SIEMENS

SIMATIC

ET 200SP
Interface module IM 155-6 PN BA (6ES7155-6AR01-0AN0)

Equipment 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 persons are those who, because of their training and experience, are familiar with the installation, assembly, commissioning, operation, decommissioning and disassembly of the product and can recognize risks and avoid possible hazards.

Proper use of Siemens products

Note the following:

⚠ WARNING

Siemens products may only be used for the application described in the catalog and the associated usage information. 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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Introduction

1

1.1 Introduction

Purpose of the documentation

This equipment 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 the system manual.

The information provided in this manual and in the system/function manuals supports you in commissioning the system.

Conventions

CPU: When the term "CPU" is used hereinafter, it applies to the CPUs of the S7-1500 automation system as well as to the CPUs/interface modules of the ET 200SP distributed I/O system.

STEP 7: In this documentation, "STEP 7" is used as a synonym for all versions of the configuration and programming software "STEP 7 (TIA Portal)".

Also observe notes marked as follows:

NOTE

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

Recycling and disposal

For environmentally sustainable recycling and disposal of your old equipment, contact a certified electronic waste disposal company and dispose of the equipment according to the applicable regulations in your country.

1.2 ET 200SP Documentation Guide

1.2.1 ET 200SP 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.

You can download the documentation free of charge from the Internet (https://support.industry.siemens.com/cs/ww/en/view/109742709).

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.

Examples:

- ET 200SP System Manual
- System Manual ET 200SP HA/ET 200SP modules for devices used in a hazardous area
- Online help TIA Portal

Device information



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

Examples:

- Equipment Manuals CPUs
- Equipment Manuals Interface Modules
- Equipment Manuals Digital Modules
- Equipment Manuals Analog Modules
- Equipment Manuals Motor Starter
- BaseUnits Equipment Manuals
- Equipment Manual Server Module
- Equipment Manuals Communications Modules
- Equipment Manuals Technology Modules

General information



The function manuals contain detailed descriptions on general topics relating to the SIMATIC ET 200SP distributed I/O system.

Examples:

- Function Manual ET 200AL/ET 200SP Mixed Configuration
- Function Manual Diagnostics
- Function Manual Communication
- PROFINET Function Manual
- PROFIBUS Function Manual
- Function Manual Designing Interference-free Controllers
- MultiFieldbus Function Manual

Product Information

Changes and supplements to the manuals are documented in a Product Information. The Product Information takes precedence over the device and system manuals.

You can find the latest Product Information on the ET 200SP distributed I/O system on the Internet. (https://support.industry.siemens.com/cs/de/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.
(https://support.industry.siemens.com/cs/ww/en/view/84133942)

1.2.2 SIMATIC Technical Documentation

Additional SIMATIC documents will complete your information. You can find these documents and their use at the following links and QR codes.

The Industry Online Support gives you the option to get information on all topics. Application examples support you in solving your automation tasks.

Overview of the SIMATIC Technical Documentation

Here you will find an overview of the SIMATIC documentation available in Siemens Industry Online Support:



Industry Online Support International (https://support.industry.siemens.com/cs/ww/en/view/109742705)

Watch this short video to find out where you can find the overview directly in Siemens Industry Online Support and how to use Siemens Industry Online Support on your mobile device:



Quick introduction to the technical documentation of automation products per video (https://support.industry.siemens.com/cs/us/en/view/109780491)



YouTube video: Siemens Automation Products - Technical Documentation at a Glance (https://youtu.be/TwLSxxRQQsA)

Retention of the documentation

Retain the documentation for later use.

For documentation provided in digital form:

1. Download the associated documentation after receiving your product and before initial installation/commissioning. Use the following download options:
   - Industry Online Support International: (https://support.industry.siemens.com)

     The article number is used to assign the documentation to the product. The article number is specified on the product and on the packaging label. Products with new, non-compatible functions are provided with a new article number and documentation.
   - ID link:

     Your product may have an ID link. The ID link is a QR code with a frame and a black frame corner at the bottom right. The ID link takes you to the digital nameplate of your product. Scan the QR code on the product or on the packaging label with a smartphone camera, barcode scanner, or reader app. Call up the ID link.
2. Retain this version of the documentation.

Updating the documentation

The documentation of the product is updated in digital form. In particular in the case of function extensions, the new performance features are provided in an updated version.

1. Download the current version as described above via the Industry Online Support or the ID link.
2. Also retain this version of the documentation.

mySupport

With "mySupport" you can get the most out of your Industry Online Support.

Registration	You must register once to use the full functionality of "mySupport". After registration, you can create filters, favorites and tabs in your personal workspace.
Support requests	Your data is already filled out in support requests, and you can get an overview of your current requests at any time.
Documentation	In the Documentation area you can build your personal library.
Favorites	You can use the "Add to mySupport favorites" to flag especially interesting or frequently needed content. Under "Favorites", you will find a list of your flagged entries.
Recently viewed articles	The most recently viewed pages in mySupport are available under "Recently viewed articles".
CAx data	The CAx data area gives you access to the latest product data for your CAx or CAe system. You configure your own download package with a few clicks: • 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" on the Internet. (https://support.industry.siemens.com/My/ww/en)

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 on individual products.

You can find the application examples on the Internet.
(https://support.industry.siemens.com/cs/ww/en/ps/ae)

1.2.3 Tool support

The tools described below support you in all steps: from planning, over commissioning, all the way to analysis of your system.

TIA Selection Tool

The TIA Selection Tool tool supports you in the selection, configuration, and ordering of devices for Totally Integrated Automation (TIA).

As successor of the SIMATIC Selection Tools , the TIA Selection Tool assembles the already known configurators for automation technology into a single 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.
(https://support.industry.siemens.com/cs/ww/en/view/109767888)

SINETPLAN

SINETPLAN, the Siemens Network Planner, supports you in planning automation systems and networks based on PROFINET. The tool facilitates professional and predictive dimensioning of your PROFINET installation as early as in the planning stage. In addition, SINETPLAN supports you during network optimization and helps you to exploit network resources optimally and to plan reserves. This helps to prevent problems in commissioning or failures during productive operation even in advance of a planned operation. This increases the availability of the production plant and helps improve operational safety.

The advantages at a glance

- Network optimization thanks to port-specific calculation of the network load
- Increased production availability thanks to online scan and verification of existing systems
- Transparency before commissioning through importing and simulation of existing STEP 7 projects
- Efficiency through securing existing investments in the long term and the optimal use of resources

You can find SINETPLAN on the Internet
(https://new.siemens.com/global/en/products/automation/industrial-communication/profinet/sinetplan.html).

See also

PRONETA Professional (https://support.industry.siemens.com/cs/ww/en/view/109781283)

1.3 MultiFieldbus Configuration Tool (MFCT)

MultiFieldbus Configuration Tool

MultiFieldbus Configuration Tool (MFCT) is PC-based software and supports the configuration of MultiFieldbus-Devices and DALI-modules. In addition, the MFCT offers convenient options for bulk firmware updating of ET 200 devices with MultiFieldbus-support and reading of service data for many other Siemens devices.

Functional scope of the MFCT

- MultiFieldbus configuration:
  Engineering, configuration and diagnostics of MultiFieldbus-devices, provision of the required project files (project, UDT-, CSV- and EDS-file), transfer/export of the files to device and/or data memory.
- DALI configuration:
  Device selection and online configuration of DALI modules.
- TM FAST:
  Generation and download of FPGA-UPD- and FPGA-DB-files.
- CM PtP:
  Analysis of serial communication, event logs and reading of the current configuration.
- Maintenance:
  Topology scan of a Ethernet network, reading of service data, parameter assignment and firmware update.
- Settings:
  Language switching German / English, network scanner speed, setting of the network adapter, installation of GSDML-and EDS-files.

System/installation requirements for MFCT

The MFCT runs under Microsoft Windows and does not require installation or administrator rights.

For MFCT you must also install the following software:

- Microsoft .NET Framework 4.8 (You can find an Offline Installer on the Internet. (https://support.microsoft.com/en-us/topic/microsoft-net-framework-4-8-offline-installer-for-windows-9d23f658-3b97-68ab-d013-aa3c3e7495e0))
- NPcap from directory "Misc"
- PG/PC interface from directory "Misc"
- Microsoft C++ Redistributable for x86-systems (you can find the installation data for download on the Internet. (https://aka.ms/vs/15/release/vc_redist.x86.exe))

The download of the tool and further information as well as documentation on the individual functions of the MFCT can be found on the Internet.
(https://support.industry.siemens.com/cs/ww/en/view/109773881)

Industrial cybersecurity 2

2.1 Introduction to industrial cybersecurity

Due to the digitalization and increasing networking of machines and industrial plants, the risk of cyber attacks is also growing. Appropriate protective measures are therefore mandatory, particularly in the case of critical infrastructure facilities.

You can find more general information and measures on the subject of industrial cybersecurity in the ET 200SP Distributed I/O system (https://support.industry.siemens.com/cs/ww/en/view/58649293) System Manual.

This section provides an overview of security-related information pertaining to your SIEMENS device.

2.2 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://www.siemens.com/cert.

2.3 Cybersecurity-relevant information

Observe all cybersecurity-relevant information.

Topics with cybersecurity-relevant information	Reference
Operational application environment and security assumptions	
Requirements for the operational application environment of the system and security assumptions	You can find this section in the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).
Security properties of the product	
Access protection	Note the information on access protection in the Protection chapter of the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).
Data integrity	The topic of data integrity is described in the "Industrial cybersecurity" section of the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).
Signed firmware update	The topic of signed firmware updates is described in the "Industrial cybersecurity" section of the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).
PROFINET Security Class 1 • The device supports PROFINET Security Class 1. • With the introduction of PROFINET Security Class 1, additional security settings have been integrated into the PROFINET communication.	Detailed information about PROFINET Security Class 1 and the additional security settings can be found in the PROFINET with STEP 7 Function Manual (https://support.automation.siemens.com/WW/view/en/49948856)
Supported Ethernet services	You can find information on supported services in the Technical specifications section. You can find detailed information about supported Ethernet services in the Communication Function Manual (https://support.industry.siemens.com/cs/ww/en/view/59192925).
Interfaces, ports, protocols and services	
Information on the following is security-relevant: • Communication layer and communication role • Default states • Enabling/disabling of ports and services	You can find detailed information on these topics in the Communication Function Manual (https://support.industry.siemens.com/cs/ww/en/view/59192925).
Secure operation	
Recommendations for safe operation	You can find cross-system information on the safe operation of interface modules in the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).
Corrective measures for known risks	Corrective measures for known risks are announced on the Siemens ProductCERT and Siemens CERT (https://siemens.com/productcert) web page. You can find more information on SIEMENS ProductCERT in the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).

Topics with cybersecurity-relevant information	Reference
Security checks	You can find descriptions of specific security measures, such as cyclic checks of the configuration via checksums, in the Industrial cybersecurity section of the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).
Secure decommissioning Products that contain security-relevant data must be securely decommissioned before disposal or resale.	You can find information on secure decommissioning in the System Manual (https://support.industry.siemens.com/cs/ww/en/view/58649293), Secure operation of the system section

Product overview

3

3.1 Properties

Article number

6ES7155-6AR01-0AN0 (interface module IM 155-6 PN BA and server module)

View of the module

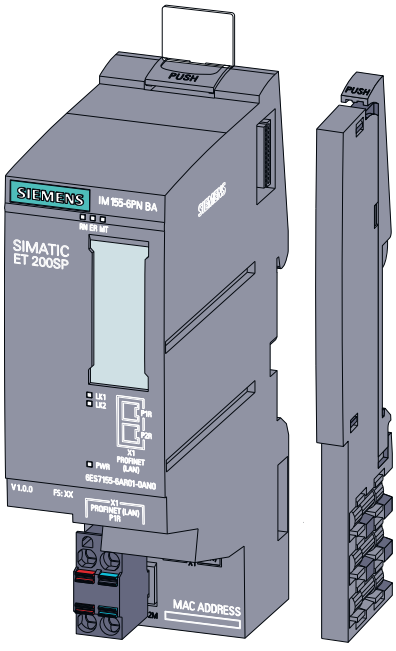


Figure 3-1 View of the IM 155-6 PN BA interface module with included accessories (24 V DC connector and server module) and optional accessories (the labeling strips and equipment labeling plate)

Properties

The module has the following technical properties:

- Connects the ET 200SP distributed I/O system with PROFINET IO
- Power supply 1 L+ 24 V DC (SELV/PELV). The connection plug is included in the scope of delivery of the interface module.

Supported topologies

- Linear bus topology
- Star topology
- Tree topology

The module supports the following functions (Page 18):

Maximum configuration

- 16 ET 200SP I/O modules
- 128 bytes I/O data

Accessories

The following accessories can be ordered separately:

- 24 V DC connector
- Labeling strips
- Equipment labeling plate
- SIMATIC system rail

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 scope of delivery of the interface module and is also available separately.

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, e.g. group diagnostics: No supply voltage L+, status bytes.
- I&M identification data
- Retentive storage of the device name for device replacement without topological configuration

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 16 I/O modules, the server module is inserted in slot 17.

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

NOTE

First BaseUnit of an ET 200SP in the configuration

When an AC I/O module or AI Energy Meter ST is plugged, the first BaseUnit in an ET 200SP station may be a dark one. Note the information on limiting the overvoltage and power rating in the AC I/O module manuals.

In order to route the 24 V DC supply voltage via a fuse, a light BaseUnit must be plugged into the slot of the first 24 V DC I/O module.

Pay attention to the type of the BaseUnits during configuration.

3.2 Functions

Introduction

The interface module supports the following PROFINET IO functions:

- Integrated switch with 2 ports
- Supported Ethernet services: ICMP, ARP, SNMP, LLDP
- Port diagnostics
- Deactivating ports
- Real-time communication
- Isochronous real-time communication
- Minimum update time 1 ms
- Media redundancy (MRP and MRPD)
- Device replacement without programming device (PG) and without topological configuration
- Reset to factory settings via PROFINET IO or RESET button (station-wide)
- Reset to factory settings via PROFINET IO (Factory Mode 8)
- Firmware update via PROFINET IO
- Performance upgrade PROFINET (DFP, FFT, fragmentation)
- Identification data I&M 0 to I&M 4
- PROFIenergy
- Configuration control (option handling)
- Value status (quality information, QI) of I/O modules
- Reading out service data
- Reference temperature distribution
- Setting the time
- Time distribution
- Diagnostic interrupts
- Hardware interrupts
- Removal/insertion of multiple I/O modules during operation (multi hot swap)
- Maintenance events

Requirements

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

Table 3-1 Version dependencies of other module functions

Function	Functional status of the module as of	Firmware version of the module as of	Configuration software		
			Configuration with GSD file (http://support.automation.siemens.com/WW/view/en/19698639/130000)/software from a third-party manufacturer [1]	STEP 7 Classic	STEP 7 (TIA Portal)
Integrated switch with 2 ports	1	V6.2.1	X	X	X
Supported Ethernet services: ICMP, ARP, SNMP, LLDP	1	V6.3.0	X	X	X
Port diagnostics	1	V6.3.0	X	X	X
Deactivating ports	1	V6.3.0	X	X	X
Real-time communication	1	V6.3.0	X	X	X
Isochronous real-time communication	1	V6.4.0	X	X	X
Minimum update time 1 ms	1	V6.3.0	X	X	X
Media redundancy (MRP)	1	V6.3.0	X	X	X
Media redundancy (MRPD)	1	V6.4.0	X	X	X
Device replacement without programming device (PG) and without topological configuration	1	V6.3.0	X	X	X
Reset to factory settings via PROFINET IO or RESET button	1	V6.2.1	X	X	X
Reset to factory settings via PROFINET IO (Factory Mode 8)	1	V6.4.0	X	X	X
Firmware update via PROFINET IO	1	V6.3.0	X	X	X
Performance upgrade PROFINET (DFP, FFT, fragmentation)	1	V6.4.0	X	X	X
Identification data I&M 0 to I&M 4	1	V6.3.0	X	X	X
PROFIenergy	1	V6.3.0	---	X	X
Configuration control (option handling)	1	V6.3.0	X	X	X
Value status (quality information, QI) of I/O modules	1	V6.3.0	X	X	X
Reading out service data	1	V6.3.0	-	X	X

[1] Systems of third-party manufacturers: Depending on the range of functions of the third-party system

Function	Functional status of the module as of	Firmware version of the module as of	Configuration software		
			Configuration with GSD file (http://support.automation.siemens.com/WW/view/en/19698639/130-000)/software from a third-party manufacturer [1]	**STEP 7 Classic**	**STEP 7 (TIA Portal)**
Reference temperature distribution	1	V6.3.0	X	X	X
Setting the time	1	V6.3.0	X	X	X
Time distribution	1	V6.3.0	X	X	X
Diagnostic interrupts	1	V6.3.0	X	X	X
Hardware interrupts	1	V6.3.0	X	X	X
Removal/insertion of multiple I/O modules during operation (multi hot swap)	1	V6.3.0	X	X	X
Maintenance events	1	V6.3.0	X	X	X
User data • MaxApplicationInputLength 128 bytes • MaxApplicationOutput-Length 128 bytes	1	V6.3.0	X	X	X

[1] Systems of third-party manufacturers: Depending on the range of functions of the third-party system

The following table shows the appropriate version of the configuration software depending on the functional status of the module.

Table 3-2 Version of the configuration software depending on the functional status of the module

Firmware version of the module	STEP 7 Classic	STEP 7 (TIA Portal)
As of V6.1	As of STEP 7 V5.5 SP4 with HSP0329 V1.0	As of V18 with HSP0415 V1.0
As of V6.2	As of STEP 7 V5.6 with HSP0329 V2.0	As of V19 with HSP0415 V1.0
As of V6.3	As of STEP 7 V5.7 SP3 HF3 with HSP0342 V1.0	As of V19 with HSP0415 V2.0
As of V6.4	As of STEP 7 V5.7 SP3 HF3 with HSP0342 V2.0	As of V20 with HSP0415 V2.0

Cabling with fixed connection setting

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

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

- As of STEP 7 V12 in the PROFINET with STEP 7 V13 (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 of an IM 155-6 PN BA

In a replacement scenario, you reset an IO device that is already in operation to the as-delivered state using "Reset to factory settings". You can find more information in the ET 200SP distributed I/O system (http://support.automation.siemens.com/WW/view/en/58649293) system manual.

GSD file

An additional GSD file based on the schema version V2.25 is available for the previous PROFINET GSD files. This is only to be used when the engineering tool used does not support GSD files of the current schema version.

3.2.1 Supported Ethernet services: ICMP, ARP, SNMP, LLDP

The module supports the following standardized Ethernet services:

- **ICMP - Internet Control Message Protocol (RFC 792)**

ICMP is a protocol used to transmit informational and error messages over the Internet protocol.

- **ARP - Address Resolution Protocol (RFC 826)**

ARP is a protocol used to determine the hardware address (MAC) of an associated Internet Protocol (IP) address.

- **SNMP - Simple Network Monitoring Protocol (RFC 1157, RFC 3410)**

SNMP is a protocol for transmitting management information across networks.

- **LLDP – Link Layer Discovery Protocol (IEEE 802.1AB)**

LLDP is a protocol for identifying neighboring devices.

3.2.2 Port diagnostics

The device supports special diagnostics alarms that signal the quality of data transfer on the medium used.

3.2.3 Disabling of ports

The device supports the deactivation of the port by parameter assignment, so that all communication on this port is prevented.

3.2.4 Real-time communication

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

3.2.5 Isochronous real-time communication

Synchronized transmission method for cyclic exchange of IRT data between PROFINET devices. A reserved bandwidth within the send clock is available for IRT data. The reserved bandwidth ensures that the IRT data is also transmitted in time-synchronized intervals, unaffected by other high network loading (e.g. TCP/IP communication or additional real time communication).

A topological configuration is required for IRT.

NOTE

IO controller as sync master with IRT communication

Operation of the IO controller as a sync master is recommended when configuring the IRT communication.

Otherwise, IRT- and RT-configured IO devices may fail if the sync master fails.

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 V12 in the PROFINET with STEP 7 V13 (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

3.2.6 Minimum update time 1 ms

The shortest update cycle of IO data for this device is 1 ms. To achieve this value, the controller used must also support this time.

3.2.7 Media redundancy (MRP and MRPD)

MRP is a function for ensuring communication and plant availability. A ring topology ensures that an alternative communication path is made available if a transmission route fails.

You can find more information in the STEP 7 online help and as of STEP 7 (TIA Portal) V12 in the PROFINET with STEP 7 (https://support.industry.siemens.com/cs/ww/en/view/49948856) function manual.

3.2.8 Device replacement without programming device (PG) and without topological configuration

Device replacement without topological configuration

The device name is stored on the server module (as of V1.1.1) as well as on the interface module. A device name stored in the server module is required for device replacement without topology configuration.

When the interface module is replaced, there is range of scenarios in which the device name is used.

Table 3-3 Scenarios for using the device name

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

Note the following constraints:

- Resetting to factory settings deletes the device name in both the interface module and the server module. To prevent the device name from being deleted in the server module, you can remove the server module from the interface module before resetting to factory settings.
- When a server module is replaced, a device name stored in the server module is applied to the interface module after a POWER ON.
- Removal/insertion of the server module under voltage is not permitted. If you pull/plug the server module while under voltage, the interface module restarts.
- If you use a server module with an invalid firmware version (< V1.1.1), channel-specific diagnostics is generated with the error number 27 (general error). To correct this error, you need to replace the server module or update the server module firmware.

Device replacement with topology configuration

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

- The device name does not need to be assigned with the programming device (PG).

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

If the IO devices were already used in another configuration, reset them to factory settings before reusing them. You can find more information in the ET 200SP distributed I/O system system manual.

You can find more information in the STEP 7 online help and as of STEP 7 (TIA Portal) V12 in the PROFINET with STEP 7 (https://support.industry.siemens.com/cs/ww/en/view/49948856) function manual.

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- Removal/insertion of the server module under voltage is not permitted. If you pull/plug the server module while under voltage, the interface module restarts.
- If you use a server module with an invalid firmware version (< V1.1.1), channel-specific diagnostics is generated with the error number 27 (general error). To correct this error, you need to replace the server module or update the server module firmware.

See also

Distributed I/O system ET 200SP
(https://support.industry.siemens.com/cs/ww/en/view/58649293)

3.2.9 Reset to factory settings via PROFINET IO

There are two modes for resetting to factory settings:

- Resetting to factory settings via PROFINET IO or the RESET button deletes the device name, IP address, service data and I&M data 1-4 both in the selected interface module and in the corresponding BusAdapter and server module.
- Resetting via PROFINET IO using Factory Mode 8 deletes the IP address, service data and I&M data 1-4 in the device and all associated modules that support resetting to factory settings.

3.2.10 Firmware update via PROFINET IO

You can find information on how to perform a firmware update in the ET 200SP Distributed I/O System system manual.

See also

Distributed I/O system ET 200SP
(https://support.industry.siemens.com/cs/ww/en/view/58649293)

3.2.11 Performance upgrade PROFINET (DFP, FFT, fragmentation)

Dynamic Frame Packing (DFP)

Dynamic Frame Packing (DFP) optimizes the PROFINET communication by combining multiple small frames into larger packets.

- Reduces network overhead and improves bandwidth utilization
- Helps reduce network load and improves real-time performance
- Particularly effective when many small data packets have to be transmitted.

Fast Forwarding Technology (FFT)

Fast Forwarding Technology (FFT) is an advanced switching technology that accelerates frame forwarding in PROFINET networks.

- Reduces latency through frame processing at hardware level.
- Enables cut-through switching instead of store-and-forward
- Particularly important for time-critical applications

Frame fragmentation

Frame fragmentation enables large data packets to be split into smaller fragments.

- Enables better coexistence of real-time and non-real-time data traffic.
- Prevents time-critical frames from being blocked by large data packets.
- Improves the overall network determinism.

Preamble shortening

Preamble shortening is a PROFINET optimization method that reduces the standard Ethernet frame preamble length to improve network performance.

3.2.12 Identification data I&M 0 to I&M 4

Identification and maintenance data (I&M data) is information saved on the module. The data is:

- Read-only (I-data) or
- Readable/writable (M-data)

Identification data (I&M0): Manufacturer information about the module that can only be read. Some identification data is also printed on the housing of the module, for example article number and serial number.
Maintenance data (I&M1, 2, 3): Plant-dependent information, e.g. installation location. Maintenance data is created during configuration and downloaded to the module.
All modules of the ET 200SP distributed I/O system support identification data (I&M0 to I&M3).

Checksums CRC (I&M4): The interface module calculates checksums based on its used data and the supplied data from the associated modules, such as parameter settings, IP address, device name, MAC address and I&M data. The interface module stores the checksums in the I&M4 data area.

The I&M identification data supports you in the following activities:

- Checking the system configuration
- Locating hardware changes in a plant
- Correcting faults in a plant
- Inspection of safe operation of a plant

Modules can be clearly identified online using the I&M identification data.

With TIA Portal, you can read out the identification data I&M (see online help of the TIA Portal).

IM4 is write-protected due to information integrity. You can find more information on the identification data I&M 0 to I&M 3 in the ET 200SP distributed I/O system system manual (https://support.industry.siemens.com/cs/ww/en/view/58649293).

3.2.13 PROFIenergy

Properties

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

Reference

You can find more information on PROFIenergy in the:

- Product manual I/O modules (http://support.automation.siemens.com/WW/view/en/55679691/133300)
- PROFINET with STEP 7 V13 (http://support.automation.siemens.com/WW/view/en/49948856) function manual.
- System manual PROFINET system description (http://support.automation.siemens.com/WW/view/en/19292127)
- PROFIenergy (http://support.automation.siemens.com/WW/view/en/66928686) product information.
- Internet (http://www.profibus.com) under Common Application Profile PROFIenergy; Technical Specification for PROFINET; Version 1.0; January 2010; Order No: 3.802.

3.2.14 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.

3.2.15 Value status (quality information, QI) of I/O modules

The IM 155-6 PN BA interface module supports I/O modules with value status. The value status provides information about the validity of the individual process values.

You can find more information on the value status in the system manual (https://support.industry.siemens.com/cs/ww/en/view/58649293) and in the I/O module manuals.

3.2.16 Reading out service data

The function makes it possible to read out diagnostic and service information from the interface module.

In the case of a pending maintenance alarm, you can read out the service data and make it available to SIEMENS support for queries and product improvement.

The service data is read out using the TCP protocol. A connection on port 102 is opened for this.

Methods of reading service data

- TIA V19
- Multi Fieldbus Configuration Tool (MFCT), V1.4.1 or higher

The tool download and more information, as well as documentation on the individual functions of the MFCT, can be found on the Internet (https://support.industry.siemens.com/cs/de/de/view/109773881/en).

3.2.17 Reference temperature distribution

Specific I/O modules require a reference temperature to compensate for temperature dependence. This device supports the function of distributing this temperature on the backplane bus. Up to 4 reference temperatures can be distributed.

3.2.18 Setting the time

The interface module supports time setting, for example, with AI Energy Meter CT HF (6ES7134-6PA01-0CU0).

We show you how to set the time in an application example (https://support.industry.siemens.com/cs/ww/en/view/109754890).

3.2.19 Time distribution

For example, if there is an AI Energy Meter CT HF (6ES7134-6PA01-0CU0), the time is automatically distributed within the ET 200SP station. You can find more information in the section Setting the time.

3.2.20 Diagnostic interrupts

A diagnostic interrupt is a display of an error state.

If a module with diagnostic capability in which the diagnostic interrupt is released detects a change in its diagnostic state, it sends a diagnostics interrupt request to the CPU.
The CPU then interrupts the processing of the user program and processes the diagnostic interrupt OB (OB 82).

You can find more information in the Interrupts and Alarms sections.

3.2.21 Hardware interrupts

According to the configuration, the I/O modules or the interface module trigger a hardware interrupt for certain events/states. When a hardware interrupt occurs, the CPU interrupts the execution of the user program and runs the assigned hardware interrupt OB. The event that triggered the interrupt is entered in the start information of the assigned hardware interrupt OB by the CPU.

3.2.22 Removal/insertion of multiple I/O modules during operation (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 interface module IM 155-6 PN BA does not support the removal and insertion of the server module and the interface module during operation.

Reference

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

3.2.23 Maintenance events

A maintenance event indicates an identified maintenance requirement that has no direct influence on the function of the module. The maintenance event indicates that a check or replacement of plant components is required.

When a module with maintenance capability detects a change in its diagnostic state, it sends a maintenance request to the CPU. The CPU then interrupts the processing of the user program and processes the diagnostic interrupt OB (OB 82).

You can find more information in the Interrupts and Alarms sections.

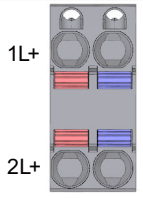
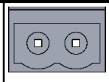
Wiring

4

4.1 Pin assignment

24 V DC supply voltage (X80)

Table 4-1 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

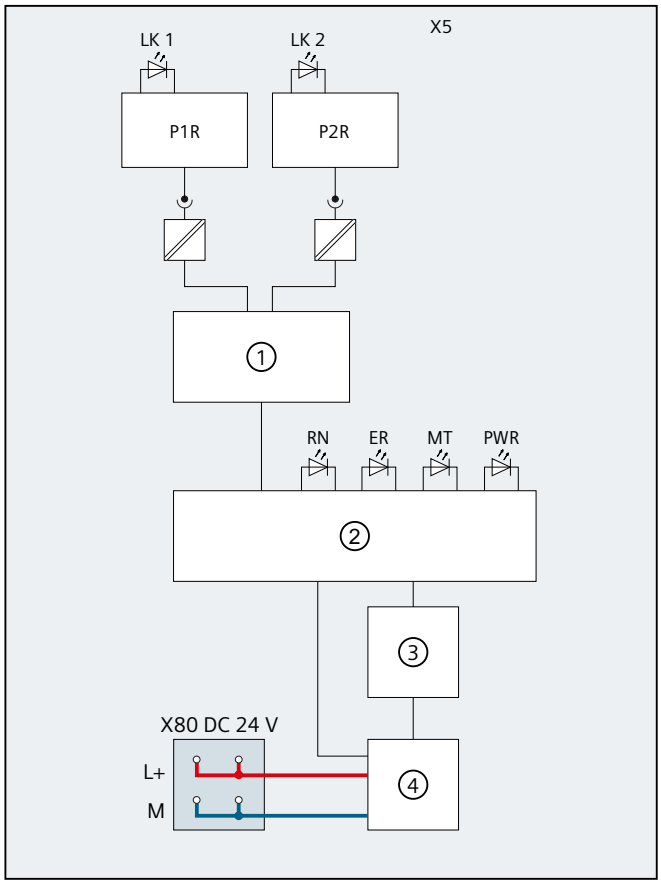
[2] Maximum 10 A permitted

Reference

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

4.2 Schematic circuit diagram

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



①	Switch	L+	24 V DC supply voltage
②	ET 200SP backplane bus interface and electronics	M	Mass
③	Backplane bus	LK 1,2	Link TX/RX LED (green)
④	Internal power supply	RN	RUN LED (green)
X80 24 V DC	Supply voltage infeed	ER	ERROR LED (red)
P1R	PROFINET interface X1 port 1	MT	MAINTENANCE LED (yellow)
P2R	PROFINET interface X1 port 2	PWR	POWER LED (green)

Figure 4-1 Schematic circuit diagram of the IM 155-6 PN BA interface module

Parameters/address space

5

5.1 Parameters

Parameters for IM 155-6 PN BA interface module

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

Table 5-1 Configurable parameters and their defaults for IM 155-6 PN BA interface module (GSD file)

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

5.2 Explanation of parameters

5.2.1 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.

5.3 Substitute value behavior

You can find more information on substitute value behavior in the system manual ET 200SP Distributed I/O System (http://support.automation.siemens.com/WW/view/en/58649293).

5.4 Status of supply voltage L+ and feedback voltage of I/O modules

Configurations

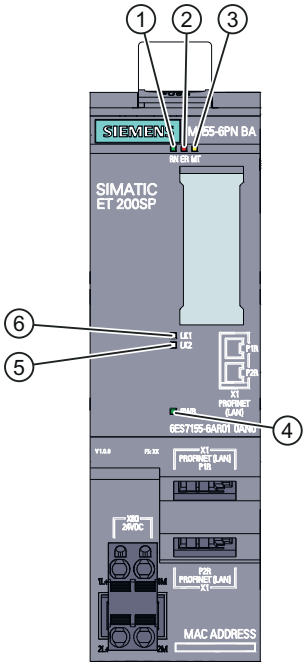
The "Status of supply voltage L+ and the feedback voltage of I/O modules" is configured on the server module. The input data can then be read out on the server module. You will find the relevant description in the Server module (http://support.automation.siemens.com/WW/view/en/63257531) equipment manual.

Interrupts, diagnostics, error, and system messages 6

6.1 Status and error displays

LED display

The figure below shows the LED display on the interface module.



① RN (green)
② ER (red)
③ MT (yellow)
④ PWR (green)
⑤ LK1 (green)
⑥ LK2 (green)

Figure 6-1 LED display on the interface module

Meaning of the LEDs

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

RN/ER/MT LEDs on the interface module

Table 6-1 Status and error displays of the RN/ER/MT LEDs

LEDs			Meaning	Solution
RN (RUN)	**ER (ERROR)**	**MT (MAINT)**		
Off	Off	Off	Missing or insufficient supply voltage on interface module.	Check the supply voltage or switch 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.	-
On	On	On	RN/ER/MT LEDs are permanently on: Hardware or firmware defective. Error information will be determined and stored retentively on the Flash memory.	Do not disconnect the interface module from the supply voltage while the LEDs are permanently lit up. This may take a few minutes.
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.	
			ET 200SP is reset to factory settings.	
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 45)
			Parameter assignment 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 required is present; that is, at least one maintenance event has occurred.	See section AUTOHOTSPOT

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

LEDs			Meaning	Solution
RN (RUN)	**ER (ERROR)**	**MT (MAINT)**		
■ On	☼ Flashes	☼ Flashes	The server module was removed or more than one server module is inserted in the station.	Re-insert the server module or check the number of inserted server modules.
☼ Flashes	☼ Flashes	☼ Flashes	The "Node flash test" is run (the LK1 and LK2 LEDs of the PROFINET interface also flash).	-
			Hardware or firmware defective (LK1 and LK2 LEDs of the PROFINET interface do not flash).	Restart the device by disconnecting and reconnecting the supply voltage. Perform a firmware update. If the error persists, contact Siemens Industry Online Support. Replace the interface module. You can read out the service data with TIA Portal as of V18 and MFCT.

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

PWR LED on the interface module

Table 6-2 PWR status display on the interface module

PWR LED	Meaning	Solution
□ Off	Missing or insufficient supply voltage on interface module.	Check the supply voltage.
■ On	Supply voltage L+ is available.	-

LK1/LK2 LED on the interface module

Table 6-3 LK1/LK2 Status display on the interface module

LEDs LK1/LK2	Meaning	Solution
□ Off	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 or whether the port is disabled.
■ On	There is an Ethernet connection between the PROFINET IO interface of your PROFINET device and a communication partner (e.g. IO controller).	-
☼ Flashes	The "Node flash test" is run (the RN/ER/MT LEDs also flash).	-

LED display of configuration errors

Configuration errors of the ET 200SP distributed I/O system are indicated on the interface module via the red ERROR LED and the yellow MAINT LED.

The following configuration errors are indicated by the LEDs:

- No server module
- Interruptions or short-circuit on the backplane bus

Operating principle

The LED error display provides information on the cause of the error. After notification by the flashing 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.
- Takes precedence over all other states indicated by the ERROR LED (ER) and MAINT LED (MT).
- remains turned on until the cause of the error has been corrected.

Table 6-4 Display of error type and error location

Sequence		Description
1	The ERROR and MAINT LEDs flash 3x at 0.5 Hz	Signaling of error type
2	MAINT LED flashes at 1 Hz	Display of error type (decimal)
3	The ERROR and MAINT LEDs flash 3x at 2 Hz	Signaling of error location/error code
4	The ERROR LED flashes at 1 Hz	Display of tens digit (decimal) of the error location/error code
5	The MAINT LED flashes at 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 6-5 Error display

Error type (MAINT)	Error location (ERROR/MAINT)	Cause of error	Solution
1	65*	• No server module • More than one server module plugged in • Interruptions on 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

6.2 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

In STEP 7 (TIA Portal), the updated system diagnostics is available for the devices of the S7-1500 automation system (IO controller S7-1500 CPU) and ET 200SP (IO device). 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.

You will find more information on system diagnostics in the Diagnostics (http://support.automation.siemens.com/WW/view/en/59192926) function manual.

6.2.1 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 processing of the user program and processes the diagnostics block OB 82. The event which led to the interrupt is entered in the start information of the OB 82.

6.2.2 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)

Do not use hardware interrupts for functional purposes (e.g. cyclic generation of hardware interrupts).

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.

6.2.3 Triggering a swapping interrupt

In the event of a pull/plug interrupt, the CPU interrupts processing of the user program and processes the pull/plug OB (OB 83). The event which led to the interrupt is entered in the start information of the 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 OB83. After inserting a module, 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.

6.2.4 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 Type 10 standard. The goal is to detect and remove potential problems as early as possible.

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

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

6.3 Alarms

Introduction

The ET 200SP distributed I/O system generates the following alarms:

- Diagnostic alarms
- Maintenance alarms

6.3.1 Diagnostics alarms

Actions after a diagnostics alarm

There can be more than one diagnostics alarm at the same time. Each diagnostics alarm initiates the following actions:

- The ER LED on the interface module flashes red.
- Diagnostics are 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.
- (S7-300/400) The diagnostic interrupt OB is called. If the diagnostic interrupt OB (OB 82) is not available, the IO controller goes into STOP mode.

You can find more information on using PROFINET IO in the STEP 7 online help.

Table 6-6 Diagnostics alarms, their meaning and possible remedies

Diagnostics alarm	Channel Error Type (CET)	Extended Channel Error Type (ECET)	Associated value AddValue	Meaning / Cause	Solution
Configuration error: Module parameter (potential group) incorrect or wrong BaseUnit/terminal block in real slot <slot>	0x0602	0x0691	Slot	The configured BaseUnit or the terminal block does not match the real configuration.	Check for suitable BaseUnit or terminal block.
Configuration error: Station stop - missing or wrong server module	0x0602	0x0693	0x00	During the startup of an ET 200SP station, no server module was plugged in or the server module was removed during operation.	Check that the server module is installed correctly in the rack.
Configuration error: Station stop - too many server modules	0x0602	0x068C	-	More than one server module is plugged into the station.	Ensure that only one server module is plugged into the station.
Configuration error: Permitted size of backplane bus exceeded	0x0602	0x0698	0x00	The total width of the installed modules exceeds the permitted configuration length of 1 000 mm.	Check that the configuration of the backplane bus does not exceed the permitted size.
Configuration error: Incorrect backplane bus configuration in slot <slot>	0x0602	0x0699	Slot	The maximum power requirement of all installed modules exceeds 2 100 mA in total. The associated value <slot> indicates the faulty slot.	Check backplane bus mounting.
Network configuration error: Shared Device conflict, invalid submodule assignment at slot <slot>	0x0603	0x06A5	Slot	There is an invalid submodule assignment.	Check the submodule assignment.

The scope of the diagnostics alarms displayed depends on the configuration and the parameter assignment.

If required, the standard can be downloaded from the Internet (http://www.profibus.com).

Reading the diagnostics

Table 6-7 Reading the diagnostics with STEP 7

Automation system with IO controller	Application	See ...
SIMATIC S7	Diagnostics as plain text in STEP 7 using Online and Diagnostics view	STEP 7 online help • as of STEP 7 V12, Function Manual PROFINET with STEP 7 as of V12 (http://support.automation.siemens.com/WW/view/en/19289930) • 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	

More information on the data records for PROFINET IO

You will find the structure of the diagnostics data records and examples for programming in the Programming Manual, From PROFIBUS DP to PROFINET IO (http://support.automation.siemens.com/WW/view/en/19289930) in the sections "Structure of diagnostic data records" and "Examples of diagnostic data records" 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 manuals for I/O modules (http://support.automation.siemens.com/WW/view/en/55679691/133300) in the section, "Interrupts, error messages, and system events".

PROFINET IO

Another source of diagnostics events is the PROFINET base used. This generates diagnostics alarms whose coding is already defined in the PROFINET IO - Application Layer Service Definition V2.2 standard.

The actual scope of diagnostics used is dependent on the configuration and parameter assignment.

If required, the standard is available for download on the Internet (http://www.profibus.com) from the PROFIBUS User Organization home page.

See also

PROFINET with STEP 7 V11 (http://support.automation.siemens.com/WW/view/en/49948856)

6.3.2 Maintenance alarms

Triggering of a maintenance event

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

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

The CPU interrupts user program execution and executes the diagnostic interrupt OB. The event that triggered the maintenance event is entered in the start information of the diagnostic interrupt OB.

NOTE

Detailed information on other maintenance alarms can be found in TIA Portal.

Maintenance required alarms

A maintenance event is generated each time maintenance required is detected. However, it has no influence on the ER LED or MT LED on the interface module.

NOTE

Maintenance alarms have no direct influence on the function of the module.

Table 6-8 Maintenance required alarms, their meaning and possible remedies

Maintenance required alarm	Channel Error Type (CET)	Extended Channel Error Type (ECET)	Associated value AddValue	Meaning / Cause	Solution
Security event: Firmware successfully downloaded and activated for use after a reset (New firmware version <FW version>)	0x0190	0x012C	Signed firmware version	The firmware has been successfully loaded into the module. This firmware update takes effect after the interface module is restarted.	-
Security event: The firmware integrity checks failed. The new firmware version <FW version> was rejected.	0x0190	0x0193	Signed firmware version	The firmware was not successfully loaded into the module. This can have many different reasons, e.g. corrupted binary files or an incorrect signature.	Verify if the firmware update file you are using comes from a secure source. Download the firmware again from the Siemens support website and repeat the firmware update.

System alarms in STEP 7 (TIA Portal)

The maintenance information is generated in STEP 7 (TIA Portal) with the following system events:

- Maintenance required - indicated for each port by a wrench with a green background in the device view or in the hardware configuration.

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

6.3.3 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 data exchange.

- 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

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.

6.3.4 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.

6.3.5 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 OB 86. This record contains all diagnostics for the slots assigned to an IO controller in an IO device.

Compatibility

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Compatibility between the versions of the IM 155-6 PN BA

The table below describes which version you can use in the configuration for which actually plugged version of the IM 155-6 PN ST BA interface module.

Interface modules plugged		Interface modules configured		
		155-6AR00-0AN0	155-6AR01-0AN0	155-6AR01-0AN0
		IM155-6 PN BA V3.2	IM155-6 PN BA V6.3	IM155-6 PN BA V6.4
155-6AR00-0AN0	IM155-6 PN BA, V3.2	X	-	-
155-6AR01-0AN0	IM155-6 PN BA, V6.3	X	X	-
155-6AR01-0AN0	IM155-6 PN BA, V6.4	X	X	X

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	Article number
DI 8x24VDC ST	6ES7131-6BF00-0BA0
DI 16x24VDC ST	6ES7131-6BH00-0BA0
DI 8x24VDC HF	6ES7131-6BF00-0CA0
DQ 4x24VC/2A ST	6ES7132-6BD20-0BA0
DQ 8x24VDC/0,5A ST	6ES7132-6BF00-0BA0
DQ 16x24VDC/0,5A ST	6ES7132-6BH00-0BA0
DQ 8x24VDC/0,5A HF	6ES7132-6BF00-0CA0

Operation and maintenance

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8.1 Resetting interface module to factory settings with MFCT

You can also reset the interface module to factory settings with MFCT.

Information on this is available in the "Resetting the MF device" section of the "MultiFieldbus (https://support.industry.siemens.com/cs/ww/en/view/109773209)" function manual.

8.2 Firmware update with MFCT

With MFCT, you can perform firmware updates for modules and interface modules.

Information on this is available in the "MultiFieldbus (https://support.industry.siemens.com/cs/ww/en/view/109773209)" function manual in the section "Firmware update with MFCT".

Technical specifications

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Technical specifications of the IM 155-6 PN BA

The following table lists the technical specifications as of the issue date. You can find a data sheet including daily updated technical specifications on the Internet (https://support.industry.siemens.com/cs/de/en/pv/6ES7155-6AR01-0AN0/td?dl=de).

Article number	6ES7155-6AR01-0AN0
General information	
Product type designation	IM 155-6 PN BA
Firmware version	V6.4.0
• FW update possible	Yes
Vendor identification (VendorID)	0x002A
Device identifier (DeviceID)	0x0313
Product function	
• I&M data	Yes; I&M0 to I&M4
• Module swapping during operation (hot swapping)	Yes; Multi-hot swapping
• Isochronous mode	Yes
• IRT	Yes
• Local coupling, IO data	Yes
– Number of coupling modules	6; 1x output + max. 5x input
Engineering with	
• STEP 7 TIA Portal configurable/integrated from version	V20
• STEP 7 configurable/integrated from version	V5.7 SP3
• PROFINET from GSD version/GSD revision	GSDML V2.45
Configuration control	
via dataset	Yes
Supply voltage	
Rated value (DC)	24 V
permissible range, lower limit (DC)	19.2 V
permissible range, upper limit (DC)	28.8 V
Reverse polarity protection	Yes
Short-circuit protection	Yes
Mains buffering	
• Mains/voltage failure stored energy time	5 ms

Article number	6ES7155-6AR01-0AN0
Input current	
Current consumption (rated value)	200 mA
Current consumption, max.	300 mA
Inrush current, max.	1 A
I^2t	0.05 $A^2 \cdot s$
Power loss	
Power loss, typ.	1.8 W
Address area	
Address space per module	
• Address space per module, max.	128 byte; For input and output data respectively
Address space per station	
• Address space per station, max.	128 byte
Hardware configuration	
Rack	
• Quantity of operable ET 200SP modules, max.	16
• Quantity of operable ET 200AL modules, max.	0
Submodules	
• Number of submodules per station, max.	256
Interfaces	
Number of PROFINET interfaces	1; 2 ports (switch)
1. Interface	
Interface types	
• RJ 45 (Ethernet)	Yes; 2 integrated RJ45 ports
• Number of ports	2; integrated RJ45 ports
• integrated switch	Yes
• BusAdapter (PROFINET)	No
Protocols	
• PROFINET IO Device	Yes
• Open IE communication	Yes
• Media redundancy	Yes; PROFINET MRP client
PROFINET IO Device	
Services	
– IRT	Yes; 1 ms to 4 ms at an interval of 125 µs
– Dynamic Frame Packing (DFP)	Yes
– Fast Forwarding	Yes
– Fragmentation	Yes
– PROFIenergy	Yes
– Prioritized startup	Yes

Article number	6ES7155-6AR01-0AN0
– Shared device	No
Interface types	
RJ 45 (Ethernet)	
• Transmission procedure	PROFINET with 100 Mbit/s full duplex (100BASE-TX)
• 100 Mbps	Yes
• Autonegotiation	Yes
• Autocrossing	Yes
Protocols	
Supports protocol for PROFINET IO	Yes
PROFIsafe	No
PROFIBUS	No
EtherNet/IP	No
Modbus TCP	No
Redundancy mode	
• PROFINET system redundancy (S2)	No
Media redundancy	
– MRP	Yes
– MRPD	Yes
Open IE communication	
• TCP/IP	Yes
• UDP	Yes
• SNMP	Yes
• LLDP	Yes
• ARP	Yes
• IGMP	Yes
• Multicast	Yes
• Broadcast	Yes
• IPv4	Yes
• IPv6	No
Interrupts/diagnostics/status information	
Status indicator	Yes
Alarms	Yes
Diagnostics function	Yes
Diagnostics indication 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

Article number	6ES7155-6AR01-0AN0
• Connection display LINK TX/RX	Yes; 2x green LED
Potential separation	
between backplane bus and electronics	No
between PROFINET and all other circuits	Yes; 1500 V AC (type test)
between supply and all other circuits	No
Permissible potential difference	
between different circuits	Safety extra low voltage SELV
Isolation	
Isolation tested with	707 V DC (type test)
Standards, approvals, certificates	
Network loading class	3
Security	
PROFINET Security Class	1
signed firmware update	Yes
Secure Boot	No
safely removing data	Yes
data integrity	Yes
Ambient conditions	
Ambient temperature during operation	
• horizontal installation, min.	-30 °C; No condensation
• horizontal installation, max.	60 °C
• vertical installation, min.	-30 °C; No condensation
• vertical installation, max.	50 °C
Altitude during operation relating to sea level	
• Installation altitude above sea level, max.	5 000 m; Restrictions for installation altitudes > 2 000 m, see manual
Connection method	
ET-Connection	
• via BU/BA Send	No
Mechanics/material	
Strain relief	No
Dimensions	
Width	35 mm
Height	117 mm
Depth	74 mm
Weights	
Weight, approx.	125 g

Dimension drawing

A

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.

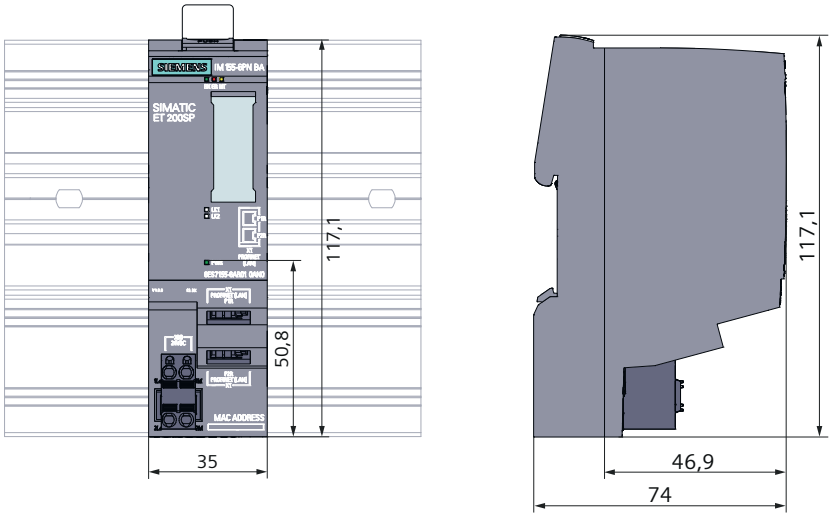


Figure A-1 Dimension drawing of the IM 155-6 PN BA interface module (front and side view)