

DeltaLog10 Software Manual

Introduction

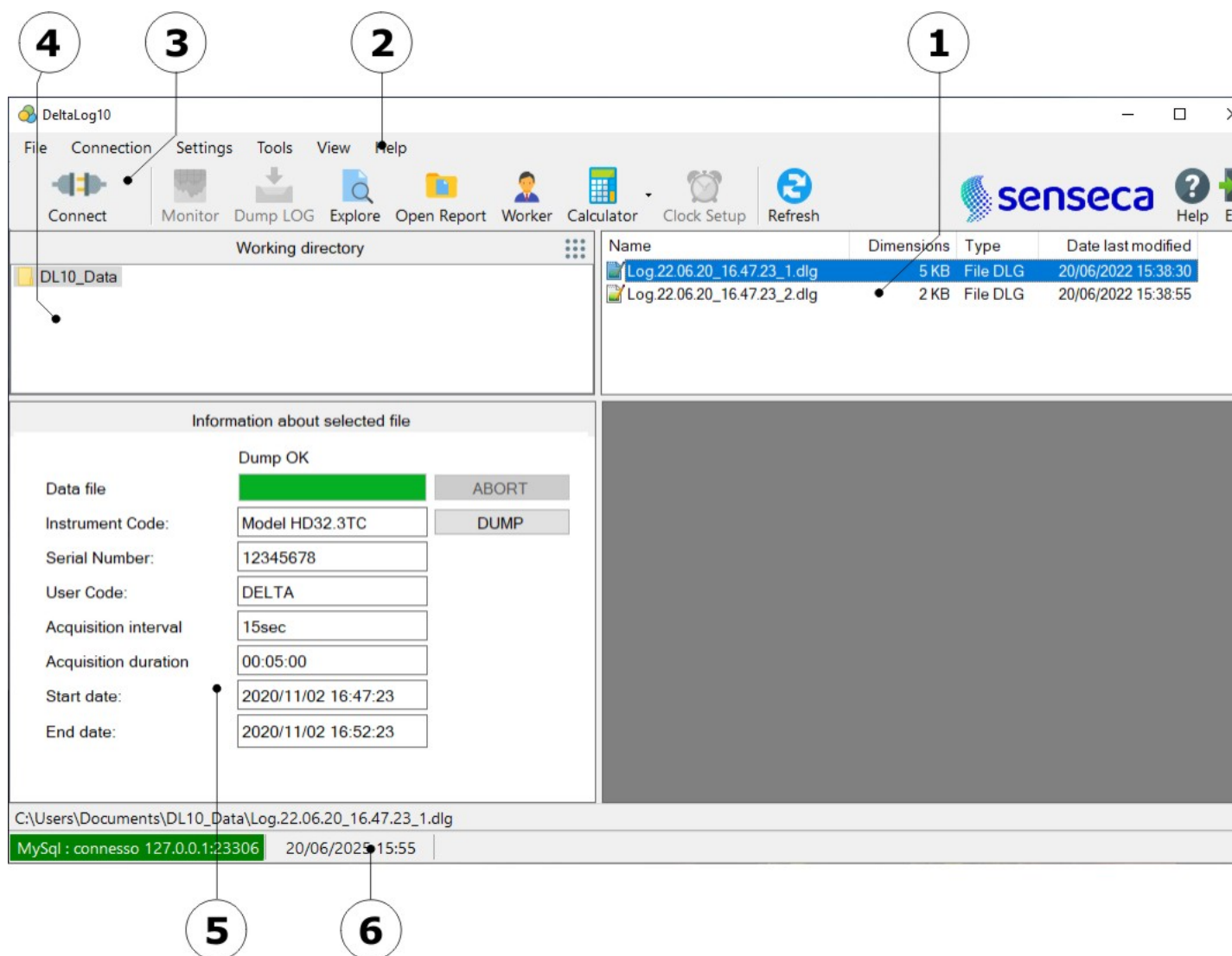
The **DeltaLog10** software, which can be used with the instruments **HD32.1**, **HD32.2**, **HD32.3**, **HD32.3TC**, **HD37AB1347** and **HD21AB17**, allows saving in a database, displaying and processing the acquired measurements.

Moreover, depending on the connected model, the software guides the user in making a complete report with microclimatic indices calculation according to environment type, subject characteristics and type of activity.

The software consists of the following modules:

- **DR Index**
- **Moderate Environments**
- **Discomfort Analysis**
- **Hot and very hot Environments**
- **Cold Environments**

Main window



You can see following sections:

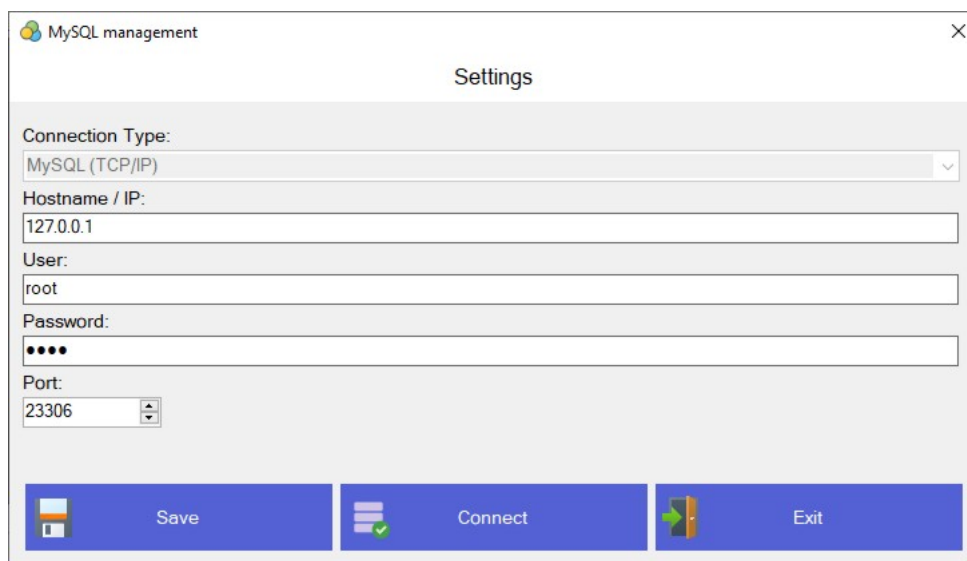
1. **File Window**: list of the files in the folder selected in the folder window (point 4).
2. **Menu**
3. **Toolbar**
4. **Folder Window**: the **default working folder** is displayed. By clicking on the the section heading "Working directory", the folders tree appears and a different folder can be selected.
5. **Selected file properties**: information on the file selected in the File Window (point 1).
6. **Status Bar**: information on connection. Current date and time are reported.

Database

The data acquired by the instrument are saved in a MySQL database. The database is installed in the local PC by the DeltaLog10 program the first time it is run. The connection to the database is automatic when the program is started.

WARNING: THE FIRST TIME THE DELTALOG10 PROGRAM MUST BE RUN AS ADMINISTRATOR, TO ALLOW THE CORRECT INITIALIZATION OF THE DATABASE.

The database connection parameters are displayed in the status bar of the main program window and can be modified by selecting the menu item "*Connection >> Database setup*".

The image shows a 'MySQL management' window with a 'Settings' tab. It contains several input fields: 'Connection Type' (a dropdown menu showing 'MySQL (TCP/IP)'), 'Hostname / IP' (a text box with '127.0.0.1'), 'User' (a text box with 'root'), 'Password' (a text box with four dots), and 'Port' (a spinner box with '23306'). At the bottom, there are three buttons: 'Save' (with a floppy disk icon), 'Connect' (with a green checkmark icon), and 'Exit' (with a red X icon).

- *Hostname / IP* : IP address of the PC where the database is installed (127.0.0.1 = local PC).
- *User* : leave default setting (root).
- *Password* : database password (default = root).
- *Port* : PC port number associated to the database service.

Normally it is not necessary to change the default parameters. If the parameters are changed (for example to connect to a different database available to the user), press *Save* to save the new parameters and press *Connect* to connect to the database with the new settings.

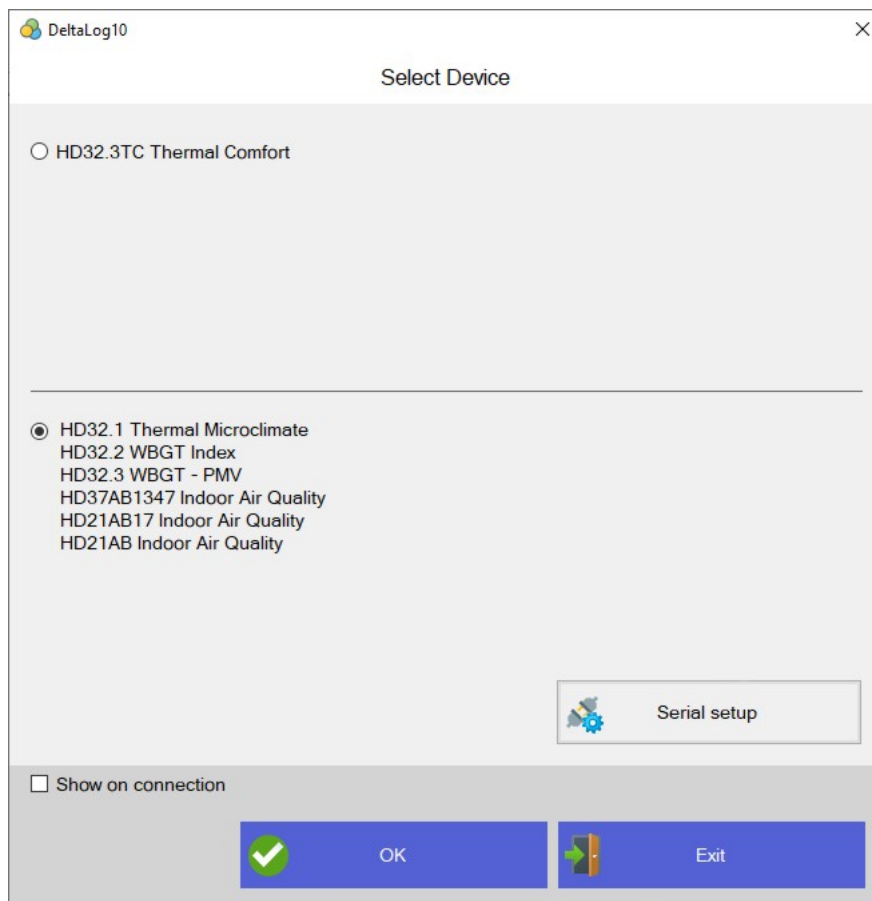
Connecting the instrument

Connect the instrument to the PC:

- **HD32.3TC** can be connected to a PC USB port through the **CP31** cable.
- **HD32.1** can be connected to a PC USB port through the **CP22** cable or to a RS323C port through the **9CPRS232** cable.
- **HD32.2**, **HD32.3** e **HD37AB1347** can be connected to a PC USB port through the **HD2110/USB** cable or to a RS323C port through the **HD2110/RS** cable.
- **HD21AB** e **HD21AB17** can be connected to a PC USB port through the **CP23** cable.

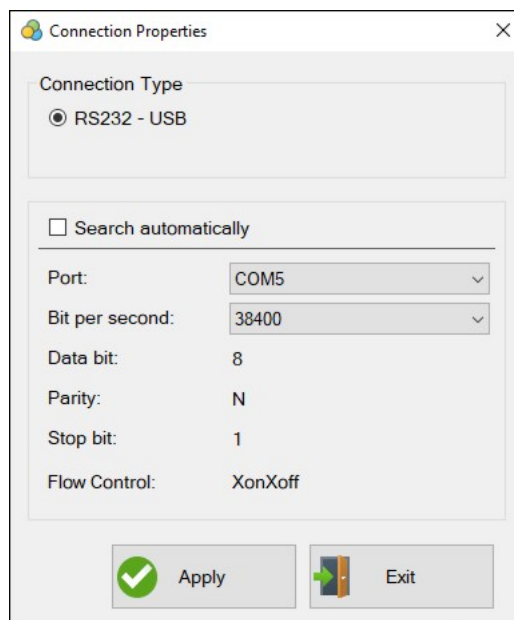
Except for HD32.3TC, the USB connection require prior installation of a driver included in the DeltaLog10 software package: Please see the installation guide in the "Documentation" section of the DeltaLog10 software package.

After connecting the instrument to the PC, select the menu item "*Connection >> Select Device*" and select the type of device.



If HD32.3TC is selected, the status bar of the main program window does not show information on the instrument connection as the device does not support serial or "Virtual COM" connection, but only HID connection.

If HD32.1 / HD32.2 / HD32.3 / HD37AB1347 / HD21AB / HD21AB17 are selected, press the *Serial setup* button to select the COM port to which the instrument is connected and the Baud Rate (the button is disabled for HD32.3TC). Select the Baud Rate **460800 (USB)** if the instrument USB output is connected. Selecting the *Search automatically* option, the program search automatically a connected instrument (trying first with the settings of the last connection and in case of failure starting to scan all the ports of the PC at various speeds). Press *Apply* to confirm and save the settings.



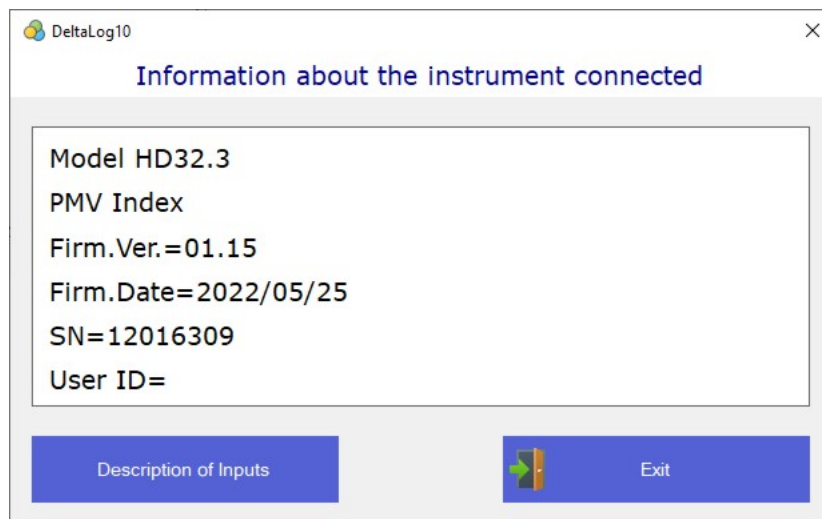
By selecting the *Show on connection* option in the device type selection window, the device type selection window opens automatically when the *Connect* button in the toolbar in the main software window is pressed. Deselect the option if you do not want the window to open on every connection.

Note: the communication parameters configuration window can also be opened directly by selecting the menu item "*Connection >> Serial Settings*".

Press *OK* in the device type selection window to confirm the choice.

For HD32.1 / HD32.2 / HD32.3 / HD37AB1347 / HD21AB / HD21AB17 press the *Connect* button in the toolbar in the main software window. **For HD32.3TC pressing the *Connect* button is not required.**

If the connection is successful, the window showing the connected instrument properties appears (except HD32.3TC):

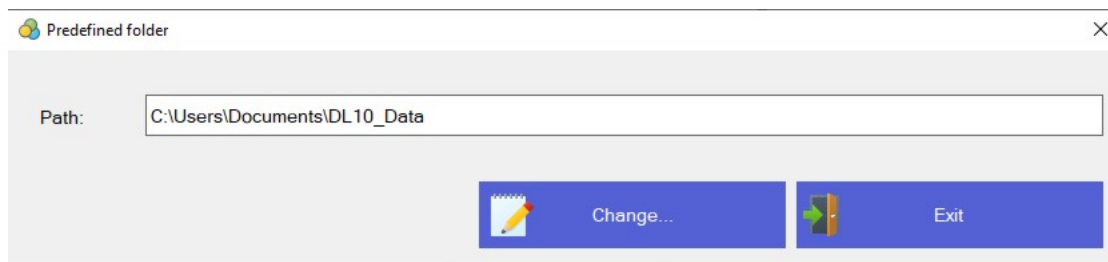


The key *Description of Inputs* reports the characteristics of the probes connected to the instrument at the time of connection. Press *Exit* to return to the main program window.

To end a connection, press the *Disconnect* button in the toolbar in the main software window (not necessary for HD32.3TC).

Default working folder

The default working folder is the folder displayed by the software in the main window and in which the files downloaded by the instrument are saved (except HD32.3TC). The default working folder can be changed by selecting the menu item *Settings >> Predefined folder*.



To change the folder, press *Change...* and select the new folder.

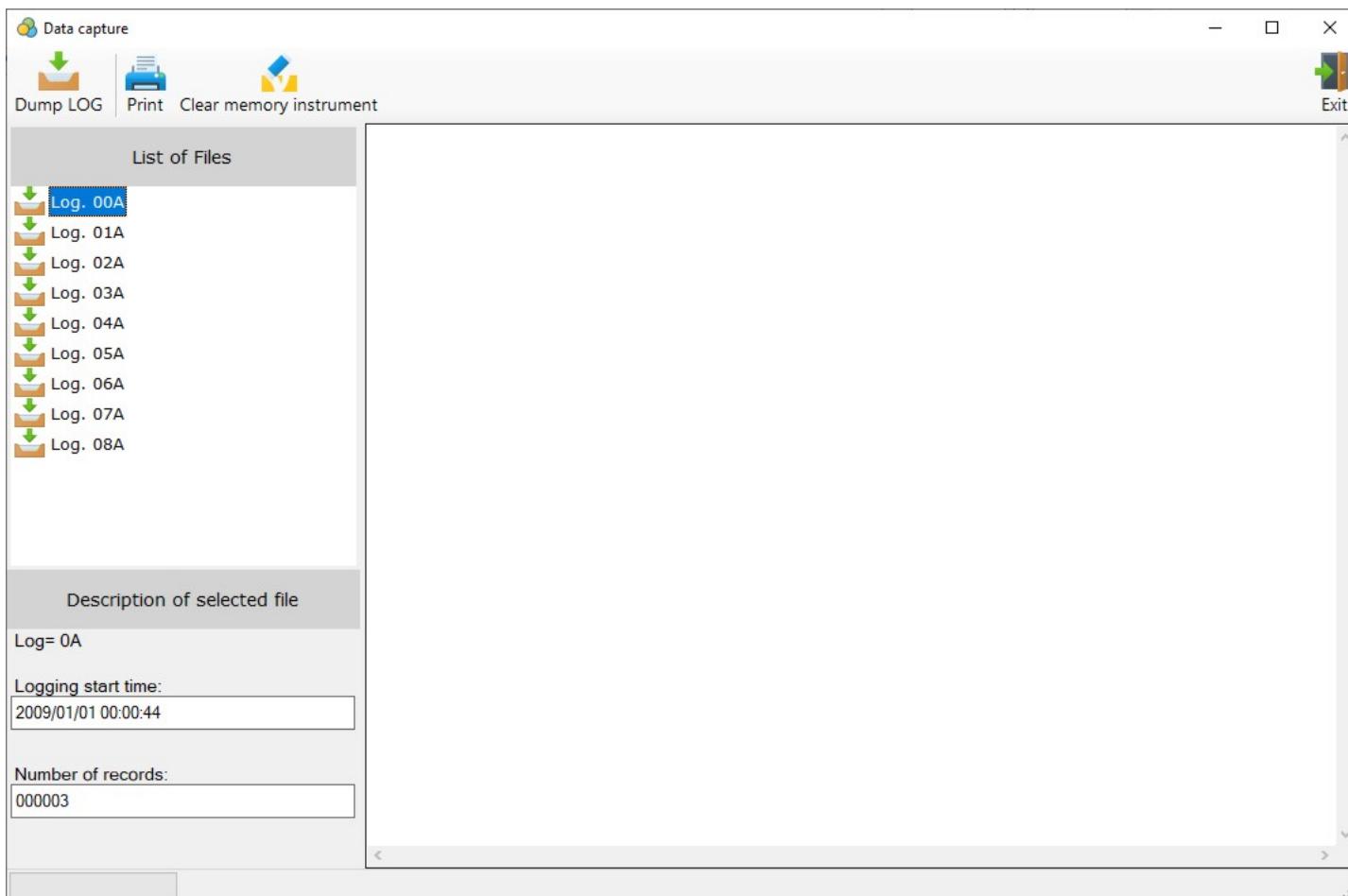
Data Download

The data stored in the instrument memory can be saved in the PC for subsequent processing. How the data are saved depends on the instrument model.

Warning: to download data, any logging session in progress must be stopped: it is not possible to download the measures if the instrument is logging.

HD32.1, HD32.2 and HD32.3 data download

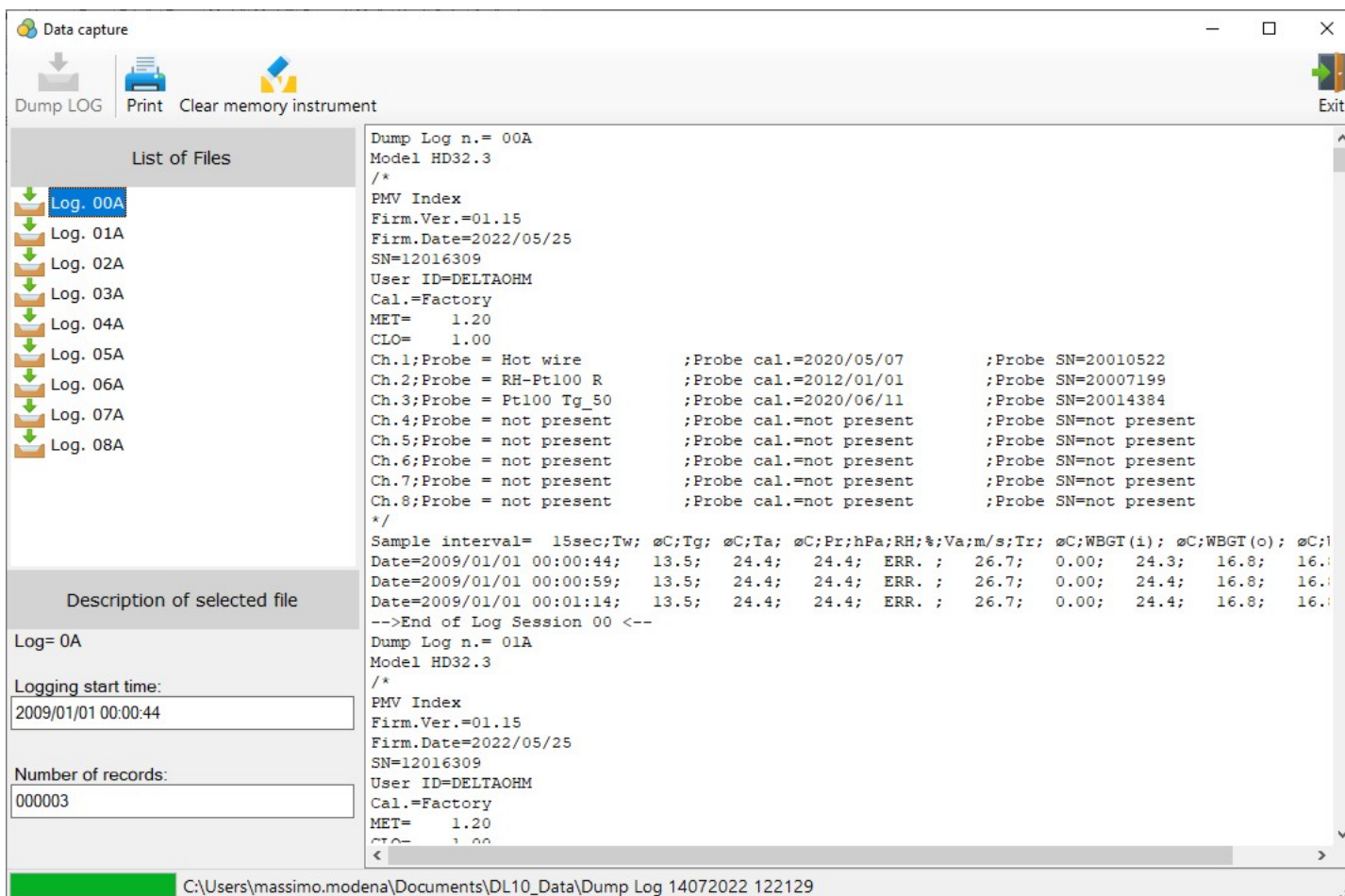
After connecting the instrument, press the *Dump LOG* button in the toolbar in the main software window. The window with the list of stored data files opens.



The section *List of Files* shows the files in the instrument memory: the letter following the progressive number (A, B or C) identifies the operating program used for storing the data.

By selecting a file in the list, its properties are displayed in the section *Description of the selected file*: number of samples and starting date of the storage are reported.

To download the memory content, press the the *Dump LOG* button: the data files are displayed in sequence in the right panel (whose contents can be printed by pressing the *Print* button).

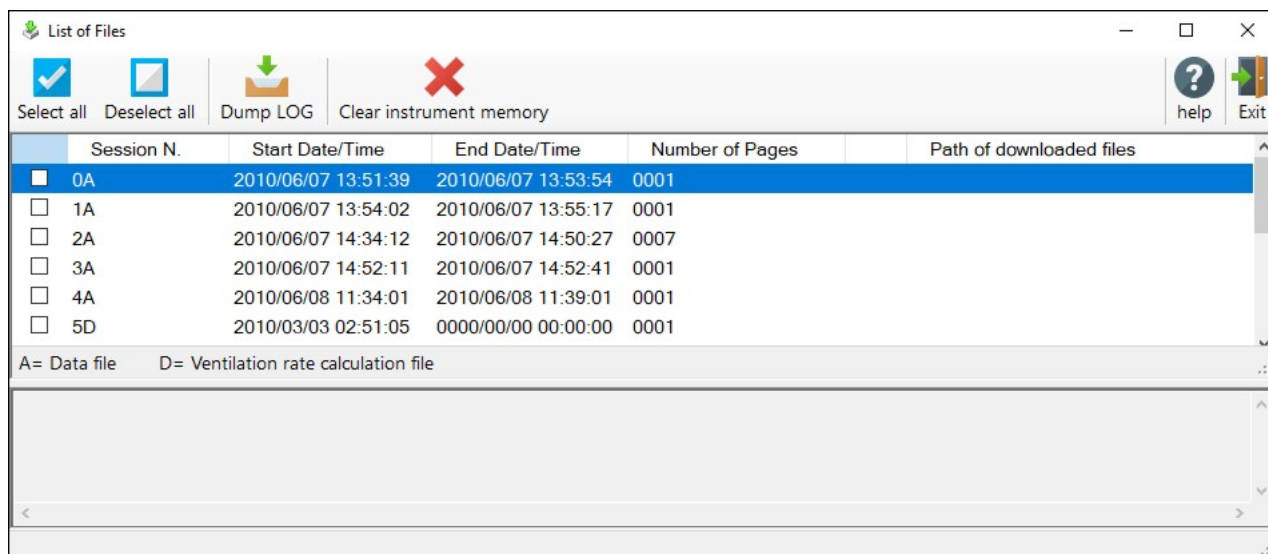


The downloaded data are automatically saved in the **default working folder**, in a subfolder identified by the date and time of data download in the PC (therefore, if previously downloaded data are downloaded again, they will be again saved in a different folder marked with the new download date/time).

It is possible to clear all the contents of the instrument memory using the *Clear instrument memory* button. This function deletes all the measures stored in memory: it is not possible to delete individual logging sessions.

HD37AB1347 and HD21AB17 data download

After connecting the instrument, press the *Dump LOG* button in the toolbar in the main software window. The window with the list of the logging sessions opens.

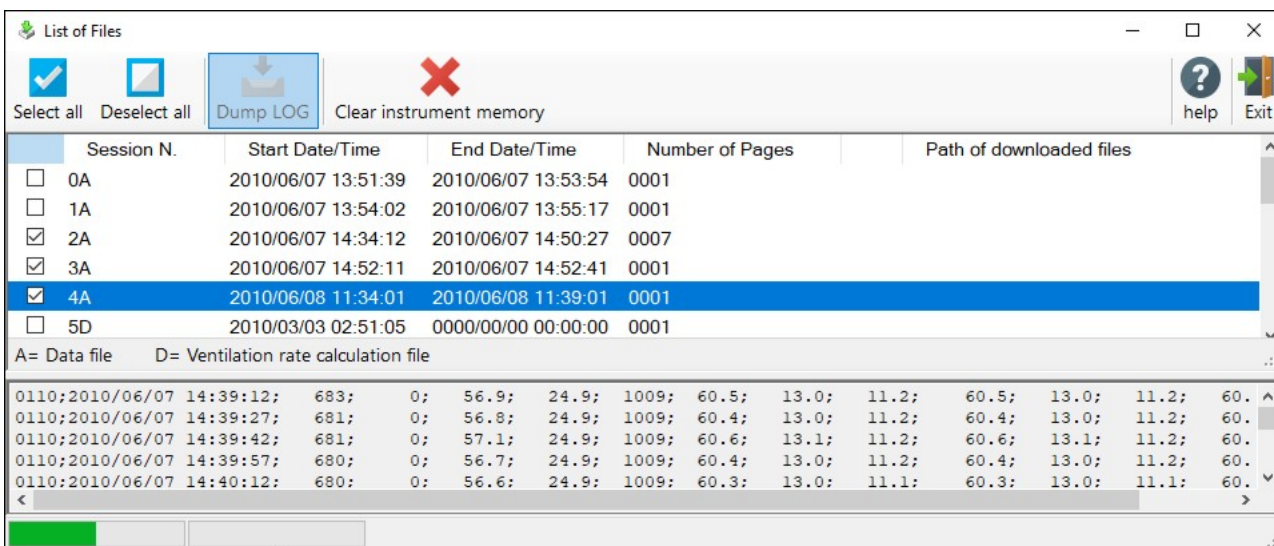


For each session, logging start and stop date and time and the number of memory pages occupied are displayed. Each memory page contains 10 acquisitions, except for the last page of each session, that can contain from 1 to 10 samples depending on the total number of acquisitions in the session. So, the number of pages gives the idea of the number of samples that have been acquired. For instance, if a session occupies 5 memory pages, it means that it consists of 41 minimum up to 50 maximum samples.

The session number is followed by the **A** letter if the session contains acquired measures only, or by the **D** letter if the session is related to the ventilation rate calculation made by the HD37AB1347.

The sessions can be arranged in increasing or decreasing order with regard to each of the available fields by clicking on the column header. By clicking again on the same header, the list order is reversed.

Select the logging sessions you wish to import, by clicking on the box on the left of the session number. To select or deselect all the sessions, press the *Select all* or the *Deselect all* button respectively. To start data download to a PC, press the *Dump LOG* button.



During the download, in the lower panel of the window it is displayed a preview of the file being downloaded. At the end of download, confirmation of completed download is displayed: press OK.

The downloaded data are automatically saved in the **default working folder**, in a subfolder identified by the date and time of data download in the PC (therefore, if previously downloaded data are downloaded again, they will be again saved in a different folder marked with the new download date/time).

Note: if a file has not been properly downloaded, a warning symbol (yellow triangle with an exclamation mark) appears next to the path of the downloaded file; in such case, select again the session and try to download it again.

Note: it is possible to stop the download of the current session by pressing the <ESC> key on the instrument. On the monitor of the PC a message appears asking for dump stop confirmation. Confirming the stop, the session data downloaded up to the time of the stop remain saved in the PC, and the corresponding file is marked with the warning symbol (yellow triangle with an exclamation mark) to warn that data are not complete. Only the session being downloaded is stopped; if further sessions should be downloaded, after stopping the current session the program continues with the download of the next sessions.

It is possible to clear all the contents of the instrument memory using the *Clear instrument memory* button. This function deletes all the measures stored in memory: it is not possible to delete individual logging sessions.

HD32.3TC data download

It is not necessary to perform connection and data download procedures with the software. Once the instrument has been connected to a USB port on the PC, simply view the tree of the directories in the software folder window, select the desired folder in the disk drive corresponding to the instrument (or on the PC if the file has previously been copied to the PC) and select the data file.

Warning: in order to view the disk drive corresponding to the instrument, any logging session in progress must be stopped: it is not possible to view the disk drive corresponding to the instrument if the instrument is in acquisition mode.

Worker activity and clothing settings

The microclimatic indices are calculated according to the activity carried out by the worker and his/her clothing thermal resistance, parameters described in the ISO 7730 and ISO 8996 standards.

To set clothing and activity, press the *Worker* button in the toolbar in the main software window. A window divided into two panels opens: **Clothing** and **Activity**.

In the **Clothing** panel, select the type of composition: *Detailed Clothes*, *Typical Single*, *Workwear* or *Every Day Clothing*; subsequently, expand the item of interest (e.g. Underwear, Underwear vests, Shirts, etc.) by clicking on the + sign, select an item and add it by pressing the right arrow button (>). More items can be added.

Set activity and thermal resistance of clothing

Clothing **Activity**

Composition of clothing

☒ Detailed Clothes ☐ Work wear
☐ Typical Single ☐ Every Day Clothing

Additional Parameter - Clothing

Text: [Description]
Value: [Value] clo **ADD**

Environment

☒ Moderate environment
☐ Very hot environment
☐ Very cold environment

Summary table

Thermal resistance	0 clo
0 ≤ clo ≤ 2	
	0 m2C/W
0 ≤ m2C/W ≤ 0,31	
Reset	
Metabolic Heat Production	0 met
0,8 ≤ met ≤ 4	
	0 W/m²
46,52 ≤ m2C/W ≤ 2	
Mechanical Efficiency	0 %
0 ≤ % ≤ 25	
Reset	

Type: Diagonal weave, antistatic, fireproof
Covering: 81 %
Composition: 100% SEF, modacrylic
Thermal resistance: 0,5 CLO

Thermal resistance: 0 CLO
0 ≤ clo ≤ 2
0 m2C/W
0 ≤ m2C/W ≤ 0,31

Save **Exit**

If an item is not present in the typical compositions, you can add it by using the *Additional Parameter* box (enter a description and the thermal resistance value in clo) and pressing *ADD*.

The summary table, on the right, gives the overall thermal resistance (calculated according to the added clothing), the metabolic heat production and the mechanical efficiency (depending on the activity carried out by the worker). These parameters, in order to conform to the above regulations, should be within a range that varies according to the type of environment: moderate, very hot or very cold, which must be selected at the top right.

Warning: if after adding articles you change the type of composition, the thermal resistance coefficient is reset.

To delete an added article, select it in the added article list and press the left arrow button (<). To delete all added items, press the left double arrow button (<<) or the *Reset* button in the overall thermal resistance box.

In the **Activity** panel, choose whether to select by *typical activity* or by *job*; subsequently, expand the item of interest (e.g. Basic activities, Professions - Construction Industry, etc.) by clicking on the + sign and select an activity.

Set activity and thermal resistance of clothing

Clothing
Activity

Activity

☒ Select by typical activity
☐ Select by job

Basic activities

Walking on a level, even path
Walking uphill at 3 km/h

gradient of 5°.
gradient of 10°.
gradient of 15°.

Walking downhill at 5 km/h
Climb steps (0.172 m/step)
Walk down steps (0.172 m/step)
Transport a load over a flat, even ground, 4 km/h

Professions - Construction Industry
Professions - Iron and steel industry
Professions - Forestry industry
Professions - Agriculture
Professions - Sport
Professions - Domestic work

Additional Parameter - Activity

[Description] W(%) [Value]

MET(W/m²) [Value] ADD

Limit values of metabolic heat production 195 a 195 W/m2
Limit values of mechanical efficiency 10 a 10 %

Save

Exit

Environment

☒ Moderate environm
☐ Very hot environme
☐ Very cold environm

Summary table

Thermal resistance

0 clo
0 <= clo <= 2

0 m2C/W
0 <= m2C/W <= 0,31

Reset

Metabolic Heat Produ

3,35 met
0,8 <= met <= 4

195 W/m²
46,52 <= m2C/W <= 2

Mechanical Efficiency

10 %
0 <= % <= 25

Reset

If an activity is not present, you can add it by using the *Additional Parameter* box (enter a description and the metabolic activity values) and pressing **ADD**. Press **Save** to save clothing and activity data to a file. A file for each worker can be created. The files can be used later for data processing.

Data viewing and processing

The data can be displayed and processed to obtain the reports with the microclimatic indices according to the worker [activities and clothing settings](#).

When a data file (extension ".dlg") is selected for the first time in the main program window, the contained data are automatically saved in the MySQL database (a green "progress bar" indicates the saving progress; the **ABORT** and **DUMP** buttons allow respectively to cancel and retry the saving, if not successful).

Information about selected file

Data file

ABORT

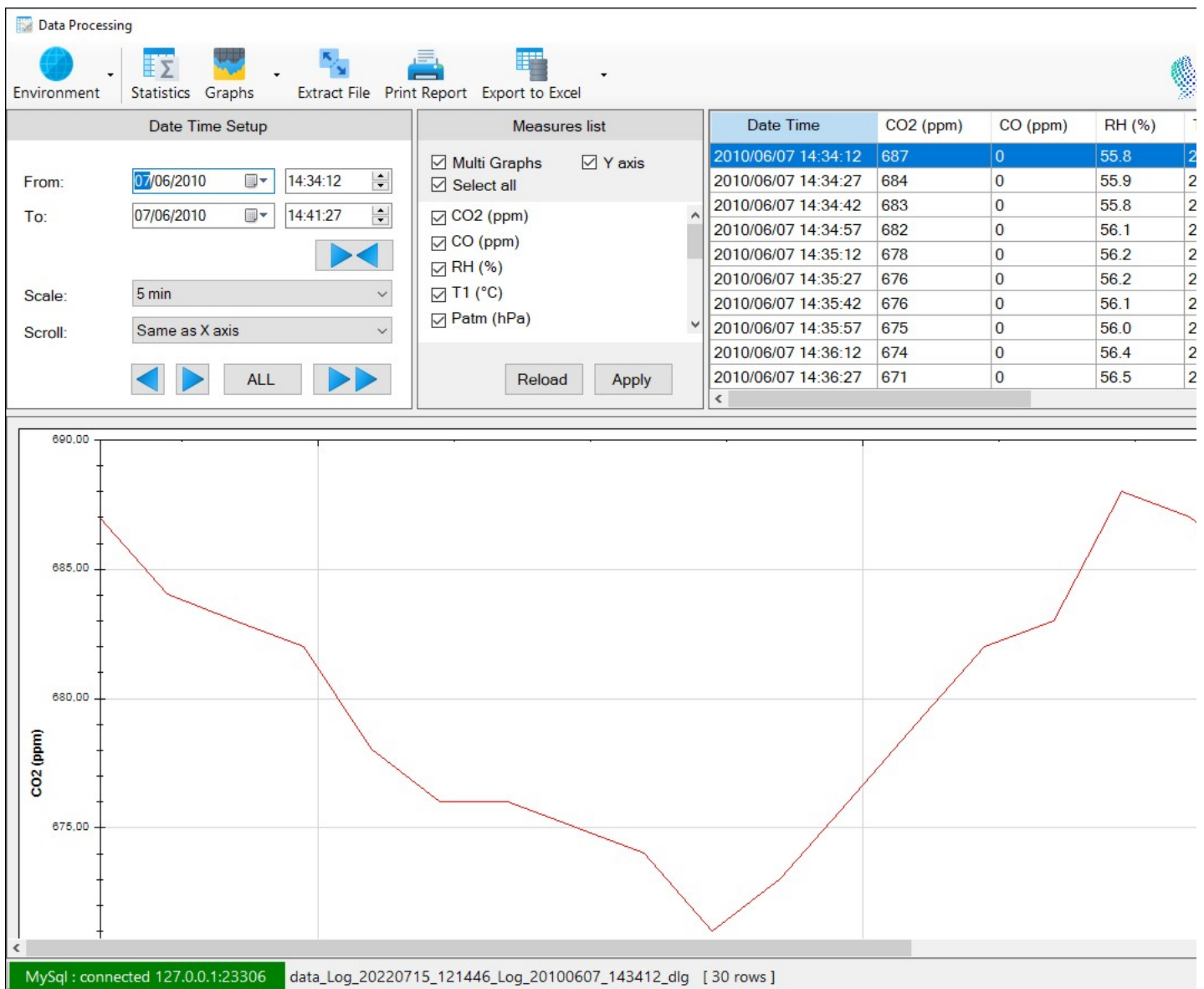
Instrument Code:

Model HD37AB1347

DUMP

Serial Number:

At the end of saving the data in the database, to view the data of the selected file, press the *Explore* button in the toolbar in the main software window (the *Explore* command is also available by clicking with the right mouse button). The following window opens:



In the upper right part, the list of measured values appears. In the lower part there are the graphs of the measured quantities: by default, a graph for each quantity. In the *Measures list* panel it is possible to select/deselect the quantities to be displayed, to be confirmed by pressing the *Apply* button (the *Reload* button allows cancelling any unconfirmed changes to the selection of the quantities). By repeatedly pressing the *Graphs* button you can toggle between graphical only, tabular only or complete data display.

All the quantities can be displayed in the same graph by deselecting the *Multi Graphs* option. If the *Multi Graphs* option is deselected, the *Y Axis* option allows enabling/disabling the display of the Y axes (if the *Multi Graphs* option is selected, the *Y Axis* option has no effect). If changed, the *Multi Graphs* and *Y Axis* options must be activated by pressing the *Apply* button.

The *Environment* button allows accessing the calculation options of the [microclimatic indices](#).

The *Extract File* button allows [creating a file containing a subset of the data](#).

The *Statistics* button enables/disables the display of the following statistical information: Max, Min, Avg (average), Std (standard deviation), Max-Min, Max-Avg and Avg-Min.

By pressing the *Print Report* button, a [report](#) in PDF format can be generated.

The numerical measurement data can be exported in CSV format by pressing the *Export to Excel* button. By selecting the small arrow to the right of the export button, you can select the *Setup Export File* command to set the data separators to be used for the export: separator for date (e.g. "/"), time (e.g. ":", "."), decimal (e.g. ".") and field (e.g. ";").

Displaying a subset of data

To view only the data captured in a certain time interval, set the interval start and end date/time in the *From... / To...* fields of the *Date Time Setup* panel.

Press the  button to confirm.

Environment Statistics **Graphs** Extract File Print Re...

Date Time Setup

From: 07/06/2010 14:34:12

To: 07/06/2010 14:41:27

Scale: 5 min

Scroll: Same as X axis

ALL

The time span of the data can also be changed by selecting an interval in the *Scale* field and pressing the button  to confirm.

Use the  and  buttons to scroll through the data in the graph. The data scroll by the interval set in the *Scroll* field. The button  scrolls to the end of the data. The ALL button restores the full view of the data.

Note: the microclimatic indices are always calculated considering all the data in the file, even if only a part of it is displayed; to calculate the microclimatic indices only on a part of the data, use the *Extract File* function.

Graphs customization

By selecting the small arrow to the right of the *Graphs* button, you can select the *Graphs Setup* command, which opens the following window:

Graphs Setup

☐ Visible ☐ Auto scale ☐ Marker

Visible	Name	Color	Width	Auto scale	Min	Max	Marker	Alarm A	Alarm A Value	Alarm A Shadow	Alarm B	Alarm B Value	Alarm B Shadow
☒	CO2 (ppm)	Red	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	CO (ppm)	Blue	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☒	RH (%)	Green	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	T1 (°C)	Brown	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	Patm (hPa)	Orange	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	Va (m/s)	Light Green	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	T2 (°C)	Olive	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	FVa (L/s)	Light Yellow	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	DP (°C)	Brown	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	AH (g/m³)	Yellow	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	MR (g/kg)	Orange	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	Tw (°C)	Light Brown	1	☒	0	100	☐	☐	0	Off	☐	0	Off
☐	H (kJ/kg)	Yellow	1	☒	0	100	☐	☐	0	Off	☐	0	Off

Reload Apply

For each quantity, the following properties can be set:

Visible: displays/hides the graph.

Color: color of the graph line.

Width: thickness of the graph line (enter an integer).

Auto scale: enable/disable the automatic scale for the Y axis.

Min / Max: minimum and maximum values of the Y axis (only if the automatic scale is disabled).

Marker: enable/disable the display of a marker in correspondence with the measurement acquisition instants.

Alarm A/B: displays a horizontal reference line in correspondance to "Alarm A/B Value".

Alarm A/B value: A/B threshold value.

Alarm A/B Shadow: can assume the "Off/Down/Up" values and allows you to color the background of the graph area below/above "Alarm A/B Value".

The *Visible*, *Auto scale* and *Marker* options at the top of the window simultaneously select the corresponding option for all quantities.

Press the *Apply* button to confirm the settings. The *Reload* button allows cancelling any unconfirmed changes.

Graphs zoom

In order to enlarge a specific area on the graph, press the left mouse key to define the first corner of a rectangular area, then, holding down the key, drag the mouse to the second point and release it to define the zoom window: the area selected will fill the whole area destined to the graph.



To go back to previous zoom levels, click with the right mouse key on the graph, then select *Un-Zoom* to go back to previous zoom level or *Undo All Zoom/Pan* to go back to the original graph display setting.

Other functions for the graphs

In addition to the Un-Zoon functions, a click with the right mouse button on a graph also makes the following commands available:

- *Copy*: copies the current graph to the clipboard.
- *Save Image As...*: saves the current graph as an image file. A window will open allowing to choose the file position and format (emf, png, gif, jpg, tif, bmp).
- *Page Setup...*: allows setting up the page for printing the graph.
- *Print...*: opens the window for printing the current graph.
- *Show Point Values*: enables the display of the labels showing the sample number and the value of the variable when the mouse is on the graph line.
- *Set Scale to Default*: expands the axis so as to display the variable with the best resolution possible.

Extracting a subset of data

By pressing the *Extract File* button you can create a file containing a subset of the data contained in the open file, for a separate analysis (the *Extract File* command is also available by clicking with the right mouse button on the file selected in the main software window).

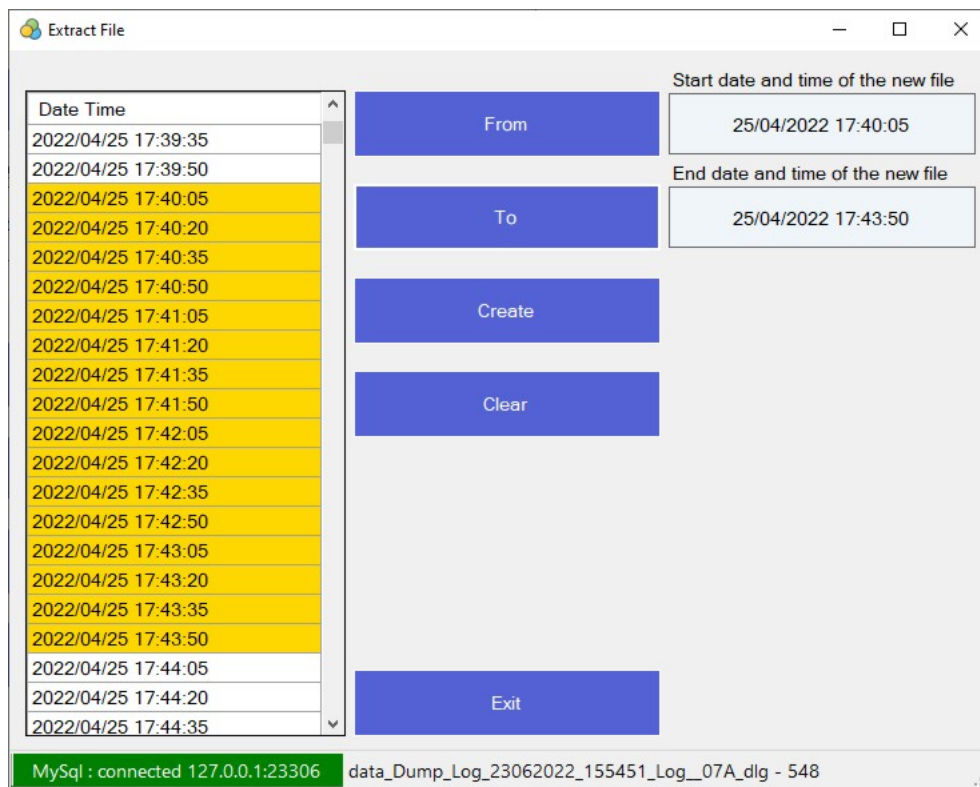
Date Time
2022/04/25 17:38:05
2022/04/25 17:38:20
2022/04/25 17:38:35
2022/04/25 17:38:50
2022/04/25 17:39:05
2022/04/25 17:39:20
2022/04/25 17:39:35
2022/04/25 17:39:50
2022/04/25 17:40:05
2022/04/25 17:40:20
2022/04/25 17:40:35
2022/04/25 17:40:50
2022/04/25 17:41:05
2022/04/25 17:41:20
2022/04/25 17:41:35
2022/04/25 17:41:50
2022/04/25 17:42:05
2022/04/25 17:42:20
2022/04/25 17:42:35
2022/04/25 17:42:50
2022/04/25 17:43:05

Start date and time of the new file

End date and time of the new file

MySQL : connected 127.0.0.1:23306 data_Dump_Log_23062022_155451_Log_07A_dlg - 548

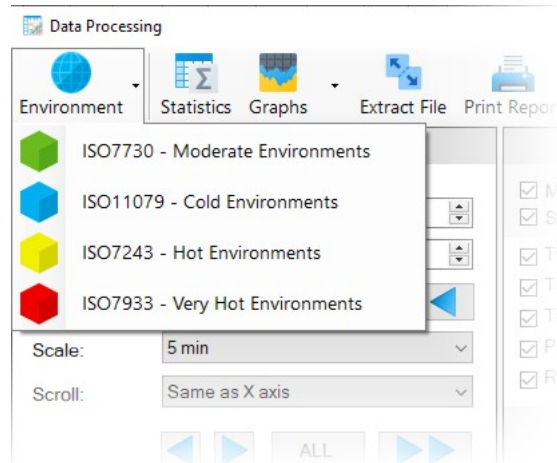
Select the initial sample of the subset to be extracted and press the *From* button. Select the final sample of the subset to be extracted and press the *To* button. The subset of data is highlighted. Press the *Create* button to save the file with the subset of data highlighted.



To cancel the selection, press the *Clear* button.

Microclimatic indices

By pressing the *Environment* button in the downloaded data view window (opened with *Explore*), the **Moderate Environments**, **Cold Environments**, **Hot Environments**, and **Very Hot Environments** calculation options are available, which allow to obtain, based on the data acquired by the instrument and the worker activities and clothing settings, a detailed report on the state of thermal well-being or thermal stress.



By choosing a calculation option, the window for defining the worker activities and clothing opens.

Worker parameters

Worker parameters

To continue, the activity and clothing of the worker under examination need to be defined

New

Enter new values

Load

Enter saved values

Load

Enter values from the file

Continue

Continue using displayed values

Clothing

0,50 = Coveralls work

0,5
clo

Metabolism

preparing a runner

5,85
met

Efficiency %

5

Exit

Press the button:

- *New*, for defining a new profile of **worker activities and clothing**.
- *Load - Enter saved values*, for importing a previously saved profile file.
- *Load - Enter values from the file*, for importing the CLO and MET values stores in the logged data file (this button is enabled only in HD32.2, HD32.3 and HD32.3TC; the button is disabled in HD32.1).
- *Continue*, for calculating the microclimatic indices with the profile displayed.

To return to the downloaded data view window without continuing with the calculation of the microclimatic indices, press *Exit*.

Moderate Environments

The **PMV** (Predicted Mean Vote) and **PPD** (Percentage of Dissatisfied) indices are calculated according to the **ISO 7730** standard.

Environmental data captured			Parameters obtained from calculation of the PMV		Value	Unit
T2 (°C)	Dry bulb	0	Fcl clothing coefficient correction		1,1	
	Globe temperature	0	Hfc convection heat transfer coefficient		0	W/m²
	Mean radiant temperature	0	Tcl clothing surface temperature		19,32	°C
Va (m/s)	Air speed	0	HL1 heat loss by diffusion through the skin		9,54	W/m²
RH (%)	Relative humidity	56,87	HL2 heat loss by sweating		111,31	W/m²
			HL3 latent heat loss by respiration		31,93	W/m²
			HL4 sensible heat loss by respiration		16,19	W/m²
			HL5 heat loss by radiation		-11,54	W/m²
			HL6 heat loss by convection		106,07	W/m²
			Pa Partial water-vapour pressure		0,346	kPa

Worker Parameters		
Icl (clo)	Thermal resistance	0,5
M (W/m²)	Metabolic Heat Production	340,1775
W (%)	Efficiency	5
Clothes description		
0,50 = Coveralls work		
Activity description		
preparing a runner		

PMV - PPD Comfort Indices

PMV **1,67** PPD **60,18**

Thermal Sensation:

hot

PMV and PPD are also displayed graphically (the vertical axis of the graph, corresponding to PPD, is on a logarithmic scale). A right click on the graph opens a menu allowing to copy the graph to the clipboard, save it as an image and print it.

The *Thermal Sensation* is indicated, which can assume the following values: very cold, cold, lightly cold, neutral, lightly hot, hot and very hot.

By pressing the *Report* button, a [report](#) in PDF format can be generated.

Cold Environments

The **IREQ** (thermal insulation of the required clothing), **Iclr** (thermal insulation of clothing), **Dlim** (Limit Exposure Time), **RT** (Recovery Time) and **WCI** (Wind Chill Temperature) indices are calculated according to the **ISO 11079** standard.

Cold stress indices(IREQ, DLE, RT, WCI) calculation EN ISO 11079:2001 Standard

Environmental data captured		
Ta (°C)	Dry bulb	24,53
Tg (°C)	Globe temperature	24,45
Tr (°C)	Mean radiant temperature	24,43
Va (m/s)	Air speed	0
RH (%)	Relative humidity	46,03
WCI (°C)	Wind Chill Index	0

Worker Parameters		
Icl (clo)	Thermal resistance	0,5
M (W/m²)	Metabolic Heat Production	340,1775

Clothes description

0,50 = Tute lavoro

Activity description

preparare il canale di colata

Calculated values IREQ, DLE, RT

Calculation of Required Insulation, IREQ and Duration Limited Exposure, Dlim

Calculation of required recovery time, RT

Calculation of Required Insulation, IREQ and Duration Limited			
		Minimum	Nei
Thermal insulation of the required clothing	IREQ	-0,4	-0,4
Thermal insulation of clothing	Iclr	-0,5	-0,5
Limit Exposure Time	Dlim	> 8	>

PDF

Report

By pressing the *Report* button, a [report](#) in PDF format can be generated.

Hot Environments

The **WBGT**, **WBGTeff** and **WBGT Limit** indices are calculated according to the **ISO 7243** standard.

Environmental data captured		
Ta (°C)	Dry bulb	24,9
Tg (°C)	Globe temperature	24,68
Tw (°C)	Natural wet temperature	17,83
WBGT(i) (°C)	WBGT-indoor	19,89
WBGT(o) (°C)	WBGT-outdoor	19,93

Body mass	W	75	Kg
Height	H	1,8	m

Thermal resistance	lcl	0.5	clo
Metabolic Heat Production	M	340.1775	W/m ²
Metabolism	M	659.22	W

0.50 = Coveralls work

```
preparing a runner
```

Work clothes

- Work clothes made from a woven fabric is the reference ensemble

0 °C-WBGT

☒ People acclimatized to heat

☐ Dead Air

☐ Indoor and outdoor without solar radiation

WBGT	19,9	C
WBGT _{eff}	19,9	C
WBGT limite	24,3	C



By pressing the *Report* button, a **report** in PDF format can be generated.

The **Tre** (Expected Rectal Temperature), **WL** (Water Loss), **DLimTre** (Maximum Exposure Time Allowed for Thermal Accumulation), **DLimLoss50** (Maximum Exposure Time Allowed for Water Loss, Average Person) and **DLimLoss95** (Maximum Exposure Time Allowed for Water Loss, 95% of the Working Population) thermal stress indices are calculated according to the **ISO 7933** standard.

Very Hot Environments

—
□
×

Thermal Stress Parameters EN ISO 7933:2005 Standard

Environmental data captured		
Ta (°C)	Dry bulb	24,9
Tg (°C)	Globe temperature	24,68
Tr (°C)	Mean radiant temperature	24,58
Va (m/s)	Air speed	0
RH (%)	Relative humidity	49,68

Worker Parameters		
Icl (clo)	Thermal resistance	0,5
M (W/m²)	Metabolic Heat Production	340,1775
Clothes description		
0.50 = Coveralls work		
Activity description		
preparing a runner		

Enter parameters of the worker under examination

To change the value of a parameter double-click on the corresponding line

Quantity	Value	Unit
Body mass	75	kg
Height	1,8	m
Duration	480	min
Mechanical flow	0	W/m²
Static Vapour Permeability Index	0,38	
Speed of the person	1	m/s
Angle between direction of movement and wind direction	0	°
Acclimatization Percentage	100	%
Posture	Seated	
Emissivity of reflective clothing	0,42	
Can the person drink freely?	Yes	
Is the person walking?	Yes	
Is there a defined direction of walk?	Yes	
Fraction of body surface covered by reflective clothing	0	

Thermal Stress Parameters		
Tre	38,3	C
WL	4570	g
DLimTre	24	min
DLimLoss50	480	min
DLimLoss95	396	min

Save
 Report
 Exit

In order to change a parameter value in the table at the bottom left, double click on the row to be modified, enter the new value and confirm with *Apply*.

Data

Quantity	Value	Unit
Body mass	75	kg

Apply
 Exit

The *Save* button allows saving the current calculation in a file.

By pressing the *Report* button, a [report](#) in PDF format can be generated.

Reports

By pressing the *Print Report* button in the downloaded data view window (opened with *Explore*) or the *Report* button in the [microclimatic indices calculation](#) windows, it is possible to generate a report in PDF format.

The window that opens consists of the following Report setting sections:

Cover page: allows entering the textual information to appear on the first page of the report.

Address book: registry of the customers and authors of the measurements. This section is present only if the report is generated from the microclimatic indices calculation windows.

Measurements settings: allows including the statistical data in the report and choose whether to print the data in tabular and/or graphic form.

Report setup: allows setting the report header.

The *Load* and *Save* buttons allow you respectively to import a previously saved configuration and to save the current configuration.

In order to generate the PDF report, press *Execute*. The PDF report is saved in the [default working folder](#).

Address book

The address book collects the information of the customers and authors of the measurements. It allows selecting/deselecting the insertion of three pieces of information in the report:

- the entity to which the report is to be registered (it will appear on the first page of the report),
- the location of the survey,
- the author of the report.

Report setup

Cover page

Address book

Measurements settings

Report setup

Address book

☒ **Heading of the report:**

Company	Delta
Address	Via Marconi 5
City	Selvazzano Dentro
Province	PD
Country	Italy
Contact person	Mario Rossi
Tel. / Fax	0039-0498977150
E-mail	

☒ **Location of the survey**

Company	Delta
Address	Via Marconi 5
City	Selvazzano Dentro
Province	PD
Country	Italy
Contact person	Mario Bianchi
Tel. / Fax	0039-0498977150
E-mail	

☒ **Author of the report**

Company	Delta
Address	Via Marconi 5
City	Selvazzano Dentro
Province	PD
Country	Italy
Contact person	Mario Neri
Tel. / Fax	0039-0498977150
E-mail	

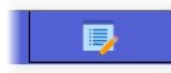
Load

Save

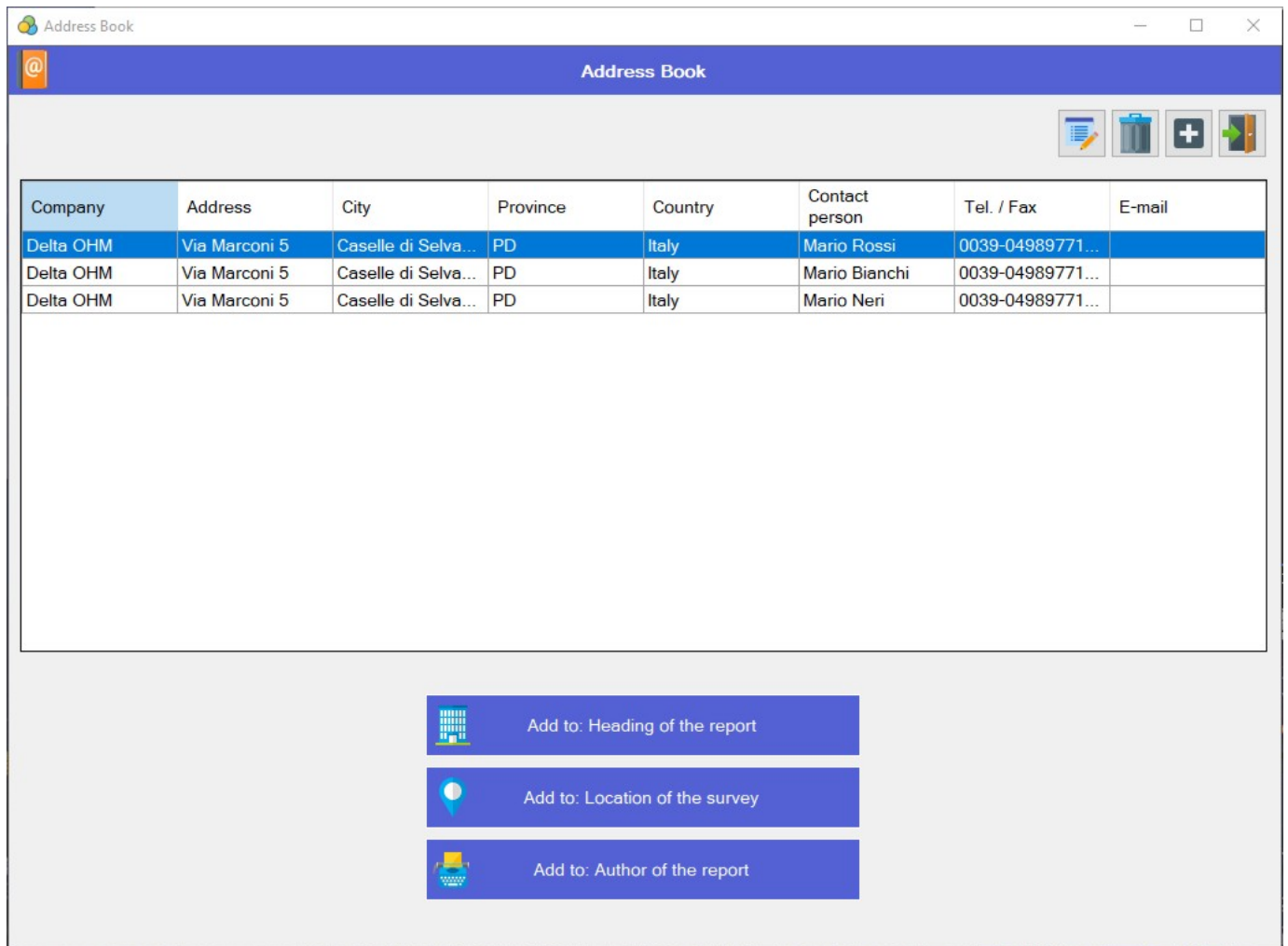
Execute

Exit

To select different names and edit/add names to the address book, press the button at the top right of the section header.



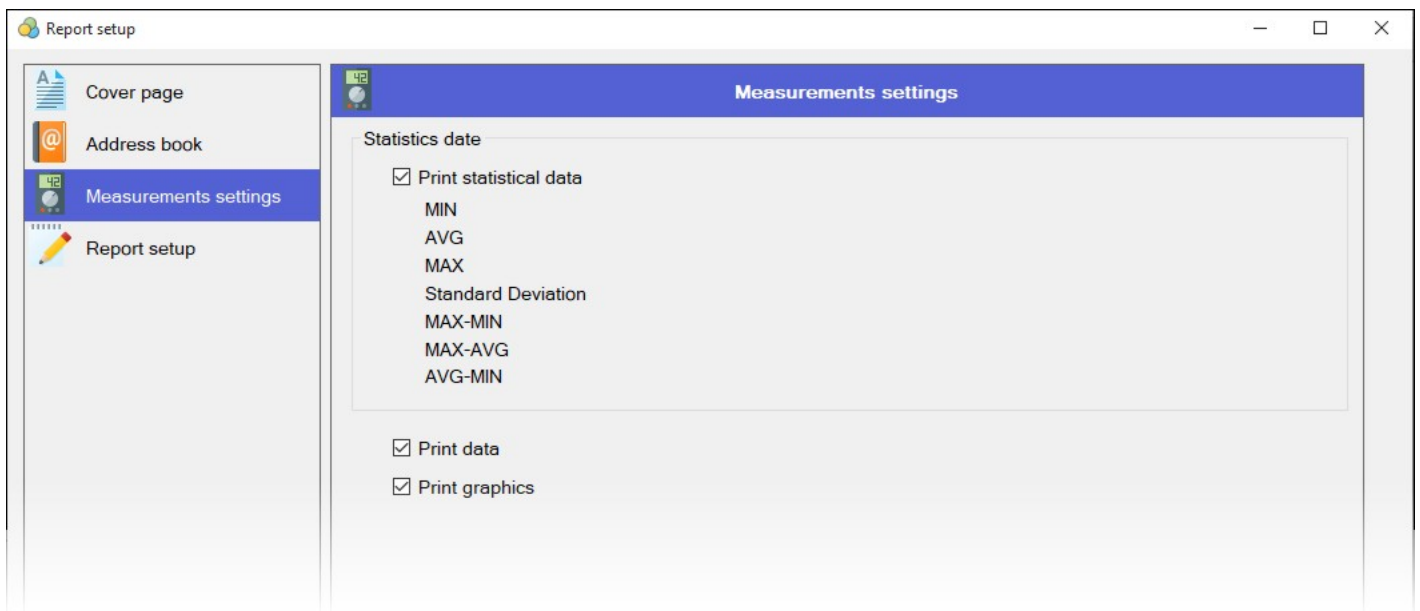
In the window with the list of names that opens, the buttons at the top right allow you to respectively modify the selected name, delete the selected name and add a name.



To enter a name in the report, select it in the list and then with the three buttons at the bottom of the window choose whether to add it as *Heading of the report*, *Location of the survey* or *Author of the report*. At the end, press *Exit* to return to the previous window.

Measurements settings

This section allows including the statistical data in the report and choose whether to print the data in tabular and/or graphic form.



Report setup

This section allows setting the report header. It is possible to add a logo (*Choose logo* button) in jpg, png or bmp format.

Report setup

Report setup

Logo

Choose logo

Print header

First header line
Cold Environments

Second header row
Calculate IREQ, WCI, DLE, RT indices

Third heading line
ISO 11079:2001

Print user credentials

☒ Username
MaRo

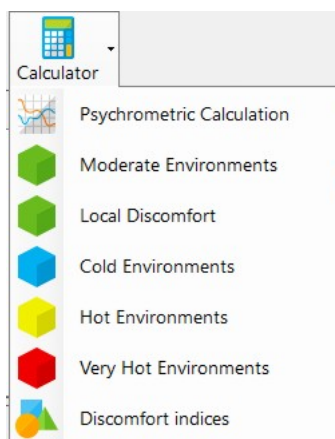
☒ User's first and last name
Mario Rossi

☒ Print cover page

☒ Print date and time

Calculator

The *Calculator* function allows execution of calculations and simulations on the psychrometric and microclimatic parameters. Press the *Calculator* button in the toolbar in the main software window and select the type of calculation or environment.



Calculator - Psychrometric Calculation

Calculator: Psychrometric Calculation

Open

Save

Print

Exit

Psychrometric Calculation

Atmospheric Pressure

900

1013,25

1200

hPa

Dry bulb temperature

-30

25

70

°C

Wet bulb temperature

-30

20

70

°C

Relative Humidity

0

63,5

100

%

Specific Humidity

13,6

g/kg

Enthalpy

32,281

kJ/kg

Dew point

17,6

°C

Vapour pressure

20,1

kPa

Saturated vapour pressure (dry bulb)

3,169

kPa

Saturated vapour pressure (wet bulb)

2,339

kPa

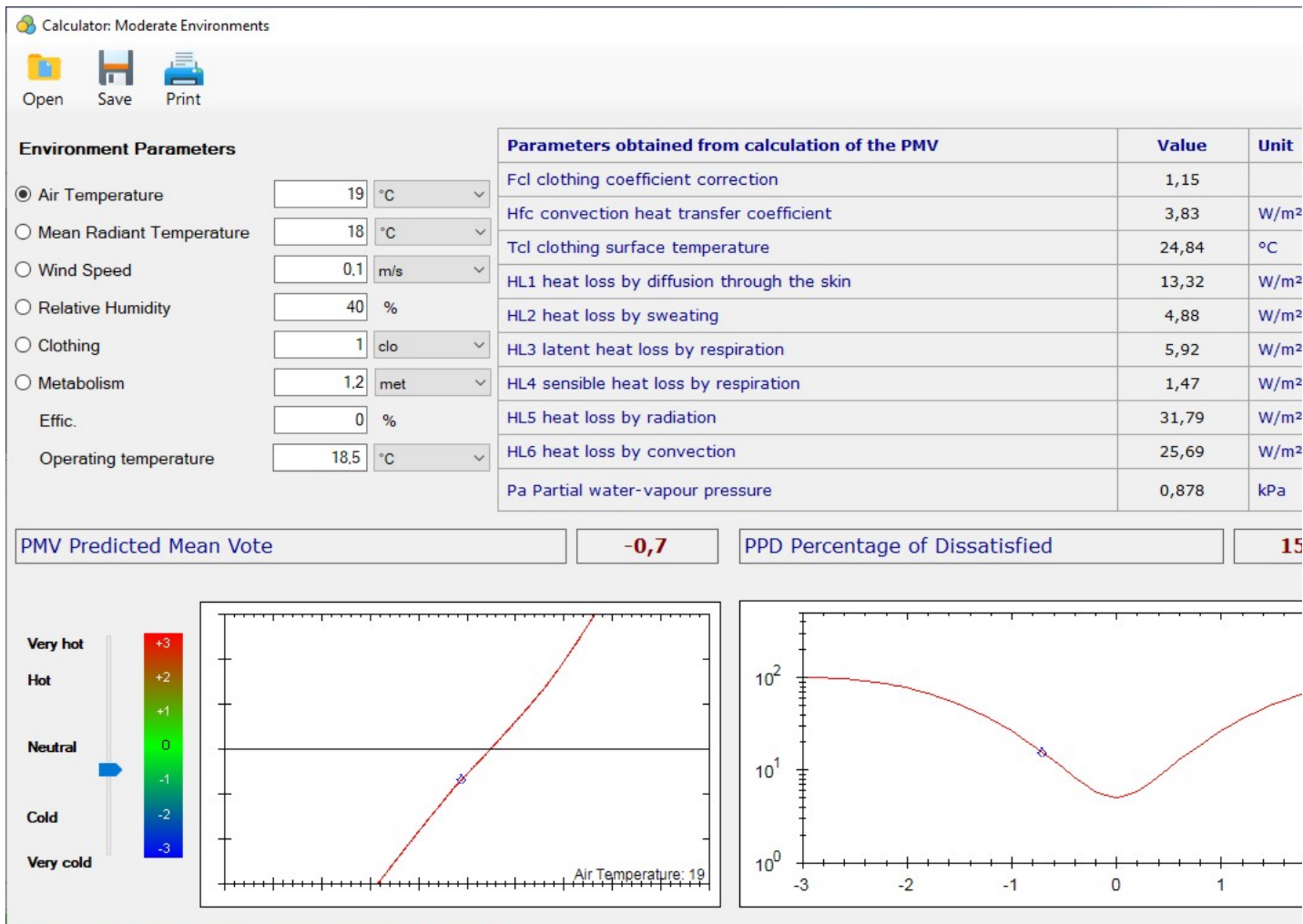
The parameters at the top can be set, the others are calculated according to the set values.

The *Save* button allows saving the current calculation in a file. The *Open* button allows opening a previously saved calculation file. The *Print* button allows printing the values of the parameters.

Calculator - Moderate Environments

This calculator is used for microclimatic calculation in moderate environments.

This is illustrated in the following picture:

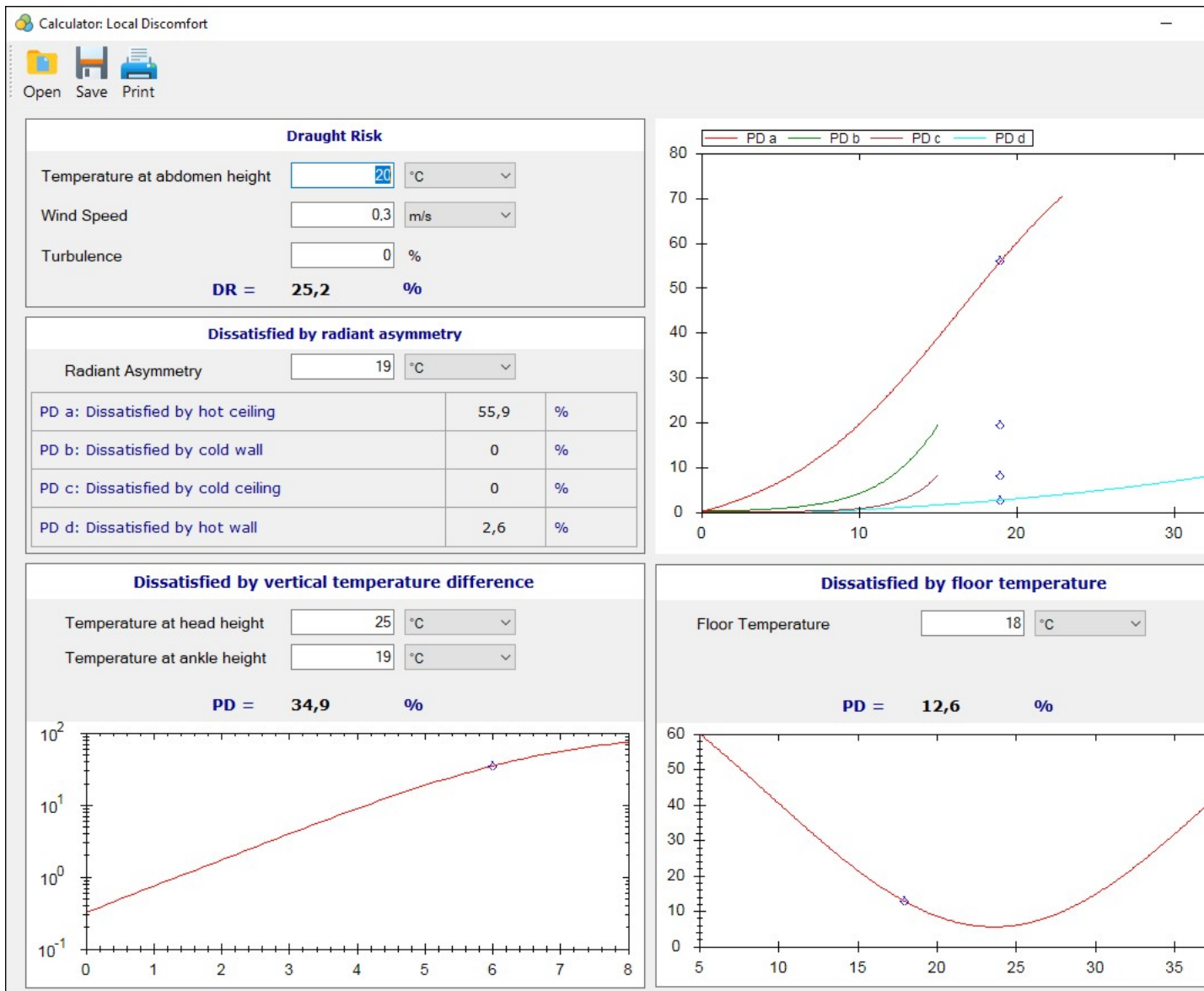


Based on the environmental parameters that can be set, the PMV (Predicted Mean Vote) and PPD (Percentage of Dissatisfied) indices are calculated.

PMV and PPD are also displayed graphically (the dot indicates the current index value). The PMV graph is a function of the selected environmental parameter. The graph display gives a clear indication of the weight of the selected parameter on the calculation of the PMV: if the curve associated to a certain parameter is "horizontal", it means that a variation, even large, of that parameter has a light effect on the PMV; on the contrary, a very steep curve (vertical) indicates that the parameter has a significant weight on the PMV. The Cursor on the left of the PMV graph allows modifying the selected environmental parameter; by moving the cursor in the range from -0.5 to +0.5, you can get the values of the environmental parameter that give an optimum microclimate.

The *Save* button allows saving the current calculation in a file. The *Open* button allows opening a previously saved calculation file. The *Print* button allows printing the values of the parameters.

Calculator - Local Discomfort



Based on the environmental parameters that can be set, the *Draught Risk* (DR) and various types of percentages of dissatisfied (PD) are calculated.

For the Draught Risk, the allowed limits of the parameters are the following:

- 20 °C < Air temperature at abdomen height < 26 °C
- Wind speed < 0.5 m/s
- 10% < Turbulence < 60% (if the turbulence is unknown, the norm recommends to use 40%)

The percentages of dissatisfied are also displayed graphically (the dot indicates the current value). The vertical axis of the percentage of *dissatisfied by vertical temperature difference* graph is on a logarithmic scale.

The *Save* button allows saving the current calculation in a file. The *Open* button allows opening a previously saved calculation file. The *Print* button allows printing the values of the parameters.

Calculator - Cold Environments

Calculator: Cold Environments

Open Save

IREQ, Dlim RT twc

Cattura finestra

Calculation of Required Insulation, IREQ and Duration Limited Exposure, Dlim

Dry Bulb Temperature: -50 30 °C

Average Radiation Temperature: -50 30 °C

Wind Speed: 0 50 m/s

Clothing: 0,5

Metabolism: 1

Relative Humidity: 0

		Minimum	Neutral	
Thermal insulation of the required clothing	IREQ	3,3	3,6	clo
Thermal insulation of clothing	Iclr	4	4,4	clo
Limit Exposure Time	Dlim	0,2	0,2	h

Calculate

Based on the parameters that can be set, the IREQ (thermal insulation of the required clothing), Iclr (Thermal insulation of clothing), Dlim (Limit Exposure Time), RT (Recovery Time) and WCI (Wind Chill Temperature) indices are calculated in various panels.

Calculator: Cold Environments

Open Save

IREQ, Dlim RT twc

Calculation of required recovery time, RT

Dry Bulb Temperature: -50 30 °C

Average Radiation Temperature: -50 30 °C

Wind Speed: 0 50 m/s

Clothing: 0,5

Metabolism: 1

Relative Humidity: 0

		Neutral	
Recovery Time	RT	1,7	h

Calculate

Calculator: Cold Environments

Open Save

IREQ, Dlim RT twc

Calculation of windchill temperature, twc

Dry Bulb Temperature: -50 30 °C

Wind Speed: 0 50 m/s

Wind Chill Temperature	twc	-31,6	°C
------------------------	-----	-------	----

Calculate

Press the *Calculate* button after setting the parameters to calculate the indices.

The *Save* button allows saving the current calculation in a file. The *Open* button allows opening a previously saved calculation file.

Calculator - Hot Environments

Calculator: Hot Environments

Open Save Print Exit

WBGT Heat Stress Index Calculation

	MIN		MAX	
Natural Ventilation Wet Bulb	-30	28	70	°C
Globe Thermometer Temperature	-30	30	70	°C
Dry Bulb Temperature	-30	35	70	°C
Body mass	15	75	150	Kg
Height	1	1.8	2,5	m
Metabolic Heat Production	1	1.5	10	met
Clothing Adjustment Value (CAV)	0	0	20	°C-WBGT

Person acclimatized to heat: ☒ yes ☐ no

Dead Air: ☒ yes ☐ no

Indoor and outdoor without solar radiation: ☒ yes ☐ no

Metabolism	169,031	Watt
WBGT Index	29,1	°C
Indice WBGTeff	29,1	°C
WBGT Limit Index	30	°C

Based on the parameters that can be set, the WBGT, WBGTeff and WBGT Limit indices are calculated.

The *Save* button allows saving the current calculation in a file. The *Open* button allows opening a previously saved calculation file. The *Print* button allows printing the values of the parameters.

Calculator - Very hot Environments

Calculator: Very Hot Environments

Open Save Print

Thermal stress caused by heat (predicted heat strain) calculation

Dry Bulb Temperature: -30 70 °C Clothing: 0,3

Average Radiation Temperature: -30 100 °C Metabolism: 1

Partial vapour pressure: 0 32 kPa

Wind Speed: 0 5 m/s

Quantity	Value	Unit
Body mass	75	kg
Height	1,8	m
Duration	480	min
Mechanical flow	0	W/m ²
Static Vapour Permeability Index	0,38	
Speed of the person	1	m/s
Angle between direction of movement and wind direction	0	°
Acclimatization Percentage	100	%
Posture	Seated	
Emissivity of reflective clothing	0,42	
Can the person drink freely?	Yes	
Is the person walking?	Yes	
Is there a defined direction of walk?	Yes	
Fraction of body surface covered by reflective clothing	0	

Expected Rectal Temperature
Water Loss
Maximum Exposure Time Allowed for Thermal Accumulation
Maximum Exposure Time Allowed for Water Loss, Average Person
Maximum Exposure Time Allowed for Water Loss, 95% of the Working Population

Based on the parameters that can be set, the Predicted Heat Strain (PHS) is calculated.

In order to change a parameter value in the table at the bottom left, double click on the row to be modified, enter the new value and confirm with *Apply*.

Data

Quantity	Value	Unit
Body mass	75	kg

☒ Apply ☐ Exit

The *Save* button allows saving the current calculation in a file. The *Open* button allows opening a previously saved calculation file. The *Print* button allows printing the values of the parameters.

Note: in addition to the window above, a second window also opens that allows you to calculate the Predicted Heat Strain during several phases of an activity.

Calculator - Discomfort indices

Discomfort indices

Open Save Print Calculate

Tw Wet bulb temperature
19.0
°C

Ta Dry bulb temperature
19.0
°C

RH Relative humidity
100.0
%

Va Wind speed
0.1
m/s

Pa Atmospheric pressure
1013.25
hPa

The Equivalent Temperature Index is suitable to single out thermal comfort or discomfort conditions within a wide range of climatic conditions. The equivalent temperature corresponds to the temperature that an air mass, at constant pressure would assume if the water vapour contained in it would condensate and the latent condensation heat were used to increase its temperature. The equivalent temperature, therefore, is the actual air temperature increased by the latent condensation heat of all the water vapour contained in it. It is expressed in °C and constant in the humid adiabatic processes (ascending and descending air current of saturated air without heat exchange with the outside).

Scharlau Index
Thom Index
Thermohygrometric Index
Relative Strain Index
Heat Index
New Summer Simmer Index
Humidex Index
Equivalent Temperature Index

FLD - Day Light Factor

$$T_e = -0.0003 \cdot RH^2 + 0.1497 \cdot RH - 7.7133$$

$$-6^{\circ}\text{C} < T_e < 5^{\circ}\text{C}$$

$$RH > 40\%$$

$$IS = T_e - T_a$$

$$T_e = -17.089 \cdot \ln(RH) + 94.979$$

$$17^{\circ}\text{C} < T_e < 39^{\circ}\text{C}$$

$$RH > 30\%$$

$$IS = T_e - T_a$$

Critical Temperature	Label7	°C
Scharlau Index	Label21	°C

Scharlau Index Class (IS)	Description
IS >= 0	Comfort
-1 < IS < 0	Light discomfort
-3 < IS <= -1	Medium discomfort
IS <= -3	Strong discomfort

Based on the parameters that can be set, various discomfort indices are calculated.

To select an index, click on the corresponding button. Press the *Calculate* button after setting the parameters to calculate the indices.

The *Save* button allows saving the current calculation in a file. The *Open* button allows opening a previously saved calculation file. The *Print* button allows printing the values of the parameters.

Monitor

The **Monitor** function displays the measurements registered by the instrument in real time. The displayed data and the reading frequency have to be selected before starting the *Monitor* function.

Note: the Monitor function is not available for HD32.3TC.

Connect the instrument and press the *Monitor* button in the toolbar (or select the menu item *File >> Monitor*). The window for setting the rate with which the data detected by the instrument are displayed opens: select the interval and confirm with *Apply*.

Monitor

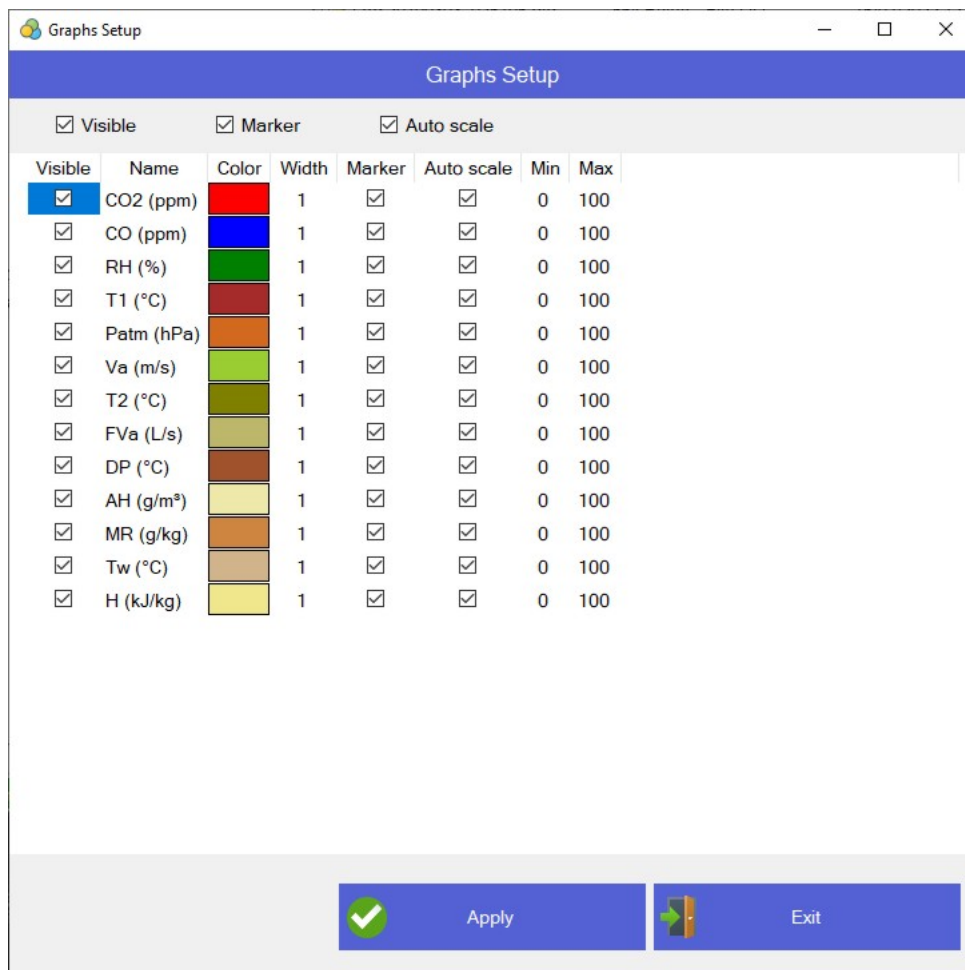
Select acquisition frequency

2 sec

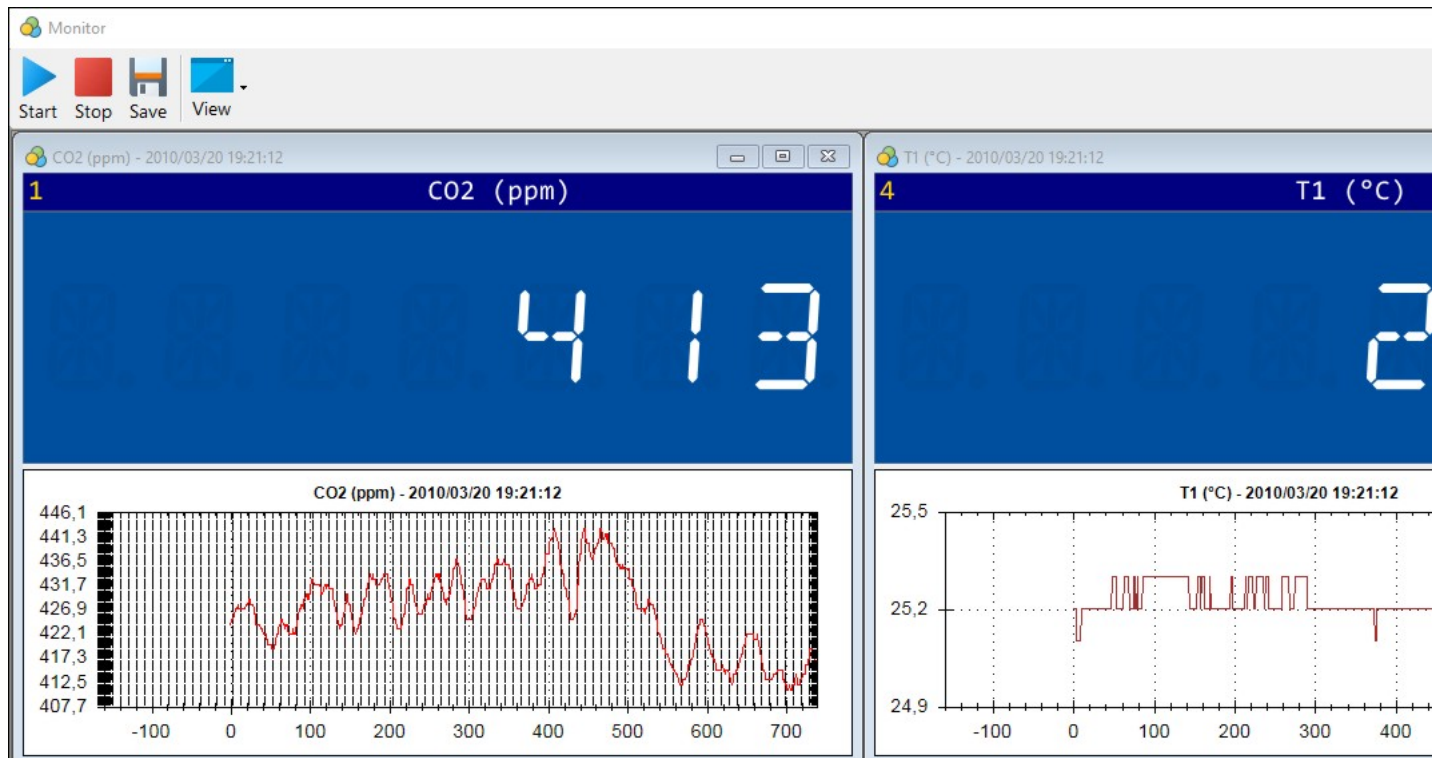
✓
Apply

Exit

In the following window, select the parameters you wish to display. It is possible to set the color and the thickness of the line of each graph, to make a marker appear or not in correspondence with the measurement acquisition instants and to set the minimum and maximum values of the ordinate axis or the automatic scale (*Auto scale* option). Press *Apply* to start the monitor.



In the window that opens, using the menu items *View >> View data* and *View >> View graphs* it is possible to choose whether to view only the current measurement, only the graph (of the last 900 measured samples, the horizontal axis shows the number of samples) or both. Still using the *View* menu, the measurement windows can be arranged tiled horizontally, vertically or in cascade.



The *Start/Stop* buttons start and stop the Monitor function.

The *Save* button stores the data acquired with the Monitor function in a file (you must first stop the Monitor function with the Stop button).

A right click on a graph opens a menu containing the following commands:

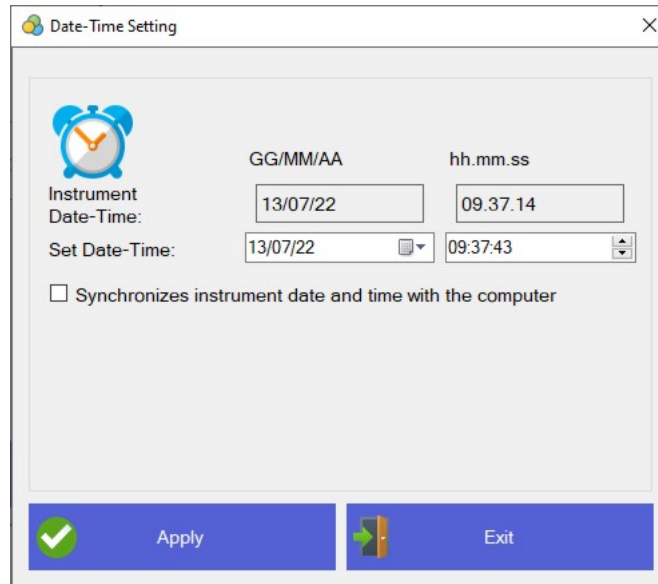
- *Copy*: copies the current graph to the clipboard.
- *Save Image As...*: saves the current graph as an image file. A window will open allowing to choose the file position and format (emf, png, gif, jpg, tif, bmp).
- *Page Setup...*: allows setting up the page for printing the graph.
- *Print...*: opens the window for printing the current graph.
- *Show Point Values*: enables the display of the labels showing the sample number and the value of the variable when the mouse is on the graph line.

- *Un-Zoom*: cancels the last zoom performed on the graph.
- *Undo All Zoom/Pan*: cancels all zooms performed and restores the initial view.
- *Set Scale to Default*: expands the axis so as to display the variable with the best resolution possible.

To close the Monitor window, press the *Exit* button (you must first stop the Monitor function with the Stop button).

Clock setup

To set the instrument date and time (except HD32.3TC), **connect** the instrument and press the *Clock Setup* button in the toolbar (or select the menu item *Tools >> Clock Setup*).



The **Date-Time Setting** dialog box contains the following elements:

- Instrument Date-Time:** A label with a clock icon, followed by two input fields. The first field is labeled "GG/MM/AA" and contains "13/07/22". The second field is labeled "hh.mm.ss" and contains "09.37.14".
- Set Date-Time:** A label followed by two input fields. The first field contains "13/07/22" with a calendar icon to its right. The second field contains "09:37:43" with a time selection icon to its right.
- Synchronization:** A checkbox labeled "Synchronizes instrument date and time with the computer".
- Buttons:** At the bottom, there are two buttons: "Apply" (with a green checkmark icon) and "Exit" (with a green arrow icon).

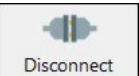
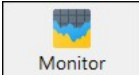
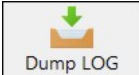
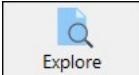
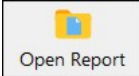
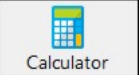
The *Instrument Date-Time* is the date and time that was read on the instrument when the *Watch Setup* button was pressed. The two *Set Date-Time* boxes allow editing the instrument date/time: the update occurs when the *Apply* button is pressed.

By selecting the option *Synchronize instrument date and time with the computer*, the instrument date and time are synchronized with the PC when the *Apply* button is pressed.

Software language

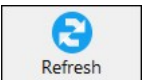
In order to modify the software language, select the menu item *Help >> Language*, then select the appropriate language.

Toolbar

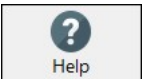
	Connect Connects the instrument to the software (available only if the instrument is not connected).
	Disconnect Disconnects the instrument from the software (available only if the instrument is connected).
	Monitor Acquisition of the instrument measures in real time on PC.
	Dump LOG Transfer of the data stored in the instrument to the PC.
	Explore Visualization and processing of the downloaded data.
	Open Report Allows opening a report in "rpt" format saved with previous versions of the software.
	Worker Configuration of the worker activity and clothing.
	Calculator Execution of calculations and simulations.

**Clock Setup**

Setting of the instrument date and time.

**Refresh**

Updates the displayed folder and file lists.

**Help**

Opens the software online manual.

**Exit**

Closes the software.

Menu

File >> Monitor: Acquisition of the instrument measures in real time on PC.

File >> Dump LOG: transfer of the data stored in the instrument to the PC.

File >> Explore: Visualization and processing of the downloaded data.

File >> Open Report: allows opening a report in "rpt" format saved with previous versions of the software.

File >> Exit: closes the software.

Connection >> Connect: connects the instrument to the software (available only if the instrument is not connected).

Connection >> Disconnect: disconnects the instrument from the software (available only if the instrument is connected).

Connection >> Serial Settings: setting of the COM port to which the instrument is connected and of the Baud Rate (the menu item is disabled for HD32.3TC).

Connection >> Database setup: database connection settings.

Connessione >> Select Device: selection of the type of instrument to be connected.

Settings >> Worker: configuration of the worker activity and clothing.

Settings >> Predefined folder: allows changing the default working folder

Tools >> Calculator: execution of calculations and simulations.

Tools >> Clock Setup: setting of the instrument date and time.

Tools >> Refresh: updates the displayed folder and file lists.

Tools >> Instrument info: opens the window with the properties of the connected instrument (the menu item is disabled if the instrument is not connected).

Tools >> Firmware update: updating of the firmware of the instrument.

View >> Toolbar: enables/disables the toolbar.

View >> Status Bar: enables/disables the status bar.

View >> Tree View: enables/disables the folder window.

Help >> DeltaLog10 Manual: opens the software online manual.

Help >> DeltaLog10 License: opens the end user license agreement.

Help >> Language: selection of the software language.

Help >> About...: information on the software version.

Instrument firmware update

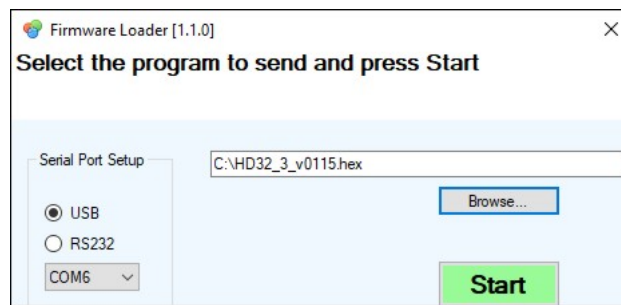
Note: the firmware of the instrument HD32.3TC cannot be updated through the DeltaLog10 software.

During the firmware update it is advisable to connect the instrument to the external power supply.

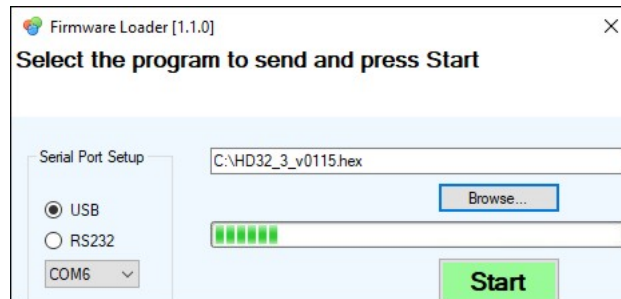
Procedure:

1. **Connect** the instrument and select the menu item *Tools >> Firmware update*: the program "Firmware Loader" that handle the entire updating procedure will start.

2. Press *Browse...* and select the updating file with HEX extension.



6. Press *START* and wait for the update to complete. At the end, the message "Uploading executed correctly" will appear: wait about 20 seconds until the instrument switches itself on automatically and the "Firmware Loader" program closes automatically.



Note: during the update, the display could turn off: in this case, the instrument will automatically turn on at the end of the process.