SIEMENS

SIMATIC NET

Network components
Transceiver SFP/SFP+/SCP/STP

Operating Instructions

03/2022
A5E02630804-17

Legal information

Warning notice system

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

⚠ DANGER

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

⚠ WARNING

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

⚠ CAUTION

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

NOTICE

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

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

Qualified Personnel

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

Proper use of Siemens products

Note the following:

⚠ WARNING

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

Trademarks

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

Disclaimer of Liability

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

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Introduction

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Purpose of the compact operating instructions

Based on the compact operating instructions, you will be able to install the SFP, SFP+, SCP and STP transceivers. The configuration and the integration of the devices in a network are not described in these instructions.

Validity of these compact operating instructions

These compact operating instructions apply to the SFP, SFP+, SCP and STP product group.

Further documentation

In the system manuals "Industrial Ethernet / PROFINET Industrial Ethernet" and "Industrial Ethernet / PROFINET passive network components", you will find information on other SIMATIC NET products that you can operate along with the devices of this product line in an Industrial Ethernet network.

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

You will find the system manuals here:

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

SIMATIC NET manuals

You will find the SIMATIC NET manuals here:

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

SIMATIC NET glossary

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

You will find the SIMATIC NET glossary here:

- On the data medium that ships with some products:
  - Product CD / product DVD
  - SIMATIC NET Manual Collection
- On the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/view/50305045).

Security information

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

In order to protect plants, systems, machines and networks against cyber threats, it is necessary to implement – and continuously maintain – a holistic, state-of-the-art industrial security concept. Siemens' products and solutions constitute one element of such a concept.

Customers are responsible for preventing unauthorized access to their plants, systems, machines and networks. Such systems, machines and components should only be connected to an enterprise network or the internet if and to the extent such a connection is necessary and only when appropriate security measures (e.g. firewalls and/or network segmentation) are in place.

For additional information on industrial security measures that may be implemented, please visit https://www.siemens.com/industrialsecurity (https://www.siemens.com/industrialsecurity)

Siemens' products and solutions undergo continuous development to make them more secure. Siemens strongly recommends that product updates are applied as soon as they are available and that the latest product versions are used. Use of product versions that are no longer supported, and failure to apply the latest updates may increase customers' exposure to cyber threats.

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

Catalogs

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

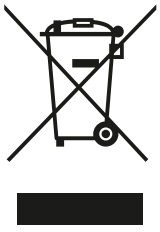
- SIMATIC NET Industrial Communication / Industrial Identification, catalog IK PI
- SIMATIC Products for Totally Integrated Automation and Micro Automation, catalog ST 70
- Industry Mall - catalog and ordering system for automation and drive technology, Online catalog (https://mall.industry.siemens.com/goos/WelcomePage.aspx?regionUrl=/de&language=en)

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

Device defective

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

Recycling and disposal



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

Do not dispose of the products at public disposal sites.

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

Note the different national regulations.

Trademarks

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

SCALANCE, C-PLUG, OLM

Safety notes

2

Read the safety notices

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

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

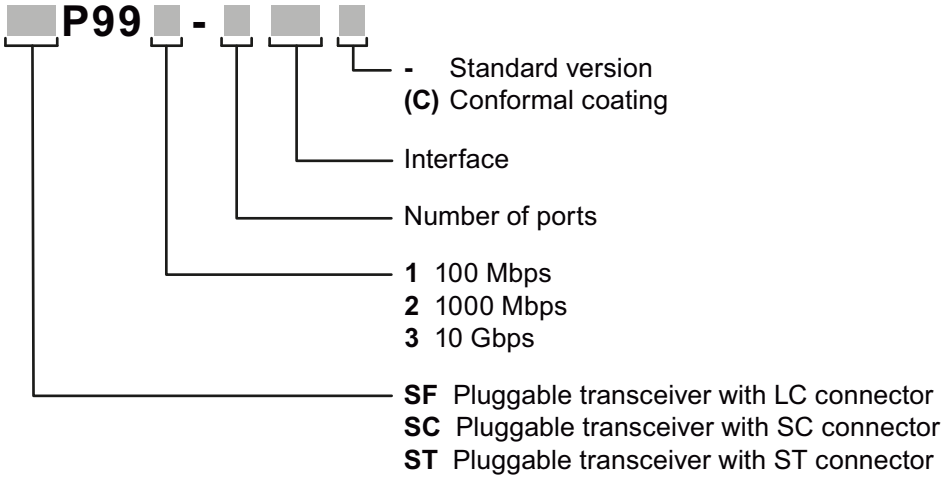
⚠ CAUTION
To prevent injury and damage, read the manual before using the device.

Description of the device

3

Structure of the type designation

The type designation of an pluggable transceiver is made up of several parts that have the following meaning:



Interface *)	Property
[-]	100 Mbps, LC port optical, glass FO cable (multimode), up to max. 3 km
	1000 Mbps, LC port optical, glass FO cable (multimode), up to max. 750 m
	10 Gbps, LC port optical, glass FO cable (multimode), up to 550 m
+	1000 Mbps, LC port optical, glass FO cable (multimode), up to max. 2 km
A	100 Mbps, LC port optical, glass FO cable (multimode), up to max. 3 km to use Gigabit slots as Fast Ethernet interfaces
BXMT	1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 500 m, for transmission over only one fiber
BXMR	1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 500 m, for transmission over only one fiber
BX10T	1000 Mbps, LC port optical for glass FO cable (single mode), up to max. 10 km, for transmission over only one fiber
BX10R	1000 Mbps, LC port optical for glass FO cable (single mode), up to max. 10 km, for transmission over only one fiber
LD	100 Mbps, LC port optical, glass FO cable (single mode), up to max. 26 km
	1000 Mbps, LC port optical, glass FO cable (single mode), up to max. 10 km
	10 Gbps, LC port optical, glass FO cable (single mode), up to 10 km
LD A	100 Mbps, LC port optical, glass FO cable (single-mode), up to max. 26 km to use Gigabit slots as Fast Ethernet interfaces
LD+	1000 Mbps LC port optical for glass FO cable (single mode) up to max. 30 km

Interface *)	Property
LH	1000 Mbps, LC port optical, glass FO cable (single mode), up to max. 40 km
	10 Gbps, LC port optical, glass FO cable (single mode), up to 40 km
LH+	100 Mbps, LC port optical, glass FO cable (single mode), up to max. 70 km
	1000 Mbps, LC port optical, glass FO cable (single mode), up to max. 70 km
ELH	1000 Mbps, LC port optical, glass FO cable (single mode), up to max. 120 km
ELH200	100 Mbps, LC port optical, glass FO cable (single mode), up to max. 200 km

*) LD (Long Distance), LH (Long Haul), LH+ (Long Haul +), ELH (Extreme Long Haul)

3.1 Product overview

All plug-in transceivers listed below are intended for use in SIMATIC NET devices.

Note

Fiber monitoring

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

Pluggable transceiver SFP (100 Mbps)

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

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

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

Active plug-in transceiver SFP (100 Mbps)

With active plug-in transceivers, Gigabit slots can be used as Fast Ethernet interfaces.

Type	Property	Article number
SFP991-1A	1 x 100 Mbps, LC port optical for glass FO cable (multimode), up to max. 5 km	6GK5 991-1AD00-8GA0
SFP991-1LD A	1 x 100 Mbps LC port optical for glass FO cable (single mode) up to max. 26 km	6GK5 991-1AF00-8GA0

Pluggable transceiver SFP (1000 Mbps)

Type	Property	Article number
SFP992-1	1 x 1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 750 m	6GK5 992-1AL00-8AA0
	10 packing unit (VPE 10)	6GK5 992-1AL00-8AC0
SFP992-1 (C)	1 x 1000 Mbps, LC port optical, for glass FO cable (multimode), up to max. 750 m, varnished	6GK5 992-1AL00-8FA0
SFP992-1+	1 x 1000 Mbps, LC port optical for glass FO cable (multimode), up to max. 2 km	6GK5 992-1AG00-8AA0
SFP992-1LD	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 10 km	6GK5 992-1AM00-8AA0
	10 packing unit (VPE 10)	6GK5 992-1AM00-8AC0
SFP992-1LD (C)	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 10 km, varnished	6GK5 992-1AM00-8FA0
SFP992-1LD+	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 30 km	6GK5 992-1AM30-8AA0
SFP992-1LH	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 40 km	6GK5 992-1AN00-8AA0
SFP992-1LH+	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 70 km	6GK5 992-1AP00-8AA0
SFP992-1ELH	1 x 1000 Mbps LC port optical for glass FO cable (single mode) up to max. 120 km	6GK5 992-1AQ00-8AA0

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

Note

Only the following transceivers are permitted for the SCALANCE W786-2 SFP:

- SFP992-1
- SFP992-1LD
- SFP992-1LH
- SFP992-1LH+
- SFP992-1ELH

Bidirectional plug-in transceiver SFP

Bidirectional plug-in transceivers feature only one fiber connection. They transmit and receive on two different wavelengths. To establish a connection, you need two matching bidirectional SFPs. The connected SFPs must respectively transmit on the wavelength at which the connection partner receives.

Type	Properties	Article number
SFP992-1BXMT	1 x 1000 Mbps LC port optical for glass FO (multimode) with max. 500 m, transmits at 1550 nm, receives at 1310 nm	6GK5 992-1AL00-8TA0
SFP992-1BXMR	1 x 1000 Mbps LC port optical for glass FO (multimode) with max. 500 m, transmits at 1310 nm, receives at 1550 nm	6GK5 992-1AL00-8RA0
SFP992-1BX10T	1 x 1000 Mbps LC port optical for glass FO (single mode) with max. 10 km, transmits at 1550 nm, receives at 1310 nm	6GK5 992-1AM00-8TA0
SFP992-1BX10R	1 x 1000 Mbps LC port optical for glass FO (single mode) with max. 10 km, transmits at 1310 nm, receives at 1550 nm	6GK5 992-1AM00-8RA0

SFP+ transceiver

Type	Properties	Article number
SFP993-1	1 x 10 Gbps, LC port optical for glass FO cable (multimode), up to max. 550 m	6GK5 993-1AT00-8AA0
SFP993-1LD	1 x 10 Gbps, LC port optical for glass FO cable (single mode), up to max. 10 km	6GK5 993-1AU00-8AA0
SFP993-1LH	1 x 10 Gbps, LC port optical for glass FO cable (single mode), up to max. 40 km	6GK5 993-1AV00-8AA0

Can only be operated in SFP+ slots.

Note

Restriction with SFP+ pluggable transceivers for SCALANCE XR526-8C

If you use SFP+ transceivers with the SCALANCE XR526-8C, the maximum ambient temperature is reduced to 50 ℃.

Preassembled IE cable with SFP+ plugs

Component	Description		Article number
IE Cable SFP+/SFP+	Preassembled IE cable with two permanently mounted SFP+ plugs, electrical, 10 Gbps, pack of 1	Length 1 m	6GK5 980-3CB00-0AA1
		Length 2 m	6GK5 980-3CB00-0AA2
		Length 7 m	6GK5 980-3CB00-0AA7

SCP / STP transceiver

Type	Properties	Article number
SCP992-1	1 x 1000 Mbps SC port optical for glass FO cable (multimode) up to max. 750 m	6GK5 992-1AJ00-8AA0
SCP992-1LD	1 x 1000 Mbps SC port optical for glass FO cable (single mode) up to max. 10 km	6GK5 992-1AK00-8AA0
STP991-1	1 x 100 Mbps ST port optical for glass FO cable (multimode) up to max. 3 km	6GK5 991-1AB00-8AA0
STP991-1LD	1 x 100 Mbps ST port optical for glass FO cable (single mode) up to max. 26 km	6GK5 991-1AC00-8AA0

Can only be operated in SCP and STP slots.

Media modules

Note

The SFP media modules MM992-2SFP may only be fitted with approved transceivers. The media module can be fitted with up to two pluggable transceivers.

The SFP media modules MM992-4SFP may only be fitted with approved transceivers. The media module can be fitted with up to four pluggable transceivers.

Type	Properties	Article number	Labeling on the device
MM992-2SFP	2 x 100 / 1000 Mbps, SFP media module	6GK5 992-2AS00-8AA0	9922AS
MM992-2SFP (C)	2 x 100 / 1000 Mbps, SFP media module, coated	6GK5 992-2AS00-8FA0	9922AS
MM992-4SFP	4 x 100 / 1000 Mbps, SFP media module	6GK5 992-4AS00-8AA0	9924AS

3.2 Components of the product

The following components are supplied with a transceiver:

- Transceiver
- Information sheet

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.

Assembling

4

4.1 Safety notices for installation

Safety notices

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

NOTICE
Improper mounting Improper mounting may damage the device or impair its operation. • Before mounting the device, always ensure that there is no visible damage to the device.

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

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

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

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

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

⚠ WARNING
Requirements for the cabinet/enclosure The equipment shall be installed in a suitable enclosure that provides a degree of protection not less than IP54 in accordance with EN/IEC 60079-15.

⚠ WARNING

Suitable cables at high ambient temperatures

If the temperature of the cable or housing socket exceeds 70 °C or the branching point of conductors exceeds 80 °C, special precautions must be taken.

If the device is operated at ambient temperatures of between 50 °C and 70 °C, only use cables with a maximum permitted operating temperature of at least 80 °C.

4.2 Notes on installation of SFP / SFP+ transceivers

General notes on media modules and pluggable transceivers

⚠ WARNING

Install and remove media modules only when the power is off

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

Use only approved media modules

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

NOTICE

Only use plug-in transceivers in approved SCALANCE devices

Only use the SFP/SFP+ plug-in transceivers in SCALANCE devices that have ATEX/IECEx approval.

If you use the SFP/SFP+ plug-in transceivers in other devices, Siemens cannot guarantee the compatibility and risk-free use of these components.

⚠ CAUTION

Remember the orientation of media modules.

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

- The first MM900 media module is installed in slot 1.
- The second MM900 media module installed in slot 2 must be turned through 180 degrees.

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

Example of a rack device:

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

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

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

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

The following aspects can restrict the maximum permitted operating temperature:

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

NOTICE

Use only approved pluggable transceivers

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

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

Note

Use media modules only in an approved modular device

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

The names and labeling of the media modules differ

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

Note

Shipbuilding approval

The shipbuilding approval applies to all SFP pluggable transceivers.

Note

Slot number

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

Note

Different colors of the clip

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

Note

Plugging and pulling during operation

With SCALANCE X, the pluggable transceivers can be plugged and pulled during operation. If you have questions on the use of SIMATIC NET products, please contact your Siemens sales partner.

Notes on SCALANCE X-300

Note

Pluggable transceivers with the SCALANCE XR324-4M EEC

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

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

Notes on SCALANCE XR-500

Note

Fixed slots of the SCALANCE XR528-6M and XR552-12M

The SFP+ transceivers are not suitable for media modules. The devices SCALANCE XR528-6M and XR552-12M product group have four fixed slots for SFP+.

It is, however, possible to operate SFP transceivers in the fixed SFP+ slots of the device. Note that the SFP+ slots only support SFP transceivers with a transmission rate of 1000 Mbps.

Notes on SCALANCE W:

Note

With a SCALANCE W786-2, do not plug or pull an SFP transceiver during operation!

If you have questions on the use of SIMATIC NET products, please contact your Siemens sales partner.

4.3 Using a pluggable transceiver (SFP/SFP+)

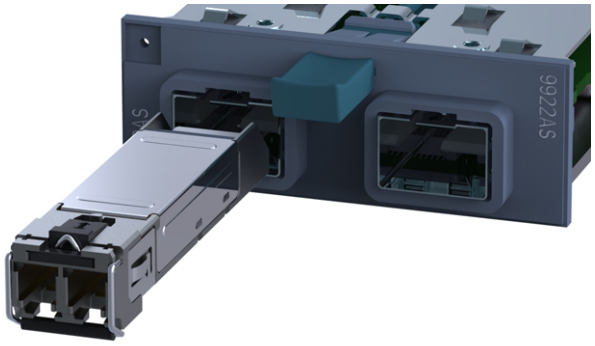


Figure 4-1 Plugging in a transceiver

Follow the steps below to insert a pluggable transceiver:

1. Remove the sealing plug of the pluggable transceiver.
2. Close the clip of the pluggable transceiver.
3. Insert the pluggable transceiver in the pluggable transceiver slot until you hear it engage, see figure.
   The pluggable transceiver is then firmly secured.
4. Insert the connecting cable into the pluggable transceiver until you hear it engage.
   The connecting cable is then firmly secured.

4.4 Notes on installation of SCP / STP transceivers

General notes on pluggable transceivers

NOTICE

Use only approved pluggable transceivers

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

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

NOTICE

Only use plug-in transceivers in approved SCALANCE devices

Only use the SCP/STP plug-in transceivers in SCALANCE devices that have ATEX/IECEx approval.

If you use the SCP/STP plug-in transceivers in other devices, Siemens cannot guarantee the compatibility and risk-free use of these components.

Note

Shipbuilding approval

The shipbuilding approval applies to all SCP / STP transceivers.

Note

Plugging and pulling during operation

The pluggable transceivers can be plugged and pulled during operation. If you have questions on the use of SIMATIC NET products, please contact your Siemens sales partner.

Notes on SCALANCE XM-400

Note

SCP / STP transceivers can only be used in the SCP / STP slots of the SCALANCE XM408-4C.

Notes on SCALANCE W:

Note

With a SCALANCE W786-2, do not plug or pull an SFP transceiver during operation!

If you have questions on the use of SIMATIC NET products, please contact your Siemens sales partner.

4.5 Using a pluggable transceiver (SCP/STP)

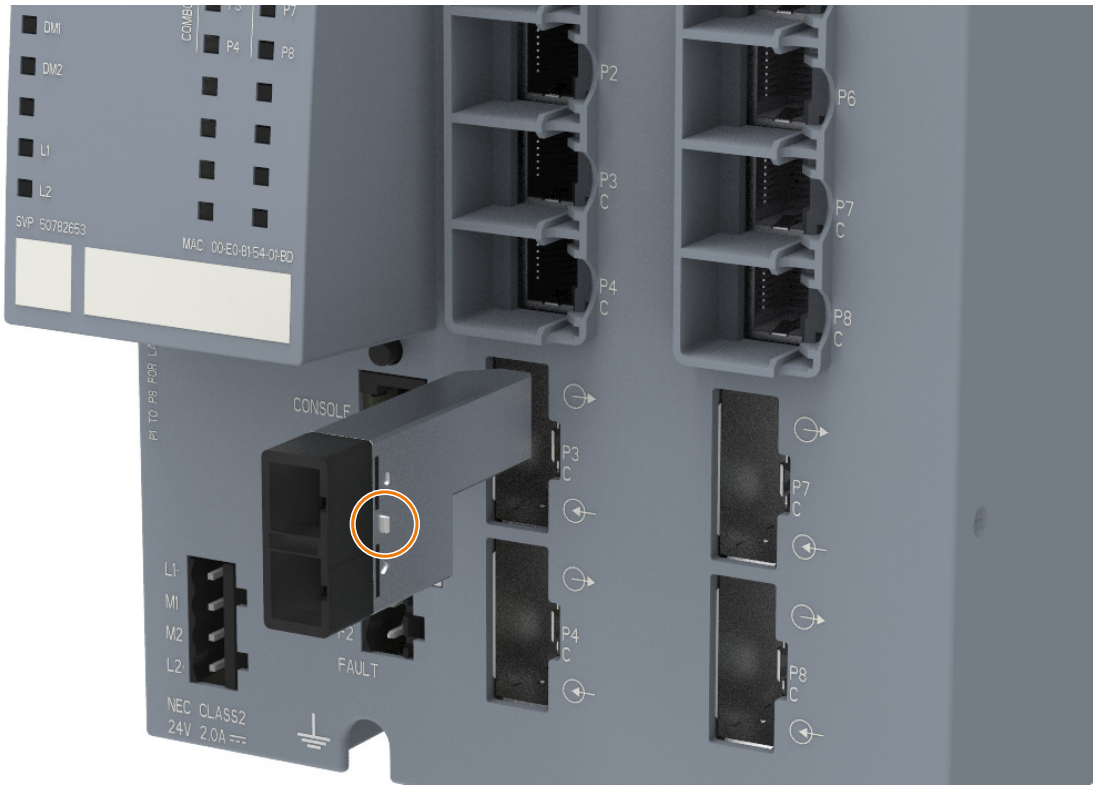


Figure 4-2 Plugging in a transceiver

Follow the steps below to insert a pluggable transceiver:

1. Remove the sealing plug of the pluggable transceiver.
2. Hold the pluggable transceiver so that the slight protrusion is on the right, see figure.
3. Insert the pluggable transceiver in this position in the pluggable transceiver slot until you hear it engage.
   The pluggable transceiver is then firmly secured.
4. Insert the connecting cable into the pluggable transceiver until you hear it engage.
   The connecting cable is then firmly secured.

Uninstalling

5

⚠ WARNING

Improper disassembly

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

For proper disassembly, observe the following:

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

5.1 Removing a pluggable transceiver (SFP/SFP+)

Notes on deinstallation

⚠ CAUTION

Risk of burns due to the high temperatures of the pluggable transceiver

The pluggable transceivers can be plugged and pulled during operation. Leave the transceiver to cool down.

Procedure

Follow the steps below to remove a pluggable transceiver:

1. Remove the connecting cable of the pluggable transceiver.
2. Open the clip of the pluggable trabsceiver.
3. Remove the pluggable transceiver from the pluggable transceiver slot.

   Note

   Do not use force

   It must be possible to remove the pluggable transceiver easily and without applying any force.

4. Close the pluggable transceiver slot with a sealing plug.

5.2 Removing a pluggable transceiver (SCP/STP)

Notes on deinstallation

CAUTION

Risk of burns due to the high temperatures of the pluggable transceiver

The pluggable transceivers can be plugged and pulled during operation. Leave the transceiver to cool down.

Procedure

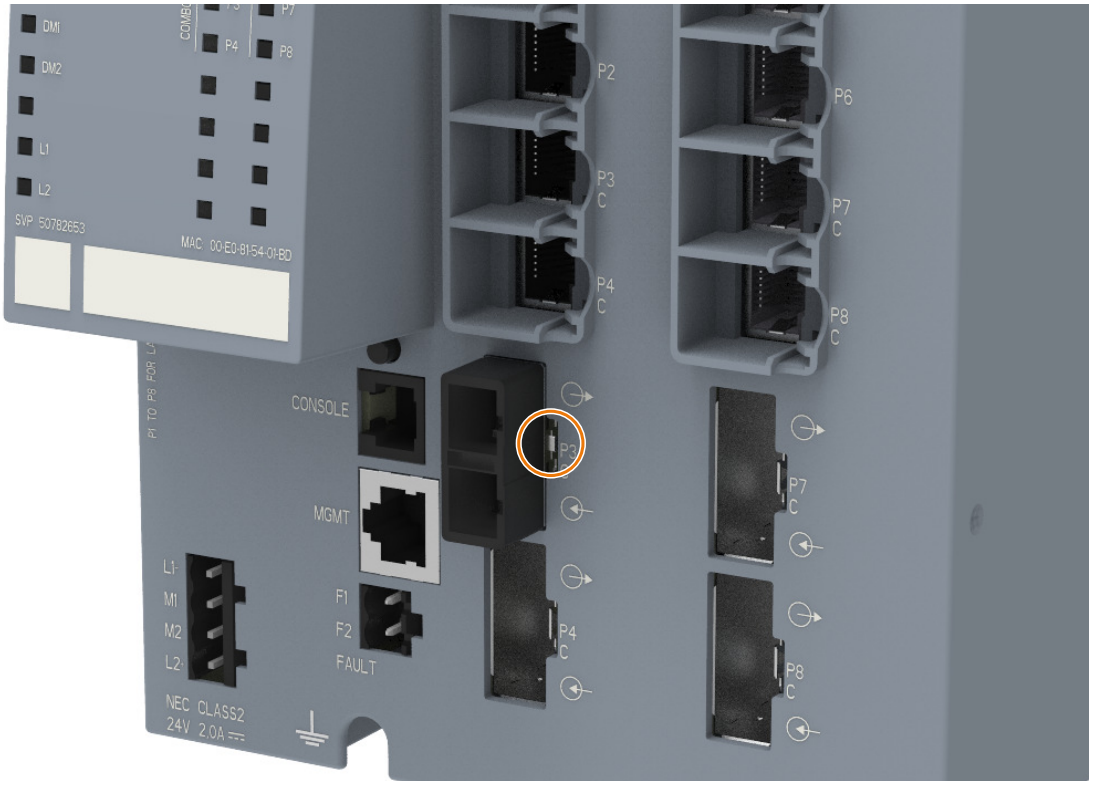


Figure 5-1 Removing a pluggable transceiver

Follow the steps below to remove a pluggable transceiver:

1. Remove the connecting cable of the pluggable transceiver.
2. Press the spring in the transceiver slot to the right using a screwdriver, see figure.
   The transceiver is pushed part of the way out of the transceiver slot.

3. Remove the pluggable transceiver from the pluggable transceiver slot.

Note

Do not use force

It must be possible to remove the pluggable transceiver easily and without applying any force.

4. Fit a sealing plug to the pluggable transceiver.

Connecting up

6

6.1 Safety when connecting up

Safety notices

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

Safety notices on use in hazardous areas

General safety notices relating to protection against explosion

⚠ WARNING

EXPLOSION HAZARD

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

⚠ WARNING

Unsuitable cables or connectors

Risk of explosion in hazardous areas

- Only use connectors that meet the requirements of the relevant type of protection.
- Close unused cable openings for electrical connections.
- Check the cables for a tight fit after installation.

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

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

⚠ WARNING

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

Provisions shall be made to prevent the rated voltage from being exceeded by transient disturbances of more than 119 V.

Further notes

NOTICE

Note the fiber type and the shape of the fiber end

Note the following when setting up an optical connection:

- Use the correct fiber type:
  - Multimode
  - Single mode
- Use the correct shape of the fiber end:
  - PC (Physical Contact)
    Flat, polished fiber end rounded toward the edge
  - UPC (Ultra Physical Contact)
    Flat, ultra-polished fiber end rounded toward the edge
  - APC (Angled Physical Contact)
    Angled, ultra-polished fiber end rounded toward the edge

  For the fiber connection to a plug-in transceiver, only use fibers in the shape PC or UPC. Only with these shapes will you achieve low transfer damping between transceiver and cable.

NOTICE

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

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

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

Note

Commissioning devices with redundancy mechanisms

If you use redundancy mechanisms ("HRP" media redundancy or "MRP" and/or redundant linking of rings via standby link), 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 is also enabled. If the device is intended to operate as the redundancy manager, "Redundancy manager enabled" must also be set.
- Standby connection:
  "Standby connection" must be "enabled" and the "Standby connection name" must match the name of the partner device. You also configure the port with "Enable Standby Port Monitoring".

6.2 Power supply

The pluggable transceivers are supplied with power via the SFP media modules in the modular devices or via the SFP/SFP+/SCP/STP slots.

Maintenance and cleaning

7

WARNING

Unauthorized repair of devices in explosion-proof design

Risk of explosion in hazardous areas

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

WARNING

Impermissible accessories and spare parts

Risk of explosion in hazardous areas

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

CAUTION

Hot surfaces

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

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

Technical data

8

Note

Deviations of the technical specifications from the values displayed in the WBM

The values displayed can vary from the values displayed in the WBM (menu "System > Port diagnostics", "SFP diagnostics" tab). The values stated and explained in this document are authoritative.

Wavelength

For SFP plug-in transceivers, the center frequency of the wavelength of the sender is specified. The wavelength provides information about the technology used.

You have the following specifications for plug-in transceivers:

- **1300 nm** (LED) or **1310 nm** (FP-LASER) for 100 Mbps multimode transceivers
  The specifications 1300 nm and 1310 nm are only used to distinguish between LED and LASER based transceivers. You can connect the transceivers with each other without any restrictions.
- **850 nm** (VCSEL-LASER) for 1000 Mbps and 10 Gbps multimode transceivers
- **1310 nm** (FP-LASER) for all transceiver types LD, LD+ (single-mode/all speeds)
- **1550 nm** (DFB-LASER) for all plug-in transceiver types LH, LH+, ELH, ELH200 (single-mode/all speeds)

Bidirectional plug-in transceivers are an exception. For these transceivers, the wavelengths of sender and receiver are specified.

8.1 SFP transceiver

LC connector technology

The attachment to Industrial Ethernet uses LC connector technology (Lucent Connector).

Pluggable transceiver slot/
plugged in transceiver

8.1.1 SFP991-1/SFP991-1(C)

Properties			
Transmission mode	100Base-FX complying with IEEE 802.3		
Transmission rate	100 Mbps (Fast Ethernet)		
Transmission medium	Multimode fiber-optic cable		
Light source	LED/Class1-LASER "Eye safe"		
Wavelength	1300 nm		
Cable length (max.) *)	At 50 µm fiber core diameter		3 km
	At 62.5 µm fiber core diameter		3 km
Transmitter output (optical)	Minimum	At 50 µm	-24 dBm
		At 62.5 µm	-20 dBm
	Maximum		-14 dBm
Receiver input	Sensitivity min.		-31 dBm
	Input power max.		-12 dBm

*) Depending on the cable used:

- If you are using at least OM1 fibers (attenuation ≤ 1.5 dB/km, bandwidth length product ≥ 500 MHz*km), you can reach a cable length of up to 3 km.
- When are using fibers with attenuation values ≤ 1 dB/km, you can reach a cable length of up to 5 km.

You can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.2 SFP991-1A

Properties			
Transmission mode	100Base-FX complying with IEEE 802.3		
Transmission speed	100 Mbps (Fast Ethernet)		
Transmission medium	Multimode fiber-optic cable		
Light source	Class1-LASER "Eye safe"		
Wavelength	1310 nm		
Cable length (max.) *)	At 50 µm fiber core diameter		3 km
	At 62.5 µm fiber core diameter		3 km
Transmitter output (optical)	Minimum	At 50 µm	-23.5 dBm
		At 62.5 µm	-20 dBm
	Maximum		-14 dBm
Receiver input	Sensitivity min.		-31 dBm
	Input power max.		-8 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.3 SFP991-1LD/SFP991-1LD(C)

Properties		
Transmission mode	100Base-LX complying with IEEE 802.3	
Transmission rate	100 Mbps (Fast Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1310 nm	
Cable length (max.) *)	26 km	
Transmitter output (optical)	Minimum	-15 dBm
	Maximum	-8 dBm
Receiver input	Sensitivity min.	-28 dBm
	Input power max.	-8 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.4 SFP991-1LD A

Properties		
Transmission mode	100Base-LX complying with IEEE 802.3	
Transmission rate	100 Mbps (Fast Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1310 nm	
Cable length (max.) *)	26 km	
Transmitter output (optical)	Minimum	-15 dBm
	Maximum	-8 dBm
Receiver input	Sensitivity min.	-31 dBm
	Input power max.	-8 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.5 SFP991-1LH+

Properties		
Transmission mode	100Base-LX	
Transmission rate	100 Mbps (Fast Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1550 nm	
Cable length (max.) *)	70 km	
Transmitter output (optical)	Minimum	-5 dBm
	Maximum	0 dBm
Receiver input	Sensitivity min.	-34 dBm
	Input power max.	-10 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.6 SFP991-1ELH200

Properties		
Transmission mode	100Base-LX	
Transmission rate	100 Mbps (Fast Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1550 nm	
Cable length (max.) *)	200 km	
Transmitter output (optical)	Minimum	1 dBm
	Maximum	5 dBm
Receiver input	Sensitivity min.	-42 dBm
	Input power max.	-9 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.7 SFP992-1/SFP992-1(C)

Properties	
Transmission mode	1000Base-SX complying with IEEE 802.3
Transmission rate	1000 Mbps (Gigabit Ethernet)

Properties		
Transmission medium	Multimode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	850 nm	
Cable length (max.) *)	At 50 µm fiber core diameter	750 m
	At 62.5 µm fiber core diameter	350 m
Transmitter output (optical)	Minimum	-9.5 dBm
	Maximum	-2.5 dBm
Receiver input	Sensitivity min.	-17 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.8 SFP992-1+

Properties		
Transmission mode	1000Base-LX	
Transmission speed	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Multimode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1310 nm	
Cable length (max.) *)	At 50 µm fiber core diameter	2 km
	At 62.5 µm fiber core diameter	1 km
Transmitter output (optical)	Minimum	-9 dBm
	Maximum	-1 dBm
Receiver input	Sensitivity min.	-19 dBm
	Input power max.	-1 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.9 SFP992-1LD/SFP992-1LD(C)

Properties	
Transmission mode	1000Base-LX complying with IEEE 802.3
Transmission rate	1000 Mbps (Gigabit Ethernet)
Transmission medium	Single mode fiber-optic cable
Light source	Class1-LASER "Eye safe"
Wavelength	1310 nm

Properties		
Cable length (max.) *)	10 km	
Transmitter output (optical)	Minimum	-9.5 dBm
	Maximum	-3 dBm
Receiver input	Sensitivity min.	-19 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.10 SFP992-1LD+

Properties		
Transmission mode	1000Base-LX complying with IEEE 802.3	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1310 nm	
Cable length (max.) *)	30 km	
Transmitter output (optical)	Minimum	-5 dBm
	Maximum	0 dBm
Receiver input	Sensitivity min.	-24 dBm
	Input power max.	0 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.11 SFP992-1LH

Properties		
Transmission mode	1000Base-EX complying with IEEE 802.3	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1550 nm	
Cable length (max.) *)	40 km	
Transmitter output (optical)	Minimum	-6 dBm
	Maximum	0 dBm

Properties		
Receiver input	Sensitivity min.	-23 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.12 SFP992-1LH+

Properties		
Transmission mode	1000Base-ZX complying with IEEE 802.3	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1550 nm	
Cable length (max.) *)	70 km	
Transmitter output (optical)	Minimum	0 dBm
	Maximum	5 dBm
Receiver input	Sensitivity min.	-22 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.1.13 SFP992-1ELH

Properties		
Transmission mode	1000Base-ZX	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1550 nm	
Cable length (max.) *)	120 km	
Transmitter output (optical)	Minimum	0 dBm
	Maximum	5 dBm
Receiver input	Sensitivity min.	-32 dBm
	Input power max.	-8 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.2 Bidirectional plug-in transceiver SFP

LC connector technology (bidirectional)

The attachment to Industrial Ethernet uses LC connector technology (Lucent Connector) with a fiber connection.

Pluggable transceiver slot/ plugged in transceiver

8.2.1 SFP992-1BXMT

Properties		
Transmission mode	1000Base-BX	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Multimode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	Transmitter (sender)	1550 nm
	Receiver (receiver)	1310 nm
Cable length (max.) *)	500 m	
Transmitter output (optical)	Minimum	-10 dBm
	Maximum	-4 dBm
Receiver input	Sensitivity min.	-17 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.2.2 SFP992-1BXMR

Properties		
Transmission mode	1000Base-BX	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Multimode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	Transmitter (sender)	1310 nm
	Receiver (receiver)	1550 nm
Cable length (max.) *)	500 m	

Properties		
Transmitter output (optical)	Minimum	-10 dBm
	Maximum	-4 dBm
Receiver input	Sensitivity min.	-17 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.2.3 SFP992-1BX10T

Properties		
Transmission mode	1000Base-BX	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	Transmitter (sender)	1550 nm
	Receiver (receiver)	1310 nm
Cable length (max.) *)	10 km	
Transmitter output (optical)	Minimum	-9 dBm
	Maximum	-3 dBm
Receiver input	Sensitivity min.	-21 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.2.4 SFP992-1BX10R

Properties		
Transmission mode	1000Base-BX	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	Transmitter (sender)	1310 nm
	Receiver (receiver)	1550 nm
Cable length (max.) *)	10 km	
Transmitter output (optical)	Minimum	-9 dBm
	Maximum	-3 dBm

Properties		
Receiver input	Sensitivity min.	-21 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.3 SFP+ transceiver

LC connector technology

The attachment to Industrial Ethernet uses LC connector technology (Lucent Connector).

Pluggable transceiver slot/ plugged in transceiver

8.3.1 SFP993-1

Properties		
Transmission mode	10GBASE-SR complying with IEEE 802.3	
Transmission rate	10 Gbps (10 Gigabit Ethernet)	
Transmission medium	Multimode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	850 nm	
Cable length (max.) *)	OM3 fiber	300 m
	OM4 fiber	550 m
Transmitter output (optical)	Minimum	-5 dBm
	Maximum	-1 dBm
Receiver input	Sensitivity min.	-11 dBm
	Input power max.	-1 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.3.2 SFP993-1LD

Properties		
Transmission mode	10GBASE-LR complying with IEEE 802.3	
Transmission rate	10 Gbps (10 Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1310 nm	
Cable length (max.) *)	10 km	
Transmitter output (optical)	Minimum	-8.2 dBm
	Maximum	0.5 dBm
Receiver input	Sensitivity min.	-12.6 dBm
	Input power max.	0.5 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.3.3 SFP993-1LH

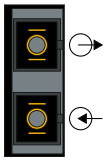
Properties		
Transmission mode	10GBASE-ER complying with IEEE 802.3	
Transmission rate	10 Gbps (10 Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1550 nm	
Cable length (max.) *)	40 km	
Transmitter output (optical)	Minimum	-4.7 dBm
	Maximum	4 dBm
Receiver input	Sensitivity min.	-14.1 dBm
	Input power max.	0.5 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.4 SCP transceiver

SC connectors

The attachment to Industrial Ethernet uses SC connector technology (Subscriber Connector).



8.4.1 SCP992-1

Properties		
Transmission mode	1000Base-SX complying with IEEE 802.3	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Multimode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	850 nm	
Cable length (max.) *)	At 50 µm fiber core diameter	750 m
	At 62.5 µm fiber core diameter	350 m
Transmitter output (optical)	Minimum	-9.5 dBm
	Maximum	-2.5 dBm
Receiver input	Sensitivity min.	-17 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.4.2 SCP992-1LD

Properties		
Transmission mode	1000Base-LX complying with IEEE 802.3	
Transmission rate	1000 Mbps (Gigabit Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1310 nm	
Cable length (max.) *)	10 km	
Transmitter output (optical)	Minimum	-9.5 dBm
	Maximum	-3 dBm

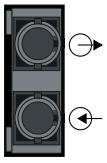
Properties		
Receiver input	Sensitivity min.	-19 dBm
	Input power max.	-3 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.5 STP transceiver

ST/BFOC connectors

The attachment to Industrial Ethernet uses ST/BFOC connector technology (Straight Tip/Bayonet Fiber Optic Connector).



8.5.1 STP991-1

Properties			
Transmission mode	100Base-FX complying with IEEE 802.3		
Transmission rate	100 Mbps (Fast Ethernet)		
Transmission medium	Multimode fiber-optic cable		
Light source	LED/Class1-LASER "Eye safe"		
Wavelength	1300 nm		
Cable length (max.) *)	At 50 µm fiber core diameter		3 km
	At 62.5 µm fiber core diameter		3 km
Transmitter output (optical)	Minimum	At 50 µm	-24 dBm
		At 62.5 µm	-20 dBm
	Maximum		-14 dBm
Receiver input	Sensitivity min.		-31 dBm
	Input power max.		-12 dBm

*) Depending on the cable used:

- If you are using at least OM1 fibers (attenuation ≤ 1.5 dB/km, bandwidth length product ≥ 500 MHz*km), you can reach a cable length of up to 3 km.
- When are using fibers with attenuation values ≤ 1 dB/km, you can reach a cable length of up to 5 km.

You can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.5.2 STP991-1LD

Properties		
Transmission mode	100Base-LX complying with IEEE 802.3	
Transmission rate	100 Mbps (Fast Ethernet)	
Transmission medium	Single mode fiber-optic cable	
Light source	Class1-LASER "Eye safe"	
Wavelength	1310 nm	
Cable length (max.) *)	26 km	
Transmitter output (optical)	Minimum	-15 dBm
	Maximum	-8 dBm
Receiver input	Sensitivity min.	-28 dBm
	Input power max.	-8 dBm

*) Depending on the cable used, you can find additional information in the "Industrial Ethernet / PROFINET Passive network components" System Manual, see also section "Introduction", paragraph "Additional documentation".

8.6 Attenuators

Attenuators

Transceivers of the types LH, LH+, ELH and ELH200 are designed for long distances and therefore send more power than they can receive.

If you establish a connection between such transceivers with a short cable length, use attenuators. Attenuators increase the attenuation and therefore protect the receiving diode.

Select the attenuation so that the transmit power (transmitter output) behind the attenuator is lower than the maximum received power (input power):

Transmitter output max. [dBm] - attenuator [dB] < input power max. [dBm]

Recommendation for the attenuation of the attenuator on a connection with the same transceivers:

Transceiver type	Attenuator
LH	6 dB ... 12 dB
LH+	12 dB ... 20 dB
ELH, ELH200	16 dB ... 24 dB

If you have established a connection on a pluggable transceiver with a short cable length, it is possible that the transmitter will be turned off. In this case, pull the transceiver and plug it in again.

8.7 Construction

Construction		
SFP/SFP+	Dimensions (W x H x D)	14 x 9 x 57 mm
	Weight	20 g
SCP/STP	Dimensions (W x H x D)	28 x 9 x 57 mm
	Weight	60 g

8.8 Environmental conditions

Environmental conditions	
Transportation/storage temperature	-40 to +85 °C
Service temperature *)	-40 to +85 °C
Operating temperature (active plug-in transceivers) *)	-40 to +95 °C
Maximum relative humidity in operation at 25 °C	< 95 % no condensation
Operating elevation above sea level	• 2000 m for uncoated plug-in transceivers • 4000 m for coated plug-in transceivers (conformal coating)
*) The temperatures depend on the selected device. You will find detailed information on the temperatures in the operating instructions of the devices.	

8.9 Effective power loss

Effective power loss at 25 °C ambient temperature		
SFP	SFP991-1/SFP991-1(C)	0.36 W
	SFP991-1A	1.1 W
	SFP991-1LD/SFP991-1LD(C)	0.39 W
	SFP991-1LD A	1.1 W
	SFP991-1LH+	0.47 W
	SFP991-1ELH200	0.63 W
	SFP992-1/SFP992-1(C)	0.33 W
	SFP992-1+	0.52 W
	SFP992-1LD/SFP992-1LD(C)	0.41 W
	SFP992-1LD+	0.6 W
	SFP992-1LH	0.45 W
	SFP992-LH+	0.50 W
	SFP992-1ELH	0.63 W
	SFP992-1BXMT	0.53 W
	SFP992-1BXMR	0.53 W
	SFP992-1BX10T	0.53 W
	SFP992-1BX10R	0.53 W
SFP+	SFP993-1	0.67 W
	SFP993-1LD	0.85 W
	SFP993-1LH	1.4 W
SCP	SCP992-1	0.33 W
	SCP992-1LD	0.41 W
STP	STP991-1	0.36 W
	STP991-1LD	0.39 W

Note

Fusing of transceivers

The pluggable transceivers (SFP/SFP+/SCP/STP) do not have fuses. The fuse is in the modular device.

8.10 MTBF (Mean Time Between Failure)

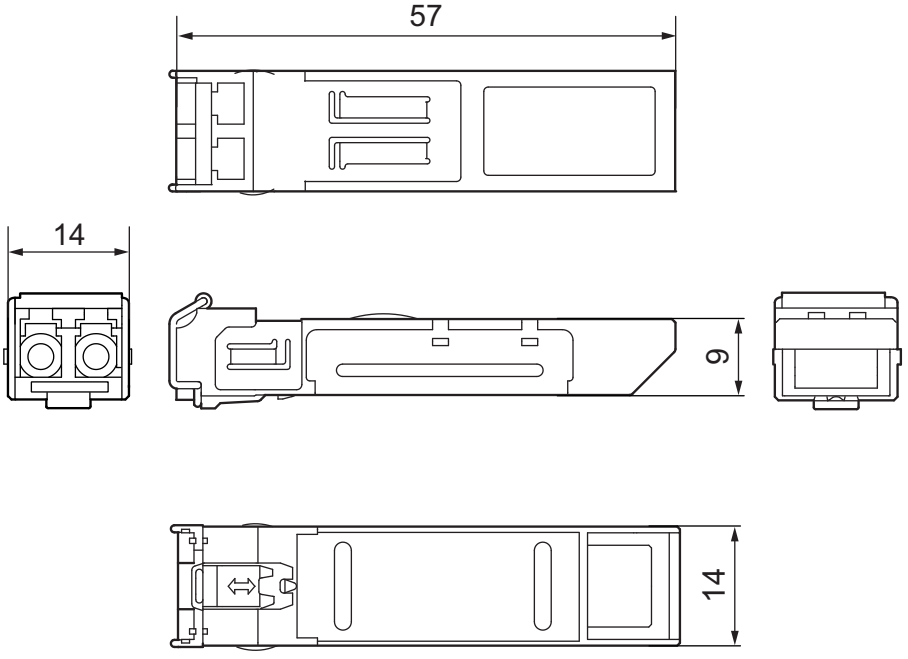
MTBF		
SFP	SFP991-1/SFP991-1(C)	> 490 years
	SFP991-1A	> 345 years
	SFP991-1LD/SFP991-1LD(C)	> 490 years
	SFP991-1LD A	> 370 years
	SFP991-1LH+	> 420 years
	SFP991-1ELH200	> 380 years
	SFP992-1/SFP992-1(C)	> 670 years
	SFP992-1+	> 227 years
	SFP992-1LD/SFP992-1LD(C)	> 600 years
	SFP992-1LD+	> 320 years
	SFP992-1LH	> 490 years
	SFP992-1LH+	> 490 years
	SFP992-1ELH	> 430 years
	SFP992-1BXMT	> 340 years
	SFP992-1BXMR	> 340 years
	SFP992-1BX10T	> 320 years
	SFP992-1BX10R	> 320 years
SFP+	SFP993-1	> 1100 years
	SFP993-1LD	> 850 years
	SFP993-1LH	> 300 years
SCP	SCP992-1	> 670 years
	SCP992-1LD	> 600 years
STP	STP991-1	> 490 years
	STP991-1LD	> 490 years

Dimension drawings

9

9.1 SFP dimension drawing

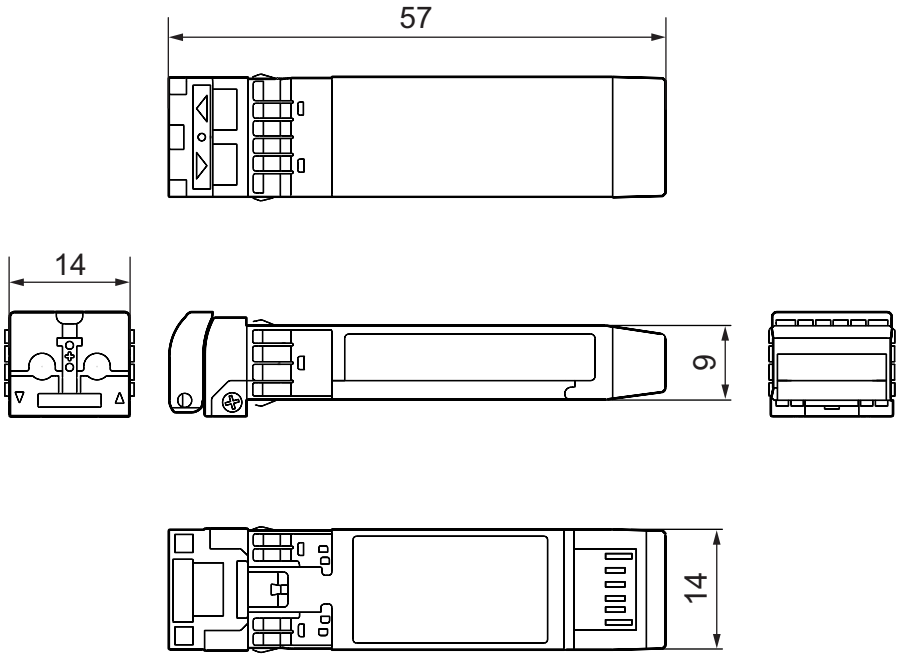
Front and top view, side view (left/right) and view from below



Dimensions are specified in mm.

9.2 SFP+ dimension drawing

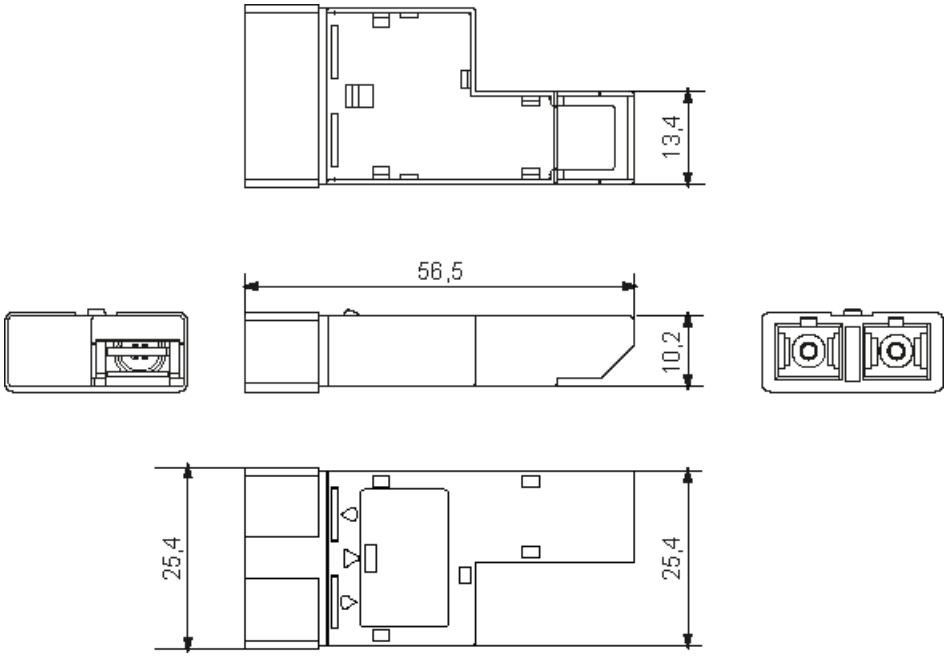
Front and top view, side view (left/right) and view from below



Dimensions are specified in mm.

9.3 SCP dimension drawing

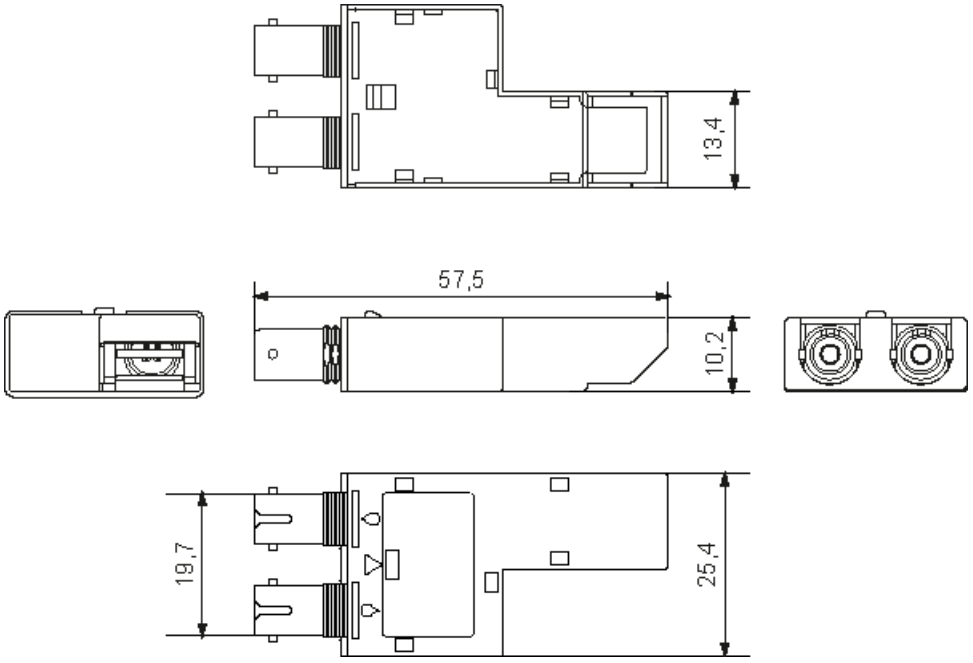
Front and top view, side view (left/right) and view from below



Dimensions are specified in mm.

9.4 STP dimension drawing

Front and top view, side view (left/right) and view from below



Dimensions are specified in mm.

Approvals

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

Note

Issued approvals on the type plate of the device

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

Current approvals on the Internet

You will find the current approvals for the product on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

Notes for the manufacturers of machines

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

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

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

Machinery directive

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

According to the Machinery Directive respectively the Supply of Machinery (Safety) Regulations (UK), we are obliged to point out that the product described is intended solely for installation in a machine.

Before the final product can be put into operation, it must be tested to ensure that it conforms with the Machinery Directive 2006/42/EEC and the Supply of Machinery (Safety) Regulations 2008 (UK).

UK Declaration of Conformity

UK CA

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

Siemens Aktiengesellschaft
Process Industries and Drives Division,
Process Automation

DE-76181 Karlsruhe
Germany

Importer UK:

Siemens plc,
Manchester M20 2UR

You can find the current UK Declaration of Conformity for these products on the Internet pages under Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert@@@).

The SIMATIC NET products described in this document meet the requirements of the following directives/regulation:

- EMC Regulation
  SI 2016/1091 Electromagnetic Compatibility Regulations 2016, and related amendments
- RoHS Regulation
  SI 2012/3032 Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012, and related amendments

EU Declaration of Conformity/manufacturer's declaration

CE

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

- **2014/30/EU (EMC)**
  EMC directive of the European Parliament and of the Council of February 26, 2014 on the approximation of the laws of the member states relating to electromagnetic compatibility; official journal of the EU L96, 29/03/2014, pages. 79-106
- **2011/65/EU (RoHS)**
  Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment, official journal of the EC L174, 01/07/2011, pages 88-110

You will find the EU Declaration of Conformity/manufacturer's declaration for these products on the Internet pages of Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

The EU Declaration of Conformity/manufacturer's declaration is available to all responsible authorities at:

Siemens Aktiengesellschaft

Digital Industries
DE-76181 Karlsruhe
Germany

ATEX, IECEx, UKEX and CCC Ex certification

WARNING

Risk of explosion in hazardous areas

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

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

You will find this document

- on the data medium that ships with some devices.
- on the Internet pages under Siemens Industry Online Support (https://support.industry.siemens.com/cs/ww/en/ps/15273/cert).

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

The SIMATIC NET products described in these operating instructions meet the requirements of the EU directive 2014/34/EU "Equipment and Protective Devices for Use in Potentially Explosive Atmospheres".

Note

Type of protection of the device

The devices are approved for various types of protection. You can find the type of protection of your device and the Ex certificate number on the packaging label.

Note

Use the plug-in transceivers only SIMATIC NET devices that are listed in the ATEX/IECEx/UKEX certificates DEKRA 18ATEX0078 U, IECEx DEK 18.0050U, DEKRA 21UKEX0006 U and the respective CCC Ex certificates.

The markings of the electrical devices are:

II 3 G Ex ec IIC T4 Gc
DEKRA 18ATEX0078 U
IECEx DEK 18.0050U
DEKRA 21UKEX0006 U
Importer UK:
Siemens plc,
Manchester
M20 2UR
(Ex na IIC T4 Gc, not on the nameplate)
2020322310002916

The products meet the requirements of the following standards:

- EN/IEC 60079-7, GB 3836.8
- EN IEC/IEC 60079-0, GB 3836.1

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

Note for devices with CLASS 1 LASER

Important note on products certified according to Type Examination Certificate DEKRA 18ATEX0078 U and IECEx Certificate of Conformity DEK 18.0050 U and containing Class 1 optical radiation sources.

Note

CLASS 1 LASER

The plug-in transceivers are approved as laser Class 1 according to IEC 60825-1.

Fiber optic cables that are connected to these optical radiation sources may therefore either lead into or through hazardous areas that require equipment of the explosion protection level (EPL) Gb, Gc, Db or Dc.

EMC (electromagnetic compatibility)

The SIMATIC NET products described in these operating instructions meet the electromagnetic compatibility requirements according to the EU Directive 2014/30/EU as well as the UK-Regulation SI 2016/1091 and their associated amendments.

Applied standards:

- EN 61000-6-2 Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity for industrial environments
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid EC/UK Declaration of Conformity.

RoHS

The SIMATIC NET products described in these operating instructions meet the requirements on the restriction of the use of certain hazardous substances in electrical and electronic equipment according to the EU Directive 2011/65/EU as well as the UK-Regulation SI 2012/3032 and their associated amendments.

Applied standard:

- EN IEC 63000

Note

The transceivers do not have a UL listing but a c-UR-us approval (component approval).

Note for Australia - RCM

The product meets the requirements of the RCM standard.

Applied standards:

- AS/NZS CISPR11 (Industrial, scientific and medical equipment - Radio-frequency disturbance characteristics - Limits and methods of measurement).
- EN 61000-6-4 Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments

You will find the current versions of the standards in the currently valid RCM SDoCs (Self-Declaration of Conformity).

MSIP 요구사항 - For Korea only

A급 기기(업무용 방송통신기자재)

이 기기는 업무용(A급) 전자파 적합기기로서 판매자 또는 사용자는 이 점을 주의하시기 바라며, 가정 외의 지역에서 사용하는것을 목적으로 합니다.

Marking for the customs union

EAC

EAC (Eurasian Conformity)

Eurasian Economic Union of Russia, Belarus, Armenia, Kazakhstan and Kyrgyzstan

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

FDA and IEC marking

The following devices meet the FDA and IEC requirements listed below:

Pluggable transceiver	CLASS 1 LASER PRODUCT
SFP	●
SFP+	●
SCP	●
STP	●

Figure 10-1 FDA and IEC approvals

CAUTION

Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

Mechanical stability (in operation)

Pluggable transceiver	IEC 60068-2-6 vibration	IEC 60068-2-27 shock
	5 – 9 Hz: 3.5 mm 9 – 150 Hz: 1 g 1 octave/min, 20 sweeps	15 g, 11 ms duration 6 shocks per axis
SFP	●	●
SFP+	●	●
SCP	●	●
STP	●	●

Installation guidelines

The devices meet the requirements if you adhere to the installation and safety instructions contained in this documentation and in the following documentation when installing and operating the devices.

- "Industrial Ethernet / PROFINET Industrial Ethernet" System Manual (https://support.industry.siemens.com/cs/ww/en/view/84922825)
- "Industrial Ethernet / PROFINET - Passive Network Components" System Manual (https://support.industry.siemens.com/cs/ww/en/view/27069465)
- "EMC Installation Guidelines" configuration manual (https://support.industry.siemens.com/cs/ww/en/view/60612658)

WARNING

Personal injury and property damage can occur

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

Only use expansions that are approved for the system.

Note

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

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

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