SIEMENS

# SIMATIC

# ET 200eco PN
# Distributed I/O system ET 200eco PN M12-L

System Manual




08/2025
A5E48753295-AK

## Legal information

### Warning notice system

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

**⚠ DANGER**

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

**⚠ WARNING**

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

**⚠ CAUTION**

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

**NOTICE**

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

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

### Qualified Personnel

The product/system described in this documentation may be operated only by **personnel qualified** for the specific task in accordance with the relevant documentation, in particular its warning notices and safety instructions. Qualified persons are those who, because of their training and experience, are familiar with the installation, assembly, commissioning, operation, decommissioning and disassembly of the product and can recognize risks and avoid possible hazards.

### Proper use of Siemens products

Note the following:

**⚠ WARNING**

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

### 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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A5E48753295-AK
Ⓟ 08/2025 Subject to change

# Table of contents

# Introduction

1

## Purpose of the documentation

This documentation provides you with important information on configuring, installing, wiring and commissioning the SIMATIC ET 200eco PN M12-L distributed I/O devices.

The ET 200eco PN M12-L I/O devices are the innovation of the proven product family ET 200eco PN. You can recognize the I/O devices of the new innovation level by the suffix **M12-L**.

## 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 200eco PN M12-L 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:

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**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.

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## Standards

You can find a dated reference to the respective standards or the EU Declaration of Conformity on the Internet (https://support.industry.siemens.com/cs/ww/en/ps/14244/cert?ct=444&ci=526).

## 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

- 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).
- You can find more information in section SiePortal (Page 9).

## 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 to ET 200eco PN M12-L

### 1.2.1 Information classes ET 200eco PN M12-L

The documentation for the SIMATIC ET 200eco PN M12-L 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/de/en/view/109742718).

#### Basic information

The System Manual describes in detail the configuration, installation, wiring and commissioning of the SIMATIC ET 200eco PN M12-L distributed I/O system.

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

Examples:

- ET 200eco PN M12-L 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 Equipment Manuals
- I/O Device Digital Inputs/Outputs Equipment Manuals
- IO-Link Master I/O Device Communication Module Equipment Manual
- I/O Device Analog Inputs Equipment Manual

### General information

The function manuals contain detailed descriptions on general topics relating to the SIMATIC ET 200eco PN M12-L 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/TwLSxxRQQsA)

### Retention of the documentation

Retain the documentation for later use.

For documentation provided in digital form:

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

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

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

## Updating the documentation

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

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

## mySupport

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

| | |
|---|---|
| **Registration** | You must register once to use the full functionality of "mySupport". After registration, you can create filters, favorites and tabs in your personal workspace. |
| **Support requests** | Your data is already filled out in support requests, and you can get an overview of your current requests at any time. |
| **Documentation** | In the Documentation area you can build your personal library. |
| **Favorites** | You can use the "Add to mySupport favorites" to flag especially interesting or frequently needed content. Under "Favorites", you will find a list of your flagged entries. |
| **Recently viewed articles** | The most recently viewed pages in mySupport are available under "Recently viewed articles". |
| **CAx data** | The CAx data area gives you access to the latest product data for your CAx or CAe system. You configure your own download package with a few clicks:<br>• Product images, 2D dimension drawings, 3D models, internal circuit diagrams, EPLAN macro files<br>• Manuals, characteristics, operating manuals, certificates<br>• 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 instructions

# 2

## 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 related icons for ET 200eco PN M12-L

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**<br>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. |
|  | The assigned safety symbols apply to devices with Ex approval.<br>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. |
|  | General warning sign **Hot surface**<br>The surface of I/O modules with the marking 'Hot surface' can heat up significantly during operation. |
|  | Read the information provided by the product documentation.<br>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.<br>IEC 60417 No. 6182 |

| Symbol | Meaning |
|---|---|
|  | Note that a device of Protection Class III can only be supplied with a protective low voltage according to the standard SELV/PELV.<br>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 88).

## 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

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.

### 2.7.1 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)).

## 2.7.2 Conductive pollution

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

## 2.7.3 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 the correct installation position.
- 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.

### 2.7.4 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 105)).
- 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 Technical specifications (Page 88).

## 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 200eco PN M12-L distributed I/O devices only with disconnected supply and load voltages.

  Refer to section Mounting (Page 30)
- 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 200eco PN M12-L.
  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 80)
- When disconnecting plug-in connections during running operation, personal injury and material damage may occur in potentially explosive atmospheres.
  In potentially explosive atmospheres, de-energize the ET 200eco PN M12-L I/O device before disconnecting plug connections.

  Observe the special conditions for hazardous areas in these sections:

  – Codes and approvals (Page 88)
  – Use of the ET 200eco PN M12-L in Zone 2/Zone 22 hazardous areas (Page 103)

# New properties/functions

# 3

## 3.1 Changes compared to previous version

### What's new in the ET 200eco PN M12-L System Manual, 08/2025 edition compared to the 11/2024 edition?

| What's new? | | What are the customer benefits? | Where can I find information? |
|---|---|---|---|
| New contents | ID link | Here you will find a description of the ID link | Section Introduction (Page 7) |
| | Importer addresses | You can find the importer addresses for specific countries here. | Section Standards and requirements (Page 94) |
| | SIMATIC ET 200eco PN M12-L data | This section provides an overview of the data that is generated by the SIMATIC ET 200eco PN M12-L automation system and accessible to you. | Section SIMATIC ET 200eco PN M12-L data (Page 133) |
| Changed contents | Technical specifications | Various specifications have been adapted in the "Technical specifications" section | Section Technical specifications (Page 88) |
| | Industrial cybersecurity | The contents relating to measures and protection of your plants and systems against cyber attacks have been modified. | Section Industrial cybersecurity (Page 105) |

### What's new in the ET 200eco PN M12-L System Manual, 11/2024 edition compared to the 06/2024 edition?

| What's new? | | What are the customer benefits? | Where can I find information? |
|---|---|---|---|
| Changed contents | Firmware update and reset to factory settings as of STEP 7 V5.6 | The firmware update and the reset to factory settings is possible online with STEP 7 as of version V5.6. | Section Firmware update (Page 82)<br>Section Resetting the I/O device to factory settings (Page 85) |
| | Temperature of the cables, connectors and plugs for hazardous areas | The requirements for the cables, connectors and plugs for the hazardous area have been modified. | Section Codes and approvals (Page 88) |
| | Industrial cybersecurity | The contents relating to measures and protection of your plants and systems against cyber attacks have been modified. | Section Industrial cybersecurity (Page 105) |
| | IP69 accessories | Addition of the accessories with IP69 cable for the power supply. | Section Accessories/spare parts (Page 128) |

### What's new in the ET 200eco PN M12-L System Manual, 06/2024 edition compared to the 03/2024 edition?

| What's new? | | What are the customer benefits? | Where can I find information? |
|---|---|---|---|
| Changed contents | Cleaning the I/O device | Supplementing the description with more details. | Section Cleaning the I/O device (Page 87) |
| | Shipping and storage conditions | Supplementing the transport condition class and storage condition class. | Section Transport and storage conditions (Page 98) |

### What's new in the ET 200eco PN M12-L System Manual, 03/2024 edition compared to the 11/2023 edition?

| What's new? | | What are the customer benefits? | Where can I find information? |
|---|---|---|---|
| New contents | Signed firmware update | A signed firmware update ensures the authenticity and integrity of the firmware loaded onto a device. | Section Signed firmware update (Page 118) |
| Changed contents | I/O device technology | The I/O device technology is included in the description and list. | Section What are the SIMATIC ET 200eco PN M12-L distributed I/O devices? (Page 25)<br>Section Wiring (Page 53) |
| | UL-approved cables | Noted that Siemens offers UL-approved cables for UL applications in the product portfolio. | Section UL-approved cables (Page 131) |

### What's new in the ET 200eco PN M12-L System Manual, 11/2023 edition compared to the 08/2023 edition?

| What's new? | | What are the customer benefits? | Where can I find information? |
|---|---|---|---|
| New contents | Approval for hazardous areas | According to the specifications in the information for use, the I/O devices are suitable for Zone 2/Zone 22 hazardous areas. | Starting with section System overview (Page 25) |
| | Tests for advanced environmental conditions | After approval you use the I/O devices under specific conditions in the outdoors. | Section Mechanical and climatic ambient conditions (Page 98) |
| | Safety information | The safety instructions are summarized in the new chapter. | Section Safety instructions (Page 16) |
| | Industrial cybersecurity | The new section contains the specifications and recommendations for the measures with which you can protect your plants and systems against cyber attacks. | Section Industrial cybersecurity (Page 105) |

## What's new in the ET 200eco PN M12-L System Manual, 08/2023 edition compared to the 03/2023 edition?

| What's new? | | What are the customer benefits? | Where can I find information? |
|---|---|---|---|
| New contents | Calibrating analog I/O devices | Certain directives require calibration for all components of a measuring circuit at regular intervals. | Section Calibrating an analog I/O device (Page 84) |
| | IP69K degree of protection | Approval of the IP69K degree of protection means you can now use the I/O devices in a wider range of applications. | Starting with section System overview (Page 25) |
| Changed contents | Safety-oriented tripping of ET 200eco PN M12-L | With safety-oriented tripping, you can shut down certain outputs of standard devices in a fail-safe manner. | Section Safety-related shutdown of ET 200eco PN M12-L (Page 120) |

## What's new in the ET 200eco PN M12-L System Manual, 03/2023 edition compared to the 02/2022 edition?

| What's new? | | What are the customer benefits? | Where can I find information? |
|---|---|---|---|
| New contents | EtherNet/IP | With MultiFieldbus, the I/O devices support the PROFINET IO, EtherNet/IP, and Modbus TCP communication protocols. | Section EtherNet/IP (Page 67) |
| | Modbus TCP | | Section Modbus TCP (Page 68) |

# System overview

# 4

## 4.1 What are the SIMATIC ET 200eco PN M12-L distributed I/O devices?

### SIMATIC ET 200eco PN M12-L

The SIMATIC ET 200eco PN M12-L 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. MultiFieldbus supports the following communication protocols:

- PROFINET IO
- EtherNet/IP
- Modbus TCP

The connection interface is marked PN/MF.

### Customer benefits of the system

**Easy to use**

- Simple wiring through coded M12 connections
- CAx compliant labeling of all interfaces
- Quick, comfortable configuration and commissioning viaSTEP 7 (TIA Portal)

**Simple power supply concept**

- High power input through power connector M12-L
- Supply of 2 power supplies isolated from each other

**Compact design**

- High IP quantity structures for module widths of 45 mm
- High degree of protection IP65/IP67 and IP69K
- Suitable for temperatures from -40 ° C to +60 °C and accelerations up to 20 g

**Communication standards**

- PROFINET IO
- EtherNet/IP
- Modbus TCP

**Flexible mounting**

- Simple installation in all mounting positionseven in the very confined spaces
- Spatially separated assemblyof the I/O devices
- Integration of sensor technology and actuator technology via M12 connection technology

**Flexible automation concepts**

- Access of multiple controllers with shared device and module-internal shared input / shared output (MSI/MSO)
- Deterministic connection of the sensors / actuators by means of clock-synchronous operation
- use in fault-tolerantapplications using S2 redundancy

Figure 4-1 ET 200eco PN M12-L benefits

## Area of application

The areas of application of the ET 200eco PN M12-L are derived from its special properties.

- A robust design and degrees of protection IP65/IP67 and IP69K make the ET 200eco PN M12-L distributed I/O device suitable for use in harsh industrial environments
- The distributed I/O ET 200eco PN M12-L with the IP54 degree of protection is suitable for use in Zone 2/Zone 22 hazardous areas.
- The compact design of the ET 200eco PN M12-L enables use in confined areas without control cabinets.
- The easy handling of ET 200eco PN M12-L facilitates fast commissioning and maintenance.

## Configuration

The SIMATIC ET 200eco PN M12-L distributed I/O system is made up of the following I/O devices:

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

The I/O devices of the ET 200eco PN M12-L are connected to an IO controller via MultiFieldbus.

## Configuration example

The figure below shows an example configuration with the ET 200eco PN M12-L distributed I/O devices in a PROFINET IO network.

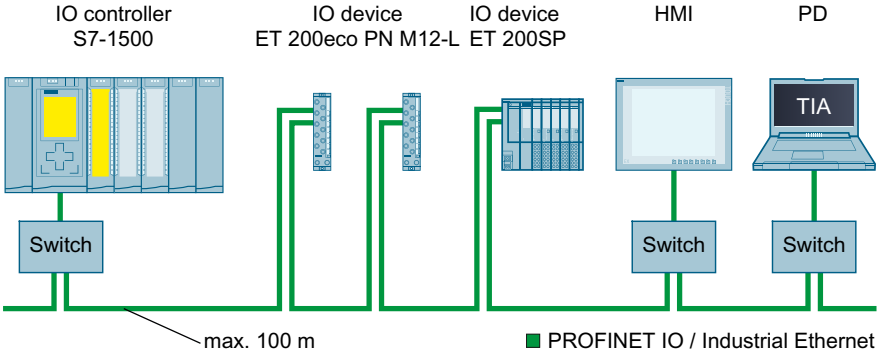


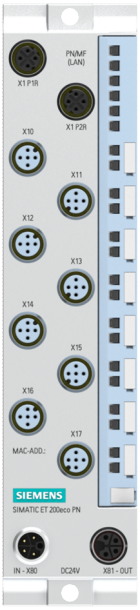

Figure 4-2 Configuration example of the ET 200eco PN M12-L

# 4.2 Components

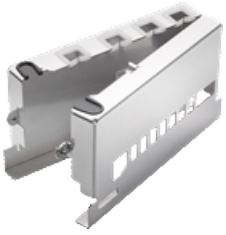
## Components of the ET 200eco PN M12-L distributed I/O system

The following table shows and explains the function of the most important components of the ET 200eco PN M12-L 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<br>• The I/O device provides the interface to the process<br>• Recording and controlling the current process status via the connected sensors and actuators |  |
| Mounting rail | • Simple installation of several I/O devices next to one another.<br>• Without drilling holes for I/O devices |  |
| Profile screws for mounting rail | • Suitable screw for mounting the I/O device on the mounting rail. |  |

| Component | Function | Figure |
|---|---|---|
| Identification labels | • The identification labels come with the module<br>• They can be machine-printed<br>• They can be ordered separately |  |
| Sealing cap | • Caps for unused connections<br>• IP protection class is maintained through use |  |
| PROFINET IO cable and M12-D plug | • Connection to the MultiFieldbus |  |
| Power connecting cable and M12-L plug / coupling | • Connection of supply and load voltages<br>• Looping through of supply and load voltages to other devices |  |

| Component | Function | Figure |
|---|---|---|
| Y cable | • Double connection of actuators or sensors to one socket<br>• IP protection class is maintained when 2 actuators or sensors are connected to one socket |  |
| Y-connector | • Double connection of actuators or sensors to one socket<br>• IP protection class is maintained when 2 actuators or sensors are connected to one socket |  |
| Plug cover | • For use in Zone 2 / Zone 22 hazardous area |  |

# Mounting

# 5

## 5.1 Basics

### Introduction

All ET 200eco PN M12-L 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. Only use such accessories which are permitted for the required degree of protection.

### Mounting position

You can mount the ET 200eco PN M12-L distributed I/O devices in any mounting position.

### Minimum clearances

Ensure that the I/O devices are installed with a minimum clearance of 2 cm.

If the installation distance to other devices or objects is less than 2 cm, the ambient temperature must be reduced by 5 K (for example, 60 °C ⇒ 55 °C). This also applies to the derating diagrams in the equipment manuals.

The plug cover is an accessory for protecting the connected connectors on the I/O device. The plug cover may be necessary for use in hazardous areas. If you use the plug cover, the minimum distances from section Installing the plug cover (Page 36) apply.

### Simple installation

The ET 200eco PN M12-L distributed I/O devices are designed for easy installation.

- The I/O device should be mounted on a level solid surface.
- The I/O device can be pre-wired.

## Mounting rules

When mounting the I/O device, you do not need to following any special rules.

The plug cover is an accessory for protecting the connected connectors on the I/O device. The plug cover may be necessary for use in hazardous areas. If you use the plug cover, the installation rules from section Installing the plug cover (Page 36) apply.

**NOTE**

**Mounting of the I/O devices**

Install the ET 200eco PN M12-L distributed I/O devices only with disconnected supply and load voltages.

## Configuration variants

There are two mounting variants:

- Without mounting rail
- With mounting rail

You can find additional information in the following sections.

## 5.2 Mounting without mounting rail

### Introduction

The ET 200eco PN M12-L distributed I/O devices are designed for installation on a level, firm surface.

The axially symmetric drill holes allow you to fasten the I/O devices to an aluminum or carrier profile.

The following picture shows an aluminum mounting rail on which the I/O devices can be mounted.

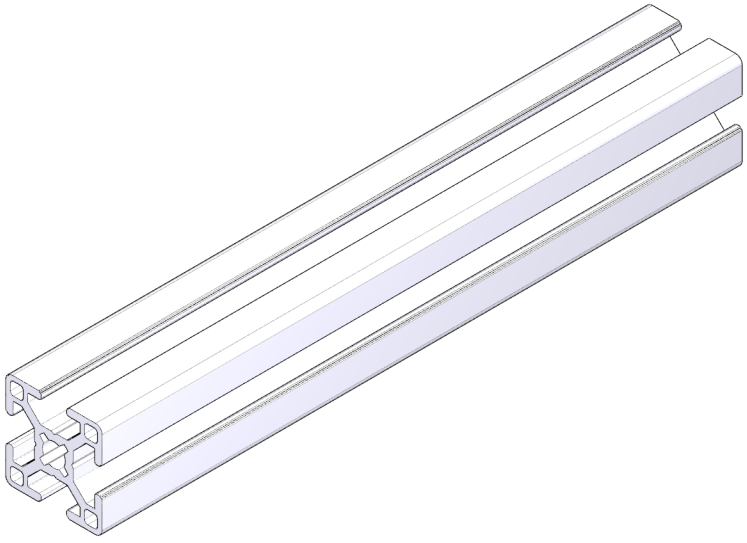


Figure 5-1 Aluminum profile

### Required tools

For the installation you need a screwdriver, suitable for the screws used.

### Required screws

For mounting, use screws with a diameter of 5 mm and a length of at least 35 mm.

### Drill holes of the I/O device

All enclosures of the ET 200eco PN M12-L distributed I/O devices have a uniform hole pattern.

The housings of the I/O devices are axially symmetric. The distance between the drill holes is identical for all I/O devices.

## Installing the I/O device

The I/O devices have an attachment point on top and on the bottom. You can also attach the I/O devices to the side.

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

1. Drill two fixing holes at a distance of 191 mm.
   The drilling hole diameter depends on your chosen installation.
2. Fasten the I/O device with the screws at both fastening points to the flat base surface.
   The torque is 3 Nm

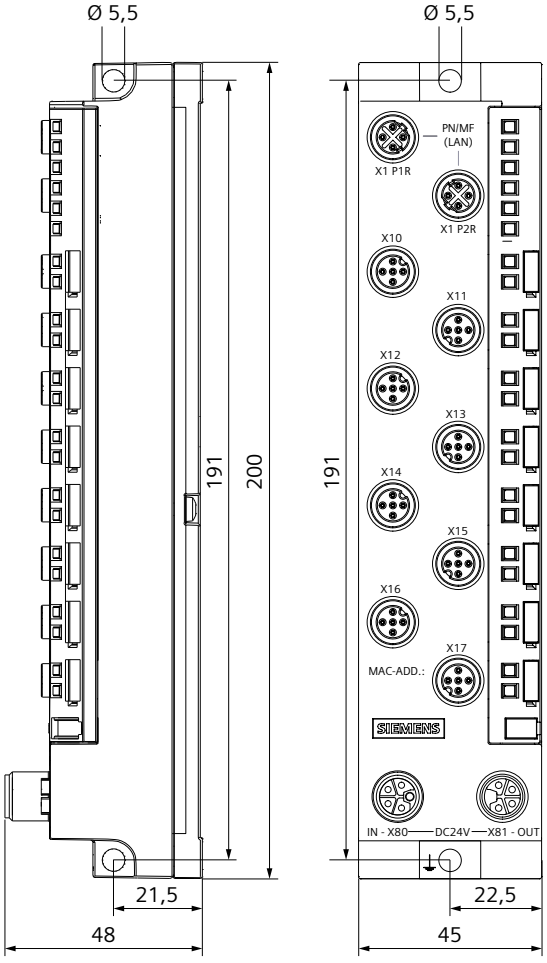



Figure 5-2 Mounting dimensions of the I/O device

# 5.3 Mounting with mounting rail

## Introduction

A suitable mounting rail and profile screws are available as accessories for mounting the I/O devices.

Advantages of the mounting rail:

- Mounting rail can be cut to size for the application
- No drill holes required for the individual I/O devices
- I/O devices can be easily mounted on the mounting rail by simply screwing in the profile screws.

## Required tools

For the installation you need a screwdriver, suitable for the screws used.

## Required screws

**For mounting rail**

To mount the mounting rail, use screws with a diameter of 8 mm and a length of at least 20 mm.

**For I/O devices on the mounting rail**

To mount the I/O device on the mounting rail, use the mounting rail screws for the mounting rail ET 200eco PN M12-L**.**

## Version

The mounting rail is available in a length of 500 mm.

## Installing the mounting rail

The mounting rail with 500 mm length must be cut to length according to your requirements.

To install the mounting rail with 500 mm length, follow these steps:

1. Drill the mounting holes for screws with 8 mm diameter.
   We recommend that, after an initial distance of 12 mm, the mounting holes be provided at regular intervals of 182 mm.
2. Fasten the mounting rail with the screws.

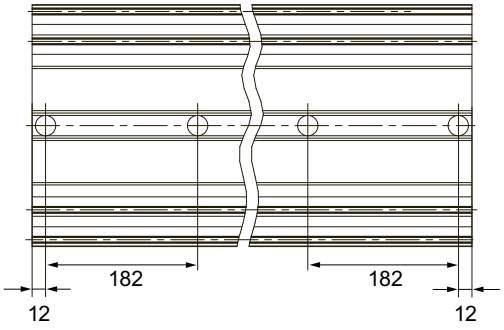



Figure 5-3 Installing the mounting rail

## Installing the I/O device

The I/O devices have an attachment point at top and bottom for front mounting and side mounting.

The mounting rail has a groove at the top and bottom in which the profile screws are simply screwed in without drilling.

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

1. Insert a profile screw through the mounting point of the I/O device and in a groove of the mounting rail.
2. Use the screwdriver to screw the I/O device to the mounting rail.
3. Align the I/O device on the mounting rail.
4. Insert a profile screw through the other mounting point of the I/O device and in the other groove of the mounting rail.
5. Screw the I/O device to the mounting rail. The tightening torque is 1.5 Nm.

## Accessories

The accessories for mounting the distributed I/O device can be found in section Accessories/spare parts (Page 128).

## 5.4 Installing the plug cover

The plug cover is an accessory for protecting the connected connectors on the I/O device. The plug cover may be necessary for use in hazardous areas. Complete the following tasks before installing the plug cover:

- Mounting the I/O device
- Wiring of the I/O device
- Various tests on the system

### Mounting rules

The use of the plug cover is possible with the following mounting rules:

- Cables with straight connection of the socket or plug
- Maximum outer diameter of socket/plug is 16 mm
- Maximum per cable holder
  - 3 cables
  - Maximum outer diameter is 7 mm
- Adherence to the minimum clearance
- Maximum 10 mounting and disassembly operations of the cables in the cable holders permitted

### Minimum clearances

Maintain the following minimum clearances.

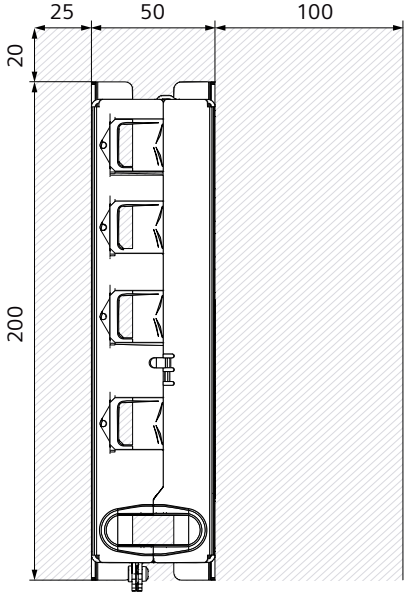



Figure 5-4 Minimum clearances

## Dimensions of plug cover

The figure below shows the dimensions of the plug cover.

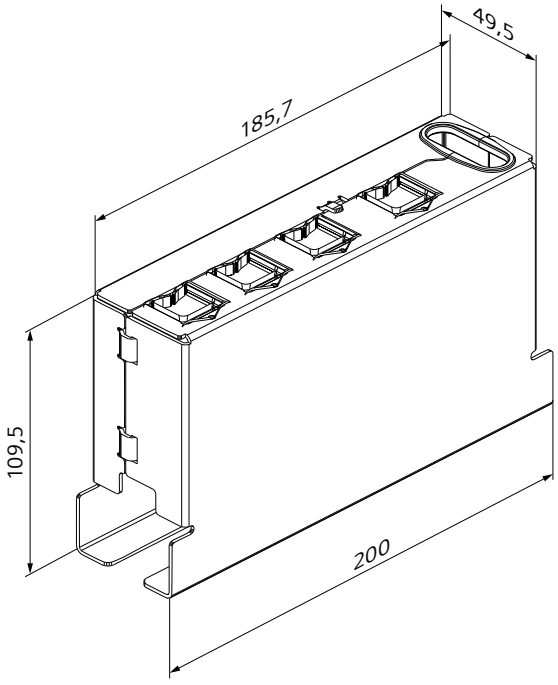



Figure 5-5 Dimensions of plug cover

## Requirement

The mounting of the I/O module is prepared according to the description of these sections:

1. Basics (Page 30)
2. The planned mounting variant:
   - Mounting without mounting rail (Page 32)
   - Mounting with mounting rail (Page 34)

## Required tools

For the mounting you will need:

- A screwdriver, suitable for the fixing screws used for the module.
- A TX 10 screwdriver for the plug cover

## Installing the plug cover

For the installation, follow the steps below.

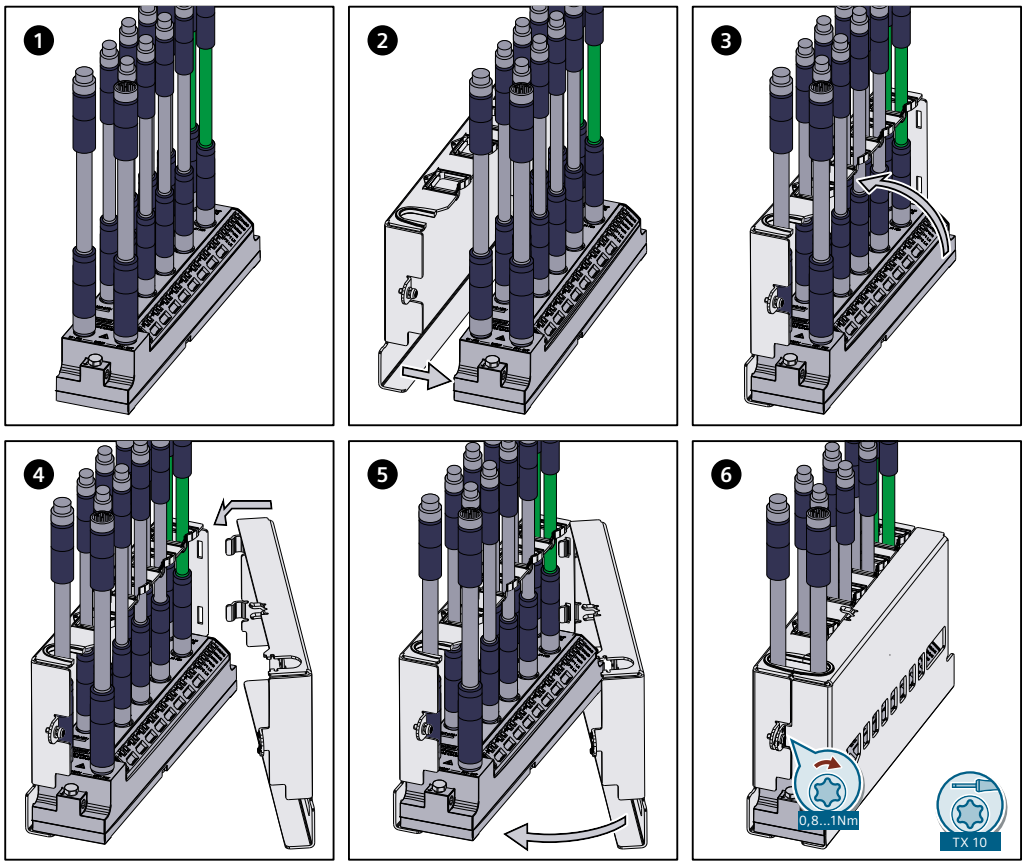



Figure 5-6 Installing the plug cover

1. Loosen the mounting screws of the I/O device
2. Slide the plug cover part with the cable cutouts under the I/O device.
3. Snap the connected cables into the provided cable holders
4. Hook the plug cover with the cutouts for the LED display into the plug cover with the cable cutouts.
5. Close the plug cover.
6. Close the plug cover with the connecting screw. Tightening torque: 0.8 to 1 Nm
7. Screw the cover into place on the I/O device, including the functional ground connection, with the fixing screws

# Connecting

# 6

## 6.1 Rules and regulations for operation

### Introduction

The ET 200eco PN M12-L 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 200eco PN M12-L 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 dangerous system conditions are excluded, 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 200eco PN M12-L 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.
- Conductor cross-section suitable for the application and fusing.
- Designed for a continuous ambient temperature of min. 20K (at 8 A) to 40K (at 12 A) above the ambient temperature of the ET 200eco PN M12-L. Please refer to the "Deratings of the input currents while maintaining the minimum clearance (Page 52)" 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 disconnector, there must be a disconnector 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 200eco PN M12-L distributed I/O system, the fluctuation/deviation of the line voltage from the rated value must be within the permitted tolerance.

You can find more information in section Details on insulation, protection class, degree of protection and rated voltage (Page 101).

### 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 60950-1.
  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 device are listed in the System Manual and the device manuals. If you do not comply with the specifications, malfunctions, interferences, failure or destruction of the peripheral device or connected peripherals can result.

### 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 200eco PN M12-L 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 200eco PN M12-L 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 200eco PN M12-L 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 200eco PN M12-L 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**<br>When operating in a damp / wet environment, voltage limits apply for SELV/PELV andere according to IEC 61010-2-201. |

### Configuring ET 200eco PN M12-L with grounded reference potential (PELV)

When configuring the ET 200eco PN M12-L distributed I/O devices with grounded reference potential, occurring interference currents are discharged into functional earth. The connections must be externally connected. Establish a connection between 1M or 2M and functional earth.

### Configuring ET 200eco PN M12-L with non-grounded reference potential (SELV)

When configuring the ET 200eco PN M12-L 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.

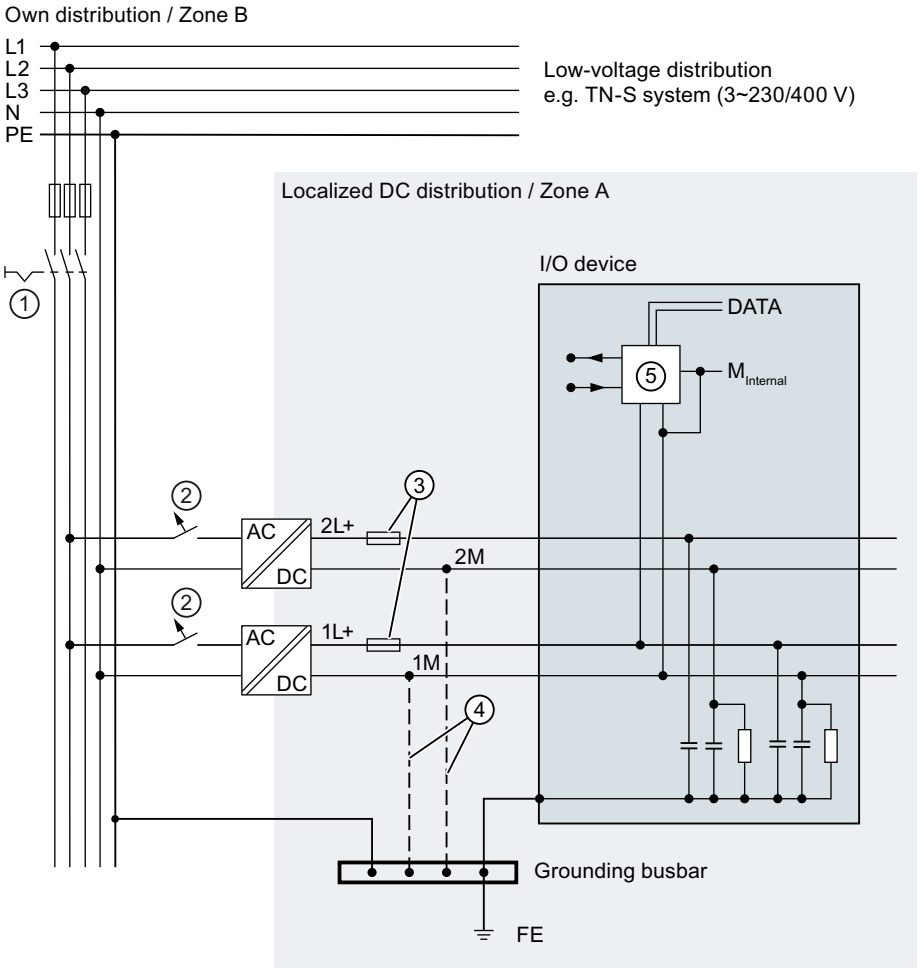
The following table shows the components of the electrical configuration with reference to the "Electrical configuration" figure below and compares the IEC regulations.

Table 6-1 Components of electrical configuration

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

## Overall configuration of ET 200eco PN M12-L

The following figure shows a ET 200eco PN M12-L 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 200eco PN M12-L 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 200eco PN M12-L 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 200eco PN M12-L distributed I/O devices with non-grounded reference potential
- If dangerous system states occur due to error

# 6.3 Electrical configuration of the ET 200eco PN M12-L

## Electrical isolation

The electrical configuration of the ET 200eco PN M12-L features electrical isolation between:

- 1L+: Non-switched supply voltage (electronics/sensor/load supply):
  Isolated from MultiFieldbus and 2L+ (load voltage supply)
- 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.

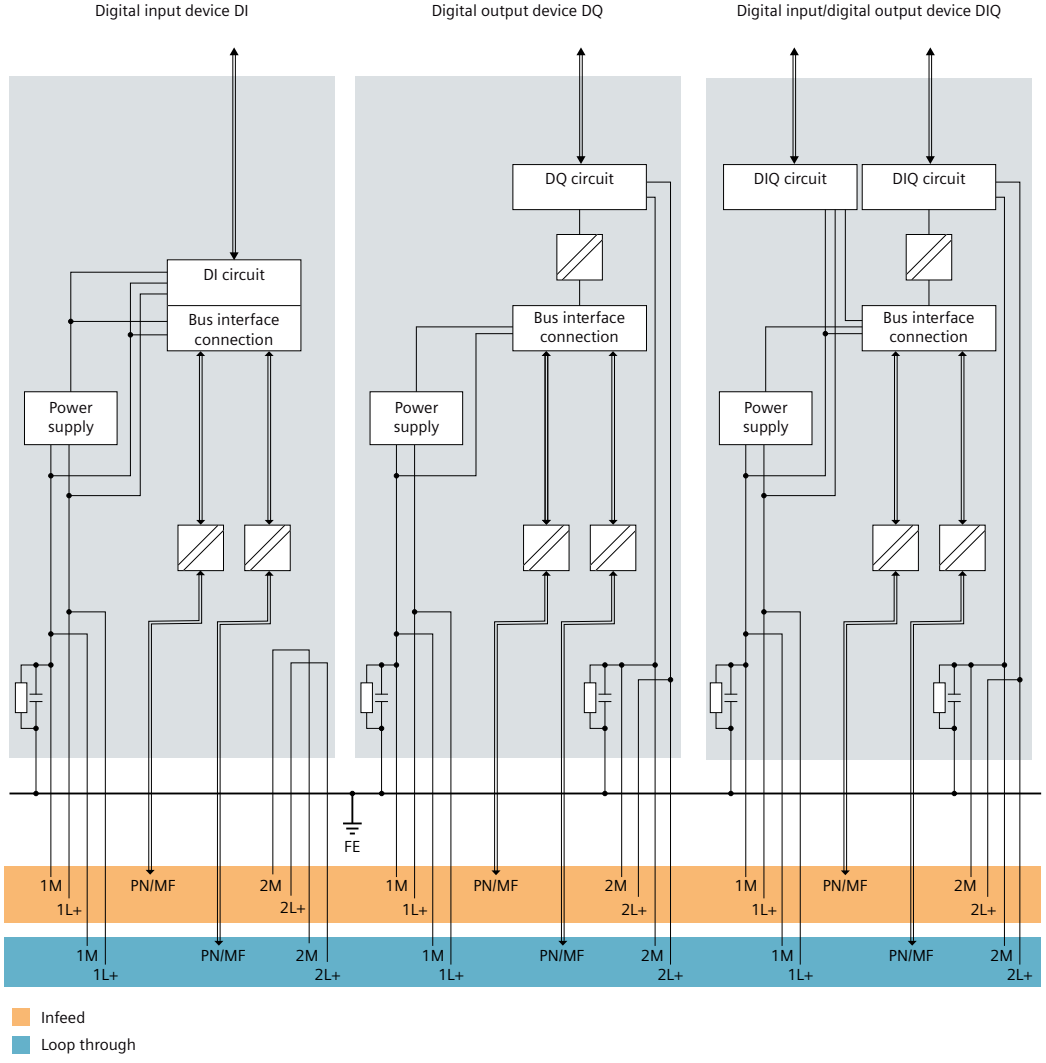



Figure 6-2 Electrical relationships

## 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 200eco PN M12-L 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**

**Turning 1L+ and 2L+ on and off**

In contrast to the load voltage 2L+, the operational switching on and off 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 200eco PN M12-L (Page 52).

## 6.4 Connecting ET 200eco PN M12-L to the functional earth

### Introduction

You must connect the ET 200eco PN M12-L distributed I/O devices to the functional earth.

### What is functional earth?

All ET 200eco PN M12-L I/O devices feature a functional-earth connection. This connection is used to suppress interference sensitivity, but not for protection purposes. With the functional earth connection, you create an electrical connection to a point of your system or shielding. This discharges the EMC interference directly into the earth. 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 earth connection is identified on the ET 200eco PN M12-L I/O devices.

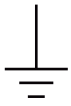


Figure 6-3 Functional earth

### 6.4.1 Mounting ET 200eco PN M12-L on conductive surface

#### Requirement

Conductive substrate for mounting of the I/O device.

#### Required tools

To connect to functional earth, you need the following tools:

- Screwdriver

#### Required accessories:

To connect to functional earth, you need the following accessories:

- 2 x 5 mm fixing screws

#### Mounting

Proceed as follows to connect ET 200eco PN M12-L distributed I/O devices to functional earth with a conductive mounting surface:

1. Drill two fastening holes. The dimensions of the I/O device can be found in the section Dimension drawing (Page 126).
2. Screw the module with the 5 mm fastening screws using a torque of 3 Nm.

**NOTE**

**Earthing with conductive mounting substrate**

If you attach a ET 200eco PN M12-L distributed I/O device to a conductive, grounded base, the two fixing screws establish a conductive connection to the ground potential.

Ensure that there is a low-impedance connection between the I/O device and conductive surface as well as between the conductive surface and the functional grounding.

#### Reference

You will find more information on installing the I/O devices in the section Mounting (Page 30).

## 6.4.2 Mounting ET 200eco PN M12-L on non-conductive surface

### Requirement

Non-conductive substrate for mounting of the I/O device.

### Required tools

To connect to functional earth, you need the following tools:

- Screwdriver
- Stripping tool
- Crimp tool

### Required accessories:

To connect to functional earth on a non-conductive fastening substrate, you need the following accessories:

- 2 x 5 mm fixing screws
- Cable lug, suitable for 5 mm screws
- Spring lock washer
- Washer
- Grounding cable (braided copper cable) with a minimum cross section of 4 $mm^2$

### Mounting

To connect ET 200eco PN M12-L distributed I/O devices to functional earth, proceed as follows:

1. Drill two fastening holes. The dimensions of the I/O device can be found in the section Dimension drawing I/O device (Page 126).
2. Strip the grounding cable.
3. Fasten the cable lug to the grounding cable.
4. Screw the I/O device and the cable lug with the 5 mm fastening screws using a torque of 3 Nm.

The figure below shows how to connect functional earth.

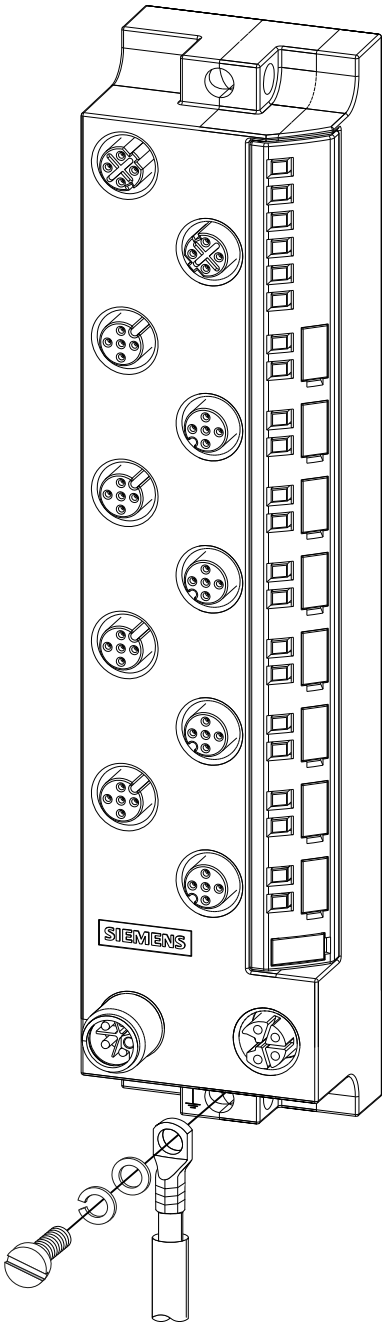



Figure 6-4 Connecting the functional earth

**NOTE**

**Earthing with non-conductive mounting substrate**

Make sure there is a low-impedance connection between the I/O device and the functional earth.

### Reference

You will find more information on installing the I/O devices in the section Mounting (Page 30).

## 6.5 Connecting cables for ET 200eco PN M12-L

### 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 200eco PN M12-L 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 200eco PN M12-L 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 10 m cable with Ø 1.5 $mm^2$, 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 |
| 60 °C | 8 A | 8 A |

**NOTE**

**Adherence to the minimum clearance**

The I/O devices may be used at an installation distance of 2 cm up to max. 60 °C ambient temperature.

If the installation distance to other devices or objects is less than 2 cm, the ambient temperature must be reduced by 5 K (for example, 60 °C ⇒ 55 °C). This must also be taken into consideration for the derating diagrams of the Equipment Manuals.

# 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 IO/MultiFieldbus lines on the 4-pin M12-D coded round sockets
- Signal lines at the 8-pin M12 round sockets

## Requirement

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

## Use in hazardous areas

The plug cover is an accessory for protecting the connected connectors on the I/O device. The plug cover may be necessary for use in hazardous areas. If you use the plug cover, the minimum distances specified in the Installing the plug cover (Page 36) section apply for installation.

## 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 $mm^2$) 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 connector
  or
- PROFINET cable and PROFINET M12 connector D-coded

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

To connect M12 plugs, 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 figure below shows the connection of several I/O devices to the supply voltage and the MultiFieldbus as an example.

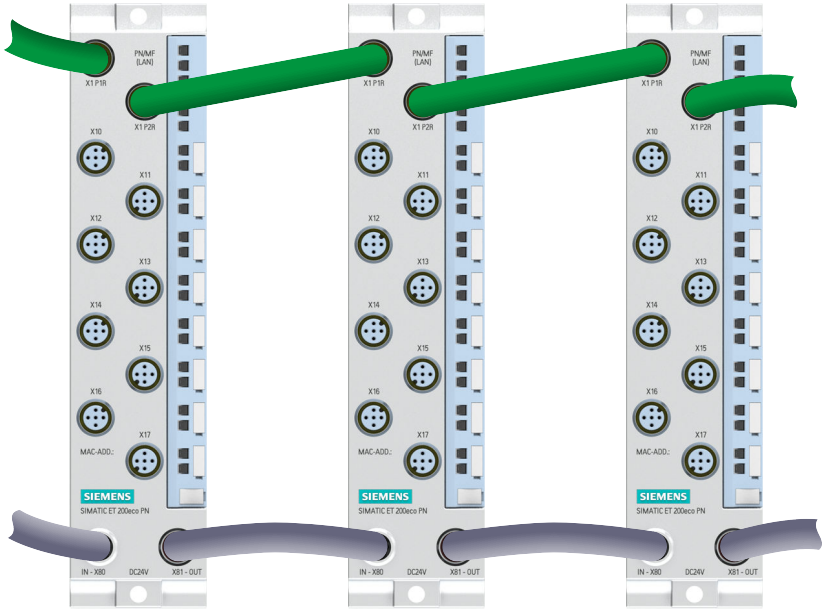



Figure 6-5 Connecting the supply voltage and MultiFieldbus

The figure below shows the connection of the sensor/actuator M12 plugs.

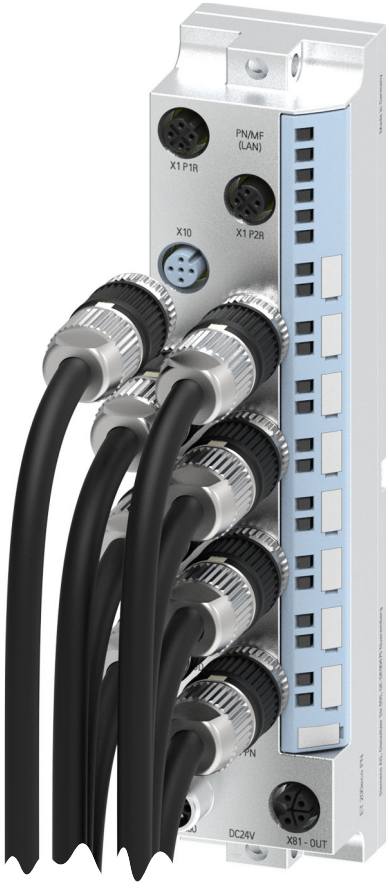



Figure 6-6 Connect sensor/actuator cable

## Pin assignments of the sockets

You can find the pin assignment of the sockets in the Equipment Manuals of the I/O devices, in the section on pin assignment.

## Y- connection

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

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.

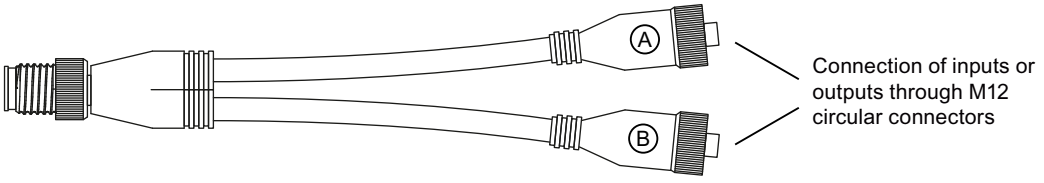



Figure 6-7 Y cable

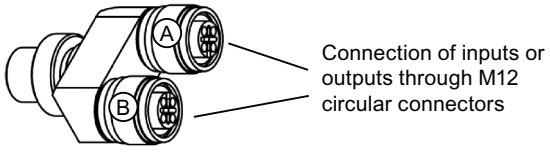



Figure 6-8 Y-connector

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

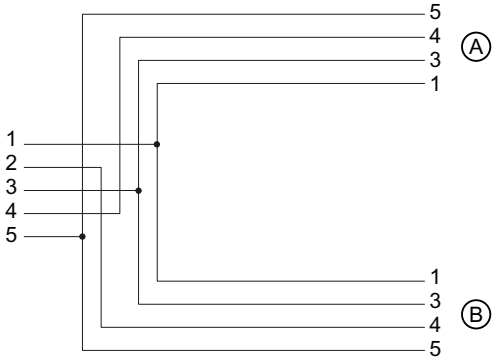



Figure 6-9 Wiring of the Y-connection

## Sealing of unused sockets

To ensure IP65/IP67 or IP69K degree of protection, seal off all unused sockets with sealing caps. The sealing caps must be permitted for the required degree of protection.

## Article numbers for accessories/spare parts

You will find the labels and article numbers in the Accessories/spare parts (Page 128) section.

# 6.7 Marking the ET 200eco PN M12-L

## 6.7.1 Factory markings

### Introduction

For better orientation, the ET 200eco PN M12-L 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.

The table below shows the labeling of the interfaces.

Table 6-3 Interface labeling

| interface | Labeling |
|---|---|
| MultiFieldbus interfaces | X1 P1R and X1 P2R |
| I/O input and output interfaces | X10 to X17 |
| Power supply interfaces | X80 (IN) and X81 (OUT) |

## 6.7.2 Optional markings

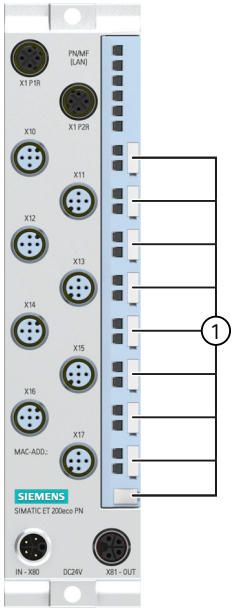
### Introduction

In addition to the factory markings, there are also optional possibilities for labeling and/or identifying interfaces and I/O devices on the ET 200eco PN M12-L distributed I/O system.

### Identification label

The identification labels come with each I/O device as strips and can be machine-printed. A strip has 10 identification labels measuring 10 x 5 mm in the color RAL9016. The identification labels can be inserted into every I/O device at the points provided. The identification labels are used for channel and I/O device labeling.

The figure below shows all points where you can attach the identification labels.




① Identification labels

Figure 6-10 Optional marking

## 6.7.3 Mounting identification labels

### Introduction

This section describes how to mount or remove identification labels.

### Required tools

You need a screwdriver with 3 mm blade width (only to remove identification labels).

### Mounting procedure

To mount an identification label, proceed as follows:

1. Print the identification label using commercially available marking systems.
2. Press the identification label out of its holder.
3. Stick the identification labels into the cutouts provided, as shown in the figure Optional marking (Page 58).

Mounting the identification labels is the same for all I/O devices.

### Removal procedure

To remove an identification label, proceed as follows:

1. Carefully use a screwdriver to pull out the identification label.

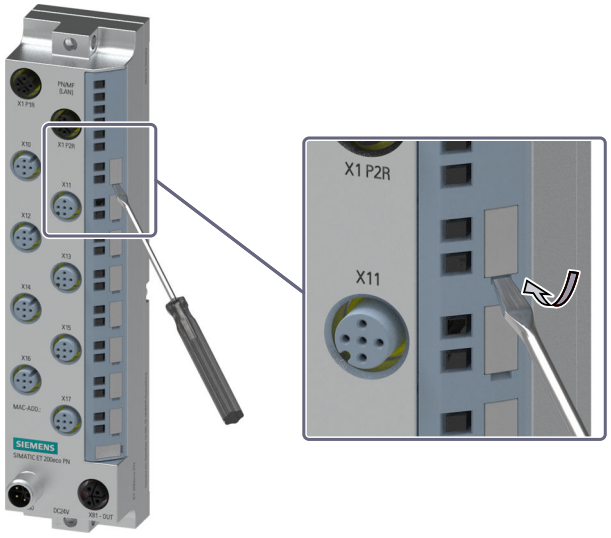



Figure 6-11 Replacing labels

Removing identification labels is the same for all I/O devices.

# Configuring

# 7

## 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 (not MF Shared Device) 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 200eco PN M12-L 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 200eco PN M12-L

### Introduction

You configure and assign parameters to the ET 200eco PN M12-L 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) as of V16 with HSP 0299 | PROFINET | STEP 7 online help |
| STEP 7 TIA Portal as of V14 | PROFINET GSD file | The GSD versions are largely downward compatible. |
| STEP 7 V5.6 or higher | PROFINET GSD file | STEP 7 online help |
| Software of another manufacturer | | Manufacturer documentation |

### Configuring the ET 200eco PN M12-L 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 200eco PN M12-L 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 from when this function is supported.

| Function | Firmware version |
|---|---|
| Isochronous real-time communication | FW 1.0.x or higher |
| Isochronous mode | FW 1.0.x or higher |
| Shared device | FW 1.0.x or higher |
| Module-internal shared input / shared output (MSI/MSO) | FW 1.0.x or higher |
| System redundancy S2 | FW 1.1.x or higher |
| Prioritized startup | FW 1.1.x or higher |
| Device replacement without programming device | FW 1.0.x or higher |
| Media redundancy | FW 1.0.x or higher |

## 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 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 µs. 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 200eco PN M12-L 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 V1.1.0) 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 more information on the topic of **system redundancy S2** in the STEP 7 online help and in the Function Manual SIMATIC PROFINET with STEP 7 (https://support.industry.siemens.com/cs/ww/en/view/49948856).

## 7.3.7 Prioritized startup

### Prioritized startup

Prioritized startup denotes the PROFINET functionality for accelerating the startup of IO devices operated on a PROFINET IO system with RT and IRT communication.

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

- After the supply voltage has returned
- After station recovery
- After IO Devices have been activated

The prioritized startup function is supported by the ET 200eco PN M12-L I/O devices operated in a PROFINET IO system as of these FW versions.

- RT communication as of FW V1.0.0
- IRT communication as of FW V1.1.0

You recognize valid input values and output values from value status QI = 1. In the case of analog devices and IO-Link master communication modules, the determination of the analog value or the establishment of the IO-Link connection can take more time, for example. You receive invalid values with value status QI = 0 until then.

### 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 Device replacement without programming device (PG)

### Requirement

A topology must be created in the project.

### 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 setpoint topology must agree with the actual topology.

If an I/O device was already in operation, reset it to factory settings before further use.

### 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.

## 7.3.9 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 200eco PN M12-L 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"). Then the configuration is loaded into I/O devices of the plant and the configuration files prepared for the controller.

**NOTE**

**Temporary bus interruption**

The ET 200eco PN M12-L 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 V1.3 SP1 or higher:

| Function | Firmware version |
|---|---|
| I/O communication with scanner | FW 5.1.x or higher |
| Reading diagnostics | FW 5.1.x or higher |
| Normative CIP objects | FW 5.1.x or higher |
| Hardware interrupt | FW 5.1.x or higher |
| Transfer data records | FW 5.1.x or higher |
| Resetting I/O module modules to factory setting | FW 5.1.x or higher |

| Function | Firmware version |
|---|---|
| Diagnostics bit in data status of cyclic I/O data per submodule | FW 5.1.x or higher |
| Shared device | FW 5.1.x or higher |
| Module-internal shared input / shared output (MSI/MSO) | FW 5.1.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.
Procedure:

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 200eco PN M12-L 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"). Then the configuration is loaded into I/O devices of the plant and the configuration files prepared for the controller.

**NOTE**

**Temporary bus interruption**

The ET 200eco PN M12-L 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 V1.3 SP1:

| Function | Firmware version |
|---|---|
| I/O communication with scanner | FW 5.1.x or higher |
| Reading diagnostics | FW 5.1.x or higher |
| Hardware interrupt | FW 5.1.x or higher |
| Transfer data records | FW 5.1.x or higher |
| Resetting I/O module modules to factory setting | FW 5.1.x or higher |
| Diagnostics bit in data status of cyclic I/O data per submodule | FW 5.1.x or higher |
| Shared device | FW 5.1.x or higher |
| Module-internal shared input / shared output (MSI/MSO) | FW 5.1.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

## 8.1 Commissioning ET 200eco PN M12-L 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 200eco PN M12-L 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 200eco PN M12-L on the MultiFieldbus

| Step | Procedure | Reference |
|---|---|---|
| 1 | Mounting the ET 200eco PN M12-L | Section Mounting (Page 30) |
| 2 | Wiring the ET 200eco PN M12-L | Section Connecting (Page 39) |
| 3 | Configuring the ET 200eco PN M12-L | Section Configuring (Page 60) |
| 4 | Switching on supply voltage for the IO controller | IO controller manual |
| 5 | IO controller is in RUN mode | IO controller manual |

### Commissioning the ET 200eco PN M12-L

1. Switch on the supply voltage 1L+ non-switched for the ET 200eco PN M12-L.
2. Switch on the power supply 2L+, if necessary.

## Reference

Additional information on the commissioning:

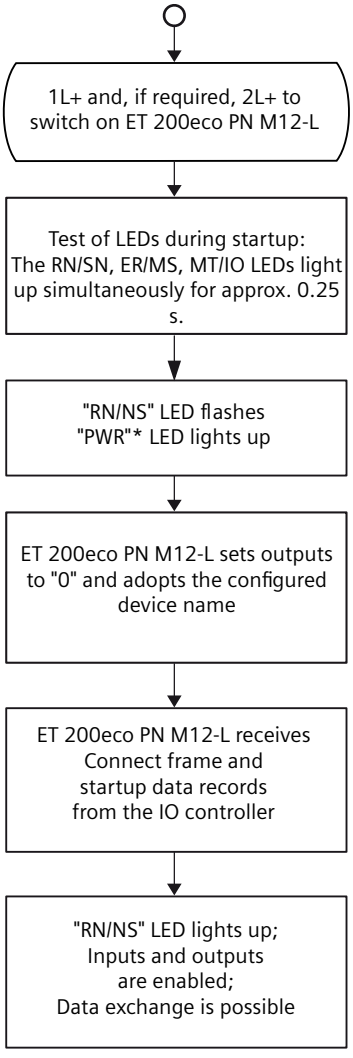
- STEP 7 online help
- In the manual SIMATIC PROFINET with STEP 7 (https://support.industry.siemens.com/cs/ww/en/view/49948856)
- In the MultiFieldbus (https://support.industry.siemens.com/cs/ww/en/view/109773209) function manual

# 8.2 Startup of the I/O device

## 8.2.1 Unconfigured on PROFINET IO

### Startup without parameter assignment on PROFINET IO

The following schematic diagram shows the startup of the ET 200eco PN M12-L in factory setting, without PROFINET IO:

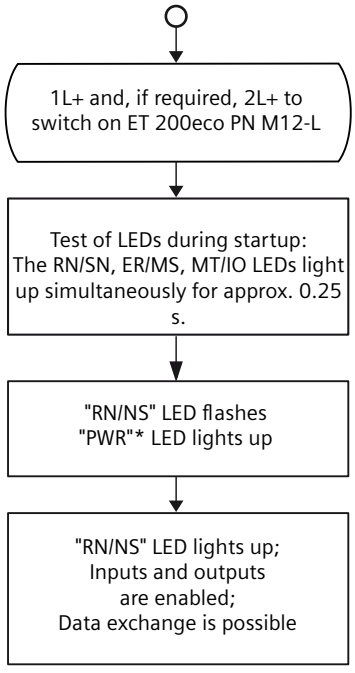



* "PWR" only for I/O devices that use 2L+ and when 2L+ is connected

## 8.2.2 Configured on PROFINET IO

### Startup configured on PROFINET IO

The following schematic diagram shows the startup of the ET 200eco PN M12-L I/O device on PROFINET IO:

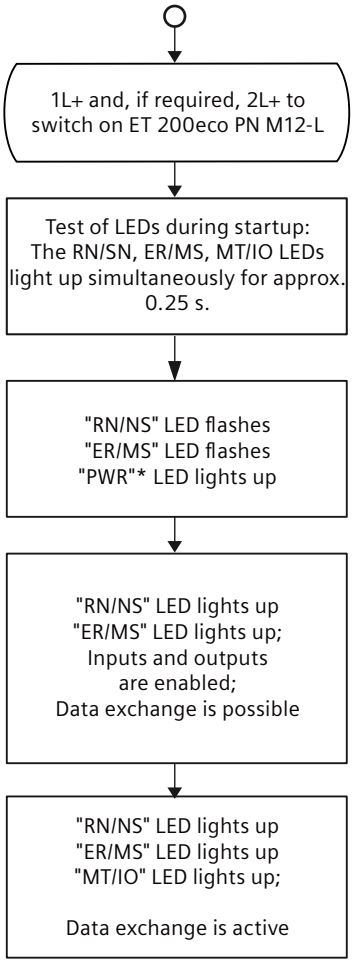



* "PWR" only for I/O devices that use 2L+ and when 2L+ is connected

## 8.2.3 Configured on EtherNet/IP

### Startup configured on EtherNet/IP

The following schematic diagram shows the startup of the ET 200eco PN M12-L I/O device on EtherNet/IP:

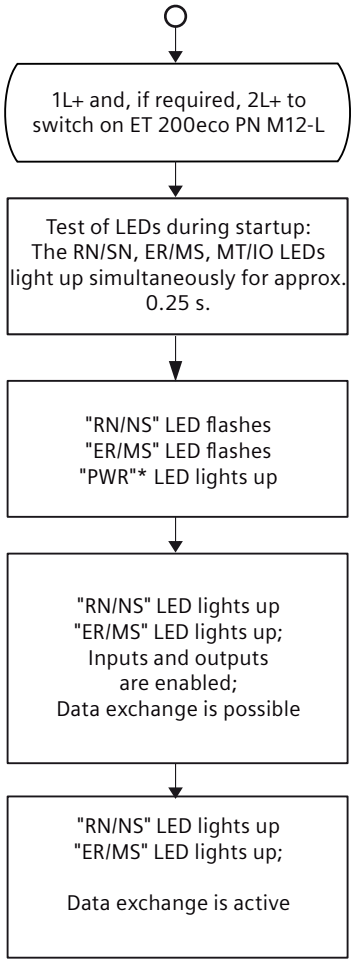



* "PWR" only for I/O devices that use 2L+ and when 2L+ is connected

## 8.2.4 Configured on Modbus TCP

### Startup configured on Modbus TCP

The following schematic diagram shows the startup of the ET 200eco PN M12-L I/O device on Modbus TCP:

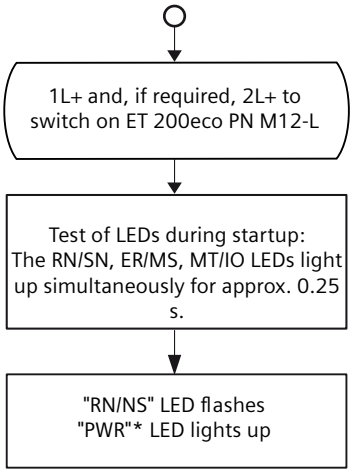



* "PWR" only for I/O devices that use 2L+ and when 2L+ is connected

### 8.2.5 Unconfigured without communication to fieldbus

#### Startup without parameter assignment, without communication to fieldbus

The following schematic diagram shows the startup of the ET 200eco PN M12-L with factory settings, displayed schematically without communication to the fieldbus:




* "PWR" only for I/O devices that use 2L+ and when 2L+ is connected

## 8.3 Identification and maintenance data

### 8.3.1 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 200eco PN M12-L 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.

## 8.3.2 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: $0020_H$<br>I&M1: $0021_H$<br>I&M2: $0022_H$<br>I&M3: $0023_H$ |
| BlockLength | 2 | I&M0: $0038_H$<br>I&M1: $0038_H$<br>I&M2: $0012_H$<br>I&M3: $0038_H$ |
| BlockVersionHigh | 1 | 01 |
| BlockVersionLow | 1 | 00 |
| **Identification data** | | |
| Identification data<br>(see table below) | 54<br>54<br>16<br>54 | I&M0/Index $AFF0_H$<br>I&M1/Index $AFF1_H$<br>I&M2/Index $AFF2_H$<br>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) | 6ES7141-6BG00-0BB0 | 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 - $FF_H$ | |

| Identification data | Access | Default | Explanation |
|---|---|---|---|
| IM_REVISION_COUNTER | read (2 bytes) | $0000_H$ | Provides information about configured changes on the I/O device<br>(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<br>($0101_H$ = 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<br>(32 bytes) | - | For the I/O device, enter an identifier that is unique plant-wide here. |
| IM_TAG_LOCATION | Read/write<br>(22 bytes) | - | Enter the installation location of the I/O device here. |
| **Maintenance data 2: (data record index AFF2 hex)** | | | |
| IM_DATE | Read/write<br>(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<br>(54 bytes) | - | Enter a comment about the I/O device here. |

# Maintenance 9

## 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**<br>If you connect or disconnect the I/O devices with the power connected, this can lead to undefined states in your system.<br>Material damage to the ET 200eco PN M12-L distributed I/O device can occur as a result.<br>Only remove or replace I/O devices when the power is disconnected.<br>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.

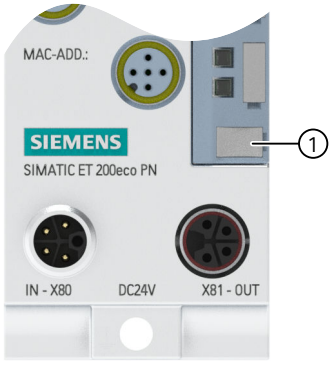
**⚠ WARNING**

**Observe the connection sequence of I/O devices**

If you mix up the ET 200eco PN M12-L I/O devices or lines when connecting them, this can cause personal injury and damage to the machine.

We recommend that you clearly label the ET 200eco PN M12-L I/O devices with the device number.

The figure below shows a recommendation for labeling the ET 200eco PN M12-L I/O devices with the device number.




① Recommendation for labeling the device number

Figure 9-1 Device number

### Result

**Topological configuration:**

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

   **NOTE**
   **New or factory setting**
   The I/O device only obtains the device names automatically with PROFINET IO with:
   – New I/O device
   – 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.

**NOTE**
**Temporary bus interruption**
When you update the firmware of an ET 200eco PN M12-L I/O device, then the MultiFieldbus is briefly interrupted due to the reboot 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 with STEP 7, V5.6 or higher
- Online via STEP 7, TIA Portal
- 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 Calibrating an analog I/O device

## Introduction

Calibration checks the process values measured by the I/O device analog inputs, determines their deviation from the actual values and compensates the measuring errors.

## Calibration

The analog inputs I/O device is calibrated before delivery. The I/O device has a high long-term stability, so that calibration during operation is not necessary. Certain directives require calibration for all components of a measuring circuit at regular intervals.
The calibration procedure is described in the Function Manual SIMATIC Analog Value Processing.

**NOTE**

**Restriction during calibration**

You cannot calibrate the I/O device with the following settings:

- Configured as 1 x 8-channel I/O device MSI.
- Configured as 2 x 4-channel I/O device

## Reference

You can find information on the procedure in the Function Manual SIMATIC analog value processing (https://support.industry.siemens.com/cs/ww/en/view/67989094).

# 9.4 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<br>(configurable when resetting: "Retain IP address"/<br>"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 with 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 200eco PN M12-L 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 200eco PN M12-L 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 factor 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

With PRONETA you can follow these steps:

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

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.

## 9.5 Maintenance and repair

The components of the SIMATIC ET 200eco PN M12-L system are maintenance-free.

**NOTE**

Repairs to an ET 200eco PN M12-L I/O device may only be carried out by the manufacturer.

## 9.6 Cleaning the I/O device

The I/O devices do not require cleaning from the manufacturer perspective. When wired, ET 200eco PN M12-L I/O devices comply with the IP65/IP67 and IP69K degrees of protection and can be cleaned, if necessary.

Note the following points during cleaning:

- Observe the IP65/IP67 and IP69K degrees of protection.
- Use checked liquids only
  - Material compatibility test of the ECOLAB® company (Page 93)

# Technical specifications

# 10

## 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 200eco PN approvals (https://support.industry.siemens.com/cs/ww/en/ps/14244/cert)

### CE marking

CE

The ET 200eco PN M12-L 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

- 2014/34/EU "Equipment and protective systems intended for use in potentially explosive atmospheres" (Explosion Protection 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 equipment and protective systems intended for use in potentially explosive atmospheres; Official Journal of the European Union L96, 29/03/2014, pp. 309–356

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
- Equipment and Protective Systems Intended for Use in Potentially Explosive Atmospheres Regulations 2016 (S.I. 2016 No. 1107), 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

### ATEX approval

According to EN 60079-7 (Electrical apparatus for potentially explosive atmospheres - Part 7: Increased safety "e"), EN IEC 60079-0 (Electrical apparatus for potentially explosive gas atmospheres - Part 0: General Requirements) and EN 60079-31 (Electrical apparatus for potentially explosive atmospheres – Part 31: dust ignition protection by enclosure "t").

II 3 G Ex ec IIC T4 Gc
II 3 D Ex tc IIIB T90 °C Dc
DEKRA 22ATEX0081X

**Special conditions in hazardous areas:**

To prevent electrostatic charging, wipe the housing surface only with a wet cloth.
You must only use the devices in an environment in which they are protected against UV light.
Cables, plug-in connectors and plugs must fulfill these requirements:

- Suitable for 90 °C or higher
- Minimum degree of protection IP54 in accordance with EN IEC 60079-0

For use in Zone 2/22, the devices must be installed in a suitable protective enclosure which fulfills the requirements of the impact resistance test according to EN IEC 60079-0, e.g. connector cover 6ES7194-6JA00-0BB0.
The following additional conditions apply when using the devices in an area that requires EPL Gc:

- Only use the devices in an area with a degree of pollution 2 according to EN 60664-1.
- Provisions must be taken to prevent the rated operating voltage from being exceeded by transient disturbance voltages of more than 119 V.
- In the case of use in Zone 2/22, the I/O devices are approved for -20 °C to +60 °C and IP54.

**More information**

You can find the explosion protection with the approved ET 200eco PN M12-L I/O devices here on the Internet (https://support.industry.siemens.com/cs/ww/en/ps/14244/cert?ct=441).

The multilingual product information "Use of the ET 200eco PN M12-L in Zone 2/Zone 22 hazardous areas" is available here on the Internet (https://support.industry.siemens.com/cs/ww/en/view/109814099).

## UKEX approval

According to EN 60079-7 (Electrical apparatus for potentially explosive atmospheres - Part 7: Increased safety "e"), EN IEC 60079-0 (Electrical apparatus for potentially explosive gas atmospheres - Part 0: General Requirements) and EN 60079-31 (Electrical apparatus for potentially explosive atmospheres – Part 31: dust ignition protection by enclosure "t").

II 3 G Ex ec IIC T4 Gc
II 3 D Ex tc IIIB T90 °C Dc
DEKRA 22UKEX6018X

**Special conditions in hazardous areas:**

To prevent electrostatic charging, wipe the housing surface only with a wet cloth.
You must only use the devices in an environment in which they are protected against UV light.
Cables, plug-in connectors and plugs must fulfill these requirements:

- Suitable for 90 °C or higher
- Minimum degree of protection IP54 in accordance with EN IEC 60079-0

For use in Zone 2/22, the devices must be installed in a suitable protective enclosure which fulfills the requirements of the impact resistance test according to EN IEC 60079-0, e.g. connector cover 6ES7194-6JA00-0BB0.
The following additional conditions apply when using the devices in an area that requires EPL Gc:

- Only use the devices in an area with a degree of pollution 2 according to EN 60664-1.
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According to IEC 60079-7 (Electrical apparatus for potentially explosive atmospheres - Part 7: Increased safety "e"), IEC 60079-0 (Electrical apparatus for potentially explosive gas atmospheres - Part 0: General Requirements) and IEC 60079-31 (Electrical apparatus for potentially explosive atmospheres – Part 31: dust ignition protection by enclosure "t").

Ex ec IIC T4 Gc
Ex tc IIIB T90 °C Dc
IECEx DEK 22.0080X

**Special conditions in hazardous areas:**

To prevent electrostatic charging, wipe the housing surface only with a wet cloth.
You must only use the devices in an environment in which they are protected against UV light.
Cables, plug-in connectors and plugs must fulfill these requirements:

- Suitable for 90 °C or higher
- Minimum degree of protection IP54 in agreement with IEC 60079-0

For use in Zone 2/22, the devices must be installed in a suitable protective enclosure which fulfills the requirements of the impact resistance test according to EN IEC 60079-0, e.g. connector cover 6ES7194-6JA00-0BB0.
The following additional conditions apply when using the devices in an area that requires EPL Gc:

- Only use the devices in an area with a degree of pollution 2 according to IEC 60664-1.
- Provisions must be taken to prevent the rated operating voltage from being exceeded by transient disturbance voltages of more than 119 V.
- In the case of use in Zone 2/22, the I/O devices are approved for -20 °C to +60 °C and IP54.

**More information**

You can find the explosion protection with the approved ET 200eco PN M12-L I/O devices here on the Internet (https://support.industry.siemens.com/cs/ww/en/ps/14244/cert?ct=441).

The multilingual product information "Use of the ET 200eco PN M12-L in Zone 2/Zone 22 hazardous areas" is available here on the Internet (https://support.industry.siemens.com/cs/ww/en/view/109814099).

## CCCEx approval

According to GB/T 3836.3 (Explosive atmospheres - Part 3: Equipment protection by type of protection "e"), GB/T 3836.1 (Explosive atmospheres - Part 1: Equipment - General requirements) and GB/T 3836.31 (Explosive atmospheres - Part 31: Equipment dust ignition protection by enclosure "t").

Ex ec IIC T4 Gc

Ex tc IIIB T90°C Dc

**Special conditions in hazardous areas:**

To prevent electrostatic charging, wipe the housing surface only with a wet cloth.
You must only use the devices in an environment in which they are protected against UV light.
Cables, plug-in connectors and plugs must fulfill these requirements:

- Suitable for 90 °C or higher
- Minimum degree of protection IP54 in agreement with GB/T 3836.1

For use in Zone 2/22, the devices must be installed in a suitable protective enclosure which fulfills the requirements of the impact resistance test according to GB/T 3836.1, e.g. connector cover 6ES7194-6JA00-0BB0.
The following additional conditions apply when using the devices in an area that requires EPL Gc:

- Only use the devices in an area with a degree of pollution 2 according to GB/T 16935.1.
- Provisions must be taken to prevent the rated operating voltage from being exceeded by transient disturbance voltages of more than 119 V.
- In the case of use in Zone 2/22, the I/O devices are approved for -20 °C to +60 °C and IP54.

**More information**

You can find the explosion protection with the approved ET 200eco PN M12-L I/O devices here on the Internet (https://support.industry.siemens.com/cs/ww/en/ps/14244/cert?ct=441).

The multilingual product information "Use of the ET 200eco PN M12-L in Zone 2/Zone 22 hazardous areas" is available here on the Internet (https://support.industry.siemens.com/cs/ww/en/view/109814099).

## RCM Australia/New Zealand

The ET 200eco PN M12-L 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.

이기기는업무용(A급) 전자파적합기기로서판매자또는사용자는이점을주의하시기바라며 가정외의지역에서사용하는것을목적으로합니다.

### EAC (Eurasian Conformity)

The code EAC (Eurasian Conformity) confirms the conformity with the guidelines (TR) of the Eurasian Economic Union.

### WEEE mark (European Union)

Disposal information, observe the local regulations and section "Recycling and disposal (Page 118)".

## 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 200eco PN Marine/Shipbuilding (https://support.industry.siemens.com/cs/ww/en/ps/14244/cert?ct=446)

### Material compatibility test

The distributed I/O devices ET 200eco PN M12-L have been tested by the ECOLAB® company with the following liquids.

- Topactive 200
- Topax MD3
- Topaz AC3
- Topaz AC4
- Topax 91
- Topax 990
- Topax 960
- Alcodes

The testimonial from the ECOLAB® company is available for downloading on the Internet. See also: ET 200eco PN M12-L Ecolab Testimonial (https://support.industry.siemens.com/cs/ww/en/view/109805757)

## 10.3 Standards and requirements

### IEC 61131-2

The ET 200eco PN M12-L distributed I/O system fulfills the requirements and criteria of 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 200eco PN M12-L distributed I/O system fulfills the requirements and criteria of standard IEC 61010-2-201.

### PROFINET standard

The ET 200eco PN M12-L distributed I/O system is based on standard IEC 61158 Type 10.

### EtherNet/IP requirement

The ET 200eco PN M12-L 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 200eco PN M12-L distributed I/O system is based on the requirements of the Modbus TCP Application Protocol Specification V1.1b3.

### IO-Link standard

The ET 200eco PN M12-L distributed I/O system is based on standard IEC 61131-9.

### Use in industrial environments

The ET 200eco PN M12-L 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 200eco PN M12-L 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 200eco PN M12-L 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 200eco PN M12-L distributed I/O system is not intended for use in residential areas. Using the ET 200eco PN M12-L 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.<br>Manchester M20 2UR |
| Türkiye (TR) | Siemens San. ve Tic. A.Ş.<br>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 200eco PN M12-L 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 200eco PN M12-L 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.[1] | Air discharge: ±8 kV | 3 |
| | Contact discharge: ±6 kV | 3 |
| Burst pulses (fast transient disturbance variables) according to IEC 61000-4-4.[1] | ±2 kV (power supply cable) | 3 |
| | ±2 kV (MultiFieldbus line) | 4 |
| | ±2 kV (signal line) | 4 |
| High-energy single pulse (surge) to IEC 61000-4-5 [2]<br>• For installation within buildings:<br>– Signal line < 30 m<br>• For installation outdoors<br>– Signal line < 30 m<br>– Use of shielded IP lines<br>– Grounding of the shielding at both ends according to IEC 61000-4-5 | | |
| • 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 |

[1] The maximum short-term influencing of analog devices during the duration of the EMC tests can amount to ±10 % of the full-scale value.

[2] Analog value deviation beyond the limits of the nominal range and diagnostics possible.

## 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<br>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 | |

The maximum short-term influencing of analog modules during the duration of the EMC tests can amount to ±1 % of the full-scale value.

## 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<br>< 76 dB (µV) M |
| 0.5 ... 30 MHz | < 83 dB (µV) Q<br>< 70 dB (µV) M |

## 10.5 Transport and storage conditions

### Shipping and storage conditions

The I/O devices of the ET 200eco PN M12-L 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 Shipping 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<br>(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 200eco PN M12-L distributed I/O system is suitable for use in weather-proof, fixed locations.

- The rated conditions exceed the requirements according to IEC 61131-2
  - Class OTH4

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 vibrations, I/O device mounted without mounting rail[1] | Vibration test according to IEC 60068-2-6 | Type of oscillation: Frequency sweeps at a rate of change of 1 octave/minute.<br>10 Hz ≤ f ≤ 58 Hz, constant amplitude 1.5 mm<br>58 Hz ≤ f ≤ 150 Hz, constant acceleration 20 g<br>Period of oscillation: 10 frequency sweeps per axis at each of three vertically aligned axes |
| Sinusoidal vibrations, I/O device mounted on mounting rail | | Type of oscillation: Frequency sweeps at a rate of change of 1 octave/minute.<br>5 ≤ f ≤ 9.1 Hz, constant amplitude 15 mm<br>9.1 ≤ f ≤ 150 Hz, constant acceleration 5 g<br>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<br>Shock intensity: 30 g peak value, 18 ms duration<br>Direction of shock: 3 shocks each in ± direction in each of the 3 axes vertical to one another |

1 When using the plug cover, use the "I/O device mounted on mounting rail" parameters for checking

## Extended environmental conditions for use outdoors

The table below provides important information with respect to the type and scope of the test of extended ambient conditions for use in the outdoors. Consider further specifications and constraints for use in the outdoors.

Table 10-8 Test of extended environmental conditions

| Condition tested | Test standard | Conditions/remarks |
|---|---|---|
| Salt spray | IEC 60068-2-52 | Degree of severity 1 for products that are used at sea or in the immediate vicinity of the sea:<br>4 cycles with each:<br>• 2 h with 5 % NaCl at 35 °C<br>• 6 days + 22 h at 40 °C/93 % relative humidity |
| 200 h salt spray test | IEC 60068-2-11 | 5 % NaCl at 35 °C for 200 hours pH value: 6.5-7.2 |
| UV resistance | IEC 61215-2 | • Irradiance (E): 550 W/m²<br>• Black standard temperature (BST): 55 °C |
| Condensed water alternating climate | EN ISO 6270-2 | 84 cycles with each:<br>• 8 h at 40 °C with 100 % relative humidity (condensation)<br>• 16 h at 18 °C to 28 °C with 100 % relative humidity |
| Temperature shock | IEC 60068-2-14 | Temperature: -40 °C/+85 °C<br>Duration: 250 cycles (250 h)<br>Device in switched-off state |
| Icing | EN 60068-2-1 | Check according to section 5.4 |
| IP test | ISO 20653 | IP69K (water and dust) |

## Climatic ambient conditions

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

Table 10-9 Tests for climatic ambient conditions

| Ambient conditions | Fields of application | Comments |
|---|---|---|
| Temperature | -40 ... 60 °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 30).

## Use above 2000 m is possible.

The following constraints apply to the maximum specified ambient temperature:

Table 10-10 **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).

## Pollution class according to IEC 61010-2-201

- Protection class III

## Severity for voltage interruption

The I/O device of the distributed I/O system ET 200eco PN M12-L meet the severity class PS2 for voltage interruption (10 ms).

## Pollution degree / overvoltage category according to IEC 61010-2-201

Connected according to the specifications in the "Wiring (Page 53)" 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

Degree of protection of the ET 200eco PN M12-L distributed I/O system:

IP65/IP67 according to 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 200eco PN M12-L distributed I/O system operates.

Table 10-11 Rated voltage for operation

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

# 10.8 Use of the ET 200eco PN M12-L in Zone 2/Zone 22 hazardous areas

## Introduction

This section contains important notes on the ET 200eco PN M12-L distributed I/O device for installation in the Zone 2/Zone 22 hazardous areas.

The multilingual product information in different EU official languages is available here: Use of the ET 200eco PN M12-L in Zone 2/Zone 22 hazardous areas (https://support.industry.siemens.com/cs/ww/en/view/109814099)

## Approved I/O devices ET 200eco PN M12-L

The I/O devices have these explosion approvals:

- ATEX approval
- UKEX approval
- IECEX approval
- CCCEx approval

You can find the explosion protection certificates with the approved ET 200eco PN M12-L I/O devices here on the Internet (https://support.industry.siemens.com/cs/ww/en/ps/14244/cert?ct=441).

**⚠ WARNING**

**Personal injury and material damage**

When disconnecting plug-in connections during running operation, personal injury and material damage may occur in potentially explosive atmospheres.
In potentially explosive atmospheres, de-energize the ET 200eco PN M12-L I/O device before disconnecting plug connections.

## Special conditions

- Set up the I/O devices so that the risk of mechanical danger is low.
- Adhere to the technical specifications for the I/O devices as specified in the EU -type examination certificate:
  - Supply voltage of the ET 200eco PN M12-L
  - Currents of inputs and outputs
  - Ambient temperatures
- All M12 connection plugs (for MultiFieldbus, supply voltage, encoders and actuators) must not be connected or disconnected under voltage.

**NOTE**

**Prerequisites when using the plug cover**

The plug cover is an accessory for protecting the connected connectors on the I/O device. If you use a plug cover, the cables with connectors must fulfill the following requirements:

- The cables have a straight plug outlet
- The maximum outer diameter of the connector is 16 mm

## Plug cover

The figure below shows the plug cover. The plug cover is an accessory for protecting the connected connectors on the I/O device. The plug cover may be necessary for use in hazardous areas. You will find the article numbers in the Accessories/spare parts (Page 128) section.

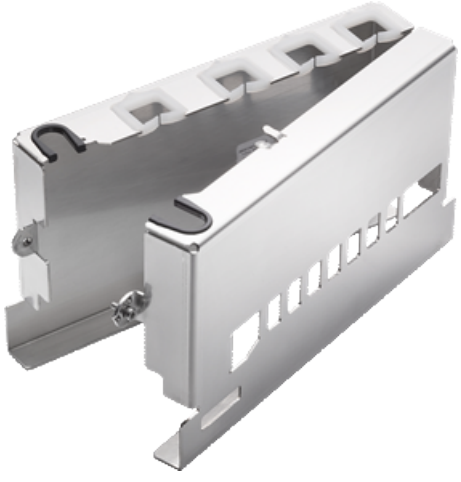

Figure 10-1 Plug cover

# Industrial cybersecurity

# 11

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.

**NOTE**

Security-relevant changes to software or devices are documented in the section New properties/functions (Page 22).

## 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, proceed as follows:

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" > " SIMATIC Industrial Automation Systems" > "I/O systems" > "SIMATIC ET 200 systems without control cabinet" > "ET 200eco PN".
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 Integrated 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 106). 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 25) 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 115).

### 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 82)
- Section Notification of security updates (Page 106)

### 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**<br>Incomplete or non-secure deletion of data from data memories can result in data misuse by third parties.<br>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.

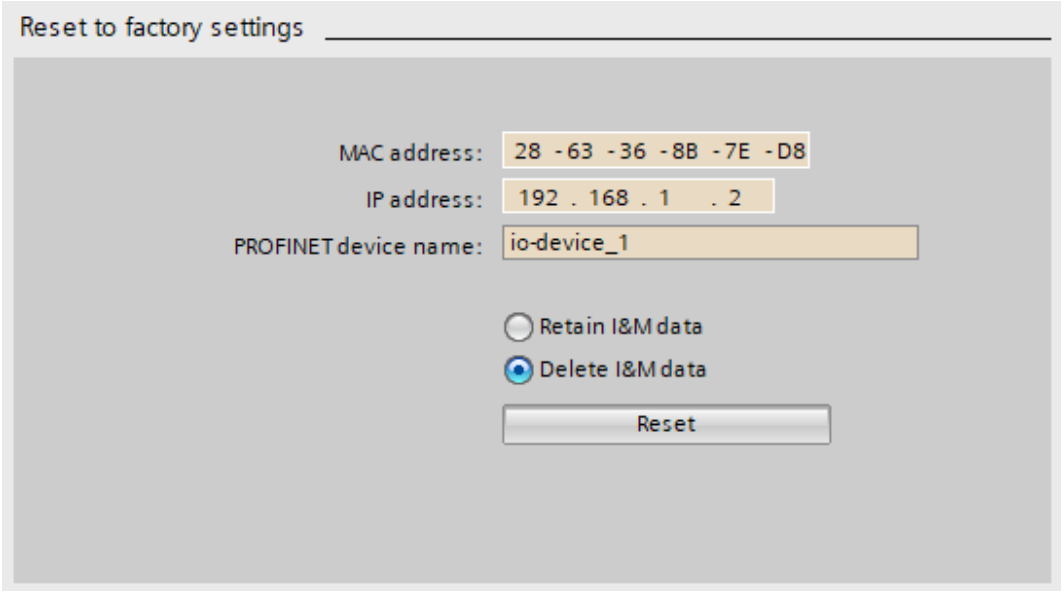


Figure 11-1 Resetting the I/O device to factory settings

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 85).

**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.

## 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

### 11.9.1 Secure operation of I/O devices

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

### 11.9.2 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 website.
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

## A.1 Safety-related shutdown of ET 200eco PN M12-L

### Introduction

The setup below describes how you shut down ET 200eco PN M12-L standard modules in a fail-safe manner.

With the illustrated setup (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 200eco PN M12-L standard modules are switched to the safe OFF state. The ET 200eco PN M12-L standard modules are operated at 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 200eco PN M12-L 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.

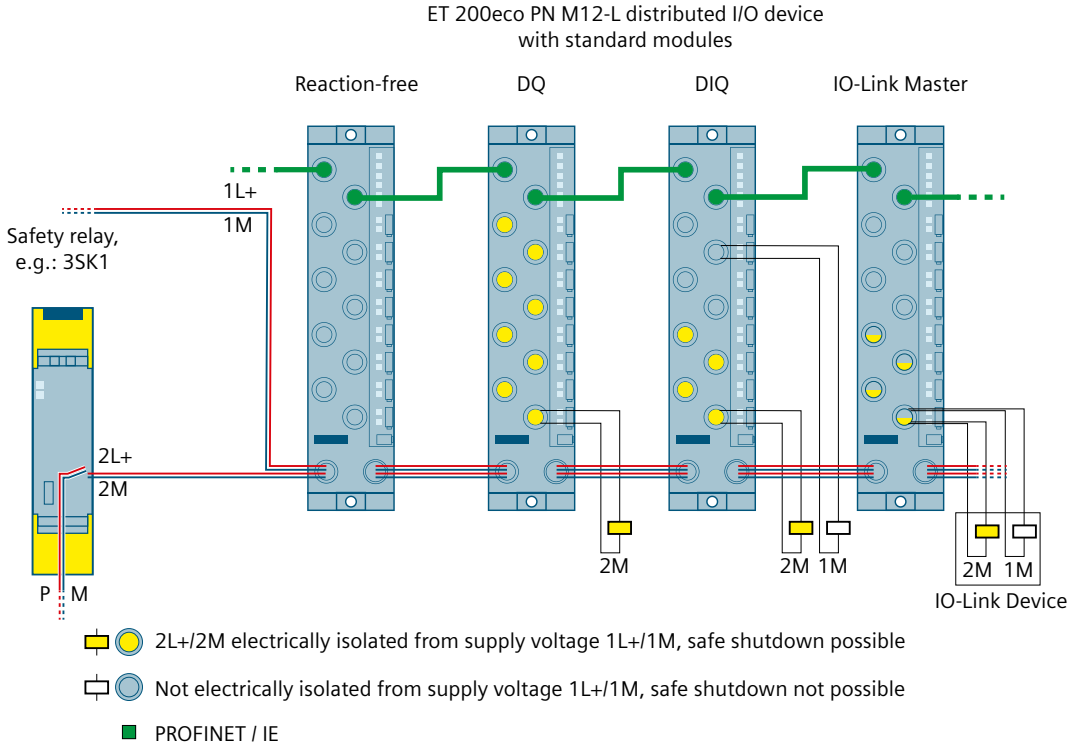


Figure A-1 Higher-level safety circuit of the outputs

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.

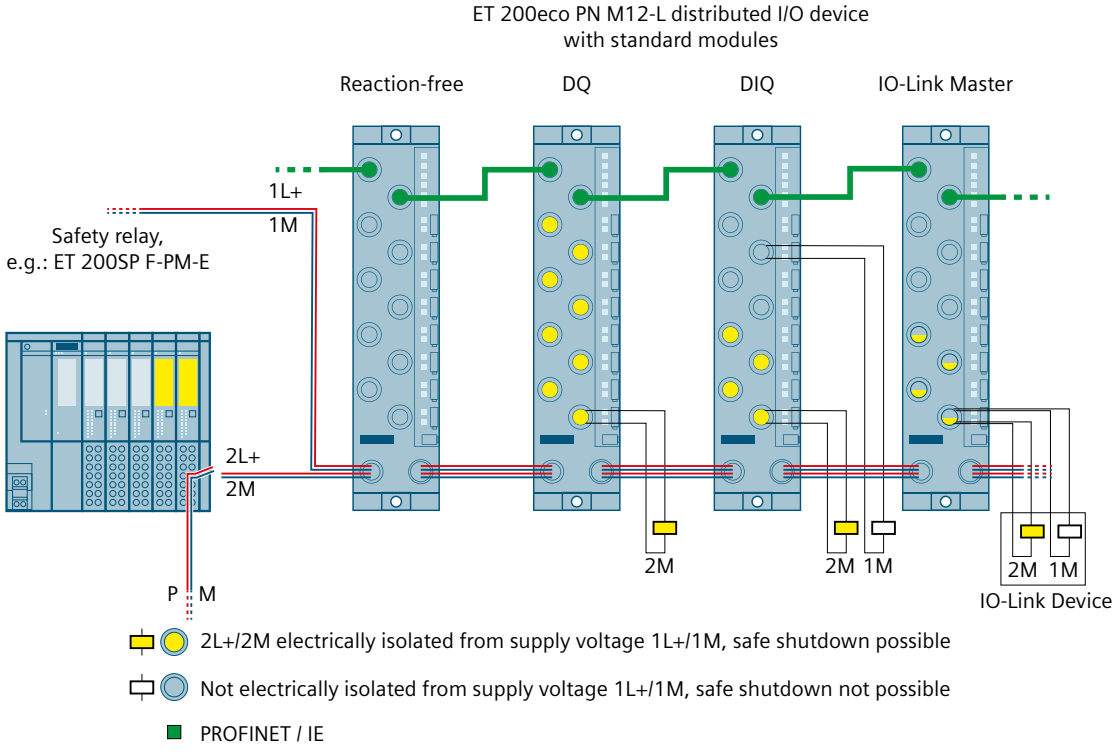


Figure A-2 Higher-level safety circuit of the outputs

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 module as shown in figure Safety-related shutdown of ET 200eco PN M12-L (Page 120)
- 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 200eco PN M12-L 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 200eco PN M12-L system.

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

### 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. SN96753T)

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 drawings

B

## B.1 Dimension drawing I/O device

The following figure shows the dimensions of an I/O device of the distributed I/O system ET 200eco PN M12-L.

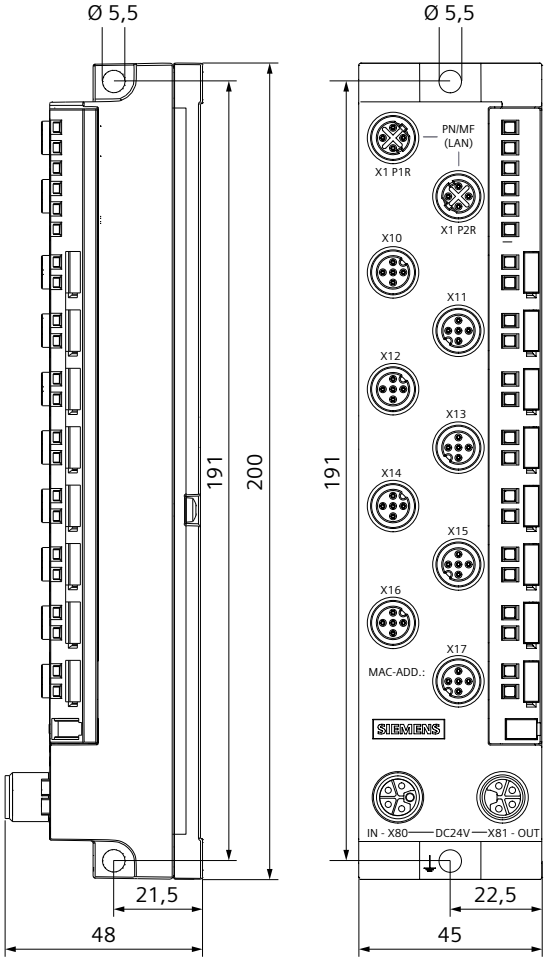


Figure B-1 Dimension drawing of an I/O device

## B.2 Dimension drawing of plug cover

The figure below shows the dimensions of the plug cover for a distributed I/O device ET 200eco PN M12-L.

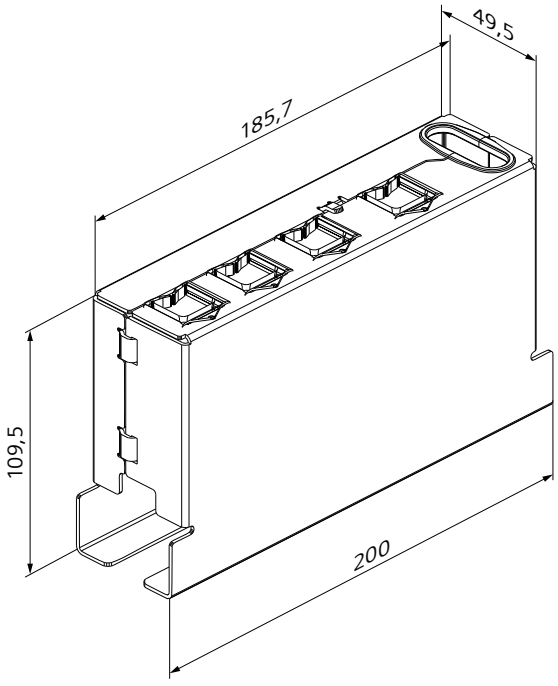


Figure B-2 Dimension drawing of plug cover

# Accessories/spare parts

C

## C.1 Accessories/spare parts

### Accessories for the ET 200eco PN M12-L distributed I/O system

The following tables show a selection of the suitable accessories. You can find a detailed overview of suitable plugs and cables for the ET 200eco PN distributed I/O system in this FAQ (https://support.industry.siemens.com/cs/ww/en/view/109781065).

Table C-1 Accessories for power supply

| Designation | Length | Article number |
|---|---|---|
| **Cable is pre-assembled** | | |
| CONNECTING CABLE M12, L-CODED<br>Power connecting cable M12-180/M12-180 for power supply of ET 200<br>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 |
| | 15.0 m | 6XV1801-6DN15 |
| M12 CONNECTING CABLE, L-CODED, ANGLED<br>Power connecting cable M12-90/M12-90 for power supply of ET 200<br>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 mm2 for power supply of end devices/network components; prefabricated 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** | | |

| Designation | Length | Article number |
|---|---|---|
| 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-2 Non-preassembled connector **PROFINET** M12

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

Table C-3 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-4 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, preassembled on both sides with M12 plugs 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 |

| Designation | | Article number |
|---|---|---|
| PROFINET M12 connecting cable, trailing cable, pre-assembled on both sides with M12 plugs 180° (pin) | 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 sides with M12 plugs, 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 one side with M12 plug, 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 side with M12 plug 180° (pin), other side with RJ45 plug 145° | 2.0 m | 6XV1871-5TH20 |
| | 3.0 m | 6XV1871-5TH30 |
| | 5.0 m | 6XV1871-5TH50 |
| | 10.0 m | 6XV1871-5TN10 |
| | 15.0 m | 6XV1871-5TN15 |
| IE robust connecting cable M12-180/M12-180, IP69, pre-assembled IE FC robust food cable GP 2x2, with 2 M12 plugs (D-coded) | 1.0 m | 6XV1881-5AH10 |
| | 2.0 m | 6XV1881-5AH20 |
| | 3.0 m | 6XV1881-5AH30 |
| | 5.0 m | 6XV1881-5AH50 |

Table C-5 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-6 Additional accessories

| Designation | | Article number |
|---|---|---|
| Mounting rail for ET 200ECO PN | 0.5 m | 6ES7194-6GA00-0AA0 |
| Profile screws for mounting rail ET 200ECO PN | 50 unit/ pack | 6ES7194-6MA00-0AA0 |
| Identification labels 10 x 5 mm | 200 unit/ pack | 6ES7194-2BA00-0AA0 |

| Designation | | Article number |
|---|---|---|
| SEALING CAP M12<br>AS-Interface accessories M12 sealing cap for IP67 modules external diameter 12 mm without O-ring | 100 unit/ pack | 3RX9802-0AA00 |
| AS-I SEALING CAP M12 F. IP67 MODULES<br>AS-Interface accessories M12 sealing cap for IP67 modules external diameter 15 mm with O-ring | 100 unit/ pack | 3RK1901-1KA00 |
| AS-I SEALING CAP M12 F. IP67 MODULES<br>AS-Interface accessories M12 sealing cap for IP67 module manipulation-proof model external diameter 15 mm with O-ring | 100 unit/ pack | 3RK1901-1KA01 |
| Stripping Tool for PROFINET | | 6GK1901-1GA00 |
| Plug cover for ET 200ecoPN M12-L<br>For use of ET 200ecoPN M12-L in Zone 2/22 hazardous areas | 1 unit/pack | 6ES7194-6JA00-0BB0 |

### Online catalog

Other article numbers for the ET 200eco PN M12-L distributed I/O system can be found on the Internet (http://www.siemens.com/automation/service&support) in the online catalog and the online order system.

## C.2 UL-approved cables

In combination with the UL-approved cables for the power supply and the connection of inputs/outputs, the SIMATIC ET 200eco PN M12-L distributed I/O devices meet UL approval. Siemens has UL-approved cables for these applications in the product portfolio.

## C.3 Plug cover for ET 200ecoPN M12-L

The following table shows the technical specifications for plug cover for ET 200ecoPN M12-L.

| Article number | 6ES7194-6JA00-0BB0 |
|---|---|
| **General information** | |
| Product description | connector cover for ET200ecoPN M12-L |
| **Degree and class of protection** | |
| IP degree of protection | IP20 |
| **Ambient conditions** | |
| Ambient temperature during assembly, min. | -40 °C |
| Ambient temperature during assembly, max. | 80 °C |
| **Ambient temperature during operation** | |
| • min. | -40 °C |
| • max. | 60 °C |

| Article number | 6ES7194-6JA00-0BB0 |
|---|---|
| **Ambient temperature during storage/transportation** | |
| • min. | -40 °C |
| • max. | 80 °C |
| **Mechanics/material** | |
| Material of housing | stainless steel with plastic edge protection |
| Material property | |
| • Silicone-free | Yes |
| **Dimensions** | |
| Width | 50 mm |
| Height | 200 mm |
| Depth | 110 mm |
| **Weights** | |
| Weight, approx. | 710 g |

# SIMATIC ET 200eco PN M12-L data

# D

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

The following information provides an overview of the data that is generated by the SIMATIC ET 200eco PN M12-L 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<br>Depending on application |
| Configuration and parameter data (upload to PG/PC) | Binary formats, string formats | Depending on application |
| Diagnostics data, service data | Binary formats | Depending on application<br>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 higher-level 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<br>(for I&M data, configuration and parameter data, service data) | I/O devices up to 16 MB | Permanent |
| Work memory<br>(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<br>TIA Portal<br>SIMATIC Automation Tool<br>PRONETA<br>S7-PCT (for IO-Link masters)<br>MFCT (for interface modules as MultiFieldbus devices) | Via fieldbus without authentication<br>Via CPU (https://support.industry.siemens.com/cs/de/de/view/59193101-/en) | Prioritization of control tasks over data access<br>Standard fieldbus transmission mechanisms<br>Data throughputs up to 1 Gbps via PROFINET |
| Configuration and parameter data (upload to PG/PC) | TIA Portal (via CPU)<br>S7-PCT (for IO-Link masters)<br>MFCT (for interface modules as MultiFieldbus devices) | Via fieldbus without authentication<br>Via CPU (https://support.industry.siemens.com/cs/de/de/view/59193101-/en) | Standard fieldbus transmission mechanisms |
| Diagnostics data, service data | CPU<br>TIA Portal<br>SIMATIC Automation Tool<br>PRONETA<br>S7-PCT (for IO-Link masters)<br>MFCT (for interface modules as MultiFieldbus devices) | Via fieldbus without authentication<br>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<br>TIA Portal<br>SIMATIC Automation Tool<br>PRONETA<br>S7-PCT (for IO-Link masters)<br>MFCT (for interface modules as MultiFieldbus devices) | Via fieldbus without authentication<br>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 "Securely removing data (Page 115)" and "Restoring the factory settings (Page 85)" sections.

# Glossary

### AR (Application Relation)

The AR (**A**pplication **R**elation) 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.

### Encoders

Encoders are used for the accurate detection of routes, positions, velocities, rotational speeds, masses, etc. in the form of digital and analog signals.

### 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).

### Functional grounding

Functional grounding is a low-impedance current path between electric circuits and ground. It is not designed as a safety measure but instead, for example, as a measure to improve interference immunity.

### Functional status (FS)

Functional status provides information on the hardware version of the module.

### Ground

Conductive ground whose electrical potential can be set equal to zero at any point.

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

### Ground

Conductive ground whose electrical potential can be set equal to zero at any point.

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

### Grounding

Grounding means connecting an electrically conductive part to a grounding electrode by means of a grounding system.

### 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 protocol as a communication protocol which is based on a master/device or client/server architecture and permits Ethernet TCP/IP as a further transmission technology

### 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

**P**rotective **E**xtra **L**ow **V**oltage = grounded protective extra-low voltage

### PG

→ Programming device

### Product version (ES)

The product version provides information on the hardware version of the module.

**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-P**ort **C**onfiguration **T**ool = Siemens program for the parameter assignment of Siemens IO-Link master modules and IO-Link devices from any manufacturer.

**SELV**

**S**afety **E**xtra **L**ow **V**oltage = 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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## U



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