SIEMENS

SIMATIC NET

Industrial Ethernet Switches SCALANCE X-300

Operating Instructions

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Legal information

Warning notice system

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

⚠ WARNING

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

Trademarks

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

Disclaimer of Liability

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

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Introduction

Purpose of the Operating Instructions

These operating instructions support you when installing and connecting up devices of the SCALANCE X-300 product group.

Validity of the Operating Instructions

These operating instructions apply to the following devices:

- SCALANCE X-300
- SCALANCE X-300M
- SCALANCE XR-300M
- SCALANCE X-300EEC
- SCALANCE XR-300M EEC
- SCALANCE X-300M PoE
- SCALANCE XR-300M PoE
- MM900 media modules
- SFP transceiver

Designations used

Classification	Description	Terms used
Product line	For all devices and variants of all product groups within the SCALANCE X-300 product line, the term "IE Switches X-300" is used	IE Switches X-300
Product group	For all devices and variants of a product group, only the product group is used.	SCALANCE X-300
Device	For a specific device, only the device name is used.	e.g. SCALANCE XR-300M EEC

Overview of technical documentation on the IE switches SCALANCE X-300

You will find the technical documentation for the SCALANCE X-300 product line in the following documents:

- Configuration manual (PH), available as PDF document
  The configuration manual describes the software for the two product lines SCALANCE X-300 and SCALANCE X-400.
- Compact operating instructions (BAK), supplied with the device in printed form
  The compact operating instructions describe devices within a product group.
- Operating instructions (BA), available as PDF document
  The operating instructions describe all devices of the product line and provide generally valid information on the devices.

Type of document	Relevant for the following products	Document identification number	Contents
Configuration Manual			
PH X300/X400	All devices of the SCALANCE X-300 and SCALANCE X-400 product lines	C79000-G89000-C187	Configuration of the device
Operating instructions			
BA X-300	All devices of the SCALANCE X-300 product line	A5E01113043	Device description, technical specifications, information on installing, connecting and commissioning
Compact operating instructions			
BAK X-300	SCALANCE X-300	A5E00982643A	Device description, technical specifications, information on installing, connecting and commissioning
BAK X-300M	SCALANCE X-300M	A5E02630801A	
BAK XR-300M	SCALANCE XR-300M	A5E02661171A	
BAK X-300 EEC	SCALANCE X-300EEC	A5E02661176A	
BAK XR-300M EEC	SCALANCE XR-300M EEC	A5E02630809A	
BAK X-300M PoE	SCALANCE X-300M PoE	A5E02630810A	
BAK XR-300M PoE	SCALANCE XR-300M PoE	A5E02661178A	
BAK MM900	SCALANCE MM900 (media modules)	A5E02630805A	
BAK SFP Information sheet	SCALANCE SFP (plug-in transceivers)	A5E02630804A A5E02648904A	Device description, technical specifications, information on installing, connecting and commissioning

Documentation on configuration

You will find detailed information on configuring the devices in the configuration manual:

- SIMATIC NET: Industrial Ethernet switches SCALANCE X-300 / X-400 Configuration Manual

You will find the Configuration Manual here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15297/man).

Additional documentation

The manual

- "SIMATIC NET Industrial Ethernet Twisted Pair and Fiber Optic Networks (https://support.industry.siemens.com/cs/ww/en/view/1172207)"

contains additional information on other SIMATIC NET products that you can operate along with the devices of the SCALANCE X-300 product line in an Industrial Ethernet network.

Integration in STEP 7 projects

The current GSDML file must be used for integration in STEP 7 V5.4 SP5 projects. This applies to all products covered by these operating instructions.

You can obtain the relevant GSD file from the Internet under the following entry ID:

46183514 (https://support.industry.siemens.com/cs/ww/en/view/46183514)

You will find the file for the firmware update V3.3.1 for X-300 under entry ID "46183538".

Further documentation

In the system manuals "Industrial Ethernet / PROFINET Industrial Ethernet" and "Industrial Ethernet / PROFINET passive network components", you will find 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.

You will find the system manuals here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support:
  - Industrial Ethernet / PROFINET Industrial Ethernet System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
  - Industrial Ethernet / PROFINET Passive Network Components System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)

SIMATIC NET manuals

You will find the SIMATIC NET manuals here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15247).

SIMATIC NET glossary

Explanations of many 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 or product DVD
  The DVD ships with certain SIMATIC NET products.
- On the Internet under the following address:
  50305045 (https://support.industry.siemens.com/cs/ww/en/view/50305045)

Security information

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

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions 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 security measures that may be implemented, please visit https://www.siemens.com/industrialsecurity (https://www.siemens.com/industrialsecurity)

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 customers' exposure to cyber threats.

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

Catalogs

You will find the article 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://mall.industry.siemens.com/goos/WelcomePage.aspx?regionUrl=/de&language=en)

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

Device defective

If a fault develops, send the device to your SIEMENS representative for repair. Repairs on-site are not possible.

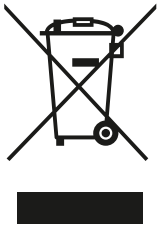
Decommissioning

Shut down the device properly to prevent unauthorized persons from accessing confidential data in the device memory.

To do this, restore the factory settings on the device.

Also restore the factory settings on the storage medium.

Recycling and disposal



The products are low in pollutants, can be recycled and meet the requirements of the WEEE directive 2012/19/EU for the disposal of electrical and electronic equipment.

Do not dispose of the products at public disposal sites.

For environmentally friendly recycling and the disposal of your old device contact a certified disposal company for electronic scrap or your Siemens contact (Product return (https://support.industry.siemens.com/cs/ww/en/view/109479891)).

Note the different national regulations.

SCALANCE, C-PLUG, OLM

Trademarks

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Safety instructions

1

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".

⚠ CAUTION
To prevent injury and damage, read the manual before using the device.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

⚠ WARNING
EXPLOSION HAZARD
Do not open the device when the supply voltage is turned on.

Safety instructions for use in hazardous locations according to UL/FM HazLoc

If you use the device under UL or FM HazLoc conditions, you must also adhere to the following safety instructions in addition to the general safety instructions 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.

Recommendations on network security

2

NOTICE
Information security Connect to the device and change the standard passwords for the users "admin" and "user" before you operate the device. To be able to change passwords you need to be logged in with write access to the configuration data.

To prevent unauthorized access to the device and/or network, observe the following security recommendations.

General

- Check the device regularly to ensure that these recommendations and/or other internal security policies are complied with.
- Evaluate the security of your location and use a cell protection concept with suitable products (https://www.industry.siemens.com/topics/global/en/industrial-security/pages/default.aspx).
- When the internal and external network are disconnected, an attacker cannot access internal data from the outside. Therefore operate the device only within a protected network area.
- No product liability will be accepted for operation in a non-secure infrastructure.
- Use VPN to encrypt and authenticate communication from and to the devices.
- For data transmission via a non-secure network, use an encrypted VPN tunnel (IPsec, OpenVPN).
- Separate connections correctly (WBM, SSH etc.).
- Check the user documentation of other Siemens products that are used together with the device for additional security recommendations.
- Using remote logging, ensure that the system protocols are forwarded to a central logging server. Make sure that the server is within the protected network and check the protocols regularly for potential security violations or vulnerabilities.

Physical access

- Restrict physical access to the device to qualified personnel because the plug-in data medium can contain sensitive data.
- Lock unused physical interfaces on the device. Unused interfaces can be used to gain access to the plant without permission.

Software (security functions)

- Keep the firmware up to date. Check regularly for security updates for the device. You can find information on this at the Industrial Security (https://www.siemens.com/industrialsecurity) website.
- Inform yourself regularly about security recommendations published by Siemens ProductCERT (https://www.siemens.com/cert/en/cert-security-advisories.htm).
- Only activate protocols that you require to use the device.
- Restrict access to the management of the device with rules in an access control list (ACL).
- The option of VLAN structuring provides protection against DoS attacks and unauthorized access. Check whether this is practical or useful in your environment.
- Use a central logging server to log changes and accesses. Operate your logging server within the protected network area and check the logging information regularly.

Authentication

Note

Accessibility risk - Risk of data loss

Do not lose the passwords for the device. Access to the device can only be restored by resetting the device to factory settings which completely removes all configuration data.

- Replace the default passwords for all user accounts, access modes and applications (if applicable) before you use the device.
- Define rules for the assignment of passwords.
- Use passwords with a high password strength. Avoid weak passwords, (e.g. password1, 123456789, abcdefgh) or recurring characters (e.g. abcabc).
  This recommendation also applies to symmetrical passwords/keys configured on the device.
- Make sure that passwords are protected and only disclosed to authorized personnel.
- Do not use the same passwords for multiple user names and systems.
- Store the passwords in a safe location (not online) to have them available if they are lost.
- Regularly change your passwords to increase security.
- A password must be changed if it is known or suspected to be known by unauthorized persons.
- When user authentication is performed via RADIUS, make sure that all communication takes place within the security environment or is protected by a secure channel.
- Watch out for link layer protocols that do not offer their own authentication between endpoints, such as ARP or IPv4. An attacker could use vulnerabilities in these protocols to attack hosts, switches and routers connected to your layer 2 network, for example, through manipulation (poisoning) of the ARP caches of systems in the subnet and subsequent interception of the data traffic. Appropriate security measures must be taken for non-secure layer 2 protocols to prevent unauthorized access to the network. Physical access to the local network can be secured or secure, higher layer protocols can be used, among other things.

Certificates and keys

Note

ECDSA certificates for SCALANCE X300 and SCALANCE X408-2

The following applies to devices of the SCALANCE X-300 product series and devices of the SCALANCE X408-2 type (devices of the SCALANCE X414-3E type are not affected):

As of firmware version V4.1.4, there has been a conversion from RSA certificates to certificates for elliptic curves cryptography ("ECDSA certificates"). Only use ECDSA certificates in PEM format that were generated with the following curves:

- secp256r1 (NIST P-256)
- secp384r1 (NIST P-384)
- secp521r1 (NIST P-521)

RSA certificates are no longer supported as of this firmware version. The existing RSA certificates on the device are automatically replaced with self-signed ECDSA certificates.

- On the device there is a preset SSL certificate with the key length 256 bits for the elliptic-curves cryptography. Replace this certificate with a self-made certificate with key. We recommend that you use a certificate signed either by a reliable external or by an internal certification authority.
- Use a certification authority including key revocation and management to sign certificates.
- Make sure that user-defined private keys are protected and inaccessible to unauthorized persons.
- Verify certificates and fingerprints on the server and client to prevent "man in the middle" attacks.
- It is recommended that you use certificates with a key length of at least 256 bits.
- Change certificates and keys immediately if there is a suspicion of compromise.

Secure/non-secure protocols

- Avoid or disable non-secure protocols, for example Telnet and TFTP. For historical reasons, these protocols are available, however not intended for secure applications. Use non-secure protocols on the device with caution.
- Check whether use of the following protocols and services is necessary:
  - Non authenticated and unencrypted ports
  - MRP, HRP
  - LLDP
  - DHCP Options 66/67

  The following protocols provide secure alternatives:
  - HTTP → HTTPS
  - TFTP → FTPS
  - Telnet → SSH
  - SNTP → NTP
    Check whether use the use of NTP is necessary. NTP is classified as non-secure. Activate Secure NTP when the NTP server supports this protocol and use the authentication and encryption mechanisms of Secure NTP.
  - SNMPv1/v2c → SNMPv3
    Check whether use of SNMPv1/v2c. is necessary. SNMPv1/v2c are classified as non-secure. Use the option of preventing write access. The device provides you with suitable setting options.
    If SNMP is enabled, change the community names. If no unrestricted access is necessary, restrict access with SNMP.
    Use the authentication and encryption mechanisms of SNMPv3.
- Use secure protocols when access to the device is not prevented by physical protection measures.
- If you require non-secure protocols and services, operate the device only within a protected network area.
- Restrict the services and protocols available to the outside to a minimum.
- For the DCP function, enable the "DCP read-only" mode after commissioning.

Available protocols

The following list provides you with an overview of the open protocol ports.

The table includes the following columns:

- **Protocol**
- **Port number**
- **Port status**
  - Open
  - Closed

- **Factory setting**
  Indicates the state of the port on delivery or after reset to factory settings.
- **Authentication**
  Specifies whether the communication partner is authenticated.
- **Encryption**
  Specifies whether or not the transfer is encrypted.

Protocol	Port number	Port status	Factory setting	Authentication	Encryption [1]
FTP	TCP/21	Open	Open	✓	-
SSH Server	TCP/22	Open	Open	✓	✓
TELNET	TCP/23	Open (when configured)	Closed	✓	-
HTTP	TCP/80	Open (when configured)	Open	✓	-
PROFINET Service	TCP/84	Open	Open	-	-
SSL Server	TCP/443	Open	Open	✓	✓
DHCP	UDP/68	Open (when configured)	Open	-	-
SNTP	UDP/123	Open (when configured)	Closed	-	-
NTP (secure)					✓
SNMP	UDP/161	Open (when configured)	Open	✓	✓ (SNMPv3)
RADIUS Client	UDP/1812, 1813	Open	Open	✓	-
PROFINET	UDP/34964 UDP/49152, 49153 *)	Open (when configured)	Open	-	-

[1] You can find additional information on the encryption methods used in the WBM appendix "Ciphers used".

*) These ports are assigned dynamically and can differ from the values specified here.

Decommissioning

Shut down the device properly to prevent unauthorized persons from accessing confidential data in the device memory.

To do this, restore the factory settings on the device.

Also restore the factory settings on the storage medium.

Network topologies

3

3.1 Basics of Ethernet switching

Ethernet switching

Ethernet switches forward data packets directly from the input port to the appropriate output port during data exchange based on the address information. Ethernet switches operate on a direct delivery basis.

Essentially, switches have the following functions:

- Connecting collision domains / subnets

  Since repeaters and star couplers (hubs) operate at the physical level, their use is restricted to the span of a collision domain. Switches connect collision domains. Their use is therefore not restricted to the maximum span of a repeater network. On the contrary, extremely large networks with very large spans are possible with switches. The distances achieved depend on the fiber-optic interfaces used in the devices and the FO fibers used (see technical specifications).

- Load containment

  By filtering the data traffic based on the Ethernet (MAC) addresses, local data traffic remains local. In contrast to repeaters or hubs, which distribute data unfiltered to all ports / network nodes, switches operate selectively. Only data intended for nodes in other subnets is switched from the input port to the appropriate output port of the switch. To make this possible, a table assigning Ethernet (MAC) addresses to output ports is created by the switch in a "teach-in" mode.

- Limiting the propagation of errors to the subnet involved.
  By checking the validity of a data packet on the basis of the checksum which each data packet contains, the switch ensures that bad data packets are not transported further. Collisions in one network segment are not passed on to other segments.

The need for Industrial Ethernet switches

With over 95% of LANs based on Ethernet, this is the most commonly used technology. The use of switches is particularly important: They allow extensive networks with large numbers of nodes to be set up, increase the data throughput, and simplify network expansion.

The IE Switches X-300 from SIMATIC NET are designed for use in high-speed plant networks that will also meet future requirements. With the HRP redundancy function and standby linking of rings, high network availability can be achieved. HRP and standby link reconfigures the network within 300 ms. Support of IT standards such as VLAN, RSTP, IGMP, and GARP makes seamless integration of automation networks in existing office networks possible.

The IE Switches X-300 are designed for use in switching cubicles and cabinets.

Technical options (network topologies)

The IE Switches X-300 simplify the expansion of a network regardless of the network topology.

You can use an IE Switch X-300 in the following network topologies:

- Linear structure
- Star/tree structure
- Ring with redundancy manager

The maximum cable length is 70 km for single-mode gigabit transmission. A mixed topology consisting of IE Switch X-300 devices and OSMs/ESMs is possible at the electrical ports. Operation of IE Switches X-300 and OSM/ESM in a common topology via optical ports is possible when IE Switches X-300 use optical ports that support a data rate of 100 Mbps. This is the case, for example, with the SCALANCE MM991-2 media module.

Using an IE Switch X-300 as the redundancy manager in a ring with redundancy manager provides greater availability. If there is an interruption on the connection between these switches, the IE Switch X-300 used as redundancy manager acts like a switch and creates a line (bus) from the ring within a very short time. As a result, a functional, end-to-end structure is restored. For information on this topic, refer to the Configuration Manual "SIMATIC NET - Industrial Ethernet Switches SCALANCE X-300 SCALANCE X-400."

3.2 Linear structure

Functional description

Linear structures can be created with the IE Switches X-300. The cascading depth and total span of a network are limited only by the signal propagation times of the communication connections.

Properties of the linear structure

Each IE Switch X-300 communicates over a TP or FO cable with a neighboring Ethernet switch. Communication is possible over the optical or the electrical ports.

Configuration example

Sample configuration with SCALANCE X308-2, SIMATIC S7-300/400 and operator panel as end devices.

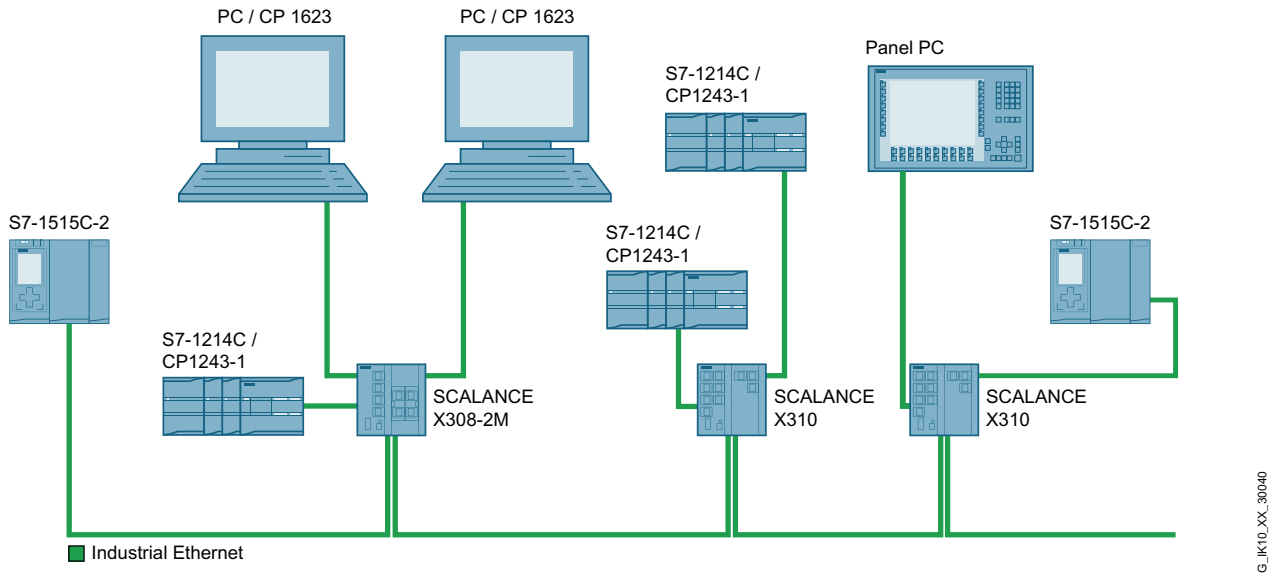


Figure 3-1 Linear structure (optical)

3.3 Star/tree structure

Functional description

Star/tree structures can be created with the IE Switches X-300. The cascading depth and total span of a network are limited only by the signal propagation times of the communication connections.

Properties of a star structure

Each IE Switch X-300 communicates over a TP or FO cable with a central switch with which all other switches are also connected within a star structure. Communication is possible over the optical or the electrical ports.

Configuration example

Sample electrical configurations with SCALANCE X310, SCALANCE X-200, SIMATIC S7-300/400, SIMATIC ET 200, and operator panels as end devices.

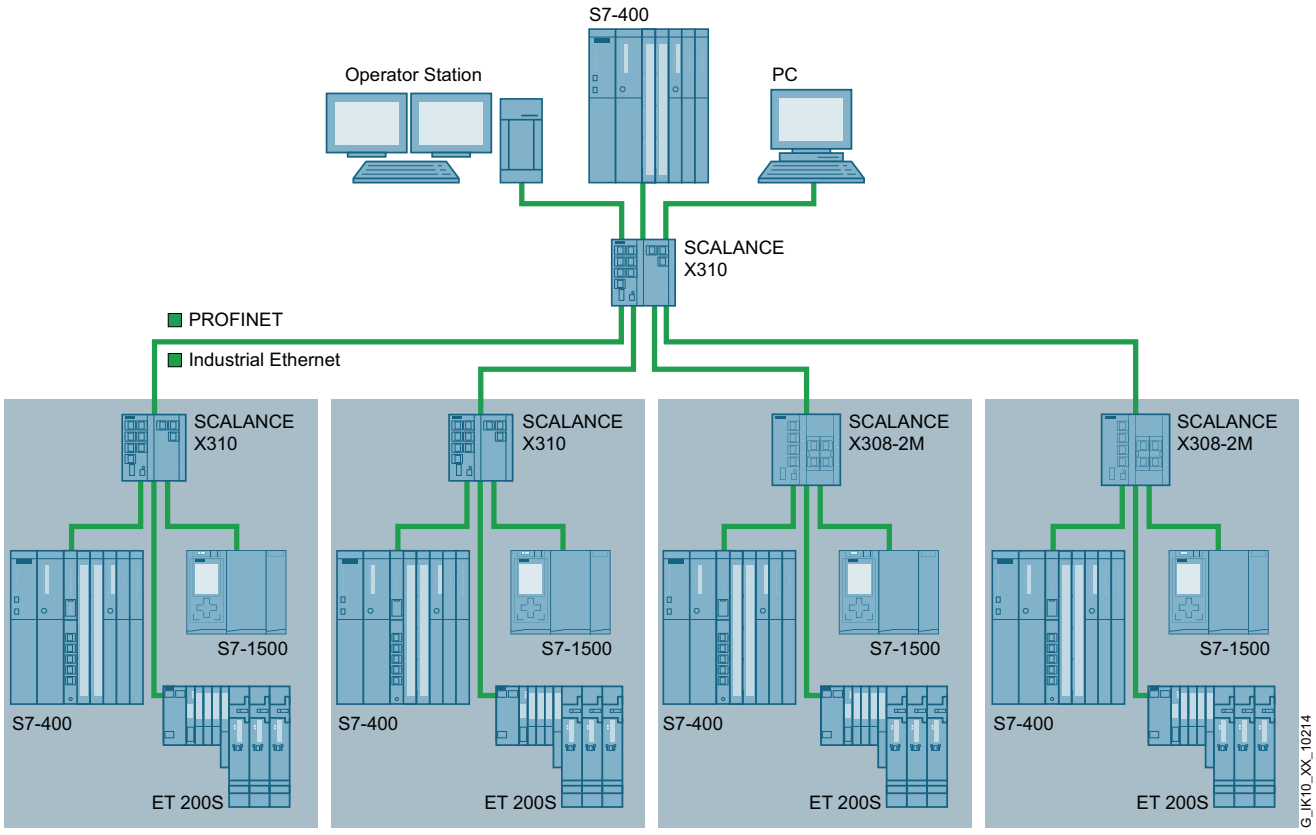


Figure 3-2 Star structure (electrical)

3.4 Ring with redundancy manager

Ring with redundancy manager

To increase availability, linear topologies of up to 100 switches can be closed to form a ring:

- Optical: SCALANCE XR-500, SCALANCE XM-400, SCALANCE X-300, SCALANCE X-200
- Electrical: SCALANCE XR-500, SCALANCE XM-400, SCALANCE X-300, SCALANCE X-200 or ESM

Functional description

The two ends of the bus are closed to form a ring by a IE Switch X-300 operating as a redundancy manager. Both the redundancy manager and the other IE switches (redundancy clients) in the ring must be interconnected via their ring ports (see below).

The redundancy manager function is enabled by the SELECT/SET button or by a setting in the software. For more detailed information, refer to the configuration manual "SCALANCE X-300 and SCALANCE X-400 Industrial Ethernet Switches".

In contrast to the ring ports of the redundancy clients, the ring ports of the redundancy manager are disconnected when the network is operating problem-free. The IE Switch X-300 operating in the role of redundancy manager mode monitors the connected bus over its ring ports and switches the ring ports through if there is an interruption on the connected bus; in other words, it restores a functioning bus over this substitute path. Reconfiguration is achieved within 0.3 s. As soon as the problem is eliminated, the original topology is restored; in other words, the ring ports in the redundancy manager are disconnected from each other again.

In a ring with media redundancy, only one device can operate as the redundancy manager.

Ring ports

An electrical ring with redundancy manager can be set up via the RJ-45 connectors that allow attachment of electrical (twisted pair) connections (10, 100 and/or 1000 Mbps). The SCALANCE X310FE is an exception to this. This device only allows attachment of electrical (twisted-pair) connections at 10 or 100 Mbps.

The use of the IE Switch X-300 in an optical ring (1000 Mbps, with SCALANCE X-300EEC 100Mbps) with a redundancy manager is also possible with the exception of the devices SCALANCE X310 and SCALANCE X310FE.

You can configure which ports take on the function of ring ports individually. The following table shows the factory defaults for the ring ports.

Device	Factory setting for the ring ports	
	Electrical	Optical
X-304-2FE		Port 1 and port 2
X306-1LD FE	Port 2 and port 3	
X307-3		Port 9 and port 10
X307-3LD		Port 9 and port 10
X308-2		Port 9 and port 10
X308-2LD		Port 9 and port 10
X308-2LH		Port 9 and port 10
X308-2LH+		Port 9 and port 10
X310	Port 9 and port 10	(no optical ports)
X310FE	Port 9 and port 10	(no optical ports)
X320-1FE	Port 1 and port 2	
X320-3LD FE	Port 1 and port 2	
X308-2M	Port 1 and port 2	
X308-2M TS	Port 1 and port 2	
X308-2M PoE	Port 1 and port 2	
X302-7 EEC	Port 8 and port 9	
X307-2 EEC	Port 8 and port 9	
XR324-12M	Port 1.1 and port 1.2	
XR324-12M TS	Port 1.1 and port 1.2	

Device	Factory setting for the ring ports	
	Electrical	Optical
XR324-4M EEC	Port 1 and port 2	
XR324-4M PoE	Port 1 and port 2	
XR324-4M PoE TS	Port 1 and port 2	

Configuration example

Sample configurations with IE Switch X-300, SIMATIC S7-1500, operator control and monitoring system, H system, and PC as end devices.

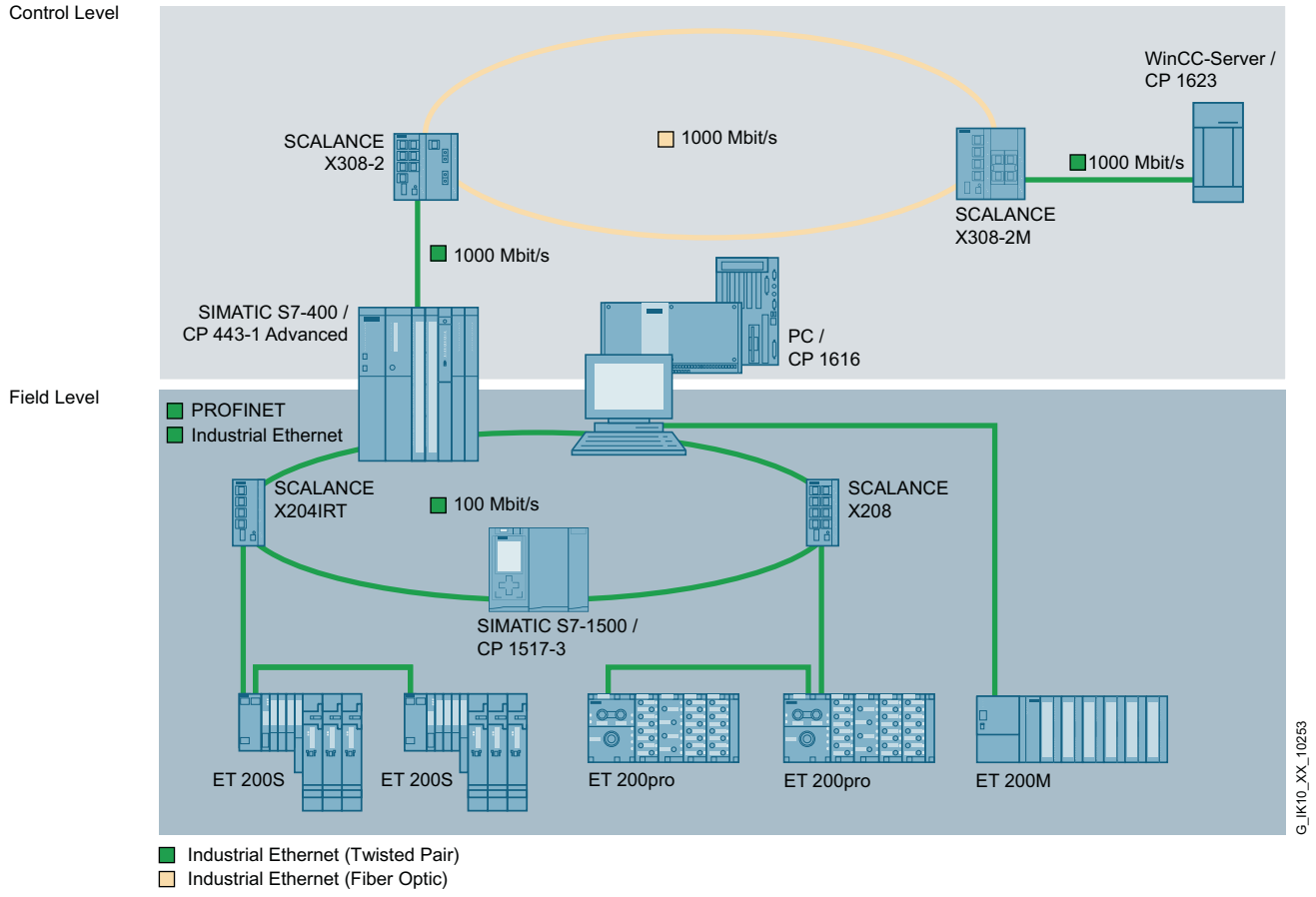


Figure 3-3 Ring with redundancy manager (RM)

3.5 Redundant coupling of network segments

Redundant coupling of network segments

The example of redundant coupling of two network segments as shown here, for example rings with a redundancy manager, can be implemented homogeneously with all SCALANCE X300 variants.

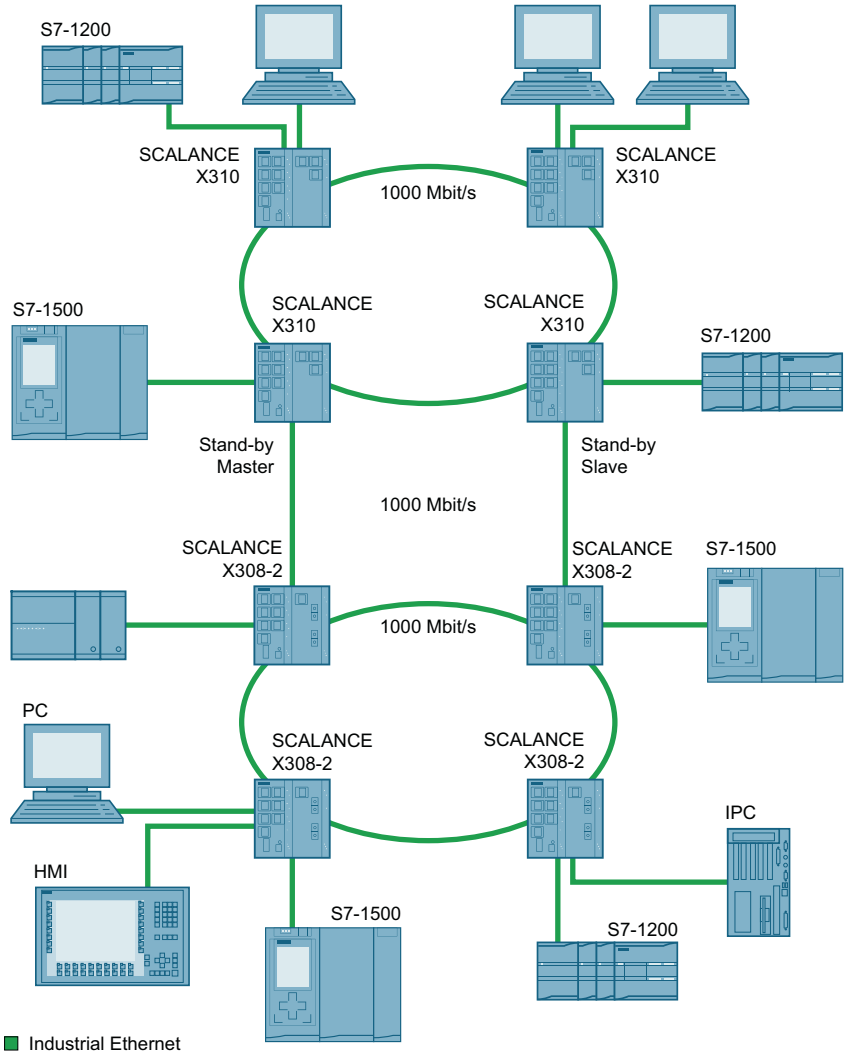


Figure 3-4 Redundant coupling of two subnets in mixed operation with SCALANCE X310 and SCALANCE X308-2

In this case, network segments are rings with a redundancy manager (RM). The rings can also be interrupted at one point (linear topology).

For a redundant link as shown in the figure, two IE Switches X-300 must be configured within a network segment. This configuration is set in Web Based Management, Command Line Interface or using SNMP access. For more detailed information, refer to the "Configuration Manual SCALANCE X-300 and SCALANCE X-400 Industrial Ethernet Switches". The two

IE Switches X-300 connected in the configuration exchange data frames with each other to synchronize their operating statuses (one device is master and the other slave). If there are no problems, only the link from the master to the other network segment is active. If this link fails (for example due to a link-down or a device failure), the slave activates its link as long as the problem persists. Reconfiguration takes place within 0.3 s.

Note

If IE Switches X-300 or SCALANCE X408-2 devices are used exclusively for redundant coupling of the gigabit rings, the coupling links can also be designed with a gigabit transmission rate.

Description of the device

4

4.1 Compatibility of SCALANCE X-300

Compatibility list

Note

Modular devices (M)

The MM900 media modules and the SFP transceivers are used only in modular devices (M).

The following products and devices are compatible with IE Switches X-300:

- End devices:

  All SIMATIC NET products with a TP interface can be connected to the ports of IE Switches X-300.

- Network components with a bus (linear) or star structure:
  ESM/OSM
  OMC (TP cable max. 6 m long)
  SCALANCE X005
  SCALANCE X-100
  SCALANCE XB000
  SCALANCE XB000G
  SCALANCE X-100 media converter
  SCALANCE X-200
  SCALANCE X-200IRT
  SCALANCE XF200
  SCALANCE XF204IRT
  SCALANCE X-300
  SCALANCE X-400
  SCALANCE S-600
  SCALANCE W-700

- Network components in a ring structure with IE Switch X-300 as redundancy manager
  - Electrical ring structure:
    ESM/OSM
    SCALANCE X-200
    SCALANCE X-200IRT
    SCALANCE XF200
    SCALANCE XF204IRT
    SCALANCE X-300 (it may be necessary to configure other ring ports)
    SCALANCE X-400
  - Optical ring structure:
    SCALANCE X-400
    SCALANCE X-300 (exceptions SCALANCE X310 and SCALANCE X310FE)
- Redundant coupling of networks
  - In the network segment with the master-slave pair to be configured:
    SCALANCE X-400
    SCALANCE X-300
    In the standby coupling also to SCALANCE X-200
  - In the network segment to be coupled:
    ESM/OSM
    SCALANCE X-200
    SCALANCE X-200IRT
    SCALANCE XF200
    SCALANCE XF204IRT
    SCALANCE X-300
    SCALANCE X-400

Note

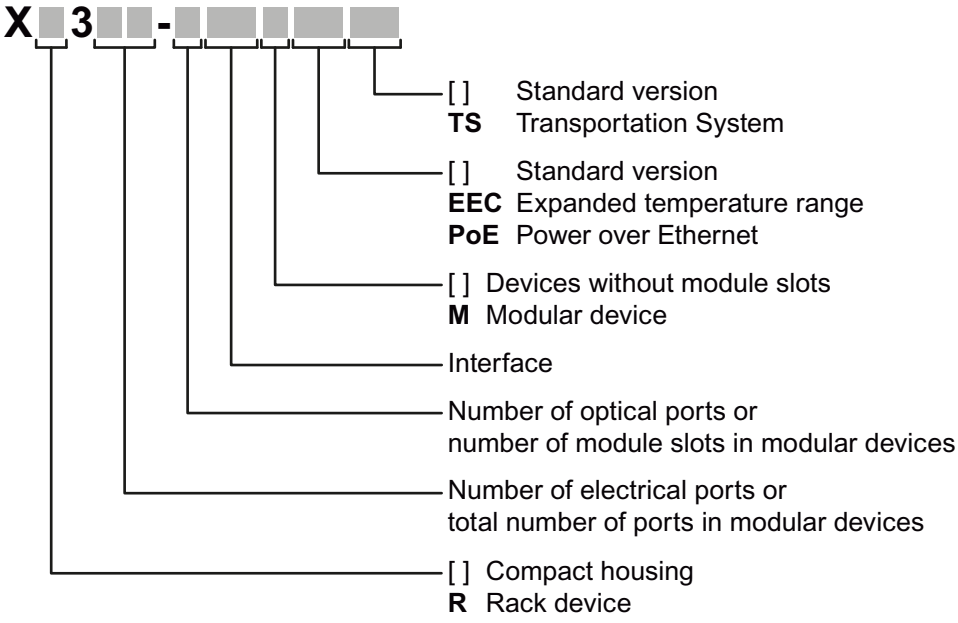
All compatibility information assumes the correct use of the TP and FOC cables.

4.2 Product overview

4.2.1 Type designations

Structure of the type designation

The type designation of an IE Switch X-300 is made up of several parts that have the following meaning:



Interfaces of devices without optical ports:

Interface	Property
FE	Electrical RJ-45 port for 10/100 Mbps.
[-]	Electrical RJ-45 port for 10/100 Mbps or 10/100/1000 Mbps.

Interfaces of devices with optical ports:

Interface	Property
FE	SC port 100 Mbps multimode FO cable (up to max. 5 km).
LD FE	SC port 100 Mbps single mode FO cable (up to max. 26 km).
[-]	SC port 1000 Mbps multimode FO cable (up to max. 750 m).
LD	SC port 1000 Mbps single mode FO cable (up to max. 10 km).
LH	SC port 1000 Mbps single mode FO cable (up to max. 40 km).
LH+	SC port 1000 Mbps single mode FO cable (up to max. 70 km).

If information applies to all devices, the term "IE Switches X-300" is used. If information applies to only a particular product group, the relevant names will be used without extra information on

the type or number of interfaces. Examples: "X-300" stands for non-modular devices with a compact housing, "XR-300" means all rack devices, "X-300M" means all modular devices etc.

Note

SCALANCE X320-3LD FE

The SCALANCE X320-3LD FE deviates from the type designation in that it has an SC port for multimode fiber-optic cable up to a maximum of 5 km in length and two SC ports for single mode fiber-optic cable up to a maximum of 26 km in length.

- Port 21: Multimode
- Port 22: LD (long distance, single mode)
- Port 23: LD (long distance, single mode)

4.2.2 Designs of the IE Switch X-300 devices

Designs and variants of the IE Switch X-300

The IE switches of the SCALANCE X-300 product line can have the following designs and variants:

Designs of the IE Switch X300	
X	Compact devices: IE switches X-300 (3 sizes: 60, 120, 180)
XR	Rack devices (R): 19" IE switches (for 19" cabinet installation)
X-300EEC	IE Switches X-300: 19"/2 devices (width: 216 mm)

Table 4-1

Variant M of the IE Switch X-300	
M	Modular devices (M) are intended to accommodate media modules. • Partially modular devices: Some of the ports (slots) are intended to accommodate media modules. Example: X308-2M • Fully modular devices: All ports (slots) are intended to accommodate media modules. Example: XR324-12M

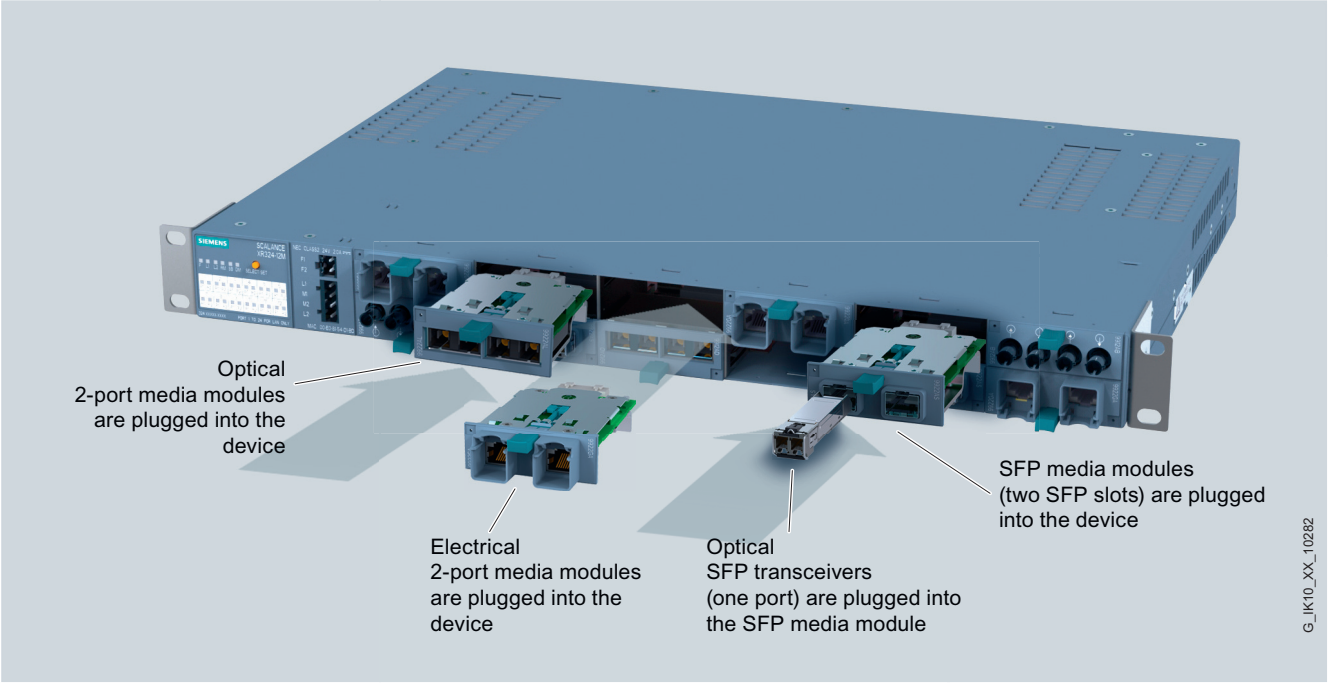


Figure 4-1 Designs of the X-300 IE switches, example of plugging media modules into the media module slotsof the XR324-12M

4.2.3 X-300 product group

Article numbers

Device	Properties	Article number
X304-2FE	4 x 10/100 Mbps RJ-45 ports electrical 2 x 1000 Mbps, SC ports optical, for glass FO cable (multi-mode), up to max. 750 m	6GK5 304-2BD00-2AA3
X306-1LD FE	6 x 10/100 Mbps RJ-45 ports electrical 1 x 100 Mbps, SC port optical, for glass FO cable (single mode), up to max. 26 km	6GK5 306-1BF00-2AA3
X307-3	7 x 10/100 Mbps RJ-45 ports electrical 3 x 1000 Mbps, SC ports optical, for glass FO cable (multi-mode), up to max. 750 m	6GK5 307-3BL00-2AA3 6GK5 307-3BL10-2AA3
X307-3LD	7 x 10/100 Mbps RJ-45 ports electrical 3 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 10 km	6GK5 307-3BM00-2AA3 6GK5 307-3BM10-2AA3
X308-2	1 x 10/100/1000 Mbps, RJ-45 ports electrical 7 x 10/100 Mbps RJ-45 ports electrical 2 x 1000 Mbps, SC ports optical, for glass FO cable (multi-mode), up to max. 750 m	6GK5 308-2FL00-2AA3 6GK5 308-2FL10-2AA3

Device	Properties	Article number
X308-2LD	1 x 10/100/1000 Mbps, RJ-45 ports electrical 7 x 10/100 Mbps RJ-45 ports electrical 2 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 10 km	6GK5 308-2FM00-2AA3 6GK5 308-2FM10-2AA3
X308-2LH	1 x 10/100/1000 Mbps, RJ-45 ports electrical 7 x 10/100 Mbps RJ-45 ports electrical 2 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 40 km	6GK5 308-2FN00-2AA3 6GK5 308-2FN10-2AA3
X308-2LH+	1 x 10/100/1000 Mbps, RJ-45 ports electrical 7 x 10/100 Mbps RJ-45 ports electrical 2 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 70 km	6GK5 308-2FP00-2AA3 6GK5 308-2FP10-2AA3
X310	3 x 10/100/1000 Mbps, RJ-45 ports electrical 7 x 10/100 Mbps RJ-45 ports electrical	6GK5 310-0FA00-2AA3 6GK5 310-0FA10-2AA3
X310FE	10 x 10/100 Mbps RJ-45 ports electrical	6GK5 310-0BA00-2AA3 6GK5 310-0BA10-2AA3
X320-1FE	20 x 10/100 Mbps RJ-45 ports electrical 1 x 100 Mbps, SC port optical, for glass FO cable (multi-mode), up to max. 5 km	6GK5 320-1BD00-2AA3
X320-3LD FE	20 x 10/100 Mbps RJ-45 ports electrical 1 x 100 Mbps SC port optical for glass FO cable (multi-mode) up to max. 5 km, 2 x 100 Mbps SC ports optical for glass FO cable (single mode) up to max. 26 km	6GK5 320-3BF00-2AA3

4.2.4 Product group X-300M

Article numbers

Device	Properties	Article number
X308-2M	1 x 24 V DC 4 x 10/100/1000 Mbps, RJ-45 ports electrical 2 x 100/1000 Mbps for 2-port media modules LEDs, connector power supply and data cable outlet on front Diagnostics port at rear	6GK5 308-2GG00-2AA2 6GK5 308-2GG10-2AA2
X308-2M TS	1 x 12 V DC, module varnished 4 x 10/100/1000 Mbps, RJ-45 ports electrical 2 x 100/1000 Mbps for 2-port media modules LEDs, connector power supply and data cable outlet on front Diagnostics port at rear	6GK5 308-2GG00-2CA2 6GK5 308-2GG10-2CA2

4.2.5 Product group XR-300M

Article numbers

Device	Properties	Article number
XR324-12M	2 x 24 V DC LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Screw-in grounding bolts	6GK5 324-0GG00-1AR2
	2 x 24 V DC LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Pressed-in grounding bolts	6GK5 324-0GG10-1AR2
	1 x 100 to 240 V AC LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Screw-in grounding bolts	6GK5 324-0GG00-3AR2
	1 x 100 to 240 V AC LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Pressed-in grounding bolts	6GK5 324-0GG10-3AR2
	2 x 24 V DC LEDs and diagnostics port on front connector power supply and data cable outlet at rear Screw-in grounding bolts	6GK5 324-0GG00-1HR2 6GK5 324-0GG10-1HR2
	1 x 100 to 240 V AC LEDs and diagnostics port on front connector power supply and data cable outlet at rear Screw-in grounding bolts	6GK5 324-0GG00-3HR2 6GK5 324-0GG10-3HR2
XR324-12M TS	2 x 24 V DC, modules varnished LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Screw-in grounding bolts	6GK5 324-0GG00-1CR2
	2 x 24 V DC, modules varnished LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Pressed-in grounding bolts	6GK5 324-0GG10-1CR2

4.2.6 X-300EEC product group

Article numbers

Device / Ports	Properties	Article number
X302-7EEC • 2 electrical ports • 7 optical ports	1 x power supply unit 24 to 48 V DC	6GK5302-7GD00-1EA3
	1 x power supply unit 24 to 48 V DC PCB coated	6GK5302-7GD00-1GA3
	2 x power supply unit 24 to 48 V DC	6GK5302-7GD00-2EA3
	2 x power supply unit 24 to 48 V DC PCB coated	6GK5302-7GD00-2GA3
	1 x power supply unit 100 to 240 V AC / 60 to 250 V DC	6GK5302-7GD00-3EA3
	1 x power supply unit 100 to 240 V AC / 60 to 250 V DC PCB coated	6GK5302-7GD00-3GA3
	2 x power supply unit 100 to 240 V AC / 60 to 250 V DC	6GK5302-7GD00-4EA3
	2 x power supply unit 100 to 240 V AC / 60 to 250 V DC PCB coated	6GK5302-7GD00-4GA3
X307-2EEC • 7 electrical ports • 2 optical ports	1 x power supply unit 24 to 48 V DC	6GK5307-2FD00-1EA3
	1 x power supply unit 24 to 48 V DC PCB coated	6GK5307-2FD00-1GA3
	2 x power supply unit 24 to 48 V DC	6GK5307-2FD00-2EA3
	2 x power supply unit 24 to 48 V DC PCB coated	6GK5307-2FD00-2GA3
	1 x power supply unit 100 to 240 V AC / 60 to 250 V DC	6GK5307-2FD00-3EA3
	1 x power supply unit 100 to 240 V AC / 60 to 250 V DC PCB coated	6GK5307-2FD00-3GA3
	2 x power supply unit 100 to 240 V AC / 60 to 250 V DC	6GK5307-2FD00-4EA3
	2 x power supply unit 100 to 240 V AC / 60 to 250 V DC PCB coated	6GK5307-2FD00-4GA3

***** See naming key below

4.2.7 XR-300M EEC product group

Article numbers

Device	Properties	Article number
XR324-4M EEC	1 x 24 to 48 V DC LEDs, connector data cable outlet on front Connector power supply and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-1ER2 6GK5 324-4GG10-1ER2
	2 x 24 to 48 V DC LEDs, connector data cable outlet on front Connector power supply and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-2ER2 6GK5 324-4GG10-2ER2
	1 x 100 to 240 V AC / 60 to 250 V DC LEDs, connector data cable outlet on front Connector power supply and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-3ER2 6GK5 324-4GG10-3ER2
	2 x 100 to 240 V AC / 60 to 250 V DC LEDs, connector data cable outlet on front Connector power supply and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-4ER2 6GK5 324-4GG10-4ER2
	1 x 24 to 48 V DC LEDs, connector power supply on front Data cable outlet and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-1JR2 6GK5 324-4GG10-1JR2
	2 x 24 to 48 V DC LEDs, connector power supply on front Data cable outlet and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-2JR2 6GK5 324-4GG10-2JR2
	1 x 100 to 240 V AC / 60 to 250 V DC LEDs, connector power supply on front Data cable outlet and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-3JR2 6GK5 324-4GG10-3JR2
	2 x 100 to 240 V AC / 60 to 250 V DC LEDs, connector power supply on front Data cable outlet and diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4GG00-4JR2 6GK5 324-4GG10-4JR2

4.2.8 Product group X-300M PoE

Article numbers

Device	Properties	Article number
X308-2M PoE	4 x 10/100/1000 Mbps RJ45 ports electrical with PoE; 2 x 100/1000 Mbps for 2-port media modules, electrical or optical; LEDs	6GK5 308-2QG00-2AA2 6GK5 308-2QG10-2AA2

Note

For more information on Power over Ethernet (PoE), refer to the Configuration Manual X-300/X-400.

4.2.9 Product group XR-300M PoE

Article numbers

Device	Properties	Article number
XR324-4M PoE	1 x 24 V DC, PoE LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Screw-in grounding bolts	6GK5 324-4QG00-1AR2
	1 x 24 V DC, PoE LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4QG10-1AR2
	1 x 100 to 240 V AC, PoE LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Screw-in grounding bolts	6GK5 324-4QG00-3AR2
	1 x 100 to 240 V AC, PoE LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4QG10-3AR2
	1 x 24 V DC, PoE LEDs and diagnostics port at front, connector power supply and data cable outlet at rear Screw-in grounding bolts	6GK5 324-4QG00-1HR2 6GK5 324-4QG10-1HR2
	1 x 100 to 240 V AC, PoE LEDs and diagnostics port on front, connector power supply and data cable outlet at rear Screw-in grounding bolts	6GK5 324-4QG00-3HR2 6GK5 324-4QG10-3HR2
XR324-4M PoE TS	1 x 24 V DC, PoE, module varnished LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Screw-in grounding bolts	6GK5 324-4QG00-1CR2
	1 x 24 V DC, PoE, module varnished LEDs, connector power supply and data cable outlet on front Diagnostics port at rear Pressed-in grounding bolts	6GK5 324-4QG10-1CR2

Note

For more information on Power over Ethernet (PoE), refer to the Configuration Manual X-300/X-400.

4.2.10 SFP plug-in transceivers product group

Pluggable transceiver SFP (100 Mbps)

Type	Property	Article number
SFP991-1	1 x 100 Mbps, LC port optical for glass FO cable (multimode), up to max. 5 km	6GK5 991-1AD00-8AA0
	10 packing unit (VPE 10)	6GK5 991-1AD00-8AC0
SFP991-1 (C)	1 x 100 Mbps, SC port optical, for glass FO cable (multimode), up to max. 5 km, varnished	6GK5 991-1AD00-8FA0
SFP991-1LD	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 26 km	6GK5 991-1AF00-8AA0
	10 packing unit (VPE 10)	6GK5 991-1AF00-8AC0
SFP991-1LD (C)	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 26 km, varnished	6GK5 991-1AF00-8FA0
SFP991-1LH+	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 70 km	6GK5 991-1AE00-8AA0
SFP991-1ELH200	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 200 km	6GK5 991-1AE30-8AA0

The SFP plug-in transceiver (100 Mbps) cannot be operated in SFP+ slots.

Pluggable transceivers with the supplement (C) in the type name have varnished printed circuit boards (conformal coating).

Pluggable transceiver SFP (1000 Mbps)

Type	Property	Article number
SFP992-1	1 x 1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 750 m	6GK5 992-1AL00-8AA0
	10 packing unit (VPE 10)	6GK5 992-1AL00-8AC0
SFP992-1 (C)	1 x 1000 Mbps, LC port optical, for glass FO cable (multimode), up to max. 750 m, varnished	6GK5 992-1AL00-8FA0
SFP992-1+	1 x 1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 2 km	6GK5 992-1AG00-8AA0
SFP992-1LD	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 10 km	6GK5 992-1AM00-8AA0
	10 packing unit (VPE 10)	6GK5 992-1AM00-8AC0
SFP992-1LD (C)	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 10 km, varnished	6GK5 992-1AM00-8FA0
SFP992-1LD+	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 30 km	6GK5 992-1AM30-8AA0
SFP992-1LH	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 40 km	6GK5 992-1AN00-8AA0

Type	Property	Article number
SFP992-1LH+	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 70 km	6GK5 992-1AP00-8AA0
SFP992-1ELH	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 120 km	6GK5 992-1AQ00-8AA0

Pluggable transceivers with the supplement (C) in the type name have varnished printed circuit boards (conformal coating).

4.2.11 MM900 media modules product group

Note

Type designation and labeling of a media module differ

Example: The device with article number 6GK5 992-2AS00-8AA0 is called "MM992-2SFP", the labeling on the device is "9922AS".

The labeling on the devices is shown in bold in the following table following the [article numbers].

Note

Media modules for SFP transceivers

Only the media modules MM992-2SFP andMM992-2SFP (C) may be fitted with approved SFP transceivers. These SFP media modules can be fitted with up to two SFPs.

Note

Supplement (C) in the type name

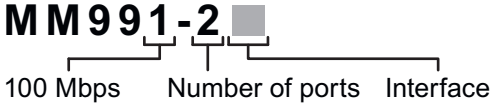
Media modules with the supplement (C) in the type name have varnished printed circuit boards (conformal coating).

Media module	Properties	Article number Labeling on the device
MM992-2CUC	2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar	6GK5 992-2GA00-8AA0 **9922GA**
MM992-2CUC (C)	2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar, varnished	6GK5 992-2GA00-8FA0 **9922GA**
MM992-2CU	2 x 10/100/1000 Mbps, RJ-45 port electrical without securing collar	6GK5 992-2SA00-8AA0 **9922SA**
MM992-2M12 (C)	2 x 10/100/1000 Mbps, GE M12 connector electrical, varnished	6GK5 992-2HA00-0AA0 **9922HA**
MM992-2VD	2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar, variable distance	6GK5 992-2VA00-8AA0 **9922VA**

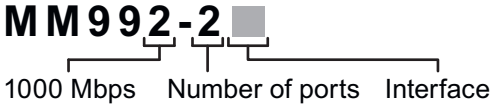
Media module	Properties	Article number Labeling on the device
MM992-2SFP	2 x 100/1000 Mbps, SFP media module	6GK5 992-2AS00-8AA0 **9922AS**
MM992-2SFP (C)	2 x 100/1000 Mbps, SFP media module, varnished	6GK5 992-2AS00-8FA0 **9922AS**
MM991-2 (BFOC)	2 x 100 Mbps, BFOC port optical, for glass FO cable (multimode), up to max. 5 km	6GK5 991-2AB00-8AA0 **9912AB**
MM991-2FM (BFOC)	2 x 100 Mbps, BFOC port optical, for glass FO cable (multimode) with diagnostics up to max. 5 km	6GK5 991-2AB01-8AA0 **9912AB**
MM991-2LD (BFOC)	2 x 100 Mbps, BFOC port optical, for glass FO cable (single mode), up to max. 26 km	6GK5 991-2AC00-8AA0 **9912AC**
MM991-2 (SC)	2 x 100 Mbps, SC ports optical, for glass FO cable (multimode), up to max. 5 km	6GK5 991-2AD00-8AA0 **9912AD**
MM991-2LD (SC)	2 x 100 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 26 km	6GK5 991-2AF00-8AA0 **9912AF**
MM991-2LH+ (SC)	2 x 100 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 70 km	6GK5 991-2AE00-8AA0 **9912AE**
MM991-2P (SC RJ)	2 x 100 Mbps SC RJ ports optical for Plastic Optical Fiber (POF) up to max. 50 m or Polymer Cladded Fiber (PCF) up to max. 100 m	6GK5 991-2AH00-8AA0 **9912AH**
MM992-2 (SC)	2 x 1000 Mbps, SC ports optical, for glass FO cable (multimode), up to max. 750 m	6GK5 992-2AL00-8AA0 **9922AL**
MM992-2 (C) (SC)	2 x 1000 Mbps, SC ports optical, for glass FO cable (multimode), up to max. 750 m, varnished	6GK5 992-2AL00-8FA0 **9922AL**
MM992-2LD (SC)	2 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 10 km	6GK5 992-2AM00-8AA0 **9922AM**
MM992-2LH (SC)	2 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 40 km	6GK5 992-2AN00-8AA0 **9922AN**
MM992-2LH+ (SC)	2 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 70 km	6GK5 992-2AP00-8AA0 **9922AP**
MM992-2ELH (SC)	2 x 1000 Mbps, SC ports optical, for glass FO cable (single mode), up to max. 120 km	6GK5 992-2AQ00-8AA0 **9922AQ**

Type key for the MM900 media modules

The type designation of an MM900 media module is made up of several parts that have the following meaning:



Interface	Property
[-]	BFOC port 100 Mbps multimode FO cable
LD	BFOC port 100 Mbps single mode FO cable
(SC)	SC port 100 Mbps multimode FO cable (up to max. 5 km)
LD (SC)	SC port 100 Mbps single mode FO cable (up to max. 26 km)
LH+ (SC)	SC port 100 Mbps single mode FO cable (up to max. 70 km)
P	SC RJ port 100 Mbps POF or PCF
FM	BFOC port 100 Mbps multimode FO cable with diagnostics



Interface	Property
CU	RJ-45 port electrical 10/100/1000 Mbps without securing collar
CUC	RJ-45 port electrical 10/100/1000 Mbps with securing collar
M12	M12 connection electrical 10/100/1000 Mbps
VD	RJ-45 port electrical 10/100/1000 Mbps with securing collar (up to max. 1000 m)
[-]	SC port 1000 Mbps multimode FO cable (up to max. 750 m)
LD	SC port 1000 Mbps single mode FO cable (up to max. 10km)
LH	SC port 1000 Mbps single mode FO cable (up to max. 40 km)
LH+	SC port 1000 Mbps single mode FO cable (up to max. 70 km)
ELH	SC port 1000 Mbps single mode FO cable (up to max. 120 km)
SFP	SFP media module

Ethernet standards of the media modules

The following table shows which Ethernet standards according to IEEE 802.3 the individual media modules comply with.

Media module	IEEE 802.3 standard
MM992-2CUC	1000Base-TX
MM992-2CUC (C)	1000Base-TX
MM992-2CU	1000Base-TX
MM992-2M12 (C)	1000Base-TX
MM992-2VD	1000Base-TX
MM991-2 (BFOC)	100Base-FX
MM991-2FM (BFOC)	100Base-FX
MM991-2LD (BFOC)	100Base-FX
MM991-2 (SC)	100Base-FX
MM991-2LD (SC)	100Base-FX
MM991-2LH+ (SC)	100Base-FX

Media module	IEEE 802.3 standard
MM991-2P (SC RJ)	100Base-FX
MM992-2 (SC)	1000Base-SX
MM992-2 (C) (SC)	1000Base-SX
MM992-2LD (SC)	1000Base-LX
MM992-2LH (SC)	1000Base-LX
MM992-2LH+ (SC)	1000Base-LX
MM992-2ELH (SC)	1000Base-LX

4.3 Components of the product

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.

4.3.1 Components of the product

Scope of delivery

The following components are supplied with a SCALANCE X-300:

- Device with C-PLUG exchangeable medium (article number of the C-PLUG: 6GK1900-0AB00)
- A four-pin terminal block for the 24 V DC power supply

- A two-pin terminal block for the signaling contact
- Product CD with documentation and software

4.3.2 X-300M components of the product

Scope of delivery

The following components are supplied with a SCALANCE X-300M:

- Device with C-PLUG exchangeable medium (article number of the C-PLUG: 6GK1900-0AB00)
- A four-pin terminal block for the power supply:
  - 24 V DC with X308-2M
  - 12 V DC with X308-2M TS
- A two-pin terminal block for the signaling contact
- Product CD with documentation and software

Note

When shipped, the slots for the media modules have a dummy cover fitted.

Note

Labels to identify the installed MM900 media modules are supplied with the modular devices (M).

4.3.3 Components of the XR-300M product

Scope of delivery

Note

When shipped, the slots for the media modules have dummy covers fitted.

Note

Labels to identify the installed MM900 media modules are supplied with the modular devices (M).

The following parts ship with a SCALANCE XR-300M:

- 1 x device with 1 x C-PLUG exchangeable medium (article number of the C-PLUG: 6GK1900-0AB00)
- 2x mounting brackets and 8x screws (M3x5 recessed head, drive: Torx) for 19" rack installation
  - With devices with 6GK5 324-0GG**00**-* the mounting brackets ship with the product.
  - With devices with 6GK5 324-0GG**10**-* the mounting brackets are premounted
- 1 x two-pin terminal block for the signaling contact
- 1 x connecting cable for the diagnostics port
- 1 x product CD with documentation and software

For devices with a 100 to 240 V AC power supply also:

- 1 x two-pin connector for the power supply

For devices with a 24 V DC power supply, also:

- 1 x four-pin terminal block for the power supply
- Adhesive feet for desktop operation

4.3.4 X-300EEC product components

Scope of delivery

The following components are supplied with a SCALANCE X-300EEC:

- 1 x device with 1 x C-PLUG exchangeable medium (article number of the C-PLUG: 6GK1900-0AB00)
- 1 x product CD with documentation and software

Additional parts are listed in the following table according to the device version:

Table 4-2 Overview of the components shipped with the X-300EEC product group

Device	**Plug-in terminal block**		
	Signaling contact with contact pins	**Power supply**	
		24 to 48 V DC	**100 to 240 V AC / 60 to 250 V DC**
SCALANCE X302-7EEC			
1 x power supply unit 24 V DC	1 x 2-pin	1 x 4-pin	-
2 x power supply unit 24 V DC	2 x 2-pin	2 x 4-pin	-
1 x power supply unit 100 to 240 V AC / 60 to 250 V DC	1 x 3-pin	-	1 x 3-pin
2 x power supply unit 100 to 240 V AC / 60 to 250 V AC	2 x 3-pin	-	2 x 3-pin
SCALANCE X307-2EEC			

Device	Plug-in terminal block		
	Signaling contact with contact pins	Power supply	
		24 to 48 V DC	100 to 240 V AC / 60 to 250 V DC
1 x power supply unit 24 V DC	1 x 2-pin	1 x 4-pin	-
2 x power supply unit 24 V DC	2 x 2-pin	2 x 4-pin	-
1 x power supply unit 100 to 240 V AC / 60 to 250 V DC	1 x 3-pin	-	1 x 3-pin
2 x power supply unit 100 to 240 V AC / 60 to 250 V AC	2 x 3-pin	-	2 x 3-pin

4.3.5 Components of the XR-300M EEC product

Scope of delivery

Note

When shipped, the slots for the media modules have dummy covers fitted.

Note

Labels to identify the installed MM900 media modules are supplied with the modular devices (M).

The following components are supplied with a SCALANCE XR-300M EEC:

- 1 x device with one C-PLUG exchangeable medium (article number of the C-PLUG: 6GK1900-0AB00)
- 2x mounting brackets and 8x screws (M3x5 recessed head, drive: Torx) for 19" rack installation
  - With devices with 6GK5 324-4GG**00**-*, the mounting brackets ship with the product
  - With devices with 6GK5 324-4GG**10**-*, the mounting brackets are premounted
- 1 x connecting cable for the diagnostics port
- 1 x product CD with documentation and software

- With devices with power supply 100 to 240 V AC / 60 to 250 V DC:
  - A 3-pin terminal block (or two terminal blocks for redundant power supply) for the signaling contacts
  - A 3-pin terminal block (or two terminal blocks for redundant power supply) for the power supply
- With devices with power supply 24 V to 48 V DC:
  - A 2-pin terminal block (or two terminal blocks for redundant power supply) for the signaling contacts
  - A 4-pin terminal block (or two terminal blocks for redundant power supply) for the power supply

4.3.6 Components of the X308-2M PoE product

Article numbers

Type	Article number
X308-2M PoE	6GK5 308-2QG00-2AA2 6GK5 308-2QG10-2AA2

Interfaces

Type	RJ-45 port electrical 10/100/1000 Mbps	Module slots
X308-2M PoE	4	2

4.3.7 Components of the XR-324-4M PoE product

Scope of delivery

Note

When shipped, the slots for the media modules have dummy covers fitted.

Note

Labels to identify the installed MM900 media modules are supplied with the modular devices (M).

The following components are supplied with a SCALANCE XR-300M PoE:

- 1 x device with one C-PLUG exchangeable medium (article number of the C-PLUG: 6GK1900-0AB00)
- 2x mounting brackets and 8x screws (M3x5 recessed head, drive: Torx) for 19" rack installation
  - With devices with 6GK5 324-4QG**00**-* the mounting brackets ship with the product.
  - With devices with 6GK5 324-4QG**10**-*, the mounting brackets are premounted.
- 1 x connecting cable for the diagnostics port
- 1 x product CD with documentation and software
- With devices with a 100 to 240 V AC power supply:
  - A 2-pin terminal block for the power supply
  - A 2-pin terminal block for the signaling contact
- With devices with 24 V DC power supply:
  - 4-pin terminal block for the power supply
  - 2-pin terminal block for the signaling contact
- With devices with 6GK5 324-4QG**10**-* and power supply 24 V DC:
  - 4 adhesive feet for desktop mounting

4.3.8 Components shipped with the SFP product

Table 4-3 Overview of the components shipped with the **SFP** product group

Device: **Transceiver**	**(Variant)**	**Plug-in terminal block**		**Device**	**Product CD**
		(signaling contact) **2-pin**	**(24V)** **4-pin**		
SFP991-1	(-)	-	-	●	-
SFP991-1LD	(-)	-	-	●	-
SFP991-1LH+	(-)	-	-	●	-
SFP992-1	(-)	-	-	●	-
SFP992-1+	(-)	-	-	●	-
SFP992-1LD	(-)	-	-	●	-
SFP992-1LH	(-)	-	-	●	-
SFP992-LH+	(-)	-	-	●	-
SFP992-1ELH	(-)	-	-	●	-

4.3.9 Components shipped with the MM900 product

Scope of delivery

The following components are supplied with a SCALANCE MM900 media module:

- MM99x-2xx media module
- Compact operating instructions

Note

Identification labels

The location labels identify the media modules and ship with the SCALANCE device.

4.4 Product properties and device views

4.4.1 X-300 product group

4.4.1.1 SCALANCE X304-2FE product characteristics

Possible attachments

The SCALANCE X304-2FE provides the following options for the connection of end devices or other network segments:

- 4 RJ-45 jacks
- 2 FO ports (for multimode fiber)



Figure 4-2 X304-2FE

Column	1	2
Port number	P1	P3
		P4
	P2	P5
		P6
Connection type	Optical: Fast Ethernet	Electrical: Fast Ethernet

4.4.1.2 SCALANCE X306-1LD FE product characteristics

Possible attachments

The SCALANCE X306-1LD FE provides the following options for the connection of end devices or other network segments:

- 6 RJ-45 jacks
- 1 FO port (for single mode fiber)



Figure 4-3 SCALANCE X306-1LD FE

Column	1	2
Port number	P1 *)	P4
		P5
	P2	P6
	P3	P7
Connection type	Electrical: Fast Ethernet *) Optical: Fast Ethernet	Electrical: Fast Ethernet

4.4.1.3 SCALANCE X307-3 product characteristics

Possible attachments

The SCALANCE X307-3 provides the following options for the connection of end devices or other network segments:

- 7 RJ-45 jacks
- 3 FO ports (for multimode fiber)



Figure 4-4 SCALANCE X307-3

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6		
	P3	P7	-	P10
	P4	-		
Connection type	Electrical: Fast Ethernet		Optical: Gigabit Ethernet	

4.4.1.4 SCALANCE X307-3LD product characteristics

Possible attachments

The SCALANCE X306-3LD provides the following options for the connection of end devices or other network segments:

- 7 RJ-45 jacks
- 3 FO ports (for single mode fiber)



Figure 4-5 SCALANCE X307-3LD

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6		
	P3	P7	-	P10
	P4	-		
Connection type	Electrical: Fast Ethernet		Optical: Gigabit Ethernet	

4.4.1.5 SCALANCE X308-2LH product characteristics

Possible attachments

The SCALANCE X308-2LH provides the following options for the connection of end devices or other network segments:

- 8 RJ-45 jacks
- 2 FO ports (for single mode fiber)



Figure 4-6 SCALANCE X308-2LH

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6	-	
	P3	P7	-	P10
	P4	-	-	
Connection type	Electrical: Fast Ethernet		Electrical: Gigabit Ethernet	Optical: Gigabit Ethernet

4.4.1.6 SCALANCE X308-2LH+ product characteristics

Possible attachments

The SCALANCE 308-2LH+ provides the following options for the connection of end devices or other network segments:

- 8 RJ-45 jacks
- 2 FO ports (for single mode fiber)



Figure 4-7 SCALANCE X308-2LH+

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6	-	
	P3	P7	-	P10
	P4	-	-	
Connection type	Electrical: Fast Ethernet		Electrical: Gigabit Ethernet	Optical: Gigabit Ethernet

4.4.1.7 SCALANCE X308-2 product characteristics

Possible attachments

The SCALANCE X308-2 provides the following options for the connection of end devices or other network segments:

- 8 RJ-45 jacks
- 2 FO ports (for multimode fiber)



Figure 4-8 SCALANCE X308-2

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6	-	
	P3	P7	-	P10
	P4	-	-	
Connection type	Electrical: Fast Ethernet		Electrical: Gigabit Ethernet	Optical: Gigabit Ethernet

4.4.1.8 SCALANCE X308-2LD product characteristics

Possible attachments

The SCALANCE X308-2LD provides the following options for the connection of end devices or other network segments:

- 8 RJ-45 jacks
- 2 FO ports (for single mode fiber)



Figure 4-9 SCALANCE X308-2LD

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6	-	
	P3	P7	-	P10
	P4	-	-	
Connection type	Electrical: Fast Ethernet		Electrical: Gigabit Ethernet	Optical: Gigabit Ethernet

4.4.1.9 SCALANCE X310 product characteristics

Possible attachments

The SCALANCE X310 provides the following options for the connection of end devices or other network segments:

- 10 RJ-45 jacks



Figure 4-10 SCALANCE X310

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6	-	P10
	P3	P7	-	-
	P4	-	-	-
Connection type	Electrical: Fast Ethernet		Electrical: Gigabit Ethernet	

4.4.1.10 SCALANCE X310FE product characteristics

Possible attachments

The SCALANCE X310FE provides the following options for the connection of end devices or other network segments:

- 10 RJ-45 jacks



Figure 4-11 SCALANCE X310FE

Column	1	2	3	4
Port number	P1	P5	P8	P9
	P2	P6	-	P10
	P3	P7	-	-
	P4	-	-	-
Connection type	Electrical: Fast Ethernet			

4.4.1.11 SCALANCE X320-1FE product characteristics

Possible attachments

The SCALANCE X320-1 FE provides the following options for the connection of end devices or other network segments:

- 20 RJ-45 jacks
- 1 FO port (for multimode fiber)



Figure 4-12 SCALANCE X320-1 FE

Column	1	2	3	4	5	6
Port number	P1	P5	P9	P13	P17	P21
	P2	P6	P10	P14	P18	-
	P3	P7	P11	P15	P19	-
	P4	P8	P12	P16	P12	-
Connection type	Electrical: Fast Ethernet					Optical: Fast Ether-net

4.4.1.12 SCALANCE X320-3LD FE product characteristics

Possible attachments

The SCALANCE X320-3LD FE provides the following options for the connection of end devices or other network segments:

- 20 RJ-45 jacks
- 1 FO port (for multimode fiber)
- 2 FO ports (for single mode fiber)



Figure 4-13 SCALANCE X320-3LD FE

Column	1	2	3	4	5	6
Port number	P1	P5	P9	P13	P17	P21
	P2	P6	P10	P14	P18	P22
	P3	P7	P11	P15	P19	P23
	P4	P8	P12	P16	P20	-
Connection type	Electrical: Fast Ethernet					Optical: Fast Ethernet

4.4.2 Product group X-300M

4.4.2.1 SCALANCE X308-2M product characteristics

Possible attachments

The SCALANCE X308-2M and X308-2M TS are partly modular devices and each has 8 ports.

- **4 fixed ports in the base device:**
  4 electrical RJ-45 jacks (with securing collars) for connection of end devices or other network segments.
- **4 modular ports via module slots:**
  Two media modules (optical or electrical as required) can be combined using slots (S1-S2) depending on the application. End devices and other network segments are connected according to the media modules being used.

Note

When shipped, the slots for the media modules have a dummy cover fitted.



Figure 4-14 SCALANCE X308-2M with dummy covers

Possible attachments (example)

CAUTION
Use only approved media modules in the module slots The connection of end devices or other network segments does not depend on the module slot, but rather on the selected media module. Refer to the section Media module installation in slot.

Example of connections



Figure 4-15 SCALANCE X308-2M with MM992-2 and MM991-2

Column	1	2	3	4
Slot number	-	-	S1	S2
Media modules used			MM992-2	MM991-2

Column	1	2	3	4
Port number	-	P1	P5	P7
	-	P2		
	-	P3	P6	P8
	-	P4		
Connection type	-	Optical: Gigabit Ethernet	Connection type depending on module used	

4.4.3 Product group XR-300M

4.4.3.1 SCALANCE XR324-12M product characteristics

Possible attachments

The SCALANCE XR324-12M is a fully modular device and has 24 ports.

- **0 fixed ports on the base device**
- **24 modular ports via module slots:**
  12 media modules (optical or electrical as required) can be combined using slots (S1-S12) depending on the application. End devices and other network segments are connected according to the modules being used.

Note

When shipped, the slots for the media modules have a dummy cover fitted.

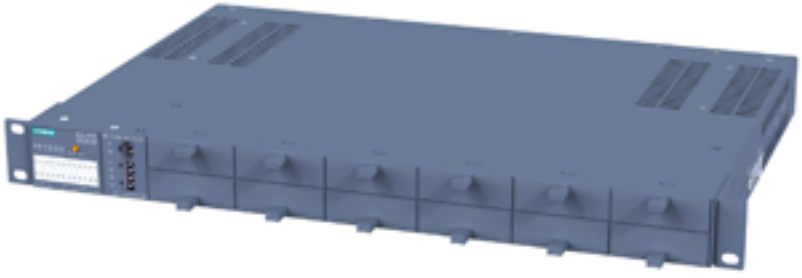


Figure 4-16 SCALANCE XR324-12M with blind covers

Example of a configuration

CAUTION

Use only approved media modules in the module slots

The connection of end devices or other network segments does not depend on the module slot, but rather on the selected media module.

Refer to the section Media module installation in slot.

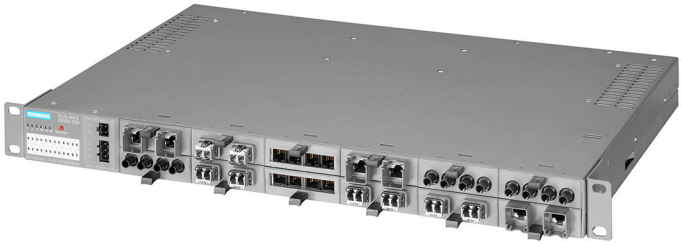


Figure 4-17 SCALANCE XR324-12M with MM900

Slot number	S1		S2		S3		S4		S5		S6	
Media modules used	MM992-2CUC		MM992-2CUC		MM992-2CUC		MM991-2 (SC)		MM991-2 (SC)		MM991-2 (SC)	
Port number	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2
Slot number	S7		S8		S9		S10		S11		S12	
Media modules used	MM992-2CUC		MM992-2CUC		MM992-2CUC		MM991-2		MM991-2		MM991-2	
Port number	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2	P1	P2

4.4.4 X-300EEC product group

4.4.4.1 SCALANCE X-300EEC product characteristics

Variants

The SCALANCE X-300EEC is a 19"/2 device with 9 ports for the connection of end devices or other network segments. There are 2 device types with the following ports:

- **SCALANCE X302-7EEC**
  - 2 x RJ-45 jacks
  - 7 x FO ports for multimode fiber, LC connector
- **SCALANCE X307-2EEC**
  - 7 x RJ-45 jacks
  - 2 x FO ports for multimode fiber, LC connector

Device versions

The X-300EEC is available in the following alternative versions:

- **Power supply**
  - Power supply unit 24 to 48 VDC
  - Multirange power supply unit 100 to 240 VAC / 60 to 250 VDC
- **Power supply unit**
  - Single
  - Redundant
- **Printed board**
  - Varnished (suitable for aggressive environments)
  - Unvarnished

This combination of versions results in the product variants listed in section X-300EEC product group (Page 38).



Figure 4-18 SCALANCE X302-7EEC (from below) with protective bracket and LC connector

Replacing the C-PLUG

In the X-300EEC devices, the slot for the C-PLUG is on the top on the housing.



Figure 4-19 C-PLUG of the X-300EEC

NOTICE
The C-PLUG may only be removed or inserted when the power supply to the device is turned off. In a device with a varnished printed circuit board, you may only use a C-PLUG with a varnished board.

To remove the C-PLUG, open the slider and close it again after inserting the C-PLUG.

Terminal block for signaling contact and power supply

The terminal block of the X-300EEC for connecting the signaling contact and power supply has the following terminals:

- F1, F2: Signaling contact
  The 2 signaling contacts on the device version with a redundant power supply are energized in parallel.
- L1, M1: Power supply 1
- L2, M2: Power supply 2 (redundant version)
  The power supply units for the power supply are available in the following versions:
  - 24 to 48 VDC
  - As multirange power supply unit 100 to 240 VAC / 60 to 250 VDC

RJ-45 interface

The RJ-45 ports of the IE Switch X-300EEC are fitted with a securing bracket instead of a securing collar.

To increase mechanical stability, secure the IE FC RJ-45 PLUGs to this securing bracket with a cable binder.

LEDs of the X-300EEC

You will find the meaning of the individual LEDs in the section "LED display (Page 155)".

Ports of the X302-7EEC

The SCALANCE X302-7EEC has the following ports:

- 2 electrical gigabit ports (P8 to P9)
- 7 optical Fast Ethernet ports (P1 to P7)

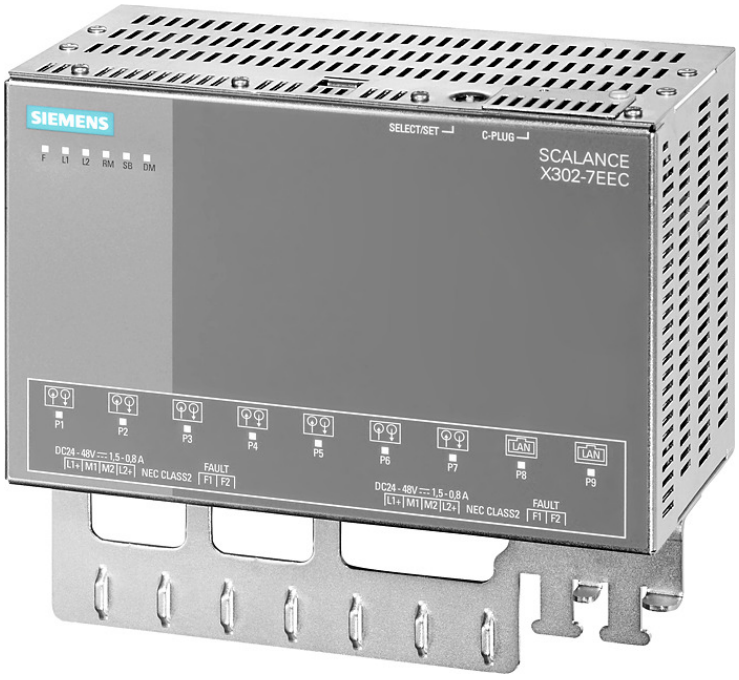


Figure 4-20 SCALANCE X302-7EEC

Port number	P1	P2	P3	P4	P5	P6	P7	P8	P9
Connection type	Optical: Fast Ethernet							Electrical: Gigabit Ethernet	

Ports of the X307-2EEC

The SCALANCE X307-2EEC has the following ports:

- 7 electrical ports (P3 to P9)
  - 5 Fast Ethernet ports (P3 to P7)
  - 2 gigabit ports (P8, P9)
- 2 optical Fast Ethernet ports (P1, P2)

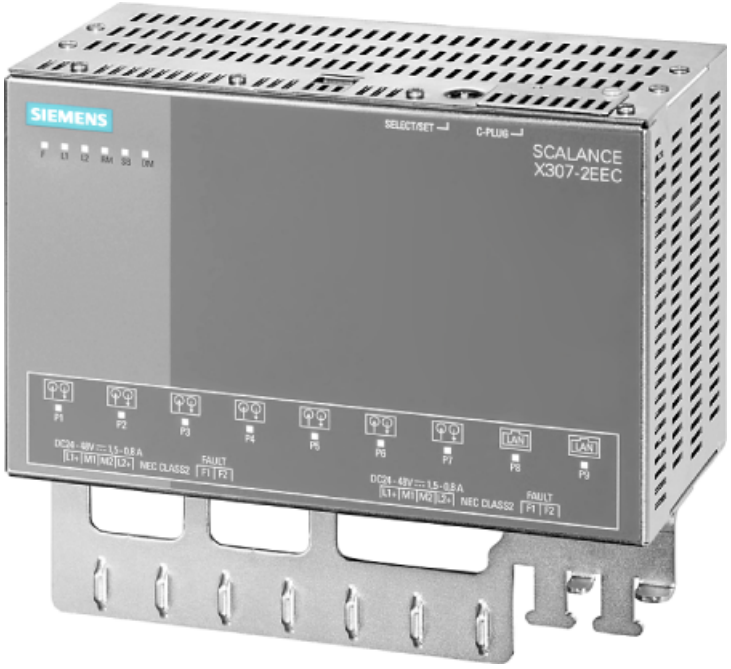


Figure 4-21 SCALANCE X307-2EEC

Port number	P1	P2	P3	P4	P5	P6	P7	P8	P9
Connection type	Optical: Fast Ethernet		Electrical: Fast Ethernet					Electrical: Gigabit Ethernet	

4.4.5 XR-300M EEC product group

4.4.5.1 SCALANCE XR324-4M EEC product characteristics

Connection options with the SCALANCE XR324-4M EEC

The SCALANCE XR324-4M EEC is a partially modular device and has 24 ports.

- **16 fixed ports in the base device:**
  16 RJ-45 jacks for connection of end devices or other network segments.
- **8 modular ports via module slots:**
  4 modules can be combined using slots (S1-S4) depending on the application. End devices and other network segments are connected according to the modules being used.



Figure 4-22 XR324-4M EEC

CAUTION

Use only approved media modules

If you use media modules that are not approved by Siemens AG, there is no guarantee that the device will function according to the specification.

If you use unapproved media modules, this can lead to the following problems:

- Damage to the device
- Loss of the approvals
- Violation of the EMC regulations

Use only approved media modules.

Slot number									S1		S2	
Port number	P1	P2	P3	P4	P5	P6	P7	P8	P1	P2	P1	P2
Slot number									S3		S4	
Port number	P9	P10	P11	P12	P13	P14	P15	P16	P1	P2	P1	P2

4.4.6 Product group X-300M PoE

4.4.6.1 SCALANCE X308-2M PoE product characteristics

Possible attachments

The SCALANCE X308-2M PoE is a partially modular device and has eight ports.

- **Four fixed ports in the base device:**
  Four PoE-compliant ports (RJ-45 jacks with securing collars) for connection of end devices or other network segments.
- **Four modular ports via module slots:**
  Two media modules (optical or electrical as required) can be combined using slots (S1-S2) depending on the application. End devices and other network segments are connected according to the media modules being used.

Note

When shipped, the slots for the media modules have a dummy cover fitted.



Figure 4-23 SCALANCE X308-2M PoE with dummy covers

Possible attachments (example)

CAUTION
Use only approved media modules in the module slots The connection of end devices or other network segments does not depend on the module slot, but rather on the selected media module. Refer to the section Media module installation in slot.

Example: Fitted with media modules MM992-2 and MM991-2



Figure 4-24 SCALANCE X308-2M PoE with MM992-2 and MM992-2SFP

Column	1	2	3	4
Slot number	-	-	S1	S2
Media modules used	-	-	MM992-2	MM992-2SFP

Column	1	2	3	4
Port number	-	P1 (gigabit Ethernet)	P5 (gigabit multimode fiber-optic cable, SC ports)	P7 (interface depends on SFP used)
	-	P2 (gigabit Ethernet)		
	-	P3 (gigabit Ethernet)	P6 (gigabit multimode fiber-optic cable, SC ports)	P8(interface depends on SFP used)
	-	P4 (gigabit Ethernet)		

4.4.7 Product group XR-300M PoE

4.4.7.1 SCALANCE XR324-4M PoE product characteristics

Connection options of the SCALANCE XR324-4M PoE and XR324-4M PoE TS switches

The switches are partly modular devices and all have 24 ports.

- **16 fixed ports on the base device:**
  - Ports P1 to P8
    8 PoE-compliant gigabit ports (RJ-45 jacks with securing collars) for connection of end devices or other network segments.
    Non PoE-compliant end devices can also be connected to the PoE-compliant RJ-45 jacks because the switches check that the end devices are suitable for the PoE function before applying the power.
  - Ports P9 to P16
    8 gigabit ports (RJ-45 jacks with securing collars) for connection of end devices or other network segments (no PoE).
- **8 modular ports via 4 module slots:**
  4 media modules each with 2 ports are combined optically or electrically via the slots S1 to S4 depending on the application. End devices and other network segments are connected according to the media modules being used.



Figure 4-25 XR324-4M PoE and XR324-4M PoE TS

CAUTION

Use only approved modules in the slots

Possible module connection types:

- 2 x RJ-45
- 2 x FX100
- 2 x FX1000
- or 2 x SFP slots

With FX, single mode fibers or multimode fibers are possible.
Connecting end devices or other network segments does not depend on the module slots.

Slot number									S1		S2	
Port number	P1	P2	P3	P4	P5	P6	P7	P8	P1	P2	P1	P2
Slot number									S3		S4	
Port number	P9	P10	P11	P12	P13	P14	P15	P16	P1	P2	P1	P2
Connection type	Electrical: Gigabit Ethernet								Connection type depending on module used			

4.4.8 MM900 media modules

4.4.8.1 MM991-2 (BFOC) product characteristics

Possible attachments

The MM991-2 (BFOC) media module has the following:

- 2 x 100 Mbps, BFOC port optical (multimode, glass) up to max. 5 km

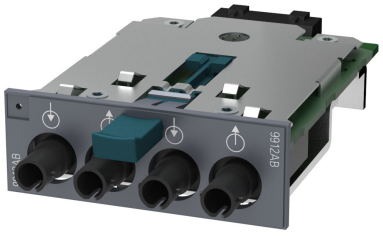


Figure 4-26 MM991-2 (BFOC) [9912AB]

[Device labeling in square brackets]

4.4.8.2 MM991-2FM (BFOC) product characteristics

Possible attachments

The MM991-2FM (BFOC) media module has the following:

- 2 x 100 Mbps, BFOC port optical (multimode, glass) with diagnostics up to max. 5 km

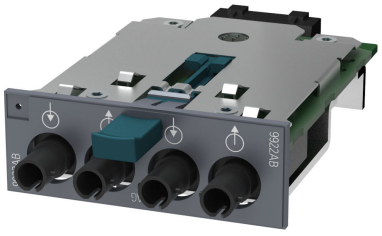


Figure 4-27 MM991-2FM (BFOC) [9912AB]

[Device labeling in square brackets]

4.4.8.3 MM991-2LD (BFOC) product characteristics

Possible attachments

The MM991-2LD (BFOC) media module has the following:

- 2 x 100 Mbps, BFOC port optical, (single mode glass), up to max. 26 km

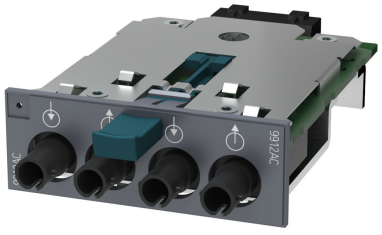


Figure 4-28 MM991-2LD (BFOC) [9912AC]

[Device labeling in square brackets]

4.4.8.4 MM991-2 (SC) product characteristics

Possible attachments

The MM991-2 (SC) media module has the following:

- 2 x 100 Mbps, SC port optical, (multimode glass), up to max. 5 km

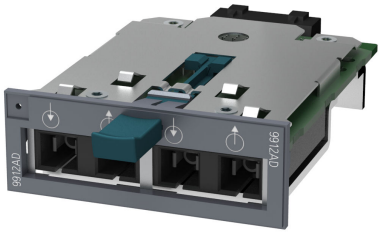


Figure 4-29 MM991-2 (SC) [9912AD]

[Device labeling in square brackets]

4.4.8.5 MM991-2LD (SC) product characteristics

Possible attachments

The MM991-2LD (SC) media module has the following:

- 2 x 100 Mbps, SC port optical, (single mode glass), up to max. 26 km

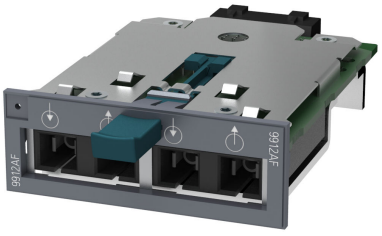


Figure 4-30 MM991-2LD (SC) [9912AF]

[Device labeling in square brackets]

4.4.8.6 MM991-2LH+ (SC) product characteristics

Possible attachments

The MM991-2LH+ (SC) media module has the following:

- 2 x 100 Mbps, SC port optical, (single mode glass), up to max. 70 km

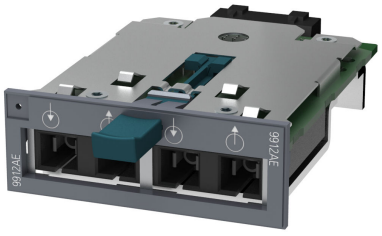


Figure 4-31 MM991-2LH+ (SC) [9912AE]

[Device labeling in square brackets]

4.4.8.7 MM991-2P (SC RJ) product characteristics

Possible attachments

The MM991-2P (SC RJ) media module has the following:

- 2 x 100 Mbps SC RJ ports optical for Plastic Optical Fiber (POF) up to max. 50 m or Polymer Cladded Fiber (PCF) up to max. 100 m

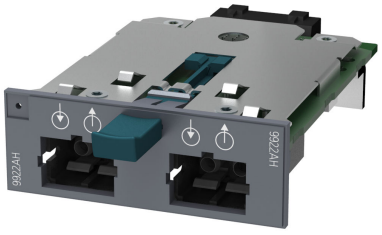


Figure 4-32 MM991-2P (SC RJ) [9912AH]

[Device labeling in square brackets]

Note

Installation of the XR-300M, XR-300M PoE and XR-300M EEC

Only the lower slots may be equipped with the MM991-2P.

- XR-300M: Maximum 6 modules in slots 7 to 12
- XR-300M PoE, XR-300M EEC: Maximum 2 modules in slots 3 and 4

The slot above an MM991-2P may only be used as follows:

- Without media module
- With media module MM992-2CUC or MM992-2CU

Example XR-300M: If the MM991-2P is plugged into slot 8, an MM992-2CUC may be used in slot 2.

See also table: "Operating temperature with media module MM991-2P"

4.4.8.8 MM992-2CU product characteristics

Possible attachments

The MM992-2CU media module has the following:

- 2 x 10/100/1000 Mbps, RJ-45 port electrical without securing collar

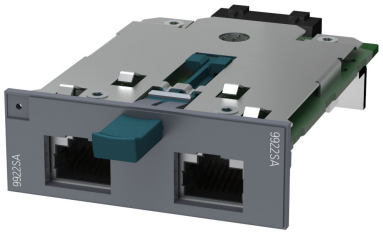


Figure 4-33 MM992-2CU [9922SA]

[Device labeling in square brackets]

Note

For connection to electrical networks note the information in Appendix A.1 and A.2.

4.4.8.9 MM992-2CUC product characteristics

Possible attachments

The MM992-2CUC media module has the following:

- 2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar

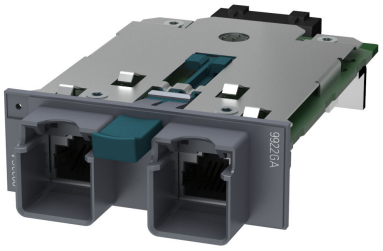


Figure 4-34 MM992-2CUC [9922GA]

[Device labeling in square brackets]

Note

For connection to electrical networks note the information in Appendix A.1 and A.2.

4.4.8.10 MM992-2VD product characteristics

Possible attachments

The MM992-2VD media module has the following:

- 2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar
- Additional two-wire transfer function (variable distance) for establishing Ethernet connections even using cables that do not conform to Ethernet. Possible distance covered depends on the cable quality.
- If you use the two-wire transfer function, you need to connect the MM992-2VD media module with a device that also supports the two-wire transfer function. Devices with the suffix "VD" in the type designation support the two-wire transfer function. In addition, observe the operating instructions for the VD device.

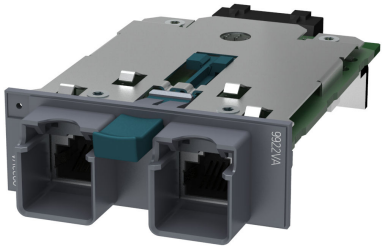


Figure 4-35 MM992-2VD [9922VA]

[Device labeling in square brackets]

NOTICE
Cable connection between VD devices Use the same type of cable for the cable connection between two VD devices. Infrastructure cables as well as any patch cables in use must be of the same cable type. If the cable type between the two VD devices changes during the transmission path, signal reflections can occur at the connection site of the different cables, which can result in frame losses.

Note

For connection to electrical networks note the information in Appendix A.1 and A.2.

Pin assignment for the RJ-45 connector of a PROFIBUS cable

If you use a PROFIBUS cable along with an IE FC RJ-45 plug 4x2, note the following:

RJ-45 connectors		**PROFIBUS cable**
Pin assignment	**Color**	**Wire color**
1	Yellow	Green
2	Orange	Red
3	White	--
6	Blue	--

Note

Using PROFIBUS standard cable GP

If you use a PROFIBUS standard cable GP, the wires must be stripped before they are inserted in the FC connector.

Note

If you use cables with a length > 500 m, connection establishment can take up to 2 min.

Note

If you connect an MM992-2VD media module to existing PROFIBUS cabling, the same requirements relating to shield contact and the lightning protection concept apply as for PROFIBUS.

4.4.8.11 MM992-2 (SC) product characteristics

Possible attachments

The MM992-2 (SC) media module has the following:

- 2 x 1000 Mbps, SC port optical, (multimode glass), up to max. 750 m

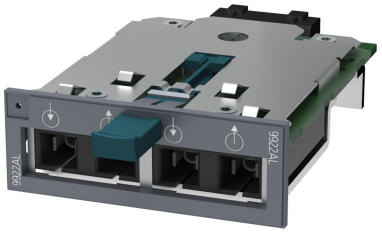


Figure 4-36 MM992-2 (SC) [9922AL]

[Device labeling in square brackets]

4.4.8.12 MM992-2LD (SC) product characteristics

Core statement

The MM992-2LD (SC) media module has the following:

- 2 x 1000 Mbps, SC port optical, (single mode glass), up to max. 10 km

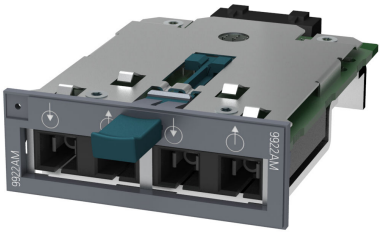


Figure 4-37 MM992-2LD (SC) [9922AM]

[Device labeling in square brackets]

4.4.8.13 MM992-2LH (SC) product characteristics

Possible attachments

The MM992-2LH (SC) media module has the following:

- 2 x 1000 Mbps, SC port optical, (single mode glass), up to max. 40 km

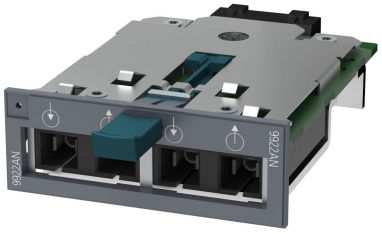


Figure 4-38 MM992-2LH (SC) [9922AN]

[Device labeling in square brackets]

4.4.8.14 MM992-2LH+ (SC) product characteristics

Possible attachments

The MM992-2LH+ (SC) media module has the following:

- 2 x 1000 Mbps, SC port optical, (single mode glass), up to max. 70 km

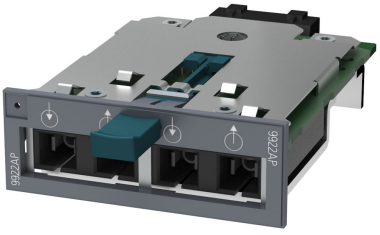


Figure 4-39 MM992-2LH+ (SC) [9922AP]

[Device labeling in square brackets]

4.4.8.15 MM992-2ELH (SC) product characteristics

Possible attachments

The MM992-2ELH (SC) media module has the following:

- 2 x 1000 Mbps, SC port optical, (single mode glass), up to max. 120 km

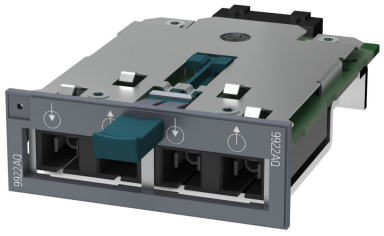


Figure 4-40 MM992-2ELH (SC) [9922AQ]

[Device labeling in square brackets]

4.4.8.16 MM992-2M12 product characteristics

Possible attachments

The MM992-2M12 media module has the following:

- 2 x 10/100/1000 Mbps, GE M12 connector electrical

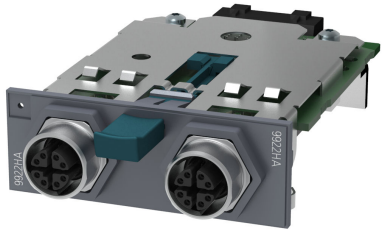


Figure 4-41 MM992-2M12C [9922HA]

[Device labeling in square brackets]

Note

For connection to electrical networks note the information in Appendix (A.1, A.2 and A.3)

4.4.8.17 MM992-2SFP / MM992-2SFP (C) product properties

Note

Only the media modules MM992-2SFP / M992-2SFP (C) may be fitted with approved SFP transceivers. The SFP media modules can be fitted with up to two SFPs.

Possible attachments

The media modules MM992-2SFP / M992-2SFP (C) have:

- 2 x 100/1000 Mbps, SFP slot

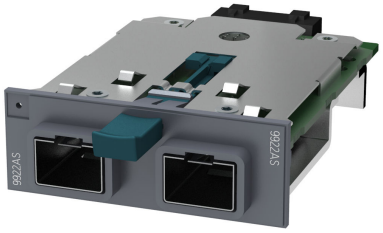


Figure 4-42 MM992-2SFP [9922AS]

[Device labeling in square brackets]

4.4.8.18 General notes on MM900

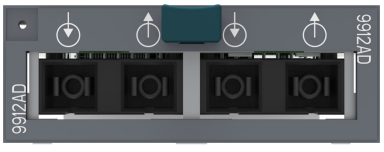
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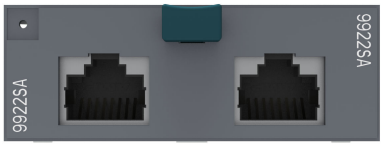
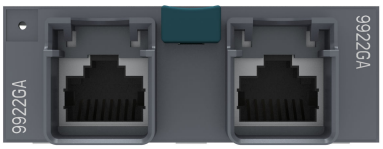
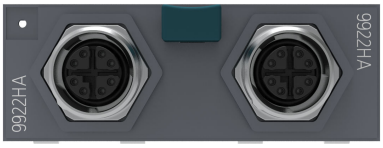
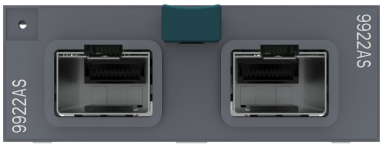
Use media modules only in an approved modular device ("M")

Use an MM900 media module only in a device equipped with suitable slots for such modules. Example: X308-2M.

The MM900 media module decides what can be connected

The connection of end devices or other network segments does not depend on the module slot, but rather on the selected MM900 media module.

Possible attachment	Figure
BFOC ports optical	
BFOC-Ports optical with diagnostics	
Optical SC ports	
SC RJ ports optical	

Possible attachment	Figure
Electrical RJ-45 ports without securing collar	
Electrical RJ-45 ports with securing collar	
GE M12 connector electrical	
SFP transceivers Only the SFP media module MM992-2SFP may be fitted with approved SFP transceivers. The SFP media module can be fitted with up to two SFPs.	

4.4.9 SFP transceiver

Note

An SFP with multimode has a black clip and an SFP with single mode has a blue clip. To protect the pins, these are fitted with a dummy plug.

Note

Fiber monitoring

All pluggable transceivers are capable of diagnostics and support fiber monitoring.

SFP transceiver

Type	Properties	Article number
SFP991-1 *	1 x 100 Mbps, LC port optical for glass FO cable (multimode), up to max. 3 km	6GK5 991-1AD00-8AA0
SFP991-1 (C) *	1 x 100 Mbps, LC port optical, for glass FO cable (multimode), up to max. 3 km, coated	6GK5 991-1AD00-8FA0
SFP991-1LD *	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 26 km	6GK5 991-1AF00-8AA0
SFP991-1LD (C) *	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 26 km, varnished	6GK5 991-1AF00-8FA0

Type	Properties	Article number
SFP991-1LH+ *	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 70 km	6GK5 991-1AE00-8AA0
SFP991-1ELH200 *	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 200 km	6GK5 991-1AE30-8AA0
SFP992-1	1 x 1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 750 m	6GK5 992-1AL00-8AA0
SFP992-1+	1 x 1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 2 km	6GK5 992-1AG00-8AA0
SFP992-1LD	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 10 km	6GK5 992-1AM00-8AA0
SFP992-1LD (C)	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 10 km, varnished	6GK5 992-1AM00-8FA0
SFP992-1LD+	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 30 km	6GK5 992-1AM30-8AA0
SFP992-1LH	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 40 km	6GK5 992-1AN00-8AA0
SFP992-1LH+	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 70 km	6GK5 992-1AP00-8AA0
SFP992-1ELH	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 120 km	6GK5 992-1AQ00-8AA0

* Cannot be operated in SFP+ slots.

Pluggable transceivers with the supplement (C) in the type name have varnished printed circuit boards (conformal coating).

4.4.9.1 MM992-2SFP / MM992-2SFP (C) product properties

Note

Only the media modules MM992-2SFP / M992-2SFP (C) may be fitted with approved SFP transceivers. The SFP media modules can be fitted with up to two SFPs.

Possible attachments

The media modules MM992-2SFP / M992-2SFP (C) have:

- 2 x 100/1000 Mbps, SFP slot

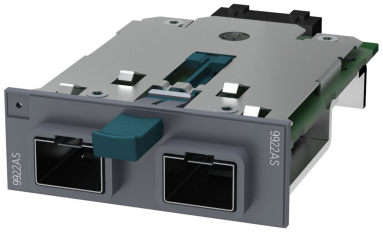


Figure 4-43 MM992-2SFP [9922AS]

[Device labeling in square brackets]

4.5 Interfaces and signaling contact of the switches

4.5.1 Ethernet interfaces - electrical ports

4.5.1.1 10Base-T / 100Base-TX

Transmission rate

The transmission rate of the electrical ports is 10 Mbps or as Fast Ethernet ports 100 Mbps.

Transmission mode

The transmission mode for 10Base-T / 100Base-TX is specified in the IEEE 802.3i / IEEE 802.3u standards of the Institute of Electrical and Electronic Engineers.

Autonegotiation (automatic detection of the best transmission modes) is default. The order in which they are selected is:

- 100Base-TX full duplex
- 100Base-TX half duplex
- 10Base-T full duplex
- 10Base-T half duplex

Two communication modes are possible:

- Half duplex
  Two-way alternate transmission mode - it is only possible to either send or receive over the interfaces at any one time.
- Full duplex mode
  Two-way simultaneous - both communication partners can send and receive at the same time.

Connections to other switches can use half or full duplex; connections to hubs are possible only in half duplex mode.

Transmission medium

Data transmission at 10 Mbps and at 100 Mbps is over two wire pairs (pin 1, 2, 3, 6) of the twisted pair cable. For 10 Mbps, at least a category 3 (Cat 3) and for 100 Mbps, at least a four-wire (2 x 2) category 5 (Cat 5) cable is necessary.

Transmission range

The maximum transmission range (segment length) is 100 m.

Connectors

A node or network segment is connected to an 8-pin RJ-45 jack with securing collar. Due to its flush fitting with an IE FC RJ-45 Plug 180 / IE FC RJ45 Plug 145 connector, the securing collar ensures a robust connection suitable for industry that provides tensile and bending strain relief for the inserted connector.

Note

The RJ-45 jacks of the SCALANCE X300EEC variants do not have a securing collar. The tensile and bending relief are provided by the securing bracket using a cable binder, see also section Signaling contact (Page 147).

4.5.1.2 1000Base-T

Transmission rate

The transmission rate of the electrical Ethernet ports is 10 Mbps, as Fast Ethernet ports 100 Mbps or as gigabit ports 1 Gbps.

Transmission mode

The transmission mode for 1000Base-T is specified in the IEEE 802.3ab standard.

Autonegotiation (automatic detection of the best transmission mode) is default.
The order in which they are selected is:

- 1000Base-T full duplex
- 1000Base-T half duplex
- 100Base-TX full duplex
- 100Base-TX half duplex
- 10Base-T full duplex
- 10Base-T half duplex

Two communication modes are possible:

- Half duplex
  Two-way alternate transmission mode - it is only possible to either send or receive over the interfaces at any one time.
- Full duplex mode
  Two-way simultaneous - both communication partners can send and receive at the same time.

Transmission medium

Data is transmitted over an eight-wire twisted pair cable.

Note

For data transmission at 1 Gbps, at least a Cat 5e twisted-pair cable with 4 x 2 wires is necessary. With a four-wire cable (2 x 2 wires), a maximum data transmission rate of 100 Mbps is possible.

Transmission range

The maximum transmission range (segment length) is 100 m.

Connectors

The connectors used are 8-pin RJ-45 jacks.

4.5.1.3 Power over Ethernet (PoE)

Power over Ethernet (PoE)

With PoE, the power for networked devices is carried via Ethernet. Here, there are two methods of supplying power:

- Alternative A
  Here, the voltage is transferred on the data wires 1, 2, 3 and 6 of the Ethernet cable
  Requirements for the Ethernet cable:
  - For 10Base-T/100Base-TX, a 4-wire cable is adequate for data transmission and power supply.
  - With 1000BASE-T, an 8-wire cable is necessary for data transmission.
- Alternative B
  Power is transferred on the free wires 4, 5, 7 and 8 of the Ethernet cable.
  Requirements for the Ethernet cable: For 10Base-T/100Base-TX/1000BASE-T, an 8-wire cable is needed.

PoE-compliant devices can be divided into the following groups:

- PSE - power sourcing equipment
  These inject power onto the Ethernet cable.
- PD - powered devices
  These are supplied with power via Ethernet.

4.5.1.4 Ports of the X308-2M PoE

PoE ports of SCALANCE X-300M PoE switches

As a PSE, the PoE switch supplies PoE-capable devices with power over Ethernet. The 48 V power required to supply the powered devices is generated internally on the switch, no extra power supply unit is necessary.

The PoE switch uses "alternative A" for this. Per RJ-45 port, a maximum of 15.4 W are available for supplying a PoE-compliant device. If a Cat5/Cat5e cable with a maximum length of 100 m is used, the connected device can be supplied with a power of 12.95 W.

Note

The total power provided by the switch on all four PoE ports is a maximum of 30.8 W.

The PoE ports meet the conditions listed in the IEEE 802.3af / IEEE 802.3at standard (type 1) for environment A , in other words power supply over Ethernet within a power supply system. For details of configuring and enabling PoE for individual ports, refer to the configuration manual SCALANCE X-300 / X-400 on the accompanying CD.

4.5.1.5 PoE ports

PoE ports of SCALANCE XR-300M PoE switches

As a PSE, the PoE switch supplies PoE-capable devices with power over Ethernet. The power required to supply the powered devices is generated internally on the switches, no extra power supply unit is necessary.

The PoE switch uses "alternative A" for this. Per RJ-45 port, a maximum of 15.4 W are available for supplying a PoE-compliant device. If a Cat5/Cat5e cable with a maximum length of 100 m is used, the connected device can be supplied with a power of 12.95 W.

Note

The total power provided by the switch on all eight PoE ports is a maximum of 53.2 W.

The PoE ports meet the conditions listed in the IEEE 802.3af / IEEE 802.3at standard (type 1) for environment A , in other words power supply over Ethernet within a power supply system. For details of configuring and enabling PoE for individual ports, refer to the configuration manual SCALANCE X-300 / X-400 on the accompanying CD.

4.5.1.6 Isolation between the TP ports

All ports meet the requirement of 1.5 kV isolation voltage to the shield and between the ports (corresponds to IEEE802.3, Environment B).

Note

Exceptions are X307-3, X307-3LD, X308-2, X308-2LD, X308-2LH, X308-2LH+, X310, X310FE

The following port group is an exception to this:

- Port group 1: P1, P2, P3 and P4

Between the ports of port group 1, the requirements for Environment A are met.

4.5.2 Ethernet interfaces - optical ports

4.5.2.1 1000Base-SX

Transmission rate

The transmission rate of the optical gigabit ports is 1 Gbps.

Transmission mode

Transmission with 1000Base-SX is defined in the IEEE 802.3z standard and is specified as 1000 Mbps transmission rate and full duplex.

Transmission medium

Data is transmitted over multimode FOC. The wavelength is 850 nm.

The core diameter of the multimode FOC is 50 µm; the light source is an LED. Many modes (light beams) are used for signal transmission. The propagation times of the light pulses (dispersion) restrict the maximum range considerably.

Transmission range

The maximum transmission range (segment length) is 750 m when using SIMATIC NET fiber-optic multimode FOC with SC duplex connectors.

Connectors

SC duplex female connectors are used.

On the IE Switches X-300EEC, devices are connected via LC jacks.

4.5.2.2 1000Base-LX / 100Base-FX

Transmission rate

The transmission rate of the optical gigabit ports is 1 Gbps.

Transmission mode

Transmission with 1000Base-LX is defined in the IEEE 802.3z standard and is specified as 1000 Mbps transmission rate and full duplex.

Transmission medium

Data is transmitted over single mode FOC. The wavelength is 1310 nm or 1550 nm.

The core diameter of the single mode FO cable is 9 or 10 µm; the light source is a laser diode. To transmit a signal, only one mode (light beam) is used greatly reducing dispersion. As a result, the maximum range of single mode FOC is greater than that of multimode FOC.

Transmission range

The maximum transmission distance (segment length) is 120 km for 1000Base-LX transmission.

IE Switches X-300 connector technology

SC duplex female connectors are used.

Connector technology of the IE Switch X-300EEC

FC duplex female connectors with the following characteristics are used:

- Maximum range: up to 3 km
- Wavelength: 1310 nm
- Transmission mode: Multimode
- Standard: 100Base-FX

4.5.3 Signaling contact

The signaling contact (relay contact) is a floating switch with which error/fault states can be signaled by breaking the contact.

Error indication

- The signaling by the signaling contact is synchronized with the fault LED, in other words, all errors displayed by this LED (freely configurable) are also signaled on the signaling contact.
- If an internal fault occurs, the fault LED lights up and the signaling contact opens.

- The connection or disconnection of a communication node on an unmonitored port does not lead to an error message.
- The signaling contact remains activated until the error/fault is eliminated or until the current status is entered in the fault mask as the new desired status.

4.6 C-PLUG (configuration plug)

NOTICE
DO NOT REMOVE C-PLUG WHILE POWER IS ON The C-PLUG may only be removed or inserted when the power supply to the device is turned off. In a device with a varnished printed circuit board, you may only use a C-PLUG with a varnished board.

Area of application

The C-PLUG is an exchangeable medium for storage of the configuration data of the IE Switch and ships with the product. This means that the configuration data remains available if the IE Switch is replaced.

How it works

Power is supplied by the IE Switch. The C-PLUG retains all data permanently when the power is turned off.

If an empty C-PLUG (factory settings or deleted with the Clean function) is inserted, all the configuration data of the IE Switch is saved to it automatically when the device starts up. Changes to the configuration during operation without operator intervention are saved on the C-PLUG if this is in the "ACCEPTED" status.

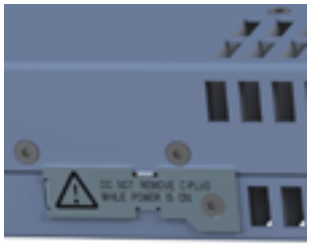
An IE Switch with an accepted C-PLUG inserted uses the configuration data of the C-PLUG automatically when it starts up. Acceptance is possible only when the data was written by a compatible device type.

This allows an IE Switch to be replaced quickly and simply. The C-PLUG is taken from the failed component and inserted in the replacement. The first time it is started up, the replacement device has the same configuration as the failed device except for the MAC address set by the vendor.

Diagnostics

Inserting a C-PLUG that does not contain the configuration of a compatible device type, accidentally removing the C-PLUG or general malfunctions of the C-PLUG are signaled by the diagnostics mechanisms of the IE Switch (LEDs, WEB-based management, SNMP, CLI and PROFINET diagnostics).

Inserting in the C-PLUG slot on the IE Switch X-300

Product group	Slot	Figure	C-PLUG
X-300 **X-300M**	Rear of the device		1. Remove the screw cover. 2. Insert the C-PLUG in the intended slot. 3. Close the screw cover again correctly.
XR-300M	Rear of the device - right		1. Remove the cover. 2. Insert the C-PLUG in the intended slot. 3. Close the cover again correctly.
X-300EEC	Top of the housing		1. Open the slider. 2. Insert the C-PLUG. 3. Close the slider.

Removing the C-PLUG from the IE Switch X-300

It is only necessary to remove the C-PLUG if the IE Switch develops a fault.

The C-PLUG can be removed from the slot using flat pliers, tweezers, or a small screwdriver.

Product group	Slot	Figure	
X-300 **X-300M**	Rear of the device		1. Remove the screw cover. 2. Remove the C-PLUG. 3. Close the screw cover again correctly.
XR-300M	Rear of the device - right		1. Remove the cover. 2. Remove the C-PLUG. 3. Close the cover again correctly.
X-300EEC	Top of the housing		1. Open the slider. 2. Remove the C-PLUG. 3. Close the slider.

4.7 Starting the device for the first time

Note

When the device is started up for the first time, the power-up time is approximately 1 minute longer than for all other starts of the device. The reason for this delay is the calculation of the certificates required for encrypted communication. With SCALANCE devices, encrypted access is possible via Web Based Management with HTTPS or via the Command Line Interface with SSH.

Installation and removal

5

5.1 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 50 °C, 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 50 °C.

WARNING

If the device is installed in a cabinet, the inner temperature of the cabinet corresponds to the ambient temperature of the device.

WARNING

If the temperature of the cable or housing socket 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 50 °C to 60 °C, only use cables with a permissible operating temperature of at least 85 °C.

NOTICE

Improper mounting

Improper mounting may damage the device or impair its operation.

- Before mounting the device, always ensure that there is no visible damage to the device.
- Mount the device using suitable tools. Observe the information in the respective section about mounting.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

WARNING
EXPLOSION HAZARD Replacing components may impair suitability for Class 1, Division 2 or Zone 2.

WARNING
The device is intended for indoor use only.

WARNING
The device may only be operated in an environment of contamination class 1 or 2 (see EN/IEC 60664-1, GB/T 16935.1).

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.

Notes for use in hazardous locations according to ATEX, IECEx, UKEX and CCC Ex

If you use the device under ATEX, IECEx, UKEX or CCC Ex conditions you must also keep to the following safety instructions in addition to the general safety instructions for protection against explosion:

5.2 Requirements for the cabinet EN 60529 (ATEX), UKEX, IECEx and CCC-Ex

WARNING
To comply with EU Directive 2014/34 EU (ATEX 114), UK-Regulation SI 2016/1107 or the conditions of IECEx or CCC-Ex, the housing or cabinet must meet the requirements of at least IP54 (according to EN/IEC 60529, GB/T 4208) in compliance with EN IEC/IEC 60079-7, GB 3836.8.

WARNING
The equipment shall only be used in an area of not more than pollution degree 2, as defined in EN/IEC 60664-1, GB/T 16935.1.

⚠ WARNING

If the temperature of the cable or housing socket exceeds 60 °C or the temperature at the branching point of the cables 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.

Safety notices when using according to IEC 61131-2

If you use the device supplied with 100 ... 240 V AC according to IEC 61131-2, you must observe the following safety notices in addition to the general safety notices for protection against explosion:

According to the requirements of the IEC 61131-2 standard and the EC directive 2006/95/EC (Low Voltage Directive), the devices are "open equipment" and, in accordance with UL/CSA certification, they are an "open type".

To fulfill requirements for safe operation with regard to mechanical stability, flame retardation, stability, and protection against contact, the following alternative types of installation are specified:

- Installation in a suitable cabinet
- Installation in a suitable enclosure
- Installation in a suitably equipped, enclosed control room

Additional notes

⚠ CAUTION

Use only approved components

If you use components and accessories that are not approved for SIMATIC NET devices or their target systems, this may violate the requirements and regulations for safety and electromagnetic compatibility.
Only use components approved for the SIMATIC NET devices.

NOTICE

Warming and premature aging of the IE switch due to direct sunlight

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

Provide suitable shade to protect the IE switch against direct sunlight.

Note

During installation and operation, keep to the installation guidelines and safety notices described in this document and in the system manuals "Industrial Ethernet / PROFINET Industrial Ethernet" and "Industrial Ethernet / PROFINET passive network components".

You will find information on the system manuals in the section "Introduction", under "Further documentation".

Mounting position of the IE Switch X-300EEC

NOTICE
Only the normal mounting position with the cable outlets downwards is permitted.

Minimum clearances

If you install the IE Switch X-300EEC in enclosures without forced ventilation or cooling, minimum clearances must be maintained to neighboring devices or the wall of the enclosure. By keeping to the minimum clearances, there is then an adequate stream of air for heat dissipation during operation. Keep to the following minimum clearances to neighboring devices.

Table 5-1 Minimum clearances when installing the X-300EEC

Minimum clearance to devices below the switch	100 mm
Minimum clearance to devices above the switch	100 mm
Minimum clearance at the sides	20 mm

5.3 Overview of the methods of installation

Installing the switches

IE Switches X-300 can be installed in various ways:

- Installation on a 35 mm DIN rail
- Installation on a SIMATIC S7-300 standard rail
- Wall mounting
- 19" rack mounting (SCALANCE XR300)

For the possible types of installation, refer to section Technical specifications (Page 161)

Note

Standard rail and wall mounting of the IE Switch X-300EEC

With the X-300EEC, note the special features in the relevant subsection on standard rail or wall mounting.

Media modules and SFP transceivers

Media modules and SFP transceivers are used in modular devices.

- Media modules are used in the appropriate slots of the switch.
- SFP transceivers are used only in SFP media modules.

5.4 Installing a switch

CAUTION

Electrical connections

Make sure that the power supply of the switch is turned off when fitting the connectors for the power supply and the signaling contacts.

For information on the electrical connections, refer to Section Connecting (Page 125).

5.4.1 Installation on a DIN rail

WARNING

No installation on a 35 mm DIN rail in shipbuilding

In ships, the 35 mm DIN rail does not provide adequate support.

This applies to all devices with this notice in the "Installation options" table in the section "Technical specifications" (subsection, "Construction, installation and environment").

Installation

Install the IE Switch X-300 on a 35 mm DIN rail complying with DIN EN 60715.

1. Hang the IE Switch X-300 on the DIN rail and then push it in against the rail until it clips into place.
2. Connect the grounding of the switch according to the description in the section Grounding (Page 131).

3. Fit the connectors for the power supply.
4. Fit the connectors for the signaling contact.
5. Insert the terminal blocks into the sockets on the IE Switch X-300.

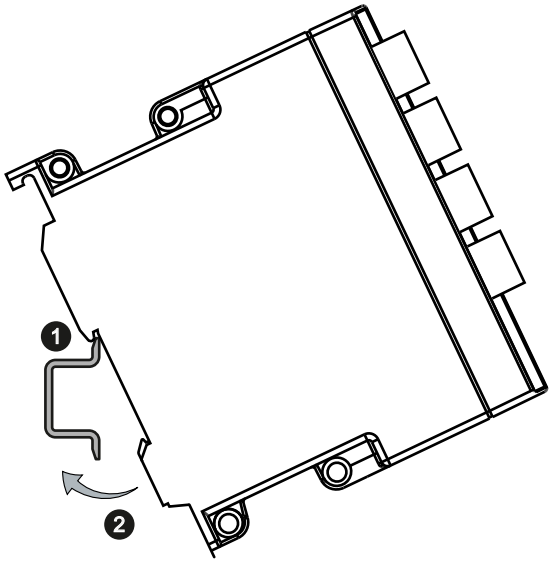


Figure 5-1 Mounting an IE Switch X-300 on a DIN rail (35 mm)

Uninstalling

To remove an IE Switch X-300 from the DIN rail:

1. Disconnect all cables from the switch.
2. Release the lower part of the IE Switch X-300 from the DIN rail with a screwdriver and pull the lower part of the switch away from the DIN rail.

DIN rail mounting of the IE Switch X-300EEC

⚠ CAUTION

Grounding

The device is grounded via the bolts in the floor of the housing. Grounding via the DIN rail alone is not adequate.

On the X-300EEC with power supply 100...240 V AC, you must always connect protective ground via the bolts on the bottom of the device housing.

Removing the IE Switch X-300EEC

1. Push the X-300EEC down.
2. Swing the device upwards.

No tools are necessary for removing the device.

5.4.2 Installation on a standard rail

Installation on a SIMATIC S7-300 standard rail

1. Hang the upper guide at the top of the switch housing onto the S7 standard rail.
2. Screw the IE Switch X-300 to the underside of the standard rail.
3. Connect the grounding of the switch according to the description in the section Grounding (Page 131).
4. Connect the power supply to the appropriate terminal block.
5. Connect the cable for the signaling contact to the appropriate terminal block.
6. Insert the terminal blocks into the sockets on the IE Switch X-300.

Note

Standard rail mounting of the IE Switch X-300EEC

The IE Switch X-300EEC can only be mounted on an S7-300 standard rail using a commercially available adapter.

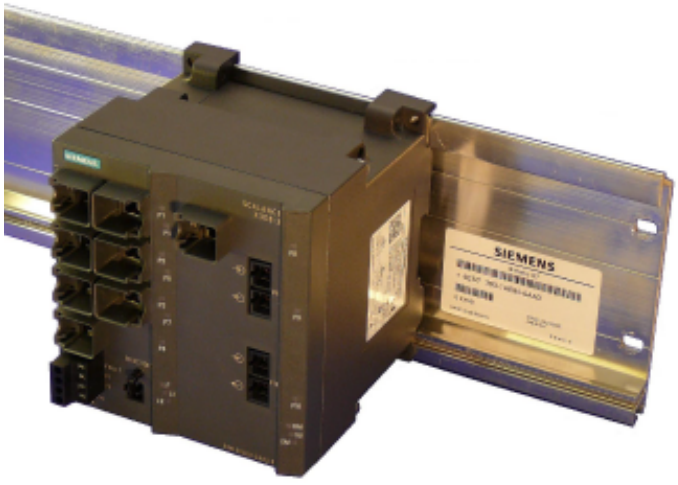


Figure 5-2 Installing an IE Switch X-300 on a SIMATIC S7-300 standard rail

⚠ CAUTION

Grounding of the X-300EEC

The device is grounded via the bolts in the floor of the housing.

On the X-300EEC with power supply 100...240 V AC, you must always connect protective ground via the bolts on the bottom of the device housing.

Uninstalling

To remove an IE Switch X-300 from the SIMATIC S7-300 standard rail, follow these steps:

1. Disconnect all connected cables.
2. Loosen the screws on the underside of the standard rail and lift the IE Switch X-300 away from the rail.

5.4.3 Wall mounting

Wall mounting

Note

Installation fittings

When mounting on a wall, use mounting fittings suitable for the type of wall. For example, to secure to concrete:

- 4 wall plugs, 6 mm in diameter and 30 mm long
- 4 screws 3.5 mm in diameter and 40 mm long

The wall mounting must be capable of supporting at least four times the weight of the IE Switch X-300.

1. Mount the switch on the wall.
2. Connect the grounding of the switch according to the description in the section Grounding (Page 131).
3. Connect the power supply to the appropriate terminal block.
4. Connect the cable for the signaling contact to the appropriate terminal block.
5. Insert the terminal blocks into the sockets on the IE Switch X-300.

⚠ CAUTION

Grounding of the X-300EEC

The device is grounded via the bolts in the floor of the housing.

On the X-300EEC with power supply 100...240 V AC, you must always connect protective ground via the bolts on the bottom of the device housing.

Note

For precise dimensions, refer to the dimension drawings in section Graphics (Page 231).

Note

Wall mounting of a rack device

For wall mounting of a rack device (R), use suitable fittings such as a mounting bracket.

Wall mounting of the IE Switch X-300EEC

To mount the IE Switch X-300EEC on a wall, you require an additional securing bracket. You will find the dimensions for a suitable securing bracket in section Graphics (Page 231).

5.4.4 19" rack mounting

⚠ WARNING

Use of approved components

- Use only approved 19" cabinets.
- Use only supplied mounting brackets.
  There are several ways of fixing the mounting brackets depending on the mounting position required.

19" rack mounting

19" rack mounting is possible for all rack devices identified by (XR).
Refer to the technical specifications, Installation options table for each product group. The rack device (R) is installed using two mounting brackets fitted to the front. After fitting the two mounting brackets, the rack device can then be installed in a 19" cabinet.

NOTICE

Do not cover the ventilation grilles

During installation, select a mounting position so that the ventilation grilles are always free to achieve adequate cooling. With normal orientation, the ventilation grilles are on the top, bottom and sides of the housing.

If you install more than one rack device, make sure that the permitted ambient conditions are met for all devices in the rack.

Minimum clearances

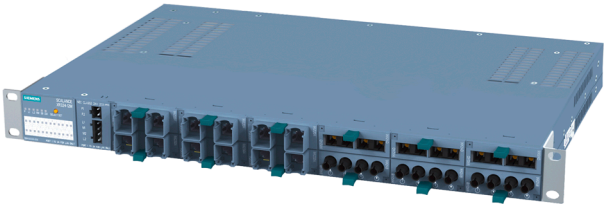
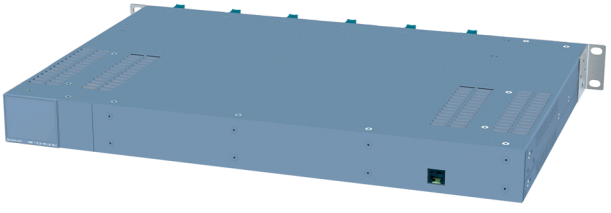
If you install the IE Switch in rack devices without forced ventilation or cooling, minimum clearances must be maintained to neighboring devices or the wall of the enclosure. By keeping to the minimum clearances, there is then an adequate stream of air for heat dissipation during operation. Keep to the following minimum clearances to neighboring devices.

Table 5-2 Minimum clearances for installation in rack devices

Minimum clearance to devices below the switch	100 mm
Minimum clearance to devices above the switch	100 mm
Minimum clearance between two SCALANCE XR-300s at an ambient temperature up to 70 °C without external ventilation	100 mm
Minimum clearance between two SCALANCE XR-300s at an ambient temperature up to 60 °C without external ventilation	45 mm (1 height unit)

NOTICE
Four-point mounting If mechanical load is high, the device should be secured at four points. You will find more detailed information in the section "Mechanical stability in operation".

Normal orientation

Normal orientation of the device	
• The LED display is on the left of the front panel of the housing. • To the right of the LED display, the SCALANCE XR-300 has connectors for the signaling contacts and the power supply. Note that the SCALANCE XR-300 is available for different power supplies (100 to 240 VAC and 24 VDC variants). • The Ethernet ports or the slots for the modules are also on the front of the housing. Slots for the modules are fitted with dummy covers. • The C-PLUG is on the right behind a protective panel secured with screws. (For more detailed information, refer to the section on the C-PLUG in the X-300 operating instructions.) • The ventilation grilles are on the top, bottom and sides of the housing.	
• On the back of the housing, you will find the diagnostics port of the device. (For more details, refer to Diagnostics port XR-300.) On the SCALANCE X-300M EEC, you will also find the connectors for the signaling contacts and power supply here.	

19" rack mounting with normal orientation

19" rack mounting		
1.	Select the required rack device (R) and the 19" cabinet.	
2.	Fix the two mounting brackets with 4 screws each to the sides of the housing. The maximum tightening torque for these screws is 0.5 Nm.	
	CAUTION: If you install a rack device (R) with components inserted. The locking mechanisms of components installed in the rack device (R) (for example the handles of media modules or the clips on the SFP) must be closed. See also installation of modular devices: - Installing media modules in a slot - Installing an SFP in an SFP media module.	
3.	Insert the rack device (R) in the 19" cabinet and hold the rack device (R) at the required height. Make sure that nothing is obstructing air from entering the ventilation grilles. Fit the securing screws to the two mounting brackets to secure the rack device (R) in the 19" cabinet.	
4.	Connect the grounding bolts. On the SCALANCE X-300EEC, the PE connector is on the bottom of the device. On the SCALANCE XR-300M EEC, the PE connector is on the rear of the device between the power connectors.	
5.	Fit the connectors for the power supply. Note that the SCALANCE X-300 is available for different power supplies (100 to 240 VAC and 24 VDC variants).	
6.	Fit the remaining connectors, for example the signaling contact.	

Example of individual installation

Note

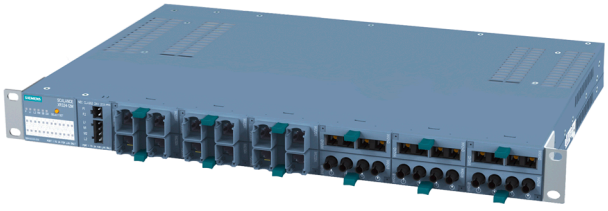
Individual installation of the SCALANCE XR-300M

Devices of the XR-300M category can also be installed upright in a cabinet door. In this case, the LED display is at the front and the data cable outlet at the back at the cabinet door.

Make sure that the mounting bracket is correctly positioned on the rack device (R) so that the rack device (R) can be mounted securely on the cabinet door.

Desktop operation (only 24 V DC variants with adhesive feet)

CAUTION
No desktop operation for devices with 100 to 240 V AC power supply Desktop operation is permitted only for the 24 VDC variants of the rack devices (R). The adhesive feet ship with the 24 VDC variants. The permitted ambient temperature for desktop operation is -40 °C to +50 °C.

Desktop operation (only 24 VDC variants with adhesive feet)		
1.	Select the required 24 V variant of the rack device (R).	
2.	Lay out the four adhesive feet in preparation.	
	Check the rack device (R) you are installing; for example that the two mounting brackets are fitted at the front and that the ventilation grilles are free.	
	CAUTION: If you install a rack device (R) with components inserted. The locking mechanisms of components installed in the rack device (R) (for example the handles of media modules or the clips on the SFP) must be closed. See also installation of modular devices: - Installing media modules in a slot - Installing an SFP in an SFP media module.	
4.	Turn the rack device (R) over and fit the four adhesive feet on the base.	
5.	Fit the connectors for the 24 V power supply.	
6.	Fit the remaining connectors, for example the signaling contact.	

Removal

Removing from the rack	
1.	Turn off the power supply for the SCALANCE XR-300M.
2.	Disconnect all cables for data traffic and the connectors for the power supply and the grounding cable.
3.	Undo the screws on the mounting bracket and remove the rack device (R) from the 19" cabinet. If necessary, release the locking mechanisms of components inserted in the rack device (R) (for example handles on the media module or clips on the SFP) to be able to remove the media modules (MM900) or the transceiver (SFP).

5.4.5 19" rack mounting - X-300EEC product group

The X-300EEC can be installed in a rack singly or as pairs.

- Mounting singly:
  To do this, an X-300EEC device is secured to a plate and screwed into the 19" rack.
- Mounting as pairs:
  Here, two X-300EEC devices are fastened together with plates before installation in the rack:
  - 1 plate as middle section (6 screws)
  - 2 plates on the outside (3 screws each)
    You will find dimension drawings of the plates in section X-300EEC dimension drawings (Page 241).

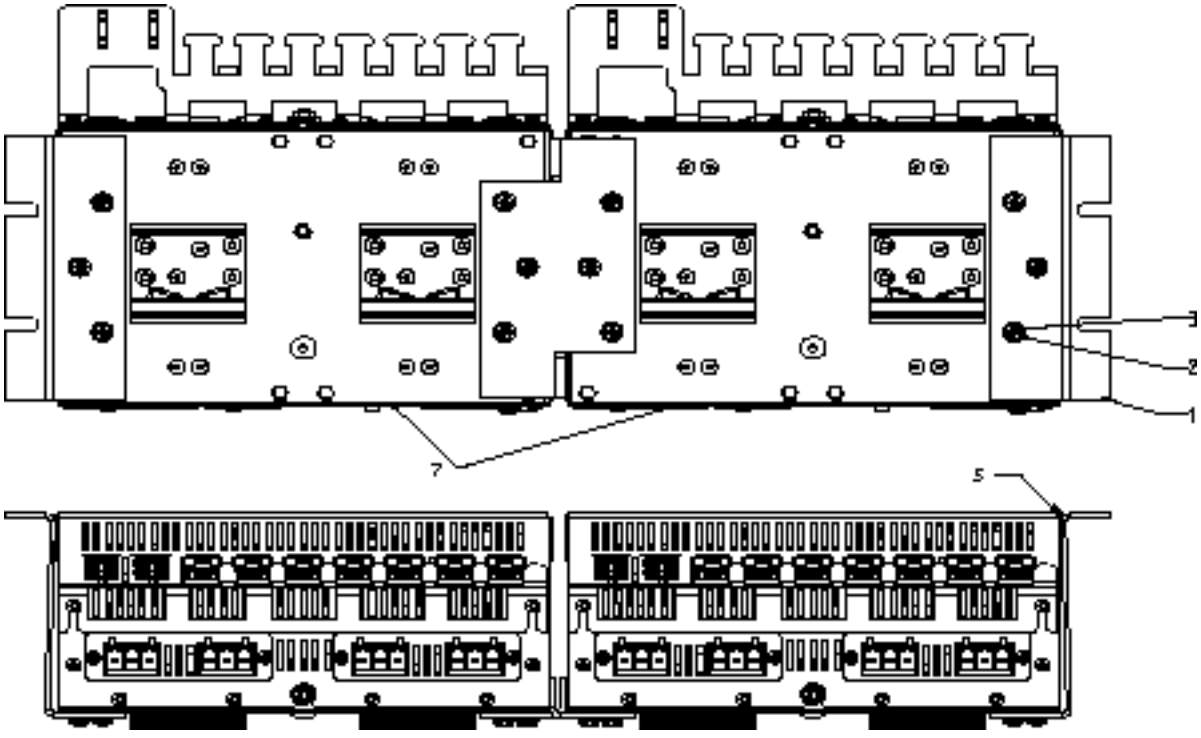


Figure 5-3 Rack mounting of two IE-Switches X-300EEC fastened togetherFigure at top: Rear of the switchesFigure at bottom: View from below

Table 5-3 Legend for rack mounting of two IE-Switches X-300EEC fastened together

No.	Name
1	Plate for side
2	Spring washer
3	Hexagonal nut
5	Side section (the side panel should be under slight tension)
7	IE Switch X-300EEC

5.4.6 19" rack mounting - XR-300M EEC product group

⚠ CAUTION

Danger of injury by falling objects

If you do not use the supplied mounting brackets for 19"rack installation, it is not possible to install the device correctly.

Use only the supplied mounting brackets.

There are several ways of fixing the mounting brackets depending on the mounting position required.

19" rack mounting

19" rack mounting is possible for all rack devices identified by (XR).
Refer to the technical specifications, Installation options table for each product group. The rack device is installed using two mounting brackets fitted to the front. After fitting the two mounting brackets, the rack device can then be installed in a 19" cabinet.

NOTICE

Do not cover the ventilation grilles

During installation, select a mounting position so that the ventilation grilles are always free to achieve adequate cooling. With normal orientation, the ventilation grilles are on the top, bottom and sides of the housing.

If you install more than one rack device, make sure that the permitted ambient conditions are met for all devices in the rack.

Minimum clearances

If you install the IE Switch in rack devices without forced ventilation or cooling, minimum clearances must be maintained to neighboring devices or the wall of the enclosure. By keeping to the minimum clearances, there is then an adequate stream of air for heat dissipation during operation. Keep to the following minimum clearances to neighboring devices.

Table 5-4 Minimum clearances for installation in rack devices

Minimum clearance to devices below the switch	100 mm
Minimum clearance to devices above the switch	100 mm
Minimum clearance between two SCALANCE XR-300 EEC at an ambient temperature up to 70 °C without external ventilation	100 mm
Minimum clearance between two SCALANCE XR-300 EEC at an ambient temperature up to 60 °C without external ventilation	45 mm (1 height unit)

NOTICE
Four-point mounting If mechanical load is high, the device should be secured at four points. You will find more detailed information in the section "Mechanical stability in operation".

Normal orientation

Normal orientation of the device	
• The LED display is on the left of the front panel of the housing. • The Ethernet ports or the slots for the modules are also on the front of the housing. Slots for the modules are fitted with dummy covers. • The C-PLUG is on the right behind a protective panel secured with screws. (For more detailed information, refer to the section on the C-PLUG in the X-300 operating instructions.) • The ventilation grilles are on the top, bottom and sides of the housing.	 SCALANCE XR324-4M EEC
• On the rear of the device, you will find the diagnostics port. • The grounding bolt and the connectors for the signaling contact and power supplies are also on the rear of the device. Note that there are different power supplies (see section "XR-300M EEC product group (Page 39)").	 SCALANCE XR324-4M EEC

19" rack mounting with normal orientation

19" rack mounting		
1.	Select the required rack device and the 19" cabinet.	
2.	Fix the two mounting brackets with 4 screws each to the sides of the housing. The maximum tightening torque for these screws is 0.5 Nm.	

19" rack mounting		
	CAUTION: If you install a rack device with components inserted. The locking mechanisms of components installed in the rack device (for example the handles of media modules or the clips on the SFP) must be closed. See also installation of modular devices: - Installing media modules in a slot - Installing an SFP in an SFP media module.	 SCALANCE XR324-4M EEC
3.	Insert the rack device in the 19" cabinet and hold the rack device at the required height. Make sure that nothing is obstructing air from entering the ventilation grilles. Fit the securing screws to the two mounting brackets to secure the rack device in the 19" cabinet.	
4.	Connect the grounding bolts. On the SCALANCE X-300EEC, the PE connector is on the bottom of the device. On the SCALANCE XR-300M EEC, the PE connector is on the rear of the device between the power connectors.	
5.	Fit the connectors for the power supply. Note that the SCALANCE X-300 is available for different power supplies (100 to 240 V AC and 24 V DC variants).	
6.	Fit the remaining connectors, for example the signaling contact.	

Removal

Removing from the rack	
1.	Turn off the power supply for the SCALANCE XR-300M.
2.	Disconnect all cables for data traffic and the connectors for the power supply and the grounding cable.
3.	Undo the screws on the mounting bracket and remove the rack device from the 19" cabinet. If necessary, release the locking mechanisms of components inserted in the rack device (for example handles on the media module or clips on the SFP) to be able to remove the media modules (MM900) or the transceiver (SFP).

5.5 Inserting media modules and SFP transceivers

5.5.1 Installation and removal of media modules

Connecting media modules and SFP transceivers

⚠ WARNING

Install and remove media modules only when the power is off

Media modules may only be inserted in or removed from a SCALANCE device when the power supply to the device has been turned off.

Use only approved media modules

Use only "MM900" media modules in the module slots of SCALANCE devices.

⚠ CAUTION

Remember the orientation of media modules

On modular devices, there are always two module slots arranged opposite each other. Remember the correct orientation when installing MM900 media modules.
Example:

- The first MM900 media module is installed in slot 3.
- The second MM900 media module installed in slot 4 must be turned through 180 degrees.

On modular devices for rack mounting, pairs of module slots are located one above the other in which modules can be inserted in a specific order:

Example of a rack device:

- The first MM900 media module is installed in slot 1.
- The second MM900 media module installed in slot 7 must be turned through 180 degrees.

Other modules are then inserted in slots 2 and 8 or 3 and 9 etc.

The permitted operating temperature is decided by the fully equipped device (switch + media module + SFP transceiver).

With modular devices, it is not only the switch that decides the permitted operating temperature of the overall device but also the temperature ranges of the MM900 media modules and the SFP transceivers. You will find details in the technical specifications of the relevant components.

The following aspects can restrict the maximum permitted operating temperature:

- The orientation of the carrier device.
- The use of SFP transceivers.
- The use of transceivers of the types LH, LH+ or ELH.

NOTICE

Failure of the data traffic due to contamination of optical plug-in connections

Optical sockets and plugs are sensitive to contamination of the end face. Contamination can lead to the failure of the optical transmission network.

Close unused optical sockets and plugs as well as pluggable transceivers and slots with the supplied protective caps.

Remove the protective caps only immediately before you use the plug-in connection.

NOTICE

Use only approved SFPs

If you use components not approved by Siemens AG, in particular SFPs, Siemens cannot accept any responsibility for the correct functioning of the "Ethernet switch system" according to the specification.

Moreover, if components are used that have not been Siemens approved, Siemens cannot vouch for their compatibility or for risk-free use of these components.

Note

Use media modules only in an approved modular device

Use an MM900 media module only for a device equipped with suitable slots for such modules. Example: X308-2M.

The names and labeling of the media modules differ

- Example: The device is called, for example, MM992-2SFP" [6GK5 992-2AS00-8AA0], the labeling on the device is “9922AS”. You will find detailed information on the labeling of the media modules in the "MM900 media modules" compact operating instructions.

Note

SFP transceivers with the SCALANCE XR324-4M EEC

In contrast to the information in the product documentation for the SCALANCE MM900, MM992-2SFP media modules can be operated in the SCALANCE XR324-4M EEC at ambient temperatures up to a maximum of 70 °C if the following requirements are met:

- MM992-2SFP media modules as of hardware product version 02 are suitable. The hardware product version can be found on the device. You can also read out this information with the WBM or the CLI.
- Only the following SFP transceivers may be used:
  - SFP991-1
  - SFP991-1LD
  - SFP992-1
  - SFP992-1LD

Note

Slot number

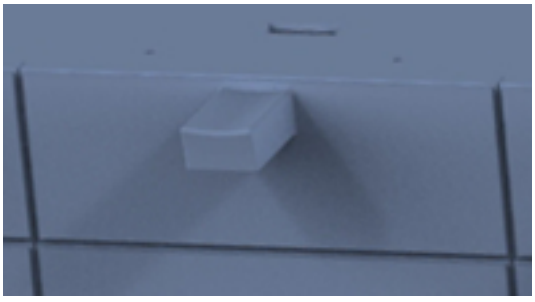
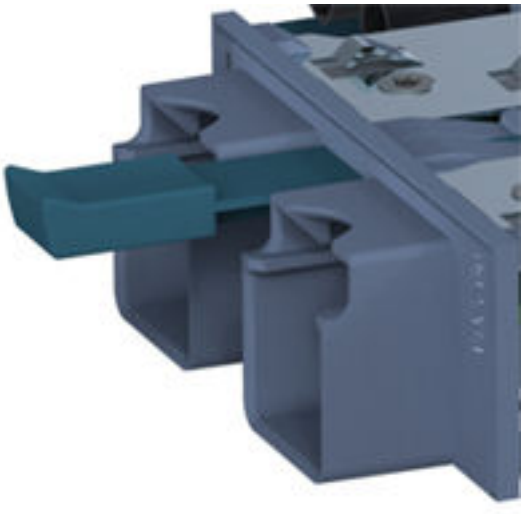
With modular devices, the MM900 media modules must be given a slot number.
The slot number labels are supplied with the modular devices.

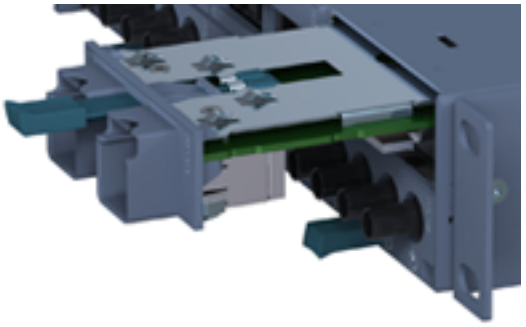
Installing a media module

The media module is inserted with the handle pulled out. When the handle is inserted, the media module is locked in the device.

Note

The figures in the following installation instructions show the installation of a media module in a rack device. The procedure for installation is identical for rack or compact devices.

1.	Select the required slot on the device (for example, X308-2M). Remove the dummy cover.	
2.	Pull out the handle on the selected media module.	

3.	Place the media module in the guide rails of the device slot. The media module is correctly installed when it clips easily into the device.	
4.	Push the handle back into the media module. This locks the media module in the device.	
5.	Insert the connectors.	

Removing a media module

CAUTION

Risk of burns due to the high temperature of the module housing

Before removing an MM900 media module, turn the switch off and allow the device to cool down first.

1. Remove all connectors from the media module.
2. Pull out the handle of the media module and remove the media module from the device slot.
3. Secure the dummy cover.

5.5.2 SFP installation in SFP media module

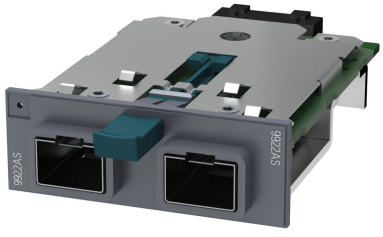
NOTICE
Use only approved SFPs If you use SFPs that are not approved by Siemens AG, there is no guarantee that the device will function according to the specification. If you use unapproved SFPs, this can lead to the following problems: • Damage to the device • Loss of the approvals • Violation of the EMC regulations Use only approved SFPs.

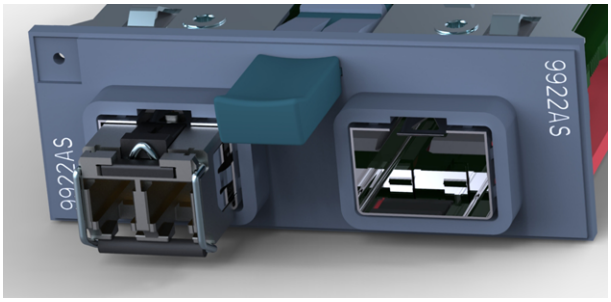
You can insert or remove the SFP during ongoing operation.

Inserting an SFP

Note

Only the media module MM992-2SFP may be fitted with approved SFPs. The SFP media module can be fitted with up to two SFPs.

Device: Media module	Variant	[Article number] Labeling on the device	Figure
MM992-2SFP (SFP media module)	2 x 100/1000 Mbps	[6GK5 992-2AS00-8AA0] 9922AS	

1.	Select the required SFP media module in the slot of the device. (Example: X-308-2M, slot 2)	
2.	Insert the SFP with the clip closed in the SFP media module. Notice: Closing the clip after insertion does not lock the device in the rack.	
3.	The SFP can be heard to lock in place and is therefore firmly secured.	
4.	Plug the connecting cable into the SFP. The connecting cable can be heard to lock in place and is then firmly secured.	

Removing an SFP

1. Remove the cable connected to the SFP.
2. Open the clip on the SFP and remove the SFP from the SFP media module.
   Notice: It must be possible to remove the SFP easy without using force.
3. Fit a blind plug to the SFP.

5.6 Removal

⚠ WARNING

Improper disassembly

Improper disassembly may result in a risk of explosion in hazardous areas.

For proper disassembly, observe the following:

- Before starting work, ensure that the electricity is switched off.
- Secure remaining connections so that no damage can occur as a result of disassembly if the system is accidentally started up.

Connecting

6

6.1 Safety when connecting up

Safety notices

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

Safety note on devices with 24 V DC power supply

⚠ WARNING

Safety extra low voltage (only devices with 24 V DC power supply)

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

This means that only SELV / LPS (Limited Power Source) 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.

A power source that supplies safety extra low voltage combined with a following NEC Class 2 power limiter also meets the requirements according to IEC 60950-1 / EN 60950-1 / VDE 0805-1 or NEC Class 2. A suitable power limiter is for example the redundancy module SITOP PSE202U NEC Class 2 (article number 6EP1962-2BA00).

Note

Safety extra-low voltage

The supply of the devices by PELV (Protective Extra Low Voltage) according to DIN VDE 0100-410 or IEC 60364-4-41 is permitted when the generated nominal voltage does not exceed the voltage limits 25 VAC or 60 VDC.

Safety note on devices with 100 to 240 V AC power supply

⚠ WARNING

Danger from line voltage

The supply voltage for the devices listed is 100 to 240 V AC.

This device can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Connecting and disconnecting may only be performed by an electrical specialist.

Connect or disconnect power supply cables only when the power is turned off.

⚠ WARNING

Devices with a 100 to 240 V AC power supply do not have an ATEX or IECEx approval.

Devices with a 100 to 240 V AC power supply are not approved for use in hazardous areas according to 2014/34/EU ATEX or IECEx.

NOTICE

Securing cables with dangerous voltage

Make sure that the connector cannot be released accidentally by pulling on the connecting cable. Lay the cables in cable ducts or cable channels and secure the cables, where necessary, with cable ties.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

⚠ WARNING

EXPLOSION HAZARD

Do not connect or disconnect cables to or from the device when a flammable or combustible atmosphere is present.

⚠ WARNING

EXPLOSION HAZARD

Do not press the SELECT/SET button when there is an explosive atmosphere.

⚠ WARNING

Suitable cables at high ambient temperatures in hazardous area

At an ambient temperature of ≥ 60 °C, use heat-resistant cables designed for an ambient temperature at least 20 °C higher. The cable entries used on the enclosure must comply with the IP degree of protection required by EN IEC / IEC 60079-0, GB 3836.1.

⚠ WARNING

Unsuitable cables or connectors

Risk of explosion in hazardous areas

- Only use connectors that meet the requirements of the relevant type of protection.
- If necessary, tighten the connector screw connections, device fastening screws, grounding screws, etc. according to the specified torques.
- Close unused cable openings for electrical connections.
- Check the cables for a tight fit after installation.

⚠ WARNING

Lack of equipotential bonding

If there is no equipotential bonding in hazardous areas, there is a risk of explosion due to equalizing current or ignition sparks.

- Ensure that equipotential bonding is available for the device.

⚠ WARNING

Unprotected cable ends

There is a risk of explosion due to unprotected cable ends in hazardous areas.

- Protect unused cable ends according to IEC/EN 60079-14.

⚠ WARNING

Improper installation of shielded cables

There is a risk of explosion due to equalizing currents between the hazardous area and the non-hazardous area.

- Ground shielded cables that cross hazardous areas at one end only.
- Lay a potential equalization conductor when grounding at both ends.

WARNING

Insufficient isolation of intrinsically safe and non-intrinsically safe circuits

Risk of explosion in hazardous areas

- When connecting intrinsically safe and non-intrinsically safe circuits, ensure that the galvanic isolation is performed properly in compliance with local regulations (e.g. IEC 60079-14).
- Observe the device approvals applicable for your country.

Notes for use in hazardous locations according to ATEX, IECEx, UKEX and CCC Ex

If you use the device under ATEX, IECEx, UKEX or CCC Ex conditions you must also keep to the following safety instructions in addition to the general safety instructions for protection against explosion:

WARNING

Transient overvoltages

Take measures to prevent transient overvoltages of more than 40% of the rated voltage (or more than 119 V). This is the case if you only operate devices with SELV (safety extra-low voltage).

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

You may only connect or disconnect cables carrying electricity when the power supply is switched off or when the device is in an area without inflammable gas concentrations.

Further notes

WARNING

Safety notice for connecting with a LAN ID (Local Area Network)

A LAN or LAN segment with all the interconnected devices should be contained completely in a single low voltage power distribution in a building. The LAN is designed either for “Environment A” according to IEEE802.3 or "Environment 0" according to IEC TR 62102.

Do not connect any electrical connectors directly to the telephone network (telephone network voltage) or a WAN (Wide Area Network).

NOTICE

Failure of the data traffic due to contamination of optical plug-in connections

Optical sockets and plugs are sensitive to contamination of the end face. Contamination can lead to the failure of the optical transmission network. Take the following precautions to avoid functional impairments:

- Clean the end face of field-assembled connectors carefully before connecting. No residues of processing may remain on the connector.
- Only remove the dust caps of optical transceivers and pre-configured cables shortly before connecting the cables.
- Close unused optical sockets and plugs as well as pluggable transceivers and slots with the supplied protective caps.

Note

Commissioning devices with redundancy mechanisms

If you use redundancy mechanisms ("HRP" media redundancy or "MRP" and/or redundant coupling of rings over standby coupling), open the redundant path before you insert a new or replacement device in an operational network. A bad configuration or attachment of the Ethernet cables to incorrectly configured ports causes overload in the network and a breakdown in communication.

A device may only be inserted in a network and connected in the following situations:

- HRP/MRP:
  The ring ports of the device being inserted in the ring were configured as ring ports. The required redundancy mode must also be enabled (see "Configuration Manual SCALANCE X-300 / X-400", section "X-300 Ring Configuration"). If the device is intended to operate as the redundancy manager, "Redundancy manager enabled" must also be set.
- Standby coupling:
  "Standby connection" must be "enabled" and the "Standby connection name" must match the name of the partner device. You will also need to configure the port with "Enable Standby Port Monitoring" (see "Configuration Manual SCALANCE X-300 / X-400", section "X-300/ X-400 Standby Mask").

6.2 Wiring rules

When wiring use cables with the following AWG categories or cross sections.

Wiring rules for ...		**Screw/spring-loaded terminals**
connectable cable cross sections for flexible cables ...	without wire end ferrule	0.25 - 2.5 mm^2
		AWG: 24 - 13
	with wire end ferrule with plastic ferrule**	0.25 - 2.5 mm^2
		AWG: 24 - 13
	with wire end ferrule without plastic ferrule**	0.25 - 2.5 mm^2
		AWG: 24 - 13
	with TWIN wire end ferrule**	0.5 - 1 mm^2
		AWG: 20 - 17
Stripped length of the cable		8 - 10 mm
Wire end ferrule according to DIN 46228 with plastic ferrule**		8 - 10 mm

* AWG: American Wire Gauge

** See note "Wire end ferrules"

Note

Wire end ferrules

Use crimp shapes with smooth surfaces, such as provided by square and trapeze shaped crimp cross sections.

Crimp shapes with wave-shaped profile are unsuitable.

6.3 Connecting the switch

Procedure for connecting the device

Follow the steps below to connect the device:

1. Turn off the power supply.
2. Connect the grounding of the switch according to the following description.
3. Connect the signaling contact of the switch according to the following description.
4. Connect the power supply of the switch according to the following description.
5. Connect the network nodes / subnets to the switch.
6. Turn on the power supply for the switch.

6.4 Connecting media modules/SFPs

Power supply of the MM900 media modules

The MM900 media modules are supplied with power by the switch.

Power supply of the SFP transceivers

The SFP transceivers are supplied with power via the SFP media module.

6.5 Grounding

Installation on a DIN rail

The device is grounded over the DIN rail.

S7 standard rail

The device is grounded over its rear panel and the neck of the screw.

Wall mounting

The device is grounded by the securing screw in the unpainted hole.

Please note that IE Switches X-300 must be grounded over one securing screw with minimum resistance.

If an IE Switch X-300 is mounted on a non-conducting base, a grounding cable must be installed. The grounding cable is not supplied with the device. Connect the paint-free surface of the IE Switch X-300 to the nearest grounding point using the grounding cable.

19" rack mounting

- 24 VDC variant:
  Grounding is via the mounting bracket on the device or alternatively/additionally via the bolts on the rear of the device.
- 100 to 240 VAC variant:
  Grounding is via the mounting bracket on the device or alternatively/additionally via the bolts on the rear of the device.

6.5.1 SCALANCE X-300EEC and rack devices

Functional ground

With the devices with a 100 to 240 VAC / 60 to 250 VDC power supply, functional ground must be connected to the grounding bolts or the power supply terminal of every power supply unit. With the devices with 24 to 48 VDC, functional ground must be connected to the grounding bolts or the mounting brackets (XR-300M EEC).

To wire up the functional ground, use a copper cable of category 18-8 AWG or cable with a cross-section of 0.75 to 6 mm².

Protective ground

When the device is operated with multirange power supply unit 100 to 240 VAC / 60 to 250 VDC, the protective ground is connected in addition to the functional ground.

⚠ CAUTION

Danger from line voltage

Grounding simply via the housing is inadequate.

In this case, connect the functional ground to ensure reliable operation.

With devices with a supply voltage of 100 to 240 VAC / 60 to 250 VDC, you should also connect the protective earth to the grounding bolt.

To wire up the protective ground, use a copper cable of category 14-8 AWG or cable with a cross-section of 1.5 to 6 mm².

6.5.1.1 Grounding of the rack devices

Grounding options

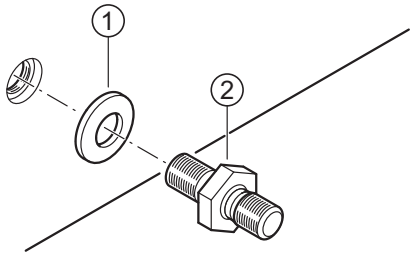
Grounding (functional ground) is via the mounting bracket on the device or via the bolts on the rear of the device.

Position

The connector for the grounding cable is in the center of the rear panel of the device, see section "Graphics (Page 231)".

Grounding is via a screw-in or a pressed in grounding bolt, see section "Product overview (Page 33)".

Fitting screw in grounding bolts

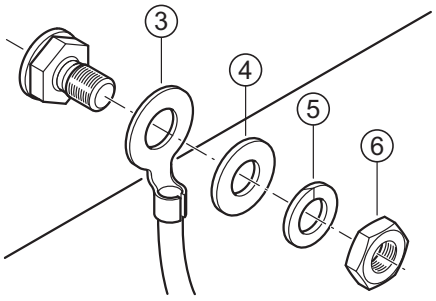
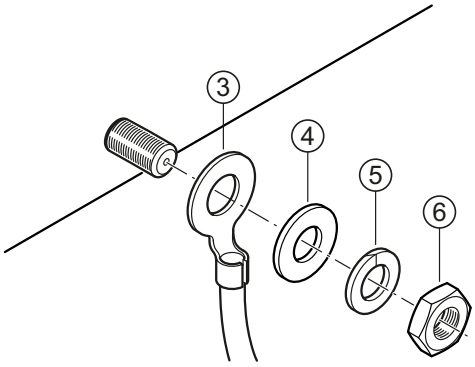


① Toothed washer
② Grounding bolt

To fit the screw-in grounding bolts, follow the steps below:

1. Thread the toothed washer ① onto the bolt.
2. Screw in the grounding bolt ② with a maximum tightening torque of 2 Nm.

Connecting up functional ground

Screw-in grounding bolts	Pressed in grounding bolts
	

③	Grounding terminal with cable
④	Washer
⑤	Spring washer
⑥	Nut

Follow the steps below to connect the functional ground:

1. Put the parts ③, ④ and ⑤ together on the grounding bolt as shown in the drawing.
2. Tighten the nut ⑥ with a maximum tightening torque of 1.5 Nm.

6.5.1.2 Grounding of the X-300EEC

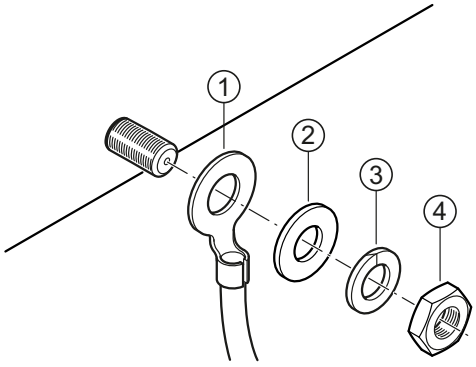
Position

On the SCALANCE X-300EEC, the grounding bolt is on the bottom of the device.



Figure 6-1 Grounding bolts on the bottom of the X-300EEC housing

Connecting ground



① Grounding terminal with cable
② Washer
③ Spring washer
④ Nut

Follow the steps below to connect ground:

1. Put the parts ①, ② and ③ together on the grounding bolt as shown in the drawing.
2. Tighten the nut ④ with a maximum tightening torque of 1.5 Nm.

6.6 Power supply

6.6.1 24 VDC power supply

6.6.1.1 Safety extra low voltage

24 V safety extra-low voltage (SELV)

WARNING

Operation only with safety-extra low voltage

- The IE Switch X-300 is designed for operation with safety extra-low voltage (SELV). This means that only safety extra-low voltages (SELV) complying with IEC950/EN60950/ VDE0805 can be connected to the power supply terminals.
- The power supply unit for the IE Switch X-300 power supply must meet NEC Class 2, as described by the National Electrical Code(r) (ANSI/NFPA 70).
- 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.
- The signaling contact can be subjected to a maximum load of 100 mA (safety extra low voltage (SELV), 24 V DC).
- Never operate the device with AC voltage or DC voltage higher than 32 V DC.

CAUTION

Overvoltage protection for the power supply cables

If IE Switches X-300 are supplied over long 24 V power supply lines or networks, measures are necessary to prevent interference by strong electromagnetic pulses on the supply lines. These can result, for example, due to lightning or switching of large inductive loads.

One of the tests used to attest the immunity of devices of the IE Switches X-300 to electromagnetic interference is the "surge immunity test" according to EN61000-4-5. This test requires overvoltage protection for the power supply lines (doe not apply to the X-300EEC). A suitable device is, for example, the Dehn Blitzductor BVT AVD 24 article no. 918 422 or a comparable protective element.

The modular Blitzductor BXT ML4 BE 36, art. no. 920 336, with the corresponding basic part BXT BAS, art. no. 920 300, is recommended for railway applications according to EN 50155 and EN 50121.

Manufacturer: DEHN+SÖHNE GmbH+Co.KG, Hans Dehn Str. 1, Postfach 1640, D - 92306 Neumarkt, Germany.

Note

Device variants

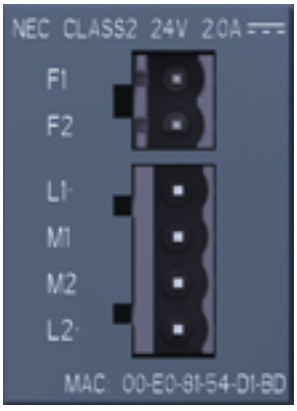
There are devices with one power supply unit or with two power supply units. Depending on the variant, the data cable outlet can be on the front or at the rear of the device.

Connecting 24 V safety extra-low voltage (SELV)

- The power supply is connected using a 4-pin plug-in terminal block.
- The power supply can be connected redundantly. Both inputs are isolated. There is no distribution of load. When a redundant power supply is used, the power supply unit with the higher output voltage supplies the IE Switch X-300 alone.
- The power supply is connected over a high resistance with the enclosure to allow an ungrounded set up. The two power inputs are non-floating.

Terminal block assignment (4-pin)

Table 6-1 Pinout of the 24 V safety extra-low voltage (SELV)

Pin number	Assignment	Labeling (example)
Pin 1	L1+ 24 V DC	
Pin 2	M1	
Pin 3	M2	
Pin 4	L2+ 24 V DC	

6.6.1.2 X-300 product group

Table 6-2 24 to 48 VDC safety extra-low voltage overview

Device	Device version (power supply)	24 V safety extra-low voltage (SELV) can be connected redundantly
X304-2FE	1 x 24 VDC	●
X306-1LD FE	1 x 24 VDC	●
X307-3	1 x 24 VDC	●
X307-3LD	1 x 24 VDC	●
X308-2	1 x 24 VDC	●
X308-2LD	1 x 24 VDC	●

Device	Device version (power supply)	24 V safety extra-low voltage (SELV) can be connected redundantly
X308-2LH	1 x 24 VDC	●
X308-2LH+	1 x 24 VDC	●
X310	1 x 24 VDC	●
X310FE	1 x 24 VDC	●
X320-1 FE	1 x 24 VDC	●
X320-3LD FE	1 x 24 VDC	●

6.6.1.3 X-300M product group

Table 6-3 24 to 48 VDC safety extra-low voltage overview

Device	Device version (power supply)	24 V safety extra-low voltage (SELV) can be connected redundantly
X308-2M	1 x 24 VDC	●
X308-2M TS	1 x 12 VDC	●

6.6.1.4 XR-300M product group

Table 6-4 24 to 48 VDC safety extra-low voltage overview

Device	Device version (power supply)	24 V safety extra-low voltage (SELV) can be connected redundantly
XR324-12M	2 x 24 VDC	●

6.6.1.5 X-300EEC product group

Table 6-5 24 to 48 V DC safety extra low voltage

Device	Device version (power supply)	24 V safety extra-low voltage (SELV) can be connected redundantly
X302-7EEC	1 x 24 to 48 V DC	●
	2 x 24 to 48 V DC	●
X307-2EEC	1 x 24 to 48 V DC	●
	2 x 24 to 48 V DC	●

Table 6-6 24 to 48 V DC safety extra low voltage

Device	Device version (power supply)	24 V safety extra-low voltage (SELV)
		can be connected redundantly
XR324-4M EEC	1 x 24 to 48 V DC	●
	2 x 24 to 48 V DC	●

6.6.1.6 X-300M PoE product group

Table 6-7 24 VDC safety extra-low voltage overview

Device	Device version (power supply)	24 V safety extra-low voltage (SELV)
		can be connected redundantly
X308-2M PoE	1 x 24 VDC	●

6.6.1.7 XR-300M PoE product group

Table 6-8 24 V DC safety extra low voltage

Device	Device version (power supply)	24 V safety extra-low voltage (SELV)
		can be connected redundantly
XR324-4M PoE	1 x 24 V DC	●
XR324-4M PoE TS	1 x 24 V DC	●

6.6.1.8 Connector for redundant power supply

Device variants with 1 or 2 power supply units

There are devices variants with one power supply unit or with two power supply units. With device variants with two power supply units, the 2nd power supply unit is also known as the redundant power supply unit.

The connection is made using a 4-terminal plug-in terminal block to which two power supply units can be connected (connected redundantly).

If two power supply units are connected, this is known as a redundant power supply.

Connect two power supplies as described below to achieve a correlation between the pin assignment and LED display.

Connecting a redundant power supply to 1 power supply unit

Use the terminal block "X1" to connect the power supply.

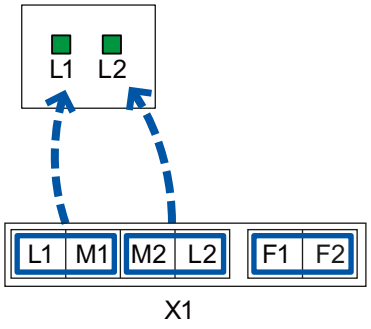


Figure 6-2 Assignment of the LED display to the pins for redundant power supply with devices with one power supply unit

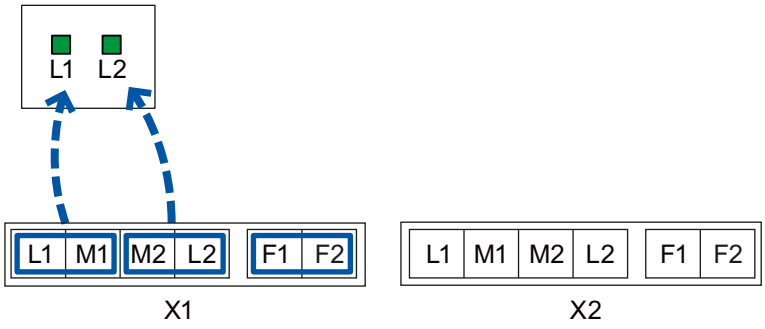


Figure 6-3 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units

- If the power supply fails at pins L1/M1, this is indicated by LED L1.
- If the power supply fails at pins L2/M2, this is indicated by LED L2.

Connecting a redundant power supply to 2 power supply units

To connect the power supplies, use pins L1/M1 of the left terminal block "X1" and pins L1/M1 of the right terminal block "X2". Only "L1" is monitored on each terminal block.

Since both power supply units have connectors for redundant power supply, you can connect 2 power supplies to each of the two power supply units. This should, however, only be necessary in extremely rare situations.

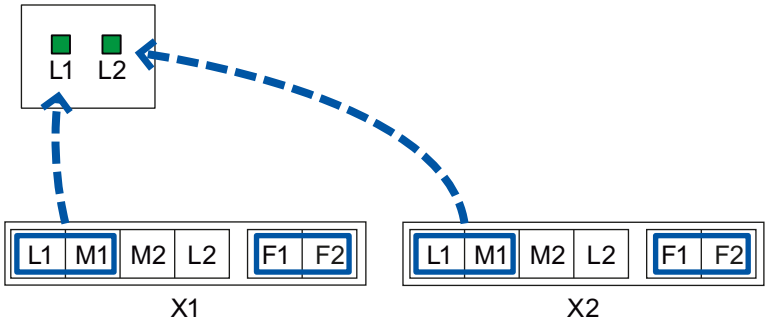


Figure 6-4 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units

- If the power supply fails at pins L1/M1 of terminal block "X1", this is indicated by LED L1.
- If the power supply fails at pins L1/M1 of terminal block "X2", this is indicated by LED L2.

6.6.1.9 Connecting a redundant power supply to the XR300-EEC

Device variants with 1 or 2 power supply units

There are devices variants with one power supply unit or with two power supply units. With device variants with two power supply units, the 2nd power supply unit is also known as the redundant power supply unit.

The connection is made using a 4-terminal plug-in terminal block to which two power supply units can be connected (connected redundantly).

If two power supply units are connected, this is known as a redundant power supply.

Connect two power supplies as described below to achieve a correlation between the pin assignment and LED display.

Connecting a redundant power supply to 1 power supply unit

Use "PS1" to connect the power supply of the terminal block.

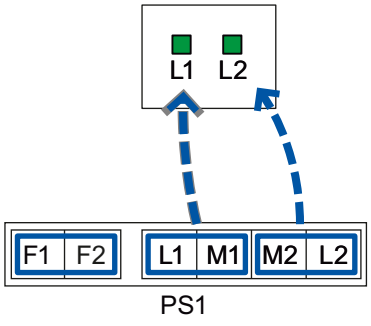


Figure 6-5 Assignment of the LED display to the pins for redundant power supply with devices with one power supply unit

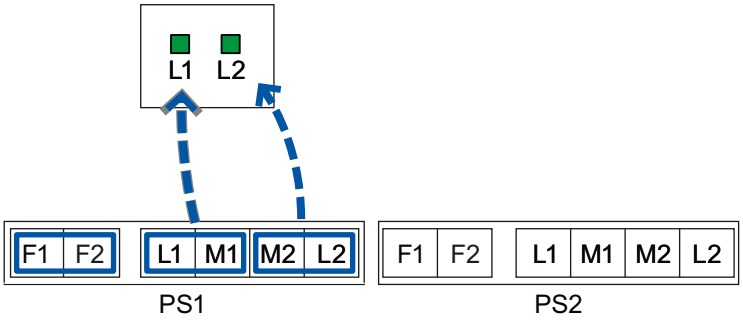


Figure 6-6 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units

- If the power supply fails at pins L1/M1, this is indicated by LED L1.
- If the power supply fails at pins L2/M2, this is indicated by LED L2.

Connecting a redundant power supply to 2 power supply units

To connect the power supplies, use pins L1/M1 of the left terminal block "PS1" and pins L2/M2 of the right terminal block "PS2".

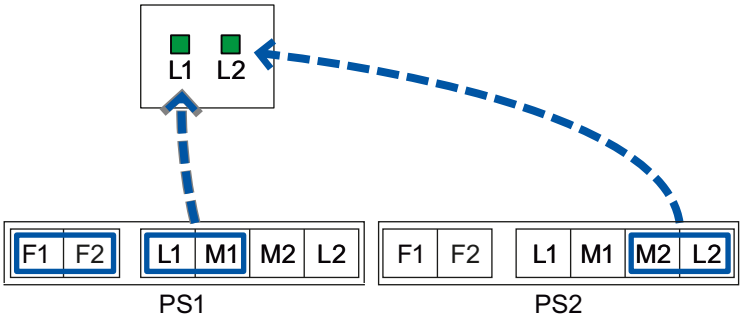


Figure 6-7 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units.

- If the power supply fails at pins L1/M1, this is indicated by LED L1.
- If the power supply fails at pins L2/M2, this is indicated by LED L2.

It would also be possible to use the L1/M1 pins of the right terminal block. In this case, however, identification of the terminal block involved from the LED display is not immediately obvious.

6.6.2 100 to 240 VAC power supply

⚠ WARNING

Danger to life from line voltage for devices with a 240 V AC supply voltage

This device can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Connecting and disconnecting may only be performed by an electrical specialist.

Connect or disconnect power supply cables only when the power is turned off!

⚠ WARNING

Devices with a 100 ... 240 V AC supply voltage do not have an approval for hazardous areas

Devices with a 100 ...240 V AC supply voltage are **not** approved for use in hazardous areas according to ATEX, IECEx, FM and UL HazLoc.

NOTICE

Securing cables with dangerous voltage

Make sure that the connector cannot be released accidentally by pulling on the connecting cable. Lay the cables in cable ducts or cable channels and secure the cables, where necessary, with cable ties.

6.6.2.1 XR-300M product group

Table 6-9 100 to 240 V AC voltage

Device	Device version (power supply)	100 to 240 V voltage	
		Redundant	Single
XR324-12M	1 x 100 to 240 V AC	-	●

6.6.2.2 X-300EEC product group

Table 6-10 100 to 240 V AC voltage

Device	Device version (power supply)	100 to 240 V voltage	
		Redundant	Single
X302-7EEC	1 x 100 to 240 V AC / 60 to 250 V DC	-	●
	2 x 100 to 240 V AC / 60 to 250 V DC	●	-
X307-2EEC	1 x 100 to 240 V AC / 60 to 250 V DC	-	●
	2 x 100 to 240 V AC / 60 to 250 V DC	●	-

6.6.2.3 XR-300M EEC product group

Table 6-11 100 to 240 V AC voltage

Device	Device version (power supply)	100 to 240 V voltage	
		Redundant	Single
XR324-4M EEC	1 x 100 to 240 V AC / 60 to 250 V DC	-	●
	2 x 100 to 240 V AC / 60 to 250 V DC	●	-

6.6.2.4 XR-300M PoE product group

Table 6-12 100 to 240 V AC voltage

Device	Device version (power supply)	100 to 240 V voltage	
		Redundant	Single
XR324-4M PoE	1 x 100 to 240 V AC	-	●

6.6.2.5 Fitting the connector for 100 to 240 V AC



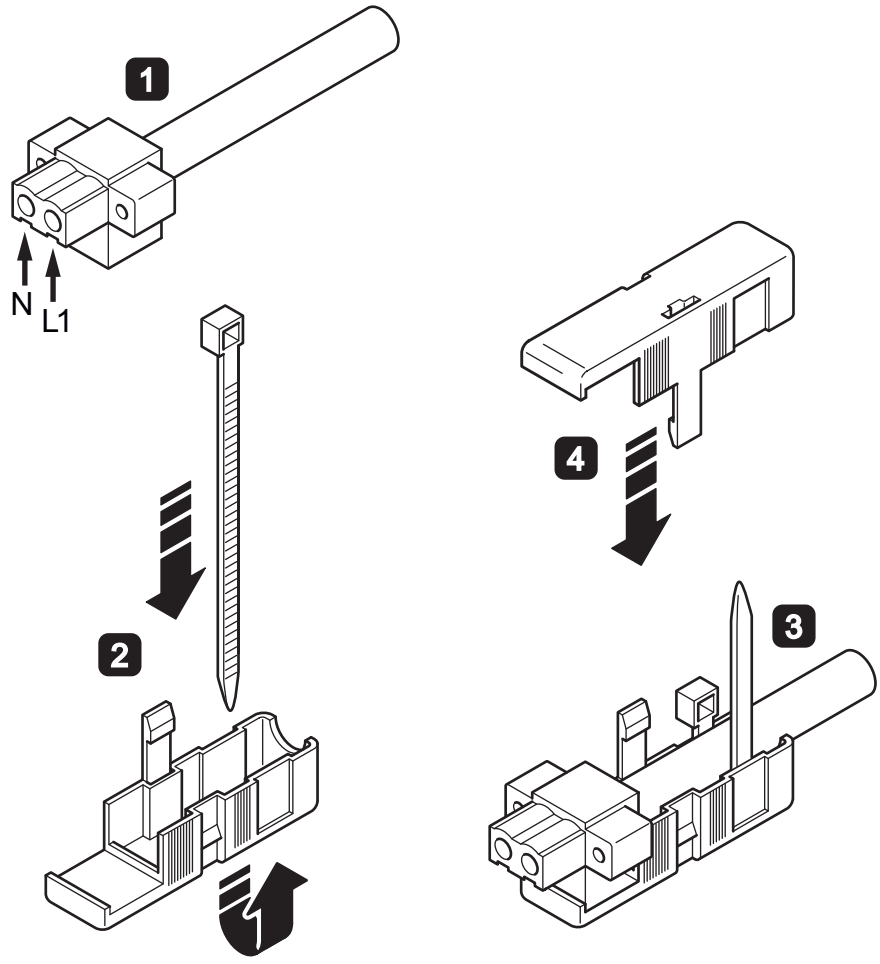
⚠ WARNING

Danger from line voltage

If used with cables with more than two wires, correct functioning of the connector casing cannot be guaranteed because the two halves of the connector casing can come apart. If this occurs, you will also not be able to connect all the wires in the connector. Open wire ends may be dangerous due to line voltage.

Use only two-wire cables.

Procedure



Follow the steps below to fit the connector to a two-wire cable:

1. Connect the cable to the terminal block. Strip the cable jacket only as far as necessary to be able to strip the insulation and connect up the wires.
2. Feed the supplied cable tie through the two openings in the lower part of the housing as shown in the figure.
3. Insert the terminal block with the connected cable in the lower part of the housing and tighten the cable tie. The cable must be securely held in the lower part of the housing by the cable tie. Cut off the excess cable tie.
4. Fit the upper part of the housing. The housing is correctly mounted when the two catches audibly click into place and are flush with the surface of the housing.

6.6.2.6 Connecting the 100 to 240 VAC power supply

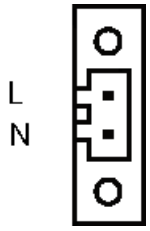
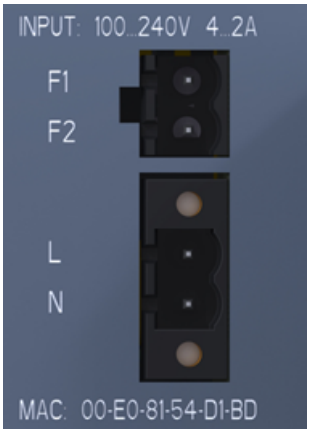
Connecting the 100 to 240 VAC power supply via the 2-pin terminal block

There are devices with single (1 x 100 to 240 V) or redundant power supply (2 x 100 to 240 V). The cable outlet can be to the front or rear depending on the device type.

- The power supply is connected using a 2-pin plug-in terminal block.
- The two power inputs are always non-floating.

Terminal block assignment (2-pin)

Table 6-13 Pin assignment of the 100 to 240 VAC power supply

Pin number	Assignment	Labeling
		
Pin 1	L1 (100 to 240 VAC)	
Pin 2	N	

6.6.2.7 Connecting the power supply 100 to 240 VAC to X-300EEC / XR-300M EEC

Power supply 100 to 240 VAC / 60 to 250 VDC

The switch is available in the following versions for power supply with the multirange power supply unit 100 to 240 VAC / 60 to 250 VDC:

- With single power supply unit (1 x 100 to 240 VAC / 60 to 250 VDC)
- With redundant power supply unit (2 x 100 to 240 VAC / 60 to 250 VDC)
  Each power supply unit PS1 and PS2 has a separate supply connector.

You can recognize the type of power supply from the labeling on the device and the labeling of the terminal block for the power supply of the switch.

On devices with a 100 to 240 VAC power supply, the connectors of the signaling contact and the power supply are identical. To avoid confusion, the two pins have a different coding.

Grounding

⚠ WARNING

Danger from line voltage

Grounding simply via the housing is inadequate.

In this case, connect the functional ground to ensure reliable operation.

With devices with a supply voltage of 100 to 240 VAC / 60 to 250 VDC, you should also connect the protective earth to the grounding bolt.

On the SCALANCE X-300EEC, the grounding bolt is on the bottom of the device.

On the SCALANCE XR-300M EEC, the grounding bolt is on the rear of the housing between the power connectors.

Connecting to the power supply

The connection is made via one (or two) 3-pin connector(s) on the terminal block for the power supply.

NOTICE

Damage to the device due to incorrectly wiring the terminal blocks

With devices with a supply voltage of 100 to 240 VAC and 60 to 250 VDC, the terminal blocks for the power supply and signaling contact are plugged in and screwed down in the device. Both terminal blocks have three pins but coding prevents the two terminal blocks being confused.

Make sure that the cables of the power supply and the cables for the signaling contact are connected to the correct terminal block.

Table 6-14 Pin assignment at terminal block 100 to 240 VAC / 60 to 250 VDC for the power supply

Pin number	Assignment
Pin 1	L (100 to 240 V)
Pin 2	N
Pin 3	FE (functional earth)

To wire up the power connector, use a copper cable of category 18-8 AWG or cable with a cross-section of 0.75 to 6 mm^2.

DC voltage is connected at the following terminals:

- Plus to "L"
- M to "N"

Secure the firm seat of connectors and the terminal block by tightening the screws (does not apply to X-300EEC).

6.6.2.8 Connecting the 100 to 240 V AC power supply with the XR-300M PoE

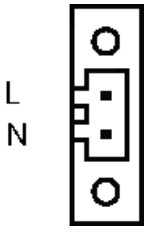
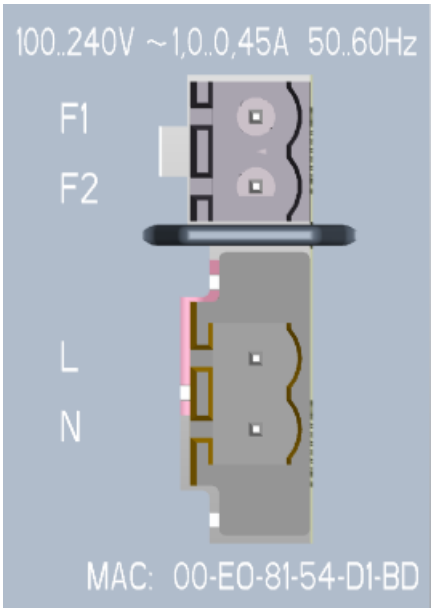
Connecting to the power supply

The devices have a single power supply (1 x 100 to 240 V).

The power supply is connected using a 2-pin plug-in terminal block.

Terminal block assignment (2-pin)

Table 6-15 Pin assignment of the 100 to 240 VAC power supply

Assignment	Labeling
	

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.

6.7 Signaling contact

6.7.1 24 VDC signaling contact

Connecting the signaling contact

The signaling contact is connected to a 2-pin plug-in terminal block.

The signaling contact can be subjected to a maximum load of 100 mA (safety extra low voltage SELV 12 VDC / 24 VDC).

Table 6-16 Pin assignment of the signaling contact

Pin number	Assignment (example)
	
Pin 1	F1
Pin 2	F2

NOTICE

Laying the connecting cables of the signaling contact with the X-300EEC

To improve the EMC properties (surge protection), the two connecting cables of the signaling contact should be laid together.

6.7.2 Signaling contact 100 to 240 VAC / 60 to 250 VDC (X-300EEC)

⚠ WARNING

Danger from line voltage

Devices with this mark have a 100 to 240 VAC power supply.

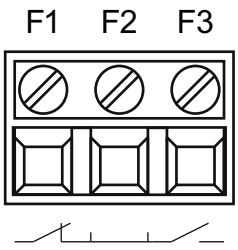
This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

Connecting and disconnecting may only be performed by an electrical specialist.
Connect or disconnect power supply cables only when the power is turned off.

Signaling contact 100 to 240 VAC / 60 to 250 VDC

The signaling contact is connected to a 3-pin plug-in terminal block.

Table 6-17 Pin assignment of the 100 to 240 VAC / 60 to 250 VDC signaling contact

Pin number	Assignment
	
F1	NC contact
F2	Root
F3	NO contact

To wire up the signaling contact, use a copper cable of category 18-8 AWG or cable with a cross-section of 0.75 to 6 mm².

NOTICE

Securing cables with dangerous voltage

Make sure that the connector cannot be released accidentally by pulling on the connecting cable. Lay the cables in cable ducts or cable channels and secure the cables, where necessary, with cable ties.

Configuration, displays and display elements 7

7.1 Assignment of slot numbers

⚠ CAUTION
Specifying the slot number Slots should be numbered in ascending order. Insert a label with the slot number in the slot on the housing starting, for example, with the fixed ports and continuing with the modular ports (with MM900 media modules fitted). Include blind covers and unused slots in the numbering.

Applying the slot numbers

1. Place the required slot number in front of the module.
2. Place the tongue in the opening on the module.
3. Press the slot number into the recess on the front of the housing with your finger. The slot number breaks out of the wheel.

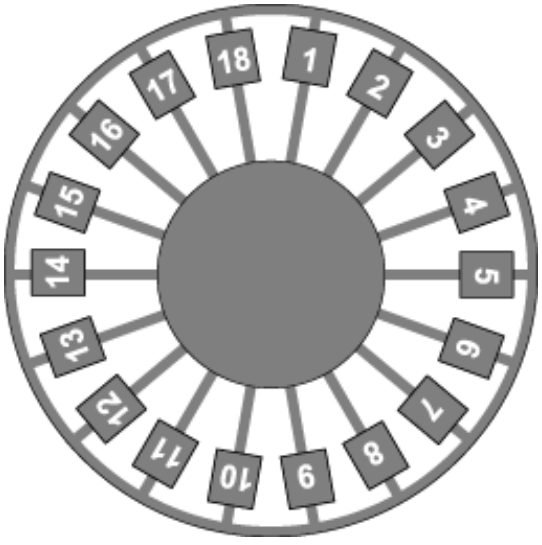


Figure 7-1 Slot number plate

7.2 Show Location

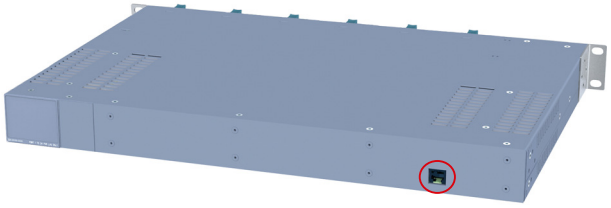
Localizing an IE Switches X-300

To identify an IE Switch X-300 locally and with certainty, you can use the "show location" function on a programming device to select the node over the network and make it flash. This can be used, for example, when assigning addresses to make sure that the correct node receives the address. All port LEDs of the addressed node flash green twice a second.

7.3 XR-300 diagnostics port

Description

Rack devices have a diagnostics port on the rear of the housing. This port is designed for an RJ-11 plug. A suitable connecting cable with an RJ-11 plug and a 9-pin D sub female connector for connection to the serial port of the PC ships with the SCALANCE XR-300.



Diagnostics port on the rear of the device

Pin assignment

The following table shows the pin assignment of the RJ-11 plug and the D sub female connector:

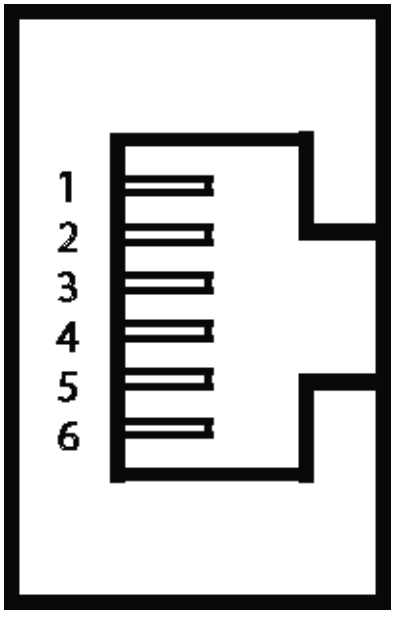


Figure 7-2 RJ-11 jack (schematic)

RJ-11 plug		D-sub 9-pin, female	
Pin	**Assignment**	**Pin**	**Assignment**
1	n. c.	1	n. c.
2	n. c.	2	RD (Receive Data)
3	TD (Transmit Data)	3	TD (Transmit Data)
4	SG (Signal Ground)	4	n. c.
5	RD (Receive Data)	5	SG (Signal Ground)
6	n. c.	6	n. c.
		7	n. c.
		8	n. c.
		9	n. c.

7.4 The SET / SELECT button

The SET/SELECT button is located on the top of the housing of devices of the X-300 EEC series. On all other devices, this button is on the front panel of the housing beside the LED display. The SET/SELECT button has several functions that are described below.

Change the display mode

By pressing the button briefly, you change to the display mode of the LED display. For more detailed information on this topic, refer to the section "LED display".

Resetting the device to the factory defaults

If you reset, all the changes you have made will be overwritten by factory defaults. Follow the steps outlined below:

1. Turn on display mode A. Display mode A is active when the "DM" LED is not lit. If this LED is lit or flashing, you will need to press the SET/SELECT briefly (possibly several times) until the "DM" LED goes off. If the SELECT/SET button is not pressed for longer than a minute, the device also turns on display mode A.
2. Hold down the SELECT/SET button for 12 seconds. If you release the button before the 12 seconds have elapsed, the reset is canceled.

Definition of the fault mask

Using the fault mask, you specify an individual "good status" for the connected ports and the power supply. Deviations from this status are then displayed as errors/faults.

1. Turn on display mode A or D. Display mode A is active when the "DM" LED is not lit. Display mode D is active when the "DM" LED flashes yellow/orange. If a different display mode is active, you will need to press the SET/SELECT briefly (possibly several times) until the required display mode is active.
2. Hold down the SET/SELECT button for five seconds. After three seconds, the "DM" LED begins to flash. If you release the button before the five seconds have elapsed, the previous fault mask will be retained.

Enable/disable the redundancy manager

1. Turn on display mode B. Display mode B is active when the "DM" LED is lit green. If a different display mode is active, you will need to press the SET/SELECT briefly (possibly several times) until display mode B is active.
2. Hold down the SET/SELECT button for five seconds. After three seconds, the "DM" LED begins to flash. If you release the button before the five seconds have elapsed, the action is aborted.
3. The result of the action depends on the initial situation:
   - If the redundancy manager and media redundancy were disabled, media redundancy is also enabled after enabling the redundancy manager.
   - If you disable the redundancy manager, media redundancy remains enabled.

7.5 LED display

The "RM" LED for the "redundancy manager" function

The "RM" LED indicates whether or not the device is operating in the role of redundancy manager and whether or not the ring is operating error-free.

LED color	LED status	Meaning
-	off	The device is not operating in the role of "redundancy manager".
green	on	The device is operating in the role of redundancy manager. The ring is working without problems, monitoring is activated.
green	flashes	The device is operating in the role of redundancy manager. An interruption has been detected on the ring and the device has switched through.

The "SB" LED for the standby function

This LED shows the status of the standby function.

LED color	LED status	Meaning
-	off	The standby function is disabled.
green	on	The standby function is enabled. The standby section is passive.
green	flashes	The standby function is enabled. The standby section is active.

The "F" LED for the fault status

The "F" LED (fault) provides information on the error/fault status of the device. While the device is starting up, this LED has the following meaning:

LED color	LED status	Meaning during the device startup
-	off	Device startup completed successfully.
red	on	Device startup not yet completed or a fault/error has occurred.
red	flashes	Bad firmware image.

During normal operation, the "F" LED provides the following information:

LED color	LED status	Meaning during operation
-	off	No operating problems.
red	on	The device has detected an error. The signaling contact opens.

The "DM" LED for the display mode

The "DM" LED (Display Mode) indicates which of the four display modes A, B, C or D is currently active. The meaning of the L1, L2 and P1, P2, ... LEDs depends on the display mode.

LED color	LED status	Meaning
-	off	Display mode **A**
green	on	Display mode **B**
orange	on	Display mode **C**
yellow/orange	flashes	Display mode **D**

Selecting the display mode

Press the SELECT/SET button to set the required display mode. If the SELECT/SET button is not pressed for longer than a minute, the device automatically changes to display mode A.

Pressing the SELECT/SET button starting at display mode A	Status of the "DM" LED	Display mode
-	off	Display mode **A** (default mode)
Press once	lit green	Display mode **B**
Press twice	lit orange	Display mode **C**
Press 3 times	flashes yellow/orange	Display mode **D**

The "L1" and "L2" or "L" LEDs for the power supply

Whereas on other devices, the "L1" and "L2" LEDs indicate information about the power, on the SCALANCE X306-1LD FE, this is done by the "L" LED. A redundant power supply for this device can be recognized by the color of the LED.

Meaning in display mode A, B or C

LED	Color	Status	Meaning
L1 / L2	_	off	Power supply L1 / L2 lower than 17 V *)
	green	on	Power supply L1 / L2 higher than 17 V *)
L	-	off	Power supplies L1 and L2 less than 17 V or not connected.
	orange	on	Power supply L1 or L2 higher than 17 V (no redundant supply).
	green	on	Power supplies L1 and L2 higher than 17 V (redundant supply).

*) for the X-300EEC the following applies:

- For devices with power supply unit 24 to 48 VDC: Limit voltage = 17 VDC
- For devices with a multiple range power supply unit 100 to 240 VAC / 60 to 250 VDC: Limit voltage = 46.5 VDC or 80 VAC

Meaning in display mode D

LED	Color	Status	Meaning
L1 / L2	_	off	Power supply L1 / L2 is not monitored. If L1 / L2 falls below 17 V *), the signaling contact does not respond.
	green	on	Power supply L1 / L2 is monitored. If L1 / L2 falls below 17 V *), the signaling contact responds.
L	-	off	Power supplies L1 and L2 are not monitored. If L1 or L2 falls below 17 V, the signaling contact does not respond.
	orange	on	Power supply L1 or L2 is monitored. If L1 or L2 falls below 17 V, the signaling contact responds.
	green	on	Power supplies L1 and L2 are monitored. If L1 and L2 fall below 17 V, the signaling contact responds.
*) for the X-300EEC the following applies: • For devices with power supply unit 24 to 48 VDC: Limit voltage = 17 VDC • For devices with a multiple range power supply unit 100 to 240 VAC / 60 to 250 VDC: Limit voltage = 46.5 VDC or 80 VAC			

Note

Devices of the X-300EEC product group

When using only one power supply unit 24 VDC and two 24 VDC power supplies, the LEDs "L1" and "L2" signal the existence of the power supply L1 and L2.
When using two 24 VDC power supply units, the LEDs "L1" and "L2" signal the existence of the primary voltage and the secondary voltage for both power supply units. If the power supply is intact, a fault occurring on a power supply unit on the secondary side can be recognized.

The P1, P2, ... LEDs for the port status

The P1, P2, ... LEDs show information on the status of their port (transmission speed, mode, port monitoring). The meaning of these LEDs depends on the display mode ("DM" LED).

Meaning in display mode A

LED color	LED status	Meaning
-	off	No valid link to the port (for example station turned off or cable not connected).
green	on	Link exists and port in normal status. In this status, the port can receive and send data.
	flashes once per second	Link exists and port in "blocking" status. In this status, the port only sends and receives management data (no user data).
	flashes 3 times per second	Link exists and port turned off by management. In this status, no data is sent or received via the port.
	flashes 4 times per second	Port exists and is in the "monitor port" status. In this status, the data traffic of another port is mirrored to this port.
yellow	flashes / lit	Receiving data at port. With SCALANCE X-300 devices, both the receipt and the sending of data is indicated for the optical gigabit ports.

Meaning in display mode B

LED color	LED status	Meaning
-	off	Port operating at 10 Mbps.
green	on	Port operating at 100 Mbps.
orange	on	Port operating at 1000 Mbps.

If there is a problem on the connection and the type of transmission is fixed (autonegotiation off), the desired status, in other words the set transmission speed (1000 Mbps, 100 Mbps, 10 Mbps) continues to be displayed. If there is a problem on the connection and autonegotiation is active, the port LED goes off.

Meaning in display mode C

LED color	LED status	Meaning
-	off	Port operating in half duplex.
green	on	Port operating in full duplex.

Meaning in display mode D

LED color	LED status	Meaning
-	off	The port is not monitored; in other words, if a link is not established at the port, this does not trigger the signaling contact.
green	on	The port is monitored, in other words, if no connection was established at the port (for example no cable inserted), this triggers the signaling contact and an error state results.
orange	on	The port is monitored, in other words, when a valid connection exists at the port (for example non-permitted cable inserted), this triggers the signaling contact and an error state results.

Maintenance and cleaning

8

WARNING

Unauthorized repair of devices in explosion-proof design

Risk of explosion in hazardous areas

- Repair work may only be performed by personnel authorized by Siemens.

WARNING

Impermissible accessories and spare parts

Risk of explosion in hazardous areas

- Only use original accessories (Page 229) and original spare parts.
- Observe all relevant installation and safety instructions described in the manuals for the device or supplied with the accessories or spare parts.



CAUTION

Hot surfaces

Risk of burns during maintenance work on parts with a surface temperature above 70 °C (158 °F).

- Take appropriate protective measures, for example, wear protective gloves.
- Once maintenance work is complete, restore the touch protection measures.

NOTICE

Cleaning the housing

If the device is not in a hazardous area, only clean the outer parts of the housing with a dry cloth.

If the device is in a hazardous area, use a slightly damp cloth for cleaning.

Do not use solvents.

Technical specifications

9

9.1 Overview of operating temperatures for SCALANCE X-300

Operating temperature depending on the media modules used

The information applies to media modules with product version 2 (PV2):

Type	Installation location	Without media module	MM992-2CUC MM992-2CU MM991-2 MM991-2LD MM991-2 (SC) MM991-2LD (SC) MM992-2 MM992-2LD	MM991-2LH+ (SC) MM992-2LH MM992-2LH+ MM992-2ELH	Media module MM992-2SFP with SFP transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Media module MM992-2SFP with SFP transceiver SFP991-1LH+ SFP992-1LH SFP992-1+ SFP992-1LH+ SFP992-1ELH
X-300M	Horizontal	-40 °C to +70 °C			-40 °C to +60 °C	
	Vertical	-40 °C to +50 °C				
X-300M PoE	Horizontal	-40 °C to +60 °C		-40 °C to +50 °C	-40 °C to +60 °C	-40 °C to +50 °C
	Vertical	-40 °C to +45 °C				
XR-300M	Horizontal	Not possible (fully modular device)	-40 °C to +70 °C	Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C	-40 °C to +60 °C	Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	Not possible (fully modular device)	-40 °C to +50 °C			
XR-300M PoE	Horizontal	-40 °C to +60 °C		Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C	-40 °C to +60 °C	Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C				

Type	Installation location	Without media module	MM992-2CUC MM992-2CU MM991-2 MM991-2LD MM991-2 (SC) MM991-2LD (SC) MM992-2 MM992-2LD	MM991-2LH+ (SC) MM992-2LH MM992-2LH+ MM992-2ELH	Media module MM992-2SFP with SFP transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Media module MM992-2SFP with SFP transceiver SFP991-1LH+ SFP992-1LH SFP992-1+ SFP992-1LH+ SFP992-1ELH
XR-300M EEC	Horizontal	-40 °C to +70 °C		Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C	-40 °C to +70 °C SFP transceivers of this group can only be used in conjunction with media modules MM992-2CUC and MM992-2CU. When using other modules: -40 °C to +60 °C	Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C				

The permitted operating temperature depends on how the mounting device was installed. The installation is horizontal if the device labeling is from left to right. With a vertical installation, the device labeling is rotated through 90°.

9.2 X-300 technical specifications

Note

Validity of the technical specifications

All the technical specifications described in this section that is not assigned to a specific device variant, version or a media module, apply to all device variants/versions of the product group.

9.2.1 Construction, installation and environmental conditions

Table 9-1 Construction

Device variant	Dimensions (W x H x D)	Weight	Degree of protection
X304-2FE, X306-1LD FE	60 × 125 × 123 mm	700 g	IP30
X307-3, X307-3LD, X308-2, X308-2LD, X308-2LH, X308-2LH+, X310, X310FE,	120 × 125 × 123 mm	1400 g	IP30
X320-1FE, X320-3LD FE	180 × 125 × 123 mm	1650 g	IP30

Table 9-2 Installation options

Device variant	Installation options
X304-2FE, X306-1LD FE	• DIN rail • S7-300 standard rail • Wall
X307-3, X307-3LD, X308-2, X308-2LD, X308-2LH, X308-2LH+, X310, X310FE, X320-1FE, X320-3LD FE	• DIN rail [1)] • S7-300 standard rail • Wall

[1)] Note: When used in shipbuilding, installation on a 35 mm DIN rail is not permitted. In ships, the 35 mm DIN rail does not provide adequate support.

Table 9-3 Permitted ambient conditions

Device variant	Storage/transport temperature	Operating temperature	Max. relative humidity in operation at 25 °C	Max. ambient temperature at operating altitude
X304-2FE, X306-1LD FE, X320-1FE, X320-3LD FE	-40 °C to +70 °C	As of hardware product version 1: -40 °C to +60 °C	<= 95% (no condensation)	Max. 55 °C as of 2000 m Max. 50 °C as of 3000 m
X307-3, X308-2	-40 °C to +70 °C	For hardware product version 1: 0 °C to +60 °C As of hardware product version 2: -10 °C to +60 °C	<= 95% (no condensation)	Max. 55 °C as of 2000 m Max. 50 °C as of 3000 m
X307-3LD, X308-2LD, X308-2LH, X308-2LH+, X310, X310FE	-40 °C to +70 °C	For hardware product version 1: 0 °C to +60 °C As of hardware product version 2: -40 °C to +60 °C	<= 95% (no condensation)	Max. 55 °C as of 2000 m Max. 50 °C as of 3000 m

9.2.2 Connectors and electrical data

Table 9-4 Connection for end devices or network components

Device variant	Electrical over twisted pair	Optical over fiber-optic cable
X304-2FE	4 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex)	2 x SC duplex socket (MM) (100 Mbps, full duplex to 100BaseFX)
X306-1LD FE	6 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex)	1 x SC duplex socket (SM) (100 Mbps, full duplex to 100BaseFX)
X307-3	7 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex)	3 x SC duplex sockets (1000 Mbps, full duplex to 1000BaseSX)
X307-3LD	7 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex)	3 x SC duplex sockets (1000 Mbps, full duplex to 1000BaseLX)
X308-2	7 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex) 1 x RJ-45 socket with MDI-X pinning 10/100/1000 Mbps (half/ full duplex)	2 x SC duplex sockets (1000 Mbps, full duplex to 1000BaseSX)

Device variant	Electrical over twisted pair	Optical over fiber-optic cable
X308-2LD	7 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex) 1 x RJ-45 jacks with MDI-X assignment 10/100/1000 Mbps (half / full duplex)	2 x SC duplex sockets (1000 Mbps, full duplex to 1000BaseLX)
X308-2LH	7 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex) 1 x RJ-45 socket with MDI-X pinning 10/100/1000 Mbps (half/ full duplex)	2 x SC duplex sockets (1000 Mbps, full duplex to 1000BaseLX)
X308-2LH+	7 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex) 1 x RJ-45 jacks with MDI-X assignment 10/100/1000 Mbps (half / full duplex)	2 x SC duplex sockets (1000 Mbps, full duplex to 1000BaseLX)
X310	7 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex) 3 x RJ-45 jacks with MDI-X assignment 10/100/1000 Mbps (half / full duplex)	-
X310FE	10 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex)	-
X320-1 FE	20 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex)	1 x SC duplex socket (MM) (100 Mbps, full duplex to 100BaseFX)
X320-3LD FE	20 x RJ-45 jacks with MDI-X assignment 10/100 Mbps (half / full duplex)	1 x SC duplex socket (MM) 2 x SC duplex sockets (SM) (100 Mbps, full duplex to 100BaseFX)

Table 9-5 Electrical data: Power supply

Rated voltage Safety extra-low voltage (SELV)	Voltage range	Permitted voltage range including total ripple
24 VDC	19.2 VDC - 28.8 VDC	18 VDC - 32 VDC

Table 9-6 Electrical data: Power consumption

Device variant	Power loss at 24 VDC	Current consumption at rated voltage 24 VDC	Overcurrent protection at input (non-replaceable fuse)
X304-2FE	6.2 W	260 mA	3 A / 32 V
X306-1LD FE	4.8 W	200 mA	3 A / 32 V

Device variant	Power loss at 24 VDC	Current consumption at rated voltage 24 VDC	Overcurrent protection at input (non-replaceable fuse)
X307-3, X307-3LD, X308-2, X308-2LD, X308-2LH, X308-2LH+, X310, X310FE, X320-1 FE	9.6 W	400 mA	3 A / 32 V
X320-3LD FE	12 W	500 mA	3 A / 32 V

Table 9-7 Electrical data: Signaling contact

Voltage via signaling contact	24 VDC
Switching capacity (resistive load)	max. 100 mA
Resistor between F1-F2	< 8 Ω

Table 9-8 Plug-in terminal block for connectors of the power supply and signaling contact

Power supply	1 x 4-pin
Signaling contact	1 x 2-pin

Table 9-9 Electrical data: Transmitter output (optical) and receiver input

Device variant	Transmitter output (optical)		Receiver input	
	min. [dBm]	max. [dBm]	Sensitivity min. [dBm]	Input power max. [dBm]
X304-2FE	-19	-14	-32	-3
X306-1LD FE	-15	-8	-34	-3
X307-3	-9.5	-4	-17	-3
X307-3LD	-9.5	-3	-21	-3
X308-2	-9.5	-4	-17	-3
X308-2LD	-9.5	-3	-21	-3
X308-2LH	-6	0	-23	-3
X308-2LH+	0	5	-23	-3
X310	-	-	-	-
X310FE	-	-	-	-
X320-1 FE	-19	-14	-32	-3

Device variant	Transmitter output (optical)		Receiver input	
	min. [dBm]	max. [dBm]	Sensitivity min. [dBm]	Input power max. [dBm]
X320-3LD FE	-15[1)]	-8[1)]	-34[1)]	-3[1)]
	-19[2)]	-14[2)]	-32[2)]	-3[2)]

[1)] Fast Ethernet, long distance interface

[2)] Fast Ethernet, multimode interface

Note

Exception in the naming of X320-3LD FE

With the X320-3LD FE IE switch, the key to the name is different. The position -3LD covers a total of 3 connectors (1-2) of which only 2 connectors are LD, refer to the explanation below:

- Port 21: Multimode
- Port 22: LD (long distance, single mode)
- Port 23: LD (long distance, single mode)

Note

2 optical interface transceivers possible (X320-3LD FE)

The device is also equipped with 2 optical interface transceivers.

- [1)] Fast Ethernet, long distance interface
- [2)] Fast Ethernet, multimode interface

As a result, the electrical data in the technical specifications is divided into two parts: transmitter output optical and receiver input.

9.2.3 Cable lengths

Table 9-10 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 9-11 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE FC standard cable, 4×2, 24 AWG IE FC flexible cable, 4×2, 24 AWG	with IE FC RJ-45 Plug 180, 4x2	0 to 90 m
IE FC standard cable, 4×2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC flexible cable, 4×2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Table 9-12 Permitted cable lengths (fiber-optic cable - Fast Ethernet)

Device variant	Fiber-optic cable type	Permitted cable length	Attenuation
X304-2FE, X320-1 FE	50/125 µm multimode fiber	0 to 5 km	≤1 dB/km at 1300 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
	62.5/125 µm multimode fiber	0 to 5 km	≤1 dB/km at 1300 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
X306-1LD FE	9/125 µm single mode fiber	0 to 26 km	≤0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 14 dB max. permitted FO cable attenuation at 2 dB link power margin
X310FE	-	-	-
X320-3LD FE	50/125 µm multimode fiber	0 to 5 km	≤1 dB/km at 1300 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
	9/125 µm single mode fiber	0 to 26 km	≤0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 14 dB max. permitted FO cable attenuation at 2 dB link power margin

Table 9-13 Permitted cable lengths (fiber-optic cable - gigabit)

Device variant	Fiber-optic cable type	Permitted cable length	Attenuation
X307-3, X308-2	62.5/125 µm multimode fiber	0 to 350 m	≤3.1 dB/km at 850 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 4.5 dB max. permitted FO cable attenuation at 3 dB link power margin
	50/125 µm multimode fiber	0 to 750 m	≤2.5 dB/km at 850 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 4.5 dB max. permitted FO cable attenuation at 3 dB link power margin
X307-3LD X308-2LD	9/125 µm single mode fiber	0 to 10 km	≤0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 6 dB max. permitted FO cable attenuation at 3 dB link power margin

Device variant	Fiber-optic cable type	Permitted cable length	Attenuation
X308-2LH	9/125 µm single mode fiber	to 40 km	≤0.4 dB/km at 1550 nm; maximum insertion loss 0.5 dB; 18 dB max. permitted FO cable attenuation at 2 dB link power margin; minimum cable attenuation 3 dB
X308-2LH+	9/125 µm single mode fiber	to 70 km	≤0.28 dB/km at 1550 nm; maximum insertion loss 0.5 dB; 21 dB max. permitted FO cable attenuation at 2 dB link power margin; minimum cable attenuation 8 dB
X310	-	-	-

9.2.4 Other properties

Switching properties

Max. number of learnable addresses	8000
Aging time	30 sec
Switching technique	Store and forward
Latency	5 µs

Reconfiguration times for redundancy mechanisms

Redundancy mechanism	Reconfiguration times
HRP	300 ms
Standby link	300 ms
MRP	200 ms

Mean time between failure (MTBF)

Device variant	MTBF [1]
X304-2FE	55 years
X306-1LD FE	65 years
X307-3	40 years
X308-2	42 years
X307-3LD , X308-2LD, X308-2LH, X308-2LH+,	38 years
X310, X310FE	45 years
X320-1 FE	35 years
X320-3LD FE	30 years

[1] These values apply at 40 °C.

Note

The IE Switches X-300 support "full wire speed switching" complying with IEEE 802.3 on all ports. The number of packets therefore depends on the packet length.

Full wire speed switching

Number of frames per second		At a frame length of
At 100 Mbps	**At 1000 Mbps**	
148810	1488095	64 bytes
84459	844595	128 bytes
45290	452899	256 bytes
23496	234962	512 bytes
11973	119732	1024 bytes
9615	96154	1280 bytes
8127	81274	1518 bytes

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame delay time. When a frame passes through the switch, this is delayed by the Store&Forward function of the IE Switch X-300 by the following values:

- at 64 bytes frame length: Delay of approx. 10 microseconds (at 100 Mbps)
- at 1500 bytes frame length: Delay of approx. 130 microseconds (at 100 Mbps)

This means, the more IE Switches X-300 a frame runs through, the higher the frame delay.

PRP compatibility

Device variant	As of version *
X304-2FE	V3.7.0
X306-1LD FE	
X307-3	
X307-3LD	
X308-2	
X308-2LD	
X308-2LH	
X308-2LH+	
X310	
X310FE	
X320-1 FE	
X320-3LD FE	

***** Information about the firmware version (V) as of which PRP is supported.

Note

For a device to be used in PRP networks, it must be able to process a frame length of at least 1528 bytes (Jumbo Frames). This value is the maximum frame length including VLAN tag of 1522 bytes plus the length of the PRP trailer of 6 bytes. The following table shows the version as of which the devices are PRP-compatible.

9.3 X-300M technical specifications

Note

Validity of the technical specifications

All the technical specifications described in this section that is not assigned to a specific device variant, version or a media module, apply to all device variants/versions of the product group.

9.3.1 Construction, installation and environmental conditions

Table 9-14 Construction

Dimensions (W x H x D)	120 × 125 × 124 mm
Weight	1400 g
Degree of protection	IP20

Table 9-15 Installation options

Installation options	• DIN rail [1)] • S7-300 standard rail • Wall

[1)] Note: When used in shipbuilding, installation on a 35 mm DIN rail is not permitted. In ships, the 35 mm DIN rail does not provide adequate support.

Table 9-16 Permitted ambient conditions

Storage/transport temperature	-40 °C to +85 °C
Max. relative humidity in operation at 25 °C	<= 95% (no condensation)
Max. ambient temperature at operating altitude	2000 m or above: -5 °C of the max. operating temperature[1)] 3000 m or above: -10 °C of the max. operating temperature[1)]

[1)] See table: "Operating temperature depending on the media modules used"

Table 9-17 Operating temperature depending on the media modules used

Media module	**Installation direction**	**Operating temperature** [1]
Without media module	Horizontal	-40 °C to +70 °C
	Vertical	-40 °C to +50 °C
MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD MM991-2 MM991-2FM MM991-2LD MM991-2 (SC) MM991-2LD (SC) MM992-2 MM992-2 (C) MM992-2LD	Horizontal	-40 °C to +70 °C
	Vertical	-40 °C to +50 °C
MM991-2LH+ (SC) MM992-2LH MM992-2LH+ MM992-2ELH	Horizontal	-40 °C to +70 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1LH+ SFP992-1+ SFP992-1LH SFP992-1LH+ SFP992-1ELH SFP991-1ELH200	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +50 °C
MM991-2P		- 25 °C to + 40 °C

[1] The permitted operating temperature depends on how the mounting device was installed. The installation is horizontal if the device labeling is from left to right. With a vertical installation, the device labeling is rotated through 90°.

9.3.2 Connectors and electrical data

Table 9-18 Connection for end devices or network components

Max. number	8 ports
Electrical (via twisted-pair)	4 x RJ-45 jacks with MDI-X assignment 10/100/1000 Mbps (half / full duplex)

Media module slots	4 x modular (2 ports per slot)
Transmitter output (optical) and receiver input	The values correspond to those of the permitted MM900 media modules and SFP transceivers.

Table 9-19 Electrical data: Power supply

Device version (power supply)	**Redundant power supply unit**	**Redundant power supply possible**	**Power supply**	
12 VDC	No	Yes	12 VDC (10.6 to 32 VDC) *)	
24 VDC	No	Yes	Rated voltage	24 VDC
			Voltage range	19.2 to 28.8 VDC
			Permitted voltage range incl. total ripple	18 to 32 VDC

*) The shipbuilding approvals apply only with a supply voltage of 24 VDC (18 ... 31.2 VDC).

Table 9-20 Electrical data: Current consumption and power loss

Device version (power supply)	**Current consumption**	**Effective power loss**
12 VDC	1.4 A	16.6 W
24 VDC	0.7 A	16.6 W

Table 9-21 Electrical data: Overcurrent protection

Device version (power supply)	**Overcurrent protection of the power supply Non-replaceable fuse**
12 VDC	3 A / 32 V
24 VDC	3 A / 32 V

Table 9-22 Electrical data: Signaling contact

Device version (power supply)	**Voltage via signaling contact**	**Switching capacity (resistive load)**	**Resistor between F1-F2**
12 VDC	12 VDC / 24 VDC	Max. 100 mA	< 8 Ω
24 VDC	24 VDC	Max. 100 mA	

Table 9-23 Plug-in terminal block for connectors of the power supply and signaling contact

Device version (power supply)	Power supply	Signaling contact
12 VDC	1 x 4-pin	1 x 2-pin
24 VDC	1 x 4-pin	1 x 2-pin

9.3.3 Cable lengths

Table 9-24 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 9-25 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE FC Standard Cable, 4 × 2, 24 AWG IE FC Flexible Cable, 4 × 2, 24 AWG	with IE FC RJ-45 Plug 180, 4 × 2	0 to 90 m
IE FC Standard Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC Flexible Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Note

Permitted cable lengths (fiber-optic cable - Fast Ethernet or gigabit)

The values correspond to those of the permitted MM900 media modules and SFP transceivers.

9.3.4 Other properties

Switching properties

Max. number of learnable addresses	8000
Aging time	30 sec
Switching technique	Store and forward
Latency	5 µs

Reconfiguration times for redundancy mechanisms

Redundancy mechanism	Reconfiguration times
HRP	300 ms
Standby link	300 ms
MRP	200 ms

Mean time between failure (MTBF)

The value in the following table applies to the basic device without media modules.

MTBF	> 40 years [1]

[1] This value applies at 40 °C.

In the calculation of the MTBF of a modular switch, the standard parts count applies; in other words, the reciprocals of all component failure rates are added.

The reciprocal of this total id the MTBF of the entire assembly.

$$MTBF_{total} = \frac{1}{\left(\frac{1}{MTBF_{basic\ device}} + \frac{1}{MTBF_{module\ 1}} + \ldots + \frac{1}{MTBF_{module\ n}}\right)}$$

Full wire speed switching

Number of frames per second		At a frame length of
At 100 Mbps	At 1000 Mbps	
148810	1488095	64 bytes
84459	844595	128 bytes
45290	452899	256 bytes
23496	234962	512 bytes
11973	119732	1024 bytes
9615	96154	1280 bytes
8127	81274	1518 bytes

Note

The IE Switches X-300 support "full wire speed switching" complying with IEEE 802.3 on all ports. The number of packets therefore depends on the packet length.

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame delay time. When a frame passes through the switch, this is delayed by the Store&Forward function of the IE Switch X-300 by the following values:

- at 64 bytes frame length: Delay of approx. 10 microseconds (at 100 Mbps)
- at 1500 bytes frame length: Delay of approx. 130 microseconds (at 100 Mbps)

This means, the more IE Switches X-300 a frame runs through, the higher the frame delay.

PRP compatibility

Device variant	As of version *
X308-2M X308-2M TS	V3.7.0

***** Information about the firmware version (V) as of which PRP is supported.

Note

For a device to be used in PRP networks, it must be able to process a frame length of at least 1528 bytes (Jumbo Frames). This value is the maximum frame length including VLAN tag of 1522 bytes plus the length of the PRP trailer of 6 bytes. The following table shows the version as of which the devices are PRP-compatible.

9.4 XR-300M technical specifications

Note

Validity of the technical specifications

All the technical specifications described in this section that is not assigned to a specific device variant, version or a media module, apply to all device variants/versions of the product group.

9.4.1 Construction, installation and environmental conditions

Table 9-26 Construction

Device version (power supply)	Dimensions (W x H x D)	Weight	Degree of protection
2 x 24 VDC	483 × 44 × 305 mm	5500 g	IP20
1 x 100 to 240 VAC	483 × 44 × 305 mm	5900 g	IP20

Table 9-27 Installation options

Device version (power supply)	**Installation options**
2 x 24 VDC	• 19" rack [1)] • Desktop operation with adhesive feet
1 x 100 to 240 VAC	19" rack [1)]

[1)] Note: If mechanical load is high, the device should be secured at four points. You will find more detailed information in the section "Mechanical load in operation".

Note

No desktop operation for devices with 100 to 240 VAC power supply

Desktop operation is permitted only for the 24 VDC variants of the rack devices (R). The adhesive feet ship with the 24 VDC variants. In this case, the permitted ambient temperature is -40 °C to +50 °C.

Table 9-28 Permitted ambient conditions

Storage/transport temperature	-40 °C to +85 °C
Max. relative humidity in operation at 25 °C	<= 95% (no condensation)
Max. ambient temperature at operating altitude	2000 m or above: -5 °C of the max. operating temperature[1)] 3000 m or above: -10 °C of the max. operating temperature[1)]

[1)] See table: "Operating temperature depending on the media modules used"

Table 9-29 Operating temperature depending on the media modules used

Media module [1)]	**Installation direction**	**Operating temperature [2)]**
MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD MM991-2 MM991-2FM MM991-2LD MM991-2 (SC) MM991-2LD (SC) MM992-2 MM992-2 (C) MM992-2LD	Horizontal	-40 °C to +70 °C
	Vertical	-40 °C to +50 °C

Media module [1]	**Installation direction**	**Operating temperature** [2]
MM991-2LH+ (SC) MM992-2LH MM992-2LH+ MM992-2ELH	Horizontal	Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1LH+ SFP992-1+ SFP992-1LH SFP992-1LH+ SFP992-1ELH SFP991-1ELH200	Horizontal	Max. 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C
MM991-2P		Maximum 6 modules in slots 7 and 12: The slot above an MM991-2P may be used as follows: • Without media module: - 25 °C to + 50 °C • With media module MM992-2CUC or MM992-2CU: - 25 °C to + 40 °C

[1] Only hardware product version 02 of the media modules is permitted.
The hardware product version is shown on the product. You can also read out this information from the device with the WBM or the CLI.

[2] The permitted operating temperature depends on how the mounting device was installed. The installation is horizontal if the device labeling is from left to right. With a vertical installation, the device labeling is rotated through 90°.

9.4.2 Connectors and electrical data

Table 9-30 Connection for end devices or network components

Max. number	24 ports
Media module slots	12 x modular (2 ports per slot)
Transmitter output (optical) and receiver input	The values correspond to those of the permitted MM900 media modules and SFP transceivers.
Diagnostics port	RJ-11 jack

Table 9-31 Electrical data: Power supply

Device version (power supply)	**Redundant power supply unit**	**Redundant power supply possible**	**Power supply**	
2 x 24 VDC	No	Yes	Rated voltage	24 VDC
			Voltage range	19.2 VDC - 28.8 VDC
			Permitted voltage range incl. total ripple	18.5 VDC - 30.2 VDC
1 x 100 to 240 VAC	No	No	100 to 240 VAC (85 to 264 VAC)	

Table 9-32 Electrical data: Current consumption and power loss

Device version (power supply)	**Current consumption**	**Effective power loss**
2 x 24 VDC	1.8 A	44 W
1 x 100 to 240 VAC	0.8 to 0.45 A	50 W

Table 9-33 Electrical data: Overcurrent protection

Device version (power supply)	**Overcurrent protection of the power supply Non-replaceable fuse**
2 x 24 VDC	5 A / 125 V
1 x 100 to 240 VAC	3.15 A / 250 V

Table 9-34 Electrical data: Signaling contact

Voltage via signaling contact	24 VDC
Switching capacity (resistive load)	max. 100 mA
Resistor between F1-F2	< 8 Ω

Table 9-35 Plug-in terminal block for connectors of the power supply and signaling contact

Device version (power supply)	**Power supply**	**Signaling contact**
2 x 24 VDC	2 x 4-pin	2 x 2-pin
1 x 100 to 240 VAC	1 x 2-pin	1 x 2-pin

9.4.3 Cable lengths

Table 9-36 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 9-37 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE FC Standard Cable, 4 × 2, 24 AWG IE FC Flexible Cable, 4 × 2, 24 AWG	with IE FC RJ-45 Plug 180, 4 × 2	0 to 90 m
IE FC Standard Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC Flexible Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Note

Permitted cable lengths (fiber-optic cable - Fast Ethernet or gigabit)

The values correspond to those of the permitted MM900 media modules and SFP transceivers.

9.4.4 Block architecture

Block architecture with SCALANCE XR-300 devices

The XR324-12M and XR324-4M handle the Ethernet frame traffic of the 24 ports with the aid of three switch blocks.

- The three switch blocks are connected in series (block 1 via block 2 to block 3)
- Gigabit wire speed is possible within a block (max. 8 ports per block).
- Between the blocks there is a bandwidth of 1 gigabit/s available,that must be shared by all ports for frame traffic between the blocks.

When operating solely with Fast Ethernet (100 Mbps), the XR devices support full wire speed via all blocks.

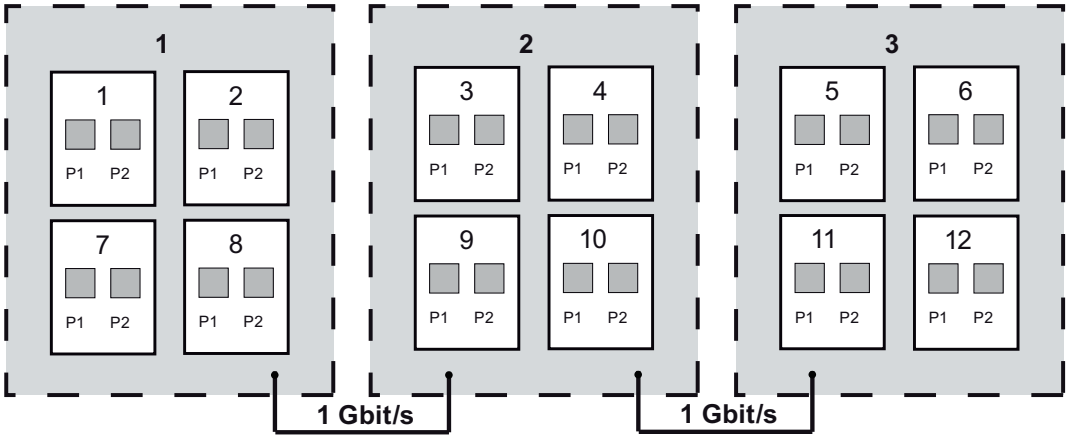


Figure 9-1 Block architecture of the XR324-12M

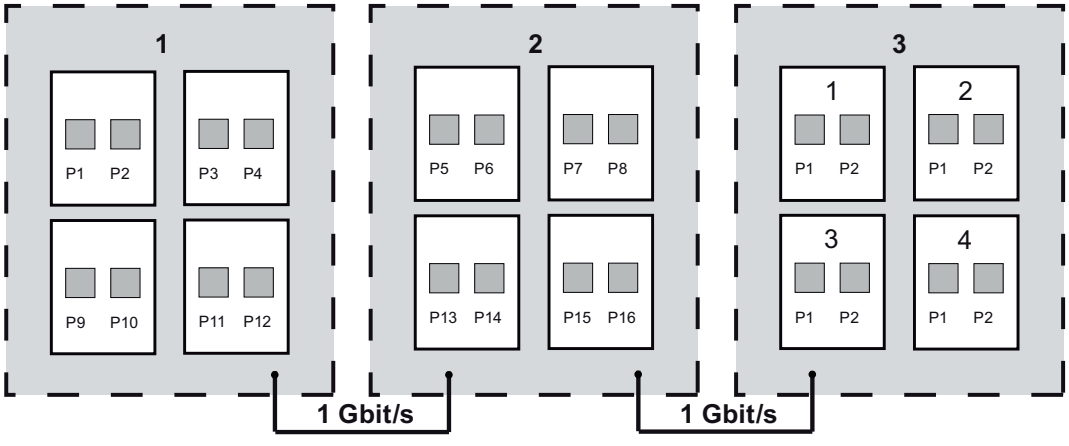


Figure 9-2 Block architecture of the XR324-4M

9.4.5 Other properties

Switching properties

Max. number of learnable addresses	8000
Aging time	30 sec
Switching technique	Store and forward
Latency	5 µs

Reconfiguration times for redundancy mechanisms

Redundancy mechanism	Reconfiguration times
HRP	300 ms
Standby link	300 ms
MRP	200 ms

Mean time between failure (MTBF)

The values in the following table apply to the basic device without media modules.

Device version (power supply)	MTBF [1]
2 x 24 V DC	> 26 years
1 x 100 to 240 V AC	> 22 years

[1] These values apply at 40 °C.

In the calculation of the MTBF of a modular switch, the standard parts count applies; in other words, the reciprocals of all component failure rates are added.

The reciprocal of this total id the MTBF of the entire assembly.

$$MTBF_{total} = \frac{1}{\left(\frac{1}{MTBF_{basic\ device}} + \frac{1}{MTBF_{module\ 1}} + \ldots + \frac{1}{MTBF_{module\ n}}\right)}$$

Full wire speed switching

Number of frames per second		At a frame length of
At 100 Mbps	At 1000 Mbps	
148810	1488095	64 bytes
84459	844595	128 bytes
45290	452899	256 bytes
23496	234962	512 bytes
11973	119732	1024 bytes
9615	96154	1280 bytes
8127	81274	1518 bytes

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame delay time. When a frame passes through the switch, this is delayed by the Store&Forward function of the IE Switch X-300 by the following values:

- at 64 bytes frame length: Delay of approx. 10 microseconds (at 100 Mbps)
- at 1500 bytes frame length: Delay of approx. 130 microseconds (at 100 Mbps)

This means, the more IE Switches X-300 a frame runs through, the higher the frame delay.

PRP compatibility

Device variant	As of version *
XR324-12M	V3.7.0
XR324-12M TS	V3.7.2

***** Information about the firmware version (V) as of which PRP is supported.

Note

For a device to be used in PRP networks, it must be able to process a frame length of at least 1528 bytes (Jumbo Frames). This value is the maximum frame length including VLAN tag of 1522 bytes plus the length of the PRP trailer of 6 bytes. The following table shows the version as of which the devices are PRP-compatible.

9.5 Technical specifications for X-300EEC

Note

Validity of the technical specifications

All the technical specifications described in this section that is not assigned to a specific device variant, version or a media module, apply to all device variants/versions of the product group.

9.5.1 Construction, installation and environmental conditions

Table 9-38 Construction

Device version (power supply)	Dimensions (W x H x D)	Weight	Degree of protection
1 24 VDC power supply unit	• Without clip: 60 × 125 × 123 mm • With clip: 216 × 203 × 99 mm	1800 g	IP30
2 x 24 VDC power supply units	• Without clip: 60 × 125 × 123 mm • With clip: 216 × 203 × 99 mm	2030 g	IP30
1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	• Without clip: 60 × 125 × 123 mm • With clip: 216 × 203 × 99 mm	1850 g	IP30
2 x power supply units 100 to 240 VAC / 60 to 250 VDC	• Without clip: 60 × 125 × 123 mm • With clip: 216 × 203 × 99 mm	2120 g	IP30

Table 9-39 Installation options

Installation options	• DIN rail • S7-300 standard rail [1] • Wall [2] • 19" rack [3]

[1] Possible only with adapter (must be provided by installers).

[2] Wall mounting possible with suitable wall support.

[3] With mounting support

Table 9-40 Permitted ambient conditions

Storage/transport temperature	Operating temperature	Max. relative humidity in operation at 25 °C	Max. ambient temperature at operating altitude
-40 °C to +70 °C	-40 °C to +70 °C [1]	<= 95% (no condensation)	Max. 65 °C as of 2000 m Max. 60 °C as of 3000 m

[1] The IE Switch was type tested for 16 h at +85 °C.

Table 9-41 Mechanical stability

Strain withstood / category (standard)	**Test conditions**
Vibration (IEC 60068-2-6)	Frequency range 10 Hz to 150 Hz: • Transit frequency: 58 Hz to 60 Hz • Peak value of the displacement [mm] below the transit frequency: 0.075 • Peak value of the acceleration [g] above the transit frequency: 1 • Number of cycles per axis: 20 Frequency range 5 Hz to 150 Hz: • Transit frequency: 8.4 Hz • Peak value of the displacement [mm] below the transit frequency: 3.5 • Peak value of the acceleration [g] above the transit frequency: 1 • Number of cycles per axis: 10 • Octaves / min: 1 Frequency range 2 Hz to 100 Hz: • Frequency range: 2 Hz to 100 Hz • Transit frequency: 13.2 Hz • Peak value of the displacement [mm] below the transit frequency:1 • Peak value of the acceleration [g] above the transit frequency: 0.7 • Number of cycles per
Vibration (IEEE1613 Class V.S.2)	• Velocity: <10 mm/s • Frequency: 1 to 150 Hz
Shock (IEC 60068-2-27)	• Acceleration: 15 g • Duration of the pulse: 11 ms • Number of shocks per direction: 3

9.5.2 Connectors and electrical data

Table 9-42 Connection for end devices or network components

Device variant	Electrical over twisted pair	Optical over fiber-optic cable
X302-7EEC (all variants)	2 x RJ-45 jacks with MDI-X assignment 10/100/1000 Mbps (half / full duplex)	7 x LC sockets multimode (100 Mbps, full duplex)
X307-2EEC (all variants)	7 x RJ-45 jacks with MDI-X assignment • 5 x Fast Ethernet 10/100 Mbps (half/full duplex) • 2 x Gigabit Ethernet 10/100/1000 Mbps (half/full duplex)	2 x LC sockets multimode (100 Mbps, full duplex)

Table 9-43 Electrical data: Power supply

Device version (power supply)	Redundant power supply unit	Redundant power supply possible	Power supply (min./max. range)
1 power supply unit 24 to 48 VDC	No	Yes	24 to 48 VDC (19.2 to 57.6 VDC)
2 power supply units 24 to 48 VDC	Yes	Yes [1]	24 to 48 VDC (19.2 to 57.6 VDC)
1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	No	No	100 to 240 VAC (80 to 276 VAC) [2] 60 to 250 VDC (46.25 to 300 VDC)
2 x power supply units 100 to 240 VAC / 60 to 250 VDC	Yes	Yes	100 to 240 VAC (80 to 276 VAC) [2] 60 to 250 VDC (46.25 to 300 VDC)

[1] With a redundant 24 VDC power supply, "L1" must be connected on both power supply units.

[2] AC 50/60 Hz ±5 %

Table 9-44 Electrical data: Current consumption and power loss

Device variant	Device version (power supply)	Current consumption	Effective power loss
X302-7ECC	24 to 48 VDC	0.8 to 0.4 A	17 W
	100 to 240 VAC / 60 to 250 VDC	0.4 to 0.3 A (AC) 0.3 to 0.1 A (DC)	18 to 19 W (AC) 17 to 18 W (DC)
X307-2ECC	24 to 48 VDC	0.5 to 0.3 A	12 W
	100 to 240 VAC / 60 to 250 VDC	0.3 to 0.2 A (AC) 0.3 to 0.1 A (DC)	12 to 13 W (AC) 12 to 13 W (DC)

Table 9-45 Electrical data: Overcurrent protection

Device version (power supply)	**Overcurrent protection of the power supply Non-replaceable fuse**
1 power supply unit 24 to 48 VDC	1 x T4A / 125 V
2 power supply units 24 to 48 VDC	2 x T4A / 125 V
1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	1 x T4A / 250 V (AC) 1 x T4A / 300 V (DC)
2 x power supply units 100 to 240 VAC / 60 to 250 VDC	2 x T4A / 250 V (AC) 2 x T4A / 300 V (DC)

Table 9-46 Electrical data: Signaling contact

Device version (power supply)	**Voltage via signaling contact**	**Switching capacity (resistive load)**	**Resistor between F1-F2**
24 to 48 VDC	24 VDC	max. 0.1 A	< 8 Ω
100 to 240 VAC / 60 to 250 VDC	240 VAC	max. 5 A	
	60 VDC	max. 0.4 A	
	125 VDC	max. 0.22 A	
	250 VDC	max. 0.11 A	

Table 9-47 Plug-in terminal block for connectors of the power supply and signaling contact

Device version (power supply)	**Power supply**	**Signaling contact**
1 power supply unit 24 to 48 VDC	1 x 4-pin male connector	1 x 2-pin male connector
2 power supply units 24 to 48 VDC	2 x 4-pin male connector	2 x 2-pin connector [1]
1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	1 x 3-pin male connector	1 x 3-pin male connector
2 x power supply units 100 to 240 VAC / 60 to 250 VDC	2 x 3-pin male connector	2 x 3-pin connector [1]

[1] For redundant design connect the signaling contacts in parallel.

Table 9-48 Electrical data: Transmitter output (optical) and receiver input

Transmitter output (optical) [1]		**Receiver input [1]**	
min. [dBm]	**max. [dBm]**	**Sensitivity min. [dBm]**	**Input power max. [dBm]**
-19	-14	-32	-14

[1] Values for glass fiber: 62.5 to 125 µm multimode

Table 9-49 Overvoltage category

General	Overvoltage category II
In the application range of EN 60255-27	Overvoltage category III

9.5.3 Cable lengths

Table 9-50 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	**Accessory (plug, outlet, TP cord)**	**Permitted cable length**
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 9-51 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	**Accessory (plug, outlet, TP cord)**	**Permitted cable length**
IE FC Standard Cable, 4 × 2, 24 AWG IE FC Flexible Cable, 4 × 2, 24 AWG	with IE FC RJ-45 Plug 180, 4 × 2	0 to 90 m
IE FC Standard Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC Flexible Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Table 9-52 Permitted cable lengths (fiber-optic cable - Fast Ethernet)

Fiber-optic cable type	**Permitted cable length**	**Attenuation**
62.5/125 µm 50/125 µm,	0 to 5 km	≤1 dB/km at 1310 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin

9.5.4 Other properties

Switching properties

Max. number of learnable addresses	8000
Aging time	30 sec
Switching technique	Store and forward
Latency	5 µs

Reconfiguration times for redundancy mechanisms

Redundancy mechanism	Reconfiguration times
HRP	300 ms
Standby link	300 ms
MRP	200 ms

Mean time between failure (MTBF)

Device variant	Device version	MTBF[1)]
X302-7EEC	1 x power supply unit 24 V DC	27 years
	2 x power supply unit 24 V DC	19 years
	1 x power supply unit 100 to 240 V AC / 60 to 250 V DC	22 years
	2 x power supply unit 100 to 240 V AC / 60 to 250 V DC	15 years
X307-2EEC	1 x power supply unit 24 V DC	29 years
	2 x power supply unit 24 V DC	20 years
	1 x power supply unit 100 to 240 V AC / 60 to 250 V DC	24 years
	2 x power supply unit 100 to 240 V AC / 60 to 250 V DC	16 years

1) These values apply at 40 °C.

Note

The IE Switches X-300 support "full wire speed switching" complying with IEEE 802.3 on all ports. The number of packets therefore depends on the packet length.

Full wire speed switching

Number of frames per second		At a frame length of
At 100 Mbps	At 1000 Mbps	
148810	1488095	64 bytes
84459	844595	128 bytes
45290	452899	256 bytes
23496	234962	512 bytes
11973	119732	1024 bytes

Number of frames per second		At a frame length of
At 100 Mbps	**At 1000 Mbps**	
9615	96154	1280 bytes
8127	81274	1518 bytes

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame delay time. When a frame passes through the switch, this is delayed by the Store&Forward function of the IE Switch X-300 by the following values:

- at 64 bytes frame length: Delay of approx. 10 microseconds (at 100 Mbps)
- at 1500 bytes frame length: Delay of approx. 130 microseconds (at 100 Mbps)

This means, the more IE Switches X-300 a frame runs through, the higher the frame delay.

PRP compatibility

Device variant	As of version *
X302-7EEC X307-2EEC	V3.7.0

***** Information about the firmware version (V) as of which PRP is supported.

Note

For a device to be used in PRP networks, it must be able to process a frame length of at least 1528 bytes (Jumbo Frames). This value is the maximum frame length including VLAN tag of 1522 bytes plus the length of the PRP trailer of 6 bytes. The following table shows the version as of which the devices are PRP-compatible.

9.6 XR-300M EEC technical specifications

Note

Validity of the technical specifications

All the technical specifications described in this section that is not assigned to a specific device variant, version or a media module, apply to all device variants/versions of the product group.

9.6.1 Construction, installation and environmental conditions

Table 9-53 Construction

Device	Device version (power supply)	Dimensions (W x H x D)	Weight	Degree of protection
XR324-4M EEC	1 x 24 to 48 VDC	483 × 44 × 305 mm	6500 g	IP20
	2 x 24 to 48 VDC	483 × 44 × 305 mm	6800 g	IP20
	1 x 100 to 240 VAC / 60 to 250 VDC	483 × 44 × 305 mm	6600 g	IP20
	2 x 100 to 240 VAC / 60 to 250 VDC	483 × 44 × 305 mm	7000 g	IP20

Table 9-54 Installation options

Device	Installation options
XR324-4M EEC	19" rack [1]

[1] Note: If mechanical load is high, the device should be secured at four points. You will find more detailed information in the section "Mechanical load in operation".

Table 9-55 Permitted ambient conditions

Storage/transport temperature	-40 °C to +85 °C
Max. relative humidity in operation at 25 °C	<= 95% (no condensation)
Max. ambient temperature at operating altitude	2000 m or above: -5 °C of the max. operating temperature[1] 3000 m or above: -10 °C of the max. operating temperature[1]

[1] See table: "Operating temperature depending on the media modules used"

Table 9-56 Operating temperature depending on the media modules used

Media module [1]	Installation direction	Operating temperature [2]
Without media module	Horizontal	-40 °C to +70 °C
	Vertical	-40 °C to +50 °C

Media module [1]	**Installation direction**	**Operating temperature** [2]
MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD MM991-2 MM991-2FM MM991-2LD MM991-2 (SC) MM991-2LD (SC) MM992-2 MM992-2 (C) MM992-2LD	Horizontal	-40 °C to +70 °C
	Vertical	-40 °C to +50 °C
MM991-2LH+ (SC) MM992-2LH MM992-2LH+ MM992-2ELH	Horizontal	Maximum 2 modules in slots 3 and 4: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Horizontal	-40 °C to +70 °C Pluggable transceivers of this group may only be used in conjunction with media modules MM992-2CUC, MM992-2CU and MM992-2M12. When using other modules: -40 °C to +60 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1LH+ SFP992-1+ SFP992-1LH SFP992-1LH+ SFP992-1ELH SFP991-1ELH200	Horizontal	Max. 2 modules in slots 3 and 4: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +55 °C
MM991-2P		Maximum 2 modules in slots 3 and 4: The slot above an MM991-2P may be used as follows: • Without media module: - 25 °C to + 50 °C • With media module MM992-2CUC or MM992-2CU: - 25 °C to + 40 °C

[1] Only hardware product version 02 of the media modules is permitted.
The hardware product version is shown on the product. You can also read out this information from the device with the WBM or the CLI.

[2] The permitted operating temperature depends on how the mounting device was installed. The installation is horizontal if the device labeling is from left to right. With a vertical installation, the device labeling is rotated through 90°.

9.6.2 Connectors and electrical data

Table 9-57 Connection for end devices or network components

Max. number	24 ports
Electrical	16 x RJ-45 jacks 10/100/1000 Mbps
Media module slots	4 x modular (2 ports per slot)
	12 x modular (2 ports per slot)
Transmitter output (optical) and receiver input	The values correspond to those of the permitted MM900 media modules and SFP transceivers.
Diagnostics port	RJ-11 jack

Table 9-58 Electrical data: Power supply

Device version (power supply)	**Redundant power supply unit**	**Redundant power supply possible**	**Power supply (min./max. range)**
1 x 24 to 48 VDC	No	Yes	24 to 48 VDC (19.2 to 57.6 VDC)
2 x 24 to 48 VDC	Yes	Yes	24 to 48 VDC (19.2 to 57.6 VDC)
1 x 100 to 240 VAC / 60 to 250 VDC	No	No	100 to 240 VAC (80 to 276 VAC) 60 to 250 VDC (48 to 300 VDC)
2 x 100 to 240 VAC / 60 to 250 VDC	Yes	No	100 to 240 VAC (80 to 276 VAC) 60 to 250 VDC (48 to 300 VDC)

Table 9-59 Electrical data: Current consumption and power loss

Device version (power supply)	**Current consumption**	**Effective power loss**
24 to 48 VDC	1.6 to 0.75 A	40 W
100 to 240 VAC / 60 to 250 VDC	0.6 to 0.37 A (AC) 0.7 to 0.17 A (DC)	42 W (AC) 42 W (DC)

Table 9-60 Electrical data: Overcurrent protection

Device version (power supply)	**Overcurrent protection of the power supply Non-replaceable fuse**
1 x 24 to 48 VDC	1 x T2H / 250 V
2 x 24 to 48 VDC	2 x T2H / 250 V
1 x 100 to 240 VAC / 60 to 250 VDC	1 x T2H / 250 V (AC) 1 x T2H / 300 V (DC)
2 x 100 to 240 VAC / 60 to 250 VDC	2 x T2H / 250 V (AC) 2 x T2H / 300 V (DC)

Table 9-61 Electrical data: Signaling contact

Device version (power supply)	**Voltage via signaling contact**	**Switching capacity (resistive load)**	**Resistor between F1-F2**
24 to 48 VDC	24 VDC	max. 0.1 A	< 8 Ω
100 to 240 VAC / 60 to 250 VDC	240 VAC	max. 5 A	
	60 VDC	max. 0.4 A	
	125 VDC	max. 0.22 A	
	250 VDC	max. 0.11 A	

Table 9-62 Plug-in terminal block for connectors of the power supply and signaling contact

Device version (power supply)	**Power supply**	**Signaling contact**
1 x 24 to 48 VDC	1 x 4-pin	1 x 2-pin
2 x 24 to 48 VDC	2 x 4-pin	2 x 2-pin
1 x 100 to 240 VAC / 60 to 250 VDC	1 x 3-pin	1 x 3-pin
2 x 100 to 240 VAC / 60 to 250 VDC	2 x 3-pin	2 x 3-pin

Table 9-63 Overvoltage category

General	Overvoltage category II
In the application range of EN 60255-27	Overvoltage category III

9.6.3 Cable lengths

Table 9-64 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 9-65 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE FC Standard Cable, 4 × 2, 24 AWG IE FC Flexible Cable, 4 × 2, 24 AWG	with IE FC RJ-45 Plug 180, 4 × 2	0 to 90 m
IE FC Standard Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC Flexible Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Note

Permitted cable lengths (fiber-optic cable - Fast Ethernet or gigabit)

The values correspond to those of the permitted MM900 media modules and SFP transceivers.

9.6.4 Block architecture

Block architecture with SCALANCE XR-300 devices

The XR324-12M and XR324-4M handle the Ethernet frame traffic of the 24 ports with the aid of three switch blocks.

- The three switch blocks are connected in series (block 1 via block 2 to block 3)
- Gigabit wire speed is possible within a block (max. 8 ports per block).
- Between the blocks there is a bandwidth of 1 gigabit/s available,that must be shared by all ports for frame traffic between the blocks.

When operating solely with Fast Ethernet (100 Mbps), the XR devices support full wire speed via all blocks.

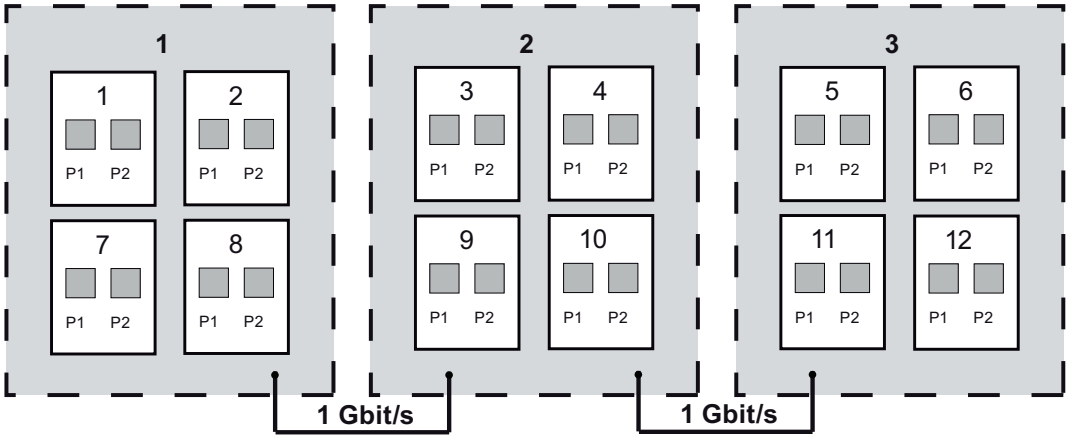


Figure 9-3 Block architecture of the XR324-12M

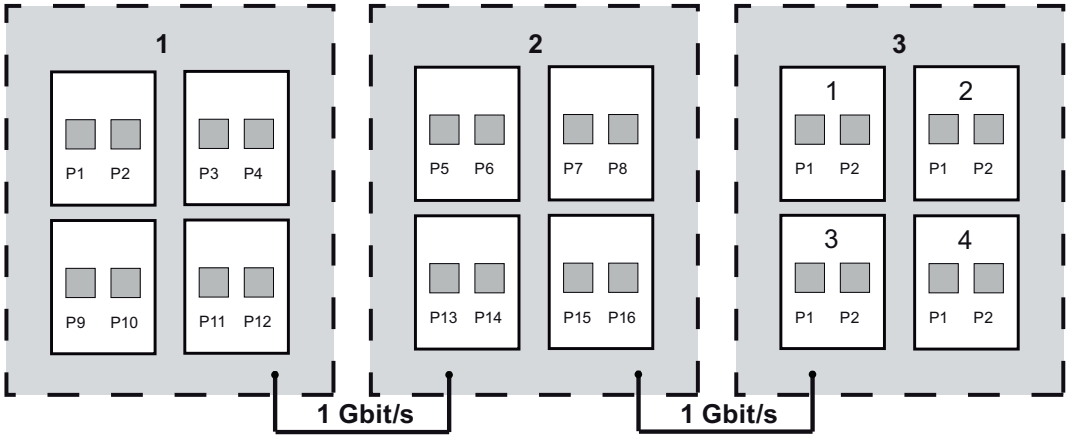


Figure 9-4 Block architecture of the XR324-4M

9.6.5 Other properties

Switching properties

Max. number of learnable addresses	8000
Aging time	30 sec
Switching technique	Store and forward
Latency	5 µs

Reconfiguration times for redundancy mechanisms

Redundancy mechanism	Reconfiguration times
HRP	300 ms
Standby link	300 ms
MRP	200 ms

Mean time between failure (MTBF)

The values in the following table apply to the basic device without media modules.

Device version (power supply)	MTBF [1]
1 x 24 to 48 V DC or 1 x 100 to 240 V AC / 60 to 250 V DC	> 15 years
2 x 24 to 48 V DC or 2 x 100 to 240 V AC / 60 to 250 V DC	> 15 years [2]

1) These values apply at 40 °C.

2) The redundant power supply unit increases the reliability of the system. The MTBF value of the power supply unit is > 20 years.

In the calculation of the MTBF of a modular switch, the standard parts count applies; in other words, the reciprocals of all component failure rates are added.

The reciprocal of this total id the MTBF of the entire assembly.

$$MTBF_{total} = \frac{1}{\left(\frac{1}{MTBF_{basic\ device}} + \frac{1}{MTBF_{module\ 1}} + \ldots + \frac{1}{MTBF_{module\ n}}\right)}$$

Full wire speed switching

Number of frames per second		At a frame length of
At 100 Mbps	At 1000 Mbps	
148810	1488095	64 bytes
84459	844595	128 bytes
45290	452899	256 bytes
23496	234962	512 bytes
11973	119732	1024 bytes

Number of frames per second		At a frame length of
At 100 Mbps	**At 1000 Mbps**	
9615	96154	1280 bytes
8127	81274	1518 bytes

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame delay time. When a frame passes through the switch, this is delayed by the Store&Forward function of the IE Switch X-300 by the following values:

- at 64 bytes frame length: Delay of approx. 10 microseconds (at 100 Mbps)
- at 1500 bytes frame length: Delay of approx. 130 microseconds (at 100 Mbps)

This means, the more IE Switches X-300 a frame runs through, the higher the frame delay.

PRP compatibility

Device variant	As of version *
XR324-4M EEC	V3.7.0

***** Information about the firmware version (V) as of which PRP is supported.

Note

For a device to be used in PRP networks, it must be able to process a frame length of at least 1528 bytes (Jumbo Frames). This value is the maximum frame length including VLAN tag of 1522 bytes plus the length of the PRP trailer of 6 bytes. The following table shows the version as of which the devices are PRP-compatible.

9.7 X-300M PoE technical specifications

Note

Validity of the technical specifications

All the technical specifications described in this section that is not assigned to a specific device variant, version or a media module, apply to all device variants/versions of the product group.

9.7.1 Construction, installation and environmental conditions

Table 9-66 Construction

Dimensions (W x H x D)	120 × 125 × 124 mm
Weight	1150 g
Degree of protection	IP20

Table 9-67 Installation options

Installation options	• DIN rail [1)] • S7-300 standard rail • Wall

[1)] Note: When used in shipbuilding, installation on a 35 mm DIN rail is not permitted. In ships, the 35 mm DIN rail does not provide adequate support.

Table 9-68 Permitted ambient conditions

Storage/transport temperature	-40 °C to +85 °C
Max. relative humidity in operation at 25 °C	<= 95% (no condensation)
Max. ambient temperature at operating altitude	2000 m or above: -5 °C of the max. operating temperature[1)] 3000 m or above: -10 °C of the max. operating temperature[1)]

[1)] See table: "Operating temperature depending on the media modules used"

Table 9-69 Operating temperature depending on the media modules used

Media module [1)]	**Installation direction**	**Operating temperature [2)]**
Without media module	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +45 °C
MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD MM991-2 MM991-2FM MM991-2LD MM991-2 (SC) MM991-2LD (SC) MM992-2 MM992-2 (C) MM992-2LD	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +45 °C

Media module [1]	**Installation direction**	**Operating temperature** [2]
MM991-2LH+ (SC) MM992-2LH MM992-2LH+ MM992-2ELH	Horizontal	-40 °C to +50 °C
	Vertical	-40 °C to +45 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +45 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1LH+ SFP992-1+ SFP992-1LH SFP992-1LH+ SFP992-1ELH SFP991-1ELH200	Horizontal	-40 °C to +50 °C
	Vertical	-40 °C to +45 °C
MM991-2P		- 25 °C to + 40 °C

1) Only hardware product version 02 of the media modules is permitted.
The hardware product version is shown on the product. You can also read out this information from the device with the WBM or the CLI.

2) The permitted operating temperature depends on how the mounting device was installed. The installation is horizontal if the device labeling is from left to right. With a vertical installation, the device labeling is rotated through 90°.

9.7.2 Connectors and electrical data

Table 9-70 Connection for end devices or network components

Max. number	8 ports
Electrical	4 x RJ-45 jacks, MDI-X pinning, 10/100/1000 Mbps (half/full duplex) power supply for connected devices (PDs) using Power over Ethernet (PoE) according to IEEE 802.3af / 802.3at (type 1)
Media module slots	2 x modular (2 ports per slot)
Transmitter output (optical) and receiver input	The values correspond to those of the permitted MM900 media modules and SFP transceivers.

Table 9-71 Electrical data: Power supply

Rated voltage	**Voltage range**	**Permitted voltage range including total ripple**
24 VDC	19.2 VDC - 28.8 VDC	18.5 VDC - 30.2 VDC

Table 9-72 Electrical data: Power consumption and redundancy

Current consumption	2 A
Max. power consumption (incl. PoE power supply of the connected PoE devices (PDs))	48 W
Power loss at 24 VDC	17 W
Overcurrent protection of the power supply Non-replaceable fuse	3 A / 32 V and 5 A / 125 V (PoE)
Redundant power supply unit	No
Redundant power supply possible	Yes

Table 9-73 Electrical data: Signaling contact

Voltage via signaling contact	24 VDC
Switching capacity (resistive load)	max. 100 mA
Resistor between F1-F2	< 8 Ω

Table 9-74 Plug-in terminal block for connectors of the power supply and signaling contact

Power supply	1 x 4-pin male connector
Signaling contact	1 x 2-pin male connector

Table 9-75 Power over Ethernet at port P1, P2, P3, P4

PoE function within a power supply system	According to IEEE 802.3af / 802.3at (type 1) for environment A
Method of PoE power feed	Alternative A (refer to the following table for the pin assignment)
Reserved power per port	15.4 W at port, of which the following can be used by the PD: 12.95 W
Overall power on all 4 ports	Max. 30.8 W

Table 9-76 Electrical isolation

Between the ports	No
Between ports and ground	Yes
Between ports and 24 VDC power input	Yes

Table 9-77 Pin assignment of the Ethernet ports of the SCALANCE PoE switch

Pin number / wire [1)]	**Assignment for data transmission**	**Assignment for power transfer (PoE).** **Alternative A (MDI-X)**
Pin 1	RX+	V-
Pin 2	RX-	V-
Pin 3	TX+	V+
Pin 4	-	-
Pin 5	-	-
Pin 6	TX-	V+
Pin 7	-	-
Pin 8	-	-

1) with 4-wire industrial twisted-pair cables, the wires are connected to pins 1, 2, 3 and 6.

9.7.3 Cable lengths

Table 9-78 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	**Accessory (plug, outlet, TP cord)**	**Permitted cable length**
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 9-79 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	**Accessory (plug, outlet, TP cord)**	**Permitted cable length**
IE FC Standard Cable, 4 × 2, 24 AWG IE FC Flexible Cable, 4 × 2, 24 AWG	with IE FC RJ-45 Plug 180, 4 × 2	0 to 90 m
IE FC Standard Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC Flexible Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Note

Permitted cable lengths (fiber-optic cable - Fast Ethernet or gigabit)

The values correspond to those of the permitted MM900 media modules and SFP transceivers.

9.7.4 Other properties

Switching properties

Max. number of learnable addresses	8000
Aging time	30 sec
Switching technique	Store and forward
Latency	5 µs

Reconfiguration times for redundancy mechanisms

Redundancy mechanism	Reconfiguration times
HRP	300 ms
Standby link	300 ms
MRP	200 ms

Mean time between failure (MTBF)

The value in the following table applies to the basic device without media modules.

MTBF	> 30 years [1)]

[1)] This value applies at 40 °C.

In the calculation of the MTBF of a modular switch, the standard parts count applies; in other words, the reciprocals of all component failure rates are added.

The reciprocal of this total id the MTBF of the entire assembly.

$$MTBF_{total} = \frac{1}{\left(\frac{1}{MTBF_{basic\ device}} + \frac{1}{MTBF_{module\ 1}} + \ldots + \frac{1}{MTBF_{module\ n}}\right)}$$

Note

The IE Switches X-300 support "full wire speed switching" complying with IEEE 802.3 on all ports. The number of packets therefore depends on the packet length.

Full wire speed switching

Number of frames per second		At a frame length of
At 100 Mbps	**At 1000 Mbps**	
148810	1488095	64 bytes
84459	844595	128 bytes
45290	452899	256 bytes
23496	234962	512 bytes
11973	119732	1024 bytes
9615	96154	1280 bytes
8127	81274	1518 bytes

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame delay time. When a frame passes through the switch, this is delayed by the Store&Forward function of the IE Switch X-300 by the following values:

- at 64 bytes frame length: Delay of approx. 10 microseconds (at 100 Mbps)
- at 1500 bytes frame length: Delay of approx. 130 microseconds (at 100 Mbps)

This means, the more IE Switches X-300 a frame runs through, the higher the frame delay.

PRP compatibility

Device variant	As of version *
X308-2M PoE	V3.7.0

***** Information about the firmware version (V) as of which PRP is supported.

Note

For a device to be used in PRP networks, it must be able to process a frame length of at least 1528 bytes (Jumbo Frames). This value is the maximum frame length including VLAN tag of 1522 bytes plus the length of the PRP trailer of 6 bytes. The following table shows the version as of which the devices are PRP-compatible.

9.8 XR-300M PoE technical specifications

Note

Validity of the technical specifications

All the technical specifications described in this section that is not assigned to a specific device variant, version or a media module, apply to all device variants/versions of the product group.

9.8.1 Construction, installation and environmental conditions

Table 9-80 Construction

Dimensions (W x H x D)	449 × 43.6 × 305 mm
Weight	6800 g
Degree of protection	IP20 (with closed service panel)

Table 9-81 Installation options

Device version (power supply)	**Installation options**
24 VDC	• 19" rack • Desktop operation with adhesive feet
100 to 240 VAC	19" rack

Table 9-82 Permitted ambient conditions

Storage/transport temperature	-40 °C to +85 °C
Max. relative humidity in operation at 25 °C	<= 95% (no condensation)
Max. ambient temperature at operating altitude	2000 m or above: -5 °C of the max. operating temperature[1)] 3000 m or above: -10 °C of the max. operating temperature[1)]

[1)] See table: "Operating temperature depending on the media modules used"

Table 9-83 Operating temperature depending on the media modules used

Media module [1)]	**Installation direction**	**Operating temperature [2)]**
Without media module	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +50 °C
MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD MM991-2 MM991-2FM MM991-2LD MM991-2 (SC) MM991-2LD (SC) MM992-2 MM992-2 (C) MM992-2LD	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +50 °C

Media module [1]	**Installation direction**	**Operating temperature** [2]
MM991-2LH+ (SC) MM992-2LH MM992-2LH+ MM992-2ELH	Horizontal	Maximum 2 modules in slots 3 and 4: -40 °C ... +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Horizontal	-40 °C to +60 °C
	Vertical	-40 °C to +50 °C
Media module MM992-2SFP with pluggable transceiver SFP991-1LH+ SFP992-1+ SFP992-1LH SFP992-1LH+ SFP992-1ELH SFP991-1ELH200	Horizontal	Maximum 2 modules in slots 3 and 4: -40 °C ... +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C
MM991-2P		Maximum 2 modules in slots 3 and 4: The slot above an MM991-2P may be used as follows: • Without media module: - 25 °C to + 50 °C • With media module MM992-2CUC or MM992-2CU: - 25 °C to + 40 °C

1) Only hardware product version 02 of the media modules is permitted.
The hardware product version is shown on the product. You can also read out this information from the device with the WBM or the CLI.

2) The permitted operating temperature depends on how the mounting device was installed. The installation is horizontal if the device labeling is from left to right. With a vertical installation, the device labeling is rotated through 90°.

9.8.2 Connectors and electrical data

Table 9-84 Connection for end devices or network components

Max. number	24 ports
Electrical	Port 1 to 8 8 x RJ-45 jacks, MDI-X pinning, 10/100/1000 Mbps (half/full duplex) power supply for connected devices (PDs) using Power over Ethernet (PoE) according to IEEE 802.3af / 802.3at (type 1) Port 9 to 16: 8 x RJ-45 jacks with MDI-X assignment 10/100/1000 Mbps (half / full duplex)

Media module slots	4 x modular (2 ports per slot)
Transmitter output (optical) and receiver input	The values correspond to those of the permitted MM900 media modules and SFP transceivers.
Diagnostics port	RJ-11 jack

Table 9-85 Electrical data: Power supply

Device version (power supply)	**Redundant power supply unit**	**Redundant power supply possible**	**Power supply**	
24 VDC	No	Yes	Rated voltage	24 VDC
			Voltage range	19.2 VDC - 28.8 VDC
			Permitted voltage range incl. total ripple	18.5 VDC - 30.2 VDC
100 to 240 VAC	No	No	100 to 240 VAC (85 to 264 V)	

Table 9-86 Electrical data: Current consumption and power loss

Device version (power supply)	**Current consumption**	**Effective power loss**	**Max. power consumption [1)]**
24 VDC	4.2 A	46 W	100 W
100 to 240 VAC	1.3 ... 0.7 A	42 W	96 W

1) incl. PoE power supply of the connected PoE devices (PDs)

Table 9-87 Electrical data: Overcurrent protection

Device version (power supply)	**Overcurrent protection of the power supply Non-replaceable fuse**
24 VDC	T 5 A / 250 V
100 to 240 VAC	T 2 A / 500 V

Table 9-88 Electrical data: Signaling contact

Voltage via signaling contact	24 VDC
Switching capacity (resistive load)	max. 100 mA
Resistor between F1-F2	< 8 Ω

Table 9-89 Plug-in terminal block for connectors of the power supply and signaling contact

Device version (power supply)	**Power supply**	**Signaling contact**
24 VDC	1 x 4-pin	1 x 2-pin
100 to 240 VAC	1 x 2-pin	1 x 2-pin

Table 9-90 Power over Ethernet at port P1 to P8

PoE function within a power supply system	According to IEEE 802.3af / 802.3at (type 1) for environment A
Method of PoE power feed	Alternative A (refer to the following table for the pin assignment)
Reserved power per port	15.4 W at port, of which the following can be used by the PD: 12.95 W
Overall power on all PoE ports	Max. 53.2 W

Table 9-91 Electrical isolation

Between ports P1 to P8	No
Between ports P9 to P16	Yes
Between port groups P1 to P8 and P9 to P16	Yes
Between ports and ground	Yes
Between ports and 24 VDC / 230 VAC power input	Yes

Table 9-92 Pin assignment of the Ethernet ports of the SCALANCE PoE switch

Pin number / wire [1)]	**Assignment for data transmission**	**Assignment for power transfer (PoE).** **Alternative A (MDI-X)**
Pin 1	RX+	V-
Pin 2	RX-	V-
Pin 3	TX+	V+
Pin 4	-	-
Pin 5	-	-
Pin 6	TX-	V+
Pin 7	-	-
Pin 8	-	-

1) with 4-wire industrial twisted-pair cables, the wires are connected to pins 1, 2, 3 and 6.

9.8.3 Cable lengths

Table 9-93 Permitted cable lengths (copper cable - Fast Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE TP torsion cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 55 m
IE FC TP Marine Cable IE FC TP Trailing Cable IE FC TP Flexible Cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 85 m
IE FC TP standard cable	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	with IE FC RJ-45 Plug 180	0 to 100 m

Table 9-94 Permitted cable lengths (copper cable - gigabit Ethernet)

Cable type	Accessory (plug, outlet, TP cord)	Permitted cable length
IE FC Standard Cable, 4 × 2, 24 AWG IE FC Flexible Cable, 4 × 2, 24 AWG	with IE FC RJ-45 Plug 180, 4 × 2	0 to 90 m
IE FC Standard Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
IE FC Flexible Cable, 4 × 2, 22 AWG	with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

Note

Permitted cable lengths (fiber-optic cable - Fast Ethernet or gigabit)

The values correspond to those of the permitted MM900 media modules and SFP transceivers.

9.8.4 Block architecture

Block architecture of the SCALANCE XR-300M PoE

The XR-300M PoE handles the Ethernet frame traffic of the 24 ports with the aid of three switch blocks.

- The three switch blocks are connected in series (block 1 via block 2 to block 3).
- Gigabit wire speed is possible within a block (max. 8 ports per block).
- Between the blocks there is a bandwidth of 1 gigabit/s available,that must be shared by all ports for frame traffic between the blocks.

When operating solely with Fast Ethernet (100 Mbps), the XR devices support full wire speed via all blocks.

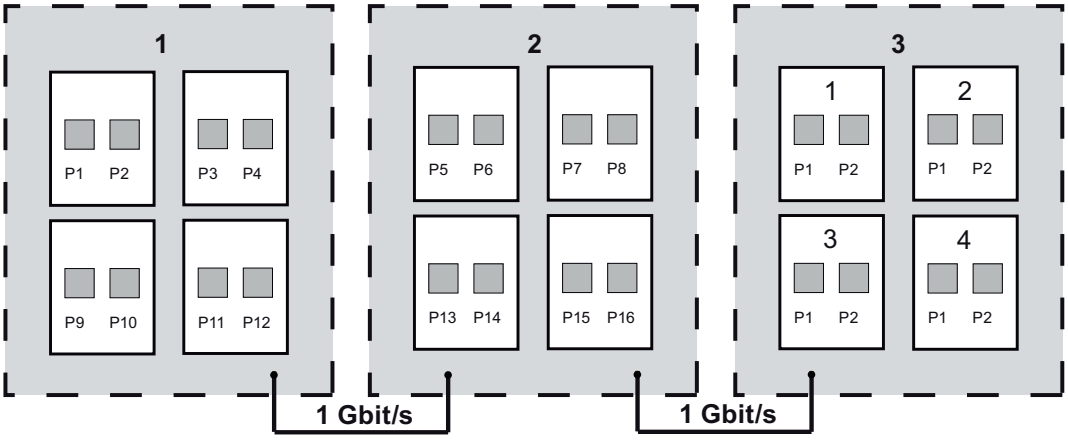


Figure 9-5 Block architecture of the XR324-4M

9.8.5 Other properties

Switching properties

Max. number of learnable addresses	8000
Aging time	30 sec
Switching technique	Store and forward
Latency	5 µs

Reconfiguration times for redundancy mechanisms

Redundancy mechanism	Reconfiguration times
HRP	300 ms
Standby link	300 ms
MRP	200 ms

Mean time between failure (MTBF)

The value in the following table applies to the basic device without media modules.

MTBF	> 15 years [1]

[1] This value applies at 40 °C.

In the calculation of the MTBF of a modular switch, the standard parts count applies; in other words, the reciprocals of all component failure rates are added.

The reciprocal of this total id the MTBF of the entire assembly.

$$MTBF_{total} = \frac{1}{\left(\frac{1}{MTBF_{basic\ device}} + \frac{1}{MTBF_{module\ 1}} + \ldots + \frac{1}{MTBF_{module\ n}}\right)}$$

Full wire speed switching

Number of frames per second		At a frame length of
At 100 Mbps	**At 1000 Mbps**	
148810	1488095	64 bytes
84459	844595	128 bytes
45290	452899	256 bytes
23496	234962	512 bytes
11973	119732	1024 bytes
9615	96154	1280 bytes
8127	81274	1518 bytes

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame delay time. When a frame passes through the switch, this is delayed by the Store&Forward function of the IE Switch X-300 by the following values:

- at 64 bytes frame length: Delay of approx. 10 microseconds (at 100 Mbps)
- at 1500 bytes frame length: Delay of approx. 130 microseconds (at 100 Mbps)

This means, the more IE Switches X-300 a frame runs through, the higher the frame delay.

PRP compatibility

Device variant	As of version *
XR324-4M PoE	V3.7.0
XR324-4M PoE TS	V3.7.x

***** Information about the firmware version (V) as of which PRP is supported.

Note

For a device to be used in PRP networks, it must be able to process a frame length of at least 1528 bytes (Jumbo Frames). This value is the maximum frame length including VLAN tag of 1522 bytes plus the length of the PRP trailer of 6 bytes. The following table shows the version as of which the devices are PRP-compatible.

9.9 MM900 technical specifications

Note

Validity of the technical specifications

All the technical specifications described in this section that are not specific to a product version, apply to the MM900 media module.

9.9.1 Construction, installation and environmental conditions

Table 9-95 Construction

Dimensions (W x H x D)	60 × 22 × 100 mm
Weight	80 g

Table 9-96 Operating temperature depending on the media modules used [1) 2)]

Type	Installation location	Without media module	MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD MM991-2 (BFOC) MM991-2FM (BFOC) MM991-2LD (BFOC) MM991-2 (SC) MM991-2LD (SC) MM992-2 (SC) MM992-2 (SC) (C) MM992-2LD (SC)	MM991-2LH+ (SC) MM992-2LH (SC) MM992-2LH+ (SC) MM992-2ELH(SC)	Media module MM992-2SFP with SFP transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD	Media module MM992-2SFP with SFP transceiver SFP991-1LH+ SFP992-1+ SFP992-1LH SFP992-1LH+ SFP992-1ELH SFP991-1ELH200
X-300M	Horizontal	-40 °C to +70 °C			-40 °C to +60 °C	
	Vertical	-40 °C to +50 °C				
X-300M PoE	Horizontal	-40 °C to +60 °C		-40 °C to +50 °C	-40 °C to +60 °C	-40 °C to +50 °C
	Vertical	-40 °C to +45 °C				

Type	**Installation location**	**Without media module**	**MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD MM991-2 (BFOC) MM991-2FM (BFOC) MM991-2LD (BFOC) MM991-2 (SC) MM991-2LD (SC) MM992-2 (SC) MM992-2 (SC) (C) MM992-2LD (SC)**	**MM991-2LH+ (SC) MM992-2LH (SC) MM992-2LH+ (SC) MM992-2ELH(SC)**	**Media module MM992-2SFP with SFP transceiver SFP991-1 SFP991-1LD SFP992-1 SFP992-1LD**	**Media module MM992-2SFP with SFP transceiver SFP991-1LH+ SFP992-1+ SFP992-1LH SFP992-1LH+ SFP992-1ELH SFP991-1ELH200**
XR-300M	Horizontal	Not possible (fully modular device)	-40 °C to +70 °C	Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C	-40 °C to +60 °C	Maximum 2 modules in slots 11 and 12: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	Not possible (fully modular device)	-40 °C to +50 °C			
XR-300M PoE	Horizontal	-40 °C to +60 °C		Maximum 2 modules in slots 3 and 4: -40 °C ... +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C	-40 °C to +60 °C	Maximum 2 modules in slots 3 and 4: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C				
XR-300M EEC	Horizontal	-40 °C to +70 °C		Maximum 2 modules in slots 3 and 4: -40 °C ... +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C	-40 °C to +70 °C SFP transceivers of this group can only be used in conjunction with media modules MM992-2CUC, MM992-2CUC (C) and MM992-2CU. When using other modules: -40 °C to +60 °C	Maximum 2 modules in slots 3 and 4: -40 °C to +60 °C With more than 2 modules or other slot assignment: -40 °C to +50 °C
	Vertical	-40 °C to +50 °C				

1) Only hardware product version 02 of the media modules is permitted.
The hardware product version is shown on the product. You can also read out this information from the device with the WBM or the CLI.

2) The permitted operating temperature depends on how the mounting device was installed. The installation is horizontal if the device labeling is from left to right. With a vertical installation, the device labeling is rotated through 90°.

Table 9-97 **Operating temperature with media module MM991-2P**

Type	Operating temperature
X-300M X-300M PoE	• - 25 °C to + 40 °C
XR-300M XR-300M PoE XR-300M EEC	The slot above an MM991-2P may be used as follows: • Without media module: - 25 °C to + 50 °C) • With media module MM992-2CUC or MM992-2CU: - 25 °C to + 40 °C) Note the information under "MM991-2P product characteristics".

Table 9-98 Permitted ambient conditions

Storage/transport temperature	-40 °C to +85 °C
Max. relative humidity in operation at 25 °C	<= 95% (no condensation)
Max. ambient temperature at operating altitude	As of 2000 m: -5 °C of the max. operating temperature[1)] As of 3000 m: -10 °C of the max. operating temperature[1)]

[1)] See table: "Operating temperature depending on the media modules used"

9.9.2 Connectors and electrical data

Table 9-99 Interfaces

Media module	Interfaces
MM992-2CUC	2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar
MM992-2CUC (C)	2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar, varnished
MM992-2CU	2 x 10/100/1000 Mbps, RJ-45 port electrical without securing collar
MM992-2M12 (C)	2 x 10/100/1000 Mbps, GE M12 connector electrical
MM992-2VD	2 x 10/100/1000 Mbps, RJ-45 ports electrical with securing collar
MM991-2 (BFOC)	2 x 100 Mbps, BFOC ports optical, multimode FO cable, up to max. 5 km
MM991-2FM (BFOC)	2 x 100 Mbps, BFOC port optical, for glass FO cable (multimode) with diagnostics up to max. 5 km
MM991-2LD (BFOC)	2 x 100 Mbps, BFOC ports optical, single mode FO cable, up to max. 26 km
MM991-2 (SC)	2 x 100 Mbps, SC ports optical, multimode FO cable, up to max. 5 km
MM991-2LD (SC)	2 x 100 Mbps, SC ports optical, single mode FO cable, up to max. 26 km
MM991-2LH+ (SC)	2 x 100 Mbps, SC ports optical, single mode FO cable, up to max. 70 km

Media module	Interfaces
MM991-2P (SC RJ)	2 x 100 Mbps SC RJ ports optical for Plastic Optical Fiber (POF) up to max. 50 m or Polymer Cladded Fiber (PCF) up to max. 100 m
MM992-2 (SC)	2 x 1000 Mbps, SC ports optical, multimode FO cable, up to max. 750 m
MM992-2 (C) (SC)	2 x 1000 Mbps, SC ports optical, multimode FO cable, up to max. 750 m, varnished
MM992-2LD (SC)	2 x 1000 Mbps, SC ports optical, single mode FO cable, up to max. 10 km
MM992-2LH (SC)	2 x 1000 Mbps, SC ports optical, single mode FO cable, up to max. 40 km
MM992-2LH+ (SC)	2 x 1000 Mbps, SC ports optical, single mode FO cable, up to max. 70 km
MM992-2ELH (SC)	2 x 1000 Mbps, SC ports optical, single mode FO cable, up to max. 120 km
MM992-2SFP[1)]	2 x 100/1000 Mbps, SFP media module, optical LC ports with corresponding SFP transceivers.

Table 9-100 Power supply

Power supply	(24 VDC SELV) The media modules are supplied with power by the SCALANCE device. No other power supply is permitted.

Table 9-101 Electrical data: Current consumption and power loss I

Media module	Current consumption	Effective power loss
MM992-2CUC	70 mA	1.65 W
MM992-2CUC (C)	70 mA	1.65 W
MM992-2CU	70 mA	1.65 W
MM992-2M12 (C)	70 mA	1.65 W
MM992-2VD	70 mA	1.65 W
MM991-2 (BFOC)	100 mA	2.42 W
MM991-2FM (BFOC)	100 mA	2.42 W
MM991-2LD (BFOC)	80 mA	2.04 W
MM991-2 (SC)	100 mA	2.42 W
MM991-2LD (SC)	80 mA	2.04 W
MM991-2LH+ (SC)	80 mA	2.04 W
MM991-2P (SC RJ)	140 mA	3.36 W
MM992-2 (SC)	70 mA	1.76 W
MM992-2 (C) (SC)	70 mA	1.76 W
MM992-2LD (SC)	80 mA	1.95 W
MM992-2LH (SC)	90 mA	2.11 W
MM992-2LH+ (SC)	100 mA	2.42 W
MM992-2ELH (SC)	110 mA	2.75 W

Table 9-102 Electrical data: Current consumption and power loss II

MM992-2SFP with	Current consumption	Effective power loss
SFP991-1	60 mA	1.54 W
SFP991-1LD	60 mA	1.54 W
SFP991-1LH+	70 mA	1.65 W
SFP992-1	60 mA	1.38 W
SFP992-1+	90 mA	1.97 W
SFP992-1LD	70 mA	1.60 W
SFP992-1LH	70 mA	1.71 W
SFP992-LH+	80 mA	1.93 W
SFP992-1ELH	100 mA	2.31 W
SFP991-1ELH200	100 mA	2.31 W

Note

Fusing and signal contacts with media modules

The MM900 media modules do not have their own fuses and have no signaling contacts. The fuses and the signaling contacts exist in the SCALANCE device.

Table 9-103 Electrical data: Transmitter output (optical) and receiver input

Media module	Transmitter output (optical)		Receiver input	
	min. [dBm]	max. [dBm]	Sensitivity min. [dBm]	Input power max. [dBm]
MM992-2CUC	-	-	-	-
MM992-2CUC (C)	-	-	-	-
MM992-2CU	-	-	-	-
MM992-2M12 (C)[2)]	-	-	-	-
MM992-2VD	-	-	-	-
MM991-2 (BFOC)	-19	-14	-32	-3
MM991-2FM (BFOC)	-19	-14	-32	-3
MM991-2LD (BFOC)	-15	-8	-34	-3
MM991-2 (SC)	-19	-14	-34	-3
MM991-2LD (SC)	-15	-8	-32	-3
MM991-2LH+ (SC)	-5	0	-34	-3
MM991-2P (SC RJ)	-8	-2	-23	+1
MM992-2 (SC)	-9.5	-4	-17	-3
MM992-2 (C) (SC)	-9.5	-4	-17	-3
MM992-2LD (SC)	-9.5	-3	-21	-3
MM992-2LH (SC)	-6	0	-23	-3
MM992-2LH+ (SC)	0	5	-23	-3
MM992-2ELH (SC)	0	5	-30	-3
MM992-2SFP[1)]	-	-	-	-

[1] You will find further information in the compact operating instructions "Transceiver SFP/SFP+".

[2] The ports of the MM992-2M12 (C) only meet the requirements according to Environment A (IEEE 802.3), in other words, the electrical isolation of the ports is designed for 500 Vrms (1 minute).

9.9.3 Cable lengths

Copper cables

Table 9-104 Permitted cable lengths (copper cable - Fast Ethernet)

Media module	Cable	Permitted cable length
MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD (without VD)[1]	IE TP torsion cable with IE FC Outlet RJ-45 + 10 m TP cord	0 to 45 m + 10 m TP cord
	IE TP torsion cable with IE FC RJ-45 Plug 180	0 to 55 m
	IE FC TP marine/trailing/flexible cable with IE FC Outlet RJ-45 + 10 m TP cord	0 to 75 m + 10 m TP cord
	IE FC TP marine/trailing/ flexible cable with IE FC RJ-45 Plug 180	0 to 85 m
	IE FC TP standard cable with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord
	IE FC TP standard cable with IE FC RJ-45 plug 180	0 to 100 m
MM992-2VD (with VD)[2]	IE FC TP standard cable GP 4X2 (24 AWG) with IE FC RJ-45 plug 4x2	0 to 500 m at 100 Mbps
	IE FC TP standard cable GP 2x2 with IE FC RJ-45 plug 2x2	0 to 300 m at 100 Mbps.
	IE FC TP standard cable GP 2x2 with IE FC RJ-45 plug 2x2	300 to 500 m at 10 Mbps
	PROFIBUS FC standard cable GP with IE FC RJ-45 plug 4x2	100 to 1000 m at 10 Mbps
	PROFIBUS FC standard cable GP with IE FC RJ-45 plug 4x2	0 to 100 m at 100 Mbps.

[1] The VD mode (Variable Distance) is turned off.

[2] The VD mode (Variable Distance) is turned on.

Table 9-105 Permitted cable lengths (copper cable - gigabit Ethernet)

Media module	Cable	Permitted cable length
MM992-2CUC MM992-2CUC (C) MM992-2CU MM992-2M12 (C) MM992-2VD (without VD)[1) 2)]	IE FC standard cable, 4×2, 24 AWG IE FC flexible cable, 4×2, 24 AWG with IE FC RJ-45 Plug 180, 4x2	0 to 90 m
	IE FC standard cable, 4×2, 22 AWG with IE FC Outlet RJ-45 + 10 m TP cord	0 to 60 m + 10 m TP cord
	IE FC flexible cable, 4×2, 22 AWG with IE FC Outlet RJ-45 + 10 m TP cord	0 to 90 m + 10 m TP cord

1) The VD mode (Variable Distance) is turned off.

2) If the VD mode is turned on, the speed is reduced to 100 Mbps. For permitted cable lengths, see table Fast Ethernet.

Fiber-optic cables

Table 9-106 Permitted cable lengths (fiber-optic cable - Fast Ethernet)

Media module	Fiber-optic cable type	Max. permitted cable length	Attenuation
MM991-2 (BFOC)	50/125 µm multimode fiber	5 km	≤1 dB/km at 1300 nm;1200 MHz*km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
	62.5/125 µm multi-mode fiber	5 km	≤1 dB/km at 1300 nm; 1200 MHz*km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
MM991-2FM (BFOC)	50/125 µm multimode fiber	5 km	≤1 dB/km at 1300 nm;1200 MHz*km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
	62.5/125 µm multi-mode fiber	5 km	≤1 dB/km at 1300 nm; 1200 MHz*km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
MM991-2LD (BFOC)	9/125 µm single mode fiber	26 km	≤0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 14 dB max. permitted FO cable attenuation at 2 dB link power margin
MM991-2 (SC)	50/125 µm multimode fiber	5 km	≤1 dB/km at 1300 nm;1200 MHz*km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
	62.5/125 µm multi-mode fiber	5 km	≤1 dB/km at 1300 nm; 1200 MHz*km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin
MM991-2LD (SC)	9/125 µm single mode fiber	26 km	≤0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 14 dB max. permitted FO cable attenuation at 2 dB link power margin
MM991-2LH+ (SC)	9/125 µm single mode fiber	70 km	≤0.28 dB/km at 1550 nm; maximum insertion loss 0.5 dB; 26 dB max. permitted FO cable attenuation at 2 dB link power margin, minimum cable attenuation 3 dB

Media module	Fiber-optic cable type	Max. permitted cable length	Attenuation
MM991-2P (SC RJ)	980/1000 plastic optical fiber	50 m	9 dB max. permitted FO cable attenuation with 3 dB link power margin
	200/230 polymer cladded fiber	100 m	6 dB max. permitted FO cable attenuation with 3 dB link power margin

Table 9-107 Permitted cable lengths (fiber-optic cable - gigabit Ethernet)

Media module	Fiber-optic cable type	Max. permitted cable length	Attenuation
MM992-2 (SC) MM992-2 (C) (SC)	62.5/125 µm multimode fiber	350 m	≤3.1 dB/km at 850 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 4.5 dB max. permitted FO cable attenuation at 3 dB link power margin
	50/125 µm multimode fiber	750 m	≤2.5 dB/km at 850 nm; 1200 MHz×km; maximum insertion loss 0.5 dB; 4.5 dB max. permitted FO cable attenuation at 3 dB link power margin
MM992-2LD (SC)	9/125 µm single mode fiber	10 km	≤0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 6 dB max. permitted FO cable attenuation at 3 dB link power margin
MM992-2LH (SC)	9/125 µm single mode fiber	40 km	≤0.4 dB/km at 1550 nm; maximum insertion loss 0.5 dB; 18 dB max. permitted FO cable attenuation at 2 dB link power margin, minimum cable attenuation 3 dB
MM992-2LH+ (SC)	9/125 µm single mode fiber	70 km	≤0.28 dB/km at 1550 nm; maximum insertion loss 0.5 dB; 21 dB max. permitted FO cable attenuation at 2 dB link power margin, minimum cable attenuation 8 dB
MM992-2ELH (SC)	9/125 µm single mode fiber	120 km	≤0.225 dB/km at 1550 nm; maximum insertion loss 0.5 dB; 27 dB max. permitted FO cable attenuation at 2 dB link power margin, minimum cable attenuation 8 dB

Copper / fiber-optic cables

Table 9-108 Permitted cable lengths (copper cable/fiber-optic cable) for the SFP media module

Media module	Max. permitted cable length
MM992-2SFP*)	Depending on the SFP transceiver used.

*) You will find further information in the compact operating instructions "Transceiver SFP/SFP+".

Attenuators

Transceivers of the types LH, LH+, ELH and ELH200 are designed for long distances and therefore send more power than they can receive.

If you establish a connection between such transceivers with a short cable length, use attenuators. Attenuators increase the attenuation and therefore protect the receiving diode.

Select the attenuation so that the transmit power (transmitter output) behind the attenuator is lower than the maximum received power (input power):

Transmitter output max. [dBm] - attenuator [dB] < input power max. [dBm]

Recommendation for the attenuation of the attenuator on a connection with the same transceivers:

Transceiver type	Attenuator
LH	6 dB ... 12 dB
LH+	12 dB ... 20 dB
ELH, ELH200	16 dB ... 24 dB

If you have established a connection on a pluggable transceiver with a short cable length, it is possible that the transmitter will be turned off. In this case, pull the transceiver and plug it in again.

GI-PCF

For segment lengths longer than 100 m, you can use GI-PCF cables. Note the information of the manufacturer.

9.9.4 Other properties

Table 9-109 Mean time between failure (MTBF)

Device version (power supply)	MTBF[1)]
MM992-2CUC, MM992-2CUC (C), MM992-2CU, MM992-2M12 (C)	> 250 years
MM991-2P (SC RJ)	> 230 years
MM992-2VD	> 200 years
MM991-2 (BFOC) MM991-2 (SC)	> 140 years
MM991-2FM (BFOC) MM992-2 (C) (SC)	> 135 years
MM991-2LD (BFOC) MM991-2LD (SC) MM992-2LD (LD)	> 115 years
MM991-2LH+ (SC) MM992-2LH (SC) MM992-2LH+ (SC)	> 105 years
MM992-2ELH (SC)	> 95 years
MM992-2SFP[2)]	> 250 years [3)]

1) These values apply at 40 °C

2) You will find further information in the compact operating instructions "Transceiver SFP/SFP+".

3) empty

9.10 SFP technical specifications

9.10.1 Construction, installation and environment

Table 9-110 Construction

Device: Transceiver	(Variant)	Dimensions (W x H x D) [in mm]	Weight [in g]	IP degree of protection
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	13.7 x 11.9 x 56.5	20	IP20
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	13.7 x 11.9 x 56.5	20	IP20
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	13.7 x 11.9 x 56.5	20	IP20
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	13.7 x 11.9 x 56.5	20	IP20
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	13.7 x 11.9 x 56.5	20	IP20
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	13.7 x 11.9 x 56.5	20	IP20
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	13.7 x 11.9 x 56.5	20	IP20
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	13.7 x 11.9 x 56.5	20	IP20
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	13.7 x 11.9 x 56.5	20	IP20

Table 9-111 Installation options (modular)

Device: Transceiver	(Variant)	Modular installation options:	
		Media module installation in slot	SFP installation in SFP media module
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	-	●
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	-	●
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	-	●

Device: Transceiver	(Variant)	Modular installation options:	
		Media module installation in slot	SFP installation in SFP media module
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	-	●
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	-	●
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	-	●
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	-	●
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	-	●
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	-	●
*) **Note: When used in shipbuilding, installation on a 35 mm DIN rail is not permitted.** In ships, the 35 mm DIN rail does not provide adequate support.			

Table 9-112 Permitted ambient conditions

Device: transceiver	(Variant)	Operating temperature	Storage/transport temperature	Relative humidity at 25 °C during operation, maximum	Operating altitude at max. xx °C ambient temperature
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	-40 °C to +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C

Device: transceiver	(Variant)	Operating temperature	Storage/transport temperature	Relative humidity at 25 °C during operation, maximum	Operating altitude at max. xx °C ambient temperature
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	-40 °C through +85 °C	-40 °C to +85 °C	<= 95% (no condensation)	2000 m at max. 56 °C 3000 m at max. 50 °C

9.10.2 Connectors and electrical data

Table 9-113 Connection of end devices or network components

Device: Transceiver	(Variant)	Connection of end devices or network components				
		Max. number	of which:			
			electrical	- optical		
				over FO cable	Single mode	Multi mode
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	2	-	1 x LC port (100 Mbps)	-	●
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	2	-	1 x LC port (100 Mbps)	●	-
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	2	-	1 x LC port (100 Mbps)	●	-
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	2	-	1 x LC port (1000 Mbps)	-	●
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	2	-	1 x LC port (1000 Mbps)	-	●
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	2	-	1 x LC port (1000 Mbps)	●	-
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	2	-	1 x LC port (1000 Mbps)	●	-
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	2	-	1 x LC port (1000 Mbps)	●	-
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	2	-	1 x LC port (1000 Mbps)	●	-

Table 9-114 Electrical data: Power supply, current consumption and power loss

Device: Transceiver	(Variant)	Effective power loss *)
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	0.36 W
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	0.39 W
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	0.47 W
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	0.33 W
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	0.52 W
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	0.41 W
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	0.45 W
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	0.50 W
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	0.63 W
***) Note**: SFP values in 25 °C environment.		

Note

Fusing of transceivers

The SFP transceivers do not have fuses. The fuse is in the modular device (M).

Note

Signaling contact and media modules

The SFP transceivers do not have a signaling contact. The signaling contact is on the modular device (M).

Table 9-115 Electrical data: Transmitter output optical and receiver input

Device: Transceiver	**(Variant)**	**Transmitter output optical**		**Receiver input**	
		min. [dBm]	**max. [dBm]**	**Sensitivity min. [dBm]**	**max. input power [dBm]**
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	-19	-14	-32	-3
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	-15	-8	-34	-3
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	-5	0	-34	-3
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	-9.5	-4	-17	-3
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	-15	-1	-23	-3
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	-9.5	-3	-21	-3
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	-6	0	-23	-3
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	0	5	-23	-3
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	0	5	-32	-8

9.10.3 Cable lengths

Table 9-116 Permitted cable lengths (fiber-optic) Fast Ethernet

Device: transceiver	(Variant)	Fiber	FO cable lengths
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	50/125 µm multimode fiber	**0-3 km** (1 dB/km at 1300 nm; 1200 MHz*km; maximum insertion loss 0.5 dB; 9 dB max. permitted FO cable attenuation at 3 dB link power margin)
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	9/125 µm single mode fiber	**0-26 km** (0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 14 dB max. permitted FO cable attenuation at 2 dB link power margin)
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	9/125 µm single mode fiber	***) -70 km** (0.28 dB/km at 1550 nm; maximum insertion loss 0.5 dB, 26 dB max. permitted FO cable attenuation at 2 dB link power margin, *) minimum cable attenuation 3 dB)

Table 9-117 Permitted cable lengths (fiber-optic) gigabit

Device: transceiver	(Variant)	Fiber	FO cable lengths
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	62.5/125 µm multimode fiber	**0-350 m** (3.1 dB/km at 850 nm; 1200 MHz*km; maximum insertion loss 0.5 dB; 4.5 dB max. permitted FO cable attenuation at 3 dB link power margin)
		50/125 µm multimode fiber	**0-750 m** (2.5 dB/km at 850 nm; 1200 MHz*km; maximum insertion loss 0.5 dB; 4.5 dB max. permitted FO cable attenuation at 3 dB link power margin)
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	62.5/125 µm multimode fiber	**0-1 km**
		50/125 µm multimode fiber	**0-2 km**
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	9/125 µm single mode fiber	**0 -10 km** (0.5 dB/km at 1310 nm; maximum insertion loss 0.5 dB; 6 dB max. permitted FO cable attenuation at 3 dB link power margin)
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	9/125 µm single mode fiber	***) -40 km** (0.4 dB/km at 1550 nm; maximum insertion loss 0.5 dB, 18 dB max. permitted FO cable attenuation at 2 dB link power margin, *) minimum cable attenuation 3 dB)

Device: transceiver	(Variant)	Fiber	FO cable lengths
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	9/125 µm single mode fiber	***) -70 km** (0.28 dB/km at 1550 nm; maximum insertion loss 0.5 dB, 21 dB max. permitted FO cable attenuation at 2 dB link power margin, *) minimum cable attenuation 8 dB)
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	9/125 µm single mode fiber	***) -120km** (0.225 dB/km at 1550 nm; maximum insertion loss 0.5 dB, 27 dB max. permitted FO cable attenuation at 2 dB link power margin, *) minimum cable attenuation 13 dB)

9.10.4 Other properties

Table 9-118 MTBF

Device: pluggable transceiver	(Variant)	MTBF[1)]
SFP991-1	(1 x 100 Mbps, LC port optical, multimode glass, up to max. 3 km)	> 120 years
SFP991-1LD	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 26 km)	> 120 years
SFP991-1LH+	(1 x 100 Mbps, LC port optical, single mode glass, up to max. 70km)	> 120 years
SFP992-1	(1 x 1000 Mbps, LC port optical, multimode glass, up to max. 750m)	> 120 years
SFP992-1+	(1x 1000 Mbps, LC port optical, multimode glass, up to max. 2 km)	> 227 years
SFP992-1LD	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 10km)	> 120 years
SFP992-1LH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 40km)	> 120 years
SFP992-LH+	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 70km)	> 120 years
SFP992-1ELH	(1 x 1000 Mbps, LC port optical, single mode glass, up to max. 120km)	> 120 years

1) These values apply at 40 °C.

Note

The IE Switches X-300 support full wire speed switching complying with IEEE 802.3 on all ports.

The number of packets depends on the packet length according to the IEEE802.3 standard:

Table 9-119 Full wire speed switching

Number of frames		At a frame length of (in bytes):
at 100 Mbps	**at 1000 Mbps**	
148810	1488095	64
84459	844595	128
45290	452899	256
23496	234962	512
11973	119732	1024
9615	96154	1280
8127	81274	1518

Note

The following applies to IE Switches X-300:

The number of IE Switches X-300 connected in a line influences the frame propagation time.

When a frame passes through an IE Switch X-300, it is delayed by the Store&Forward function of the IE Switch X-300

- with a 64 byte frame length by approx. 10 microseconds (at 100 Mbps)
- with a 1500 byte frame length by approx. 130 microseconds (at 100 Mbps)

This means that the more IE Switch X-300 devices the frame passes through, the longer the frame delay.

Accessories

10

Table 10-1 Accessories with article numbers

Product	Article number	Available for SCALANCE ...
"Industrial Ethernet TP and Fiber Optic Networks" manual	6GK1970-1BA10-0AA0	All switches
Cables and accessories		
IE FC Stripping Tool	6GK1901-1GA00	For IE cables
IE FC blade cassettes	6GK1901-1GB00	For stripping tool
IE FC TP standard cable GP	6XV1840-2AH10	
IE FC TP trailing cable	6XV1840-3AH10	
IE FC TP marine cable	6XV1840-4AH10	
IE FC TP trailing cable GP	6XV1870-2D	
IE FC TP flexible cable GP	6XV1870-2B	
IE FC FRNC cable GP	6XV1871-2F	
IE FC ground cable	6XV1871-2G	
IE FC TP festoon cable GP	6XV1871-2S	
IE FC ground cable	6XV1871-2G	
IE TP train cable, 2 x 2, CAT5	6XV1871-2T	
IE FC TP food cable	6XV1871-2L	
IE TP torsion cable	6XV1870-2F	
IE FC Standard Cable, 4 x 2, AWG24	6XV1878-2A	(gigabit cable)
IE FC Flexible Cable, 4 x 2, AWG24	6XV1878-2B	(gigabit cable)
IE TP train cable, 4 x 2, CAT7	6XV1878-2T	
PROFIBUS FC standard cable GP	6XV1830-0EH10	
Fast Ethernet connector		
IE FC RJ-45 Plug 180 pack of 1	6GK1901-1BB10-2AA0	For all electrical Fast Ethernet ports
IE FC RJ-45 Plug 180 pack of 10	6GK1901-1BB10-2AB0	For all electrical Fast Ethernet ports
IE FC RJ-45 Plug 180 pack of 50	6GK1901-1BB10-2AE0	For all electrical Fast Ethernet ports
Gigabit connector		
IE FC RJ-45 Plug 180, 4 x 2, pack of 1	6GK1901-1BB11-2AA0	For all electrical gigabit ports
IE FC RJ-45 Plug 180, 4 x 2, pack of 10	6GK1901-1BB11-2AB0	For all electrical gigabit ports
IE FC RJ-45 Plug 180 4 x 2, pack of 50	6GK1901-1BB11-2AE0	For all electrical gigabit ports
FO connectors and accessories		
FC FO Standard Cable GP (62.5/200/230)	6XV1847-2A	
FC FO Trailing Cable (62.5/200/230)	6XV1847-2C	
Crimp and Cleave assembly case for FC FO system	6GK1900-1GL00-0AB0	
FC BFOC connector set with cleaning cloths and dust protection cap, pack of 20	6GK1900-1GB00-0AC0	
FC SC connector set with cleaning cloths and dust protection cap, pack of 20 = 10 duplex connectors	6GK1900-1LB00-0AC0	
FC BFOC coupler, 10 single couplings	6GK1900-1GP00-0AB0	

Product	Article number	Available for SCALANCE ...
FC SC coupler, 5 duplex couplings	6GK1900-1LP00-0AB0	
C-PLUG		
C-PLUG	6GK1900-0AB00	SCALANCE X-200 / X-300 / X-400

Graphics

11

11.1 Dimension drawing

Note

The IE Switches X-300 are available in small, medium and large variants.
The dimension drawings are shown below.

Small design

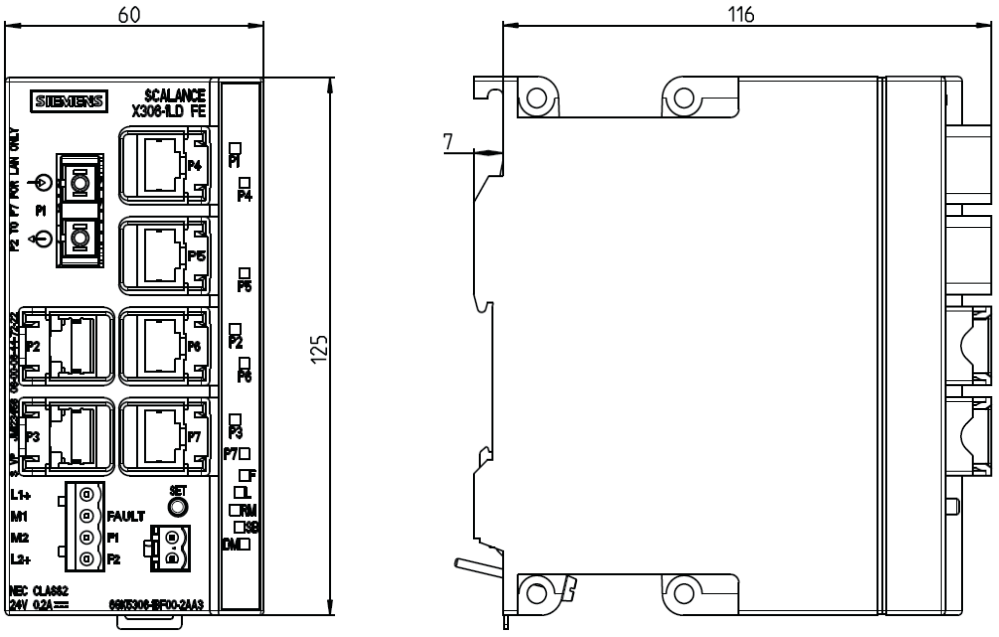


Figure 11-1 Small design dimension drawing (example used here SCALANCE X306-1LD FE)

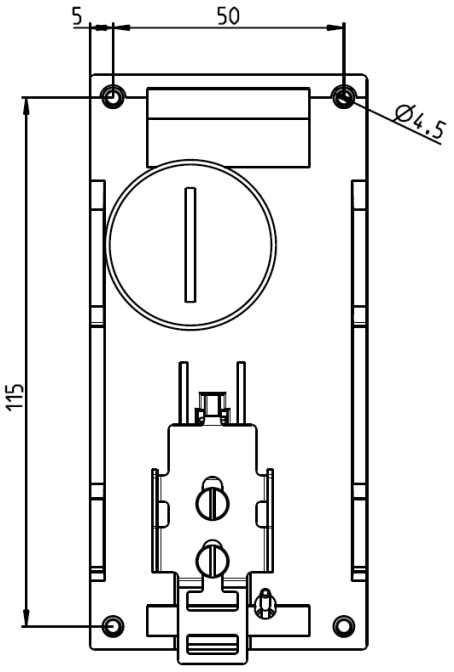


Figure 11-2 Small design dimension drawing (IE Switch X-306)

Medium design

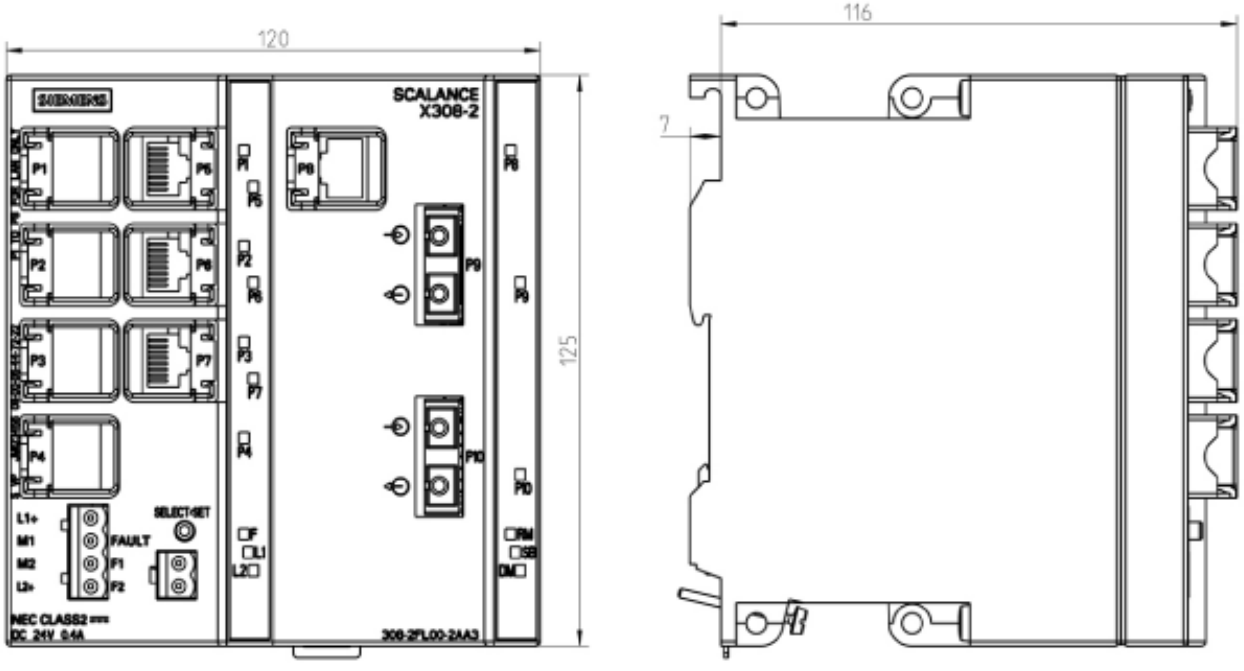


Figure 11-3 Medium design dimension drawing (example used here SCALANCE X308-2)

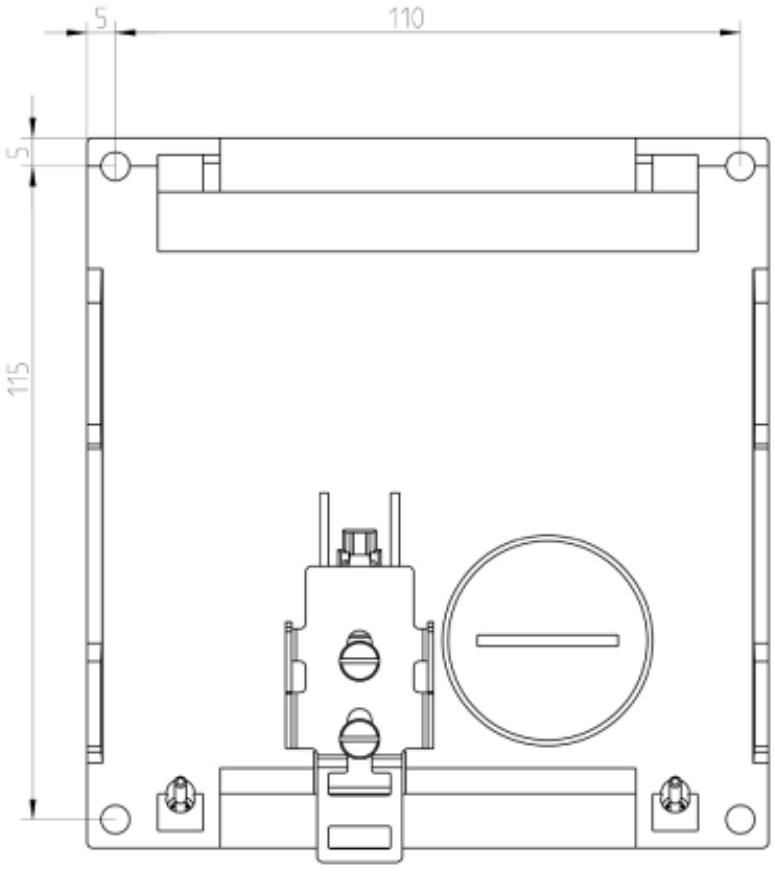


Figure 11-4 Medium design dimension drawing (IE Switch X-300)

Large design

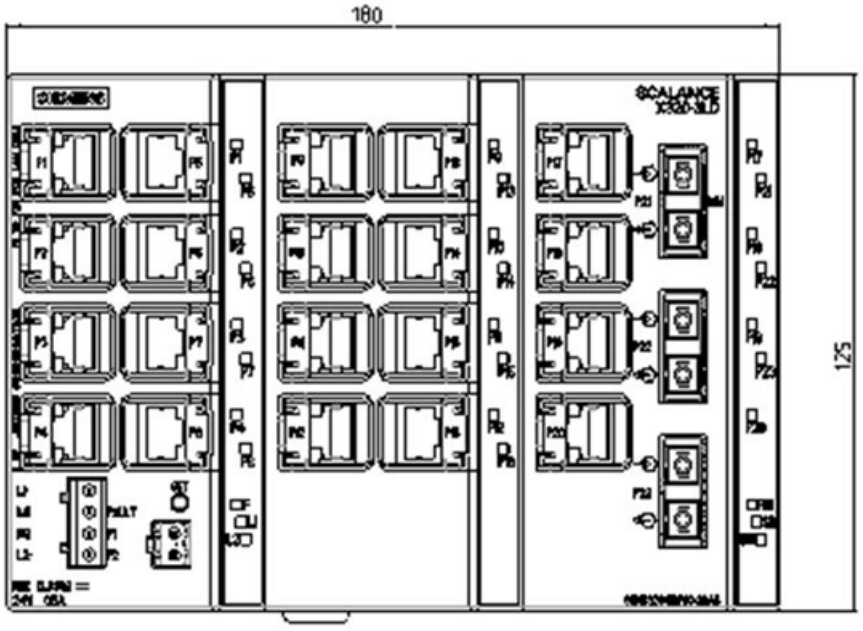


Figure 11-5 Large design dimension drawing Part 1 (example used here SCALANCE X320-3LD FE)

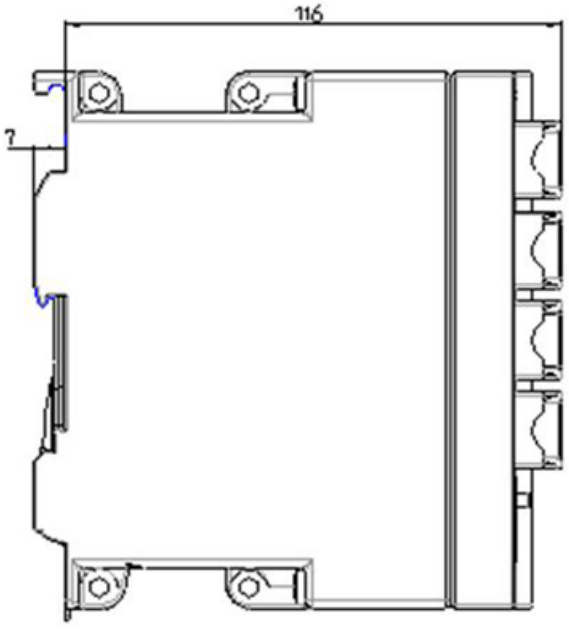


Figure 11-6 Large design dimension drawing Part 2 (example used here SCALANCE X320-3LD FE)

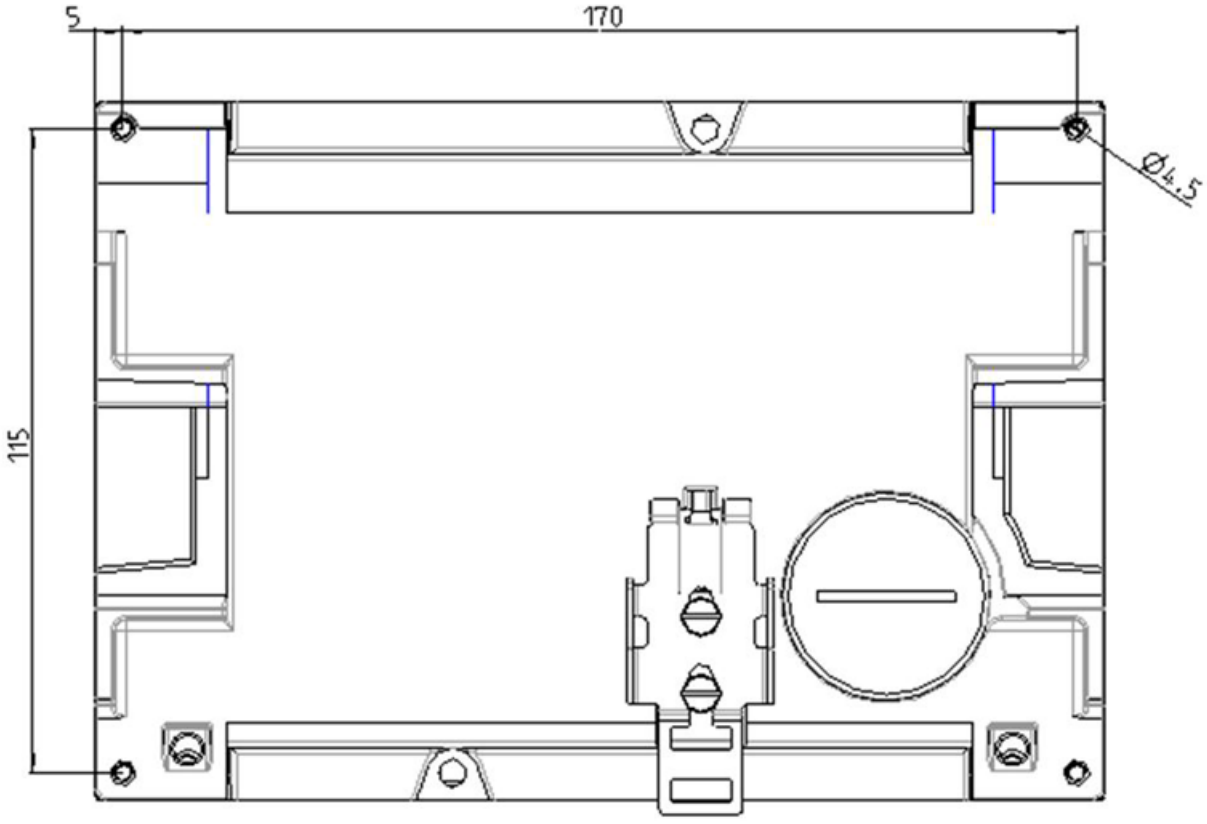


Figure 11-7 Large design dimension drawing (IE Switch X-320)

11.2 X-300M dimension drawings

Note

The following dimension drawings are available for the **X-300M** product group.

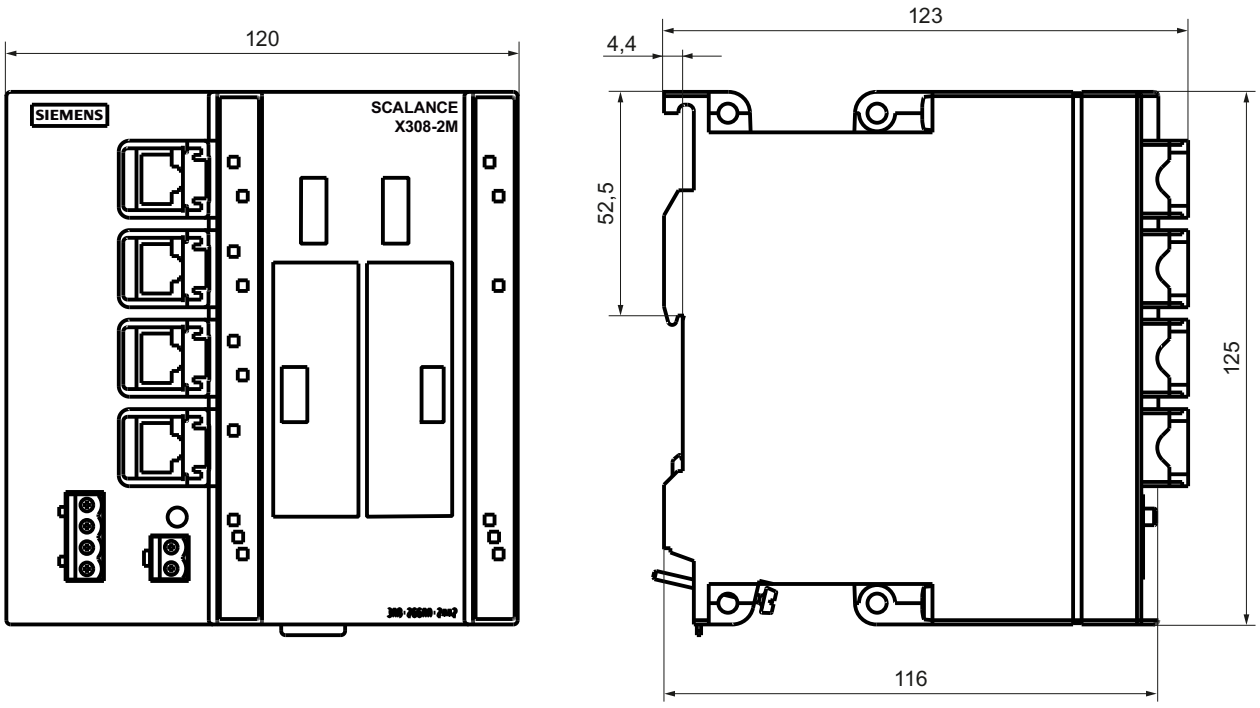


Figure 11-8 X308-2M dimension drawing

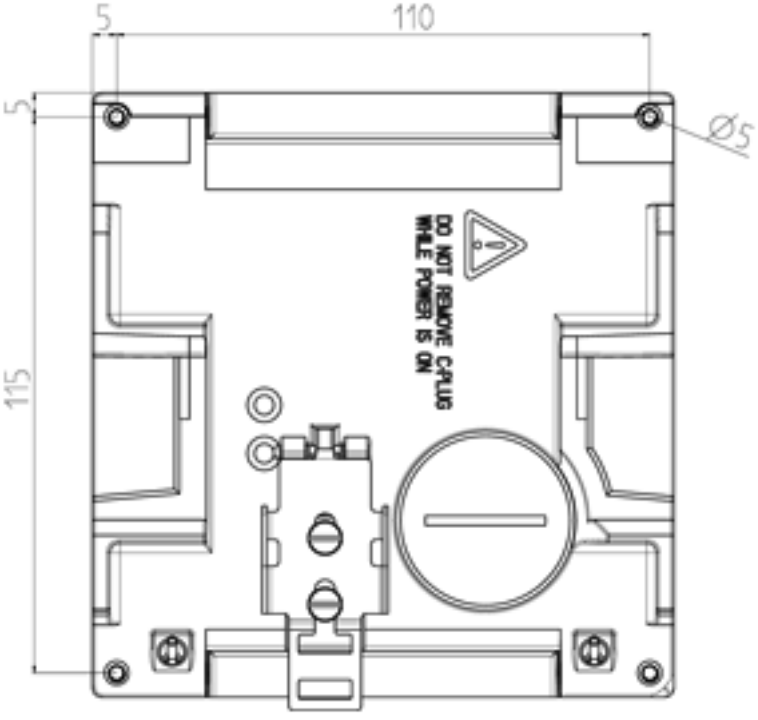


Figure 11-9 X308-2M drilling template

11.3 XR-300M dimension drawings

Note

All dimensions in the drawings are in millimeters.

Front view



Figure 11-10 Front view of the XR324-12M

From above

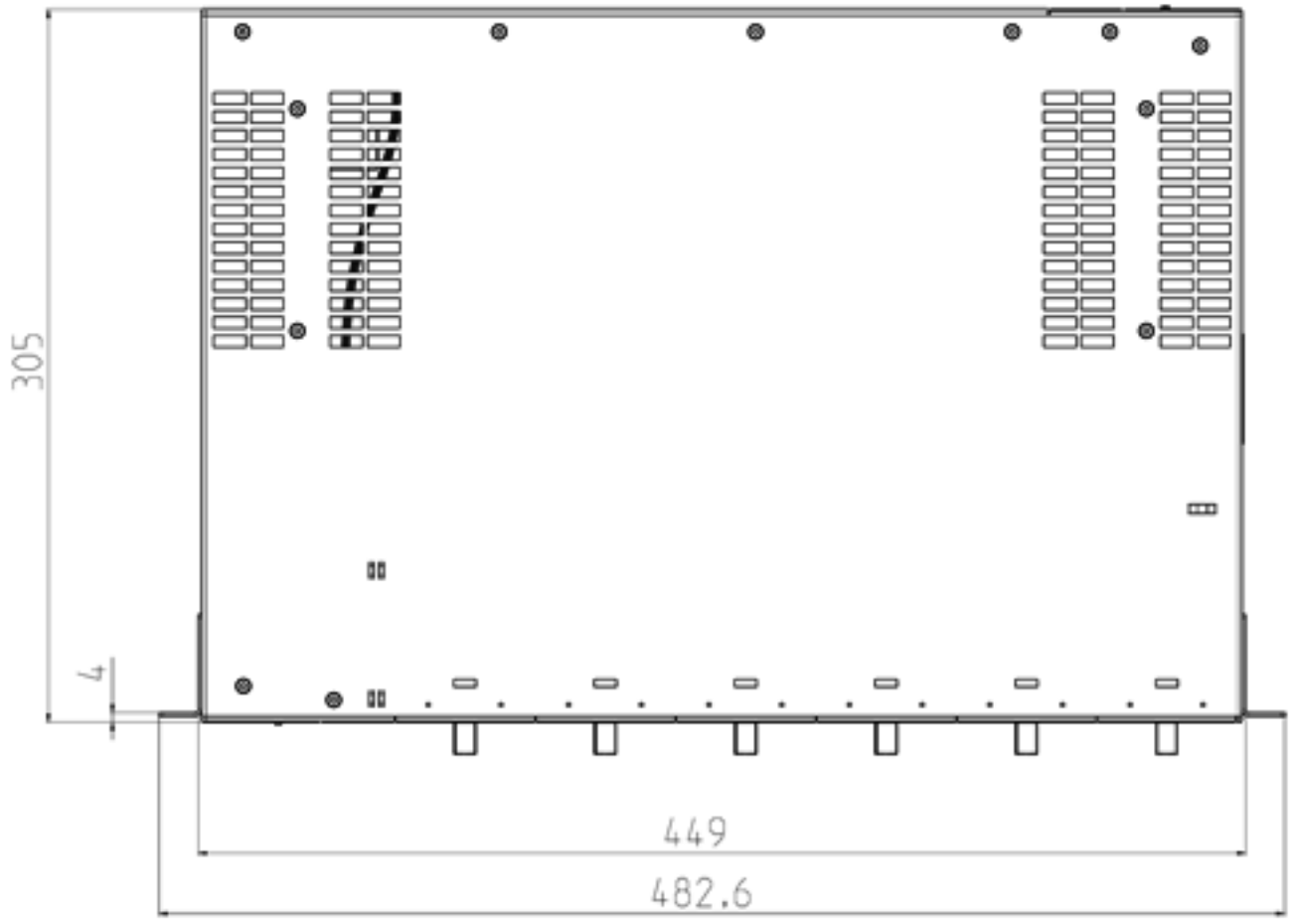


Figure 11-11 XR324-12M from above

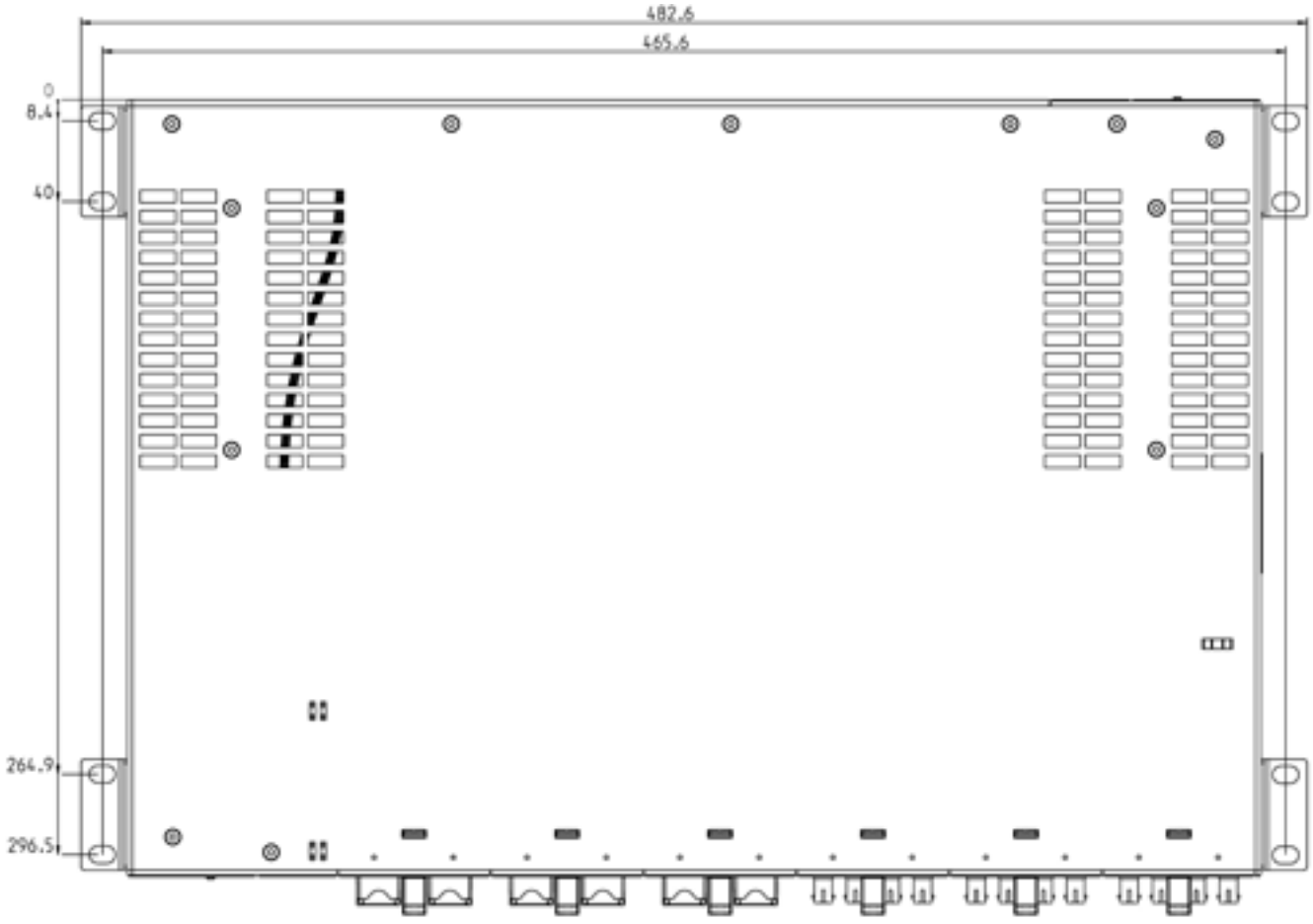
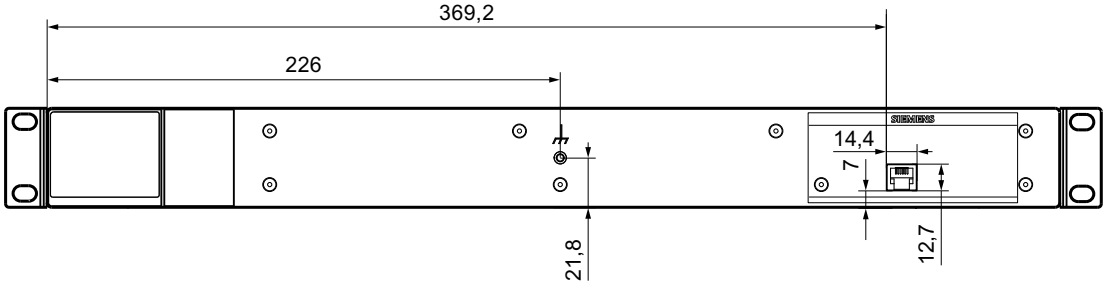
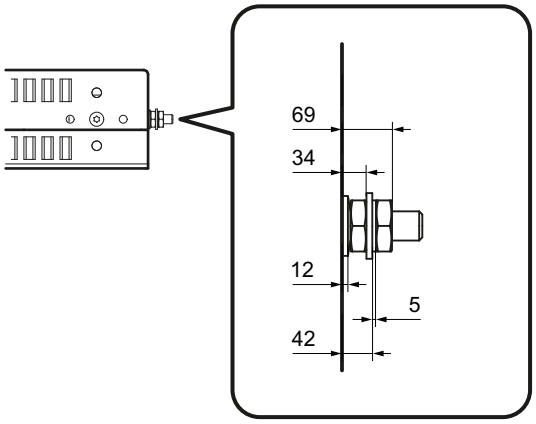


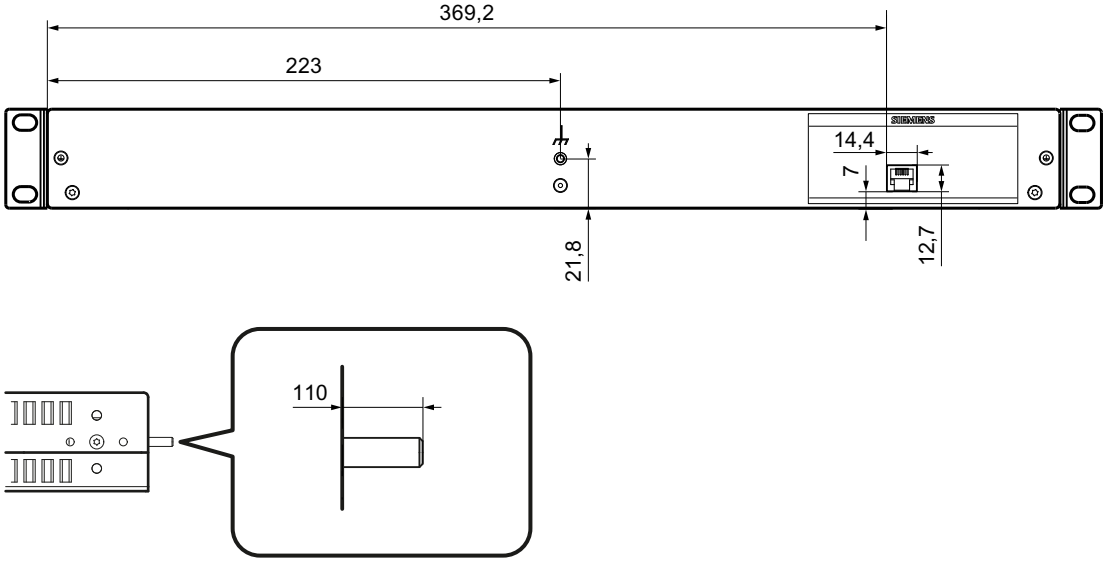
Figure 11-12 XR324-12M from above

Screw-in grounding bolts





Pressed-in grounding bolts



11.4 X-300EEC dimension drawings

All dimensions in the drawings are in millimeters

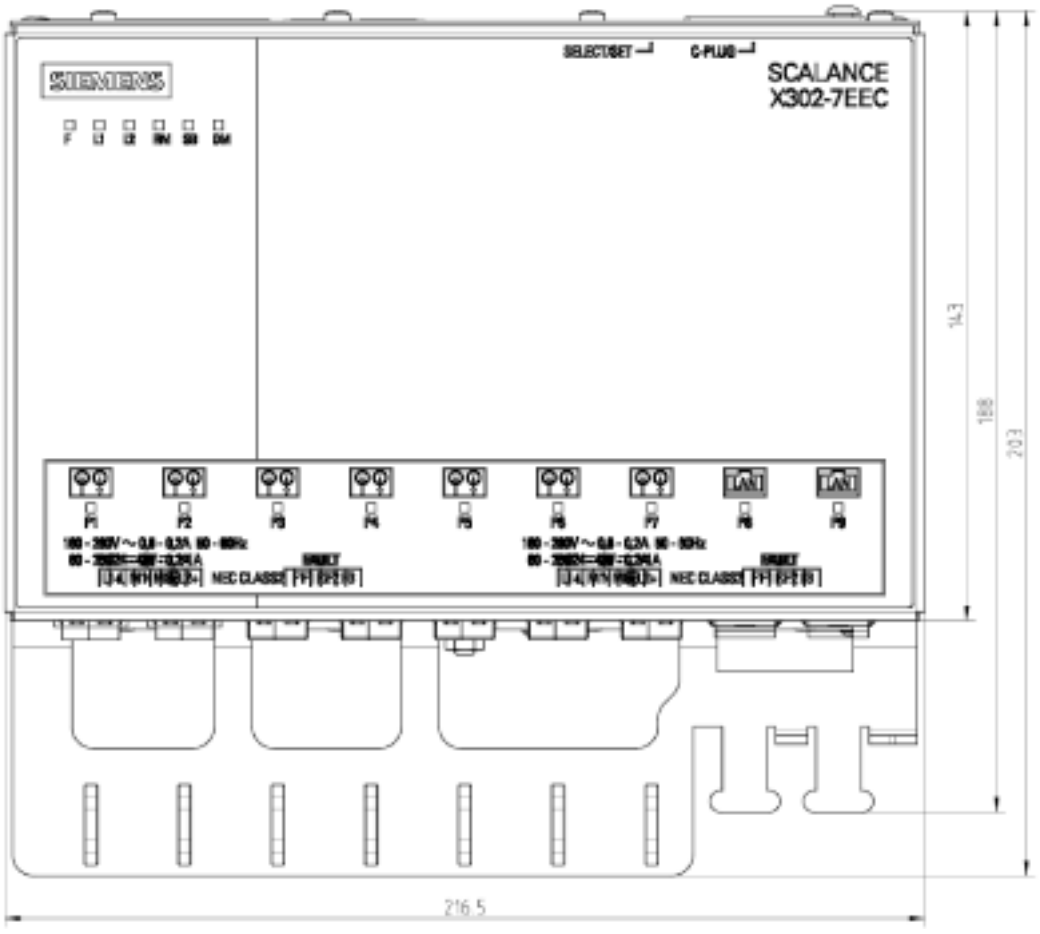


Figure 11-13 Dimension drawing IE Switch X302-7EEC - view

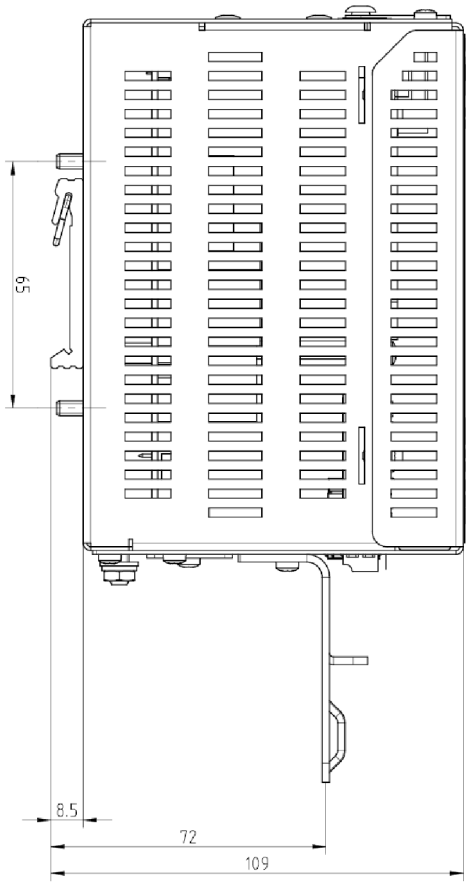


Figure 11-14 Dimension drawing IE Switch X302-7EEC - side view

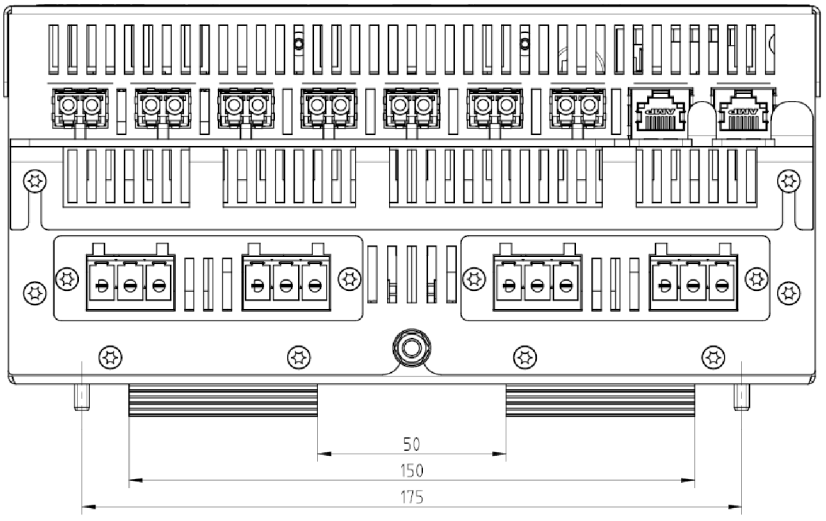


Figure 11-15 Dimension drawing IE Switch X302-7EEC - from above

11.5 XR-300M EEC dimension drawings

Note

All dimensions in the drawings are in millimeters.

Front and rear

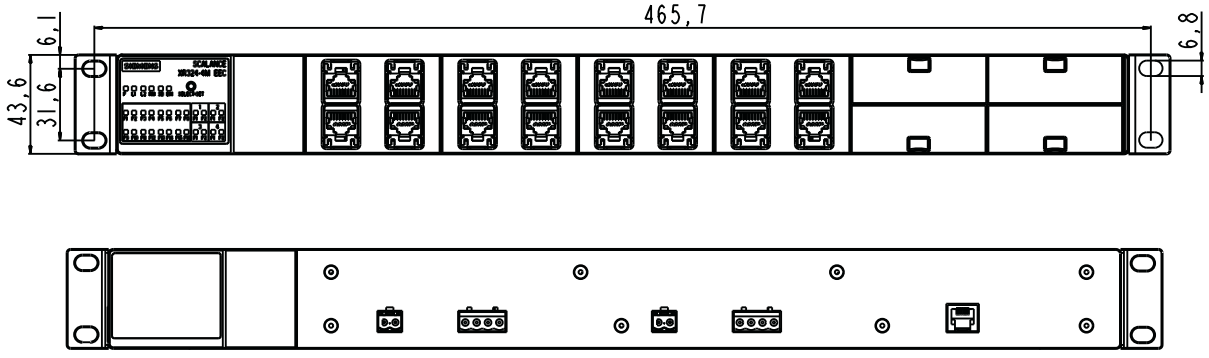


Figure 11-16 Housing front and rear

From above

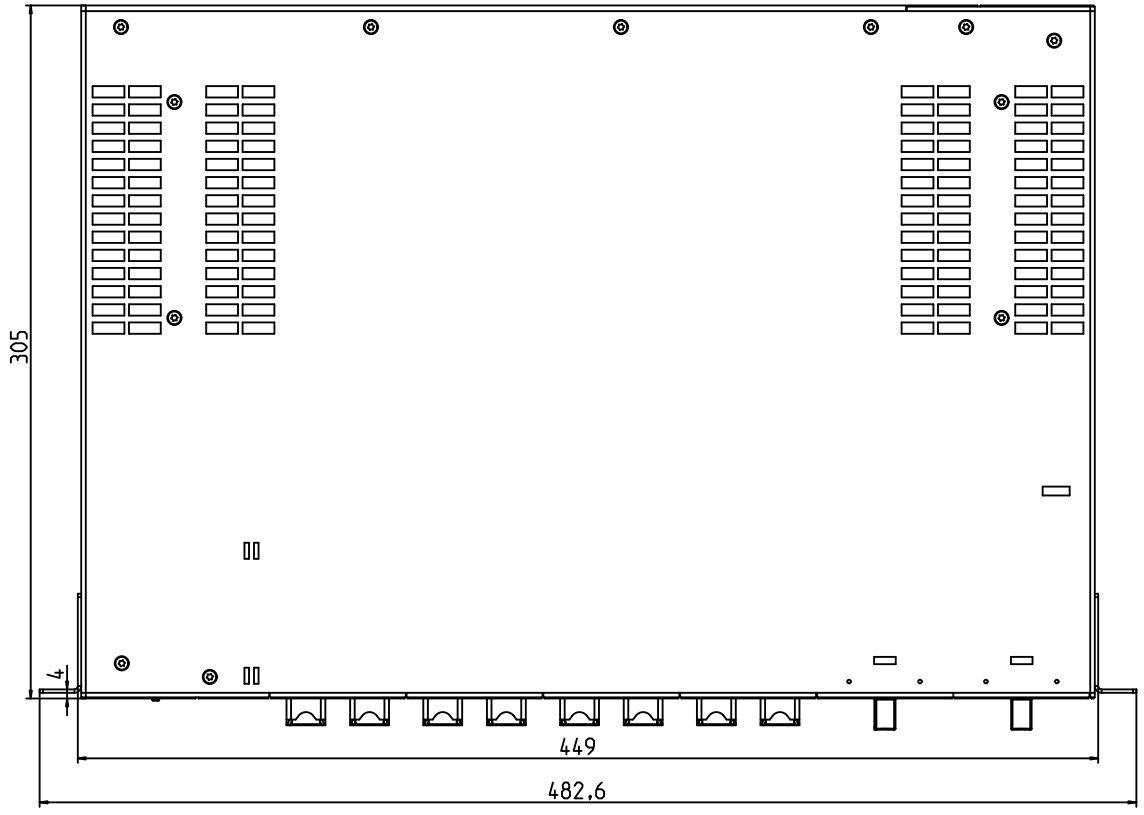


Figure 11-17 Top of the housing

Grounding bolts pressed in (100 to 240 VAC / 60 to 250 VDC)

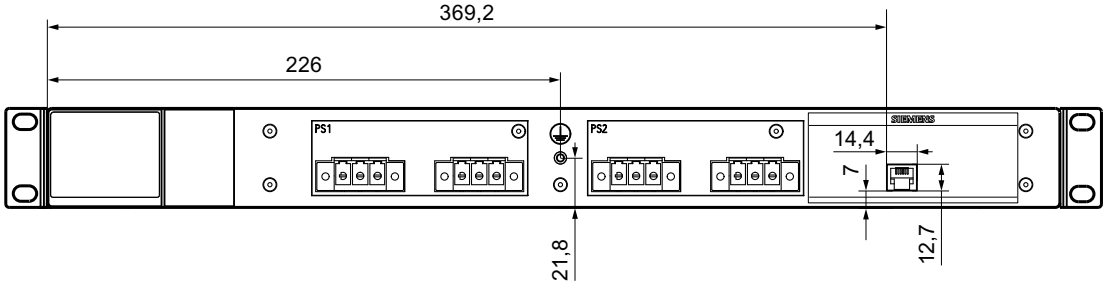


Figure 11-18 Example of a XR324-4M EEC (2 x 100 to 240 VAC, cable outlet front)

Grounding bolts pressed in (24 to 48 VDC)

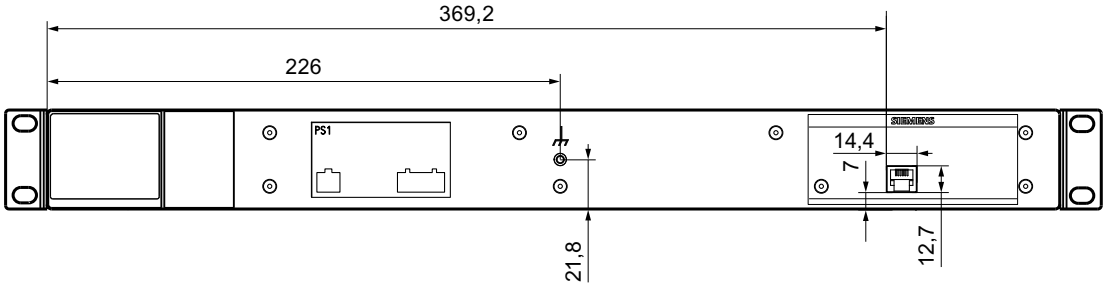
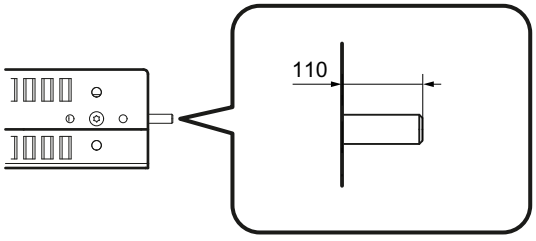


Figure 11-19 Example of a XR324-4M EEC (1 x 24 VDC, cable outlet front)

Grounding bolt



Mounting the IE Switch X-300EEC

CAUTION

Making a mounting support

Suitable mounting supports are necessary for wall mounting and 19" rack mounting. Have these made according to the drawing.

You will find other accessories, such as screws in the tables. If you have questions, contact our Customer Support.

You will also find dimension drawings on the Internet on the pages of Siemens Industry Automation Customer Support under the following entry ID:

33118441 (http://support.automation.siemens.com/WW/view/en/33118441)
→ "Entry list" tab

Mounting support for EEC wall mounting

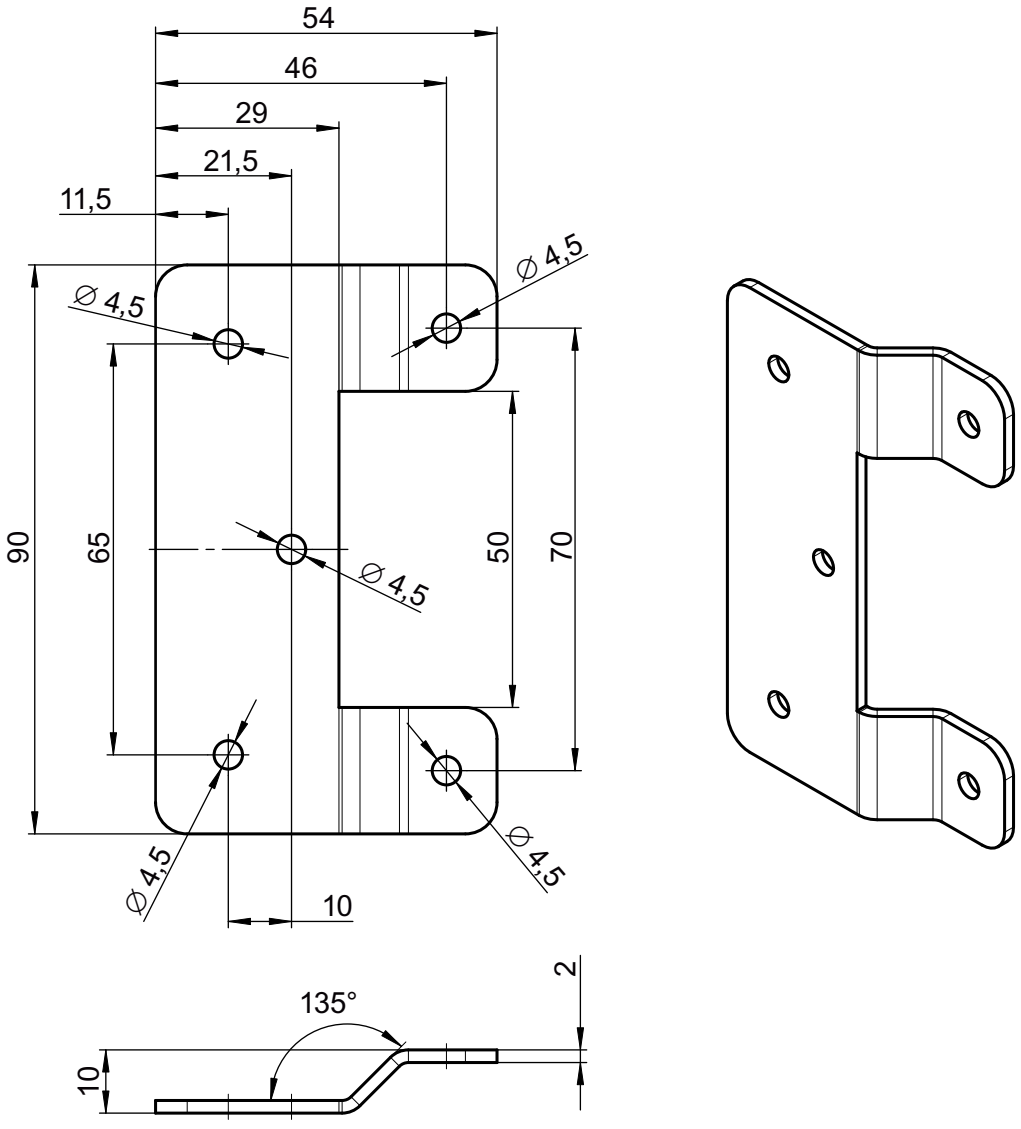


Figure 11-20 X-300EEC wall mounting (dimensions in mm)

Mounting support for 19" rack mounting of the X-300EEC switch

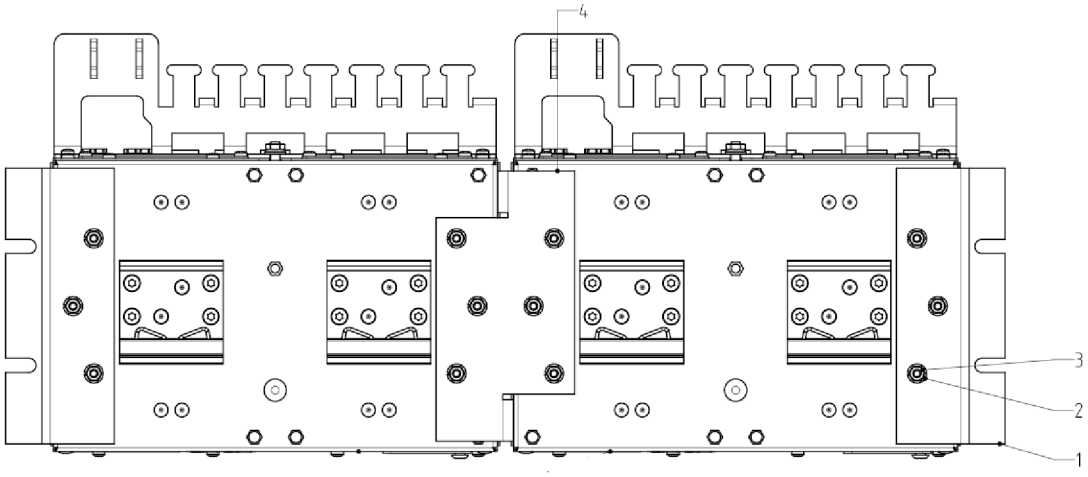


Figure 11-21 Rack mounting of two X-300EECs fastened together (view from below)

Table 11-1 Legend for rack mounting of two X-300EECs fastened together

No.	Number needed	Name
1	2	Plate for side
2	12	Spring washer SN60727-4-NrSt
3	12	Hexagonal nut ISO 4032-M4-8
4	1	Mid part of mounting support

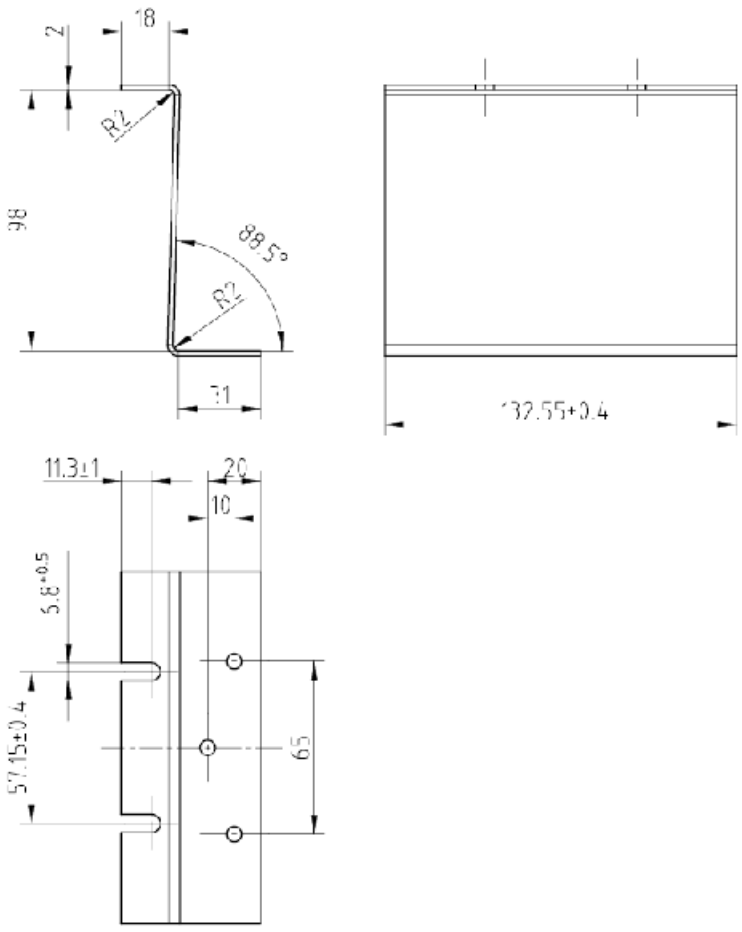


Figure 11-22 Side part of mounting support for X-300EEC (dimensions in mm)

Material: Plate 2.0 DIN EN10152 DC01+ZE25/25

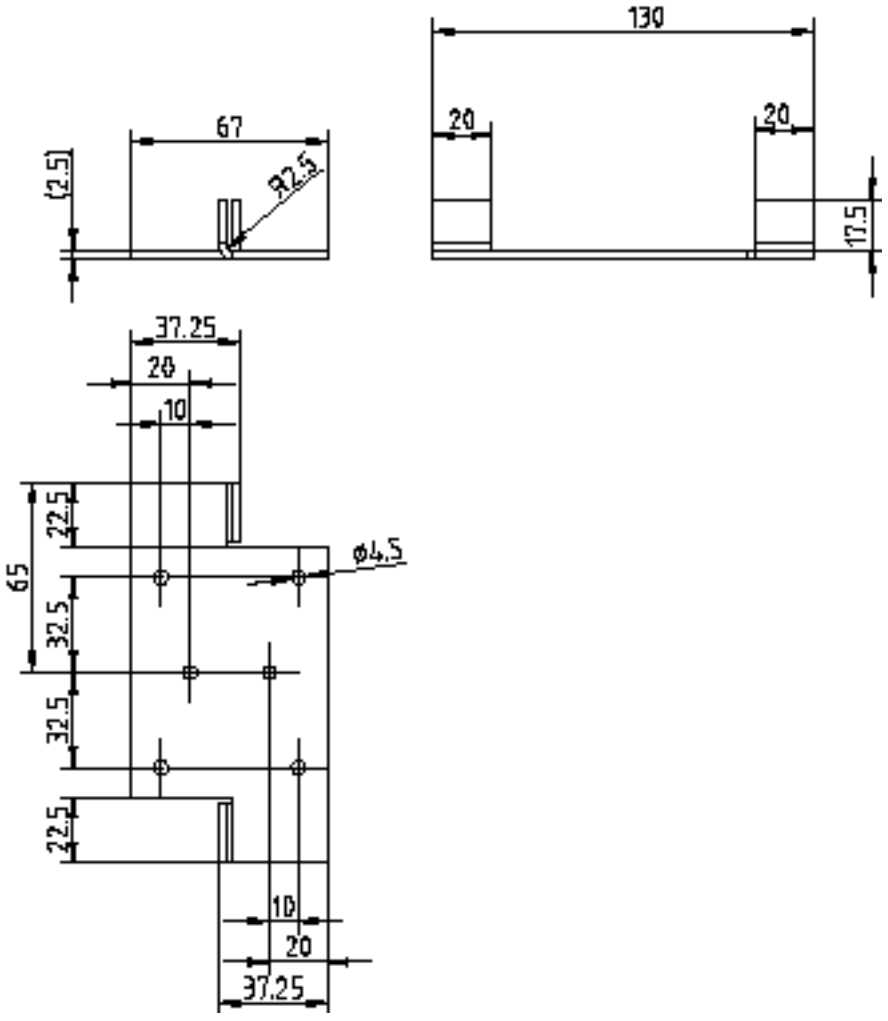


Figure 11-23 Middle part of mounting support for X-300EEC (dimensions in mm)

Material: Plate 2.0 DIN EN10152 DC01+ZE25/25

See also

19" rack mounting - X-300EEC product group (Page 113)

11.6 X-300M PoE dimension drawings

All dimensions in the drawings are in millimeters.

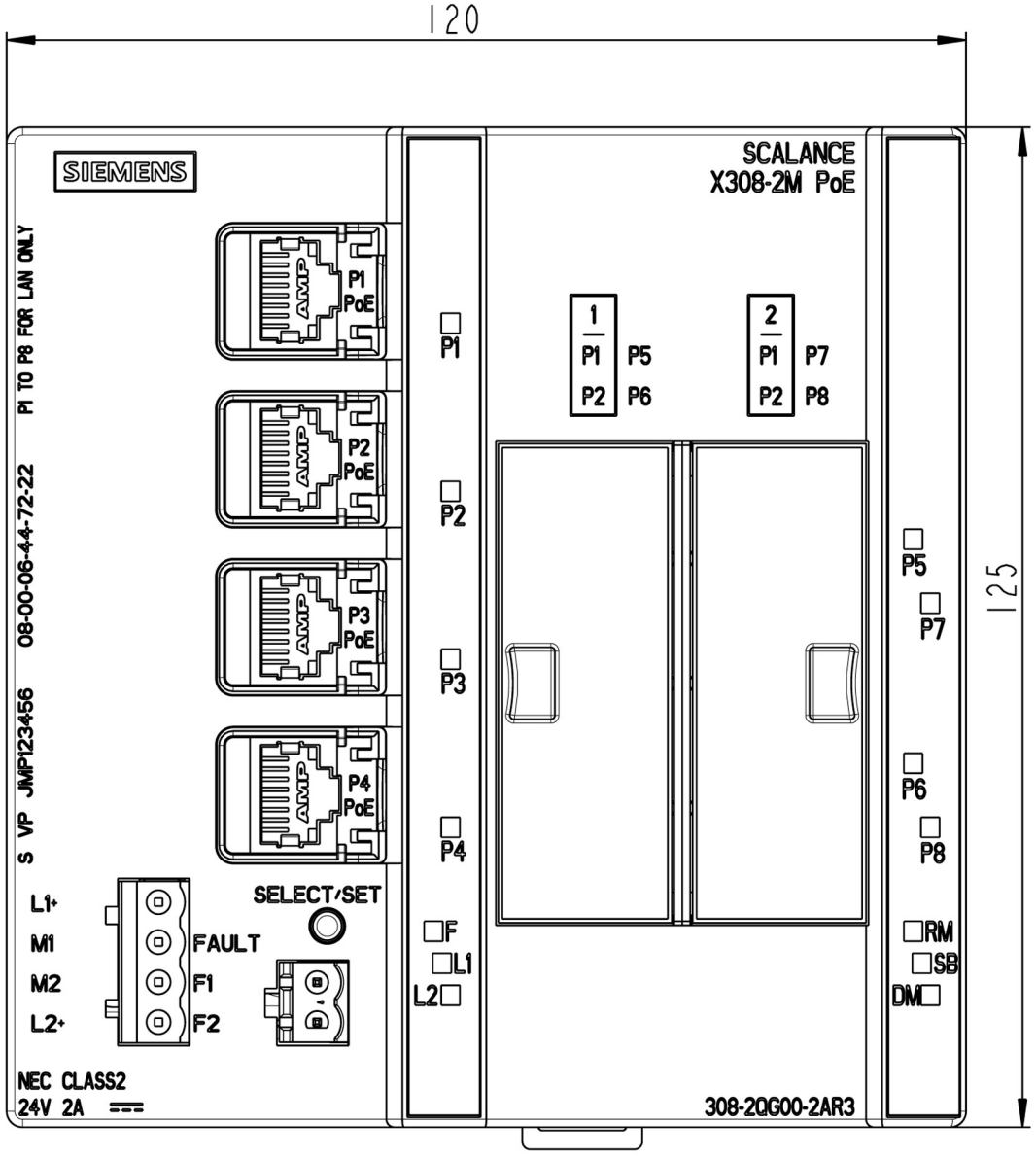


Figure 11-24 X308-2M PoE: Front view

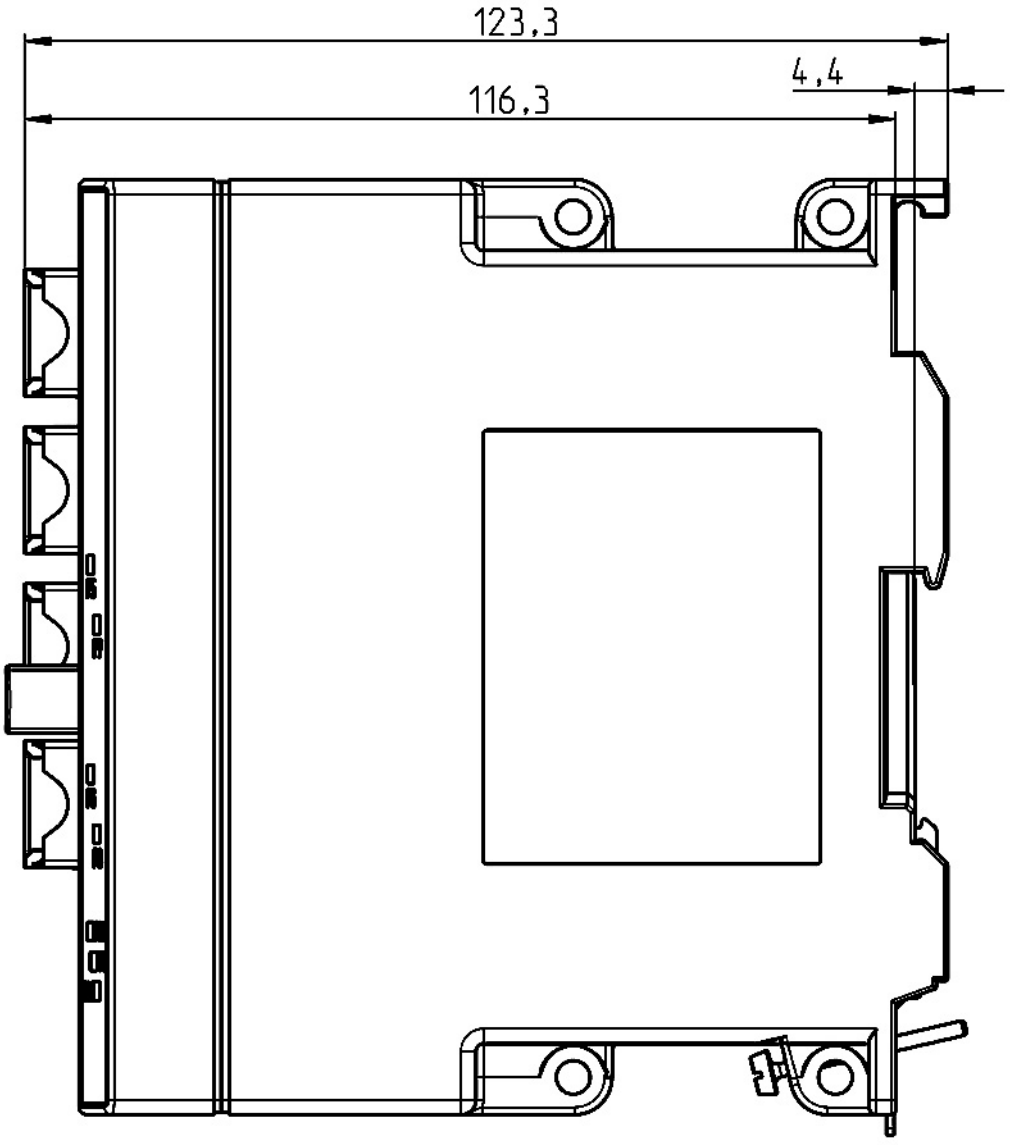


Figure 11-25 X308-2M PoE: Side view

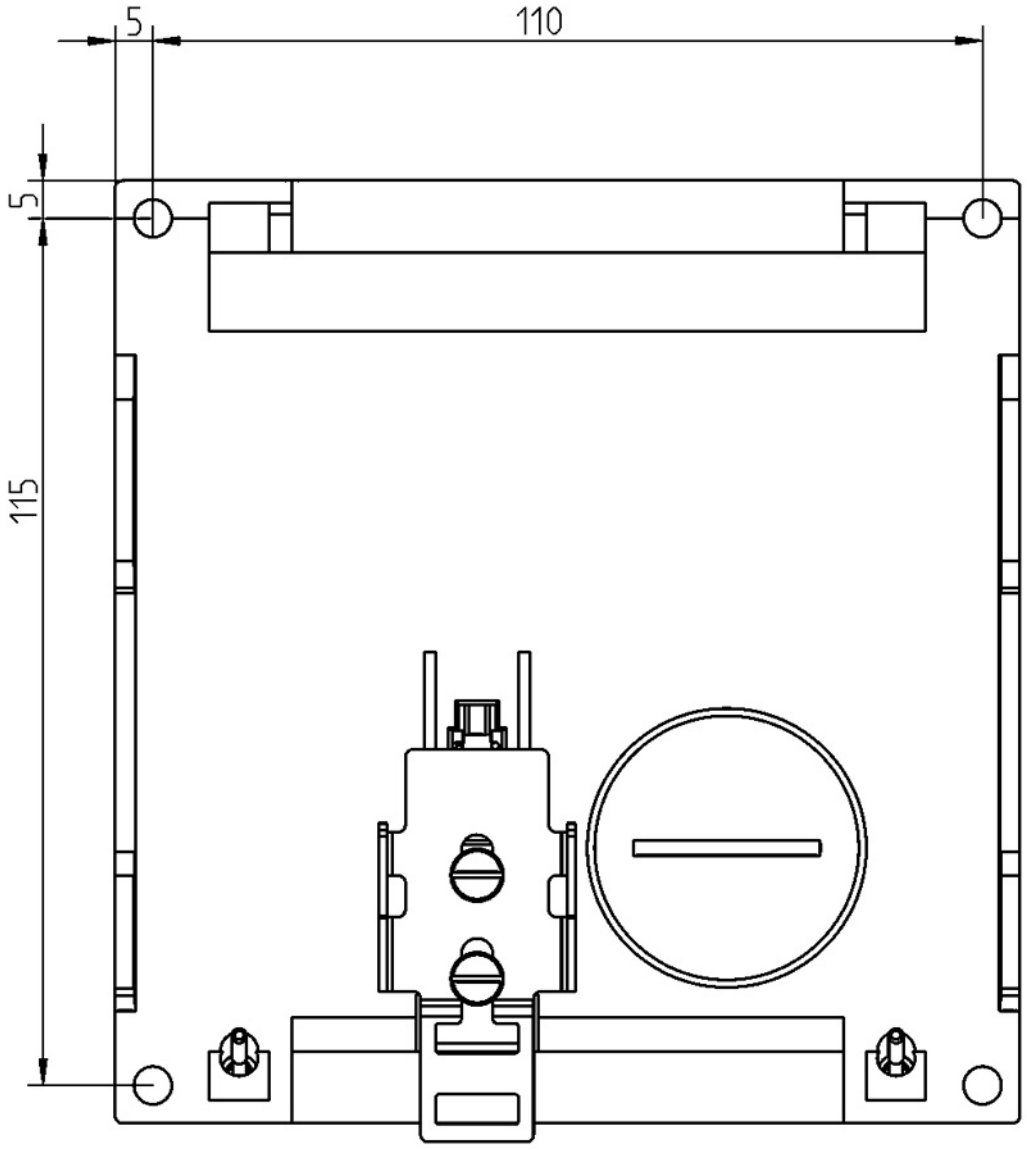


Figure 11-26 X308-2M PoE: Drilling template

11.7 XR-300M PoE dimension drawings

Note

All dimensions in the drawings are in millimeters.

Front view

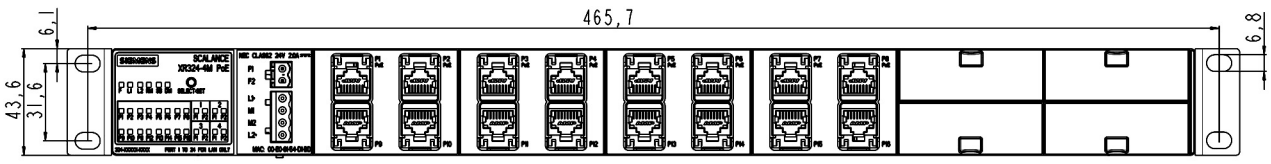


Figure 11-27 XR324-4M PoE and XR324-4M PoE TS: Front view

Side view

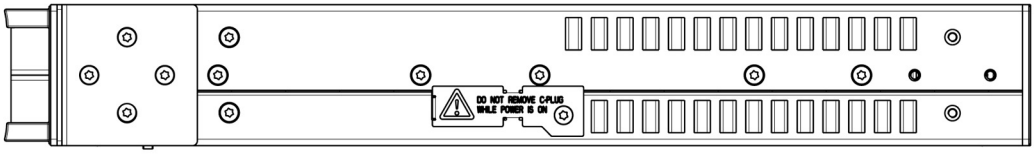


Figure 11-28 XR324-4M PoE and XR324-4M PoE TS: Side view

Rear

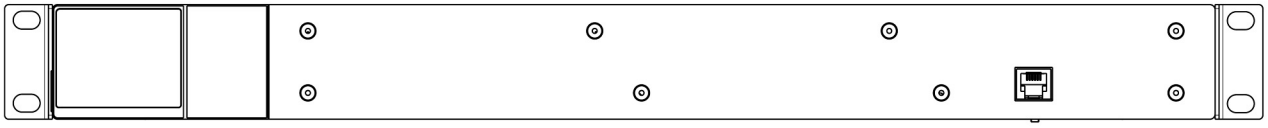


Figure 11-29 XR324-4M PoE and XR324-4M PoE TS: Rear

From above

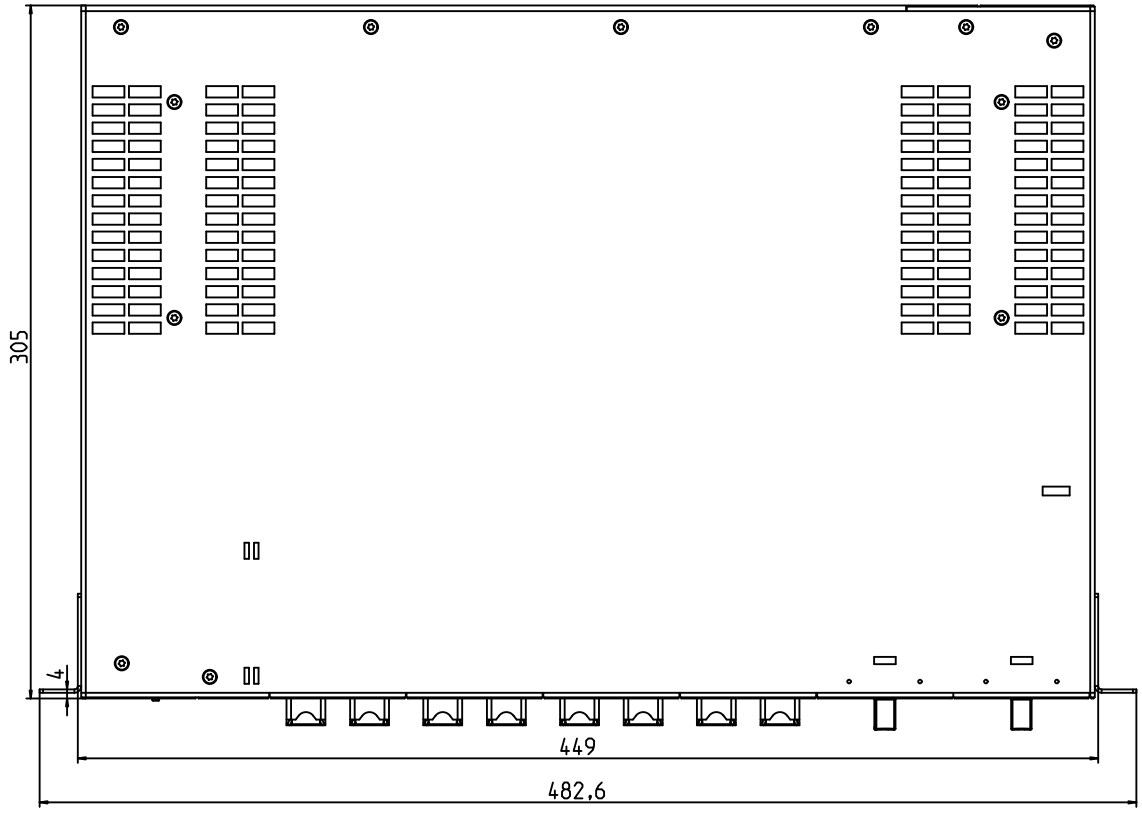
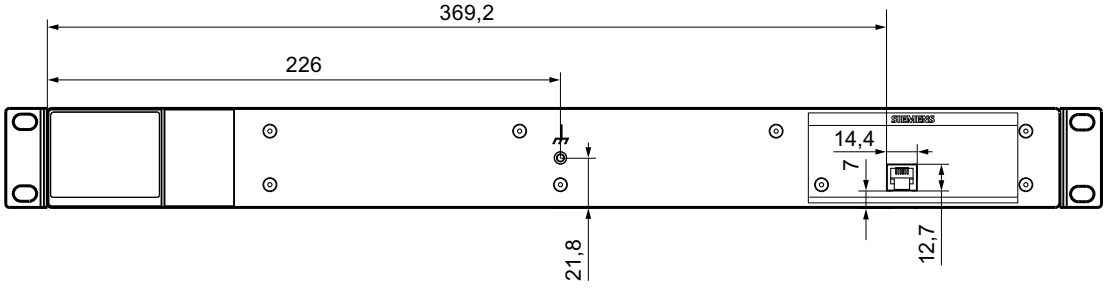
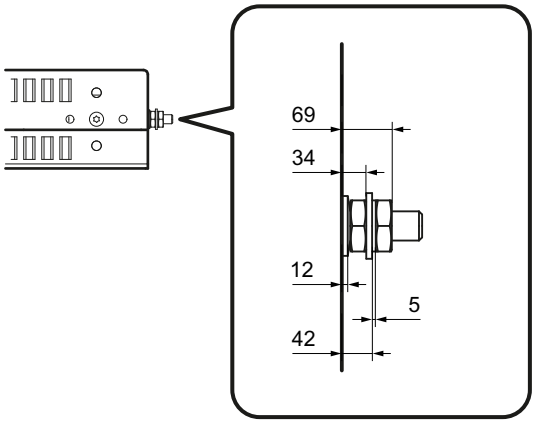


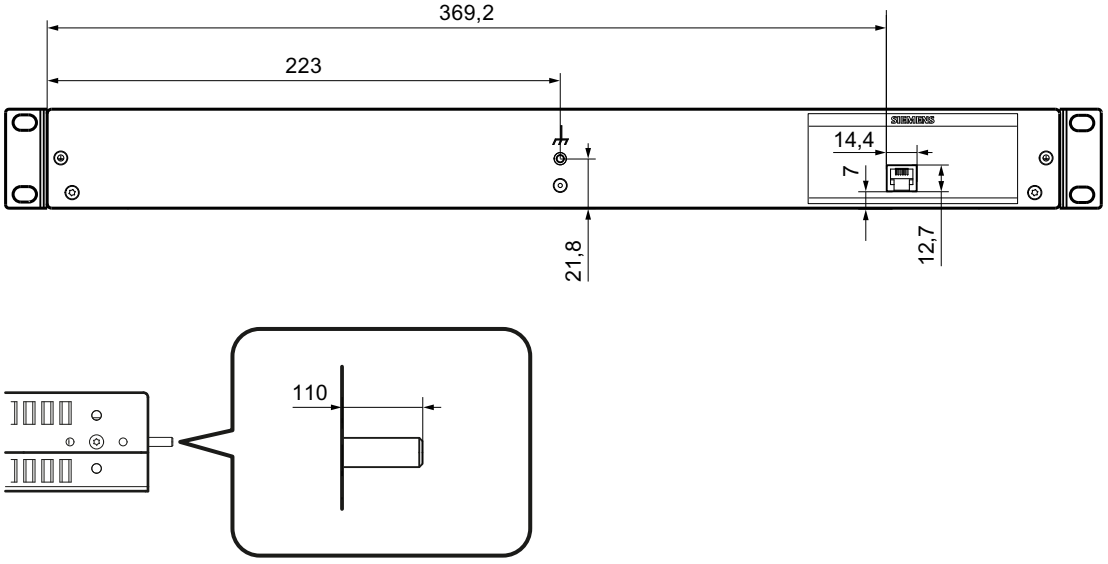
Figure 11-30 XR324-4M PoE and XR324-4M PoE TS: From above

Screw-in grounding bolts





Pressed-in grounding bolts



11.8 MM900 dimension drawings

Note

The following dimension drawings are available for the **MM900** product group.

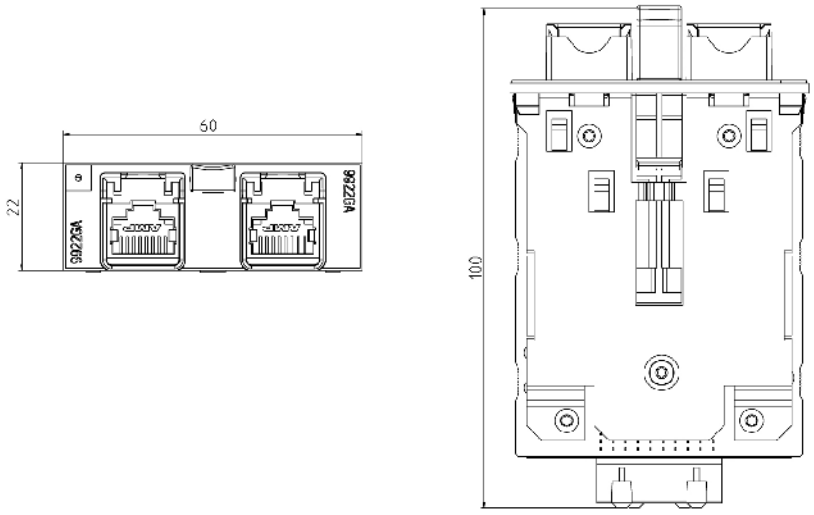


Figure 11-31 MM900 dimension drawing 1: Electrical RJ-45 ports with securing collar

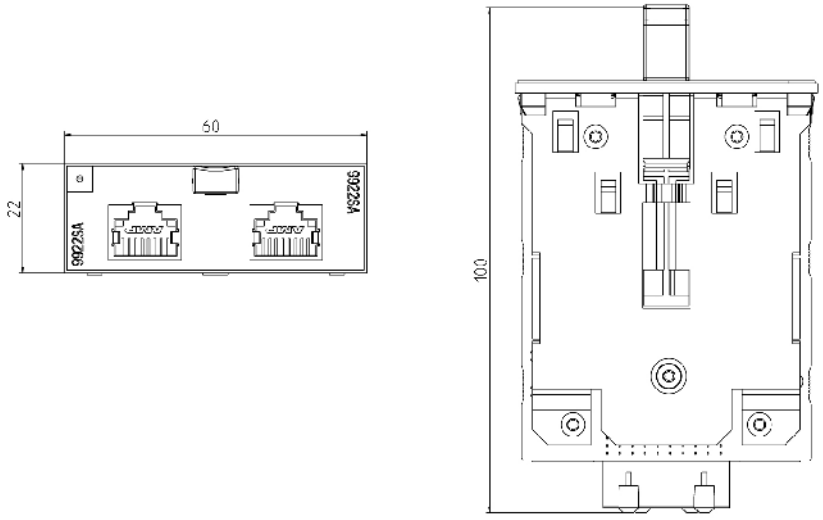


Figure 11-32 MM900 dimension drawing 2: Electrical RJ-45 ports without securing collar

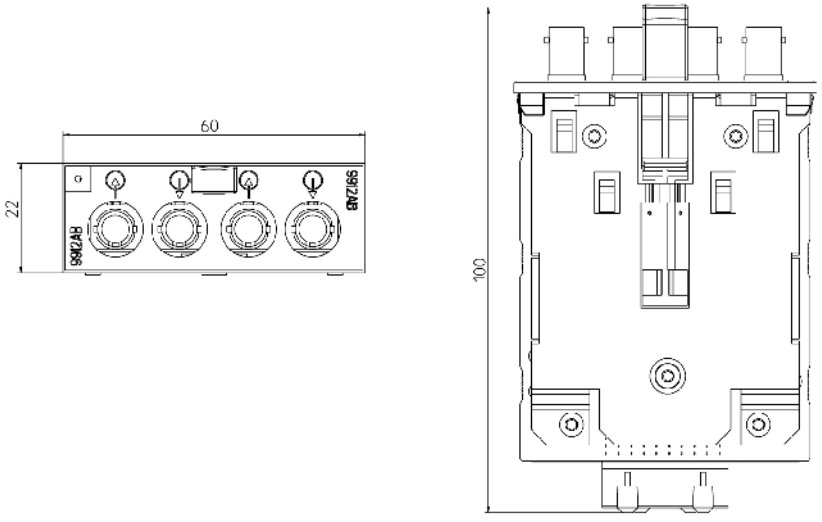


Figure 11-33 MM900 dimension drawing 3: BFOC ports

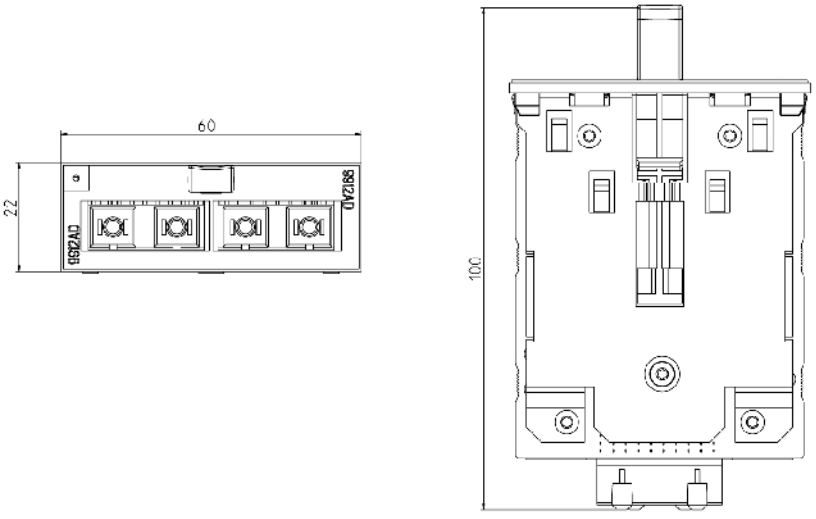


Figure 11-34 MM900 dimension drawing 4: Optical SC ports

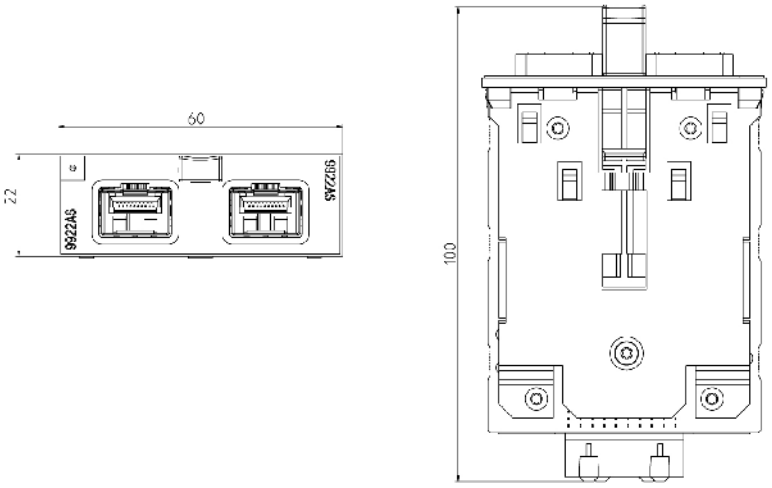


Figure 11-35 MM900 dimension drawing 5: SFP media module

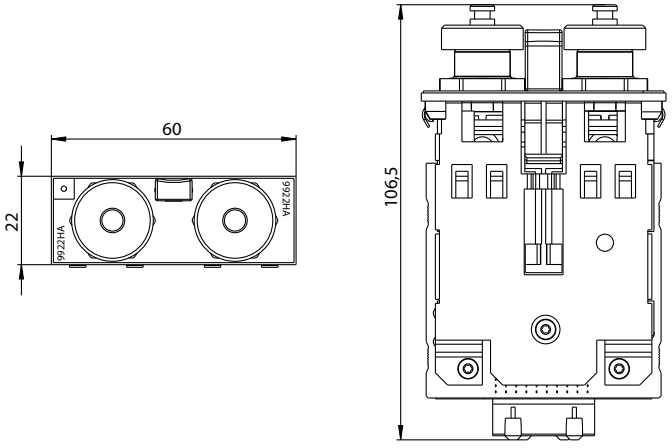


Figure 11-36 MM900 dimension drawing 6: M12 ports electrical

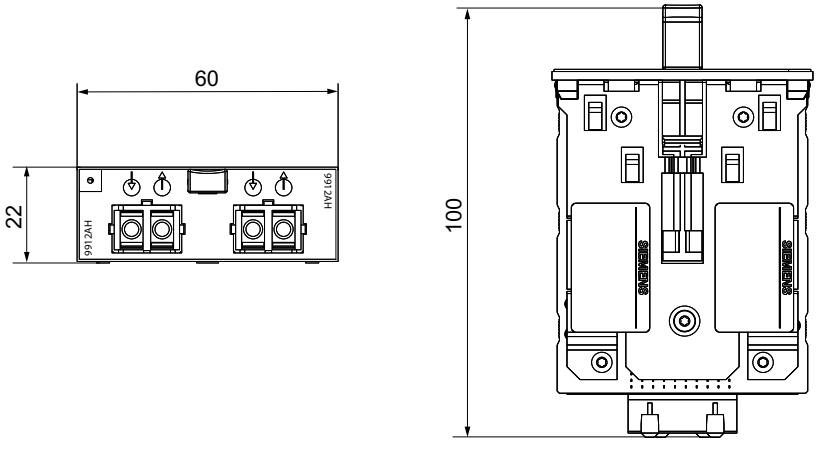


Figure 11-37 MM900 dimension drawing 7: SC RJ ports optical

11.9 SFP dimension drawings

Note

The following dimension drawings are available for the **SFP** product group.

Note

All dimensions are ± 0.2 mm unless otherwise specified.

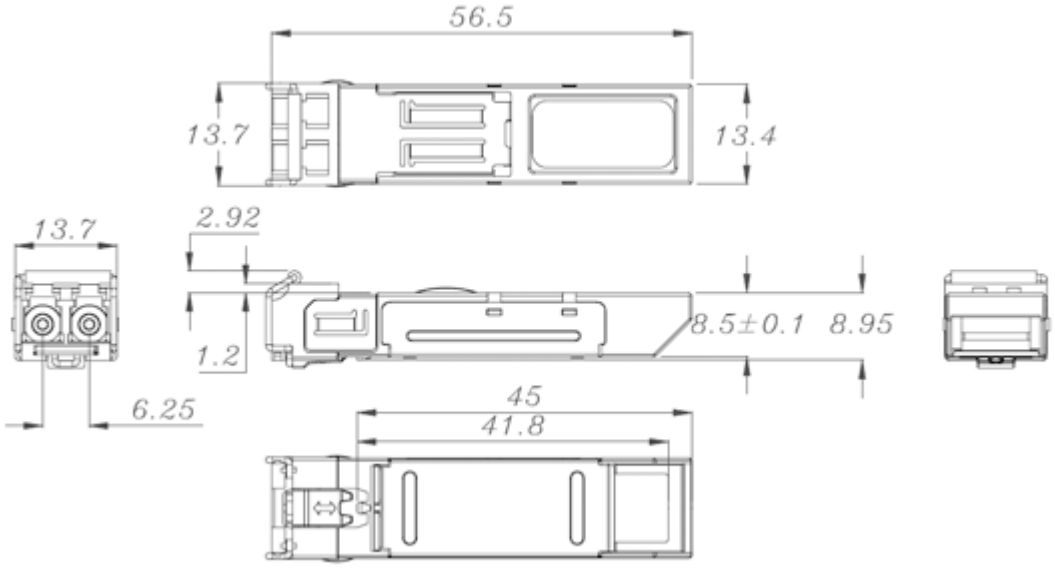


Figure 11-38 SFP dimension drawing

Certifications and approvals 12

12.1 X-300 product group

12.1.1 Certifications and approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15296/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EC directives and comply with the harmonized European

standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages. 309-356
- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, pages 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15297/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Digital Industries
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

⚠ WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013)

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  ATEX classification: II 3 (2) G Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEKRA 11ATEX0060 X
  The products meet the requirements of the following standards:
  - EN 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025 X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  IECEx classification: Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEK 14.0026X
  The products meet the requirements of the following standards:
  - IEC 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate KEMA 07ATEX0145 X as of Issue 95 / DEKRA 18ATEX0025X and IECEx Certificate of Conformity DEK 14.0025X as of Issue 43 / DEK 18.0017X and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The device contains optical radiation sources which comply with the limits of Class 1 according to IEC 60825-1. Fiber-optic cables connected to these optical radiation sources may therefore be routed either to or through hazardous areas requiring Category 2G, 3G, 2D or 3D equipment.

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

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

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는것을 목적으로 합니다.

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Type	CLASS 1 LASER Product
X304-2FE	●
X306-1LD FE	●
X307-3	●
X307-3LD	●
X308-2	●
X308-2LD	●
X308-2LH	●
X308-2LH+	●
X310	-
X310FE	-
X320-1FE	●
X320-3LD FE	●



Figure 12-1 FDA and IEC approvals

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Mechanical stability (in operation)

Device	IEC 60068-2-6 vibration	IEC 60068-2-27 shock
	5 – 9 Hz: 3.5 mm 9 – 150 Hz: 1 g 1 octave/min, 20 sweeps	**15 g, 11 ms duration 6 shocks per axis**
X304-2FE	●	●
X306-1LD FE	●	●
X307-3	●	●
X307-3LD	●	●
X308-2	●	●
X308-2LD	●	●
X308-2LH	●	●
X308-2LH+	●	●
X310	●	●

Device	IEC 60068-2-6 vibration	IEC 60068-2-27 shock
	5 – 9 Hz: 3.5 mm 9 – 150 Hz: 1 g 1 octave/min, 20 sweeps	**15 g, 11 ms duration 6 shocks per axis**
X310FE	●	●
X320-1FE	●	●
X320-3LD FE	●	●

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.2 Product group X-300M

12.2.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15297/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EC directives and comply with the harmonized European standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages. 309-356
- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, pages 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15297/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Digital Industries
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document

- on the data medium that ships with some devices.
- on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013).

Enter the document identification number C234 as the search term.

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

EMC directive (railway applications)

The TS device variant also meets the requirements of the EU Directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 50121-3-2 Railway applications - Electromagnetic compatibility - part 3-2: Rolling stock - Devices
- EN 50121-4 Railway applications - Electromagnetic compatibility - part 4: Interference emissions and immunity of signal telecommunications equipment

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

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

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

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Railway approval

The TS variant of the device meets the requirements of the standards:

- EN 50155 "Railway applications - Electronic equipment used on rolling stock"
- EN 45545 "Railway applications - Fire protection on railway vehicles"

Note

When used on railway stock, a stabilized power supply must be used to comply with EN50155.

12.2.1.1 X-300M mechanical stability (in operation)

Mechanical stability (in operation)

Device	IEC 60068-2-6 vibration	IEC 60068-2-27 shock
	5 – 9 Hz: 3.5 mm 9 – 150 Hz: 1 g 1 octave/min, 20 sweeps	15 g, 11 ms duration 6 shocks per axis
X308-2M	●	●
X308-2M TS	●	●

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.automation.siemens.com/WW/view/en/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (http://support.automation.siemens.com/WW/view/en/60612658)

⚠ 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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.3 Product group XR-300M

12.3.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15298/cert).

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.

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EU directives and comply with the harmonized European standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, p. 309-356

  Note

  Only variants with 24 V DC power supply meet the requirements of this approval.

- **2014/35/EU (Low Voltage Directive)**
  Directive of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits; official journal of the EU L96, 29/03/2014, p. 357-374.

  Note

  Only variants with 240 V AC power supply meet the requirements of this approval.

- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, p. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, p. 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Division Process Industries and Drives
Process Automation
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

⚠ WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013)

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  ATEX classification: II 3 (2) G Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEKRA 11ATEX0060 X
  The products meet the requirements of the following standards:
  - EN 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025 X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  IECEx classification: Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEK 14.0026X
  The products meet the requirements of the following standards:
  - IEC 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate KEMA 07ATEX0145 X as of Issue 95 / DEKRA 18ATEX0025X and IECEx Certificate of Conformity DEK 14.0025X as of Issue 43 / DEK 18.0017X and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The device contains optical radiation sources which comply with the limits of Class 1 according to IEC 60825-1. Fiber-optic cables connected to these optical radiation sources may therefore be routed either to or through hazardous areas requiring Category 2G, 3G, 2D or 3D equipment.

Programmable logic controllers (low voltage directive)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/35/EU "Low Voltage Directive".

Applied standard:

- DIN EN 61131-2 Programmable logic controllers - Part 2: Operating resource requirements and tests.

Note

Only variants with 100 to 240 V AC power supply meet the requirements of this approval.

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

EMC directive (railway applications)

The TS device variant also meets the requirements of the EU Directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 50121-3-2 Railway applications - Electromagnetic compatibility - part 3-2: Rolling stock - Devices
- EN 50121-4 Railway applications - Electromagnetic compatibility - part 4: Interference emissions and immunity of signal telecommunications equipment

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

cULus approval for industrial control equipment

cULus Listed IND. CONT. EQ.

Underwriters Laboratories Inc. complying with

- UL 508
- CSA C22.2 No. 142-M1987

Report no. E85972

Note

Only variants with 100 to 240 VAC power supply meet the requirements of this approval.

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

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Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

Railway approval

The TS variant of the device meets the requirements of the standards:

- EN 50155 "Railway applications - Electronic equipment used on rolling stock"
- EN 45545 "Railway applications - Fire protection on railway vehicles"

Note

When used on railway stock, a stabilized power supply must be used to comply with EN50155.

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Device	CLASS 1 LASER Product
SCALANCE XR324-12M	(*)
SCALANCE XR324-12M	(*)
SCALANCE XR324-12M	(*)
SCALANCE XR324-12M	(*)
* For modular devices, you can find the marking in the operating instructions for the media module or plug-in transceiver used.	



Figure 12-2 FDA and IEC approvals

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

12.3.1.1 XR-300M mechanical stability (in operation)

Device: SCALANCE	(Variant)	IEC 60068-2-6 vibration	IEC 60068-2-27 shock	IEC 60068-2-6 vibration *)
		10 – 58 Hz: 0.15 mm 58 – 500 Hz: 1 g 1 octave/min, 10 cycles	15 g, 11 ms duration 6 shocks per axis	5 – 8.51 Hz: 7 mm 8.51 – 500 Hz: 1 g 1 octave/min, 10 cycles
XR324-12M	(2 x DC data cable outlet on front)	●	●	●
XR324-12M	(1 x 100...240 VAC, data cable outlet on front)	●	●	●
XR324-12M	(2 x 24 VDC data cable outlet at rear)	●	●	●

Device: SCALANCE	(Variant)	IEC 60068-2-6 vibration	IEC 60068-2-27 shock	IEC 60068-2-6 vibration *)
		10 – 58 Hz: 0.15 mm 58 – 500 Hz: 1 g 1 octave/min, 10 cycles	**15 g, 11 ms duration 6 shocks per axis**	**5 – 8.51 Hz: 7 mm 8.51 – 500 Hz: 1 g 1 octave/min, 10 cycles**
XR324-12M	(1 x 100 to 240 VAC, data cable outlet at rear)	●	●	●
*) Note: When rack mounted with 4 securing points				

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.4 X-300EEC product group

12.4.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15301/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EU directives and comply with the harmonized European

standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, p. 309-356

  Note

  Only variants with 24 V DC power supply meet the requirements of this approval.

- **2014/35/EU (Low Voltage Directive)**
  Directive of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits; official journal of the EU L96, 29/03/2014, p. 357-374.

  Note

  Only variants with 240 V AC power supply meet the requirements of this approval.

- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, p. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, p. 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Division Process Industries and Drives
Process Automation
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013)

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  ATEX classification: II 3 (2) G Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEKRA 11ATEX0060 X
  The products meet the requirements of the following standards:
  - EN 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025 X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  IECEx classification: Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEK 14.0026X
  The products meet the requirements of the following standards:
  - IEC 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate KEMA 07ATEX0145 X as of Issue 95 / DEKRA 18ATEX0025X and IECEx Certificate of Conformity DEK 14.0025X as of Issue 43 / DEK 18.0017X and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The device contains optical radiation sources which comply with the limits of Class 1 according to IEC 60825-1. Fiber-optic cables connected to these optical radiation sources may therefore be routed either to or through hazardous areas requiring Category 2G, 3G, 2D or 3D equipment.

Programmable logic controllers (low voltage directive)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/35/EU "Low Voltage Directive".

Applied standard:

- DIN EN 61131-2 Programmable logic controllers - Part 2: Operating resource requirements and tests.

Note

Only variants with 100 to 240 V AC power supply meet the requirements of this approval.

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

EMC directive (railway applications)

The device variants with coated PCB also meet the requirements of the EU Directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 50121-3-2 Railway applications - Electromagnetic compatibility - part 3-2: Rolling stock - Devices
- EN 50121-4 Railway applications - Electromagnetic compatibility - part 4: Interference emissions and immunity of signal telecommunications equipment

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

cULus approval for industrial control equipment

cULus Listed IND. CONT. EQ.

Underwriters Laboratories Inc. complying with

- UL 508
- CSA C22.2 No. 142-M1987

Report no. E85972

Note

Only variants with 100 to 240 VAC power supply meet the requirements of this approval.

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Railway approval

The device variants with coated PCB also meet the requirements of the railway standard:

- EN 50155 "Railway applications - Electronic equipment used on rolling stock".

Note

When used on railway stock, a stabilized power supply must be used to comply with EN50155.

12.4.1.1 Restriction: as of hardware version 3

Note

Only devices as of hardware version 3 meet the requirements of this approval.

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는것을 목적으로 합니다.

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

IEC 61850-3 (EN55022 / CISPR22 CLASS A)

The product meets the requirements of the standard IEC 61850-3 (EN55022 / CISPR22 CLASS A).

IEEE 1613

The product meets the requirements of the standard IEEE 1613 CLASS 1 (electrical ports) or IEEE 1613 CLASS 2 (optical ports).

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Device	CLASS 1 LASER Product
6GK5302-7GD00-1EA3	●
6GK5302-7GD00-1GA3	●
6GK5302-7GD00-2EA3	●
6GK5302-7GD00-2GA3	●
6GK5302-7GD00-3EA3	●
6GK5302-7GD00-3GA3	●
6GK5302-7GD00-4EA3	●
6GK5302-7GD00-4GA3	●
6GK5307-2FD00-1EA3	●
6GK5307-2FD00-1GA3	●
6GK5307-2FD00-2EA3	●
6GK5307-2FD00-2GA3	●
6GK5307-2FD00-3EA3	●
6GK5307-2FD00-3GA3	●
6GK5307-2FD00-4EA3	●
6GK5307-2FD00-4GA3	●



Figure 12-3 FDA and IEC markings

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

12.4.1.2 Mechanical stability

All variants of the IE Switch SCALANCE X-300EEC meet the following requirements for mechanical stability:

- IEC 60068-2-6 (vibration)
  5 – 9 Hz: 3.5 mm
  9 – 150 Hz: 1 g
  1 octave/min, 20 sweeps
- IEC 60068-2-27 (shock)
  15 g, 11 ms duration
  6 shocks per axis

For further details, refer to the technical specifications.

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/de/view/60612658)

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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.5 XR-300M EEC product group

12.5.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15302/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EU directives and comply with the harmonized European

standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, p. 309-356

  Note

  Only variants with 24 V DC power supply meet the requirements of this approval.

- **2014/35/EU (Low Voltage Directive)**
  Directive of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits; official journal of the EU L96, 29/03/2014, p. 357-374.

  Note

  Only variants with 240 V AC power supply meet the requirements of this approval.

- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, p. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, p. 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Division Process Industries and Drives
Process Automation
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

⚠ WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013)

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  ATEX classification: II 3 (2) G Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEKRA 11ATEX0060 X
  The products meet the requirements of the following standards:
  - EN 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025 X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  IECEx classification: Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEK 14.0026X
  The products meet the requirements of the following standards:
  - IEC 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate KEMA 07ATEX0145 X as of Issue 95 / DEKRA 18ATEX0025X and IECEx Certificate of Conformity DEK 14.0025X as of Issue 43 / DEK 18.0017X and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The device contains optical radiation sources which comply with the limits of Class 1 according to IEC 60825-1. Fiber-optic cables connected to these optical radiation sources may therefore be routed either to or through hazardous areas requiring Category 2G, 3G, 2D or 3D equipment.

Programmable logic controllers (low voltage directive)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/35/EU "Low Voltage Directive".

Applied standard:

- DIN EN 61131-2 Programmable logic controllers - Part 2: Operating resource requirements and tests.

Note

Only variants with 100 to 240 V AC power supply meet the requirements of this approval.

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

cULus approval for industrial control equipment

cULus Listed IND. CONT. EQ.

Underwriters Laboratories Inc. complying with

- UL 508
- CSA C22.2 No. 142-M1987

Report no. E85972

Note

Only variants with 100 to 240 VAC power supply meet the requirements of this approval.

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는것을 목적으로 합니다.

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

IEC 61850-3 (EN55022 / CISPR22 CLASS A)

The product meets the requirements of the standard IEC 61850-3 (EN55022 / CISPR22 CLASS A).

IEEE 1613

The product meets the requirements of the standard IEEE 1613 CLASS 1 (electrical ports) or IEEE 1613 CLASS 2 (optical ports).

12.5.1.1 FDA and IEC XR-300M EEC marking

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Device	CLASS 1 LASER Product
6GK5 324-4GG00-1ER2	(*)
6GK5 324-4GG10-1ER2	(*)
6GK5 324-4GG00-2ER2	(*)
6GK5 324-4GG10-2ER2	(*)
6GK5 324-4GG00-3ER2	(*)
6GK5 324-4GG10-3ER2	(*)
6GK5 324-4GG00-4ER2	(*)
6GK5 324-4GG10-4ER2	(*)
6GK5 324-4GG00-1JR2	(*)
6GK5 324-4GG10-1JR2	(*)
6GK5 324-4GG00-2JR2	(*)
6GK5 324-4GG10-2JR2	(*)
6GK5 324-4GG00-3JR2	(*)
6GK5 324-4GG10-3JR2	(*)
6GK5 324-4GG00-4JR2	(*)
6GK5 324-4GG10-4JR2	(*)
* For modular devices, you can find the marking in the operating instructions for the media module or plug-in transceiver used.	



Figure 12-4 FDA and IEC markings

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

12.5.1.2 XR-300M EEC mechanical stability (in operation)

The devices of the SCALANCE XR-300M EEC product group meet the following standards (prerequisite: rack mounted with 4 securing points):

- **IEC 60068-2-6**
  (vibrations during transportation and operation)
  Test parameters:
  5 – 9 Hz: 3.5 mm
  9 – 150 Hz: 1 g
  1 octave/min, 20 sweeps
- **IEC 60068-2-27**
  (shocks during operation)
  Test parameters:
  15 g, 11 ms duration
  6 shocks per axis
- **IEC 60068-2-6**
  (vibrations during transportation)
  Test parameters:
  10 – 58 Hz: 0.075 mm
  85 – 150 Hz: 1 g
  1 octave/min, 20 sweeps

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

⚠ 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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.6 Product group X-300M PoE

12.6.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15299/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EC directives and comply with the harmonized European

standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages. 309-356
- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, pages 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15297/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Digital Industries
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

⚠ WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013)

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  ATEX classification: II 3 (2) G Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEKRA 11ATEX0060 X
  The products meet the requirements of the following standards:
  - EN 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025 X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  IECEx classification: Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEK 14.0026X
  The products meet the requirements of the following standards:
  - IEC 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate KEMA 07ATEX0145 X as of Issue 95 / DEKRA 18ATEX0025X and IECEx Certificate of Conformity DEK 14.0025X as of Issue 43 / DEK 18.0017X and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The device contains optical radiation sources which comply with the limits of Class 1 according to IEC 60825-1. Fiber-optic cables connected to these optical radiation sources may therefore be routed either to or through hazardous areas requiring Category 2G, 3G, 2D or 3D equipment.

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

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

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Device	CLASS 1 LASER Product
6GK5 308-2QG00-2AA2	(*)
6GK5 308-2QG10-2AA2	(*)
* For modular devices, you can find the marking in the operating instructions for the media module or plug-in transceiver used.	



Figure 12-5 FDA and IEC markings

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

12.6.1.1 Mechanical stability in operation

The switch meets the following requirements for mechanical stability:

IEC 60068-2-6 (vibration)

- Securing on a DIN rail
  5 – 9 Hz: 3.5 mm
  9 – 150 Hz: 1 g
  1 octave/min, 20 sweeps

IEC 60068-2-27 (shock)

- Securing on a DIN rail
  15 g, 11 ms duration, 6 shocks per axis

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.7 Product group XR-300M PoE

12.7.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15300/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EU directives and comply with the harmonized European standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, p. 309-356

  Note

  Only variants with 24 V DC power supply meet the requirements of this approval.

- **2014/35/EU (Low Voltage Directive)**
  Directive of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits; official journal of the EU L96, 29/03/2014, p. 357-374.

  Note

  Only variants with 240 V AC power supply meet the requirements of this approval.

- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, p. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, p. 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Division Process Industries and Drives
Process Automation
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

⚠ WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013)

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  ATEX classification: II 3 (2) G Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEKRA 11ATEX0060 X
  The products meet the requirements of the following standards:
  - EN 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025 X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  IECEx classification: Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEK 14.0026X
  The products meet the requirements of the following standards:
  - IEC 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate KEMA 07ATEX0145 X as of Issue 95 / DEKRA 18ATEX0025X and IECEx Certificate of Conformity DEK 14.0025X as of Issue 43 / DEK 18.0017X and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The device contains optical radiation sources which comply with the limits of Class 1 according to IEC 60825-1. Fiber-optic cables connected to these optical radiation sources may therefore be routed either to or through hazardous areas requiring Category 2G, 3G, 2D or 3D equipment.

Programmable logic controllers (low voltage directive)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/35/EU "Low Voltage Directive".

Applied standard:

- DIN EN 61131-2 Programmable logic controllers - Part 2: Operating resource requirements and tests.

Note

Only variants with 100 to 240 V AC power supply meet the requirements of this approval.

12.7.1.1 Restriction EMC (railway applications) TS device variant

EMC directive (railway applications)

The TS device variant also meets the requirements of the EU Directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 50121-3-2 Railway applications - Electromagnetic compatibility - part 3-2: Rolling stock - Devices
- EN 50121-4 Railway applications - Electromagnetic compatibility - part 4: Interference emissions and immunity of signal telecommunications equipment

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

cULus approval for industrial control equipment

cULus Listed IND. CONT. EQ.

Underwriters Laboratories Inc. complying with

- UL 508
- CSA C22.2 No. 142-M1987

Report no. E85972

Note

Only variants with 100 to 240 VAC power supply meet the requirements of this approval.

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

Railway approval

The TS variant of the device meets the requirements of the railway standard

- EN 50155 "Railway applications - Electronic equipment used on rolling stock".

Note

When used on railway stock, a stabilized power supply must be used to comply with EN50155.

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Device	CLASS 1 LASER Product
6GK5 324-4QG00-1AR2	(*)
6GK5 324-4QG10-1AR2	(*)
6GK5 324-4QG00-3AR2	(*)
6GK5 324-4QG10-3AR2	(*)
6GK5 324-4QG00-1HR2	(*)
6GK5 324-4QG10-1HR2	(*)
6GK5 324-4QG00-3HR2	(*)
6GK5 324-4QG10-3HR2	(*)
6GK5 324-4QG00-1CR2	(*)
6GK5 324-4QG10-1CR2	(*)
* For modular devices, you can find the marking in the operating instructions for the media module or plug-in transceiver used.	



Figure 12-6 FDA and IEC markings

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

12.7.1.2 Mechanical stability in operation

The switch meets the following requirements for mechanical stability:

IEC 60068-2-6 (vibration)

- Mounting in the rack: (2-point mounting:)
  10 to 58 Hz: 0.075 mm
  85 – 150 Hz: 1 g
  1 octave/min, 20 sweeps
- Individual mounting: (4-point mounting):
  5 to 8.51 Hz: 3.5 mm
  8.51 – 500 Hz: 1 g
  1 octave/min, 20 sweeps

IEC 60068-2-27 (shock)

- Mounting in the rack (2-point mounting):
  15 g, 11 ms duration, 6 shocks per axis

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

⚠ 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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.8 MM900 product group

12.8.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15303/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

EC declaration of conformity

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EC directives and comply with the harmonized European standards (EN) which are published in the official documentation of the European Union and here.

- **2014/34/EU (ATEX explosion protection directive)**
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages. 309-356
- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, pages 88-110

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15303/cert).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Digital Industries
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15303/cert)

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the ATEX certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3G Ex nA IIC T4 Gc
  Certificate no.: KEMA 07ATEX0145 X
  The products meet the requirements of the following standards:
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  ATEX classification: II 3 (2) G Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEKRA 11ATEX0060 X
  The products meet the requirements of the following standards:
  - EN 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - EN 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX classification: II 3 G Ex ec IIC T4 Gc
  Certificate no.: DEKRA 18ATEX0025X
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid ATEX certificates.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC T4 Gc
  Certificate no.: DEK 14.0025X
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- nA [op is]
  IECEx classification: Ex nA [op is Gb] IIC T4 Gc
  Certificate no.: DEK 14.0026X
  The products meet the requirements of the following standards:
  - IEC 60079-28 (Explosive atmospheres - Part 28: Protection of equipment and transmission systems using with optical radiation)
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC T4 Gc
  Certificate no.: DEK 18.0017X
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate KEMA 07ATEX0145 X as of Issue 95 / DEKRA 18ATEX0025X and IECEx Certificate of Conformity DEK 14.0025X as of Issue 43 / DEK 18.0017X and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The device contains optical radiation sources which comply with the limits of Class 1 according to IEC 60825-1. Fiber-optic cables connected to these optical radiation sources may therefore be routed either to or through hazardous areas requiring Category 2G, 3G, 2D or 3D equipment.

EMC directive (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC declaration of conformity.

EMC directive (railway applications)

The device variants with the supplement (C) in the type name have varnished printed circuit boards (conformal coating) and also meet the requirements of EU directive 2014/30/EU "Electromagnetic Compatibility" (EMC Directive).

Applied standards:

- EN 50121-3-2 Railway applications - Electromagnetic compatibility - part 3-2: Rolling stock - Devices
- EN 50121-4 Railway applications - Electromagnetic compatibility - part 4: Interference emissions and immunity of signal telecommunications equipment

You will find the current versions of the standards in the currently valid EC declaration of conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements of the EC directive 2011/65/EC for the restriction of the use of certain hazardous substances in electrical and electronic equipment:

Applied standard:

- EN 50581

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

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 for industrial control equipment

cULus Listed IND. CONT. EQ.

Underwriters Laboratories Inc. complying with

- UL 508
- CSA C22.2 No. 142-M1987

Report no. E85972

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

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

Railway approval

Media modules with the supplement (C) in the type name have varnished printed circuit boards (conformal coating) and meet the requirements of the railway standard:

- EN 50155 "Railway applications - Electronic equipment used on rolling stock".

Note

When used on railway stock, a stabilized power supply must be used to comply with EN50155.

FDA and IEC approvals

The following MM900 media modules meet the FDA and IEC requirements listed below:

Media module	CLASS 1 LASER PRODUCT
MM992-2CUC	-
MM992-2CUC (C)	-
MM992-2CU	-
MM992-2M12 (C)	-
MM992-2VD	-
MM992-2SFP	(*)
MM992-2SFP (C)	(*)
MM991-2 (BFOC)	●
MM991-2FM (BFOC)	●
MM991-2LD (BFOC)	●
MM991-2 (SC)	●
MM991-2LD (SC)	●
MM991-2LH+ (SC)	●
MM991-2P (SC RJ)	●
MM992-2 (SC)	●
MM992-2 (C) (SC)	●
MM992-2LD (SC)	●
MM992-2LH (SC)	●
MM992-2LH+ (SC)	●
MM992-2ELH (SC)	●

* You will find additional information in the compact operating instructions "Transceiver SFP/SFP+".



Figure 12-7 FDA and IEC approvals

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

12.9 Product group SFP

12.9.1 Approvals

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.

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included into the EU declaration of conformity procedure by the manufacturer of the machine.

UK Declaration of Conformity

UK CA

The UK declaration of conformity is available to all responsible authorities at:

Siemens Aktiengesellschaft
Process Industries and Drives Division,
Process Automation
DE-76181 Karlsruhe
Germany

Importer UK:

Siemens plc,
Manchester M20 2UR

You can find the current UK Declaration of Conformity for these products on the Internet pages under Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert@@@).

The SIMATIC NET products described in this document meet the requirements of the following directives/regulation:

- EMC Regulation
  SI 2016/1091 Electromagnetic Compatibility Regulations 2016, and related amendments
- RoHS Regulation
  SI 2012/3032 Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, and related amendments

Certificate of Conformity

UK CA

The EU and the UK certificates of conformity are available to all responsible authorities at:

Siemens Aktiengesellschaft
Process Industries and Drives Division,
Process Automation
DE-76181 Karlsruhe
Germany

You can find the current certificates of conformity for these products on the Internet pages under Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert@@@).

The SIMATIC NET products described in this document meet the requirements of the following directives/regulations:

- EC directive 2014/34/EU (ATEX guideline for explosion protection)
  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages 309-356
- UK-Regulation
  SI 2016/1107 Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016, and related amendments

EU Declaration of Conformity/manufacturer's declaration

CE

The SIMATIC NET products described in these operating instructions meet the requirements and safety objectives of the following EC directives and comply with the harmonized European standards (EN) which are published in the official documentation of the European Union and here.

- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, pages 88-110

You will find the EU Declaration of Conformity/manufacturer's declaration for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

The EU Declaration of Conformity/manufacturer's declaration is available to all responsible authorities at:

Siemens Aktiengesellschaft

Digital Industries
DE-76181 Karlsruhe
Germany

ATEX, IECEx, UKEX and CCC Ex certification

WARNING

Risk of explosion in hazardous areas

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

"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document

- on the data medium that ships with some devices.
- on the Internet pages under Siemens Industry Online Support.

Enter the document identification number "C234" as the search term.

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the Ex certificate number on the packaging label.

Note

Use the plug-in transceivers only SIMATIC NET devices that are listed in the ATEX/IECEx/UKEX certificates DEKRA 18ATEX0078 U, IECEx DEK 18.0050U, DEKRA 21UKEX0006 U and the respective CCC Ex certificates.

The markings of the electrical devices are:



II 3 G Ex ec IIC T4 Gc
DEKRA 18ATEX0078 U
IECEx DEK 18.0050U
DEKRA 21UKEX0006 U
Importer UK:
Siemens plc,
Manchester
M20 2UR



(Ex na IIC T4 Gc, not on the nameplate)

The products meet the requirements of the following standards:

- EN/IEC 60079-7, GB 3836.8
- EN IEC/IEC 60079-0, GB 3836.1

You will find the current versions of the standards in the currently valid certificates.

Permitted types of protection

The following types of protection are possible:

- nA
  ATEX classification: II 3 G Ex nA IIC Gc
  Certificate no.: DEKRA 18ATEX0078 U
  The products meet the requirements of the following standards:
  - EN/IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - EN/IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  ATEX/UKEX classification: II 3 G Ex ec IIC Gc
  Certificate no.: DEKRA 18ATEX0078 U, DEKRA 21ATEX0006 U
  The products meet the requirements of the following standards:
  - EN 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - EN/IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

Note

The plug-in transceivers meet the T4 classification when they are installed in SIMATIC NET devices that are listed in the ATEX certificate KEMA 07ATEX0145 X or DEKRA 18ATEX0025 X or DEKRA 18ATEX0026 X for ambient temperatures up to 70 °C.

You will find the current versions of the standards in the currently valid ATEX certificates.

IECEx

The SIMATIC NET products described in these operating instructions meet the requirements of explosion protection according to IECEx.

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the IECEx certificate number on the nameplate.

Note

Use the transceivers only in SIMATIC NET devices that are listed in the IECEx certificates IECEx DEK 14.0025X, IECEx DEK 18.0017X or IECEx DEK 18.0018X.

Permitted types of protection

The following types of protection are possible:

- nA
  IECEx classification: Ex nA IIC Gc
  Certificate no.: IECEx DEK 18.0050 U
  The products meet the requirements of the following standards:
  - IEC 60079-15 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)
- ec
  IECEx classification: Ex ec IIC Gc
  Certificate no.: IECEx DEK 18.0050 U
  The products meet the requirements of the following standards:
  - IEC 60079-7 (Explosive atmospheres - Part 7: Equipment protection through increased safety "e")
  - IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

Note

The plug-in transceivers meet the T4 classification when they are installed in SIMATIC NET devices that are listed in the IECEx certificate DEK 14.0025X for ambient temperatures up to 70 °C.

You will find the current versions of the standards in the currently valid IECEx certificates.

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate DEKRA 18ATEX0078 U and IECEx Certificate of Conformity DEK 18.0050 U and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The plug-in transceivers are approved as laser Class 1 according to IEC 60825-1.

Fiber optic cables that are connected to these optical radiation sources may therefore either lead into or through hazardous areas that require equipment of the explosion protection level (EPL) Gb, Gc, Db or Dc.

EMC (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the electromagnetic compatibility requirements according to the EU Directive 2014/30/EU as well as the UK-Regulation SI 2016/1091 and their associated amendments.

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC/UK Declaration of Conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements on the restriction of the use of certain hazardous substances in electrical and electronic equipment according to the EU Directive 2011/65/EU as well as the UK-Regulation SI 2012/3032 and their associated amendments.

Applied standard:

- EN IEC 63000

Note

The transceivers do not have a UL listing but a c-UR-us approval (component approval).

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는것을 목적으로 합니다.

Marking for the customs union

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

Declaration of conformity according to the technical regulations of the customs union (TR ZU)

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Pluggable transceiver	CLASS 1 LASER PRODUCT
SFP	●
SFP+	●
SCP	●
STP	●



Figure 12-8 FDA and IEC approvals

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Mechanical stability (in operation)

Pluggable transceiver	IEC 60068-2-6 vibration	IEC 60068-2-27 shock
	5 – 9 Hz: 3.5 mm 9 – 150 Hz: 1 g 1 octave/min, 20 sweeps	**15 g, 11 ms duration 6 shocks per axis**
SFP	●	●
SFP+	●	●
SCP	●	●
STP	●	●

Installation guidelines

The devices meet 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 devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

⚠ 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.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

Appendix

A

A.1 TP port

Connector pinout

On the IE Switch X-300, the TP ports are implemented as RJ-45 jacks with MDI-X assignment (Medium Dependent Interface–Autocrossover) of a network component.

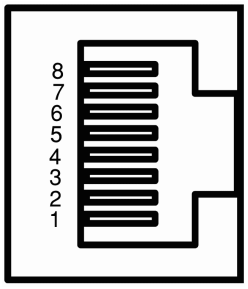


Figure A-1 RJ-45 jack

Table A-1 Pin assignment

Pin number	Pinning of the Fast Ethernet ports of IE-Switches X-300 (P1-P7) Except: SCALANCE X310FE (P1-P10)	Pinning of the gigabit Ethernet ports on SCALANCE X310 (P8 - P10) on SCALANCE X308-2, X308-2LD, X308-2LH, X308-2LH+ (P8)
Pin 8	n. c.	3-
Pin 7	n. c.	3+
Pin 6	TD-	1-
Pin 5	n. c.	2-
Pin 4	n. c.	2+
Pin 3	TD+	1+
Pin 2	RD-	0-
Pin 1	RD+	0+

Note

TP cords or TP-XP cords with a maximum length of 10 m can be connected to the RJ-45 TP port.

With the IE FC cables and IE FC RJ-45 plug, an overall cable length of up to 100 m is permitted between two devices depending on the cable type.

Autonegotiation

Autonegotiation means the automatic detection of the functionality of the port at the opposite end. Using autonegotiation, network components or end devices can detect the functionality available at the port of a partner device allowing automatic configuration of different types of device. With autonegotiation, two components connected to a link segment can exchange parameters and set themselves to match the supported communication functionality.

Note

With devices that do not support autonegotiation, the IE Switch X-300 port must be set manually to the speed and duplexity settings of the device (in other words, the identical setting).

Note

The IE Switch X-300 is a plug-and-play device that does not require settings to be made for commissioning.

MDI /MDIX autocrossover function

The advantage of the MDI /MDIX autocrossover function is that straight-through cables can be used throughout and crossover Ethernet cables are unnecessary. This prevents malfunctions resulting from mismatching send and receive wires. This makes installation much easier for the user.

The IE Switches X-300 all support the MDI / MDIX autocrossover function.

Note

Autocrossover works only in autonegotiation is enabled. If the setting is fixed, there is no autocrossover (see Glossary).

Note

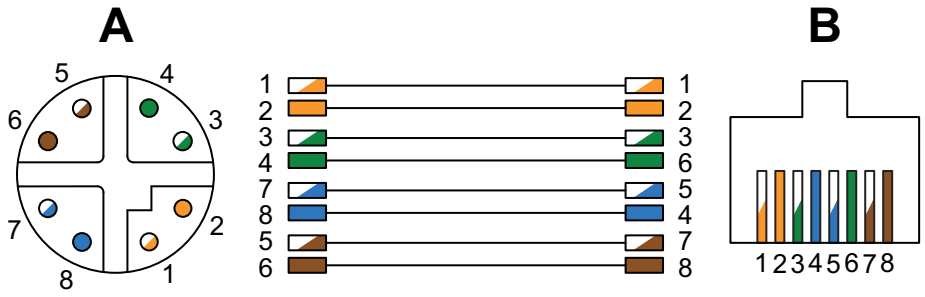
Please note that a direct connection between two ports on the IE Switch X-300 or an accidental connection over several IE Switches X-300 can cause illegal formation of loops unless RSTP or STP is activated. Such a loop can lead to network overload and network failures.

A.2 Connector system M12/X-coded according to IEC 61076-2-109

Description

M12 connectors with X coding are also suitable for transmission rates up to 10 Gbps (Cat6A) because the shields of the wire pairs can be led into the connectors. A further advantage is the availability of connectors with degree of protection IP67 with which the equipped devices are also suitable for adverse environmental conditions (dust, dampness). Due to the locking technology standardized for the M12 connectors a high resistance to vibration is achieved. Numerous SCALANCE devices therefore provide connection options for X coded M12 connectors.

Pin assignment



A Front view of M12 connector, X coded according to IEC61076-2-109

B Front view of RJ-45 connector, latching nose at the top, with pin assignment according to EIA/TIA 568B

Pin	M12/X coded		RJ-45 according to EIA/TIA 568B	
	Wire color	Signal	Wire color	Signal
1	White / orange	TX+	White / orange	TX+
2	Orange	TX-	Orange	TX-
3	White / green	RX+	White / green	RX+
4	Green	RX-	Blue	
5	White / brown		White / blue	
6	Brown		Green	RX-
7	White / blue		White / brown	
8	Blue		Brown	

A.3 Fitting the IE FC RJ-45 Plug

Assembly of the IE FC RJ-45 Plug on an IE FC Standard Cable

For information on assembling an IE FC RJ-45 Plug on a SIMATIC NET Industrial Ethernet FastConnect cable, please refer to the instructions supplied with the IE FC RJ-45 Plug.

Inserting the IE FC RJ-45 Plug

1. Insert the IE FC RJ-45 Plug in the twisted-pair interface of the IE switch until it locks in place.



Figure A-2 Inserting the IE FC RJ-45 Plug (based on the example of the IE FC RJ-45 Plug 180)

The flush fit and locking mechanism of the PROFINET-compliant IE FC RJ-45 Plug along with the securing collar on the TP port of the IE Switch guarantee a robust connection suitable for industrial conditions providing tensile and bending strain relief for the inserted connector.

The RJ-45 interface of the IE Switch X-300EEC is fitted with a securing bracket instead of a securing collar. To increase mechanical stability, you can secure the IE FC RJ-45 PLUG to this securing bracket with a cable binder.

Removing the IE FC RJ-45 Plug

1. Press on the locking lever of the IE FC RJ-45 Plug gently to remove the plug.



Figure A-3 Releasing the RJ-45 plug (based on the example of the IE FC RJ-45 Plug 180)

If there is not enough space to release the lock with your hand, you can also use a 2.5 mm screwdriver. You can then remove the IE FC RJ-45 Plug from the twisted pair socket.



Figure A-4 Releasing the RJ-45 plug with a screwdriver (based on the example of the IE FC RJ-45 Plug 180)

A.4 Electrical tests (EEC devices)

Regulations / standards

- IEC 60255 (product standards)
- IEEE C37.90.0/.1/.2
- UL 508

Further standards: See individual tests.

Insulation test

Relevant standards: IEC 60255-5 and IEC 60870-2-1

Voltage test (routine test) for all circuits except communications and time synchronization interfaces 2.5 kV (eff) 50 Hz / 3.5 kV DC

Voltage test (routine test) only for protected communications interfaces 500 V (eff) 50 Hz / 707 V DC

Voltage test (routine test) for all circuits except communications interfaces, class III 5 kV (peak); 1.2/50 µs; 0.5 J

EMC tests of immunity (type tests)

Relevant standards: IEC 60255-6 and -22 (product standards), EN 61000-6-2 (generic standard)

High frequency test IEC 60255-22-1, class III / IEEE C37.90.1, 2.5 kV (peak); 1 MHz

Discharge of static electricity IEC 60255-22-2, class IV and IEC 61000-4-2, class IV 8 kV contact discharge; 15 kV air discharge

Radiated electromagnetic field disturbance, frequency sweep IEC 60255-22-3, class III IEC 61000-4-3, class III 10 V/m; 80 MHz to 1000 MHz; 80 % AM; 1 kHz 10 V/m; 800 MHz to 960 MHz; 80 % AM; 1 kHz 20 V/m; 1.4 GHz to 2.0 GHz; 80 % AM; 1 kHz

Irradiation with RF field, single frequencies IEC 60255-22-3, IEC 61000-4-3, class III – amplitude modulated – pulse modulated 10 V/m 80/160/450/900 MHz; 80 % AM; 1 kHz

Fast transients / burst IEC 60255-22-4 and IEC 61000-4-4 and IEEE C37.90.1 class IV 4 kV

High voltage spikes (SURGE), IEC 61000-4-5 installation class 4, auxiliary voltage pulse: 1.2/50 µs common mode: 4 kV; diff. mode: 2 kV

Relay outputs, common mode: 4 kV; diff. mode: 2 kV (valid for the signaling contact 100..240 V AC/60...250 V DC)

Line conducted high frequency, amplitude modulated IEC 61000-4-6, class III 10 V; 150 kHz to 80 MHz; 80 % AM; 1 kHz

Power frequency magnetic field IEC 60255-6 IEC 61000-4-8, class IV 0.5 mT; 50 Hz, 30 A/m permanent; 300 A/m for 3 s; 50 Hz

Radiated electromagnetic interference IEEE Std C37.90.2 35 V/m; 80 MHz to 1000 MHz

Damped oscillatory magnetic field IEC 60694, IEC 61000-4-12 2.5 kV (peak value), polarity alternating 100 kHz, 1 MHz

EMC tests of emission (type tests)

Relevant standard: EN 61000-6-1 (generic standard)

Radiated emission on cables, only auxiliary voltage IEC-CISPR 22 150 kHz to 30 MHz limit value class A

Radiated electric field strength IEC-CISPR 22, 30 MHz to 1000 MHz limit value class A

Voltage fluctuations and flicker on the power supply cable at 230 VAC IEC 61000-3-3; limit values kept to.

A.5 EMC-compatible installation of electrical Industrial Ethernet or PROFIBUS cabling

The Industrial Ethernet / PROFINET system manual "Passive network components" prescribes the use of fiber-optic cables for cabling between buildings and/or external facilities because there may be large potential differences between nodes.

If IE FC or PROFIBUS FC cables are used for such applications, the same rules apply as when installing cables indoors.
The following also applies:

- Install cables on metal cable racks
- Electrically connect the cable racks where they join
- Ground the cable racks
- Connect the shields of the cables to the grounding network as close as possible to the point of entry into the building or facility.
- Electrical bus cables installed outside buildings must be included in the lightening protection and grounding concept of the entire system. Follow the instructions in Appendix B "Lightning and Surge Voltage Protection for LAN Cables Between Buildings" of the SIMATIC NET PROFIBUS Networks manual.
- All SIMATIC NET PROFIBUS cables can be used if they are installed in cable channels protected against dampness. The safety clearances specified in Appendix C.7 "Cable categories and clearances" of the SIMATIC NET PROFIBUS Network Manual must then be adhered to.

A.6 Equipotential bonding

When do potential differences occur?

Potential differences can, for example, be caused by different power supplies. Potential differences between separate parts of the plant can be damaging to the system in the following situations:

- Programmable controllers and peripheral devices are linked on grounded connections
- Cable shields are contacted at both ends and grounded to different parts of the plant.

How do you avoid potential differences?

Potential differences must be reduced by installing bonding conductors so that the functions of the electronic components used are guaranteed.

When and why is equipotential bonding necessary?

Several good reasons for equipotential bonding are listed below:

- Devices with a grounded interface can be damaged by potential differences.
- The shield of the PROFIBUS cable must not be used for equipotential bonding. This is, however, the case if parts of the system connected by the cable shield are connected to different grounding points.
- Equipotential bonding is a requirement for lightning protection.

Rule for equipotential bonding

Remember the following points about equipotential bonding systems:

- The lower the impedance of the equipotential bonding cable, the greater the effectiveness of the equipotential bonding.
- The impedance of the additional bonding conductor must not exceed 10% of the shield impedance of the bus cable.
- Make largearea contact between the bonding conductor and the PE conductor.
- Protect the bonding conductor from corrosion.
- Install the bonding conductor so that the area enclosed by the bonding conductor and signal cables is as small as possible.
- Use copper or galvanized steel for the bonding conductor
- Include metal, conductive cable channels/racks in the equipotential bonding of the building and between the individual parts of the system. The individual segments of the channels/racks must be connected together with low inductance and low resistance and connected to the building ground system as often as possible. Expansion joints and angled connections should be bridged by additional flexible grounding bands.
- The connections between the individual segments of channels must be protected from corrosion (longterm stability)
- If there are connections between sections of buildings (for example separated by expansion joints) with their own reference point for the building ground network, a bonding conductor (equivalent copper crosssectional area ≥10 mm^2) must be installed parallel to the cables. This bonding conductor is not necessary if metal, conducting cable channels/racks are used.

Note

Bonding conductors are unnecessary if the sections of a system are connected exclusively using fiberoptic cable (FO).

Notes on systems in which no equipotential bonding is possible

To ensure greater immunity to interference, cables for SIMATIC NET PROFINET and PROFIBUS are always shielded. Due to the defined shielding property, the shield needs to make contact at both ends.

In systems in which no equipotential bonding is possible, the current flow via the shield needs to be prevented. Despite this, to be able to use the shield properties of the cable note the following:

- Contact the shield at one end with low resistance.
- Connect the other end of the shield to the grounding system using capacitive coupling.

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