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English

Operating manual

RTD thermometers

HD2127.1 – HD2127.2

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CONTENTS

INTRODUCTION

The **HD2127.1** and **HD2127.2** are portable instruments **with two inputs** and a large LCD display. They measure the temperature using immersion, penetration, contact or air probes.
The instruments accept input from probes with SICRAM module and Pt100 sensor or probes with direct 4-wire Pt100 sensor, 2-wire Pt1000 or 2-wire Ni1000.

The Pt100 probes are fitted with SICRAM module and the factory calibration settings are already memorized inside. Upon turning on the instrument automatically detects them.

The HD2127.2 instrument is a **datalogger**. It memorizes up to 32,000 pairs of data which can be transferred from the instrument connected to a PC via the RS232C serial port or USB 2.0 port. The storing interval, printing, and baud rate can be configured using the menu.
The HD2127.1 and HD2127.2 models are fitted with an RS232C serial port and can transfer the acquired measurements to a PC or to a portable printer in real time.
The *Max, Min* and *Avg* function calculates the maximum, minimum or average values; the A-B function calculates the difference of the temperatures measured by the two inputs A and B.
Other functions include: the relative measurement REL, the HOLD function, and the automatic turning off which can also be disabled.
The instruments have IP66 protection degree.

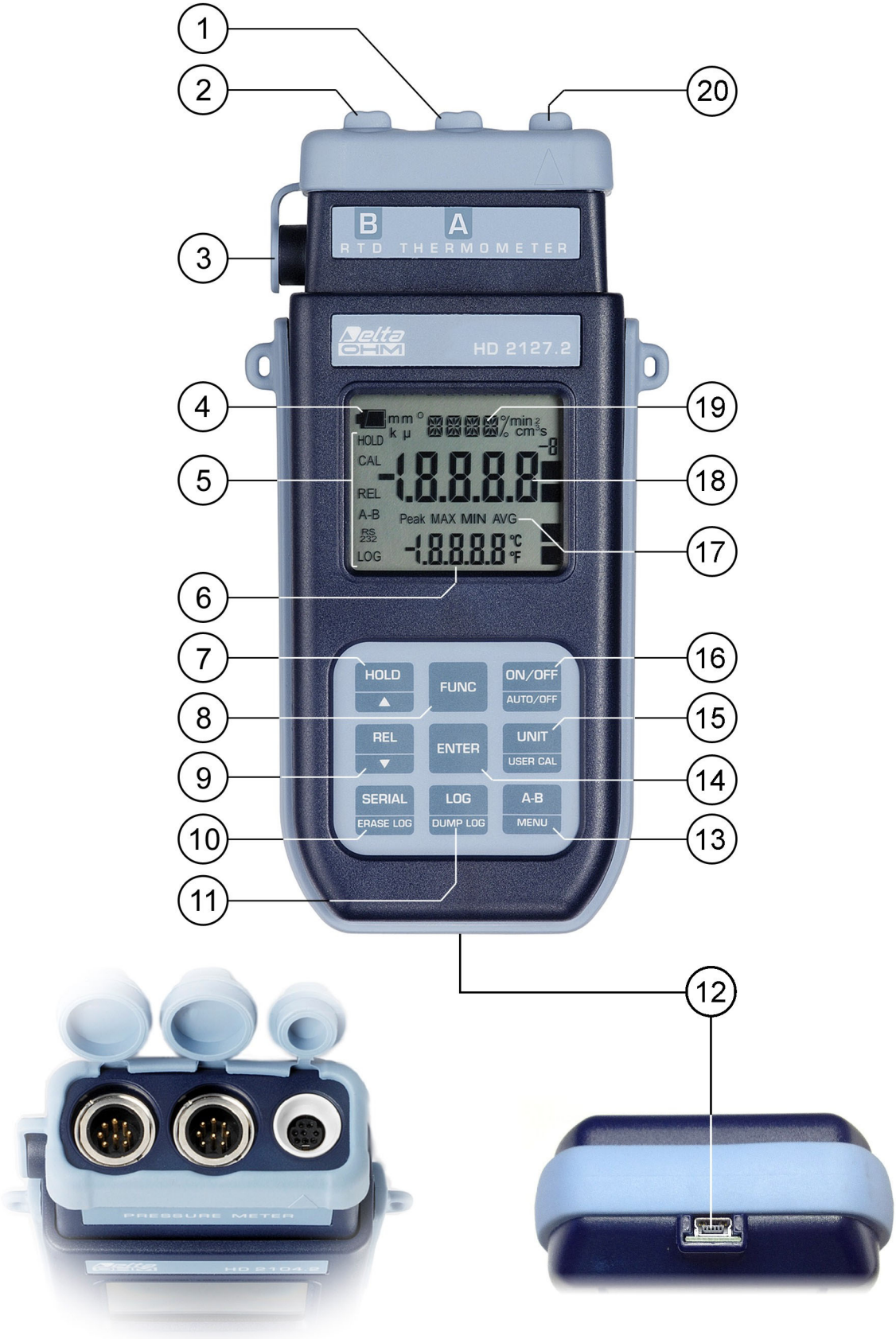
This manual describes the HD2127.1 and HD2127.2 models: if not otherwise specified, the description is intended to be applicable to both models.

Double input RTD Thermometers
HD2127.1

HD2127.1

1. Input A for probes, 8-pole DIN45326 connector. It can be connected to a Pt100 temperature probe with SICRAM module or a probe with direct 4 wire Pt100 sensor, 2 wire Pt1000 or Ni1000.
2. Input B for probes, 8-pole DIN45326 connector. It can be connected to a Pt100 temperature probe with SICRAM module or a probe with direct 4 wire Pt100 sensor, 2 wire Pt1000 or Ni1000.
3. External auxiliary power supply connector input.
4. Battery symbol: displays the battery charge level.
5. Function indicators.
6. Secondary display line.
7. **HOLD/▲** key: freezes the measurement during normal operation; in the menu, increases the current value.
8. **FUNC** key: displays the maximum (MAX), the minimum (MIN) and the average (AVG) of current measurements. When pressed together with the UNIT/USER CAL key, starts the calibration procedure for the probe connected to the instrument.
9. **REL/▼** key: enables the relative measurement (displays the difference between the current value and the logged value when the key is pressed); in the menu, decreases the current value.
10. **SERIAL** key: starts and ends the data transfer to the serial communication port.
11. **A-B** key: displays the difference between the temperatures measured at the two inputs A and B.
12. **MENU** key: allows access to and exit from the menu.
13. **ENTER** key: in the menu, confirms the current selection.
14. **UNIT/USER CAL** key: during normal operation selects the unit of measurement for the temperature between °C, °F or °K; when pressed together with the FUNC key, starts the calibration procedure of the probe connected to the instrument.
15. **ON-OFF/AUTO-OFF** key: turns the instrument on and off; when pressed together with the HOLD key, disables the automatic turn off.
16. MAX, MIN and AVG symbols.
17. Main display line.
18. Line for symbols and comments.
19. 8-pole MiniDin connector for RS232C. For the connection to PC (with cable HD2110CSNM or C206) or printer (with cable HD2110CSNM).

Double input RTD Thermometers
HD2127.2



HD2127.2

1. Input A for probes, 8-pole DIN45326 connector. It can be connected to a Pt100 temperature probe with SICRAM module or a probe with direct 4 wire Pt100 sensor, 2 wire Pt1000 or Ni1000.
2. Input B for probes, 8-pole DIN45326 connector. It can be connected to a Pt100 temperature probe with SICRAM module or a probe with direct 4 wire Pt100 sensor, 2 wire Pt1000 or Ni1000.
3. External auxiliary power supply connector input.
4. Battery symbol: displays the battery charge level.
5. Function indicators.
6. Secondary display line.
7. **HOLD/▲** key: freezes the measurement during normal operation; in the menu, increases the current value.
8. **FUNC** key: displays the maximum (MAX), the minimum (MIN) and the average (AVG) of current measurements. When pressed together with the UNIT/USER CAL key, starts the calibration procedure for the probe connected to the instrument.
9. **REL/▼** key: enables the relative measurement (displays the difference between the current value and the logged value when the key is pressed); in the menu, decreases the current value.
10. **SERIAL/ERASE LOG** key: starts and ends the data transfer to the serial communication port. In the menu, clears the data contained in the instrument's memory.
11. **LOG/DUMP LOG** key: during normal operation, starts and ends the saving of the data in the internal memory; in the menu, starts the data transfer from the instrument's memory to the PC.
12. Mini-USB type B connector for USB 2.0. For the connection to PC (with cable CP23).
13. **A-B/MENU** key: displays the difference of the temperatures measured at the two inputs A and B. When pressed together with the FUNC key, allows access to and exit from the menu.
14. **ENTER** key: in the menu, confirms the current selection.
15. **UNIT/USER CAL** key: during normal operation selects the unit of measurement for the temperature between °C, °F or °K; when pressed together with the FUNC key, starts the calibration procedure of the probe connected to the instrument.
16. **ON-OFF/AUTO-OFF** key: turns the instrument on and off; when pressed together with the HOLD key, disables the automatic turn off.
17. MAX, MIN and AVG symbols.
18. Main display line.
19. Line for symbols and comments.
20. 8-pole MiniDin connector for RS232C. For the connection to PC (with cable HD2110CSNM or C206) or printer (with cable HD2110CSNM).

KEYBOARD AND MENU DESCRIPTION

Foreword
The instrument keyboard is composed of single-function keys, like the MENU key, and double-function keys such as the ON-OFF/Auto-OFF key.
In the double-keys, the function in the upper part is the "main function", while the one in the bottom part is the "secondary function". When the instrument is in standard measurement mode, the main function is active. In the menu or in conjunction with the FUNC key, the secondary function is enabled.
The pressing of a key is accompanied by a short confirmation beep: a longer beep sounds if the wrong key is pressed.

The HD2127.1 and HD2127.2 models measure two temperatures: the temperature corresponding to input A is displayed in the main line. The temperature detected by input B is displayed in the secondary line.

Each key specific function is described in detail below.

ON-OFF/Auto-OFF key

The instrument is turned on and off using the ON/OFF key. The turning on enables all display segments for a few seconds, and then the type of calibration enabled (CAL FACT = factory calibration; CAL USER = user calibration). An auto-test follows, including the detection of the probe connected to the input, and then the instrument is ready for normal measurement.

If no probe is connected to input A, the "CH_A_NO_ SER_NUM" message appears for a few seconds in the line for symbols. Similarly, the "CH_B_NO_ SER_NUM" message is scrolled for input B.
When the probe is inserted into a functioning instrument, the "NEW_CH_A_PROB_DET" or "NEW_CH_B_PROB_DET" (New probe detected in channel A or New probe detected in channel B) message appears: as the probe's data are captured upon turning the instrument on, it is necessary to turn the instrument off and on again.
Replace the probes when the instrument is off.

Automatic turning off

The instrument has an *AutoPowerOff* function that automatically turns the instrument off after about 8 minutes if no key is pressed during the intervening time. The *AutoPowerOff* function can be disabled by holding the HOLD key pressed down during the turning on phase: the battery symbol will blink to remind the user that the instrument can only be turned off by pressing the <ON/OFF> key.
The automatic turning off function is disabled when external power is used. On the other hand, it cannot be disabled when the batteries are discharged.

FUNC key

It enables the display and logging of the maximum (MAX), minimum (MIN) and average (AVG) value of the measurements captured by the probe connected to the instrument, updating them with the acquisition of new samples. The acquisition frequency is once a second.
The MAX, MIN and AVG measurements remain in the memory until the instrument is on, even after exiting the calculation function. To reset the previous values and restart with a new measurement session, press FUNC until the message "FUNC CLR" appears, then use the arrows to select YES and confirm using ENTER.
Attention: the data captured using the Record function cannot be transferred to the PC.

HOLD/▲ key

It increases the current parameter when used in the menu; when used in measurement mode, it freezes the measurement in progress, and upon application of pressure on the key, the message **HOLD** appears in the upper side of the display. To return to the current measurement, press the key again.
Upon turning on the instrument, the *AutoPowerOff* function can be disabled by holding the MENU key down (please see the ON-OFF key description).

UNIT/UserCAL key

In measurement mode, it allows selection of the unit of measurement for the input temperature (shown in the central line of the display). By repeatedly pressing the function key, the different units of measurement are displayed in sequence:

1. °C Celsius degrees
2. °F Fahrenheit degrees
3. °K Kelvin degrees

This setting changes the information displayed and the immediate print of data (SERIAL key). **The data recorded using the LOG function (*HD2127.2*) and sent to the printer or PC through the**

serial port using the SERIAL function (*HD2127.1 and HD2127.2*), keep the chosen unit of measurement and display it.

+


Calibration of the probe and selection of the type of calibration

Simultaneous pressure on the UNIT/USER CAL and FUNC keys starts the calibration procedure of the temperature probe connected to the instrument. Please see the paragraph dedicated to calibration on page 14.
To select the type of calibration (USER=user or FACT= factory) press the UNIT/USER CAL and FUNC keys together, then use the arrows to select the desired item, and confirm using ENTER.

ENTER key

In the menu, the ENTER key confirms the current parameter and then goes to the next one.

REL/▼ key

In measurement mode, it displays the difference between the current value and that measured on pressing the key. The **REL** message appears on the display; press the key again to return to the current measurement.

When used in the menu, it decreases the current variable value.

A-B key - only for HD2127.1

It displays, in the secondary line of the display, the difference of the temperatures, measured by the probes connected to the inputs A and B, and indicates ERR if one of the probes is in error (not connected, faulty or overrange). To end the function, press the key again.

A-B/MENU key - only for HD2127.2

In measurement mode, it displays in the secondary line the difference of the temperatures measured by the probes connected to the inputs A and B, and indicates ERR if one of the probes is in error (not connected, faulty or overrange). To end the function, press the key again.
To access the instrument menu, press simultaneously the A-B/Menu and FUNC/Enter keys. Please see the description illustrated below.

MENU Key- only for HD 2127.1

The first menu item is accessed by initially pressing on the MENU key (**A-B/Menu + FUNC/Enter in the HD2127.2 model**); press ENTER to go to the following items. To modify the item displayed, use the arrow keys (▲ and ▼). The current value is confirmed by pressing the ENTER key and the display moves on to the next parameter. If pressing FUNC the setting is cancelled.
To exit the menu, press the MENU key at any time.

The menu items are listed in this order:

1) **Management of memorized data (only HD2127.2)**: the message ">>>_LOG_DUMP_or_ERAS" **(Transfer data or erase)** is scrolled in the comment line. The center figure reports the number of free memory pages (FREE). Pressing SERIAL/EraseLOG permanently erases all memory data. By pressing LOG/DumpLOG, the data transfer of the logged data on the serial port is started: the "BAUD-RATE" must have previously been set to the maximum value (please see the menu items described below and the paragraph "STORING AND TRANSFERRING DATA TO A PERSONAL COMPUTER" on page 25).
2) **CH A**: the display shows the type of probe connected to channel A:
   - "Pt100 Sicr" if the temperature probe is a Pt100 complete with SICRAM module
   - "Pt100 4W" if the probe is a direct 4-wire Pt100 complete with TP47 module.
   - "Pt1000 2W" if the probe is a direct 2-wire Pt1000 complete with TP47 module.
   - "Ni1000 2W" if the probe is a direct 2-wire Ni1000 complete with TP47 module.

   Upon turning on the instrument automatically detects the probes fitted with SICRAM module: the *Probe Type* menu item is configured to "Pt100 Sicr" and cannot be modified by the user.
   When turned on, the direct 4-wire Pt100, direct 2-wire Pt1000 and Ni1000 temperature probes display the message **"NO_PRBE_SER_NUM" (no probe serial number). In this case the probe type must be entered manually**. Select **CH A** using the MENU key and then select the type of probe used with the arrow keys; confirm using ENTER.

3) **CH B**: the display shows the type of probe connected to channel B:
   - "Pt100 Sicr" if the temperature probe is a Pt100 complete with SICRAM module
   - "Pt100 4W" if the probe is a direct 4-wire Pt100 complete with TP47 module.
   - "Pt1000 2W" if the probe is a direct 2-wire Pt1000 complete with TP47 module.
   - "Ni1000 2W" if the probe is a direct 2-wire Ni1000 complete with TP47 module.

   Upon turning on the instrument automatically detects the probes fitted with SICRAM module: the *Probe Type* menu item is configured to "Pt100 Sicr" and cannot be modified by the user.

   When turned on, the temperature probes direct 4-wire Pt100, direct 2-wire Pt1000 and Ni1000 display the message **"NO_PRBE_SER_NUM" (no probe serial number). In this case the probe type must be entered manually**. Select **CH B** using the MENU key and then select the type of probe used with the arrow keys; confirm using ENTER.

4) **Print and log interval**: sets the interval in seconds between two loggings or data transfers to the serial port. The interval can be set at 0, 1s, 5s, 10s, 15s, 30s, 60s (1min), 120s (2min), 300s (5min), 600s (10min), 900s (15min), 1200s (20min), 1800s (30min) and 3600s (1hour). **If the value 0 is set, SERIAL works on command: the sending of data to the serial port is performed each time the key is pressed**. Recording (LOG) is performed with one-second intervals even if the interval is set to 0. With an interval from 1 to 3600s, continuous data transfer is started when the SERIAL key is pressed. To end the recording (LOG) and **continuous** data transfer operations (SERIAL with an interval greater than 0), press the same key again.

5) **Sleep_Mode_LOG (Automatic turning off during recording) (only HD2127.2):** this function controls the instrument's automatic turning off during logging, occurring between the capture of a sample and the next one. When the interval is lower than 60 seconds, the instrument will always remain on. With intervals greater than or equal to 60 seconds, it is possible to turn off the instrument between loggings: it will turn on at the moment of sampling and will turn off immediately afterwards, thus increasing the battery life. Using the arrows select **YES** and confirm using **ENTER** in order to enable the automatic turning off, select **NO** and confirm to disable it and keep the instrument on continuously.
Note: even if **Sleep_Mode_LOG=YES** is selected, the instrument does not turn off for less than one minute intervals.

6) **YEAR**: to set the current year. Use the arrows to modify this parameter and confirm using ENTER.

7) **MNTH (month)**: to set the current month. Use the arrows to modify this parameter and confirm using ENTER.

8) **DAY**: to set the current day. Use the arrows to modify this parameter and confirm using ENTER.

9) **HOUR**: to set the current hour. Use the arrows to modify this parameter and confirm using ENTER.

10) **MIN**: to set the current minutes. In order to correctly synchronize the minute, it is possible to reset the seconds by pressing the UNIT key. Use the arrows to set the current minute plus one, and as soon as that minute is reached press UNIT: this synchronizes the time to the second. Press ENTER to go onto the next item.

11) **BAUD_RATE:** indicates the frequency used for the serial communication with the PC. Values from 1200 to 38400 baud. Use the arrows to modify this parameter and confirm using ENTER. **The communication between instrument and PC (or serial port printer) only works if the instrument and PC baud rates are the same**. If the USB connection is used this parameter value is automatically set (please see the details on page 25).

LOG/DumpLOG key - only HD2127.2

In measurement mode, this function starts and stops the logging of a data block to be saved in the instrument's internal memory. The data logging frequency is set in the "**Print and log interval**" menu parameter. The data logged between a start and subsequent stop represent a block.

When the logging function is on, the LOG indication is displayed, the battery symbol blinks and a beep is issued each time a logging occurs; **the battery symbol does not appear when using an external power supply**.
To end the logging, press LOG.

The HD2127.2 can turn off during logging between one capture and the next: the function is controlled by the **Sleep_Mode_LOG** parameter. When the logging interval is less than one minute, the logging instrument remains on; with an interval of at least one minute, it turns off between one capture and the next if the parameter **Sleep_Mode_LOG**=YES.

Dump LOG - only HD2127.2

To start the transfer of the data contained in the instrument internal memory via the serial port, press simultaneously the FUNC/Enter and A-B/Menu keys, and then the LOG/DumpLOG key.
Please see the paragraph dedicated to data transfer on page 25.

SERIAL key - only HD2127.1

SERIAL/EraseLOG key - only HD2127.2

In measurement mode, this function starts and stops the data transfer to the RS232C serial output.
According to the settings entered in the **Print and log interval** menu item, a single sample can be printed if **Print and log interval**=0 or a continuous indefinite printing of the measured data can be set up if **Print and log interval**=1…3600.
The printing operation is accompanied by the display of the RS232 symbol and the blinking of the battery symbol; **when using an external power supply the battery symbol does not appear**.
Press SERIAL to end the continuous printing.

Before starting the printing with SERIAL, set the baud rate. To do so, select the **Baud Rate** menu item and select the maximum value equal to 38400 baud by using the arrows. Confirm by pressing ENTER.
The DeltaLog9 software for PC will automatically set the baud rate value during connection. **If you are using a different program than DeltaLog9, be sure the baud rate is the same for both the instrument and the PC: the communication will only work in this way.**

Erase memory - only HD2127.2

Press simultaneously the FUNC/Enter and A-B/Menu keys, and then the SERIAL/ERASE LOG key, to **permanently** erase the data contained in the HD2127.2's memory.

THE PROBES

The instrument works with temperature probes fitted with the SICRAM module (with a Platinum Pt100 sensor with 100Ω resistance), with direct 4-wire Pt100 sensor, 2-wire Pt1000 or 2-wire Ni1000. The excitation current was chosen in order to minimize the sensor self-heating effects. The SICRAM module acts as an interface between the sensor on the probe and the instrument. There is a microprocessor circuit with a permanent memory inside the module that enables the instrument to recognize the type of probe connected and to read its calibration information.

The probe is detected during turn on, and this cannot be performed when the instrument is already on, therefore if a probe is connected and the instrument is on, it is necessary to turn it off and on.

TEMPERATURE MEASUREMENT

In all versions the temperature sensor is housed in the end part of the probe.

The response time for the measurement of the temperature in **air** is greatly reduced if the air is moving. If the air is still, stir the probe. The response times are longer than those for liquid measurements.

The temperature measurement by **immersion** is carried out by inserting the probe in the liquid for at least 60mm; the sensor is housed in the end part of the probe.

In the temperature measurement by **penetration** the probe tip must be inserted to a depth of at least 60mm, the sensor is housed in the end part of the probe. When measuring the temperature on frozen blocks it is convenient to use a mechanical tool to bore a cavity in which to insert the tip probe.

In order to perform a correct **contact** measurement, the measurement surface must be even and smooth, and the probe must be perpendicular to the measurement plane. A contact measurement is hard to perform due to various factors: the operator must be experienced in handling the probe and consider all the factors influencing it.
So as to obtain the correct measurement, the insertion of a drop of oil or heat-conductive paste is useful (do not use water or solvents). This method also improves the response time.

The °C, °F or °K unit of measurement can be chosen for display, printing, and logging using the UNIT/USER CAL key.

Calibration of the temperature probe connected to the instrument

To calibrate the probes correctly, the knowledge of and abiding by the physical phenomena on which the measurement is based is fundamental. This is the reason why it is recommended to abide by what is reported below carefully, and only to perform new calibrations if technically proficient and using the suitable equipment.
The probes with SICRAM module are calibrated in the factory and the calibration parameters are recorded in the module. The probes with direct input **are checked for conformity with class A tolerance** according to norm IEC751 - BS1904 - DIN43760.
The instrument is provided with the FACT (factory) calibration. The user is also able to perform a USER calibration of instrument+probe on each channel. The calibration information is saved in the instrument memory and not in the probe.
The same correction is applied to any probe connected to the input used for the user calibration: it is therefore implied that the USER calibration should only be used with a precise probe: the one used during calibration and no other probe.

To pass from the user to the factory calibration and back, press the UNIT/USER CAL and FUNC keys together, then use the arrows to select the type of calibration, and confirm using ENTER.

Calibration sequence:
The calibration can be carried out on one or two points **that should differ by at least 10°C** and be included in the probe functioning range.
Insert the probe into a thermostatic bath, the temperature of which is precisely known from a reading taken on a sample reference thermometer. Wait for the measurement to stabilize.
Press simultaneously the UNIT/USER CAL and FUNC keys, using the arrows select the USER calibration, and confirm with UNIT/USER CAL.
Use the arrows to select the input to which the probe being calibrated is connected, choosing the channel A or B: confirm with ENTER.

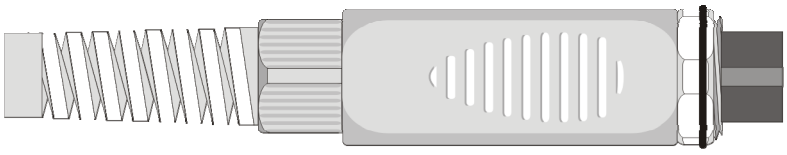
Use the arrows to select 1 (first calibration point) and confirm using ENTER. The message "UP DOWN 1st MEAS" (correct the first point using the arrows ▲/▼) is scrolled in the comment line.
The instrument display shows the measured temperature: use the arrows to correct the indicated value until it coincides with the value measured by the sample reference thermometer.
Confirm by pressing ENTER.
To exit the procedure without performing the second point, select 0 and press ENTER.

To calibrate the second point, select the point 2 using the arrows and press ENTER.
The message "UP DOWN 2nd MEAS" (correct the second point using the arrows ▲/▼) is scrolled in the comment line.
Move the probe to the second thermostatic bath and wait for the measurement to stabilize. The instrument display shows the measured temperature: use the arrows to correct the indicated value until it coincides with the value measured by the sample reference thermometer.
Confirm by pressing ENTER.

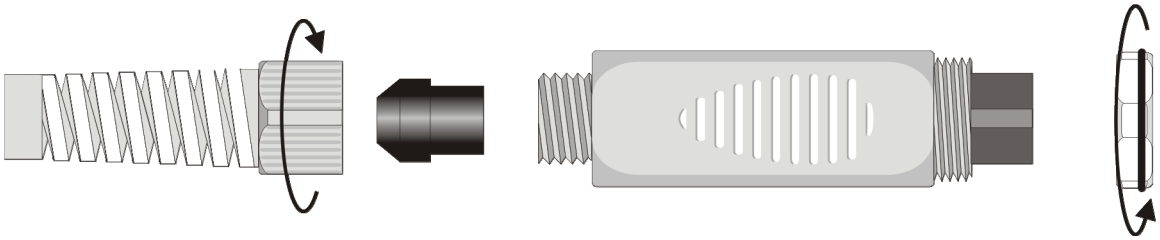
The procedure is now complete.

Instructions to connect the TP47 connector for 4-wire Pt100, 2-wire Pt1000 and Ni1000 probes

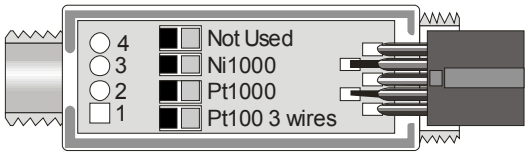
All Delta Ohm probes are provided with a connector. The HD2127.1 and HD2127.2 instruments also work with direct 4 wire Pt100, 2 wire Pt1000 and Ni1000 probes manufactured by other producers: for the instrument connection is prescribed the TP47 connector to which the probe's wires should be welded.



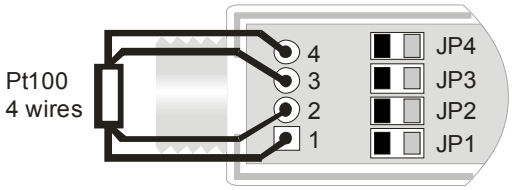
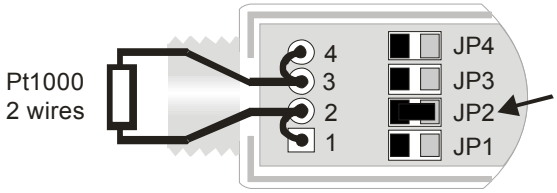
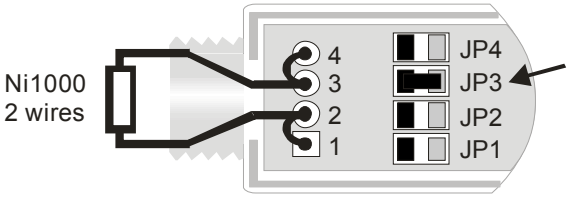
The instructions to connect the Platinum or Nickel probe to the module are provided below.
The module is supplied complete with fairlead and gasket for 5mm maximum diameter cables. Do the following to open the module and connect a probe:
Unscrew the fairlead and extract the gasket, remove the label using a cutter, unscrew the ring on the opposite side as illustrated in the figure:



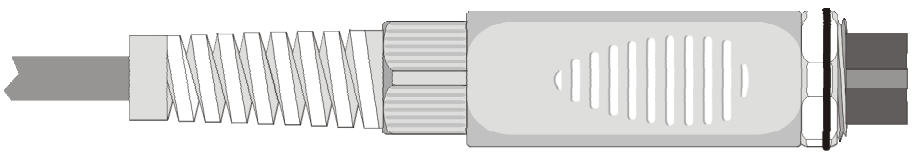
Open the two module shells: the printed circuit to which the probe must be connected is housed inside. On the left there are the 1…4 points on which the sensor wires must be welded. The JP1…JP4 jumpers are in the center of the board. These must be closed with a tin bead for some type of sensors:



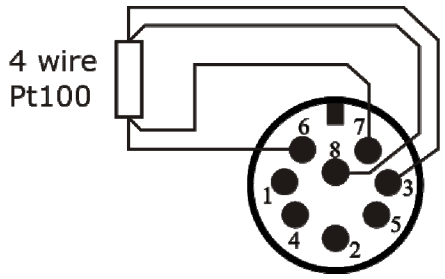
Before welding, pass the probe cable through the fairlead and gasket.
Weld the wires as shown in the table:

Sensor	TP47 card connection	Jumper to close
Pt100 4 wires		None
Pt1000 2 wires		JP2
Ni1000		JP3

Ensure the welds are clean and perfect. Once the welding operation is complete, close the two shells, insert the gasket in the module, and screw the fairlead and the ring. At the other end of the module, enter the ring with the O-Ring. Make sure the cable is not twisted while you are screwing the fairlead. Now the probe is ready.



Direct connection of 4-wire Pt100 sensors

Sensor	Direct soldering to the connector
4-wire Pt100	 View of the soldering side of the free female connector

4 wire Pt100 sensors can be soldered directly to the pins of the free female connector without making use of the TP47 board. The 4 wires of the Pt100 sensors have to be soldered as indicated in the figure on the left.

The P100 probe is recognized upon turning on the instrument: connect the probe when the instrument is switched off and then turn it on. The use of this probe type doesn't require any other settings.

WARNINGS AND OPERATING INSTRUCTIONS

1. Do not expose the probes to gases or liquids that could corrode the material of the sensor or the probe itself. Clean the probe carefully after each measurement.
2. Do not bend the probe connectors or force them upward or downward.
3. Do not bend or force the contacts when inserting the probe connector into the instrument.
4. Do not bend, deform or drop the probes, as this could cause irreparable damage.
5. Always select the most suitable probe for your application.
6. Do not use the temperature probes in presence of corrosive gases or liquids. The sensor container is made of AISI 316 stainless steel, while the contact probe container is made of AISI 316 stainless steel plus silver. Avoid contact between the probe surface and any sticky surface or substance that could corrode or damage it.
7. Above 400°C and below –40°C, avoid violent blows or thermal shocks to Platinum temperature probes as this could cause irreparable damage.
8. To obtain reliable measurements, temperature variations that are too rapid must be avoided.
9. Temperature probes for surface measurements (contact probes) must be held perpendicular against the surface. Apply oil or heat-conductive paste between the surface and the probe in order to improve contact and reduce reading time. Whatever you do, do not use water or solvent for this purpose. A contact measurement is always very hard to perform. It has high levels of uncertainty and depends on the ability of the operator.
10. Temperature measurements on non-metal surfaces usually require a great deal of time due to the low heat conductivity of non-metal materials.
11. The sensor is not insulated from its external casing; be very careful not to come into contact with live parts (above 48V). This could be extremely dangerous for the instrument as well as for the operator, who could be electrocuted.
12. Avoid taking measurements in presence of high frequency sources, microwave ovens or large magnetic fields; results may not be very reliable.
13. Clean the probe carefully after use.
14. The instrument is water resistant and IP66, but should not be immersed in water. Protect the connectors from water by closing them well using their caps. The probe connectors must be fitted with sealing gaskets. Should the instrument fall into the water, check for any water infiltration. Gently handle the instrument in such a way as to prevent any water infiltration from the connectors' side.

INSTRUMENT SIGNALS AND FAULTS

The following table lists all error indications and information displayed by the instrument and supplied to the user in different operating situations.

Display indications	Explanation
CH_A COMM LOST ERR	This appears if the SICRAM module connected to input A, has already been detected by the instrument, but is disconnected. At the same time an intermittent beep is issued.
CH_B COMM LOST ERR	This appears if the SICRAM module connected to input B, has already been detected by the instrument, but is disconnected. At the same time an intermittent beep is issued.
CH_A CH_B COMM LOST ERR	This appears if the SICRAM modules connected to inputs A and B, have already been detected by the instrument, but are both disconnected. At the same time an intermittent beep is issued.
OVER or UNDR	Measurement overflow: indicates that the probe is measuring a value exceeding the expected range.
LOG MEM FULL	Memory full; the instrument cannot store further data, the memory space is exhausted.
PROB ERR	A probe with SICRAM module has been inserted when not admissible for that specific instrument.
SYS ERR #	Instrument management program error. Contact the instrument's supplier and communicate the numeric code # reported by the display.
CAL LOST	Program error: it appears after turning on for a few seconds. Contact the instrument's supplier.
CAL FACT	Factory calibration.
CAL USER	User calibration.
BATT TOO LOW CHNG NOW	Indication of insufficient battery charge appearing on turning on. The instrument issues a long beep and turns off. Replace the batteries.

The following table reports the indications provided by the instrument as they appear on the display, together with their description.

Display indication	Explanation
>>> CAL_MODE >>> KEY_UNIT FOR_NEW_USER CAL_	calibration mode >>> press UNIT to start a new user calibration
>>>_LOG_DUMP_or_ERAS	transfer or erase data
1ST_MEAS UP DOWN	correct the first point using the arrows ▲/▼
2ND_MEAS UP DOWN	correct the second point using the arrows ▲/▼
BATT TOO LOW - CHNG NOW	battery discharged - replace it immediately
BAUDRATE >>>	baud rate value
CH_A	description of the probe connected to channel A
CH_A CH_B COMM LOST	lost communication with probes connected to channels A and B
CH_A COMM LOST	lost communication with probe connected to channel A
CH_A_NO__SER_NUM	no SICRAM module connected to channel A
CH_A_SER #### ####	serial number #### #### of the probe connected to channel A
CH_B	description of the probe connected to channel B
CH_B COMM LOST	lost communication with probe connected to channel B
CH_B_NO__SER_NUM	no SICRAM module connected to channel B
CH_B_SER #### ####	serial number #### #### of the probe connected to channel B
COMM STOP	printing complete
COMM STRT	printing started
DAY_	day
DUMP_END	data transfer complete
DUMP_In_PROG >>>	data transfer in progress
ERR	error
FUNC CLR	max, min and average values clearing
FUNC CLRD	max, min and average values cleared
HOUR	hour
LOG In PROG	logging in progress
LOG MEM FULL	memory full
LOG_CLRD	memory data cleared
LOG_STOP	logging complete
LOG_STRT	logging started
MIN >>> USE_UNIT_TO_ZERO SEC	minutes >>> use the UNIT key to reset the seconds
MNTH	month
PLS_EXIT >>> FUNC RES_FOR_FACT ONLY	please exit using FUNC >>> function reserved to factory calibration
PRNT AND LOG INTV	printing and logging intervals
PRNT INTV >>>	printing interval
SEL CHAN	input channel selection for user's calibration
SEL MEAS 1/2	select the first/second user calibration point
SLP_MODE_LOG	turning off during recording mode
SYS ERR #	program error number #
YEAR	year

LOW BATTERY WARNING AND BATTERY REPLACEMENT

The battery symbol 
on the display constantly shows the battery charge status. To the extent that batteries have discharged, the symbol "empties". When the charge decreases still further it starts blinking…

In this case, batteries should be replaced as soon as possible.
If you continue to use it, the instrument can no longer ensure correct measurement. The memory data are maintained.
If the battery charge level is insufficient, the following message appears when you turn the instrument on:

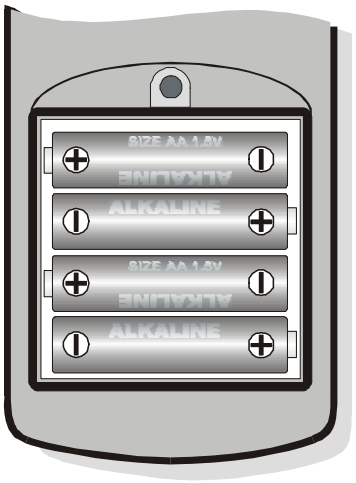
BATT TOO LOW
CHNG NOW

The instrument issues a long beep and turns off. In this case, replace the batteries in order to turn the instrument back on.

In order to avoid data loss, the logging session is ended, if the HD2127.2 is logging and battery voltage falls below the minimum operating level.

The battery symbol turns off when the external power supply is connected.

To replace the batteries, switch the instrument off and unscrew the battery cover counter clockwise. After replacing the batteries (4 1.5V alkaline batteries - type AA) screw the cover on clockwise.



After replacing the batteries, the date, time, baud rate, type of probe, printing interval, logging parameters **must be set again**: **in order to simplify the operation, on insertion of the new batteries the instrument turns on automatically and requests these parameters in sequence**. To go to the next item press ENTER; to return to measurement mode, press MENU.

MALFUNCTIONING UPON TURNING ON AFTER BATTERY REPLACEMENT

After replacing the batteries, the instrument may not restart correctly; in this case, repeat the operation. After disconnecting the batteries, wait a few minutes in order to allow circuit condensers to discharge completely; then reinsert the batteries.

WARNING ABOUT BATTERY USE

- Batteries should be removed when the instrument is not used for an extended time.
- Flat batteries must be replaced immediately.
- Avoid batteries leaking.
- Always use good quality leakproof alkaline batteries. Sometimes on the market, it is possible to find new batteries with an insufficient charge capacity.

INSTRUMENT STORAGE

Instrument storage conditions:

- Temperature: -25…+65°C.
- Humidity: less than 90%RH without condensation.
- Do not store the instrument in places where:
  Humidity is high.
  The instrument may be exposed to direct sunlight.
  The instrument may be exposed to a source of high temperature.
  The instrument may be exposed to strong vibrations.
  The instrument may be exposed to steam, salt or any corrosive gas.

The instrument case is made of ABS plastic and the protections are rubber: do not use any incompatible solvent for cleaning.

SERIAL INTERFACE AND USB

The HD2127.1 and HD2127.2 instruments are fitted with an electrically isolated RS-232C serial interface; the HD2127.2 also has an USB 2.0 interface.
The following serial cables can be used:

- **HD2110CSNM**: serial connection cable with 8-pole MiniDin connector on one end and 9-pole Sub D connector on the other end;
- **C.206**: serial connection cable with 8-pole MiniDin connector on one end and USB type A connector on the other end. With integrated RS232/USB converter;
- **CP23**: connection cable with Mini-USB type B connector on one end and USB type A connector on the other end (only for HD2127.2).

The connection via the C.206 cable requires the previous installation of the cable USB drivers. Install the drivers **before connecting the C.206 cable to the PC**.
The connection via the CP23 cable does not require the installation of USB drivers: when connecting the instrument to the PC, the Windows® operating system automatically recognizes the device as an HID device (Human Interface Device) and uses the drivers already included in the operating system.

Cable	Instrument port	PC port	Installation of USB drivers
HD2110CSNM	RS232 (MiniDin)	RS232 (9-pole SubD)	No
C.206	RS232 (MiniDin)	USB	Yes
CP23	USB (Mini-USB)	USB	No

The instrument standard serial transmission parameters are:

- Baud rate 38400 baud
- Parity None
- N. bit 8
- Stop bit 1
- Protocol Xon/Xoff

It is possible to change the RS232C serial port baud rate by setting the "*Baudrate*" parameter in the menu (please see page 12). The possible values are: 38400, 19200, 9600, 4800, 2400, 1200. The other transmission parameters are fixed.
The USB 2.0 connection does not require the setting of parameters.

The instruments are provided with a complete set of commands and data queries to be sent via the PC. The serial commands work with a standard serial communication program (e.g. Hyperterminal) only through the RS232 serial port of the instrument, using the cable HD2110CSNM or the cable C.206.

All the commands transferred to the instrument must have the following structure:
XYcr where: **XY** is the command code and **cr** is the Carriage Return (ASCII 0D)

Command	Response	Description
P0	&	Ping (locks the instrument keyboard for 70 seconds)
P1	&	Unlocks the instrument keyboard
S0	35.2 23.8	Captured measurements (24 characters)
G0	Model HD2127 -2	Instrument model

Command	Response	Description
G1	M=RTD Thermometer	Model description
G2	SN=12345678	Instrument serial number
G3	Firm.Ver.=01-00	Firmware version
G4	Firm.Date=2004/06/15	Firmware date
G5	cal 0000/00/00 00:00:00	Calibration date and time
G6	Probe=Sicram Pt100	Type of probe connected to channel A
G7	Probe SN=11119999	Serial number of the probe connected to channel A
G8	Probe cal.=2004/01/12	Calibration date of the probe connected to channel A
GD	Probe=Sicram Pt100	Type of probe connected to channel B
GE	Probe SN=11119999	Serial number of the probe connected to channel B
GF	Probe cal.=2004/01/12	Calibration date of the probe connected to channel B
GB	User ID=0000000000000000	User code (set with T2xxxxxxxxxxxxxxx)
GC		Print instrument's heading
LN	&2000	Number of free pages in the flash memory
LD	PRINTOUT OF LOG	Print data logged in flash
LE	&	Erase data in flash memory
K1	PRINTOUT IMMEDIATE MODE	Immediate printing of data
K0		Stop printing data
K4	&	Start logging data
K5	&	Stop logging data
K7	&	Enable REL function
K6	&	Disable REL function
KP	&	Auto-power-off function=ENABLE
KQ	&	Auto-power-off function=DISABLE
RA	& #	Reading of LOG/PRINT interval set
RP	& 600	Battery level (Resolut. 0.01V)
RUA	U= °C	Channel A unit of measurement
RUB	U= °C	Channel B unit of measurement
WA#	&	Setting LOG/PRINT interval. # is a hexadecimal number 0…D that represents the position of the interval in the list 0, 1, 5, 10, …, 3600 seconds.
WC0	&	Setting SELF off
WC1	&	Setting SELF on

Command characters are exclusively upper case characters. Once a correct command is entered, the instrument responds with "&"; when any wrong combination of characters is entered, the instrument responds with "?". The instrument response strings end with the sending of the CR command (Carriage Return). The instrument does not send the LF command (Line Feed).
Before sending commands to the instrument via the serial port, locking the keyboard to avoid functioning conflicts is recommended: use the P0 command. When complete, restore the keyboard with the P1 command.

STORING AND TRANSFERRING DATA TO A PERSONAL COMPUTER

The HD2127.1 and HD2127.2 instruments can be connected to a personal computer via an RS232C serial port or USB 2.0 port, and exchange data and information through the DeltaLog9 software running in a Windows operating environment. Both models can send in real time input measured values directly to a PC, through the PRINT function; the HD2127.2 can also store the values measured by using the *Logging* function (LOG key) in its internal memory. If necessary, the data stored in the memory can be transferred to a PC later.

THE *LOGGING* FUNCTION - ONLY FOR HD2127.2

The *Logging* function allows the recording up to 32,000 pairs of measurements registered by the probes connected to the two inputs. The time interval between two consecutive measurements can be set from 1 second to 1 hour. The logging starts by pressing the LOG key and ends by pressing the same key again: the data memorized in this way form a continuous block of data.

See the description of the menu items on page 11.

If the automatic turning off option between two recordings (MENU >> **Sleep_Mode_LOG)** is enabled, upon pressing the LOG key the instrument logs the first data and turns off. 15 seconds before the next logging instant, it turns on again to capture the new sample, and then turns off.

Press simultaneously the FUNC and A-B/MENU keys and then the LOG key to transfer to the PC the data contained in the instrument's memory. During data transfer the display shows the message DUMP; to stop the data transfer press FUNC on the instrument or ESC on the PC.

CLEARING THE MEMORY - ONLY FOR HD2127.2

Press simultaneously the FUNC and A-B/MENU keys and then the SERIAL key to erase the data contained in the instrument's memory. The instrument starts clearing the internal memory; at the end of the operation, it goes back to normal display.

NOTES:

- Data transfer does not cause the memory to be erased; the operation can be repeated as many times as required.
- The stored data remain in the memory independently of battery charge conditions.
- In order to print the data to a parallel interface printer, you must use a parallel-serial adaptor (not supplied).
- **The direct connection between instrument and printer via a USB connector does not work.**
- Some keys are disabled during logging. The following keys work: ON/OFF, HOLD, FUNC (Max-Min-Avg) and SERIAL.
- Pressing the HOLD, REL and FUNC keys has no effect on the logged data if these keys are pressed **after** starting the recording, otherwise the following is valid.
- The recording started with the display in HOLD mode proceeds normally with the actual measured values (that is, not in "HOLD" mode). Only the display is frozen to the values present when the HOLD key was pressed.
- The same is true for the Max-Min-Avg function.
- If the logging is started when the display is in REL mode, the relative values are logged.
- It is possible to activate both the logging (LOG) and direct transfer (PRINT) functions at the same time.

THE *PRINT* FUNCTION

The PRINT function sends the measurements taken in real time by the instrument inputs directly to a PC or a printer. Print data units of measurements are the same as those used on the display. The function is started by pressing SERIAL. The time interval between two consecutive prints can be set from 1 second to 1 hour (please see the **Print and log interval** menu item at page 11). If the print interval is equal to 0, by pressing SERIAL the single data is sent to the connected device. If the print interval is higher than 0, the data transfer continues until the operator stops it by pressing SERIAL again.

The PRINT function works with a standard serial communication program (e.g. Hyperterminal) only through the RS232 serial port of the instrument, using the cable HD2110CSNM or the cable C.206.

Connect the HD40.1 printer using cable HD2110CSNM.

NOTES:

- The print out is formatted across 24 columns.
- Some keys are disabled during serial transmission. The following keys work: ON/OFF, HOLD, FUNC (Max-Min-Avg) and LOG.
- Pressing the HOLD, REL and FUNC keys has no effect on the printed data if these keys are pressed **after** starting the printing, otherwise the following is valid.
- The serial transfer started with the display in HOLD mode proceeds normally with the actual measured values (that is, not in "HOLD" mode). Only the display is frozen to the values present when the HOLD key was pressed.
- The same is true for the Max-Min-Avg function.
- If the serial transfer is started when the display is in REL mode, the relative values are transferred.
- It is possible to activate both the logging (LOG) and direct transfer (PRINT) functions at the same time.

CONNECTION TO A PC

HD2127.1

Connection to the PC with the cable:

- **HD2110CSNM**: 8-pole MiniDin connector on one end and 9-pole Sub D connector on the other end;
- **C.206**: 8-pole MiniDin connector on one end and USB type A connector on the other end. With integrated RS232/USB converter (requires the installation of the USB drivers).

HD2127.2

Connection to the PC with the cable:

- **CP23**: Mini-USB type B connector on one end and USB type A connector on the other end;
- **HD2110CSNM**: 8-pole MiniDin connector on one end and 9-pole Sub D connector on the other end;
- **C.206**: 8-pole MiniDin connector on one end and USB type A connector on the other end. With integrated RS232/USB converter (requires the installation of the USB drivers).

The instruments are supplied with the DeltaLog9 software that manages the connection, data transfer, graphic presentation, and printing operations of the captured or logged measurements.
The DeltaLog9 software is complete with "On-line Help" (also in PDF format) describing its characteristics and functions.

CONNECTION TO THE RS232C SERIAL PORT OF THE INSTRUMENT

1. The measurement instrument must be switched off.
2. Using the Delta Ohm HD2110CSNM or C.206 cable, connect the measurement instrument to the first free RS232C (COM) or USB serial port of the PC.
3. Turn on the instrument and set the baud rate to 38400 (MENU >> ENTER until the Baud Rate parameter >> select 38400 using the arrows >> confirm with ENTER). The parameter remains in the memory until replacement of the batteries.
4. Launch the DeltaLog9 application and press CONNECT. Wait for the connection to occur and follow the indications on the screen. For a description of the DeltaLog9 application, please refer to its on-line Help.

CONNECTION TO THE USB 2.0 PORT OF THE INSTRUMENT - ONLY FOR HD2127.2

The connection via the CP23 cable does not require the installation of USB drivers: when connecting the instrument to the PC, the Windows® operating system automatically recognizes the device as an HID device (Human Interface Device) and uses the drivers already included in the operating system.

To check if the connection has been successfully completed, double-click on "*Device Manager*" from the Control Panel. The following items should appear:

"*Human Interface Device*" >> "*HID-compliant device*"

"*Human Interface Device*" >> "*USB Human Interface Device*"

When the USB cable is disconnected, the items disappear and reappear when it is connected again.

NOTES ABOUT WORKING AND OPERATING SAFETY

Authorized use

The technical specifications as given in chapter "TECHNICAL CHARACTERISTICS" must be observed. Only the operation and running of the measuring instrument according to the instructions given in this operating manual is authorized. Any other use is considered unauthorized.

General safety instructions

This measuring system is constructed and tested in compliance with the EN 61010-1:2010 safety regulations for electronic measuring instruments. It left the factory in a safe and secure technical condition.
The smooth functioning and operational safety of the measuring system can only be guaranteed if the generally applicable safety measures and the specific safety instructions in this operating manual are followed during operation.
The smooth functioning and operational safety of the instrument can only be guaranteed under the environmental and electrical operating conditions that are in specified in chapter "TECHNICAL CHARACTERISTICS".

Do not use or store the product in places such as listed below:

- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the instrument.
- Excessive induction noise, static electricity, magnetic fields or noise.

If the measuring system was transported from a cold environment to a warm environment, the formation of condensate can impair the functioning of the measuring system. In this event, wait until the temperature of the measuring system reaches room temperature before putting the measuring system back into operation.

Obligations of the purchaser

The purchaser of this measuring system must ensure that the following laws and guidelines are observed when using dangerous substances:

- EEC directives for protective labour legislation
- National protective labour legislation
- Safety regulations

INSTRUMENT TECHNICAL CHARACTERISTICS

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
Warehouse temperature	-25…65°C
Working relative humidity	0…90%RH without condensation
Protection degree	**IP66**
Power Supply	
Batteries	4 1.5V type AA batteries
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed with instrument off	20µA
Mains (cod. **SWD10**)	Mains adapter 100-240Vac/12Vdc-1A
Measuring units	°C - °F - °K
Security of memorized data	Unlimited, independent of battery charge conditions
Time	
Date and time	Schedule in real time
Accuracy	1min/month max drift
*Measured values storage - model **HD2127.2***	
Type	2000 pages containing 16 pairs of samples each
Quantity	Total of 32000 samples (channel A + channel B)
Selectable storage interval	1s, 5s, 10s, 15s, 30s, 1min, 2min, 5min, 10min, 15min, 20min, 30min and 1hour
Serial interface RS232C	
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
Selectable print interval	immediate or 1s, 5s, 10s, 15s, 30s, 1min, 2min, 5min, 10min, 15min, 20min, 30min and 1hour

*USB interface - model **HD2127.2***

Type	1.1 - 2.0 electrically isolated

Connections

Input modules for the probes	2 8-pole male DIN45326 connectors
RS232 serial interface	8-pole MiniDin connector
USB interface (only **HD2127.2**)	Mini-USB type B connector
Mains adapter (cod. **SWD10**)	2-pole connector (positive at centre)

Temperature measurement

Pt100 measurement range	-200…+650°C
Pt1000 measurement range	-200…+650°C
Ni1000 measurement range	-50…+250°C
Resolution	**0.01°C in the range ±199.99°C** **0.1°C in the remaining range**
Accuracy	± 0.01°C (excluding probe error)
Drift after 1 year	0.1°C/year (only the instrument)

TECHNICAL DATA OF PROBES AND MODULES IN LINE WITH INSTRUMENT

Pt100 SENSOR TEMPERATURE PROBES WITH SICRAM MODULE

Model	Type	Application range	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
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
TP474C.0 1/3 DIN - Thin Film	Contact	-50°C…+300°C	±0.3°C
TP475A.0 1/3 DIN - Thin Film	Air	-50°C…+250°C	±0.3°C
TP472I.5	Immersion	-50°C…+400°C	±0.3°C (-50°C…+300°C) ±0.6°C (+300°C…+400°C)
TP472I.10	Immersion	-50°C…+400°C	±0.3°C (-50°C…+300°C) ±0.6°C (+300°C…+400°C)
TP49A.I Class A	Immersion	-70°C…+250°C	±0.25°C
TP49AC.I Class A	Contact	-70°C…+250°C	±0.25°C
TP49AP.I Class A	Penetration	-70°C…+250°C	±0.25°C
TP875.I	Globe-thermometer Ø 150 mm	-30°C…+120°C	±0.25°C
TP876.I	Globe-thermometer Ø 50 mm	-30°C…+120°C	±0.25°C
TP87.O 1/3 DIN - Thin Film	Immersion	-50°C…+200°C	±0.25°C
TP878.O 1/3 DIN - Thin Film	Photovoltaic	+4°C…+85°C	±0.25°C
TP878.1.O 1/3 DIN - Thin Film	Photovoltaic	+4°C…+85°C	±0.25°C
TP879.O 1/3 DIN - Thin Film	Compost	-20°C…+120°C	±0.25°C

Common characteristics

Resolution	**0.01°C in the range ±199.99°C** **0.1°C in the remaining range**
Temperature drift @ 20°C	0.003%/°C

4-WIRE Pt100 AND 2-WIRE Pt1000 PROBES

Model	Type	Application range	Accuracy
TP47.100.O 1/3 DIN – Thin Film	Pt100 4 wires	-50…+250°C	1/3 DIN
TP47.1000.O 1/3 DIN – Thin Film	Pt1000 2 wires	-50…+250°C	1/3 DIN
TP87.100.O 1/3 DIN – Thin Film	Pt100 4 wires	-50…+200°C	1/3 DIN
TP87.1000.O 1/3 DIN – Thin Film	Pt1000 2 wires	-50…+200°C	1/3 DIN

Common characteristics

Resolution **0.01°C in the range ±199.99°C**
0.1°C in the remaining range

Temperature drift @ 20°C

Pt100 0.003%/°C

Pt1000 0.005%/°C

ORDER CODES

HD2127.1	Kit including the instrument HD2127.1, 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **The probes and the cables must be ordered separately.**
HD2127.2	Kit including the HD2127.2 **datalogger,** 4 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **The probes and the cables must be ordered separately.**
HD2110CSNM	Connection cable 8-pole MiniDin – Sub D 9-pole female for RS232C.
C.206	Connection cable 8-pole MiniDin – USB type A. With integrated RS232/USB converter.
CP23	Connection cable Mini-USB type B – USB type A.
DeltaLog9	Software for transfer and management of the data on PC using Windows (from 98) operating systems.
SWD10	Stabilized power supply at 100-240Vac/12Vdc-1A mains voltage.
HD40.1	The kit includes: 24-column portable thermal printer, serial interface, 57mm paper width, four NiMH 1.2V rechargeable batteries, SWD10 power supply, instruction manual, 5 thermal paper rolls.
BAT.40	Spare battery pack for HD40.1 printer with in-built temperature sensor.
RCT	The kit includes 4 thermal paper rolls 57mm wide and 32mm in diameter.

PROBES COMPLETE WITH SICRAM MODULE

TP472I	Immersion probe, sensor Pt100. Stem Ø 3 mm, length 300 mm. Cable length 2 metres.
TP472I.0	Immersion probe, sensor Pt100. Stem Ø 3 mm, length 230 mm. Cable length 2 metres.
TP473P.I	Penetration probe, sensor Pt100. Stem Ø 4mm, length 150 mm. Cable length 2 metres.
TP473P.0	Penetration probe, sensor Pt100. Stem Ø 4mm, length 150 mm. Cable length 2 metres.
TP474C.0	Contact probe, sensor Pt100. Stem Ø 4 mm, length 230 mm, contact surface Ø 5 mm. Cable length 2 metres.
TP475A.0	Air probe, sensor Pt100. Stem Ø 4 mm, length 230 mm. Cable length 2 metres.
TP472I.5	Immersion probe, sensor Pt100. Stem Ø 6 mm, length 500 mm. Cable length 2 metres.
TP472I.10	Immersion probe, sensor Pt100. Stem Ø 6 mm, length 1000 mm. Cable length 2 metres.
TP49A.I	Immersion probe, sensor Pt100. Stem Ø 2.7 mm, length 150 mm. Cable length 2 metres. Aluminium handle.
TP49AC.I	Contact probe, sensor Pt100. Stem Ø 4 mm, length 150 mm. Cable length 2 metres. Aluminium handle.

TP49AP.I Penetration probe, sensor Pt100. Stem Ø 2.7 mm, length 150 mm. Cable length 2 metres. Aluminium handle.

TP875.I Globe-thermometer Ø 150 mm with handle. Cable length 2 metres.

TP876.I Globe-thermometer Ø 50 mm with handle. Cable length 2 metres.

TP87.O Immersion probe, sensor Pt100. Stem Ø 3 mm, length 70 mm. Cable length 2 metres.

TP878.O Contact probe for solar panels. Cable length 2 metres.

TP878.1.O Contact probe for solar panels. Cable length 5 metres.

TP879.O Penetration probe for compost. Stem Ø 8 mm, length 1 metre. Cable length 2 metres.

TEMPERATURE PROBES WITHOUT SICRAM MODULE

TP47.100.O Immersion probe, sensor Pt100 direct 4 wires. Probe's stem Ø 3mm, length 230mm. 4-wire connection cable with connector, length 2 metres.

TP47.1000.O Immersion probe, sensor Pt1000. Probe's stem Ø 3mm, length 230mm. 2-wire connection cable with connector, length 2 metres.

TP87.100.O Immersion probe, sensor Pt100 direct 4 wires. Probe's stem Ø 3mm, length 70mm. 4-wire connection cable with connector, length 2 metres.

TP87.1000.O Immersion probe, sensor Pt1000. Probe's stem Ø 3mm, length 70mm. 2-wire connection cable with connector, length 2 metres.

TP47 Only connector for probe connection: Pt100 direct 3 and 4 wires, Pt1000 and Ni1000 2 wires.

DELTA OHM metrology laboratories LAT N° 124 are accredited by ACCREDIA for Temperature, Humidity, Pressure, Photometry / Radiometry, Acoustics and Air Velocity. They can supply calibration certificates for the accredited quantities.

NOTES

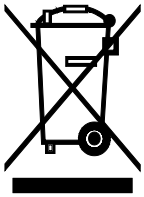
WARRANTY

The manufacturer is required to respond to the "factory warranty" only in those cases provided by Legislative Decree 6 September 2005 - n. 206. Each instrument is sold after rigorous inspections; if any manufacturing defect is found, it is necessary to contact the distributor where the instrument was purchased from. During the warranty period (24 months from the date of invoice) any manufacturing defects found will be repaired free of charge. Misuse, wear, neglect, lack or inefficient maintenance as well as theft and damage during transport are excluded. Warranty does not apply if changes, tampering or unauthorized repairs are made on the product. Solutions, probes, electrodes and microphones are not guaranteed as the improper use, even for a few minutes, may cause irreparable damages.
The manufacturer repairs the products that show defects of construction in accordance with the terms and conditions of warranty included in the manual of the product. For any dispute, the competent court is the Court of Padua. The Italian law and the "Convention on Contracts for the International Sales of Goods" apply.

TECHNICAL INFORMATION

The quality level of our instruments is the result of the continuous product development. This may lead to differences between the information reported in the manual and the instrument you have purchased.
We reserves the right to change technical specifications and dimensions to fit the product requirements without prior notice.

DISPOSAL INFORMATION



Electrical and electronic equipment marked with specific symbol in compliance with 2012/19/EU Directive must be disposed of separately from household waste. European users can hand them over to the dealer or to the manufacturer when purchasing a new electrical and electronic equipment, or to a WEEE collection point designated by local authorities. Illegal disposal is punished by law.

Disposing of electrical and electronic equipment separately from normal waste helps to preserve natural resources and allows materials to be recycled in an environmentally friendly way without risks to human health.

CE RoHS

senseca

Please note our new name:
Senseca Italy Srl
Via Marconi 5, 35030 Padua, Italy
Documents are in the process of being changed.