

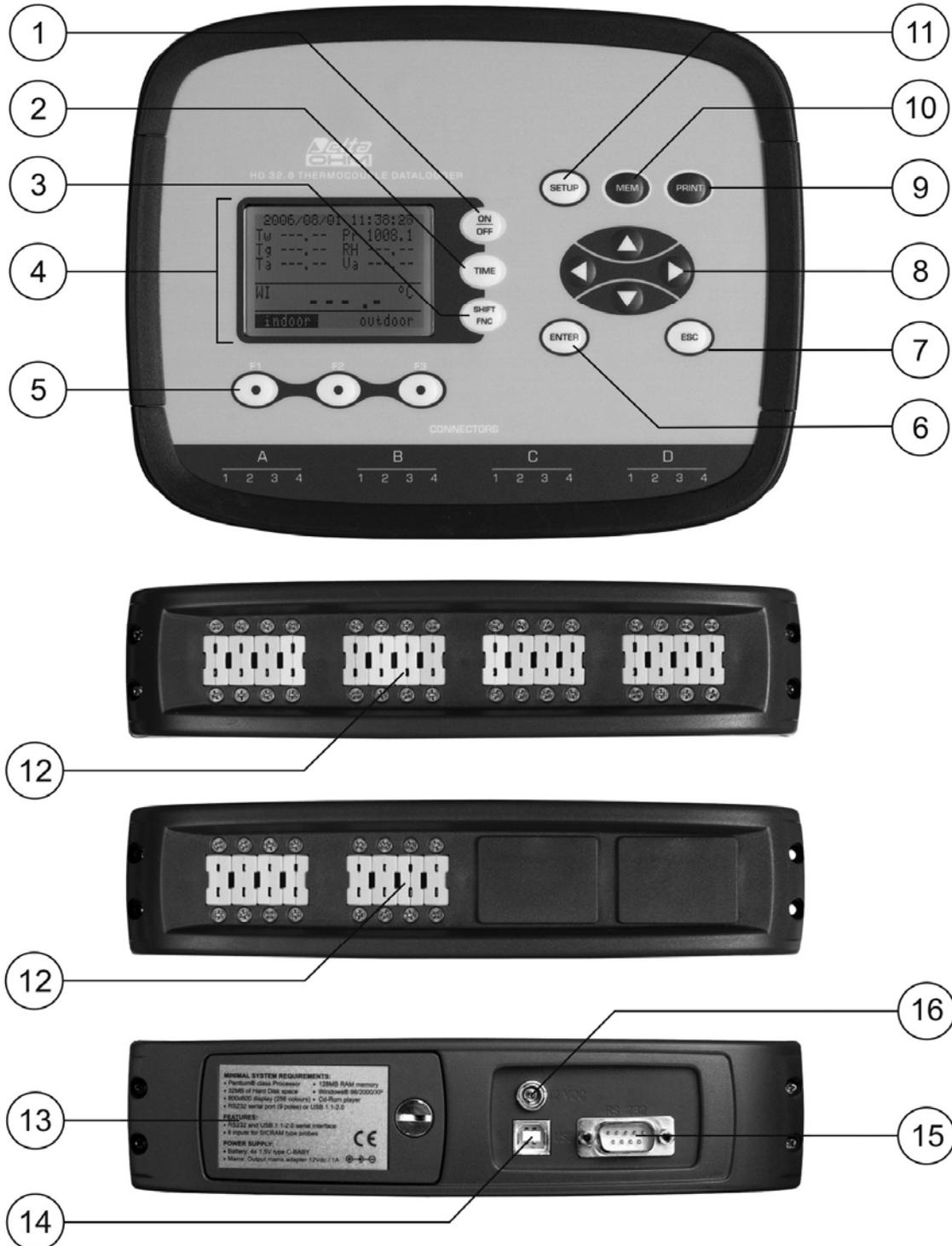
HD32.8.8 - HD32.8.16
Datalogger for thermocouples
ENGLISH

Our instruments' quality level is the results of the product continuous development. This can bring about differences between the information written in this manual and the instrument that you have purchased. We cannot entirely exclude errors in the manual, for which we apologize.

The data, figures and descriptions contained in this manual cannot be legally asserted. We reserve the right to make changes and corrections without prior notice.

HD32.8.8 Datalogger for 8 Thermocouples

HD32.8.16 Datalogger for 16 Thermocouples



HD32.8.8 and HD32.8.16

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, you can select the type of thermocouple using the **▲▼** arrows. Using the **◀▶** arrows, you can display the inputs in groups of four (*the probes from C1 to D4 are present in the HD32.8.16 model*).
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 thermocouple probes, standard miniature connectors: 8 inputs for the HD32.8.8, 16 inputs for the HD32.8.16.
13. Battery compartment.
14. USB type B port.
15. Sub D 9-pole male connector for the RS232C serial port.
16. Power supply input 12Vdc/1A – external \varnothing 5.5mm, internal \varnothing 2.1mm. The power supply positive (pole) must be connected to the central pin.

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1. GENERAL CHARACTERISTICS

The **HD32.8.8** and **HD32.8.16** are two *dataloggers* for *thermocouples* that can capture, log and then send to a PC or serial printer the data coming from the 8 or 16 thermocouples. The instruments can work with thermocouple of type K, J, T, N, R, S, B or E. **During the measuring phase, the connected probes must be of the same type.**

The probes position is detected during turn on: The probes are displayed in sequence according to the same order of connection: First, the group A ones, then group B, etc.

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 probes.

Other user selectable/settable parameters are:

- 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 relative value *REL*.
- 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 800,000 recordings divided amongst all existing inputs.

The memory space can be handled in two modes:

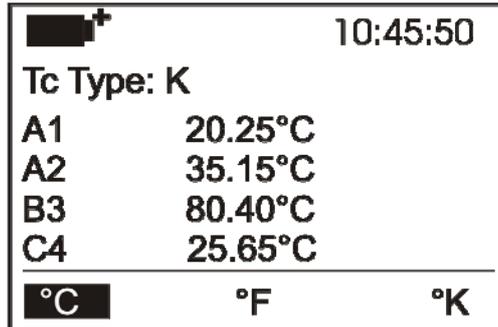
- When the available memory is full, the collected data are overwritten starting from the oldest ones (circular memory),
- The recording is stopped when the available memory is full.

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.

In this phase, the instrument detects the inputs where the probes are connected and the unused inputs.

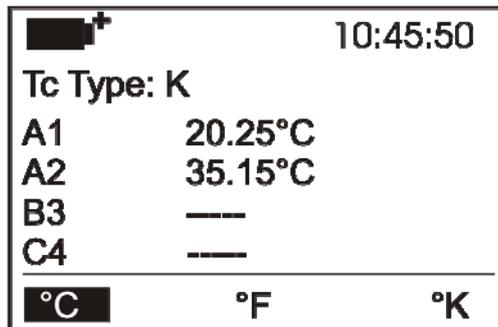
The probes are displayed in groups of four, according to the order of the connectors from left to right: From input A1 to input B4 in the HD32.8.8 model, and from input A1 to input D4 in the HD32.8.16 model. The unused inputs are not shown in the list.



 +	10:45:50
Tc Type: K	
A1	20.25°C
A2	35.15°C
B3	80.40°C
C4	25.65°C
<hr/>	
°C	°F °K

If you have more than four probes connected at the same time, use the ◀▶ arrows to move from one group to the other.

If a probe is disconnected when the instrument is on, the measurement indication is replaced by some dashes “-----”, as in the following example.

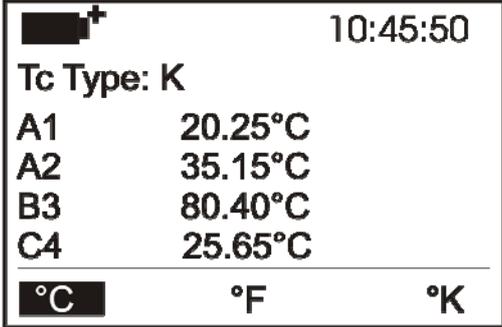


 +	10:45:50
Tc Type: K	
A1	20.25°C
A2	35.15°C
B3	---
C4	---
<hr/>	
°C	°F °K

Connect the probes again to restore the normal view.

2.1 THE DISPLAY

The **HD32.8** standard display is divided in two areas:



	10:45:50	
Tc Type: K		
A1	20.25°C	
A2	35.15°C	
B3	80.40°C	
C4	25.65°C	
		

The first area displays, from top to bottom, the **battery's charge status** and the current **time**, the **type** of selected thermocouple, and the **temperatures measured** by the probes connected to the inputs.

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. After few seconds the temperatures measured by the connected probes will be displayed.

NOTE: The display shows only the inputs to which the probes are connected. The probes are detected during turn on: If a probe is later disconnected, the display will show some dashes near that input.



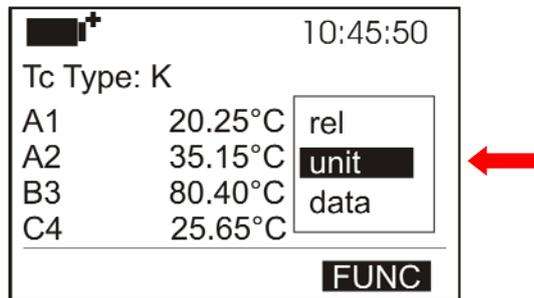
TIME key

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 FUNCTION key

It activates the Shortcut window.

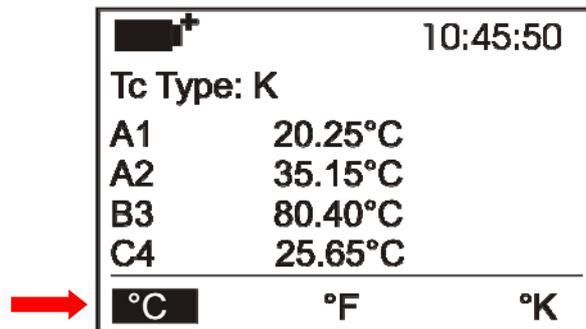


A drop-down menu opens as in the figure: The black background item is the active item. To select another item, use the ▲▼ arrows and confirm with ENTER.



F1, F2, F3 keys

These are “function keys”: They activate the function in the lower 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 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.



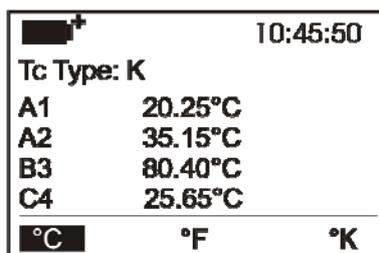
Arrow keys

Allow navigation through the menus, selection of the type of thermocouple, and choice of the inputs to be displayed. During measurement, you can select the type of thermocouple using the ▲ ▼ arrows. The connected thermocouples screens are display with the ◀▶ arrows.

3. OPERATION

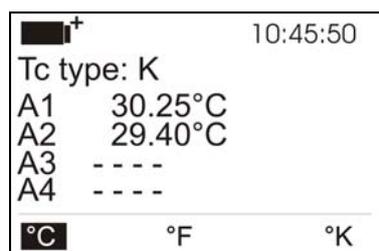
Connect the probes to the inputs located in the lower part of the instrument, and turn the HD32.8 datalogger on with the  key. Using the ▲▼ arrows, select the type of thermocouple used (*Tc type*).

On the display you will see the values measured by the first four connected probes. To view the other probes, use the ◀▶ arrows.



■ ⁺		10:45:50
Tc Type: K		
A1	20.25°C	
A2	35.15°C	
B3	80.40°C	
C4	25.65°C	
°C	°F	°K

If a probe is disconnected when the instrument is on, the value on the display is replaced by a series of dashes: Reconnect the probe to view the new data.



■ ⁺		10:45:50
Tc type: K		
A1	30.25°C	
A2	29.40°C	
A3	----	
A4	----	
°C	°F	°K

The battery charge symbol and current time are up on the left (for further details, see page 32). Then the temperatures detected by each input are displayed, starting from the inputs A, then the inputs B, and so on. The available inputs are arranged in groups of four probes each, A, B, C and D: A1 is the first input of group A, A2 the second input, and so on, until input B4 for the HD32.8.8 and input D4 for the HD32.8.16.

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. Press **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 the **F1**, **F2** or **F3** function keys, the unit is selected and 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 THE RELATIVE VALUE “REL”.

In the “Functions” menu, you can also display the relative value of the measured temperatures. This function clears the current temperature measurement and displays, **for all inputs**, the difference between the current value and that measured when the function was activated.

1. Use **SHIFT FNC** to open the drop-down menu;
2. Use the arrows **▲▼** to select “**rel**”;
3. Press **ENTER** to confirm: the **rel** message is displayed in the lower line of the display;
4. To enable the function, press **F1**;
5. The temperatures will be cleared and the **rel** message will be displayed near their value;
6. After few instants the (negative or positive) departure values will be displayed;
7. Press **F1** again to disable the **rel** function
8. Press **ESC** to exit the drop-down menu without making any change.

3.4 INSTRUMENT SETUP

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

3.5 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.

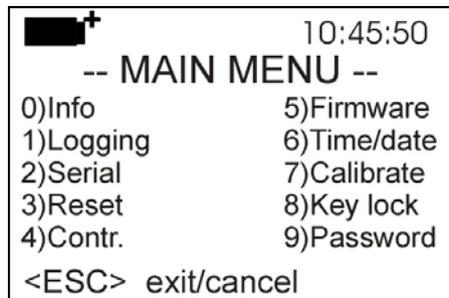
To end the logging, press **MEM** again.

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:



- 0) Info
- 1) Logging
- 2) Serial
- 3) Reset
- 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.

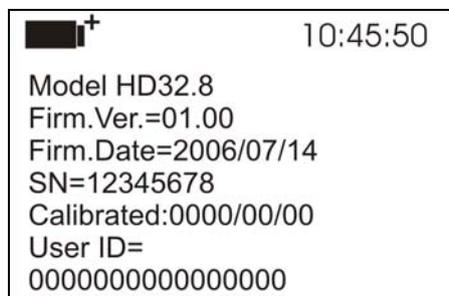
To exit the selected item and return to the previous menu, press **ESC**.

To exit the menu and return directly to measurement, press **SETUP**.

4.1 INFO MENU

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.



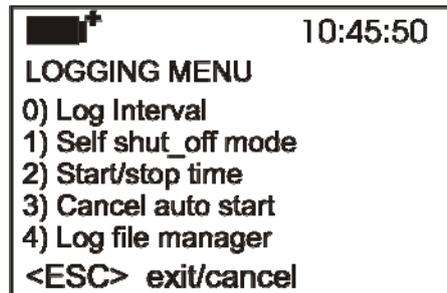
This screen cannot be modified: The user identification code (User ID) can be set using the DeltaLog9 software (vers. 3.0 and later).

Press **ESC** to return to the main menu. Press **SETUP** to exit the menu.

4.2 LOGGING MENU

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.



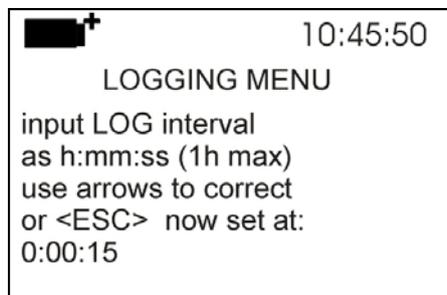
You can set the data capture frequency (*Log interval*) and the automatic logging start (*Start/stop time*). **The capture interval is the same for all probes.**

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**:



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:

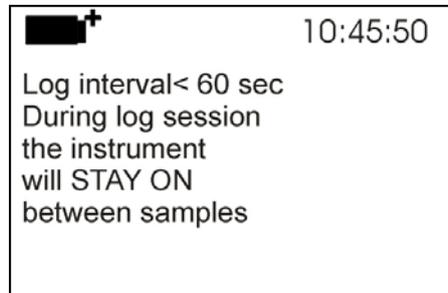
2, 5, 10, 15, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes, and 1 hour.

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 screen 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)

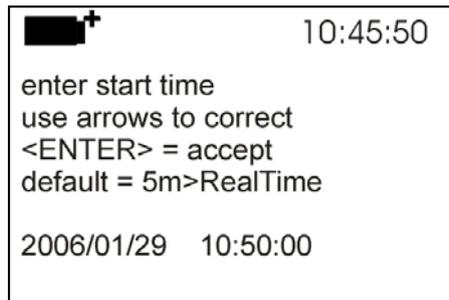
2. Press **ESC** to return to the **Logging** menu;
3. Press **ESC** again to return to the main menu;
4. Press **SETUP** to exit immediately from the menu.

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.

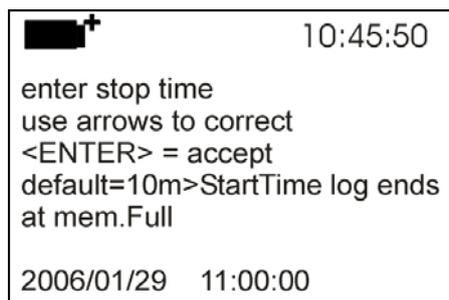
To enter this setting, proceed as follows.

Once you have accessed the **LOGGING** submenu use the arrows ▲ ▼ to select **Start/Stop time**: The following message “Enter start time” will be displayed:



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:



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. 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.

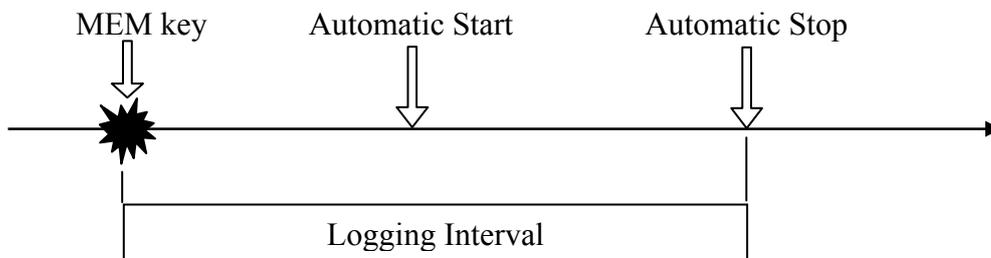
Press **MEM** to stop the session before the set time.

To cancel the automatic start setting, use the **Cancel auto start** function as illustrated in the following paragraph.

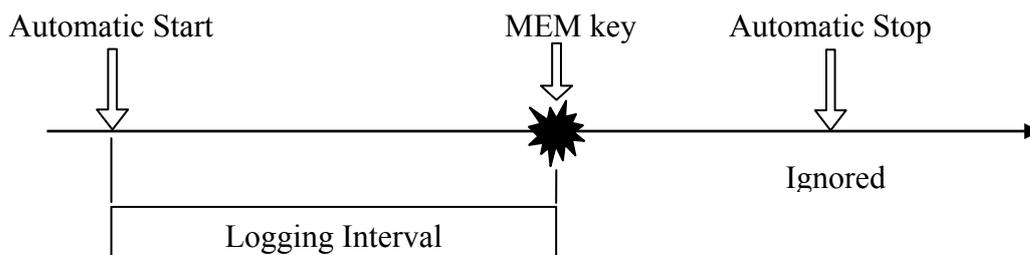
NOTE 1: The automatic logging session is started even when the instrument is off. If it is off when the automatic logging session is started, the instrument is turned on few seconds before the start time and, if powered by the mains, it remains on at the end of logging. If it is powered by the battery, it is turned off when idle for some minutes at the end of the logging session.

NOTE 2: 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.

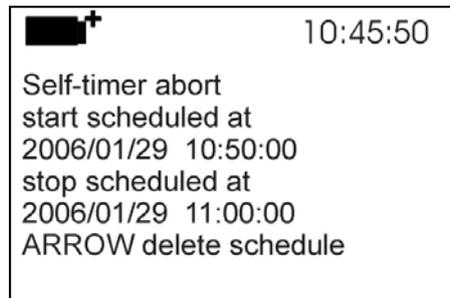


4.2.4 Cancel auto start

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

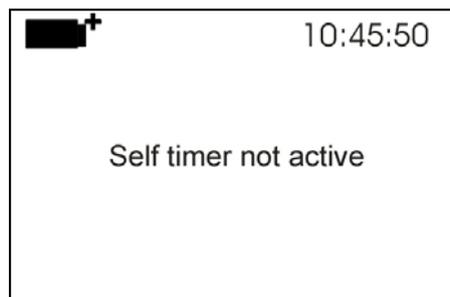
Once you have accessed the *LOGGING* submenu:

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

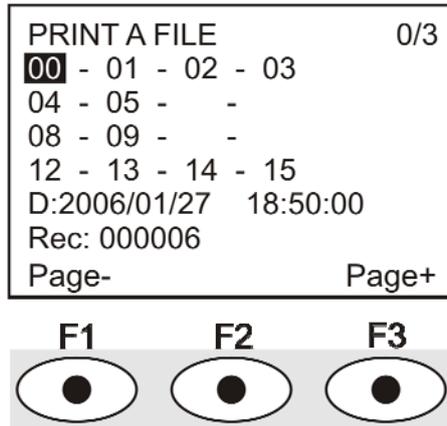
4. Press **ENTER** to confirm the automatic start cancellation;
5. Press **ESC** to exit without cancelling the automatic start;
6. Press **ESC** again to exit from the submenus;
7. Or press **SETUP** to exit immediately from the main menu.

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.



Once you have accessed the **LOGGING** submenu:

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



- 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).

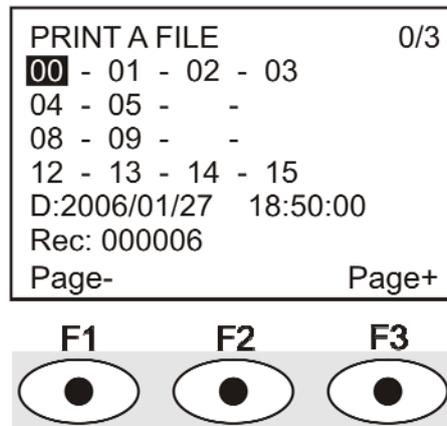
Before starting the printing via the RS232C port, you have to set the baud rate.

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:



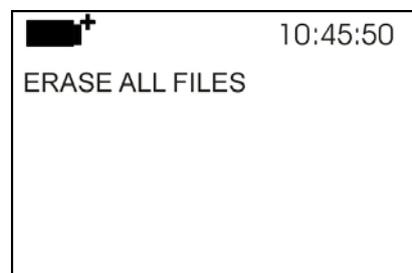
1. Use the arrows ▲ ▼ ◀ ▶ to select the log to be printed, and the F1 and F3 function keys to shift page.
2. Once a file is selected, the acquisition start date and time and the number of samples contained in the file (Rec) are displayed at the bottom of the display.

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

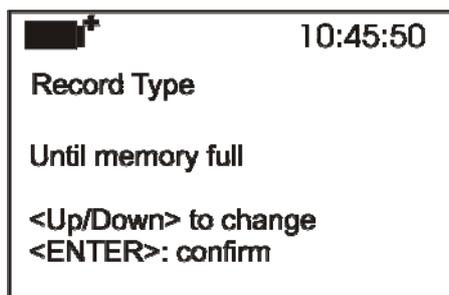
By selecting this item, the “Erase ALL files” message will be displayed:



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:



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 MENU (SERIAL COMMUNICATION)

The **Serial** submenu allows setting the data transfer speed via the serial port (**Baud rate**), and the 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.

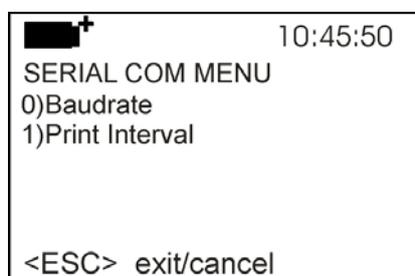
In case of USB connection, the transfer speed is fixed at 460800 baud.

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.

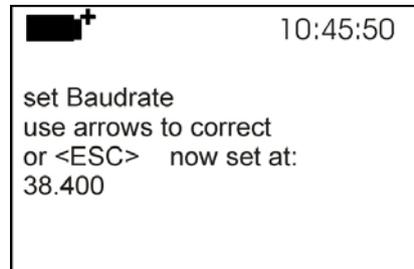


4.3.1 The Baud Rate

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:



A screenshot of a terminal window showing a menu for setting the baud rate. The window has a black title bar with a plus sign icon. The text inside the window is as follows: '10:45:50' in the top right corner, 'set Baudrate' on the first line, 'use arrows to correct' on the second line, 'or <ESC> now set at:' on the third line, and '38.400' on the fourth line.

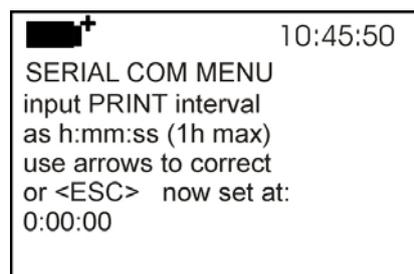
3. Use the arrows ▼ ▲ to set the value;
4. Press **ENTER** to confirm and return to the previous page, or press **ESC** to cancel the change and exit the menu item;
5. Press **ESC** over and over to exit from the submenus;
6. Press **SETUP** to exit immediately from the main menu.

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:



A screenshot of a terminal window showing a menu for setting the print interval. The window has a black title bar with a plus sign icon. The text inside the window is as follows: '10:45:50' in the top right corner, 'SERIAL COM MENU' on the first line, 'input PRINT interval' on the second line, 'as h:mm:ss (1h max)' on the third line, 'use arrows to correct' on the fourth line, 'or <ESC> now set at:' on the fifth line, and '0:00:00' on the sixth line.

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

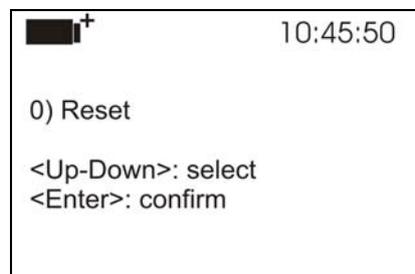
data printing is started when the PRINT key is pressed. Press PRINT again to end the **continuous** printing.

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

4.4 RESET

To restore the factory settings, reset command was designed for a complete reset of the instrument. To access the **Reset** submenu, proceed as follows:

1. Press **SETUP**;
2. Use the arrows **▲ ▼** to select **Reset**;
3. Press **ENTER**: You will get the following message



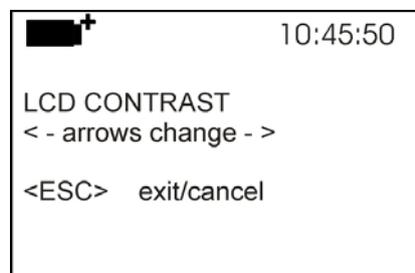
4. Use the arrows **▲ ▼** to select **Reset**;
5. Press **ENTER** to confirm, or **ESC** to exit the submenus without resetting the instrument;
6. Press **SETUP** to exit immediately from the main menu.

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



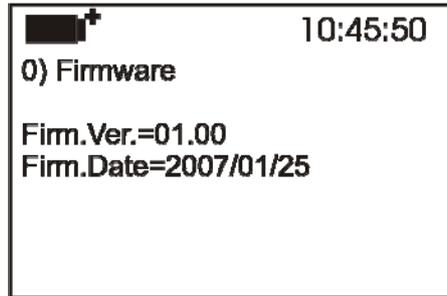
5. Use the arrows **◀▶** to decrease or increase the contrast;
6. Press **ENTER** or **ESC** to return to the main menu;
7. Press **SETUP** to exit immediately from the main menu.

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



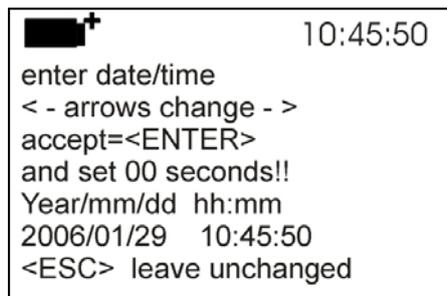
5. Press **ESC** to return to the main menu;
6. Press **SETUP** to exit immediately from the main menu.

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



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.

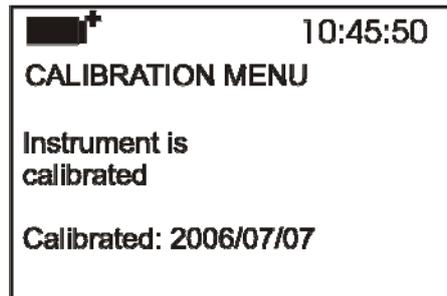
NOTE: In regard to the time, you can set hours and minutes. The seconds are always set to 00 (set 00 seconds!!).

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



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.

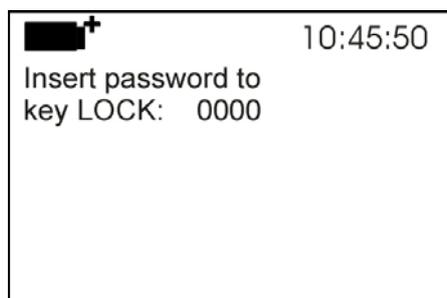
NOTE: The calibration date cannot be modified by the user.

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”



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;

WARNING! 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”. The default password is “0000” (four zeroes).

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

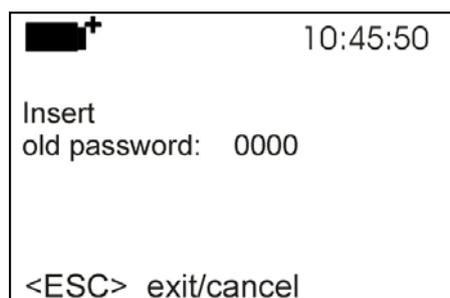


```

[■]⁺ 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;

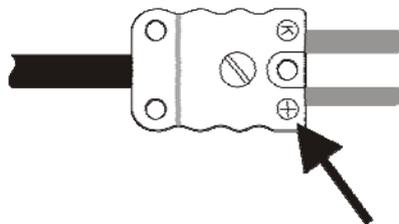
12. Press **SETUP** to exit immediately from the main menu.

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

5. PROBES AND MEASUREMENTS

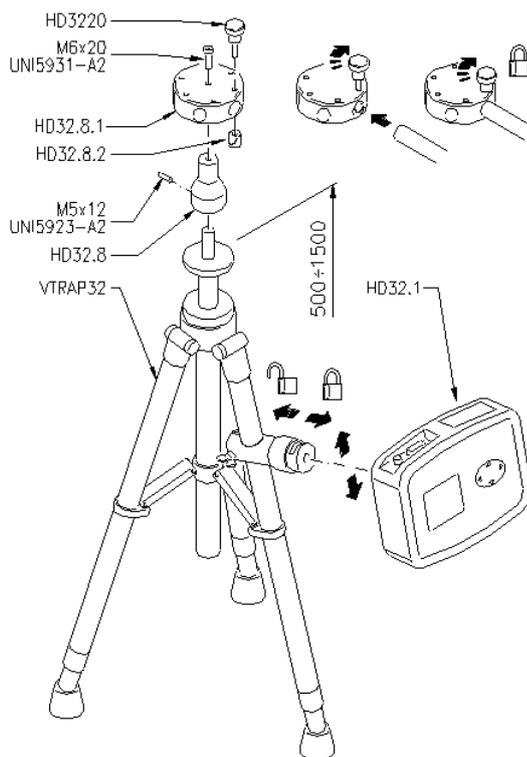
You can connect the thermocouple temperature probes of type K, J, T, N, R, S, B and E to the **HD32.8.8** and **HD32.8.16** dataloggers. The selection is done using the ▲ ▼ arrows (see chapter 3. OPERATION).

The contacts of the thermocouple probe connector are polarized. They must be inserted on the standard miniature socket located on the instrument in the correct direction. These probe positive pole is usually marked with a "+" sign, as shown in the following drawing.



The user can choose the unit of measurement for display, printing and logging among the allowed ones: °C, °F or °K.

All used probes must be the same type of thermocouple:



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**.

5.1 TEMPERATURE MEASUREMENT

In all versions the thermocouple hot junction 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 measured by **immersion** is carried out by inserting the probe in the liquid where you wish to perform the measurement; the hot junction is housed in the end part of the probe.

In the temperature measured by **penetration** the probe tip must be inserted into the material; the hot junction 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.

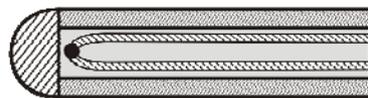
So as to obtain the correct measurement, the insertion of a drop of oil or heat-conductive paste between the surface and the probe is useful (do not use water or solvents). This improves the response time and the measurement accuracy.

5.2 WARNINGS, CARE AND MAINTENANCE OF THE PROBES

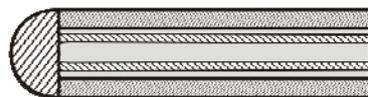
- Do not expose the probes to gases or liquids that could corrode the material of the probe. Clean the probes carefully after each measurement.
- Do not bend the probe connectors or force them upward or downward.
- Comply with the correct polarity of the probes.
- Do not bend or force the contacts when 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.
-  The thermocouple could be non-insulated from its external casing. In this case, 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.
- For **cleaning**, use only detergents suitable to the different types of probes and instrument parts.

The thermocouple hot junction can be insulated or non-insulated from the probe's earth. The probe response time is faster in the thermocouples with an earthed junction.

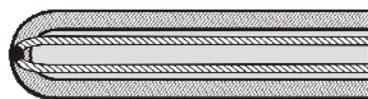
The thermocouple insulation decreases with the temperature increase.



Insulated junction.



Earthed junction.



Exposed junction.

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 probe, already detected during turn on, is disconnected or faulty.
Over	Overflow appears when the probe detects a higher value than expected measurement range for that type of thermocouple.
Under	Underflow appears when the probe detects a lower value than expected measurement range for that type of thermocouple.
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.

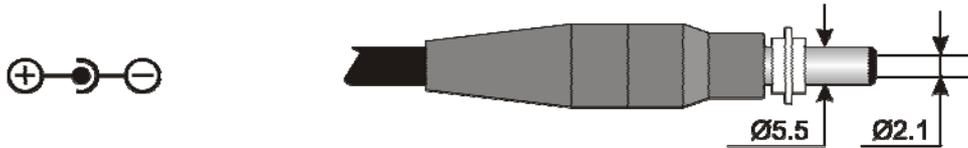
To replace the batteries, proceed as follows:

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 (pole) 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 **HD32.8** 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 details on chapter “11.2 CONNECTION TO THE USB 2.0 PORT”).

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
G0	Model HD32.8	Instrument model
G1	M=Thermocouple datalogger	Model description
G2	SN=12345678	Instrument serial number
G3	Firm.Ver.=01.00	Firmware version
G4	Firm.Date=2007/10/12	Firmware date
G5	cal 0000/00/00 00:00:00	Calibration date and time
GB	User ID=0000000000000000	User code (set with T2xxxxxxxxxxxxxxxxxx)
K0	&	Stop printing data
K4	&	Start logging data
K5	&	Stop logging data
KP	&	Auto-power-off function = ENABLE
KQ	&	Auto-power-off function = DISABLE

Command	Response	Description
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 log = 30sec	Reading of LOG interval set
RL	Sample print = 0sec	Reading of PRINT interval set
S0		Printing of the current measurement of all inputs
S1		Printing of the REL current measurement of all inputs
WA#	&	Setting LOG interval. # is a hexadecimal number 1..D that represents the position of the interval in the list 2, 5, 10, ..., 3600 seconds.
WC0	&	Setting SELF off
WC1	&	Setting SELF on
WL#	&	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.

10. STORING AND TRANSFERRING DATA TO A PC

The **HD32.8** 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 varies according to the number of probes connected to the instrument inputs. The following table reports the number of samples that can be stored according to the number of connected probes:

Number of connected probes	Number of samples that can be stored
1	800000
2	400000
3	264000
4	200000
5	160000
6	128000
7	112000
8	96000
9	88000
10	80000
11	72000
12	64000

Number of connected probes	Number of samples that can be stored
13	56000
14	56000
15	48000
16	48000

The time required to fill the memory depends on the number of connected probes and 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
Number of connected probes	1	18:12:26:40	46:7:6:40	92:14:13:20	138:21:20:0	277:18:40:0	555:13:20:0	1111:2:40:0
	2	9:6:13:20	23:3:33:20	46:7:6:40	69:10:40:0	138:21:20:0	277:18:40:0	555:13:20:0
	3	6:2:40:0	15:6:40:0	30:13:20:0	45:20:0:0	91:16:0:0	183:8:0:0	366:16:0:0
	4	4:15:6:40	11:13:46:40	23:3:33:20	34:17:20:0	69:10:40:0	138:21:20:0	277:18:40:0
	5	3:16:53:20	9:6:13:20	18:12:26:40	27:18:40:0	55:13:20:0	111:2:40:0	222:5:20:0
	6	2:23:6:40	7:9:46:40	14:19:33:20	22:5:20:0	44:10:40:0	88:21:20:0	177:18:40:0
	7	2:14:13:20	6:11:33:20	12:23:6:40	19:10:40:0	38:21:20:0	77:18:40:0	155:13:20:0
	8	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
	9	2:0:53:20	5:2:13:20	10:4:26:40	15:6:40:0	30:13:20:0	61:2:40:0	122:5:20:0
	10	1:20:26:40	4:15:6:40	9:6:13:20	13:21:20:0	27:18:40:0	55:13:20:0	111:2:40:0
	11	1:16:0:0	4:4:0:0	8:8:0:0	12:12:0:0	25:0:0:0	50:0:0:0	100:0:0:0
	12	1:11:33:20	3:16:53:20	7:9:46:40	11:2:40:0	22:5:20:0	44:10:40:0	88:21:20:0
	13	1:7:6:40	3:5:46:40	6:11:33:20	9:17:20:0	19:10:40:0	38:21:20:0	77:18:40:0
	14	1:7:6:40	3:5:46:40	6:11:33:20	9:17:20:0	19:10:40:0	38:21:20:0	77:18:40:0
	15	1:2:40:0	2:18:40:0	5:13:20:0	8:8:0:0	16:16:0:0	33:8:0:0	66:16:0:0
	16	1:2:40:0	2:18:40:0	5:13:20:0	8:8:0:0	16:16:0:0	33:8:0:0	66:16:0:0

		Logging interval					
		5min	10min	15min	20min	30min	1h
Number of connected probes	1	2777:18:40:0	5555:13:20:0	8333:8:0:0	11111:2:40:0	16666:16:0:0	33333:8:0:0
	2	1388:21:20:0	2777:18:40:0	4166:16:0:0	5555:13:20:0	8333:8:0:0	16666:16:0:0
	3	916:16:0:0	1833:8:0:0	2750:0:0:0	3666:16:0:0	5500:0:0:0	11000:0:0:0
	4	694:10:40:0	1388:21:20:0	2083:8:0:0	2777:18:40:0	4166:16:0:0	8333:8:0:0
	5	555:13:20:0	1111:2:40:0	1666:16:0:0	2222:5:20:0	3333:8:0:0	6666:16:0:0
	6	444:10:40:0	888:21:20:0	1333:8:0:0	1777:18:40:0	2666:16:0:0	5333:8:0:0
	7	388:21:20:0	777:18:40:0	1166:16:0:0	1555:13:20:0	2333:8:0:0	4666:16:0:0
	8	333:8:0:0	666:16:0:0	1000:0:0:0	1333:8:0:0	2000:0:0:0	4000:0:0:0
	9	305:13:20:0	611:2:40:0	916:16:0:0	1222:5:20:0	1833:8:0:0	3666:16:0:0
	10	277:18:40:0	555:13:20:0	833:8:0:0	1111:2:40:0	1666:16:0:0	3333:8:0:0
	11	250:0:0:0	500:0:0:0	750:0:0:0	1000:0:0:0	1500:0:0:0	3000:0:0:0
	12	222:5:20:0	444:10:40:0	666:16:0:0	888:21:20:0	1333:8:0:0	2666:16:0:0
	13	194:10:40:0	388:21:20:0	583:8:0:0	777:18:40:0	1166:16:0:0	2333:8:0:0
	14	194:10:40:0	388:21:20:0	583:8:0:0	777:18:40:0	1166:16:0:0	2333:8:0:0
	15	166:16:0:0	333:8:0:0	500:0:0:0	666:16:0:0	1000:0:0:0	2000:0:0:0
	16	166:16:0:0	333:8:0:0	500:0:0:0	666:16:0:0	1000:0:0:0	2000:0:0:0

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 **HD32.8** 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 >> 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/Remove 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. The installation wizard prompts the software user license: To proceed, **the software usage terms must be accepted - click on YES.**
5. On the next page the folder where the drivers will be installed is indicated: Confirm without modifying.
6. Complete the installation by clicking on *Finish*. Wait few seconds until the **DeltaLog9** page appears.
7. Close **DeltaLog9**.
8. Connect the instrument to the PC USB port. When Windows detects the new device, the “New software installation wizard” is started.

9. If you are asked for the authorization to search an updated driver, answer *NO* and continue.
10. In the installation window, select “*Install from a list or specific location*”.
11. In the next window select “*Search for the best driver in these locations*” and “*Include this location in the search*”.
12. Using *Browse*, indicate the installation folder provided at point 5:

C:\Program Files\Texas Instruments\USB-Serial Adapter

 Confirm with *OK*.
13. If you get the message that the software did not pass the Windows Logo testing, select “*Continue*”.
14. The USB drivers are installed: At the end, click on “*Finish*”.
15. **The installation wizard requests the files location once more:** Repeat the just described steps and provide the location of the same folder (see point 12).
16. **Wait:** The task could take a few minutes.
17. The installation procedure is now complete: The device will be automatically detected on each new connection.

In order to check if the entire operation was successful, in CONTROL PANEL double click on SYSTEM. Select “Device Manager” and connect the instrument to the USB port.

The following items should appear:

- “*UMP Devices >> UMP3410 Unitary driver*” and “*Ports (COM and LPT) >> UMP3410 Serial Port (COM#)*” for Windows 98 and Windows Me,
- “*Multiport serial cards >> TUSB3410 Device*” and “*Ports (COM and LPT) >> USB-Serial Port (COM#)*” for Windows 2000,
- “*Ports (COM and LPT) >> TUSB3410 Device (COM#)*” for Windows NT, Xp, Vista and 7.

When the USB cable is disconnected, these two items disappear and come back when it is connected again.

Notes.

1. If the instrument is connected to the USB port **before** installing the drivers, Windows signals the presence of an unknown device: In this case, cancel the operation and repeat the procedure illustrated at the beginning of this section.
2. **In the documentation supplied with the *DeltaLog9* CD-Rom**, is included a detailed version of this chapter with pictures. Moreover, the necessary steps to remove the USB drivers are reported.

12. FUNCTIONING NOTES AND OPERATING SECURITY

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 concerning electronic measurement instruments and was delivered ex factory in perfect security conditions.

Its regular functioning and operating security 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 LCD, Dot Matrix 128x64 points, visible area 56x38mm

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 Ø 5.5mm, internal Ø 2.1mm
Power supply via the PC USB port.	
Autonomy	200 hours with 7800mAh alkaline batteries, and all probes connected

Power absorbed @6Vdc

<60µA when the instrument is off
<60µA 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 for the HD32.8.8 16 for the HD32.8.16
Connection	Miniature female socket

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
------	---------------------------------

Instrument accuracy and measurement range

Tc: K	-200...+1370°C / ±0.1°C up to 600°C ±0.2°C over 600°C
Tc: J	-100...+750°C / ±0.1°C up to 400°C ±0.2°C over 400°C
Tc: T	-200...+400°C / ±0.1°C
Tc: N	-200...+1300°C / ±0.1°C up to 600°C ±0.2°C over 600°C
Tc: R	+200...+1480°C / ±0.3°C
Tc: S	+200...+1480°C / ±0.3°C
Tc: B	+200...+1800°C / ±0.4°C
Tc: E	-200...+750°C / ±0.1°C up to 300°C ±0.2°C over 300°C

The precision only refers to the instrument. Error due to the thermocouple or to the cold junction reference sensor is not included.

<i>Resolution</i>	0.05°C in the range ±199.9°C 0.1°C elsewhere
<i>Temperature drift @20°C</i>	0.02%/°C
<i>Drift after 1 year</i>	0.1°C/year
<i>Internal clock accuracy</i>	1min/month max. departure
<i>Unit of measurement</i>	°C, °F, °K
<i>Keyboard</i>	15 keys; the instruments can also be configured without a PC.
<i>Password and locking of the keyboard function.</i>	
<i>Memory</i>	Divided in 64 blocks.
<i>Storage capacity</i>	Up to 800,000 recordings divided amongst the existing inputs; i.e. with one probe connected, 800,000 recordings, with 8 probes connected, 96,000 recordings.
<i>Logging interval</i>	Selectable among: 2, 5, 10, 15, 30 seconds, 1, 2, 5, 10, 15, 20, 30 minutes, and 1 hour.
<i>Dump LOG</i>	RS232C from 1200 to 38400 baud, electrically isolated. Sub D 9-pole male connector. USB 1.1 – 2.0 electrically isolated.

Probes

It is possible to connect all the thermocouple probes of type K, J, T, N, R, S, B, and E using a male miniature connector.

In addition to the K probes available in the catalogue, Delta Ohm can provide probes of different type and shape on request.

EMC Standard Regulations

Security	EN61010-1
Electrostatic discharge	EN61000-4-2 level 3
Electromagnetic interference susceptibility	EN61000-4-3 level 3
Electric fast transients	EN61000-4-4 level 3
Immunity to conducted disturbances	EN61000-4-6
Voltage variations	EN61000-4-11
Electromagnetic interference emission	EN55022:2007 class B

Accuracy of the thermocouple probes:

The tolerance of a type of thermocouple corresponds to the maximum acceptable departure from the e.m.f. of any thermocouple of that type, with reference junction at 0°C.

The **tolerance** is expressed in degrees Celsius, preceded by the sign.

The **percentage tolerance** is given by the ratio between the tolerance expressed in degrees Celsius and the measurement junction temperature, multiplied by one hundred.

The thermocouples conforming to regulations must comply with one of the following tolerance levels, the values of which are reported in the table.

G I (special tolerances)

G II (normal tolerances)

The tolerances refer to the expected thermocouple operating temperature, in agreement with the thermoelements' diameter.

Tolerance of the thermocouples:

Type of thermocouple	Range °C	G I*	G II*
K	0 ... +1370°C	±1.1°C or ±0.4%	±2.2°C or ±0.75%
J	0 ... +750°C	±1.1°C or ±0.4%	±2.2°C or ±0.75%
T	0 ... +400°C	±0.5°C or ±0.4%	±1°C or ±0.75%
N	0 ... +1300°C	±1.1°C or ±0.4%	±2.2°C or ±0.75%
R or S	+200 ... +1480°C	±0.6°C or ±0.1%	±1.5°C or ±0.25%
B	+200 ... +1800°C	±0.25%	±0.5%
E	0 ... +750°C	±1°C or ±0.4%	±1.7°C or ±0.5%
K**	-200 ... 0°C	---	±2.2°C or ±2%
T**	-200 ... 0°C	---	±1°C or ±1.5%
E**	-200 ... 0°C	---	±1.7°C or ±1%

* The higher of the two optional limits is the valid one. Example: at 200°C the percentage tolerance for type K thermocouple, tolerance G II, is ±0.75% and is equal to ±1.5°C. Therefore, the limit of ±2.2°C is valid. On the other hand, at 600°C the percentage tolerance is equal to ±4.5%, and therefore this is the limit to use.

** The thermocouples that meet the limits for temperatures higher than 0°C do not necessarily meet the limits for the range under 0°C.

14. ORDERING CODES

- HD32.8.8** **8-input data logger** instrument for temperature probes with thermocouples type K, J, T, N, R, S, B, and E. The kit is composed of the HD32.8.8, 4 1.5V alkaline C-BABY type batteries, operating manual, DeltaLog9 software (vers. 3.0 and later), and bearing and transport belt. **The probes, tripod support, suitcase and cables must be ordered separately.**
- HD32.8.16** **16-input data logger** instrument for temperature probes with thermocouples type K, J, T, N, R, S, B, and E. The kit is composed of the HD32.8.16, 4 1.5V alkaline C-BABY type batteries, operating manual, DeltaLog9 software (vers. 3.0 and later). **The probes, tripod 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.

HD32.8.8 and HD32.8.16 probes

It is possible to connect all the temperature probes with thermocouples type K, J, T, N, R, S, B, and E using a male miniature connector.

Different probes can be supplied on request.

HD32.8.8 and HD32.8.16 accessories

- 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 HD32.8 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.

CERTIFICATO DI CONFORMITÀ DEL COSTRUTTORE

MANUFACTURER'S CERTIFICATE OF CONFORMITY

rilasciato da

issued by

DELTA OHM SRL STRUMENTI DI MISURA

DATA
DATE

2009/02/04

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: Datalogger Termocoppia

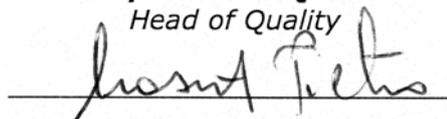
Product Type: Thermocouple Datalogger

Nome Prodotto: HD32.8.8 – HD32.8.16

Product Name:

Responsabile Qualità

Head of Quality



DELTA OHM SRL

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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 HD32.8.8 HD32.8.16

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