

TURCK
works

Industrial
Automation

**Intelligent
Temperature
Sensors**



www.turck.com

TURCK

Temperature Sensors

Precise, Reliable Temperature Sensors for Process Automation

Accurately determining temperature is one of the most important tasks in processing and manufacturing industries. Precision, reliability and interface flexibility are just some of the characteristics that make a great temperature sensor. **TURCK's** new TS400 and TS500 temperature sensor series provide all these traits and more, and adhere to the high standards consistent with all **TURCK** products.



- **Quality** – Internal and external design features uphold an increased level of reliability.
- **User-Friendly** – Easy to program and maintain.
- **Flexible** – Remote or direct mounting.
- **Benefits** – May be applied across all factory and process automation applications.

TS400 and TS500 temperature sensors incorporate design elements that equate to real advantages in your applications. The TS400 and TS500 sensor series are platinum resistance temperature detectors (RTDs), commonly referred to as a Pt-100. Pt-100's are known to be highly precise, repeatable, and provide extremely short response times.

Pt-100's contain a platinum wire that is wrapped around a core or patterned as a thin film on a substrate so that it experiences minimal differential expansion or other strains. As the temperature changes, the controller measures the change in the electrical resistance of the platinum wire. Specifically, the hotter the wire becomes, the higher the value of electrical resistance. Pt-100 RTDs have a nominal resistance of 100 ohms at 0°C with an accuracy of 0.4°C at 50°C. The sensor's operating range varies from -50 to 500°C (-58 to 932°F).



Quality

TS400 and TS500 sensors were designed to handle harsh manufacturing environments.

- High immunity to electromagnetic interference
- Reliable and accurate
- Compact design
- Robust stainless steel housing
- IP 67 environmental protection to increase operational durability



User-Friendly

TS400 and TS500 sensors were designed with the user in mind.

- Simple push-button programming
- Recessed button stores selected values and helps prevent unintentional operational errors
- The entire display can be inverted electronically
- The TS500 version can be rotated 320 degrees
- Does not require regular maintenance calibration
- M12 **euromast**® connection promotes easy integration in existing applications



Flexible

TS400 and TS500 use state of the art technology to bring you a sensor that facilitates operational efficiency.

- Remote or direct mountable
- Compact, robust housing
- 4-pin M12 **euromast**® connection
- Compatible with 4-wire probes
- Displays output in °C, °F, K and ohms



Benefits

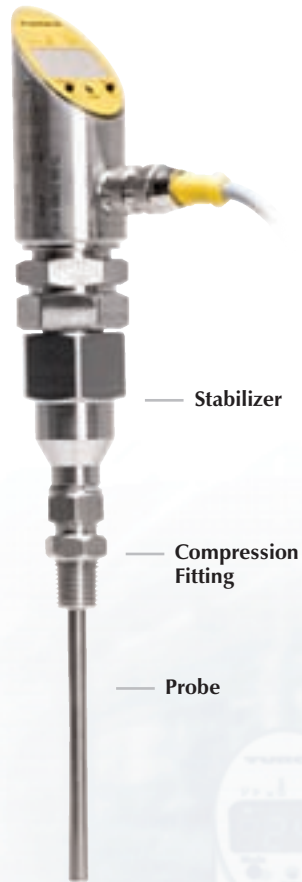
TS400 and TS500 temperature sensors allow you to realize immediate benefits in your application.

- May be implemented in nearly all factory or process automation applications
- Housing design permits sensors to be mounted directly next to each other or in restrictive places
- Large, bright LED display

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Temperature Sensors

Direct Mounting Sensor



Remote Mounting Sensor



Accessories



Stabilizer
(use with TP-203A .. & TP-206A ..)



Remote Cordset
(RK 4.4T-* -RS 4.4T)

Probe Options



TP-104A ..



TP-306A ..



TP-203A ..
or TP-206A ..

Process Connection Options



Compression Fitting
(CF)



Thermowell
THW ... TRI



Thermowell
THW ... N

How to Order TS400 and TS500 Sensors and Accessories

1. Determine your desired output and select the TS model that meets your needs.
2. Select the appropriate probe for your application.
 - a) Questions? Call 1-800-554-7769.
3. Choose remote or direct mounting.
 - a) For direct mounting with TP-203 and TP-206, order the stabilizer (STA-3 or STA-6) for applications with vibration.
 - b) For remote mounting, order a mating cordset (RK 4.4T-* -RS 4.4T).
4. Select a process connection.
 - a) For thermowells, order one length (50 mm) shorter than the length of probe you selected in step 2.
 - b) If no thermowell is selected, a compression fitting is needed for mounting the probe.

(Note: The TP-104A does not require a process connection.)

* Length in meters.



Direct Mounting



Remote Mounting

Push Button Programming

TS400 and TS500 sensors allow optimum control. Programming the TS series is made easy with push button programming. The MODE and SET buttons are finger-operated for scrolling through the various menu options. Values for set-points, output functions, analog ranges and a range of special features, such as switch delays and display direction, can be programmed into the sensor. Programmed values are protected by a recessed button that can lock values to further ensure protection. The temperature is constantly displayed on the 4-digit, 7-segment LED display.

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Temperature Sensors

TS400/TS500 Temperature Sensor Part Number Key

TS - 400 - LI 2U PN 8 X - H1141

Style

TS = Temperature Sensor

Housing

400 = Adjustable, with display, non-rotatable

500 = Adjustable, with display, rotatable

Analog Output

LI = Current analog output

LU = Voltage analog output

Switching Output

2U = 2 x programmable N.O./N.C. mode

U = 1 x programmable N.O./N.C. mode

Connection

H1141 = 4-pin, M12x1, *euromat*® connector

With LED Display

Operational Voltage

8 = 15-30 VDC (switching outputs)

8 = 18-30 VDC (switching and analog outputs)

Output Logic

PN = PNP/NPN configurable transistor switching output

Electrical Data

Operating Voltage	15-30 VDC (switching outputs) 18-30 VDC (switching and analog output)
No-Load Current	≤50 mA
SELV. PELV	According to EN 50178
Short-Circuit Protection	Yes
Reverse Polarity Protection	Yes
Insulation Class	III

Switching Output

Switching Frequency	≤180 Hz
Output Function	2 x PNP or NPN, N.C./N.O. programmable
Voltage Drop at I _e	≤2 V
Rated Operational Current	0.2 A
Switching Point Distance	0.2 K -49.8° to +500°C (-58° to +932°F)
Reset Points	-50° to +499.8°C (-58° to +932°F)

Analog Current Output

Current Output	4-20 mA, 0-20 mA, 20-4 mA, 20-0 mA programmable
Response Time	<100 ms
Load	≤0.5 kΩ

Analog Voltage Output

Voltage Output	0-10 V, 0-5 V, 1-6 V, 10-0 V, 5-0 V, 6-1 V programmable
Response Time	<100 ms
Load	≥2 kΩ

Temperature Sensor Accuracy

Switching Output	
Switching Point Accuracy	≤ ± 0.2 K
Repetition Accuracy	≤ ± 0.1 K
Analog Output Accuracy (Lin.+Hys.+Rep.)	≤ ± 0.2 K

Temperature Sensor Housing

Housing Material	Stainless steel/plastic 1.4404 (AISI 316L)/PC
Electrical Connection	Connector M12x1 (eurofast ®), 4-pin with integrated high-speed connection technology.
Sensor Connection	Connector M12x1 (eurofast), 4-pin
Coupling Nut Size (with tightening torque)	SW 30 (max. 35 Nm)

Display

Temperature Display	4-digit 7-segment display can be rotated by 180° and switched off
Switch State Display	2 x LED yellow
Measured Value/Programming	Switch/release points; hysteresis/window mode; N.O./N.C.; unit of display; peak value memory
Display of Temperature Unit	4 x LED green (°C, °F, K, Ω)

EMC

EN 61000-4-2	ESD 4 kV CD / 8 kV AD
EN 61000-4-3	HF radiated: 15 V/m ²
EN 61000-4-4	Burst 2 kV
EN 61000-4-5	Surge 1 kV, 42 Ω
EN 61000-4-6	HF conducted: 10 V

Ambient Conditions

Medium Temperature.	Directly connected -50° to 150°C (otherwise see temperature probes)
Ambient Temperature	-40° to +80°C (-40° to +176°F)
Storage Temperature	-40° to +80°C (-40° to +176°F)
Degree of Protection	IP 67
Vibration Resistance	20 g (10-2000 Hz) according to IEC 68-2-6

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Temperature Sensors



Housing	Part Number	ID Number	Temperature Range – Remote	Temperature Range – Direct	Output
Temperature Sensor for 4-wire PT100 	TS-400-2UPN8X-H1141	M6840017	-50° to 500°C (-58° to 932°F)	-50° to 150°C (-58° to 302°F)	Dual PNP/NPN N.O./N.C.
	TS-400-LUUPN8X-H1141	M6840008			1 PNP/NPN N.O./N.C. and Programmable Voltage
	TS-400-LI2UPN8X-H1141	M6840007			1 PNP/NPN N.O./N.C. and Programmable Current or 1 PNP/NPN N.O./N.C.
Temperature Sensor for 4-wire PT100, 320° Rotatable Housing 	TS-500-2UPN8X-H1141	M6840018	-50° to 500°C (-58° to 932°F)	-50° to 150°C (-58° to 302°F)	Dual PNP/NPN N.O./N.C.
	TS-500-LUUPN8X-H1141	M6840016			1 PNP/NPN N.O./N.C. and Programmable Voltage
	TS-500-LI2UPN8X-H1141	M6840015			1 PNP/NPN N.O./N.C. and Programmable Current or 1 PNP/NPN N.O./N.C.

For remote probes use cordset RK 4.4T-*-RS 4.4T.

* Length in meters.

See page 17 for additional cordset information.

Voltage	Switching Current (mA)	Analog Load	Mating Cordset	Wiring Diagram #	Wiring Diagrams
15-30 VDC	≤200	N/A	RK 4.4T-*	1	<p>Diagram 1</p>
18-30 VDC	≤ 200	≤500 Ω	RK 4.4T-*	2	<p>Diagram 2</p>
18-30 VDC	≤200	≤500 Ω	RK 4.4T-*	3	<p>Diagram 3</p> <p>or</p>
15-30 VDC	≤200	N/A	RK 4.4T-*	1	
18-30 VDC	≤200	≤500 Ω	RK 4.4T-*	2	
18-30 VDC	≤200	≤500 Ω	RK 4.4T-*	3	

* Length in meters.

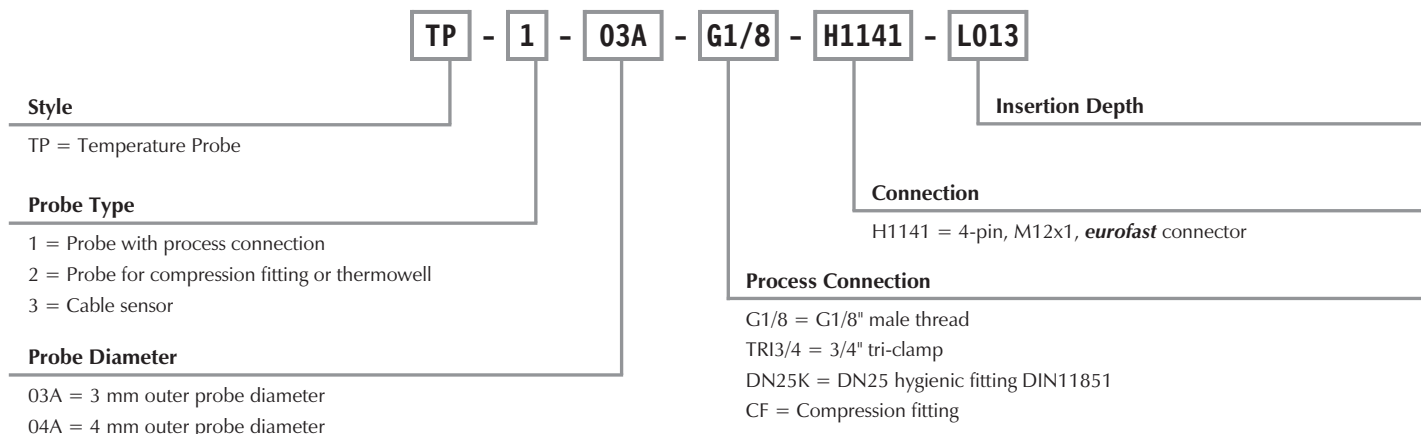
Simple Mounting

After the sensor is mounted, the actual processor unit is attached and fixed using a coupling nut. The sensor can still be rotated and aligned in all directions.

TS500 shown.



Temperature Probes Part Number Key



Temperature Probes Technical Data

Probe (TP-104A ..)

Temperature Operating Range	-50° to 120°C (-58° to +248°F)
Ambient Temperature	-20° to 90°C (-4° to +194°F)
Measuring Element	Pt100, DIN EN 60751, Class A
Response Time	$t_{0.5} = 3$ s; $t_{0.9} = 10$ s in water at 0.2 m/s
Output Function	4-wire
Reverse Polarity Protection	Yes
Degree of Protection	IP 67
Housing Material	Plastic/Stainless steel
Housing Quality	1.4404 (AISI 316L)
Sensor Material	Stainless steel
Sensor Quality	1.4404 (AISI 316L)
Pressure Rating (psi)	580.15
Connection	Connector, M12x1 (<i>eurofast</i> ®)
Mechanical Connection	Tri-Clamp 3/4"

Temperature Probes Technical Data

Probe (TP-203 .. / TP-206 ..)

Temperature Operating Range	-30° to +500°C (-22° to 932°F) ≤350°C accuracy class A (662°F) ≥350°C accuracy class B (662°F)
Ambient Temperature	-20° to 90°C (-4° to +194°F)
Measuring Element	Pt100, DIN EN 60751, Class A
Response Time	203: $t_{0.5} = 1.5$ s; $t_{0.9} = 6$ s 206: $t_{0.5} = 6$ s; $t_{0.9} = 15$ s
Output Function	4-wire
Reverse Polarity Protection	Yes
Degree of Protection	IP 67
Housing Material	Stainless steel/plastic
Housing Quality	1.4404 (AISI 316L) mineral insulated
Sensor Material	Stainless steel
Sensor Quality	1.4404 (AISI 316L)
Pressure Rating (psi)	1450
Connection	Connector, M12x1 (euromast ®)
Mechanical Connection	For compression fittings or thermowells

Probe (TP-306 ..)

Temperature Operating Range	-50° to +105°C (-58° to +221°F)
Ambient Temperature	-20° to +90°C (-4° to +194°F)
Measuring Element	Pt100, DIN EN 60751, Class A
Response Time	$t_{0.5} = 8$ s; $t_{0.9} = 20$ s in water at 0.2 m/s
Output Function	4-wire
Reverse Polarity Protection	Yes
Degree of Protection	IP 67
Housing Material	Plastic/Stainless steel
Housing Quality	TPE (thermoplastic elastomer)
Sensor Material	Stainless steel
Sensor Quality	1.4404 (AISI 316L)
Pressure Rating (psi)	217
Connection	Connector, M12x1 (euromast)
Mechanical Connection	For compression fittings



Temperature Probes

Housing Style	Part Number	ID Number	Temperature Range	Length (mm)
Pt100 Temperature Probe, 3/4" Tri-Clamp, Ø8 mm 	TP-104A-TRI3/4-H1141-L035	M9910429	-50° to +120°C (-58° to +248°F)	35
	TP-104A-TRI3/4-H1141-L100	M9910430		100
Pt100 Temperature Probe, Ø3 m 	TP-203A-CF-H1141-L100	M9910402	-30° to +350°C (-22° to +662°F)	100
	TP-203A-CF-H1141-L150	M9910403		150
	TP-203A-CF-H1141-L200	M9910482		200
	TP-203A-CF-H1141-L250	M9910404		250
	TP-203A-CF-H1141-L1000	M9910496		1000
	TP-203A-CF-H1141-L2000	M9910499		2000
Pt100 Temperature Probe, Ø6 mm 	TP-206A-CF-H1141-L100	M9910475	100	
	TP-206A-CF-H1141-L150	M9910476	150	
	TP-206A-CF-H1141-L200	M9910477	200	

Mating cordset for remote connections; RK 4.4T*-RS 4.4T.

* Length in meters.

For technical data see page 9-10.

See page 17 for additional cordset information.



Temperature Probes

Housing Style	Part Number	ID Number	Temperature Range	Length (m)
Pt100 Cable Probe, 4-Pin M12x1 eurofast®, Ø6 mm 	TP-306A-CF-H1141-L1000	M9910479	-50° to 105°C (-58° to 221°F)	1
	TP-306A-CF-H1141-L2000	M9910480		2
	TP-306A-CF-H1141-L5000	M9910481		5

For technical data see page 10.

Rotatable Display

TS400 and TS500 sensors may also be installed horizontally. The display may be electronically inverted 180 degrees by software incorporated within the sensor.



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Temperature Sensors

Thermowell Part Number Key

THW - 3 - G1/8 - A4 - L013

Thermowell

Probe Diameter

3 = 3 mm probe diameter
6 = 6 mm probe diameter

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
TRI3/4 = 3/4" tri-clamp
DN25K = DN25 hygienic fitting thread DIN 11851
UNI25 = Universal weld Ø25 mm

Insertion Depth

Material

A4 = Stainless steel AISI316L

Compression Fittings Part Number Key

CF - M - 3 - G1/8 - A4

Compression Fitting

Compression Ring Material

M = AISI316L
P = PTFE

Probe Diameter

3 = 3 mm outer diameter
6 = 6 mm outer diameter

Material

A4 = Stainless steel AISI316L

Operational Voltage

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
N1/2 = 1/2" NPT male thread



Thermowells

Housing Style	Part Number	ID Number	Process Connection	Length (mm)	Compatible Probe	Pressure Rating (psi)
Thermowell, 1/2" Male NPT 	THW-3-N1/2-A4-L050	M9910447	1/2" NPT	50	3 mm	5800
	THW-3-N1/2-A4-L100	M9910448	1/2" NPT	100	3 mm	5800
	THW-3-N1/2-A4-L150	M9910449	1/2" NPT	150	3 mm	5800
	THW-3-N1/2-A4-L250	M9910450	1/2" NPT	250	3 mm	5800
Thermowell, 1/4" Male NPT 	THW-3-N1/4-A4-L050	M9910416	1/4" NPT	50	3 mm	5800
	THW-3-N1/4-A4-L100	M9910420	1/4" NPT	100	3 mm	5800
	THW-3-N1/4-A4-L150	M9910424	1/4" NPT	150	3 mm	5800
	THW-3-N1/4-A4-L200	M9910428	1/4" NPT	200	3 mm	5800
Thermowell, 1/8" Male NPT 	THW-3-N1/8-A4-L050	M9910414	1/8" NPT	50	3 mm	5800
	THW-3-N1/8-A4-L100	M9910418	1/8" NPT	100	3 mm	5800
	THW-3-N1/8-A4-L150	M9910422	1/8" NPT	150	3 mm	5800
	THW-3-N1/8-A4-L200	M9910426	1/8" NPT	200	3 mm	5800
Thermowell, 3/4" Tri-Clamp 	THW-3-TRI3/4-A4-L035	M9910433	3/4" Tri-Clamp	35	3 mm	580
	THW-3-TRI3/4-A4-L050	M9910451	3/4" Tri-Clamp	50	3 mm	580
	THW-3-TRI3/4-A4-L100	M9910452	3/4" Tri-Clamp	100	3 mm	580
	THW-3-TRI3/4-A4-L150	M9910453	3/4" Tri-Clamp	150	3 mm	580
	THW-3-TRI3/4-A4-L250	M9910454	3/4" Tri-Clamp	250	3 mm	580
Thermowell, Universal Weld 	THW-3-UNI25-A4-L035	M9910502	Weld	35	3 mm	1450
	THW-3-UNI25-A4-L100	M9910503	Weld	100	3 mm	1450

Note: Material is AISI 316L/1.4404



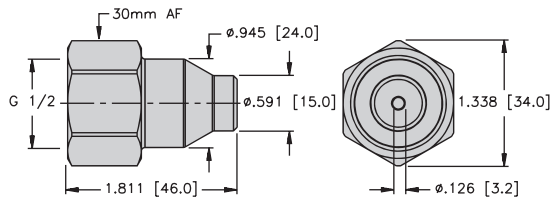
Thermowells

Housing Style	Part Number	ID Number	Process Connection	Length (mm)	Compatible Probe	Pressure Rating (psi)
Thermowell, 1/2" Male NPT 	THW-6-N1/2-A4-L050	M9910463	1/2" NPT	50	6 mm	5800
	THW-6-N1/2-A4-L100	M9910464	1/2" NPT	100	6 mm	5800
	THW-6-N1/2-A4-L150	M9910465	1/2" NPT	150	6 mm	5800
	THW-6-N1/2-A4-L250	M9910466	1/2" NPT	250	6 mm	5800
Thermowell, 3/4" Tri-Clamp 	THW-6-TRI3/4-A4-L050	M9910467	3/4" Tri-Clamp	50	6 mm	580
	THW-6-TRI3/4-A4-L100	M9910468	3/4" Tri-Clamp	100	6 mm	580
	THW-6-TRI3/4-A4-L150	M9910469	3/4" Tri-Clamp	150	6 mm	580
	THW-6-TRI3/4-A4-L250	M9910470	3/4" Tri-Clamp	250	6 mm	580

Note: Material is AISI 316L/1.4404

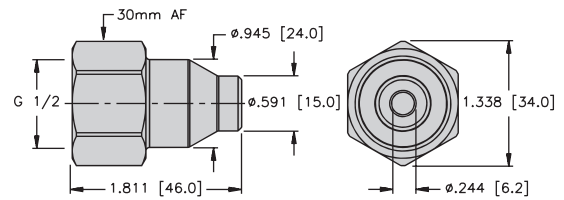
Stabilizer Accessories for Direct Mounting

Stabilizer for 3 mm Temperature Probe



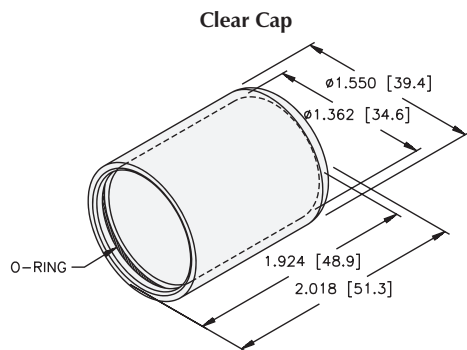
STA-3
(M6835024)

Stabilizer for 6 mm Temperature Probe



STA-6
(M6835023)

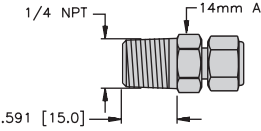
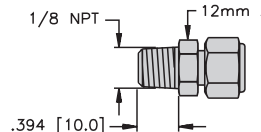
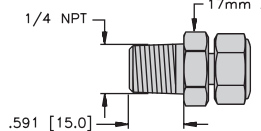
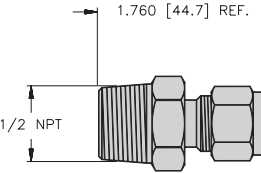
Accessories



PTS-COVER
(A9350)



Compression Fittings

Housing Style	Part Number	ID Number	Compatible Probe Diameter	Compression Fitting	Temperature Range	Pressure Rating (psi)
Compression Fitting, 1/4" Male NPT 	CF-M-3-N1/4-A4	M9910408	Ø3 mm	Metal	350°C (662°F)	580
	CF-P-3-N1/4-A4	M9910412	Ø3 mm	PTFE	100°C (212°F)	87
Compression Fitting, 1/8" Male NPT 	CF-M-3-N1/8-A4	M9910406	Ø3 mm	Metal	350°C (662°F)	580
	CF-P-3-N1/8-A4	M9910410	Ø3 mm	PTFE	100°C (212°F)	87
Compression Fitting, 1/4" Male NPT 	CF-M-6-N1/4-A4	M9910484	Ø6 mm	Metal	350°C (662°F)	580
	CF-P-6-N1/4-A4	M9910486	Ø6 mm	PTFE	100°C (212°F)	87
Compression Fitting, 1/2" Male NPT 	CF-M-6-N1/2-A4	A0950	Ø6 mm	Metal	350°C (662°F)	580

Note: Material is AISI 316L/1.4404

Mounts in Compact Spaces

With a housing diameter of 34 mm, multiple temperature sensors can fit in tight spaces.



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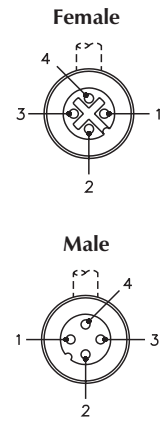
Temperature Sensors

4-Wire eurofast® Cordsets, Standard Plug Body

- Straight Male and Female Connectors
- NEMA 1, 3, 4, 6P and IEC IP 68 Protection
- 250 VAC/300 VDC, 4 A



Housing Style	Part Number	Cable	Features	Pinout
<p>RK ..**</p>	RK 4.4T-*	AWM PVC Grey 4x22 AWG 105°C 5.2 mm OD Cable #RF50516-*M	<i>flexlife</i> ®	1. BN 2. WH 3. BU 4. BK
<p>RS ..**</p>	RK 4.4T-* - RS 4.4T			

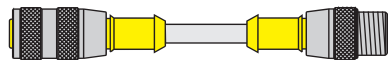


* Length in meters. Standard cable lengths are 2, 4, 6, 8 and 10 meters. Consult factory for other lengths.

** Standard coupling nut material is nickel plated brass "RK .."; "RKK .." indicates nylon and "RKV .." indicates 316 stainless steel.

Extension Example:

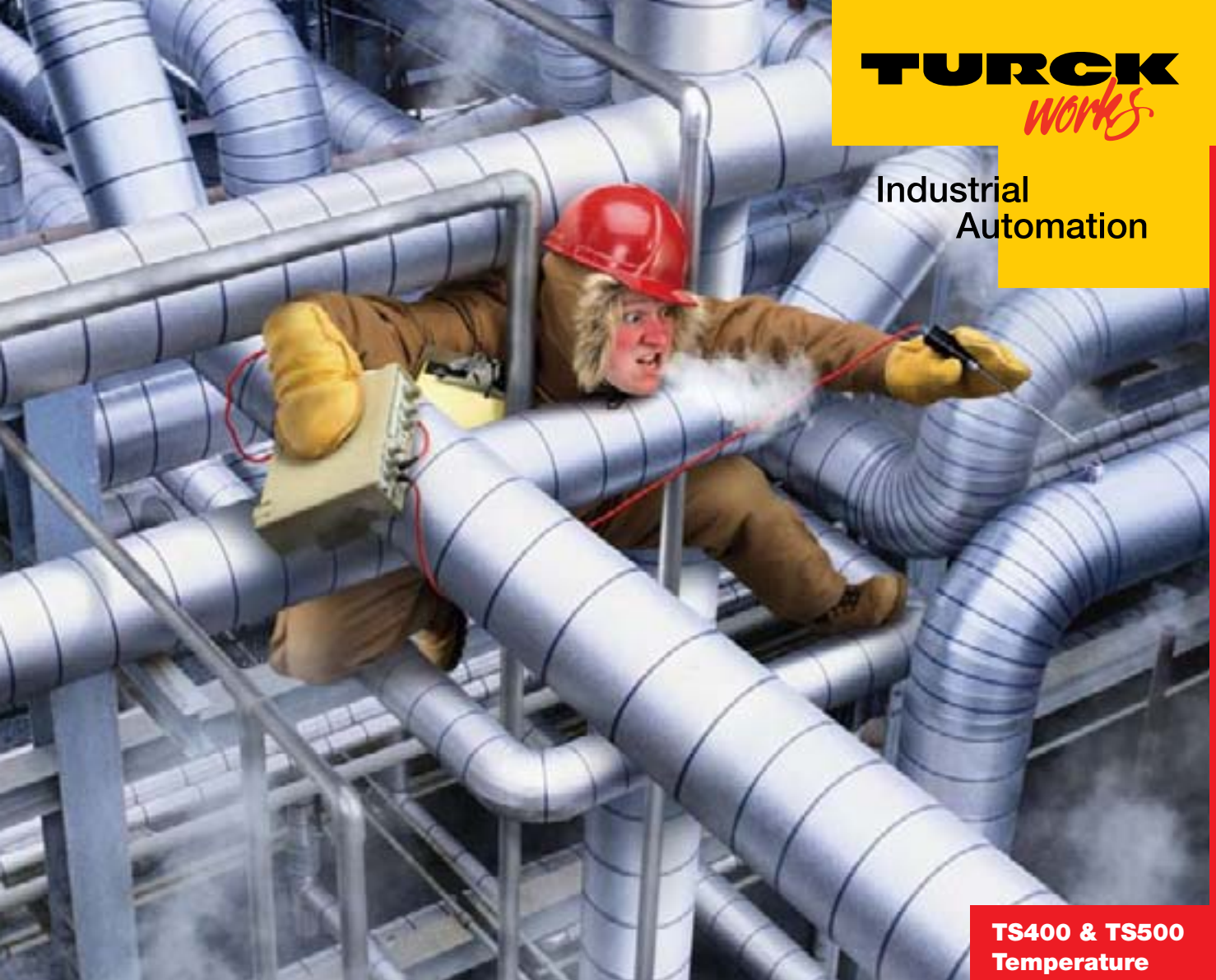
RK **4.4T** - **2** - **RS** **4.4T**



RK .. - RS ..

TURCK
works

Industrial
Automation



**TS400 & TS500
Temperature
Sensors**

THERE'S AN EASIER WAY TO MONITOR TEMPERATURES AT CONTROL POINTS.

- Direct or remote mounting with optional thermowells
- One sensor displays output in °C, °F, K and ohms
- **Exclusive Feature!** IP67 stainless steel housing with integrated M12 *eurofast*® connector
- **Exclusive Feature!** 320° housing rotation and display inversion
- Transparent harsh-duty cover option



Solid-state TURCK TS400 and TS500 Temperature Sensors bring local monitoring and display directly to your application control point. TS Series temperature sensors use PT 100 technology and are superior replacements for thermocouples and other RTDs hard wired into panel meters or PLCs.

Call us with your next application:
1-800-544-7769
email: turckusa@turck.com
www.turck.com

....**Sense It!**....**Connect It!**....**Bus It!**

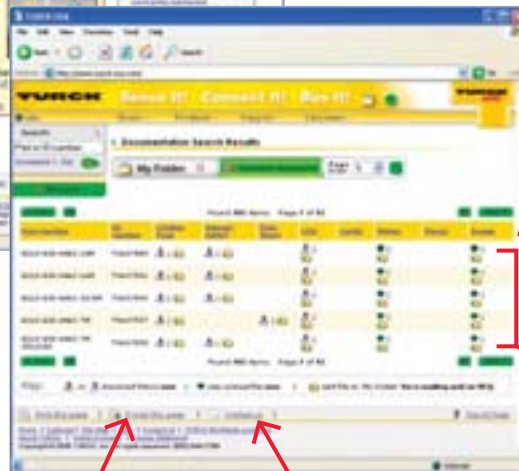
....Sense It!....Connect It!....Bus It!....Solve It!

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