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Operating manual

RTD Data Logger
HD32.7

www.deltaohm.com

Keep for future reference.

RTD Datalogger
HD32.7
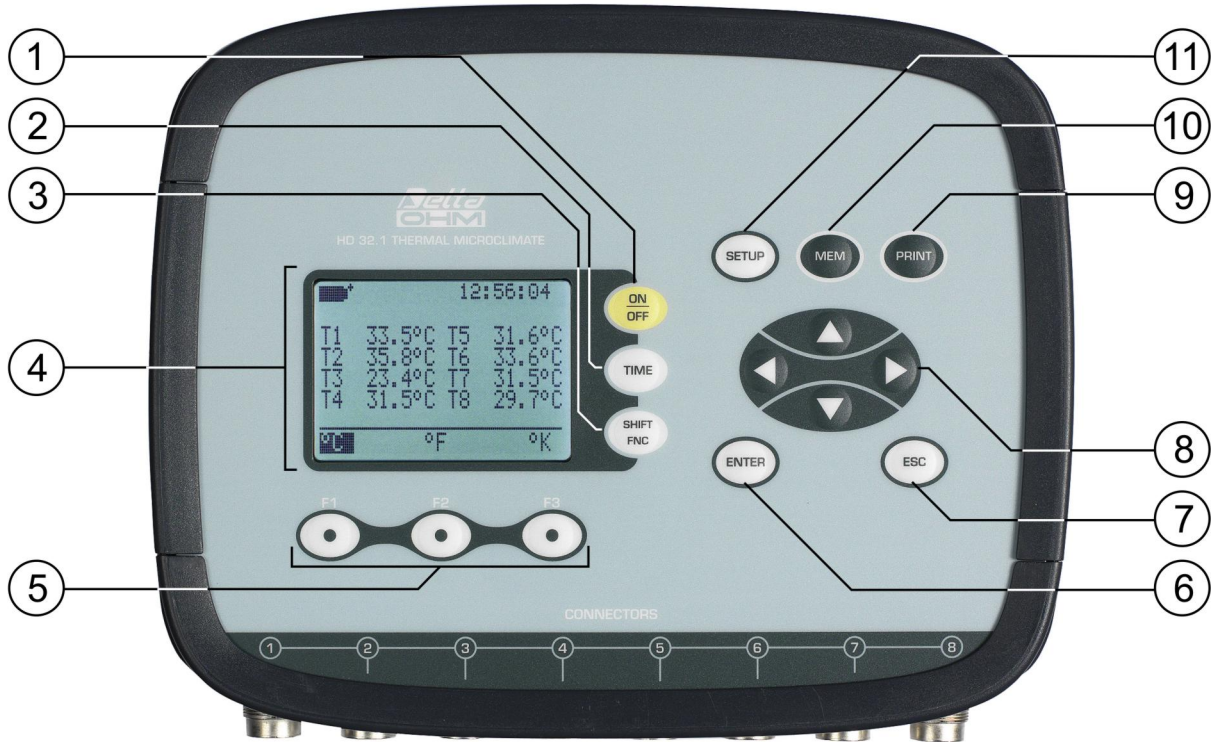
HD32.7

1. **ON/OFF** key: It turns the instrument on and off.

2. **TIME** key: It allows the display of **date** and **time**, in the first line for about 8 seconds.

3. **SHIFT FNC** key: It activates the Shortcut window.

4. Graphic display.

5. Function keys **F1**, **F2**, **F3**: Activate the function in the bottom line of the display.

6. **ENTER** key: In the menu, it confirms the data entered.

7. **ESC** key: It allows to exit from the menu or, in case of a submenu, to exit from the current level display.

8. Navigation keys ▲ ▼ ◄ ►: Allow navigation through the menus. During measurement, the ◄ ► arrows change the display contrast.

9. **PRINT** key: It starts and ends the data transfer to the serial/USB communication port.

10. **MEM** key: It starts and ends the recording of the data.

11. **SETUP** key: It allows to enter and exit the instrument's functioning parameter setting menu.

12. Inputs for the temperature probes: Pt100 with SICRAM module, direct 4-wire Pt100 or direct 2-wire Pt1000. The connected probes must be of the same type: you cannot simultaneously connect probes of different types.

13. Battery compartment.

14. Sub D 9-pole male connector for the RS232C serial port.

15. USB type B port.

16. Power supply input 12Vdc/1A – external ∅ 5.5mm, internal ∅ 2.1mm. The power supply positive must be connected to the central pin.

TABLE OF CONTENTS

1. GENERAL CHARACTERISTICS

The **HD32.7 RTD datalogger** is an instrument that can capture, log and then send to a PC or serial printer the data coming from 8 temperature probes with Pt100 or Pt1000 sensor connected to the inputs.

The probes can be Pt100 with SICRAM module, direct 4-wire Pt100 or direct 2-wire Pt1000. All the connected probes must be of the same type.

The Pt100 SICRAM probes are fitted with an electronic circuit that communicates with the instrument. The sensor calibration information, the probe's type and the serial number are memorized inside. Thanks to the SICRAM module, the probes' interchangeability on the instrument is guaranteed. While the probes with SICRAM module are calibrated in the factory and can be recalibrated, the 4-wire Pt100 and 2-wire Pt1000 probe uncertainty depends on the sensor quality.

All probes are detected during turn on: After connecting or disconnecting a probe, turn the instrument off and on.

The communication with the PC occurs through a multi-standard serial port RS232 or an automatic detection USB 2.0. The memorization and printing interval, the logging start and end date, and the communication parameters can be configured using the menu.
The captured data can be displayed on the PC using the **_DeltaLog9_** software (vers. 3.0 and later).
Through the RS232 serial port, you can transfer the data in real time to an 80 column serial printer.

NOTE: **The set capture and print intervals are valid for all the connected probes.**

Other user selectable/settable parameters are:

- The type of probes connected to the instrument inputs.
- The units of measurement for the displayed temperature quantities: °C, °F, °K.
- The system date and time
- The display of the maximum, minimum, and average statistic parameters.
- The data transfer speed via the serial RS232 port.
- The setting, enabling and disabling of the password that locks the keyboard.

The instrument can store up to 64 LOG sessions (data capture) in two modes:
- _Automatic_: Setting the automatic start and stop dates;
- _Manual_: Pressing MEM to start and end the data capture session.

The flash memory has a total capacity of 96,000 recordings from 8 inputs each.
The memory space can be handled in two modes:
- When the available memory is full, the collected data are overwritten starting from the oldest ones (circular memory),
- The recording is stopped when the available memory is full.

2. KEYBOARD AND DISPLAY DESCRIPTION

The user interface consist of a backlit LCD display and the power-on, function, and setting keys.

Turn the instrument on and off with the **ON/OFF** key: When you turn the instrument on, the logo and model will be displayed for a few seconds, and then the main display.

The turning on starts a self test including the detection of the probes connected to the inputs. **As the SICRAM probes' identification and calibration data are captured upon turning the instrument on, it is necessary to connect the probes when the instrument is off. If a SICRAM probe is connected and the instrument is on, the "New" indication appears on the display and an intermittent beep is issued: It is necessary to turn the instrument off and on.**

Once turned off, wait few seconds before turning it on to allow completion of the shut down routine.

The type of probe connected to the inputs (Pt100 with SICRAM, direct 4-wire Pt100 or direct 2-wire Pt1000) is selected from the menu. (Please see the "Input" paragraph on page 22.)

2.1 The Display

The **HD32.7** standard display is divided in two areas:

```
■▪⁺                    10:45:50
T1  20.4°C   T5   - - -.- -
T2  29.8°C   T6   - - -.- -
T3  - - -.- -   T7   - - -.- -
T4  - - -.- -   T8   - - -.- -
°C          °F          °K
```

The first area displays the **battery's charge status** and the current **time** (above); then, the **temperatures measured** by the probes connected to the inputs (below) arranged on two columns. The unused inputs are indicated by dashes.

The bottom line displays the options that can be activated using the **F1**, **F2** and **F3** keys. Please see the **SHIFT FNC** key in the following paragraph.

In the example, the function keys are associated to the temperature measurement units:
°C: Celsius degrees
°F: Fahrenheit degrees
°K: Kelvin degrees

2.2   The Keyboard
The keys on the instrument perform the following functions:

ON/OFF key

It turns the instrument on and off.
When turning on the instrument using this key, the first screen will be displayed with the logo and model. After few seconds the temperatures measured by the probes connected will be displayed.

NOTE: The non-connected inputs will be indicated by dashes. If a probe is disconnected when the instrument is on, the "LOST" message will be displayed in case of a SICRAM probe, or dashes in the other cases: Reconnect the probe to read the measured temperature. Do not connect the probes when the instrument is on: In order to correctly detect them, you need to turn the instrument off and then back on again.

TIME   **TIME key**

It allows the display of **year/month/day** and **hour/minutes/seconds**, in the first line for about 8 seconds. Normally the display shows, on the left, the ▬■⁺ icon for the battery's charge status, on the right, the hour/minutes/seconds. The battery symbol becomes **[~]** when the external power supply is connected.

SHIFT FNC   **SHIFT FUNCTION key**

It activates the Shortcut window.
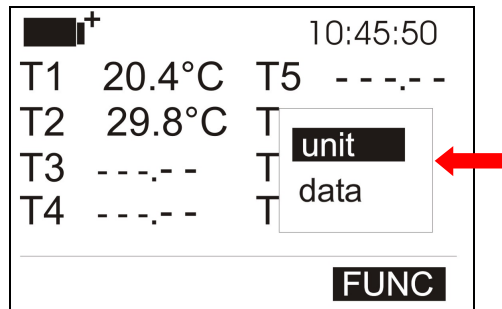
A drop-down menu opens as in the figure: The black background item is the active item. To select another item, use the ▲▼ arrows and confirm with ENTER.

●   **F1, F2, F3 keys**

These are "function keys": They activate the function in the last line of the display (indicated by the arrow in the figure); the function, enabled by **SHIFT FNC,** is selected and displayed in "reverse" (e.g. in the figure the "°C" function is enabled).
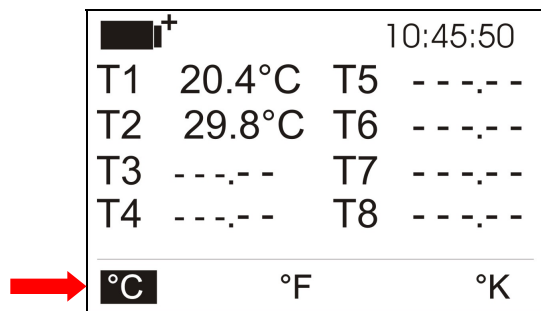
SETUP   **SETUP key**

It allows to enter and exit the instrument's functioning parameter setting menu.

ENTER key

In the menu, it confirms the entered data.

ESC key

It allows to exit from the menu or, in case of a submenu, to move up one level.

MEM key

It allows to start and end a "logging" session (data recording); the data logging interval must be set in the menu.

PRINT key

It allows direct printing of the data via the serial port; the data printing interval must be set in the menu.

Arrow keys

Allow navigation through the menus. During measurement, the ◄► arrows change the display contrast.

3. OPERATION

Before turning on the instrument, connect the probes to the 8-pole male DIN45326 inputs, located in the lower part of the instrument (see figure on page 2).

All probes must be of the same type: The selection of the type of probe should be performed in the *Input* menu item (please see page 22).

NOTE: Connect the probes when the instrument is off. If a new probe is connected when the instrument is on, the "New" indication appears on the display for a SICRAM probe, or dashes for another probe. Turn the instrument off and then back on again to enable the new probe.

If a SICRAM probe is disconnected when the instrument is on, you will get an acoustic signal (a beep) and an indication on the display near the physical quantity being disconnected. The "LOST" message will be displayed.

The Pt100 probe with SICRAM module is fitted with an electronic circuit that communicates with the instrument. The sensor calibration information are memorized inside. This guarantees its interchangeability.

Connect the probes. Turn on the instrument: After few seconds, the display will appear as follows:

```
■ı⁺                    10:45:50
T1  20.4°C   T5  - - -.- -
T2  29.8°C   T6  - - -.- -
T3  - - -.- -    T7  - - -.- -
T4  - - -.- -    T8  - - -.- -
─────────────────────────────
°C          °F          °K
```

The battery charge symbol and current time are in the upper part (for further details, see the chapter 8).

Then the temperatures detected by each input are displayed. Use the **F1**, **F2** and **F3** keys to select the unit of measurement (°C, °F or °K).

3.1 The unit of measurement "Unit"

By using the "Functions" menu, enabled by the **SHIFT FNC** key, select the unit of measurement for the temperature in °C (Celsius), °F (Fahrenheit) or °K (Kelvin) degrees, as follows:

1. Use **SHIFT FNC** to open the drop-down menu;
2. Use the arrows ▲▼ to select *unit*;
3. Press **ENTER** to confirm: The selected quantity is displayed in the central line of the display;
4. The three different temperature units of measurement are shown in the bottom line of the display using **F1**, **F2** or **F3**: The selected unit is displayed near the measured value;
5. Press **ESC** to exit the drop-down menu without making any change.

3.2 The maximum, minimum and average values of the captured quantities

In order to display the maximum, minimum and average values of the measured quantities, proceed as follows:

1. Use **SHIFT FNC** to open the drop-down menu;
2. Use the arrows ▲▼ to select "**data**";
3. Confirm by pressing **ENTER**: The selected quantity is displayed in the central line of the display;

4. The three items *max* (maximum), *min* (minimum) and *avg* (average) are shown in the bottom line of the display using **F1** or **F2**.

NOTE: Once selected, for example *max*, all displayed quantities represent the maximum value. **The average is calculated on the first five minutes of samples, and then on the current average.**

The **F3** key allows choosing to clear (*Clr*) the maximum, minimum and average data of the captured measurements:
1. Select *Clr* using **F3** to clear the max, min and avg calculations;
2. Another drop-down menu will open;
3. Use the arrows ▲ ▼ to select *yes*;
4. Press **ENTER** to confirm.
5. Press **ESC** or select *no*, to exit without clearing the data.

3.3 Instrument Setup

In order to set the instrument, open the **main menu** by pressing **SETUP**. See the next chapter for further details.

3.4 Start of a new logging session

Press **MEM** to start and end a **logging** session: This key 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 **"Log interval"** menu parameter. The data logged between a start and subsequent stop represent a measurement block.

During logging, the *LOG* indication is displayed, the battery symbol blinks and a beep is issued each time a logging occurs.
To end the logging, press **MEM** again.

The instrument can turn off during logging between one capture and the next: The function is controlled by the **Self_shut_off_Mode** menu 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 **Self_shut_off_Mode** parameter is enabled.

For the details see par. "4.2 MENU LOGGING".

4. MAIN MENU

To access the programming menu press **SETUP**: The setting menu will be displayed with the following items:

```
█▌✝              10:45:50
       -- MAIN MENU --
0) Info          5) Firmware
1) Logging       6) Time/date
2) Serial        7) Calibrate
3) Input         8) Key lock
4) Contr.        9) Password
<ESC>  exit/cancel
```
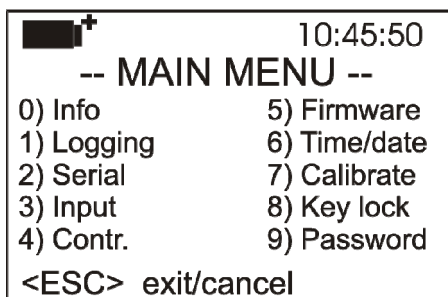
0) Info
1) Logging
2) Serial
3) Input
4) Contr.
5) Firmware
6) Time/date
7) Calibrate
8) Key lock
9) Password

If you do not press any key within 2 minutes, the instrument goes back to the main display.
Use the arrows ▲▼ ◄► and press **ENTER** to select an item.
To exit the selected item and return to the previous menu, press **ESC**.
To exit the menu and return directly to measurement, press **SETUP**.

4.1 Info

To access the **Info** menu, open the main menu using the **SETUP** key. Using the ▲▼ ◄► arrows, select *Info* and confirm with ENTER.
The following information on the instrument will be displayed: Instrument code, firmware date and version, serial number, instrument calibration date, user identification code.

```
█▌✝              10:45:50

Model HD32.7
Firm.Ver.=01.00
Firm.Date=2006/08/31
SN=12345678
Cal.=0000/00/00
User ID=
0000000000000000
```
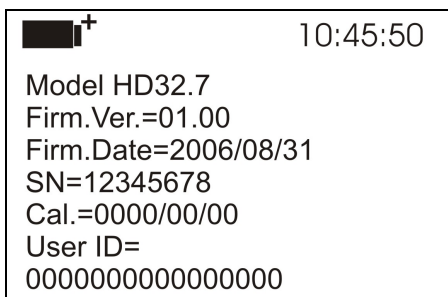
This screen cannot be modified: The user identification code (User ID) can be set using the *DeltaLog9* software (vers. 3.0 and later).
Press **ESC** to return to the main menu. Press **SETUP** to exit the menu.

4.2 Logging

To access the **Logging** menu, open the main menu using the **SETUP** key. Using the ▲▼ ◄► arrows, select *Logging* and confirm with **ENTER**.

The parameter setting submenu for the logging sessions will be displayed.

```
████⁺                    10:45:50

LOGGING MENU

0) Log Interval
1) Self shut_off mode
2) Start/stop time
3) Cancel auto start
4) Log file manager
<ESC>  exit/cancel
```

You can set the data capture frequency (*Log interval*) and the automatic logging start (*Start/ stop time*). **The capture interval is the same for all probes**.

With the "Log File Manager" you can handle the stored data sessions: printing, erasure.

4.2.1 Log Interval

Use this item to set the LOG interval (interval between two subsequent sample records). To enter this setting, proceed as follows:

Once you have accessed the *LOGGING* submenu (previous par.) use the arrows ▲ ▼ to select *Log Interval*:

```
████⁺                    10:45:50

    LOGGING MENU

input LOG interval
as h:mm:ss (1h max)
use arrows to correct
or <ESC>  now set at:
0:00:15
```
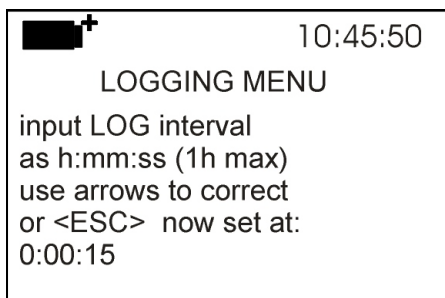
1. Use the arrows ▲ ▼ to select the interval duration from **a minimum of 2 seconds to a maximum of one hour**;
2. Press **ENTER** to confirm and return to the Logging menu;
3. Press **ESC** to return to the **Logging** menu without making any change;
4. Press **ESC** again to return to the main menu;
5. Press **SETUP** to exit immediately from the menu.

These are the available values:

2, 5, 10, 15, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes and 1 hour.

4.2.2 Self Shut-off mode

The *Self shut-off mode* item controls the instrument's automatic turning off during logging, 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

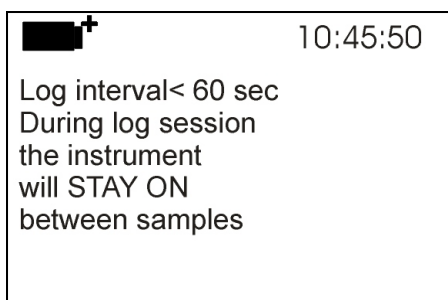to turn off the instrument between loggings: it will turn on 15 seconds before the sampling and will turn off immediately afterwards, thus increasing the battery life.
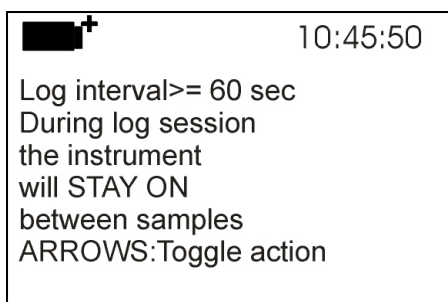
Once you have accessed the *LOGGING* submenu (previous par.) use the arrows ▲ ▼ to select *Self shut-off mode*:

- If the set *Log Interval* (see previous par.) is lower than 60 seconds, the following will be displayed

```
████⁺                    10:45:50

Log interval< 60 sec
During log session
the instrument
will STAY ON
between samples
```

- If the set *Log Interval* (see previous par.) is greater or equal to 60 seconds, the following will be displayed

```
████⁺                    10:45:50

Log interval>= 60 sec
During log session
the instrument
will STAY ON
between samples
ARROWS:Toggle action
```

1. By using the arrows ▲ ▼ you can select:

   ...STAY ON... (the instrument stays on)
   ...SHUT OFF... (the instrument shuts off between one logging and the next)

2. Press **ESC** to return to the *Logging* menu;
3. Press **ESC** again to return to the main menu;
4. Press **SETUP** to exit immediately from the menu.

4.2.3 Start/stop time

The logging start and end date and time can be programmed. When called, **the function suggests the current time plus 5 minutes as the start time**: Press <**ENTER**> to confirm or set the date and time using the ▲▼ arrows. Then you are asked to set the data to end the recording: By default (factory setting) **the instrument suggests the start time plus 10 minutes**. The default suggested values are such to allow the user to setup an instrument ready for acquisition.

To enter this setting, proceed as follows.

Once you have accessed the *LOGGING* submenu use the arrows ▲ ▼ to select *Start/Stop time*: The following message "Enter start time" will be displayed:
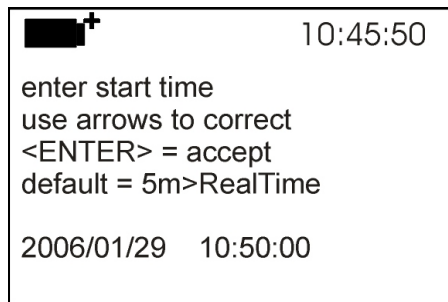
```
┌─────────────────────────────────┐
│ ■■■⁺                  10:45:50  │
│                                 │
│ enter start time                │
│ use arrows to correct           │
│ <ENTER> = accept                │
│ default = 5m>RealTime           │
│                                 │
│ 2006/01/29   10:50:00           │
└─────────────────────────────────┘
```

1. Press **ENTER** to **confirm** the data prompted by the instrument;
2. To change the prompted data, use the arrows ◄ ► to select the data to be changed (year/month/day and hour:minutes:seconds);
3. The selected data will flash;
4. Use the arrows ▼▲ to change its value;
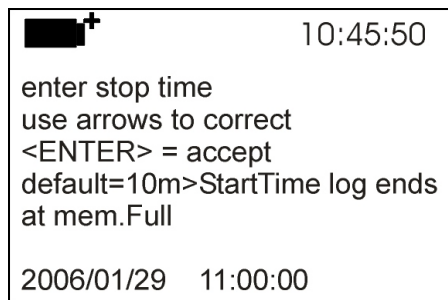5. Confirm by pressing **ENTER**;
6. Press **ESC** to return to the **Logging** menu without making any change;
7. Press **ESC** again to return to the main menu;
8. Press **SETUP** to exit immediately from the menu.

After setting the logging start time, the logging end time (enter stop time) window will be displayed:

```
┌─────────────────────────────────┐
│ ■■■⁺                  10:45:50  │
│                                 │
│ enter stop time                 │
│ use arrows to correct           │
│ <ENTER> = accept                │
│ default=10m>StartTime log ends  │
│ at mem.Full                     │
│                                 │
│ 2006/01/29   11:00:00           │
└─────────────────────────────────┘
```

1. Press **ENTER** to **confirm** the data prompted by the instrument;
2. To change the prompted data, use the arrows ◄ ► to select the data to be changed (year/month/day and hour:minutes:seconds);
3. The selected data will flash;
4. Use the arrows ▼▲ to change its value;
5. Confirm by pressing **ENTER**;
6. Press *ESC* to return to the **Logging** menu without making any change;
7. Press **ESC** again to return to the main menu;
8. Press **SETUP** to exit immediately from the menu.
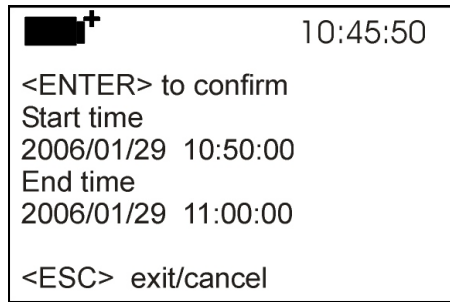
NOTE: The logging end time prompted by the instrument is 10 minutes after the logging session start time.

9. Once both values have been set, a summary will be displayed showing the start and end time of the LOG session.

```
┌─────────────────────────────────┐
│ ■■■⁺              10:45:50       │
│                                 │
│ <ENTER> to confirm              │
│ Start time                      │
│ 2006/01/29  10:50:00            │
│ End time                        │
│ 2006/01/29  11:00:00            │
│                                 │
│ <ESC>  exit/cancel              │
└─────────────────────────────────┘
```

10. Press **ENTER** to confirm or **ESC** to exit without enabling the automatic start: In both cases, you will return to the *LOGGING* menu.
11. Press **SETUP** to exit immediately from the main menu.

When the instrument starts automatically a LOG session, a beep is issued on each capture and the blinking **LOG** message is shown at the top of the display.
Press **MEM** to stop the session before the set time.
To cancel the automatic start setting, use the **Cancel auto start** function as illustrated in the following paragraph.

<u>NOTE 1:</u> The automatic logging session is started even when the instrument is off. If it is off when the automatic logging session is started, the instrument is turned on few seconds earlier and remains on at the end of logging. If it is powered by the battery, it is turned off when idle for some minutes at the end of the logging session.

<u>NOTE 2:</u> **Use of the MEM key after setting the automatic start and stop.**
• If the automatic start and stop have been set and, before the automatic start, you press the MEM key, the instrument starts recording at once. The next automatic start command is ignored, the recording ends at the automatic stop command.
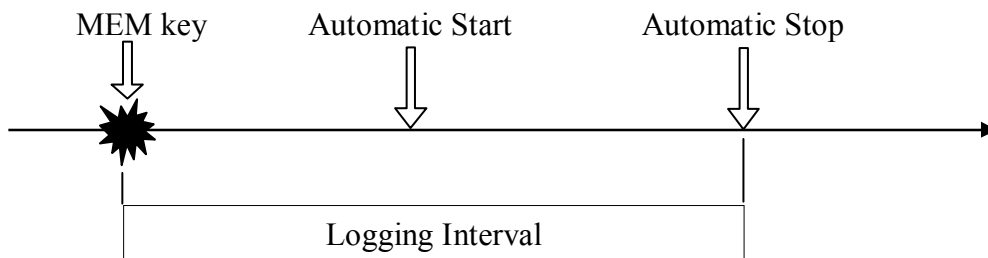
• If the automatic start and stop have been set and, after the automatic start, you press the MEM key, the instrument stops recording. The next preset automatic stop command is cleared.
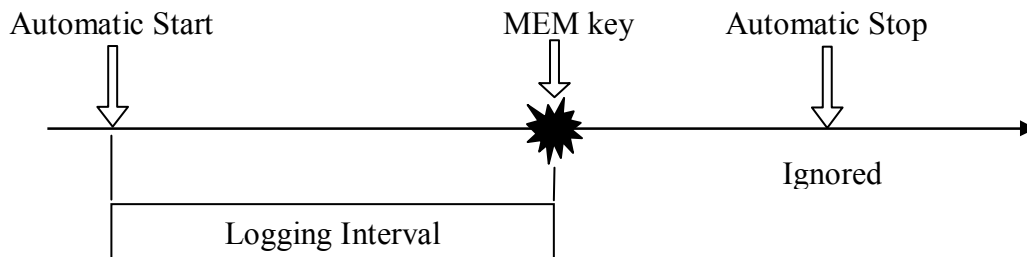
4.2.4 Cancel auto start

Once the LOG session start and end times are set, you can inhibit the session automatic start by using *Cancel auto start*.
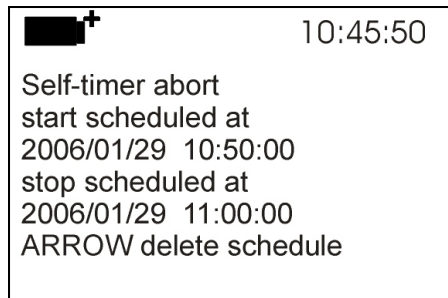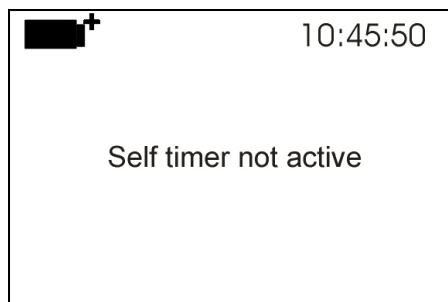
Once you have accessed the *LOGGING* submenu:

1. Use the arrows ▲ ▼ to select *Cancel auto start*
2. The LOG session start and end times will be displayed:

```
■◣⁺                    10:45:50

Self-timer abort
start scheduled at
2006/01/29  10:50:00
stop scheduled at
2006/01/29  11:00:00
ARROW delete schedule
```

3. By pressing ▲ the following message will be displayed: "Self timer not active";

```
■◣⁺                    10:45:50



          Self timer not active


```

4. Press **ENTER** to confirm the automatic start cancellation;
5. Press **ESC** to exit without cancelling the automatic start;
6. Press **ESC** again to exit from the submenus;
7. Or press **SETUP** to exit immediately from the main menu.

See the previous paragraph to set a new automatic start time after cancelling the previous one.

4.2.5 Log File Manager

This item allows managing the captured logging sessions: The instrument allows printing the files of the captured sessions (*Print selected log*), cancelling the entire memory (*Erase ALL logs*) and selecting the memory management mode (*Select memory Type*).

The instrument can store up to 64 LOG sessions, progressively numbered from 00 to 63: The session list is arranged on 4 lines and 4 columns. If you have over 16 sessions, using the F1 function key (*Page-*) you shift to the previous screen, and with the F3 key (*Page+*) to the next one. The current page (0, 1, 2 or 3) and the total data pages are displayed in the upper right corner: In the example, "0/3" means page 0 of three pages of logged data.

```
┌─────────────────────────────────┐
│ PRINT A FILE              0/3    │
│ [00] - 01 - 02 - 03             │
│ 04 - 05 -    -                  │
│ 08 - 09 -    -                  │
│ 12 - 13 - 14 - 15               │
│ D:2006/01/27   18:50:00         │
│ Rec: 000006                     │
│ Page-              Page+        │
└─────────────────────────────────┘

      F1        F2        F3
    (  ●  )   (  ●  )   (  ●  )
```
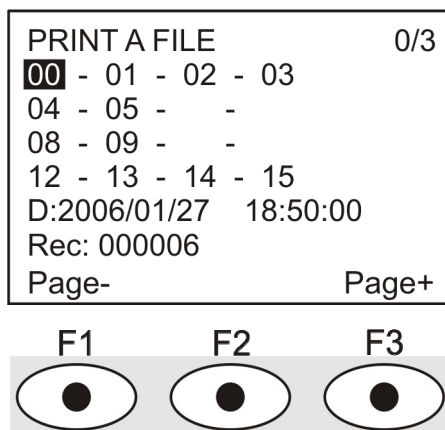
Once you have accessed the *LOGGING* submenu:

1. Use the arrows ▲ ▼ to select **Log File manager**: You will see the following submenu

```
┌─────────────────────────────────┐
│ ■■▪⁺              10:45:50       │
│                                 │
│ LOG FILE MANAGER                │
│ 0) Print selected log           │
│ 1) Erase ALL logs               │
│ 2) Select memory type           │
│                                 │
│ <ESC>  exit/cancel              │
└─────────────────────────────────┘
```
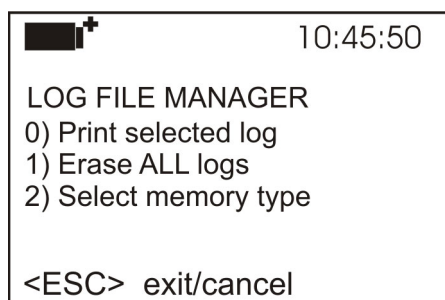
0) Print selected log
1) Erase ALL logs
2) Select memory type

2. Use the arrows ▲ ▼ to select a menu item;
3. Press **ENTER** to confirm;
4. Press **ESC** to return to the menu;
5. Press **SETUP** to exit immediately from the main menu.

NOTE: You can connect a PC or serial port printer to the instrument RS232C serial port. A parallel port printer requires a serial/parallel converter between the instrument and the printer (non supplied).

Before starting the printing via the RS232C port, you have to set the baud rate.

To do so, select the *Baud Rate* in the menu *Serial* (see par. 4.3.1 The Baud Rate) and select the maximum value equal to 38400 baud. To connect a printer, use the maximum allowed value for the printer.

The communication between instrument and PC or between instrument and printer, only works if the instrument and connected device (PC or printer) baud rates are the same.

0) Print selected log:

By selecting this item, the page of the log to be printed will be displayed:

```
PRINT A FILE              0/3
[00] - 01 - 02 - 03
04 - 05 -    -
08 - 09 -    -
12 - 13 - 14 - 15
D:2006/01/27   18:50:00
Rec: 000006
Page-              Page+
```

```
  F1        F2        F3
 ( ● )     ( ● )     ( ● )
```
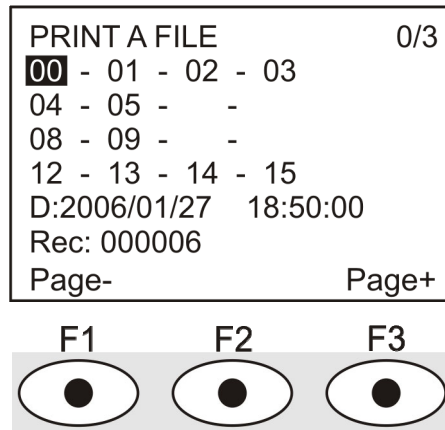
1. Use the arrows ▲ ▼ ◄ ► to select the log to be printed, and the F1 and F3 function keys to shift page.
2. Once a file is selected, the acquisition start date and time and the number of samples contained in the file (Rec) are displayed at the bottom of the display.
Warning: The files are stored in ascending order. However, if the memory is arranged in circular mode (please see later at point 3), it could be that a lower number corresponds to a more recent file. Each file is only identified by the date and time, **shown on the display**. In the example above, the file 00 is selected: The recording started at 18:50 on 27 January 2006. The file contains 6 samples.
3. Press **ENTER** to print the selected log (or press **ESC** to return to the previous menu, without printing);
4. The data transfer message will be displayed a few seconds, then the instrument will go back to the **Print selected log** page to select another log to be printed;
5. Repeat the procedure to print the required sessions or press **ESC** to exit this menu;
6. Press **SETUP** to exit immediately from the main menu.

1) Erase ALL logs

By selecting this item, the "Erase ALL files" message will be displayed:

```
■■■⁺               10:45:50

ERASE ALL FILES



```
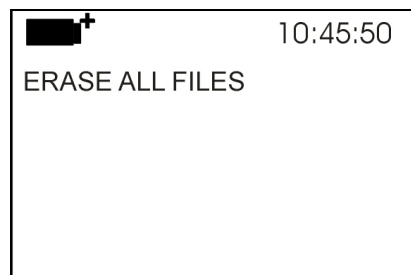
1. Press **ENTER** to erase all the files;
2. Press **ESC** to cancel the operation and return to the previous menu level;
3. Press **SETUP** to exit immediately from the main menu.

2) Select memory type

By selecting this item, the memory type selection page will be displayed:

```
                              10:45:50
■■■▪+
Record Type

Until memory full

<Up/Down> to change
<ENTER>: confirm
```
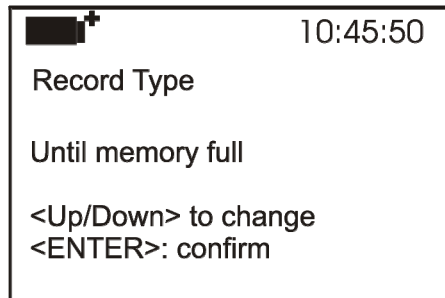
The memory can be handled in two modes that can be selected using the ▲ ▼ arrows:
- *Circular memory*. When the memory is full, the new files will overwrite the oldest ones.
- *Until memory full*. When the memory space is full, the recording will stop and the message "WARNING: MEMORY FULL!!" will be displayed. In order to continue recording, the files in the memory should be erased.

1. Press **ENTER** to confirm the selected mode;
2. Press **ESC** to cancel the operation and return to the previous menu level;
3. Press **SETUP** to exit immediately from the main menu.

4.3 Serial (Serial Communication)

Th e *Serial* submenu allows setting th e data transfer speed via th e serial port (*Baud rate*), and th e record printing interval (*Print Interval*).

The LOG sessions can be downloaded on a PC, through the serial **RS232** or **USB** connection.
In case of serial connection, the transfer speed can be set by the user (see next par.) up to a maximum of 38400 baud.
In case of USB connection, the transfer speed is fixed at 460800 baud.

The data downloaded to the PC using the DeltaLog9 software (vers. 3.0 and later) can be displayed as a table or graphically.

The instrument can be connected directly to a printer with serial input.

To access the *Serial* submenu, proceed as follows:
1. Press **SETUP**;
2. Use the arrows ▲ ▼ ◄ ► to select *Serial*;
3. Press **ENTER**;
4. You will get the *Serial* submenu.

```
                              10:45:50
■■■▪+
SERIAL COM MENU
0)Baudrate
1)Print Interval



<ESC>  exit/cancel
```
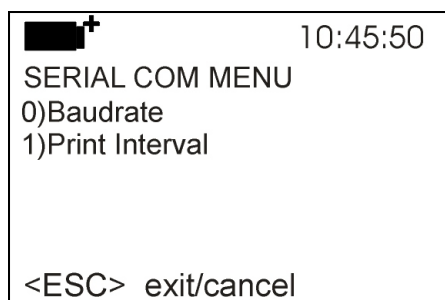
4.3.1 The Baud Rate

The **Baud Rate** indicates the speed used for the serial communication with the PC.
To set the **Baud rate**, proceed as follows:
1. Use the arrows ▲ ▼ to select the item;
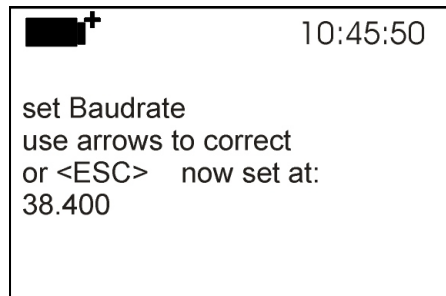2. Press **ENTER**: You will get the following message:

```
■■✛                    10:45:50


set Baudrate
use arrows to correct
or <ESC>   now set at:
38.400

```

3. Use the arrows ▼ ▲ to set the value;
4. Press **ENTER** to confirm and return to the previous page, or press **ESC** to cancel the change and exit the menu item;
5. Press **ESC** over and over to exit from the submenus;
6. Press **SETUP** to exit immediately from the main menu.

WARNING: 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.

4.3.2 Print Interval

To set the **Print Interval**, proceed as follows:
1. Use the arrows ▲ ▼ to select the item;
2. Press **ENTER**: You will get the following message:

```
■■✛                    10:45:50
SERIAL COM MENU
input PRINT interval
as h:mm:ss (1h max)
use arrows to correct
or <ESC>   now set at:
0:00:00
```
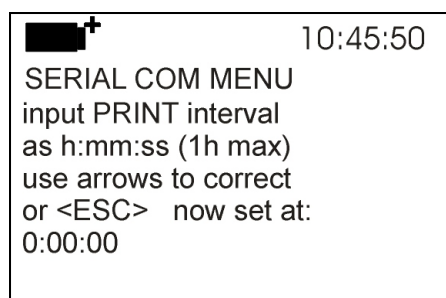
3. Use the arrows ▼ ▲ to set the value;
4. Press **ENTER** to confirm and return to the previous page, or press **ESC** to cancel the change and exit the menu item;
5. Press **ESC** over and over to exit from the submenus;
6. Press **SETUP** to exit immediately from the main menu.

The print interval can be set to one of the following fixed values:
0, 2, 5, 10, 15, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes and 1 hour.
If the value 0 is set, PRINT works on command: The sending of data to the serial port is performed each time the key is pressed. With an interval from 2 seconds to 1 hour, continuous

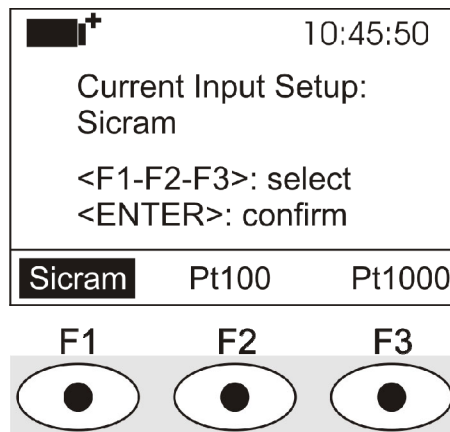data printing is started when the PRINT key is pressed. Press PRINT again to end the **continuous** printing.

Select a sufficiently long print interval so that the printer connected to the instrument can actually perform the printing.

4.4 Input

The instrument accepts the input of Pt100 with SICRAM module, direct 4-wire Pt100 or direct 2-wire Pt1000 probes. All connected probes must be of the same type:

The selection of the type of sensor is not automatic. The sensor used should be set in the INPUT menu item, after pressing SETUP. This setting remains in the memory until modified by the user.

1. Press **SETUP**;
2. Use the arrows ▲ ▼ to select *Input*;
3. Press **ENTER**: The following page opens:

```
  ■┓⁺                    10:45:50

  Current Input Setup:
  Sicram

  <F1-F2-F3>: select
  <ENTER>: confirm

  Sicram      Pt100      Pt1000

     F1          F2          F3
    ( ● )       ( ● )       ( ● )
```

4. In the upper line you will see the current sensor type (Current Input Setup).
5. Select the Pt100 with SICRAM, the direct 4-wire Pt100 or the direct 2-wire Pt1000 probe using the F1, F2 and F3 keys, respectively.
6. Press **ENTER** to confirm, **ESC** to exit without making changes.
7. Press **SETUP** to exit immediately from the main menu.
8. Turn the instrument off, connect the probes and turn it back on again.

Note: This selection remains in the memory until modified by the user.

4.5 Contrast

This menu item allows increasing or decreasing the contrast on the display:
To access the *Contrast* submenu, proceed as follows:
1. Press **SETUP**;
2. Use the arrows ▲ ▼ to select *Contr.*;
3. Press **ENTER**;
4. You will get the following message

```
                          10:45:50

LCD CONTRAST
< - arrows change - >

<ESC>   exit/cancel


```
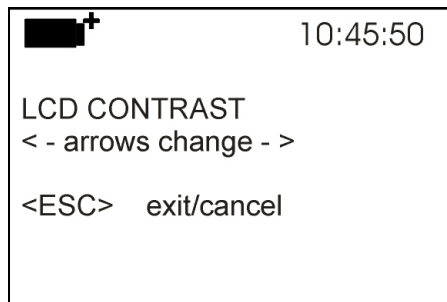
5. Use the arrows ◄► to decrease or increase the contrast;
6. Press **ENTER** or **ESC** to return to the main menu;
7. Press **SETUP** to exit immediately from the main menu.

Note: Without opening the menu, you can modify the contrast directly on the display during the measurement, using the ◄► arrows.

4.6 Firmware

This menu item allows displaying the information concerning the date and firmware version.

To access the *Firmware* submenu, proceed as follows:
1. Press **SETUP**;
2. Use the arrows ▲ ▼ ◄► to select *Firmware*;
3. Press **ENTER**;
4. This page will open

```
                          10:45:50
0) Firmware

Firm.Ver.=01.00
Firm.Date=2007/01/25


```
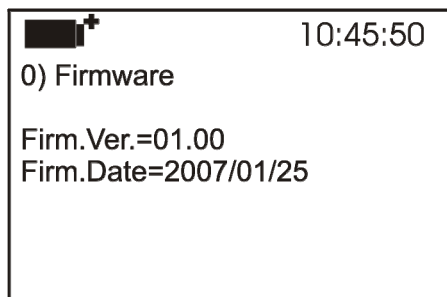
5. Press **ESC** to return to the main menu;
6. Press **SETUP** to exit immediately from the main menu.

4.7 Time/date

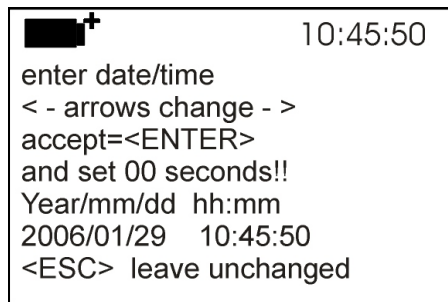This menu item allows setting the date and time that will be shown at the top of the display.
To access the *Time/date* submenu, proceed as follows:
1. Press **SETUP**;
2. Use the arrows ▲ ▼ to select *Time/date*;
3. Press **ENTER**;
4. You will get the following message

```
  ■■▪⁺                    10:45:50
enter date/time
< - arrows change - >
accept=<ENTER>
and set 00 seconds!!
Year/mm/dd  hh:mm
2006/01/29   10:45:50
<ESC>  leave unchanged
```

5. Use the arrows ◄ ► to select the data to be set (year/month/day and hour:minutes);
6. Once selected, the data will start blinking;
7. Use the arrows ▼▲ to enter the correct value;
8. Press **ENTER** to confirm and return to the main menu;
9. Or press **ESC** to return to the menu without making any change;
10. Press **SETUP** to exit immediately from the main menu.

<u>**NOTE:**</u> In regard to the time, you can set hours and minutes. The seconds are always set to 00 (set 00 seconds!!).

If the instrument power supply is interrupted, e.g. during a battery replacement or, when no battery is present, due to a mains power failure, you need to reset the date and time.

4.8 Calibrate

The *Calibrate* menu is reserved to Technical Support. It reports the last calibration date.
To access the *Calibrate* submenu, proceed as follows:
1. Press **SETUP**;
2. Use the arrows ▲▼◄► to select *Calibrate*;
3. Press **ENTER**;
4. You will get the following message

```
  ■■▪⁺                    10:45:50
CALIBRATION MENU

Instrument is
calibrated

Calibrated: 2006/07/07
```
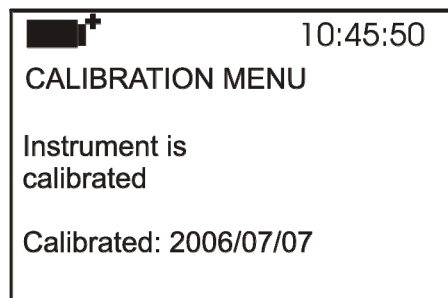
5. Press **ENTER** or **ESC** to return to the main menu: **You cannot perform any change, calibration is reserved to Technical Support;**
6. Press **SETUP** to exit immediately from the main menu.

<u>**NOTE:**</u> The calibration date cannot be modified by the user.

4.9 Key lock

This menu item allows to lock/unlock the instrument keyboard, when the password has been input. See the next chapter for further details.

To access the *Key lock* submenu, proceed as follows:

1. Press **SETUP**;
2. Use the arrows ▲ ▼ ◄ ► to select *Key lock*;
3. Press **ENTER**;
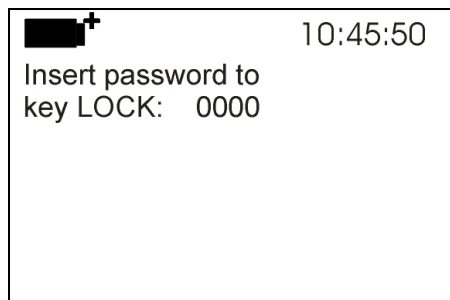4. You will get the following message: "Enter the password to lock the keyboard"

```
┌─────────────────────────────────┐
│ ■■■⁺              10:45:50       │
│                                 │
│ Insert password to              │
│ key LOCK:    0000               │
│                                 │
│                                 │
│                                 │
│                                 │
└─────────────────────────────────┘
```

5. Use the arrows ▼ ▲ to enter the correct password;
6. Press **ENTER** to confirm (or **ESC** to cancel);

By pressing **ENTER** you return to the main menu and the instrument keyboard is locked: A "key" is displayed on the upper left;

<u>**WARNING!**</u> When the instrument is locked by a password, all keys are locked, except **MEM**, used to start the LOG session (data capture) and **SETUP, ENTER** and **ESC** that allow entering the main menu to unlock the instrument.
Therefore the user has to *first* set all required parameters, protect the instrument using the KEY LOCK function and start the LOG session, in order to prevent any undesired access by unauthorized personnel.

To *unlock* the instrument, repeat the steps above: Enter the main menu and unlock the instrument using the *Key lock* item and entering the password.

If the password is wrong, you will get the message "Wrong password".

4.10 Password

This menu item allows to set a password to protect the instrument from unauthorized access. There are two types of available passwords, both consisting of four characters:

- The *user password*: Can be set by the user to protect the instrument from unauthorized access;
- The *factory password*: Reserved to Technical Support

To access the *Password* submenu, proceed as follows:
1. Press **SETUP**;
2. Use the arrows ▲ ▼ ◄ ► to select *Password*;
3. Press **ENTER**;
4. You will get the following message

```
                           10:45:50
PASSWORD MENU
0)User password
1)Factory password



<ESC>  exit/cancel
```

5. Use the arrows ▲▼ to select *User password*;
6. You will get the message "Insert old password" The default password is "0000" (four zeroes).

```
                           10:45:50

Insert
old password:   0000



<ESC>  exit/cancel
```

7. Use the ▼▲ arrows to enter the current password;
8. Press **ENTER** to confirm (or **ESC** to cancel);
9. You will get the message "Insert new password";

```
                           10:45:50

old password:   xxxx

Insert
new password: 0000

<ESC>  exit/cancel
```

10. Use the arrows ▼▲ to enter the new password;
11. Press **ENTER** to confirm (or **ESC** to cancel) and return to the main menu;
12. Press **SETUP** to exit immediately from the main menu.

**WARNING!** Using the *User password* you can lock/unlock the instrument (see paragraph "4.9 KEY LOCK").

5. PROBES AND MEASUREMENTS

The instrument works with Pt100 with SICRAM module, direct 4-wire Pt100 or direct 2-wire Pt1000 temperature probes. All connected probes must be of the same type: You cannot simultaneously connect probes of different types. The excitation current was chosen in order to minimize the sensor self-heating effects.

The type of probe connected must be selected in the menu: See the details in the *Input* menu item on page 22.

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 that enables the instrument to recognize the type of probe connected and to read its calibration information.

The probes are detected during turn on, not when the instrument is on: If you connect a probe and the instrument is on, it is not detected. It is necessary to turn the instrument off and on.
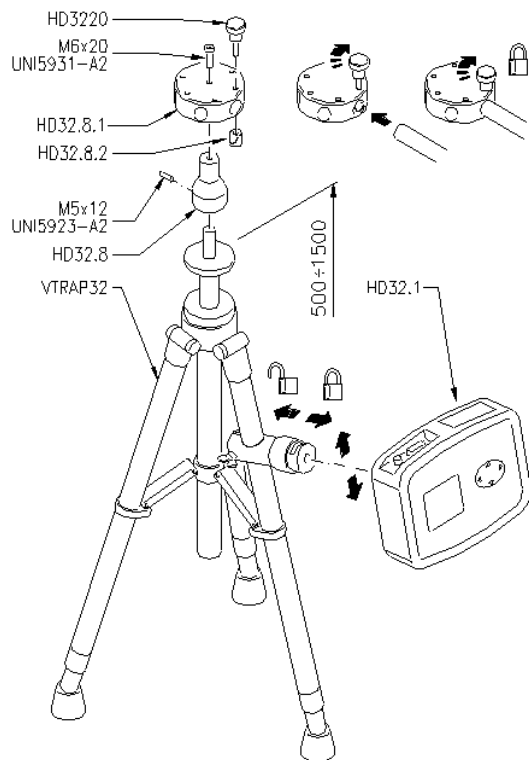
VTRAP32K

A tripod, code VTRAP32, is available for the measurements. Adjustable height up to 1.50 meters, complete with head that can host up to 6 measurement probes. The same tripod can be used to support the measurement instrument during data capture.

The arms fitted with suitable clamps for the measurement probes can be inserted in the head, code **HD3218K**.

The **VTRAP32K** kit is composed of a tripod, code **VTRAP32**, and **5** arms, code **HD3218K.**

The instrument is supplied with a belt that is fastened to the two pull buttons on the instrument side. Using this belt, the instrument can be hanged on a hook or worn around the neck. Code **HD32CS**.

Performing the measurement

The tripod and required probes are assembled where you wish to perform the measurement. When the instrument is setup, you can start the measurements.

The recorded data can be transferred to a PC or sent directly to a printer connected to the instrument, at the end of measurements.

5.1 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 60 mm; 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 60 mm, the sensor is housed in the end part of the probe.

NOTE: 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 between the surface and the probe is useful (do not use water or solvents). This method improves the response time. A contact measurement is usually very hard to perform, and not easily repeatable.

The °C, °F or °K unit of measurement can be chosen using the **SHIFT FNC** key (see par. 3.1 The unit of measurement "Unit")

## 5.2 Calibration of the probe

The probes with SICRAM module are calibrated in the factory. The calibration parameters are recorded in the SICRAM module.
The immersion, contact, air or penetration probes are calibrated by immersion. In industrial applications you cannot easily achieve the same results obtained by the laboratory.
The probes with direct input **are checked for conformity with class A tolerance** according to norm IEC751 - BS1904 - DIN43760.

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

All Delta Ohm probes are provided with a connector. The HD32.7 instrument also work with direct 4-wire Pt100, and direct 2-wire Pt1000 probes built by other manufacturers: For the instrument connection you have to use the TP47 connector, to which the probe's wires should be welded.
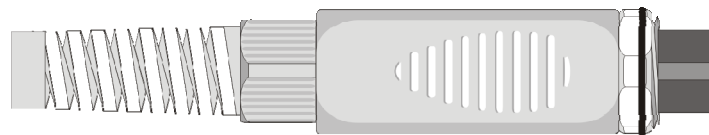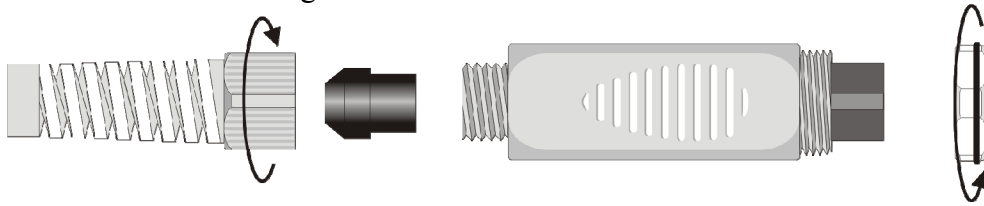

The instructions to connect the probe to the module are provided below.
The module is supplied complete with fairlead and gasket for 5mm maximum diameter cables.

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 card. These must be left open:
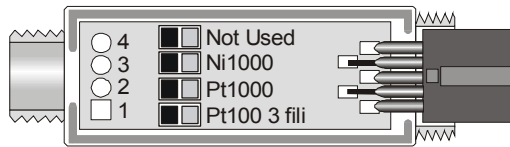
Before welding, pass the probe cable through the fairlead and gasket.
Weld the wires as shown in the table:
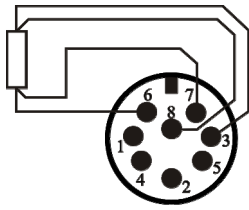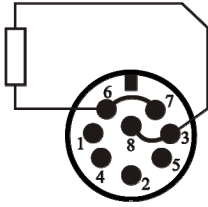
Sensor	TP47 card connection	Jumper to close
4-wire Pt100		None
Pt1000 2 wires		None

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. At the other end of the module, enter the ring with the O-Ring as indicated in the picture.
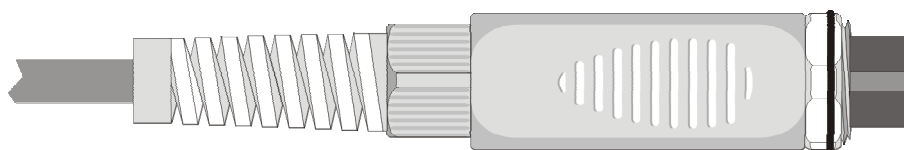
Make sure the cable is not twisted while you are screwing the fairlead. Now the probe is ready.

5.3.1 Direct connection of 4-wire Pt100 and 2-wire Pt1000 sensors to the DIN45326 8-pole female connectors

Sensor	Direct connection to the connector
4-wire Pt100	View of the female connector, welds side
2-wire Pt1000	View of the female connector, welds side

The **4-wire Pt100** and **2-wire Pt1000** sensor can be welded directly on the female connector's pins, without using the TP47 card. The wires of the sensor are welded as outlined in the scheme on the side.

5.4 Warnings, care and maintenance of the probes

- Do not expose the probes to gases or liquids that could corrode the material of the probe. Clean the probes carefully after each measurement.
- 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.
- Do not bend, deform or drop the probes, as this could cause irreparable damage.
- Always select the most suitable probe for your application.
- To obtain reliable measurements, temperature variations that are too rapid must be avoided.
- ⚠ - Some 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.
- Avoid taking measurements in presence of high frequency sources, microwave ovens or large magnetic fields; results may not be very reliable.
- The instrument is water resistant, but should not be immersed in water. Should the instrument fall into the water, check for any water infiltration.
- Do not let fingers touch the bare sensors.
- Use only detergents suitable to the different types of probes and instrument parts, to **clean** the probes.

6. INSTRUMENT SIGNALS AND FAULTS

The following table lists the instrument indications, the errors and the information supplied to the user.

Display indication	Explanation
---.--	This appears if the sensor is not present or is faulty. This appears also if the correct sensor was not set in the menu: Pt100 SICRAM, direct 4-wire Pt100 or direct 2-wire Pt1000. Please see the *Input* menu item on page 22.
New	This appears if a SICRAM probe is connected when the instrument is already on: Turn the instrument off and then back on again.
Lost	This appears if a SICRAM probe is disconnected when the instrument is on: Reconnect the probe to the instrument or, if you do not want to use the probe, turn the instrument off and then back on again.
OVFL	Overflow appears when the probe detects a value that exceeds the expected measurement range.
UFL	Underflow appears when the probe detects a lower value than the expected measurement range.
WARNING: MEMORY FULL!!	The instrument cannot store further data, the memory space is full. This appears only if the circular memory is not enabled.

7. BATTERY SYMBOL AND BATTERY REPLACEMENT, MAINS POWER SUPPLY

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.
Data stored on memory are maintained even without power supply. When the symbol is completely empty, the instrument shuts off.
The battery symbol becomes [~] when the external power supply is connected.

To replace the batteries, proceed as follows:
1. Switch the instrument off;
2. Disconnect the external power supply, if connected;
3. Unscrew the battery cover screw counter clockwise and take out the battery holder; **Do not pull the battery connection wires as they could break**;
4. Replace the batteries (4 1.5V alkaline C-BABY batteries). Check that the battery polarity matches the indication on the battery holder;
5. Replace the battery holder and fasten the cover's screw clockwise.
6. Update the clock.

The instrument can be powered by the mains using, for example, the stabilized power supply SWD10 input 100...240Vac output 12Vdc – 1A.
The power supply positive must be connected to the central pin.
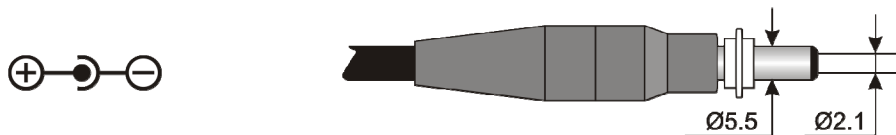
The external power supply connector has an external diameter of 5.5mm and an internal diameter of 2.1mm.

Warning: The power supply cannot be used as a battery charger. If the instrument is connected to the external power supply, the **[~]** symbol is displayed instead of the battery symbol.

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.

7.1 Warnings about battery use

- Batteries should be removed when the instrument is not used for an extended time.
- Flat batteries must be replaced immediately.
- Avoid loss of liquid from batteries.
- Use waterproof and good-quality batteries, if possible alkaline. Sometimes on the market, it is possible to find new batteries with an insufficient charge capacity.

8. INSTRUMENT STORAGE

Instrument storage conditions:
- Temperature: -25…+65°C.
- Humidity: less than 90% RH without condensation.
- During storage avoid locations 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.

Some parts of the instrument are made of ABS plastic, polycarbonate: do not use any incompatible solvent for cleaning.

9. SERIAL INTERFACE AND USB

The **HD32.7** is fitted with an electrically isolated RS-232C serial interface, and an USB 2.0 interface. Optionally, we can supply a serial cable with sub D 9-pole female connectors (code **9CPRS232**) or a cable with USB 2.0 connectors (code **CP22**).

The USB connection requires the previous installation of a driver contained in the DeltaLog9 CD-ROM. **Install the driver before connecting the USB cable to the PC (please see the documentation provided with DeltaLog9 CD-ROM).**

Standard parameters of the instrument RS232 serial transmission 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 "*Baud Rate*" parameter in the menu (please see par. "4.3.1 The Baud Rate"). The possible values are: 38400, 19200, 9600, 4800, 2400, 1200. The other transmission parameters are fixed. To send the data to an 80 column printer with serial input, check the maximum baud rate that can be set on the printer.

The USB 2.0 connection does not require the setting of parameters.

The selection of the port is carried out directly by the instrument: If the USB port is connected to a PC, the RS232 serial port is automatically disabled and vice versa.

The instruments are provided with a complete set of commands and data queries to be sent via the PC.

All the commands transferred to the instrument must have the following structure:
XXCR where: **XX** is the command code and **CR** is the Carriage Return (ASCII 0D)
The XX 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) and LF (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.

Command	Response	Description
C1		Input 1 probe type, serial number, calibration date
C2		Input 2 probe type, serial number, calibration date
C3		Input 3 probe type, serial number, calibration date
C4		Input 4 probe type, serial number, calibration date
C5		Input 5 probe type, serial number, calibration date
C6		Input 6 probe type, serial number, calibration date
C7		Input 7 probe type, serial number, calibration date
C8		Input 8 probe type, serial number, calibration date
G0	Model HD32.7	Instrument model
G1	M=RTD DATALOGGER	Model description
G2	SN=12345678	Instrument serial number
G3	Firm.Ver.=01.00	Firmware version

Command	Response	Description
G4	Firm.Date=2005/10/12	Firmware date
G5	cal 0000/00/00 00:00:00	Calibration date and time
GB	User ID=0000000000000000	User code (set with T2xxxxxxxxxxxxxxxx)
GC		Print instrument's heading
K0	&	Stop printing data
K1	&	Immediate printing of data
K4	&	Start logging data
K5	&	Stop logging data
KP	&	Auto-power-off function = ENABLE
KQ	&	Auto-power-off function = DISABLE
LDnn		Print data stored in section nn. (nn= hexadecimal number 00-63). If the section is empty: "-->No Log Data<--"
LEX	&	Cancel data stored in all sections.
LFnn	Start on; 2007/01/01 00:37:32; rec;000003	Print memory nn section status. The number, and storage start date and time are displayed. (nn= hexadecimal number 00-63). If the section is empty: "-->No Log Data<--"
LN	00 ; 01 ; 02 ; 03 ; . ; . ; . ; . ;	Print instrument memory map: If a section is allocated a number is displayed, if it is free a point (.) is displayed.
P0	&	Ping (locks the instrument keyboard for 70 seconds)
P1	&	Unlocks the instrument keyboard
RA	Sample print = 0sec	Reading of PRINT interval set
RL	Sample log = 30sec	Reading of LOG interval set
S0		Printing of the current measurement of all inputs
WA#	&	Setting PRINT interval. # is a hexadecimal number 0…D that represents the position of the interval in the list 0, 2, 5, 10, …, 3600 seconds.
WC0	&	Setting SELF off
WC1	&	Setting SELF on
WL#	&	Setting LOG interval. # is a hexadecimal number 1…D that represents the position of the interval in the list 2, 5, 10, …, 3600 seconds.

10. STORING AND TRANSFERRING DATA TO A PC

The **HD32.7** instrument can be connected to a personal computer via an RS232C serial port or USB port, and exchange data and information through the Deltalog9 software (vers. 3.0 and later) running in a Windows operating environment. It is possible to print the measured values on an 80 column printer (*PRINT* key) or store them in the internal memory using the *Logging* function (MEM key). If necessary, the data stored in the memory can be transferred later to a PC.

10.1 The Logging Function

The *Logging* function allows recording of the measurements registered by the probe connected to the inputs. The time interval between two consecutive measurements can be set from 2 seconds to 1 hour. The logging starts by pressing the **MEM** 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 chapter "4. MAIN MENU**"**.

If the *automatic turning off* option between two recordings (see par. "4.2.2 Self Shut-off mode") is enabled, upon pressing the **MEM** 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.

The data stored in the memory can be transferred to a PC using the DeltaLog9 software (vers. 3.0 and later) or using the instrument File Manager (see par. "4.2.5 Log File Manager"). During data transfer the display shows the message DUMP; to stop the data transfer press ESC on the instrument or on the PC.

If during a logging session the batteries have discharged, the instrument stops recording and shuts off. The data downloaded on the PC will indicate the logging interruption due to lack of power.

If the instrument is powered only by the mains and, during a logging session, there is a mains power failure, the last record could be stored incorrectly.

During a logging session, we recommend to attach a charged battery pack and connect the external power supply: This way, in case of a mains power failure, the batteries continue to power the instrument.

10.1.1 Storage capacity

The storage capacity does not vary according to the number of probes connected to the instrument inputs: It can store up to 96,000 samples from 8 channels each.

The time required to fill the memory depends on the selected logging interval. The following tables report this time, **in the format:**

days:hours:minutes:seconds.

Logging interval						
2s	**5s**	**10s**	**15s**	**30s**	**1min**	**2min**
2:5:20:0	5:13:20:0	11:2:40:0	16:16:0:0	33:8:0:0	66:16:0:0	133:8:0:0

Logging interval					
5min	**10min**	**15min**	**20min**	**30min**	**1h**
333:8:0:0	666:16:0:0	1000:0:0:0	1333:8:0:0	2000:0:0:0	4000:0:0:0

10.1.2 The *Erase* function: clearing the memory

To clear the memory use the Erase Log function (see par. "4.2.5 Log File Manager"). 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 the 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 are enabled: **MEM**, **SETUP**, **TIME**, **ENTER** and **ESC**.

10.2 The *Print* function

Press **PRINT** to send the measured data directly to the RS232 ports, in real time. The printed data units of measurements are the same as those used on the display. The function is started by pressing **PRINT**. The time interval between two consecutive prints can be set to 0 or from 2 seconds to 1 hour (please see the **Print interval** menu item in the par. "4.3.2 Print Interval"). If the print interval is equal to 0, by pressing **PRINT** a 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 **PRINT** again. The "PN" message is displayed at the top of the display.

11. CONNECTION TO A PC

The **HD32.7** is fitted with two ports for connecting the instrument to the PC:
- RS232C serial port with null modem cable code **9CPRS232**. The cable has two sub D 9-pole female connectors.
- USB 2.0 port with the cable code **CP22**. The cable has a USB type A connector for PC connection and a USB type B connector for connection to the instrument.

The instrument is supplied with the ***DeltaLog9*** **software** *(vers. 3.0 and later).* The software manages the connection, data transfer, graphic presentation, and printing operations of the captured or logged measurements.
The DeltaLog9 software is complete with an "On-line Help" (also in PDF format) describing its characteristics and functions.

The instruments are also compatible with the HyperTerminal communication program supplied with the Windows operating systems (from Windows 98 to Windows XP).

11.1 Connection to the RS232C serial port

1. The measuring instrument has to be switched off.
2. Using the null-modem Delta Ohm 9CPRS232 cable, connect the measurement instrument to the first free serial port (COM) of the PC.
3. Turn on the instrument and set the baud rate to 38400 (SETUP key >> *"Serial"* >> *"Baud Rate"*, select 38400 using the arrows and confirm with ENTER). The parameter remains in the memory.
4. Launch the ***DeltaLog9*** software and press CONNECT. Wait for the connection to occur and follow the instructions on the screen. For a description of the DeltaLog9 application, please refer to its On-line Help.

11.2 Connection to the USB 2.0 port

Proceed as follows:

1. **Do not connect the instrument to the USB port until you are expressly requested to do it**.

2. Insert the ***DeltaLog9*** CD-ROM and select the "*Install USB driver*" item.

3. The application checks the presence of the drivers on the PC: The installation starts if they are not present; if they are already installed, the drivers are removed by pressing the key.

4. Follow the guide to the USB driver installation/removal included in the CD-ROM.

12. FUNCTIONING NOTES AND OPERATING SAFETY

Authorized use

Comply with the technical specifications outlined in the next chapter. Its use is authorized only in conformity with the instructions written in this manual. Any different use is considered improper.

General instructions on security

This instrument has been manufactured and tested according to safety regulation EN 61010-1:2010 concerning electronic measurement instruments and was delivered ex factory in perfect security conditions.

Its regular functioning and operating safety can be ensured only if all the normal safety measures as well as the specifications described in this manual are complied with.

Its regular functioning and operating security can be ensured only within the climatic conditions specified in the chapter "TECHNICAL CHARACTERISTICS".

Do not use or store the instrument in ways and/or places in which there are:

- Quick environment temperature changes that could cause condensation.
- Corrosive or inflammable gases.
- Direct vibrations or shocks against the instrument.
- High intensity electromagnetic fields, static electricity.

If the instrument is moved from a cold to a hot environment, the condensation can disturb its functioning. In this case, you need to wait for the instrument to reach the environment temperature before using it.

User obligations

The user of the instrument must ensure that the following regulations and directives concerning the handling of hazardous materials are complied with:

- CEE directives on job safety
- National laws on job safety
- Accident prevention regulations

13. TECHNICAL CHARACTERISTICS

Instrument

Dimensions (Length x Width x Height)	220x180x50 mm
Weight	1100 g (batteries included)
Materials	ABS, polycarbonate and aluminium
Display	Backlit, Dot Matrix
	128x64, visible area 56x38mm
Type of probes	Pt100 SICRAM, direct 4-wire Pt100, direct 2-wire Pt1000

Temperature measurement (from vers. 01.30 of 04-12-2007)

Pt100 measurement range	-200…+650°C
Pt1000 measurement range	-200…+350°C
Resolution with Pt100 [*]	0.01°C in the range ± 199.99°C
	0.1°C in the remaining range
Resolution with Pt1000	0.1°C in the whole range
Accuracy (only the instrument)	±0.01°C ±1digit (in the range ±199.9°C)
	±0.1°C ±1digit in the remaining range
Drift after 1 year	0.1°C/year

Operating conditions

Operating temperature	-5 … 50°C
Warehouse temperature	-25 … 65°C
Working relative humidity	0 … 90% RH without condensation
Protection degree	**IP64**

Power

Batteries	4 1.5V alkaline C-BABY type batteries
Mains adapter (code SWD10)	12Vdc/1A, connector external $\varnothing$ 5.5mm, internal $\varnothing$ 2.1mm
Autonomy	200 hours with 7800mAh alkaline batteries, and all probes connected

Power absorbed @6Vdc

$<60\mu A$ when the instrument is off
$<60\mu A$ in sleep mode with all probes connected
$<40mA$ during data capture with all probes connected

Security of stored data   Unlimited

Connections

Number of inputs	8
Type	8-pole male DIN 45326 connectors

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[*] In the versions preceding the version 01-30 dated 04-12-2007, the resolution with Pt100 and Pt1000 is 0.1°C over the whole measuring range.

Memory	Divided in 64 blocks.
Storage capacity	96,000 records from 8 inputs each.
Logging interval	Selectable among: 2, 5, 10, 15, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes, and 1 hour.
Internal clock accuracy	1min/month max. departure
RS232C serial interface	
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. 15 m
USB interface	
Type	1.1 - 2.0 electrically isolated

13.1 Technical data of the probes complete with SICRAM module for the instrument

TEMPERATURE PROBES Pt100 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

Temperature drift @ 20°C   0.003%/°C

Probes Pt100 4 wires and Pt1000 2 wires

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

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

14. ORDERING CODES

HD32.7 **8-input data logger** instrument for temperature probes fitted with Pt100 sensor complete with SICRAM module. The kit is composed of the HD32.7, 4 1.5V alkaline C-BABY type batteries, operating manual, DeltaLog9 software (vers. 3.0 and later), and bearing and transport belt. **The probes, support, suitcase and cables must be ordered separately.**

DeltaLog9 Additional copy of the software (vers. 3.0 and later) for download and management of the data on PC using Windows (from 98) operating systems.

14.1 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.

14.2 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 4 wires, Pt1000 2 wires.

14.3 Accessories for the HD32.7

9CPRS232   Connection cable with sub D 9-pole female connectors for RS232C (null modem).

CP22   Connection cable USB 2.0 connector type A - connector type B.

BAG32.2   Suitcase for the HD32.7 instrument and accessories.

HD32CS   Instrument bearing and transport belt.

SWD10   Stabilized power supply at 100-240Vac/12Vdc-1A mains voltage.

VTRAP32   Tripod complete with 6 input head and 5 probe holder, code HD3218K.

HD3218K   Rod for another probe.

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.

CE DICHIARAZIONE DI CONFORMITÀ UE
EU DECLARATION OF CONFORMITY

Delta Ohm S.r.L. a socio unico – Via Marconi 5 – 35030 Caselle di Selvazzano – Padova – ITALY

Documento Nr. / Mese.Anno:
Document-No. / Month.Year :   **5023 / 09.2017**

Si dichiara con la presente, in qualità di produttore e sotto la propria responsabilità esclusiva, che i seguenti prodotti sono conformi ai requisiti di protezione definiti nelle direttive del Consiglio Europeo:
We declare as manufacturer herewith under our sole responsibility that the following products are in compliance with the protection requirements defined in the European Council directives:

Codice prodotto:
Product identifier :   **HD32.7**

Descrizione prodotto:
Product description :   **Datalogger RTD**
RTD Data Logger

I prodotti sono conformi alle seguenti Direttive Europee:
The products conform to following European Directives:

Direttive / *Directives*	
2014/30/EU	Direttiva EMC / *EMC Directive*
2014/35/EU	Direttiva bassa tensione / *Low Voltage Directive*
2011/65/EU	RoHS / *RoHS*

Norme armonizzate applicate o riferimento a specifiche tecniche:
Applied harmonized standards or mentioned technical specifications:

Norme armonizzate / *Harmonized standards*	
EN 61010-1:2010	Requisiti di sicurezza elettrica / *Electrical safety requirements*
EN 61326-1:2013	Requisiti EMC / *EMC requirements*
EN 50581:2012	RoHS / *RoHS*

Il produttore è responsabile per la dichiarazione rilasciata da:
The manufacturer is responsible for the declaration released by:

Johannes Overhues

Amministratore delegato
Chief Executive Officer

Caselle di Selvazzano, 07/09/2017

Questa dichiarazione certifica l'accordo con la legislazione armonizzata menzionata, non costituisce tuttavia garanzia delle caratteristiche.
This declaration certifies the agreement with the harmonization legislation mentioned, contained however no warranty of characteristics.

GUARANTEE

Delta OHM
Member of GHM GROUP

TERMS OF GUARANTEE

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.
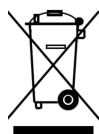
The electrical and electronic equipment marked with this symbol cannot be disposed of in public landfills. According to the Directive 2011/65/EU, the european users of electrical and electronic equipment can return it to the dealer or manufacturer upon purchase of a new one. The illegal disposal of electrical 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: ❑ **HD32.7**

Serial Number _____

RENEWALS

Date _____   Date _____

Inspector _____   Inspector _____

Date _____   Date _____

Inspector _____   Inspector _____

Date _____   Date _____

Inspector _____   Inspector _____

CE

RoHS
2011/65/EU

V1.3
07/09/2017