HYGIENIC BY DESIGN
ANDERSON-NEGELE

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 Profibus PA and 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

FDA

Temperature sensor TFP-40
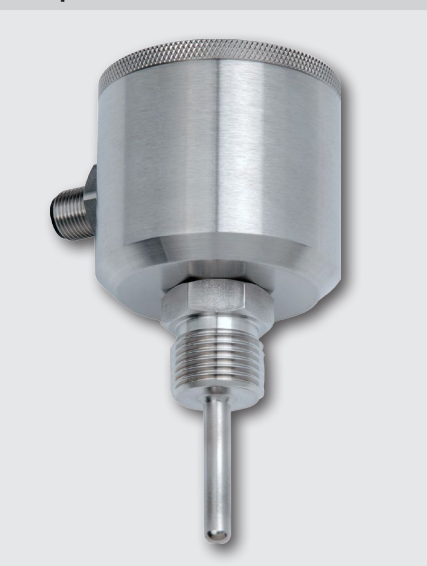
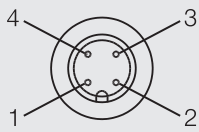## Temperature sensor TFP-160 / ... / MPU-M

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 1.4305 stainless steel 1.4404
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 1.4305, 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-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 programable 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

1 2   3 4

Pt100

With 2 x M12 plug

Configuration 2nd M12 plug

1 2   3 4
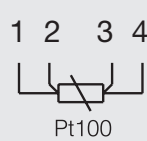
Pt100

With cable gland
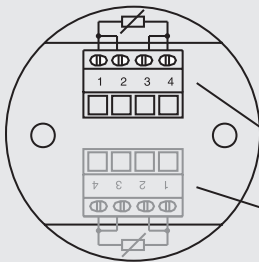
Configuration strip terminal

1 2   3 4
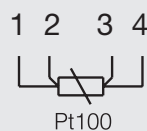
Pt100

clamps for 1st Pt100

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

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

Pt100

Electrical connection with transmitter

With M12 plug

Configuration M12 plug

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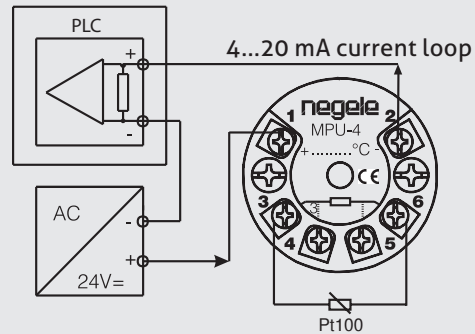3: not connected
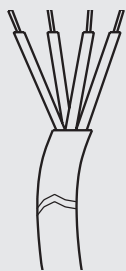4: not connected

With cable gland

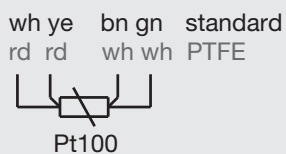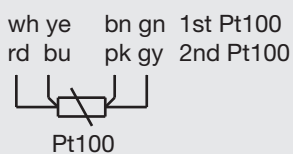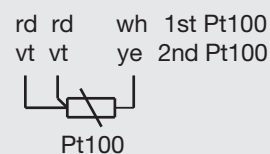## Electrical connection with two transmitter (TFP-60)
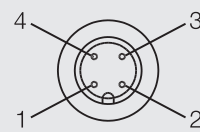
With 1 x M12-plug (sensor 1 + sensor 2)

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

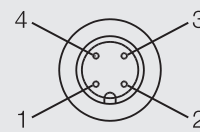### With 2 x M12-plug (sensor 2)

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

ø55
52
8
SW22
G1/2"
EL

TFP-60

ø55
59
8
SW22
G1/2"
EL

TFP-50 | TFP-50.2

ø55
52
92
8
SW22
G1/2"
EL
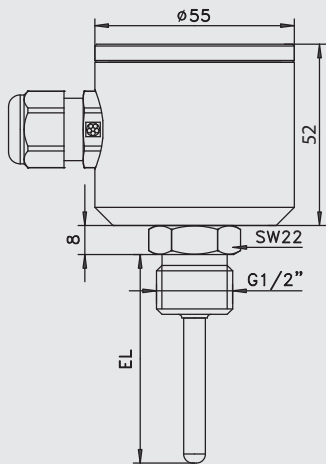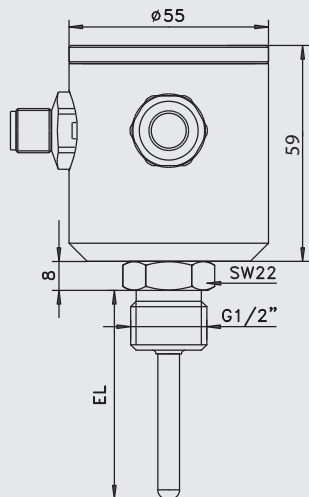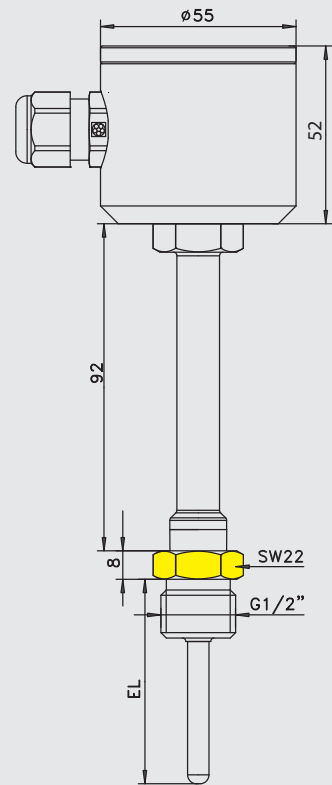
Important installation advice

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

TFP-160

34
ø18
8
SW22
16.5
G1/2"
EL

TFP-160 / ... / MPU-M

58
ø18
8
SW22
16.5
G1/2"
EL

TFP-180 | TFP-180.2

2,5m
40
ø18
8
SW22
16.5
G1/2"
EL
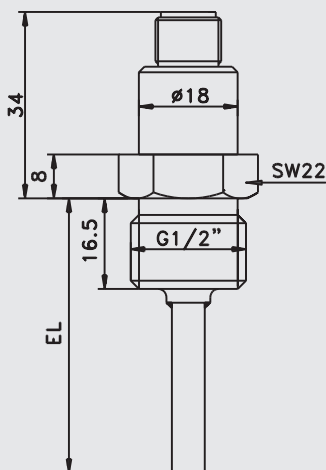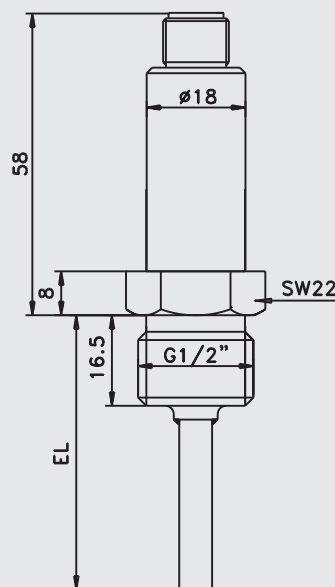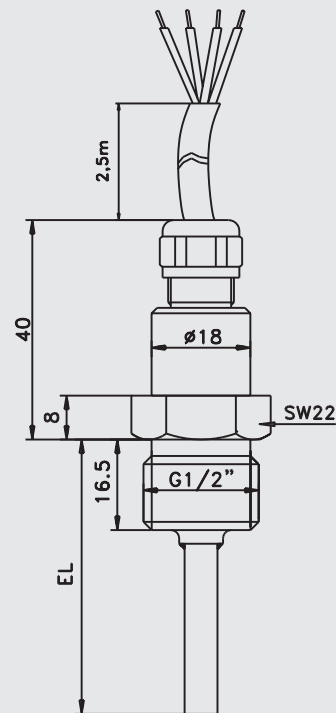
Sensor tip diameter and response time

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: $t_{50} \leq 8.8$ s 90 %-time: $t_{90} \leq 24.5$ s	50 %-time: $t_{50} \leq 3.0$ s 90 %-time: $t_{90} \leq 8.0$ s	50 %-time: $t_{50} \leq 2.4$ s 90 %-time: $t_{90} \leq 6.5$ s	50 %-time: $t_{50} \leq 0.5$ s 90 %-time: $t_{90} \leq 1.5$ s
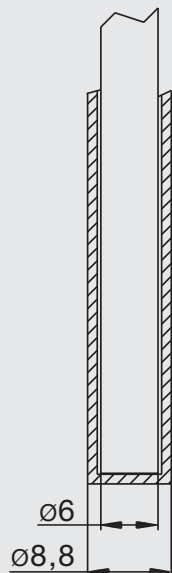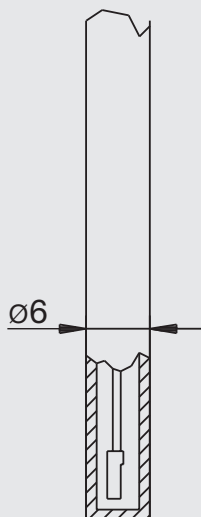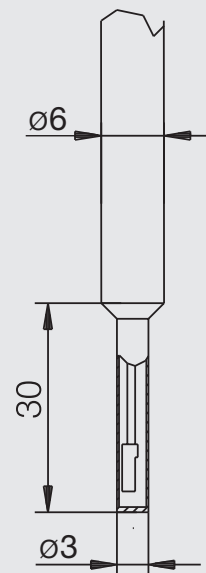
Thermowell ESH-G1/2"
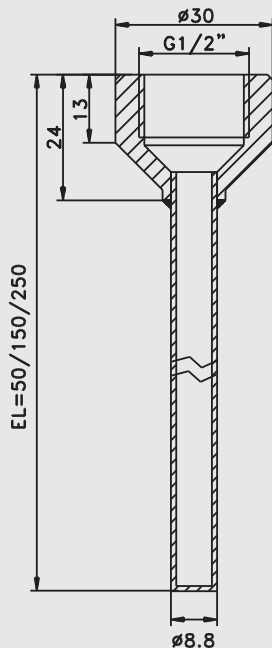
Note

· 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.

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, 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!

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.

Note on CE ℹ️

· 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.

Disposal ℹ️

· 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 ℹ️

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-10   (Profibus PA)
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** |