REV. 2.3
22/12/2014

HD2124.1
HD2124.2

ENGLISH

CONTENTS

INTRODUCTION

The **HD2124.1** and **HD2124.2** are portable instruments with a large LCD display. They perform measurements of absolute, relative and differential pressure, and temperature.
The PP471 electronic module is used to measure the pressure. The PP471 electronic module works as an interface between the instrument and the TP704 and TP705 series Delta Ohm probes.
The temperature is detected with immersion, penetration, contact or air Pt100 probe with SICRAM module or 4-wire Pt100 probe.
The temperature probes are fitted with SICRAM module and the factory calibration settings are already memorized inside. Upon turning on the instrument automatically detects them.

The HD2124.2 instrument is a **datalogger**. It memorizes up to 32,000 samples that can be transferred from the instrument connected to a PC via the RS232C serial port or USB 2.0 port. The memorization interval, printing, and baud rate can be configured using the menu.
The HD2124.1 and HD2124.2 models are fitted with an RS232C serial port and can transfer the acquired measurements in real time to a PC or to a portable printer.

The *Max, Min* and *Avg* function calculate the maximum, minimum or average values, the *Peak* function detects the presence of pressure peaks, the *A-B* function calculates the difference of the pressures or temperatures measured by the two inputs A and B.
Other functions include: the relative measurement REL, the HOLD function, and the automatic turning off that can also be disabled.
The instruments have IP66 protection degree.

This manual describes the HD2124.1 and HD2124.2 models: if not otherwise specified, the description is intended to be applicable to both models.

Manometer - Thermometer
HD2124.1

HD2124.1

1. Input A, 8-pole DIN45326 connector. It is possible to connect: the PP471 extension cable for TP704 and TP705 pressure probes or a Pt100 temperature probe fitted with SICRAM module or 4-wire Pt100 probe.
2. Input B, 8-pole DIN45326 connector. It is possible to connect: the PP471 extension cable for TP704 and TP705 pressure probes or a Pt100 temperature probe fitted with SICRAM module or 4-wire Pt100 probe.
3. External auxiliary power supply connector input.
4. Battery symbol: displays the battery charge level.
5. Functions indicators
6. Secondary display line.
7. **HOLD/▲** key: freezes the measurement during normal operation; in the menu, increases the current value.
8. **FUNC/ENTER** key: during normal operation displays the maximum (MAX), the minimum (MIN) and the average (AVG) of current measurements; in the menu, confirms the current selection.
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. **PEAK** key: starts and ends the peak measurement.
12. **MENU** key: allows access to and exit from the menu.
13. **A/B-ESC** key: with two pressure probes connected to the A and B inputs, this displays the A channel, the B channel and the A-B pressure difference in sequence. The measurement appears on the main line. With two temperature probes, this displays the B channel or the A-B pressure difference in the secondary line. In the menu cancels the operation in progress without making changes.
14. **UNIT** key: selects the unit of measurement for the pressure.
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, AVG and Peak symbols: peak indicates that displayed value is the peak of the current measurement; MAX, MIN and AVG that the displayed temperature or pressure values are respectively the minimum, maximum or average value.
17. Main display line.
18. Multiplication factor -3, 3 or 6: the apex, if present, indicates that the displayed measurement must be divided by 1000 (apex "-3"), multiplied by 1000 (apex "3") or by 1,000,000 (apex "6").
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).

Manometer - Thermometer
HD2124.2

HD2124.2

1. Input A, 8-pole DIN45326 connector. It is possible to connect: the PP471 extension cable for TP704 and TP705 pressure probes or a Pt100 temperature probe fitted with SICRAM module or 4-wire Pt100 probe.
2. Input B, 8-pole DIN45326 connector. It is possible to connect: the PP471 extension cable for TP704 and TP705 pressure probes or a Pt100 temperature probe fitted with SICRAM module or 4-wire Pt100 probe.
3. External auxiliary power supply connector input.
4. Battery symbol: displays the battery charge level.
5. Functions indicators.
6. Secondary display line.
7. **HOLD/▲** key: freezes the measurement during normal operation; in the menu, increases the current value.
8. **FUNC/ENTER** key: during normal operation displays the maximum (MAX), the minimum (MIN) and the average (AVG) of current measurements; in the menu, confirms the current selection.
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. **PEAK/MENU** key: during normal operation, starts and ends the peak measurement. When pressed together with the FUNC/ENTER key, allows access to the menu. To exit the menu, press the key again.
14. **A/B-ESC** key: with two pressure probes connected to the A and B inputs, this displays the A channel, the B channel and the A-B pressure difference in sequence. The measurement appears on the main line. With two temperature probes, this displays the B channel or the A-B pressure difference in the secondary line. In the menu cancels the operation in progress without making changes.
15. **UNIT** key: selects the unit of measurement for the pressure.
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, AVG and Peak symbols: peak indicates that displayed value is the peak of the current measurement; MAX, MIN and AVG that the displayed temperature or pressure values are respectively the minimum, maximum or average value.
18. Main display line.
19. Multiplication factor -3, 3 or 6: the apex, if present, indicates that the displayed measurement must be divided by 1000 (apex "-3"), multiplied by 1000 (apex "3") or by 1,000,000 (apex "6").
20. Line for symbols and comments.
21. 8-pole MiniDin connector for RS232C. For the connection to PC (with cable HD2110CSNM or C206) or printer (with cable HD2110CSNM).

INPUTS CONFIGURATION AND DISPLAY

The HD2124.1 and HD2124.2 are instruments with two pressure and temperature inputs. To measure pressure, the PP471 SICRAM module is used with one of the Delta Ohm TP704 or TP705 probes. The temperature is measured using Pt100 probes fitted with SICRAM module or 4-wire Pt100 probes.
The instruments handle the following configurations: two pressure probes, two temperature probes, or a temperature and a pressure probe.
The two inputs for the probes are identified by letters A and B: as reported on the instrument label, the B channel is on the left and the A channel is the central one.

Inputs configuration:

1) *Two PP471 pressure modules connected to the A and B inputs.*
   The two pressure measurements are both displayed in the main line. Pressing the A/B-ESC key in sequence displays the A channel, the B channel and, **if the two probes are equal**, the A-B pressure difference. The channel is displayed in the secondary line: A (Ch A) or B (Ch B). When the difference is shown, the A-B symbol is turned on.
   The maximum (MAX), the minimum (MIN) and the average (AVG) are always indicated in the main line alternating with the current measurement: for detailed information see the FUNC/ENTER key description in the next chapter.
2) *PP471 module connected to the central channel A, Pt100 probe connected to the channel B.*
   The pressure is displayed in the main line; the secondary line shows the temperature.
3) *Pt100 probe connected to the central channel A, PP471 module connected to the channel B.*
   The pressure is displayed in the main line; the secondary line shows the temperature.
4) *Two Pt100 temperature probes connected to the A and B inputs.*
   The measurement provided by the probe connected to the A channel is displayed in the main line. The secondary line shows the measurement provided by the probe connected to the B channel. Pressing the A/B-ESC key in sequence displays the A channel in the secondary line, the temperature measured by channel B channel and the difference A-B between the two temperatures. When the difference is shown, the A-B symbol is turned on. The unit of measurement (°C or °F) is the same for both temperatures.

KEYBOARD AND MENU DESCRIPTION

Foreword

The instrument keyboard is composed of single-function keys, like the UNIT key, and double-function keys such as the ON-OFF/Auto-OFF key.

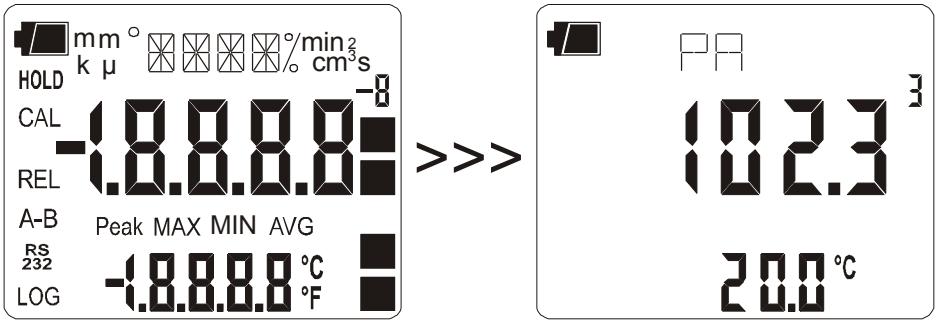
In the double-keys, the function in the upper part is the “main function”, while the one in the bottom part is the “secondary function”. When the instrument is in standard measurement mode, the main function is active. In the menu or in conjunction with the FUNC key, the secondary function is enabled.

The pressing of a key is accompanied by a short confirmation beep: a longer beep sounds if the wrong key is pressed.

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, starts an auto-test including the detection of the probes connected to the inputs, and sets the instrument ready for normal measurement. During the auto-test, the serial number of the connected probes is indicated in the comment line: e.g. "CH_A_SER_1234_5678" means the probe with serial number 12345678 is connected to the central input A.



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 a probe equipped with SICRAM module 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 when turning the instrument on: 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/ENTER key

During normal measurement this enables the display 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 calculation begins upon turning on and is updated when the instrument is in normal measurement mode. 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.
The MAX, MIN and AVG pressure is always displayed in the main line: in cases where two probes are connected to the inputs, use A/B-ESC to move from one variable to the other.
The MAX, MIN and AVG temperature is always displayed with the respective instantaneous temperature: main line for channel A and secondary line for channel B.

In the menu, the ENTER key confirms the current parameter and then goes to the next one. Pressed together with the PEAK/MENU key, opens the menu (please see the PEAK/MENU key description).

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 HOLD key down (please see the ON-OFF key description).

UNIT key

In measurement mode, it allows selection of the unit of measurement of the pressure (shown in the central line of the display). By repeatedly pressing the key, the different units of measurement are displayed in sequence: Pa, hPa, kPa, mbar, bar, atm, mmHg, mmH_2O, kgf/cm^2, PSI, inchHg, $inchH_2O$.

This setting changes the information displayed and the immediate print of data (SERIAL key).

The data recorded using the LOG function (*HD2124.2*) keep the chosen unit of measurement displayed during logging.
The unit of measurement associated with the data sent to the printer or PC through the serial port by using the SERIAL function, must be selected before starting the print function.

A/B-ESC key

If two pressure probes are connected to the inputs, the main line displays the A channel, then the B channel, and finally, if the probes are equal, the A-B pressure difference.
With two temperature probes, the lower line displays, alternately, the B channel instantaneous measurement and indication of the A-B difference. The main line continues to display channel A temperature.

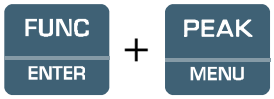
When used in the menu, it clears or cancels the active function.

REL/▼ key

In measurement mode, it displays the difference between the current value and that measured on pressing the key for both measurements - main and secondary. 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.

MENU key - only HD2124.1



PEAK/MENU key - only HD2124.2

The first menu item is accessed by initially pressing on the MENU key (FUNC/ENTER + PEAK/MENU in the HD2124.2 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. By pressing the ESC key, the setting is cancelled.
To exit the menu, press the MENU or the PEAK/MENU key at any time.

The menu items are listed in this order:

1) **Probes zeroing**: the zero command operates simultaneously on the inputs A and B.
   - In the differential pressure probes leave the two inputs open, so that they detect the same pressure.
   - In the relative pressure (compared to the atmosphere) probes, leave the input open, so that it detects the atmospheric pressure.

- In the absolute pressure probes, apply the vacuum by using a suitable pressure calibrator.

The "PRES_REL_TO_ZERO ENTR_TO_MENU" message appears: press REL to zero the pressure or press ENTER to access other menu items. Press A/B – ESC to toggle from one channel to the other: the zero is still applied to both A and B channels.

2) **Management of stored data (only HD2124.2)**: the message "**>>>_LOG_DUMP_or_E-RAS**" **(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).

3) **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 1 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.

4) **Sleep_Mode_LOG (Automatic turning off during recording) (only HD2124.2):** 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.

5) **°C/°F selection**: sets the unit of measurement for the temperature. the message SEL_MEAS UNIT" is scrolled in the comment line: using the arrows select °C or °F and confirm with ENTER.

6) **CH A (channel A probe type)**: the characteristics of the probe connected to input A are shown. For the pressure, the full scale and the type of sensor connected to the PP471 SICRAM module are reported. For the temperature, the indication *"Pt100Sicr"* or *"Pt100 4W "* is reported.

7) **CH B (channel B probe type)**: the characteristics of the probe connected to input B are shown. For the pressure, the full scale and the type of sensor connected to the PP471 SICRAM module are reported. For the temperature, the indication *"Pt100Sicr"* or *"Pt100 4W "* is reported.

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

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

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

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

12) **MIN (minutes)**: to set the current minutes. In order to synchronise the minute correctly, 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.

13) **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).

PEAK key - only HD2124.1

PEAK/MENU key - only HD2124.2

The PEAK **(HD2124.1)** or PEAK/MENU **(HD2124.2)** keys enable the pressure peak measurement circuit. When two probes are present, use the A/B key to move from one channel to the other.
The Peak indication blinks and the current pressure is shown. When a peak is detected (a positive variation greater than 5% compared to current measurement), the Peak indication remains on for 5 seconds and its value is displayed. If, in the meantime, a higher peak than the previous one is detected, the indication is updated. From 5 seconds after the previously detected peak, the Peak indication returns to blinking and the current pressure is shown.
To keep the maximum peak on the display, select the peak function and then the record MAX function using FUNC/ENTER. This way, the display continuously shows the maximum peak reached during measurement. Before starting new measurements, clear the memory of previous measurements using "FUNC CLR": please see the FUNC/ENTER key description.

*The Logging function during peak measurement **(only HD2124.2)**:*
To record the maximum peaks, start the peak function and then the record function (LOG key). As the measured peak is maintained for about 5 seconds, in order to avoid losing any peak, use 1 second logging intervals. Indeed, using longer times the single event could occur between two subsequent recording and be ignored.

LOG/DumpLOG key - only HD2124.2

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 HD2124.2 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.

[FUNC ENTER + PEAK MENU] >>> LOG DUMP LOG **Dump LOG - only HD2124.2**

To start the transfer of the data contained in the instrument internal memory via the serial port, press simultaneously the FUNC/ENTER and PEAK/MENU keys, using ENTER select the ">>>_LOG_DUMP_or_ERAS" item, and then press on the LOG/DumpLOG key.

Please see the paragraph dedicated to data transfer on page 25.

SERIAL **SERIAL key - only HD2124.1**

SERIAL ERASE LOG **SERIAL/EraseLOG key - only HD2124.2**

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 display of the RS232 symbol and the blinking of the battery symbol accompany the printing operation; **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.**

[FUNC ENTER + PEAK MENU] >>> SERIAL ERASE LOG **Erase memory - only HD2124.2**

Press simultaneously the FUNC/ENTER and PEAK/MENU keys, using ENTER select the ">>>_LOG_DUMP_or_ERAS" item, and then press on the SERIAL/EraseLOG key: this clears **permanently** all the data contained in the instrument's memory.

THE PROBES

The instrument measures absolute, relative and differential pressure using the PP471 SICRAM module and the TP704 and TP705 series probes. It also measures the temperature with a Pt100 sensor fitted with SICRAM module or 4-wire Pt100 probes.

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 datalogger to recognize the type of probe connected and to read its calibration information.

The probes are 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.

The manometers are fitted with two inputs dedicated to the probes: it is possible to connect one or two pressure probes, one or two temperature probes or one pressure probe and one temperature probe. See the details on page 8.

The probes are fitted with SICRAM modules are calibrated in the factory; no calibration is required by the user.

PP471 MODULE FOR PRESSURE MEASUREMENT

The PP471 module acts as an interface between the TP704 and TP705 series Delta Ohm probes and the instrument. The TP704 series pressure probes have a 1/4” BSP threaded male connection and must be screwed in the joint where you wish to measure the pressure. The TP 705 series have two Ø5 connections where the suitable tubes are inserted in order to perform the desired measurement. Please pay careful attention to the joint pressure sealing; use suitable gaskets and joints. A plastic cap protects the threaded connection. Put it back after use as it protects the pressure cell from foreign bodies. **VERY IMPORTANT: ensure the probe's full scale is higher that the pressure that will be measured. In case this value is unknown, start by using higher-capacity probes.**

For every pressure probe a range of overload pressure and a burst pressure are declared: pressures in the range of overload pressure don’t cause the break of the sensor but the declared accuracy can be overcome. Pressure over the stated burst pressure may break the sensor. The application of higher pressures than the overload pressure limit, although lower than the burst pressure, may produce permanent damage to the probe (e.g. offset shift). Never exceed the stated burst pressure.

Please see the technical characteristics of the probes on page 31.

Upon turning on the instrument automatically detects the PP471 module. The probe's type (absolute, relative or differential) and full scale value are detected even when the instrument is on. If no logging or recording operations are in progress, it is possible to change the probe connected to the module without turning the instrument off and on again.

The measurement provided can be the instantaneous or the peak value of the pressure: please see the PEAK key description on page 13.

To change the instantaneous or peak value unit of measurement, press UNIT. The following units of measurement are available:

Pa, hPa, kPa, mbar, bar, atm, mmHg, mmH_2O, kgf/cm^2, PSI, inchHg, inchH_2O.

Some following units of measurement require a multiplication factor: the “-3” symbol indicates the displayed value must be divided by 1,000; the "3" and "6" symbols indicate the displayed value must be multiplied respectively by 1,000 or by 1,000,000.

Pt100 TEMPERATURE PROBE

The instrument accepts the input of Platinum temperature probes with resistances of 100Ω.
The Pt100 sensors are connected to 4 wires; the excitation current was chosen in order to minimize the sensor self-heating effects.
All probes are calibrated in the factory; no calibration is usually required by the user.

The °C or °F unit of measurement can be chosen for display, printing, and logging using the "SEL_MEAS UNIT" menu item.

How to measure

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. Please remember that the response times in any case are longer than those for liquid measurements.

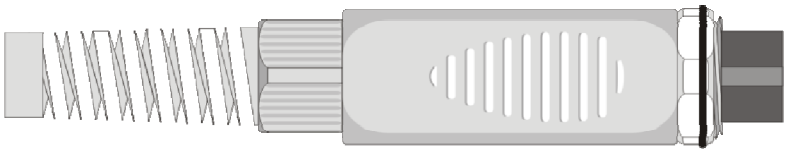
The temperature measurement by **immersion** is carried out by inserting the probe in the liquid for at least 60mm; the sensor is housed in the end part of the probe.

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.

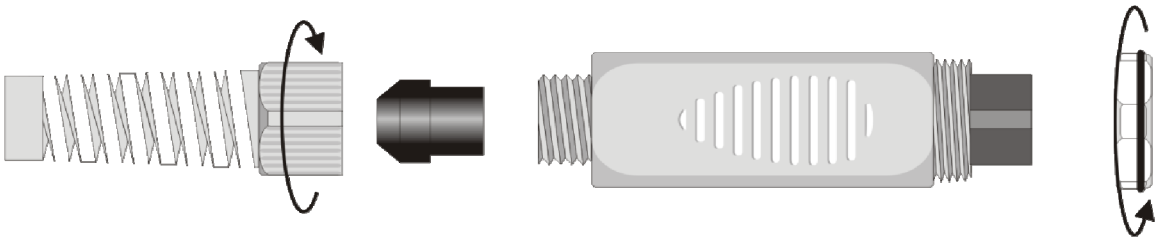
In order to perform a correct **contact** measurement, the measurement surface must be even and smooth, and the probe must be perpendicular to the measurement plane.
So as to obtain the correct measurement, the insertion of a drop of oil or heat-conductive paste is useful (do not use water or solvents). This method also improves the response time.

Instructions to connect the TP47 connector for 4-wire Pt100

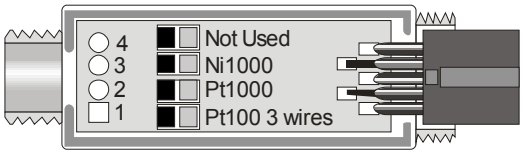
All probes produced by Delta Ohm are provided with a connector. The HD2124.1 and HD2124.2 instruments also work with 4-wire direct Pt100 probes manufactured by other producers: for the instrument connection is prescribed the TP47 connector to which the probe's wires should be welded.



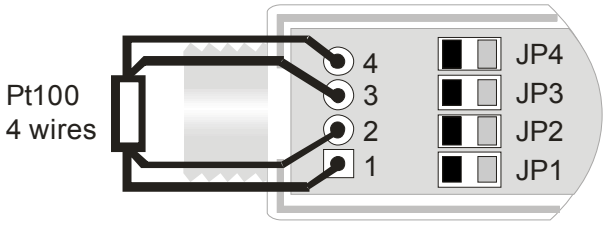
The instructions to connect the Platinum probe to the module are provided below.
The module is supplied complete with fairlead and gasket for 5mm maximum diameter cables.
Do the following to open the module and connect a probe:
Unscrew the fairlead and extract the gasket, remove the label using a cutter,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



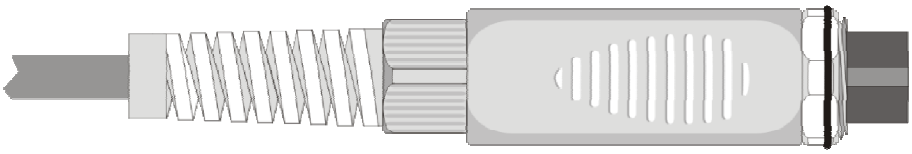
Open the two module shells: the printed circuit to which the probe must be connected is housed inside. On the left there are the 1…4 points on which the sensor wires must be welded. The JP1…JP4 jumpers are in the center of the board. For the 4-wire Pt100 sensor the jumpers must be left open.



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

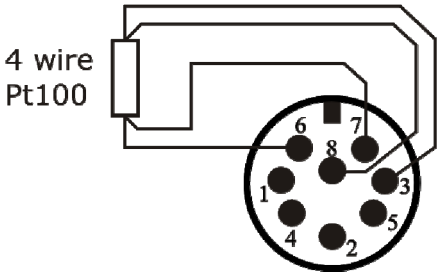
Sensor	Board connection	Jumper to close
Pt100 4 wires		None

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 as indicated in the picture.



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 sensor 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. Some pressure probe models are suitable for measurement of non corrosive gases or air and dry and not liquid only: check the membrane compatibility with the plant fluid.
2. Do not bend the probe connectors or force them upward or downward. Do not bend or force the contacts when inserting the probe connector into the instrument.
3. Do not bend, deform or drop the probes, as this could cause irreparable damage.
4. Always select the most suitable probe for your application.
5. Do not use 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 from AISI 316 stainless steel plus silver. Avoid contact between the probe surface and any sticky surface or substance that could corrode or damage it.
6. Above 400°C and below –40°C, avoid violent blows or thermal shocks to Platinum temperature probes as this could cause irreparable damage.
7. To obtain reliable measurements, temperature variations that are too rapid must be avoided.
8. 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.
9. Temperature measurements on non-metal surfaces usually require a great deal of time due to the low heat conductivity of non-metal materials.
10. **Probes are not insulated from their 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.
11. Avoid taking measurements in presence of high frequency sources, microwave ovens or large magnetic fields; results may not be very reliable.
12. Clean the probe carefully after use. Clean the probe pressure chamber carefully. Avoid deposits or incrustations left by the fluid coming into contact with the membrane, as with time this could cause measurement errors.
13. Avoid inserting nails or spikes into the pressure chamber as the membrane could be unintentionally torn.
14. In order to fix the probes, use a suitable fixed wrench, and possibly sealing gaskets.
15. **Great attention must be paid while installing the probes in containers and tubes under pressure. Also pay attention to the probes' bottom scale. In addition to the irreparable damage, it can even cause serious physical damage to both the operator and things. Before the probe a stop valve should always be present. Ensure that the plant is not subject to abnormal or unexpected depressed fluid fluctuations.**
16. The instrument is water-resistant and IP66, but is not watertight and therefore should not be immersed in water without closing the free connectors using 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	Measurement overflow: this appears if the pressure sensor exceeds the limit of 120% of the bottom scale nominal value. Over 125%, the display indicates ERR. Measurement overflow: this appears if the external temperature probe is measuring a value exceeding the set measuring range.
ERR	This appears in the menu, under the "**CH A**" and "**CH B**" items, if a SICRAM module that has already been recognised is disconnected.
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.
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 indications	Explanation
### BAR ABS	probe ###bar absolute
### BAR DIFF	probe ###bar differential
### BAR GAUG	probe ###bar relative
### BAR SG	probe ###bar relative compared to 1 bar
### mBAR ABS	probe ###mbar absolute
### mBAR DIFF	probe ###mbar differential
### mBAR GAUG	probe ###mbar relative
>>>_LOG_DUMP_or_ERAS	transfer or erase data
BATT TOO LOW - CHNG NOW	battery discharged - replace it immediately
BAUDRATE >>>	baud rate value
CH_A	channel A
CH_A CH_B COMM LOST	lost communication with probes connected to inputs A and B
CH_A COMM LOST	lost communication with probe connected to input A
CH_A_NO__SER_NUM	the serial number of the probe connected to input A is absent
CH_A_SER #### ####	serial number #### #### of the probe connected to input A
CH_B	channel B
CH_B COMM LOST	lost communication with probe connected to input B
CH_B_NO__SER_NUM	the serial number of the probe connected to input B is absent
CH_B_SER #### ####	serial number #### #### of the probe connected to input 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
NEW_CH_A_CH_B_PROB_DET	two new probes connected to inputs A and B detected
NEW_CH_A_PROB_DET	new probe connected to input A detected
NEW_CH_V_PROB_DET	new probe connected to input B detected
OVER	maximum limit exceeded
PLS_EXIT >>> FUNC RES_FOR_FACT ONLY	please exit using ESC >>> function reserved to factory calibration
PRES_REL_TO_ZERO ENTR_TO_MENU	press REL to reset probe or ENTER to access menu
PRNT AND LOG INTV	printing and logging intervals
PRNT INTV >>>	printing interval
PROB ERR	error - unexpected probe
SEL_MEAS UNIT	selection of the unit of measurement for temperature (°C or °F)
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:

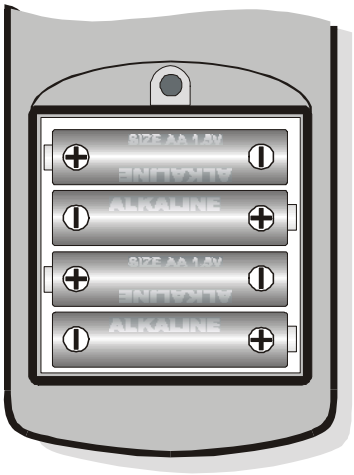
BATT TOO LOW
CHNG NOW

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 HD2124.2 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 **HD2124.1** and **HD2124.2** instruments are fitted with an electrically isolated RS-232C serial interface; the HD2124.2 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 HD2124.2).

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 standard serial transmission parameters of the instrument 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 13). 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	101.5E+3 22.7	Captured measurements (24 characters)
G0	Model HD2124 -2	Instrument model

Command	Response	Description
G1	M=PRESSURE	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 Pressure	Type of probe connected to input 1
G7	Probe SN=11119999	Probe 1 serial number
G8	Probe cal.=2004/01/12	Probe 1 calibration date
GB	User ID=0000000000000000	User code (set with T2xxxxxxxxxxxxxxxx)
GC		Print instrument's heading
GD	Probe=Sicram Pt100	Type of probe connected to input B
GE	Probe SN=12345678	Probe 2 serial number
GF	Probe cal.=2004/01/12	Probe 2 calibration date
LN	&1999	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
KZ	&	Probes zero function
RA	& #	Reading of LOG/PRINT interval set
RP	& 600	Battery level (Resolut. 0.01V)
RUA	U= Pa	Main unit of measurement
RUB	U= °C	Secondary 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 HD2124.1 and HD2124.2 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 HD2124.2 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 HD2124.2

The *Logging* function allows the recording up to 32000 measurement pairs registered by the probes connected to the 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. In this phase, the display will signal that the instrument is logging using the flashing message: "LOG ON".

The data stored in the memory can be transferred to a PC using the DUMP LOG command: press simultaneously the FUNC/ENTER and PEAK/MENU keys, using ENTER select the “>>>_LOG_DUMP_or_ERAS” item, and then press on the LOG/DumpLog key. During data transfer the display shows the message DUMP; to stop the data transfer press ESC on the instrument or on the PC.

CLEARING THE MEMORY - ONLY FOR HD2124.2

To clear the memory use the Erase Log function (press simultaneously the FUNC/ENTER and PEAK/MENU keys, using ENTER select the “>>>_LOG_DUMP_or_ERAS” item, and then press on the SERIAL/EraseLOG key).
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.
- Stored data remain in the internal memory independently of batteries 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: HOLD, FUNC (Max-Min-Avg) and SERIAL.
- Pressing the HOLD, REL FUNC and PEAK 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.
- If the logging is started when the display is in Peak mode, the peak values are logged, provided that the logging interval is equal to 1 second. Please see the paragraph dedicated to that on page 13.
- 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 on 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 FUNC and PEAK 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.
- If the serial transfer is started when the display is in Peak mode, the peak values are transferred, provided that the printing interval is equal to 1 second. Please see the paragraph dedicated to that on page 13.
- It is possible to activate both the logging (LOG) and direct transfer (PRINT) functions at the same time.

CONNECTION TO A PC

HD2124.1

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).

HD2124.2

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 HD2124.2

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 OPERATIVE 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 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 characters 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**)	Output mains adapter 100-240Vac/12Vdc-1A
Measuring units	°C - °F - Pa - hPa - mbar - bar - atm - mmHg - mmH_2O - kgf/cm^2 - PSI - inchHg
Security of memorized data	Unlimited, independently of battery charge conditions
Time	
Date and time	Schedule in real time
Precision	1min/month max drift
*Measured values storage - model **HD2124.2***	
Type	2000 pages of 16 samples each
Quantity	32,000 pairs of samples
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 **HD2124.2***

Type	1.1 - 2.0 electrically isolated

Connections

Input module for the probes	2 8-pole male DIN45326 connectors
RS232 serial interface	8-pole MiniDin connector
USB interface (only **HD2124.2**)	Mini-USB type B connector
Mains adapter (cod. **SWD10**)	2-pole connector (positive at centre)

Measurement of temperature by Instrument

Pt100 measurement range	-200…+650°C
Resolution	0.1°C
Instrument accuracy	±0.1°C
Drift after 1 year	0.1°C/year

TECHNICAL DATA OF PROBES AND MODULES IN LINE WITH THE INSTRUMENT

MEASUREMENT OF PRESSURE BY MODULE PP471

All TP704 and TP705 series Delta Ohm probes can be connected to the PP471 module. For the technical characteristics of the single probes, see the table below.

Technical characteristics

Precision	±0.05% of bottom scale
Peak duration	≥ 5ms
Peak accuracy	±0.5% of bottom scale
Peak dead band	≤ 2% of bottom scale

Full scale pressure	Maximum over-pressure	Burst pressure	Resolution	ORDER CODES			Accuracy From 20 to 25°C	Operating temperature	Connection
				Differential pressure	Relative pressure (compared to atmosphere)	Absolute pressure			
				NON insulated membrane	Insulated membrane	Insulated membrane			
10.0 mbar	350 mbar	400 mbar	0.01 mbar	**TP705-10MBD**			0.50 % FSO	0…60°C	Tube ∅ 5mm
20.0 mbar	350 mbar	400 mbar	0.01 mbar	**TP705-20MBD**			0.50 % FSO	0…60°C	Tube ∅ 5mm
50.0 mbar	350 mbar	400 mbar	0.01 mbar	**TP705-50MBD**			0.50 % FSO	0…60°C	Tube ∅ 5mm
100 mbar	350 mbar	400 mbar	0.1 mbar	**TP705-100MBD**			0.25 % FSO	0…60°C	Tube ∅ 5mm
	200 mbar	250 mbar			**TP704-100MBGI**		0.25 % FSO	-10…+80°C	¼ BSP
200 mbar	600 mbar	700 mbar	0.1 mbar	**TP705-200MBD**			0.25 % FSO	0…60°C	Tube ∅ 5mm
	400 mbar	450 mbar			**TP704-200MBGI**		0.25 % FSO	-10…80°C	¼ BSP
400 mbar	800 mbar	900 mbar	0.1 mbar		**TP704-400MBGI**		0.25 % FSO	-10…80°C	¼ BSP
500 mbar	1500 mbar	1800 mbar	0.1 mbar	**TP705-500MBD**			0.25 % FSO	0…60°C	Tube ∅ 5mm
600 mbar	1200 mbar	1500 mbar	0.1 mbar		**TP704-600MBGI**		0.25 % FSO	-40…125°C	¼ BSP
1.00 bar	3 bar	3.3 bar	1 mbar	**TP705-1BD**			0.25 % FSO	0…60°C	Tube ∅ 5mm
	2 bar	2.2 bar				**TP705BARO**	0.25 % FSO	0…60°C	Tube ∅ 5mm
	2 bar				**TP704-1BGI**		0.25 % FSO	-40…125°C	¼ BSP
	2 bar					**TP704-1BAI**	0.25 % FSO	-40…120°C	¼ BSP
2.00 bar	6 bar	7 bar	1 mbar	**TP705-2BD**			0.25 % FSO	0…60°C	Tube ∅ 5mm
	4 bar	4.5 bar			**TP704-2BGI**		0.25 % FSO	-40…125°C	¼ BSP
	4 bar					**TP704-2BAI**	0.25 % FSO	-25…85°C	¼ BSP
5.00 bar	10 bar	12 bar	1 mbar		**TP704-5BGI**		0.25 % FSO	-40…125°C	¼ BSP
						TP704-5BAI	0.25 % FSO	-25…85°C	¼ BSP
10.0 bar	20 bar	25 bar	0.01 bar		**TP704-10BGI**		0.25 % FSO	-40…125°C	¼ BSP
						TP704-10BAI	0.25 % FSO	-25…85°C	¼ BSP
20.0 bar	40 bar	45 bar	0.01 bar		**TP704-20BGI**		0.25 % FSO	-40…125°C	¼ BSP
						TP704-20BAI	0.25 % FSO	-25…85°C	¼ BSP
50.0 bar	100 bar	120 bar	0.01 bar		**TP704-50BGI**		0.25 % FSO	-40…125°C	¼ BSP
						TP704-50BAI	0.25 % FSO	-25…85°C	¼ BSP
100 bar	200 bar	240 bar	0.1 bar		**TP704-100BGI**		0.25 % FSO	-40…125°C	¼ BSP
						TP704-100BAI	0.25 % FSO	-25…85°C	¼ BSP
200 bar	400 bar	450 bar	0.1 bar		**TP704-200BGI**		0.25 % FSO	-40…125°C	¼ BSP
						TP704-200BAI	0.25 % FSO	-25…85°C	¼ BSP
500 bar	700 bar	1000 bar	0.1 bar		**TP704-500BGI**		0.25 % FSO	-40…125°C	¼ BSP
						TP704-500BAI	0.25 % FSO	-25…85°C	¼ BSP

TEMPERATURE PROBES Pt100 USING 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.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
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.O Class A - Thin Film	Immersion	-70°C…+250°C	±0.25°C
TP49AC.O Class A - Thin Film	Contact	-70°C…+250°C	±0.25°C
TP49AP.O Class A - Thin Film	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

PROBES Pt100 4 WIRES

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

Common characteristics

Resolution	0.1°C
Temperature drift @ 20°C	0.003%/°C

ORDER CODES

HD2124.1	Kit including the instrument HD2124.1, 4 x 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **The probes, the SICRAM interface module PP471 and the cables must be ordered separately.**
HD2124.2	Kit including the instrument HD2124.2 **datalogger**, 4 x 1.5V alkaline batteries, operating manual, case and DeltaLog9 software. **The probes, the SICRAM interface module PP471 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

PRESSURE MEASUREMENT PROBES

PP471	SICRAM interface module between instrument and TP704 and TP705 series Delta Ohm probes. Cable length 2 metres.
	The list of pressure probes is outlined in the table on page 31.

TEMPERATURE MEASUREMENT PROBES

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.I	Contact probe, sensor Pt100. Stem Ø 4 mm, length 230 mm, contact surface Ø 5mm. 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.O	Immersion probe, sensor Pt100. Stem Ø 2.7 mm, length 150 mm. Cable length 2 metres. Aluminium handle.
TP49AC.O	Contact probe, sensor Pt100. Stem Ø 4 mm, length 150 mm. Cable length 2 metres. Aluminium handle.
TP49AP.O	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.
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.
TP47	Only connector for direct 4-wire Pt100 probes connection.

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.

CERTIFICATO DI CONFORMITÀ DEL COSTRUTTORE

MANUFACTURER'S CERTIFICATE OF CONFORMITY

rilasciato da

issued by

DELTA OHM SRL STRUMENTI DI MISURA

DATA
DATE 2014/07/02

Si certifica che gli strumenti sotto riportati hanno superato positivamente tutti i test di produzione e sono conformi alle specifiche, valide alla data del test, riportate nella documentazione tecnica.

We certify that below mentioned instruments have been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

La riferibilità delle misure ai campioni internazionali e nazionali è garantita da una catena di riferibilità che ha origine dalla taratura dei campioni di prima linea dei laboratori accreditati di Delta OHM presso l'Istituto Primario Nazionale di Ricerca Metrologica.

The traceability of measures assigned to international and national reference samples is guaranteed by a reference chain which source is the calibration of Delta OHM accredited laboratories reference samples at the Primary National Metrological Research Institute.

Tipo Prodotto: **Manometro – Termometro RTD**
Product Type: ***Manometer – RTD Thermometer***

Nome Prodotto: **HD2124.1 – HD2124.2**
Product Name:

Responsabile Qualità
Head of Quality

DELTA OHM SRL
35030 Caselle di Selvazzano (PD) Italy
Via Marconi, 5
Tel. +39.0498977150 r.a. - Telefax +39.049635596
Cod. Fisc./P.Iva IT03363960281 - N.Mecc. PD044279
R.E.A. 306030 - ISC. Reg. Soc. 68037/1998

WARRANTY

TERMS OF WARRANTY

All DELTA OHM instruments are subject to accurate testing, and are guaranteed for 24 months from the date of purchase. DELTA OHM will repair or replace free of charge the parts that, within the warranty period, shall be deemed non efficient according to its own judgement. Complete replacement is excluded and no damage claims are accepted. The DELTA OHM guarantee only covers instrument repair. The guarantee is void in case of incidental breakage during transport, negligence, misuse, connection to a different voltage than that required for the appliance by the operator. Finally, a product repaired or tampered by unauthorized third parties is excluded from the guarantee. The instrument shall be returned FREE OF SHIPMENT CHARGES to your dealer. The jurisdiction of Padua applies in any dispute.

The electrical and electronic equipment marked with this symbol cannot be disposed of in public landfills. According to the UE Directive 2002/96/EC, the European users of electrical and electronic equipment can return it to the dealer or manufacturer upon purchase of a new one. The illegal disposal of electrical and electronic equipment is punished with an administrative fine.

This guarantee must be sent together with the instrument to our service centre.

IMPORTANT: Guarantee is valid only if coupon has been correctly filled in all details.

Instrument code ❑ **HD2124.1** ❑ **HD2124.2**

Serial Number _____

RENEWALS

Date _____ Date _____

Inspector _____ Inspector _____

Date _____ Date _____

Inspector _____ Inspector _____

Date _____ Date _____

Inspector _____ Inspector _____

CE CONFORMITY	
The product complies with 2004/108/CE (EMC) and 2006/95/CE (low voltage) directives, and meets the requirements of the following technical standards:	
Safety	EN61010-1
Electrostatic discharge immunity test	EN61000-4-2 Level 3
Radiated, radio-frequency, electromagnetic field immunity	EN61000-4-3 Level 3
Electrical fast transient/burst immunity	EN61000-4-4 Level 3
Immunity to conducted disturbances, induced by RF fields	EN61000-4-6
Voltage dips, short interruptions and voltage variations immunity	EN61000-4-11
Radio disturbance characteristics (conducted and radiated emissions)	EN55022:2007 class B