

**HD2178.1, HD2178.2**



**HD2178.1 AND HD2178.2  
Pt100 AND TC INPUT THERMOMETERS**

HD2178.1 and HD2178.2 are portable instruments with a large LCD display. These instruments measure temperature by means of immersion, penetration, contact or air probes with Pt100, Pt1000 or thermocouple probes.

You can connect a 3 or 4 wires Pt100 sensor or a 2 wires Pt1000 sensor to B input, a K, J, T, N, E type thermocouple to input A. Probes to B input, a 8-poles DIN45326 connector, are equipped with an automatic detection module, with the factory calibration settings already being memorized inside. A input is equipped with a miniature female polarized connector for thermocouple probes.

The instrument HD2178.2 is a data logger; it stores up to 80.000 samples that can be transferred to a PC when connected to the instrument through a RS232C serial port or a USB 2.0 port. It is possible to configure the storage interval, the printing and the baud rate or to a portable printer by the menu.

Functions Max, Min and Avg calculate maximum, minimum and average values. Further functions are: REL relative measure, HOLD and automatic switching-off system (excludable).

Instruments have IP66 protection degree.

Technical specifications	
<b>Temperature measurement - RTD sensors</b>	
Pt100 Measuring range	-200...+650°C
Pt1000 Measuring range	-200...+650°C
Accuracy	±0.05°C
<b>Temperature measurement - Tc</b>	
TC measuring range: K	-200...+1370°C
TC measuring range: J	-100...+750°C
TC measuring range: T	-200...+400°C
TC measuring range: N	-200...+1300°C
TC measuring range: E	-200...+750°C
<b>Instrument accuracy</b>	
Thermocouple K	±0.1°C up to 600°C ±0.2°C over 600°C
Thermocouple J	±0.1°C up to 400°C ±0.2°C over 400°C
Thermocouple T	±0.1°C
Thermocouple N	±0.1°C up to 600°C ±0.2°C over 600°C
Thermocouple E	±0.1°C up to 300°C ±0.2°C over 300°C
Accuracy is referred to the instrument only; error due to sensors is not included.	
Resolution	0.1°C
Temperature drift @20°C	0.02%/°C
Drift after 1 year	0.1°C/year
Unit of measurement	°C - °F
Measured values storage - model HD2178.2	
Type	2000 pages each one containing 40 samples
Quantity	80000 samples in total
Storage interval can be selected among	1,5,10,15,30 s; 1,2,5,10,15,20,30 min.; 1 hour
Security of stored data	Unlimited, independent of battery charge conditions
<b>Power Supply</b>	
Batteries	4 Batteries 1.5V type AA
Autonomy	200 hours with 1800mAh alkaline batteries
Current consumption with instrument off	20µA
Mains	12Vdc / 1000mA Output mains adapter
<b>Serial interface RS232C</b>	
Type	RS232C galvanically isolated
Baud rate	can be set up from 1200 to 38400 baud
Data bit	8
Parity	None
Stop bit	1
Flow control	Xon/Xoff
Serial cable length	Max 15m
Print interval	Immediate or selectable among: 1,5,10,15,30 s; 1,2,5,10,15,20,30 min.; 1 hour
<b>USB interface - model HD2178.2</b>	
Type	1.1 - 2.0 galvanically isolated
<b>Connections</b>	
Input for RTD probes	8 pole male DIN45326 connector
Input for TC probes	2-pole female polarized standard miniature connector
RS232C serial interface	8-pole MiniDin connector
USB interface	Type B MiniUSB connector
Mains adapter	2-pole connector (positive at centre)

Operating conditions	
Operating Temperature	-5...50°C
Storage temperature	-25 ... 65°C
Working relative humidity	0 ... 90% RH, no condensation
Protection degree	IP66
General characteristics	
Dimensions (Length x Width x Height)	185x90x40mm
Weight	470g (complete with batteries)
Materials	ABS, rubber
Display	2 rows 4½ digits plus symbols Visible area: 52x42mm
Time	
Date and time	In real time
Accuracy	1 min/month max drift

## ORDERING CODES

**HD2178.1:** The kit consists of instrument HD2178.1, 4 per 1.5V alkaline batteries, instruction manual and case, software Deltalog9 downloadable from Delta OHM website. Probes and cables have to be ordered separately

**HD2178.2:** The kit consists of instrument data logger HD2178.2, 4 per 1.5V alkaline batteries, instruction manual and case, CP23 USB cable, software Deltalog9 downloadable from Delta OHM website. Probes have to be ordered separately

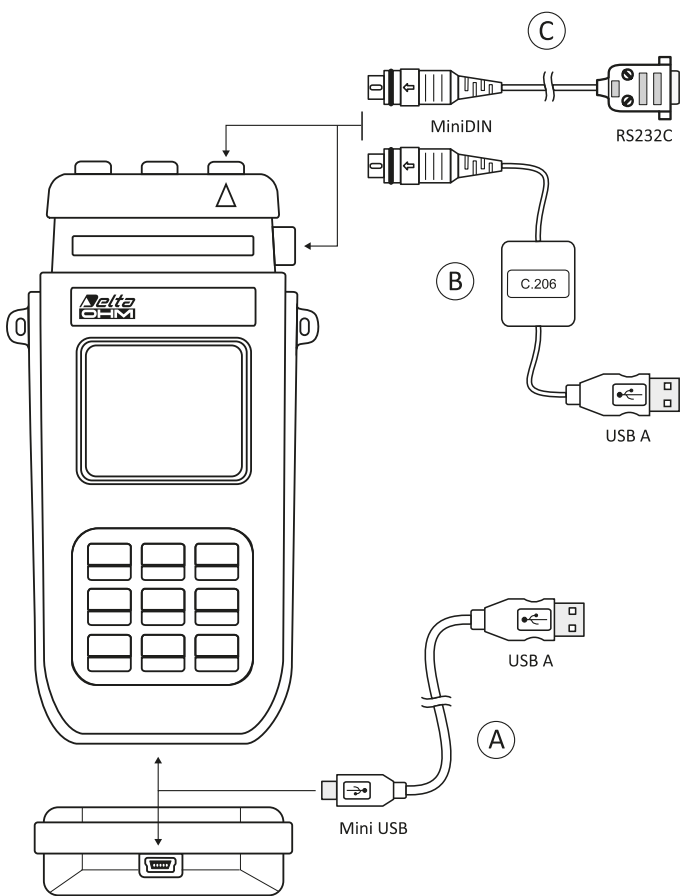
**HD2110CSNM:** 8-pole connection cable MiniDin - Sub D 9-pole female for RS232C.

**C.206:** Cable for instruments of the serie HD21...1 to connect directly to USB input of PC.

**SWD10:** Stabilized at 230Vac/12Vdc-1000mA mains .

**HD40.1:** Upon request, portable, serial input, 24 column thermal printer, 58mm paper width. Use cable HD 2110 CSNM (option).

For all Pt100, Pt1000 and thermocouple probes, see from **pag.30** onwards



**A** The portable data logger HD2178.2 is equipped with HID ( Human Interface device ) type USB port with mini USB connector.

For the connection to a PC with the CP23 cable it is not necessary to load any USB driver.

**B** For the connection of the model HD2178.1 to the USB port of a PC, is necessary the USB/serial converter C.206. The converter is supplied with its own drivers which must be installed before the connection of the converter to the PC.

**C** The port with the miniDin connector is a serial port type RS232C. The serial port RS232C of a PC or the printer HD40.1 can be connected by the cable HD2110CSNM.



HD2178



SWD10

## TEMPERATURE PROBES – RESISTANCE THERMOMETERS

Delta OHM offers a wide choice of Platinum resistance thermometers with resistance equal to 100 Ω at 0 °C and temperature coefficient α as defined by the IEC 60751 standard: Pt100, R<sub>0</sub>=100 Ω, α= 3.851·10<sup>-3</sup> °C<sup>-1</sup>.

For particular applications, probes with Pt1000 sensor or with a thermistor sensor are available. The response time τ<sub>0.63</sub> indicated for each probe is the response time of the sensor to a temperature variation, with a variation of the measured signal corresponding to the 63% of the total variation. The response times are referred:

- in water at 100 °C for immersion probes;
- to the contact with a metal surface at 200 °C for surface probes;
- to an air temperature of 100 °C for air probes.

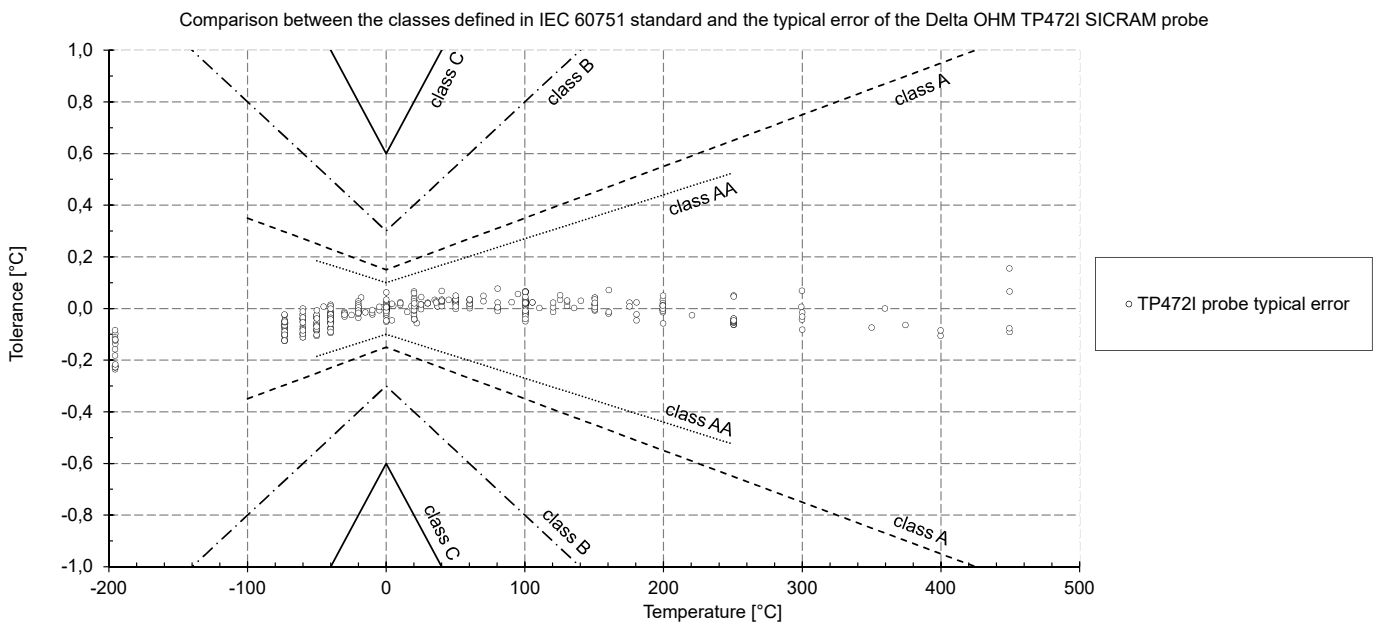
The IEC 60751:2008 standard defines the tolerance classes of the resistance thermometers as summarized in the following table:

Tolerance class	Temperature Range		Tolerance [°C]
	WIRE WOUND sensor	THIN FILM sensor	
classe AA (1/3 DIN)	from -50 °C to 250 °C	from 0 °C to 150 °C	±(0.1+0.0017· t )
classe A	from -100 °C to 450 °C	from -30 °C to 300 °C	±(0.15+0.002· t )
classe B	from -196 °C to 600 °C	from -50 °C to 500 °C	±(0.3+0.005· t )
classe C	from -196 °C to 600 °C	from -50 °C to 600 °C	±(0.6+0.01· t )

On request, the probes can be assembled with a compatible connector chosen from TP471 and TP47.

The TP471 connector developed by Delta OHM contains an electronic module (**SICRAM**) that allows the probe error to be adjusted. During the Quality Control, the probes provided with this module are individually checked in our laboratories, linearizing the characteristic and allowing more stringent accuracy over the entire working range.

The following graph shows the Delta OHM SICRAM module probe TP472I typical error values obtained from the calibrations performed in our ISO17025 calibration laboratory. The graph highlights the effectiveness of the linearization performed on the probes.



Tolerance as a function of temperature. The temperature range refers to the platinum wire wound probes.

Tolerance [°C]	Temperature [°C]										
	-196	-100	-50	0	100	250	300	350	450	500	600
class AA	---	± 0.27	± 0.19	± 0.10	± 0.27	± 0.53	± 0.61	± 0.70	---	---	---
class A	---	± 0.35	± 0.25	± 0.15	± 0.35	± 0.65	± 0.75	± 0.85	± 1.05	---	---
class B	± 1.28	± 0.80	± 0.55	± 0.30	± 0.80	± 1.55	± 1.80	± 2.05	± 2.55	± 2.80	± 3.30
class C	± 2.56	± 1.60	± 1.10	± 0.60	± 1.60	± 3.10	± 3.60	± 4.10	± 5.10	± 5.60	± 6.60
accuracy TP472I	± 0.30	± 0.30	± 0.20	± 0.10	± 0.20	± 0.20	± 0.30	± 0.30	± 0.30	± 0.30	---

By means of the calibration, the purchased instrument can be metrologically characterized, determining the systematic error of the thermometer and ensuring at the same time the traceability to international standards. Delta OHM Laboratories are able to provide this service by issuing calibration reports according to ISO 9001 or ACCREDIA LAT certificates in compliance with ISO/IEC 17025 standard, recognized internationally through ILAC MRA agreements.



LAT N° 124

Temperature - Humidity - Pressure - Air speed  
Photometry/Radiometry - Acoustics

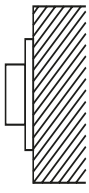
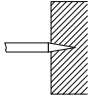
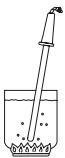






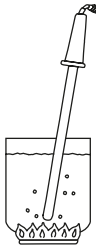

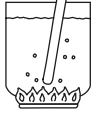
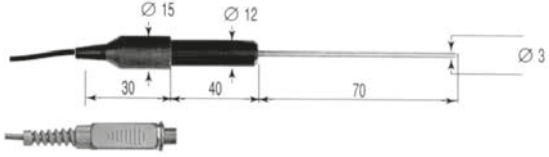
**Pt100 PROBES WITH TP471 SICRAM MODULE**

CODE	T (°C)	ACCURACY	USE	$\tau_{0.63}$	DIMENSIONS
TP472I	-196 +500	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		3s	
TP472I.O	-50 +300	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		3s	
TP473P.I	-50 +400	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		5s	
TP473P.O	-50 +300	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)			
TP474C.O	-50 +300	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		5s	
TP475A.O	-50 +250	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C)		12s	
TP472I.5	-50 +400	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		3s	
TP472I.10	-50 +400	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		3s	
TP49A.I	-70 +250	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		3,5s	
TP49AC.I	-70 +250	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		5,5s	
TP49AP.I	-70 +250	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C)		4s	
TP87.O	-50 +200	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250 °C)		3s	




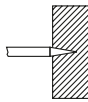
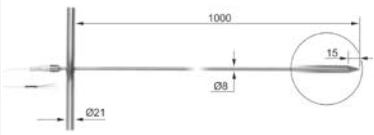
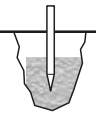
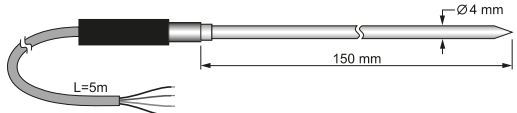
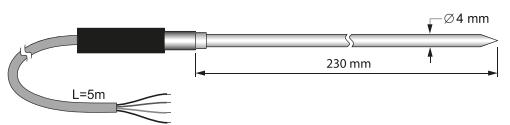
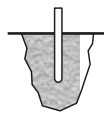
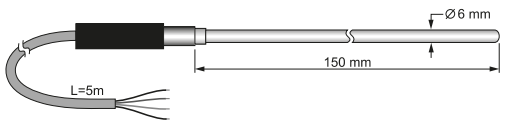

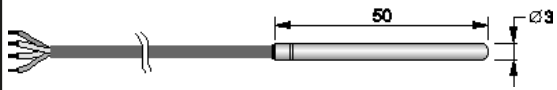
Pt100 PROBES WITH TP471 SICRAM MODULE

CODE	T (°C)	ACCURACY	USE	$\tau_{0.63}$	DIMENSIONS
TP878.O	-40 +85	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250°C)		60s	Contact probe for solar panels, with SICRAM module. Cable L = 2 m
TP878.1.O	-40 +85	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250°C)			Contact probe for solar panels, with SICRAM module. Cable L = 5 m
TP879.O	-20 +120	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250°C)		60s	Penetration probe for compost, with SICRAM module. Cable L = 5 m
TP880/300.I	-50 +450	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250°C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		60s	Mignon head, cable length = 2m
TP880/600.I	-50 +450	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250°C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		60s	Mignon head, cable length = 2m
TP35.5AF.5S	-110 +180	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250°C) $\pm 0.3$ °C (t < -50 °C; t > 250 °C)		3s	 Cable L = 5 m. Shield in Inox + PTFE
TP875.I					Globe-thermometer probe for measurement of radiant heat with $\varnothing 150$ mm. Accuracy according to ISO 7243 ISO 7726. Pt100 sensor, 4-wire cable L=2 m. Supplied with SICRAM module.
TP876.I	-30 +120	$\pm 0.1$ °C (@ 0 °C) $\pm 0.2$ °C (-50 °C $\leq$ t $\leq$ 250°C)		15'	Globe-thermometer probe for measurement of radiant heat with $\varnothing 50$ mm. Accuracy according to ISO 7243 ISO 7726. Pt100 sensor, 4-wire cable L=2 m. Supplied with SICRAM module.


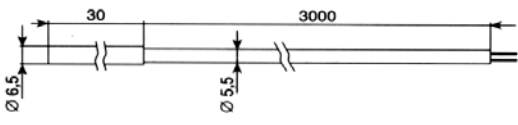

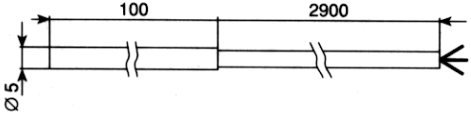
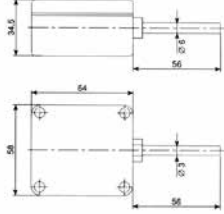
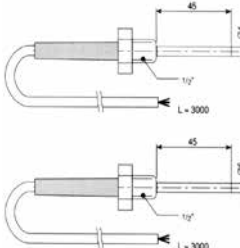
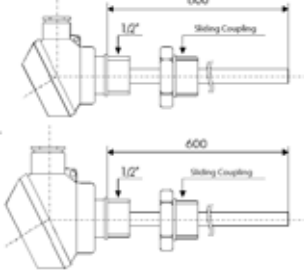
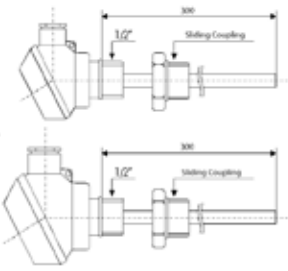
**Pt100/Pt1000 PROBES WITH TP47 CONNECTOR WITHOUT SICRAM MODULE**

CODE	T (°C)	CLASS	USE	$\tau_{0.63}$	DIMENSIONS
TP47.100.O (Pt100)	-50 +250	Class A		3s	
TP47.1000.O (Pt1000)					
TP87.100.O (Pt100)	-50 +200	Class A		3s	
TP87.1000.O (Pt1000)					



**Pt100 PROBES ENDING WITH FREE WIRES**

TP875.1.I	-30 +120	Class A		15s	Globe-thermometer probe for measurement of radiant heat with Ø150mm. Accuracy according to ISO 7243 ISO 7726. Pt100 sensor, 4-wire cable L=2 m.
TP876.1.I					Globe-thermometer probe for measurement of radiant heat with Ø50mm. Accuracy according to ISO 7243 - ISO 7726. Pt100 sensor, 4-wire cable L=2 m.
TP878.1SS.O	-40 +85	Class A		60s	Contact probe for solar panels 4-wire cable L = 5 m 
TP879.1.O	-20 +120	Class A		60s	Penetration probe for compost 4-wire cable L = 5 m 
TP32MT.1P.I	-40 +100	Class A		40s	
TP32MT.1P.2	-50 +250	Class A		40s	
TP32MT.2.I	-40 +100	Class A		60s	
TP35.5AF.5	-110 +180	Class A		3s	 Cable L = 5 m. Shield in Inox + PTFE

**TEMPERATURE PROBES FOR INDUSTRIAL USE**

CODE	T (°C)	CLASS	USE	$\tau_{0.63}$	DIMENSIONS
HD882/EK (KTY81)	-40 +150	Not applicable		5s	
HD882/ E/100 (Pt100)	-50 +300	Class A		5s	
HD882/GK (KTY81)	-50 +100	Not applicable	Environmental	5s	
HD882/G100 (Pt100)	-50 +100	Class A	Environmental	5s	
HD882/L104 (Pt100)	0 +250	Class A	Process Thread	7s	
HD882/L106 (Pt100)	0 +250	Class A	Process Thread	15s	
HD882M100/600 (Pt100)	-50 +450	Class A	Process Thread - Miniature Head	15s	
HD882DM100/600 (Pt100)	-50 +450	Class A	Process Thread - DIN B Head	15s	
HD882M100/300 (Pt100)	-40 +100	Class A	Process Thread - Miniature Head	15s	
HD882DM100/300 (Pt100)	-50 +250	Class A	Process Thread - DIN B Head	15s	

**CONNECTORS**

TP47	Connector without SICRAM module. It can be connected to 4-wire Pt100 probes (and 3-wire with some instruments) or 2-wire Pt1000 probes.	
TP471	Connector with SICRAM electronic module for the connection of resistance thermometers and the correction of the characteristic of the sensor. It can be connected to 3-wire or 4-wire Pt100Ω platinum temperature probes. assembling and calibration only in Delta OHM	



# TEMPERATURE PROBES – THERMOCOUPLES

Delta OHM offers a wide choice of K-type thermocouples, meeting the characteristics defined by the IEC 60584 standard.

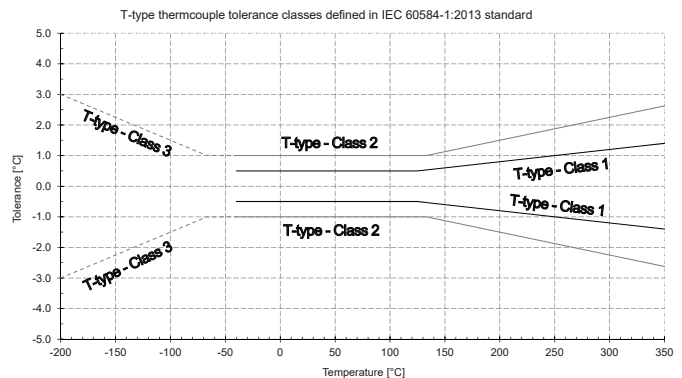
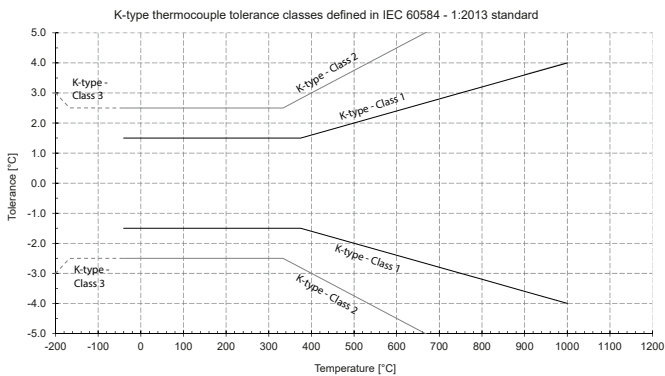
The response time  $\tau_{0.63}$  indicated for each probe is the reaction time of the sensor to a temperature variation, with a variation of the measured signal corresponding to the 63% of the total variation. The response times are referred:

- in water at 100 °C for immersion probes;
- to the contact with a metal surface at 200 °C for surface probes;
- to an air temperature of 100 °C for air probes.

The IEC 60584-1:2013 standard defines the tolerance classes of the thermocouples as summarized in the following table:

Thermocouple Type	Class 1		Class 2		Class 3	
	Tolerance <sup>1</sup>	Temp. range	Tolerance <sup>1</sup>	Temp. range	Tolerance <sup>1</sup>	Temp. range
T	0.5 °C or 0.004· t	-40 °C...+350 °C	1 °C or 0.0075· t	-40 °C...+350 °C	1 °C or 0.015· t	-200 °C...+40 °C
E	1.5 °C or 0.004· t	-40 °C...+800 °C	2.5 °C or 0.0075· t	-40 °C...+900 °C	2.5 °C or 0.015· t	-200 °C...+40 °C
J		-40 °C...+750 °C		---	---	
K		-40 °C...+1000 °C		-40 °C...+1200 °C	2.5 °C or 0.015· t	-200 °C...+40 °C
N		-40 °C...+1000 °C		-40 °C...+1200 °C		-200 °C...+40 °C
R	1 °C	0 °C...+1100 °C	1.5 °C or 0.0025· t	0 °C...+1600 °C	---	---
S	[1+0.003·(t-1100)]	+1100 °C...+1600 °C		0 °C...+1700 °C	---	---
B	---	---		+600 °C...+1700 °C	4 °C or 0.005· t	600 °C...+1700 °C
C	---	---		+426 °C...+2315 °C	---	---
A	---	---	0.01· t	+1000 °C...+2500 °C	---	---

<sup>1</sup> Tolerance is expressed as a numerical value or as a function of temperature. The greater of the two values is valid



The elements that make up the thermocouple wires, with their respective polarity, are shown below.

Thermocouple type	Alloy standard elements and composition	
	Positive conductor	Negative conductor
R	Platinum – 13 % Rhodium	Platinum
S	Platinum – 10 % Rhodium	Platinum
B	Platinum – 30 % Rhodium	Platinum
J	Iron	Copper - Nickel
T	Copper	Copper - Nickel
E	Nickel - Chrome	Copper - Nickel
K	Nickel - Chrome	Nickel - Aluminium
N	Nickel - Chrome - Silicon	Nickel - Silicon
C	Tungsten - 5 % Rhenium	Tungsten - 26 % Rhenium
A	Tungsten - 5 % Rhenium	Tungsten - 20 % Rhenium

By means of the calibration, the purchased instrument can be metrologically characterized, determining the systematic error of the thermometer and ensuring at the same time the traceability to international standards. Delta OHM Laboratories are able to provide this service by issuing calibration reports according to ISO 9001 or ACCREDIA LAT certificates in compliance with ISO/IEC 17025 standard, recognized internationally through ILAC MRA agreements.



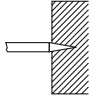
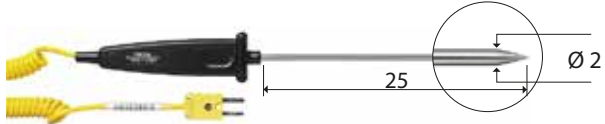
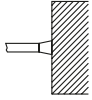

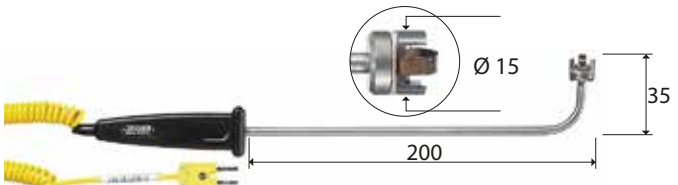
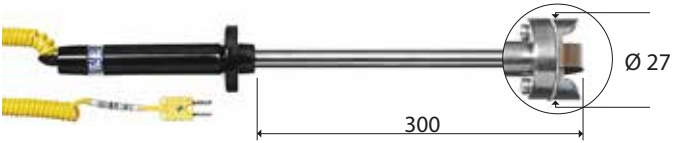
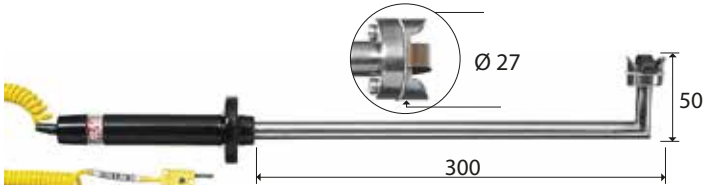

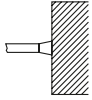
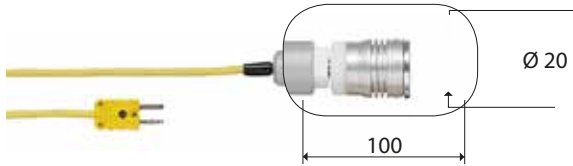

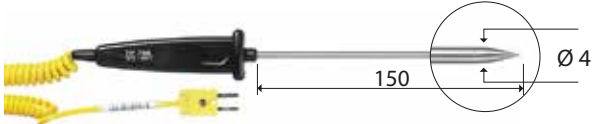
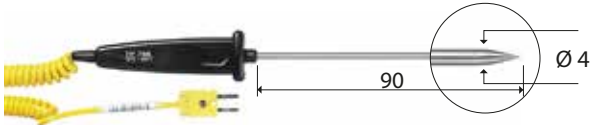
LAT N° 124

Temperature - Humidity - Pressure - Air speed  
Photometry/Radiometry - Acoustics

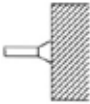
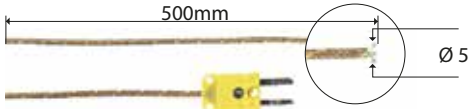

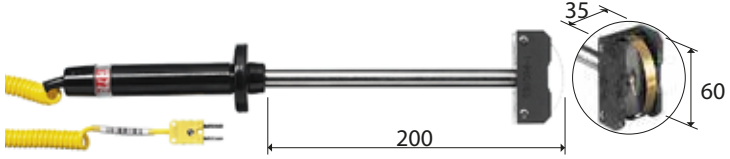
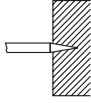

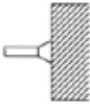
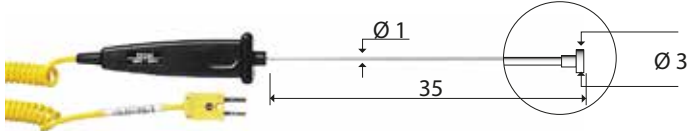
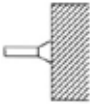
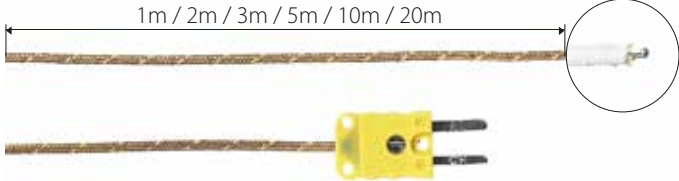




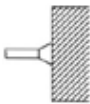


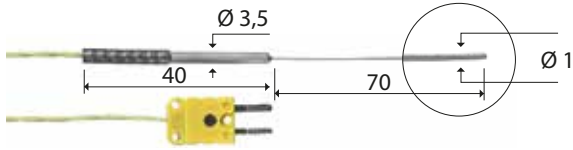
**"K" type THERMOCOUPLES - Chromel (Ni-Cr) / Almel (Ni-Al) - Class 1**

CODE	T <sub>max</sub> (°C)	USE	τ <sub>0,63</sub>	DIMENSIONS
TP741	+800		2s	
TP741/1	+400		2s	
TP741/2	+800		2s	
TP742	+800		2s	
TP742/1	+400		2s	
TP742/2	+800		2s	
TP743	+800		3s	
TP744	+400		4s	
TP745	+500		5s	
TP746	+250		2s	
TP750	+1000		3s	
TP750.0	+800		3s	


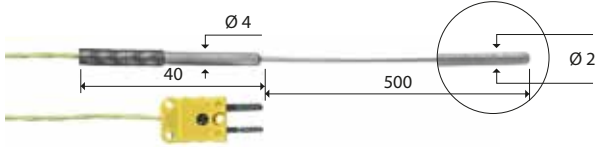
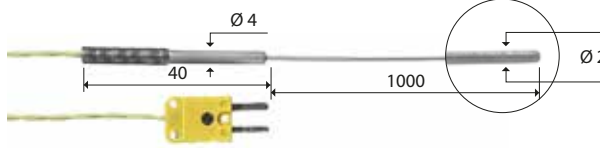

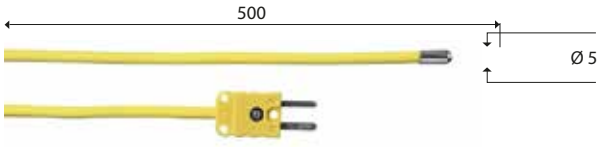
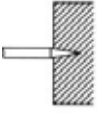
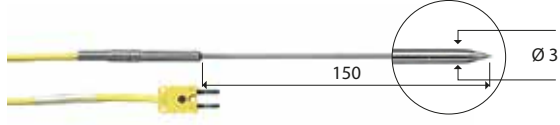
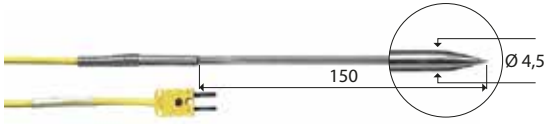


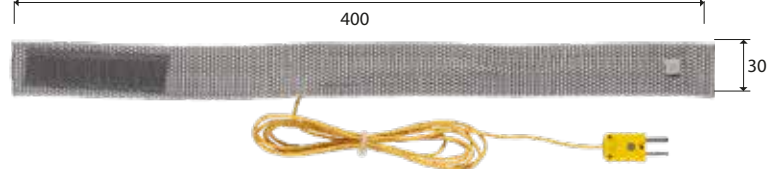

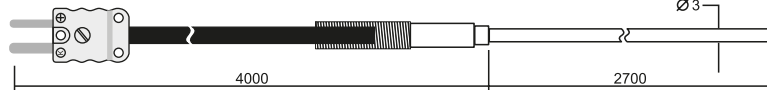
**"K" type THERMOCOUPLES - Chromel (Ni-Cr) / Almel (Ni-Al) - Class 1**

CODE	T <sub>max</sub> (°C)	USE	τ <sub>0.63</sub>	DIMENSIONS
TP751	+200		2s	
TP754	+500		2s	
TP754/9	+500		2s	
TP755	+800		2s	
TP755/9	+800		2s	
TP756	+200			2s
TP757	+180		30s	Magnetic probe for contact measurements on magnetic metal surfaces 
TP758	+400		4s	
TP758.1	+400		4s	




"K" type THERMOCOUPLES - Chromel (Ni-Cr) / Alumel (Ni-Al) - Class 1

TP772	+400		3s	
TP774	+250		2s	
TP776	+200		2s	
TP777	+200		3s	
TP647	+300		2s	Fiberglass cable
TP647/2				
TP647/3				
TP647/5				
TP647/10				
TP647/20				
TP651	+1200		6s	
TP652	+1200		6s	
TP655	+180		2s	
TP656	+200		1s	

**"K" type THERMOCOUPLES - Chromel (Ni-Cr) / Almel (Ni-Al) - Class 1**

CODE	T <sub>max</sub> (°C)	USE	τ <sub>0.63</sub>	DIMENSIONS
TP656/1	+1000		1s	
TP656/2	+1000		1s	
TP657/1	+100		5s	
TP659	+400		3s	
TP660	+400		4s	
TP661	+50		30s	
TP662	+180		120s	 Strap probe with velcro for measurements on pipes with Ø max 110 mm
TP663	+1050		3s	

**THERMOCOUPLE CONNECTORS AND CABLES**

CM CS	"K"	 CS	 CM
PW	"K"	 Cable Length: 2m/5m/10m/15m/20m	