Product Information TFP-47, -57, -67, -167 **FOOD**

Temperature Sensor Tri-Clamp

Application/Specified usage

· Temperature Measurement in vessels and pipes

Application examples

· Monitoring of CIP-/SIP-process
· Temperature monitoring in milk vessels

Hygienic design/Process connection

· Tri-Clamp sealing system without adapter
· Product contacting materials compliant to FDA
· Sensor completely made of stainless steel
· Conforming to 3-A Sanitary Standard 74-06

Features/Advantages

· Direct Connection without adapter
· Integrated transmitter optional
· Different electrical connections available

Options/Accessories

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

Authorizations

FDA 3-A 74-06

Temperature sensor TFP-47

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)

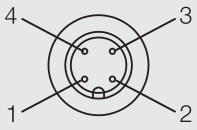
Temperature sensor		
Process connection		Tri-Clamp
Materials	connecting head thermowell and Tri-Clamp	stainless steel 1.4305 stainless steel 1.4404
Surface quality		$R_a \leq 0.8$ µm
Insertion length EL		20...500 mm in steps of 5 mm
Operating pressure		10 bar maximum
Temperature ranges	ambient process CIP-/ SIP-cleaning	-50...+80 °C -50...+250 °C 150 °C max. for 120 minutes (with transmitter)
Sensing resistor	acc. to DIN EN 60751	Pt100
Electrical connection	cable gland cable connection	M16 x 1.5 M12-plug 1.4305, 4-pins
Protection class	cable gland cable connection	IP 67 IP 69 K

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 %

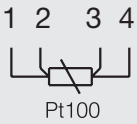
Accuracy classes of temperature sensors | Tolerances for Pt100 acc. to DIN EN 60751			
Pt100	**A**	**1/3 B**	**1/10 B**
0 °C / 100 Ω	±0.15 K / ±0.06 Ω	±0.10 K / ±0.04 Ω	±0.03 K / ±0.01 Ω
100 °C / 138.5 Ω	±0.35 K / ±0.13 Ω	±0.27 K / ±0.10 Ω	±0.08 K / ±0.03 Ω

Electrical connection without transmitter

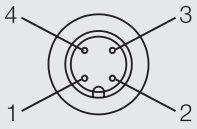
With 1 x M12 plug



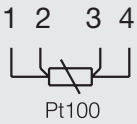
Configuration 1st M12 plug



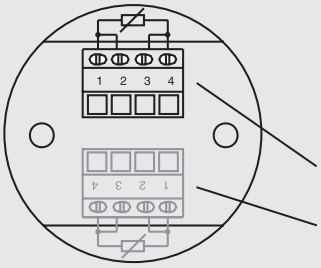
With 2 x M12 plug



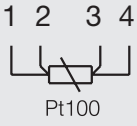
Configuration 2nd M12 plug



With cable gland



Configuration strip terminal

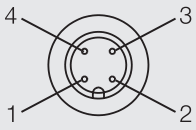


clamps for 1st Pt100

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

Electrical connection with transmitter

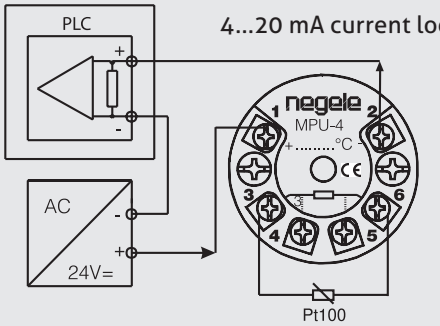
With M12 plug



Configuration M12 plug

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

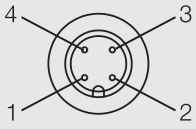
With cable gland



4...20 mA current loop

Electrical connection with two transmitter (TFP-67)

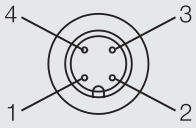
With 1 x M12-plug (sensor 1 + sensor 2)



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)

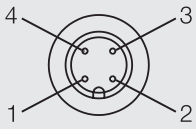
With 2 x M12-plug (sensor 1)



Configuration M12-plug

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

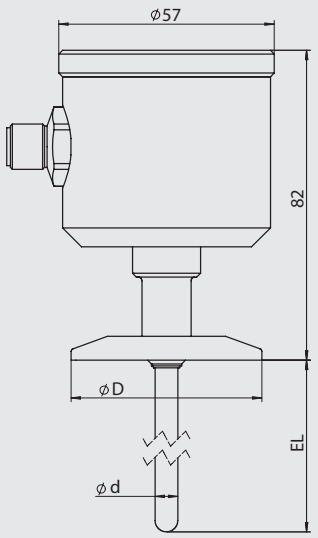
With 2 x M12-plug (sensor 2)



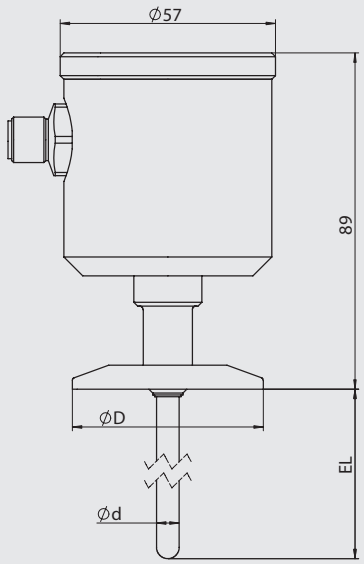
Configuration M12-plug

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

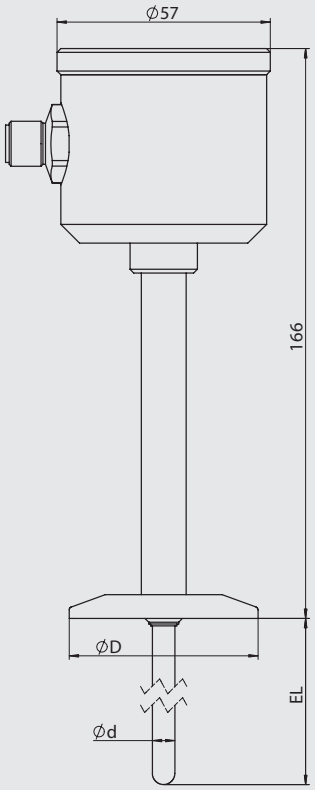
TFP-47 | TFP-47.2



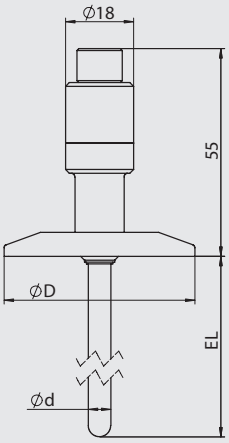
TFP-67



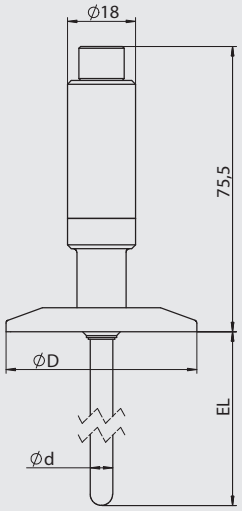
TFP-57 | TFP-57.2



TFP-167



TFP-167 / ... / MPU-M



Dimension table Tri-Clamp

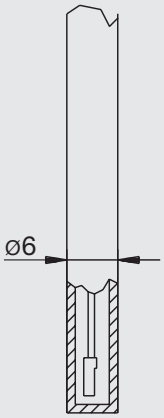
Type	Order code	Clamp size D [mm]	Suitable for pipe diameter	Pipe style
C25	TFP-.../C25	25.0	DN 6...8 ISO 6...10 1/4", 3/8", 1/2", 3/4"	DIN 11866 series A DIN 11866 series B / ISO 1127 DIN 11866 series C
C34	TFP-.../C34	34.0	DN 10...20	DIN 11866 series A
C50	TFP-.../C50	50.5	DN 25...40 ISO 15...25 1" + 1½"	DIN 11866 series A DIN 11866 series B / ISO 1127 DIN 11866 series C
C64	TFP-.../C64	64.0	DN 50 2"	DIN 11866 series A DIN 11866 series C
C77	TFP-.../C77	77.5	2½"	DIN 11866 series C
C91	TFP-.../C91	91.0	DN 65 3"	DIN 11866 series A DIN 11866 series C

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.

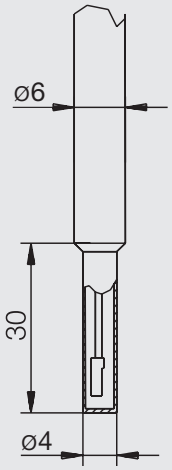
Sensor tip Ø 6 mm

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



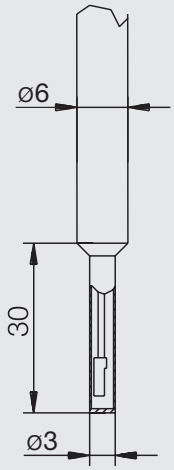
Sensor tip Ø 4 mm

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



Accessories | Spare parts

Diameter pipe		Clamp size D [mm] (see page 4)			
DIN 11866 series A	**DIN 11866 series C**		**Clamp ring Tri-Clamp**	**Sealing ring Tri-Clamp**	
DN10		**34.0**	SRC-10	DRC-10	
DN15		**34.0**	SRC-10	DRC-15	
DN20		**34.0**	SRC-10	DRC-20	
DN25		**50.5**	SRC-25	DRC-25	
DN32		**50.5**	SRC-25	DRC-32	
DN40		**50.5**	SRC-25	DRC-40	
DN50		**64.0**	SRC-50	DRC-50	
DN65		**9.0**	SRC-65	DRC-65	
	1/2"	**25.0**	SRC-5	DRC-1/2"	
	3/4"	**25.0**	SRC-5	DRC-3/4"	
	1"	**50.5**	SRC-25	DRC-1"	
	2"	**64.0**	SRC-50	DRC-50	
	2½"	**77.5**	SRC-2½"	DRC-2½"	
	3"	**91.0**	SRC-65	DRC-65	

Conditions for a measuring point according to 3-A Sanitary Standard 74-06

- The sensors TFP-47, -57, -67, -167 conforming to the 3-A Sanitary Standard.
- The sensors are designed for CIP-/ SIP-cleaning. Maximum 150 °C / 120 min.
- Only with 3-A conforming Tri-Clamp connection.
- Mounting position, self draining and the position of the leackage hole must be in accordance to current 3-A Sanitary Standard.

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!

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.

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

Programming adapter MPU-P 9701	Programming adapter for MPU-4, MPU-H and MPU-M

PVC-cable with M12-connection

Programming adapter MPU-P 9701

Order code for version with 1 x Pt100

TFP-47 (connecting head Ø 55 mm)
TFP-57 (connecting head Ø 55 mm, with spacer)
TFP-167 (connecting head Ø 18 mm, electrical connection via M12-plug)

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

Diameter thermowell in mm
6
8

Diameter sensor tip in mm
X (no reduction)
3 (only for thermowell 6 mm)
4 (only for thermowell 6 mm and 8 mm)
6 (only for thermowell 8 mm)

Accuracy class Pt100
A
1/3B
1/10B

Electrical connection (not selectable for TFP-167)
PG (cable gland M16x1.5)
M12 (M12-plug 1.4305, standard with MPU-LCD)

Transmitter

X (without)

only for TFP-47, -57
MPU-4 (programmable)
MPU-10 (Profibus PA)
MPU-H (HART-protocol)
MPU-LCD (with display)

only for TFP-167

MPU-M (programmable)

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

Tri-Clamp size
C25 (Pipe diameter: see "Dimension
C34 Table Tri-Clamp" on page 4)
C50
C64
C77
C91

TFP-47/	**100/**	**6/**	**X/**	**A/**	**PG/**	**MPU-4/**	**0...100/**	**C25**

Order code for version with 2 x Pt100

TFP-47.2 (connecting head Ø 55 mm, 2 x Pt100, no transmitter possible)
TFP-57.2 (connecting head Ø 55 mm, 2 x Pt100, with spacer, no transmitter possible!)
TFP-67 (high connecting head Ø 55 mm, 2 x Pt100, prepared for 2 x transmitter)

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

Diameter thermowell in mm
6
8

Diameter sensor tip in mm
X (no reduction)
3 (only for thermowell 6 mm)
4 (only for thermowell 6 mm and 8 mm)
6 (only for thermowell 8 mm)

Accuracy class Pt100
A
1/3B
1/10B

Electrical connection (only for TFP-47.2 and 57.2)
PG (cable gland M16x1.5)
2PG (2 x cable gland M16x1.5)
2M12 (2 x M12-plug 1.4305)

Electrical connection (only for TFP-67)
M12 (M12-plug 1.4305)
2M12 (2 x M12-plug 1.4305)

1st Transmitter

MPU-4 (programmable)

Measuring range 1st transmitter
-10...40 (measurement range -10...40 °C)
0...50 (measurement range 0...+50 °C)
0...100 (measurement range 0...+100 °C)
0...150 (measurement range 0...+150 °C)
0...200 (measurement range 0...+200 °C)
xx...yy (special range)

2nd Transmitter

MPU-4 (programmable)

Measuring range 2nd transmitter
-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)

Tri-Clamp size
C25 (Pipe diameter:
C34 see "Dimension
C50 table Tri-Clamp" on
C64 page 4)
C77
C91

TFP-67/	100/	6/	X/	A/	M12/	MPU-4/	0...100/	MPU-4/	0...100/	C25

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