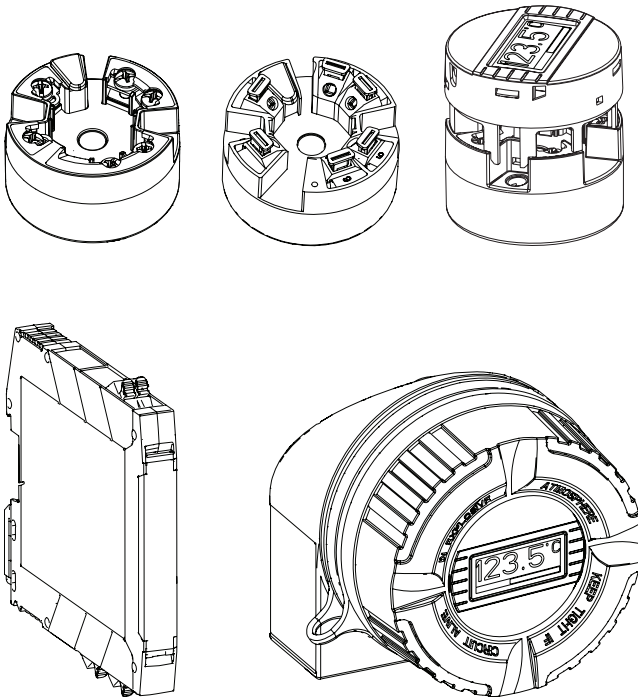


PROSENSE XTH2/XTD2 SERIES PROGRAMMABLE TEMPERATURE TRANSMITTERS



OPERATING INSTRUCTIONS

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1 Document Information

1.1 Document function





These Operating Instructions contain all the information that is required in various phases of the life cycle of the device: from product identification, incoming acceptance and storage, to mounting, connection, operation and commissioning through to troubleshooting, maintenance and disposal.


1.2 Symbols

1.2.1 Safety instructions











Symbol	Meaning
	DANGER! This symbol alerts you to a dangerous situation. Failure to avoid this situation will result in serious or fatal injury.
	WARNING! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in serious or fatal injury.
	CAUTION! This symbol alerts you to a dangerous situation. Failure to avoid this situation can result in minor or medium injury.
	NOTICE! This symbol contains information on procedures and other facts which do not result in personal injury.

1.2.2 Electrical symbols




Symbol	Meaning	Symbol	Meaning
	Direct current		Alternating current
	Direct current and alternating current		Ground connection A grounded terminal which, as far as the operator is concerned, is grounded via a grounding system.

Symbol	Meaning
	Protective ground connection A terminal which must be connected to ground prior to establishing any other connections. • Inner ground terminal: Connects the protective earth to the mains supply. • Outer ground terminal: Connects the device to the plant grounding system.


1.2.3 Symbols for certain types of information

Symbol	Meaning	Symbol	Meaning
	Permitted Procedures, processes or actions that are permitted.		Preferred Procedures, processes or actions that are preferred.
	Forbidden Procedures, processes or actions that are forbidden.		Tip Indicates additional information.
	Reference to documentation.		Reference to page.
	Reference to graphic.		Series of steps.
	Result of a step.		Visual inspection.

1.2.4 Symbols for graphics

Symbol	Meaning	Symbol	Meaning
1, 2, 3, ...	Item numbers		Series of steps.
A, B, C, ...	Views	A-A, B-B, C-C,...	Sections
	Hazardous area		Safe area (non-hazardous area)

1.2.5 Symbols for tools

Symbol	Meaning
	Phillips head screwdriver

1.3 Documentation

Additional technical specifications and documentation available at www.automationdirect.com

2 Basic Safety Instructions

2.1 Requirements for the personnel

The personnel for installation, commissioning, diagnostics and maintenance must fulfill the following requirements:

- Trained, qualified specialists must have a relevant qualification for this specific function and task
- Are authorized by the plant owner/operator
- Are familiar with federal/national regulations
- Before beginning work, the specialist staff must have read and understood the instructions in the Operating Instructions and supplementary documentation as well as in the certificates (depending on the application)
- Following instructions and basic conditions

The operating personnel must fulfill the following requirements:

- Being instructed and authorized according to the requirements of the task by the facility's owner/operator
- Following the instructions in these Operating Instructions

2.2 Designated use

The device is a universal and user-configurable temperature transmitter with one sensor input for a resistance thermometer (RTD), thermocouples (TC), resistance and voltage transmitters. The head transmitter version of the device is intended for mounting in a terminal head (flat face) as per DIN EN 50446. It is also possible to mount the device on a DIN rail using optional DIN rail clips. The DIN rail version of the device is suitable for DIN rail mounting as per IEC 60715/TH35

2.2.1 Incorrect use

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The manufacturer is not liable for damage caused by improper or non-designated use.

2.3 Operational safety

Risk of injury!

- Operate the device in proper technical condition and fail-safe condition only.
- The operator is responsible for interference-free operation of the device.

Electromagnetic compatibility

The measuring system complies with the general safety requirements as per EN 61010-1, the EMC requirements as per the IEC/EN 61326 series and the NAMUR recommendations NE 21.

NOTICE

The device must only be powered by a power unit that operates using an energy-limited electric circuit according to UL/EN/IEC 61010-1

3 Product Identification and Acceptance

3.1 Incoming acceptance

1. Unpack the temperature transmitter carefully. Is the packaging or content damaged?
Damaged components may not be installed as the manufacturer can otherwise not guarantee compliance with the original safety requirements or the material resistance, and can therefore not be held responsible for any resulting damage.
2. Is the delivery complete or is anything missing? Check the scope of delivery against your order.

3.2 Scope of delivery

The scope of delivery of the device comprises:

- Temperature transmitter
- Mounting material (head transmitter)
- Hard copy of Operating Instructions

3.3 Certificates and approvals

The device left the factory in a safe operating condition. The device complies with the requirements of the standards EN 61010-1 "Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use" and with the EMC requirements as per the IEC/EN 61326 series.

3.3.1 CE mark, declaration of conformity

The device meets the legal requirements of the EU guidelines. The manufacturer confirms that the device is compliant with the relevant guidelines by applying the CE mark.

3.3.2 CSA mark

These products are eligible to bear the CSA mark shown with adjacent indicators 'C' and 'US' for Canada and US markets.

3.4 Storage and transport

4.3.1 Storage conditions

Carefully remove all the packaging material and protective covers that are part of the transported package.

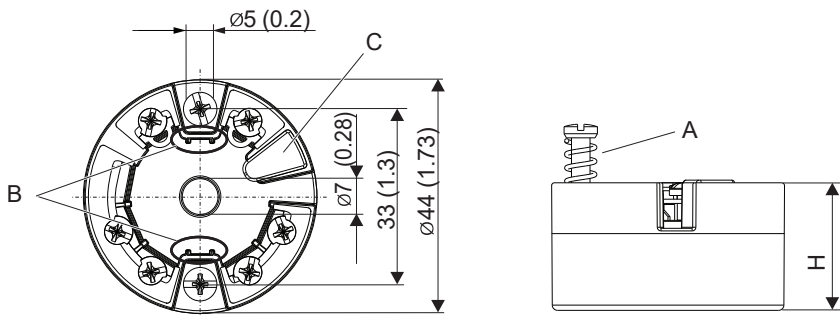
Storage temperature

- Head transmitter: -50 to $+100$ °C (-58 to $+212$ °F)
- DIN rail device: -50 to $+100$ °C (-58 to $+212$ °F)

4 Installation

4.1 Installation conditions

4.1.1 Dimensions



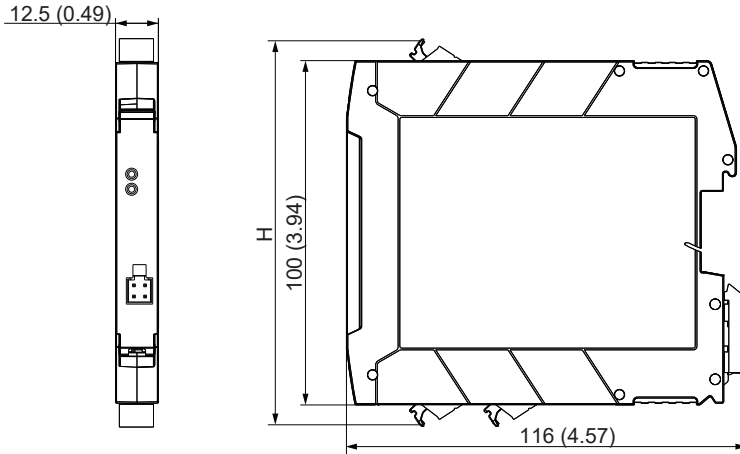
Head transmitter version with screw terminals. Dimensions in mm (in)

A Spring travel $L \geq 5$ mm (not for US - M4 securing screws)

B Mounting elements for attachable measured value display

C Interface for contacting measured value display

i The same dimensions apply to the version with push-in terminals. Exception: housing height $H = 30$ mm (1.18 in).



The height of housing H varies depending on the terminal version: screw terminals = 114 mm (4.49 in), push-in terminals = 111.5 mm (4.39 in)

4.1.2 Mounting location

- Head transmitter:
 - In the terminal head, flat face, as per DIN EN 50446, direct mounting on insert with cable entry (middle hole 7 mm)
 - In the field housing, separated from the process
 - With DIN rail clip on DIN rail as per IEC 60715/TH35
- DIN rail transmitter:
 - In DIN rail housing on DIN rail as per IEC 60715/TH35

NOTICE

When using DIN rail transmitters with a thermocouple/mV measurement, increased measurement deviations may occur depending on the installation situation and ambient conditions.

- If the DIN rail transmitter is mounted on the DIN rail without any adjacent devices, this may result in deviations of up to ± 1.34 °C. If the DIN rail transmitter is mounted in series between other DIN rail devices (reference operating conditions: 24 V, 12 mA), deviations of up to + 2.94 °C may occur.

4.1.3 Important ambient conditions

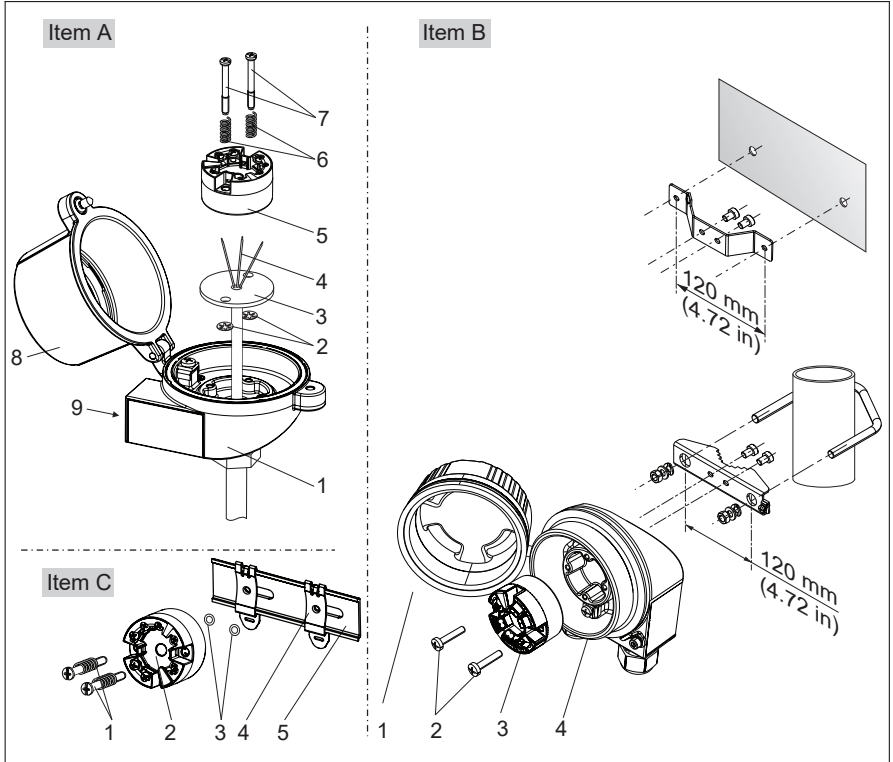
- Ambient temperature: -40 to $+85$ °C (-40 to 185 °F), .
- Head transmitter in accordance with climate class C1, DIN rail transmitter in accordance with B2 as per EN 60654-1
- Condensation as per IEC 60068-2-33 permitted for head transmitter, not permitted for DIN rail transmitter
- Max. rel. humidity: 95% as per IEC 60068-2-30
- Degree of protection:
- Head transmitter with screw terminals: IP 00, with push-in terminals: IP 30. In installed state, depends on the terminal head or field housing used.
- When installing in field housing XTH2-ENC-x: IP 66/68 (NEMA Type 4x encl.)
- DIN rail device: IP 20

4.2 Installation

A Phillips head screwdriver is required to mount the head transmitter.

- Maximum torque for securing screws = 1 Nm ($\frac{3}{4}$ foot-pound), screwdriver: Pozidriv Z2
- Maximum torque for screw terminals = 0.35 Nm ($\frac{1}{4}$ foot-pound), screwdriver: Pozidriv Z1

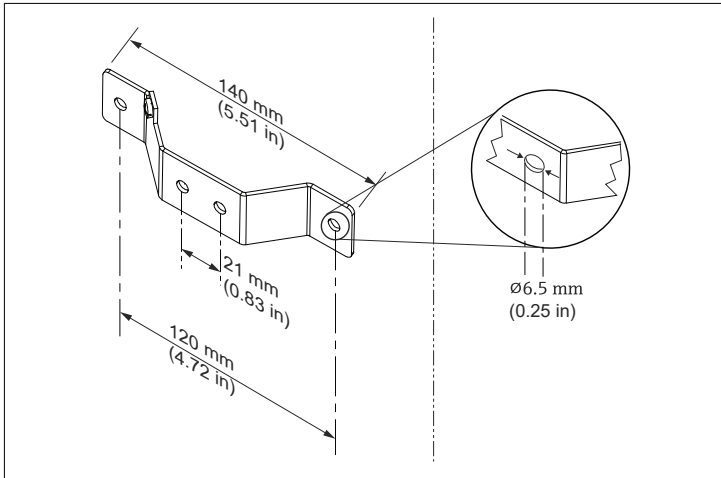
4.2.1 Mounting the head transmitter



Head transmitter mounting (three methods)

Procedure for mounting in a terminal head, Item A:

1. Open the terminal head cover (8) on the terminal head.
2. Guide the connection wires (4) of the insert (3) through the center hole in the head transmitter (5).
3. Fit the mounting springs (6) on the mounting screws (7).
4. Guide the mounting screws (7) through the side boreholes of the head transmitter and the insert (3). Then fix both mounting screws with the snap rings (2).
5. Then tighten the head transmitter (5) along with the insert (3) in the terminal head.
6. After wiring, close the terminal head cover (8) tightly again.



Dimensions of angle bracket for wall mount (complete wall mounting set available as accessory)

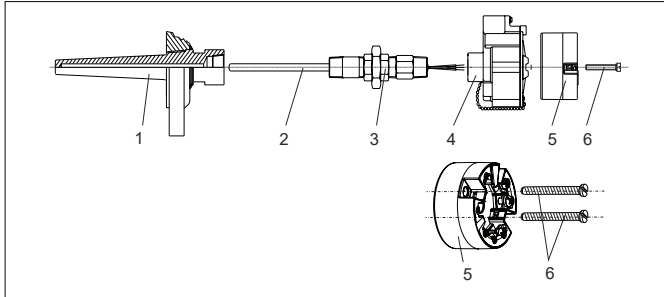
Procedure for mounting in a field housing, Item B:

1. Open the cover (1) of the field housing (4).
2. Guide the mounting screws (2) through the lateral bores in the head transmitter (3).
3. Screw the head transmitter to the field housing.
4. After wiring, close the field housing cover (1)

Procedure for mounting on a DIN rail, Item C:

1. Press the DIN rail clips (4) onto the DIN rail (5) until they engage with a click.
2. Fit the mounting springs on the mounting screws (1) and guide the screws through the side boreholes of the head transmitter (2). Then fix both mounting screws with the snap rings (3).
3. Screw the head transmitter (2) onto the DIN rail clips (4).

Mounting typical of North America



Head transmitter mounting

Thermometer design with thermocouples or RTD sensors and head transmitter:

1. Fit the thermowell (1) on the process pipe or the container wall. Secure the thermowell according to the instructions before the process pressure is applied.
2. Fit the necessary neck tube nipples and adapter (3) on the thermowell.
3. Make sure sealing rings are installed if such rings are needed for harsh environmental conditions or special regulations.
4. Guide the mounting screws (6) through the lateral bores of the head transmitter (5).
5. Position the head transmitter (5) in the terminal head (4) in such a way that the bus cable (terminals 1 and 2) point to the cable entry.
6. Using a screwdriver, screw down the head transmitter (5) in the terminal head (4).
7. Guide the connection wires of the insert (3) through the lower cable entry of the terminal head (4) and through the middle hole in the head transmitter (5). Wire the connection wires up to the transmitter.
8. Screw the terminal head (4), with the integrated and wired head transmitter, onto the ready-mounted nipple and adapter (3).

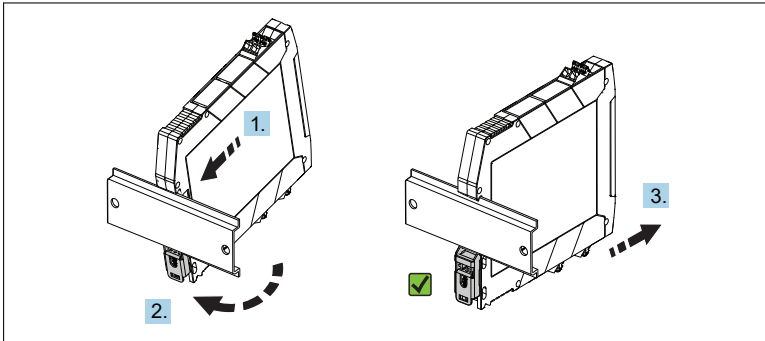
4.2.2 Mounting the DIN rail transmitter

NOTICE

Wrong orientation

Measurement deviates from the maximum accuracy rating when a thermocouple is connected and the internal reference junction is used.

- Mount the device vertically and ensure it is oriented correctly!



Mounting the DIN rail transmitter

1. Position the top DIN rail groove at the top end of the DIN rail.
2. Slide the bottom of the device over the bottom end of the DIN rail until you can hear the lower DIN rail clip click into place on the DIN rail.
3. Pull gently on the device to check if it is correctly mounted on the DIN rail. If it doesn't move, the DIN rail transmitter is correctly mounted.

4.3 Post-installation check

After installing the device, always run the following final checks:

Device condition and specifications
Is the device undamaged (visual inspection)?
Do the ambient conditions match the device specification (e.g. ambient temperature, measuring range, etc.)?

5 Electrical Connection

⚠ CAUTION

- Switch off the power supply before installing or connecting the device. Failure to observe this may result in the destruction of parts of the electronics.

- Do not occupy the display connection. An incorrect connection can destroy the electronics

5.1 Connection conditions

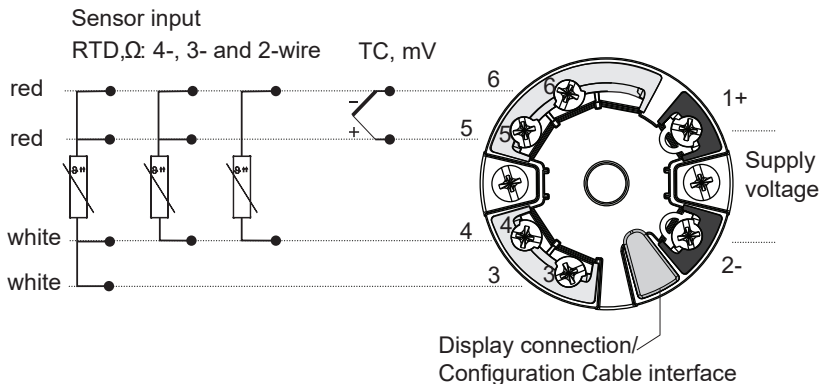
A Phillips head screwdriver is required to wire the head transmitter with screw terminals. Use a flat blade screwdriver for the DIN rail housing version with screw terminals. The push-in terminal version can be wired without any tools.

Proceed as follows to wire a mounted head transmitter:

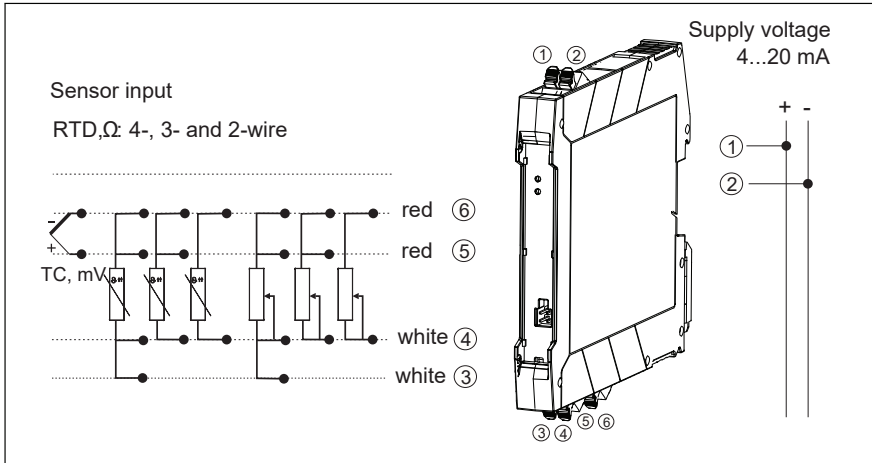
1. Open the cable gland and the housing cover on the terminal head or the field housing.
2. Feed the cables through the opening in the cable gland.
3. If the head transmitter is fitted with push-in terminals, pay particular attention to the information in the "Connecting to push-in terminals" section".
4. Tighten the cable gland again and close the housing cover.

In order to avoid connection errors always follow the instructions in the post-connection check section before commissioning!

5.2 Quick wiring guide



Terminal assignment of head transmitter



Assignment of terminal connections for DIN rail transmitter

In the event of a thermocouple (TC) measurement, a 2-wire RTD Pt100 can be connected to measure the reference junction temperature. This is connected to terminals 4 and 6.

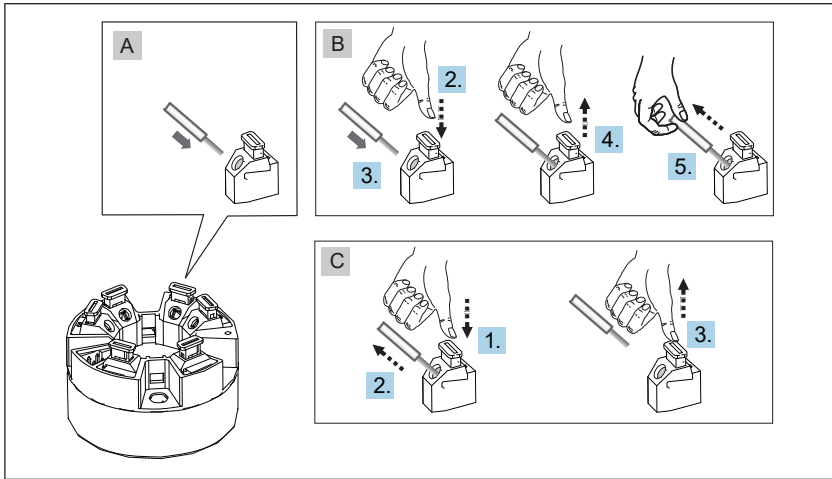
NOTICE



ESD - electrostatic discharge. Protect the terminals from electrostatic discharge. Failure to observe this may result in the destruction or malfunction of parts of the electronics.

5.3 Connection the sensor cables

5.3.1 Connecting to push-in terminals



Push-in terminal connection, using the example of a head transmitter

Fig. A, solid or ferruled wire:

1. Strip wire end. Min. stripping length 10 mm (0.39 in).
2. Insert the wire end into the terminal.
3. Pull the wire gently to ensure it is connected correctly. Repeat from step 1 if necessary.

Fig. B, fine-strand wire without ferrule:

1. Strip wire end. Min. stripping length 10 mm (0.39 in).
2. Press down on the lever opener.
3. Insert the wire end into the terminal.
4. Release lever opener.
5. Pull the wire gently to ensure it is connected correctly. Repeat from step 1 if necessary.

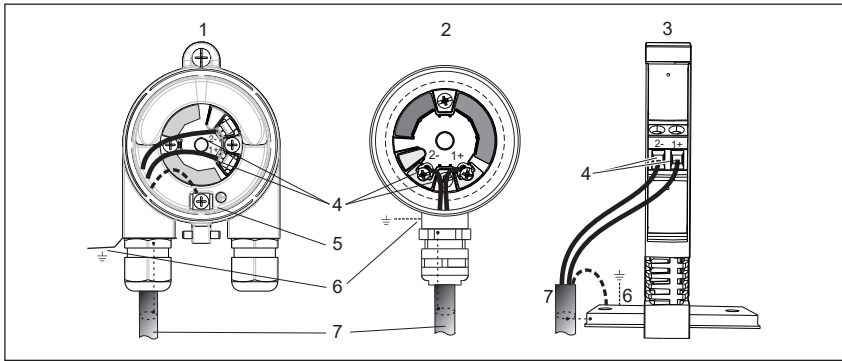
Fig. C, Releasing the connection:

1. Press down on the lever opener.
2. Remove the wire from the terminal.
3. Release lever opener.

5.4 Connecting the transmitter

i Cable specification

In the case of the DIN rail version, a shielded cable must be used if the sensor cable length exceeds 30 m (98.4 ft). The use of shielded sensor cables is generally recommended.

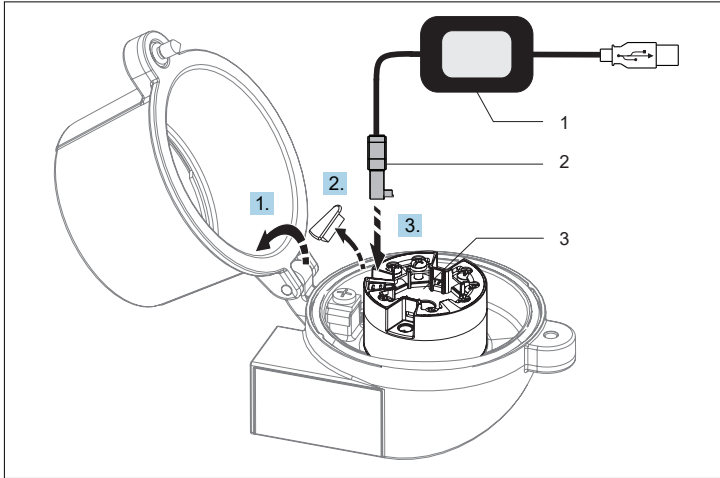


Connecting the signal cables and power supply

1. Head transmitter installed in field housing
2. Head transmitter installed in terminal head
3. DIN rail transmitter mounted on DIN rail
4. Terminals for power supply
5. Internal ground connection
6. External ground connection
7. Shielded signal cable

i

- The terminals for the power supply signal cable connection (1+ and 2-) are protected against reverse polarity.
- Conductor cross-section:
 - Max. 2.5 mm² for screw terminals
 - Max. 1.5 mm² for push-in terminals. Min. stripping length of cable 10 mm (0.39 in).



Fitting the connector of the configuration cable, visualization and maintenance of the head transmitter via PC and ProSense Field Device Configuration software

1. Configuration cable (XT-USB) with USB connection
2. Configuration cable connector
3. Installed head transmitter with configuration interface

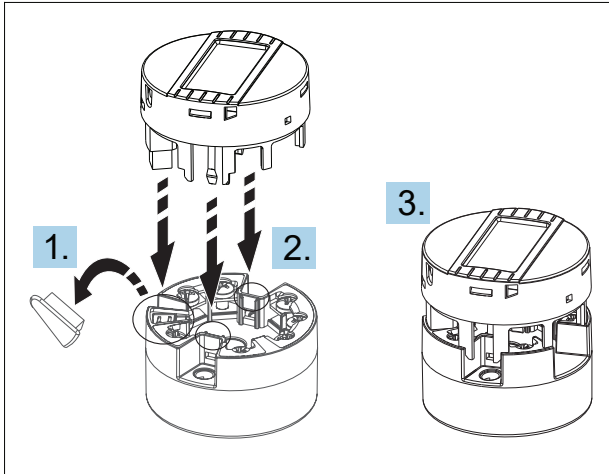
5.5 Post-installation check

Device condition and specifications
Is the device undamaged (visual inspection)?
Electrical connection
Does the supply voltage match the specifications on the nameplate?
Do the cables have adequate strain relief?
Are the power supply and signal cables correctly connected?
Are all the screw terminals well tightened and have the connections of the push-in terminals been checked?
Are all the cable entries installed, tightened and sealed?
Are all housing covers installed and firmly tightened?

6 Operation Options

6.1 Measured value display and operating elements

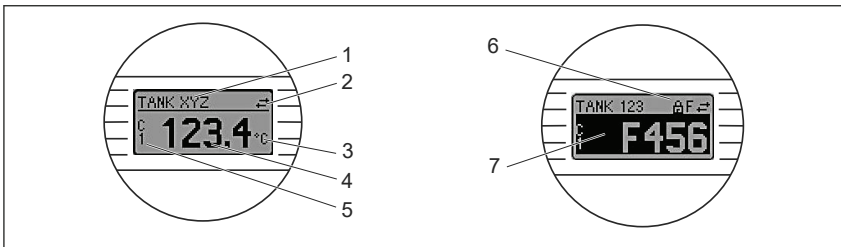
Option: Display XTH2-UNV-DISP for head transmitter



Attach the display to the transmitter

Display elements

Head transmitter



Optional LC display for head transmitter

Item no.	Function	Description
1	Displays the TAG	TAG, 32 characters long.
2	'Communication' symbol	The communication symbol appears when read and write-accessing via the fieldbus protocol. Not used.
3	Unit display	Unit display for the measured value displayed.
4	Measured value display	Displays the current measured value.
5	Value/channel display DT, PV, I, %	e.g. PV for a measured value from channel 1 or DT for the device temperature
6	'Configuration locked' symbol	The 'configuration locked' symbol appears when configuration is locked via the DIP switch.
7	Status signals	

Note: For detailed status and diagnostic information see the ProSense Field Device Configuration software.

DIN rail transmitter

Two LEDs on the front indicate the device status.

Type	Function and characteristic
Status LED (red)	<p>When the device is operating without errors, the device status is displayed. This function can no longer be guaranteed in the event of an error.</p> <ul style="list-style-type: none"> LED off: without diagnostic message LED is lit: diagnostics display, "Failure detected". LED flashing: diagnostics display "Out of specification"
Power LED (green) 'ON'	<p>When the device is operating without errors, the operating status is displayed. This function can no longer be guaranteed in the event of an error.</p> <ul style="list-style-type: none"> LED off: Power failure or insufficient supply voltage LED is lit: Supply voltage is OK (either via configuration cable or via supply voltage, terminals 1+, 2-)

Note: For detailed status and diagnostic information see the ProSense Field Device Configuration software.

Local operation

NOTICE



ESD - electrostatic discharge. Protect the terminals from electrostatic discharge. Failure to observe this may result in the destruction or malfunction of parts of the electronics.

<p>Hardware settings via DIP switches</p>	1: Connection to head transmitter
	2: DIP switches (1 - 64, SW/HW, ADDR and SIM = simulation mode) no function for this head transmitter
	3: DIP switch (WRITE LOCK = write protection; DISPL. 180° = switch, turn the display monitor 180°)

Procedure for setting the DIP switch:

1. Open the cover of the terminal head or field housing.
2. Remove the attached display from the head transmitter.
3. Configure the DIP switch on the rear of the display accordingly.
In general: switch to ON = function enabled, switch to OFF = function disabled.
4. Fit the display onto the head transmitter in the correct position.
The head transmitter accepts the settings within one second.
5. Secure the cover back onto the terminal head or field housing.

Switching write protection on/off

Write protection is switched on and off via a DIP switch on the rear of the optional attachable display. When write protection is active, parameters cannot be modified. A lock symbol on the display indicates that write protection is on. Write protection prevents any write access to the parameters. Write protection remains active even when the display is removed. To deactivate write protection, the display must be attached to the transmitter with the DIP switch switched off (WRITE LOCK = OFF). The transmitter adopts the setting during operation and does not need to be restarted.

Turning the display

The display can be rotated 180° using the "DISPL. 180°" DIP switch.

7 Commissioning

7.1 Function check

Before commissioning your measuring point, ensure that the post-installation and post-connection checks have been performed.

- "Post-installation check" checklist
- "Post-connection check" checklist

7.2 LED display

Once you have completed the post-connection checks, switch on the supply voltage. The transmitter performs a number of internal test functions after power-up. During this process, a sequence containing device information appears on the display.

The device operates in normal mode after approx. 7 seconds, including the attached display. Normal measuring mode commences as soon as the switch-on procedure is completed. Measured values and status values appear on the display.

