SIEMENS

# SIMATIC NET

# Network components SCALANCE XC100-4OBR

Operating Instructions




10/2013

C79000-G8976-C297-02

# Legal information

## Warning notice system

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

**⚠DANGER**

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

**⚠WARNING**

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

**⚠CAUTION**

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

**NOTICE**

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

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

## Qualified Personnel

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

## Proper use of Siemens products

Note the following:

**⚠WARNING**

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

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## Disclaimer of Liability

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

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# Table of contents

# Introduction

# 1

## 1.1 On the Operating Instructions

### Purpose of the Operating Instructions

These operating instructions support you when installing and connecting up devices of the SCALANCE XC-100 product line.

### Validity of the Operating Instructions

These Operating Instructions apply to all devices of the SCALANCE XC-100 product line.

Unless mentioned otherwise, the descriptions in these operating instructions refer to all devices of the SCALANCE XC-100 product line.

### Designations used

| Classification | Description | Terms used |
|---|---|---|
| Product line | For all devices and variants in the product line, the designation of the product line is used. | SCALANCE XC-100 |
| Device | The device name is used to identify a specific device. | SCALANCE XC100-4OBR |
| Variant | For a variant of the device, the device name has the appropriate variant added to it in brackets. | e.g. SCALANCE XC100-4OBR (single mode) |

**Note**

The term "bypass relay" is used in these Operating Instructions as a generic term for the various device names.

### Further documentation

The "SIMATIC NET Industrial Ethernet Network Manual" contains information on other SIMATIC NET products that you can operate along with the devices of this product line in an Industrial Ethernet network.

There, you will find among other things optical performance data of the communications partner that you require for the installation.

The "SIMATIC NET Industrial Ethernet Network Manual" can be found on the Internet pages of Siemens Industry Online Support under the following entry ID:
27069465 (http://support.automation.siemens.com/WW/view/en/27069465)

## SIMATIC NET manuals

You will find SIMATIC NET manuals on the Internet pages of Siemens Industry Online Support:

- using the search function:

  Link to Siemens Industry Online Support (http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo2&aktprim=99&lang=en)

  Enter the entry ID of the relevant manual as the search item.

- In the navigation panel on the left hand side in the area "Industrial Communication":

  Link to the area "Industrial Communication" (http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo&lang=de&siteid=csius&aktprim=0&extranet=standard&viewreg=WW&objid=10805878&treeLang=en)

  Go to the required product group and make the following settings:
  tab "Entry list", Entry type "Manuals"

You will find the documentation for the SIMATIC NET products relevant here on the data medium that ships with some products:

- Product CD / product DVD
- SIMATIC NET Manual Collection

## SIMATIC NET glossary

Explanations of the specialist terms used in this documentation can be found in the SIMATIC NET glossary.

You will find the SIMATIC NET glossary here:

- SIMATIC NET Manual Collection

  The DVD ships with certain SIMATIC NET products.

- On the Internet under the following entry ID:

  50305045 (http://support.automation.siemens.com/WW/view/en/50305045)

## Security messages

**Note**

For its automation and drives product portfolio, Siemens provides IT security mechanisms to support secure operation of the plant/machine. Our products are continuously being further developed also taking into account the aspect of IT security. We therefore recommend that you regularly check for updates of our products and that you only use the latest versions.
You will find information in:
Industrial Security (http://www.siemens.com/industrialsecurity)

Here, you can register for a product-specific newsletter.

For the secure operation of a plant/machine, it is also necessary to integrate the automation components in a full IT security concept for the entire plant/machine that represents the state of the art in IT technology. You will find information on this in:
Siemens Industry online support
(http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo2&aktprim=99&lang=en)

Products from other manufacturers that are being used must also be taken into account.

# 1.2 On the product

## Catalogs

You will find the order numbers for the Siemens products of relevance here in the following catalogs:

- SIMATIC NET Industrial Communication / Industrial Identification, catalog IK PI
- SIMATIC Products for Totally Integrated Automation and Micro Automation, catalog ST 70
- Industry Mall - catalog and ordering system for automation and drive technology, Online catalog (https://eb.automation.siemens.com/goos/WelcomePage.aspx?regionUrl=/en&language=en)

You can request the catalogs and additional information from your Siemens representative.

## Order numbers

The variants of the SCALANCE XC100-4OBR have the following order numbers:

| Variant | Order number | Description |
|---|---|---|
| SCALANCE XC100-4OBR (single mode) | 6GK5100-4AV00-2FA2 | with TAP function * |
| | 6GK5100-4AV00-2DA2 | without TAP function * |
| SCALANCE XC100-4OBR (multimode) | 6GK5100-4AW00-2FA2 | with TAP function * |

* You will find an explanation of the TAP function in the section "Purpose (Page 14)".

## Components of the product

The following parts ship with a SCALANCE XC100-4OBR:

- A device with the following factory settings:
  - Monitoring voltage: 24 V (-20 %)
  - Startup time: 30 s
- Operating Instructions (compact)
- A 4-pin terminal block for the power supply (spring-loaded terminal)
- A 2-pin terminal block for the signaling contact (spring-loaded terminal)
- A 2-pin terminal block for the digital input (spring-loaded terminal)
- Securing screw for mounting on an S7 standard rail

## Accessories

### Network cable for connecting the SCALANCE XC100-4OBR to end devices

| Component | Length | Order number |
|---|---|---|
| MM FO connecting cable SC/SC | 1 m | 6XV1843-5EH10-0CC0 |
| MM FO connecting cable SC/BFOC | 1 m | 6XV1843-5EH10-0CB0 |
| MM FO connecting cable SC/LC | 1 m | 6XV1843-5EH10-0CA0 |
| SM FC connecting cable SC/SC | 1 m | 6XV1843-5FH10-0CC0 |
| SM FO connecting cable SC/BFOC | 1 m | 6XV1843-5FH10-0CB0 |
| SM FO connecting cable SC/LC | 1 m | 6XV1843-5FH10-0CA0 |

### Network cable for connecting the SCALANCE XC100-4OBR to the network

| Component | Attenuation factor per length at 1300 nm | Order number |
|---|---|---|
| MM FO robust cable GP | 1 dB/km | 6XV1873-2R |
| MM FO standard cable GP | 0.7 dB/km | 6XV1873-2A |
| MM FO ground cable | 0.7 dB/km | 6XV1873-2G |
| SM FO robust cable GP | 0.5 dB/km | 6XV1843-2R |

### SFP transceiver

The following table shows several SFP transceivers with their optical budgets. You require the optical budget to calculate the cable length (see section "Installation guide (Page 20)").

| Component | optical budget | Order number |
|---|---|---|
| SFP991-1 | 13 dB | 6GK5 991-1AD00-8AA0 |
| SFP991-1LD | 19 dB | 6GK5 991-1AF00-8AA0 |
| SFP991-1LH+ | 29 dB | 6GK5 991-1AE00-8AA0 |
| SFP992-1LD | 12 dB | 6GK5 992-1AM00-8AA0 |
| SFP992-1LH | 17 dB | 6GK5 992-1AN00-8AA0 |

**Note**

The designations LD, LH and LH+ are used for optical single mode interfaces with SCALANCE X. IE switches with the corresponding interfaces have the same designation, e.g. SCALANCE X204-2LD.

## Unpacking and checking

**WARNING**

**Do not use any parts that show evidence of damage**

If you use damaged parts, there is no guarantee that the device will function according to the specification.

If you use damaged parts, this can lead to the following problems:

- Injury to persons
- Loss of the approvals
- Violation of the EMC regulations
- Damage to the device and other components

Use only undamaged parts.

1. Make sure that the package is complete.
2. Check all the parts for transport damage.

# Safety notes

# 2

## Read the safety notices

Note the following safety notices. These relate to the entire working life of the device.

You should also read the safety notices relating to handling in the individual sections, particularly in the sections "Installation" and "Connecting up".

## Safety notices on use in hazardous areas

### General safety notices relating to protection against explosion

| ⚠ WARNING |
| --- |
| EXPLOSION HAZARD |
| DO NOT OPEN WHEN ENERGIZED. |

### Safety notices when using the device according to Hazardous Locations (HazLoc)

If you use the device under HazLoc conditions you must also keep to the following safety notices in addition to the general safety notices for protection against explosion:

This equipment is suitable for use in Class I, Division 2, Groups A, B, C and D or non-hazardous locations only.

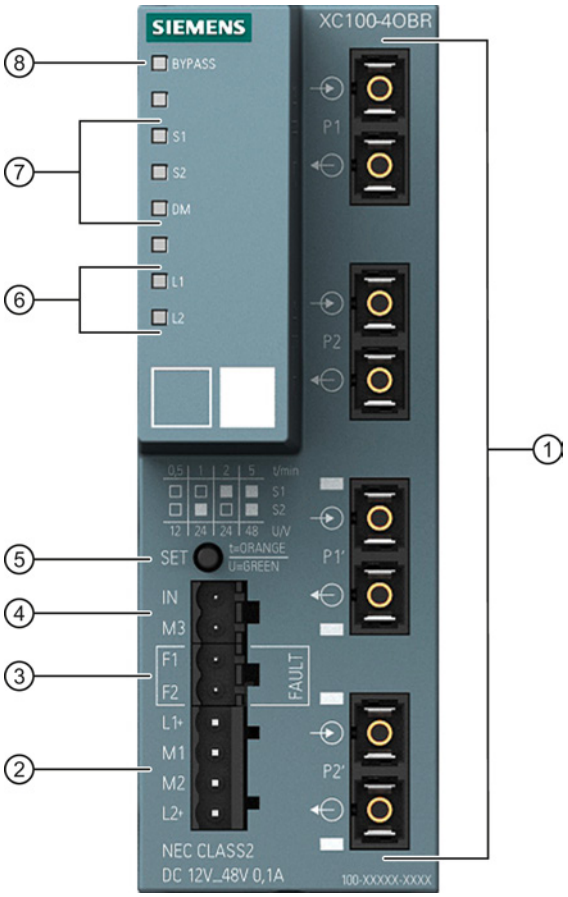
This equipment is suitable for use in Class I, Zone 2, Group IIC or non-hazardous locations only.

# Description of the device

# 3

## 3.1 View

The following figure shows the individual components of the SCALANCE XC100-4OBR.




① Optical connectors
② Connector for redundant power supply L1/M1/M2/L2
③ Connector for signaling contact F1/F2
④ Connector for digital input IN/M3
⑤ "SET" button
⑥ LEDs "L1" and "L2" for indicating the power supply
⑦ LEDs "S1", "S2" and "DM" for displaying the mode and configuration
⑧ "BYPASS" LED for indicating the operating mode

# 3.2 Purpose

## Basic function

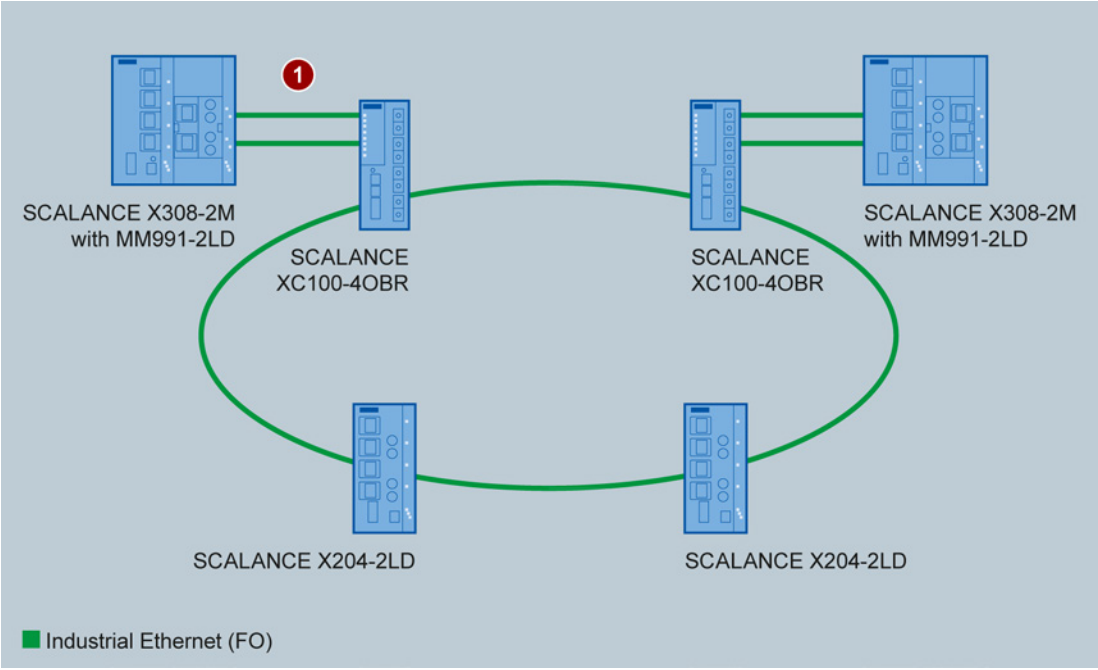
With the optical bypass relay SCALANCE XC100-4OBR, you can activate and deactivate end devices in bus, star and ring structures without interrupting the communication between other network components.

If an error occurs, the bypass relay bypasses the connected end device so that the connection in the network is retained.

An end device is a device connected to the network via a bypass relay.

## Normal operation

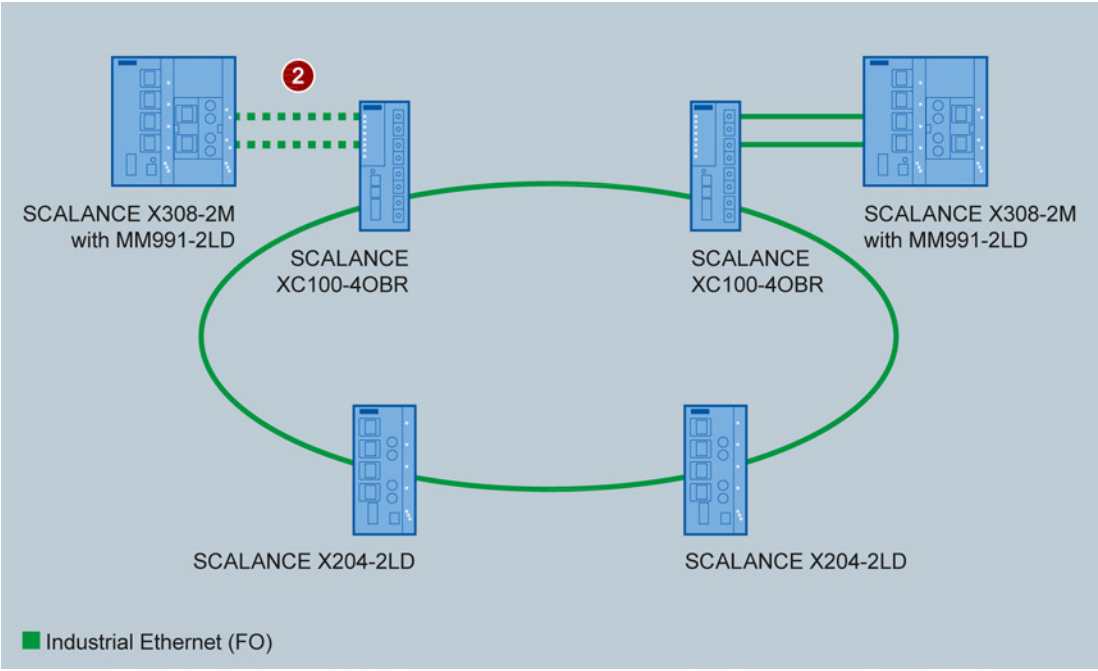
When the SCALANCE XC100-4OBR is supplied with power, the network interfaces are connected to the end device interfaces of the bypass relay ①. The end device to which the bypass relay is connected is therefore in the network.



## Bypass mode

If the voltage of the end device drops, for example due to a fault or during maintenance, the voltage of the SCALANCE XC100-4OBR also drops. The monitoring voltage is no longer in the set range.

The bypass relay then interconnects its two network interfaces within 10 ms. As result, the connection to the end device that has been turned off is inactive and the bypass relay forms the connection to the neighboring network components or bypass relays ②.




When you turn on the voltage of the end device and therefore of the SCALANCE XC100-4OBR again, the two network interfaces remain connected until the end device is operational. It is only after this startup time that the bypass relay connects the network interfaces to the end device interfaces again.

## TAP function

In bypass mode, a SCALANCE XC100-4OBR with TAP function forwards the received data not only to the neighboring network components. The TAP function has the effect that the data is also sent to the end device. The end device receives and sends data as if it were connected to the network. The data that the end device sends in bypass mode is not forwarded to the network by the bypass relay.

With a bypass relay with TAP function, the end device can establish a link to the neighboring network components in bypass mode.

### Bypass relay with TAP function

If you use a bypass relay with TAP function in MRP or HRP rings, you can activate and deactivate the connected end device without the redundancy manager initiating reconfiguration routines in the ring.

### Bypass relay without TAP function

If you use a bypass relay without TAP function in MRP and HRP rings, the redundancy manager reacts when the connected end device is turned on or off again. The redundancy manager enables the alternative (redundant) ring section and initiates the reconfiguration of the logical communications connections.

**Note**

The insertion loss is lower with a bypass relay without TAP function.

# 3.3 Installation guidelines

Note the information on the topic of redundancy in the configuration manuals of the connected devices.

You will find the configuration manuals of the SCALANCE X switches on the Internet pages of Siemens Industry Online Support (http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo2&aktprim=99&lang=en).

## Operating the SCALANCE XC100-4OBR in an (R)STP network

### Bypassing an (R)STP bridge

If you want to bypass an (R)STP bridge with a SCALANCE XC100-4OBR using the TAP function, connect the (R)STP bridge to the (R)STP network only via the two ports of the bypass relay.

**Note**

If you connect the (R)STP bridge with the (R)STP network via other ports, the TAP function causes a network loop in bypass mode and communication in the network fails.

### Bypassing the root bridge

If the root bridge of an (R)STP network is bypassed by a bypass relay, an alternative root bridge is selected. By turning the root bridge on and off, the (R)STP network is recalculated.

If an (R)STP bridge is bypassed, the (R)STP section is longer and attenuation increases. This changes the path costs.

## Operating the SCALANCE XC100-4OBR in a redundant ring structure

### Bypassing the redundancy manager

Within an MRP or HRP ring, a permanently configured redundancy manager must not be bypassed using a bypass relay.

**Note**

If the redundancy manager is bypassed, this causes a network loop and the communication fails.

### Bypassing ring nodes

If the ring nodes are operated in the redundancy modes "MRP Auto Manager" or "Automatic Redundancy Detection", any ring nodes can be connected and disconnected by the bypass relay.

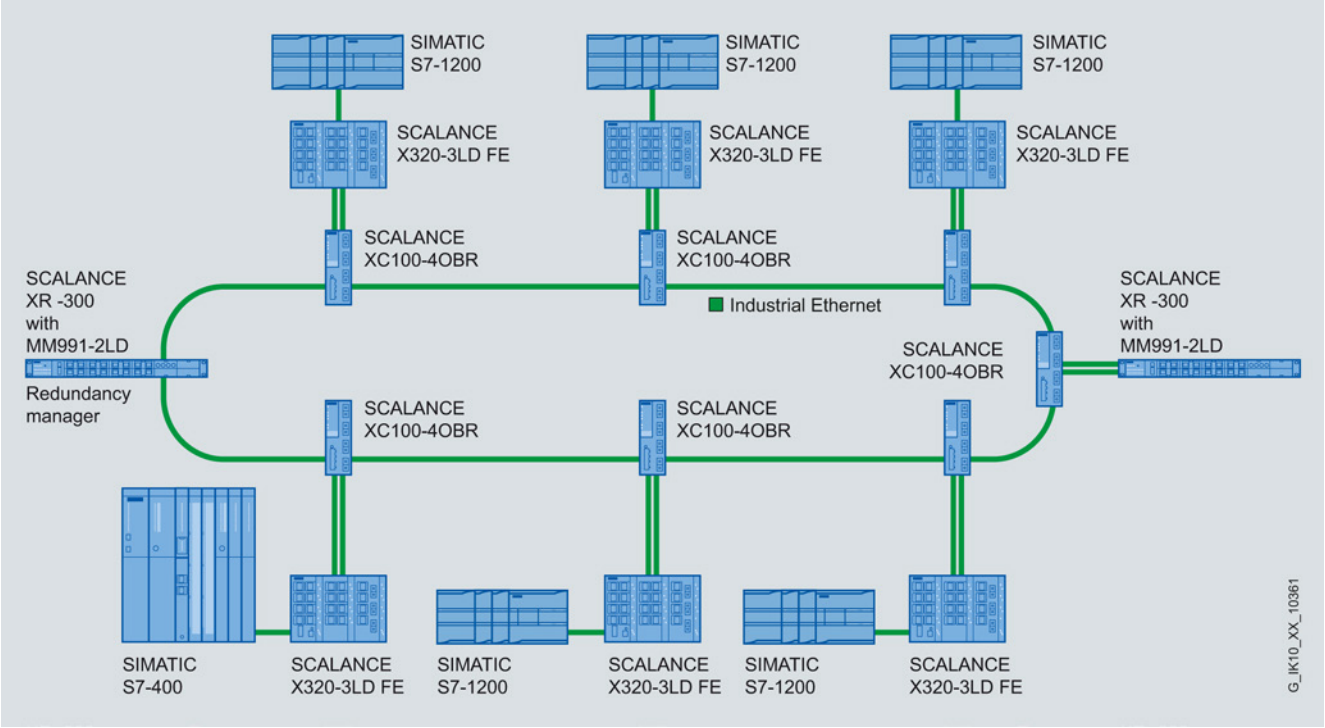
If the current redundancy manager is bypassed, another ring node takes over control of the redundancy. If the redundancy manager changes, the logical communications connections are reconfigured.

# 3.4 Areas of application

## Redundant ring structure with SCALANCE XC100-4OBR with TAP function

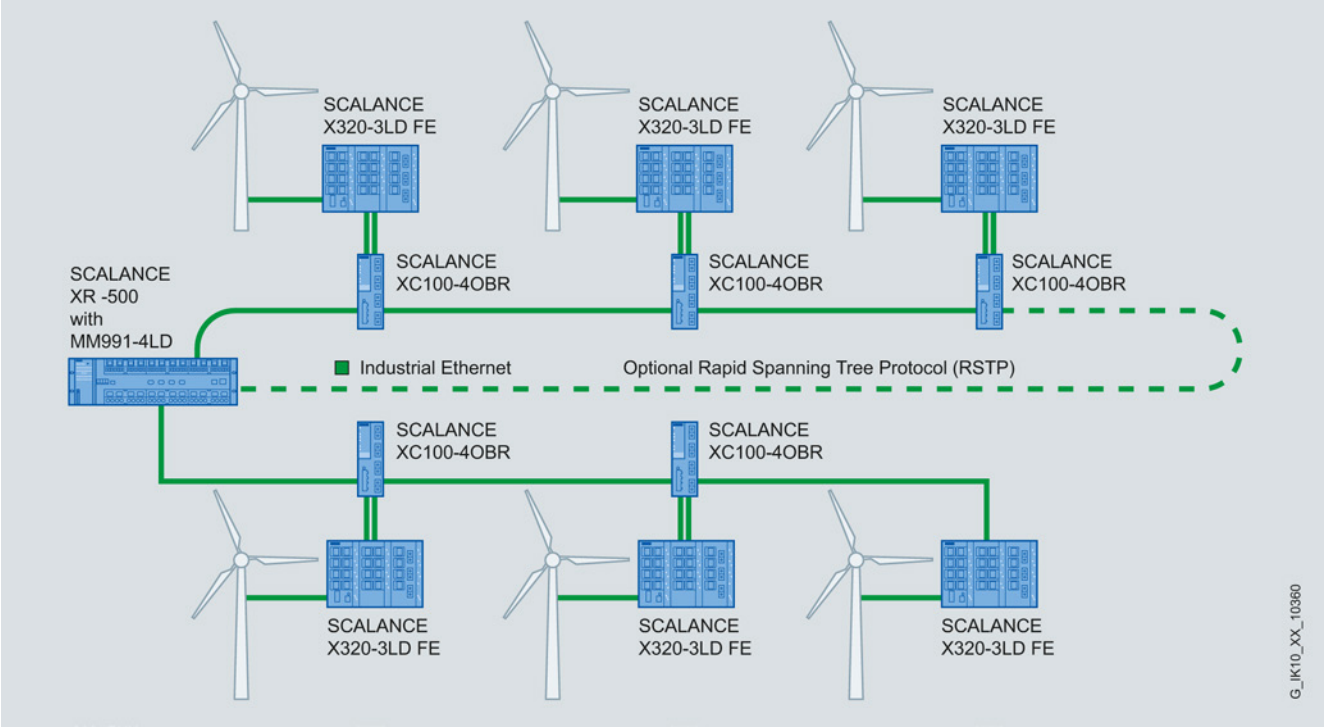
By using the SCALANCE XC100-4OBR in MRP or HRP rings, ring nodes can be turned on and off without the redundancy manager reacting to the topology change.
This, for example, allows maintenance to be performed without reconfiguration of the ring. The communication of the ring nodes continues uninterrupted. This also avoids alarm storms in the monitored network.

Due to the configurable startup time, end devices that have been turned off are returned to the network when they are operational and have established the link to the neighboring network components.



## Redundant network with SCALANCE XC100-4OBR

By using the SCALANCE XC100-4OBR, network availability can be increased particularly in networks that are not easy to access, for example wind farm networks.
If the bypass relay is connected before a network component, the network component can be bypassed by the bypass relay if a problem occurs (e.g. power outage) and communication in the network remains established.



# 3.5 Installation guide

## Calculating the cable length

The maximum cable length between a SCALANCE XC100-4OBR and a connected network component depends on the optical budget of the transceiver and the attenuation of the bypass relay.

To calculate the maximum cable length, you need to deduct the attenuation values from the optical budget of the transceiver.

The available budget is shown based on the example of the SFP transceiver (see section "On the product (Page 8)", subsection "Accessories").

**Note**

The wall sockets in the device are specified as having an attenuation value of 0.3 dB. This value must be deducted from the budget for each plug-in connection.

To achieve a greater cable length, use transceivers with a higher optical budget, for example transceivers with the designation LH instead of LD.

## Transceiver

The SCALANCE XC100-4OBR is suitable for transceivers with the following properties:

- Multimode, 1300 nm, Fast Ethernet
- Single mode, 1310 nm and 1550 nm, Fast/Gigabit Ethernet

The SFP transceivers listed in the "Accessories" section have these properties. You can use the SFP transceivers in IE switches with suitable slots.

You can also use IE switches in which the optical transceivers are already integrated.

## Attenuation

The following factors influence the attenuation of the bypass relay:

- **TAP function**
  Bypass relay with or without TAP function
- **Mode**
  Normal or bypass mode
- **Variant of the bypass relay**
  single mode or multimode

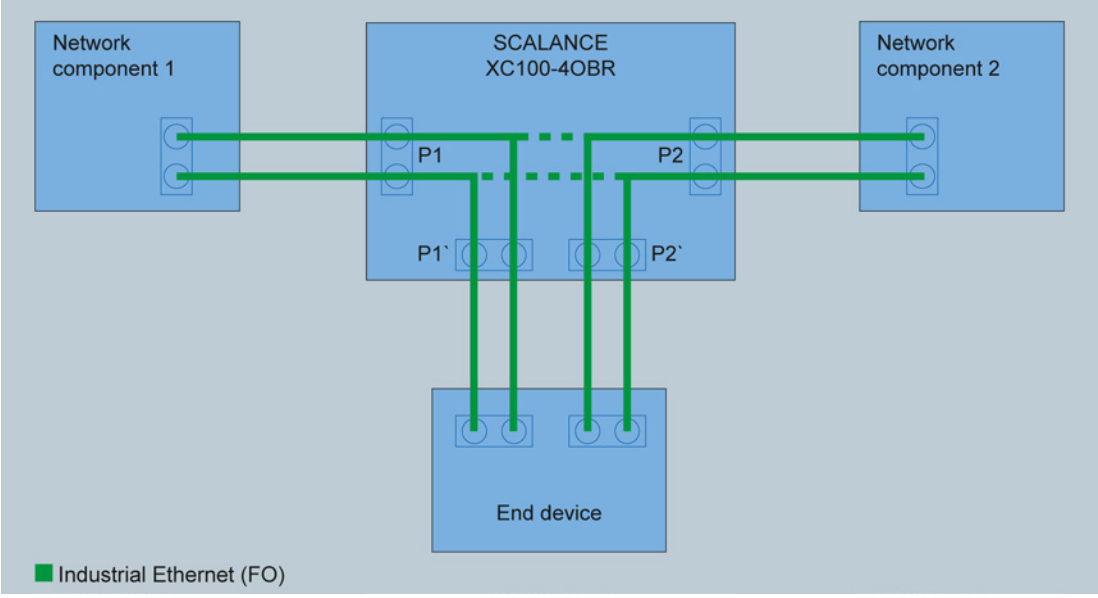
The following use cases show the possible installation of the SCALANCE XC100-4OBR and the resulting attenuation values.

## Use case 1: A SCALANCE XC100-4OBR is installed between three IE switches

### Normal operation

In normal operation, the network interfaces of the bypass relay (P1 and P2) are connected to the corresponding end device interfaces (P1` and P2`).

Network component 1 and the end device and the end device and network component 2 are connected via the bypass relay.




If a network component is connected to an end device via a bypass relay with TAP function in normal operation, the attenuation depends on the direction. The attenuation in the send and receive direction is different.

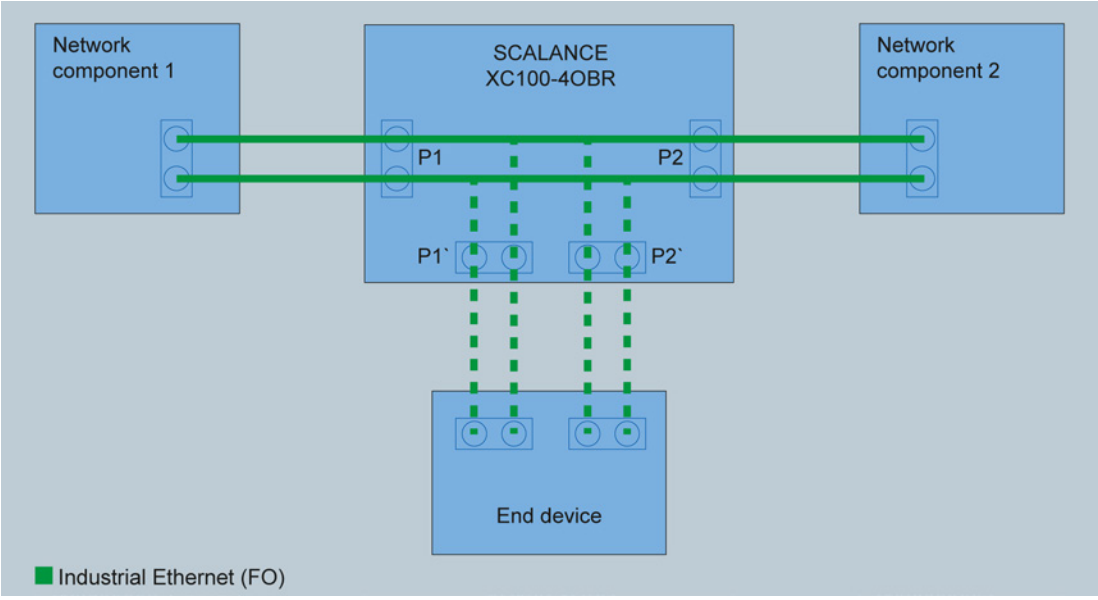
On connections via a bypass relay without TAP function, the attenuation in the send and receive direction is the same.

| Variant | TAP function | Connection | Attenuation at 0 °C to 60 °C |
|---|---|---|---|
| SCALANCE XC100-4OBR (single mode) | Without TAP function | Network component 1 → end device<br>End device → network component 1 | 1.0 dB |
| | With TAP function | Network component 1 → end device | 5.5 dB |
| | | End device → network component 1 | 1.0 dB |
| SCALANCE XC100-4OBR (multimode) | With TAP function | Network component 1 → end device | 5.8 dB |
| | | End device → network component 1 | 1.3 dB |

### Bypass mode

In bypass mode, the network interfaces of the bypass relay (P1 and P2) are connected together.

The network components 1 and 2 are connected via the bypass relay.




If two network components are connected via a bypass relay with TAP function, the attenuation in the send and receive direction is the same.

| Variant | TAP function | Connection | Attenuation at 0 °C to 60 °C |
|---|---|---|---|
| SCALANCE XC100-4OBR (single mode) | Without TAP function | Network component 1 → network component 2<br>Network component 2 → network component 1 | 1.0 dB |
| | With TAP function | Network component 1 → network component 2<br>Network component 2 → network component 1 | 3.9 dB |
| SCALANCE XC1004OBR (multimode) | With TAP function | Network component 1 → network component 2<br>Network component 2 → network component 1 | 4.3 dB |

## Use case 2: Two SCALANCE XC100-4OBR devices are installed one after the other

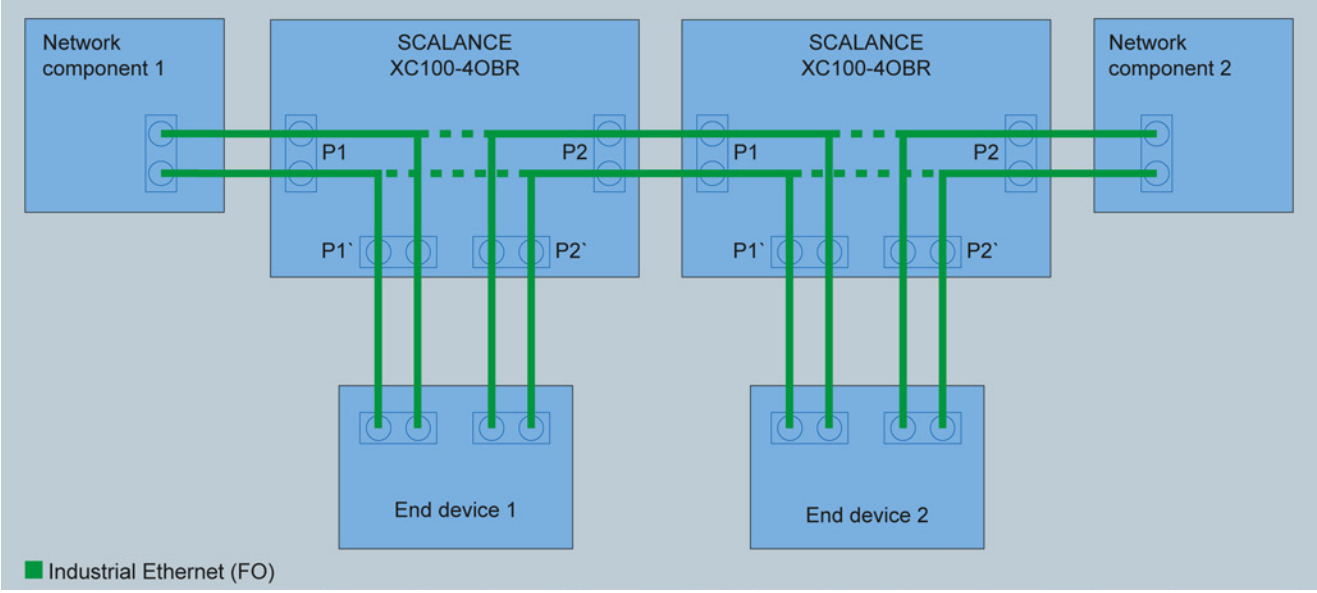
**Note**

Due to the available budget, arranging several bypass relays in series is possible only for SCALANCE XC100-4OBR (single mode).

### Normal operation

In normal operation, the network interfaces of the bypass relays (P1 and P2) are connected to the corresponding end device interfaces (P1` and P2`).

The end devices 1 and 2 are connected via two bypass relays. Both bypass relays are in normal mode.



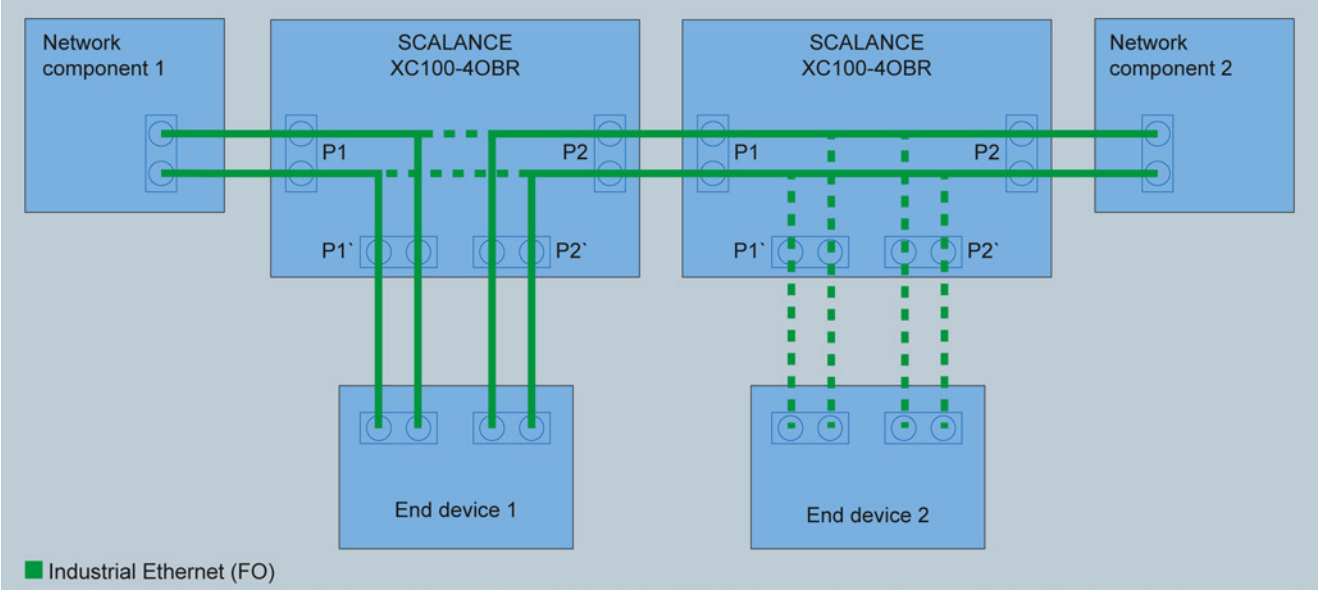

If two end devices are connected via two bypass relays, the attenuation in the send and receive direction is the same.

| Variant | TAP function | Connection | Attenuation at 0 °C to 60 °C |
|---|---|---|---|
| SCALANCE XC100-4OBR (single mode) | Without TAP function | End device 1 → end device 2<br>End device 2 → end device 1 | 2.0 dB |
| | With TAP function | End device 1 → end device 2<br>End device 2 → end device 1 | 6.5 dB |

### Bypass mode

In bypass mode, the network interfaces of the bypass relay (P1 and P2) are connected together.

The end device 1 and network component 2 are connected via a bypass relay in normal mode and a bypass relay in bypass mode.




If a network component is connected to an end device via two bypass relays with TAP function, the attenuation depends on the direction. The attenuation in the send and receive direction is different.

On connections via a bypass relay without TAP function, the attenuation in the send and receive direction is the same.

| Variant | TAP function | Connection | Attenuation at 0 °C to 60 °C |
|---|---|---|---|
| SCALANCE XC100-4OBR (single mode) | Without TAP function | End device 1 → network component 2<br>Network component 2 → end device 1 | 2.0 dB |
| | With TAP function | End device 1 → network component 2 | 4.9 dB |
| | | Network component 2 → end device 1 | 9.4 dB |

# 3.6 "SET" button

## Information on the "SET" button

### Position and functions

On the front of the SCALANCE XC100-4OBR, there is a "SET" button with which you can control the bypass relay locally.

Using the "SET" button, you can display (display mode) or set (configuration mode) the startup time and the monitoring voltage.

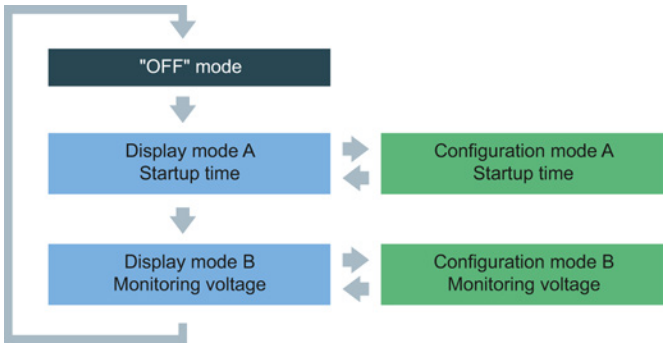
### LED display

The "DM" LED shows the mode in which the device is operating, see section ""DM" LED (Page 28)".

The LEDs "S1" and "S2" indicate the configuration, see the section "LEDs "S1" and "S2" (Page 29)".

### The various modes

The following graphic shows an overview of the various modes of the "SET" button:




## "OFF" mode

In the "OFF" mode, you can neither see nor modify the set configurations.

The LEDs "DM", "S1" and "S2" are off.

In the following section, use of the "SET" button is always described starting from the "OFF" mode.

## Display mode

In display mode, you can see which configuration is currently set.

In display mode A, you see the set startup time. In display mode B, you see the set monitoring voltage.

### Changing to a display mode

1. To change to a display mode, press the "SET" button.

| Pressing the "SET" button starting from the "OFF" mode | Mode |
|---|---|
| Press once | Display mode A |
| Press twice | Display mode B |
| Press three times | "OFF" mode |

**Note**

**LED display**

You will find the corresponding LED displays in the sections ""DM" LED (Page 28)" and "LEDs "S1" and "S2" (Page 29)".

## Configuration mode

In configuration mode, you can modify the current configuration. For each display mode, there is a corresponding configuration mode.

You can set the startup time in configuration mode A. You can set the monitoring voltage in configuration mode B.

### Changing to a configuration mode

1. To change to a configuration mode, first change to a display mode.
2. To change from the display mode to the corresponding configuration mode, press the "SET" button for 5 s.

   Once you have changed to a configuration mode, you can see the current configuration.

| Pressing the "SET" button starting from the "OFF" mode | Mode |
|---|---|
| Press once and then press once and hold down for 5 s | Configuration mode A |
| Press twice and then press once and hold down for 5 s | Configuration mode B |
| Press three times | "OFF" mode |

**Note**

**LED display**

You will find the corresponding LED displays in the sections ""DM" LED (Page 28)" and "LEDs "S1" and "S2" (Page 29)".

### Setting the configuration

In the following table, it is assumed that configuration 0 is currently set.

1. To change between the available configurations, press the "SET" button briefly in the relevant configuration mode.

| Pressing the "SET" button<br>starting from configuration 0 | Configuration |
|---|---|
| Press once | 1 |
| Press twice | 2 |
| Press three times | 3 |
| Press four times | 0 |

**Note**

**Configurations and LED display**

You will find the configurations available to you for startup time or the monitoring voltage and the corresponding indications of the LEDs in the sections ""DM" LED (Page 28)" and "LEDs "S1" and "S2" (Page 29)".

### Saving the configuration

1. To store the set configuration permanently on the device, avoid pressing the "SET" button for approximately 10 s in configuration mode.

   Once the 10 s have elapsed, you are in the relevant display mode.

**Note**

**LED display**

You will find the corresponding LED displays in the sections ""DM" LED (Page 28)" and "LEDs "S1" and "S2" (Page 29)".

# 3.7 LED displays

## 3.7.1 "Bypass" LED

The "Bypass" LED indicates whether or not the SCALANCE XC100-4OBR is in normal or in bypass mode.

| LED status | LED color | Meaning |
|---|---|---|
| Off | - | Normal operation |
| Lit | Orange | Bypass mode |
| Flashes | Orange | Waiting for the startup time |

## 3.7.2 "DM" LED

The "DM" LED indicates the mode of the bypass relay.

| Pressing the "SET" button starting from the "OFF" mode | Mode | LED status | LED color |
|---|---|---|---|
| Press once | Display mode A | Lit | Orange |
| Press once and then press once and hold down for 5 s | Configuration mode A | Flashes | Orange |
| Press twice | Display mode B | Lit | Green |
| Press twice and then press once and hold down for 5 s | Configuration mode B | Flashes | Green |
| Press three times | "OFF" mode | Off | - |

## 3.7.3 LEDs "S1" and "S2"

### Meaning in display and configuration mode A

In display and configuration mode A, the LEDs "S1" and "S2" indicate the configuration of the startup time.

| Pressing the "SET" button starting from configuration 0 | Configuration | Startup time | "S1" LED | "S2" LED |
|---|---|---|---|---|
| - | 0 | 30 s | Off | Off |
| Press once | 1 | 60 s | Off | Lit |
| Press twice | 2 | 120 s | Lit | Off |
| Press three times | 3 | 300 s | Lit | Lit |

### Meaning in display and configuration mode B

In display and configuration mode B, the LEDs "S1" and "S2" indicate the configuration of the monitoring voltage.

| Pressing the "SET" button starting from configuration 0 | Configuration | Monitoring voltage | "S1" LED | "S2" LED |
|---|---|---|---|---|
| - | 0 | 12 V (-10%) | Off | Off |
| Press once | 1 | 24 V (-20%) | Off | Lit |
| Press twice | 2 | 24 V (-10%) | Lit | Off |
| Press three times | 3 | 48 V (-20%) | Lit | Lit |

### 3.7.4 LEDs "L1" and "L2"

The "L1" and "L2" LEDs indicate the current range of the power supply at connectors "L1" and "L2".

The colors of the "L1" and "L2" LEDs have the following significance:

- Green

  The connected voltage is higher than the monitoring voltage.

- Orange

  The connected voltage is higher than 8 V, however lower than the monitoring voltage.

- Off

  The connected voltage is lower than 8 V.

| LED "L1" | LED "L2" | Power supply | |
|---|---|---|---|
| | | Connector "L1" | Connector "L2" |
| Green | Off | Higher than the monitoring voltage | Lower than 8 V |
| Green | Green | Higher than the monitoring voltage | Higher than the monitoring voltage |
| Off | Green | Lower than 8 V | Higher than the monitoring voltage |
| Green | Orange | Higher than the monitoring voltage | higher than 8 V,<br>but lower than the monitoring voltage |
| Orange | Orange | higher than 8 V,<br>but lower than the monitoring voltage | higher than 8 V,<br>but lower than the monitoring voltage |
| Orange | Green | higher than 8 V,<br>but lower than the monitoring voltage | Higher than the monitoring voltage |

**Note**

**Value of the monitoring voltage**

For a description of the monitoring voltage, refer to the section "Technical data (Page 43)".

# Mounting

# 4

## 4.1 Safety notices for installation

### Safety notices

When installing the device, keep to the safety notices listed below.

**⚠ WARNING**

If a device is operated in an ambient temperature of more than 60 ℃, the temperature of the device housing may be higher than 70 °C. The device must therefore be installed so that it is only accessible to service personnel or users that are aware of the reason for restricted access and the required safety measures at an ambient temperature higher than 60 ℃.

### Safety notices on use in hazardous areas

#### General safety notices relating to protection against explosion

**⚠ WARNING**

EXPLOSION HAZARD

SUBSTITUTION OF COMPONENTS MAY IMPAIR SUITABILITY FOR CLASS I, DIVISION 2 OR ZONE 2.

**⚠ WARNING**

When used in hazardous environments corresponding to Class I, Division 2 or Class I, Zone 2, the device must be installed in a cabinet or a suitable enclosure.

**Safety notices when using the device according to ATEX**

If you use the device under ATEX conditions you must also keep to the following safety notices in addition to the general safety notices for protection against explosion:

**⚠ WARNING**

To comply with EU Directive 94/9 (ATEX95), this enclosure must meet the requirements of at least IP54 in compliance with EN 60529.

**⚠ WARNING**

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 60 °C, only use cables with admitted maximum operating temperature of at least 80 °C.

### Further notes

**NOTICE**

**Warming and premature aging of the network component due to direct sunlight**

Direct sunlight can heat up the device and can lead to premature aging of the network component and its cabling.

Provide suitable shade to protect the network component against direct sunlight.

## 4.2 Types of installation

### Types of installation

The SCALANCE XC100-4OBR can be installed in the following ways:

- DIN rail
- S7-300 standard rail
- S7-1500 standard rail

# 4.3 Mounting on DIN rails

## Installation

**⚠ WARNING**

**Danger of injury by falling objects**

The 35 mm DIN rail does not provide adequate support in shipping or when there is severe vibration (> 10 g). When used under these conditions, the device can detach itself and may cause injury to persons.
When used in shipbuilding or when extreme vibration can be expected, mount the device on a S7 standard rail.

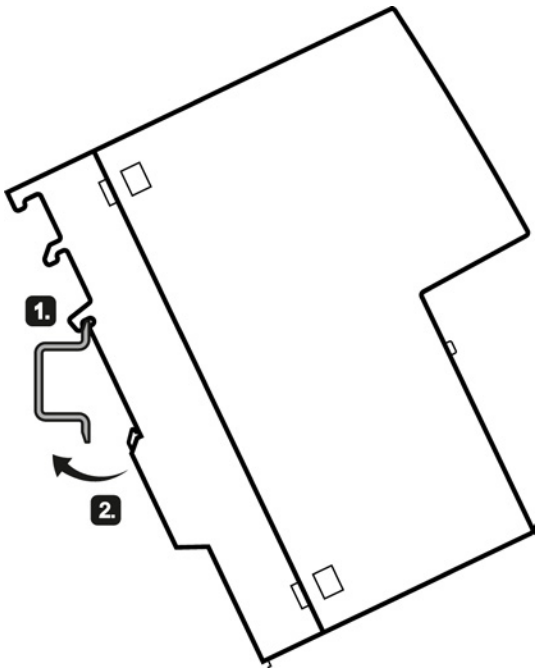



Figure 4-1 DIN rail mounting

To install the device on a 35 mm DIN rail complying with DIN EN 60715, follow the steps below:

1. Place the third housing guide of the device on the top edge of the DIN rail.
2. Press the device down against the DIN rail until the spring catch locks in place.
3. Fit the connectors for the power supply, see the section "Power supply (Page 39)".
4. Fit the connectors for the signaling contact, see the section "Signaling contact (Page 40)".
5. Fit the connectors for the digital input, see the section "Digital input (Page 41)".
6. Insert the terminal blocks into the sockets on the device.

## Removal

To remove the device from a DIN rail, follow the steps below:

1. Disconnect all connected cables.
2. Release the DIN rail catch on the bottom of the device using a screwdriver.
3. Pull lower part of the device away from the DIN rail.

## 4.4 Installation on a standard S7-300 rail

### Installing on an S7-300 standard rail

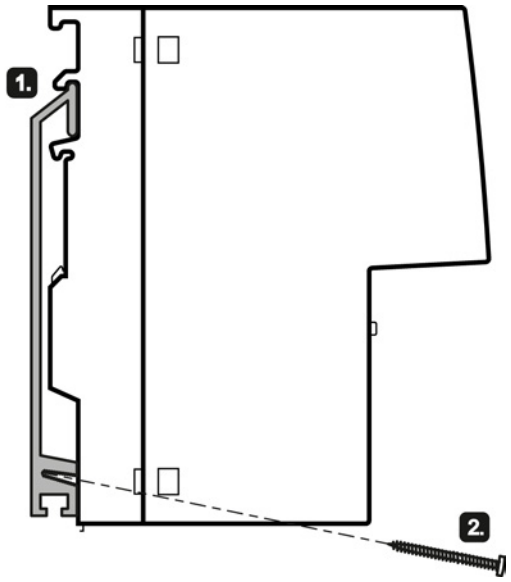



Figure 4-2 S7-300 standard rail mounting

To install the device on an S7-300 standard rail, follow the steps below:

1. Place the second housing guide of the device on the top edge of the standard rail.
2. Screw the device to the lower part of the standard rail with the supplied screw.
3. Fit the connectors for the power supply, see the section "Power supply (Page 39)".
4. Fit the connectors for the signaling contact, see the section "Signaling contact (Page 40)".
5. Fit the connectors for the digital input, see the section "Digital input (Page 41)".
6. Insert the terminal blocks into the sockets on the device.

### Removal

To remove the device from a standard rail, follow the steps below:

1. Disconnect all connected cables.
2. Release the screw on the bottom of the standard rail.
3. Remove the device from the standard rail.

# 4.5 Installation on a standard S7-1500 rail

## Installing on an S7-1500 standard rail

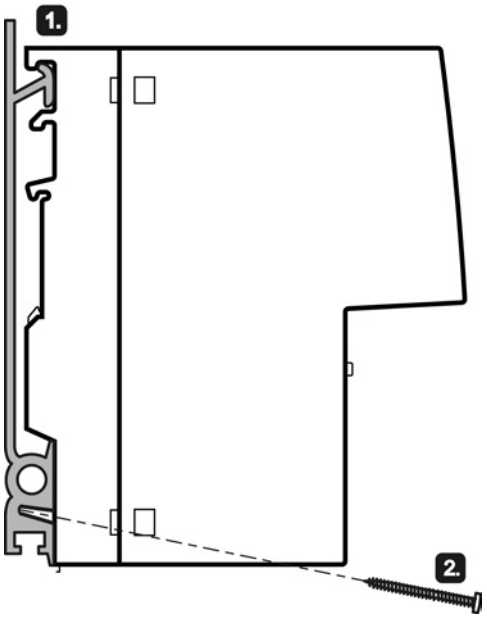



Figure 4-3 S7-1500 standard rail mounting

To install the device on an S7-1500 standard rail, follow the steps below:

1. Place the first housing guide of the device on the top edge of the standard rail.
2. Screw the device to the lower part of the standard rail with the supplied screw.
3. Fit the connectors for the power supply, see the section "Power supply (Page 39)".
4. Fit the connectors for the signaling contact, see the section "Signaling contact (Page 40)".
5. Fit the connectors for the digital input, see the section "Digital input (Page 41)".
6. Insert the terminal blocks into the sockets on the device.

## Removal

To remove the device from a standard rail, follow the steps below:

1. Disconnect all connected cables.
2. Release the screw on the bottom of the standard rail.
3. Remove the device from the standard rail.

# Connection 5

## 5.1 Safety when connecting up

### Safety notices

When connecting up the device, keep to the safety notices listed below.

**⚠ WARNING**

The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS).

This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).

If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

### Safety notices on use in hazardous areas

#### General safety notices relating to protection against explosion

**⚠ WARNING**

**EXPLOSION HAZARD**

DO NOT CONNECT OR DISCONNECT EQUIPMENT WHEN A FLAMMABLE OR COMBUSTIBLE ATMOSPHERE IS PRESENT.

#### Safety notices when using the device according to Hazardous Locations (HazLoc)

If you use the device under HazLoc conditions you must also keep to the following safety notices in addition to the general safety notices for protection against explosion:

**⚠ WARNING**

**EXPLOSION HAZARD**

DO NOT DISCONNECT WHILE CIRCUIT IS LIVE UNLESS AREA IS KNOWN TO BE NON-HAZARDOUS.

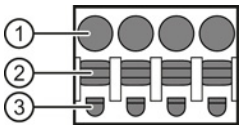
**Safety notices when using the device according to ATEX**

If you use the device under ATEX conditions you must also keep to the following safety notices in addition to the general safety notices for protection against explosion:

| ⚠ WARNING |
| --- |
| Take measures to prevent transient voltage surges of more than 40% of the rated voltage. This is the case if you only operate devices with SELV (safety extra-low voltage). |

## 5.2 Spring-loaded terminal

The following figure shows the individual components of a spring-loaded terminal:




| | | |
| --- | --- | --- |
| ① | Wire inlet | For connecting the wire |
| ② | Button | For releasing the wire |
| ③ | Test contact | For measuring the voltage |

# 5.3 Power supply

## Information on the power supply

- The "L1" and "L2" LEDs indicate the current range of the power supply, see the section "LEDs "L1" and "L2" (Page 30)".
- The power supply is connected using a 4-pin plug-in terminal block (spring-loaded terminal). The terminal block ships with the device.
- The power supply can be connected redundantly.
- The two chassis grounds M1 and M2 are connected.
- To wire up the power connector, use a copper cable of category 18-12 AWG or cable with a cross-section of 0.75 to 2.5 mm².

**⚠ WARNING**

**Incorrect power supply**

The power of all connected power supply units must total the equivalent of a power source with limited power (LPS limited power source).

If the device is connected to a redundant power supply (two separate power supplies), both power supplies must meet these requirements.

Never operate the device with AC voltage or DC voltage higher than 60 V DC.

## Position and assignment

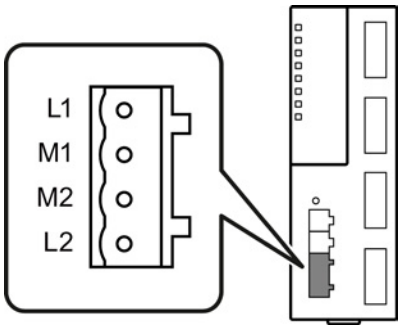



Figure 5-1 Position of the power supply on the SCALANCE XC100-4OBR and the assignment of the terminal block

| Contact | Assignment |
|---|---|
| L1 | L1+ 12 VDC/24 VDC/48 VDC |
| M1 | Ground |
| M2 | Ground |
| L2 | L2+ 12 VDC/24 VDC/48 VDC |

# 5.4 Signaling contact

## Information on the signaling contact

- The signaling contact is a floating switch with which you can output the mode.

  The signaling contact must be operated within the range of the operating voltage.

  When the bypass relay is in bypass mode, it closes the signaling contact. If the bypass relay is in normal mode, the signaling contact is open.
- The signaling contact is connected using a 2-pin plug-in terminal block (spring-loaded terminal). The terminal block ships with the device.
- To wire up the signaling contact, use a copper cable of category 18-12 AWG or a cable with a cross-section of 0.75 to 2.5 $mm^2$.

| NOTICE |
| --- |
| **Damage due to voltage being too high** |
| The signaling contact can be subjected to a maximum load of 100 mA (safety extra low voltage SELV 12 VDC / 24 VDC / 48 VDC). |

## Position and assignment

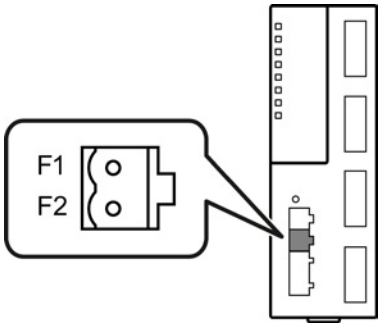



Figure 5-2 Position of the signaling contact on the SCALANCE XC100-4OBR and the assignment of the terminal block

| Pin number | Assignment |
| --- | --- |
| Pin 1 | F1 |
| Pin 2 | F2 |

# 5.5 Digital input

## Information on the digital input

- The digital input is a floating switch. Using the digital input, you can use digital control to change between normal and bypass mode. The change to normal mode does not involve any delay.

  The bypass relay then only activates the digital input when the connected voltage is in the voltage range being monitored.

  The switching threshold of the digital input is at 9 V.
- The "Bypass" LED indicates which mode the SCALANCE XC100-4OBR is in, see the section ""Bypass" LED (Page 28)".
- The digital input is connected using a 2-pin plug-in terminal block (spring-loaded terminal). The terminal block ships with the device.
- To wire up the digital input, use a copper cable of category 18-12 AWG or a cable with a cross-section of 0.75 to 2.5 $mm^2$.

| NOTICE |
| --- |
| **Damage due to voltage being too high**<br>The digital input can be subjected to a maximum load of 10 mA (safety extra low voltage SELV 12 VDC / 24 VDC / 48 VDC). |

## Position and assignment

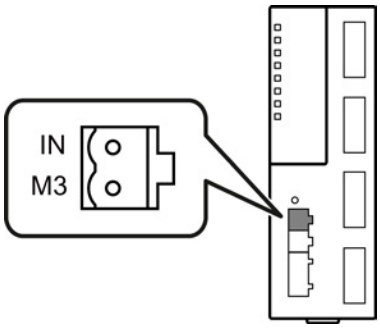



Figure 5-3 Position of the digital input on the SCALANCE XC100-4OBR and the assignment of the terminal block

| Pin number | Assignment |
| --- | --- |
| Pin 1 | IN |
| Pin 2 | M3 (ground) |

# 5.6 Optical connectors

## Information on optical connectors

The SCALANCE XC100-4OBR has 4 fiber-optic interfaces. Two of the interfaces (P1 and P2) are used to connect the device to the ring or bus structure of the network. The two other interfaces (P1' and P2') are used to connect an end device.

## Position and description

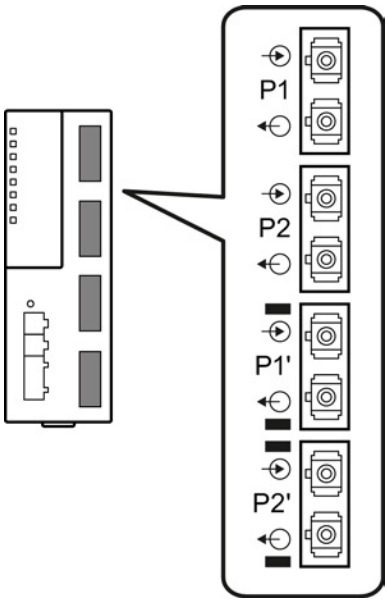



Figure 5-4 Position of the optical connectors on the SCALANCE XC100-4OBR and description of the ports

| Port number | Description | Designation |
|---|---|---|
| P1 | FO interface for connection to network port 1 | Network interface |
| P2 | FO interface for connection to network port 2 | Network interface |
| P1’ | FO interface for connection of the end device to network port 1 | End device interface |
| P2’ | FO interface for connection of the end device to network port 2 | End device interface |

# Technical data

# 6

## Validity

Unless indicated otherwise, the information applies to all variants of the SCALANCE XC100-4OBR.

| | | |
|---|---|---|
| **Technical specifications** | | |
| **Electrical data** | | |
| Power | Voltage range | 12 V to 48 V |
| | Design | Terminal block, 4 terminals |
| | Cable cross-section | 0,75 ... 2.5 mm² (18-12 AWG) |
| | Properties | Implemented redundantly |
| Current consumption | at 12 VDC | 0.1 A |
| Effective power loss | at 12 VDC | 1 W |
| Signaling contact | Quantity | 1 |
| | Design | Terminal block, 2 terminals |
| | Permitted voltage range | 24 VDC |
| | Load capability | max. 100 mA |
| Digital input | Quantity | 1 |
| | Design | Terminal block, 2 terminals |
| | Status "0" | 0 V to 9 V |
| | Status "1" | 9 V to 60 V |
| | max. input current | max. 10 mA |
| **Selectable parameters** | | |
| Selectable monitoring voltage | 12 V (-10 %) | |
| | 24 V (-20 %) - factory setting | |
| | 24 V (-10 %) | |
| | 48 V (-20 %) | |
| Selectable startup time | 30 s - factory setting | |
| | 60 s | |
| | 120 s | |
| | 300 s | |
| **Permitted ambient conditions** | | |
| Ambient temperature | During operation up to 2000 m | -40 ℃ to +70 ℃ |
| | During operation 2000 m and higher | -40 °C to +65 °C |
| | During operation 3,000 m and higher | -40 °C to +60 °C |
| | During storage | -40 °C to +85 °C |
| | During transportation | -40 °C to +85 °C |
| Relative humidity | During operation at 25 ℃ | 95 % |

| **Technical specifications** | | | | |
|---|---|---|---|---|
| **Design, dimensions and weight** | | | | |
| Degree of protection | | IP20 | | |
| Weight | | 550 g | | |
| Dimensions (W x H x D) | | 50 x 140 x 125 mm | | |
| Installation options | | • Installation on a DIN rail<br>• Installation on an S7-300 standard rail<br>• Installation on an S7-1500 standard rail | | |
| Varnishing of the circuit board | | Yes | | |
| MTBF | | 160 years | | |
| **Optical connectors** | | | | |
| | | **Single mode** | | **Multimode** |
| Number of fiber-optic cables | | 4 | | 4 |
| Design | | SM glass FO cable with SC socket | | MM glass FO cable with SC socket |
| Transmission rate | | 100/1000 Mbps | | 100 Mbps |
| Wavelength | | Lower: 1310 nm<br>Upper: 1550 nm | | 1310 nm |
| **Optical parameters** | | | | |
| | | **Single mode** | | **Multimode** |
| | | With TAP function | Without TAP function | With TAP function |
| Attenuation *<br>- 40 °C to + 70 °C<br>(Attenuation<br>0 °C to 60 °C) | P1 (RX) → P2 (TX)<br>P2 (RX) → P1 (TX) | 4.1 dB (3.9 dB) | 1.2 dB (1.0 dB) | 4.5 dB (4.3 dB) |
| | P1 (RX) → P1' (TX)<br>P2 (RX) → P2' (TX) | 5.7 dB (5.5 dB) | 1.2 dB (1.0 dB) | 6.0 dB (5.8 dB) |
| | P1' (RX) → P1 (TX)<br>P2' (RX) → P2 (TX) | 1.2 dB (1.0 dB) | 1.2 dB (1.0 dB) | 1.5 dB (1.3 dB) |
| Switching delay | | 10 ms | | 10 ms |
| Fiber used | | SMF28+ | | 50/125 µm OM3 |

* The wall feedthroughs in the device are specified as having an attenuation value of 0.3 dB. This value is not taken into account in the specified attenuation values.

# Dimension drawings

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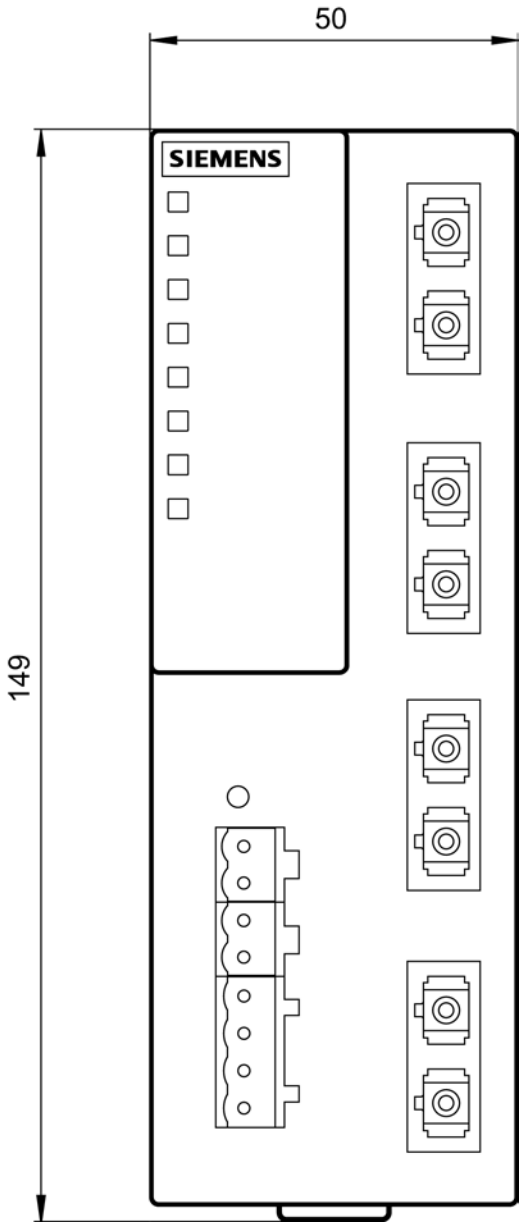
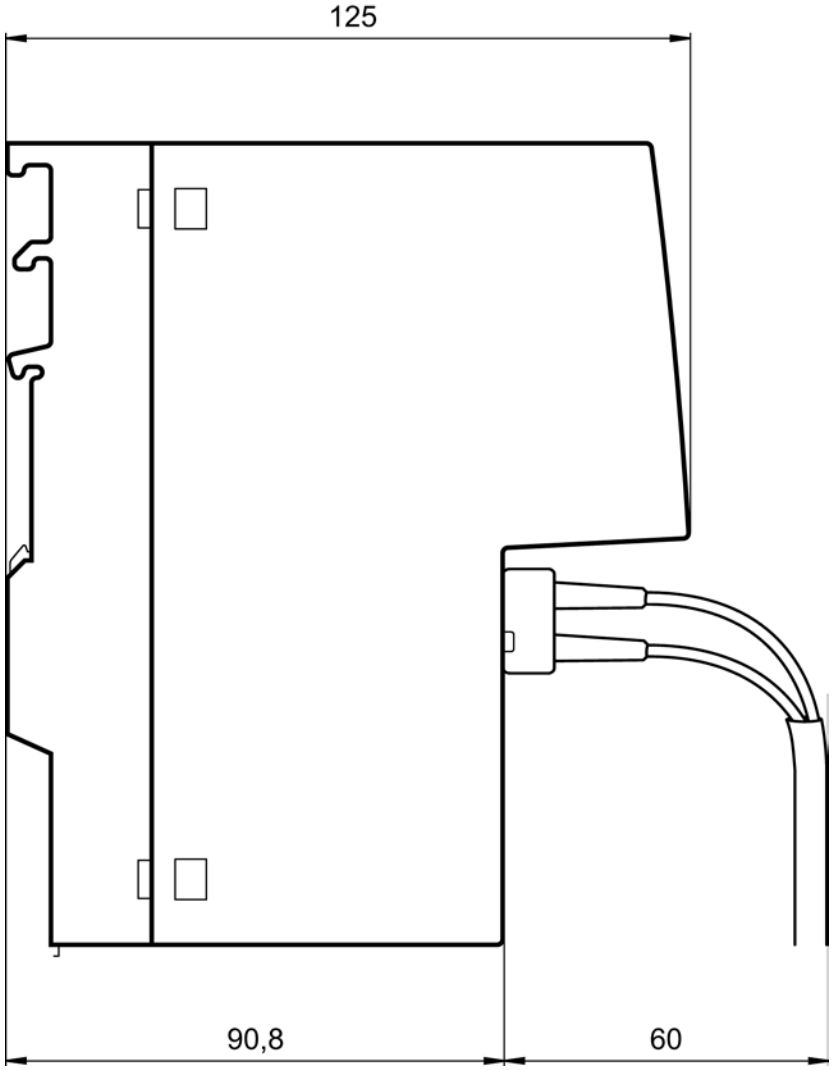
**Note**

Dimensions are specified in mm.

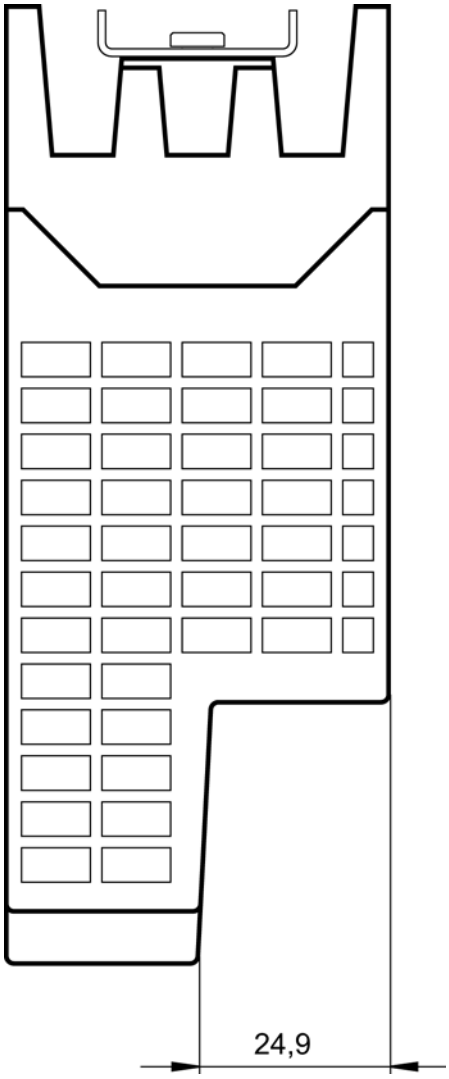
## Front view



## Side view



### From above



# Approvals

# 8

The SIMATIC NET products described in these Operating Instructions have the approvals listed below.

**Note**

**Issued approvals on the type plate of the device**

The specified approvals apply only when the corresponding mark is printed on the product. You can check which of the following approvals have been granted for your product by the markings on the type plate.

## EC directives

SIMATIC NET products meet the requirements and aims of the following EC directives.

## EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EC directive 2004/108/EC "Electromagnetic Compatibility" for the following areas of application:

| Field of application | Requirements | |
|---|---|---|
| | Emission | Immunity to interference |
| Industry | EN 61000-6-4 : 2007 | EN 61000-6-2 : 2005 |

**⚠ WARNING**

**Personal injury and property damage can occur**

The installation of expansions that are not approved for SIMATIC NET products or their target systems may violate the requirements and regulations for safety and electromagnetic compatibility.

Only use expansions that are approved for the system.

- **Keep to the installation guidelines**
  The product meets the requirements if you adhere to the installation and safety instructions contained in this documentation and in the following documentation when installing and operating the product.
- **You can always find the latest documentation on the Internet**
  The current descriptions of the currently available products can always be found on the Internet under the specified entry IDs/Internet pages:
  - SIMATIC NET Industrial Ethernet Network manual

    ID = 27069465 (http://support.automation.siemens.com/WW/view/en/27069465)
  - EMC Installation Guideline, Planning Guide

    ID = 60612658 (http://support.automation.siemens.com/WW/view/en/60612658)
  - **Working on the product**
    To protect the product from electrostatic discharge, personnel must first discharge any electrostatic charge from their body before touching the product.

    **Note**

    The product was tested with a device that also complies with the standards listed above.
    If the product is operated with a device that does not meet these standards, there is no guarantee that the corresponding values will be adhered to.

## Machinery directive

The product is a component in compliance with the EC Machinery Directive 2006/42//EEC. According to the machinery directive, we are obliged to point out that the product described is intended solely for installation in a machine.

Before the final product can be put into operation, it must be tested to ensure that it conforms with the directive 2006/42/EEC.

**Note**

**Note for the manufacturers of machines**

This product is not a machine in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EEC for this product.

## ATEX (explosion protection directive)

**⚠ WARNING**

When using SIMATIC NET products in hazardous area zone 2, make absolutely sure that the associated conditions in the following document are adhered to:

"Use of subassemblies/modules in a Zone 2 Hazardous Area".

This document can be found on the CD that ships with the device or on the Internet at the following URL:

`http://support.automation.siemens.com/WW/`

> Product Support > Industrial Communication

Enter the document identification number `A5E00352937` as the search term.

SIMATIC NET products meet the requirements of the EC directive:94/9/EC "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

ATEX classification:

II 3 G Ex nA IIC T4 Gc

KEMA 07ATEX0145 X

The products meet the requirements of the following standards:

- EN 60079-15: 2010 (electrical apparatus for potentially explosive atmospheres; Type of protection "n")
- EN 60079-0: 2009 (Explosive atmospheres - Part 0: Equipment - General requirements)

## FM

The product meets the requirements of the standards:

- Factory Mutual Approval Standard Class Number 3611
- FM Hazardous (Classified) Location Electrical Equipment:
  Non Incendive / Class I / Division 2 / Groups A,B,C,D / T4 and
  Non Incendive / Class I / Zone 2 / Group IIC / T4

## C-TICK

The product meets the requirements of the AS/NZS 2064 standard (Class A).

## cULus Approval for Information Technology Equipment

cULus Listed I. T. E.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- CSA C22.2 No. 60950-1-03

Report no. E115352

## cULus Approval Hazardous Location

cULus Listed I. T. E. FOR HAZ. LOC.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)
- ANSI/ISA 12.12.01-2007
- CSA C22.2 No. 213-M1987

Approved for use in
Cl. 1, Div. 2, GP A, B, C, D T4
Cl. 1, Zone 2, GP IIC T4

Report no. E240480

# Index

## T