



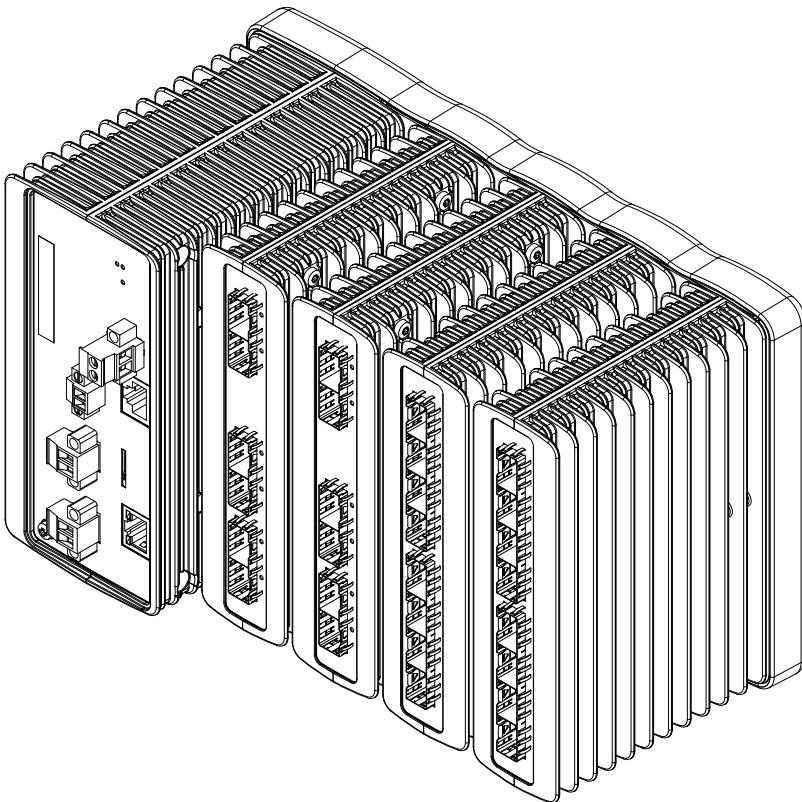
HIRSCHMANN

A **BELDEN** BRAND

User Manual

Installation

Industrial Ethernet Bobcat Rail Performance BRP Family



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Hirschmann Automation and Control GmbH

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Germany

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.

Documentation mentioned in the “Installation” user manual that is not supplied with your device as a printout can be found at:

[*doc.hirschmann.com*](http://doc.hirschmann.com)

The Network Management Software Industrial HiVision provides you with options for smooth configuration and monitoring. You find further information at:

[*https://www.belden.com/products/industrial-networking-cybersecurity/software-solutions/network-management-software/industrial-hivision-network-management-software*](https://www.belden.com/products/industrial-networking-cybersecurity/software-solutions/network-management-software/industrial-hivision-network-management-software)

Important information

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.

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.

La présence de ce symbole sur une étiquette « Danger » ou « Avertissement » signale un risque d'électrocution qui provoquera des blessures physiques en cas de non-respect des consignes de sécurité.



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.

La présence de ce symbole sur une étiquette « Danger » ou « Avertissement » signale un risque d'électrocution qui provoquera des blessures physiques en cas de non-respect des consignes de sécurité.



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.

Ce symbole indique le risque de surfaces chaudes sur l'équipement. En relation avec les consignes de sécurité, le non-respect des instructions entraînera inévitablement des blessures.

DANGER



DANGER indicates a hazardous situation which, if not avoided, will result in death, serious injury, or equipment damage.

DANGER



DANGER indique une situation dangereuse qui, si elle n'est pas évitée, entraînera la mort, des blessures graves ou des dommages matériels.

WARNING



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

AVERTISSEMENT



AVERTISSEMENT indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner la mort, des blessures graves ou des dommages matériels.

CAUTION



CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury, or equipment damage.

ATTENTION



ATTENTION indique une situation dangereuse qui, si elle n'est pas évitée, peut entraîner des blessures légères ou des blessures modérées ou des dommages matériels.

NOTICE

NOTICE is used to address practices not related to physical injury which could result in equipment damage.

AVIS

AVIS est utilisé pour indiquer des pratiques non liées à des blessures corporelles qui peuvent entraîner des dommages matériels.

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1. Safety instructions

WARNING



UNCONTROLLED MACHINE ACTIONS

Failure to follow the instructions could result in death, serious injury, or equipment damage.

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.

AVERTISSEMENT



ACTIONS INCONTRÔLÉES DE LA MACHINE

Le non-respect des instructions peut entraîner la mort, des blessures graves ou des dommages matériels.

Pour éviter les actions incontrôlées de la machine causées par la perte de données, configurez tous les équipements de transmission de données individuellement.

Avant de démarrer une machine commandée par transmission de données, assurez-vous de finaliser la configuration de tous les équipements de transmission de données.

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.

- Verify that the electrical installation meets local or nationally applicable safety regulations.
- 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.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

1.1. 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.

1.2. Intended use

- Use the product only for the application cases described in the Hirschmann Automation and Control GmbH product information, including this manual.
- Only instructed or skilled person allowed to use the equipment (no ordinary person allowed).
- This equipment is not suitable for use in locations where children are likely to be present.
- Operate the product only according to the technical specifications, see [General data on page 82](#).
- Connect to the product only components suitable for the requirements of the specific application case.

1.3. Installation site requirements

- Install this device only in a switch cabinet or in an operating site with restricted access, to which maintenance staff have exclusive access.
- 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. For more information, see [General data on page 82](#).
- This is an Open Type Equipment intended to be DIN rail mounted in enclosed cabinets which supplies safety aspects protecting the operator from hazards.

1.4. Device casing

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

- 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.
- Mount the device in the vertical position.
- At ambient air temperatures $> +60\text{ }^{\circ}\text{C}$ ($+140\text{ }^{\circ}\text{F}$), the surfaces of the device housing may become hot. Avoid touching the device while it is operating.

1.5. 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.

1.6. Electrical connections

1.6.1. Grounding the device

Before supplying your device with power, **ALWAYS** verify that the device is grounded.

The device is grounded via 1 separate grounding screw. The grounding screw is located next to the power supply connection on the front left side of the device.

- Ground the device before connecting any other cables.
- Disconnect the grounding only after disconnecting all other cables.

For more information on grounding the device, see [Grounding the device on page 61](#).

1.6.2. Shielding ground

The overall shield of connectable twisted-pair cables is connected to the ground connection of the device casing as a conductor.

- Beware of possible short circuits when connecting a cable section with conductive shielding braiding.

1.6.3. Requirements for connecting electrical wires

Before connecting the electrical wires, **ALWAYS** verify that the requirements listed are complied with. The following requirements apply without restriction:

- The electrical wires are voltage-free.
- The device is grounded via the designated ground connection(s).
- The connected voltage source is limited by a current limitation device or a fuse.
- The device is only switched on after installation.
- The ground connection is disconnected only after all other cables have been disconnected.

- The cables used are permitted for the temperature range of the application case.

 Relevant for North America: Exclusively use +60/75 °C (+140/167 °F) or +75 °C (+167 °F) copper wire (Cu wire).

 Important pour l'Amérique du Nord : N'utilisez que des câbles en cuivre de +60/75 °C (+140/167 °F) ou +75 °C (+167 °F).

- The external circuits intended to be connected to this device are separated from the mains supply or hazardous live voltage by reinforced or double insulation.

1.6.4. Requirements for connecting the supply voltage

Before connecting the supply voltage, **ALWAYS** verify that the requirements listed are complied with. The following requirements apply without restrictions:

- The supply voltage corresponds to the voltage specified on the type plate of the device.
- The power supply cable is suitable for the required voltage, current, and physical load.
- The cross-section of the ground conductor is the same size as or larger than the cross-section of the power supply cables.
- The power supply conforms to overvoltage category I or II.
- The power supply conforms to NEC Class 2.
- The power supply has an easily accessible disconnecting device (for example a switch or a plug). This disconnecting device is clearly labelled and identifiable, so that in case of an emergency it is clear which power supply the disconnecting device belongs to.
- The power supply is potential-free.

Low voltage (LV) power supply:

- The device is rated for DC voltage.
- The conductor cross-section of the power supply cable is at least 1 mm² (16 AWG) for each supply voltage input of the device.
- A back-up fuse suitable for DC voltage is installed in **EVERY** plus conductor of the power supply.
- **EVERY** minus input needs to be on the same potential.
- **EVERY** plus input needs to have a higher voltage than the minus potential.
- If the minus potential is not ground, an additional fuse is necessary. Regarding the properties of this back-up fuse, see [General data on page 82](#).

High voltage (HV) power supply:

- The device is rated for AC and DC voltage.
- The conductor cross-section of the power supply cable is at least 0.75 mm² (18 AWG) on the supply voltage input of the device.
- A back-up fuse suitable for DC voltage is installed in **EVERY** outer conductor of the power supply.

1.6.5. 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 restriction:

- 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 source is limited by a current limitation device or a fuse.
- The electrical threshold values for the signal contact are observed.

For more information, see [Signal contact on page 84](#).

1.7. ATEX directive 2014/34/EU – specific regulations for safe operation

The following applies to BRP devices if you operate them in areas with explosive gases according to ATEX directive 2014/34/EU:

- List of standards:
EN IEC 60079-0:2018
EN 60079-7:2015 + A1:2018
EN IEC 60079-15:2019
- Make sure that the device has the following label:



II 3G Ex ec nC IIC T4 Gc

T4: $0\text{ °C} \leq T_a \leq +60\text{ °C}$ ($+32\text{ °F} \leq T_a \leq +140\text{ °F}$) for device types “S” or “C”

(Position 27 of the product code) or

T4: $-40\text{ °C} \leq T_a \leq +70\text{ °C}$ ($-40\text{ °F} \leq T_a \leq +158\text{ °F}$) for device types “T”, “E” or “G”

(Position 27 of the product code)

- The equipment is suitable for use in an area with maximum pollution degree 2, as defined in IEC 60664-1.
- The modules shall be installed in a suitable enclosure in accordance with IEC 60079-0 providing a degree of protection of at least IP54 according to IEC 60529, taking into account the environmental conditions under which the equipment will be used.
- When the temperature under rated conditions exceeds +70 °C (+158 °F) at the cable or the conduit entry point, or +80 °C (+176 °F) at the branching point of the conductors, take measures so that the temperature specification of the selected cable and cable entries is in compliance with the actual measured temperature values.
- Connectors shall be connected or disconnected exclusively in dead-voltage state.

1.8. LED or laser components

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

CLASS 1 LASER PRODUCT

CLASS 1 LED PRODUCT



WARNING: Class 1 laser product according to IEC 60825-1:2014 and EN 0825-1:2014 + A11:2021.

Complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in "Laser Notice No. 56", dated May 8, 2019.

AVERTISSEMENT : Produit laser de classe 1 selon les normes CEI 60825-1:2014 et EN 0825-1:2014 + A11:2021.

Conforme aux normes 21 CFR 1040.10 et 1040.11, à l'exception de la conformité à la norme CEI 60825-1 Éd. 3., comme décrit dans le document « Laser Notice No. 56 » du 8 mai 2019.

1.9. Recycling note



The symbol of a crossed-out wheeled bin shown on the device indicates that the device **MUST NOT** be disposed of with household waste at the end of its service life.

After its service life, the used device must be disposed of properly as electronic waste in accordance with the locally applicable disposal regulations.

End users are responsible for deleting personal data from the used device prior to disposal.

End users are obliged to separate used batteries and accumulators that are not enclosed by the used device from the used device in a non-destructive manner before disposing of the used device. The used batteries and accumulators must be handed in for separate collection. This does not apply if the used device is handed in for reuse.

2. Approvals

2.1. 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.

- **2014/34/EU (ATEX)**

Directive of the European Parliament and the Council on the harmonisation of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres.

The ATEX Directive applies exclusively to the device variants labeled with an ATEX certificate number:

[*ATEX directive 2014/34/EU – specific regulations for safe operation on page 19*](#)

- **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 available to the relevant authorities at the following address:

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

You can download the PDF file of the EU conformity declaration at: <https://www.doc.hirschmann.com/certificates.html>

The device can be used in industrial environments.

- Interference immunity: EN 61000-6-2
- Emitted interference: EN 55032
- Safety: IEC/EN 62368-1

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

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.

AVERTISSEMENT : Ce produit est un équipement de la classe A. Ce produit peut provoquer des interférences dans les habitations. Dans ce cas, l'exploitant peut être tenu de procéder aux mesures appropriées.

2.2. FCC note

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

Bobcat Rail Performance

BRP Family

U.S. Contact Information

Belden Inc. – 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.

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. Description

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

The device 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 level characteristic value 2A, 2S, or 3A provide you with the option to set up switched Industrial Ethernet networks that conform to the IEEE 802.3 standard.

Type of the device mounting:

- Mounting on a DIN rail

You can choose various media to connect to the end devices and other network components:

- Twisted-pair cable
- Multimode F/O (Fiber Optic)
- Singlemode F/O (Fiber Optic)

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. For more information, see <https://www.belden.com/products/industrial-networking-cybersecurity/software-solutions/network-management-software/industrial-hivision-network-management-software>.

- V.24 interface (locally on the device)

The device provides you with a large range of functions, which the Manual Collection (User and Reference Manuals) for the operating software informs you about. For more information, see doc.hirschmann.com.

3.1. 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.

Table 1. Device name and product code

Item	Characteristic	Characteris- tic value	Description
1 ... 3	Product	BRP	Bobcat Rail Performance
4	Data rate	3	100/1000 Mbit/s Ethernet Ports
		4	1 Gbit/s Ethernet Ports
		5	1/2.5 Gbit/s Ethernet Ports
		6	1/2.5/10 Gbit/s Ethernet Ports
5	Hardware type	0	Standard
6		-	(hyphen)
7 ... 8	Number of 100 Mbit/s ports	00	0 × (10)/100 Mbit/s ports
		08	8 × (10)/100 Mbit/s ports
		16	16 × (10)/100 Mbit/s ports
		24	24 × (10)/100 Mbit/s ports
9 ... 10	Number of 1 Gbit/s ports	04	4 × (10)/100/1000 Mbit/s ports
		08	8 × (10)/100/1000 Mbit/s ports
		12	12 × (10)/100/1000 Mbit/s ports
		16	16 × (10)/100/1000 Mbit/s ports
		20	20 × (10)/100/1000 Mbit/s ports
		24	24 × (10)/100/1000 Mbit/s ports
11 ... 12	Number of 2.5 Gbit/s ports	28	28 × (10)/100/1000 Mbit/s ports
		00	0 × (0.1)/1/2.5 Gbit/s ports
		04	4 × (0.1)/1/2.5 Gbit/s ports
		08	8 × (0.1)/1/2.5 Gbit/s ports
		12	12 × (0.1)/1/2.5 Gbit/s ports
13	Number of 10 Gbit/s ports	0	0 × 1/2.5/10 Gbit/s ports
		4	4 × 1/2.5/10 Gbit/s ports
14	Port Group 1	A	4 × SFP (1/2.5/10 Gbit/s)
		C	4 × SFP (1/2.5 Gbit/s)

Table 1. Device name and product code (continued)

Item	Characteristic	Characteris- tic value	Description
15	Transceivers: PG 1	D	4 × SFP (1 Gbit/s)
		9	Not configurable
		J	SFP: 1 Gbit/s SX/LC EEC
		L	SFP: 1 Gbit/s LX/LC EEC
		M	SFP: 2.5 Gbit/s MM/LC EEC
		N	SFP: 2.5 Gbit/s SM/LC EEC
		P	SFP: 2.5 Gbit/s SM-/LC EEC
		Q	SFP: 10 Gbit/s SR/LC EEC
16	Number of transceivers: PG 1	R	SFP: 10 Gbit/s LR/LC EEC
		0	N/A
		2	2 × Pre-assembled transceivers
		4	4 × Pre-assembled transceivers
17	Port Group 2	F	8 × SFP (1/2.5 Gbit/s)
		G	8 × SFP (1 Gbit/s)
		I	8 × TP (0.1/1/2.5 Gbit/s)
		J	8 × TP (0.1/1 Gbit/s)
		K	8 × TP (100 Mbit/s)
18	Transceivers: PG 2	9	Not configurable
		F	SFP: 100 Mbit/s MM/LC EEC
		H	SFP: 100 Mbit/s SM/LC EEC
		J	SFP: 1 Gbit/s SX/LC EEC
		L	SFP: 1 Gbit/s LX/LC EEC
		M	SFP: 2.5 Gbit/s MM/LC EEC
		N	SFP: 2.5 Gbit/s SM/LC EEC
		P	SFP: 2.5 Gbit/s SM-/LC EEC
19	Number of transceivers: PG 2	0	N/A
		2	2 × Pre-assembled transceivers
		4	4 × Pre-assembled transceivers
		6	6 × Pre-assembled transceivers
		8	8 × Pre-assembled transceivers
20	Port Group 3	9	N/A

Table 1. Device name and product code (continued)

Item	Characteristic	Characteris- tic value	Description
		A	8 × SFP (100/1000 Mbit/s)
		B	8 × SFP (100 Mbit/s)
		C	4 × SFP (100/1000 Mbit/s) and
		4 ×	TP (10/100/1000 Mbit/s)
		D	4 × SFP (100 Mbit/s) and
		4 ×	TP (10/100/1000 Mbit/s)
		G	8 × TP (10/100/1000 Mbit/s)
		H	8 × TP (10/100 Mbit/s)
21	Transceivers: PG 3	9	Not configurable
		F	SFP: 100 Mbit/s MM/LC EEC
		H	SFP: 100 Mbit/s SM/LC EEC
		J	SFP: 1 Gbit/s SX/LC EEC
		L	SFP: 1 Gbit/s LX/LC EEC
22	Number of transceivers: PG 3	0	N/A
		2	2 × Pre-assembled transceivers
		4	4 × Pre-assembled transceivers
		6	6 × Pre-assembled transceivers
		8	8 × Pre-assembled transceivers
23	Port Group 4	9	N/A
		A	8 × SFP (100/1000 Mbit/s)
		B	8 × SFP (100 Mbit/s)
		C	4 × SFP (100/1000 Mbit/s) and
		4 ×	TP (10/100/1000 Mbit/s)
		D	4 × SFP (100 Mbit/s) and
		4 ×	TP (10/100/1000 Mbit/s)
		G	8 × TP (10/100/1000 Mbit/s)
		H	8 × TP (10/100 Mbit/s)
24	Transceivers: PG 4	N	Edge Compute
		9	Not configurable
		F	SFP: 100 Mbit/s MM/LC EEC
		H	SFP: 100 Mbit/s SM/LC EEC

Table 1. Device name and product code (continued)

Item	Characteristic	Characteris- tic value	Description
25	Number of transceivers: PG 4	J	SFP: 1 Gbit/s SX/LC EEC
		L	SFP: 1 Gbit/s LX/LC EEC
		0	N/A
		2	2 × Pre-assembled transceivers
		4	4 × Pre-assembled transceivers
		6	6 × Pre-assembled transceivers
26	Temperature range	8	8 × Pre-assembled transceivers
		-	(hyphen)
		S	0 °C ... +60 °C (32 °F ... +140 °F)
		C	0 °C ... +60 °C with Conformal Coating (32 °F ... +140 °F)
		T	-40 °C ... +70 °C (-40 °F ... +158 °F)
		E	-40 °C ... +70 °C with Conformal Coating (-40 °F ... +158 °F)
27	Voltage range	G	-40 °C ... +70 °C with Conformal Coating, glued (-40 °F ... +158 °F)
		K	2 × 60 - 250 V DC and 2 × 100 - 240 V AC
		F	2 × 24 - 48 V DC
28	Casing	D	IP40 Metal
29	Approvals/Declarations Part A	Z	CE, FCC, EN 61131, EN 62368-1, NEMA TS2
		Y	Z + UL 61010
		X	Z + UL 61010 + UL 121201
		H	Z + UL 61010 + UL 121201 + IEC 61850
		V	Z + IEC 61010 + IEEE 1613
		U	Z + DNV
		S	Z + DNV + extended ship approval
		R	Z + ATEX
		W	Z + ATEX/IECEx
		T	EN 50121

Table 1. Device name and product code (continued)

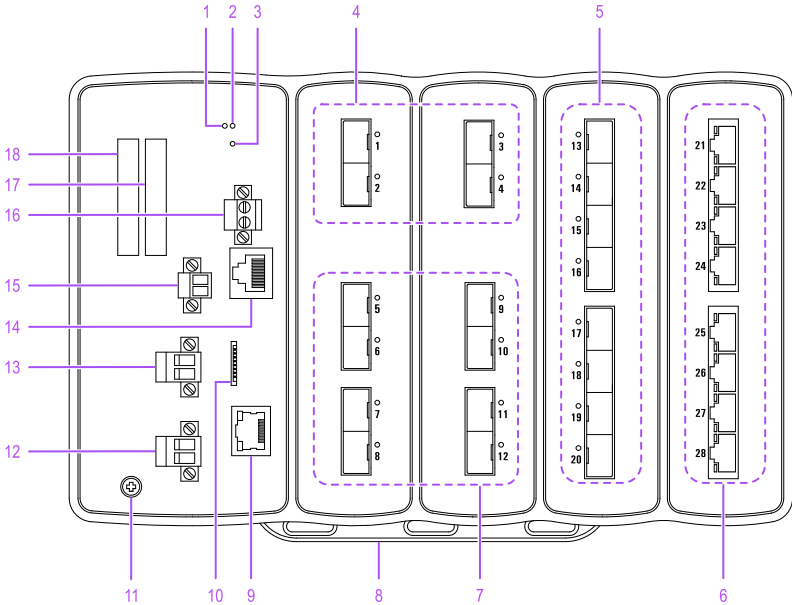
Item	Characteristic	Characteristic value	Description
31	Approvals/Declarations Part B	9	No additional approvals
		Y	UL 61010
		X	UL 61010 + UL 121201
		H	UL 61010 + UL 121201 + IEC 61850
		V	IEC 61010 + IEEE 1613
		U	DNV
		S	DNV + extended ship approval
		R	ATEX
		W	ATEX/IECEX
		T	EN 50121
32	Software packages	9	Reserved
		U	IPv4 Unicast Routing Package
		M	IPv4 Multicast Routing Package
33 ... 34	Customization	HH	Hirschmann
35	Technology	S	Standard
		E	Edge Computing
36	Software configuration	E	Empty
		P	PROFINET
37 ... 38	Software level	2S	HiOS Layer 2 Standard
		2A	HiOS Layer 2 Advanced
		3A	HiOS Layer 3 Advanced

3.2. Device views

3.2.1. Front view

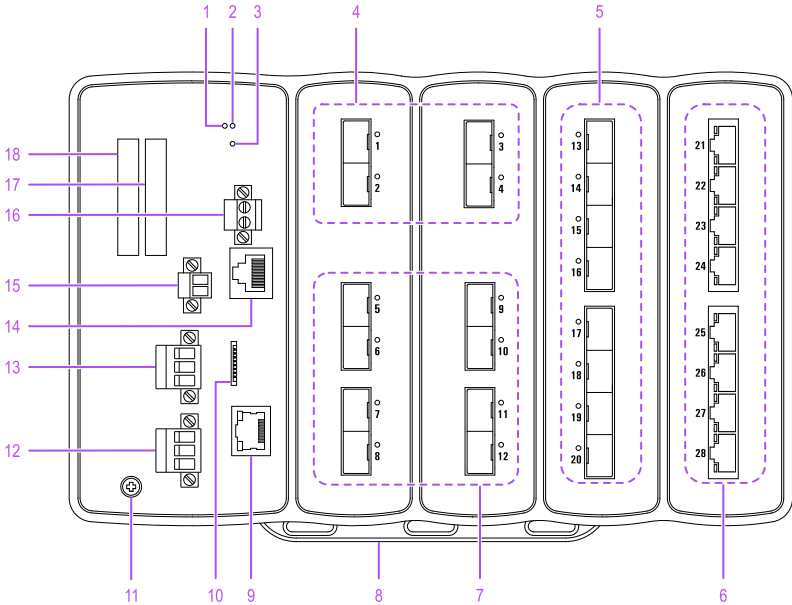
For the available number and types of connections and port groups on your device, check the product code in [Device name and product code on page 27](#).

Figure 1. Front view and port assignment of a device variant (supply voltage characteristic value F)



Note: The numerical sequence of the port assignment is identical for every device variant.

Figure 2. Front view and port assignment of a device variant (supply voltage characteristic value K)



Note: The numerical sequence of the port assignment is identical for every device variant.

Table 2. Front view: Description of device elements

1	Status LED	
2	Power LED	
3	ACA LED	
4	Port group 1 (PG 1)	Ports 1 ... 4
5	Port group 3 (PG 3)	Ports 13 ... 20
6	Port group 4 (PG 4)	Ports 21 ... 28
7	Port group 2 (PG 2)	Ports 5 ... 12
8	Rail lock slide for DIN rail mounting	
9	Out-of-band management port (MGMT)	
10	ACA41 interface (microSD card slot)	
11	Grounding screw	
12	Power supply connection 2 (P2)	

Table 2. Front view: Description of device elements (continued)

13	Power supply connection 1 (P1)
14	V.24 interface
15	Signal contact
16	2-pin terminal block with screw lock for the digital input
17	Label area for IP address of device
18	Label area for product code of device

3.2.2. Rear view

Figure 3. Rear view

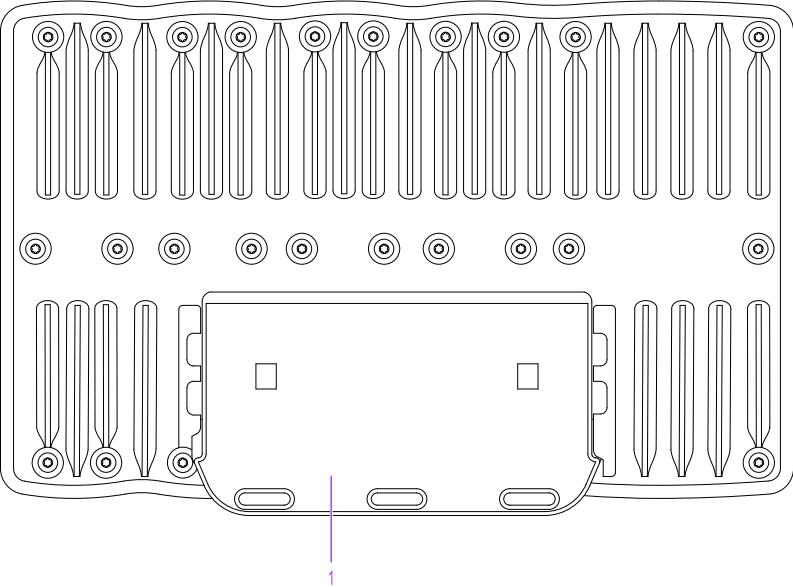


Table 3. Rear view: Description of device elements

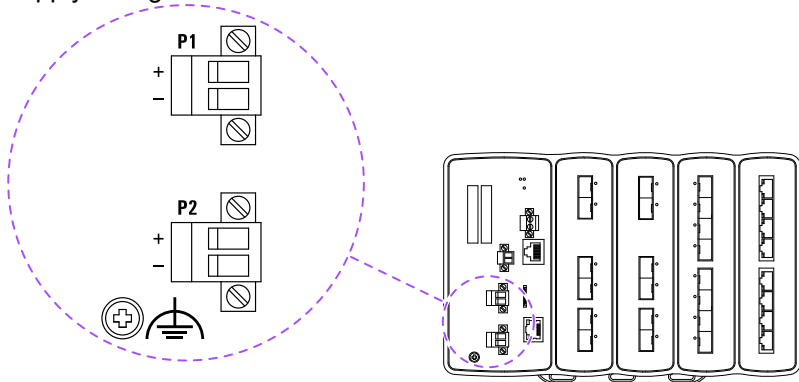
1	Rail lock slide for DIN rail mounting
---	---------------------------------------

3.3. Power supply

The following options for power supply are available:

Supply voltage with characteristic value F

Figure 4. Supply voltage: Example for the supply voltage location, supply voltage with characteristic value F



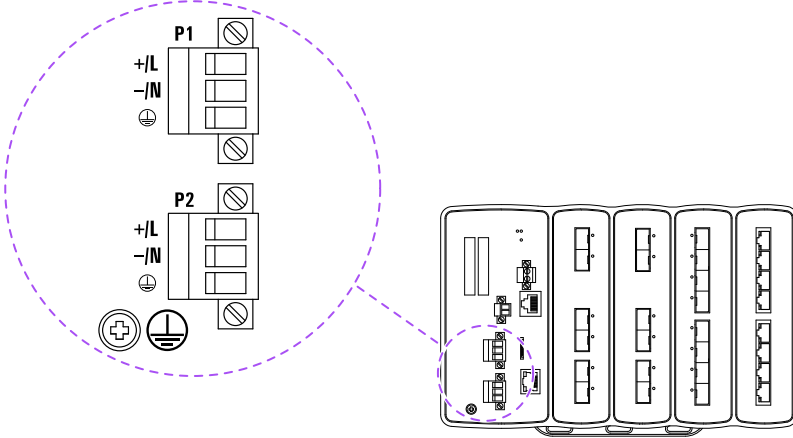
The supply voltage can be connected redundantly on the same minus potential.

The supply voltage is electrically isolated from the casing. The power supply units are protected against polarity reversal.

If one input is not connected, an LED signal lights up. You can deactivate this signal by changing the configuration in the device management. For more information on the LED signals, see [Device status on page 47](#).

Supply voltage with characteristic value K

Figure 5. Supply voltage: Example for the supply voltage location, supply voltage with characteristic value K



The supply voltage can be connected redundantly. Both inputs are electrically isolated from each other. The first input has priority.

The supply voltage is electrically isolated from the casing. The power supply units are protected against polarity reversal.

If one input is not connected, an LED signal lights up. You can deactivate this signal by changing the configuration in the device management. For more information on the LED signals, see [Device status on page 47](#).

3.3.1. Supply voltage range 24 V DC ... 48 V DC

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

Corresponds to the supply voltage characteristic value F. For more information, see [Device name and product code on page 30](#).

Figure 6. 2-pin terminal block with screw lock

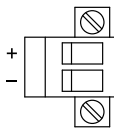


Table 4. Type and specification of the supply voltage, pin assignment on the device

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 16.8 V DC ... 60 V DC	+	Plus terminal of the supply voltage
		-	Minus terminal of the supply voltage

Note: The minus terminals of power supply 1 and power supply 2 are galvanically connected.

3.3.2. Supply voltage range 100 V AC ... 240 V AC, or 60 V DC ... 250 V DC

Corresponds to power supply characteristic value K in the product code. For more information, see [Device name and product code on page 30](#).

This BRP Family supply voltage characteristic value offers the following power supply option(s):

- 100 V AC ... 240 V AC (50 Hz ... 60 Hz) with 3-pin terminal block
- 60 V DC ... 250 V DC with 3-pin terminal block

Figure 7. Connecting supply voltage 100 V AC ... 240 V AC (50 Hz ... 60 Hz), or 60 V DC ... 250 V DC: 3-pin terminal blocks with screw lock

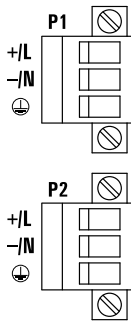


Table 5. Description supply voltage 100 V AC ... 240 V AC (50 Hz ... 60 Hz), or 60 V DC ... 250 V DC: Specifications

Type of supply voltage that can be connected	Specification of the supply voltage	Pin assignment	Meaning
AC voltage	Rated AC voltage range: 100 V AC ... 240 V AC, 50 Hz ... 60 Hz AC voltage range including maximum tolerances: 85 V AC ... 264 V AC, 47 Hz ... 63 Hz		PE (Protective grounding)
		N	Neutral conductor
		L	Outer conductor (phase)
DC voltage	Rated DC voltage range: 60 V DC ... 250 V DC DC voltage range including maximum tolerances: 48 V DC ... 280 V DC		PE (Protective grounding)
		-	Minus terminal of the supply voltage
		+	Plus terminal of the supply voltage

You find information on connecting the supply voltage in [Connecting the supply voltage on page 66](#).

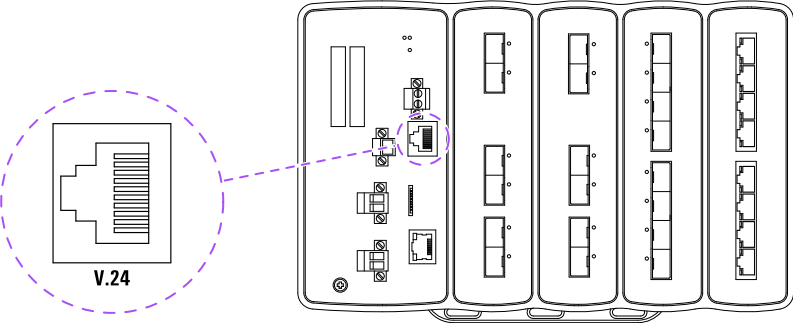
3.4. Management Interfaces

3.4.1. V.24 interface (external management)

A serial interface is provided on the RJ45 socket (V.24 interface) for the local connection of an external management station (VT100 terminal or PC with corresponding terminal emulation). This enables you to set up a connection to the Command Line Interface (CLI) and to the System Monitor.

The terminal cable is available as an accessory, see [Accessories on page 103](#).

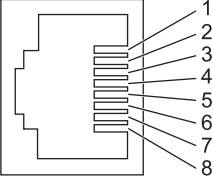
Figure 8. V.24 interface: Location on the device



VT100 terminal settings	
Data rate	9600 Baud
Data	8 bit
Stopbit	1 bit
Flow control	off
Parity	none

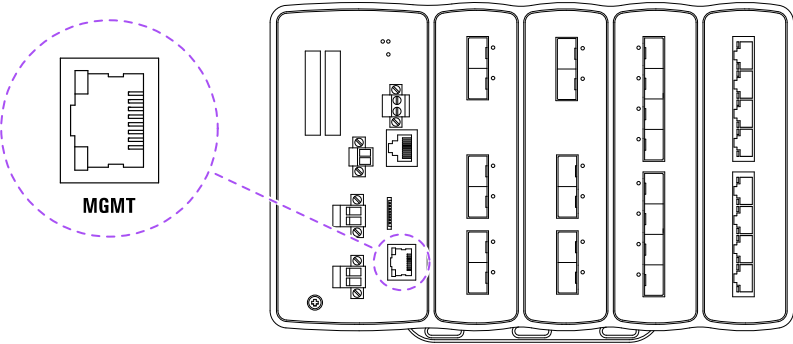
The socket housing is electrically connected to the front panel of the device. The V.24 interface is electrically isolated from the supply voltage.

Table 6. Pin assignment of the V.24 interface

	Pin	Function
	1	–
	2	–
	3	TXD
	4	CLI GND
	5	–
	6	RXD
	7	–
	8	–

3.4.2. Out-of-band management port

Figure 9. Out-of-band management interface MGMT: Location on the device



This port is an RJ45 socket.

The port allows you to connect network components according to the IEEE 802.3 10BASE-T/100BASE-TX/1000BASE-T standards.

This port supports:

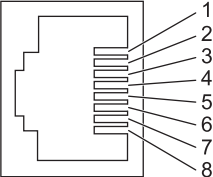
- Autonegotiation
- 10 Mbit/s half duplex mode, 100 Mbit/s half duplex mode,
- 10 Mbit/s full duplex mode, 100 Mbit/s full duplex mode, 1000 Mbit/s full duplex mode

The port allows you to manage the device and upload configurations via the following protocols:

- SNMP
- SSH
- Telnet
- FTP
- SCP
- HTTP/HTTPS

For more information, see the Manual Collection (User and Reference Manuals) at doc.hirschmann.com.

Table 7. Pin assignment of the out-of-band management port, RJ45 socket, MDI-X mode

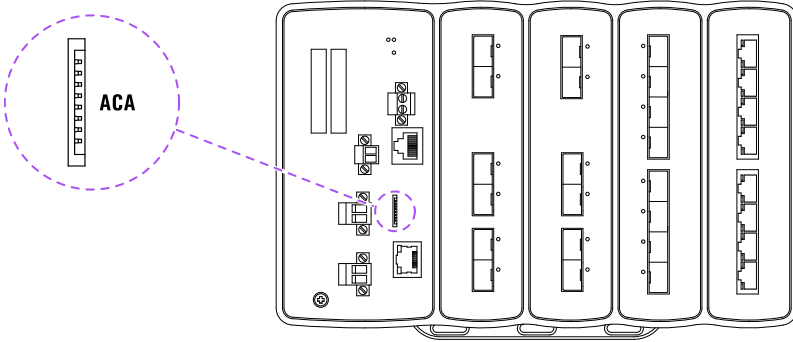
	Pin	10/100 Mbits/s	1000 Mbit/s
	1	RX+	BI_DB+
	2	RX-	BI_DB-
	3	TX+	BI_DA+
	4	-	BI_DD+
	5	-	BI_DD-
	6	TX-	BI_DA-
	7	-	BI_DC+
	8		BI_DC-

3.4.3. MicroSD card interface

Prerequisite:

Exclusively use Hirschmann microSD cards. Hirschmann microSD cards are available as accessories, see [Accessories on page 103](#).

Figure 10. ACA41 interface (microSD card): Location on the device (front side of the device)



The ACA41 microSD card interface allows you to connect the AutoConfiguration Adapter ACA41 storage medium. This storage medium is used for saving/loading the configuration data and diagnostic information, and for loading the software.

The lower LED display element in the LED group which is located above the 2-pin terminal block for the digital input informs you about the status of the interface. For more information on the LED location and status, see [Device status on page 47](#).

3.5. Ethernet ports

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

Note: The port/slot speed available on each port group and the number of ports depends on the data rate characteristic value of your device variant and the individual types of the chosen port group(s). For more information, see item 4 in [Device name and product code on page 27](#).

3.5.1. Twisted-pair port 10/100/1000 Mbit/s

This port is an RJ45 socket.

The 10/100/1000 Mbit/s twisted-pair port allows you to connect network components according to the standard IEEE 802.3 10BASE-T/100BASE-TX/1000BASE-T.

This port supports:

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

Delivery state:

- Autonegotiation activated

The pin assignment corresponds to MDI-X mode.

Table 8. Pin assignments of the 10/100/1000 Mbit/s twisted-pair port in 1000 Mbit/s mode, RJ45 socket, MDI-X mode

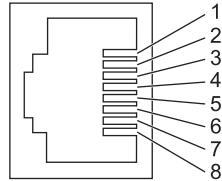
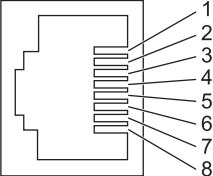
	Pin	Function
	1	BI_DB+
	2	BI_DB-
	3	BI_DA+
	4	BI_DD+
	5	BI_DD-
	6	BI_DA-
	7	BI_DC+
	8	BI_DC-

Table 9. Pin assignments of the 10/100/1000 Mbit/s twisted-pair port in 1000 Mbit/s mode, RJ45 socket, MDI-X mode

	Pin	10/100 Mbits/s	1000 Mbit/s
	1	RX+	BI_DB+
	2	RX-	BI_DB-
	3	TX+	BI_DA+
	4	-	BI_DD+
	5	-	BI_DD-
	6	TX-	BI_DA-
	7	-	BI_DC+
	8	-	BI_DC-

Note: The port/slot speed available on each port group and the number of ports depends on the data rate characteristic value of your device variant and the individual types of the chosen port group(s). For more information, see item 4 in [Device name and product code on page 27](#).

3.5.2. Twisted-pair port 100/1000/2500 Mbit/s

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:

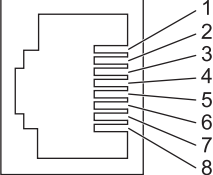
- Autonegotiation
- Autopolarity
- Autocrossing (if autonegotiation is activated)
- 100/1000/2500 Mbit/s full duplex

Delivery state: Autonegotiation activated

The port casing is electrically connected to the front panel.

The pin assignment corresponds to MDI-X.

Table 10. Pin assignments of the 100/1000/2500 Mbit/s twisted-pair port, RJ45 socket, MDI-X mode

	Pin	100 Mbits/s	1000 Mbit/s
	1	RX+	BI_DB+
	2	RX-	BI_DB-
	3	TX+	BI_DA+
	4	-	BI_DD+
	5	-	BI_DD-
	6	TX-	BI_DA-
	7	-	BI_DC+
	8	-	BI_DC-

3.5.3. F/O port 100/1000 Mbit/s

This port is an SFP slot.

The port allows you to connect network components according to standard IEEE 802.3 100BASE-FX/1000BASE-SX/1000BASE-LX.

This port supports:

- 100 Mbit/s full duplex mode
- 1000 Mbit/s full duplex mode

Delivery state:

- 100 Mbit/s full duplex mode when using a Fast Ethernet SFP transceiver
- 1000 Mbit/s full duplex mode when using a Gigabit Ethernet SFP transceiver

3.5.4. F/O port 1/2.5 Gbit/s

This port is an SFP slot.

The port allows you to connect network components according to the IEEE 802.3 1000BASE-SX/1000BASE-LX or 2500BASE-X standard.

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.

3.5.5. F/O port 1/2.5/10 Gbit/s

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, IEEE 802.3 2500BASE-X 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 10 Gigabit Ethernet SFP+ transceiver.

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

3.6. 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.

3.6.1. Device status

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

Figure 11. LED display elements for device status

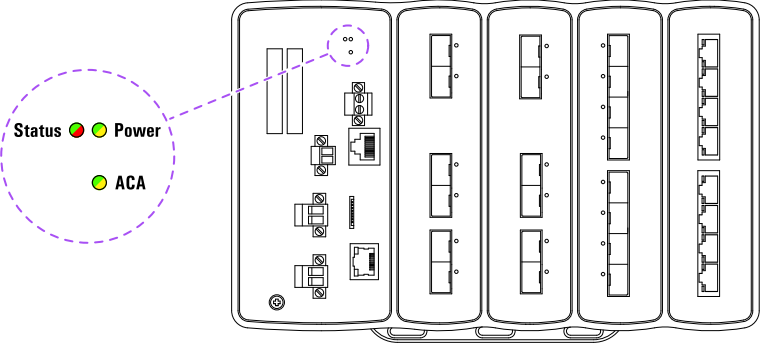


Table 11. Power LED: Color, activity and meaning

Color	Activity	Meaning
none	none	Supply voltage is too low or not available
yellow	lights up	Device variants with redundant power supply Supply voltage 1 or 2 is on
yellow	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

Table 12. Status LED: Color, activity and meaning

Color	Activity	Meaning
none	none	Device is starting and/or is not ready for operation
red	lights up	Device is ready for operation Device has detected at least one error in the monitoring results

Table 12. Status LED: Color, activity and meaning (continued)

Color	Activity	Meaning
red	flashes 1 × a period	The boot parameters used when the device has been started differ from the boot parameters saved. Start the device again.
red	flashes 4 × a period	Device has detected duplicate IP address
red/green	flashes alternately	Device is in recovery mode
green	lights up	Device is ready for operation Characteristics can be configured

Table 13. ACA LED: Color, activity and meaning

Color	Activity	Meaning
none	none	ACA storage medium not connected
yellow	lights up	ACA is not ready for operation
green	lights up	ACA storage medium connected
green	flashes 3 × a period	Device writes to/reads from the storage medium

3.6.2. Out-of-band management port status

Figure 12. LED display elements for out-of-band management interface

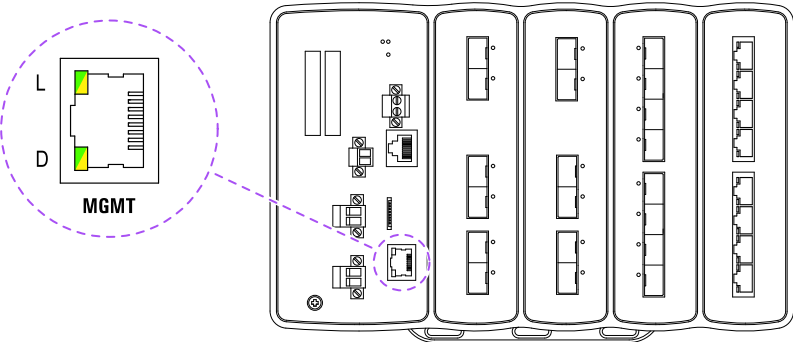


Table 14. Out-of-band management interface MGMT LEDs

LED	Display
L	Link state
D	Data Traffic

Table 15. MGMT LEDs: Color, activity and meaning

Color	Activity	Meaning
none	none	Device detects an invalid or missing link
green	lights up	Device detects a valid link
green	flashes 1 × a period	Port is switched to stand-by
green	flashes 3 × a period	Port is switched off
yellow	flashing alternately	Device is transmitting and/or receiving data
yellow	lights up	Device detects a non-supported SFP transceiver or a non-supported data rate
yellow	flashes 1 × a period	Device detects at least one unauthorized MAC address (Port Security Violation) and sends a trap
yellow	flashes 3 × a period	The device deactivates the relevant port (auto-deactivation)

3.6.3. Port status

These LEDs display port-related information.

Figure 13. SFP port status: Location of the port status display elements on the device (Example port 1 and port 2)

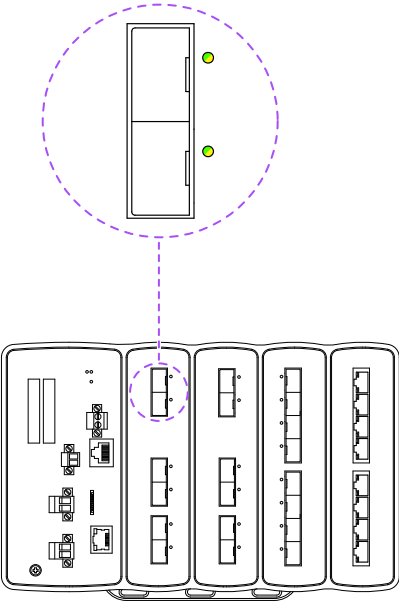
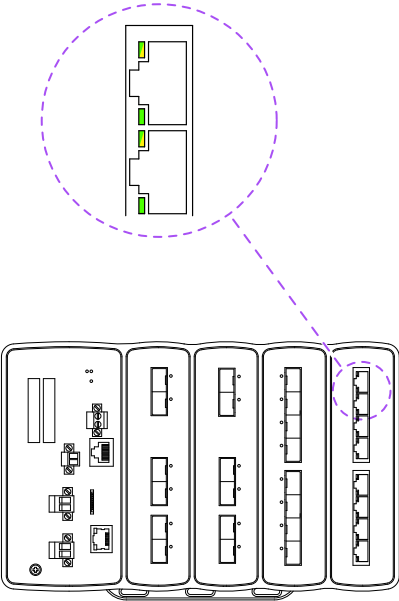


Figure 14. TP port status: Location of the port status display elements on the device (Example port 21 and port 22)



Note: Depending on the device variant and related port groups, the position of the LED display elements varies. For the available number and types of connections and port groups on your device, check the product code in [Device name and product code on page 27](#).

Table 16. Port status LED: Color, activity and meaning

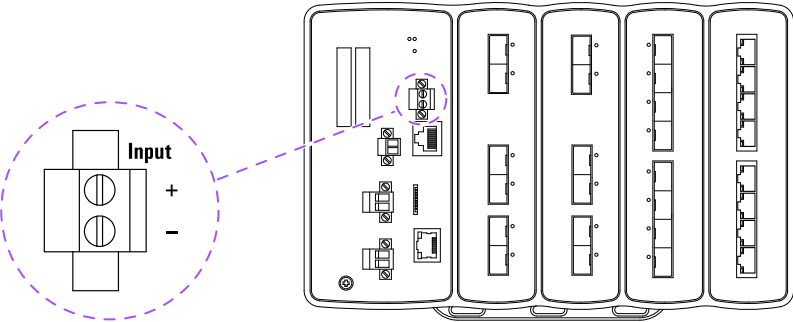
Color	Activity	Meaning
none	none	Device detects an invalid or missing link
yellow	flashing	Device is transmitting and/or receiving data
yellow	lights up	Device detects an unsupported SFP or a data rate mismatch
green	lights up	Device detects a valid link
green	flashes 1 × a period	Port is switched to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

3.7. Input/output interfaces

The following input/output interfaces are available:

3.7.1. Digital input

Figure 15. Location and connection of terminal block mounted on the device



The digital input allows you to capture and forward signals from digital sensors. In the configuration, you specify how the device uses the digital input.

You find detailed information on possible applications and the configuration of the digital input in the software user documentation at doc.hirschmann.com.

3.7.2. Signal contact

Figure 16. Signal contact: Location on the device

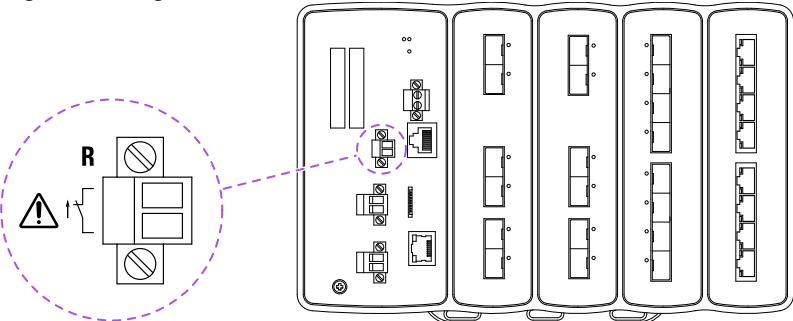


Table 17. Signal contact

Signal contact		
Nominal value	Supply with AC voltage	$I_{max} = 2\text{ A}$ at $U_{max} = 250\text{ V AC}$ resistive load
	Supply with DC voltage	$I_{max} = 2\text{ A}$ at $U_{max} = 30\text{ V DC}$ resistive load

Table 17. Signal contact (continued)

Signal contact	
$I_{\max} = 0.2\text{ A}$ at $U_{\max} = 125\text{ V DC}$ ¹ resistive load $I_{\max} = 0.1\text{ A}$ at $U_{\max} = 250\text{ V DC}$ ¹ resistive load	
Connection type	2-pin terminal block
Tightening torque	0.34 Nm (3 lb-in)
Minimum conductor cross-section	0.34 mm² ... 1.3 mm² (22 AWG ... 16 AWG)
Maximum conductor cross-section	1.3 mm² (16 AWG)

The signal contact allows you to control external devices or monitor device functions.

The potential-free signal contact (relay contact, closed circuit) reports through a break in contact:

- At least one power supply is inoperable.
- The device is not operational.
- Loss of connection to at least one port.
The link state can be masked for each port using the configuration. In the delivery state, link monitoring is inactive.

You can specify how the device uses the signal contact in the device configuration.

See the software user documentation for detailed information on possible applications and the configuration of the signal contact. You find the software user documentation at doc.hirschmann.com.

1. Not UL 62368-1 certified

4. Installation

The devices have been developed for practical application in a harsh industrial environment.

On delivery, the device is ready for operation.

To install and configure the device, perform the following steps:

- *Checking the package contents on page 53*
- *Installing the ACA41 microSD card (optional) on page 54*
- *Mounting the device on page 54*
- *Grounding the device on page 61*
- *Installing an SFP transceiver (optional) on page 64*
- *Connecting the digital input on page 65*
- *Connecting the signal contact on page 66*
- *Connecting the supply voltage on page 66*
- *Operating the device on page 70*
- *Connecting data cables on page 71*
- *Filling out the inscription label on page 72*

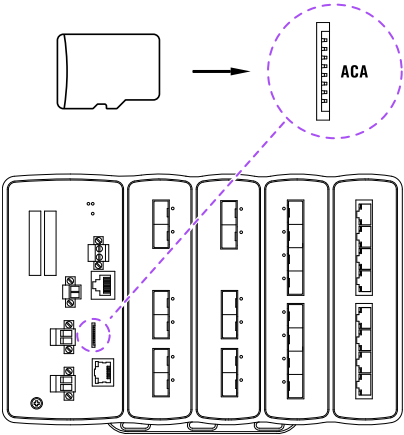
4.1. Checking the package contents

- Check whether the package includes all items named in *Scope of delivery on page 102*.
- Check the individual parts for transport damage.

4.2. Installing the ACA41 microSD card (optional)

Perform the following steps:

- Carefully push the ACA41 microSD card into the ACA41 microSD card slot on the device until the microSD card locks in place with a click.



4.3. Mounting the device

CAUTION



BURN HAZARD

Failure to follow the instructions could result in minor or moderate injury, or equipment damage.

The surfaces of the device casing may become hot. Avoid touching the device while it is operating.

If ambient temperatures are $\geq 45^{\circ}\text{C}$ ($\geq 113^{\circ}\text{F}$), exclusively install the device in “restricted access locations” according to EN 62368-1.

⚠ ATTENTION**RISQUE DE BRÛLURE**

Le non-respect des instructions peut entraîner des blessures légères ou des blessures modérées ou des dommages matériels.

Les surfaces du boîtier de l'équipement peuvent devenir chaudes. Évitez de toucher l'équipement lorsqu'il fonctionne.

Si les températures ambiantes sont $\geq 45^{\circ}\text{C}$ ($\geq 113^{\circ}\text{F}$), installez l'équipement exclusivement dans des « emplacements à accès restreint » conformément à la norme EN 62368-1.

⚠ WARNING**ELECTRIC SHOCK**

Failure to follow the instructions could result in death, serious injury, or equipment damage.

Never insert sharp or pointed objects (screwdrivers, wires, etc.) into the device or into the connection terminals for electric conductors.

Do not touch the connection terminals.

⚠ AVERTISSEMENT**CHOC ÉLECTRIQUE**

Le non-respect des instructions peut entraîner la mort, des blessures graves ou des dommages matériels.

N'insérez jamais d'objets coupants ou pointus (tournevis, fils, etc.) à l'intérieur de l'équipement ou dans les bornes de raccordement pour les conducteurs électriques.

Ne touchez pas aux bornes de raccordement.

⚠ WARNING**ELECTRIC SHOCK**

Failure to follow the instructions could result in death, serious injury, or equipment damage.

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.

⚠ AVERTISSEMENT**CHOC ÉLECTRIQUE**

Le non-respect des instructions peut entraîner la mort, des blessures graves ou des dommages matériels.

Installez cet équipement exclusivement dans une armoire électrique ou dans un emplacement à accès restreint conformément à la norme CEI/EN 62368-1, auquel seul le personnel de maintenance a accès.

⚠ CAUTION**OVERHEATING OF THE DEVICE**

Failure to follow the instructions could result in minor or moderate injury, or equipment damage.

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

⚠ ATTENTION**SURCHAUFFE DE L'ÉQUIPEMENT**

Le non-respect des instructions peut entraîner des blessures légères ou des blessures modérées ou des dommages matériels.

Vérifiez que toutes les ailettes d'aération sont dégagées lors de l'installation de l'équipement. Évitez de toucher l'équipement lorsqu'il est en marche.

You have the following option(s) for mounting your device:

- *Mounting the device onto the DIN rail on page 58*

4.3.1. Mounting the device onto the DIN rail

Prerequisites:

Note: Failure to observe the mounting instructions may result in damage to the locking gate, device casing or DIN rail.

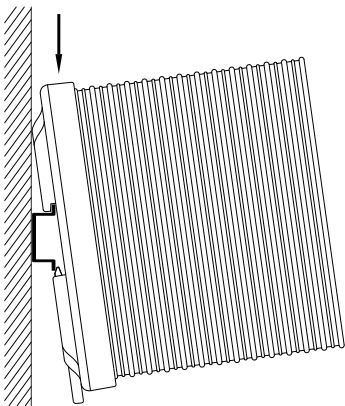
- The device is designed to be mounted on a 35 mm (1.38 in) DIN rail in accordance with DIN EN 60715.
- The mounting height of the device must not exceed 2 m (78.74 in).
- Verify that the minimum clearance at the ventilation slots of 5 cm (2 in) is maintained to meet the climatic conditions during operation.

Perform the following steps:

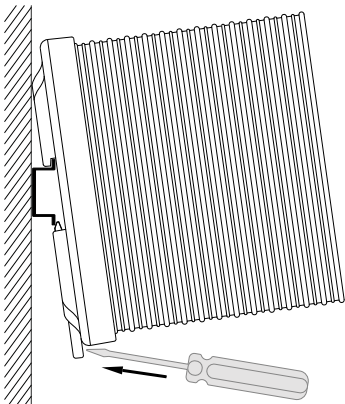
1. Slide the upper snap-in guide of the device onto the DIN rail.

Verify that the snap-in guide of the device is correctly placed onto the top part of the DIN rail.

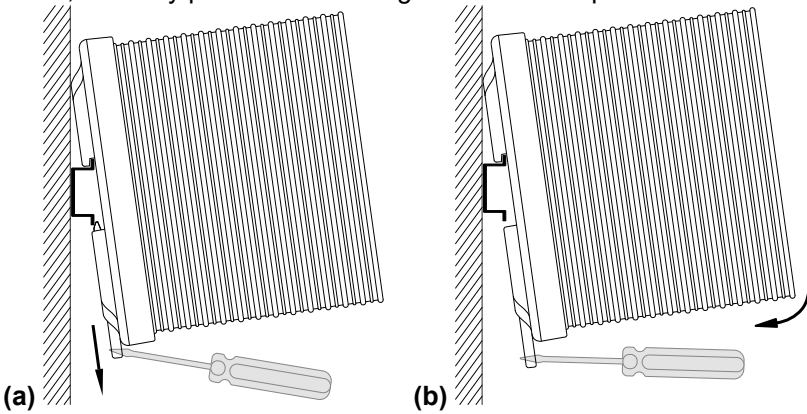
Do NOT press the device against the DIN rail or the flat surface behind the DIN rail.



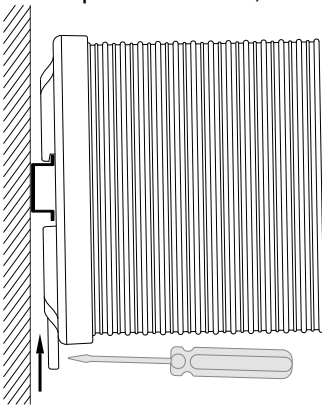
2. Insert a tool (for example a screwdriver) horizontally into the locking gate on the underside of the device.



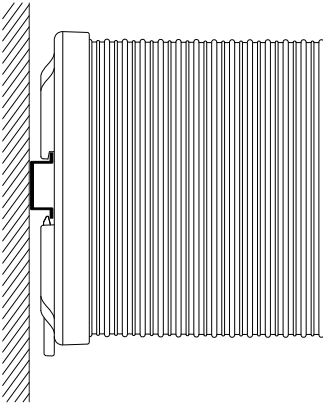
3. Pull the rail lock slide downwards **(a)** and, with the rail lock slide pulled down, carefully push the device against the lower part of the DIN rail **(b)**.



4. To snap in the device, carefully slide the rail lock slide back up.



The device is mounted onto the DIN rail:



4.4. Grounding the device

⚠ CAUTION	
	ELECTRIC SHOCK Failure to follow the instructions could result in minor or moderate injury, or equipment damage. Ground the device before connecting any other cables.

⚠ ATTENTION	
	CHOC ÉLECTRIQUE Le non-respect des instructions peut entraîner des blessures légères ou des blessures modérées ou des dommages matériels. Mettez l'équipement à la terre avant de connecter tout autre câble.

Figure 17. Location of the ground connection (functional earth screw) on the device

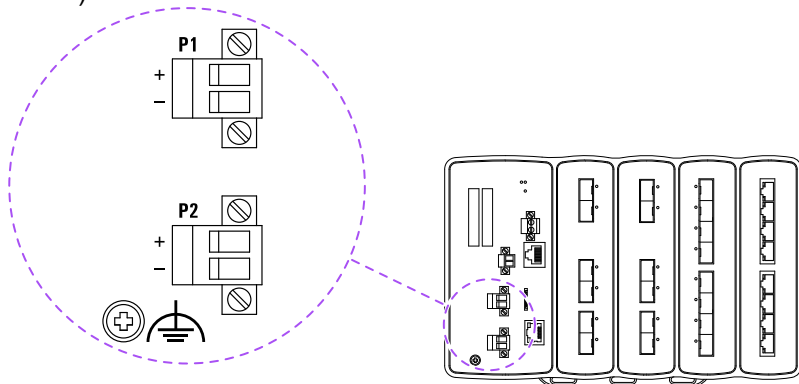
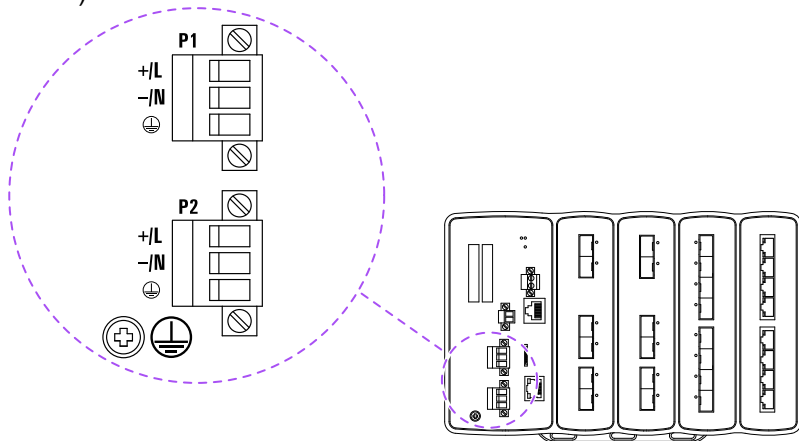


Figure 18. Location of the ground connection (protective earth screw) on the device



Perform the following steps:

- Ground the device via the ground screw.

For information on the prescribed tightening torque, see [General data on page 82](#)

4.5. Connecting the ferrite

Exclusively applies to the following device variants:

- Device variants featuring supply voltage with characteristic value K.

For more information, see [Device name and product code on page 27](#).

Device variants featuring supply voltage with characteristic value F do not require ferrites.

In order to maintain EMC conformity, connect both of the supplied ferrites to the voltage input via the power supply cable.

Perform the following steps:

- Insert the power supply cable through the ferrite 1 times.
- Position the ferrite as close as possible to the voltage input (max. distance 5 cm (2 in)).

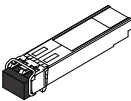
4.6. Installing an SFP transceiver (optional)

Prerequisites:

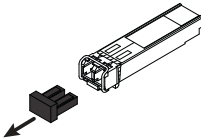
Exclusively use Hirschmann SFP transceivers. Transceivers are available as accessories, see [Accessories on page 103](#).

Perform the following steps:

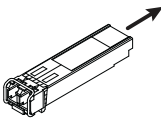
1. Take the SFP transceiver out of the transport packaging.



2. Remove the protection cap from the SFP transceiver.



3. Push the SFP transceiver with the lock closed into the slot until it latches in.



4.7. Connecting the digital input

Figure 19. Terminal block mounted on the device

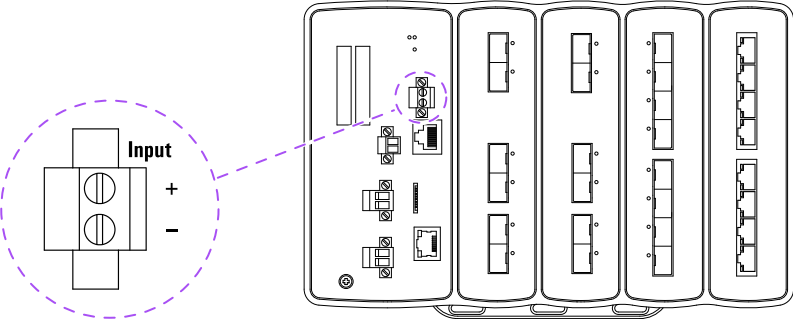


Table 18. Digital input: pin assignment

Pin	Signal, terminal	Function
1	DI (+)	Signal input
2	DI (-)	Reference potential

Perform the following steps:

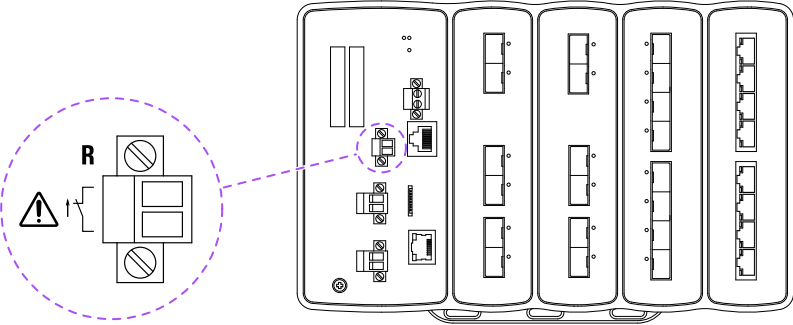
- 1. Remove the terminal connector from the device.
- 2. Connect the wires according to the pin assignment on the device with the clamps.
- 3. Fasten the wires in the terminal block by tightening the terminal screws.

For more information on the tightening torque, see [Digital input on page 84](#).

- 4. Mount the terminal block on the device using screws.

4.8. Connecting the signal contact

Figure 20. Connecting the signal contact: Location on the device



Perform the following steps:

- Connect the signal contact lines with the terminal block connections.
- Fasten the wires in the terminal block by tightening the terminal screws.

For information on the prescribed tightening torque, see [General data on page 82](#).

4.9. Connecting the supply voltage

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

⚠ WARNING	
	ELECTRIC SHOCK Failure to follow the instructions could result in death, serious injury, or equipment damage. Exclusively connect the supply voltage that corresponds to the type plate of your device.

 AVERTISSEMENT**CHOC ÉLECTRIQUE**

Le non-respect des instructions peut entraîner la mort, des blessures graves ou des dommages matériels.

Branchez exclusivement la tension d'alimentation correspondant à la plaque signalétique de votre équipement.

 WARNING**ELECTRIC SHOCK**

Failure to follow the instructions could result in death, serious injury, or equipment damage.

Never insert sharp or pointed objects (screwdrivers, wires, etc.) into the device or into the connection terminals for electric conductors.

Do not touch the connection terminals.

 AVERTISSEMENT**CHOC ÉLECTRIQUE**

Le non-respect des instructions peut entraîner la mort, des blessures graves ou des dommages matériels.

N'insérez jamais d'objets coupants ou pointus (tournevis, fils, etc.) à l'intérieur de l'équipement ou dans les bornes de raccordement pour les conducteurs électriques.

Ne touchez pas aux bornes de raccordement.

4.9.1. Supply voltage range 100 V AC ... 240 V AC, or 60 V DC ... 250 V DC

Corresponds to power supply characteristic value K in the product code. For more information, see [Device name and product code on page 30](#).

Figure 21. Connecting supply voltage 100 V AC ... 240 V AC (50 Hz ... 60 Hz), or 60 V DC ... 250 V DC: 3-pin terminal blocks with screw lock

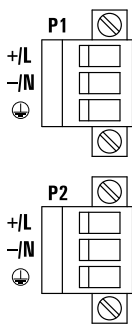


Table 19. Connecting supply voltage 100 V AC ... 240 V AC (50 Hz ... 60 Hz), or 60 V DC ... 250 V DC: Specifications

Type of supply voltage that can be connected	Specification of the supply voltage	Pin assignment	Meaning
AC voltage	Rated AC voltage range: 100 V AC ... 240 V AC, 50 Hz ... 60 Hz AC voltage range including maximum tolerances: 85 V AC ... 264 V AC, 47 Hz ... 63 Hz		PE (Protective grounding)
		N	Neutral conductor
		L	Outer conductor (phase)
DC voltage	Rated DC voltage range: 60 V DC ... 250 V DC DC voltage range including maximum tolerances: 48 V DC ... 280 V DC		PE (Protective grounding)
		+	Plus terminal of the supply voltage
		-	Minus terminal of the supply voltage

Perform the following steps:

- For connecting the voltage supply, verify the required conditions in [Requirements for connecting the supply voltage on page 17](#).
- Ensure all connections are voltage-free.
- Connect the power supply conductor wires to the terminal block(s) according to the pin assignment .
- Secure the conductor wires in the terminal block(s) by tightening the screws on the terminal block(s).
- Install the terminal block(s) on the device.

4.9.2. Supply voltage range 24 V DC ... 48 V DC

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

Corresponds to the supply voltage characteristic value F. For more information, see [Device name and product code on page 30](#).

Figure 22. 2-pin terminal block with screw lock

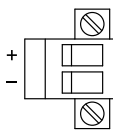


Table 20. Type and specification of the supply voltage, pin assignment on the device

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

For **EVERY** supply voltage to be connected, perform the following 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.

For information on the prescribed tightening torque, see [General data on page 82](#).

4.10. Operating the device

 WARNING	
	ELECTRIC SHOCK Failure to follow the instructions could result in death, serious injury, or equipment damage. Exclusively connect the supply voltage that corresponds to the type plate of your device.
 AVERTISSEMENT	
	CHOC ÉLECTRIQUE Le non-respect des instructions peut entraîner la mort, des blessures graves ou des dommages matériels. Branchez exclusivement la tension d'alimentation correspondant à la plaque signalétique de votre équipement.

Note: Observe the instructions in [Requirements for connecting electrical wires on page 16](#).

When a powered supply voltage is connected, the device starts up.

Perform the following steps:

- Enable the supply voltage.

You find detailed information on the operation of the device in the Manual Collection (User and Reference Manuals) at doc.hirschmann.com.

4.11. 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 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 ducts.
- To comply with EN 50121-4 EMC requirements, exclusively use shielded copper data cables.
- Verify that power supply cables and data cables do not run parallel over longer distances. If reducing the inductive coupling is necessary, verify that the power supply cables and data cables cross at a 90° angle.
- Connect the data cables according to your requirements. For more information, see [Ethernet ports on page 42](#).

Perform the following steps:

- Connect the data cables.

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

4.12. Filling out the inscription label

The information field for the IP address helps you identify your device.

5. Basic settings

2 or more devices configured with the same IP address can cause unpredictable operation of your network.

Perform the following work step:

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 IP addresses:

- AutoConfiguration Adapter
- Configuration via BOOTP
- Configuration via DHCP (Option 82)
- Configuration via DHCP (state on delivery)
- Input via the Industrial HiVision application. You find further information about the application Industrial HiVision at:
Industrial HiVision
<https://www.belden.com/products/industrial-networking-cybersecurity/software-solutions/network-management-software/industrial-hivision-network-management-software>

For more information, see the Manual Collection (User and Reference Manuals) at doc.hirschmann.com.

5.1. Default settings

- Ethernet ports: link status is not evaluated (signal contact)
- IP address: The device looks for its IP address parameters using DHCP
- Management password:
Login: user, password: public (read only)
Login: admin, password: private (read/write)
- Optical ports: Full duplex

- Twisted-pair ports: Autonegotiation
- Rapid Spanning Tree Protocol (RSTP): enabled
- V.24 data rate: 9600 Baud
- Redundancy manager: disabled
- Ring redundancy: disabled

5.2. 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 Proview Explorer the first time you log on to the device.
- Log on to the device with the default user name "admin" and the default password "private". On successful login, 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.

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

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

6. Monitoring ambient conditions

6.1. Monitoring the ambient air temperature

Operate the device below the specified maximum ambient air temperature exclusively.

For more information, see [Climatic conditions during operation on page 87](#).

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 temperature displayed is thus only an approximate indication of the ambient conditions present during device operation.

Exclusively operate the device within the specified ambient air temperature range.

6.2. Monitoring the ambient humidity

Exclusively operate the device within the specified ambient humidity range.

For more information, see [General data on page 82](#).

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, see the Manual Collection (User and Reference Manuals) at doc.hirschmann.com.

7. 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.
- Relays are subject to natural wear. This wear depends 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 at:
www.belden.com
- Depending on the pollution degree of the operating environment, check regularly that the cooling fins and surfaces of the device are not obstructed.
- 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.

You find information on settling complaints at:

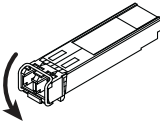
<https://my.belden.com>

8. Disassembly

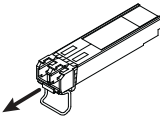
8.1. Removing an SFP transceiver (optional)

Perform the following steps:

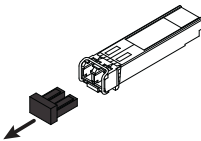
1. Open the locking mechanism of the SFP transceiver.



2. Pull the SFP transceiver out of the slot via the open locking mechanism.



3. Close the SFP transceiver with the protection cap.



8.2. Removing the device from the DIN rail

Prerequisites:



WARNING



ELECTRIC SHOCK
Failure to follow the instructions could result in death, serious injury, or equipment damage.

Disconnect the grounding only after disconnecting all other cables.



AVERTISSEMENT



CHOC ÉLECTRIQUE
Le non-respect des instructions peut entraîner la mort, des blessures graves ou des dommages matériels.

Ne débranchez la mise à la terre qu'après avoir débranché tous les autres câbles.

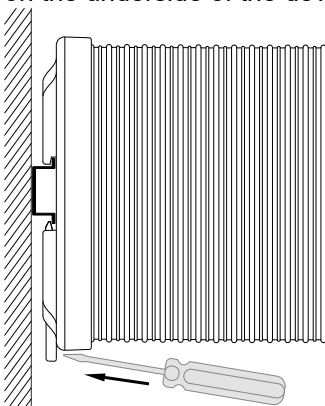
Perform the following steps:

- 1. Disconnect the data cables.
- 2. Disable the supply voltage.

The device contains a built-in energy storage. When you disable the supply voltage, the device may thus continue to run for a few seconds before switching off.

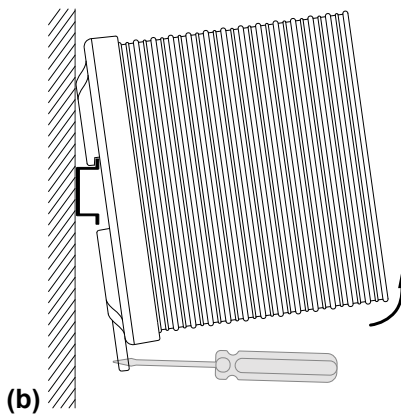
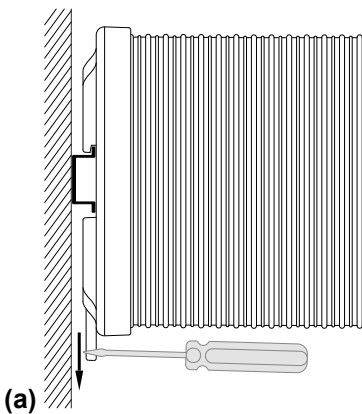
- 3. Disconnect the terminal blocks.

4. Disconnect the grounding.
5. Insert a tool (for example a screwdriver) horizontally into the rail lock slide on the underside of the device.

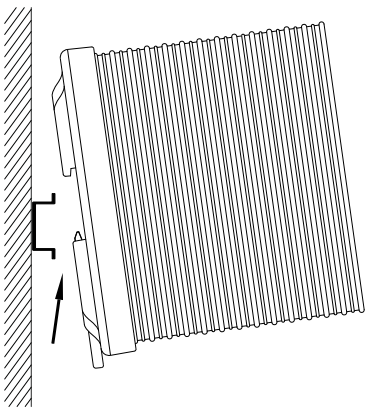


6. Pull the rail lock slide downwards **(a)** and, with the rail lock slide pulled down, carefully tilt the device away from the DIN rail. **(b)**.

Do NOT press the device against the DIN rail or the flat surface behind the DIN rail.



7. Detach the device from the DIN rail by lifting it upwards from the DIN rail.

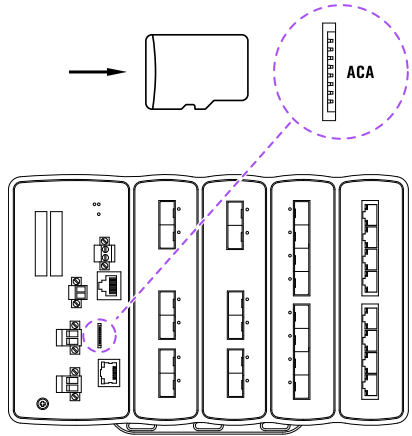


The device is removed from the DIN rail.

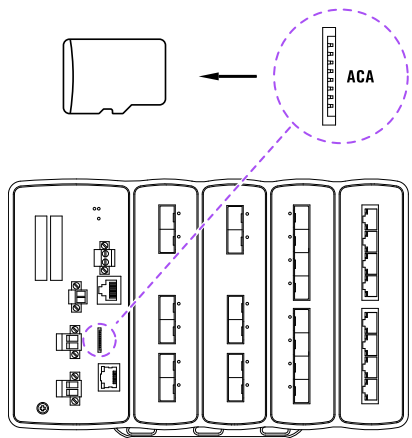
8.3. Removing the ACA41 microSD card (optional)

Perform the following steps:

1. Carefully push the ACA41 microSD card into the ACA41 microSD card slot until the release mechanism clicks noticeably.



2. As shown, pull the ACA41 microSD card out of the ACA41 microSD card slot on the device.



9. Technical data

9.1. General data

Dimensions	See Dimension drawings on page 85 .	
Weight	Depending on device variant	3.5 kg ... 4.5 kg (7.7 lb ... 10 lb)
Pollution degree	2	
Laser protection	Class 1 in compliance with IEC 60825-1	
Degree of protection	IP40	
Ground connection	Screw type	M3
	Tightening torque	0.34 Nm (3 lb-in)
	min. conductor cross-section	0.75 mm² (18 AWG)

9.2. Supply voltage

9.2.1. Supply voltage range 24 V DC ... 48 V DC

Corresponds to power supply characteristic value F in the [Device name and product code on page 30](#).

Table 21. Supply voltage

Power supply unit with supply voltage characteristic value F	Rated voltage	24 V DC ... 48 V DC	
	Voltage range including maximum tolerances	16.8 V DC ... 60 V DC	
	Connection type	2-pin terminal block	
		Tightening torque	0.34 Nm (3 lb-in)
		min. conductor cross-section	1 mm² (16 AWG)
		max. conductor cross-section	2.5 mm² (14 AWG)
	Power loss buffer	>100 ms	
	Back-up fuse for each voltage input	Nominal rating:	20 A
		Characteristic:	slow blow
	Overload current protection on the device	Non-replaceable fuse	

Table 21. Supply voltage (continued)

	Peak inrush current	<8 A
9.2.2. Supply voltage range 100 V AC ... 240 V AC, or 60 V DC ... 250 V DC		
Corresponds to power supply characteristic value K in the <i>Device name and product code</i> on page 30.		
Rated voltage range AC:	100 V AC ... 240 V AC, 50 Hz ... 60 Hz	
Voltage range AC incl. maximum tolerances:	85 V AC ... 264 V AC, 47 Hz ... 63 Hz	
Rated voltage range DC:	60 V DC ... 250 V DC	
Voltage range DC incl. maximum tolerances:	48 V DC ... 280 V DC	
Connection type	3-pin terminal block	
	Tightening torque	0.5 Nm (4.4 lb-in)
	min. conductor cross-section	AC voltage: 0.75 mm² (18 AWG) DC voltage: 0.75 mm² (18 AWG)
	max. conductor cross-section	2.5 mm² (14 AWG)
Power loss buffer	>100 ms	
Back-up fuse for each voltage input	Nominal rating:	20 A
	Characteristic:	slow blow
Overload current protection on the device	Non-replaceable fuse	
Peak inrush current	<5 A	

9.3. Power consumption/power output

Table 22. Power consumption/power output

Product code	Maximum power consumption	Maximum power output
BRP30/40/50/60...	40 W	137 Btu (IT)/h

9.4. Digital input

Digital input	
Connection type	2-pin terminal block with screw lock
	Tightening torque 0.5 Nm (4.4 lb-in)
	min. conductor cross-section 0.08 mm² (AWG 28)
	max. conductor cross-section 2.5 mm² (AWG12)
Maximum permitted input voltage range	between -32 V DC and +32 V DC
Nominal input voltage	+24 V DC
Input voltage, low level, status "0"	-0.3 V DC ... +5 V DC
Input voltage, high level, status "1"	+11 V DC ... +30 V DC
Maximum input current at nominal input voltage	15 mA
Permitted closed-circuit current for 2-wire sensors	1.5 mA
Input characteristic according to IEC 61131-2 (current-consuming)	Type 3

9.5. Signal contact

Table 23. Signal contact

Signal contact		
Nominal value	Supply with AC voltage	$I_{\max} = 2\text{ A}$ at $U_{\max} = 250\text{ V AC}$ resistive load
	Supply with DC voltage	$I_{\max} = 2\text{ A}$ at $U_{\max} = 30\text{ V DC}$ resistive load
		$I_{\max} = 0.2\text{ A}$ at $U_{\max} = 125\text{ V DC}^2$ resistive load
		$I_{\max} = 0.1\text{ A}$ at $U_{\max} = 250\text{ V DC}^2$ resistive load
Connection type	2-pin terminal block	
	Tightening torque	0.34 Nm (3 lb-in)
	Minimum conductor cross-section	0.34 mm² ... 1.3 mm² (22 AWG ... 16 AWG)
	Maximum conductor cross-section	1.3 mm² (16 AWG)

2. Not UL 62368-1 certified

9.6. Dimension drawings

9.6.1. Dimension drawings

For more information on the device variants, see [Device name and product code on page 27](#).

Figure 23. BRP device variants - Front view

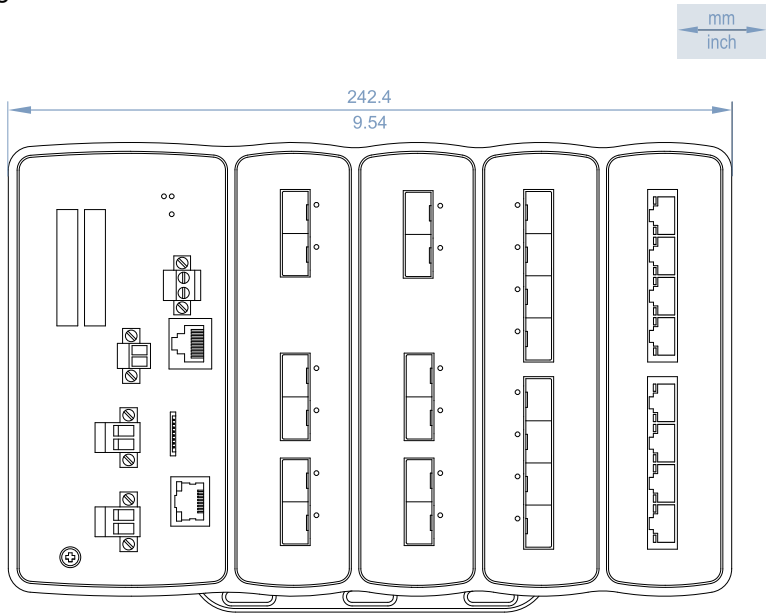


Figure 24. BRP device variants - Side view

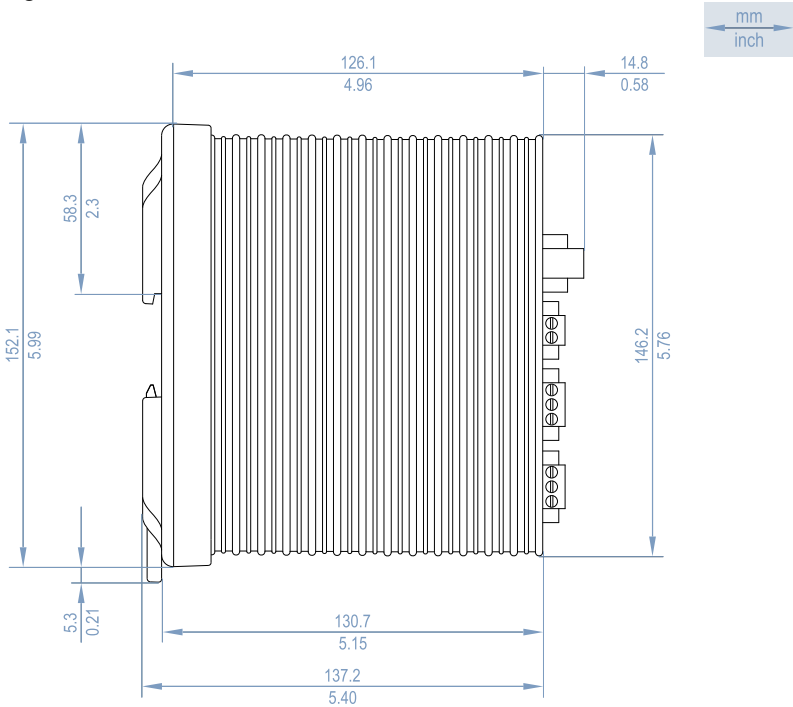


Figure 25. BRP device variants - Top view

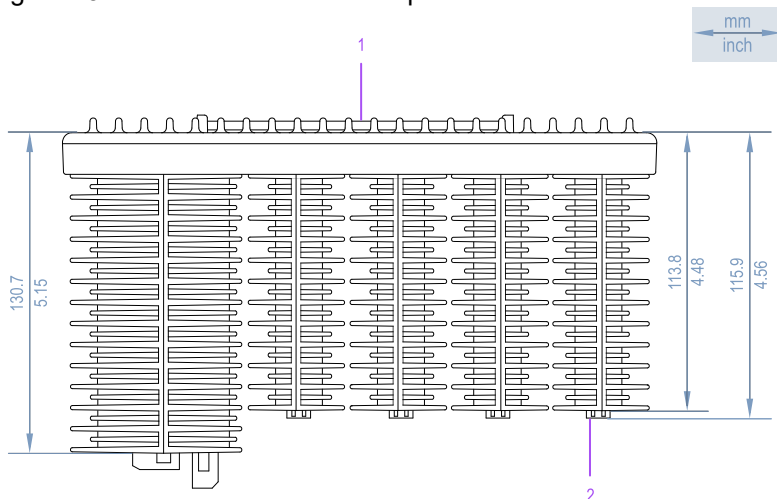


Table 24. Top view: Description of device elements

1	Rail lock slide
2	SFP slot (depending on the device variant)

9.7. Climatic conditions during operation

Table 25. Climatic conditions during operation

Climatic conditions during operation			
Ambient air temperature ³	up to 2000 m ASL (6562 ft ASL)	Operating temperature range characteristic value S	Standard: 0 °C ... +60 °C (+32 °F ... +140 °F)
		Operating temperature range characteristic value C	Standard: 0 °C ... +60 °C (+32 °F ... +140 °F) with Conformal Coating (CC)
		Operating temperature range characteristic value T	Extended: -40 °C ... +70 °C (-40 °F ... +158 °F) -40 °C ... +85 °C (-40 °F ... +185 °F) for 16 hours (tested in accordance with IEC 60068-2-2) ⁴
		Operating temperature range characteristic value E	Extended: -40 °C ... +70 °C (-40 °F ... +158 °F) with Conformal Coating (CC)

3. Temperature of the ambient air at a distance of 5 cm (2 in) from the device

4. Exclusively use SFP transceivers with extension EEC. If you use SFP transceivers without extension EEC, the standard temperature range applies.

Table 25. Climatic conditions during operation (continued)

Climatic conditions during operation		
		-40 °C ... +85 °C (-40 °F ... +185 °F) for 16 hours (tested in accordance with IEC 60068-2-2) ⁵
up to 4000 m ASL (13123 ft ASL)	Operating temperature range characteristic value S	Standard: 0 °C ... +50 °C (+32 °F ... +122 °F)
	Operating temperature range characteristic value C	Standard: 0 °C ... +50 °C (+32 °F ... +122 °F) with Conformal Coating (CC)
	Operating temperature range characteristic value T	Extended: -40 °C ... +60 °C (-40 °F ... +140 °F)
	Operating temperature range characteristic value E	Extended: -40 °C ... +60 °C (-40 °F ... +140 °F) with Conformal Coating (CC)
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)

9.8. Climatic conditions during storage

Table 26. Climatic conditions during storage

Climatic conditions during storage		
Ambient temperature	-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		5 % ... 95 % (non-condensing)
Air pressure		min. 600 hPa (+4000 m ASL; +13123 ft ASL) max. 1060 hPa (-400 m ASL; -1312 ft ASL)

9.9. Derating

SFP transceivers become warm during operation. Depending on the type and number of SFP transceivers used, deratings are in place to keep the internal device temperature within permissible limits. If applicable, subtract the temperature derating in Kelvin (K) from the maximum device temperature

5. Exclusively use SFP transceivers with extension EEC. If you use SFP transceivers without extension EEC, the standard temperature range applies.

in degrees Celsius (°C) to get the individual maximum operating temperature for your device. For derating purposes, SFP transceivers are classed into High Power (HP) and Low Power (LP) variants. For more information on the classification, see [Derating depending on SFP transceiver class on page 89](#).

9.9.1. Derating depending on SFP transceiver class

Exclusively applies to operating temperature range characteristic values T and E. For more information, see [Device name and product code on page 30](#).

Note: A stable airflow of at least 200 LFM on the device needs to be provided.

9.9.1.1. Power class classification of SFP transceivers

Table 27. Power class classification of SFP transceivers: Fast Ethernet (100 Mbit/s) SFP transceivers

Fast Ethernet SFP transceiver	SFP power class	Order number
M-FAST SFP-MM/LC	HP	943865001
M-FAST SFP-MM/LC EEC	HP	943945001
M-FAST SFP-SM/LC	LP	943866001
M-FAST SFP-SM/LC EEC	LP	943946001
M-FAST SFP-SM+/LC	HP	943867001
M-FAST SFP-SM+/LC EEC	HP	943947001
M-FAST SFP-LH/LC	HP	943868001
M-FAST SFP-LH/LC EEC	HP	943948001

Table 28. Power class classification of SFP transceivers: Gigabit Ethernet (1000 Mbit/s) SFP transceivers

Product code	SFP power class	Order number
M-SFP-SX/LC	LP	943014001
M-SFP-SX/LC EEC	LP	943896001
M-SFP-MX/LC EEC	HP	942108001
M-SFP-LX/LC	LP	943015001
M-SFP-LX/LC EEC	LP	943897001
M-SFP-LX+/LC	LP	942023001

Table 28. Power class classification of SFP transceivers: Gigabit Ethernet (1000 Mbit/s) SFP transceivers (continued)

Product code	SFP power class	Order number
M-SFP-LX+/ LC EEC	LP	942024001
M-SFP-LH/LC	HP	943042001
M-SFP-LH/LC EEC	HP	943898001

Table 29. Power class classification of SFP transceivers: 2.5 Gigabit Ethernet (2500 Mbit/s) SFP transceivers

Product code	SFP power class	Order number
M-SFP-2.5-MM/LC EEC	LP	942162001
M-SFP-2.5-SM/LC EEC	HP	942163001
M-SFP-2.5-SM/LC EEC	HP	942164001
M-SFP-2.5-LH/LC	HP	942220001

Table 30. Classification of 10 Gigabit Ethernet SFP+ transceivers

Product code	SFP power class	Order number
M-SFP-10-SR/LC-EEC	LP	942210001
M-SFP-10-LR/LC-EEC	HP	942211001

9.10. Immunity

Table 31. Immunity: Standard applications

EN 61131-2, CE, FCC – applies to all devices

Applicable standard	Behavior	Frequency
IEC 60068-2-6, test Fc	Vibration	5 Hz ... 8.4 Hz with 3.5 mm (0.14 in) amplitude
IEC 60068-2-6, test Fc	Vibration	8.4 Hz ... 150 Hz with 1 g
IEC 60068-2-27, test Ea	Shock	15 g at 11 ms

Table 32. Immunity: Marine applications

Applicable standard	Behavior	Frequency
IEC 60068-2-6, test Fc	Vibration	2 Hz ... 13.2 Hz with 1 mm (0.04 in) amplitude
IEC 60068-2-6, test Fc	Vibration	13.2 Hz ... 100 Hz with 0.7 g

Table 33. Immunity: Railway applications (on vehicles)

According to EN 50121-4

Applicable standard	Behavior	Frequency
IEC 60068-2-6, test Fc	Vibration	Operating 5 Hz ... 150 Hz, Broadband noise vertical: 1.0 m/s ² (rms) horizontal: 0.7 m/s ² (rms)
IEC 60068-2-6, test Fc	Vibration	Non-operating: 5 Hz ... 150 Hz, Broadband noise vertically: 5.72 m/s ² (rms) horizontally: 3.96 m/s ² (rms)
IEC 60068-2-27, test Ea	Shock	vertical: 30 m/s ² , 30 ms horizontal: 50 m/s ² , 30 ms

Table 34. Immunity: Railway applications (trackside)

Applicable standard	Behavior	Frequency
IEC 60068-2-6, test Fc	Vibration	–
IEC 60068-2-6, test Fc	Vibration	–
IEC 60068-2-27, test Ea	Shock	–

Table 35. Immunity: Substation applications

EN 61850-3, IEEE 1613 – applies to devices with the approval code WW

Applicable standard	Behavior	Frequency
IEC 60068-2-6, test Fc	Vibration	2 Hz ... 9 Hz with 3 mm (0.11 in) amplitude
IEC 60068-2-6, test Fc	Vibration	9 Hz ... 200 Hz with 1.0 g
IEC 60068-2-6, test Fc	Vibration	200 Hz ... 500 Hz with 1.5 g
IEC 60068-2-27, test Ea	Shock	10 g at 11 ms
EN 60255-21-2	Bump	10 g at 16 ms

9.11. Electromagnetic compatibility (EMC)

9.11.1. EMC interference emission

Table 36. EMC interference emission: Standard applications

EN 61131-2, CE, FCC – applies to all devices

Applicable standard	Connection type	Specification
Radiated emission		
FCC 47 CFR Part 15		Class A
EN 55032		Class A
Conducted emission		
EN 55032		Class A

Table 37. EMC interference emission: Marine applications

Applicable standard	Specification
DNV Guidelines	EMC B

Table 38. EMC interference emission: Railway applications (trackside)

According to EN 50121-4

Applicable standard	Specification
EN 61000-6-4	Fulfilled

Table 39. EMC interference emission: Substation applications

Applicable standard	Connection type	Specification
Radiated emission		
FCC 47 CFR Part 15		Class A
EN 55032		Class A
EN 61000-6-4		Fulfilled
Conducted emission		
FCC 47 CFR Part 15	Supply connection	Class A
EN 55032	Supply connection	Class A
EN 55032	Telecommunication connections	Class A

Table 39. EMC interference emission: Substation applications (continued)

Applicable standard	Connection type	Specification
EN 61000-6-4	Supply connection	Fulfilled
EN 61000-6-4	Telecommunication connections	Fulfilled

9.11.2. EMC interference immunity

Table 40. EMC interference immunity: Standard applications

EN 61131-2, CE, FCC – applies to all devices

Applicable standard	Connection type	Voltage
Electrostatic discharge		
EN 61000-4-2 IEEE C37.90.3	Contact discharge	±4 kV
EN 61000-4-2 IEEE C37.90.3	Air discharge	±8 kV
Electromagnetic field		
EN 61000-4-3	80 MHz ... 6000 MHz	max. 10 V/m
Fast transients (burst)		
EN 61000-4-4	Power supply connection	±2 kV
Voltage surges - power supply connection		
EN 61000-4-5	line/ground	2 kV Supply voltage HV
EN 61000-4-5	line/line	1 kV Supply voltage HV
Conducted disturbances		
EN 61000-4-6	150 kHz ... 80 MHz	10 V

Table 41. EMC interference immunity: Railway applications (trackside)

Applicable standard	Connection type	Voltage
Electrostatic discharge		
EN 61000-4-2 IEEE C37.90.3	Contact discharge	±4 kV
EN 61000-4-2 IEEE C37.90.3	Air discharge	±8 kV

**Table 41. EMC interference immunity: Railway applications (trackside)
(continued)**

Applicable standard	Connection type	Voltage
Electromagnetic field		
EN 61000-4-3	80 MHz ... 2700 MHz	max. 20 V/m
EN 61000-4-3	80 MHz ... 6000 MHz	max. 10 V/m
Fast transients (burst)		
EN 61000-4-4	Power supply connection	±2 kV
Voltage surges - power supply connection		
EN 61000-4-5	line/ground	2 kV Supply voltage HV
EN 61000-4-5	line/line	1 kV Supply voltage HV
Conducted disturbances		
EN 61000-4-6	150 kHz ... 80 MHz	10 V

Table 42. EMC interference immunity: Substation applications

Applicable standard	Connection type	Voltage
Electrostatic discharge		
EN 61000-4-2 IEEE C37.90.3	Contact discharge	±8 kV
EN 61000-4-2 IEEE C37.90.3	Air discharge	±15 kV
Electromagnetic field		
IEEE 1613	80 MHz ... 1000 MHz (continuous wave)	max. 20 V/m
Fast transients (burst)		
EN 61000-4-4 IEEE C37.90.1	Power supply connection	±4 kV
EN 61000-4-4 IEEE C37.90.1	Data line	±4 kV
Voltage surges - power supply connection		
EN 61000-4-5	line/ground	±2 kV
IEEE 1613	line/ground	±5 kV
EN 61000-4-5	line/line	±1 kV
Voltage surges - data line		

Table 42. EMC interference immunity: Substation applications (continued)

Applicable standard	Connection type	Voltage
EN 61000-4-5	line/ground	±2 kV
Conducted disturbances		
EN 61000-4-6	150 kHz ... 80 MHz	10 V
Damped oscillation – power supply connection		
EN 61000-4-12 IEEE C37.90.1	line/ground	±2.5 kV
EN 61000-4-12 IEEE C37.90.1	line/line	±1 kV
Damped oscillation – data line		
EN 61000-4-12 IEEE C37.90.1	line/ground	±2.5 kV
EN 61000-4-12	line/line	±1 kV

9.12. Network range

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

Note: The port/slot speed available on each port group and the number of ports depends on the data rate characteristic value of your device variant and the individual types of the chosen port group(s). For more information, see item 4 in [Device name and product code on page 27](#).

9.12.1. Twisted-pair port 10/100/1000 Mbit/s

Table 43. Network range: 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)

9.12.2. Twisted-pair port 100/1000/2500 Mbit/s

Table 44. Network range: 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)

9.12.3. Gigabit Ethernet SFP transceiver

Table 45. F/O port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

Product code	Mode ⁶	Wave length	Fiber	System attenuation	Example for F/O cable length ⁷	Fiber attenuation	BLP ⁸ /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
M-SFP-MX/LC...	MM	1310 nm	62.5/125 µm	0 dB ... 12 dB	0 km ... 0.50 km (0 mi ... 0.31 mi)	1,0 dB/km	500 MHz×km
M-SFP-MX/LC EEC	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
M-SFP-MX/LC EEC	MM	1310 nm	62.5/125 µm	0 dB ... 12 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	1.00 dB/km	5000 MHz×km
M-SFP-LX/LC...	MM	1310 nm ⁹	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 ¹⁰	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) ¹¹	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)

6. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul

7. Including 3 dB system reserve when compliance with the fiber data is observed.

8. Using the bandwidth-length product is inappropriate for expansion calculations.

9. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).

10. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).

11. Including 2.5 dB system reserve when compliance with the fiber data is observed.

Table 46. F/O port 100/1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

Product code	Mode ¹²	Wave length	Fiber	System attenuation	Example for F/O cable length ¹³	Fiber attenuation	BLP ¹⁴ /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-LX/LC...	MM	1310 nm ¹⁵	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 ¹⁶	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) ¹⁷	0.4 dB/km	3.5 ps/(nm×km)

12. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul

13. Including 3 dB system reserve when compliance with the fiber data is observed.

14. Using the bandwidth-length product is inappropriate for expansion calculations.

15. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).

16. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).

17. Including 2.5 dB system reserve when compliance with the fiber data is observed.

9.12.4. Fast Ethernet SFP transceiver

Table 47. F/O port 100BASE-FX (SFP Fiber Optic Fast Ethernet Transceiver)

Product code	Mode ¹⁸	Wave length	Fiber	System attenuation	Example for F/O cable length ¹⁹	Fiber attenuation	BLP/Dispersion
M-FAST-SFP-MM/L-C...	MM	1310 nm	50/125 µm	0 dB ... 8 dB	0 km ... 5 km (0 mi ... 3.11 mi)	1.0 dB/km	800 MHz×km
M-FAST-SFP-MM/L-C...	MM	1310 nm	62.5/125 µm	0 dB ... 11 dB	0 km ... 4 km (0 mi ... 2.49 mi)	1.0 dB/km	500 MHz×km
M-FAST-SFP-SM/L-C...	SM	1310 nm	9/125 µm	0 dB ... 13 dB	0 km ... 25 km (0 mi ... 15.53 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-FAST-SFP-SM+/LC...	SM	1310 nm	9/125 µm	10 dB ... 29 dB	25 km ... 65 km (15.53 mi ... 40.39 mi)	0.4 dB/km	3.5 ps/(nm×km)
M-FAST-SFP-LH/L-C...	SM	1550 nm	9/125 µm	10 dB ... 29 dB	47 km ... 104 km (29.20 mi ... 64.62 mi)	0.25 dB/km	19 ps/(nm×km)
M-FAST-SFP-LH/L-C...	SM	1550 nm	9/125 µm	10 dB ... 29 dB	55 km ... 140 km (14.29 mi ... 86.99 mi)	0.18 dB/km ²⁰	18 ps/(nm×km)
SFP-FAST-MM/LC	MM	1310 nm	50/125 µm	0 dB ... 8 dB	0 km ... 5 km (0 mi ... 3.11 mi)	1.0 dB/km	800 MHz
SFP-FAST-MM/L-C EEC	MM	1310 nm	62.5/125 µm	0 dB ... 11 dB	0 km ... 4 km (0 mi ... 2.49 mi)	1.0 dB/km	500 MHz×km
SFP-FAST-SM/LC	SM	1310 nm	9/125 µm	0 dB ... 13 dB	0 km ... 25 km (0 mi ... 15.53 mi)	0.4 dB/km	3.5 ps/(nm×km)
SFP-FAST-SM/L-C EEC	SM	1310 nm	9/125 µm	0 dB ... 13 dB	0 km ... 25 km (0 mi ... 15.53 mi)	0.4 dB/km	3.5 ps/(nm×km)

18. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul

19. Including 3 dB system reserve when compliance with the fiber data is observed.

20. With ultra-low-loss optical fiber.

9.12.5. 2.5 Gigabit Ethernet SFP transceiver

Table 48. F/O port 2.5 Gbit/s (SFP fiber optic Gigabit Ethernet transceiver)

Product code	Mode ²¹	Wave length	Fiber	System attenuation	Example for F/O cable length	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)

9.12.6. 10 Gigabit Ethernet SFP+ transceiver

Table 49. F/O port 10 Gbit/s (SFP+ fiber optic Gigabit Ethernet transceiver)

Product code	Mode ²²	Wave length	Fiber	System attenuation	Example for F/O cable length ²³	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)

21. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul

22. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul

23. Including 3 dB system reserve when compliance with the fiber data is observed.

Table 49. F/O port 10 Gbit/s (SFP+ fiber optic Gigabit Ethernet transceiver) (continued)

Product code	Mode ²²	Wave length	Fiber	System attenuation	Example for F/O cable length ²³	Fiber attenuation	BLP/Dispersion
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)
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)

22. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul

23. Including 3 dB system reserve when compliance with the fiber data is observed.

10. Scope of delivery

Table 50. Scope of delivery

Amount	Article
1 ×	Device
1 ×	Safety and general information sheet
1 ×	2-pin terminal block for signal contact
2 ×	Exclusively for device variants featuring supply voltage with characteristic value K: Ferrite with key For more information, see Connecting the ferrite on page 63 .

11. Order numbers

11.1. Device variants

Device	Order number
BRP	942319999
Fixed device variants	Order number
BRP30-16FE FX/12GE FX-LV-2A	942319008
BRP40-24GE FX/4GE FX-LV-2A	942319006
BRP50-24GE FX/4x2.5GE FX-LV-2A	942319004
BRP60-16GE FX/8x2.5GE FX/4x10GE FX-HV-2A	942319002

11.2. Accessories

You find more information on available accessories in the Belden Online Catalog at catalog.belden.com.

Table 51. General accessories

Article	Order number
2-pin terminal block with screw lock (10 pieces)	942272201
2-pin terminal block angled (10 pieces)	942367001
2-pin terminal block (50 pieces)	943845010
2-pin terminal block with screw lock (50 pieces)	943845009
3-pin High Voltage Interlock terminal block (50 pieces)	943845008
AutoConfiguration Adapter ACA41	942342001
Network management software Industrial HiVision	943156xxx
Terminal cable: RJ45 on Sub-D, 9-pin	942097001
Terminal cable: RJ45 on USB	942096001
Protection cap for RJ45 socket (50 pieces)	943936001
Protection cap for SFP slot (25 pieces)	943942001

11.2.1. Fast Ethernet SFP transceiver

Table 52. Accessories: Fast Ethernet SFP transceivers

Fast Ethernet SFP transceiver	Certification type ²⁴	Temperature range ²⁵	Order number
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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.
- It is currently not possible to set autocrossing manually.

M-FAST SFP-MM/LC	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	943865001
M-FAST SFP-MM/LC EEC	Standard level	-40 °C ... +70 °C (-40 °F ... +158 °F)	943945001
M-FAST SFP-SM/LC	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	943866001
M-FAST SFP-SM/LC EEC	Standard level	-40 °C ... +70 °C (-40 °F ... +158 °F)	943946001
M-FAST SFP-SM+/LC	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	943867001
M-FAST SFP-SM+/LC EEC	Standard level	-40 °C ... +70 °C (-40 °F ... +158 °F)	943947001
M-FAST SFP-LH/LC	Standard level	0 °C ... +60 °C (+32 °F ... +140 °F)	943868001
M-FAST SFP-LH/LC EEC	Standard level	-40 °C ... +70 °C (-40 °F ... +158 °F)	943948001

11.2.2. Gigabit Ethernet SFP transceiver

Table 53. Accessories: Gigabit Ethernet SFP transceiver

Gigabit Ethernet SFP transceiver	Certification type	Temperature range ²⁶	Order number
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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)	943014001
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24. Use Entry level SFP transceivers for industrial applications that exclusively require the following approvals: CE, FCC or UL 61010-2-201.

Use Standard level SFP transceivers for industrial applications that exclusively require the following approvals: CE, FCC, UL 61010-2-201, DNV, Lloyd's Register, Bureau Veritas, UL 121201 (Hazardous Locations), IEC 61850-3, EN 50121-4, ATEX or IECEx. For further information on certifications, see www.belden.com.

25. The temperature range specifications refer to the use in the BRP device.

26. The temperature range specifications refer to the use in the BRP device.

Table 53. Accessories: Gigabit Ethernet SFP transceiver (continued)

Gigabit Ethernet SFP transceiver	Certification type	Temperature range ²⁶	Order number
M-SFP-SX/LC EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	943896001
M-SFP-MX/LC EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	942108001
M-SFP-LX/LC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	943015001
M-SFP-LX/LC EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	943897001
M-SFP-LX+/LC	Standard level	0 °C ... +45 °C (+32 °F ... +113 °F)	942023001
M-SFP-LX+/LC EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	942024001
M-SFP-LH/LC	Standard level	-5 °C ... +60 °C (+23 °F ... +140 °F)	943042001
M-SFP-LH/LC EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	943898001

11.2.3. 2.5 Gigabit Ethernet SFP transceiver

Table 54. Accessories: 2.5 Gigabit Ethernet SFP transceiver

2.5 Gigabit Ethernet SFP transceiver	Certification type	Temperature range ²⁷	Order number
M-SFP-2.5-MM/LC EEC	Standard level	-40 °C ... +70 °C (-40 °F ... +158 °F)	942162001
M-SFP-2.5-SM-/LC EEC	Standard level	-40 °C ... +70 °C (-40 °F ... +158 °F)	942163001
M-SFP-2.5-SM/LC EEC	Standard level	-40 °C ... +70 °C (-40 °F ... +158 °F)	942164002

11.2.4. 10 Gigabit Ethernet SFP transceiver

Table 55. Accessories: 10 Gigabit Ethernet SFP transceiver

10 Gigabit Ethernet SFP transceiver	Certification type	Temperature range ²⁸	Order number
M-SFP-10-SR/LC-EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	942210001
M-SFP-10-LR/LC-EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	942211001
M-SFP-10-ER/LC-EEC	Standard level	-10 °C ... +60 °C (+14 °F ... +140 °F)	942212001

26. The temperature range specifications refer to the use in the BRP device.

27. The temperature range specifications refer to the use in the BRP device.

28. The temperature range specifications refer to the use in the BRP device.

12. Underlying technical standards

The device has an approval based on a specific standard exclusively if the approval indicator appears on the device casing.

The device generally fulfills the technical standards named in their current versions.

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 at www.belden.com in the product information.

Table 56. List of technical standards

ANSI/ISA 12.12.01	Non-incendive Electrical Equipment for Use in Class I, Division 2 Hazardous Locations
UL 62368-1	Audio/video, information and communication technology equipment – Part 1: Safety requirements
DNV-CG-0339	Environmental test specification for electrical, electronic and programmable equipment and systems.
EN 50121-4	Railway applications – EMC – Emission and immunity of the signaling and telecommunications apparatus (Rail Trackside)
EN 55032	Electromagnetic compatibility of multimedia equipment – Emission Requirements
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
FCC 47 CFR Part 15	Code of Federal Regulations
IEC 60825-1	Laser product safety
IEC/EN 61850-3	Communication networks and systems for power utility automation - Part 3: General requirements.
IEC/EN 62368-1	Equipment for audio/video, information and communication technology - Part 1: Safety requirements
IEC 62443-4-2	Security for industrial automation and control systems.
IEC 60068-1	Environmental testing

Table 56. List of technical standards (continued)

IEEE 802.1Q	Virtual Bridged Local Area Networks
IEEE 802.1w	Rapid Reconfiguration
IEEE 802.3	Ethernet

Further support

Technical questions

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

You find the addresses of our partners on the Internet at www.belden.com.

For technical support, visit my.belden.com. This site also includes a free of charge knowledge base and a software download section.

Technical Documents

The current manuals and operating instructions for Belden products are available at doc.hirschmann.com.

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- 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 www.belden.com/solutions/customer-innovation-center.
- Support ranges from the first installation through the standby service to maintenance concepts.

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