SIEMENS

SIMATIC NET

Industrial Ethernet switches SCALANCE X-300EEC

Compact Operating Instructions

05/2016

A5E02630809-10

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
Division Process Industries and Drives
Postfach 48 48
90026 NÜRNBERG
GERMANY

A5E02630809-10
℗ 04/2016 Subject to change

Table of contents

Introduction

1

Purpose of the Operating Instructions (compact)

These operating instructions (compact) contain information with which you will be able to install and connect up an IE Switch X-300EEC.

Validity of these Operating Instructions (compact)

These Operating Instructions (compact) are valid for the product group X-300EEC of the SCALANCE X-300 product line.

Names of the devices in these operating instructions (compact)

Classification	Description	Designation / example
Product line (X-300)	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 (2 electrical ports, 7 optical ports)
Variant	A variant of a device represents a particular design version. They are identified by a separate order number. When all variants of a device are meant in the text, "(all)" is often added after the device name.	X302-7EEC 1 x power supply unit 24 V DC, printed board varnished [6GK5 302-7GD00-2EA3]

Overview of the technical documentation of the IE Switches X-300

A CD is supplied with the IE Switches X-300 on which you will find a detailed description of the products in PDF format in the relevant subfolder.

The technical documentation of the X-300 product line is divided into hardware and software and can be found in the following documents:

- **PH** - Configuration Manual (PDF)

  The software is described in the configuration manual (PH) for both product lines X-300 and X-400.

- **BAK** - Operating Instructions (compact) on paper

  The hardware of each product group is described in the Operating Instructions (compact) (BAK).

- **BA** - Operating Instructions (PDF)

  The hardware for all product groups and general information can be found in the Operating Instructions (BA).

Security messages

Note

Siemens offers IT security mechanisms for its automation and drive product portfolio in order to support the safe operation of the plant/machine. Our products are also continuously developed further with regard to IT security. We therefore recommend that you regularly check for updates of our products and that you only use the latest versions. You will find information in:

(http://support.automation.siemens.com/WW/llisapi.dll?func=cslib.csinfo2&aktprim=99&lang=en)

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

For the safe operation of a plant/machine, however, it is also necessary to integrate the automation components into an overall IT security concept for the entire plant/machine, which corresponds to the state-of-the-art IT technology. You will find information on this in: (http://www.siemens.com/industrialsecurity)

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

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

1.1 X-300EEC product group

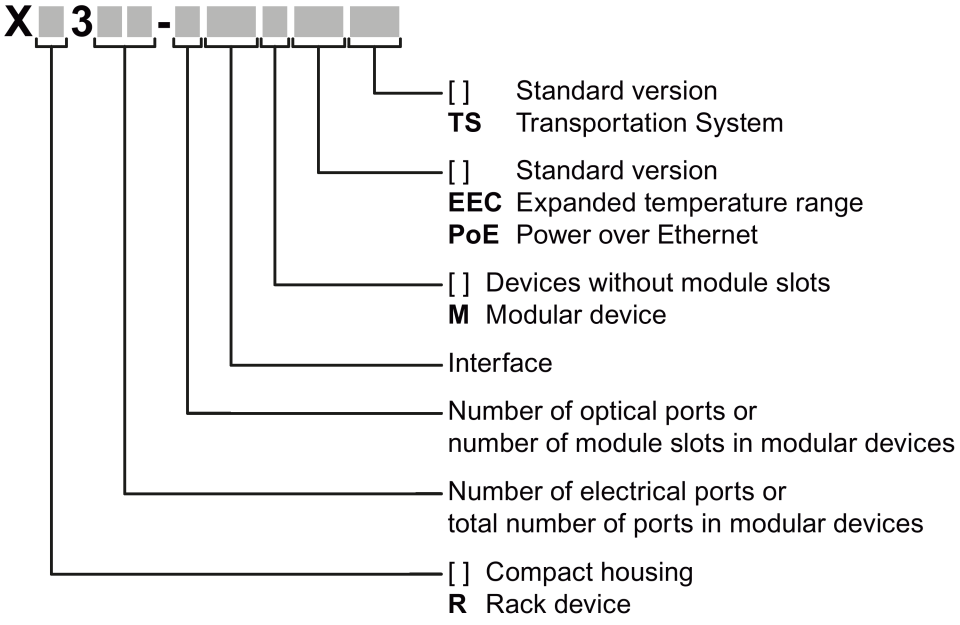
Product / ports	Properties	Order number
X302-7EEC • 2 electrical ports • 7 optical ports	1 x power supply unit 24 to 48 VDC	6GK5302-7GD00-1EA3
	1 x power supply unit 24 to 48 VDC Printed board varnished	6GK5302-7GD00-1GA3
	2 x power supply unit 24 to 48 VDC	6GK5302-7GD00-2EA3
	2 x power supply unit 24 to 48 VDC Printed board varnished	6GK5302-7GD00-2GA3
	1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	6GK5302-7GD00-3EA3
	1 x power supply unit 100 to 240 VAC / 60 to 250 VDC Printed board varnished	6GK5302-7GD00-3GA3
	2 x power supply unit 100 to 240 VAC / 60 to 250 VDC	6GK5302-7GD00-4EA3
	2 x power supply unit 100 to 240 VAC / 60 to 250 VDC Printed board varnished	6GK5302-7GD00-4GA3
X307-2EEC • 7 electrical ports • 2 optical ports	1 x power supply unit 24 to 48 VDC	6GK5307-2FD00-1EA3
	1 x power supply unit 24 to 48 VDC Printed board varnished	6GK5307-2FD00-1GA3
	2 x power supply unit 24 to 48 VDC	6GK5307-2FD00-2EA3
	2 x power supply unit 24 to 48 VDC Printed board varnished	6GK5307-2FD00-2GA3
	1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	6GK5307-2FD00-3EA3
	1 x power supply unit 100 to 240 VAC / 60 to 250 VDC Printed board varnished	6GK5307-2FD00-3GA3
	2 x power supply unit 100 to 240 VAC / 60 to 250 VDC	6GK5307-2FD00-4EA3
	2 x power supply unit 100 to 240 VAC / 60 to 250 VDC Printed board varnished	6GK5307-2FD00-4GA3

***** See naming key below

1.2 Type designations

Structure of the type designation

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



Interfaces of devices without optical ports:

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

Interfaces of devices with optical ports:

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

If information applies to all devices, the term "IE Switches X-300" is used. If information applies to only a particular product group, the relevant names will be used without extra information on the type or number of interfaces. Examples: "X-300" stands for non-modular devices with a compact housing, "XR-300" means all rack devices, "X-300M" means all modular devices etc.

Note

SCALANCE X320-3LD FE

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

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

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".

2.1 Use of approved components

⚠ WARNING

Use of approved components

- Use only approved components, for example supporting brackets, SFPs, 19 inch racks.
- Create any supports you require according the dimension drawing.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

⚠ WARNING

EXPLOSION HAZARD

DO NOT OPEN WHEN ENERGIZED.

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.

2.2 Important notes on using devices (BA X-300)

Safety notices on the use of the device

The following safety notices must be adhered to when setting up and operating the device and during all associated work such as installation, connecting up, replacing or opening the device.

General information

⚠ WARNING

Opening the device

DO NOT OPEN WHEN ENERGIZED.

⚠ WARNING

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

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

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

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

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

⚠ WARNING

For use in an environment with pollution level 2

⚠ WARNING

Safety notice for connectors with LAN (Local Area Network) marking

A LAN or LAN segment, with all its associated interconnected equipment, shall be entirely contained within a single low-voltage power distribution and within a single building. The LAN is considered to be in an "environment A" according to IEEE802.3 or "environment 0" according to IEC TR 62102, respectively. Never connect directly to TNV-circuits (Telephone Network) or WAN (Wide Area Network).

General notices about use in hazardous areas

⚠ WARNING

Risk of explosion when connecting or disconnecting the device

EXPLOSION HAZARD

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

⚠ WARNING

Replacing components

EXPLOSION HAZARD

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

⚠ WARNING

Requirements for the cabinet/enclosure

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.

⚠ WARNING

Opening the device

DO NOT OPEN WHEN ENERGIZED.

Safety notices on use in hazardous areas according to ATEX and IECEx

⚠ WARNING

Requirements for the cabinet/enclosure

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

The fiber-optic bus connections labeled SCALANCE MM900 (see type plate) may also be led through a hazardous area zone1 (see also Auto-Hotspot, section "Explosion Protection Directive (ATEX)").

⚠ WARNING

Suitable cables for temperatures in excess of 70 °C

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.

⚠ WARNING

Protection against transient voltage surges

Provisions shall be made to prevent the rated voltage from being exceeded by transient voltage surges of more than 40%. This criterion is fulfilled, if supplies are derived from SELV (Safety Extra-Low Voltage) only.

2.3 Important notes on using the device in hazardous areas

⚠ WARNING

WARNING - EXPLOSION HAZARD -

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

⚠ WARNING

Restricted area of application

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

⚠ WARNING

Restricted area of application

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

Note on devices with power supply 100 to 240 V AC

⚠ WARNING

Danger from line voltage

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

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 EC-RL-94/9 ATEX or IECEx.

NOTICE

Securing cables with dangerous voltage

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

Safety 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.

2.4 PELV

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.

Description

3

Unpacking, 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

Use only undamaged parts.

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

3.1 X-300EEC product components

Apart from the device itself, the following components are also supplied with the switch:

Table 3- 1 Overview of the components shipped with the X-300EEC product group

Device: SCALANCE (variants)	Components of the product				
	C-PLUG	Plug-in terminal block			Product CD
		Signaling contact with contact pins	Power		
			DC 24 to 48 V	AC 100 to 240 V / DC 60 to 250 V	
X302-7EEC					
1 x power supply unit 24 VDC,	•	1 x 2-pin	1 x 4-pin	-	•
2 x power supply unit 24 VDC	•	2 x 2-pin	2 x 4-pin	-	•
1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	•	1 x 3-pin	-	1 x 3-pin	•
2 x power supply unit 100 to 240 VAC / 60 to 250 VDC	•	2 x 3-pin	-	2 x 3-pin	•

Device: SCALANCE (variants)	Components of the product				
	C-PLUG	Plug-in terminal block			Product CD
		Signaling contact with contact pins	Power		
			DC 24 to 48 V	AC 100 to 240 V / DC 60 to 250 V	
X307-2EEC					
1 x power supply unit 24 VDC	•	1 x 2-pin	1 x 4-pin	-	•
2 x power supply unit 24 VDC	•	2 x 2-pin	2 x 4-pin	-	•
1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	•	1 x 3-pin	-	1 x 3-pin	•
2 x power supply unit 100 to 240 VAC / 60 to 250 VDC	•	2 x 3-pin	-	2 x 3-pin	•

3.2 Characteristics of the X-300EEC product group

Variants

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

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

Device versions

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

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

This combination of versions results in the product variants listed in section X-300EEC product group (Page 7).

Image 3-1 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.

Image 3-2 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.

LEDs of the X-300EEC

You will find the meaning of the individual LEDs in the Operating Instructions (BA) of the IE Switch SCALANCE X-300.

3.2.1 Ports of the X302-7EEC

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)

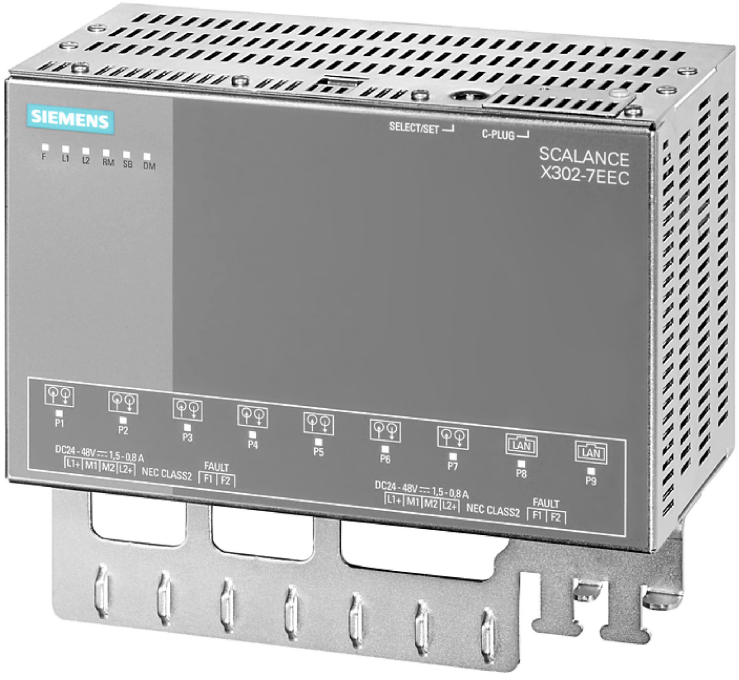


Image 3-3 SCALANCE X302-7EEC

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

3.2.2 Ports of the X307-2EEC

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)

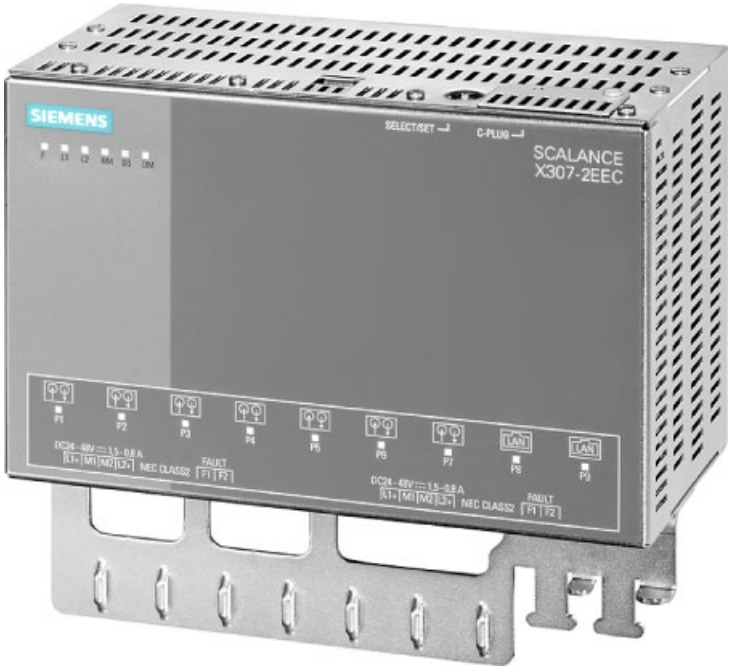


Image 3-4 SCALANCE X307-2EEC

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

3.2.3 Signaling contact

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

Error indication

- The signaling by the signaling contact is synchronized with the fault LED, in other words, all errors displayed by this LED (freely configurable) are also signaled on the signaling contact.
- If an internal fault occurs, the fault LED lights up and the signaling contact opens.
- The connection or disconnection of a communication node on an unmonitored port does not lead to an error message.
- The signaling contact remains activated until the error/fault is eliminated or until the current status is entered in the fault mask as the new desired status.

3.3 The SET / SELECT button

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

Change the display mode

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

Resetting the device to the factory defaults

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

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

Definition of the fault mask

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

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

Enable/disable the redundancy manager

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

3.4 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).

*) The following applies to the X-300EEC:

- 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.

*) The following applies to the X-300EEC:

- 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.

3.5 C-PLUG

3.5.1 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).

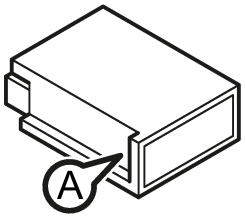
3.5.2 Removing and inserting the C-PLUG (compact housing)

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

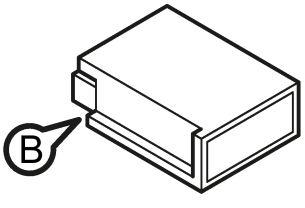
Position of the C-PLUG

	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.

Assembling

4

4.1 Safety notices for installation

Safety notices

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

4.2 Suitable installation location at temperatures above 50 °C

⚠ WARNING

Suitable installation location at temperatures above 50 °C

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.

When installing the device, select a location where only qualified service personnel or trained users have access to it.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

⚠ WARNING

EXPLOSION HAZARD

The replacement of components may impair suitability for Class 1, Division 2 or zone 2.

4.3 Pollution degree (only 2)

⚠ WARNING

The device may only be operated in an environment of pollution degree class 2 (cf. IEC 60664-1).

⚠ 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.

Safety notices for use according to ATEX and IECEx

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

4.4 Requirements for the cabinet EN 60529 (ATEX) and IECEx_extended

⚠ WARNING

Requirements for the cabinet

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

The fiber-optic bus connections labeled SCALANCE MM900 (see type plate) may also be led through a hazardous area zone1 (see also , Auto-Hotspotsection "Explosion Protection Directive (ATEX)").

4.5 Suitable cables for temperatures in excess of 70 °C (ATEX)

⚠ WARNING

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

4.6 Installation

⚠ WARNING

Suitable installation location at temperatures above 50 °C

If a device is operated in ambient temperature of more than 50 °C, the temperature of the device housing may exceed 70 °C.

When installing the device, select a location where only qualified service personnel or trained users have access to it.

⚠ WARNING

Use of approved components

- Use only approved components, for example supporting brackets, SFPs, 19 inch racks.
- Create any supports you require according the dimension drawing.

⚠ WARNING

Suitable cables for temperatures in excess of 70 °C

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.

⚠ CAUTION

Provide suitable shade to protect the IE Switch X-300 against direct sunlight. This avoids unnecessary warming of the IE Switch X-300 and prevents premature aging of the IE Switch X-300 and cabling.

Note

When installing and operating the device, keep to the installation instructions and safety-related notices as described here and in the manual SIMATIC NET - Twisted Pair and Fiber Optic Networks.

Unless stated otherwise, the installation options listed below apply to all device variants.

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 4- 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

4.7 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.

4.8 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 Auto-Hotspot.
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 42)

4.9 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 Auto-Hotspot.
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.

4.10 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 Auto-Hotspot.
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 61).

4.11 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 61).

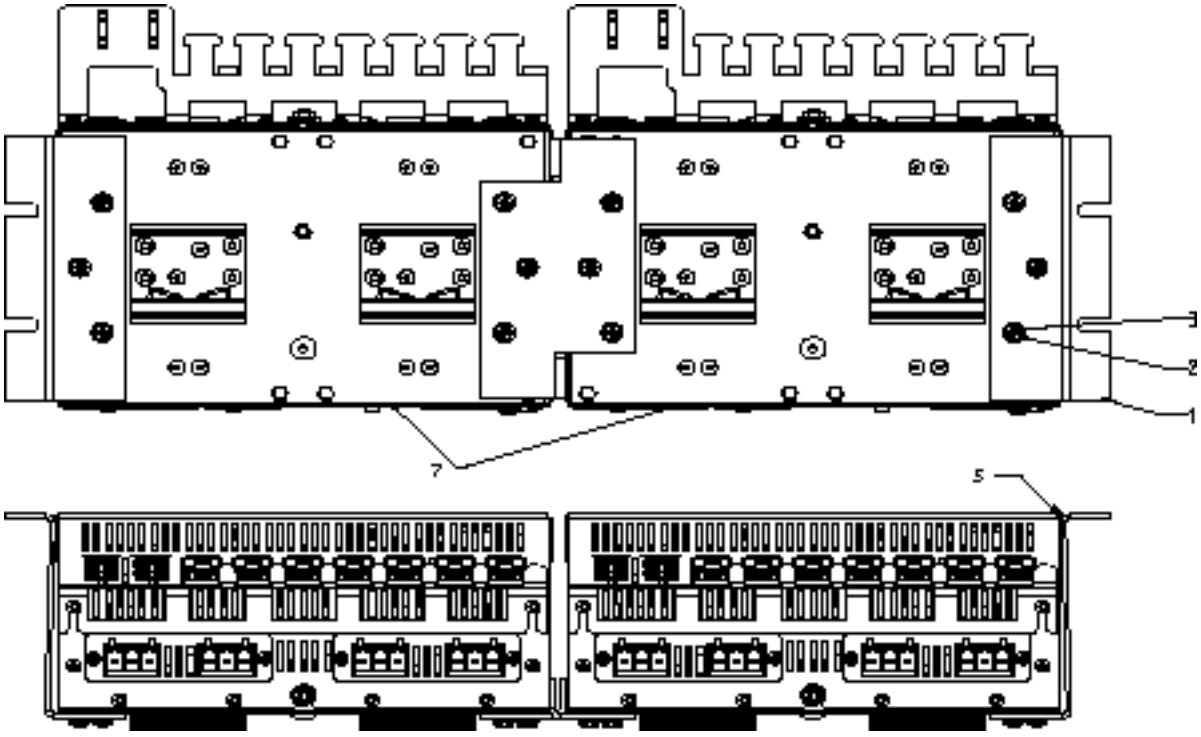


Image 4-1 Rack mounting of two IE-Switches X-300EEC fastened together
Figure at top: Rear of the switches
Figure at bottom: View from below

Table 4- 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

5

5.1 Safety when connecting up

Safety notices

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

⚠ WARNING

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

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

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

NOTICE

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

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

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

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

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.

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

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

⚠ WARNING

EXPLOSION HAZARD

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

Safety notices for use according to ATEX and IECEx

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

⚠ WARNING

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

⚠ WARNING

Before connecting up and commissioning the device, read the information in the section Safety notes (Page 11)

5.2 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").

5.3 Commissioning

⚠ 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).

5.4 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.

Functional ground

With the devices X-300EEC and XR-300M EEC 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 X-300EEC and XR-300M EEC with 24 to 48 VDC, functional ground must be connected to the grounding bolts or the mounting brackets (XR-300M EEC). On the X-300EEC, the functional ground is on the bottom of the device, on the XR-300M-EEC on the side.

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

Protective ground

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

⚠ CAUTION

Danger from line voltage

Grounding simply via the housing is inadequate.

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

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

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.

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.

Grounding bolts on the underside of the housing of the X-300EEC or on the rear of the XR-300M-EEC

5.5 Signaling contact

5.5.1 Signaling contact 24 to 48 V

24 VDC 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 VDC).

Table 5- 1 Pin assignment of the 24 VDC 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.

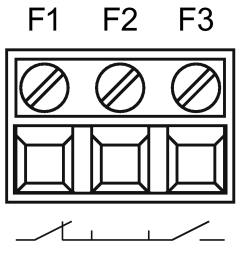
5.5.2 Signaling contact 100 to 240 VAC / 60 to 250 VDC

⚠ 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 5- 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.

5.6 Power supply

5.6.1 Connecting devices with 24 VDC power supply

5.6.1.1 24 VDC - product group X-300EEC

Table 5- 3 24 to 48 VDC safety extra-low voltage overview

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

5.6.1.2 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 safety extra-low voltages (SELV) complying with IEC950 / EN60950 / VDE0805 can be connected to the power supply terminals.
- IEC 60950-1 / EN 60950-1 / VDE0805 connected.
- The power supply unit for the IE Switch X-300 power supply must meet NEC Class 2, as described by the National Electrical Code(r) (ANSI/NFPA 70).
- The power of all connected power supply units must total the equivalent of a power source with limited power (LPS limited power source).
- If the device is connected to a redundant power supply (two separate power supplies), both power supplies must meet these requirements.
- The signaling contact can be subjected to a maximum load of 100 mA (safety extra-low voltage (SELV) 24 V DC).
- Never operate the device with AC voltage or DC voltage higher than 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 5- 4 Pinout of the 24 to 48 V safety extra-low voltage (SELV)

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

5.6.1.3 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.

5.6.1.4 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.

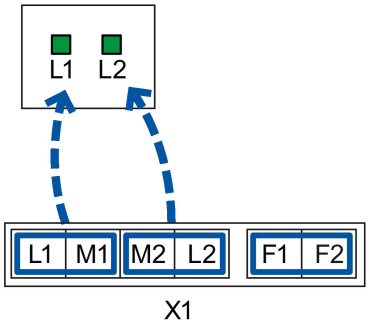


Image 5-1 Assignment of the LED display to the pins for redundant power supply with devices with one power supply unit

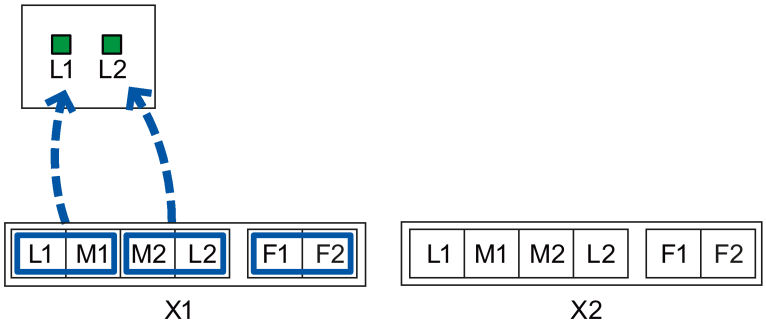


Image 5-2 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units

- 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.

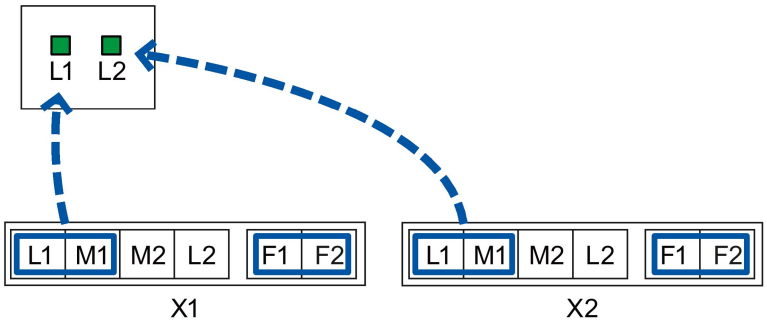


Image 5-3 Assignment of the LED display to the pins for redundant power supply with devices with two power supply units

- If the power supply fails at pins L1/M1 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.

5.6.2 Connecting devices with 100 to 240 VAC power supply

5.6.2.1 100 to 240 VAC - product group X-300EEC

Table 5- 5 100 to 240 VAC power supply overview

Device	Device version (power supply)	100 ... 240 V power supply	
		Redundant	Single
X302-7EEC	1 x 100 to 240 VAC / 60 to 250 VDC	-	•
	2 x 100 to 240 VAC / 60 to 250 VDC	•	-
X307-2EEC	1 x 100 to 240 VAC / 60 to 250 VDC	-	•
	2 x 100 to 240 VAC / 60 to 250 VDC	•	-

5.6.2.2 Notes on the power supply 100 to 240 VAC

⚠ WARNING

Danger from line voltage

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

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 VAC power supply do not have an ATEX approval.

Devices with a 100 to 240 V AC power supply are not approved for use in hazardous areas according to EC-RL-94/9 (ATEX).

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.

5.6.2.3 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 5- 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 mm².

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).

Technical data

6

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.

6.1 Construction, installation and environmental conditions

Table 6- 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 6- 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 6- 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 6- 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

6.2 Connectors and electrical data

Table 6- 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 6- 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 6- 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 6- 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 6- 9 Electrical data: Signaling contact

Device version (power supply)	**Voltage via signaling contact**	**Switching capacity (resistive load)**
24 to 48 VDC	24 VDC	max. 0.1 A
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 6- 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 6- 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 6- 12 Overvoltage category

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

6.3 Cable lengths

Table 6- 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 6- 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 6- 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

6.4 Other properties

Table 6- 16 Switching properties

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

Table 6- 17 Reconfiguration times for redundancy mechanisms

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

Table 6- 18 Mean time between failure (MTBF)

Device variant	Device version	MTBF[1)]
X302-7EEC	1 x power supply unit 24 VDC	27 years
	2 x power supply unit 24 VDC	19 years
	1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	22 years
	2 x power supply unit 100 to 240 VAC / 60 to 250 VDC	15 years
X307-2EEC	1 x power supply unit 24 VDC	29 years
	2 x 24 VDC power supply unit	20 years
	1 x power supply unit 100 to 240 VAC / 60 to 250 VDC	24 years
	2 x power supply unit 100 to 240 VAC / 60 to 250 VDC	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.

Table 6- 19 Full wire speed switching

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

Note

The following applies to IE Switches X-300:

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

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

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

Dimension drawings

7

All dimensions in the drawings are in millimeters

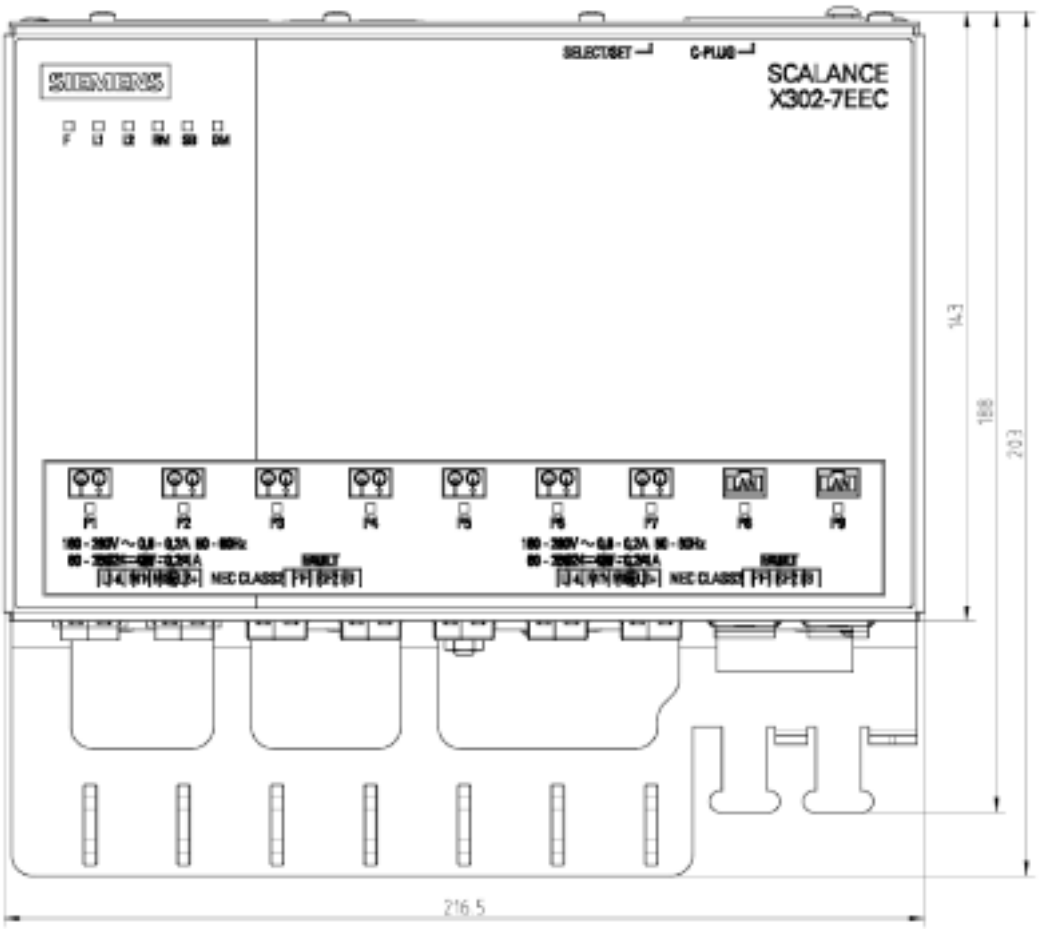


Image 7-1 Dimension drawing IE Switch X302-7EEC - view

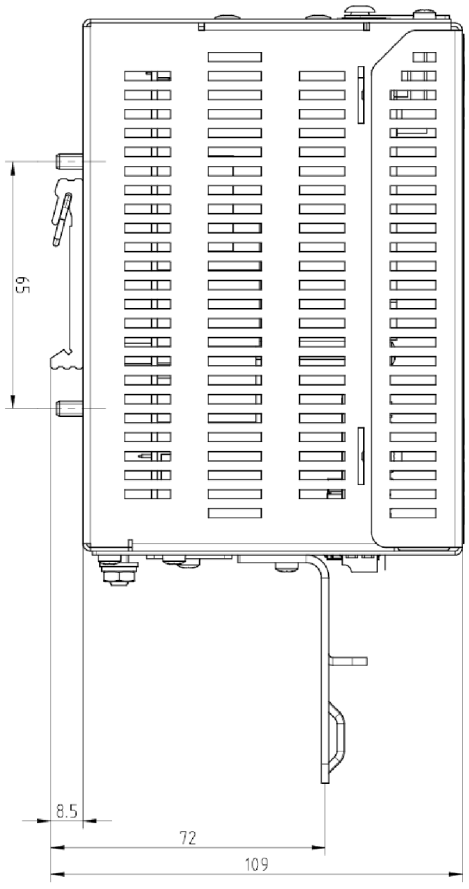


Image 7-2 Dimension drawing IE Switch X302-7EEC - side view

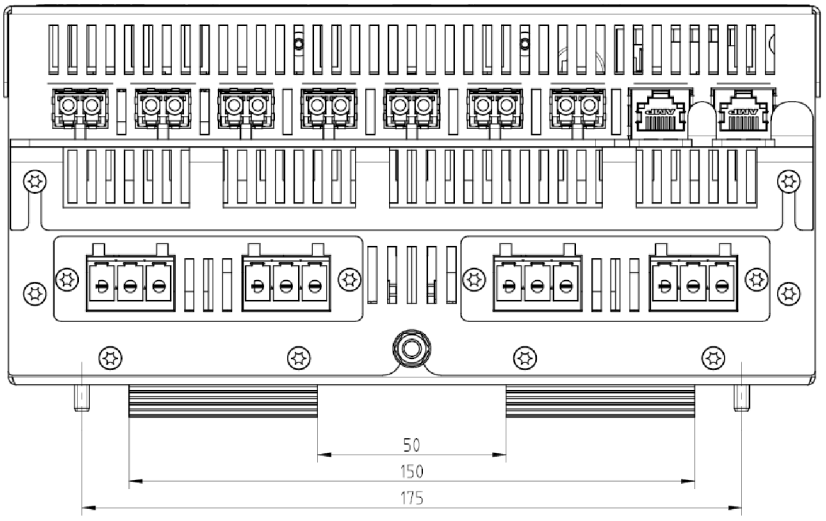


Image 7-3 Dimension drawing IE Switch X302-7EEC - from above

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

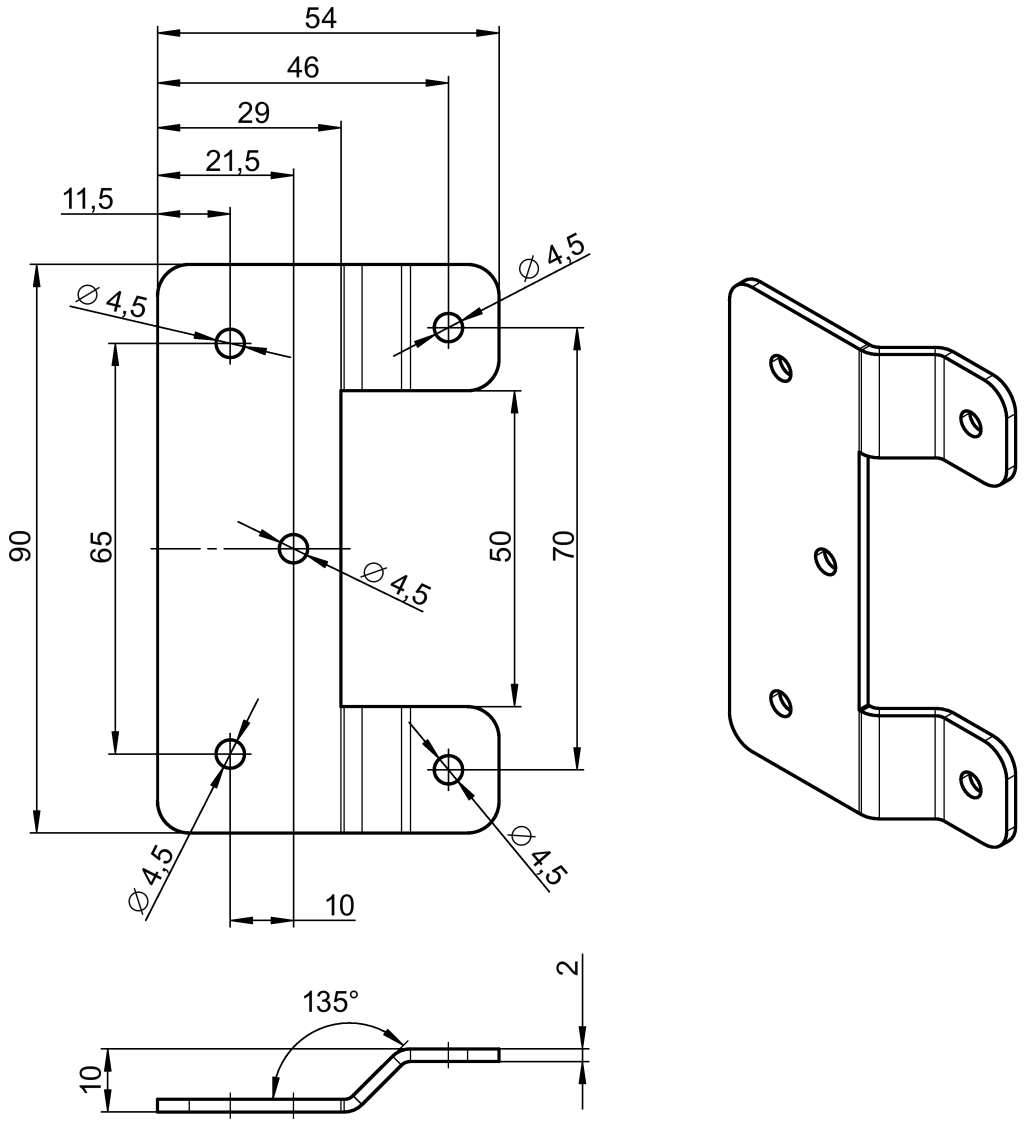


Image 7-4 X-300EEC wall mounting (dimensions in mm)

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

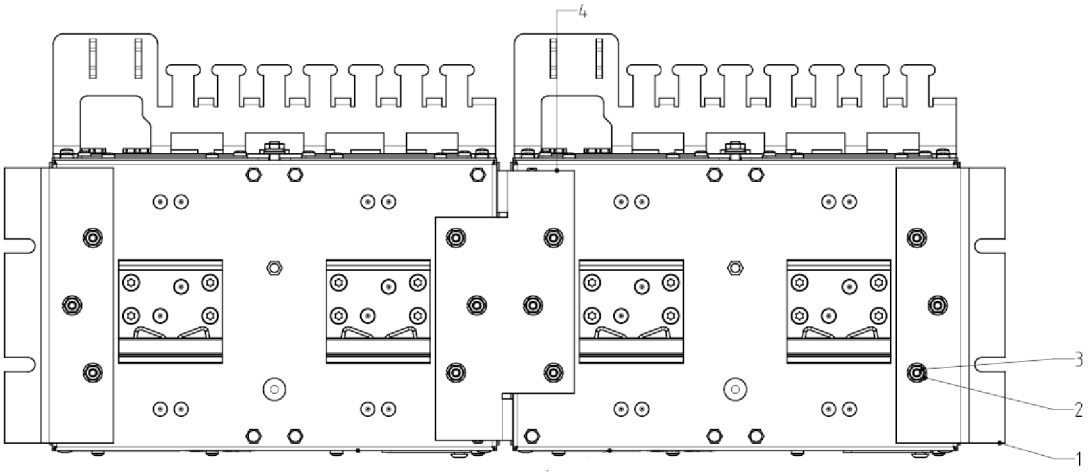


Image 7-5 Rack mounting of two X-300EECs fastened together (view from below)

Table 7- 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

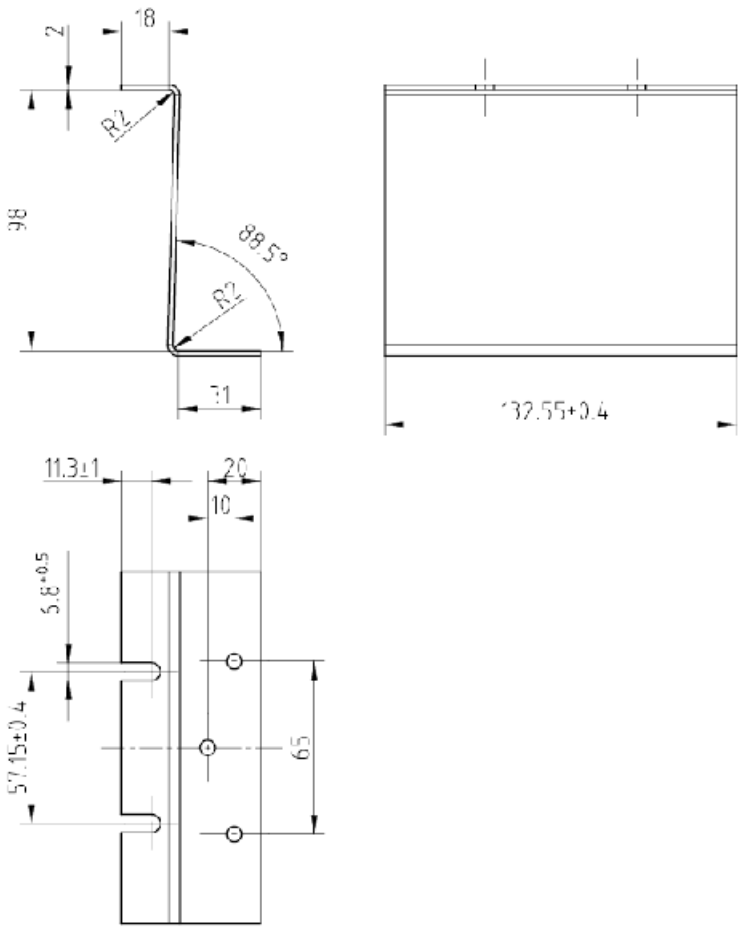


Image 7-6 Side part of mounting support for X-300EEC (dimensions in mm)

Material: Plate 2.0 DIN EN10152 DC01+ZE25/25

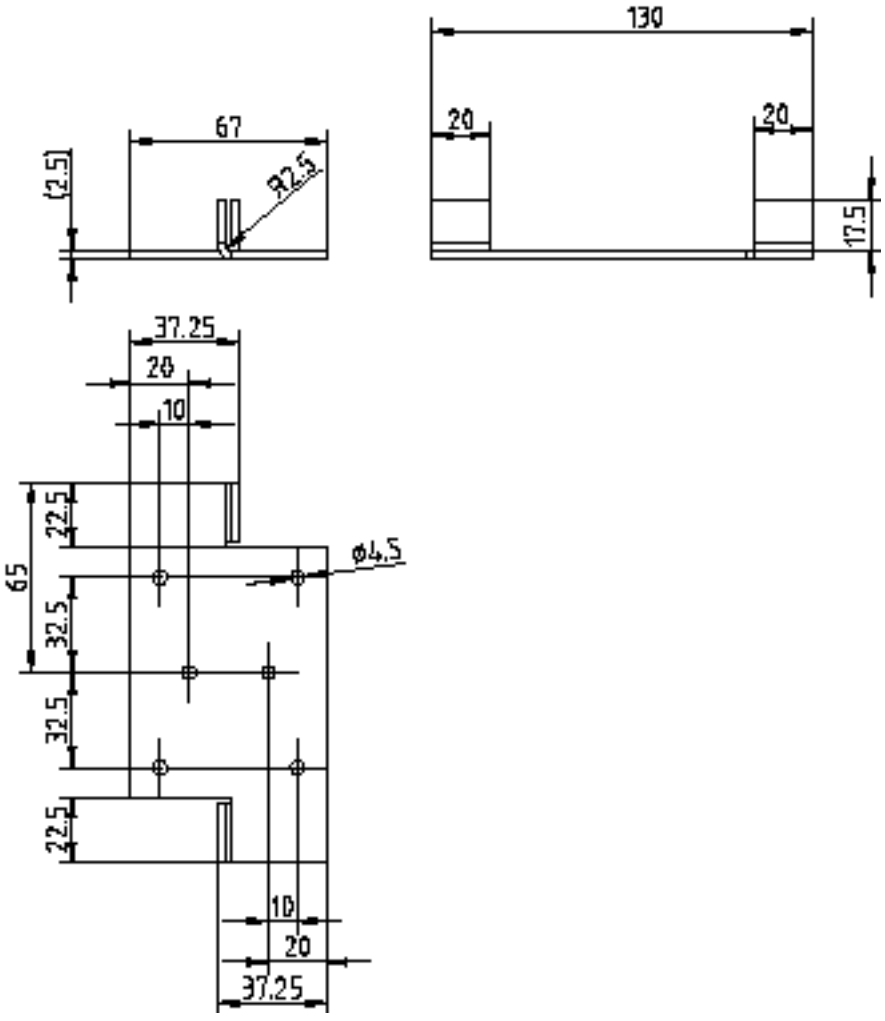


Image 7-7 Middle part of mounting support for X-300EEC (dimensions in mm)

Material: Plate 2.0 DIN EN10152 DC01+ZE25/25

See also

19" rack mounting (Page 37)

Approvals

8

8.1 X-300EEC approvals and certificates

Approvals issued

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.

The term "the product" as used below includes all device variants of the SCALANCE X-300EEC unless specific variants are expressly named for an approval.

EC directives

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

Low voltage equipment directive

Devices supplied with 100 to 240 VAC meet the requirements of the directive 2006/95/EC "Electrical Equipment Designed for Use within Certain Voltage Limits” (Low Voltage Equipment Directive). Conformity attested by compliance with the standard EN 60950-1:2010.

EMC directive (electromagnetic compatibility)

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

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

⚠ WARNING

Personal injury and property damage can occur

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

Only use expansions that are approved for the system.

- **Keep to the installation guidelines**
  The 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.
- **You can always find the latest documentation on the Internet**
  The current descriptions of the currently available products can always be found on the Internet under the specified entry IDs/Internet pages:
  - "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual
  - "Industrial Ethernet / PROFINET - Passive network components" System Manual

    You will find information on the system manuals in the section "ID = 27069465 (http://support.automation.siemens.com/WW/view/en/27069465)", in "Further documentation".
  - "EMC Installation Guidelines" configuration manual

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

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.

Machinery directive

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

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

Note

Note for the manufacturers of machines

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

ATEX (explosion protection directive)

⚠ WARNING

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

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

You will find this document

- on the data medium that ships with some devices.
- on the Internet pages of Siemens Industry Online Support (http://support.automation.siemens.com/WW/view/en).

Enter the document identification number C234 as the search term.

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

ATEX classification:

II 3 G Ex nA IIC T4 Gc

KEMA 07ATEX0145 X

The products meet the requirements of the following standards:

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

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

IECEx

The SIMATIC NET products meet the requirements of explosion protection according to IECEx.

IECEx classification:

Ex nA IIC T4 Gc

DEK 14.0025X

The products meet the requirements of the following standards:

- IEC 60079-15 : 2010 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n"
- IEC 60079-0 : 2011 (Explosive atmospheres - Part 0: Equipment - General requirements)

Note

Only variants with 24 VDC power supply meet the requirements of this approval.

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).

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.

C-Tick

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

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.

8.2 SCALANCE X-300 declaration of conformity

You will find the EC Declaration of Conformity for these products on the Internet at the following address:

SCALANCE X-300 declaration of conformity
(https://support.industry.siemens.com/cs/ww/en/ps/15296/cert)

1. Click on the entry "SCALANCE X-300 managed" in the navigation panel at the top edge of the window and from the drop-down list that opens, select the entry for your product group.
2. Select the entry "Certificate" from the "Entry type"drop-down list.

Result: A list of the available certificates is displayed.

8.3 Overview of the approvals

Table 8- 1 Overview of the approvals

Device	Variant	c-UL-us Inf. Tech. Eq.	c-UL-us for Hazard-ous Loca-tions [1)]	c-UL-us Ind. Cont. Eq.	FM[1)]	C-TICK	CE	ATEX95 Zone 2 [1)]
X302-7EEC	24 to 48 VDC	•	•	-	•	•	•	•
X302-2EEC	100...240 VAC / 60...250 VDC	-	-	•	-	•	•	-

[1] For temperature information "T.." or the maximum ambient temperature "Ta:..", refer to the type plate.

8.4 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.

Index