SIEMENS

SIMOTION

SIMOTION SCOUT TIA

Configuration Manual

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Legal information

Warning notice system

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

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

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

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

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

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

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Disclaimer of Liability

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

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Preface

SIMOTION Documentation

An overview of the SIMOTION documentation can be found in the SIMOTION Documentation Overview document.

This documentation is included as electronic documentation in the scope of delivery of SIMOTION SCOUT TIA and it comprises ten documentation packages.

The following documentation packages are available for SIMOTION product version V5.7:

- SIMOTION Engineering System Handling
- SIMOTION System and Function Descriptions
- SIMOTION Service and Diagnostics
- SIMOTION IT
- SIMOTION Programming
- SIMOTION Programming - References
- SIMOTION C
- SIMOTION P
- SIMOTION D
- SIMOTION Supplementary Documentation

Hotline and Internet addresses

SIMOTION at a glance

We have compiled an overview page from our range of information about SIMOTION with the most important information on frequently asked topics - which can be opened with only one click.

Whether beginner or experienced SIMOTION user – the most important downloads, manuals, tutorials, FAQs, application examples, etc. can be found at

https://support.industry.siemens.com/cs/ww/de/view/109480700

Additional information

Click the following link to find information on the following topics:

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

https://support.industry.siemens.com/cs/ww/en/view/109479653

My Documentation Manager

Click the following link for information on how to compile documentation individually on the basis of Siemens content and how to adapt it for the purpose of your own machine documentation:

https://support.industry.siemens.com/My/ww/en/documentation

Training

Click the following link for information on SITRAIN - Siemens training courses for automation products, systems and solutions:

http://www.siemens.com/sitrain

FAQs

Frequently Asked Questions can be found in SIMOTION Utilities & Applications, which are included in the scope of delivery of SIMOTION SCOUT TIA, and in the Service&Support pages in **Product Support**:

https://support.industry.siemens.com/cs/de/en/ps/14505/faq

Technical support

Country-specific telephone numbers for technical support are provided on the Internet under **Contact**:

https://support.industry.siemens.com/cs/ww/en/sc/2090

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Fundamental safety instructions

1

1.1 General safety instructions



⚠ WARNING

Electric shock and danger to life due to other energy sources

Touching live components can result in death or severe injury.

- Only work on electrical devices when you are qualified for this job.
- Always observe the country-specific safety rules.

Generally, the following six steps apply when establishing safety:

1. Prepare for disconnection. Notify all those who will be affected by the procedure.
2. Isolate the drive system from the power supply and take measures to prevent it being switched back on again.
3. Wait until the discharge time specified on the warning labels has elapsed.
4. Check that there is no voltage between any of the power connections, and between any of the power connections and the protective conductor connection.
5. Check whether the existing auxiliary supply circuits are de-energized.
6. Ensure that the motors cannot move.
7. Identify all other dangerous energy sources, e.g. compressed air, hydraulic systems, or water. Switch the energy sources to a safe state.
8. Check that the correct drive system is completely locked.

After you have completed the work, restore the operational readiness in the inverse sequence.



⚠ WARNING

Electric shock if there is no ground connection

For missing or incorrectly implemented protective conductor connection for devices with protection class I, high voltages can be present at open, exposed parts, which when touched, can result in death or severe injury.

- Ground the device in compliance with the applicable regulations.



⚠ WARNING

Electric shock due to connection to an unsuitable power supply

When equipment is connected to an unsuitable power supply, exposed components may carry a hazardous voltage. Contact with hazardous voltage can result in severe injury or death.

- Only use power supplies that provide SELV (Safety Extra Low Voltage) or PELV- (Protective Extra Low Voltage) output voltages for all connections and terminals of the electronics modules.



⚠ WARNING

Electric shock due to equipment damage

Improper handling may cause damage to equipment. For damaged devices, hazardous voltages can be present at the enclosure or at exposed components; if touched, this can result in death or severe injury.

- Ensure compliance with the limit values specified in the technical data during transport, storage and operation.
- Do not use any damaged devices.



⚠ WARNING

Electric shock due to unconnected cable shield

Hazardous touch voltages can occur through capacitive cross-coupling due to unconnected cable shields.

- As a minimum, connect cable shields and the conductors of power cables that are not used (e.g. brake cores) at one end at the grounded housing potential.

⚠ WARNING

Spread of fire from built-in devices

In the event of fire outbreak, the enclosures of built-in devices cannot prevent the escape of fire and smoke. This can result in serious personal injury or property damage.

- Install built-in units in a suitable metal cabinet in such a way that personnel are protected against fire and smoke, or take other appropriate measures to protect personnel.
- Ensure that smoke can only escape via controlled and monitored paths.

⚠ WARNING

Unexpected movement of machines caused by radio devices or mobile phones

The use of radio devices or mobile telephones in the immediate vicinity of the components can result in equipment malfunction. Malfunctions may impair the functional safety of machines and can therefore put people in danger or lead to property damage.

- If you come closer than around 2 m to such components, switch off any radios or mobile phones.
- Use the "SIEMENS Industry Online Support app" only on equipment that has already been switched off.

⚠ WARNING

Fire due to inadequate ventilation clearances

Inadequate ventilation clearances can cause overheating of components with subsequent fire and smoke. This can cause severe injury or even death. This can also result in increased downtime and reduced service lives for devices/systems.

- Ensure compliance with the specified minimum clearance as ventilation clearance for the respective component.

NOTICE

Overheating due to inadmissible mounting position

The device may overheat and therefore be damaged if mounted in an inadmissible position.

- Only operate the device in admissible mounting positions.

⚠ WARNING

Unrecognized dangers due to missing or illegible warning labels

Dangers might not be recognized if warning labels are missing or illegible. Unrecognized dangers may cause accidents resulting in serious injury or death.

- Check that the warning labels are complete based on the documentation.
- Attach any missing warning labels to the components, where necessary in the national language.
- Replace illegible warning labels.

⚠ WARNING

Unexpected movement of machines caused by inactive safety functions

Inactive or non-adapted safety functions can trigger unexpected machine movements that may result in serious injury or death.

- Observe the information in the appropriate product documentation before commissioning.
- Carry out a safety inspection for functions relevant to safety on the entire system, including all safety-related components.
- Ensure that the safety functions used in your drives and automation tasks are adjusted and activated through appropriate parameterizing.
- Perform a function test.
- Only put your plant into live operation once you have guaranteed that the functions relevant to safety are running correctly.

Note

Important safety notices for Safety Integrated functions

If you want to use Safety Integrated functions, you must observe the safety notices in the Safety Integrated manuals.

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

⚠ WARNING

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

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

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

1.2 Safety instructions for electromagnetic fields (EMF)



⚠ WARNING

Danger to life from electromagnetic fields

Electromagnetic fields (EMF) are generated by the operation of electrical power equipment such as transformers, converters or motors.

People with pacemakers or implants are at a special risk in the immediate vicinity of these devices/systems.

- Ensure that the persons involved are the necessary distance away (minimum 2 m).

1.3 Handling electrostatic sensitive devices (ESD)

Electrostatic sensitive devices (ESD) are individual components, integrated circuits, modules or devices that may be damaged by either electric fields or electrostatic discharge.



NOTICE

Damage through electric fields or electrostatic discharge

Electric fields or electrostatic discharge can cause malfunctions through damaged individual components, integrated circuits, modules or devices.

- Only pack, store, transport and send electronic components, modules or devices in their original packaging or in other suitable materials, e.g conductive foam rubber of aluminum foil.
- Only touch components, modules and devices when you are grounded by one of the following methods:
  - Wearing an ESD wrist strap
  - Wearing ESD shoes or ESD grounding straps in ESD areas with conductive flooring
- Only place electronic components, modules or devices on conductive surfaces (table with ESD surface, conductive ESD foam, ESD packaging, ESD transport container).

1.4 Cybersecurity information

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

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

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary

and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial cybersecurity measures that may be implemented, please visit
https://www.siemens.com/cybersecurity-industry.

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

To stay informed about product updates, subscribe to the Siemens Industrial Cybersecurity RSS Feed under
https://new.siemens.com/cert.

1.5 Note regarding the general data protection regulation

Siemens observes the principles of data protection, in particular the principle of data minimization (privacy by design). For this product this means:

The product does not process / store any personal data, only technical functional data (e.g. time stamp). If the user links this data with other data (e.g. shift plans) or stores personal data on the same medium (e.g. hard disk) and thus establishes a personal reference, the user must ensure compliance with data protection regulations.

1.6 Danger to life due to software manipulation when using removable storage media

⚠ WARNING

Danger to life due to software manipulation when using removable storage media

The storage of files on removable storage media involves a high risk of infection, e.g. via viruses or malware. Incorrect parameter assignment can cause machines to malfunction, which can lead to injuries or death.

- Protect the files on removable storage media against harmful software through appropriate protective measures, e.g. virus scanners.

1.7 Residual risks of power drive systems

When performing the risk assessment for a machine or plant in accordance with the respective local regulations (e.g. EC Machinery Directive), the machine manufacturer or plant constructor must take into account the following residual risks associated with the control and drive components of a drive system:

1. Unintentional movements of driven machine or system components during commissioning, operation, maintenance and repairs caused by, for example:
   - Hardware and/or software errors in the sensors, control system, actuators, and cables and connections
   - Response times of the control system and of the drive
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - Parameterization, programming, cabling, and installation errors
   - Use of wireless devices / mobile phones in the immediate vicinity of electronic components
   - External influences/damage
   - X-rays, ionizing radiation and cosmic radiation
2. Unusually high temperatures, including open flames, as well as emissions of light, noise, particles, gases, etc., can occur inside and outside the components under fault conditions caused by, for example:
   - Component failure
   - Software errors
   - Operation and/or environmental conditions outside the specification
   - External influences/damage
3. Hazardous shock voltages caused by, for example:
   - Component failure
   - Influence during electrostatic charging
   - Induction of voltages in moving motors
   - Operation and/or environmental conditions outside the specification
   - Condensation/conductive contamination
   - External influences/damage
4. Electrical, magnetic and electromagnetic fields generated in operation that can pose a risk to people with a pacemaker, implants or metal replacement joints, etc., if they are too close
5. Release of environmental pollutants or emissions as a result of improper operation of the system and/or failure to dispose of components safely and correctly

For more information about the residual risks of the drive system components, see the relevant sections in the technical user documentation.

Introduction 2

2.1 Target group and content of the configuration manual

The SIMOTION SCOUT TIA Configuration Manual is a general description of the software for new users and experienced users switching from SIMOTION SCOUT.

To differentiate the two versions from each other, the SIMOTION SCOUT designation refers to SCOUT in the SIMATIC Manager environment and the SIMOTION SCOUT TIA designation to SCOUT in the TIA Portal environment.

At the beginning of each section a note is included that indicates whether each configuration step is performed in the TIA Portal or in SIMOTION SCOUT TIA.

For an overview of the configuration step and its place of execution, refer to section Configuration - Overview.

Not all available software functions are described in this document. For detailed, topic-specific information, refer to the information system of the TIA Portal, the context-sensitive online help of SIMOTION SCOUT TIA, and the corresponding documentation.

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

- SIMOTION, Equipment for Production Machines, PM 21 Catalog

Note

Getting Started with SIMOTION SCOUT TIA

We recommend that you work through "Getting Started with SIMOTION SCOUT TIA" in the online help or the "SIMOTION SCOUT TIA Getting Started" tutorial. There you find guidelines how you work with SIMOTION SCOUT TIA, for example, how you create a project, compile and save it, insert a SIMOTION device, insert and parameterize a technology object, and how to create a program. When you have worked through all these steps, you will be able to create more complex projects.

Additional references

The "SIMOTION SCOUT TIA Getting Started" tutorial is available at (https://support.industry.siemens.com/cs/ww/en/view/109474299)

2.2 SIMOTION in the TIA Portal

By integrating the SIMOTION motion control system in the **T**otally **I**ntegrated **A**utomation Portal, Siemens has expanded the efficient engineering framework within the "Integrated Drive System" concept to include another powerful tool. The full range of SIMOTION motion control functions can now also be used in the TIA Portal. All the SIMOTION components can be configured and engineered simply and efficiently using the TIA Portal's intuitive user interface.

This enables the efficient and user-friendly mechanisms of this engineering framework to be used for commissioning, configuring and designing SIMOTION components. That includes, for example, merging of the hardware and network configuration into one consistent editor, thus enabling intuitive and fully graphical configuration and powerful diagnostics of the configured and networked components. In the device view, the SIMOTION CPU is displayed fully graphically with all its interfaces and properties. All the parameters can be selected and modified intuitively. In the network view, further automation components such as the HMI (Human Machine Interface) or drives can be connected to the CPU, and configuration of the PROFINET network topology is just as intuitive.

With SIMOTION SCOUT TIA, configuration is as easy as ever. Not only can you configure telegrams and integrate technology and drive objects, you can also configure automatic communication for distributed synchronous operation between two CPUs.



Figure 2-1 SIMOTION in the TIA Portal

SIMOTION devices in the TIA Portal

As of Version 13 of the TIA Portal, you can also configure SIMOTION devices.

A SIMOTION configuration comprises the following steps:

- Configuring the hardware
- Configuring the technology

The following overview shows which configuration steps you perform in the TIA Portal and which configuration steps you perform in SIMOTION SCOUT TIA:

Configuration steps in the TIA Portal

- Managing a project
- Configuring the hardware
- Saving and compiling the hardware configuration
- Configuring communication
- Creating F-programs
- Integrating HMI
- Set up and test online connection

Configuration steps in SIMOTION SCOUT TIA

- Configure the drive
- Configure the technology (e.g. axis, external encoder)
- Create user programs
- Saving and compiling
- Establishing online/offline connection
- Using diagnostic functions
- Using trace functions

Integration of SIMOTION SCOUT TIA as an option package of the TIA Portal has resulted in the following special features of use:

- You can only start SIMOTION SCOUT TIA from the TIA Portal.
- As soon as you close the TIA Portal, SIMOTION SCOUT TIA is also closed.
- When you switch to SIMOTION SCOUT TIA, you cannot undo the actions you last performed in the TIA Portal.

2.3 SIMOTION SCOUT TIA Engineering System

Introduction

The SIMOTION motion control system provides not only a range of ready-to-use functions, but can also be individually parameterized and programmed. High-performance tools, which provide optimum support and ease of use for the necessary engineering steps, are required for this.

The SIMOTION SCOUT TIA 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).

SIMOTION SCOUT TIA provides a uniform, function-oriented view for your automation task and it is also very user-friendly.

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 TIA provides views that are adapted to the task, and it can be expanded by additional tools.

SIMOTION SCOUT TIA provides all the necessary tools for the following functions:

- Configuration
- Parameterization
- Programming
- Testing
- Diagnostics

The following tasks are graphically supported with operator guidance:

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

2.4 SIMOTION hardware platforms

To meet the complex requirements of machine construction, SIMOTION offers three hardware variants with different performance, packaging formats and expandability options. The basic system characteristics, like the engineering, are identical.

SIMOTION D (Drive-based)

SIMOTION D is a compact, drive-based version of SIMOTION based on the SINAMICS S120 drives family. For SIMOTION D, the SIMOTION runtime environment and the SINAMICS drive software run concurrently on the controller hardware in the SINAMICS S120 packaging format.

SIMOTION P (PC-based)

SIMOTION P is a PC-based, open motion control system from SIMOTION. Control, motion control, and HMI functions are executed together with standard PC applications on the SIMOTION P hardware platform.

SIMOTION P combines the openness of the Windows operating system with the real-time capability of SIMOTION P Runtime.

SIMOTION C (Controller-based)

SIMOTION C is the modular controller variant in the tried and trusted packaging system of the SIMATIC S7-300 with its very varied expandability options on the I/O bus. The SIMOTION C240 high-performance motion controller is available for control and motion control tasks. The integrated interface for four analog coupled drives makes the SIMOTION C particularly suitable for compact applications with the control of analog electrical drives and the operation of hydraulic axes. SIMOTION C also supports operation of four stepper motors at these interfaces. SIMOTION C240 PN offers a PROFINET interface instead of the encoder and drive interfaces.

Note

In the current version, SIMOTION SCOUT TIA supports only specific SIMOTION devices.

To find out which SIMOTION devices are supported, see Supported devices (Page 25).

2.5 Supported devices

Not all devices that are available in SIMOTION SCOUT are currently supported by SIMOTION SCOUT TIA.

The following table lists the devices that are supported in the current version of SIMOTION SCOUT TIA:

SIMOTION devices	SINAMICS devices
As of SIMOTION firmware/kernel V4.3 and SINAMICS Integrated V4.5: • SIMOTION C240/C240 PN • SIMOTION D410-2 / D4x5-2 / CX32-2 As of SIMOTION firmware/kernel V4.5: • SIMOTION P320-4	SINAMICS V4.5 and as of 4.7: • SINAMICS S120 CU310-2 / CU320-2

Note

The SINAMICS devices listed in the table can be found in the TIA Portal in the "hardware catalog" task card at "Controller > SIMOTION > SIMOTION drives".

You can parametrize these devices in SIMOTION SCOUT TIA only if you have networked them with a SIMOTION device via PROFIBUS/PROFINET.

The following devices are not supported:

- Single drive devices

See also

Inserting a SIMOTION drive (Page 99)

Migrating a SIMOTION SCOUT project (Page 76)

SIMOTION hardware platforms (Page 24)

Overview (Page 272)

2.6 Supported functionalities

SIMOTION SCOUT TIA generally supports the same functionality as SIMOTION SCOUT and the TIA Portal.

The following functionality from SIMOTION SCOUT is not currently supported in SIMOTION SCOUT TIA:

- DCC SIMOTION / DCC SINAMICS
- Scripting for HWCN data
- XML import/export of hardware data
- SIMOTION Easy Project

See also

Migrating a SIMOTION SCOUT project (Page 76)

2.7 Programming languages

SIMOTION provides different programming languages for the solution of Motion Control tasks, control logic, arithmetic calculations, etc. During runtime, the selected programming language has no effect – except in the different displays when debugging. You can create user applications in different programming languages and use them jointly in a project.

The following programming languages are available in SIMOTION SCOUT TIA:

- **Motion Control Chart (MCC)**
  Graphical programming as a flow chart.
  In particular, for sequential tasks with a high level of motion control functionality.
- **Ladder Logic / Function Block Diagram (LAD/ FBD)**
  Graphical Programming as Ladder Logic / Function Block Diagram, supplemented by Motion Control Functions via PLCopen Function Blocks.
  In particular, for cyclic tasks with a high logic proportion.
- **Structured Text (ST)**
  Textual Programming in a High-level Language.
  As the base language of the SIMOTION system, ST supports all system features and functions of the technology packages and is thus suitable for all tasks.

Sources (units)

Programs are created in program containers, the so-called sources (units). They are compiled in the engineering system. Any errors or warnings that occur during compilation are output in the diagnostics window. Sources compiled without error can then be loaded into the associated controller.

A source contains any number of programs, functions, function blocks and classes. Each executable part of a source (program, function, function block, class) is called a POU (Program Organization Unit).

A source is divided into an interface and an implementation section.

Interface section

All parts exported by the source are defined in the interface section. Other sources and external components (e.g. HMI systems) can access these parts. These include user-defined data types, data (variables and constants) as well as names of programs, functions, and function blocks.

Implementation section

The data types and data defined in the implementation section are global throughout the source and can be used by all POEs. The implementation section also contains the program code of the POUs. Any POUs not specified in the interface section can only be used within the source.

Note

Source concept

The source concept with encapsulation of code and data allows you to structure applications. For example, the functionality of an entire machine module with a defined external interface can be implemented in a single source.

Tasks

Programs are processed in tasks. A task is a job which is executed in a certain chronological sequence. The advantage of the task system (execution system) is that processes appended to the appropriate task levels can run simultaneously.

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

Additional references

For detailed information on the programming languages and the execution system, refer to the online help of SIMOTION SCOUT TIA and the respective programming and operating manuals.

See also

Motion Control Chart (MCC) (Page 28)

Ladder Logic / Function Block Diagram (LAD/FBD) (Page 29)

Structured Text (ST) (Page 30)

2.7.1 Motion Control Chart (MCC)

MCC (Motion Control Chart) is a "flow diagram language" that graphically formulates the process sequences in production machines in a simple manner. The result is one or more flow diagrams, comprising MCC blocks that describe the time execution of the individual machine actions. Due to its special means of expression, an MCC is ideally suited to programming sequential processes.

Motion Control Chart supports the simple description of the motion sequences of machines using powerful motion control commands, such as reference axis, position axis, synchronize or desynchronize cam, and many more.

To control the machine sequence, commands are available for awaiting conditions and for formulating computations, as well as for programming 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 has to do in the event of a fault.

All MCC blocks – a selection of the most important SIMOTION functions – are available in tool bars. They are grouped according to function and are automatically inserted in the flow diagram at the marked point by means of a click. A click on the individual elements opens specific dialogs for parameterization. Obviously, you can also add your own comments for the further documentation of the process sequence. Functions from the SIMOTION command library that are not individually offered as MCC blocks can be used in an MCC program by means of a special command.

Performance features:

- Easy-to-use due to graphical illustration in the form of flow diagrams.
- Hierarchical command library for motion control, PLC, and technology functions
- Control structures (IF, WHILE, CASE, etc.)
- Zooming for LAD, FBD and ST
- Subroutine calls (FB/FC, programs, etc.)
- Structuring based on command module generation, i.e. combination of command sequences to form a module command
- User-friendly debug functions for online test and diagnosis, for example, single-step, program status or breakpoints for easier troubleshooting (debugging)
- Monitor, trace

Note

Implicit conversion to ST

When being compiled, programs written in MCC are implicitly converted to ST programs and then compiled.

You can export the intermediate result as an ST and use it as a basis for your own ST programs.

Additional references

Detailed information can be found in the online help of SIMOTION SCOUT TIA and in the SIMOTION MCC Motion Control Chart Programming and Operating Manual.

2.7.2 Ladder Logic / Function Block Diagram (LAD/FBD)

LAD/FBD is a graphical programming language and is available for Ladder Logic / Function Block Diagram. The statement syntax corresponds to a circuit diagram (LAD) or a function block diagram (FBD). LAD/FBD enable simple tracking of the signal flow between power rails via inputs, outputs, and operations. LAD and FBD programs are usually suitable for application in cyclic tasks (in particular, BackgroundTask).

LAD/FBD programs consist of elements and boxes that are graphically connected to networks. Their operations work mostly according to the rules of Boolean logic or simple arithmetic expressions and equations. Therefore, they are suitable only for control-relevant programs or also for motion control tasks by using the PLCopen blocks.

Functions, function blocks and programs can be programmed in LAD/FBD. A source can contain several LAD and FBD blocks. Only one POU can be implemented in an LAD or FBD block.

LAD/FBD also include commands for SIMOTION system control using standard logic functions. These commands are added from the command library. Motion Control tasks are preferably programmed with PLCopen blocks. Blocks which have been programmed in other SIMOTION languages can be called. User-friendly functions such as "on the fly" variable declarations or automatic syntax checks are available when programming in LAD or FBD. It is possible to switch over between LAD and FBD in the editor at any time. A program can therefore be viewed and processed in either LAD or FBD.

The following user-friendly debug functions are available for online testing and diagnostics:

- Monitor variables in the symbol browser or a watch table
- Program status
- Trace tool with measurement functions for drives and function generators
- Breakpoints

Note

Direct editing of motion commands is not recommended. Instead, it is better to use the PLCopen blocks. These blocks are designed for integration in logic-oriented programs.

Additional references

Detailed information can be found in the online help of SIMOTION SCOUT TIA and in the SIMOTION LAD/FBD Programming and Operating Manual.

2.7.3 Structured Text (ST)

Structured Text

ST is a high-level, PASCAL-based programming language. ST is based on the IEC 61131-3 standard. This standard harmonizes programming languages for programmable logic 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 other comprehensive, extremely flexible Motion Control commands.

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.

Performance features:

- Motion Control, PLC and technology functions in a single language
- Well-structured programs with comment capability

- Powerful editor functions, such as:
  - Syntax coloring
  - Automatic indenting
  - Automatic completion
  - Bookmarks
  - Fold (show and hide blocks)
  - Displaying sets of parentheses
  - Select text, e.g. by column
  - Using the command library
- Convenient 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 breakpoints.

Note

Object-oriented programming (OOP)

As of version V4.5, the Structured Text programming language supports object-oriented programming.

Additional references

Detailed information can be found in the online help of SIMOTION SCOUT TIA and in the SIMOTION ST Structured Text Programming and Operating Manual.

2.8 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 TIA provides the VDI wizard as assistance. Cam geometries are created in offline mode.

Information on the graphical creation of cams can be found in the section CamTool options package (Page 32).

Additional references

Detailed information on the topic can be found in the SIMOTION SCOUT TIA online help and in the SIMOTION Motion Control, Synchronous Operation TO, TO Cam Function Manual.

2.9 CamTool options package

SIMOTION CamTool is a powerful, graphical editor for creating and optimizing cams.

SIMOTION CamTool can be used as an expansion package for SIMOTION SCOUT TIA and is completely integrated in the SIMOTION SCOUT TIA user interface.

Basic functions

SIMOTION CamTool provides the following basic functions:

- Inserting and editing cams.
  Cams can be inserted in a SIMOTION SCOUT TIA project using SIMOTION CamTool. You can also edit a cam created with CamEdit using CamTool: Cams can also be imported from a text file or read from a SIMOTION device.
- Customize display of the cam in CamTool.
  In SIMOTION CamTool, you can show and hide diagrams, change display parameters of the axes and diagrams and adjust the lines and fonts. You can also display auxiliary lines in the diagram.
- Convert cams from SIMOTION CamTool to SIMOTION CamEdit.
  To edit a cam that is edited in SIMOTION CamTool using SIMOTION CamEdit, the cam needs to be converted.
- Export cams to a text file.
- Load cams into a SIMOTION device.

Additional references

Detailed information can be found in the online help of SIMOTION SCOUT TIA and in the SIMOTION CamTool Configuration Manual.

See also

CamEdit cam editor (Page 31)

2.10 Technology packages and technology objects

Technology packages in SIMOTION SCOUT TIA

Technology packages combine software functions which are required for automation in mechanical engineering in various sectors. They are loaded into the controller during configuration and expand the basic functionality through additional system functions. The functions of the technology packages can be accessed easily in the SIMOTION SCOUT TIA command library during engineering. Access to the technology package functions is provided by additional language commands and system variables. Programming of motional sequences is therefore simple and integrated.

The following standard technology packages are available for SIMOTION SCOUT TIA:

CAM technology package

The SIMOTION CAM technology package contains the basic Motion Control technologies, such as drive axis, position axis, following axis, synchronous object, cam, output cam, cam track, and measuring input.

PATH technology package

The SIMOTION PATH technology package contains additionally the path interpolation technology.
Path interpolation generates the traversing profile for the path, calculates the path interpolation points in the interpolation cycle, and uses the kinematic transformation to derive the axis setpoints for the interpolation cycle points.

CAM_EXT technology package

The CAM_EXT technology package also contains objects for preparing technological data at the system level, e.g. addition object, formula object.

TControl technology package

The SIMOTION technology package for temperature control (TControl) provides temperature channels with extensive functions. These functions are also accessed via additional language commands and system variables.

More sector-specific technology packages are also available as separate products.

The loadable technology packages support the creation of technology objects (e.g. positioning and synchronous axis, cam tracks, external encoders) which can be accessed over system functions and system variables for use in every SIMOTION programming language.

Technology objects in SIMOTION SCOUT TIA

SIMOTION SCOUT TIA uses technology objects (TOs) to represent the functionality of axes, cams, output cams, etc. After creating a technology object (e.g. axis) and configuring it (e.g. as positioning axis), you can access it when programming with system functions.

Note

Missing licenses

All TOs outside the basic functionality (Motion Control Basic) must be licensed. Missing licenses are indicated by a flashing group error LED. The number and type of missing licenses is stated by the online diagnostics. They are also displayed during downloading.

Additional references

Detailed information is provided in the online help of SIMOTION SCOUT TIA and in the following documents:

- SIMOTION Runtime Basic Functions Function Manual
- 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, TO Path Object
- Function Manual: SIMOTION Motion Control, Basic Functions for Modular Machines

See also

Licensing of the runtime components (Page 346)

2.11 CLib Studio option package

SIMOTION CLib Studio

If required, further functions and function blocks can be created in user libraries (SIMOTION CLib Studio) by means of C/C++ programming in the Windows environment.

They can be used in all SIMOTION languages (MCC, LAD, FBD, ST).

That allows the creation of application-specific and high-performance function extensions as well as adaptations including know-how protection.

Installation 3

3.1 SIMOTION SCOUT TIA and TIA Portal system preconditions

Note

Note, as of V14, TIA Portal supports only 64-bit operating systems.

Further details for the system requirements are contained in the *Readme* file in the start menu at "Start > All programs > Siemens Automation > Documentation > Readmes".

Compatibility details can be found in the Internet compatibility list at: Compatibility list (https://support.industry.siemens.com/cs/ww/en/view/18857317)

3.2 Install SIMOTION SCOUT TIA

Requirements

The following requirements apply to the installation of SIMOTION SCOUT TIA:

- Hardware and software of the PG/PC meet the system preconditions.
- You require administrator rights on your PG/PC.
- All running programs are closed.
- The TIA Portal (framework) is installed, for example with the STEP 7 or WinCC software package.
- The SIMOTION SCOUT TIA version to be installed (not part of the TIA Portal) is compatible with the installed TIA Portal version.

Side-by-side installations

The following combinations are possible:

- Different versions of the TIA Portal
- Different SIMOTION SCOUT TIA versions (V4.4 and V4.5 or V4.4 and V5.4)
- SIMOTION SCOUT (as of V4.4) and different SIMOTION SCOUT TIA versions
- STARTER (as of V4.4) and different SIMOTION SCOUT TIA versions
- S7T Config and different SIMOTION SCOUT TIA versions

Note

You cannot install STARTER, S7T Config and SIMOTION SCOUT at the same time.

Procedure

To install SIMOTION SCOUT TIA, proceed as follows:

1. Insert the installation data medium into the appropriate computer drive.
   The Setup program will start automatically provided Autostart is not disabled on the PG/PC.If the Setup program does not start automatically, start it manually by double-clicking the "Start.exe" file.
2. If necessary, click the "Yes" button for the Windows confirmation prompt.
3. Select the installation language of the Setup program.
4. Read the product information and installation instructions. To do this, click the "Read installation notes" or "Read product information" button.
5. Close the online help and click the "Next >" button.
6. The "Product Languages" dialog box shows those languages that were installed with the TIA Portal Framework. All languages supported by the product are installed automatically for SIMOTION SCOUT TIA from the activated languages. Click the "Next >" button.
7. In the following dialog box, select the product configuration.
   The required memory and the target directory are also listed. Click the "Next >" button.
8. Read and accept all the listed licensing agreements. Click the "Next >" button.
9. Read and accept all the listed safety instructions for safe operation. Click the "Next >" button.
10. All installation settings are listed in the overview. If you want to change the settings, navigate with the "< Back" button to the appropriate installation dialog box, and perform the change there.
    Otherwise, click the "Install" button to start the installation.

    Note

    License transfer

    If a license key is found during installation, you can transfer it to your PC. If you skip the license transfer, you can transfer it later using the Automation License Manager.

    You will find further information on licensing in section Licensing for SIMOTION SCOUT TIA (Page 38).

11. The computer may need to be restarted. Activate the "Yes, restart computer now" checkbox. Then click the "Restart" button.
12. If the computer does not need to be restarted, click the "Exit" button.

Result

SIMOTION SCOUT TIA has been installed in the specified directory on the PG/PC.

3.3 Uninstall SIMOTION SCOUT TIA

Requirements

The following requirements are valid for uninstalling SIMOTION SCOUT TIA:

- You require administrator rights on your PG/PC.
- All running programs are closed.

Note

Uninstalling TIA Portal

When an upgrade is made to a different TIA Portal version, the TIA Portal and SIMOTION SCOUT TIA must be uninstalled beforehand.

Procedure

To uninstall SIMOTION SCOUT TIA, proceed as follows:

1. Open the Control Panel via "Start > Control Panel".
2. Double-click the "Programs and functions" entry.
   The "Uninstall or Change a Program" dialog opens.
3. Double-click the "Siemens Totally Integrated Automation portal Vxx" entry.
4. If necessary, click the "Yes" button for the Windows confirmation prompt.
5. Select the installation language and click the "Next >" button.
   The dialog for selecting the products to be uninstalled opens.
6. Select SIMOTION SCOUT TIA and click the "Next >" button.
7. Check in the "Overview" dialog the list of products to be uninstalled. To make changes, click the "Back" button.
8. Click the "Uninstall" button.
   The uninstall is started.
   The expected time until completion of uninstalling is displayed in the dialog.
9. The computer may need to be restarted. Activate the "Yes, restart computer now" checkbox. Then click the "Restart" button.
10. If the computer does not need to be restarted, click the "Exit" button.

Result

The selected SIMOTION SCOUT TIA version is uninstalled.

3.4 Licenses

3.4.1 Licensing for SIMOTION SCOUT TIA

To use SIMOTION SCOUT TIA, in addition to the product DVDs, you will also receive a data medium containing the authorization data medium on which you will find the license key for SIMOTION SCOUT TIA.

Because the license key is identical for SIMOTION SCOUT TIA and SIMOTION SCOUT, it is valid for both.

The *Automation License Manager* program manages the license.

Installing the license for SIMOTION SCOUT TIA

1. Insert the authorization data medium with the license key.
2. Start the *Automation License Manager* program as follows:
   – In the start menu, select "Start > All programs > Siemens Automation > Automation License Manager".
   Or double-click the "Automation License Manager" symbol.
3. In the navigation area, select the drive with the authorization data medium.
   The license key is displayed in the right-hand window.
4. Select the license key and drag-and-drop it to the target drive.
5. Exit the Automation License Manager.
6. Remove the authorization data medium.

Result

SIMOTION SCOUT TIA has been licensed.

Installing the license upgrade for SIMOTION SCOUT TIA

1. Insert the authorization data medium with the upgrade license key.
2. Start the *Automation License Manager* program as follows:
   – In the start menu, select "Start > All programs > Siemens Automation > Automation License Manager".
   Or double-click the "Automation License Manager" symbol.

   In the navigation area, select the drive where the authorization for the old version of SIMOTION SCOUT TIA is located. Generally, the authorization will be installed on a hard disk drive on the PG/PC.
3. 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..." in the menu.
   The "Transfer license key" dialog opens.

4. Select the connected data medium and click "OK" to start the transfer.
   When the transfer is complete, the authorization and the upgrade license key will be stored on the data medium.
5. Select the "Upgrade..." command in the "License Key" menu.
   The older authorization will be deleted. After the upgrade, you will have a new floating license.

   Note

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

6. Now transfer the new floating license onto the hard disk drive.
   Proceed as described under item 3.
7. Exit the Automation License Manager.
8. Remove the automation data medium.

Result

SIMOTION SCOUT TIA has been upgraded.

Additional references

Detailed information about license keys is provided in the online help of the *Automation License Manager*.

User interfaces

4

4.1 Introduction

The TIA Portal serves as framework for the hardware and network configuration (HWCN).

Call SIMOTION SCOUT TIA from this framework with the "SIMOTION configuration" entry. SIMOTION SCOUT TIA is the workbench for configuring and programming the motion control.

As you are working both in the TIA Portal and in SIMOTION SCOUT TIA, both user interfaces are briefly described in the following sections.

Additional references

Detailed information about the user interfaces is provided in the information system of the TIA Portal and in the help system of SIMOTION SCOUT TIA.

See also

TIA Portal (Page 41)

SIMOTION SCOUT TIA (Page 46)

4.2 TIA Portal

Views in the TIA Portal

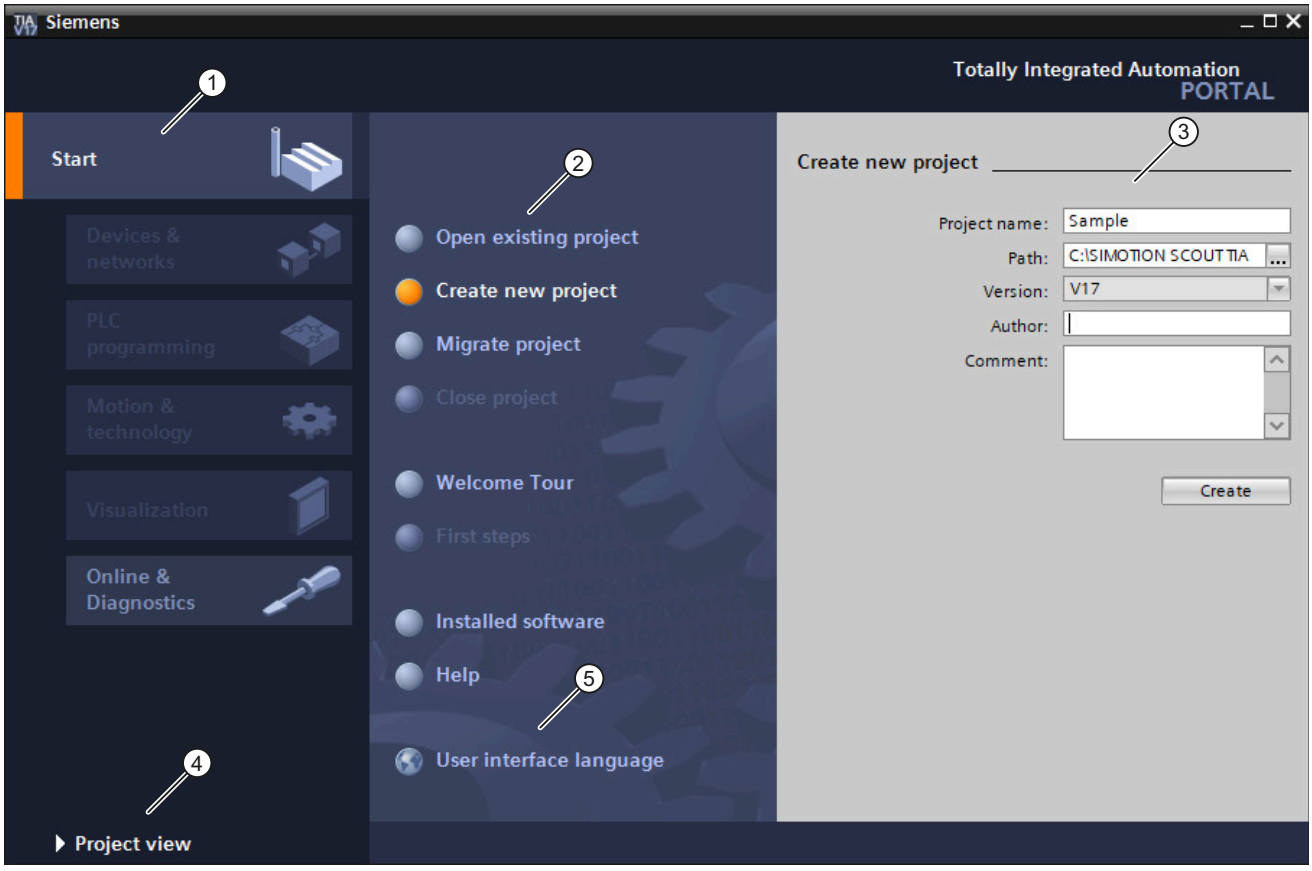
The following views are available in the TIA Portal:

- Portal view
- Project view

Portal view

The portal view provides an overview of all configuration steps and enables a task-based entry to your automation solution.

The individual portals ("Start", "Devices & Networks", "PLC Programming", "Visualization", "Online & Diagnostics", etc.) provide the basic functions for the individual tasks.



① **Portals for the various tasks**

The portals provide the basic functions for the individual task areas. The portals provided in the portal view depend on the products that have been installed.

Start SIMOTION SCOUT TIA from the "Motion & Technology" portal.

② **Actions for the selected portal**

Depending on the selected portal, the actions are offered that can be executed in this portal. You can open context-sensitive help in every portal.

③ **Selection window for the selected action**

The selection window is available in all portals. The content of the window adapts to your current selection.

④ **Change to the project view**

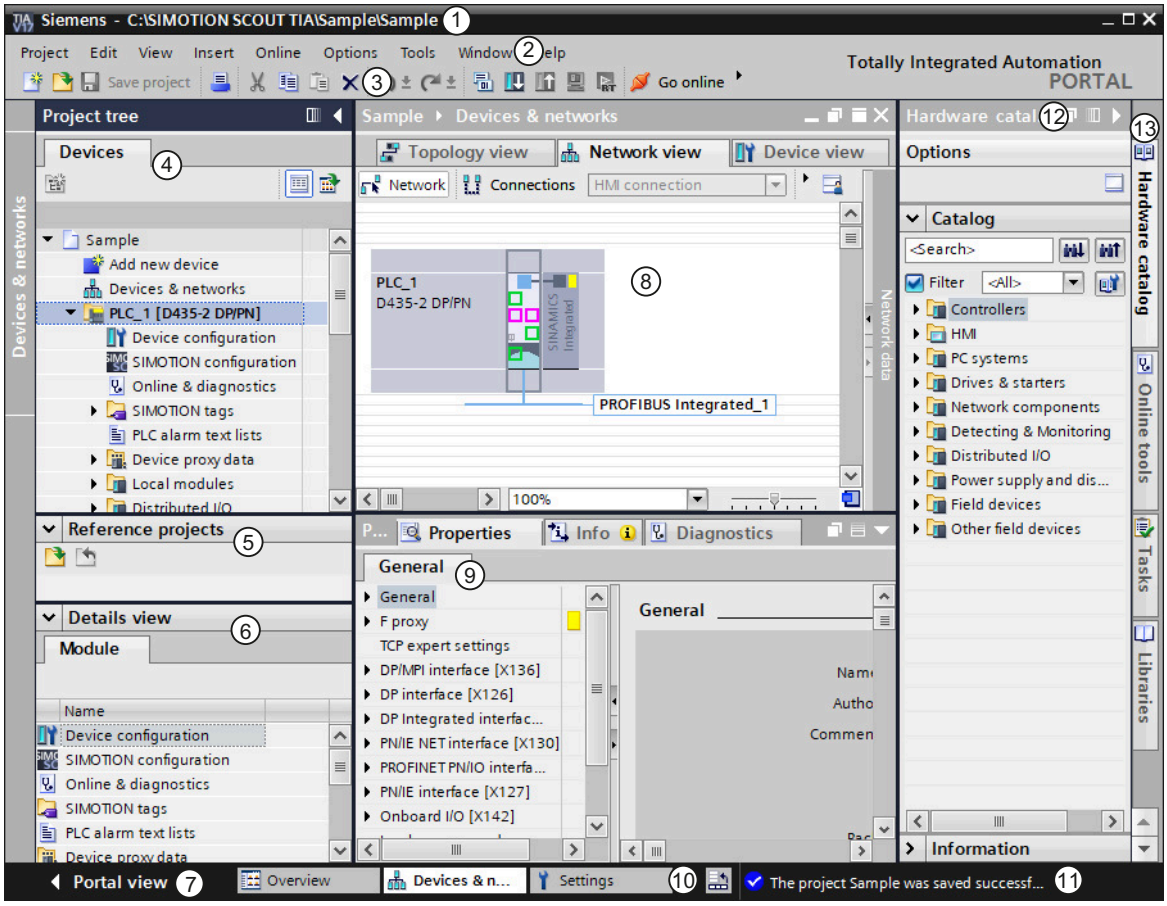
Use the "Project view" link to change to the project view.

⑤ **Select user interface language**

Use the "User interface language" link to set the user interface language.

Project view

The project view is a hierarchically structured view of all components in a project. The project view enables quick access to all objects in the project, the relevant working areas and editors. The various work windows show all the associated data for the selected objects.



① **Title bar**

The name of the project is displayed in the title bar.

② **Menu bar**

The menu bar contains all the commands that you require for your work.

③ **Toolbar**

The tool bar provides you with buttons for commands you will use frequently. This allows you to access these commands faster.

④ **Project tree**

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

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

⑤ **Reference projects**

In the "Reference projects" view, you can open further projects in addition to the current project. Although these reference projects are write-protected, you can copy individual devices from a reference project and add them to your current project where they can be further processed.

⑥ **Details**

The details view shows certain contents of a selected object. Possible contents include text lists and variables.

⑦ **Changing to the portal view**

Use the "Portal view" link to change to the portal view.

⑧ **Working area**

The objects that you can open for editing purposes are displayed in the working area.

⑨ **Inspector window**

The Inspector window displays additional information on a selected object or on executed actions.

⑩ **Editor bar**

The opened editors are displayed in the editor bar. If you have many open editors, they are shown grouped. The editor bar can be used to change quickly between the opened elements.

⑪ **Status bar with progress display**

The status bar contains the progress display for those background processes that are running currently.

⑫/⑬ **Task cards**

Depending on the edited or selected objects, task cards are provided to perform further actions, such as

- Select objects from a library or from the hardware catalog
- Search for objects in the project and replace
- Drag objects to the working area

The available task cards are found in a bar at the right-hand edge of the screen. You can expand and collapse the task cards at any time.

Additional references

For detailed information about the user interface and operation of the TIA Portal, refer to the "Introduction to the TIA Portal" section in the information system of the TIA Portal.

4.2.1 TIA Portal - language settings

User interface language

The TIA Portal allows you to switch the user interface language during operation. SIMOTION SCOUT TIA takes over the language setting of the TIA Portal. However, change in the language setting takes effect only after a restart of the SIMOTION SCOUT TIA.

The TIA Portal supports the following languages:

- German
- English
- French
- Italian

- Spanish
- Chinese (simplified)

Note

Not all languages of the TIA Portal are supported by SIMOTION SCOUT TIA.

If you have selected a user interface language not supported by SIMOTION SCOUT TIA, the SIMOTION SCOUT TIA user interface is displayed in English.

Changing the user interface language

Proceed as follows to change the user interface language:

1. Switch to the TIA Portal.
2. Switch to the "General" group in the "Tools > Settings" menu.
3. Select the preferred language from the "User interface language" drop-down menu of the "General Settings".

Note

Multiple languages in SIMOTION SCOUT TIA

After switching the language, the SIMOTION SCOUT TIA texts and messages may be displayed in both the previous and the new selected user interface language.
In this case, exit SIMOTION SCOUT TIA and restart the TIA Portal.

4.2.2 TIA Portal - Using Help

TIA Portal information system

The TIA Portal has an extensive information system. Start the information system in the Portal view via the "Help" button or in the Project view via the "Help -> View Help" menu and read how to work with the help in Section "Introduction to the TIA Portal".

Additional references

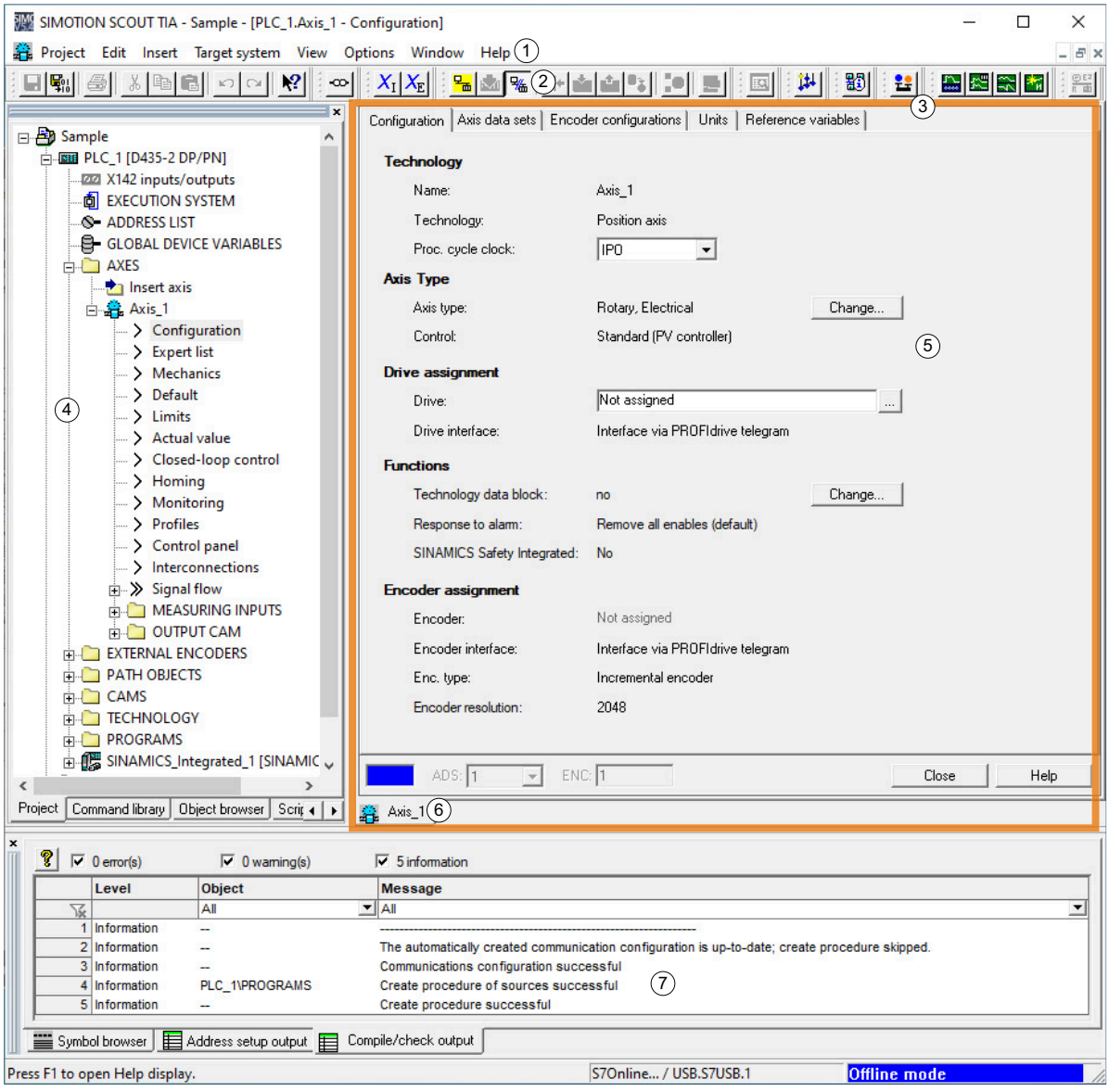
You will find detailed information on all steps that you perform for SIMOTION configuration in the TIA Portal (e.g. configuring hardware, setting up communications, etc.) in the information system of the TIA Portal in the "Configuring SIMOTION devices" section.

4.3 SIMOTION SCOUT TIA

4.3.1 SIMOTION SCOUT TIA - using workbench

The SIMOTION SCOUT TIA workbench is the common framework for all other tools of the engineering system. The workbench is the navigation center of the individual engineering steps and offers a uniform and integrated view of all data and programs.

The following figures shows an example of the Workbench components:



① Menu bar
② Tool bars
③ Working area
④ Project navigator
⑤ Snap-in
⑥ Tab
⑦ Detail view

Workbench components

The workbench comprises the following components:

- **Menu bar**:
  You call the functions of SIMOTION SCOUT TIA via the menus in the menu bar.
- **Tool bars:**
  Frequently used menu commands are also available in tool bars, which can be activated or deactivated as required. These provide quick access to the functions. The tool bars can be undocked from the header and relocated to a different position (e.g. at right, left, lower border) or as a window.
- **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.
- **Project navigator**:
  The project navigator provides an overview of the entire project. All defined elements, such as devices, drives, axes, etc., are displayed in a tree structure.
  The following tabs are also available in the project navigator:
  - Command library - depending on the configuration, contains all the commands and functions required for the programming
  - Object browser - clearly displays the object structure of the configuration in a hierarchical structured tree
  - Scripting library - contains all scripting objects and methods in alphabetical order
- **Snap-in / tab:**
  A Snap-in is a program integrated automatically in the working area of the SIMOTION SCOUT TIA Workbench. Snap-ins provide functions for processing SIMOTION SCOUT TIA projects and are displayed as a work window in the working area of the workbench. You can open several snap-ins. Open Snap-ins are displayed in the working area as tabs. The active Snap-in is visible in the foreground.
  The following Snap-Ins are available:
  - Program editors
  - Wizards for the configuration of technology objects
  - Device diagnostics
  - Drive navigator
- **Detail display:**
  In the detail display, you can show more detailed information about the element selected in the project navigator and the active window in the working area, for example, variables of a program, system variables of a technology object, protocols of compiled program sources.

Additional references

Detailed information can be found in the SIMOTION SCOUT TIA online help.

4.3.2 SIMOTION SCOUT TIA - using the working area

The workbench displays all of the Snap-in work windows in the working area. Each Snap-in provides its own work window. You can open multiple instances of these windows. You can, for example, open several programs at the same time for editing.

The following table provides an overview of the active functions in the working area of the workbench depending on the project mode (offline/online):

Function in project navigator	**Function in working area offline mode (Example)**	**Function in working area online mode (Example)**
Programs (MCC, ST, LAD/FBD) For further information, please go to: • SIMOTION MCC Motion Control Chart • SIMOTION ST • SIMOTION LAD/FBD	Create program	Monitor program
Execution system	Assign program	-
Technology objects (TO configuration)	Create and configure TO element	Change configuration data during RUN
Cam editor CamEdit/CamTool	Create cam	Change cam
Trace	Load and evaluate old recordings	Create current recordings

Window in the working area

You can change the size of the windows in the working area:
Click the edge of the window, hold down the left mouse button, and drag the window to the required size.

To maximize or restore a window, press <Ctrl+F11>.

Each window opened in the working area can be accessed via a tab at the bottom edge of the working area.

The following options are available to bring a window into the foreground:

- Click the relevant tab.
- Select the appropriate item in the "Window" menu.

To close a window, proceed as follows:

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

Configuration dialogs and editors can also be closed with <Ctrl+F4>.

4.3.3 SIMOTION SCOUT TIA - using the project navigator

By default, the project navigator comprises the "Project" tab and the "Command library", "Object browser" and "Scripting library" tabs.

Project tab

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

In addition to the elements created automatically via the hardware configuration, create the following elements manually in the project navigator:

- Technology objects
  e. g. axes, external encoders, measuring inputs, cams
- Programs
  e. g. ST source files, MCC chart
- Watch tables
- Libraries

You can change the properties, e.g. the name of an element.

To improve clarity in the project navigator, you can sort and group lower-level objects into topics.

Command library tab

Depending on the configuration, the commands and functions required for the programming are displayed in a tree on the "Command library" tab. You can use these commands to program in the ST editor, LAD/FBD editor and MCC editor, e.g. to create conditions. You can search in the command library or set filters.

Object browser tab

The object structure of the configuration is clearly displayed in a tree in the "Object browser" tab. The tree is structured hierarchically and clearly shows the individual objects, classes, interfaces and references.

Scripting library tab

The scripting structure is clearly displayed in a tree in the "Scripting library" tab. The tree contains the individual objects and methods of scripting in alphabetical order.

4.3.4 SIMOTION SCOUT TIA - menus

SIMOTION SCOUT TIA menus are subdivided into static and dynamic menus.

Static menu

Static menus are primarily used to control the workbench or a project. Static menus are permanently displayed.

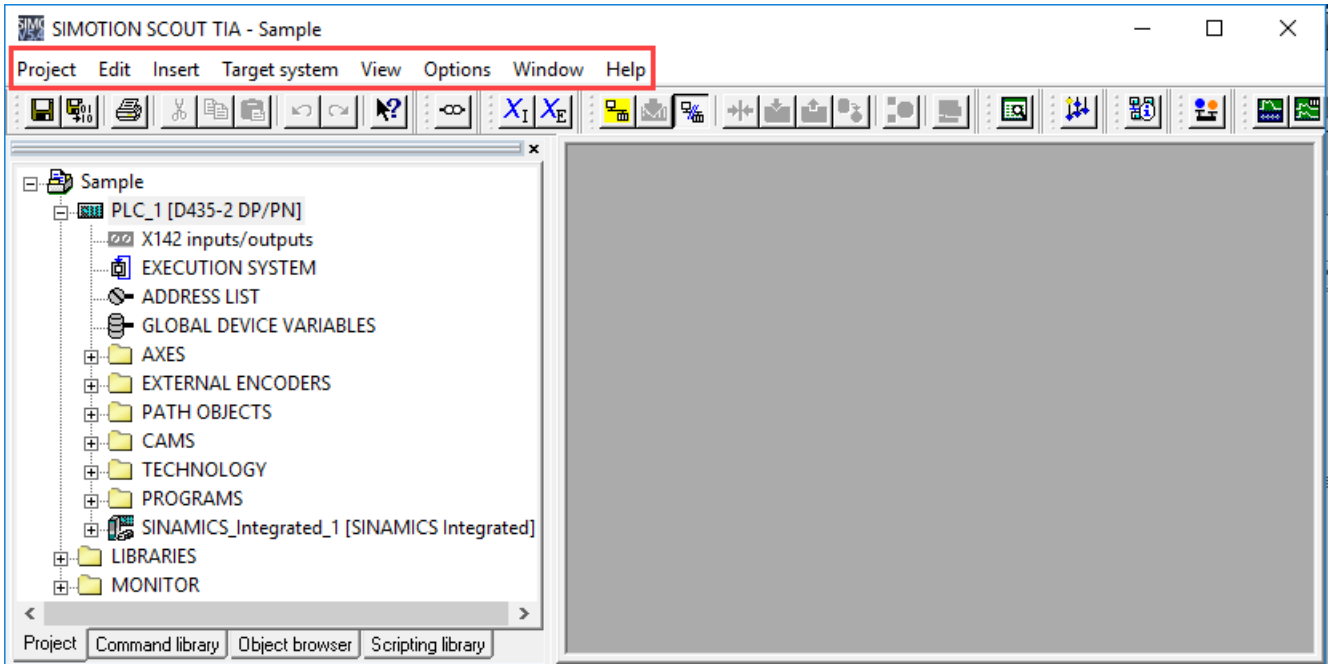


Figure 4-1 Static menu

Dynamic menu

Dynamic menus are provided by Snap-ins and are added to the static menu. The menu with active Snap-in in the working area is always displayed.

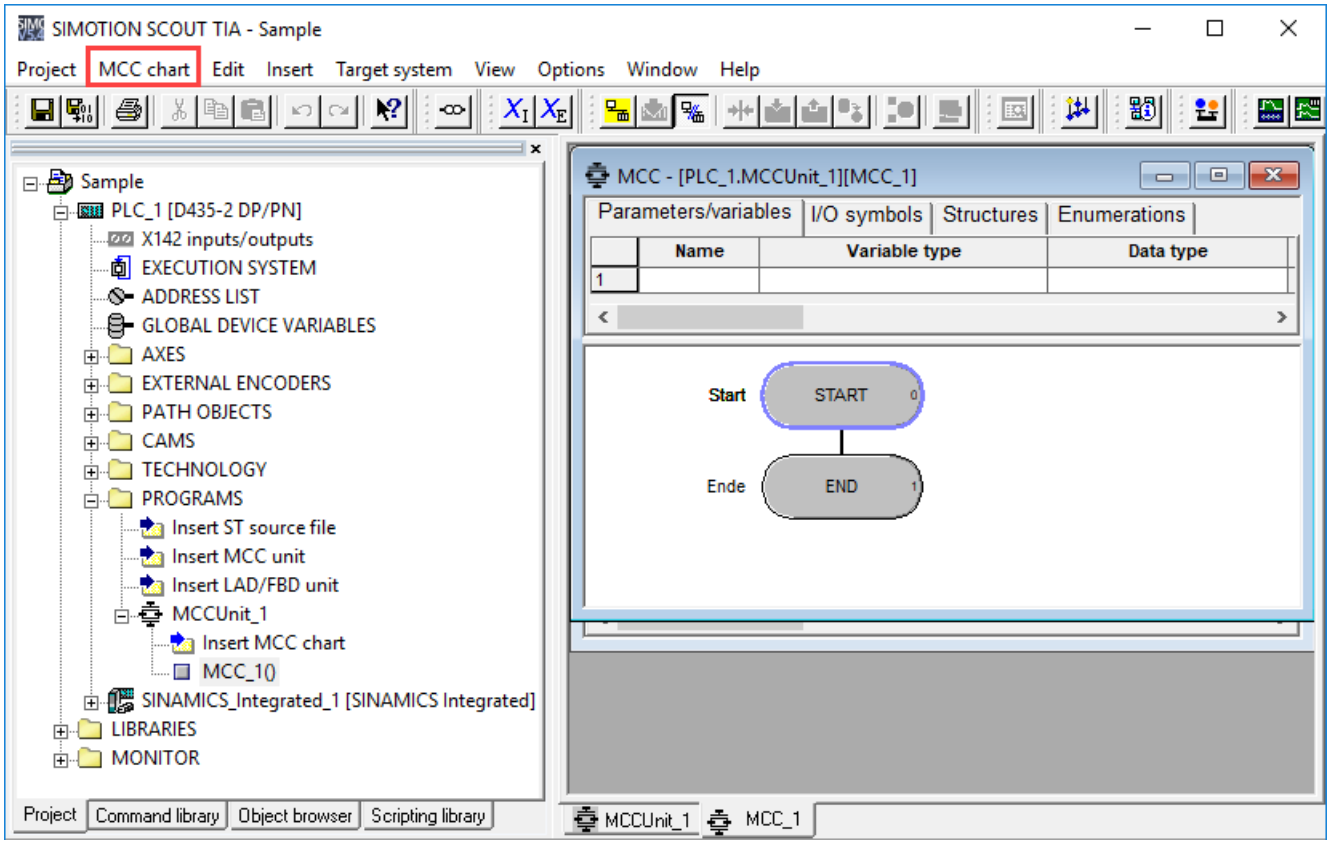


Figure 4-2 Example of a dynamic menu

Table 4-1 Structure of the menu bar

Menu	Comment
Project	Static menu, always visible
(Dynamic menu)	See "Dynamic menus" table
Edit	Static menu, always visible
Paste	Static menu, always visible
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 4-2 Dynamic menus

Dynamic menu	Comment
Axis	Visible only when the project is open and the associated Snap-in is active in the working area. The dynamic menus appear in the menu bar between the "Project" and "Edit" static menus.
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	
MCC source	Visible only when a project has been loaded and the associated Snap-in is active in the working area. The dynamic menus appear in the menu bar between the "Project" and "Edit" static menus.
MCC chart	
LAD/FBD source	
LAD/FBD program	

4.3.5 SIMOTION SCOUT TIA - menu items

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

Table 4-3 Menu items in SIMOTION SCOUT TIA

Shortcuts	Menu item	Response
Project...		
Ctrl+Alt+K	Check consistency	Checks project consistency
Ctrl+Alt+B	Save and compile changes	Saves the project and compiles the changes made in the project since the last compilation
Ctrl+P	Print	Prints the selected window
Alt+F4	Exit	Exits the SIMOTION SCOUT TIA program

Shortcuts	Menu item	Response
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

Shortcuts	Menu item	Response
Edit...		
Ctrl+V	Paste	Inserts the clipboard contents
Del	Delete contents	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	Search	Opens the Search window
F3	Find next	Continues the search from the current position
Ctrl+Shift+F	Search in the project	Opens the Search window
Ctrl+Shift+G	Replace in the project	Opens the "Search and Replace" window

CTRL+H	Replace	Opens the "Replace" window
CTRL+J	Display next position	-
Ctrl+G	Go to in the project navigator...	Opens the "Go To in the Project Navigator" dialog box

Shortcuts	Menu item	Response
Target system...		
Ctrl+L Is only possible online	Download / target device	Loads individual target device
Ctrl+D Is only possible online	Device diagnostics	Opens device diagnostics
Ctrl+I Is only possible online	Control operating state	Opens the dialog box for controlling the operating state

Shortcuts	Menu item	Response
View...		
Ctrl+F11	Maximize working area	Maximizes and restores the view of the working area
Ctrl+F12	Maximize detail view	Maximizes and restores the view of the detail view
Ctrl+Num+ (Plus key on the numeric keypad)	Zoom in	Enlarges the graphic in the program editors
Ctrl+Num+ (Minus key on the numeric keypad)	Zoom out	Scales down the graphic in the program editors
F5	Refresh	Refreshes the view

Shortcuts	Menu item	Response
Options...		
Ctrl+Alt+E	Settings	Opens the "Options > Settings" dialog box

Shortcuts	Menu item	Response
Window...		
Ctrl+Shift+F5	Arrange cascading	Arranges the opened windows in the working area
Ctrl+Shift+F3	Arrange vertically	

Shortcuts	Menu item	Response
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	Response
Help...		
F1	Help topics	Opens the entire help available for SIMOTION SCOUT TIA
SHIFT+F1	Context-sensitive help	Opens the context-sensitive help function for the selected object, parameter, etc.

Note

List of all shortcuts

The online help of SIMOTION SCOUT TIA includes a complete list of all the shortcuts available in SIMOTION SCOUT TIA and the programming and operating instruction manuals.

4.3.6 SIMOTION SCOUT TIA - keyboard operation and shortcuts

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

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

Table 4-4 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 opens
Right mouse button	Selects the tree object at the cursor position; detail view displays the associated details; corresponding context menu opens
UP/DOWN arrow keys	Selects the tree object at the cursor position
"ENTER"	Snap-in for the selected tree object opens
"Context menu key"	Context menu for the selected tree object opens

4.3.7 SIMOTION SCOUT TIA - using the context menus

The tree elements of the project navigator have context menus. Context menus give you fast access to all important functions permitted for this tree element.

To call the desired function of the tree element via context menus, proceed as follows:

1. Select the appropriate element in the project navigator.
2. Open the context menu with a right-click.
3. Left-click the appropriate command to select it.

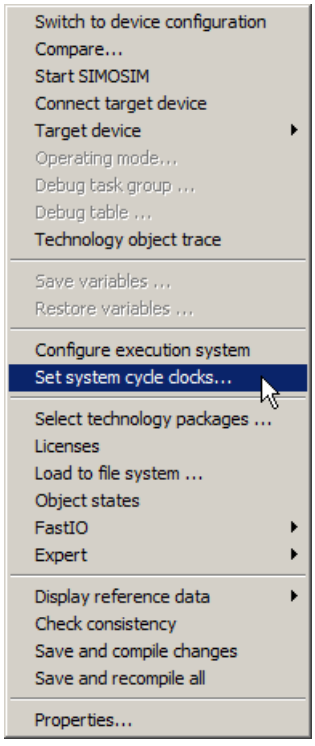


Figure 4-3 Context menu for SIMOTION device

4.3.8 SIMOTION SCOUT TIA - detail view

4.3.8.1 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.

To display the detailed view for the address list and the watch table, double-click this element in the project navigator.

Depending on the selected element, different tabs are offered and information about the element is displayed therein.

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

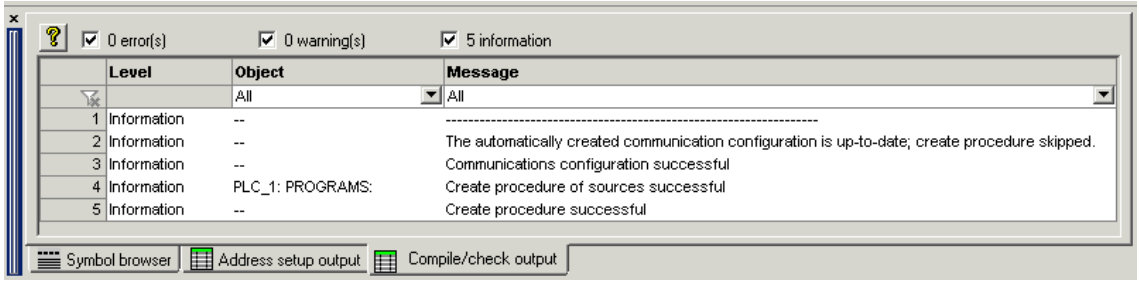


Figure 4-4 Example of detail view

Each tab is only opened once. This means:

- The active tab shows the details of the selected element/action.

You can maximize or minimize each tab with <Ctrl+F12>.

4.3.8.2 Using the symbol browser

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

Permanently retain the display in the symbol browser

You can permanently retain the display in the symbol browser. The display remains even when, for example, other device or technology objects are selected in the project navigator.

To permanently retain the display in the symbol browser, proceed as follows:

1. Click the pin at the top right of the symbol browser view.

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

4.3.8.3 Using the address list

The address list is where you create I/O variables, which you then assign to a particular item of hardware. You can monitor I/O variables in the address list, and, when necessary, modify them. The I/O variables are assigned either manually or via an assignment wizard.

Opening the address list

To open the address list, proceed as follows:

1. Browse to the folder for the device in the project navigator.
2. Double-click the "Address list" element below the device.
   The address list opens in the details area.

Additional references

Further information about the the address list is available in the SIMOTION SCOUT TIA online help.

4.3.8.4 Using the watch table

With the symbol browser you can view the variables belonging to one object in your project; with the program status you can view the variables belonging to a selected monitoring area in the program. With watch tables, in contrast, you can monitor selected variables from different sources as a group (e.g. program sources, technology objects, SINAMICS drives - even on different devices). You can sort the variables in the watch table in any way, add comments and combine them into groups. You can hide individual variables to make the watch table more manageable and also control variables via the watch table directly.

Creating a watch table

To create a watch table and assign your variables, proceed as follows:

1. Open the "Monitor" folder in the project navigator.
2. Double-click the "Insert watch table" entry to create a watch table.
3. Enter the name of the watch table.
   A watch table is created with this name in the "Monitor" folder.
4. In the project navigator, click the object from which you want to move variables to the watch table.
5. In the symbol browser, in the address list, or in the expert list, select the corresponding variable line by clicking its number in the left column.
6. From the context menu, select the "Add to watch table" command and the appropriate watch table, e.g. "Watch_table_1".
7. If you click the watch table, you will see in the detail view of the"Watch table" tab that the selected variable is now in the watch table.
8. Alternately, you can copy-and-paste variables to the watch table.
9. To monitor the variables of various objects, repeat steps 3 to 6.

You can also create a watch table direct by selecting a variable followed by "Add to watch table > New watch table" in the context menu.

The new watch table is created automatically and filled with the selected variables.

If you are connected to the target system, you can monitor the variable contents.

Using multiple watch tables (>Watchtable_temp<)

To monitor variables simultaneously in different watch tables, create temporary watch tables.

To create a temporary watch table ">Watchtable_Temp<", proceed as follows:

1. Open the "Monitor" folder in the project navigator.
2. Double-click ">Watchtable_Temp<".
   The temporary watch table is displayed in the detail view.
3. Drag-and-drop the desired watch tables from the project navigator to the temporary watch table.
   The watch tables are arranged below each other.
   The contents are lost when the temporary watch table is closed.

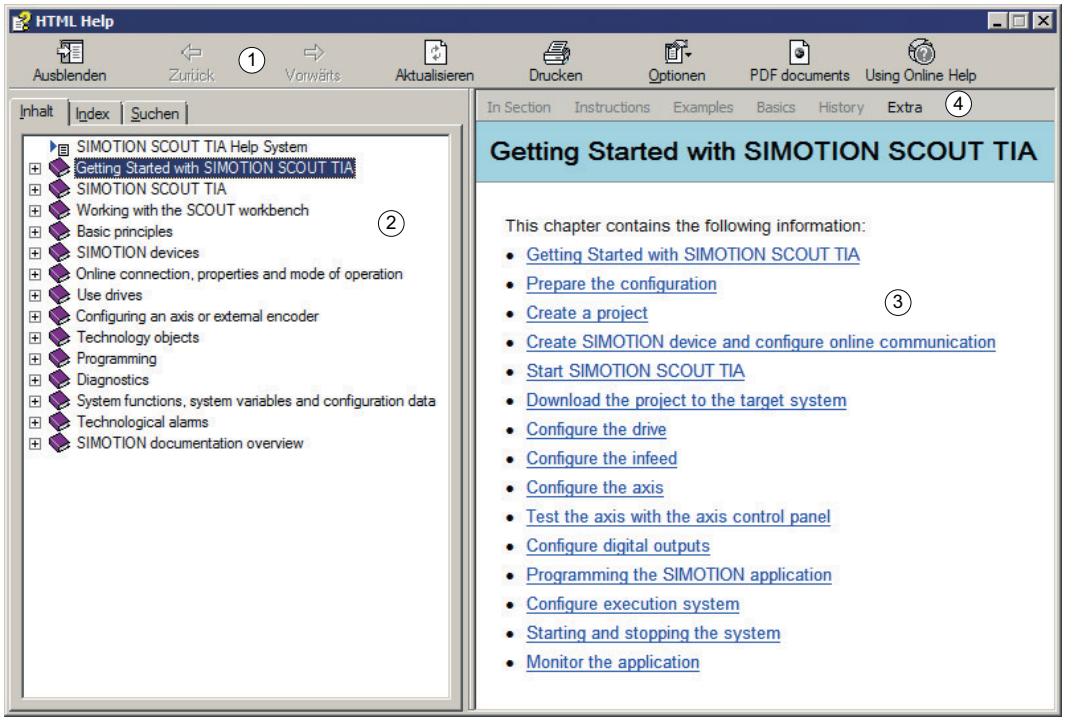
Additional references

Detailed information about the use of watch tables is contained in the "Watch table" section in the SIMOTION SCOUT TIA online help.

4.3.9 SIMOTION SCOUT TIA - using the help

SIMOTION SCOUT TIA has a comprehensive context-sensitive help. The following is a description of how to work with the help system using different examples.

Structure of the Online help window



1 Menu bar

You can use buttons in the menu bar to configure the help or display general information.

- Click "PDF documents" to display the available function diagrams.
- Click "Use online help" to display the help page for the full text search on the "Search" tab.

2 Navigation area

In the navigation area you can navigate through the help, open the index or search through the entire help.

- Click the "Contents", "Index", or "Search" tab to navigate through the help.
- Click the "+" in front of a book to open the table of contents.
- Click a book or help page to display its contents in the contents area.

3 Contents area

The contents for the help pages selected in the navigation area are displayed in the contents area.

Within the contents area, you can use symbols to display hidden information:

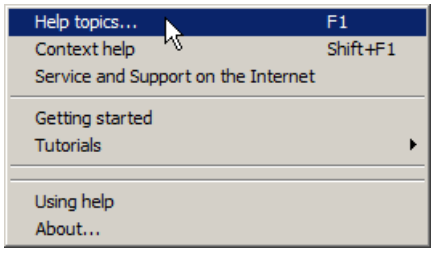
- Click the arrow to display or hide additional information.
- Click the minimized view to display a hidden figure.
- Click the copy symbol. The following program code will be saved automatically in the clipboard. You can then insert this in a program editor.

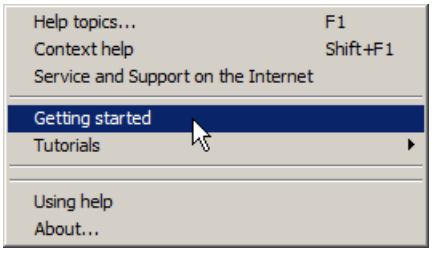
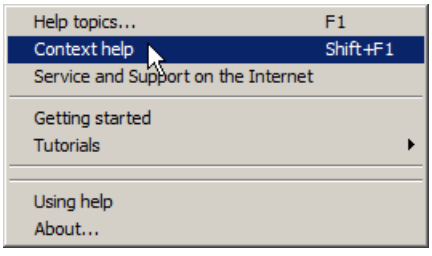
4 Link bar

The header area of many help pages has a link bar. This link bar displays further information for the selected help page. The link bar contains the following entries:

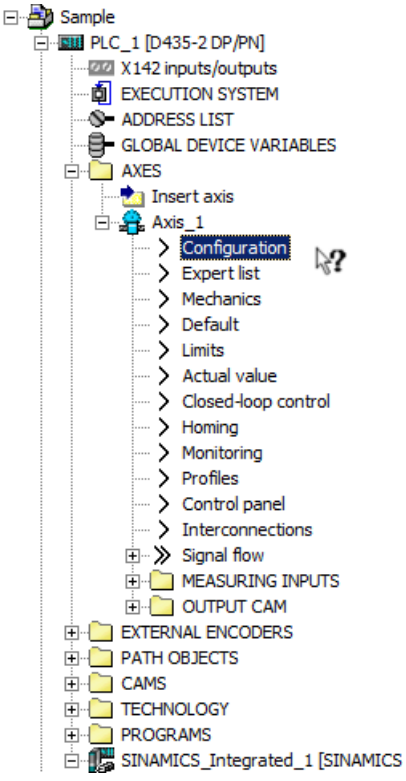
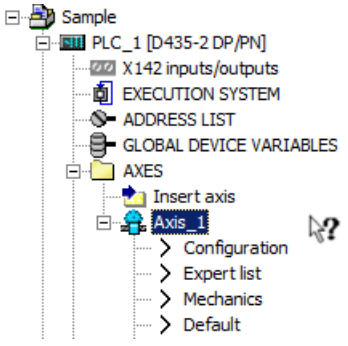
- In Section
  Links to headers of the displayed topic.
- Programming Manuals
  Links to handling instructions.
- Examples
  Links to examples.
- Fundamentals
  Links to background information, such as definitions or details.
- History
  List of the most recently opened help pages.
- Options
  Link to the start page.
  Forwards and backwards in the previously opened help pages.

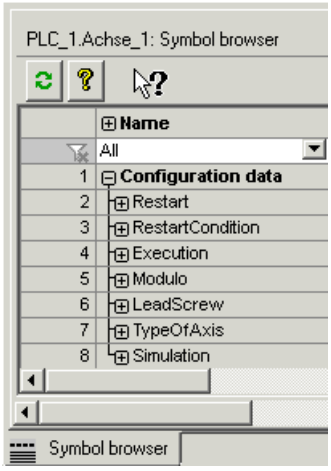
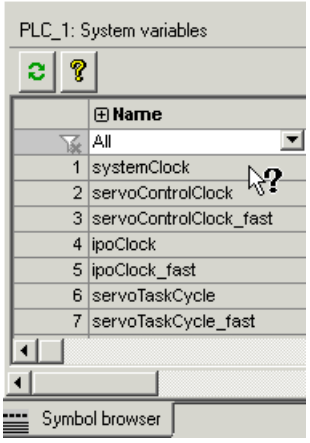
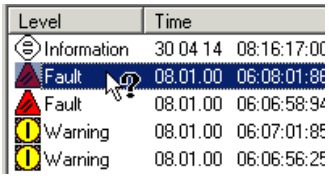
Features of online help

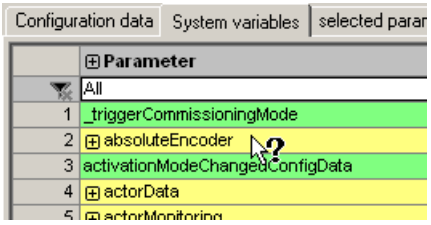
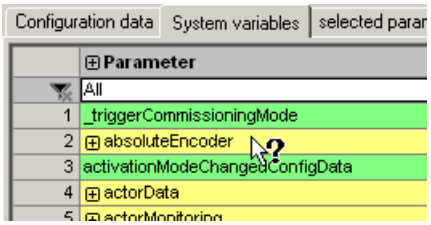
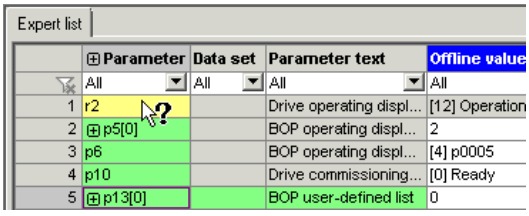
Features of online help	To open the help:	
Open entire help	Key <F1>	Press <F1>.
	or	
		Select "Help > Help topics" from the menu.
	The entire help opens.	

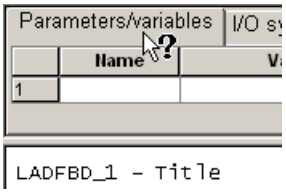
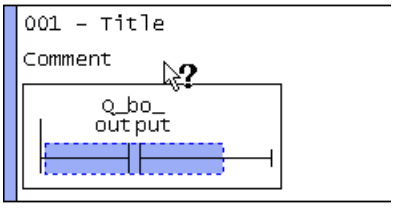
Features of online help	To open the help:	
Open Getting Started		Select "Help > Getting Started" from the menu.
	Getting Started opens.	
Help button	 or 	Click the Help button of the respective dialog box or window.
	The context-sensitive help for the dialog box opens.	
Context-sensitive help	<Shift+F1>	• Press <Shift+F1>.
	• or	
		• Click the button in the menu bar.
	• or	
		• In the menu, select "Help > Context help".
	The mouse pointer changes to a question mark.	
		• Then click with the changed mouse cursor on the dialog box, the parameter, the input field or the menu item.
	The context-sensitive help for the selected entry opens.	

Examples of the context-sensitive help

Help in the project navigator		
General help		Press <Shift+F1>. Then click with the question mark on the project navigator. The general help for the project navigator opens.
Help for the technology object (only SIMOTION)		Press <Shift+F1>. Then click with the question mark on a technology object in the project navigator. The help for this technology object opens.

Help for the detail view		
General help for the symbol browser		Press <Shift+F1>. Then click with the question mark in the margin of the symbol browser. Alternatively, you can also open the help for the symbol browser by clicking . The general help for the symbol browser opens.
System variables in the symbol browser		In the project navigator, select the SIMOTION device or the technology object. The system variables of the element are displayed in the symbol browser. Press <Shift+F1>. Then click with the question mark on the system variable in the symbol browser. The associated help opens.
Help for alarms		Press <Shift+F1>. Then click with the question mark on the alarm shown on the "Alarms" tab. The help for the drive alarm or technological alarm opens.

Help for the expert list		
Configuration data		Press <Shift+F1>. Then click with the question mark on the configuration data item in the expert list. The help opens.
System variables		Press <Shift+F1>. Then click with the question mark on the system variable in the expert list. The help opens.
Parameters of the drives		Press <Shift+F1>. Then click with the question mark on the parameter in the expert list. The help opens.

Help for the LAD/FBD editor (SIMOTION only)		
Declaration area		Press <Shift+F1>. Then click with the question mark on a tab in the declaration area of the LAD/FBD editor. The help opens.
Editor area		Press <Shift+F1>. Then click with the question mark on an element in the editor area of the LAD/FBD editor. The help opens.

Basics of SIMOTION configuration in the TIA Portal 5

5.1 Configuration overview

Configuring requirements

The following requirements apply to configuring:

- The TIA Portal (framework) is installed, for example with the STEP 7 or WinCC software package.
- SIMOTION SCOUT TIA has been installed and licensed for the PG/PC.
- The hardware has been installed and wired.
- The PG/PC has been connected to the SIMOTION device via the PROFIBUS, Ethernet or PROFINET IO interface.
- For configuring the drives with the drive wizard, you need the article number of the drive unit and the components (power supply, power unit, motors and encoders).

The following table provides an overview of the individual configuring steps and where to implement them.

Configuring step	Where
① Create a new project	TIA Portal
② Insert SIMOTION devices	TIA Portal
③ Insert a SIMOTION drive	TIA Portal
④ Compile hardware configuration	TIA Portal
⑤ Configure online access	TIA Portal
⑥ Configure communication	TIA Portal
⑦ Configure HMI connection	TIA Portal
⑧ Go online	SIMOTION SCOUT TIA
⑨ Configure the drives	SIMOTION SCOUT TIA
⑩ Configure the technology objects	SIMOTION SCOUT TIA
⑪ Create user programs	SIMOTION SCOUT TIA
⑫ Test and diagnostics	SIMOTION SCOUT TIA

See also

Target group and content of the configuration manual (Page 21)

5.2 Managing projects

Basic principles

Projects are used for the orderly storage of data and programs that result in the creation of an automation solution. You create projects in the TIA Portal and manage them there. The data summarized in a project shall include, in particular:

- Configuration data on the hardware structure and parameter data for modules
- Configuration data for communication via networks
- Configuration data for the devices
- Reports
- Configuration data
- User programs
- Motion profiles
- Drive data

The following table provides an overview of the individual configuration steps and where to implement them.

Project management	Where
Creating a new project	TIA Portal
Open project	TIA Portal
Delete a project	TIA Portal
Close a project	TIA Portal
Save project as	TIA Portal
Migrating a project	TIA Portal
Save project	SIMOTION SCOUT TIA
Save project and compile changes	SIMOTION SCOUT TIA
Save project and recompile everything	SIMOTION SCOUT TIA
Load project to the target system	SIMOTION SCOUT TIA
Saving and exporting a project	SIMOTION SCOUT TIA

See also

Creating a new project (Page 69)

Transferring SIMOTION SCOUT projects (Page 75)

5.2.1 Creating a new project

Note

You can only create a project in the TIA Portal.

Procedure

To create a project, proceed as follows:

1. Start the TIA Portal.
2. Select the "Create new project" entry in the secondary navigation in the Portal view.
3. Assign a name for the new project below "Project name".
4. Click the "..." button to set the storage location.
5. Enter any required comments in the comment field.
6. Create the project using the "Create" button.

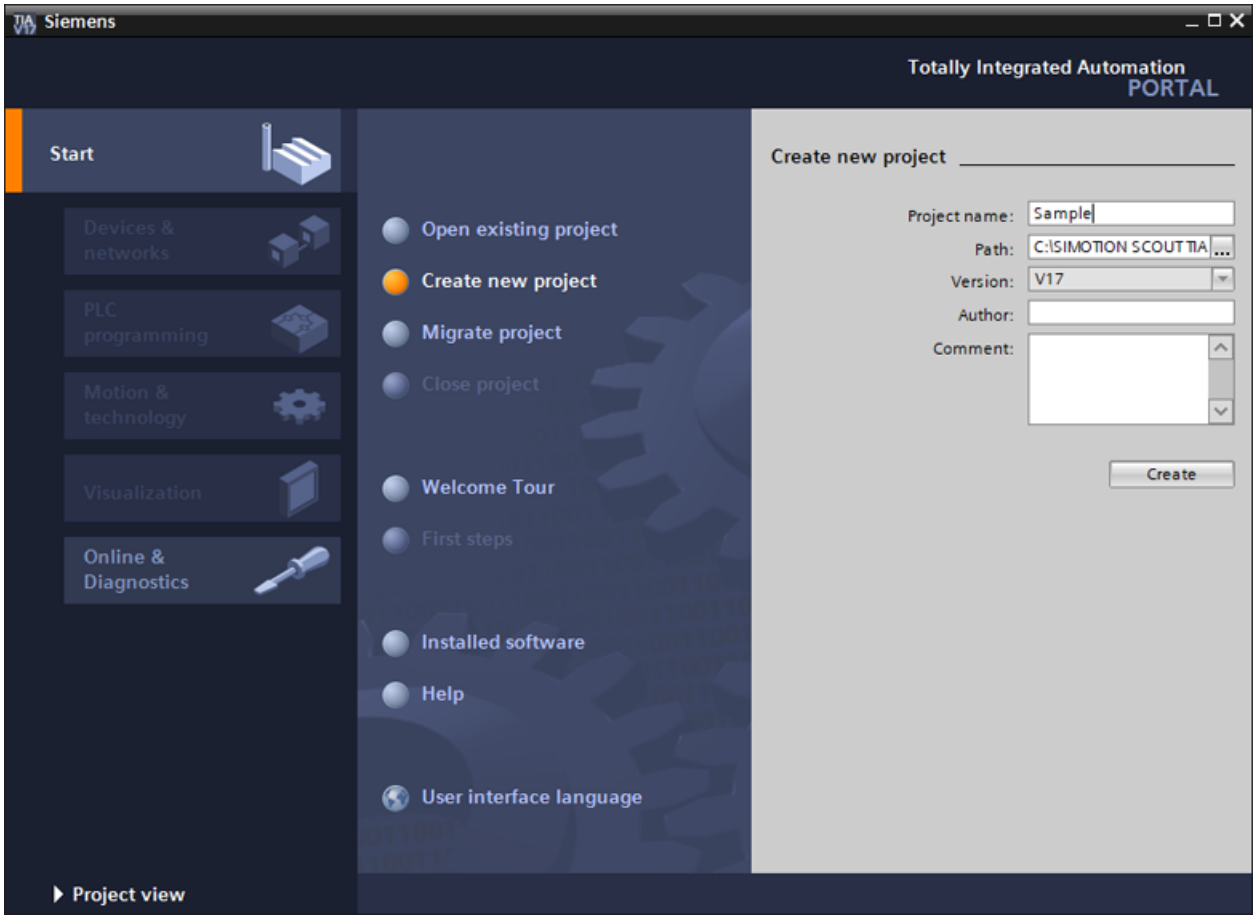


Figure 5-1 Creating a project

Result

You have created a project that was saved in the specified directory.

Note

Maximum number of characters

If necessary, change the storage location or project name because a maximum of 94 characters are available for the project name and 143 characters for the path.

5.2.2 Open project

Note

You can only open a project in the TIA Portal.

Procedure

To open a project, proceed as follows:

1. Start the TIA Portal.
2. Select the "Open existing project" entry in the secondary navigation in the Portal view.
3. Select the project you want to open in the right-hand window at "Recently used".
4. Click the "Open" button to open the project.

If the project to be opened is not listed, proceed as follows:

1. Click the "Browse" button and navigate to the project you want to open in the subsequent "Open existing project" dialog.
2. Double-click the project file.

Result

You have opened the project and are in the Portal view.
Switch to the Project view to continue with the configuration.

5.2.3 Close a project

Note

You can only close a project in the TIA Portal.

Procedure

To close a project, proceed as follows:

1. Switch to the TIA Portal.
2. Open the "Close" entry in the "Project" menu in the Portal view.
   Or select the "Close project" command in the secondary navigation in the Portal view.
3. If you have made changes in the project, you will be prompted in "The project has been changed" dialog whether or not you want to save the changes.

Result

You have closed the selected project. SIMOTION SCOUT TIA has been closed.

5.2.4 Save project as

Note

You can only perform "Save project as" in the TIA Portal.

Procedure

To save a project at the required target location, proceed as follows:

1. Switch to the TIA Portal.
2. Select the "Save project as ..." command in the "Project" menu in the Portal view.
3. In the "Save current project as ..." dialog, navigate to the storage location where you want to save the project.
4. Assign a file name to the project.
5. Save the project at the set storage location by clicking the "Save" button.

Result

You have saved the project in the specified location.

Note

Maximum number of characters

If necessary, change the storage location or project name because a maximum of 94 characters are available for the project name and 143 characters for the path.

5.2.5 Delete a project

Note

You can only delete a project in the TIA Portal.

Requirement

- The project is not opened.

Procedure

To delete a project, proceed as follows:

1. In the "Project" menu, select the "Delete project..." command.
   The "Delete project" dialog opens and a list of recently used projects is displayed. The project currently open is not displayed in the list.
2. Select the project you want to delete.
   If the required project is not in the list, click the "Browse" button. Navigate to the project folder and open the project file.
3. Click the "Delete" button.
4. Confirm the prompt with "Yes" to delete the project permanently.

Result

The complete project folder has been deleted from the file system.

5.2.6 Search and replace

Browsing a project

You can use the following search options within the TIA Portal:

- Browse the complete project
- Search and replace within an editor
- Browse the hardware catalog

Note

Search in SIMOTION SCOUT TIA

To search for any text or variables within the Motion Control configuring, switch to SIMOTION SCOUT TIA in the "Edit > Search in the project..." menu.

Procedure

To start the search editor in the TIA Portal, proceed as follows:

1. In the "Edit" menu, select the "Browse project" command.
   The search editor opens.
2. Enter the search text as "Search for:".
3. If the search results need to be restricted, activate the appropriate options for "Restrict search to:".
4. Start the search with the "Start search" command.

Result

All found objects are listed. Double-click a hit to open the source.

Search and replace in the project

The following methods are available within an editor to search for and replace texts.

Note

Searching and replacing in SIMOTION SCOUT TIA

To search for or replace any text or variables within the Motion Control configuring, switch to SIMOTION SCOUT TIA in the "Edit > Replace in the project..." menu.

Procedure

To start the editor for the "Search and replace " function in the TIA Portal, proceed as follows:

1. In the "Edit" menu, select the "Search and replace" command.
   The "Search and replace" editor opens.
2. Enter the search text as "Search for:".
3. Activate the desired additional options for the search.
4. Click "Search".
5. The first search hit is selected in the editor.
6. Enter the text with which you want to replace the search hit as "Replace".
7. To replace the selected hit, click "Replace".

Result

The found term is replaced with the desired text.

5.2.7 Print project

Print project content

The "Print" function allows you to print the complete project, individual objects, visible information from an editor or a compact project overview.

Note

Printing in SIMOTION SCOUT TIA

To print a complete project overview or individual parts from the configuring within the Motion Control configuring, e.g. programs or technology objects, switch to SIMOTION SCOUT TIA, select the element to be printed, and select the "Project > Print..." menu.

Procedure

To print content from the hardware configuration in the TIA Portal, proceed as follows:

1. Select in the project navigation the element to be printed.
2. Select the "Print project..." menu.
   The "Print" dialog opens.
3. Select the desired print options.
4. To start the print operation, click "Print".

Result

The selected project content is printed.

5.2.8 Archiving a project

The archiving of a project has the advantage of reducing the project size for large projects, for example, to send a project as e-mail.

Procedure

To archive a project, proceed as follows:

1. Save the currently open project.
2. Select the "Archive..." command in the "Project" menu in the project view.
3. Select the required archiving settings.
   To save a compressed project archive, activate the "Archive as compressed file" option.
   If you do not want to back up restorable data when the project is archived, select the option "Discard restorable data".
   To automatically add the date and time of day to the file name, select the option "Add date and time to target name".
4. Under "Target path:", navigate to the storage location where the archive should be saved.
5. Assign a file name for the archive.
6. Archive the project at the set storage location by clicking the "Archive" button.

Result

A compressed archive with the file extension ".zapVersion" is created. A project archived in TIA Portal V17 has the file extension ".zap17".

Additional references

Detailed information about creating project archives can be found in the information system of the TIA Portal under "Archiving and retrieving projects".

5.2.9 Transferring SIMOTION SCOUT projects

To transfer a SIMOTION SCOUT project to SIMOTION SCOUT TIA, the following possibilities are available:

- Migration with the migration tool in the TIA Portal (complete, including the hardware and network configuration, and the SCOUT data).
- Migration with the migration tool outside the TIA Portal as dual-computer solution and import the SIMOTION SCOUT project using an intermediate file into the TIA Portal.
- Export of the SIMOTION SCOUT project and import into SIMOTION SCOUT TIA (only SCOUT data).

Note

Readiness Check Tool TIA Portal

With the TIA Portal Readiness Check Tool, you can easily check whether the hardware included in your projects is supported by the TIA Portal.

Detailed information about the tool and a download link online are available in the Internet at Readiness Check Tool TIA Portal (https://support.industry.siemens.com/cs/ww/en/view/60162195).

See also

Migrating a SIMOTION SCOUT project (Page 76)

Exporting and importing projects (Page 81)

Examples of export/ import (Page 85)

5.2.9.1 Migrating a SIMOTION SCOUT project

Migration of a SIMOTION SCOUT project

Note

Migration, including the hardware configuration

You can migrate a SIMOTION SCOUT project only together with the hardware configuration.

A SIMOTION SCOUT TIA project cannot be converted to a SIMOTION SCOUT project. However, you can export the SIMOTION SCOUT TIA data without the hardware configuration and import it into SIMOTION SCOUT by XML export/import. See Section Exporting and importing projects (Page 81). In this case, you must manually create the hardware configuration in SIMOTION SCOUT so that it is identical to the TIA Portal project.

Note

Alarm_S messages

Alarm_S messages are incremented in the number range starting at 60,000,000 hex for the migration from SIMOTION SCOUT to SIMOTION SCOUT TIA.

As of SIMOTION SCOUT TIA V5.2, you can edit the number value in this range.

Note that the Alarm_S information text is limited to the same characters as the Alarm_S text.

Note that the associated values in the Alarm_S text can be only displayed formatted appropriately for the data type.

Note the TIA Portal specifications for data type formattings for previously configured Alarm_S messages.

If you reconfigure Alarm_S messages in SIMOTION SCOUT, check the message text for compatibility with TIA Portal.

To do this, activate the "Check compatibility with TIA Portal" option.

Detailed information is contained in the information system of the TIA Portal at "Configuring messages".

You must migrate a SIMOTION SCOUT project to use it in SIMOTION SCOUT TIA.

The following procedures are available for this purpose:

- Migration with the migration tool in the TIA Portal (complete, including the hardware and network configuration, and the SCOUT data).
- Migration with the migration tool outside the TIA Portal as dual-computer solution and import the SIMOTION SCOUT project using an intermediate file into the TIA Portal.

Migration in the TIA Portal

During the migration, the project data from a SIMOTION SCOUT project can be converted for processing in SIMOTION SCOUT TIA. The migration is performed in the TIA Portal using the migration tool.

Requirements

The following requirements must be satisfied for a migration:

- The TIA Portal migration tool (integral part of SIMATIC STEP 7 Professional as of V13) and the migration tool plug-in for SIMOTION SCOUT TIA (included on the installation DVD for SIMOTION SCOUT/SIMOTION SCOUT TIA) are installed.
- The TIA Portal migration tool and the migration tool plug-in must be mutually compatible in the version.
- STEP 7 as of V5.5 SP4 is installed.
- SIMATIC STEP 7 Safety Advanced is installed so that Safety projects can be migrated.

- WinCC flexible 2008 as of SP3 is installed provided that an HMI is available.
- SIMOTION SCOUT as of V4.4 is installed.
- SIMOTION SCOUT TIA as of V4.4 is installed.
- SIMOTION SCOUT and STEP 7 must be mutually compatible in the version.
- The SIMOTION SCOUT project is consistent and can be compiled without error.
- You have saved the SIMOTION SCOUT project in SIMOTION SCOUT as of version 4.4.
- The SIMOTION SCOUT project does not use any devices, objects or functionality not supported by SIMOTION SCOUT TIA.
  (See Section Supported devices (Page 25) and Section Supported functionalities (Page 26).)

Note

SIMOTION SCOUT TIA V4.5 and V5.1 in the same project format

TIA Portal projects that you created with SIMOTION SCOUT TIA V5.1 still have the project format of version V4.5.

Once you have used SIMOTION Version V5.1 devices in your TIA Portal project, a TIA Portal project becomes version V14 SP1. You then require a compatible version for the migration tool and the SCOUT version for the migration.

Note

Save and compile in SIMOTION SCOUT

Save and compile the project in SIMOTION SCOUT with the "Save and recompile everything" command before you start the migration.

Procedure

To migrate a SIMOTION SCOUT project, proceed as follows:

1. Start the TIA Portal.
2. Select the "Migrate project" entry in the secondary navigation in the Portal view.
3. Use the "..." button to set the source path to the SIMOTION SCOUT project that you want to migrate.
4. Activate the "Include hardware configuration" option.
5. Assign a name to the migrated project.
6. Click the "..." button to set the target path.

7. Enter any required comments in the comment field.
8. Start the migration with the "Migrate" button.

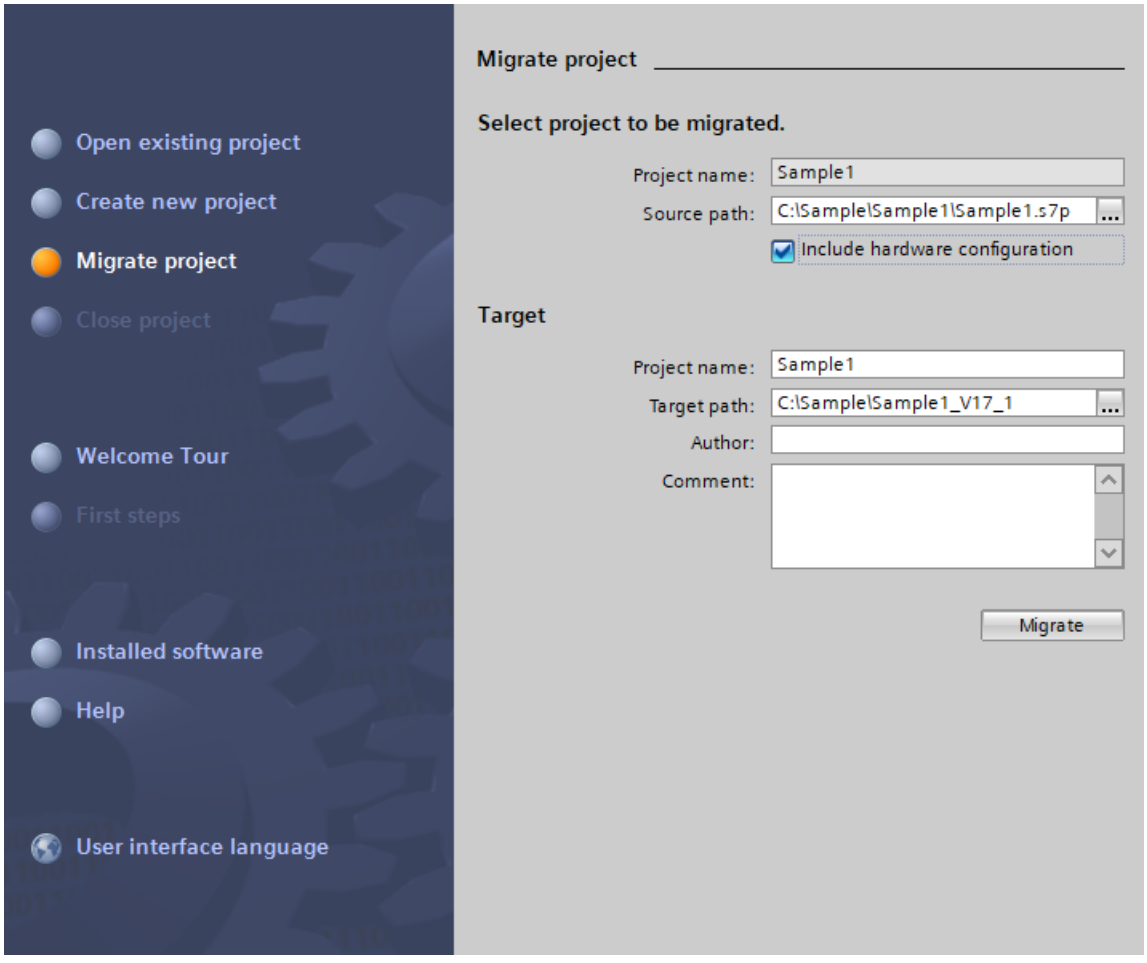


Figure 5-2 Migration

Result

The migrated project opens in the TIA Portal.

You can find the migrated project in the selected target directory.

Note

Save and compile in SIMOTION SCOUT TIA

Save and compile the project in SIMOTION SCOUT TIA with the "Save and recompile everything" command before you start working with the project.

Note

Abort of the migration

The migration is aborted with an error message if the SIMOTION SCOUT project to be migrated uses SIMOTION/SINAMICS devices that are not supported by SIMOTION SCOUT TIA, or the SIMOTION SCOUT project contains objects that are not supported.

In the event of an error, open the project in SIMOTION SCOUT and remove the devices/objects that are not supported, or upgrade the firmware of the devices used.

For information on which devices/objects/functionalities are supported, see Section Supported devices (Page 25) and Section Supported functionalities (Page 26).

Detailed information on the firmware upgrade can be found in Section "Upgrade" of the SIMOTION SCOUT TIA online help.

If the project includes further components in addition to SIMOTION components, such as SIMATIC components and HMI, then the migration conditions specified therein are also applicable.

Migration outside TIA Portal as dual-computer solution

In many cases, the project that you want to migrate is not located on the same PG/PC on which the TIA Portal is installed. The migration tool converts the initial project into a compatible format. This file can be imported and further process in the TIA Portal.

Procedure

To migrate a SIMOTION SCOUT project, proceed as follows:

1. Start the migration tool on computer 1.

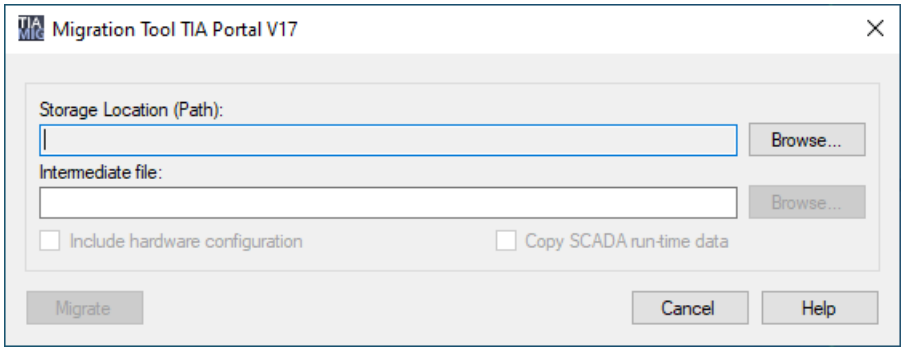


Figure 5-3 Migration tool

2. Navigate to your source project.

3. At "Intermediate file:", set the target path under which the migration file is to be saved.

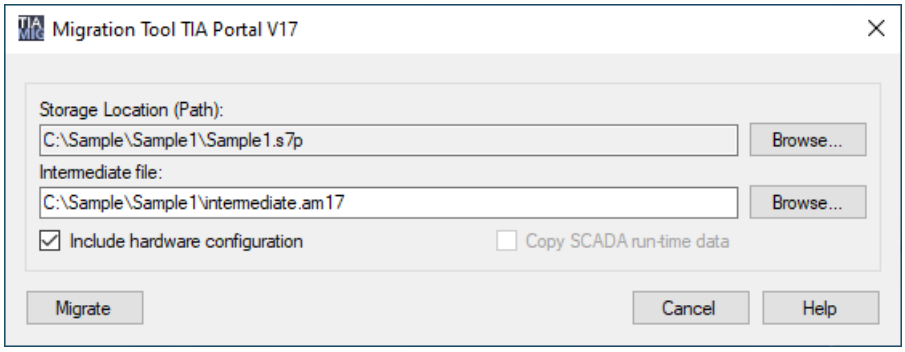


Figure 5-4 Setting the paths

4. Activate the "Include hardware configuration" option (include hardware configuration).
5. Migrate the source project in the migration file format with the appropriate file extension ".amxx".
6. Copy the migration file to the target system, computer 2.
7. Perform the migration within the TIA Portal using the procedure described under "Migration in the TIA Portal".
   Under "Source path", select the generated migration file ".amxx" as the project to be migrated.

Result

The migrated project opens in the TIA Portal.

You can find the migrated project in the selected target directory.

Note

Save and compile in SIMOTION SCOUT TIA

Save and compile the project in SIMOTION SCOUT TIA with the "Save and recompile everything" command before you start working with the project.

5.2.9.2 Exporting and importing projects

Fundamentals

You can export a whole project or individual projects and subsequently import them into another project.

This functionality is available to you both in SIMOTION SCOUT and in SIMOTION SCOUT TIA. An exchange of project data is thus possible via export and import.

Restrictions

You can only export the SCOUT data with SIMOTION SCOUT TIA because hardware and network configuration is performed in the TIA Portal. Similarly, you can only import projects in SIMOTION SCOUT TIA without the hardware configuration.

Note

Export/import is only possible in offline mode.

Export and import functions

The following functions are available to you in each of the applications:

SIMOTION SCOUT	SIMOTION SCOUT TIA
Export/import of complete projects (with and without hardware configuration)	Export/import of a project without hardware configuration
Export/import of individual devices	Export/import of an existing project without hardware configuration
Export/import of individual data or objects	Export/import of technology objects, watch tables, programs, drive objects, scripts (see restrictions in Section Appendix A (Page 401)), and global device and I/O variables.

The export and import functions for complete projects are described below.

Requirements

Complete projects can only be exchanged between SIMOTION SCOUT and SIMOTION SCOUT TIA via the export/import function if the hardware is identical.

The SCOUT data exported from SIMOTION SCOUT must have identical device properties (name, type, version) in order to be able to import it into SIMOTION SCOUT TIA. From the point of view of configuration, a SIMOTION D435-2 DP V4.5 and a D435-2 DP/PN V4.5 are the same type.

Procedure for exporting from SIMOTION SCOUT

To export a project from SIMOTION SCOUT, proceed as follows:

1. Start SIMOTION SCOUT.
2. Open the project that you want to export.
3. Compile the project.
4. Change to offline mode.
5. Mark the project in the project navigator, right-click to open the context menu and select "Project > Expert > Save and export...".

6. In the next dialog, enter a target directory for the export.

   Note

   Access violation to target directory

   Before the export, all files in the specified target directory are deleted. Therefore make sure that no application accesses a subdirectory or file of the specified target directory (e.g. Windows Explorer). In case of an error, export will be interrupted with an error message. In this case, close the associated application or the opened file and restart the export.

7. If necessary, activate the "Use optimized export format" option.
   In this format, the storage volume is reduced because only the data required for a running system is exported. For example, all comments, minimum and maximum values of parameters from files are suppressed.
8. If necessary, deactivate the "Export, including hardware configuration (STEP 7 data)" option.
9. Confirm with "OK".

Result

The project has been exported into the specified target directory.

Procedure for exporting from SIMOTION SCOUT TIA

To export a project from SIMOTION SCOUT TIA, proceed as follows:

1. Start the TIA Portal.
2. Open the project that you want to export.
3. Switch to SIMOTION SCOUT TIA.
4. Compile the project.
5. Change to offline mode.
6. Mark the project in the project navigator, right-click to open the context menu and select "Project > Expert > Save and export...".
7. In the next dialog, enter a target directory for the export.

   Note

   Access violation to target directory

   Before the export, all files in the specified target directory are deleted. Therefore make sure that no application accesses a subdirectory or file of the specified target directory (e.g. Windows Explorer). In case of an error, export will be interrupted with an error message. In this case, close the associated application or the opened file and restart the export.

8. If necessary, activate the "Use optimized export format" option.
   In this format, the storage volume is reduced because only the data required for a running system is exported. For example, all comments, minimum and maximum values of parameters from files are suppressed.

Procedure for importing into SIMOTION SCOUT

To import XML data for projects that you exported previously from SIMOTION SCOUT or SIMOTION SCOUT TIA, proceed as follows:

1. Open the project into which you want to import the data.
2. Change to offline mode.
3. Mark the project in the project navigator, right-click to open the context menu and select "Project > Expert > Import SCOUT data...".
4. Select the XML file to be imported under "Source path and name of the import file" in the next dialog box.
5. Select the target path and target name of the project file.
   This displays the target path and target name of the currently opened project.
6. Confirm with "OK".
7. Compile the project.

Result

You have imported the project.

Procedure for importing into SIMOTION SCOUT TIA

You only import the SIMOTION SCOUT data without hardware configuration into SIMOTION SCOUT TIA. If there is any hardware configuration data in the import file it will be ignored. You can optionally delete any libraries, watch tables, messages contained in the target project when you import. Please note that you can only import SCOUT data if a corresponding hardware configuration exists in the target project. You overwrite the existing SCOUT data when you import.

Note

Backup copy before importing

If necessary, make a backup copy of the project before you import because deleted and replaced data cannot be restored after being imported.

To import the SIMOTION SCOUT data, proceed as follows:

1. Open the project into which you want to import the data.
2. Change to offline mode.
3. Select "Project > Expert > Import SCOUT data..." or select the project in the project navigator and select "Expert > Import SCOUT data..." in the context menu.
4. In the dialog that then opens, select the source path and the source name for the import.
5. Confirm with "OK".
6. Compile the project.

Note

Alarm_S messages

Alarm_S messages are incremented in the number range starting at 60,000,000 hex for the migration from SIMOTION SCOUT to SIMOTION SCOUT TIA.

As of SIMOTION SCOUT TIA V5.2, you can edit the number value in this range.

Note that the Alarm_S information text is limited to the same characters as the Alarm_S text.

Note that the associated values in the Alarm_S text can be only displayed formatted appropriately for the data type.

Configure Alarm_S messages in SIMOTION SCOUT TIA in accordance with the TIA Portal specifications for data type formatting.

If you reconfigure Alarm_S messages in SIMOTION SCOUT, check the message text for compatibility with TIA Portal.

To do this, activate the "Check compatibility with TIA Portal" option.

Note also for previously configured Alarm_S messages the TIA Portal specifications for data type formatting.

Detailed information is contained in the information system of the TIA Portal at "Configuring messages".

Result

You have imported the project.

Additional references

You will find detailed information about exporting and importing individual objects or devices, for example, in section "Exporting and importing" of the SIMOTION SCOUT TIA online help.

See also

Examples of export/ import (Page 85)

Migrating a SIMOTION SCOUT project (Page 76)

5.2.9.3 Examples of export/ import

The migration of a project via export and import by two examples is illustrated below.

Export/import of SIMOTION SCOUT data to SIMOTION SCOUT TIA (Example 1)

A project of SIMOTION SCOUT is migrated to SIMOTION SCOUT TIA via export and import of the SIMOTION SCOUT data.

Requirements

- A project with two C240 CPUs with distributed synchronization via PROFIBUS or PROFINET.
- A SIMOTION D CPU with an axis interconnected with a drive to the SINAMICS Integrated.
- An ST program with a P1 program that runs in the BackgroundTask.
- The project can be compiled without errors.

Procedure

1. Export the project to SIMOTION SCOUT.
   – Deactivate the "Export including hardware configuration (STEP 7 data)" option during export.
2. Create a new project in the TIA Portal.
3. Configure the hardware in the TIA Portal same as in SIMOTION SCOUT.
4. Open SIMOTION SCOUT TIA and import the previously exported SIMOTION SCOUT data.
5. Compile the project.

Result

- The distributed synchronization is established.
- The connection of the axis to the drive is established.
- Program P1 is entered in the execution system (BackgroundTask).
- The project can be compiled without errors.

Export/import of SIMOTION SCOUT TIA data to SIMOTION SCOUT (Example 2)

A project of SIMOTION SCOUT TIA is migrated to SIMOTION SCOUT via export and import of the SIMOTION SCOUT data.

Requirements

Modify the sample project previously imported into SIMOTION SCOUT TIA as follows:

- Move the program P1 from the BackgroundTask to the MotionTask_1.
- Add a further drive to the SINAMICS Integrated.
- The axis is connected with the new drive.
- The project can be compiled without errors.

Procedure

1. Export the project to SIMOTION SCOUT TIA.
   – SCOUT data without hardware configuration
2. Start SIMOTION SCOUT.

3. Open the previously exported project from example 1.
4. Import the previously exported project from example 2.
5. Compile the project.

Result

- The axis is connected with the new drive.
- The program P1 is entered in the MotionTask_1.
- The program can be compiled without errors.

See also

Commissioning the drives (Page 272)

5.2.10 Converting projects

Project conversion is necessary when a SIMOTION SCOUT TIA project was created with an older version of the TIA Portal (<V14) and is to be processed further in a newer version of the TIA Portal (V15.1).

The conversion creates a copy of the project for the current version. The project data is converted and saved in the current version.

Note

Converting projects from TIA Portal V13 to TIA Portal ≥V14

To convert a SIMOTION SCOUT TIA V4.4 project from TIA Portal V13 to a SIMOTION SCOUT TIA V4.5 project in TIA Portal V14 or to a SIMOTION SCOUT TIA V5.4 project in TIA Portal V17, you must first upgrade the project to V13 SP1 of the TIA Portal.

Upgraded projects can no longer be edited with the old TIA Portal version.

Note

Converting projects from TIA Portal V14 to TIA Portal V14 SP1

In versions V14 and V14 SP1 of the TIA Portal, you can open and process projects alternately within a SCOUT TIA version provided you do not use any new functions.

If in TIA Portal V14 SP1 you use new functions or devices in your project or different SCOUT TIA versions, you must upgrade the project.

Upgraded projects can no longer be edited with the old TIA Portal version.

Note

Global libraries

If the project contains libraries, they must also be upgraded.

When a global library in the current version of the TIA Portal opens, a copy of the library is created and it is upgraded to the current version of the TIA Portal.

5.3 Configure the device.

5.3.1 Adding a SIMOTION device

Note

You can add a SIMOTION device only in the TIA Portal.

A SIMOTION device can be added in several ways.

SIMOTION SCOUT TIA does not support all devices that can be configured with SIMOTION SCOUT.

To find out which SIMOTION devices are supported, see Supported devices (Page 25).

To find out which functionality is supported, see Supported functionalities (Page 26).

Procedure

To add a SIMOTION device via the project tree, proceed as follows:

1. Switch to the project view.
2. Double-click "Add new device" in the project navigation.
   The "Add new device" dialog opens.
3. Under "Controller," open the desired device variant, e.g. SIMOTION D - Drive based.
4. Select the desired SIMOTION device.
5. To display device-specific information, click the article number.

6. Select the firmware version of the installed SIMOTION device at "Version".

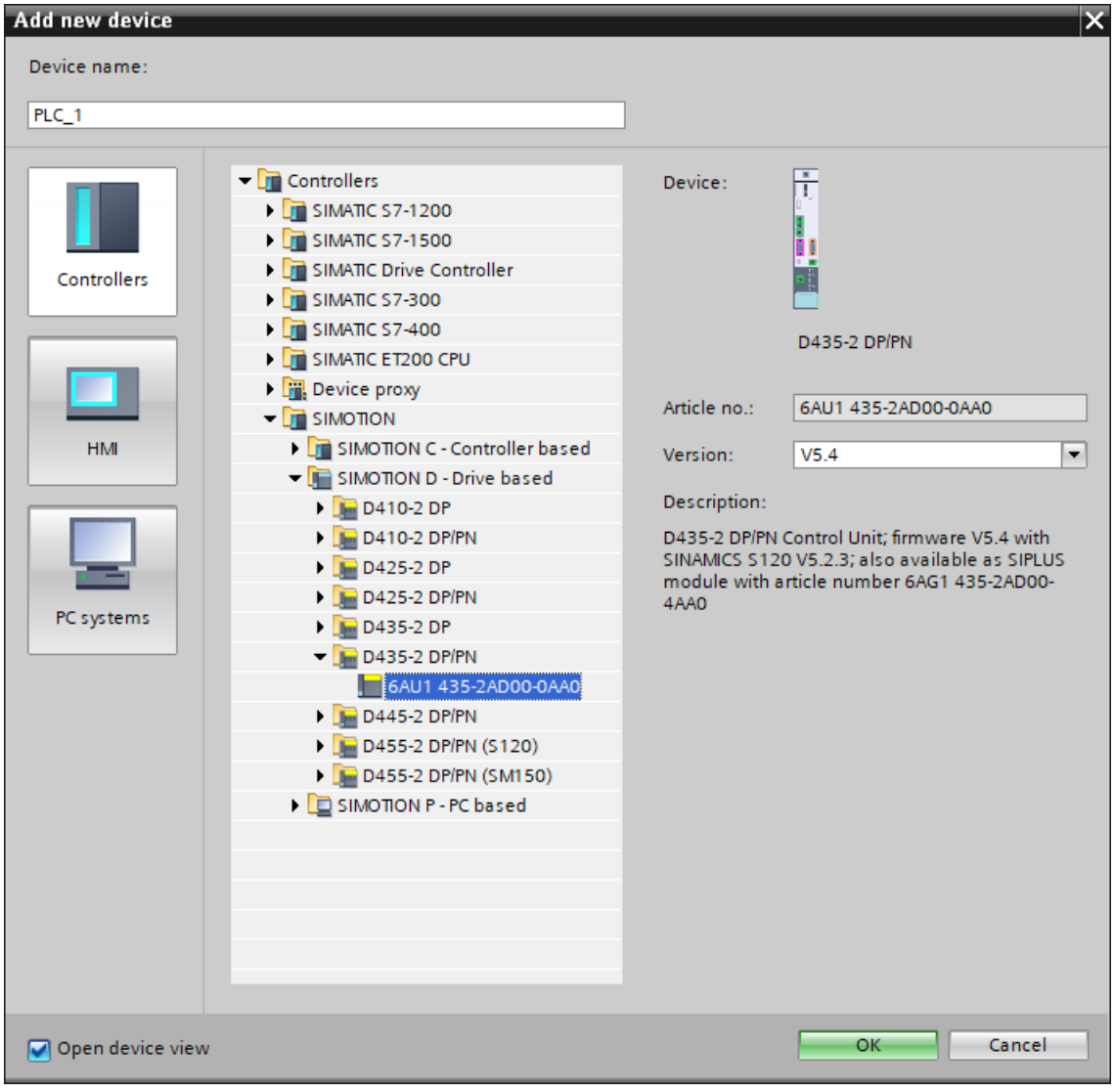


Figure 5-5 Project tree - Add device

7. Click "OK" to apply the settings and add the SIMOTION device.

Result

You have now created a SIMOTION device.

In the device view, the SIMOTION device is displayed in full graphics, showing all interfaces and properties.

In the Inspector window at "Properties", you can configure and parameterize the interfaces easily and intuitively.

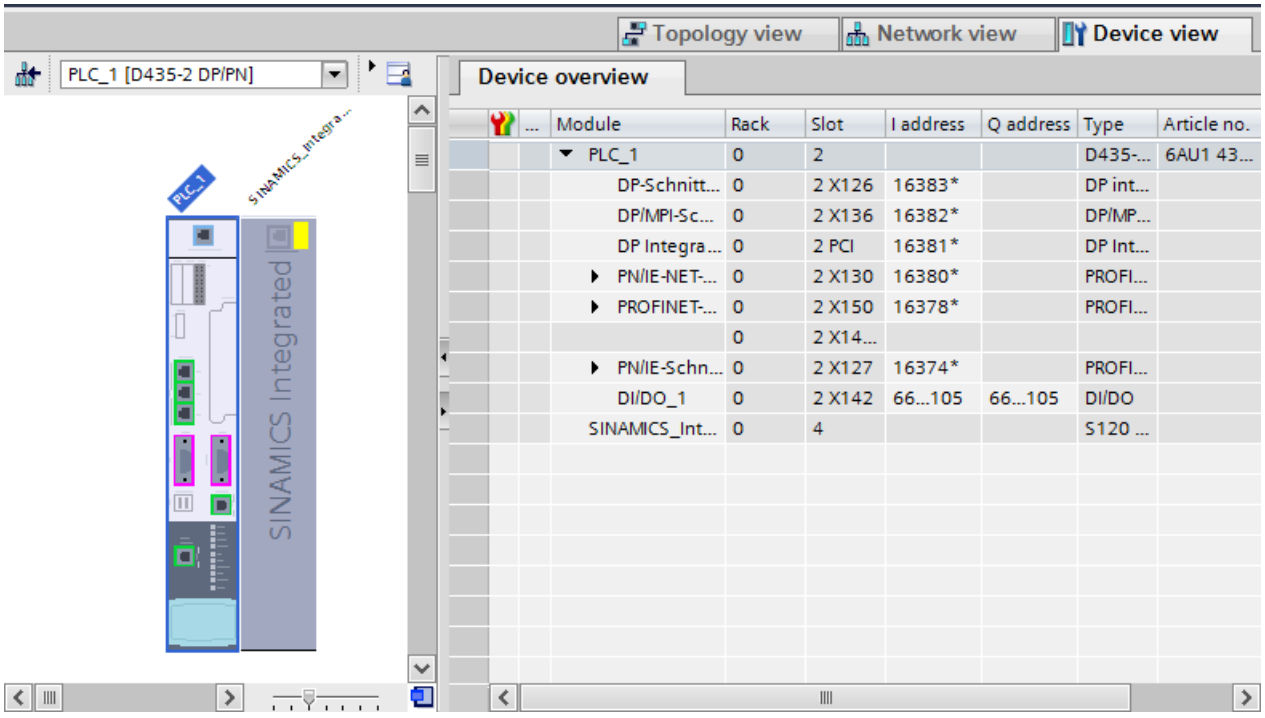


Figure 5-6 SIMOTION device in the device view

All inserted devices are also visible in the project tree.

As soon as you have inserted the SIMOTION device in the TIA Portal, it is also visible in SIMOTION SCOUT TIA.

Note

The selected firmware version must match the firmware version on the memory card of the device, otherwise you receive an error message when you switch to online mode.

5.3.2 Replacing a SIMOTION device

Note

You can replace a SIMOTION device only in the TIA Portal.

Procedure

To replace a SIMOTION device, proceed as follows:

1. In the TIA Portal, select the SIMOTION device that you want to replace in one of the views (topology view, network view or device view).
2. In the context menu, select the "Replace device..." command.
   The "Replace device" dialog opens.

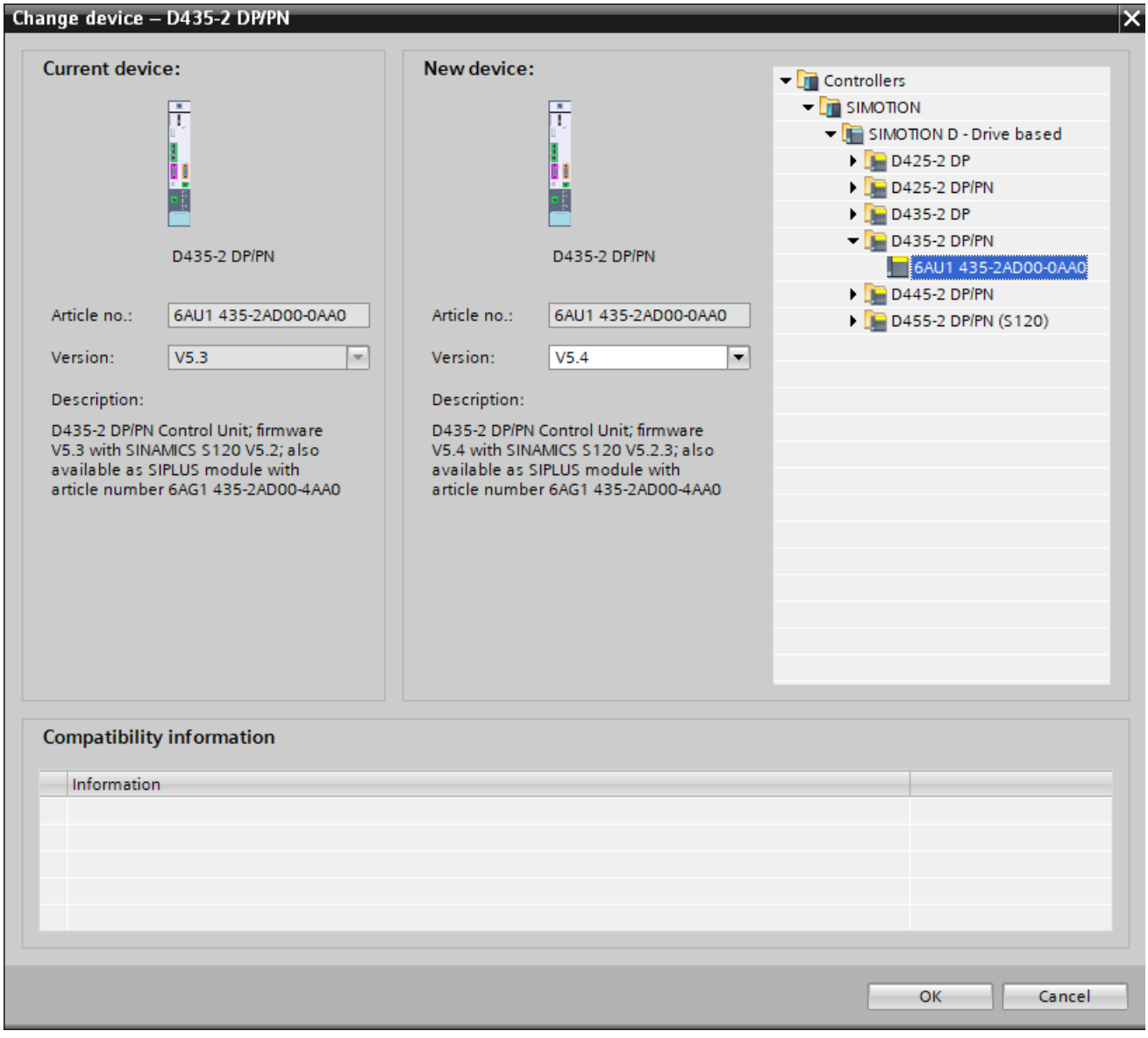


Figure 5-7 Replace device

   – The device that you want to replace is displayed in the "Current device:" area.
   – In the right-hand area, only those devices are listed that are compatible with the device that you want to replace.
3. In the right-hand area, select the new device.
   The selected device is displayed in the "New device:" area.

4. Select the correct firmware version at "Version".
   Observe the compatibility information.
5. Close the dialog with the "OK" button.
6. Save the project.

Result

You have replaced a SIMOTION device.

When you replace the device in the TIA Portal and save the project, it will also be replaced in SIMOTION SCOUT TIA.

Note

Devices must be mutually compatible.

You can only replace devices with devices that are compatible. If you select an incompatible device or an incompatible firmware version, the "OK" button remains inactive.

A SIMOTION D can be replaced with another SIMOTION D only when the associated SINAMICS version is the same or higher. It is not possible to downgrade to an earlier SINAMICS version

Replacing hardware components may result in inconsistencies in the project. The consistency check indicates any inconsistencies.

Eliminate these inconsistencies as appropriate.

5.3.3 Deleting a SIMOTION device

Note

You can delete a SIMOTION device only in the TIA Portal.

Procedure

To delete a device, proceed as follows:

1. Select the device you want to delete from one of the following views.
   - Device view
   - Network view
     In the graphical view or in the "Network overview" tab.
   - Topology view
     In the graphical view or in the "Topology overview" tab.
   - Project navigation
     In the tree structure of the project.
2. Press "Del".
3. Save the project.

Result

The SIMOTION device has been deleted.

Once you have deleted the device in the TIA Portal, it is also deleted in SIMOTION SCOUT TIA.

Note

Inconsistencies caused by deleting hardware components

Deletion of hardware components may lead to inconsistencies in the project.

The inconsistencies are indicated in the consistency check.

Eliminate these inconsistencies as appropriate.

5.3.4 Configuring an Ethernet interface

Creating an Ethernet subnet

You set up online communication of the PG/PC with the SIMOTION device via PROFIBUS, PROFINET, or Industrial Ethernet.

The most common application is the communication via Industrial Ethernet (communication via PROFINET protocol).

To configure I/O devices, you must create a subnet. The following step shows how a subnet is created.

Requirement

You have connected the PG/PC and the SIMOTION device with an Ethernet cable.

Procedure

To add a subnet to the SIMOTION device in the network view, follow these steps:

1. Click the Ethernet "X127" interface of the SIMOTION device where you would like to create a subnet.
2. Open the context menu with a right-click and select the "Add subnet" command.

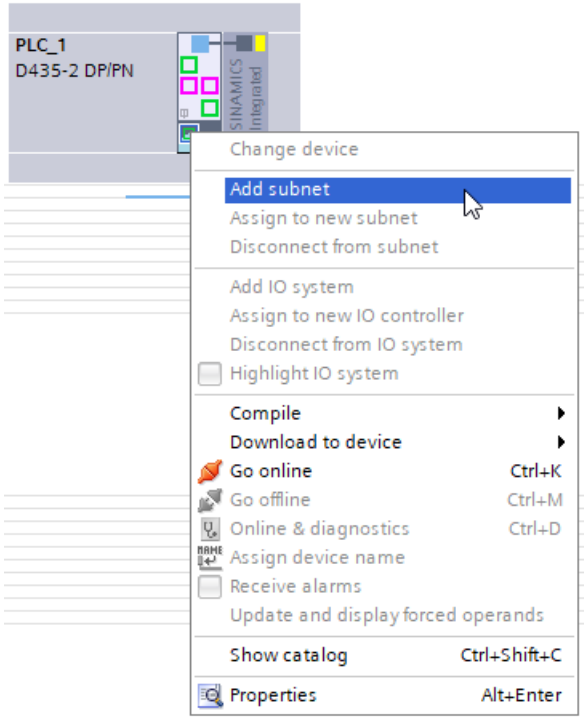


Figure 5-8 Adding a subnet

Result

You have added a subnet.

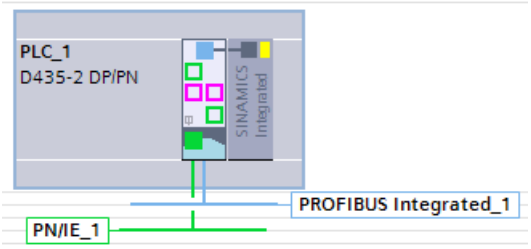


Figure 5-9 Subnet added

5.3.5 Add the expansion module SIMOTION - CX32-2

Note

You can insert a CX32-2 only via the hardware catalog in the TIA Portal.

If the computing performance of SINAMICS Integrated is not sufficient and you wish to use additional drives, you can insert an CX32-2 to increase performance. This module is connected via DRIVE-CLiQ and is thus networked via PROFIBUS Integrated.

Requirement

You have now created a SIMOTION device.

Procedure

To insert a CX32-2 in the network view, proceed as follows:

1. Switch to the "Hardware Catalog" task card and open the "Controller" component.
2. Open the "SIMOTION" folder and then "SIMOTION D - Drive-based".
3. At "Controller extensions", select the CX32-2 that you wish to use.

4. Drag-and-drop the CX32-2 to the PROFIBUS Integrated.
   The "Wiring between controller and CX" dialog opens.

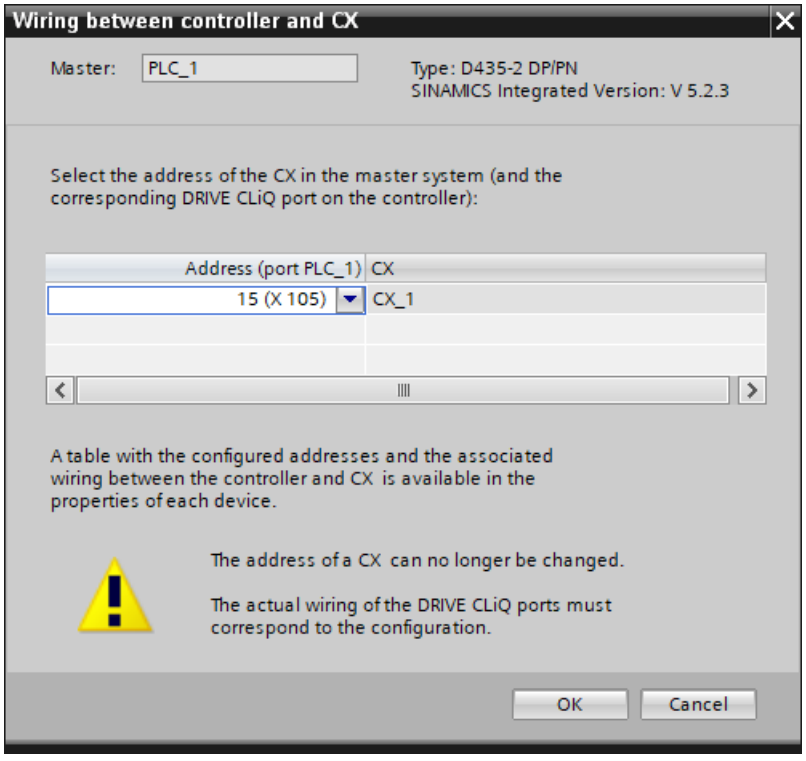


Figure 5-10 CX32-2 wiring

5. Select the address (DRIVE-CLiQ interface) to which your CX32-2 is connected. Make sure that the configured wiring is the same as the real wiring.

DP address of the CX32-2 in the master system	DRIVE-CLiQ socket on the SIMOTION device
10	X100
11	X101
12	X102
13	X103
14	X104
15	X105

6. Click OK to apply the settings.

Note

The configured address cannot be changed.

Once you have created the CX32-2 in the network view, you can no longer change the configured address.

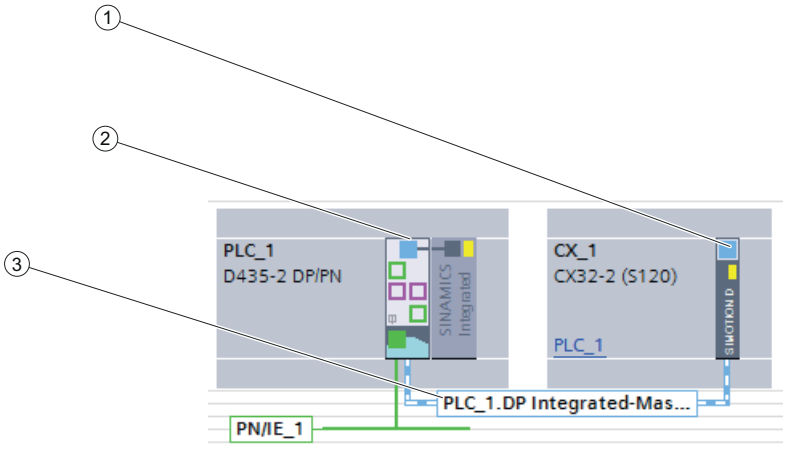
If you want to change the address anyway, you must delete the CX32-2 in the network view and then create a new one.

Result

The CX32-2 is inserted in PROFIBUS Integrated and assigned to the SIMOTION module.

PROFIBUS Integrated and the interfaces are configured in the "Properties" tab in the Inspector window.

The following figure shows a CX32-2 on a SIMOTION D435-2.



① DRIVE-CLiQ interface CX32-2
② DRIVE-CLiQ interface SIMOTION D435-2
③ PROFIBUS Integrated

Note

Configuring the CX32-2

Configure the CX32-2 interface in SIMOTION SCOUT TIA.

5.3.6 Using communication modules

CBE20

The device is connected to PROFINET IO using the CBE20 communication board for SINAMICS S120. The module supports PROFINET IO with isochronous Realtime Ethernet (IRT), PROFINET IO with RT, and standard TCP/IP communication.

The following SINAMICS drive devices support the onboard version.

- SINAMICS S120 CU320-2 DP CBE20 V4.5
- SINAMICS S120 CU320-2 DP CBE20 V4.7

- SINAMICS S120 CU320-2 DP CBE20 V4.8
- SINAMICS S120 CU320-2 DP CBE20 V5.1
- SINAMICS S120 CU320-2 DP CBE20 V5.1.1
- SINAMICS S120 CU320-2 DP CBE20 V5.2
- SINAMICS S120 CU320-2 PN CBE20 V4.5
- SINAMICS S120 CU320-2 PN CBE20 V4.7
- SINAMICS S120 CU320-2 PN CBE20 V4.8
- SINAMICS S120 CU320-2 PN CBE20 V5.1
- SINAMICS S120 CU320-2 PN CBE20 V5.1.1
- SINAMICS S120 CU320-2 PN CBE20 V5.2
- SINAMICS S120 CU320-2 PN CBE20 V5.2.3

When selecting a drive unit from the hardware catalog, you can decide whether to use the CBE20 communication board.

Choose the appropriate variant of the SINAMICS S120 CU320-2. You can find the CBE20 communication modules in the hardware catalog under "Controllers > SIMOTION > SIMOTION drives > SINAMICS S120".

CBE30-2

A second PROFINET interface can be implemented for the SIMOTION D4x5-2 DP/PN with the CBE30-2 communication board.

It is not possible to use a CBE30-2 in SIMOTION D4x5-2 DP controllers.

Adding a communications module

To add the CBE30-2 communication module, proceed as follows:

1. Select the SIMOTION device.
2. Switch to the device view.
3. Switch to the "Hardware Catalog" task card and open the "Controller" component
4. Open the folder "SIMOTION D – Drive-based".
5. Select the CBE30-2 communication module in the "Communication modules" folder under "PROFINET".
6. Drag-and-drop the communication board into the device view onto the interface of the device.

5.3.7 Inserting a SIMOTION drive

Note

You can insert a SIMOTION drive only via the hardware catalog in the TIA Portal.

A SIMOTION drive in the current version of SIMOTION SCOUT TIA is a drive of the SINAMICS S120 type (interconnection via PROFINET or PROFIBUS) interconnected with a SIMOTION CPU. The explicit SIMOTION drives you can insert can be found in Supported devices (Page 25).

These SIMOTION drives can be configured and parameterized only under these conditions (interconnection with SIMOTION CPU). The latter is configured in SIMOTION SCOUT TIA.

Procedure

To insert a SIMOTION drive (SINAMICS S120), proceed as follows:

1. Insert a SIMOTION device, if not available yet.
2. Create the bus system, e.g. DP master system or PN/IO system.
3. Navigate in the hardware catalog to the "Controller" component and open the "SIMOTION" folder.
4. Open the "SINAMICS S120" sub-folder in the "SIMOTION drives" folder and select the desired drive, in the example "CU310-2 PN".
5. Drag-and-drop the drive to the bus system.
6. Assign the master system.
   To do this, click "Unassigned" and select the device with which the drive is to be networked.

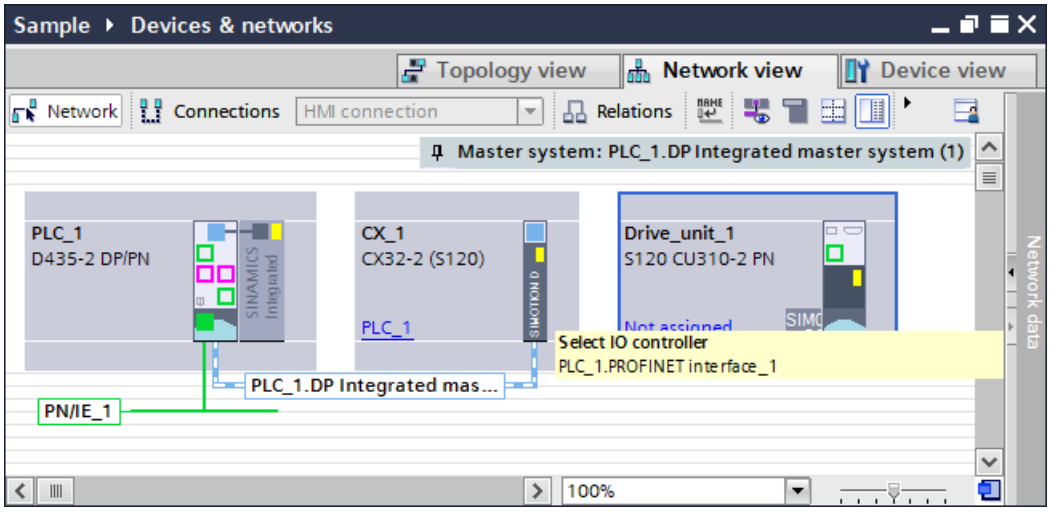


Figure 5-11 Networking the drive

Result

You have networked the drive with the SIMOTION device via the bus system.

The settings on the bus system are adapted in the "Properties" tab in the Inspector window.

Some the following settings can be made:

- Specify the transmission rate
- Configure the line
- Set the bus parameters and constant bus cycle time.

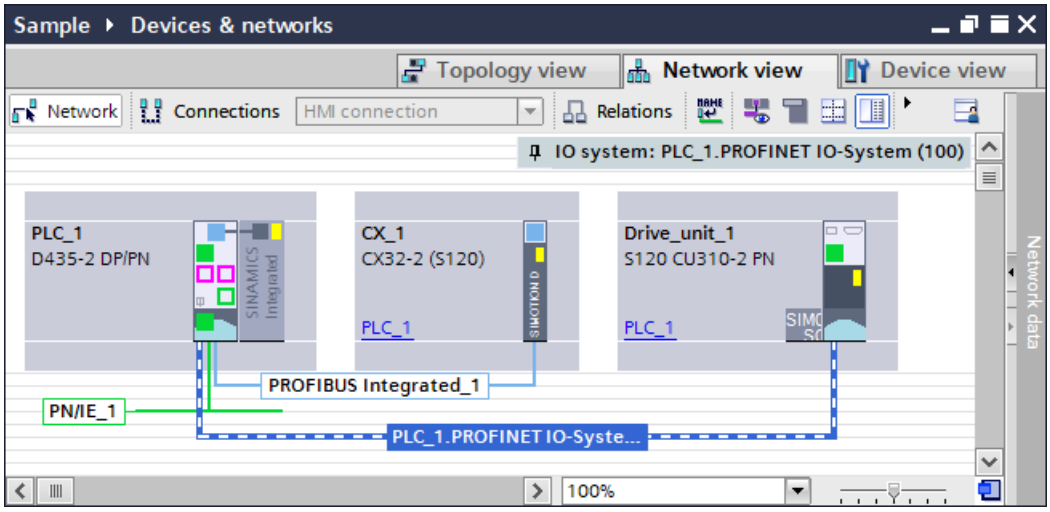


Figure 5-12 Networked drive

Note

The drive is configured in SIMOTION SCOUT TIA.

5.3.8 Inserting a Startdrive drive

Requirements

- You have installed the compatible "Startdrive" option package for the TIA Portal.
- You have now added a SIMOTION device.

Procedure

Inserting a drive and assigning it to a controller

To insert a Startdrive drive (e.g. SINAMICS G120, SINAMICS G110M,...), proceed as follows:

1. Add a higher-level controller, e.g. SIMOTION D435-2.
2. Switch to the network view.
3. Double-click "Add new device" in the project navigation.
   The "Add new device" dialog opens.
4. Open the variant of the drive you require at "Drives".

5. Then select the desired drive.
6. To display device-specific information, click the drive.
7. Select the firmware version of the drive at "Version".

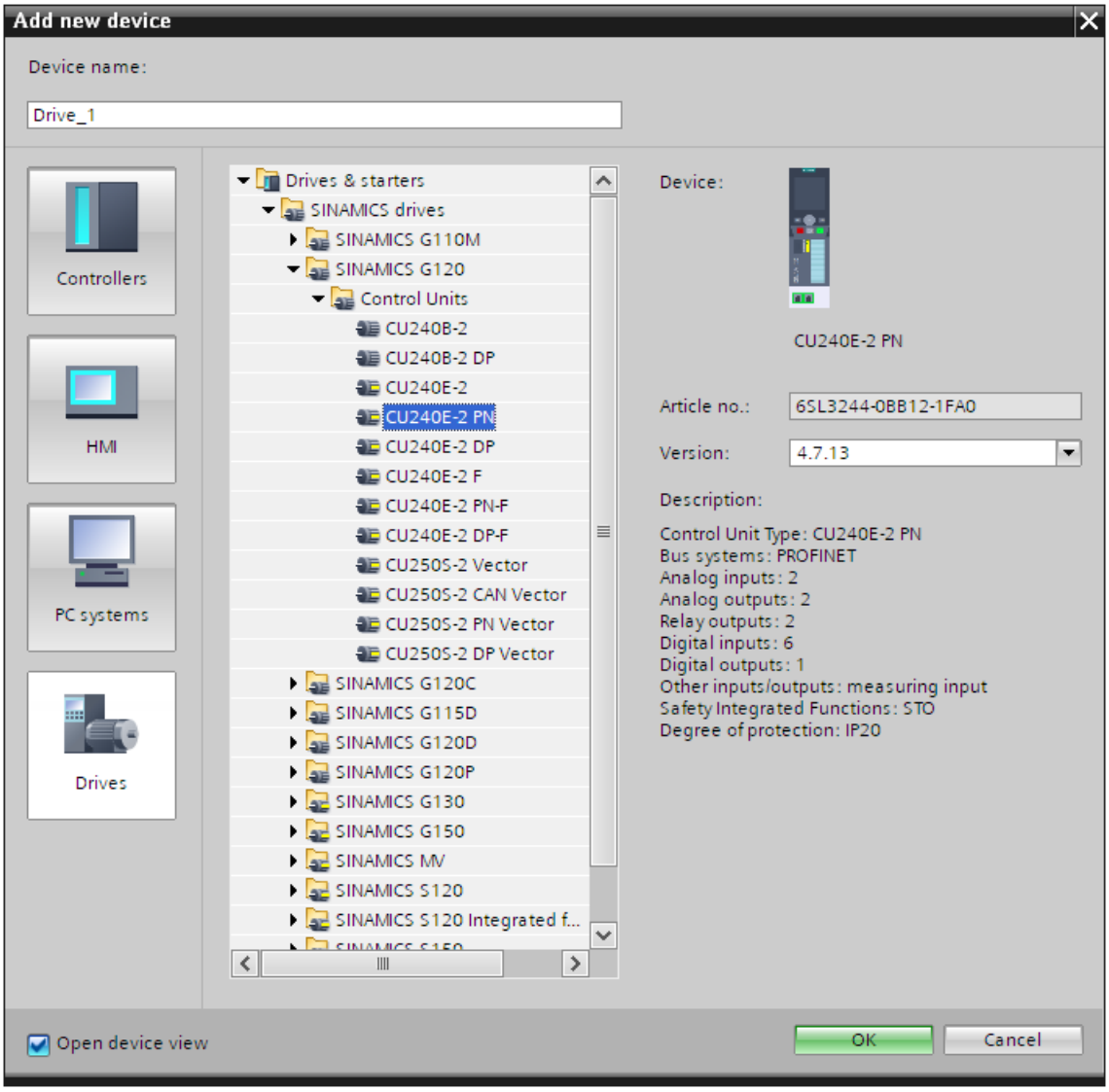


Figure 5-13 Selecting a Startdrive drive

8. Click "OK" to apply the settings and add the Startdrive drive.

Adding a Power Module

To add a Power Module, proceed as follows:

1. Switch to the device view.
2. Switch to the "Hardware Catalog" task card and open the "Power Modules" component.
3. Select the Power Module that you want to use, a PM240 in the example.

4. Drag-and-drop the Power Module onto the drive.
5. Assign the master system. To do this, click "Unassigned" and select the device with which the drive is to be networked.

Result

You have created a Startdrive drive and added the Power Module.

You have networked the drive with the SIMOTION device.

The device view displays a full graphical view of the Startdrive drive, showing all interfaces and properties.

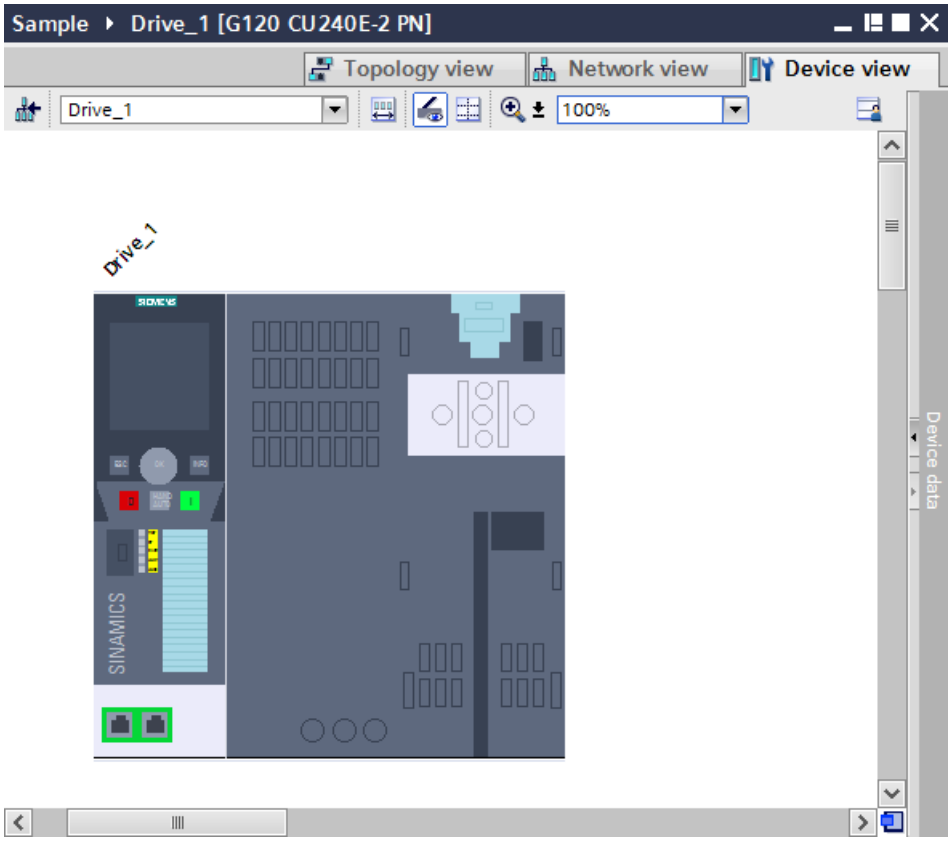


Figure 5-14 Startdrive drive in the device view

The inserted Startdrive drive is visible in the project tree.

As soon as you have inserted the Startdrive drive in the TIA Portal, it will also be visible in SIMOTION SCOUT TIA.

Note

Interconnecting and configuring Startdrive drives

Like GSD drives, Startdrive drives can be interconnected with technology objects in SIMOTION SCOUT TIA. The drives are configured with Startdrive.

5.3.9 Inserting a GSD drive

If you are using a drive that cannot be configured via SIMOTION SCOUT TIA or Startdrive, insert this drive as a GSD drive. Various Siemens drives, such as SINAMICS S150 CU320-2, are available as a GSD drive in the TIA Portal.

Procedure

Inserting a GSD drive and assigning it to a controller

To insert a GSD drive and assign it to a controller, proceed as follows:

1. Add a higher-level controller, e.g. SIMOTION D435-2.
2. Switch to the network view.
3. Switch to the "Hardware Catalog" task card and open the "Other field devices" component.

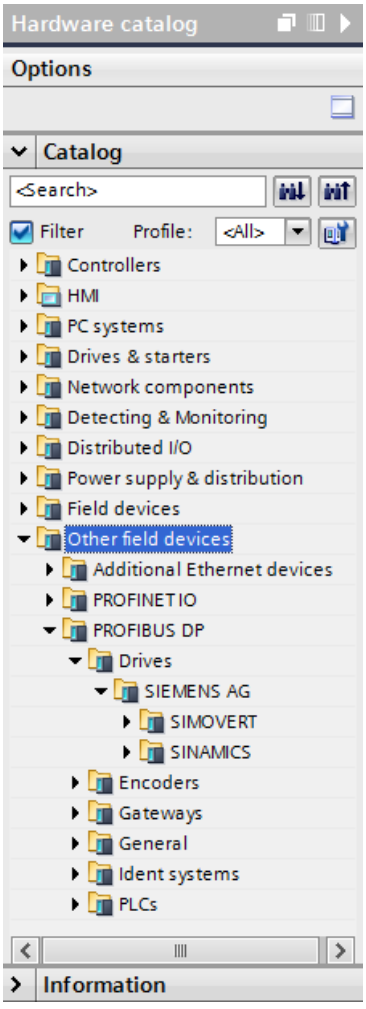


Figure 5-15 Selecting field devices

4. Select the GSD drive in the hardware catalog, SINAMICS GM150 in the example.

5. Drag-and-drop the GSD drive to the "Network view".
6. Assign the master system.
   To do this, click "Unassigned" and select the device with which the GSD drive is to be networked.

Configuring telegrams for the communication

Communication between the controller and the drive is performed via PROFIdrive telegrams. Different telegrams are available, depending on the task.

To add a telegram for the communication between controller and drive, proceed as follows:

1. Select the GSD drive and switch to the device view.
2. Display the device overview.
3. Switch to the "Hardware catalog" task card.
   The telegrams available for this drive are displayed.

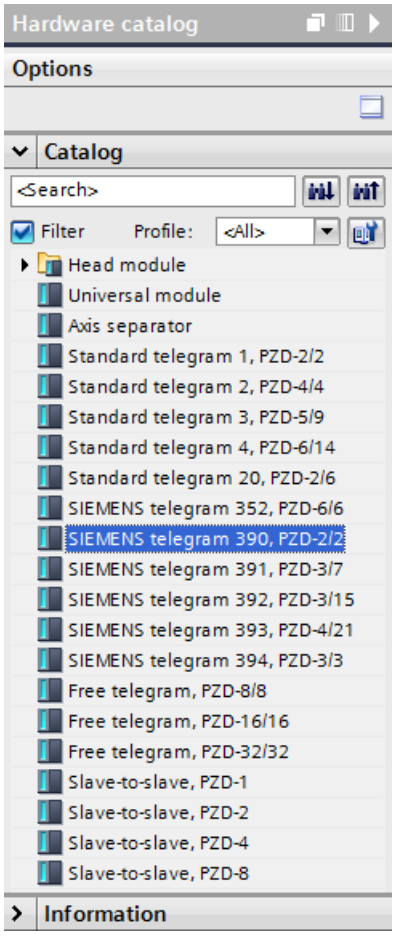


Figure 5-16 Hardware catalog telegrams

4. Select a telegram.
   In the device view, the possible positions for insertion are indicated by blue lines.

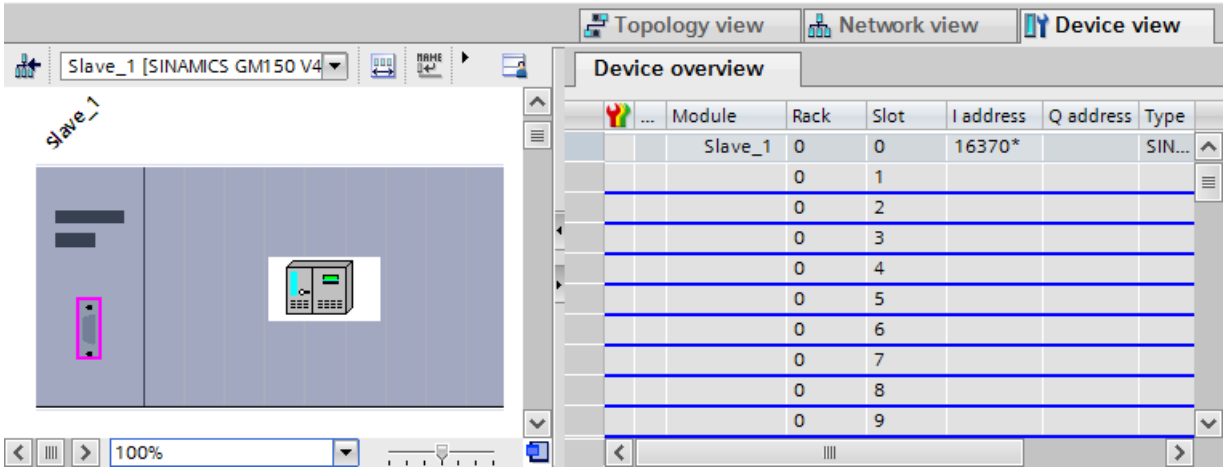


Figure 5-17 Selecting a telegram

5. Drag-and-drop the telegram into the device overview and the desired position.
   The I/O addresses are assigned automatically.
6. If required, adapt the I/O addresses for the Motion Control applications.

Result

You have created a GSD drive and networked it with the SIMOTION device.

You have inserted a telegram for the communication between controller and drive.

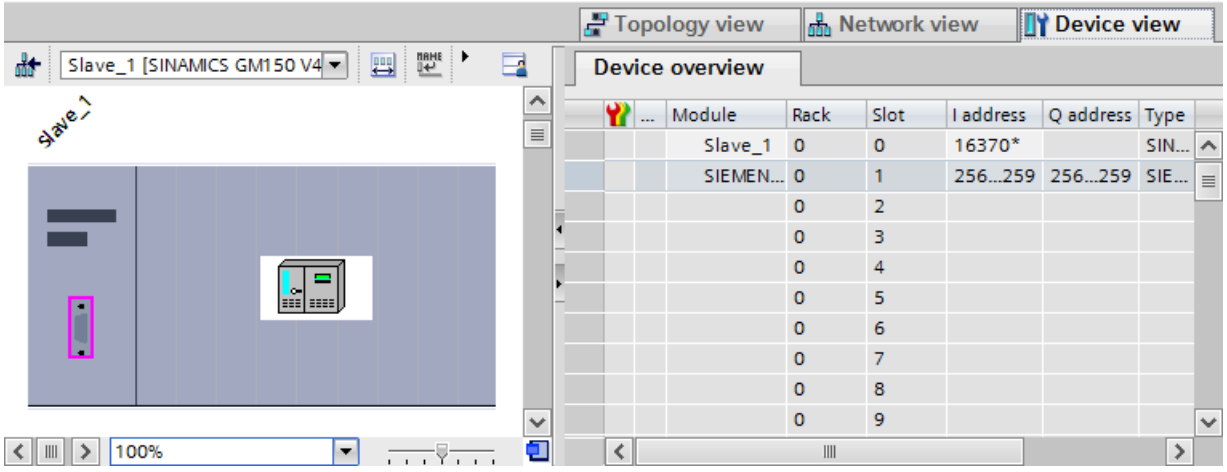


Figure 5-18 Telegram inserted into device overview

As soon as you have inserted the GSD drive in the TIA Portal, it will also be visible in SIMOTION SCOUT TIA.

5.4 Configuring online access

5.4.1 Online access of the project

Displaying available nodes in the TIA Portal

In the "Online access" folder in the project navigation, you will find all active interfaces at your PG/PC. At each interface icon, you receive information about the current status. You can view the available nodes and use the context menu to show and change the properties of an interface.

Procedure

To display the available nodes on a single interface of the PG/PC, proceed as follows:

1. Open the "Online access" folder in the project navigation.
2. To make all objects ordered below the interface visible, click the arrow at the left next to the "Online access".
3. Double-click "Update accessible nodes" below the interface.
   All nodes that can be accessed via this interface are displayed in the project navigation.

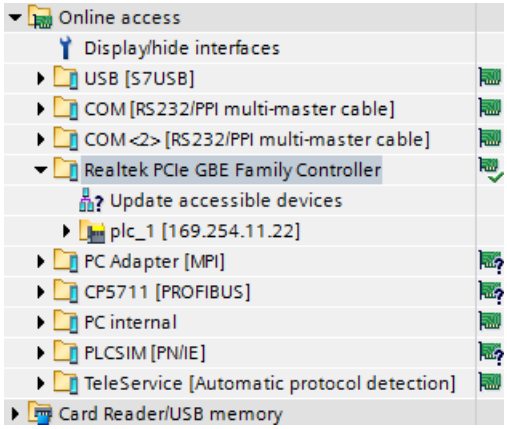


Figure 5-19 Accessible nodes

5.4.2 Setting up the PG/PC communication

Note

You assign the PG/PC interface in the TIA Portal.

Communication between the SIMOTION device and the PG/PC requires a conditioner card (for PROFIBUS) or an Ethernet interface. You configure, parameterize, program and test using the PG/PC.

The following options to assign the PG/PC interface are available:

- "Connect online" function
  The function is available until the PG/PC interface has been successfully set up.
- "Online & diagnostics" function
- "Online access" function

Assign PG/PC interface

The following procedure describes the process for the Ethernet interface type by using the "Online access" function.

To assign the interfaces, proceed as follows:

1. Navigate to the appropriate interface in the project tree at "Online access".
2. Select the "Properties..." command in the context menu.

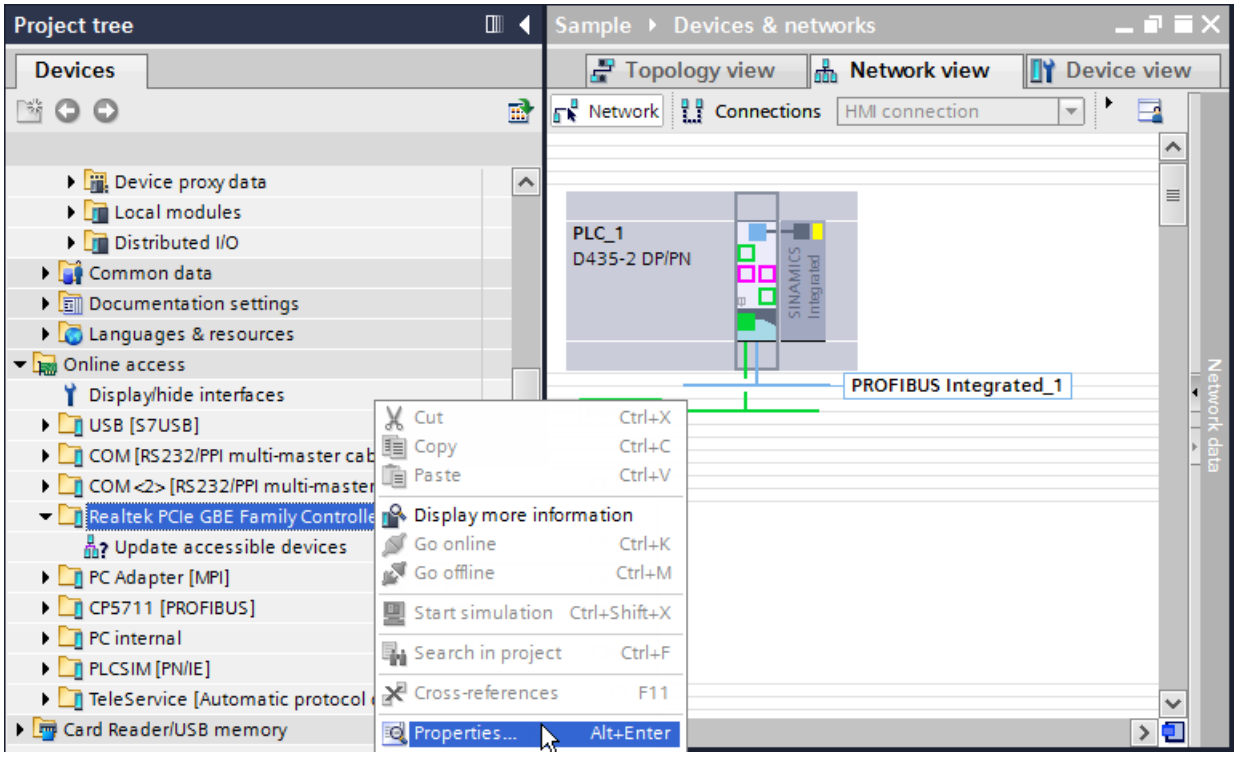


Figure 5-20 Online access properties

3. In the next step, select the subnet and apply the setting with "OK".

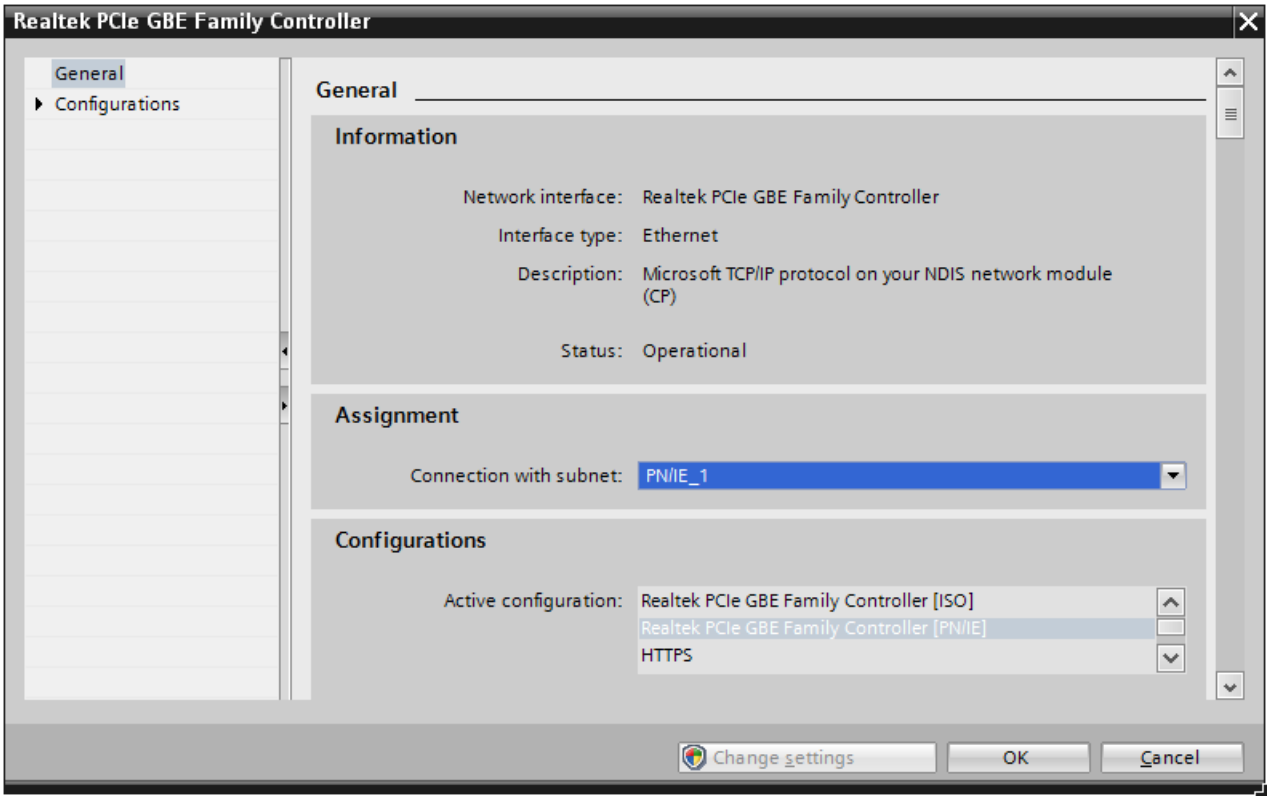


Figure 5-21 Assigning a subnet

Adding an IP address in the subnet

If the SIMOTION device and the PG/PC are not in the same subnet, add a suitable IP address from the subnet of the device to the PG/PC.

To automatically add an IP address in the subnet, proceed as follows:

1. Click Go online in the toolbar.
   The "Connect online" dialog opens.
2. Click "Start search" to search for accessible devices.

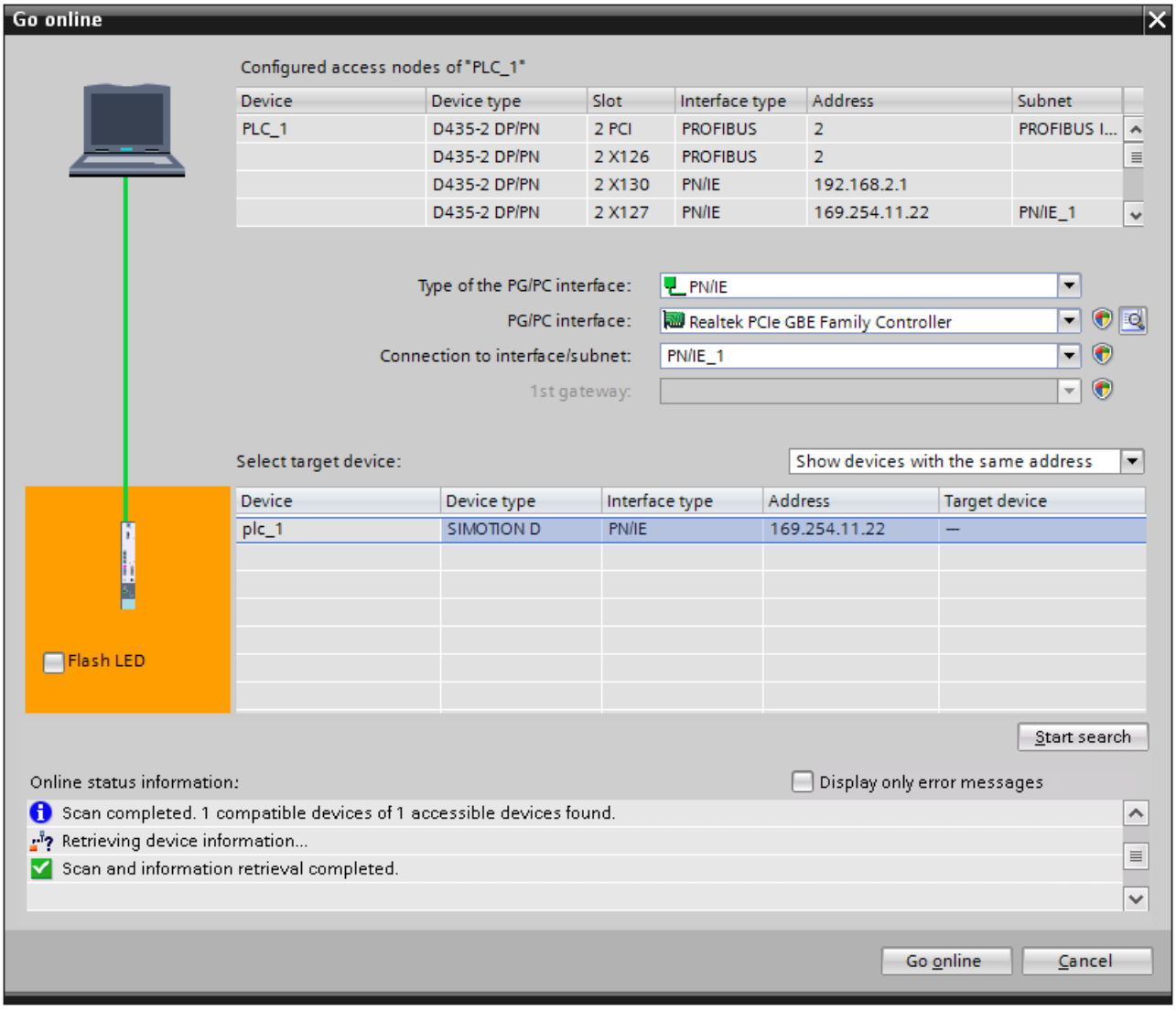


Figure 5-22 Connect online - select a device

3. Click "Connect" in order to establish a connection to the device located by the search.

4. If the SIMOTION device and the PG/PC are not in the same subnet, a message is displayed offering you the option of temporarily assigning a suitable IP address from the subnet of the device.

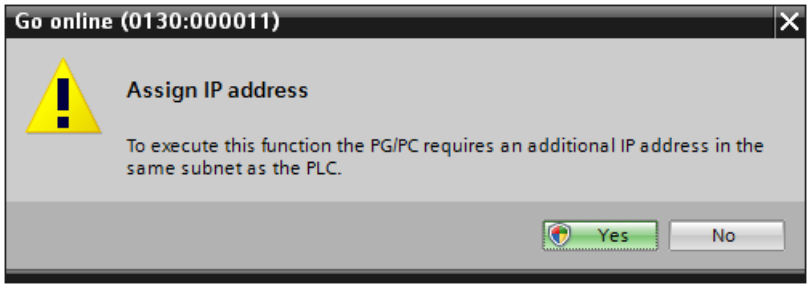


Figure 5-23 Assigning an IP address

5. Confirm with "Yes".



Figure 5-24 IP address assigned

6. To use the connection path specified in the settings as default for the online access, click "Yes".

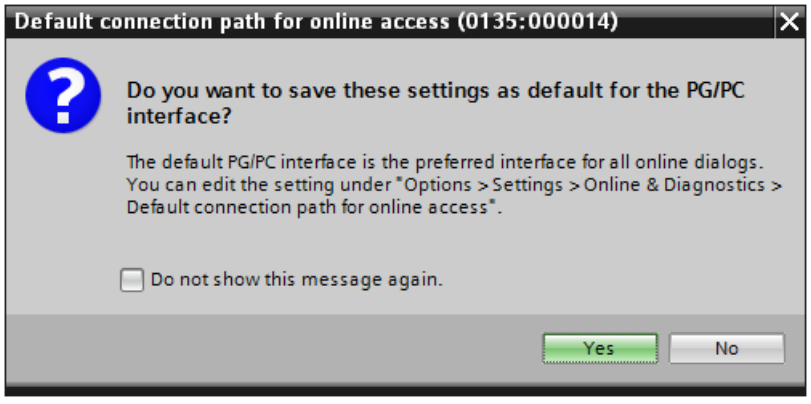


Figure 5-25 Default connection path

Result

- You have assigned the PG/PC interface.
- The TIA Portal has assigned an IP address within a project.
- The online connection has been established.
  The title bar of the project navigation is orange colored.

Displaying and deleting temporary IP addresses

You can display and also delete all temporarily assigned addresses.

To display and delete temporary IP addresses, proceed as follows:

1. Navigate in the project navigator at "Online access" to the appropriate interface.
2. Select "Properties" in the context menu.
3. At Configuration, select the "IE-PG access" entry.

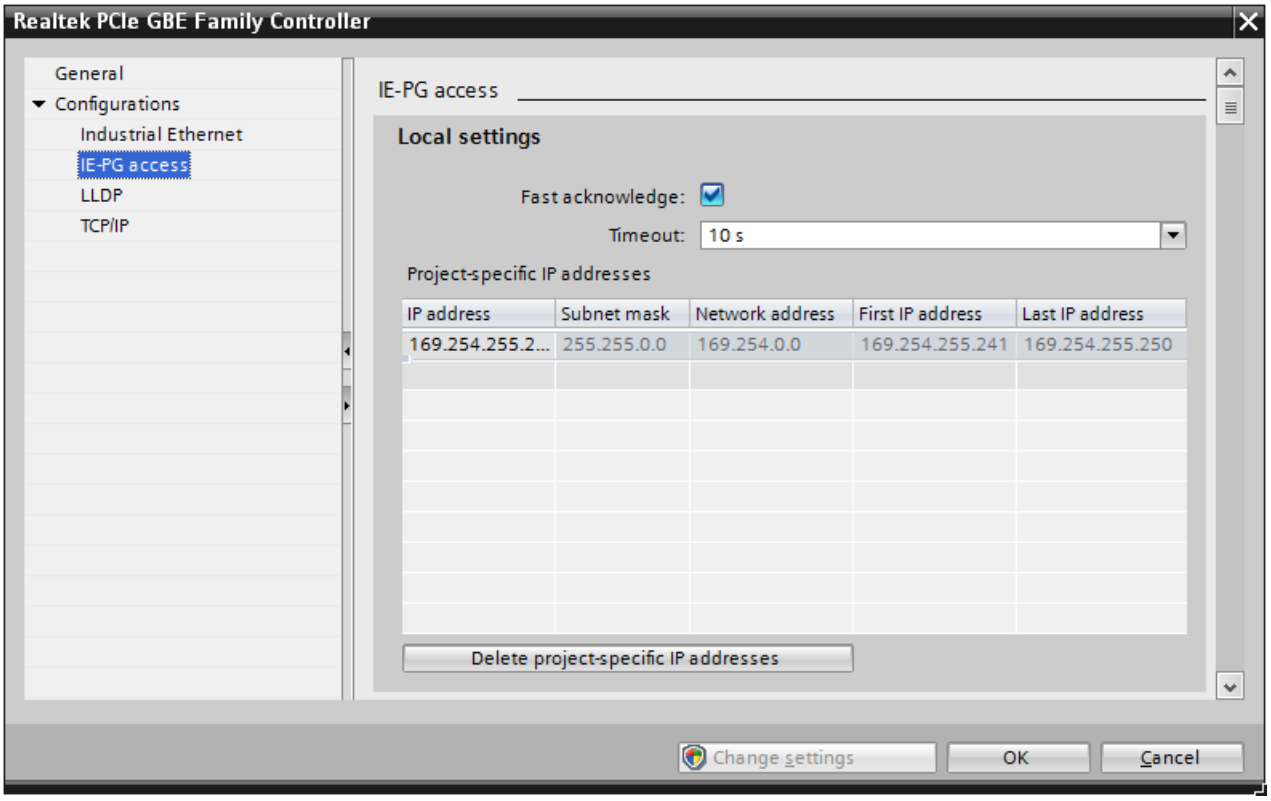


Figure 5-26 Displaying and deleting temporary IP addresses

Compiling the project and downloading the hardware configuration to the SIMOTION device

Note

Downloading the hardware configuration

Before you continue configuring in the SIMOTION SCOUT TIA, download the hardware configuration in the TIA Portal to the SIMOTION device.

Downloading to the SIMOTION device from the TIA Portal is necessary, for example, if you want to change the device names of the IP address. In addition, the loading in the TIA Portal results in the routing information being loaded.

Requirement

The online connection to the SIMOTION device is disconnected.

Procedure

To compile the hardware configuration and download to the SIMOTION device, proceed as follows:

1. Select the SIMOTION device and select "Compile > Hardware (only changes)" in the context menu.

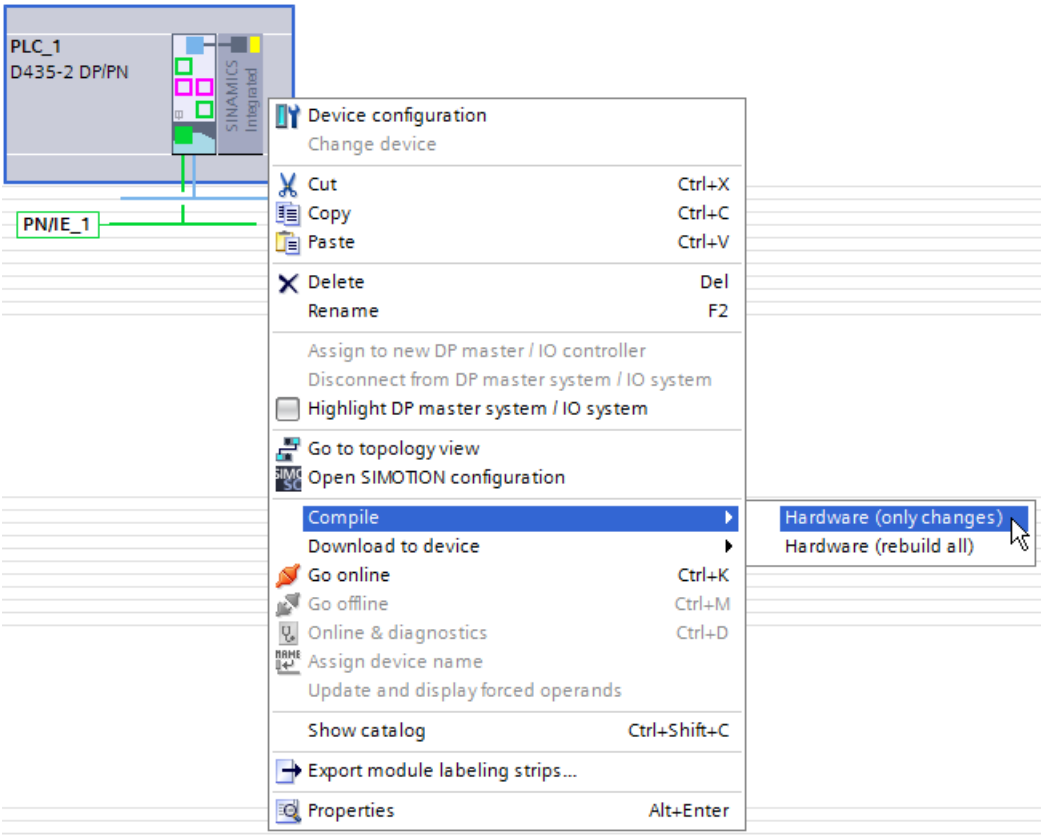


Figure 5-27 Compile hardware

2. Select the SIMOTION device and select "Load to device > Hardware configuration" in the context menu.

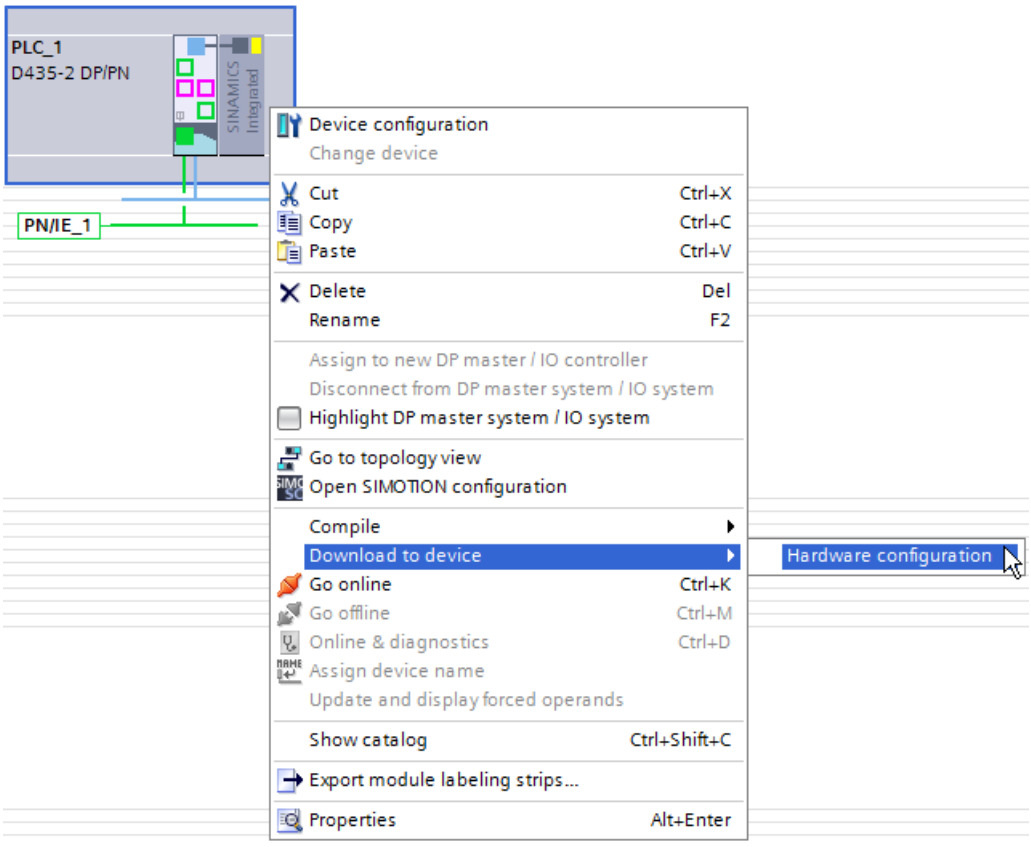


Figure 5-28 Load hardware

– If you have already established an online connection, the "Load Preview" dialog opens. In this dialog, messages are displayed and actions required for loading suggested.
– If you have not yet established any online connection, the "Advanced Load" dialog opens and you must first select the interfaces with which the online connection to the device should be established.

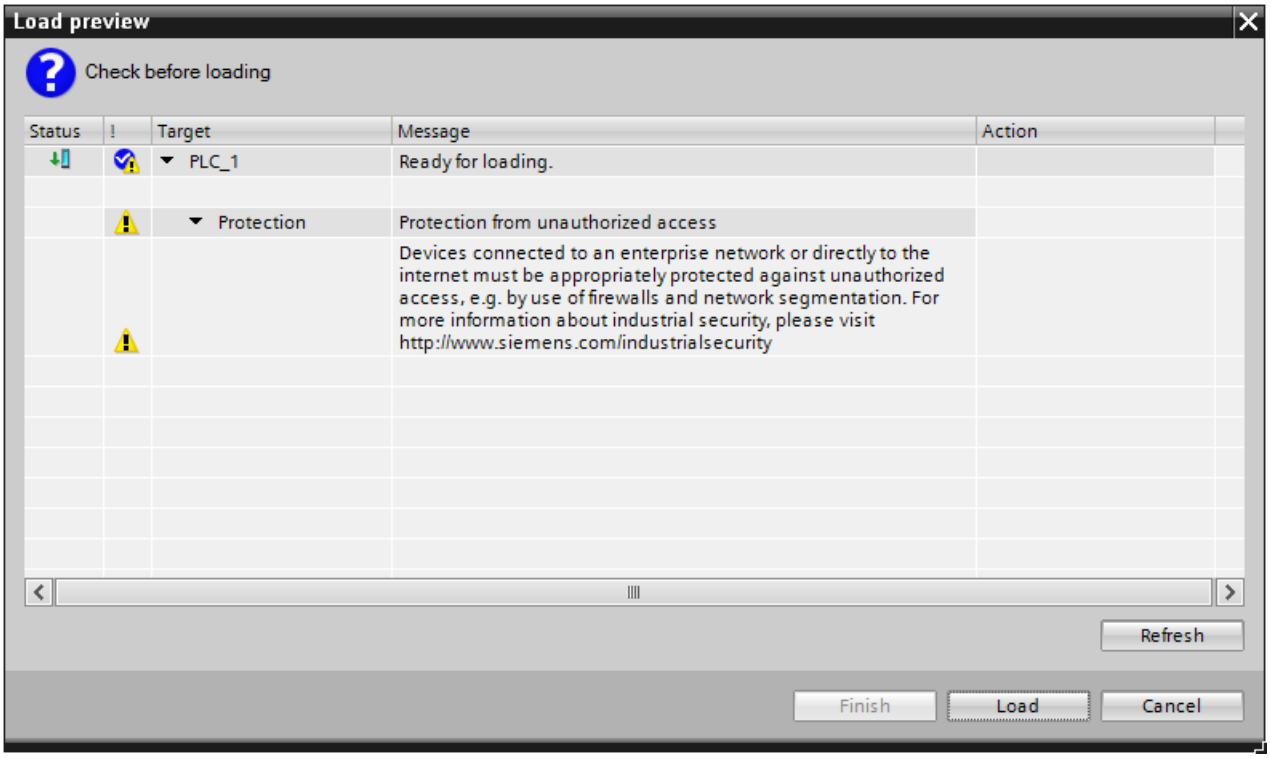


Figure 5-29 Loading the preview

3. Click "Load".

Result

You have compiled the current hardware configuration and loaded it to the target device.

Additional references

You will find a detailed description of how to set up the Ethernet interfaces in SIMOTION SCOUT TIA in the online help "SIMOTION SCOUT TIA Getting Started".

For detailed information about the configuration of the online access, refer to the information system of the TIA Portal "Configuring online access".

5.5 Diagnostics and functions

5.5.1 Overview

The following device diagnostics functions are available, for example, via the online and diagnostics view:

- Display diagnostics status of a module
- Read out diagnostics buffer of a CPU

- Assign an IP address to a PROFINET IO device
- Determine and set the time of a CPU
- Assign PROFINET device name
- Reset the parameters of the PROFINET interface

Calling up the online and diagnostics view

To call up the online and diagnostics view, proceed as follows:

1. Open the device view.
2. Select the module to be diagnosed.
3. Select "Online> Online & diagnostics" from the main menu or select "Online & diagnostics" in the context menu.

Result

The online and diagnostics view of the module to be diagnosed is started.

Note

Establish the online connection

If no online connection is available when starting the online and diagnostics view, no online information can be displayed. The corresponding display fields remain empty.

Structure of the online and diagnostics view

Via the "Online access" group it is displayed if there is currently an online connection to the associated target or not. Furthermore, you can also establish or cancel an online connection.

The "Diagnostics" folder contains several diagnostic groups for the selected module.

The "Functions" folder contains several groups in which you can change the settings on the selected module, or output commands to the module.

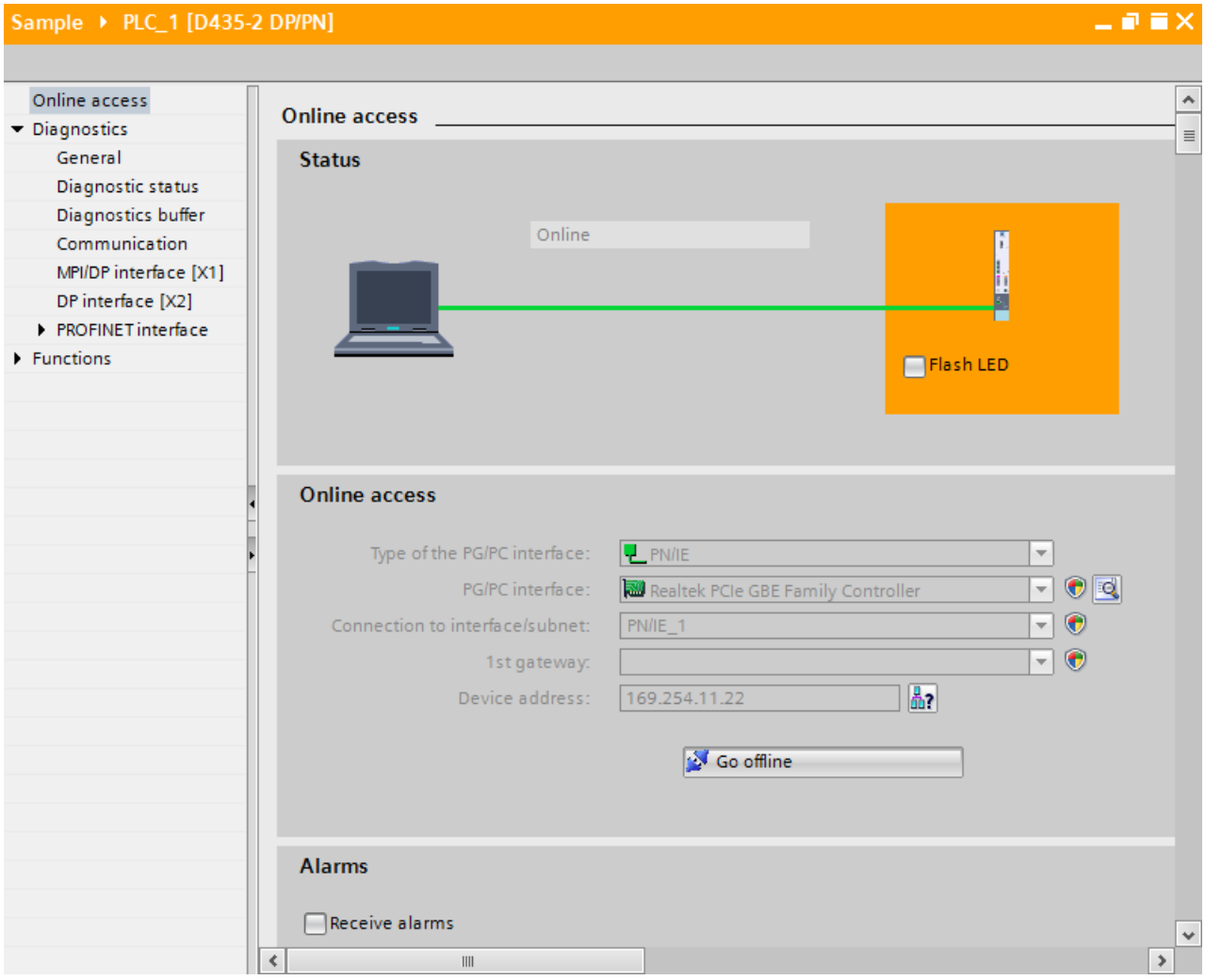


Figure 5-30 Online and diagnostics view

5.5.2 Diagnostics

General

The "General" group shows the general characteristics and system-relevant information of a module.

The following areas are displayed:

Module	The "Module" area contains information such as short designation, article number, firmware, hardware, rack and slot.
Module information	The "Module information" area contains information such as device name, module name, plant ID and location designation.
Manufacturer information	The "Manufacturer information" area contains information, such as manufacturer description, serial number, copyright and profile details.

Diagnostics status

The "Diagnostics status" group displays the status of the module from the perspective of the CPU.

Diagnostics buffer

The diagnostics buffer is used as a log file for the diagnostic events that have occurred on the CPU and its associated modules. The diagnostic results are entered in the order in which they occurred, with the most recent event shown at the top.

The following areas are displayed:

Events	Activate the "CPU time stamp considers local PG/PC time" option if you want the diagnostics buffer entries to be displayed with the time that is calculated using the following formula: Displayed time = module time + time zone offset of your PG/PC. It is assumed that the module time is identical with UTC. Use this setting if you want to see the local time of your PG/PC as the time-of-day in the diagnostics buffer entries of the module. If you activate or deactivate the checkbox, the time information of the diagnostics buffer entries is immediately adjusted. The events with consecutive number, date and time, and short description of the event are listed in the events table. If you click the "Freeze display" button, the current display of the diagnostics buffer entries will be frozen. If there is a quick succession of diagnostic events, this lets you examine the entries without a hurry. The CPU continues to enter events in the diagnostics buffer. Click "Cancel freezing" to update the diagnostics buffer entries again.
Event details	Detailed information such as the consecutive number of the event in the diagnostics buffer, event ID, description of the event with event-related additional details, time stamp, and information as to whether it is an incoming or outgoing event is displayed in the "Events" area. If you click the "Help for event" button, the selected event will be explained in greater detail and, if applicable, remedies are suggested. If you click the "Open in editor" button, the referenced block is opened in the offline view at the programming instruction causing the error if reference is made in the diagnostic event to a relative address of a block. This allows you to check the source code of the block at the specified location and, if necessary, change and subsequently load it back into the CPU. If the diagnostic event was triggered by a module, the "Open in editor" function opens the device view of the module concerned. Click "Save as..." if you want to save the contents of the diagnostics buffer in a text file.
Settings	In the "Settings" area, you can configure how the events should be displayed.

Communication

The following areas are displayed:

Connection resources, maximum number	Specifies the maximum number of available connection resources of the module. In each case, a certain number of available connection resources is reserved for PG, OP communication, S7 communication, and S7 basic communication. However, you can create additional PG or OP connections; the number of unassigned connection resources is then reduced accordingly.
Cycle load through communication	The CPU's cycle time can be extended due to communication processes. These communication processes include, for example: • Data transfer to another CPU • Loading of blocks is triggered via a programming device (PG) The duration of these communication processes can be controlled to a certain extent by means of the CPU parameter "Cycle load through communication". Via the parameter "Cycle load through communication", you indicate the percentage of total CPU processing power that is to be available to the communication processes.

Displaying interfaces and interface properties of a module

The interfaces and interface properties of a module can be found in the following groups:

- MPI/DP interface
- DP interface
- PROFINET interface

Additional references

Detailed information about diagnostic functions can be found in the information system of the TIA Portal at "Diagnose hardware".

5.5.3 Functions

Assigning an IP address

If the IP address of a device is located in a different subnet than the IP address of the network card, you must first assign the network card an additional IP address with the same subnet address as that of the device. Only then is communication between the device and the PG/PC possible.

Select "Connect online", for example, in order to automatically assign a temporary address in the same subnet to the PG/PC. A prompt is displayed automatically if the current IP address of the PG/PC is not already located in the correct subnet.

A temporarily assigned IP address is valid until the next restart of the PG/PC or until it is manually deleted.

Setting the time-of-day

In the "Set time-of-day" folder, you can determine and change the time of a CPU. This is only possible if there is an existing online connection.

The following areas are displayed:

PG/PC time:	Here the set time zone, the current date, and the current time-of-day of your PG/PC is displayed.
Module time	The "Module information" area contains information such as device name, module name, plant ID and location designation. This displays the current date and time values that were read from the module (e.g. CPU) and converted to local time. If the "Import from PG/PC" checkbox is activated, clicking on the button "Apply" triggers transfer of the date and the PG/PC time-to-day converted to UTC time) to the module. If the "Import from PG/PC" checkbox is deactivated, you can specify the date and time-of-day for the internal clock of the module. After clicking the "Apply" button, the date and time-of-day of day (converted to UTC time) will be transferred to the module.
Time system	In the "Time system" area, the following factors are considered for the time-of-day and synchronization: • **Resolution**: Specifies the accuracy of the calculation and output of the time-of-day. • **Real-time clock**: Indicator whether the CPU has a real-time clock: "available" when yes; "not available" when no. • **Correction factor**: Parameterized correction factor for the real-time clock of the module. The daily deviation of the clock is corrected using the correction factor. Synchronization can be achieved through synchronization mechanisms between the clocks of various sub-systems. The time synchronization settings are made during module parameterization. The integrated real-time clock - if present - can synchronize the clocks of other modules (master) or can be synchronized by the clocks of other nodes (slave), or it does not participate in the synchronization. Synchronization can be performed in the AS or MPI.

Assigning a PROFINET device name

Before an IO device can be addressed by an IO controller, it must have a device name. In the case of PROFINET, this method was chosen because names are easier to handle than complex IP addresses.

The assignment of a device name for a PROFINET IO device can be compared with setting the PROFIBUS address of a DP slave.

In its delivery state, an IO device does not have a device name. An IO device can only be addressed by an IO controller, for example, for the transfer of project engineering data (including the IP address) during startup or for user data exchange in cyclic operation, after it has been assigned a device name with the PG/PC.

Additional references

Detailed information about diagnostic functions can be found in the information system of the TIA Portal at "Diagnose hardware".

Configuring communication 6

6.1 Devices, networks and communication services in the TIA Portal

6.1.1 Configure and parametrize communication

Editing devices and networks

In the TIA Portal, you edit devices and networks in the hardware and network editor. For a detailed description, refer to the corresponding section in the information system of the TIA Portal at "Editing devices and networks". Note that modules can be fully parameterized only if they are assigned to a CPU. Therefore, PROFIBUS or PROFINET modules need to be networked first, so that they form a master system or IO system.

Only then, for example, can the addresses of the components be edited.

In this section, only the settings relevant to SIMOTION are listed below:

- PROFIBUS Integrated on SIMOTION D
- SIMOTION on PROFIBUS DP
- SIMOTION and PROFINET IO
- SIMOTION drives on PROFIBUS DP
- SIMOTION drives on PROFINET IO

Note

SIMOTION communications

The theoretical principles of the communication for SIMOTION are contained in the *Motion Control Communication* Manual.

Representation in the user interface

Devices and networks are shown in the device view and the network view.

Device view

In the device view, the device is illustrated with all interfaces. Additional modules can also be added, e.g. communication boards.

In the device overview, the parameters of the individual interfaces are shown in tabular form.

If you select an interface or the whole device, you will see the corresponding parameters displayed in tabs in the Inspector window.

Network view

In the network view, you perform the following tasks:

- Configure and parametrize devices
- Network devices with each other

For SIMOTION devices, this means they are interconnected with each other, with drives, SIMATIC modules or PN IO devices (e.g. ET200SP, third-party devices) in the network view.

In the network overview, the parameters of the modules are shown in tabular form.

If you select a device or the bus, you will see the corresponding parameters displayed in tabs in the Inspector window.

Configuring telegrams

Telegrams are generally configured in SIMOTION SCOUT TIA. Telegrams are configured in the TIA Portal for drives and other hardware that have been inserted, for example, via GSD. In SIMOTION SCOUT TIA, you specify the telegrams or allow specification of the telegrams by the symbolic assignment. The telegrams configured for the respective drive objects are displayed in the device overview of the device in the TIA Portal.

Device overview

Module	Rack	Slot	I address	Q address	Type	Order no.
Drive unit_1	Rack_0	0	16369*		S120 CU 320-2 PN	6SL3 040-1MA01
PROFINET interface_1	Rack_0	0 X1	16368*		PROFINET-Interface	
Drive_1	Rack_0	1			Drive object	
Module access point_1	Rack_0	1 1	16365*		Module access point	
SIEMENS telegram 105	Rack_0	1 2	288...307	288...307	SIEMENS telegram 105, PZD-1...	
	Rack_0	1 3				
	Rack_0	1 4				
Supply	Rack_0	2			Drive object	
Module access point_1	Rack_0	2 1	16364*		Module access point	
SIEMENS telegram 370	Rack_0	2 2	320...321	320...321	SIEMENS telegram 370, PZD-1/1	
	Rack_0	2 3				
	Rack_0	2 4				
Control_Unit	Rack_0	3			Drive object	
Module access point_1	Rack_0	3 1	16363*		Module access point	
SIEMENS telegram 390	Rack_0	3 2	352...355	352...355	SIEMENS telegram 390, PZD-2/2	
	Rack_0	3 3				

Figure 6-1 View telegrams

Note

Handling telegrams

Deleting telegrams in the TIA Portal can result in synchronization errors between SCOUT TIA and the TIA Portal.

- Avoid deleting telegrams in the TIA Portal.

Move the slots in the TIA Portal device overview

- The moving of individual slots in the TIA Portal device overview can cause problems when saving and compiling or during the telegram alignment. The "Value outside permissible range" message appears. For this reason, do not move any slots in the device overview.

6.1.2 Telegram configuration and symbolic assignment

Introduction

The communication and also the communication roles of PROFINET IO controllers / IO devices or master-slave relationships for PROFIBUS DP are based on the use of telegrams. The telegrams and necessary interconnections can be automatically created during configuration in SIMOTION SCOUT TIA via the symbolic assignment. This in turn is a requirement for the automatic setting of the communication relationships in the TIA Portal.

Symbolic assignment in SIMOTION SCOUT TIA

SIMOTION SCOUT TIA supports the symbolic assignment on SINAMICS drive objects (DOs, Drive Objects) during the configuration of technology objects (TOs) and I/Os. This simplifies the configuration of the technological relationships, including communication between IO controllers and IO devices (e.g. drives) for PROFINET IO or master and slave for PROFIBUS DP.

After the configuration of the hardware in the TIA Portal (devices created, ports interconnected), you should configure the drives and technology objects (axes) in SIMOTION SCOUT TIA. Because of the selected functions for the configuration of the drives and technology objects, the required telegrams are determined. They are used as basis for the communications configuring in the TIA Portal. If a telegram configuration exists, the TIA Portal makes the required settings automatically, e.g. the Sync-Master and Sync-Slave synchronization roles are preassigned automatically and a synchronous mode set. Note this for further actions.

Note

Before communications are configured in the TIA Portal, the drive and axis should be configured with active symbolic assignment in SIMOTION SCOUT TIA.

For further information about the symbolic assignment, see the *SIMOTION Runtime Basic Functions* Function Manual.

6.1.3 Time-of-day synchronization via NTP

Introduction

To ensure that all components throughout the system have the same time of day, they must be synchronized to a time of day and one component must be the time generator for all the others. One possibility is to synchronize the time of day via an NTP server.

For NTP, the device sends time of day queries in regular time intervals to the NTP server in the subnet. A router must be used if the NTP server is located outside the subnet. The most accurate time of day is determined based on the responses and used to synchronize the station time of day. NTP has the advantage that the synchronization is also performed over subnet limits.

NTP time-of-day synchronization properties

- The NTP server is configured at the PN/IE interface of the controller. The PN interface via which communication with the time-of-day server actually takes place is determined on the basis of the IP address configured in the TCP/IP stack.
  - X7 with C240
  - X130 with D4x5
  - X127 with D410
  - X1 with P320-4
- Up to four servers can be configured as time generator.
- NTP does not support any automatic adjustment between summer and winter time.
- Time zones cannot be set. UTC (Universal Time Coordinated) is always transferred. It is identical with GMT (Greenwich Mean Time).

6.1.4 Configuring NTP in SIMOTION SCOUT

Introduction

The NTP time-of-day synchronization of a SIMOTION CPU can be configured in the TIA Portal.

Procedure

How to configure the NTP time synchronization:

1. In the device view, click the PN/IE interface (e.g. for D4x5 X130).
2. In the Inspector window, select "Properties > General" and click "Time-of-day synchronization".
3. Activate the "Activate time-of-day synchronization via NTP server" checkbox.

4. Enter the IP addresses for as many as four NTP servers. A router must be used when the IP address lies outside the subnet of the SIMOTION controller.
5. Select the refresh interval.

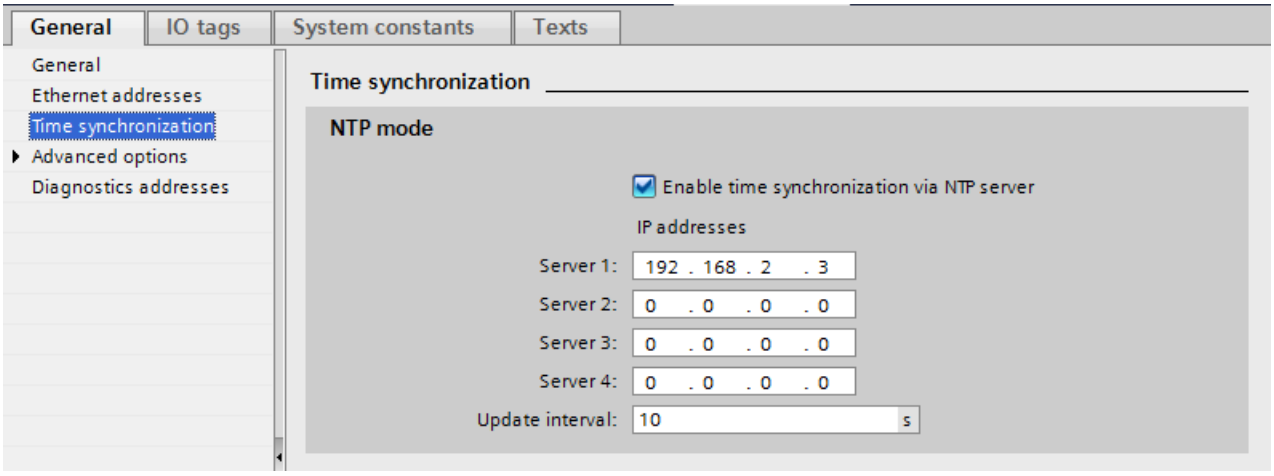


Figure 6-2 Time-of-day synchronization via the NTP protocol in the TIA Portal

6.1.5 TCP expert settings

You set the TCP expert settings for SIMOTION controllers in the TIA Portal at "Properties > General". With these settings, you configure the behavior of the host (SIMOTION) for TCP/IP connections. TCP is a connection-oriented protocol, the sender receives a receive confirmation via the reception of the sent data.

Set the times for the timeout so that the sender does not have to wait continuously for a receive confirmation when there is a connection abort. You can set these and the number of new send attempts here. Only change these values when the communication is frequently faulted due to timeouts. This can be the case with slow communication connections with high latency:

The following settings are required:

- Connection timeout [ms]
  Within this period, the sender waits for a receive conformation from the recipient.
- Max. retransmission timeout [ms]
  After this time has expired, a retransmission is started until the connection timeout or the maximum number of retransmissions is reached.
- Max. number of retransmissions
  Maximum number of attempts for a retransmission. If the maximum number is exceeded, there is no retransmission attempt.

6.2 PROFINET IO

6.2.1 Device settings on the PROFINET IO

Introduction

This section briefly explains the basic concepts and properties of PROFINET IO.

PROFINET IO

PROFINET, as an Ethernet-based automation standard specified by PROFIBUS International (PI - PROFIBUS & PROFINET International), defines a manufacturer-independent communication, automation and engineering model.

PROFINET IO systems

A PROFINET IO system consists of a PROFINET IO controller and its assigned PROFINET IO devices. The PROFINET IO controller is a controller (e.g. SIMOTION D4x5-2 DP/PN) that controls the automation task. A PROFINET IO device is a device (e.g. SINAMICS S120) controlled and monitored by an IO controller.

RT classes and isochronous mode

PROFINET offers two transmission protocols that are adapted to the requirements of automation. These are PROFINET IO with RT and PROFINET IO with IRT. For typical motion control applications, an isochronous application with IRT is required. As well as synchronizing the transmission network, IRT enables the application (e.g. SIMOTION position controller and interpolator) to be synchronized in the devices (isochronous application).

Addressing of PROFINET IO devices

In addition to the MAC and the IP address, PROFINET also uses a device name (NameOfStation) to identify PROFINET devices.

Creating a PROFINET subsystem

To create a new PROFINET subsystem, proceed as follows:

1. Right-click the PN interface at which you want to create a subsystem.
2. Select "Create subnet" if you want to create a new subnet.
3. Select "Assign subnet" if you want to assign an existing subnet to the PN interface.

Editing an IP address

To set an IP address, proceed as follows:

1. In the network view / device view, select the interface whose IP address you want to edit.
2. In the Inspector window, select the "Properties" tab and click the "General" tab.
3. Select "Ethernet addresses".
   You will now see the IP address and subnet mask below the "IP protocol".

   Note

   Make sure that all IP addresses and subnet masks are in the same area.

4. On this tab, you can select the subnet assigned to the interface with "Interface networked with".

Assigning device names

Before an IO device can be addressed by an IO controller, it must have a device name. In the case of PROFINET, this method was chosen because names are easier to handle than complex IP addresses.

The PROFINET device name must conform to the DNS naming conventions. Further information is available in the online help of the TIA Portal with the "Address and naming convention for PROFINET devices" keyword.

To change the device name, proceed as follows:

1. In the network view / device view, select the interface whose device name you want to edit.
2. In the Inspector window, select the "Properties" tab and click the "General" tab.
3. Select "Ethernet addresses".
   You now see at "PROFINET" the setting options of the device name.
4. Change the device name or select "Automatically generate PROFINET device name" for automatic generation.

Note

Converted device names

The TIA Portal supports PROFINET device names that do not conform with the DNS name conventions. A "converted name" is generated from the non-conform PROFINET device name. This is the device name that is actually loaded to the device. The PROFINET device name is converted only when it does not conform to the IEC 61158-6-10 rules. The PROFINET device name and the converted name are displayed for the properties of the PN interface. You cannot change the converted name; it is generated automatically.

Additional references

You will find detailed information and SIMOTION-specific settings and parameters described in detail in the *SIMOTION Communication* Function Manual.

6.2.2 Brief introduction communication configuration SIMOTION controller with SIMOTION drive via PROFINET IO

6.2.2.1 SIMOTION controller with PROFINET IO drive

Introduction

This section explains how to get started quickly with communication configuration of a PROFINET IO system using the examples of a SIMOTION D455-2 DP/PN with a SINAMICS S120 CU320-2 PN drive.

Configuration example	Description
SIMOTION D455-2 DP/PN IO controller	Sync master in the sync domain (IRT) Servo isochronous mode of the subnet
IO device SINAMICS S120 CU320-2 PN	Sync slave in the sync domain (IRT) IO device isochronous mode with the servo cycle

Note

For the following steps, symbolic assignment must have been activated in SIMOTION SCOUT TIA and the drive and axis must have been configured before communication configuration.

Additional references

Detailed information about the basic theoretical principles is contained in the *SIMOTION Communication* System Manual or in the information system for the TIA Portal.

General overview of the configuration sequence

To configure an isochronous PROFINET IO system, proceed as follows:

1. Insert a SIMOTION D4x5-2 DP/PN (PROFINET IO controller) and a SINAMICS S120 CU320-2 PN (PROFINET IO device) (Inserting devices (Page 131)).
2. Configure a PROFINET IO system (Inserting a subnet (Page 132)).
3. Interconnect the topology. This is necessary if you are using PROFINET IO with IRT (Interconnecting topology (Page 134)).
4. Switch to SIMOTION SCOUT TIA and configure the drive and the telegrams (Telegram configuration (Page 134)).
5. Switch to the TIA Portal. All necessary settings for communication configuration are performed automatically (Communication configuration (Page 136)).

Result

The PROFINET IO system is fully configured. Further operating steps are only required if you want to make changes to the default settings.

A detailed description of the individual steps is given in the next sections.

6.2.2.2 Inserting SIMOTION D455-2 DP/PN and SINAMICS S120 CU320-2 PN

Requirement

You have created a new project in the TIA Portal.

Inserting a device and drive

1. Drag a SIMOTION D455-2 DP/PN (S120) from the folder "Controller > SIMOTION" in the hardware catalog and drop it into the network view. The IP address and the PROFINET device name are assigned automatically. You can leave the default settings unchanged or adjust them accordingly.
2. Drag a SINAMICS S120 CU320-2 PN from the folder "Controller > SIMOTION > SIMOTION drives > SINAMICS S120" in the hardware catalog and drop it into the network view. The IP address and the PROFINET device name are assigned automatically. You can leave the default settings unchanged or adjust them accordingly.

After inserting the hardware, the network view is represented as follows. The drive device is shown as "Not assigned".

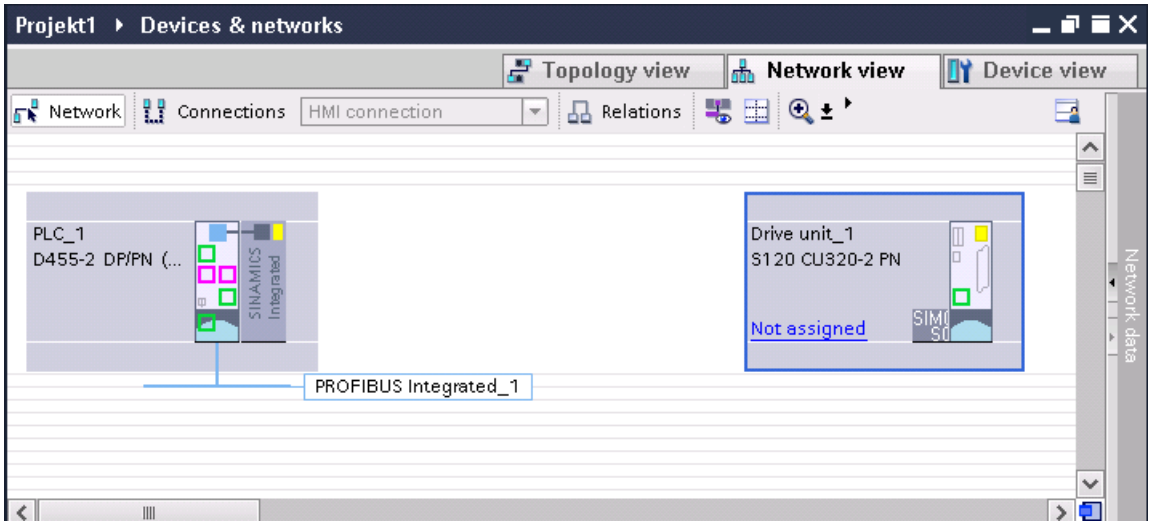


Figure 6-3 SIMOTION D455-2 DP/PN and SINAMICS S120 CU320-2 PN in the network view

In the next step, you will create a PROFINET IO system.

6.2.2.3 Creating a PROFINET IO system

Introduction

After inserting the hardware, it must first be assigned to a subnet. Unassigned devices are displayed as "Not assigned". Nodes of a subnet form a PROFINET IO system. A sync domain is also needed for synchronizing PROFINET IO devices. The sync domain ensures that all nodes are synchronized. When a subnet is created, a new sync domain is also created.

Creating a sync domain

To assign the devices to a sync domain, proceed as follows:

1. In the network view, click the "Not assigned" link on the SINAMICS S120 CU320-2 PN. All IO controllers in the project are displayed.

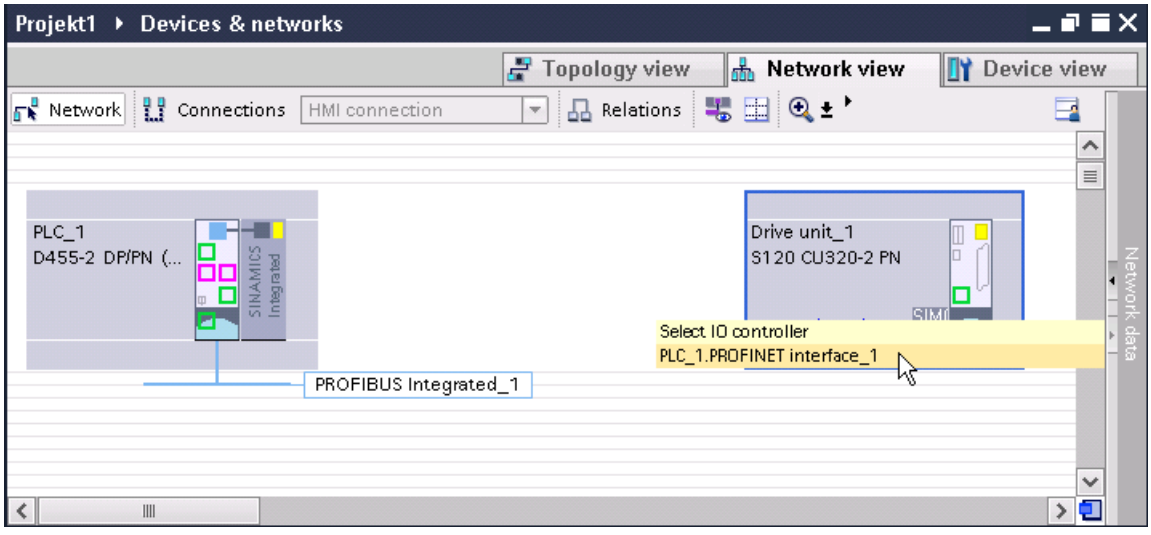


Figure 6-4 Assigning an IO device to an IO controller

2. Click the displayed PROFINET device name of the SIMOTION D455-2 DP/PN to connect it to the SINAMICS S120 CU320-2 PN IO device. A PROFINET IO system and a sync domain with the two nodes is automatically created.
   If you assign another IO device to the IO system of the IO controller, the IO device will automatically be assigned to the sync domain of the IO controller.

After you have assigned the drive unit, a sync domain ① and a PROFINET IO system ② will be created automatically. The IO controller is created as a sync master and the drive unit is created as an IO device without synchronization ③. The RT class and the synchronization role of the drive unit is automatically generated when the drive and the axis are configured in SIMOTION SCOUT TIA.

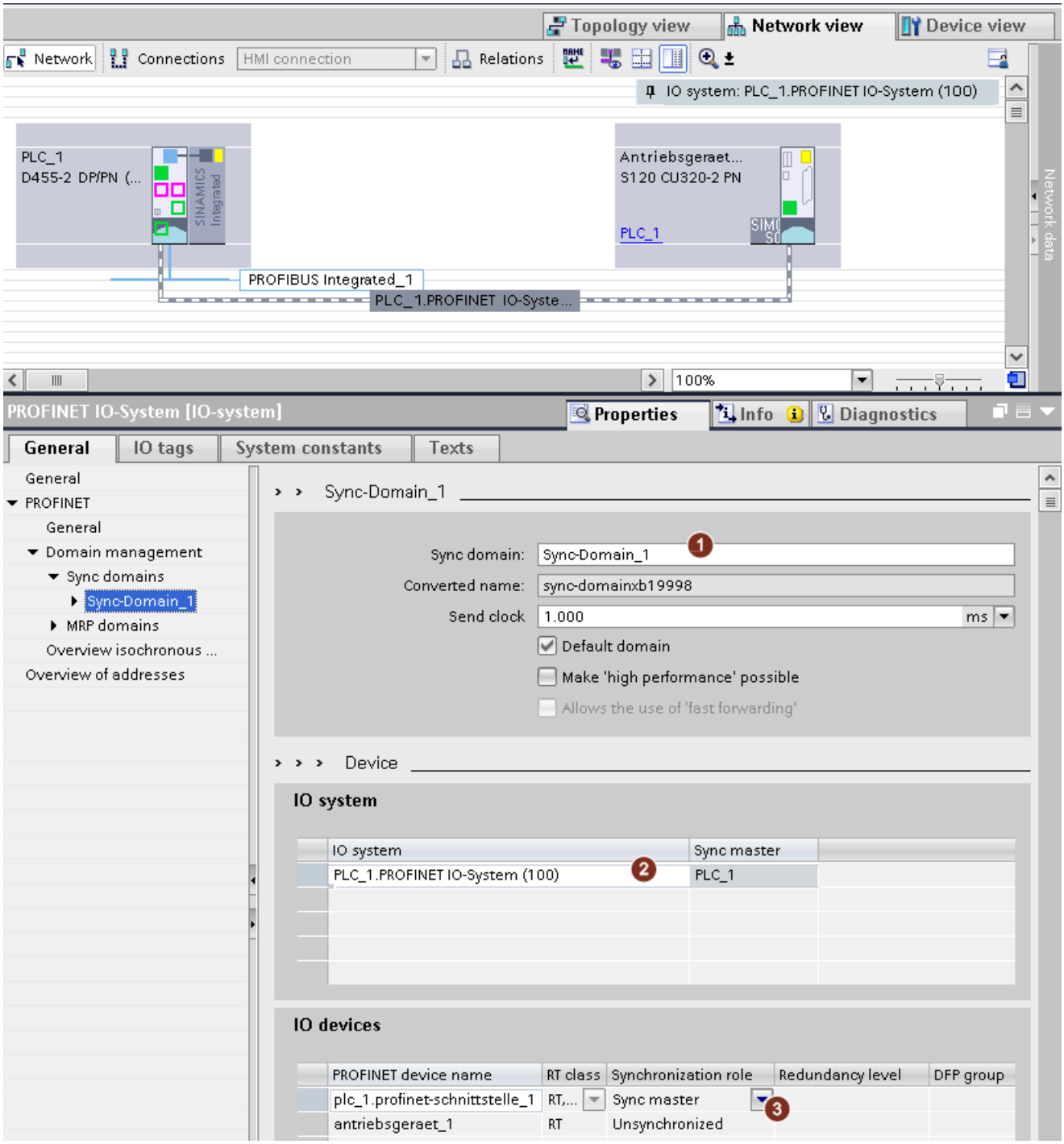


Figure 6-5 Sync domain and PROFINET IO system

The topology is interconnected in the next step.

6.2.2.4 Interconnecting the topology

Introduction

A requirement for isochronous IRT is the topology configuration. In the example, a connection from the port of the IO controller (SIMOTION D455-2 DP/PN) to the port of the IO device (SINAMICS S120 CU320-2 PN) must be configured. The configuration is performed in the topology view.

Configuring the topology

1. Switch to the "Topology view" tab.
2. Click the port of SIMOTION D455-2 DP/PN. The topmost port (X150 P1) is used in the example.
3. Hold down the left mouse button and draw a connection to the port of the SINAMICS S120 CU320-2 PN. The topmost port (X150 P1) is used in the example.

The connection between the ports is created.

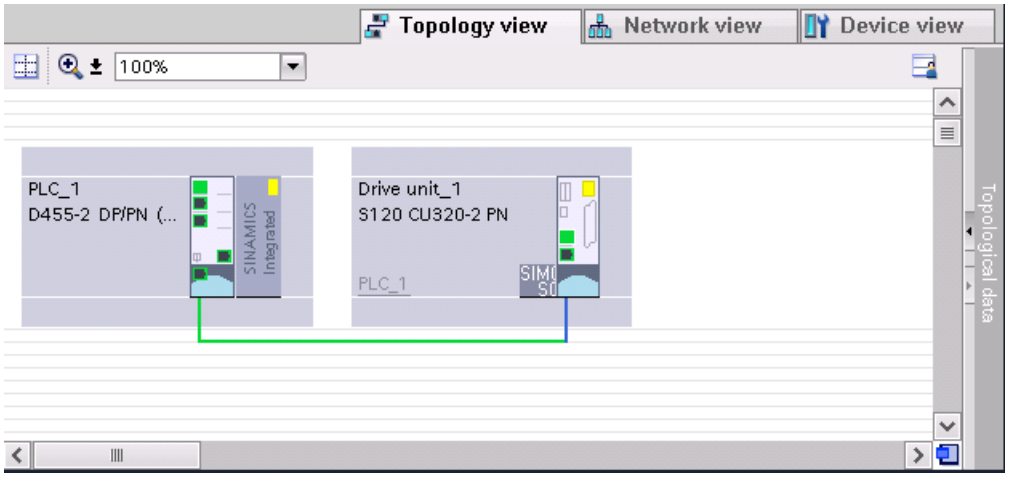


Figure 6-6 Configuration of the topology in the topology view

After this step, configuration in the TIA Portal is complete. The next steps are performed in SIMOTION SCOUT TIA.

6.2.2.5 Configuration of technology and telegrams in SIMOTION SCOUT TIA

Introduction

After you have inserted the hardware in the TIA Portal and configured the topology, switch to the SIMOTION SCOUT TIA to configure the drive and the axis (technology). This step is necessary for automatic communication configuration. With configuration of an axis on the drive, the TIA Portal automatically configures communication, e.g. the drive as a sync slave that is isochronous with the servo cycle.

Procedure

Note

You will find the precise procedure for configuration of the drive and the axis in the "SIMOTION SCOUT TIA" Configuration Manual in the Motion Control parameterization/programming section.

1. Open SIMOTION SCOUT TIA.
2. Configure the drive. In the example, a SINAMICS S120 CU320-2 PN.
3. Create an axis and assign it to the drive in the axis wizard.
   If only one axis and one drive are present in the project, the correct assignment is automatically displayed.

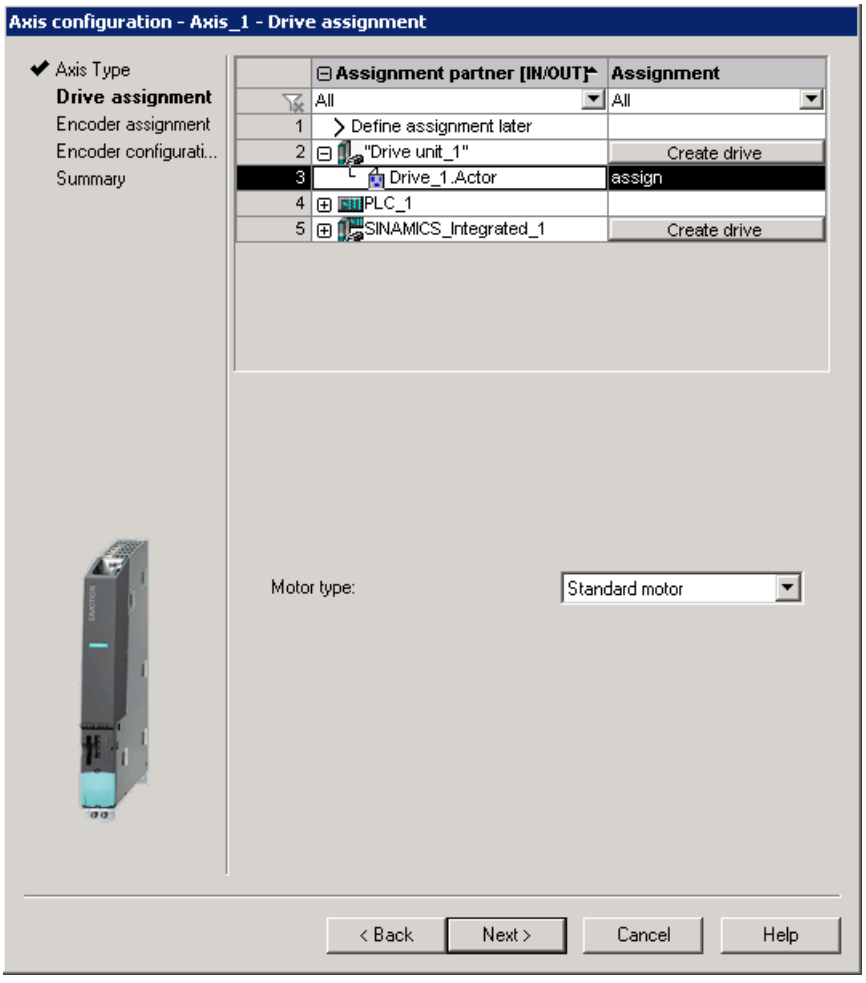


Figure 6-7 Axes are assigned to the drive during configuration

4. "Save and compile" in SIMOTION SCOUT TIA. During active symbolic assignment, the technological relationships and the telegrams are configured in the SIMOTION SCOUT TIA automatically.
5. Open the telegram configuration below the drive unit to view the configured telegrams.

Result

The telegrams and addresses have been synchronized with the TIA Portal. With the "Telegram configuration" entry below the drive unit, you can switch to the telegram overview in which blue checkmarks are now shown.

Configuration in SIMOTION SCOUT TIA has now been completed. The communication configuration has therefore been created automatically in the TIA Portal.

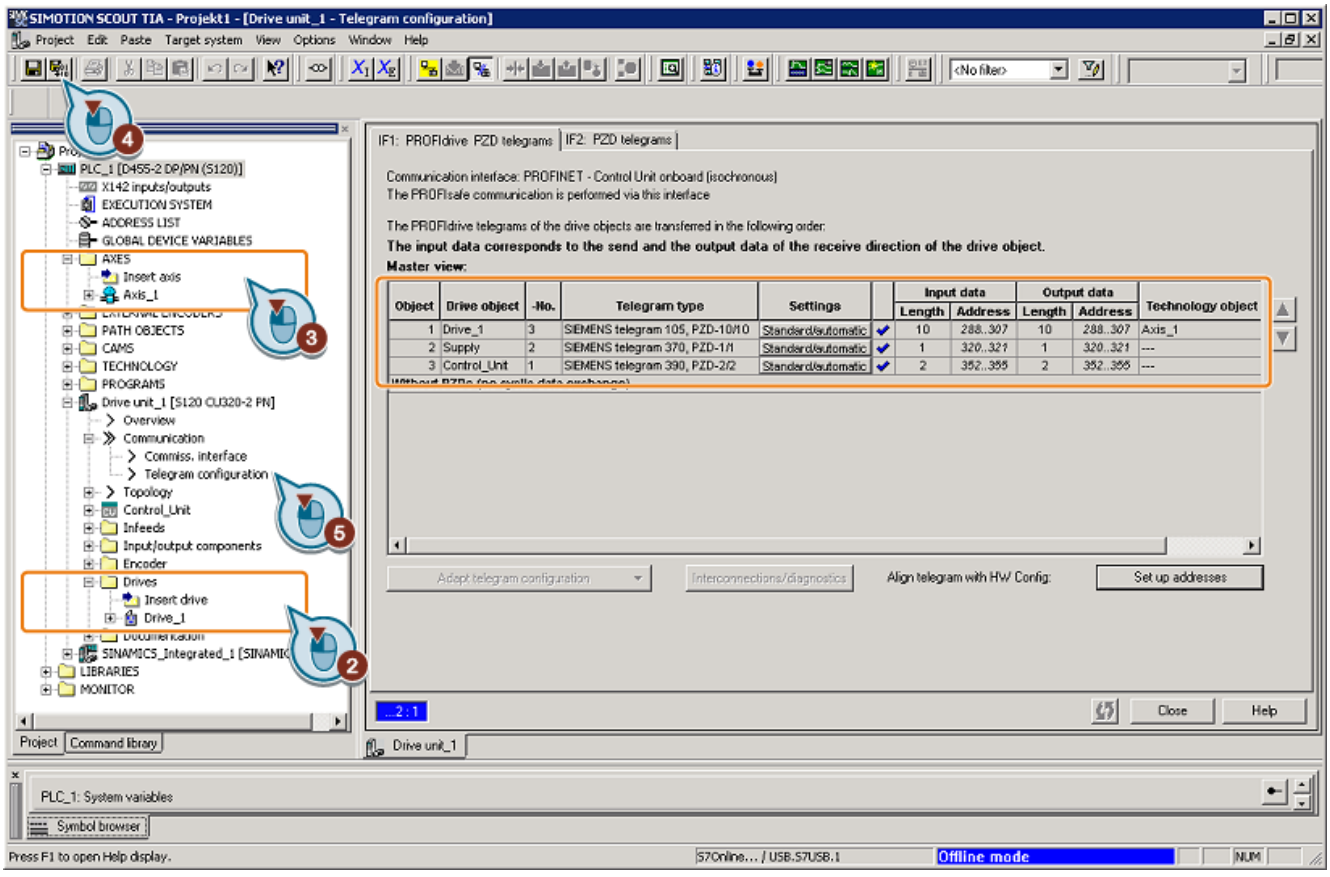


Figure 6-8 Drive and axis configuration in the SIMOTION SCOUT TIA

6.2.2.6 Automatic communication configuration in the TIA Portal

Introduction

After synchronization of the telegrams of SIMOTION SCOUT TIA to the TIA Portal, the communication configuration will automatically be adapted in the TIA Portal. All necessary communication settings required because of the technology configuration in SIMOTION SCOUT TIA have been adapted automatically. You can check the automated settings below. The communication configuration has now been completed.

Checking for automatic communication configuration

In the table, you can see the necessary communication configuration settings. You can check them.

Configuration example	Description
SIMOTION D455-2 DP/PN IO controller	Sync master in the sync domain (IRT) ① Servo isochronous mode of the subnet ③
IO device SINAMICS S120 CU320-2 PN	Sync slave in the sync domain (IRT) ② IO device isochronous mode with the servo cycle ④

Checking sync domain, sync master, sync slave ①②

1. Select the PROFINET IO system in the network view.
2. Select the sync domain in the secondary navigation "PROFINET > Domain management > Sync domains" on the "General" tab. You can check the settings there.

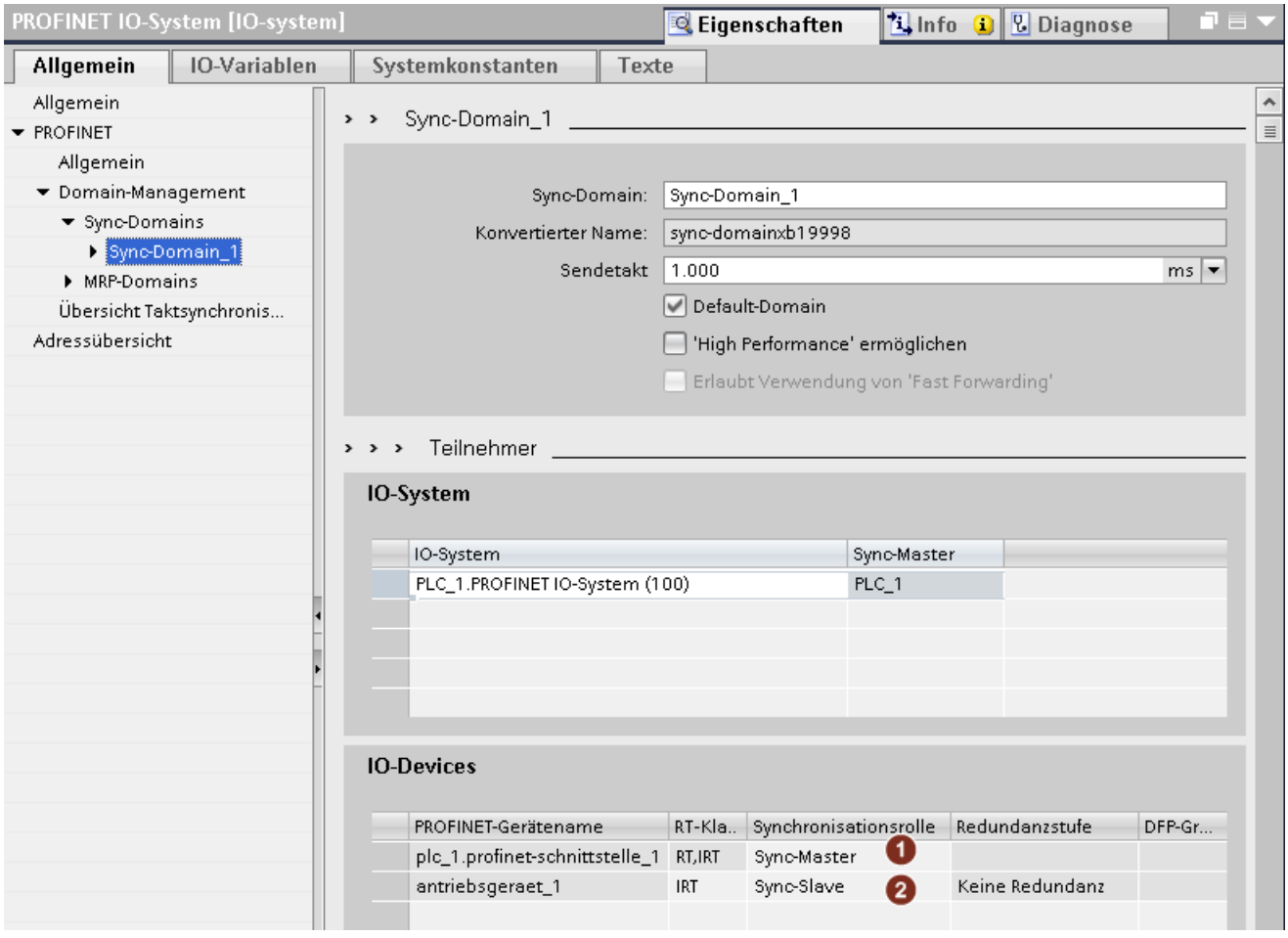


Figure 6-9 Checking sync domain, sync master, sync slave

Servo isochronous mode of the subnet ③

1. Select the PROFINET IO system in the network view and click the "Overview isochronous mode" entry on the "General" tab of the Inspector window. You can check the settings there.

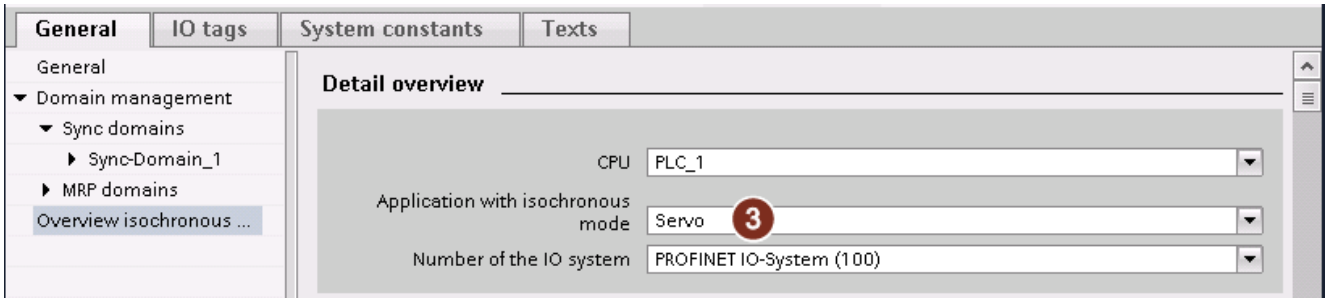


Figure 6-10 Isochronous mode of the subnet

IO device (sync slave) isochronous with the servo cycle ④

1. In the network view, select the PN interface of the IO device and click the "isochronous mode" entry on the "General" tab of the Inspector window. You can check the settings there. The isochronous telegram of the drive is shown in the detailed view.

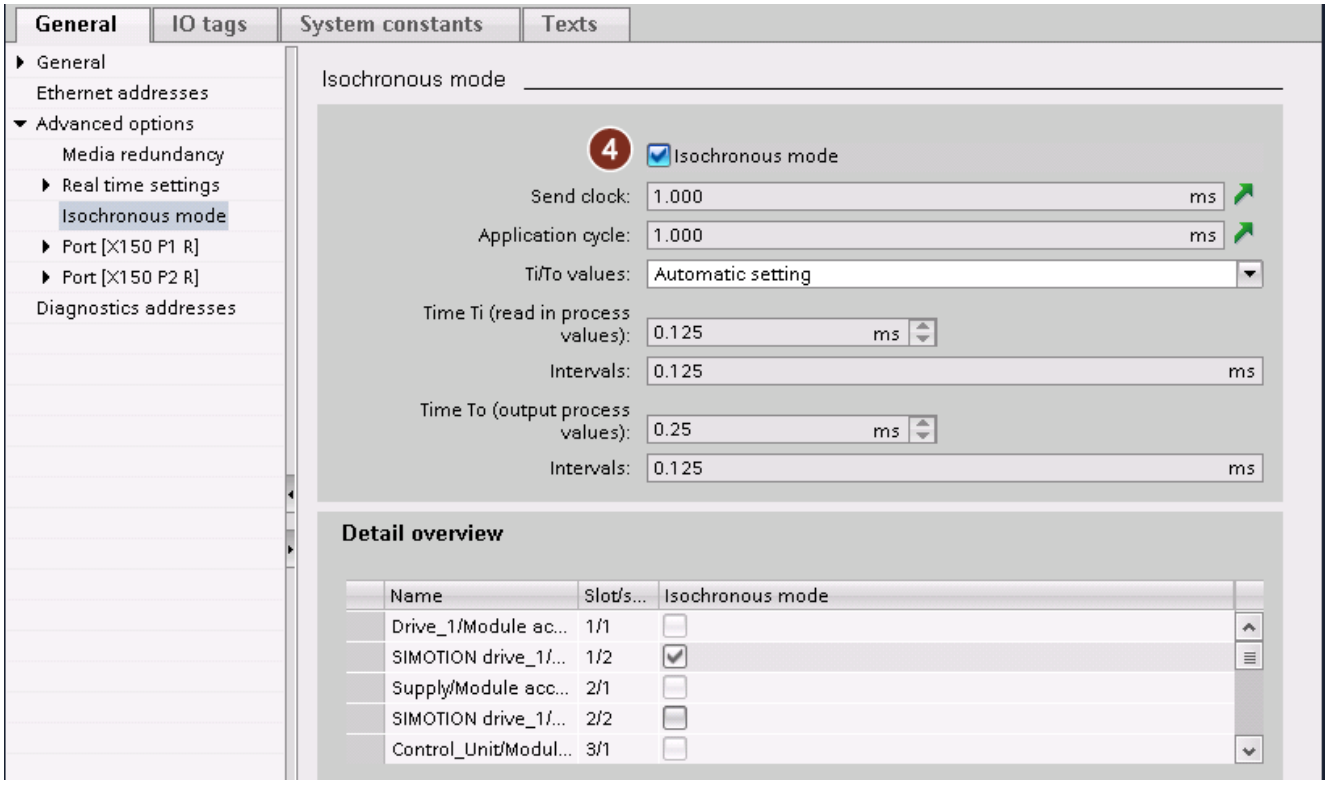


Figure 6-11 Isochronous mode of the PROFINET IO device in the servo cycle

If you would like to change the preset values, e.g. the send cycle, you will find more detailed explanations in the following sections.

6.2.3 Sync domain, topology, and isochronous mode

6.2.3.1 IO device (drive) on PROFINET IO

Introduction

A SIMOTION device should be connected with an IO device via PROFINET, in our example, a drive device. You have already inserted a SIMOTION device with integrated PROFINET interface into your project.

Section "Inserting a SIMOTION device (Page 88)" describes inserting a SIMOTION device in detail.

Note

Drive devices that are not networked or assigned to an IO controller are not displayed in SIMOTION SCOUT TIA.

Inserting and editing drives

To operate a drive as an IO device, proceed as follows:

1. Select a SIMOTION drive in the hardware catalog at "Controller> SIMOTION> SIMOTION drives" and drag it into the network view.
2. Click the link on the unassigned device in the network view (in the example, a SINAMICS S120).
   All possible IO controllers in the project are displayed.

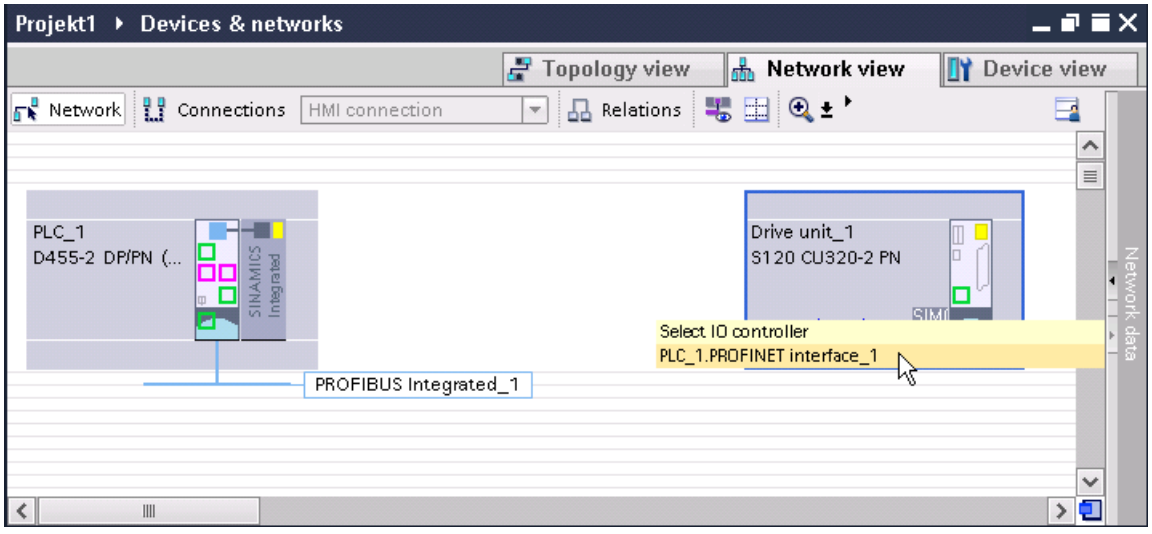


Figure 6-12 Assigning an IO device to an IO controller

3. Assign the drive to a SIMOTION controller. A PROFINET IO system and a sync domain with the two nodes are created automatically. If you assign another IO device to the IO system of the IO controller, the IO device is assigned automatically to the sync domain of the IO controller.

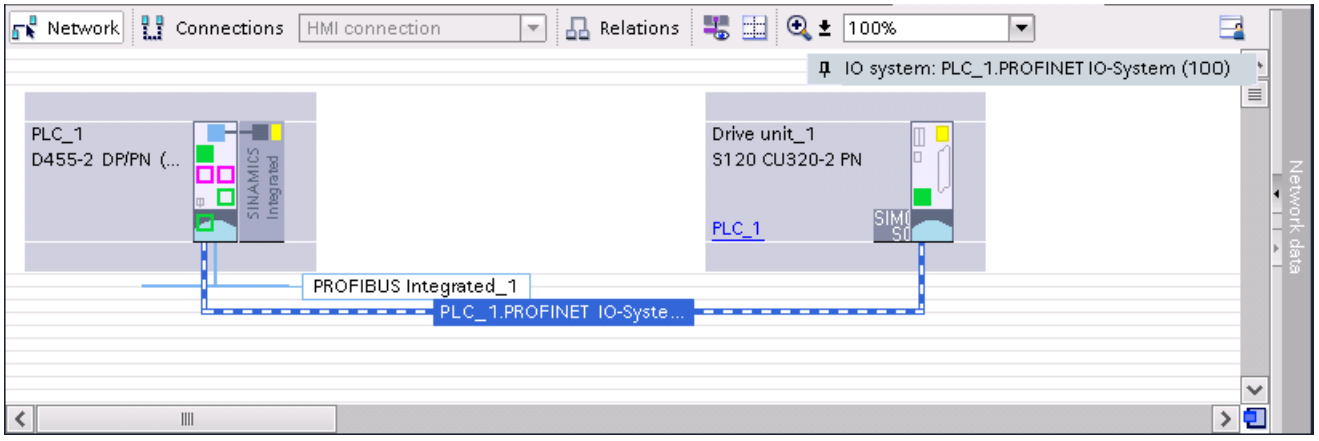


Figure 6-13 SINAMICS drive device on SIMOTION D4x5-2 via PROFINET

Note

You need a telegram for the communication between a SIMOTION controller and a drive. Telegrams are configured in SIMOTION SCOUT TIA. This requires that you configure the drive and the axis in SIMOTION SCOUT TIA. If "Symbolic assignment" is activated, the required telegrams are configured automatically for saving and compiling.

After inserting the IO device, you can configure the sync domain and the isochronous mode of the IO device. Isochronous mode is required for typical motion control applications.

See also

Real-time settings on IO devices and I devices (Page 160)

Configure sync domains and send clock (Page 141)

6.2.3.2 Configure sync domains and send clock

Configuring sync domains

A sync domain is needed for synchronizing PROFINET IO devices. The sync domain ensures that all nodes that belong to it are synchronized. After being inserted, the nodes of the sync domain are not synchronized.

After inserting a SINAMICS CPU and a SINAMICS S120 drive device, they must first be assigned to a subnet. Unassigned devices are displayed as "Not assigned".

To configure the sync domain, proceed as follows:

1. Select the PROFINET IO system in the network view.
2. In the Inspector window, click the "General" tab and select "Domain management > Sync domain > Sync domain_1". You can set the parameters in the tab.
3. You can set a new name at "Sync domain". It is converted automatically to a conformant name that is displayed at "Converted name".
4. Select the sync master (in the example, SIMOTION D445-2 DP/PN) and select the RT class for the IO device (in the example, SINAMICS S120). When you select IRT, the synchronization role of the IO device is set automatically to sync slave.
5. Select the "send cycle" for the sync domain.

   Note

   You can set the send cycle only when you have configured the synchronization role and the RT class at "IO devices".

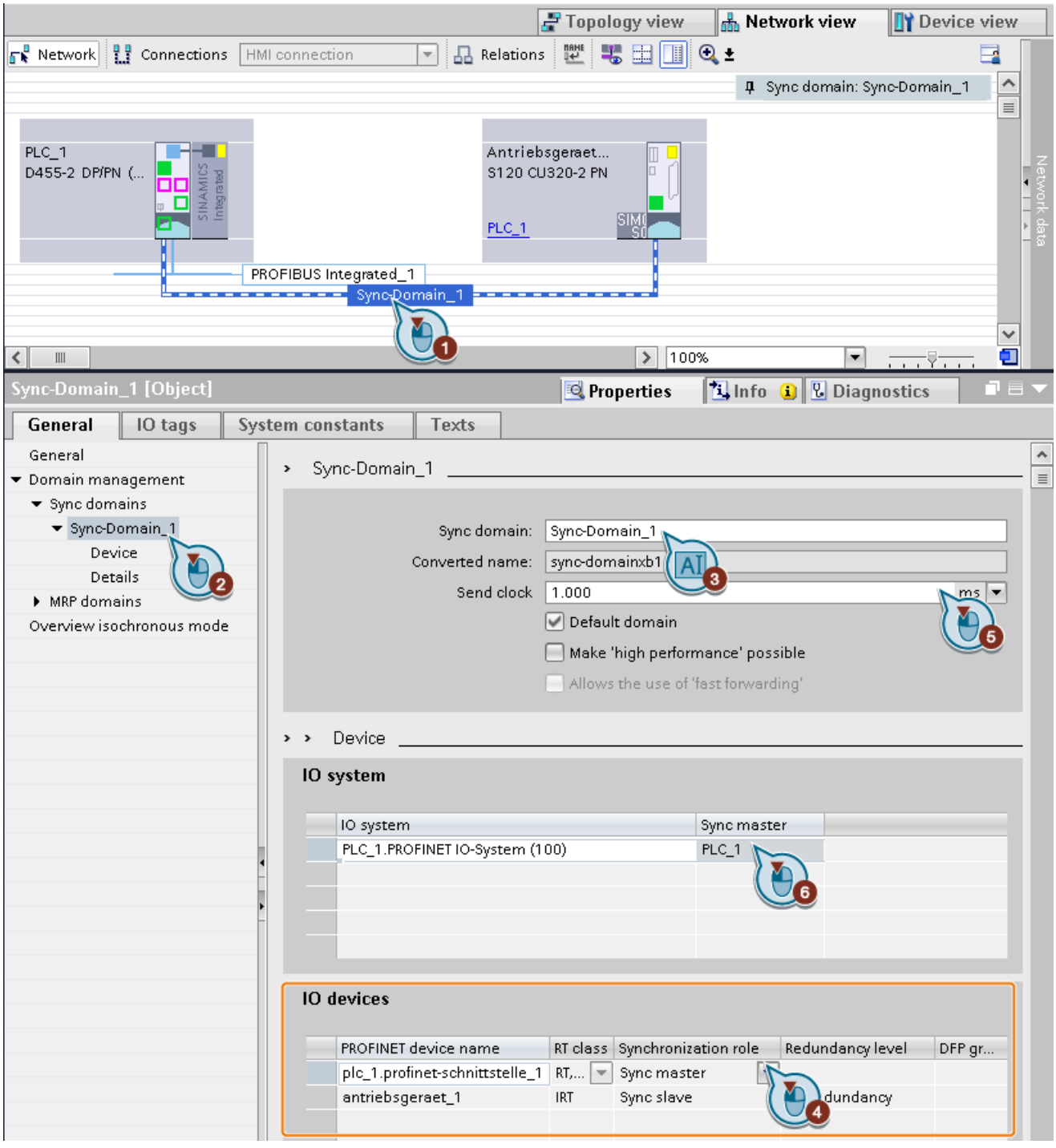


Figure 6-14 Configuring the sync domain

Explanation of the parameters

Parameter	Description
③ Sync domain	Name of the sync domain. This name is converted automatically if it does not conform with the DNS conventions.
④ IO devices	Here, you can see a list of the IO devices of the sync domain. You can select the following parameters for the nodes: • RT class: Select either RT (Real Time) or IRT (Isochronous Real Time). • Synchronization role: Choose between sync master, redundant sync master or sync slave. The synchronization role is displayed as "unsynchronized" by default, e.g. for devices in RT networks. Information about the RT classes and synchronization roles is provided in the SIMOTION SCOUT Communication Function Manual.
⑤ Send cycle	Select the send cycle for the sync domain here.
⑥ Node	The nodes of the PROFINET IO system are listed here.

See also

IO device (drive) on PROFINET IO (Page 139)

6.2.3.3 Set up the sync master and sync slave.

Requirement

You have performed the following configured steps:

- IO controller and IO device configured with RT
- Port interconnections are configured

Note

The sync master and sync slave are automatically configured in the TIA Portal if you have configured the drive and axis as well as saved and compiled the project in SIMOTION SCOUT TIA. You will find further information and a description of the configuring in SIMOTION SCOUT TIA in Section Isochronous mode (Page 148).

Configuring the sync master

To configure a sync master, proceed as follows:

1. Select the PROFINET interface of the sync master in the network view.
   The interface settings are displayed in the Inspector window.
2. Click "Extended options > Real-time settings > Synchronization" on the "General" tab.
3. Select the "Sync master" entry at "Synchronization role".

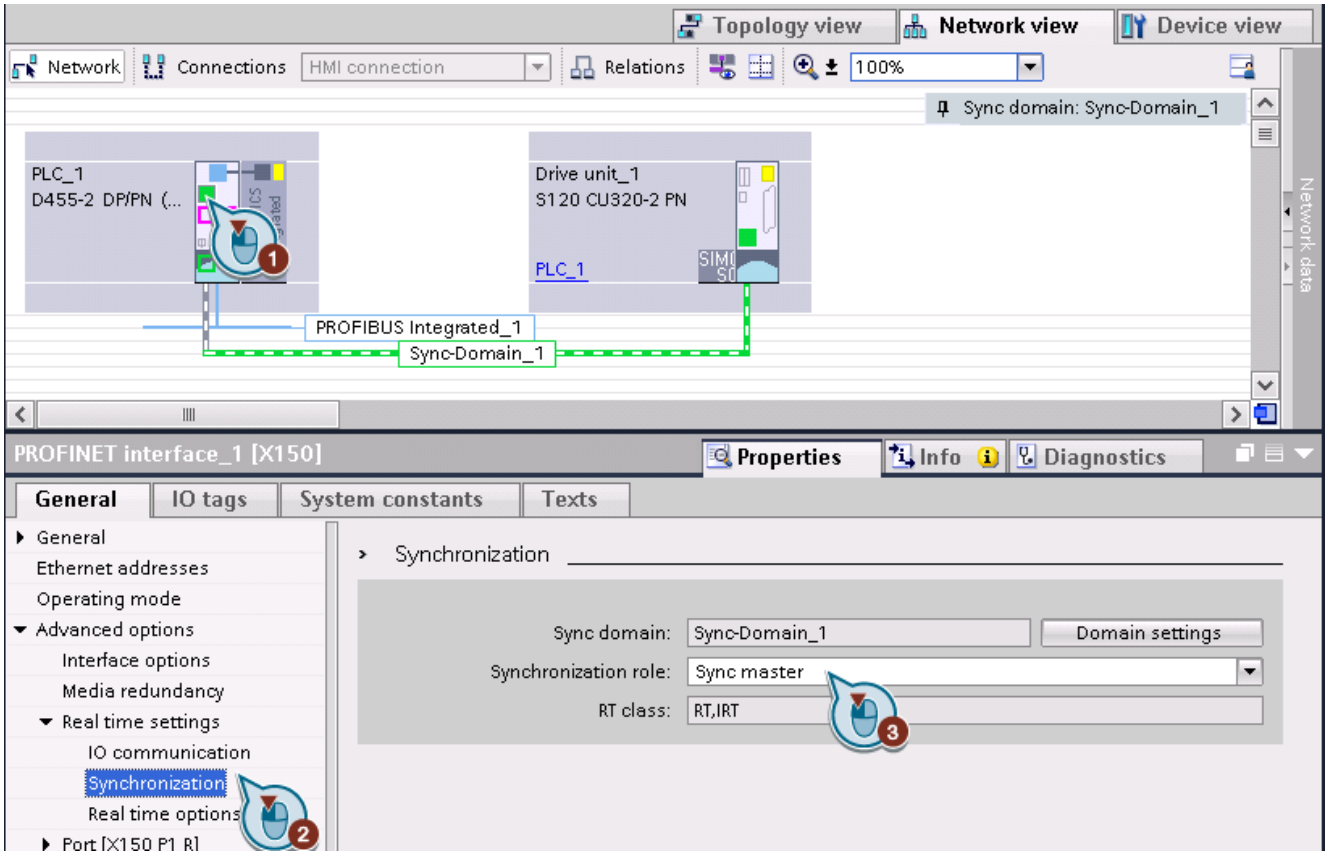


Figure 6-15 Configuring the sync master

Configuring the IO device as a sync slave

To configure a device within a PROFINET IO system as a sync slave, proceed as follows:

1. Select the PROFINET interface for the sync slave in the network view.
   The interface settings are displayed in the Inspector window.
2. Click "Extended options > Real-time settings > Synchronization" on the "General" tab.
3. Select "IRT" as RT class. In the example, the "sync slave" entry is selected automatically as "synchronization role".

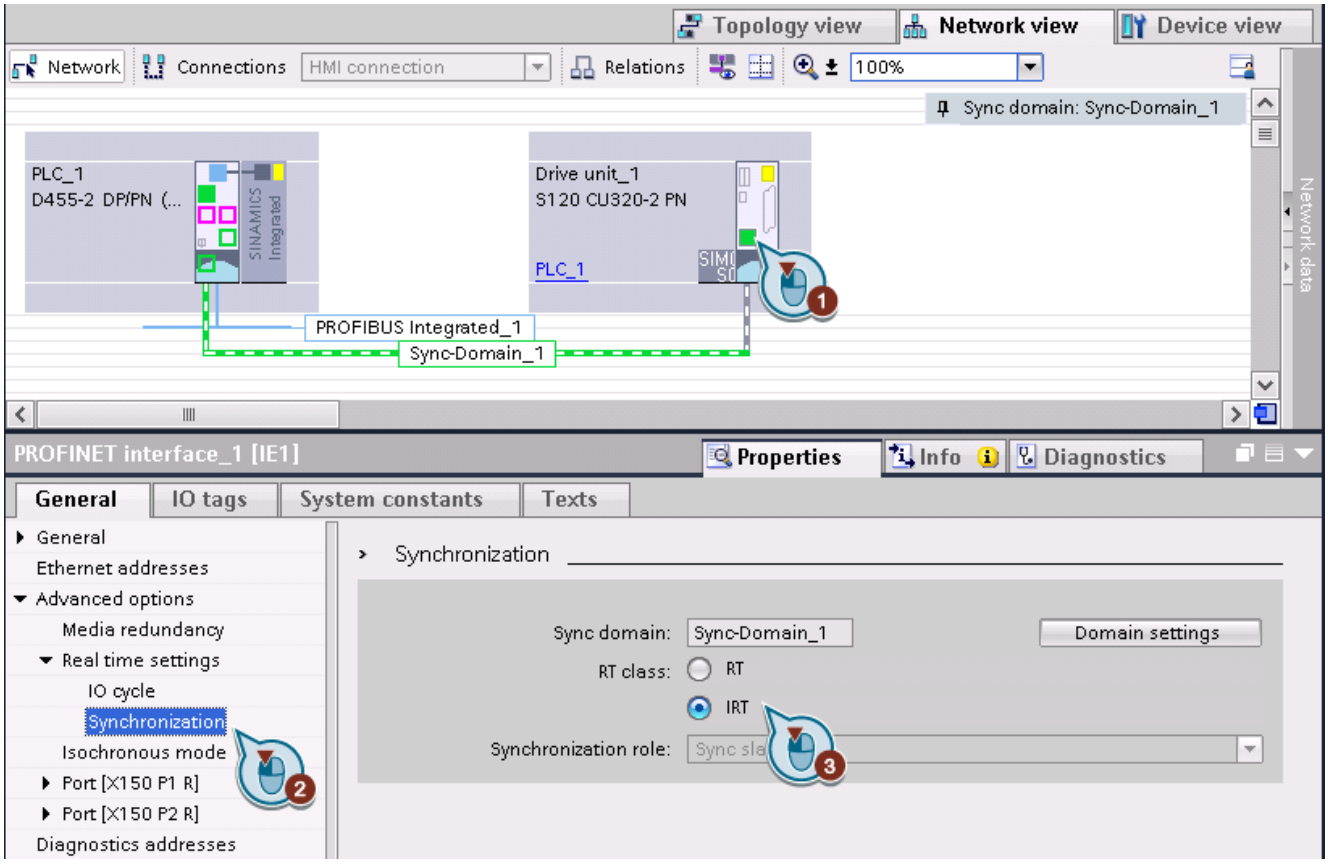


Figure 6-16 IO device as a sync slave

See also

Configure isochronous IO device (Page 147)

6.2.3.4 Configuring the topology, interconnecting ports

Interconnecting ports

A requirement for IRT is that the topology is configured and settings made to determine which device is to be connected via which port to which other devices.

There are two options for defining the properties of the cables between the ports of the switches:

- Using the topology view
- Using the object properties

Use the topology view

With the topology view you have an overview of all ports in the project and can interconnect them centrally.

To configure the topology, proceed as follows:

1. Click the "Topology view" tab.
   You can perform the following in the topology view:
   - Interconnect ports
   - Modify the properties of the interconnection
   - Insert passive components
   - Arrange for an offline/online comparison to be displayed in online mode
2. If you hover the mouse over the ports, port names are displayed in the tooltip. In the Inspector window, the properties for each selected port/ device are displayed.
3. Click on the source port and drag-and-drop the connection to the target port.
   The topology view then shows the connection between the two ports.

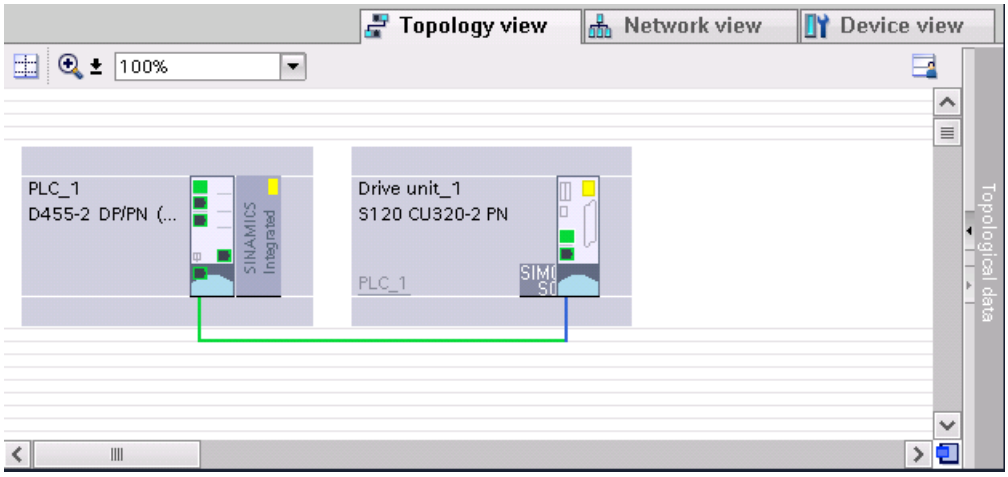


Figure 6-17 Topology view

Port interconnection via the properties

After selecting a device or an interface, you see the entries for the ports in the Inspector window under "PROFINET PN/IO interface > Extended options" in the "General" tab.

1. Select the interface, whose ports you want to edit, from the Inspector window.
2. Select the interface you wish to interconnect.
3. Select the "Port interconnection" entry.
   The "Local port" and "Partner port" dialogs open.
4. Open the "Partner port" drop-down menu.
   All devices with their PROFINET interfaces are shown.
5. Below the respective interface, select the port you want to connect to the selected port.
   Ports that you cannot interconnect are marked in red. Ports that are already occupied are not displayed.
   The connection between the ports is displayed in the topology view.
6. If necessary, edit the other parameters of the port.

Additional references

For more information on this topic, refer to the Online Help of the TIA Portal.

6.2.3.5 Configure isochronous IO device

Configuring isochronous mode for IO devices

The drive and controller together form a sync domain. For motion control applications of the PROFINET IO system, you must parameterize the IRT operating mode (for isochronous drives) and the PROFINET settings. Isochronous mode for the application on the bus is only possible for PROFINET IO with IRT. In the case of PROFINET IO with IRT, a sync master generates a synchronization telegram to which all sync slaves synchronize themselves. To use isochronous mode, you must configure it for the IO device.

The PROFINET IO system is isochronous with the servo clock. If you want to use the Servo_fast clock, you must select it under "Isochronous mode" on the IO controller.

Note

Isochronous mode only applies if isochronous submodules are configured in the IO device so that the IO controller has isochronous IO submodules. Otherwise, the Save and compile in the TIA Portal will be terminated with an error message.

To configure isochronous mode in the TIA Portal, you should therefore have already configured the drive and an axis in the SIMOTION SCOUT TIA. In this case, the necessary telegrams and isochronous submodules will be generated on Save and compile (symbolic assignment in SIMOTION SCOUT TIA). This is precondition for configuring the isochronous mode in the TIA Portal. After the configuration in the SIMOTION SCOUT TIA, isochronous mode is usually preset.

To configure isochronous mode, proceed as follows:

1. Select the IO device in the network view and click the PN interface.
   The interface properties are displayed in the Inspector window.
2. Click "Extended options > Isochronous mode" on the "General" tab.
3. Activate the "isochronous mode" option.
4. In the "detailed overview", the drive objects with the appropriate telegrams are displayed. The objects and telegrams must have been configured previously in SIMOTION SCOUT TIA. The telegrams are parameterized automatically during the symbolic assignment.
5. If necessary, activate the "isochronous mode" option besides the drive object with the appropriate telegram. This setting cannot be changed for telegrams for which isochronous mode is essential (e.g. telegram 105). In the example, telegram 105 is created automatically during symbolic assignment in SIMOTION SCOUT TIA.

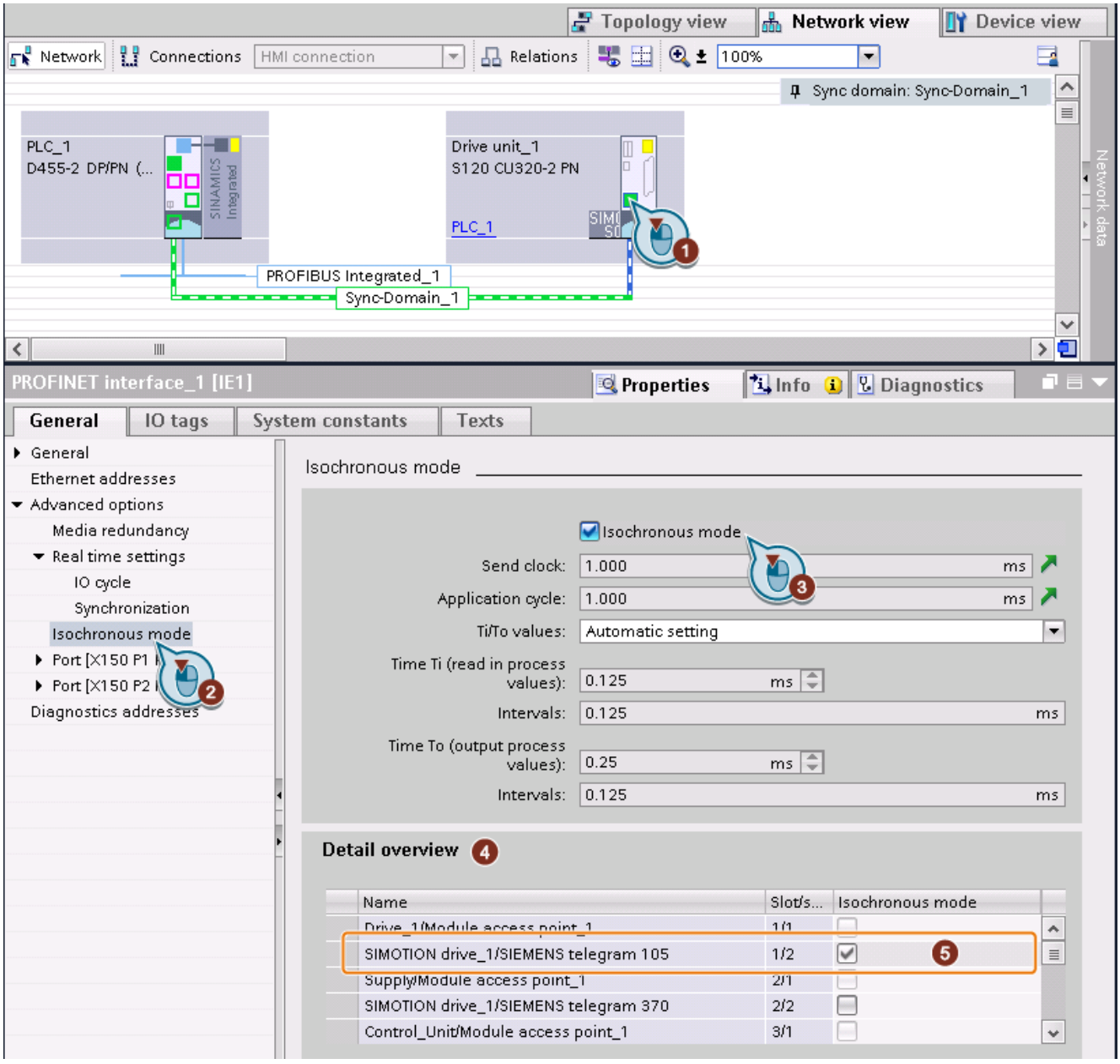


Figure 6-18 Configure isochronous IO device

Parameterizing isochronous mode

Isochronous mode can be individually activated or deactivated for each IO device or module in the IO device. You will find a more detailed description of the possible settings for isochronous mode in the following table.

Parameter	Description
Isochronous mode	Activate this option if you want to operate the drive (IO device) in isochronous mode with the PROFINET IO.
Send clock	Shows the send cycle clock of the PROFINET IO system. Click the link to edit the setting.
Application cycle	Shows the application cycle (multiple of the data cycle).
Ti/To values	Three settings are possible for the Ti/To values: • Automatic: Ti/To is automatically calculated. • Manual: Ti/To can be edited. • Task: Ti/To values are transferred to the OB. Ti, To: can only be edited if "manual" is set. Ti_{Min}/Ti_{Max}: minimum or maximum time for Ti. To_{Min}/To_{Max}: minimum or maximum time for To. Interval: defined interval for Ti/To values.
Time Ti (actual value)	Specifies at what time Ti, the actual value will be read in before the cycle starts.
Intervals	Indicates in which interval the value will be read in. The value should not be changed.
Time To (setpoint)	Specifies at what time To, the setpoint will be read out after the end of the cycle.
Interval	Indicates in which interval the value will be read in. The value should not be changed.

See also

Isochronous mode with servo cycle clock (Page 149)

Isochronous mode with Servo_fast cycle clock (Page 151)

6.2.3.6 Isochronous mode with servo cycle clock

Isochronous mode with the servo clock

For isochronous mode, the drive unit (IO device) must be synchronized with the PROFINET IO clock. You make these settings on the PN interface of the drive unit. In the previous chapter, you have already configured this. You can check isochronous mode in the IO controller.

Displaying isochronous mode in the TIA Portal

To display isochronous mode for a PROFINET IO system or DP master system, proceed as follows: A PROFINET IO system is shown in the example.

1. Select the device (interfaces) in the network view.
   The interface settings are displayed in the Inspector window.
2. Select "General > Isochronous mode" in the Inspector window.
   The TIA Portal initializes the settings automatically in accordance with their configuration; the settings cannot be changed.
   The application cycle is calculated and is derived from the settings in the TIA Portal and SIMOTION SCOUT TIA.

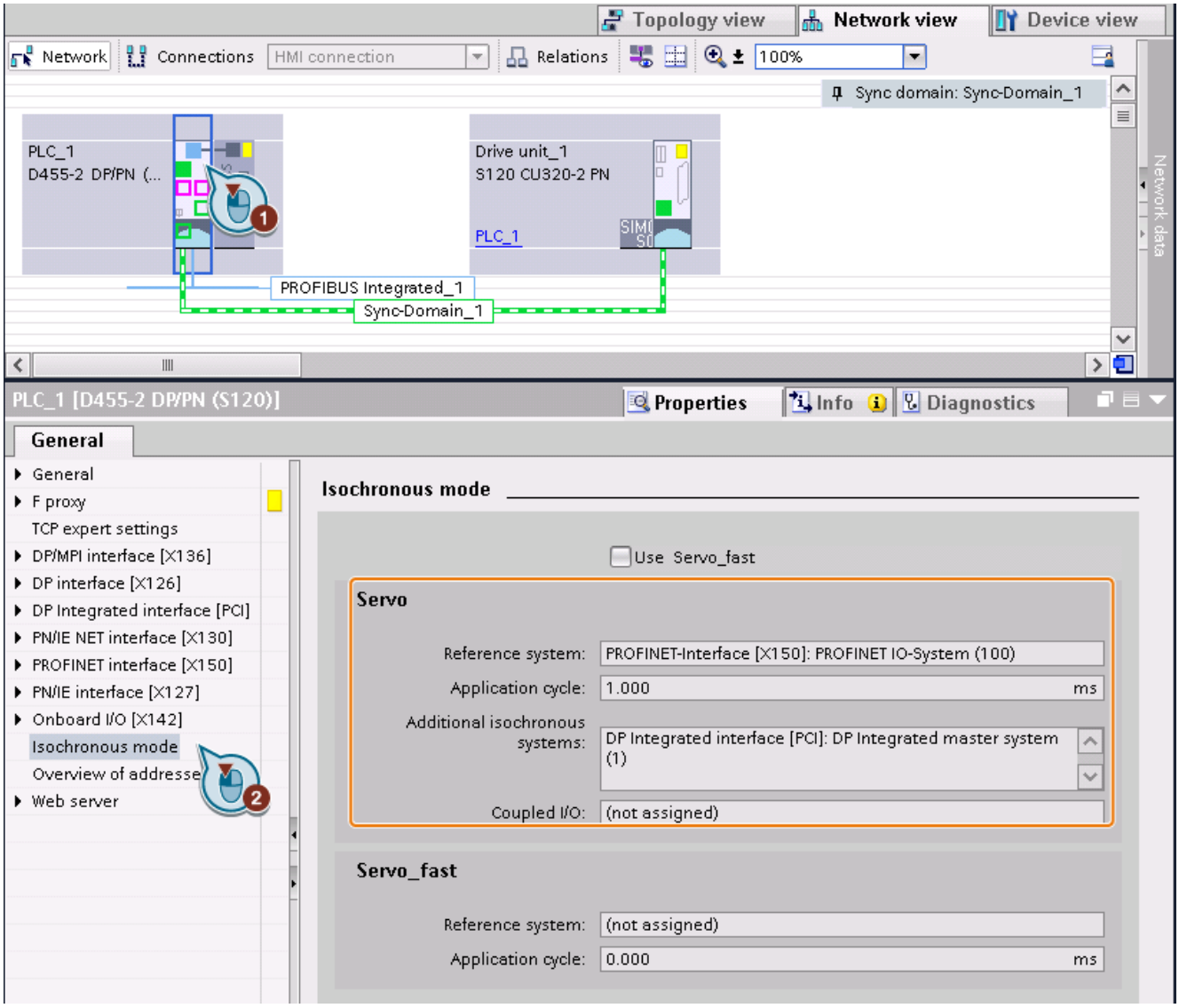


Figure 6-19 Setting the servo

The following parameters are displayed:

Parameter	Description
Reference system	Displays the reference system for the servo cycle in the following form: "Type of interface [interface name]: Master/IO system (number of master/ IO systems)". In the example, the reference system (clock generator) is the PN interface X150.
Application cycle	Shows the application cycle. The application cycle corresponds to the servo clock and can be set in SIMOTION SCOUT TIA. 1. Right-click the controller in the project navigator and perform "Set system cycle clocks." 2. Select an appropriate value in the "Factor" column.
Other isochronous systems	Displays the other (DP) master systems that are operated in isochronous mode.
Coupled IO	Displays the IO system on the [X1400] with the isochronously operated drive unit as the coupled I/O.

See also

Isochronous mode with Servo_fast cycle clock (Page 151)

6.2.3.7 Isochronous mode with Servo_fast cycle clock

Configuring Servo_fast

Servo_fast is configured like the Servo. That means the IO devices must be operated isochronously and the application of Servo_fast must be activated explicitly at the IO controller.

Note

Servo_fast is only supported by SIMOTION D435-2 DP/PN, D445-2 DP/PN and D455-2 DP/PN. The requirements and constraints that apply to the Servo_fast can be found in the "SIMOTION SCOUT Communication" Function Manual.

For detailed information, read the descriptions of the servo settings:

Configure isochronous IO device (Page 147).

In the following example, a SIMOTION D455-2 DP/PN with two SINAMICS S120 CU310-2 PN drive devices is configured. The drives operate isochnronously. The drive device at the integrated PN interface (X150) should be operated isochronous with the Servo_fast; the drive device on the CBE30-2 (X1400) should be operated isochronous with the servo.

To configure Servo_fast, proceed as follows:

1. Select the device in the network view.
   The interface settings are displayed in the Inspector window.
2. In the Inspector window, select the "Properties > General" tab and click "Isochronous mode".

3. Activate the "Use Servo_fast" option.
   The settings are "read-only" and are filled according to the configuration. The application cycle is calculated and is derived from the settings in the TIA Portal and SIMOTION SCOUT TIA. The reference systems in this example for Servo and Servo_fast are X1400 CBE30-2 interface and X150 PN Integrated, respectively.

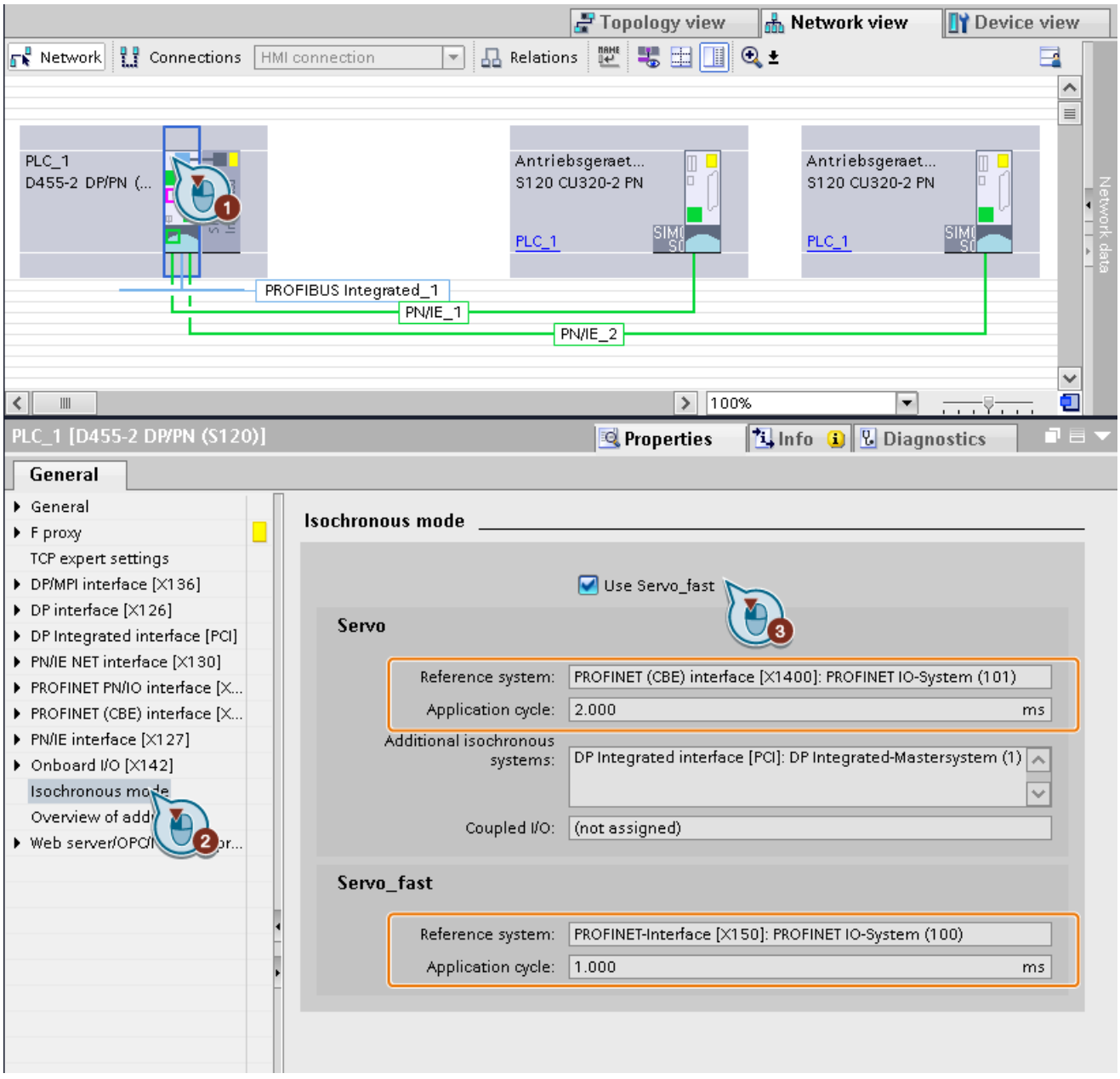


Figure 6-20 Assign Servo_fast

4. The application cycle corresponds to the servo cycle and can be set in SIMOTION SCOUT TIA. Switch to SIMOTION SCOUT TIA, right-click the controller and select "Set system cycles" in the context menu. In the opened dialog, select an appropriate value in the "Factor" column. In the example, Servo_fast is set to 1 ms and Servo to 2 ms.

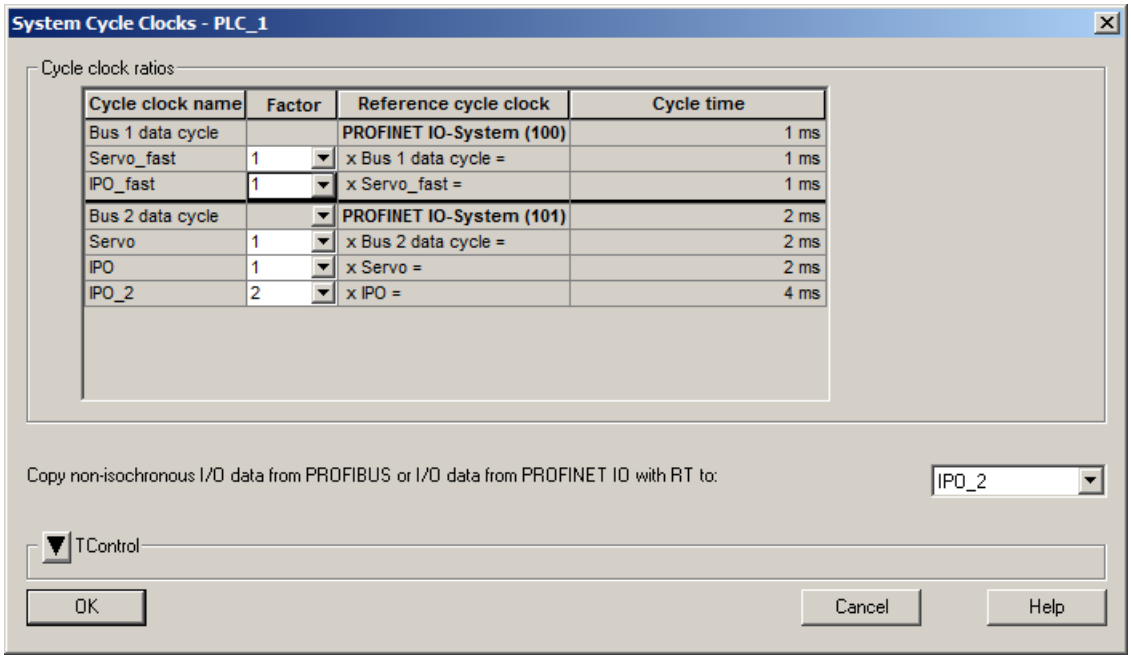


Figure 6-21 Setting system cycles for SIMOTION SCOUT TIA

5. Switch to the TIA Portal. There you can check the isochronous mode, the send cycle and the application cycle for the IO devices. A send cycle has been entered as 1 ms (i.e. synchronously to the Servo_fast cycle) at the IO device at the integrated PN interface (X150).

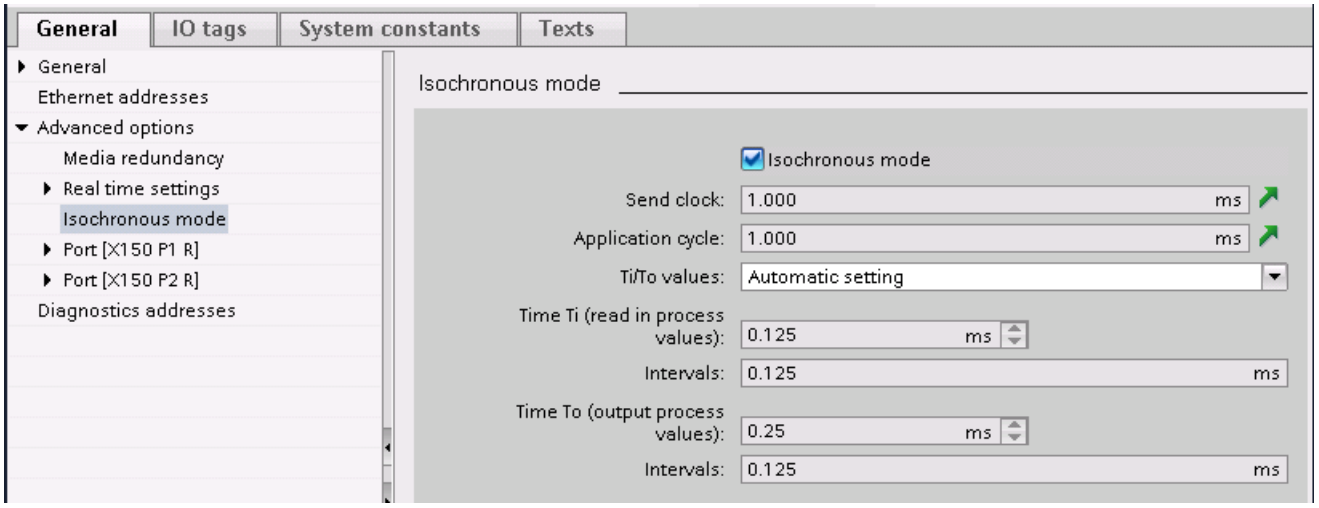


Figure 6-22 IO device configured isochronous to the Servo_fast

6. At the IO device at the PN interface of the CBE30-2, the send cycle has been entered with 2 ms, which means synchronously to the servo cycle.

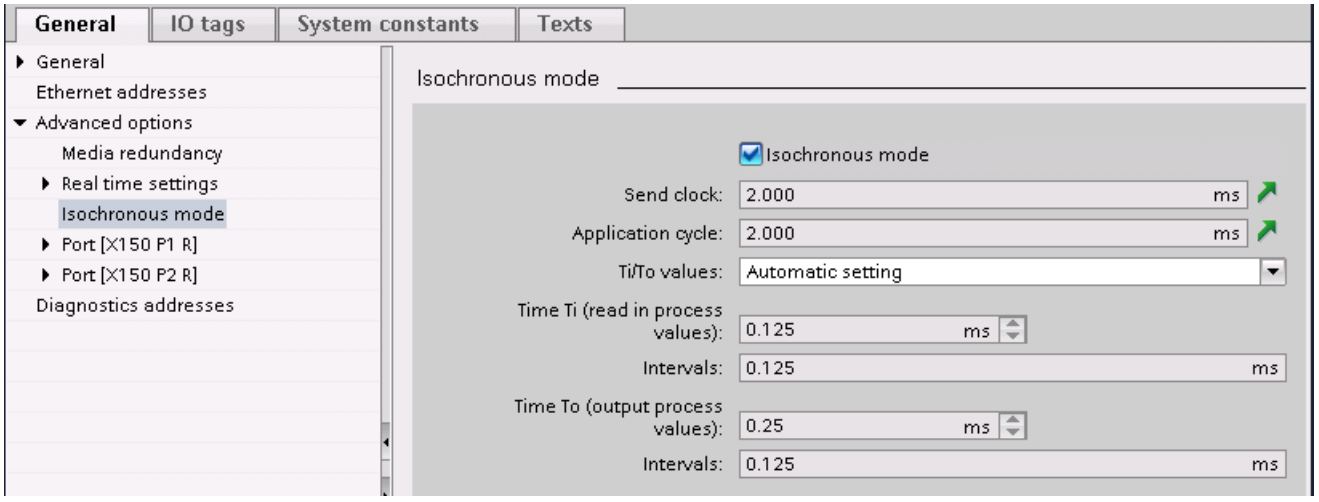


Figure 6-23 IO device configured isochronous to the servo

6.2.4 IO controller as IO device (I-Device)

6.2.4.1 Configuring I devices

I-Device description

The "I-Device" (intelligent IO device) functionality of a controller enables exchange of data with an IO controller. Here the I-Device is connected as an IO device to a higher-level IO controller. Communication can be established in both directions (bidirectional) via I/O areas using the I-Device functionality. This function also allows both controllers to operate in separate projects. When operating as an I-Device, a SIMOTION device can be used for data exchange with a SIMATIC station, for example.

Additional references

You will find detailed information in the information system of the TIA Portal under the keyword "I-Device" and in the "SIMOTION SCOUT Communication" Function Manual.

I-Device properties

With SIMOTION, the I-Device is available for PROFINET IO with RT and IRT. The restrictions that exist for operation as IRT or RT are contained in the following table.

Table 6-1 RT and IRT I-Device combination options with SIMOTION

SIMOTION functions	Possible additional functions			
	RT I-Device	RT controller	IRT I-Device	IRT controller
RT I-Device	-	X	-	X
RT controller	X	-	X*	X*
IRT I-Device	-	X	-	-
IRT controller	X	X	-	-

*Either an IRT I-Device or an IRT controller

Configuring I-Device

In the following example, a SIMOTION D455-2 DP/PN with isochronous SINAMICS S120 operates as I-Device on a SIMATIC S7 CPU 1516-F. If you want to operate a device as an I-Device, you must first activate the "IO device" operating mode.

In order to create an I-Device, proceed as follows:

1. In the network view, select the SIMOTION controller and the interface over which the I-Device is to be operated. In the example, X150.
2. In the Inspector window, select the "Properties > General" tab and click "Operating mode".
3. Activate the "IO device" option.

4. Assign the controller to which the I-Device is to be assigned at "Assigned IO controller".

Note

If the I-Device is to be used in another project, select "not assigned". To be able to use the I-Device, you must export the GSD and reinstall it. In the hardware catalog, this is displayed at "Other field devices" in a subfolder.

5. Activate the "Parameterization of the PN interface by higher-level IO controller" option if the interfaces of the I-Device and its ports are to be configured by the controller. This is the case if the I-Device is to be operated with IRT.
   If the I-Device is to be operated isochronously with IRT, you must also activate the "Operate in isochronous mode" option. This option is only available when the "Parameterization of the PN interface by the higher-level IO controller" option has been activated. If isochronous operation of the I-Device is not possible (e.g. already configured as IRT controller), you cannot activate the "Operate in isochronous mode" option.

Note

If you operate the I-Device with a lower-level IO system, the PROFINET interface (e.g. port parameter) of the I-Device cannot be parameterized by the higher-level IO controller.

Note

Restriction to configuring an isochronous IRT I-Device

Configuring an isochronous IRT I-Device in a single project in the TIA Portal is not supported. When an isochronous IRT I-Device is configured, the configuration must be divided between two projects.

This restriction also applies to migrated SIMOTION SCOUT projects. The SIMOTION SCOUT project must be divided between two projects before it is migrated.

This restriction does not apply to RT I-Devices.

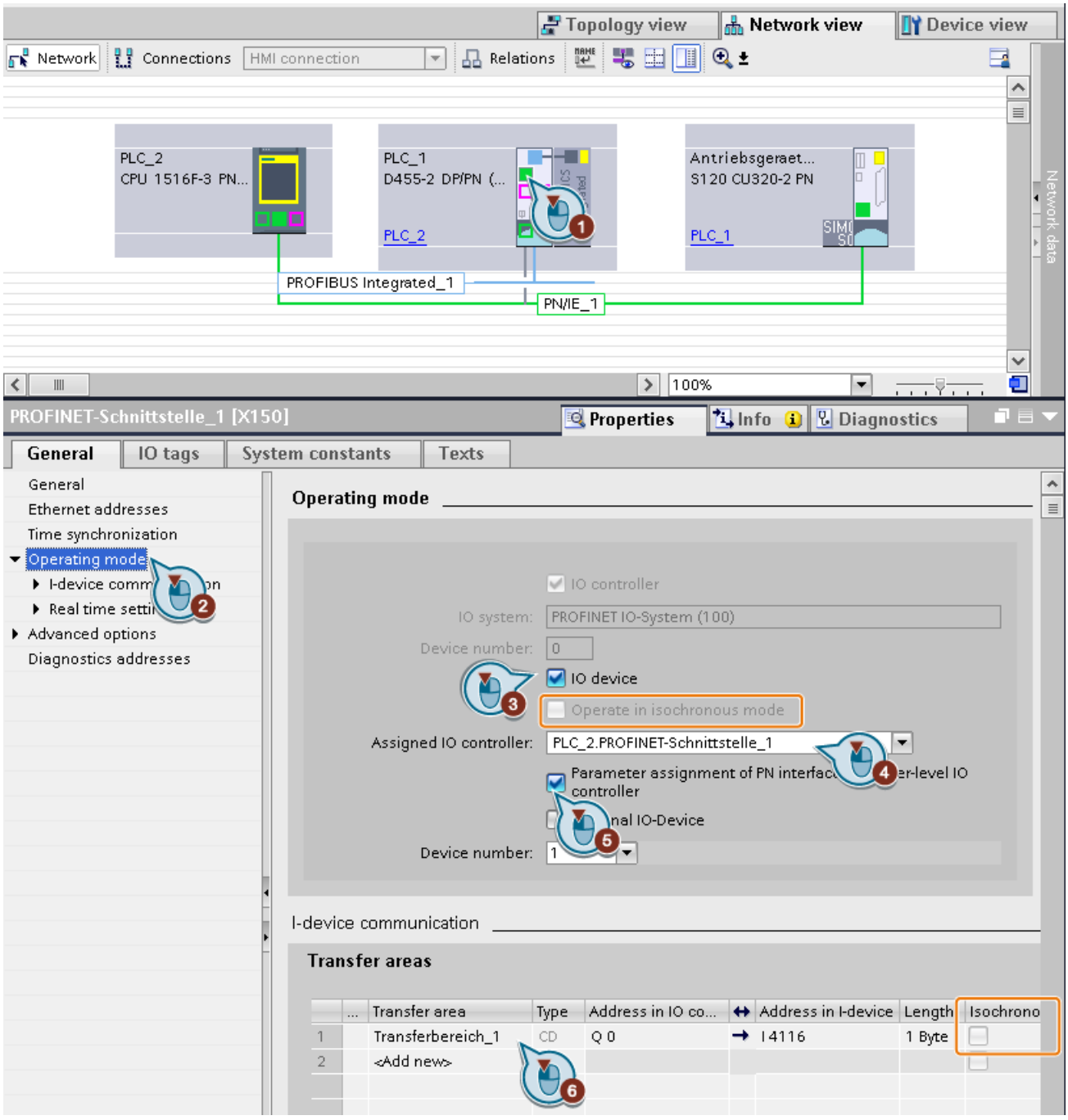


Figure 6-24 Setting the I-Device

6. Once the "IO device" option has been activated for the controller, you can define the transfer area. It is necessary to define a transfer area for the data exchange.

Parameter		Description
⑥ Transfer areas		Transfer areas are the peripheral areas over which the I-Device communicates data with the higher-level IO controller.
	Add new	Add a transfer area. A name is created automatically for the transfer area, the addresses are assigned in the IO controller and I-Device, and the length of the transfer area is set. You can still edit the following data:
	Type	Select the "Type" CD (Controller Device communication relationship).
	TransferArea_x	After you have created a transfer area, "Details of the transfer area" are displayed, where you can view the settings and change them, if necessary.
Diagnostic address of the communication		Here, you see the diagnostic addresses for each module and its ports/interfaces.
Export the device description file (GSD)		If you use the I-Device in another project or if the I-Device is used in another engineering system, then configure the higher-level IO controller and the I-Device as described here, in principle. Click the "Export" button after configuration of the transfer areas to create a GSD file from the I-Device. This GSD file is the representative of the I-Device configured in the other project.

Exporting and installing an I-Device

You can also export an I-Device as a GSD file and then install it in the TIA Portal. With this functionality, you can insert the I-Device in other projects via the hardware catalog.

1. In the "Operating mode" window, select the "not assigned" entry at "Assigned IO controller".
2. Configure the transfer area.
3. The next step is to export the GSD (generic station description). Click the "Export" button in the same window in the field "Export generic station description (GSD)".
4. In the dialog that opens, enter a name and description and specify the export path.
5. Confirm with "Export". The GSD file will be stored in the specified folder.
6. Select "Options" > "Install GSD file" in the menu.
7. Navigate to the storage location of the exported GSD file and select it in the window that opens.
8. Click "Install". The GSD file will be installed. In the hardware catalog, the I-Device is displayed at "Other field devices" in a subfolder.
9. With a drag-and-drop operation, you can, for example, insert the I-Device into another project.

6.2.4.2 Real-time settings on IO devices and I devices

Real-time settings for IO devices

The real-time settings are displayed when you set the "IO device" operating mode. Accordingly, these settings are also available for I-Devices:

1. Mark the SIMOTION CPU and select the "Real-time settings" for the PN interface in the "Properties" tab in the Inspector window.
   The table shows the possible options.

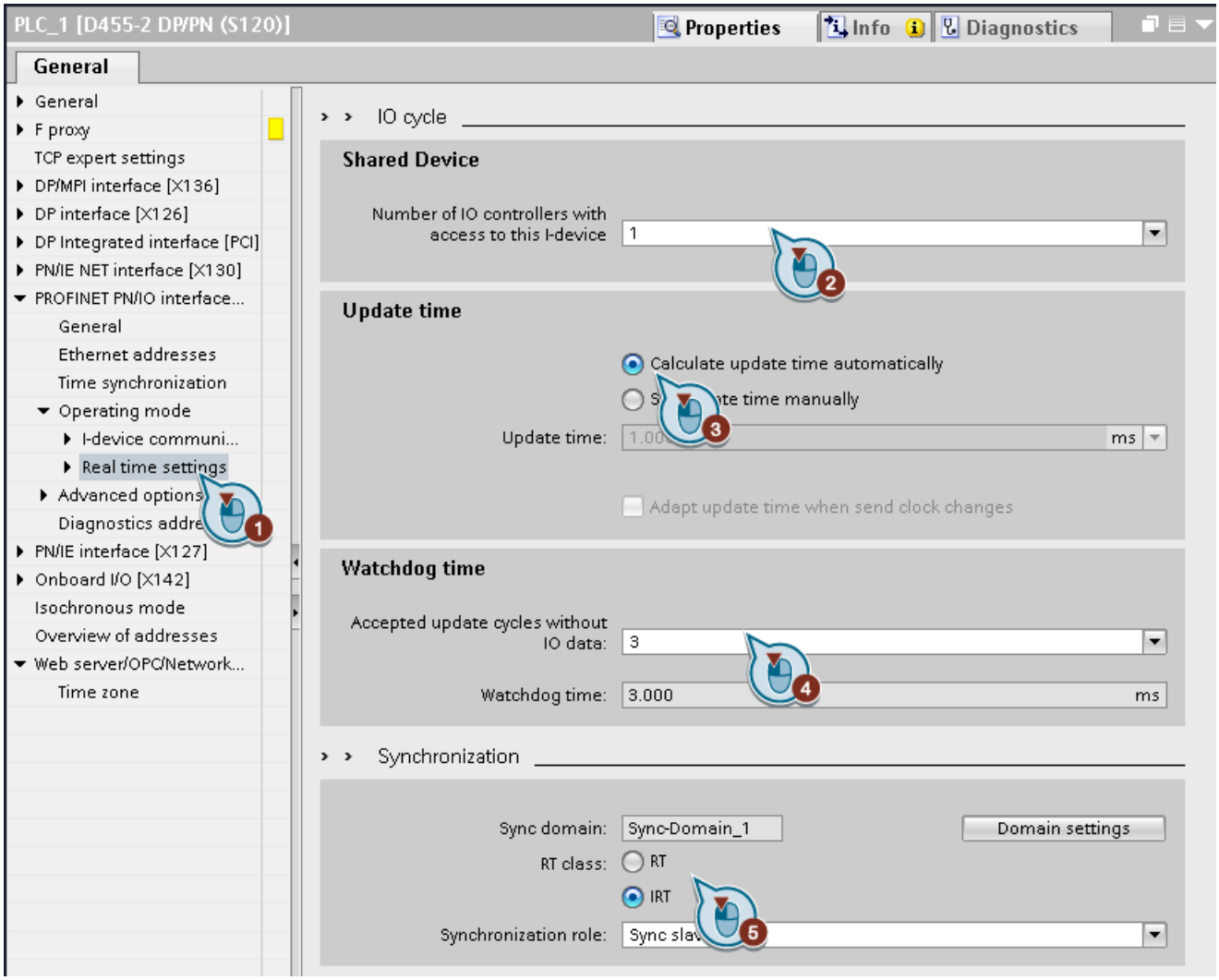


Figure 6-25 Real-time settings on the I-Device / IO device

You can set the following parameters:

Parameter		Description
② Shared device		From the drop-down menu, select the number of IO controllers to have access to this I-Device (only possible if you have configured an I-Device). **Note:** A SIMOTION I-Device can be operated only on **one** IO controller. As shared I-Device is not possible. A number > 1 causes an error message during the compilation.
③ Update time		Within this time interval an IO device / IO controller in the PROFINET IO system is supplied with new data by the IO controller / IO device. The update time can be configured separately for each IO device and determines the interval at which data is sent from the IO controller to the IO device (outputs) as well as from the IO device to the IO controller (inputs).
	Automatic	Automatically calculates the update time for each IO device of the PROFINET IO system, taking into account the data volume and the send cycle set.
	Adjustable	Activate the option to enter the update time manually. However, this can lead to errors if the bandwidth is not sufficient, or for example, too many nodes are configured.
	Adjust the update time when changing the send cycle	Automatically adjusts the update time.
④ Response monitoring time		If the IO device is not supplied with input or output data (IO data) by the IO controller within the response monitoring time, it switches to the safe state.
	Accepted update cycles without IO data	Enter here the number of cycles in which the IO device may be without data from the IO controller.
	Response monitoring time	Displays the current response monitoring time.
⑤ Synchronization		Can only be edited if the "Parameterization of the PN interface by the higher-level IO controller" option has been activated.
	Sync domain	Displays the name of the assigned sync domain. Click the "Domain setting" to edit the sync domain.
	RT class	Select the current RT class here. The following are available: • RT; for the cyclic data transmission • IRT; for isochronous real-time data transmission **Note:** The I-Device can operate only in IRT mode when IO devices connected to the I-Device operate only in RT mode.
	Synchronization role	Indicates the synchronization role the IO device has. The following are possible: • Unsynchronized • Sync master • Sync slave

See also

IO device (drive) on PROFINET IO (Page 139)

6.2.5 Direct data exchange via PROFINET IO

6.2.5.1 Direct data exchange

Direct data exchange between two SIMOTION controllers

IO data areas can be exchanged cyclically via IRT between two or more SIMOTION controllers. This is also referred to as controller-controller data exchange broadcast. Controller-controller data exchange broadcast is possible only between SIMOTION controllers via PROFINET IO with IRT. The following requirements must be met:

- The controllers are interconnected to the subnet.
- The topology is configured (ports interconnected).
- The PN-IO system is configured.
- The synchronization roles are assigned.
- The devices are in a single sync domain.

Procedure

To configure controller-controller data exchange broadcast, proceed as follows:

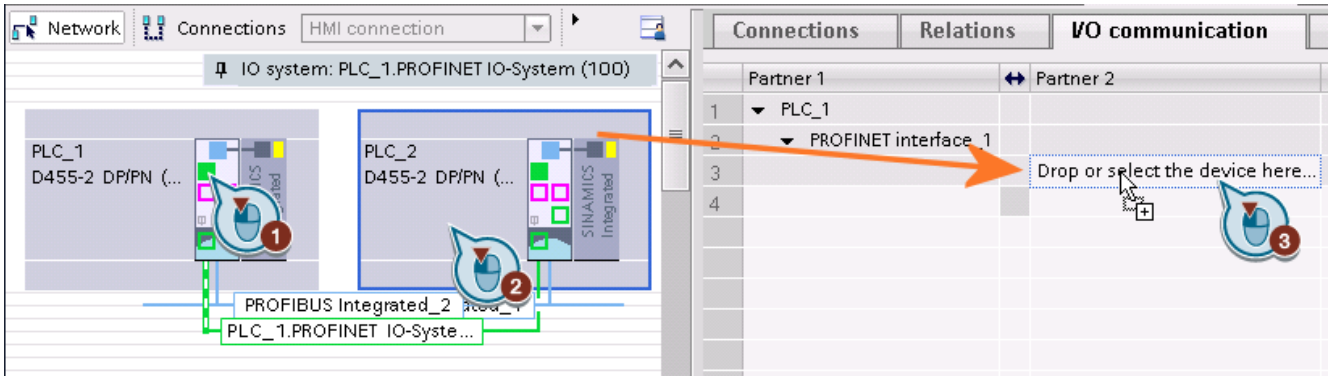


Figure 6-26 Drag-and-drop direct data exchange

1. Call the network view and click the "I/O communication" tab in the foreground below "Network data".
2. At the transmitter module, select the interface that you want to use for direct data exchange. At "I/O communication", the modules that are configured in this subnet are displayed.
3. Drag-and-drop the receiver module onto the transmitter interface.
   The module is displayed with the corresponding direction of communication.
4. Repeat the operation to configure the reverse direction of communication.
5. Select the "receiver module" to configure it as a transmitter and drag the "transmitter module" onto the interface in the "I/O communication".
   The two configured communication paths are now displayed.

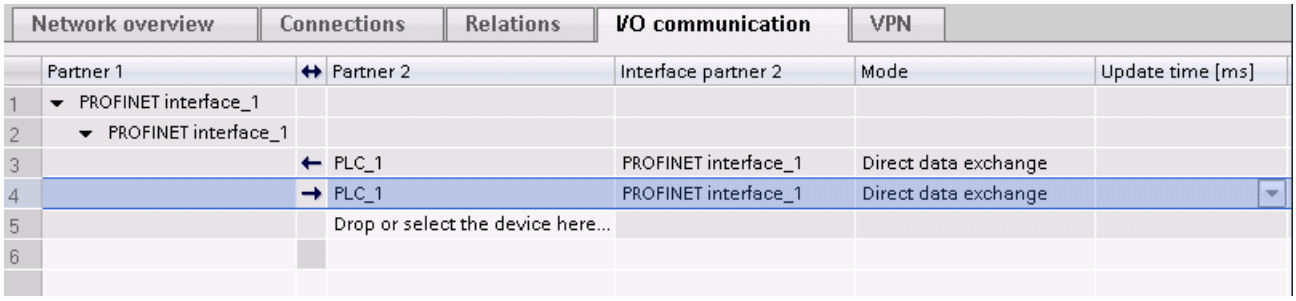


Figure 6-27 I/O communication

Configure transfer areas

It is necessary to define transfer areas for direct data exchange. Once you have selected the interface in the "I/O communication", the "Direct data exchange" area is displayed below the "General" tab in the Inspector window.

To configure a transfer area, proceed as follows:

1. On the "General" tab, click the "Add new..." entry in the "Transfer areas" table.
   The transfer area is created and displayed with the given data.
2. Repeat the process to create the transfer area for the reverse direction.

Note

The transfer areas must be configured both in the transmit and the receive direction (bidirectional data communication).

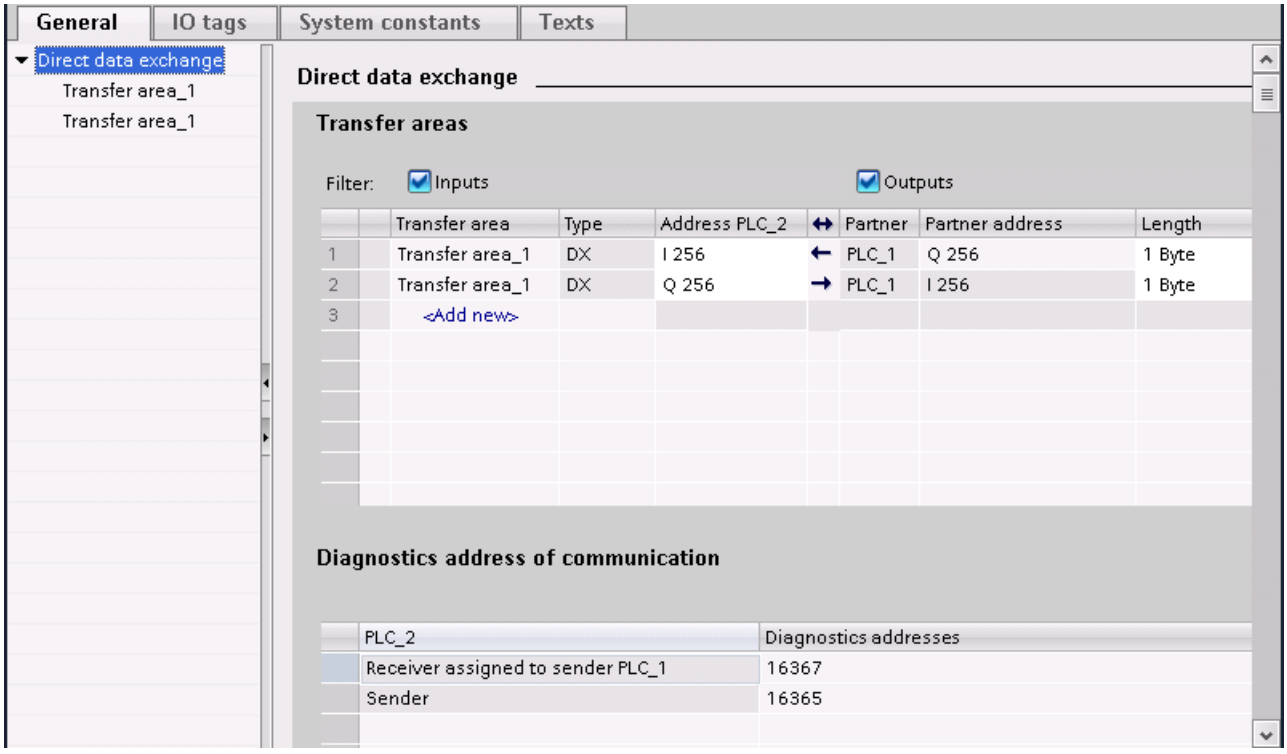


Figure 6-28 Configure transfer areas

3. In order to parameterize the transfer areas further, click the "Transfer area 1", ... "Transfer area x" entries in the secondary navigation.
   The corresponding parameters are displayed for each transfer area.

The diagnostic addresses for transmitter and receiver are illustrated at "Diagnostic address of communication".

If you want to configure direct data exchange for additional controllers, add them to the subnet, and perform the configuration similarly.

Type of transfer areas

In the TIA Portal, different types of communication (PROFIBUS, PROFINET) can be configured. Depending on this configuration, different short codes are shown for the transfer area type.

- PROFINET IO
  For Direct Data Exchange, "DX" is displayed as the type in the TIA Portal. For synchronous and distributed synchronism configurations that are generated automatically by SIMOTION SCOUT TIA, "M-DX" is displayed as the type. M-DX means Motion Control with Direct Data Exchange.

See also

Set up the sync master and sync slave. (Page 143)

6.2.6 Configuring the redundancy second sync master

Configuring the redundant sync master

There are machines/plants that consist of two submachines / plant units. For such machines/ plants (complete systems), it can be necessary that both submachines / plant units (subsystems) must be able to be operated synchronously, alone (separated) and in the complete system. This requires that a sync master is defined/configured on each subsystem. Only one sync master is permitted in the complete system. Consequently, a sync master is configured on one subsystem and a redundant sync master is configured on the other subsystem.

If the complete system is operated combined, either the sync master or the redundant sync master handles the synchronization of the complete system (depending on the switch-on sequence; for simultaneous switch-on, the sync master).

Example of a redundant sync master

In the following example, simple topology is configured with a redundant sync master. The project contains two SIMOTION D455-2 DP/PNs and one SINAMICS S120 CU320-2 PN. One SIMOTION D455-2 DP/PN is configured as the sync master (PLC_2) and the other as the redundant sync master (PLC_1). On the redundant sync master, the SINAMICS S120 is connected in isochronous mode via PROFINET.

For configuration of the sync master and sync slave, refer to Section Communication configuration SIMOTION controller with SIMOTION drive (Page 130).

To configure a redundant sync master, proceed as follows:

1. Select the PROFINET interface in the network view.
   The interface settings are displayed in the Inspector window.
2. Click "Synchronization" at "Real-time settings".

3. Select the "Redundant sync master" entry.

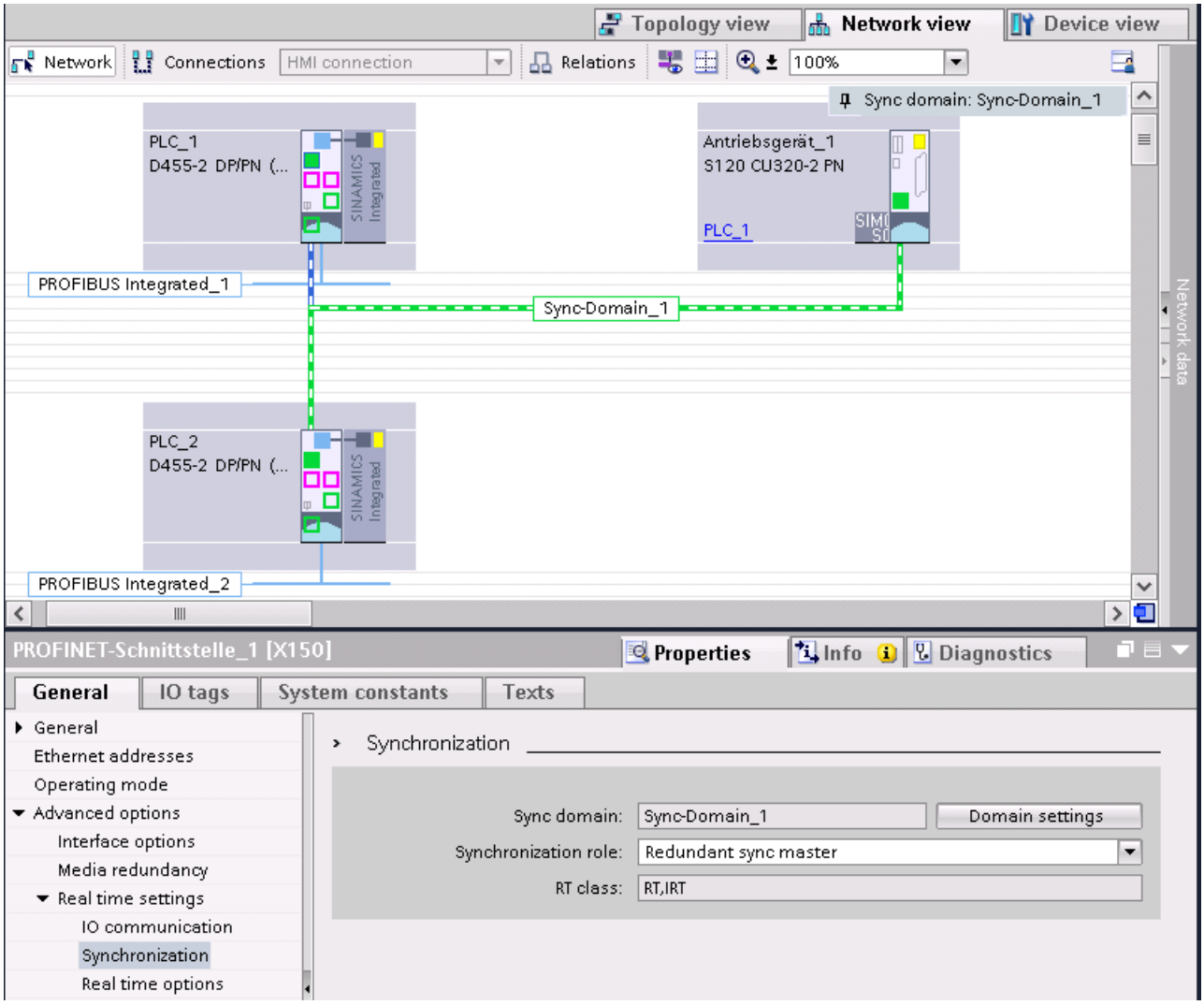


Figure 6-29 Redundant sync master

4. Switch to the topology view.
5. Interconnect the ports of the two SIMOTION controllers.

Note

In the topology view, the redundant sync master should be between the sync master and the sync slaves.

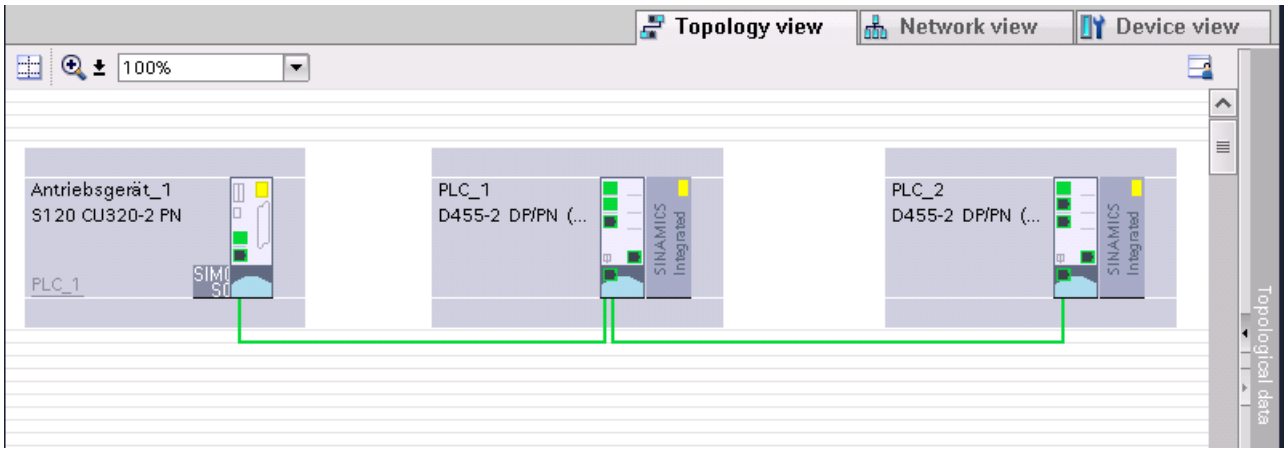


Figure 6-30 Topology view with redundant sync master

6.2.7 Media redundancy (MRP and MRPD)

6.2.7.1 Configuring MRP media redundancy

Configuring MRP (PROFINET RT)

It is possible to establish redundant networks via the so-called Media Redundancy Protocol (MRP). Redundant transmission links (ring topology) ensure that an alternative communication path is made available when a transmission link fails. The PROFINET devices that are part of this redundant network form an MRP domain. The Redundancy Manager coordinates the communication. All other members in the MRP ring are so-called redundancy clients, e.g. SINAMICS S120 drives.

Only devices with MRP-capable ports may be inserted in an MRP ring. In SIMOTION controllers, the ring ports are marked R. In MRP, no IRT communication can be configured, i.e. no PROFINET interface is set to "sync master" or "sync slave".

Additional references

You will find detailed information in the information system of the TIA Portal under the keyword "Media redundancy" and in the "SIMOTION SCOUT Communication" Function Manual.

Requirements

1. Generate a ring via the port interconnections in the topology view. If no rules are violated, a MRP domain is automatically created.
2. Check the media redundancy roles, e.g. who assumes the role of the "Redundancy Manager".
3. Select the device and click "Properties" in the Inspector window and then the "General" tab. You edit the parameters at the "Media redundancy" entry.

Port interconnection ring topology for MRP

In the topology view, you must configure the port interconnection of the manager with the clients to create a ring. In the example, a SCALANCE X-200 IRT as the redundancy manager, a SIMOTION D435-2 DP/PN, and a SINAMICS S120 CU310-2 PN as clients are configured.

1. Open the topology view.
2. Interconnect the individual ports of the devices. The interconnected ports must be ring ports. They are marked with an R.
3. Connect the two end points of the line topology with each other in order to close the ring, e.g. the redundancy manager with a redundancy client.

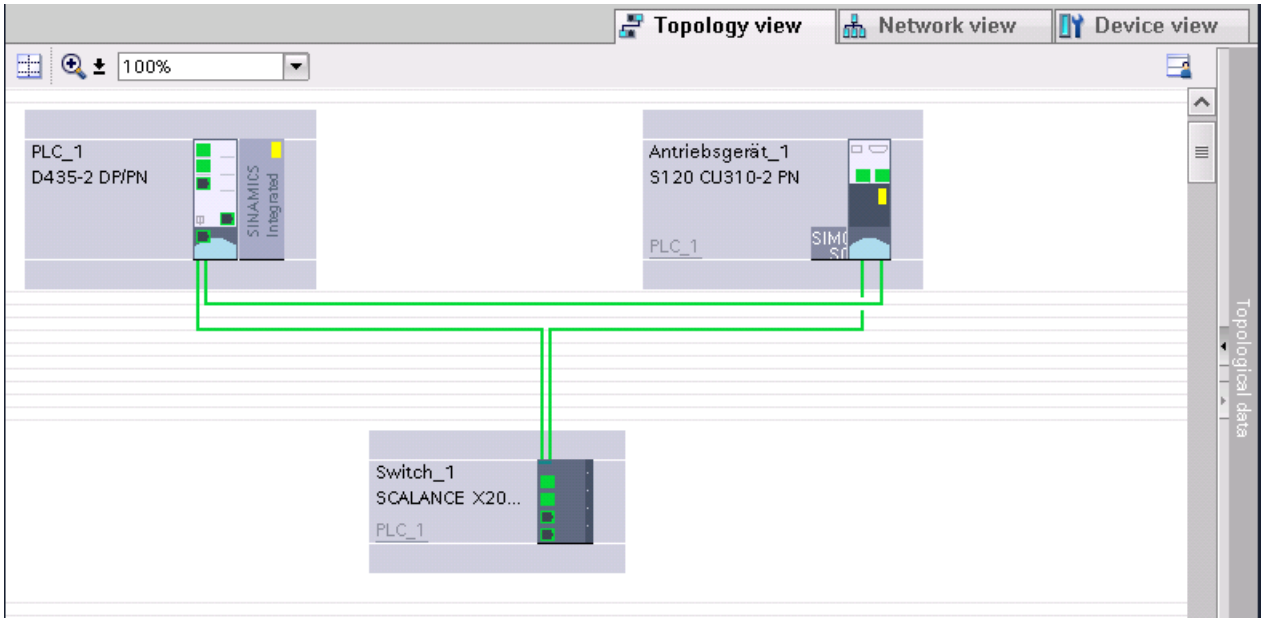


Figure 6-31 Port interconnection of a ring topology

MRP parameters

You can set the following parameters for media redundancy:

Parameter	Description
MRP domain	Shows the MRP domain that is assigned to the device. The assignment is made at Domain Management, see below.
Media redundancy role	Please select here the role the device is to perform in the ring: • Manager (Auto) if the device is to assume the manager role. The device must be able to fulfill this role. • Client if the device is part of the MRP ring. • Not node within the ring if the unit is not to participate in the MRP.
Ring port 1	Displays the interconnection of ring port 1.
Ring port 2	Displays the interconnection of ring port 2.
Diagnostic alarms (in the manager only)	Activate the option if you want to display diagnostic alarms.
Alternative redundancy (in the manager only)	Select this option if the properties of the media redundancy are parameterized by alternative mechanisms or tools.
Domain settings	Click this button to edit the domain settings. Then switch to the "Properties > General" tab of the PROFINET system. There, you can edit the settings for sync domains and MRP domains, see also Configure sync domains and send clock (Page 141).

In the following example, you see the media redundancy settings of a SIMOTION D435-2 DP/PN, which is configured as a client in the ring. The SCALANCE X-200 IRT is configured as a manager and the SINAMICS S120 CU310-2 PN as a further client.

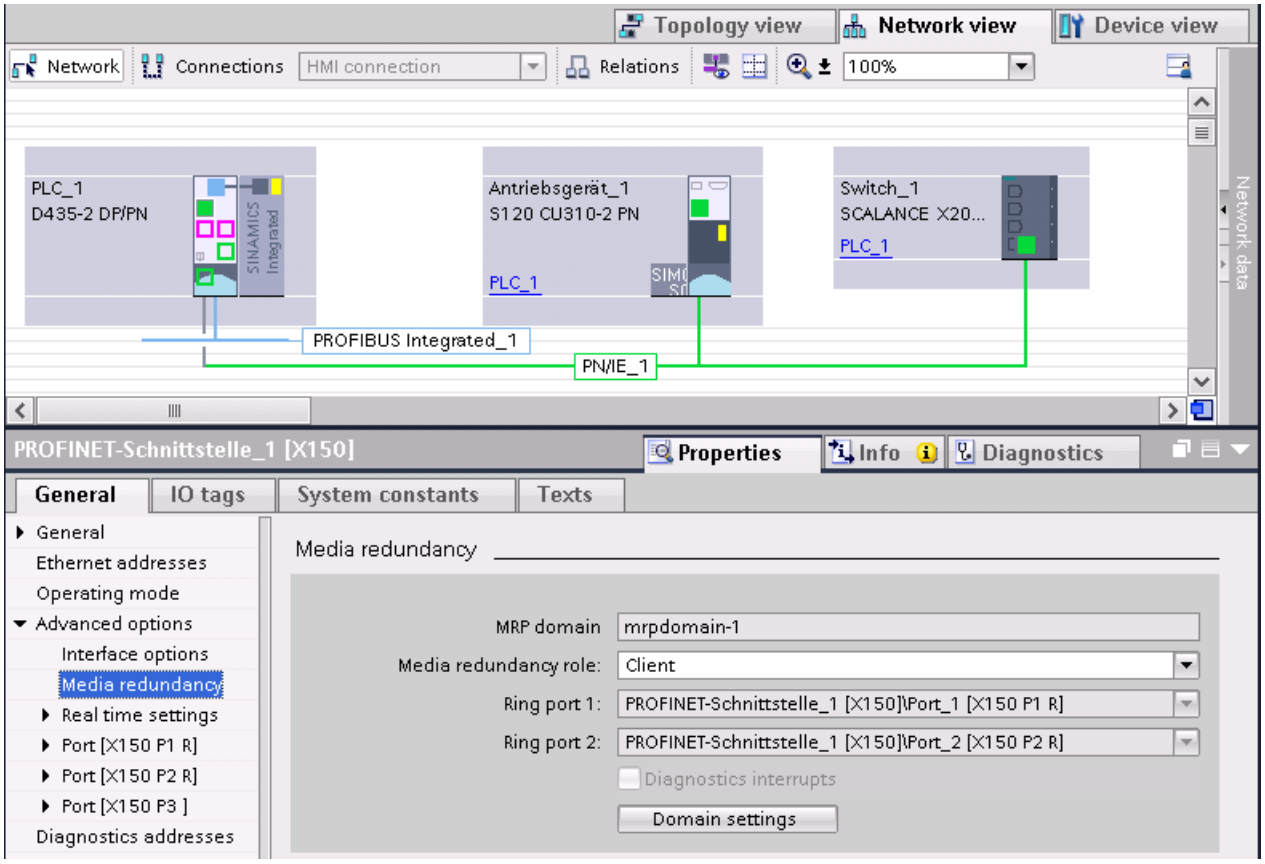


Figure 6-32 Media redundancy settings of a SIMOTION D435-2 DP/PN as redundancy client

6.2.7.2 Configuring the MRP domain

MRP domain

All devices that want to participate in the MRP must be part of an MRP domain. The ring topology can be accessed via the corresponding port interconnection.

Configuring the MRP domains

To configure the nodes of an MRP domain, proceed as follows:

1. Select the PROFINET IO system in the network view.
2. In the Inspector window, select the "General" tab and click the "MRP domain" entry.

The following parameters can be edited:

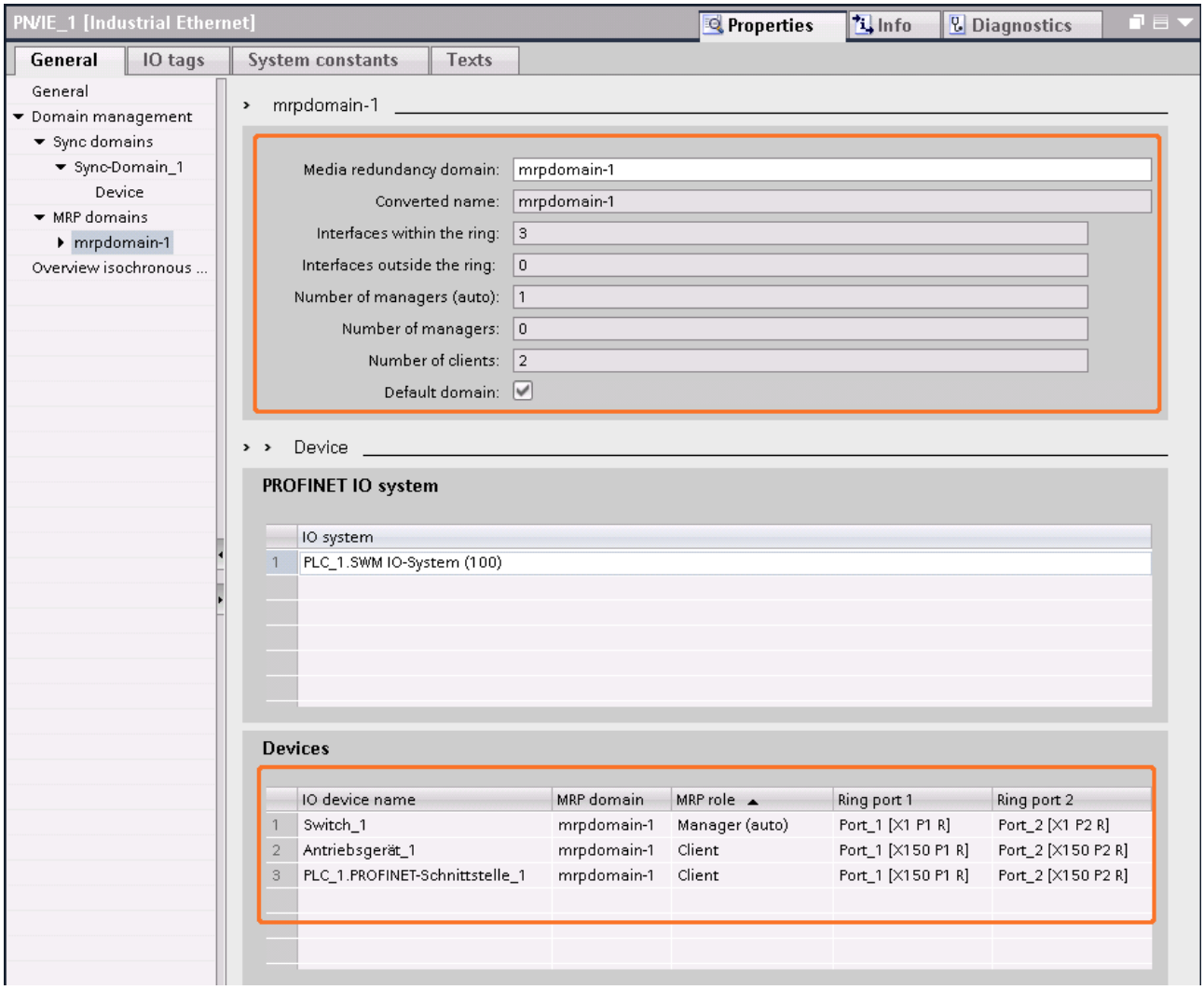


Figure 6-33 Configure MRP domain

Parameter		Description
MRP domains		
	Media redundancy domain	Displays the MRP domain to which the device is assigned.
	Converted name	Displays the converted name of the MRP domain.
	Interfaces within the ring	Displays the number of PROFINET interfaces that are located within the ring.
	Interfaces outside of the ring	Displays the number of PROFINET interfaces that are located outside of the ring.
	Number of managers	Displays the number of Redundancy Managers.
	Number of clients	Displays the number of Redundancy Clients.
	Default domain	Indicates whether the displayed MRP domain is the default domain.
PROFINET IO System		
	IO system	Displays the IO systems that are part of the MRP domain.
Devices		
	IO device name	Lists the device names of the PROFINET IO system nodes.

Parameter		Description
	MRP domain	Drop-down menu to select the MRP domain
	MRP role	Drop-down menu to select the role of the device in the MRP domain: • Not node within the ring • Client; is a redundancy client within the ring • Master; is a redundancy master within the ring
	Ring port 1	Drop-down menu to select the port through which the device is connected to the ring.
	Ring port 2	Drop-down menu to select the second port through which the device is connected to the ring.

6.2.7.3 Configuring MRPD media redundancy for IRT

Configuring MRPD (PROFINET IRT)

MRPD (Media Redundancy for Planned Duplication) is a method for smooth media redundancy with PROFINET IRT. MRPD also requires MRP.

The combination of MRP with MRPD provides bumpless PROFINET operation for short cycle times in the event of a fault in the ring. MRPD is based on IRT and ensures bumpless operation by the transmitter sending the cyclic data in both directions which the recipient then receives twice. The first received telegram is used by the recipient. The second telegram is discarded automatically. If the ring is interrupted at one location (e.g. through the failure of a ring node), receipt of the cyclic data via the problem-free side of the ring is still guaranteed.

Note

Bumpless media redundancy MRPD always requires the activation of MRP in the individual rings.

Requirements for media redundancy with MRPD

- All nodes in the ring must support MRPD.
- IRT must be configured for all components.
- All nodes in the ring must be configured as node.
- Devices not contained in the ring must assume the MRP role "Not node of the ring".

Configure MRPD and redundancy level

MRPD does not need to be activated explicitly. The function is available automatically once all MRPD requirements are satisfied. If MRPD is available, the redundancy level is displayed for each IO device. The redundancy level specifies the extent to which the real-time communication is affected in the event of a network interruption between an IO device and its IO controller.

In the following example, a SCALANCE X-200 IRT as the redundancy manager, a SIMOTION D455-2 DP/PN and a SINAMICS S120 CU320-2 PN as clients are configured. MRPD is set automatically when all nodes satisfy the requirements. For active MRPD, the "Redundancy level" column with the associated value is displayed for the IO devices.

Displaying the redundancy level

1. Select the PROFINET IO system in the topology view.
2. In the Inspector window, select "Properties > General" and open the "Nodes" of the sync domain in the secondary navigation. The redundancy level is displayed in the "IO devices" table.

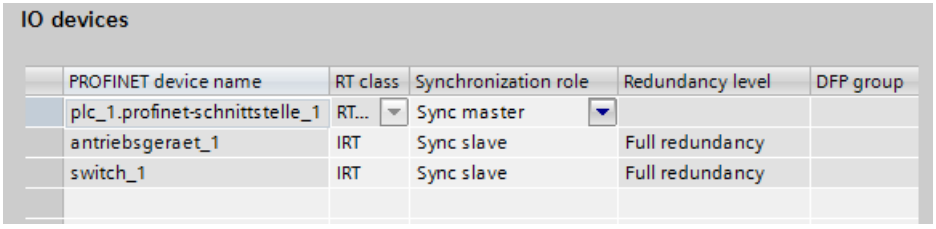


Figure 6-34 Redundancy level for available MRPD in the ring

6.2.8 Series machine projects (modular machine)

6.2.8.1 Series machine projects

Introduction

Series machine projects (basis for modular machine projects) are designed to help you configure and commission flexible automation solutions for series or modular machines.

A hardware configuration comprising an IO controller and any number of connected IO devices represents a "PROFINET IO system master". This master is a "maximum configuration" and a template from which various options can be derived for a variety of series machines with, for example, different design variants of the IO system.

SIMOTION SCOUT TIA provides you with a range of functions that will support you as you configure a master project from which you can derive modular machine instances.

Characteristics

- You can derive different variants (instances) from a project with maximum configuration.
- An IO system can be integrated using simple tools into an existing on-site network.

Functions for series machine projects

- Addresstailoring (reusable IO systems) Adaptation of IP addresses and device names on-site using simple tools.
- Machinetailoring (configuration control for IO systems) Vary the number of on-site IO devices

Additional references for TIA Portal

Additional information and application examples on the subject of Configuration control with SIMATIC S7 (https://support.industry.siemens.com/cs/ww/en/view/29430270) can be found in the Service & Support Portal.

6.2.8.2 Assigning device name and IP address via user program / DCP

Introduction

With the SIMOTION system functions, the IP addresses and the device names of the PN IE interfaces and the PN IO interfaces can be assigned from the user program or the DCP (Discovery and Configuration Protocol). An additional reboot is no longer necessary for the PN interfaces. This mechanism allows the IP addresses and device names to be adjusted without making changes to the project. The IP settings can be changed locally, in particular for series machines.

System functions

New system functions have been introduced as of SIMOTION V4.4 for assigning the IP address and device name.

- _setPnNameOfStation
- _getPnNameOfStation
- _getPnPortNeighbour (only PN IO interfaces)
- _setPnIpConfig
- _getPnIpConfig

Assigning the device name based on the MAC address (V5.2)

As of SIMOTION SCOUT V5.2, the device name can also be assigned based on the MAC address. The PN devices are named with the system function _assignNameOfStationToDevice().

Note

A detailed description of the system functions can be found in the online help of SIMOTION SCOUT TIA, in the *SIMOTION System Functions/Variables Devices* List Manual, and in the *SIMOTION Communication System Manual*.

6.2.8.3 Permit adaption of IP addresses and device names directly on the device

Introduction

The IP address and the device name can be assigned via a user program. The hardware must consider this during the configuration.

Procedure

1. Select in the network view or device view of the hardware and network editor of STEP 7, the PROFINET interface of an IO controller.
2. Navigate in the Inspector window to "Ethernet addresses".
3. Select the "Permit adaptation of the IP address directly on the device" option in the "IP protocol" area.
4. Activate the "Permit adaptation of the PROFINET device name directly on the device" checkbox in the "PROFINET" area.

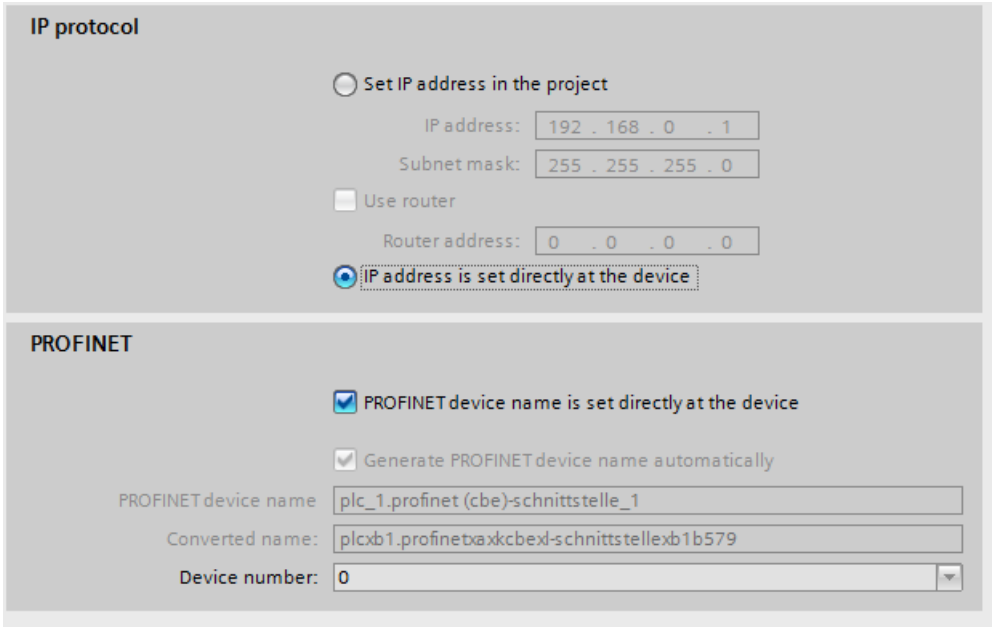


Figure 6-35 Permit assignment of device names and IP addresses differently (e.g. user program)

The IP address and the device name for the commissioning can be assigned via the user program or, for example, also via the PST (Primary Setup Tool) or PRONETA.

6.2.8.4 Permit overwriting the PN device name

Introduction

Previously, a topological naming of an IO device was possible only when the IO device did not have any device name (NameOfStation). To change existing device names of IO devices, they had to be reset. Only then could the devices be renamed by the IO controller. As of SIMOTION V4.5, overwriting a device name can be activated without reset for the hardware configuration. This option, for example, makes it easier for you to replace a device during automatic commissioning.

⚠ CAUTION

Unstable error states during partial commissioning

The activated option can cause the system to reach an unstable error state in the case, for example, of a wiring error, and wiring errors are difficult to diagnose.

After the wiring has been rectified, you must manually delete, for example, the device names of the IO devices to ensure that the names are correctly assigned.

⚠ WARNING

Incorrect PROFINET device names from the configuration due to incorrectly connected devices

Depending on the I/O connected, malfunctions may pose a danger to life or risk of serious injury or property damage if PROFINET device names are entered incorrectly because the device connections are incorrect.

To eliminate any risks, always check when a device is replaced whether the appropriate replacement device is connected and the port interconnection matches the configured set topology!

Principle

With activated "Permit overwriting the PROFINET device name" option, the IO controller (CPU) can overwrite the PROFINET device names of the IO devices in the IO system.

Note

The "Permit overwriting the PROFINET device name" option must be activated for address tailoring and is set automatically when "Reusable IO system" is selected.

Procedure

To change the "Permit overwriting the PROFINET device name" option, proceed as follows:

1. Select in the network view or in the device view the PROFINET interface or the CPU for which the option is to be changed.
2. Select the "Extended options" area, "Interface options" section.
3. Change the option.

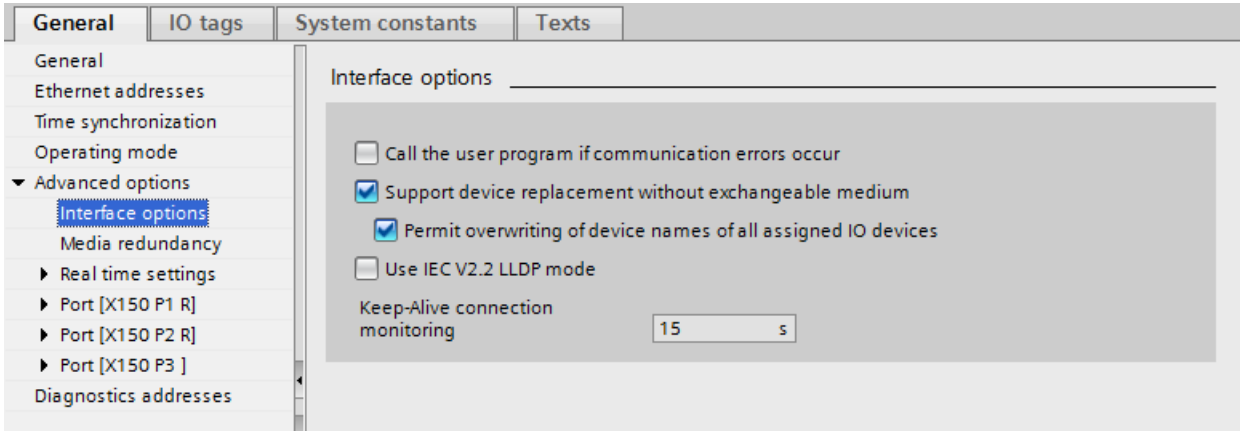


Figure 6-36 Permit overwriting the PROFINET device name

6.2.8.5 Reusable IO systems - Addresstailoring

Introduction

The Addresstailoring function assigns the IP address and NameOfStation for IO controllers and IO devices via system functions at commissioning time. This feature allows a machine consisting of an IO controller and IO devices to be supplied with IP addresses and NameOfStation, and permits multiple instances of the machine to be commissioned on a single physical Ethernet without the engineering system.

There is only one project (configuration and programs). It can be loaded onto machines of the same type without change. To integrate the machine in an existing network infrastructure, only limited customization is required for the on-site commissioning (IP address, NameOfStation). The user program assigns the IP address and the NameOfStation during the first controller startup.

Note

Addresstailoring can be configured only for SIMOTION SCOUT TIA.

Example of an automation solution

The following figure shows how an automation solution with a reusable IO system is loaded into various automation systems and one of these is then adapted on-site to the existing network infrastructure.

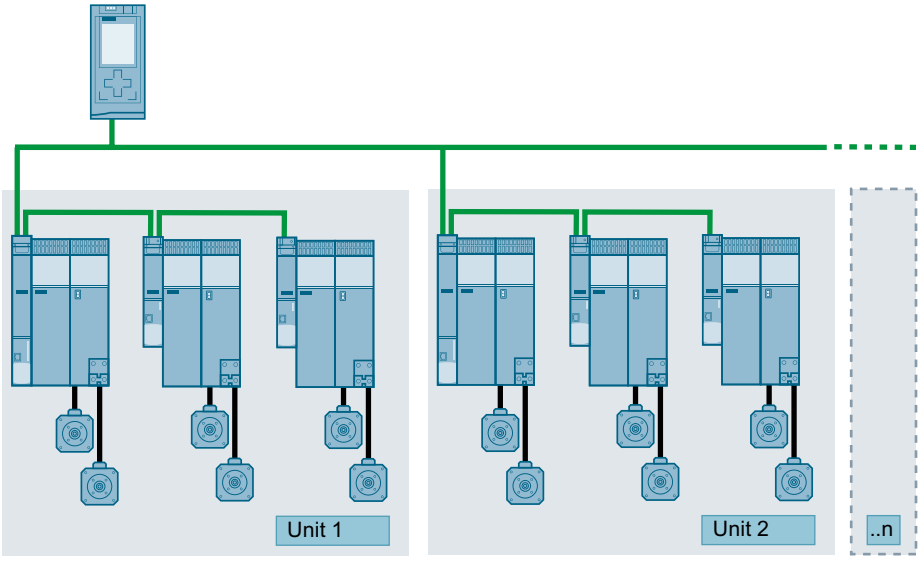


Figure 6-37 Addresstailoring: Series machine with the same units with a different name and IP address

Rules

The following rules apply to a reusable IO system:

- A series machine project consists of an IO controller and the associated IO devices. Consequently, configure only one CPU as IO controller and the associated IO devices in the series machine project.
- No IO device may be configured as shared device.
- If IRT is configured, all IO devices must belong to the same sync domain and the sync domain must not contain any further IO devices.

Alternatively to Addresstailoring via two PN interfaces

In the SIMOTION environment, under some circumstances, rather than using Addresstailoring, the same functionality can also be achieved by using the two PN interfaces. One PN interface is configured as I device and connected with the higher-level controller. The second PN interface is the IO controller for the IO devices. In this case, a second PN interface (e.g. CBE30-2) is required.

In the previously described configuration, the IO devices are located within a local network and so can have the same NameOfStation and IP address in all instances.

Additional references

Further information can be found in the *Basic Functions for Modular Machines Function Manual* and in the *online help for the TIA Portal*.

6.2.8.6 Configuring the project for Addresstailoring

Introduction

The Addresstailoring function ensures that all devices in the physical network are assigned a unique IP address and NameOfStation. This must be configured in the project for the IO controller and for the IO devices.

Procedure

The configuration of a series machine is described in the following using a SIMOTION D CPU as an example.

Configure a series machine project with Addresstailoring as follows

1. Create a project.
2. Configure the SIMOTION CPU as IO controller.
3. Configure the required IO devices (e.g. SINAMICS S120) and assign the IO devices to the PROFINET IO controller.
4. Configure the port interconnections between the devices.
5. Select the IO system so that you can edit the properties in the Inspector window.
6. Activate the "Reusable IO system" checkbox in the "General" area of the inspector window.

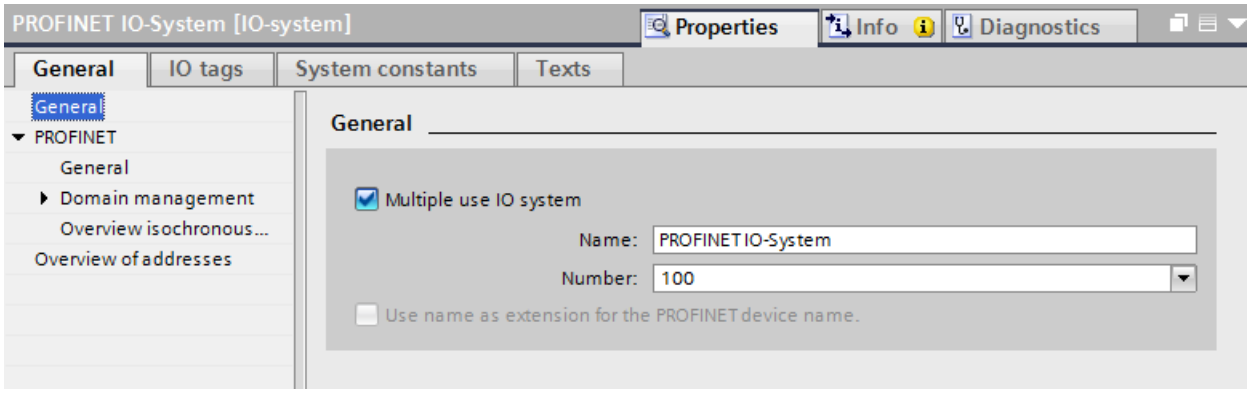


Figure 6-38 Configuring a reusable IO system (Addresstailoring)

Result in the TIA Portal

The following settings are made automatically through the configuration in the TIA Portal.

- The device name of the IO controller (CPU) in the series machine project is set to "Permit adaptation of the PROFINET device name directly on the device". At first, the IO controller (CPU) does not have a PROFINET device name.
- The IP protocol of the IO controller (CPU) is set to "Permit adaptation of the IP address directly on the device". At first, the CPU does not have an IP address.
- The "Enable device replacement without exchangeable medium" option is activated automatically. This option enables an automatic commissioning. A commissioning engineer does not have to assign device names on site to the IO devices. Based on the target topology and other settings, the IO controller assigns the device name and the IP address to the IO devices during startup.
- The device name of the IO devices is set to "Automatically generate PROFINET device name" (from the configured name of the IO device).
- The IP protocol for the IO devices is set to "Permit adaptation of the IP address by the IO controller". At first, the IO devices do not have an IP address. If an IO device is not a typical distributed I/O system (e.g. ET 200 system), but rather another device, e.g. an HMI device, then change the option to "Permit adaptation of the IP address directly on the device", see below.
- The device numbers for the IO devices are assigned automatically and used locally to make the IP address unique.

In order that the IO controller can adapt the device names later at the operator, the "Permit overwriting of the PROFINET device name" option must be activated (CPU parameters, property of the PROFINET interface, Ethernet addresses area). This option is deactivated per default.

Local commissioning

During the plant startup, the IP address and the NameOfStation are assigned to the IO devices. IP address and name are generated according to the following rules:

- IP address: Sum of the IP address of the IO controller and the station number of the IO device
- NameOfStation: <Configured name of the IO device from the series machine project>.<Name of the associated IO controller set on the device>

Diagnostics

If an error occurs during startup, e.g. incorrect IP address or NameOfStation is too long, an error message is entered in the diagnostic buffer.

6.2.8.7 Configuration control for IO systems - Machinetailoring

Introduction

The configuration control for IO systems (Machinetailoring) allows several specific instances or configurations of the series machine to be generated from a single series machine project. The configuration of an IO system can vary flexibly for a specific application provided the real configuration can be derived from the configured configuration. The configured configuration (series machine project) so forms the superset of all derivable real configurations.

You can activate or deactivate a PROFINET IO system (IO devices, I devices) in a specific system. Different variants can be operated from a configured maximum configuration of an IO system. You prepare for a series machine project a modular system consisting of IO devices that can be adapted flexibly for the wide range of configurations via the configuration control.

Machinetailoring allows the following customizations to be made on-site (without engineering system):

- Variation of the number of associated modules (IO devices). This is also possible with restrictions with IRT (IRT node as leaf for the IRT node part in a line).

Note

Machinetailoring can be configured only for SIMOTION SCOUT TIA.

PROFINET IRT

Machinetailoring is possible for PROFINET IRT only when minor adaptations need to be made to the IRT devices of the master machine. Minor adaptation means that IRT IO devices are only bridged or individual branches and leaves are removed.

Example of an automation solution

The following figure shows an example from a series machine project how an instance can be created with a different number of IO devices. The IO devices in the middle and at the end can be optional.

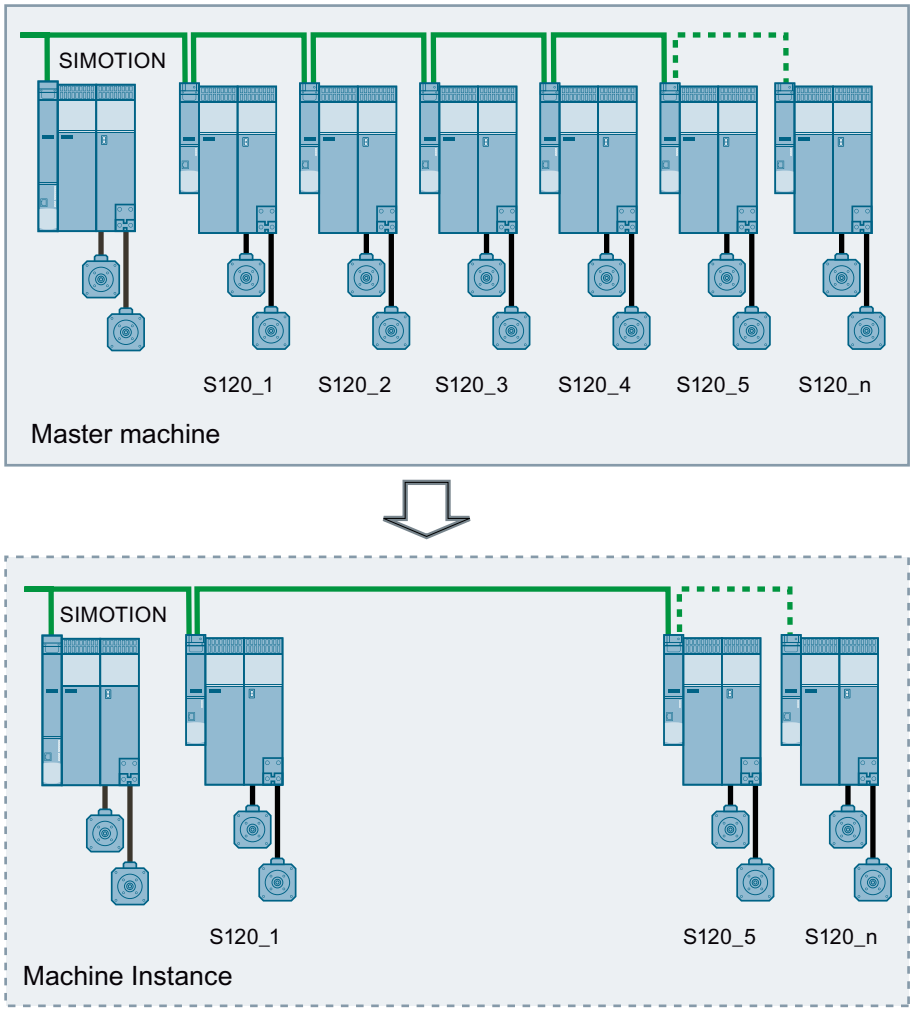


Figure 6-39 Instance of the machine with a different number of IO devices

Restrictions

- The number of optional IO devices in series is limited.
- The data exchange between IO controllers (controller-controller slave-to-slave communication) is possible only from the user program.
- Because it cannot be guaranteed that the optional IO devices actually exist in the machine instance, data exchange between IO devices is not meaningful.

Additional references

Further information can be found in the *Basic Functions for Modular Machines Function Manual* and in the *online help for the TIA Portal*.

6.2.8.8 Configuring with optional IO devices

Principle

In the project, configure the maximum configuration of the series machines. The supplied machines contain all or individual IO devices of the maximum configuration. The user program transfers a parameterized data set for configuring the supplied machines. After the reconfiguration, the optional IO devices are activated.

Requirement

You must observe the following for the configuration of the optional IO devices:

IO controller

- No special settings need to be made on the IO controller.
- The IO controller must be assigned a subnet.

IO devices

- The deployed interface modules have a PROFINET interface.
- The distributed peripheral stations are assigned the same subnet as the IO controller.
- The topology of the IO devices is defined.

Configuring the optional IO devices

For the configuration, settings must be made on the IO devices that should be optional.

1. Open the "Devices & networks" overview.
2. Double-click the IO device in the project navigator. The selected IO device is displayed in the device view.
3. Click the PROFINET interface of the IO device. Open the "Advanced options".
4. Activate the "Optional IO device" checkbox for "Interface options" in the Inspector window.
5. Repeat the steps for all optional IO devices.

SIMOTION controller as intelligent IO device (I device) on a higher-level IO controller

If you operate a SIMOTION controller as I device together with optional IO devices, you must take the following into account during the configuration of the SIMOTION I device. The parameterization for the PN interface of the SIMOTION I device must be performed as for a "normal" IO device by the higher-level controller.

Note

Parameterization by the higher-level controller

In order that the "Optional IO device" function can be activated, all IO devices and I devices in the PROFINET IO system must be parameterized by the higher-level IO controller, irrespective of whether they are used optionally. This means that "Parameter assignment of PN interface by higher-level PN controller" must be configured for all I devices.

To configure the SIMOTION I device:

1. Activate the following options for the operating mode of the I device.
   - IO device
   - Operate isochronously
   - Parameterization of the PN interface higher-level PN controller
2. Save and compile the hardware.
3. Export the SIMOTION I device.
4. You can now connect the SIMOTION I device as intelligent IO device to the higher-level controller.

SIMOTION variant management function block

The IO devices to be activated are specified with a data set. A function block transfers this to the IO controller, which activates the IO devices accordingly. The function block and the associated documentation (SIMOTION variant management) with the detailed procedure are available as download in the Service & Support Portal (https://support.industry.siemens.com/cs/ww/en/view/109747768).

6.2.9 Performance upgrade - low send cycle clocks

6.2.9.1 Optimized data transfer / 125 µs PROFINET send clock

PROFINET V2.3 Performance Upgrade

All SIMOTION Control Units support PROFINET in accordance with the PROFINET International specification PN V2.3. The optional **Performance Upgrade** functionality that provides extended functional scope is available for SIMOTION D455-2 DP/PN.

- Minimum PROFINET send cycle clock 125 µs (Fast Send Clock)
- Optimization of data transfer (e.g. by Dynamic Frame Packing - DFP (Page 186))
- Fast forwarding
- Fragmentation

Note

Validity

The PROFINET Performance Upgrade (Fast Send Clock 125 µs and Dynamics Frame Packing) is only approved for SIMOTION SCOUT TIA.

Note

You will find further information on this on the web site of the PI Organization (http://www.profibus.com) and the following technical specifications:

- Technical Specification for PROFINET, Version 2.3 – Date: October 2010, Order No.: 2.722
- Application Layer services for distributed I/O and distributed automation, Technical Specification for PROFINET, Version 2.3 – Date: October 2010, Order No.: 2.712

With optimized data transfer, the following options are possible:

- More devices can be operated with the same cycle time.
- The cycle time can be reduced for the same number of devices.

Requirements

General conditions for using the 125 µs send cycle:

- The 125 µs send cycle is supported only by the onboard PROFINET interface X150 in conjunction with Servo_fast / IPO_fast.
- Only one port can be used on X150; the other two ports must therefore be deactivated in the interface properties of X150 (the ports cannot be used for TCP/IP or UDP communication either).
- X150 can only be used as a PROFINET IO controller (not as an I-Device).

- No MRP/MRPD media redundancy (only one port is available on X150).
- Use of STEP 7 V14, V14; for other operating conditions, see also *Readme* for SIMOTION SCOUT V4.5.

Note

Quantity structures in the case of very short send cycles

When very short send cycles (125 µs, 250 µs) are used in a configuration with a large number of PROFINET devices, SIMOTION will be operating close to its upper performance limits. It is not possible to reliably predict all the restrictions applicable to the configuring of such systems. Only during runtime will it be possible to identify overload situations. Overload conditions will be indicated by appropriate messages (cycle violation, inconsistent data transmission). When you are using these very short cycle times, you should therefore restrict the number of devices to the absolute minimum necessary.

Components that can be used

The 125 µs send cycle is only supported by selected PROFINET nodes (e.g. by the ET 200SP I/O system). No SCALANCE switches are currently available for the 125 µs send cycle.

- SIMOTION D455-2 DP/PN as of V4.5

Note

For the PROFINET nodes that support a send cycle of 125 µs and the general conditions that have to be met, see the relevant product documentation.

6.2.9.2 Dynamic Frame Packing - DFP

Description

For PROFINET V2.2, a separate Ethernet frame is used for each IO device for the cyclic transfer of the IO data. This leads to a large overhead due to the Ethernet header, especially in the case of IO devices with a small amount of IO data.

With the PN V2.3 Performance Upgrade, SIMOTION D455-2 DP/PN supports Dynamic Frame Packing (DFP) via the onboard PROFINET interface X150. With Dynamic Frame Packing, the cyclic data of multiple IO devices is summarized in one Ethernet frame. DFP significantly reduces the bandwidth required to exchange the cyclic data, especially in the case of IO devices with a small amount of IO data. This makes it possible to either operate more IO devices with the same cycle time or to reduce the cycle time in order to achieve a shorter response time.

In the outbound direction (from the IO controller to the last IO device), the Ethernet frame is automatically reduced. This is achieved by having each device remove its own data from the telegram when forwarding. In the inbound direction (from the last IO device to the IO controller), each IO device adds its own data to the Ethernet frame.

Dynamic Frame Packing is used automatically when send cycles < 250 µs are set and the requirements (see "Requirements" section) are met.

The figure below shows examples of how package groups can be formed. The IO devices (IO-D) with red backgrounds are automatically grouped into package groups.

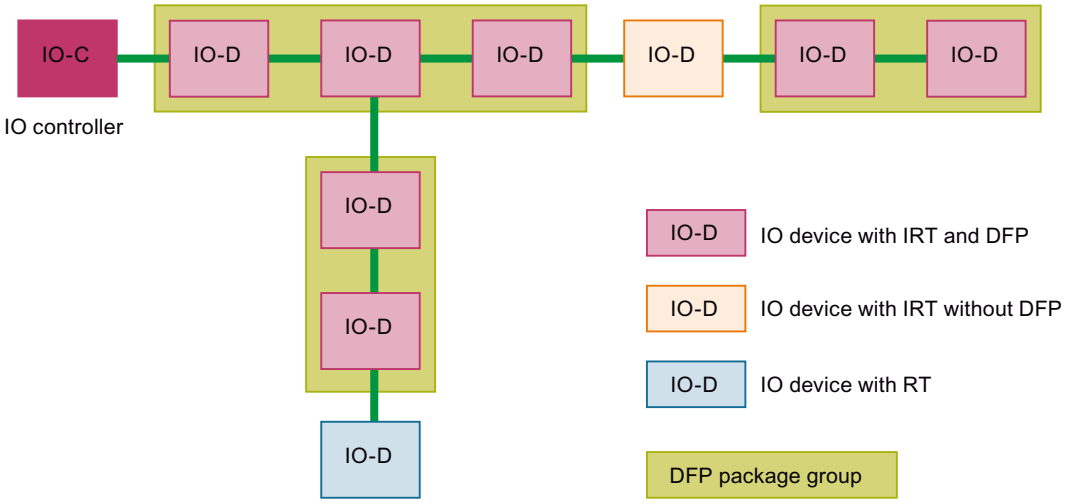


Figure 6-40 Example of DFP package group formation

Requirements

DFP can only be used with the following restrictions:

- DFP can be used only on the onboard PROFINET interface X150 of the SIMOTION D455-2 DP/PN and on the ET200SP High Speed IO-Devices.
- DFP is supported by SIMOTION only as an IO controller. The SIMOTION I-Device does not support DFP.
- A DFP device can be used as a shared device by a second IO controller. Whereby the shared device restrictions apply. One IO controller communicates with DFP via IRT; the other via RT.
- In the case of MRPD, the DFP devices must be present in a spur line. IO devices in the ring are not supported.
- IO devices that do not support DFP terminate a package group; i.e. the grouped IO devices must form a line with no gaps.
- A maximum of 63 IO devices can be packed in one group.
- The size of a package frame is limited to 128 bytes in the outbound direction and 256 bytes in the inbound direction.

6.2.9.3 Configuring IRT with Performance Upgrade

Introduction

To use PN V2.3 Performance Upgrade on the SIMOTION CPU with SIMOTION SCOUT TIA, you must activate this option on the sync domain.

Activating High Performance and increasing the bandwidth

To use send cycles < 250 µs and other Performance Upgrade functions, proceed as follows:

1. Deactivate all ports (except for port 1) of the SIMOTION D455-2 DP/PN.
2. Select the PROFINET IO system in the network view.
3. In the Inspector window, select the "Properties > General" tab.
4. Select "Domain-Management" in the navigation and then the appropriate sync domain.
5. Select the send cycle 0.125 ms.
6. Activate "Permit High Performance" and "Fast Forwarding" optionally.

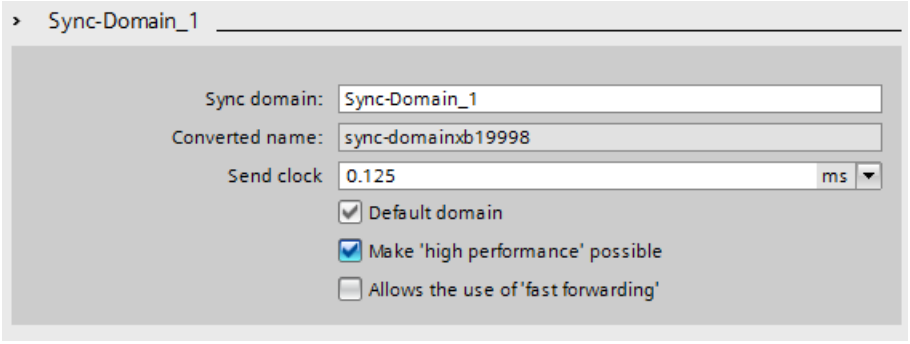


Figure 6-41 Activating High Performance for SIMOTION

7. Click "Details" in the navigation below the sync domain.
8. Select "Maximum 90% cyclical IO data..." for the bandwidth use.

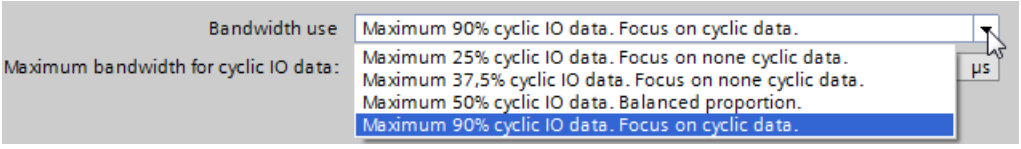


Figure 6-42 Increasing the bandwidth for cyclical IO data

6.3 Using PROFIsafe

6.3.1 PROFIsafe for SIMOTION

Description

The drive-based safety functions in the drive can be controlled either by using safe terminals directly on the drive or from a fail-safe control (F control) via PROFIBUS/PROFINET.

The control signals for the drive-based safety functions, as well as the feedback relating to the safety function status, are safety-oriented and must be transferred via a communication channel that is secured by means of the PROFIsafe protocol.

Mechanisms with PROFIsafe

Basically, the PROFIsafe communication can be performed via PROFINET and also via PROFIBUS. The following mechanisms are available for PROFINET and PROFIBUS:

- PROFINET I device F-proxy
  - I device directly on the F-host (a project for F-CPU and SIMOTION CPU)
  - I device as GSDML file coupled to F-host (two projects)
  - Shared I device (like I device as GSDML file, the I device is also "shared")
- PROFINET Shared Device
- PROFIBUS slave-to-slave communication
  - I slave to slave

For all the mechanisms, the fail-safe data is managed by the F-CPU and the motion control data by the SIMOTION controller. The required properties of the PROFIsafe communication are set in the F-parameters during the hardware configuration.

Note

Mixed operation in a PROFIsafe configuration is **not** possible with **one** Control Unit. If, for example, in the case of a SINAMICS drive, the safety configuration for one axis is carried out via F-Proxy and those of the other axes are configured via Shared Device, this configuration will be rejected with a consistency error during compilation. The F-Proxy variants are recommended for the PROFIsafe configuration.

Supported number of F-Proxy submodules

A maximum of 128 I device submodules are supported. Of these, up to 64 submodules can be used for Safety by default. The other 64 submodules are available for standard IOs. The maximum number of 64 F-Proxy submodules can be configured **independently** of the PROFIsafe telegram for all SIMOTION CPUs.

Up to 128 F-Proxy submodules supported (as of SIMOTION V4.5)

As of firmware version 4.5, a maximum of 128 F-Proxy submodules, and thus a maximum of 128 safety axes, can be configured for the SIMOTION D455-2. The maximum number of F-Proxy submodules **depends** on the configured PROFIsafe telegram.

In the following tables, the input/output data, as well as the maximum number of F-Proxy submodules, are shown depending on the PROFIsafe telegram and the SIMOTION CPU.

SINAMICS PROFIsafe telegrams

PROFIsafe telegram	F-Proxy submodules SIMOTION D455-2	F-Proxy submodules SIMOTION CPU (other)	Single telegram Input	Single telegram Output	Single telegram Total
30	128	64	6	6	12
31	128	64	8	8	16

PROFIsafe telegram	F-Proxy submodules SIMOTION D455-2	F-Proxy submodules SIMOTION CPU (other)	Single telegram Input	Single telegram Output	Single telegram Total
901	89	64	14	10	24
902	79	64	16	10	26
903	89	64	14	10	24

Configuring more than 64 F-Proxy submodules

The following must be taken into account when configuring more than 64 F-Proxy submodules:

- A SIMOTION I device supports a maximum of 128 subslots. If, for example, 128 subslots are assigned to F-Proxy axes, no further user data can be configured on the I device interface (see table above).
- A SIMOTION I device supports a maximum of 1440 bytes of user data (including IOPS/CS user data qualifier). Depending on the selected safety telegram and the number of F-Proxy axes, only limited (or no) space is available for user data in the I device.

6.3.2 F proxy with SIMOTION

F-Proxy description

SIMOTION features integrated F-Proxy functionality for the purpose of PROFIsafe connection of drives that are controlled by SIMOTION but are in a different communication domain than the F-CPU, for example. The F-Proxy functionality enables transparent routing of safety telegrams from the SIMOTION I-Device interface to the respective SIMOTION controller interface on which the drive is configured. Despite the SIMOTION routing function, PROFIsafe communication between the F-CPU and drive is secure, as the PROFIsafe drivers at the end points (F-CPU, drive) securely monitor communication.

In order to use F-Proxy functionality, the two paths of communication - from the F-CPU to SIMOTION and from SIMOTION to the drive - need to be configured separately.

The following drive connections can be used on the SIMOTION controller for the F-Proxy:

- Drive on SINAMICS_Integrated (SIMOTION D)
- Drive on PROFIBUS DP
- Drive on PROFINET IO Onboard PN interface
- Drive on PROFINET IO CBE30-2 PN interface

Properties of the I-Device F-Proxy

- The F-Proxy submodules on the SIMOTION controller are RT and can be operated non-isochronously.
- The PROFIsafe standard telegrams 30 and 31 and the PROFIsafe SIEMENS telegrams 901, 902 and 903 are supported.

Additional references

Detailed information about the F-Proxy can also be found in the *SIMOTION Communication* Function Manual.

Note

Connection between SIMOTION and F-CPU only via PROFINET IO

With the TIA Portal, you can interconnect F-Proxy slots between the SIMOTION controllers and the F-CPU only via PROFINET IO. A so-called PROFIBUS I slave F-Proxy is not supported.

Basic procedure for an F-Proxy configuration

The F-Proxy configuration is performed in the TIA Portal and in SIMOTION SCOUT TIA:

- Creating the device (F-CPU, SIMOTION controller, drives) in the TIA Portal
- Networking the devices and creating the topology in the TIA Portal
- Creating and configuring the drives, axes, and configuration of PROFIsafe in the drive in SIMOTION SCOUT TIA
- Changing the operating mode of the PN interface of the SIMOTION controller to IO device (I-Device) in the TIA Portal
- Interconnecting the F-CPU with the drive units via the PN interface that functions as I-Device in the TIA Portal

A configuration example (Page 192) is described in detail in the next section.

F-Proxy settings on the SIMOTION controller

If you want to run a SIMOTION controller as F-Proxy, you must perform the following steps:

1. Change the operating mode for the SIMOTION device to IO device and select whether the F-CPU is in the same or in another project.
2. In the Inspector window below "General", select the "F-Proxy" entry.
3. Configure the interconnections of the F-Proxy.

See also

Direct data exchange via PROFIBUS DP (Page 235)

Direct data exchange (Page 162)

Checking project-wide PROFIsafe addresses (Page 203)

6.3.3 Configuration example for I device F-Proxy

Introduction

This section describes a configuration example for an I-Device F-Proxy. The configuration is largely identical for all drives at the SIMOTION controller. The difference is essentially whether the F-CPU is in the same or in another project. As an example, the configuration is shown in the same project.

Controllers and drives used

- SIMOTION D455-2 DP/PN (Motion Control) [PLC_1]
- SINAMICS S120 CU320-2 PN
- SIMATIC S7-300 CPU317F-2 PN/DP (F-CPU) [PLC_2]

Requirement

- Project created in the TIA Portal.
- Controllers and drives inserted.
- PROFINET IO system configured with SIMOTION D455-2 DP/PN and SINAMICS S120 CU320-2 PN.
- Ports are interconnected.
- Drive and the axis are configured in SIMOTION SCOUT TIA.

Also note Section Brief introduction to SIMOTION control and SINAMICS drive via PROFINET IO (Page 130).

Configuring PROFIsafe in SIMOTION SCOUT TIA

1. In the project navigator in SIMOTION SCOUT TIA below the drive, click "Functions > Safety Integrated".
   The window for safety configuration opens in the working area.
2. Select a PROFIsafe function such as "Extended functions via PROFIsafe".
   You can view the "PROFIsafe address" in the window "Configuration PROFIsafe". 0001H is used in this example.

   Note

   The PROFIsafe address for the safety configuration is the F-destination address for the later configuration of the F-Proxy. These **must** be identical. You enter the F-destination address in the interconnection table when interconnecting the F-Proxy.

   The F-destination address must be configured at three places and must be identical:

   - in the drive (PROFIsafe-address)
     As of V5.2, you can apply in the drive the PROFIsafe address (F-destination address) configured in the TIA Portal.
   - at the F-Proxy interconnection
   - at the exported I-Device if the F-CPU is in another project

   Observe the procedure for checking PROFIsafe addresses in the project in section Checking project-wide PROFIsafe addresses (Page 203).
3. Activate Safety Integrated for the axis. Double-click "Configuration" below the axis in the project navigator. The window opens in the working area.
4. In the "Functions" field, click the "Change..." button and select the "Standard (support of the entire safety functionality via DSDB)" option in the "SINAMICS Safety Integrated" tab.
5. After configuration, you have to select the PROFIsafe telegram. In the SIMOTION SCOUT TIA project navigator, below the drive unit double-click "<Drive unit_xx"> - Communication > Telegram configuration".
   The telegram configuration is opened in the working area.
6. Mark the appropriate drive in the tab "IF1: PROFIdrive PZD telegram" in the telegram overview, and in the bottom part of the window at "Adapt telegram configuration", select the entry "Add PROFIsafe".
   The PROFIsafe telegram is inserted. Dependent on the drive, you can select from several telegrams. The PROFIsafe standard telegram 30 is inserted by standard. You can change this.



Figure 6-43 Adding the PROFIsafe telegram on the drive

7. Save and compile the project.

8. Click "Set up address" to run an address alignment between SIMOTION SCOUT TIA and TIA Portal. A successful alignment is indicated with a blue checkmark. For the drive, telegrams are indicated with red checkmarks, since during the alignment the process data was extended due to the automatic telegram extension. This is for information purposes only. Configuration in SIMOTION SCOUT TIA is completed by saving.

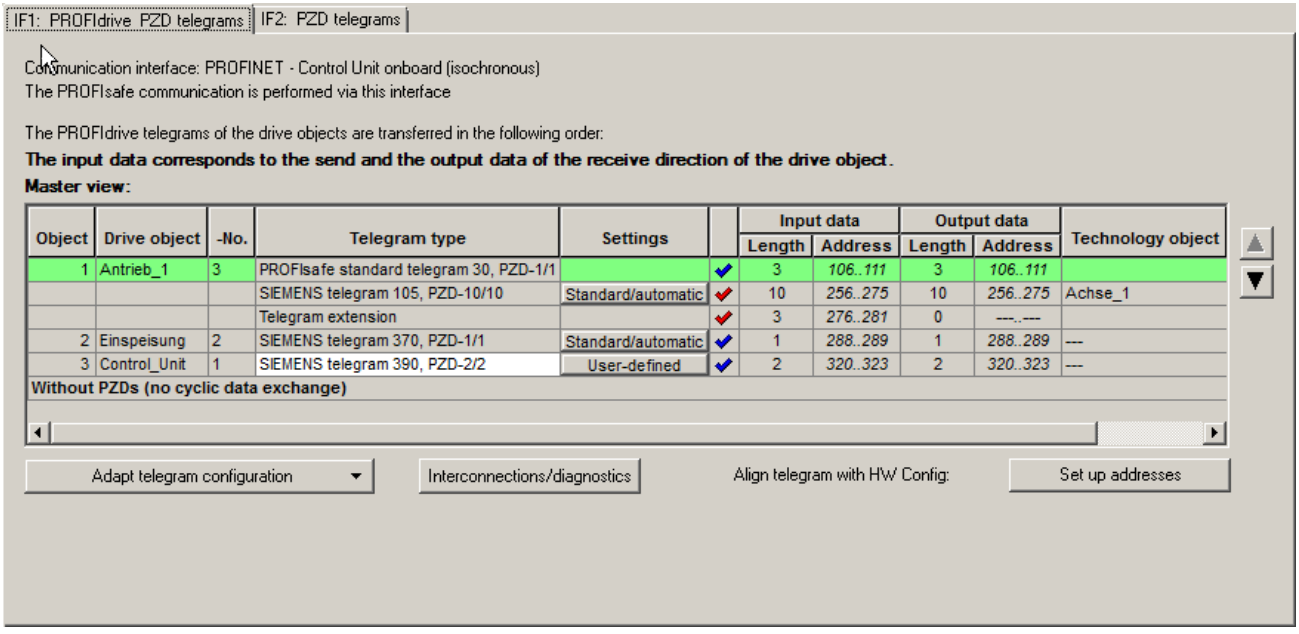


Figure 6-44 Telegram configuration for drive with PROFIsafe

9. Switch to the TIA Portal and create the I-Device.

Creating an I-Device in the TIA Portal

1. In the network view, select the SIMOTION controller and the interface via which the I-Device is to be operated. In the example, X150.
2. In the Inspector window, select "Properties > General" and click "Operating mode".
3. Activate the "IO device" option.

4. Assign the controller to which the I-Device is to be assigned at "Assigned IO controller". In this case, the F-CPU. A subnet is automatically inserted between the F-CPU and the SIMOTION controller.

   Note

   From that point on, the configuration is different if the F-CPU is in another project. "Not assigned" is selected as IO controller and the transfer area is defined and the F-Proxy is configured. A GSD file of the I-Device is then created.

5. Define the transfer area.
   You configure the F-Proxy in the next step.

   Note

   Transfer areas

   In the transfer area, the automatically created fail-safe I/O transfer areas are **not** displayed.

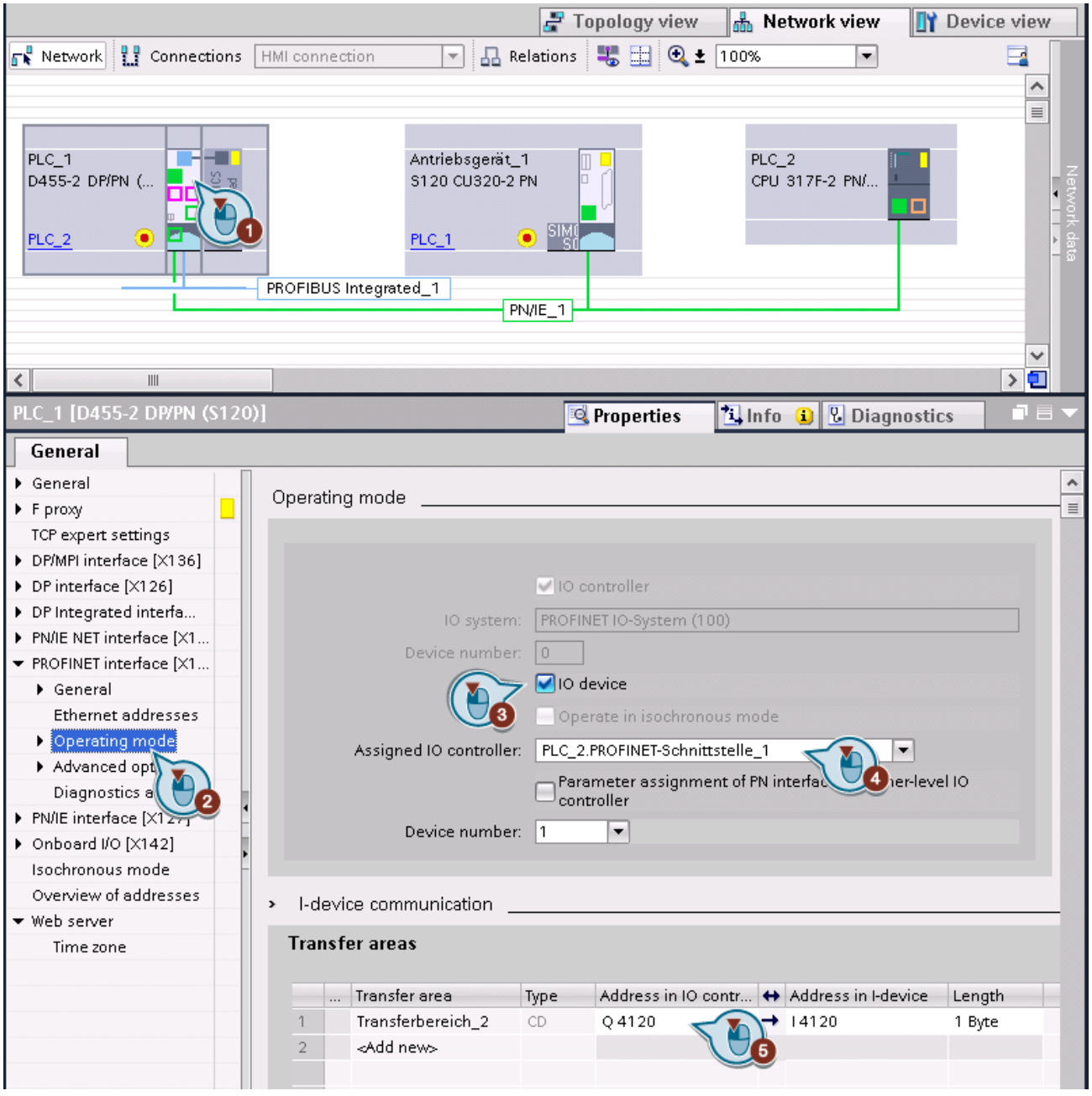


Figure 6-45 Creating an I-Device for I-Device F-Proxy

Configuring F-Proxy in the TIA Portal

1. Click the SIMOTION controller in the network view.
2. Click "F-Proxy" on the "General" tab. The F-Proxy interconnection is opened.
3. In the column "F-CPU", select the IO controller for PROFIsafe monitoring. All controllers in the project are displayed. Choose "PLC_2.PROFINET_Interface_1" in the example.

4. If the F-CPU is already interconnected with the SIMOTION controller, the PN interface used is automatically entered into the column "F-Proxy interface". If there is no interconnection yet, you can select the PN interface of the SIMOTION controller here.
5. An address is specified in the "F-destination address" column. This address must be identical with the PROFIsafe address of the drive in SIMOTION SCOUT TIA. Check if these addresses are identical and change them. Address 0001H is used in this example. Click the field to change the address. This will finish the configuration.
   More information about the interconnection table can be found in Section Editing F-Proxy settings (Page 199).

Note

The F-destination address must be assigned for each drive. If you have configured further drives at the SIMOTION controller, they are shown in the table and are configured identically. You must also enter the specific F-destination addresses of the safety configuration here for each drive.

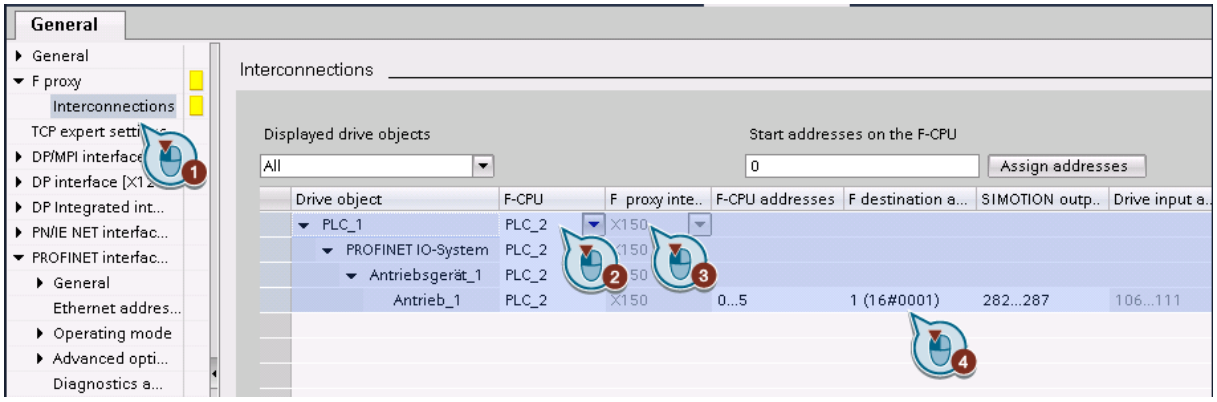


Figure 6-46 Configuring interconnections for F-Proxy

F-CPU in another project

If the F-CPU exists in another project, you must pay attention to some points.

1. When configuring the I-Device, select the entry "Not assigned" at "Assigned IO controller" and then configure the I-Device as described above.
2. Configure the interconnection of the F-Proxy. For the F-CPU, select "F-CPU in another project" and then configure the further parameters of the F-Proxy as described above.

3. Change back to the "Operating Mode" window. Now export the I-Device as device description file (GSD). The procedure is described in Section Configuring an I-Device (Page 155).

Note

Configuring an F-Proxy prior to the I-Device export

Before you create the I-Device, you must have finished the F-Proxy interconnections. If changes are made to the F-Proxy interconnection (e.g. other F-destination addresses), you must export the I-Device again.

4. You may insert the installed I-Device with a drag-and-drop operation into the other project with the F-CPU and connect it to the subnet of the F-CPU.

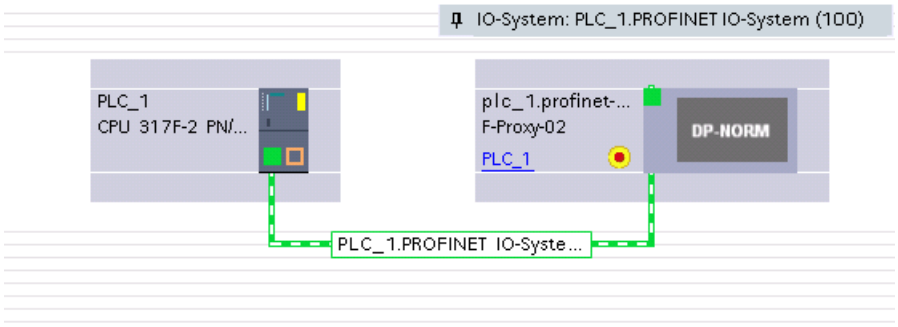


Figure 6-47 F-CPU in another project with I-Device F-Proxy on the subnet

6.3.4 Automatic transfer of the F-destination addresses

Accept F-destination address (V5.2 and higher)

All axes are configured and commissioned during initial commissioning of a machine. Next the PROFIsafe telegrams are added in the telegram configuration of SIMOTION SCOUT or Starter. As soon as the telegram is used for the F-Proxy it can no longer be changed. The logical address is specified during "Save and compile" with symbolic assignment.

After the slot for the PROFIsafe telegram has been accepted in HW Config, the PROFIsafe telegram also receives its F-destination address. Up to V5.2, this address had to be entered manually for all drives with PROFIsafe while commissioning Safety Integrated. To avoid incorrect entries, the "Accept F-destination address" button is available during Safety commissioning as of V5.2 and higher.

F-destination address during Safety Integrated commissioning

You apply the F-destination address for PROFIsafe during drive commissioning.

1. In the SIMOTION SCOUT project navigator, click on "Functions > Safety Integrated" below the drive. The Safety configuration window opens in the work area. PROFIsafe is configured as Safety function.
2. Click the "PROFIsafe configuration" button.
3. You can view the "F_Dest_add" in the "PROFIsafe configuration" window.

4. Click "<" to accept the F-destination address as PROFIsafe address.

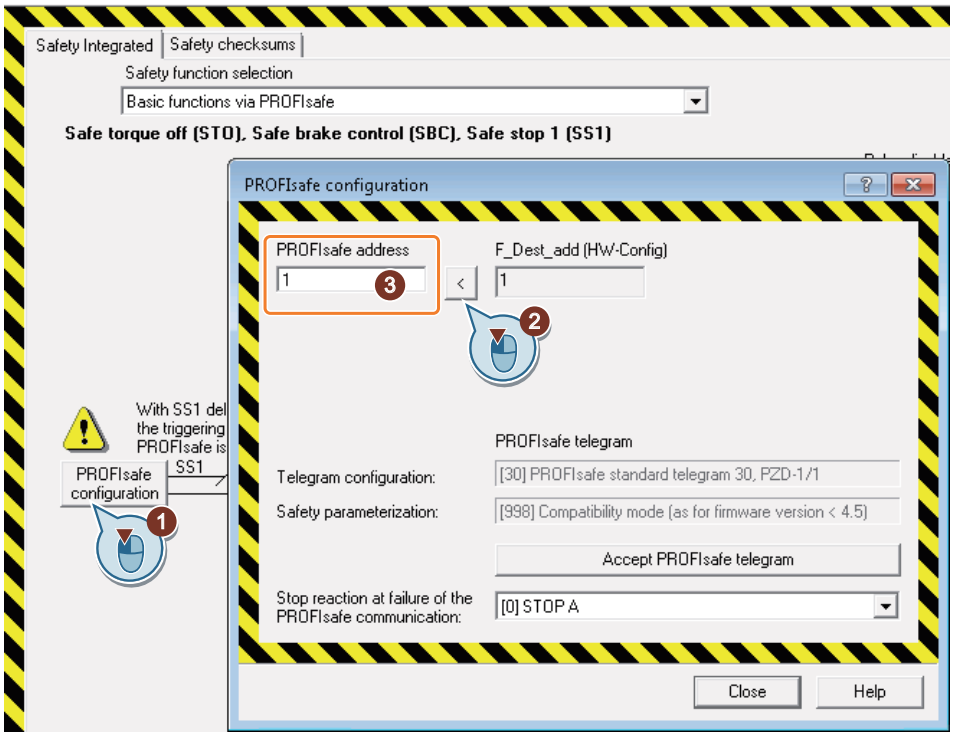


Figure 6-48 Accepting the F-destination address as PROFIsafe address

5. Click "Close" to confirm.

Scripting

The "Accept F-destination address" function can also be programmed via scripting. To do so, program the following scripting commands.

- GetFDestAdressFromHWCN
- SetUpAddresses

6.3.5 Editing F-Proxy settings

Working with the F-Proxy interconnection table

With an interconnection table, you interconnect all drives (also termed drive objects or DOs) with a F-CPU. The drives must be connected to the SIMOTION controller and a PROFIsafe telegram must be set up.

The table is hierarchically organized. If you change a setting (F-CPU, F-Proxy interface) on a higher-level entry, the new setting will be propagated to all lower-level objects.

- To edit the settings below a SIMOTION controller, edit the settings at the controller level to interconnect all the interfaces and drive objects below it.
- If you only want to interconnect the drive objects of one particular bus system, edit the relevant entry of the interface to interconnect all the drive objects below it.
- If you only want to configure a particular drive object, change the settings on this drive object only.

In the first example figure, for example, the F-CPU with the name PLC_2 is used for all drive objects.

In the following figures, you can see an example of an F-proxy interconnection with an F-CPU in the same project and an F-CPU in another project. You will find the explanations of the numerals in the table. In the interconnection table, you can edit only the field with a light-blue background.

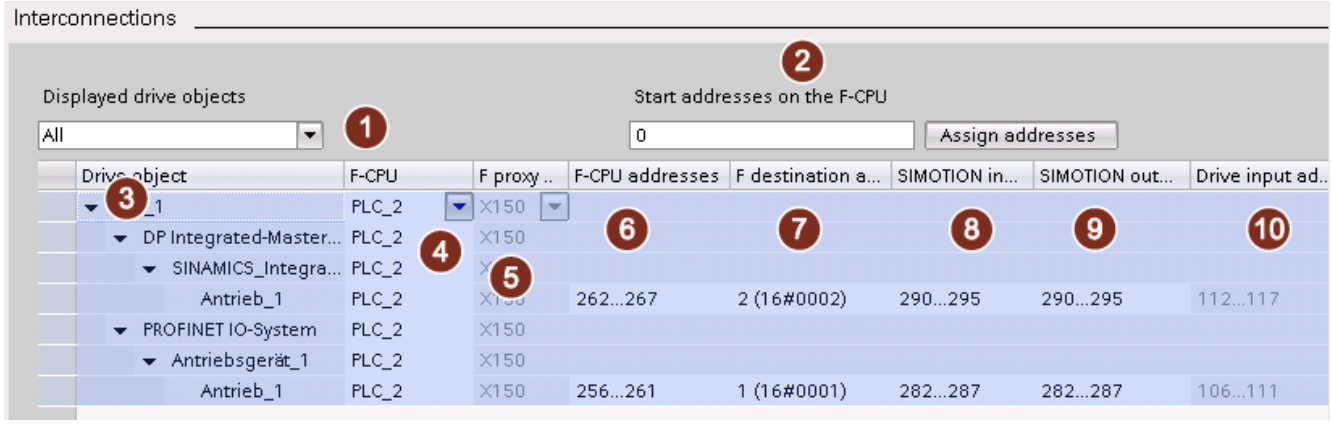


Figure 6-49 F-proxy interconnection table with two drive objects and F-CPU in the same project

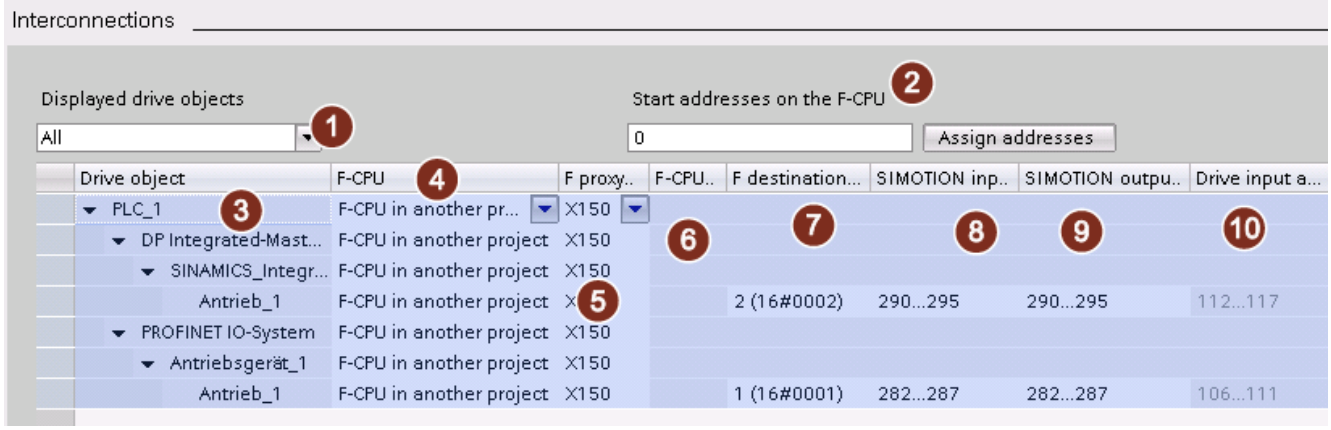


Figure 6-50 F-proxy interconnection table with two drive objects and F-CPU in another project

Explanations of the interconnection table

Parameter	Description
Displayed drive objects ①	At "Displayed drive objects", you can filter the display of the drive objects. You can have only the interconnected or only the non-interconnected objects displayed.
Start address in the F-CPU ②	Enter a start address as the basis for address assignment in the F-CPU here. If no drive object has yet been interconnected with the F-CPU, this button is not active.
Drive object ③ (not editable)	The drive objects are displayed sorted hierarchically below the controller and interface.
F-CPU ④	Select the F-CPU with which interconnection of the SIMOTION controller is to be performed via the F-proxy. • All F-CPUs connected to the SIMOTION controller are listed (F-CPU in the same project) In the example, the SIMOTION controller (PLC_1) is interconnected to the F-CPU (PLC_2). • F-CPU in another project • None With this selection, existing interconnections will be deleted.
F-proxy interface ⑤	Here, you can select the PN interface of the SIMOTION controller via which interconnection with the F-CPU is performed. All PN interfaces that are in I-Device mode are displayed (X150, X1400). In the example, it is the X150 interface. If the F-CPU is in the same project and is already interconnected with the SIMOTION controller, the interface will be entered automatically.
F-CPU addresses ⑥	Address of the drive objects in the IO controller of the F-CPU. On the first drive object, the start address is used that was entered at "Start address in the F-CPU".
F-destination address ⑦	You enter the F-destination address here. This is preset to a default value. The F-destination address is identical to the PROFIsafe address in the drive.
Input address ⑧	Enter the input address of the I-Device here (SIMOTION controller).
Output address ⑨	Enter the output address of the I-Device here (SIMOTION controller).
Drive input address ⑩ (not editable)	The logical address of the PROFIsafe telegram of the drive object is displayed here. You can change this address in SIMOTION SCOUT TIA.

Configuring a table

When you right-click the table header, a shortcut menu opens.

1. Select "Display/hide" if you wish to configure the displayed columns. Please note that some of the columns including, for example, F-CPU address are required for programming the F-CPU application.
2. "Show all columns" if you require the entire table.

F-CPU in another project

If the fail-safe module is located in another project, for example, after migrating a project, select the entry "F-CPU in another project" for the F-CPU.

For this setting, at least one PN interface of the SIMOTION controller must be configured as an I-Device and no F-CPU must be present in the project. When you have made all the parameter settings, you must export the I-Device with a GSD export and then install it and reinsert and interconnect it in the F-CPU.

Filtering the display

With the "Displayed drive objects" filter, you can filter displayed drive objects, for example, for the following application scenarios:

- You want to interconnect additional drive objects subsequently.
- You have a project with a large number of drive objects.
- For checking whether all drive objects have been interconnected.

The entries that do not correspond to the filter criterion are hidden.

Start address of the F-CPU

The start address defines an address range in the F-CPU. All components are then clearly listed within the address band.

1. Enter a start address as the basis for address assignment in the F-CPU here.
   If no drive object has yet been interconnected with the F-CPU, this button is not active.
2. First enter the start address.
3. The make the interconnection.
   When you then interconnect the object, the addresses will be assigned from the starting value in ascending order.

If you want to change the address range after having made an interconnection, enter a new start address and click "Assign address".
The addresses are automatically moved into the address range.

Deleting components

If you delete an F-CPU, for example, all interconnections and transfer areas will be deleted.

6.3.6 Changing CRC backed-up data of a PROFIsafe telegram

Improved configuring/commissioning of drives with safety technology

For plants and machines with comprehensive safety technology, it must be possible to detect changes to safety-related data quickly and precisely. Each safety element usually has safety features, e.g. CRC (Cyclic Redundancy Check) backed-up data. For machines with 128 safety axes, for example, large data storage areas such as F-parameters are protected for the PROFIsafe telegrams. This means changed data must be displayed in a clearly structured manner. As of V5.2 and higher, the F-Proxy Interconnections table is extended by the **CRC change** column.

CRC change in the F-Proxy Interconnections table

Each change of CRC backed-up data of a PROFIsafe telegram is recorded. When the signature of the F-parameters (Failsafe_F_Par_CRC/F-parameter signature with addresses) is changed, this is indicated visually for the F-Proxy in the Interconnections table. If there is no CRC change, the column remains empty. CRC changes are displayed by a symbol for the respective safety axis. Check the respective F-parameters of the safety axis when a change is detected.

The detected difference only serves as information. The generation of online data is not prevented.

Working with the CRC change

1. Save and compile the modified project. A check is performed during compiling to see whether a CRC change exists.
2. If changes are detected, the comment "Unconfirmed CRC changes present" is displayed in the "Info > Compile" detailed view.
3. Click on the "Go to" column in the information row to jump to the Interconnections table with the detected CRC changes.
4. Check the displayed changes.

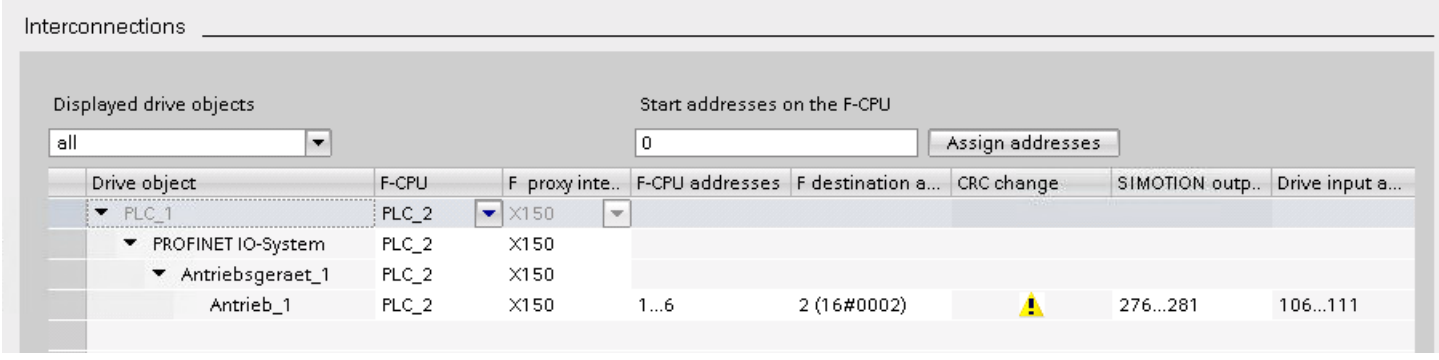


Figure 6-51 CRC change detected at safety axes

5. By using the filter selection "With CRC changes" for "Displayed drive objects", only the rows with changed CRC data are displayed.
6. At the bottom of the Interconnections table, click on the "Confirm CRC changes" button. The markings at the changed safety axes are deleted.

6.3.7 Checking project-wide PROFIsafe addresses

Unique PROFIsafe address

To ensure reliable communication, unique PROFIsafe addresses are required throughout the CPU and the network.

For this reason, you need to carefully check the settings of the PROFIsafe addresses.

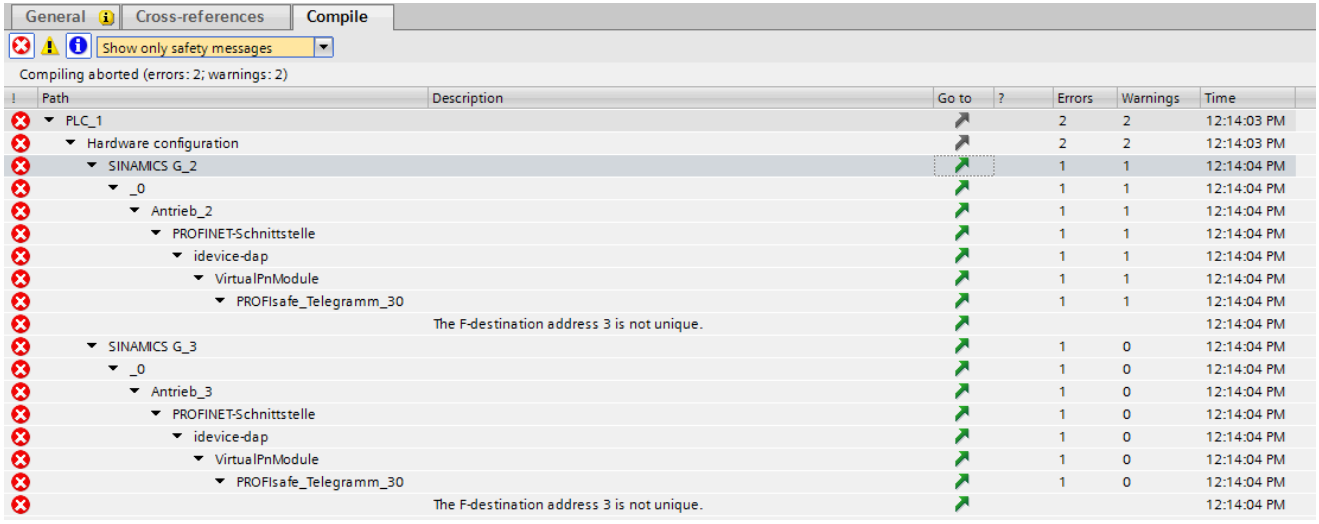
⚠ WARNING

Unique PROFIsafe addresses

You must ensure the unique assignment of the PROFIsafe address throughout the network and the CPU.

- The fail-safe I/O of PROFIsafe address type 1 is uniquely addressed by its F-destination address.
- The F-destination address of the fail-safe I/O (drive units in this case) must be unique for all the fail-safe I/Os throughout the network and the CPU (system-wide). The fail-safe I/O of PROFIsafe address type 2, e.g. modules of the ET 200SP type, must also be taken into account.
- Note also the corresponding documentation in the TIA Portal online help in section "SIMATIC Safety - Configuration and programming".
  (*SDR001*)

1. Make sure that the following parameters are set for each drive:
   – Parameter p9610 in the parameter view = "F address" (F_Dest_Add) in the Inspector window under "Cyclic data exchange".
   Or
   – Parameter p9610 in the function view in dialog "F-DI / F-DO PROFIsafe" = F address (F_Dest_Add) in the Inspector window under "Cyclic data exchange".
2. Check the messages in the Inspector window while the control safety program is being compiled (compile CPU in the project tree). An error will be displayed for any address that is not unique:



!	Path	Description	Go to	?	Errors	Warnings	Time
⊗	PLC_1				2	2	12:14:03 PM
⊗	Hardware configuration				2	2	12:14:03 PM
⊗	SINAMICS G_2				1	1	12:14:04 PM
⊗	_0				1	1	12:14:04 PM
⊗	Antrieb_2				1	1	12:14:04 PM
⊗	PROFINET-Schnittstelle				1	1	12:14:04 PM
⊗	idevice-dap				1	1	12:14:04 PM
⊗	VirtualPnModule				1	1	12:14:04 PM
⊗	PROFIsafe_Telegramm_30				1	1	12:14:04 PM
⊗		The F-destination address 3 is not unique.					12:14:04 PM
⊗	SINAMICS G_3				1	0	12:14:04 PM
⊗	_0				1	0	12:14:04 PM
⊗	Antrieb_3				1	0	12:14:04 PM
⊗	PROFINET-Schnittstelle				1	0	12:14:04 PM
⊗	idevice-dap				1	0	12:14:04 PM
⊗	VirtualPnModule				1	0	12:14:04 PM
⊗	PROFIsafe_Telegramm_30				1	0	12:14:04 PM
⊗		The F-destination address 3 is not unique.					12:14:04 PM

Figure 6-52 Compiler error message "F destination address is not unique"

Navigate into the telegram configuring screen of the affected device and assign a different PROFIsafe address.

3. Check the safety printout of the PLC you are using.
   Create the printout by right clicking on "Safety Administration" to call the context menu and then select "Print".
   All of the relevant data is listed in the printout. Below you can see an example for a drive that is networked as an IO device; the PROFIsafe address is displayed under "F-destination" address.

Note

Error-free hardware and software compilation

Error-free hardware and software compilation is the prerequisite for the creation of the safety printout for acceptance purposes. Only then is it assured that all consistency checks have been performed and therefore the safety printout created for a consistent project.

PROFINET-Schnittstelle : PROFINET IO-System PN/IE_1 idevice-dap					
Slot	Module	Start address	F-destination address	F-monitoring time	Parameter signature (w/o addresses)
0	PROFIsafe_Telegramm_30	8	1101	50 ms	0xEE5 (3813)

PROFIsafe_Telegramm_30 : idevice-dap, PositionNumber 0		
Module data		Channel parameters
Hardware		Info
Name	PROFIsafe_Telegramm_30	Module has no channels.
PositionNumber	0	
TypeName	Virtual.F.PnSubmodule.Drive	
--	--	
Start address input	8	
Start address output	8	
Laddr	276	
F_WD_Time	150 ms	
F_Dest_Add	1101	
F_Par_CRC_WithoutAddresses	0xEE5 (3813)	
F_Par_CRC	0xD884 (56244)	
Behavior after channel error	Passivate the complete module	
RIO for FA-Safety	No	
F_Par_Version	V2-mode	
PROFIsafe protocol version	Loop-back extension (LP)	
Software		
F-I/O DB number	30002	
F I/O DB name	F00008_SINAMICSG_1	
Used in F-runtime group	No	

Figure 6-53 PROFIsafe address in the safety printout

Compare this PROFIsafe address with the value of the drive in p9610.
Compare this PROFIsafe address with the values of all other nodes and make sure that the addresses are unique.

6.3.8 Typical PROFIsafe topologies

Overview of topologies

This topic shows examples of topologies in which SIMOTION PROFIsafe is used.

1. F-CPU in another project (GSDML export)

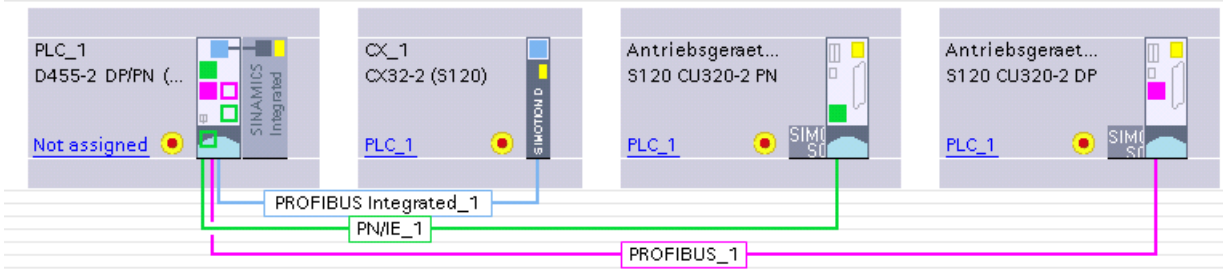


Figure 6-54 F-CPU in another project

2. F-CPU with SIMOTION via PROFINET as an I-Device (F-Proxy)

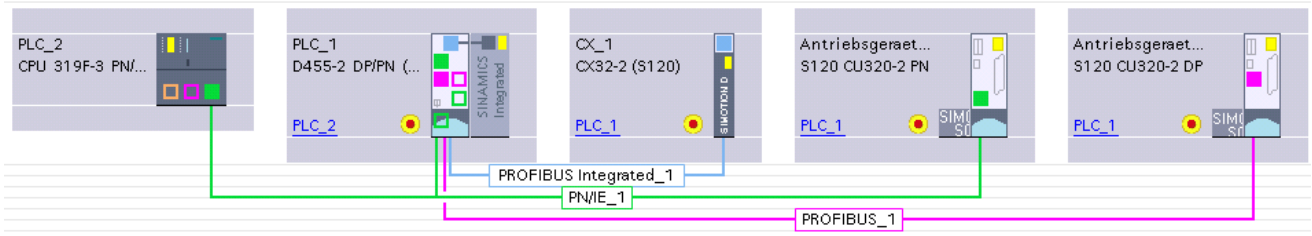


Figure 6-55 F-CPU with SIMOTION via PROFINET as an I-Device

Check of F-destination addresses

3. F-CPU with SIMOTION via PROFINET as an IO device (GSDML import)

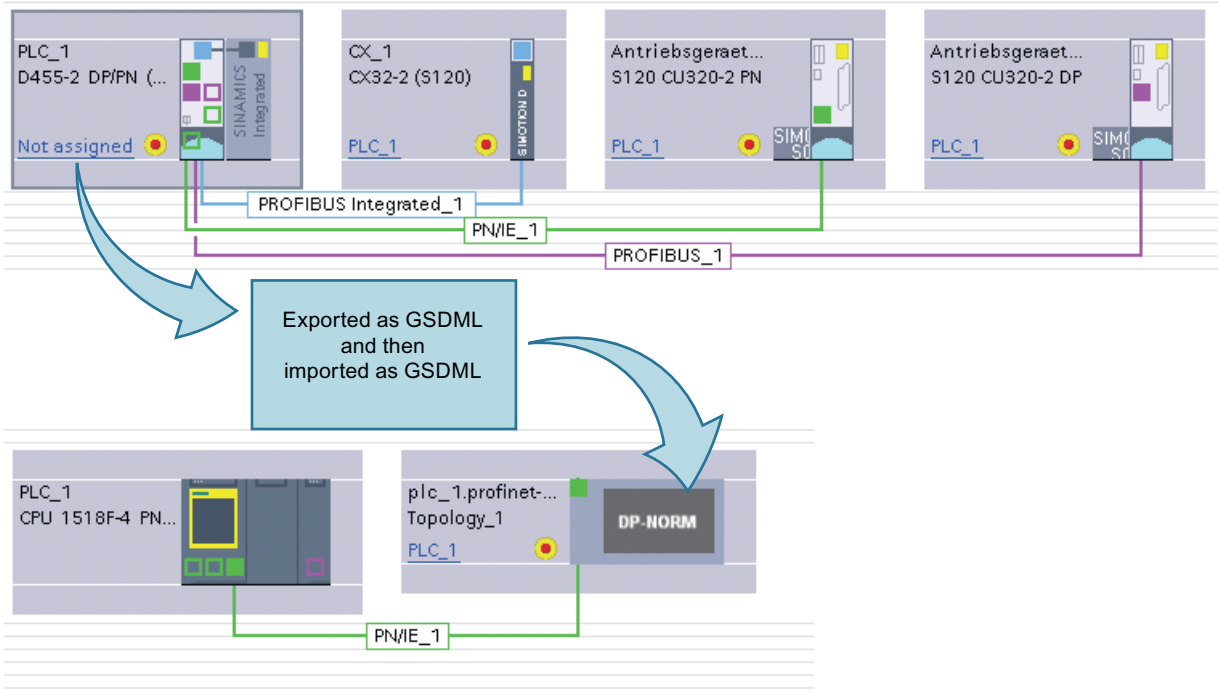


Figure 6-56 F-CPU with SIMOTION via PROFINET as an IO device

4. F-CPU with SINAMICS via PROFIBUS as a DP slave (F-DX-Mod)

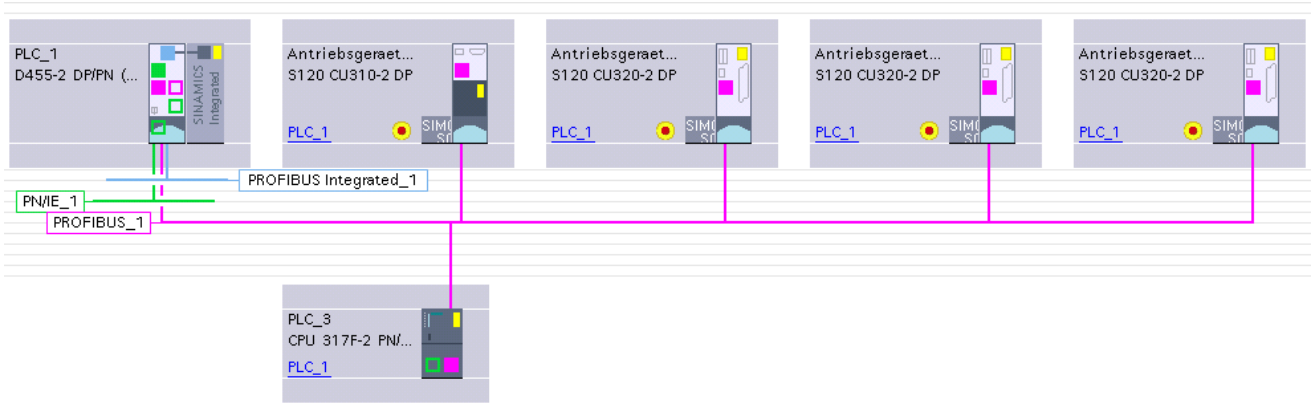


Figure 6-57 F-CPU with SINAMICS via PROFIBUS as a DP slave

5. F-CPU with SIMOTION as shared IO device via PROFINET (GSDML import)

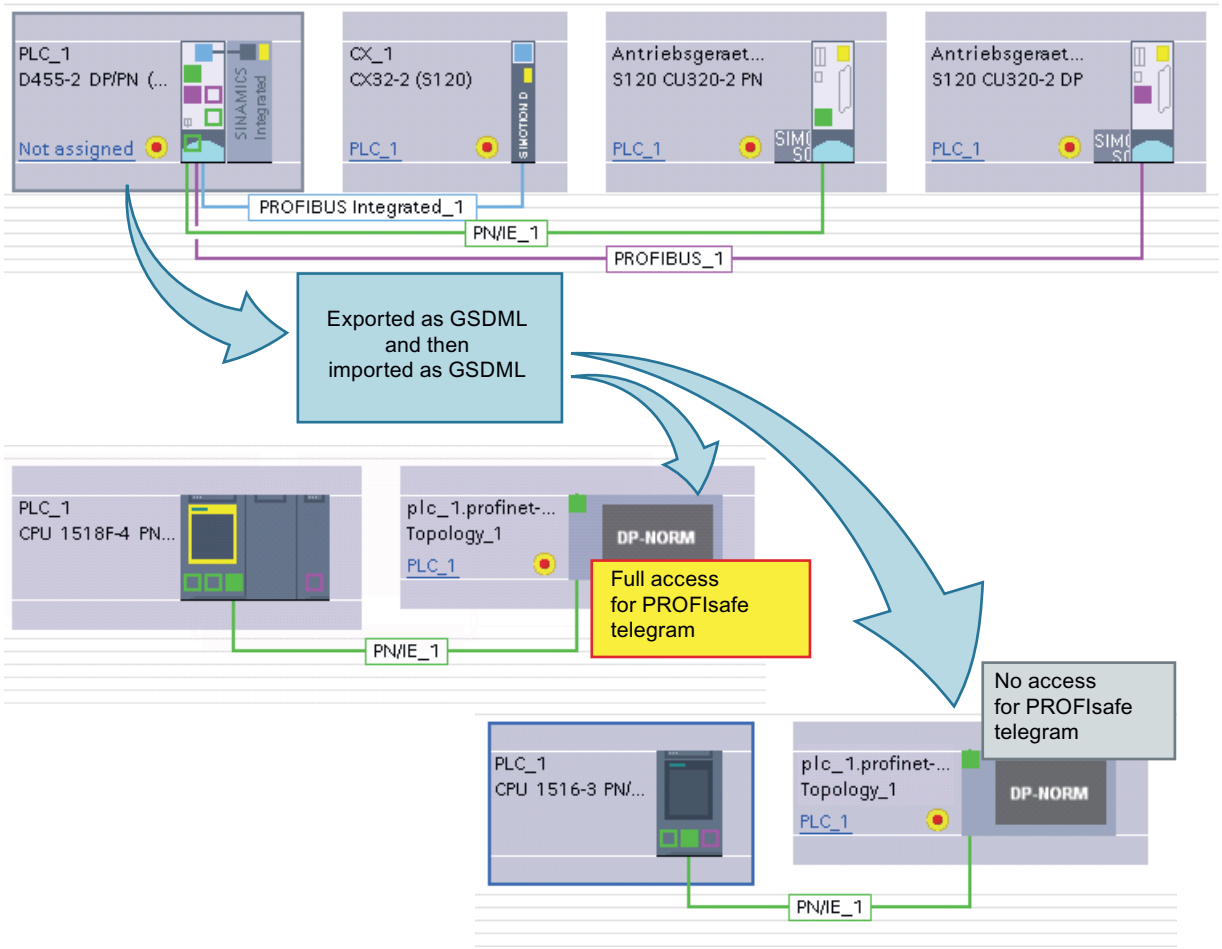


Figure 6-58 F-CPU with SIMOTION as shared device via PROFINET

Unique PROFIsafe addresses

You must check the uniqueness of the PROFIsafe addresses for all nodes in every topology. Typical points to be considered with respect to the topologies illustrated are described in the table.

Topology	F-destination address (F_Dest_Add)
Re 2:	Compare this F-destination address with the values of all other nodes and make sure that the addresses are unique. The nodes in the area between the F-CPU and the coupled SIMOTION CPU must be checked.
Re 3:	Compare this F-destination address with the values of all other nodes and make sure that the addresses are unique. The nodes in the F-CPU area must be checked. The nodes of the SIMOTION CPU in the imported project (topology 1) must also be checked.
Re 4 and 5:	Compare this F-destination address with the values of all other nodes and make sure that the addresses are unique. The nodes in the F-CPU area must be checked.

6.3.9 Shared Device and PROFIsafe

6.3.9.1 Shared Device and PROFIsafe

Description

With the Shared Device functionality, you can configure access to an IO device with several IO controllers using PROFINET. This enables channels/modules to be flexibly assigned to different IO controllers. This option is available for inputs and outputs. Access to the submodules of the Shared Device is divided between the individual IO controllers. Each submodule of the Shared Device can be assigned exclusively to one IO controller.

You can use this mechanism to access the fail-safe data of a drive configured below a SIMOTION CPU via the F-CPU, for example.

Note

When configuring PROFIsafe, it is recommended that you use the I-Device F-Proxy functionality instead of the Shared Device. The configuration as Shared Device is only relevant when the F-Proxy functionality cannot be used because of the number of axes.

Schematic diagram of Shared Device

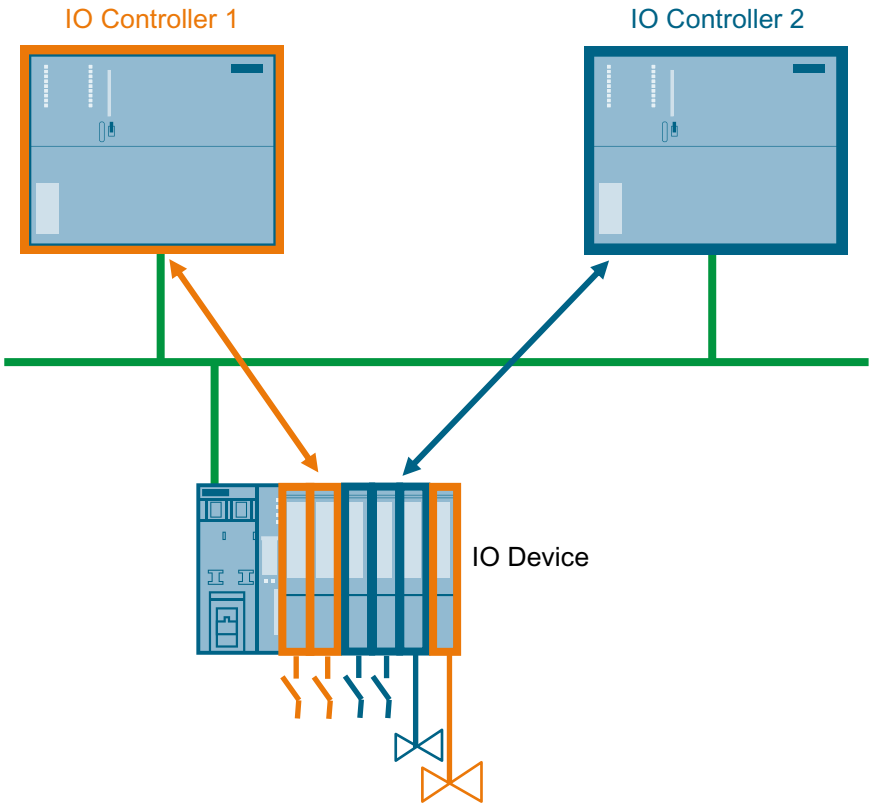


Figure 6-59 Schematic diagram of Shared Device

6.3.9.2 SINAMICS G120 shared by SIMOTION and F-CPU

Introduction

SINAMICS G120 as Shared Device only supports a fixed division of the subslots between the two sharing IO controllers. The Shared Device functionality is available only for the SINAMICS G120 GSD drives.

The following rule applies:

- Only the safety subslots are assigned to a second IO controller as F-CPU.
- All other subslots are assigned to the automation CPU, i.e. SIMOTION.

Note

The F-Proxy for SINAMICS G120 is**not** supported via GSD and Startdrive.

Configuring

A SINAMICS G120 can only be configured as Shared Device via GSDML. The configuration via GSD is performed in the same way as for a SINAMICS S120. The drive commissioning must be performed separately.

- SINAMICS G120 as GSD drive on SIMOTION CPU (project 1)
- SINAMICS G120 as GSD drive on SIMATIC F-CPU (project 2)
- Drive configuration and SINAMICS G120 commissioning in Startdrive (project 3)

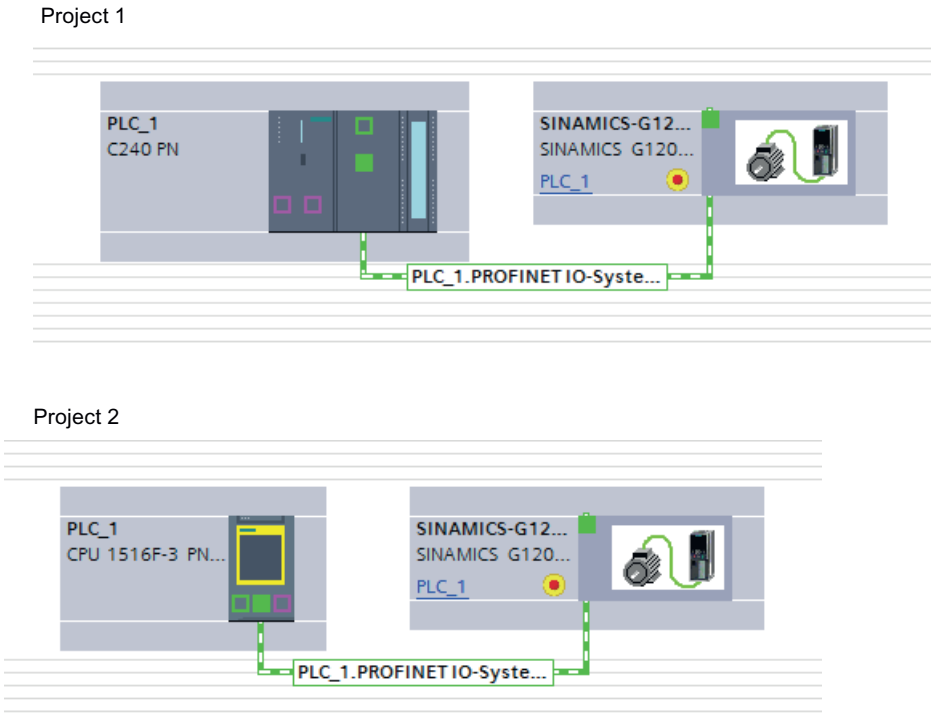


Figure 6-60 Two projects with SINAMICS G120 shared between SIMOTION CPU and F-CPU

Procedure

In the following example, you configure a project with a SIMOTION C240 PN with SINAMICS G120 CU240E-2 PN and a second project with a SIMATIC CPU 1516F-3 PN/DP, which accesses the fail-safe data of the shared SINAMICS G120. You perform the drive commissioning in Startdrive in a third project.

Creating project 1 with SIMOTION CPU and SINAMICS G120

1. Create a new project with a SIMOTION CPU.
2. Insert the SINAMICS G120 CU240E-2 PN (V4.7) IO device via the GSD file. You can find the GSD file in the hardware catalog at "Further field devices > PROFINET IO > Drives > SIEMENS AG > SINAMICS".
3. Assign the IO device to the controller.
4. You must adapt the SINAMICS G120 modules that are to be shared in the device overview.

5. Insert the modules and submodules from the hardware catalog using drag-and-drop. Only the safety modules have to be configured.
   - PROFIsafe telegram (PROFIsafe telegram 30 in the example)
   - SIEMENS telegram (SIEMENS telegram 352 in the example)

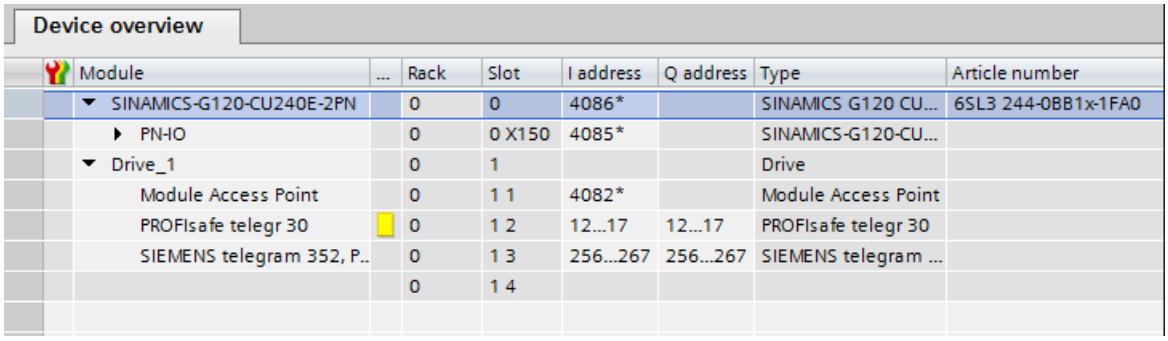


Figure 6-61 SINAMICS G120 inserted via GSD, Shared Device PROFIsafe modules via F-CPU

6. The following parameters and addresses must be identical in all three projects:
   - I/O addresses of the PROFIsafe telegram and the F-parameters (F-source/F-destination address).
   - The device name (also the converted device name) and the IP address.
7. Save the project.

Creating project 2 with F-CPU and SINAMICS G120 via GSD

1. Create a new project with an F-CPU, e.g. SIMATIC CPU 1516F-4 PN/DP.
2. Insert the SINAMICS G120 IO device and proceed as described above in project 1 as of step 3.

Creating project 3 with SINAMICS G120 (Startdrive must be installed)

1. Create a new project with a SINAMICS G120 CU240E-2 PN in the TIA Portal.
2. Run through the drive commissioning in Startdrive and configure the drive and PROFIsafe.
3. To use the SINAMICS G120 as Shared Device, parameter p8929 of the Control Unit must be set to "(2) Automation and safety".
4. Continue as described above in project 1 as of step 6.

Configuring access to the modules of the SINAMICS G120 (Shared Device)

1. Open project 1.
2. Click the SINAMICS G120 drive unit in the network view.
3. In the Inspector window, navigate to the "PROFINET interface > Extended options > Real-time settings > I/O cycle" area.
4. Select the number of project-external IO controllers at "Shared Device" (one in the example).
5. Select "Properties > General > Shared Device" in the Inspector window.

6. Configure the F-CPU access to the safety module. To do this, select the value "---" in the "Access" column in the "PROFIsafe telegram" row. In this way, another controller (the F-CPU in this case) can access these modules.

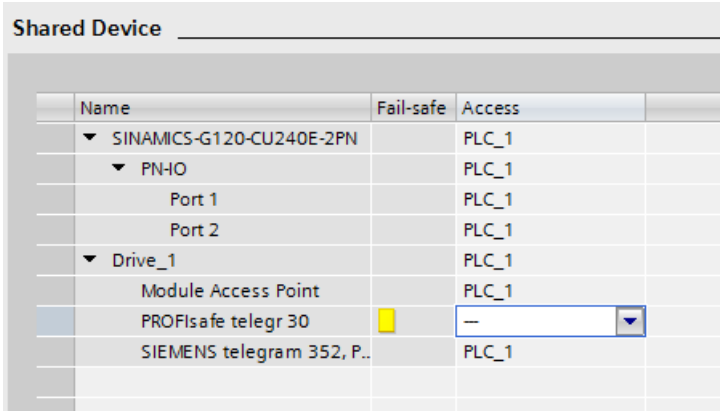


Figure 6-62 SINAMICS G120 Shared Device, automation assigned to the SIMOTION CPU

Note

If you select the "---" option, you cannot change the associated parameters for the PROFINET interface and the ports. They are read-only. Parameters of the PROFINET interface and port parameters can only be edited in the project in which the PROFINET interface is assigned to the local CPU. Irrespective of this, the ports can be connected in both projects.

7. Open project 2.
8. In the Inspector window, navigate to the "PROFINET interface > Extended options > Real-time settings > I/O cycle" area.
9. Select the number of project-external IO controllers at "Shared Device" (one in the example). Select "Properties > General > Shared Device" in the Inspector window.
10. Configure the access to the safety module with the F-CPU in the same project. To do this, select the value "PLC_1" in the "Access" column in the "PROFIsafe telegram" row for the local CPU. All other modules are set to the value "---".

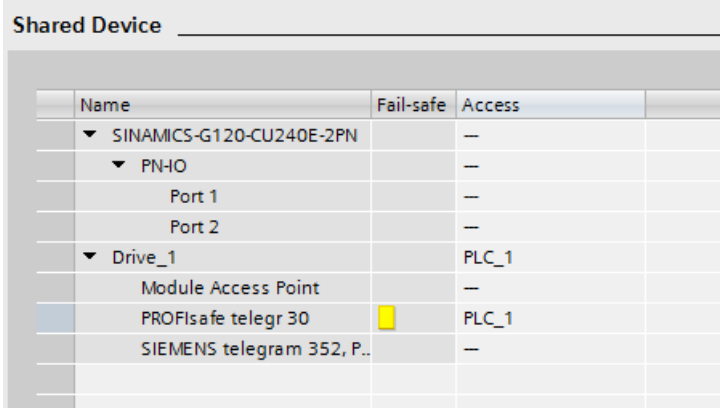


Figure 6-63 SINAMICS G120 Shared Device, PROFIsafe modules assigned to the F-CPU

11. Check whether the same IP address parameters and device names have been set for the Shared Device in all projects and that the modules have not been assigned twice. Only one IO controller may have access to a module.
12. Save all projects.

6.3.9.3 ET200SP as a shared device on SIMOTION CPU

Introduction

The SIMATIC ET200SP can be operated as Shared Device on SIMOTION controllers as of V4.5. The SIMATIC ET200SP is integrated as IO device, as GSD or via the hardware catalog (MDD). Two higher-level IO controllers share the submodules of the SIMATIC ET200SP. A typical application is a SIMOTION CPU as automation CPU and an F-CPU for the safety application.

Note

Isochronous mode and MRPD are only supported by SIMATIC ET200SP HS.

Applications

In principle, there are three typical applications for the SIMATIC ET200SP as Shared Device with two higher-level controllers.

1. SIMOTION CPU not isochronous and F-CPU
2. SIMOTION CPU isochronous and F-CPU (variation of application 1)
3. SIMOTION CPU isochronous and second CPU not isochronous (e.g. SIMOTION or SIMATIC)

Applications 1 and 2:SIMOTION CPU not isochronous or isochronous and F-CPU

The application is configured in two separate projects.

- SIMATIC ET200SP HS or SIMATIC ET200SP HF as Shared Device
- SIMOTION CPU (CPU 1)
  Accesses the standard modules of the ET200SP station via PROFINET with IRT for isochronous applications.
  Variant:
  SIMOTION accesses the standard modules of the ET200SP via PROFINET RT for non-isochronous applications.
- SIMATIC F-CPU (CPU 2)
  Accesses the safety modules of the ET200SP via PROFINET RT and the safety telegrams of the integrated drives of SIMOTION via the I-Device F-Proxy of SIMOTION.

Support of MSI and MSO

The modules/submodules are logical copies of real IO modules. Isochronous operation is not supported in MSI/MSO mode.

Schematic diagram

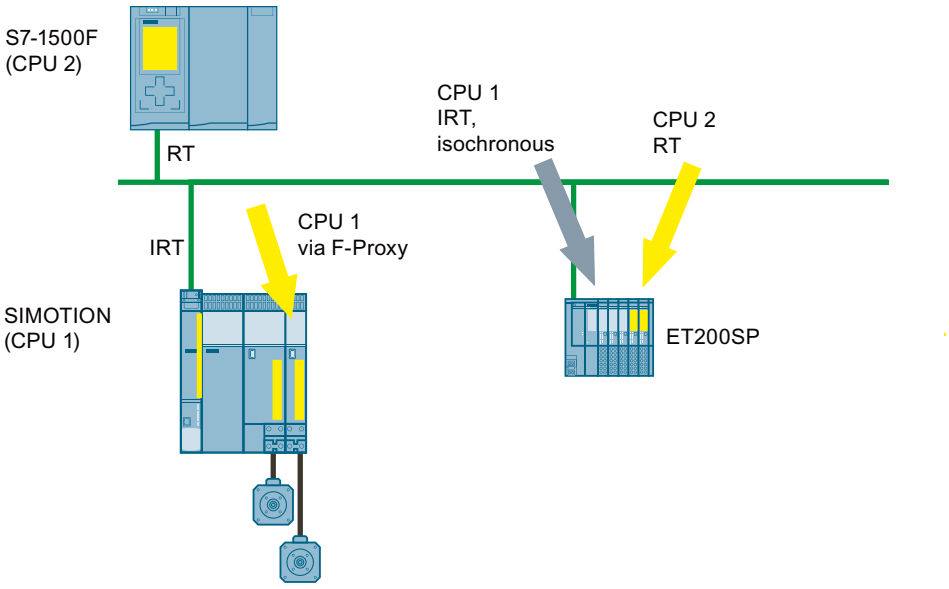


Figure 6-64 SIMATIC ET200SP as Shared Device between SIMOTION CPU IRT isochronous and F-CPU RT (application 2)

Application 3:SIMOTION CPU isochronous and second CPU not isochronous (e.g. SIMOTION or SIMATIC)

The application is configured in two separate projects.

- SIMATIC ET200SP HS as Shared Device
- SIMOTION CPU (CPU 1)
  Accesses the standard modules of the ET200SP station via PROFINET with IRT for isochronous applications.
- SIMOTION or SIMATIC CPU (CPU 2) accesses the non-safety modules via PROFINET RT for non-isochronous applications.
  SIMOTION accesses the standard modules of the ET200SP via PROFINET RT for non-isochronous applications. CPU 2 can also be any SIMATIC CPU, e.g. S7-1500.

Supported modules

Modules can each be DI, DQ, AI, AQ. The modules/submodules are logical copies of real IO modules. Isochronous operation is not supported in MSI/MSO mode.

Schematic diagram

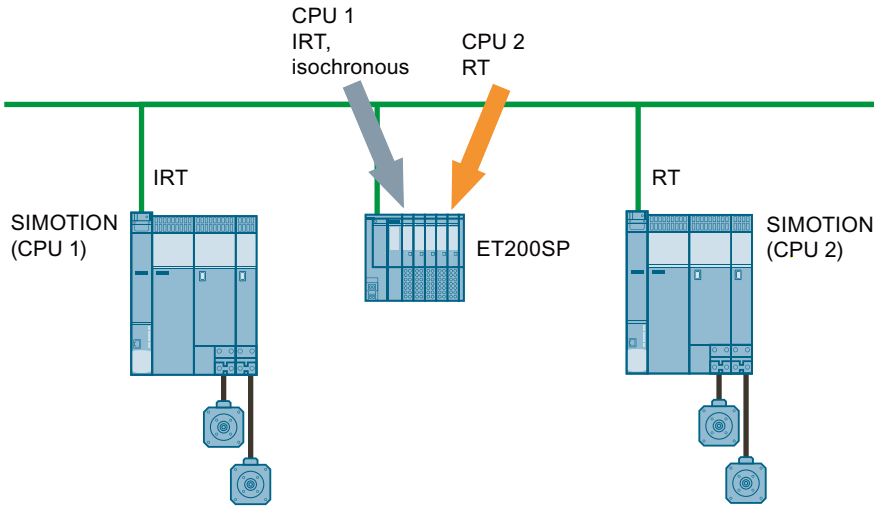


Figure 6-65 SIMATIC ET200SP as Shared Device between SIMOTION CPU IRT isochronous and second SIMOTION/SIMATIC CPU RT

Configuration example of SIMOTION CPU isochronous and F-CPU (application 2)

In the following example, an ET200SP HS isochronous is shared with a SIMOTION CPU and an F-CPU. The F-CPU accesses the PROFIsafe modules via RT.

Table 6-2 Hardware used

Project 1	Project 2
• SIMATIC S71516F-3 PN/DP • ET200SP HS (shared): IM 155-6 PN HS with the following modules DQ 8x24 VDC HF DI 8x24 VDC / 0.5 A HF F-DQ 4x24 VDC / 2 A PM HF F-DI 8x24 VDC HF	• SIMOTION D455-2 PN/DP • ET200SP HS (shared copied): IM 155-6 PN HS with the following modules DQ 8x24 VDC HF DI 8x24 VDC / 0.5 A HF F-DQ 4x24 VDC / 2 A PM HF F-DI 8x24 VDC HF

Configuring project 1 with F-CPU

1. Create a new project 1 in the TIA Portal with the F-CPU and an ET200SP HS with the modules described above.
2. Configure the PN subnet. The ET200SP HS is operated in RT mode.
3. Click the ET200SP HS station in the network view.
4. In the Inspector window, navigate to the "PROFINET interface > Extended options > Real-time settings > I/O cycle" area.
5. Select the number of project-external IO controllers at "Shared Device" (one in the example).
6. Select "Properties > General > Shared Device" in the Inspector window.

7. Configure the F-CPU access to the safety module. To do this, select the value "---" for all modules that are to have access through the SIMOTION CPU from another project. The F-DI and F-DQ modules remain assigned to the F-CPU.
8. Save and compile the project.

Configuring project 2 with SIMOTION CPU

1. Create a new project 2 in a new instance of the TIA Portal with the SIMOTION CPU.
2. Configure the SIMOTION CPU with the appropriate integrated drives and PROFIsafe.
3. Switch to project 1, click the ET200SP HS in the network view and select "Copy" in the shortcut menu.
4. Insert the copied ET200SP HS station in project 2 and assign it to the SIMOTION CPU. The IP address and the device name must be identical and in the same subnet.
5. Click the inserted ET200SP HS station in the network view.
6. In the Inspector window, navigate to the "PROFINET interface > Extended options > Real-time settings > I/O cycle" area.
7. Select the number of project-external IO controllers at "Shared Device" (one in the example).
8. Select "Properties > General > Shared Device" in the Inspector window.
9. Configure the access of the SIMOTION CPU to the modules. The F-DI and F-DQ modules are assigned to the F-CPU and are assigned the value "---". Assign the other modules to the SIMOTION CPU, e.g. value "PLC_1".
10. Configure the SIMOTION CPU as master and the ET200SP HS station as slave in the IRT isochronous mode to the servo.
11. Switch to the device view of the inserted ET200SP HS station and select "Servo" as process image for the DI and DQ modules for the I/O addresses.

    Note

    An ON delay must not be activated for the inputs of the modules that are to be operated in isochronous mode. "Servo" must be selected as process image for the I/O addresses of the isochronous modules.

12. Save and compile the project.

Note

Supplementary condition for ET200SP as a shared device

The PROFINET send cycle must be identical in both projects (sync domains of the controllers). The first higher-level controller operates the SIMATIC ET200SP in IRT isochronous mode, e.g. with a send cycle of 2 ms. The second higher-level controller which has shared access to the SIMATIC ET200SP in RT mode must also operate in a 2 ms send cycle. Only if the two controllers have the same send cycle can the ET200SP establish a connection with both of them. If they have different send cycles, the shared device randomly establishes contact with one controller and cannot be accessed by the other controller.

6.3.10 Shared I-Device and PROFIsafe

6.3.10.1 Shared I-Device and PROFIsafe

Description

An I-Device can be operated on two higher-level IO controllers as an IO device. This functionality is known as shared I-Device.

It provides the following application areas:

- One of the higher-level controllers works as the "Automation CPU" and uses the SIMOTION I-Device as an isochronous I-Device in the IRT operating mode.
- The other higher-level IO controller works as the "Safety CPU" and uses the submodules configured as the F-Proxy in the RT operating mode.

This means that an I-Device can communicate with two higher-level controllers as an IO device. At the same time, higher-level controllers can access certain modules, e.g. an F-CPU can access the F-Proxy submodules, using Shared Device.

The configuration is performed in three projects. The two higher-level IO controllers are configured in two projects and the SIMOTION CPU in an extra project. The SIMOTION CPU is connected to the higher-level IO controllers via GSD. Only two higher-level IO controllers are supported.

Schematic diagram

The schematic diagram below shows two IO controllers which share the submodules on the I-Device of a third IO controller.

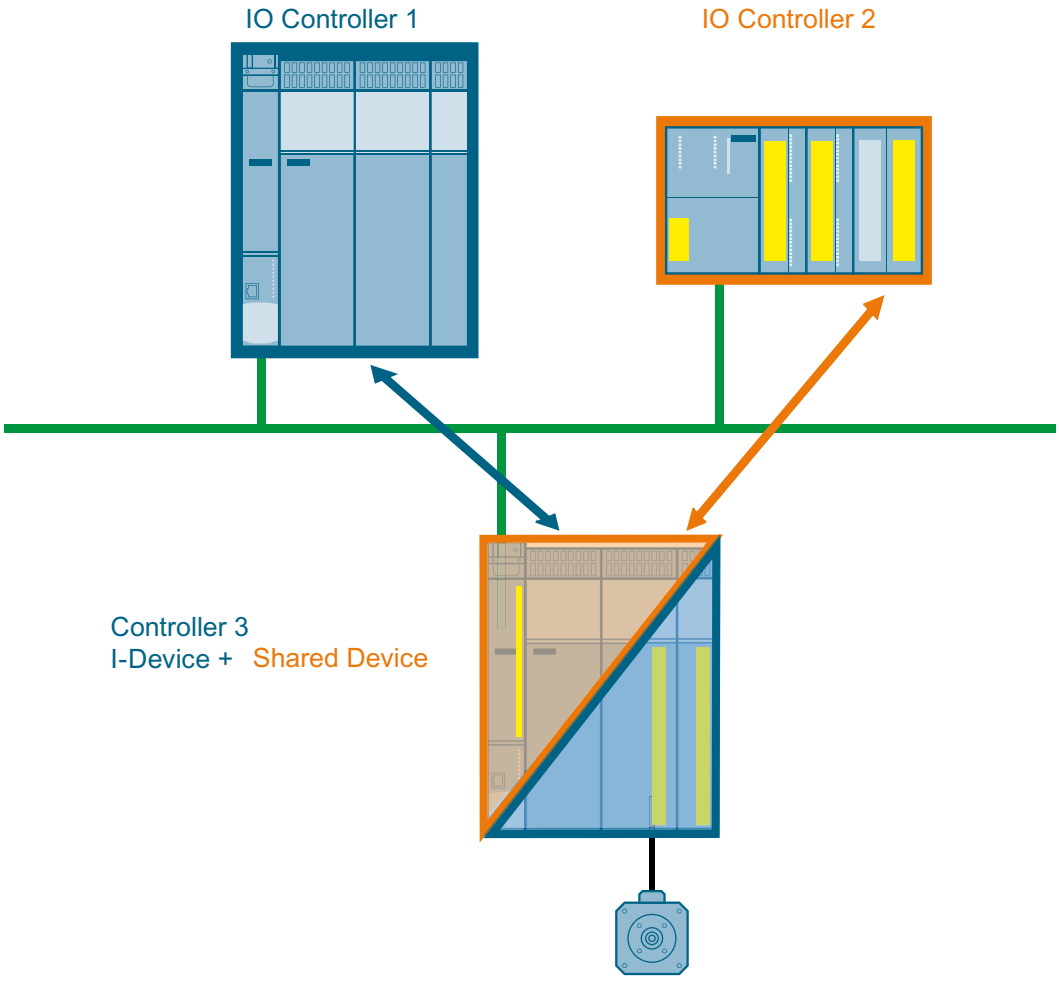


Figure 6-66 I-Device as Shared Device

Note

In this configuration, only the submodules that are used by the "Automation CPU" are configured as isochronous (IRT).

Applications

In principle, there are five typical applications for the SIMOTION CPU as shared I-Device with two higher-level controllers.

1. Shared I-Device via RT (or IRT not isochronous) - RT
   - SIMOTION CPU is a shared I-Device on PN Integrated or CBE30-2
   - Automation CPU 1 SIMATIC (RT or IRT not isochronous)
   - Automation CPU 2 SIMATIC (RT)
2. Shared I-Device via IRT isochronous
   - SIMOTION CPU is a shared I-Device on PN Integrated or CBE30-2
   - Automation CPU 1 SIMOTION (IRT isochronous)
   - Automation CPU 2 SIMOTION (RT)
3. Shared I-Device via RT (or IRT not isochronous) - PROFIsafe
   - SIMOTION CPU is a shared I-Device on PN Integrated or CBE30-2
   - Automation CPU 1 SIMATIC (RT or IRT not isochronous)
   - F-CPU SIMATIC (RT)
4. Shared I-Device via IRT isochronous - PROFIsafe
   - SIMOTION CPU is a shared I-Device on PN Integrated or CBE30-2
   - Automation CPU 1 SIMOTION (IRT isochronous)
   - F-CPU SIMATIC (RT)
5. Shared I-Device via PROFIsafe - PROFIsafe
   - SIMOTION CPU is a shared I-Device on PN Integrated or CBE30-2
   - F-CPU 1 SIMATIC (RT)
   - F-CPU 2 SIMATIC (RT)

6.3.10.2 Configuration example of a shared I-Device and PROFIsafe

Configuration example

In the following example, a SIMATIC S7-1500 is used as automation CPU and an S7-15xxF for safety for the central machine logic. The SIMOTION CPU performs the motion control task and is coupled to the automation CPU and the F-CPU via PROFINET RT as shared I-Device. The F-CPU accesses the SIMOTION drives via F-Proxy. The configuration must be performed in three projects.

Extended application

Several SIMOTION CPUs can be used as shared I-Device as extended application The SIMOTION CPUs work in a synchronized group using direct data exchange. The shared I-Devices are all PROFINET RT.

In the following example, only one SIMOTION CPU is configured as shared I-Device.

Schematic diagram

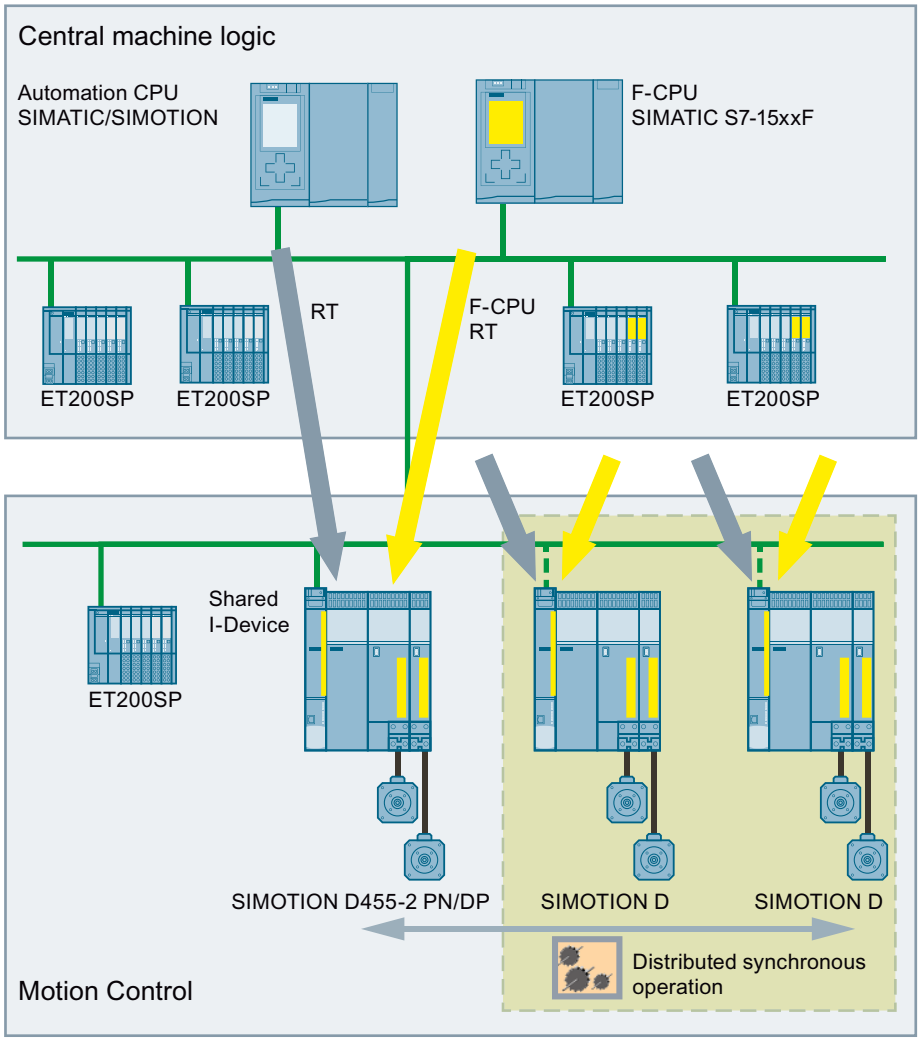


Figure 6-67 Two higher-level SIMATIC IO controllers access the SIMOTION CPU via shared I-Device (RT). Optionally, also additional SIMOTION CPUs in synchronous operation.

Hardware used in the projects

Project 1 (I-Device)	Project 2 (automation CPU)	Project 3 (F-CPU)
• SIMOTION D455-2 PN/DP • SINAMICS S120 on the PROFIBUS Integrated axis assigned with Safety Integrated	• SIMATIC S7-1516-3 PN/DP • SIMOTION I-Device via PROFINET RT	• SIMATIC S7-1516F-3 PN/DP • SIMOTION I-Device via PROFINET RT

Project 1: Configuring the SIMOTION CPU, drive and PROFIsafe

In project 1 you configure the SIMOTION CPU and create the SIMOTION I-Device.

1. Create a new project in the TIA Portal with a SIMOTION D455-2 PN/DP.
2. In SIMOTION SCOUT TIA, configure the drive on the SINAMICS Integrated and insert an axis, and assign it to the drive.
3. Configure PROFIsafe:
   - Activate "Safety via PROFIsafe" on the drive.
   - Activate the functions of the SINAMICS Safety Integrated axis.
   - Insert a PROFIsafe telegram during the telegram configuration of the SINAMICS Integrated.
4. Save and compile the project in SIMOTION SCOUT TIA. The addresses are set up.
5. Switch to the TIA Portal and in the network view click the PN interface of the SIMOTION CPU in order to configure the operating mode as I-Device.
6. In the Inspector window, switch to "Properties > General > Ethernet addresses".
7. Assign a unique "IP address" and a unique "PROFINET device name".
8. In the Inspector window, click "Operating mode".
   - Activate "IO-Device".
   - Add the transfer areas.
   - Select the number of IO controllers that are to have access to the I-Device ("Operating mode > Real-time settings > IO cycle", "Shared Device" section).
9. Click the SIMOTION CPU in the network view and select the "F-Proxy" section on the "General" tab in the Inspector window.
   - Enter the "Start address" of the F-CPU.
   - Select "F-CPU in another project".
   - Select the "F-Proxy interface" X150.
10. Save the project.
11. In the Inspector window, switch to "Properties > General > Operating mode > I-Device communication" tab.
12. Click "Export" in the "Export device description file (GSD)" section, select the designation and path and export the GSD file.
13. You must install the exported GSD in the TIA Portal. Select "Options > Manage device description file GSD" in the menu, navigate to the storage path and install the GSD file. The I-Device is displayed at "Other field devices" in the "PROFINET IO > PLCs & CPs" subfolder in the hardware catalog.

Note

The IP address and the device name must be identical for the SIMOTION CPU and the I-Device. Check that the parameters are identical in other projects in which you use the I-Device because with Shared Device, it is the same device.

Project 2: Coupling SIMOTION as shared I-Device to the automation CPU

In project 2, you couple the SIMOTION I-Device to the automation CPU and assign the modules to the IO controller.

1. Create a new project in the TIA Portal with a SIMATIC S7-1516-3 PN/DP and configure the CPU.
2. Insert the I-Device from the hardware catalog (hardware catalog: Other field devices > PROFINET IO > PLCs & CPs).
3. Assign the IO controller to the I-Device.
4. In the properties of the I-Device, select the "Shared Device" area. All transfer areas and the PROFINET interface are assigned the local IO controller (PLC_1) in the table.
5. Specify the transfer areas to which the automation CPU should not have access. Select the entry "---" for these areas. These transfer areas are intended for the F-CPU.
6. Save the project.

Project 3: Coupling SIMOTION as shared I-Device to the F-CPU

In project 3, you couple the SIMOTION I-Device to the F-CPU and assign the modules to the IO controller.

1. Create a new project in the TIA Portal with a SIMATIC S7-1516F-3 PN/DP and configure the CPU.
2. Insert the I-Device from the hardware catalog (hardware catalog: Other field devices > PROFINET IO > PLCs & CPs) or copy the I-Device from project 2 and insert it in the network view.
3. Assign the IO controller to the I-Device.
4. In the properties of the I-Device, select the "Shared Device" area. All transfer areas and the PROFINET interface are assigned the local IO controller (PLC_1) in the table.
5. Specify the transfer areas to which the F-CPU CPU should not have access. Select the entry "---" for these areas. For the safety module,. select "PLC_1".
6. Save the project.

Compiling and loading

You only have to compile the configurations for the IO controller and load them in succession to the CPUs. Errors in the configuration and consistency errors are not detected during the compilation. They can cause communication and access errors.

6.3.11 PROFIsafe via PROFIBUS with failsafe direct data exchange

Introduction

This section describes a configuration example for fail-safe slave-to-slave communication. During fail-safe slave-to-slave communication, the SIMOTION CPU is the DP master. The SIMATIC F-CPU is the I slave on PROFIBUS DP and controls fail-safe communication, e.g. with a CU320 of the SINAMICS S120.

Controllers and drives used

- SIMOTON D410-2 DP (motion control)
- SINAMICS S120 CU320-2 DP
- SIMATIC S7-300 CPU317F-2 PN/DP (F-CPU)

Requirements

- Project created in the TIA Portal
- Controllers and drives inserted in TIA Portal
- PROFIBUS DP system with SIMOTION D410-2 DP, SINAMICS S120 CU320-2 DP, and SIMATIC S7-300 CPU317F-2 PN/DP configured in the TIA Portal

Configuring fail-safe slave-to-slave communication

1. In network view, create an F-CPU, a SIMOTION D410 controller, and a SINAMICS S120 in accordance with the hardware installed. The devices are located in the same PROFIBUS DP subnet.

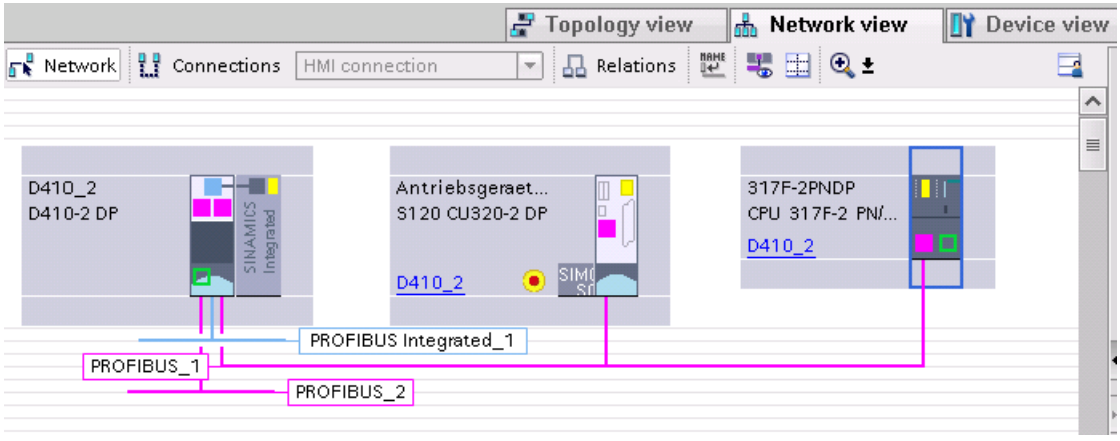


Figure 6-68 Configuration example of fail-safe slave-to-slave communication on the PROFIBUS DP

2. You configure the SIMOTION CPU as a DP master and the SINAMICS S120 as a DP slave, which is isochronously synchronized to the constant DP cycle.

3. You configure the SIMATIC F-CPU as an I slave and enter at least one transfer area per transfer direction.

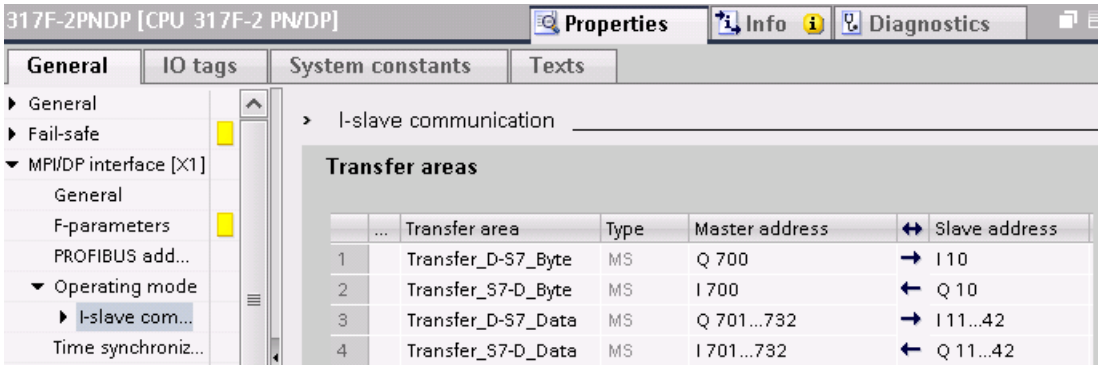


Figure 6-69 I slave communication transfer areas

4. Configure the SINAMICS drive unit (safety configuration) in SIMOTION SCOUT TIA in accordance with your hardware configuration.
5. Then insert a new TO axis in SIMOTION SCOUT TIA and run through the axis wizard. In the wizard, interconnect the axis to the corresponding drive object of the S120 and a corresponding telegram will automatically be created (symbolic assignment).
6. Save and compile the project in SIMOTION SCOUT TIA.
7. Create a PROFIsafe slot in SIMOTION SCOUT TIA in the configuration of the SINAMICS drive unit.
   For this, on tab "IF1: PROFIdrive PZD telegrams", select the drive object that will communicate with the SIMATIC F-CPU via PROFIsafe. Click the "Adapt telegram configuration" button and select "Add PROFIsafe". In the example, a PROFIsafe telegram 901 is configured.

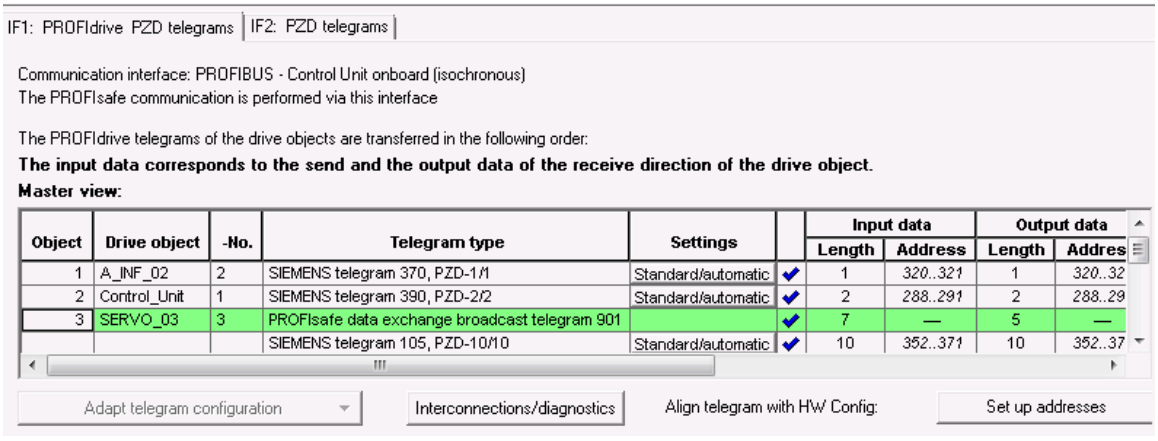


Figure 6-70 Adding a PROFIsafe telegram

8. Transfer the new PROFIsafe slot by clicking the "Set up address" button.
9. Switch to the TIA Portal and in the network view click SIMATIC F-CPU.
10. At the network data, select the "I/O communication" tab. You can show the network data on the right-hand side of the network view.

11. On the transmitter module (SIMATIC F-CPU), select the interface that you want to use for direct data exchange. At "I/O communication", the modules that are configured in this subnet are displayed. Click the SINAMICS drive unit. It is inserted for slave-to-slave communication.

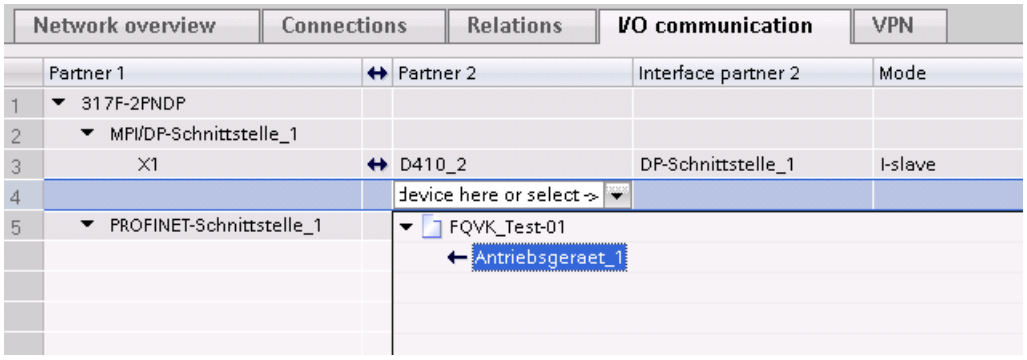


Figure 6-71 Setting up slave-to-slave communication in the TIA Portal

12. On the "I/O communication" tab, click the inserted drive unit. In the "Inspector window", go to the "Properties" tab and then "General" to add a transfer area for fail-safe slave-to-slave communication.

13. Click "<Add new>" and then insert a transfer area of type "F-DX-Mode" and adapt the addresses accordingly.

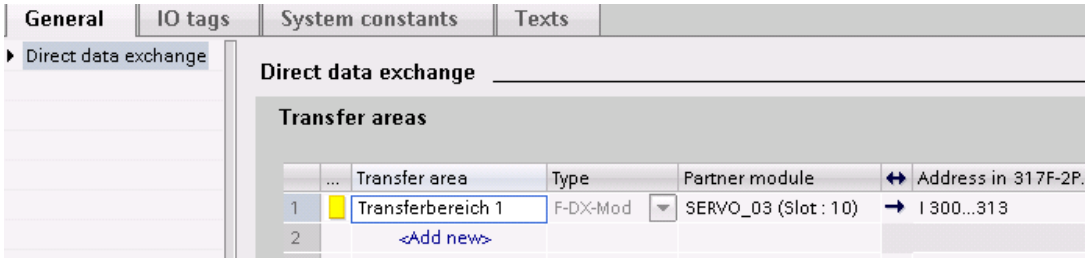


Figure 6-72 Adding a transfer area F-DX-Mode in the TIA Portal

14. Save and compile the project in the TIA Portal. Fail-safe slave-to-slave communication is configured.

6.4 Configuring onboard IO X142

6.4.1 SIMOTION D4x5-2 I/Os (terminal X142)

The I/Os of terminal X142 are permanently assigned to the SIMOTION D4x5-2. The configuration is performed in the device view of the TIA Portal. The digital I/Os on the X142 connector are provided for the connection of sensors and actuators.

The following types of digital inputs/outputs are available:

- Digital inputs (DI)
- Bidirectional digital I/Os (DI/DO, IN/OUT)

Bidirectional digital I/Os can be configured individually as digital inputs or outputs. Assignment of the I/Os to functions can be parameterized as required. Special functions (e.g. input of measuring input and cam output) can also be assigned to the I/Os.

Note

If you want to interconnect a measuring input or an output cam to the terminals X142 in the SIMOTION SCOUT TIA, you can select all of the I/Os (measuring inputs / output cams) configured here.

You can set the following parameters:

Table 6-3 Channels 0-7

Field/button		Meaning/instruction
IN/OUT X142		Inputs/outputs (IN/OUT 0-7) of the X142
Inverter		Button for the inversion
Function		
	DI	Digital input
	DO	Digital output
	Output cam	Output for output cam
	Measuring input	Input for measuring input
IN filter time		
	Filter time	The selection list has the values 1 µs and 125 µs and is available only for the function "DI" and "measuring input".
Logical addr.		PI, PQ for output cams and measuring inputs The displayed logical address of a channel is only required when symbolic assignments are not used.

Table 6-4 Digital inputs and outputs

Field/button	Meaning/instruction
Input addresses	
Start address	Enter the start address of the digital inputs here.
End address	The end address is determined by the length.
Output addresses	
Start address	Enter the start address of the digital outputs here.
End address	The end address is determined by the length.

Configuration of the D4x5-2 I/Os (terminal X142)

The following figure shows an example interconnection to DI, DO, measuring input, and output cam.

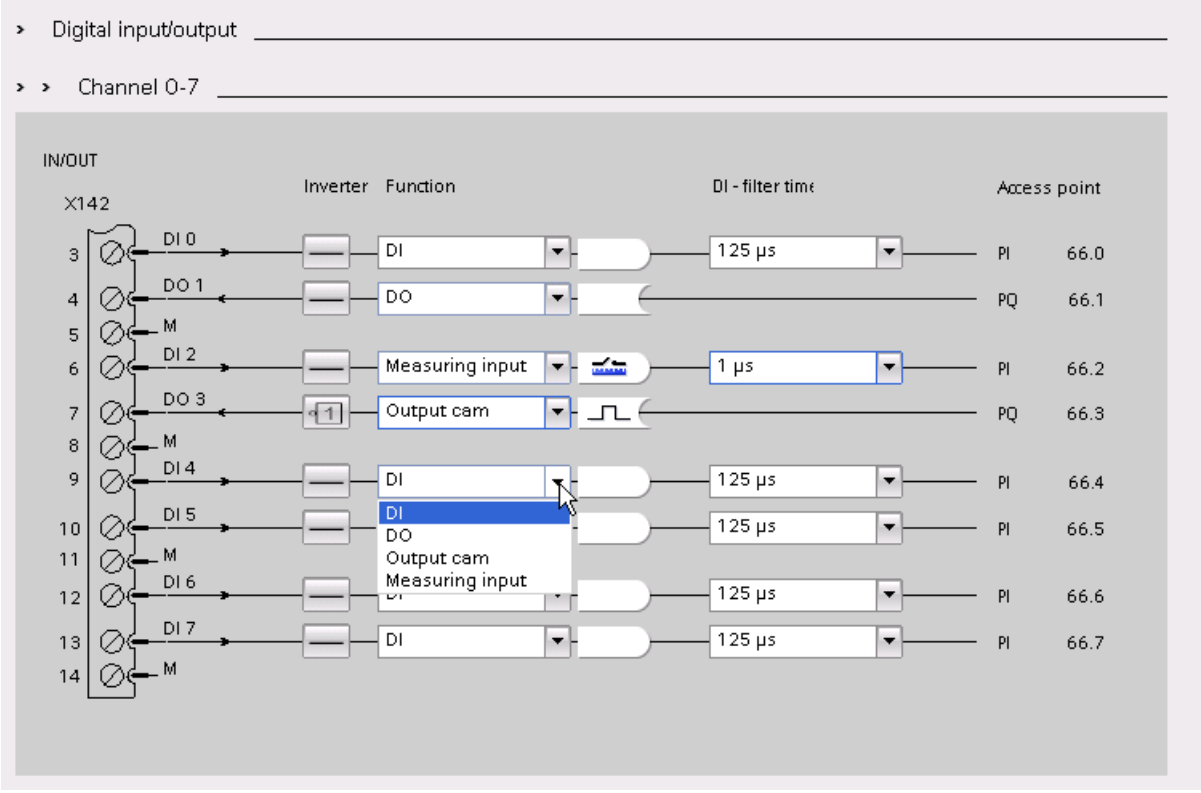


Figure 6-73 Configuration of the D4x5-2 I/Os (terminal X142)

In the SIMOTION SCOUT TIA, you can interconnect the technology object to the configured I/Os of the X142 in the configuration of the technology objects measuring inputs or output cams. In the example, the input X142.6 with the measuring input.

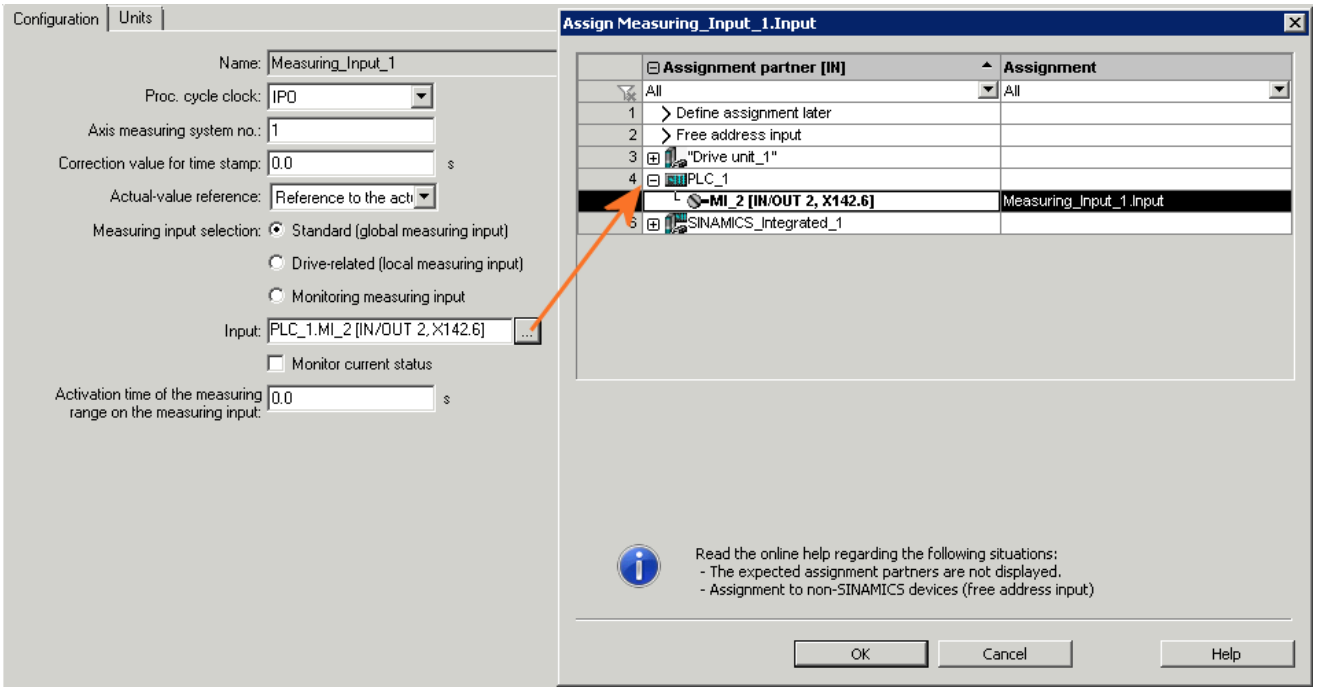


Figure 6-74 Configuring a measuring input at the input X142

6.5 PROFIBUS DP

6.5.1 Settings on the PROFIBUS

Parameterize PROFIBUS DP

PROFIBUS DP is used for communication between the SIMOTION controller and other devices such as drives or other SIMOTION or SIMATIC controllers. Via DRIVE-CLiQ, you can connect additional modules (CX32-2) to the PROFIBUS Integrated.

For the settings that are possible for the different devices, refer to the documentation of the devices that you use.

Creating a PROFIBUS subnet or master system

To create a new PROFIBUS subnet or a DP master system, proceed as follows:

1. Right-click the interface at which you want to create a system.
2. Select "Create subnet" if you want to create a PROFIBUS subnet at this interface.
3. Select "Assign subnet" if you want to assign an existing subnet to the interface.
4. Select "Create master system" if your device is to act as a DP master.

PROFIBUS address

In general, the PROFIBUS address of the interface is assigned automatically.

Reserve PROFIBUS address "0" for a service PG and "1" for a service HMI device which are connected to the subnet as required.

For service purposes, it is recommended reserving the address "2" for a SIMOTION module. This prevents occurrence of duplicate addresses when a SIMOTION D4x5-2 is installed in the subnet using default settings (for example, when replacing a SIMOTION D4x5-2). You should therefore assign addresses greater than "2" to additional units on the subnet.

The PROFIBUS address set in the TIA Portal must match the address that is set on the device.

You edit The PROFIBUS address either in the device view or in the network view:

- In the device view or network view by selecting the device and then clicking the "PROFIBUS address" entry below the "Inspector window > General > <Interface>". There, set the PROFIBUS address in the "Address" drop-down menu.
- In the device view or network view by directly selecting the interface and then clicking the "PROFIBUS address" entry below the "Inspector window > General". There, set the PROFIBUS address in the "Address" drop-down menu.

Operating mode

To create a DP master system, you need a DP master and at least one DP slave. Once you connect a DP master with a DP slave, a master-slave coupling occurs.

You can change the operating mode subsequently:

1. To do this, select the device in the network view.
2. Change to the Inspector window and call the respective interface from the "Operating mode".
3. Activate the option you want to use for your device.

PROFIBUS Integrated

The PROFIBUS Integrated is operated only equidistantly. You can view the settings by clicking the bus in the network view and the "General" tab in the Inspector window under "Properties".

In order to parameterize the isochronous cycle for the PROFIBUS Integrated, proceed as follows:

1. Select the PROFIBUS Integrated in the network view.
2. Select the "General" tab in the Inspector window and click "Equidistance" to display the parameters for the equidistant PROFIBUS.
   The "Activate equidistant bus cycle" setting is permanently selected and cannot be edited.

The other parameters are set to default settings and can be edited.

See also

Drives on PROFIBUS DP (Page 233)

6.5.2 Cycles with SINAMICS_Integrated (<500 µs)

Introduction

As of SIMOTION SCOUT/SIMOTION SCOUT TIA V4.5, SINAMICS_Integrated for drives on SIMOTION D4x5-2 can use bus cycles of less than 500 µs. It supports cycles between 250 µs and 375 µs. SINAMICS_Integrated remains assigned to the servo cycle. Servo_fast is not supported.

Supplementary conditions

The supplementary conditions for deployment of cycles < 500 µs are listed below.

PROFIBUS and Servo_fast

- External PROFIBUS interfaces cannot be used isochronously
- Since a factor of 4 between Servo and Servo_fast is prescribed for cycles of ≤ 250 µs, Servo_fast with 125 µs cannot be used in parallel to SINAMICS_Integrated with 250 µs.
- Because the Servo cycle must be a multiple of the Servo_fast cycle, Servo_fast cannot be used:
  - Servo_fast > 250 µs: N = 2, 4, 8, 16, 32, ...
  - Servo_fast ≤ 250 µs: N = 4, 8, 16, 32, ...

Number of axes

With regard to utilization, SINAMICS_Integrated is subject to the same restrictions as those applicable to an external SINAMICS drive.

If the SINAMICS_Integrated is operated with a DP Integrated cycle clock of 250 µs or 375 µs, the resultant utilization is higher in comparison to a cycle clock of ≥ 500 µs. Depending on the utilization situation (e.g. by deployed ALMs, CXs, TMs), this can result in a reduction in the number of axes (e.g. from six to five servo drives).

The higher utilization can result in a reduction of the quantity structure for vector and V/f-controlled drives.

CBE30

CBE30 supports a minimum send cycle of 500 µs. The SINAMICS_Integrated can only be operated with 250 µs if no isochronous communication is configured for the CBE30. If the CBE30 operates isochronously (assignment to the Servo), the Servo has a minimum cycle of 500 µs.

6.5.3 Setting the equidistant PROFIBUS

Configuring the equidistance

The PROFIBUS properties of "isochronicity" and "equidistance" form the basis for synchronized editing cycles.

Equidistance ensures exactly the same interval for bus cycles. The "Constant bus cycle time" function ensures that the DP master always starts the PROFIBUS DP bus cycle within a constant time interval. Therefore, the connected slaves also obtain their data from the master in exactly constant time intervals. This is also called "clock of the bus cycle."

Equidistance is the requirement for isochronous operation. For instructions on setting isochronicity, refer to Drives on PROFIBUS DP (Page 233).

Equidistant PROFIBUS

In order to perform the settings for the PROFIBUS, select the bus in the network view.

1. In the Inspector window, select the "Properties > General" tab and click "Equidistance".
2. Parameterize the bus settings there.

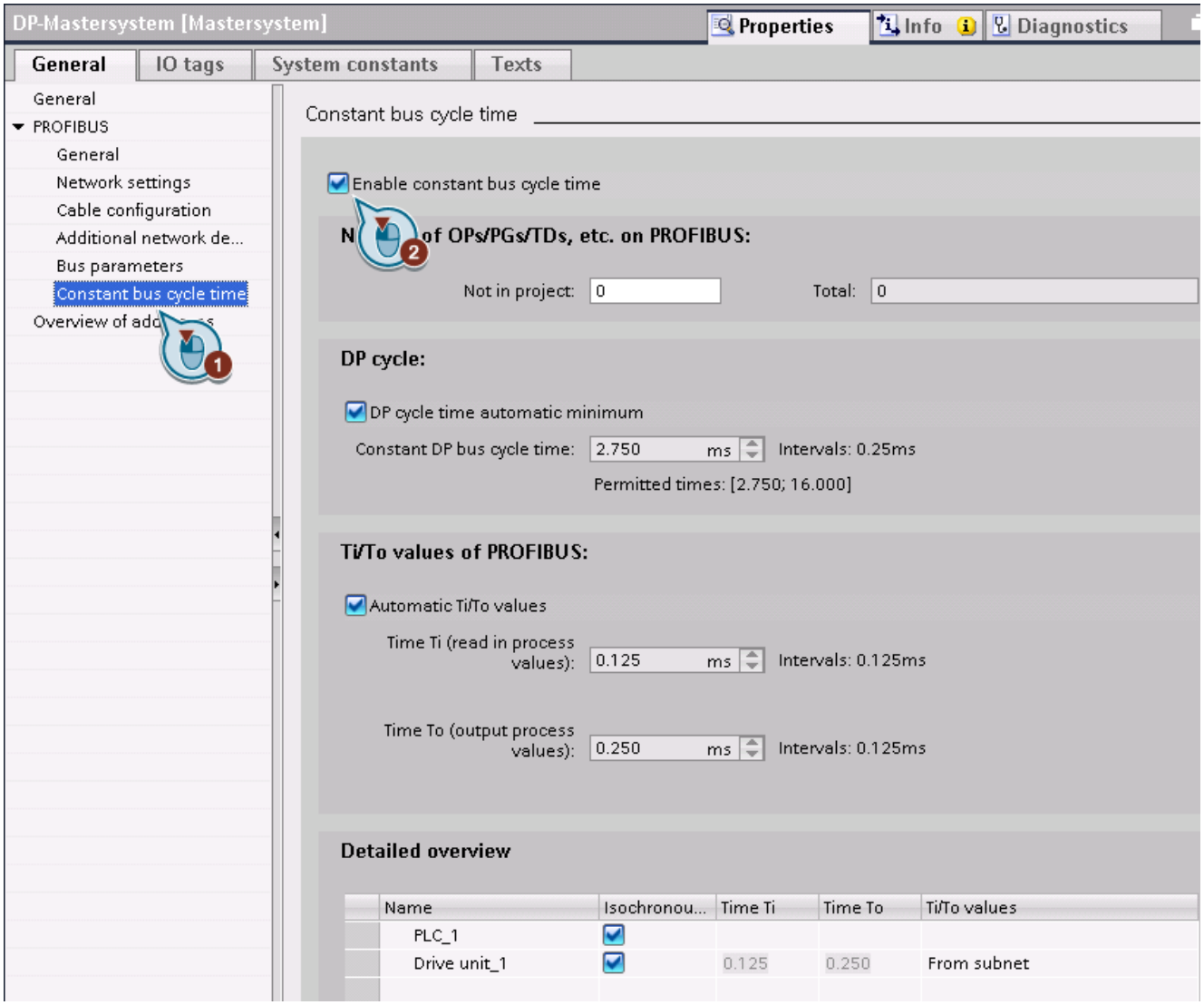


Figure 6-75 Configuring the equidistant PROFIBUS

Parameter		Description
Activate the equidistant bus cycle		Activate this option if you want to operate the bus isochronously.
DP cycle		
	DP cycle time automatically minimal	Activate this option if you want to assign the values automatically with the minimum value.
	Equidistant DP cycle	The equidistant DP cycle in which the master exchanges data with all slaves is set here.
Ti/To values of the PROFIBUS		
	Ti/To values automatic	Activate this option if you want to assign the values automatically.
	Time Ti (read in process values)	Specifies at what time Ti before the start of the "DP cycle", the actual position value (process value) is recorded.
	Time To (output process values)	Specifies at what time To after the start of the "DP cycle" the controller transfers the setpoint (e.g. speed setpoint).

Detailed overview

For an overview of the current settings and nodes on the equidistant PROFIBUS DP, select the "Properties > General" tab in the Inspector window and click "Equidistance". The "Details view" is located in the lower area of the "Equidistance" tab.

6.5.4 Drives on PROFIBUS DP

Settings on PROFIBUS DP

Drives are normally operated on the PROFIBUS DP as slave on a higher-level controller. There is also the possibility of operating the bus equidistantly and isochronously.

For an isochronous mode, you have to click the "Activate equidistant bus cycle" option on the bus, see also Settings on the PROFIBUS (Page 229).

More settings on the drive (DP slave) are necessary for an isochronous PROFIBUS.

For detailed information, refer to the information system of the TIA Portal under "Isochronous" and "Equidistant" operation.

Drive units that are not networked or are assigned to a DP master are not displayed in SIMOTION SCOUT TIA.

Set the isochronization on the drive

1. Click the interface of the drive in the network view.
2. In the "General" inspector window, select "Isochronization."
3. Activate the "Synchronize DP slave to constant DP cycle" option.

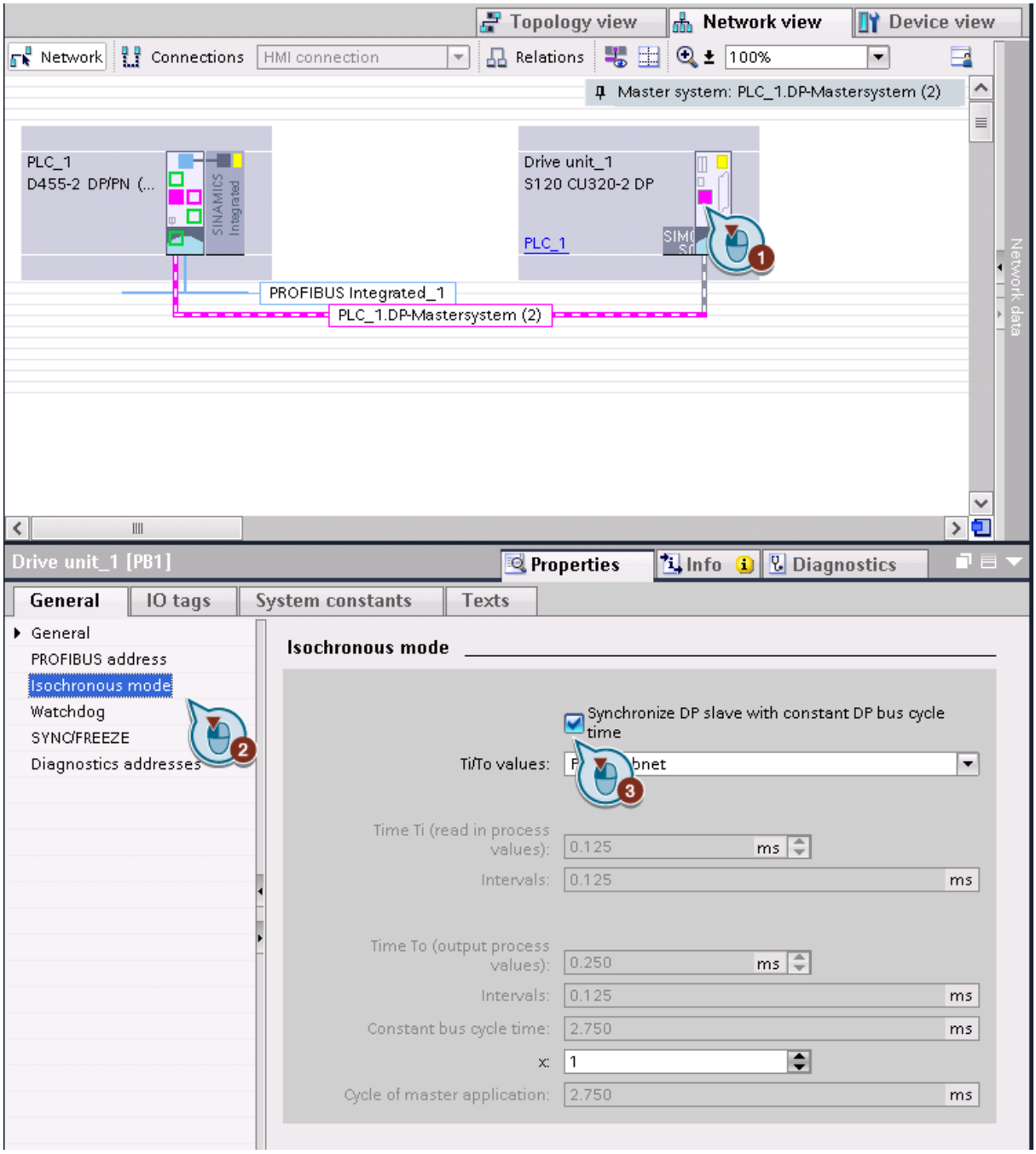


Figure 6-76 Isochronous drives on PROFIBUS DP

The following settings can be made:

Parameter	Description
Synchronize the DP slave to equidistant DP cycle	Activate this option if you want to synchronize the drive (DP slave) to the equidistant DP cycle.
Ti/To values	From the drop-down menu, select whether you want to enter the Ti/To values manually or obtain them from the subnet. The values for Ti/To are then set the same for all DP slaves.

Parameter	Description
Time Ti (read in process values)	Specifies at what time Ti before the start of the "DP cycle", the process value (actual position value) is recorded. If several drives operate as group, the same value for all axes should be entered here.
Grid	Indicates in which field the value is read.
Time To (output process values)	Specifies at what time To after the start of the "DP cycle" the controller transfers the process value (e.g. speed setpoint). If several drives operate as group, the same value for all axes should be entered here.
Grid	Indicates in which field the value is read.
Equidistant DP cycle	Displays the calculated cycle time in the equidistant PROFIBUS.
x	Factor which is multiplied by the cycle time.
Cycle of the master application	Enter the master application cycle here. The cycle describes the reduction ratio between the DP cycle and the cycle of a higher-level controller, e.g. the servo cycle of a SIMOTION controller.

6.5.5 Direct data exchange via PROFIBUS DP

Configuring direct data exchange between two controllers

Master-slave communication is possible between two SIMOTION controllers via PROFIBUS DP using direct data exchange.

You can find more information in the information system of the TIA Portal under "Direct data exchange."

One module is the DP master, the other module is the I slave. This makes, for example, distributed synchronous operation on two modules possible.

Procedure

To configure communication for this topology, proceed as follows:

1. Insert two SIMOTION modules in the TIA Portal.
2. Create a DP master system. Preferably, you should create the system on the module that is to be the DP master and drag the PROFIBUS DP onto the second module.
3. In the network view, select a module which is to be the master.
4. In the inspector window on the "General" tab under the interface used under operating mode, select the option "DP Master."
5. In the network view, select a module which is to be the I slave.
6. In the Inspector window on the "General" tab under the interface used, select the item "Operating mode".
7. Select the "DP Slave" option.
   The direct data exchange is automatically created and displayed under I/O communication.

8. In the "Assigned DP master" dropdown list, select the controller with the interface being used. Additional parameters are listed under "I-Slave communication":

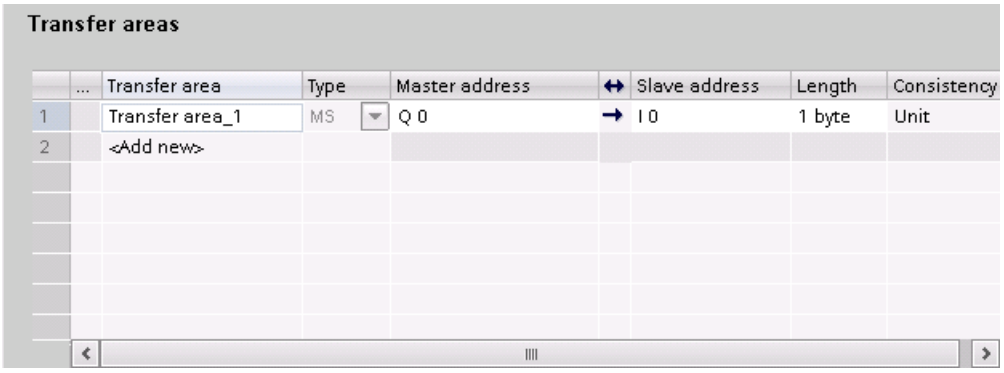


Figure 6-77 Transfer area

9. Under "Transfer areas" click "Add new". A new transfer area is created.
10. Select type "MS" (Master - Slave).
    The addresses are entered automatically.
11. In the "Transfer direction" column, click the arrow to reverse the communication direction. This activates data transfer from the "sender" (master) to the "receiver" (I-Slave) and vice versa.

Type of transfer areas

In the TIA Portal, different types of communication (PROFIBUS, PROFINET) can be configured. Depending on this configuration, different short codes are displayed as the transfer area type.

- PROFIBUS DP
  In master I-slave communication, "MS" is displayed as the type. For synchronous and distributed synchronism configurations that are generated automatically by SIMOTION SCOUT TIA, "M-MS" is displayed as the type. M-MS means motion control with master I-slave communication.

See also

F proxy with SIMOTION (Page 190)

Configuring an HMI connection 7

7.1 Supported HMI panels

An overview of the HMI panels supported with SIMOTION SCOUT TIA can be found in the Internet at: Compatibility list (https://support.industry.siemens.com/cs/ww/en/view/18857317).

7.2 Adding an HMI

Note

You can only add an HMI device in the TIA Portal.

An HMI device can communicate with a SIMOTION device via the PROFINET, Ethernet and PROFIBUS bus systems. The SIMOTION device and the HMI operator panel can exchange information about variables for technology objects, system variables and global user variables.

Procedure

To add an HMI, proceed as follows:

1. In the network view, browse to the "Hardware Catalog" task card and open the "HMI" component.
2. Open the folder of the panel type, "SIMATIC Comfort Panel" in the example.

3. In the folder for the display size, select the installed panel, "15" Display > TP1500 Comfort" in the example.
4. Drag the HMI panel into the network view of your project.

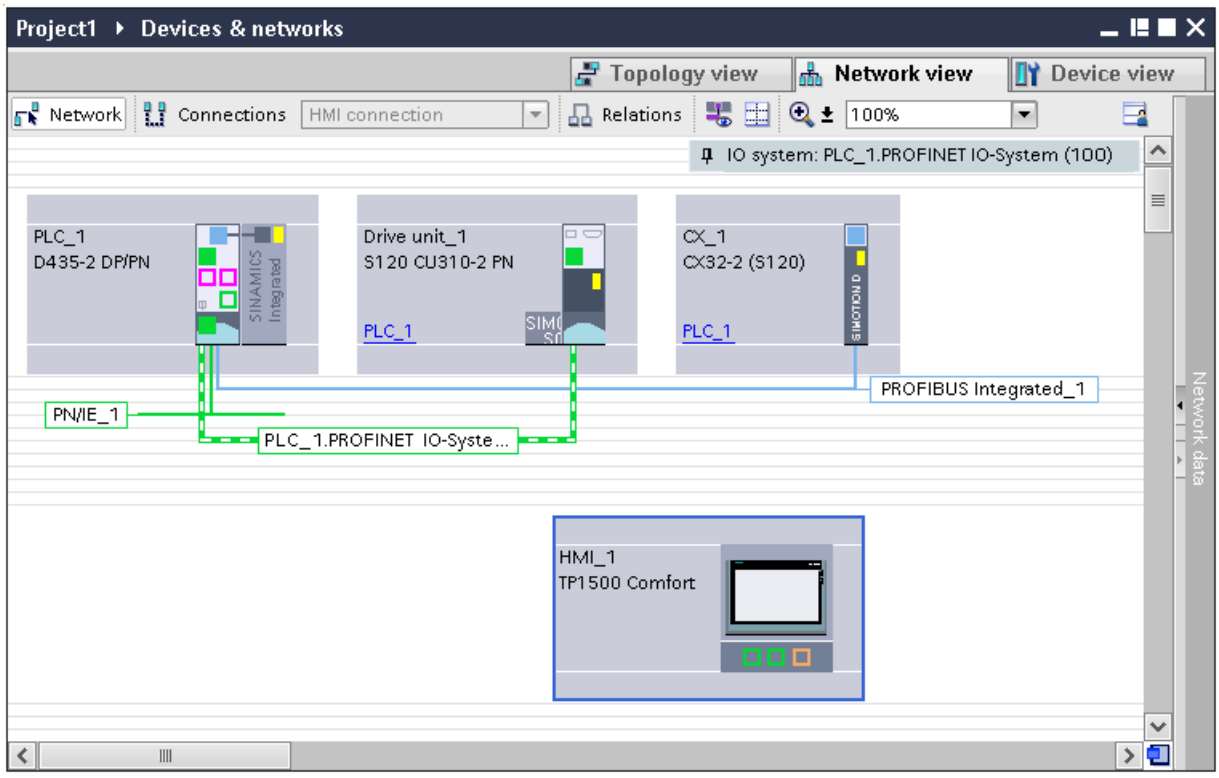


Figure 7-1 HMI in the network view

Result

The inserted HMI is visible in the project navigator.

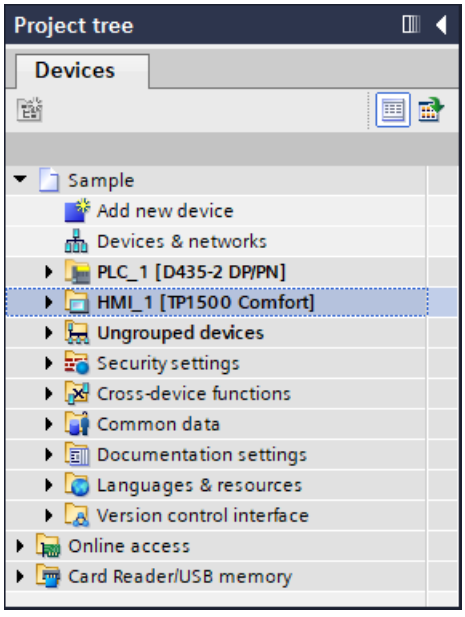


Figure 7-2 HMI in the project navigator

7.3 Synchronizing SIMOTION variables and messages

So that they can be displayed on an HMI, the variables and messages of SIMOTION SCOUT TIA must be transferred to the TIA Portal.

Procedure

To determine when the variables and messages will be transferred, proceed as follows:

1. Switch to SIMOTION SCOUT TIA.
2. Select "Options > Settings" in the menu.
3. Switch to the "WinCC" tab and select when the data is to be synchronized, e.g. "Automatically with Save and compile".
4. Save and compile your project.

Result

The variables have been transferred to the TIA Portal and can be called there in the project navigation below the SIMOTION device with the "SIMOTION variables > Show all variables" entry.

Note

SIMOTION variables

The following SIMOTION variables are visible after synchronization in the TIA Portal:

- System variables of the technology objects and of the SIMOTION device
- Configuration data of the technology objects
- Global device variables
- Global unit variables
- I/O variables

User-defined data types are also available in the TIA Portal.

The messages (user alarms and alarms of the technology objects) have been transferred to the TIA Portal and are available there for the message configuration for the HMI.

Note

SIMOTION messages

The following messages are also available in the TIA Portal after transfer and/or synchronization:

- Alarm_S messages (TIA Portal text lists are supported)
- TO alarms (separate alarm class in the TIA Portal)
- User-defined diagnostic buffer entries
- System-side diagnostic buffer entries

The display language for the entire project including message texts is set in the project navigation of the TIA Portal at "Languages & Resources".

Additional references

You will find detailed information on creating and compiling message texts in Section "Message configuration" in the SIMOTION SCOUT TIA Online Help.

See also

Using tags (Page 295)

7.4 Creating an HMI connection

To make this connection, the SIMOTION device and the HMI device must have been created in HWCN. The HMI device must support SIMOTION CPUs.

There are two ways of establishing the communications connection between the SIMOTION CPU and the HMI device:

- The communications connection is configured manually in the network view.
- The communications connection is generated automatically when a SIMOTION variable is used in an HMI image.

Configuring an HMI connection manually

To configure the HMI connection manually, proceed as follows:

1. Switch to the network view.
2. Click Connections and select "HMI connection" in the drop-down list.
   The connection option is then highlighted in color.

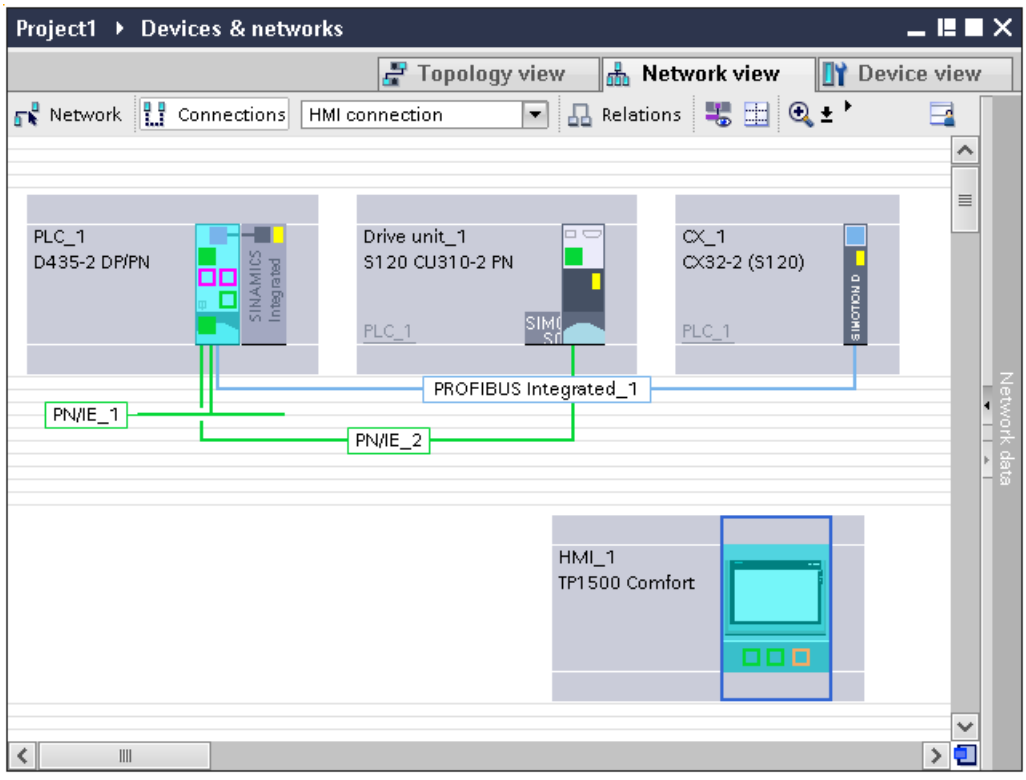


Figure 7-3 Displaying an HMI connection

3. Move a connection from the HMI device to the SIMOTION device with a drag-and-drop operation.

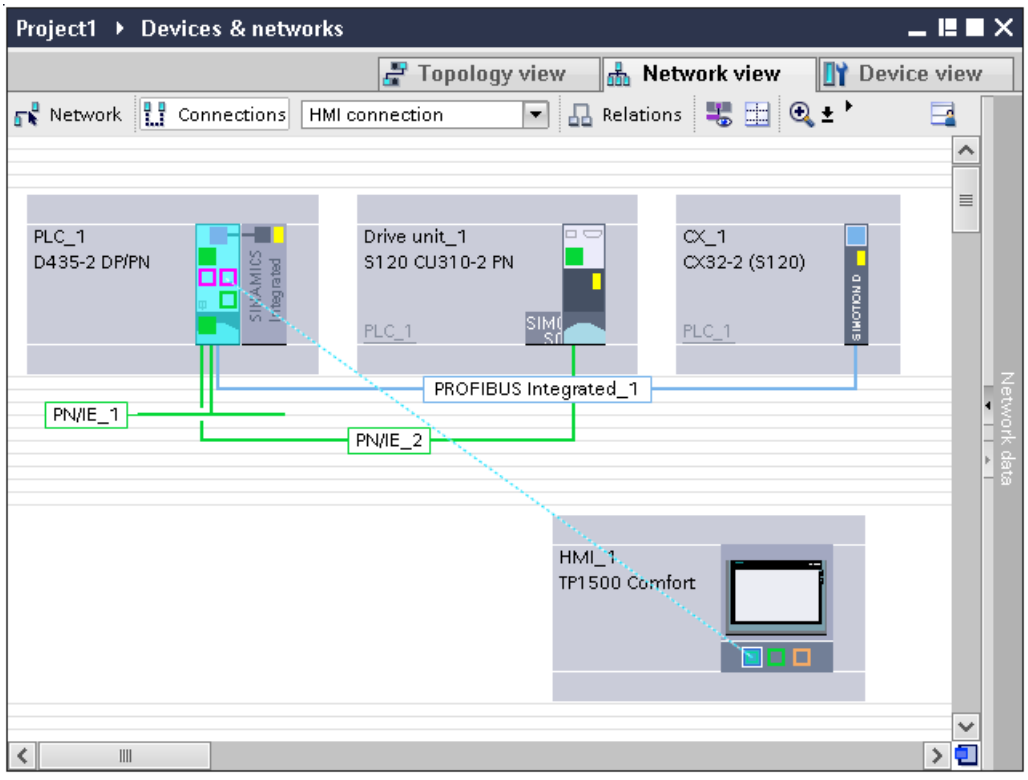


Figure 7-4 Configuring an HMI connection

The parameters of this connection are displayed in the "Properties" tab of the inspector window.

You can specify the connection subsequently here and/or create a suitable connection path to the partner via "Find connection path".

Result

The HMI connection has been established.

You can connect parameters in the "Connections" editor.

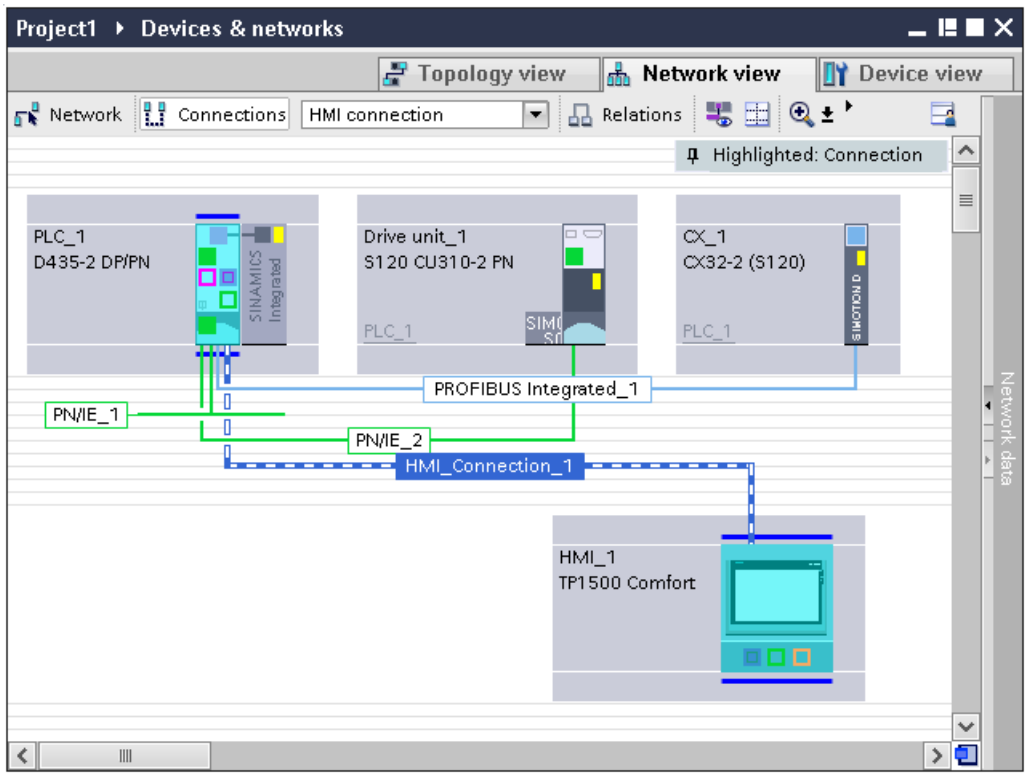


Figure 7-5 HMI connection created

Generating an HMI connection using variables

To generate the HMI connection using variables, proceed as follows:

Creating an HMI screen

1. In the TIA Portal, browse to the HMI in the project navigator.
2. Click "Images" and double-click "Insert new image".

Adding I/O fields

1. In the "Tools" window, select the desired element.

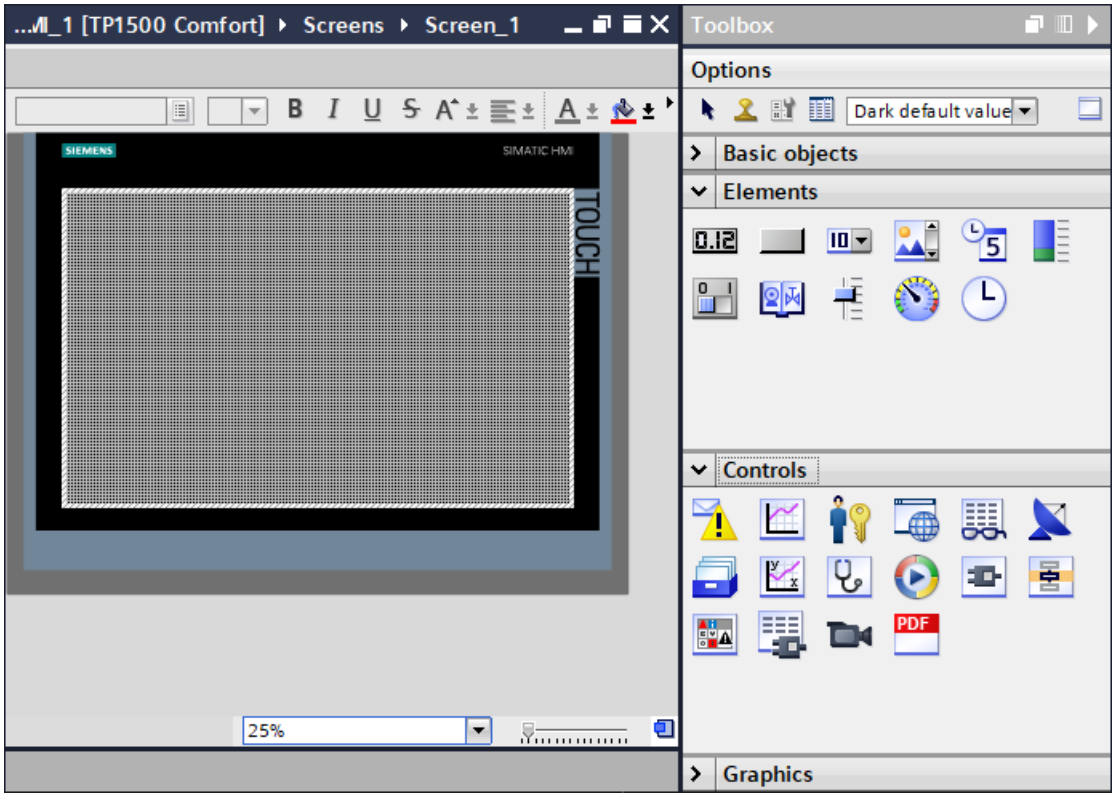


Figure 7-6 Selecting an element

2. Drag the element to the approximate position on the screen at which you want it to appear later.
3. Select the element and switch to the properties window.
4. In the navigation, select the entry "General".
   In this area, you can configure the connection of the process variables and settings to the mode and displayed format.
5. Drag the variable from the project navigator to the properties window onto the "Variables" entry.

Result

The system automatically creates an HMI variable assignment.

You can see the assignment of the connections in the network view of the device configuration.

7.5 Testing the connection

To test the created connection with the HMI device in the TIA Portal, proceed as follows:

1. Configure an alarm window on the HMI device.
   To do this, select the object "Alarm control" under "Controls".
2. Define "Alarm buffer" as display setting.
3. Compile the project.
4. Load the project to the controller and to the HMI device.
5. Switch the controller's operating mode to RUN.

Result

Buildup of the connection is displayed in the alarm window.

Motion Control parameterization/programming in SIMOTION SCOUT TIA

8

8.1 Start SIMOTION SCOUT TIA

Note

You can only start SIMOTION SCOUT TIA from the TIA Portal.

After you have created the project in the TIA Portal and you have configured the hardware and communication, start SIMOTION SCOUT TIA to configure the technology.

Procedure

You can start SIMOTION SCOUT TIA in the following ways:

In the portal view

1. Click the "Motion & Technology" function.
2. Click the "Open SIMOTION configuration" entry in the secondary navigation.

In the project view

1. Start SIMOTION SCOUT TIA via the "Project > Open SIMOTION configuration" menu.
   Or double-click the "SIMOTION configuration" menu entry below the SIMOTION device in the project navigation.

Note

Disconnecting the online connection to the TIA Portal

You should not go online simultaneously in the TIA Portal and SIMOTION SCOUT TIA.

Always disconnect the online connection in the TIA Portal before going online with SIMOTION SCOUT TIA. You need to do this so that programs can be compiled in SIMOTION SCOUT TIA.

Making basic settings

In SIMOTION SCOUT TIA, you can make various basic settings via the "Options > Settings..." menu.

To make the settings, proceed as follows:

1. In the "Options" menu, select the "Settings..." command.
   The "Settings" dialog opens.
2. Switch to the desired tab.

3. Make the settings.
4. Confirm with "OK".

Additional references

You will find detailed information on the individual tabs and settings in the SIMOTION SCOUT TIA Online Help.

8.2 Going online/offline with SIMOTION SCOUT TIA

8.2.1 Selecting the access point and target devices

8.2.1.1 Online access points

You have two access points for the communication of SIMOTION SCOUT TIA with controllers and drive units.

- The properties of the access point **S7ONLINE** are defined in the TIA Portal. With this access point, you go online via the interface that you have configured in the TIA Portal. The settings in SIMOTION SCOUT TIA are not used and are not effective.
  The settings for this access point are taken from the TIA Portal.

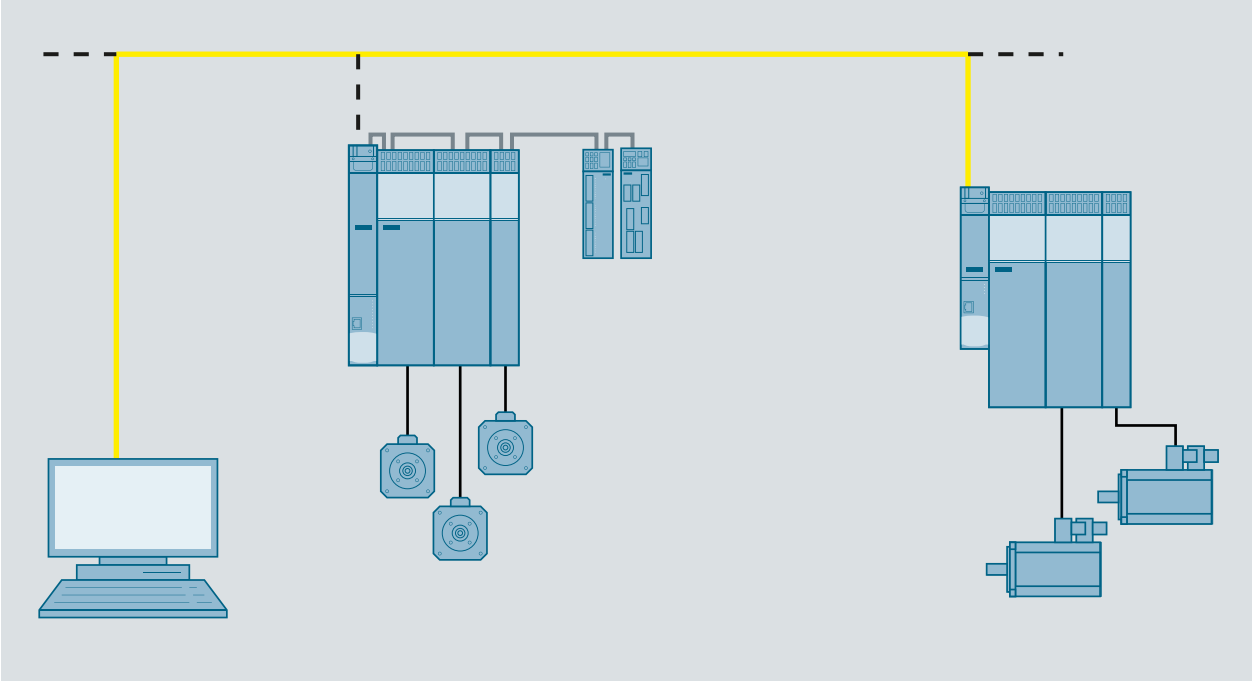


Figure 8-1 S7ONLINE

- The **DEVICE (STARTER, SCOUT)** access point provides the option of connecting SIMOTION SCOUT TIA (either in parallel or alternatively to S7ONLINE) directly to a device, e.g. via the Ethernet interface. In this way, you can communicate quickly, without changing the project settings, with the device either via the system network or via a separate connection in order, for example, to adapt the parameterization or read out the diagnostics information. The DEVICE access point does not exist in the TIA Portal. Thus, the settings for this access point can be configured only in SIMOTION SCOUT TIA.

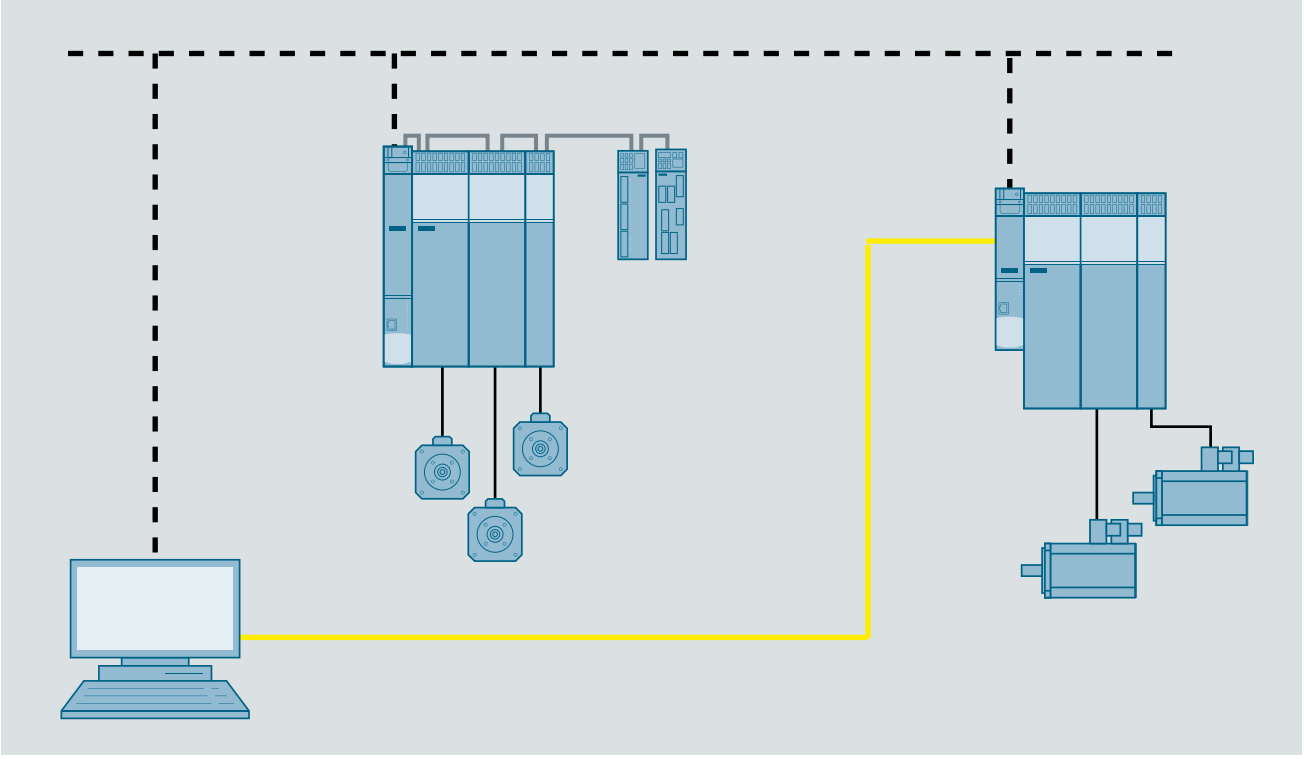


Figure 8-2 DEVICE

It is therefore possible to configure both access points for a device and to go online via these points.

See also

Select target devices (Page 253)

8.2.1.2 Available nodes

The function "Accessible nodes" in SIMOTION SCOUT TIA enables you to identify devices in a network and go online with them.

Note

The search for accessible nodes assumes that no online connection with an opened project exists.

Displaying accessible nodes

Proceed as follows to identify accessible nodes:

1. Select "Project > Accessible nodes" in the menu.
   All the devices found in the network are listed in the working area below the folder "Accessible Nodes". Type information is also displayed for the devices.

Assigning interface parameterization to an access point

To create a connection between the access point, the interface parameterization, and the interface, proceed as follows:

1. Click the "PG/PC..." button to open the "Set PG/PC Interface" dialog.
2. At "Access point of the application", select the DEVICE access point to which you assign the interface parameterization.
3. Select one of the interface parameterizations to assign it to the access point, modify its properties, copy it, or delete it.
4. Click "OK" to accept the settings.
5. In the working area, click "Update" to restart the search for accessible nodes.

Note

The settings in SIMOTION SCOUT TIA are only accepted for the access point DEVICE. The access point S7ONLINE must be configured in the TIA Portal.

Searching for accessible nodes via the IP address

With TCP/IP interface parameterization you can search for nodes via the IP address. Enter the IP address in the "IP address of the sought node:" field.

For the automatic detection of accessible nodes via a PG/PC interface with TCP/IP, the nodes must be connected to the same physical Ethernet subnet as the PG/PC. Once a device is downstream of an IP router and so located in another physical Ethernet subnet, this device will no longer be automatically detected in "Accessible nodes".

You can also enter an IP address and check whether it is possible to access a node downstream of an IP router with the configuration currently set on the Ethernet adapter located in the PG/PC (IP address / subnet mask).

Displaying additional information

To display additional information about identified devices, proceed as follows:

1. Right-click on a device or drive unit and select, for example, one of the following options from the shortcut menu:
   - "Device Diagnostics"
   - "Operating state..."
   - "Licenses"
   - "Edit Ethernet Node..."
   - "Flashing"

See also

Setting the access point on the PG/PC (Page 252)
Select target devices (Page 253)

8.2.1.3 Setting the access point on the PG/PC

Note

The data for the PG/PC interface can only be changed when the interface is not online. If several instances of SIMOTION SCOUT TIA have been started, an online connection can only be established from one of the instances. An attempt to go online simultaneously from several SIMOTION SCOUT TIA applications to different CPUs results in errors.

Using S7ONLINE

SIMOTION SCOUT TIA takes the settings for the S7ONLINE access point from the TIA Portal. At "Online accesses", select the following settings:

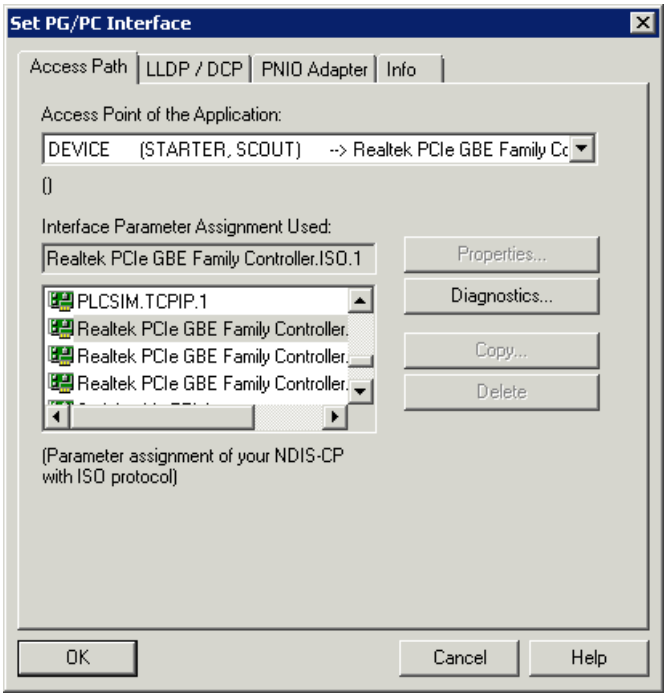
1. PG/PC interface type
2. PG/PC interface
3. Connection with interface/subnet
4. "1st gateway"
5. Device address

The settings for S7ONLINE in the "Set PG/PC Interface" dialog box are not applied.

Setting the DEVICE access point

Proceed as follows to set the DEVICE access point:

1. Select "Options > Set device access interface..." in the menu.
   The "Set PG/PC Interface" dialog box opens.
2. Select the DEVICE access point at "Access point of the application":



3. At "Interface parameterization in use", select the interface with which you want to go online via the selected access point.
4. Confirm your selection with OK.

8.2.1.4 Select target devices

With the target device selection, you specify whether an online connection to this device will be established and which access point will be used when you perform "Connect to selected target devices".

Procedure

To select a target device, proceed as follows:

1. Select "Target system -> Select target devices ..." in the menu.
   The "Target Device Selection" dialog opens.

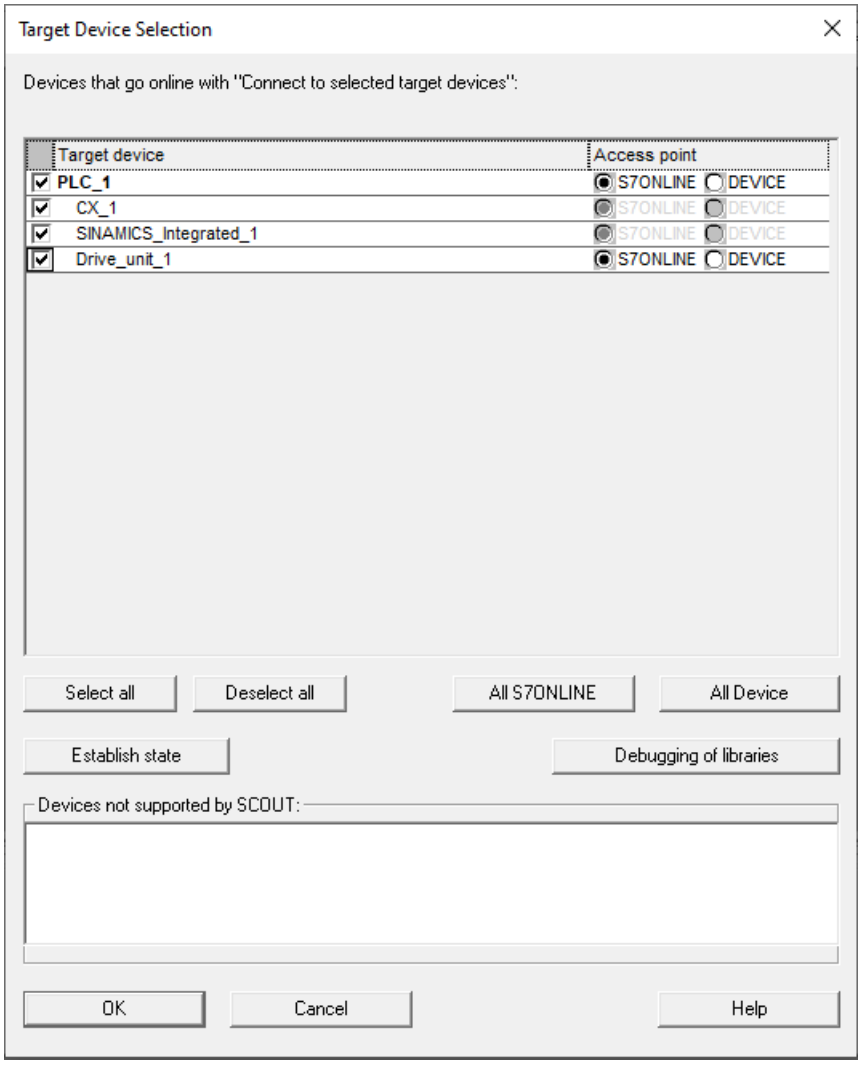


Figure 8-3 Selecting target devices and access points

2. Activate the checkbox for the respective device.
3. Click the "Establish state" button.

- Establish a connection to a device that was deselected when going online and that has been subsequently selected.
- Separate a connection to a device that was selected when going online and that has been subsequently deselected.

8.2.2 Save project and compile changes

Overview

Note

You can only "save a project and compile changes" in SIMOTION SCOUT TIA.

"Save project" in SIMOTION SCOUT TIA automatically performs a "Save project" in the TIA Portal.

Always cancel the online connection in the TIA Portal before you perform "Save and compile project" in SIMOTION SCOUT TIA.

To download a project to the target system, it must first be saved and compiled into an executable code. Only the compiled code can be downloaded to the target system and executed.

By default, "Save and compile" is performed automatically for a download if the appropriate option is activated under "Options > Settings..." in the "Download" tab.

Save project

With "Save project", the project is saved to the hard disk. The changes are accepted into the project. No further processes (such as compilation or consistency checking) are triggered for the project.

Procedure

To save a project, proceed as follows:

1. Select "Project > Save" in the menu.

Save project and compile changes

"Save project and compile changes" searches through the entire project for changes. If a source is found which has been changed or has no compilation results, this and any linked sources are compiled and saved (e.g. during an FB call). Therefore only the changes are compiled.

Procedure

To save and compile a project, proceed as follows:

1. Select "Project > Save and compile changes" in the menu.
   Or click the "Save project and compile changes" button in the toolbar.

The compilation run is logged in the detail view of the workbench. Information, warning and compilation errors are shown there in plain text.

Saving projects and recompiling all

With "Save and recompile all", all sources of the entire project are recompiled. The command is suitable if you are quite sure that all the old data from older versions should be removed and replaced with new compilation results. The function comprises the following steps:

- Project-wide deletion of all compilation results
- Recompilation of all objects

Procedure

To save and recompile data, proceed as follows:

1. Select the "Project > Save and recompile all" menu command.

The compilation run is logged in the detail view of the workbench. Information, warnings and compilation errors are shown there in plain text.

8.2.3 Check consistency

Overview

Use "Check consistency" to check the current configuration and parameterization of the project for formal errors in the data.

This allows you to determine that the programmed configuration is consistent with the defined hardware configuration.

Procedure

To check the consistency of a project, proceed as follows:

1. Select "Project > Check consistency" in the menu.

The results of the consistency check are logged in the detail view of the workbench in the "Compile/check output" tab.

8.2.4 Connect to selected target devices

8.2.4.1 Overview

Use the "Connect to selected target devices" function to go online with the device connected to the PG/PC. You can send and receive data.

Requirements

- You have created a subnet for the PG/PC interface in the TIA Portal.
- You have assigned the PG/PC interface to the subnet in the TIA Portal (see also Setting up the PG/PC communication (Page 106)).
- In the TIA Portal, you have loaded the hardware configuration into the SIMOTION device (see also Setting up the PG/PC communication (Page 106)).
- You have disconnected the online connection in the TIA Portal.

Establishing an online connection

To establish an online connection, proceed as follows:

1. Select "Project > Connect to selected target devices" in the menu.
   Or click the "Connect to selected target devices" button in the toolbar.
   The "Target Device Selection" dialog opens.
2. In this dialog, check the settings of the target device selection and the access points and confirm with "OK".
   Devices not selected in this dialog but still online will not be disconnected from the target system.

Establishing a selective online connection

To establish a selective online connection, proceed as follows:

1. Select a CPU or a drive in the project navigator.
2. Perform "Connect target device" in the context menu to establish a specific connection to this drive.

Result

- The connection will be established and the project checked for consistency.
- The footer area indicates that the system is online.
- The detail view shows the drives control panel.
- In the project navigator, the status of the online connection is indicated in a color by the connector icons.

Consistency display (connector icons)

Each element in the project navigator has its characteristic icon. In online mode, the icons are highlighted in color or additional icons (connector icons) are displayed which are characteristic for the PG/PC to target system connection.

The following table provides an overview of the meaning of the various icons.

Icon	Description
	The SINAMICS drive unit / element of a drive unit (DO) is in online mode. There is an inconsistency in terms of the data contents (parameter values) of the drive unit / element. SINAMICS drive unit / element of a drive unit (DO) is in online mode. There is an inconsistency in terms of the data contents (parameter values) of the drive unit / element. Possible reasons for the inconsistency: • At least one parameter value differs between the project data and the actual values in the target system. • Sequential parameterization: After a parameter assignment has been downloaded, sequential parameterization may be required once data has been received in the drive. In this case, you must perform an upload for alignment purposes. Note: • If the inconsistency is displayed by means of the icon in the project navigator, you can display the inconsistency in detail using the object comparison. Depending on the result, you can then decide whether or not an upload or download is necessary. • If this icon is displayed, it may be that, depending on the mechanism used, the parameters of a DO that are marked with this icon will be marked as "equal" in the object comparison. The object comparison is based on a direct comparison of all the values for the element and, therefore, provides the correct difference.
	The component (drive object) is in online mode. The component is physically present in the RAM of the drive unit or project data in the main memory of the PG/PC is identical with the project data of the component present in the RAM.
	The component (drive object) is not in online mode. The component is not physically present in the RAM of the drive unit or the connection to the target device is broken.

Icon	Description
	The device was not selected during the change to online mode. There is no connection to this device.
	Device/element is in online mode. There is an inconsistency between the project data of the device/element in the PG/PCs and the actual values of the device/element in the target system. • Possible reasons for the inconsistency – SIMOTION CPUs/TOs/Units: – Configuration data of a technology object changed / technology objects added – Change in a program source, in a global device variable, or in the address list – Change to the default value of a system variable • Possible reasons for the inconsistency – drive unit / DO, e.g. due to: – Change in the name of a DO – Change in the type of drive object (DO) from SERVO -> VECTOR – Selection/deselection of different function modules – Addition/removal of DDS/CDS – Addition of a DCC chart to a drive object (DO) Structural changes have been made to the DO. If this inconsistency is present, integrated online diagnostics cannot be performed on the device/element. Remedy: In the event of this inconsistency, save the project and reload the new project data to the target system. Note: If an inconsistency is displayed by means of the icon in the project navigator, you can display the inconsistency in detail using the object comparison.

No connection could be established to SINAMICS Integrated/drive units

1. Check the messages in the output window.
2. Perform a project download to load the project data to the device and establish a connection. Select "Project > Download to target system" in the menu.

You will find more information in Section Loading data to the target system (Page 262).

Note

You must make sure that you go online via the selected interfaces. If, for example, you have configured the incorrect interface for the S7ONLINE access point, you will not go online. Therefore, if required, check the settings made there.

Additional references

You will find more information in Section "Set interface" of the SIMOTION SCOUT TIA Online Help.

8.2.4.2 Problems when going online

Not possible to connect to target system

If you cannot go offline with the project despite proceeding as described above, check the following settings:

- Network connections (TIA Portal)
- PG/PC interface access point S7ONLINE (TIA Portal)
- Access point Device (SIMOTION SCOUT TIA)
- Bus address of the devices or IP address (TIA Portal)
- Firmware version of the device (SIMOTION SCOUT TIA)

Subsequently we describe the procedures that are particularly easy to implement.

You have the choice of communicating with the controller via PROFINET/Ethernet or PROFIBUS. These options also provide maximum flexibility in the choice of a teleservice connection (teleservice via PROFINET/Ethernet or PROFIBUS). This access method, which is specified once, enables you to use routing to access other controllers and drives connected to the SIMOTION controller via PROFINET/Ethernet or PROFIBUS.

You can also access the SIMOTION controller via existing routing connections to other controllers, without there being a direct connection between the PG and the SIMOTION controller.

However, these options require that an online access is specified during the initial commissioning. This description explains the procedure for the initial commissioning (or when changing the access settings). When this configuration has been performed correctly and completed, going online then is practically only at the touch of a button.

Only procedures that always and safely result in success are described here. Depending on the initial situation, a different procedure is also possible with sufficient knowledge.

PG/PC interface (access point S7ONLINE) configured in the TIA Portal?

Were you online with the TIA Portal and have you configured the PG/PC interface?

Before you can go online with the SIMOTION SCOUT TIA, you must configure the interface on which you want to go online. Perform this step in the TIA Portal.

Possible sources of error include:

- You are still online with the TIA Portal. Disconnect the online connection.
- You have not assigned the controller to any subnet. Instructions for assigning the controller to a subnet are described in the SCOUT TIA Online help in the TIA Portal.
- IP address and subnet screen of the PG/PC and the controller are not on the same subnet. Adapt the IP address / subnet of the PG/PC in the Windows Control Panel or automatically assign a temporary IP address via the TIA Portal. Associated information is contained in the SCOUT TIA online help in the TIA Portal.
- In the TIA Portal, check with which interface you attempt to go online at "Online & diagnostics".

Before going online with the controller, you must clarify the following questions:

Is the project to be loaded (or consistent project) already on the controller and have no changes been made to the interface settings?

In this case, activate the interface configured in the project and go online in SIMOTION SCOUT TIA using the  button, "Connect to selected target devices". The devices to which a connection is established can be seen under "Target system > Select target devices...".

Have the interface settings been changed?

When do changes have to be made to the interface settings?

- An overall reset has been performed on the controller (MRES).
- The controller has been replaced.
- The project is to be loaded to a new (or unknown) controller.
- Interface settings have been changed in the project (different PROFIBUS baud rate selected; access addresses changed).

Requirement: You have a completed HW configuration and a project that can be downloaded.

Do I require an online connection to all devices/components present in the project?

In online operation, SIMOTION SCOUT TIA tries to perform online operation with all hardware components contained in the project. This means that the time needed for going online increases. We recommend that you make settings for SIMOTION SCOUT TIA so that online operation is made only with those components currently needed. The setting can be found with "Target system > Select target devices..." in the menu. The selection and deselection of the devices in the online state can be made from the "Online connection" context menu on the device.

This procedure is also advantageous for SIMOTION D when configuration of the SINAMICS Integrated is complete. Without completely going offline with all hardware components, the connection may simply be deselected on the object SINAMICS_Integrated via the context menu.

See also

Setting up the PG/PC communication (Page 106)

Troubleshooting

If you still cannot go online with the project despite proceeding as described above, check the settings of CX32-2.

To be able to go online on a CX32-2, at least the hardware configuration (HWCN) must be loaded to the D4x5-2 and the CX32-2 connected without errors via the configured DRIVE-CLiQ ports on the D4x5-2.

Online access to the drives is not possible if HWCN is not loaded at the time you initially connect to the target system.

8.2.5 Loading data to the target system

8.2.5.1 Overview

Note

Loading data to the target system can only be done in SIMOTION SCOUT TIA.

You have to download the project data that you have created with SIMOTION SCOUT TIA to the target system.

The target system can contain several CPUs, e.g. SIMOTION controllers or drives. The project data contains the programs (e.g. MCC) that you have created and compiled, the hardware configuration and the technology packages that you have created and parameterized.

You must download a project to the target system if you have made the following changes:

- You have created or changed programs.
- You have changed definitions of global variables or symbolic I/O variables.
- You have made changes in the execution system.
- You have inserted or changed technology objects.
- In the TIA Portal, you have loaded the hardware configuration of a SIMOTION controller with the "Upload device as new station (hardware and software)..." function into a project.

Requirements

The following conditions must be met before the project can be downloaded to the target system:

- All ports (cables) must be plugged in and the interfaces configured
- All source codes are compiled without errors.
- The project is consistent.
- SIMOTION SCOUT TIA is in online mode.

Responses in the event of an error

The download is canceled in response to a fault: Information can be found in the "Target system output" tab.

Download variants

You can either load the entire project to the target system or perform a download for a specific device:

- Download a project to the target system (all target devices)
- Download CPU / drive unit to target device
- Download a program subset and single units (sources) to the target device

Additional references

You will find detailed information on downloading in the SIMOTION Runtime Basic Functions Function Manual and in the SIMOTION SCOUT TIA Online Help at "Downloading data to the target device".

See also

Load project to the target system (Page 263)

Load CPU / drive unit to target device (Page 265)

Downloading a program subset and single units (sources) to the target device (Page 267)

8.2.5.2 Load project to the target system

Note

You can only perform a project download in the STOP operating state and for all target devices with which you are ONLINE.

Procedure

To load a project to the target system, proceed as follows:

1. Select "Project -> Download to target system" in the menu or click the "Download project to target system" button in the toolbar.
   The "Download to Target System" dialog opens.

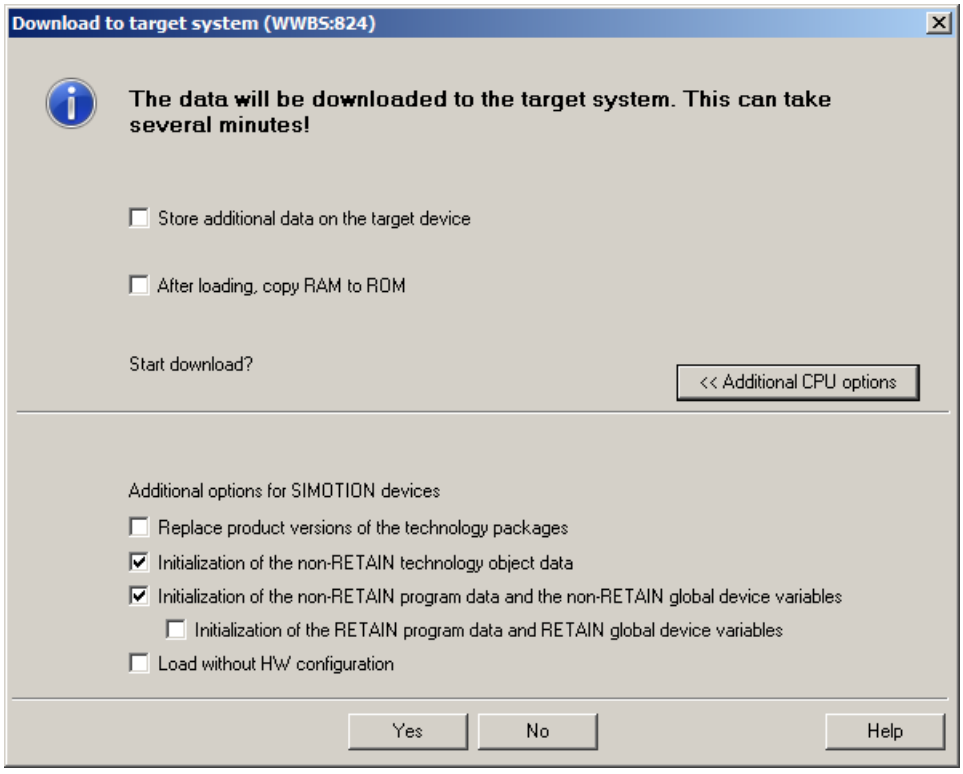


Figure 8-4 Download to target system

   Optionally activate the following options, depending on the device:

   – Store additional data on the target device
   – Copy RAM to ROM after download

2. Click the "Additional CPU options" button to display the following options:
   – "Replace product versions of the technology packages"; this loads the technology packages selected in the "Select Technology Packages" dialog to the target system.
   – "Initialization of the non-RETAIN technology object data"; only non-RETAIN data can be initialized for TOs. This does not affect the program data (variable values).
   – "Initialization of the non-RETAIN program data and the non-RETAIN global device variables"
     The "RETAIN program data and the RETAIN global device variables" can also be initialized. This does not affect the technology object data. The global device variables are initialized together with the settings for the program data (variable values) - only works in STOP mode.
   – Load without HW configuration

3. Select additional options when required.
4. Click "Yes" to start the download.

Note

Global download settings

You make the global presetting in SIMOTION SCOUT TIA under "Options > Settings... > Download".

Note

Default names in the station manager and offline project for SIMOTION P

Note that the default names in SIMOTION SCOUT in the station manager and the offline project must match.

If you have performed a download from SIMOTION SCOUT TIA and then want to start a download from SIMOTION SCOUT, make sure that the default names in the station manager and the offline project match.

Result

The project data has been loaded to the target device and an online connection established.

If the connection was successful, the connector icons are highlighted in green.

8.2.5.3 Load CPU / drive unit to target device

In addition to a project download, you can also selectively load data to each CPU / drive unit. The standard procedure is the download in STOP operating state. However, under certain circumstances you can also perform a download in RUN operating state.

Procedure

Proceed as follows to load selective data to a CPU / drive unit:

1. First select the device to which you want to load the data in the project navigator. The device must be online.
2. Click the "Download CPU / drive unit to target device" button.
   Or right-click the device in the project navigator and select "Target device > Download..." in the context menu.
   The "Download" dialog opens. The contents depend on the device for which you want to download data.

Loading the CPU to the target device

A download can be performed for the entire CPU (without drive unit) but also separately for individual related download units.

- Download CPU without drive unit
- Download all technology objects of the CPU
- Download all programs of the CPU

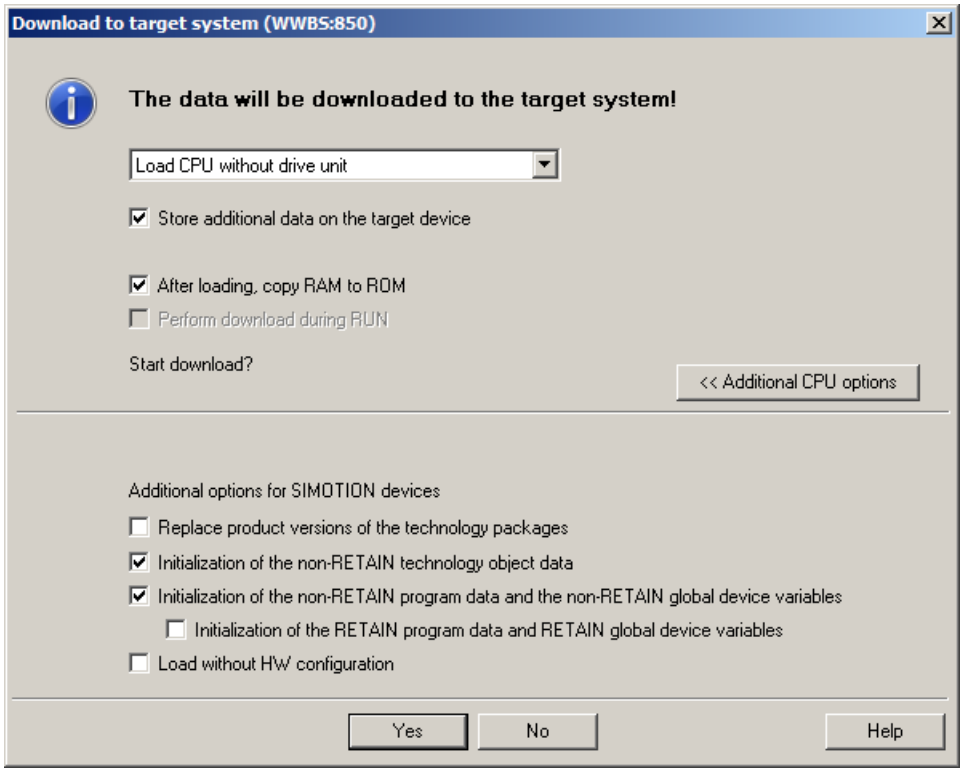


Figure 8-5 Download to CPU / drive unit

You can select the following options:

- "Store additional data on the target device"; you can use this option to store additional data, e.g. program sources, on the target device.
- "After loading, copy RAM to ROM"
- "Perform download during RUN"; enables a download to be performed in RUN operating state.

Click "Additional CPU options" to display the following options:

- "Replace product versions of the technology packages"
- "Initialization of the non-RETAIN technology object data"
- "Initialization of the non-RETAIN program data and the non-RETAIN global device variables"
- "Load without HW configuration"

Downloading the drive to the target device

For drives, you can only download the drive data (parameterization, etc.) to the drive unit.

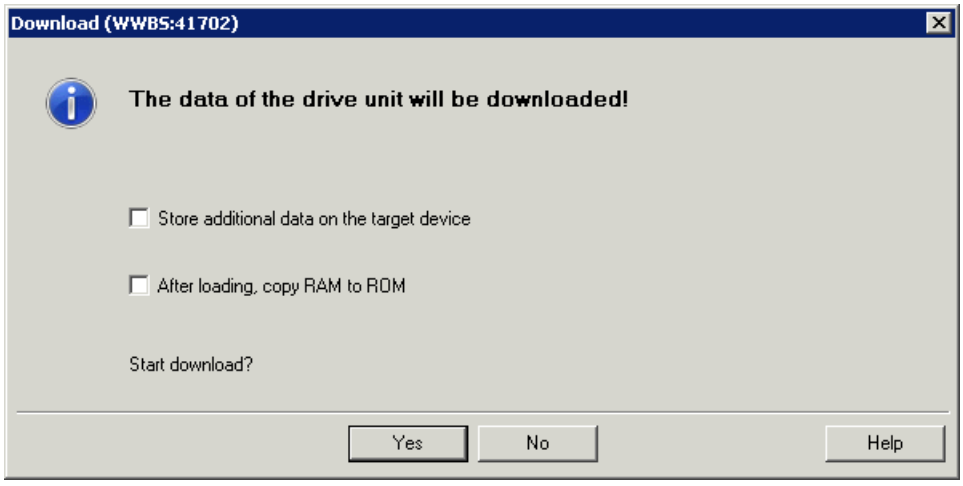


Figure 8-6 Download to drive unit

By default, the download is performed in STOP. After a successful download, the CPU can be restored to its previous state.

You can select the following options:

- "Store additional data on the target device"; you can use this option to store additional data, e.g. program sources, on the target device.
- "After loading, copy RAM to ROM"; copies RAM to ROM to the selected device once the download is complete.

Additional references

You will find detailed information on downloading in the SIMOTION Runtime Basic Functions Function Manual and in the SIMOTION SCOUT TIA Online Help at "Downloading data to the target device".

8.2.5.4 Downloading a program subset and single units (sources) to the target device

Download of selected units

You can load single or multiple units to the SIMOTION device in the RUN and STOP operating states and in this way specifically load only a selected subset of programs.

This enables, for example, two users who are connected online to the target device at the same time with SIMOTION SCOUT TIA to download separate program subsets independently.

To load selected units to the target device, proceed as follows:

1. In the project navigator, right-click the unit and select the "Download" command in the context menu.

Additional references

You will find detailed information on downloading in the SIMOTION Runtime Basic Functions Function Manual and in the SIMOTION SCOUT TIA Online Help at "Downloading data to the target device".

8.2.6 Loading data from the target device

8.2.6.1 Load to PG

With Load to PG, the SIMOTION SCOUT TIA data is loaded from the target device to the PG/PC. In this way, SIMOTION SCOUT TIA data can be loaded from the target device to the existing SIMOTION SCOUT TIA offline project on the PG/PC.

Load the CPU / drive unit to the PG

- Select this option if you want to load all the project data from the target device to the PG. Note the information in the dialog.
- Select the "Save before loading to PG" option if you want to save the project on your PG before loading.
- Select the "Overwrite available libraries" option if you want to overwrite the libraries of the project available locally on your PG.

Only load configuration data to PG

- Select the "Only load configuration data to PG" option if you want to load the current configuration data present in the target device to the PG.

Transfer current data to RAM

If you want to load the current data present in the current data memory of the target device to the RAM before Load to PG, activate the "Transfer current data to RAM" option. If you do not transfer the current data to the RAM, it is not loaded to the PG.

When "Load to PG" is executed, adapted values for configuration are detected and "Transfer current data to RAM" is also automatically preselected.

Load to PG via project comparison (object granular)

With the project comparison functionality, you can also load the data for individual objects to the PG.

Additional references

You will find detailed information in Section "Loading data from the target device" of the SIMOTION SCOUT TIA Online Help.

Detailed information on the project comparison can be found in the SIMOTION SCOUT TIA Online Help and in the SIMOTION Project Comparison Function Manual.

See also

Device upload (Page 399)

8.2.7 Load to file system

Select "Edit > Load to file system..." to save data for a device to a memory card/CF card directly via a card adapter on the PC. Alternatively, the device data can also be saved locally on a hard disk in order to copy it to a memory card / CF card at a later point in time. First delete the USER directory on the card as otherwise inconsistencies can occur. The directory structure of the versions of the hard disk and CF card may not be the same and data will not be overwritten.

Note

Kernel version and device type

A project is always created for exactly one kernel version and one device type and will only run on the relevant SIMOTION device if this exact kernel version and this device type are available. If this is not the case, the SIMOTION device remains in the STOP operating state.

Note

Saving only possible in offline mode

To be able to load data into the file system, SIMOTION SCOUT TIA must be in OFFLINE mode and the device must be selected in the project navigator.
When the project data is saved, an executable project results.

Additional references

Detailed information can be found in the SIMOTION SCOUT TIA Online Help.

8.2.8 Disconnect from target system

Use "Disconnect from target system" to switch to offline mode. The device is disconnected from the PC/PG.

Disconnecting from the target system

To disconnect the connection to the target system, proceed as follows:

1. Select "Project > Disconnect from target system".
   Or click the "Disconnect from target system" button in the toolbar.

Result

The connection is interrupted and SIMOTION SCOUT TIA goes into offline mode.

Disconnecting a device

To disconnect a device selectively, proceed as follows:

1. In the project navigator, select the drive that you want to disconnect.
2. Select "Disconnect target device" in the context menu.

Result

The drive goes offline.

If this is the last drive that was online, SIMOTION SCOUT TIA goes into offline mode.

8.3 Selecting technology packages

The technology packages (e.g. TP CAM, TP PATH) for SIMOTION are available for installation in various versions.

You can only use the functions of the technology objects selected if the technology objects are available in the target system.

You can select the technology packages and their versions (as well as the service packs and hotfix versions) for each SIMOTION device.

In the "Select Technology Packages" dialog, you can adopt a more selective approach when choosing the technology packages you want to use. To open this window,

Procedure

To select technology packages, proceed as follows:

1. Select a SIMOTION device in the project navigator.
2. Select "Select technology packages..." in the context menu.
   The "Select Technology Packages" dialog opens.

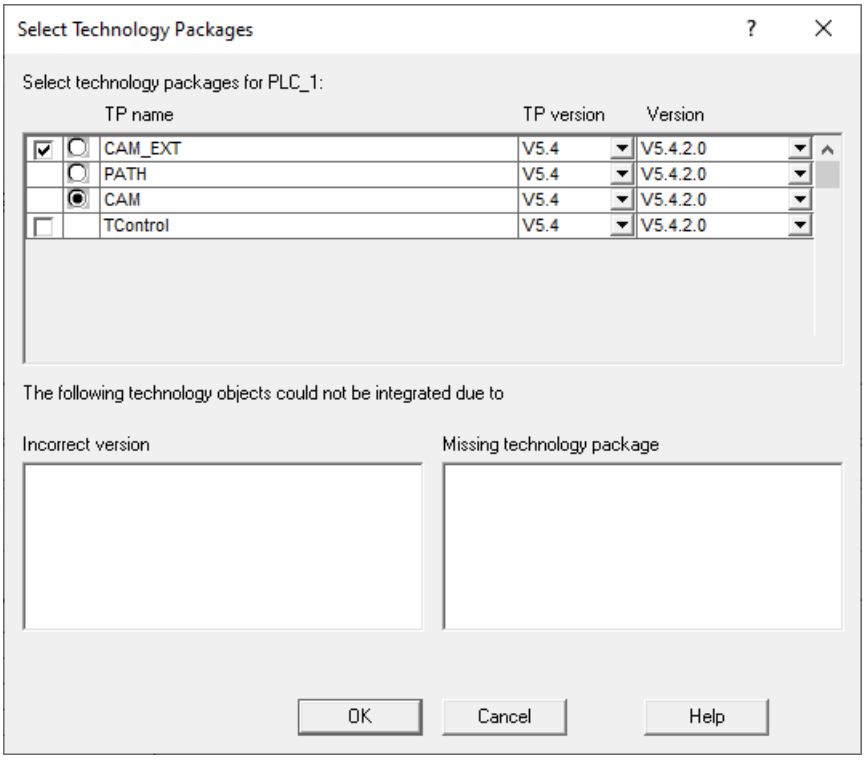


Figure 8-7 Selecting technology packages

3. Select the technology package, version and product version.
4. Confirm with "OK".

Note

Device diagnostics can provide information on which technology package product version has been loaded to a CPU.

Loading technology packages to the target device

Technology packages are only loaded to the target device if no technology package has been loaded previously. If a technology package version changes, the technology package must be explicitly reloaded to the target device.

To download a changed technology package to the target system, proceed as follows:

1. In the "Project" menu, select the "Download to target system" command.
   The "Download to Target System" dialog opens.
2. Click the "Additional CPU options" button.
3. Activate the "Replace product versions of the technology packages" option.
4. Confirm with "OK".

Additional references

You will find detailed information on downloading in the SIMOTION Runtime Basic Functions Function Manual and in the SIMOTION SCOUT TIA Online Help at "Downloading data to the target device".

8.4 Commissioning the drives

8.4.1 Overview

Note

Creating a SIMOTION drive

You configure a SIMOTION drive in SIMOTION SCOUT TIA. A SIMOTION drive in the current version of SIMOTION SCOUT TIA is a drive of the SINAMICS S120 type (interconnection via PROFINET or PROFIBUS) interconnected with a SIMOTION CPU. You will find the SIMOTION drives you can insert explicitly in Section Supported devices (Page 25). These SIMOTION drives can be configured and parameterized only under these conditions (interconnection with SIMOTION CPU).

You can configure the drive both in offline and online modes.

After configuring the drive, you can test the drive with the drive control panel.

8.4.2 Configure drives online

Requirements:

- You have created a drive in the project.
- The project has been downloaded to the target system.
- SIMOTION SCOUT TIA is in online mode.
- The drive is not being used by a current project (TO axis linked to this drive) in the RUN state.

Procedure

To configure drives automatically, proceed as follows:

1. In the project navigator, navigate to the SINAMICS drive and double-click "Automatic configuration".

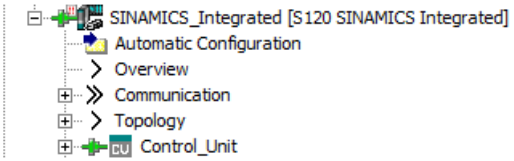


Figure 8-8 Starting automatic configuration

The "Configuration" dialog opens.

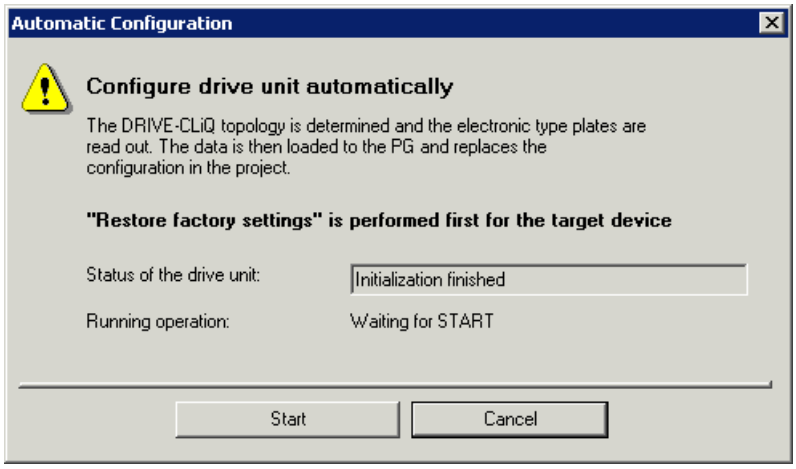


Figure 8-9 "Automatic Configuration" dialog

2. Click the "Start" button and reset the device configuration in the following "Restore Factory Settings" dialog.
   The confirmation prompt appears if the drive unit is not in the "First commissioning" state.

3. In the "Automatic Commissioning" dialog, you can specify whether you are using a drive object of the type "servo" or "vector". Confirm your selection with "Create". Automatic configuration is started.

   Note

   Firmware update

   If the firmware version on the DRIVE-CLiQ components is different to that on the CF card, a firmware update is performed automatically at this position.

   In this case, proceed as follows:

   - Wait for the procedure to finish. This can take several minutes.
   - Go offline.
   - Switch the power supply to the SIMOTION device off and on again.

   As soon as automatic commissioning has finished, SIMOTION SCOUT TIA carries out an upload. With this upload, the configuration data of the component is uploaded to the SIMOTION SCOUT TIA project.

4. Close automatic configuration and select "Stay ONLINE" to test the drive with the drive control panel.

Result

The drive is displayed in the "Drives" folder in the project navigator.

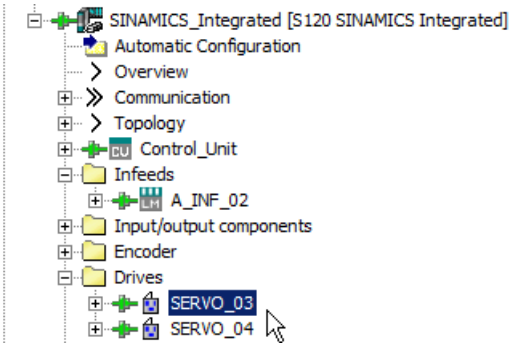


Figure 8-10 Drives inserted

Infeed

- If an infeed with DRIVE-CLiQ connection has already been created, the ready signal of the infeed (r0863.0) is automatically interconnected with "Infeed operation, p0864" of the drive when drives are inserted (only applies to drives that are attached to the same drive unit as the infeed).
- If you are using an infeed without a DRIVE-CLiQ interface, e.g. a Smart Line Module, you must wire the ready signal of the infeed via terminals, see Section Configuring the infeed (Page 279).

8.4.3 Configure a drive offline

The drive is configured in offline mode in two steps:

1. Insert a drive into the project.
2. Configure the drive with the Wizard.

Procedure

To insert a drive, proceed as follows:

1. In the project navigator, navigate to the drive unit and double-click "Configure drive unit".

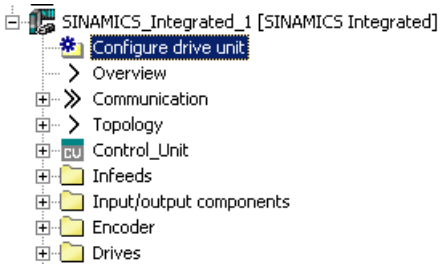


Figure 8-11 Configuring a drive unit

The "Configuration - Option Module" dialog opens.

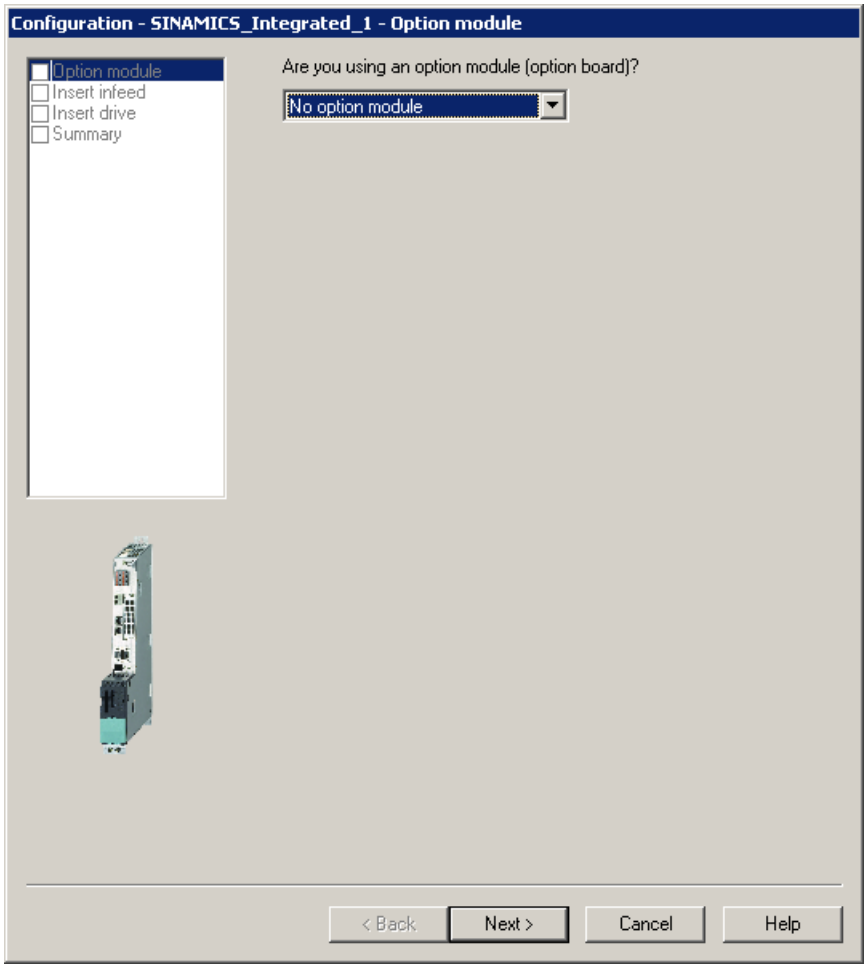


Figure 8-12 Option module configuration

2. Select the option module used at "Option module" when required. Confirm with "Next>".

3. At "Insert infeed", select whether you want to use an infeed with or without DRIVE CLiQ interface.
   - If you are using an infeed with DRIVE-CLiQ interface, the ready signal of the infeed is interconnected automatically.
   - If you are using an infeed without a DRIVE-CLiQ interface, e.g. a Smart Line Module, you must wire the ready signal of the infeed via terminals, see Section Configuring the infeed (Page 279).
4. At "Insert drive," confirm with "YES" that you would like to create a drive. Click "Continue>". The "Configuration - Drive Properties" dialog opens.

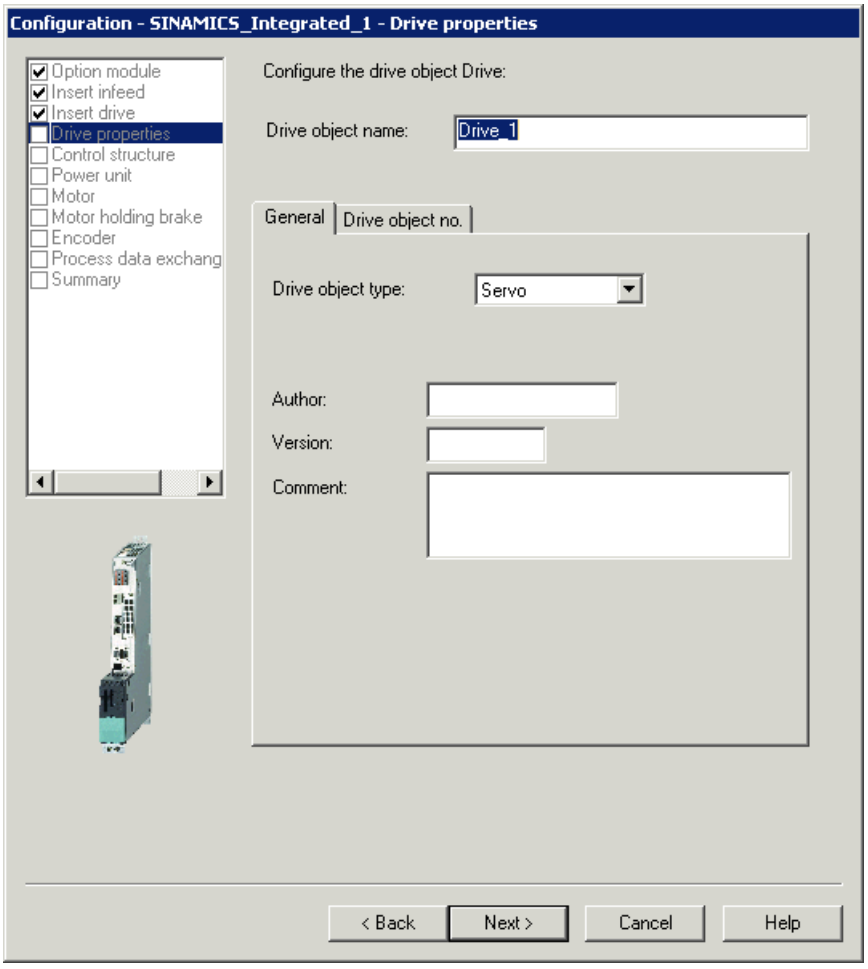


Figure 8-13 Configuring drive properties

5. Assign a name for the drive. Optionally, you can enter Author, Version, and Comment.
6. Confirm with "Next>".
7. At "Control structure", specify the control mode and the function modules depending on the operating mode (servo or vector). Confirm with "Next>".
8. At "Power unit", select the required power unit. Further narrow down your selection of possible power units by using the prescribed filter criteria supply voltage, cooling method, type. Confirm with "Next>".

9. If you are using an infeed without a DRIVE-CLiQ interface, you must manually interconnect the ready signal of the infeed in the next step "Power unit BICO". In the example, parameter p0864 is set to 1 (high) to simplify matters.
   From the perspective of the drive, the infeed is thus always ready, regardless of its actual state of readiness.
10. At "Motor", define the motor for the SINAMICS drive. Confirm with "Next>".
11. At "Motor holding brake", you can configure the motor holding brake of the selected motor. Depending on the motor, different parameters are displayed. Confirm with "Next>".
12. At "Encoder", specify the encoder that you want to use. This step is skipped if you selected speed control without encoder as the control type. Confirm with "Next>".
13. Adopt the preset option at "Process data exchange" and confirm with "Next>". The telegram configuration is done automatically.
14. Once you have worked through all the steps of the configuration, the configured configuration is displayed once again for you to confirm.
    Close the dialog with "Finish".

Result

The drive is displayed in the "Drives" folder in the project navigator.

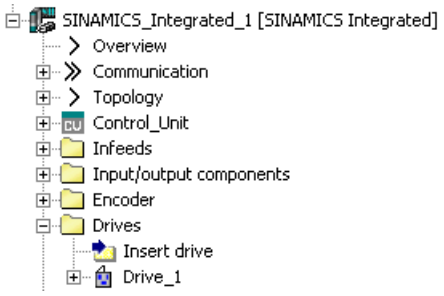


Figure 8-14 Drive inserted

Change configuration

To change the configuration of a drive that has already been configured, proceed as follows:

1. Open in the project navigator the folder of the drive whose configuration you want to change.
2. Double-click "Configuration".
3. Click "Configure DDS" or "Wizard", depending on the drive, to start the drive wizard.

Download the drive configuration to the target system

Save and compile the changes and load the drive configuration to the target system to be able test the drive function with the control panel in the next step.

Additional references

You will find detailed information in Section "Configure SINAMICS drives" of the SIMOTION SCOUT TIA Online Help.
Further information on the interconnection of the ready signal can be found in Section Configuring the infeed (Page 279).

8.4.4 Configuring the infeed

Configuring an infeed without a DRIVE-CLiQ interface

An infeed without DRIVE-CLiQ interface provides the ready signal (p0863.0) via an output terminal. In the project, you specify on which input (r0722) of SINAMICS Integrated the signal is active. The drive supplied by the infeed uses the signal as a ready signal (p0864).

Note

Infeed ready

A drive on SINAMICS Integrated of a SIMOTION D can only be moved if the infeed is ready.

Interconnecting the ready signal of the infeed

Requirements

- You have configured a drive.
- SIMOTION SCOUT TIA is in online mode.

Procedure

In the next step, in order to wire the ready signal of the infeed (terminal "DO: Ready" of the infeed) with the DI 0 of the D4x5-2, proceed as follows in case you have not already established the interconnection during processing using the drive wizard:

1. Navigate in the project navigator to the "Drives" folder and double-click "Configuration" below the drive.

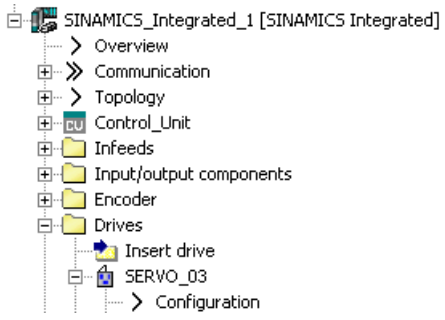


Figure 8-15 Configuring a drive

2. Click the "Configure DDS" button with a yellow background in the working area.

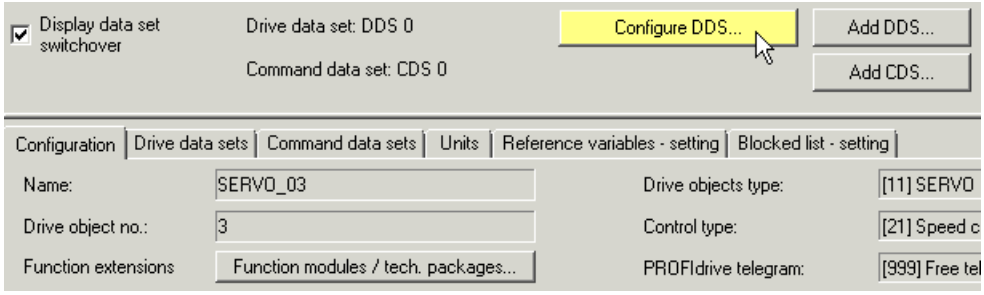


Figure 8-16 Configuring DDS

The drive wizard opens.

3. Click "Next" in the drive wizard until you reach the "Configuration - SINAMICS_Integrated - BICO Power Unit" dialog.
4. In the input field "p0864", select the digital input (e.g. DI 0) to which the ready signal of the infeed is wired.

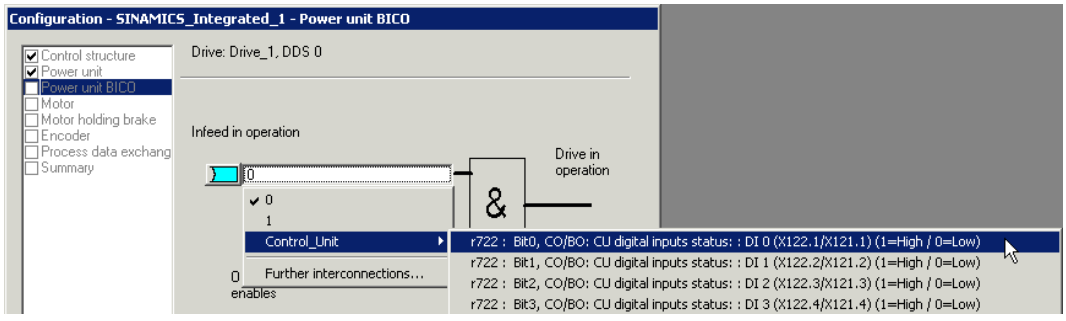


Figure 8-17 BICO interconnection

5. Click "Next". Run through all other dialogs without change until the final "Summary" dialog.
6. Click "Finish".
Thus, the configuration is finished.

See also

Configure a drive offline (Page 275)
Configure drives online (Page 272)

8.4.5 Testing the drive with the drive control panel

Drive control panel

The drive control panel is used to control and monitor individual drives. With the drive control panel, you can traverse drives and can:

- Test each part of the system individually before the drives are traversed in a coordinated manner by means of a program.
- Test in a fault situation whether the individual drives can be traversed by the drive control panel at all, or whether there are already problems here.

⚠ WARNING

This software may be used only when the associated safety instructions are observed! The non-observance can cause injury to persons or damage to material!

The function is released exclusively for commissioning, diagnostic and service purposes. The function should generally only be used by authorized technicians. The safety shutdowns from the higher-level control have no effect.

The **Stop with preconfigured braking ramp** function is not guaranteed in all operating states. Therefore, there must be an EMERGENCY STOP circuit in the hardware. The appropriate measures must be taken by the user.

Requirements

- You have created and fully configured a drive in the project.
- You have stored and compiled the project. The project is consistent.
- SIMOTION SCOUT TIA is in online mode.
- The project with the drive parameterization has been loaded to the target system.

Opening the drive control panel

To open the drive control panel, proceed as follows:

1. In the project navigator, navigate to the drive unit and open the "Drives" folder.
2. Open the "Commissioning" entry and double-click "Control panel".
   The drive control panel opens in the detail view.

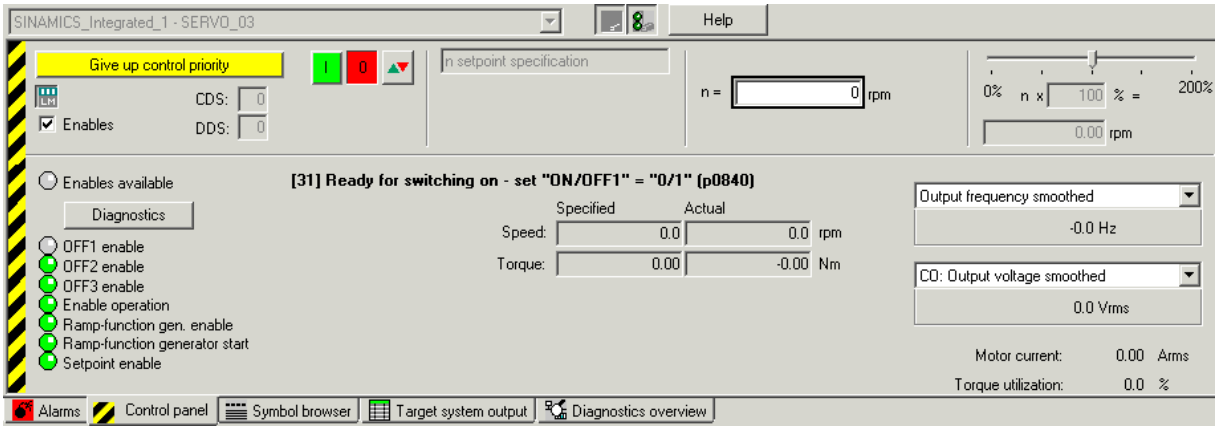


Figure 8-18 Drive control panel

Using the drive control panel

Assuming control priority

To assume control priority, proceed as follows:

1. Click the button to show the control area to test the motor speed specified at "n=".
2. Click the button to show the diagnostics area to display and evaluate defined parameters. You can determine the status of the required enables with the "Diagnostics" button.
3. In the selection list, select the drive that you want to control or monitor using the PG/PC, "SINAMICS_Integrated_1 - SERVO_03" in the example.
4. Specify the parameters that you want to display in the selection lists on the bottom right-hand side of the diagnostics area. The values are displayed below.

5. Select "Assume control priority" to establish the connection to the PG/PC. The "Assume Control Priority" dialog opens.

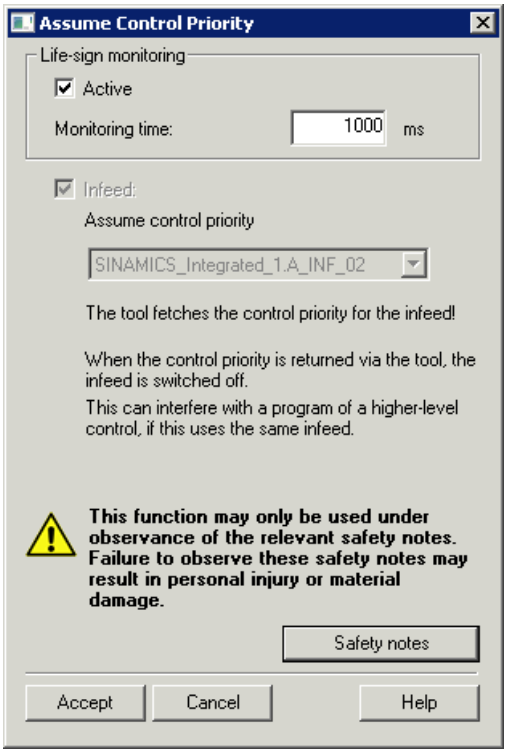


Figure 8-19 Assuming control priority

6. Consider the following infeed options for the type of connection you are using.
   - If you are using an infeed with a DRIVE-CLiQ interface, select the infeed for which the control priority is to be assumed at "Infeed" in the "Assume Control Priority" dialog. Activate the "Infeed" option if the infeed control priority is to be assumed and activated.
   - If you are using an infeed without a DRIVE-CLiQ interface, you will have to interconnect the "Infeed operation" signal (drive parameter p0864) yourself. In this case, the dialog does not contain any fields for selecting infeed.
   - If the signal of the "Closed-loop control operation" infeed is already BICO interconnected with the drive, the infeed is permanently specified. No selection is possible in the dialog, the fields are grayed out.
7. Read the safety instructions and confirm these with "Accept".

The PG/PC has the control priority; the label of the button has changed to "Return control priority".

Note

Stopping the drive

You can also stop the drive at any time by pressing the SPACEBAR.

Activating the infeed

To switch on the infeed, proceed as follows:

1. Click the button for more information.

Activating enables

To activate the enables, proceed as follows:

1. Activate the "Enables" option to enable the drive.
   The ON and OFF buttons and are activated and the enable states are indicated by the LEDs.
   Click the "Diagnostics" button to show any missing enables.

Testing the drive

To test the drive, proceed as follows:

1. Enter a speed setpoint in the "n=" field.
2. Use the slider to set the current speed **setpoint** in relation to the maximum speed **setpoint (100%)**.
3. Click the green switch to start the drive.
   Or click the switch to control the drive in jog mode. The motion continues as long as you keep the switch pressed.
   In the diagnostics area you can monitor the set speed/torque as well as the actual speed/ torque.

Exiting the drive control panel

To exit the drive control panel, proceed as follows:

1. Click the red button to stop the drive.
2. Deactivate the "Enables" option.
   The LEDs are grayed out.
3. Deactivate the infeed. To do this, click "Infeed on/off".
4. Click the "Return control priority" button to return the control priority of the control panel.
5. On the menu bar, select "Project > Disconnect from target system" to switch to offline mode.

Result

The drive can be operated. The drive configuration is complete.

8.5 Creating and testing an axis

8.5.1 TO axis technology object

Note

You create the technology object (TO) axis in SIMOTION SCOUT TIA.

You can create the axis both in offline and online mode.

Technology objects represent the respective real objects, e.g. a position axis, in the controller.

The technology object axis offers the user a technological view of the drive and the encoder (actuator and sensor) and provides technological functions, such as communication with the drive, actual value processing, position control and positioning functionality. It executes control and motion commands and indicates states and actual values.

Requirements

If you want to insert a real axis, you require a functional drive.

If you want to insert a virtual axis, you do not require a functional drive.

Note

Virtual axis

All axis types can also be virtual axes, i.e. they do not control real drives but are used as auxiliary axes, e.g. as a leading axis for several following axes (line shaft).

Axis technologies

You can use the following axis technologies:

- Speed-controlled axis
  Motion control is performed using a speed specification without position control.
- Positioning axis
  Motions are position-controlled.
- Synchronous axis
  The synchronous axis creates a grouping of the following axis and synchronous object.
- Path axis
  The path axis type can be interconnected with a path object.
  The path object can be used to calculate and traverse a linear, circular or polynomial path in the 2D/3D coordinate system for at least two path axes and up to three path axes.

Axis wizard

SIMOTION SCOUT TIA provides the Axis wizard for the creation of a new axis. Using the wizard, you interconnect the TO axis with a drive.

Note

Axis wizard - restriction

The wizard can only be run through once.

Subsequent changes to the axis configuration are possible in the corresponding dialogs of the TO axis.

8.5.2 Configuring Axes

Procedure

To insert an axis with the axis wizard and to interconnect with drive and encoder, proceed as follows:

1. Navigate to the folder in the project navigator "AXES" and open it by double-clicking.
2. Select "Insert axis".
   The "Insert Axis" dialog opens.

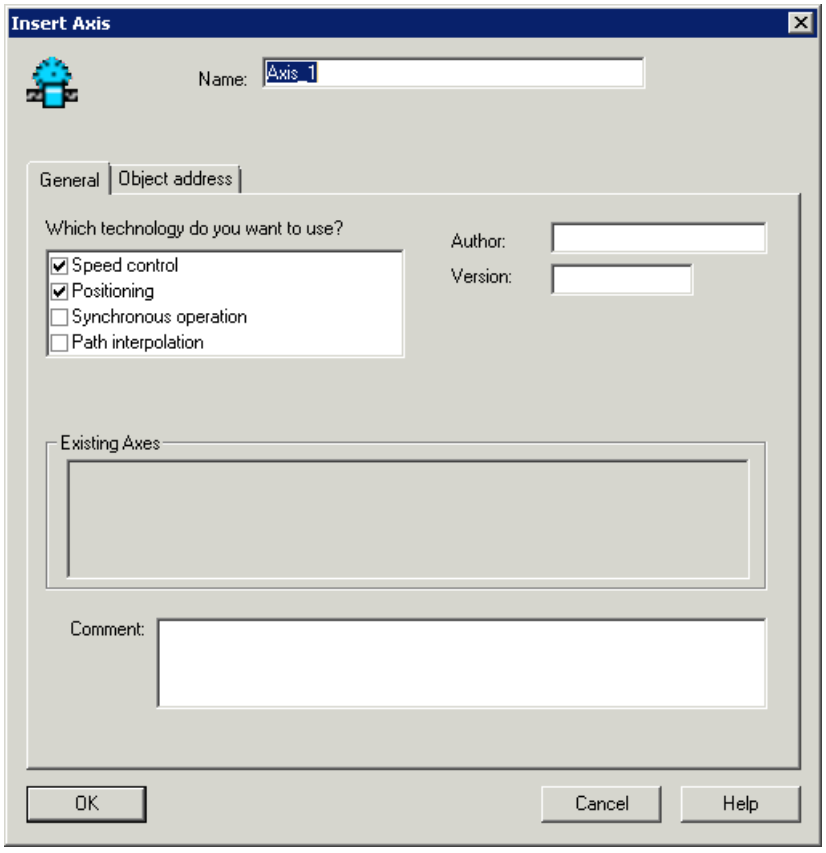


Figure 8-20 Creating an axis

3. Name the axis and select the axis technology that you want to use.
   Note here that the "Positioning" technology always requires the "Speed control" technology. Thus, this technology cannot be deactivated.

4. Click "OK" to exit the dialog.
   The "Axis Configuration - Axis Type" dialog opens.

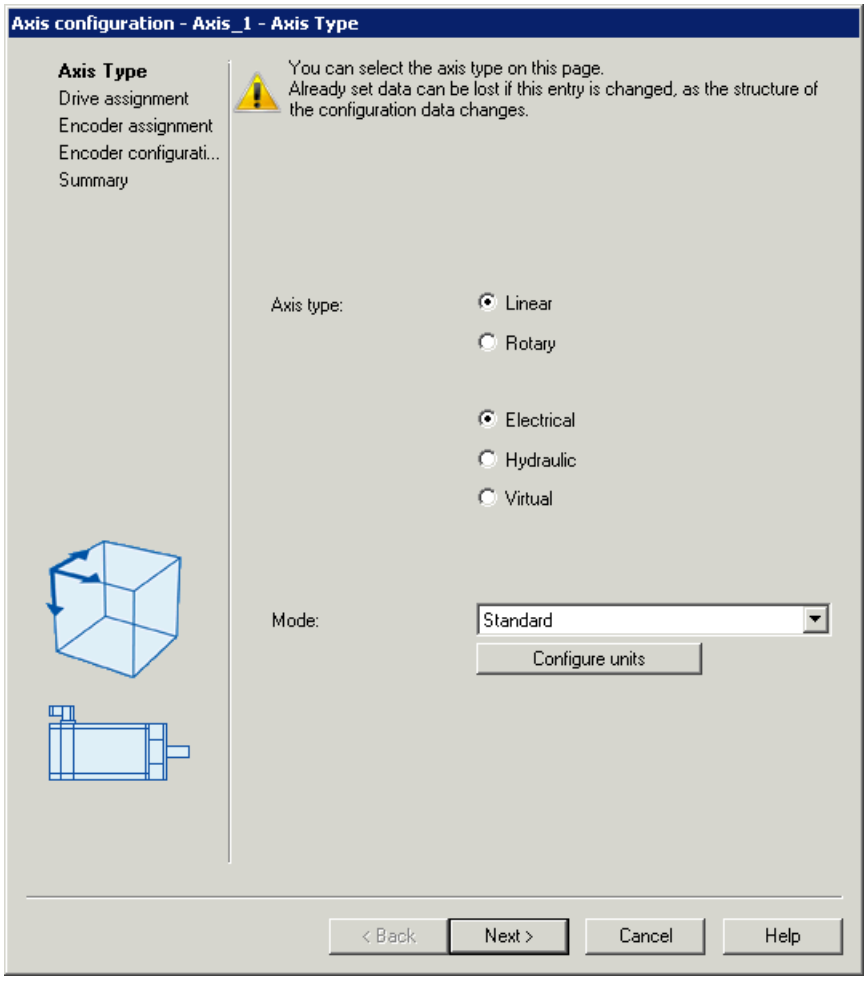


Figure 8-21 Axis configuration - defining the axis type

5. Select the axis type, and specify it. Select the mode for electric axes or hydraulic axes and confirm with "Next>".
   The "Axis Configuration - Drive Assignment" dialog opens.

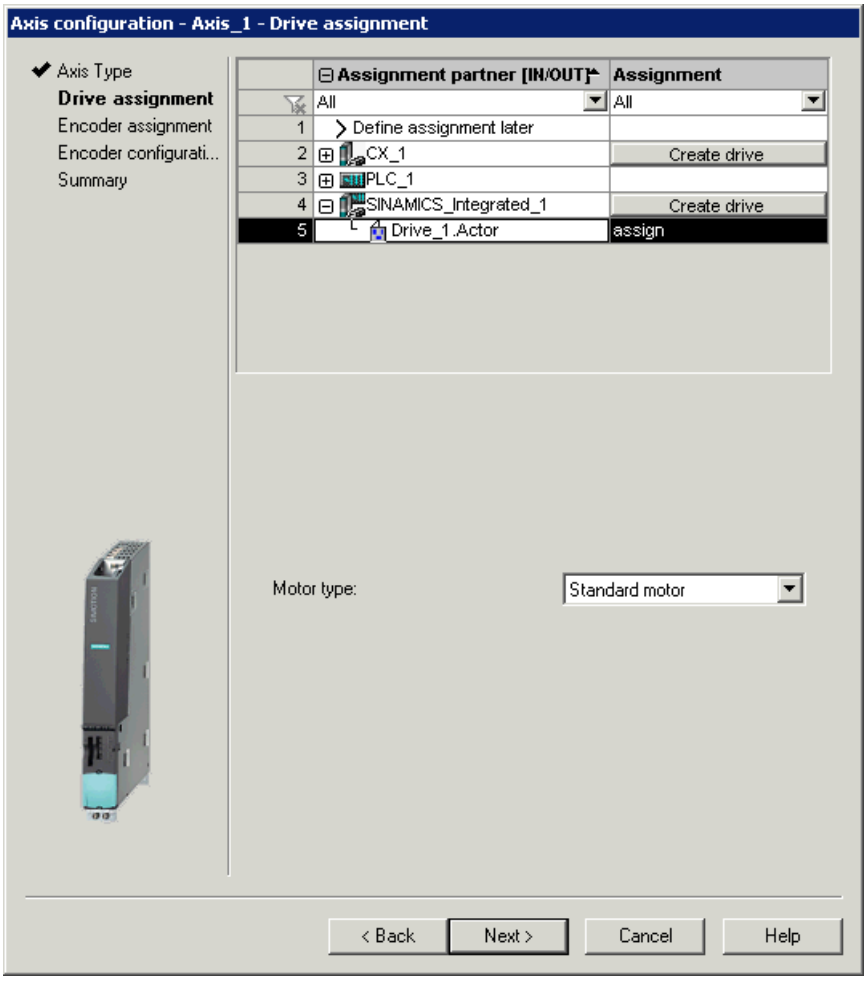


Figure 8-22 Axis configuration - Drive assignment

6. Depending on the selected axis type, with an electric axis you assign the drive which you have configured previously in the "Drive assignment" step.
   Several drives are configured in the example: "Drive_unit_1" (CU310-2), "CX_1" (CX32-2) and "SINAMICS_Integrated_1" (SIMOTION D SINAMICS Integrated).

   Note

   As an alternative to assigning the axis to an already configured drive, the axis wizard offers two further selection options:

   - Define the axis/drive assignment later:
     The axis is to be created and not assigned to a drive until later. Programming and simulation of the axis are also possible here.
   - Create drive:
     The drive wizard can be called up from the axis wizard (offline configuring). The axis can thus be created in one step along with the drive, and assigned to the drive.

   The alternative approaches are not being considered at this point.

   With an hydraulic axis, you configure the output for a Q-valve in the step "Configuration of Q-output"; the Q-valve represents the actuator for a volume flow.
   Confirm with "Next>".
7. Specify the encoder to be used by the axis or the active axis data set in the "Encoder assignment" step.
   Confirm with "Next>".
8. Specify the parameters for the encoder used in the "Encoder configuration". Only the encoder type has to be specified when using the symbolic assignment.
9. Once you have worked through all the steps of the configuration of a TO axis, the configured configuration is displayed once again for you to confirm.
   Close the dialog with "Finish".

Result

The axis is displayed in the "AXES" folder of the project navigator.

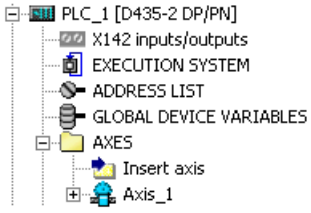


Figure 8-23 Axis created

Automatic settings of the engineering system

The engineering system automatically defines the PROFIdrive axis telegrams required for communication with the drive, as well as the addresses used.

In the same way, telegrams are extended and interconnections automatically created in the drive, depending on the selected TO technology (e.g. SINAMICS Safety Integrated).

Drive and encoder data, as well as reference variables, maximum variables, torque limits, and granularity in torque reduction of the SINAMICS S120 are accepted automatically for the configuration of the SIMOTION technology objects "TO axis" and "TO externalEncoder". This data no longer has to be entered in SIMOTION.

Loading the axis configuration to the target system

Save and compile the changes and download the axis configuration to the target system in order to be able to test the function of the axis in the next configuration step.

Additional references

For detailed information, refer to the section "Configuring the axis and external encoder" in the SIMOTION SCOUT TIA Online Help.

8.5.3 Testing the axis with the axis control panel

Using the axis control panel you can control and monitor individual axes.

You can perform the following tasks with the axis control panel:

- Test axes before you traverse them via a program.
- Testing as to whether you can move the axis using the axis control panel if a fault is detected.
- Set/remove axis enable.

Requirements

- You have created, configured and connected an axis to the drive.
- SIMOTION SCOUT TIA is in online mode.
- You have loaded the project to the target system.

Opening the axis control panel

To open the axis control panel, proceed as follows:

1. Open the "AXES" folder in the project navigator.
2. Double-click the "Control panel" entry below the axis to be tested.

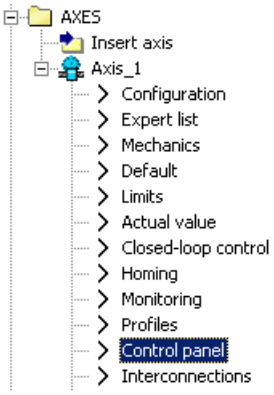


Figure 8-24 Select axis control panel

The axis control panel opens in the detail view.

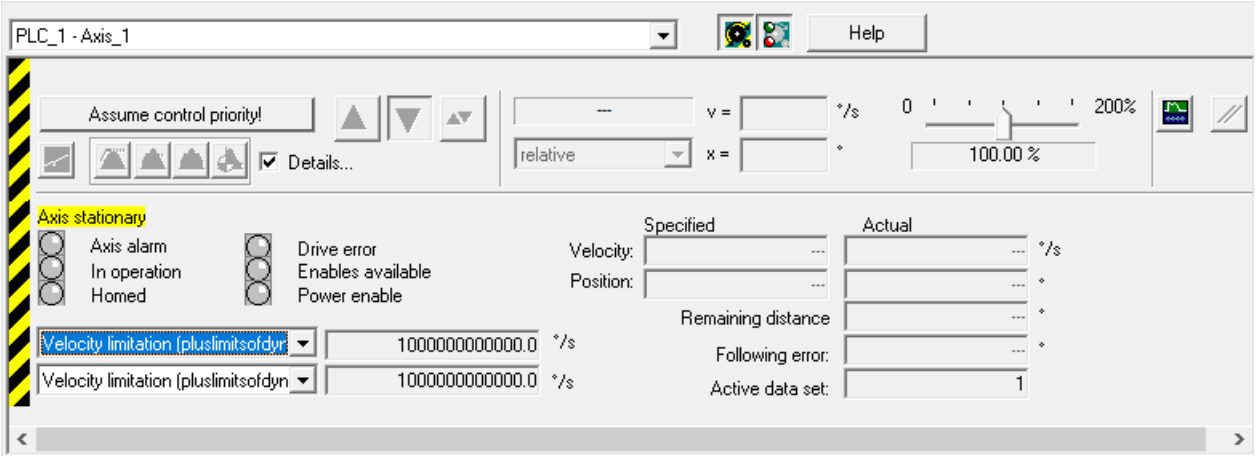


Figure 8-25 Axis control panel

Using the axis control panel

⚠ WARNING

Activate sign-of-life monitoring

Use the axis control panel in control mode only with activated sign-of-life monitoring and a suitably short monitoring time! Otherwise, if problems occur in the communication link between the control PC and the device, the axis may start moving in an uncontrollable manner.

Assume control priority

To assume control priority, proceed as follows:

1. Show the control area by clicking the button in order to test, for example, programmed traversing motions in this mode.
2. Show the diagnostic area by clicking the button in order to test traversing motions that are caused by the motion commands sent to the axis in this mode.
3. Select the axis that you want to traverse and monitor from the selection list, PLC_1 - Axis_1 in the example.
4. Specify the parameters you want to display in the lower left side of the Diagnostics area using the selection lists. The corresponding values are shown next to them.
5. Select "Assume control priority" to establish the connection to the PG/PC.
   The "Assume Control Priority" dialog opens.

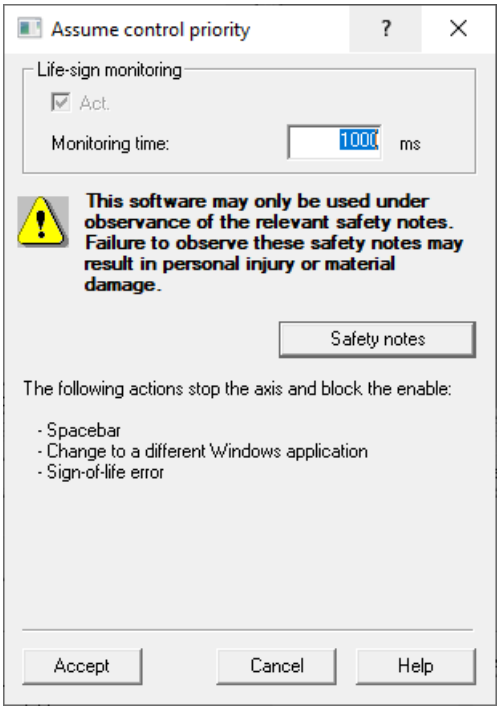


Figure 8-26 Assume control priority

6. Read the safety instructions and confirm these with "Accept".

The PG/PC has the control priority; the label of the button has changed to "Return control priority".

Note

Stopping the axis

By pressing the SPACEBAR, you can stop the axis at any time.

Activating enables

To activate the enables, proceed as follows:

1. Click the "Set/remove enables" button to enable the axis.
2. Confirm the dialog "Switch axis enable" with "OK".
   The LEDs indicate the status of the enables.

Specifying motion commands for axis

1. Specify motion commands for the axis.
   The following functions are available:

Button	Meaning/function
	Speed default This command specifies that the axis is started speed-controlled. Specify a speed setpoint to which the axis can be ramped up via a velocity profile. The command is possible for all axis types; position and following axes are operated speed-controlled.
	Start axis position-controlled This command specifies that the axis is started position-controlled. Specify a speed setpoint to which the axis can be ramped up via a velocity profile. The command is possible for position and following axes.
	Position axis With this command, you specify positioning of the axis (positioning or synchronous axis) at a specific position. The position value entered can be absolute or relative. Modulo axes can also be positioned via the shortest path. The programmed position must be within the software limit switches.
	Home axis With an absolute measuring system, homing is only required once during commissioning. When this is completed, the position value will be known when the machine is switched on. In the case of an incremental measuring system, the machine must be homed every time it is switched on.

Start axis motion

To start the axis motion, proceed as follows:

1. Click the switch to start the motion command parameterized last.
   Or click the switch to start the "Speed specification" or "Start axis position-controlled" motion commands in jog mode.
   The motion continues as long as the right-hand mouse button is pressed.

Exit axis control panel

To exit the axis control panel, proceed as follows:

1. To stop the system, click the switch.
2. Deactivate the "Set/remove releases" button.

3. Confirm the "Remove Axis Enable" dialog with "OK".

Note

Acknowledging alarms

If you want to traverse the axis again, acknowledge all alarms in the "Alarms" window.

4. Click "Give up control priority" to return the control priority to the control panel.
5. On the menu bar, select "Project > Disconnect from target system" to switch to offline mode.

Result

The axis can be traversed. Axis configuration is complete.

Potential problems

The axis cannot be traversed.

If the axis cannot be traversed using the axis control panel, test to see if you can traverse the drive using the drive control panel.

- If you cannot traverse the drive using the drive control panel, there is a problem with the drive.
- If you can traverse the drive with the drive control panel, there is a communication problem. Check the drive.

See also

Testing the drive with the drive control panel (Page 281)

8.6 Program SIMOTION application

8.6.1 Using tags

Variable types

Variables are used to structure programs. They are wild cards in a program and can assume values.

In SIMOTION, different types of variables are distinguished:

- **System variables**
  Each SIMOTION device and technology object has specific system variables. You can access system variables within the SIMOTION device from all programs.
- **I/O variables**
  An I/O variable is a symbolic variable name that is assigned to an I/O address of the SIMOTION device or to the I/O. Thus, direct access to the peripherals is possible.
  I/O variables are valid for all devices. All programs of the SIMOTION device have access to them.
- **Global device variables, unit variables and local variables** are user-defined variables with limited scope:
  These global device variables can be accessed from all parts of the user program. They can also be accessed from HMI devices.
  Unit variables can be accessed by all programs, function blocks and functions defined within the same source, e.g. ST source, MCC source, LAD/FBD source.
  A source is a logic unit that you can create in your project and that can contain programs, functions and function blocks.
  Local variables can only be accessed within the program, the function or function block in which they are defined.
  If variables have been defined in the interface section of a source, they can be accessed by other sources and external components, e.g. HMI systems.

Creating global device variables

Note

Global device variables can only be created in offline mode.

To create global device variables, proceed as follows:

1. Click the "GLOBAL DEVICE VARIABLES" element in the project navigator below the SIMOTION device.
   The "Global device variables" table is displayed in the symbol browser.
2. In the "Name" column, click the first empty cell and enter the variable name, "g_bo_start" in the example.
   Press the RETURN or TAB key. The input focus jumps to the "Data type" field. Alternatively, you can click on the field to move the input focus to it.
3. Enter the data type in the "Data type" field, "BOOL" in the example.
4. Press <RETURN> to confirm.
   The variable is created and available in the project. In the symbol browser, a new line is opened for input.

5. Create other global device variables in the same way, "g_bo_ready" in the example.

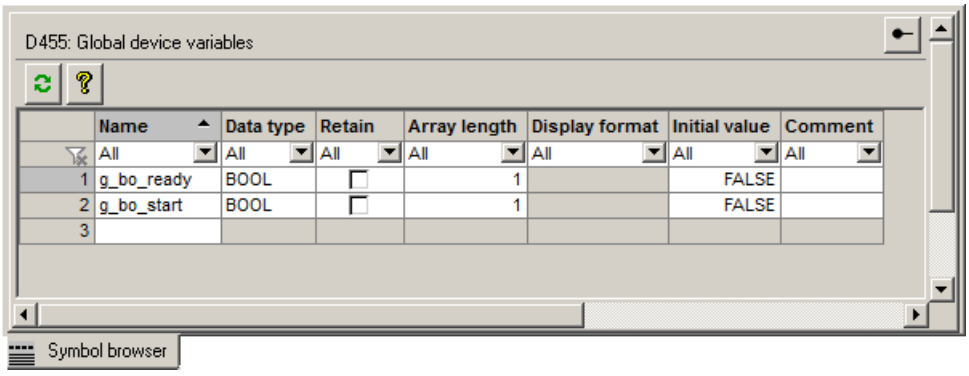


Figure 8-27 Creating global device variables

6. Select "Project > Save and compile changes" in the menu to accept the expansions in the project.

Creating I/O variables

Note

I/O variables can only be created in offline mode.

To create I/O variables, proceed as follows:

1. Double-click the "ADDRESS LIST" element below the SIMOTION device in the project navigator.
   In the detail view, the "Address list" tab opens.
2. Click on the first free cell in the "Name" column. Enter a name for the variable.
3. Press the <RETURN> or <TAB> key. The cursor moves to the "I/O address" field.
4. Select the "IN" entry for input variables or "OUT" for output variables in the I/O address column.
5. Click the three dots in the "Assign" column to open the "Assignment" dialog.
6. In the "Assignment" dialog, select the required variable and select the "Assign" entry in the "Assignment" column.
7. Confirm the dialog with "OK".
8. Select "Project > Save and compile changes" in the menu to accept the expansions in the project.

Note

Steps 4, 5, 6 and 7 only apply for devices that support symbolic assignment (e.g. CU320-2).

Additional references

You will find detailed information on the creation of variables in the SIMOTION SCOUT TIA Online Help and the relevant Programming and Operating Manuals.

8.6.2 Use MCC

8.6.2.1 Overview

Program creation steps

Creation of an MCC program encompasses the following steps:

1. Creating the MCC unit.
2. Creating the MCC chart in the MCC unit.
3. Inserting MCC commands in the MCC chart and parameterizing the commands.

8.6.2.2 Creating the MCC unit

Procedure

To insert an MCC unit, proceed as follows:

1. In the project navigator, below the SIMOTION device, open the "PROGRAMS" folder.
2. Double-click "Insert MCC unit".
   The "Insert MCC Unit" dialog opens.

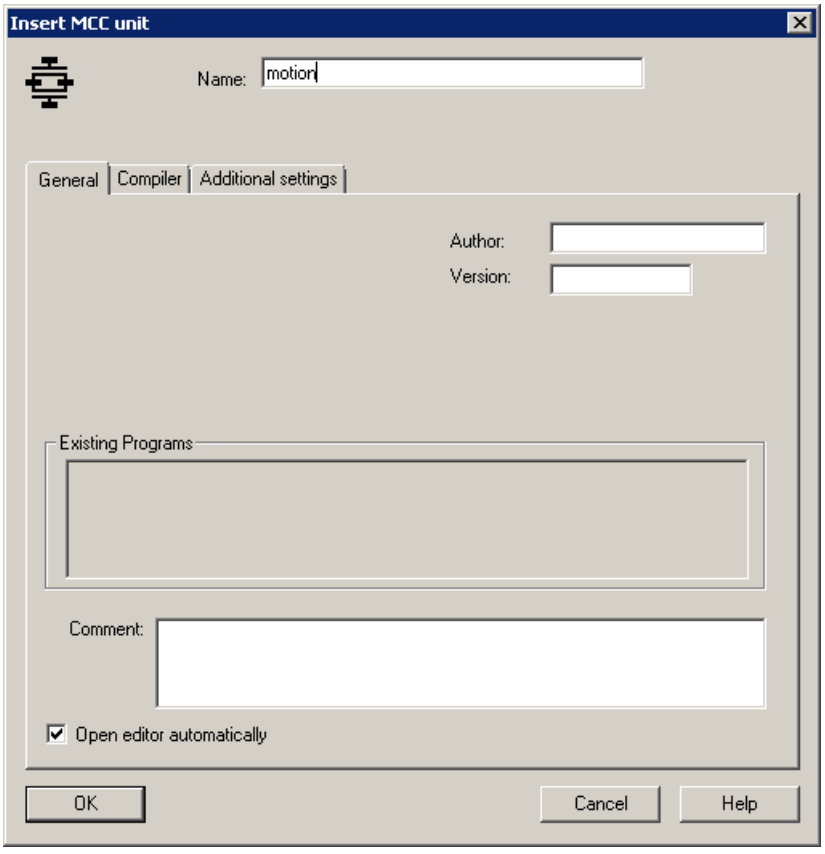


Figure 8-28 Inserting an MCC unit

3. Assign a name, "motion" in the example.
4. Go to the "Compiler" tab. For diagnostics purposes, activate the "Permit program status" and "Permit single step" options. In this way, you can monitor program execution later in online mode.
5. Confirm with "OK".

Result

The MCC unit is created.

- The unit appears in the project navigator below the "PROGRAMS" branch.
- The declaration table of the source file opens in the working area of the workbench. The variables declared there apply within the MCC unit and can be linked in other units.

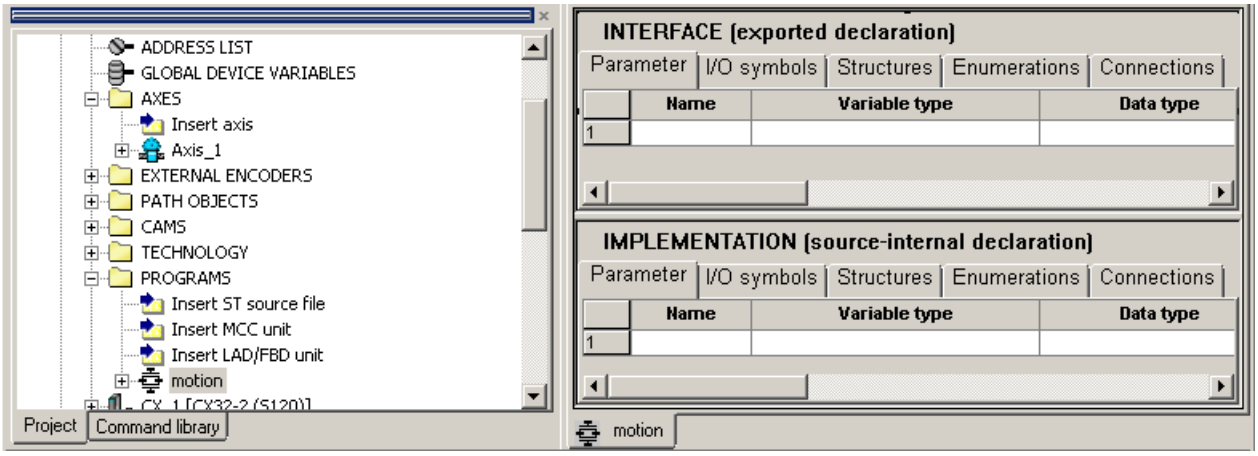


Figure 8-29 MCC unit "motion" inserted

8.6.2.3 Creating an MCC chart

Procedure

To insert an MCC chart, proceed as follows:

1. In the project navigator, below the SIMOTION device, open the "PROGRAMS" folder.
2. In the "PROGRAMS" folder, open the MCC unit, "motion" in the example.

3. Double-click "Insert MCC chart".
   The "Insert MCC Chart" dialog opens.

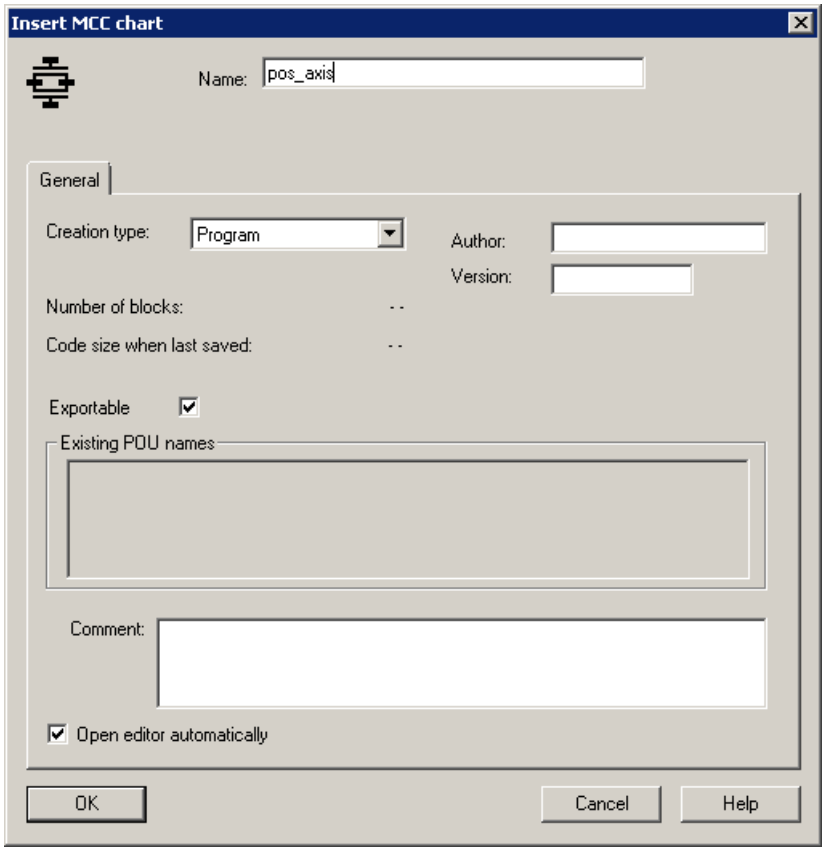


Figure 8-30 Inserting an MCC chart

4. Assign a name, "pos_axis" in the example.
5. For the creation type, select "Program".
6. Confirm with "OK".

Result

The MCC chart is created in the project.

- The created MCC chart "pos_axis" appears in the PROGRAMS folder below the "motion" unit.
- The MCC editor is opened in the working area of the workbench. The start and end nodes are already pre-defined. You can start MCC programming.

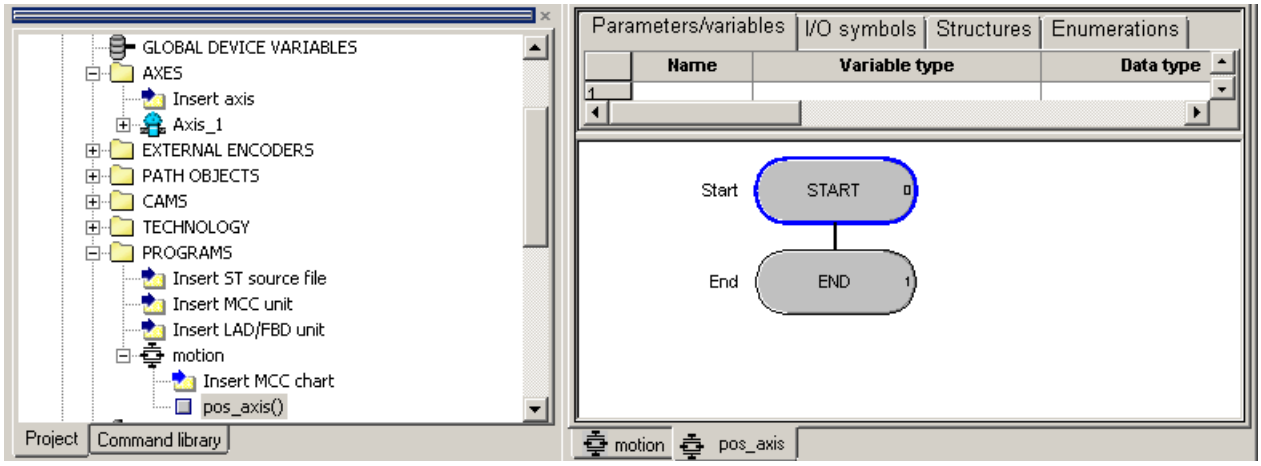


Figure 8-31 MCC chart "pos_axis" inserted

8.6.2.4 Using MCC command blocks

Every newly created MCC chart already contains a start and an end node.

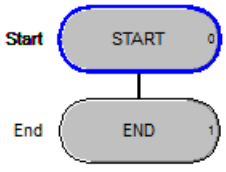


Figure 8-32 MCC chart, start/end nodes

You insert the MCC command blocks between these. The commands are processed in the direction from the start to the end node.

The MCC commands are available to you via:

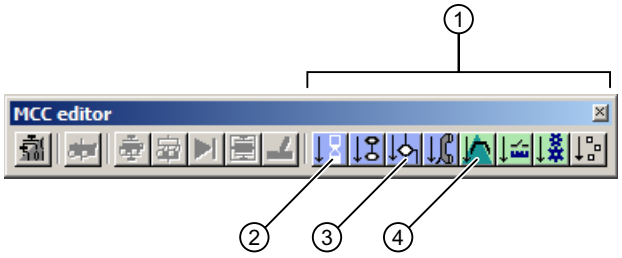
- "MCC editor" toolbar
- "MCC chart > Paste" menu command
- Context menu of the command block

Using the MCC editor toolbar

Open the toolbar

The "MCC editor" toolbar is displayed in the workbench as soon as you open an MCC chart.

The commands are arranged into command groups.



① Command groups
② Basic commands
③ Program structures
④ Single axis commands

Note

Displaying the MCC toolbar

If you do not see the toolbar, check that the display is switched on: Open the "View > Toolbars" menu. Select the checkbox for "MCC editor" in the "Toolbars" window.

Opening the command group

Move the cursor across the colored buttons of the toolbar to display the command groups.

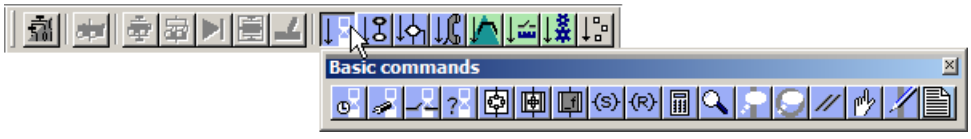


Figure 8-33 Opening the command group

Keeping command groups open or closed continuously

Click the window title of a command group to keep the command group open continuously.

Select "Hide" in the context menu of a command group to close the command group.

Placing the command group as required

Drag the toolbar or the command groups of the toolbar with the mouse to any location on the workbench.

Docking the toolbar

Drag the toolbar or the command groups of the toolbar with the mouse to the edge areas of the workbench to dock them there.

Showing a tooltip for the command

Hold the mouse pointer briefly over a command button. The designation of the command is shown.

Inserting MCC editor commands in the MCC chart

In order to insert an MCC editor command in the created MCC chart, proceed as follows:

1. In the active MCC chart, click the connecting line between two commands, or click the command after which the new command is to be inserted.
   The connecting line or the border line of the command button is marked blue. The marking flashes.
2. On the "MCC editor" toolbar, select the command group.
3. Click the desired command in the command group.

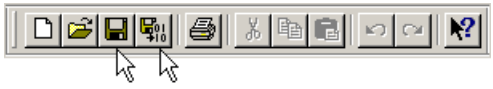
Result

The command was inserted into the chart and can now be parameterized.

8.6.2.5 Backing up the MCC program

To back up the MCC programs, proceed as follows:

1. On the toolbar, click the "Save project" or "Save project and compile changes" button.



Alternatively you can click the "Accept and compile" command in the MCC editor toolbar.



This command compiles the currently selected program as well as all other programs of the same unit.
However, the command does not save the changes.
You thus have the option of accepting changes to a program into the project without having to save or compile the entire project again.

Additional references

For further information, refer to the SIMOTION MCC Motion Control Chart Programming and Operating Manual.

The "Getting Started section of the SIMOTION SCOUT TIA" Online Help contains a detailed description of a sample configuration.

8.6.3 Use LAD/FBD

8.6.3.1 Overview

Program creation steps

Creation of a LAD/FBD program encompasses the following steps:

1. Creating an LAD/FBD unit.
2. Creating an LAD/FBD program in the LAD/FBD unit.
3. Inserting LAD/FBD commands in the LAD/FBD program and parameterizing the commands.
4. Saving and compiling the LAD/FBD program.

8.6.3.2 Create LAD/FBD unit

Procedure

In order to set up an LAD/FBD unit, proceed as follows:

1. In the project navigator, below the SIMOTION device, open the "PROGRAMS" folder.
2. Double-click "Insert LAD/FBD unit".
   The "Insert LAD/FBD Unit" dialog opens.

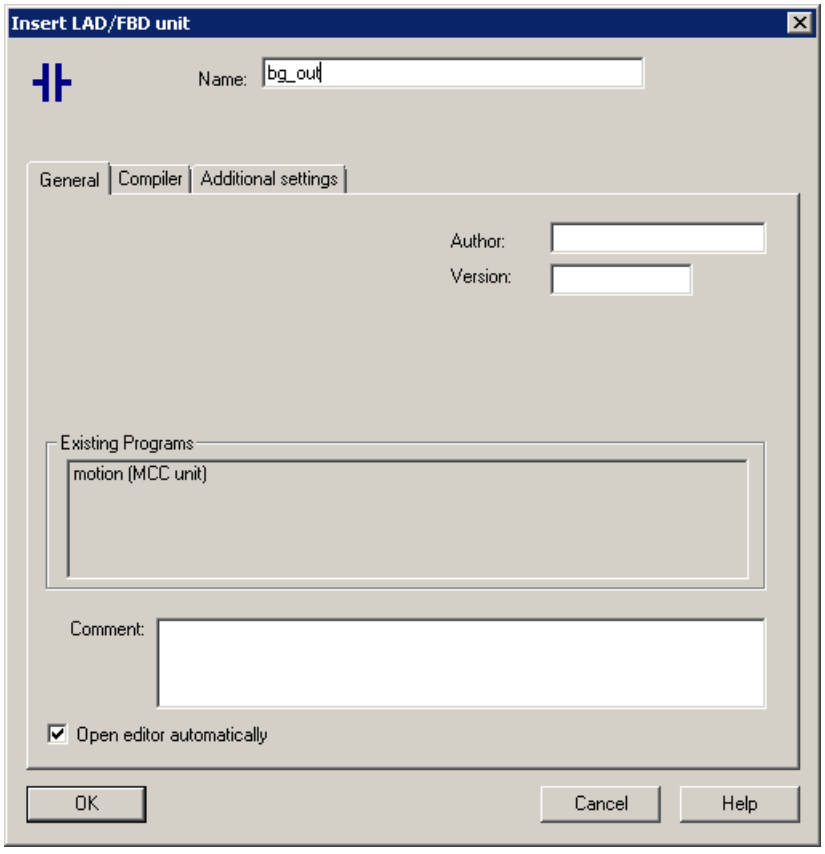


Figure 8-34 Inserting the LAD/FBD unit

3. Assign a name, "pos_axis" in the example.
4. Switch to the Compiler tab.
5. Activate the "Permit program status" option for diagnostics purposes. In this way, you can monitor program execution later in online mode.
6. Confirm with "OK".

Result

The LAD/FBD unit is created.

- The LAD/FBD unit "bg_out" appears in the "PROGRAMS" folder.
- The declaration table of the source file opens in the working area of the workbench. The variables declared there apply within the LAD/FBD unit and can be linked in other units.

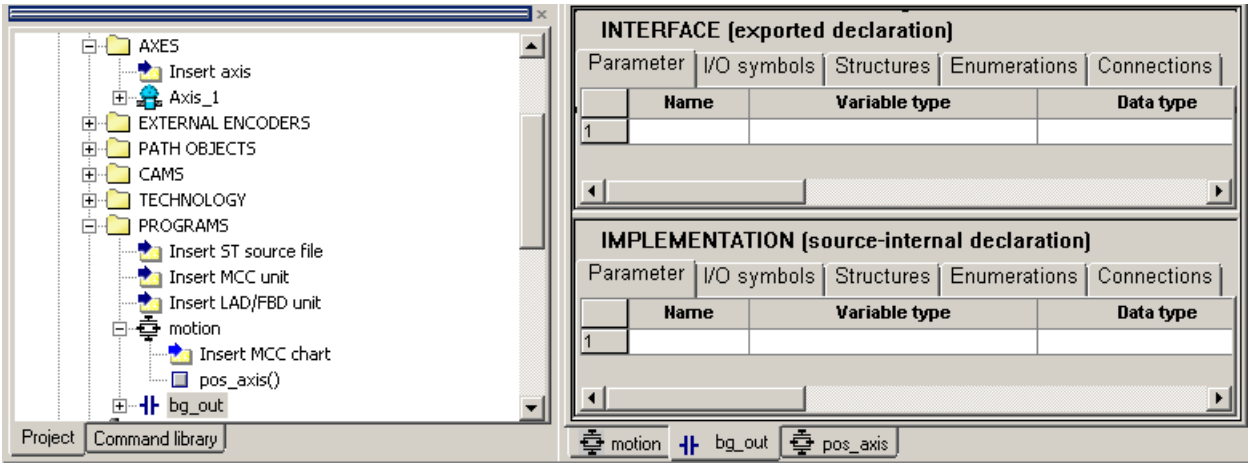


Figure 8-35 LAD/FBD unit "bg_out" inserted

8.6.3.3 Create LAD/FBD program

Procedure

In order to set up an LAD/FBD program, proceed as follows:

1. In the project navigator, below the SIMOTION device, open the "PROGRAMS" folder.
2. Open the LAD/FBD unit "bg_out" in the "PROGRAMS" folder.

3. Double-click "Insert LAD/FBD program".
   The "Insert LAD/FBD Program" dialog opens.

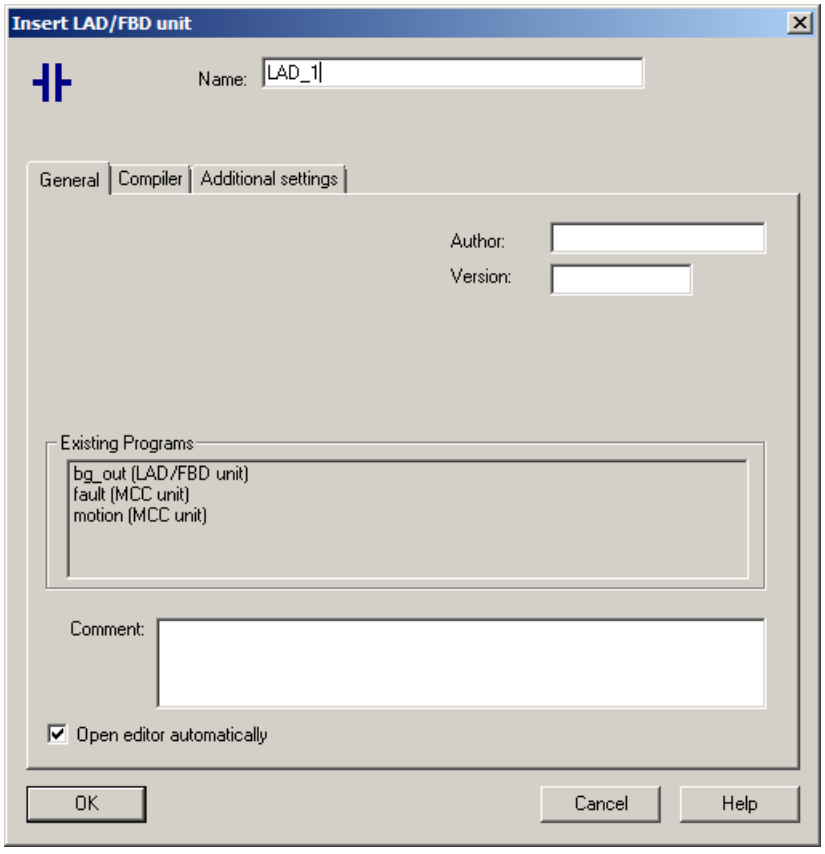


Figure 8-36 Inserting the LAD/FBD program

4. Assign a name, "LAD_1" in the example. The name must be unique throughout the project.
5. For the creation type, select "Program".
6. Confirm with "OK".

Result

The LAD/FBD program "LAD_1" is created in the project.

- The LAD/FBD program appears in the "PROGRAMS" folder.
- The LAD/FBD editor is opened in the working area of the workbench. You can start programming.

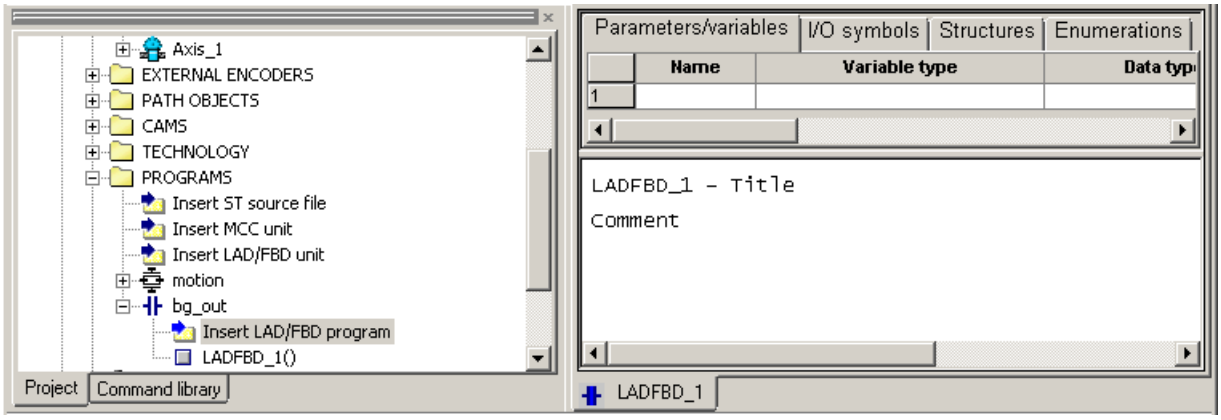


Figure 8-37 LAD/FBD program "LAD_1" inserted

8.6.3.4 Using the LAD/FBD toolbar

Opening the LAD/FBD toolbar

The LAD/FBD toolbar becomes visible in the workbench as soon as you open an LAD/FBD program.

Move the cursor across the active buttons of the toolbar to display the functions.



Note

Displaying the LAD/FBD toolbar

If you do not see the toolbar, check if the display is switched on: Open the "View > Toolbars" menu. In the "Toolbars" window, activate the "LAD/FBD toolbar" checkbox.

Switching the programming language

SIMOTION SCOUT TIA allows simple switching between ladder logic and function block diagram. The LAD/FBD editor contains the command "LAD/FBD program > Switch to FBD" or "Switch to LAD".

8.6.3.5 Backing up the LAD/FBD program

Procedure

In order to back up an LAD/FBD program, proceed as follows:

1. On the toolbar, click the "Save project" or "Save project and compile changes" button.



Alternatively you can click the "Accept and compile" command in the LAD/FBD toolbar.



This command compiles the currently selected program as well as all other programs of the same unit.
However, the command does not save the changes.
You thus have the option of accepting changes to a program into the project without having to save or compile the entire project again.

Additional references

For further information, refer to the Online Help and SIMOTION LAD/FBD Programming and Operating Manual.

The "Getting Started section of the SIMOTION SCOUT TIA" Online Help contains a detailed description of a sample configuration.

8.6.4 Using ST

8.6.4.1 Overview

Program creation steps

The creation of an ST program encompasses the following steps:

1. Creating an ST source file.
2. Saving and compiling the ST program.
3. Executing the ST program.

Note

Template for example unit

An extensively annotated *template for example unit* is also available in the online help.

8.6.4.2 Creating an ST source file

Procedure

To create an ST source file, proceed as follows:

1. In the project navigator, below the SIMOTION device, open the "PROGRAMS" folder.
2. Double-click Insert ST source file.
   The "Insert ST Source File" dialog opens.

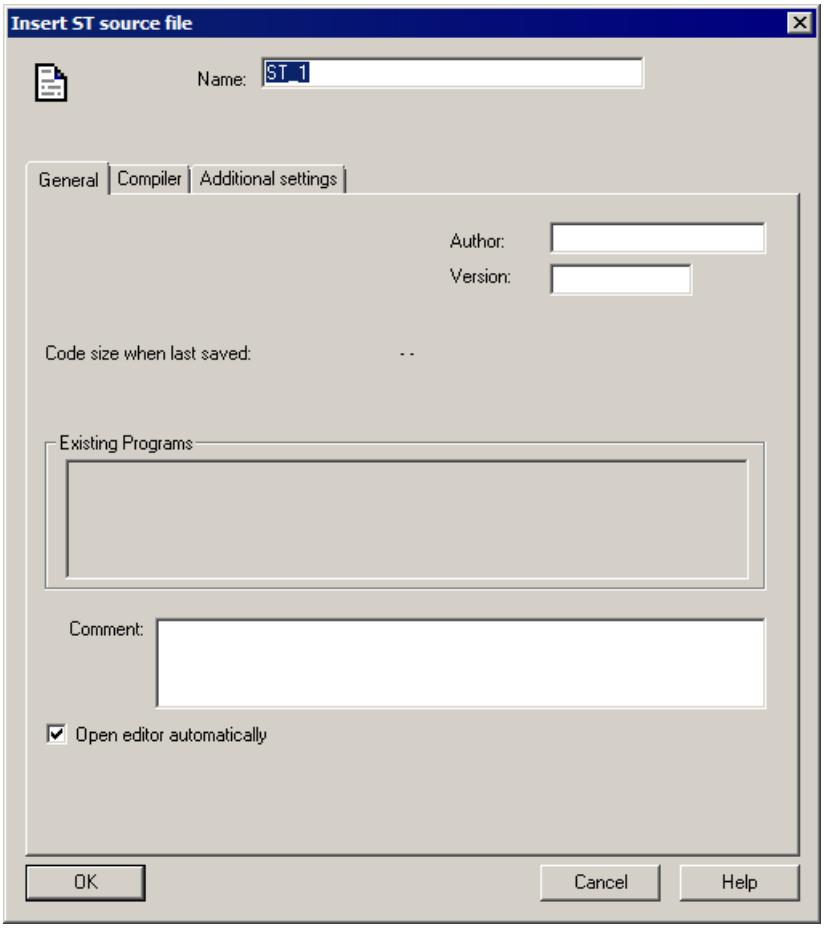


Figure 8-38 Inserting an ST source file

3. Assign a name, "ST_1" in the example.
4. Confirm with "OK".

Result

The ST source file has been created.

- The unit appears in the project navigator below the "PROGRAMS" branch.
- The declaration table of the source file opens in the working area of the workbench.

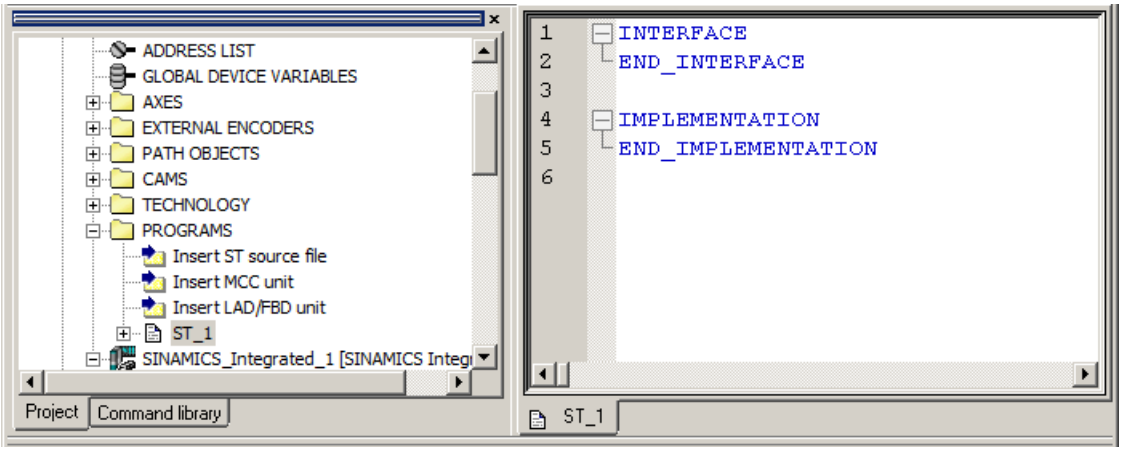


Figure 8-39 ST source file "ST_1" inserted

8.6.4.3 Using the Snippet Editor

With the Snippet Editor, you can create your own snippets for frequently used code blocks. You assign a keyword to the code block and insert the code block into your ST program by calling the keyword.

To call the Snippet Editor, click in the active work area of your ST source and select "View > Snippet Editor" in the context menu.

Additional references

Detailed information on the Snippet Editor can be found in the SIMOTION SCOUT TIA online help, section "Code Snippets".

8.6.4.4 Using the ST toolbar

Using the ST toolbar

The ST toolbar is displayed in the workbench as soon as you have created an ST source file.



Move the cursor across the buttons of the toolbar to display the functions.

8.6.4.5 Backing up the ST program

Procedure

To back up an ST program, proceed as follows:

1. Save the entire project.
   Select the "Save" command in the "Project" menu.
2. Click the "Accept and compile" button in the toolbar to run and test the program.

8.6.4.6 Executing the ST program.

Before you can execute the sample program, you must assign it to an execution level or a task. When you have done this, you can establish the connection to the target system, download the program to the target system, and then start it.

Additional references

Detailed information can be found in the SIMOTION SCOUT TIA Online Help and in the SIMOTION ST Structured Text Programming and Operating Manual.

The "Getting Started section of the SIMOTION SCOUT TIA" Online Help contains a detailed description of a sample configuration.

8.6.5 Using libraries

In SIMOTION SCOUT TIA, you can create general functions or standard functions as a library and use them in ST source files, LAD/FBD programs or MCC charts for programming.

You can create user and standard libraries for user-defined data types, unit variables, functions (FC) and function blocks (FB).

You create libraries in the project navigator in the "LIBRARIES" folder. You store the ST source files/LAD/FBD programs/MCC charts for the library below the library. A library's individual ST source files, LAD/FBD programs or MCC charts can be protected against unauthorized opening, reading and modification via the know-how protection for programs.

Inserting libraries

To insert a library, proceed as follows:

1. Open the "LIBRARIES" folder in the project navigator.
2. Double-click "Insert library".
   The "Insert library" dialog opens.

3. Enter the name of the library.

   Note

   Long library names

   If the library name is longer than 9 characters, the name may be shortened depending on the set column width. A tooltip shows the full library name.

   For example, a user has assigned the name "myVeryVeryLongLibName_1". "myV ... e_1" is shown.

   If there is only a small number of libraries, the displayed name can be longer, depending on the window size.

   CPU names can also be long, so their display mode is limited in the same way as the library names, except that the displayed length is 15 characters. The full name is displayed via a tooltip here also.

4. Go to the "Technology packages" tab and select the device and the technology package. You can select specific technology packages for each device.
5. Switch to the "Compiler" tab and enable the current settings for the library. This setting applies to all ST source files of this library. The current settings overwrite the global settings.
6. Confirm with "OK". The library is created.
7. To create the ST source files/LAD programs/MCC charts of the library, double click on "Insert ST source file"/"Insert MCC unit"/"Insert LAD/FBD unit" under the folder of the created library You can also insert ST, MCC or LAD/FBD source files from the "PROGRAMS" folder into the library by copying or drag-and-drop, or import them via a selective export from another project.

Using libraries

To use libraries, follow these steps:

1. For MCC charts and LAD/FBD programs, select the connection type "Library" in the "Connections" tab in the active work area of the source. Select the name of the library. For ST source files, integrate the libraries via the USELIB command.

A library is always specifically created for one SIMOTION device and one technology package. These settings are taken into consideration during compilation and the library can only be run on this set device with the selected technology package. If the library is also to be capable of being run with other devices or technology packages, you have to change the library's properties accordingly and perform the compilation again. When changing the technology package, you must make sure that the system functions used in the library are also to be found in the technology package. If there are any errors, they will be displayed during compilation.

Debugging libraries

Debugging a library is only possible if it is connected to a device. You can link libraries to CPUs to define the context in the editors so that the files are available from the corresponding CPU via "Diagnostics".

Proceed as follows to connect the library with a CPU and select it:

1. Select the "LIBRARIES" folder in the project navigator.
2. Right-click and select "Debugging by target device..." in the context menu.
   Only the CPUs available online are displayed.
   CPUs that are already connected are marked with a checkmark.

   Note

   A library can only be connected with one CPU at any time

   Please note that a library can only be connected with one CPU at any time.

   To disconnect a device, click on the CPU again.

3. Set the connection.
   The libraries are connected.

   Note

   The same CPU can be connected with multiple libraries

   You can connect multiple libraries to the same CPU.

Additional references

Detailed information on the topic of libraries can be found in the SIMOTION SCOUT TIA online help, section "Libraries".

8.6.6 Searching in variables and programs

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 sources. All global and local variables at the declaration and use points are recognized.

Global search

To start the search, proceed as follows:

1. In the "Edit" menu, select the "Search in the project..." command.
   The "Search in the Project" dialog opens.

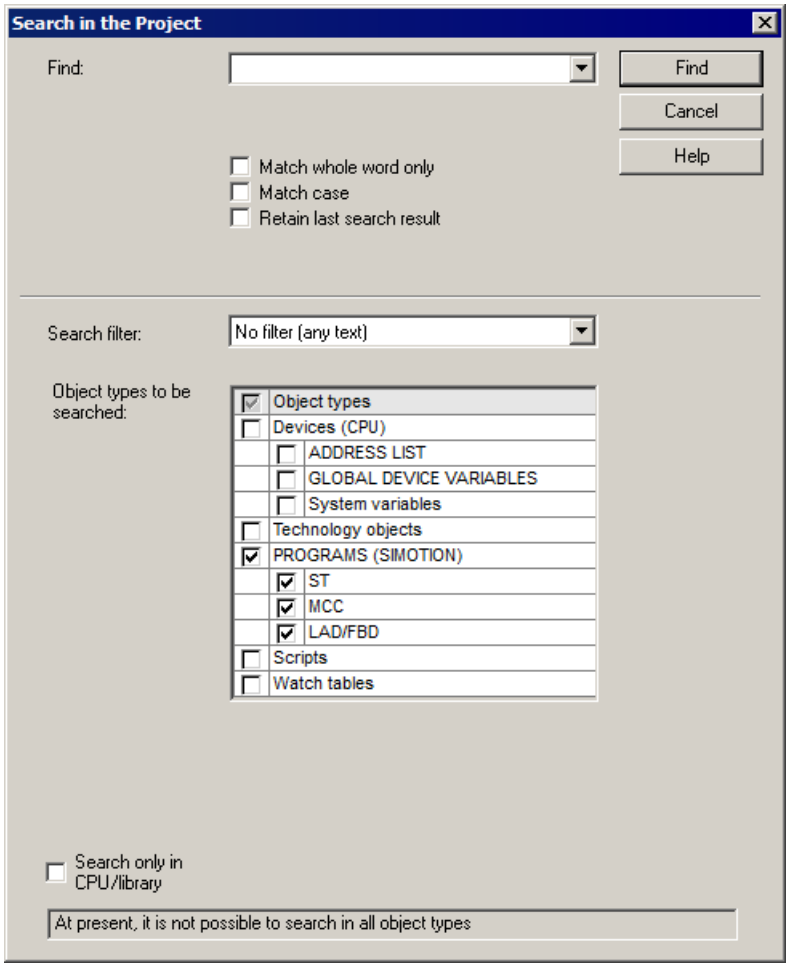


Figure 8-40 Search in the project

2. Enter the search text and specify additional criteria for the search.
3. Start the search by clicking "Find".

Result

The search results are displayed in the detail view in the "Search result" tab.

Local search

You can search locally for a specific text in the various editors and the declaration tables.

To start the local search, proceed as follows:

1. Open the appropriate editor, e.g. for a program or created global device variable.
   The focus in on the editor window.
2. In the "Edit" menu, select the "Search..." command.
   The "Search" dialog opens.
3. Enter the search text.
4. To start the search, click "Find next".

Result

The result of the search is highlighted in the editor window.

8.7 Configure execution system

Execution levels define the chronological sequence of tasks in the execution system. A level can contain several tasks. The tasks provide the framework for program execution. A task may comprise several programs. By assigning the created programs to the tasks, you can, for example, define the priority, the time frame or order in which the programs are to be executed.

Assigning programs to tasks

To assign programs to tasks in the execution system, proceed as follows:

1. In the project tree, under the SIMOTION device, double-click "EXECUTION SYSTEM". The "EXECUTION SYSTEM" window opens in the working area.
2. Assign the required program to the preferred task. In the sample MCC program, "motion.pos_axis" and "MotionTask_1" task.
   – Select the "ExecutionLevels > OperationLevels > MotionTasks > MotionTask_1" branch in the tree of the execution system.

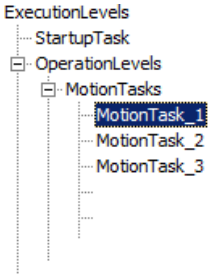


Figure 8-41 Execution system, tree view of the execution levels and tasks

The "MotionTasks" window opens on the right of the working area. On the "Program assignment" tab, under "Programs," the programs "pos_axis" and "KOP_1" and the programs of the source "fault" are visible.

– Select the MCC program "motion.pos_axis" and click the ">>" button. The program is displayed under "Programs used". Thus, the "MotionTask_1" task is assigned.

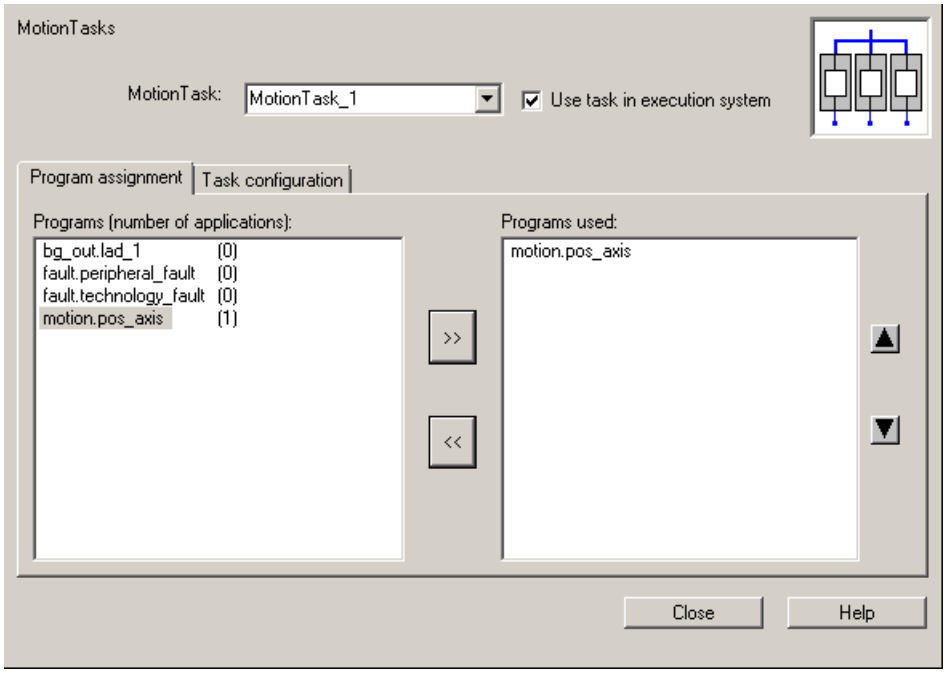


Figure 8-42 Execution system, MotionTasks window

The assignment is visible in the tree of the execution system. The "motion.pos_axis" program appears below the "MotionTask_1" branch.

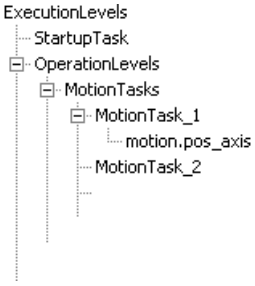


Figure 8-43 Execution system, MotionTask_1 with assigned pos_axis program

– In the "Task configuration" tab, activate the "Activation after StartupTask" option. This executes the MCC program immediately after the SIMOTION device is started. If this option is not activated, the program must be started explicitly by the call from another program that is assigned to the StartupTask or another active task.

3. Assign the LAD program "bg_out.kop_1" to the task "BackgroundTask":

   – In the tree of the execution system, select the branch "ExecutionLevels > OperationLevels > BackgroundTask". Assign the LAD program "bg_out.kop_1" to this task.

4. Assign the fault handling routines:
   - In the tree of the execution system, select the branch "ExecutionLevels > OperationLevels > SystemInterruptTasks > TechnologicalFaultTask". Assign the MCC program "fault.technology_fault" to this task.
   - In the tree of the execution system, select the "ExecutionLevels > OperationLevels > SystemInterruptTasks > PeripheralFaultTask" branch. Assign the MCC program "fault.peripheral_fault" to this task.
5. Click the "Close" button. Confirm with "Yes" if you are prompted to save.

Result

The execution system is configured.

Loading the configured execution system to the target system

Save and compile the changes, go online and load the configured execution system into the target system.

8.8 Controlling the target system

8.8.1 RUN and STOP operating states

Operating states

In the SIMOTION SCOUT TIA dialog "Control Operating State", you can switch a SIMOTION CPU to the RUN or STOP state.

RUN operating state

SIMOTION executes the user program and the associated system services:

- Reading process image of inputs
- Execution of the user programs assigned to the execution system
- Writing process image of outputs

The technology packages are active in this state. They can execute commands from the user program.

STOP operating state

SIMOTION does not process a user program.

- It is possible to load a complete user program.
- All system services (communication, etc.) are active.

- The I/O modules are in the safe state (this means, for example, digital outputs are "LOW" and analog outputs are de-energized or at zero current).
- The technology packages are inactive, i.e. all releases are deleted. No axis motions can be executed.

Additional references

Detailed information about operating states can be found in the section "SIMOTION device: Operating state**"** in the SIMOTION SCOUT TIA Online Help.

8.8.2 Control operating mode

⚠ WARNING

Danger to life through unexpected machine movement

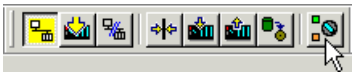
If the operating state is not switched under controlled conditions, this may endanger the safety of personnel and the machine.

- Observe the safety regulations before you control a SIMOTION device via the mode selector switch in SIMOTION SCOUT TIA.

Switching SIMOTION devices to the RUN or STOP operating state

To control the operating state, proceed as follows:

1. Select "Target system -> Control operating state..." in the menu to open the "Control Operating State" dialog.
   Or click on the "Control operating state" icon in the toolbar.

   The call is possible if at least one CPU of the project is in online mode.
2. Click the assigned button to select the desired "RUN" or "STOP" operating state for the displayed devices in the "Control Operating State" dialog.
   The "State" field indicates whether the operating state change was performed.

Control Operating State dialog

The dialog shows the operating state of all configured CPUs. The display can be filtered. The change of operating state is possible per device, or for several devices simultaneously.

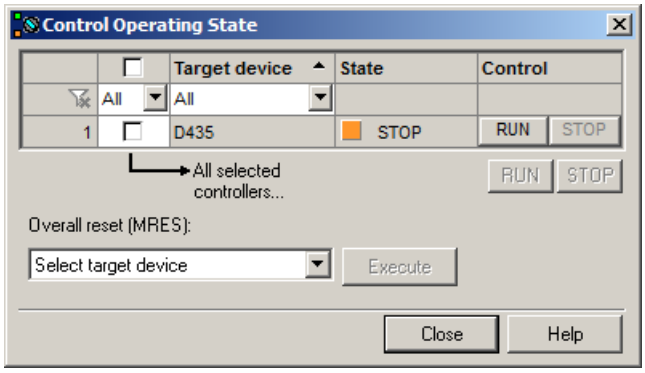


Figure 8-44 STOP operating state

Note

"Control Operating State" dialog with all configured devices

As of Version 4.4, the "Control Operating State" dialog represents all configured SIMOTION devices. The previous dialog had to be opened individually for each CPU.

Overall reset is possible in the dialog as before. You will find additional information about overall reset in the section Overall reset (Page 328).

The SIMOTION P State tool is retained unchanged.

Listed devices

The "Target device" column shows the names of the CPUs available in the project. The order corresponds to the order of the CPUs in the project navigator.

Offline/online distinction

If a CPU is in offline mode, the name of the CPU and all other assigned elements are grayed out in the table line.

The checkbox is always open for input.

Filter

The list of the CPUs can be filtered according to the following criteria:

- Selection by checkbox
- Name, or part of the name, of the CPU
- CPU in online mode

Filtering the display with the checkbox

The display can be restricted to CPUs that are activated in the checkbox column. The field in the header of the checkbox column provides a choice of the following filter values.

Table 8-1 Filter values in the checkbox column

Filter value	Filter result
All	All CPUs are displayed, irrespective of whether a check mark is set or not.
Set	Only CPUs with a set check mark are displayed.
Not set	Only CPUs without a set check mark are displayed.

If the dialog is called from the context menu of a CPU, this CPU is automatically preselected ("Context menu > Target device > Operating state").

All CPUs can be selected or deselected with the checkbox in the header.

Filtering the display by operating state or CPU name

The selection field in the header of the "Target device" column offers the following filter values:

Table 8-2 **Filter values in the Target device column**

Filter value	Filter result
All	All CPUs are displayed, regardless of whether they are in online or offline mode
Online	Only CPUs that are in online mode are displayed.
User-definable	The field can be edited, thus enabling filtering according to parts of names. Up to five user-defined filters remain for selection.

Operating states

State column: Shows the state of the CPUs in text form and via static LEDs.

Table 8-3 Operating states of a SIMOTION device

Operating state		Description
Text	**LED**	
STOP	(orange)	• 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 D)
STOP U	(orange/white)	• Technology objects active • Technology objects can execute jobs for test and commissioning functions • Otherwise identical to STOP operating state • STOP U means stop user program • User program is not executed
RUN	(green)	• Technology objects active • Execution of the user programs assigned to the execution system • Loading a user program is possible • The process image of the inputs and outputs is read or written
STOP	(orange/white)	• All tasks shut down, operating system stopped, real-time clock continues to run
STARTUP	(orange/white)	• The display only appears if the state persists longer than 1 second, or in the event of a fault
SERVICE	(orange/white)	• Display, e.g. if master control has been fetched by the axis control panel
SHUTDOWN	(orange/white)	• Display appears only if the state persists for longer than 1 second
(empty)	(empty)	• CPU is in offline mode

Control operating state

A CPU can be switched to the designated operating state with the RUN and STOP switches. The switching options are dependent on the position of the mode selector switch on the SIMOTION device. The setting on the device takes priority.

Table 8-4 Switching options of the software switch dependent on the position of the mode selector switch on the SIMOTION device.

Mode selector switch position of the SIMOTION device	Switching option in the SCOUT "Control Operating State" dialog
STOP	STOP
STOP U	STOP
RUN	RUN, STOP
MRES	STOP

Note

Manual switching to the "STOP U" operating state is no longer possible.

As of V4.4, manual switching to the "STOP U" operating state is no longer possible in the "Control Operating State" dialog of SCOUT.

If a CPU is in offline mode, both the RUN and STOP buttons are deactivated.

Simultaneous control of several CPUs

CPUs that are in online mode and that are selected in the filter column can be switched simultaneously to the RUN or STOP operating state. To do so, click the RUN or STOP switch below the list.



Observe that the switches only switch the CPUs that are visible in the dialog. For this reason, verify the effect of the name filter in the "Target device" column.

Error messages

A CPU that can no longer assume the required state is indicated in color. The "State" cell changes to red or yellow/orange.

- Red: Error
- Yellow/orange: Note

A single click on the corresponding cell causes an error text or information text to appear in a roll-out tip.

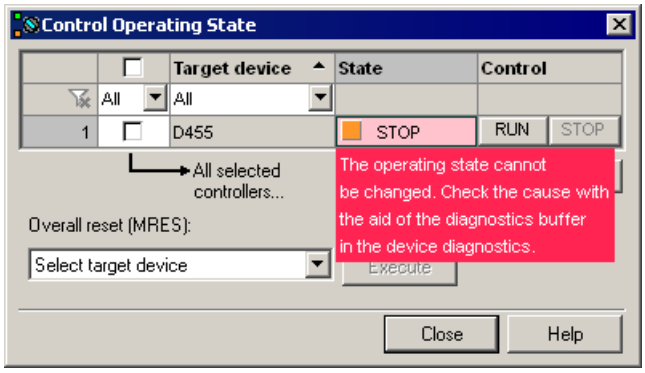


Figure 8-45 Roll-out tip with error message

Priority of the mode selector switch on the SIMOTION device

The setting of the operating state on the SIMOTION device has priority. SIMOTION SCOUT TIA can switch a SIMOTION device to the RUN operating mode only if the mode selector on the device is set to "0" or "RUN".

- **SIMOTION D**
  You can find the mode selector switch of the D410-2 and D4x5-2 in the lower area of the front behind the blanking cover.

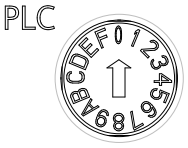


Figure 8-46 D410-2 and D4x5-2, mode selector switch, switch position 0 (RUN)

- **SIMOTION P**
  The LEDs, mode selector switch and CF card handling indicators, which are implemented as hardware on other SIMOTION platforms, are visualized on the screen for SIMOTION P.
  The display is performed via the *SIMOTION P State* application.
  The following figures show *SIMOTION P State* in the started state, using the SIMOTION P320-4 as an example.

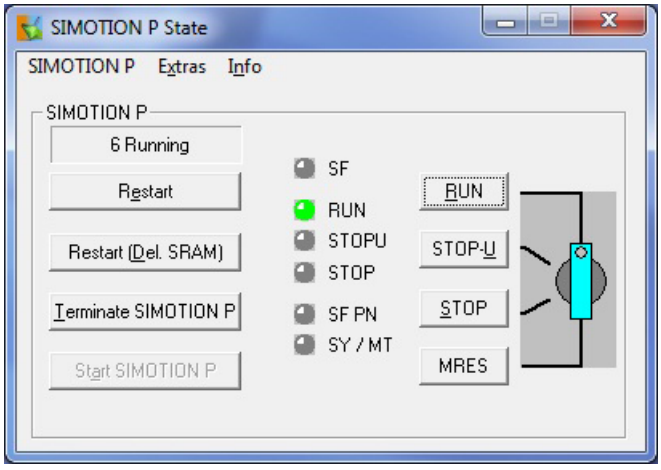


Figure 8-47 SIMOTION P State - state display

- **SIMOTION C**

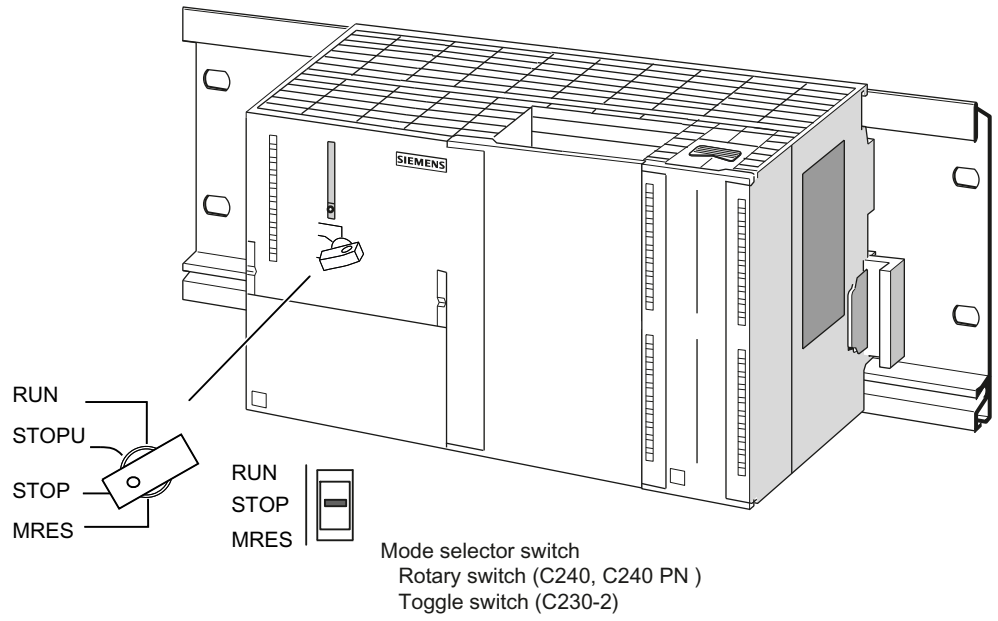


Figure 8-48 SIMOTION C module front

Additional references

Detailed information can be found in:

- SIMOTION C Operating Instructions
- SIMOTION D4x5-2 Manual
- SIMOTION D4x5-2 Commissioning and Hardware Installation Manual
- SIMOTION D410-2 Manual
- SIMOTION D410-2 Commissioning and Hardware Installation Manual
- SIMOTION P320-4 E / P320-4 S Manual
- SIMOTION P320-4 E / P320-4 S Commissioning and Hardware Installation Manual
- SIMOTION SCOUT TIA Online Help

8.8.3 Overall reset

Requirement

The SIMOTION device for which overall reset is to be performed must be online.

Procedure

To execute an overall reset, proceed as follows:

1. Select "Target system -> Control operating state" in the menu to open the "Control Operating State" dialog.
   Or click "Control operating state" in the toolbar.

   The call is possible if at least one CPU of the project is in online mode.
2. Switch the SIMOTION device for which an overall reset is to be performed to the "STOP" operating state in the "Control Operating State" dialog.
3. Select the SIMOTION device under "Overall reset (MRES)". Click the "Execute" button. Confirm the command by clicking "Yes".

Result

The memory reset will now be performed.

See also

Control operating mode (Page 321)

8.9 Know-how protection

Know-how protection

The know-how protection in SIMOTION SCOUT TIA prevents unauthorized viewing and editing of your programs or parameters directly in the drive unit. A distinction is made between the following two know-how protection types:

- Know-how protection for programs
- Know-how protection for drive units (as of SINAMICS V4.5)

Note

Write protection for drive units

In addition to the know-how protection, write protection can be set up for drive units.

See also

Know-how protection for programs (Page 330)
Know-how protection for drive units (Page 333)
Write protection for drive unit (Page 336)

8.9.1 Know-how protection for programs

The know-how protection protects the programs and libraries in your project. Unauthorized viewing and editing of your programs is prevented when the know-how protection is activated.

Note

If a program is copied using copy and paste, the copied program also remains locked. A program retains its know-how protection even when it is imported or exported.

Setting up a password

By specifying a login and password, the know-how protection is activated for the program. The programs included in the project are visible to the user in the project navigator, but the programs are locked. Only by entering the password can you remove the lock and open the program for editing.

Procedure

To set up a password, proceed as follows:

1. Select "Project > Know-how protection for programs > Edit default login..." in the menu. The "Edit Default Login" dialog opens.

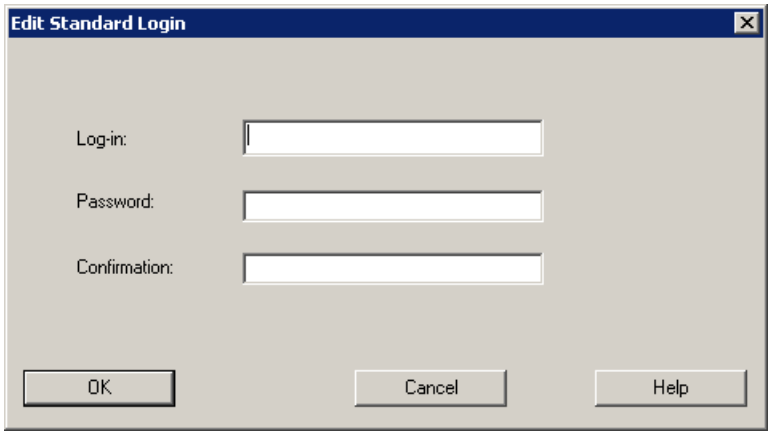


Figure 8-49 Setting up know-how protection password

2. Select the login and specify a password.

Note

The set default login remains valid for the whole project until it is deleted or SIMOTION SCOUT TIA is closed.

Configuring know-how protection

To configure the password security level, proceed as follows:

1. Select "Project > Know-how protection > Configure..." in the menu.
   The "Configure Know-how Protection for Programs" dialog opens.

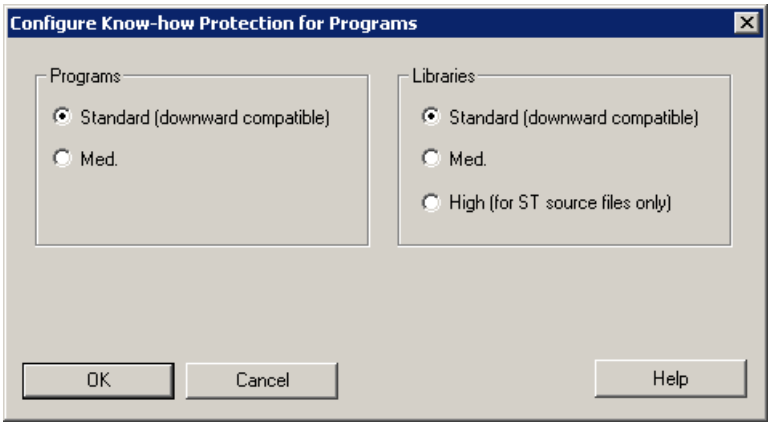


Figure 8-50 Configuring know-how protection

2. Select the required security level for programs and libraries.

Additional references

For detailed information, refer to Section "Know-how protection" in the SIMOTION SCOUT TIA Online Help.

8.9.2 Activating/ deactivating know-how protection

Activate know-how protection

Proceed as follows to activate know-how protection for programs:

1. Open the project and, in the project navigator, select the "PROGRAMS" folder or a program, depending on whether you want to set know-how protection for all programs or for selected individual programs.
2. Right-click to open the context menu and select "Know-how protection > Set".

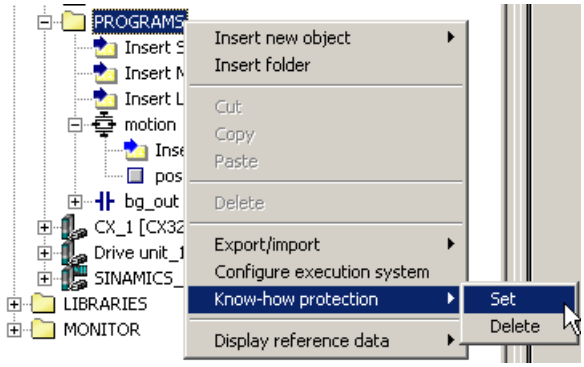


Figure 8-51 Set know-how protection

Result

The selected programs are protected and then locked. Protected programs are identified in the project navigator symbolically by a lock.

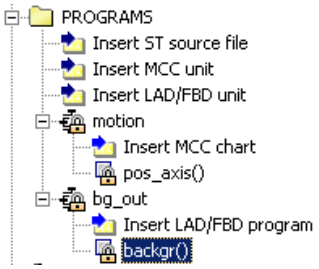


Figure 8-52 Result: Programs are protected

Only by entering the password can you remove the lock and open the program.

Deactivating know-how protection

Proceed as follows to deactivate know-how protection for programs:

1. Open the project and, in the project tree, select the "PROGRAMS" folder or the program, depending on whether you want to deactivate the know-how protection for all or only for specific programs.
2. Right-click to open the context menu and select "Know-how protection > Delete".

Result

The know-how protection for all programs or for the selected individual programs will be deleted.

Search in know-how-protected sources

If you have set know-how protection on sources, these are no longer included in the search. A search is only possible if you open the source in the appropriate editor or if you remove know-how protection again.

Note

Setting know-how protection for all programs

In ST source files, MCC charts and LAD/FBD programs, you can protect all programs in one action by setting the know-how protection directly in the "PROGRAMS" folder.

8.9.3 Know-how protection for drive units

The Drive unit know-how protection only applies online and is used to protect intellectual property, in particular, the know-how of machine manufacturers, against unauthorized use or reproduction of their products.

Activating know-how protection for a drive unit

Proceed as follows to activate the know-how protection for the drive unit:

1. Open the project, and in the project navigator, select the drive unit to which you want to apply know-how protection.
2. Right-click to open the context menu and select "Know-how protection for drive unit > Activate ...".
   The "Activate Know-how Protection for Drive Unit" dialog opens.

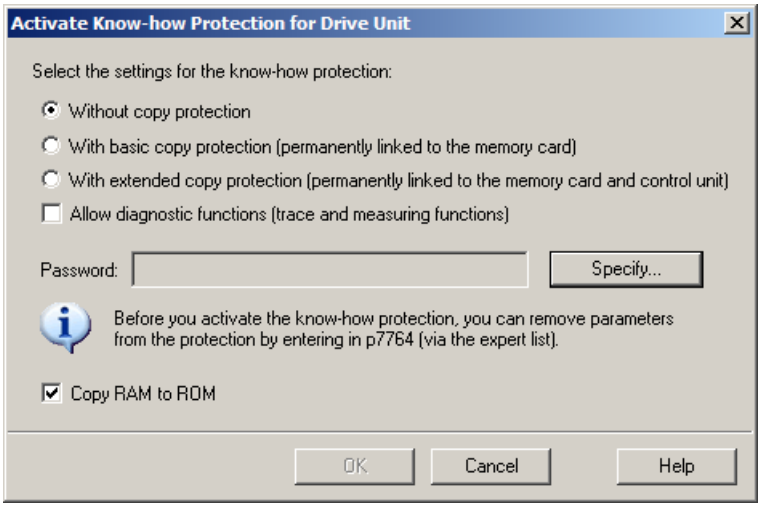


Figure 8-53 Know-how protection for drive unit

3. Specify whether the know-how protection should be set with or without copy protection.
4. Activate "Copy RAM to ROM" if the know-how protection is to be maintained permanently.
5. To set a password, click the "Set" button.
   The "Know-how Protection for Drive Unit - Define Password" dialog opens.
6. Define a password.
7. Confirm with "OK" to close the dialog.
8. Confirm with "OK" to activate the know-how protection for the drive unit.

Deactivating know-how protection for a drive unit

Proceed as follows to deactivate the know-how protection for the drive unit:

1. Open the project, and in the project navigator, select the drive unit whose know-how protection you want to deactivate.
2. Right-click to open the context menu and select "Know-how protection for drive unit > Deactivate ...".
   The "Deactivate Know-how Protection for Drive Unit" dialog opens.

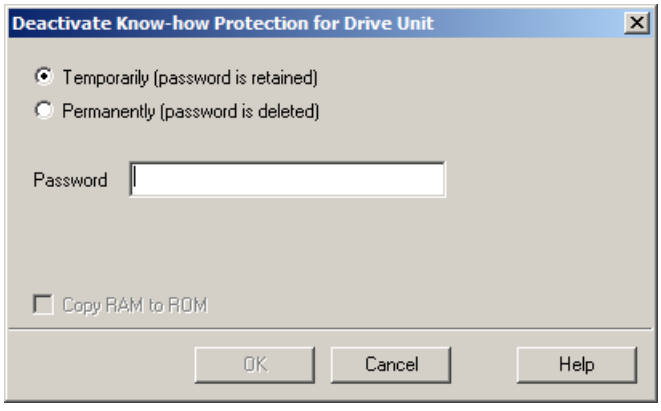


Figure 8-54 Deactivating know-how protection for a drive unit

3. Specify whether the know-how protection should be temporarily deactivated or whether the know-how protection should be deleted permanently.
   For temporary deactivation, you can activate the know-how protection via the context menu. Copying from RAM to ROM is not possible here.
4. Enter the password and confirm with "OK".

Additional references

For detailed information, refer to Section "Know-how protection" in the SIMOTION SCOUT TIA Online Help.

8.10 Access protection for technology objects

Overview

With the access protection for technology objects, you can protect important configuration data of the machine, e.g. axis settings, cams, coupling types, controller settings, etc., from unauthorized access.

With enabled access protection, the following actions can only be performed after input of a password:

- Uploading data from the controller
- Reading out data with the Web server
- Reading/analyzing data from a CF card

Note

Protect memory card from unauthorized access

It makes sense to extend the security measure and ensure that unauthorized persons have no access to the memory card.

Note

Longer controller ramp-up times

Please note that ramp-up may take longer for controllers with enabled access protection.

Managing access protection

Access protection is based on SIMOTION IT and is managed via SIMOTION IT.

You set up access protection via "Manage Config > SIMOTION IT > Access Control".

We distinguish between the following applications:

1. No access protection is set up yet.
   Set up access protection via "Manage Config > SIMOTION IT > Access Control" and assign a password.
2. Access protection is already set up. You as user are authorized to access the configuration data and have logged in successfully.
   In this mode, you can remove access protection, change the password for access protection, or enable access protection.
3. Access protection is set up and active. You have not yet logged in with a password.
   On the login page, enter your login data with password to log in.

When access protection is enabled and without login with password, the following functions are blocked:

- IT-Diag
- FTP (even when enabled in HW Config)

- OPC UA (even when enabled in HW Config)
- Upload of SIMOTION SCOUT TIA

Additional references

You can find detailed information on access protection in the "SIMOTION IT Diagnostics and Configuration" Diagnostics Manual and in the SIMOTION SCOUT TIA online help.

8.11 Write protection for drive unit

8.11.1 Drive unit with activated write protection

As of SINAMICS V4.5 there is a write protection for drive units. You can only activate/deactivate this write protection in online mode.

The write protection applies only online and is used for protection against accidental changes by the user. When write protection is set, p parameters can be read, but not written.

Activate/deactivate the write protection via the "Write protection for drive unit" context menu of the drive unit or via parameter p7761 of the expert list. A password is not required to activate/deactivate the write protection. You can query the status of the write protection via parameter r7760.0 in the expert list (value = 0 means that the write protection is not set).

Note

Permanent write protection

If you want to activate the write protection permanently, execute the "Copy RAM to ROM" function.

Features for drive units with activated write protection

Note the following restrictions for activated write protection of drive units:

- The write protection for drive unit always applies to the device, not to individual drive objects.
- Write protection only applies online.
- All r parameters can still be read and are visible as usual.
- All p parameters can be read, but not written. p parameters are displayed hatched.
- Parameters with the WRITE_NO_LOCK attribute can be written despite the write protection.

The following functions are available even when write protection is activated for the drive units:

- Restoring factory settings
- Upload

- Acknowledging alarms
- Control panel
- Trace
- Function generator
- Measuring functions
- Reading out the diagnostic buffer

Note

Restoring factory settings

You can restore the factory settings via the expert list (parameters p9, p976).

The following functions are not available when write protection for drive unit is activated:

- Download
- Automatic controller setting
- Stationary/rotating measurement
- Delete fault buffer (p952 must not be defined as an exception parameter)
- Delete drive unit completely or individual components thereof
- Rename drive unit

8.11.2 Activating/deactivating write protection for drive unit

Activate write protection

Proceed as follows to activate the Drive unit write protection:

1. Connect to the target device online.
2. Select the drive unit to which write protection is to be applied in the project navigator.
3. Right-click the drive unit and select "Drive unit write protection > Activate" in the context menu.

Result

Write protection has been activated.

Copy RAM to ROM

You can select whether the write protection for drive unit is to be set permanently by activating "Copy RAM to ROM".

Deactivating write protection

Proceed as follows to deactivate the Drive unit write protection:

1. Connect to the target device online.
2. In the project tree, select the drive unit, whose write protection you want to remove.
3. Right-click the drive unit and select "Drive unit write protection > Deactivate" in the context menu.

Result

Write protection has been deactivated.

Note

Activating/deactivating write protection in the expert list

You can activate and deactivate the Drive unit write protection also directly in the expert list via the parameter p7761. No password is required to modify the parameter p7761. Similarly, you can activate and deactivate the Drive unit write protection via script.

Additional references

For detailed information, refer to Section "Drive unit write protection" in the SIMOTION SCOUT TIA Online Help.

8.12 Configuring multilingual messages

Multilingual messages and comments can be configured with the "Language-dependent texts" function. This is necessary, for example, if you want to output multilingual user-defined Alarm_S messages or diagnostic buffer entries.

Procedure

To configure multilingual messages, proceed as follows:

1. Select "Project > Language-dependent texts..." in the menu.
   The "Select Language" dialog box opens.
2. At "Relevant text sources", select the source for which you want to configure multilingual texts, e.g. Alarm_S.
3. Add the languages for which you want to configure texts in the selected text source. To do so, click the (>) arrow key to transfer the languages from the "Other languages" field to the "Languages in the project" field.
   Dual-language messages, for example, German and English, are then in the "Languages in the project" field.

4. Set the current configuring language. To do so, select the language in the "Languages in the project" field and click the arrow-down key (v). The selected language is displayed as "Current language".
   The language-dependent texts for the selected text source are now configured in this language setting.
5. Confirm with "OK".
6. Select "Project -> Messages > Configuration" in the menu.
   The "Message Configuration" dialog box opens.
7. Check the language set at "Configuration language".
   The message texts and remarks are displayed in the language in which they were originally configured. These texts must then be translated into the new configuration language.
8. Double-click the messages for which you want to enter texts in the new configuration language.
   The "Edit Message" dialog box opens.
9. Enter the new message text and remarks in the changed language.
   The symbol name must not be changed in foreign language messages, as this symbol name is used for programming.
   Only the message text and remarks are language-dependent.
10. Confirm with "OK".
    The modified message text is entered in the Message configuration table.

Exporting and importing text sources for translation

Using the "Language-dependent texts... > Export" function, you can export the language-dependent texts within the same project for translation, and then import them again.

Proceed as follows to export text sources:

1. Select "Project > Language-dependent texts..." in the menu.
   The "Select Language" dialog box opens.
2. At "Affected text sources", select the source that you want to export for translation, e.g. Alarm_S.
3. Click the "Export..." button.
4. Navigate to the target directory and assign a file name.
5. Confirm the selection with "Save".
   A *.txt text file has been imported that contains placeholders for all languages defined in the project.

Proceed as follows to import the translated text sources again:

1. Select "Project > Language-dependent texts..." in the menu.
   The "Select Language" dialog box opens.
2. Click the "Import..." button.
3. Navigate to the translated text file.

4. Click "Open".
   The translated text source has been imported and is available in the project in the respective configuration language.
5. Select "Project > Save and compile changes" in the menu to save the changes.

Additional references

Detailed information can be found in Section "Message configuration" and in Section "Exporting/ importing language-dependent texts" in the SIMOTION SCOUT TIA online help.

Observe in particular the constraints applying to the use of language-dependent texts described in the online help under "Notes on language-dependent texts".

8.13 Exporting OPC data

8.13.1 Overview

The OPC interface (**O**LE for **P**rocess **C**ontrol) is the specification of a common, manufacturer independent software interface based on OLE (**O**bject **L**inking and **E**mbedding). It has been designed as an industry standard by leading automation companies with the support of the Microsoft Corporation.

Up to now, applications that accessed process data depended on manufacturer-specific interfaces. With the standardized OPC interface, you can now access process data uniformly via the OPC interface when using, for example, operator control and monitoring software.

For OPC data export, the following symbols are exported in the symbol file:

- System variables of the device and the technology objects
- Global device user variables
- Symbolic input and output variables
- Interface variables of user programs (ST source file, MCC, LAD/FBD)

Note

In the interface area of a program, a maximum of 64 KB data can be addressed for operator control and monitoring. Data beyond this area get lost during the export.

In addition, the following data can be exported for OPC Alarm/Event:

- Configured alarms (Alarm_S/Q)
- Alarms from technology objects (technology object alarms)
- All messages/alarms of the diagnostics buffer

The data is saved as an XML file in the selected target directory (OPC_AE.xml).

8.13.2 Exporting OPC data

Procedure

Proceed as follows to export the OPC data:

1. In SIMOTION SCOUT TIA, select "Options > Export OPC data..." in the menu.
   The "Setting the Data for Export" dialog opens.

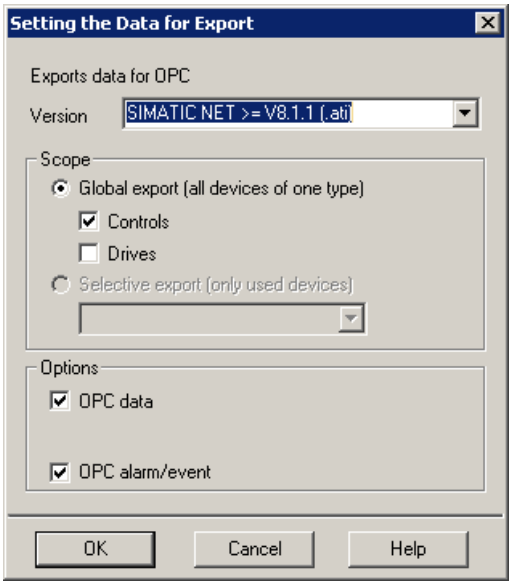


Figure 8-55 Exporting OPC data

2. Select the intended use of the data to be exported and confirm with OK.
   The "Exporting OPC data" dialog opens.
3. Select a target directory and confirm with "OK".
4. If several interfaces with different bus addresses are available on the device, also select the protocol, e.g. PROFIBUS or TCP/IP, and the interface for the export. The "Parameterize Interfaces" dialog opens. If the interfaces possess the same bus addresses or only one is being used, this dialog will not be displayed. Select the interface and protocol and confirm with "OK". An interface must be selected for all SIMOTION devices in the project. Repeat this step when required.
   The export is started. A successful export is displayed in the "Export OPC data status display" tab in the detail view.

5. If the SIMOTION devices are distributed across multiple subnets and you want to address a SIMOTION device with a SIMATIC OPC server via a router, you must configure this router again in a window after the file export in SIMOTION SCOUT TIA. If you do not want to use a router, confirm the dialog with "No".
   The following information is displayed in the "OPC Routing Information for HMI Devices" dialog:
   - All configured networks
   - All SIMOTION devices contained in the project
6. First select the subnet (location) of the OPC server.
7. Select the network station and then the first router for each network station to be addressed via the OPC server in the displayed window.
8. Confirm with "OK".

8.13.3 Setting the data to be exported

Note

OPC data can only be exported if a project is open. The export is possible both in offline and online mode.

Note

Default export setting

The latest version is set as default for the OPC export. As of SIMATIC Net V8.1.1 the OPC server can use the format "*.ati" and as of SIMOTION SCOUT TIA V4.4.

The data to be exported is selected in this window.

The following parameters can be selected:

Field/button	Meaning/note
Exports data for SIMATIC NET OPC	
SIMATIC NET versions	Select the SIMATIC NET version for which the export data is to be used. Different versions are not fully compatible. The SIMATIC NET >= V8.1.1 (.ati) Export is the fastest export version. The symbol file to be exported is first configured in the main memory and then exported. For this operation, you require sufficient main memory for the number of symbols. Before the export is started, the maximum number of symbols that can be exported is displayed. Check first whether the maximum possible number of symbols is greater than the number of symbols in your export.
Scope	

Field/button	Meaning/note
Global export	Under "Global export", activate the data (control data, drive data) that you want to export. All the required variables of the controller (SIMOTION CPU) are exported with the control data. Only drive data of drives of the SINAMICS family can be exported. Whereby the drive must be inserted below a SIMOTION CPU. The export of data of single drives and drives below a SIMATIC CPU is not possible.
Selective export	Activate "Selective export" if you only want to export certain variables. You must first have compiled these variables in watch tables in SIMOTION SCOUT TIA. In the selection list, you can then select the watch table whose variables are to be exported. A selective export is only possible when you have inserted watch tables in the project. You can create watch tables in the project tree by clicking "Insert watch table" in the "MONITORING" folder. The drive parameters are copied to the watch table using the expert list of the associated drive object.
Options	
OPC data	Activate OPC data if the symbol names and variable names are to be exported from the current SIMOTION project. If the option is deactivated, no data is exported.
Arrays with single elements	Activate the option if the arrays' single elements are to be exported with them. If the option is deactivated, only the first address of the array is exported and the data export can be shortened and the data volume reduced.
OPC alarm/event	Activate OPC alarm/event if you want to export the configured alarms and alarm texts. All existing languages of the alarms are exported to the file. If the option is deactivated, no alarms are exported.

8.13.4 OPC export - OPC data

The target directory is defined in the "Project Export" window.

You can set the following parameters:

Field/button	Meaning/note
Export settings	
Enter a target directory for the export	To select a target directory for the files to be exported, proceed as follows: 1. Click Browse to the right of the text field. A window opens. 2. Specify a target directory. 3. Confirm with "Open". Your selection is displayed in the text box.
Project path	The path of the currently opened project is displayed here. The symbol name of the current project is exported as a file or files.

8.13.5 Exporting OPC data, ati export (main memory)

SIMATIC NET >= V8.1.1 (.ati) export

The SIMATIC NET >= V8.1.1 (.ati) export is faster than the old versions of the OPC export. However, it requires more main memory as the symbol file must be configured in the main memory. For this operation, you require sufficient main memory for the number of symbols.

Therefore, at the start of the export, a calculation is made as to how many symbols can be exported with the available main memory. Check first whether the maximum possible number of symbols is greater than the number of symbols in your export. If the calculated number is not sufficient for the export of the project data, then you still have to use the other export versions, e.g. SIMATIC NET V7.x/V8.0.

8.13.6 Assigning the connection parameters

Assign the parameters for the connection in this window.

The following parameters can be selected:

Field/button	Meaning/note
Device	The device for which you must select the protocol and the interface is displayed here. You must specify the interface settings for each device in the project. You must specify these settings in this window depending on the number of devices.
Connection name	With V4.3, it is possible to use device names that do not satisfy the ST conventions. If the name of the device violates these conventions, a name valid for the OPC export is displayed at "Connection name". The following is modified in the name: • Invalid characters are replaced by a "_". • If the first character is not a letter, an "A" is set as prefix. • A number (_<n>) is added at the end, if not already available, so that the connection name is unique. You can rename the name modified in this way. Since the connection name and the device name may be different, the device/connection assignment is also exported in a file (OPC_device_connection.dat).
Protocol	Selects the transmission protocol for the SIMOTION device. **PROFIBUS** Protocol for PROFIBUS **TCP/IP** Protocol for Ethernet
Interface	Use "Interface" to select the interface for the symbol names to be exported. The SIMOTION device is addressed via this interface from the HMI software. Each symbol name must be uniquely assignable to a hardware address (bus address). This assignment is set via the "Interface" selection. **Notice** : If the interface is parameterized for isochronous bus cycle, then it must not be used for an OP.

8.13.7 OPC routing information (routers)

If the SIMOTION devices are distributed across multiple subnets and you want to address a SIMOTION device with a SIMATIC OPC server via a router, you must configure this router again in a dialog after the file export in SIMOTION SCOUT TIA.

In the "OPC routing information for HMI devices" dialog, the following is displayed:

- All configured networks
- All SIMOTION devices contained in the project

First select a location of the OPC server and then the first router for each node to be addressed via the OPC server.

Several projects interconnected

To communicate with the SIMOTION devices in a network interconnection through several projects, the SIMATIC NET OPC server must be forwarded the following files and items of information:

- "OPC Alarm/Event" files, which may originate from several SIMOTION SCOUT TIA projects
- Time zones
- Router

An auxiliary program, "SIMOTION OPC File Manager", enables you to configure this data for the SIMATIC NET OPC server.

8.13.8 Exporting OPC data, status display

The status is displayed in the "Export OPC data status display" tab in the detail view during the export.

The following information can be displayed during export:

Information displayed	Meaning/note
Error messages	Error messages are displayed in plain text if export fails. The following errors are possible: • 64k overshoot. • Export file with symbol names already exists and is being used by another application.
Location and name of the exported data	Displays the storage location of the exported files after the symbol names have been successfully exported.

8.14 Licensing of the runtime components

8.14.1 Licensing of the runtime components

8.14.1.1 Overview for the licensing

Licensing of the technology functions

Functions can be licensed using the following software options:

- Motion control technology functions
  The licensing is performed axis-specifically for:
  - POS; use of the technology functions for positioning axis
  - GEAR; use of the technology functions for following axis and path 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 POS/GEAR/CAM technology function on a SIMOTION device, e.g. a D4x5-2.

- TControl technology function
  The TControl technology package functions are licensed on a channel-specific basis in packages of eight temperature channels.

Note

For SIMOTION C, D and P, licenses for Runtime software can also be ordered as pre-installed software (via order code / Z option) on the memory card.

Additional references

You will find information on further licensed technology functions and detailed information on licensing the runtime software and the order data under:

- SIMOTION, SINAMICS S120 & SIMOTICS, equipment for production machines, PM 21 catalog
- PM 21 catalog, section titled SIMOTION runtime software
- Configurator for SIMOTION Runtime licenses in the Industry Mall (http://mall.industry.siemens.com)

8.14.1.2 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 storage medium of the SIMOTION device during the licensing procedure.

There are two ways of ordering 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 Web License Manager can be found on the Internet under:
  Web License Manager (http://www.siemens.com/automation/license).

Note

Web License Manager login

You can find the required login data, e.g. license number and the delivery note number, on the license sticker on the software.

The license key is transferred to the hardware with SIMOTION SCOUT TIA.

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 TIA (licensing wizard).
- The serial number of the CoL (Certificate of License)
  You have this number on paper.

Table 8-5 The serial number on the SIMOTION hardware assigned to the SIMOTION device

SIMOTION device	Hardware serial number of the module
SIMOTION C2xx	SIMOTION Micro Memory card
SIMOTION D	SIMOTION Compact Flash card
SIMOTION P	You can find this information on the rating plate of the SIMOTION P, starting with SVP...

License keys can be generated separately from the licensing.

Note

Archiving the licensing data

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.

You will find additional information in Section License key delete protection (Page 350).

8.14.1.3 Determining licensing requirements

License requirement

Determine your license requirement only if you have completed the configuration, and before you load it into the target device! Before you begin, the project must have been saved and compiled.

If you have not acquired any licenses yet, under-licensing is displayed.

You can determine the licenses in the following ways:

- **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.

Procedure

To determine the license requirement, proceed as follows:

1. Select the SIMOTION device in the project tree.
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 key, is carried out in the target system. Possible responses in the case of under-licensing can be found in Section Underlicensing (Page 351).

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

Note

A license which has already had a license key allocated can no longer be taken.

It is possible, however, to add licenses to an already generated license key.

8.14.1.4 Display the available 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 TIA has been started.
- SIMOTION SCOUT TIA is in offline mode.

Procedure

To display the licenses assigned to the SIMOTION device, proceed as follows:

1. Select the menu "Project" > "Accessible nodes" menu.
   The list of accessible nodes is displayed in the working area.
2. Select the relevant SIMOTION device.
3. Select the "Licenses" command in the context menu.
   The "Licenses" dialog opens. The actual licenses of the selected SIMOTION device are displayed.
4. You can close the window with "X" or continue with "Perform licensing...".

8.14.1.5 Performing the licensing

If there are no pre-installed licenses, you can acquire the licenses you need and then generate the license key required.

Requirements

Licensing is subject to the following requirements:

- The 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 TIA is in online mode.

Procedure

To perform the licensing, proceed as follows:

1. Select the relevant SIMOTION device in SIMOTION SCOUT TIA.
2. Select the "Licenses" command in the context menu.
3. In the "Licenses" dialog, click "Perform licensing...".
   If the "Use wizard" option is activated, a wizard guides you through the licensing procedure. If the option is not activated, the window for expert licensing opens. 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 of switching to the Web tool to generate a license key. Then return 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 the "Finish" button.
   The wizard closes. Licensing is complete.

Note

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

8.14.2 Changing the license key

Through changes in the project, such as through the inclusion of an additional axis, the license key for the project can lose its validity. This is why under-licensing 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.

8.14.3 Licensing during hardware replacement

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

8.14.4 License key delete protection

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.

Deleting the license key in the boot sector through user operation is not possible, also not by formatting the card or by using the "Write boot sector..." function.

If the license key is no longer present on the card, it will be written again during startup from the boot sector to 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, e.g. through relicensing. At the next startup, the license key will be saved again in the boot sector.

8.14.5 Underlicensing

If SIMOTION SCOUT TIA detects the presence of under-licensing 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 under-licensing 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 under-licensing 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.

See also

Determining licensing requirements (Page 348)

Service and diagnostics

9

9.1 Diagnostic functions in SIMOTION SCOUT TIA

There are extensive diagnostic options in the online mode within the SIMOTION SCOUT TIA for the operation of SIMOTION devices. 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 the online mode. You can call up detailed 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.
- The "Address list" tab in the detail area offers extended functions in terms of I/O diagnostics and hardware availability.
- With the device diagnostics, you determine extensive diagnostic information (e.g. diagnostics buffer, system utilization, task status, etc.).
- 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. modify variable, program status, breakpoints.
- Back up diagnostic data including non-volatile data (retain data) to CompactFlash card (for SIMOTION D) or MMC (for SIMOTION C).
- Back up the HTML pages, including the current contents for diagnostic purposes, on the CF card or MMC.
- Restore backed up non-volatile data (retain data).
  Further information can be found in the FAQ section on the Utilities & Applications DVD under: FAQs > Engineering > Backing up diagnostic data and non-volatile data.
  SIMOTION IT also offers comprehensive diagnostic options that can be easily accessed via an Internet browser.

Additional references

Detailed information can be found in:

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

9.2 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.

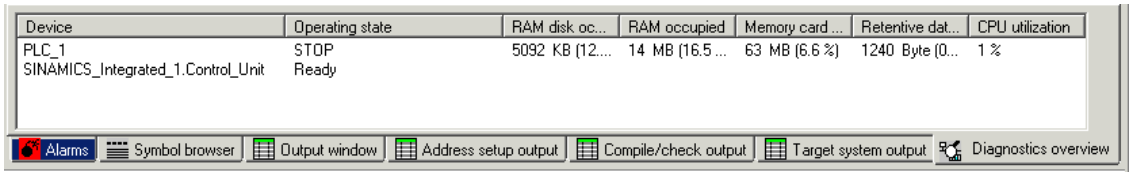


Figure 9-1 Diagnostics overview in the detail view (online mode)

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 units are also displayed. To obtain a detailed display of the individual devices, open the device diagnostics.

9.3 Device diagnostics

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

To display the diagnostic results of the individual devices, follow these steps:

1. Select the desired SIMOTION device in the project navigator.
2. Select the "Target system > Device diagnostics" menu.
   Or double-click the SIMOTION device in the Diagnostics overview tab in the detail view.

Note

Device diagnostics for several SIMOTION devices

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 will open in the working area of the workbench. This window provides you with the following information:

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

- Userlog file
- Syslog file
- Alarms

You can work with this information as follows:

- 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 state:

- Click "Control operating state".

9.3.1 General information on the SIMOTION device

To obtain general information on the SIMOTION device, proceed as follows:

- Select the "General" tab in the device diagnostics.

The following information will be displayed:

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

- Standard gateway
- Article numbers and designations of the deployed components, e.g. SIMOTION device, Motion Control technology package.

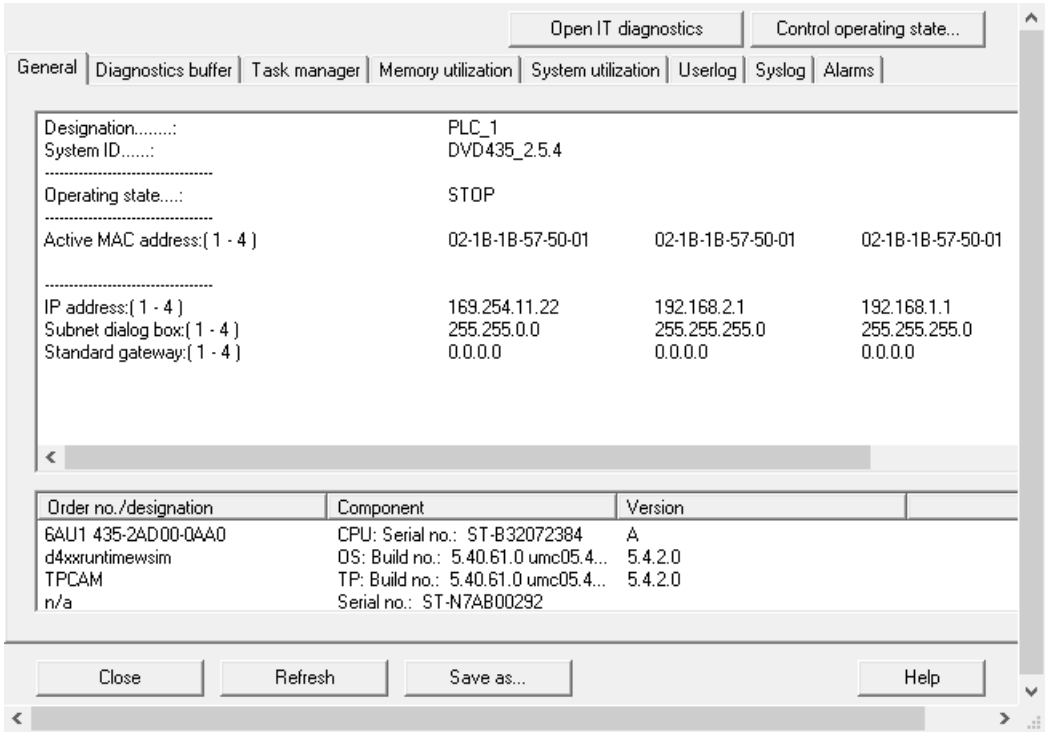


Figure 9-2 Display of general information in the device diagnostics

9.3.2 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. 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 state transitions
- User-defined diagnostic events
- Technology object alarms
- Alarm_S messages
- Errors in the user program
- User-defined entries with the _writeAndSendMessage() function
- Compatibility errors, e.g. between the drive software and SIMOTION (SIMOTION D)

To display the diagnostic buffer events, proceed as follows:

1. Select the "Diagnostics buffer" tab in the "Device Diagnostics" dialog.
   The saved events are displayed in tabular form.
2. Select the event for which you want to display more information.
   Detailed information for the selected event is displayed in the lower pane of the window.

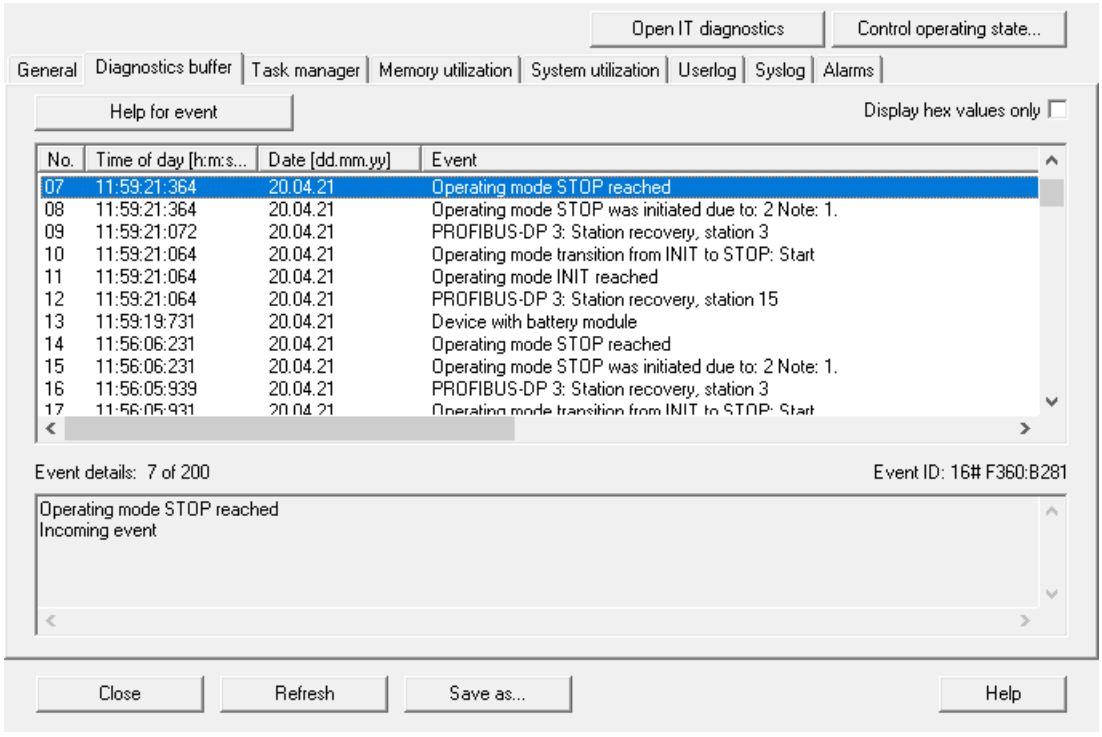


Figure 9-3 Example of the diagnostics buffer display in the device diagnostics

9.3.3 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 device. The resolution of the displayed task runtimes is performed in the servo cycle clock.

Note

The task runtimes are calculated to the µs and indicate the effective level runtime of the respective task (including the interrupt times). Thus, these correspond to the values of the "effectiveTaskruntime" device variables.

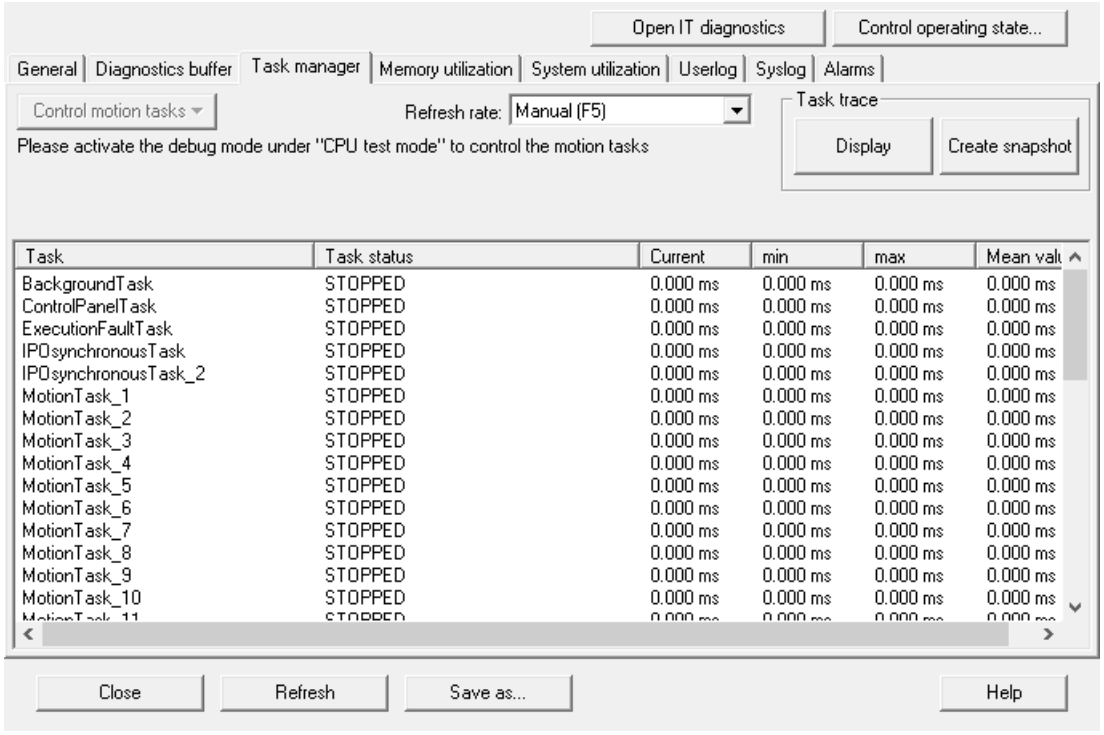


Figure 9-4 Example of the displayed task runtimes in the device diagnostics - STOPPED status

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.:
  - By "_startTask" function
  - As an active cyclic task
- RUNNING_SCHEDULED (TASK_STATE_RUNNING_SCHEDULED)
  Task is interrupted by the system.
  If the task status RUNNING_SCHEDULED remains pending for a long time, it identifies a long running user task, e.g. a programmed endless 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 "_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 the 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 eight incoming interrupts can be stored in the buffer. If another interrupt occurs, the buffer overflows and the CPU goes into STOP operating state.
- 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 the "_enableScheduler" command is called. It does not, however, affect system tasks. The time watchdog for cyclic tasks is **not** suspended.

  Note

  This also prevents the activation of the SystemInterruptTasks and UserInterruptTasks.

Controlling MotionTasks

It is possible to control MotionTasks via SIMOTION SCOUT TIA without a user program. 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 also 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 MotionTasks specifically with SIMOTION SCOUT TIA and then carry out the download in RUN mode.

Additional references

More detailed information on downloading in RUN mode can be found in:

- SIMOTION Runtime Basic Functions Function Manual
- SIMOTION SCOUT Task Trace Function Manual

9.3.4 Checking memory utilization

To display the memory utilization, proceed as follows:

1. Select the "Memory utilization" tab in the device diagnostics.

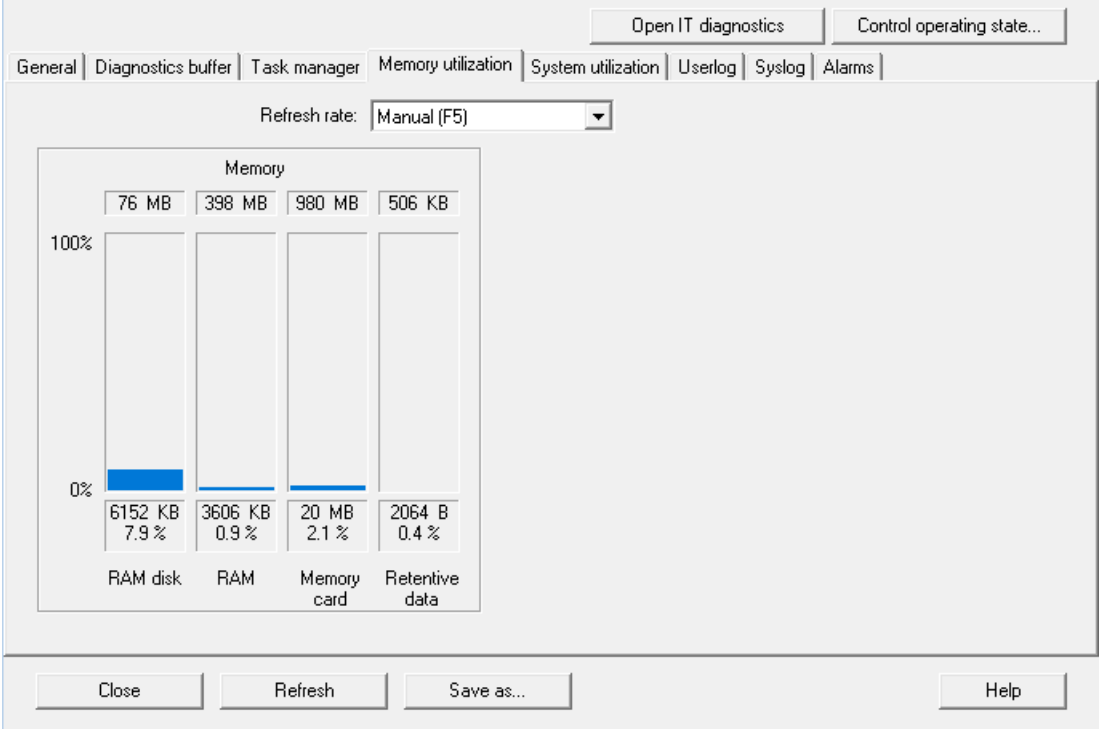


Figure 9-5 Example of the memory utilization display in the device diagnostics

Additional references

More detailed information on this topic can be found in:

- SIMOTION Runtime Basic Functions Function Manual, Section "Overview of the memory in the target device"
- SIMOTION SCOUT TIA Online Help

9.3.5 Checking the system utilization

To display the system utilization, proceed as follows:

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

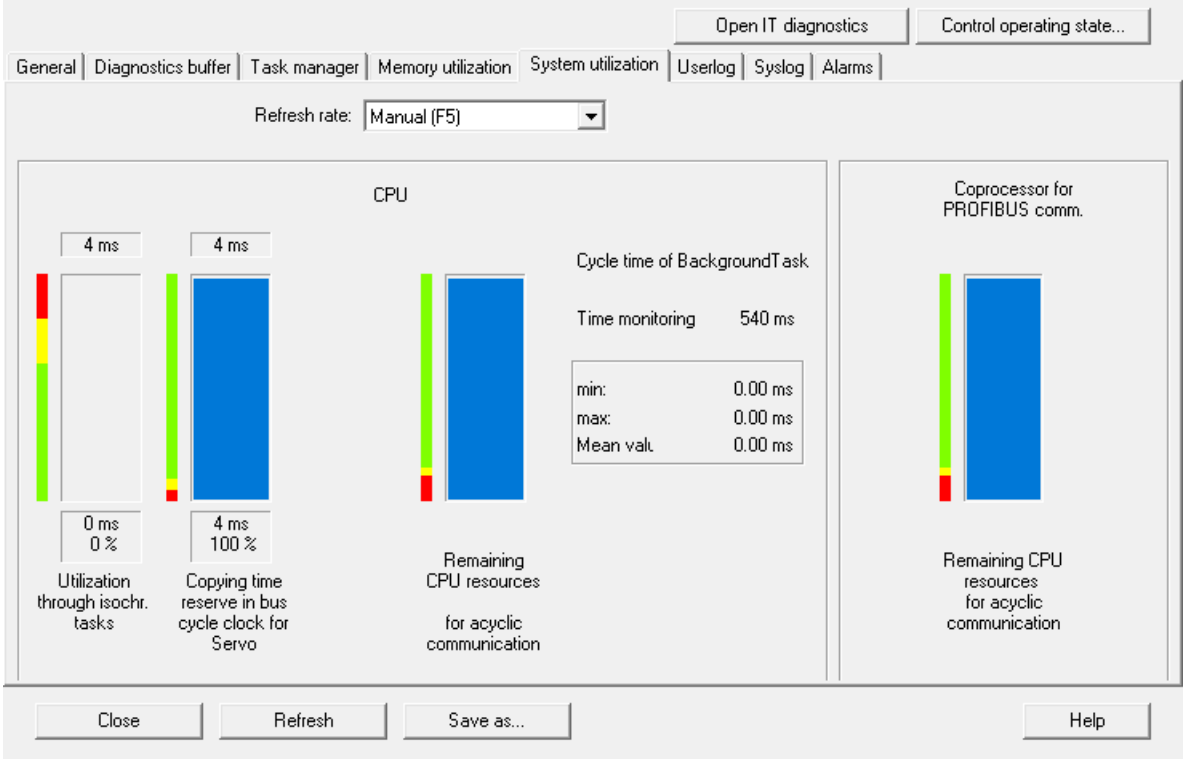


Figure 9-6 Example of the system utilization display in the device diagnostics

Additional references

More detailed information on this topic can be found in:

- SIMOTION Runtime Basic Functions Function Manual, Section "Overview of the memory in the target device"
- SIMOTION SCOUT TIA Online Help

9.3.6 User log file

With the Userlog file, you can store your own texts 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 TIA. 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.

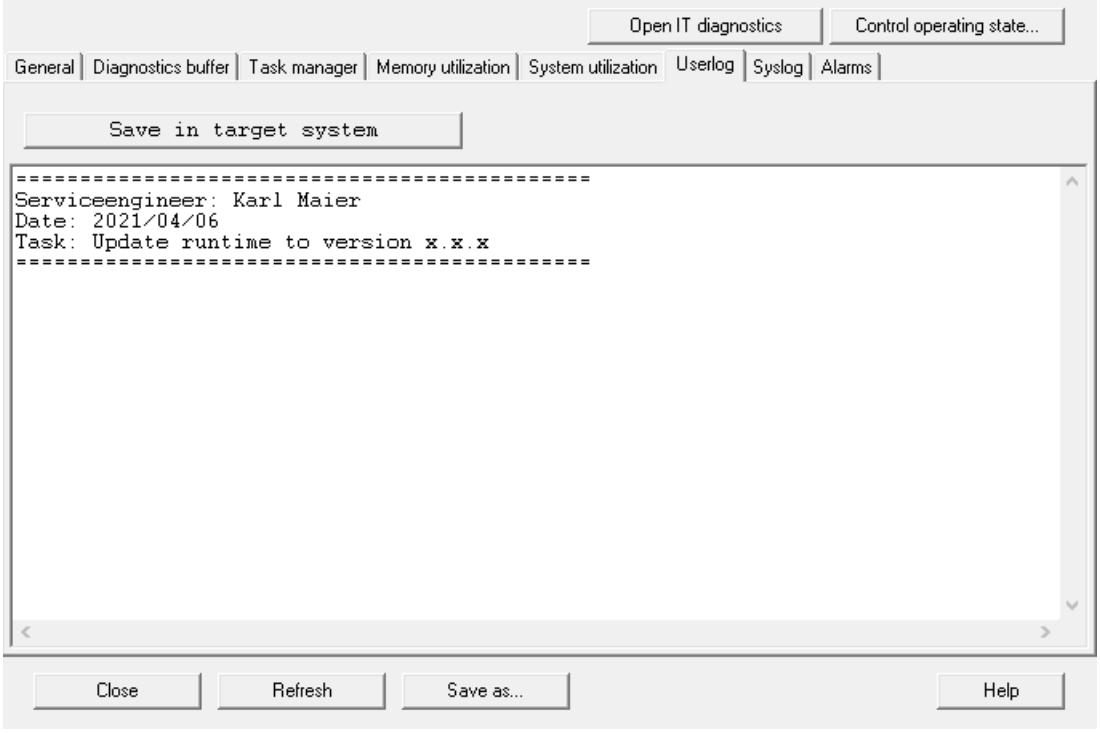


Figure 9-7 Example of the Userlog file display in the device diagnostics

How to work in the Userlog file

- In the Device diagnostics, select the "Userlog" tab.
  The editor is in edit mode, i.e. you can write or delete immediately.
  The system does not add any additional system content, such as date/time.
  Enter the information.
- To save, click "Save as..." The Userlog file is saved as a .txt file.
  All text entries can be changed or deleted at any time.
  Access protection is not available.
- The Userlog file can also be read without the project.
  The online mode is necessary for this.
- The Userlog file remains after "Delete user data".

9.3.7 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 the card from SIMOTION SCOUT TIA

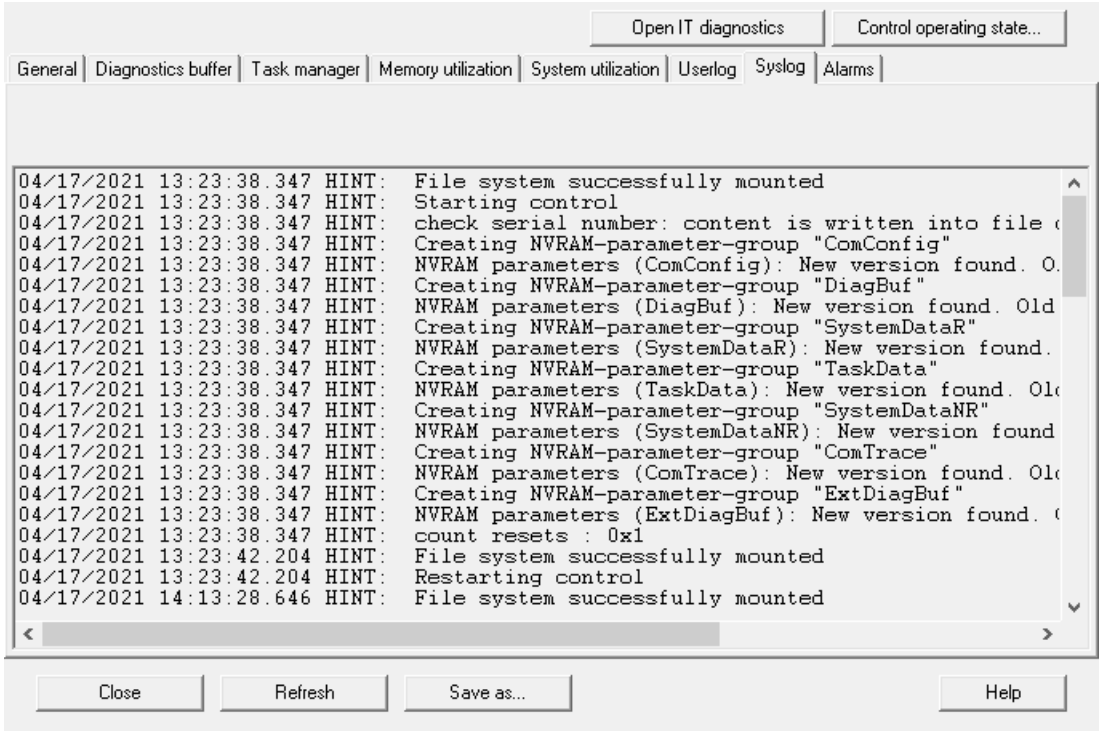


Figure 9-8 Example of the Syslog file display in the device diagnostics

9.3.8 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.

Note

Alarm_S messages

When configuring Alarm_S messages, observe the specifications for the TIA Portal data type formattings.

Detailed information is contained in the information system of the TIA Portal at "Configuring messages".

Detailed information can be found in the SIMOTION SCOUT TIA Online Help, in the Alarms output window.

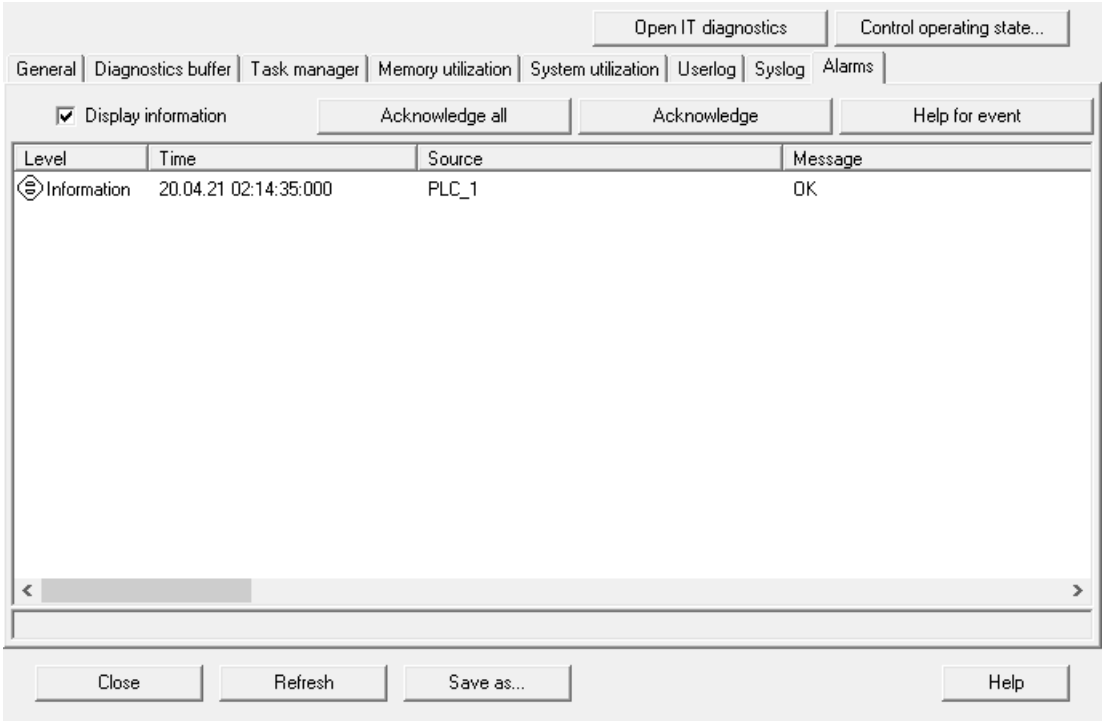


Figure 9-9 Example of the displayed alarms in the device diagnostics

9.4 Diagnostic functions in the address list

The Address list provides more features for I/O diagnostics. In online mode, the information is displayed in the "Availability" column. Detailed information is available via a tool tip if you move the cursor over the relevant cell.

To open the address list, proceed as follows:

1. Browse to the folder for your device in the project navigator.
2. Double-click the "ADDRESS LIST" item.
   The address list opens in the detailed area.

The following diagnostic information is recorded:

- I/O stations that have failed completely
- Modules have been removed, e.g. for ET200SP
- Deactivated I/O stations
- I/O variables working with substitute values
- I/O stations whose set topology differs from the actual topology

- I/O stations configured to be isochronous are not isochronous
  - Distributed synchronous operation
  - Drive units
  - Isochronous I/O
- Partner device, e.g. I-Device, I-Slave, is in STOP state
- For PROFINET devices: Provider state / consumer state displays errors
  - Controller
  - I/O device
  - Module
  - Submodule

Additional references

Further information can be found in the description of the "_quality()" system function in Section *Detailed status of I/O variables (as of kernel V4.2)* in the SIMOTION ST Structured Text Programming and Operating Manual.

For further information on diagnostics with the address list, please refer to the Online Help.

9.5 Trace and measuring functions

9.5.1 Trace, measuring function, and automatic controller setting

Overview

SIMOTION SCOUT TIA provides support for the commissioning and optimization of technology objects and user programs. The following functions are available:

- Device trace / function generator
- System trace
- Measuring function
- Automatic controller setting

Calling trace and measuring functions

To call the trace and measuring functions in SIMOTION SCOUT TIA, proceed as follows:

1. Select the SIMOTION device in the project navigator.
2. Select "Target system" in the menu and select the desired function.
   Or click the desired function in the toolbar.



① ② ③ ④

① Device trace / function generator
② System trace
③ Measuring function
④ Automatic controller setting

Device trace / function generator

You can use the device trace to record and evaluate parameters as well as system and program variables.

The device trace for system variables is mainly used to analyze time-synchronous sequences in the real-time system.

An automatic multiple trace is available as of SINAMICS V4.6. It can be used to trigger a recording automatically according to the trigger conditions. The measurement is stored as a YDB file (SIMOTION) or ACX file (SINAMICS) in a ring buffer on the memory card. At least five measurements can be stored in the ring buffer.
You can parameterize the multiple trace on the Trace tab under "Save to device (memory card)".

Program variables can be traced in order to find logical errors in the execution system or in user programs. For this purpose, rather than a time-triggered measuring task, an event-triggered measuring task in the RT system can be used. The event that causes the measurement recording is the execution of a specific code position in the user program by the RT processor. To start recording, a trigger event based on the variable can be selected on the Device trace tab (on a positive edge, a tolerance range or a bit map, for example).

The function generator can be used for test purposes to dynamically generate setpoints with defined shapes (e.g. rectangle, sine) for various system variables. With the aid of the trace, for example, the system response can be recorded in order to optimize the controllers. Two function generators are provided which you can start separately or simultaneously. You can also output the signals of the two function generators to a system variable at the same time. The signals are then superimposed.

System trace

You can use the system trace to record and evaluate parameters, system variables, and program variables from multiple CPUs at the same time. It is essential that the CPUs communicate via PROFINET. An isochronous connection must exist between the CPUs, and the PROFINET Sync Master must be a SIMOTION device.

Function generator, mathematical processing and bit tracks are not available for recording with the system trace.

Measuring function

The measuring function is used for controller optimization.

The SIMOTION measuring functions are used to commission the axis controller without requiring a user program.

With the SINAMICS measuring function, you can directly inhibit the influence of higher-level control loops by means of simple parameterization, and analyze the dynamic response of individual drives. The free measuring function measures and averages several measurement series with parameterizable noise sources without master control. This measuring function is suitable for controller settings and for avoiding whirling resonance with magnetic suspension bearing applications with rotor systems.

Automatic controller setting

The automatic controller setting can be used to configure the speed controller in the drive and the DSC position controller in the controller (SCOUT TIA only) for SINAMICS drive units.

Additional references

Detailed information can be found in the SIMOTION SCOUT TIA Online Help under Diagnostics.

9.5.2 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

Detailed information on this topic can be found in:

- Function Manual: Task Trace
- SIMOTION IT Diagnostics and Configuration Diagnostics Manual
- SIMOTION SCOUT TIA Online Help

9.5.3 Trace technology object

With the Trace technology object, you can monitor commands at a technology object and track access to the system variables and configuration data

Overview

In SIMOTION, technology objects can be influenced by configuration data, system variables and commands during runtime. In order to represent the influences on a technology object during runtime through the user program, a TO trace / object trace records the last actions at the technology object in chronological order.

Note

Simultaneous use of the **Trigger through program call** trigger condition for the TO trace and the device trace is not permitted.

If the TO trace and the device trace are active simultaneously, different trigger conditions must be used.

The recording can be read out from the technology object on request and displayed in the ES.

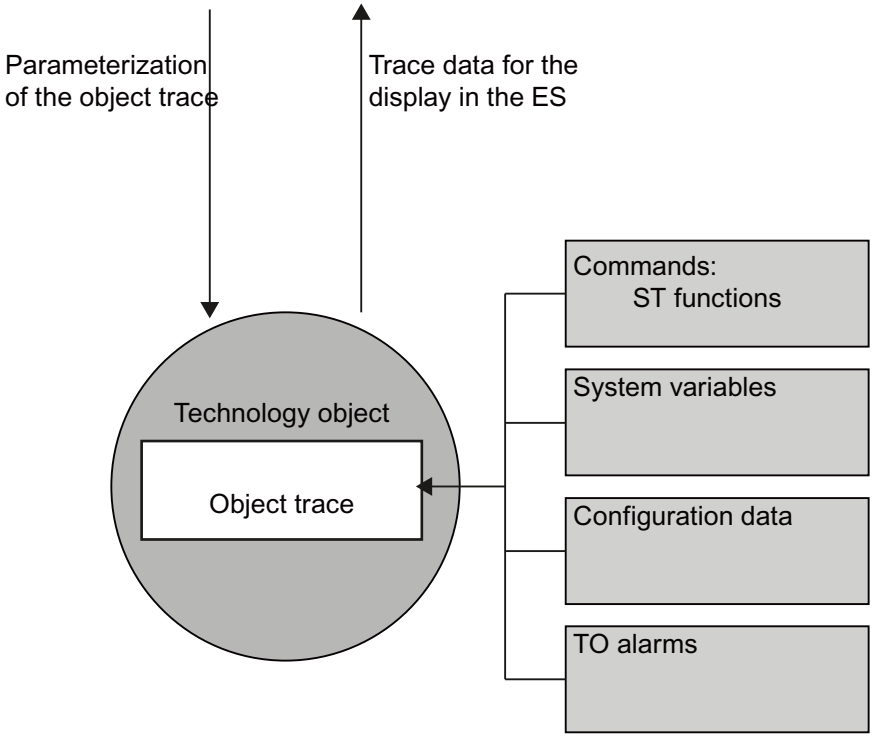


Figure 9-10 Principle of the object trace

The TO trace is used for the diagnostics of technology objects and displays the information and the events that influence a technology object during runtime in tabular form. The TO trace can be configured separately for each technology object.

It records commands and access to configuration data and system variables with their command and error statuses when the TO trace is read out. As of SIMOTION V4.4, alarms of

the individual technology objects can also be recorded and an automatic trace is available. It can be used to trigger a recording automatically according to a trigger condition immediately after a restart. You parameterize the automatic trace in the "Settings > Save in the device (memory card)" tab.

The TO trace is displayed in a table/list with a time stamp.

The TO trace is available for the following technology objects:

- Drive axis
- Position axis
- Following axis
- Path interpolation
- Following object
- External encoder
- Measuring input
- Output cam
- Cam track
- Addition object
- Formula object
- Sensor
- Temperature channel
- Fixed gear
- Controller object

Additional references

Additional information on this topic can be found in the SIMOTION Runtime Basic Functions Function Manual.

9.6 Interconnection overview

The interconnection overview allows you to display all motion input and output interconnections of technology objects (TO) within the project. This overview is displayed in the SIMOTION SCOUT TIA 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.

Call the interconnection overview with "Edit > Interconnection overview" in the menu.

Note

Device names with special characters

As of V4.3, it is possible to assign device names that do not comply with the ST naming convention. Names with special characters such as "." are displayed in the interconnection overview in " ".

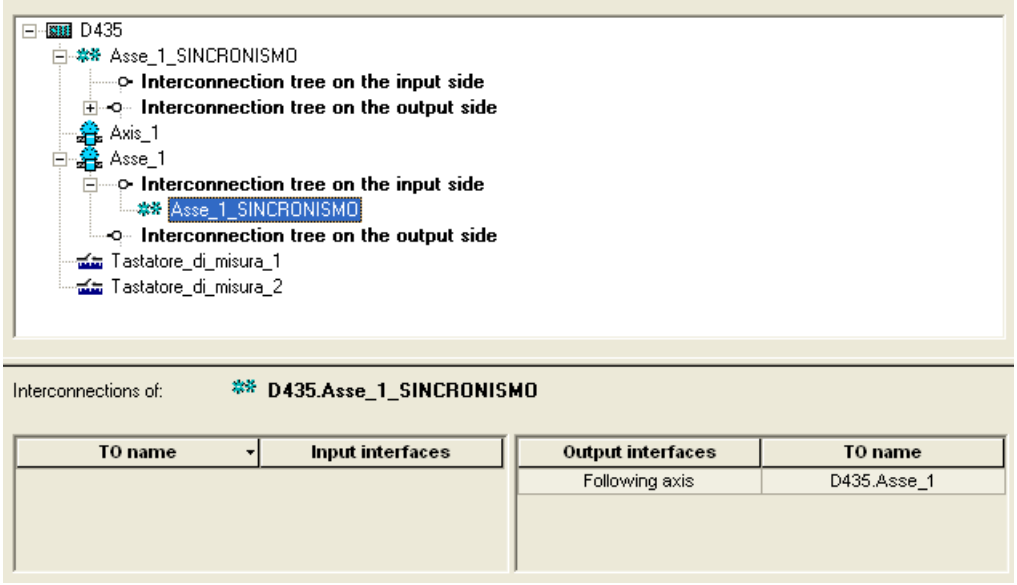


Figure 9-11 Example of an interconnection overview

Additional references

Further information on this topic can be found in:

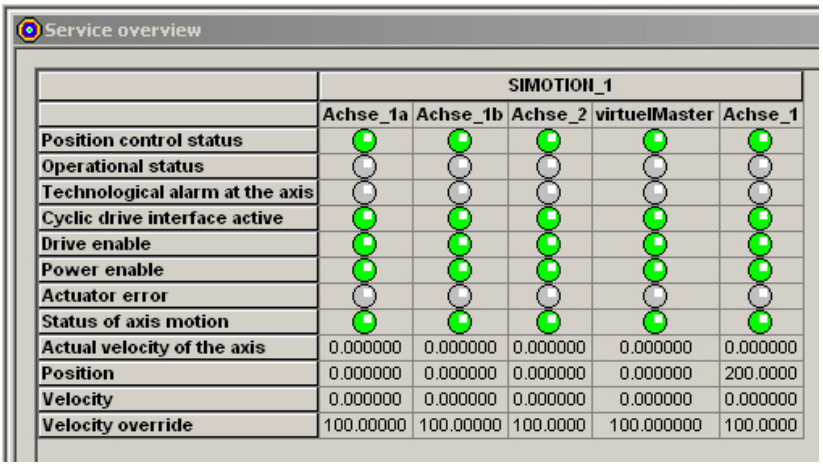
- SIMOTION Runtime Basic Functions Function Manual
- SIMOTION SCOUT TIA Online Help

9.7 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 with "Target system > Service overview" in the menu.

Error states are indicated by a red light and an active state by a green light.



	SIMOTION_1				
	Achse_1a	Achse_1b	Achse_2	virtuelMaster	Achse_1
Position control status					
Operational status					
Technological alarm at the axis					
Cyclic drive interface active					
Drive enable					
Power enable					
Actuator error					
Status of axis motion					
Actual velocity of the axis	0.000000	0.000000	0.000000	0.000000	0.000000
Position	0.000000	0.000000	0.000000	0.000000	200.0000
Velocity	0.000000	0.000000	0.000000	0.000000	0.000000
Velocity override	100.00000	100.00000	100.0000	100.000000	100.0000

Figure 9-12 Service overview

9.8 Program testing and debugging

Comprehensive program testing and debugging functions are available in SIMOTION SCOUT TIA.

Overview

Various SIMOTION device operating modes are available for program testing.

To choose the operating mode, select the SIMOTION device and the "Operating mode..." command in the context menu.

Process mode

Program execution on the SIMOTION device is optimized for maximum system performance. The following diagnostic functions are available:

- Monitor variables in the symbol browser or a watch table
- Program status (restricted)
- Trace tool (restricted)

Test mode

The diagnostic functions of the process mode are available to the full extent.

The following diagnostic functions are available:

- Monitor variables in the symbol browser or a watch table
- Program status
- Trace tool

Debug mode

In addition to the functions of the test mode, you can use the following functions:

- Breakpoints
- Controlling MotionTasks

You can only select the debug mode for one SIMOTION device.

Note

Parameterizing the sign-of-life monitoring

Observe the safety information before using debug mode.

You will find detailed information on this topic in the SIMOTION SCOUT TIA online help under "Modes of the SIMOTION devices > Important information about the life-sign monitoring".

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
- SIMOTION SCOUT TIA Online Help

9.9 Project comparison

You can use the "Compare..." function to compare objects within the same project or objects from other projects (online or offline).

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

Procedure

To compare objects, proceed as follows:

1. Start the project comparison by clicking the "Object comparison" button .
   The "Select Comparison Partners" dialog opens.
2. Select the projects to be compared.

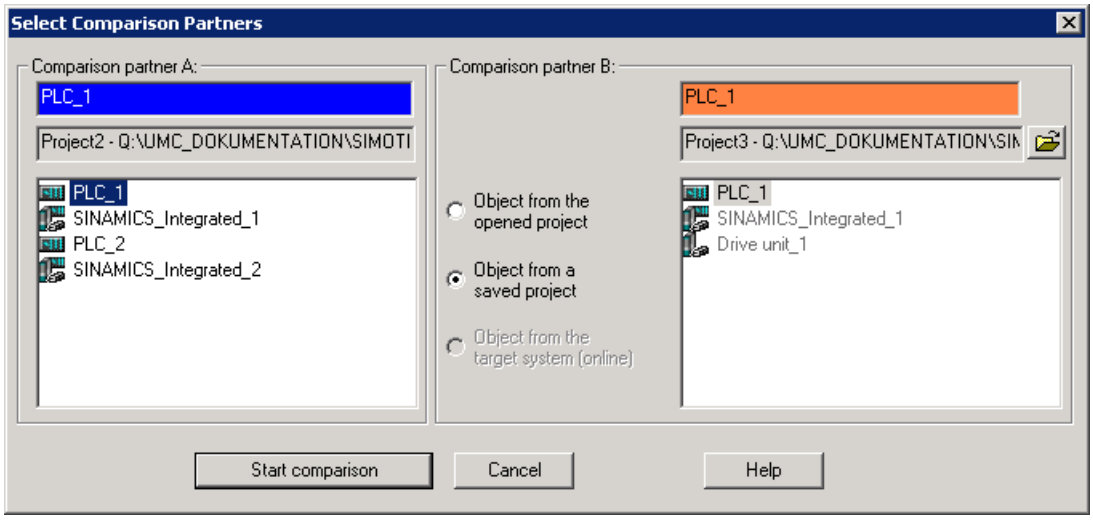


Figure 9-13 "Select Comparison Partners" dialog

3. Click the "Start comparison" button.

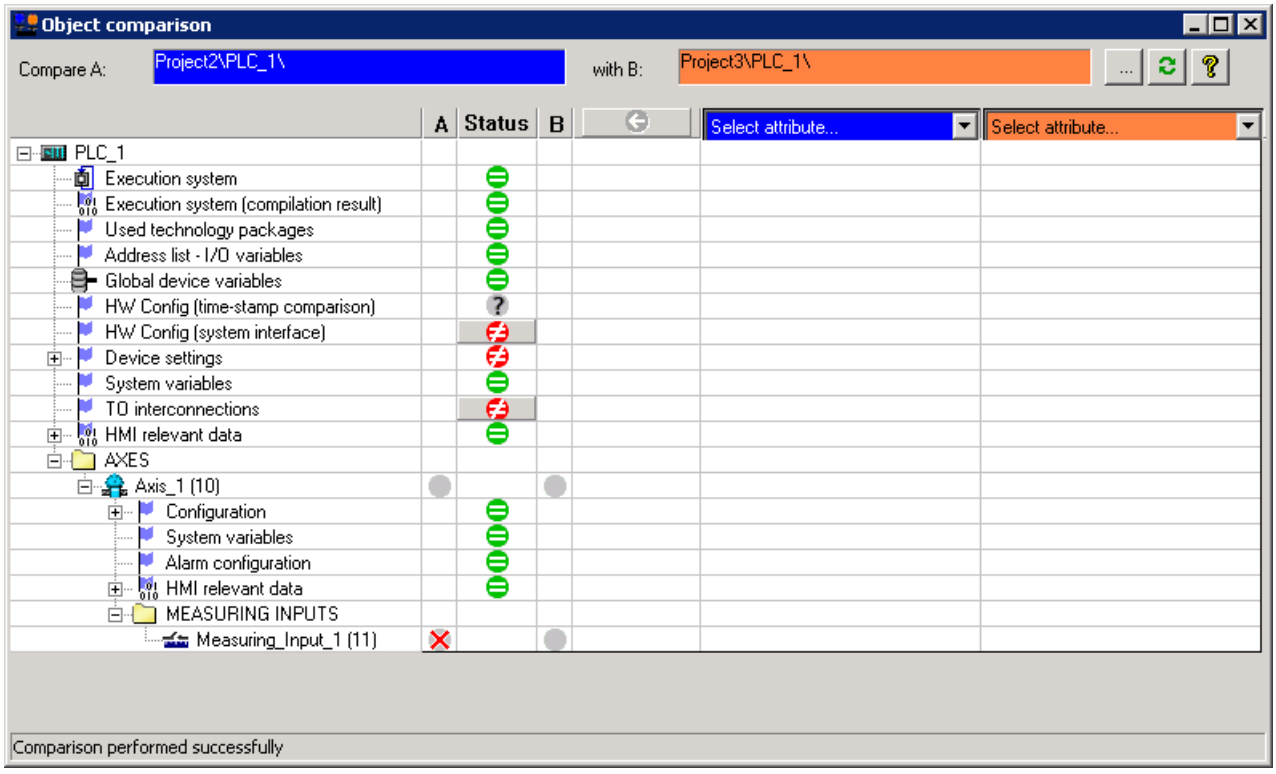


Figure 9-14 Synchronizing project data via the project comparison function

4. Move the mouse over the symbols highlighted in color to display information about the status.

Note

A detailed comparison is only possible if supplementary data (e.g. program sources) has also been downloaded to the target device ("Options > Settings... > Download").

Additional references

Detailed information on the topic can be found in the SIMOTION SCOUT TIA Online Help and in the SIMOTION Project Comparison Function Manual.

9.10 Creating a Project Overview by Script

In the Utilities_Applications\src\Scripts\ReportingScripts folder on the product DVD VOL3, you will find sample scripts that allow you to create reports on the following objects of the current SIMOTION project:

- TOs
- Programs, function blocks, functions

- Sources
- Tasks and assigned programs

The script lists the relevant specific objects of the SIMOTION project in an HTML document, arranged in a tabular format. Once generated, the HTML document opens automatically in the Internet Explorer. The information gathered can also be saved from there in HTML or CSV format or as an Excel file.

9.11 Services and diagnostics without an engineering system

Activating the Web server

SIMOTION devices have an integrated Web server. The Web server supports the display of diagnostics and system data in standard Internet browsers and the carrying out of project/ firmware updates, even in the absence of an engineering system.

As of version V4.5, SIMOTION SCOUT TIA supports the OPC Unified Architecture (UA) communication standard in addition to OPC XML-DA for access to process data.

Note

Protection against unauthorized HTTP requests

To protect the SIMOTION IT Web pages and the Web server, proven techniques have been implemented that prevent unauthorized access to the data.

As of V5.2, Cross Site Request Forgery (CSRF) protects all applications or Web services for which it could be possible to generally impair the status of the Web server and/or of the controller.

You will find detailed information on how CSRF works in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual, section "CSRF protection".

Procedure

To enable the Web server in the TIA Portal, proceed as follows:

1. Select the SIMOTION device in the network view or in the device view.
2. In the Inspector window, select the "Properties" tab and then click the "General" tab.

3. Select "Webserver/OPC/Netzwerkprotokolle"??.
   The Web server is disabled in the basic setting.
4. To display the CPU Web pages, you must activate the corresponding checkbox.

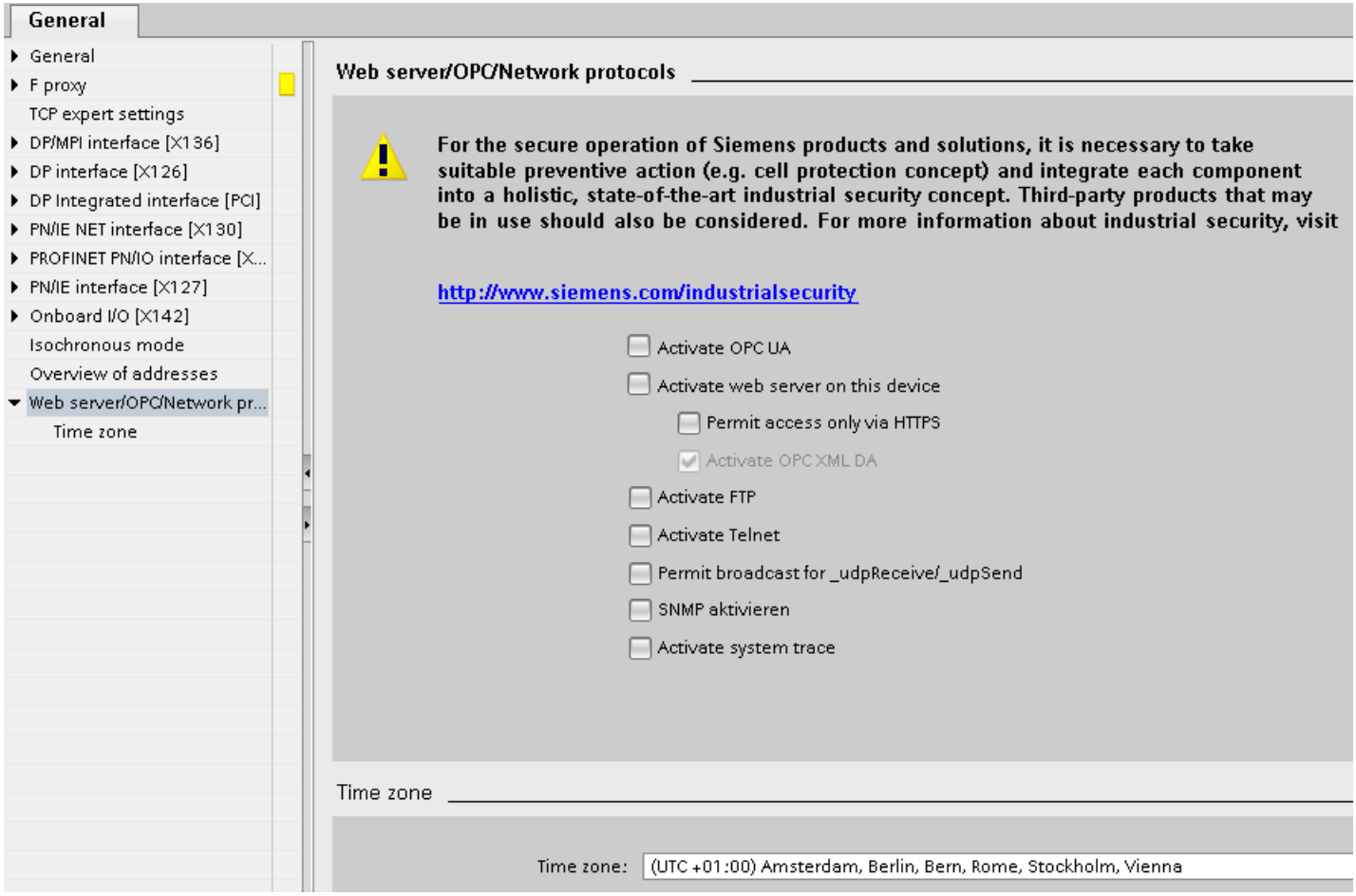


Figure 9-15 Activating the Web server

The Web server is addressed via HTTP/S. FTP and Telnet are only connected to the user administration.

Security concept of HTTP/S, FTP, and Telnet access on the Web server

As of version V4.4, access to the SIMOTION IT Web server is protected by a multi-level security concept.

The security state of the Web server is indicated by the security level on the Website. There are three possible security levels: Low, normal, high.

You will find detailed information on the security concept of the connection via FTP/Telnet in the SIMOTION IT Diagnostics and Configuration Diagnostics Manual, section "Security concept".

Calling HW Config from SIMOTION SCOUT TIA

With SIMOTION SCOUT TIA, you can switch directly to the appropriate tab of the Inspector window in the TIA Portal.

To call HW Config from SIMOTION SCOUT TIA, proceed as follows:

1. Select the SIMOTION device in the project navigator.
2. Select the "Properties..." command in the context menu.
   The "Properties" dialog opens.

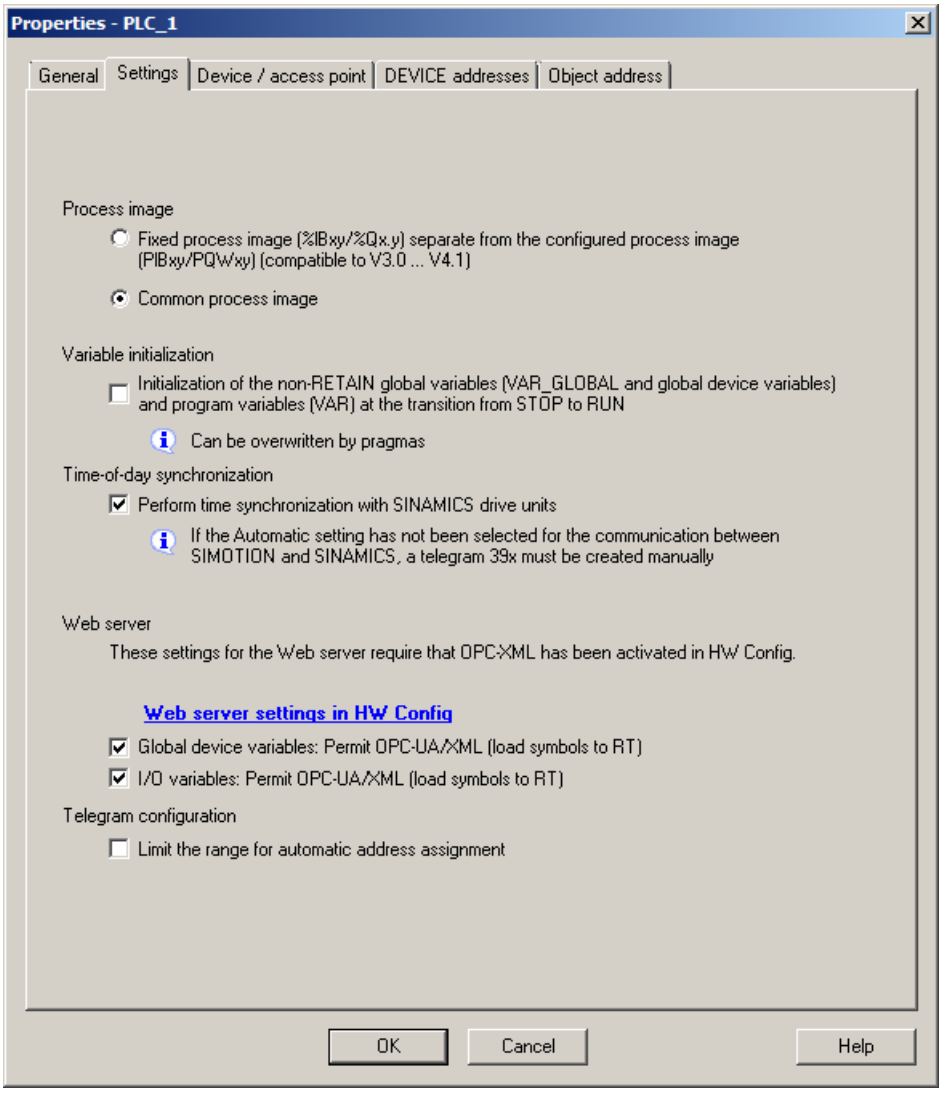


Figure 9-16 Calling HW Config from SIMOTION SCOUT TIA

3. Switch to the "Settings" tab and click the link "Web server settings in HW Config".
   Now you can change the Web server settings in the TIA Portal.

Additional references

Detailed information on this topic can be found in:

- SIMOTION IT Programming and Web Services Programming Manual
- SIMOTION IT Diagnostics and Configuration Diagnostics Manual
- SIMOTION SCOUT TIA Online Help

SIMOTION Runtime Simulation 10

10.1 Overview

Note

SIMOTION Runtime Simulation only for SIMOTION devices D4x5-2 as of V5.1

SIMOTION Runtime Simulation (SIMOSIM) is supported for SIMOTION devices D4x5-2 as of V5.1.

With SIMOTION Runtime Simulation, you can test and evaluate the general workflow of a SIMOTION runtime without connected hardware.

The simulation is so ideal for training purposes or, for example, to test and debug programs before they go online on a real module.

The projects are loaded into SIMOTION SCOUT TIA and can be switched retentive with RamToRom. SINAMICS Integrated and external I/Os are not simulated.

As of SIMOTION SCOUT TIA V5.3 you can perform the following simulation tasks with the new PROFIdrive State Machine implemented in SIMOSIM:

- Switch the drive selectively to the S1 - S4 states with _enableAxis(BY_STW_BIT)
- Monitor drive enables with STW1 via the system variable on the TO axis
- Monitor status information of the drive with ZSW1 via the system variable on the TO axis

Note

Simulation of SIMOTION devices

Note that not more than one device can be simulated concurrently within a project.

Restrictions

The following functions are not supported:

- CLib
- OA packages
- Technology packages TPDCBADM, TPTControl and TPDCBlib

Note

Technology package product versions

Note that only those technology packages integrated in the simulation (TPCAM, TPPATH, TPCAM_EXT) are supported.

10.2 Using SIMOSIM

Requirements

- You have installed SIMOTION SCOUT TIA.
  SIMOSIM is part of the installation up to SIMOTION SCOUT TIA V5.2.
  SIMOSIM will be supplied as a dedicated component in a separate setup as of SIMOTION SCOUT TIA V5.2 SP1 HF2.
- You have activated the "Siemens SIMOSIM Virtual Ethernet Adapter" in the network settings of your PC.
- You have created a project in TIA Portal and use SIMOTION D4x5-2 devices as of V5.1 in your project.
- SIMOTION devices and Siemens SIMOSIM Virtual Ethernet Adapter are contained in the same IP subnet.
- No active online connection to a real SIMOTION device exists.

Starting SIMOSIM in SIMOTION SCOUT TIA

Note

Starting SIMOSIM for side-by-side use of SIMOTION SCOUT and SIMOTION SCOUT TIA

You can start SIMOSIM just once, either in SIMOTION SCOUT or in SIMOTION SCOUT TIA.

To start SIMOSIM and simulation mode in SIMOTION SCOUT TIA, proceed as follows:

1. Switch to SIMOTION SCOUT TIA.
2. In the project navigator, select the device you want to simulate.

3. Click "Start SIMOSIM" in the menu bar.
   The "Start Simulation Mode and SIMOSIM" dialog box opens.

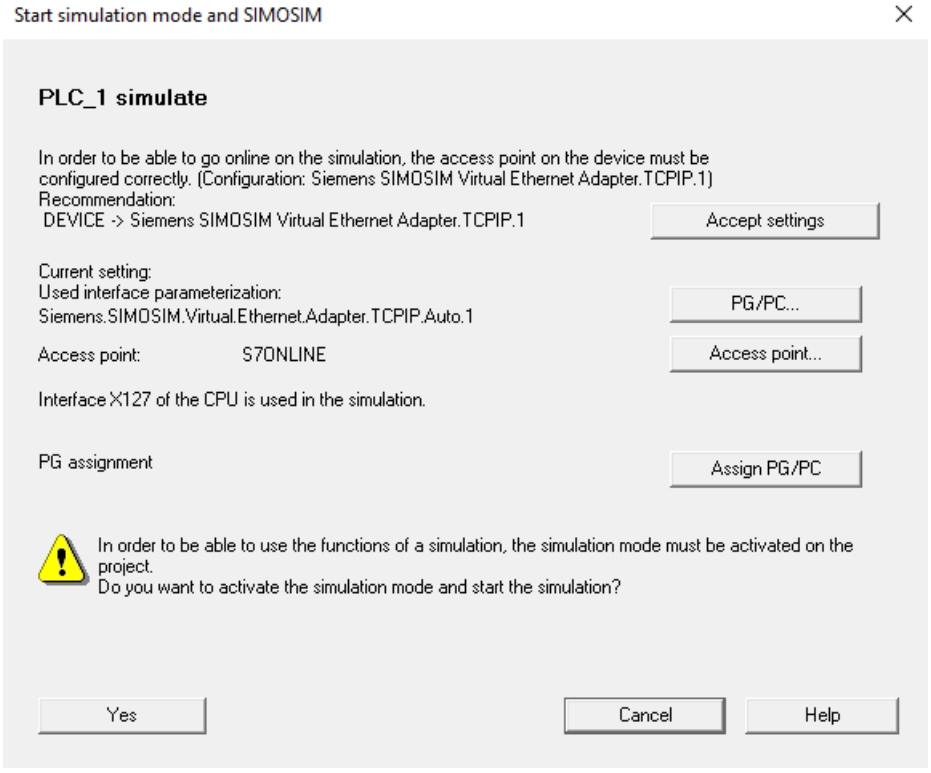


Figure 10-1 Starting simulation mode and SIMOSIM

4. Click "PG/PC...".
   The "Set PG/PC Interface" dialog box opens.

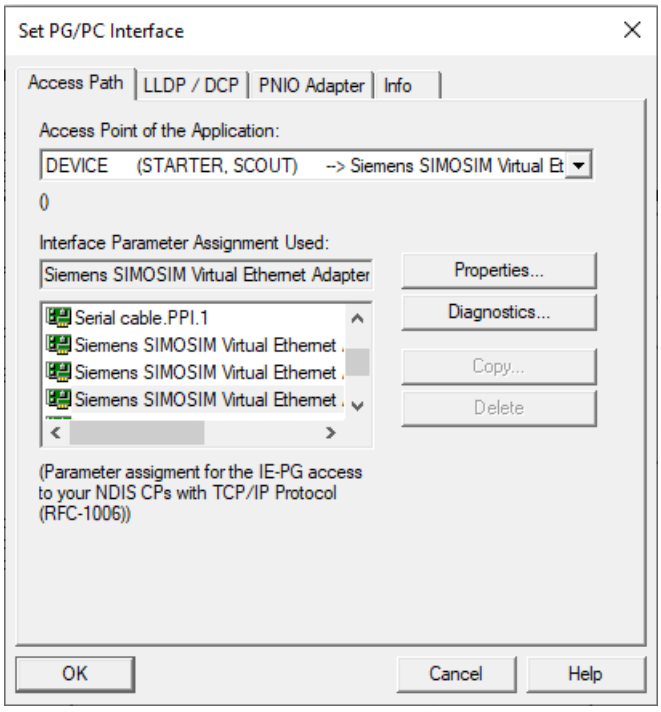


Figure 10-2 Setting the SIMOSIM PG/PC interface

5. Select "DEVICE ->Siemens SIMOSIM Virtual Ethernet Adapter.TCPIP.1" as access point of the application.
   Note the prompt that an online connection via router is no longer possible with this setting and confirm with "OK".

6. Confirm the selected access point with "OK".
   Note the prompt about the changed access path and confirm with OK.

Note

Accepting Siemens SIMOSIM Virtual Ethernet Adapter automatically as setting

To accept Siemens SIMOSIM Virtual Ethernet Adapter automatically as setting, click "Accept settings" in the "Start Simulation Mode and SIMOSIM" dialog box.

7. Click "Access point..." in the "Start simulation mode and SIMOSIM" dialog box.
   The "Properties > Device / access point" dialog box opens.



Figure 10-3 Access point used by SIMOSIM

8. Activate "DEVICE" as used access point.
9. Click "Set DEVICE addresses".
   The "DEVICE addresses" tab appears.

10. Activate X127 as virtual interface.
    You can use online access to the simulation only via interface X127.

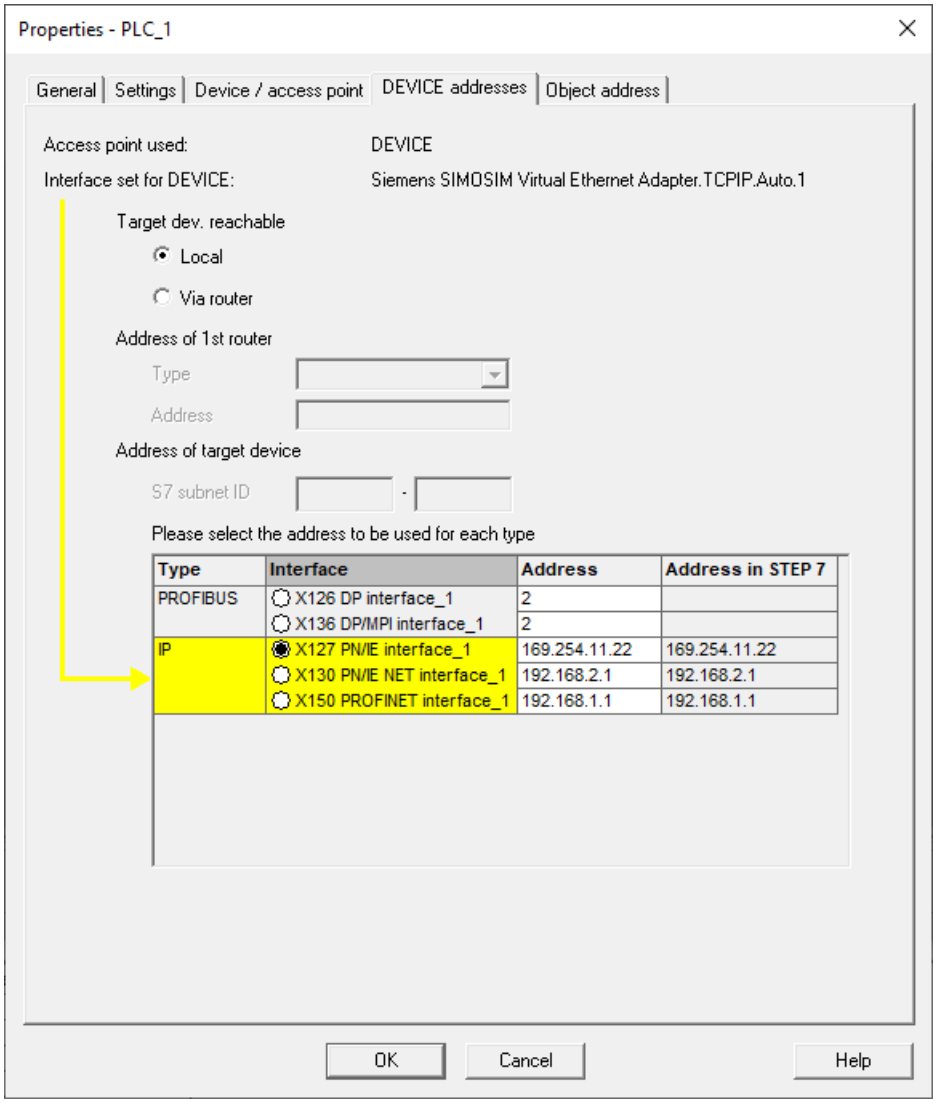


Figure 10-4 Setting the SIMOSIM DEVICE address

11. Click "OK" to confirm the selection.

12. Check your settings for the online interface.

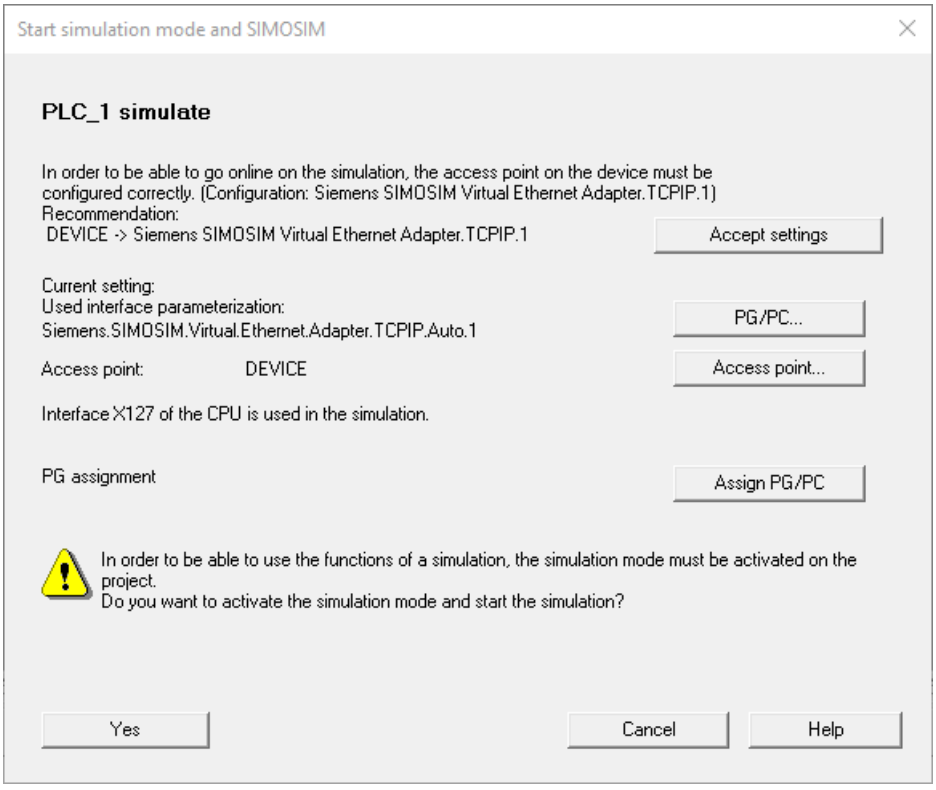


Figure 10-5 Starting simulation mode and SIMOSIM

13. To start simulation mode, click "Yes".
Simulation mode is activated, SIMOTION simulation is started and a virtual controller is shown.

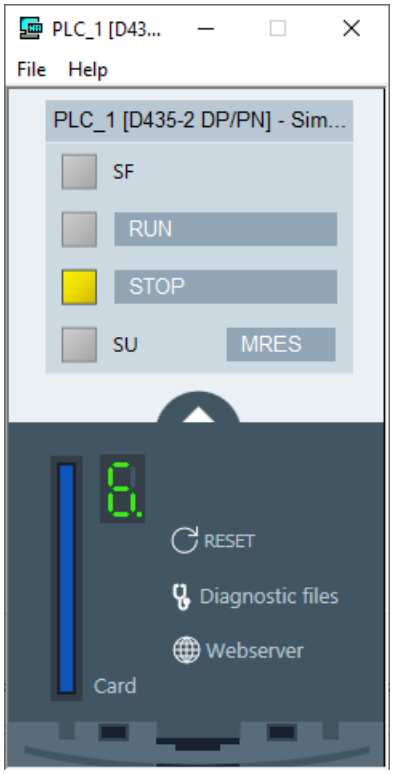


Figure 10-6 Virtual controller

With the graphical interface, you can:

- Control the CPU operating state
- Open the Web server in the browser window
- Access the diagnostic files
- Reset the controller
- Access data on the memory card

Accessing simulation data

At every start of a new simulation of a device, a directory is created in which the memory image of the device is stored.

The data stored in the NVRAM, RAM disk and CF card can be found in this directory.

To access data in this directory, proceed as follows:

1. Start the SIMOTION simulation.
2. Click the slot of the CF card in the displayed virtual controller.
   The Windows Explorer opens and the directory of the CF card is displayed.
3. To access the memory image of the NVRAM and RAM disk, switch from the CF card to the root directory of the virtual controller in the Windows Explorer.

Note

Check and clear the data memory regularly.

To ensure that no memory bottlenecks occur and that all functions can be used without restrictions, regularly delete the simulation data records from the directory.

To delete data from the simulation directory, proceed as follows:

1. Select "Project -> Delete SIMOSIM data..." in the menu.
   The "Delete SIMOSIM Data" dialog box opens.
2. Select the simulation project whose data you want to delete from the directory.
3. Click "Delete" to start the deletion.

Starting SIMOSIM in simulation mode

To start the simulation in activated simulation mode, proceed as follows:

1. Click "Start SIMOSIM" in the menu bar.
2. The "Start SIMOSIM" dialog box opens.

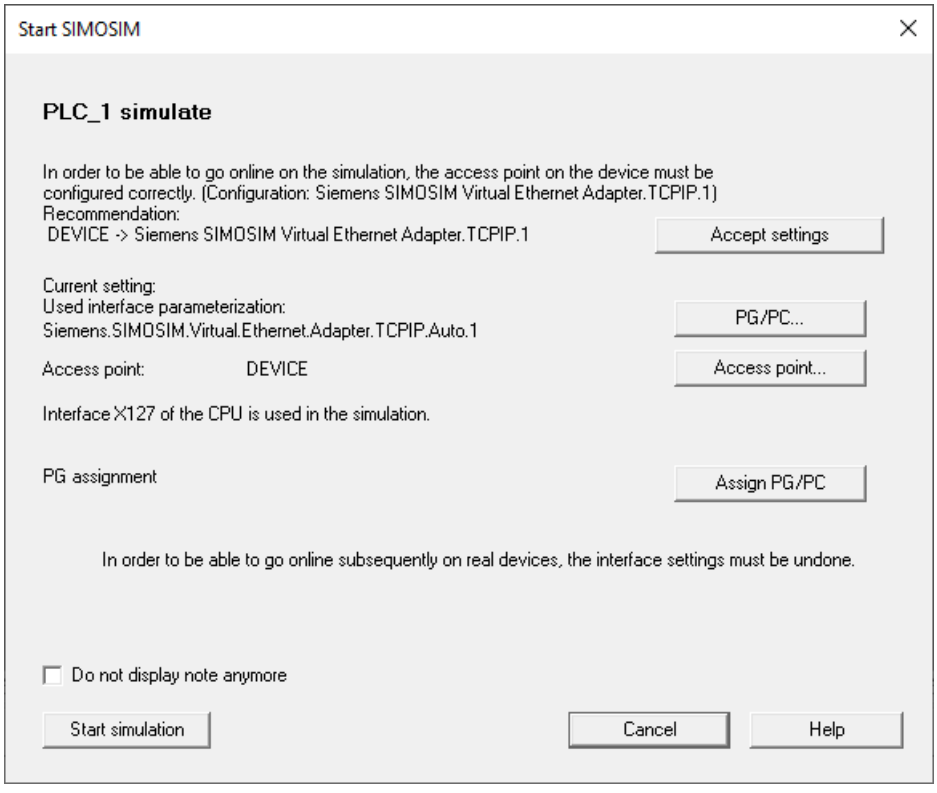


Figure 10-7 Restarting SIMOSIM

3. Click "Start simulation".

Result

Simulation mode and SIMOSIM have been started.

You can now go online with a target device and download your project data into the virtual target system.

You can then simulate programs, axes, etc. You so allow SIMOSIM to write directly to the inputs.

Note

Going online in simulation mode

Note that only one device can go online in simulation mode.

Note

Simulation mode active/inactive

When simulation mode is active, this is color-highlighted in the SIMOTION SCOUT TIA status bar.

To exit simulation mode, close the controller window by clicking the "X" in the upper area of the window. Deactivate the "Use simulation mode" option in the "Project" menu.
The flag in the status bar is reset. Simulation mode is exited.

Note

Emergency stop deactivated in debug mode

Note that in debug mode, no emergency stop is made with the space bar or by switching the application.

Note

Access via HTTPS to the SIMOTION Web server

Note that the certificates must be created at the first access via HTTPS. This may take some time. Acknowledge any corresponding messages that may appear.

Setting the online access point in the TIA Portal

You now find yourself in SIMOSIM simulation mode.

To set the online access point in the TIA Portal, proceed as follows:

1. Switch to the TIA Portal.
2. Select the "Online > Online & Diagnostics" menu.
   The "Online Accesses" dialog box opens.

3. Select SIMOSIM and X127 as access point

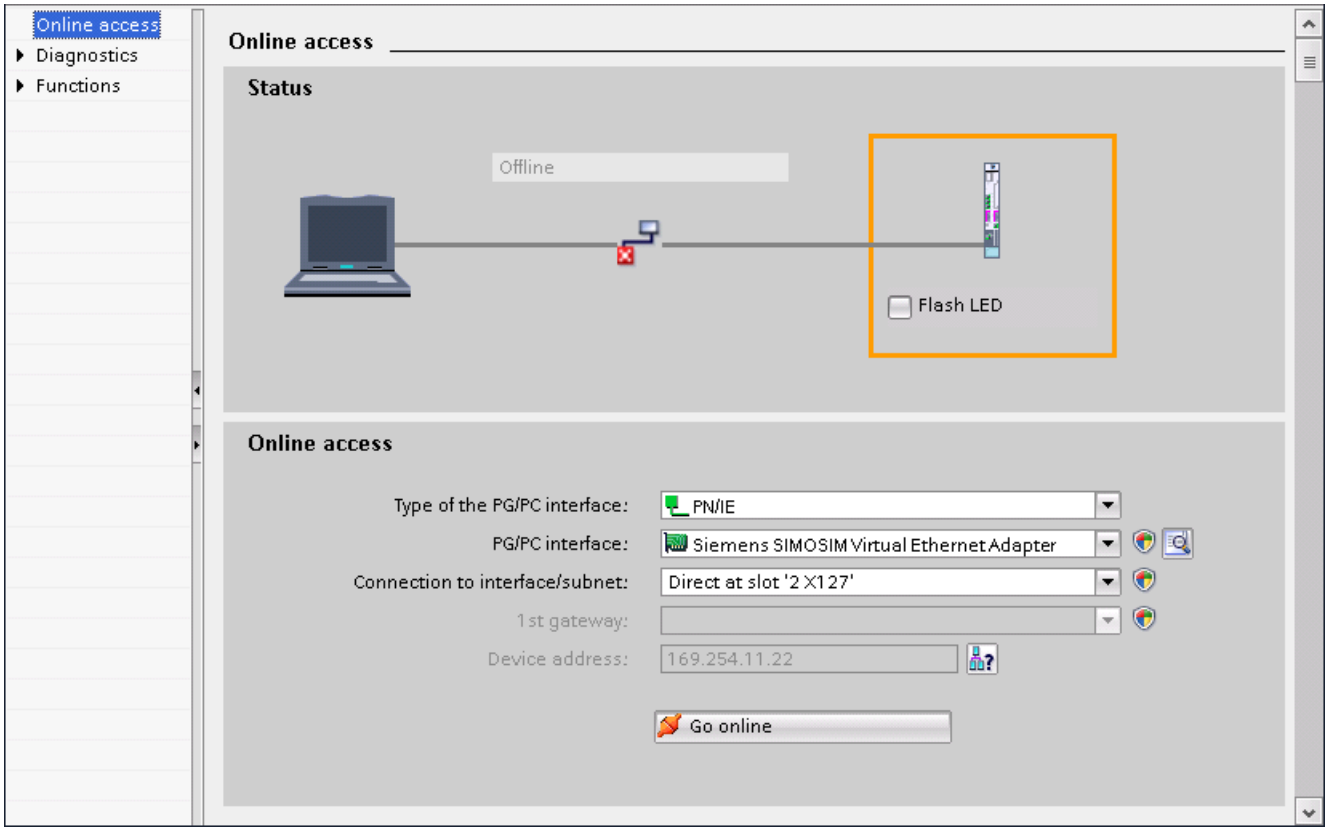


Figure 10-8 Setting the SIMOTION simulation access point

4. Click "Connect online".
   A device is displayed that can be accessed and simulated via the access point.

Multiuser engineering 11

11.1 Overview

With Multiuser Engineering, the TIA Portal offers you the possibility, in the context of the Team Engineering functionality, to work together with multiple users and to perform various configuration tasks in a project at the same time (Multiuser Engineering). You can then commission your configuration together using the TIA Portal functionality "Commission Engineering".

This significantly reduces the configuration and commissioning times. You can commission your plant and start to work productively much quicker.

The multiuser engineering in the TIA Portal functions as follows:

- The project management is on a local or an external server.
- Different users work in local sessions, based on the projects managed by the server.
- Users work independently from each other in local sessions.
- Changes from local sessions are transferred by checking into the server project.
- Checked-in changes from other users are displayed and can be applied.

The Multiuser Commissioning in the default synchronous mode in the TIA Portal functions as follows:

- As with commissioning, project management is located either on a local or external server.
- Different users work in local sessions, based on the projects managed by the server.
- Users can work independently from each other in local sessions also during commissioning.
- The changes from the local sessions are first always downloaded to the common CPU and only transferred to the server project after successful download.
- Downloaded changes from other users are displayed and can be conveniently applied.
- The server project is already synchronized on the project server. This means consistent versions of the server project are always downloaded to the CPU. Time-consuming synchronization of different project versions on the CPU therefore becomes obsolete.

The following description of the functionality of Multiuser Engineering in the TIA Portal serves only as a brief insight into team-oriented configuration within the TIA Portal.

Functionalities that go beyond this, e.g. commissioning together at the same time in a team (Multiuser Commissioning) as part of the TIA Portal functionality "Team Engineering", do not form part of this documentation.

Additional references

Detailed information on the concept of Team Engineering in the TIA Portal can be found in the information system of the TIA Portal at "Using Team Engineering".

11.2 Working with Multiuser Engineering

Requirements

- The TIA project server is installed.
  You can install the TIA project server together with the TIA Portal or standalone via a separate installation process.
  The local project server with limited functionality is installed automatically with the TIA Portal.

  Note

  License required

  To be able to use the project server with extended functionality, for example because you want to use it as external server for long-term cooperation, you need an additional license.

  While you are only using the local project server available with limited functionality, you do not need an additional license for the installed TIA Portal.

- You have created an executable project.

Creating a local session

To be able to work on a server project together with other users in the context of Multiuser Engineering, each user needs to create their own local session.

The respective user can insert their changes in one or more local sessions and then check them into the server project and publish them.

After check-in, the changes from the local session are available again to all users in the server project. They can continue to be used and modified again in subsequent local sessions.

The following steps are required to create a local session:

Configuring the local project server

To configure a local project server, proceed as follows:

1. Select the "Options > Settings > Project server" command in the TIA Portal menu.
2. Double-click on "Local project server" under "Project server" in the table.
   The "Edit server connection" dialog opens.
3. Enter the desired port.
4. Confirm your entries with "OK".

Starting the local project server

Proceed as follows to start the project server:

1. Select the "Project > Project server > Manage server projects..." command in the TIA Portal menu.
   The "Manage server projects" dialog opens.
2. Under "Select server", choose the local project server in the drop-down list. If server projects have already been created, you will see all server projects for the selected server connection listed in the table.
   The "Start local project server" dialog opens.
3. To start the local project server, confirm with "Yes".

Adding the server project

To add a project to the project server, proceed as follows:

1. Select the "Project > Project server > Manage server projects" command in the TIA Portal menu.
2. To add a server project to the server, click "<Add project to server>".
   The "Add project to project server "Local Project Server"" dialog opens.
3. Select the project that you want to make into the server project under "Source path:".
4. Click "Add".

Creating a local session

Follow these steps to create a local instance:

1. Select the "Project > Project server > Manage server projects" command in the TIA Portal menu.
2. Select "Manage server projects" in the dialog and right-click to select "Create new local session" in the context menu.
3. Select the type for the session, check the path for the session and change it if necessary.
   - Select "Multiuser Engineering" if you want to work with multiple users in parallel.
   - Select "Exclusive Engineering" if you want to work exclusively in the local session.
4. Click "Create".

Result

The session folder has been created in the Windows Explorer and the server project created with the file extension "als17".

11.3 Editing the server project

So that the changes made by different users in separate sessions can be combined and published in the context of Multiuser Engineering, the respective changes from the session or the server project view must be checked in and the server project updated.

Note

Editing objects in SIMOTION SCOUT TIA

The SIMOTION configuration cannot be opened in the session in V17.

To make changes in SIMOTION SCOUT TIA, switch to the server project view in which a temporary local copy of the server project is opened.
During this time, other users cannot open a server project view and check-in changes.

Procedure

Editing objects in the session

To edit a server project in the session, proceed as follows:

1. Select the "Open" command in the "Project" menu.
2. Click "Browse" in the "Open project" dialog.
3. Navigate to the created session and select the file with the extension "als17".
   The selected session opens and the associated toolbar is displayed.



Figure 11-1 Local session toolbar

4. Edit the desired objects in the hardware configuration.
5. Select each changed object. To do this, click the grayed-out flag.
   In the example shown, the HMI variable "HMI_Variable_1" has been marked for check-in with a blue flag.

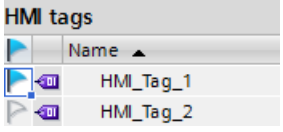


Figure 11-2 Selecting an object

6. To transfer the changes to the local server project, click "Check in" in the local session toolbar.
   All changes pending for check-in are shown in the work area.
7. Click "Start check-in".
   A message may be output prompting you to adjust the options for compiling. You make this setting in the TIA Portal under "Options > Settings > Multiuser".

Note

Changes to objects that cannot be selected

To make changes to objects that cannot be selected, you need to open the server project view.

If you have made changes to objects that cannot be selected in the local sessions, these changes are not applied on check-in.

Editing objects in the server project view

To edit a multiuser server project in the server project view, proceed as follows:

1. Select the "Open" command in the "Project" menu.
2. Click "Browse" in the "Open project" dialog.
3. Navigate to the created session and select the file with the extension "als17".
   The selected session opens and the associated toolbar is displayed.



Figure 11-3 Local session toolbar

4. Change to the server project view. To do so, click in the multiuser toolbar.
   The server project view opens under the session. The session is now in "read-only" mode.
5. Open the SIMOTION configuration in the server project view and make the desired changes.
6. Switch to the TIA Portal and click "Save changes".
7. Enter a meaningful comment for the change history.
8. To close the server project view when required, click .
   The server project view closes. You are now in your local session again.
9. To transfer the changes to the local server project, click "Check in" in the local session toolbar.
   All changes pending for check-in are shown in the work area.
10. Click "Start check-in".
    A message may be output prompting you to adjust the options for compiling.
    You make this setting in the TIA Portal under "Options > Settings > Multiuser".

Result

All changes to objects in the project have been saved and checked in.

1. To synchronize any newer changes from editing of the server project view in the local session, click on "Refresh local session" in the local session toolbar.

Note

Showing the change history

To show the change history to the local session, start the Administration Tool under Windows via "Start > All Programs > Siemens Automation > TIA project server Vxx - Administration".

Add the corresponding server. All server projects assigned to the server are shown in the left-hand area of the tool. You can also display the local sessions for this project via the arrow on the left next to the server project and view the history of the changes made.

11.4 Comparing project versions in SIMOTION SCOUT TIA

Thanks to the 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.

The following functions can be performed in parallel operation in SIMOTION SCOUT TIA:

- 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)
- Downloading of individual program sources even when other sources are inconsistent

See also

Project comparison (Page 372)

Loading data to the target system (Page 262)

Loading data from the target device (Page 268)

Device upload (Page 399)

Updating with the Device Update Tool 12

12.1 Updating SIMOTION devices

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

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 portable, easy-to-use storage medium or a communication connection.

You can create update or restore data based on the opened project with the Device Update Tool. The data contains all the information required for updating or restoring the data on a SIMOTION device.

This includes:

- SIMOTION project
- Technology packages
- User data
- Firmware

Once the update data has been created, it can either be saved directly to an update medium or stored as an update archive.

Depending on the SIMOTION device, the storage or update medium can be:

- CF/MMC card
- USB memory stick or
- SIMOTION IT DIAG file
- File system (update archive)

Update data can also be imported from the update medium to the SIMOTION device, irrespective of time and place, using the Device Update Tool.

Note

Exiting SIMOTION SCOUT TIA terminates the Device update tool functionality

Note that when exiting SIMOTION SCOUT TIA or closing the project in SIMOTION SCOUT TIA, the functionality of the Device update tool is also terminated.

When required, close the open "Device Update Tool" dialog box with "Cancel".

Additional references

Detailed information can be found in the SIMOTION SCOUT TIA Online Help at "Updating SIMOTION devices" and in the "Updating SIMOTION devices" Operating Instructions.

Device upload

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13.1 Upload functions

As of TIA Portal V14, the hardware configuration of a SIMOTION CPU can be uploaded in the TIA Portal.

Note

Note that the device that you want to upload in the TIA Portal must have been loaded with the TIA Portal (≥V14).

Note

Note that the upload of SIMOTION PC stations is not supported.

The following upload functions are supported:

- Uploading of the hardware configuration in the TIA Portal for a SIMOTION CPU.
- Uploading of the SIMOTION data in SIMOTION SCOUT TIA including the drive data, e.g. for a project comparison, a data adaptation of the configuration data, for multiuser engineering or for debugging.
- Small changes, e.g. in an ST source file.

Alternatively to an upload, you can store the archived project on the CF card.

Additional references

Detailed information on the upload functions in the TIA Portal can be found in the information system of the TIA Portal.

See also

Project comparison (Page 372)

Loading data from the target device (Page 268)

Appendix A

A

A.1 Scripting functionality

A.1.1 Automation of sequences with scripts

Overview

You can use the scripting functionality to automate the configuration of devices, such as drive objects (DOs), e.g. SINAMICS drives and SIMOTION technology objects (TOs), such as axes, using an easy-to-learn script language.

Standard scripts can be adapted to special situations occurring during runtime with interactive queries that modify the script processing depending on the query results. This facilitates and speeds up commissioning.

Other application possibilities include the documentation of the settings that have been made and the repetition of complex settings without error.

The implementation basis is VBScript by MICROSOFT, which has been expanded with special objects and methods for SIMOTION SCOUT TIA.

The application of the scripting functionality assumes that you are familiar with script programming.

For scripts and related documents, refer to the installation DVD 3 in the Utilities_Applications\src\Scripts directory.

The selection of documents and scripts you will find there should help you quickly get to grips with scripting in SIMOTION. As well as demonstration-only scripts for studying the code, there are also scripts and script libraries you can actually use yourself.

Restrictions

In the context of SIMOTION SCOUT TIA (TIA Portal), only scripts that influence/use pure SIMOTION SCOUT/SIMOTION SCOUT TIA data/functionalities can be used.

A scripting of the HWCN data/functionalities and project handling of the TIA Portal (framework) is not possible.

The following is explicitly not possible via scripting:

- Creation, deletion, and renaming of objects that have a representation in the TIA Portal (e.g. all SIMOTION devices).
- Creating, deleting, and renaming of projects.
- File system access to TIA Portal projects.

- Utilization of functionality provided by the TIA Portal (framework), e.g. archiving/retrieval.
- Any handling of TIA Portal data.

Additional references

For detailed information, refer to Section "Scripts for sequence automation" in the Online Help.

A.1.2 Scripting with TIA Portal Openness

Introduction

External scripting of the SIMOTION data is only possible in combination with scripting in the TIA Portal. The project and device handling is controlled from the TIA Portal.

To be able to access the valid object model and the Application Program Interface, you must install the *TIA Openness V14.0* option package.

As of STEP 7 or WinCC V13 SP1, the TIA Portal Openness is contained in the scope of delivery of STEP 7 or WinCC in the TIA Portal. You can find the components in the installation files at "Support".

As of TIA Portal V14 SP1, TIA Openness is included in the functional scope of the setup.

Requirement

In order to be able to access a C# project on the SIMOTION application object, the following references must be entered: Siemens.MC.Simotion.Scripting.dll

In order to be able to access the TIA Portal application object, the following references must be entered: Siemens.Engineering.dll and Siemens.Engineering.Hmi.dll

You can find these DLLs in the PublicAPI folder of the TIA Portal installation under "...\Siemens\Automation\Portal V17\PublicAPI\V17".

Set the "Local copy" property of the DLLs to "False".

If no SIMOTION SCOUT is installed on your computer, you must add the reference to the following file in your project: Siemens.MC.Simotion.SideBySide.manifest.

You can find this file in the Bin folder of the TIA Portal installation under "...\Siemens\Automation\Portal V17\Bin".

Establishing version references in the configuration file

To ensure that TIA Portal and SIMOTION SCOUT can operate side by side in the correct version, you must enter the relevant references in the configuration file.

The configuration file "myScript.exe.config" is stored in the same directory as the script and must be transferred together with the script.

An example of how to adapt the configuration file to the TIA Portal V14 version with reference to the installation directories is given below. Adjust this to suit your installation.

```
<?xml version="1.0"?>

<configuration>

 <runtime>

 <assemblyBinding>

 <dependentAssembly>

 <assemblyIdentity name="Siemens.Engineering" culture="neutral"
publicKeyToken="d29ec89bac048f84"/>

 <codeBase version="14.0.0.0" href="FILE://
F:\Program Files (x86)\Siemens\Automation\Portal
V14\PublicAPI\V14\Siemens.Engineering.dll"/>

 </dependentAssembly>

 <dependentAssembly>

 <assemblyIdentity name="Siemens.Engineering.Hmi" culture="neutral"
publicKeyToken="d29ec89bac048f84"/>

 <codeBase version="14.0.0.0" href="FILE://
F:\Program Files (x86)\Siemens\Automation\Portal
V14\PublicAPI\V14\Siemens.Engineering.Hmi.dll"/>

 </dependentAssembly>

 <dependentAssembly>

 <assemblyIdentity name="Siemens.MC.Simotion.Scripting"
culture="neutral" publicKeyToken="d29ec89bac048f84"/>

 <codeBase version="1.0.0.0" href="FILE://
F:\Program Files (x86)\Siemens\Automation\Portal
V14\PublicAPI\V14\Siemens.MC.Simotion.Scripting.dll"/>

 </dependentAssembly>

 </assemblyBinding>

 </runtime>

</configuration>
```

Use of scripts

The procedure for external scripting of the SIMOTION data via TIA Portal is explained using an example in the following steps.

TIA Portal uses scripts based on .Net. C# is used in the following example.

1. Create the TIA Portal application object:
   ```
   TiaPortal tiaPortal = new TiaPortal();
   ```
2. Open an existing project:
   ```
   ProjectAggregation projects = tiaPortal.Projects;
   string projectPath = @"C:\Demo\AnyCompanyProject.ap14";
   Project tia_proj = projects.Open(projectPath);
   ```
3. Synchronize the hardware configuration data of TIA Portal with the SIMOTION data in SIMOTION SCOUT TIA:
   ```
   Siemens.Engineering.IEngineeringServiceProvider iServProv =
   project as Siemens.Engineering.IEngineeringServiceProvider;
   Siemens.Engineering.Simotion.SimotionProvider iSimotionProv =
   iServProv.GetService<Siemens.Engineering.Simotion.SimotionProvider
   >();
   System.String strSimotionAppID = iSimotionProv.Initialize();
   ```
4. Create an application object for the SIMOTION scripting.
   ```
   Type comType = Type.GetTypeFromProgID(strSimAppID);
   Siemens.MC.Simotion.Scripting.Application SimApp =
   Activator.CreateInstance(comType) as
   Siemens.MC.Simotion.Scripting.Application;
   ```
5. Assign the project path to the SIMOTION application object:
   ```
   SIMOTIONLib.Project SimProj = SimApp.AttachToProject(projectPath);
   ```
   You can now automate configuration sequences, e.g. for drive objects (DOs), with the scripting function in SIMOTION SCOUT TIA.
6. Before you close the TIA Portal project, release the project again in the SIMOTION application object.
   ```
   SimApp.DetachFromProject();
   tia_proj.Close();
   ```

Additional references

Detailed information on scripts in the TIA Portal can be found at:

https://support.industry.siemens.com/cs/ww/en/view/108716692 (https://support.industry.siemens.com/cs/ww/en/view/108716692)

Detailed information on scripts in SIMOTION SCOUT TIA can be found in Section "Scripts for sequence automation" in the online help.

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