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 Conne ction**
- 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 450 °C (on request)
- Pre-assembled connecting cable for M12-plug
- Fixed cable in other lengths and other material available
- Calibration certificate (optional with order)
## Temperature sensor

<table>
<thead>
<tr>
<th>Process connection</th>
<th>thread</th>
<th>M12 CLEANadapt; combined with Negele weld-in sleeves, build-in-systems, adapter sleeves</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tightening torque</td>
<td>10 Nm</td>
<td></td>
</tr>
<tr>
<td>Insertion length</td>
<td>standard</td>
<td>20...500 mm</td>
</tr>
<tr>
<td>Materials</td>
<td>connecting head thermowell</td>
<td>stainless steel 1.4305, stainless steel 1.4404</td>
</tr>
<tr>
<td>Operating pressure</td>
<td>50 bar maximum</td>
<td></td>
</tr>
<tr>
<td>Temperature ranges</td>
<td>ambient sensor tip</td>
<td>-50...+80 °C, -50...+250 °C</td>
</tr>
<tr>
<td>Sensing resistor</td>
<td>acc. to DIN EN 60751</td>
<td>Pt100</td>
</tr>
<tr>
<td>Electrical connection</td>
<td>cable gland</td>
<td>M16 x 1.5, M12-plug 1.4305, 4-pins LIVY 4 x 0.25 mm², PTFE 4 x 0.14 mm²</td>
</tr>
<tr>
<td>Protection class</td>
<td>IP 69 K (with electrical connection M12-plug)</td>
<td></td>
</tr>
</tbody>
</table>

### Transmitter MPU-4, MPU-10, MPU-H, MPU-M

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

### Accuracy classes of temperature sensors | Tolerances for Pt100 acc. to DIN EN 60751

<table>
<thead>
<tr>
<th>Pt100</th>
<th>A</th>
<th>1/3 B</th>
<th>1/10 B</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 °C / 100 Ω</td>
<td>±0.15 K / ±0.06 Ω</td>
<td>±0.10 K / ±0.04 Ω</td>
<td>±0.03 K / ±0.01 Ω</td>
</tr>
<tr>
<td>100 °C / 138.5 Ω</td>
<td>±0.35 K / ±0.13 Ω</td>
<td>±0.27 K / ±0.10 Ω</td>
<td>±0.08 K / ±0.03 Ω</td>
</tr>
</tbody>
</table>
### Electrical Connection

**Electrical connection without transmitter**

**With 1 x M12 plug**

Configuration 1st M12 plug

1 2 3 4

Pt100

**With 2 x M12 plug**

Configuration 2nd M12 plug

1 2 3 4

Pt100

Clamps for 1st Pt100

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

**With cable gland**

Configuration strip terminal

1 2 3 4

Pt100

**With fixed cable**

Fixed cable connection with 1 x Pt100

wh ye bn gn standard
rd rd wh wh PTFE

Pt100

Fixed cable connection with 2 x Pt100 (LIYY)

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

Pt100

Fixed cable connection with 2 x Pt100 (PTFE)

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

Pt100

### Electrical connection with transmitter

**With M12 plug**

Configuration M12 plug

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

**With cable gland**

4...20 mA current loop

**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 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
Important advice for TFP-52 und -52.2

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

<table>
<thead>
<tr>
<th>Sensor type Ø 6 mm</th>
<th>Sensor tip Ø 4 mm</th>
<th>Sensor tip Ø 3 mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>50 %-time: ( t_{50} \leq 3,0 ) s</td>
<td>50 %-time: ( t_{50} \leq 2,4 ) s</td>
<td>50 %-time: ( t_{50} \leq 0,5 ) s</td>
</tr>
<tr>
<td>90 %-time: ( t_{90} \leq 8,0 ) s</td>
<td>90 %-time: ( t_{90} \leq 6,5 ) s</td>
<td>90 %-time: ( t_{90} \leq 1,5 ) s</td>
</tr>
</tbody>
</table>
Mechanical Connection / Installation
- Use only Negele CLEANadapt system for safe operation of measuring point!

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!

Disposal
- Electrical devices should not be disposed of with household trash. They must be recycled in accordance with national laws and regulations.
- Take the device directly to a specialized recycling company and do not use municipal collection points.

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

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!

Standards and Guidelines
- You have to comply with applicable regulations and directives.

Note on CE
- Applicable directives: Electromagnetic Compatibility Directive 2014/30/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

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.
## Order Code

**Order code for version with 1 x Pt100**

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFP-42</td>
<td>(connecting head Ø 55 mm)</td>
</tr>
<tr>
<td>TFP-52</td>
<td>(connecting head Ø 55 with spacer)</td>
</tr>
<tr>
<td>TFP-162</td>
<td>(connecting head Ø 18 mm, electrical connection via M12-plug)</td>
</tr>
<tr>
<td>TFP-182</td>
<td>(connecting head Ø 18 mm, electrical connection via 2,5 m PVC-cable; other lengths: see accessories; no transmitter possible!)</td>
</tr>
</tbody>
</table>

### Sensor length EL in mm

<table>
<thead>
<tr>
<th>Range</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>020...500</td>
<td>(in steps of 5 mm)</td>
</tr>
<tr>
<td>xxx</td>
<td>(special length)</td>
</tr>
</tbody>
</table>

### Diameter thermowell in mm (only selectable at sensor length > 30 mm)

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>(only with sensor tip 4 mm)</td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
</tbody>
</table>

### Diameter sensor tip in mm

<table>
<thead>
<tr>
<th>Diameter</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>(only with thermowell 6 mm)</td>
</tr>
<tr>
<td>4</td>
<td>(only with thermowell 6 mm, standard when sensor length ≤ 30 mm)</td>
</tr>
<tr>
<td>6</td>
<td>(only with thermowell 6 mm)</td>
</tr>
</tbody>
</table>

### Accuracy class Pt100

- A
- 1/3B
- 1/10B

### Electrical connection (not selectable at TFP-162 and -182)

- **PG**: cable gland M16x1.5
- **M12**: M12 plug, standard with MPU-LCD

### Transmitter

- X (without)
- MPU-4 (programmable)
- MPU-10 (Profibus PA)
- MPU-H (HART-protocol)
- MPU-LCD (with display)

**Only for TFP-162 (not for TFP-182)**

- MPU-M (programmable)

### Measuring range MPU

- -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)
- xxx...yy (special range)

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### 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

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### PVC-cable with M12-connection
Order code for version with 2 x Pt100

<table>
<thead>
<tr>
<th>Product Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>TFP-42.2</td>
<td>(connecting head Ø 55 mm, 2 x Pt100, no transmitter possible!)</td>
</tr>
<tr>
<td>TFP-52.2</td>
<td>(connecting head Ø 55 mm, 2 x Pt100, with spacer, no transmitter possible!)</td>
</tr>
<tr>
<td>TFP-62</td>
<td>(higher connecting head Ø 55 mm, 2 x Pt100, prepared for 2 x transmitter)</td>
</tr>
<tr>
<td>TFP-62-H</td>
<td>(like TFP-62, but with spacer)</td>
</tr>
<tr>
<td>TFP-182.2</td>
<td>(connecting head Ø 18 mm, electrical connection 2.5 m PTFE-cable; other lengths: see at accessories)</td>
</tr>
</tbody>
</table>

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

Diameter thermowell in mm (only selectable at sensor length > 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)
- 2PG (2 x cable gland M16x1,5)
- 2M12 (2 x M12-plug)

Electrical connection (only for TFP-62 and TFP-62-H)
- M12 (M12-plug)
- 2M12 (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)