HD 2178.1
HD 2178.2

Operating conditions

Operating temperature	-5 … 50°C
Storage temperature	-25 … 65°C
Working relative humidity	0 … 90% RH, no condensation
Protection degree	**IP66**

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

Unit of measurement   °C - °F

Security of stored data   Unlimited, independent of battery charge conditions

Time

Date and time	In real time
Accuracy	1min/month max drift

Measured values storage - model HD2178.2

Type	2000 pages each one containing 40 samples
Quantity	80000 samples in total
Storage interval can be selected between	1,5,10,15,30 s.; 1,2,5,10,15,20,30 min.; 1 hour

Serial interface RS232C

Type	RS232C galvanically 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
Print interval	Immediate or can be selected between 1,5,10,15,30 s.; 1,2,5,10,15,20,30 min.; 1 hour

USB interface - model HD2178.2

Type	1.1 - 2.0 electrically isolated

Connections

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)

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	±0.1°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

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 RS232C serial port or a USB 2.0 port. It is possible to configure the storage interval, the printing and the baud rate by the menu. All models are equipped with RS232C serial port and are able to transfer the acquired measures, in real time, to 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 IP66 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

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.

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 · t	from -40 to +133°C ± 1°C from 133 to 350°C ± 0.0075 · t	from -67 to+40°C ± 1°C from -200 to -67°C ± 0.015 · t
Type E Temperature interval Tolerance Temperature interval Tolerance	from -40 to +375°C ± 1.5°C from 375 to 800°C ± 0.004 · t	from -40 to +333°C ± 2.5°C from 333 to 900°C ± 0.0075 · t	from -167 to +40°C ± 2.5°C from -200 to -167°C ± 0.015 · t
Type J Temperature interval Tolerance Temperature interval Tolerance	from -40 to +375°C ± 1.5°C from 375 to 750°C ± 0.004 · t	from -40 to +333°C ± 2.5°C from 333 to 750°C ± 0.0075 · t	- - - -
Type K Temperature interval Tolerance Temperature interval Tolerance	from -40 to +375°C ± 1.5°C from 375 to 1000°C ± 0.004 · t	from 40 to +333°C ± 2.5°C from 333 to 1200°C ± 0.0075 · t	from -167 to+40°C ± 2.5°C from -200 to -167°C ± 0.015 · t

[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…+300°C) ±0.5°C (+300°C…+500°C)
TP472I.0 1/3 DIN Thin Film	Immersion	-50°C…+300°C	±0.25°C (-50°C…+300°C)
TP473P.I	Penetration	-50°C…+400°C	±0.25°C (-50°C…+300°C) ±0.5°C (+300°C…+400°C)
TP473P.0 1/3 DIN Thin Film	Penetration	-50°C…+300°C	±0.25°C (-50°C…+300°C)
TP474C.I	Contact	-50°C…+400°C	±0.3°C (-50°C…+300°C) ±0.5°C (+300°C…+400°C)
TP474C.0 1/3 DIN Thin Film	Contact	-50°C…+300°C	±0.3°C (-50°C…+300°C)
TP475A.0 1/3 DIN Thin Film	Air	-50°C…+250°C	±0.3°C (-50°C…+250°C)
TP472I.5	Penetration	-50°C…+400°C	±0.3°C (-50°C…+300°C) ±0.6°C (+300°C…+400°C)
TP472I.10	Penetration	-50°C…+400°C	±0.30°C (-50°C…+300°C) ±0.6°C (+300°C…+400°C)
TP49A.0 Class A Thin Film	Immersion	-70°C…+250°C	±0.3°C (-70°C…-50°C) ±0.25°C (-50°C…+250°C)
TP49AC.0 Class A Thin Film	Contact	-70°C…+250°C	±0.3°C (-70°C…-50°C) ±0.25°C (-50°C…+250°C)
TP49AP.0 Class A Thin Film	Penetration	-70°C…+250°C	±0.3°C (-70°C…-50°C) ±0.25°C (-50°C…+250°C)
TP875.I	Globe-thermometer Ø150mm	-30°C…+120°C	±0.25°C
TP876.I	Globe-thermometer Ø50mm	-30°C…+120°C	±0.25°C
TP87.0 1/3 DIN Thin Film	Immersion	-50°C…+200°C	±0.25°C
TP878.0 1/3 DIN Thin Film TP878.1.0 1/3 DIN Thin Film	Photovoltaic	+4°C…+85°C	±0.25°C
TP879.0 1/3 DIN Thin Film	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
TP47.100.0 1/3 DIN Thin Film	4 wires Pt100	-50…+250°C	1/3 DIN
TP47.1000.0 1/3 DIN Thin Film	2 wires Pt1000	-50…+250°C	1/3 DIN
TP87.100.0 1/3 DIN Thin Film	4 wires Pt100	-50…+200°C	1/3 DIN
TP87.1000.0 1/3 DIN Thin Film	2 wires Pt1000	-50…+200°C	1/3 DIN

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

HD2178

SWD10

ORDERING 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 serie HD21…1 to connect directly to USB input of PC.

CP23: Connection cable USB 2.0 connector type A- Mini USB type B.

DeltaLog9: Software for download and management of the data on PC using Windows® operating systems.

SWD10: Stabilized power supply at 230Vac/12Vdc-1000mA mains voltage.

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

Probes equipped with SICRAM module

TP472I: Immersion probe, Wire Wound Pt100 sensor. Stem Ø 3 mm, length 300 mm. Cable 2 meters long.

TP472I.0: Immersion probe, Thin Film Pt100 sensor. Stem Ø 3 mm, length 230 mm. Cable 2 meters long.

TP473P.I: Penetration probe, Wire Wound Pt100 sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP473P.0: Penetration probe, Thin Film Pt100 sensor. Stem Ø 4mm, length 150 mm. Cable 2 meters long.

TP474C.I: Contact probe, Wire Wound Pt100 sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP474C.0: Contact probe, Thin Film Pt100 sensor. Stem Ø 4mm, length 230mm, contact surface Ø 5mm. Cable 2 meters long.

TP475A.0: Air probe, Thin Film Pt100 sensor. Stem Ø 4mm, length 230mm. Cable 2 meters long.

TP472I.5: Penetration probe, Thin Film Pt100 sensor. Stem Ø 6mm, length 500 mm. Cable 2 meters long.

TP472I.10: Penetration probe, Thin Film Pt100 sensor. Stem Ø 6mm, length 1000mm. Cable 2 meters long.

TP49A.0: Immersion probe, Thin Film Pt100 sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AC.0: Contact probe, Thin Film Pt100 sensor. Stem Ø 4 mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP49AP.0: Penetration probe, Thin Film Pt100 sensor. Stem Ø 2.7mm, length 150mm. Cable 2 meters long. Aluminium handle.

TP875.I: Globe thermometer Ø 150 mm with handle. Wire Wound Pt100 sensor complete of SICRAM module. Cable 2 meters long.

TP876.I: Globe thermometer Ø 50 mm with handle. Wire Wound Pt100 sensor complete of SICRAM module. Cable 2 meters long.

TP87.0: Immersion probe, Thin Film Pt100 sensor. Stem Ø 3 mm, length 70 mm. Cable 2 meters long.

TP878.0: Contact probe for solar panels. Thin Film Pt100 sensor. Cable 2 meters long.

TP878.1.0: Contact probe for solar panels. Thin Film Pt100 sensor .Cable 5 meters long

TP879.0: Penetration probe for compost. Thin Film Pt100 sensor. Stem Ø 8 mm, length 1000mm. Cable 2 meters long.

Temperature probes without SICRAM module

TP47.100.0: Immersion probe, Thin Film Pt100 sensor probe. Stem Ø 3 mm, length 230mm. 4 wires connection cable with connector, 2 meters long.

TP47.1000.0: Thin Film 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 without SICRAM module: direct 3 and 4 wires Pt100, 2 wires Pt1000.

TP87.100.0 Immersion probe, Thin Film Pt100 sensor. Stem Ø 3 mm, length 70mm. Cable 2 meters long. 4 wires connection cable with connector 1 meter long.

TP87.1000.0 Immersion probe, Thin Film Pt100 sensor. Stem Ø 3 mm, length 70mm. Cable 2 meters long. 2 wires connection cable with connector 1 meter long.

A To the portable data loggers of the series **HD21….2** a serial port mini USB type HID (Human Interface Device) has been inserted.
For the connection to a PC with the cable USB type A - MiniUSB type B code CP23, **it is not necessary to load any driver USB**.

B For the connection of the models **HD21….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.(see details in the Cd-Rom supplied with the converter).

C The port with the miniDin connector included in all the models, 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.