



FICHA TÉCNICA DE PRODUTO

PRODUCT DATASHEET

---

HMI – Automação e Instrumentação, Lda.

---

Rua dos 5 Caminhos, nº 570  
4780-382 Santo Tirso  
PORTUGAL

Tel. +351 252 850 501  
Fax. +351 300 013 487

Web: [www.hmi.pt](http://www.hmi.pt)

Email: [hmi@hmi.pt](mailto:hmi@hmi.pt)

# SensyTemp TSA050, TSA101 Exchangeable measuring insets

Compatible and versatile

Measurement made easy



## For resistance thermometers and thermocouples

### Structure

- 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)

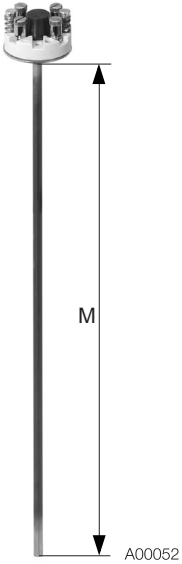
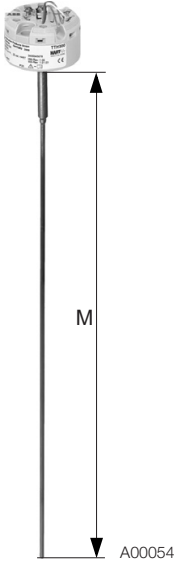
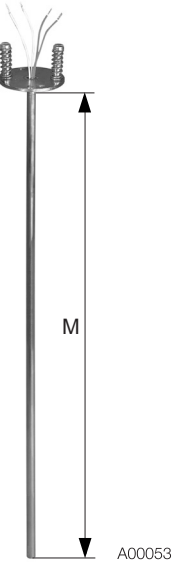
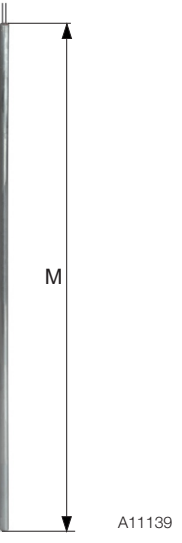
## Areas of application

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

# SensyTemp TSA050, TSA101

## Exchangeable measuring insets

### Overview of measuring insets

Industrial thermocouples and industrial resistance thermometers			
Ceramic base with connecting terminals (TSA101)	Fixed transmitter (TSA101)	Open connection wires (TSA101)	Form 0 (TSA050)
 <p>A00052</p>	 <p>A00054</p>	 <p>A00053</p>	 <p>A11139</p>

- Flexible and vibration-resistant ABB mineral insulated cable. Sheath material for resistance thermometer made of stainless steel 1.4571 (316Ti), 1.4404 (316L) or nickel-basis alloy 2.4816 (alloy 600) for thermocouples.
- Sensors in accordance with IEC 60751 platinum resistance thermometer with measuring ranges of -196 ... 800 °C (-320.8 ... 1472 °F) in three tolerance classes or thermocouples in accordance with IEC 60584 and ANSI MC96.1 with measuring ranges of -40 ... 1200 °C (-40 ... 2192 °F), respectively in two tolerance classes.
- Type S thermocouple in an accuracy class of 0 ... 1600 °C (32 ... 2912 °F).
- Fitted with single- or double sensors.
- Due to a large spring travel (10 mm (0.39 inch)) of the pressing springs on the retaining plate of the measuring inset, a pressing behavior is achieved (TSA101 only).
- Measuring insets are available with outer diameters of 3 mm (0.12 inch), 4.5 mm (0.24 inch), 6 mm (0.24 inch), and for thermocouples also 8 mm (0.32 inch). Also available for TSA101 only: 8 mm (0.32 inch) tip with sleeve and 10 mm (0.39 inch) tip with sleeve

M = Measuring inset length

## Design

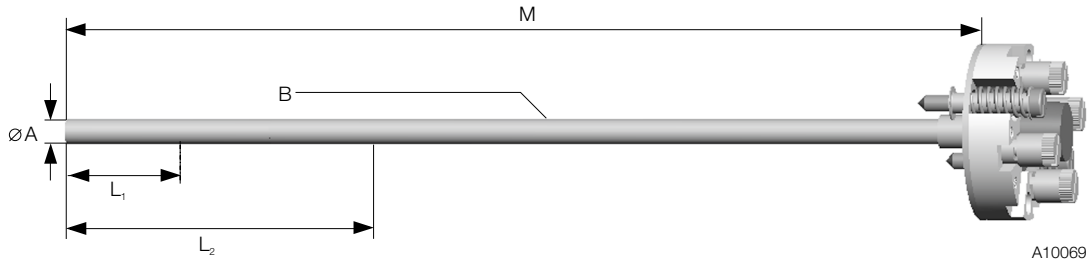


Fig. 1: TSA structure, connector base on TSA101 only

- A Measuring inset diameter
- B Mineral insulated cable with compact wires embedded in magnesium oxide (MgO) powder
- M Measuring inset length
- L<sub>1</sub> Temperature-sensitive length
- L<sub>2</sub> Non-flexible length

Connector base (TSA101 only)	
Base:	Ø 42 mm (1.65 inch)
Distance between screws:	Ø 33 mm (1.3 inch)
Screw size:	M4 x 1.5
Spring travel:	> 10 mm (0.39 inch)

# SensyTemp TSA050, TSA101

## Exchangeable measuring insets

### Specifications

#### 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<sup>2</sup> (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 TFs comply with the accuracy classes A and AA in a range of -196 ... 400 °C (-320.8 ... 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.

#### Designs

##### Basic design

Thin film resistor (TF)

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

#### Increased vibration resistance

Thin film resistor (TF)

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

### Extended measuring range

Wire wound resistor (WW)

	Measuring range	Vibration resistance
Class B	-196 ... 800 °C (-320.8 ... 1472 °F)	100 m/sec <sup>2</sup> (10 g) at 10 to 500 Hz
Class A	-100 ... 450 °C (-148 ... 842 °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		●	●		●	●

### Extended measuring range, increased vibration resistance

Wire wound resistor (WW)

	Measuring range	Vibration resistance
Class B	-196 ... 600 °C (-320.8 ... 1112 °F)	600 m/sec <sup>2</sup> (60 g) at 10 to 500 Hz
Class A	-100 ... 450 °C (-148 ... 842 °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.

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

### 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.

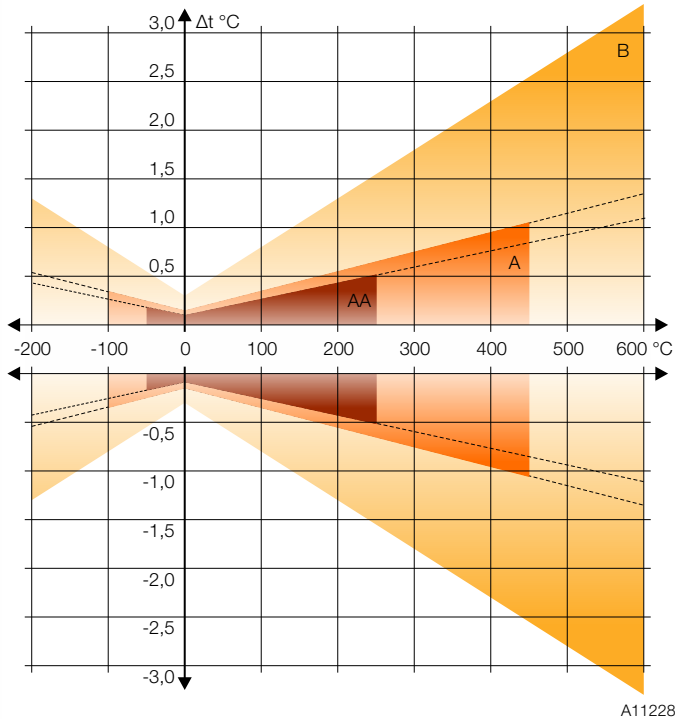
Example: A sensor of class AA is used at 290 °C. After the use (even short-term), Class A applies to this sensor, (example does not apply to the TFs of classes A extended and AA extended).

Thin film resistor (TF), built-in		
Class B	$\Delta t = \pm (0.30 + 0.0050 \times [t])$	-50 ... 400 °C (58 ... 752 °F)
Class A	$\Delta t = \pm (0.15 + 0.0020 \times [t])$	-30 ... 300 °C (-22 ... 572 °F)
Class AA	$\Delta t = \pm (0.10 + 0.0017 \times [t])$	0 ... 100 °C (32 ... 212 °F)
Class A extended	$\Delta t = \pm (0.15 + 0.0020 \times [t])$	-196 ... 400 °C (-320.8 ... 752 °F)
Class AA extended	$\Delta t = \pm (0.10 + 0.0017 \times [t])$	-196 ... 400 °C (-320.8 ... 752 °F)

Wire wound resistor (WW), built-in		
Class B	$\Delta t = \pm (0.30 + 0.0050 \times [t])$	-196 ... 600 °C (-320.8 ... 1112 °F)
Class A	$\Delta t = \pm (0.15 + 0.0020 \times [t])$	-100 ... 450 °C (-148 ... 842 °F)

# SensyTemp TSA050, TSA101

## Exchangeable measuring insets



A11228

**Fig. 2: Graphical presentation of the accuracy classes**  
**Colored areas:** Temperature range in accordance with IEC 60751 (WW)  
**Dashed line:** Extended temperature range

### 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:

- Measuring inset Ø 3.0 mm: (0.281 Ω/m ⇒ 0.7 °C/m)
- Measuring inset Ø 6.0 mm: (0.1 Ω/m ⇒ .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 meet the requirements of the international standard IEC 60584. On request, ABB can also supply thermocouples 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.

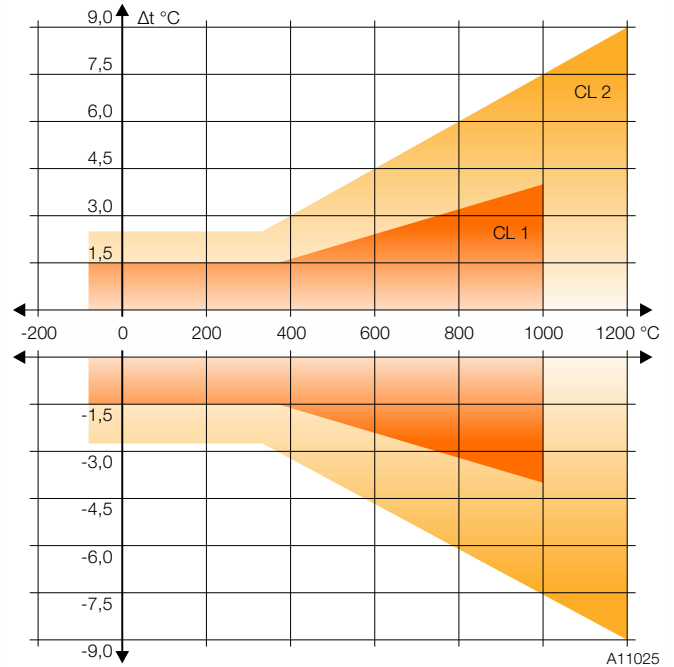
Version	Minimum immersion length	Temperature-sensitive length	Non-flexible length
Vibration-resistant up to 600 m/sec <sup>2</sup> (60 g)	70 mm (2.76 inch)	7 mm (0.28 inch)	30 mm (1.18 inch)

	1K	2K	3K	1J	2J	1L <sup>1)</sup>	2L <sup>1)</sup>	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	•	•		•	•			•	•	•	•	•	•		

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 ... 333 °C (-40 ... 631.4 °F)	±2.5 °C (36.5 °F)
		333 ... 1200 °C (631.4 ... 2192 °F)	±0.0075 x [t]
	1	-40 ... 375 °C (-40 ... 707 °F)	±1.5 °C (34.7 °F)
		375 ... 1000 °C (707 ... 1832 °F)	±0.004 x [t]
J (Fe-CuNi)	2	-40 ... 333 °C (-40 ... 631.4 °F)	±2.5 °C (36.5 °F)
		333 ... 750 °C (631.4 ... 1382 °F)	±0.0075 x [t]
	1	-40 ... 375 °C (-40 ... 707 °F)	±1.5 °C (34.7 °F)
		375 ... 750 °C (707 ... 1382 °F)	±0.004 x [t]
T (Cu-CuNi)	2	-40 ... 133 °C (-40 ... 271.4 °F)	±1.0 °C (33.8 °F)
		133 ... 350 °C (271.4 ... 662 °F)	±0.0075 x [t]
	1	-40 ... 125 °C (-40 ... 257 °F)	±0.5 °C (32.9 °F)
		125 ... 350 °C (257 ... 662 °F)	±0.005 x [t]
S (Pt10%Rh-Pt)	2	0 ... 600 °C (32 ... 1112 °F)	±1.5 °C (34.7 °F)
		600 ... 1600 °C (1112 ... 2912 °F)	±0.0025 x [t]
E (NiCr-CuNi)	2	-40 ... 333 °C (-40 ... 631.4 °F)	±2.5 °C (36.5 °F)
		333 ... 900 °C (631.4 ... 1652 °F)	±0.0075 x [t]
	1	-40 ... 375 °C (-40 ... 707 °F)	±1.5 °C (34.7 °F)
		375 ... 800 °C (707 ... 1472 °F)	±0.004 x [t]



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



# SensyTemp TSA050, TSA101

## Exchangeable measuring insets

DIN 43710	Temperature range	Maximum measuring error
L (Fe-CuNi)	50 ... 400 °C (122 ... 752 °F)	±3.0 °C (37.4 °F)
	400 ... 900 °C (752 ... 1652 °F)	±0.0075 x [t]

ANSI MC 96.1	Class (CL)	Temperature range	Maximum measuring error
K (NiCr-Ni), N (NiCrSi-NiSi)	Standard	0 ... 293 °C (32 ... 559.4 °F)	±2.2 °C (35.96 °F)
		293 ... 1250 °C (559.4 ... 2282 °F)	±0.0075 x [t]
	Special	0 ... 275 °C (32 ... 527 °F)	±1.1 °C (33.98 °F)
		275 ... 1250 °C (527 ... 2282 °F)	±0.0040 x [t]
J (Fe-CuNi)	Standard	0 ... 293 °C (32 ... 559.4 °F)	±2.2 °C (35.96 °F)
		293 ... 750 °C (559.4 ... 1382 °F)	±0.0075 x [t]
	Special	0 ... 275 °C (32 ... 527 °F)	±1.1 °C (33.98 °F)
		275 ... 750 °C (527 ... 1382 °F)	±0.0040 x [t]
N (NiCrSi-NiSi)	Standard	0 ... 293 °C (32 ... 559.4 °F)	±2.2 °C (35.96 °F)
		293 ... 1250 °C (559.4 ... 2282 °F)	±0.0075 x [t]
	Special	0 ... 275 °C (32 ... 527 °F)	±1.1 °C (33.98 °F)
		275 ... 1250 °C (527 ... 2282 °F)	±0.0040 x [t]

### Insulation resistance of measuring inset

The insulation resistance is measured between the outer sheath and measuring circuit. If there are two measuring loops, the insulation resistance between both measuring loops is also measured.

The following applies for all measuring inset types:

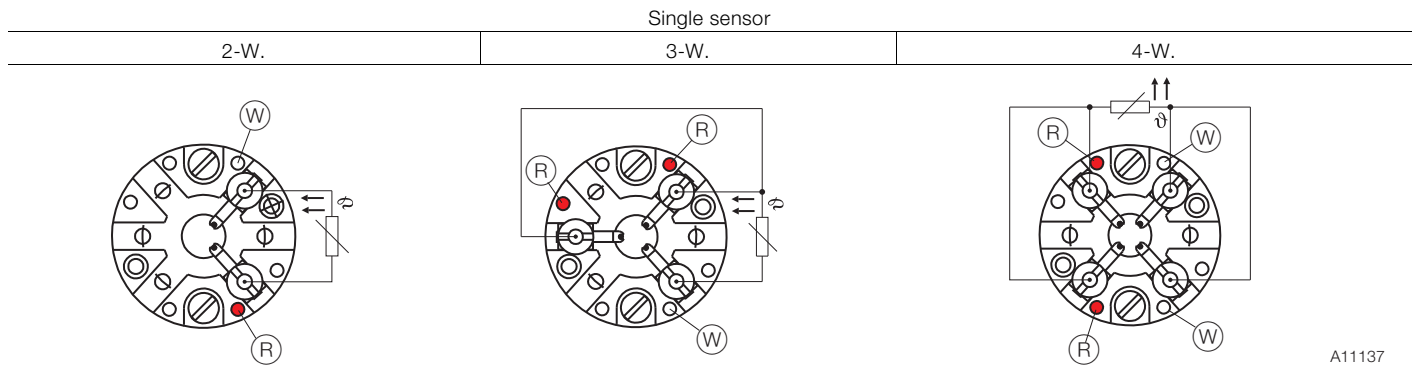
- 500 V DC
- Insulation resistance  $R_{iso} \geq 500M\Omega$  with an ambient temperature range of 15 ... 35 °C (59 ... 95 °F)
- Humidity < 80 %.

Thanks to a special process used during manufacturing, ABB measuring insets can boast outstanding insulation values even at high temperatures.

# Electrical connections

## Resistance thermometer

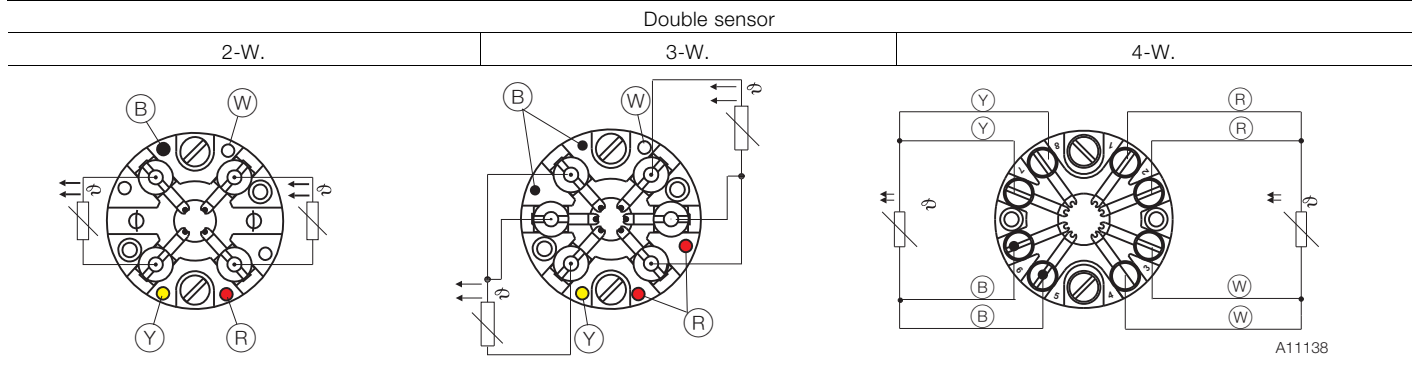
### Electrical connections and color coding of resistance thermometers in accordance with IEC 60751



A11137

(R) Red (W) White

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

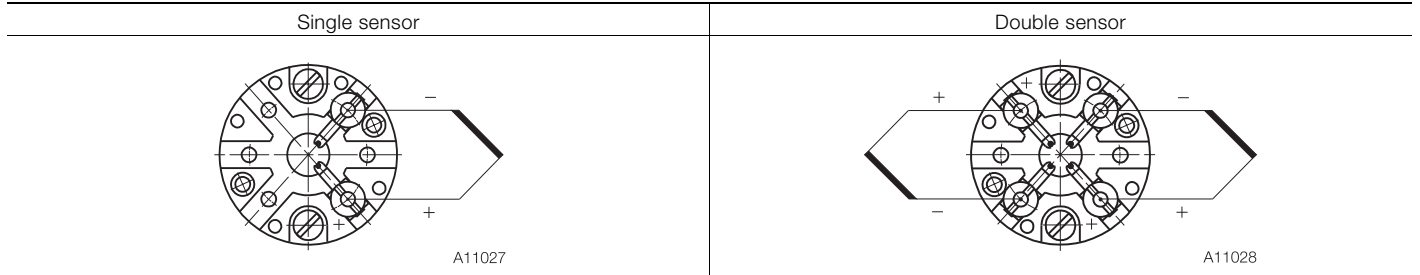


A11138

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

## Thermocouples

### Electrical connections of thermocouples in accordance with IEC 60584



A11027

A11028

# SensyTemp TSA050, TSA101 Exchangeable measuring insets





## Transmitters (TSA101 only)

Installing a transmitter has the following advantages:

- Decreased cost due to reduced wiring.
- Amplification of the sensor signal 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.
- SIL2 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:

Type	
TTH200 HART 4 ... 20 mA, HART	 A11232
TTH300 HART 4 ... 20 mA, HART	 A11233
TTH300 PA PROFIBUS PA	 A11234
TTH300 FF FOUNDATION Fieldbus H1	 A11235

### NOTICE

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
- ATEX Dust-Ex                BVS 06 ATEX E 029
- ATEX Ex d                    PTB 99 ATEX 1144
- Ex n (zone 2 and 22)       Declarations of conformity
- IECEx
- EAC Ex (GOST)

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 functional tests of the temperature sensor
  - Tolerance test
  - Material testing of the mineral insulated cable (TSA050)
  - 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 ... 150 mm
- At temperatures over 500 °C (932 °F): 300 ... 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 ... 850 °C (31 ... 1562 °F) and for thermocouples in the temperature range of -35 ... 1200 °C (31 ... 2192 °F).

#### **Recalibration recommendation**

Recommended values for a maximum uniform operating temperature:

- 400 °C (752 °F) recalibration after two years at the latest
- 200 °C (392 °F) recalibration after five 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.

# SensyTemp TSA050, TSA101

## Exchangeable measuring insets

### Ordering Information

#### Main ordering information SensyTemp TSA050

Base model	TSA050	XX	XX	XX	XX	XX	XX	XX	XX	XX
SensyTemp TSA050, Form 0 for resistance thermometers and thermocouples										
<b>Explosion Protection / Approvals</b>										
Without		Y0								
<b>Measuring Inset Type</b>										
RTD, Basic application, TF, measuring range -50 ... 400 °C (-58 ... 752 °F), 10 g										S1
RTD, Extended vibration resistance, TF, measuring range -50 ... 400 °C (-58 ... 752 °F), 60 g										S2
RTD, TF, Extended measuring range -196 ... 400 °C (-321 ... 752 °F), 10 g										S3
RTD, TF, Extended vibration resistance, extended measuring range -196 ... 400 °C (-321 ... 752 °F), 60 g										S4
RTD, Extended measuring range, WW, -196 ... 600 °C (-321 ... 1112 °F), 10 g										D1
RTD, Extended vibration resistance, WW, extended measuring range -196 ... 600 °C (-321 ... 1112 °F), 60 g										D3
RTD, Extended measuring range, WW, -196 ... 800 °C (-321 ... 1472 °F)										D8
Thermocouple										T1
Others										Z9
<b>Measuring Inset Diameter</b>										
3 mm										D3
4.5 mm										D4
6 mm										D6
8 mm										D8
Others										Z9
<b>Mineral Insulated Cable Material</b>										
Stainless steel ASTM 316Ti (1.4571)										S1
Stainless steel ASTM 316L (1.4404)										S2
Stainless steel ASTM 321 (CrNi, 1.4541)										S6
Inconel Alloy 600 (2.4816)										J1

Continued see next page

Main ordering information SensyTemp TSA050	XX	XX	XX	XX	XX
<b>Sensor Type and Wiring</b>					
1 x Pt100, 2-wire	P1				
1 x Pt100, 3-wire	P2				
1 x Pt100, 4-wire	P3				
2 x Pt100, 2-wire	P4				
2 x Pt100, 3-wire	P5				
2 x Pt100, 4-wire	P6				
1 x Pt1000, 2-wire	P8				
1 x Pt1000, 3-wire	P7				
1 x Pt1000, 4-wire	P9				
1 x Type K (NiCr-NiAl)	K1				
2 x Type K (NiCr-NiAl)	K2				
3 x Type K (NiCr-NiAl)	K3				
1 x Type J (Fe-CuNi)	J1				
2 x Type J (Fe-CuNi)	J2				
1 x Type L (Fe-CuNi)	L1				
2 x Type L (Fe-CuNi)	L2				
1 x Type N (NiCrSi-NiSi)	N1				
2 x Type N (NiCrSi-NiSi)	N2				
1 x Type T (Cu-CuNi)	T1				
2 x Type T (Cu-CuNi)	T2				
1 x Type E (NiCr-CuNi)	E1				
2 x Type E (NiCr-CuNi)	E2				
1 x Type S (Pt10Rh-Pt)	S1				
2 x Type S (Pt10Rh-Pt)	S2				
Others	Z9				
<b>Sensor Accuracy</b>					
Wire Wound, Accuracy Class B, IEC 60751		B2			
Wire Wound, Double, Accuracy Class A, IEC 60751, Range 0 ... 250 °C (32 ... 482 °F)		D2			
Wire Wound, Accuracy Class A, IEC 60751, Range -100 ... 450 °C (-148 ... 842 °F)		D1			
Thin Film, Accuracy Class A, IEC 60751, Range -30 ... 300 °C (-22 ... 572 °F)		S1			
Thin Film, Accuracy Class AA, IEC 60751, Range 0 ... 100 °C (0 ... 212 °F)		S3			
Thin Film, Accuracy Class A extended according to IEC 60751, Range -196 ... 400 °C (-320,8 ... 752 °F)		S6			
Thin Film, Accuracy Class AA extended according to IEC 60751, Range -196 ... 400 °C (-320,8 ... 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			
Thermocouple, DIN 43710		T5			
<b>Inset Length</b>					
Customer specific length				Z9	
<b>Length Unit of Measure</b>					
Millimeters (mm)					U1
Inches (in.)					U3
<b>Sealing cold end</b>					
Mineral insulated cable, sealed, up to 120 °C (248 °F)					S1
Mineral insulated cable, sealed, up to 200 °C (392 °F)					E1

# SensyTemp TSA050, TSA101

## Exchangeable measuring insets

### Additional ordering information SensyTemp TSA050

	XX	XX	XX	XX	XX
<b>Certificates</b>					
Declaration of compliance according EN 10204-2.1, with the order	C4				
Test report according EN 10204-2.2 for batch values, MIC-TC	C5				
Inspection certificate according EN 10204-3.1, material monitoring for wetted parts	C2				
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				
<b>Number of Calibration Test Points</b>					
1 point		P1			
2 points		P2			
3 points		P3			
4 points		P4			
5 points		P5			
<b>Temperatures for Sensor Calibration</b>					
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		
<b>Documentation Language</b>					
German				M1	
English				M5	
<b>Additional TAG Plate</b>					
Adhesive label					T3

## Main ordering information SensyTemp TSA101

Base model	TSA101	XX	XX	XX	XX	XX	XX	XX
SensyTemp TSA101 Exchangeable Measuring Inset, for resistance thermometers and thermocouples								
<b>Explosion Protection / Approvals</b>								
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						
Dust ignition proof ATEX II 1 D IP6x		A3						
Dust ignition proof ATEX II 1 D IP6X T133 ... T400 and								
Intrinsic Safety ATEX II 1 G Ex ia IIC T6 ... T1-Zone 0, 1, 2, 20, 21, 22	1)	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	1)	B1						
Dust ignition proof ATEX II 1 D IP6X T133 and								
Flameproof enclosure ATEX II 1/2 G Ex d IIC T6 - Zone 1, 2, 20, 21, 22	1)	B5						
Intrinsic safety IECEx ia IIC T6 Ga		H1						
Intrinsic Safety IECEx ib IIC T6 Gb or IECEx ib IIC T6 Ga/Gb		H2						
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						
<b>Measuring Inset Type</b>								
RTD, TF, Basic application, measuring range -50 ... 400 °C (-58 ... 752 °F), 10 g		S1						
RTD, TF, Extended vibration resistance, measuring range -50 ... 400 °C (-58 ... 752 °F), 60 g		S2						
RTD, TF, Extended measuring range -196 ... 400 °C (-321 ... 752 °F), 10 g		S3						
RTD, TF, Extended vibration resistance, extended measuring range -196 ... 400 °C (-321 ... 752 °F), 60 g		S4						
RTD, WW, Extended measuring range -196 ... 600 °C (-321 ... 1112 °F), 10 g		D1						
RTD, WW, Extended vibration resistance, extended measuring range -196 ... 600 °C (-321 ... 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 ... 800 °C (-321 ... 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						

Continued see next page



# SensyTemp TSA050, TSA101

## Exchangeable measuring insets

Main ordering information SensyTemp TSA101	XX	XX	XX	XX	XX
<b>Measuring Inset Diameter</b>					Continued see next page
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				
<b>Sensor Type and Wiring</b>					
1 x Pt100, 2-wire		P1			
1 x Pt100, 3-wire		P2			
1 x Pt100, 4-wire		P3			
2 x Pt100, 2-wire		P4			
2 x Pt100, 3-wire		P5			
2 x Pt100, 4-wire		P6			
1 x Pt1000, 2-wire		P8			
1 x Pt1000, 3-wire		P7			
1 x Pt1000, 4-wire		P9			
1 x Type K (NiCr-NiAl)		K1			
2 x Type K (NiCr-NiAl)		K2			
3 x Type K (NiCr-NiAl)		K3			
1 x Type J (Fe-CuNi)		J1			
2 x Type J (Fe-CuNi)		J2			
1 x Type L (Fe-CuNi)		L1			
2 x Type L (Fe-CuNi)		L2			
1 x Type N (NiCrSi-NiSi)		N1			
2 x Type N (NiCrSi-NiSi)		N2			
1 x Type T (Cu-CuNi)		T1			
2 x Type T (Cu-CuNi)		T2			
1 x Type E (NiCr-CuNi)		E1			
2 x Type E (NiCr-CuNi)		E2			
1 x Type S (Pt10Rh-Pt)		S1			
2 x Type S (Pt10Rh-Pt)		S2			
Others		Z9			
<b>Sensor Accuracy</b>					
Accuracy Class B, IEC 60751			B2		
Wire Wound, Double, Accuracy Class A, IEC 60751, Range 0 ... 250 °C (32 ... 482 °F)			D2		
Wire Wound, Accuracy Class A, IEC 60751, Range -100 ... 450 °C (-148 ... 842 °F)			D1		
Thin Film, Accuracy Class A, IEC 60751, Range -30 ... 300 °C (-22 ... 572 °F)			S1		
Thin Film, Accuracy Class AA, IEC 60751, Range 0 ... 100 °C (0 ... 212 °F)			S3		
Thin Film, Accuracy Class A extended according to IEC 60751, Range -196 ... 400 °C (-320,8 ... 752 °F)			S6		
Thin Film, Accuracy Class AA extended according to IEC 60751, Range -196 ... 400 °C (-320,8 ... 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		

Main ordering information SensyTemp TSA101		XX	XX
<b>Inset Length</b>			
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	
<b>Transmitter</b>			
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 ... 20 mA, dual input		H4	
TTH300-HART, Ex version, programmable, output signal 4 ... 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 ... 20 mA		H6	
TTH200-HART, Ex version, programmable, output signal 4 ... 20 mA		H7	

# SensyTemp TSA050, TSA101

## Exchangeable measuring insets

### Additional ordering information SensyTemp TSA101

	XX	XX	XX	XX	XX	XX	XX	XX	XX	XX
<b>Transmitter Measuring Range</b>										
Standard measuring range	A0									
Customer-specific measuring range	AZ									
<b>Certificates</b>										
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
<b>Number of Calibration Test Points</b>										
1 point										P1
2 points										P2
3 points										P3
4 points										P4
5 points										P5
<b>Temperatures for Sensor Calibration</b>										
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

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

1) According to EN 60079-0 and EN 61241-0, the application in hybrid mixtures (concomitance of potentially explosive dust and gas) is currently not allowed

### Trademarks

® HART is a registered trademark of FieldComm Group, Austin, Texas, USA




® PROFIBUS and PROFIBUS PA are registered trademarks of PROFIBUS & PROFINET International (PI)

® FOUNDATION Fieldbus is a registered trademark of FieldComm Group, Austin, Texas, USA





## Our offering:

	Actuators and Positioners		Analytical Instruments
	Device Management, Fieldbus and Wireless		Flow Measurement
	Force Measurement		Level Measurement
	Natural Gas Measurement		Pressure Measurement
	Recorders and Controllers		Temperature Measurement

---

HMI – Automação e Instrumentação, Lda.

---

Rua dos 5 Caminhos, nº 570  
4780-382 Santo Tirso  
PORTUGAL

Tel. +351 252 850 501  
Fax. +351 300 013 487

Web: [www.hmi.pt](http://www.hmi.pt)

Email: [hmi@hmi.pt](mailto:hmi@hmi.pt)

# Contact us

## **ABB Limited**

### **Process Automation**

Howard Road, St. Neots  
Cambridgeshire, PE19 8EU  
UK

Tel: +44 (0)870 600 6122

Fax: +44 (0)1480 213 339

Mail: [enquiries.mp.uk@gb.abb.com](mailto:enquiries.mp.uk@gb.abb.com)

## **ABB Inc.**

### **Process Automation**

125 E. County Line Road  
Warminster, PA 18974  
USA

Tel: +1 215 674 6000

Fax: +1 215 674 7183

## **ABB Automation Products GmbH**

### **Process Automation**

Schillerstr. 72  
32425 Minden  
Germany

Tel: +49 571 830-0

Fax: +49 571 830-1806

[www.abb.com/temperature](http://www.abb.com/temperature)

## Note

We reserve the right to make technical changes or modify the contents of this document without prior notice.

With regard to purchase orders, the agreed particulars shall prevail. ABB does not accept any responsibility whatsoever for potential errors or possible lack of information in this document.

We reserve all rights in this document and in the subject matter and illustrations contained therein. Any reproduction, disclosure to third parties or utilization of its contents – in whole or in parts – is forbidden without prior written consent of ABB.

Copyright© 2016 ABB

All rights reserved

3KXT111001R1001