

# Temperature Sensor with M12 hygienic

## Application / Specified Usage

- Temperature Measurement in pipes DN15...DN80
- Temperature measurement in thin-walled pipes and vessels

## Application Examples

- Process monitoring
- Monitoring of CIP- / SIP-process
- Temperature measurement in UHT-plants

## Hygienic Design / Process Connection

- Flow optimized, hygienic and easy sterilizable installation by using Negele weld-in sleeve, e.g. EMK-032 or build-in system, e.g. EHG-... / M12
- Additional process connections: adapters for TriClamp, dairy flange (DIN 11851), Varivent, DRD, APV et al
- Sealing system free of elastomers, the connection will be without gaps and crevices
- Product contacting materials compliant to FDA
- Sensor completely made of stainless steel

## Features / Advantages

- Integrated transmitter optional
- Different electrical connections available

## Options / Accessories

- 2 x Pt100 (not retrofittable)
- 2 x Pt100 with two transmitters (not retrofittable)
- Programmable transmitters MPU-4 as well as MPU-M with output 4...20 mA, 2-wire
- Integrated transmitters for Profibus PA and HART-protocol
- Integrated transmitter MPU-LCD with display in connecting head
- Programming adapter MPU-P 9701
- Pt100 chip with other classes of accuracy (1/3B, 1/10B)
- Sensor tips with diameter 3 mm and 4 mm
- Spacer for high temperature up to 250 °C permanent temperature up to 600 °C (on request)
- Pre-assembled connecting cable for M12-plug
- Fixed cable in other lengths and other material available
- Calibration certificate (optional with order)

## Authorizations



## Temperature Sensor TFP-42



## Temperature Sensor TFP-162 with transmitter MPU-M



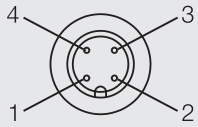
| Temperature Sensor    |   |  |
|-----------------------|---|--|
| Process connection    | thread  | M12 combined with Negele weld-in sleeves, build-in systems, adapter sleeves                            |
| Tightening torque     |   | 10 Nm  |
| Insertion length      | standard  | 20...500 mm  |
| Materials             | connecting head<br>thermowell   | stainless steel 1.4305<br>stainless steel 1.4404   |
| Operating pressure    |   | 50 bar maximum   |
| Temperature ranges    | ambient<br>sensor tip   | -50...+80 °C<br>-50...+250 °C  |
| Sensing resistor      | acc. to DIN EN 60751  | Pt100  |
| Electrical connection | cable gland<br>cable connection<br>fixed cable 2,5 m<br>fixed cable 2,5 m (> 90 °C) | M16 x 1,5<br>M12-plug 1.4305, 4-pins<br>LIYY 4 x 0,25 mm <sup>2</sup><br>PTFE 4 x 0,14 mm <sup>2</sup> |
| Protection class      |   | IP 69 K (with electrical connection M12-plug)  |

| Transmitter MPU-4, MPU-10, MPU-H, MPU-M |                                    |  |
|---|------------------------------------|--|
| Temperature ranges                      | ambient<br>storage                 | -40...+85 °C<br>-55...+90 °C   |
| Measuring ranges                        | MPU-4, MPU-H, MPU-M<br><br>MPU-10  | standard: -10...40 °C, 0...50 / 100 / 150 / 200 °C<br>special ranges free programmable<br>standard -200...850 °C<br>configuration occurs with Profibus |
| Accuracy                                | input                              | < ±0,25 °C   |
| Temperature drift                       | zero, span                         | < 0,01 % / K   |
| Supply                                  | MPU-M, MPU-4<br>MPU-10<br>accuracy | 8...35 V DC<br>9...32 V DC<br>0,01 % / V (reference: 12 V DC)  |
| Output                                  | signal<br>accuracy<br>burden       | analog 4...20 mA (not for MPU-10)<br>< ±0,1 % of measurement range<br>< 600 Ω (at U <sub>B</sub> = 24 V)   |
| Humidity                                | without condensation               | 0...98 %   |

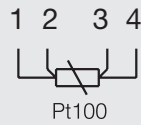
| Accuracy classes of temperature sensors   Tolerances for Pt100 acc. to DIN EN 60751 |                   |                   |                   |
|---|-------------------|-------------------|-------------------|
| Pt100   | A                 | 1/3 B             | 1/10 B            |
| 0 °C / 100 Ω  | ±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

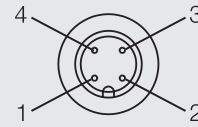


Configuration 1st M12 plug



Electrical connection with transmitter

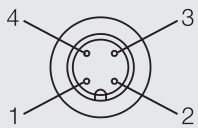
With M12 plug



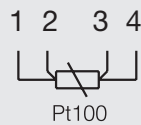
Configuration M12 plug

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

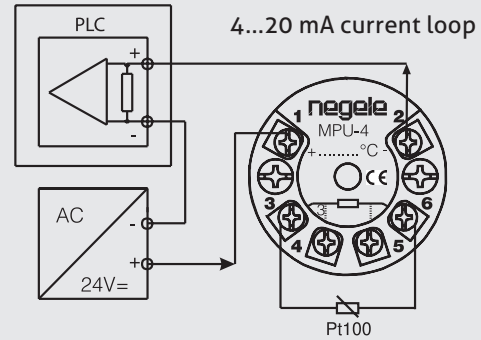
With 2 x M12 plug



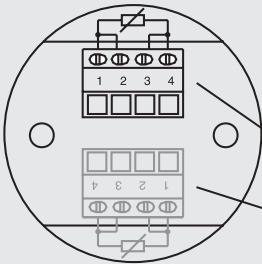
Configuration 2nd M12 plug



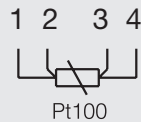
With cable gland



With cable gland



Configuration strip terminal

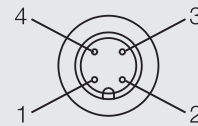


clamps for 1st Pt100

clamps for 2nd Pt100  
(at version 2 x Pt100)

Electrical connection with two transmitter (TFP-62)

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



Configuration M12-plug

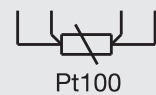
- 1: + supply (sensor 1)
- 2: - supply 4...20 mA (sensor 1)
- 3: - supply 4...20 mA (sensor 2)
- 4: + supply (sensor 2)

With fixed cable



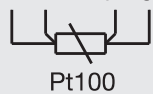
Fixed cable connection with 1 x Pt100

wh ye bn gn standard  
rd rd wh wh PTFE



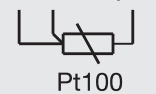
Fixed cable connection with 2 x Pt100 (LIYY)

wh ye bn gn 1st Pt100  
rd bu pk gy 2nd Pt100

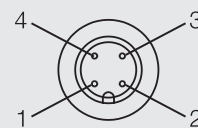


Fixed cable connection with 2 x Pt100 (PTFE)

rd rd wh 1st Pt100  
vt vt ye 2nd Pt100



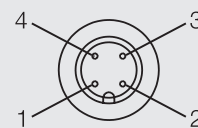
With 2 x M12-plug (sensor 1)



Configuration M12-plug

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

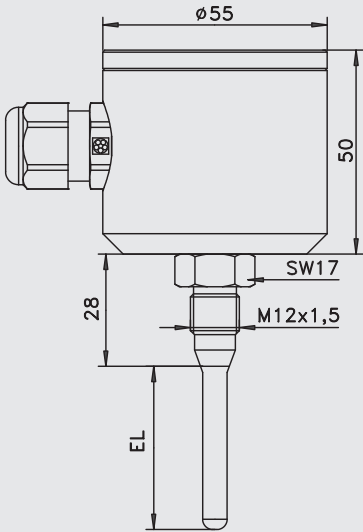
With 2 x M12-plug (sensor 2)



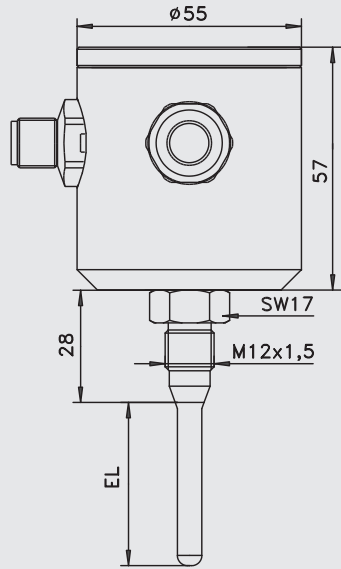
Configuration M12-plug

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

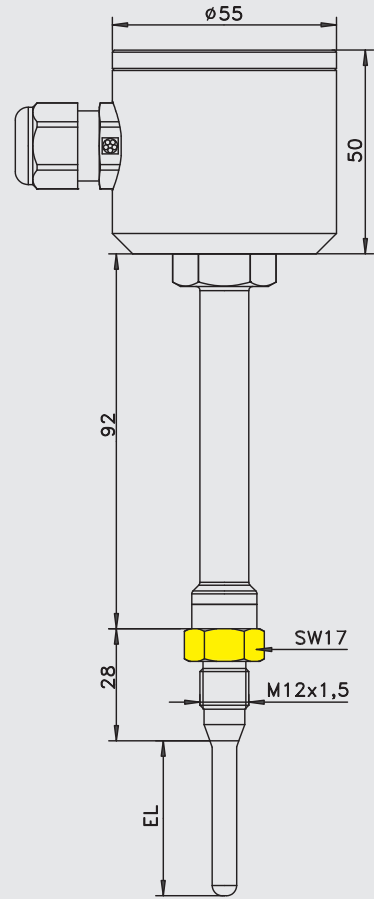
TFP-42 | TFP-42.2



TFP-62



TFP-52 | TFP-52.2

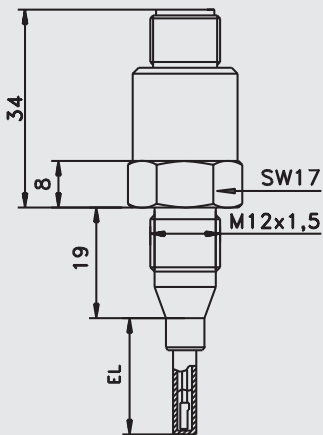


Important advice for TFP-52 und -52.2

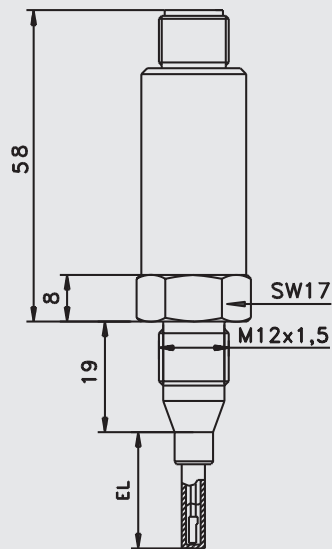


Tighten the sensor only at the lower, marked in yellow spanner flat (BE = 17 mm)!

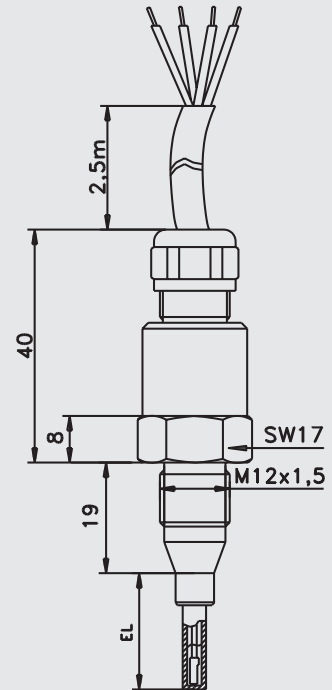
TFP-162



TFP-162 / ... / MPU-M



TFP-182 | TFP-182.2

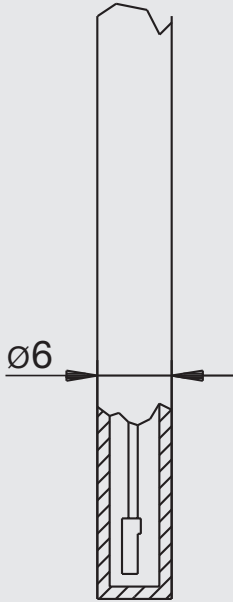


## Sensor tip diameter and response time

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

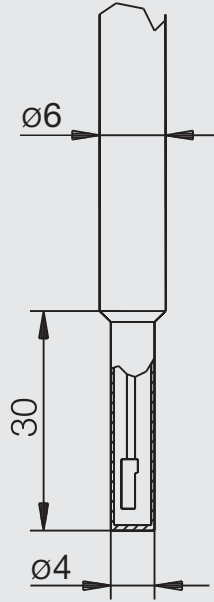
## Sensor tipe Ø 6 mm

validity:  $t_{50} \leq 3,0 \text{ s}$   
90 %-time:  $t_{90} \leq 8,0 \text{ s}$



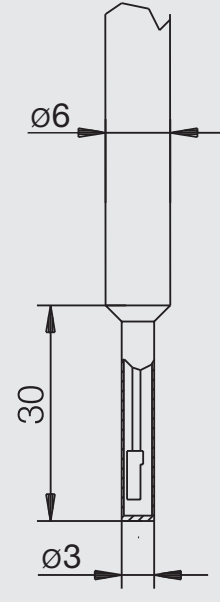
## Sensor tip Ø 4 mm

validity:  $t_{50} \leq 2,4 \text{ s}$   
90 %-time:  $t_{90} \leq 6,5 \text{ s}$



## Sensor tip Ø 3 mm

validity:  $t_{50} \leq 0,5 \text{ s}$   
90 %-time:  $t_{90} \leq 1,5 \text{ s}$



**Mechanical Connection / Installation**

- Use only Negele **CLEANadapt** system for safe operation of measuring point!

**Conventional Usage**

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

**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 %

**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!

**Cleaning / Maintenance**

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

**Standards and Guidelines**

- You have to comply with applicable regulations and directives.

**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.

**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.

## Temperature Transmitter MPU-LCD with Display

**Application / Specified Usage**

- 4...20mA 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)**

## Order code for version with 1 x Pt100

|  |  |
|--|--|
| <b>TFP-42</b>  | (connecting head Ø 55 mm)  |
| <b>TFP-52</b>  | (connecting head Ø 55 with spacer)   |
| <b>TFP-162</b>   | (connecting head Ø 18 mm, electrical connection via M12-plug)  |
| <b>TFP-182</b>   | (connecting head Ø 18 mm, electrical connection via 2,5 m PVC-cable; other lengths: see accessories; no transmitter possible!) |
| <b>Sensor length EL in mm</b>  |  |
| <b>020...500</b>   | (in steps of 5 mm)   |
| <b>xxx</b>   | (special length)   |
| <b>Diameter thermowell in mm (only selectable at sensor length &gt; 30 mm)</b> |  |
| <b>4</b>   | (only with sensor tip 4 mm)  |
| <b>6</b>   |  |
| <b>Diameter sensor tip in mm</b>   |  |
| <b>3</b>   | (only with thermowell 6 mm)  |
| <b>4</b>   | (only with thermowell 6 mm, standard when sensor length ≤ 30 mm)   |
| <b>6</b>   | (only with thermowell 6 mm)  |
| <b>Accuracy class Pt100</b>  |  |
| <b>A</b>   |  |
| <b>1/3B</b>  |  |
| <b>1/10B</b>   |  |
| <b>Electrical connection (not selectable at TFP-162 and -182)</b>              |  |
| <b>PG</b>  | (cable gland M16x1,5)  |
| <b>M12</b>   | (M12 plug, standard with MPU-LCD)  |
| <b>Transmitter</b>   |  |
| <b>X</b>   | (without)  |
| <b>for TFP-42 and -52</b>  |  |
| <b>MPU-4</b>   | (programmable)   |
| <b>MPU-10</b>  | (Profibus PA)  |
| <b>MPU-H</b>   | (HART-protocol)  |
| <b>MPU-LCD</b>   | (with display)   |
| <b>only for TFP-162 (not for TFP-182)</b>                                      |  |
| <b>MPU-M</b>   | (programmable)   |
| <b>Measuring range MPU (only for types with transmitter; not for MPU-LCD)</b>  |  |
| <b>-10...40</b>  | (range -10...40 °C)  |
| <b>0...50</b>  | (range 0...50 °C)  |
| <b>0...100</b>   | (range 0...100 °C)   |
| <b>0...150</b>   | (range 0...150 °C)   |
| <b>0...200</b>   | (range 0...200 °C)   |
| <b>xx...yy</b>   | (special range)  |
| <b>TFP-42 /</b>  | <b>050 /</b>   |
| <b>6 /</b>   | <b>4 /</b>   |
| <b>A /</b>   | <b>PG /</b>  |
| <b>MPU-4 /</b>   | <b>0...100</b>   |

## Accessories

**PVC-cable with M12-connection made of 1.4305, IP 69 K, unshielded**

|                         |                              |
|-------------------------|------------------------------|
| <b>M12-PVC / 4-5 m</b>  | PVC-cable 4-pin, length 5 m  |
| <b>M12-PVC / 4-10 m</b> | PVC-cable 4-pin, length 10 m |
| <b>M12-PVC / 4-25 m</b> | PVC-cable 4-pin, length 25 m |

**PVC-cable with M12-connection, brass nickel-plated, IP 67, shielded**

|                          |                              |
|--------------------------|------------------------------|
| <b>M12-PVC / 4G-5 m</b>  | PVC-cable 4-pin, length 5 m  |
| <b>M12-PVC / 4G-10 m</b> | PVC-cable 4-pin, length 10 m |
| <b>M12-PVC / 4G-25 m</b> | PVC-cable 4-pin, length 25 m |

## PVC-cable with M12-connection



## Order code for version with 2 x Pt100

- TFP-42.2** (connecting head Ø 55 mm, 2 x Pt100, no transmitter possible!)
- TFP-52.2** (connecting head Ø 55 mm, 2 x Pt100, with spacer, no transmitter possible!)
- TFP-62** (higher connecting head Ø 55 mm, 2 x Pt100, prepared for 2 x transmitter)
- TFP-62-H** (like TFP-62, but with spacer)
- TFP-182.2** (connecting head Ø 18 mm, electrical connection 2,5 m PTFE-cable; other lengths: see at accessories)

## Sensor Length in mm

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

**xxx** (special length)

## Diameter thermowell in mm (only selectable at sensor length &gt; 30 mm)

**4** (only with sensor tip 4 mm)

**6**

## Diameter sensor tip in mm

**3** (only with thermowell 6 mm)

**4** (only with thermowell 6 mm, standard when sensor length ≤ 30 mm)

**6** (only with thermowell 6)

## Accuracy class Pt100

**A**

**1/3B**

**1/10B**

## Electrical connection (only for TFP-42.2 and TFP-52.2)

**PG** (cable gland M16x1,5)

**2 x PG** (2 x cable gland M16x1,5)

**2 x M12** (2 x M12-plug)

## Electrical connection (only for TFP-62 and TFP-62-H)

**M12** (M12-plug)

**2 x M12** (2 x M12-plug)

## Continue if TFP-62 or TFP-62-H is selected!

No further options for TFP-42.2, -52.2, -182.2!

## 1. Transmitter

**MPU-4** (programmable)

## Measuring Range 1. MPU

**-10...40** (measuring range -10...40 °C)

**0...50** (measuring range 0...+50 °C)

**0...100** (measuring range 0...+100 °C)

**0...150** (measuring range 0...+150 °C)

**0...200** (measuring range 0...+200 °C)

**xx...yy** (special range)

## 2. Transmitter

**MPU-4** (programmable)

## Measuring Range 2. MPU

**-10...40** (-10...40 °C)

**0...50** (0...+50 °C)

**0...100** (0...+100 °C)

**0...150** (0...+150 °C)

**0...200** (0...+200 °C)

**xx...yy** (special)

TFP-62 / 100 / 6 / X / A / M12 / MPU-4 / 0...50 / MPU-4 / 0...50