SensorsX

SX-TTNA Series

Thermocouple Temperature Sensor / Transmitter



E / K / N / S / B	4–20 mA / HART	±0.2% FS
Thermocouple types	Transmitter outputs	Best accuracy option

Thermocouple Temperature Sensing | Type E / K / N / S / B | 4–20 mA / HART

■ OVERVIEW

The SX-TTNA Series includes industrial thermocouple temperature sensors and integrated temperature transmitters. Available thermocouple types are E, K, N, S and B. Depending on the selected configuration, options include threaded or flanged process connections, different probe constructions and local indication. Transmitter configurations provide 4–20 mA two-wire, 4–20 mA with HART, or 1–5 V DC output. The permissible measurement range depends on the thermocouple type, protective-tube material and complete probe assembly.



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■ FEATURES

- ◆ Type E, K, N, S, and B thermocouple sensing elements
- ◆ 4–20 mA two-wire, 4–20 mA/HART, or 1–5 V DC output
- ◆ Assembled, sheathed, sheathed assembly, and surface-mount probe constructions
- ◆ Basic accuracy options of ±1%, ±0.5%, and ±0.2% FS
- ◆ Threaded and EN 1092 PN16 RF flange connections
- ◆ Optional local analog or digital indication

■ TYPICAL APPLICATIONS

Industries Served

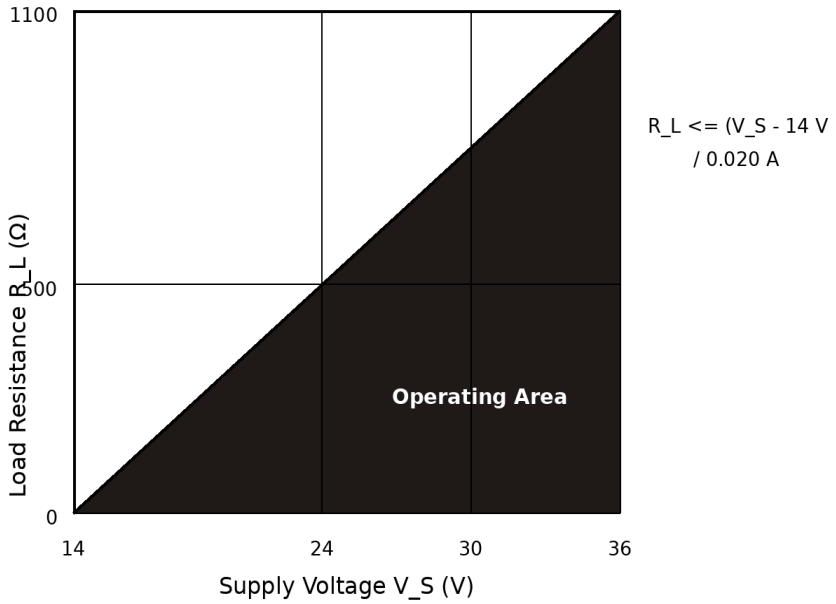
- Petroleum and gas processing
- Electric power generation
- Food processing
- Chemical processing
- Light industry
- Tanks and vessels
- Metallurgy
- Textiles
- Pipelines and industrial temperature monitoring

■ TECHNICAL SPECIFICATIONS

The following specifications apply to the 4–20 mA two-wire transmitter configuration.

Parameter	Specification
Basic accuracy	±0.2%, ±0.5%, or ±1% FS
Ambient-temperature effect — ±0.2% grade	0.02% FS/°C
Ambient-temperature effect — ±0.5% grade	0.05% FS/°C
Ambient-temperature effect — ±1% grade	0.05% FS/°C
Cold-junction compensation error	<1 °C within the specified ambient-temperature range
Output	4–20 mA DC, two-wire
Rated supply voltage	24 V DC
Load resistance	$R_l \le (V_s - 14\ V) / 0.020\ A$
Operating ambient temperature	−25 to +85 °C
Relative humidity	5–95% RH, non-condensing
Local analog indication accuracy	±2.5%
Local digital indication accuracy	±1.0%
Power consumption	<0.5 W

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Load resistance (R_L) vs. supply voltage (V_S) relationship

■ OUTPUT OPTIONS

Code	Output
F	4–20 mA, two-wire
H	4–20 mA with HART
V	1–5 V DC

For transmitter versions, confirm supply voltage and allowable load resistance for the selected output and operating temperature range.

■ PRODUCT CONFIGURATIONS

Code	Structure
A1	Economy
A2	Economy with display
A3	High-temperature wear-resistant
A4	Industrial standard
A5	Integrated economy
A7	Integrated display
A8	Explosion-proof
A9	Display with flange

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Product Configuration Photos



Economy



Economy with display



High-temperature wear-resistant



Industrial standard



Integrated economy



Integrated display



Explosion-proof



Display with flange

■ THERMOCOUPLE SENSOR ELEMENTS

Code	Type / element	Selectable measurement range
4	Type E — NiCr / Constantan	0 to +1000 °C
5	Type K — NiCr / NiSi	0 to +1300 °C
6	Type N — NiCrSi / NiSi	0 to +1300 °C
7	Type S — PtRh10 / Pt	0 to +1600 °C
8	Type B — PtRh30 / PtRh6	0 to +1800 °C

■ PROBE ASSEMBLY

Code	Construction
A	Assembled
B	Sheathed
C	Sheathed assembly
D	Surface-mount

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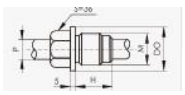
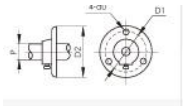
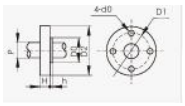
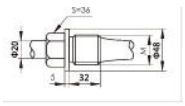
■ PROCESS CONNECTIONS AND INSTALLATION

Code	Process connection
M1	M20 × 1.5
M2	M27 × 2
M3	M20 × 1.5 adjustable
M4	M27 × 2 adjustable
N1	1/4 NPT
N2	1/2 NPT
R1	R 1/4
R2	R 1/2
F1	EN 1092 DN15 PN16 RF
F2	EN 1092 DN20 PN16 RF
F3	EN 1092 DN25 PN16 RF

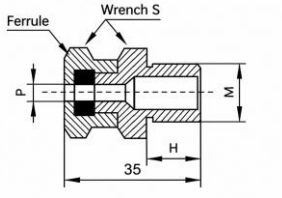
※ *Specify total length and insertion depth in millimetres, for example 350/200. Verify the process connection, immersion depth, pressure, material compatibility, and mounting orientation before ordering.*

■ MECHANICAL DIMENSIONS

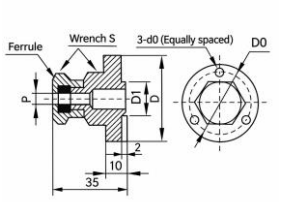
Assembly-Type Mounting Specifications

Diagram	Mounting Type	Key Dimensions	Rated Pressure
	**Fixed thread (d = Φ12 / Φ16)**	M27×2 thread; H = 32 mm; S = 32 mm; D0 = Φ40 mm	10 MPa
	**Adjustable threaded fitting (d = Φ12 / Φ16 / Φ20)**	D2 = Φ70 mm; D1 = Φ54 mm; d0 = Φ6 mm	Atmospheric
	**Fixed flange (d = Φ12 / Φ16 / Φ20)**	D2 = Φ95 mm; D1 = Φ65 mm; D0 = Φ45 mm; d0 = Φ14 mm; H = 19 mm; h = 3 mm	6.4 MPa
	**Fixed threaded connection with a tapered protective tube**	M33×2 thread; h = 32 mm; S = 36 mm; D0 = Φ48 mm	30 MPa

Ferrule Thread and Ferrule Flange Fittings



Ferrule thread fitting



Ferrule flange fitting

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Dimension	Φ8	Φ6	Φ5	Φ4	Φ3	Φ2
Thread (M)	M16×1.5	M16×1.5	M16×1.5	M12×1.5	M12×1.5	M12×1.5
Wrench size (S)	22	22	22	19	19	19
Height (H)	15	15	15	15	15	15
Fixed ferrule rated pressure	26 MPa	26 MPa	26 MPa	26 MPa	26 MPa	26 MPa
Adjustable ferrule fitting rated pressure	Atmospheric	Atmospheric	Atmospheric	Atmospheric	Atmospheric	Atmospheric

Ferrule Flange Fitting Dimensions

Dimension	Φ5/Φ6/Φ8	Φ2/Φ3/Φ4
D	Φ60	Φ50
D0	Φ42	Φ36
D1	Φ24	Φ20
d0	Φ9	Φ7
S	Φ22	Φ19
Fixed-ferrule rated pressure	25 MPa	25 MPa
Adjustable ferrule fitting rated pressure	Atmospheric	Atmospheric

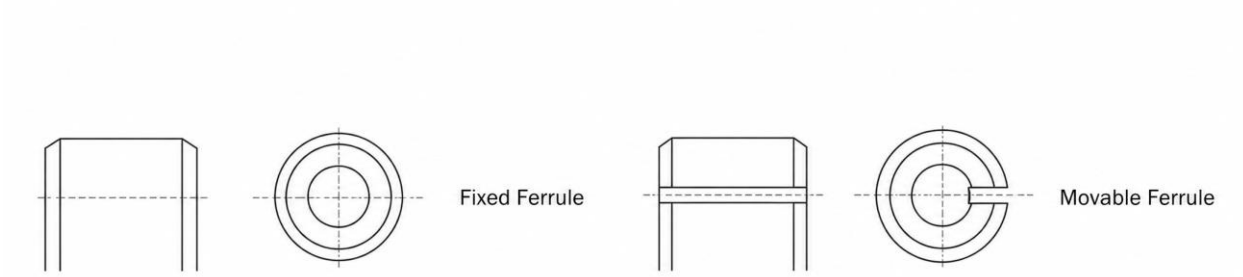
Assembly-Type Protective-Tube Ratings and Response Time

Protective Tube Diameter	Protective Tube Material	Long-Term Use Temperature	Short-Term Use Temperature	Response Time
Φ16	Corundum tube	1600 °C	1800 °C	< 150 s
Φ16	High-alumina tube	1300 °C	1600 °C	< 150 s
Φ16	1Cr18Ni8Ti	−200 to +800 °C	900 °C	< 90 s
Φ16	Cr25Ti	1000 °C	1100 °C	< 90 s
Φ16	Carbon steel (Grade 20)	−200 to +600 °C	800 °C	< 90 s
Φ20	Corundum tube	1600 °C	1800 °C	< 240 s
Φ20	High-alumina tube	1300 °C	1600 °C	< 240 s
Φ20	1Cr18Ni8Ti	−200 to +800 °C	900 °C	< 90 s
Φ20	Cr25Ti	1000 °C	1100 °C	< 90 s
Φ20	Carbon steel (Grade 20)	−200 to +600 °C	800 °C	< 90 s
Φ25	Corundum tube	1600 °C	1800 °C	< 360 s
Φ25	High-alumina tube	1300 °C	1600 °C	< 360 s
Φ25	1Cr18Ni8Ti	−200 to +800 °C	900 °C	< 90 s
Φ25	Cr25Ti	1000 °C	1100 °C	< 90 s
Φ25	Carbon steel (Grade 20)	−200 to +600 °C	800 °C	< 90 s

The listed temperatures apply to the protective tubes. The permissible operating range of the complete assembly depends on the selected thermocouple and protective-tube material.

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Sheathed-Type Mounting Specifications



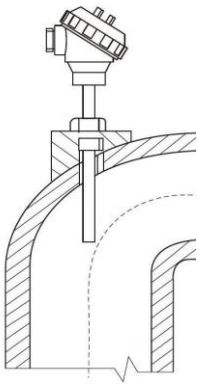
Sheathed-Type Thermocouple Response Time

Protective Tube Diameter (mm)	Φ2	Φ3	Φ4	Φ5	Φ6	Φ8
Thermocouple response time (s)	< 0.5	< 1.2	< 2.5	< 4	< 6	< 8

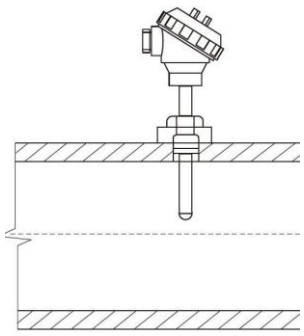
■ INSTALLATION DIAGRAMS

Integrated Temperature Transmitter — Mounting Methods

Typical mounting configurations for the SX-TTNA Series integrated temperature transmitters are shown below. When ordering, specify the process medium, measurement range, process connection specifications, and insertion depth.

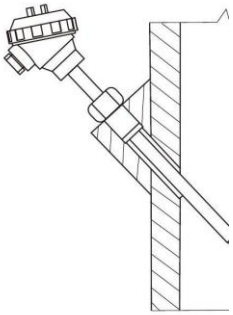


Mounting method on a bent pipe

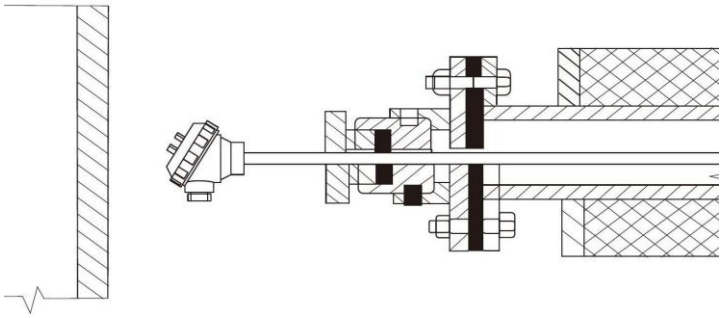


Mounting method on a horizontal pipe

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Mounting method on a vertical pipe



Sealed mounting method at a boiler flue duct port

■ ORDERING INFORMATION

Complete model number example: SX-TTNA-A42M1A350/200F2

Example interpretation: SX-TTNA series; industrial standard structure (A4); Type K thermocouple (5); M20 × 1.5 connection (M1); assembled probe (A); 350 mm total length / 200 mm insertion depth; 4–20 mA two-wire output (F); ±2% accuracy (2).

Model Number	
SX-TTNA	
Structure	
A1	Economy
A2	Economy with display
A3	High-temperature wear-resistant
A4	Industrial standard
A5	Integrated economy
A7	Integrated display
A8	Explosion-proof
A9	Display with flange
Thermocouple Element	
4	Type E; 0 to +1000 °C
5	Type K; 0 to +1300 °C
6	Type N; 0 to +1300 °C
7	Type S; 0 to +1600 °C
8	Type B; 0 to +1800 °C
Process Connection	
M1	M20 × 1.5
M2	M27 × 2
M3	M20 × 1.5 adjustable
M4	M27 × 2 adjustable
N1	1/4 NPT
N2	1/2 NPT

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R1	R 1/4
R2	R 1/2
F1	EN 1092 DN15 PN16 RF
F2	EN 1092 DN20 PN16 RF
F3	EN 1092 DN25 PN16 RF
Probe Assembly	
A	Assembled
B	Sheathed
C	Sheathed assembly
D	Surface-mount
Total Length / Insertion Depth	
350/200	Specify in millimetres
Output	
F	4–20 mA, two-wire
H	4–20 mA / HART
V	1–5 V DC
Total Accuracy (The accuracy values shown apply to the transmitter only)	
1	±1%
2	±2%
5	±5%
Customization Options	
D	Custom Configuration — Specify Requirements When Ordering

■ ORDERING NOTICE

When placing an order, please specify the following:

- 1. Product name
- 2. Model number
- 3. Sensor type (e.g., Type E; 0 to +1000 °C or Type K; 0 to +1300 °C)
- 4. Temperature measurement range
- 5. Overall accuracy, protective-tube material, outer diameter, total length, and insertion depth
- 6. Mounting / connection type
- 7. Ambient temperature
- 8. Explosion-proof marking (for explosion-proof models)
- 9. Quantity
- 10. Delivery time

Unless otherwise specified when ordering, SX-TTNA integrated thermocouple temperature transmitters are supplied with accuracy class 1. For assembly-type models, the overall protective-tube length equals the insertion depth plus 150 mm.

Custom specifications are available upon request.

■ ORDERING NOTES

- The available sensing elements are Type E, K, N, S, and B thermocouples.
- Select a measurement range within the allowable range of the chosen thermocouple type.
- Response time depends on protective-tube diameter and probe construction.

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- Confirm structure, probe material, process connection, total length, insertion depth, output, and accuracy before ordering.
- Optional and customized codes are appended only when required.

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