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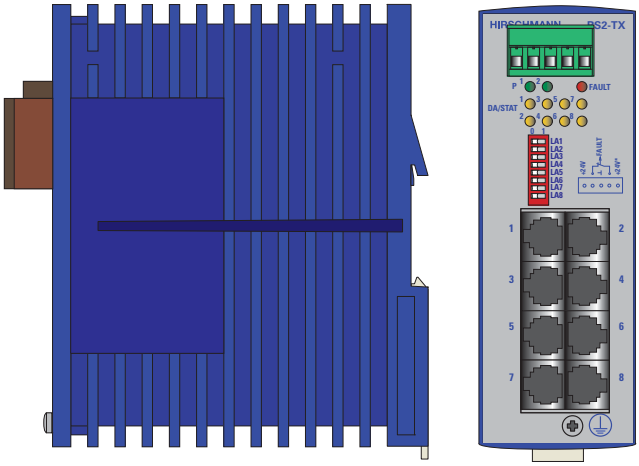
A BELDEN BRAND

Description and operating instructions Industrial Ethernet Rail Switch 2

RS2-TX

Order No.

943 686-003



The Rail Switch RS2 has been especially designed for use in industrial environments. It supports 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 technology. The switch modules are plugged onto the standard bar.

The RS2-TX modules have eight 10/100 MBit/s twisted pair ports (RJ45 connectors).

It is possible to connect up to eight data terminal equipments or other network segments to the 10/100 Mbit/s ports using twisted pair cabling. The ports support auto negotiation, autopolarity and autocrossing.

03966300108041500O

Hirschmann. Simply a good Connection.

The performance features described here are binding only if they have been expressly guaranteed in the contract. We have checked that the contents of the technical publication agree with the hardware and software described. However, it is not possible to rule out deviations completely, so we are unable to guarantee complete agreement. However, the details in the technical publication are checked regularly. Any corrections which prove necessary are contained in subsequent editions. We are grateful for suggestions for improvement.

We reserve the right to make technical modifications.

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Note

We would point out that the content of these operating instructions is not part of, nor is it intended to amend an earlier or existing agreement, permit or legal relationship. All obligations on Hirschmann arise from the respective purchasing agreement which also contains the full warranty conditions which have sole applicability. These contractual warranty conditions are neither extended nor restricted by comments in these operating instructions.

We would furthermore point out that for reasons of simplicity, these operating instructions cannot describe every conceivable problem associated with the use of this equipment. Should you require further information or should particular problems occur which are not treated in sufficient detail in the operating instructions, you can request the necessary information from your local Hirschmann sales partner or directly from the Hirschmann office (address: refer to chapter entitled „Notes on CE identification“).

Safety Instructions

This manual contains instructions which must be observed to ensure your own personal safety and to avoid
damage to devices and machinery. The instructions are highlighted with a warning triangle and are shown as
follows according to the degree of endangerment:

⚠ **Danger!**
means that death, serious injury or considerable damage to property **will** result if the appropriate safety measures are not taken.

⚠ **Warning!**
means that death, serious injury or considerable damage to property **can** result if the appropriate safety measures are not taken.

⚠ **Caution!**
means that light injury or damage to property can result if the appropriate safety measures are not taken.

Note: is an important piece of information about the product, how to use the product, or the relevant section of the documentation to which particular attention is to be drawn.

Certified usage

Please observe the following:

⚠ **Warning**
The device may only be employed for the purposes described in the catalog and technical description, and only in conjunction with external devices and components recommended or approved by Hirschmann. The product can only be operated correctly and safely if it is transported, stored, installed and assembled properly and correctly. Furthermore, it must be operated and serviced carefully.

Safety Guidelines Shielding Ground

Note: The shielding ground of the connectable twisted pairs lines is connected to the front panel as a conductor.

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

Safety Guidelines Housing

⚠ **Warning!**
Only technicians authorized by Hirschmann are permitted to open the housing.

Note: The device is grounded via the separated ground screw. It is located on the left under the front panel.

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

⚠ **Warning!**
The ventilation slits must not be covered so as to ensure free air circulation.

The distance to the ventilation slots of the housing has to be a minimum of 10 cm.

Never insert pointed objects (thin screwdrivers, wires, etc.) into the inside of the subrack! This especially applies to the area behind the socket connectors. Failure to observe this point may result in injuries caused by electric shocks.

Note: If installed the device must be operated exclusively in switch cabinets with fire protection characteristics according to IEC/EN 60950-1.

Note: The housing has to be mounted in upright position.

Safety Guidelines Power Supply

☐ Switch the basic devices on only when the case is closed.

⚠ **Warning!**
The devices may only be connected to the supply voltage shown on the type plate.

The devices are designed for operation with a safety extra-low voltage.Thus, they may only be connected to the supply voltage connections and to the signal contact with SELV circuits with the voltage restrictions in accordance with IEC/EN 60950-1.

☐ For the case where the module is operated with external power supply: Use only a safety extra-low voltage in accordance with IEC/EN 60950-1 to power the system.

☐ First of all you connect the protecting line, before you establish the further connections. When you remove connections, you disconnect the protecting line last.

☐ Relevant for North America:
The subject unit is to be suppplied by a Class 2 power source complying with the requirements of the National Electrical Code, table 11(b). If power is redundant supplied (two individual power sources) the power sources together should comply with the requirements of the National Electrical Code, table 11 (b).

☐ Relevant for North America:
Power, input and output (I/O) wiring must be in accordance with Class I, Division 2 wiring methods [Article 501-4(b) of the National Electrical Code, NFPA 70] and in accordance with the authority having jurisdiction.

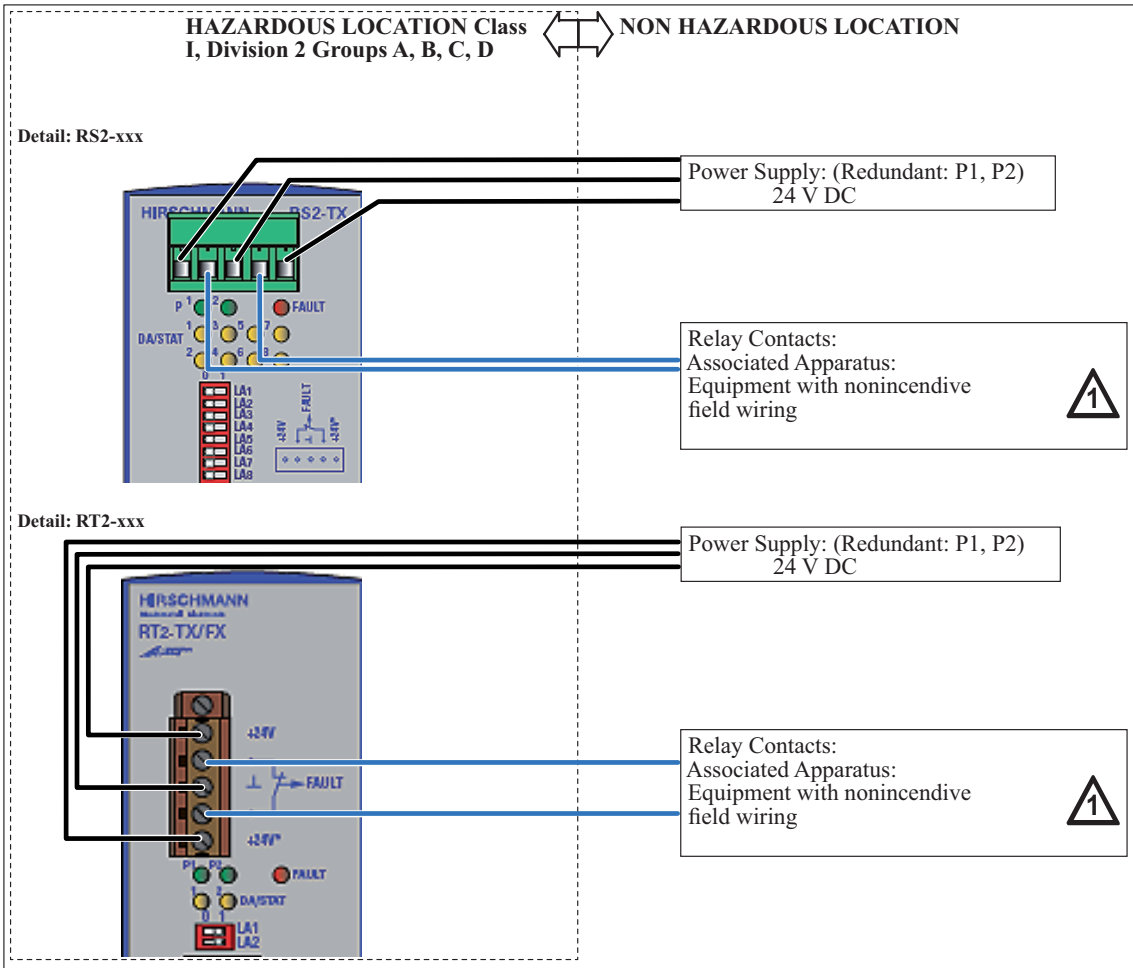
Peripheral equipment must be suitable for the location it is used in.

Use 60/75°C or 75°C copper(CU)wire only.

☐ Relevant for North America:

⚠ **Avertissement!**
Risque d'explosion - Ne pas débrancher tant que le circuit est sous tension à moins que l'emplacement soit connu pour ne contenir aucune concentration de gaz inflammable.

⚠ **Avertissement!**
Risque d'explosion - La substitution de tout composant peut rendre ce matériel incompatible pour une utilisation en classe I, division 2.



The Use in Hazardous Locations is only allowed for Rail Switch 2 and Rail Transceiver 2 Family model No's which are individually labelled "FOR USE IN CLASS I, DIVISION 2 HAZARDOUS LOCATIONS"

Notes:

1. The nonincendive field wiring circuit concept allows interconnection of nonincendive field wiring apparatus and associated nonincendive field wiring apparatus using any of the wiring methods permitted for unclassified locations when certain parametric conditions are met
   Capacity: $C_a \geq C_i + C_{Cable}$
   Inductivity: $L_a \geq L_i + L_{Cable}$
   The maximum cable length has to be determined as follows:
   (a) max. Cable Length < (L_a - L_i) / L_{Cable} and (b) max. Cable Length < (C_a - C_i) / C_{Cable}
   The lower value of (a) and (b) is to apply.
   $Cable_L$: inductance per unit length of used cable.
   $Cable_C$: capacitance per unit length of used cable.
   Other C-parameters and L-parameters are according to ANSI / ISA 12.12.01-2012 section 7.
   Where cable capacitance and inductance values per foot are not known, the following values shall be used:
   C_{Cable} 60 pF/foot, L_{Cable} 0.2 µH/foot
   Nonincendive field wiring circuits must be wired in accordance with the National Electric Code (NEC), NFPA 70, article 501.

Nonincendive Field Wiring Parameters:

	V_{max}	I_{max}	C_i	L_i
The Relay Contacts are dependent upon the following Entity Parameters:	30 V	90 mA	2.5 nF	1 µH

WARNING – EXPLOSION HAZARD – SUBSTITUTION OF ANY COMPONENTS MAY IMPAIR SUITABILITY FOR HAZARDOUS LOCATIONS OR EXPLOSIVE ATMOSPHERES.

WARNING – EXPLOSION HAZARD – DO NOT DISCONNECT EQUIPMENT UNLESS POWER HAS BEEN SWITCHED OFF OR THE AREA IS KNOWN TO BE NON-HAZARDOUS.

DO NOT OPEN WHEN ENERGIZED.

The equipment must be installed in a tool-locked enclosure.

CONTROL DRAWING for Industrial ETHERNET **Rail Switch 2 and Rail Transceiver 2 Family** According to ANSI / ISA 12.12.01-2012			HIRSCHMANN A BELDEN BRAND
Rev.: 0	Date: 2012-07-13	Document No.: 000163806DNR	Page 1 of 1

Safety Guidelines Environment

Warning!
The device may only be operated in the listed ambient temperature range 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.

Based specifications and standards:

The devices fulfil the following specifications and standards:
– EN 61000-6-2 Generic standards – Immunity for industrial environments.
– EN 55022 – Information technology equipment – Radio disturbance characteristics.
– EN 61131-2 – Programmable Controllers.
– CFR-47 Part 15 – Code of Federal Regulations.
– Germanischer Lloyd Part 1 – Test Requirements for Electronic Equipment.
– 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.
Certified devices are marked with a certification identifier.

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

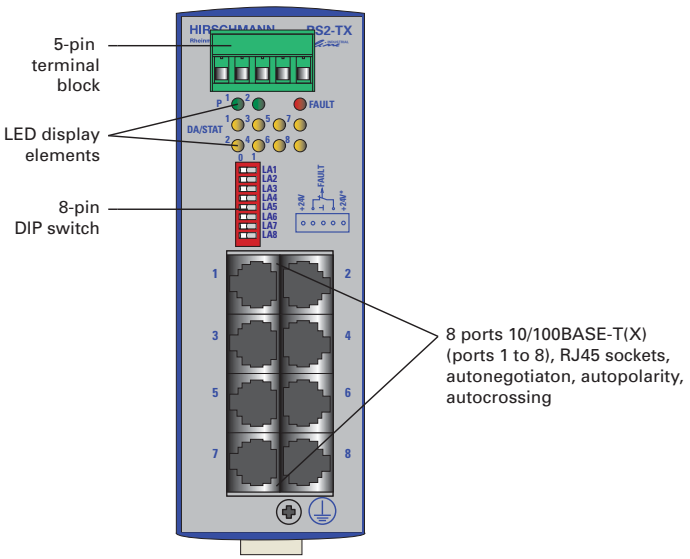
Warning!
This is a Class A device. This equipment may cause radio interference if used in a residential area; in this case it is the operator s responsibility to take appropriate measures.

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.



Fiig. 1: Overview interfaces, display elements and controls of the RS2-TX

1. Functional description

The 10/100BASE-T(X) ports of an RS2-TX 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-TX from the system bus or at the ports are stored and checked for validity. Invalid and defective frames (> 1.522 byte or CRC error) as well as fragments (< 64 byte) are discarded. The RS2-TX forwards the valid frames.

Multi address capability
An RS2-TX 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.
An RS2-TX 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 an RS2-TX.

Learnt addresses
An RS2-TX monitors the age of the learned addresses. The RS2-TX 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 VLAN tag are transmitted unchanged by the RS2-TX.

1.2 SPECIFIC FUNCTIONS OF THE TP/TX INTERFACE

Link control
The RS2-TX monitors the connected TP/TX line segments for short-circuit or interrupt using regular link test pulses in accordance with IEEE standard 802.3 10/100BASE-T/TX. The RS2-TX does not transmit any data to a TP/TX segment from which it does not receive a link test pulse.

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 link test pulses.

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

Autocrossing
The RS2-TX detects the transmit and receive pairs (MDI, MDI-X). The RS2-TX 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 FURTHER FUNCTIONS AND FEATURES

Reset
The RS2-TX will be reset by the following action:
– input voltages fall below a threshold

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

1.4 DISPLAY ELEMENTS

Equipment status
These LEDs provide information about statuses which affect the function of the entire RS2-TX.
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 – Failure (red LED)
– lit: – The indicator contact is open, i.e. it indicates an error.
– not lit: – The indicator contact is closed, i.e. it does not indicate an error.

Port Status
These LEDs display port-related information.
DA/STAT 1 to 8 – Data, Link status (green/yellow LED)
– not lit: – no valid link
– lit green: – valid link
– flashes yellow: – receiving data

1.5 CONTROLS

8-pin DIP switch
Using the 8-pin DIP switch on the RS2-TX front panel
– the message about the link statuses can be suppressed by the indicator contact on a port-by-port basis. Using switches **LA1** to **LA8**, the message about the link status of ports 1 to 8 is suppressed. State on delivery: switch position 1 (on), i.e. message not suppressed.

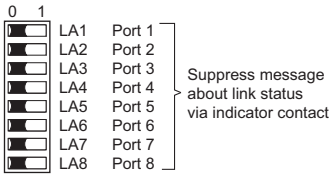


Fig. 2: 8-pin DIP switch on RS2-TX

1.6 INTERFACES

10/100 MBit/s connection
Eight 10/100 Mbit Ports (ports 1 to port 8, 8-pin R45 sockets) on RS2-TX allow terminal equipment or eight independent network segments complying with the standards IEEE 802.3 100BASE-TX / 10BASE-T to be connected. These ports support autonegotiation and the autopolarity function.

The socket casings are electrically connected to the front panel of the RS2-TX.The pin configuration complies with MDI-X.

– **Pin configuration** of the RJ45 socket:
– 1 line pair: pin 3 and pin 6
– 1 line pair: pin 1 and pin 2
– remaining pins: not used.

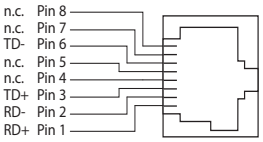


Fig. 3: Pin configuration of an TP/TX interface

5pin terminal block
The supply voltage and the indicator contact are connected via a 5pin terminal block.

Warning!
The RS2-TX equipment is 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-TX only with the higher output voltage. The supply voltage is electrically isolated from the housing.

– **Indicator contact:**
The indicator contact is used to supervise the functions of the RS2-TX 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.
– a permanent fault in the RS2-TX (internal 3,3 V DC voltage, supply voltage 1 or 2 < 9.6 V, ...).
– the faulty link status of at least one port. The indication of the link state on the RS2-TX can be masked on a port-by-port basis using the DIP switches LA1 to LA8. State of delivery: there is no link test.

Note: In the case of the voltage supply being routed without redundancy, the RS2-TX indicates the failure of a supply voltage. You can prevent this message by feeding in the supply voltage through both inputs.

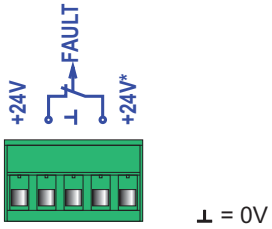


Fig. 5: Pin configuration of 5pin terminal block

Ground connection
The RS2-TX is grounded via a separate screw connection.

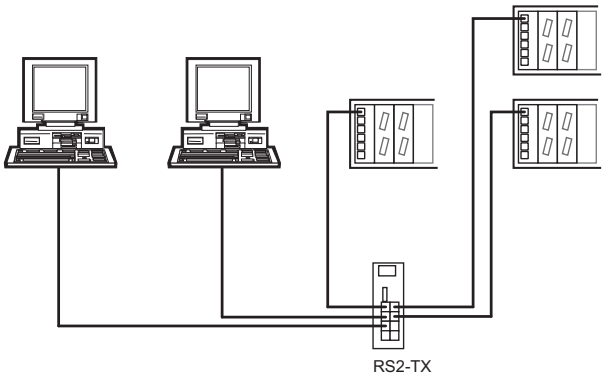


Fig. 4: Configuration with RS2-TX: Connection of up to 8 data terminal equipments or further segments via TP/TX

2. Configuration

2.1 CONNECTING DTE AND OTHER NETWORK SEGMENTS

It is possible to connect up to eight data terminal equipments (DTE) or other network segments to the 10/100 Mbit/s ports of the RS2-TX 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:

☐ Check whether the switch pre-setting suits your requirements (see chap. 1.5).
☐ Pull the terminal block off the RS2-TX and wire up the supply voltage and indicator lines.
☐ Fit the RS2-TX on a 35 mm standard bar to DIN EN 50 022.
☐ Attach the upper snap-on slide bar of the RS2-TX to the standard bar and press it down until it locks in position.
☐ Fit the signal lines.

Notes:

– The front panel of the RS2-TX is grounded via a separate ground connection.

– Do not open the housing.

– The shielding ground of the twisted pair lines which can be connected is electrically connected to the front panel.

3.3 STARTUP PROCEDURE

☐ You start up the RS2-TX by connecting the supply voltage via the 5-pin terminal block.

3.4 DISMANTLING

☐ To take the RS2-TX 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-TX upwards.

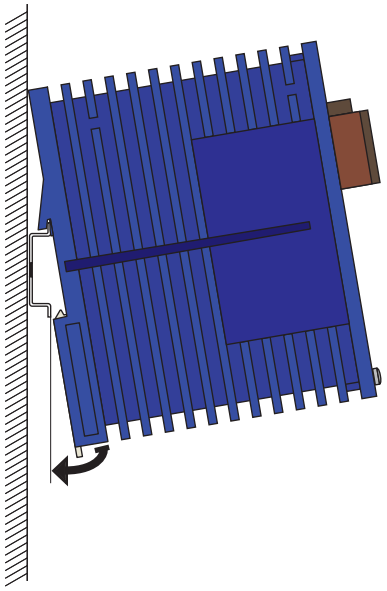


Fig. 6: Assembling the RS2-TX

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

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5. Technical data

General data

Operating voltage	NEC Class 2 power source 24 V DC (-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 V DC Potential difference to input voltage, ground: -32 V DC	
Current consumption at 24 VDC	7.0 W maximum; 24 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	1.9 in x 5.3 in x 4.4 in
Weight	230 g	5.07 lb
Ambient temperature	Surrounding air: 0 °C to + 60 °C	32 °F to 140 °F
Storage temperature	Surrounding air: - 20 °C to + 80 °C	-4 °F to 176 °F
Humidity	up to 95% (non condensing)	
Atmospheric pressure	up to 2000 m (795 hPa, higher altitudes on demand)	
Protection type	IP 20	
EMC interference proof		
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	
EMC emitted immunity		
EN 55022	Class A	
CFR-47 Part 15	Class A	
Germanischer Lloyd	Rules for Classification and Construction VI - 7 - 3 Part 1	
Stability		
Vibration	IEC 60068-2-6 Test FC, testing level in line with IEC 61131-2 Germanischer Lloyd Guidelines for the Performance of Type Tests Part 1	
Shock	IEC 60068-2-27 Test Ea, testing level in line with IEC 61131-2	

Network size

TP/TX port 10BASE-T/100BASE-TX	
Length of a twisted pair segment	100 m (328 ft) maximum

Interfaces

8 TP/TX ports	RJ45 sockets, 10/100 MBit/s
Indicator contact	1 A maximum, 24 V

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 is open and indicates error
Port status	8 x green/yellow LED	**DAT/STAT 1 to 8** – data, link status

Controls

8-pole DIP switch	**LA1 to LA8** – suppress message about the link statuses

Scope of delivery

Rail Switch RS2-TX incl.
terminal block for supply voltage
description and operating instructions

Order number	
Rail Switch RS2-TX	943 686-003

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 60	943 662-001
Rail Power Supply RPS 120	943 662-011

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