

# Temperature Sensor Tri-Clamp

## Application/Specified usage

- Temperature Measurement in vessels and pipes

## Application examples

- Monitoring of CIP-/SIP-process
- Process monitoring

## Hygienic design/Process connection

- Tri-Clamp sealing system without adapter
- Product contacting materials compliant to FDA
- Sensor completely made of stainless steel

## Features/Advantages

- Direct Connection without adapter
- Integrated transmitter optional
- Different electrical connections available
- Material 1.4435, inspection certificate 3.1 in scope of delivery (for product contacting parts)
- $R_a < 0.4 \mu\text{m}$  or  $0.6 \mu\text{m}$  (on request)

## 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



## Temperature sensor TFP-47P



# Temperature Transmitter MPU-LCD with Display

## Application / Specified Usage

- 4...20 mA 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)



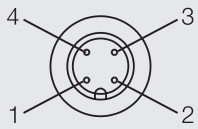
Temperature sensor		
Process connection		Tri-Clamp
Materials	connecting head thermowell and Tri-Clamp	stainless steel 1.4301 stainless steel 1.4435
Surface quality		$R_a \leq 0.8 \mu\text{m}$
Insertion length EL		20...500 mm in steps of 5 mm
Operating pressure		10 bar maximum
Temperature ranges	ambient process CIP / SIP	-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 programmable standard: -200...850 °C configuration occurs with Profibus
Accuracy	input	< $\pm 0.25$ °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) < $\pm 0.1$ % of measurement range < 600 $\Omega$ (at $U_B = 24$ V)
Humidity	without condensation	0...98 %

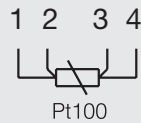
Accuracy classes of temperature sensors   Tolerances for Pt100 acc. to DIN EN 60751			
Pt100	A	1/3 B	1/10 B
0 °C / 100 $\Omega$	$\pm 0.15$ K / $\pm 0.06$ $\Omega$	$\pm 0.10$ K / $\pm 0.04$ $\Omega$	$\pm 0.03$ K / $\pm 0.01$ $\Omega$
100 °C / 138.5 $\Omega$	$\pm 0.35$ K / $\pm 0.13$ $\Omega$	$\pm 0.27$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

## Electrical connection without transmitter

## With 1 x M12 plug

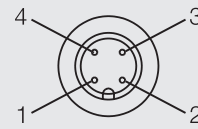


## Configuration 1st M12 plug



## Electrical connection with transmitter

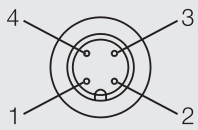
## With M12 plug



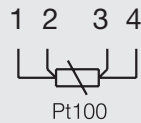
## Configuration M12 plug

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

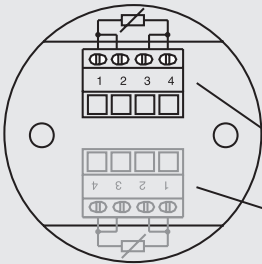
## With 2 x M12 plug



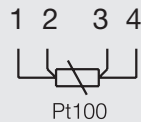
## Configuration 2nd M12 plug



## With cable gland

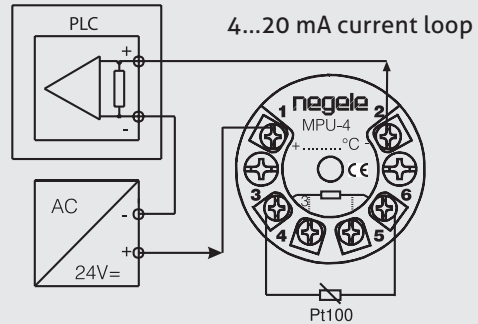


## Configuration strip terminal



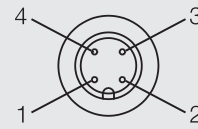
- clamps for 1st Pt100
- clamps for 2nd Pt100  
(at version 2 x Pt100)

## With cable gland



## Electrical connection with two transmitter (TFP-67P)

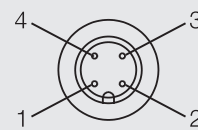
## With 1 x M12-plug (sensor 1 + sensor 2)



## 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)

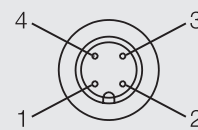
## With 2 x M12-plug (sensor 1)



## Configuration M12-plug

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

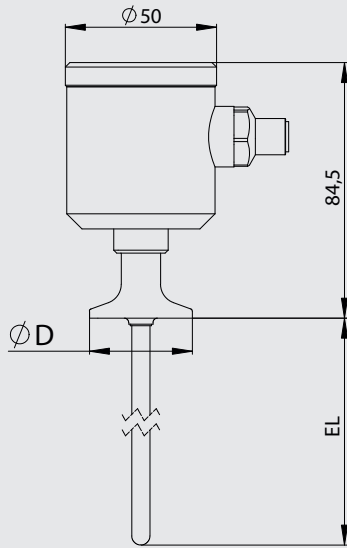
## With 2 x M12-plug (sensor 2)



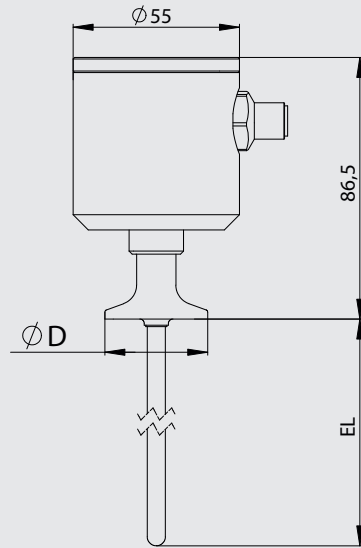
## Configuration M12-plug

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

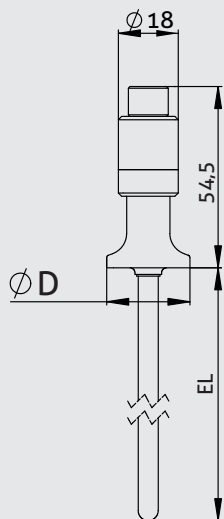
TFP-47P | TFP-47P.2



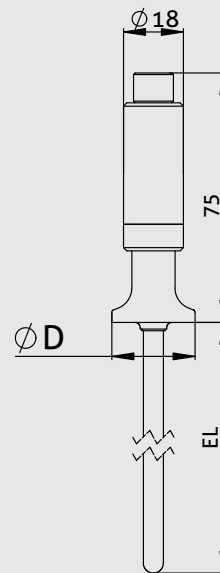
TFP-67P



TFP-167P



TFP-167P / ... / MPU-M

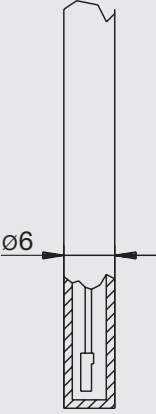
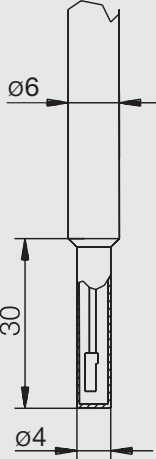
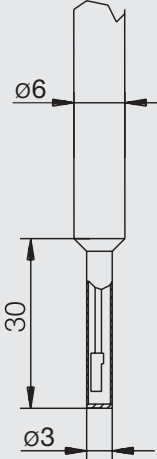


Dimension table Tri-Clamp



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	Sensor tip Ø 4 mm	Sensor tip Ø 3 mm
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: $t_{90} \leq 1.5 \text{ s}$
		

## Accessories | Spare parts


Diameter pipe		Clamp size D (see page 4)			
DIN11866 Series A	DIN11866 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		91.0	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	

Accessories	
<b>PVC-cable with M12-connection made of 1.4305, IP 69 K, unshielded</b>	
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
<b>PVC-cable with M12-connection, brass nickel-plated, IP 67, shielded</b>	
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
<b>Programming adapter MPU-P 9701</b>	Programming adapter for MPU-4, MPU-H and MPU-M




**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!

**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!

**Intended 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.

**Advice to EMC** 

- The device agrees to following standards: EMC directive 2004/108/EC.
- You have to guarantee the EMC directives for the entire equipment.

**Disposal** 

- This instrument is not subject to the WEEE directive 2002/96/EC and the respective national laws.
- Pass the instrument directly on to a specialised recycling company and do not use the municipal collecting points.

## Order code for version with 1 x Pt100

**TFP-47P** (connecting head Ø 50 mm)  
**TFP-167P** (connecting head Ø 18 mm, electrical connection via M12-plug)

**Sensor length EL in mm (in steps of 5 mm)****020...250**

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-167P)****M12** (M12-plug 1.4305, standard with MPU-LCD)**Transmitter****X** (without)**for TFP-47P****MPU-4** (programmable)**MPU-10** (Profibus PA)**MPU-H** (HART-protocol)**MPU-LCD** (with display)**for TFP-167P****MPU-M** (programmable)**Measuring range MPU****(only for types with transmitter; not for MPU-LCD)****-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)**Tri-Clamp Size****C25** (pipe diameter:**C34** see "Dimension table**C50** Tri-Clamp" on page 4)**C64****C77****C91**

TFP-47P/ 100/ 6/ X/ A/ M12/ MPU-4/ 0...100/ C25

Order code for version with 2 x Pt100

**TFP-47P.2** (connecting head Ø 50 mm, 2 x Pt100, no transmitter possible)  
**TFP-67P** (high connecting head Ø 55 mm, 2 x Pt100, prepared for 2 x transmitter)

**Sensor length EL in mm (in steps of 5 mm)**

**020...250**

**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-67P)**

**M12** (M12-plug 1.4305)

**2xM12** (2 x M12-plug 1.4305)

**Continue it TFP-67P is selected!  
 No further options for TFP-47P.2!**

**1st Transmitter**

**MPU-4** (programmable)

**Measuring range 1st transmitter**

**-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)

**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"

**C64** on page 4)

**C77**

**C91**

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