HIRSCHMANN
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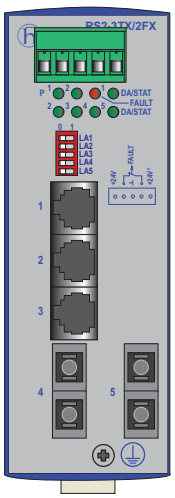
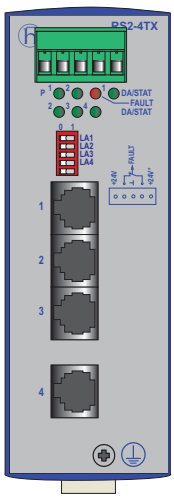
Description and operating instructions Industrial Ethernet Rail Switch 2

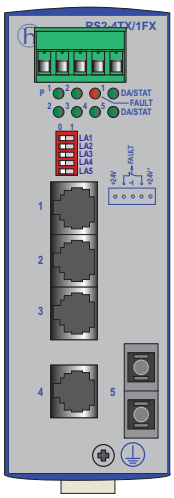
RS2-xTX/xFX EEC



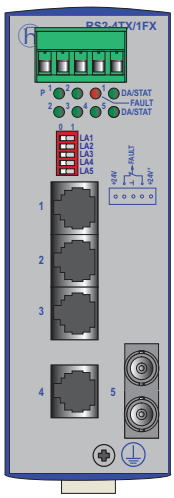
RS2-3TX/2FX EEC
RS2-3TX/2FX-SM EEC



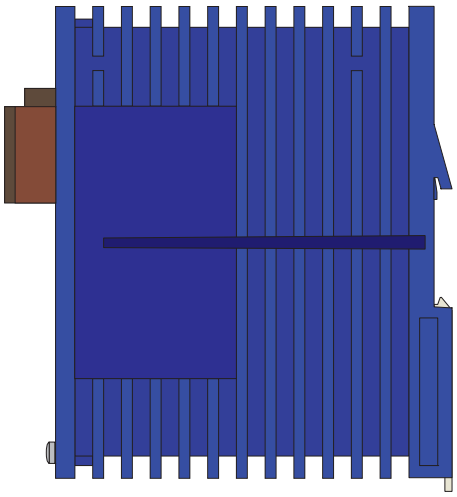
RS2-4TX EEC



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).

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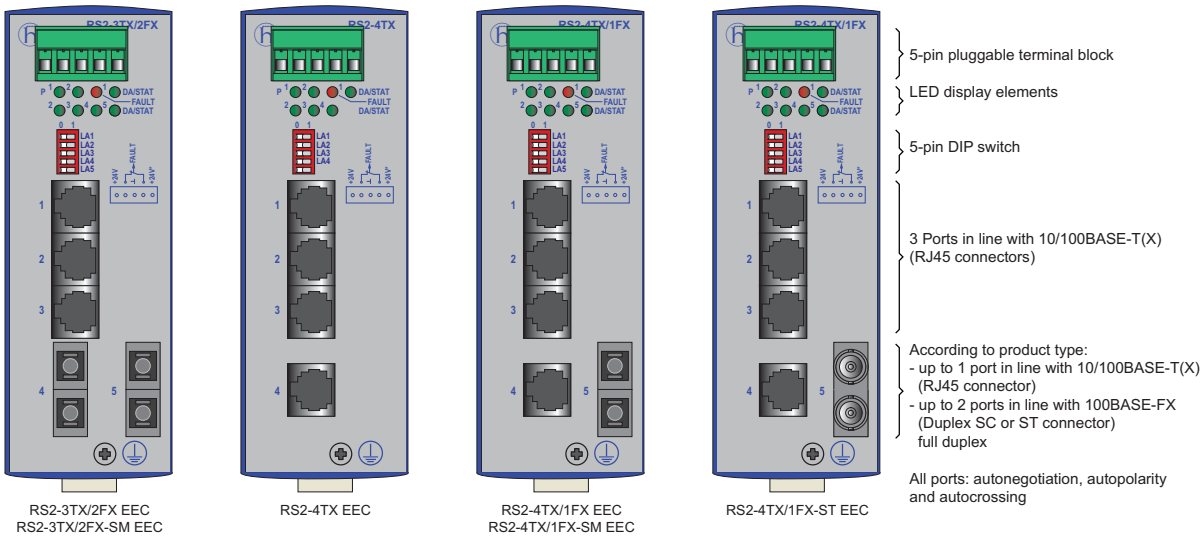

Fig. 1: Overview display elements and interfaces of the RS2-xTX/xFX EEC

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

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