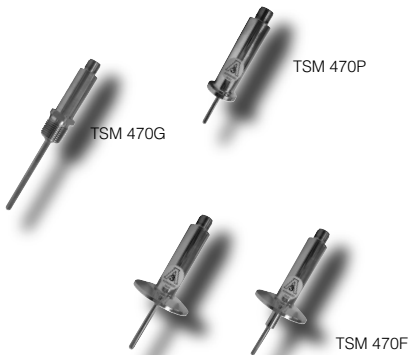


easytemp™ TSM 470 Compact RTD Transmitter

Short Operating Instructions



Measuring System:

The compact RTD transmitter consists of a complete sensor with Pt100 (Class A, 4-wire connection), process connection and built-in electronics (with an M12x1 micro-connector) that converts the Pt100 input signal into a temperature proportional 4 to 20 mA signal.

E-direct

Important Notice



Warning!

Warning!

Electrical shock could cause death or serious injury. If the sensor is installed in a high voltage environment and a fault or installation error occurs, high voltage may be present on the M12 plug-in micro-connector or the probe itself.

Safe and secure operation of the compact RTD transmitter can only be guaranteed if the operating instructions (BA 164R/24/ae) and all safety notes are read, understood and followed. See enclosed CD-ROM.

Correct use

The manufacturer cannot be held responsible for damage caused by misuse of the unit.

The installation conditions and connection values indicated in the operating instructions must be followed! For additional complete operating instructions, visit www.us.endress.com/temp.

Installation, commissioning and operation

The unit is constructed using the most up to date production equipment and complies to the safety requirements of the local guidelines. However, if it is installed incorrectly or misused, certain application dangers can occur. Installation, wiring and maintenance of the unit must only be done by trained skilled personnel who are authorized to do so by the plant operator. This skilled staff must have read and understood these instructions and must follow them to the letter. The plant operator must make sure that the measurement system has been correctly wired to the connection schematics.

Hazardous areas

Installation of the compact RTD transmitter in hazardous areas is prohibited!

Returns

Please follow the Return Authorization Policy in the operating instructions (BA 164R/24/ae). All Temperature Operating Instructions are available on CD-ROM, Part Number SONDTT-AG.

Safety pictograms and symbols



Note!

Notes draw attention to activities or procedures that can have a direct influence on operation or trigger an unforeseen device reaction if they are not carried out properly.



Caution!

Cautions draw attention to activities or procedures that can lead to persons being injured or to incorrect device operation if they are not carried out properly.



Warning!

Warnings draw attention to activities or procedures that can lead to persons being seriously injured, to safety risks or to the destruction of the device if they are not carried out properly.


Though the information provided herein is believed to be accurate, be advised that the information contained herein is NOT a guarantee of satisfactory results. Specifically, this information is neither a warranty nor guarantee, expressed or implied, regarding performance; merchantability, fitness, or other matter with respect to the products; and recommendation for the use of the product/process information in conflict with any patent. Please note that Endress+Hauser reserves the right to change and/or improve the product design and specifications without notice.

Installation


For installation, proceed as follows:

1. Seal the ½" NPT process connection with silicone tape (TSM 470G) before screwing in the device.
2. Make sure that the hygienic process fitting (TSM 470F & TSM 470P) and the clamp assembly match the maximum specified process pressure.
3. Install and tighten the compact temperature transmitter before applying process pressure.
4. Plug in the 4-pin M12 micro-connector at the compact temperature transmitter and connect the wires from pins 1 and 3 to a power supply (see BA 164R/24/ae) "Technical Data" for terminal layout of the M12 plug-in micro-connector).

Note!


 The requirement to ensure NEMA 6P rating is that the female connector to plug the compact temperature transmitter to a power supply also has NEMA 6P rating or better.

Caution!

 In order to avoid damaging the compact transmitter, do not over-tighten the nut on the M12 micro-connector.

Process temperature limits –60 to 320 °F (–51 to 160 °C)

Caution!

 Restrictions dependent on the process connection and ambient temperature are possible:

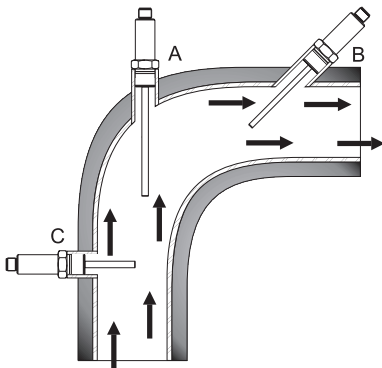
max. ambient temperature	max. process temperature
to 75 °F (23.9 °C)	no restrictions
to 100 °F (37.8 °C)	285 °F (140.6 °C)
to 140 °F (60 °C)	250 °F (121.1 °C)
to 185 °F (85 °C)	215 °F (101.7 °C)

Ambient temperature limits –40 to 185 °F (–40 to 85 °C)

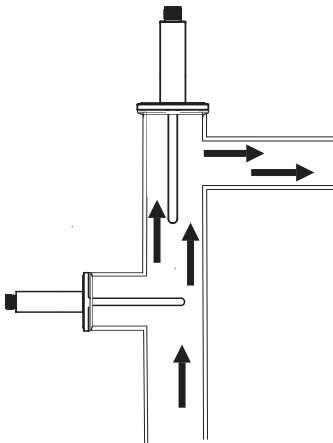
Mounting location

TSM 470G
(example)

- a) At angle sections, against the direction of flow
- b) In smaller pipes, turned against the direction of flow
- c) Perpendicular to the direction of flow

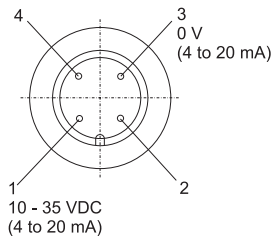


TSM 470F
TSM 470P
(example)



Power Supply

Electrical connection



Electrical connection of the compact transmitter (above)
— M12 plug, 4-pin

- Pin 1: Power supply 10 to 35 V DC; Current output 4 to 20 mA
Pin 2: PC configuration cable connection
Pin 3: Power supply 0 V DC; Current output 4 to 20 mA
Pin 4: PC configuration cable connection

The connection cable 5 m is for the 4..20mA signal and will be connected with pin 1 and 3 as shown in the picture. The pins 2 and 4 are for the communication with the computer. If you look on the communication adapter then you see that there are two male pins that are making connection to the two shortend metal pins 2 and 4. By the way the supply for the TSM470 for the communication is done by the computer interface.

Supply voltage

$U_b = 10$ to 35 V DC, polarity protected

Residual ripple

Allowable ripple $U_{ss} \leq 3$ V at $U_b \geq 13$ V,

$f_{max} = 1$ kHz



Note!

The unit must be powered by a power supply that operates using an IEC 61010-1 compliant energy limit circuit.



Caution!

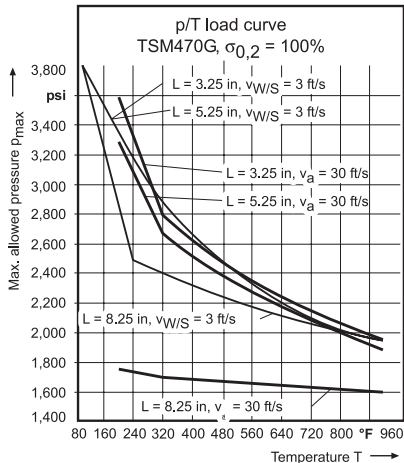
Switch off power supply before connecting the compact RTD transmitter. Do not install or connect the unit during installation to a power supply. If this is not followed, parts of the electronic circuit will be damaged.

Dimensions

Tube Diameter	Length	Length	Length
1/4" OD, 316L (TSM 470G)	3/4" (82.55 mm)	5/4" (133.35 mm)	8/4" (209.45 mm)
1/4" OD, 316L (TSM 470F)	2" (50.8 mm)	4" (101.6 mm)	6" (152.4 mm)
3/8" OD, reduced 3/16" OD, 316L	2" (50.8 mm)	4" (101.6 mm)	6" (152.4 mm)
5/32" OD, 316L	1/4" (31.75 mm)	2/4" (69.85 mm)	3/4" (19.05 mm)

Process pressure limits

p/T load curve according to Dittrich for TSM 470G. Maximum static pressure: 4,000 psi (at 77 °F / 25 °C).



L = insertion length
 v_a = flow velocity air
 $v_{w/s}$ = flow velocity water or steam

(Avoid resonance frequency as this will cause damage to the probe! Resonance frequency occurs when permanent flow velocity is at 31 ft/s (air) for the 5/4" and/or 13 ft/s (air) for 8/4" probe.)

Output values

Output signal

analog 4 to 20 mA, 20 to 4 mA

Breakdown information

		Signal (mA)
Under ranging	Standard	3.8
Over ranging	Standard	20.5
Sensor break; sensor short circuit low	To NAMUR NE 43	≤ 3.6
Sensor break; sensor short circuit high	To NAMUR NE 43	≥ 21

Source impedance

max. $(V_{\text{power supply}} - 10V) / 0.022 \text{ A}$ (current output)

Transmission behavior

temperature linear

Min. current consumption

≤ 3.5 mA

Current limit

≤ 23 mA

Switch-on delay

2 s (during power up $I_a \leq 3.8 \text{ mA}$)

Performance Characteristics

Electronics response time

1 s

Response time TSM 470

63% response time per ASTM E644

	TSM 470G	TSM 470F	TSM 470P
Tube diameter 1/4" OD, 316L	8 s	4 s	–
Tube diameter 3/8" OD reduced 3/16" OD, 316L	–	3 s	–
Tube diameter 5/32" OD, 316L	–	–	2 s

Reference operating conditions Calibration temperature: 73.4 °F ± 9 °F

Maximum measured error

Electronics: 0.18 °F (0.1 °C) or 0.08%

Sensor:

- Class A tolerance as per IEC 751, –60 to 320 °F
- Accuracy = ± 0.15 + 0.002 · |t| [°C]

FLOW

- Electromagnetic
- Vortex Shedding
- Coriolis Mass Flow
- Ultrasonic

ANALYSIS

- Conductivity
- pH/ORP
- Chlorine
- Dissolved Oxygen
- Turbidity
- Chemical Analyzers
- Nitrate Sensors
- Sludge Level

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- RTDs / Thermocouples

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- Hydrostatic

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