Product Information TFP-40, -50, -60, -160, -180 **FOOD**

Temperature Sensor G1/2" Standard

Application / Specified Usage

- Temperature measurement in vessels and pipes
- No product contacting of the sensor if using the weld-in thermowell ESH
- Demounting the sensor without opening the process if using the weld-in thermowell ESH

Application Examples

- Temperature measurement in pressure pipes
- Measurement of paste products in pipes
- Temperature monitoring in UHT-plants

Hygienic Design / Process Connection

- Hygienic and easy sterilizable installation by using thermowell ESH
- Product contacting materials compliant to FDA
- Sensor and thermowell completely made of stainless steel

Features

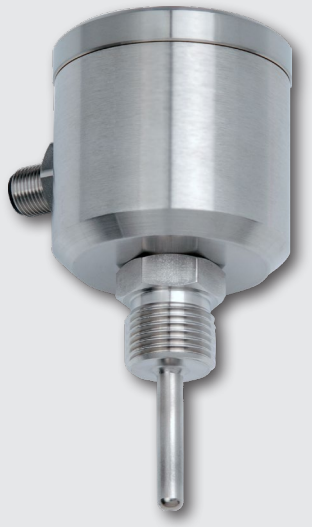
- Integrated transmitter optional
- Different types of electrical connections possible
- Protection class is IP 69 K with electrical connection M12 plug

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 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
- 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 material available

Authorizations

Temperature sensor TFP-40



Temperature sensor TFP-160 / ... / MPU-M

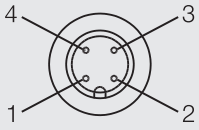
Temperature sensor		
Process connection	thread G1/2"	gap-free with weld-in thermowell, e.g. ESH-G1/2"/050
Insertion length	standard	35...500 mm **(inclusive thread)**
Materialis	connecting head thermowell	stainless steel 1.4301 (AISI 304) stainless steel 1.4404 (AISI 316L) (AISI 316L)
Operating pressure	without weld-in thermowell with weld-in thermowell	10 bar maximum 50 bar maximum
Temperature ranges	ambient sensor tip	-50...+80 °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 (≥ 90 °C)	M16 x 1.5 M12 plug 1.4301 (AISI 304), 4-pins LIYY 4 x 0.25 mm² PTFE 4 x 0.14 mm²
Protection class		IP 69 K (with electrical connection M12 plug)

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 programable
Accuracy	input	< ±0.25 °C
Temperature drift	zero, span	< 0.01 % / 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 < ±0.1 % of measurement range < 600 Ω (at U_B = 24 V)
Humidity	without condensation	0...98 %

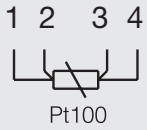
Accuracy classes of temperature sensors | Tolerances for Pt100 acc. to DIN EN 60751			
Pt100	**A**	**1/3 B**	**1/10 B**
0 °C / 100 Ω	±0,15 K / ±0,06 Ω	±0,10 K / ±0,04 Ω	±0,03 K / ±0,01 Ω
100 °C / 138,5 Ω	±0,35 K / ±0,13 Ω	±0,27 K / ±0,10 Ω	±0,08 K / ±0,03 Ω

Electrical connection without transmitter

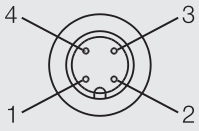
With 1 x M12 plug



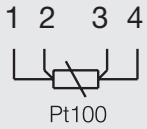
Configuration 1st M12 plug



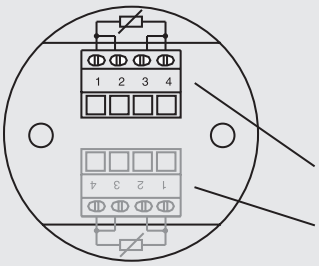
With 2 x M12 plug



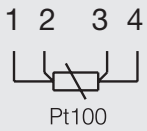
Configuration 2nd M12 plug



With cable gland



Configuration strip terminal

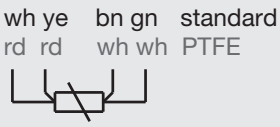


clamps for 1st Pt100

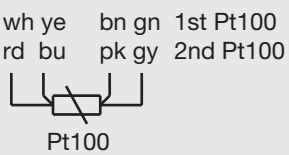
clamps for 2nd Pt100
(at version 2 x Pt100)

With fixed cable

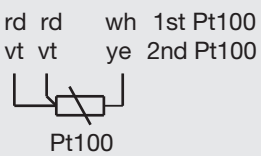
Fixed cable connection with 1 x Pt100



Fixed cable connection with 2 x Pt100 (LIYY)

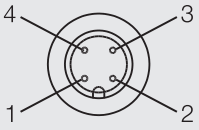


Fixed cable connection with 2 x Pt100 (PTFE)



Electrical connection with transmitter

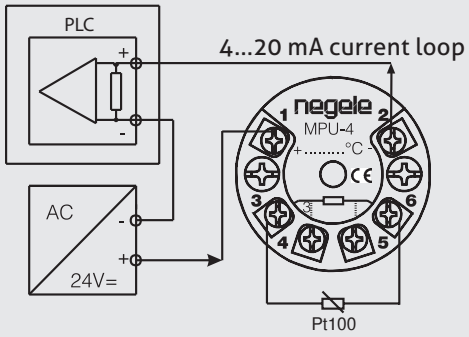
With M12 plug



Configuration M12 plug

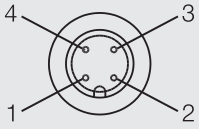
1: + supply
2: - supply 4...20 mA
3: not connected
4: not connected

With cable gland



Electrical connection with two transmitter (TFP-60)

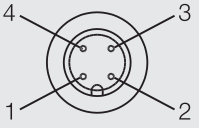
With 1 x M12 plug (sensor 1 + sensor 2)



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)

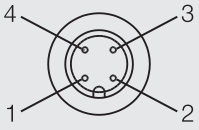
With 2 x M12 plug (sensor 1)



Configuration M12 plug

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

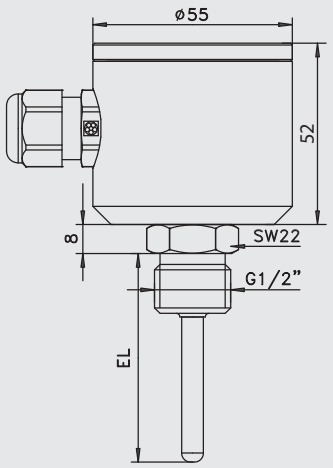
With 2 x M12 plug (sensor 2)



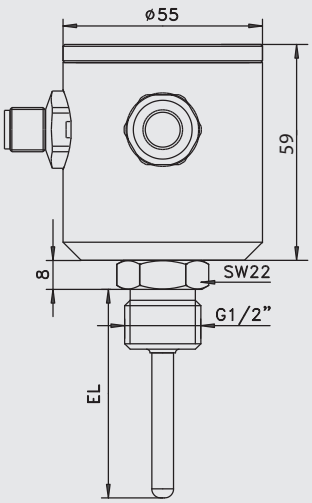
Configuration M12 plug

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

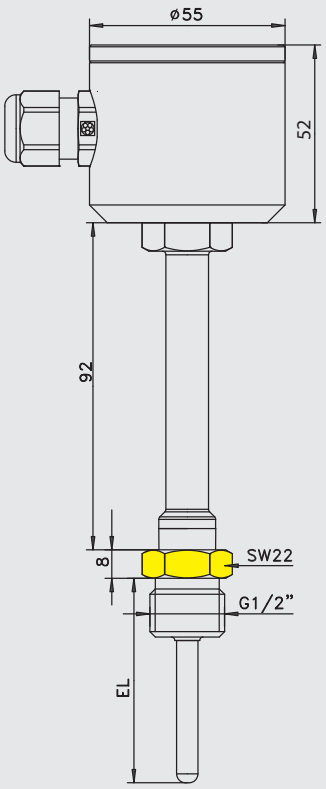
TFP-40 | TFP-40.2



TFP-60



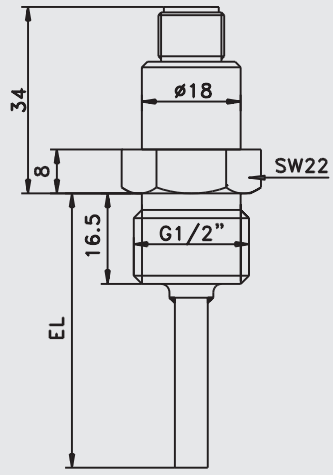
TFP-50 | TFP-50.2



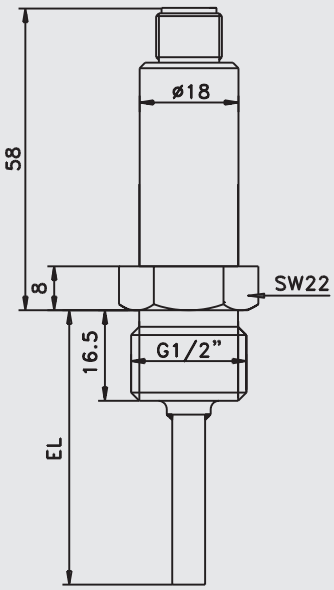
Important installation advice

Tighten the sensor only at the lower spanner flat (BE = 22 mm)!

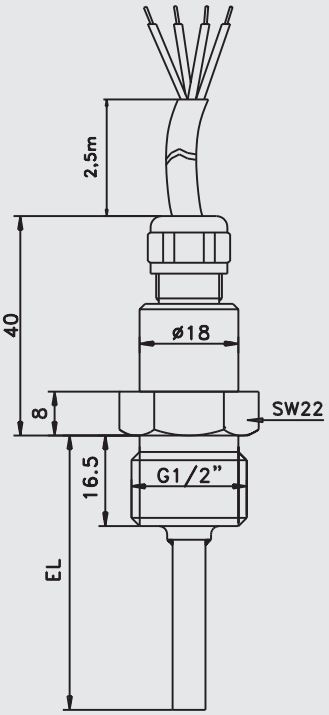
TFP-160



TFP-160 / ... / MPU-M



TFP-180 | TFP-180.2

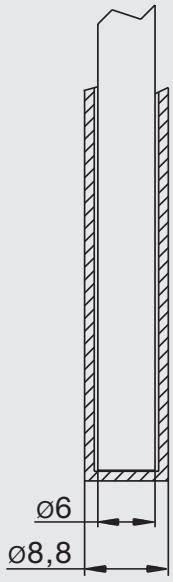


Sensor tip diameter and response time

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.

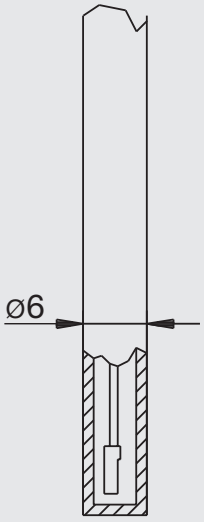
Sensor tip Ø 6 mm with thermowell

50 %-time: $t_{50} \leq 8.8$ s
90 %-time: $t_{90} \leq 24.5$ s



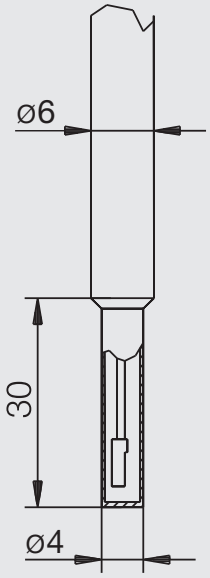
Sensor tip Ø 6 mm

50 %-time: $t_{50} \leq 3.0$ s
90 %-time: $t_{90} \leq 8.0$ s



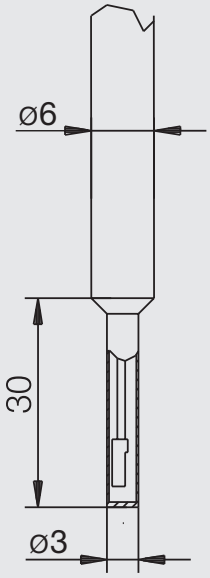
Sensor tip Ø 4 mm

50 %-time: $t_{50} \leq 2.4$ s
90 %-time: $t_{90} \leq 6.5$ s

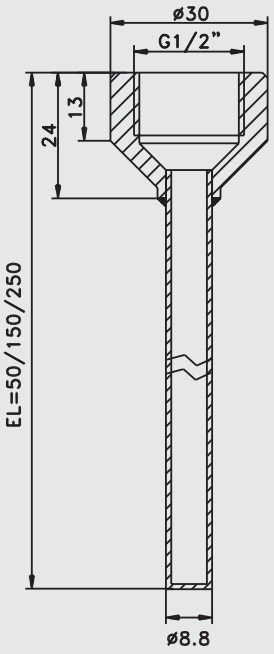


Sensor tip Ø 3 mm

50 %-time: $t_{50} \leq 0.5$ s
90 %-time: $t_{90} \leq 1.5$ s



Thermowell ESH-G1/2"



Note

- When using weld-in thermowells we recommend to use heat-conductive paste too. This can reduce the response time up to 50 %.
- Detailed Information to Thermowell ESH you will find in product information CLEANadapt.

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.

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.

Cleaning / Maintenance

- In case of using pressure washers, dont'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!

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

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

TFP-40 (connecting head Ø 55 mm
TFP-50 (connecting head Ø 55 with spacer)
TFP-160 (connecting head Ø 18 mm, electrical connection via M12 plug)
TFP-180 (connecting head Ø 18 mm,electrical connection via 2,5 m PVC-cable; other lengths: see accessories; no transmitter possible)

Sensor Length EL in mm incl. thread connection 16,5 mm!
035...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 (not selectable at TFP-160 and -180)
PG (cable gland M16x1,5)
M12 (M12 plug, standard with MPU-LCD)

Transmitter

X (without)

for TFP-40 and -50
MPU-4 (programmable)
MPU-H (HART-protocol)
MPU-LCD (with display)

only for TFP-160 (not for TFP-180)

MPU-M (programmable)

Measuring range MPU (only for types with transmitter; not for MPU-LCD)
-10...40 °C
0...50 °C
0...100 °C
0...150 °C
0...200 °C
xx...yy (special range)

TFP-40 /	**100 /**	**6 /**	**6 /**	**A /**	**M12**	**MPU-4 /**	**0...100 °C**

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

Order code for version with 2 x Pt100

TFP-40.2 (connecting head Ø 55 mm, 2 x Pt100, no transmitter possible!)
TFP-50.2 (connecting head Ø 55 mm, 2 x Pt100, with spacer, no transmitter possible!)
TFP-60 (higher connecting head Ø 55 mm, 2 x Pt100, prepared for 2 x transmitter)
TFP-60-H (like TFP-60, but with spacer)
TFP-180.2 (connecting head Ø 18 mm, electrical connection 2,5 m PTFE-cable; other lengths: see at accessories)

Sensor Length in mm, incl. thread connection piece 16,5 mm!
035...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-40.2 and TFP-50.2)
PG (cable gland M16x1,5)
2PG (2 x cable gland M16x1,5)
2M12 (2 x M12 plug)

Electrical connection (only for TFP-60 and TFP-60-H)
M12 (M12 plug)
2M12 (2 x M12 plug)

Continue if TFP-60 oder TFP-60-H is selected!
No further options for TFP-40.2, -50.2, -180.2!

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-60 /	**100 /**	**6 /**	**X /**	**A /**	**M12 /**	**MPU-4 /**	**0...50 /**	**MPU-4 /**	**0...50**

50006 / 6.2 / 2019-07-26 / SD / EU

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