



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 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 multi-standard RS232C serial port and a USB 2.0 port. It is possible to configure the storage interval, the printing and the baud rate by the menu. HD2178.1 and HD2178.2 are equipped with RS232C serial port and are able to transfer the acquired measures, in real time, into a PC or a portable printer. 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 IP67 protection degree.**

TECHNICAL SPECIFICATIONS OF THE INSTRUMENTS

Instrument

Dimensions (Length x Width x Height)	185x90x40mm
Weight	470g (complete with Batteries)
Materials	ABS, rubber
Display	2x4½ digits plus symbols Visible area: 52x42mm

Operating conditions

Operating temperature	-5 ... 50°C
Storage temperature	-25 ... 65°C
Working relative humidity	0 ... 90% RH, no condensation
Protection degree	IP67

Power supply

Batteries	4 Batteries 1.5V type AA
Autonomy	200 hours with 1800mAh alkaline batteries
Current consumption with instrument off	20µA
Main	12Vdc / 1000mA Output main adapter

<i>Unit of measurement</i>	°C - °F
<i>Security of data stored</i>	Unlimited, independent of battery charge conditions 1min/month max drift
<i>Time</i>	
Date and time	Schedule in real time
Accuracy	1min/month max drift
<i>Measured values storage - model HD2178.2</i>	
Type	2000 pages each one containing 40 samples
Quantity	80000 samples in total
Storage interval	1s ... 3600s (1 hour)
<i>Serial interface RS232C</i>	
Type	RS232C electrically isolated
Baud rate	can be set from 1200 to 38400 baud
Data bit	8
Parity	None
Stop bit	1
Flow Control	Xon/Xoff
Serial cable length	Max 15m
Immediate print interval	1s ... 3600s (1 hour)
<i>USB interface - model HD2178.2</i>	
Type	1.1 - 2.0 electrically isolated
<i>Connections</i>	
Input for probes	8 pole male DIN45326 connector
Serial and USB interface	8-pole MiniDin connector
Mains adapter	2-pole connector (positive at centre)

Temperature measurement by instrument - RTD sensors

Pt100 Measuring range	-200...+650°C
Pt1000 Measuring range	-200...+650°C
Resolution	0.1°C
Accuracy	±0.05°C
Drift after 1 year	0.1°C/year

Temperature measurement by instrument - Tc

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
Resolution	0.1°C
Instrument accuracy	
Thermocouple K	±0.1°C up to 600°C ±0.2°C over 600°C
Thermocouple J	±0.05°C up to 400°C ±0.1°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
	±0.15°C over 300°C

Accuracy is referred to the instrument only; error due to the thermocouple or to the cold junction reference sensor is not included.

Temperature drift @20°C	0.02%/°C
Drift after 1 year	0.1°C/year

Thermocouple probes accuracy:

Tolerance of a type of thermocouple corresponds to the maximum acceptable shift from the e.m.f. of any thermocouple of that type, with reference junction at 0°C. The tolerance is expressed in degrees Celsius, preceded by the sign. The percentage tolerance is given by the ratio between the tolerance expressed in degrees Celsius and the measurement junction temperature, multiplied by one hundred. The tolerances refer to the operating temperature expected for the thermocouple, in agreement with the thermo-elements' diameter. Those thermocouples that comply with the limits for temperatures over 0°C, do not necessarily comply with the limits for ranges below 0°C.



HD2178



SWD10

Tolerance classes for thermocouples (reference junction at 0°C)

Type of thermocouple	Tolerance Class 1	Tolerance Class 2	Tolerance Class 3 ⁽¹⁾
Type T Temperature interval Tolerance Temperature interval Tolerance	from -40 to +125°C ± 0.5°C from 125 to 350°C ± 0.004 · ltr	from -40 to +133°C ± 1°C from 133 to 350°C ± 0.0075 · ltr	from -67 to +40°C ± 1°C from -200 to -67°C ± 0.015 · ltr
Type E Temperature interval Tolerance Temperature interval Tolerance	from -40 to +375°C ± 1.5°C from 375 to 800°C ± 0.004 · ltr	from -40 to +333°C ± 2.5°C from 333 to 900°C ± 0.0075 · ltr	from -167 to +40°C ± 2.5°C from -200 to -167°C ± 0.015 · ltr
Type J Temperature interval Tolerance Temperature interval Tolerance	from -40 to +375°C ± 1.5°C from 375 to 750°C ± 0.004 · ltr	from -40 to +333°C ± 2.5°C from 333 to 750°C ± 0.0075 · ltr	- - - -
Type K, type N Temperature interval Tolerance Temperature interval Tolerance	from -40 to +375°C ± 1.5°C from 375 to 1000°C ± 0.004 · ltr	from 40 to +333°C ± 2.5°C from 333 to 1200°C ± 0.0075 · ltr	from -167 to +40°C ± 2.5°C from -200 to -167°C ± 0.015 · ltr
Type R, type S Temperature interval Tolerance Temperature interval Tolerance	from 0 to +1100°C ± 1°C from 1100 to 1600°C ± [1 + 0.003 (t-1 100)] °C	from 0 to +600°C ± 1.5°C from 600 to 1600°C ± 0.0025 · ltr	- - - -
Type B Temperature interval Tolerance Temperature interval Tolerance	- - - -	- - from 600 to 1700 °C ± 0.0025 · ltr	from +600 to +800C + 4°C from 800 to 1700°C ± 0.005 · ltr

⁽¹⁾ Materials for thermocouples are generally supplied so to comply with the factory tolerances specified in the table for temperatures over -40°C. However these materials can sometimes not comply with the factory tolerances for the low temperatures reported under Class 3, for thermocouples of T, E, K and N type, when thermocouples have to comply at the same time the limits of Class 3 and Class 1 and/or Class 2.

TECHNICAL DATA OF PROBES AND MODULES EQUIPPED WITH INSTRUMENT
Temperature probes Pt100 sensor with SICRAM module

Model	Type	Application field	Accuracy
TP472I	Immersion	-196°C...+500°C	±0.25°C (-196°C...+350°C) ±0.4°C (+350°C...+500°C)
TP472I.0	Immersion	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P.0	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C.0	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP475A.0	Air	-50°C...+250°C	±0.3°C (-50°C...+250°C)
TP472I.5	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP472I.10	Immersion	-50°C...+400°C	±0.30°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49A	Immersion	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AC	Contact	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AP	Penetration	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP875	Globe-thermometer Ø150mm	-30°C...+120°C	±0.25°C
TP876	Globe-thermometer Ø 50mm	-30°C...+120°C	±0.25°C
TP87	Immersion	-50°C...+200°C	±0.25°C
TP878 TP878.1	For solar panels	+5°C...+80°C	±0.25°C
TP879	For compost	-20°C...+120°C	±0.25°C

Common features
Temperature drift @20°C 0.003%/°C

4 wires Pt100 and 2 wires Pt1000 Probes

Model	Type	Application field	Accuracy
TP47.100	4 wires Pt100	-50...+400°C	Class A
TP47.1000	2 wires Pt1000	-50...+400°C	Class A

Common features
Temperature drift @20°C
Pt100 0.003%/°C
Pt1000 0.005%/°C

PURCHASING CODES

HD2178.1: The kit consists of instrument HD2178.1, 4 per 1.5V alkaline Batteries, instruction manual and case, software DeltaLog9. **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, software DeltaLog9. **Probes and cables 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 series HD21...1 and .2 to connect directly to USB input of PC.
HD2101/USB: Connection cable USB 2.0 connector type A - 8-pole MiniDin.
DeltaLog9: Software for download and management of the data on PC using Windows 98 to XP and Vista operating systems.
SWD10: Stabilized power supply at 230Vac/12Vdc-300mA-1000mA mains voltage.
HD40.1: Upon request, portable, serial input, 24 column thermal printer, 58mm paper width.

Probes equipped with SICRAM module

TP472I: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 300 mm. Cable 2 meters long.
TP472I.0: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 230 mm. Cable 2 meters long.
TP473P: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.
TP473P.0: Penetration probe, Pt100sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.
TP474C: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.
TP474C.0: Contact probe, Pt100sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.
TP475A.0: Air probe, Pt100sensor. Stem Ø 4mm, length 230mm. Cable 2 meters long.
TP472I.5: Immersion probe, Pt100sensor. Stem Ø 6mm, length 500 mm. Cable 2 meters long.
TP472I.10: Immersion probe, Pt100sensor. Stem Ø 6mm, length 1,000mm. Cable 2 meters long.
TP49A: Immersion probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.
TP49AC: Contact probe, Pt100sensor. Stem Ø 4 mm, length 150mm. Cable 2 meters long. Aluminium handle.
TP49AP: Penetration probe, Pt100sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.
TP875: Globe thermometer Ø 150 mm with handle. Cable 2 meters long.
TP876: Globe thermometer Ø 50 mm with handle. Cable 2 meters long.
TP87: Immersion probe, Pt100sensor. Stem Ø 3 mm, length 70 mm. Cable 2 meters long.
TP878: Contact probe for solar panels. Cable 2 meters long.
TP878.1: Contact probe for solar panels. Cable 5 meters long
TP879: Penetration probe for compost. Stem Ø 8 mm, length 1 meter. Cable 2 meters long.

Temperature probes without SICRAM module

TP47.100: Direct 4 wires Pt100 sensor immersion probe. Stem Ø 3 mm, length 230mm. 4 wires connection cable with connector, 2 meters long.
TP47.1000: Pt1000 sensor immersion probe. Stem Ø 3 mm, length 230mm. 2 wires connection cable with connector, 2 meters long.
TP47: Only connector for probe connection: direct 3 and 4 wires Pt100, 2 wires Pt1000.

Thermocouple probes
Any thermocouple probe with standard miniature connector available on the price list can be connected to these instruments.
Please see pages from 17 to 21.



Temperature