Your Global Automation Partner

TURCK

TS+
Industrial Temperature Sensors

Products are linked to further information.

TS+ Industrial Temperature Sensors with IO-Link

Maximum freedom

The temperature sensors of the TS+ series allow for a reliable and reproducible measurement of process temperatures in industrial applications. The components are optimally equipped for both indoor and outdoor use.

The large number of measuring ranges and process connections available creates a wide range of variants to easily meet the majority of application requirements. In addition to the compact temperature sensors in the series, compact processing and display units for connecting separate temperature probes are also available. The devices support and automatically detect virtually all typical industrial temperature probes, such as resistance thermometers or thermocouples, giving users the maximum degree of freedom for selecting components.

Downtime reduction

The stainless steel housing in conjunction with the translucent front cap is an extremely robust design. The absence of mechanical operating elements ensures high wear resistance. The reduced number of sealing surfaces provides maximum protection from humidity and dust penetration – even outdoors, thanks to UV and salt spray resistant materials. The new sealing concepts make it possible to implement protection classes IP67 and IP69K. The TS+ series temperature sensors also offer high resistance to vibration and shock, as well as exceptional electromagnetic compatibility.

The overall concept is made complete by software-supported mechanisms. For example, the sensor features a locking mechanism in order to prevent accidental operation or even intentional manipulation. This makes it possible to lock out the sensor from local onsite access.

Transparency via IO-Link events

The standard IO-Link events also ensure a transparent process, which can be evaluated at any time to significantly increase plant availability.

The user can select different smart data variables such as:

- Monitoring of extreme process values (electronic drag pointer)
- Operating hours/switching cycle monitoring
- Power supply monitoring
- Device internal temperature monitoring
- User interface lock monitoring

As an additional exclusive event, the compact processing and display units also offer connection monitoring between the actual temperature probe and the processing and display unit.

Conventional applications

Temperature sensors are typically used in the following applications:

- Lubrication
- Hydraulics
- Cooling

Modular concept
Turck's particularly variable portfolio of temperature sensors is made possible by its modular mechanical design. The standard M18 x 1 coupling nut makes it possible to adapt different process connections to the particular application. Short delivery times are guaranteed thanks to intelligent inventory management.

Multicolor display
The display can show all indicated information in green and also in red. This makes it possible to adapt the device optimally to the particular lighting conditions of the application. Several setting options also allow the display color to be linked to the status of the sensor switching outputs.

Simple operation

The temperature switching points can be set in a few steps in the usual way, either according to the Turck or VDMA standard. The two-color 14-segment display offers users optimum support in navigating the menus.

The display can show process values in red or green so that it can be adapted to the lighting conditions of the particular plant. The color change can be linked here to the switching outputs in order to indicate the actual switching status in addition to the switching point LED.

Furthermore, the measured process value can also be displayed in °C, °F, K or Ω as required.

Extended Functions

The extended functions enable the sensor to be reset to its previous settings (Undo function) as well as to the factory settings. The switching behavior of the outputs can be set to "Normally Open" (NO) and "Normally Closed" (NC). Additional hysteresis and filter functions enable the optimum adaption of the sensor even with complex applications.

Features

- Innovative operating concept
- Specified according to IO-Link standard 1.1
- Support of multiple IO-Link events
- Variable IO-Link process data mapping
- Automatic temperature probe detection
- Automatic detection of the required output characteristics
- 180° invertible multi-color display
- Rotatable sensor head
- Units with integrated or separate signal processors
- Excellent configuration options thanks to modular concept
- Variable process connection options with neutral M18 adapter
- Connection of resistance thermometers and thermocouples
- Excellent shock and vibration resistance
- Very large temperature processing range

Switching output auto detection
The characteristics of the sensor switching outputs are automatically detected by channel according to the connected input (PNP/NPN). The resulting reduction of variants minimizes configuration effort and eliminates potential error sources. The user saves time and costs.

Analog output auto detection
The characteristics of the sensor analog output are automatically detected according to the connected input signal (U/I). The resulting reduction of variants minimizes configuration effort and eliminates potential error sources. The user saves time and costs.

Easy installation and commissioning

The TS+ series offers a large number of useful features to make the installation, connection and commissioning of the sensors as effective and straightforward as possible.

- The different designs allow maximum freedom for selecting components with a very large processing range
- The large selection of different process connections ensures simple connection to the process environment at hand
- The automatic selection of sensor output characteristics simplifies the connection to the controller environment
- Automatic probe detection simplifies sensor configuration and eliminates potential error sources
- The different IO-Link process data profiles enable the sensor to be adapted to existing systems and thus reduce the configuration and programming effort required
- The option of either Turck or VDMA standard menu guidance ensures intuitive operation of the sensor
- The freely rotatable sensor housing allows the display and connector to be aligned even after mounting

Award-winning design and concept

The sensors of the TS+ series won the iF DESIGN AWARD in the Industry/Tools category. The prize has been awarded every year since 1954 for outstanding achievements in product design. The innovative cross-platform operating concept particularly impressed the jury.

Turck's new sensor series also won the most important prize of the automation sector, the AUTOMATION AWARD, which is awarded every year by readers of the elektroAutomation technical publication. The combination of a uniform technology concept and functional design made a big impression on the specialist audience.

Temperature probe auto detection
The processing and display unit automatically detects the characteristics of the connected probe. Sensor probes, such as Pt100, Pt1000 as well as various thermocouples and the connection types (2-, 3-, 4-wire), are automatically detected. The cold junction compensation is also automatic.

Adaptive process data mapping
Different IO-Link process data profiles enable the flexible integration of the sensor with a large degree of freedom – even into existing systems. Existing sensors – also from other manufacturers – can be exchanged or replaced very quickly. Complex changes in the PLC are kept to a minimum.

Switching point LEDs
Two highly visible LEDs indicate the state of the two switching outputs

Process value display
The four-digit 14-segment display can show process values clearly in red or green

Inscription
The laser engraved translucent front cap and the stainless steel housing are abrasion resistant and offer a high contrast

Adjustability
The sensor head is freely rotatable by 340° and the display can be inverted 180°, thus simplifying the positioning of the electrical connection and user interface after mounting

Tilted display
The 45° display angle of the user interface offers greater convenience for operation and reading

Status LEDs
Additional LEDs indicate the status of the power supply, errors, the locking state as well as IO-Link communication

Translucent front cap
The front cap consists of a scratch-proof, temperature and impact resistant plastic

MODE, ENTER and SET
Touch-sensitive touchpads with a large surface area ensure straightforward menu navigation, even with gloves

IO-Link

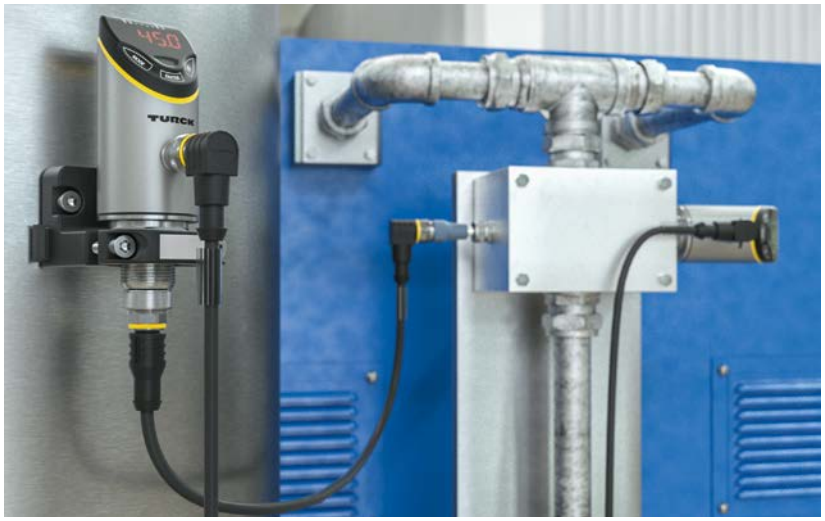
Capacitive touchpads
The sensor is operated using capacitive touchpads. These do not require any moving parts and are therefore abrasion and wear-free. An additional seal, as required with conventional mechanical operating elements, is not required.

Maximum robustness
The temperature sensors with their IP67 and IP69K protection offer very good resistance to shock and vibration, as well as a high pressure resistance, thus ensuring increased system availability. The design without mechanical pushbuttons also minimizes the number of sealing surfaces.

Typical Applications

Temperature measurement on hydraulic power units

In addition to the actual process temperature, the temperature of the hydraulic oil is an important process variable on hydraulic power units. A hydraulic temperature of over 80 °C can often cause lasting damage to components and a considerable shortening of component service life. This often requires the implementation of additional maintenance measures with cost-intensive downtimes. The temperature sensors of the TS+ series support the user in the control of cooling circuits so that these efficiently support the overall application as required.



Temperature measurement on dosing heads

In order to ensure the quality and efficacy of sealing processes, the sealant temperature must not drop below a defined value. The temperature sensors of the TS+ series enable users to implement their specific requirements precisely and maintain the desired quality without losing excess energy in the system. Besides saving energy resources, the achieved temperature control can considerably extend the service life of the dosing head, thanks to the reduced input of thermal energy.

Temperature measurement on drum washers

Drum washers are used to automatically clean components contaminated with oil and lubricant using water-based cleaning agent. This involves the supply of heated cleaning agents to the washing system, which optimize cleaning and reduce the drying times of the components. The temperature sensors of the TS+ series support the entire process – both for the optimum heating of the medium as well as for increasing the cycle rates and throughput rates.

Types and Features

Compact temperature sensors – TS700

Type code	Ident-No.	L	Thread	Measuring element	Measuring range	Accuracy
TS700-L016-16-2UPN8-H1141	100004377	16 mm	G½"	Pt1000 class A	-50…150 °C	± 0.2K
TS700-L016-30-2UPN8-H1141	100003635	16 mm	½" NPT	Pt1000 class A	-50…150 °C	± 0.2K
TS700-L050-16-2UPN8-H1141	100004379	50 mm	G½"	Pt1000 class A	-50…150 °C	± 0.2K
TS700-L050-30-2UPN8-H1141	100004378	50 mm	½" NPT	Pt1000 class A	-50…150 °C	± 0.2K
Immersion sensors | 24 VDC | Transistor switching signal (2-channel) | IO-Link | PNP/NPN | NO/NC						

Type code	Ident-No.	L	Thread	Measuring element	Measuring range	Accuracy
TS700-L016-30-LI2UPN8-H1141	100003641	16 mm	G½"	Pt1000 class A	-50…150 °C	± 0.2K
TS700-L016-16-LI2UPN8-H1141	100004380	16 mm	½" NPT	Pt1000 class A	-50…150 °C	± 0.2K
TS700-L050-30-LI2UPN-H1141	100004381	50 mm	G½"	Pt1000 class A	-50…150 °C	± 0.2K
TS700-L050-16-LI2UPN-H1141	100004383	50 mm	½" NPT	Pt1000 class A	-50…150 °C	± 0.2K
Immersion sensors | 24 VDC | Transistor switching signal (1-2 channel) | IO-Link | PNP/NPN | NO/NC | Analog signal (1-1 channel) | 0 (4)…20 mA, 0 (2)10 VDC, 0…5 VDC, 1…6 VDC, 0.5…4.5 VDC, inverted						

Compact processing and display unit – TS720 for connecting resistance thermometers (RTD) and thermocouples (TC)

Type code	Ident-No.	Measuring element	Processing range	Display accuracy
TS720-2UPN8-H1141	100003633	Depending on temperature probe	-200…1800 °C	± 0,1K
Processing and display unit | 24 VDC | Transistor switching signal (1-2 channel) | IO-Link | PNP/NPN | NO/NC				

Type code	Ident-No.	Measuring element	Measuring range	Display accuracy
TS720-LI2UPN8-H1141	100003640	Depending on temperature probe	-200…1800 °C	± 0,1K
Processing and display unit | 24 VDC | Transistor switching signal (1-2 channel) | IO-Link | PNP/NPN | NO/NC | Analog signal (0-1 channel) | 0 (4)…20 mA, 0 (2)10 VDC, 0…5 VDC, 1…6 VDC, 0.5…4.5 VDC, inverted				

The compact processing and display units support the connection of Pt100 and Pt1000 resistance thermometers in 2-, 3- and 4-wire technology as well as type T, S, R, N, K, J, E and B thermocouples. Turck offers a broad portfolio of temperature probes and accessories, including:

Temperature probes – Resistance thermometers (RTD) Process connection via compression fitting

Type code	Ident-No.	Ø	L	Measuring element	Measuring range	Note
TP-306A-CF-H1141-L1000	9910479	6 mm	1000 mm	Pt100 class A	-50…105 °C	Connection to TS 720[1)]
TP-306A-CF-H1141-L2000	9910480	6 mm	2000 mm	Pt100 class A	-50…105 °C	Connection to TS 720[1)]
TP-306A-CF-H1141-L5000	9910481	6 mm	5000 mm	Pt100 class A	-50…105 °C	Connection to TS 720[1)]
TP-206A-CF-H1141-L100	9910475	6 mm	100 mm	Pt100 class A	-50…500 °C	Connection to TS 720[1)]
TP-206A-CF-H1141-L150	9910476	6 mm	150 mm	Pt100 class A	-50…500 °C	Connection to TS 720[1)]
TP-206A-CF-H1141-L200	9910477	6 mm	200 mm	Pt100 class A	-50…500 °C	Connection to TS 720[1)]
TP-206A-CF-H1141-L300	9910478	6 mm	300 mm	Pt100 class A	-50…500 °C	Connection to TS 720[1)]
TP-203A-CF-H1141-L100	9910402	3 mm	100 mm	Pt100 class A	-50…500 °C	Connection to TS 720[2)]
TP-203A-CF-H1141-L150	9910403	3 mm	150 mm	Pt100 class A	-50…500 °C	Connection to TS 720[2)]
TP-203A-CF-H1141-L200	9910482	3 mm	200 mm	Pt100 class A	-50…500 °C	Connection to TS 720[2)]
TP-203A-CF-H1141-L300	9910474	3 mm	300 mm	Pt100 class A	-50…500 °C	Connection to TS 720[2)]

[1)] Recommended electromechanical connection between temperature probe and processing unit: direct, alternatively with standard or shielded sensor cable
[2)] Recommended electromechanical connection between temperature probe and processing unit: depending on application with standard or shielded sensor cable

Products are linked to further information.

Temperature probes – Thermocouples (TC)

Type code	Ident-No.	Ø	L/mm	Element	Measuring range	Note
TP-206KK1-CF-H1141-L100	100017085	6 mm	100 mm	Type K (K1)	-200…1100 °C	Connection to TS720[3)]
TP-206KK1-CF-H1141-L150	100017084	6 mm	150 mm	Type K (K1)	-200…1100 °C	Connection to TS720[3)]
TP-206KK1-CF-H1141-L200	100017083	6 mm	200 mm	Type K (K1)	-200…1100 °C	Connection to TS720[3)]
TP-206KK1-CF-H1141-L500	100017082	6 mm	500 mm	Type K (K1)	-200…1100 °C	Connection to TS720[3)]

[3)] Recommended electromechanical connection between temperature probe and processing unit: direct, alternatively thermocouple equalization cable

Type codes

TS 7 0 0 – L016 – 30 – 2UPN 8 – H 1 1 4 1

TS Operating principle

Operating principle
TS Temperature sensor

7 0 0 Mechanical design

Display
0 14-segment display

Mechanical design
0 Process connection via adapter
1 Fixed process connection
2 Without process connection

Design
7 Compact device

L016 Probes

Probes
L016 PT100 probe, 16 mm
L050 PT100 probe, 50 mm

30 Process connection

Process connection
16 1/2″ NPT male thread
30 G1/2″ male thread

2UPN 8 Electrical version

Voltage range
8 18…30 VDC

Output function
2UPN If required: 2 switching outputs/IO-Link
LI2UPN If required: current and switching outputs/IO-Link

H1 1 4 1 Electrical connection: Male connector

Assignment
1 Standard-compliant assignment

Number of contacts
4 4 contacts

Orientation
1 Straight

Design
H1 Male connector M12 x 1

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