SIEMENS

SIMATIC NET

Industrial Ethernet switches SCALANCE X-300EEC

Compact Operating Instructions

05/2023
A5E02630809-16

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.

Siemens AG
Digital Industries
Postfach 48 48
90026 NÜRNBERG
GERMANY

A5E02630809-16
Ⓟ 05/2023 Subject to change

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Introduction

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Purpose of the compact operating instructions

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

Validity of these compact operating instructions

These compact operating instructions are valid for the following devices:

- SCALANCE X302-7EEC
- SCALANCE X307-2EEC

Designations used

Classification	Description	Designation / example
Product line	For all devices and variants of all product groups within the SCALANCE X-300 product line, the term "IE Switch 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.	X-300EEC
Device	For a device, only the device name is used.	X302-7EEC
Variant	For a variant of the device, the device name has the appropriate variant added to it in brackets.	X302-7EEC (2 electrical ports, 7 optical ports)

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 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 (http://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 customer's exposure to cyber threats.

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

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.

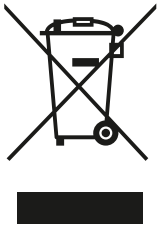
Decommissioning

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

The following and possibly other names not identified by the registered trademark sign ® are registered trademarks of Siemens AG:

Safety notes

2

Read the safety notices

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

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

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

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

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

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

Security recommendations

3

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	TCP/22	Open	Open	✓	✓
TELNET	TCP/23	Open (when configured)	Closed	✓	-
HTTP	TCP/80	Open (when configured)	Open	✓	-
PROFINET Service	TCP/84	Open	Open	-	-
HTTPS	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	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.

Description of the device

4

4.1 Product overview

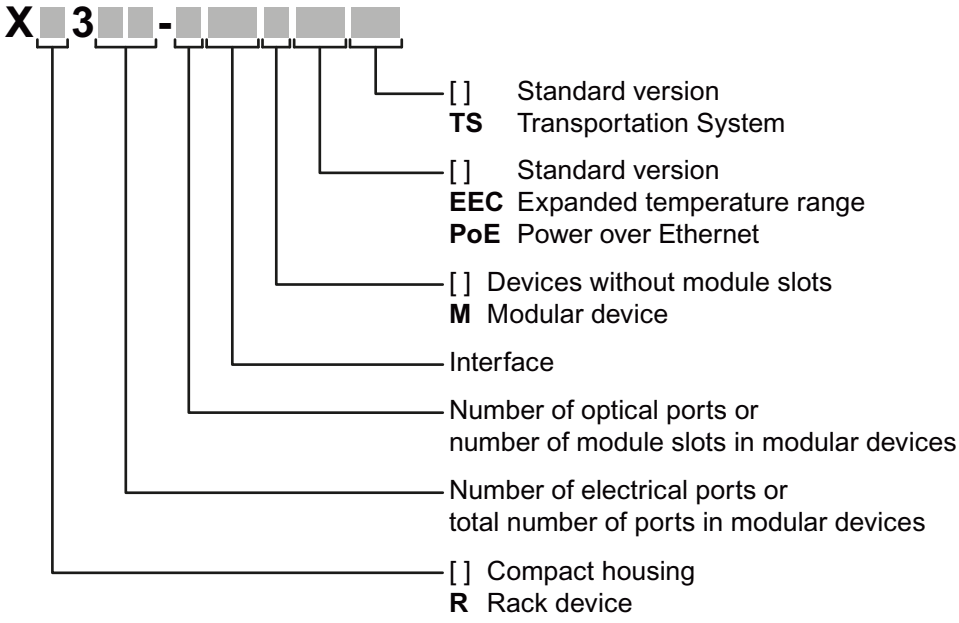
Article numbers

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

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)

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.

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 4-1 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			
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

4.2 Product properties and device views

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 Product overview (Page 19).

Figure 4-1 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 4-2 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.

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)

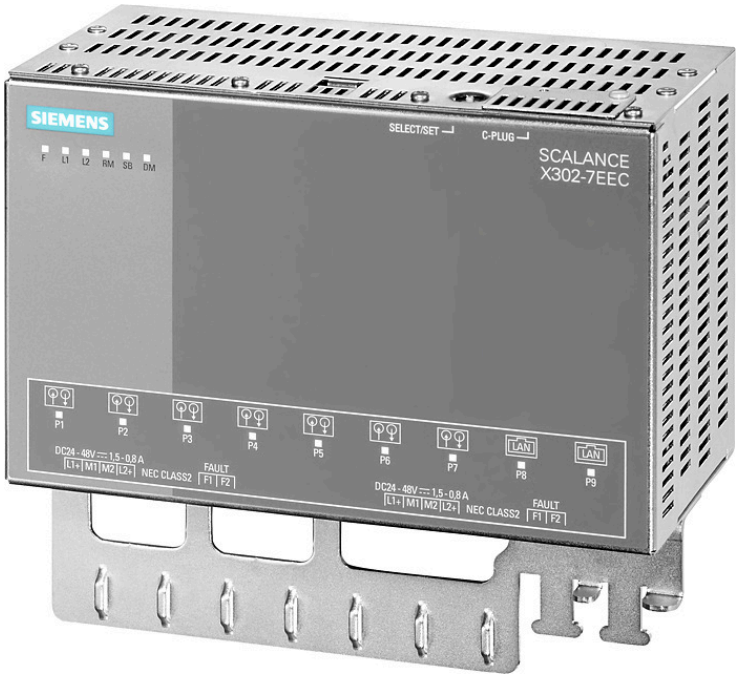


Figure 4-3 SCALANCE X302-7EEC

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)

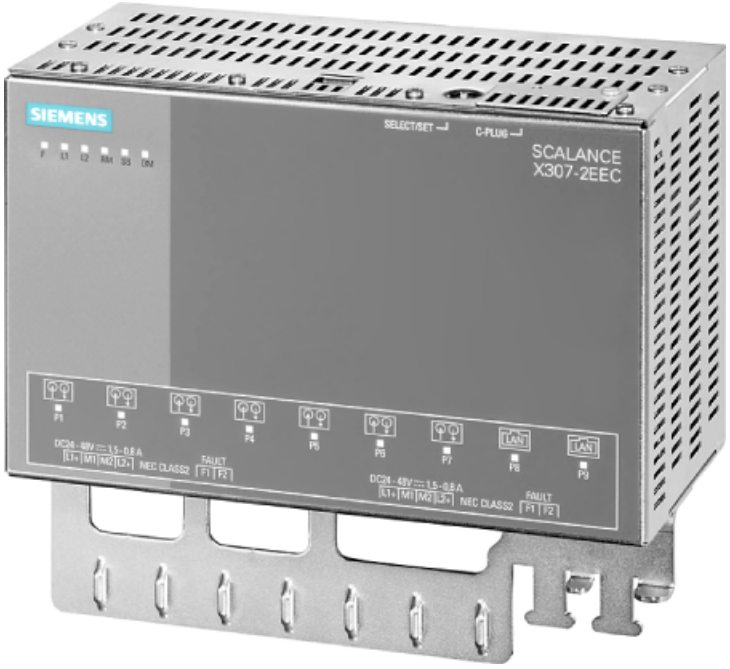


Figure 4-4 SCALANCE X307-2EEC

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

4.3 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.

4.4 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.

4.5 C-PLUG

4.5.1 Area of application and function of the C-PLUG

Area of application

The C-PLUG (configuration plug) that ships with the product is an exchangeable memory medium for storing the configuration data of the device. The device can also be operated without a C-PLUG.

This allows fast and uncomplicated replacement of a device. The C-PLUG is taken from the previous device and inserted in the new device. The first time it is started up, the replacement device has the same configuration as the previous device except for the MAC address set by the vendor.

Principle

The data remains stored on the C-PLUG even when power is turned off. In terms of using the C-PLUG, there are two ways of operating the device:

- With unwritten C-PLUG
  If an empty C-PLUG (factory settings or deleted with the Clean function) is inserted, all the configuration data of the device is saved to it automatically when the device starts up. Changes to the configuration during operation are saved without operator intervention on the C-PLUG if this is in the "ACCEPTED" status. This depends on how you configured your SCALANCE device. In this mode, the internal memory is neither read nor written. This mode is active when a C-PLUG is inserted.
- With written C-PLUG
  A device 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.

Response to errors

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 device (LEDs, Web-based management, SNMP, CLI and PROFINET diagnostics).

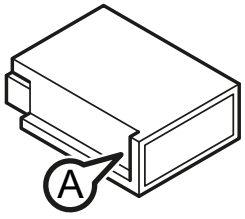
4.5.2 Removing and inserting the C-PLUG (compact housing)

NOTICE
A C-PLUG may only be removed or inserted when the device is turned off.

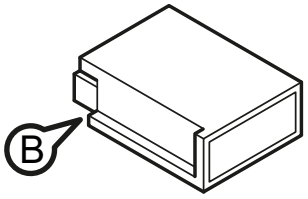
Position of the C-PLUG

	In devices with a compact housing, the C-PLUG is located behind the sealing screw on the rear of the device. To remove the sealing screw, use a coin or a wide blade screwdriver.

Removing the C-PLUG

	1. Turn off the power to the device. 2. Remove the sealing screw on the rear of the device with a coin or a wide blade screwdriver. 3. Insert a screwdriver between the front edge of the C-PLUG (position A) and the slot and release the C-PLUG. 4. Remove the C-PLUG and close the housing again with the sealing screw.

Inserting the C-PLUG

	1. Turn off the power to the device. 2. Remove the sealing screw on the rear of the device with a coin or a wide blade screwdriver. 3. The housing of the C-PLUG has a protruding ridge on the long side (position B). The slot has a groove at this position. Insert the C-PLUG correctly oriented into the slot. 4. Close the housing again with the sealing screw.

Installation and disassembly

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

Cable

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 50 °C, only use cables with admitted maximum operating temperature of at least 80 °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 3836.3.

⚠ 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.

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".

5.3 Installation

Note

When installing and operating the device, keep to the installation instructions and safety-related notices as described in this document and in the manual "SIMATIC NET Industrial Ethernet Twisted Pair and Fiber Optic Networks (https://support.industry.siemens.com/cs/ww/en/view/1172207)".

Safety requirements for installation

According to the IEC 61131-2 standard and therefore in accordance with the EU 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 shock-hazard protection, 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.

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

5.4 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

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.

5.5 Installation on a DIN rail

WARNING

When used in shipbuilding, installation on a 35mm DIN rail is not permitted.

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

Installation

Install the switch on a 35 mm DIN rail complying with DIN EN 60715.

1. Hang the switch 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 AUTOHOTSPOT.
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 switch.

Removing

1. Push the switch down.
2. Swing the device upwards.

No tools are necessary for removing the device.

Grounding

CAUTION

Grounding of the X-300EEC

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 to 240 V AC, you must always connect protective ground via the bolts on the bottom of the device housing.

See also

Connecting the switch (Page 45)

5.6 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 switch to the underside of the standard rail.
3. Connect the grounding of the switch according to the description in the section AUTOHOTSPOT.
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 switch.

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

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

Removing

To remove the switch 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 switch away from the rail.

5.7 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 switch.

1. Mount the switch on the wall.
2. Connect the grounding of the switch according to the description in the section AUTOHOTSPOT.
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 switch.

⚠ 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

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 Dimension drawings (Page 71).

5.8 19" rack mounting

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 Dimension drawings (Page 71).

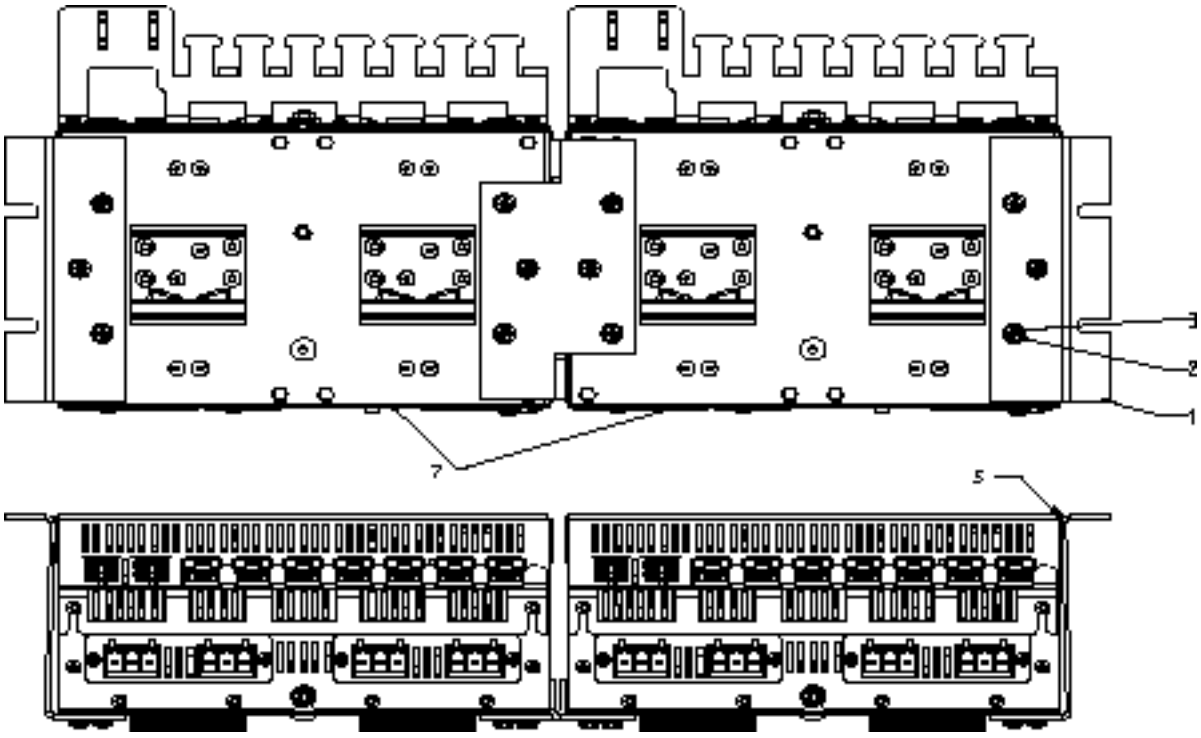


Figure 5-1 Rack mounting of two IE-Switches X-300EEC fastened togetherFigure at top: Rear of the switchesFigure at bottom: View from below

Table 5-2 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

Connecting

6

6.1 Safety when connecting up

Safety notices

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

⚠ 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.

6.2 Notes on commissioning

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").

6.3 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.

6.4 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.

6.5 Connecting the grounding

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 mm^2.

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.

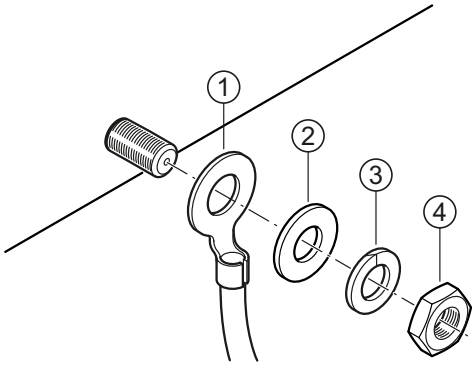
To wire up the protective ground, use a copper cable of category 14-8 AWG or cable with a cross-section of 1.5 to 6 mm².

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 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.

6.6.1 Signaling contact 24 to 48 V

24 V DC 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, 24 V DC).

Table 6-1 Pin assignment of the 24 V DC signaling contact

Pin number	Assignment
	
Pin 1	F1
Pin 2	F2

To wire up the signaling contact, use a copper cable of category 18-12 AWG or cable with a cross-section of 0.75 to 2.5 mm².

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.

6.6.2 Signaling contact 100 to 240 VAC / 60 to 250 VDC

⚠ WARNING

Danger from line voltage

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

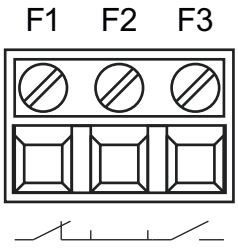
This product can only function correctly and safely if it is transported, stored, set up, and installed correctly, and operated and maintained as recommended.

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 6-2 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.

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.

6.7 Power supply

6.7.1 Power supply for the X-300EEC / XR-300M EEC

Power supply of the IE switches X300 EEC / XR300M EEC

WARNING

Danger to life: 100 ... 240 V / 60 to 250 VDC

Please note that the IE switches X300EEC / XR300M EEC can have a 100 to 240 VAC / 60 to 250 VDC - or a 24 to 48 VDC power supply.

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.

The 100 to 240 VAC / 60 to 250 VDC and 24 to 48 VDC terminal blocks for the power supply of the X300 EEC / XR300M EEC are coded and cannot be confused when you plug them in.

Power supply redundancy with the IE switches X300 EEC / XR300M EEC

The IE switches X300 EEC / XR300M EEC provide the following options for redundancy of the 24 to 48 VDC power supply:

- Redundant power supply via one power supply unit (1 x 24 to 48 VDC)
  You can connect a redundant power supply to each 24 V to 48 VDC power supply unit. To do this, use the terminals L1 and L2 of terminal block PS1.
- Redundant power supply units 24 to 48 VDC
  Connect one power supply to a power supply unit.

NOTICE

Connection with redundant 24 to 48 VDC power supply units

If you connect an X-300EEC with redundant 24 to 48 VDC terminal blocks to two power supplies, you will need to use L1 of the PS1 terminal block and L2 of the PS2 terminal block.

The IE switches X300 EEC / XR300M EEC provide the following options for redundancy of the 100 to 240 VAC / 60 to 250 VDC power supply:

- Redundant terminal blocks
  You can order the switch with redundant terminal blocks for the power supply. Each terminal block has only 1 pin for 1 power supply.
- Redundancy of the power infeed is not possible with this version.

6.7.2 Connecting devices with 24 VDC power supply

⚠ WARNING

Power supply

The device is designed for operation with a directly connectable safety extra low voltage (SELV) from a limited power source (LPS).

The power supply therefore needs to meet at least one of the following conditions:

- Only safety extra low voltage (SELV) with limited power source (LPS) complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 or IEC 62368-1 / EN 62368-1 / VDE 62368-1 may be connected to the power supply terminals.
- The power supply unit for the device must meet NEC Class 2 according to 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.

Note

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 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.

6.7.2.1 Overview

Table 6-3 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	●

6.7.2.2 Connecting the external 24 VDC power supply

24 V safety extra-low voltage (SELV)

WARNING

- The IE Switch X-300 is designed for operation with safety extra-low voltage (SELV). This means that only SELV complying with IEC 60950-1 / EN 60950-1 / 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 an 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 58 V DC.

Connecting to the power supply (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 6-4 Pinout of the 24 to 48 V safety extra-low voltage (SELV)

Pin number	Assignment
Pin 1	L1+ (24 to 48 V DC)
Pin 2	M1
Pin 3	M2
Pin 4	L2+ (24 to 48 V DC)

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.

6.7.2.3 Redundant power supply

Redundancy with the 24...48 V power supply of the IE Switch X-300EEC

The X-300EEC is available with a single or redundant power supply unit to supply 24…48 V DC. Each power supply unit is monitored for power failure.

The IE Switches X-300EEC therefore provide the following options for redundancy of the 24…48 V DC power supply:

- Redundant power supply with 1 power supply unit
  You can connect a redundant power supply to each 24…48 V DC power supply unit.
- Redundant power supply units 24…48 V DC
  Connect 1 power supply to each power supply unit.
  Since both power supply units have 2 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.

Note

Connection with redundant power supply units 24...48 V DC

If you connect an X-300EEC with redundant power supply units 24…48 V DC to two power supplies, you will need to connect the power supply to terminal "L1" on both power supply units.

Only "L1" is monitored on each connector.

6.7.2.4 Connecting a redundant power supply to the X-300EEC

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.

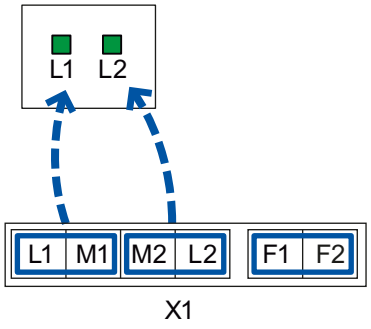


Figure 6-2 Assignment of the LED display to the pins for redundant power supply with devices with one power supply unit

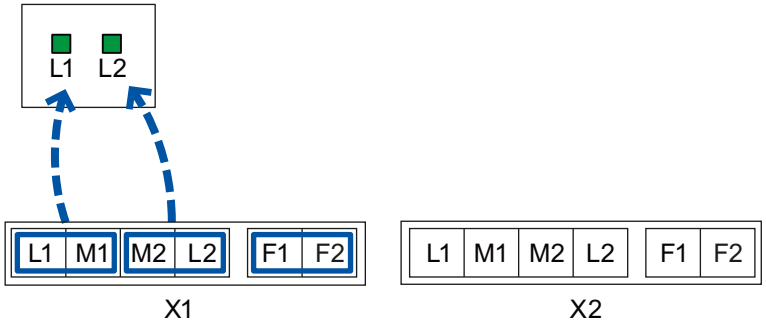


Figure 6-3 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units

- 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.

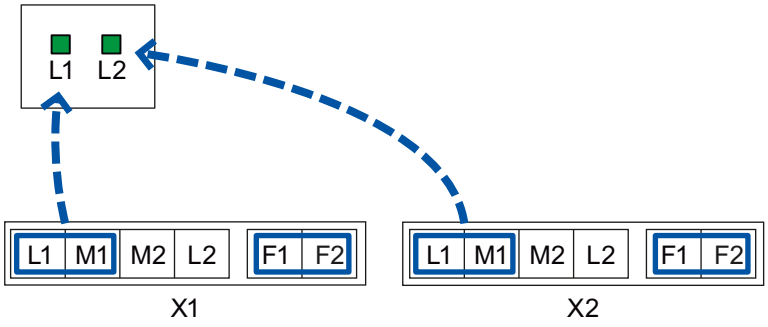


Figure 6-4 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units

- 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.

6.7.3 Connecting devices with 100 to 240 VAC power supply

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.

6.7.3.1 Overview

Table 6-5 100 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	●	-

6.7.3.2 Connecting the 100 to 240 VAC power supply

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 6-6 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).

Maintenance and cleaning

7

⚠ 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 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 data

8

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.

8.1 Construction, installation and environmental conditions

Table 8-1 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 8-2 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 8-3 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 8-4 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

8.2 Connectors and electrical data

Table 8-5 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 8-6 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 8-7 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 8-8 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 8-9 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 8-10 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 8-11 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 8-12 Overvoltage category

General	Overvoltage category II
In the application range of EN 60255-27	Overvoltage category III

8.3 Cable lengths

Table 8-13 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 8-14 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 8-15 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

8.4 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.

Dimension drawings

9

All dimensions in the drawings are in millimeters

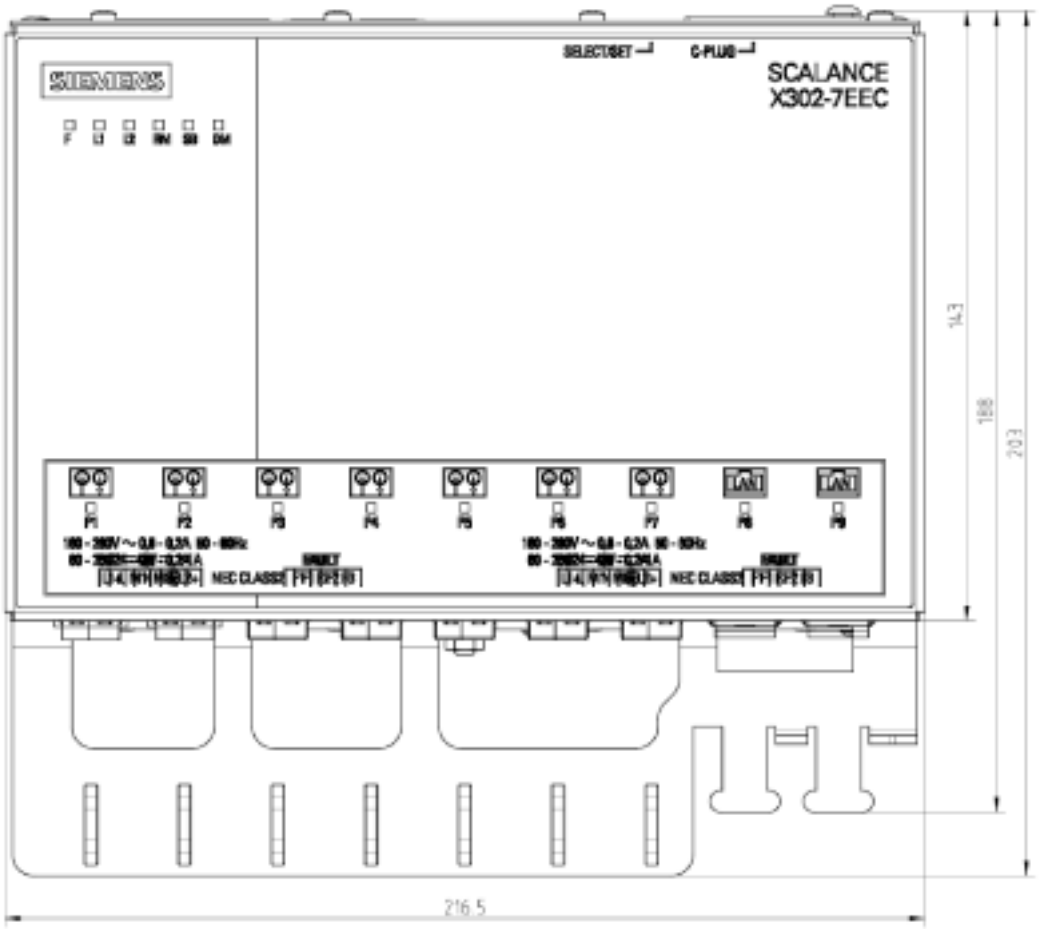


Figure 9-1 Dimension drawing IE Switch X302-7EEC - view

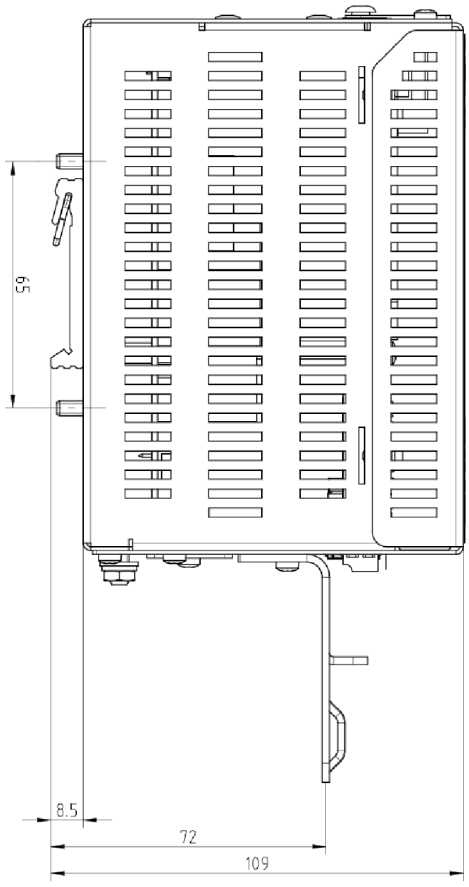


Figure 9-2 Dimension drawing IE Switch X302-7EEC - side view

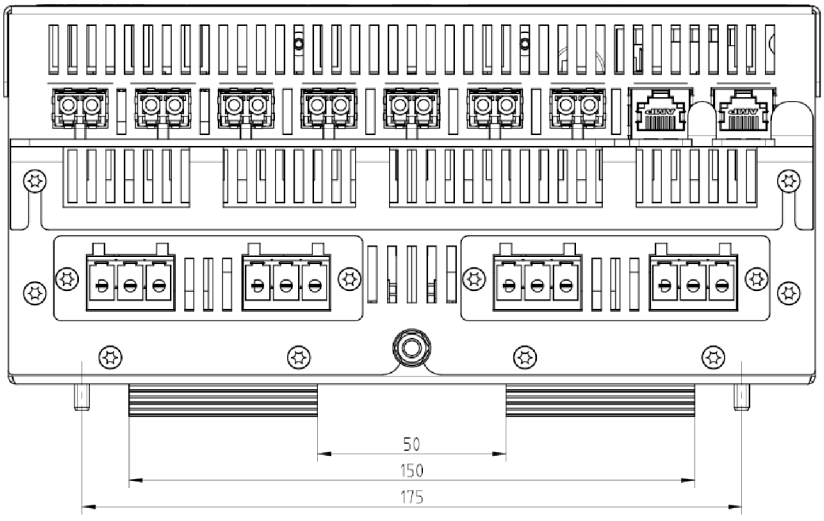


Figure 9-3 Dimension drawing IE Switch X302-7EEC - from above

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

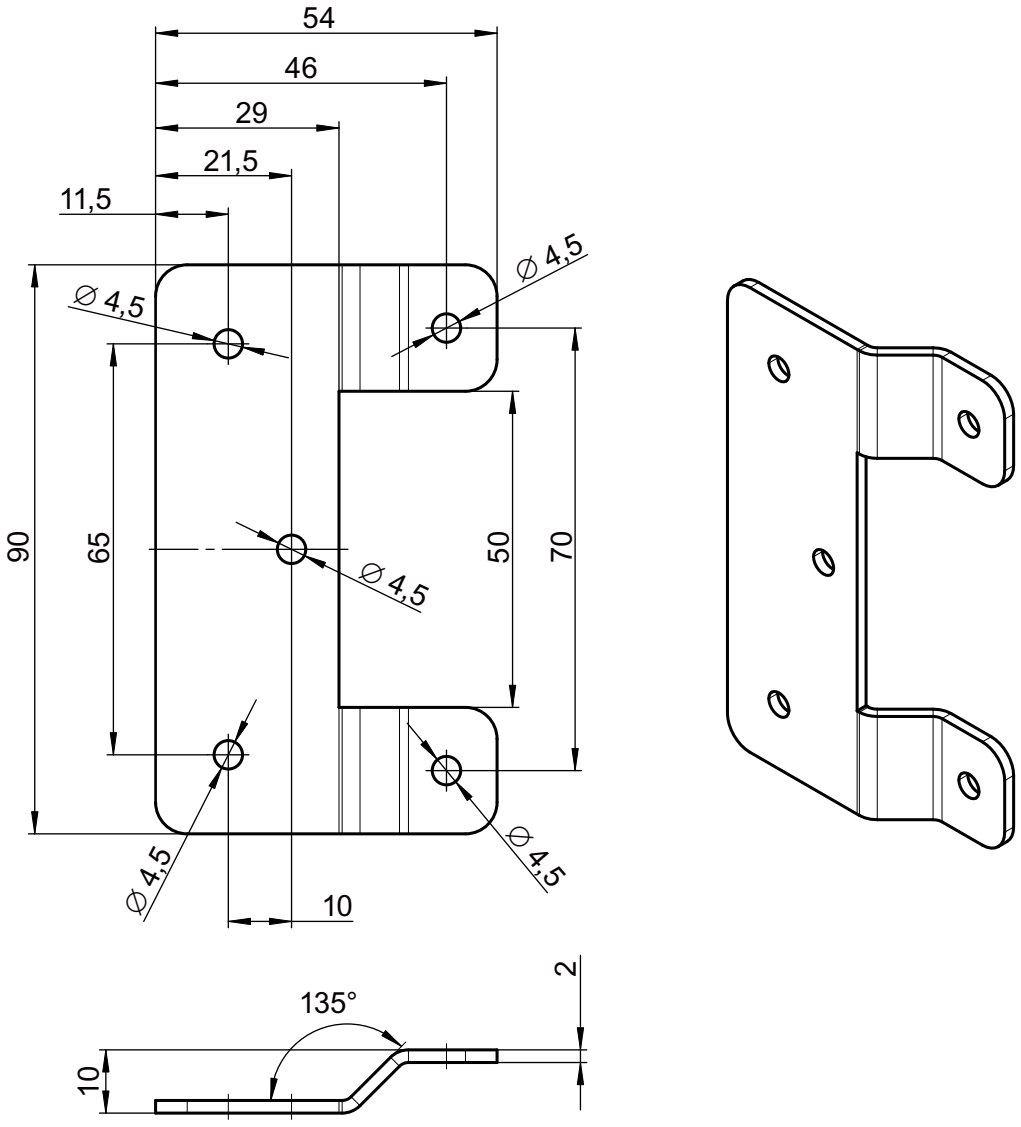


Figure 9-4 X-300EEC wall mounting (dimensions in mm)

Mounting support for 19" rack mounting of the X-300EEC switch

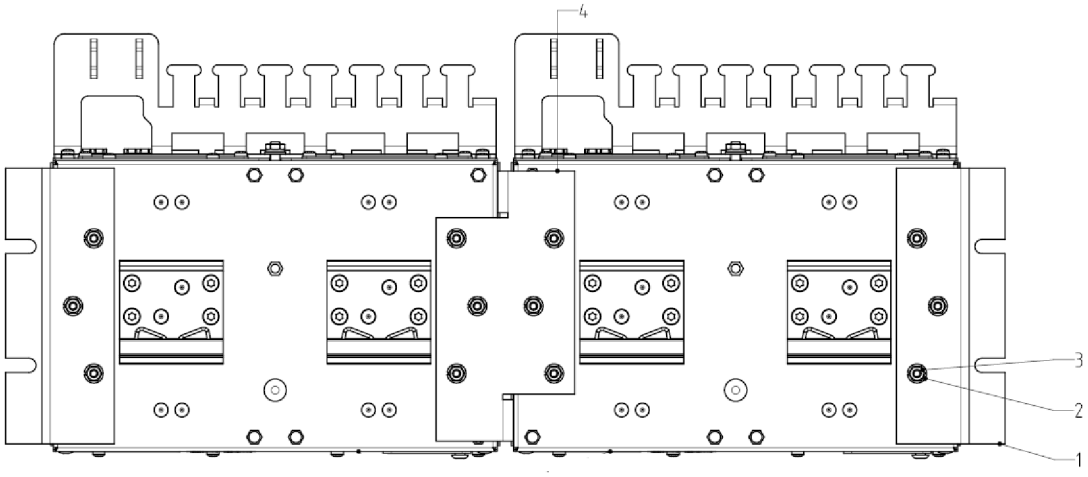


Figure 9-5 Rack mounting of two X-300EECs fastened together (view from below)

Table 9-1 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

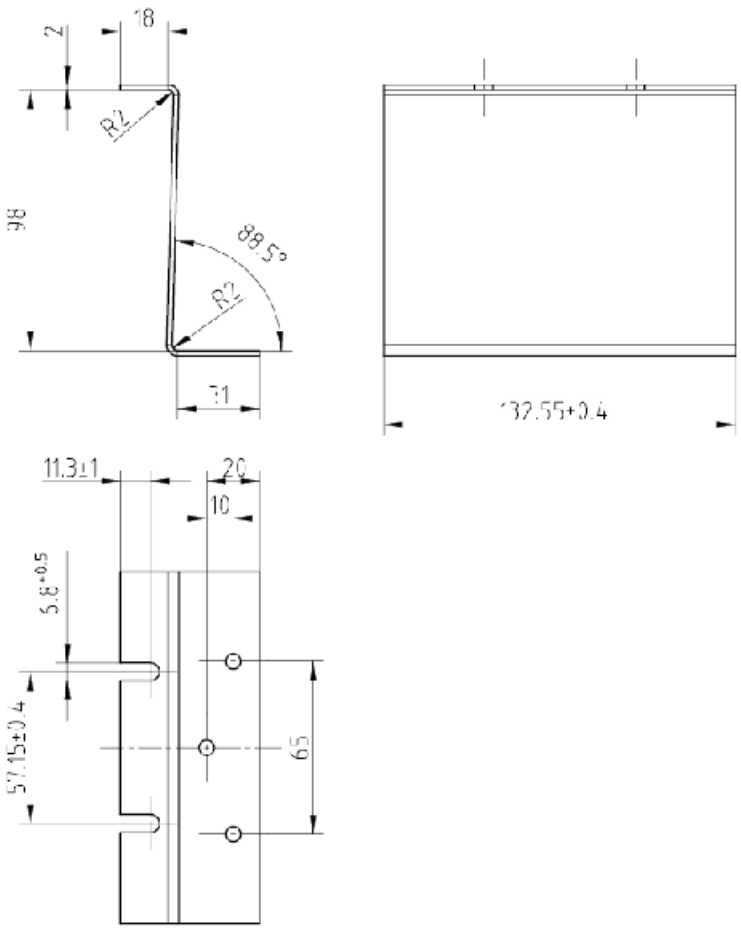


Figure 9-6 Side part of mounting support for X-300EEC (dimensions in mm)

Material: Plate 2.0 DIN EN10152 DC01+ZE25/25

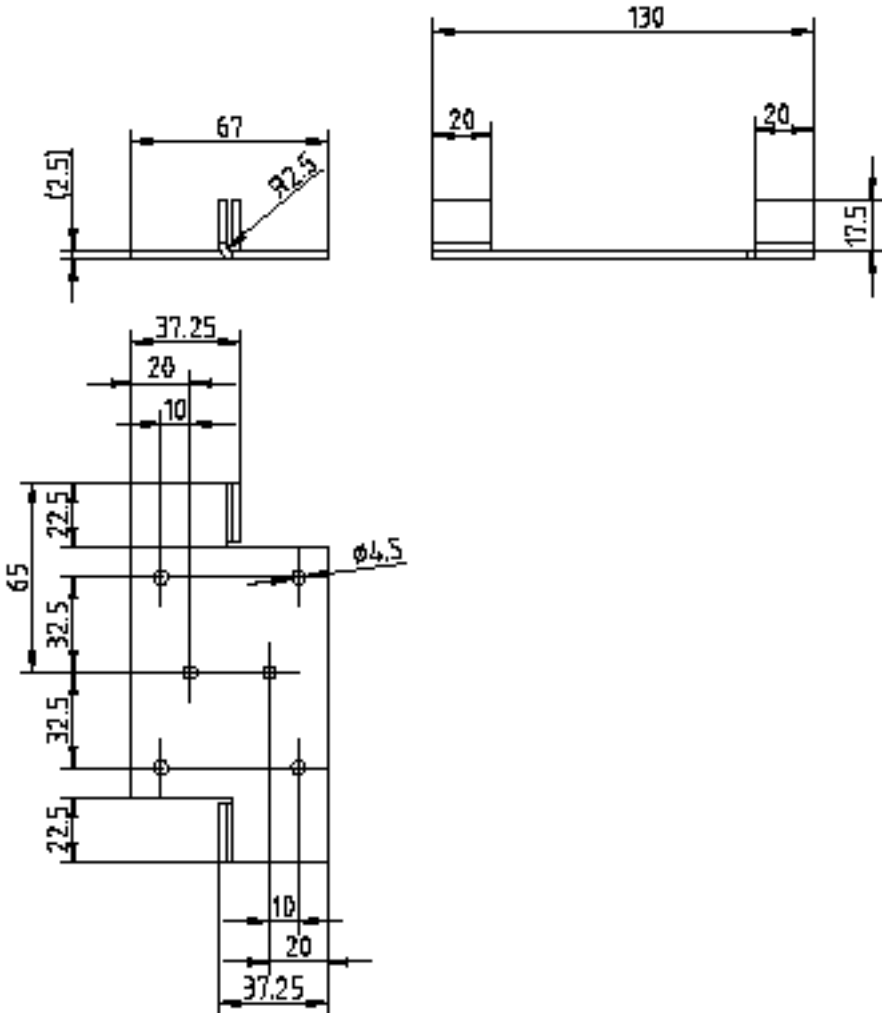


Figure 9-7 Middle part of mounting support for X-300EEC (dimensions in mm)

Material: Plate 2.0 DIN EN10152 DC01+ZE25/25

See also

19" rack mounting (Page 42)

Approvals

10

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

This product is not a machine in the sense of the EC Machinery Directive or the Supply of Machinery (Safety) Regulations (UK).

There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EEC or the Supply of Machinery (Safety) Regulations 2008 (UK) for this product.

If the product is part of the equipment of a machine, it must be included in the procedure for obtaining the EU/UK conformity assessment by the manufacturer of the machine.

Machinery directive

The product is a component in compliance with the EC Machinery Directive 2006/42/EEC and the Supply of Machinery (Safety) Regulations 2008 (UK).

According to the Machinery Directive respectively the Supply of Machinery (Safety) Regulations (UK), 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 Machinery Directive 2006/42/EEC and the Supply of Machinery (Safety) Regulations 2008 (UK).

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

Digital Industries
DE-76181 Karlsruhe
Germany

UK Declaration of Conformity

UK CA

The UK declaration of conformity is available to all responsible authorities at:

Siemens Aktiengesellschaft
Digital Industries
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:

- UK-Regulation
  SI 2016/1107 Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016, and related amendments
- 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

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:

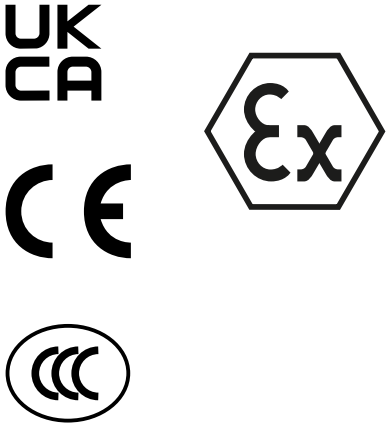
"SIMATIC NET Product Information Use of subassemblies/modules in a Zone 2 Hazardous Area".

You will find this document

- on the data medium that ships with some devices.
- on the Internet pages under Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/78381013).

Enter the document identification number "C234" as the search term.

The markings of the electrical devices are:



II 3 G Ex ec IIC T4 Gc
DEKRA 18ATEX0025 X
DEKRA 21UKEX0001 X
IECEx DEK 18.0017X
Importer UK:
Siemens plc,
Manchester
M20 2UR
(Ex ec IIC T4 Gc, not on the nameplate)

The products meet the requirements of the following standards:

- EN/IEC 60079-7, GB 3836.3
- EN IEC/IEC 60079-0, GB 3836.1

You will find the current versions of the standards in the currently valid 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 18ATEX0025 X 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 (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.

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 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

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.

10.1 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 10-1 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.

10.2 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.

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