ABB MEASUREMENT & ANALYTICS | DATA SHEET

SensyTemp TSA101

Exchangeable measuring insets

Measurement made easy
Compatible and versatile

For resistance thermometers and thermocouples

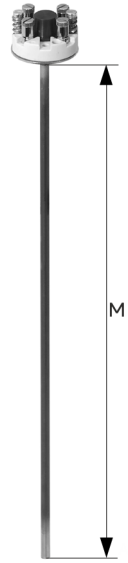
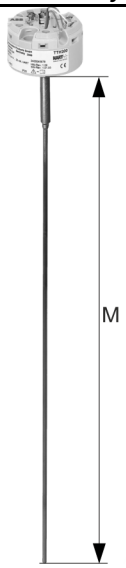
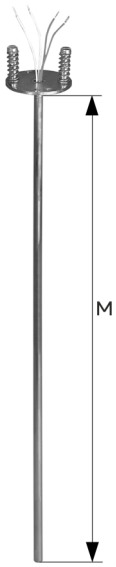
Design
- In accordance with IEC 43735
- With mineral insulated cable
- With retaining plate

Approvals
- For installation in approved TSP temperature sensors
- IECEx
- ATEX
- EAC Ex (GOST)
- Other approvals on request

Areas of application
- Offshore and coastal areas
- Oil / natural gas production and transport
- Petrochemical industry
- Chemical industry
- Power generation
- Mechanical engineering and plant construction
- General process engineering
- Container and pipeline construction

Overview of measuring insets

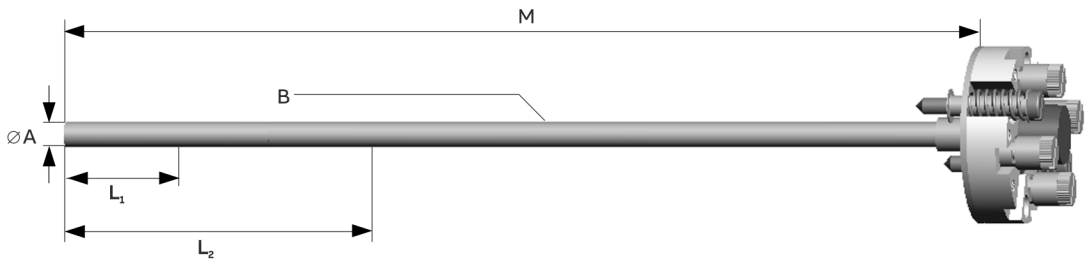
Industrial thermocouples and industrial resistance thermometers

Ceramic base with terminals	Permanently-mounted transmitter	Open connection wires
		

- Flexible and vibration-resistant ABB mineral insulated cable. Sheath material for resistance thermometer made of stainless steel 1.4571 (316Ti) or nickel-basis alloy 2.4816 (Alloy 600) for thermocouples.
- Sensors in accordance with IEC 60751 platinum resistance thermometer with measuring ranges of −196 to 800 °C (−320.8 to 1472 °F) in three tolerance classes or thermocouples in accordance with IEC 60584 and ANSI MC96.1 with measuring ranges of −40 to 1200 °C (−40 to 2192 °F), each in two tolerance classes.
- Type S thermocouple in an accuracy class of 0 to 1600 °C (32 to 2912 °F).
- Fitted with single- or double sensors.
- Optimum clamping at the measuring inset's holding plate is assured by generous spring travel (10 mm (0.39 inch)) on the part of the clamping springs.
- The measuring insets can be ordered with outside diameter 3 mm (0.12 in), 4.5 mm (0.24 in), 6 mm (0.24 in), 8 mm (0.32 in, for thermocouples only), 8 mm (0.32 in) tip with sleeve and 10 mm (0.39 in) tip with sleeve.

M = Measuring inset length

Design



A Measuring inset diameter

B Mineral insulated cable with compact wires embedded in magnesium oxide (MgO) powder

M Measuring inset length

L_1 Temperature-sensitive length

L_2 Non-flexible length

Figure 1: Setup of the TSA101

Connector base	
Base	Ø 42 mm (1.65 in)
Distance between screws	Ø 33 mm (1.3 in)
Screw size	M4 × 1.5
Spring travel	> 10 mm (0.39 in)

Specification

Resistance thermometer

The use of a mineral insulated cable and special installed measuring elements ensure very high vibration resistance of all measuring insets of the TSP temperature sensors.
The acceleration values of 30 m/sec^2 (3 g), defined for already increased requirements in accordance with the standard IEC 60751, are exceeded by all measuring inset types for TSP temperature sensors.
Apart from thin film resistors that reach their accuracy class within the temperature ranges defined by the standard IEC 60751, ABB also offers thin film resistors (TF) with extended temperature range. These thin film resistors comply with the accuracy classes A and AA in a range of −196 to 400 °C (−320.8 to 752 °F) beyond the standard IEC 60751. These TFs are also available with increased resistance to vibration.
The optimally suitable combination of measuring range, diameter, accuracy, and vibration resistance can be taken from the following tables.

Thin film resistor (TF) – Basic design

	Meas. range	Vibration resistance
Class B	−50 to 400 °C (−58 to 752 °F)	100 m/sec^2 (10 g) at 10 to 500 Hz
Class A	−30 to 300 °C (−22 to 572 °F)	
Class AA	0 to 100 °C (32 to 212 °F)	
Class A extended	−196 to 400 °C (−321 to 752 °F)	
Class AA extended	−196 to 400 °C (−321 to 752 °F)	

	Single sensor			Double sensor		
	2-W	3-W	4-W	2-W	3-W	4-W
3.0 mm, class B	●	●	●			
3.0 mm, class A		●	●			
3.0 mm, class AA		●	●			
4.5 mm, class B	●	●	●			
4.5 mm, class A		●	●			
4.5 mm, class AA		●	●			
6.0 mm, class B	●	●	●	●	●	●
6.0 mm, class A		●	●		●	●
6.0 mm, class AA		●	●		●	●

Thin film resistor – increased vibration resistance

	Meas. range	Vibration resistance
Class B	−50 to 400 °C (−58 to 752 °F)	600 m/sec^2 (60 g) at 10 to 500 Hz
Class A	−30 to 300 °C (−22 to 572 °F)	
Class AA	0 to 100 °C (32 to 212 °F)	
Class A extended	−196 to 400 °C (−321 to 752 °F)	
Class AA extended	−196 to 400 °C (−321 to 752 °F)	

	Single sensor			Double sensor		
	2-W	3-W	4-W	2-W	3-W	4-W
3.0 mm, class B	●	●	●			
3.0 mm, class A		●	●			
3.0 mm, class AA		●	●			
4.5 mm, class B	●	●	●			
4.5 mm, class A		●	●			
4.5 mm, class AA		●	●			
6.0 mm, class B	●	●	●	●	●	●
6.0 mm, class A		●	●		●	●
6.0 mm, class AA		●	●		●	●

Wire wound resistor (WW) – extended measuring range

	Meas. range	Vibration resistance
Class B	−96 to 800 °C (−320.8 to 1472 °F)	100 m/sec^2 (10 g) at 10 to 500 Hz
Class A, single WW	−100 to 450 °C (−148 to 842 °F)	
Class A, double WW	0 to 250 °C (32 to 482 °F)	

	Single sensor			Double sensor		
	2-W	3-W	4-W	2-W	3-W	4-W
3.0 mm, class B	●	●	●	●	●	
3.0 mm, class A		●	●		●	
4.5 mm, class B	●	●	●	●	●	
4.5 mm, class A		●	●		●	
6.0 mm, class B	●	●	●	●	●	●
6.0 mm, class A		●	●		●	●

… Specification

Wire wound resistor (WW) – increased vibration resistance

	Meas. range	Vibration resistance
Class B	−196 to 600 °C (−320.8 to 1112 °F)	600 m/sec² (60 g) at 10 to 500 Hz
Class A, single WW	−100 to 450 °C (−148 to 842 °F)	
Class A, double WW	0 to 250 °C (32 to 482 °F)	

	Single sensor			Double sensor		
	2-W	3-W	4-W	2-W	3-W	4-W
3.0 mm, class B						
3.0 mm, class A						
6.0 mm, class B	●	●	●	●	●	●
6.0 mm, class A		●	●		●	●

Length specifications for the tip of the measuring inset

The following table shows the minimum immersion length, the temperature-sensitive length and the non-flexible length at the tip of the measuring inset.

Type	minimum immersion length	Temperature-sensitive length	Non-flexible length
Basic design	70 mm (2.75 in)	7 mm (0.28 in)	30 mm (1.18 in)
Increased vibration resistance	70 mm (2.75 in)	10 mm (0.39 in)	40 mm (1.57 in)
Extended measuring range, increased vibration resistance	70 mm (2.75 in)	50 mm (1.97 in)	60 mm (2.36 in)

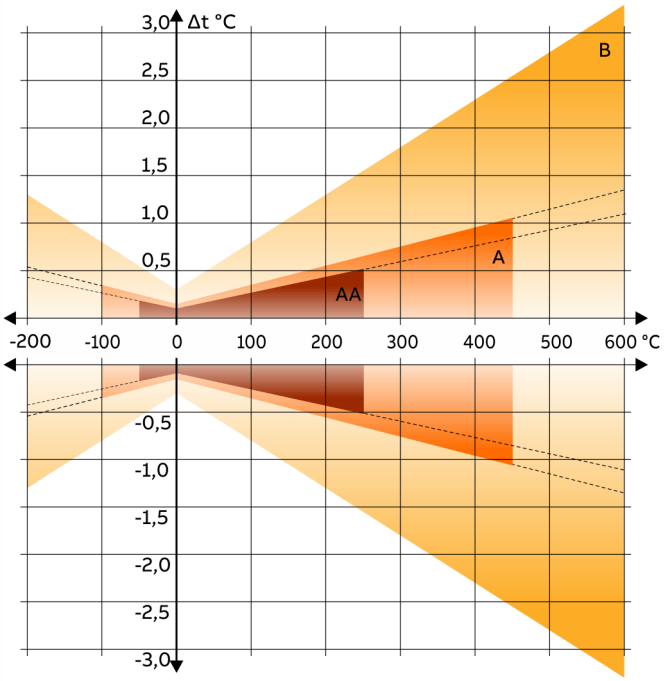
Accuracy classes of measurement resistors in accordance with IEC 60751

Both thin film resistors and wire wound resistors in accordance with IEC 60751 can be used across the entire range of application (also with increased accuracy class AA or class A). Subsequently, only the accuracy class of the temperature range used can remain valid.

Example: A sensor of class AA is used at 290 °C (554 °F). After the use (even short-term), Class A applies to this sensor, (example does not apply to the TFs of classes A extended and AA extended).

Thin film resistor (TF), built-in		
Class B	Δt = ± (0.30 + 0.0050 × [t])	−50 to 400 °C (−58 to 752 °F)
Class A	Δt = ± (0.15 + 0.0020 × [t])	−30 to 300 °C (-22 to 572 °F)
Class AA	Δt = ± (0.10 + 0.0017 × [t])	0 to 100 °C (32 to 212 °F)
Class A extended	Δt = ± (0.15 + 0.0020 × [t])	−196 to 400 °C (−320.8 to 752 °F)
Class AA extended	Δt = ± (0.10 + 0.0017 × [t])	−196 to 400 °C (−320.8 to 752 °F)

Wire wound resistor (WW), built-in		
Class B	Δt = ± (0.30 + 0.0050 × [t])	−196 to 600 °C (−320.8 to 1112 °F)
Class A	Δt = ± (0.15 + 0.0020 × [t])	−100 to 450 °C (−148 to 842 °F)



Colored areas: Temperature range in accordance with IEC 60751 (WW)

Dashed line: Extended temperature range

Figure 2: Graphical representation of accuracy classes

Measuring errors with two-wire circuits
The electrical resistance of the copper inner conductor for the measuring inset affects the measured value for two-wire circuits and must be taken into consideration. It depends on the diameter and length of the measuring inset.
If the error cannot be compensated metrologically, the following reference values shall apply:

- Ø Measuring inset 3.0 mm: (0.281 Ω/m ⇒ 0.7 °C/m)
- Ø Measuring inset 6.0 mm: (0.1 Ω/m ⇒ 0.25 °C/m)

It is for this reason that ABB supplies three-wire / four-wire circuits as standard.

Thermocouples

The accuracy classes of the thermocouples are in accordance with the IEC 60584 international standard. On request, ABB also supplies in accordance with ANSI MC96.1 and DIN 43710. Since the values of both standards differ from each other only very slightly at low temperatures (up to approx. 300 °C(572 °F)), ABB recommends using thermocouples in accordance with IEC 60584. The tolerance specifications are presented in the table 'Accuracy classes in accordance with IEC 60584'

The following table shows the temperature-sensitive length, the minimum immersion length, and the non-flexible length at the tip of the temperature sensor.

Type	minimum immersion length	Temperature-sensitive length	Non-flexible length
Vibration-resistant up to 600 m/sec^2 (60 g)	70 mm (2.76 in)	7 mm (0.28 in)	30 mm (1.18 in)

	1K	2K	3K	1J	2J	1L*	2L*	1N	2N	1T	2T	1E	2E	1S	2S
3.0 mm, class 2	●	●		●	●	●	●	●	●						
3.0 mm, class 1	●	●		●	●			●	●						
4.5 mm, class 2	●	●													
4.5 mm, class 1	●	●													
6.0 mm, class 2	●	●	●	●	●	●	●	●	●	●	●	●	●	●	●
6.0 mm, class 1	●	●		●	●			●	●	●	●	●	●		

* Tolerance in accordance with DIN 43710

Accuracy classes in accordance with IEC 60584, DIN 43710 and ANSI MC96.1

IEC 60584	Class (CL)	Temperature range	Maximum measuring error
K (NiCr-Ni), N (NiCrSi-NiSi)	2	−40 to 333 °C (−40 to 631.4 °F)	±2.5 °C (±4.5 °F)
		333 to 1200 °C (631.4 to 2192 °F)	±0.0075 × [t]
	1	−40 to 375 °C (−40 to 707 °F)	±1.5 °C (±2.7 °F)
		375 to 1000 °C (707 to 1832 °F)	±0.004 × [t]
J (Fe-CuNi)	2	−40 to 333 °C (−40 to 631.4 °F)	±2.5 °C (±4.5 °F)
		333 to 750 °C (631.4 to 1382 °F)	±0.0075 × [t]
	1	−40 to 375 °C (−40 to 707 °F)	±1.5 °C (±2.7 °F)
		375 to 750 °C (707 to 1382 °F)	±0.004 x [t]
T (Cu-CuNi)	2	−40 to 133 °C (−40 to 271.4 °F)	±1.0 °C (±1.8 °F)
		133 to 350 °C (271.4 to 662 °F)	±0.0075 × [t]
	1	−40 to 125 °C (−40 to 257 °F)	±0.5 °C (±0.9 °F)
		125 to 350 °C (257 to 662 °F)	±0.005 × [t]
S (Pt10%Rh-Pt)	2	0 to 600 °C (32 to 1112 °F)	±1.5 °C (±2.7 °F)
		600 to 1600 °C (1112 to 2912 °F)	±0.0025 x [t]
E (NiCr-CuNi)	2	-40 to 333 °C (-40 to 631.4 °F)	±2.5 °C (±4.5 °F)
		333 to 900 °C (631.4 to 1652 °F)	±0.0075 × [t]
	1	−40 to 375 °C (−40 to 707 °F)	±1.5 °C (±2.7 °F)
		375 to 800 °C (707 to 1472 °F)	±0.004 × [t]

… Specification

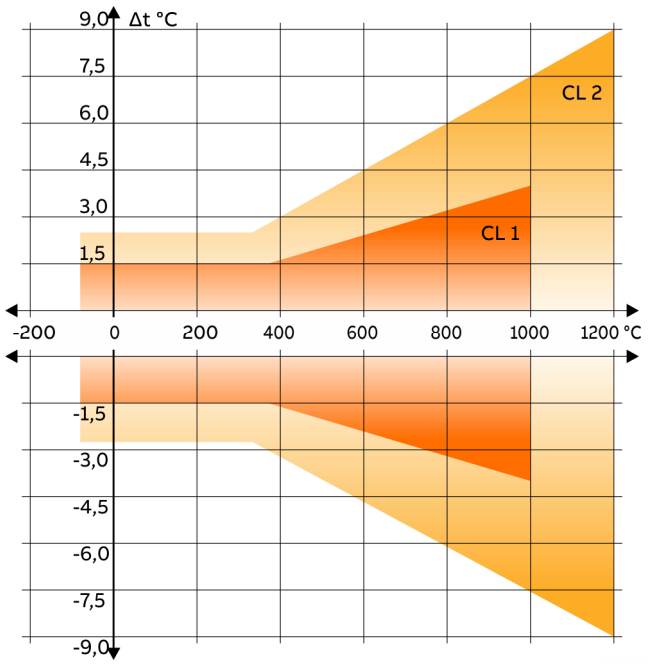


Figure 3: Graphical representation of accuracy classes using type K and N in accordance with IEC 60584 as examples. See tables for other types.

DIN 43710	Temperature range	Maximum measuring error
L (Fe-CuNi)	50 to 400 °C (122 to 752 °F)	±3.0 °C (±5.4 °F)
	400 to 900 °C (752 to 1652 °F)	±0.0075 × [t]

ANSI MC 96.1	Class (CL)	Temperature range	Maximum measuring error
K (NiCr-Ni), N (NiCrSi-NiSi)	Standard	0 to 293 °C (32 to 559.4 °F)	±2.2 °C (±3.96 °F)
		293 to 1250 °C (559.4 to 2282 °F)	±0.0075 × [t]
	Special	0 to 275 °C (32 to 527 °F)	±1.1 °C (±1.98 °F)
		275 to 1250 °C (527 to 2282 °F)	±0.0040 × [t]
J (Fe-CuNi)	Standard	0 to 293 °C (32 to 559.4 °F)	±2.2 °C (±3.96 °F)
		293 to 750 °C (559.4 to 1382 °F)	±0.0075 × [t]
	Special	0 to 275 °C (32 to 527 °F)	±1.1 °C (±1.98 °F)
		275 to 750 °C (527 to 1382 °F)	±0.0040 × [t]

Insulation resistance of measuring inset

The insulation resistance is measured between the outer sheath and measuring loop. If there are two measuring loops, the insulation resistance between both measuring loops is also measured.
Thanks to a special process used during manufacturing, ABB measuring insets can boast outstanding insulation values even at high temperatures.

Insulation resistance R_{iso}
≥ 500 MΩ with a ambient temperature range from 15 to 35 °C (59 to 95 °F)

Air humidity
< 80 %

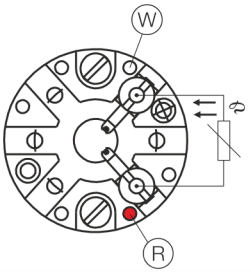
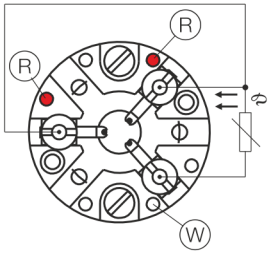
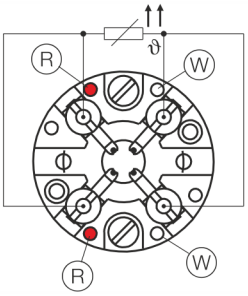
Electrical connections

Note

For the correct connection to the ceramic connection base, the color markings described are decisive, rather than any numbers that may be on the base.

Electrical connections and color coding of resistance thermometers in accordance with IEC 60751

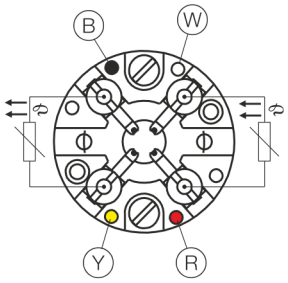
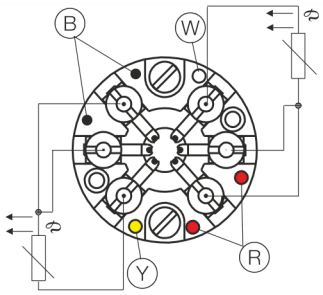
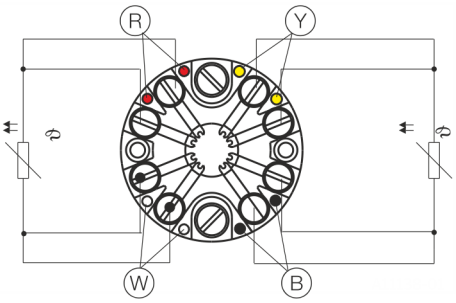
Single sensor

Two-wire circuit	Three-wire circuit	Four-wire circuit
		

(R) Red (W) White

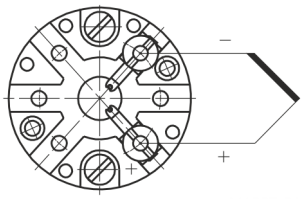
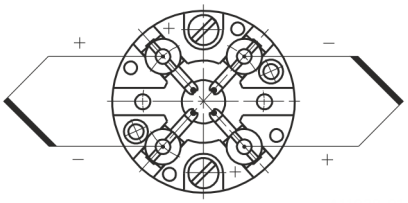
Electrical connections and color coding of resistance thermometers in accordance with IEC 60751

Double sensor

Two-wire circuit	Three-wire circuit	Four-wire circuit
		

(R) Red (Y) Yellow (B) Black (W) White

Electrical connections of thermocouples in accordance with IEC 60584

Single sensor	Double sensor
	

Transmitter

Installing a transmitter has the following advantages:

- Cost savings due to reduced wiring costs
- Amplification of the sensor signal directly at the measuring point and conversion to a standard signal (thereby increasing the signal's interference immunity).
- Option to install an LCD indicator in the connection head.
- SIL 2 with accordingly classified transmitter.

The output signal of a temperature sensor is determined by the selection of the corresponding transmitter. When using ABB transmitters, self-heating can be ignored.

The following output signals are available:

Transmitter type	
TTH200 HART® 4 to 20 mA, HART®	
TTH300 HART® 4 to 20 mA, HART®	
TTH300 PA PROFIBUS PA®	
TTH300 FF FOUNDATION Fieldbus® H1	

Note
Further information on the transmitters listed above can be found in the data sheets DS/TTH200 and DS/TTH300.

Approvals, tests and certificates

Approvals

The TSA101 measuring insets are spare parts for the TSP temperature sensors. The approvals only apply in case of installing appropriately certified temperature sensors.
These range from metrological approvals for Ex-approvals for individual countries, ATEX certificates applicable throughout the EU and in Switzerland up to internationally recognized IECEx documents.
Specifically, these are:

- ATEX Ex i — PTB 01 ATEX 2200 X
- Ex n (Zone 2 and 22) — Manufacturer's declarations
- IECEx i — IECEx PTB 11.0111 X
- GOST / EAC Ex
- Other approvals on request

ABB TSA101 measuring insets in accordance with ATEX Ex i also meet the NAMUR NE24 recommendation.

Tests and certificates

In order to increase the safety and accuracy of the process, ABB offers various mechanical and electrical tests. The results are confirmed with certificates in accordance with EN 10204.
The following certificates are issued:

- Declaration of compliance 2.1 for order conformity
- Declaration of compliance 2.2, batch elements of the thermocouple
- Inspection certificate 3.1 for the following tests:
  - Visual, dimensional and function checks of the temperature sensor
  - Tolerance test
  - Reference measurement at the measuring inset

For measurements requiring extremely high accuracy, ABB offers a calibration of the temperature sensor in its own DAkkS-calibration laboratory.
With a DAkkS-calibration, a separate calibration certificate is provided for each temperature sensor. Reference measurements and DAkkS-calibrations are conducted on the measuring inset, if necessary, with a transmitter.

In order to obtain accurate measurement results, a minimum length of the mineral insulated cable of the measuring inset should be adhered to:

– At very low temperatures (< −70° C (−94 °F)): 300 mm
– At low to medium temperatures: 100 to 150 mm
– At temperatures exceeding 500 °C (932 °F): 300 to 400 mm

Greater lengths allow additional measurement methods and simplify the measuring process. If you require any further information, please contact your local ABB partner.

In case of a reference measurements and DAkkS-calibration, the individual sensor characteristic of the temperature sensor can also be calculated and a suitable transmitter can be accordingly programmed using a freestyle characteristic. The measuring accuracy of the temperature sensor can be considerably improved by adjusting the transmitter to the sensor characteristics. To this end, the measurement must be conducted with at least three temperatures.

The DAkkS calibration laboratory is accredited for both resistance thermometers in the temperature range of −35 to 850 °C (31 to 1562 °F) and for thermocouples in the temperature range of −35 to 1200 °C (31 to 2192 °F).

Recalibration recommendation

Recommended values for a maximum uniform operating temperature:

– 400 °C (752 °F) Recalibration after 2 years at the latest
– 200 °C (392 °F) Recalibration after 5 years at the latest

Depending on process requirements (e.g., increased accuracy, system availability, safety) and in applications with above-average stress levels (strong vibrations, frequent and rapid temperature changes, etc.), the time periods may have to be shortened significantly.

Ordering Information

NOTE
Order codes cannot be combined at will. Your ABB partner will be happy to answer any questions you might have regarding installation feasibility. All documentation, declarations of conformity, and certificates are available in ABB's download area.

SensyTemp TSA101

Base model	**TSA101**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**
SensyTemp TSA101 Exchangeable Measuring Inset, for resistance thermometers and thermocouples									
Explosion Protection / Approvals									
Without		Y0							
Intrinsic Safety ATEX II 1 G Ex ia IIC T6 Ga or II 2 G Ex ib IIC T6 Gb or II 1/2 G Ex ib IIC T6 Ga/Gb		A1							
ATEX Dust Explosion Protection: Zone 20: II 1D Ex ta IIIC T133 ... T400 Da, Zone 20/21: II 1/2 D Ex ta/tb IIIC T133 ... T400 Da/Db		A3*							
ATEX Dust Explosion Protection and Intrinsic Safety (IS): Zone 20 / Zone 0: II 1D Ex ta IIIC T133 ... T400 Da and II 1 G Ex ia IIC T6 Ga (Not for application in explosive hybrid mixtures)		A4*							
Flameproof enclosure ATEX II 1/2 G Ex d IIC T1 - T6 Ga/Gb		A5							
Non incendive ATEX II 3 G Ex nA IIC T1 - T6 Gc and ATEX II 3 D Ex tc IIIB T133°C Dc		B1**							
ATEX Dust Explosion Protection and Flameproof Enclosure: Zone 20 / Zone 1/0: II 1D Ex ta IIIC T133 ... T400 Da and II 1/2 G Ex db IIC T6/T4 Ga/Gb (Not for application in explosive hybrid mixtures)		B5*							
ATEX Dust Explosion Protection: Zone 21: II 2D Ex tb IIIC T133 ... T400 Db		D5***							
ATEX Dust Explosion Protection and Intrinsic Safety (IS): Zone 21 / Zone 0: II 2D Ex tb IIIC T133 ... T400 Db and II 1 G Ex ia IIC T6 Ga (Not for application in explosive hybrid mixtures)		D6***							
ATEX Dust Explosion Protection and Flameproof Enclosure: Zone 21 / Zone 1/0: II 2D Ex tb IIIC T133 ... T400 Db and II 1/2 G Ex db IIC T6/T4 Ga/Gb (Not for application in explosive hybrid mixtures)		D8***							
Intrinsic Safety IECEx ia IIC T6 Ga		H1							
Intrinsic Safety IECEx ib IIC T6 Gb or IECEx ib IIC T6 Ga/Gb		H2							
Flameproof enclosure IECEx d IIC T1 - T6 Ga/Gb		H5							
IECEx Dust Explosion Protection: Zone 20: Ex ta IIIC T133 ... T400 Da, Zone 20/21: Ex Ta/tb IIIC T133 ... T400 Da/Db		J9*							
IECEx Dust Explosion Protection: Zone 21: Ex tb IIIC T133 ... T400 Db		J5***							
Intrinsic Safety acc. NAMUR NE 24 and ATEX II 1 G Ex ia IIC T6 Ga		N1							
GOST Russia - metrological approval		G1							
GOST Russia - metrological approval and EAC-Ex, Ex i - Zone 0		P2							
GOST Russia - metrological approval and EAC-Ex, Ex d		P3							
GOST Russia - metrological approval and EAC-Ex, dust ignition proof		P4							
GOST Kazakhstan - metrological approval		G3							
GOST Kazakhstan - metrological approval and EAC-Ex, Ex i - Zone 0		T2							
GOST Kazakhstan - metrological approval and EAC-Ex, Ex d		T3							
GOST Kazakhstan - metrological approval and EAC-Ex, dust ignition proof		T4							
GOST Belarus - metrological approval		M5							
GOST Belarus - metrological approval and EAC-Ex, Ex i - Zone 0		U2							
GOST Belarus - metrological approval and EAC-Ex, Ex d		U3							
GOST Belarus - metrological approval and EAC-Ex, dust ignition proof		U4							

* not with TTH300, not with LCD indicator, transmitter with HART protocol only

** Use in explosive hybrid mixtures (where explosive dusts and gases are present simultaneously) is not currently permitted in accordance with EN 60079–0 and EN 61241–0

*** transmitter with HART protocol only

Continued see next page

Base model	**TSA101**	**XX**	**XX**	**XX**	**XX**	**XX**	**XX**
Measuring Inset Type							
RTD, TF, Basic application, measuring range −50 to 400 °C (−58 to 752 °F), 10 g		S1					
RTD, TF, Extended vibration resistance, measuring range −50 to 400 °C (−58 to 752 °F), 60 g		S2					
RTD, TF, Extended measuring range −196 to 400 °C (−321 to 752 °F), 10 g		S3					
RTD, TF, Extended vibration resistance, extendend measuring range −196 to 400 °C (−321 to 752 °F), 60 g		S4					
RTD, WW, Extended measuring range −196 to 600 °C (−321 to 1112 °F), 10 g		D1					
RTD, WW, Extended vibration resistance, extendend measuring range −196 to 600 °C (−321 to 1112 °F), 60 g		D3					
RTD, adjustable to German calibration regulations, sign of app. 000/308 - without calibration		E1					
RTD, WW, Extended measuring range −196 to 800 °C (−321 to 1472 °F)		D8					
RTD, custody preliminary, adjustable to German calibration regulations,							
sign of app. 000/308 - with calibration −10 °C and +50 °C		E2					
Thermocouple		T1					
Others		Z9					
Measuring Inset Diameter							
3 mm			D3				
4,5 mm			D4				
6 mm			D6				
8 mm			D8				
8 mm, tip with sleeve, DIN 43735 Sleeve 80 mm (RTD), 20 mm (TC)			H8				
10 mm, tip with sleeve Sleeve 80 mm (RTD), 20 mm (TC)			H1				
Others			Z9				
Sensor Type and Wiring							
1 × Pt100, 2-wire				P1			
1 × Pt100, 3-wire				P2			
1 × Pt100, 4-wire				P3			
2 × Pt100, 2-wire				P4			
2 × Pt100, 3-wire				P5			
2 × Pt100, 4-wire (with integrated transmitter only one Pt100 is connected)				P6			
1 × Pt1000, 2-wire				P8			
1 × Pt1000, 3-wire				P7			
1 × Pt1000, 4-wire				P9			
1 × Typ K (NiCr-NiAl)				K1			
2 × Typ K (NiCr-NiAl)				K2			
3 × Typ K (NiCr-NiAl)				K3			
1 × Typ J (Fe-CuNi)				J1			
2 × Typ J (Fe-CuNi)				J2			
1 × Typ L (Fe-CuNi)				L1			
2 × Typ L (Fe-CuNi)				L2			
1 × Typ N (NiCrSi-NiSi)				N1			
2 × Typ N (NiCrSi-NiSi)				N2			
1 × Typ T (Cu-CuNi)				T1			
2 × Typ T (Cu-CuNi)				T2			
1 × Typ E (NiCr-CuNi)				E1			
2 × Typ E (NiCr-CuNi)				E2			
1 × Typ S (Pt10Rh-Pt)				S1			
2 × Typ S (Pt10Rh-Pt)				S2			
Others				Z9			

… Ordering Information

Base model	**TSA101**	**XX**	**XX**	**XX**
Sensor Accuracy				
Accuracy Class B, IEC 60751		B2		
Wire Wound, Double, Accuracy Class A, IEC 60751, Range 0 to 250 °C (32 to 482 °F)		D2		
Wire Wound, Accuracy Class A, IEC 60751, Range −100 to 450 °C (−148 to 842 °F)		D1		
Thin Film, Accuracy Class A, IEC 60751, Range −30 to 300 °C (−22 to 572 °F)		S1		
Thin Film, Accuracy Class AA, IEC 60751, Range 0 to 100 °C (32 to 212 °F)		S3		
Thin Film, Accuracy Class A extended according to IEC 60751, Range −196 to 400 °C (−320,8 to 752 °F)		S6		
Thin Film, Accuracy Class AA extended according to IEC 60751, Range −196 to 400 °C (−320,8 to 752 °F)		S8		
Thermocouple, Accuracy Class 2, IEC 60584		T2		
Thermocouple, Accuracy Class 1, IEC 60584		T1		
Thermocouple, Standard Accuracy ANSI MC96.1		T4		
Thermocouple, Special Accuracy ANSI MC96.1		T3		
Others		Z9		
Inset Length				
M = 245 mm (9.6 in)			S2	
M = 255 mm (10.0 in)			M1	
M = 270 mm (10.6 in)			H1	
M = 285 mm (11.2 in)			D1	
M = 300 mm (11.8 in)			D2	
M = 315 mm (12.4 in)			M2	
M = 330 mm (13.0 in)			H2	
M = 355 mm (14.0 in)			H3	
M = 375 mm (14.8 in)			D3	
M = 390 mm (15.4 in)			D4	
M = 405 mm (15.9 in)			M3	
M = 420 mm (16.5 in)			H4	
M = 435 mm (17.1 in)			D5	
M = 450 mm (17.7 in)			D6	
M = 455 mm (17.9 in)			H5	
M = 505 mm (19.9 in)			H6	
M = 555 mm (21.9 in)			M4	
M = 570 mm (22.4 in)			H7	
M = 585 mm (23.0 in)			D7	
M = 600 mm (23.6 in)			D8	
M = 605 mm (23.8 in)			H8	
M = 1025 mm (40.4 in)			M5	
Customer specific length			Z9	
Transmitter				
Without transmitter, sensor with ceramic terminal block - spring loaded				Y1
Without transmitter, sensor with flying leads and metal plate - spring loaded				Y2
TTH300-HART, programmable, output signal 4 to 20 mA, dual input				H4
TTH300-HART, Ex version, programmable, output signal 4 to 20 mA, dual input				H5
TTH300-PA, programmable, output PROFIBUS PA, dual input				P6
TTH300-PA, Ex version, programmable, output PROFIBUS PA, dual input				P7
TTH300-FF, programmable, output FOUNDATION Fieldbus H1, dual input				F6
TTH300-FF, Ex version, programmable, output FOUNDATION Fieldbus H1, dual input				F7
TTH200-HART, programmable, output signal 4 to 20 mA				H6
TTH200-HART, Ex version, programmable, output signal 4 to 20 mA				H7

Additional ordering information SensyTemp TSA101

	XX	XX	XX	XX
Transmitter Measuring Range				
Standard measuring range	A0			
Customer-specific measuring range	AZ			
Declarations and certificates				
Declaration of compliance according EN 10204–2.1, with the order		C4		
Inspection certificate according EN 10204–3.1, visual, dimensional and functional test		C6		
Inspection certificate according EN 10204–3.1, sensor tolerance		CC		
Inspection certificate according EN 10204–3.1, sensor calibration, single RTD		CD		
Inspection certificate according EN 10204–3.1, sensor calibration, double RTD		CE		
Inspection certificate according EN 10204–3.1, sensor calibration, single thermocouple		CF		
Inspection certificate according EN 10204–3.1, sensor calibration, double thermocouple		CG		
DAkkS sensor calibration, single RTD, calibration certificate per thermometer		CH		
DAkkS sensor calibration, double RTD, calibration certificate per thermometer		CJ		
DAkkS sensor calibration, single thermocouple, calibration certificate per thermometer		CK		
DAkkS sensor calibration, double thermocouple, calibration certificate per thermometer		CL		
Number of Calibration Test Points				
1 point			P1	
2 points			P2	
3 points			P3	
4 points			P4	
5 points			P5	
Temperatures for Sensor Calibration				
Standard calibration: 0 °C (32 °F)				V1
Standard calibration: 100 °C (212 °F)				V2
Standard calibration: 400 °C (752 °F)				V3
Standard calibration: 0 °C and 100 °C (32 °F and 212 °F)				V4
Standard calibration: 0 °C and 400 °C (32 °F and 752 °F)				V5
Standard calibration: 0 °C, 100 °C and 200 °C (32 °F, 212 °F and 392 °F)				V7
Standard calibration: 0 °C, 200 °C and 400 °C (32 °F, 392 °F and 752 °F)				V8
Standard calibration: Customer specific temperatures				V6
DAkkS calibration: 0 °C (32 °F)				D1
DAkkS calibration: 100 °C (212 °F)				D2
DAkkS calibration: 400 °C (752 °F)				D3
DAkkS calibration: 0 °C and 100 °C (32 °F and 212 °F)				D4
DAkkS calibration: 0 °C and 400 °C (32 °F and 752 °F)				D5
DAkkS calibration: 0 °C, 100 °C and 200 °C (32 °F, 212 °F and 392 °F)				D7
DAkkS calibration: 0 °C, 200 °C and 400 °C (32 °F, 392 °F and 752 °F)				D8
DAkkS calibration: Customer specific temperatures				D6

… Ordering Information

Additional ordering information SensyTemp TSA101 (Continuation)	**XX**	**XX**	**XX**	**XX**
Measuring inset: Option				
Hot junction grounded	J1			
2 insets paired from 0 to 100 °C (32 to 212 °F), max. deviation 0.1 K	J3			
Upgrading Sensor Accuracy to Cl. A, 0 to 600°C	J7			
Improvement Sensor Accuracy to 0.5 Cl. A, 0 to 100°C, U>100 mm	J8			
Improvement Sensor Accuracy to 0.5 Cl. A, 0 to 400°C, U>250 mm	J9			
Measuring inset: Other Options				
Others		JZ		
Documentation Language				
German			M1	
English			M5	
Additional TAG Plate				
Stainless steel plate with TAG no.				T1

Trademarks

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Notes

Notes

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