SIEMENS

SIMATIC NET

Industrial Ethernet switches
SCALANCE X-000

Operating Instructions

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

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Disclaimer of Liability

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

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Introduction

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1.1 On the Operating Instructions

Purpose of the Operating Instructions

These operating instructions support you when commissioning the unmanaged Industrial Ethernet entry level switches SCALANCE X-000.

Validity of the Operating Instructions

These operating instructions are valid for the following devices:

Device	Article number
SCALANCE X005	6GK5 005-0BA00-1AA3
	6GK5 005-0BA10-1AA3
SCALANCE X005TS (Transportation System)	6GK5 005-0BA00-1CA3

Further documentation

The "SIMATIC NET Industrial Ethernet Twisted Pair and Fiber Optic Networks" manual contains additional information on other SIMATIC NET products that you can operate along with the SCALANCE X-000 IE switches in an Industrial Ethernet network.

You can order the manual "SIMATIC NET Industrial Twisted Pair and Fiber Optic Networks", release 05/2001, using the following order numbers:
6GK1970-1BA10-0AA0 German
6GK1970-1BA10-0AA1 English
6GK1970-1BA10-0AA2 French
6GK1970-1BA10-0AA4 Italian

You will also find this network manual on the Internet pages of Service & Support under the following entry ID: 1172207 (http://support.automation.siemens.com/WW/view/en/1172207).

You will find further information in the "System Manual Industrial Ethernet" in the Manual Collection.

You will find further information on the SCALANCE system on the Internet at www.siemens.com/scalance (www.siemens.com/scalance).

Audience

These Operating Instructions are intended for persons who commission networks with the IE switches of the SCALANCE X-000 product line.

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 on the Internet at the following address:

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

Security information

Siemens provides products and solutions with industrial security functions that support the secure operation of plants, solutions, machines, equipment and/or networks. They are important components in a holistic industrial security concept. With this in mind, Siemens' products and solutions undergo continuous development. Siemens recommends strongly that you regularly check for product updates.

For the secure operation of Siemens products and solutions, it is necessary to take suitable preventive action (e.g. cell protection concept) and integrate each component into a holistic, state-of-the-art industrial security concept. Third-party products that may be in use should also be considered. You will find more information about Industrial Security in: Industrial security (http://www.siemens.com/industrialsecurity)

To stay informed about product updates as they occur, sign up for a product-specific newsletter. You will find more information about this in Product support (https://support.industry.siemens.com/cs/ww/en/ps/15247/pm)

1.2   On the product

What is possible?

The SCALANCE X-000 IE switches allow the cost-effective installation of small Industrial Ethernet linear bus or star structures with switching functionality. The devices are designed for installation in a cabinet.

Note

It is not possible to use a SCALANCE X-000 in a redundant ring because it does not support redundancy.

Note

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

One of the tests used to attest the immunity of these devices to electromagnetic interference is the "surge immunity test" according to EN 61000-4-5. This test requires overvoltage protection for the power supply lines. A suitable device is, for example, the Dehn Blitzductor BVT AVD 24 V type no. 918 422 or a comparable protective element.

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

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Components of the product

The following components are supplied with a SCALANCE X-000:

● IE switch SCALANCE X-000

● 2-terminal plug-in block (power supply)

● Product information

Accessories

Component	Packaging unit	Article number
IE FC Stripping Tool	1	6GK1 901-1GA00
IE FC blade cassettes	1	6GK1 901-1GB00
IE FC TP standard cable GP	1	6XV1 840 2AH10
IE FC TP trailing cable	1	6XV1 840-3AH10
IE FC TP marine cable	1	6XV1 840-4AH10
IE FC TP trailing cable GP	1	6XV1 870-2D
IE FC TP flexible cable GP	1	6XV1 870-2B
IE FC RJ-45 Plug 180	1	6GK1 901-1BB10-2AA0

Component	Packaging unit	Article number
IE FC RJ-45 Plug 180	10	6GK1 901-1BB10-2AB0
IE FC RJ-45 Plug 180	50	6GK1 901-1BB10-2AE0

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.

Warning triangle on the type plate.

This warning triangle on the type plate refers to the safety-relevant notes in the documentation.

Read the operating instructions and note the safety-relevant information.

Network topologies 2

Switching technology allows extensive networks to be set up with numerous nodes and simplifies network expansion.

Which topologies can be implemented?

Using the SCALANCE X-000 IE switches, you can implement star topologies.

Note

Keep to the maximum permitted cable lengths of the devices you are using. You will find the permitted cable lengths in the section "Technical specifications (Page 33)".
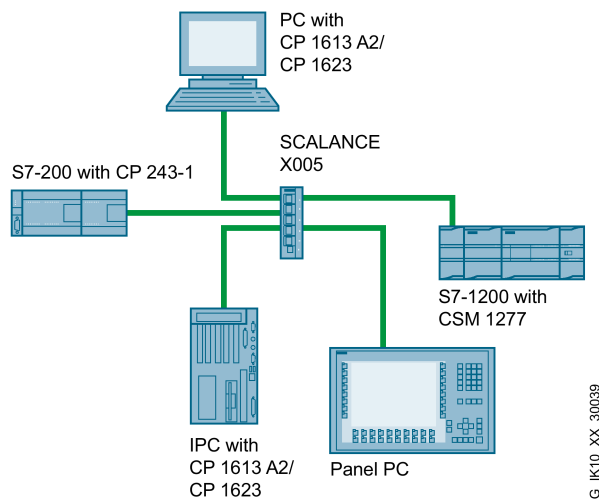
Star topology

Figure 2-1   Example of a star topology with SCALANCE X-000

Description of the device

<div style="text-align: right; font-size: 2em;">3</div>

3.1 Overview SCALANCE X-000

Table 3- 1   Overview of the product characteristics

	X005	X005TS
SIMATIC environment	+	+
Diagnostics LED	+	+
24 VDC	+	+
2 x 24 VDC	-	-
Compact housing (securing collar, etc.)	+	+
Signaling contact + on-site operation	-	-
Diagnostics: Web, SNMP, PROFINET	-	-
C-PLUG	-	-
Ring redundancy with RM	-	-
Passive ring redundancy	-	-
Standby redundancy	-	-
IRT capability	-	-
Fast learning	-	-
Passive listening	-	-
Log table	-	-
SNTP + SICLOCK	-	-
Cut Through	-	-

Table 3- 2   Overview of the connection options

	X005	X005TS
TP (RJ-45) Fast Ethernet 10 / 100 Mbps	5	5

3.2 Product characteristics

Possible attachments

The SCALANCE X-000 has five RJ-45 jacks for connection of end devices or other network segments.
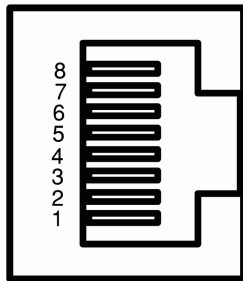

Figure 3-1   SCALANCE X005

Note

The SCALANCE X005 shown above has the same construction as the SCALANCE X005TS.

3.3 TP ports (twisted pair)

RJ-45 connector pinout

With SCALANCE X-000, the twisted-pair ports are designed as RJ-45 jacks with MDI-X pin assignment (Medium Dependent Interface Autocrossover) of a network component.

Pin number	Assignment
Pin 8	n. c.
Pin 7	n. c.
Pin 6	TD-
Pin 5	n. c.
Pin 4	n. c.
Pin 3	TD+
Pin 2	RD-
Pin 1	RD+

Note
Permitted cable lengths

TP cords or TP-XP cords with a maximum length of 10 m can be connected to the TP port with RJ-45 jacks.

With the IE FC cables and IE FC RJ-45 plugs 180, an overall cable length of a maximum of 100 m is permitted between two devices depending on the cable type.

Autonegotiation

With the autonegotiation mechanism, repeaters and end devices can automatically determine the transmission speed and the transmission mode of the partner port. This makes it possible to configure different devices automatically.

Two components connected to a link segment can exchange information about the data transfer and can adapt their settings to each other. The mode with the highest possible speed is set.

Note

Setting ports with a fixed configuration

Devices not supporting autonegotiation must be set permanently to 100 Mbps half duplex or 10 Mbps half duplex.

Auto polarity exchange

If the pair of receiving cables is connected incorrectly (RD+ and RD- interchanged), the polarity is adapted automatically.

Note

The SCALANCE X-000 IE switches are plug-and-play devices that require no settings during commissioning.

MDI / MDI-X autocrossover function

With the MPI/MDI-X autocrossover function, the send and receive contacts of an Ethernet port are assigned automatically. The assignment depends on the cable with which the communications partner is connected. This means that it does not matter whether the port is connected using a patch cable or crossover cable. This prevents malfunctions resulting from mismatching send and receive lines. This makes installation much easier for the user.

The SCALANCE X-000 devices support the MDI / MDI-X autocrossover function.

Insulation between the TP ports

NOTICE
Formation of loops
Note that the direct connection of two ports or accidental connection over several switches causes an illegal loop that can cause network overload and failure.

Devices with port groups

On the following devices, the ports are divided into port groups.

- SCALANCE X005

   6GK5 005-0BA00-1AA3

- SCALANCE X005TS

   6GK5 005-0BA00-1CA3

There are two TP port groups:
Group 1: P1
Group2: P2 to P5

Between ports of different port groups, an insulation voltage of 1.5 kV is adhered to (corresponds to IEEE802.3, Chapter 33.4.1.1, Environment B), e.g. between P1 and P2.

The requirements for Environment A are met between ports of the same group, e.g. between P2 and P5.

Devices without port groups

The following devices do not have port groups:

- SCALANCE X005

    6GK5 005-0BA10-1AA3

The requirements for Environment A are met between all ports.

3.4 LEDs

Power LED "L" (green LED)

The power LED shows the status of the power supply.

LED color	LED status	Meaning
Green	Lit	Power supply is connected.
-	Off	Power supply is not connected or <14 V.

Port LEDs "P" (green/yellow LEDs)

The port LEDs indicate the status of the ports.

LED color	LED status	Meaning
Green	Lit	TP link exists, no data reception at port
Yellow	Lit	TP link exists, data reception at port
Yellow	Flashing	Test phase during power on

Mounting   4

4.1   Safety notices for installation

Safety notices

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

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

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

> ⚠ **WARNING**
>
> The device is suitable only for operation in the interior.

> ⚠ **WARNING**
>
> The device may only be operated in an environment with pollution degree 1 or 2 (see 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:

⚠ **WARNING**

To comply with EC Directive 2014/34/EU (ATEX 114) or the conditions of IECEx, this enclosure or cabinet must meet the requirements of at least IP54 in compliance with EN 60529.

⚠ **WARNING**

If the cable or conduit entry point exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken. If the equipment is operated in an air ambient in excess of 50 °C to 75 °C, only use cables with admitted maximum operating temperature of at least 80 ℃.

4.2 Types of installation

The devices can be installed in the following ways:

● Installation on a 35 mm DIN rail

● Installation on a SIMATIC S7-300 standard rail

● Wall mounting

⚠ **WARNING**

If a device is operated in an ambient temperature between 50 ℃ and 75 ℃, 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 of 50 ℃ to 75 ℃.

Installation clearance

Keep to the minimum clearances so that the convection ventilation of the device is not blocked.

● Below at least 10 cm

● Above at least 10 cm

4.3 Installation on a DIN rail

Mounting

To install the device on a 35 mm DIN rail complying with DIN EN 50022, follow the steps below:

1. Place the second housing guide of the device on the top edge of the DIN rail.

2. Press the device down against the DIN rail until the spring catch locks in place.

3. Fit the connectors for the power supply. See also section "Power supply (Page 26)".

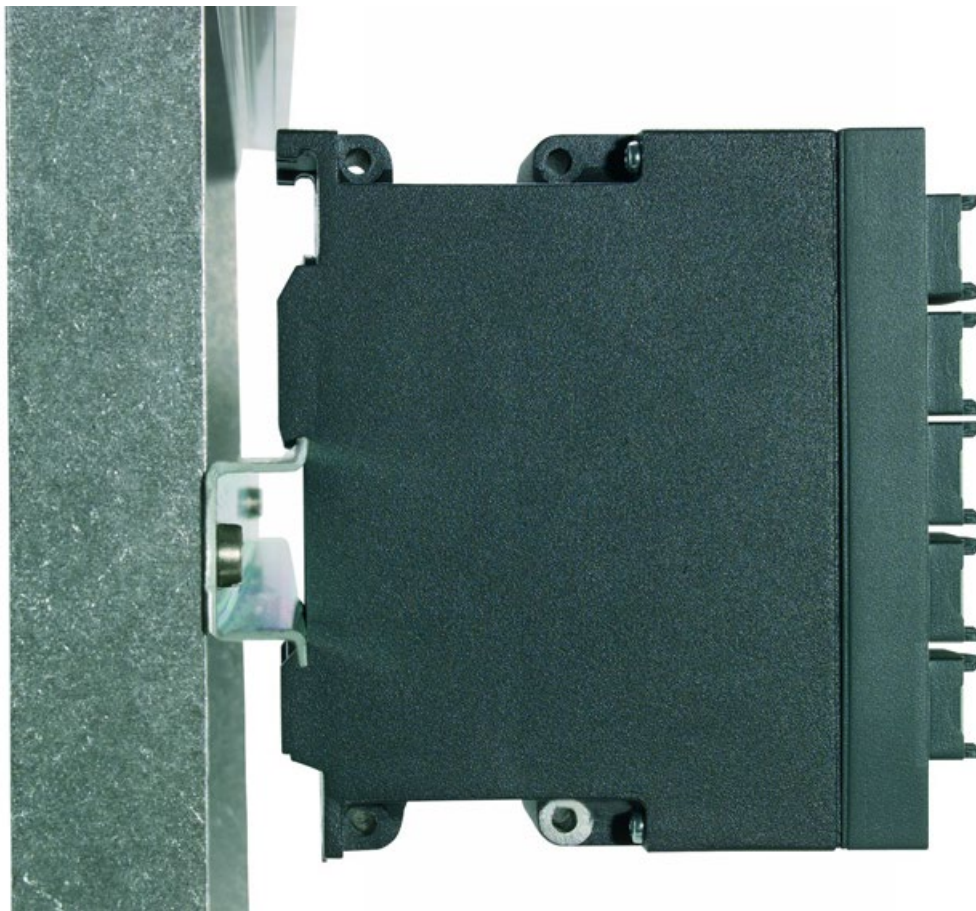4. Insert the terminal block into the sockets on the device.

Figure 4-1   Installation on a 35 mm DIN rail

Removal

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

1. Disconnect all connected cables.

2. Pull out the terminal block for the power supply.

3. Release the DIN rail catch on the bottom of the device using a screwdriver.

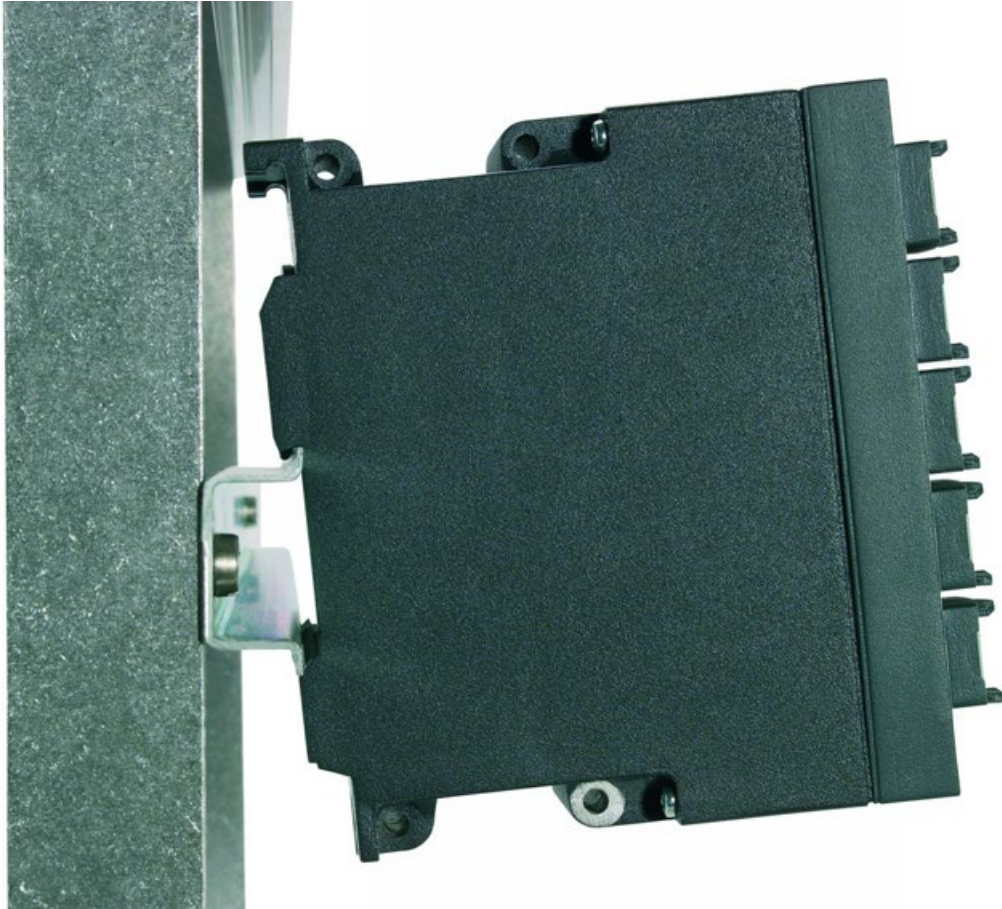4. Pull the lower part of the device away from the DIN rail.

Figure 4-2   Removal from a 35 mm DIN rail

4.4　Installation on a standard rail

Installation on a SIMATIC S7-300 standard rail

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

1. Place the first housing guide of the device on the top edge of the S7-300 standard rail.

2. Screw the device to the underside of the standard rail (tightening torque 2 Nm).

3. Fit the connectors for the power supply. See also section "Power supply (Page 26)".

4. Insert the terminal block for the power supply into the socket on the device.

Figure 4-3　　Installation on a SIMATIC S7-300 standard rail

Removal

To remove the device from the S7-300 standard rail, follow the steps below:

1. Disconnect all connected cables.

2. Release the screw on the bottom of the standard rail.

3. Remove the device from the standard rail.

4.5 Wall mounting

⚠ **WARNING**

Wall mounting is only permitted if the requirements for the housing, the installation regulations, the clearance and separating regulations for the control cabinets or housings are adhered to. The control cabinet cover or housing must be secured so that it can only be opened with a tool. An appropriate strain-relief assembly for the cable must be used.

⚠ **WARNING**

Wall mounting outside of the control cabinet or housing does not fulfill the requirements of the FM approval.

Note

You must not install the device on a wall in hazardous areas.

To mount the device on a wall, you require the following:

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

To mount the device on a wall, follow the steps below:

1. Prepare the drill holes for wall mounting. For the precise dimensions, refer to the section "Dimension drawings (Page 45)".
2. Fit the connectors for the power supply. See also section "Power supply (Page 26)".
3. Insert the terminal block into the sockets on the device.
4. Screw the device to the wall.

Note

The wall mounting must be capable of supporting at least four times the weight of the device.

Connecting up

<div style="text-align: right; font-size: 2em;">5</div>

5.1 Safety when connecting up

Safety notices

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

> ⚠️ **WARNING**
>
> The equipment is designed for operation with Safety Extra-Low Voltage (SELV) by a Limited Power Source (LPS).
>
> This means that only SELV / LPS complying with IEC 60950-1 / EN 60950-1 / VDE 0805-1 must be connected to the power supply terminals. The power supply unit for the equipment power supply must comply with NEC Class 2, as described by the National Electrical Code (r) (ANSI / NFPA 70).
>
> If the equipment is connected to a redundant power supply (two separate power supplies), both must meet these requirements.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

> ⚠️ **WARNING**
>
> **EXPLOSION HAZARD**
>
> Do not connect or disconnect 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**

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).

5.2 Wiring rules

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

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

* AWG: American Wire Gauge

** See note "Wire end ferrules"

Note

Wire end ferrules

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

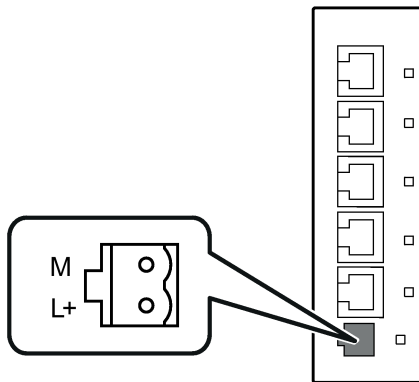Crimp shapes with wave-shaped profile are unsuitable.

5.3 Power supply

The power supply is connected using a 2-terminal plug-in block. The power supply is connected over a high resistance with the enclosure to allow an ungrounded set up. The power supply is non-floating.

Note

The device can be disconnected from the power supply with the terminal block.

The following figure shows the position of the power supply of the SCALANCE X-000 and the assignment of the terminal block.

Contact	Assignment
M	Ground
L+	L+ 24 VDC

⚠ WARNING

Incorrect power supply

The power supply unit to supply the device must comply with NEC Class 2 (voltage range 18 - 32 V, current requirement 350 mA).

Do not operate the device with an AC voltage.

Never operate the device with DC voltages higher than 32 VDC.

5.4 Grounding

Installation on a DIN rail

The device is grounded over the DIN rail.

S7 standard rail

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

Wall mounting

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

Note that the device must be grounded over a securing screw with as low a low resistance as possible.

If the device is mounted on a non-conductive base, a grounding cable must be fitted. The grounding cable is not supplied with the device. Connect the paint-free surface of the device to the nearest grounding point using the grounding cable.

5.5　　　IE FC RJ-45 Plug 180

The rugged node connectors are designed for industry with PROFINET-compliant connectors and provide additional strain and bending relief with a locking mechanism on the casing.

Fitting the IE FC RJ45 Plug 180 to the IE FC Standard Cable

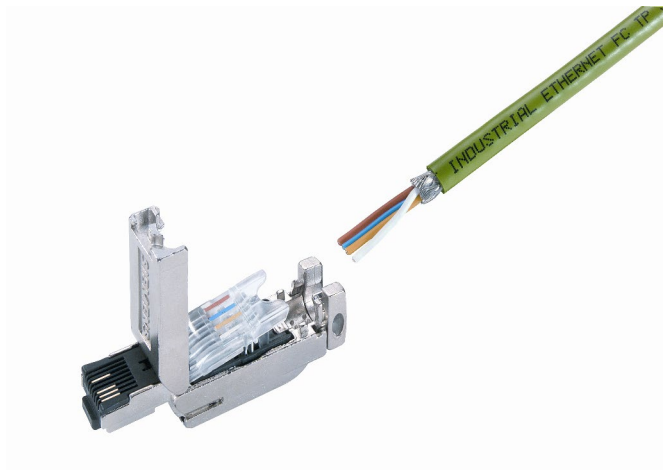You will find the notes on installation in the instructions that ship with the IE FC RJ45 Plug 180.

Figure 5-1　　　IE FC 45 Plug 180

Plugging in the IE FC RJ45 Plug 180

Plug the IE FC RJ45 Plug 180 into the twisted-pair port of the device until it locks in place.

Figure 5-2   Plugging in the IE FC RJ45 Plug 180

With its tight fit and locking mechanism with the PROFINET-compliant male connector IE FC RJ45 Plug 180, the securing collar on the TP port of the device ensures a rugged node attachment that provides strain and bending relief for the RJ-45 jack.

Pulling the IE FC RJ45 Plug 180

Press on the locking lever of the IE FC RJ45 Plug 180 gently to remove the plug.

If there is not enough space to release the lock with your hand, you can also use a 2.5 mm screwdriver. You can then remove the IE FC RJ45 Plug 180 from the RJ-45 jack.

Maintenance and troubleshooting

<div style="text-align: right; font-size: 2em;">6</div>

Fuses

The SCALANCE X000 IE switches have a resettable fuse / PTC. If the fuse triggers (all LEDs are off despite correctly applied power supply), the device should be disconnected from the power supply for approximately 30 minutes before turning it on again.

Device defective

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

Technical specifications

<div style="text-align: right; font-size: 2em;">7</div>

> **Note**
>
> Note the article number in the technical specifications.

The following technical specifications apply to the following devices:

Device	Article number
SCALANCE X005	6GK5 005-0BA00-1AA3
SCALANCE X005TS	6GK5 005-0BA00-1CA3

> **Note**
>
> Unless mentioned otherwise, the technical specifications in the following table relate to the SCALANCE X005 and SCALANCE X005TS.

Technical specifications		
Attachment to Industrial Ethernet		
Quantity	5	
Design	RJ-45 jack with MDI-X pinning	
Properties	Half duplex / full duplex	
Transmission rate	10/100 Mbps	
Permitted cable lengths (Ethernet)	**Alternative combinations per length range**	
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet	
0 to 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet	
Electrical data		
Power supply	Rated voltage	24 VDC
	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Design	2-terminal plug-in block
Current consumption	Typical	80 mA
Power loss at 24 VDC	Typical	2 W
Overvoltage protection at input		PTC resettable fuse (0.5 A / 60 V)
Permitted ambient conditions		

Technical specifications		
Ambient temperature	During operation	
	• SCALANCE X005	• 0 ℃ to +65 ℃
	• SCALANCE X005TS	• -40 ℃ to +75 ℃
	During storage	-40 ℃ to +80 ℃
	During transportation	-40 ℃ to +80 ℃
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 46 ℃ ambient temperature
		≤ 2,000 m above sea level at max. 40 ℃ ambient temperature
Design, dimensions and weight		
Immunity	EN 61000-6-2 (Class A) EN 61000-6-1 (Class B) with a ferrite core on the cables Manufacturer: Würth Elektronik - Type: 742 711 31	
RF interference level	EN 61000-6-4	
Degree of protection	IP30	
MTBF (EN/IEC 61709, 40 °C)	167.1 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	550 g	
Dimensions (W x H x D)	44 x 125 x 124 mm	
Installation options	• Mounting on a DIN rail	
	• Mounting on an S7-300 standard rail	
	• Wall mounting	
Switching properties		
Aging time	375 seconds	
Max. number of learnable MAC addresses	1024	
Response to LLDP frames	Blocking	
Response to spanning tree BPDU frames	Forwarding	
CoS acc. to IEEE 802.1Q	Yes	
QoS priority queues	2	
IEEE 802.1Q tags (VLAN ID, priority) transparent forwarding	Yes	

Note

The number of connected SCALANCE X Industrial Ethernet Switches influences the frame propagation time.
When a frame passes through the SCALANCE X005 or SCALANCE X005TS, it is delayed by the store and forward function of the switch:

- with a 64 byte frame length by approx. 10 µs (at 100 Mbps)
- with a 1500 byte frame length by approx. 130 µs (at 100 Mbps)

This means that the more SCALANCE X005 or SCALANCE X005TS devices the frame passes through, the longer the frame delay.

The following technical specifications apply to the following devices:

Device	Article number
SCALANCE X005	6GK5 005-0BA10-1AA3

Note

Unless mentioned otherwise, the technical specifications in the following table relate to the SCALANCE X005.

Technical specifications		
Attachment to Industrial Ethernet		
Quantity	5	
Design	RJ-45 jack with MDI-X pinning	
Properties	Half duplex / full duplex	
Transmission rate	10/100 Mbps	
Permitted cable lengths (Ethernet)	**Alternative combinations per length range**	
0 ... 85 m	• Max. 85 m IE FC TP Marine/Trailing Cable with IE FC RJ45 Plug 180 • Max. 75 m IE FC TP Marine/Trailing Cable + 10 m TP Cord via IE FC RJ45 Outlet	
0 to 100 m	• Max. 100 m IE FC TP Standard Cable with IE FC RJ45 Plug 180 • Max. 90 m IE FC TP Standard Cable + 10 m TP Cord via IE FC RJ45 Outlet	
Electrical data		
Power supply	Rated voltage	24 VDC
	Voltage range	18 to 32 VDC Safe Extra Low Voltage (SELV)
	Design	2-terminal plug-in block
Current consumption	Typical	60 mA
Power loss at 24 VDC	Typical	1.5 W
Overvoltage protection at input		PTC resettable fuse (0.5 A / 60 V)

Technical specifications		
Permitted ambient conditions		
Ambient temperature	During operation	
	• SCALANCE X005	• -40 ℃ to +75 ℃
	• SCALANCE X005E EC	• -40 ℃ to +75 ℃
	During storage	-40 ℃ to +80 ℃
	During transportation	-40 ℃ to +80 ℃
Relative humidity	During operation	≤ 95 % no condensation
Operating altitude	During operation	≤ 2,000 m above sea level at max. 46 ℃ ambient temperature
		≤ 2,000 m above sea level at max. 40 ℃ ambient temperature
Design, dimensions and weight		
Immunity	EN 61000-6-2	
	EN 61000-6-1	
RF interference level	EN 61000-6-4	
Degree of protection	IP30	
MTBF (EN/IEC 61709, 40 ℃)	165 years	
Housing material	Basic housing	Die cast aluminum, powder coated
	Front cover	Polyphenylene ether + polystyrene (PPE+PS plastic)
Weight	550 g	
Dimensions (W x H x D)	44 x 125 x 124 mm	
Installation options	• Mounting on a DIN rail	
	• Mounting on an S7-300 standard rail	
	• Wall mounting	
Switching properties		
Aging time	45 seconds	
Max. number of learnable MAC addresses	1024	
Response to LLDP frames	Blocking	
Response to spanning tree BPDU frames	Forwarding	
CoS acc. to IEEE 802.1Q	Yes	
QoS priority queues	4	
IEEE 802.1Q tags (VLAN ID, priority) transparent forwarding	Yes	

Note

The number of connected SCALANCE X Industrial Ethernet Switches influences the frame propagation time.

When a frame passes through the SCALANCE X005, it is delayed by the store and forward function of the switch:

- with a 64 byte frame length by approx. 10 µs (at 100 Mbps)
- with a 1500 byte frame length by approx. 130 µs (at 100 Mbps)

This means that the more SCALANCE X005 the frame passes through, the longer the frame delay.

Approvals

<div style="text-align: right; font-size: 2em;">8</div>

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.

Unless mentioned otherwise, the following approvals apply to all variants of the SCALANCE X-000.

Notes for the manufacturers of machines

The devices are not machines in the sense of the EC Machinery Directive. There is therefore no declaration of conformity relating to the EC Machinery Directive 2006/42/EC for these devices.

If the devices are part of the equipment of a machine, they must be included in the declaration of conformity procedure by the manufacturer of the machine.

See also

SIMATIC NET Industrial Ethernet TP and Fiber Optic Networks (http://support.automation.siemens.com/WW/view/en/8763736)

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
- "Industrial Ethernet / PROFINET - Passive network components" System Manual

  You will find information on the system manuals in the section "Auto-Hotspot", in "Further documentation".

- "EMC Installation Guidelines" configuration manual

  60612658 (http://support.automation.siemens.com/WW/view/en/60612658)

> ⚠ **WARNING**
>
> **Personal injury and property damage can occur**
>
> The installation of expansions that are not approved for SIMATIC NET products or their target systems may violate the requirements and regulations for safety and electromagnetic compatibility.
>
> Only use expansions that are approved for the system.

Note

The test was performed with a device and a connected communications partner that also meets the requirements of the standards listed above.

When operating the device with a communications partner that does not comply with these standards, adherence to the corresponding values cannot be guaranteed.

EC declaration of conformity

The SIMATIC NET products described in these operting instructions meet the requirements and safety objectives of the following EC directives and comply with the harmonized European standards (EN) for programmable logic controllers which are published in the official documentation of the European Union.

- **2014/34/EU (ATEX explosion protection directive)**

  Directive of the European Parliament and the Council of 26 February 2014 on the approximation of the laws of the member states concerning equipment and protective systems intended for use in potentially explosive atmospheres, official journal of the EU L96, 29/03/2014, pages. 309-356

- **2014/30/EU (EMC)**

  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106

- **2011/65/EU (RoHS)**

  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

You will find the EC declaration of conformity for these products on the Internet pages of Siemens Industry Online Support (http://support.automation.siemens.com/WW/view/en/33118389/134200).

The EC Declaration of Conformity is available for all responsible authorities at:

Siemens Aktiengesellschaft

Division Process Industries and Drives
Process Automation
DE-76181 Karlsruhe
Germany

ATEX (explosion protection directive)

> ⚠️ **WARNING**
>
> 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.

The SIMATIC NET products meet the requirements of the EC directive 94/9/EC "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres". and as of 20.04.2016 the EC directive 2014/34/EU.

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

You will find the current versions of the standards in the currently valid ATEX certificates.

IECEx

The SIMATIC NET products 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 (Explosive atmospheres - Part 15: Equipment protection by type of protection "n")
- IEC 60079-0 (Explosive atmospheres - Part 0: Equipment - General requirements)

You will find the current versions of the standards in the currently valid IECEx certificates.

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

Ta: -40 ... +75 °C

cULus approval for industrial control equipment

cULus Listed IND. CONT. EQ.

Underwriters Laboratories Inc. complying with

- UL 61010-2-201

- CAN/CSA-IEC 61010-2-201

Report no. E85972

cULus Approval for Information Technology Equipment

cULus Listed I. T. E.

Underwriters Laboratories Inc. complying with

- UL 60950-1 (Information Technology Equipment)

- CSA C22.2 No. 60950-1-03

Report no. E115352

cULus for Hazardous Locations

ANSI/ISA 12.12.01-2007, CSA C22.2 No. 213-M1987
CL. 1, Div. 2 GP. A.B.C.D T..
CL. 1, Zone 2, GP, IIC, T..
(T.. = For detailed information on the temperature class, refer to the type plate)

ECE directive

The IE switch SCALANCE X005TS meets the requirements of the directive ECE R10, Rev. 3.

Test number: 10 R - 024733

EC directive

The SCALANCE X005TS IE switch meets the requirements of the Directive 72/245/EEC in the form 2006/96/EC "Electromagnetic Compatibility".

RCM

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

Marking for the customs union

EAC (Eurasian Conformity)

Customs union of Russia, Belarus and Kazakhstan

Declaration of the conformity according to the technical regulations of the customs union (TR CU)

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.

Noise test

The IE switch SCALANCE X005TS was tested according to EN 60068-2-64.

Testing accuracy: IEC 60721-3-5
Severity level: Class 5M2 (for road vehicles)

Overvoltage resistance

The SCALANCE X005TS IE switch has passed further overvoltage tests.

Power supply = 24 VDC

Overvoltage test with:

- 36 V/1s
- 100 V/1ms (with a source resistance of 10 ohms)

Mechanical stability (in operation)

Device	DIN EN 60068-2-6 oscillation	DIN EN 60068-2-27 shock
	10 - 58.12 Hz: 0.075 mm 58.12 - 500 Hz: 10 m/s² 10 cycles	150 m/s², 11 ms duration 6 shocks per axis
SCALANCE X005	●	●
SCALANCE X005TS	●	●

Dimension drawings

9
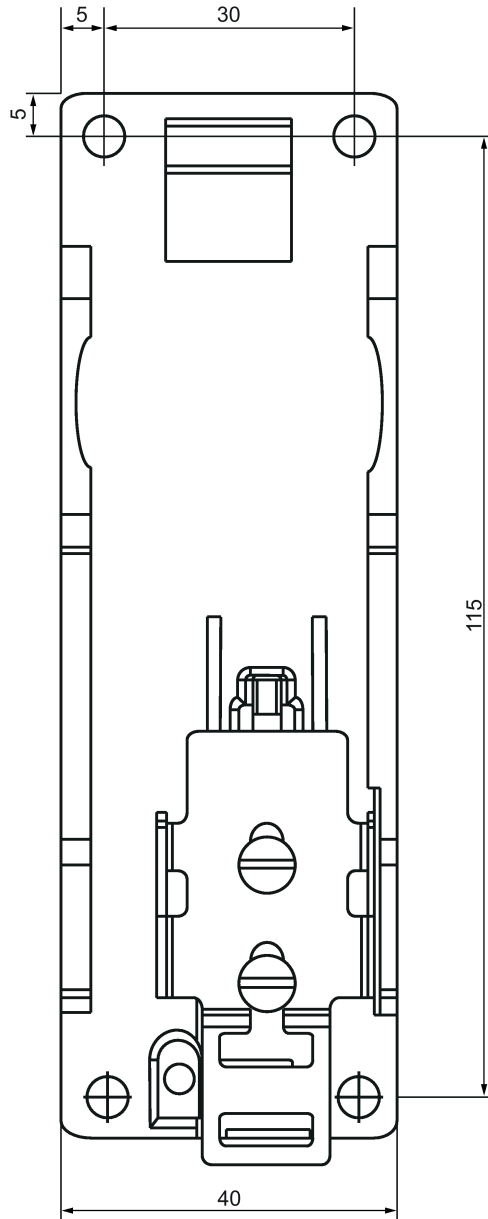
Figure 9-1   Dimension drawing, rear of the SCALANCE X-000
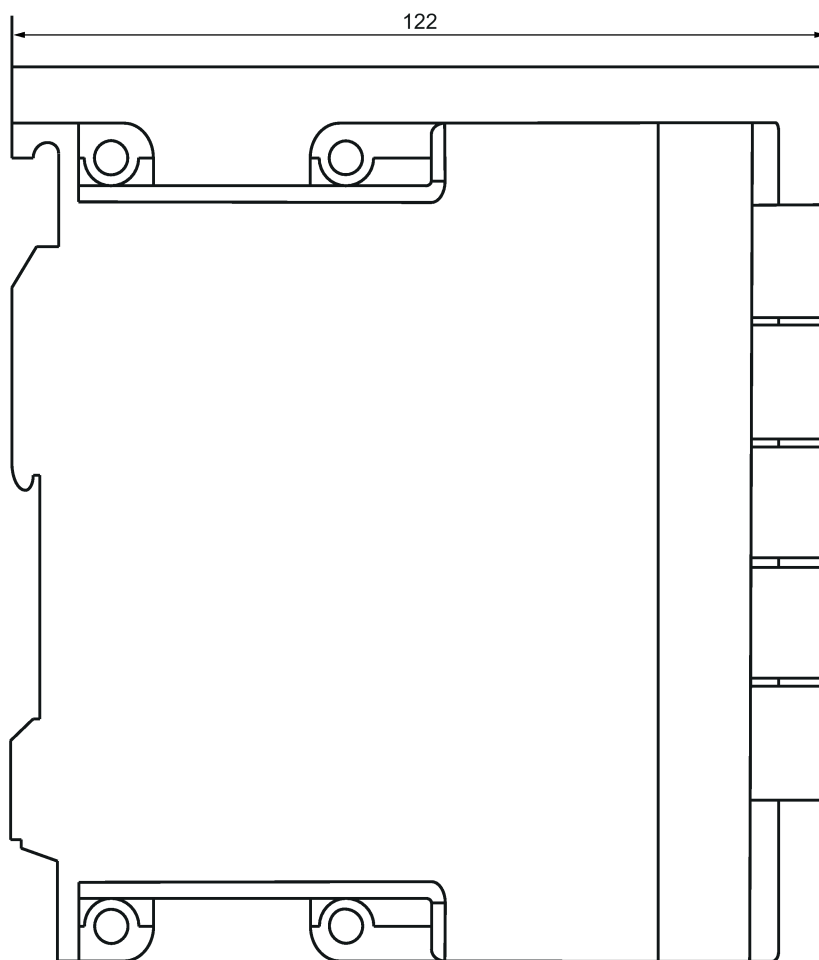
Figure 9-2   Dimension drawing, side view of SCALANCE X-000

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