

Product Information TFP-49, -69, -169, -189, -06

FOOD

Temperature Sensor without thread

Application/Specified usage

- Installation in thin-walled pipes and vessels
- No product contacting of the sensor (with thermowell)
- Demounting the sensor without opening the process

Authorizations



Application examples

- Process monitoring in pipes
- Temperature measurement in pressure pipes
- Measurement of paste products in pipes

Hygienic design/Process connection

- Hygienic and easy sterilizable installation by weld-in sleeve (e.g. EMK-25/76) or weld-in thermowell (e.g. ESH-KM12/...).
- By elastomer free sealing system the connection is free of gaps and crevices
- CIP-/SIP-cleaning up to 140 °C
- Product contacting materials compliant to FDA
- Sensor and head completely made of stainless steel

Features

- Variable insertion depths
- Integrated transmitter (optional)
- Different types of electrical connections possible

Temperature sensor TFP-49



Options/Accessories

- 2 x Pt100 (not retrofittable)
- 2 x Pt100 with two transmitters (not retrofittable)
- Programmable transmitters MPU-4 and MPU-M with output 4...20 mA, 2-wire
- Integrated transmitters for HART-protocol
- Programming adapter MPU-P 9701
- Integrated transmitter MPU-LCD with display in connecting head
- Pt100 chip with other classes of accuracy (1/3B, 1/10B)
- Fast response sensor tip 3 mm and 4 mm
- Pre-assembled connecting cable for M12 plug
- Fixed cable in other lengths and material available

Temperature sensor TFP-169 with transmitter MPU-M



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



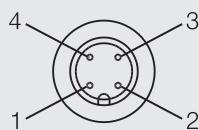
Temperature sensor		
Process connection		gap-free with weld-in sleeve, e.g. EMK-25/76 or weld-in thermowell, e.g. ESH-KM12/...
Insertion length EL	standard	50...500 mm
Materials	connecting head thermowell	stainless steel 1.4301 (AISI 304) stainless steel 1.4404 (AISI 316L)
Operating pressure	with weld-in sleeve with weld-in thermowell	10 bar maximum 50 bar maximum
Temperature ranges	ambient sensor tip	-50...+85 °C -50...+250 °C
Sensing resistor	acc. to DIN EN 60751	Pt100
Electrical connection	cable gland cabel connection fixed cable 2,5 m fixed cable 2,5 m ($\geq 90^{\circ}\text{C}$)	M16 x 1,5 M12 plug 1.4301 (AISI 304), 4-pins LIYY 4 x 0,25 mm ² PTFE 4 x 0,14 mm ²
Protection class	TFP-49, -169, -189 TFP-06	IP 69 K (with cable connection) IP 68

Transmitter MPU-4, MPU-H, MPU-M		
Temperature ranges	ambient storage	-40...+85 °C -55...+90 °C
Measuring ranges	MPU-4, MPU-H, MPU-M	standard: -10...40 °C, 0...50 / 100 / 150 / 200 °C special ranges free programmable
Accuracy	input	$< \pm 0.25^{\circ}\text{C}$
Temperature drift	zero, span	$< 0.01\% / \text{K}$
Supply	MPU-4, MPU-H, MPU-M accuracy	8...35 V DC 0.01 % / V (reference: 12 V DC)
Output	signal accuracy burden	analog 4...20 mA $< \pm 0.1\% \text{ of measurement range}$ $< 600 \Omega \text{ (at } U_B = 24 \text{ V)}$
Humidity	without condensation	0...98 %

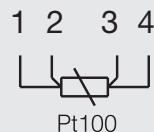
Accuracy classes of temperature sensors Tolerances for Pt100 acc. to DIN EN 60751			
Pt100	A	1/3 B	1/10 B
0 °C / 100 Ω	$\pm 0,15 \text{ K} / \pm 0,06 \Omega$	$\pm 0,10 \text{ K} / \pm 0,04 \Omega$	$\pm 0,03 \text{ K} / \pm 0,01 \Omega$
100 °C / 138,5 Ω	$\pm 0,35 \text{ K} / \pm 0,13 \Omega$	$\pm 0,27 \text{ K} / \pm 0,10 \Omega$	$\pm 0,08 \text{ K} / \pm 0,03 \Omega$

Electrical connection without transmitter

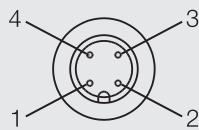
With 1 x M12 plug



Configuration 1st M12 plug



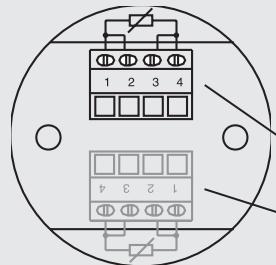
With 2 x M12 plug



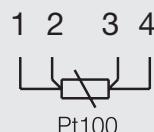
Configuration 2nd M12 plug



With cable gland



Configuration strip terminal

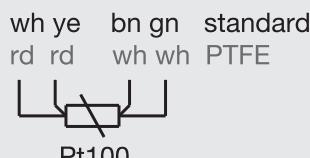


clamps for 1st Pt100
clamps for 2nd Pt100
(at version 2 x Pt100)

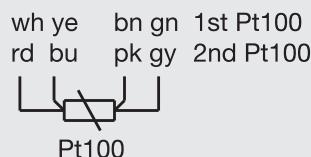
With fixed cable



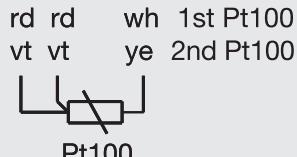
Fixed cable connection with 1 x Pt100



Fixed cable connection with 2 x Pt100 (LIYY)

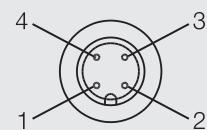


Fixed cable connection with 2 x Pt100 (PTFE)



Electrical connection with transmitter

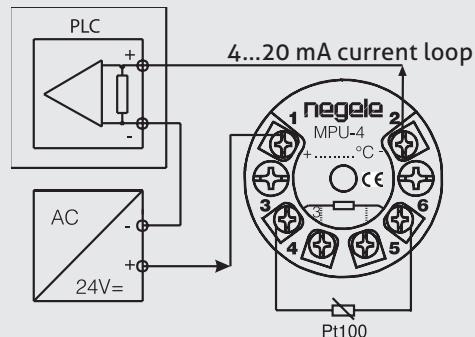
With M12 plug



Configuration M12 plug

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

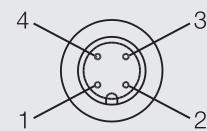
With cable gland



Electrical connection with two transmitter (TFP-69)

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

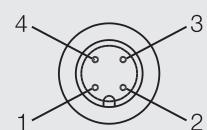
Configuration M12 plug



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)

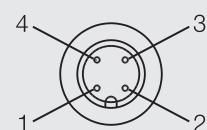
Configuration M12 plug



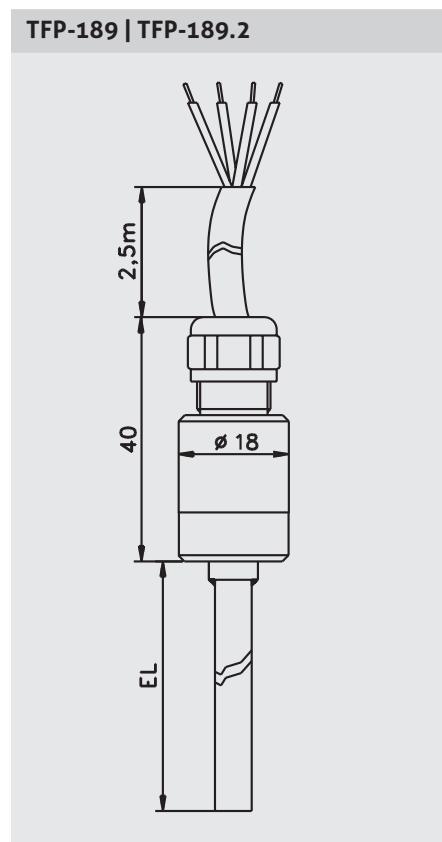
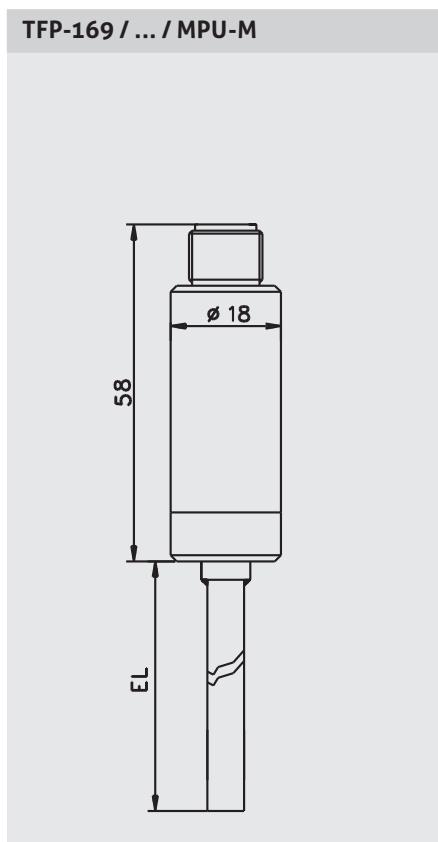
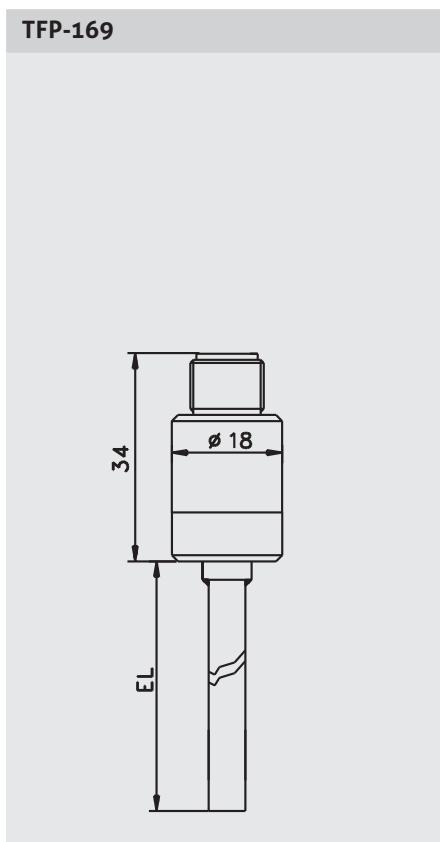
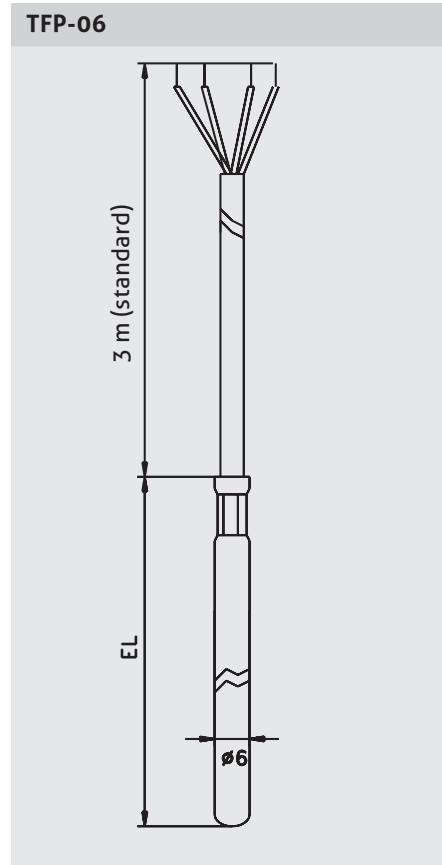
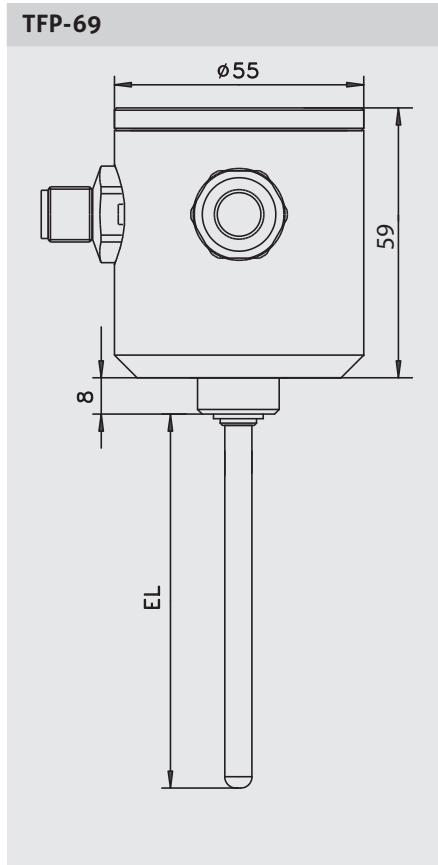
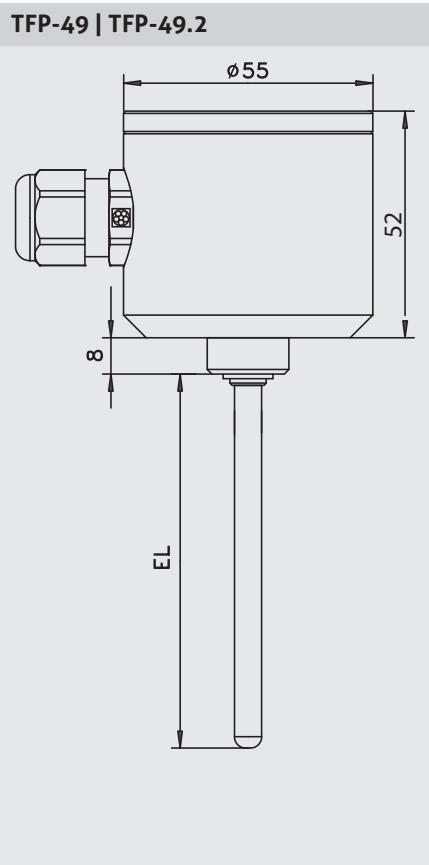
1: + supply (sensor 1)
2: - supply 4...20 mA (sensor 1)
3: not connected
4: not connected

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



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 tip Ø 6 mm with thermowell	Sensor tip Ø 6 mm	Sensor tip Ø 4 mm	Sensor tip Ø 3 mm
50 %-time: $t_{50} \leq 8.8 \text{ s}$ 90 %-time: $t_{90} \leq 24.5 \text{ s}$	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: $t_{90} \leq 1.5 \text{ s}$

Note

When using weld-in thermowells we recommend to use heat-conductive paste too. This can reduce the response time up to 50 %.



Mechanical Connection / Installation

- Check the compatibility of the sensor length to the used thermowell.

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 %

Standards and Guidelines

- You have to comply with applicable regulations and directives.

Cleaning / Maintenance

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

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.

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!

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.

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

**Option MPU-LCD
(display in the connection head)****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 for version with 1 x Pt100

TFP-49	(connecting head Ø 55 mm)
TFP-169	(connecting head Ø 18 mm, electrical connection M12 plug)
TFP-189	(sensor with head Ø 18 mm, electrical connection 2,5 m PVC-cable; no transmitter possible)
TFP-06	(sensor without connecting head, with 3 m PVC-cable, other lengths: on request)
TFP-06- IP68	(sensor without conn. head, prot. cl. IP 68, with 3 m PTFE-cable, other lengths: on request)

Sensor length EL in mm**050...250**

xxx (special length)

Diameter thermowell in mm**6****8****10****12****Diameter sensor tip in mm**

X (no reduction)

3 (only for thermowell 6 mm)

4 (only for thermowell 6 mm and 8 mm;
no extra charge for sensor length 20 mm)

6 (only for thermowell 8 mm and 10 mm)

8 (only for thermowell 12 mm)

Accuracy Class**A****1/3B****1/10B****Electrical connection**

(not selectable at TFP-169 and -189, -06 and -06-IP68)

PG (cable gland M16x1,5)**M12** (M12 plug, standard with MPU-LCD)**Transmitter**

X (without)

only for TFP-49

MPU-4 (programmable)**MPU-H** (HART-protocol)**MPU-LCD** (with display)

only for TFP-169

MPU-M (programmable)Measuring range MPU
(only for types with transmitter;
not at MPU-LCD)**-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)

TFP-49 /

100 /

6 /

6 /

A /

M12 /

MPU-4 /

0...100 °C

Order code for version with 2 x Pt100

TFP-49.2 (connecting head Ø 55 mm, 2 x Pt100, no transmitter possible!)
TFP-69 (higher connecting head Ø 55 mm, 2 x Pt100, prepared for 2 x transmitter)
TFP-189.2 (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

6
8
10
12

Diameter sensor tip in mm

X (no reduction)
3 (only with thermowell 6 mm)
4 (only with thermowell 6 mm and 8 mm)
6 (only with thermowell 8 mm and 10 mm)
8 (only with thermowell 12 mm)

Accuracy class Pt100

A
1/3B
1/10B

Electrical connection (only for TFP-49.2)

PG (cable gland M16x1,5)
2PG (2 x cable gland M16x1,5)
2M12 (2 x M12 plug)

Electrical connection (only for TFP-69)

M12 (M12 plug)
2M12 (2 x M12 plug)

Continue if TFP-61 or TFP-61-H is selected!
 No further options for TFP-49.2, and TFP-189.2!

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-69 / 100 / 6 / X / A / M12 / MPU-4 / 0...50 / MPU-4 / 0...50