The Ethernet hub 100 Mbps 4TX supports a fast network expansion. You can connect up to four data terminal devices or further twisted pair segments via twisted pair cord.

To install, just fit the hub on an ISO/DIN rail. No other configuration is required. The 24 V voltage is supplied via the terminal block and can be fed in redundantly.

The terminal block contains an integrated indicator contact, receiving error and warning messages about the rail hub which are defined as digital signals. These signals can, for example, be utilized as process messages by a Quantum or Premium PLC. The indicator contact becomes active as soon as disturbances occur in the hub, such as when a power supply fails or at least one TP port reports a faulty link status or has auto partitioned.

LEDs indicating fault, link status, segmentation, power and received data are available for diagnostic purposes.

The Ethernet Hub 100 Mbps has four twisted pair (TP) interfaces. It is possible to connect up to four terminals or other TP segments using Shielded and Foiled Twisted Pair cords (SFTP) in industrial environments with electromagnetic interference.

You will find a detailed description for construction of a local area network, network design and network installation in the “Transparent Factory User and Planning Guide” (Order no. 490USE13300).
Warning

If warning notes are ignored, severe injuries and/or material damage may 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

Ethernet Hub 100 Mbps 4TX units are designed for operation with safe extra-low voltage. Accordingly, only safe extra-low voltages (SELV) conforming to IEC950/EN60950/VDE0805 may be connected to the supply voltage connections.
1. Functional description

1.1 GENERAL FUNCTIONS

Signal regeneration
The Hub 100 Mbps 4TX processes the signal shape and amplitude of the data received.

Retiming
In order to prevent jitter increasing over several segments, the Hub 100 Mbps 4TX retimes the data to be transmitted.

Collision handling
If the Hub 100 Mbps 4TX 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 devices.

Auto partitioning
Network failures can be caused by permanent occupancy, ruptured lines, damaged cable insulation and frequent collisions due to electromagnetic interference. In order to protect the network from such failures, the Hub 100 Mbps 4TX in this case separates the segment in the receiving direction from the rest of the network.

The Hub 100 Mbps 4TX 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 - there are more than 60 consecutive data collisions.

Reconnection
The segment is reconnected to the network as soon as a package with the minimum length of 450…560 BT (1 BT = 10 ns) is sent 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 Hub 100 Mbps 4TX interrupts reception and transmission at the affected TP port after 57.500 BT.

1.2 SPECIFIC FUNCTIONS OF THE TP INTERFACE

Link control
The Hub 100 Mbps 4TX monitors the connected TP line segments for short-circuit or interrupt using idle signals during frame pauses in accordance with IEEE standard 802.3 100BASE-TX. The Hub 100 Mbps 4TX 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.

1.3 DISPLAY ELEMENTS

Equipment status
The two LEDs provide information about the status which affects the function of the entire Hub 100 Mbps 4TX.

P1 - Power 1 (green LED)
- lit: supply voltage 1 present
- not lit: - software fault in Hub 100 Mbps 4TX

P2 - Power 2 (green LED)
- lit: supply voltage 2 present
- not lit: - supply voltage 2 not present,
- - hardware fault in Hub 100 Mbps 4TX

DA - Data (yellow LED)
- lit: Hub 100 Mbps 4TX receiving data on hub level
- not lit: Hub 100 Mbps 4TX is not receiving any idle signals from TP segment,
- - the equipment connected is switched off,
- - the TP line is interrupted or short-circuited

FAULT (red LED)
- lit: indicator contact reports error
- not lit: indicator contact of the Hub 100 Mbps 4TX reports no error

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

STAT 1 to STAT 4 - link status of the TP ports (4 x green/yellow LED)
- lit green: Hub 100 Mbps 4TX receiving link test pulses from TP segment,
- - the TP segment connected is working properly
- - flashes green: port has auto partitioned
- - not lit: Hub 100 Mbps 4TX 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 front panel of the Hub 100 Mbps 4TX
- the message about the link status 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. Factory setting: switch position 1 (ON), i.e. message not suppressed.

1.5 INTERFACES

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

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 Hub 100 Mbps 4TX 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 only supplies the Hub 100 Mbps 4TX with the higher output voltage. The supply voltage is electronically isolated from the housing.
- Indicator contact: Contact interrupt indicates the following by means of a volt-free indicator contact (relay contact, closed circuit):
  - the failure of at least one of the two supply voltages.
  - a permanent fault in the hub (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 status can 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 Hub 100 Mbps 4TX 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 STANDALONE STRUCTURE
STAR SHAPED STRUCTURE
The Hub 100 Mbps 4TX enables connection of up to four data terminal devices via twisted pair.

2.2 EXPANSION OF EXISTING NETWORKS
The Hub 100 Mbps 4TX offers the possibility of expanding your network quickly, for example by using an existing hub switch link.

Fig. 4: Standalone configuration of the Hub 100 Mbps 4TX

Fig. 5: Configuration with Ethernet 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 factory-setting is suitable for your requirements.
- Pull the terminal block off the Hub 100 Mbps 4TX and wire up the supply voltage and indicator lines.
- Fit the Hub 100 Mbps 4TX on a 35 mm ISO/DIN rail to DIN EN 50 022.
- Suspend the upper snap-in hook of the Hub 100 Mbps 4TX in the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide pull this downwards (see Fig. 7, dismantling) and press the bottom of the module onto the ISO/DIN rail until it locks in position (Fig. 6).
- Fit the signal lines.

Notes:
- The front panel of the Hub 100 Mbps 4TX is grounded via the separate ground connection in the front panel.
- 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 Hub 100 Mbps 4TX 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 Hub 100 Mbps 4TX off the ISO/DIN rail, insert a screwdriver horizontally under the housing into the locking slide, pull it (without tipping the screwdriver) downwards and tilt the Hub 100 Mbps 4TX upwards.

Fig. 6: Assembling the Hub 100 Mbps 4TX
Fig. 7: Dismantling the Hub 100 Mbps 4TX
### 4. Technical data

#### General data

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Operating voltage</strong></td>
<td>DC 18 V, 32 V safe extra-low voltage (SELV) (redundant inputs decoupled)</td>
</tr>
<tr>
<td><strong>Current consumption</strong></td>
<td>typ. 210 mA at 24 VDC (without data) max. 270 mA at 24 VDC (with data)</td>
</tr>
<tr>
<td><strong>Overload current protection at input</strong></td>
<td>non-replaceable thermal fuse</td>
</tr>
<tr>
<td><strong>Dimensions W x H x D</strong></td>
<td>47 mm x 135 mm x 111 mm (1.85 in x 5.31 in x 4.37 in)</td>
</tr>
<tr>
<td><strong>Weight</strong></td>
<td>240 g (0.529 lb)</td>
</tr>
<tr>
<td><strong>Ambient temperature</strong></td>
<td>0 ºC to + 60 ºC (32 ºF to + 140 ºF)</td>
</tr>
<tr>
<td><strong>Storage temperature</strong></td>
<td>- 40 ºC to + 80 ºC (-40 ºF to + 176 ºF)</td>
</tr>
<tr>
<td><strong>Humidity</strong></td>
<td>10% to 95% (non condensing)</td>
</tr>
<tr>
<td><strong>Protection class</strong></td>
<td>IP 20</td>
</tr>
<tr>
<td><strong>Radio interference level</strong></td>
<td>EN 55022 Class A</td>
</tr>
<tr>
<td><strong>Warning!</strong></td>
<td>This is a Class A Equipment. 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. EN 61000-6-2:1999</td>
</tr>
<tr>
<td><strong>Interference immunity</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Interfaces</strong></td>
<td>4 ports in compliance to 100BASE-TX with RJ45 connectors (shielded) 1 x 5 pole mountable terminal block</td>
</tr>
<tr>
<td><strong>Displays</strong></td>
<td>P1, P2: power DA: data FAULT STAT 1 to STAT 4: link status per port</td>
</tr>
<tr>
<td><strong>Agency Approval</strong></td>
<td>IEC 61131-2, Marine (Germanisher Lloyd)</td>
</tr>
</tbody>
</table>

#### Network size

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Class II Repeater</strong></td>
<td></td>
</tr>
<tr>
<td><strong>SOP (start-of-packet propagation delay)</strong></td>
<td>46 BT (1BT = 10 ns)</td>
</tr>
<tr>
<td><strong>SOJ (start-of-collision Jam propagation del.)</strong></td>
<td>46 BT</td>
</tr>
<tr>
<td><strong>PDV (path delay value)</strong></td>
<td>92 BT</td>
</tr>
</tbody>
</table>

**TP line length (TP-Port - - TP-Port)**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Length of a twisted pair segment</strong></td>
<td>max. 100 m (328 ft)</td>
</tr>
<tr>
<td><strong>Number of cascaded hubs</strong></td>
<td>max. 2</td>
</tr>
</tbody>
</table>

#### Scope of delivery

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
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<tbody>
<tr>
<td><strong>Ethernet Hub 100 Mbps 4TX incl.</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Quick Reference Guide</strong></td>
<td></td>
</tr>
<tr>
<td><strong>Order number</strong></td>
<td>Ethernet Hub 100 Mbps 4TX 499NEH14100</td>
</tr>
</tbody>
</table>

#### Accessories

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
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</thead>
<tbody>
<tr>
<td><strong>Ethernet SFTP cat5 RJ45 cords</strong></td>
<td>490NTW000</td>
</tr>
<tr>
<td><strong>Ethernet SFTP cat5 RJ45 crossed cords</strong></td>
<td>490NTC000</td>
</tr>
<tr>
<td><strong>Transparent Factory User and Planning Guide</strong></td>
<td>490USE13300</td>
</tr>
<tr>
<td><strong>Transparent Factory Network Design and Cabling Guide</strong></td>
<td>490USE13400</td>
</tr>
</tbody>
</table>

#### Notes on CE identification

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


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.

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