The Twisted Pair industrial hubs for ISO/DIN rail (Deutsche Industrie Norm – standard US industrial rails) allow Ethernet networks to be flexibly constructed in accordance with IEEE standard 802.3 using fiber optic (F/O) and copper technology. The hubs for ISO/DIN rail provide several connection options in one piece of equipment and are plugged onto the ISO/DIN rail.

The rail hub has three twisted pair (TP) interfaces and two BFOC optical interfaces. It is possible to connect up to three terminals or other TP segments using TPs, and F/Os can be used to connect up to two more terminals or optical network components (RH1-TP/FL, ECFL2, Mini-OTDE etc.).

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.

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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 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 the safety extra-low voltages (SELV) in compliance with IEC 950/EN60950/VDE0805.

☐ For the case where the module is operated with external power supply: Use only a safety extra-low voltage in accordance with IEC 950/EN 60 950/VDE 0805 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.

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.

☐ 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: According to EN60950 the device may only be operated in a fire protective housing.

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

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.

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:
Notes on CE identification
The devices comply with the regulations of the following European directive:
89/336/EEC

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.

Area used | Requirements for emitted interference | Interference immunity
---|---|---
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:
Hirschmann Electronics GmbH & Co. KG
Automation and Network Solutions
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.

FCC 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.

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

□ 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.

Recycling Note:
After its use, this product has to be processed as electronic scrap to a proper disposal according to the prevailing waste disposal regulations of your community/district/country/state.
When the redundant mode is active, packages >51 µs sent at a F/O port without collision also lead to reconnection.

J abber 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/FL interrupts reception - at the affected TP or AUI port after 5.5 ms.
- 9.6 µs after the end of the error the auto partitioning will be canceled. (jabber lockup protection)
- at the relevant F/O port after 3.9 ms. 420 ms after the end of the error the auto partitioning will be canceled. (Rx jabber)

1.2 SPECIFIC FUNCTIONS OF THE TP INTERFACE
Link control
The RH1-TP/FL 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/FL 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 energised transceiver cannot transmit idle signals.

1.3 SPECIFIC FUNCTIONS OF THE F/O INTERFACE
Link control
The RH1-TP/FL monitors the connected F/O lines for interrupts using idle signals during frame pauses in accordance with IEEE standard 802.3 10BASE-FL. The RH1-TP/FL transmits no data to an F/O line from which it is receiving no idle signal.

Redundancy
In areas where data security has top priority, it is possible with the aid of the redundancy function to bridge any failure of an F/O line or RH1-TP/FL. To do so, a replacement line is frequently routed in a different cable run. In the event of a fault, there is an automatic switch between the main line and the replacement. A cross-link within the bus structure creates a ring (see Fig. 6). If any RH1-TP/FL link or RH1-TP/FL fails, every other RH1-TP/FL can still be reached with the aid of the redundant run.

Hirschmann Patent Frame Redundancy:
- EP 0403763 (Europe)
- NO 5.218.600 (USA)

1.4 DISPLAY ELEMENTS
Equipment status
The 4 LEDs on top provide information about the status which affects the function of the entire RH1-TP/FL.

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

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

DA – Data (yellow LED)
- lit: RH1-TP/FL receiving data at least one interface
- lit not: - RH1-TP/FL not receiving data at any interface,
  - hardware fault in RH1-TP/FL

CD – Collision Detect (red LED)
- lit: data collision detected at RH1-TP/FL level
- lit not: - no data collision at RH1-TP/FL level

Port Status
These groups of LEDs display port-related information.

LS1 to LS3 – link status of the TP ports
(3 x green LED)
- lit: RH1-TP/FL receiving idle signals from TP segment,
  - the TP segment connected is working properly
- lit not: RH1-TP/FL 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

LS4 – link status of F/O port 4
(green LED)
- lit: RH1-TP/FL receiving idle signals from F/O segment,
  - the F/O segment connected is working properly
- flashes 2 times per period:
  - port has auto partitioned
- lit not: RH1-TP/FL not receiving any idle signals from F/O segment,
  - the assigned F/O port is not connected,
  - the equipment connected is switched off,
  - the F/O receiving fibre is interrupted
**LS5 - Link status of F/O port 5**

*(green LED)*

**Normal mode switched on**
- lit: RH1-TP/FL receiving idle signals from F/O segment,
- the connected redundant F/O segment is working properly
- flashes 2 times per period:
  - port has auto partitioned
- lit not: RH1-TP/FL not receiving any idle signals from F/O segment,
  - the assigned F/O port is not connected,
  - the equipment connected is switched off,
  - the F/O receiving fibre is interrupted

**LS5 - Link status of F/O port 5**
*(green LED)*

**Redundant mode switched on**
- lit: RH1-TP/FL receiving idle signals from F/O segment,
- the connected redundant F/O segment is working properly and is active,
- flashes 1 time per period:
  - RH1-TP/FL receiving idle signals from F/O segment,
  - the connected redundant F/O segment is working properly and is in stand-by mode,
- lit not: RH1-TP/FL not receiving any idle signals from F/O segment,
  - the assigned F/O port is not connected,
  - the equipment connected is switched off,
  - the F/O receiving fibre is interrupted

**1.5 CONTROLS**

**6-pin DIP switch**

Using the 6-pin DIP switch on the top of the RH1-TP/FL housing
- the message about the link statuses can be suppressed by the indicator contact on a port-by-port basis. Using switches LA1 to LA5, the message about the link status of ports 1 to 5 is suppressed. State on delivery: switch position 1 (ON), i.e. message not suppressed.
- port 5 can be switched to redundant mode. State on delivery: switch position 0 (OFF), i.e. port 5 in normal mode.

**1.6 INTERFACES**

**TP connection**
Three 8pole RJ 45 sockets enable three independent TP segments to be connected.

- **Pin configuration of the RJ 45 socket:**
  - TD+: Pin 3, TD-: Pin 6
  - RD+: Pin 1, RD-: Pin 2
  - remaining pins: not configured.

**F/O connection**
2 optical ports to 10BASE-FL (BFOC/2.5 (ST) sockets) enable RH1-TP/FL equipment to be cascaded as well as redundant rings to be constructed using F/OS and terminal equipment to be connected.

**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/FL 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.

**- 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/FL 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 5V DC voltage, supply voltage 1 or 2 not in the permissible range).
- the faulty link status of at least one F/O or 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. Port 5 in redundant mode doesn’t indicate the state „auto partitioning“, because this function characterizes the error free state of the optical ring.

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

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**Fig. 1: 6-pin DIP switch**

**Fig. 2: Pin configuration TP interface**

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

2.1 LINE STRUCTURE
The RH1-TP/FL enables line structures to be built up. Cascading can be effected using both the TP and F/O ports.

When cascading via TP ports, use a cable which crosses the signal pairs, i.e. in each case connects output to input.

2.2 REDUNDANT RING STRUCTURE
Redundant ring structures can be built up using the F/O ports of the RH1-TP/FL equipment. To do so, the first piece of equipment is connected to the last in the fiber optical line structure consisting of RH1-TP/FL equipment (see above) and the redundant fiber optical ring thus closed.

To do so, the redundant connection on precisely one of the two RH1-TP/FL modules is to be connected to port 5, and port 5 switched to redundant mode. Switchover is effected at the 6-pin DIP switch on top of the equipment (see chapter entitled “Functional description - Controls”.

Note: All the modules in the redundant ring may only be connected to one another via F/O runs (ECFL2, ECFL4).

2.3 COMBINATION WITH CONCENTRATORS OF THE ASGE, MC AND AMC FAMILY
The RH1-TP/FL can also be combined with concentrators of the ASGE, MC and AMC family. The RH1-TP/FL modules can be cascaded for example in line structures via the ECFL2, ECFL4, ECTP3 etc. interface cards.

The number of pieces of equipment which can be cascaded depends on the overall network structure. Redundant ring structures can be implemented via the F/O ports.

Hints on calculating the maximum network expansion can be found in the “Ethernet manual”, Chapter 8 (see “Technical data” for order number).

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/FL and wire up the supply voltage and indicator lines.
- Fit the RH1-TP/FL on a 35 mm ISO/DIN rail to DIN EN 50 022.
- Suspend the upper snap-on slide bar of the RH1-TP/FL in the standard bar and press it down towards the standard bar until it locks in position.
- Fit the signal lines.

Notes:
- The housing of the RH1-TP/FL 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.

3.3 STARTUP PROCEDURE
You start up the RH1-TP/FL 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 dismantle the RH1-TP/FL from the standard bar, pull the RH1-TP/FL downwards and on the bottom lift the RH1-TP/FL away from the standard bar.

RH1-TP/FL
A maximum of 11 RH1-TP/FL modules might be cascaded in a fiber optical line. Here the total line length between the terminal equipments with the maximum distance might not exceed 1180 m.

The total line length is determined by the total sum of all F/O line sections and the two TP lines to the terminal equipments.
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

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<td>Graded-index fiber 62.5/125 µm (average)</td>
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Scope of delivery

RH1-TP/FL Optical/Electrical Twisted Pair Industrial Hub for ISO/DIN Rail incl. terminal block for supply voltage
description and operating instructions
Order number
RH1-TP/FL – Optical Twisted Pair Industrial Hub for ISO/DIN Rail 943 613-001

Accessories

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Notizen / Notes

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