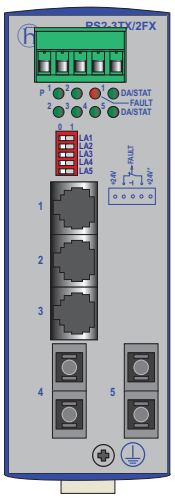
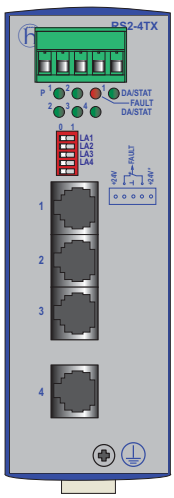
HIRSCHMANN
A BELDEN BRAND

Description and operating instructions Industrial Ethernet Rail Switch 2

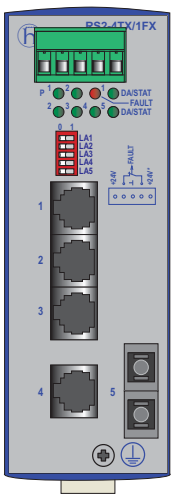
RS2-xTX/xFX EEC



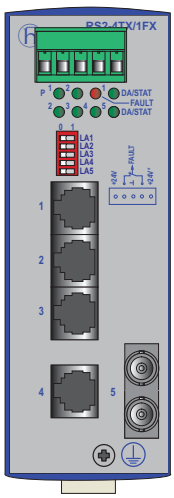
RS2-3TX/2FX EEC
RS2-3TX/2FX-SM EEC



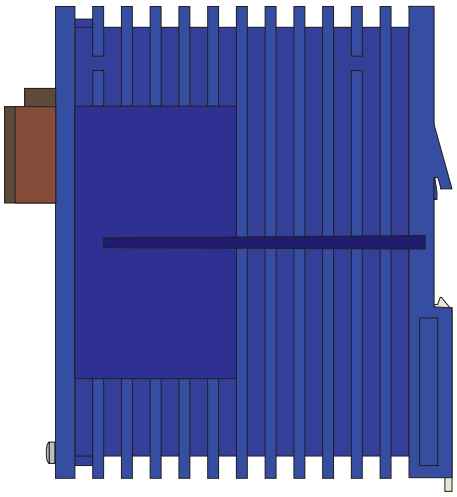
RS2-4TX EEC



RS2-4TX/1FX EEC
RS2-4TX/1FX-SM EEC



RS2-4TX/1FX-ST EEC



The Rail Switches

– RS2-3TX/2FX EEC
– RS2-3TX/2FX-SM EEC

– RS2-4TX/1FX EEC
– RS2-4TX/1FX-ST EEC
– RS2-4TX/1FX-SM EEC

– RS2-4TX EEC

in short RS2-xTX/xFX EEC, are switches especially designed for use in industrial environments. They support Ethernet 10 MBit/s and Fast Ethernet 100 MBit/s.

The Rail Switch modules support switched Ethernet networks in accordance with IEEE standard 802.3 using copper and fiber optic technology. The switch modules are plugged onto the standard DIN rail.

The RS2-3TX/2FX... modules have three 10/100 MBit/s twisted pair ports (10/100BASE-TX, RJ45 connectors) and two 100 MBit/s fiber optic ports (100BASE-FX, Duplex SC connector).
It is possible to connect up to three DTEs or other TP/TX network segments to the TP/TX ports using twisted pair cabling. Two further DTEs or optical network components can be connected to the fiber ports.

The RS2-4TX/1FX... modules have four 10/100 MBit/s twisted pair ports (10/100BASE-TX, RJ45 connectors) and one 100 MBit/s fiber optic port (100BASE-FX, Duplex SC connector or ST connector on R2-4TX/1FX-ST EEC).
The RS2-4TX EEC module has four 10/100 MBit/s twisted pair ports (10/100BASE-TX, RJ45 connectors).
It is possible to connect up to four DTEs or other TP/TX network segments to the TP/TX ports using twisted pair cabling. One further DTE or optical network component can be connected to the fiber port (with RS2-4TX/1FX...).

The TP ports support auto negotiation, autopolarity and autocrossing.

The fiber optic ports support full duplex (FDX).

03965100211041500

Hirschmann. Simply a good Connection.

ATEX Directive 94/9/EC – Special conditions for safe use

Relevant for RS2-xTX/xFX EEC devices when operating in explosive gas atmospheres according to ATEX Directive 94/9/EC, the following applies:

List of Standards:
- EN 60079-0:2009
- EN60079-15:2010

Certificate No.: DEKRA 13ATEX0013 X

☐ Make sure that the device has the following label:

Ⓔx II 3G Ex nA IIC T4 Gc DEKRA 13ATEX0013 X

Ambient rating and temperature code:
Ta: -40 °C ... +60 °C

☐ The modules shall be installed in a suitable enclosure in accordance with EN 60079-15 providing a degree of protection of at least IP54 according to EN 60529, taking into account the environmental conditions under which the equipment will be used.

☐ When the temperature under rated conditions exceeds 70 °C at the cable or conduit entry point, or 80 °C at the branching point of the conductors, the temperature specification of the selected cable and cable entries shall be in compliance with the actual measured temperature values.

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

☐ Connectors shall be connected or disconnected exclusively in dead-voltage state.

☐ DIP switches shall be switched exclusively in dead-voltage state.

Safety Guidelines Environment

⚠ **Warning!**
The device may only be operated in the listed surrounding air temperature and at the listed relative air humidity (non condensing).

☐ The installation location is to be selected so as to ensure compliance with the climatic limits listed in the Technical Data.

☐ To be used in an up to Pollution Degree 2 environment only (IEC 60664-1).

Staff qualification requirements

Note: Qualified personnel, as understood in this manual and in the warning signs, are persons who are familiar with the setup, assembly, startup, and operation of this product and are appropriately qualified for their job. This includes, for example, those persons who have been:

– trained or directed or authorized to switch on and off, to ground and to label power circuits and devices or systems in accordance with current safety engineering standards

– trained or directed in the care and use of appropriate safety equipment in accordance with the current standards of safety engineering

– trained in providing first aid.

General Safety Instructions

☐ This device is electrically operated. Adhere strictly to the safety requirements relating to voltages applied to the device as described in the operating instructions!

⚠ **Warning!**
Failure to observe the information given in the warnings could result in serious injury and/or major damage.

Only personnel that have received appropriate training should operate this device or work in its immediate vicinity. The personnel must be fully familiar with all of the warnings and maintenance measures in these operating instructions.

Correct transport, storage, and assembly as well as careful operation and maintenance are essential in ensuring safe and reliable operation of this device.

Use only undamaged parts!

☐ These products are only to be used in the manner indicated in this version of the "Description and Operating Instructions".

☐ Particular attention is to be paid to all warnings and items of information relating to safety.

⚠ **Warning!**
Any work that may have to be performed on the electrical installation should be performed by fully qualified technicians only.

⚠ **Warning!**
LED- or LASER components according to IEC 60825-1:
CLASS 1 LASER PRODUCT.
LIGHT EMITTING DIODE - CLASS 1 LED PRODUCT.

Based specifications and standards:

The devices fulfil the following specifications and standards:
– EN 61000-6-2 Basic standard – interference resistance in industry.
– EN 55022 – Interference characteristics for IT systems.
– EN 60950 – Security in IT systems.
– EN 61131 – Programmable Logic Controllers.
– CFR-47 Part 15 – Code of Federal Regulations.
– UL 508 – Underwriters Laboratories Inc. Safety for Industrial Control Equipment.
– ISA 12.12.01 – Nonincendive Electrical Equipment for Use in Class I and II, Division 2 and Class III, Divisions 1 and 2 Hazardous (Classified) Locations.
– UL 60950 – Safety for Information Technology Equipment.
– Germanischer Lloyd – rules for classification and construction VI-7-3 part 1.
Certified devices are marked with a certification identifier.

CE Notes on CE identification

The devices comply with the regulations of the following European directives:

2004/108/EC (EMV)
Directive of the European Parliament and of the Council on the approximation of the laws of the Member States relating to electromagnetic compatibility.

2011/65/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.

The EU declaration of conformity is kept available for the responsible authorities in accordance with the above-mentioned EU directives at:

Hirschmann
Automation and Control GmbH
Stuttgarter Straße 45-51
D-72654 Neckartenzlingen
Telephone: +49 (0)1805 14-1538

The product can be used in the industrial sphere.
– Interference immunity: EN 61000-6-2
– Radio interference level: EN 55022 Class A

⚠ **Warning!**
This is a Class A device. This equipment may cause radio interference if used in a residential area; in this case it is the operator s responsibility to take appropriate measures.

The precondition for compliance with EMC limit values is strict adherence to the construction guidelines specified in this description and operating instructions.

FCC Note:

This equipment has been tested and found to comply with the limits for a Class A digital device, persuant 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.

♺ **Recycling Note:**
After its use, this product has to be processed as electronic scrap and disposed of according to the prevailing waste disposal regulations of your community / district / country / state.

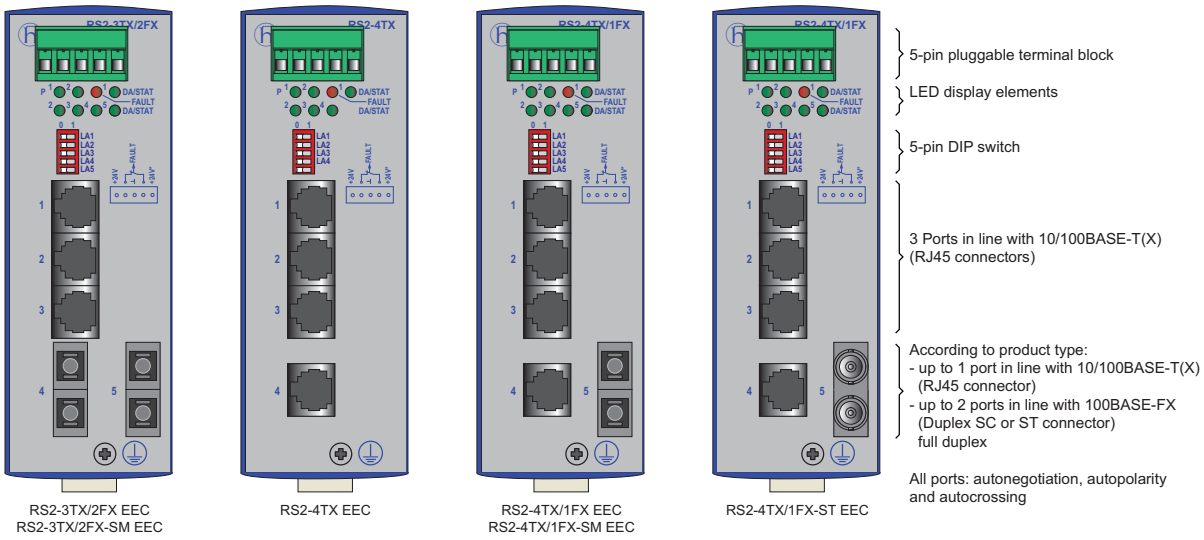


Fig. 1: Overview display elements and interfaces of the RS2-xTX/xFX EEC

1. Functional description

The 10/100BASE-T(X) ports of a RS2-xTX/xFX EEC represent a terminal connection for the connected LAN segment. You can connect single devices or complete network segments.

1.1 FRAME SWITCHING FUNCTIONS

Store and Forward
All data received by the RS2-xTX/xFX EEC from the system bus or at the ports is stored and checked for validity. Frames > 1536 bytes as well as fragments (< 64 bytes) are discarded. The RS2-xTX/xFX EEC forwards the valid frames.

Multi address capability
A RS2-xTX/xFX EEC learns all source addresses per port. Only packets with
– unknown addresses
– addresses learnt at this port
– a multi/broadcast address
in the destination address field are sent to this port.
A RS2-xTX/xFX EEC learns up to 1,000 addresses. This becomes necessary if more than one terminal device is connected to one or more ports. In this way several independent subnetworks can be connected to a RS2-xTX/xFX EEC.

Learnt addresses
A RS2-xTX/xFX EEC monitors the age of the learned addresses. The RS2-xTX/xFX EEC deletes address entries from the address table which exceed a certain age (300 seconds).
Note: Restarting deletes the learned address entries.

Tagging (IEEE 802.1Q)
The IEEE 802.1 Q standard designates the VLAN tag to be included in a MAC data frame for the VLAN and prioritizing functions. The VLAN tag consists of 4 bytes (2 bytes tag protocol identifier TPID, 2 bytes tag control information TCI). It is inserted between the source address field and the type field. Data packets with a VLAN tag are transmitted unchanged by the RS2-xTX/xFX EEC.

1.2 SPECIFIC FUNCTIONS OF THE TP/TX INTERFACE

Link control
The RS2-xTX/xFX EEC monitors the connected TP/TX line segments for short-circuits or interrupts using regular Idle signals in accordance with IEEE standard 802.3 10/100BASE-T/TX. The RS2-xTX/xFX EEC does not transmit any data to a TP/TX segment from which it does not receive an Idle signal.

Note: A non-occupied interface is assessed as a line interrupt. The TP/TX line to terminal equipment which is switched off is likewise assessed as a line interrupt as the de-energised bus coupler cannot transmit Idle signals.

Auto polarity exchange
If the receive line pair is incorrectly connected (RD+ and RD- switched) polarity is automatically reversed.

Autocrossing
The RS2-xTX/xFX EEC detects the transmit and receive pairs (MDI, MDI-X). The RS2-xTX/xFX EEC automatically configures its port for the correct transmit and receive pins. Consequently it does not matter whether you connect devices using a cross-over or straight cable.

1.3 SPECIFIC FUNCTIONS OF THE F/O INTERFACE

Link control
The RS2-xTX/xFX EEC monitors the connected F/O line for interrupts using idle signals during frame pauses in accordance with IEEE standard 802.3 100BASE-FX. The RS2-xTX/xFX EEC transmits no data to a F/O line from which it is receiving no idle signal.

Low Light Detection
If the optical input power decreases below the low light threshold the transmit and receive path will be disabled for data and the idle signal will be transmitted.

Far-End Fault
The optical transmission distance of the RS2-xTX/xFX EEC can be monitored in receiving direction as well as in transmitting direction, if the other side also supports Far-End Fault. If the other side does not support Far-End Fault, the optical transmission distance is monitored only in receiving direction.
Far-End Fault is sent, if the optical input power at the optical port has fallen under the low light level. If Far-End Fault is received, the link stays inactive (DA/STAT LED dark).

1.4 FURTHER FUNCTIONS AND FEATURES

Reset
The RS2-xTX/xFX EEC will be reset by the following action:
– input voltages fall below a threshold

After a reset the following action is carried out:
– initialization

1.5 DISPLAY ELEMENTS

Equipment status
These LEDs provide information about statuses which affect the function of the entire RS2-xTX/xFX EEC.
P1 – Power 1 (green LED)
– lit: – supply voltage 1 present
– not lit: – supply voltage 1 less than 9.6 V

P2 – Power 2 (green LED)
– lit: – supply voltage 2 present
– not lit: – supply voltage 2 less than 9.6 V

FAULT (Red LED)
– lit: – Indicator contact indicates an error
– lit: – no error

Port Status
These LEDs display port-related information.
DA/STAT 1 to 5,
DA/STAT 1 to 4 (on RS2-4TX EEC)
– Data, Link status (green LED)
– not lit: – no valid link
– flashes: – data activity
– lit: – valid link

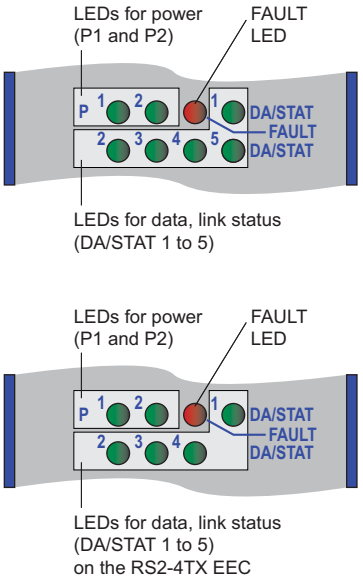


Fig. 2: Display elements of the RS2-xTX/xFX EEC

1.6 INTERFACES

10/100 MBit/s connection (TP port)

The 10/100 Mbit ports of the RS2-xTX/xFX EEC (8-pin shielded R45 sockets),
- three ports on the RS2-3TX/2FX...
- four ports on the RS2-4TX/1FX...

allow DTEs or independent network segments complying with the standards IEEE 802.3 100BASE-TX / 10BASE-T to be connected. These ports support autonegotiation, the autopolarity function and autocrossing.

The socket casings are electrically connected to the front panel of the RS2-xTX/xFX EEC.

– **Pin configuration** of the RJ45 socket, RS2-xTX/xFX EEC:
  – 1 line pair: pin 3 and pin 6
  – 1 line pair: pin 1 and pin 2
  – remaining pins: not used.

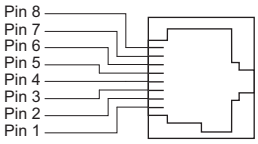


Fig. 3: Pin configuration of a TP/TX interface

100 Mbit/s connection (FX port)

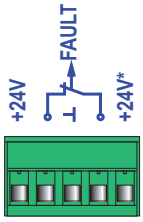
The 100 MBit/s ports of the RS2-xTX/xFX EEC,
- one port on the RS2-4TX/1FX...
- two ports on the RS2-3TX/2FX... support the IEEE 802.3 100BASE-FX FDX standard. They use a duplex SC connector or a ST connector (on RS2-4TX/1FX-ST EEC). Each 100 MBit/s port allows one further DTE or an optical network component to be connected.

5pin terminal block

The supply voltage and the indicator contact are connected via a 5pin terminal block. If the terminal block is fitted the wrong way round, the device will still work correctly.

⚠ **Warning!**
The RS2-xTX/xFX EEC equipments are designed for operation with a safety extra-low voltage. Thus, they may only be connected to the supply voltage connections with SELV circuits with the voltage restrictions in accordance with IEC/EN 60950-1.

– **Voltage supply**: Redundant voltage supplies are supported. Both inputs are decoupled. There is no load distribution. With redundant supply, the power pack supplies the RS2-xTX/xFX EEC only with the higher output voltage. The supply voltage is electrically isolated from the housing.



⊥ = 0V

Fig. 5: Pin configuration of 5 pin terminal block

– **Indicator contact:**
  The indicator contact is used to supervise the functions of the RS2-xTX/xFX EEC and thus facilitates remote diagnosis without management software.
  Contact interrupt indicates the following by means of a potential-free indicator contact (relay contact, closed circuit):
  – the failure of at least one of the two supply voltages (supply voltage 1 or 2 < 9.6 V).
  – a permanent fault in the RS2-xTX/xFX EEC (internal voltage supply).
  – the faulty link status of at least one port. The indication of the link state on the RS2-xTX/xFX EEC can be masked on a port-by-port basis using the DIP switches LA1 to LA5 (LA1 to LA4 on RS2-4TX EEC).
  State of delivery: link test is activated.

Ground connection

The RS2-xTX/xFX EEC is grounded via a separate screw connection.

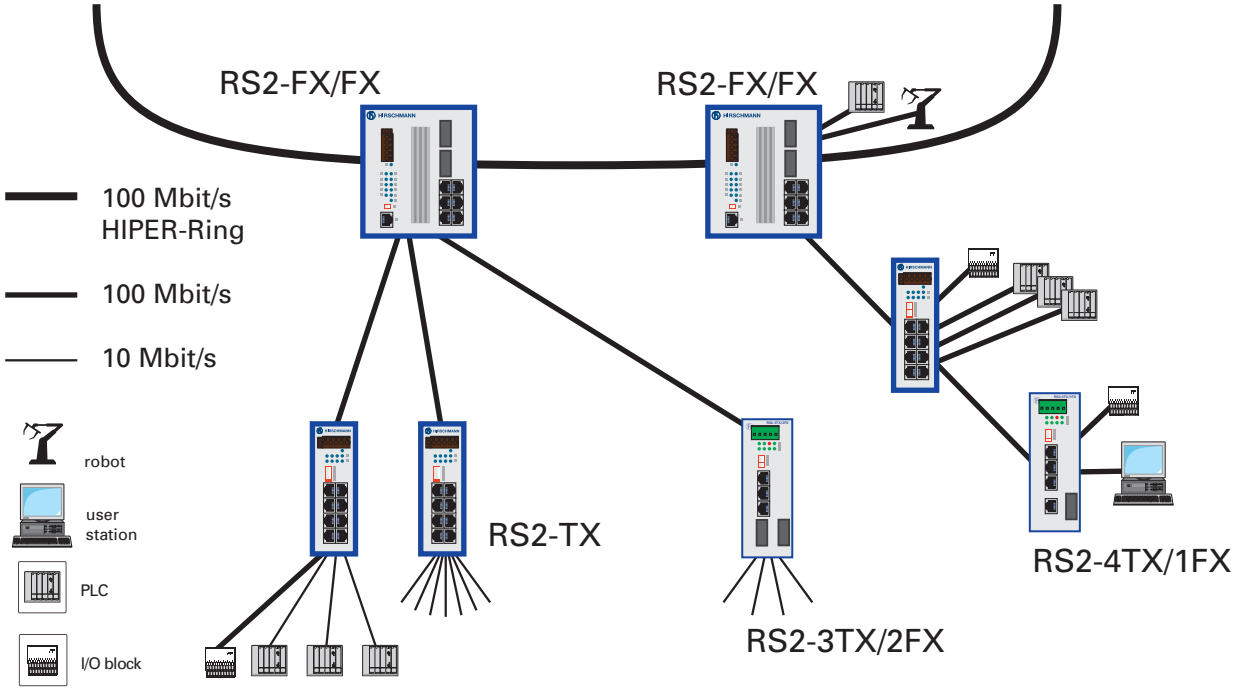


Fig. 4: Configuration with RS2-xTX/xFX EEC: Connection of up to 4 data terminal equipments (4 on RS2-4TX/1FX..., 3 on RS2-3TX/2FX...) or further segments via TP/TX as well as connection via fiber optic cable with up to 2 optical ports (1 on RS2-4TX/1FX..., 2 on RS2-3TX/2FX....

1.7 CONTROLS

5-pole DIP switch

(Suppressing the link states)

With a DIP switch on the front panel of the RS2-xTX/xFX EEC the indication of the link states by the indicator contact can be suppressed port by port. Using the switches LA1 to LA5 (LA1 to LA4 on RS2-4TX EEC), the indication of the link states can be suppressed.
Switch position „ON“: the indication of the link state is not suppressed, that is the indicator contact indicates the unvalid link.
State of delivery: LA1 to LA5 (LA1 to LA4 on RS2-4TX EEC) in position „ON“ (position 1).

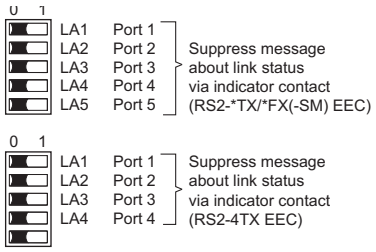


Fig. 6: 5-pole DIP switch to suppress the indication of the link states

2. Configuration

2.1 CONNECTING DTE AND OTHER NETWORK SEGMENTS

It is possible to connect up to three DTEs or other TP/TX network segments to the 10/100 Mbit/s ports of the RS2-3TX/2FX... using twisted pair cabling. Two further data terminal equipments or optical network components can be connected at 100 Mbit/s to the optical ports using fiber optic cable.
It is possible to connect up to four DTEs or other TP/TX network segments to the 10/100 Mbit/s ports of the RS2-4TX/1FX... using twisted pair cabling. One further data terminal equipment or optical network component can be connected at 100 Mbit/s to the optical port using fiber optic cable.
It is possible to connect up to four DTEs or other TP/TX network segments to the 10/100 Mbit/s ports of the RS2-4TX EEC using twisted pair cabling.
(ref. Fig. 4).

3. Assembly, startup procedure and dismantling

3.1 UNPACKING, CHECKING

☐ Check whether the package was delivered complete (see scope of delivery).
☐ Check the individual parts for transport damage.

⚠ **Warning!**
Use only undamaged parts!

3.2 ASSEMBLY

The equipment is delivered in a ready-to-operate condition. The following procedure is appropriate for assembly:

☐ Pull the terminal block off the RS2-xTX/xFX EEC and wire up the supply voltage.
☐ Fit the RS2-xTX/xFX EEC on a 35 mm standard DIN rail to DIN EN 50 022.
☐ Attach the upper snap-on slide bar of the RS2-xTX/xFX EEC to the standard DIN rail and press it down until it locks into position.
☐ Fit the signal lines.

Notes:

– The front panel of the RS2-xTX/xFX EEC is grounded via a separate ground connection.

– Do not open the housing.

– The shielding ground of the twisted pair cables is electrically connected to the front panel.

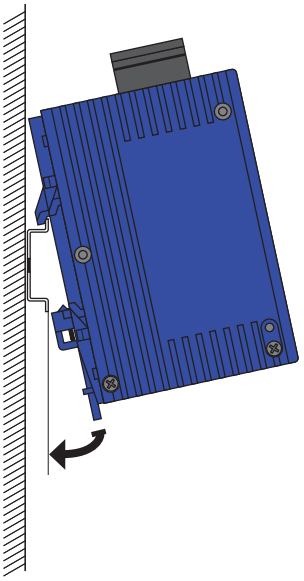


Fig. 7: Assembling the RS2-xTX/xFX EEC

3.3 STARTUP PROCEDURE

☐ You start up the RS2-xTX/xFX EEC by connecting the supply voltage via the 5-pin terminal block.

3.4 DISMANTLING

☐ To take the RS2-xTX/xFX EEC off the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide, pull it (without tipping the screwdriver) downwards and lift the RS2-xTX/xFX EEC upwards.

4. Further support

In the event of technical queries, please talk to the Hirschmann contract partner responsible for looking after your account or directly to the Hirschmann office. You can find the addresses of our contract partners on the Internet
http://www.hirschmann.com

You can contact us

in the EMEA region at
Tel.: +49 (0)1805 14-1538
E-mail: hac.support@belden.com

in the America region at
Tel.: +1 (717) 217-2270
E-mail: inet-support.us@belden.com

in the Asia-Pacific region at
Tel.: + 65 6854 9860
E-mail: inet-ap@belden.com

www.hicomcenter.com gives you an up-to-date overview of training courses about technology and products.

5. Technical data

General data

Operating voltage	NEC Class 2 power source 24 VDC (-25% +33%) safety extra-low voltage (SELV) (redundant inputs decoupled), 5 A maximum	
Buffer time	min. 10 ms at 24 VDC	
Potential difference between input voltage and housing	Potential difference to input voltage, +24 VDC: 32 VDC Potential difference to input voltage, ground: -32 VDC	
Power comsumption at 24 VDC		
RS2-3TX/2FX EEC	5.9 W maximum;	21 Btu (IT)/h
RS2-3TX/2FX-SM EEC	5.9 W maximum;	21 Btu (IT)/h
RS2-4TX EEC	4.8 W maximum;	17 Btu (IT)/h
RS2-4TX/1FX EEC	5.4 W maximum;	19 Btu (IT)/h
RS2-4TX/1FX-ST EEC	5.4 W maximum;	19 Btu (IT)/h
RS2-4TX/1FX-SM EEC	5.4 W maximum;	19 Btu (IT)/h
Overload current protection at input	non-changeable fuse	
Dimensions W x H x D	47 mm x 135 mm x 111 mm	
Mass	RS2-3TX/2FX...: 335g RS2-4TX/1FX...: 330g RS2-4TX EEC: 300g	
Ambient temperature	Surrounding air -40°C to +70°C (expanded temperature bounds)	
Storage temperature	Surrounding air -40°C to +85°C (expanded temperature bounds)	
Humidity	up to 95% (non condensing)	
Atmospheric pressure	suitable for use in up to 2000 m (795 hPa, higher altitudes on demand)	
Laser protection	Class 1 conforming to EN 60825-1	
Protection type	IP 20	
Interference proof EMC		
Discharge of static electricity		
Contact discharge	EN 61000-4-2 Test level 3	
Air discharge	EN 61000-4-2 Test level 3	
Electromagnetic fields	EN 61000-4-3 Test level 3	
Fast transients	EN 61000-4-4 Test level 3	
Surge voltage symmetrical	EN 61000-4-5 Test level 2	
Surge voltage asymmetrical	EN 61000-4-5 Test level 3	
Cable-based RF faults	EN 61000-4-6 Test level 3	
Radiated emission EMC		
EN 55022	Class A	
CFR-47 Part 15	Class A	
Stability		
Vibration	IEC 60068-2-6 Test FC, testing level in line with EN 61131-2	
Shock	IEC 60068-2-27 Test Ea, testing level in line with EN 61131-2	

Network size

TP/TX port 10BASE-T/100BASE-TX			
Length of a twisted pair segment	100 m (328 ft) maximum		
F/O port 100BASE-FX			
According to IEEE 802.3 100BASE-FX			
System attenuation			
50/125 µm fiber (multimode MM)	0 to 8 dB		
62,5/125 µm fiber (multimode MM)	0 to 11 dB		
9/125 µm fiber (singlemode SM)	0-16 dB	(...-SM)	
Wave length	1300 nm	(...-SM)	
F/O line length (example)			
50/125 µm fiber (multimode MM)	5 km approx.		(data of fiber: 1.0 dB/km, 800 MHz∗km)
62,5/125 µm fiber (multimode MM)	4 km approx.		(data of fiber: 1.0 dB/km, 500 MHz∗km)
10/125 µm fiber (singlemode SM)	30 km (98,420 ft) maximum (...-SM)		(data of fiber: 0,4 dB/km)

Interfaces

RS2-3TX/2FX...	3 TP/TX ports	RJ45 sockets, 10/100 MBit/s
	2 FX ports	Duplex SC connector, 100 MBit/s
RS2-4TX/1FX EEC, RS2-4TX/1FX-SM EEC	4 TP/TX ports	RJ45 sockets, 10/100 MBit/s
	1 FX port	Duplex SC connector, 100 MBit/s
RS2-4TX/1FX-ST EEC	4 TP/TX ports	RJ45 sockets, 10/100 MBit/s
	1 FX port	ST connector, 100 MBit/s
RS2-4TX EEC	4 TP/TX ports	RJ45 sockets, 10/100 MBit/s

Displays

Equipment status	1 x green LED	**P1** – power 1, supply voltage 1 present
	1 x green LED	**P2** – power 2, supply voltage 2 present
	1 x red LED	**FAULT** – indicator contact indicates an error
Port status	5 x green LED	**DA/STAT 1 to 5** – data, link status (on RS2-xTX/xFX...)
	4 x green LED	**DA/STAT 1 to 4** – data, link status (on RS2-4TX EEC)

Scope of delivery

Rail Switch RS2-xTX/xFX EEC incl. terminal block for supply voltage description and operating instructions	

Order number	
Rail Switch RS2-3TX/2FX EEC	943 771-001
Rail Switch RS2-3TX/2FX-SM EEC	943 772-001
Rail Switch RS2-4TX EEC	943 819-001
Rail Switch RS2-4TX/1FX EEC	943 773-001
Rail Switch RS2-4TX/1FX-ST EEC	943 119-002
Rail Switch RS2-4TX/1FX-SM EEC	943 774-001

Accessories

Ethernet manual	943 320-011
Manual	
Basics Industrial Ethernet and TCP/IP	280 720-834
Rail Power Supply RPS 30	943 662-003
Rail Power Supply RPS 80 EEC	943 662-080
Rail Power Supply RPS 120 EEC	943 662-120