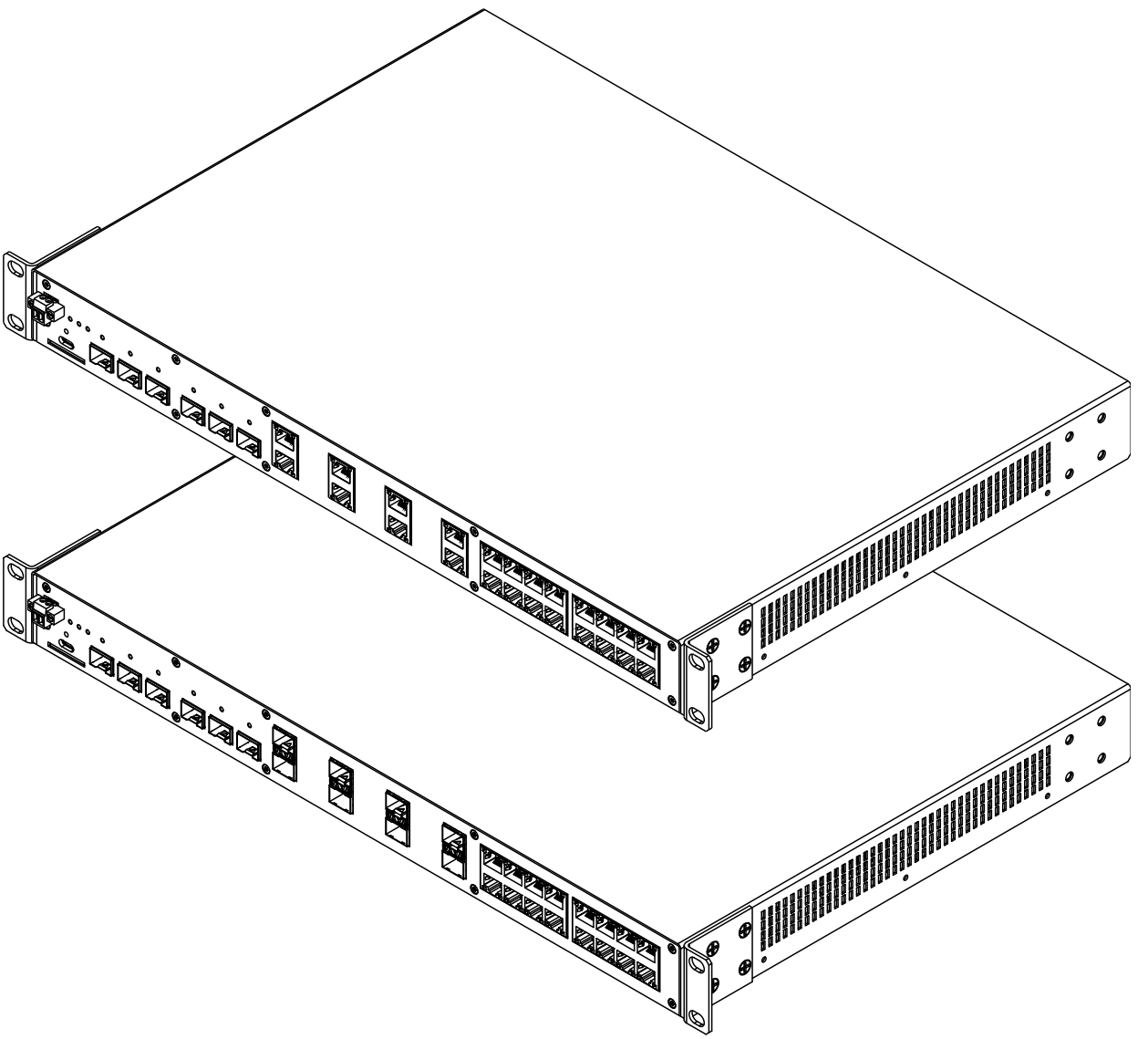
HIRSCHMANN
A BELDEN BRAND

User Manual

Installation
Industrial Ethernet Workgroup Switch
GRS105/GRS106/GRS115/GRS116



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You can get the latest version of this manual on the Internet at:
https://www.doc.hirschmann.com

Hirschmann Automation and Control GmbH
Stuttgarter Str. 45-51
72654 Neckartenzlingen
Germany

Contents

1 About this manual

The “Installation” user manual contains a device description, safety instructions, a description of the display, and the other information that you need to install the device.
The Network Management Software Industrial HiVision provides you with options for smooth configuration and monitoring. You find further information on the Internet at the Hirschmann product pages:
http://www.hirschmann.com/en/QR/INET-Industrial-HiVision

Documentation mentioned in the “User Manual Installation” that is not supplied with your device as a printout can be found as PDF files for downloading on the Internet at: https://www.doc.hirschmann.com

2 General safety instructions

Note: Read these instructions carefully, and familiarize yourself with the device before trying to install, operate, or maintain it. The following notes may appear throughout this documentation or on the device. These notes warn of potential hazards or call attention to information that clarifies or simplifies a procedure.

You operate this device with electricity. Improper usage of the device entails the risk of physical injury or significant property damage. The proper and safe operation of this device depends on proper handling during transportation, proper storage and installation, and careful operation and maintenance procedures.

- ☐ Before connecting any cable, read this document, and the safety instructions and warnings.
- ☐ Operate the device with undamaged components exclusively.
- ☐ The device is free of any service components. In case of a damaged or malfunctioning device, turn off the supply voltage and return the device to Hirschmann for inspection.

⚠ WARNING

UNCONTROLLED MACHINE ACTIONS

To avoid uncontrolled machine actions caused by data loss, configure all the data transmission devices individually.
Before you start any machine which is controlled via data transmission, be sure to complete the configuration of all data transmission devices.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

2.1 Warning symbols

This is a general warning symbol. This symbol alerts you to potential personal injury hazards. Observe all safety notes that follow this symbol to avoid possible injury or death.

If this symbol is displayed in addition to a safety instruction of the type “Danger” or “Warning”, it means that there is a danger of electric shock and failure to observe the instructions will inevitably result in injury.

This symbol indicates the danger of hot surfaces on the device. In connection with safety instructions, non-observance of the instructions will inevitably result in injuries.

This symbol instructs you to disconnect all power sources before opening the device.

DANGER

DANGER draws attention to an immediately dangerous situation, which will **inevitably** result in a serious or fatal accident if not observed.

WARNING

WARNING indicates a potentially hazardous situation which, if not avoided, **could** result in death or serious injury.

CAUTION

CAUTION indicates a possible danger which, if not avoided, **may** result in minor injuries.

NOTICE

NOTICE provides information about procedures that do not involve the risk of injury.

2.2 Intended use

☐ Use the product only for the application cases described in the Hirschmann product information, including this manual.
☐ Operate the product only according to the technical specifications.
See “General technical data” on page 66.
☐ Connect to the product only components suitable for the requirements of the specific application case.

2.3 National and international safety regulations

☐ Verify that the electrical installation meets local or nationally applicable safety regulations.

2.4 Installation site requirements

Operate the device only at the specified ambient temperature (temperature of the ambient air at a distance of 5 cm (2 in) from the device) and at the specified relative humidity.

- When you are selecting the installation location, make sure you observe the climatic threshold values specified in the technical data.
- Use the device in an environment with a maximum pollution degree that complies with the specifications in the technical data.
See “General technical data” on page 66.
- If the device is not installed in a horizontal position, it must be installed in a control cabinet or other enclosure with fire protection properties. The enclosure can be made of metal or plastic with fire protection properties of at least V-1 according to IEC 60695-11-10. Bottom openings must **NOT** exceed 2 mm (0.078 in) in diameter.

2.5 Qualification requirements for personnel

☐ Only allow qualified personnel to work on the device.

Qualified personnel have the following characteristics:

- Qualified personnel are properly trained. Training as well as practical knowledge and experience make up their qualifications. This is the prerequisite for grounding and labeling circuits, devices, and systems in accordance with current standards in safety technology.
- Qualified personnel are aware of the dangers that exist in their work.
- Qualified personnel are familiar with appropriate measures against these hazards in order to reduce the risk for themselves and others.
- Qualified personnel receive training on a regular basis.

2.6 Device casing

Only technicians authorized by the manufacturer are permitted to open the casing.

- ☐ Never insert sharp objects (small screwdrivers, wires, etc.) into the inside of the device.
- ☐ Keep the ventilation slits free to ensure good air circulation.
- ☐ Make sure there is at least 5 cm (2 in) of space in front of the ventilation slits of the casing.
- ☐ Mount the device horizontally or vertically in the switch cabinet (figure 17) or on the wall (figure 15).
- ☐ Exclusively use Hirschmann mounting brackets.
- ☐ Exclusively use the provided screws when you reposition the attached mounting brackets or install additional mounting brackets. You obtain the additional brackets as accessories.
  See “Accessories” on page 83.

2.7 Strain relief

Note: If the strain relief is insufficient, there is a potential risk of torsion, contact problems and creeping interruptions.

- ☐ Relieve the connection points of cables and lines from mechanical stress.
- ☐ Design strain reliefs in such a way that they help prevent any mechanical damage to cables, wires or conductors caused by external influences or their own weight.
- ☐ To help prevent damage to device connections, connectors and cables, follow the instructions for proper installation in accordance with DIN VDE 0100-520:2013-06, sections 522.6, 522.7 and 522.13.

2.8 Shielded ground

The shielded ground wire of the twisted pairs cables is connected to the front panel as a conductor.
Beware of possible short circuits when connecting a cable section with conductive shield braiding.

2.9 Electrical connections

2.9.1 Grounding the device

Before supplying your device with power, **always** verify that the device is grounded.
The device is grounded via 1 grounding screw. Power supply variants characteristic value G and M are additionally grounded via the power supply connection.

2.9.2 Requirements for connecting electrical wires

Before connecting the electrical wires, **always** verify that the requirements listed are complied with.

The following requirements apply without restrictions:

- The electrical wires are voltage-free.
- The cables used are permitted for the temperature range of the application case.
- Only switch on the device when the casing is closed.
- Relevant for North America:
  Exclusively use +60/+75 °C (+140/+167 °F) or +75 °C (+167 °F) copper (Cu) wire.

2.9.3 Requirements for connecting the supply voltage

The supply voltage is connected to the device casing through protective elements exclusively.
The supply voltage is electrically isolated from the casing.

Before connecting the supply voltage, **always** verify that the requirements listed are complied with.
Prerequisites:
All of the following requirements are complied with:

- The supply voltage corresponds to the voltage specified on the type plate of the device.
- The power supply conforms to overvoltage category I or II.
- The power supply has an easily accessible disconnecting device (for example a switch or a plug). This disconnecting device is clearly identified. So in the case of an emergency, it is clear which disconnecting device belongs to which power supply cable.
- The cross-section of the ground conductor is the same size as or bigger than the cross-section of the power supply cables.
- The power supply cable is suitable for the voltage, the current and the physical load. Hirschmann recommends a conductor cross section of 0.5 mm² to 0.75 mm² (AWG20 up to AWG18).

2.9.4 Requirements for connecting the signal contact

Before connecting the signal contact, **always** verify that the requirements listed are complied with.

The following requirements apply without restrictions:

- The switched voltage complies with the requirements for a safety extra-low voltage (SELV) according to IEC 60950-1 or ES1 according to IEC/EN 62368-1.
- The connected voltage is limited by a current limitation device or a fuse. Observe the electrical threshold values for the signal contact.
  See “Technical data” on page 66.

2.10 LED or laser components

LED or LASER components according to IEC 60825-1 (2014):
CLASS 1 LASER PRODUCT
CLASS 1 LED PRODUCT

2.11 Recycling note

After usage, this device must be disposed of properly as electronic waste, in accordance with the current disposal regulations of your county, state, and country.

3 Approvals

3.1 CE marking

The labeled devices comply with the regulations contained in the following European directive(s):

- **2011/65/EU and 2015/863/EU (RoHS)**
  Directive of the European Parliament and of the Council on the restriction of the use of certain hazardous substances in electrical and electronic equipment.
- **2014/30/EU (EMC**)
  Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to electromagnetic compatibility.
- **2014/35/EU**
  Directive of the European Parliament and of the Council on the harmonisation of the laws of the Member States relating to the making available on the market of electrical equipment designed for use within certain voltage limits.

In accordance with the above-named EU directive(s), the EU conformity declaration will be at the disposal of the relevant authorities at the following address:

Hirschmann Automation and Control GmbH
Stuttgarter Str. 45-51
72654 Neckartenzlingen
Germany

You find the EU conformity declaration as PDF file for downloading on the Internet at: https://www.doc.hirschmann.com/certificates.html

The product can be used in the industrial sector.
- Interference immunity: EN 61000-6-2
- Emitted interference: EN 55032
- Safety: IEC/EN 62368-1

Warning! This is a class A device. This device can cause interference in living areas, and in this case the operator may be required to take appropriate measures.

Note: The assembly guidelines provided in these instructions must be strictly adhered to in order to observe the EMC threshold values.

3.2 UKCA marking

The labeled devices comply with the following UK regulations:

- **S.I. 2012 No. 3032**
  Restriction of the Use of Certain Hazardous Substances in Electrical and Electronical Equipment Regulations
- **S.I. 2016 No. 1101**
  Electrical Equipment (Safety) Regulations 2016
- **S.I. 2016 No. 1091**
  Electromagnetic Compatibility Regulations 2016

UK
CA

The UKCA conformity declaration will be available to the relevant authorities at the following address:

Belden UK Ltd.
1 The Technology Centre, Station Road
Framlingham, IP13 9EZ, United Kingdom

You find the UKCA conformity declaration as PDF file for downloading on the Internet at: https://www.doc.hirschmann.com/certificates.html

The product can be used in the industrial sector.
- Interference immunity: EN 61000-6-2
- Emitted interference: EN 55032
- Safety: IEC/EN 62368-1

Warning! This is a class A device. This device can cause interference in living areas, and in this case the operator may be required to take appropriate measures.

Note: The assembly guidelines provided in these instructions must be strictly adhered to in order to observe the EMC threshold values.

3.3 FCC note

Supplier's Declaration of Conformity
47 CFR § 2.1077 Compliance Information

GRS105/GRS106/GRS115/GRS116

U.S. Contact Information
Belden – St. Louis
1 N. Brentwood Blvd. 15th Floor
St. Louis, Missouri 63105, United States
Phone: 314.854.8000

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

3.4 Relevant for installations in 19" switch cabinets according to UL 60950-1/ UL 62368-1

- Higher ambient air temperature during operation: If installed in a closed switch cabinet or a multi-unit switch cabinet, the ambient air temperature inside the switch cabinet during operation can be higher than the ambient air temperature in the room. Install devices in environments that are compatible with the maximum ambient air temperature of the device.
- Reduced air flow: When you install the device in a switch cabinet, make sure that a sufficient air flow is guaranteed in order to safely operate your devices.
- Mechanical stress: Check for potential dangers resulting from unevenly distributed weight when you install the device in a switch cabinet.

- Electric circuit overloading: Observe the effects of electric circuit overloads on the overload current protection and the power supply cables when you connect devices to the power supply. Refer to the device parameters specified on the type plate of the device.
- Safe grounding: Make sure that devices installed in switch cabinets are grounded safely. When you install a device in a switch cabinet, also watch out for power supply connections other than the direct connections to the circuit branch (for example socket boards).

4 Key

The symbols used in this manual have the following meanings:

▶	Listing
☐	Work step
■	Subheading

5 Description

5.1 General device description

The GRS105/GRS106/GRS115/GRS116 family provides you with a range of device variants.
The device is designed for the special requirements of industrial automation. The device meets the relevant industry standards, provides very high operational reliability, even under extreme conditions, and also long-term reliability and flexibility.

The devices with software variant L2... allow you to set up switched industrial Ethernet networks that conform to the IEEE 802.3 standard.
The following installation options are available:

- Horizontal mounting in a 19" rack
- Horizontal mounting on a flat surface
- Vertical mounting on a flat surface

You have the option of choosing various media to connect to the end devices and other network components:

- Twisted pair cable
- Multimode F/O
- Singlemode F/O
- DAC cable

The ring redundancy concept allows the network to be reconfigured quickly after a failure.

There are convenient options for managing the device. Manage your devices via:

- Web browser
- SSH
- Network management software (for example Industrial HiVision)
  The Network Management Software Industrial HiVision provides you with options for smooth configuration and monitoring. You find further information on the Internet at the Hirschmann product pages:
  http://www.hirschmann.com/en/QR/INET-Industrial-HiVision
- USB-C interface (locally on the device)

The device provides you with a large range of functions, which the manuals for the operating software inform you about. You can download these manuals as PDF files from the Internet at: https://www.doc.hirschmann.com

The Hirschmann network components help you ensure continuous communication across all levels of the company.

5.2 Device name and product code

The device name corresponds to the product code. The product code is made up of characteristics with defined positions. The characteristic values stand for specific product properties.

Item	Characteristic	Characteristic value	Description	
1 ... 3	Product		GREYHOUND Switch	
4	Series	1	GREYHOUND Series	
5	Technology	0	Standard	
		1	MACsec	
6	Data rate	5	GRS105-...	6 × 1/2.5 GE (Port group I) + 8 × 1 GE (Port group II) + 16 × 1 GE (Port group III)
			GRS115-...	4 × 1 GE MACsec capable (Port group I) + 2 × 1/2.5 GE (Port group I) + 8 × 1 GE (Port group II) + 16 × 1 GE (Port group III)
		6	GRS106-...	6 × 1/2.5/10 GE (Port group I) + 8 × 1/2.5 GE (Port group II) + 16 × 1 GE (Port group III)
			GRS116-...	4 × 1/10 GE MACsec capable (Port group I) + 2 × 1/2.5/10 GE (Port group I) + 8 × 1/2.5 GE (Port group II) + 16 × 1 GE (Port group III)
7	(hyphen)	-		
8 ... 9	Port group I	6F	6 × SFP slot	
10 ... 11	Port group II	8F	8 × SFP slot	
		8T	8 × Twisted Pair port	
12 ... 14	Port group III	16T	16 × Twisted Pair port	
15	Operating temperature range	S	Standard	-10 °C ... +60 °C (+14 °F ... +140 °F)
		C	Standard with Conformal Coating	-10 °C ... +60 °C (+14 °F ... +140 °F)
16	Power supply unit 1	G	Rated voltage range 110 V AC ... 240 V AC	
		M	Rated voltage range 110 V DC ... 250 V DC	
		L	Rated voltage range 24 V DC ... 48 V DC	
17	Power supply unit 2	G	Rated voltage range 110 V AC ... 240 V AC	
		M	Rated voltage range 110 V DC ... 250 V DC	
		L	Rated voltage range 24 V DC ... 48 V DC	
		9	No second power supply unit	

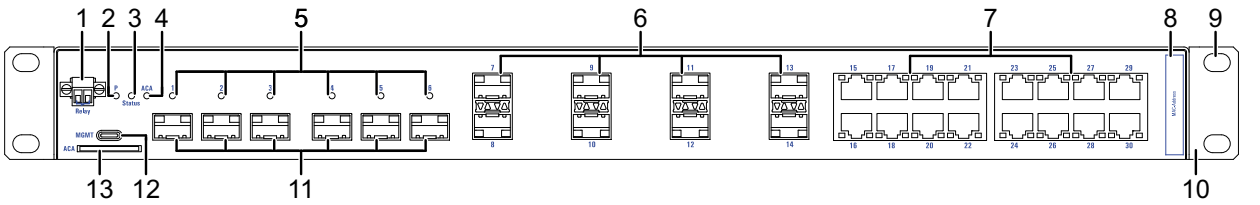
Table 1: Device name and product code: Product code GRS105/GRS106/GRS115/GRS116

Item	Characteristic	Characteristic value	Description
18 ... 19	Certificates and declarations	Z9	CE, FCC, EN 61131, IEC/EN 62368-1
		Y9	Characteristic value Z9 + cUL 62368-1
		T9	Characteristic value Z9 + EN 50121-4
		TY	Characteristic value T9 + cUL 62368-1
20 ... 21	Customer-specific version	HH	Hirschmann Standard
22	Hardware configuration	S	Standard
23	Software configuration	E	Entry (Hirschmann Standard)
24 ... 25	Software level	2S	HiOS Layer 2 Standard
		2A	HiOS Layer 2 Advanced
		3A	HiOS Layer 3 Advanced
26 ... 27	Software package	99	Reserved
		UR	Unicast Routing
		MR	Unicast + Multicast Routing
28 ... 32	Software version	XX.X	Current software version
		08.9.	Software version 08.9.
		09.0.	Software version 09.0.
		09.1.	Software version 09.1.
33 ... 34	Maintenance version	00	Maintenance version 00
		XX	Current maintenance version

Table 1: Device name and product code: Product code GRS105/GRS106/GRS115/GRS116

5.3 Device views

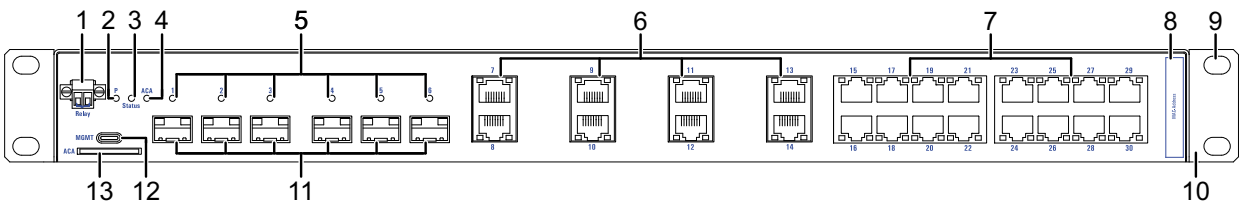
5.3.1 Front view device variant GRS105-6F8F16T...



1	Signal contact	2-pin terminal block	
2	Status LED Power (P)		
3	Status LED Device status (Status)		
4	Status LED AutoConfiguration Adapter (ACA)		
5	LED display elements (SFP slots Port group I)		
6	Port group II	8 ×	SFP slot for 1000 Mbit/s F/O connections
7	Port group III	16 ×	RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field		
9	Oblong hole		
10	Mounting bracket		
11	Port group I	6 ×	SFP slot for 1/2.5 Gbit/s F/O connections
12	Management interface (MGMT), USB Type-C socket		
13	SD card slot (ACA31)		

Table 2: Front view device variant GRS105-6F8F16T...

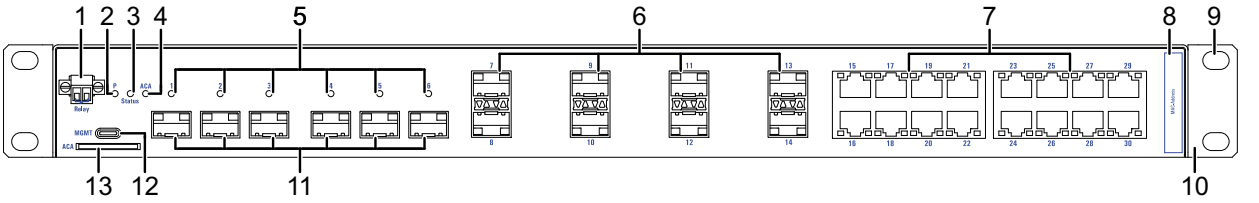
5.3.2 Front view device variant GRS105-6F8T16T...



1	Signal contact	2-pin terminal block	
2	Status LED Power (P)		
3	Status LED Device status (Status)		
4	Status LED AutoConfiguration Adapter (ACA)		
5	LED display elements (SFP slots Port group I)		
6	Port group II	8 ×	RJ45 socket for 100/1000 Mbit/s Twisted pair connections
7	Port group III	16 ×	RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field		
9	Oblong hole		
10	Mounting bracket		
11	Port group I	6 ×	SFP slot for 1/2.5 Gbit/s F/O connections
12	Management interface (MGMT), USB Type-C socket		
13	SD card slot (ACA31)		

Table 3: Front view device variant GRS105-6F8T16T...

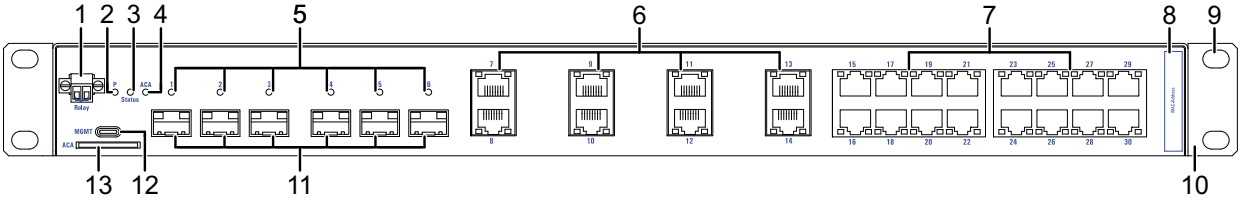
5.3.3 Front view device variant GRS106-6F8F16T...



1	Signal contact	2-pin terminal block	
2	Status LED Power (P)		
3	Status LED Device status (Status)		
4	Status LED AutoConfiguration Adapter (ACA)		
5	LED display elements (SFP slots Port group I)		
6	Port group II	8 ×	SFP slot for 1/2.5 Gbit/s F/O connections
7	Port group III	16 ×	RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field		
9	Oblong hole		
10	Mounting bracket		
11	Port group I	6 ×	SFP slot for 1/2.5/10 Gbit/s F/O connections
12	Management interface (MGMT), USB Type-C socket		
13	SD card slot (ACA31)		

Table 4: Front view device variant GRS106-6F8F16T...

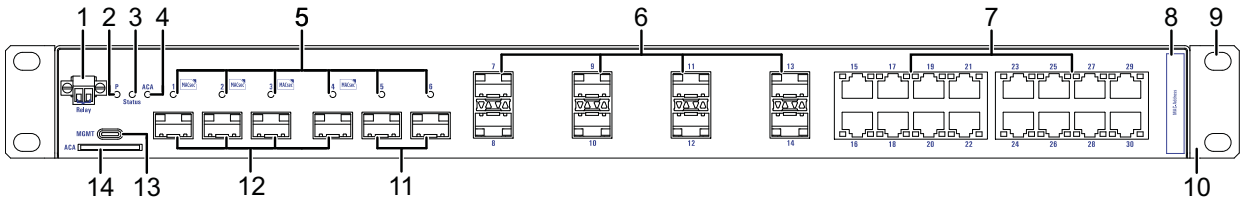
5.3.4 Front view device variant GRS106-6F8T16T...



1	Signal contact	2-pin terminal block	
2	Status LED Power (P)		
3	Status LED Device status (Status)		
4	Status LED AutoConfiguration Adapter (ACA)		
5	LED display elements (SFP slots Port group I)		
6	Port group II	8 ×	RJ45 socket for 100/1000/2500 Mbit/s Twisted pair connections
7	Port group III	16 ×	RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field		
9	Oblong hole		
10	Mounting bracket		
11	Port group I	6 ×	SFP slot for 1/2.5/10 Gbit/s F/O connections
12	Management interface (MGMT), USB Type-C socket		
13	SD card slot (ACA31)		

Table 5: Front view device variant GRS106-6F8T16T...

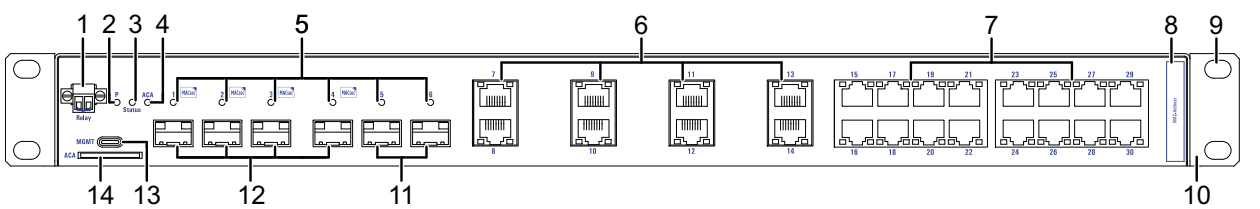
5.3.5 Front view device variant GRS115-6F8F16T...



1	Signal contact	2-pin terminal block
2	Status LED Power (P)	
3	Status LED Device status (Status)	
4	Status LED AutoConfiguration Adapter (ACA)	
5	LED display elements (SFP slots Port group I)	
6	Port group II	8 × SFP slot for 1000 Mbit/s F/O connections
7	Port group III	16 × RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field	
9	Oblong hole	
10	Mounting bracket	
11	Port group I: Port 5-6	2 × SFP slot for 1/2.5 Gbit/s F/O connections
12	Port group I: Port 1-4	4 × SFP slot for 1 Gbit/s F/O connections (MACsec capable)
13	Management interface (MGMT), USB Type-C socket	
14	SD card slot (ACA31)	

Table 6: Front view device variant GRS115-6F8F16T...

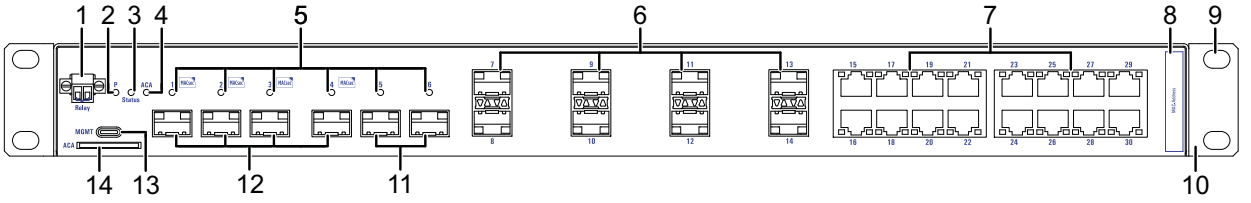
5.3.6 Front view device variant GRS115-6F8T16T...



1	Signal contact	2-pin terminal block
2	Status LED Power (P)	
3	Status LED Device status (Status)	
4	Status LED AutoConfiguration Adapter (ACA)	
5	LED display elements (SFP slots Port group I)	
6	Port group II	8 × RJ45 socket for 100/1000 Mbit/s Twisted pair connections
7	Port group III	16 × RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field	
9	Oblong hole	
10	Mounting bracket	
11	Port group I: Port 5-6	2 × SFP slot for 1/2.5 Gbit/s F/O connections
12	Port group I: Port 1-4	4 × SFP slot for 1 Gbit/s F/O connections (MACsec capable)
13	Management interface (MGMT), USB Type-C socket	
14	SD card slot (ACA31)	

Table 7: Front view device variant GRS115-6F8T16T...

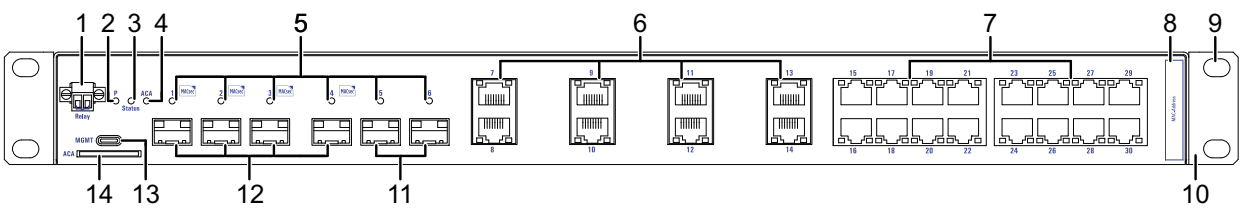
5.3.7 Front view device variant GRS116-6F8F16T...



1	Signal contact	2-pin terminal block	
2	Status LED Power (P)		
3	Status LED Device status (Status)		
4	Status LED AutoConfiguration Adapter (ACA)		
5	LED display elements (SFP slots Port group I)		
6	Port group II	8 ×	SFP slot for 1/2.5 Gbit/s F/O connections
7	Port group III	16 ×	RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field		
9	Oblong hole		
10	Mounting bracket		
11	Port group I: Port 5-6	2 ×	SFP slot for 1/2.5/10 Gbit/s F/O connections
12	Port group I: Port 1-4	4 ×	SFP slot for 1/10 Gbit/s F/O connections (MACsec capable)
13	Management interface (MGMT), USB Type-C socket		
14	SD card slot (ACA31)		

Table 8: Front view device variant GRS116-6F8F16T...

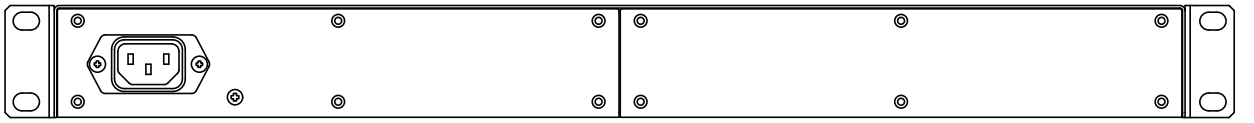
5.3.8 Front view device variant GRS116-6F8T16T...



1	Signal contact	2-pin terminal block	
2	Status LED Power (P)		
3	Status LED Device status (Status)		
4	Status LED AutoConfiguration Adapter (ACA)		
5	LED display elements (SFP slots Port group I)		
6	Port group II	8 ×	RJ45 socket for 100/1000/2500 Mbit/s Twisted pair connections
7	Port group III	16 ×	RJ45 socket for 10/100/1000 Mbit/s Twisted Pair connections
8	MAC address field		
9	Oblong hole		
10	Mounting bracket		
11	Port group I: Port 5-6	2 ×	SFP slot for 1/2.5/10 Gbit/s F/O connections
12	Port group I: Port 1-4	4 ×	SFP slot for 1/10 Gbit/s F/O connections (MACsec capable)
13	Management interface (MGMT), USB Type-C socket		
14	SD card slot (ACA31)		

Table 9: Front view device variant GRS116-6F8T16T...

5.3.9 Rear view



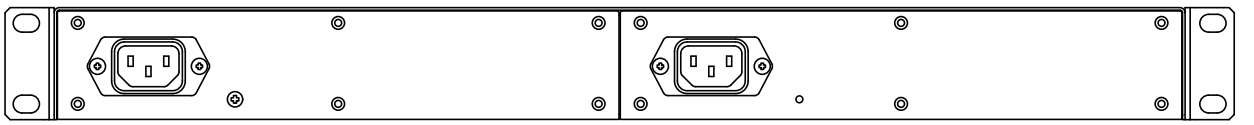
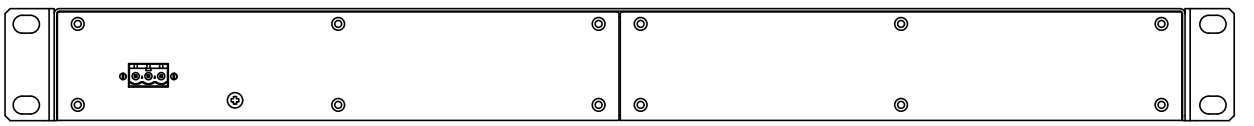


Table 10: Rear view: Power supply characteristic value G9 (non-redundant, 1 connector) and GG (redundant, 2 connectors)



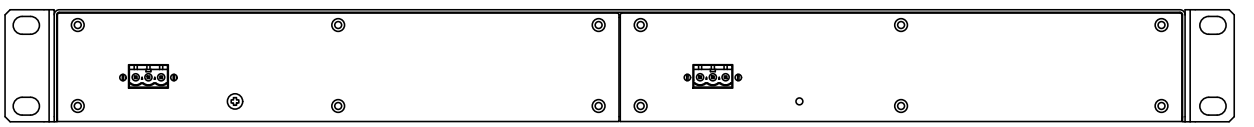
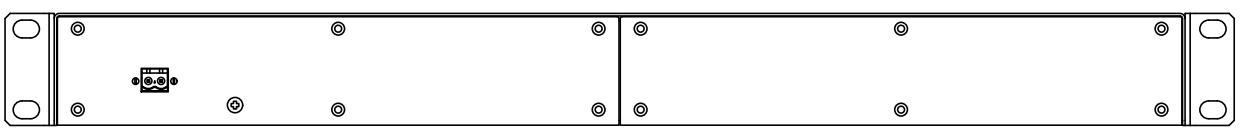


Table 11: Rear view: Power supply characteristic value M9 (non-redundant, 1 connector) and MM (redundant, 2 connectors)



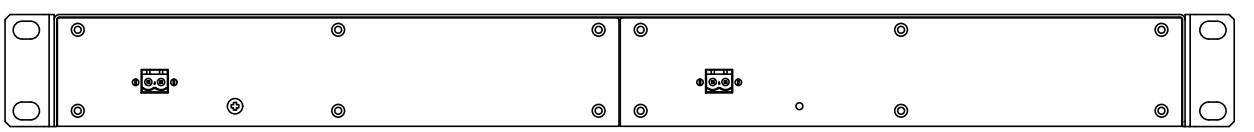
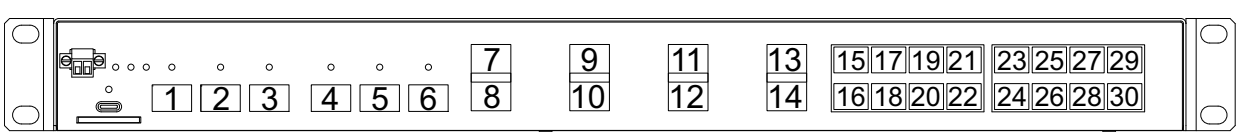


Table 12: Rear view: Power supply characteristic value L9 (non-redundant, 1 connector) and LL (redundant, 2 connectors)

5.3.10 Port assignment



Port	Description
1 ... 6	Port group I

Table 13: Port assignment: Front view; numbering sequence identical for all device variants

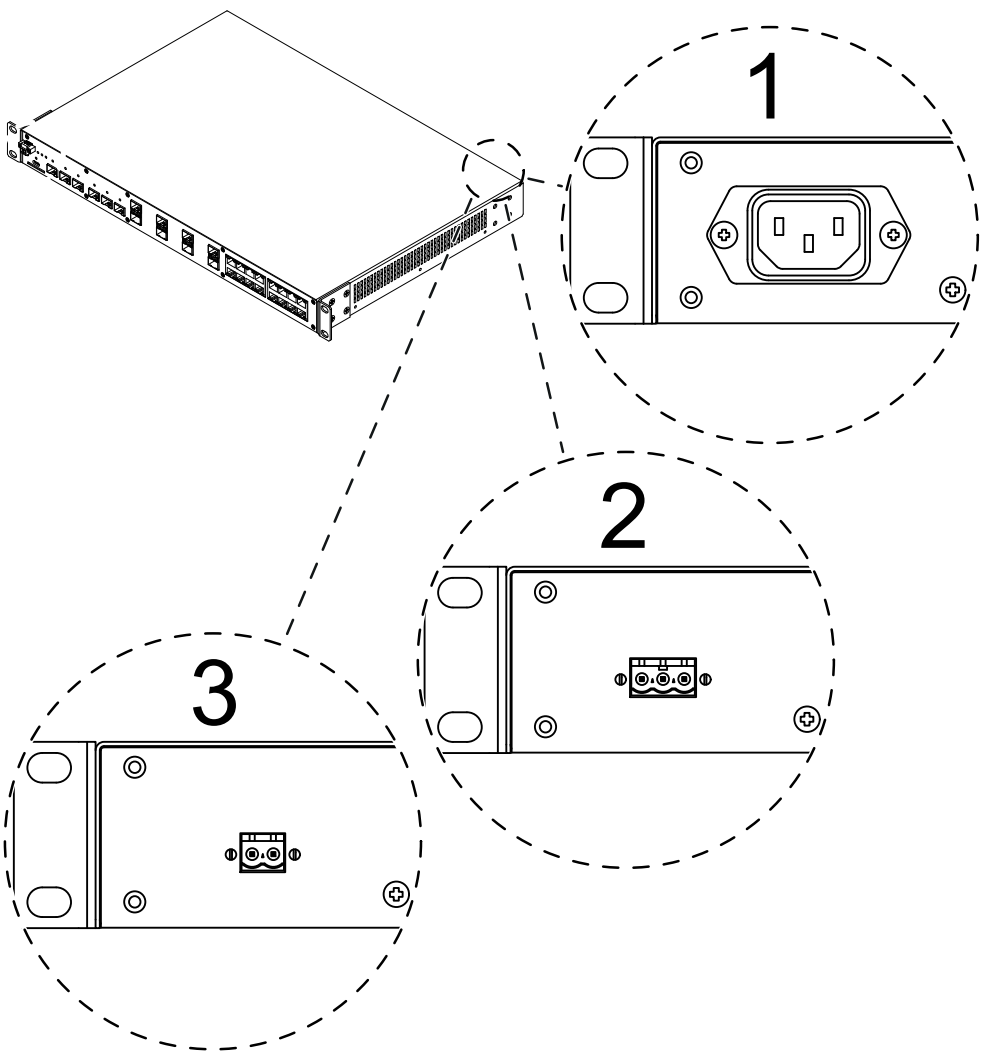
7 ... 14	Port group II
15 ... 30	Port group III

Table 13: Port assignment: Front view; numbering sequence identical for all device variants

5.4 Power supply

Note: Note the safety instructions in “Requirements for connecting electrical wires” on page 12.

The following supply voltage characteristic value combinations are available: G9, GG, GM, GL, M9, MM, ML, L9, LL.



1	Supply voltage variant characteristic value G: Built-in C14 plug according to IEC 60320-1
2	Supply voltage variant characteristic value M: 3-pin terminal block
3	Supply voltage variant characteristic value L: 2-pin terminal block

Table 14: Supply voltage: Supply voltage options, location on the device

The supply voltage can be connected redundantly. Both inputs are electrically isolated from each other. When 2 power supply units are used, the load is distributed. Without redundant supply, the power supply unit supplies the device on its own.
The supply voltage is electrically isolated from the casing. The power supply units are protected against polarity reversal.

With a non-redundant supply of the supply voltage, the device reports the loss of a supply voltage. You can prevent this message by applying the supply voltage via both inputs, or by changing the configuration in the device management.

5.4.1 Supply voltage characteristic value G

You have the option of supplying the supply voltage redundantly, with load distribution.
The supply voltage is electrically isolated from the casing.

Note: The supply voltage is connected to the device casing through protective elements exclusively.

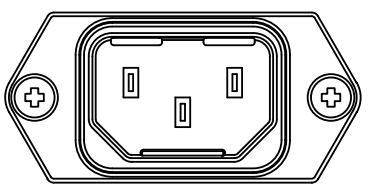


Figure 1: Supply voltage with characteristic value G: non-heating-appliance cable connection with built-in C14 plug (according to IEC 60320-1)

Type of the voltages that can be connected	Specification of the supply voltage	Pin assignment	
AC voltage	Rated voltage range 110 V AC ... 240 V AC, 50 Hz ... 60 Hz	L N ⏚	Outer conductor Neutral conductor Protective conductor

Table 15: Type and specification of the supply voltage, connections

5.4.2 Supply voltage with characteristic value M

You will find information on the characteristic values here:
“Device name and product code” on page 22
You have the option of supplying the supply voltage redundantly, with load distribution.
Both supply voltage inputs are electrically isolated.

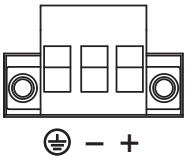


Figure 2: Supply voltage with characteristic value M: 3-pin terminal block with screw lock

Type of the voltages that can be connected	Specification of the supply voltage	Pin assignment	
DC voltage	Rated voltage range 110 V DC ... 250 V DC Voltage range including maximum tolerances 88 V DC ... 288 V DC	+/L -/N ⏚	Plus terminal of the supply voltage Minus terminal of the supply voltage Protective conductor

Table 16: Supply voltage with characteristic value M: type and specification of the supply voltage, pin assignment on the device

5.4.3 Supply voltage characteristic value L

Note: Exclusively supply your device with SELV/ES1 voltage.

You will find information on the characteristic values here:
“Device name and product code” on page 22
You have the option of supplying the supply voltage redundantly, with load distribution.
Both supply voltage inputs are electrically isolated.

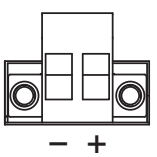


Figure 3: Supply voltage with characteristic value L: 2-pin terminal block with screw lock

Type of the voltages that can be connected	Specification of the supply voltage	Pin assignment	
DC voltage	Rated voltage range 24 V DC ... 48 V DC Voltage range including maximum tolerances 19.2 V DC ... 60 V DC	+ -	Plus terminal of the supply voltage Minus terminal of the supply voltage

Table 17: Supply voltage with characteristic value L: type and specification of the supply voltage, pin assignment on the device

5.5 Ethernet ports

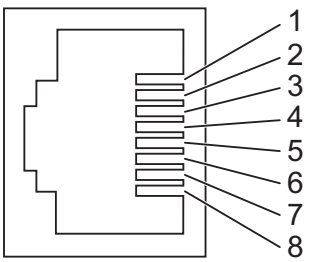
You can connect end devices and other segments to the device ports using twisted pair cables, DAC cables or optical fibers (F/O).

5.5.1 10/100/1000 Mbit/s twisted pair port

This port is an RJ45 socket.
The 10/100/1000 Mbit/s twisted pair port allows you to connect network components according to the IEEE 802.3 10BASE-T/100BASE-TX/ 1000BASE-T standard.
This port supports:

- Autonegotiation
- Autopolarity
- Autocrossing (if autonegotiation is activated)
- 1000 Mbit/s full duplex
- 100 Mbit/s half-duplex mode, 100 Mbit/s full duplex mode
- 10 Mbit/s half-duplex mode, 10 Mbit/s full duplex mode

Delivery state: Autonegotiation activated.
The port casing is electrically connected to the front panel.
The pin assignment corresponds to MDI-X.



Pin	Function
1	BI_DB+
2	BI_DB−
3	BI_DA+
4	BI_DD+
5	BI_DD−
6	BI_DA−
7	BI_DC+
8	BI_DC−

Table 18: Pin assignments of the 10/100/1000 Mbit/s twisted pair port in 1000 Mbit/s mode, RJ45 socket, MDI-X mode

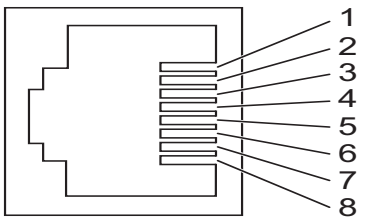
5.5.2 100/1000/2500 Mbit/s twisted pair port

This port is an RJ45 socket.
The 100/1000/2500 Mbit/s twisted pair port allows you to connect network components according to the IEEE 802.3 100BASE-TX/1000BASE-T and IEEE 802.3bz 2.5GBASE-T standards.
This port supports:

- Autonegotiation
- Autopolarity
- Autocrossing (if autonegotiation is activated)
- 100/1000/2500 Mbit/s full duplex

Delivery state: Autonegotiation activated
The port casing is electrically connected to the front panel.

The pin assignment corresponds to MDI-X.



Pin	Function
1	BI_DB+
2	BI_DB-
3	BI_DA+
4	BI_DD+
5	BI_DD-
6	BI_DA-
7	BI_DC+
8	BI_DC-

Table 19: Pin assignments of 100/1000/2500 Mbit/s twisted pair port, RJ45 socket, MDI-X mode

5.5.3 1/2.5 Gbit/s F/O port

This port is an SFP slot.
The port allows you to connect network components according to the IEEE 802.3 1000BASE-SX/1000BASE-LX standard.
The port allows you to connect network components according to IEEE 802.3bz 2.5GBASE-T.
This port supports:
Full duplex mode
Delivery state:
1 Gbit/s full duplex when using a Gigabit Ethernet SFP transceiver or 2.5 Gbit/s full duplex when using a 2.5 Gigabit Ethernet SFP transceiver.

Note: The F/O ports of the current device versions are not capable of Fast Ethernet.

5.5.4 1/2.5/10 Gbit/s F/O port

This port is an SFP slot.
The port allows you to connect network components according to the standards IEEE 802.3 1000BASE-SX/1000BASE-LX or IEEE 802.3 (Clause 49) 10GBASE-R.
This port supports:
Full duplex mode
Delivery state:
1 Gbit/s full duplex when using a Gigabit Ethernet SFP transceiver, or 2.5 Gbit/s full duplex when using a 2.5 Gigabit Ethernet SFP or 10 Gbit/s full duplex when using a Gigabit Ethernet SFP+ transceiver.

Note: The F/O ports of the current device versions are not capable of Fast Ethernet.

5.6 Management interfaces

5.6.1 Signal contact

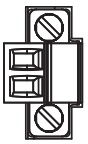


Figure 4: Signal contact: 2-pin terminal block with screw locking casing

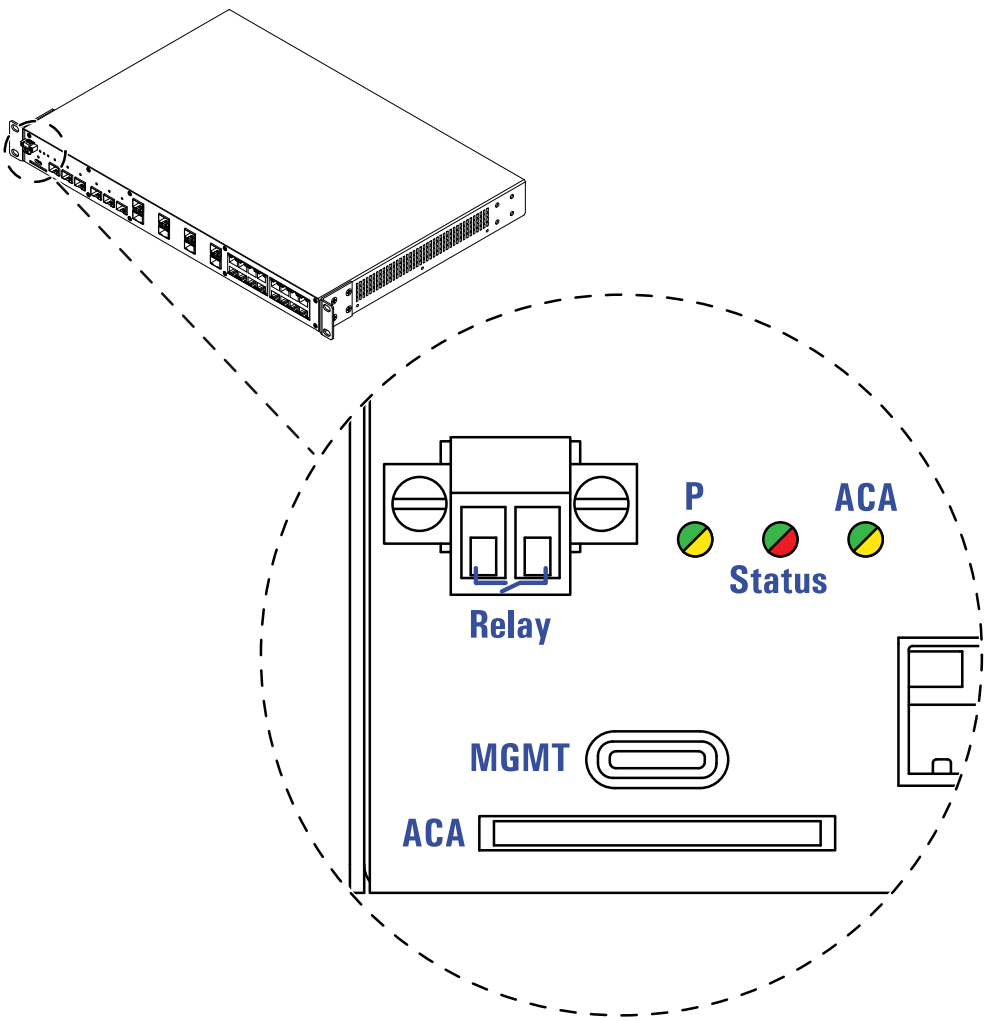


Figure 5: Signal contact: 2-pin terminal block with screw lock, location on the device (front of the device)

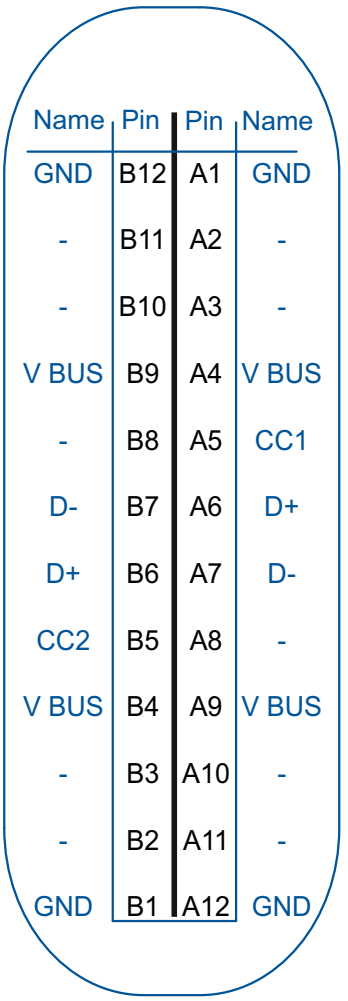
The signal contact is a potential-free relay contact. When the device is not connected to a power supply, the signal contact is open.
The signal contact allows you to control external devices or monitor device functions.
In the configuration, you specify how the device uses the signal contact.

You will find detailed information on possible applications and the configuration of the signal contact in the software user documentation. You will find the software user documentation as PDF files on the Internet at https://www.doc.hirschmann.com

5.6.2 Management interface MGMT (external management)

Note: The MGMT interface exclusively supports CLI access via terminal emulation.

Note: When connecting an external USB-C to USB-C cable to the Management interface MGMT, the rotational symmetry feature of the connectors is not supported. For this reason, connections may not be operational. To fix this issue, remove the plugged-in USB-C connector from the device and plug it back in rotated by 180 °.



Name	Pin	Pin	Name
GND	B12	A1	GND
-	B11	A2	-
-	B10	A3	-
V BUS	B9	A4	V BUS
-	B8	A5	CC1
D-	B7	A6	D+
D+	B6	A7	D-
CC2	B5	A8	-
V BUS	B4	A9	V BUS
-	B3	A10	-
-	B2	A11	-
GND	B1	A12	GND

Figure 6: Management interface MGMT: Pin assignment of the USB-C interface.

This interface is a USB Type-C socket with shielding. This interface is electrically isolated from the power supply input.

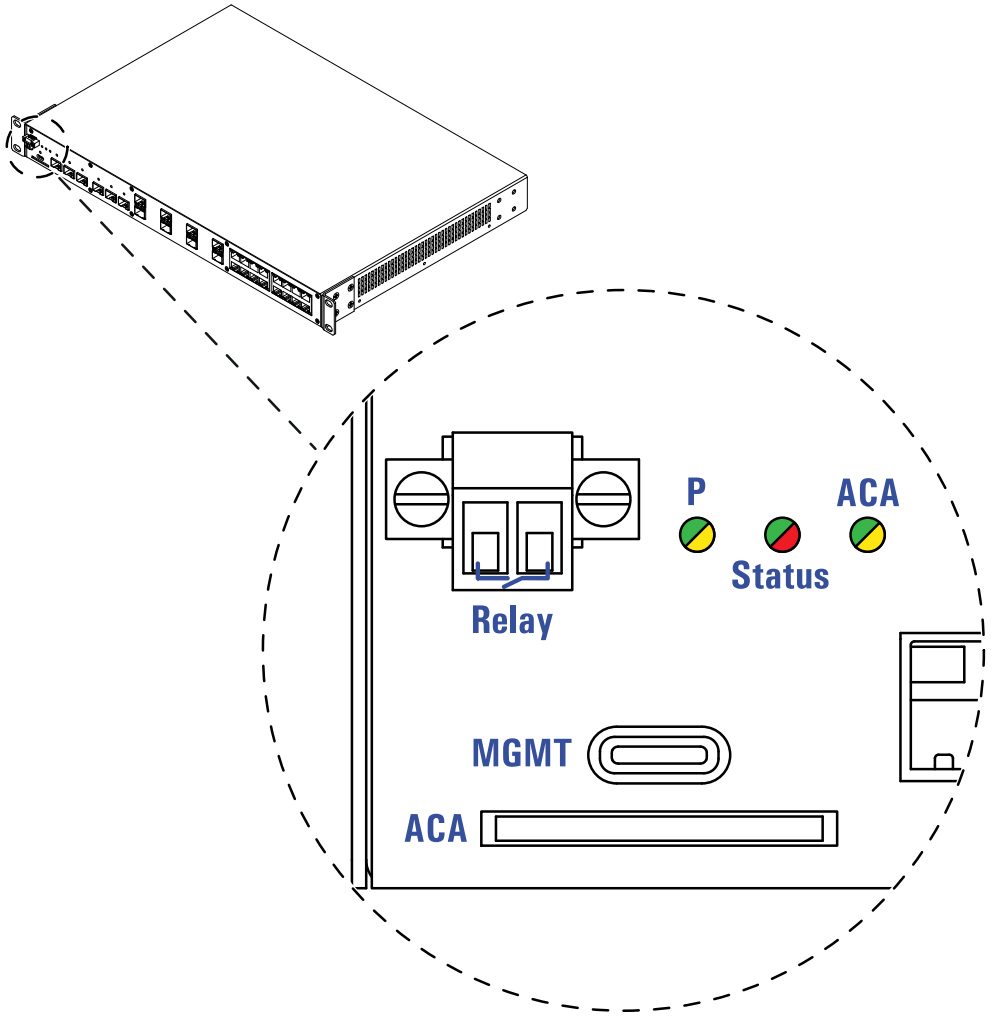


Figure 7: Management interface MGMT: Location on the device (front side of the device)

The interface allows you to connect your device temporarily via terminal emulation or network to an external device using an adapter cable. The adapter cable is available as an accessory (see on page 83 “Accessories”). The interface allows you to configure, manage and check your device.

The interface has the following properties:

- Supports USB Device mode
- Supports USB 2.0 (data rate max. 480 Mbit/s)

VT100 terminal settings	
Speed	115200 Baud
Data	8 bit
Stopbit	1 bit
Handshake	off
Parity	none

Configuration, management and checking via adapter cable

You have the option to configure, manage and check your device via the interface using an adapter cable. You find detailed information in the software user documentation. You find the software user documentation as PDF files on the Internet at https://www.doc.hirschmann.com
The adapter cable is available as an accessory (see on page 83 “Accessories”).

Note: The interface is electrically isolated from the power supply input. Exclusively connect adapter cables temporarily. Adapter cables may exclusively be used to configure, manage and check your device.

5.6.3 SD card interface

Prerequisite:
Only use Hirschmann SD cards.

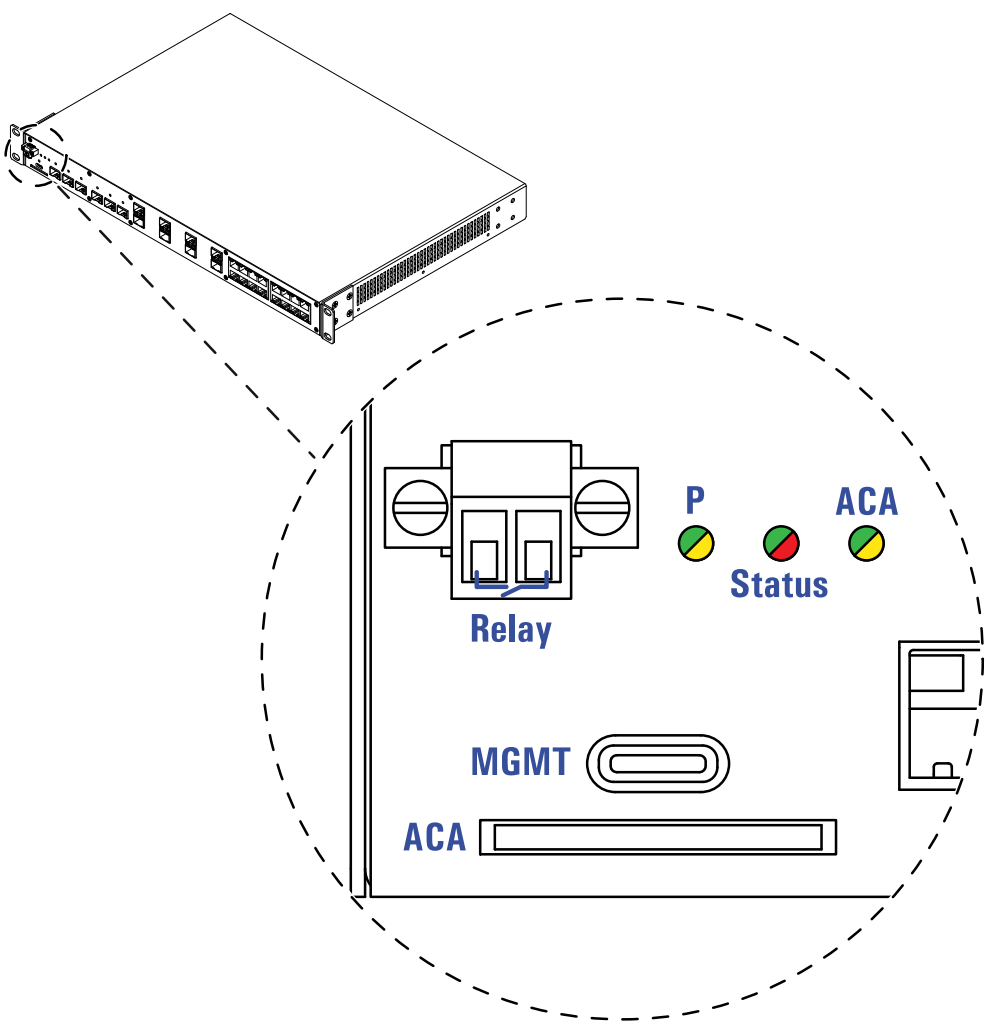


Figure 8: SD card interface: Location on the device (front side of the device)

The SD card interface allows you to connect the AutoConfiguration Adapter storage medium. This is used for saving/loading the configuration data and diagnostic information, and for loading the software.
On the front side of the device there are LEDs that inform you about the status of the interface.

5.7 Display elements

After the supply voltage is set up, the Software starts and initializes the device. Afterwards, the device performs a self-test. During this process, various LEDs light up.

5.7.1 Device status

These LEDs provide information about conditions which affect the operation of the whole device.

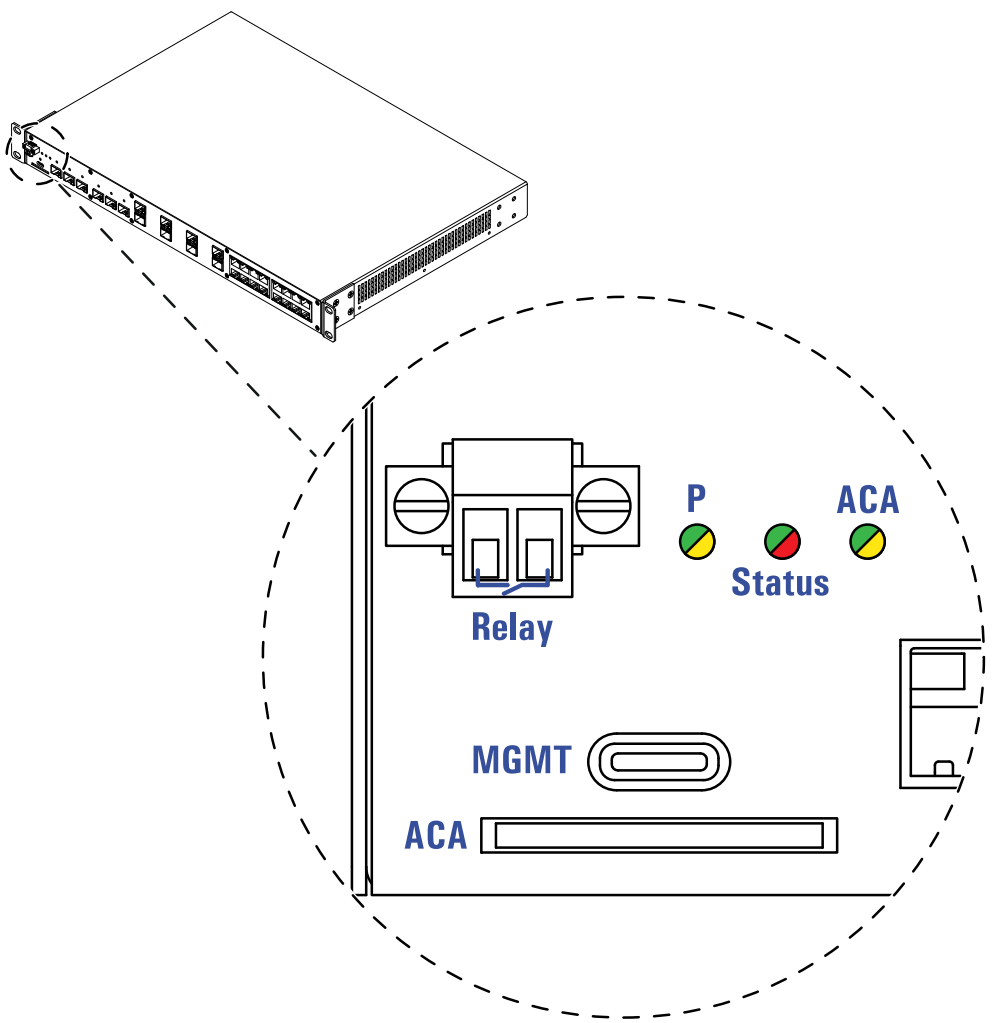


Figure 9: Device status: Location of the display elements on the device (front side of the device)

These LEDs provide information about conditions which affect the operation of the whole device.

LED	Display	Color	Activity	Meaning
P Power	Supply voltage	-	none	Supply voltage is too low
		yellow	lights up	Device variants with redundant power supply: Supply voltage 1 **or** 2 is on
			flashes 4 × a period	Software update is running. Maintain the power supply.
		green	lights up	Device variants with redundant power supply: Supply voltage 1 **and** 2 is on
				Device variants with single power supply: Supply voltage 1 is on
Status	Device status	-	none	Device is starting and/or is not ready for operation.
		green	lights up	Device is ready for operation Characteristics can be configured
		red	lights up	Device is ready for operation Device has detected at least one error in the monitoring results
			flashes 1 × a period	The boot parameters used when the device has been started differ from the boot parameters saved. Start the device again.
			flashes 4 × a period	Device has detected a multiple IP address
		red/ green	flashing alternately	Device is in recovery mode.
ACA	AutoConfiguration Adapter	-	none	ACA storage medium not connected
		green	lights up	ACA storage medium connected
			flashes 3 × a period	Device writes to/reads from the storage medium
		yellow	lights up	ACA storage medium inoperative

5.7.2 Port status

These LEDs display port-related information.

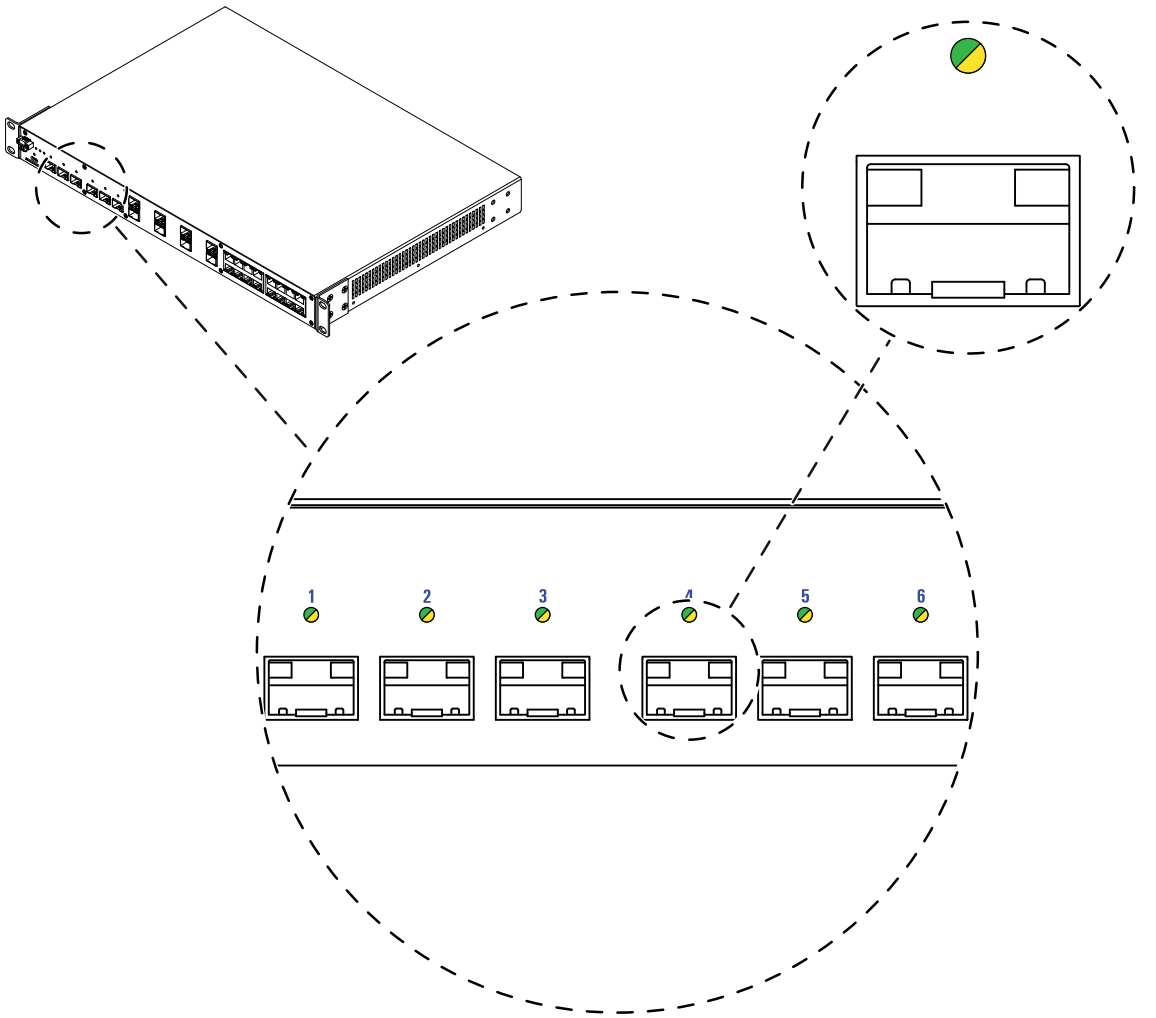


Figure 10: Port status: Location of the display elements of Port group I on the device (front side of the device)

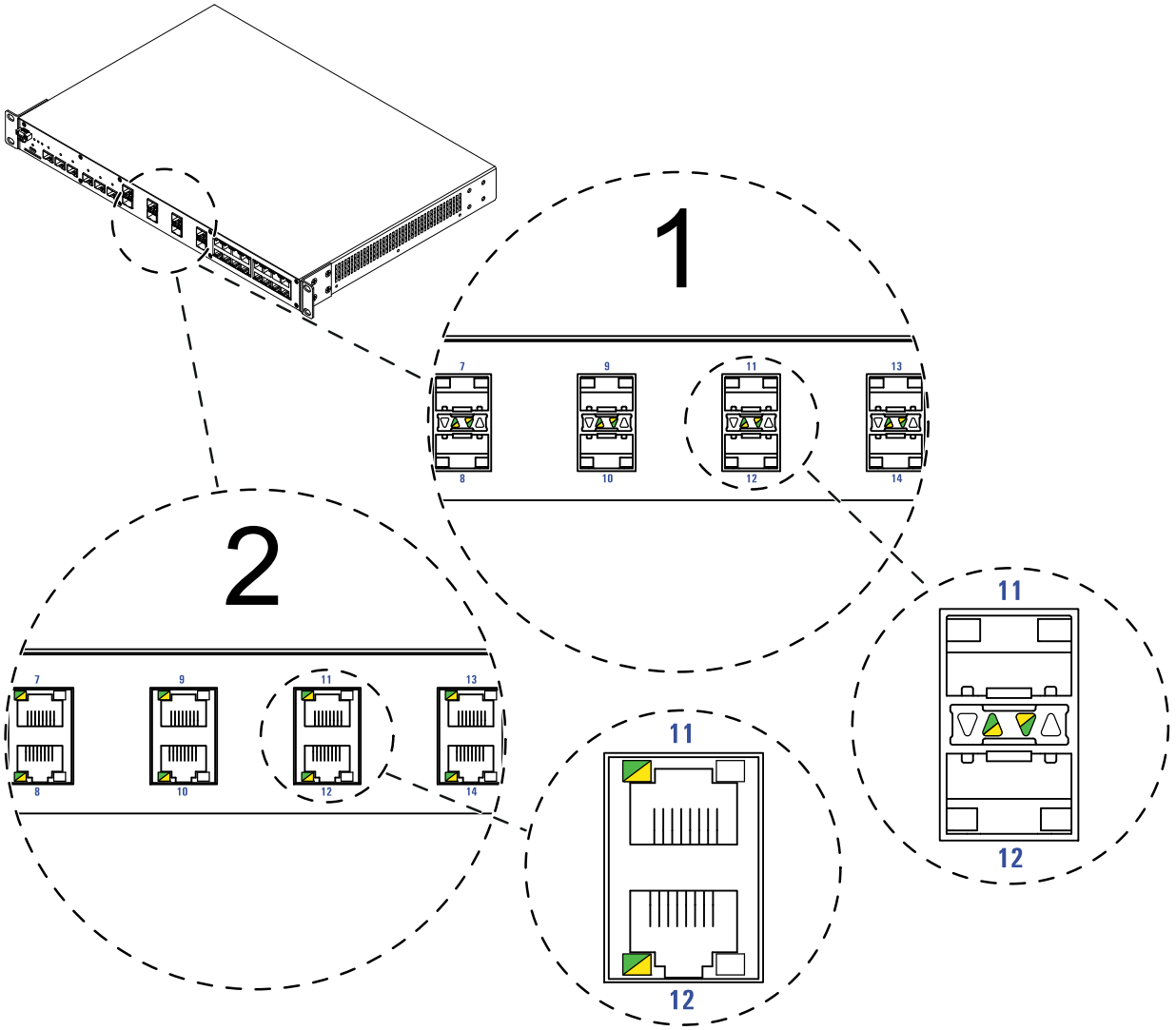


Figure 11: Port status: Location of the display elements of Port group II on the device (front side of the device)

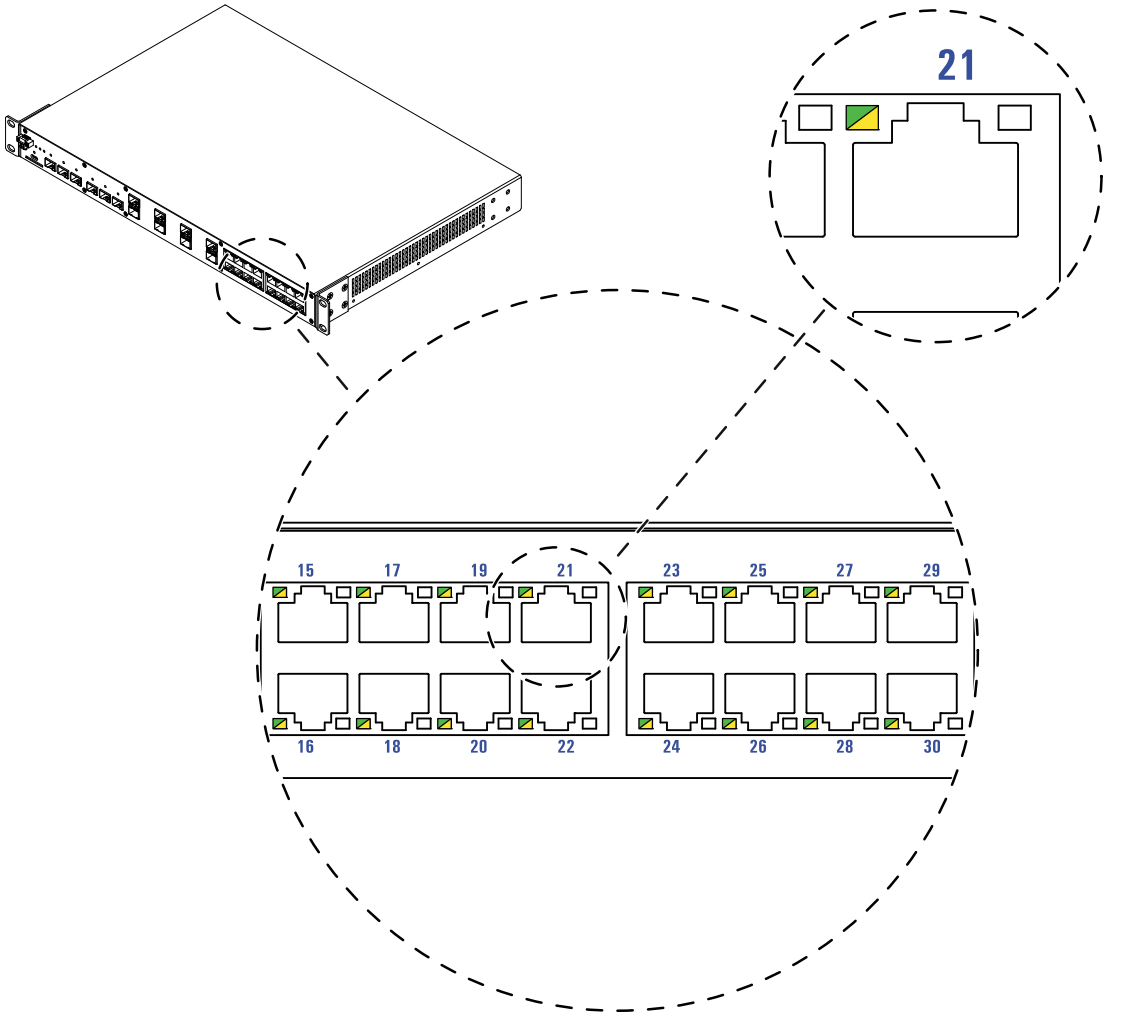


Figure 12: Port status: Location of the display elements of Port group III on the device (front side of the device)

Display	Color	Activity	Meaning
Link status	–	none	Device detects an invalid or missing link
	green	lights up	Device detects a valid link
		flashes 1 × a period	Port is switched to stand-by
	yellow	lights up	Device detects an unsupported SFP or a data rate mismatch
		flashing	Device is transmitting and/or receiving data

6 Installation

The device was developed for practical application in a harsh industrial environment.
On delivery, the device is ready for operation.

To install the device, perform the following work steps:

- Checking the package contents
- Installing the SD card (optional)
- Installing an SFP transceiver (optional)
- Installing the device
- Grounding the device
- Connecting the terminal blocks
- Connecting data cables
- Filling out the inscription label

Note: Note the safety instructions in “Requirements for connecting electrical wires” on page 12.

6.1 Checking the package contents

☐ Check whether the package includes all items named in the section “Scope of delivery” on page 81.
☐ Check the individual parts for transport damage.

6.2 Installing the SD card (optional)

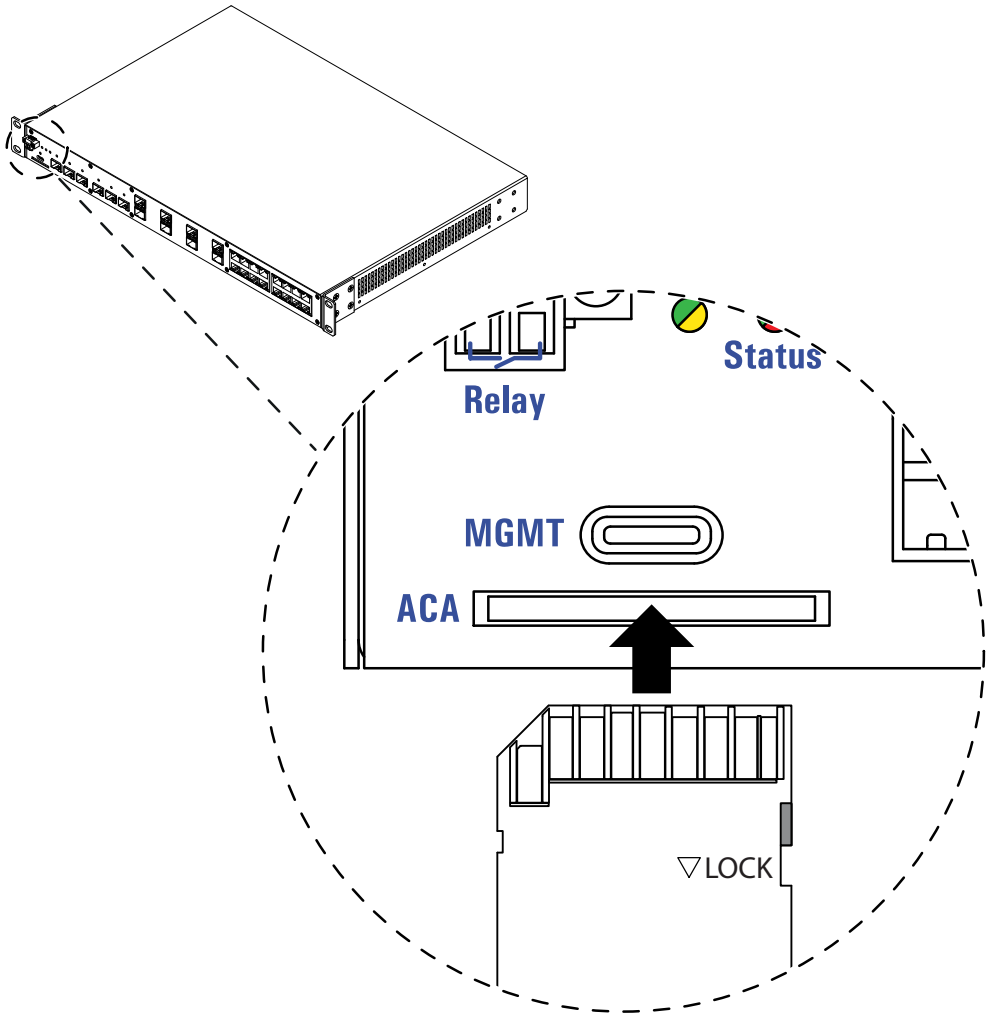


Figure 13: SD card interface: Location on the device (front side of the device)

Perform the following work steps:

☐ Deactivate the write protection on the SD card by pushing the write-protect lock towards the contacts of the card.

☐ Push the SD card into the slot with the beveled corner on the front left side.

6.3 Installing an SFP transceiver (optional)

Prerequisites:
Exclusively use Hirschmann SFP transceivers.
See “Accessories” on page 83.

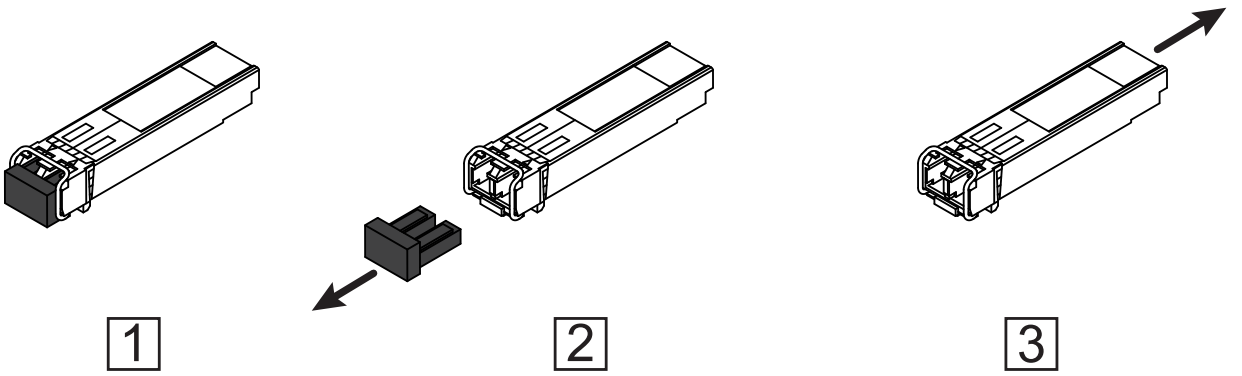


Figure 14: Installing SFP transceivers: Installation sequence

Perform the following work steps:
- ☐ Take the SFP transceiver out of the transport packaging (1).
- ☐ Remove the protection cap from the SFP transceiver (2).
- ☐ Push the SFP transceiver with the lock closed into the slot until it latches in (3).

6.4 Installing the device

⚠ WARNING

ELECTRIC SHOCK

Never insert pointed objects (narrow screwdrivers, wires, etc.) into the device or into the connection terminals for electric conductors.
Do not touch the connection terminals.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ WARNING

ELECTRIC SHOCK

Exclusively install this device in a switch cabinet or in a restricted access location according to IEC/EN 62368-1, to which maintenance staff have exclusive access.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

⚠ CAUTION

OVERHEATING OF THE DEVICE

Verify that all ventilation slots are clear when installing the device. Avoid touching the device while it is operating.

Failure to follow these instructions can result in minor injury or equipment damage.

6.4.1 Selecting the installation location

Select the assembly location according to the safety guidelines (see on page 8 “General safety instructions”).
The device can be installed on a flat surface, vertically on a flat surface, or in a 19" standard switch cabinet.
When selecting the installation location, also make sure the following requirements are met:

- The installation location should be close to a power outlet.
- Adhere to the climatic threshold values listed in the technical data.
- Keep the ventilation slits free to ensure good air circulation.
- The installation location can be accessed for maintenance and repair work.
- The LED display elements are clearly visible.
- Twisted pair cables are at a sufficient distance from potential sources of electrical interference, such as power supply cables.
- The device has a separate power source with a ground connection. The power supply can be interrupted by means of a separate isolator or power switch. We recommend using overvoltage protection for all devices.

Note: Decreasing the minimum clearance reduces the specified maximum operating temperature.

See table 20 on page 47.

Mounting	Minimum clearance around the device casing	Temperature derating
Mounting in a switch cabinet (horizontal)	5 cm (2 in)	0 °C (0 °F)
	0 cm (0 in)[a]	5 °C (9 °F)
Mounting on a flat surface (horizontal)	5 cm (2 in)	0 °C (0 °F)
Mounting on a vertical flat surface (ventilation slits at the top and bottom)	5 cm (2 in)	0 °C (0 °F)

Table 20: Derating for different mounting positions

a. Only for distances to passive components.

6.4.2 Mounting on a flat surface

Install the device in line with the criteria listed in “Installing the device” on page 45.

Perform the following work steps:

☐ Remove the screws on the pre-installed mounting brackets.
☐ Move the 2 pre-installed mounting brackets on the front side into the position shown in figure 15.

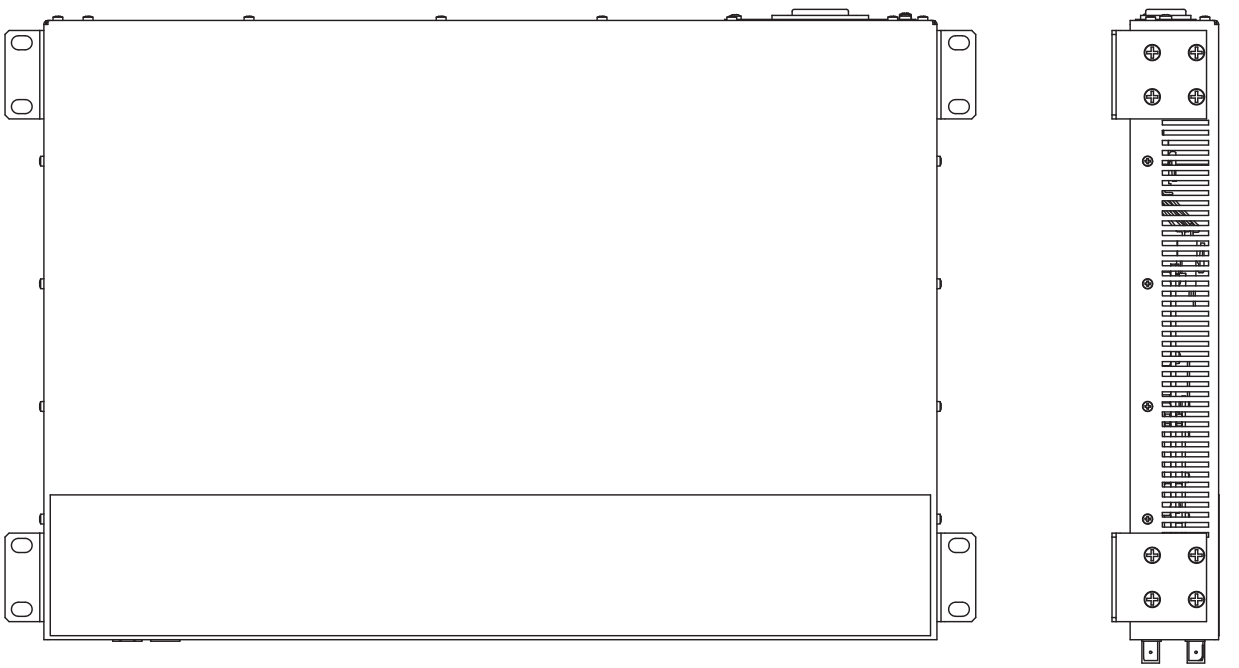


Figure 15: Mounting on a flat surface

☐ Use the screws to secure the mounting brackets on the device.
☐ Attach 2 additional mounting brackets to the back of the device. (see figure 15)
You obtain the additional brackets as accessories.
See “Accessories” on page 83.
☐ Fasten the device by screwing the brackets to the flat surface.
Completely screw the device to the flat surface using screws through each mounting hole. Exclusively use screws suitable for the installation and application case to ensure flawless operation of the device.

Note: Optionally, the device can be rotated by 90° to optimize ventilation: Mount the device on a vertical flat surface with the ventilation slits at the top and bottom of the device. See figure 16.

Note: The device may be used as a desktop device.

6.4.3 Mounting on a vertical flat surface

WARNING

FIRE HAZARD

Install the device in a fire enclosure according to IEC/EN 62368-1 if you install the device vertically.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Install the device in line with the criteria listed in “Installing the device” on page 45.

Perform the following work steps:

☐ Remove the screws on the pre-installed mounting brackets.

☐ Move the 2 pre-installed mounting brackets on the front side into the position shown in figure 15.

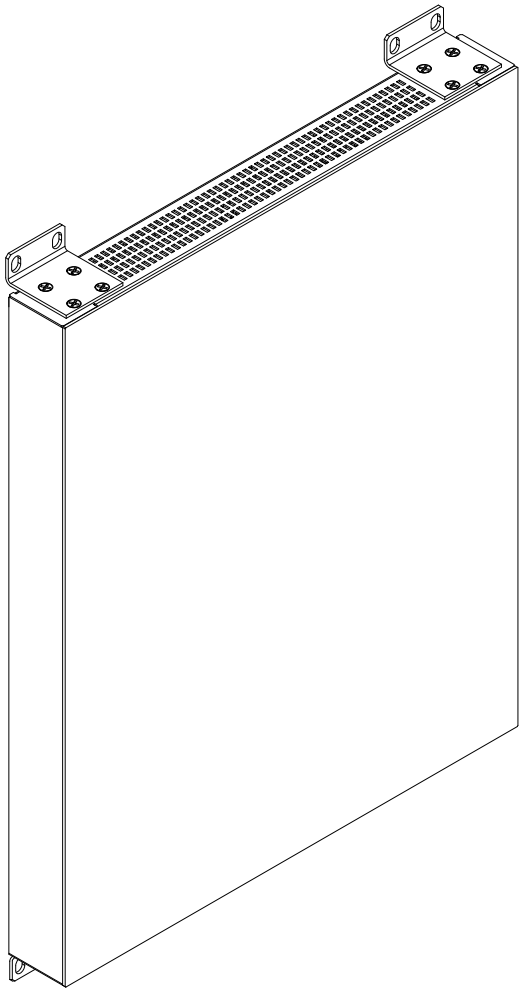


Figure 16: Mounting vertically on a flat surface: Optional mounting on a vertical flat surface.

☐ Use the screws to secure the mounting brackets on the device.
☐ Attach 2 additional mounting brackets to the back of the device.
(see figure 15)
You obtain the additional brackets as accessories.
See “Accessories” on page 83.
☐ Fasten the device by screwing the brackets to the flat surface.
Completely screw the device to the flat surface using screws through each mounting hole. Exclusively use screws suitable for the installation and application case to ensure flawless operation of the device.

6.4.4 Mounting in a switch cabinet

⚠ CAUTION

OVERHEATING OF THE DEVICE

When installing the device, make sure any ventilation slots remain free. Maintain a clearance of at least 5 cm (2 in).

Failure to follow these instructions can result in injury or equipment damage.

Prerequisites:

- Install the device in the 19" switch cabinet using sliding or mounting rails. This provides a more stable position of your device in environments subject to vibration.
  For more information on sliding/mounting rails and how to install them, please contact your switch cabinet manufacturer.
- The devices are designed to be mounted in a 19" switch cabinet.
  In the delivery state, there are 2 pre-mounted mounting brackets on the sides of the device.
- Ensure adequate ventilation. If necessary, install an additional fan in the switch cabinet to prevent the device from overheating.
- Measure the depth of the 19" cabinet so that all the lines to be connected can be fed in easily.

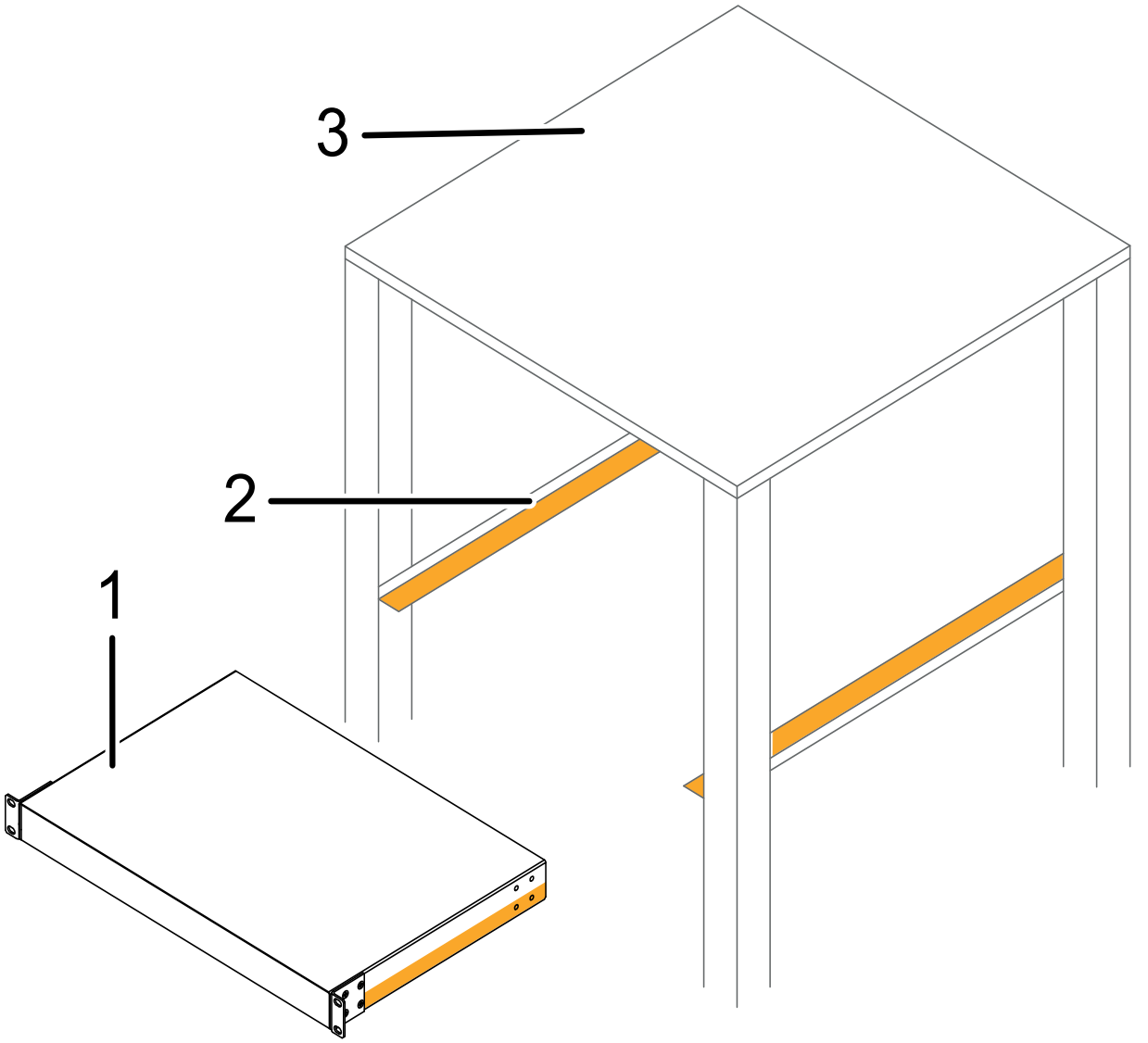


Figure 17: Assembly in a switch cabinet with sliding/mounting rails
1 - device
2 - sliding/mounting rail
3 - 19" switch cabinet

Perform the following work steps:

☐ Assemble the sliding or mounting rails in the 19" switch cabinet as specified by the manufacturer.
☐ Position the device on the rails in the switch cabinet.
☐ Fasten the device in the switch cabinet by screwing it in with the mounting brackets.

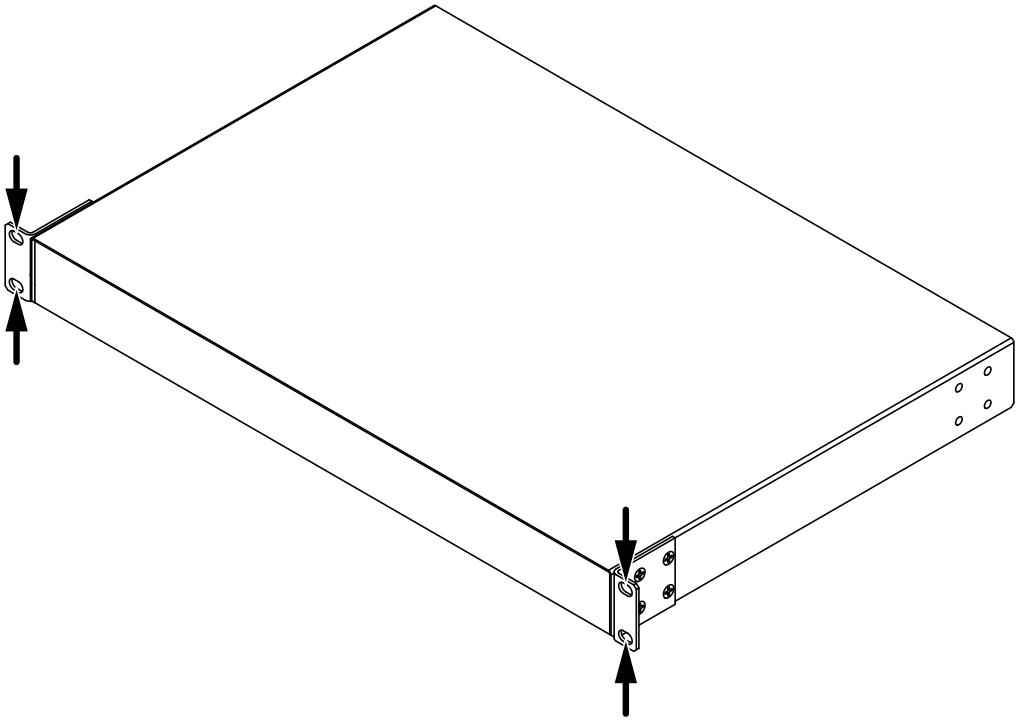


Figure 18: Mounting in a switch cabinet: Mounting brackets with oblong holes

Note: When operating the device in an environment with continuous vibration loads, it is necessary to additionally fasten the device to the switch cabinet using 2 mounting brackets on the front or rear side of the device. You obtain the additional brackets as accessories.
See “Accessories” on page 83.

6.5 Grounding the device

⚠ WARNING

ELECTRIC SHOCK

Ground the device on the power supply unit with a grounding screw.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

The power supply variants with characteristic value M9, MM, ML, G9, GG, and GL have a connection for protective grounding.

The power supply variants with characteristic value L9 and LL have a connection for functional grounding.

☐ Ground the device via a ground screw on the ground connection on the left side.
You find the prescribed tightening torque in chapter:
“General technical data” on page 66

Note: The power supply variants with characteristic value G or M are grounded via the power supply connection and additionally via a ground screw.

6.6 Connecting the terminal blocks

WARNING

ELECTRIC SHOCK

Connect only a supply voltage that corresponds to the type plate of your device.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

WARNING

ELECTRIC SHOCK

Never insert pointed objects (narrow screwdrivers, wires, etc.) into the device or into the connection terminals for electric conductors.
Do not touch the connection terminals.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

Note: The supply voltage is connected to the device casing through protective elements exclusively.

6.6.1 Supply voltage with characteristic value M

You will find information on the characteristic values here:
“Device name and product code” on page 22
You have the option of supplying the supply voltage redundantly, with load distribution.
Both supply voltage inputs are electrically isolated.

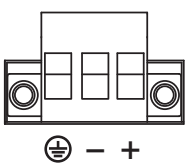


Figure 19: Supply voltage with characteristic value M: 3-pin terminal block with screw lock

Type of the voltages that can be connected	Specification of the supply voltage	Pin assignment	
DC voltage	Rated voltage range 110 V DC ... 250 V DC Voltage range including maximum tolerances 88 V DC ... 288 V DC	+ - ⏚	Plus terminal of the supply voltage Minus terminal of the supply voltage Protective conductor

Table 21: Supply voltage with characteristic value M: type and specification of the supply voltage, pin assignment on the device

For **every** supply voltage to be connected, perform the following work steps:

☐ Remove the terminal block from the device.

☐ Connect the wires according to the pin assignment on the device with the clamps.

☐ Fasten the wires in the terminal block by tightening the terminal screws. You find the prescribed tightening torque in chapter: “General technical data” on page 66

6.6.2 Supply voltage characteristic value L

Note: Exclusively supply your device with SELV/ES1 voltage.

You will find information on the characteristic values here:
“Device name and product code” on page 22
You have the option of supplying the supply voltage redundantly, with load distribution.
Both supply voltage inputs are electrically isolated.

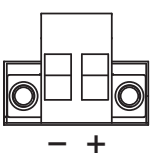


Figure 20: Supply voltage with characteristic value L: 2-pin terminal block with screw lock

Type of the voltages that can be connected	Specification of the supply voltage	Pin assignment	
DC voltage	Rated voltage range 24 V DC ... 48 V DC Voltage range including maximum tolerances 19.2 V DC ... 60 V DC	+ -	Plus terminal of the supply voltage Minus terminal of the supply voltage

Table 22: Supply voltage with characteristic value L: type and specification of the supply voltage, pin assignment on the device

For **every** supply voltage to be connected, perform the following work steps:

☐ Remove the terminal block from the device.

☐ Connect the wires according to the pin assignment on the device with the clamps.

☐ Fasten the wires in the terminal block by tightening the terminal screws. You find the prescribed tightening torque in chapter:
“General technical data” on page 66

6.6.3 Signal contact

☐ Connect the signal contact lines with the terminal block connections.

☐ Fasten the wires in the terminal block by tightening the terminal screws. You find the prescribed tightening torque in chapter:
“General technical data” on page 66

6.7 Connecting data cables

Note the following general recommendations for data cable connections in environments with high electrical interference levels:

☐ Keep the length of the data cables as short as possible.

☐ Use optical data cables for the data transmission between the buildings.

☐ When using copper cables, provide a sufficient separation between the power supply cables and the data cables. Ideally, install the cables in separate cable channels.

☐ Verify that power supply cables and data cables do not run parallel over longer distances. To reduce inductive coupling, verify that the power supply cables and data cables cross at a 90 ° angle.

☐ Use shielded data cables for gigabit transmission via copper cables, for example SF/UTP cables according to ISO/IEC 11801. To meet EN 50121-4 and marine application requirements, use shielded data cables at all transmission rates.

☐ Connect the data cables according to your requirements.
See “Ethernet ports” on page 32.

Note: Verify that you connect only optical ports with the same optical transmission properties with each other.

6.8 Filling out the inscription label

The information field for the MAC address on the front of the device helps you to identify your device.

7 Operating the device

⚠ WARNING
ELECTRIC SHOCK Connect only a supply voltage that corresponds to the type plate of your device. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Note: Note the safety instructions in “Requirements for connecting electrical wires” on page 12.

Perform the following work steps:

☐ Plug the non-heating-appliance cables into the device and a socket with an appropriate power source (supply voltage characteristic value G) and/or screw the terminal blocks onto the device (supply voltage characteristic value M or L).
You find the prescribed tightening torque in chapter:
“General technical data” on page 66

☐ Enable the supply voltage.

8 Making basic settings

Note: 2 or more devices configured with the same IP address can cause unpredictable operation of your network.
Install and maintain a process that assigns a unique IP address to every device in the network.

The IP parameters must be entered when the device is installed for the first time. The device provides the following options for configuring the IP addresses:

- Configuration via DHCP (state on delivery)
- Configuration via DHCP (Option 82)
- Configuration via BOOTP
- Input via the USB-C interface
- AutoConfiguration Adapter ACA31
- Input via the HiView or Industrial HiVision application. You find further information about the applications HiView or Industrial HiVision on the Internet at the Hirschmann product pages:
  HiView
  http://www.hirschmann.com/en/QR/INET-HiView
  Industrial HiVision
  http://www.hirschmann.com/en/QR/INET-Industrial-HiVision

Further information on the basic settings of the device can be found in the “Basic Configuration” user manual.

8.1 Default settings

IP address: The device looks for the IP address using DHCP

- Password for management:
  Login: user; password: public (read only)
  Login: admin; password: private (read and write)
- USB-C data rate: 115200 Baud
- Ring redundancy: disabled
- Ethernet ports: link status is not evaluated (signal contact)
- Optical 1000 Mbit/s ports: 1000 Mbit/s full duplex
  All other ports: autonegotiation
- Redundancy manager disabled
- Rapid Spanning Tree enabled
- Stand-by coupling: disabled
  Port 3 = control port, Port 4 = coupling port for redundant ring coupling

8.2 First login (Password change)

To help prevent undesired access to the device, it is imperative that you change the default password during initial setup.

Perform the following steps:

☐ Open the Graphical User Interface, the Command Line Interface, or HiView the first time you log on to the device.

☐ Log on to the device with the default password “private”. The device prompts you to type in a new password.

☐ Type in your new password.
To help increase security, choose a password that contains at least 8 characters which includes upper-case characters, lower-case characters, numerical digits, and special characters.

☐ When you log on to the device with the Command Line Interface, then the device prompts you to confirm your new password.

☐ Log on to the device again with your new password.

Note: If you lost your password, then use the System Monitor to reset the password.

For further information see:
https://hirschmann-support.belden.com/en/kb/required-password-change-new-procedure-for-first-time-login

9 Monitoring the ambient conditions

9.1 Monitoring the ambient air temperature

Operate the device below the specified maximum ambient air temperature exclusively.
See “General technical data” on page 66.

The ambient air temperature is the temperature of the air at a distance of 5 cm (2 in) from the device. It depends on the installation conditions of the device, for example the distance from other devices or other objects, and the output of neighboring devices.

The temperature displayed in the CLI (Command Line Interface) and the GUI (Graphical User Interface) is the internal temperature of the device. It is higher than the ambient air temperature. The maximum internal temperature of the device named in the technical data is a guideline that indicates to you that the maximum ambient air temperature has possibly been exceeded. Exclusively operate the device within the specified ambient air temperature range.

9.2 Monitoring the ambient humidity

Exclusively operate the device within the specified ambient humidity range.
See “General technical data” on page 66.

The humidity in the device is measured by an internal humidity sensor. The measurements of the sensor may vary depending on the installation conditions of the device, for example the distance from other devices or other objects, and the thermal output of neighboring devices.

The measured humidity is displayed in the CLI and the GUI of the device. The measured humidity is a guideline that indicates to you whether the rated humidity thresholds were reached or possibly have been exceeded.

For more information refer to the software user manuals. You can download these manuals as PDF files from the Internet on the Hirschmann product pages (https://www.doc.hirschmann.com).

10 Maintenance and service

- ☐ When designing this device, Hirschmann largely avoided using high-wear parts. The parts subject to wear and tear are dimensioned to last longer than the lifetime of the product when it is operated normally. Operate this device according to the specifications.
  See “Technical data” on page 66.
- ☐ Relays are subject to natural wear. This wear depends on the frequency of the switching operations. Check the resistance of the closed relay contacts and the switching function depending on the frequency of the switching operations.
- ☐ Hirschmann is continually working on improving and developing their software. Check regularly whether there is an updated version of the software that provides you with additional benefits. You find information and software downloads on the Hirschmann product pages on the Internet (https://www.hirschmann.com).
- ☐ Internal fuses are triggered only in the case of a detected error in the device. In case of damage or malfunction of the device, turn off the supply voltage and return the device to the plant for inspection.
- ☐ Depending on the pollution degree in the operating environment, check at regular intervals that the ventilation slots in the device are not obstructed.

Note: You find information on settling complaints on the Internet at http://www.beldensolutions.com/en/Service/Repairs/index.phtml.

11 Disassembly

Perform the following work steps:

- ☐ Removing an SFP transceiver (optional)
- ☐ Removing the SD card (optional)
- ☐ Removing the device

11.1 Removing an SFP transceiver (optional)

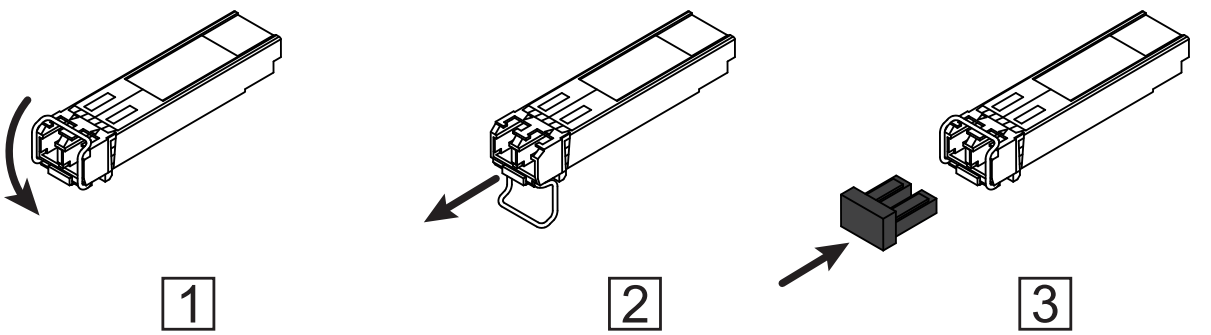


Figure 21: De-installing SFP transceivers: De-installation sequence

Perform the following work steps:

- ☐ Open the locking mechanism of the SFP transceiver (1).
- ☐ Pull the SFP transceiver out of the slot via the open locking mechanism (2).
- ☐ Close the SFP transceiver with the protection cap (3).

11.2 Removing the SD card (optional)

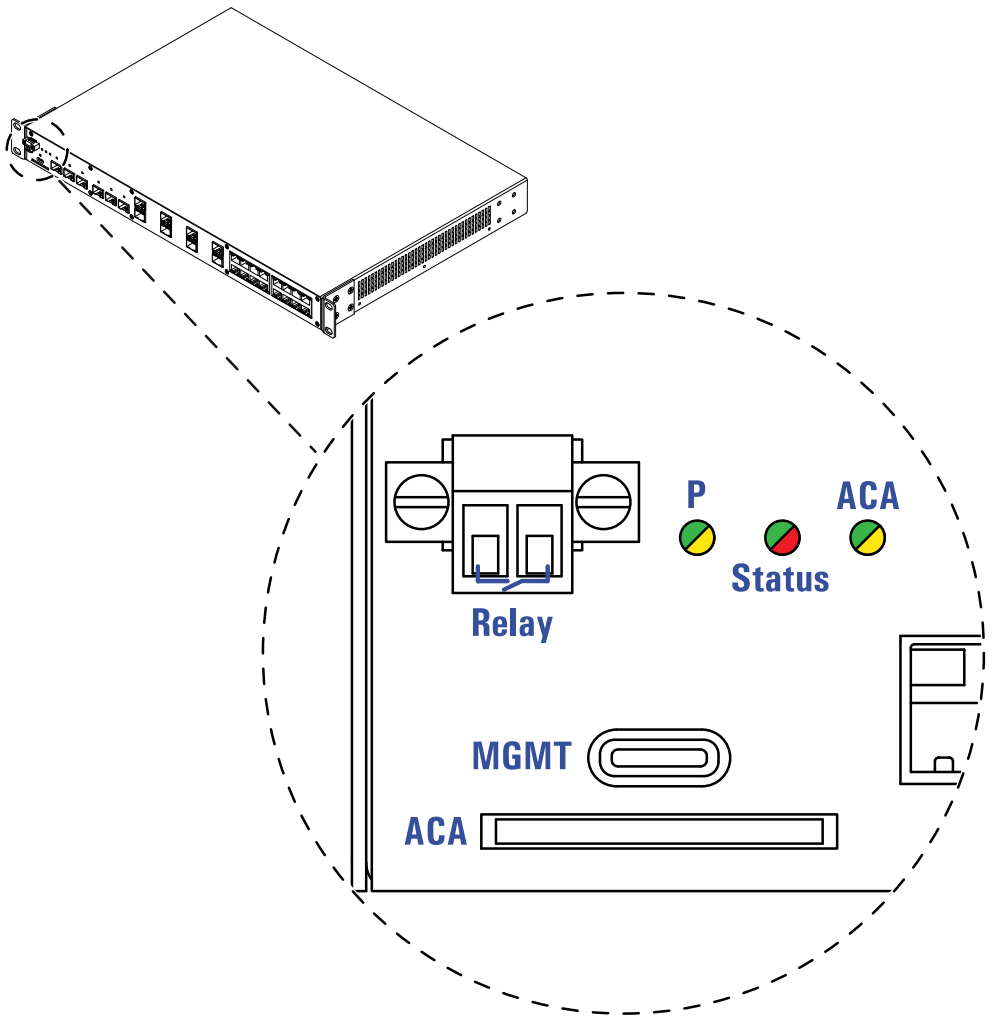


Figure 22: SD card interface: Location on the device (front side of the device)

Perform the following work steps:

☐ Pull the SD card out of the SD card slot.

11.3 Removing the device

⚠ WARNING
ELECTRIC SHOCK Disconnect the grounding only after disconnecting all other cables. **Failure to follow these instructions can result in death, serious injury, or equipment damage.**

Perform the following work steps:

☐ Disconnect the data cables.
☐ Disable the supply voltage.
☐ Disconnect the supply voltage.
☐ Remove terminal blocks and power supply cables from the device.
☐ Disconnect the grounding.

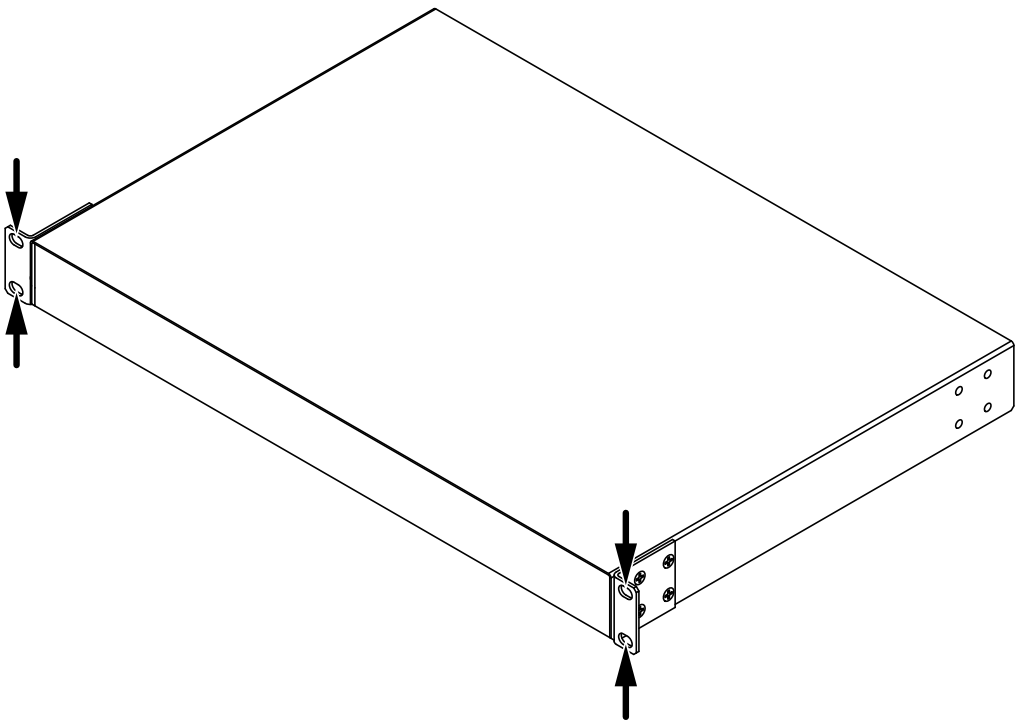


Figure 23: Removing the device: Mounting brackets with oblong holes

☐ To detach the device from a switch cabinet or a plain surface, remove the screws from the mounting brackets on the device.

12 Technical data

12.1 General technical data

Dimensions	See “Dimension drawings” on page 70.	
Weight	GRS105/GRS106 with1 Power supply unit	4.7 kg (10.36 lb)
	GRS115/GRS116 with1 Power supply unit	
	GRS105/GRS106 with2 Power supply units	5.1 kg (11.24 lb)
	GRS115/GRS116 with2 Power supply units	
Pollution degree		2
Protection classes	Laser protection	Class 1 in compliance with IEC 60825-1
	Degree of protection	IP30
Ground connection	Screw type	M3
	Tightening torque	0.34 Nm (3 lb-in)
	min. conductor diameter	0.75 mm² (AWG18)

12.2 Temperature ranges

Applies to all device variants:
Note the following deratings:

- Mounting: See “Installing the device” on page 45.
- SFP transceiver:See “Derating due to SFP transceiver” on page 78.
- See “Climatic conditions during operation” on page 68.

Product name	Temperature range
GRS105-...	-10 °C ... +60 °C (+14 °F ... +140 °F)
GRS106-...	-10 °C ... +60 °C (+14 °F ... +140 °F)
GRS115-...	-10 °C ... +60 °C (+14 °F ... +140 °F)
GRS116-...	-10 °C ... +60 °C (+14 °F ... +140 °F)

Table 23: Temperature ranges of GRS device variants

12.3 Supply voltage

Power supply unit with supply voltage characteristic value G	Rated voltage	110 V AC ... 240 V AC, 50 Hz ... 60 Hz	
	Voltage range including maximum tolerances	88 V AC ... 276 V AC	
	Connection type	Built-in non-heating-appliance connection (built-in C14 plug according to IEC 60320-1)	
		min. conductor diameter	0.75 mm² (AWG18)
		max. conductor diameter	2.5 mm² (AWG12)
	Power loss buffer	110 V AC: >26 ms 230 V AC: >140 ms	
	Back-up fuse for each voltage input	Nominal rating: Characteristic:	20 A slow blow
	Overload current protection on the device	Non-replaceable fuse	
	Peak inrush current	<5 A	
Power supply unit with supply voltage characteristic value M	Rated voltage	110 V DC ... 250 V DC	
	Voltage range including maximum tolerances	88 V DC ... 288 V DC	
	Connection type	3-pin terminal block	
		Tightening torque	0.5 Nm (4.4 lb-in)
		min. conductor diameter	1 mm² (AWG16)
		max. conductor diameter	2.5 mm² (AWG12)
	Power loss buffer	110 V AC: >11 ms 250 V AC: >82 ms	
	Back-up fuse for each voltage input	Nominal rating: Characteristic:	20 A slow blow
	Overload current protection on the device	Non-replaceable fuse	
	Peak inrush current	<5 A	
Power supply unit with supply voltage characteristic value L	Rated voltage	24 V DC ... 48 V DC	
	Voltage range including maximum tolerances	19.2 V DC ... 60 V DC	
	Connection type	2-pin terminal block	
		Tightening torque	0.34 Nm (3 lb-in)
		min. conductor diameter	1 mm² (AWG16)
		max. conductor diameter	1.3 mm² (AWG16)
	Power loss buffer	20.4 V DC: >25 ms	
	Back-up fuse for each voltage input	Nominal rating: Characteristic:	6.3 A slow blow
	Overload current protection on the device	Non-replaceable fuse	
	Peak inrush current	<7 A	

Table 24: Supply voltage

12.4 Power consumption/power output

Name	Maximum power consumption	Maximum power output
GRS105-...	31 W	107 Btu (IT)/h
GRS106-...	32 W	110 Btu (IT)/h
GRS115-...	42 W	143 Btu (IT)/h
GRS116-...	43 W	147 Btu (IT)/h

Table 25: Power consumption/power output

12.5 Signal contact

Signal contact		
Nominal value	Switching current	max. 2 A, SELV/ES1
	Switching voltage	max. 30 V DC or max. 30 V AC, SELV/ES1
Connection type	2-pin terminal block	
	Tightening torque	0.34 Nm (3 lb-in)
	min. conductor diameter	0.08 mm² (AWG28)
	max. conductor diameter	2.5 mm² (AWG12)

Table 26: Signal contact

12.6 Climatic conditions during operation

Climatic conditions during operation		
Ambient air temperature[a]	Standard up to 2000 m ASL (6562 ft ASL)	-10 °C ... +60 °C (+14 °F ... +140 °F)
	2000 m ASL ... 3000 m ASL (6560 ft ASL ... 9842 ft ASL)	-10 °C ... +50 °C (+14 °F ... +122 °F)
	3000 m ASL ... 4000 m ASL (9842 ft ASL ... 13123 ft ASL)	-10 °C ... +45 °C (+14 °F ... +113 °F)
	Note: Note the following de-ratings due to: ▶ Mounting: See “Installing the device” on page 45. ▶ SFP Transceiver See “Derating due to SFP transceiver” on page 78.	
Maximum internal air temperature[b]	+75 °C (+167 °F)	
Humidity	5 % ... 95 % (non-condensing)	
Air pressure	min. 600 hPa (+4000 m ASL; +13123 ft ASL) max. 1060 hPa (-400 m ASL; -1312 ft ASL)	

Table 27: Climatic conditions during operation

a. Temperature of the ambient air at a distance of 5 cm (2 in) from the device
b. Temperature measured by the temperature sensor within the device.

12.7 Climatic conditions during storage

Climatic conditions during storage		
Ambient temperature	-40 °C ... +85 °C (-40 °F ... +185 °F)	up to 3 months
	-40 °C ... +70 °C (-40 °F ... +158 °F)	up to 1 year
	-40 °C ... +50 °C (-40 °F ... +122 °F)	up to 2 years
	0 °C ... +30 °C (+32 °F ... +86 °F)	up to 10 years
Humidity	1 % ... 95 % (non-condensing)	
Air pressure	min. 540 hPa (+5000 m ASL; +16404 ft ASL) max. 1060 hPa (-400 m ASL; -1312 ft ASL)	

Table 28: Climatic conditions during storage

12.8 Dimension drawings

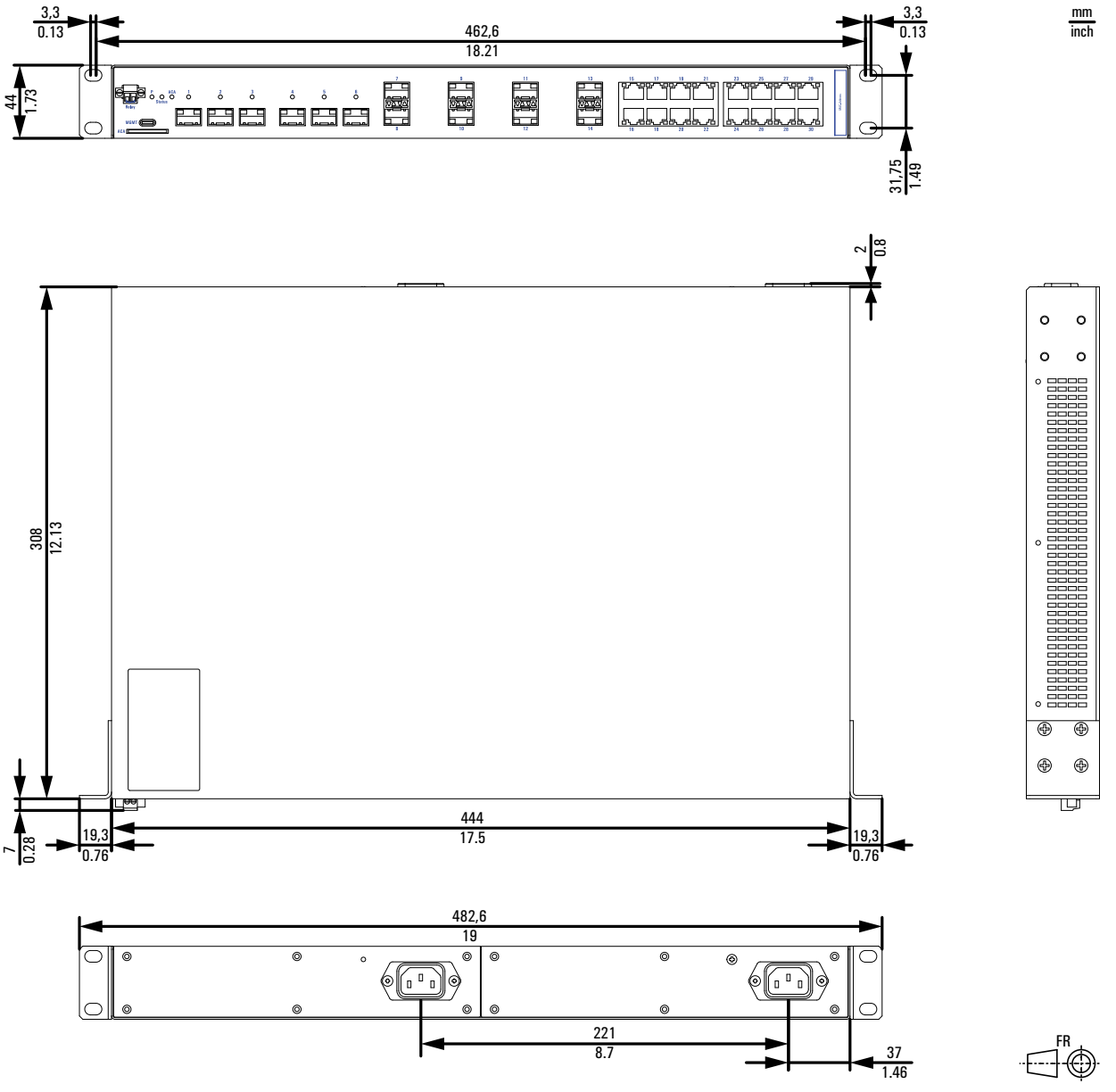


Figure 24: Dimension drawings: Dimensions for GRS105/GRS106/GRS115/GRS116 device variants (Example: GRS106-6F8F16TSGG...)

12.9 EMC

Note: Use shielded data cables for gigabit transmission via copper cables. Use shielded Cat6 Ethernet cables for 2.5 Gbit/s transmission rates via copper cables. Use shielded data cables for all transmission rates to meet the requirements according to EN 50121-4 and marine applications.

EMC interference emission		Standard applications	Railway applications (trackside)
EN 55032	Class A	Fulfilled	Fulfilled
FCC 47 CFR Part 15	Class A	Fulfilled	Fulfilled
EN 61000-6-4		Fulfilled	Fulfilled

12.10 Immunity

Immunity		Standard applications	Railway applications (trackside)
IEC 60068-2-6, test Fc	Vibration	5 Hz ... 8.4 Hz with 3.5 mm (0.14 in) amplitude	—
		8.4 Hz ... 150 Hz with 1 g	—
IEC 60068-2-27, test Ea	Shock	15 g at 11 ms	—

EMC interference immunity		Standard applications[a]	Railway applications (trackside)[b]
Electrostatic discharge			
EN 61000-4-2	Contact discharge	±4 kV	±6 kV
EN 61000-4-2	Air discharge	±8 kV	±8 kV
Electromagnetic field			
EN 61000-4-3	80 MHz ... 6000 MHz	max. 10 V/m	max. 20 V/m
Fast transients (burst)			

Table 29: EMC and immunity: EMC interference immunity

EMC interference immunity		Standard applications[a]	Railway applications (trackside)[b]
EN 61000-4-4	Supply voltage connection	±2 kV	±2 kV
EN 61000-4-4	Data line	±1 kV	±2 kV
Voltage surges - AC supply connection			
EN 61000-4-5	line/ground	±2 kV	±2 kV
EN 61000-4-5	line/line	±1 kV	±1 kV
Voltage surges - data line			
EN 61000-4-5	line/ground	±1 kV	±2 kV
Conducted disturbances			
EN 61000-4-6	150 kHz ... 80 MHz	10 V	10 V

Table 29: EMC and immunity: EMC interference immunity

a. According to EN 61000-6-2.
b. According to EN 50121-4.

12.11 Network range

Note: The line lengths specified for the transceivers apply for the respective fiber data (fiber attenuation and Bandwidth Length Product (BLP)/ Dispersion).

12.11.1 10/100/1000 Mbit/s twisted pair port

10/100/1000 Mbit/s twisted pair port	
Length of a twisted pair segment	max. 100 m (328 ft) (for Cat5e cable)

Table 30: Network range: 10/100/1000 Mbit/s twisted pair port

12.11.2 100/1000/2500 Mbit/s twisted pair port

100/1000/2500 Mbit/s twisted pair port	
Length of a twisted pair segment	max. 100 m (328 ft) (for Cat5e cable)

Table 31: Network range: 100/1000/2500 Mbit/s twisted pair port

12.11.3 Gigabit Ethernet SFP transceiver

Product code	Mode[a]	Wave length	Fiber	System attenuation	Example for F/O line length[b]	Fiber attenuation	BLP/Dispersion
M-SFP-SX/LC...	MM	850 nm	50/125 µm	0 dB ... 7.5 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	3.0 dB/km	400 MHz×km
M-SFP-SX/LC...	MM	850 nm	62.5/125 µm	0 dB ... 7.5 dB	0 km ... 0.275 km (0 mi ... 0.17 mi)	3.2 dB/km	200 MHz×km
M-SFP-MX/LC...	MM	1310 nm	50/125 µm	0 dB ... 12 dB	0 km ... 1.5 km (0 mi ... 0.93 mi)	1.0 dB/km	800 MHz×km

Table 32: F/O port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

Product code	Mode[a]	Wave length	Fiber	System attenuation	Example for F/O line length[b]	Fiber attenuation	BLP/Dispersion
M-SFP-MX/LC...	MM	1310 nm	62.5/125 µm	0 dB ... 12 dB	0 km ... 50 km (0 mi ... 31.06 mi)	1.0 dB/km	500 MHz×km
M-SFP-LX/LC...	MM	1310 nm[c]	50/125 µm	0 dB ... 10.5 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	1.0 dB/km	800 MHz×km
M-SFP-LX/LC...	MM	1310 nm[d]	62.5/125 µm	0 dB ... 10.5 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	1.0 dB/km	500 MHz×km
M-SFP-LX/LC...	SM	1310 nm	9/125 µm	0 dB ... 10.5 dB	0 km ... 20 km (0 mi ... 12.43 mi)[e]	0.4 dB/km	3.5 ps/(nm×km)
M-SFP-LX+/LC...	SM	1310 nm	9/125 µm	5 dB ... 20 dB	14 km ... 42 km (8.70 mi ... 26.10 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-SFP-LH/LC...	LH	1550 nm	9/125 µm	5 dB ... 22 dB	23 km ... 80 km (14.29 mi ... 49.71 mi)	0.25 dB/km	19 ps/(nm×km)
M-SFP-LH+/LC	LH	1550 nm	9/125 µm	15 dB ... 30 dB	71 km ... 108 km (44.12 mi ... 67.11 mi)	0.25 dB/km	19 ps/(nm×km)
M-SFP-LH+/LC	LH	1550 nm	9/125 µm	15 dB ... 30 dB	71 km ... 128 km (44.12 mi ... 79.54 mi)	0.21 dB/km (typically)	19 ps/(nm×km)
M-SFP-LH+/LC EEC	LH	1550 nm	9/125 µm	13 dB ... 32 dB	62 km ... 116 km (38.52 mi ... 72.07 mi)	0.25 dB/km	19 ps/(nm×km)
M-SFP-LH+/LC EEC	LH	1550 nm	9/125 µm	13 dB ... 32 dB	62 km ... 138 km (38.52 mi ... 85.75 mi)	0.21 dB/km (typically)	19 ps/(nm×km)
SFP-GIG-LX/LC...	MM	1310 nm[f]	50/125 µm	0 dB ... 10.5 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	1.0 dB/km	800 MHz×km
SFP-GIG-LX/LC...	MM	1310 nm[g]	62.5/125 µm	0 dB ... 10.5 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	1.0 dB/km	500 MHz×km
SFP-GIG-LX/LC...	SM	1310 nm	9/125 µm	0 dB ... 10.5 dB	0 km ... 20 km (0 mi ... 12.43 mi)[h]	0.4 dB/km	3.5 ps/(nm×km)

Table 32: F/O port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

a. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul
b. Including 3 dB system reserve when compliance with the fiber data is observed.
c. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).
d. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).
e. Including 2.5 dB system reserve when compliance with the fiber data is observed.

f. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).
g. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).
h. Including 2.5 dB system reserve when compliance with the fiber data is observed.

12.11.4 Bidirectional Gigabit Ethernet SFP transceiver

Product code	Mode[a]	Wave length TX	Wave length RX	Fiber	System attenuation	Example for F/O line length[b]	Fiber attenuation	BLP/Dispersion
M-SFP-BIDI Type A LX/LC EEC	SM	1310 nm	1550 nm	9/125 µm	0 dB ... 11 dB	0 km ... 20 km (0 mi ... 12.43 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-SFP-BIDI Type B LX/LC EEC	SM	1550 nm	1310 nm	9/125 µm	0 dB ... 11 dB	0 km ... 20 km (0 mi ... 12.43 mi)	0.25 dB/km	19 ps/(nm×km)
M-SFP-BIDI Type A LH/LC EEC	LH	1490 nm	1590 nm	9/125 µm	5 dB ... 24 dB	23 km ... 80 km (14.29 mi ... 49.71 mi)	0.25 dB/km	19 ps/(nm×km)
M-SFP-BIDI Type B LH/LC EEC	LH	1590 nm	1490 nm	9/125 µm	5 dB ... 24 dB	23 km ... 80 km (14.29 mi ... 49.71 mi)	0.25 dB/km	19 ps/(nm×km)
SFP-GIG-BA LX/LC EEC	SM	1310 nm	1550 nm	9/125 µm	0 dB ... 15 dB	0 km ... 20 km (0 mi ... 12.43 mi)	0.4 dB/km	3.5 ps/(nm×km)
SFP-GIG-BB LX/LC EEC	SM	1550 nm	1310 nm	9/125 µm	0 dB ... 15 dB	0 km ... 20 km (0 mi ... 12.43 mi)	0.25 dB/km	19 ps/(nm×km)
SFP-GIG-BA LX+/LC EEC	SM	1310 nm	1550 nm	9/125 µm	3 dB ... 20 dB	12 km ... 40 km (7.45 mi ... 24.86 mi)	0.4 dB/km	3.5 ps/(nm×km)
SFP-GIG-BB LX+/LC EEC	SM	1550 nm	1310 nm	9/125 µm	3 dB ... 20 dB	12 km ... 40 km (7.45 mi ... 24.86 mi)	0.25 dB/km	19 ps/(nm×km)
SFP-GIG-BA LH/LC EEC	LH	1490 nm	1550 nm	9/125 µm	4 dB ... 24 dB	19 km ... 80 km (11.80 mi ... 49.71 mi)	0.25 dB/km	19 ps/(nm×km)
SFP-GIG-BB LH/LC EEC	LH	1550 nm	1490 nm	9/125 µm	4 dB ... 24 dB	19 km ... 80 km (11.80 mi ... 49.71 mi)	0.25 dB/km	19 ps/(nm×km)

Table 33: F/O port (bidirectional Gigabit Ethernet SFP transceiver)

a. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul
b. Including 3 dB system reserve when compliance with the fiber data is observed.

12.11.5 2.5 Gigabit Ethernet SFP transceiver

Product code	Mode[a]	Wave length	Fiber	System attenuation	Example for F/O line length[b]	Fiber attenuation	BLP/Dispersion
M-SFP-2.5-MM/LC EEC	MM	850 nm	50/125 µm	0 dB ... 4 dB	0.55 km (0.34 mi)	3.5 dB/km	2000 MHz×km (OM3)
M-SFP-2.5-MM/LC EEC	MM	850 nm	50/125 µm	0 dB ... 4 dB	0.4 km (0.25 mi)	3.5 dB/km	500 MHz×km (OM2)
M-SFP-2.5-MM/LC EEC	MM	850 nm	62.5/125 µm	0 dB ... 4 dB	0.17 km (0.11 mi)	3.5 dB/km	200 MHz×km (OM1)
M-SFP-2.5-SM-/LC EEC	SM	1310 nm	9/125 µm	0 dB ... 8.5 dB	5 km (3.11 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-SFP-2.5-SM/LC EEC	SM	1310 nm	9/125 µm	0 dB ... 13 dB	20 km (12.43 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-SFP-2.5-SM+/LC EEC	SM	1310 nm	9/125 µm	12 dB ... 25 dB	45 km (27.96 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-SFP-2.5-LH/LC	LH	1551 nm	9/125 µm	14 dB ... 28 dB	80 km (49.71 mi)[c]	0.25 dB/km	19 ps/(nm×km)

Table 34: F/O port 2.5 Gbit/s (SFP fiber optic Gigabit Ethernet transceiver)

a. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul
b. Including 3 dB system reserve when compliance with the fiber data is observed.
c. Typically the DWDM (Dense Wave Division Multiplexing) links have filters because the remaining attenuation budget is consumed by the filters.For point-to-point connections without filters and with max. 1.5 dB of connector losses you can cover up to 59 mi (95 km).

12.11.6 10 Gigabit Ethernet SFP+ transceiver

Product code	Mode[a]	Wave length	Fiber	System attenuation	Example for F/O line length[b]	Fiber attenuation	BLP/dispersion
M-SFP-10-SR/LC EEC	MM	850 nm	50/125 µm	0 dB ... 8.1 dB	0.066 km (0.041 mi)	3 dB/km	400 MHz×km
M-SFP-10-SR/LC EEC	MM	850 nm	50/125 µm	0 dB ... 8.1 dB	0.082 km (0.051 mi)	3 dB/km	500 MHz×km (OM2)
M-SFP-10-SR/LC EEC	MM	850 nm	50/125 µm	0 dB ... 8.1 dB	0.3 km (0.186 mi)	3 dB/km	2000 MHz×km (OM3)
M-SFP-10-SR/LC EEC	MM	850 nm	50/125 µm	0 dB ... 8.1 dB	0.4 km (0.25 mi)	3 dB/km	4700 MHz×km (OM4)
M-SFP-10-SR/LC EEC	MM	850 nm	62.5/125 µm	0 dB ... 8.1 dB	0.026 km (0.016 mi)	3.2 dB/km	160 MHz×km
M-SFP-10-SR/LC EEC	MM	850 nm	62.5/125 µm	0 dB ... 8.1 dB	0.033 km (0.021 mi)	3.2 dB/km	200 MHz×km (OM1)

Table 35: F/O port 10 Gbit/s (SFP+ fiber optic Gigabit Ethernet transceiver)

Product code	Mode[a]	Wave length	Fiber	System attenuation	Example for F/O line length[b]	Fiber attenuation	BLP/dispersion
M-SFP-10-LR/LC EEC	SM	1310 nm	9/125 µm	0 dB ... 7.4 dB	10 km (6.21 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-SFP-10-ER/LC EEC	LH	1550 nm	9/125 µm	3 dB ... 15 dB	10 km ... 40 km (6.21 mi ... 24.86 mi)	0.25 dB/km	19 ps/(nm×km)
M-SFP-10-ZR/LC	LH	1550 nm	9/125 µm	11 dB ... 22 dB	40 km ... 80 km (24.86 mi ... 49.71 mi)	0.25 dB/km	19 ps/(nm×km)

Table 35: F/O port 10 Gbit/s (SFP+ fiber optic Gigabit Ethernet transceiver)

a. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul
b. Including 3 dB system reserve when compliance with the fiber data is observed.

12.11.7 DAC cables

The maximum cable length of a DAC cable corresponds to its maximum network range.

Product code	Cable length	Maximum network range
SFP-10-DAC-05m (Direct Attach Copper)	0.5 m (1.64 ft)	0.5 m (1.64 ft)
SFP-10-DAC-1m (Direct Attach Copper)	1 m (3.28 ft)	1 m (3.28 ft)
SFP-10-DAC-2m (Direct Attach Copper)	2 m (6.56 ft)	2 m (6.56 ft)
SFP-10-DAC-4m (Direct Attach Copper)	4 m (13.12 ft)	4 m (13.12 ft)

Table 36: Network range: DAC cables

12.12 Derating due to SFP transceiver

12.12.1 Classification of SFP transceiver

The SFP transceivers are classified according to the power classes Low Power (LP) and High Power (HP).

Gigabit Ethernet SFP transceiver

Product code	SFP power class	Order number
M-SFP-TX/RJ45 EEC	HP	942 161-001
M-SFP-TX/RJ45	HP	943 977-001
M-SFP-SX/LC	LP	943 014-001
M-SFP-SX/LC EEC	LP	943 896-001
M-SFP-MX/LC EEC	HP	942 108-001
M-SFP-LX/LC	LP	943 015-001
M-SFP-LX/LC EEC	LP	943 897-001
M-SFP-LX+/LC	LP	942 023-001
M-SFP-LX+/ LC EEC	LP	942 024-001
M-SFP-LH/LC	HP	943 042-001
M-SFP-LH/LC EEC	HP	943 898-001
M-SFP-LH+/LC	HP	943 049-001
M-SFP-LH+/LC EEC	HP	942 119-001
SFP-GIG-LX/LC	HP	942 196-001
SFP-GIG-LX/LC EEC	HP	942 196-002

Table 37: Classification of Gigabit Ethernet SFP transceiver

2.5 Gigabit Ethernet SFP transceiver

Product code	SFP power class	Order number
M-SFP-2.5-MM/LC EEC	LP	942 162-001
M-SFP-2.5-SM-/LC EEC	HP	942 163-001
M-SFP-2.5-SM/LC EEC	HP	942 164-001
M-SFP-2.5-SM+/LC EEC	HP	942 165-001
M-SFP-2.5-LH/LC	HP	942 220-001

Table 38: Classification of 2.5 Gigabit Ethernet SFP transceiver

10 Gigabit Ethernet SFP+ transceiver

Product code	SFP power class	Order number
M-SFP-10-SR/LC-EEC	LP	942 210-001
M-SFP-10-LR/LC-EEC	HP	942 211-001
M-SFP-10-ER/LC-EEC	HP	942 212-001
M-SFP-10-ZR/LC	HP	942 213-001
SFP-10-DAC-05m	LP	942 280-001
SFP-10-DAC-1m	LP	942 280-002

Table 39: Classification of 10 Gigabit Ethernet SFP+ transceiver

Product code	SFP power class	Order number
SFP-10-DAC-2m	LP	942 280-003
SFP-10-DAC-4m	LP	942 280-004

Table 39: Classification of 10 Gigabit Ethernet SFP+ transceiver

Bidirectional Gigabit Ethernet SFP transceiver

Product code	SFP power class	Order number
M-SFP-BIDI Type A LX/LC EEC	HP	943 974-001
M-SFP-BIDI Type B LX/LC EEC	HP	943 974-002
M-SFP-BIDI Type A LH/LC EEC	HP	943 975-001
M-SFP-BIDI Type B LH/LC EEC	HP	943 975-002
M-SFP-BIDI Bundle LX/LC EEC (Type A + B)	HP	943 974-101
M-SFP-BIDI Bundle LH/LC EEC (Type A + B)	HP	943 975-101
SFP-GIG-BA LX/LC EEC	HP	942 207-001
SFP-GIG-BB LX/LC EEC	HP	942 207-002
SFP-GIG-BA LX+/LC EEC	HP	942 208-001
SFP-GIG-BB LX+/LC EEC	HP	942 208-002
SFP-GIG-BA LH/LC EEC	HP	942 209-001
SFP-GIG-BB LH/LC EEC	HP	942 209-002

Table 40: Classification of bidirectional Gigabit Ethernet SFP transceiver

12.12.2 Derating

Note: Only use SFP transceivers with EEC extension for GRS115 and GRS116 device variants. The derating specifications in table 41 and table 42 only apply to SFP transceivers with EEC extension.

Derating	GRS115	GRS116
0 SFP	—	—
2-6 SFP class LP	—	—
2 SFP class HP[a]	—	—
4 SFP class HP[a]	5 K	5 K
6 SFP class HP[a]	10 K	10 K

Table 41: Derating for device variants GRS11x-6F8T...

a. The derating is not influenced by the number of LP SFP transceivers used.

Derating	GRS115	GRS116
0 SFP	—	—
2-14 SFP class LP	—	—
2 SFP class HP[a]	—	—
4 SFP class HP[a]	—	5 K
6 SFP class HP[a]	5 K	10 K

Table 42: Derating for device variants GRS11x-6F8F...

Derating	GRS115	GRS116
8 SFP class HP[a]	10 K	10 K
>8 SFP class HP[a]	15 K	15 K

Table 42: Derating for device variants GRS11x-6F8F...

a. The derating is not influenced by the number of LP SFP transceivers used.

13 Scope of delivery

Amount	Article
1 ×	GRS105/GRS106/GRS115/GRS116 device
1 ×	2-pin terminal block for signal contact
1 ×	Safety and general information sheet
2 ×	Mounting bracket (pre-mounted)
Exclusively for devices with supply voltage characteristic value M: 1 × or 2 × (depending on device variant)	3-pin terminal block for power supply
Exclusively for devices with supply voltage characteristic value L: 1 × or 2 × (depending on device variant)	2-pin terminal block for power supply

14 Order numbers

GRS105/GRS106/GRS115/GRS116 device	Order number
GRS105-...	942 287-999
GRS106-...	942 287-999
GRS115-...	942 287-999
GRS116-...	942 287-999
GRS105-24TX/6SFP-1HV-2A	942 287-001
GRS105-24TX/6SFP-2HV-2A	942 287-002
GRS105-24TX/6SFP-2HV-3A	942 287-003
GRS105-16TX/14SFP-1HV-2A	942 287-004
GRS105-16TX/14SFP-2HV-2A	942 287-005
GRS105-16TX/14SFP-2HV-3A	942 287-006
GRS106-24TX/6SFP-1HV-2A	942 287-007
GRS106-24TX/6SFP-2HV-2A	942 287-008
GRS106-24TX/6SFP-2HV-3A	942 287-009
GRS106-16TX/14SFP-1HV-2A	942 287-010
GRS106-16TX/14SFP-2HV-2A	942 287-011
GRS106-16TX/14SFP-2HV-3A	942 287-012

15 Accessories

Note that products recommended as accessories may have different characteristics to those of the device, which may limit the application range of the overall system. For example, if you add an accessory with IP20 to a device with IP65, the degree of protection of the overall system is reduced to IP20.

General accessories	Order number
AutoConfiguration Adapter ACA31	942 074-001
Industrial HiVision Network Management Software	943 156-xxx
Non-heating-appliance cable (Euro model)	942 271-001
2-pin terminal block (50 pieces)	943 845-010
2-pin terminal block with screw lock (50 pieces)	943 845-009
3-pin High Voltage Interlock terminal block (50 pcs.)	943 845-008
Bracket for fastening the casing (2 pcs.)	943 943-001
Bracket, long (+50 mm/1.97 in), for fastening the casing (2 pcs.)	943 943-101
Protection cap for RJ45 socket (50 pieces)	943 936-001
Protection cap for SFP slot (25 pieces)	943 942-001

Gigabit Ethernet SFP transceiver	Certification type	Temperature range[a]	Order number
M-SFP-TX/RJ45	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	943 977-001
M-SFP-TX/RJ45 EEC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	942 161-001
The following operating conditions apply to twisted pair transceivers: ▶ Longer RSTP switching times and link loss detection times compared to twisted pair ports provided by the device directly. ▶ Cannot be used with Fast Ethernet ports. ▶ Exclusively supports the autonegotiation mode including autocrossing.			
M-SFP-SX/LC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	943 014-001
M-SFP-SX/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 896-001
M-SFP-MX/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 108-001
M-SFP-LX/LC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	943 015-001
M-SFP-LX/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 897-001
M-SFP-LX+/LC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	942 023-001
M-SFP-LX+/ LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 024-001
M-SFP-LH/LC	Standard level	-5 °C ... +60 °C (+23 °F ... +140 °F)	943 042-001

Table 43: Accessory: Gigabit Ethernet SFP transceiver

Gigabit Ethernet SFP transceiver	Certification type	Temperature range[a]	Order number
M-SFP-LH/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 898-001
M-SFP-LH+/LC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	943 049-001
M-SFP-LH+/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 119-001
SFP-GIG-LX/LC	Entry level	0 °C ... +45 °C (+32 °F ... +113 °F)	942 196-001
SFP-GIG-LX/LC EEC	Entry level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 196-002

Table 43: Accessory: Gigabit Ethernet SFP transceiver

a. The temperature range specifications refer to the use in the GRS device.

Bidirectional Gigabit Ethernet SFP transceiver	Certification type	Temperature range[a]	Order number
M-SFP-BIDI Type A LX/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 974-001
M-SFP-BIDI Type B LX/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 974-002
M-SFP-BIDI Type A LH/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 975-001
M-SFP-BIDI Type B LH/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 975-002
M-SFP-BIDI Bundle LX/LC EEC (Type A + B)	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 974-101
M-SFP-BIDI Bundle LH/LC EEC (Type A + B)	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	943 975-101
SFP-GIG-BA LX/LC EEC	Entry level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 207-001
SFP-GIG-BB LX/LC EEC	Entry level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 207-002
SFP-GIG-BA LX+/LC EEC	Entry level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 208-001
SFP-GIG-BB LX+/LC EEC	Entry level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 208-002
SFP-GIG-BA LH/LC EEC	Entry level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 209-001
SFP-GIG-BB LH/LC EEC	Entry level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 209-002

Table 44: Accessory: Bidirectional Gigabit Ethernet SFP transceiver

a. The temperature range specifications refer to the use in the GRS device.

2.5 Gigabit Ethernet SFP transceiver	Certification type	Temperature range[a]	Order number
M-SFP-2.5-MM/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 162-001
M-SFP-2.5-SM-/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 163-001

Table 45: Accessory: 2.5 Gigabit Ethernet SFP transceiver

2.5 Gigabit Ethernet SFP transceiver	Certification type	Temperature range[a]	Order number
M-SFP-2.5-SM/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 164-001
M-SFP-2.5-SM+/LC EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 165-001
M-SFP-2.5-LH/LC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	942 220-001

Table 45: Accessory: 2.5 Gigabit Ethernet SFP transceiver

a. The temperature range specifications refer to the use in the GRS device.

10 Gigabit Ethernet SFP transceiver	Certification type	Temperature range[a]	Order number
M-SFP-10-SR/LC-EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 210-001
M-SFP-10-LR/LC-EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 211-001
M-SFP-10-ER/LC-EEC	Standard level	-10 °C ... +60 °C (14 °F ... +140 °F)	942 212-001
M-SFP-10-ZR/LC	Standard level	-5 °C ... +60 °C (+23 °F ... +140 °F)	942 213-001
SFP-10-DAC-05m	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	942 280-001
SFP-10-DAC-1m	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	942 280-002
SFP-10-DAC-2m	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	942 280-003
SFP-10-DAC-4m	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	942 280-004

a. The temperature range specifications refer to the use in the GRS device.

16 Underlying technical standards

Name	
EN 55032	Electromagnetic compatibility of multimedia equipment – Emission Requirements
FCC 47 CFR Part 15	Code of Federal Regulations
IEC/EN 62368-1	Equipment for audio/video, information and communication technology - Part 1: safety requirements
IEEE 802.1D	MAC Bridges (switching function)
IEEE 802.1Q	Virtual LANs (VLANs, MRP, Spanning Tree)
IEEE 802.1w	Rapid Reconfiguration
IEEE 802.3	Ethernet
cUL 62368-1	Audio/video, information and communication technology equipment – Part 1: Safety requirements
IEC 60825-1	Laser product safety
EN 50121-4	Railway applications - EMC - emitted interference and interference immunity for signal and telecommunication systems
EN 61000-3-2	Electromagnetic compatibility (EMC) – part 3-2: Threshold values – threshold values for harmonic currents (device input current ≤ 16 A per conductor)
EN 61000-3-3	Electromagnetic compatibility (EMC) – part 3-3: Threshold values – limitation of voltage changes, voltage fluctuations and flickering in public low power supply networks for devices with a rated current ≤ 16 A per conductor that are not subject to any special connection condition
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 – Emitted interference in industrial environments
EN 61131-2	Programmable controllers – Part 2: Equipment requirements and tests

Table 46: List of the technical standards

The device generally fulfills the technical standards named in their current versions.
The device has an approval based on a specific standard exclusively if the approval indicator appears on the device casing.
If your device has a shipping approval according to DNV, you find the approval mark printed on the device label. You will find out whether your device has other shipping approvals on the Hirschmann website at www.hirschmann.com in the product information.

A Further support

Technical questions

For technical questions, please contact any Hirschmann dealer in your area or Hirschmann directly.

You find the addresses of our partners on the Internet at http://www.hirschmann.com.

A list of local telephone numbers and email addresses for technical support directly from Hirschmann is available at https://hirschmann-support.belden.com.

This site also includes a free of charge knowledge base and a software download section.

Customer Innovation Center

The Customer Innovation Center is ahead of its competitors on three counts with its complete range of innovative services:

- Consulting incorporates comprehensive technical advice, from system evaluation through network planning to project planning.
- Training offers you an introduction to the basics, product briefing and user training with certification.
  You find the training courses on technology and products currently available at https://www.belden.com/solutions/customer-innovation-center.
- Support ranges from the first installation through the standby service to maintenance concepts.

With the Customer Innovation Center, you decide against making any compromises in any case. Our client-customized package leaves you free to choose the service components you want to use.

Internet:
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