

 IO-Link

TURCK

Industrial
Automation

**TEMPERATURE
MEASUREMENT**



Sense it! Connect it! Bus it! Solve it!

Temperature measurement – The perfect solution for your application

Temperature is a critical factor in many industrial processes and has to be monitored constantly in order to operate machines and systems safely and efficiently. A reliable and practical solution for temperature measurement are electronic temperature sensors and transmitters. Reliability is not just provided through high accuracy and repeatability but also through many available interfaces to the process and the operator.

In industrial applications, temperature is measured with resistance thermometers or thermocouples. Resistance thermometers accomplish this via temperature-sensitive electrical resistors. While the resistance of PTCs increases with the rise of temperature, NTCs behave opposite.

The TURCK product portfolio offers a broad range of connectivity solutions and different output signals for many different temperature measurement tasks.



TS-400

TS-500



- **Maximum operating comfort**

The TS series is programmed with the buttons MODE and SET. The ENTER button is recessed to avoid accidental changes of programmed values.

- **Many mounting options**

The sensors can be mounted in many positions thanks to the rotatable sensor body, the inclined display and the reading that can be reversed by 180° via software.

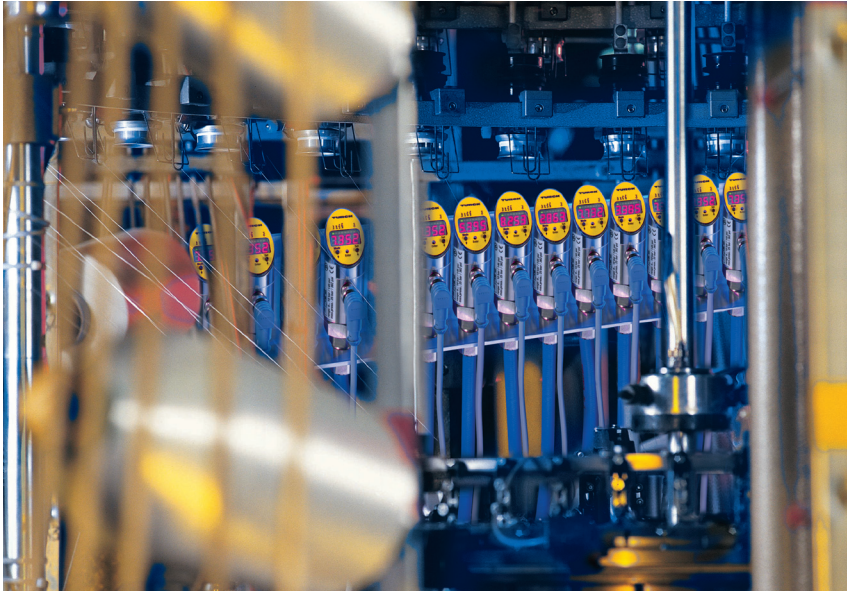
- **Highest accuracy**

Thanks to an accuracy of 0.2 K, only a few types of temperature sensors are needed to handle many different applications.

- **Highest system availability**

The rugged stainless steel housing, excellent EMC properties and protection rating IP67 provide highest operational safety.





IM and IMS series – Interface technology delivered in a modular housing

The interface modules of the IM and IMS series are incorporated in a compact housing which is simply snapped on a DIN rail EN 60715. They can be aligned close together, horizontally or vertically. The 1 and 2-channel IMS modules are only 6.2 mm slim and offer functions such as galvanic isolation, signal conditioning and temperature measurement.

The 18 mm and 27 mm devices of the IM series can also be screwed on a panel. Thanks to a great variety of functions, these interface modules are suitable for many applications. In addition, they are equipped with a universal power supply unit 20...250 VUC, resp. 20...250 VAC/20...125 VDC for Ex devices, allowing them to be connected to all industrial power supply networks.

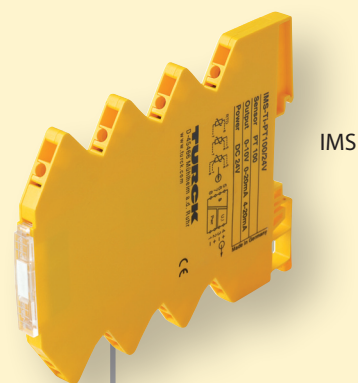
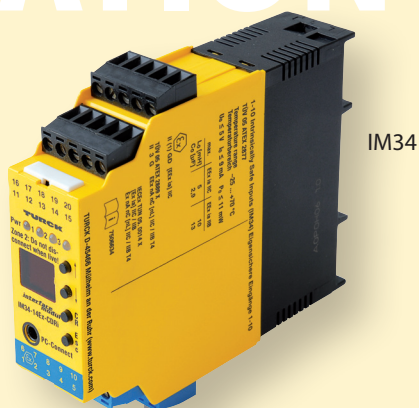


Through features such as easy programming, flexible process connection and a well readable display, the **TS series** provides everything you need to optimize your application. The compact sensors of the **TT/TC series** are available either with integrated probe or with a standard M12 plug connection to mount probes. The infrared sensors of the **T-Gage series** measure temperatures contactless in a range between 0 and +300 °C and at wavelengths between 8 and 14 μm. A further important device of the product

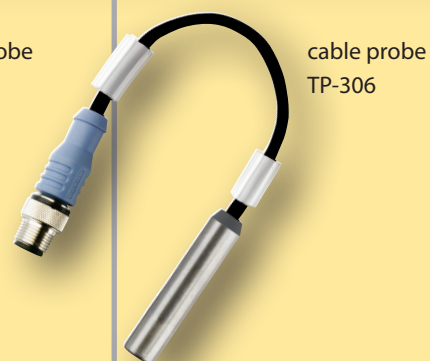
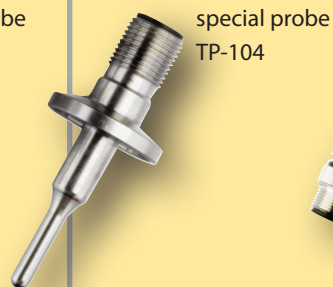
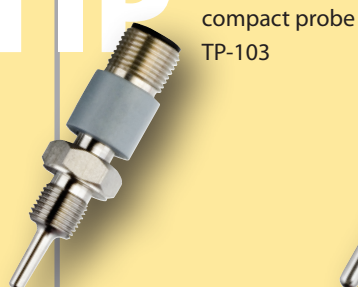
portfolio is the IP67 rated Pt 100 resistance thermometer, used for temperatures between -50 and +500 °C. The temperature probes of the **TP series** are available in different lengths and diameters. When using a thermowell for protection, the sensor can be adapted to critical application conditions.

Flexibility in every respect

EVALUATION



END TIP



PROCESS CONNECTION



PROCESS





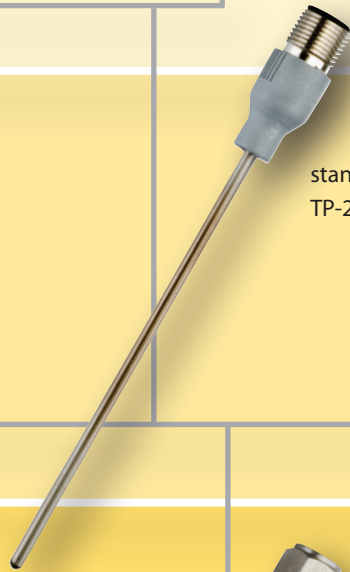
TS-Serie



TT-100



TTM-103A



standard probe
TP-203/206



compressing
fitting
CF-...



standard
thermowell
THW-...



special
thermowell
THW-...

Temperature monitoring

Communication via IO-Link

IO-Link communication is built on a point-to-point connection between sensor and an interface module. Until now, only switching signals could be transferred via the binary connection. IO-Link instead, enables a combined transfer of switching signals and data, typically 2 bytes per 2 ms cycle. In addition to the process values, also parameters or diagnostic messages can be interchanged. This way, the entire process down to the sensors is covered to enable integrated communication. IO-Link doesn't need

any special wiring. You can continue using the well established, reasonably priced and unshielded industrial cables. You can also choose between the standard switching or communication mode.

IO-Link solutions



IO-Link

Your advantages with IO-Link:

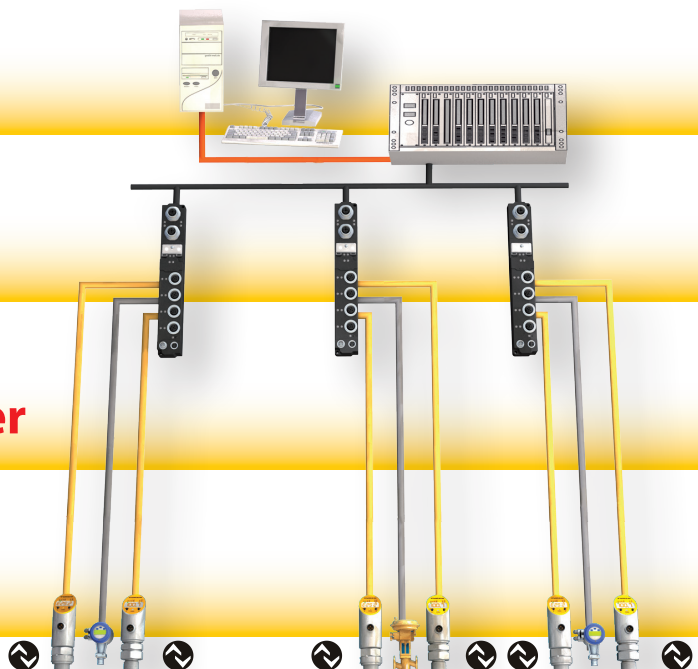
- Parameters and configurations are safely stored in the system and always retrievable
- False parametrization is excluded.
- No complicated local parametrization
- Interferences on analog lines belong to the past
- Easy and comfortable FDT/DTM based engineering

Control Layer

I/O Layer

Connectivity Layer

Sensor Layer



TS series

IO-Link

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Industrial Automation

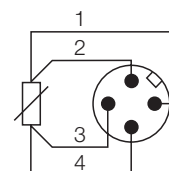
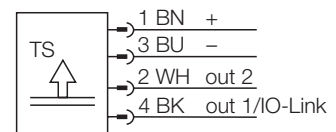
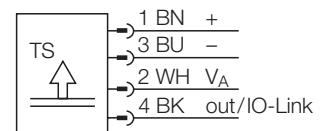
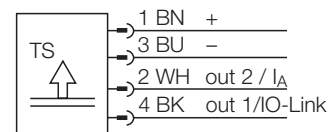
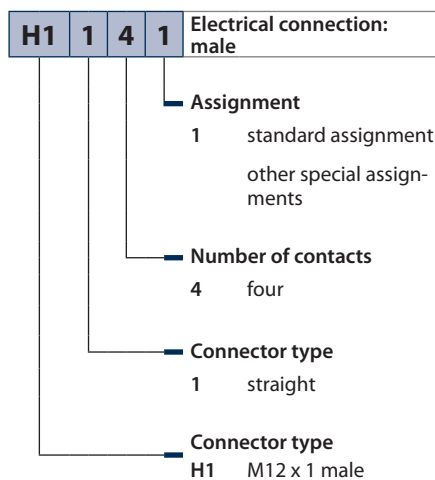
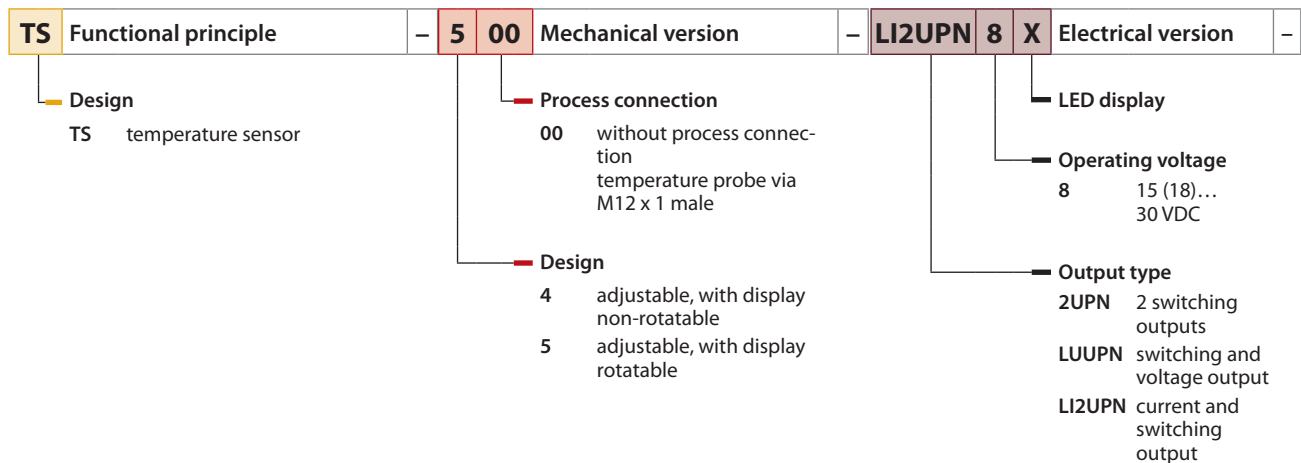
- Accuracy ± 0.2 K
- Sensor rotatable by 320°
- Connection of temperature probes via M12 x 1 male
- stainless steel 1.4305 (AISI 303)
- Permanent display of temperature ($^\circ\text{C}$, $^\circ\text{F}$, K, Ω)
- Storage of max/min values
- Protection class IP67

A standard M12 x 1 plug connection is available for TP temperature probes. The display indicates the temperature during normal operation and guides the operator through the programming menu. We offer sensors with switching outputs or with a combination of switching and analog outputs.



The processing units of the TS-400/TS-500 series are incorporated in a non-rotatable, rugged stainless steel housing.

TS - 5 00 - LIU2 PN 8 X - H1 1 4 1



TT/TC series

- Accuracy 0.1 % f.s.
- Operating range -50...+500 °C
- Customized settings
- Stainless steel 1.4404 (AISI 316L)
- 4...20 mA (2-wire), default setting 0...150 °C
- Switch output PNP
- Protection class IP67

The temperature transmitters of the TT series as well as the temperature switches of the TC series are available with or without integrated probe. The version without probe takes any Pt100 (4-wire) probe of the TP series.



TT - **103A** - **G1/8** - **LI6** - **H1 1 4** - **L013** - **S713**

TT Functional principle - **103A** Mechanical version - **G1/8** Process connection -

Design

- TC temperature switch
- TT temperature transmitter

Design

- 100** processing unit without probe, connection via M12 x 1 male
- 103A** processing unit with probe Ø 3 mm, process connection via standard thread accuracy class A
- 206A** processing unit with probe Ø 6 mm, process connection via clamping sleeve, accuracy class A

Process connection

- G1/8"** G1/8" male thread (only 103)
- CF** compression fitting or thermowell (only 206A)
- blank** probe not integrated

LI6 Electrical version / **H1 1 4 0** Electrical connection - **L013** Probe length /

- LI6** 4...20 mA (2-wire)
- APG** Switch PNP (NO)

Assignment

- 0** standard assignment other special assignments

- Number of contacts**
4 four

- Connector type**
1 straight

- Connector type**
H1 M12 x 1 male

Probe length mm

- L013** 13 mm
- L024** 24 mm
- L0100** 100 mm
- L0150** 150 mm

Customized lengths on request!

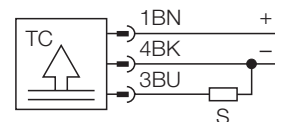
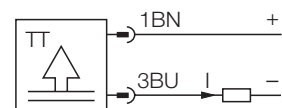
S713 Customized measuring

Customized measuring (on request)

S713 Just add „/S713“ to the type code of the device you want to order (e.g. TT-100-LI6-H1140/S713“) and also the following information:

Temperature switch TC:
desired switch and reset point

Temperature transmitter:
desired measuring range (adjustable via the analog start and end point)



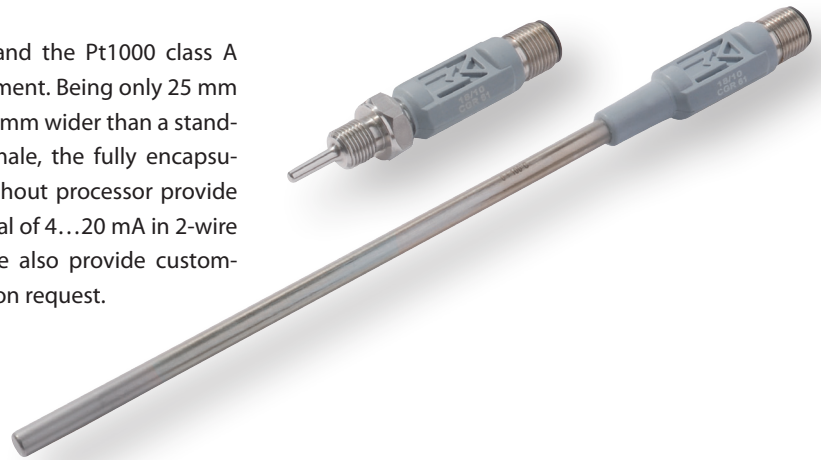
TTM series



- Accuracy ± 0.2 K
- Protection class IP67
- Stainless steel 1.4404 (AISI 316L)
- Analog current output 4...20 mA (2-wire)
- Operating range -50...+500 °C

Miniature sensors of the TTM series fit in the most confined spaces and measure temperatures precisely via the integrat-

ed processor and the Pt1000 class A measuring element. Being only 25 mm longer and 1.5 mm wider than a standard M12 x 1 male, the fully encapsulated TTM without processor provide an output signal of 4...20 mA in 2-wire technology. We also provide customized solutions on request.

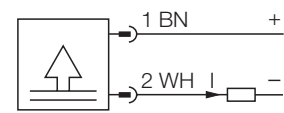


TTM - **100C** - **2** - **03A** - **CF** - **LI6** - **H1 1 4 0** - **L100**

TTM	Functional principle	-	100C	Measuring range	-	2	Design	-
	Design			Measuring range (other on request)			Design	
	TTM Temperature Transmitter Miniature			50C 0...50 °C			1 with process connection	
				100C 0...100 °C			2 compression fitting	
				150C 0...150 °C				

103A	Probe	-	CF	Process connection	-	LI6	Electrical output	-
	Design			Process connection			Electrical output	
	103A processing unit with probe \varnothing 3 mm, process connection via standard thread accuracy class A			G1/8 G1/8" male thread			LI6 4...20 mA 2-wire	
	104A with food-proof process connection \varnothing 4 mm, accuracy class A			N1/8 1/8" NPT male thread				
	203A compression fitting/thermowell, probe \varnothing 3 mm, accuracy class A			G1/4 G1/4" male thread				
	206A compression fitting/thermowell, probe \varnothing 6 mm			N1/4 1/4"-NPT male thread				
	306A cable probe			G1/2 G1/2" male thread				
				N1/2 1/2"-NPT male thread				
				TRI3/4 3/4"-Tri-Clamp				
				DN25K DN25 dairy screw connection DIN 11851				

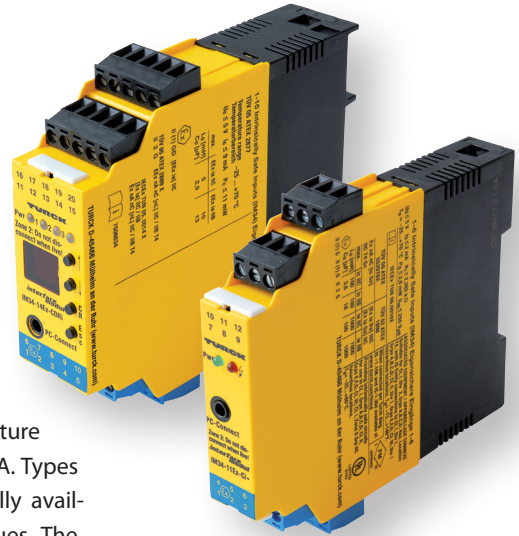
H1 1 4 0	Electrical connection: male	-	L100	Immersion depth
	Assignment			Immersion depth
	0 special assignment			L100 100 mm
	Number of contacts			L150 150 mm
	4 four			Customized lengths on request!
	Connector type			
	1 straight			
	Connector type			
	H1 M12 x 1 male			



IM34

- Temperature measuring amplifiers, 1-channel, mounting on DIN rail
- Input for Pt100/ Ni100 resistors in 2, 3 or 4-wire technology, variable resistors, thermocouples and millivolt signals
- With intrinsically safe input circuits Ex ia, for zone 2, additional limit value relay required
- Current output of 0/4...20 mA.
- Galvanic isolation between input circuits and output circuits and supply voltage
- Parametrized via PACTware™
- HART® transmission
- Universal operating voltage
- Removable terminal blocks, reverse-polarity protected

The IM34 temperature measuring amplifiers are designed to evaluate temperature-dependent changes of Ni100/Pt100 resistors, thermocouples B, E, J, K, L, N, R, S, T or low voltage in a range of -160...+160 mV and to output them as temperature linear current signals 0/4...20 mA. Types with relay output are additionally available for monitoring of limit values. The devices are parametrized via FDT/DTM. The following adjustments can be made: 2, 3, or 4-wire technology, measuring range, wire-break monitoring, output behaviour in the event of input circuit failure, internal or external cold junction



compensation, temperature unit and mode (resistance, thermocouple, low voltage and line compensation).

IM34 - 1 2 1 - Ex - R / 24VDC

IM34 Design - **1 2 1** Number of channels - **Ex** Device class -

IM interface module
34 temperature measuring amplifier

Number of special outputs
 1 special output e.g. alarm

Number of channels on control side
 1 output channel
 2 output channels
 4 output channels

Number of channels on field side
 1 output channel

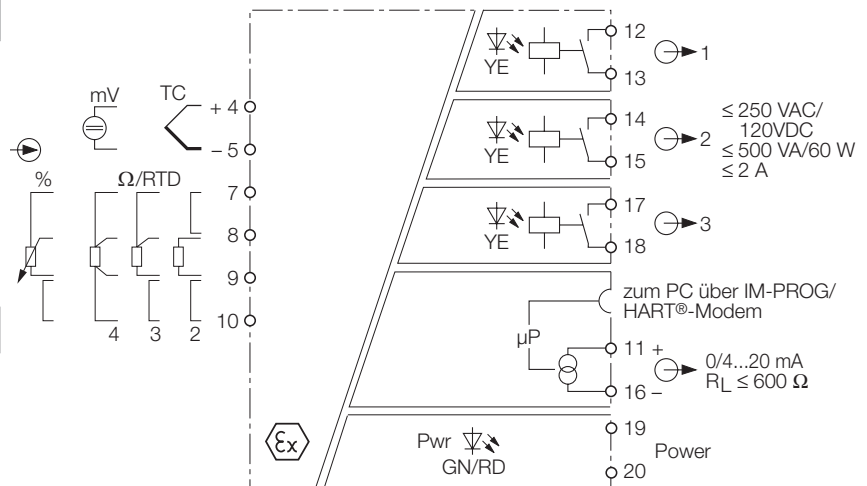
Ex associated equipment with intrinsically safe field current circuits (non-Ex no details)

R Output type /

R relay switching output
I current output 0/4...20 mA
C computer parametrizable (FDT/DTM)
D Display
H HART®

24 VDC Power supply

24 VDC power supply 24 VDC
no details universal power supply unit



IMS-TI

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- Temperature measuring amplifier, 1 channel
- Modular housing, width 6.2 mm, for DIN rail mounting
- Input for Pt100
- Output signal 0/4...20 mA
- Output signal 0...10 V
- galvanic isolation between input circuits and output circuits and supply voltage

Galvanic isolation, signal conditioning and transmission in a slim 6.2 mm housing – these are the unique features provided by the IMS series for mounting on DIN rail.

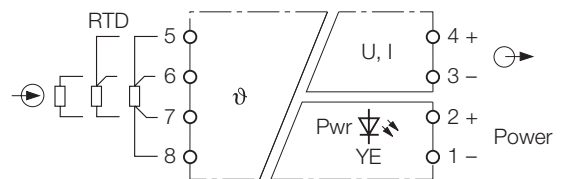
A 1-channel version is available for temperature measurement. Pt100 temperature probes in 2, 3 or 4-wire technology can be connected. Measuring range (-50...+150 °C, 0...+100 °C or 0...+200 °C) and output signal (0/4...20 mA or 0...10 V) are adjusted via DIP switch.



IMS - **TI** - **PT100** / **24 VDC**

IMS Design	-	TI Functional principle	-	PT100 Input	/
IMS interfacemodul small		TI Temperature measuring		PT100 Temperature probe Pt100	

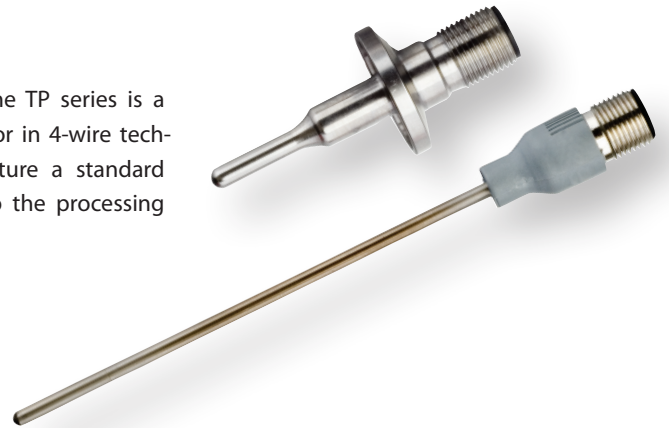
24 VDC Operating voltage	-
24 VDC 19...29 VDC	



TP series

- Accuracy
 - class A for temp. < 350 °C
 - class B for temp. > 350 °C
- Pt100 probe acc. to DIN EN 60751
- Vibration proof
- Connectable to TS, TT and TC series as well as IM34 and IMS
- Protection class IP67
- Mineral-insulated probes
- Bendable rod-type probe

The core element of the TP series is a Pt100 measuring resistor in 4-wire technology. All probes feature a standard M12 x 1 connection to the processing unit.



TP - **103A** - **G1/8** - **H1** **1** **4** **0** - **L013**

TP Functional principle - **103A** Mechanical version - **G1/8** Process connection -

Design

TP temperature probe

Design

- 103A** processing unit with probe Ø 3 mm, process connection via standard thread accuracy class A accuracy class A
- 104A** with food-proof process connection Ø 4 mm, accuracy class A
- 203A** compression fitting thermowell probe Ø 3 mm, accuracy class A
- 206A** compression fitting thermowell probe Ø 6 mm
- 306A** cable probe

Process connection (only devices with integrated probe)

- DN25** DN25 dairy screw connection DIN 11851
- CF** process connection via compression fitting or thermowell
- G1/8** G¹/₈" male thread
- TR13/4** Tri-Clamp 3/4"

H1 **1** **4** **1** Electrical connection - **L013** Immersion depth

Assignment

- 0** special assignment
- 1** standard assignment

Number of contacts

- 4** four

Connector type

- 1** straight

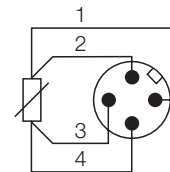
Connector type

- H1** M12 x 1 male

Probe length mm

- L013** 13 mm (only 103A)
- L024** 24 mm (only 103A)
- L035** 35 mm (only 104A)
- L100** 100 mm
- L150** 150 mm
- L200** 200 mm
- L250** 250 mm
- L300** 300 mm
- L1000** 1000 mm
- L2000** 2000 mm
- L5000** 5000 mm

Customized lengths on request!



T-Gage series

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- Short response time of 75 ms
- User-friendly programming
- Compact design
- Rugged, fully encapsulated construction
- Available with cable or 5-pole M12 x 1 male
- Target need not be moved to be detected
- Alarm output for maximum signal
- Programmable for rising or dropping analog characteristic

The T-GAGE is a passively operating device, used for analog temperature measurement. It measures the temperature of objects in a defined range and emits a proportional voltage. Unlike other photoelectric sensors, the T-GAGE doesn't emit light but only measures the infrared radiation of objects. This sensor is thus perfectly suited for monitoring the temperature of hot objects, such as injection-moulded parts or bakery products, but also metals, bottles or rubbers. To avoid overload, the T-GAGE is also used for monitoring the temperature of conveyor-



belt rollers. The sensor can also be used in applications of the food industry to monitor cold objects, such as ice cream or milk products for example.

M18T B 6 Q

M18T Design

M18T cylindrical thread, metal, 18 mm

B Configuration of output and voltage

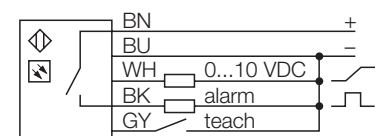
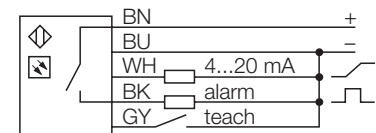
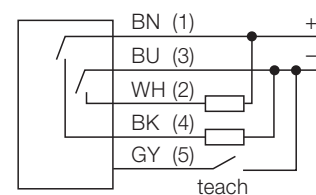
B bipolar (NPN/PNP); 10...30 VDC
 UP 0...30 V analog output and 1 PNP alarm output, 12...30 VDC
 IP 4...20 mA analog output and 1 PNP alarm output, 12...30 VDC

6 D:S ratio

Distance-Spot ratio
 6 6:1
 8E 8:1, encapsulated plastic housing
 14 14:1, germanium lens

Q Electrical connection

- cable, 2 m, 5-pole
- Q M12 x 1 male, 5-pole



THW

- Thermowells
- Stainless steel 1.4404 (AISI 316L)
- Pressure-resistant up to 600 bar
- Probes fixed in place with compression fitting
- Rugged construction

THW thermowells are used to protect probes against environmental influences. They are available in different material qualities and for many requirements. Standard thermowells are made of 1.4404 stainless steel and designed for individual sensors.



THW - **3** - **G1/8** - **A4** - **L013**

THW Functional principle - **3** Probe diameter - **G1/8** Process connection -

— Thermowell
THW

— Probe diameter

3 3 mm
6 6 mm

— Process connection

G1/8 G1/8" male thread
N1/8 1/8" NPT male thread
G1/4 G1/4" male thread
N1/4 1/4"-NPT male thread
G1/2 G1/2" male thread
N1/2 1/2"-NPT male thread
TR13/4 3/4"-Tri-Clamp
DN25K DN25 dairy screw connection DIN 11851

A4 Material - **L013** Immersion depth

— Material

A4 Stainless steel AISI 316L/1.4404

— Probe length mm

L013 13 mm (only 103A)
L024 24 mm (only 103A)
L035 35 mm (only 104A)
L100 100 mm
L150 150 mm
L200 200 mm
L250 250 mm
L300 300 mm
L1000 1000 mm
L2000 2000 mm
L5000 5000 mm

Customized lengths on request!

- Compression fittings for temperature probes with different process connections
- Stainless steel 1.4404 (AISI 316L)
- Pressure-resistant up to 100 bar
- Probes fixed in place with compression fitting

Compression fittings are always used when temperature probes have direct contact with a medium. A liquid and gas-tight connection is established by means of a compression fitting installed between the process and the environment.



CF - **M** - **3** - **G^{1/8}** - **A4**

CF	Functional principle	-	M	Material	-	3	Probe diameter	-
	Threaded adapter CF			Cutting ring material M AISI 316L P PTFE			Probe diameter 3 3 mm 6 6 mm	

G^{1/8}	Process connection	-	A4	Material
	Process connection G ^{1/8} G ^{1/8} " male thread N ^{1/8} 1/8"-NPT male thread G ^{1/4} G ^{1/4} " male thread N ^{1/4} 1/4"-NPT male thread G ^{1/2} G ^{1/2} " male thread N ^{1/2} 1/2"-NPT male thread TRI ^{3/4} 3/4"-Tri-Clamp DN ^{25K} DN25 dairy screw connection DIN 11851			Material A4 stainless steel AISI 316L/1.4404

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To get all product information, just scan the QR code with a smart-phone or webcam.

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