

SIMATIC

ET 200clean Distributed I/O system

System Manual

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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.

Trademarks

All names identified by ® are registered trademarks of Siemens Aktiengesellschaft. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

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

Purpose of the documentation

This documentation provides you with important information on configuring, installing, wiring and commissioning the SIMATIC ET 200clean distributed I/O devices.

Basic knowledge required

This manual requires general knowledge of automation engineering.

This manual contains a description of the components that were valid at the time the manual was published. We reserve the right to issue a Product Information which contains up-to-date information about new components and new versions of components.

Validity of the documentation

This documentation applies to the SIMATIC ET 200clean distributed I/O devices.

Safety of the plant or the system

Safety is the responsibility of the assembler

The safety of any plant or system incorporating the equipment is the responsibility of the assembler of the plant or system.

Conventions

Also observe notes marked as follows:

NOTE

A note contains important information:

- On the product described in the documentation
 - On handling the product
 - On the part of the documentation to which special attention is drawn, as this can result in damage.
-

ID Link for the digital nameplate



Figure 1-1 ID Link example DI 16x24VDC 8xM12

The ID Link is a globally unique identifier according to IEC 61406, which you will find in the future as a QR code on your product.

The figure shows an example of an ID Link for the I/O device digital inputs DI 16x24VDC 8xM12.

You can recognize the ID Link by the frame with 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 the ID Link.

In the digital nameplate, you will find product data, manuals, declarations of conformity, certificates, and other helpful information about your product.

Additional support

- Information about Technical Support is available in section SiePortal (Page 8).
- The range of technical documentation for the individual SIMATIC products and systems can be found on the Internet (<https://support.industry.siemens.com/cs/ww/en/ps>).
- Information about the online catalog and online order system is available in section SiePortal (Page 8).

1.1 SiePortal

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

- **Catalog and ordering system**
Ordering system for automation and drive solutions on the basis of Totally Integrated Automation (TIA) and Totally Integrated Power (TIP).
- **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.
- **mySiePortal**
Your personal work area in the SiePortal for notifications, support requests, and configurable documents.

This information is provided by SiePortal on the Internet (<https://sieportal.siemens.com/>).

1.2 Guide ET 200clean

1.2.1 ET200clean information classes



The documentation for the SIMATIC ET 200clean 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/us/en/view/109742718>).

Basic information



The System Manual describes in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200clean distributed I/O system

The STEP 7 online help supports you in the configuration and programming.

Examples:

- ET 200clean System Manual
- Online help in the 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:

- I/O Device Digital Inputs Equipment Manuals
- I/O Device Digital Inputs/Outputs Equipment Manuals
- IO-Link Master I/O Device Communication Module Equipment Manual

General information



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

Examples:

- Function Manual Diagnostics
- Function Manual Communication
- PROFINET Function Manual
- Function Manual Designing Interference-free Controllers
- IO-Link System Function Manual
- MultiFieldbus Function Manual

1.2.2 Basic tools

Tools

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>

SIMATIC Automation Tool

You can use the SIMATIC Automation Tool to perform commissioning and maintenance activities on various SIMATIC S7 stations as bulk operations independent of TIA Portal.

The SIMATIC Automation Tool offers a wide range of functions:

- Scanning of a PROFINET/Ethernet system network and identification of all connected CPUs
- Assignment of addresses (IP, subnet, Gateway) and device name (PROFINET device) to a CPU
- Transfer of the date and the programming device/PC time converted to UTC time to the module
- Program download to CPU
- RUN/STOP mode switchover

- CPU localization through LED flashing
- Reading out of CPU error information
- Reading the CPU diagnostic buffer
- Reset to factory settings
- Firmware update 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

SIEMENS PRONETA (PROFINET network analysis) is a commissioning and diagnostic tool for PROFINET networks. PRONETA Basic has two core functions:

- In the network analysis, you get an overview of the PROFINET topology. Compare a real configuration with a reference installation or make simple parameter changes, e.g. to the names and IP addresses of the devices.
- The "IO test" is a simple and rapid test of the wiring and the module configuration of a plant, including documentation of the test results.

You can find SIEMENS PRONETA Basic on the Internet:

(<https://support.industry.siemens.com/cs/ww/en/view/67460624>)

SIEMENS PRONETA Professional is a licensed product that offers you additional functions. It offers you simple asset management in PROFINET networks and supports operators of automation systems in automatic data collection/acquisition of the components used through various functions:

- The user interface (API) offers an access point to the automation cell to automate the scan functions using MQTT or a command line.
- With PROFIenergy diagnostics, you can quickly detect the current pause mode or the readiness for operation of devices that support PROFIenergy and change these as needed.
- The data record wizard supports PROFINET developers in reading and writing acyclic PROFINET data records quickly and easily without PLC and engineering.

You can find SIEMENS PRONETA Professional on the Internet.

(<https://www.siemens.com/proneta-professional>)

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>).

1.2.3 S7 Port Configuration Tool (S7-PCT)

SIMATIC S7-PCT

The Port Configuration Tool (PCT) is a PC-based software for the parameter assignment of Siemens IO-Link Master modules and IO-Link devices from any manufacturer.

You integrate IO-Link-devices using the standardized device description "IODD", which you get from the respective device manufacturer. S7-PCT supports version 1.0 and V1.1 of the IODD.

S7-PCT is called via the hardware configuration of the IO-Link Master from STEP 7. When STEP 7 is not used or the IO-Link Master is not operated on a SIMATIC controller, "standalone"-operation is also possible.

You can find additional information on IO-Link on the Internet

(<https://new.siemens.com/global/en/products/automation/industrial-communication/io-link.html>).

1.2.4 MultiFieldbus Configuration Tool (MFCT)

MultiFieldbus Configuration Tool

MultiFieldbus Configuration Tool (MFCT) is a PC-based software and supports the configuration of MultiFieldbus- and DALI-devices. In addition, the MFCT offers convenient options for mass firmware updates of ET 200 devices with MultiFieldbus- support and reading 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 devices.
- TM FAST:
Generation and download of FPGA-UPD- and FPGA-DB-files.
- 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/de/en/view/109773881>)

1.2.5 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/TwLSxxRQsA>)

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>)

Safety information

2.1 Warnings in this document

You can find explanations of the warnings used in this document in the "Legal information" section.

2.2 Safety-relevant symbols for ET 200clean

The following table explains the symbols located on the I/O device with the degree of protection IP65/IP67 and IP69K, on its packaging or in the accompanying documentation.

Symbol	Meaning
	General warning sign Caution/Notice You must follow the product documentation. The product documentation contains information about the type of potential hazard and enables you to recognize risks and implement countermeasures.
	Read the information provided by the product documentation. ISO 7010 M002
	Be aware that the device is only approved for the industrial field and only for indoor use.
	Ensure the device is only installed by an electrically skilled person. IEC 60417 No. 6182
	Note that a device of Protection Class III can only be supplied with a protective low voltage according to the standard SELV/PELV. IEC 60417-DB symbol 5180 "Class III equipment"
	Note that the device must be constructed and connected in accordance with EMC regulations.
	Note that connected lines must be designed according to the expected minimum and maximum ambient temperature.

2.3 Intended use

The system is used to control machines and plants.

Intended use also includes observance of this documentation, in particular the safety instructions and conditions of use. See section Technical specifications (Page 71).

2.4 Changes to the device and spare parts

Modifications to the module may affect the safety and the function of the module:

- Do not make any changes or attachments to the module.
- Do not remove or paste over safety instructions on the module.
- Only use original spare parts and accessories.

2.5 Target group and personnel qualifications

All persons working with this module require the following knowledge:

- Contents of this document as well as contents of the enclosed documents.
- Handling the module (after instruction)
- Relevant standards and regulations
- Accident prevention regulations

The following activities are reserved for specially qualified personnel:

Working on electrical parts

Work on electrical parts may only be performed by the following persons:

- Qualified electricians
- Persons trained in electrical engineering under the direction and supervision of qualified personnel.

Commissioning and configuration

Commissioning and configuration requires general knowledge in the field of automation technology.

2.6 Working on electrical parts

Only work on electrical parts if you are a qualified specialist (see section Target group and personnel qualifications [\(Page 17\)](#)).

- Always observe the country-specific safety rules.
- Notify all those who will be affected by the procedure.
- Follow the 5 safety rules according to DIN EN 50110-1 (VDE 0105-1):

1. Disconnect
2. Secure to prevent reconnection
3. Verify safe isolation from the supply (all poles)
4. Ground and short-circuit
5. Erect barriers around or cover adjacent live parts

After completing work:

- Restore operational readiness in reverse order.

2.7 Residual risks

2.7.1 Residual risks

Despite all the technical and procedural risk reductions that have been carried out, not all dangers can be avoided. The following sections describe these residual risks and measures to avoid them.

2.7.2 Live parts

Operation

- Do not open the module.
- Do not use damaged modules.
- Pull the plug and not the cable.

Installation and connection

- Only work on electrical parts if you are a qualified specialist (see section Target group and personnel qualifications [\(Page 17\)](#)).
- Adhere to the protective measures for safe working on electrical parts (see section Working on electrical parts [\(Page 18\)](#)).
- Fuse the connection cables according to the current-carrying capacity of the cable used, taking into account the applicable standards.
- Ground the module according to regulations.
- For the 24 V DC supply (SELV/PELV), only use power supply units that provide safe electrical extra-low voltage in accordance with IEC 61131-2 or IEC 61010-2-201.

Maintenance

- Only work on electrical parts if you are a qualified specialist (see section Target group and personnel qualifications [\(Page 17\)](#)).
- Adhere to the protective measures for safe working on electrical parts (see section Working on electrical parts [\(Page 18\)](#)).

2.7.3 Conductive pollution

Malfunctions may occur if electrical energy is transmitted via conductive soiling.
Seal unused connections with a suitable and approved sealing cap.

2.7.4 Overheating

Smoke development and fire due to overheating of module and cables may result in burns and life-threatening injuries (death).

To avoid overheating:

- Ensure sufficient air supply (e.g. observe mounting clearances).
- Only use undamaged cables.
- Only use correctly dimensioned cables.
- Ensure that the cable protection is dimensioned correctly.

Installation and connection

- Follow the instructions for the mounting position.
- Adhere to the specified ventilation clearances.
- Fuse the connecting cables according to the cable cross-section.
- Ensure for the connection that the overvoltage protection is sufficient.

Maintenance

- Check plug-in connections and cables regularly for damage.

2.7.5 Unsafe operating states

Unsafe operating states may result in personal injury of unknown extent.
The following factors can be triggers:

- Manipulation of the software, e.g. viruses, trojans or worms.

Manipulation of the software, e.g. viruses, trojans or worms.

- Adhere to the protective measures against tampering with the software (see section Industrial cybersecurity (Page 82)).
- Perform available updates in a timely manner.
- Protect files stored on removable media from malware with appropriate protective measures, e.g. virus scanner.
- Set up access protection for the CPU.

2.8 Behavior in case of emergency

The safety of any plant or system incorporating the equipment is the responsibility of the assembler of the plant or system. If an emergency occurs in the plant or the system, follow the instructions of the assembler and operator.

When the safe operating state has been restored, the person responsible for the plant ensures that the system starts up in a controlled manner.

2.9 Material damage

2.9.1 Transport and storage

- Only pack, store, transport and ship electronic components, modules or devices in the original product packaging or in other suitable materials.
- Observe the limits during transport and storage. See section Transport and storage conditions [\(Page 78\)](#).

2.9.2 Installation and connection

Ensure for the connection that the overvoltage protection is sufficient.

Installation/disassembly with voltage switched on

- Install the ET 200clean distributed I/O devices only with disconnected supply and load voltages.
Refer to section Mounting [\(Page 28\)](#)
- If you connect or disconnect the I/O devices with the power connected, this can lead to undefined states in your system.
As a result, material damage may occur at the distributed I/O device ET 200clean.
Only remove or replace the I/O device when the voltage is switched off. Always comply with the required standards and safety guidelines when configuring a system.
Refer to section Maintenance [\(Page 64\)](#)

New features/functions

3.1 Changes compared to previous version

What's new in Edition 08/2025 of the ET 200clean system manual compared with Edition 02/2025?

What's new?		What are the customer benefits?	Where can I find information?
New contents	Markings and approvals	Addition of further markings and approvals for the I/O devices	Section Codes and approvals (Page 71)
	Shipbuilding certificates	Addition of required shipbuilding certificates.	Section Certificates (Page 73)
	Importer addresses	You can find the importer addresses for specific countries here.	Section Standards and requirements (Page 74)
	Accessories/spare parts overview FAQ	The FAQ gives you an overview of the accessories and spare parts for the ET 200clean.	Section Accessories/spare parts overview FAQ (Page 104)
	SIMATIC ET 200clean data	This section provides an overview of the data that is generated by the SIMATIC ET 200clean automation system and accessible to you.	Section SIMATIC ET 200clean data (Page 108)
Changed contents	Technical specifications	Various specifications have been adapted in the "Technical specifications" section	Section Technical specifications (Page 71)
	Industrial cybersecurity	The contents relating to measures and protection of your plants and systems against cyber attacks have been modified.	Section Industrial cybersecurity (Page 82)

System overview

4.1 Distributed I/O devices SIMATIC ET 200clean

SIMATIC ET 200clean

The SIMATIC ET 200clean distributed I/O devices are part of a scalable and highly flexible, distributed I/O system for connecting the process signals to a higher-level controller via MultiFieldbus.

Customer benefits of the system

Use in hygienically sensitive environment

- Hygienic design according to the EHEDG guidelines allows for simple hygienic 360° cleaning
- IP65 / IP67 / IP69K degrees of protection ensure tightness during operation and cleaning processes
- Chemically resistant enclosure material enables cleaning with selected industrial disinfectants and cleaning agents
- Hygienic accessories

Reduced commissioning and maintenance effort

- Optical display of the current states enables the quick localization of possible error causes
- Early reaction by means of diagnostics and hardware interrupts
- Simple wiring through coded M12 connections

Communication standards

- MultiFieldbus enables flexible use with the various fieldbuses and Ethernet controllers on:
 - PROFINET IO
 - EtherNet/IP
 - Modbus TCP
- Use of the advantages of IO-Link

Flexible automation concepts

- High power infeed through power connector M12-L
- Configurable channels
- Access of multiple controllers with shared device and module-internal shared input / shared output (MSI/MSO)
- Deterministic connection of sensors by means of isochronous mode
- Use in high availability applications by means of S2 redundancy
- Realization of simple safety function by means of the standard outputs by means of SIL2 / Performance Level d

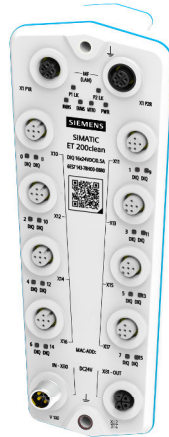


Figure 4-1 ET 200clean benefits

Area of application

The areas of application of the ET 200clean I/O devices result from their special properties.

- Easy to clean device shape
- Hygienic design
- Resistance against variety of industrial cleaning agents and disinfectants
- Degrees of protection IP65/IP67 and IP69K
- Compact structure for use in cabinet-free areas
- Easy handling for fast commissioning and for maintenance

Thanks to these special properties, ET 200clean I/O devices are particularly suitable for use in hygienic and wet areas. You can find these areas in the following industries, for example:

- Food industry
- Beverage industry
- Pharmaceutical industry
- Cosmetics industry

Protocol support for PROFINET, EtherNet/IP and Modbus TCP makes the I/O devices suitable for operation on different Ethernet controllers. Safety-related applications can be easily implemented by safely switching off actuators via standard outputs. Use in systems with high-availability and fail-safe processes is supported by S2 redundancy.

Configuration

The SIMATIC ET 200clean distributed I/O system consists of the following I/O devices:

- I/O device digital inputs
- Digital inputs/outputs of the I/O device
- I/O device IO-Link Master

The I/O devices of ET 200clean are connected to up to two IO controllers via MultiFieldbus.

Configuration example

The figure below shows an example configuration with the ET 200clean distributed I/O devices in a PROFINET IO network.

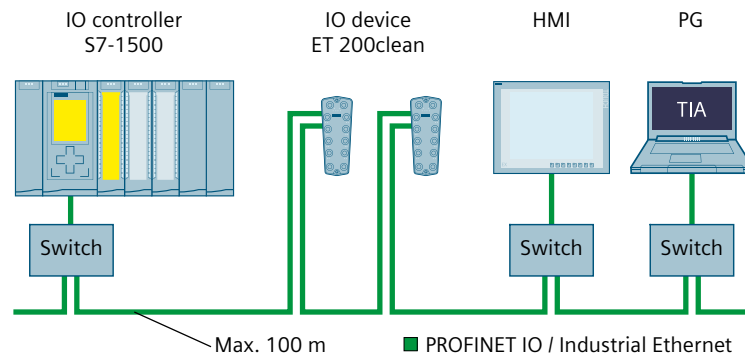


Figure 4-2 Configuration example of the ET 200clean

4.2 Components

Components of the ET 200clean distributed I/O system

The following table shows and explains the function of the most important components of the ET 200clean distributed I/O system.

Table 4-1 Overview of components

Component	Function	Figure
I/O device	- The I/O device exchanges data with the IO controller via MultiFieldbus - The I/O device provides the interface to the process - Recording and controlling the current process status via the connected sensors and actuators	

Component	Function	Figure
		

Mounting

5.1 Basics

Introduction

All ET 200clean distributed I/O devices are designed for IP65/IP67 and IP69K degrees of protection. This means that you can directly mount these I/O devices in your plant.

Mounting position

You can mount the ET 200clean distributed I/O devices in any mounting position.

Minimum clearances

The minimum clearance around the I/O device is 2 cm.

Simple installation

The ET 200clean distributed I/O devices are designed for easy installation. You can, for example, pre-wire the I/O device.

Mounting rules

Follow these rules during installation:

- Install the ET 200clean distributed I/O devices only with disconnected supply and load voltages.
- Install the ET 200clean distributed I/O devices only on a surface with these properties:
 - Level
 - Fixed
 - Conductive

5.2 Installation

Introduction

The ET 200clean distributed I/O devices are designed for installation on a level, firm surface. The hygienic seals at the support points of the I/O devices provide a hygienic seal to the flat surface.

Installation for hygienic requirements

If there are hygienic requirements, only use screws and accessories that meet these hygienic requirements.

Accessories

You can find suitable parts in the section "Accessories/spare parts (Page 104)". The accessories for hygienic requirements are listed separately in this section.

Required tools

For the installation, you require the suitable tool for the screws used.

Required screws

For mounting, use screws with a diameter of 5 mm and a length of at least 50 mm.

You can find M5x50 screws with hygienic sealing in the section "Accessories/spare parts (hygienic) (Page 104)".

Drill holes of the I/O device

All enclosures of the ET 200clean distributed I/O devices have a uniform hole pattern.

Installing the I/O device

The I/O devices have an attachment point on top and on the bottom.

To install the I/O device, follow these steps:

1. Drill two fixing holes at a distance of 186 mm.
The drilling hole diameter depends on your chosen installation.
2. Attach the I/O device at both attachments points on the level surface with the screws.
The tightening torque is 3 Nm

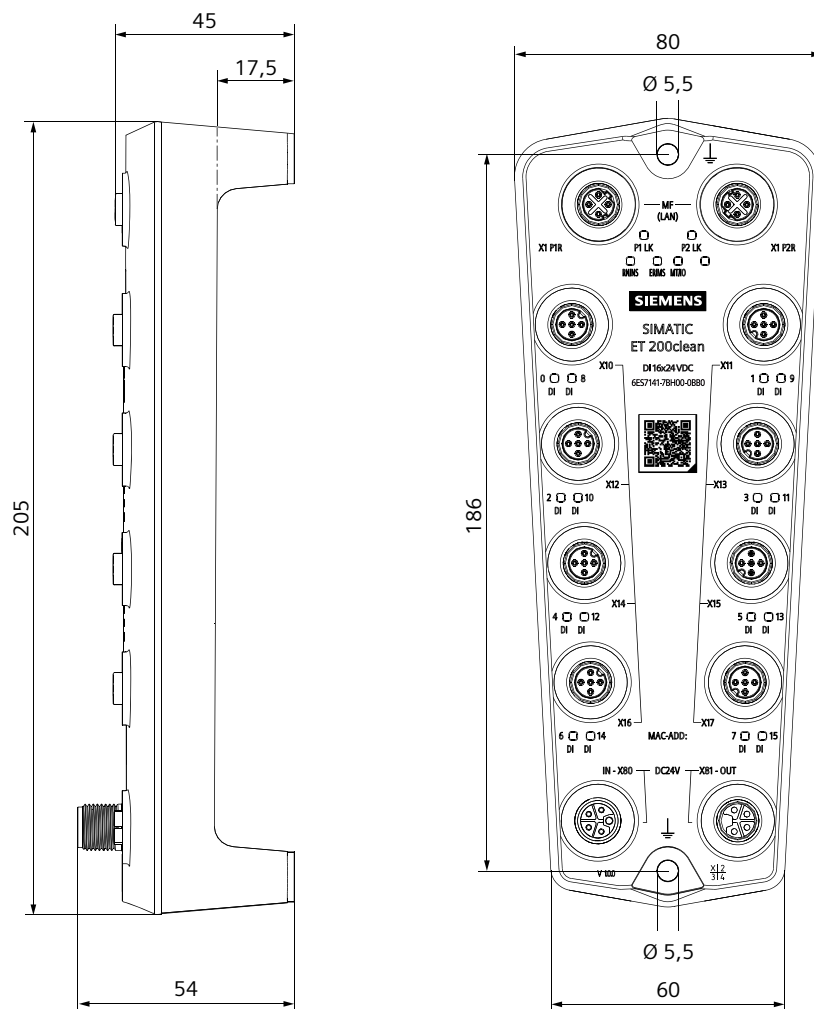


Figure 5-1 Mounting dimensions of the I/O device

Connecting

6.1 Rules and regulations for operation

Introduction

The ET 200clean distributed I/O devices are part of plants and systems. Depending on the area of application, follow the special rules and regulations.

This section provides an overview of the most important rules to be followed for integrating the ET 200clean distributed I/O devices into a plant or a system.

Specific application

Follow the safety and accident prevention regulations applicable to specific applications, e.g. the Machinery Directive.

EMERGENCY-STOP device

Emergency off devices according to IEC 60204-1 (corresponds to DIN VDE 0113-1) must remain effective in all operating modes of the plant or system.

Excluding hazardous system conditions

Hazardous plant states must not occur.

Ensure that hazardous plant states are not possible, even in the following situations:

- In the event of a voltage dip / power outage
- When the plant restarts after a voltage dip or power outage.
- When the ET 200clean distributed I/O system restarts after interruption of MultiFieldbus communication

If necessary, force the EMERGENCY STOP.

An uncontrolled or undefined startup is not permitted after the "EMERGENCY STOP" is unlocked.

Cables and wires

The cables and lines used including plug must fulfill the following requirements:

- Designed for at least the supply voltage used.
- Selected cross-section suitable for the application and fusing.
- Designed for a continuous ambient temperature of min. 20K (at 9 A) to 40K (at 12 A) above the ambient temperature of the ET 200clean. Please refer to the "Deratings of the input currents while maintaining the minimum clearance (Page 41)" table and the information enclosed with the cables.

External fuses/switches

External fuses and switches must be installed so that they meet the standards for cable and device protection applicable to your application.

Line voltage

The points to note for line voltage are set out below:

- For stationary plants or systems without an all-pole line disconnecter, there must be a disconnecter unit (all-pole) fitted in the building installation.
- For load current supplies, the configured rated voltage range must correspond to the local line voltage.
- For all power circuits of the ET 200clean distributed I/O system, the fluctuation/deviation of the line voltage from the rated value must lie within the permitted tolerance.

You can find more information in section Details on insulation, protection class, degree of protection and rated voltage (Page 80).

24 V supply

The points to note for 24 V power supply are set out below:

- For buildings:
If there is a danger due to overvoltages, you must take lightning protection measures for external lightning protection (e.g. lightning protection elements).
- For 24 V DC supply lines and signal lines:
In the event of danger through overvoltage, you must provide lightning protection measures for internal lightning protection (e.g. lightning protection elements). Additional information can be found in the function manual Designing interference-free controllers (<https://support.industry.siemens.com/cs/ww/en/view/59193566>).

- For 24 V DC supply:
Ensure that there is a safe electrical separation of extra-low voltage (SELV/PELV) according to IEC 61010-2-201 or IEC 62368-1.
Secure all feeding supply voltages with a UL/IEC approved fuse. This fuse must match the cable cross-section and must not exceed 24 V DC / 12 A.

NOTE**Wet environment**

Other SELV/PELV values apply when using the I/O device in wet environments.

The specifications for a correct connection of the I/O devices are listed in this system manual and the equipment manuals. If you do not adhere to the specifications, the I/O device or connected I/O may malfunction, fail or be destroyed.

Protection against outside electrical influences

Below is a description of what you must pay attention to in terms of protection against electrical impacts and/or faults:

- To protect against electromagnetic faults, connect the I/O devices to functional earth.
- Ensure correct installation and wiring of the supply, signal lines and bus lines.
- Configure the plant/system in such a way that an error does not result in undefined states.
 - Line/wire break
 - Cross-circuit in the line

Reference

Additional information can be found in the function manual Designing interference-free controllers (<https://support.industry.siemens.com/cs/ww/en/view/59193566>).

6.2 Operation on grounded/non-grounded infeed

Introduction

Information is provided below on the overall configuration of an ET 200clean distributed I/O system on a grounded incoming supply (TN-S network). The specific subjects discussed are:

- Disconnecting devices, short-circuit and overload protection to IEC 60364 (corresponding to DIN VDE 0100) and IEC 60204 (corresponding to DIN VDE 0113)
- Load current supplies and load circuits
- Supply voltages of the ET 200clean distributed I/O system

Grounded infeed

In grounded incoming supplies, the neutral conductor of the supply system is grounded. A ground fault between a live conductor and ground or a grounded plant unit causes the protective devices to trip.

Supply voltages

Provide the ET 200clean distributed I/O devices with a SELV/PELV supply voltage for 1L+. The supplied SELV/PELV load voltage for 2L+ can be switched, depending on the application.

- 1L+: Supply voltage (non-switched)
- 2L+: Load voltage (switched)

Safe electrical isolation (SELV/PELV)

Power packs/power supply modules with safe electrical isolation SELV/PELV are necessary for operating the ET 200clean distributed I/O devices. These power supplies/power supply modules must comply with IEC 61010-2-201 or IEC 60950-1.

The wiring of SELV/PELV circuits must be separated from the wiring of non-SELV/PELV circuits. The insulation of all conductors must be dimensioned for the higher voltage.

NOTICE
Operation in damp / wet environment
When operating in a damp / wet environment, voltage limits apply for SELV/PELV and are according to IEC 61010-2-201.

Configuring ET 200clean with grounded reference potential (PELV)

When configuring the ET 200clean distributed I/O devices with grounded reference potential, occurring interference currents are discharged into functional ground. The connections must be externally connected. Establish a connection between 1M or 2M and functional earth.

Configuring ET 200clean with non-grounded reference potential (SELV)

When configuring the ET 200clean distributed I/O devices with grounded reference potential, occurring interference currents are discharged into functional earth via an internal RC network. You do not need external connection between 1M, 2M and functional earth.

Components and protective measures

Various components and protective measures are stipulated for setting up a complete plant. The types of components and the degree to which the protective measures are mandatory depend on the IEC regulation that applies to your plant setup.

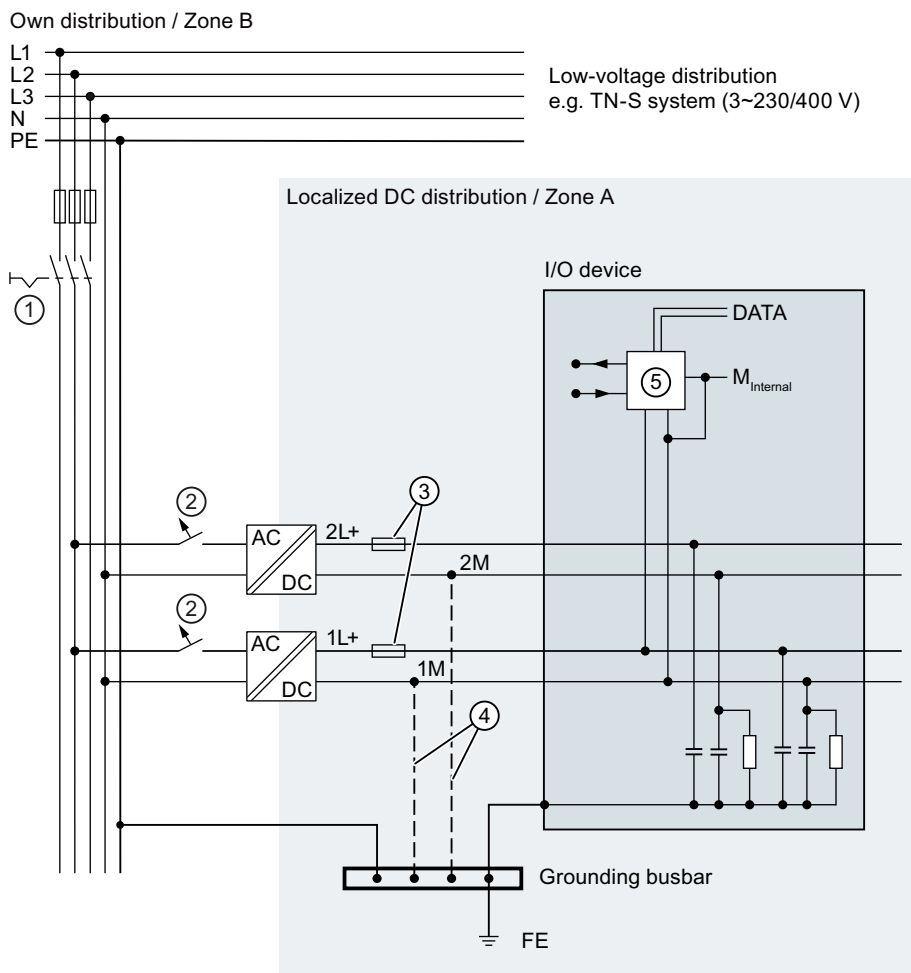
The following table shows the components of the electrical configuration with reference to the "Electrical configuration" figure below and compares the IEC regulations.

Table 6-1 Components of electrical configuration

	Reference to illustration	IEC 60364 DIN VDE 0100	IEC 60204 DIN VDE 0113
Disconnection element for controller, sensors, and actuators	①	IEC 60364-4-41 VDE 0100 Part 460: Main switch	IEC 60204-1 VDE 0113 Part 1: Disconnecter unit according to VDE 0113-1
Short-circuit / overload protection	②	IEC 60364-5-55 VDE 0100 Part 557: • Grounded secondary circuit: Secure single pole • Non-grounded secondary circuit: Secure all poles Execution according to the line "Cable protection ③"	IEC 60204-1 VDE 0113 Part 1: • Grounded secondary circuit: Secure single pole • Another grounded secondary circuit: Secure all poles
Cable protection	③	IEC 60364-4-41 VDE 0100 Part 460: Protection of cables and wires against overcurrent Protect all incoming supply cables with a circuit breaker.	IEC 60204-1 VDE 0113 Part 1: Overcurrent protection

Overall configuration of ET 200clean

The following figure shows an ET 200clean distributed I/O device with electrical overall configuration.



- ① Main switch
- ② Short-circuit and overvoltage protection
- ③ Fuses for cable protection
- ④ When configuring the ET 200clean distributed I/O devices with non-grounded reference potential, no connection is made between 1M, 2M and functional earth.
- ⑤ Circuit logic

Figure 6-1 Electrical configuration

NOTE

If you connect ET 200clean distributed I/O devices via upstream local power supplies to own distribution (or batteries), then you do not have to provide any additional protective measures against overvoltages.

Insulation monitoring

In the following situations, you must provide insulation monitoring:

- When setting up the ET 200clean distributed I/O devices with non-grounded reference potential
- If dangerous system states occur due to error

6.3 Electrical configuration of the ET 200clean

Electrical isolation

The electrical configuration of the ET 200clean features electrical isolation between:

- 1L+: Non-switched supply voltage (electronics/sensor/load supply):
Electrically isolated from all other circuit components
- 2L+: Switched supply voltage (load current supply):
Electrical isolation from all other circuit components.
Can be switched off without affecting the 1L+
- MultiFieldbus interface:
Electrical isolation from all other circuit components.

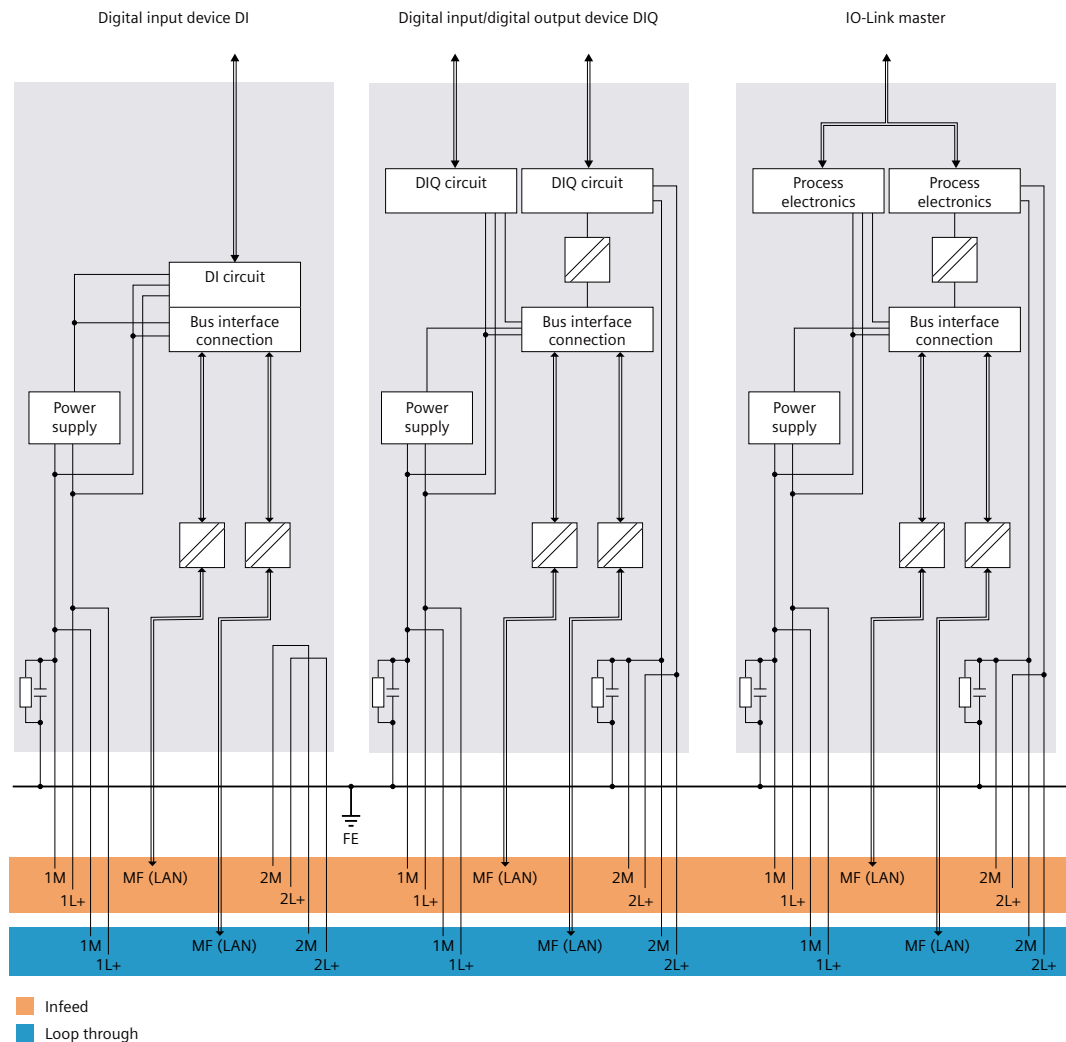


Figure 6-2 Electrical relationships

Connection of a digital output with a digital input

NOTICE

Pay attention to the potential groups

When a digital output is connected to a digital input, pay attention to the potential groups. Depending on the configuration, 1M and 2M can then be connected, resulting in elimination of the electrical isolation between 1L+ and 2L+. The possible compensating currents can destroy the digital module.



WARNING

Note potential groups for safety-related shutdown

When a digital output is connected to a digital input, pay attention to the potential groups. Depending on the configuration, 1M and 2M can then be connected, which leads to elimination of the electrical isolation between 1L+ and 2L+. The safety-related shutdown is not permitted if the electrical isolation is eliminated.

Cable protection

According to DIN VDE 0100, cable protection is required. Therefore, you must always protect the supply lines externally.

Protect the 24 V DC supply lines against short-circuits and overloads.

Select a protective device that meets the following criteria:

- 24 V DC supply voltage
- Suitable for cable cross-section and type of installation
- Suitable for other conditions, such as temperature

Power supply of the configuration

Two voltage groups are available for the ET 200clean distributed I/O devices.

- 1L+ (supply voltage / non-switched)
- 2L+ (load voltage / switched)

A renewed voltage supply of 1L+ and 2L+ may be necessary.

- To configure different potential groups
- Because of the voltage drop in long lines or several I/O devices

Create a supply/consumption balance for the selection of the infeed point of the supply voltages.

NOTE

Switching 1L+ and 2L+ on and off

In contrast to the load voltage 2L+, operational switching off and on of the supply voltage 1L+ results in a restart of the I/O devices.

Reference

You will find more information on electrical configuration and the voltage drop in the section Connecting cables for ET 200clean [\(Page 41\)](#).

6.4 Connecting ET 200clean to functional grounding

Introduction

You must connect the ET 200clean distributed I/O devices to the functional ground.

What is functional ground?

All ET 200clean I/O devices have 2 connections for the functional ground. These connections are used to suppress interference sensitivity, but not for protection purposes. With the functional ground connection, you establish an electrical connection to a point of your system or a shield. Electromagnetic interferences are discharged directly to ground via this connection. By discharging the EMC interference, the interference immunity of the entire I/O device is increased.

The figure below shows the symbol with which the functional ground connection is identified on the ET 200clean I/O devices.



Figure 6-3 Functional ground

Connection through conductive surface

The contact surfaces to the 2 attachment points of the ET 200clean establish the connection to the functional ground. Therefore, follow these instructions:

- Installation according to the specifications in the Mounting [\(Page 28\)](#) section
- Use both fastening screws
- Ensure that there is a low-impedance connection between the I/O device and the conductive surface.

6.5 Connecting cables for ET 200clean

Impact of cable length on the supply voltage

When you wire your configuration, you must take into account the impact of the cable length on the supply voltage of the ET 200clean distributed I/O system.

CAUTION

Pay attention to maximum incoming currents

For each power supply (1L+, 2L+), you can feed in a maximum of 12 A.

If you exceed the maximum incoming currents and do not comply with the required cable cross sections, an increased incoming current could lead to overheating of the cable insulation and the contacts. This could result in damage to the I/O devices.

To estimate the voltage drop in your ET 200clean distributed I/O system, you must add the voltage drops of the different cables. For every I/O device used, you must factor in an additional voltage drop of around 0.1 V.

Example

When using a 10m cable with Ø 1.5 mm², the voltage will drop by 2.5 V at a load of 10 A; this is equivalent to 0.25 V at a load of 1 A.

Derating of the input currents

The table below shows the maximum permissible input current of the distributed I/O systems depending on the ambient temperature.

Table 6-2 Deratings of the input currents while maintaining the minimum clearance

Ambient temperature	Max. input current 1L+	Max. input current 2L+
40 °C	12 A	12 A
50 °C	10 A	10 A
55 °C	9 A	9 A

6.6 Wiring

Wiring

Connect all cables to the front side of the I/O device:

- Supply voltage to the 4-pin M12-L coded round connectors and round sockets
- Signal lines to the 5-pin M12-A coded round sockets
- PROFINET I/O / MultiFieldbus lines on the 4-pin M12-D coded round sockets

Requirement

Wire the I/O devices with the supply voltage off.

NOTE

Selecting accessories according to the hygienic requirements

In case of hygienic requirements, only use accessories that fulfill these requirements.

Required tools

If you are not using pre-assembled cables, you need the following tools:

- Stripping tool
- Screwdriver to wire the connection plugs

Accessories required when connecting the supply voltage

You need the following accessories:

- Pre-assembled power cable 4-pin M12-L coded
or
- Flexible 4-wire copper cable (wire cross section: 1.5 to 2.5 mm²) and a connection plug 4-pin M12-L coded.

Accessories required for the connection of MultiFieldbus

You need the following accessories:

- Pre-assembled PROFINET M12 connecting cables with D-coded round connectors
or
- PROFINET cable and PROFINET M12 connector D-coded

Connecting the supply voltage, MultiFieldbus and sensor cable/actuator cable

To connect M12 connectors, proceed as follows:

1. Insert the plug into the respective round socket on the I/O device.
Ensure the correct alignment of the coding between plug and socket.
2. Tighten the knurled screw of the connector with a torque of 1 Nm.

The following figure shows the connection of several I/O devices to the supply voltage and the MultiFieldbus as an example.

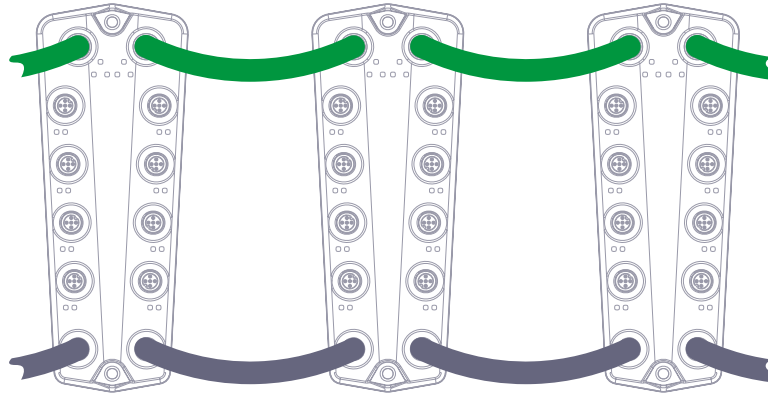


Figure 6-4 Connecting the supply voltage and MultiFieldbus

The following figure shows the connection of the sensor / actuator M12 connectors.

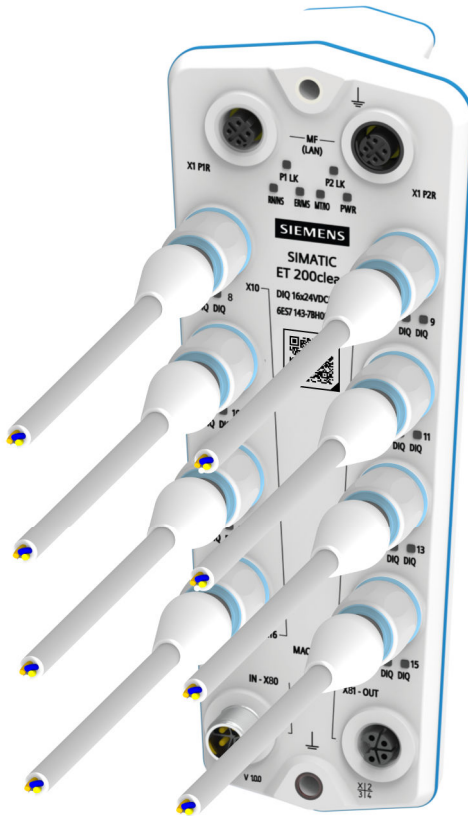


Figure 6-5 Connect sensor/actuator cable

Pin assignment of the sockets

The pin assignment of the sockets can be found in the manuals of the I/O device in the section on pin assignment.

Y-connection (not hygienic)

The Y-connection allows you to connect two actuators or sensors to the inputs or outputs of the I/O devices for non-hygienic applications.

The use of a Y-cable or the Y-connector is particularly recommended when two channels are occupied for each socket of an I/O device. The Y-cable or the Y-connector distributes the two channels to two circular connectors.

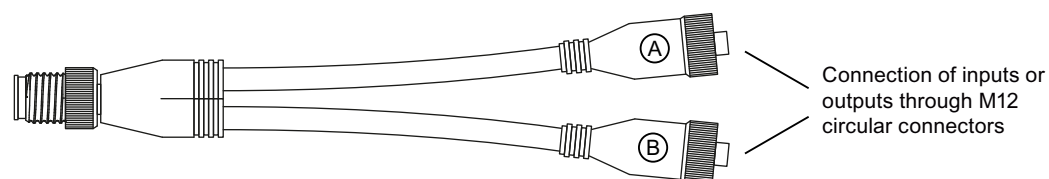


Figure 6-6 Y cable

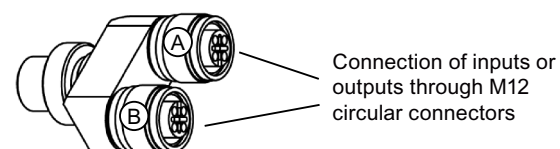


Figure 6-7 Y-connector

The figure below shows the wiring of the Y-connection.

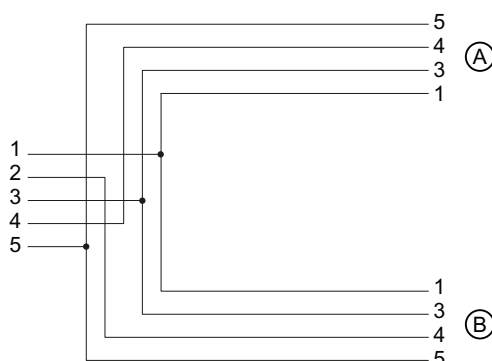


Figure 6-8 Wiring of the Y-connection

Sealing of unused sockets

To ensure IP65/IP67 and IP69K degrees of protection, seal off all unused sockets with approved sealing caps.

In the case of hygienic requirements, use sealing caps that are approved for this.

You can find sealing caps with hygienic seal in the section "Accessories/spare parts (hygienic) (Page 104)".

NOTE

Protective mounting sleeve for sealing cap

Use the enclosed protective mounting sleeve for mounting and disassembly. With the protective mounting sleeve you avoid scratches and damage to the sealing cap.

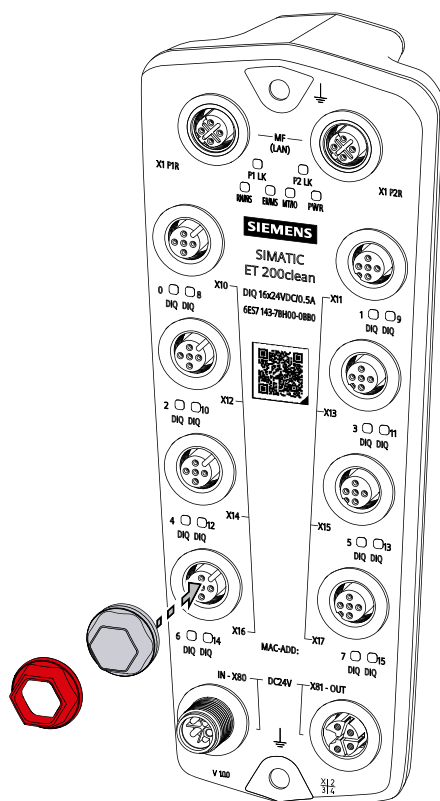


Figure 6-9 Mounting sealing cap

Mounting the sealing cap

1. Screw the sealing cap onto the unused socket.
2. Place the protective mounting sleeve on the sealing cap.
3. The width across flats for the installation protection sleeve is 17 mm.
Tighten the sealing cap with a torque of 1 Nm.

Article numbers for accessories/spare parts

You will find the designations and article numbers in the "Accessories/spare parts [\(Page 104\)](#)" section.

6.7 Factory markings

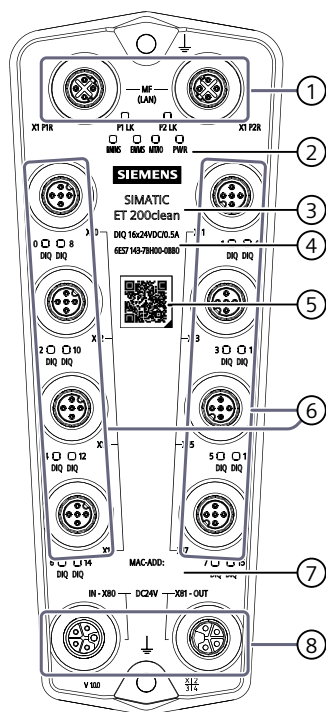
Introduction

For better orientation, the ET 200clean distributed I/O system is identified using various markings which will help you when configuring and connecting the I/O devices.

Marking of the interfaces

The interfaces of the I/O devices are factory-labeled. For hygienic reasons, additional marking of the interfaces is not foreseen.

The following figure shows the factory labeling using the example of the I/O device digital inputs/digital outputs DIQ 16x24VDC/0.5A 8xM12.



- ① MultiFieldbus interfaces
- ② LED labeling
- ③ Product family
- ④ Device type and article number
- ⑤ ID Link
- ⑥ I/O input and output interfaces
- ⑦ MAC address
- ⑧ Power supply interfaces

Figure 6-10 Example DIQ 16x24VDC/0.5A 8xM12

Configuring

7.1 MultiFieldbus engineering

MultiFieldbus Configuration Tool (MFCT)

You create and load the configuration and parameter assignment of the I/O modules with MFCT. The configuration and parameter assignment are retentively stored in the I/O module.

MFCT creates the following files and makes them available:

- User Defined Data Types (UDT) file (file extension *.l5x), enables structured access to I/O data with Ethernet/IP.
- Electronic Data Sheet (EDS) according to CIP specification Vol.1 for integration into EtherNet/IP configuration systems (the EDS file is also available for download)
- Comma Separated Values (CSV), contains the I/O data mapping of your configuration

You can find additional information on MFCT in the "MultiFieldbus (<https://support.industry.siemens.com/cs/ww/en/view/109773209>)" function manual.

7.2 Detect active fieldbus

For exclusive operation on a fieldbus you can recognize the active fieldbus by the number of green LEDs on the MF Device.

This requires that there are no errors and that the MF Device is in cyclic data exchange with a controller.

Active fieldbus:	RN/NS	ER/MS	MT/IO
PROFINET	 Green	 Off	 Off
Modbus TCP	 Green	 Green	 Off
EtherNet/IP	 Green	 Green	 Green

7.3 PROFINET IO

Introduction

By configuring, parameterizing and connecting the individual hardware components of the ET 200clean distributed I/O devices, you determine their configuration (preset configuration) and their mode of operation. You perform the work needed for this in STEP 7 in *Devices & Networks*.

"**Configuring**" refers to the arranging, setup and networking of devices and modules within the *Devices & Networks* of STEP 7. STEP 7 graphically represents the I/O devices.

"**Assigning parameters**" refers to the setting of the properties of the I/O devices used.

STEP 7 compiles the hardware configuration (the result of "Configuring" and "Assigning parameters") and loads the configuration into the IO controller and/or into I/O devices of the plant.

7.3.1 Configuring the ET 200clean

Introduction

You configure and assign parameters to the ET 200clean distributed I/O device with STEP 7 or in the configuration software of another manufacturer.

Requirements

Table 7-1 Requirements for installation

Configuration software	Requirements	Installation information
STEP 7 TIA Portal V19	HSP 0414	STEP 7 online help
STEP 7 TIA Portal as of V12 SP1	PROFINET GSD file	- The GSD versions are largely downward compatible. - STEP 7 online help - Manufacturer documentation
STEP 7 V5.6 or higher		
Software of another manufacturer		

You can find the requirements for configuring the individual device in the technical specifications of the Equipment Manual, under the "Engineering with" entry.

Configuring the ET 200clean with STEP 7 TIA Portal

Information on the configuration can be obtained from the STEP 7 online help and in the SIMATIC PROFINET with STEP 7

(<https://support.industry.siemens.com/cs/ww/en/view/49948856>) system manual.

Configuring the ET 200clean with STEP 7 Classic

The procedure for STEP 7 Classic can be found in the manual Programming with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/109751825>).

Overview of PROFINET IO functions

The table below provides an overview of various PROFINET IO functions and the firmware version as of which this function is supported.

Function ¹	Firmware version
Isochronous real-time communication (IRT)	FW 1.1.x or higher
Isochronous mode	FW 1.1.x or higher
Shared device	FW 1.1.x or higher
Module-internal shared input / shared output (MSI/MSO)	FW 1.1.x or higher
System redundancy S2	FW 1.1.x or higher
Device replacement without programming device	FW 1.1.x or higher
Media redundancy	FW 1.1.x or higher

¹ Not all I/O devices support all functions. You can find the supported functions in the technical specifications of the I/O device used.

7.3.2 Isochronous real-time communication

Isochronous real-time communication

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

- IRT option:
A topological configuration is required (STEP 7 V5.5 and higher).

NOTE

When an IO controller is used as sync master for IRT communication, the following must be observed:

Operate the IO controller also as a sync master when configuring IRT communication. Otherwise, IRT and RT configured IO devices can fail if the sync master fails.

Detailed information

You can find additional information on the topic of **isochronous real-time communication** in the STEP 7 online help and in the SIMATIC PROFINET with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/49948856>) function manual.

7.3.3 Isochronous mode

Isochronous mode

The input data and output data of distributed I/O modules in the system is simultaneously acquired and simultaneously output. For this purpose, the I/O data, the transmission cycle via PROFINET IO and the user program are synchronized. The constant PROFINET IO cycle forms the corresponding clock generator. The I/O devices support isochronous mode of I/O data to the IO controllers starting at 250 μ s. The I/O device can exchange isochronous process data with a maximum of one IO controller.

NOTE

Restriction with STEP 7 TIA Portal

The isochronous mode function is fully usable in STEP 7 TIA Portal from V16 Update 1. In the previous versions, it depended on the respective configuration whether and to what extent isochronous mode could be used. If an error occurs, the I/O device rejects the configuration with the alarm message "Parameter error".

For configuration with GSDML, select a configuration in the hardware catalog that provides the value status (QI) in order to use isochronous mode.

Detailed information

You can find additional information on the topic of **isochronous mode** in the STEP 7 online help and in the SIMATIC PROFINET with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/49948856>) function manual.

7.3.4 Shared device

Shared device

IO device that makes its data available to up to two IO controllers.

If **there is no validity check of the shared device projects by the Engineering System**, note the following:

- Make sure the configurations are consistent. Assign each module or submodule to only one IO controller. Multiple assignment will result in an error as the module or submodule will only be available in the first controller.
- If you reconfigure shared device configurations without the validity check mentioned above, you have to commission the ET 200clean once again. This means you must download the projects of all involved IO controllers to the respective CPU again after reconfiguration. If necessary, perform a POWER OFF/POWER ON of the IO controller and the I/O device.

NOTE

In the case of a shared device application, make sure that all controllers work with the same send clock. If the controller does not have the same send clock, this may result in communication relationships not being set up.

If you set up all controllers in one project, the same send clock is ensured. Set the same send clock for engineering in separate projects.

Detailed information

You can find additional information on the topic of **shared device** in the STEP 7 online help and in the SIMATIC PROFINET with STEP 7

(<https://support.industry.siemens.com/cs/ww/en/view/49948856>) function manual.

7.3.5 Module-internal shared input / shared output (MSI/MSO)

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 several IO controllers. Each controller has read access to the same channels.

The module-internal shared output function allows an output module to be operated by several IO controllers. One IO controller has write access. A second IO controller can have read access to the same channels.

Detailed information

You can find additional information on the topic of **Module-internal shared input / shared output (MSI/MSO)** in the STEP 7 online help and in the SIMATIC PROFINET with STEP 7

(<https://support.industry.siemens.com/cs/ww/en/view/49948856>) function manual.

7.3.6 System redundancy S2

System redundancy S2

An IO device with S2 system redundancy supports redundant connections to 2 IO controllers (ARs).

In a redundant system, an IO device with system redundancy S2 has a redundant AR for each of the two CPUs (IO controllers). If one CPU fails, the IO device with S2 system redundancy remains accessible to the remaining IO controller via the AR.

The I/O devices support system redundancy S2 (as of FW V1.1.x) on S7-400H CPUs (as of FW V3.0) and on S7-1500R/H CPUs (as of FW V2.6).

Detailed information

You can find additional information on the topic of **system redundancy S2** in the STEP 7 online help and in the SIMATIC PROFINET with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/49948856>) function manual.

7.3.7 Device replacement without programming device (PG)

Requirement

A topology must be created in the project (topological configuration).

Device replacement without programming device

IO devices with this function can be easily replaced:

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

The replaced IO device receives the device name from the IO controller, no longer from the programming device. For this purpose, the IO controller uses the configured topology and the neighborhood relationships determined by the IO devices. The configured preset topology must match the actual topology.

Before you use them further, reset IO devices that were already in operation to factory settings.

Detailed information

You can find more information in the SIMATIC PROFINET with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/49948856>) system manual.

7.3.8 Media redundancy

Media redundancy

Function for ensuring the network and system availability. Redundant transmission links (ring topology) ensure that an alternative communication path is made available if a transmission link fails (STEP 7 V5.5 and higher).

For additional information, refer to the STEP 7 online help and the SIMATIC PROFINET with STEP 7 (<https://support.industry.siemens.com/cs/ww/en/view/49948856>) manual.

7.4 EtherNet/IP

7.4.1 Introduction to configuring

Introduction

By configuring, parameterizing and connecting the individual hardware components of the ET 200clean distributed I/O devices, you determine their configuration (preset configuration) and their mode of operation. You perform the work needed for this in MFCT. The full range of functions is not ensured with other software.

"**Configuring**" refers to the arranging, setting up and networking of devices and modules in the MFCT or in another software.

"**Assigning parameters**" refers to the setting of the properties of the I/O devices used.

MFCT or another software compiles the hardware configuration (the result of "Configuring" and "Assigning parameters"). The configuration is then loaded into the I/O devices of the plant and the configuration files for the controller are prepared.

NOTE

Temporary bus interruption

The ET 200clean I/O device starts again once the configuration is loaded. The reboot interrupts the MultiFieldbus for all downstream devices. The bus interruption is evaluated by the software used and the controller.

Detailed information

You can find more information in the "MultiFieldbus (<https://support.industry.siemens.com/cs/ww/en/view/109773209>)" function manual.

7.4.2 EtherNet/IP functions

The I/O modules can be configured with MFCT or another user program via EtherNet/IP.

The following table shows the supported EtherNet/IP functions with the configuration software MFCT as of V1.5.3.2:

Function	Firmware version
I/O communication with scanner	FW 1.1.x or higher
Reading diagnostics	FW 1.1.x or higher
Normative CIP objects	FW 1.1.x or higher
Hardware interrupt	FW 1.1.x or higher
Transfer data records	FW 1.1.x or higher
Resetting I/O module modules to factory setting	FW 1.1.x or higher
Diagnostics bit in data status of cyclic I/O data per submodule	FW 1.1.x or higher
Shared device	FW 1.1.x or higher
Module-internal shared input / shared output (MSI/MSO)	FW 1.1.x or higher

IP address

For the EtherNet/IP bus protocol, the IP address and the gateway address must not be identical.

NOTE

Setting the IP address

If there is an active connection to the controller and the IP address is set, an error message may be displayed in some configuration software. Follow these steps:

1. Stop the connection to the controller.
 2. Enter the IP address.
-

7.5 Modbus TCP

7.5.1 Introduction to configuring

Introduction

By configuring, parameterizing and connecting the individual hardware components of the ET 200clean distributed I/O devices, you determine their configuration (preset configuration) and their mode of operation. You perform the work needed for this in MFCT. The full range of functions is not ensured with other software.

"**Configuring**" refers to the arranging, setting up and networking of devices and modules in the MFCT or in another software.

"**Assigning parameters**" refers to the setting of the properties of the I/O devices used.

MFCT or another software compiles the hardware configuration (the result of "Configuring" and "Assigning parameters"). The configuration is then loaded into the I/O devices of the plant and the configuration files for the controller are prepared.

NOTE

Temporary bus interruption

The ET 200clean I/O device starts again once the configuration is loaded. The reboot interrupts the MultiFieldbus for all downstream devices. The bus interruption is evaluated by the software used and the controller.

Detailed information

You can find more information in the "MultiFieldbus (<https://support.industry.siemens.com/cs/ww/en/view/109773209>)" function manual.

7.5.2 Modbus TCP functions

Modbus TCP functions

The following table shows the supported functions of the I/O modules in the Modbus TCP mode with the configuration software MFCT as of V1.5.3.2:

Function	Firmware version
I/O communication with scanner	FW 1.1.x or higher
Reading diagnostics	FW 1.1.x or higher
Hardware interrupt	FW 1.1.x or higher
Transfer data records	FW 1.1.x or higher
Resetting I/O module modules to factory setting	FW 1.1.x or higher
Diagnostics bit in data status of cyclic I/O data per submodule	FW 1.1.x or higher
Shared device	FW 1.1.x or higher
Module-internal shared input / shared output (MSI/MSO)	FW 1.1.x or higher

7.6 MF Shared Device

Number of connections via the MultiFieldbus

The distributed I/O devices support 2 simultaneous connections via the same connection type. A combination of various connection types is not possible.

The module objects are displayed in the MFCT or in other software during the selection.

Detailed information

You can find more information in the MF Shared Device section of the "MultiFieldbus (<https://support.industry.siemens.com/cs/ww/en/view/109773209>)" function manual.

Commissioning

8.1 Commissioning ET 200clean on MultiFieldbus

Introduction

The commissioning of your distributed I/O devices depends on the respective plant configuration. The following procedure describes how to commission the ET 200clean on an IO controller.

Requirements for commissioning on the MultiFieldbus

NOTE**Performing tests**

You must ensure the safety of your plant. You need to run a complete functional test and perform the required safety checks before the commissioning of a plant.

Also allow for any possible foreseeable errors in the tests. This prevents you from putting persons or equipment at risk during operation.

Procedure

The following table shows the chapters/documents in which the required actions are described.

Table 8-1 Requirements for the ET 200clean on the MultiFieldbus

Step	Procedure	Reference
1	Installing the ET 200clean	Section Mounting (Page 28)
2	Wiring the ET 200clean	Section Connecting (Page 31)
3	Configuring the ET 200clean	Section Configuring (Page 49)
4	Switching on supply voltage for the IO controller	IO controller manual
5	Switching IO controller to RUN mode	IO controller manual

Commissioning the ET 200clean

1. Switch on the supply voltage 1L+ Non-Switched for the ET 200clean.
2. Switch on the power supply 2L+, if necessary.

Reference

Additional information on the commissioning:

- STEP 7 online help
- In the manual SIMATIC PROFINET with STEP 7
(<https://support.industry.siemens.com/cs/ww/en/view/49948856>)
- In the MultiFieldbus (<https://support.industry.siemens.com/cs/ww/en/view/109773209>) function manual

8.2 Identification and maintenance data

8.2.1 Reading out and entering I&M data

Introduction

I&M identification data is information which is stored on the I/O device either as read-only data (I-data) or read/write data (M-data).

Identification data (I&M0): Manufacturer information on the I/O device that is read-only and in some cases is also lasered on the I/O device housing, for example, article number, serial number and firmware version.

Maintenance data (I&M1, 2, 3): Plant-dependent information, e.g. installation location. Maintenance data is created during the configuration and written to the I/O device.

All modules of the ET 200clean distributed I/O system support identification data and maintenance data (I&M0 to I&M3).

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

- Checking the plant configuration
- Locating hardware changes in a system
- Correcting errors in a system

With the I&M identification data, you have the option of clearly identifying I/O devices online.

In STEP 7, the identification data is displayed in the "Module status" and "Properties..." tabs (see STEP 7 online help).

Options for reading out I&M data

You have the following options for reading the I&M data:

- Via the user program
- Via STEP 7 or HMI devices

Procedure for reading I&M data by means of the user program

To read the I&M data of the I/O devices in the user program, use the instruction "RDREC".

With third party software, the "read record" instruction may be named differently.

You can find more information in the "MultiFieldbus

(<https://support.industry.siemens.com/cs/ww/en/view/109773209>)" function manual.

Procedure for reading the I&M data using STEP 7

Requirement: An online connection to the I/O device must be available.

1. Select the I/O device in project tree under "Distributed I/O".
2. Select: **IO device/DP slave > Online & Diagnostics > Identification & Maintenance.**

Procedure for input of maintenance data using STEP 7

The default module name is assigned by STEP 7. You have the option to enter the following data:

- Plant designation (I&M1)
- Location identifier (I&M1)
- Installation date (I&M2)
- Additional information (I&M3)

To enter the data, follow these steps:

1. In the device view of the STEP 7 hardware network editor, select the I/O device, for example.
2. In the properties under "General", select the "Identification & Maintenance" area and enter the data.

During the loading of the hardware configuration, the I&M data is also loaded.

8.2.2 Data record structure for I&M data

Reading I&M data records (distributed via PROFINET IO)

You can directly access specific identification data by selecting **Read data record** ("RDREC" instruction). You obtain the corresponding part of the identification data under the associated data record index.

The following table shows the principle behind the structure of data records.

Table 8-2 Basic structure of data records with I&M identification data

Contents	Length (bytes)	Coding (hex)
Header information		
BlockType	2	I&M0: 0020 _H I&M1: 0021 _H I&M2: 0022 _H I&M3: 0023 _H

Contents	Length (bytes)	Coding (hex)
BlockLength	2	I&M0: 0038 _H I&M1: 0038 _H I&M2: 0012 _H I&M3: 0038 _H
BlockVersionHigh	1	01
BlockVersionLow	1	00
Identification data		
Identification data (see table below)	54 54 16 54	I&M0/Index AFF0 _H I&M1/Index AFF1 _H I&M2/Index AFF2 _H I&M3/Index AFF3 _H

The following table shows the structure of data records for I&M identification data.

Table 8-3 Data record structure for I&M identification data

Identification data	Access	Default	Explanation
Identification data 0: (data record index AFF0 hex)			
VendorIDHigh	read (1 byte)	00 _H	This is where the name of the manufacturer is stored (42 _D = SIEMENS AG).
VendorIDLow	read (1 byte)	2A _H	
Order_ID	read (20 bytes)	6ES7141-7BH00-0BB0	Order number of the I/O device (e.g. of the digital input module)
IM_SERIAL_NUMBER	read (16 bytes)	-	Serial number (device-specific)
IM_HARDWARE_REVISION	read (2 bytes)	1	Corresponding hardware version
IM_SOFTWARE_REVISION	read	Firmware version	Provides information about the firmware version of the I/O device
• SWRevisionPrefix	(1 byte)	V	
• IM_SWRevision_Functional_Enhancement	(1 byte)	00 - FF _H	
• IM_SWRevision_Bug_Fix	(1 byte)	00 - FF _H	
• IM_SWRevision_Internal_Change	(1 byte)	00 - FF _H	
IM_REVISION_COUNTER	read (2 bytes)	0000 _H	Provides information about configured changes on the I/O device (not used)
IM_PROFILE_ID	read (2 bytes)	0000 _H	Generic device
IM_PROFILE_SPECIFIC_TYPE	read (2 bytes)	0005 _H	Interface modules
IM_VERSION	read	0101 _H	provides information about the version of the identification data (0101 _H = Version 1.1)
• IM_Version_Major	(1 byte)		
• IM_Version_Minor	(1 byte)		
IM_SUPPORTED	read (2 bytes)	000E _H	Provides information about the available identification data (I&M1 to I&M3)
Maintenance data 1: (data record index AFF1 hex)			
IM_TAG_FUNCTION	Read/write (32 bytes)	-	For the I/O device, enter an identifier that is unique plant-wide here.

Identification data	Access	Default	Explanation
IM_TAG_LOCATION	Read/write (22 bytes)	-	Enter the installation location of the I/O device here.
Maintenance data 2: (data record index AFF2 hex)			
IM_DATE	Read/write (16 bytes)	YYYY-MM-DD HH:MM	Enter the installation date of the I/O device here.
Maintenance data 3: (data record index AFF3 hex)			
IM_DESCRIPTOR	Read/write (54 bytes)	-	Enter a comment about the I/O device here.

Maintenance

9.1 Replacing an I/O device

Replacing an I/O device

Replacing an I/O device is not permitted during ongoing operation.

NOTICE**Material damage can occur**

If you connect or disconnect the I/O devices with the power connected, this can lead to undefined states in your system.

Material damage to the ET 200clean distributed I/O device can occur as a result.

Only remove or replace I/O devices when the power is disconnected.

Always comply with the required standards and safety guidelines when configuring a system.

Behavior of MultiFieldbus

When an I/O device fails in the MultiFieldbus line, the line remains active up to the failed I/O device. After the I/O device has been replaced, the following I/O devices of the line log in again automatically in MultiFieldbus.

NOTE**MRP ring with PROFINET**

When set up as an MRP ring topology in the PROFINET bus protocol, only the affected I/O device fails.

Procedure

To replace an I/O device, follow these steps:

1. Disconnect the supply voltage to the I/O device to be replaced.
2. Completely remove all cables connected to the I/O device.
3. Loosen the fixing screws of the I/O device completely.
4. Replace the I/O device.

NOTE

"New" I/O device

Replace the remote I/O device with an I/O device of the same type.

5. Fasten the I/O device with a torque of 3 Nm.
6. Connect all cables.
7. Turn the supply voltage on.



WARNING

Observe the connection sequence of I/O devices

If you swap the ET 200clean I/O devices or lines when connecting them, this can cause personal injury and damage to the machine.

Result

Topological configuration:

1. The new I/O device receives the device name with PROFINET IO automatically via the IO controller.

NOTE

New or factory setting

The I/O device receives the device name with PROFINET IO automatically only when:

- I/O device is in delivery state
 - I/O device has been set to factory settings
-

2. The new I/O device receives the connect telegram and startup data record from the IO controller.
3. The new I/O device and all downstream I/O devices start up again by themselves.

No topological configuration:

1. The new I/O device must have the same name as the device name of the I/O device to be replaced.
2. The new I/O device receives the connect telegram and startup data record from the IO controller.
3. The new I/O device and all downstream I/O devices start up again by themselves.

Reference

You will find information on the device name in the STEP 7 online help or the MultiFieldbus (<https://support.industry.siemens.com/cs/ww/en/view/109773209>) function manual.

9.2 Firmware update

Introduction

During operation, it may become necessary to update the firmware (e.g. for function extensions).

Firmware updates are used to update the firmware of the I/O device. The I/O devices only allow signed firmware for an update. You can find more information in the section "Signed firmware update (Page 95)."

NOTE

Temporary bus interruption

When you update the firmware of an ET 200clean I/O device, then the MultiFieldbus is briefly interrupted by rebooting of the I/O device. This interruption generates an alarm in the controller for all downstream MultiFieldbus devices.

Options for the firmware update

You have the following options for installing a firmware update:

- Online via STEP 7, TIA Portal
- Online with STEP 7, V5.6 or higher
- Online via SIMATIC Automation Tool
- Online via MultiFieldbus Configuration Tool (MFCT)

NOTE

I/O device remains in configured fieldbus mode

After a firmware update, the I/O device remains in the bus protocol in which the update was installed.

For example, at an update via EtherNet/IP, the I/O device remains in EtherNet/IP mode.

Reference

More information about the procedure:

- FAQs on the Internet (<http://www.siemens.com/automation/service&support>)
- STEP 7 online help
- SIMATIC Automation Tool (<https://support.industry.siemens.com/cs/ww/en/view/98161300>) equipment manual (included in the SIMATIC Automation Tool).
- MultiFieldbus (<https://support.industry.siemens.com/cs/ww/en/view/109773209>) function manual

9.3 Resetting the I/O device to factory settings

Introduction

When you "Reset to factory settings", the I/O device is reset to the "delivery state". All information that was saved internally on the I/O device is deleted. The I/O device switches to PROFINET IO mode.

Result after resetting to factory settings

The following table shows an overview of the contents of the saved items after resetting to factory settings.

Table 9-1 Result after resetting to factory settings

Memory object	Contents
IP address	Deleted (configurable when resetting: "Retain IP address"/ "Delete IP address")
Device name	Deleted
MAC address	Not deleted
Identification data (I&M0)	Not deleted
Maintenance data (I&M1, 2, 3):	Deleted
Firmware	Not deleted
Configuration	Deleted
Parameters	Deleted
MultiFieldbus	Switches to PROFINET IO

NOTE

Failure of downstream stations is possible

Resetting an I/O device to factory settings can lead to failure of downstream stations in a line.

NOTE

Substitute value behavior of I/O devices when resetting to factory settings

The I/O devices take on the unconfigured state after "Reset to factory settings". There is no I/O data exchange.

Reset options

You have the following options to reset an I/O device to the factory settings:

- Online via STEP 7, TIA Portal
- Online with STEP 7, V5.6 or higher
- Online via SIMATIC Automation Tool (SAT)
- Online via PRONETA
- Online via MultiFieldbus Configuration Tool (MFCT)

Requirement

You need an online connection to reset an I/O device to factory settings.

Procedure with STEP 7 (TIA Portal)

Connect the PG/PC to the MultiFieldbus interface of the ET 200clean distributed I/O system. Make sure that there is an online connection to the I/O device which is to be reset to factory settings.

1. Open the Online and Diagnostics view of the I/O device.
2. In the "Functions" folder, select the "Reset to factory settings" group.
3. Select the "Retain IP address" option button if you want to retain the IP address, or the "Reset IP address" option button if you want to delete the IP address.
4. Click the "Reset" button.
5. Click "OK" in response to the confirmation prompts.

Result: The I/O device executes "Reset to factory settings". The RN/NS, ER/MS and MT/IO LEDs light up simultaneously for approximately 2 s while "Reset to factory settings" is running.

Procedure with STEP 7 V5.6 or higher

Connect the PG/PC to the MultiFieldbus interface of the ET 200clean distributed I/O system. Make sure that there is an online connection to the I/O device which is to be reset to factory settings.

1. Open the SIMATIC Manager.
2. Select accessible devices.
3. Select the I/O device.
4. Navigate through "Menu > Options > Edit Ethernet devices > Reset to factory settings > Reset".

Result: The I/O device executes "Reset to factory settings". The RN/NS, ER/MS and MT/IO LEDs light up simultaneously for approximately 2 s while "Reset to factory settings" is running.

Procedure using the SIMATIC Automation Tool

The procedure is described in the SIMATIC Automation Tool (<https://support.industry.siemens.com/cs/ww/en/view/98161300>) equipment manual (included in the SIMATIC Automation Tool).

Procedure using PRONETA

You can carry out these steps with PRONETA:

- Delete or reassign the device name and IP address
- Reset I&M data
- Remove module from the network and reintegrate

You can find information on this in the "PRONETA user manual (<https://support.industry.siemens.com/cs/ww/en/view/109815137>)"

Procedure using MFCT

You can find information on the procedure via MFCT under "MultiFieldbus function manual (<https://support.industry.siemens.com/cs/ww/en/view/109773209>)" in the "Resetting the MF device" section.

Reference

You will find more information on the procedure in the STEP 7 online help.

9.4 Maintenance and repair

The components of the SIMATIC ET 200clean system are maintenance-free.

NOTE

Repairs to an ET 200clean I/O device may only be carried out by the manufacturer.

9.5 Cleaning the I/O device

Note the following points during cleaning:

- Observe the degrees of protection IP65/IP67 and IP69K.
- Use checked liquids
 - Material compatibility test of the company ECOLAB® (Page 73)

Technical specifications

10.1 Codes and approvals

Codes and approvals on the type plate

The following overview provides information about the possible codes and approvals. Only the codes and approvals specified on the type plate apply for the device.

You can find the associated certificates for download on the Internet. See also: ET 200clean approvals (<https://support.industry.siemens.com/cs/ww/en/ps/29390/cert>)

CE marking



The ET 200clean distributed I/O devices meet the requirements and protection targets of the following directives. The distributed I/O devices comply with the harmonized European standards (EN) for programmable logic controllers published in the official gazettes of the European Community:

- 2014/30/EU "Electromagnetic Compatibility" (EMC Directive)
Directive of the European Parliament and of the Council of February 26, 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility; OJ L 96, 29/3/2014, pp. 79–106
- 2011/65/EU "Restriction of the use of certain hazardous substances in electrical and electronic equipment" (RoHS Directive)
Directive of the European Parliament and of the Council of June 8, 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment; OJ L 174, 1/7/2011, pp. 88–110

The EC Declarations of Conformity are available for the responsible authorities and are kept at the following address:

Siemens Aktiengesellschaft
Digital Factory
Factory Automation
DI FA TI COS TT
Postfach 1963
D-92209 Amberg

UKCA mark



The object of the declaration described above complies with the relevant Union harmonization legislation and the designated British regulations, depending on the components used, as described in the EMC, ATEX/UKEX, RoHS annexes, which form an integral part of this declaration of conformity:

- Electromagnetic Compatibility Regulations 2016 (S.I. 2016 No. 1091), and related amendments
- Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012 (S.I. 2012 No. 3032), and related amendments

UK Declarations of Conformity are available to the relevant authorities at the following address:

Siemens Aktiengesellschaft
Digital Factory

Factory Automation
DI FA TI COS TT
Postfach 1963
D-92209 Amberg

UL approval



Underwriters Laboratories Inc.:

- UL 61010-1, UL 61010-2-201
- CSA C22.2 NO. 61010-1, CSA C22.2 No. 61010-2-201

RCM Australia/New Zealand



The ET 200clean distributed I/O system meets the requirements of EN 61000-6-4 Generic standards – Emission standard for industrial environments.

Korea Certificate



Note that this device corresponds to limit class A in terms of the emission of radio frequency interference. This device can be used in all areas, except residential areas.

이 기기는 업무용(A급) 전자파적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며 가정외의 지역에서 사용하는 것을 목적으로 합니다.

WEEE mark (European Union)



Disposal information, observe the local regulations and section "Recycling and disposal (Page 94)".

10.2 Certificates

Shipbuilding certificates

The following shipbuilding certificates are intended for the device:

- ABS (American Bureau of Shipping)
- Bureau Veritas (French marine classification society)
- CCS (China Classification Society)
- Class NK (Nippon Kaiji Kyokai)
- DNV (Det Norske Veritas)
- KR (Korean Register of Shipping)
- LRS (Lloyds Register of Shipping)
- RINA (Registro Italiano Navale)

After a successful approval you can find the certificates with the certified article numbers in the Internet. See also: ET 200clean marine/shipbuilding

(<https://support.industry.siemens.com/cs/ww/en/ps/29390/cert?ct=446>)

Material compatibility test



The distributed I/O devices ET 200clean have been tested by the ECOLAB® company with the following liquids.

Substance	Concentration	Description
Topactive 200	5%	Alkaline foam disinfectant (thin film cleaner)
Topactive 500	5%	Alkaline foam disinfectant (thin film cleaner)
Topaz MD5	5%	Alkaline foam disinfectant
Topax 66	5%	Alkaline, chlorinated foam cleaning agent and disinfectant
Topaz AC3	5%	Acidic foam disinfectant (phosphoric acid basis)
Topaz AC4	5%	Acidic foam disinfectant (organic acids basis; phosphate-free)
Topax 91	3%	Neutral foam disinfectant (quaternary ammonium compounds basis)
Topax 990	3%	Neutral foam disinfectant (amine acetate basis)
Topactive DES	3%	Acidic foam disinfectant (peracetic acid basis)
Topactive OKTO	3%	Acidic foam disinfectant (peroctanoic acid, peracetic acid basis)
Topax 960	5%	Alkaline foam cleaning agent and disinfectant (amines)
Alcodes GF	100%	Neutral surface disinfectant

The testimonial from the ECOLAB® company is available for downloading on the Internet (<https://support.industry.siemens.com/cs/ww/en/ps/29390/cert?ct=448>).

The ET 200clean distributed I/O devices are certified by IPA as "tested Device". The certificate is available for downloading on the internet

(<https://support.industry.siemens.com/cs/ww/en/ps/29390/cert?ct=448>).

10.3 Standards and requirements

IEC 61131-2

The ET 200clean distributed I/O system fulfills the requirements and criteria of the standard IEC 61131-2 (Programmable controllers, Part 2: Equipment requirements and tests) and the EMC requirements for use in Zone B.

IEC 61010-2-201

The ET 200clean distributed I/O system fulfills the requirements and criteria of the standard IEC 61010-2-201.

PROFINET standard

The ET 200clean distributed I/O system is based on the standard IEC 61158 Type 10.

EtherNet/IP requirement

The ET 200clean distributed I/O system is based on the requirements of the CIP network library CIP Networks Library Volume 2 EtherNet/IP Adaptation of CIP.

Modbus TCP requirement

The ET 200clean distributed I/O system is based on the requirements of the Modbus TCP Application Protocol Specification V1.1b3.

IO-Link standard

The ET 200clean distributed I/O system is based on the standard IEC 61131-9.

The design of the ET 200clean distributed I/O devices corresponds to the EHEDG guidelines.

Use in industrial environments

The ET 200clean distributed I/O devices are designed for the industrial field. It meets the following standards for this type of use:

- Requirements for interference emission EN 61000-6-4
- Requirements for immunity EN 61000-6-2

Use in mixed areas

Under certain circumstances, you can use the ET 200clean distributed I/O system in a mixed area. A mixed area is used for residential purposes and for commercial operations that do not significantly impact on residents.

If you want to use the ET 200clean distributed I/O system in mixed areas, you must ensure that its radio frequency interference emission complies with the limit classes of the EN 61000-6-3 generic standard. Suitable measures for observing these limits for use in a mixed area are, for example:

- Use of noise filters in the supply cables

An individual acceptance test is also required.

Use in residential areas

The ET 200clean distributed I/O system is not intended for use in residential areas. Using the ET 200clean distributed I/O system in residential areas can affect radio or television reception.

Importer addresses

The following table shows the importer addresses for specific countries:

Countries	Address
United Kingdom (UK)	Siemens plc. Manchester M20 2UR
Türkiye (TR)	Siemens San. ve Tic. A.Ş. Yakacık Cad. No:111 34870 Kartal/İstanbul

10.4 Electromagnetic compatibility

Definition

Electromagnetic compatibility is the ability of an electrical apparatus to function in a satisfactory manner in its electromagnetic environment without affecting this environment.

An ET 200clean distributed I/O device fulfills the requirements of the EMC law of the European Union. The prerequisite for this is that the electrical configuration of the ET 200clean distributed I/O device complies with the specifications and guidelines for the electrical configuration.

Pulse-shaped disturbance variables

The table below shows the electromagnetic compatibility of the distributed I/O systems compared to pulse-shaped disturbance variables.

Table 10-1 Pulse-shaped disturbance variables

Pulse-shaped disturbance variable	Tested with	Corresponds with degree of severity
Electrostatic discharge according to IEC 61000-4-2.	Air discharge: ± 8 kV	3
	Contact discharge: ± 6 kV	3
Burst pulses (rapid transient disturbance values) according to IEC 61000-4-4.	± 2 kV (power supply cable)	3
	± 2 kV (MultiFieldbus line)	4
	± 1 kV (signal line)	4
High-energy surge according to IEC 61000-4-5. Signal line < 30 m and only installation within buildings		
• Asymmetric coupling	± 1 kV (24 V DC supply cable) without protective element	2
	± 1 kV (MultiFieldbus line) without protective element	2
• Symmetric coupling	± 0.5 kV (24 V DC supply cable) without protective element	2

Sinusoidal disturbance variables

The following tables show the electromagnetic compatibility of the distributed I/O systems to sinusoidal disturbance variables.

Table 10-2 RF radiation

RF radiation according to IEC 61000-4-3 Electromagnetic RF field, amplitude modulated		Corresponds with degree of severity
80 ... 1000 MHz	10 V/m	3
1.4 ... 6 GHz	3 V/m	2
80% AM (1 kHz)		

Table 10-3 RF coupling (signal and supply cables)

RF coupling according to IEC 61000-4-6.		Corresponds with degree of severity
0.15 ... 80 MHz	3	
10 V _{rms} unmodulated		
80% AM (1 kHz)		
150 Ω source impedance		

Emission of radio frequency interference

The following table shows the interference emission of electromagnetic fields according to EN IEC 61000-6-4/EN 55016-2-3.

Table 10-4 Interference emission of electromagnetic fields

Frequency	Interference emission	Measuring distance
30 ... 230 MHz	< 40 dB (μV/m) Q	10 m
230 ... 1000 MHz	< 47 dB (μV/m) Q	10 m
1 ... 3 GHz	< 76 dB (μV/m) P	3 m
3 ... 6 GHz	< 80 dB (μV/m) P	3 m

Conducted emission

The following table shows the limits for power supply connections in accordance with EN IEC 61000-6-4/EN 55016-2-1.

Table 10-5 Interference emission from the power supply

Frequency	Interference emission
0.15 ... 0.5 MHz	< 89 dB (μV) Q < 76 dB (μV) M
0.5 ... 30 MHz	< 83 dB (μV) Q < 70 dB (μV) M

10.5 Transport and storage conditions

Transport and storage conditions

The I/O devices of the ET 200clean distributed I/O system exceed the specifications regarding transport and storage conditions pursuant to IEC 61131-2. The following table shows the conditions that apply to I/O devices transported or stored in their original packaging.

- Transport condition class: TTH4
- Storage condition class: STH4

Table 10-6 Transport and storage conditions

Type of condition	Permitted range
Free fall	≤0.3 m
Temperature	-40 °C ... +70 °C
Temperature variation	20 K/h
Barometric pressure	1140 ... 540 hPa (corresponds to an altitude of -1000 m to 5000 m)
Relative humidity	5 ... 95%; no condensation

10.6 Mechanical and climatic ambient conditions

Rated conditions

The ET 200clean distributed I/O system is suitable for use in weather-proof, fixed locations without cabinet.

- The rated conditions exceed the requirements pursuant to IEC 61131-2
 - Class OTH3

You can find the values for the rated conditions in the technical specifications of the equipment manuals or on the Internet

(<https://support.industry.siemens.com/cs/de/en/view/109742718>).

Tests of mechanical ambient conditions

The following table shows the type and scope of the tests on mechanical ambient conditions.

Table 10-7 Tests of mechanical ambient conditions

Condition tested	Test standard	Values
Sinusoidal oscillations	Vibration test according to IEC 60068-2-6	Type of oscillation: Frequency sweeps at a rate of change of 1 octave/minute. $5 \leq f \leq 12.9$ Hz, constant amplitude 15 mm $12.9 \leq f \leq 150$ Hz, constant acceleration 10 g Period of oscillation: 10 frequency sweeps per axis at each of three vertically aligned axes
Shock	Shock, tested according to IEC 60068-2-27	Type of shock: Half-sine Shock intensity: 30 g peak value, 18 ms duration Direction of shock: 3 shocks each in $\pm$ direction in each of the 3 axes vertical to one another

Climatic ambient conditions

The following table shows the type and scope of the tests on climatic ambient conditions.

Table 10-8 Tests for climatic ambient conditions

Ambient conditions	Fields of application	Comments
Temperature	-30 °C ... 55 °C	All mounting positions*
Temperature variation	10 K/h	-
Relative humidity	5 ... 100%	With condensation and mounted covers
Barometric pressure	1140 ... 540 hPa	Corresponds to an elevation of -1000 to 5000 m
Pollutant concentration	ANSI/ISA-71.04 severity level G1; G2; G3	-

* Follow the instructions for the minimum distances in section Basics ([Page 28](#)).

Use above 2000 m is possible.

The following constraints apply to the maximum specified ambient temperature:

Table 10-9 Derating factor of installation elevation and ambient temperature

Installation elevation	Derating factor for ambient temperature ¹⁾
-1000 ... 2000 m	1.0
2000 ... 3000 m	0.9
3000 ... 4000 m	0.8
4000 ... 5000 m	0.7

¹⁾ Base value for application of the derating factor is the maximum permissible ambient temperature in °C for 2000 m.

NOTE

- Linear interpolation between elevations is permissible.
- The derating factors compensate for the decreasing cooling effect of air at higher elevations due to lower density.
- Make sure that the power supplies you use are rated for elevations > 2000 m.

NOTE

All markings and certifications are currently based on an elevation of up to 2000 m.

10.7 Details on insulation, protection class, degree of protection and rated voltage

Insulation

The insulation is designed in compliance with the requirements of IEC 61010-2-201.

NOTE

In the case of I/O devices with 24 V DC (SELV/PELV) supply voltage, galvanic isolations are tested with 707 V DC (type test).

Protection class according to IEC 61010-2-201

- Protection class III

Severity for voltage interruption

The I/O devices of the ET 200clean distributed I/O system meet and exceed the severity class PS1 for voltage interruptions with a value of 5 ms.

Pollution degree / overvoltage category pursuant to IEC 61010-2-201

Connected according to the specifications in the "Wiring (Page 42)" section:

- Pollution degree: 3 (macro environment)
- Overvoltage category: II

In delivery state, with one or more open connections:

- Pollution degree: 2 (micro environment)
- Overvoltage category: II

Degree of protection IP65/67, IP69K (not evaluated by UL)

Degree of protection of the ET 200clean distributed I/O system:

IP65/IP67 in accordance with IEC 60529

- 1. Code number IP6x: Dust-proof and complete protection from contact
- 2. Code number: Protection from water
 - IPx5: Protected against water jets (nozzle) from any angle
Water directed as a jet against the housing from any direction must have no harmful effects.
 - IPx7: Protected against the effects of temporary immersion in water
Water must not enter in a quantity to cause harmful effects when the enclosure is temporarily immersed in water under standardized pressure condition and time conditions.

IP69K in accordance with ISO 20653

- 1. Code number IP6x: Dust-proof
- 2. Code number IPx9K: Protected against water at high pressure/steam-jet cleaning
Water directed as a jet against the housing from any direction must not have any harmful effects or affect the performance.

Rated voltage for operation

The following table shows the nominal voltage and the corresponding tolerance with which the ET 200clean distributed I/O system operates.

Table 10-10 Rated voltage for operation

Rated voltage (SELV/PELV)	Tolerance range
24 V DC	DC 20.4 ... 28.8 V

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.

In the first part of this section you will find basic information on the subject of industrial cybersecurity. Subsequent sections describe recommended measures for protecting the entire system and individual components from manipulation and unwanted access.

11.1 Cybersecurity information

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

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

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

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

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

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

11.2 Security update notification

Read the special information on maintaining the operational safety of your plant in the Introduction (Page 7) section.

Set up notification of security updates

To receive notifications about security updates, follow these steps:

1. Register with mySiePortal (<https://sieportal.siemens.com/en-ww/home>).
2. Enter the keyword "Security" in the search engine.
3. Choose the "Search in Knowledge base" option.
4. In the "Product tree" filter menu, select your product or your product group, for example "Automation Technology" > "Automation Systems" > "Industrial Automation Systems SIMATIC" > "I/O systems" > "SIMATIC ET 200 systems without control cabinet" > "ET 200clean".
5. Select the "Other types" option from the filter menu for "Type," and then choose "Download" and "Product note".
6. Select the document about which you want to receive notifications using the 3 points on the right "Add to my favorites".
7. In the following dialog, select the name, the storage location and the "Notify me" option for the favorite. Then click on the "+ Add to my favorites" button.

Result: You will be notified by email each time the document is changed.

Under "mySiePortal" > "Lists & notifications" > "My notifications", you can display your notifications and delete them if necessary.

11.3 Basic information on industrial cybersecurity

11.3.1 Definition of industrial cybersecurity

Industrial cybersecurity is generally understood to mean all measures to protect against the following threats:

- Loss of confidentiality due to unauthorized access to data
- Loss of integrity due to manipulation of data
- Loss of availability (e.g. due to the destruction of data or denial of service (DoS))

11.3.2 Objectives of industrial cybersecurity

The objectives of industrial cybersecurity are:

- Ensuring trouble-free operation of industrial plants and production processes
- Preventing threats to people and production from cybersecurity attacks
- Protection of industrial plants against espionage and manipulation
- Protection of industrial automation systems and components against unauthorized access and data loss
- Provision of a practical and cost-effective concept for securing existing plants and devices without their own security functions
- Use of existing, open, and proven industrial cybersecurity standards
- Compliance with legal requirements

An optimized and adapted security concept applies to automation and drive technology. The security measures must not impede or endanger production.

11.4 Comprehensive security concept and security strategies

11.4.1 Comprehensive security concept "Defense in Depth"

With Defense in Depth, Siemens provides a multi-layer security concept that offers industrial plants comprehensive and far-reaching protection in accordance with the recommendations of the IEC 62443 international standard.

Productivity and know-how are protected on 3 levels:

Plant security

Plant security uses various methods to safeguard critical components from physical access by people. This starts with classic building access and extends to securing sensitive areas using access control (for example, code card, iris scan, fingerprint or access code).

Network security

Automation networks must be protected against unauthorized access. This is achieved through security measures on the product, but also those in the product-related environment.

System integrity

Targeted measures must be taken to protect existing know-how or to prevent unauthorized access to automation processes. The measures protect against unauthorized configuration changes and highlight attempts at manipulation.

You can find more information on the topics of Defense in Depth, plant security, network security, and system integrity on the SIEMENS Industrial cybersecurity (<https://www.siemens.com/us/en/company/topic-areas/cybersecurity/industrial-security.html>) Web page.

You can also visit the download center (<https://www.siemens.com/us/en/company/topic-areas/cybersecurity/industrial-security/downloads.html>) to obtain more information on the topic of industrial cybersecurity. The "Operational Guidelines", for example, provide

recommendations on basic security measures for secure machine and plant operation in an industrial environment.

11.4.2 Security management

The ISO 27001 and IEC 62443 standards call for a comprehensive approach in information technology (IT) and operational technology (OT) to protect against cyber attacks.

Responsibility for cybersecurity and IT security

Every operator of machinery and equipment is responsible for:

- Defining cybersecurity and IT security as an important criterion in the procurement and selection of machines and software applications
- Use of suitable measures to protect production resources, data, and communication from manipulation and theft
- Providing all necessary resources and training to employees to fully support these goals

For this purpose, suitable measures must be selected after a risk assessment and a cost-benefit analysis in order to protect material and intellectual property and prevent damage from occurring. These measures should be integrated into corporate processes and procedures, evaluated regularly, and firmly anchored in the corporate culture. In addition to protecting intellectual property, the protection of personal data must be ensured at all organizational units and levels.

Siemens will provide you with information and support. Subscribe to the Security feeds (<https://www.siemens.com/cert>) for information on vulnerabilities. Register with mySiePortal (<https://sieportal.siemens.com/en-ww/home>) and create filters to be notified when important information is published. The procedure is described in the section Notification of security updates (Page 83). Consider using Siemens Cybersecurity Services.

Responsibility in the digital supply chain

Cybersecurity should play a critical role in the evaluation and procurement process. The entire life cycle of a product should be considered to ensure protection against current and future risks. These include, for example, security updates throughout the product life cycle, including guidelines for secure disposal of the product.

Siemens plans and announces the provision of security updates, as well as total discontinuation of products, as part of product support.

Employee awareness

Regular training in cybersecurity and continuous testing of training success are essential so that cybersecurity measures are internalized in processes and work instructions. This involves general training in the use of software and IT hardware for company communication and as work equipment, e.g.:

- secure handling of USB devices
- encrypted communication
- use of VPN
- rules for passwords and use of access
- setting up two-factor authentication
- Educating employees about the dangers posed by malware, phishing, social engineering and other factors

Furthermore, if applicable, production equipment and software training should always include the topic of cybersecurity.

Maintaining the security concept through updates

Keeping software up-to-date is essential, for example, to benefit from the following measures:

- Implementation of new security strategies, protocols and techniques
- Closing of security vulnerabilities
- Elimination of security vulnerabilities

To this end, it is necessary to keep a constant eye on the further development of protective measures and, if necessary, the expansion of requirements.

It is recommended to:

- Set up notifications for (security) updates
- Subscribe to information on vulnerabilities
- Monitor and implement the further development of the technology, especially in the area of cybersecurity

In short: Always keep technology and knowledge up to date.

Consideration of the risks posed by cyber attacks in the Threat and Risk Assessment (TRA)

Make an inventory of all software, hardware, and infrastructure devices, in order to identify risks to the location or organization. Incident response procedures must be incorporated into all IT and manufacturing processes. The choice of risk mitigation measures should be based on a cost-benefit analysis and classification of risks. This is followed by the introduction of cybersecurity rules and procedures and the training of personnel.

Living the concept

Technical solutions alone are not sufficient to effectively counter threats.

Cybersecurity must be part of the corporate culture and process landscape and must be internalized and lived by all employees.

Continuously monitoring the security situation

Continuous monitoring of the cybersecurity situation through:

- Setting anomaly references and creating allow and deny lists based on normal network communication and production machine behavior. The SINEC software family offers you reliable security tools (<https://www.siemens.com/global/en/products/automation/industrial-communication/sinec-network-software/cybersecurity.html>) to detect potential vulnerabilities in OT networks, quickly initiate suitable measures and effectively resolve security vulnerabilities.
- Establishment of an intrusion detection system (IDS) that generates alarms when unusual behavior occurs in the network
- Introduction of a Security Information and Event Management (SIEM) system to collect, analyze, and evaluate events in real time to enable early countermeasures
- Measures regarding network security: for example network segmentation, firewalls, VPN, DMZ (demilitarized zones)

11.5 Operational application environment and security assumptions

11.5.1 Intended use

SIMATIC products are intended for use in industry. If you plan to use the product in a different environment, check the conditions required for such use.

The product may be operated only by personnel qualified for the specific task in accordance with the relevant documentation, in particular its warning notices and safety information. 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.

Operational reliability and intended use

Read the "Special information" in the Introduction ([Page 7](#)) section.

Area of application

Observe the "Area of application" section in System overview ([Page 23](#)) chapter.

11.5.2 Requirements for the operational application environment and security assumptions

Siemens recommends the following security measures:

- Conducting a threat and risk assessment (as part of security management)
- Network security concepts
 - Network segmentation
 - Asset and network management
 - Network protection
 - Remote access
- Access control concepts (utilizing access control systems)
 - Physical protection
 - Physical corporate security
 - Physical product security

Threat and Risk Assessment

Vulnerabilities and risks are identified, and countermeasures are proposed to ensure the security of the system, networks, and data.

Network security concepts

You can find information on network security in the whitepaper "Industrial Network Security Architecture", available at the Download Center (<https://www.siemens.com/us/en/company/topic-areas/cybersecurity/industrial-security/downloads.html>) on the Industrial Cybersecurity (<https://www.siemens.com/us/en/company/topic-areas/cybersecurity/industrial-security.html>) website.

Access control concepts

Physical protection

In addition to closing off and/or monitoring entire production facilities, it may be necessary to physically secure cabinets or even individual components such as circuit breakers.

Physical corporate security

Physical enterprise security can be ensured by the following measures:

- Closed off and monitored company premises
- Access control, locks/card readers, and/or security personnel
- Accompaniment of non-employees by company personnel
- Employees are trained on and embrace security processes within the company

Physical production security

The following measures can be included in assuring physical production security:

- Separate access control for critical areas, such as production zones.
- Installation of critical components in lockable cabinets/control rooms with monitoring and alarm capabilities. The cabinets/control rooms must be secured with a cylinder lock. Do not use simple locks, such as universal, triangular/square, or double-bit locks.
- Radio field planning to limit WLAN coverage areas, preventing them from extending beyond defined zones (e.g. factory floor).
- Guidelines that prohibit the use of external data storage media (such as USB flash drives) and IT devices (such as laptops) classified as unsafe on systems.

11.6 Security properties of the devices

The security properties of the individual devices are listed in the Equipment Manuals.

11.7 Secure operation of the system

This section describes measures recommended by Siemens to protect your system from manipulation and unauthorized access.

11.7.1 Hardening measures

System hardening, also simply referred to as hardening, is the secure configuration of products or systems. The aim is to close security gaps and take various measures to reduce the attack surfaces for cyberattacks.

Measures for system hardening include, for example:

- Secure configuration in which only necessary software components and services are installed or activated for proper operation.
- Access control, by which a restrictive user and rights management system is implemented.

11.7.2 Secure configuration

Secure configuration involves control over all software components, along with their interfaces, ports, and services.

Activated services and ports pose a risk.

- One possible risk is unauthorized access to the network.
- Another risk is unauthorized access to programs.

To minimize risks, only the necessary services should be activated for all automation components.

- Take all activated services (especially Web servers, FTP, remote maintenance etc.) into account in the security concept.
- Consider the default states of ports and services in your security concept.

You can find an overview of all ports and services used in the Communication Function Manual (<https://support.industry.siemens.com/cs/ww/en/view/59192925>).

11.7.3 Handling of sensitive data

Data protection information

Siemens Aktiengesellschaft observes the applicable data protection laws, including the General Data Protection Regulation (GDPR), in particular the rules of data minimization and data protection-friendly default settings (privacy by design, privacy by default).

The products do not store any personal data.

If you establish a reference to an identifiable person by linking this functional data with other data (such as shift schedules) or if you store personal data on the same medium (such as a hard disk), you are responsible for ensuring that the data protection regulations are observed.

Information on the secure removal of data is provided in the section Secure decommissioning ([Page 92](#)).

Storage of security-related data

When storing your security-relevant data on your PC, independently ensure secure data storage.

11.7.4 Regular firmware updates

NOTE

Outdated firmware versions might not be monitored for security vulnerabilities.

- Always keep your plant/products up to date to benefit from troubleshooting and to minimize potential risks.
 - Use email notifications to be automatically informed about firmware updates.
-

You can find more information in:

- Section Firmware update ([Page 66](#))
- Section Notification of security updates ([Page 83](#))

11.7.5 Notifications about security vulnerabilities (Siemens Security Advisories)

A vulnerability is a security vulnerability in information security. It can pose a threat as it provides intruders with the opportunity to access system resources and manipulate or steal data. Many vulnerabilities allow availability to be impaired.

Siemens ProductCERT

If Siemens identifies or fixes security gaps (Vulnerabilities) in the products, this will be published in the Security Advisories.

You can find the documents for SIMATIC on the following Siemens Aktiengesellschaft web page: Siemens ProductCERT and Siemens CERT

(<https://www.siemens.com/global/en/products/services/cert.html?s=SIMATIC&originalHost=new.siemens.com#SecurityPublications>)

"SIMATIC" is preset in the "Search Security Advisories" search field. You can also enter other product names or other terms in the search field and search for them.

On this page, you will also find all the required information on how to deal with vulnerabilities:

- Contact persons for matters related to vulnerabilities
- Options for automated notifications regarding vulnerabilities
- Notifications are also possible in CSAF format
- Option to subscribe to RSS feeds and newsletters
- List of all current vulnerabilities and detailed information such as:
 - Description
 - Classification according to Common Vulnerability Scoring System (CVSS)
 - Measures
 - Availability
 - Etc.

Set up Security feeds (<https://www.siemens.com/cert>) to receive notifications about security-related topics.

If you suspect or have discovered a vulnerability in a Siemens product, please inform us immediately. To do this, press the "Contact" button on the CERT Services page

(<https://www.siemens.com/cert>) and follow the instructions.

11.7.6 Data backup

Secure your configuration and parameter settings so that you can quickly restore this data if needed.

11.7.7 Security checks

Security checks for data, files, and archives serve to ensure data integrity at the storage location and during file transmission, protecting against manipulation and transmission errors. This is often achieved using digital checksums that are provided alongside the data. Tools (such as SHA-256 or SHA-512) for calculating and verifying these checksums are provided in many systems and named according to their respective calculation methods.

- File Integrity Guidelines describe the prescribed procedure for integrity checks
- Integrity protection is a protection function for engineering data and firmware files
- Communication integrity means protecting communication against unauthorized manipulations to ensure high system availability. A central element in this regard is, for example, the use of digital checksums when accessing controllers. (Source: Industrial Cybersecurity website (<https://www.siemens.com/us/en/company/topic-areas/cybersecurity/industrial-security.html>))

11.7.8 Secure decommissioning

In the following section, you will find information on how to properly decommission individual components of your automation system. Decommissioning is necessary when the component has reached the end of its service life.

Decommissioning includes environmentally sound disposal and secure removal of all digital data of electronic components with storage medium.

11.7.8.1 Securely removing data

Before disposing of components of your automation system, you should securely delete all data from the storage media of these components. How to securely delete data from the devices so that it cannot be recovered is described below.

NOTICE
Data misuse resulting from non-secure deletion of data
Incomplete or non-secure deletion of data from data memories can result in data misuse by third parties.
For this reason, ensure secure deletion of data from all storage media used before disposing of the product.

Secure erasure of data from the I/O device

With the following tools, you can securely erase the data from the I/O device:

- STEP 7 < V19
- SIMATIC Automation Tool
- MultiFieldbus Configuration Tool (MFCT)
- PRONETA

Follow these steps in the order given:

1. Establish an online connection.
2. Open the Online and Diagnostics view of the I/O device (either from the project context or via "Accessible devices").
3. In the dialog box "Functions > Reset to factory settings", select the option "Delete I&M data" and then the "Reset" button.

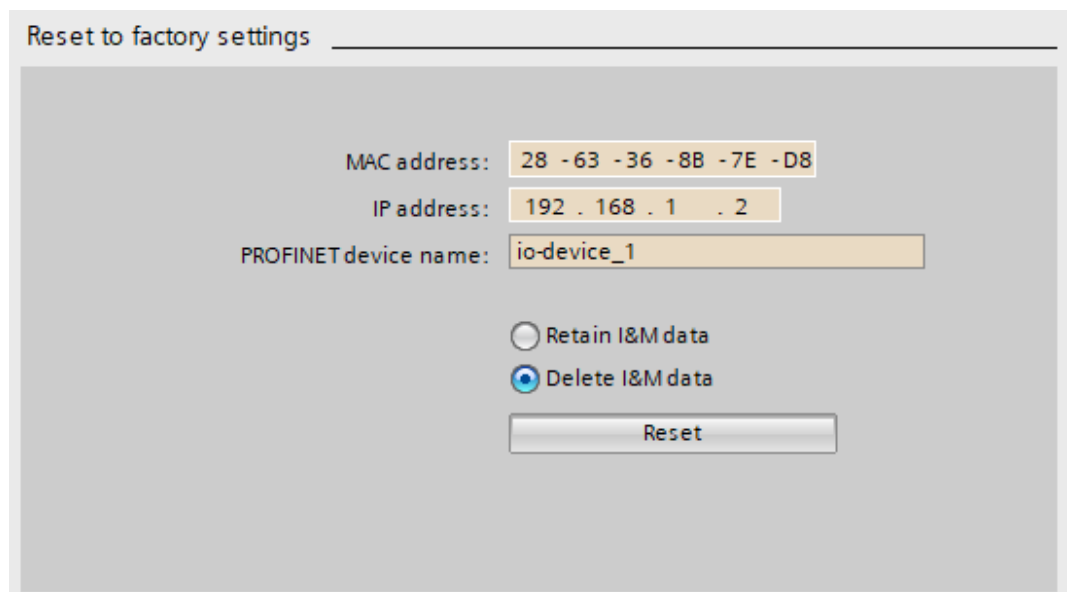


Figure 11-1 Resetting the I/O device to factory settings

Result: All the data that was still in the data memories of the I/O device was deleted. You can now dispose of the components.

For more information on resetting the I/O device to factory settings, refer to the section Resetting an interface module to factory settings (Page 67).

NOTE

STEP 7 ≥ V19

Only the communication parameters will be securely deleted on "Reset to factory settings" with the "Delete I&M data" option enabled when you use STEP 7 ≥ V19.

Deleted communication parameters:

- IP address
- Device name
- PROFINET configuration data

If you want to securely remove all data, use one of the tools listed above for this purpose.

11.7.8.2 Recycling and disposal

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

NOTE

Recycler Guides

Disassembly of electronic devices may only be carried out by specialists trained in the recycling of electronic products.

The Siemens Recycler Guides provide step-by-step disassembly instructions and material composition information of the products. This information helps recyclers direct specific materials to specialized recyclers and thus maximize the recovery of resources.

You can find the Recycler Guides in the SiePortal (<https://sieportal.siemens.com/en-ww/home>) in the "Support" area by using the search term "Recycler Guide".

11.8 Secure operation of the engineering software

For more information on secure operation of the engineering software, refer to the TIA Portal online help.

11.9 Secure operation of I/O devices

Device-specific security information and notes on I/O devices can be found in the respective Equipment Manual.

11.9.1 Signed firmware update

Signed firmware update

A signed firmware update ensures the authenticity and integrity of the firmware loaded onto a device.

It protects you against installing malicious firmware in case:

- Firmware was modified
- Firmware was downloaded from an incorrect internet source

Information on whether your I/O device supports signed firmware updates is available in the Technical specifications section of the corresponding Equipment Manual.

Principle of the signed firmware update for I/O device

Firmware updates of I/O devices may include a digital signature. The digitally signed firmware update files are available for download on the Siemens Support Web page.

The I/O device verifies the authenticity and integrity of the firmware update file before installation using the digital signature with standardized asymmetric cryptography methods. As a result, the I/O device can detect a manipulated or corrupted firmware update file and reject it.

Note that the I/O device performs the verification only after the complete firmware download has taken place.

Subsequently, a notification is sent to the firmware update tool regarding the success or failure of the signature verification.

You still have all the options for firmware updates, as described in the Firmware update section, when performing signed firmware updates for I/O devices. If the firmware update was not successful, the I/O device will continue to run with the previous firmware.

Diagnostics alarms and remedy

When performing a firmware update for an I/O device with an established connection between the I/O device and CPU, the following options for notifications are available in the CPU's diagnostic buffer:

- Successful integrity check of the firmware for the I/O device
- Rejection of non-secure firmware for the I/O device

For more information, refer to the Channel Diagnostics table in the Equipment Manual of the I/O device.

In case of firmware update rejection, proceed as follows:

1. Check whether the firmware update file you are using originates from a secure source and was downloaded unchanged. As a check, calculate the hash value of the downloaded firmware update file and compare it with the value specified on the download page.
2. Download the firmware again from the Siemens Support Web page.
3. Repeat the firmware update.

Information on the procedure for calculating and comparing hash values is available on the Internet (<https://support.industry.siemens.com/cs/de/de/view/109483101/en>).

Safety-related shutdown

A.1 Safety-related shutdown of ET 200clean

Introduction

The setup below describes how you shut down ET 200clean standard modules in a fail-safe manner.

With the setup shown (e.g. with safety relay 3SK1 or electronic module ET 200SP F-PM-E), all outputs that are connected to load voltage 2L+/2M (24 V Switched) of the ET 200clean standard modules are switched to the safe OFF state. The ET 200clean standard modules are operated at the supply voltage 1L+/1M. Supply voltage 1L+/1M is electrically isolated from load voltage 2L+/2M.

The maximum performance level achieved by the illustrated setup is SIL2/Category 3/PL d. The component with the lowest safety standard determines the maximum performance level a system achieves.

Principle of operation

A higher-level electromechanical safety relay (e.g. 3SK1) or an electronic fail-safe module (e.g. ET 200SP F-PM-E) isolates the load voltage 2L+/2M (24 V switched). The outputs of the ET 200clean standard modules operated at 2L+/2M (24 V Switched) are switched to the safe state. The outputs connected to 1L+/1M (24 V non-switched) are not intended for functional switching and therefore cannot be shut down safely.

You can also integrate I/O devices that are operated exclusively at supply voltage 1L+/1M (non-switched) in the setup of your distributed I/O system. These I/O devices must be enabled as reaction-free modules. Reaction-free modules relay the load voltage 2L+/2M and are not affected by a shutdown. The following schematic circuit diagrams illustrate this.

Schematic circuit diagram with 3SK1

The following figure shows a schematic circuit diagram with safety relay 3SK1.

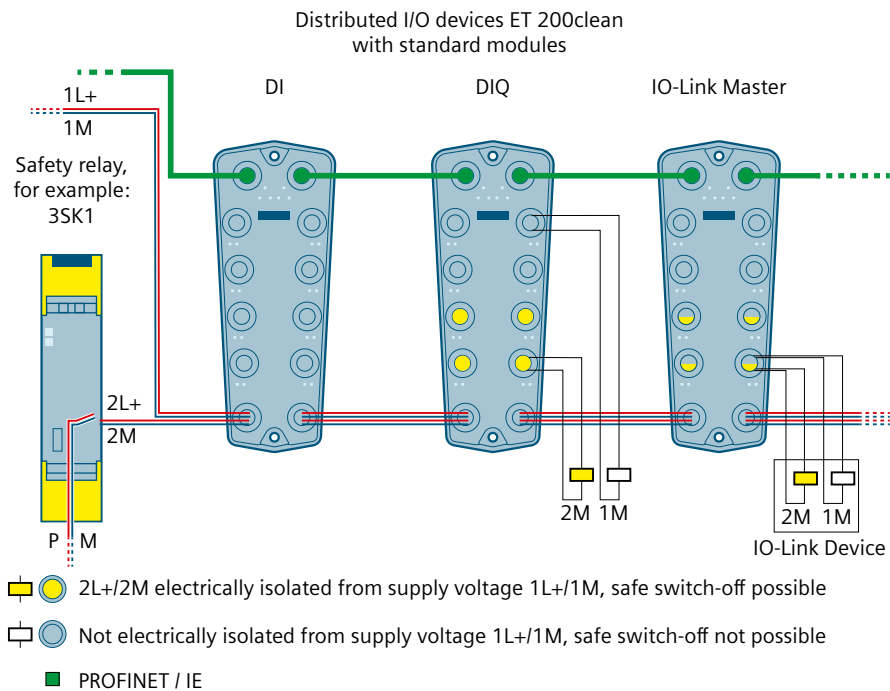


Figure A-1 Higher-level safety circuit of the outputs

You can find an overview table with the article numbers of the I/O devices and other information in the FAQ on safety-related shutdown

(<https://support.industry.siemens.com/cs/ww/en/view/39198632>).

Schematic circuit diagram with ET 200SP F-PM-E

The following figure shows a schematic circuit diagram with electronic module ET 200SP F-PM-E.

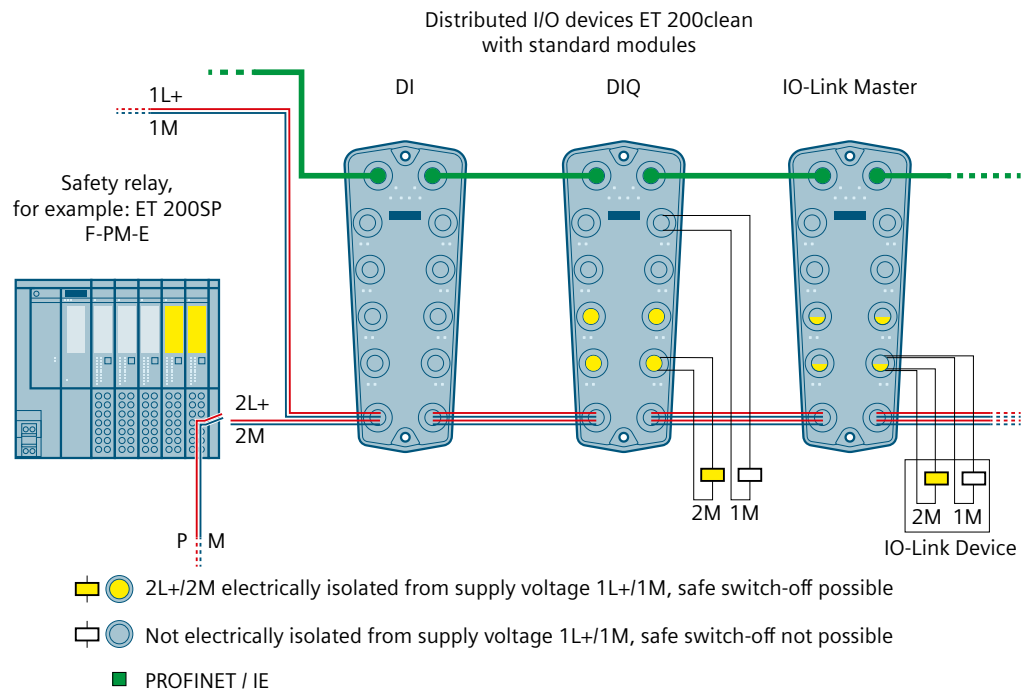


Figure A-2 Higher-level safety circuit of the outputs

You can find an overview table with the article numbers of the I/O devices and other information in the FAQ on safety-related shutdown

(<https://support.industry.siemens.com/cs/ww/en/view/39198632>).

Planning

Note the following points when planning safety circuits.

WARNING

Pay attention to potential groups for safety-related shutdown

When a digital output is connected to a digital input, pay attention to the potential groups. Depending on the configuration, 1M and 2M can then be connected, which leads to elimination of the electrical isolation between 1L+ and 2L+. Safety-related shutdown is not permitted if electrical isolation has been eliminated.

WARNING

24 V encoder supply 2U_S for DIQ channels at 2L+/2M

Use only the 24 V encoder supply 2U_S provided by the I/O device for the encoder supply for DIQ channels.

If you use a different encoder supply, this eliminates the electrical isolation of the whole safety circuit. This prevents you from establishing a safe state in the entire system.

NOTE

Safe electrical isolation

Ensure protection by electrical separation for voltages greater than SELV/PELV.

If, for example, the actuators switch 230 V, there must be protection by electrical separation between the outputs and the 230 V components.

NOTE

Safety-related shutdown for the IO-Link master

For an IO-Link master with IO-Link Port Class B, safety-related shutdown is available for the additional supply (PIN 2 and PIN 5).

The other signals at the port are reaction-free if you ensure electrical isolation from PIN 2 and PIN 5 of the port.

Note that the IO-Link device must have corresponding safety characteristics in order to use the safety-related shutdown.

ET 200SP F-PM-E documents

If you use an electronic module ET 200SP F-PM-E for a safety circuit, observe the information in these documents:

- Manual for Power Module F-PM-E 24VDC/8A PPM ST
(<https://support.industry.siemens.com/cs/ww/en/view/78645796>)
- Product information for Power Module F-PM-E 24VDC/8A PPM ST
(<https://support.industry.siemens.com/cs/ww/en/view/109761777>)

Settings for ET 200SP F-PM-E

Consider the whole system when setting and planning. Here is a small excerpt of various settings.

- Operation only as a PM-switching parameterized module, as presented in section "Safety-related shutdown of ET 200clean (Page 97)".
- Disabling of dark test (max. SIL 2, Cat.3/PL d) since it causes outputs to drop out briefly
Observe the information in Manual for Power Module F-PM-E 24VDC/8A PPM ST
(<https://support.industry.siemens.com/cs/ww/en/view/78645796>) and Product information for Power Module F-PM-E 24VDC/8A PPM ST
(<https://support.industry.siemens.com/cs/ww/en/view/109761777>)
- Switching of capacitive loads
Observe the information in section "Connecting capacitive loads" in Manual for Power Module F-PM-E 24VDC/8A PPM ST
(<https://support.industry.siemens.com/cs/ww/en/view/78645796>)

Limits of the higher-level safety circuit

The ET 200clean standard modules do not fulfill any safety functions. The safety functions are executed by the safety relay in order to bring the system into a safe state.

Adjust the operation inspection interval of the safety relay according to the safety class. Use the operating instructions and related documents of the utilized safety relay for this.

Take the following measures if energy that is not provided by the higher-level safety circuit is used to control the safety function.

Prevent dangerous faults in the safety function that are not detected by the higher-level safety circuit (e.g. 3SK1 or ET 200SP F-PM-E) by adopting suitable safety measures. The "diagnostics" must be performed indirectly via the controlled process.

Requirements for safety-related process data:

- Functionally safe
- Read via fail-safe inputs (e.g. F-DI)
- Fail-safe processing unit (e.g. F-CPU) for output of commands
- Output through fail-safe outputs (e.g. F-DQ) for controlling the safety function

If these criteria are not met, bring the standard modules to the safe state through the higher-level safety circuit.

- Process error
- Faulty standard modules

Take the fault tolerant time interval (FTTI) of the process into account for this.

Requirements for the power supply

Operation requires a SELV/PELV power supply for limiting overvoltages on L+ and M (24 V). This measure prevents possible errors from the power supply side at the same time.

Select the power supply unit according to the requirements of the respective operating instructions for the shutdown device and for the ET 200clean system.

You can find more information on safe SELV/PELV in the data sheets of the power supply units used.

FAQ

The information on the safety-related shutdown of standard modules refers to the status of the issue date. Read the up-to-date information on safety-related shutdown in this FAQ (<https://support.industry.siemens.com/cs/ww/en/view/39198632>).

This FAQ specifies the SIMATIC standard modules that are suitable for a safety-related shutdown and a file with wiring examples.

Request TÜV report (Report no. SA104002T)

You can request copies of the TÜV report at the following address:

Siemens Aktiengesellschaft
Digital Industries
DI FA TI COS TT
P.O. Box 1963
D-92209 Amberg, Germany

Dimension drawing

The following figure shows the dimensions of an I/O device of the distributed I/O system ET 200clean.

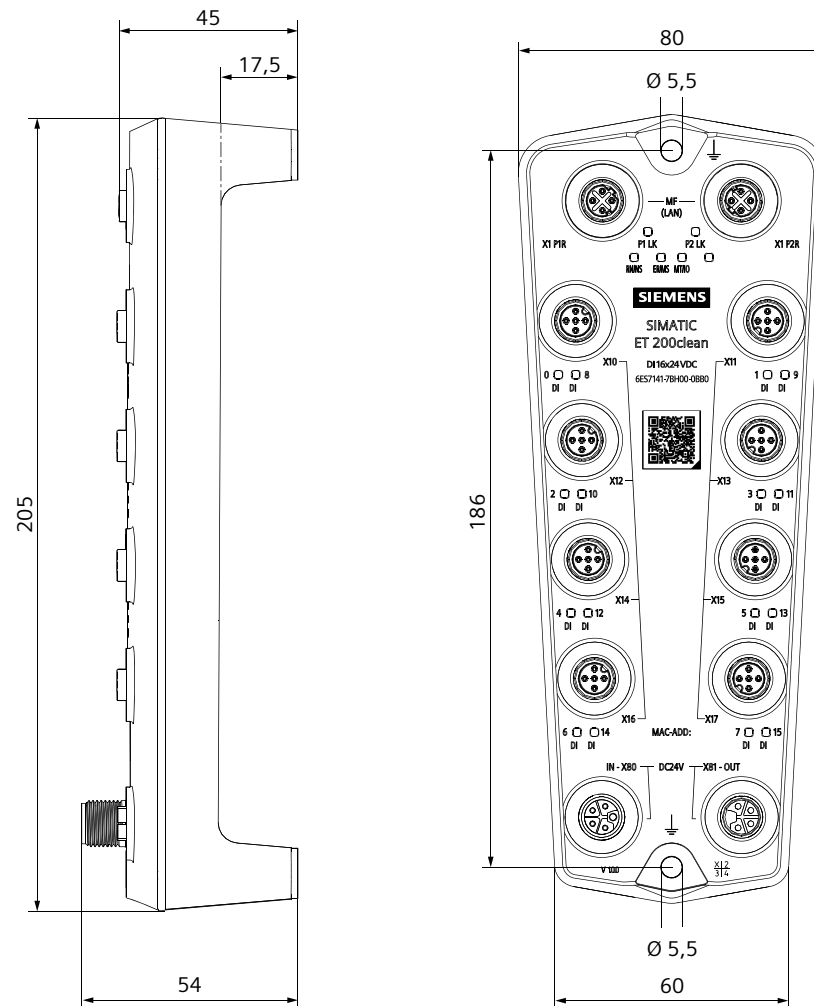


Figure B-1 Dimension drawing of an I/O device

Accessories/spare parts

C.1 Accessories/spare parts overview FAQ

You can find a detailed overview of suitable connectors and cables for the ET 200clean distributed I/O system in this FAQ

(<https://support.industry.siemens.com/cs/ww/en/view/109983348>).

C.2 Accessories/spare parts (hygienic)

Hygienic accessories for the ET 200clean distributed I/O system

Table C-1 Additional accessories

Designation		Article number
Fastening screw M5, Hygiene Design	10 unit/ pack	6ES7194-7MA00-0AA0
M12 sealing cap, hygienic design and an enclosed protective mounting sleeve	10 unit/ pack	6ES7194-7JA00-0AA0

Online catalog

Other article numbers for the ET 200clean distributed I/O system can be found on the internet (<https://sieportal.siemens.com/>) in SiePortal.

C.3 Accessories/spare parts (not hygienic)

Not hygienic accessories for the ET 200clean distributed I/O system

Table C-2 Accessories for power supply

Designation	Length	Article number
Cable is pre-assembled		
CONNECTING CABLE M12, L-CODED Power connecting cable M12-180/M12-180 for power supply of ET 200 Pre-assembled cable with M12 plug and M12 socket, L-coded, 4-pin	0.5 m	6XV1801-6DE50
	1.0 m	6XV1801-6DH10
	1.5 m	6XV1801-6DH15
	2.0 m	6XV1801-6DH20
	3.0 m	6XV1801-6DH30
	5.0 m	6XV1801-6DH50
	10.0 m	6XV1801-6DN10

Designation	Length	Article number
CONNECTING CABLE M12, L-CODED Power connecting cable M12-180/M12-180 for power supply of ET 200 Pre-assembled cable with M12 plug and M12 socket, L-coded, 4-pin	15.0 m	6XV1801-6DN15
M12 CONNECTING CABLE, L-CODED, ANGLED Power connecting cable M12-90/M12-90 for power supply of ET 200 Pre-assembled cable with M12 plug and M12 socket, L-coded, 4-pin	0.5 m	6XV1801-6GE50
	1.0 m	6XV1801-6GH10
	1.5 m	6XV1801-6GH15
	2.0 m	6XV1801-6GH20
	3.0 m	6XV1801-6GH30
	5.0 m	6XV1801-6GH50
	10.0 m	6XV1801-6GN10
	15.0 m	6XV1801-6GN15
Robust Power Connecting Cable M12-180/M12-180; IP69; 4x1.5 mm ² for power supply of end devices/network components; preassembled cable with M12 connector and M12 socket; L-coded; 4-pole	0.5 m	6XV1801-6EE50
	1.0 m	6XV1801-6EH10
	1.5 m	6XV1801-6EH15
	2.0 m	6XV1801-6EH20
	3.0 m	6XV1801-6EH30
	5.0 m	6XV1801-6EH50
	10.0 m	6XV1801-6EN10
	15.0 m	6XV1801-6EN15
Cable can be assembled in the field		
Power M12 Plug PRO; M12 connector with male contact insert, 4-pin, L-coded		6GK1906-0EA00
Power M12 Cable Connector PRO; M12 connector with female contact insert, 4-pin, L-coded		6GK1906-0EB00
Energy Cable 4 x 1.5; power cable (4-wire), by the meter, unassembled		6XV1801-2B

Table C-3 Non-preassembled connector PROFINET M12

Designation		Article number
Non-preassembled connectors for X1 P1R PN (LAN) and X1 P2R PN (LAN) socket		
PROFINET M12 plug connector D-coded with FastConnect connection system, 180°	1 unit/ pack	6GK1901-0DB10-6AA0
	8 units/ pack	6GK1901-0DB10-6AA8
PROFINET M12 plug connector, D-coded with FastConnect connection system, 180°	1 unit/ pack	6GK1901-0DB20-6AA0
	8 units/ pack	6GK1901-0DB20-6AA8
PROFINET M12 plug connector, D-coded, angled		3RK1902-2DA00

Table C-4 Non-preassembled cable **PROFINET** (sold by the meter)

Designation	Article number
Non-preassembled connectors for X1 P1R PN (LAN) and X1 P2R PN (LAN)	
PROFINET FC cable	
FC TP Standard Cable	6XV1840-2AH10
FC TP Trailing Cable	6XV1840-3AH10
FC TP Trailing Cable GP	6XV1870-2D
FC TP Marine Cable	6XV1840-4AH10
FC TP Torsion Cable	6XV1870-2F
FC TP Flexible Cable GP (PVC sheath)	6XV1870-2B
FC TP FRNC Cable (FRNC sheath)	6XV1871-2F
FC TP Food Cable (PE sheath)	6XV1871-2L
FC TP Festoon Cable GP (PVC sheath)	6XV1871-2S

Table C-5 Pre-assembled cable PROFINET M12

Designation	Article number	
Pre-assembled cable for X1 P1R PN (LAN) and X1 P2R PN (LAN)		
PROFINET M12 connecting cable, trailing cable, pre-assembled on both ends with M12 connectors 180° (pin)	0.3 m	6XV1870-8AE30
	0.5 m	6XV1870-8AE50
	1.0 m	6XV1870-8AH10
	1.5 m	6XV1870-8AH15
	2.0 m	6XV1870-8AH20
	3.0 m	6XV1870-8AH30
	5.0 m	6XV1870-8AH50
	10.0 m	6XV1870-8AN10
	15.0 m	6XV1870-8AN15
PROFINET M12 connecting cable, trailing cable, pre-assembled on both ends with M12 connectors, angled (pin)	0.3 m	6XV1870-8GE30
	0.5 m	6XV1870-8GE50
	1.0 m	6XV1870-8GH10
	1.5 m	6XV1870-8GH15
	2.0 m	6XV1870-8GH20
	3.0 m	6XV1870-8GH30
	5.0 m	6XV1870-8GH50
	10.0 m	6XV1870-8GN10
	15.0 m	6XV1870-8GN15
PROFINET M12 connecting cable, trailing cable, pre-assembled on both sides with PROFIBUS M12 connectors, angled (one end with pin, one end open)	3.0 m	3RK1902-2HB30
	5.0 m	3RK1902-2HB50
	10.0 m	3RK1902-2HC10
PROFINET M12 connecting cable, trailing cable, pre-assembled on one end with M12 connectors 180° (pin),	2.0 m	6XV1871-5TH20
	3.0 m	6XV1871-5TH30

Designation		Article number
other end with RJ45 plug 145°	5.0 m	6XV1871-5TH50
	10.0 m	6XV1871-5TN10
	15.0 m	6XV1871-5TN15

Table C-6 Y- connection

Designation		Article number
SIMATIC DP, Y cable for distributed I/O devices for double connection of I/O devices using single cable, 5-pin, M12	0.2 m	6ES7194-6KA00-0XA0
SIMATIC DP, Y-connector for distributed I/O devices for double connection of I/O devices using single cable, 5-pin, M12	1 unit/ pack	6ES7194-1KA01-0XA0

Table C-7 Additional accessories

Designation		Article number
SEALING CAP M12 AS-Interface accessories M12 sealing cap for IP67 modules external diameter 12 mm without O-ring	100 unit/ pack	3RX9802-0AA00
Stripping Tool for PROFINET		6GK1901-1GA00

Online catalog

Other article numbers for the ET 200clean distributed I/O system can be found on the internet (<https://sieportal.siemens.com/>) in SiePortal.

C.4 UL-approved cables

In combination with the UL-approved cables for the power supply and the connection of inputs/outputs, the SIMATIC ET 200clean distributed I/O devices meet UL approval. Siemens has UL-approved cables for these applications in the product portfolio.

SIMATIC ET 200clean data

The EU Data Act, a key component of the European data strategy, went into effect on January 11, 2024.

The following information provides an overview of the data that is generated by the SIMATIC ET 200clean automation system and accessible to you.

Type, format, and estimated scope of data that the product is capable of generating

Type of data	Formats	Estimated scope
Process data (input and output data, states, alarms)	Numeric formats, binary formats	Cyclic processing Depending on application
Configuration and parameter data (upload to programming device/PC)	Binary formats, string formats	Depending on application
Diagnostics data, service data	Binary formats	Depending on application Less than 100 bytes per diagnostic event; several kilobytes of service data
Fieldbus* metadata: I&M data, log data, statistics data	Binary formats, string formats	Approximately 100 bytes per read-out data record

* PROFINET, EtherNet/IP, Modbus TCP

Continuous and real-time data generation

The I/O devices are able to generate data continuously and in real time. Data acquisition takes place continuously throughout the entire operation. The cycle time is specified by the CPU.

Data storage and storage duration

Local data storage

The I/O devices store data in integrated memory areas.

Local data storage	Storage capacity	Storage duration
Retentive memory (for I&M data, configuration and parameter data, service data)	I/O devices up to 16 MB	Permanent
Work memory (for process data, diagnostics data, fieldbus metadata, configuration and parameter data, service data)	I/O devices up to 1 MB	During operation of the I/O device

Data access/retrieval, terms of use, and quality of service

Type of data	Access/retrieval via	Terms of use	Quality of service*
Process data (input and output data, states, alarms)	CPU TIA Portal SIMATIC Automation Tool PRONETA S7-PCT (for IO-Link masters) MFCT (for interface modules as MultiFieldbus devices)	Via fieldbus without authentication Via CPU (https://support.industry.siemens.com/cs/de/de/view/59193101-en)	Prioritization of control tasks over data access Standard fieldbus transmission mechanisms Data throughputs up to 1 Gbps via PROFINET
Configuration and parameter data (upload to programming device/PC)	TIA Portal (via CPU) S7-PCT (for IO-Link masters) MFCT (for interface modules as MultiFieldbus devices)	Via fieldbus without authentication Via CPU (https://support.industry.siemens.com/cs/de/de/view/59193101-en)	Standard fieldbus transmission mechanisms
Diagnostics data, service data	CPU TIA Portal SIMATIC Automation Tool PRONETA S7-PCT (for IO-Link masters) MFCT (for interface modules as MultiFieldbus devices)	Via fieldbus without authentication Via CPU (https://support.industry.siemens.com/cs/de/de/view/59193101-en)	Standard fieldbus transmission mechanisms
Fieldbus metadata: I&M data, log data, statistics data	CPU TIA Portal SIMATIC Automation Tool PRONETA S7-PCT (for IO-Link masters) MFCT (for interface modules as MultiFieldbus devices)	Via fieldbus without authentication Via CPU (https://support.industry.siemens.com/cs/de/de/view/59193101-en)	Standard fieldbus transmission mechanisms

* "Quality of service" refers to the ability of the I/O devices to manage network resources efficiently and to ensure that specific performance requirements for data transmission are met.

Deleting data from I/O devices

To delete all data from the data memories of the I/O device, the "Reset to factory settings" function is available.

To reset the I/O device to factory settings, the following access options are available:

- TIA Portal
- SIMATIC Automation Tool
- MultiFieldbus Configuration Tool (MFCT)
- PRONETA

More information

You can find more information on deleting data in the sections "Securely removing data (Page 92)" and "Reset to factory settings (Page 67)" sections.

Glossary

AR (Application Relation)

The AR (Application Relation) comprises all the communication relations between IO controller and IO device (e.g. IO data, data records, alarms). AR is also an addressing level for diagnostic data records.

Bus

A common transfer route connecting all nodes and having two defined ends.

Configuration

Systematic arrangement of the individual I/O devices (configuration).

Connection plug

Physical connection between device and cable.

Derating

Derating allows devices to be used even in harsh operating conditions by selectively restricting the output capacity. In the case of I/O devices, this usually refers to operation at high ambient temperatures.

Device

Device that can send, receive or amplify data via the bus, e.g. IO device via PROFINET IO.

Diagnostics

Monitoring functions for the detection, localization, classification, display, and further evaluation of errors, faults, and alarms. They run automatically while the system is in operation. This increases the availability of systems by reducing commissioning times and downtimes.

Distributed I/O system

System with input and output modules that are configured on a distributed basis, far away from the CPU controlling them.

EtherNet/IP

EtherNet/IP is a communication protocol based on TCP/IP and UDP/IP. EtherNet/IP thus extends the use of all Ethernet components and the well-known network and transport protocols in the industrial environment.

Firmware update

Upgrade of firmware for modules (interface modules, I/O modules etc.), e.g. after functional enhancements, to the newest firmware version (update).

Ground

A part of the ground, which is considered conductive and whose electrical potential is usually assumed to be zero, is outside the zero point of influence of a grounding arrangement.

All electrically conductive, interconnected, inactive parts of a piece of equipment that cannot accept any dangerous contact voltage, even in the event of a fault.

Ground

A part of the ground, which is considered conductive and whose electrical potential is usually assumed to be zero, is outside the zero point of influence of a grounding arrangement.

All electrically conductive, interconnected, inactive parts of a piece of equipment that cannot accept any dangerous contact voltage, even in the event of a fault.

GSD file

As a generic station description, this file in XML format has all the properties of a PROFINET or PROFIBUS device that are required for its configuration.

I/O modules

All modules that can be operated with a CPU or an interface module.

Identification data

Information that is saved in modules and that supports the user in checking the plant configuration and locating hardware changes.

Interface module

Module in the distributed I/O system. The interface module connects the distributed I/O system to the CPU (IO controller) via fieldbus and processes the data for and from I/O devices.

IO-Link

IO-Link is a point-to-point connection to conventional and intelligent sensors/actuators. The line is an unshielded 3-wire or 5-wire standard cable. IO-Link is downward compatible to all DI/DQ sensors/actuators. Switching status channel and data channel are designed in proven 24 V DC technology.

Macro environment

The macro environment is the environment of the room or other location in which the equipment is installed or used.

Micro environment

The micro environment of an electrical system are environmental conditions that directly influence the dimensioning of the clearances and creepage distances.

Modbus TCP

Modbus TCP is a communication protocol based on a master/device architecture or client/server architecture.

MultiFieldbus

MultiFieldbus states that a device supports several bus protocols. For example, PROFINET, Modbus TCP and EtherNet/IP.

Parameter assignment

Parameter assignment is the transfer of parameters from the IO controller to the IO device.

PELV

Protective Extra Low Voltage = grounded protective extra-low voltage

PG

→ Programming device

PROFINET

PROcess Field NETwork, open Industrial Ethernet standard, which continues PROFIBUS and Industrial Ethernet. A cross-manufacturer communication, automation and engineering model, defined as an automation standard by PROFIBUS International e.V.

PROFINET IO controller

Device used to address connected I/O devices (for example, distributed I/O systems). This means that: The IO controller exchanges input and output signals with assigned IO devices. The IO controller often corresponds with the CPU in which the automation program is running.

PROFINET IO device

Distributed field device that can be assigned to one or more IO controllers (for example distributed I/O system, valve terminals, frequency converters, switches).

PROFINET IO

Communication concept for the realization of modular, distributed applications in the framework of PROFINET.

Programming device

Programming devices are essentially compact and portable PCs which are suitable for industrial applications. They are identified by a special hardware and software configuration for programmable logic controllers.

Reference potential

Potential from which the voltages of the circuits involved are observed and/or measured.

S7-PCT

S7-Port Configuration Tool = Siemens program for the parameter assignment of Siemens IO-Link master modules and IO-Link devices from any manufacturer.

SELV

Safety Extra Low Voltage = potential-free safety extra-low voltage

TIA Portal

Totally Integrated Automation Portal

TIA Portal is the key to the full performance capability of Totally Integrated Automation. The software optimizes operating, machine and process sequences.

Value status

Binary additional information for an input signal. This additional information indicates whether or not the input signal is valid. Example: The value of the input signal is invalid if wire break has been detected or flutter monitoring has responded. In this case, exception handling is triggered in an automation function (e.g. with safe substitute value).

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