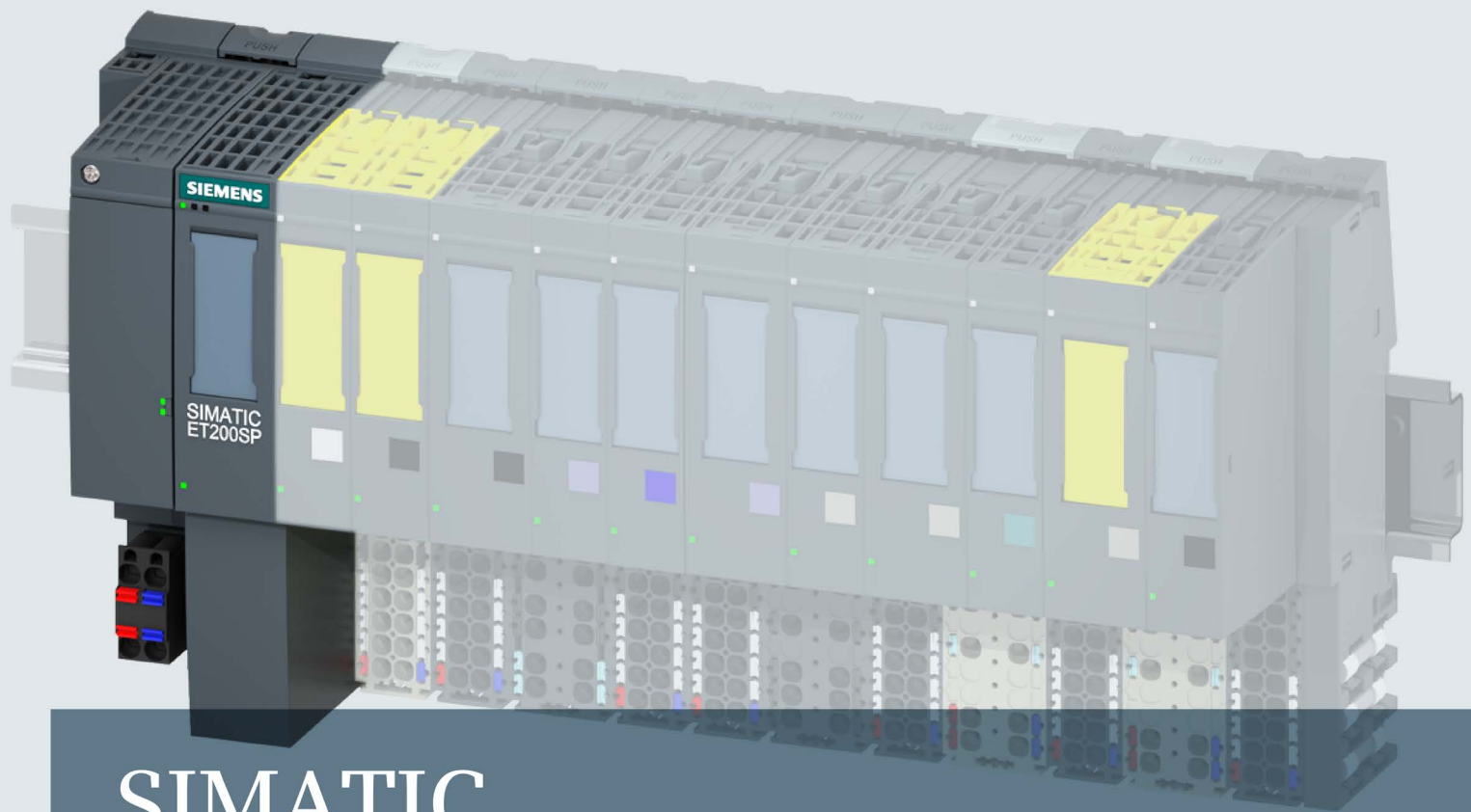


SIEMENS



SIMATIC

ET 200SP

Interface module IM 155-6 PN HS (6ES7155-6AU00-0DN0)

Manual

Edition

09/2016

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SIEMENS

SIMATIC

ET 200SP
IM 155-6 PN HS interface module
(6ES7155-6AU00-0DN0)

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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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.

Preface

Purpose of the documentation

This manual supplements the ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>) system manual.

Functions that generally relate to the system are described in this manual.

The information provided in this manual and in the system/function manuals supports you in commissioning the ET 200SP distributed I/O system.

Conventions

Please also observe notes labeled as follows:

Note

A note contains important information on the product described in the documentation, on the handling of the product, or on the section of the documentation to which particular attention should be paid.

Security information

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

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

Customer is responsible to prevent unauthorized access to its plants, systems, machines and networks. Systems, machines and components should only be connected to the enterprise network or the internet if and to the extent necessary and with appropriate security measures (e.g. use of firewalls and network segmentation) in place.

Additionally, Siemens' guidance on appropriate security measures should be taken into account. For more information about industrial security, please visit (<http://www.siemens.com/industrialsecurity>).

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

To stay informed about product updates, subscribe to the Siemens Industrial Security RSS Feed under (<http://www.siemens.com/industrialsecurity>).

Siemens Industry Online Support

You can find current information on the following topics quickly and easily here:

- **Product support**

All the information and extensive know-how on your product, technical specifications, FAQs, certificates, downloads, and manuals.

- **Application examples**

Tools and examples to solve your automation tasks – as well as function blocks, performance information and videos.

- **Services**

Information about Industry Services, Field Services, Technical Support, spare parts and training offers.

- **Forums**

For answers and solutions concerning automation technology.

- **mySupport**

Your personal working area in Industry Online Support for messages, support queries, and configurable documents.

This information is provided by the Siemens Industry Online Support in the Internet (<http://www.siemens.com/automation/service&support>).

Industry Mall

The Industry Mall is the catalog and order system of Siemens AG for automation and drive solutions on the basis of Totally Integrated Automation (TIA) and Totally Integrated Power (TIP).

Catalogs for all the products in automation and drives are available on the Internet (<https://mall.industry.siemens.com>).

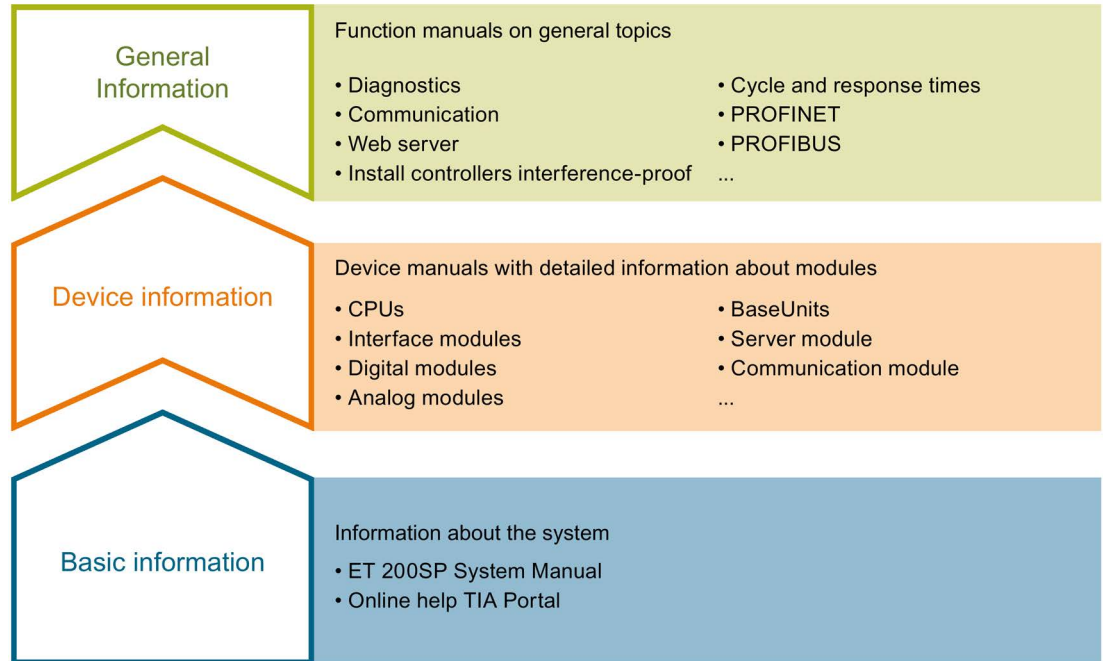
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Documentation guide

The documentation for the SIMATIC ET 200SP distributed I/O system is arranged into three areas.

This arrangement enables you to access the specific content you require.



Basic information

The system manual describes in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200SP. distributed I/O system. The STEP 7 online help supports you in the configuration and programming.

Device information

Product manuals contain a compact description of the module-specific information, such as properties, wiring diagrams, characteristics and technical specifications.

General information

The function manuals contain detailed descriptions on general topics regarding the SIMATIC ET 200SP distributed I/O system, e.g. diagnostics, communication, Web server, designing interference-free controllers.

You can download the documentation free of charge from the Internet (<http://w3.siemens.com/mcms/industrial-automation-systems-simatic/en/manual-overview/tech-doc-et200/Pages/Default.aspx>).

Changes and supplements to the manuals are documented in a Product Information.

You can download the product information free of charge from the Internet (<https://support.industry.siemens.com/cs/us/en/view/73021864>).

Manual Collection ET 200SP

The Manual Collection contains the complete documentation on the SIMATIC ET 200SP distributed I/O system gathered together in one file.

You can find the Manual Collection on the Internet (<http://support.automation.siemens.com/WW/view/en/84133942>).

"mySupport"

With "mySupport", your personal workspace, you make the most of your Industry Online Support.

In "mySupport" you can store filters, favorites and tags, request CAx data and put together your personal library in the Documentation area. Furthermore, your data is automatically filled into support requests and you always have an overview of your current requests.

You need to register once to use the full functionality of "mySupport".

You can find "mySupport" in the Internet (<https://support.industry.siemens.com/My/ww/en>).

"mySupport" - Documentation

In the Documentation area of "mySupport", you have the possibility to combine complete manuals or parts of them to make your own manual.

You can export the manual in PDF format or in an editable format.

You can find "mySupport" - Documentation in the Internet (<http://support.industry.siemens.com/My/ww/en/documentation>).

"mySupport" - CAx Data

In the CAx Data area of "mySupport", you can have access the latest product data for your CAx or CAe system.

You configure your own download package with a few clicks.

In doing so you can select:

- Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files
- Manuals, characteristics, operating manuals, certificates
- Product master data

You can find "mySupport" - CAx Data in the Internet
(<http://support.industry.siemens.com/my/ww/en/CAxOnline>).

Application examples

The application examples support you with various tools and examples for solving your automation tasks. Solutions are shown in interplay with multiple components in the system - separated from the focus in individual products.

You can find the application examples on the Internet
(<https://support.industry.siemens.com/sc/ww/en/sc/2054>).

TIA Selection Tool

With the TIA Selection Tool, you can select, configure and order devices for Totally Integrated Automation (TIA).

This tool is the successor of the SIMATIC Selection Tool and combines the known configurators for automation technology into one tool.

With the TIA Selection Tool, you can generate a complete order list from your product selection or product configuration.

You can find the TIA Selection Tool on the Internet
(<http://w3.siemens.com/mcms/topics/en/simatic/tia-selection-tool>).

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to run commissioning and maintenance activities simultaneously on various SIMATIC S7 stations as a bulk operation independently of the TIA Portal.

The SIMATIC Automation Tool provides a multitude of functions:

- Scanning of a PROFINET/Ethernet network and identification of all connected CPUs
- Address assignment (IP, subnet, gateway) and station name (PROFINET device) to a CPU
- Transfer of the data and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- Operating mode switchover RUN/STOP
- Localization of the CPU by means of LED flashing
- Reading out CPU error information
- Reading the CPU diagnostic buffer
- Reset to factory settings
- Updating the firmware of the CPU and connected modules

You can find the SIMATIC Automation Tool on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/98161300>).

PRONETA

With SIEMENS PRONETA (PROFINET network analysis), you analyze the plant network during commissioning. PRONETA features two core functions:

- The topology overview independently scans PROFINET and all connected components.
- The IO check is a fast test of the wiring and the module configuration of a system.

You can find SIEMENS PRONETA on the Internet (<https://support.industry.siemens.com/cs/ww/en/view/67460624>).

Product overview

2.1 Properties

Article number

6ES7155-6AU00-0DN0 (interface module IM 155-6 PN HS and server module)

View of the module

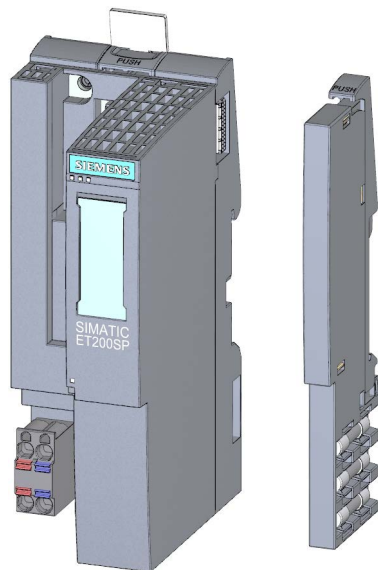


Figure 2-1 View of the IM 155-6 PN HS interface module and the server module

Properties

The module has the following properties:

- Connects the ET 200SP distributed I/O system with PROFINET IO
- High-speed applications as of 125 µs
- Isochronous mode according to PROFINET V2.3
- Supply voltage 1L+ 24 V DC (SELV/PELV).
- The connection plugs for the 24 V DC supply voltage and the server module are included in the scope of delivery of the interface module.
- PROFINET IO connection via selectable BusAdapters
 - For RJ45 bus connection plug (BA 2×RJ45)
 - For direct connection of the bus cable (BA 2×FC)
 - For POF/PCF fiber-optic cable (BA 2×SCRJ)
 - As media converter for POF/PCF fiber-optic cable ⇔ standard RJ45 plug (BA SCRJ/RJ45)
 - As media converter for POF/PCF fiber-optic cable ⇔ direct connection of the bus cable (BA SCRJ/FC)
 - For glass fiber-optic cable (BA 2×LC)
 - As media converter for glass fiber-optic cable ⇔ standard RJ45 plug (BA LC/RJ45)
 - As media converter for glass fiber-optic cable ⇔ direct connection of the bus cable (BA LC/FC)

The module supports the following PROFINET IO functions (see (Page 15))

Maximum configuration

- 30 I/O modules
- 0.5 m backplane bus (without interface module but with server module)

Maximum amount of I/O data

The maximum amount of I/O data without user data qualifier is 968 bytes.

Note

- In the case of a shared device configuration, the 968 bytes apply to the total I/O data of all controllers that share the device.
 - If more than two (max. four) controllers share the device, the maximum amount of I/O data including user data qualifier is limited to 360 bytes per controller.
-

Accessories

You order the following accessories separately:

- BA 2×RJ45 BusAdapter
- BA 2×FC BusAdapter
- BA 2×SCRJ BusAdapter
- BA SCRJ/RJ45 BusAdapter
- BA SCRJ/FC BusAdapter
- BA 2×LC BusAdapter
- BA LC/RJ45 BusAdapter
- BA LC/FC BusAdapter
- Labeling strips
- Reference identification label

A detailed list of the available accessories can be found in the system manual ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>).

Server module

The server module is included in the scope of delivery of the interface module and is available separately as a spare part. The server module has the following properties:

- Terminates the backplane bus of the ET 200SP distributed I/O system
- Features a support for 3 spare fuses (5 × 20 mm)
- Provides station functions, for example, group load diagnostics, status bytes.
- Identification data I&M 0 to 3

Note

You need to configure and assign parameters to the server module in the configuration software.

To do this, place the server module in the last configuration slot and enable the parameter Group diagnostics: Missing supply voltage L+. When there are 30 I/O modules, the server module is inserted in slot 31.

You can find more information in the Server module (<http://support.automation.siemens.com/WW/view/en/63257531>) manual.

First BaseUnit of an ET 200SP in the configuration

The interface modules support dark-colored BaseUnits in slot 1. This means that modules without a connection to the integrated voltage buses P1 and P2 can be configured starting with slot 1. Currently, this applies to the following modules:

- AI EnergyMeter
- DI 4x120..230VAC ST (6ES7131-6FD00-0BB1)
- DQ 4x24..230VAC/2A ST (6ES7132-6FD00-0BB1)
- RQ 4x120VDC-230VAC/5A NO ST (6ES7132-6HD00-0BB1)
- RQ 4x120VDC-230VAC/5A NO MA ST (6ES7132-6MD00-0BB1)

Note

First BaseUnit of an ET 200SP in the configuration

The first BaseUnit of an ET 200SP station may be a dark-colored one if an AC I/O module or AI Energy Meter is plugged. Please observe the information on limiting the overvoltage and power rating in the AC I/O module manuals.

A light-colored BaseUnit must be plugged into the slot of the first 24 V DC I/O module to supply the 24 V DC supply voltage.

Pay attention to the type of the BaseUnits during the configuration.

2.2 Functions

PROFINET IO

The interface module supports the following PROFINET IO functions:

- Integrated switch with 2 ports
- Supported Ethernet services: ping, arp, network diagnostics (SNMP)/MIB-2, LLDP-MIB and MRP-MIB
- Port diagnostics
- Disabling ports
- Minimum update time 125 μ s
- Device replacement without programming device, also without topological configuration
- Reset to factory settings via PROFINET IO
- Firmware update via PROFINET IO
- Isochronous real-time communication
- Prioritized startup
- Media redundancy (MRP)
- Media redundancy with planned duplication (MRPD)
- Shared device
- Module division of I/O modules (submodules)
- Module-internal Shared Input/Shared Output (MSI/MSO)
- Isochronous mode as of 125 μ s
- Performance upgrade PROFINET V2.3
- Freely selectable connection method and connection technology over SIMATIC BusAdapter for PROFINET copper, POF, PCF or fiber-optic cables.

The interface module supports additional functions:

- Identification data I&M 0 to 3
- Oversampling
- PROFIenergy
- Configuration control (option handling)
- Value status of I/O modules
- Use of fail-safe modules
- Multi Hot Swap (removal/insertion of multiple I/O modules during operation)
- Reset to factory settings via RESET button

Note

Docking unit

The use of the IM155-6 PN HS interface module as a docking unit (function: IO device changing in operation) in a docking system is not supported.

Requirements

The table below shows the software requirements for a configuration with the IM 155-6 PN HS interface module:

Table 2- 1 Version dependencies of other module functions

Function	Product version of the module as of	Firmware version of the module as of	Configuration software		
			Configuration with GSD file/software from a third-party manufacturer ¹	STEP 7 as of V5.5 SP4 with HSP0238	STEP 7 (TIA Portal) as of V14
Real-time communication	1	V4.0.0	X	X	X
Isochronous real-time communication according to PROFINET	1	V4.0.0	X	X	X
Prioritized startup	1	V4.0.0	X	X	X
Media redundancy (MRP)	1	V4.0.0	X	X	X
Shared device	1	V4.0.0	X	X	X
Multi Hot Swap	1	V4.0.0	X	X	X
Media redundancy with planned duplication (MRPD)	1	V4.0.0	X	X	X
Isochronous mode $\geq 250 \mu\text{s}$	1	V4.0.0	---	X	X
Isochronous mode $\geq 125 \mu\text{s}/187.5 \mu\text{s}$	1	V4.0.0	---	---	X
Device replacement without programming device	1	V4.0.0	X	X	X
Module-internal Shared Input/Shared Output (MSI/MSO)	1	V4.0.0	X	X	X
Module division of I/O modules (submodules)	1	V4.0.0	X	X	X
PROFInergy	1	V4.0.0	X	X	X
Value status	1	V4.0.0	X	X	X
Use of fail-safe modules	1	V4.0.0	---	X	X
Oversampling	1	V4.0.0	---	X	X
BA 2xRJ45 BusAdapter	1	V4.0.0	X	X	X
BA 2xFC BusAdapter	1	V4.0.0	X	X	X
BA 2xSCRJ BusAdapter	1	V4.0.0	X	X	X
BA SCRJ/RJ45 BusAdapter	1	V4.0.0	X	X	X
BA SCRJ/FC BusAdapter	1	V4.0.0	X	X	X
BA 2xLC BusAdapter	1	V4.0.0	X	X	X
BA LC/RJ45 BusAdapter	1	V4.0.0	X	X	X
BA LC/FC BusAdapter	1	V4.0.0	X	X	X

¹ systems of third-party manufacturers: Depending on the range of functions of the third-party system

Cabling with fixed connection setting

If you set a fixed connection setting of the port in STEP 7, you should also disable "Autonegotiation/Autocrossover".

You can find more information on this topic in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Real-time communication

A transmission method for PROFINET IO based on cyclic data exchange with a provider-consumer model.

Isochronous real-time communication

Synchronized communication protocol for cyclic exchange of IRT data between PROFINET devices. A reserved bandwidth is available in the send cycle for IRT data. The reserved bandwidth ensures that the IRT data can also be transferred with another high network load (e.g. TCP/IP communication or additional real time communication) at reserved, chronologically synchronized intervals.

A topological configuration is required for IRT.

Note

IO controller as sync master with IRT communication

We recommend also operating the IO controller as a sync master when configuring the IRT communication.

Otherwise, IO devices with IRT and RT configuration could fail as a result of sync master failure.

You can find more information on the configuration of synchronized PROFINET devices in sync domains in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Isochronous mode of I/O data

I/O data, transmission cycle via PROFINET IO, and the user program are synchronized to achieve maximum deterministics. The input and output data of distributed I/O modules in the system is simultaneously collected and simultaneously output. The constant PROFINET IO cycle forms the corresponding clock generator. The interface module supports isochronous mode of I/O data for the modules starting at 125 µs. The IO device can exchange isochronous process data with a maximum of one IO controller.

Note

If the IO controller cannot access a module (for example, module pulled, activated configuration control without written control data record), cycle time violations may occur with activated isochronous mode in the synchronous cycle interrupt OB (OB61). The time error OB (OB80) is called in the event of a cycle time violation.

This behavior is associated with updating the process image by means of the "SYNC_PI" (SFC126) and "SYNC_PO" (SFC127) instructions and depends, among other things, on the set cycle time and the configuration limits.

Note

Isochronous mode restrictions with IM 155-6 PN HS

Isochronous mode of I/O data in combination with the following functions is not possible with the interface module IM 155-6 PN HS:

- PROFIenergy
-

You can find more information on this topic in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Prioritized startup

Prioritized startup describes the PROFINET IO functionality for accelerating the startup of IO devices in a PROFINET IO system with IRT and RT communication.

The function reduces the time that the appropriately configured IO devices require in order to return to cyclic user data exchange in the following cases:

- After the supply voltage has returned
- After a station has returned
- After IO devices have been activated

Note

Dependency on the startup time

The startup time depends on the number and type of modules.

The interface module permits startup times from 0.5 s.

You can find more information on this topic in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14
(<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description
(<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Device replacement

Device replacement without topological configuration

The device name is also stored on the BusAdapter in addition to the interface module. A device name saved on the BusAdapter is the requirement for device replacement without topological configuration.

Storing the name on the BusAdapter and the interface module produces a range of scenarios for using the device name when the interface module is replaced.

Table 2- 2 Scenarios for using the device name

	Interface module empty	Interface module with device name
BusAdapter empty	No device name available	The device name from the interface module is used and copied to the BusAdapter.
BusAdapter with device name	The device name from the BusAdapter is used and copied to the interface module.	The device name from the BusAdapter is used and copied to the interface module if this has a different device name.

Be aware of the following constraints:

- Resetting to factory settings via the RESET button deletes the device name in both the interface module and the BusAdapter. To prevent the device name from being deleted in the BusAdapter, you can remove the BusAdapter from the interface module before resetting to factory settings.
- When a BusAdapter is replaced, a device name stored in the BusAdapter is applied to the interface module after a POWER ON.
- Do not pull/plug the BusAdapter while under voltage. If you pull/plug the BusAdapter while under voltage, the interface module restarts.

Device replacement with topological configuration

IO devices having this function can be replaced in a simple manner:

- The device name does not have to be assigned with the programming device.

The replaced IO device is assigned the device name by the IO controller and not by the programming device. The IO controller uses the configured topology and the neighboring relationships determined by the IO devices for this purpose. All involved devices must support the LLDP protocol (Link Layer Discovery Protocol). The configured target topology must match the actual topology.

IO devices that were already operated in a different configuration should be reset to their factory settings before reuse (see system manual ET 200SP Distributed I/O System (<http://support.automation.siemens.com/WW/view/en/58649293>)).

You can find more information on this topic in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Replacement scenario of an IM 155-6 PN HS or of a BusAdapter

In a replacement scenario, any IO device or BusAdapter in operation must be reset to its delivery state via "Reset to factory settings" (see the system manual ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>)).

Media redundancy (MRP)

Function for safeguarding communication and system availability. A ring topology ensures that an alternative communication path is made available if a transmission route fails.

You can find more information on this topic in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Media redundancy with planned duplication (MRPD)

If bumpless media redundancy is to be reached with short update times (together with IRT), you must use the MRP extension "Media redundancy with planned duplication (MRPD)".

You can find more information on this topic in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Shared device

IO device which makes its data available to multiple IO controllers.

The interface module supports shared device at submodule level.

Notes on configuring:

- Always load hardware changes to all affected IO controllers.
- Set the same send clocks in the projects.
- Limit the I/O data including user data qualifier to 360 bytes per IO controller.
- Use the same station name and the same IP address for each shared configuration.
- Assign each module or submodule to only one IO controller.
- In the case of an incorrect configuration, you may need to perform a power OFF/ON on the interface module.

You can find more information on this topic in the STEP 7 online help and

- As of STEP 7 V14, in the PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- As of STEP 7 V5.5, in the PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual

Submodules

The IM 155-6 PN HS interface module supports the module division of I/O modules into up to 4 submodules. This allows parts of an I/O module to be separately configured and assigned parameters.

It is possible to assign each of these submodules to different IO controllers.

The functions

- Firmware update
- Write I&M data
- Calibration
- PROFIenergy

can only be executed if you have configured submodule 1 during configuration.

Module-internal Shared Input/Shared Output (MSI/MSO)

The module-internal Shared Input function allows an input module to make its input data available to up to three additional IO controllers. Each controller has read access to the same channels.

The module-internal Shared Output function allows an output module to make the status of its output data available to up to three additional IO controllers. These additional IO controllers can read the status of the channels as input data.

You can find more information on this topic in the STEP 7 online help and:

- As of STEP 7 V14, in the PROFINET with STEP 7 V14
(<http://support.automation.siemens.com/WW/view/en/49948856>) function manual

Value status

The IM 155-6 PN HS interface module supports I/O modules with value status.

You can find more information on the value status in the manuals for the I/O modules.

Oversampling

The IM 155-6 PN HS interface module supports the oversampling mode of HS modules. With oversampling, the modules reduce the respective PROFINET send clocks in isochronous mode.

You can find more information on oversampling in the manuals for the I/O modules.

2.2.1 PROFlenergy

Properties

PROFlenergy (for PROFINET) reduces the energy consumption by using PROFlenergy commands during production-free periods.

Reference

You can find more information on PROFlenergy in the

- I/O modules (<http://support.automation.siemens.com/WW/view/en/55679691/133300>) manual
- PROFINET with STEP 7 V14 (<http://support.automation.siemens.com/WW/view/en/49948856>) function manual
- PROFINET System Description (<http://support.automation.siemens.com/WW/view/en/19292127>) system manual
- PROFlenergy (<http://support.automation.siemens.com/WW/view/en/66928686>) product information.
- Internet (<http://www.profibus.com>) under Common Application Profile PROFlenergy; Technical Specification for PROFINET; Version 1.0; January 2010; Order No: 3.802.

2.2.2 Configuration control (option handling)

Properties

Configuration control allows you to prepare your distributed I/O system for future extensions or changes. Configuration control means that you can configure the planned maximum configuration of your distributed I/O system in advance and vary it later in a flexible manner by means of the user program.

Reference

You can find more information on configuration control

- in the ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>) system manual
- on the Internet under the following link Application collection (<http://support.automation.siemens.com/WW/view/en/29430270>)
- in the STEP 7 online help.

2.2.3 Use of fail-safe modules

Properties

The interface module IM 155-6 PN HS supports the use of fail-safe modules.

Reference

You can find more information in the ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>) system manual.

2.2.4 Multi Hot Swap

Properties

You can remove and insert any number of I/O modules during operation. The interface module and the inserted I/O modules remain in operation.

Note

The IM 155-6 PN HS interface module does not support the removal and insertion of the server module, the interface module and BusAdapter during operation.

Reference

You can find more information on the removal/insertion of modules in the system manual ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>).

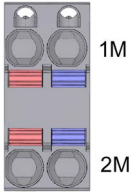
Connecting

3.1 Terminal assignment

24 V DC supply voltage

The table below shows the signal names and descriptions of the pin assignment of the 24 V DC supply voltage.

Table 3- 1 Pin assignment 24 V DC supply voltage

View		Signal name ¹	Description
Connector	IM connection		
		1L+	24 V DC
		2L+	24 V DC (for looping through) ²
		1M	Ground
		2M	Ground (for looping through) ²

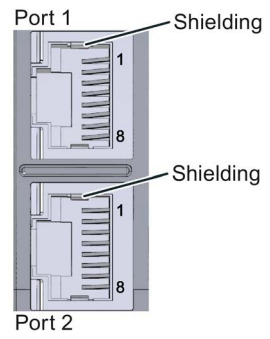
¹ 1L+ and 2L+ as well as 1M and 2M are bridged internally.

² Maximum 10 A permitted.

PROFINET IO with BusAdapter BA 2×RJ45

The following table shows the signal name and description of the pin assignment of the BusAdapter BA 2×RJ45.

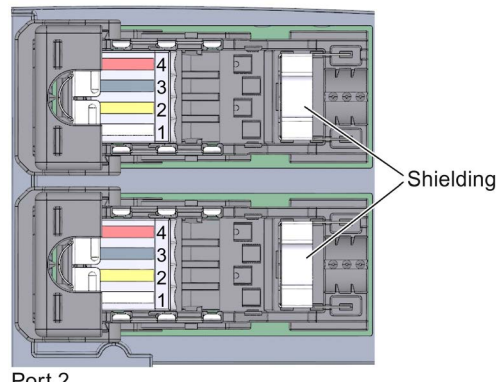
Table 3- 2 PROFINET IO pin assignment with BusAdapter BA 2×RJ45

View	Signal name		Description
	1	TD	Transmit data +
	2	TD_N	Transmit data -
	3	RD	Receive data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive data -
	7	GND	Ground
	8	GND	Ground

PROFINET IO with BusAdapter BA 2×FC

The following table shows the signal name and description of the pin assignment of the BusAdapter BA 2×FC.

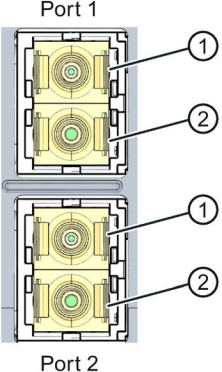
Table 3- 3 PROFINET IO pin assignment with BusAdapter BA 2×FC

View	Signal name		Description
	1	TD	Transmit data +
	2	TD_N	Transmit data -
	3	RD	Receive data +
	4	RD_N	Receive data -

PROFINET IO with BusAdapter BA 2×SCRJ

The following table shows the signal names and description of the pin assignment for the BA 2×SCRJ BusAdapter.

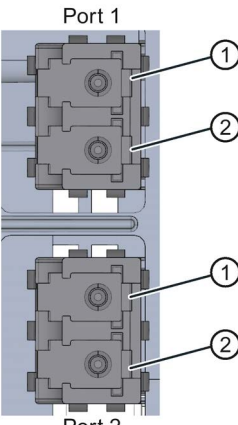
Table 3- 4 PROFINET IO pin assignment with BusAdapter BA 2×SCRJ

View	Signal name	Description
	①	Receiver/Receive data
	②	Sender/Transmit data

PROFINET IO with BusAdapter BA 2×LC

The following table shows the signal names and description of the pin assignment for the BA 2×LC BusAdapter.

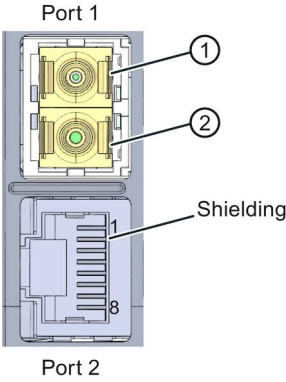
Table 3- 5 PROFINET IO pin assignment with BusAdapter BA 2×LC

View	Signal name	Description
	①	Receiver/Receive data
	②	Sender/Transmit data

PROFINET IO with BusAdapter BA SCRJ/RJ45

The following table shows the signal names and description of the pin assignment for the BA SCRJ/RJ45 BusAdapter.

Table 3- 6 PROFINET IO pin assignment with BusAdapter BA SCRJ/RJ45

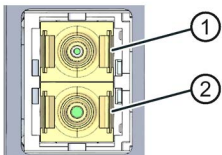
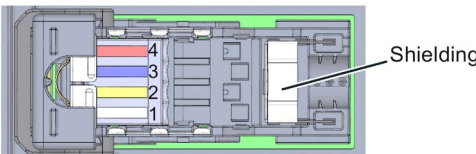
View		Signal name	Description
	①		Receiver/Receive data
	②		Sender/Transmit data
	1	TD	Transmit data +
	2	TD_N	Transmit data –
	3	RD	Receive data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive data –
	7	GND	Ground
	8	GND	Ground

PROFINET IO with BusAdapter BA SCRJ/FC

The following table shows the signal names and description of the pin assignment for the BA SCRJ/FC BusAdapter.

The pin assignment for the BA SCRJ/FC BusAdapter is shown individually for a clearer overview.

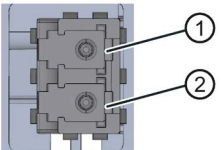
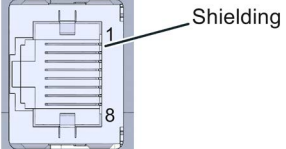
Table 3- 7 PROFINET IO pin assignment with BusAdapter BA SCRJ/FC

View	Signal name		Description
Port 1 	①		Receiver/Receive data
	②		Sender/Transmit data
Port 2 	1	TD	Transmit data +
	2	TD_N	Transmit data –
	3	RD	Receive data +
	4	RD_N	Receive data -

PROFINET IO with BusAdapter BA LC/RJ45

The following table shows the signal names and description of the pin assignment for the BA LC/RJ45 BusAdapter.

Table 3- 8 PROFINET IO pin assignment with BusAdapter BA LC/RJ45

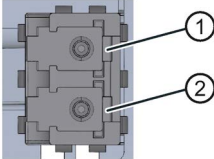
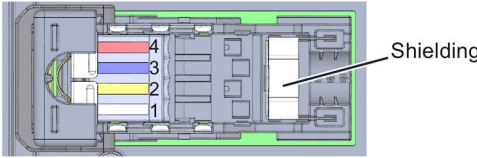
View	Signal name		Description
Port 1 	①		Receiver/Receive data
	②		Sender/Transmit data
	1	TD	Transmit data +
	2	TD_N	Transmit data –
	3	RD	Receive data +
	4	GND	Ground
	5	GND	Ground
	6	RD_N	Receive data –
Port 2 	7	GND	Ground
	8	GND	Ground

PROFINET IO with BusAdapter BA LC/FC

The following table shows the signal names and description of the pin assignment for the BA LC/FC BusAdapter.

The pin assignment for the BA LC/FC BusAdapter is shown individually for a clearer overview.

Table 3- 9 PROFINET IO pin assignment with BusAdapter BA LC/FC

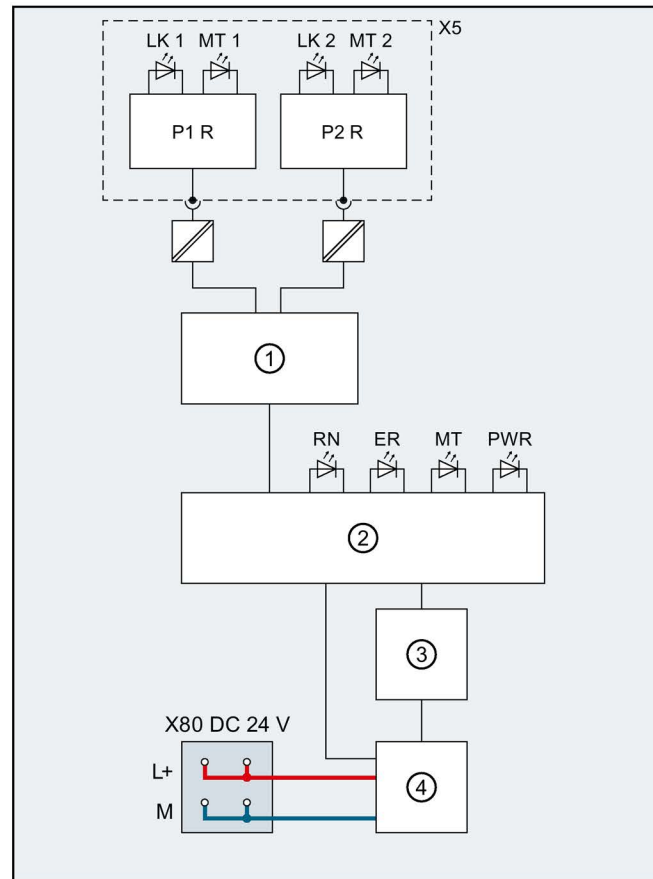
View	Signal name		Description
Port 1 	①		Receiver/Receive data
	②		Sender/Transmit data
Port 2 	1	TD	Transmit data +
	2	TD_N	Transmit data –
	3	RD	Receive data +
	4	RD_N	Receive data -

Reference

You can find more information on accessories and how to connect the interface module in the System Manual ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>).

3.2 Schematic circuit diagram

The following figure shows the block diagram of the interface module IM 155-6 PN HS.



①	Switch	L+	24 V DC supply voltage
②	ET 200SP backplane bus interface and electronics	M	Ground
③	Backplane bus	LK 1,2	Link TX/RX LED (green)
④	Internal power supply	MT 1,2	MAINT FiberOptic LED (SCRJ port) (yellow)
X80 24 V DC	Feed supply voltage	RN	RUN/STOP LED (green/yellow)
X5	BusAdapter	ER	ERROR LED (red)
P1 R	PROFINET interface X1 Port 1	MT	MAINT LED (yellow)
P2 R	PROFINET interface X1 Port 2	PWR	POWER LED (green)

Figure 3-1 Block diagram of the IM 155-6 PN HS interface module

Parameters/address space

4.1 Parameters

Parameters for IM 155-6 PN HS interface module

The following table shows the parameters for the IM 155-6 PN HS interface module.

Table 4- 1 Parameters for IM 155-6 PN HS interface module (GSD file)

Parameters	Value range	Default	Efficiency range
Configuration control	Disable/enable	Disable	ET 200SP

4.2 Explanation of parameters

4.2.1 Configuration control

You can use this parameter to enable the configuration control function in the ET 200SP distributed I/O system.

Note

If you configure the enable, the ET 200SP distributed I/O system requires a control data record 196 from the user program in order for the ET 200SP distributed I/O system to operate the I/O modules.

Reference

You can find more information in the ET 200SP distributed I/O system (<http://support.automation.siemens.com/WW/view/en/58649293>) system manual and in the STEP 7 online help.

4.3 Substitute value behavior

Substitute value behavior

The substitute value behavior in the ET 200SP distributed I/O system is defined through the configuration.

The respective output behaves according to its configured substitute value behavior:

- Current-free/voltage-free
- Output substitute value
- Keep last value

The substitute value behavior is triggered in the following cases:

- STOP controller
- Controller failure (connection interrupted)
- Parameter assignment phase during startup
- Deactivating the IO device
- Station stop:
 - Missing server module
 - At least one I/O module installed on an incorrect BaseUnit

Note

Reducing a configuration

If you reduce the configuration of the ET 200SP distributed I/O system and download the configuration to the CPU, the modules which are no longer configured but still present retain their original substitute value behavior. This applies until the supply voltage is switched off at the interface module.

The "current-free/voltage-free" behavior becomes effective in the following cases:

- Firmware update
- Reset to factory settings
- Configuration control: The IM has not received a valid control data record 196 yet.
- Incorrectly configured module
- Module with incorrect parameter assignment

4.4 Status of the supply voltage L+ of the I/O modules

The status of the supply voltage L+ of the ET 200SP I/O modules is mapped to the server module with the interface module IM 155-6 PN HS.

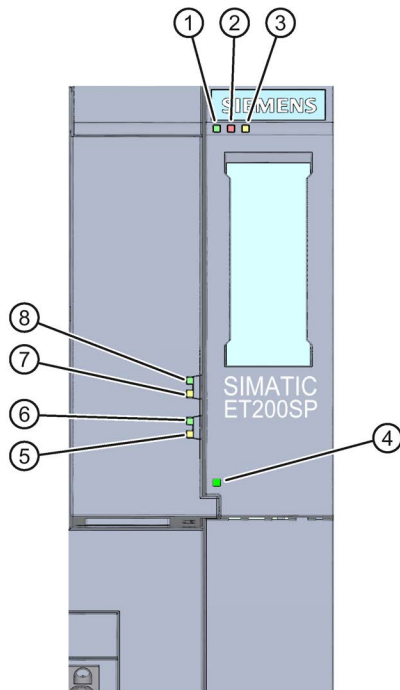
You can find information on the status of the supply voltage L+ of the I/O modules in the Server module (<http://support.automation.siemens.com/WW/view/en/63257531>) manual.

Interrupts, diagnostics, error, and system messages

5.1 Status and error displays

LED displays

The following figure shows the LED displays on the interface module and BusAdapter.



- ① RN (green)
- ② ER (red)
- ③ MT (yellow)
- ④ PWR (green)
- ⑤ MT2 (yellow) (SCRJ port)
- ⑥ LK2 (green)
- ⑦ MT1 (yellow) (SCRJ port)
- ⑧ LK1 (green)

Figure 5-1 LED displays on the interface module and BusAdapter

Meaning of the LEDs

The following tables contain the meaning of the status and error displays.

RN/ER/MT LEDs on the interface module

Table 5- 1 Status and error displays of RN/ER/MT LEDs

LEDs			Meaning	Remedy
RN (RUN)	ER (ERROR)	MT (MAINT)		
 Off	 Off	 Off	Missing or insufficient supply voltage on interface module.	Check the supply voltage or turn it on at the interface module.*
 On	 On	 On	Test of LEDs during startup: The three LEDs light up simultaneously for approximately 0.25 s.	---
 Flashes	Not relevant	Not relevant	Interface module is deactivated.	Activate the interface module with the configuration software or the user program.
			Interface module is not configured.	Configure the interface module with the configuration software.
			ET 200SP starts up.	---
			ET 200SP is being assigned parameters.	
 On	Not relevant	Not relevant	ET 200SP is currently exchanging data with the IO controller.	---
Not relevant	 Flashes	Not relevant	Group errors and group error channels.	Evaluate the diagnostics data and remedy the error.
			The configured structure does not correspond to the actual structure of the ET 200SP .	Check the structure of the ET 200SP to see whether a module is missing or defective, or whether a non-configured module is plugged.
			Invalid configuration states.	See section Invalid configuration states of the ET 200SP on PROFINET IO (Page 44)
			Parameter error in the I/O module.	Evaluate the display of the module status in STEP 7 and eliminate the error in the respective I/O module.
Not relevant	Not relevant	 On	Maintenance	See section Maintenance events (Page 42)
 Flashes	 Flashes	Not relevant	Invalid BusAdapter	Check the BusAdapter.
 Flashes	 Flashes	 Flashes	The "Node flash test" is run (the LEDs LK1 and LK2 of the PROFINET interface also flash).	---
			Hardware or firmware defective (the LEDs LK1 and LK2 of the PROFINET interface do not flash).	Run a firmware update. If the error persists, contact Siemens Industry Online Support. Replace the interface module.
Not relevant	 Flashes	 Flashes	Configuration error on backplane bus	Insert the server module as bus termination or check the number of inserted modules.

* PWR LED on (on the interface module): Check the backplane bus for a short circuit.

PWR LED on the interface module

Table 5- 2 Status display of the PWR LED

PWR LED	Meaning	Remedy
 Off	Supply voltage not present or too small	Check the supply voltage.
 On	Supply voltage present	---

LK1/LK2 and MT1/MT2 LEDs on the BusAdapter

Table 5- 3 Status and error displays of LK1/LK2 and MT1/MT2 LEDs

LED		Meaning	Remedy
LK1/LK2	MT1/MT2*		
 Off	Not relevant	There is no Ethernet connection between the PROFINET IO interface of your PROFINET device and a communication partner (e.g. IO controller).	Check whether the bus cable to the switch/IO controller is interrupted.
 On	Not relevant	There is an Ethernet connection between the PROFINET IO interface of your PROFINET device and a communication partner (e.g. IO controller).	---
 Flashes	Not relevant	The "Node flash test" is run (the RN/ER/MT LEDs also flash).	---
Not relevant	 Off	No error	---
Not relevant	 On	- Fiber-optic error - Maintenance demanded: Attenuation through the fiber-optic cable is so high that operation will soon no longer be possible.	Causes and measures for the transmission route: - Replacement of fiber-optic cable if damaged or aged - Correct installation of the PROFINET connector/PROFINET connections - Adherence to maximum length of 50 m for POF cable or 100 m for PCF cable. - Secure fit of the FOC connector

* Available only on BA 2×SCRJ, BA SCRJ/RJ45 and BA SCRJ/FC BusAdapters

LED display of configuration errors

Configuration errors of the ET 200SP distributed I/O system are output on the interface module by the ER (red) and MT (yellow) LEDs.

The following configuration errors are indicated by the LEDs:

- Missing server module
- Interruptions or short circuit on the backplane bus

Principle of operation

You determine the information for cause of the error with the LED error display. After notification by the flash signal, the error type is displayed followed by the error location/error code.

The LED error display

- is active during POWER ON as well as during operation.
- Has priority over all other states that are displayed by means of the ER and MT LEDs.
- remains turned on until the cause of the error has been corrected.

Table 5- 4 Display of error type and error location

Sequence		Description
1	ER and MT LEDs flash 3x with 0.5 Hz	Signaling of error type
2	MT LED flashes with 1 Hz	Display of the error type (decimal)
3	ER and MT LEDs flash 3x with 2 Hz	Signaling of error location/error code
4	ER LED flashes with 1 Hz	Display of tens digit (decimal) of the error location/error code
5	MT LED flashes with 1 Hz	Display of ones digit (decimal) of the error location/error code
6	Repeat steps 1 to 5 until the cause of the error has been corrected.	

Error display

The following table shows the possible causes of error that can occur.

Table 5- 5 Error display

Error type (MT)	Error location (ER/MT)	Cause of error	Remedy
1	65*	- Missing server module - Interruptions at the backplane bus - Short circuit of communication on the backplane bus	Check the configuration of the ET 200SP.

* Slot

Note

A short circuit in the backplane bus supply or the bus connection supply is indicated by the following LEDs:

- PWR LED: On
- RN-, ER and MT LED: Off

5.2 Interrupts

Introduction

The I/O device generates interrupts as a reaction to specific error events. Interrupts are evaluated based on the I/O controller used.

Evaluating interrupts with I/O controllers

The ET 200SP distributed I/O system supports the following interrupts:

- Diagnostics interrupts
- Hardware interrupts
- Swapping interrupts
- Maintenance events

In the event of an interrupt, interrupt OBs are automatically called in the CPU of the IO controller.

Information on the cause and class of the error is already available, based on the OB number and start information.

Detailed information on the error event can be obtained in the error OB using the instruction "RALRM" (read additional interrupt information).

System diagnostics

STEP 7 (TIA Portal) offers innovative system diagnostics for the devices of the S7-1500 (IO controller CPU S7-1500) and the ET 200SP (IO device) automation system. Independent of the cyclic user program, messages are made available on the display of the CPU S7-1500, the CPU web server and the HMI device.

For more information on system diagnostics, refer to the System Diagnostics function manual. (<http://support.automation.siemens.com/WW/view/en/59192926>).

5.2.1 Triggering of a diagnostics interrupt

Triggering of a diagnostics interrupt

For an incoming or outgoing event (e.g. wire break on a channel of an I/O module), the module triggers a diagnostics interrupt if this is configured accordingly.

The CPU interrupts the processing of the user program and processes the diagnostics interrupt (OB 82). The event which led to the interrupt is entered in the start information of the diagnostics interrupt (OB 82).

5.2.2 Triggering a hardware interrupt

Triggering a hardware interrupt

During a hardware interrupt, the CPU interrupts the processing of the user program and processes the hardware interrupt block (e.g., OB 40). The event that triggered the interrupt is entered in the start information of the hardware interrupt block.

Note**Diagnostics "Hardware interrupt lost" (from I/O module)**

Avoid creating hardware interrupts cyclically.

If the hardware interrupt load is too high, hardware interrupts can get lost depending on the number of I/O modules and the communication load.

5.2.3 Triggering a swapping interrupt

Triggering a remove/insert interrupt

In the event of a remove/insert interrupt, the CPU interrupts processing of the user program and processes the remove/insert interrupt (OB 83). The event which led to the interrupt is entered in the start information of the remove/insert interrupt (OB 83).

Note

Parameter assignment error after removal/insertion

If you write data records from the user program to the modules of the distributed I/O, make sure that these modules actually exist and are available. You can do this by evaluating the remove/insert interrupt (OB83). After inserting a module, the remove/insert interrupt (OB83) is not called until the module has started up and its parameters are assigned. This ensures that data record operations can be executed without errors.

5.3 Alarms

Actions after a diagnostics alarm

There can be more than one diagnostic alarm at a given time. Actions initiated by diagnostics alarms:

- The ER LED on the interface module flashes.
- Diagnostic data is reported as diagnostic interrupts to the CPU of the IO controller and can be read via data records.
- Incoming diagnostics alarms are saved to the diagnostics buffer of the I/O controller.
- The diagnostics interrupt (OB 82) is called. If the diagnostics interrupt (OB 82) is not available, the I/O controller goes into STOP mode.

You can find more information on this topic in the STEP 7 online help.

Reading out the diagnostics data

Table 5- 6 Reading the diagnostics with STEP 7

Automation system with IO controller	Application	See...
SIMATIC S7	Diagnostics as plain text in STEP 7 in online and diagnostics view	STEP 7 online help - As of STEP 7 V14, function manual PROFINET with STEP 7 V14 (http://support.automation.siemens.com/WW/view/en/49948856) - As of STEP 7 V5.5, system manual PROFINET System Description (http://support.automation.siemens.com/WW/view/en/19292127)
	Instruction "RDREC" (SFB 52) Read data records from the IO device	
	Instruction "RALRM" (SFB 54) Receive interrupts from the IO device	

Additional information on the data records for PROFINET IO

The structure of the diagnostic data records and programming examples are available in the Programming Manual From PROFIBUS DP to PROFINET IO (<http://support.automation.siemens.com/WW/view/en/19289930>) and in Example application (<http://support.automation.siemens.com/WW/view/en/24000238>).

Causes of error and troubleshooting

The causes of error and remedies for the diagnostics alarms are described in the product manuals for I/O modules (<http://support.automation.siemens.com/WW/view/en/55679691/133300>) in the section "Interrupts/diagnostics alarms".

See also

Channel diagnostics (Page 43)

5.3.1 Maintenance events

Triggering of a maintenance event

The PROFINET IO interfaces of the interface module support the diagnostic concept and maintenance concept in PROFINET IO according to the IEC 61158-6-10 standard. The goal is to detect and remove potential problems as soon as possible.

For the interface module, maintenance events signal to the user when a network component must be checked or replaced.

The CPU interrupts the processing of the user program and processes the diagnostics interrupt (OB 82). The event that triggered the maintenance event is entered in the start information of the diagnostics interrupt (OB 82).

At the following events:

- The interface module signals a maintenance event to the higher-level diagnostic system
- The I/O module signals a maintenance event.

Table 5- 7 Triggering of a maintenance event

Maintenance alarm	Event	Meaning
Maintenance demanded (<i>maintenance demanded</i>) MT LED is lit	Synchronization loss	• No synchronization telegram received No synchronization telegram was received by the sync master within the timeout period after parameter assignment or during operation. • Successive synchronization telegrams are located outside permitted limits (jitter)
	Critical FOC attenuation	The received light intensity at the FOC port is critical. The FOC should be replaced.
	Maintenance request from I/O module	An I/O module signals a maintenance event that is sent and displayed by the interface module

System alarms in STEP 7 (TIA Portal)

The maintenance information is generated in STEP 7 with the following system alarms:

- Maintenance demanded - indicated for each port by a yellow wrench icon  in the device view or in the hardware configuration.

You can find more information in the STEP 7 online help.

5.3.2 Channel diagnostics

Function

Channel-related diagnostics provides information about channel faults in modules.

Channel faults are mapped as channel diagnostics data in IO diagnostics data records.

The data record is read using the instruction "RDREC".

Structure of the diagnostics data records

The data records supported by the ET 200SP distributed I/O system are based on the standard PROFINET IO - Application Layer Service Definition V2.3.

You can download the standard PROFIBUS user organization (<http://www.profibus.com>) from the homepage of the PROFIBUS User Organization.

Codes of the extended channel diagnostics

With the IM 155-6 PN HS interface module, the following extended channel diagnostics are reported:

Slot number	ChannelError-Type (CET)	ExtendedChannel-ErrorType (ECET)	Associated value AddValue	Diagnostics
Module slot	0x0602	0x0691	Slot	Station stop - module parameter "Potential group" faulty or incorrect BaseUnit in actual slot (AddValue)
Slot 0	0x0602	0x0693	0x00	Diagnostics with missing server module
	0x0602	0x0698	0x00	Diagnostics backplane bus too long
	0x0602	0x0699	Slot	Diagnostics with incorrect bus configuration
	0x0602	0x069C	0x00	Diagnostics with incorrectly plugged BusAdapter
Server module slot	0x0610	0x06B0	0x00	Group diagnostics: Missing supply voltage L+ for the potential groups Note: The slot in which the light-colored BaseUnit of the respective load module is located is coded in the "ChannelNumber" element.

5.3.3 Invalid configuration states of the ET 200SP on PROFINET IO

Invalid configuration states

The following invalid configuration states of the ET 200SP distributed I/O system lead to the failure of the IO device or prevent the exchange of user data with the I/O modules.

- Number of modules exceeds maximum configuration
- Faulty backplane bus (e.g. defective BaseUnit). ET 200SP backplane bus interruptions do not trigger an interrupt.
- At least one I/O module is installed in a different BaseUnit than the one configured in the parameters.
- Missing server module
- Invalid or incorrectly configured BusAdapter.

Note

Removal of the server module will trigger a station stop. All I/O modules of the ET 200SP distributed I/O system fail (substitute value behavior) but the interface module is still exchanging data.

Revoking the station stop (by correcting the invalid configuration state) leads to a brief failure of the ET 200SP distributed I/O system and automatic restart.

See also

Status and error displays (Page 34)

Channel diagnostics (Page 43)

5.3.4 Failure of supply voltage L+ at BaseUnit BU...D

Failure of the supply voltage L+

The I/O modules react as follows to failure of the supply voltage L+ on the BaseUnit BU...D:

- If an I/O module is removed during failure of the supply voltage, a pull alarm is generated.
- If an I/O module is installed during failure of the supply voltage, an insert alarm is generated.

5.3.5 STOP of the IO controller and recovery of the IO device

STOP of the SIMATIC IO controller

Diagnostics frames received from the IO device while the IO controller is in STOP do not initiate a call of any corresponding OBs when the IO controller goes into RUN. You must read the data record E00C_H with the "RDREC" instruction in OB 100. This record contains all diagnostics for the slots assigned to an IO controller in an IO device.

Recovery of the SIMATIC IO devices

If you want to read the diagnostics of a station after its return, you have to read the E00C_H data record with the "RDREC" instruction in the rack interrupt (OB 86). This record contains all diagnostics for the slots assigned to an IO controller in an IO device.

Compatibility

Status of the supply voltage

Load voltage diagnostics are only valid if the station started up with a valid and complete configuration.

- For modules in the following table without a parameter assignment, the status of the supply voltage is always signaled as "1" regardless of the actual status of the supply voltage.
- If a potential group is exclusively made up of modules without parameter assignment from the table below, no group diagnostics "Missing supply voltage L+" is signaled for this potential group.

Modules	Order number
DI 8x24VDC ST	6ES7131-6BF00-0BA0
DI 16x24VDC ST	6ES7131-6BH00-0BA0
DI 8x24VDC HF	6ES7131-6BF00-0CA0
DQ 4x24VDC/2A ST	6ES7132-6BD20-0BA0
DQ 4x24VDC/2A HF	6ES7132-6BD20-0CA0
DQ 8x24VDC/0,5A ST	6ES7132-6BF00-0BA0
DQ 8x24VDC/0,5A HF	6ES7132-6BF00-0CA0
DQ 16x24VDC/0,5A ST	6ES7132-6BH00-0BA0

Reaction times for fail-safe modules

The following maximum reaction time of the interface module must be taken into account when calculating the reaction times of fail-safe modules:

maximum reaction time = configured update time + 400 µs (but at least 1.4 ms)

Technical specifications

Technical specifications of the IM 155-6 PN HS

	6ES7155-6AU00-0DN0
General information	
Product type designation	ET 200SP, IM 155-6 PN HS with server module
Firmware version	V4.0
Product function	
I&M data	Yes; I&M0 to I&M3
Engineering with	
STEP 7 TIA Portal can be configured/integrated as of version	As of STEP 7 V14
STEP 7 can be configured/integrated as of version	V5.5 SP4 or higher
PROFINET as of GSD version/GSD revision	- / V2.3
Configuration control	
Via data record	Yes
Supply voltage	
Type of supply voltage	DC
Rated value (DC)	24 V
Valid range low limit (DC)	19.2 V
Valid range high limit (DC)	28.8 V
Reverse polarity protection	Yes
Power and voltage failure backup	
Power/voltage failure backup time	5 ms
Input current	
Current consumption, max.	700 mA
Inrush current, max.	3.7 A
I^2t	0.09 A ² s
Power loss	
Power loss, typ.	2.4 W
Address area	
Address space per module	
Address space per module, max.	32 bytes; for both input and output data
Address space per station	
Address space per station, max.	968 bytes each for input data and output data

	6ES7155-6AU00-0DN0
Hardware configuration	
Racks	
Modules per rack, max.	30
Submodules	
Number of submodules per station, max.	125
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch)
1st interface	
Interface hardware	
Number of ports	2
Integrated switch	Yes
BusAdapter (PROFINET)	Yes; usable BusAdapters: BA 2x RJ45, BA 2x FC, BA 2x SCRJ, BA SCRJ / RJ45, BA SCRJ / FC, BA 2x LC, BA LC / RJ45, BA LC / FC
Protocols	
PROFINET IO device	Yes
Open IE communication	Yes
Media redundancy	Yes; as MRP or MRPD client, max. 50 or 30 devices in the ring
Interface hardware	
RJ 45 (Ethernet)	
Transmission method	PROFINET with 100 Mbps full duplex (100BASE-TX)
10 Mbps	Yes; for Ethernet services
100 Mbps	Yes; PROFINET with 100 Mbps full duplex (100BASE-TX)
Autonegotiation	Yes
Autocrossing	Yes
Protocols	
PROFINET IO device	
Services	
• S7 communication	Yes
• Isochronous mode	Yes; bus cycle time min. 125 µs
• IRT	Yes; 125 µs, 250 µs, 500 µs, 1 ms, 2 ms, 4 ms additionally with IRT with high performance: 250 µs to 4 ms in 125 µs intervals
• MRP	Yes
• MRPD	Yes
• PROFINET system redundancy	No
• PROFIenergy	Yes
• Prioritized startup	Yes
• Shared device	Yes
• Number of IO controllers with shared device, max.	4

	6ES7155-6AU00-0DN0
Open IE communication	
TCP/IP	Yes
SNMP	Yes
LLDP	Yes
Isochronous mode	
Isochronous mode (application synchronized up to terminal)	Yes
Constant bus cycle time	Yes
Shortest clock pulse	125 µs
Longest clock pulse	4 ms
Bus cycle time (TDP), min.	125 µs
Jitter, max.	0.25 µs
Interrupts/diagnostics/status information	
Status display	Yes
Interrupts	Yes
Diagnostic functions	Yes
Diagnostic indicator LED	
RUN LED	Yes; green LED
ERROR LED	Yes; red LED
MAINT LED	Yes; yellow LED
Monitoring of the supply voltage (PWR LED)	Yes; green PWR LED
Connection display LINK TX/RX	Yes; 2x green Link LED on BusAdapter
Electrical isolation	
Between backplane bus and electronics	No
between PROFINET and all other circuits	Yes
Standards, approvals, certificates	
Network loading class	3
Security level	According to Security Level 1 Test Cases V1.1.1
Ambient conditions	
Ambient temperature during operation	
Horizontal installation, min.	0 °C
Horizontal installation, max.	60 °C
Vertical installation, min.	0 °C
Vertical installation, max.	50 °C
Dimensions	
Width	50 mm
Height	117 mm
Depth	74 mm
Weights	
Weight, approx.	147 g; without BusAdapter

Technical specifications of the BusAdapter BA 2×RJ45

Table 7- 1 Technical specifications of the BusAdapter BA 2×RJ45

	6ES7193-6AR00-0AA0
Interfaces	
PROFINET IO	
Number of PROFINET interfaces	1
RJ45	Yes; 2 x
FC (FastConnect)	No
SCRJ	0
LC	0
Cable length	
• Copper cables	100 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	46 g

Technical specifications of the BusAdapter BA 2×FC

Table 7- 2 Technical specifications of the BusAdapter BA 2×FC

	6ES7193-6AF00-0AA0
Interfaces	
PROFINET IO	
Number of PROFINET interfaces	1
FC (FastConnect)	Yes; 2 x
Cable length	
• Copper cables	100 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	53 g

Technical specifications of the BusAdapter BA 2×SCRJ

Table 7- 3 Technical specifications of the BusAdapter BA 2×SCRJ

6ES7193-6AP00-0AA0	
Interfaces	
PROFINET IO	
Number of PROFINET interfaces	1; 2 ports (switch) SCRJ FO
RJ45	No
FC (FastConnect)	No
SCRJ	2
LC	0
Cable length	
• PCF	100 m
• Plastic FOC (POF)	50 m
• PCF-GI	300 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	50 g

Technical specifications of the BusAdapter BA SCRJ/RJ45

Table 7- 4 Technical specifications of the BusAdapter BA SCRJ/RJ45

	6ES7193-6AP20-0AA0
Interfaces	
PROFINET IO	
Number of PROFINET interfaces	1; 2 ports (SCRJ + RJ45)
RJ45	Yes; 1x
FC (FastConnect)	No
SCRJ	1
LC	0
Cable length	
• PCF	100 m
• Plastic FOC (POF)	50 m
• PCF-GI	300 m
• Copper cables	100 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	50 g

Technical specifications of the BusAdapter BA SCRJ/FC

Table 7- 5 Technical specifications of the BusAdapter BA SCRJ/FC

6ES7193-6AP40-0AA0	
Interfaces	
PROFINET IO	
Number of PROFINET interfaces	1; 2 ports (SCRJ + FC)
RJ45	No
FC (FastConnect)	Yes; 1x
SCRJ	1
LC	0
Cable length	
• PCF	100 m
• Plastic FOC (POF)	50 m
• PCF-GI	300 m
• Copper cables	100 m
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	50 g

Technical specifications of the BusAdapter BA 2×LC

Table 7- 6 Technical specifications of the BusAdapter BA 2×LC

	6ES7193-6AG00-0AA0
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch) LC multimode glass-fiber
PROFINET IO	
RJ45	No
FC (FastConnect)	No
SCRJ	0
LC	2
Cable length	
• Multimode gradient-index fiber 50/125 µm	3 km
• Multimode gradient-index fiber 62.5/125 µm	3 km
Ambient conditions	
Ambient temperature during operation	
Min.	0 °C
Max.	60 °C
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	40 g

Technical specifications of the BusAdapter BA LC/RJ45

Table 7- 7 Technical specifications of the BusAdapter BA LC/RJ45

	6ES7193-6AG20-0AA0
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch) LC / RJ45
PROFINET IO	
RJ45	Yes; 1x
FC (FastConnect)	No
SCRJ	0
LC	1
Cable length	
• Copper cables	100 m
• Multimode gradient-index fiber 50/125 µm	3 km
• Multimode gradient-index fiber 62.5/125 µm	3 km
Ambient conditions	
Ambient temperature during operation	
Min.	0 °C
Max.	60 °C
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	32 g

Technical specifications of the BusAdapter BA LC/FC

Table 7- 8 Technical specifications of the BusAdapter BA LC/FC

	6ES7193-6AG40-0AA0
Interfaces	
Number of PROFINET interfaces	1
PROFINET IO	
RJ45	No
FC (FastConnect)	Yes; 1x
SCRJ	0
LC	1
Cable length	
• Copper cables	100 m
• Multimode gradient-index fiber 50/125 µm	3 km
• Multimode gradient-index fiber 62.5/125 µm	3 km
Ambient conditions	
Ambient temperature during operation	
Min.	0 °C
Max.	60 °C
Dimensions	
Width	20 mm
Height	69.5 mm
Depth	59 mm
Weights	
Weight, approx.	50 g

Dimensional drawing

This appendix contains a dimension drawing of the module installed on a mounting rail. Always observe the specified dimensions for installation in cabinets, control rooms, etc.

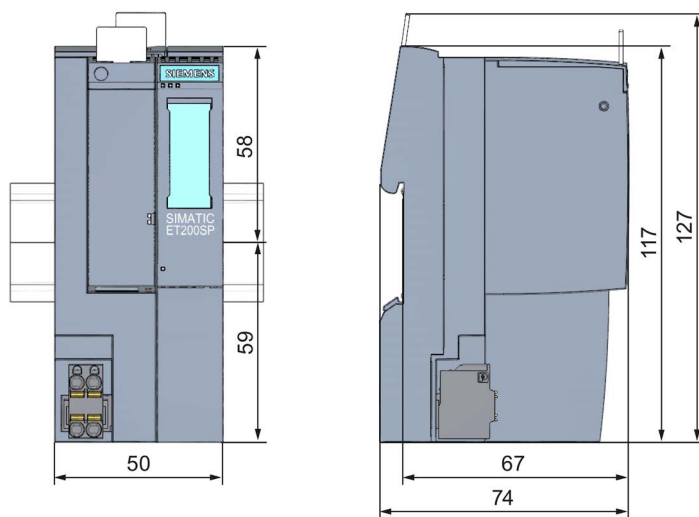


Figure A-1 Dimension drawing of the IM 155-6 PN HS interface module (front and side view)