

Temperature Sensor Tri-Clamp

Application/Specified usage

- Temperature Measurement in vessels and pipes

Application examples

- Monitoring of CIP-/SIP-process
- Temperature monitoring in milk vessels

Hygienic design/Process connection

- Tri-Clamp sealing system without adapter
- Product contacting materials compliant to FDA
- Sensor completely made of stainless steel
- Conforming to 3-A Sanitary Standard 74-06

Features/Advantages

- Direct Connection without adapter
- Integrated transmitter optional
- Different electrical connections available

Options/Accessories

- 2 x Pt100 (not retrofittable)
- 2 x Pt100 with two transmitters (not retrofittable)
- Pt100 chip with other classes of accuracy (1/3B, 1/10B)
- Programmable transmitters with output 4...20 mA, 2-wire
- Programming adapter MPU-P 9701
- Integrated transmitters for Profibus PA and HART-protocol
- Integrated transmitter MPU-LCD with display in connecting head
- Fast response sensor tip 3 mm and 4 mm
- Pre-assembled connecting cable in other lengths and other material

Authorizations



Temperature sensor TFP-47



Temperature Transmitter MPU-LCD with Display

Application/Specified usage

- 4...20 mA transmitter with LCD for Pt100 temperature sensor
- For installation in temperature sensor
- Sensor monitoring

Features

- 4-digit display with green backlight
- Temperature measurement in °C and °F
- Easy range select by one button
- Lower costs for wiring because of 2-wire technology

Note

See product information „MPU-LCD“ for details.



Option MPU-LCD (display in the connection head)



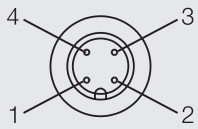
| Temperature sensor | | |
|-----------------------|---|---|
| Process connection | | Tri-Clamp |
| Materials | connecting head thermowell and Tri-Clamp | stainless steel 1.4305 stainless steel 1.4404 |
| Surface quality | | $R_a \leq 0.8 \mu\text{m}$ |
| Insertion length EL | | 20...500 mm in steps of 5 mm |
| Operating pressure | | 10 bar maximum |
| Temperature ranges | ambient process CIP-/ SIP-cleaning | -50...+80 °C -50...+250 °C 150 °C max. for 120 minutes (with transmitter) |
| Sensing resistor | acc. to DIN EN 60751 | Pt100 |
| Electrical connection | cable gland cable connection | M16 x 1.5 M12-plug 1.4305, 4-pins |
| Protection class | cable gland cable connection | IP 67 IP 69 K |

| Transmitter MPU-4, MPU-10, MPU-H, MPU-M | | |
|---|------------------------------------|---|
| Temperature ranges | ambient storage | -40...+85 °C -55...+90 °C |
| Measuring ranges | MPU-4, MPU-H, MPU-M MPU-10 | standard: -10...40 °C, 0...50 / 100 / 150 / 200 °C special ranges free programmable standard: -200...850 °C configuration occurs with Profibus |
| Accuracy | input | < ± 0.25 °C |
| Temperature drift | zero, span | < 0.01 % / K |
| Supply | MPU-M, MPU-4 MPU-10 accuracy | 8...35 V DC 9...32 V DC 0.01 % / V (reference: 12 V DC) |
| Output | signal accuracy burden | analog 4...20 mA (not for MPU-10) < ± 0.1 % of measurement range < 600 Ω (at $U_B = 24$ V) |
| Humidity | without condensation | 0...98 % |

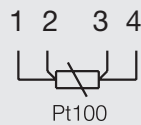
| Accuracy classes of temperature sensors Tolerances for Pt100 acc. to DIN EN 60751 | | | |
|---|------------------------------------|------------------------------------|------------------------------------|
| Pt100 | A | 1/3 B | 1/10 B |
| 0 °C / 100 Ω | ± 0.15 K / ± 0.06 Ω | ± 0.10 K / ± 0.04 Ω | ± 0.03 K / ± 0.01 Ω |
| 100 °C / 138.5 Ω | ± 0.35 K / ± 0.13 Ω | ± 0.27 K / ± 0.10 Ω | ± 0.08 K / ± 0.03 Ω |

Electrical connection without transmitter

With 1 x M12 plug

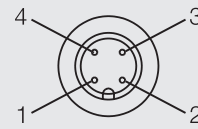


Configuration 1st M12 plug



Electrical connection with transmitter

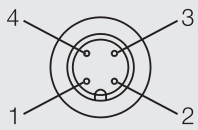
With M12 plug



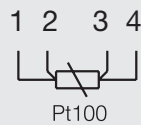
Configuration M12 plug

- 1: + supply
- 2: - supply 4...20 mA
- 3: not connected
- 4: not connected

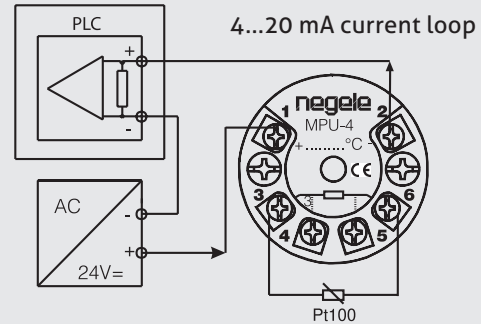
With 2 x M12 plug



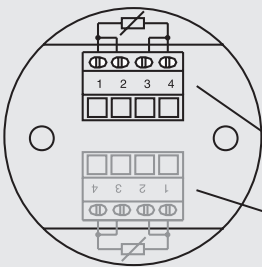
Configuration 2nd M12 plug



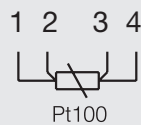
With cable gland



With cable gland



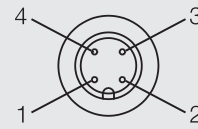
Configuration strip terminal



- clamps for 1st Pt100
- clamps for 2nd Pt100 (at version 2 x Pt100)

Electrical connection with two transmitter (TFP-67)

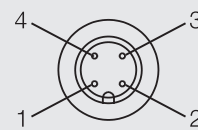
With 1 x M12-plug (sensor 1 + sensor 2)



Configuration M12-plug

- 1: + supply (sensor 1)
- 2: - supply 4...20 mA (sensor 1)
- 3: - supply 4...20 mA (sensor 2)
- 4: + supply (sensor 2)

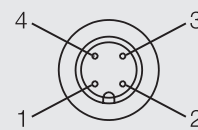
With 2 x M12-plug (sensor 1)



Configuration M12-plug

- 1: + supply (sensor 1)
- 2: - supply 4...20 mA (sensor 1)
- 3: not connected
- 4: not connected

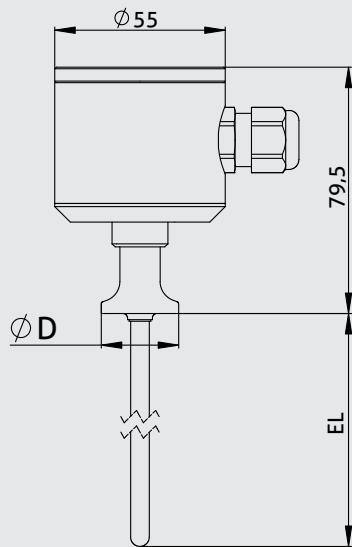
With 2 x M12-plug (sensor 2)



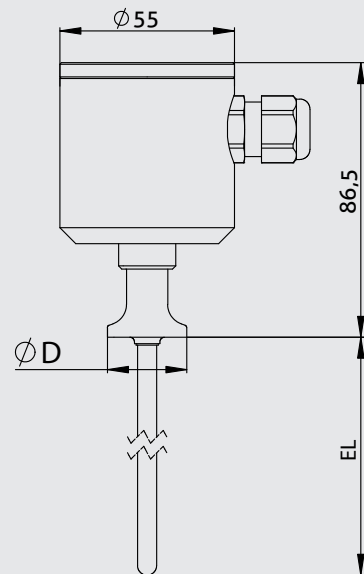
Configuration M12-plug

- 1: + supply (sensor 2)
- 2: - supply 4...20 mA (sensor 2)
- 3: not connected
- 4: not connected

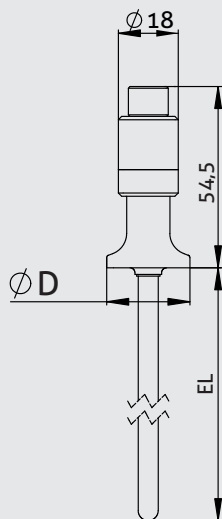
TFP-47



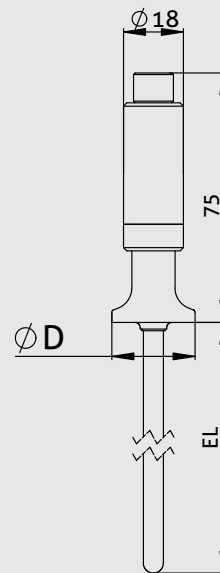
TFP-67



TFP-167



TFP-167 / ... / MPU-M

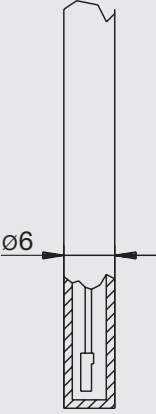
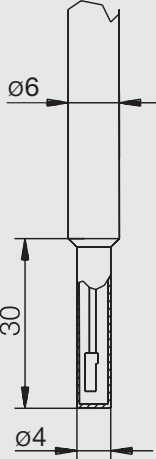
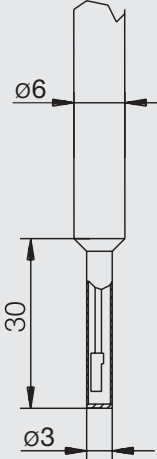


Dimension table Tri-Clamp

| Type | Order code | Clamp size D [mm] | Suitable for pipe diameter | Pipe style |
|------|-------------|-------------------|--|---|
| C25 | TFP-.../C25 | 25.0 | DN 6...8 ISO 6...10 1/4", 3/8", 1/2", 3/4" | DIN 11866 series A DIN 11866 series B / ISO 1127 DIN 11866 series C |
| C34 | TFP-.../C34 | 34.0 | DN 10...20 | DIN 11866 series A |
| C50 | TFP-.../C50 | 50.5 | DN 25...40 ISO 15...25 1" + 1½" | DIN 11866 series A DIN 11866 series B / ISO 1127 DIN 11866 series C |
| C64 | TFP-.../C64 | 64.0 | DN 50 2" | DIN 11866 series A DIN 11866 series C |
| C77 | TFP-.../C77 | 77.5 | 2½" | DIN 11866 series C |
| C91 | TFP-.../C91 | 91.0 | DN 65 3" | DIN 11866 series A DIN 11866 series C |

Sensor tip diameter and response time

All temperature sensors are available with smaller sensor tips, to ensure a shorter response time. The below-mentioned times were measured by immersing a temperature sensor from room temperature into boiling water.

| Sensor tip Ø 6 mm | Sensor tip Ø 4 mm | Sensor tip Ø 3 mm |
|---|---|---|
| 50 %-time: $t_{50} \leq 3.0 \text{ s}$ 90 %-time: $t_{90} \leq 8.0 \text{ s}$ | 50 %-time: $t_{50} \leq 2.4 \text{ s}$ 90 %-time: $t_{90} \leq 6.5 \text{ s}$ | 50 %-time: $t_{50} \leq 0.5 \text{ s}$ 90 %-time: $t_{90} \leq 1.5 \text{ s}$ |
|  |  |  |

Accessories | Spare parts

| Diameter pipe | | Clamp size D [mm] (see page 4) |  |  | |
|--------------------|--------------------|--------------------------------|--|---|--|
| DIN 11866 series A | DIN 11866 series C | | Clamp ring Tri-Clamp | Sealing ring Tri-Clamp | |
| DN10 | | 34.0 | SRC-10 | DRC-10 | |
| DN15 | | 34.0 | SRC-10 | DRC-15 | |
| DN20 | | 34.0 | SRC-10 | DRC-20 | |
| DN25 | | 50.5 | SRC-25 | DRC-25 | |
| DN32 | | 50.5 | SRC-25 | DRC-32 | |
| DN40 | | 50.5 | SRC-25 | DRC-40 | |
| DN50 | | 64.0 | SRC-50 | DRC-50 | |
| DN65 | | 9.0 | SRC-65 | DRC-65 | |
| | 1/2" | 25.0 | SRC-5 | DRC-1/2" | |
| | 3/4" | 25.0 | SRC-5 | DRC-3/4" | |
| | 1" | 50.5 | SRC-25 | DRC-1" | |
| | 2" | 64.0 | SRC-50 | DRC-50 | |
| | 2½" | 77.5 | SRC-2½" | DRC-2½" | |
| | 3" | 91.0 | SRC-65 | DRC-65 | |

Conditions for a measuring point according to 3-A Sanitary Standard 74-06

- The sensors TFP-47, -67, -167 conforming to the 3-A Sanitary Standard.
- The sensors are designed for CIP-/ SIP-cleaning. Maximum 150 °C / 120 min.
- Only with 3-A conforming Tri-Clamp connection.
- Mounting position, self draining and the position of the leakage hole must be in accordance to current 3-A Sanitary Standard.

Transport/Storage

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature -55...+90 °C
- Relative humidity maximum 98 %

Cleaning/Maintenance

- In case of using pressure washers, don't point nozzle directly to electrical connections!

Reshipment

- Sensors shall be clean and free of media or heat-conductive paste and must not be contaminated with dangerous media!
- Use suitable transport packaging only to avoid damage of the equipment!

Conventional usage

- Not suitable for applications in explosive areas.
- Not suitable for applications in security-relevant equipments (SIL).

Standards and guidelines

- You have to comply with applicable regulations and directives.

Advice to EMC

- The device agrees to following standards: EMC directive 2004/108/EC.
- You have to guarantee the EMC directives for the entire equipment.

Disposal

- This instrument is not subject to the WEEE directive 2002/96/EC and the respective national laws.
- Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points.

Accessories

PVC-cable with M12-connection made of 1.4305, IP 69 K, unshielded
M12-PVC / 4-5 m PVC-cable 4-pin, length 5 m
M12-PVC / 4-10 m PVC-cable 4-pin, length 10 m
M12-PVC / 4-25 m PVC-cable 4-pin, length 25 m

PVC-cable with M12-connection, brass nickel-plated, IP 67, shielded
M12-PVC / 4G-5 m PVC-cable 4-pin, length 5 m
M12-PVC / 4G-10 m PVC-cable 4-pin, length 10 m
M12-PVC / 4G-25 m PVC-cable 4-pin, length 25 m

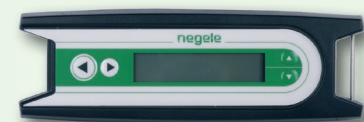
Programming adapter MPU-P 9701

Programming adapter for MPU-4, MPU-H and MPU-M

PVC-cable with M12-connection



Programming adapter MPU-P 9701



Order code for version with 1 x Pt100

TFP-47 (connecting head Ø 55 mm)

TFP-167 (connecting head Ø 18 mm, electrical connection via M12-plug)

Sensor length EL in mm

020...500 (in steps of 5 mm)

xxx (special length)

Diameter thermowell in mm

6

8

Diameter sensor tip in mm

X (no reduction)

3 (only for thermowell 6 mm)

4 (only for thermowell 6 mm and 8 mm)

6 (only for thermowell 8 mm)

Accuracy class Pt100

A

1/3B

1/10B

Electrical connection (not selectable for TFP-167)

PG (cable gland M16x1.5)

M12 (M12-plug 1.4305, standard with MPU-LCD)

Transmitter

X (without)

for TFP-47

MPU-4 (programmable)

MPU-10 (Profibus PA)

MPU-H (HART-protocol)

MPU-LCD (with display)

for TFP-167

MPU-M (programmable)

Measuring range MPU

(only for types with transmitter; not for MPU-LCD)

-10...40 (measurement range -10...40 °C)

0...50 (measurement range 0...+50 °C)

0...100 (measurement range 0...+100 °C)

0...150 (measurement range 0...+150 °C)

0...200 (measurement range 0...+200 °C)

xx...yy (special range)

Tri-Clamp size

C25 (Pipe diameter: see "Dimension

C34 Table Tri-Clamp" on page 4)

C50

C64

C77

C91

TFP-47/

100/

6/

X/

A/

PG/

MPU-4/

0...100/

C25

Order code for version with 2 x Pt100

TFP-47.2 (connecting head Ø 55 mm, 2 x Pt100, no transmitter possible)
TFP-67 (high connecting head Ø 55 mm, 2 x Pt100, prepared for 2 x transmitter)

Sensor length EL in mm

020...500 (in steps of 5 mm)
xxx (special length)

Diameter thermowell in mm

6
8

Diameter sensor tip in mm

X (no reduction)
3 (only for thermowell 6 mm)
4 (only for thermowell 6 mm and 8 mm)
6 (only for thermowell 8 mm)

Accuracy class Pt100

A
1/3B
1/10B

Electrical connection (only for TFP-47.2)

PG (cable gland M16x1.5)
2xPG (2 x cable gland M16x1.5)
2xM12 (2 x M12-plug 1.4305)

Electrical connection (only for TFP-67)

M12 (M12-plug 1.4305)
2xM12 (2 x M12-plug 1.4305)

1st Transmitter

MPU-4 (programmable)

Measuring range 1st transmitter

-10...40 (measurement range -10...40 °C)
0...50 (measurement range 0...+50 °C)
0...100 (measurement range 0...+100 °C)
0...150 (measurement range 0...+150 °C)
0...200 (measurement range 0...+200 °C)
xx...yy (special range)

2nd Transmitter

MPU-4 (programmable)

Measuring range 2nd transmitter

-10...40 (range -10...40 °C)
0...50 (range 0...+50 °C)
0...100 (range 0...+100 °C)
0...150 (range 0...+150 °C)
0...200 (range 0...+200 °C)
xx...yy (special range)

Tri-Clamp size

C25 (Pipe diameter:
C34 see "Dimension
C50 table Tri-Clamp" on
C64 page 4)
C77
C91

TFP-67/ 100/ 6/ X/ A/ M12/ MPU-4/ 0...100 MPU-4/ 0...100/ C25