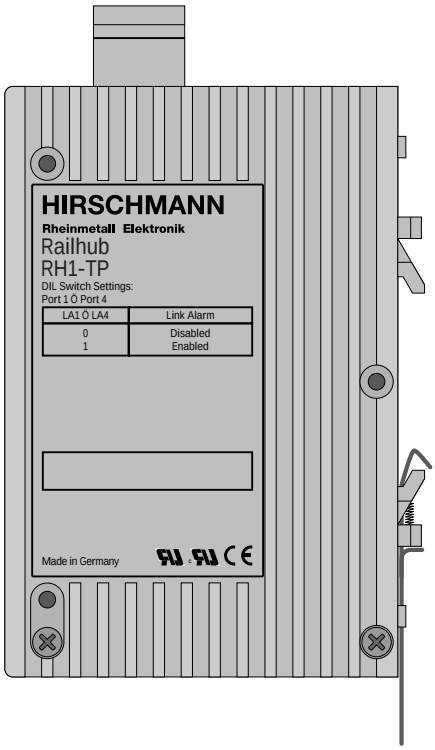
HIRSCHMANN
Rheinmetall Elektronik

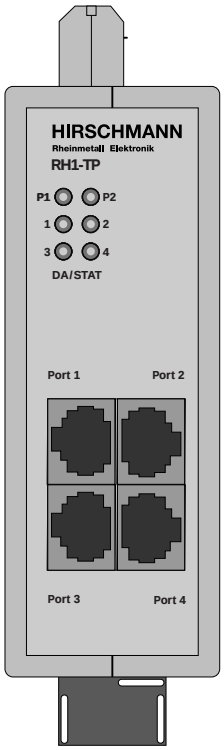
RH1-TP

Order No.

943 639-001

Description and Operating Instructions ETHERNET Twisted Pair Industrial Hubs for ISO/DIN Rail





The rail hub RH1-TP supports a fast and reasonable network expansion. You can connect up to four data terminal equipments or further twisted pair segments via twisted pair.

For startup procedure just fit the rail hub on an ISO/DIN rail, without any further configuration time. The V.24 voltage is supplied via the terminal block and can be feed in redundantly.

The terminal block contains an integrated indicator contact, receiving error and warning messages of the rail hub which are defined as digital signals. These signals e.g. can be utilized as process messages by a programmable logic control (PLC). The indicator contact becomes active as soon as disturbances appear in the rail hubs, that is when a power supply should fail or at least one TP port reports a faulty link status or has auto partitioned.

For diagnosis there are LEDs available which indicate collisions, link status, segmentation, power and received data.

The railhub has four twisted pair (TP) interfaces. It is possible to connect up to four terminals or other TP segments using TPs.

The module conforms to the specifications of ISO/IEC standard 8802-3.

You will find a detailed description for construction of a local area network on network planning and installation in the “Ethernet manual“ (Order no. 943 320-011).

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.

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“).

General

Electricity is used to operate this equipment. Comply in every detail with the safety requirements specified in the operating instructions regarding the voltages to apply!

Warning!
If warning notes are ignored, it is therefore possible for severe injuries and/or material damage to occur.

Only appropriately qualified staff should work on or near this equipment. Such staff must be thoroughly acquainted with all the warnings and maintenance measures contained in these operating instructions.

The proper and safe operation of this equipment assumes proper transport, appropriate storage and assembly and careful operation and maintenance.

Staff qualification requirements

Qualified staff within the meaning of these operating instructions or the warning notes are persons familiar with setting up, assembling, starting up and operating this product and who have appropriate qualifications to cover their activities, such as:

– training or instruction/entitlement to switch circuits and equipment/systems on and off, ground them and identify them in accordance with current safety standards;
– training or instruction in accordance with current safety standards in looking after and using appropriate safety equipment;
– first aid training.

Safety guidelines

Warning!
The RH1-TP units are designed for operation with safe extra-low voltage. Accordingly, only safe extra-low voltages (SELV) to IEC950/EN60950/VDE0805 may be connected to the supply voltage connections.

1. Functional description

1.1 GENERAL FUNCTIONS

Signal regeneration
The RH1-TP processes the signal shape and amplitude of the data received.

Retiming
In order to prevent jitter increasing over several segments, the RH1-TP retimes the data to be transmitted.

Preamble regeneration
The RH1-TP supplements lost preamble bits from data received to 64 bits (incl. the start of frame delimiter (SFD)).

Fragment extension
Collisions can cause short fragments to occur. If the RH1-TP receives a fragment, this is supplemented to give the minimum length of 96 bits. This ensures reliable collision detection by all network participants.

Collision handling
If the RH1-TP detects a data collision, it interrupts the transmission. For the duration of the collision, the collided data package is replaced by a jam signal to ensure collision detection by the terminal equipments.

Auto partitioning
Network failures can be caused by permanent occupancy, interruptured lines, lack of terminating resistors, damaged cable insulation and frequent collisions due to electromagnetic interference. In order to protect the network from such failures, the RH1-TP in this case separates the segment in the receiving direction from the rest of the network.
The RH1-TP has this auto partitioning function individually at each port. The other ports can thus continue to be operated without interference if one of the ports has been auto partitioned. In the event of auto partitioning, transmission continues into the TP segment but reception at this port is blocked.

With twisted pair, auto partitioning is activated if
– a data collision lasts longer than 105 µs or
– there are more than 64 consecutive data collisions.

Reconnection
The segment is reconnected to the network as soon as a package with the minimum length of 51 µs is received without collision at the relevant port, i. e. when the segment is working properly again.

Jabber control
Due to a defective transceiver or LAN controller, for example, the network can be continuously occupied with data. To protect against this, the RH1-TP interrupts reception at the affected TP port after 5.5 ms for a duration of 9.6 µs. This cycle (transmission for 5,5 ms, interruption for 9,6 µs) is repeated until the end of the error (jabber lockup protection).

1.2 SPECIFIC FUNCTIONS OF THE TP INTERFACE

Link control
The RH1-TP monitors the connected TP line segments for short-circuit or interrupt using idle signals during frame pauses in accordance with IEEE standard 802.3 10BASE-T. The RH1-TP does not transmit any data in a TP segment from which it does not receive an idle signals.

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

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

1.3 DISPLAY ELEMENTS

Equipment status
The two LEDs provide information about the status which affects the function of the entire RH1-TP.

P1 – Power 1 (green LED)
– lit: supply voltage 1 present
– lit not: – supply voltage 1 not present,
– hardware fault in RH1-TP

P2 – Power 2 (green LED)
– lit: supply voltage 2 present
– lit not: – supply voltage 2 not present,
– hardware fault in RH1-TP

Port Status
These groups of LEDs display port-related information.
DA/STAT 1 to DA/STAT 4 - link status of the TP ports (4 x green/yellow LED)
– lit yellow: RH1-TP receiving data
– lit green: RH1-TP receiving link test pulses from TP segment,
– the TP segment connected is working properly
– flashes green: port has auto partitioned
– lit not: RH1-TP is not receiving any idle signals from TP segment,
– the assigned TP port is not connected,
– the equipment connected is switched off,
– the TP line is interrupted or short-circuited

1.4 CONTROLS

6-pin DIP switch
Using the 6-pin DIP switch on the top of the RH1-TP housing
– the message about the link statuses can be suppressed by the indicator contact on a port-by-port basis. Using switches LA1 to LA4, the message about the link status of ports 1 to 4 is suppressed. State on delivery: switch position 1 (ON), i.e. message not suppressed.

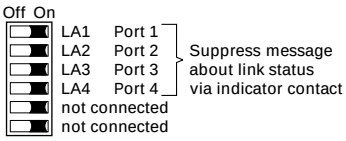


Fig. 1: 6-pin DIP switch

1.5 INTERFACES

TP connection
Four 8pole RJ45 sockets enable four independent TP segments to be connected.
– Pin configuraion of the RJ45 socket:
– TD+: Pin 3, TD-: Pin 6
– RD+: Pin 1, RD-: Pin 2
– remaining pins: not configured.

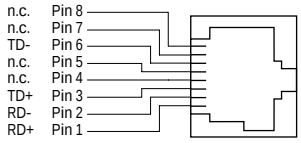


Fig. 2: Pin configuration TP interface

5-pin terminal block
The supply voltage and the indicator contact are connected via a 5-pin terminal block with screw locking mechanism.

⚠ Warning!
The RH1-TP equipment is designed for operation with SELV. Only safe extra-low voltages to IEC950/EN60950/VDE0805 may therefore be connected to the supply voltage connections and to the indicator contact.

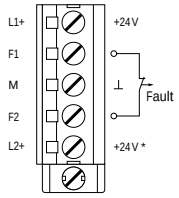


Fig. 3: Pin configuration of 5-pin terminal block

– Voltage supply: The voltage supply can be connected to be redundant. Both inputs are decoupled. There is no load distribution. With redundant supply, the power pack supplies the RH1-TP alone with the higher output voltage. The supply voltage is electrically isolated from the housing.

– Indicator contact: 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 hub for ISO/DIN rail (internal 5 V DC voltage, supply voltage 1 or 2 not in the permissible range).
  – the faulty link status of at least one TP port.
    The indication of the link state might be masked on a port-by-port basis using DIP switches.
  – at least one port has auto partitioned.

Note: In the case of the voltage supply being routed without redundancy, the RH1-TP indicates the failure of a supply voltage. You can prevent this message by feeding in the supply voltage through both inputs.

2. Configuration

2.1 STAND ALONE STRUCTURE STAR SHAPED STRUCTURE

The RH1-TP enables connection of up to four data terminal equipments or further twisted pair segments via twisted pair.

2.2 EXPANSION OF EXISTING NETWORKS

The rail hub RH1-TP gives you the possibility to expand your network in a fast and reasonable way, for example an existing rail hub-/rail switch link.

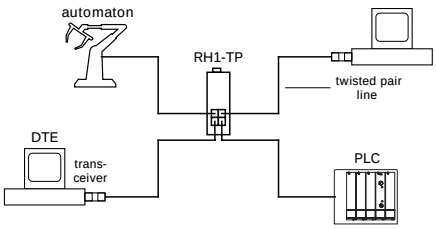


Fig. 4: Stand-alone configuration of the RH1-TP

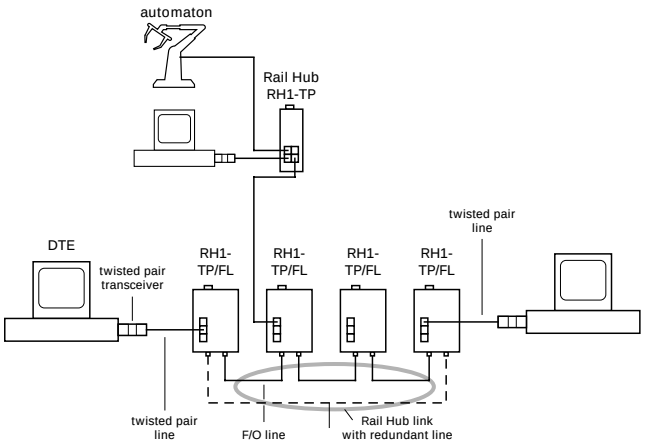


Fig. 5: Expansion of a rail hub link

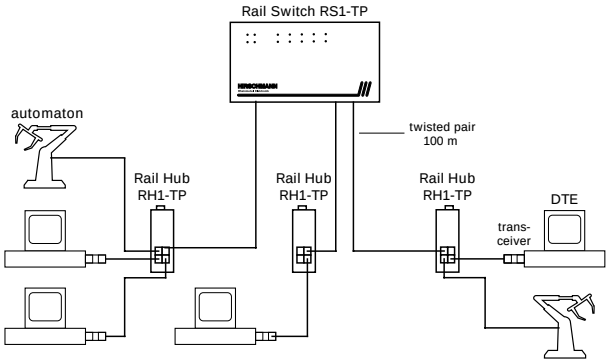


Fig. 6: Configuration with rail switch

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.
– Pull the terminal block off the RH1-TP and wire up the supply voltage and indicator lines.
– Fit the RH1-TP on a 35 mm ISO/DIN rail to DIN EN 50 022.
– Suspend the upper snap-in hook of the RH1-TP in the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide pull this downwards (cf. Fig. 8, dismantling) and press the bottom of the module onto the ISO/DIN rail until it locks in position (Fig. 7).
– Fit the signal lines.

Notes:

– The housing of the RH1-TP is grounded via the ISO/DIN rail. There is no separate ground connection.
– The screws in the lateral half-shells of the housing may not be undone under any circumstances.
– The shielding ground of the twisted pair lines which can be connected is electrically connected to the housing.

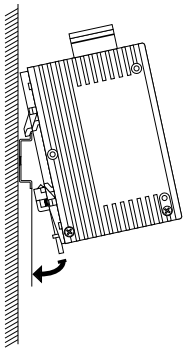


Fig. 7: Assembling the RH1-TP

3.3 STARTUP PROCEDURE

You start up the RH1-TP by connecting the supply voltage via the 5-pin terminal block. Lock the terminal block with the locking screw at the side.

3.4 DISMANTLING

To take the RH1-TP off the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide, pull it (without tipping the screwdriver) downwards and fold the RH1-TP upwards.

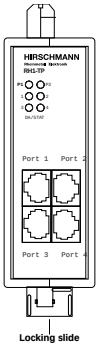


Fig. 8: Dismantling the RH1-TP

4. Further support

In the event of technical queries, please talk to your local Hirschmann sales partner or directly to the Hirschmann agency in your country. You can find the addresses

– on the Internet
(http://www.hirschmann.de)

Our hotline in Germany
Tel: +49-7127-14-1538 (Fax: -1542)

and our US support office
Tel. +800-225-0524

are also at your disposal.

5. Technical data

General data

Operating voltage	DC 18 to 32 V safe extra-low voltage (SELV) (redundant inputs decoupled)	
Current consumption	typ. 80 mA at 24 VDC (without data) max. 130 mA at 24 VDC (with data)	
Overload current protection at input	non-changeable thermal fuse	
Dimensions W x H x D	40 mm x 125 mm x 80 mm	(1.57 in x 4.92 in x 3.15 in)
Mass	530 g	(1.167 lb)
Ambient temperature	0 ºC to + 60 ºC	(32 ºF to + 140 ºF)
Storage temperature	- 40 ºC to + 80 ºC	(-40 ºF to + 176 ºF)
Humidity	10% to 90% (non condensing)	
Protection class	IP 30	
Radio interference level Interference immunity	EN 55022 Class B EN 50082-2	
Interfaces	4 ports in compliance to 10BASE-T with RJ45 connectors (shielded) 1 x 5 pole mountable terminal block	

Displays	P1, P2: power DA/STAT 1 to DA/STAT 4: data, collision, link status per port, segmentation

Network size

Transition	TP-Port ↔ TP-Port	
Propagation equivalent	95 m	(312 ft)
Variability value	2 BT	
TP line length (TP-Port ↔ TP-Port)		
Length of a twisted pair segment	max. 100 m	(328 ft)

Scope of delivery

RH1-TP Twisted Pair Industrial Hub for ISO/DIN Rail incl.
terminal block for supply voltage
description and operating instructions

Order number

RH1-TP – Twisted Pair Industrial Hub for ISO/DIN Rail	943 639-001

Accessories

Ethernet manual	943 320-011

CE

Notes on CE identification

The Twisted Pair Industrial Hubs for ISO/DIN Rail comply with the regulations of the following European directive:

89/336/EEC
Council Directive on the harmonisation of the legal regulations of member states on electromagnetic compatibility (amended by Directives 91/263/EEC, 92/31/EEC and 93/68/EEC).

Area used	Requirements for emitted interference	interference immunity
Residential	EN 50081-1: 1992	EN 50082-1: 1992
Industrial	EN 50081-2: 1993	EN 50082-2: 1995

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

Richard Hirschmann GmbH & Co
Network Systems Division
Stuttgarter Straße 45-51
D-72654 Neckartenzlingen
Telephone ++49-7127-14-1538

The product can be used in the residential sphere (residential sphere, business and trade sphere and small companies) and in the industrial sphere.

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

Richard Hirschmann GmbH & Co.
Network Systems Division
Stuttgarter Straße 45-51
D-72654 Neckartenzlingen
Tel. ++49-7127-14-1538

Printed in Germany
Subject to alterations

039597001010998000