



# 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.



TMS...

T-Gage

TTM...

TP...



IMS



IM...

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 **TTM 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.

# EVALUATION



TS-516

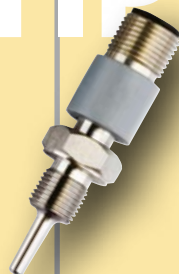


IM34

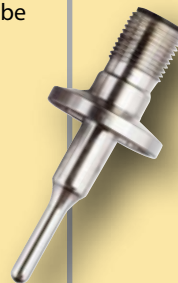


IMS

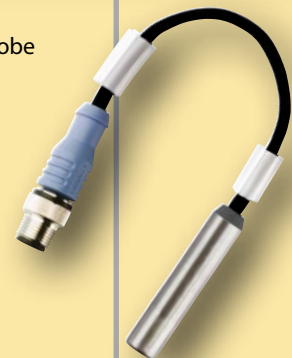
# END TIP



compact probe  
TP-103



special probe  
TP-104



cable probe  
TP-306

# PROCESS CONNECTION



compressing  
fitting  
CF-...

# PROCESS



TS-Serie



TTM-100



TTM-103A



TTMS-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:

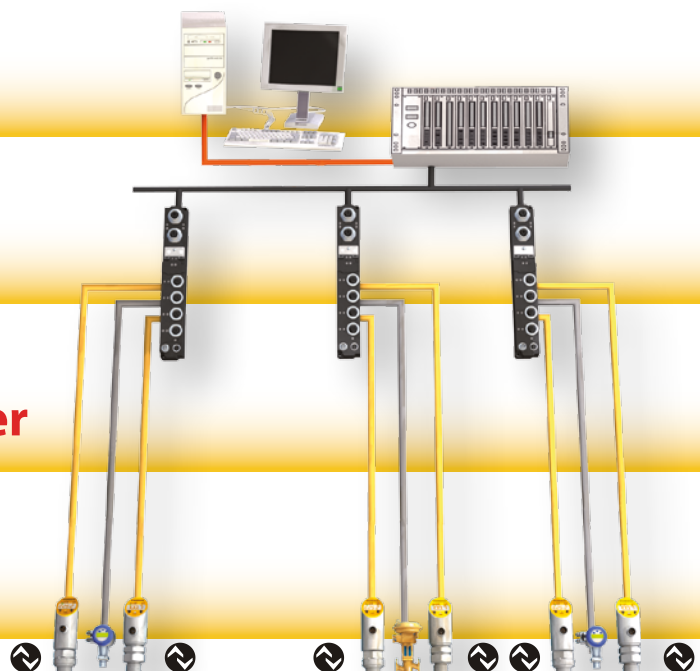
- Parameters and configurations are safely stored in the system and always retrievable
- False parametrization is excluded.
- Easy and comfortable FDT/DTM based engineering
- No complicated local parametrization
- Interferences on analog lines belong to the past

## Control Layer

## I/O Layer

## Connectivity Layer

## Sensor Layer



- Accuracy  $\pm 0.2$  K
- Sensor rotatable by  $320^\circ$
- 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,  $\Omega$ )
- Storage of max/min values
- Protection class IP67

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

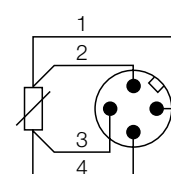
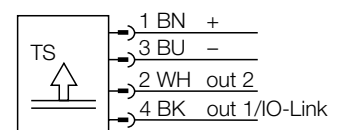
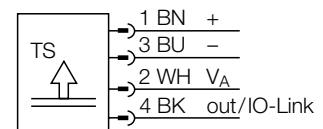
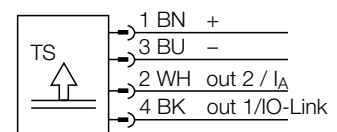
A standard M12 x 1 plug connection is available for TP temperature probes. The display indicates the temperature during normal operation and guides the operator through the programming menu. We offer sensors with switching outputs or with a combination of switching and analog outputs.



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

TS	Functional principle	-	5	00	Mechanical version	-	LI2UPN	8	X	Electrical version	-
	Design				Process connection					LED display	
	TS temperature sensor				00 without process connection temperature probe via M12 x 1 male					Operating voltage	
					16 G $\frac{1}{2}$ " with integrated probe					8 15 (18)...30 VDC	
					30 $\frac{1}{2}$ " NPT with integrated probe					Output type	
					only with design 5					2UPN 2 switching outputs	
					Design					LUUPN switching and voltage output	
					4 adjustable, with display non-rotatable					LI2UPN current and switching output	
					5 adjustable, with display non-rotatable						

H1	1	4	1	Electrical connection: male
				Assignment
				1 standard assignment other special assignments
				Number of contacts
				4 four
				Connector type
				1 straight
				Connector type
				H1 M12 x 1 male





- Accuracy  $\pm 0.2$  K
- Protection class IP67
- Stainless steel 1.4404 (AISI 316L)
- Analog current output 4...20 mA (2-wire)
- Adjustment range -210...+650 °C

Miniature sensors of the TTM series fit in the most confined spaces and measure temperatures precisely via the integrated processor and the Platinum class A

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



**TTM** - **100C** - **203A** - **CF** - **LI6** - **H1** **1** **4** **0** - **L100**

**TTM** Functional principle - **100C** Measuring range - **203A** Probe -

#### Design

**TTM** Temperature transmitter miniature  
**TTMS** Temperature transmitter miniature stainless steel

#### Measuring range (other on request)

**50C** 0...50 °C  
**100C** 0...100 °C  
**150C** 0...150 °C  
**blank** freely adjustable via IO-Link

#### 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  
**203A** compression fitting/thermowell, probe Ø 3 mm, accuracy class A  
**206A** compression fitting/thermowell, probe Ø 6 mm

**CF** Process connection - **LI6** Electrical version -

#### Process connection

**G1/8** G1/8"-male thread (nur 103A)  
**CF** Connection via clamping ring (only 203A and 206A)  
**blank** probe connected via M12

#### Electrical version

**LI6** 4...20 mA 2-wire  
**LIUPN** 4...20 mA 2-wire switching output PNP/NPN IO-Link

**H1** **1** **4** **0** Electrical connection - **L100** Probe length

#### Assignment

**0** PIN1+ PIN2-

#### Number of contacts

**4** four

#### Connector type

**1** straight

#### Connector type

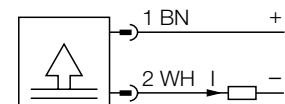
**H1** M12 x 1 male

#### Probe length mm

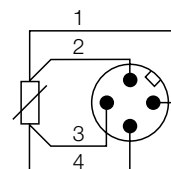
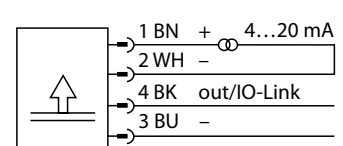
**L013** 13 mm (only 103A)  
**L024** 24 mm (only 103A)  
**L100** 100 mm  
**L150** 150 mm

Customized lengths on request!

#### LI6



#### LIUPN





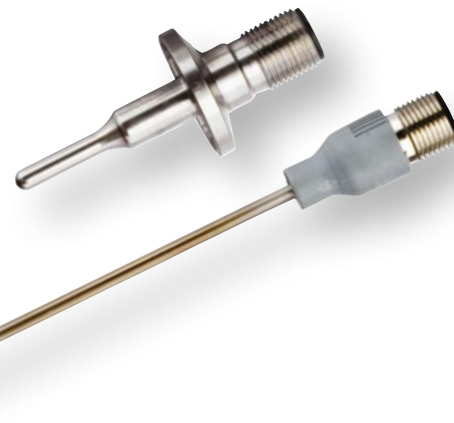
# TP series

**TURCK**

Industrial  
Automation

- 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

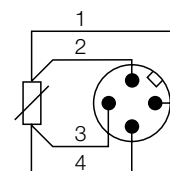
The core element of the TP series is a Pt100 measuring resistor in 4-wire technology. All probes feature a standard M12 x 1 connection to the processing unit.



**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	Process connection	DN25	DN25 dairy screw connection DIN 11851 (only 504A)	
			203A	compression fitting thermowell probe Ø 3 mm, accuracy class A		CF	compression fitting or thermowell	
			206A	processing unit with probe Ø 6 mm, process connection via clamping sleeve, accuracy class A		G1/8	G1/8"-male thread (nur 103A)	
			306A	cable probe Ø 6 mm		TRI3/4	Tri-Clamp 3/4" (only 504A)	
			504A	with food-proof process connection Ø 4 mm, accuracy class A				

H1 1 4 1	Electrical connection	–	L013	Probe length
Assignment	0 special assignment 1 standard assignment	Probe length mm	L013	13 mm (only 103A)
Number of contacts	4 four		L024	24 mm (only 103A)
Connector type	1 grade		L035	35 mm (only 504A)
Connector type	H1 M12 x 1 male		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!	



# 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**

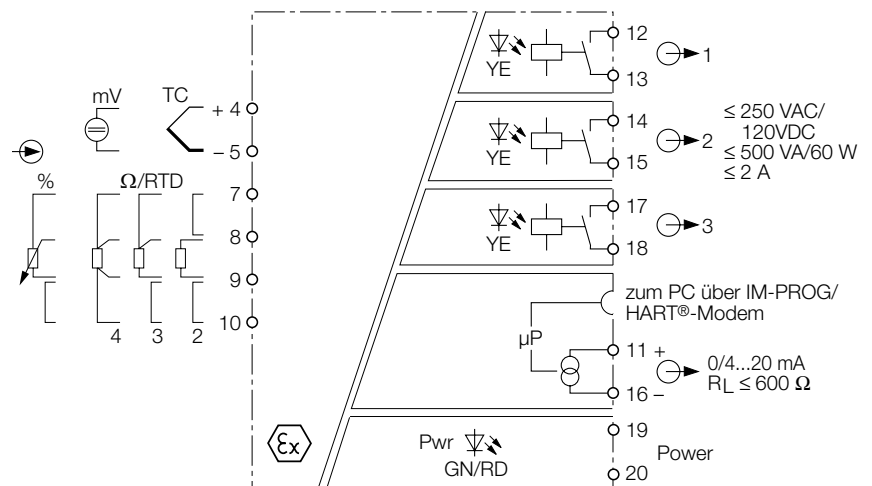
IM34 Design	-	1	2	1	Number of channels	-	Ex	Device class	-
<ul style="list-style-type: none"> <li><b>IM</b> interface module</li> <li><b>34</b> temperature measuring amplifier</li> </ul>					<ul style="list-style-type: none"> <li><b>Number of special outputs</b></li> <li>1 special output e.g. alarm</li> </ul>			<ul style="list-style-type: none"> <li><b>Ex</b> associated equipment with intrinsically safe field current circuits (non-Ex no details)</li> </ul>	
					<ul style="list-style-type: none"> <li><b>Number of channels on control side</b></li> <li>1 output channel</li> <li>2 output channels</li> <li>4 output channels</li> </ul>				
					<ul style="list-style-type: none"> <li><b>Number of channels on field side</b></li> <li>1 output channel</li> </ul>				

**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



- 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.

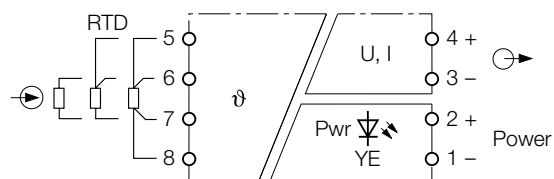
A 1-channel version is available for temperature measurement. Pt100 temperature probes in 2, 3 or 4-wire technology can be connected. Measuring range (–50...+150 °C, 0...+100 °C or 0...+200 °C) and output signal (0/4...20 mA or 0...10 V) are adjusted via DIP switch.



**IMS** – **TI** – **PT100** / **24 VDC**

<b>IMS</b> Design	–	<b>TI</b> Functional principle	–	<b>PT100</b> Input	/
IMS interfacemodul small		TI Temperature measuring		PT100 Temperature probe Pt100	

<b>24 VDC</b> Operating voltage	–
24 VDC 19...29 VDC	





# T-Gage series

- 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-



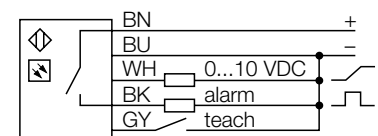
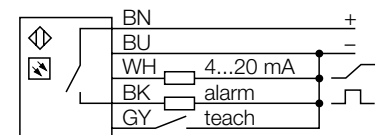
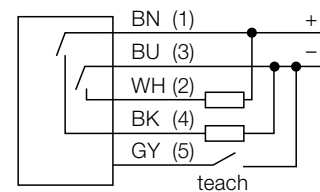
belt rollers. The sensor can also be used in applications of the food industry to monitor cold objects, such as ice cream or milk products for example.

**M18T B 6 Q**

<b>M18T</b> Design	<b>B</b> Configuration of output and voltage	<b>6</b> D:S ratio
<b>M18T</b> cylindrical thread, metal, 18 mm	<b>B</b> bipolar (NPN/PNP); 10...30 VDC <b>UP</b> 0...30 V analog output and 1 PNP alarm output, 12...30 VDC <b>IP</b> 4...20 mA analog output and 1 PNP alarm output, 12...30 VDC	<b>Distance-Spot ratio</b> 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



- 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**

<b>THW</b>	Functional principle	–	<b>3</b>	Probe diameter	–	<b>G1/8</b>	Process connection	–
	Thermowell THW			Probe diameter			Process connection	
				3 3 mm			G1/8 G1/8" male thread	
				6 6 mm			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	
							TRI3/4 3/4"-Tri-Clamp	
							DN25K DN25 dairy screw connection DIN 11851	

<b>A4</b>	Material	–	<b>L013</b>	Immersion depth
	Material			Probe length mm
	A4 Stainless steel AISI 316L/1.4404			L050 50 mm
				L100 100 mm
				L150 150 mm
				L200 200 mm
				L250 250 mm
				L300 300 mm
				Customized lengths on request!

# CF

- 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 – G1/8 – A4

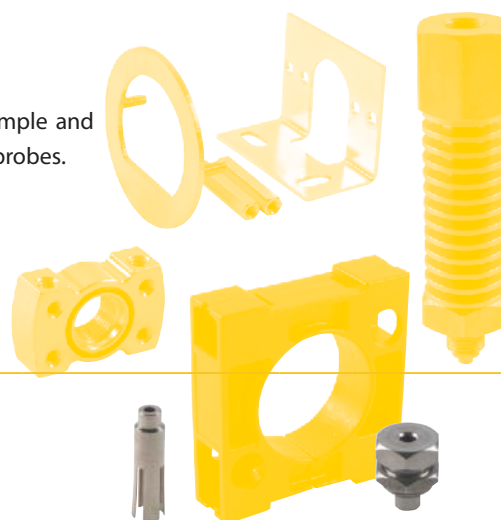
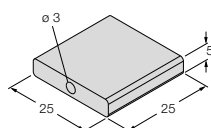
CF	Functional principle	–	M	Material	–	3	Probe diameter	–
	Threaded adapter CF			Cutting ring material			Probe diameter	
				M AISI 316L			3 3 mm	
				P PTFE			6 6 mm	

G1/8	Process connection	–	A4	Material
	Process connection			Material
G1/8	G1/8" male thread			A4 stainless steel AISI 316L/1.4404
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			

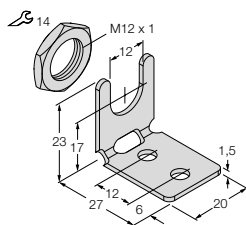


With the available product-specific accessories, the sensors can be mounted almost anywhere. We offer the right accessories for operation and installation of the temperature sensors.

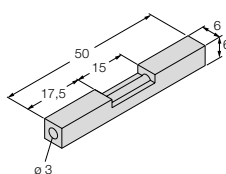
This includes accessories for simple and safe mounting of temperature probes.


**TP-MZ-001**
**TP-MZ-002**
**TP-MZ-003**
**TP-MZ-004**
**TP-MZ-005**


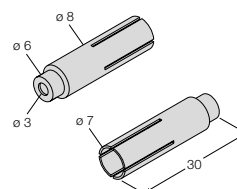
weld-on plate



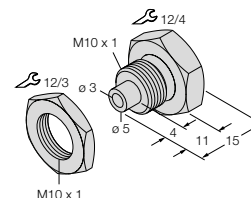
wall mounting kit TP series



barrel holder



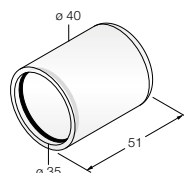
clamp sleeve



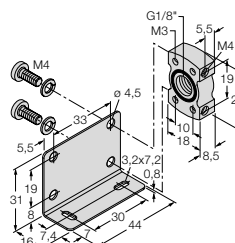
wall bushing


**PTS-Cover**

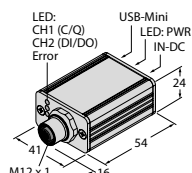
**PK-P-MZ-001**

**USB-2-IOL-0002**


closure cap for TS-Series



mounting kit TP-103A



IO-Link USB Master

# **TURCK**

## **Industrial Automation**



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