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HD37AB1347

IAQ MONITOR

ENGLISH

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HD37AB1347 Indoor Air Quality Monitor



HD37AB1347

1. **Indoor Air Quality** input for the **SICRAM** probes:
 - P37AB147: It measures CO₂ Carbon Dioxide, CO Carbon Monoxide, Relative Humidity RH, Temperature T, and Atmospheric Pressure Patm.
 - P37B147: It measures CO Carbon Monoxide, Relative Humidity RH, Temperature T, and Atmospheric Pressure Patm.
 - **Humidity** and **Temperature** combined probes.
 - **Temperature** probes with **Pt100** sensor.
2. Power supply input.
3. Backlit graphic display.
4. **ESC** key: It allows to exit from the menu or, in case of a submenu, to exit from the current level display.
5. Navigation key **▲**: It allows navigation through the menus. During normal operation, it is used to select the resetting of the statistical data and to scroll the displayed quantities upwards.
6. Navigation key **◀/Func**: It allows navigation through the menus. In normal view, it allows to display the statistical data: maximum, minimum, and average.
7. **MEM** key: It allows to start and end the recording of data (logging).
8. Navigation key **▼**: It allows navigation through the menus. During normal operation, it is used to cancel the resetting of the statistical data and to scroll the displayed quantities downwards.
9. **MENU** key: It allows to enter and exit the instrument's functioning parameter setting menu.
10. Navigation key **▶/ Unit**: It allows navigation through the menus. During normal operation, it changes the unit of measurement of the displayed main quantity.
11. **ENTER** key: In the menu, it confirms the data entered. In normal view, it allows to reset the statistical data and to print them on the HD40.1 printer.
12. **ON/OFF-Auto Off** key: It turns the instrument on and off. When pressed together with the **ESC** key, it disables the automatic turn off.
13. **RS232** and **USB** serial port.
14. **Temp-Air Velocity** input (temperature and wind speed probes) for the **SICRAM** probes:
 - **Hot-Wire Sensor Wind Speed** probes.
 - **Vane Wind Speed** probes.
 - **Temperature** probes with **Pt100** sensor.

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1. GENERAL CHARACTERISTICS

The **HD37AB1347 IAQ Monitor** is an instrument manufactured by **Delta Ohm** for the analysis of indoor air quality (IAQ, Indoor Air Quality).

The instrument simultaneously measures the following parameters, using the **P37AB147 SICRAM** probe: **CO₂ Carbon Dioxide**, **CO Carbon Monoxide**, **Temperature**, **Relative Humidity**, it calculates **Dew Point**, **Wet Bulb Temperature**, **Absolute Humidity**, **Mixing Ratio**, **Enthalpy** and **Atmospheric Pressure**. The **P37B147 SICRAM** probe does not measure CO Carbon Monoxide. You can also connect **Temperature** and **Humidity** SICRAM combined probes, **Hot-Wire Sensor** **Wind Speed** SICRAM probes, **Vane Wind Speed** SICRAM probes, and **Temperature** SICRAM probes **with Pt100 sensor**, to the instrument.

The instrument, using a proper procedure, calculates the percentage of external air input (**% Outside Air**) according to CO₂ Carbon Dioxide, temperature, and **Ventilation Rate**.

The HD37AB1347 is a datalogger with a memory capacity of 67600 recordings per each of the two inputs, divided in 64 blocks. It uses the **DeltaLog10 software, version 0.1.5.0**.

Reference Standards: **ASHRAE 62.1**, **Legislative Decree 81/2008**. These regulations apply to all confined spaces that could be used by people. Kitchens, baths, changing rooms and swimming pools are included, due to their high humidity. You should take into account, in regard to air quality, possible chemical, physical and biological contaminants, or the input of non sufficiently purified external air (Ventilation Rate).

The instrument has a wide Dot Matrix graphic display with a resolution of 160x160 dots.

The instrument typical applications, using the above range of probes, are:

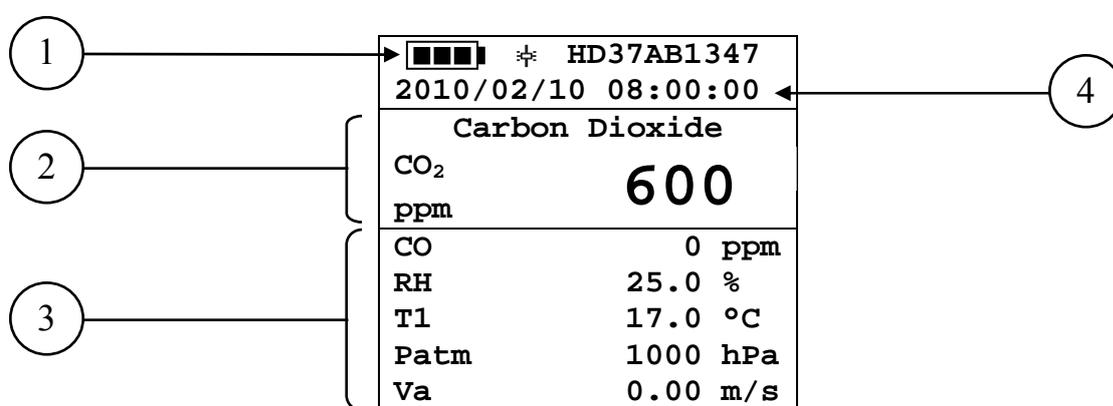
- Measurement of IAQ (*Indoor Air Quality*) and comfort conditions in schools, offices and indoor spaces.
- Analysis and study of the Sick Building Syndrome, and of the resulting consequences.
- Checking the HVAC (*Heating, Ventilation and Air Conditioning*) system efficiency.
- Examination of IAQ conditions in factories to optimize microclimate and improve productivity.
- Building Automation checks.

2. THE USER INTERFACE

The user interface consist of a **backlit LCD graphic display**, and the power-on and setting keys. When battery powered, and not pressing any key, the backlight turns off after about 1 minute. To turn it back on, press any key. When using an external power supply, the backlight is always on. Turn the instrument on and off with the **ON/OFF** key. When you turn the instrument on, the logo and model will be displayed for a few seconds, and then the main display.

The quantities detected by the instrument can be viewed with a larger character size, at the top of the display. The parameter displayed with a larger character size is called **main quantity**. In order to select the parameter to be displayed as **main quantity**, use the **▲▼** keys. For some quantities, you can select the unit of measurement; temperature can be displayed as °C or °F.

2.1 THE DISPLAY



1. **Battery's charge status** and **instrument code**. In case the **logging** function is on, this line shows the current logging number and the time elapsed from logging start.
2. **Main quantity** (in this case, CO₂ Carbon Dioxide).
3. Display of **all other quantities**.
4. **Current date and time**.

The **detected and computed quantities** are:

CO₂	Carbon Dioxide	ppm
CO	Carbon Monoxide	ppm
RH	Relative Humidity	%
T1	Temperature detected by the probe connected to input 1	°C – °F
Patm	Atmospheric Pressure	hPa
Va	Wind Speed	m/s – km/h – ft/min – mph – knot
FVa	Flow Rate	L/s – m ³ /h – m ³ /min – m ³ /h – ft ³ /s ft ³ /min
T2	Temperature detected by the probe connected to input 2	°C – °F
Td	Dew Point	°C – °F
Tw	Wet Bulb Temperature	°C – °F
AH	Absolute Humidity	g/m ³
r	Mixing Ratio	g/kg
H	Enthalpy	kJ/kg

2.2 THE KEYBOARD

The keys on the instrument perform the following functions:



ON-OFF/AUTO-OFF key

It turns the instrument on and off.

When turning the instrument on, the first screen will be displayed. After few seconds the measured quantities will be displayed.



+



Auto Power Off

The instrument has an *AutoPowerOff* function that automatically turns the instrument off after about 8 minutes if no key is pressed during the intervening time. The *AutoPowerOff* function can be disabled by holding the ESC key pressed down when turning the instrument on: the ⚡ symbol will appear on the first line to remind the user that the instrument can only be turned off by pressing the **ON/OFF** key.

The *AutoPowerOff* function is disabled when:

- External power is used.
- During data download.
- During logging.



MENU key

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



ENTER key

In the menu, it confirms the entered data.

During normal operation:

- It confirms the resetting of the statistical data.
- It prints the current data on the HD40.1 printer.



ESC key

It allows to exit from the menu or, in case of a submenu, to exit from the current level display.



MEM key

It allows to start and end a “logging” session; the data sending interval must be set in the menu.



Key ◀/FUNC

◀ allows navigation through the menus.

FUNC: In normal view, it allows to select the statistical data: maximum, minimum, and average.



Key ▲

It allows navigation through the menus. During normal operation, it is used to select the resetting of the statistical data and to scroll the displayed quantities.



Key ▼

It allows navigation through the menus. During normal operation, it is used to cancel the resetting of the statistical data and to scroll the displayed quantities.



Key ▶/UNIT

It allows navigation through the menus. During normal operation, it changes the unit of measurement of the **main quantity**:

If the **main quantity** is Relative Humidity, by repeatedly pressing the UNIT key you can display the following quantities:

RH	Relative Humidity (%)
Td	Dew Point (°C - °F)
AH	Absolute Humidity (g/m ³)
r	Mixing Ratio (g/kg)
Tw	Wet Bulb Temperature (°C - °F)
H	Enthalpy (kJ/kg)

If the **main quantity** is Temperature, by repeatedly pressing the UNIT key you can display the temperature in °C (Celsius degrees) or °F (Fahrenheit degrees).

If the **main quantity** is Wind Speed, by repeatedly pressing the UNIT key you can display the Wind Speed in m/s – km/h – ft/min – mph – knot.

If the **main quantity** is Flow Rate, by repeatedly pressing the UNIT key you can display the Flow Rate in L/s – m³/s – m³/min – m³/h – ft³/s – ft³/min.

3. OPERATION

Before turning the instrument on, connect the SICRAM probes to the inputs: 8-pole male DIN 45326 connectors, located in the upper part of the instrument.

You can connect the following probes to the inputs:

Input 1 **Indoor Air Quality** for the **SICRAM** probes:

- P37AB147: It measures CO₂ Carbon Dioxide, CO Carbon Monoxide, Relative Humidity RH, Temperature T, and Atmospheric Pressure Patm.
- P37B147: It measures CO Carbon Monoxide, Relative Humidity RH, Temperature T, and Atmospheric Pressure Patm.
- **Humidity and Temperature** combined probes.
- **Temperature** probes with **Pt100** sensor.

Input 2 **Temp-Air Velocity** for the **SICRAM** probes:

- **Hot-Wire Sensor Wind Speed** probes.
- **Vane Wind Speed** probes.
- **Temperature** probes with **Pt100** sensor.

NOTE: Connect the probes when the instrument is off. If a new probe is connected and the instrument is on, it won't be detected. You need to turn the instrument off and on.

NOTE: If you connect two temperature probes with Pt100 sensor to the two inputs, only the Indoor Air Quality input probe will be detected. The Temp – Air Velocity input probe will be ignored.

If a probe is disconnected when the instrument is on, you will get an acoustic signal (one beep per second) and an indication on the display relevant to the physical quantity being disconnected. The **LOST** message will be displayed.

During turning on, the following message is displayed for about 10 seconds:



In addition to the **Delta Ohm** logo the **instrument code** and the **firmware version** are displayed.

Connect the probes. Turn on the instrument: after about 10 seconds, the measurements will appear on the display:

■■■■		HD37AB1347
2010/02/10 08:00:00		
Carbon Dioxide		
CO ₂	600	
ppm		
CO	0 ppm	
RH	25.0 %	
T1	17.0 °C	
Patm	1000 hPa	
Va	0.00 m/s	

- CO₂:** Carbon Dioxide
- CO:** Carbon Monoxide
- RH:** Relative Humidity
- T1:** Temperature detected by the probe connected to input 1
- Patm:** Atmospheric Pressure
- Va:** Wind Speed

3.1.1 “▶/UNIT” key for the unit of measurement

It allows navigation through the menus. During normal operation, it changes the unit of measurement of the **main quantity**:

If the **main quantity** is Relative Humidity, by repeatedly pressing the UNIT key you can display the following quantities:

RH	Relative Humidity (%)
Td	Dew Point (°C - °F)
AH	Absolute Humidity (g/m ³)
r	Mixing Ratio (g/kg)
Tw	Wet Bulb Temperature (°C - °F)
H	Enthalpy (kJ/kg)

If the **main quantity** is Temperature, by repeatedly pressing the UNIT key you can display the temperature in °C (Celsius degrees) or °F (Fahrenheit degrees).

If the **main quantity** is Wind Speed, by repeatedly pressing the UNIT key you can display the Wind Speed in m/s – km/h – ft/min – mph – knot.

If the **main quantity** is Flow Rate, by repeatedly pressing the UNIT key you can display the Flow Rate in L/s – m³/s – m³/min – m³/h – ft³/s – ft³/min.

3.1.2 Immediate printing of data

By pressing **Enter**, you can print the current data on the **HD40.1** printer.

Example of an immediate printout obtained using the HD40.1 printer

	<i>NOTES</i>
===== Model HD37AB1347 Indoor Air Quality =====	Instrument model
Firm.Ver.=01.00 Firm.Date=2010/01/15 SN=12345678 User ID=0000000000000000 -----	Instrument firmware version Instrument firmware date Instrument serial number Identification Code
Probe Ch.1 description Type: CO2-C0 Fw.V0R0 Data cal.:2010/01/15 Serial N.:10010060 -----	Description of the probe connected to input 1
Probe Ch.2 description Type: Hot wire Data cal.:2010/01/15 Serial N.: 10010100 -----	Description of the probe connected to input 2
===== Date=2010/01/15 15:00:00	Date and time
CO2 850 ppm	Carbon Dioxide
C0 0 ppm	Carbon Monoxide
RH 29.2 %	Relative Humidity
T1 22.7 °C	Temperature detected at input 1
Patm 1010 hPa	Atmospheric Pressure
Va 0.00 m/s	Wind Speed
T2 22.0 °C	Temperature detected at input 2
FVa 0.0 l/s	Flow Rate
DP 3.8 °C	Dew Point
AH 5.9 g/m3	Absolute Humidity
MR 5.0 g/kg	Mixing Ratio
TW 12.8 °C	Wet Bulb Temperature
H 35.5 kJ/kg =====	Enthalpy

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

By pressing the ◀/FUNC key you can display the maximum, minimum and average values of the measured quantities.

To reset the statistical data press the ◀/FUNC key until the “Reset? Yes No” message appears. Select Yes using the ▲ ▼ keys, and confirm with ENTER.

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

3.1.4 Instrument Setup

In order to set the instrument, you have to open the main menu by pressing **MENU**. See chapter 4 for further details.

3.1.5 Start of a new logging session

Press **MEM** to start 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 Frequency**" menu parameter. The data logged between a start and subsequent stop represent a measurement block.

When the logging function is on, the **LOG** indication *and the logging session number* are displayed; 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 **AutoPowerOff** parameter. When the logging interval is less than 5 minutes, the logging instrument remains on; with an interval of at least 5 minutes, it turns off between one capture and the next.

4. MAIN MENU

To access the programming menu press **MENU**:

```
MAIN MENU

1) Informations
2) Logging
3) Serial
4) Settings
5) Air speed
6) Air Changes
7) Probes Calibration
8) Language
```

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 immediately from the main menu, press **MENU** again.

4.1 INFO MENU

Enter the main menu by pressing **MENU**. Using the **▲▼** arrows, select **Informations** and confirm with **ENTER**.

```
INFORMATIONS

1) Info Instrument
2) Info Probes
3) Time / Date

▲▼ select
<ESC> exit/cancel
<ENTER> confirm
```

By selecting **Info Instrument**, the following information on the instrument will be displayed: instrument code, firmware date and version, serial number, instrument calibration date, identification code.

```
INFO INSTRUMENT

Model HD37AB1347
Firm.Ver.=01.00
Firm.Date=2010/02/10
Ser. Number=10010000
Calib: 2010/02/10

ID: 0000000000000000
```

To change the **ID**, press **ENTER**. Use the ◀▶ arrows to select the item, and edit it with the ▲▼ arrows. Proceed with the other items, and finally confirm with **ENTER**.

By selecting **Info Probes**, the following information on the probes connected to the inputs will be displayed:

```
INFO PROBES
Input 1
Type= CO2-CO Fw.VOR0
Cal = 2010/02/10
SN  = 10010000

Input 2
Type= Hot wire
Cal = 2010/02/10
SN  = 10010001
```

INFO PROBES:

Description of the probe connected to input 1, Indoor Air Quality.
Calibration date of the probe connected to input 1, Indoor Air Quality.
Serial number of the probe connected to input 1, Indoor Air Quality.

Description of the probe connected to input 2, Temp – Air Velocity.
Calibration date of the probe connected to input 2, Temp – Air Velocity.
Serial number of the probe connected to input 2, Temp – Air Velocity.

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

Time/Date 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. Use the arrows ▲▼ to select **Time/Date**;
2. Press **ENTER**;
3. You will get the following message

```
TIME / DATE

year/mm/dd hh:mm
2010/02/10 08:00:00
set 00 seconds!

◀▶ select
▲▼ set
<ENTER> confirm
```

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

4.2 LOGGING MENU

Enter the main menu by pressing **MENU**;

- Use the arrows **▲▼** to select **Logging**;
- Press **ENTER**: The parameter setting submenu for the logging sessions (to be captured) will be displayed.

```

LOGGING MENU

1) Log frequency
2) Auto switch off
3) Start/Stop Log
4) Start Log Erase
5) Log File Manager

▲▼ select
<ENTER> confirm
    
```

4.2.1 Log Interval

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

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

```

LOGGING MENU
LOG FREQUENCY

Insert interval
of memorization
h:mm:ss (1h max)
0:00:15

▲▼ set
<ENTER> confirm
    
```

1. Use the arrows **▲▼** to select the interval duration from a minimum of 15 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 **MENU** to exit immediately from the menu.

These are the available values: 15 seconds - 30 seconds - 1 minute - 2 minutes - 5 minutes - 15 minutes - 20 minutes - 30 minutes - 1 hour

Logging interval	Storage capacity	Logging interval	Storage capacity
15 seconds	About 11 days and 17 hours	15 minutes	About 1 year and 339 days
30 seconds	About 23 days and 11 hours	20 minutes	About 2 years and 208 days
1 minute	About 46 days and 22 hours	30 minutes	About 3 years and 313 days
2 minutes	About 93 days and 21 hours	1 hour	About 7 years and 261 days
5 minutes	About 234 days and 17 hours		

4.2.2 *AutoPowerOff*– *AutoPowerOff Mode*

The *Auto switch off* 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 5 minutes, the instrument will always remain on.** With intervals greater than or equal to 5 minutes, it is possible to turn off the instrument between loggings: it will turn on one minute before sampling and will turn off immediately afterwards, thus increasing the battery life.

Once you have accessed the **LOGGING** submenu (previous paragraph) use the arrows ▲▼ to select *Auto switch off*. During configuration, the following is displayed:

- If the set **Log Interval** (see previous par.) is lower than 5 minutes, the following will be displayed

```
LOGGING MENU
AUTO SWITCH OFF
Logging frequency
setted < 5 min.
During log session
the instrument
will shut ON
between two samples
<ESC> exit/cancel
```

If the set **Log Interval** (see previous par.) is greater or equal to 5 minutes, the following will be displayed during configuration:

```
LOGGING MENU
AUTOPOWEROFF
Logging frequency
setted >= 5 min.
During log session
the instrument
will shut OFF
between two samples
▲▼ set
<ESC> exit/cancel
```

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

- ON** (the instrument stays on)
- OFF** (the instrument stays off)

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

4.2.3 Start/Stop Log – Automatic Start

The logging start and end can be programmed by entering the date and time.

Set the logging start date and time using the arrows. Confirm the logging start date and time using ENTER. Then you are asked to set the data to end the recording. Set the logging end date and time using the arrows. Confirm the logging end date and time using ENTER.

To enter this setting, proceed as follows.

Once you have accessed the **LOGGING** submenu (previous par.) use the arrows ▲▼ to select **Start/Stop Log**: The following message will be displayed:

```
START/STOP LOG
Insert date START
def.=5m>Actual Date
2010/02/10 08:05:00

◀▶ select
▲▼ set
<ENTER> confirm
```

1. Use the arrows ◀▶ to select the data to be changed (year/month/day and hour/minutes/seconds);
2. Once selected, the data will start blinking;
3. Use the arrows ▼▲ to change its value;
4. Confirm by pressing ENTER;
5. Press ESC to return to the **Logging** menu without making any change;
6. Press ESC again to return to the main menu;
7. Press MENU to exit immediately from the menu.

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

```
START/STOP LOG
Insert END date
def.=10m>Start date
2010/02/10 08:10:00
Logging ends
at memory full

◀▶ select
▲▼ set
<ENTER> confirm
```

1. Use the arrows ◀▶ to select the data to be changed (year/month/day and hour/minutes/seconds);
2. Once selected, the data will start blinking;
3. Use the arrows ▼▲ to change its value;
4. Confirm by pressing ENTER;
5. Press ESC to return to the **Logging** menu without making any change;
6. Press ESC again to return to the main menu;
7. Press MENU to exit immediately from the menu.

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

```
LOGGING MENU
SETTED LOG

START Date
2010/02/10 10:29:00
END Date
2010/02/10 10:39:00

<ESC> exit/cancel
<ENTER> confirm
```

9. Press **ENTER** to confirm or **ESC** to exit without enabling the automatic start: In both cases, you will return to the **LOGGING** menu.
10. Press **MENU** 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 **Start Log Erase** function as illustrated in the following paragraph.

NOTE: 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, even if powered by the mains, is turned on few seconds earlier and remains on at the end of logging. If it is powered by the battery, it is turned on and off at each data capture, except when the interval is lower than 5 minutes. At the end of logging, it is turned off for good.

See paragraph 4.2.2 to set the automatic shut off.

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 *Start Log Erase*.

Once you have accessed the *LOGGING* submenu:

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

```
MENU LOGGING
Auto-Start Erase

Setted start:
2010/02/10 10:29:00
Setted end:
2010/02/10 10:39:00
Press ▲▼ for
Auto-Start Erase
<ENTER> confirm
```

3. By pressing ▲ the following message will be displayed:

```
LOGGING MENU

Auto-Start
not active

<ESC> exit/cancel
<ENTER> confirm
```

4. Press **ENTER** to cancel the automatic start;
5. Press **ESC** to exit without cancelling the automatic start;
6. Press **ESC** again to exit from the submenu;
7. Or press **MENU** 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 logs captured: The instrument allows displaying of the captured data files and erasing the entire memory (*File Log Erase*).

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 **MEM** function key you shift to the next screen. The current page (0, 1, 2 or 3) and the total data pages are displayed in the upper right corner.

```
LOG FILE          0/3
00A- 01A- 02A- 03A
04A- 05A- 06A- 07A
08A- 09A- 10A- 11A
12A- 13A- 14A- 15A
START Date:
2010/02/10 08:59:40
Record: 000039
▲▼◀▶ select
<MEM> page change
```

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

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

```
LOGGING MENU
LOG FILE MANAGER

1) See File Log
2) File Log Erase
3) Log lasting

▲▼ select
<ENTER> confirm
```

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

See File Log:

Selecting this item you can view the logging sessions in the instrument:

```
LOG FILE          0/3
00A- 01A- 02A- 03A
04A- 05A- 06A- 07A
08A- 09A- 10A- 11A
12A- 13A- 14A- 15A
START Date:
2010/02/10 08:50:40
Record: 000039
▲▼◀▶ select
<MEM> page change
```

1. Use the arrows ▲▼◀▶ to select the log, and the **MEM** key to shift page. 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.
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. **The files are stored in ascending order.** 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 08:50:40 on 10 February 2010. The file contains 39 samples.
3. press **ESC** to exit this menu;
4. Press **MENU** to exit immediately from the main menu.

File Log Erase (erasing all memory)

By selecting this item, the “ERASE ALL LOGS SETTED FILES” message will be displayed:

<pre>MENU LOGGING ERASE ALL LOGS SETTED FILES <MEM> confirm <Esc> exit</pre>	<pre>MENU LOGGING ERASE ALL LOGS SETTED FILES EMPTY MEMORY <Esc> exit</pre>
---	---

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

Log lasting (time set for recording)

It represents the recording duration: After this set time, the recording is ended. The recording can be stopped earlier by pressing **MEM**.

To disable this function, set the time to 0:00:00. In this case the recording ends by pressing MEM or when the memory is full.

```
LOGGING MENU
LOG LASTING

h:mm:ss (1h max)
00:00:00
With setting:
00:00:00 Log stop
with key MEM
▲▼ set
<ESC> exit
```

Use the arrows to change the set time; the maximum allowed value is 1 hour.

Confirm with **ENTER**.

Press **ESC** to exit from this menu level without making changes.

Press **MENU** to exit immediately from the main menu.

4.3 SERIAL MENU (SERIAL COMMUNICATION)

The *Serial* submenu allows setting the data transfer speed via 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.) but it can not be higher than 38400 bps.

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

After downloading the data on the PC, using the dedicated software, they will be processed by this software for graphic display.

The instrument can be connected directly to a **HD40.1 printer**.

To access the *Serial* submenu, proceed as follows:

1. Press **MENU** on the instrument;
2. Use the arrows **▲ ▼** to select *Serial*;
3. Press **ENTER**;
4. You will get the *Serial* submenu.

```
COMMUNICATION MENU
SERIAL

1) Baudrate
2) Print Interval

▲▼ select
<ESC> exit/cancel
<ENTER> confirm
```

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:

```
COMMUNICATION MENU
SERIAL
SET BAUDRATE

Baud Rate: 38,400

▲▼ set
<ESC> exit
<ENTER> confirm
```

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 **MENU** 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.

NOTE: When setting the baud-rate, check the printer speed.

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:

```
COMMUNICATION MENU
SERIAL
PRINT INTERVAL

h:mm:ss (1h max)
0:00:00

▼▲ set
<ESC> exit
<ENTER> confirm
```

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 **MENU** to exit immediately from the main menu.

The print interval can be set from 0 seconds to one hour:

0 s - 15 s - 30 s - 1 min. - 2 min. - 5 min. - 15 min. - 20 min. - 30 min. - 1 hour.

4.4 SETTINGS

To enter the *Settings* submenu, proceed as follows:

1. press the instrument **MENU** key;
2. Use the arrows **▼ ▲** to select *Settings*
3. press **ENTER**: the following message appears:

```
SETTINGS

1) Contrast
2) Backlight
3) Reset

▼▲ select
<ESC> exit/cancel
<Enter> confirm
```

This menu item allows to:

1. Increase or decrease the display contrast.
2. Set the ON time of the display backlight.
3. Perform the complete reset of the instrument.

4.4.1 Contrast

This item of the *Settings* menu allows to increase or decrease the display contrast.

To access the *Contrast* submenu, proceed as follows:

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

```
CONTRAST LCD

Contrast set:
      012

▼▲ set
<ESC> exit/cancel
```

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

4.4.2 Backlight

This item of the **Settings** menu allows to set the ON time for the display backlight. To enter the **Backlight** submenu, proceed as follows:

1. Using the arrows ▼ ▲ select **Backlight**.
2. Press **ENTER**
3. The following message appears:

```
BACKLIGHT

1) Always switch on
2) 5 seconds
3) 15 seconds
4) 30 seconds

▼▲ select
<ESC> exit/cancel
<Enter> confirm
```

4. Use the arrows ▼ ▲ to select the desired option
5. Press **ENTER** to confirm or press **ESC** more times to escape from the various menu levels
6. Press **MENU** to exit directly form the main menu.

4.4.3 Reset

To enter the **Reset** submenu in order to carry out a complete reset of the instrument, proceed as follows:

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

```
RESET

1)Reset

Fabric Values
reset

▼▲ select
<ESC> exit/cancel
<Enter> confirm
```

4. Use the arrows ▲ ▼ to select **Reset** ;
5. Press **ENTER** to confirm, or press **ESC** over and over to exit from the submenus;
6. Press **MENU** to exit immediately from the main menu.

NOTE: after the reset, the date blinks to signal that it is necessary to set it.

4.5 AIR SPEED

This menu item allows to set the measure unit for speed, flow rate and section for the flow rate calculation. To enter the *Air Speed* submenu, proceed as follows:

1. Press the instrument **MENU** key;
2. Use the arrows **▼ ▲** to select *Air Speed*;
3. Press **ENTER**;
4. The following message appears:

```
AIR SPEED

1) speed m/s
2) flow L/s
3) section 6.4515 m2

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

4.5.1 Speed

This item of the **Air Speed** menu allows to set the speed measure unit. To enter the *Speed* submenu, proceed as follows:

1. Use the arrows **▼ ▲** to select *Speed*;
2. Press **ENTER**;
3. The following message appears:

```
AIR SPEED
UNIT OF MEASURE

1) m/s
2) km/h
3) fpm
4) mph
5) knot

▼▲ select
<ENTER> confirm
```

4. Use the arrows **▼ ▲** to select the desired speed measure unit
5. Press **ENTER** to confirm or press **ESC** more times to escape from the various menu levels
6. Press **MENU** to exit directly from the main menu.

4.5.2 Flow rate

This item of the **Air Speed** menu allows to set the flow rate measure unit. To enter the **Flow Rate** submenu, proceed as follows:

1. Use the arrows **▼▲** to select **Flow**;
2. Press **ENTER**;
3. The following message appears:

```
AIR FLOW
UNIT OF MEASURE

1) L/s
2) m3/h
3) m3/m
4) cfs
5) cfm
▼▲ select
<ENTER> confirm
```

4. Use the arrows **▼▲** to select the desired flow rate measure unit
5. Press **ENTER** to confirm or press **ESC** more times to escape from the various menu levels
6. Press **MENU** to exit directly from the main menu.

4.5.3 Section

This item of the **Air Speed** menu allows to set the section for the flow rate calculation. To enter the **Section** submenu, proceed as follows.

1. Use the arrows **▼▲** to select **Section**;
2. Press **ENTER**;
3. The following message appears:

```
AIR FLOW
SECTION SETTING

0.0001 m2
(max = 6.4515 m2)

◀▶ select
▼▲ set
<ENTER> confirm
<MEM>unit of measure
```

```
AIR FLOW
SECTION SETTING

9999.9 in2
(max = 9999.9 in2)

◀▶ select
▼▲ set
<ENTER> confirm
<MEM>unit of measure
```

4. Use the arrows **◀▶** to select the digit to be changed
5. Use the arrows **▼▲** to set the value of the selected digit
6. Press **MEM** to change the section measure unit between m^2 or $inch^2$
7. Press **ENTER** to confirm or press **ESC** more times to escape from the various menu levels
8. Press **MENU** to exit directly from the main menu.

4.6 VENTILATION RATE

To calculate the Ventilation Rate you need the following parameters:

- Calculation of the percentage of outdoor air inlet in the environment (% Outdoor Air)
- Calculation of the air flow circulating in the environment being examined;
- Number of people usually present in the environment being examined.

4.6.1 Definition of % Outdoor Air

The percentage of air inlet in the environment (% Outdoor Air) can be calculated measuring the CO₂ Carbon Dioxide or the Temperature T.

Generally, you should measure the CO₂ Carbon Dioxide when there is a lot of people in the environment being examined. Instead, you should use the temperature T when the indoor/outdoor temperature difference is very large.

To calculate the outdoor air percentage you need to detect CO₂ concentration or temperature T in three different points: outdoor air, inlet air and return air, using the following equation:

$$\%OA = \frac{(X_R - X_S)}{(X_R - X_O)} \cdot 100\%$$

Where:

X_R = CO₂ concentration or temperature T in **return** air

X_S = CO₂ concentration or temperature T in **inlet** air

X_O = CO₂ concentration or temperature T in **outdoor** air

Example

Let's suppose you have performed the following CO₂ measurement in a working environment:

CO ₂ in outdoor air	= X_O	= 400 ppm
CO ₂ in inlet air	= X_S	= 660 ppm
CO ₂ in return air	= X_R	= 850 ppm

$$\%OA = \frac{(X_R - X_S)}{(X_R - X_O)} \cdot 100\% = \frac{(850 - 660)}{(850 - 400)} \cdot 100\% = \frac{(190)}{(450)} \cdot 100\% = 42.2\%$$

The same equation can be used if you know the temperatures T. Let's suppose the measurement is performed in winter:

T in outdoor air	= X_O	= 0 °C
T in inlet air (before conditioning)	= X_S	= 10 °C
T in return air	= X_R	= 23 °C

$$\%OA = \frac{(X_R - X_S)}{(X_R - X_O)} \cdot 100\% = \frac{(23 - 10)}{(23 - 0)} \cdot 100\% = \frac{(13)}{(23)} \cdot 100\% = 56.5\%$$

The calculation of the percentage of outdoor air is not meaningful, if it is not correlated to the air flow in the environment.

Let's suppose, for example, that the environment is an office. The ASHRAE 62.1 norm recommends a ventilation rate of about 8.5 L/s×person.

Let's suppose that you have the following measurements:

Air Flow = 500 L/s
Number of occupants = 10 people
% Outdoor Air = 17%OA

$$\frac{500L/s \cdot 17\%OA}{10\text{people}} = 8.5L/s \times \text{person}$$

In this case, the ASHRAE 62.1 norm recommendation of a ventilation rate of about 8.5 L/s×person was met.

If, in the same environment, you have an air flow = 100 L/s, you need a %OA = 85% to meet the ASHRAE 62.1 norm.

$$\frac{100L/s \cdot 85\%OA}{10\text{people}} = 8.5L/s \times \text{person}$$

In this example you can see that only correlating the %OA value with the air flow value you can check if the ventilation rate meets the ASHRAE 62.1 norm.

4.6.2 Outdoor Air Calculation

Use the arrows ▲ ▼ to select the **6) Air changes** menu item

```
MAIN MENU
1) Informations
2) Logging
3) Serial
4) Settings
5) Air speed
6) Air changes
7) Probes calibration
8) Language
```

After confirming with ENTER, the following screen will appear:

```
AIR CHANGES
1) Use: CO2
2) N. occupants: 01
3) FVm: 500 L/s
4) Measures CO2

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

1) Use:

The **1) Use** menu item indicates the quantity used to calculate the %OA. To change this quantity, select the item **1) Use** with the arrows **▼▲** and confirm with ENTER. The following screen will appear:

```

      USE
    CALCULATION
AIR CALCULATION %
PLACED USING:

T:   Temperature
CO2: Carbon Dioxide

▼▲ select
<ENTER> confirm

```

Using the **▲▼** arrows, select the desired item and confirm with ENTER.

2) N. occupants

The **2) N. occupants** menu item indicates the number of people in the environment. To enter this value, select **2) N. occupants** using the **▲▼** arrows, and confirm with ENTER:

```

      AIR CHANGES

1) Use:   CO2
2) N. occupants: 01
3) FVm:   500 L/s
4) Measures CO2

▼▲ select
<ESC> exit/cancel
<ENTER> confirm

```

The following screen will appear:

```

      OCCUPANTS NUMBER

      INSERT NUMBER
      OF PERSONS IN AREA
      OF INTEREST

occupants No.: 01

▼▲ set
<ENTER> confirm

```

Use the arrows **▼▲** to change the number of occupants value, and confirm using ENTER.

3) FVm (Flow Rate)

This item indicates the average value of the flow rate. To change this value, use the arrows ▲ ▼ to select the **3) FVm** menu item.

AIR FLOW			
Samples:	010		Number of air flow rate samples captured
FVm	0.50 L/s		Average air flow rate value as arithmetical average of the samples
Va	0.01	m/s	Current wind speed
FVa	0.50	L/s	Current flow rate
1) Samples capture			Capture the air flow samples
2) Samples reset			Reset the acquired samples

Description:

samples indicates the number of acquired samples.

FVm is the average of the air flow rate acquired samples.

$$FVm = \frac{\sum_{i=1}^n FVa_i}{n}$$

Va is the current air speed value

FVa is the current air flow rate value

To acquire the **FVm** samples select with the arrows ▼ ▲ the **Samples capture** menu item. Every time the **ENTER** key is pressed, a sample is acquired. The number of samples and the FVm value are increased on display.

To reset the FVm value and the number of samples, select with the arrows ▼ ▲ the **Samples reset** menu item and confirm with **ENTER**.

Example:

The number of acquired samples is 10.

The acquired flow rate values are:

- sample n. 01: FVa = 0.2 L/s
- sample n. 02: FVa = 0.5 L/s
- sample n. 03: FVa = 0.3 L/s
- sample n. 04: FVa = 0.1 L/s
- sample n. 05: FVa = 0.6 L/s
- sample n. 06: FVa = 0.5 L/s
- sample n. 07: FVa = 0.4 L/s
- sample n. 08: FVa = 0.5 L/s
- sample n. 09: FVa = 0.2 L/s
- sample n. 10: FVa = 0.2 L/s

$$FVm = \frac{0.2 + 0.5 + 0.3 + 0.1 + 0.6 + 0.5 + 0.4 + 0.5 + 0.2 + 0.2}{10} = \frac{3.5}{10} = 0.35 \cdot L/s$$

4) Measures

This item indicates the value of the air flow circulating in the environment being examined. To change this value, use the arrows ▲ ▼ to select the **4) Measures** menu item.

```
VENTILATION RATE
1) Use:      CO2
2) N. occupants: 10
3) FVm      500 L/s
4) Measures CO2

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

After confirming with ENTER, the following screen will appear:

```
AIR CHANGES
INSERT MEASURE CO2
  Actual      700 ppm
1) Outdoor    450 ppm
2) Supply     650 ppm
3) Return     850 ppm
4) CALCULATE

◀▶ data insert
▼▲ select
<ENTER> confirm
```

Current CO₂ value
CO₂ value in outdoor air
CO₂ value in inlet air
CO₂ value in return air

Use the arrows ▲ ▼ to select the corresponding value to be captured. If you want to capture the **CO₂ Outdoor** value, select the corresponding line:

```
AIR CHANGES
INSERT MEASURE CO2
  Actual      700 ppm
1) Outdoor    450 ppm
2) Supply     650 ppm
3) Return     850 ppm
4) CALCULATE

◀▶ data insert
▼▲ select
<ENTER> confirm
```

Press ENTER to capture the CO₂ value. As an alternative, you can manually enter the CO₂ value using the arrows ◀▶.

Repeat the operation to enter the inlet and return air CO₂ values. Select the **4) CALCULATE** item to compute the % OA value on the captured data, and press ENTER.

The following screen will appear:

```
MEASURE: CO2
Outdoor      400 ppm
Supply       660 ppm
Return       850 ppm
FVm          260 L/s
occupants No. 10
%Outdoor Air 42.2 %
  Air changes:
    10.9 (L/s)/p
<MEM>save <ESC>exit
```

This page shows the **% Outside Air** result and the **Ventilation Rate** value.
The captured data can be saved in the memory by pressing MEM.

4.7 PROBE CALIBRATION

The instruments and probes are calibrated in the factory; no calibration is usually required by the user. However, you can perform a new calibration.

With the HD37AB1347 instrument, you can perform the calibration of the following connected probes:

- With the **P37AB147** and **P37B147** SICRAM probes connected to input 1 Indoor Air Quality, you can perform the calibration of the RH (Relative Humidity), CO (Carbon Monoxide – only **P37AB147**), and CO₂ (Carbon Dioxide) sensors.
- With the **temperature** and **humidity** combined SICRAM probes connected to input 1 Indoor Air Quality, you can perform the calibration of the RH (Relative Humidity) sensor.

No calibration is allowed for the Temperature sensor, and for the Hot-Wire and Vane sensors.

To calibrate the probes correctly, a knowledge of and abiding by the physical phenomena on which the measurement is based is fundamental: this is the reason why it is recommended to abide by what is reported below carefully and only to perform new calibrations if technically proficient.

```
PROBE CALIBRATION

1) Calibration CO2
2) Calibration CO
3) Calibration RH

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

4.7.1 CO₂ Calibration

Ensure the P37AB147 or P37B147 SICRAM probe is connected to input 1, Indoor Air Quality. Use the arrows ▲▼ to select the 1) Calibration CO₂ item:

```
PROBE CALIBRATION  
  
1) Calibration CO2  
2) Calibration CO  
3) Calibration RH  
  
▼▲ select  
<ESC> exit/cancel  
<ENTER> confirm
```

Confirm with ENTER. The following screen will appear:

```
PROBE CALIBRATION  
CALIBRATION CO2  
  
CO2      850      ppm  
  
<ESC> exit/cancel  
<ENTER> confirm
```

The instrument display shows the measured CO₂. The CO₂ sensor can be calibrated:

- at 400ppm in clean air
- at 0ppm with nitrogen bottles (code MINICAN.12A).

The instrument can automatically detect the calibration methods used: whether 400ppm or 0ppm. The calibration should be performed at one point only: each new calibration cancels the previous one.

Proceed as follows:

1. Unscrew the hexagon slot peg on the instrument, located back on the aluminium black disc. In the place of the peg, screw the small metal tube at the end of the plastic tube connecting to the bottle for calibration MINICAN.12A.



2. Let the inlet open if you want to perform a calibration at 400 ppm: For this second calibration procedure, **ensure the instrument is really in clean air.**
3. For the calibration at 0 ppm, after connecting the CO₂ input to the small tube from the nitrogen bottle, adjust the bottle flow meter to get a constant flow from 0.3 to 0.5 l/min.
4. Wait about 15 minutes before continuing.
5. Supply CO₂ for at least 2 minutes so as to stabilize the measurement.
6. Press ENTER on the HD37AB1347 instrument. After few seconds, the new value read by the probe will appear. Wait the two minutes necessary for calibration without changing the working conditions.
7. At the end, close the bottle spigot, unscrew the small tube from the instrument and close the hole using the M6 hexagon slot peg.

4.7.2 CO Calibration – only P37AB147

You can calibrate the **zero of the CO sensor** in clean air (the CO concentration is lower than 0.1 ppm outdoor) or using nitrogen bottles (code MINICAN.12A).
Use the arrows ▲▼ to select the **2) Calibration CO** item:

```

PROBE CALIBRATION

1) Calibration CO2
2) Calibration CO
3) Calibration RH

▼▲ select
<ESC> exit/cancel
<ENTER> confirm

```

Confirm with ENTER. The following screen will appear:

```

PROBE CALIBRATION
CALIBRATION CO

1) Cal zero
2) Sensitivity set

▼▲ select
<ESC> exit/cancel
<ENTER> confirm

```

Confirm with ENTER. The following screen will appear:

```
PROBE CALIBRATION
CALIBRATION CO
CAL ZERO

Cal zero      0 ppm

<ESC> exit/cancel
<ENTER> confirm
```

Place the instrument in a clean air environment (CO concentration is lower than 0.1 ppm outdoor). Turn the instrument on and wait at least 15 minutes so as to stabilize the measurement. Now press ENTER and wait the two minutes necessary for calibration without changing the working conditions.

CO zero calibration with nitrogen bottle (code MINICAN.12A):

- Using a screwdriver, open the front small door of the **P37AB147** probe.
- Connect the tube from the MINICAN.12A bottle with the rubber cap on the CO sensor head.



Use the arrows ▲▼ to select the **2) Calibration CO** item:

```
PROBE CALIBRATION

1) Calibration CO2
2) Calibration CO
3) Calibration RH

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

Confirm with ENTER. The following screen will appear:

```
PROBE CALIBRATION
CO CALIBRATION

1) Cal zero
2) Sensitivity set

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

Confirm with ENTER. The following screen will appear:

```
PROBE CALIBRATION
CO CALIBRATION
CAL ZERO

Cal zero      0 ppm

<ESC> exit/cancel
<ENTER> confirm
```

- Wait about 15 minutes before continuing.
- Supply the gas adjusting the bottle flow meter to get a constant flow from 0.1 to 0.2 l/min.
- Press ENTER and wait the two minutes necessary for calibration without changing the working conditions.
- At the end, close the bottle spigot and remove the cap from the CO sensor.
- Insert the protection grid.

Replacement of the CO sensor:

In normal usage conditions, the CO sensor has an average life longer than 5 years. If you need to replace the CO sensor, order a new sensor (code **ECO-SURE-2E CO**).

To replace the CO sensor, follow this procedure:

1. Switch the instrument off.
2. On the P37AB147 probe, open the sensor-holder small door using a screwdriver and extract the exhausted CO sensor.
3. Take a new CO sensor and note down the number printed on the edge that indicates its nA/ppm sensitivity.
4. Insert the new sensor electrodes in the terminals.
5. Turn the instrument on, and wait for at least 5 minutes so as to stabilize the measurement.



6. Use the arrows ▼▲ to select the **2) Calibration CO** item:

```
PROBE CALIBRATION

1) Calibration CO2
2) Calibration CO
3) Calibration RH

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

Confirm with ENTER. The following screen will appear:

```
PROBE CALIBRATION
CALIBRATION CO

1) Cal zero
2) Set sensitivity

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

Confirm with ENTER. The following screen will appear:

```
PROBE CALIBRATION
CALIBRATION CO
SENSITIVITY SET

Sens      50 nA/ppm
CO         0 ppm

▼▲ set
<ESC> exit/cancel
<ENTER> confirm
```

Use the arrows ▼▲ to change the CO sensor sensitivity value, and confirm using ENTER.
If necessary, perform the CO sensor calibration at zero ppm.

4.7.3 RH calibration

This procedure applies to **P37AB147**, **P37B147** SICRAM probes, and to **Temperature** and **Humidity** combined SICRAM probes.

Before starting the calibration operation, you should **check** if you need a new calibration using the saturated solutions at 75.4%RH and 33%RH: You should proceed with the calibration, only if you find an error in one of the two above calibration points.

The calibration procedure removes the previous calibration data.

For a correct calibration of the sensor, **the first point should be 75%RH** and the second point 33%RH.

Use the arrows **▼ ▲** to select the **3) Calibration RH** item:

```
PROBE CALIBRATION

1) Calibration CO2
2) Calibration CO
3) Calibration RH

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

Confirm with ENTER. The following screen will appear:

```
PROBE CALIBRATION
CALIBRATION RH

1) Cal RH 75%
2) Cal RH 33%

▼▲ select
<ESC> exit/cancel
<ENTER> confirm
```

1. Use the arrows **▼ ▲** to select the **1) RH Cal 75%** item; you will get the following page:

```
PROBE CALIBRATION
CALIBRATION RH
CAL RH 75%
Actual T = 22.0°C
Actual RH = 28.1%
RH 75% = 70.2%

▼▲ set
<ESC> exit/cancel
<ENTER> confirm
```

2. Use the arrows **▼ ▲** to enter the RH 75% nominal value.
3. Check that the salt solution container contains simultaneously:
 - Salt in solid state
 - Liquid solution and wet salt.

4. **The probe and the saturated solution for this operation should have the same temperature,** and therefore should be located in a room with a stable temperature for the entire calibration period.
5. Unscrew the probe protection; screw the M12×1 threaded ring.
6. **Should there be any liquid inside the measuring chamber, dry it with some blotting paper. The formation of liquids inside the measuring chamber, does not impair the measurement uncertainty of the solution or measurement.**
7. Screw the ring to the container with the saturated solution. Avoid any contact of the sensitive element with your hands or another object or liquid.
8. Once the sensor has been inserted, wait at least 30 minutes, if the probe and salts have the same temperature. Otherwise you should wait the time necessary to reach a balance.
9. After 30 minutes, press ENTER. The new calibration value has been captured by the probe connected to the instrument.
10. Once the measurements have been acquired, repeat the same operations backwards.
11. To check the second calibration point, repeat the operations from point 1 to point 10.



Notes and warnings:

- I. Store the salt solutions in a dark environment at a constant temperature of about 20°C.
- II. The salt solutions are efficient and can be used until they have some salt to be dissolved and liquids. Usually, for the 33% RH and 11% RH solutions, you need to check the presence of salt in solid state, while for the 75% RH solution, you need to check the presence of liquid or wet salt.
- III. In order to perform the best calibration, the temperature of the probe and of the solution should be as close as possible. Remember that plastic materials are bad heat exchangers. Any difference of tenths of degrees between sensors and salt saturated solutions can give errors in the RH measurements.
- IV. Do not let hands or anything touch the sensitive element. Scratches or dirt alter the instrument measurement and can damage the sensor.
- V. The measuring chamber must be closed, otherwise it will not reach a balance. Screw the probe all the way in the container thread.
- VI. The tuning or calibration sequence of Delta Ohm instruments is as follows:
 - First solution: 75% RH.
 - Second solution: 33% RH.
 - The checking order is not mandatory.
- VII. If the check, tuning or calibration, is performed at a different temperature than 20°C, the salt solution relative humidity reference value corresponding to the working temperature is outlined in the following table. The table indicates the relative humidity variation of the saturated salt according to the temperature variation.

Relative Humidity Balance values of some saturated salt solutions from 0°C to 100°C			
Temp. °C	Lithium chloride	Magnesium chloride	Sodium chloride
0	11.23 ± 0.54	33.66 ± 0.33	75.51 ± 0.34
5	11.26 ± 0.47	33.60 ± 0.28	75.65 ± 0.27
10	11.29 ± 0.41	33.47 ± 0.24	75.67 ± 0.22
15	11.30 ± 0.35	33.30 ± 0.21	75.61 ± 0.18
20	11.31 ± 0.31	33.07 ± 0.18	75.47 ± 0.14
25	11.30 ± 0.27	32.78 ± 0.16	75.29 ± 0.12
30	11.28 ± 0.24	32.44 ± 0.14	75.09 ± 0.11
35	11.25 ± 0.22	32.05 ± 0.13	74.87 ± 0.12
40	11.21 ± 0.21	31.60 ± 0.13	74.68 ± 0.13
45	11.16 ± 0.21	31.10 ± 0.13	74.52 ± 0.16
50	11.10 ± 0.22	30.54 ± 0.14	74.43 ± 0.19
55	11.03 ± 0.23	29.93 ± 0.16	74.41 ± 0.24
60	10.95 ± 0.26	29.26 ± 0.18	74.50 ± 0.30
65	10.86 ± 0.29	28.54 ± 0.21	74.71 ± 0.37
70	10.75 ± 0.33	27.77 ± 0.25	75.06 ± 0.45
75	10.64 ± 0.38	26.94 ± 0.29	75.58 ± 0.55
80	10.51 ± 0.44	26.05 ± 0.34	76.29 ± 0.65
85	10.38 ± 0.51	25.11 ± 0.39	
90	10.23 ± 0.59	24.12 ± 0.46	
95	10.07 ± 0.67	23.07 ± 0.52	
100	9.90 ± 0.77	21.97 ± 0.60	

4.8 LANGUAGE

It sets the language used by the instrument.

Using the ▲ ▼ arrows, select the desired language and confirm with ENTER.

LANGUAGE
1) Italiano
2) English
3) Français
4) Español
5) Deutsch
▼▲ select
<ESC> exit/cancel
<ENTER> confirm

5. SERIAL INTERFACE AND USB

The **HD37AB1347** is fitted with an electrically isolated RS-232C serial interface, and an USB 2.0 interface. Optionally, you can receive on request:

- Serial connection cable (code **HD2110/RS**) with M12 connector on instrument's side and Sub D 9-pole female connector on computer's side.
- Serial connection cable (code **HD2110/USB**) with M12 connector on instrument's side and USB 2.0 connector on computer's side.

The USB connection requires the previous installation of the driver saved on the CD-ROM of the instrument software. **Install the driver before connecting the USB cable to the PC** (please see the details on chapter **6.2 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 "*Selection of the serial transmission speed (Baud Rate)*" parameter in the menu (please see the menu on chapter **4.3.1 The Baud Rate**). The possible values are: 38400, 19200, 9600, 4800, 2400, 1200. The other transmission parameters are fixed.

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

The 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
P0	&	Ping (locks the instrument keyboard for 70 seconds)
P1	&	Unlocks the instrument keyboard
S0		
G0	Model HD37AB1347	Instrument model
G1	M=Indoor Air Quality	Model description
G2	SN=12345678	Instrument serial number
G3	Firm.Ver.=01.00	Firmware version
G4	Firm.Date=2010/02/10	Firmware date
G5	cal 2010/02/10 10:30:00	Calibration date and time
C1		Input 1 probe type, serial number, calibration date

Command	Response	Description
C2		Input 2 probe type, serial number, calibration date
GC		Print instrument's heading
GB	ID=0000000000000000	User code (set with T2xxxxxxxxxxxxxxxxxx)
HA		Print the current data measurement
LR		Print the instrument memory map
KInn		Print the information of Logging nn
KRaaaa		Print the recorded data in page aaaa
KE	&	Stop the data download
LE	&	Erase stored data
K1	&	Immediate printing of data
K0	&	Stop printing data
K4	&	Start logging data
K5	&	Stop logging data
KP	&	Auto-power-off function = ENABLE
KQ	&	Auto-power-off function = DISABLE
WC0	&	Setting SELF off
WC1	&	Setting SELF on
RA	Sample print = 0sec	Reading of PRINT interval set and label of the measurements
RL	Sample log = 30sec	Reading of LOG interval set
WA#	&	Setting PRINT interval. # is a hexadecimal number 0..D that represents the position of the interval in the list 0, 1, 5, 10, ..., 3600 seconds.
WL#	&	Setting LOG interval. # is a hexadecimal number 1..D that represents the position of the interval in the list 15, ..., 3600 seconds.

5.1 STORING AND TRANSFERRING DATA TO A PC

The **HD37AB1347** instrument can be connected to a personal computer via an RS232C serial port or USB port, and exchange data and information through the DeltaLog10 software (from version 0.1.5.0) running in a Windows operating environment. It is possible to print the measured values on the HD40.1 printer (*ENTER* 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.

5.1.1 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 15 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 *AutoPowerOff–AutoPowerOff Mode*) is enabled, upon pressing the **MEM** key the instrument logs the first data and turns off. 1 minute 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 through the DeltaLog10 software (from version 0.1.5.0). During data transfer the display shows the message DUMP; to stop the data transfer press ESC on the instrument or on the PC.

5.1.2 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**, **MENU**, **ENTER** and **ESC**.
- Pressing the **MEM** and **MENU** keys has no effect on the logged data if these keys are pressed **after** starting the recording, otherwise the following is valid.

5.1.3 Print function

Press **ENTER** to send the measured data directly to the RS232 or USB port, in real time. The printed data units of measurements are the same as those used on the display. The function is started by pressing **ENTER**.

The time interval between two consecutive prints can be set from 15 second to 1 hour (please see the **Print interval** menu item at par. 4.3.2 *Print Interval*). If the print interval is equal to 0, by pressing **ENTER** 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 **ENTER** again.

NOTE: When setting the baud-rate, check the printer speed.

6. CONNECTION TO A PC

The **HD37AB1347** is fitted with an **M12** connector for connecting the instrument to the PC:

Use the **HD2110/RS** cable for connection to the PC's serial port.

Use the **HD2110/ USB** cable for connection to the PC's USB port.

The instruments are supplied with the **DeltaLog10 software (from version 0.1.5.0)**. The software manages the connection, data transfer, graphic presentation, and printing operations of the captured or logged measurements.

The CD-Rom with the DeltaLog10 software (from version 0.1.5.0) is complete with "On-line Help" (also in PDF format) describing its characteristics and functions. It also contains the instrument manual and the USB drivers.

The instruments are also compatible with the HyperTerminal communication program.

6.1 CONNECTION TO THE RS232-C SERIAL PORT

1. The measuring instrument has to be switched off.
2. Using the **HD2110/RS** 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 (MENU key >> "*Serial*" >> "*Baud Rate*" >> select 38400 using the arrows >> confirm with ENTER). The parameter remains in the memory.
4. Launch the DeltaLog10 software (from version 0.1.5.0) and press CONNECT. Wait for the connection to occur and follow the instructions on the screen. **For a description of the DeltaLog10 software (from version 0.1.5.0), please refer to its On-line Help.**

6.2 CONNECTION TO THE USB 2.0 PORT

This help illustrates the procedure for the correct installation of the USB drivers.

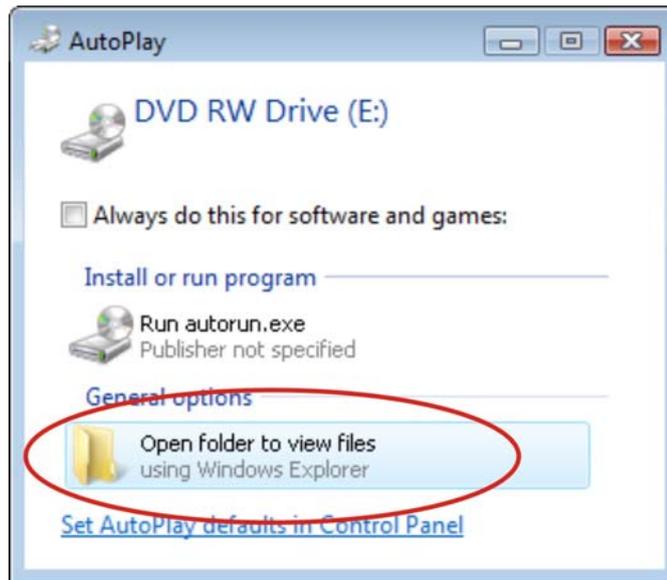
The procedure applies to Windows® operating systems: Xp, Vista and Windows 7.

For the Windows 98, ME and 2000, please see the "*Guide to installation of the USB drivers for Windows 98, ME and 2000*" in the section *Documentation of the DeltaLog10 (from version 0.1.5.0) CD-Rom*.

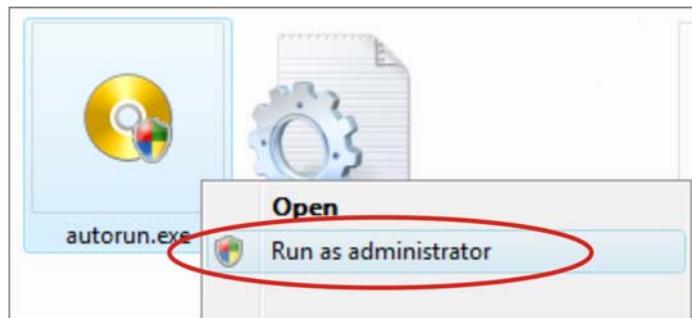
Do not connect the instrument to the USB port before installation of the drivers.

Proceed as follows:

1. **Do not connect the instrument to the USB port until you are expressly requested to do it.**
2. Insert the software CD-Rom and wait for the initial page.
 - a. With Windows Vista and Windows 7, you will get the following page: Select "*Open folder to view files*".

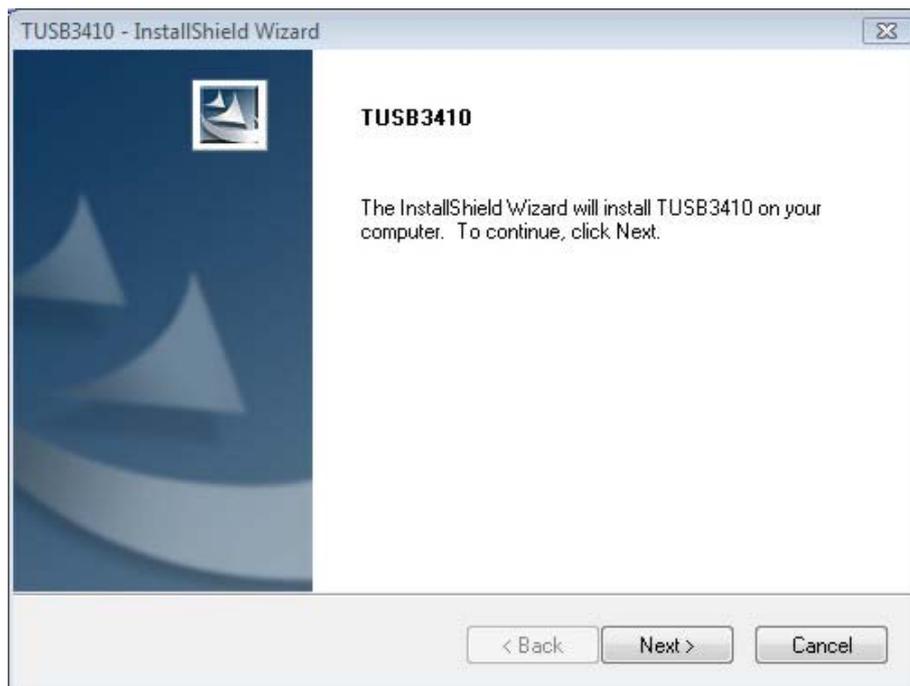


b. In the next page, right click on “Autorun” and select “Run as administrator”:

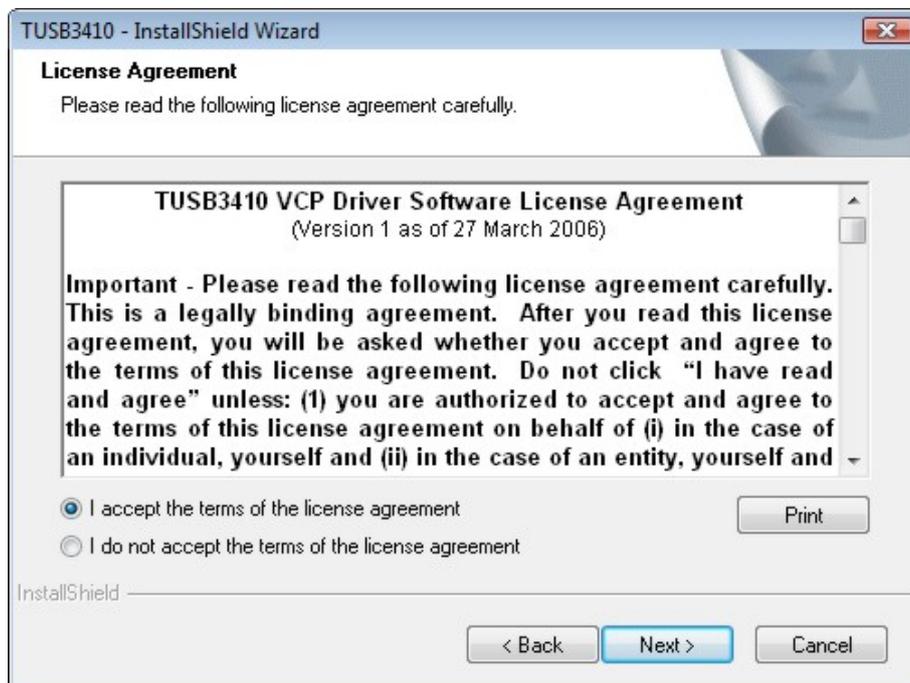


3. From the initial software page, click on "USB drivers setup" to start the USB drivers installation.
4. The application checks the presence of the drivers on the PC:
 - **If not installed**, the installation is started;
 - **If already installed**, you can proceed to remove them using this command (please see next chapter).

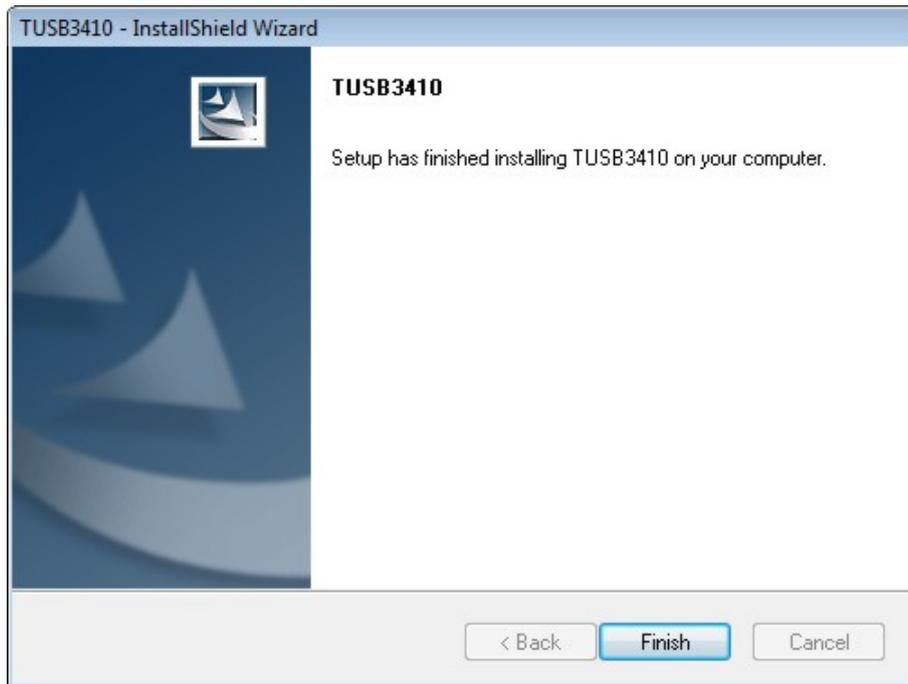
5. In the next page, press NEXT:



6. The installation wizard prompts the software user license: To proceed, the software usage terms must be accepted. Then press NEXT:



7. Wait for the file installation. At the end, you will get a confirmation message of the correct driver installation.



8. Press FINISH to close the installation program.
9. If the installation was started from the CD-Rom, you will get a message to connect the instrument to the USB port: Press OK and close the Delta Ohm software by pressing EXIT.
10. **Connect the instrument to the USB port and turn it on:** When Windows detects the new device, you will get the corresponding message.
11. Wait few seconds until the message that the new hardware is installed and ready for use appears.
12. The drive installation is now complete: The device will be automatically detected on each new connection.

In order to check if the entire operation was successful, proceed as follows:

On Windows XP:

Select “START >> Settings >> Control Panel”, then double click on SYSTEM. Select “Hardware >> Device Manager”.

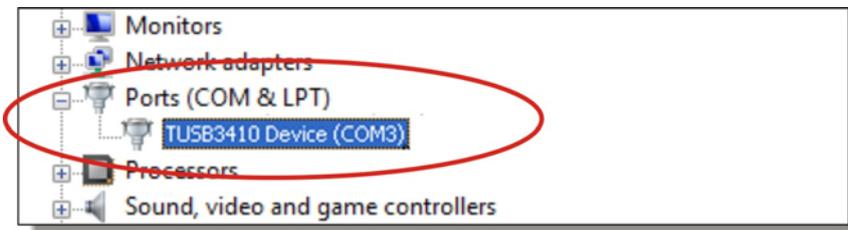
On Windows Vista and Windows 7:

Select “START >> Settings >> Control Panel”, then double click on “Device Manager”.

Connect the instrument to the USB port.

The “Ports (COM and LPT) >> TUSB3410 Device (COM#)” item should appear.

The # value is the number assigned to the virtual serial port.



When the USB cable is disconnected, this item disappears and comes back when it is connected again.

Note 1. If the instrument is connected to the USB port **before installing the drivers**, Windows XP opens the “*New hardware installation wizard*” page. On Windows Vista and Windows 7 you will get an installation error in “*Device Manager*”: In both cases, cancel the operation, disconnect the device, and repeat the procedure illustrated at the beginning of this guide.

Note 2. If the drivers have been downloaded from the Delta Ohm web site:

- a. Unzip the “*Driver_USB_TUSB3410.zip*” into a temporary folder on the PC.
- b. On Windows XP: Run “*Setup.exe*” by double clicking on it.
On Windows Vista and Windows 7, right click on “*Autorun*” and select “*Run as administrator*”.
- c. Proceed from point 4 in this chapter.

6.3 REMOVING THE USB DRIVERS

To remove the USB drivers, *proceed as follows*:

1. Disconnect the instrument from the PC.
2. On Windows XP use the control panel (START >> Settings >> Control Panel) to start “Add/Remove Software”.

On Windows Vista and Windows 7 use the control panel (START >> Settings >> Control Panel) to start “Programs and Features”.

3. Select the “*Texas Instruments TUSB3410 drivers*” item and press “Change/Remove” or “Uninstall”.
4. The program prompts for the drivers removal. Confirm with OK to proceed.

5. Wait for the drivers removal.
6. The USB drivers removal is now complete.

7. INSTRUMENT SIGNALS AND FAULTS

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

Display indication	Explanation
- - - -	This appears if the sensor relevant to the indicated physical quantity is not present or is faulty.
OVFL	Overflow appears when the probe detects a value that exceeds the expected measurement range.
UFL	Underflow appears when the probe detects a lower value than the expected measurement range.
MEMORY FULL!!	The instrument cannot store further data, the memory space is full.
LOG	It indicates that a logging session is running.

8. BATTERY SYMBOL – MAINS POWER SUPPLY

The meter is provided with a pack of **4 x 1.2V-2200mA/h Ni-MH rechargeable batteries**, placed in the battery compartment.

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.



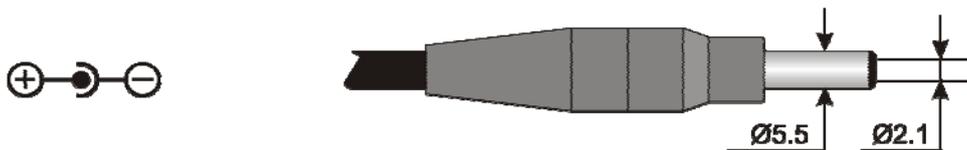
In this case, batteries should be replaced as soon as possible.

If you continue to use it, the instrument can no longer ensure correct measurement and turns off. Data stored on memory will remain.

The battery symbol becomes [≈] when the external power supply is connected and the batteries charging process is ended.

The instrument can be powered by the mains using, for example, the stabilized power supply SWD10 input 100÷240 Vac output 12 Vdc – 1000mA.

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:

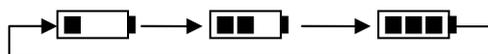
The power supply has a double function: it **powers the meter and recharge** the Ni-MH battery pack.

8.1 BATTERIES RECHARGING

To recharge the battery pack use the **SWD10** battery charger.

Proceed as follows:

- Connect the battery charger plug to the mains socket, and the battery charger connector to the socket placed on the left side of the instrument. **The power supply must be 12Vdc.**
- The batteries recharging process is highlighted on the instrument display with a cyclic visualization of the batteries level:



- Keep charging the batteries until the [≈] symbol appears on the display in the place of the battery symbol.

8.2 NOTES FOR THE BATTERIES USE

- At the first start up, it's necessary to completely recharge the batteries.
- The charge time of the batteries package is about 4 hours.
- The last of the batteries package in measurement working mode is about 8 hours.
- A new Ni-MH batteries package reaches the maximum of its performance only after being discharged and charged completely again at least twice or three times.
- The batteries package autonomy depends on the instrument use. Even if the instrument is in stand-by with the batteries package completely charges, it is autonomously charged during the time.
- The batteries package can be charge and discharge hundred of times, but using them the charge loses its own capacity. Replace the batteries package when the autonomy is reduced at some hours.
- Use only Delta Ohm batteries package code **BAT-40** and recharge it using **SWD10** battery charger or one that complies with the specifications indicated in the technical data.
- The Ni-MH batteries package lasts more if, sometimes, you act with cutting and you completely discharge it.
- Extreme temperatures weigh negatively on the performances of the batteries package.

8.3 REPLACEMENT OF THE BATTERY PACK

To replace the battery pack proceed as follows:

- Disconnect the external power supply, if connected.
- Remove, from the back of the instrument, the batteries compartment cover unscrewing the screw.
- Extract the connector paying attention to not break the wires.
- Remove the battery pack.
- Connect the new battery pack: the connector has a key that prevents a wrong insertion.
- Replace the pack in the batteries compartment.
- Close the batteries compartment with the closing screw.

8.4 BATTERIES DISPOSAL

Recycle the batteries or throw them in a suitable manner.

Don't throw the batteries to the waste.

Don't throw the batteries into the fire.

9. 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 solvents for cleaning.

10. TECHNICAL CHARACTERISTICS

Instrument

Dimensions (Length x Width x Height)	185x90x40 mm
Weight	470 g (batteries included)
Materials	ABS, rubber
Display	Backlit, Dot Matrix 160x160 dots, visible area 52x42 mm

Operating conditions

Operating temperature	-5 ... 50°C
Warehouse temperature	-25 ... 65°C
Working relative humidity	0 ... 85% RH without condensation

Protection degree

IP66

Instrument uncertainty

± 1 digit @ 20°C

Power

Mains adapter (code SWD10)	12Vdc/1A
Batteries	4 x 1.2V Ni-MH rechargeable batteries AA type
Autonomy	8 hours of continuous use in measure mode (with P37AB147 probe connected)
Power absorbed with instrument off	< 45µA

Security of stored data

Unlimited

Connections

Input for probes with SICRAM module 2 x 8-pole male DIN45326 connectors

You can connect the following probes to the **Indoor Air Quality** input:

- **P37AB147**
- **P37B147**
- **Temperature** probes complete with SICRAM module
- **Temperature and Humidity** combined probes with SICRAM module

You can connect the following probes to the **Temp – Air Velocity** input:

- **Hot-Wire Sensor Wind Speed** probes with SICRAM module
- **Vane Wind Speed** probes with SICRAM module
- **Temperature** probes complete with SICRAM module

Serial interface:

Socket: 8-pole-M12
Type: RS232C (EIA/TIA574) or USB 1.1 or 2.0 non insulated
Baud rate: Between 1200 and 38400 baud.
With USB baud=460800
Data bits: 8
Parity: None
Stop bits: 1
Flow control: Xon-Xoff
Cable length: RS232C: max. 15 m, USB: max. 5m

Memory

Divided in 64 blocks.

Storage capacity

67600 recordings per each of the 2 inputs.

Logging interval

Selectable among: 15, 30 seconds, 1, 2, 5, 15, 20, 30 minutes and 1 hour.

Logging interval	Storage capacity	Logging interval	Storage capacity
15 seconds	About 11 days and 17 hours	15 minutes	About 1 year and 339 days
30 seconds	About 23 days and 11 hours	20 minutes	About 2 years and 208 days
1 minute	About 46 days and 22 hours	30 minutes	About 3 years and 313 days
2 minutes	About 93 days and 21 hours	1 hour	About 7 years and 261 days
5 minutes	About 234 days and 17 hours		

10.1 TECHNICAL DATA OF THE PROBES THAT CAN BE CONNECTED TO THE INSTRUMENT

10.1.1 P37AB147 and P37B147 SICRAM probes

- **P37AB147:** Measurement of CO₂ – CO – Relative Humidity – Temperature – Atmospheric Pressure.
- **P37B147:** Measurement of CO₂ – Relative Humidity – Temperature – Atmospheric Pressure.

CO₂ Carbon Dioxide

Sensor	NDIR Dual Wavelength
Measurement range	0 ... 5000ppm
Sensor working range	-5 ... 50°C
Accuracy	±50ppm+3% of measure
Resolution	1ppm
Temperature dependence	0.1%f.s./°C
Response time (T ₉₀)	< 120 sec (wind speed = 2m/sec)
Long-term stability	5% of measure/5 years

CO Carbon Monoxide (only P37AB147)

Sensor	Electrochemical cell
Measurement range	0 ... 500ppm
Sensor working range	-5 ... 50°C
Accuracy	±3ppm+3% of measure
Resolution	1ppm
Response time (T ₉₀)	< 50 sec
Long-term stability	5% of measure/year
Service life	> 5 years in normal environment conditions

Relative Humidity RH

Type of sensor	Capacitive
Sensor protection	Stainless steel grid filter (on request 20µm sintered filter P6 in AISI 316 or 10µm sintered filter P7 in PTFE)
Measurement range	0 ... 100 % RH
Sensor working range	-20 ... +60°C
Accuracy	±2% (10÷90% RH) ±2.5% in the remaining range
Resolution	0.1% RH
Temperature dependence	±2% on all temperature range
Hysteresis and repeatability	1% RH
Response time (T ₉₀)	< 20 sec (wind speed = 2m/sec) without filter
Long-term stability	1%/year

Temperature T

Type of sensor	NTC 10kΩ
Measurement range	-20 ... +60°C
Accuracy	±0.2°C ±0.15% of measure
Resolution	0.1°C
Response time (T ₉₀)	< 30 sec (wind speed = 2m/sec)
Long-term stability	0.1°C/year

Atmospheric Pressure Patm

Type of sensor	Piezo-resistive
Measurement range	750 ... 1100 hPa
Accuracy	±1.5 hPa @ 25°C
Resolution	1 hPa
Long-term stability	2hPa/year
Temperature drift	±3hPa with temperature -20 ... +60°C

10.1.2 Relative humidity and temperature combined probes using SICRAM module

Model	Temperature sensor	Application range		Accuracy	
		%RH	Temperature	%RH	Temp.
HP472ACR	Pt100	0...100%UR	-20°C...+80°C	±1.5%UR (10...90%UR)	±0.3°C
HP473ACR	Pt100	0...100%UR	-20°C...+80°C	±2.5%RH remaining range	±0.3°C
HP474ACR	Pt100	0...100%UR	-40°C...+150°C	±2.5% (10...95%UR) ±3.5% remaining range	±0.3°C
HP475ACR	Pt100	0...100%UR	-40°C...+150°C		±0.3°C
HP475AC1R	Pt100	0...100%UR	-40°C...+150°C		±0.3°C
HP477DCR	Pt100	0...100%UR	-40°C...+150°C		±0.3°C
HP478ACR	Pt100	0...100%UR	-40°C...+150°C		±0.3°C
					±0.3°C

Common characteristics

Relative Humidity

Sensor	Capacitive
Typical capacity @30%RH	300pF±40pF
Sensor operating temperature	-20 ... 80°C
Measurement range	0÷100%RH
Uncertainty	±1.5% RH (10...90% RH) ±2.5% RH in the remaining range
Resolution	0.1%RH
Temperature drift @20°C	0.02%RH/°C
Response time %RH	10sec (10÷80% RH; wind speed=2m/s) at constant temperature

Temperature with sensor Pt100

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

10.1.3 Hot-Wire Wind Speed measurement probes with SICRAM module: AP471S1 – AP471S2 – AP471S3 – AP471S4

	AP471 S1 - AP471 S3	AP471 S2	AP471 S4
Type of measurements	Wind speed, calculated flow rate, air temperature		
Type of sensor			
Speed	NTC thermistor	Omni directional NTC thermistor	
Temperature	NTC thermistor	NTC thermistor	
Measurement range			
Speed	0.1 ... 40m/s	0.1 ... 5m/s	
Temperature	-25 ... +80°C	-25 ... +80°C	0...80°C
Measurement resolution			
Speed	0.01 m/s 0.1 km/h 1 ft/min 0.1 mph 0.1 knot		
Temperature	0.1°C		
Measurement accuracy			
Speed	±0.1 m/s (0...0.99 m/s) ±0.3 m/s (1.00...9.99 m/s) ±0.8 m/s (10.00...40.0 m/s)	±0.05m/s (0...0.99 m/s) ±0.15m/s (1.00...5.00 m/s)	
Temperature	±0.8°C (-10...+80°C)	±0.8°C	(-10...+80°C)
Minimum speed	0.1 m/s		
Air temperature compensation	0...80°C		
Sensor working conditions	Clean air, RH<80 %		
Battery life	Approx. 20 hours @ 20 m/s with alkaline batteries	Approx. 30 hours @ 5 m/s with alkaline batteries	
Unit of measurement			
Speed	m/s – km/h – ft/min – mph – knot		
Flow Rate	l/s - m ³ /s - m ³ /min - m ³ /h - ft ³ /s - ft ³ /min		
Pipeline section for flow rate calculation	0.0001 ... 1.9999 m ²		
Cable length	~2m		

10.1.4 Vane Wind Speed measurement probes with SICRAM module: AP472S1 – AP472S2 – AP472S4

	AP472 S1	AP472 S2	AP472 S4...			
			L	LT	H	HT
<i>Type of measurements</i>	Wind speed, calculated flow rate, air temperature	Wind speed, calculated flow rate	Wind speed, calculated flow rate	Wind speed, calculated flow rate, air temperature	Wind speed, calculated flow rate	Wind speed, calculated flow rate, air temperature
<i>Diameter</i>	100 mm	60 mm	16 mm			
<i>Type of measurement</i>						
<i>Speed</i>	Vane	Vane	Vane			
<i>Temperature</i>	Tc K	----	----	Tc K	----	Tc K
<i>Measurement range</i>						
<i>Speed (m/s)</i>	0.6 ... 25	0.5 ... 20	0.8 ... 20		10 ... 40	
<i>Temperature (°C)</i>	-25...+80 (*)		-25...+80 (*)			
<i>Resolution</i>						
<i>Speed</i>	0.01 m/s 0.1 km/h 1 ft/min 0.1 mph 0.1 knot					
<i>Temperature</i>	0.1°C	----	----	0.1°C	----	0.1°C
<i>Accuracy</i>						
<i>Speed</i>	±(0.3 m/s +1.5%f.s.)	±(0.3m/s +1.5%f.s.)	±(0.4 m/s +1.5%f.s.)			
<i>Temperature</i>	±0.8°C	----	----	±0.8°C	----	±0.8°C
<i>Minimum speed</i>	0.6m/s	0.5m/s	0.8m/s		10m/s	
<i>Unit of measurement</i>						
<i>Speed</i>	m/s – km/h – ft/min – mph – knot					
<i>Flow Rate</i>	l/s - m ³ /s - m ³ /min - m ³ /h - ft ³ /s - ft ³ /min					
<i>Pipeline section for flow rate calculation</i>	0.0001...1.9999 m ²					
<i>Cable length</i>	~2m					

(*) The indicated value refers to the vane's working range.

10.1.5 Temperature probes Pt100 using SICRAM module

Model	Type	Application range	Accuracy
TP472I	Immersion	-196°C...+500°C	±0.25°C (-196°C...+350°C) ±0.4°C (+350°C...+500°C)
TP472I.0	Immersion	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP473P.0	Penetration	-50°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP474C.0	Contact	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP475A.0	Air	-50°C...+250°C	±0.3°C (-50°C...+250°C)
TP472I.5	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP472I.10	Immersion	-50°C...+400°C	±0.3°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49A	Immersion	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AC	Contact	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP49AP	Penetration	-70°C...+400°C	±0.25°C (-50°C...+350°C) ±0.4°C (+350°C...+400°C)
TP875	Globe thermometer Ø 150 mm	-30°C...+120°C	±0.25°C
TP876	Globe thermometer Ø 50mm	-30°C...+120°C	±0.25°C
TP87	Immersion	-50°C...+200°C	±0.25°C
TP878 TP878.1	Photovoltaic	+5°C...+80°C	±0.25°C
TP879	Compost	-20°C...+120°C	±0.25°C

Common characteristics
Temperature drift @20°C

0.003%/°C

11. ORDERING CODES

HD37AB1347 IAQ Monitor datalogger instrument complete with: **DeltaLog10** software (**version 0.1.5.0 and later**) for data download, monitor, and data processing on Personal Computer, 4 x 1.2V NiMH rechargeable batteries, operating manual, case. **The probes and cables must be ordered separately.**

11.1 CARBON DIOXIDE, CARBON MONOXIDE, RELATIVE HUMIDITY, TEMPERATURE, AND ATMOSPHERIC PRESSURE PROBES WITH SICRAM MODULE

P37AB147 CO₂ Carbon Dioxide, CO Carbon Monoxide, Relative Humidity RH, Temperature T and Atmospheric Pressure Patm combined probe. Dimensions 275 mm x 45 mm x 40 mm. Connection cable length 2 meters.

P37B147 CO₂ Carbon Dioxide, Relative Humidity RH, Temperature T and Atmospheric Pressure Patm combined probe. Dimensions 275 mm x 45 mm x 40 mm. Connection cable length 2 meters.

11.2 RELATIVE HUMIDITY AND TEMPERATURE PROBES USING SICRAM MODULE

HP472ACR Combined probe %RH and temperature, dimensions Ø 26x170 mm. Connection cable length 2 meters.

HP473ACR Combined probe %RH and temperature. Handle size Ø 26x130 mm, probe Ø 14x120 mm. Connection cable length 2 meters.

HP474ACR Combined probe %RH and temperature. Handle size Ø 26x130 mm, probe Ø 14x215 mm. Connection cable length 2 meters.

HP475ACR Combined probe %RH and temperature. Connection cable length 2 meters. Handle Ø 26x110 mm. Stainless steel stem Ø 12x560 mm. Point Ø 14x75 mm.

HP475AC1R Combined probe %RH and temperature. Connection cable length 2 meters. Handle 80 mm. Stainless steel stem Ø 14x480 mm.

HP477DCR Combined sword probe %RH and temperature. Connection cable length 2 meters. Handle Ø 26x110 mm. Probe's stem 18x4mm, length 520 mm.

HP478ACR Combined probe %RH and temperature. Dimensions Ø 14x130 mm. Connection cable length 5 meters.

11.3 HOT-WIRE WIND SPEED MEASUREMENT PROBES WITH SICRAM MODULE

AP471 S1 Hot-wire telescopic probe, measuring range: 0.1...40m/s. Cable length 2 meters.

AP471 S2 Omni directional hot-wire telescopic probe, measuring range: 0.1 ... 5m/s. Cable length 2 meters.

AP471 S3 Hot-wire telescopic probe with terminal tip for easy position, measuring range: 0.1 ... 40m/s. Cable length 2 meters.

AP471 S4 Omni directional hot-wire telescopic probe with base, measuring range: 0.1 ... 5m/s. Cable length 2 meters.

11.4 VANE WIND SPEED MEASUREMENT PROBES WITH SICRAM MODULE

AP472 S1 Vane probe with thermocouple K, Ø 100 mm. Speed from 0.6 to 20m/s; temperature from -25 to 80°C. Cable length 2 meters.

AP472 S2 Vane probe, Ø 60mm. Measurement range: 0.5...20m/s. Cable length 2 meters.

AP472 S4L Vane probe, Ø 16 mm. Speed from 0.8 to 20m/s. Cable length 2 meters.

AP472 S4LT Vane probe, Ø 16 mm. Speed from 0.8 to 20 m/s. Temperature from -25 to 80°C with thermocouple K sensor. Cable length 2 meters.

AP472 S4H Vane probe, Ø 16 mm. Speed from 10 to 40m/s. Cable length 2 meters.

AP472 S4HT Vane probe, Ø 16 mm. Speed from 10 to 40m/s. Temperature from -25 to 80°C with thermocouple K sensor. Cable length 2 meters.

11.5 TEMPERATURE MEASUREMENT PROBES WITH SICRAM MODULE

TP472I	Pt100 sensor immersion probe. Stem Ø 3 mm, length 300 mm. Cable length 2 meters.
TP472I.0	Pt100 sensor immersion probe. Stem Ø 3 mm, length 230 mm. Cable length 2 meters.
TP473P	Pt100 sensor penetration probe. Stem Ø 4 mm, length 150 mm. Cable length 2 meters.
TP473P.0	Pt100 sensor penetration probe. Stem Ø 4 mm, length 150 mm. Cable length 2 meters.
TP474C	Pt100 sensor contact probe. Stem Ø 4 mm, length 230 mm, contact surface Ø 5 mm. Cable length 2 meters.
TP474C.0	Pt100 sensor contact probe. Stem Ø 4 mm, length 230 mm, contact surface Ø 5 mm. Cable length 2 meters.
TP475A.0	Pt100 sensor air probe. Stem Ø 4 mm, length 230 mm. Cable length 2 meters.
TP472I.5	Pt100 sensor immersion probe. Stem Ø 6 mm, length 500 mm. Cable length 2 meters.
TP472I.10	Pt100 sensor immersion probe. Stem Ø 6 mm, length 1000 mm. Cable length 2 meters.
TP49A	Pt100 sensor immersion probe. Stem Ø 2.7 mm, length 150 mm. Cable length 2 meters. Aluminium handle.
TP49AC	Pt100 sensor contact probe. Stem Ø 4 mm, length 150 mm. Cable length 2 meters. Aluminium handle.
TP49AP	Pt100 sensor penetration probe. Stem Ø 2.7 mm, length 150 mm. Cable length 2 meters. Aluminium handle.
TP875	Globe thermometer Ø 150 mm with handle. Cable length 2 meters.
TP876	Globe thermometer Ø 50 mm with handle. Cable length 2 meters.
TP87	Pt100 sensor immersion probe. Stem Ø 3 mm with handle, length 70mm. Cable length 2 meters.
TP878	Contact probe for photovoltaic panels. Cable length 2 meters.
TP878.1	Contact probe for photovoltaic panels. Cable length 5 meters.
TP879	Penetration probe per compost. Stem Ø 8 mm, length 1 meter. Cable length 2 meters.

11.6 ACCESSORIES

SWD10	Stabilized power supply at 100-240Vac/12Vdc-1A mains voltage.
VTRAP20	Tripod to be fixed to the instrument, maximum height 270 mm.
HD2110/RS	Connection cable with M12 connector on instrument's side and sub D 9-pole female connector for RS232C on PC's side.
HD2110/USB	Connection cable with M12 connector on instrument's side and USB 2.0 connector on PC's side.
HD40.1	Printer (it uses the HD2110/RS cable).
BAT-40	Spare batteries for the HD37AB1347 instrument with built-in temperature sensor.

11.6.1 Accessories for HD40.1 printer

BAT-40	Spare batteries for the HD40.1 printer with built-in temperature sensor.
RCT	Kit of four thermo-paper rolls, width 57 mm, diameter 32 mm.

11.6.2 Accessories for P37AB147 and P37B147 SICRAM probes

MINICAN.12A	Nitrogen bottle for CO and CO ₂ sensor calibration at 0ppm. Volume 12 liters. With adjustment valve.
MINICAN.12A1	Nitrogen bottle for CO and CO ₂ sensor calibration at 0ppm. Volume 12 liters. Without adjustment valve.
ECO-SURE-2E CO	CO spare sensor (only P37AB147)
HD37.36	Kit connection tube between instrument and MINICAN.12A for CO calibration (only P37AB147).
HD37.37	Kit connection tube between instrument and MINICAN.12A for CO ₂ calibration.

11.6.3 Accessories for Wind Speed SICRAM probes

AST.1	Telescopic rod (fully closed 210 mm, fully open 870 mm) for AP472S1 and AP472S2 vanes.
AP 471S1.23.6	Fixed telescopic element Ø 16 x 300 mm, M10 male thread on one side, female thread on the other side. For AP472S1, AP472S2, AP472S4 vanes.
AP 471S1.23.7	Fixed telescopic element Ø 16 x 300 mm, M10 female thread on one side only. For AP472S1, AP472S2, AP472S4 vanes.

11.6.4 Accessories for Temperature-Humidity SICRAM probes

HD75	Saturated solution at 75.4%RH@20°C for calibration of relative humidity probes, ring M24x1.5 and M14x1.
HD33	Saturated solution at 33.0%RH@20°C for calibration of relative humidity probes, ring M24x1.5 and M14x1.
P5	Protection grid in stainless steel for Ø 14mm probes.
P6	Complete protection in 20µ sintered AISI 316 for Ø 14mm probes.
P7	Complete protection in 10µ sintered PTFE for Ø 14mm probes.
P8	Protection grid in stainless steel and Pocan for Ø 14mm probes, thread M12x1.

The Delta Ohm Metrological Laboratories are accredited by SIT in regards to Temperature, Humidity, Pressure, Photometry/Radiometry, Acoustics and Wind Speed. On request, the probes can be supplied with calibration certificate.

CERTIFICATO DI CONFORMITÀ DEL COSTRUTTORE

MANUFACTURER'S CERTIFICATE OF CONFORMITY

rilasciato da
issued by

DELTA OHM SRL MEASURING INSTRUMENTS

DATA 2010/02/10
DATE

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.

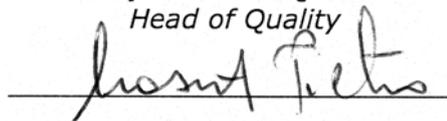
La riferibilità delle misure ai campioni internazionali e nazionali è garantita da una catena di riferibilità che ha origine dalla taratura dei campioni di prima linea dei laboratori accreditati di Delta OHM presso l'Istituto Primario Nazionale di Ricerca Metrologica.

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: Indoor Air Quality Monitor
Product Type: Indoor Air Quality Monitor

Nome Prodotto: HD37AB1347
Product Name: HD37AB1347

Responsabile Qualità
Head of Quality



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Cod. Fisc./P.Iva IT03363960281 - N.Mecc. PD044279
R.E.A. 306030 - ISC. Reg. Soc. 68037/1998

GUARANTEE



TERMS OF GUARANTEE

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



The electrical and electronic equipment marked with this symbol cannot be disposed of in public landfills. According to the 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: **HD37AB1347**

Serial Number _____

RENEWALS

Date _____

Date _____

Inspector _____

Inspector _____

Date _____

Date _____

Inspector _____

Inspector _____

Date _____

Date _____

Inspector _____

Inspector _____



CE CONFORMITY

Safety	EN61000-4-2, EN61010-1 LEVEL 3
Electrostatic discharges	EN61000-4-2 LEVEL 3
Fast electric transients	EN61000-4-4 LEVEL 3
Voltage variations	EN61000-4-11
Electromagnetic interference susceptibility	IEC1000-4-3
Electromagnetic interference emission	EN55022 class B