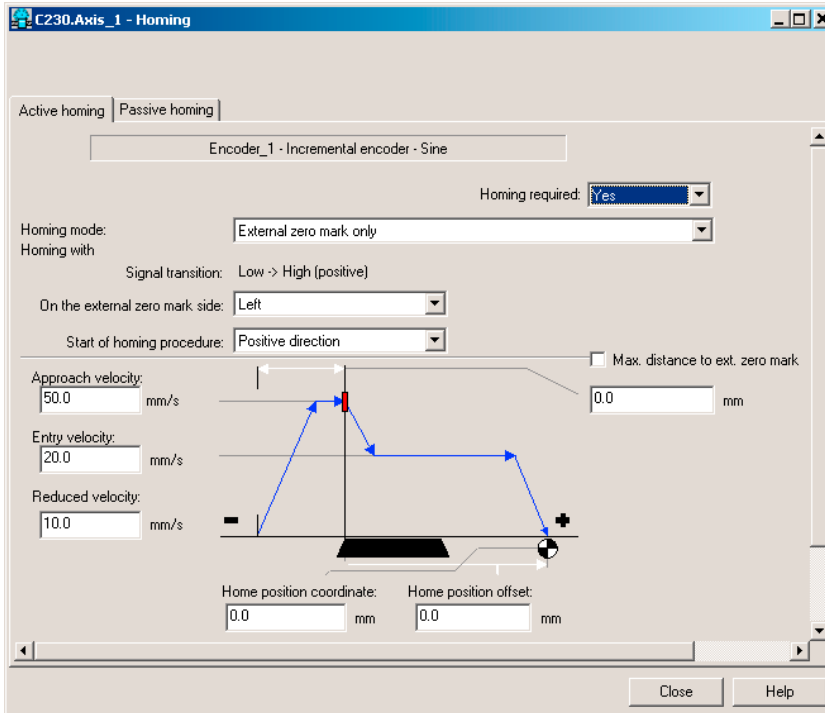


Figure 7-104 Axis homing in SIMOTION (homing mode External zero mark only)

Special settings: SIMODRIVE 611U

The homing external zero mark must be connected to input I0.x (x: Drive A or B) on the SIMODRIVE 611U.

Parameterize input I0.x with the **Equivalent zero mark** function. You must enable the equivalent zero mark via parameter **P879 Bit 13**.

Follow the procedure outlined in the section below on "Standard commissioning of SIMODRIVE 611U" for the parameterization of input I0.x.

Comment on the internal 611U edge detection:

For travel in the positive direction, only the signal change 1 → 0 is recognized as an equivalent zero mark. For travel in the negative direction, only the 0 → 1 edge is recognized as an equivalent zero mark. As a result, not all of the approach directions that can be selected in SIMOTION in combination with SIMODRIVE 611U can be used.

Homing mode "Encoder zero mark only"

An external zero mark signal is not necessary. The position is accepted at the next zero mark of the encoder.

SIMOTION

If the encoder zero mark only is selected as the homing mode, the approach direction can be selected by means of the homing direction.

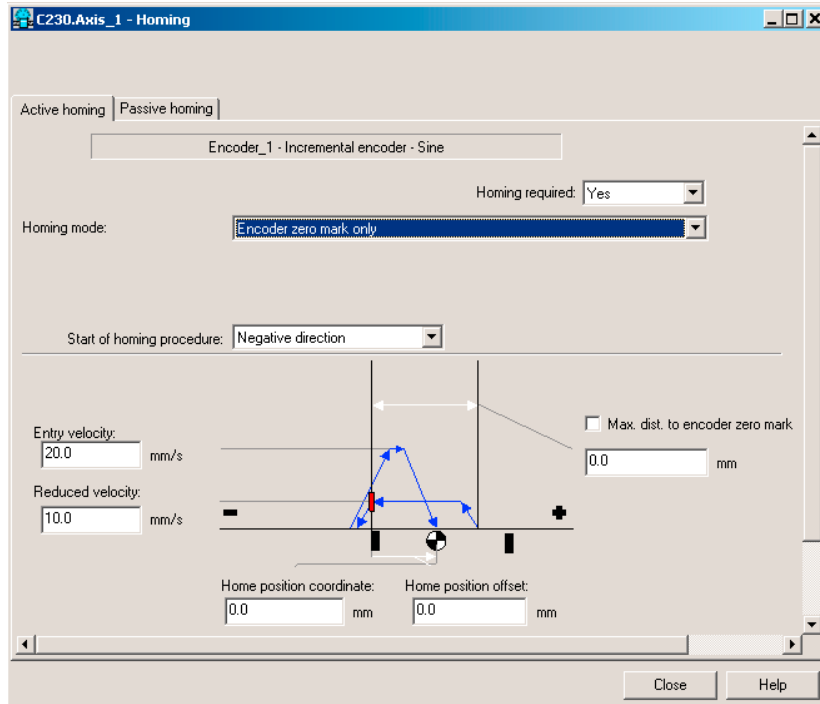


Figure 7-105 Axis homing in SIMOTION (homing mode Encoder zero mark only)

Special settings: SIMODRIVE 611U

With this mode, a motor with an incremental encoder or resolver must be connected on the SIMODRIVE 611U. Otherwise, no additional settings are necessary.

Homing mode "Homing output cam and encoder zero mark"

The axis traverses in the specified homing direction. Once the external zero mark signal is reached, the velocity of the axis switches from the homing approach velocity to the homing reduced velocity. Once the external zero mark is left, the axis is homed at the next detected zero mark of the encoder.

The homing external zero mark is connected to an unassigned SIMOTION I/O input.

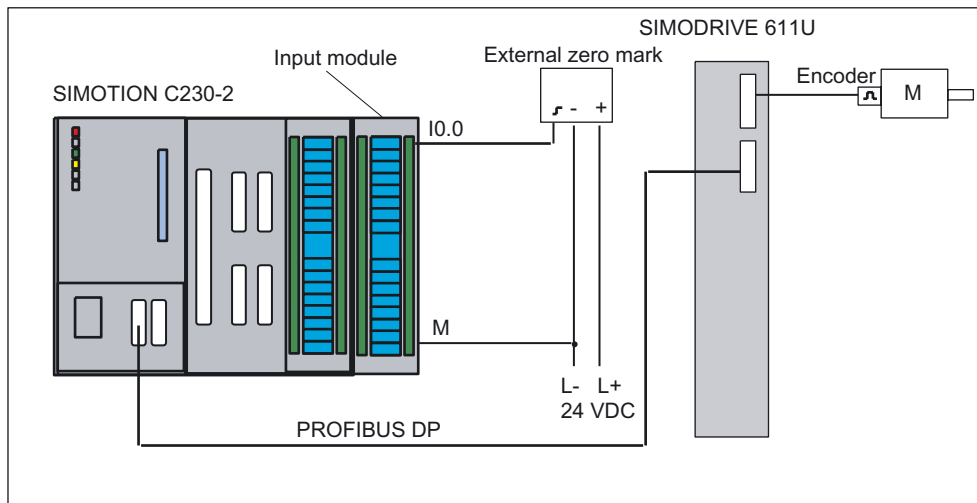


Figure 7-106 Homing (Homing output cam and encoder zero mark)

Special settings: SIMOTION

If "Homing output cam and encoder zero mark" is selected as the homing mode, the evaluation position of the zero mark can be selected via zero mark and the approach direction via homing direction.

The homing external zero mark must be connected to a freely selectable digital input of SIMOTION which has been configured in the Home Axis window. When the external zero mark is reached, homing is enabled in the drive.

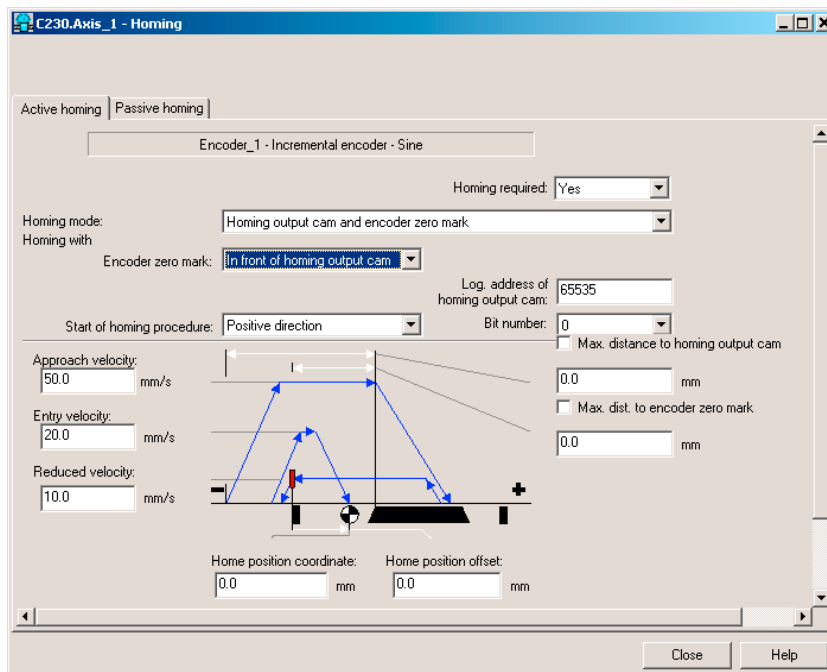


Figure 7-107 Axis homing in SIMOTION (homing mode Homing output cam and encoder zero mark)

Special settings: SIMODRIVE 611U

With this mode, a motor with an incremental encoder or resolver must be connected on the SIMODRIVE 611U. Otherwise, no additional settings are necessary.

7.10.3.8 "Measuring" function

You can use the "measuring" function to record the actual position of an axis at any time. A typical application is the acquisition of a print mark for the purpose of synchronizing the axis to this mark.

The measuring input must be connected to the fast input I0.x. The input is isolated. This enables more than one input to be switched in parallel, whereby the reference potential of the 24 V supply of the measuring input (for example, from the network supply) must also be wired.

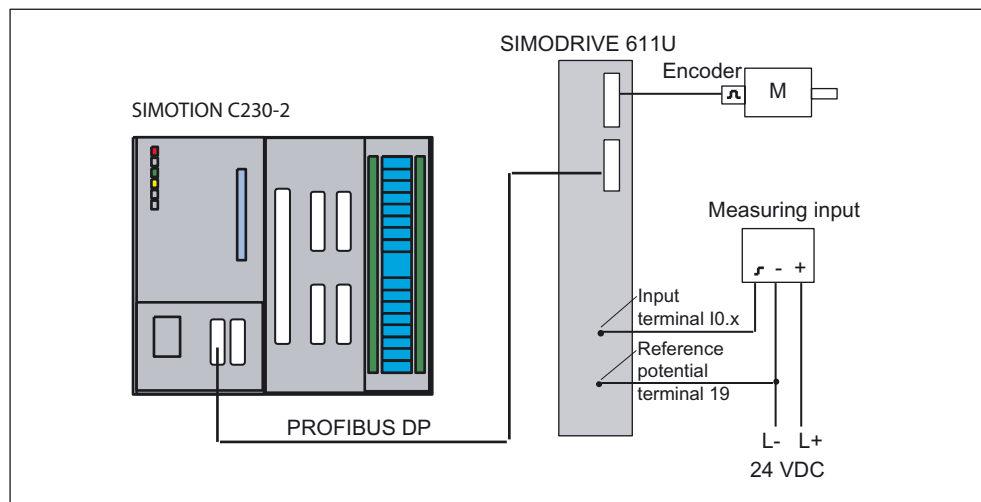


Figure 7-108 Measurement

Inserting a measuring input in SIMOTION SCOUT

1. Open the **Measuring inputs** folder in the project navigator.
2. Double-click **Insert measuring input**.
3. Enter a name for the measuring input.
4. Click **OK**.
5. Click **Close**.

SIMODRIVE 611U

Parameterize the SIMODRIVE 611U with SimoCom U so that input I0.x addresses the measuring input.

Comment on 611U-internal edge detection in HW versions up to 6SN 118-xxxxx--xxx1:

For travel in the positive direction, only the 1 → 0 signal change is detected as a measuring signal.

For travel in the negative direction, only the 0 → 1 edge is recognized as a measuring signal. You must take this into account when activating the measuring input.

Settings in the Edge field (→ SIMOTION; calling the measuring function in the user program):

- Rising edge or
- Falling edge

If you select another setting, the last valid value is taken over (rising or falling).

Response times for the measuring function

In SIMOTION, measuring can be used in various configurations. Depending on the connection of the axis (via PROFIBUS DP) and the processing level (position control cycle clock or IPO cycle clock), you must take different response times for the measuring function into account in the application.

In the user program, measuring is started with the function call `_enableMeasuringInput`. You can specify when the measuring function is to be active during the call:

- Immediately (without measuring window)
MeasuringRangeMode = WITHOUT_SPECIFIC_AREA
- Within a position-dependent measuring window
MeasuringRangeMode = WITH_SPECIFIC_AREA

When **measuring without measuring window**, the measuring input is immediately activated with `_enableMeasuringInput`.

Before the measuring edge is evaluated at the hardware input, there is a configuration-dependent runtime. To be certain to detect the measuring edge, you must ensure that `_enableMeasuringInput` is executed earlier by this amount of runtime in the user program.

When **measuring with measuring window**, the job is first only registered in the system with `_enableMeasuringInput`. Only when the axis has reached the start of the measuring window is the measuring input activated.

From the time of reaching the start position of the measuring window on the axis (mechanical) until the evaluation of the measuring edge at the hardware input, there is a configuration-dependent runtime. In order that the measuring input is active when the start position of the measuring window on the axis is reached, you must move the start of the measuring window forward depending on the axis velocity and the response time during the function call.

This is also valid for the end of the measuring window. It is important that the measuring input is no longer active when the end of the measuring window on the axis (mechanical) is passed.

These runtimes can be compensated with the MeasuringRange.activation Time configuration data item.

Note

The runtimes are only compensated without error for constant axis velocity.

The offset of the measuring window only functions reliably when the axis velocity

- within the measuring window is constant and
- known before the function call.

You can determine the response times for your configuration using the following tables. The values in the tables refer to set system cycle clocks. By using the actual times, you can calculate the response time in milliseconds.

The following abbreviations are used in the tables:

- (IS) IPO cycle clock or position control cycle clock
(is dependent on whether the measuring input is processed in the IPO or position control cycle clock; can be selected during the configuration of the measuring input)
- (DP) Cycle time on the PROFIBUS DP

Tool calculates the anticipated response and rate times when using measuring inputs on different hardware More at:

- 4_TOOLSMEASURING_INPUT_CALCULATION

Table 7- 16 Activate measuring immediately

	SIMODRIVE 611U
_enableMeasuringInput → Ready to detect the measuring edge	3 (IS) + 7 (DP)
Detection of the measuring edge → Result in SIMOTION for further processing	2 (IS) + 10 (DP)
Total Minimum time between two measurements *)	5 (IS) + 17 (DP)

Table 7- 17 Measuring in the measuring window: Measuring edge is detected in the window

	SIMODRIVE 611U
_enableMeasuringInput → Ready for the evaluation of the measuring range (start of the measuring window)	2 (IS)
Start of the measuring window on the axis (mechanical) reached → Ready to detect the measuring edge	2 (IS) + 7 (DP)
Detection of the measuring edge → Result in SIMOTION for further processing	2 (IS) + 10 (DP)
Total Minimum time between two measurements *)	5 (IS) + 17 (DP)

Table 7- 18 Measuring in the measuring window: No measuring edge in the window

	SIMODRIVE 611U
_enableMeasuringInput → Ready for the evaluation of the measuring range (start of the measuring window)	2 (IS)
Start of the measuring window on the axis (mechanical) reached → Ready to detect the measuring edge	2 (IS) + 7 (DP)
Start of the measuring window on the axis (mechanical) reached → Reset: "Ready to detect the measuring edge"	2 (IS) + 7 (DP)
Resetting of the ready to measure → Checkback signal in SIMOTION for further processing	2 (IS) + 10 (DP)
Total Minimum time between two measurements *)	7 (IS) + 24 (DP)

*) In addition, the restrictions of the respective system must be taken into account.

7.10.3.9 Drive configuration for SIMODRIVE 611U

The commissioning tool SimoCom U is used for commissioning the SIMODRIVE 611U. This SimoCom U commissioning tool is intuitive for the most part. You are guided through the individual steps.

The connection to the drive can either be made via a serial interface or PROFIBUS DP.

1. Start SimoCom U.
2. A window appears in which you are asked whether you want to change the data for the drive.
3. Establish a serial connection (PROFIBUS DP) between SimoCom U and the drive.

4. Select **Find online drives....**

The advantage of this is that you do not have to enter the data for the controller card and the PROFIBUS module. This data is read out and displayed by SimoCom U.



Figure 7-109 Drive configuration for SIMODRIVE 611U

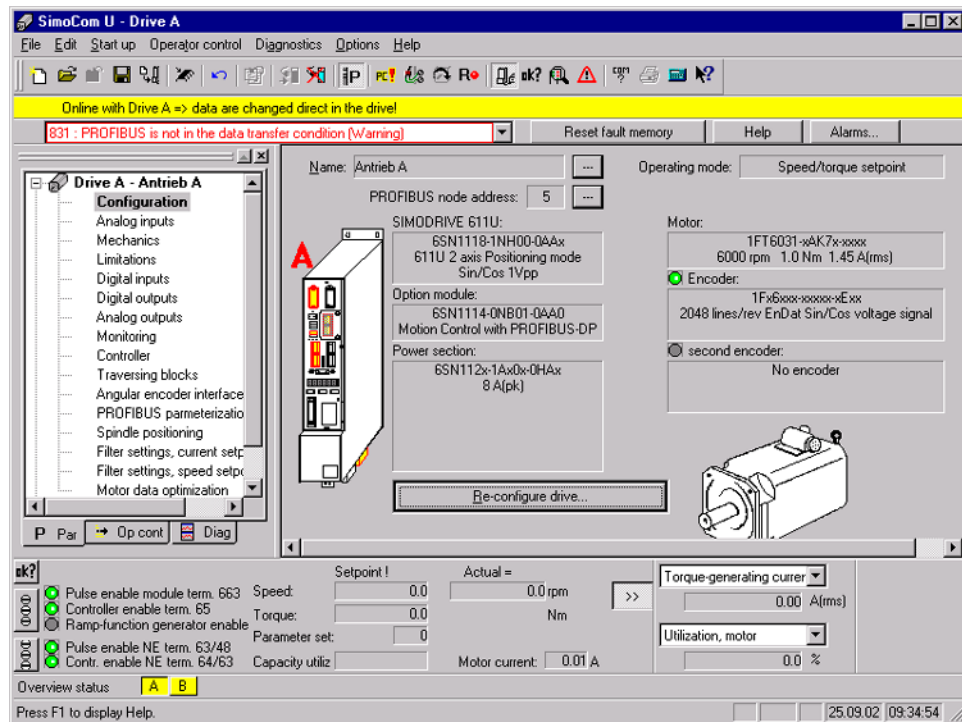


Figure 7-110 Drive configuration for SIMODRIVE 611U with SimoCom U

5. Click **Configuration** under Drive A.
6. Click the **Reconfigure drive** button in the working area.

Note

If you use a double axis module, you must perform the following procedure twice, for Drive A and Drive B. You must make sure that the PROFIBUS address setting is applicable to both drives. The same PROFIBUS message frame must be used for both drives.

7. Enter a name for the drive.

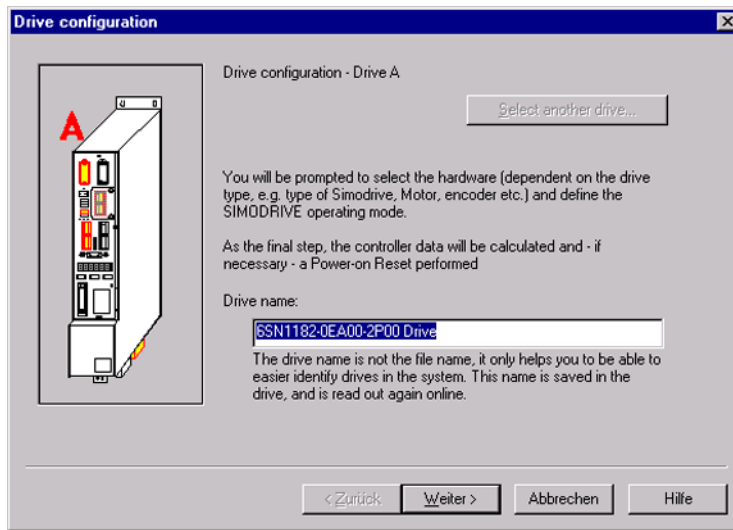


Figure 7-111 SimoCom U: Drive Configuration window

8. Click **Next**.

In the **Select SIMODRIVE** window, the order numbers of the controller module and the PROFIBUS module are displayed with a gray background, as you are connected online with the SIMODRIVE 611U. These input values cannot be changed.

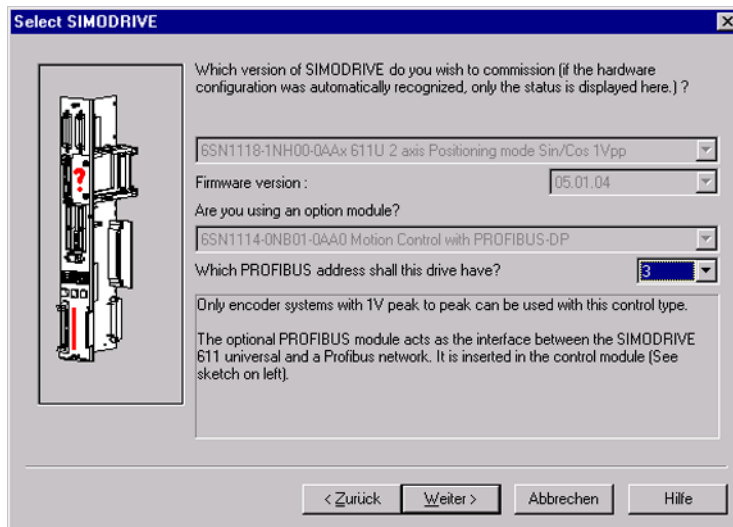


Figure 7-112 SimoCom U: SIMODRIVE Selection window

9. Enter the PROFIBUS address.
The address must agree with the bus address specified in the SIMOTION hardware configuration.

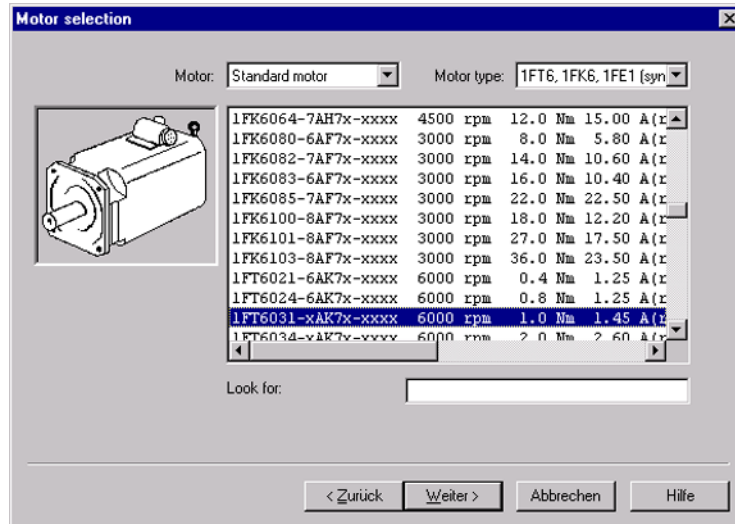


Figure 7-113 SimoCom U: Motor Selection window

10. Select the connected motor. You can find the data on the type plate of the motor.
11. Click **Next**.

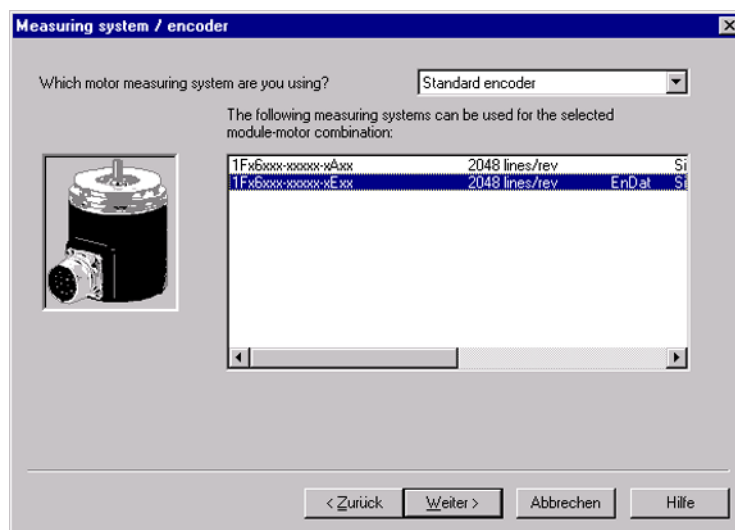


Figure 7-114 SimoCom U: Measuring System / Encoder window

12. Select the measuring system.

13. Click **Next**.

You require this data in **SIMOTION** to adjust the encoder when you commission the axis. Use this number to find the corresponding input values for the SIMOTION axis configuration in the "List of encoder data".

- In the **Operating Mode** window, you must select the **speed/torque setpoint**. This option is only available for the 611U closed-loop control modules that are also capable of positioning operation.

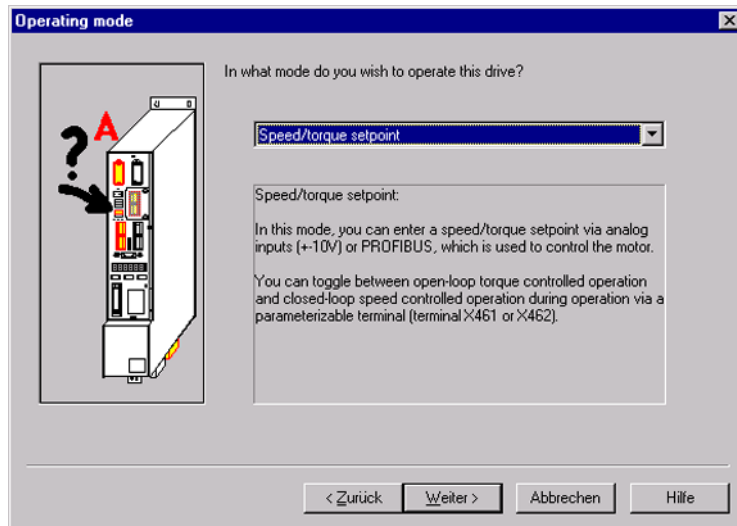


Figure 7-115 SimoCom U: Operating Mode window

14. Select the operating mode.

15. Click **Next**.

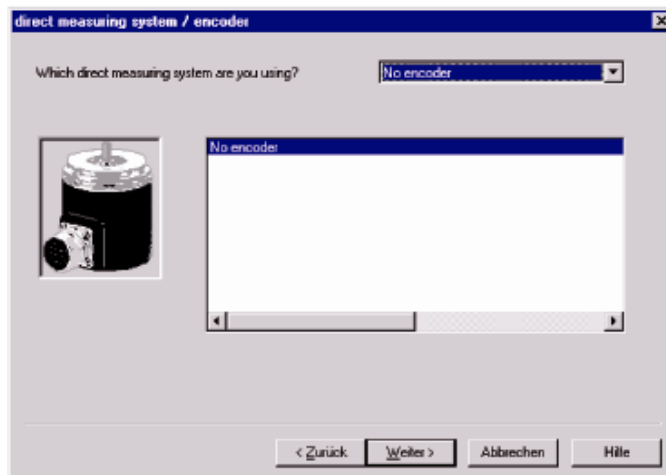


Figure 7-116 SimoCom U: Direct Measuring System / Encoder window

16. If desired, select the direct measuring system.

This encoder can only be measured on a double-axis module via the measuring input for Axis B. As a result, Axis B is no longer available for controlling an axis.

If you use the direct measuring system, you must select a PROFIBUS message frame that contains a second encoder. In SIMOTION, you can assign this encoder for the position control or create an external encoder that accesses this actual value.

17. Click **Next**.

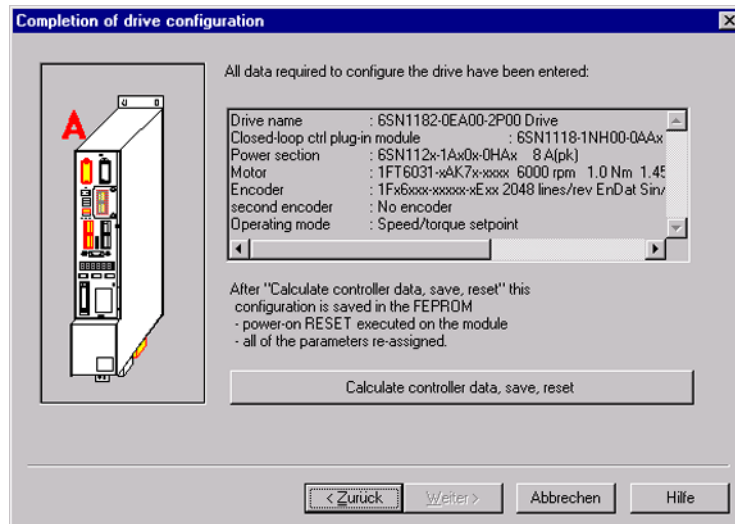


Figure 7-117 SimoCom U: Completion of the Drive Configuration window

The **Completion of the Drive Configuration** window displays a summary of the inputs.

18. Click **Calculate controller data, save, reset**.

19. Select the **PROFIBUS Parameterization** window. Here you can select the PROFIBUS address of the drive, 3 in this example, and the message frame, 105 in this example.

In **SIMOTION**, specify this data during the hardware configuration to adjust the drive.

Note

Error message for the drive enable.

If a TO alarm appears for the axis enable with absolute encoder, the encoder data is not yet valid on the drive interface. The status of the encoder system must be queried before calling the enable command. The enable command can be issued when the axis system variable `sensordata[1].state` displays the status VALID.

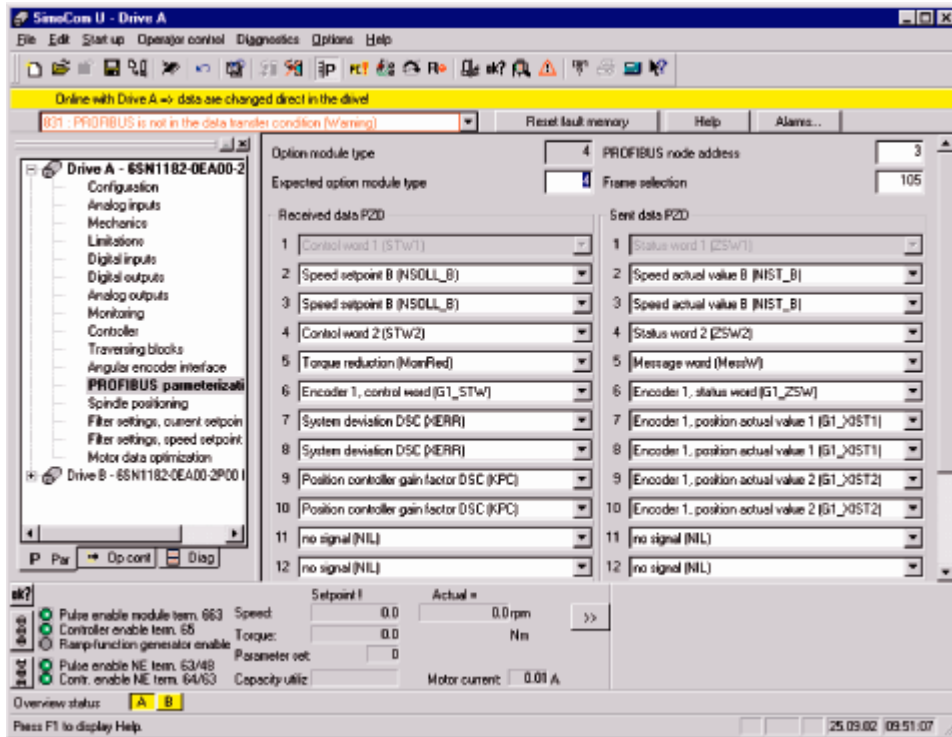


Figure 7-118 SimoCom U - Drive A

- Optional: Select the **Digital Inputs** window. Here you can define the function of input I0.x.

If you want to use the "measuring" in SIMOTION, you must select the "Flying measurement / length measurement" function here.

If you want to use the "External zero mark only homing" function in SIMOTION, you must select the "Equivalent zero mark" function here. In addition, you must enable the equivalent zero mark function via parameter **P879 Bit 13**.

Note

You cannot have "measuring" and "equivalent zero mark" active on a drive at the same time, because you may only select the functions on input I0.x. If you need both functions on a drive, you must switch the function. The section on "Expert functions" describes how you can write (switch) parameters in the drive from the user program.

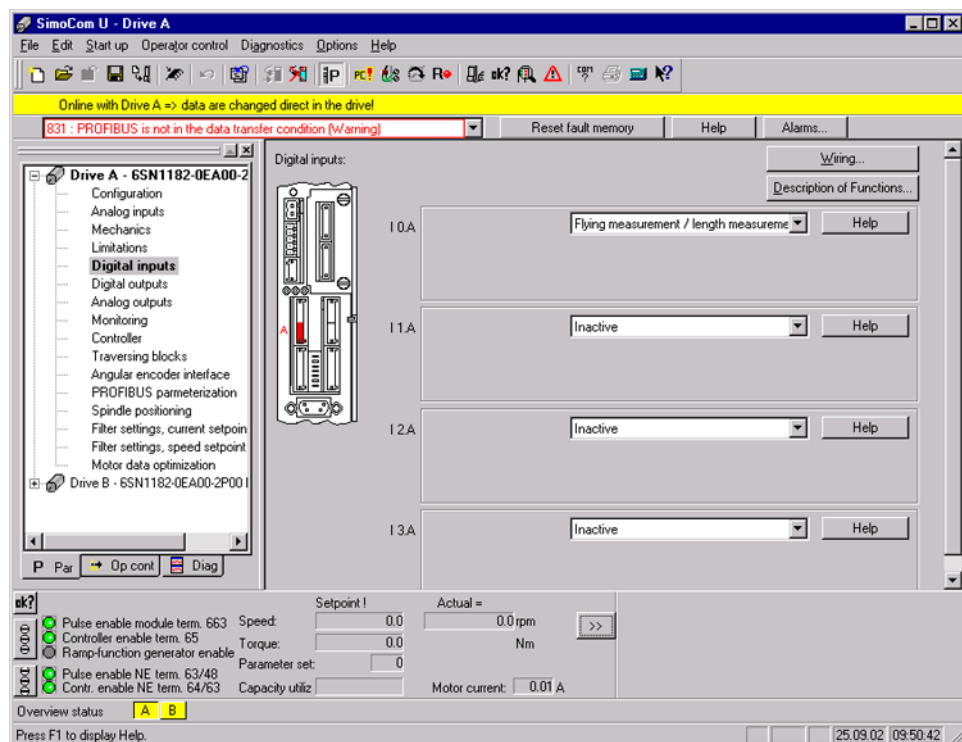


Figure 7-119 SimoCom U - Drive A digital inputs

Not all of the parameters for the SIMODRIVE 611U can be specified by means of technology screen forms. To enter parameters directly (e.g. parameter P879), open the **expert list**. Here you can select and modify the relevant parameters.

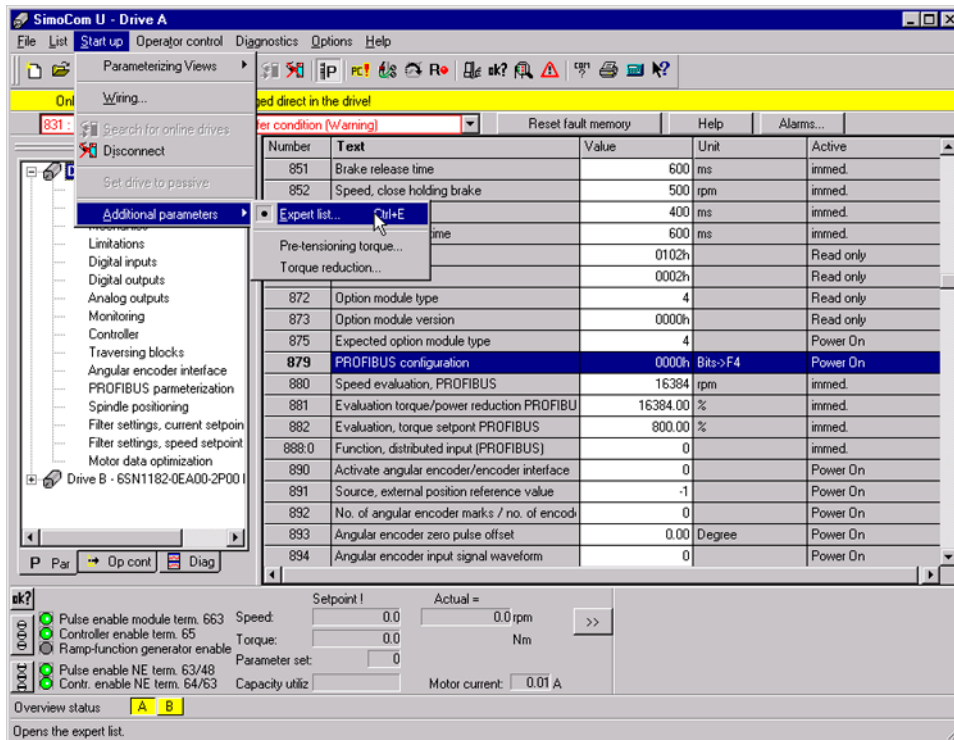


Figure 7-120 SimoCom U - Drive A expert list

Parameters to be entered directly:

- P879 Bit 13:**
Enabling of the equivalent zero mark function. This setting is necessary if you use the "External zero mark only homing" function. In addition, you must select the Equivalent zero mark function for input I0.x.
- P880:**
The scaling of the PROFIBUS speed value is specified here. For the maximum motor speed, a setpoint NSET = 4000 0000hex is transferred to the drive via the PROFIBUS. The P880 parameter is used to inform the SIMODRIVE 611U which speed should be set when NSET = 4000 0000 hex. This speed must agree with the "maximum motor speed" value specified when the axis was created (SIMOTION SCOUT: **Axis Configuration - Drive** window).

This concludes the drive configuration. If there are no errors, the green 5 VDC LED and the yellow STOP LED are now illuminated on the SIMOTION. The keyswitch is in the STOP position. The LED on the PROFIBUS module of the SIMODRIVE 611U is illuminated green.

The standard commissioning is now completed. You can continue with the section **Creating a sample program for positioning in SIMOTION SCOUT**.

If you would like to use special functions of the SIMODRIVE 611U from the user program, you should also read the **Expert functions** section.

7.10.4 Expert functions

This section explains functions that can be used in conjunction with the SIMODRIVE 611U and that go beyond the standard connection.

These functions primarily involve evaluating or influencing data (parameters) of the SIMODRIVE 611U in the user program. Several options are available for this:

- If the desired value is already contained in the message frame used for the axis connection, you can poll the value directly (cyclically).
- If the desired value is not contained in the used message frame, but can be provided cyclically by the SIMODRIVE 611U, it is possible to lengthen the message frame.
- If the value is not available cyclically, you can expand the message frame to include the parameter identifier value (PIV) mechanism and access the parameters of the SIMODRIVE 611U acyclically.

Furthermore, you can make certain operational settings on the SIMODRIVE 611U such as control of just one axis with the double-axis module, or utilize functions such as using unassigned analog inputs and outputs in the user program.

Note

This section assumes that you are well-acquainted with the functions of the SIMODRIVE 611U. The function options are only briefly presented. For more information, refer to the Description of Functions for SIMODRIVE 611 universal "Closed-Loop Control Components for Closed-Loop Speed Control and Positioning".

Important parameters on the SIMODRIVE 611U

The table lists the parameters of the SIMODRIVE 611U that are evaluated in connection with SIMOTION or must be taken into account during adaptation to SIMOTION.

Some of the listed parameters are entered during the standard commissioning.

Table 7- 19 Selection of some parameters and their meaning

Parameter	Meaning
P 660	Function selection for input I0.x 79 Equivalent zero mark If the zero mark of the encoder cannot be evaluated during homing, a signal supplied by an appropriately mounted encoder can be fed in as "equivalent zero mark" via this input. 80 Measuring input Maximum number of measuring inputs for SIMODRIVE 611U = 1; Caution: Measuring can only be performed via this input (I0.x).
P 700	Operating mode For 2-axis module only: Axis B can be deselected.
P 875	Expected optional module type PROFIBUS communication for Drive B can be deactivated here, if only one axis is operated on the 2-axis module.

Parameter	Meaning
P 879	Sign-of-life monitoring in the drive is active Bit 0,1,2: Permissible sign-of-life errors Bit 8: Deselect sign-of-life monitoring Bit 12: Activate direct measuring system Bit 13: Use incremental measuring system with equivalent zero mark
P 880	Specifies scaling of the speed for motion with PROFIBUS DP. Here you specify the maximum speed of the motor. You must also specify this speed when creating the axis in SIMOTION SCOUT.
P 881	Specifies scaling of torque reduction for motion with PROFIBUS DP.
P 915	PZD setpoint assignment for PROFIBUS
P 916	PZD actual value assignment for PROFIBUS
P 918	DP slave address as specified in the project with HW Config.
P 922	Message frame type as specified in the project on the axis.
P 1001	Speed controller cycle clock Input value 4 → 4 x 31.25 μs = 125 μs for sin/cos 1 Vpp drives Input value 16 → 16 x 31.25 μs = 500 μs for resolver drives
P 1042	Fine resolution of absolute track G1_XIST1 → fixed input value: 11
P 1044	Fine resolution of absolute track G2_XIST1 → fixed input value: 11
P 1043	Fine resolution of absolute track G1_XIST2 → fixed input value: 9
P 1045	Fine resolution of absolute track G2_XIST2 → fixed input value: 9
P 1795	Firmware for option module
P 1799	Firmware for closed-loop controller

PROFIBUS message frame

Your application may require that certain drive data be evaluated in the user program. Using the message frame structure, you can see which data are available by default for evaluation with the respective message frame. You may read, but not modify the data in the user program as this data is supplied by the axis.

7.10 SIMODRIVE 611U to SIMOTION

	PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10	PZD 11	PZD 12	PZD 13	PZD 14	PZD 15	PZD 16
MF_1 set	STW 1	NSE T_A														
MF_1 act	ZSW 1	NACT_A														
MF_2 set	STW 1	NSET_B		STW 2												
MF_2 act	ZSW 1	NACT_B		ZSW 2												
MF_3 set	STW 1	NSET_B		STW 2	G1_STW											
MF_3 act	ZSW 1	NACT_B		ZSW 2	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2								
MF_4 set	STW 1	NSET_B		STW 2	G1_STW	G2_STW										
MF_4 act	ZSW 1	NACT_B		ZSW 2	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2		G2_ZSW	E.g. G2_XIST1		E.g. G2_XIST2			
MF_5 set	STW 1	NSET_B		STW 2	G1_STW	XERR		KPC								
MF_5 act	ZSW 1	NACT_B		ZSW 2	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2								
MF_6 set	STW 1	NSET_B		STW 2	G1_STW	G2_STW	XERR		KPC							
MF_6 act	ZSW 1	NACT_B		ZSW 2	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2		G2_ZSW	E.g. G2_XIST1		E.g. G2_XIST2			
MF10 1 set	STW 1	NSET_B		STW 2	M_R ed	DAC 1	DAC 2									
MF10 1 act	ZSW 1	NACT_B		ZSW 2	Meld W											
MF10 2 set	STW 1	NSET_B		STW 2	M_R ed	G1_STW										
MF10 2 act	ZSW 1	NACT_B		ZSW 2	Meld W	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2							
MF10 3 set	STW 1	NSET_B		STW 2	M_R ed	G1_STW	G2_STW									
MF10 3 act	ZSW 1	NACT_B		ZSW 2	Meld W	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2		G2_ZSW	E.g. G2_XIST1		E.g. G2_XIST2		
MF10 5 set	STW 1	NSET_B		STW 2	M_R ed	G1_STW	XERR		KPC							
MF10 5 act	ZSW 1	NACT_B		ZSW 2	Meld W	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2							
MF10 6 set	STW 1	NSET_B		STW 2	M_R ed	G1_STW	G2_STW	XERR		KPC						
MF10 6 act	ZSW 1	NACT_B		ZSW 2	Meld W	G1_ZSW	E.g. G1_XIST1		E.g. G1_XIST2		G2_ZSW	E.g. G2_XIST1		E.g. G2_XIST2		

Figure 7-121 Message frame structure

Table 7- 20 Signal list assignment

SIMODRIVE 611U signal number	Designation	Short designation	Signal length
50001	Control word 1	STW1	16 bit
50003	Control word 2	STW2	16 bit
50005	Speed setpoint A (nset-h)	NSET_A	16 bit
50007	Speed setpoint B (n-set (h + l))	NSET_B	32 bit
50009	Encoder 1 control word	G1_STW	16 bit
50013	Encoder 2 control word	G2_STW	16 bit
50017	Encoder 3 control word	G3_STW	16 bit
50025	System deviation (DSC)	XERR	32 bit
50026	Position controller gain factor (DSC)	KPC	32 bit
50002	Status word 1	ZSW1	16 bit
50004	Status word 2	ZSW2	16 bit
50006	Actual speed value A (nact-h)	NACT_A	16 bit
50008	Actual speed value B (n-act (h + l))	NACT_B	32 bit
50010	Encoder 1 status word	G1_ZSW	16 bit
50011	Encoder 1 actual position value 1	G1_XIST1	32 bit
50012	Encoder 1 actual position value 2	G1_XIST2	32 bit
50014	Encoder 2 status word	G2_ZSW	16 bit
Device-specific signals for "SIMODRIVE 611 universal":			
50015	Encoder 2 actual position value 1	G2_XIST1	32 bit
50016	Encoder 2 actual position value 2	G2_XIST2	32 bit
50101	Torque reduction	MomRed	16 bit
50103	Analog output Terminal 75.x/15	DAC1	16 bit
50105	Analog output Terminal 16.x/15	DAC2	16 bit
50107	Digital outputs Terminals O0.x to O3.x	DIG_OUT	16 bit
50111	Distributed inputs	DezEing	16 bit
50113	Torque setpoint external	MsetExt	16 bit
50102	Message word	MeldW	16 bit
50104	Analog input Terminal 56.x/14	ADC1	16 bit

SIMODRIVE 611U signal number	Designation	Short designation	Signal length
50106	Analog input Terminal 24.x/20	ADC2	16 bit
50108	Digital inputs Terminals I0.x to I3.x	DIG_IN	16 bit
50110	Utilization	AusI	16 bit
50112	Active power	Pactive	16 bit
50114	Smoothed torque setpoint	Mset	16 bit
50116	Smoothed torque-producing current Iq	IqGl	16 bit

Adapting message frames individually

The drive may require additional functions, beyond the predefined message frames, for an application. It is possible to expand the predefined message frame for this purpose. These additional words can be addressed via the I/O interface of SIMOTION. The technology object does not access this data.

To adapt a message frame individually:

1. Find the message frame type required for your axis type from the table above.
2. In HW Config, append the desired number of additional words **after the last word** of the selected message frame.
Note: As the message frame structure no longer corresponds to the selected message frame type, another message frame or "no message frame" is displayed.
3. When creating the TO in SIMOTION, you must specify the originally selected message frame type. The TO evaluates only the number of words corresponding to the specified message frame type. The additional words can be processed in the user program.
4. In the SIMODRIVE 611U, you must generate the desired message frame structure manually using the signal numbers. To do this, set parameter P922 to 0. You can use parameter P915 Index 1 to 16 and parameter P916 Index 1 to 16 to enter the signal numbers corresponding to the message frame.

A maximum of 16 PZD words can be read or written.

Furthermore, an expansion to include the PIV area is possible. This enables parameter contents to be read or written by means of a job mechanism.

The following procedure must be followed:

1. Find the message frame type required for your axis type in the table.
2. In HW Config, select the PIV area.
Comment: As the message frame structure no longer corresponds to the selected message frame type, another message frame or "no message frame" is displayed.

The step-by-step procedure for the expansion of the message frame is described using two examples.

Example 1: Expanding the process data area

The signals of the process data area are updated in the PROFIBUS cycle clock. The evaluation takes place on the SIMODRIVE 611U in the speed control cycle clock (default 125 □ s).

Task

Based on the desired axis functionality, message frame 102 is to be used to connect the SIMODRIVE 611U.

Both of the analog inputs of the SIMODRIVE 611U are to be read in the user program.

An analog value of 0 to 10 V is to be output via the two analog outputs.

The actual torque value of the drive is to be evaluated in the user program.

Note

The analog channels on the SIMODRIVE 611U are not required for the PROFIBUS connection, and the user can make use of these as desired.

In order to utilize the functions, message frame 102 must be expanded as follows:

	PZD 1	PZD 2	PZD 3	PZD 4	PZD 5	PZD 6	PZD 7	PZD 8	PZD 9	PZD 10	PZD 11	PZD 12	PZD 13	PZD 14-16
MF set	STW1	NSET_B		STW2	M_Red	G1_S TW	DAC1	DAC2						
P915 (611U)	50001	50007	5007	50003	50101	50009	50103	50105						
MF act	ZSW1	NACT_B		ZSW2	Meld W	G1_Z SW	G1_XIST1		G1_XIST2		ADC1	ADC2	Mset	
P916 (611U)	50002	50008	50008	50004	50102	50010	50011	50011	50012	50012	50104	50106	50114	

Message frame 102

Additional functions

Not assigned

Figure 7-122 Message frame 102

Adaptations for SIMODRIVE 611U with SimoCom U

Settings differ from those described in the section on "Commissioning" as follows:

1. Call up the **Analog outputs** menu item in the SimoCom U.
2. Parameterize
the function **Signal DAC1 from PROFIBUS PP0** for the first output,
the function **Signal DAC2 from PROFIBUS PP0** for the second output.
3. Expand the PROFIBUS message frame via the expert list as follows.
Approach:
 - P922 = 102
This results in a standard assignment of the P915 and P916 parameters corresponding to message frame 102.
 - P922 = 0
This setting enables you to freely set up the message frame using the P915 and P916 parameters. The standard assignment (step 1) is still available, i.e. you only have to enter the additional signals.

P915:1 to P915:6 → standard assignment corresponding to message frame 102 setpoints
P915:7 = 50103 → analog output 1 (DAC1)
P915:8 = 50105 → analog output 2 (DAC2)
P916:1 to P916:10 → standard assignment corresponding to message frame 102 actual values
P916:11 = 50104 → analog input 1 (ADC1)
P916:12 = 50106 → analog input 2 (ADC2)
P916:13 = 50114 → smoothed torque setpoint (Mset)

Settings via SIMOTION SCOUT

Settings differ from those described in the section on "Commissioning" as follows:

Configuring the hardware:

- Message frame selection:
Select message frame 102.
- Change the length from 6 to 8 in the Setpoint line
(2 additional words DAC1 and DAC2)
- Change the length from 10 to 13 in the Actual value line
(3 additional words ADC1, ADC2 and Mset)

Note the I/O start address for both areas, for example, 256.

Note

Due to this change, the message frame structure no longer corresponds to message frame 102. For this reason, either "No message frame" or another message frame type is displayed after the change, which you can ignore. You address the drive using the originally intended message frame type, 102 in our example.

Creating the TO axis

- **Axis configuration:**
The drives created in the HW configuration can be selected here. Select the required drive.
- **Message frame:**
Specify message frame type 102. The part of the message frame relevant for the TO axis, corresponds to message frame 102.

Creating the I/O area

Create two I/O output words and three I/O input words for the additional functions in the I/O container. The addresses are calculated as follows:

- $\text{Address} = \text{message frame start address} + (\text{PZD number} - 1) \times 2$
- Example for ADC2:

Message frame start address: 256

ADC2 is on PZD12: 12

I/O input address for ADC2 = $256 + (12 - 1) \times 2 = 278$

Activating the PIV area

You can perform the following tasks via the PIV area (PIV = parameter identifier value):

- Request parameter value (reading of parameters)
- Change parameter value (writing of parameters)

The PIV area consists of 8 bytes.

Table 7- 21 PIV area

Bit 0-10 = PNU Bit 12-15 = AK		Reserved	IND	PWE			
Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8

PNU: parameter number

AK: request or response ID

IND: subindex, subparameter number, array index

PWE: parameter value

The exact structure and handling of the area is contained in the Description of Functions for SIMODRIVE 611U.

Task in example 2

- Based on the desired axis functionality, message frame 102 is to be used to connect the SIMODRIVE 611U.
- The motor temperature is to be read out from parameter P603 in the user program.

Adaptations for SIMODRIVE 611U with SimoCom U

Settings differ from those described in the section on "Commissioning" as follows: None

Settings via SIMOTION SCOUT

Settings differ from those described in the section on "Commissioning" as follows:

Configuring the hardware

- Message frame selection: Select message frame 102
- Click the "No PIV area" cell and select the "PIV area" setting.

Note the I/O start address for the PIV area, for example, 256.

Note

Due to this change, the message frame structure no longer corresponds to message frame 102. For this reason, either "No message frame" or another message frame type is displayed after the change, which you can ignore. You address the drive using the originally intended message frame type (102 in our example).

Creating the TO axis

- Axis configuration:
The drives created in the HW configuration can be selected here. Select the required drive.
- Message frame:
Specify message frame type 102. The message frame structure relevant for the TO axis, corresponds to message frame 102.

Creating the I/O area

Create one I/O input byte array for the response area and one I/O output byte array for the request area in the I/O container, with each array having a length of 8 bytes. The start is on the I/O address you noted for the PIV area (hardware configuration).

Example for requesting the P603 parameter (motor temperature):

Request ID: 6 → (request parameter value (array); refer to SIMODRIVE 611U - Description)

Parameter number: 603 = 16#25B

Index: 0

Table 7- 22 PIV area

	Bit 0-10 = PNU Bit 12-15 = AK		Reserved	IND	PWE			
	Byte 1	Byte 2	Byte 3	Byte 4	Byte 5	Byte 6	Byte 7	Byte 8
Request area	16#62	16#5B	0	0	0	0	0	0
Response area	16#42	16#5B	0	0	Data 4	Data 3	Data 2	Data 1

Note

The entered response identifier (4) corresponds to the positive request transaction.

Deactivating the sign-of-life monitoring

The PROFIBUS connection between SIMOTION and the SIMODRIVE 611U is monitored using the sign-of-life. As a general principle, sign-of-life monitoring must be active during operation. Sign-of-life monitoring is automatically selected when the axis is created. In case of problems (for example, alarm 832 on the SIMODRIVE 611U), the sign-of-life monitoring can be deactivated temporarily for diagnostic purposes.

In **SIMOTION**, parameters for the sign-of-life monitoring can be selected or deselected on the TO axis via Expert list > Configuration datalifeSignCheck.

The sign-of-life monitoring can be deactivated in the **SIMODRIVE 611U** via parameter **P879 Bit 8**.

2. Activating the second encoder

In SIMOTION, you can use the second encoder input on the SIMODRIVE 611U double-axis module for the actual value acquisition. Axis B of the SIMODRIVE 611U cannot then be used to control a motor.

A PROFIBUS message frame must be used for the second encoder in **SIMOTION**.

When creating Axis A in the **SIMODRIVE 611U**:

Create the second encoder by specifying Which direct measuring system are you using? > Enter data. Then enter the required encoder type. Depending on the configuration of the SIMODRIVE 611U, it is necessary to adapt the following parameters:

Parameter P879 Bit 12 = 1 → Enable direct measuring system (Axis A)

Parameter P922 → PROFIBUS message frame type (Axis A)

Parameter P700 = 0 → Deselect Axis B (Axis B)

Parameter P875 = 0 → Expected option module type (Axis B)

7.10.5 Commissioning the 611U with DSC

To operate SIMOTION with DSC (dynamic servo control) on the SIMODRIVE 611U via the PROFIBUS, you must enter special settings in three places when you assign parameters.

Hardware configuration

For SIMODRIVE 611U, you must select a PROFIBUS message frame type that supports DSC. Here they are the message frames 5, 6, 105 and 106.

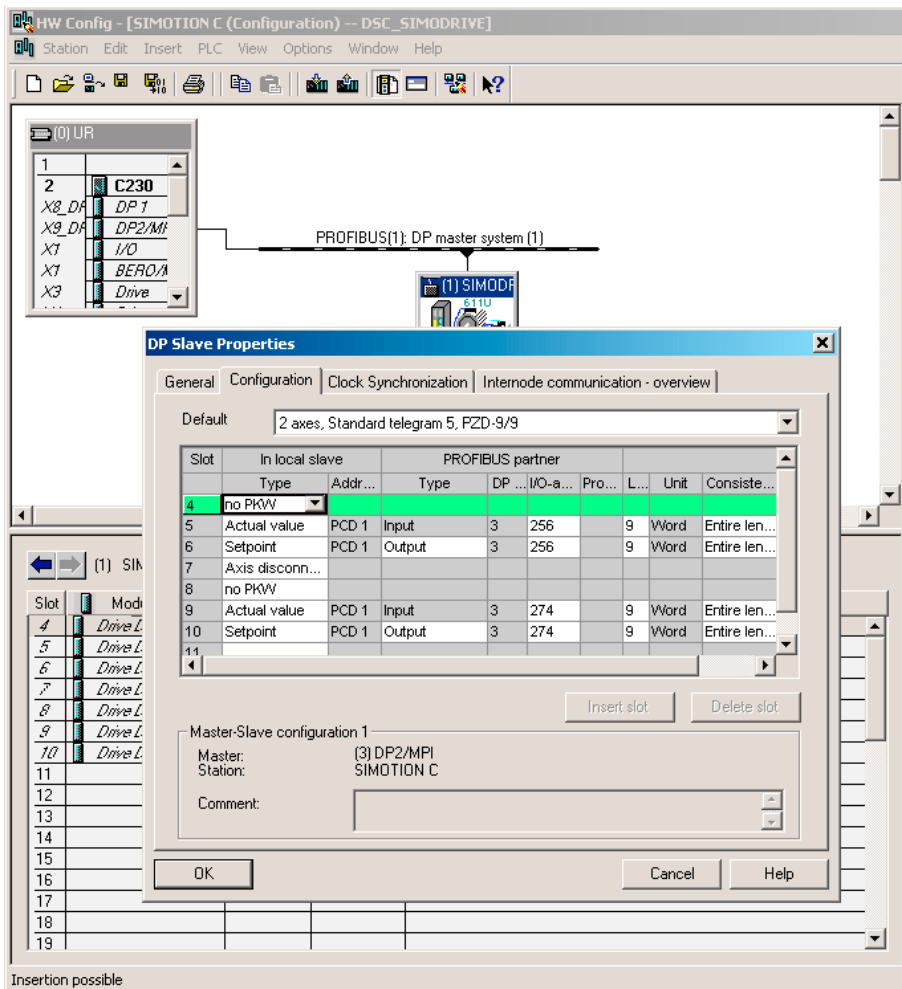


Figure 7-123 Message frame type in the HW Config

Activating DSC in SIMOTION SCOUT

You must activate a parameter in SIMOTION SCOUT in order to use the DSC function. DSC can be activated individually for each axis. This means that mixed operation is also possible.

DSC is activated via:

- Axis/Expert/Expert list/Configuration data/TypeOfAxis/NumberOfDataSets/DataSet_1/ControllerStruct/PV_Controller/enabledDSC=YES

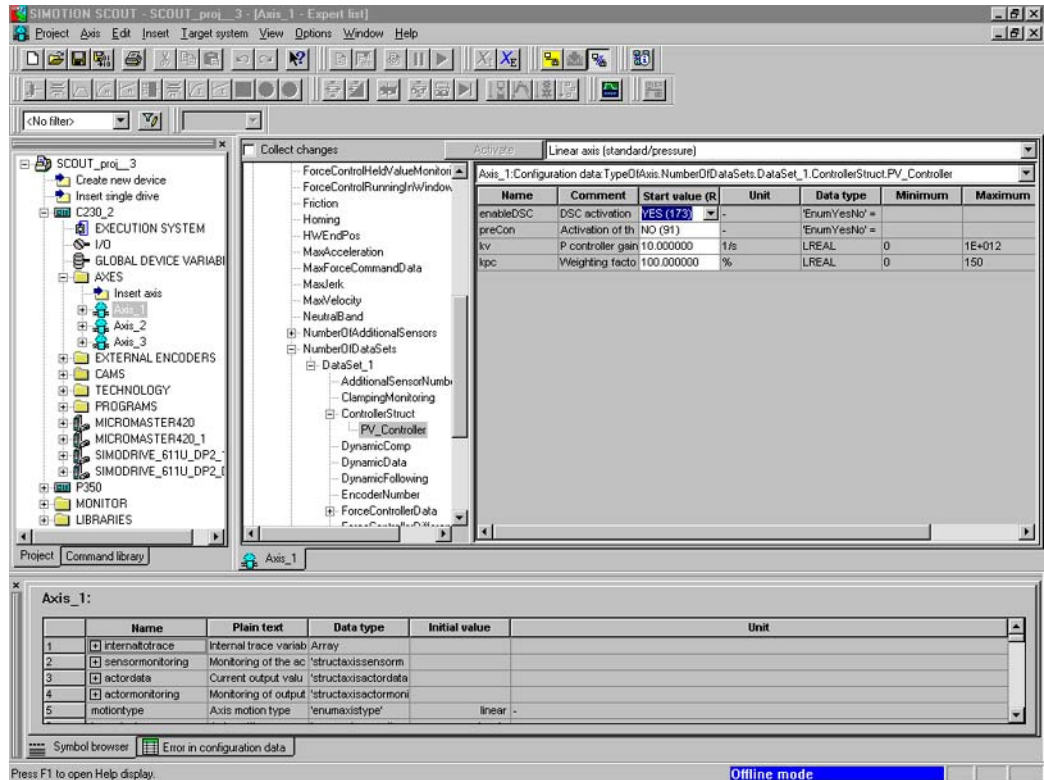


Figure 7-124 Activating DSC in SIMOTION SCOUT

Setting in the SIMODRIVE 611U

In the SIMODRIVE 611U, DSC is automatically activated when the PROFIBUS message frame type is set, i.e. the drive internal position controller is active as soon as Xerr (following error) and Kpc (position controller gain) are sent to the drive.

You should set the same message frame type selected in HW Config under PROFIBUS parameterization / message frame selection (corresponds to P922 in the expert list).

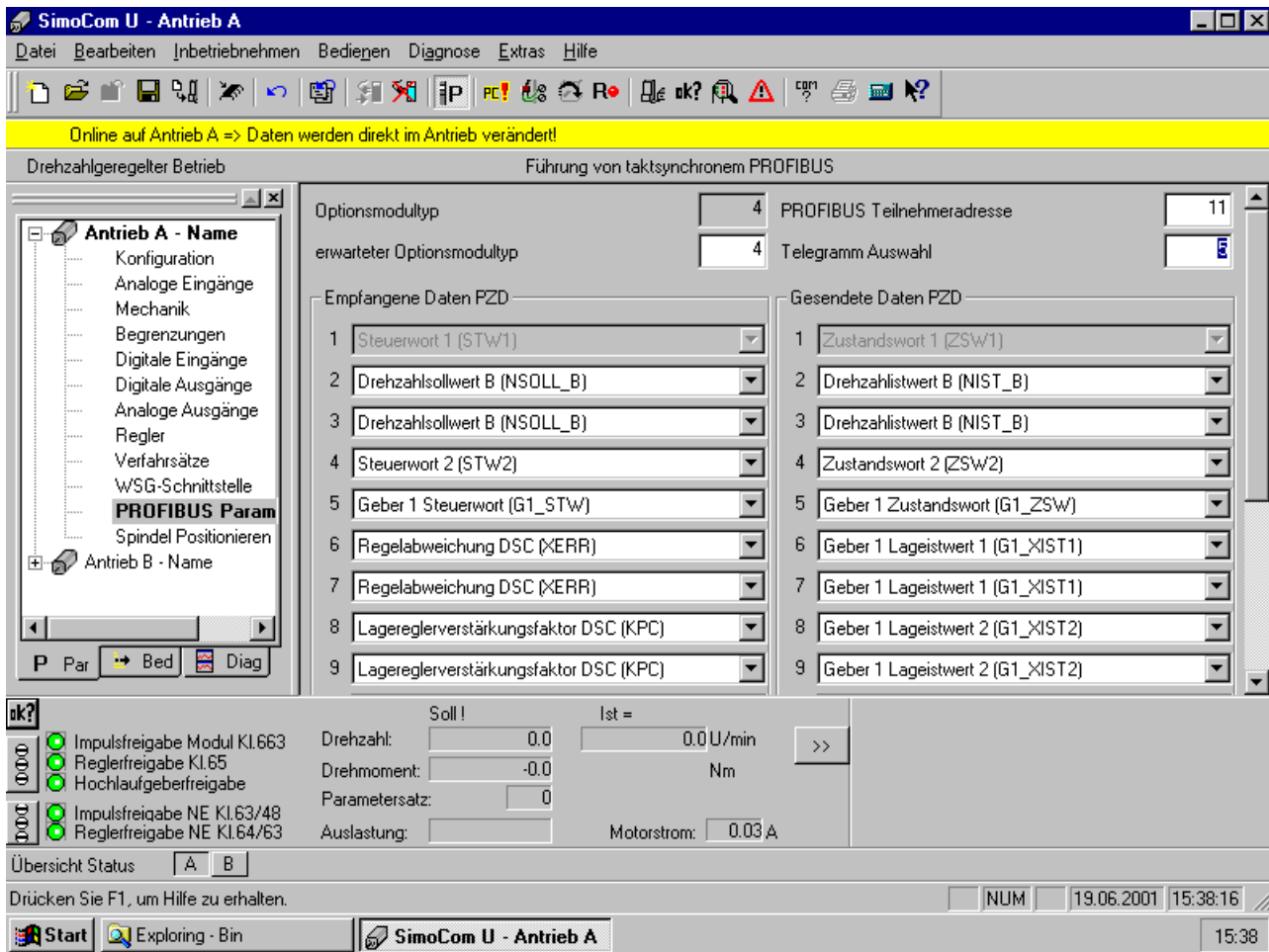


Figure 7-125 Setting during operation

7.11 Creating a sample program for positioning in SIMOTION SCOUT

Program overview

In this section, a program for positioning the connected axis is created in the **MCC** (Motion Control Chart) editor.

Inserting the programs

Set four programs with MCC.

- motion_1
- backgr
- perfault
- tecfault

Creating a program with MCC

1. Open the **Programs** folder under the created SIMOTION device in the project navigator.
2. Double-click **Insert MCC unit**.
3. Enter the name **motion_1** for the MCC unit.
4. Click the **Compiler** tab.
5. Activate the required settings.
6. Click **OK**. An MCC unit is created in the project navigator.
7. Double-click the MCC unit **motion_1** in the project navigator.
8. Double-click **Insert MCC chart**.
9. Enter the name **motion_1** for the MCC.
10. Click **OK**. The MCC is opened.
11. Click the **Single-axis commands > Switch axis enable** icon.
The command is inserted.
12. Click the **Single-axis commands > Position axis** icon.
The command is inserted.

13. Click the **Single-axis commands > Remove axis enable** icon. The command is inserted.

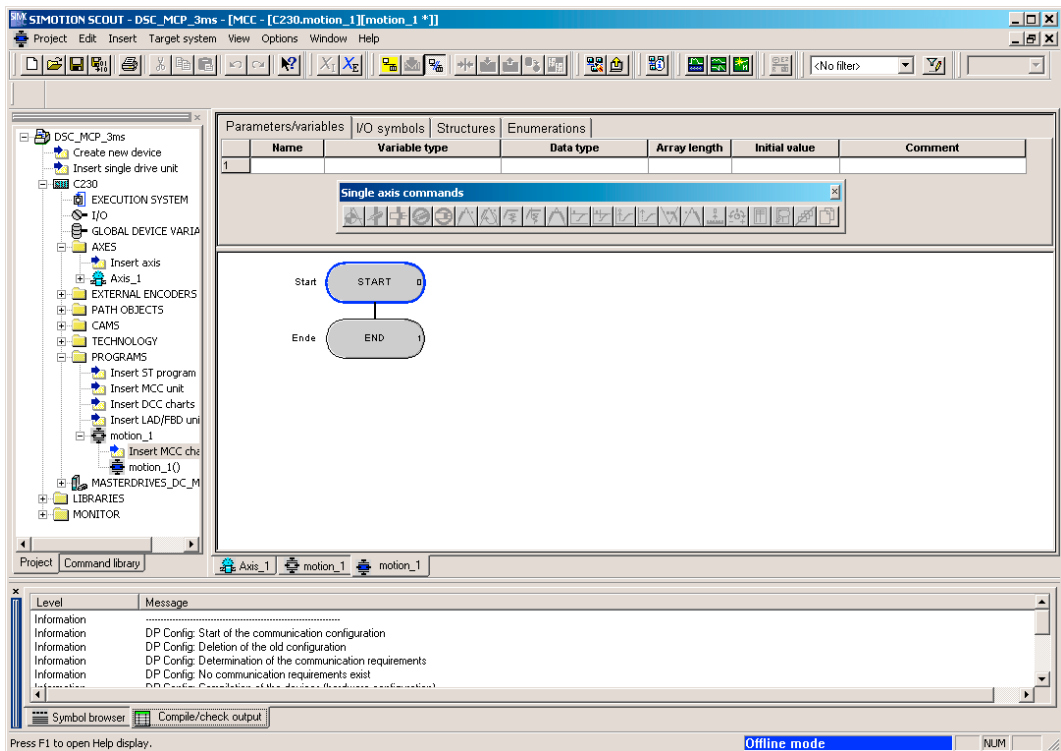


Figure 7-126 Menu bar of the single-axis commands

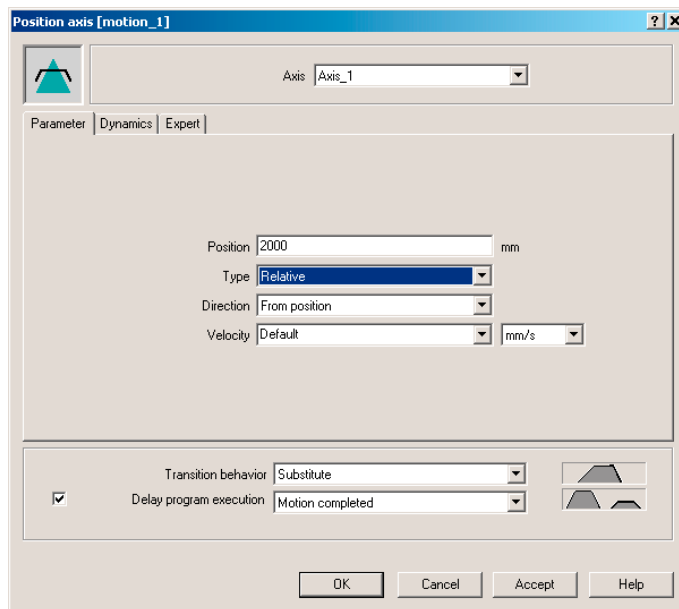


Figure 7-127 Opened command: Position axis

14. Double-click the **Switch axis enable** command.

15. Click **OK**.

16. Double-click the **Position axis** command.

17. Enter the value 2000 at Position.

18. Select **Relative** in the Type field.

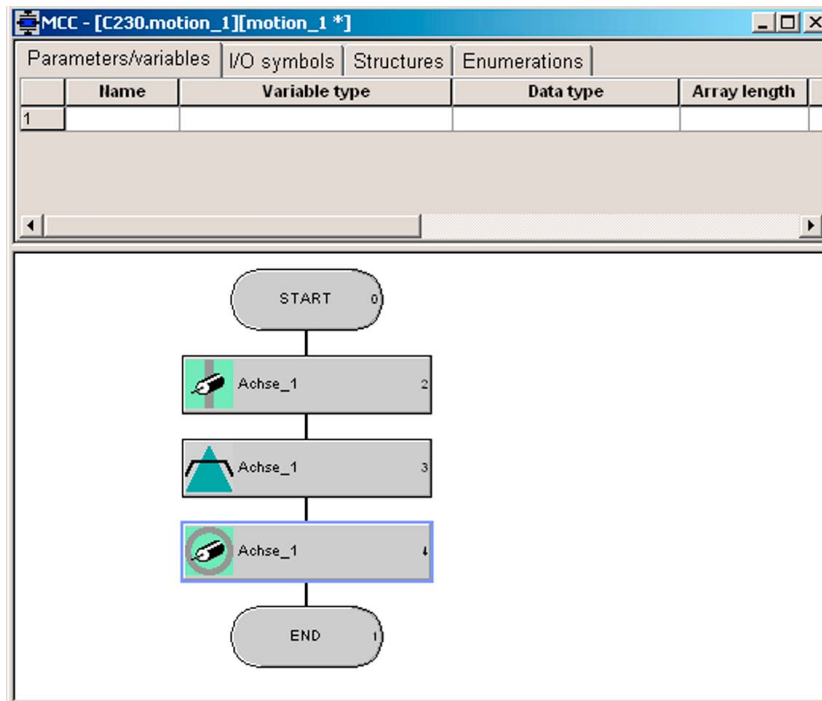


Figure 7-128 Arrangement of the single-axis commands in MCC motion_1

19. Click **OK**.

20. Double-click the **Remove axis enable** command.

21. Click **OK**.

22. Compile using the menu command **MCC chart > Apply and compile**.

Creating the backgr program

1. Double-click **Insert MCC unit**.
2. Enter the name **backgr** for the MCC unit.
3. Click the **Compiler** tab.
4. Activate the required settings.
5. Click **OK**. An MCC unit is created in the project navigator.
6. Double-click the MCC unit **backgr** in the project navigator.
7. Double-click **Insert MCC chart**.
8. Enter the name **backgr** for the MCC.
9. Click **OK**. The MCC is opened.

7.11 Creating a sample program for positioning in SIMOTION SCOUT

10. Enter the following variable data in the MCC unit **backgr**.

- In the Name field: Run
- As the variable type, select: VAR_GLOBAL
- As the data type, select: BOOL
- In the Initial value field: False

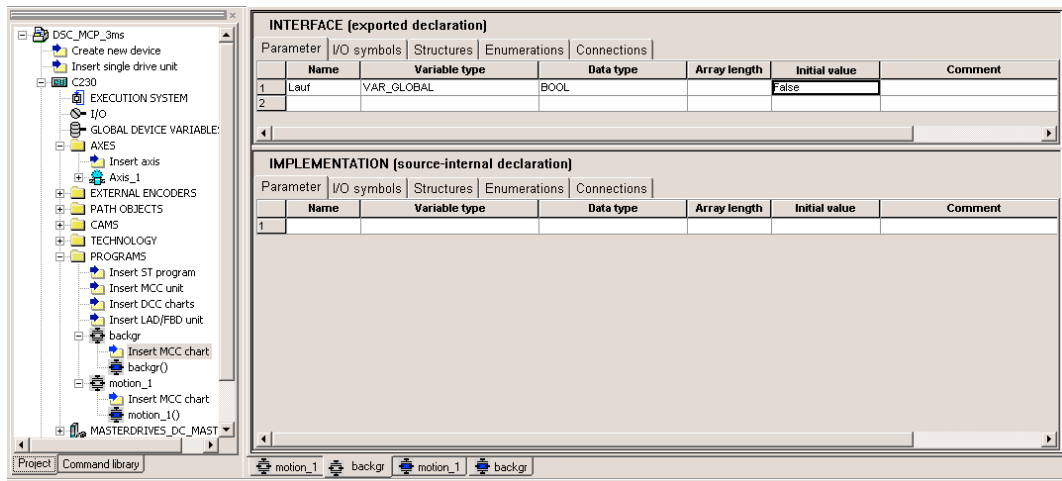


Figure 7-129 Entering a global variable

11. Switch to the MCC Chart **backgr** tab.

12. In the **Program structures** command bar, click on the **IF program branch** icon.

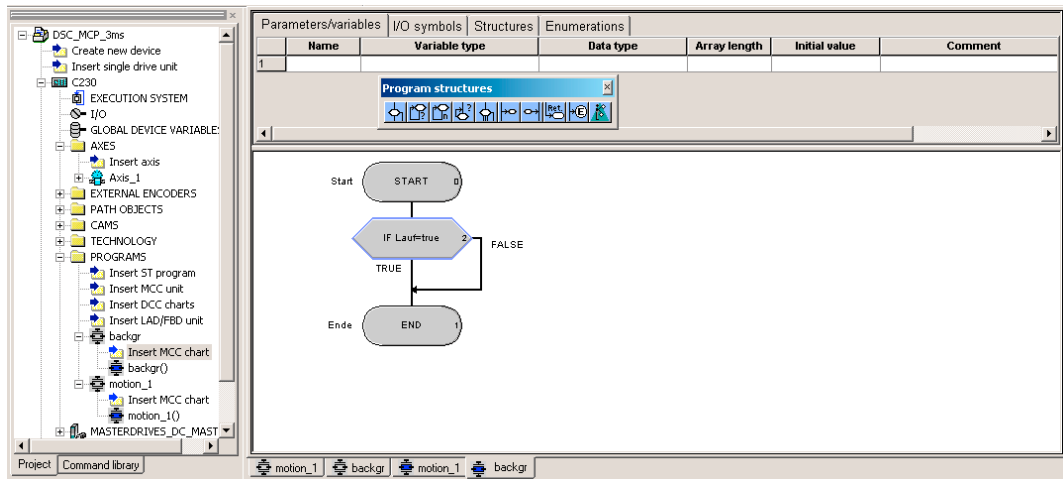


Figure 7-130 IF program branch under basic commands

13. Double-click the **IF program branch** command.

14. Select **Formula** and enter the condition **Run=true**.

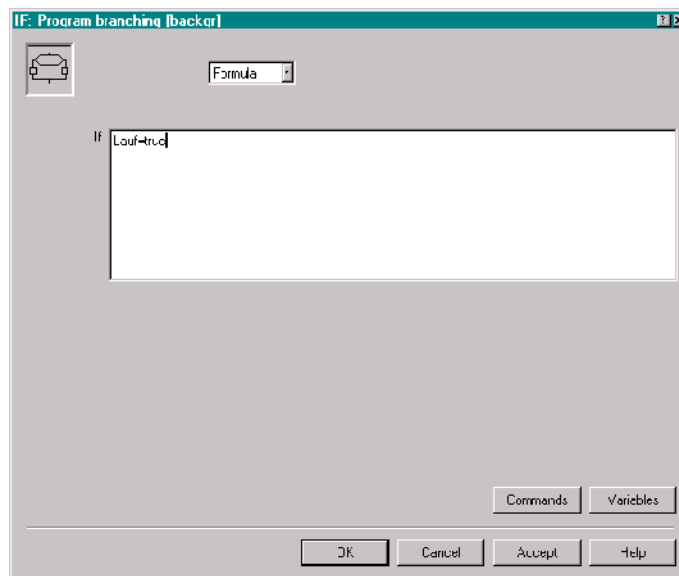


Figure 7-131 Configuration of the IF program branch

15. Confirm the input with **OK**.
16. In the **Task commands** command bar, select the command **Start task**.
This inserts the command.
17. In the **Important commands** command bar, select the command **Variable assignment**.
This inserts the command.
18. Double-click the **Start task** command.
19. Click **OK** to confirm.
20. Double-click the **Variable assignment** command.
21. Enter the statement **Run:=false**.

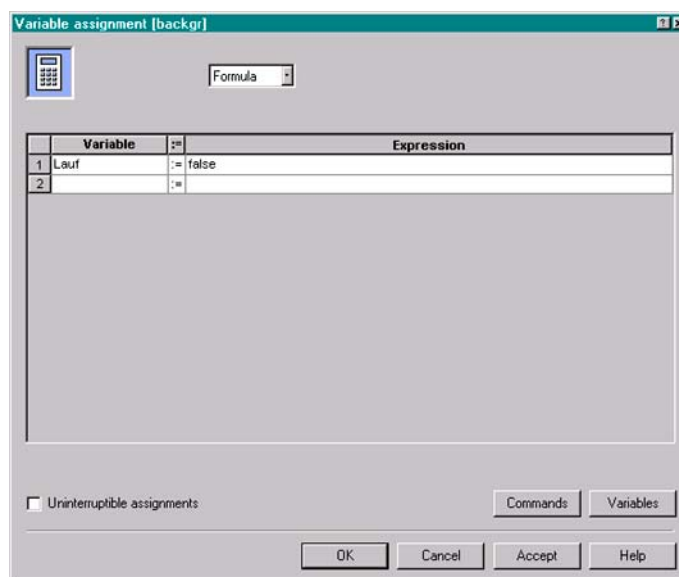


Figure 7-132 Configuration of the variable assignment

22. Click **OK** to confirm.

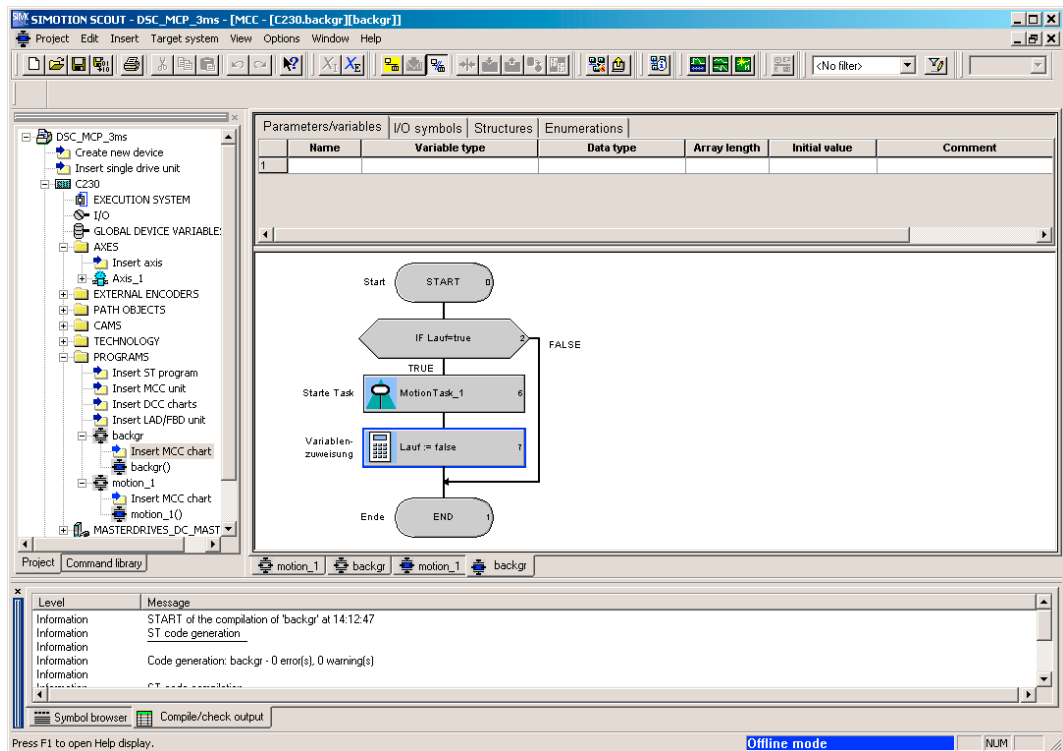


Figure 7-133 Completed program of the BackgroundTask

23. Select **MCC Chart > Accept and compile** from the menu bar. The detail display in the Compile/Check output tab indicates how compilation is progressing and when it is complete.

Creating the perfault program

1. Double-click **Insert MCC unit**.
2. Enter the name **perfault** for the MCC unit.
3. Click the **Compiler** tab.
4. Activate the required settings.
5. Click **OK**. An MCC unit is created in the project navigator.
6. Double-click the MCC unit **perfault** in the project navigator.
7. Double-click **Insert MCC chart**.
8. Enter the name **perfault** for the MCC.
9. Click **OK**. The MCC is opened.
10. Select from the menu bar **MCC chart > Apply and compile**.

Creating the tectfault program

The procedure for creating the **tecfault** program is exactly the same as for the **perfault** program.

In the MCC unit and MCC chart, enter **tecfault** as the name.

Assigning programs to the execution system

1. In the project navigator, double-click **Execution system** under the SIMOTION device. The execution system is opened in the working area.

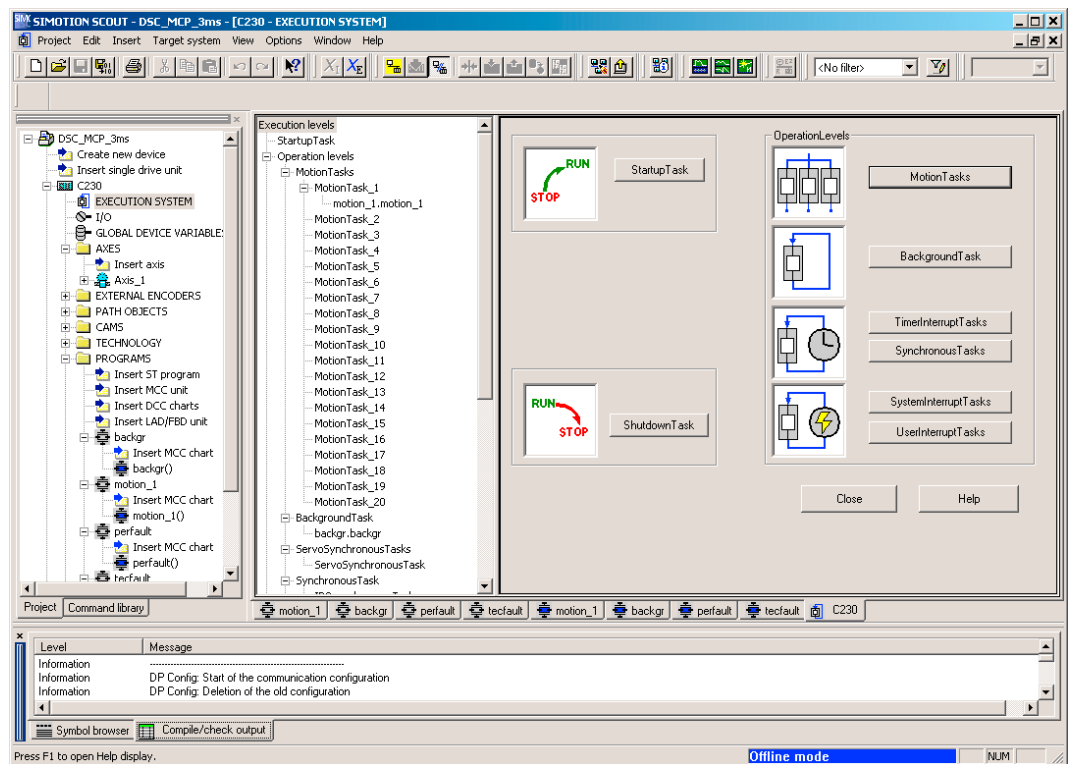


Figure 7-134 Execution system of the SIMOTION device

2. Click the **MotionTasks** button.
3. Assign the **motion_1** program to MotionTask_1.
4. Assign the **backgr** program to the BackgroundTask.
5. Assign the **perfault** program to the PeripheralFaultTask.

- Assign the **tecfault** program to the TechnologicalFaultTask.

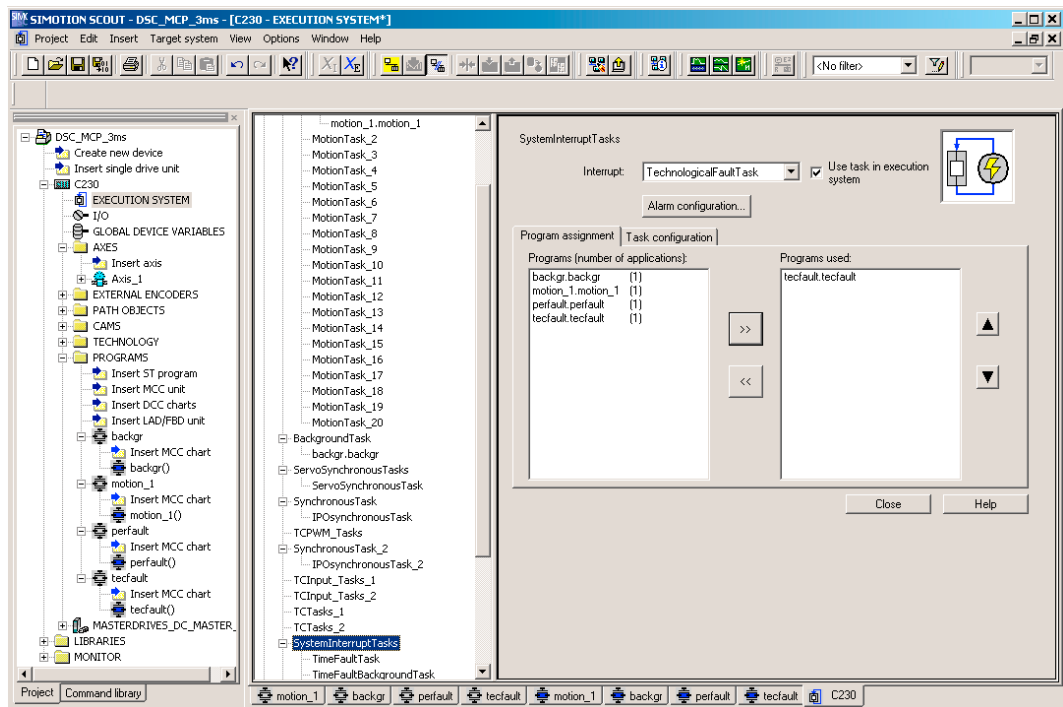


Figure 7-135 Assignment of the tasks in the task system

- Click the **Save project and compile all** button.

Loading the programs to the SIMOTION device and switching to RUN

The C230 toggle switch is still set to **STOP**.

- Establish an online connection. Click the **Connect to target system** button.
- Click the **Download project to target system** button.
This can take several minutes.
- Switch the SIMOTION device to **RUN** via the **keyswitch** after the project has been downloaded to the target system. Two LEDs, the green 5 VDC and the RUN LED, light up.

Monitoring and controlling in SIMOTION SCOUT

- Click the **Connect to target system** button.
- Select the **backgr** program.
- Select the **Symbol browser** tab.
- As **control value**, enter the variable Run "TRUE".
- Activate the setting in Status value.
- Click **Start status**. The value **FALSE** is displayed.
- Activate the setting in Control value.

8. Click **Control immediately**.

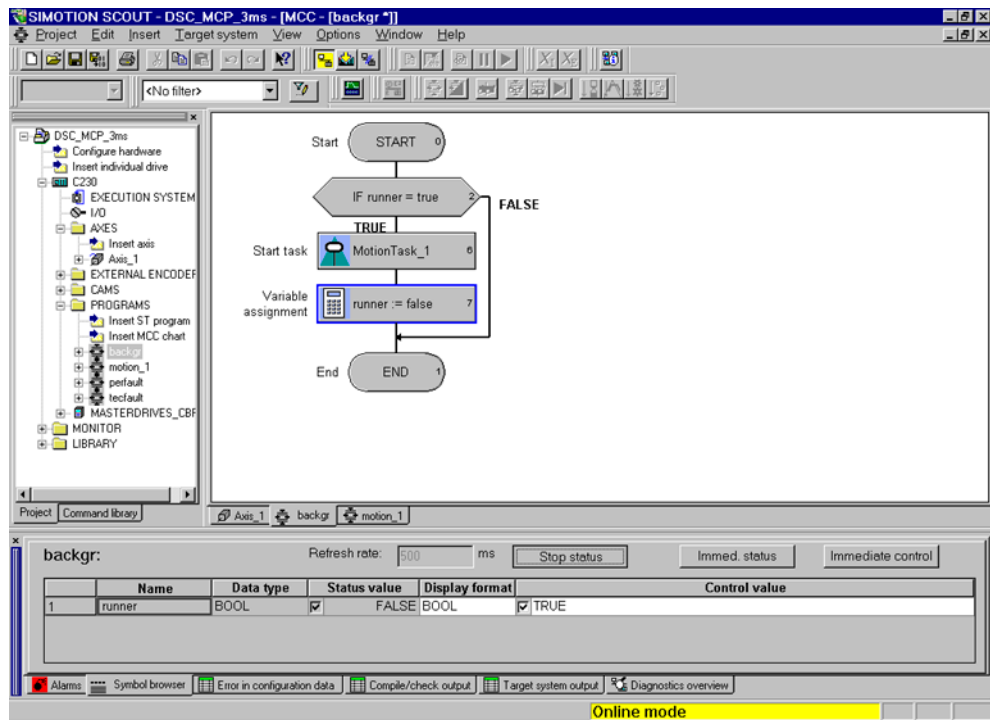


Figure 7-136 Monitoring and controlling the variable in the BackgroundTask

The motor now rotates at 6000 rpm and approaches the position 2000 mm. You can check this by selecting **Axis_1** under **Axes**, opening **positioningstate** in the symbol browser, and noting the **actualposition**.

7.11 Creating a sample program for positioning in SIMOTION SCOUT

9. Select the variable to be monitored.
10. Click **Start status**.

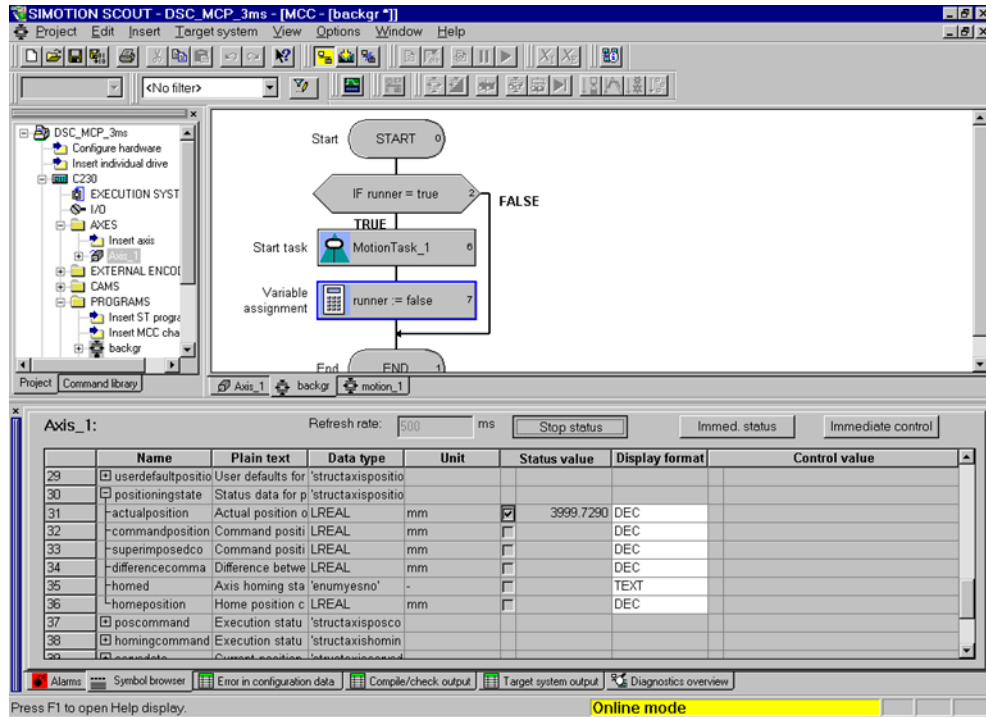


Figure 7-137 Checking the positioning motion in the symbol browser of Axis_1

When the axis has finished positioning, a value of 2000 mm appears here. If the positioning is restarted, the actual position value increases by 2000 mm for each motion.

7.12 Advanced Diagnostics on SCOUT crash

In the rare event of a SCOUT crash, important diagnostics data can be stored. This data is important for the reproducibility of the error in order to determine the cause. Contact the hotline straightaway and forward the diagnostics data.

The following dialog "Siemens Automation Diagnostics" would open:

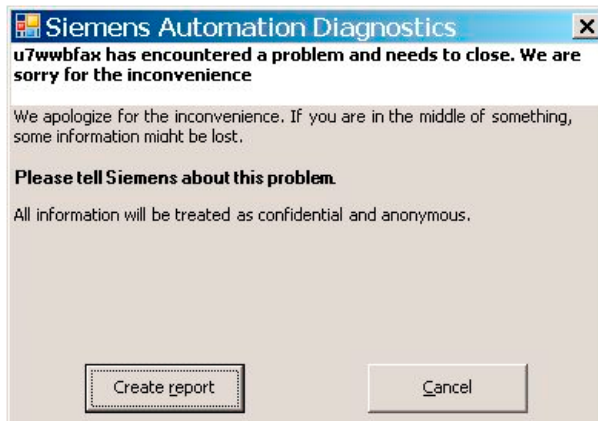


Figure 7-138 Siemens Automation Diagnostics

Please note the following:

1. Click on the **Create report** button to generate the diagnostics data. Another dialog opens.

Note

If you close the dialog by pressing **Cancel**, the diagnostics data is **not saved!**



Figure 7-139 Generate Diagnostics Data

2. Click **Details** button. Another "Siemens Automation Diagnostics" dialog is displayed.

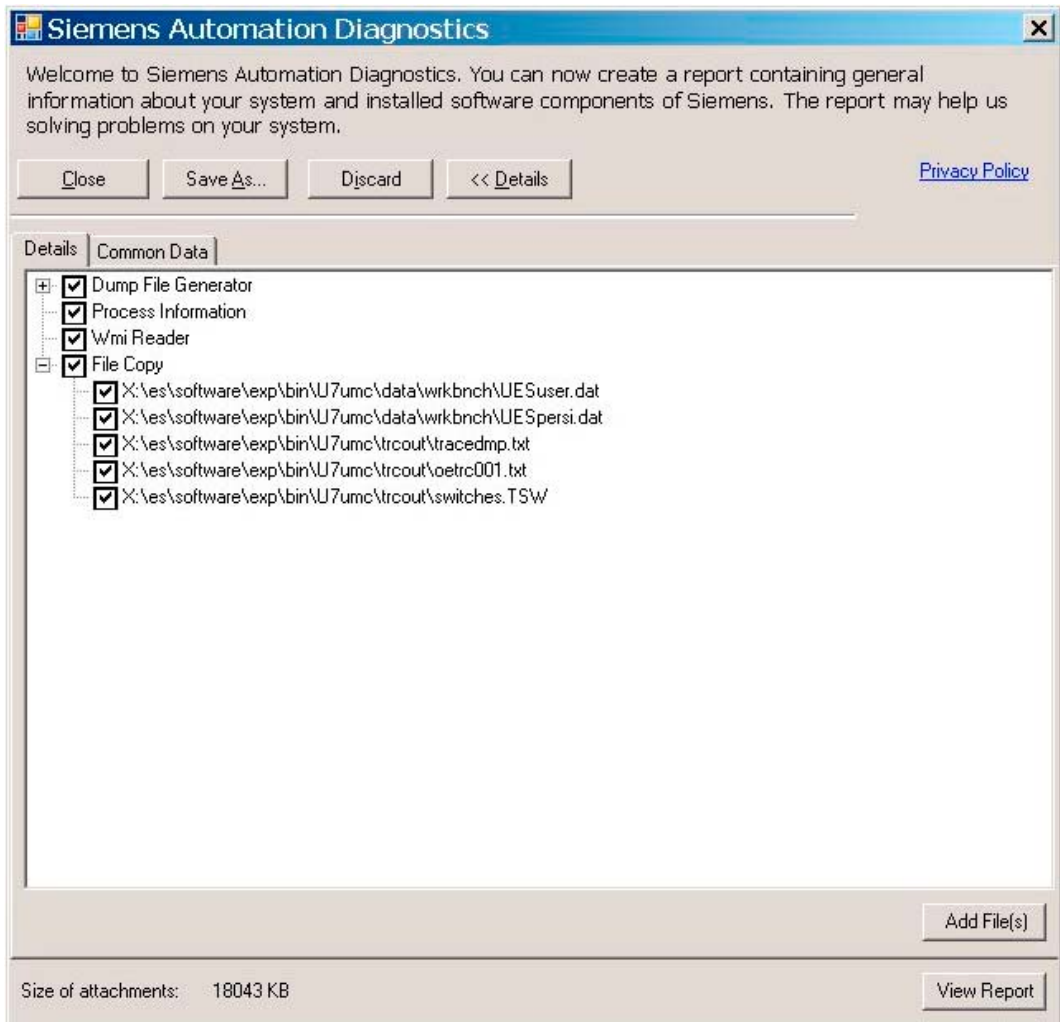


Figure 7-140 Siemens Automation Diagnostics - Details

In this window, there is more detailed information in the **Details** and **Common data** tabs.

- **Add File(s)** button
Here, you can add more user-specific files to the diagnostics directory.
- **View Report** button
The problem details are displayed in plain text.
- **Close** button
The dialog closes. The diagnostics data is saved in the following default directory:
 - U7umc/data/AdvancedDiagnostic/<files>
- **Save As** button
You can select a user-defined directory to save the diagnostics data to.
- **Discard** button
Corresponds to 'Cancel', the diagnostics data is not saved.

Technical data

8.1 Quantity framework

Technical data

Note

See also the function overview in Chapter 8 of the PM 21 Catalog.

Table 8- 1 Quantity framework for SIMOTION devices

SIMOTION devices		C2xx; P350-3; D4xx
Execution system - task structure / program execution	BackgroundTask	1 (adjustable monitoring time)
	TimerInterruptTasks (as of 1 ms)	5
	MotionTasks	32 (for C2xx = 20)
	ServoSynchronousTasks (synchronous with the position control cycle clock)	1
	IPOSynchronousTasks (synchronous with the interpolation cycle clock)	2
	InterruptTasks (for user)	2
	TControlTasks	5
	StartupTask	1
	ShutdownTask	1
Execution system - task structure / error processing (SystemInterruptTasks)	ExecutionFaultTask	1
	TechnologicalFaultTask	1
	PeripheralFaultTask	1
	TimeFaultTask	1
	TimeFaultBackgroundTask	1
Communication	Guaranteed engineering system connections	1
	Guaranteed HMI connections	5
	Number of connection points	16

8.1 Quantity framework

SIMOTION devices		C2xx; P350-3; D4xx
	Number of routed connections	10
PROFIBUS DP	Equidistance	Possible
	Baud rates	1.5; 3; 6; 12 Mbaud
	Number of slaves	64 max. per DP line
PROFINET (not C2xx)	Number of devices	Max. 64
Diagnostics and alarms	Diagnostics buffer	200 entries (100 entries for D410); an additional 200 entries for SINAMICS Integrated on the SIMOTION D4x5; an additional 100 entries for SINAMICS Integrated on the SIMOTION D410/CX32;
	Technological alarms	160 entries
	Alarm_S (buffer)	40 entries
Cycle clocks and times	Ratio of position control cycle clock to DP cycle clock	1:1 to 1:4 (for C2xx = 1:1, 2:1)
	Ratio of position control cycle clock to PN cycle clock	1:1 ... 16:1
	Ratio of IPO1 cycle clock to position control cycle clock	1:1 ... 1:6
	Ratio of IPO2 cycle clock to IPO1 cycle clock	2:1 to 64:1

Table 8- 2 Quantity framework for SIMOTION C2xx

SIMOTION device		C230-2	C240
User memory	RAM disk for user data	22 MB	22 MB
	Main memory (user RAM)	20 MB	35 MB
	Retentive user variables (retain variables)	12 KB	100 KB
Memory medium for retentive user data on the MMC (Micro Memory Card)		32 MB	64 MB
Memory space available to the user on the memory medium (persistent memory)		26 MB	58 MB
Address space	Permanent process image for BackgroundTask (I/O variables)	64 bytes	
	Additional configurable process image for cyclic task (I/O variables)	Yes	
	Logical I/O address space	2 KB	4 KB
	Physical I/O address space for PROFIBUS (max. per line for inputs and outputs respectively)	1 KB	
	Address space for each PROFIBUS DP station	244 bytes	
Technology objects	Maximum number of axes	32	

SIMOTION device		C230-2	C240
	Number of measuring inputs (measurement on onboard encoder)	2	2+4
	Onboard outputs for output cams	8 max. (140 µs)	8 max. (70 µs)
Cycle clocks and times	PROFIBUS DP cycle clock	1,5 ... 8 ms	1 ... 8 ms
	Minimum position control cycle clock	1.5 ms	1 ms

Table 8- 3 Quantity framework for SIMOTION P350

SIMOTION device		P350-3
User memory	RAM disk for user data	18 MB
	Main memory (user RAM)	24 MB up to max. 100 MB (adjustable via SIMOTION P control manager)
	Retentive user variables (retain variables)	15 KB (up to 256 KB with UPS)
Memory medium for retentive user data:		File on hard disk
Memory space available to the user on the memory medium (persistent memory)		Any
Address space	Permanent process image for BackgroundTask (I/O variables)	64 bytes
	Additional configurable process image for cyclic task (I/O variables)	Yes
	Logical I/O address space	4 KB
	Physical I/O address space for PROFIBUS (max. per line for inputs and outputs respectively)	1 KB
	Physical I/O address space for PROFINET (max. per line for inputs and outputs respectively)	4 KB
	Address space for each PROFIBUS DP station	244 bytes
	Address space for each PROFINET device station	1400 bytes
Technology objects	Maximum number of axes	64
	Number of measuring inputs	-
	Onboard outputs for output cams	-
Cycle clocks and times	PROFIBUS DP cycle clock	1 ... 8 ms
	PROFINET cycle clock	in 0.125 ms steps: 0.25 ... 4 ms
	Minimum position control cycle clock	0.25 ms

8.1 Quantity framework

Table 8- 4 Quantity framework for SIMOTION D4xx

SIMOTION device		D410	D425/D435	D445/D445-1
User memory	RAM disk for user data	17 MB	22 MB	45 MB
	Main memory (user RAM) ¹⁾	25 MB	35 MB	70 MB
	Retentive user variables (retain variables)	7 KB	320 KB	
Memory medium for remanent user data: CompactFlash Card (CF card)		512 MB and 1 GB (1 GB is recommended)		
Memory space available to the user on the memory medium (persistent memory)		300 MB		
Address space	Permanent process image for BackgroundTask (I/O variables)	64 bytes		
	Additional configurable process image for cyclic task (I/O variables)	Yes		
	Logical I/O address space	16 KB		
	Physical I/O address space for PROFIBUS (max. per ext. line for inputs and outputs respectively)	1 KB		
	Physical I/O address space for PROFINET (max. per line for inputs and outputs respectively)	4 KB		
	Address space for each PROFIBUS DP station	244 bytes		
	Address space per SINAMICS Integrated/CX32 (DP Integrated)	512 bytes		
	Address space for each PROFINET device station	1400 bytes		
Technology objects	Maximum number of axes	1	D425 = 16 D435 = 32	64
	Integrated drive control (in combination with SINAMICS S120); further axes are possible via CX32 for D435 and D445	1 (Servo, vector or U/f)	1 ... 6 (servo) 1 ... 4 (vector) 1 ... 8 (U/f)	
	Number of measuring inputs (onboard measuring inputs - for integrated drives)	3	6	
	Onboard outputs for output cams	4	8	
Cycle clocks and times	PROFIBUS DP cycle clock	2 ... 8 ms	D425 = 2 ... 8 D435 = 1 ... 8	1 ... 8 ms
	PROFINET cycle clock	in 0.125 ms steps: 0.5 ... 4 ms		
	Minimum position control cycle clock	2 ms	D425 = 2 ms D435 = 1 ms	0.5 ms

¹⁾ A dedicated 20 MB main memory is available for Java applications
 - on the D4x5 as of V4.1 SP1 HF6
 - on the D410 as of V4.1 SP2 (a Java Virtual Machine will only be provided on the D410 as of V4.1 SP2)

8.2 Memory requirement

Memory requirement

Table 8- 5 Memory requirement for each instance of a technology object

Technology object	Memory requirement / KB
Drive axis	180
Position axis	200
Following axis with following object	350
External encoder	150
Output cam	100
Measuring input	100
Cam	100
In addition for each interpolation point pair	1
TController: Heating controller	85
TController: Cooling controller	70
TController: Heating/cooling controller	100
Position axis path interpolation	250
Path object (for 4 axes, 1 cam)	200
Cam track	450
Addition object	50
Formula object	150
Fixed gear	100
Controller	100
Sensor	100

Table 8- 6 Memory requirement of technology packages

Technology package	Memory requirement / KB
TP TControl	1.700
TP CAM	7.700
TP PATH	8.500
TP CAM_EXT	9.500

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