



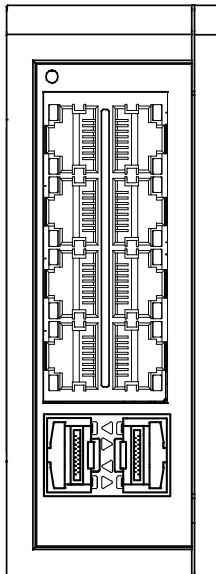
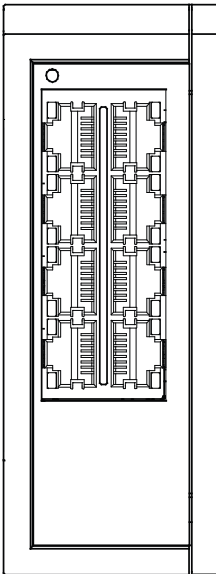
HIRSCHMANN

A **BELDEN** BRAND

User Manual

Installation

Industrial Ethernet Lemur Rail Switch LRS20-8TX and LRS30-8TX/2SFP



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You can get the latest version of this manual on the Internet at:

<https://www.doc.hirschmann.com>

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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 as PDF files for downloading on the Internet at: <https://www.doc.hirschmann.com>

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.





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





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


 **DANGER**

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

 **WARNING**

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

 **CAUTION**

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

NOTICE

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

Symboles d'avertissement



Il s'agit d'un symbole d'avertissement général. Ce symbole vous avertit des risques potentiels de blessures. Respectez les consignes accompagnant ce symbole afin d'éviter toute blessure ou accident mortel.



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.



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

AVERTISSEMENT



AVERTISSEMENT indique une situation potentiellement dangereuse et susceptible d'entraîner la mort ou des blessures graves.

ATTENTION



ATTENTION indique une situation potentiellement dangereuse et susceptible d'entraîner des blessures d'ampleur mineure à modérée.

AVIS

AVIS indique des pratiques n'entraînant pas de risques corporels.

Contents

- About this manual..... 3
- Important information..... 4
- Warning symbols..... 5
- Symboles d'avertissement..... 7
- 1. Safety instructions..... 13**
 - 1.1. Qualification requirements for personnel..... 14
 - 1.2. Intended use..... 15
 - 1.3. Installation site requirements..... 15
 - 1.4. Device casing..... 17
 - 1.5. Strain relief..... 17
 - 1.6. Electrical connections..... 17
 - 1.6.1. Grounding the device..... 17
 - 1.6.2. General requirements for connecting electrical wires..... 17
 - 1.6.3. General requirements for connecting the supply voltage..... 18
 - 1.6.4. Specific requirements for connecting the supply voltage..... 19
 - 1.7. LED or laser components..... 20
 - 1.8. Recycling note..... 20
- 2. Approvals..... 21**
 - 2.1. CE marking..... 21
 - 2.2. FCC note..... 22
- 3. Description..... 23**
 - 3.1. Device name..... 25
 - 3.2. Device views..... 26
 - 3.2.1. Front view..... 26
 - 3.3. Power supply..... 27
 - 3.3.1. Supply voltage range 12 V DC ... 24 V DC..... 28
 - 3.4. Ethernet ports..... 28

3.4.1. Twisted pair port 10/100 Mbit/s.....	28
3.4.2. F/O port 100/1000 Mbit/s.....	29
3.5. Display elements.....	30
3.5.1. Device status.....	30
3.5.2. Port status.....	30
4. Installation.....	32
4.1. Checking the package contents.....	32
4.2. Mounting the device.....	33
4.2.1. Mounting the device onto the DIN rail.....	35
4.3. Grounding the device.....	36
4.4. Installing an SFP transceiver (optional).....	37
4.5. Connecting the supply voltage.....	37
4.5.1. Supply voltage range 12 V DC ... 24 V DC.....	38
4.5.2. Connecting the 3-pin terminal block with screws.....	39
4.6. Operating the device.....	40
4.7. Connecting data cables.....	40
5. Basic settings.....	42
5.1. Default settings.....	42
5.2. First login (Password change).....	42
6. Recovery.....	44
6.1. Firmware recovery.....	44
6.2. Device recovery.....	45
6.2.1. Disabling or enabling device recovery.....	45
6.2.2. Performing device recovery.....	46
7. Monitoring ambient conditions.....	49
7.1. Monitoring the ambient air temperature.....	49
8. Maintenance and service.....	50
9. Disassembly.....	51
9.1. Removing an SFP transceiver (optional).....	51
9.2. Removing the device.....	51

10. Technical data..... 54

10.1. General data..... 54

10.2. Supply voltage..... 54

10.2.1. Supply voltage range 12 V DC ... 24 V DC..... 54

10.3. Power consumption/power output..... 55

10.4. Dimension drawings..... 55

10.4.1. Device variants LRS20-8TX and LRS30-8TX/2SFP..... 55

10.5. Climatic conditions during operation..... 56

10.6. Climatic conditions during storage..... 56

10.7. Maximum ambient air temperature..... 57

10.8. Derating..... 57

10.8.1. Derating depending on the mounting position..... 57

10.8.2. Derating depending on the altitude above sea level..... 57

10.8.3. Derating depending on the SFP transceiver..... 58

10.9. Immunity..... 59

10.10. Electromagnetic compatibility (EMC)..... 60

10.10.1. EMC interference emission..... 60

10.10.2. EMC interference immunity..... 60

10.11. Network range..... 62

10.11.1. Twisted pair port 10/100 Mbit/s..... 62

10.11.2. Fast Ethernet SFP transceiver..... 62

10.11.3. Gigabit Ethernet SFP transceiver..... 64

10.11.4. Bidirectional Fast Ethernet SFP transceiver..... 66

10.11.5. Bidirectional Gigabit Ethernet SFP transceiver..... 66

11. Scope of delivery..... 68

12. Order numbers..... 69

12.1. Device variants..... 69



12.2. Accessories..... 69



12.2.1. Fast Ethernet SFP transceiver..... 69

12.2.2. Gigabit Ethernet SFP transceiver..... 70

12.2.3. Bidirectional Fast Ethernet SFP transceiver.....	71
12.2.4. Bidirectional Gigabit Ethernet SFP transceiver.....	71
13. Underlying technical standards.....	72
A. Further support.....	73

1. Safety instructions

 WARNING	
	<p>UNCONTROLLED MACHINE ACTIONS Failure to follow these instructions can result in death, serious injury, or equipment damage.</p> <p>To avoid uncontrolled machine actions caused by data loss, configure all the data transmission devices individually.</p> <p>Before you start any machine which is controlled via data transmission, be sure to complete the configuration of all data transmission devices.</p>

 AVERTISSEMENT	
	<p>ACTIONS INCONTRÔLÉES DE LA MACHINE Le non-respect de ces instructions peut entraîner la mort, des blessures graves ou des dommages matériels.</p> <p>Pour éviter les actions incontrôlées de la machine causées par la perte de données, configurez tous les équipements de transmission de données individuellement.</p> <p>Avant de démarrer une machine commandée par transmission de données, veillez à terminer la configuration de tous les équipements de transmission de données.</p>

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.
- Operate the product only according to the technical specifications.

See [General data on page 54](#)

- Connect to the product only components suitable for the requirements of the specific application case.

1.3. Installation site requirements

WARNING



FIRE HAZARD

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

If you connect the device to a power supply that does **NOT** meet the requirements for Limited Power Source, NEC Class 2 or PS2 according to IEC/EN 62368-1 and is **NOT** limited to 100 W output power, the device must be installed in either a switch cabinet or other fire enclosure.

The fire enclosure can be made of metal or plastic with fire-protection properties of at least V-1 according to IEC 60695-11-10. Bottom openings of the fire enclosure must **NOT** exceed 2 mm in diameter.

 **AVERTISSEMENT****RISQUE D'INCENDIE**

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

Si vous connectez l'équipement à une source d'alimentation qui n'est **PAS** conforme aux exigences d'une source d'alimentation limitée, NEC Classe 2 ou PS2 selon CEI/EN 62368-1 et qui n'est **PAS** limitée à une puissance de sortie de 100 W, l'équipement doit être installé dans une armoire de distribution ou dans une autre enceinte coupe-feu.

L'enceinte coupe-feu peut être en métal ou en plastique avec des propriétés de protection contre le feu d'au moins V-1 conformément à la norme CEI 60695-11-10. Les ouvertures du fond de l'enceinte coupe-feu ne doivent **PAS** dépasser 2 mm de diamètre.

- 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.

See [General data on page 54](#)

- 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.

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

The device is grounded via a 3-pin terminal block.

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

1.6.2. General 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 cross-section of the ground conductor is the same size or larger than the cross-section of the power supply cables.
- 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.



Only use power supply cables that are suitable for a temperature of +70 °C (+167 °F). The wires of the power supply cable must be made of copper.



N'utilisez que des câbles d'alimentation adaptés à une température de +70 °C (+167 °F). Les fils des câbles d'alimentation sont en cuivre.

1.6.3. General 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 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.
- The power supply complies with the requirements for safety extra-low voltage (SELV) according to IEC 60950-1 or ES1 according to IEC/EN 62368-1.
- 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.

DC voltage power supply:

- The device is rated for DC voltage.
- A back-up fuse suitable for DC voltage is installed in **EVERY** plus conductor of the power supply.
- **EVERY** minus conductor is on ground potential. Otherwise, an additional back-up fuse is installed in **EVERY** minus conductor. Regarding the properties of this back-up fuse: [General data on page 54](#)

1.6.4. Specific 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:

Applies to device variant with 12 V DC / 24 V DC rated voltage power supply:

The power sources used are electrically isolated from the ground potential.
The insulation voltage must be 1500 V AC or 2250 V DC as specified in IEEE 802.3.

1.7. LED or laser components

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

CLASS 1 LASER PRODUCT

CLASS 1 LED PRODUCT

1.8. 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.

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

For more information on technical data, see [General data on page 54](#).

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.

2.2. FCC note

Supplier's Declaration of Conformity

47 CFR § 2.1077 Compliance Information

Lemur Rail Switch

LRS20-8TX and LRS30-8TX/2SFP

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.

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

3. Description

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 device is a lite managed switch with 8 × 10/100 Mbit/s BASE-TX twisted-pair ports, 2 × 100/1000 Mbit/s SFP optical ports. The device is ideally suited for use in smaller networks or on the edge of larger installations.

The device allows you to set up switched Industrial Ethernet networks according to the standard IEEE 802.3.

The device works without a fan.

The device is mounted on the DIN rail.

You have the option of choosing 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)

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

- Web browser
- SSH
- Telnet
- Network management software (for example Provize Explorer)

The Network Management Software Provize Explorer provides you with options for smooth configuration and monitoring. You find further information on the Internet at the Hirschmann product page: www.belden.com/get-ProvizeExplorer

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

3.1. Device name

The following device variants are available in the Belden Online Catalog. See <https://catalog.belden.com> on the web page of the device.

Table 1. Device name

Order number	Product name	Description
942328013	LRS20-8TX	Total number of ports: 8 8 × 10/100BASE-TX Power input: 12 V DC ... 24 V DC
942328014	LRS30-8TX/2SFP	Total number of ports: 10 8 × 10/100BASE-TX 2 × 100/1000-FX SFP Power input: 12 V DC ... 24 V DC

3.2. Device views

3.2.1. Front view

Figure 1. Front view of device variant LRS20-8TX

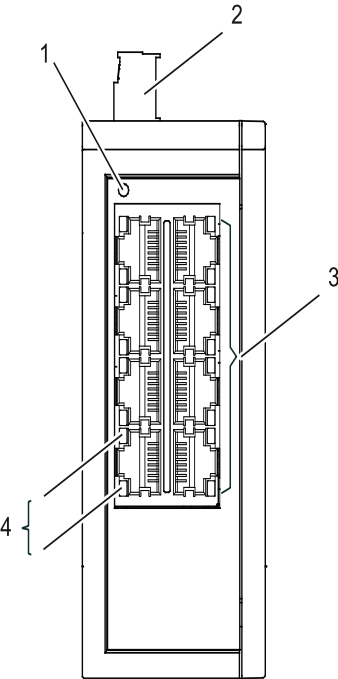


Table 2. Description of device elements: Front view of device variant LRS20-8TX

1	LED display element	Device status
2	3-pin terminal block for the supply voltage and the grounding	
3	Ports 1 ... 8	10/100 Mbit/s twisted pair ports
4	LED display elements	Port status

Figure 2. Front view of device variant LRS30-8TX/2SFP

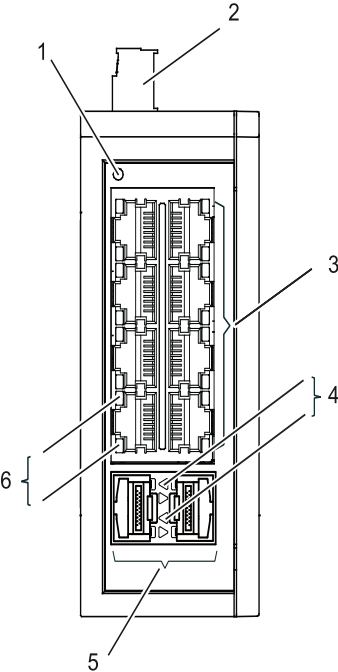


Table 3. Description of device elements: Front view of device variant LRS30-8TX/2SFP

1	LED display element	Device status
2	3-pin terminal block for the supply voltage and the grounding	
3	Ports 1 ... 8	10/100 Mbit/s twisted pair ports
4	LED display elements SFP slot for 100/1000 Mbit/s F/O connections	Port status
5	Ports 9 ... 10	SFP slot for 100/1000 Mbit/s F/O connections
6	LED display elements 10/100 Mbit/s twisted pair ports	Port status

3.3. Power supply

The following options for power supply are available:

3.3.1. Supply voltage range 12 V DC ... 24 V DC

- 12 V DC ... 24 V DC with 3-pin terminal block with screws:

You will find information on connecting the supply voltage here:

[*Connecting the supply voltage on page 37*](#)

3.4. Ethernet ports

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

3.4.1. Twisted pair port 10/100 Mbit/s

This port is an RJ45 socket.

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

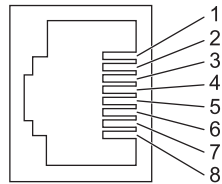
This port supports:

- Auto-Negotiation
- Autopolarity
- Auto-Crossover (if Auto-Negotiation is enabled)
- 100 Mbit/s half duplex mode, 100 Mbit/s full duplex mode
- 10 Mbit/s half duplex mode, 10 Mbit/s full duplex mode

Delivery state: Auto-Negotiation activated

The pin assignment corresponds to MDI-X.

Table 4. Pin assignment 10/100 Mbit/s twisted pair port, RJ45 socket, MDI and MDI-X mode

RJ45	Pin	10/100 Mbit/s	Function
	1	RD+	Receive path
	2	RD-	Receive path
	3	TD+	Transmission path
	6	TD-	Transmission path
	4, 5, 7, 8	-	-

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

This port is an SFP slot.

The 100/1000 Mbit/s F/O port allows you to connect network components according to the standard IEEE 802.3 100BASE-FX.

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. Display elements

3.5.1. Device status

This LED provides information about conditions which affect the operation of the whole device.

Figure 3. LED display element for device status

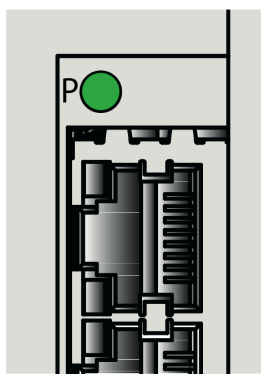


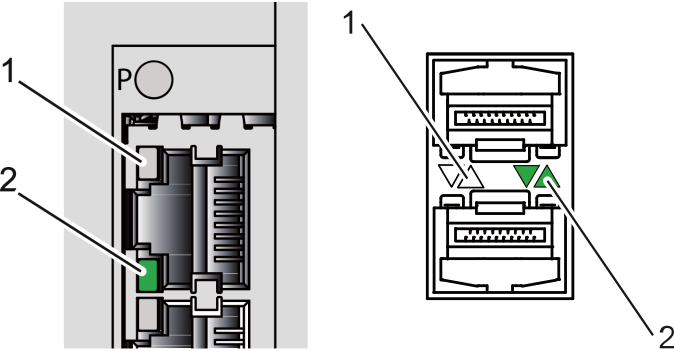
Table 5. Power LED: Color, activity and meaning

Color	Activity	Meaning
none	none	Supply voltage is too low or not available
green	lights up	Supply voltage is on

3.5.2. Port status

These LEDs display port-related information.

Figure 4. LED display elements for port status



LED	Color	Activity	Meaning
1	–	not active	–
2	Green	none	Device detects an invalid or missing link
		lights up	Device detects a valid link
		flashing	Device is transmitting and/or receiving data

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 the device, perform the following work steps:

- *Checking the package contents on page 32*
- *Mounting the device on page 33*
- *Grounding the device on page 36*
- *Installing an SFP transceiver (optional) on page 37*
- *Connecting the supply voltage on page 37*
- *Operating the device on page 40*
- *Connecting data cables on page 40*

4.1. Checking the package contents

- Check whether the package includes all items named in the section *Scope of delivery on page 68*.
- Check the individual parts for transport damage.

4.2. Mounting the device




⚠ CAUTION

BURN HAZARD
Failure to follow these instructions can result in 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 $\geq 45\text{ }^{\circ}\text{C}$ ($\geq 113\text{ }^{\circ}\text{F}$), exclusively install the device in “restricted access locations” according to EN 62368-1.



⚠ ATTENTION

RISQUE DE BRÛLURE
Le non-respect de ces instructions peut entraîner des blessures 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 $\geq 45\text{ }^{\circ}\text{C}$ ($\geq 113\text{ }^{\circ}\text{F}$), installez l'équipement exclusivement dans des "emplacements à accès restreint" conformément à la norme EN 62368-1.

- When selecting the installation location, verify that you observe the climatic threshold values of the device specified in the technical data. Take measures to prevent ambient conditions such as heat from affecting the device.

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

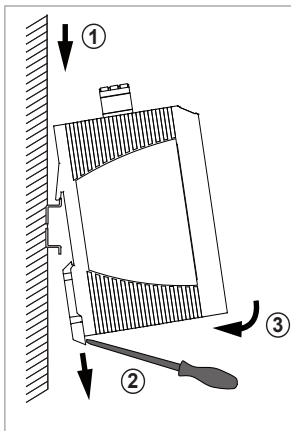
- *Mounting the device onto the DIN rail on page 35*

4.2.1. Mounting the device onto the DIN rail

Prerequisite:


- 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 work steps:



- Slide the upper snap-in guide of the device onto the DIN rail.
- Push the device downwards and onto the DIN rail.
- Use a screwdriver to pull the rail lock slide downwards.
- Snap in the device.

4.3. Grounding the device



⚠ CAUTION

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

Ground the device before connecting any other cables.



⚠ ATTENTION

CHOC ÉLECTRIQUE
Le non-respect de ces instructions peut entraîner des blessures légères ou des dommages matériels.

Mettez l'équipement à la terre avant de connecter tout autre câble.

All device variants have a functional ground connection.

A 3-pin terminal block is used for the grounding and for connecting the supply voltage.

The cross-section of the ground conductor must be the same size as or bigger than the cross-section of the power supply cables.

Perform the following work steps:

- Connect the wires to the terminal block according to the pin assignment.
- Fasten the wires in the terminal block by tightening the terminal screws.

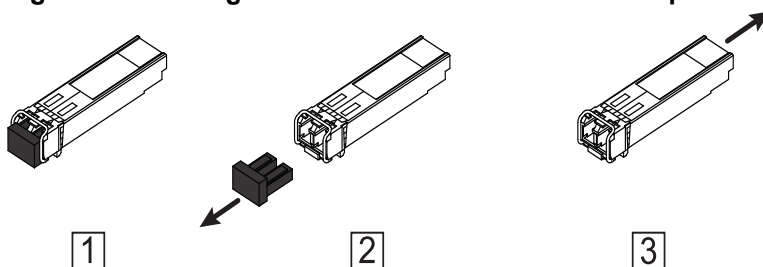
4.4. Installing an SFP transceiver (optional)

Prerequisites:

Exclusively use Hirschmann SFP transceivers.

See [Accessories](#) on page 69

Figure 5. Installing SFP transceivers: Installation sequence



Perform the following work steps:

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

4.5. Connecting the supply voltage

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

⚠ WARNING**ELECTRIC SHOCK**

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

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

⚠ AVERTISSEMENT**CHOC ÉLECTRIQUE**

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

Ne branchez qu'une tension d'alimentation correspondant à la plaque signalétique de votre équipement.


The supply voltage can be connected redundantly. Both inputs are uncoupled. There is no distributed load. With redundant supply, the power supply unit with the higher output voltage supplies the device on its own. The supply voltage is electrically isolated from the casing.

4.5.1. Supply voltage range 12 V DC ... 24 V DC

Note: Ground the device before connecting any other cables.

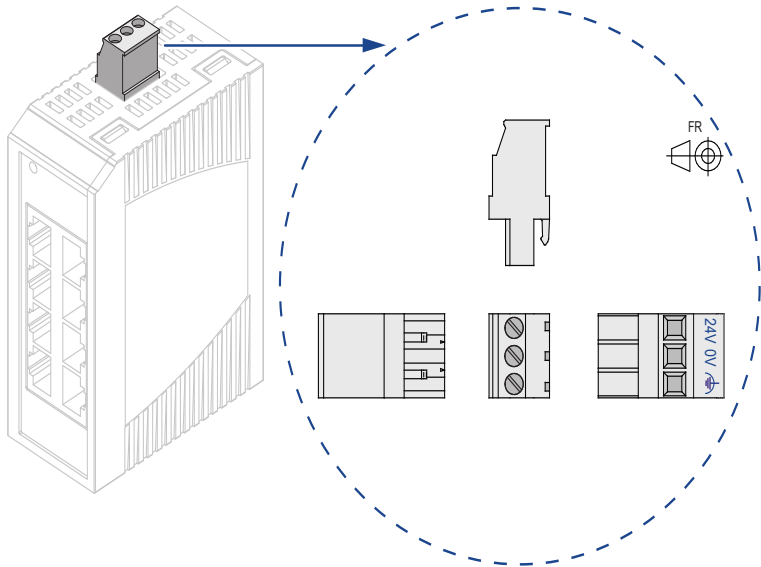
Note: The shielding ground of the connecting twisted pair cables is connected to the ground connection as a conductor.

Table 6. Type and specification of the supply voltage and pin assignment on the device

Type of the voltages that can be connected	Specification of the supply voltage	Pin assignment (left to right)	
DC voltage	Rated voltage range 12 V DC ... 24 V DC Voltage range incl. maximum toler- ances 9.6 V DC ... 32 V DC	24 V DC	Plus terminal of the supply voltage
		0 V	Minus terminal of the supply voltage
			Functional ground connection

4.5.2. Connecting the 3-pin terminal block with screws

Figure 6. 3-pin terminal block with screws



Perform the following work steps:

- Verify the required conditions for connecting the voltage supply.

Safety instructions on page 13

- Remove the terminal connector 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.
- Mount the terminal block for the supply voltage and the ground by plugging it in.

4.6. Operating the device

When you connect the supply voltage, you start up the device.

4.7. Connecting data cables

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

- Keep the length of the data cables as short as possible.
- Use optical data cables for the data transmission between 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.
- 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.

- Use shielded data cables for gigabit transmission via copper cables.
Only use shielded data cables to meet EMC requirements according to EN 50121-4.

See [Electromagnetic compatibility \(EMC\) on page 60](#)

- Connect the data cables according to your requirements.
See [Ethernet ports on page 28](#).
- Use CAT5e cable or higher for twisted pair connections.

Perform the following work steps:

- Connect the data cables.

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:

- Configuration via DHCP (state on delivery)
- Input via the Provize Explorer. You find further information about Provize Explorer on the Internet at the Hirschmann product pages:
See www.belden.com/get-ProvizeExplorer

5.1. Default settings

- IP address: The device looks for its IP address parameters using DHCP
- Optical ports: Full duplex
- Twisted pair ports: Autonegotiation
- Rapid Spanning Tree Protocol (RSTP): enabled
- Management: VLAN 1

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.

During the first login to the new device, after a factory reset, and after you run the command clear config, you bring the device to an operational state. To do this, you need to change the default password of the default administrator account. Until then, the device only has limited availability to the network:

- The protocols Telnet, Hypertext Transfer Protocol (HTTP), and the Simple Network Management Protocol (SNMP), are disabled on the device by default. After you have changed the default password, enable the needed protocols.
- The Provize Explorer application lets you change the default password using the protocol Hypertext Transfer Protocol Secure (HTTPS).
- Hirschmann recommends setting a password that is different from the default password.

Perform the following work steps:

- Open the Graphical User Interface, the Command Line Interface, or Provize 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.

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

The device displays an error when the new password entered and the password confirmed do not match.

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

Note: If you lost your password, use the device recovery ([Device recovery on page 45](#)) to reset the password.

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

6. Recovery

You have 2 options for restoring the device:

- [Firmware recovery on page 44](#)
- [Device recovery on page 45](#)

6.1. Firmware recovery

A firmware recovery might be necessary, for example, if the device does not respond to your commands due to a detected failure in the current software. In this case, you can activate the backup software by restarting the device manually 4 times. After the 4 manual restarts are completed, the device starts up normally, using the backup software to let you set up the device again and be able to use the features.

Proceed as follows:

1. Disconnect or disable the power supply to the device. When the device status LED stops glowing, the POWER OFF is completed.
2. After you have POWERED OFF the device, begin the consecutive restart cycle.
3. Connect or enable the power supply to the device. Wait until each of the device LEDs have been glowing for about 3 .. 5 seconds, indicating that the device is POWERED ON and booted. 1 cycle of the system restart is now completed.
4. Repeat the steps described above 3 more times. The prerequisite is that the consecutive restart cycle is started within a time interval of less than 2 minutes after the device LEDs have been glowing for about 3 .. 5 seconds and then have stopped glowing.

When the manual recovery is successful, the device starts up during the fourth restart by loading the version of the device software stored in the backup partition to help provide the device access.

After successful manual recovery, before setting up the device, Hirschmann advises to upload the latest version of the device software. To upload the new device software, refer to the software documentation provided on: <https://www.doc.hirschmann.com>

If the device has detected a failure during boot up with the new software version, then the device tries to recover automatically. If 3 automatic restart attempts do not help recover the current software version, then the device aborts the current software upload. Finally, the device starts up with the previous device software stored in the backup partition.

6.2. Device recovery

The device recovery mechanism lets you recover the device when the device is inaccessible or has an unstable configuration due to one of the following reasons:

- The default Administrator password is lost and the password recovery is needed.
- The device is locked out using the management access filtering.
- The device is locked out using the AAA feature.
- The VLAN 1 gets deleted or is inaccessible.

6.2.1. Disabling or enabling device recovery

The device recovery feature is enabled on the device by default. Users have the following options using the command line interface:

- Checking the current settings of the device recovery feature.
- Toggling between the disabled and enabled status if needed.

Note: In case you have forgotten the password while the device recovery is in disabled status, or if there is an error detected in the startup configuration, you might have lost access to the device. In this case, you are not able to recover the device on your own. To help avoid this situation, it is recommended to keep the device recovery feature enabled. If you still need assistance, please make use of our support: <https://hirschmann-support.belden.com>

Table 7. Device recovery settings: CLI options

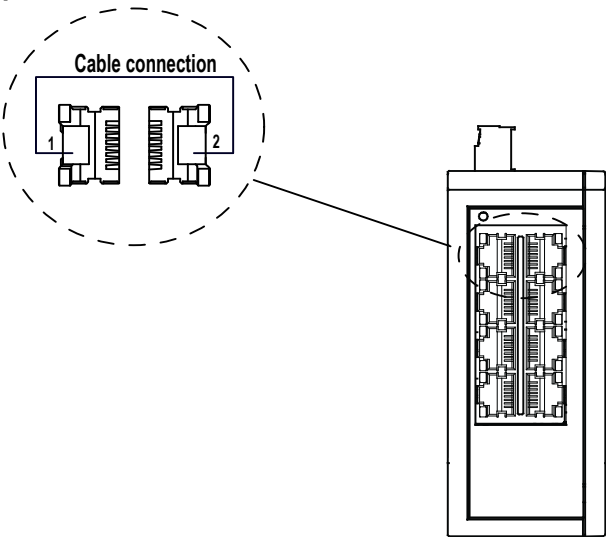
CLI command	Action
<code>show device-recovery</code>	check the current settings of the device recovery feature
<code>configure terminal</code>	change the configuration mode
<code>no device-recovery</code>	disable the device recovery feature on the device
<code>device-recovery</code>	enable the device recovery feature on the device

6.2.2. Performing device recovery

When the device is neither accessible nor the configuration is stable, perform the following work steps:

- Create a physical loopback by connecting a cable between port 1 and port 2.
- Reboot the device.

Figure 7. Device recovery, loopback between port 1 and port 2.



Note: A successful reboot is required for the execution of the manual recovery.

The reboot is successful, when the device software is booting up normally with the startup configuration stored in the non-volatile memory. This will take up to 70 seconds.

The completion of the device software boot up is identified by the following:

- The power LED is on.
- Flashing of the connected port LEDs.

After the boot up is completed, the device detects the physical loopback connected between the port 1 and port 2, and transmits a loopback packet from the port 2. When the port 1 receives and validates the loopback packet, the device performs the `clear config` operation.

As a result, the following happens on the device:

- The active configuration is cleared, including the IPv4 address configured on the management VLAN.
- The device loads the default configuration, which uses a DHCP client to set the management IPv4 address. Alternatively, you can use the Proveze Explorer application to find and administrate the device.
- The password of the default administrator user is restored to default.
- Existing user configurations are removed.
- When the `clear config` operation is completed, the device triggers the Force Password Change (FPC) to let you change the default password of the device.

After the device has triggered the Force Password Change (FPC), perform the following work steps:

- Remove the loopback cable from the device.
- Change the default password of the device. See [First login \(Password change\) on page 42](#).

Note: If required, take the back-up of the startup configuration and overwrite the startup configuration using the command `copy running-config startup-config`. Else, on the next reboot, the device will boot up with the older settings stored in startup configuration.

Once you have performed the steps for device recovery, you will get access to the device.

7. Monitoring ambient conditions

7.1. Monitoring the ambient air temperature

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

See [Climatic conditions during operation on page 56](#).

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.

8. 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. Check the resistance of the closed relay contacts and the switching function depending on the frequency of the switching operations.
- Hirschmann is continually working on improving and developing their software. Check regularly whether there is an updated version of the software that provides you with additional benefits. You find information and software downloads on the Hirschmann product pages on the Internet (<https://www.belden.com>).
- Depending on the pollution degree in the operating environment, check regularly that the ventilation slots in the device are not obstructed.

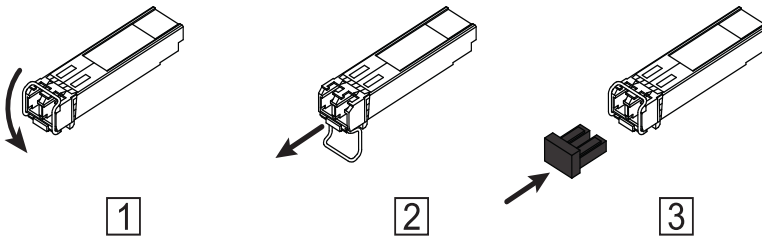
You find information on settling complaints on the Internet at:

<http://www.beldensolutions.com/en/Service/Repairs/index.phtml>.

9. Disassembly

9.1. Removing an SFP transceiver (optional)

Figure 8. De-installing SFP transceivers: De-installation sequence



Perform the following work steps:

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

9.2. Removing the device

WARNING



ELECTRIC SHOCK

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

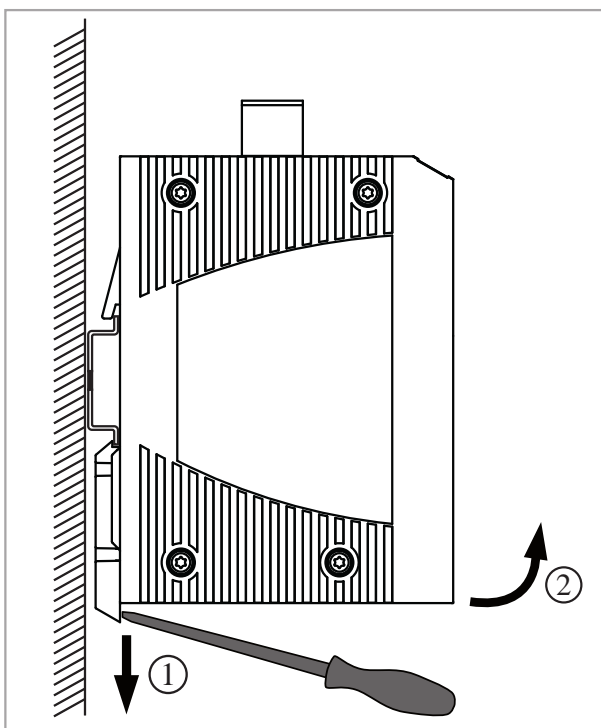
Disconnect the grounding only after disconnecting all other cables.

⚠ AVERTISSEMENT**CHOC ÉLECTRIQUE**

Le non-respect de ces 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 work steps:



- Disconnect the data cables.
- Disable the supply voltage.
- Disconnect the terminal blocks.
- Disconnect the grounding.
- Insert a screwdriver horizontally below the casing into the locking gate.
- Pull the rail lock slide down using a screwdriver and fold the device up.

10. Technical data

10.1. General data

Table 8. General data: Lemur Rail Switch

LRS20-8TX and LRS30-8TX/2SFP		
Dimensions W × H × D	See Device variants LRS20-8TX and LRS30-8TX/2SFP on page 55	
Weight (values vary depending on device variants)	LRS20-8TX	0.22 kg (0.49 lb)
	LRS30-8TX/2SFP	0.22 kg (0.49 lb)
Mounting	See Mounting the device on page 33	
Pollution degree	2	
Degree of protection	IP30	

10.2. Supply voltage

10.2.1. Supply voltage range 12 V DC ... 24 V DC

Rated voltage range DC:	12 V DC ... 24 V DC	
Voltage range DC incl. maximum tolerances:	9.6 V DC ... 32 V DC	
Connection type	3-pin terminal block for the supply voltage and the grounding	
	Tightening torque	0.5 Nm (4.4 lb-in)
	min. conductor cross-section	0.75 mm² (18 AWG)
	max. conductor cross-section	2.5 mm² (12 AWG)
Power loss buffer	>10 ms at 20.4 V DC	
	> 0.75 ms at 10.2 V DC	
Limited power source (LPS) according to IEC 60950-1 or ES1 + PS2 according to IEC/EN 62368-1	without back-up fuse	
Safety Extra-low Voltage (SELV) according to IEC 60950-1 or ES1 according to IEC/EN 62368-1	with back-up fuse	
	Nominal value at 24 V DC	1 A ... 2 A
	Nominal value at 12 V DC	1 A ... 2.5 A
	Characteristic:	slow blow

Peak inrush current	<14 A
Current integral I²t	<0.4 A²s
Connection for functional ground	Grounding the device on page 36

10.3. Power consumption/power output

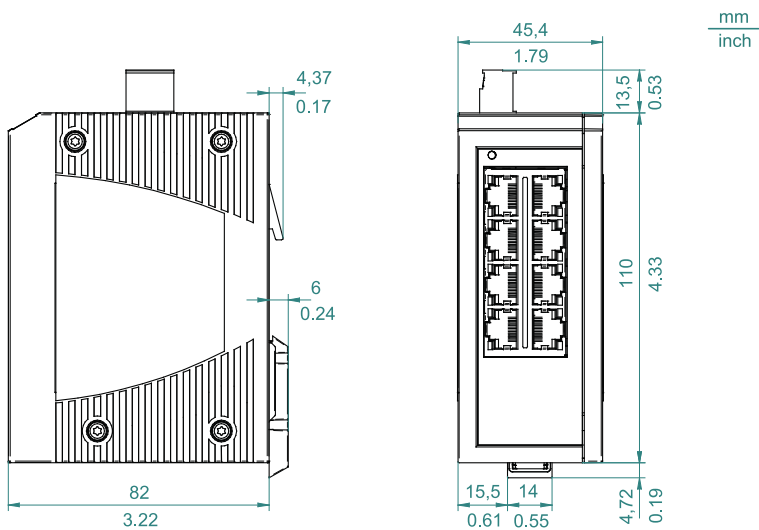
Table 9. Power consumption/power output

Device name	Total power consumption	Thermal power output
LRS20-8TX	3.63 W	12.4 Btu (IT)/h
LRS30-8TX/2SFP	4.7 W	16.0 Btu (IT)/h

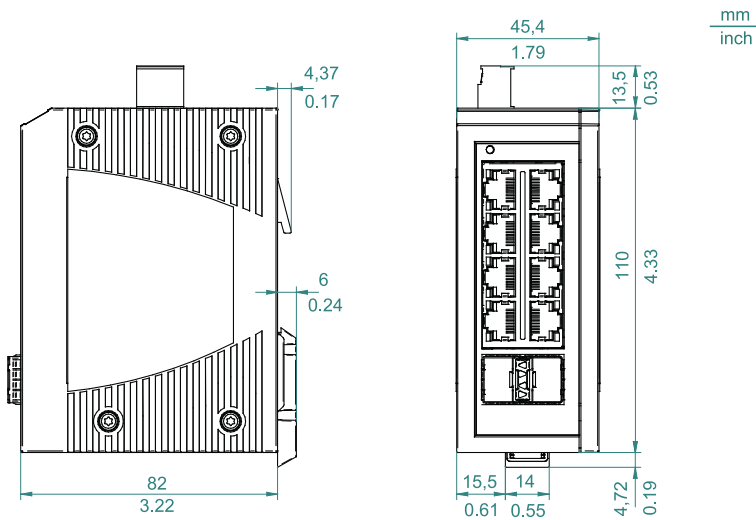
10.4. Dimension drawings

10.4.1. Device variants LRS20-8TX and LRS30-8TX/2SFP

Dimensions of device variant LRS20-8TX



Dimensions of device variant LRS30-8TX/2SFP



10.5. Climatic conditions during operation

Table 10. Climatic conditions during operation

Climatic conditions during operation	
Minimum clearance around the device	Top and bottom device side: 10 cm (3.94 in) Left and right device side: 2 cm (0.79 in)
Ambient air temperature	-40 °C ... +60 °C (-40 °F ... +140 °F)
Humidity	5 % ... 95 % (non-condensing)
Air pressure	min. 700 hPa (+3000 m ASL; +9842 ft ASL)

10.6. Climatic conditions during storage

Table 11. Climatic conditions during storage

Climatic conditions during storage	
Ambient air temperature	-40 °C ... +85 °C (-40 °F ... +185 °F)

Table 11. Climatic conditions during storage (continued)

Climatic conditions during storage	
Humidity	10 % ... 95 % (non-condensing)
Air pressure	min. 700 hPa (+3000 m ASL; +9842 ft ASL)

10.7. Maximum ambient air temperature

Note the values for installation, altitude and when using an SFP transceiver.

10.8. Derating

Add the deratings if more than one of the following conditions apply.

Note: Derating is not evaluated by UL (Underwriter Laboratories).

10.8.1. Derating depending on the mounting position

Table 12. Derating depending on the mounting position

Mounting	Minimum clearance at the ventilation slots	Derating
LRS20-8TX and LRS30-8TX/2SFP Standard mounting (vertical)	Top and bottom device side: 10 cm (3.94 in) Left and right device side: 0 cm (0 in)	5 K without SFP
	Top and bottom device side: 10 cm (3.94 in) Left and right device side: 0 cm (0 in)	10 K with SFP

10.8.2. Derating depending on the altitude above sea level

Table 13. Derating depending on the altitude above sea level

Altitude above sea level	Derating
-400 m ASL ... 2000 m ASL (-1312 ft ASL ... 6560 ft ASL)	0 K

10.8.3. Derating depending on the SFP transceiver

Table 14. Fast Ethernet SFP transceiver

Product code	Derating
M-FAST SFP-MM/LC	10 K
M-FAST SFP-MM/LC EEC	0 K
M-FAST SFP-SM/LC	10 K
M-FAST SFP-SM/LC EEC	0 K
M-FAST SFP-SM+/LC	10 K
M-FAST SFP-SM+/LC EEC	0 K
M-FAST SFP-LH/LC	10 K
M-FAST SFP-LH/LC EEC	0 K
SFP-FAST-MM/LC	0 K
SFP-FAST-SM/LC EEC	0 K

Table 15. Gigabit Ethernet SFP transceiver

Product code	Derating
M-SFP-SX/LC EEC	0 K
M-SFP-LH/LC	2 K per SFP transceiver + 15 K
M-SFP-LH/LC EEC	2 K per SFP transceiver
M-SFP-LH+/LC	3 K per SFP transceiver + 15 K
SFP-GIG-LX/LC EEC	0 K
M-SFP-LX+/LC	15 K
M-SFP-LH+/LC EEC	0 K
M-SFP-MX/LC EEC	0 K

Table 16. Bidirectional Fast Ethernet SFP transceiver

Product code	Derating
SFP-FAST-BA MM/LC EEC	0 K
SFP-FAST-BB MM/LC EEC	0 K
SFP-FAST-BA SM/LC EEC	0 K
SFP-FAST-BA SM+/LC EEC	0 K

Table 16. Bidirectional Fast Ethernet SFP transceiver (continued)

Product code	Derating
SFP-FAST-BB SM+/LC EEC	0 K

Table 17. Bidirectional Gigabit Ethernet SFP transceiver

Product code	Derating
M-SFP-BIDI-Bundle LX/LC EEC	0 K
M-SFP-BIDI Type A LX/LC EEC	0 K
M-SFP-BIDI Type B LX/LC EEC	0 K
GIG-BA LX/LC EEC	0 K
SFP-GIG-BB LX/LC EEC	0 K
SFP-GIG-BA LX+/LC EEC	0 K
SFP-GIG-BB LX+/LC EEC	0 K
SFP-GIG-BA LH/LC EEC	0 K
SFP-GIG-BB LH/LC EEC	0 K
M-SFP-BIDI Type A LH/LC EEC	2 K per SFP transceiver
M-SFP-BIDI Type B LH/LC EEC	2 K per SFP transceiver
M-SFP-BIDI-Bundle LH/LC EEC	2 K per SFP transceiver

10.9. Immunity

Table 18. Immunity: Standard applications

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

Applicable standard		
IEC 60068-2-6, test Fc	Vibration	5 Hz ... 8.4 Hz with 3.5 mm, 10 cycles, 1 octave/min
IEC 60068-2-6, test Fc	Vibration	8.4 Hz ... 200 Hz with 1 g, 10 cycles, 1 octave/min
IEC 60068-2-27, test Ea	Shock	15 g at 11 ms

10.10. Electromagnetic compatibility (EMC)

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

10.10.1. EMC interference emission

Table 19. EMC interference emission: Standard applications

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

Applicable standard		
FCC 47 CFR Part 15		Class A
EN 55032		Class A
EN 61000-6-4		Fulfilled

Table 20. EMC interference emission: Railway applications (trackside)

Applicable standard		
EN 61000-6-4		Fulfilled

10.10.2. EMC interference immunity

Table 21. EMC interference immunity: Standard applications

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

Applicable standard		
Electrostatic discharge		
EN 61000-4-2	Contact discharge	±4 kV
EN 61000-4-2	Air discharge	±8 kV
Electromagnetic field		
EN 61000-4-3	80 MHz ... 1000 MHz	max. 10 V/m

Table 21. EMC interference immunity: Standard applications

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

(continued)

Applicable standard		
EN 61000-4-3	1000 MHz ... 6000 MHz	max. 3 V/m
Fast transients (burst)		
EN 61000-4-4	Power supply connection	±2 kV
EN 61000-4-4	Data line	±2 kV
Voltage surges - power supply connection		
EN 61000-4-5	line/ground	±2 kV
EN 61000-4-5	line/line	±1 kV
Voltage surges - data line		
EN 61000-4-5	line/ground	±1 kV
Conducted disturbances		
EN 61000-4-6	150 kHz ... 80 MHz	10 V

Table 22. EMC interference immunity: Railway applications (trackside)

According to EN 50121-4

Applicable standard		
Electrostatic discharge		
EN 61000-4-2	Contact discharge	±6 kV
EN 61000-4-2	Air discharge	±8 kV
Electromagnetic field		
EN 61000-4-3	80 MHz ... 1000 MHz	max. 20 V/m
EN 61000-4-3	1000 MHz ... 6000 MHz	max. 10 V/m
Fast transients (burst)		
EN 61000-4-4	Power supply connection	±2 kV
EN 61000-4-4	Data line	±2 kV
Voltage surges - power supply connection		
EN 61000-4-5	line/ground	±2 kV
EN 61000-4-5	line/line	±1 kV
Voltage surges - data line		
EN 61000-4-5	line/ground	±2 kV

Table 22. EMC interference immunity: Railway applications (trackside)

According to EN 50121-4

(continued)

Applicable standard		
Conducted disturbances		
EN 61000-4-6	150 kHz ... 80 MHz	10 V

10.11. Network range

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

10.11.1. Twisted pair port 10/100 Mbit/s

Table 23. Network range: 10/100 Mbit/s twisted pair port

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

10.11.2. Fast Ethernet SFP transceiver

Table 24. F/O port 100BASE-FX (SFP Fiber Optic Fast Ethernet Transceiver)

Product code	Mode ¹	Wave length	Fiber	System at- tenuation	Example for F/O ca- ble length ²	Fiber at- tenuation	BLP/Disper- sion
M-FAST-SFP-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×km
M-FAST-SFP-MM/LC...	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

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

Table 24. F/O port 100BASE-FX (SFP Fiber Optic Fast Ethernet Transceiver) (continued)

Product code	Mode ¹	Wave length	Fiber	System at- tenuation	Example for F/O ca- ble length ²	Fiber at- tenuation	BLP/Disper- sion
M-FAST-SFP- 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)
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/LC...	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/LC...	SM	1550 nm	9/125 µm	10 dB ... 29 dB	55 km ... 140 km (14.29 mi ... 86.99 mi)	0.18 dB/ km ³	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/LC 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/LC 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)

1. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul
 2. Including 3 dB system reserve when compliance with the fiber data is observed.
 3. With ultra-low-loss optical fiber.

10.11.3. Gigabit Ethernet SFP transceiver

Table 25. F/O port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver)

Product code	Mode ⁴	Wave length	Fiber	System at- tenuation	Example for F/O ca- ble length ⁵	Fiber at- tenuation	BLP ⁶ /Disper- sion
M-SFP-SX/L- C...	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/L- C...	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/L- C...	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/L- C...	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)	1.0 dB/km	500 MHz×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/L- C...	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)

- MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul
- Including 3 dB system reserve when compliance with the fiber data is observed.
- Using the bandwidth-length product is inappropriate for expansion calculations.

Table 25. F/O port 1000BASE-FX (SFP fiber optic Gigabit Ethernet Transceiver) (continued)

Product code	Mode ⁴	Wave length	Fiber	System at- tenuation	Example for F/O ca- ble length ⁵	Fiber at- tenuation	BLP ⁶ /Disper- sion
M-SFP-LH +/LC	LH	1550 nm	9/125 µm	15 dB ... 30 dB	71 km ... 108 km (44.12 mi ... 67.11 mi)	0.25 dB/km	19 ps/ (nm×km)
M-SFP-LH +/LC	LH	1550 nm	9/125 µm	15 dB ... 30 dB	71 km ... 128 km (44.12 mi ... 79.54 mi)	0.21 dB/ km (typical- ly)	19 ps/ (nm×km)
M-SFP-LH +/LC...	LH	1550 nm	9/125 µm	13 dB ... 32 dB	62 km ... 116 km (38.52 mi ... 72.07 mi)	0.25 dB/km	19 ps/ (nm×km)
M-SFP-LH +/LC...	LH	1550 nm	9/125 µm	13 dB ... 32 dB	62 km ... 138 km (38.52 mi ... 85.75 mi)	0.21 dB/ km (typical- ly)	19 ps/ (nm×km)
SFP-GIG- LX/LC...	MM	1310 nm ⁷	50/125 µm	0 dB ... 10.5 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	1.0 dB/km	800 MHz×km
SFP-GIG- LX/LC...	MM	1310 nm ⁷	62.5/125 µm	0 dB ... 10.5 dB	0 km ... 0.55 km (0 mi ... 0.34 mi)	1.0 dB/km	500 MHz×km
SFP-GIG- LX/LC...	SM	1310 nm	9/125 µm	0 dB ... 10.5 dB	0 km ... ⁸ 20 km ⁸ (0 mi ... 12.43 mi)	0.4 dB/km	3.5 ps/ (nm×km)

4. MM = Multimode, SM = Singlemode, LH = Singlemode Longhaul
5. Including 3 dB system reserve when compliance with the fiber data is observed.
6. Using the bandwidth-length product is inappropriate for expansion calculations.
7. With F/O adapter compliant with IEEE 802.3-2002 Clause 38 (single-mode fiber offset-launch mode conditioning patch cord).
8. Including 2.5 dB system reserve when compliance with the fiber data is observed.

10.11.4. Bidirectional Fast Ethernet SFP transceiver

Table 26. F/O port (bidirectional Fast Ethernet SFP transceiver)

Product code SFP-FAST-B...	Wave length TX	Wave length RX	Fiber	System at- tenuation	Example for F/O cable length ¹⁰	Fiber atten- uation	Dispersion
SFP-FAST-BA MM/LC EEC	MM 1310 nm	1550 nm	50/125 µm 62.5/125 µm	0 dB ... 16 dB	0 km ... 2 km (0 mi ... 1.24 mi)	1.0 dB/km	800 MHz×km 500 MHz×km
SFP-FAST-BB MM/LC EEC	MM 1550 nm	1310 nm	50/125 µm 62.5/125 µm	0 dB ... 16 dB	0 km ... 2 km (0 mi ... 1.24 mi)	1.0 dB/km	800 MHz×km 500 MHz×km
SFP-FAST-BA SM/LC EEC	SM 1310 nm	1550 nm	9/125 µm	0 dB ... 18 dB	0 km ... 20 km (0 mi ... 12.43 mi)	0.4 dB/km	3.5 ps/ (nm×km)
SFP-FAST-BA SM+/LC EEC	SM 1310 nm	1550 nm	9/125 µm	0 dB ... 29 dB	0 km ... 60 km (0 mi ... 37.29 mi)	0.4 dB/km	3.5 ps/ (nm×km)
SFP-FAST-BB SM+/LC EEC	SM 1550 nm	1310 nm	9/125 µm	0 dB ... 29 dB	0 km ... 60 km (0 mi ... 37.29 mi)	0.25 dB/km	19 ps/ (nm×km)

10.11.5. Bidirectional Gigabit Ethernet SFP transceiver

Table 27. F/O port (bidirectional Gigabit Ethernet SFP transceiver)

Product code	Wave length TX	Wave length RX	Fiber	System at- tenuation	Example for F/O cable length ¹²	Fiber atten- uation	BLP/Dis- persion
M-SFP-BIDI Type A LX/LC EEC	SM 1310 nm	1550 nm	9/125 µm	0 dB ... 11 dB	0 km ... 20 km (0 mi ... 12.43 mi)	0.4 dB/km	3.5 ps/ (nm×km)

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

**Table 27. F/O port (bidirectional Gigabit Ethernet SFP transceiver)
(continued)**

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

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

11. Scope of delivery

Table 28. Scope of delivery

Amount	Article
1 ×	Device
1 ×	3-pin terminal block for supply voltage and the grounding
1 ×	Safety and general information sheet
1 ×	Open Source Information

12. Order numbers

12.1. Device variants

Device	Order number
LRS20-8TX	942328013
LRS30-8TX/2SFP	942328014

12.2. Accessories

You find more information on available accessories in the Belden Online Catalog at <https://catalog.belden.com>.

Note: Some products recommended as accessories do not support the entire temperature range specified for the device and can thus restrict the possible range of usage for the overall system.

Table 29. General accessories

Article	Order number
3-pin Low Voltage Interlock terminal block (50 pcs.)	943845005

12.2.1. Fast Ethernet SFP transceiver

Table 30. Accessory: Fast Ethernet SFP transceiver

Fast Ethernet SFP transceiver	Certification type ¹³	Order number
M-FAST SFP-MM/LC EEC	Standard level	943945001
M-FAST SFP-SM/LC	Standard level	943866001
M-FAST SFP-SM/LC EEC	Standard level	943946001

13. 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.
You find further information on certifications on the Internet at the Hirschmann product pages (<https://www.belden.com>).

Table 30. Accessory: Fast Ethernet SFP transceiver (continued)

Fast Ethernet SFP transceiver	Certification type ¹³	Order number
M-FAST SFP-SM+/LC	Standard level	943867001
M-FAST SFP-SM+/LC EEC	Standard level	943947001
M-FAST SFP-LH/LC	Standard level	943868001
M-FAST SFP-LH/LC EEC	Standard level	943948001
SFP-FAST-MM/LC	Entry level	942194001
SFP-FAST-MM/LC EEC	Entry level	942194002
SFP-FAST-SM/LC EEC	Entry level	942195002

12.2.2. Gigabit Ethernet SFP transceiver

Table 31. Accessory: Gigabit Ethernet SFP transceiver

Gigabit Ethernet SFP transceiver	Certification type ¹³	Order number
M-SFP-SX/LC EEC	Standard level	943896001
M-SFP-MX/LC EEC	Standard level	942108001
M-SFP-LX+/LC	Standard level	942023001
M-SFP-LH/LC	Standard level	943042001
M-SFP-LH/LC EEC	Standard level	943898001
M-SFP-LH+/LC	Standard level	943049001
M-SFP-LH+/LC EEC	Standard level	942119001
SFP-GIG-LX/LC EEC	Entry level	942196002

13. 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.

You find further information on certifications on the Internet at the Hirschmann product pages (<https://www.belden.com>).

12.2.3. Bidirectional Fast Ethernet SFP transceiver

Table 32. Accessory: Bidirectional Fast Ethernet SFP transceiver

Bidirectional Fast Ethernet SFP transceiver	Certification type ¹⁴	Order number
SFP-FAST-BA MM/LC EEC	Entry level	942204001
SFP-FAST-BB MM/LC EEC	Entry level	942204002
SFP-FAST-BA SM/LC EEC	Entry level	942205001
SFP-FAST-BA SM+/LC EEC	Entry level	942206001
SFP-FAST-BB SM+/LC EEC	Entry level	942206002

12.2.4. Bidirectional Gigabit Ethernet SFP transceiver

Table 33. Accessory: Bidirectional Gigabit Ethernet SFP transceiver

Bidirectional Gigabit Ethernet SFP transceiver	Order number
M-SFP-BIDI Type A LX/LC EEC	943974001
M-SFP-BIDI Type B LX/LC EEC	943974002
M-SFP-BIDI Type A LH/LC EEC	943975001
M-SFP-BIDI Type B LH/LC EEC	943975002
M-SFP-BIDI Bundle LX/LC EEC (Type A + B)	943974101
M-SFP-BIDI Bundle LH/LC EEC (Type A + B)	943975101
SFP-GIG-BA LX/LC EEC	942207001
SFP-GIG-BB LX/LC EEC	942207002
SFP-GIG-BA LX+/LC EEC	942208001
SFP-GIG-BB LX+/LC EEC	942208002
SFP-GIG-BA LH/LC EEC	942209001
SFP-GIG-BB LH/LC EEC	942209002

14. Use Entry level SFP transceivers for industrial applications that exclusively require the following approvals: CE, FCC or UL 61010-2-20.

13. 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 on the Hirschmann website at: <https://www.belden.com> in the product information.

Table 34. List of the technical standards

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 61000-6-2	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/EN 62368-1	Equipment for audio/video, information and communication technology - Part 1: Safety requirements
IEEE 802.3	Ethernet
UL 61010-1	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 1: General requirements
UL 61010-2-201	Safety requirements for electrical equipment for measurement, control, and laboratory use - Part 2-201: Particular requirements for control equipment
UL 62368-1	Audio/video, information and communication technology equipment - Part 1: Safety requirements

A. Further support

Technical questions

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

You find the addresses of our partners on the Internet at:

<https://www.belden.com>

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