GB - User's manual

CHAUVIN® ARNOUX
CHAUVIN ARNOUX GROUP

C.A 1246

Thermo-hygrometer

Measure up

Thank you for purchasing this **C.A 1246 thermo-hygrometer**.
For best results from your instrument:

- **read** these operating instructions carefully,
- **comply** with the precautions for use.

Information or useful tip.

Battery.

Magnet.

The product is declared recyclable following an analysis of the life cycle in accordance with standard ISO 14040.

Chauvin Arnoux has adopted an Eco-Design approach in order to design this appliance. Analysis of the complete life-cycle has enabled us to control and optimize the effects of the product on the environment. In particular this appliance exceeds regulation requirements with respect to recycling and reuse.

The CE marking indicates conformity with European directives, in particular LVD and EMC.

The rubbish bin with a line through it indicates that, in the European Union, the product must undergo selective disposal in compliance with Directive WEEE 2002/96/EC. This equipment must not be treated as household waste.

PRECAUTIONS FOR USE

This instrument is compliant with safety standard IEC 61010-2-030, for voltages up to 5V with respect to ground. Failure to observe the safety instructions may result in electric shock, fire, explosion, and destruction of the instrument and of the installations.

- The operator and/or the responsible authority must carefully read and clearly understand the various precautions to be taken in use. Sound knowledge and a keen awareness of electrical hazards are essential when using this instrument.
- Observe the conditions of use, namely the temperature, the relative humidity, the altitude, the degree of pollution, and the place of use.
- Do not use the instrument if it seems to be damaged, incomplete, or poorly close.
- Before each use, check the condition of the housing. Any item of which the insulation is deteriorated (even partially) must be set aside for repair or scrapping.
- All troubleshooting and metrological checks must be done by competent, accredited personnel.

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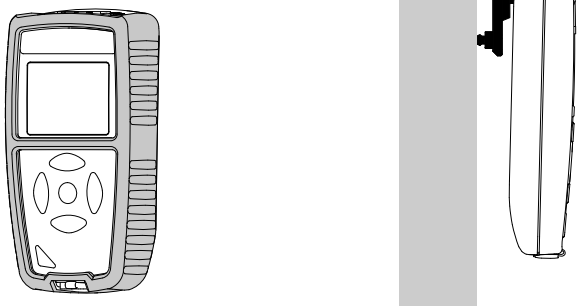
1. FIRST USE

1.1. DELIVERY CONDITION

Thermo-hygrometer C.A 1246
Supplied in a cardboard box with:
- three AA or LR6 alkaline batteries,
- one USB-micro USB cord,
- one multilingual getting started guide,
- one multilingual safety data sheet,
- one test report,
- one carrying case.

1.2. ACCESSORIES

- Cartridge of salt at 33% RH
- Cartridge of salt at 75% RH
- Multi-purpose attachment accessory
- Carrying bag.
- USB-Bluetooth adapter
- USB-mains adapter with USB-micro USB cord.
- Protecting sheath
- DataView application software

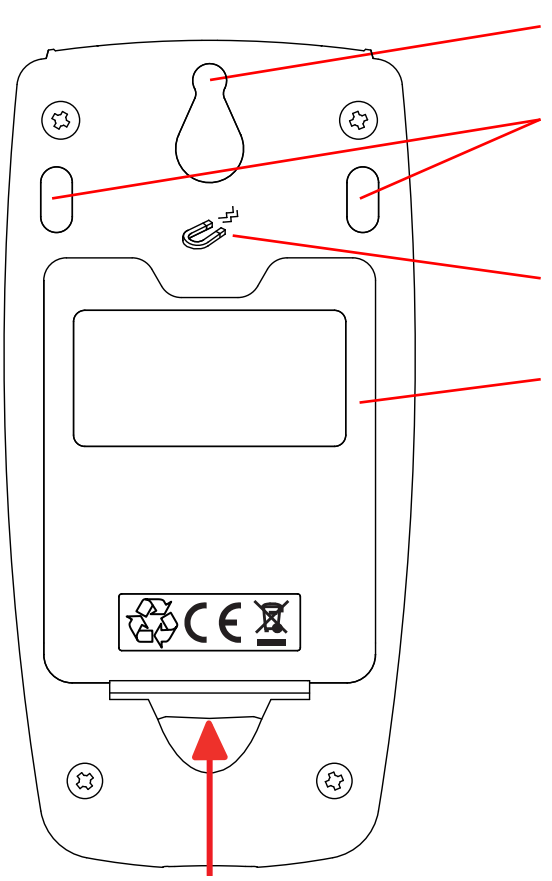


1.3. SPARE PARTS

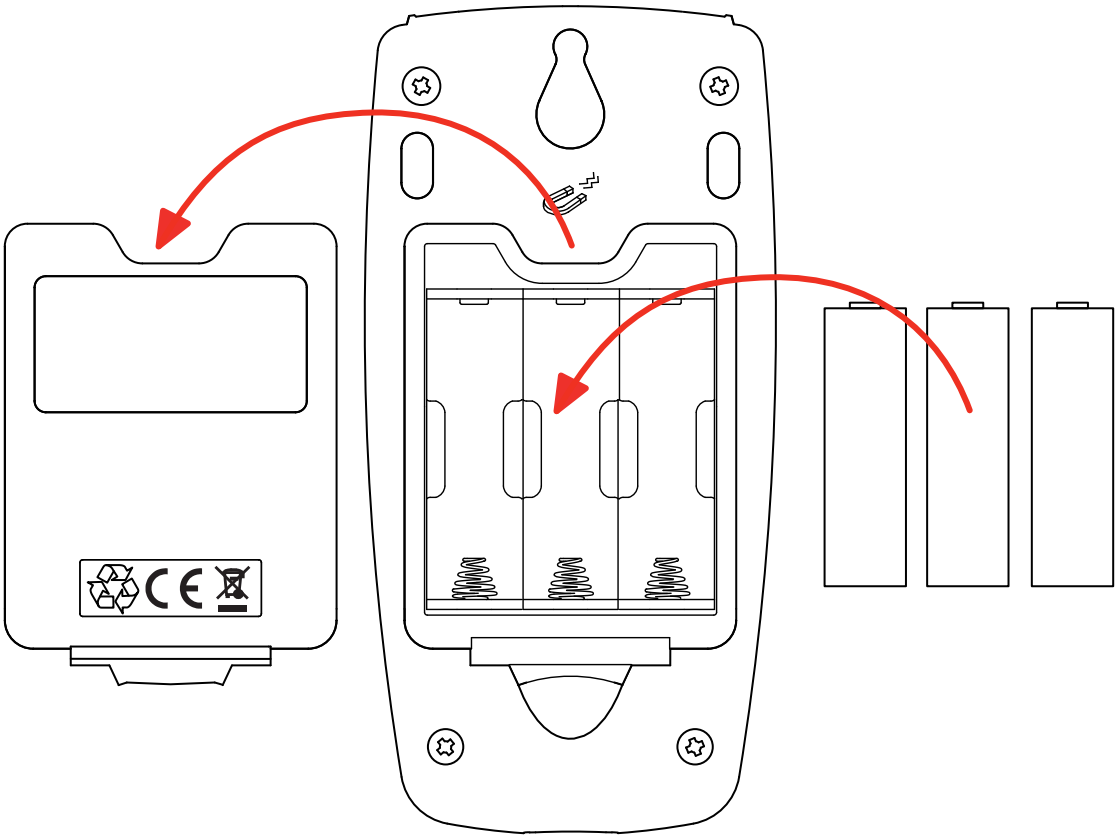
USB-micro USB cord

For the accessories and spares, consult our web site:
www.chauvin-arnoux.com

1.4. INSERTING THE BATTERIES

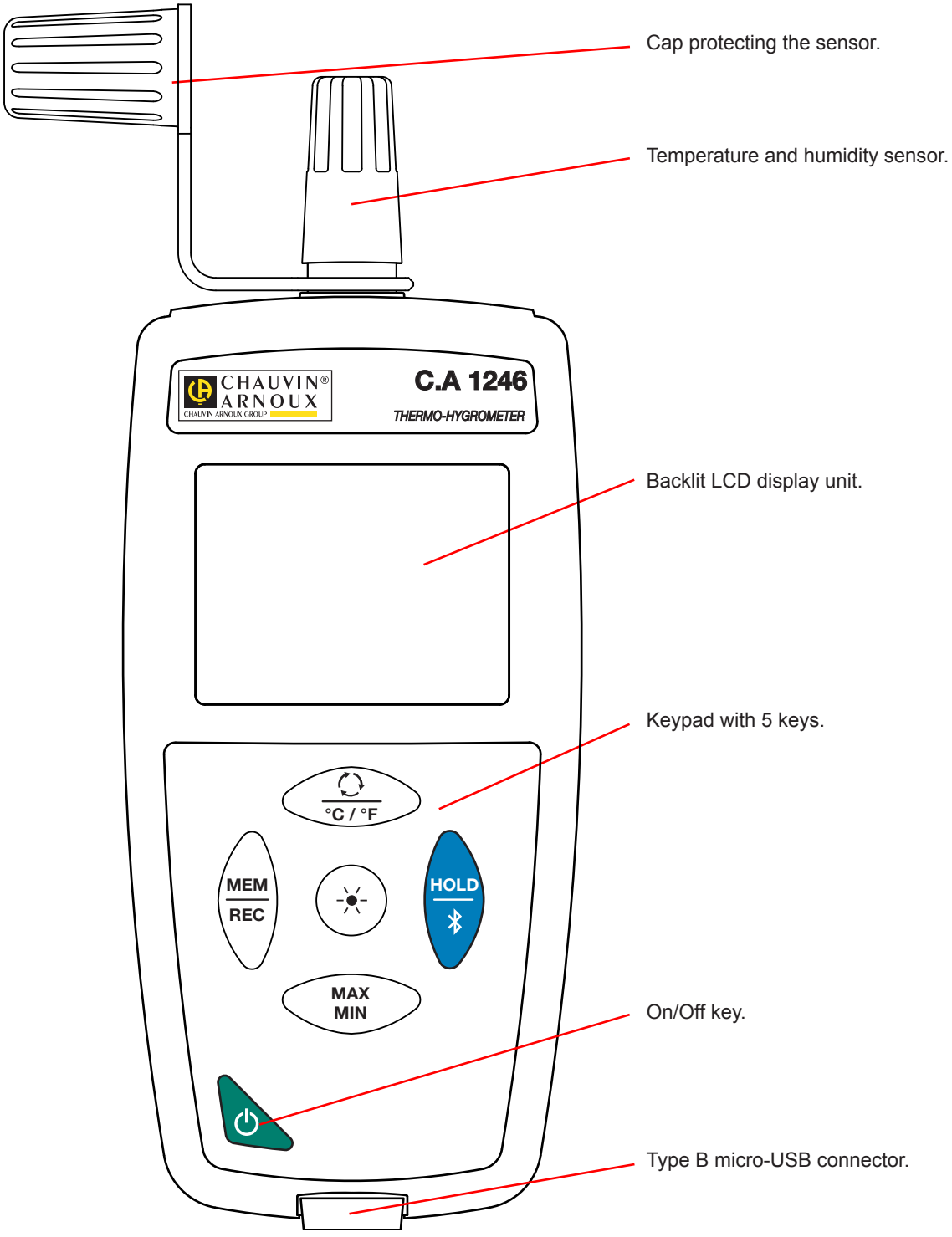


- Press the tab of the battery compartment cover and lift it clear.
- Withdraw the battery compartment cover.
- Insert the new batteries, paying attention to the polarity.
- Close the battery compartment cover; make sure that it is completely and correctly closed.



2. PRESENTATION OF THE INSTRUMENT

2.1. C.A 1246



2.2. FUNCTIONS OF THE INSTRUMENT

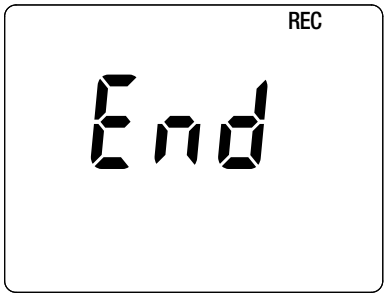
The C.A 1246 is a thermo-hygrometer. It is used to measure temperatures from -10 to +60°C and relative humidity from 3 to 98% RH.

This instrument is easy to use. It has extensive stand-alone capabilities and can display:
- temperature measurements in °C or in °F,
- to record a minimum and a maximum in a specified period,
- to record the measurements,
- to communicate with a PC via a Bluetooth link or a USB cable.

The Data Logger Transfer software can be installed on a PC and is used to configure the instruments and to recover the recorded measurements.

2.3. ON/OFF KEY

A long press on the ⏻ key switches the instrument on.
A second long press on the ⏻ key switches the instrument off when it is on.



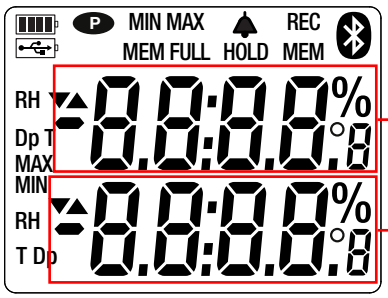
However, it is not possible to switch the instrument off when it is in record mode and is recording.
If during start-up the instrument displays the screen shown opposite, it means that a recording session has been brutally interrupted by a power outage.

During the display of this screen, the instrument recovers the recorded data. The longer the record, the longer the recovery. Do not interrupt the recovery or the data will be lost.

2.4. FUNCTION KEYS

<table>
<tr><th>Key</th><th>Function</th></tr>
<tr><td>°C/°F</td><td>
■ A short press on the ⟳ key displays:
<table>
<tr><td>Secondary display unit</td><td>Relative humidity (RH)</td><td>Dew point (Dp)</td><td>Dew point (Dp)</td></tr>
<tr><td>Main display unit</td><td>Temperature (T)</td><td>Relative humidity (RH)</td><td>Temperature (T)</td></tr>
</table>
■ A long press on the °C/°F key toggles the unit in which the temperature is displayed between °C and °F.
</td></tr>
<tr><td>MEM
REC</td><td>■ A short press on the MEM key records the measurement and the date.
■ A long press on the REC key starts or stops a recording session.</td></tr>
<tr><td>☀</td><td>A short press on the ☀ key switches on the back-lighting.</td></tr>
<tr><td>HOLD
ᛒ</td><td>■ A short press on the HOLD key freezes the display.
■ A long press on the ᛒ key activates or deactivates the Bluetooth link.</td></tr>
<tr><td>MAX MIN</td><td>■ A short press on the MAX MIN key opens the MAX MIN mode; the current values continue to be displayed.
■ A second press displays the maximum value.
■ A third press displays the minimum value.
■ A fourth press results in a return to the first-press condition and display of the current values
■ A long press is used to exit from the MAX MIN mode.</td></tr>
</table>

2.5. DISPLAY



Secondary display unit.

Main display unit.

When the measurement exceeds the limits (positive or negative), the instrument displays OL.

P: indicates that auto-off is disabled and the instrument is in permanent mode.

- This occurs when:
- the instrument is recording, in MAX MIN mode, in MAP mode, or in HOLD;
- the instrument is connected via the USB cord either to an external power supply or for communication with a PC;
- the instrument is in communication via Bluetooth;
- or auto-off is disabled (see §4.5.3).

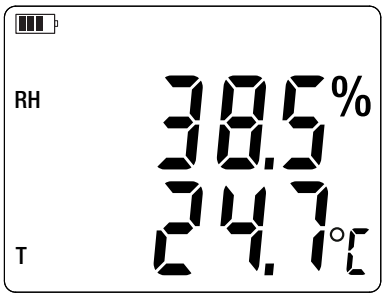
3. USE IN STAND-ALONE MODE

The instrument can operate in two modes:
- the stand-alone mode described in this section,
- the record mode, in which it is controlled by a PC. This mode is described in the next section.

3.1. TEMPERATURE AND HUMIDITY MEASUREMENT

- Remove the cap protecting the sensor.
- Long-press the ⏻ key to switch the instrument on.

The instrument displays the time, then the measurement. The time is set using the Data Logger Transfer software (see §4).



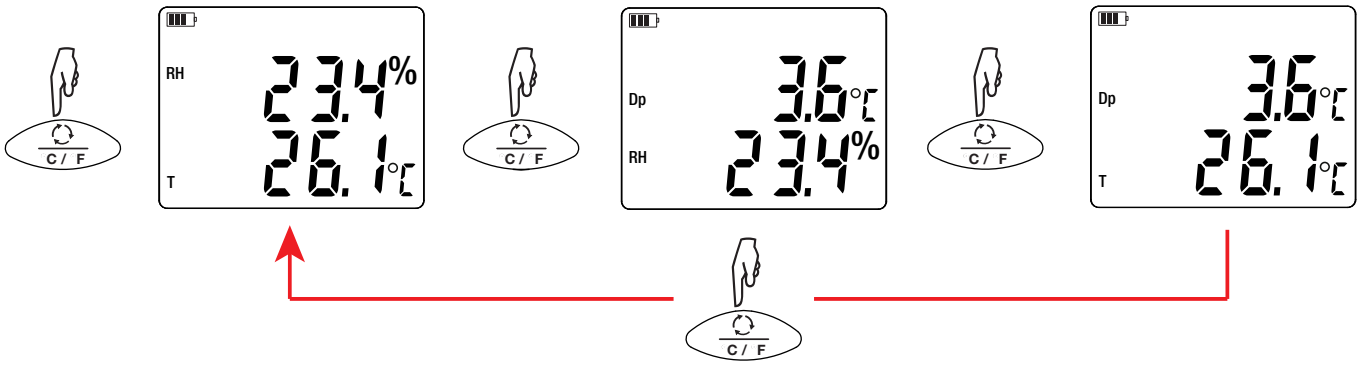
- To display the measurements in °F, press the **°C/°F** key.

Keep the sensor away from your mouth to avoid throwing off the humidity measurement.

Wait for the display to stabilize before reading the measurement.

3.2. OTHER FUNCTIONS

- The display can be changed by pressing the ⟳ key. The instrument then displays the dew point (Dp) and the relative humidity (RH). A second press displays the dew point (Dp) and the ambient temperature (T). A third press restores the initial display.

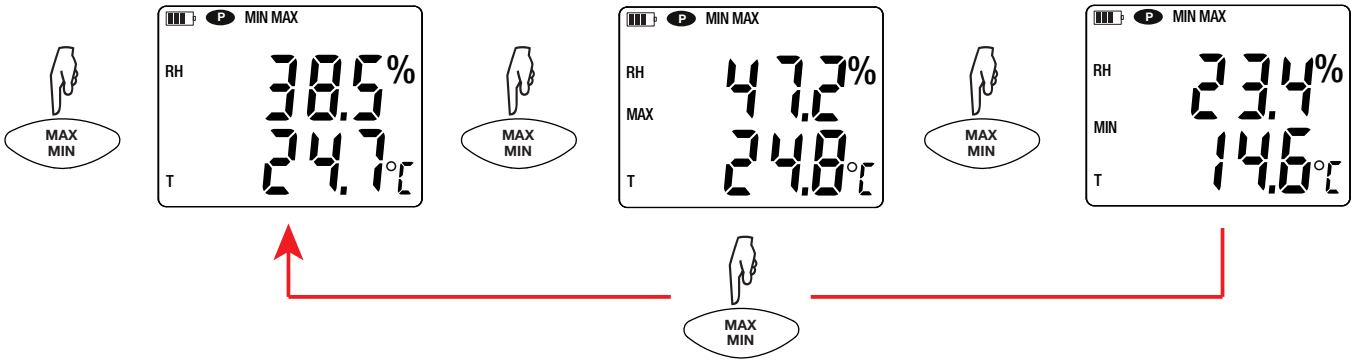


The last display selected is saved when the instrument is switched off.

The relative humidity (RH) is the ratio of the quantity of water vapour contained in a volume of air to the maximum quantity of water vapour this same volume of air could contain at the same temperature and same pressure.

The dew point is the lowest temperature to which a mass of air can be subjected, at constant pressure and absolute humidity, without liquid water forming by saturation.

- The **MAX MIN** key can be pressed to monitor the minimum and maximum values. Press the key a second time and the instrument displays the maximum (on both display units). A third press and the instrument displays the minimum. A fourth press and it returns to the current values. To exit from the MAX MIN mode, long-press the **MAX MIN** key.



- Pressing the **HOLD** key freezes the display. A second press unfreezes it.

3.3. RECORDING THE MEASUREMENTS

- A short press on the **MEM** key records the measurement and the date.
- A long press on the **REC** key starts or stops a recording session.

To see the records, you must use a PC and install the Data Logger Transfer software (see §4).

3.4. ALARMS

You can program alarms on each of the measurements (temperature and relative humidity) using the Data Logger Transfer software. When the instrument operates in stand-alone mode, if an alarm threshold is programmed, the symbol is displayed.

When a threshold is crossed, the symbol blinks.
- ▲ indicates that the measurement is above the high threshold,
- ▼ indicates that the measurement is below the low threshold,
- ▼▲ indicates that the measurement is between the 2 thresholds.

3.5. ERRORS

The instrument detects errors and displays them in the form Er.XX. The main errors are the following:

Er.01: Hardware malfunction detected. The instrument must be sent in for repair.
Er.02: Error in internal memory. Format it using Windows.
Er.03: Hardware malfunction detected. The instrument must be sent in for repair.
Er.10: The instrument has not been adjusted or is not correctly adjusted. The instrument must be sent back to customer service.
Er.11: The update of the internal software is not compatible with the instrument (the software is that of another instrument of the line). Install the correct internal software in your instrument.
Er.12: The update of the internal software is not compatible with the electronic boards in the instrument. Reload the previous internal software into your instrument.
Er.13: Recording scheduling error. Check that the instrument's time and the time of the Data Logger Transfer software are the same.

4. USE IN RECORDING MODE

The instrument can operate in two modes:
- the stand-alone mode described in the previous section,
- the record mode, in which it is controlled by a PC. This mode is described below.

4.1. CONNECTION

The device has 2 communication modes:
- A USB link via a USB-micro USB cord,
- A Bluetooth 4.0 BLE wireless link.

4.2. GET DATA LOGGER TRANSFER SOFTWARE

Visit our web site to download the latest version of the application software:
www.chauvin-arnoux.com

Go to the **Support** tab, then **Download our software**. Then search on the name of your instrument.

Download the software, then install it on your PC.

You must have administrator privileges on your PC to install the Data Logger Transfer software.

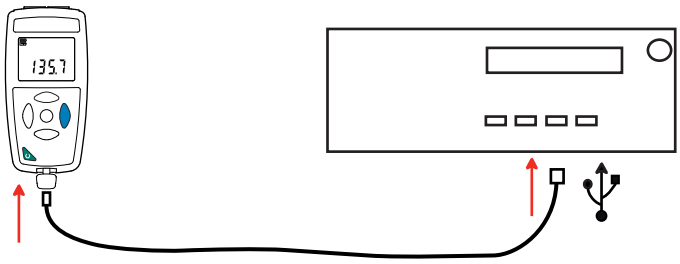
Minimum computer requirements:
- Windows 7 (32/64 bits)
- 2 GB of RAM
- 200 MB of disc space

Windows® is a registered trade mark of Microsoft®.

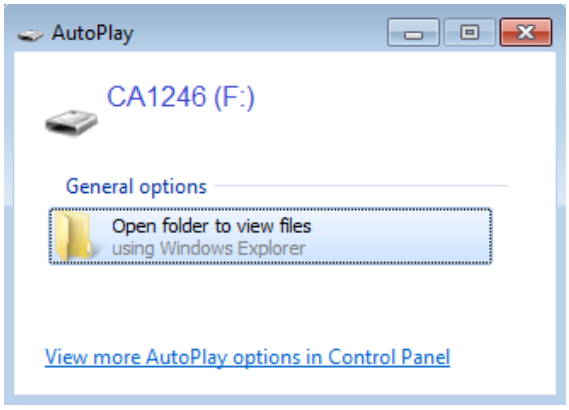
4.3. USB LINK

Long-press the ⏻ key to switch the instrument on.

Once the Data Logger Transfer software has been installed, connect the instrument to the PC.



It is treated as a USB key and you can access its content. But to read the records, you must use the Data Logger Transfer software.



4.4. BLUETOOTH LINK

The instrument has a low-energy Bluetooth 4.0 link that requires no pairing.

- Activate Bluetooth on your PC. If your PC does not have a Bluetooth link, you can add a board or Bluetooth adapter connected to a USB port (see §1.2).

Since Windows 7 does not manage low-energy Bluetooth, a specific USB/Bluetooth adapter must be used (see §1.2).

- Switch the instrument on by a long press on the ⏻ key, then activate the Bluetooth link by a long press on the ᛒ key. The symbol is displayed.
- The instrument is then ready to communicate with the PC.

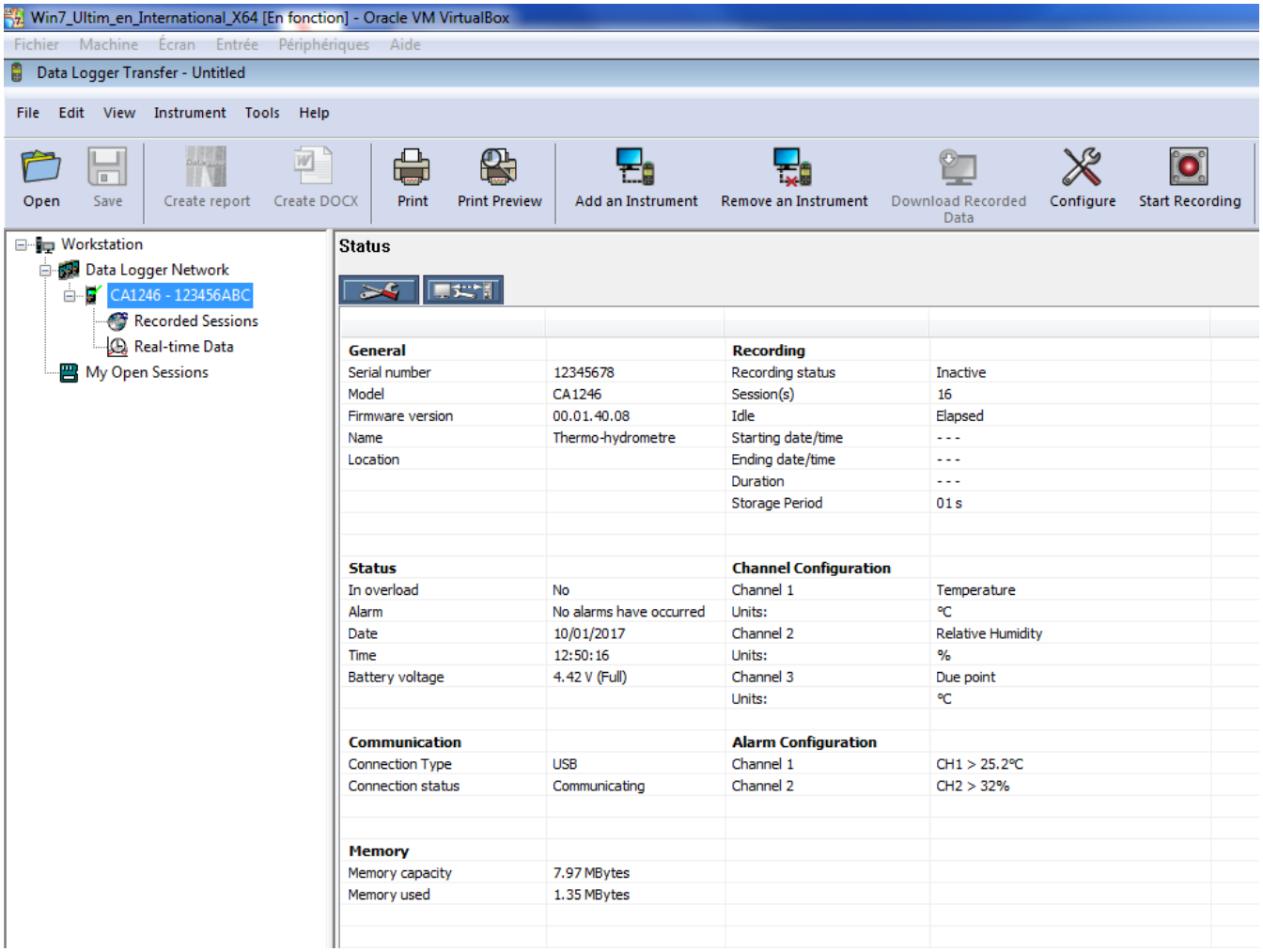
4.5. DATA LOGGER TRANSFER SOFTWARE

Once the instrument has been connected to the PC, whether by USB or by Bluetooth, open the Data Logger Transfer software.

For context-sensitive information about the use of the Data Logger Transfer software, refer to the **Help** menu.

4.5.1. CONNECTING THE INSTRUMENT

- To connect an instrument, click **Add an instrument**, then choose the type of connection (USB or Bluetooth).
- A window opens with a list of all instruments connected to the PC.
  The name of the instrument will be formed from the model of the instrument and the warranty number: CA 1110 - 123456ABC
  You can personalize your instrument by adding a name and a location, by clicking on or .
- Choose your instrument in the list. The software then displays complete information about the instrument and its measurements in progress.



4.5.2. DATE AND HOUR

The **Instrument** menu lets you set the your instrument's date and time.
These cannot be changed while recording or when a recording session has been scheduled.
By clicking , you can choose the date and time display formats.

4.5.3. AUTO OFF

As default, the instrument switches itself off automatically after 3 minutes of operation without the user's presence being confirmed by a key-press. By clicking , you can change this value to 3, 10, or 15 minutes.

It is also possible to disable this auto-off function; the instrument then displays the P symbol.

4.5.4. PROGRAMMED RECORDING SESSIONS

By clicking , you can program a recording session. Assign a name to the recording session. Then enter a starting date and time and an ending date and time or a duration. The maximum duration of a recording session depends on the memory available.

Choose a sampling period. The possible values are: 1 s, 2 s, 5 s, 10 s, 20 s, 30 s, 1 min, 2 min, 5 min, 10 min, 15 min, 30 min and 1 hour. The shorter the sampling period, the larger the recorded file.

Before and after the recording session, if the instrument is switched on, the sampling period will be that of the stand-alone mode (1s).

If the instrument is off when recording starts, it switches itself on by itself. Then it displays the measurement, which it refreshes at each sampling period.

Before starting a recording session, make sure that the battery life is sufficient, or else connect the instrument to an external power supply to a wall outlet using a micro USB cord.

4.5.5. DISPLAY

By clicking on , then opening the **Thermo-hygrometer** tab, you can modify the display of the measurements on the instrument in the same way as you can by pressing the or **°C/°F** keys.

4.5.6. ALARM

By clicking on , then opening the **Alarms** tab, you can program an alarm on each of the measurement channels (temperature and humidity). It may be triggered if the measurement is:

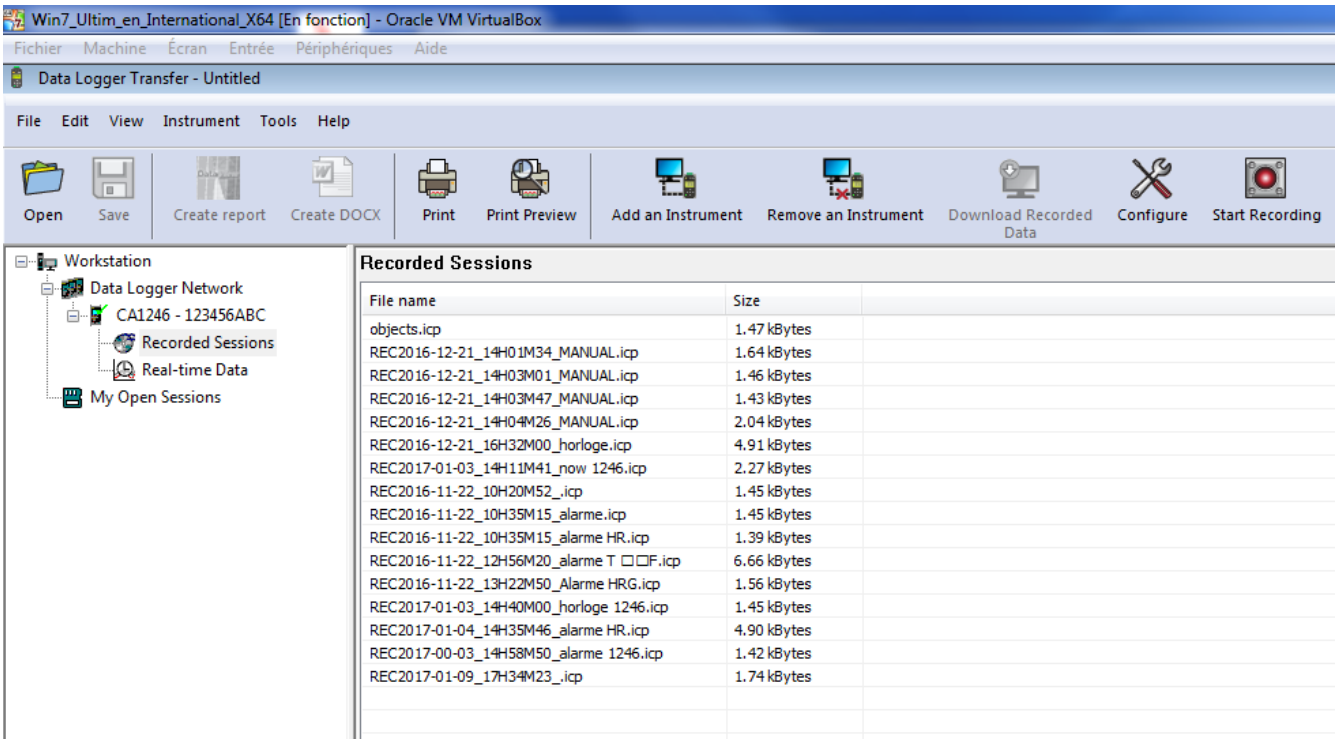
- above a high threshold,
- below a low threshold,
- between 2 thresholds,
- above the high threshold or below the low threshold.

4.5.7. RECORDING ON ALARM CONDITION

You can program recording to be triggered only when an alarm threshold is crossed ( ). The instrument then records the measurements for the programmed duration.
To ensure that no crossing of an alarm threshold is missed, the instrument cannot be switched off when this is done.

4.5.8. READING THE RECORDS

The Data Logger Transfer software lets you read the records made. Click **Recorded Sessions** under the name of your instrument to obtain a list of the records.



4.5.9. EXPORTING RECORDS

Once the list of the records is displayed, choose the one you want to export and convert it into a word-processing document (docx) or a spreadsheet (xlsx), in order to be able to use it in the form of reports or curves.

It is also possible to export the data to the DataView application software (see §1.2).

4.5.10. REAL-TIME MODE

Click **Real-time data** under the name of your instrument to see the measurements being made on the instrument as they are made.

4.5.11. FORMATTING THE MEMORY OF THE INSTRUMENT

The internal memory of the instrument is already formatted. But if there is a problem (if it becomes impossible to read or to write), it may be necessary to reformat it (in Windows).

In this case, all of the data will be lost.

5. TECHNICAL CHARACTERISTICS

5.1. REFERENCE CONDITIONS

Quantity of influence	Reference values
Temperature	23 ± 2°C
Relative humidity	45% to 75%
Supply voltage	3 to 4.5V
Electric field	< 1V/m
Magnetic field	< 40A/m

The intrinsic uncertainty is the error specified for the reference conditions.

5.2. ELECTRICAL CHARACTERISTICS

5.2.1. TEMPERATURE MEASUREMENTS

Specified measurement range	- 10 to + 60°C	14 to + 140°F
Resolution	Display in °C: 0.1°C	Display in °F: 0.1°F
Intrinsic uncertainty	from 10 to 40°C: ± (0.5°C ± 1 pt) outside of this range: ± (0.032 x (T-25) ± 1 pt)	

T = temperature in °C

5.2.2. HUMIDITY MEASUREMENTS

Specified measurement range	3 to 98% RH
Resolution	0.1 %HR
Intrinsic uncertainty	from 10 to 90% RH: ± (2% RH ± 1 pt) outside of this range: ± (4% RH ± 1 pt)
Hysteresis	± 1% RH If the humidity sensor is exposed for an extended period to a relative humidity below 10% RH or above 80% RH, subsequent measurements will be offset. The longer the exposure, the larger the offset. This offset can reach 3% RH if the sensor remains for 60 hours at 90% RH. The offset will disappear after 5 days at ambient temperature (20 to 30°C and 40 to 60% RH).
Long-term drift	<0.5% RH per year

A sensor exposed to a high temperature (for example in a car in direct sunlight) will also be exposed to a very low relative humidity. In consequence, several days of recovery at ambient temperature will be necessary.

5.2.3. DEW POINT MEASUREMENTS

Specified measurement range	- 10 to + 60°C	14 to + 140°F
Resolution	Display in °C: 0.1°C	Display in °F: 0.1°F
Intrinsic uncertainty	from 20 to 30%RH: ± 1,5°C >30%RH: ± 1°C	

5.2.4. PSYCHROMETRIC DIAGRAM

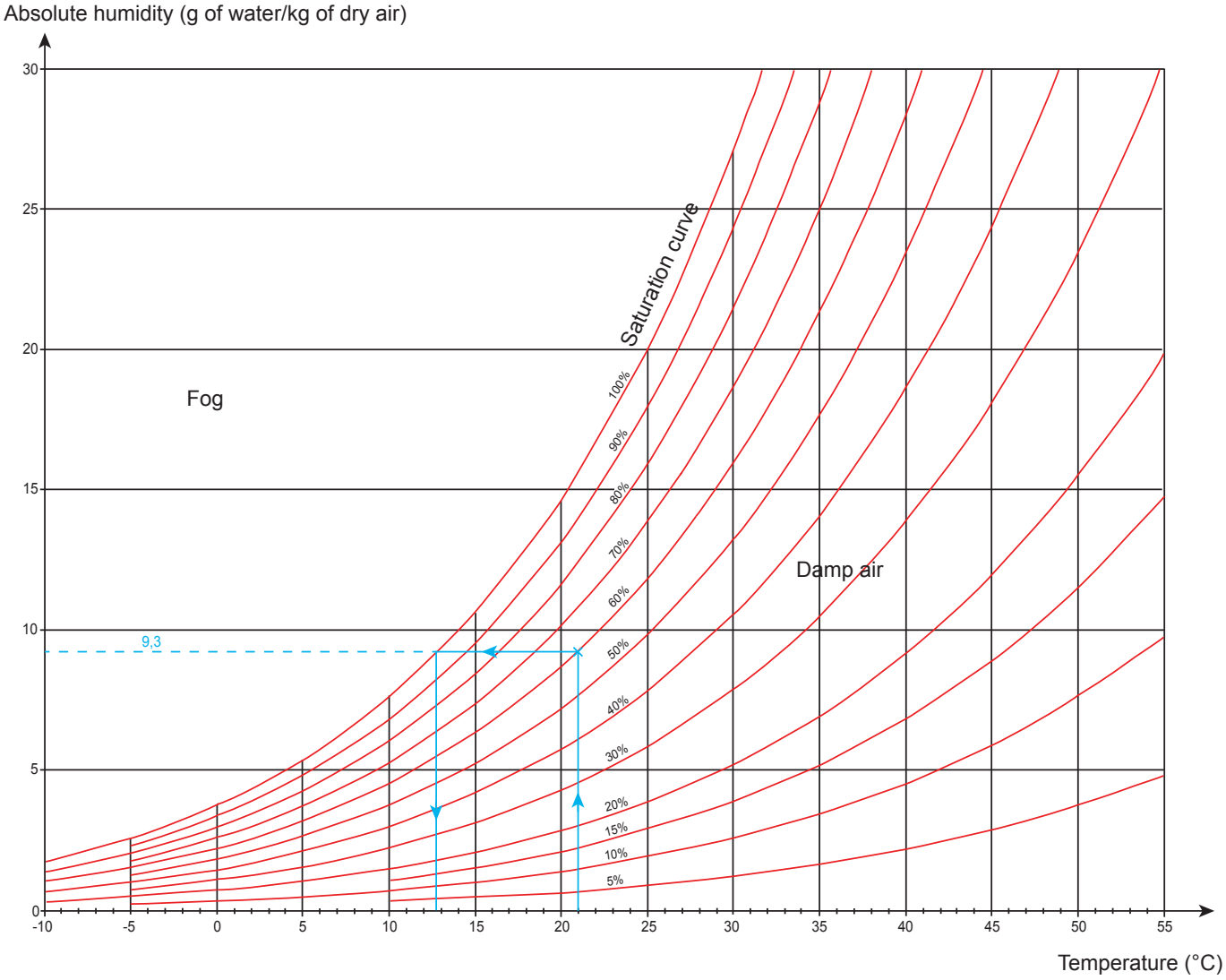
The atmospheric air that surrounds us is a mixture of:

- dry air,
- and water vapour, generally invisible, that may be found in liquid form (condensation).

There exists on the quantity of water vapour (or absolute humidity) a limiting value beyond which any additional quantity of water vapour immediately turns into liquid water.

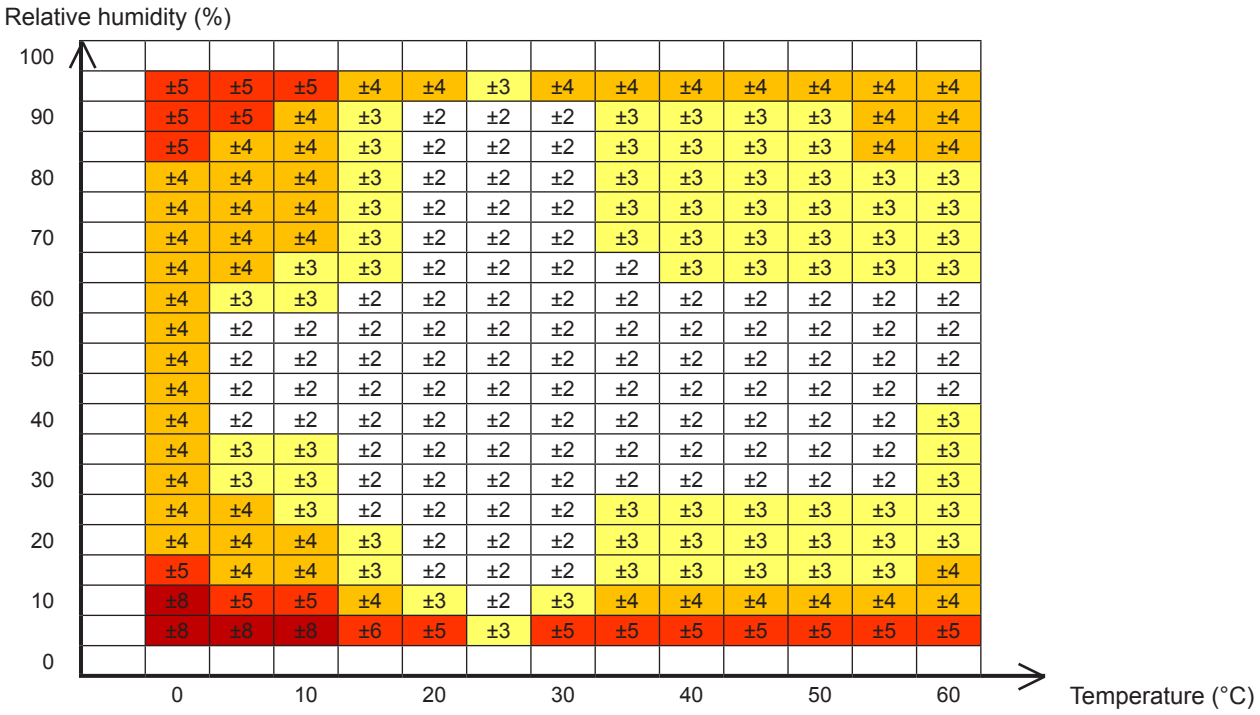
This phenomenon is known as “saturation” and is the cause of fog, dew, and condensation on cold surfaces that cool the air in contact with them.

To represent the state of the air and its evolution in graphic form, Mollier’s psychrometric diagram can be used; it represents absolute humidity versus temperature for different values of the relative humidity.



Example of use:
For air at 21°C and 60% RH, the absolute humidity is 9.3g/kg and the dew point is 12.8°C.

5.2.5. INFLUENCE OF TEMPERATURE ON THE HUMIDITY MEASUREMENT



	0	10	20	30	40	50	60
100							
90	±5	±5	±5	±4	±4	±3	±4	±4	±4	±4	±4	±4	±4
80	±5	±5	±4	±3	±2	±2	±2	±3	±3	±3	±3	±4	±4
70	±5	±4	±4	±3	±2	±2	±2	±3	±3	±3	±3	±4	±4
60	±4	±4	±4	±3	±2	±2	±2	±3	±3	±3	±3	±3	±3
50	±4	±4	±4	±3	±2	±2	±2	±3	±3	±3	±3	±3	±3
40	±4	±4	±4	±3	±2	±2	±2	±3	±3	±3	±3	±3	±3
30	±4	±4	±3	±3	±2	±2	±2	±2	±3	±3	±3	±3	±3
20	±4	±3	±3	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2
10	±4	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2
0	±4	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2
	±4	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2
	±4	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2
	±4	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±2	±3
	±4	±3	±3	±2	±2	±2	±2	±2	±2	±2	±2	±2	±3
	±4	±3	±3	±2	±2	±2	±2	±2	±2	±2	±2	±2	±3
	±4	±4	±3	±2	±2	±2	±2	±3	±3	±3	±3	±3	±3
	±4	±4	±4	±3	±2	±2	±2	±3	±3	±3	±3	±3	±3
	±5	±4	±4	±3	±2	±2	±2	±3	±3	±3	±3	±3	±4
	±8	±5	±5	±4	±3	±2	±3	±4	±4	±4	±4	±4	±4
	±8	±8	±8	±6	±5	±3	±5	±5	±5	±5	±5	±5	±5

The relative humidity is highly dependent on the temperature. To calibrate the instrument, the two sensors (the reference sensor and the sensor of the instrument) must indicate the same temperature.

At each measurement, you must note both values: the temperature and the relative humidity. They are inseparable.

5.2.6. RESPONSE TIME

Typical response time with an air speed of 2m/s:
- Temperature: τ(66%) = 30s and τ(90%) = 90s.
- Relative humidity: τ(66%) = 60s and τ(90%) = 150s.

τ(66%): Response time to 66%
τ(90%): Response time to 90%

5.3. MEMORY

The size of the flash memory containing the records is 8 MB.

This capacity is sufficient to record a million measurements. At each measurement, the temperature, the humidity, and the dew point are recorded, along with the date, the time, and the unit.

5.4. USB

Protocol: USB Mass Storage
Maximum transmission speed: 12 Mbit/s
Type B micro-USB connector

5.5. BLUETOOTH

Bluetooth 4.0 BLE
Range 10m typical and up to 30m in line of sight.
Output power: +0 to -23 dBm
Nominal sensitivity: -93 dBm
Maximum transfer rate: 10 kbits/s
Average consumption: 3.3 µA to 3.3 V

5.6. POWER SUPPLY

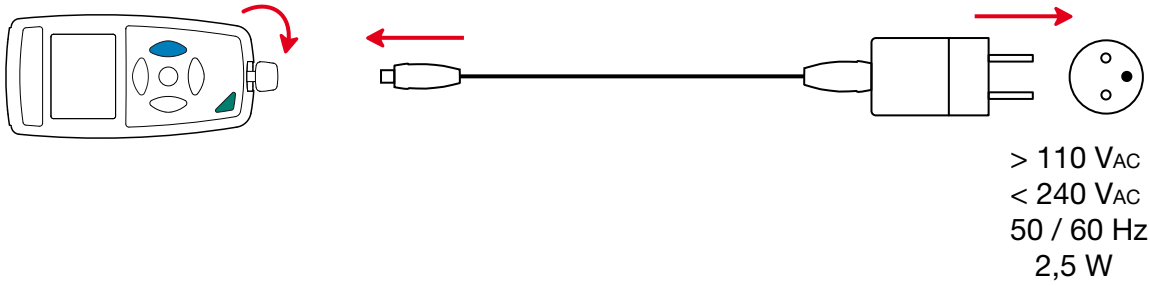
The instrument is supplied by three 1.5V LR6 or AA alkaline batteries. It is possible to replace the batteries by rechargeable NiMH batteries of the same size. But the rechargeable batteries, even when correctly charged, will not reach the voltage of the alkaline batteries and the life indicated will be or .

The voltage range ensuring correct operation is from 3 to 4.5V for the alkaline batteries and 3.6V for the rechargeable batteries.

Below 3V, the instrument stops making measurements and displays BAt.

Battery life (with the Bluetooth connection deactivated) is:
- in stand-alone mode, 1000h
- in recording mode: 3 years at rate of one measurement every 15 minutes.

The instrument can also be powered via a USB-micro USB cord, connected either to a PC or to a wall outlet via a mains adapter.



5.7. ENVIRONMENTAL CONDITIONS

For use indoors and outdoors.

Operating range	-10 to 60°C and 10 to 90%RH without condensation
Storage range	-20 to +70°C and 10 to 95%RH without condensation, without batteries
Altitude	< 2000m, and 10,000m in storage.
Pollution degree	2

5.8. MECHANICAL CHARACTERISTICS

Dimensions (L x W x H)	187 x 72 x 32 mm
Mass	260 g approx.
Inrush protection	IP 54, with the USB connector closed and the protective cap in place, per IEC 60.529.
Drop impact test	1 m per IEC 61010-1.

5.9. COMPLIANCE WITH INTERNATIONAL STANDARDS

The instrument is compliant with standard IEC 61010-1.

5.10. ELECTROMAGNETIC COMPATIBILITY (CEM)

The instrument is compliant with standard IEC 61326-1.

6. MAINTENANCE

Except for the batteries, the instrument contains no parts that can be replaced by personnel who have not been specially trained and accredited. Any unauthorized repair or replacement of a part by an "equivalent" may gravely impair safety.

6.1. CLEANING

Switch the instrument off.

Use a soft cloth, dampened with soapy water. Rinse with a damp cloth and dry rapidly with a dry cloth or forced air. Do not use alcohol, solvents, or hydrocarbons.

6.2. REPLACEMENT OF BATTERIES

The symbol indicates the remaining battery life. When the symbol is empty, all of the batteries must be replaced.

- Disconnect everything connected to the instrument and switch it off.
- Refer to §1.4 for the replacement procedure.

Spent batteries must not be treated as ordinary household waste. Take them to the appropriate recycling collection point.

6.3. MAINTENANCE

The sensor must not be exposed to volatile chemicals such as solvents or other organic compounds. If the concentration of the substances is high or if exposure to them is prolonged, the sensor's performance may be irreversibly impaired.

For example: ketene, acetone, ethanol, isopropyl alcohol, toluene, hydrogen chloride, sulphuric acid, nitric acid, ammonia, ozone, hydrogen peroxide, etc.

6.4. UPDATING THE EMBEDDED SOFTWARE

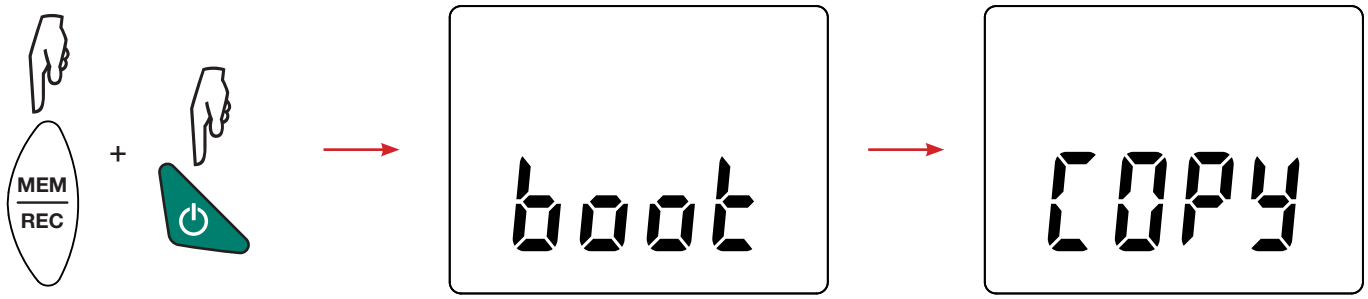
With a view to providing, at all times, the best possible service in terms of performance and technical improvements, Chauvin-Arnoux offers you the possibility of updating the internal software of this instrument by downloading, free of charge, the new version available on our web site.

See you on our site:
www.chauvin-arnoux.com
Then go to "Support", then "Download our software", then "C.A 1246".

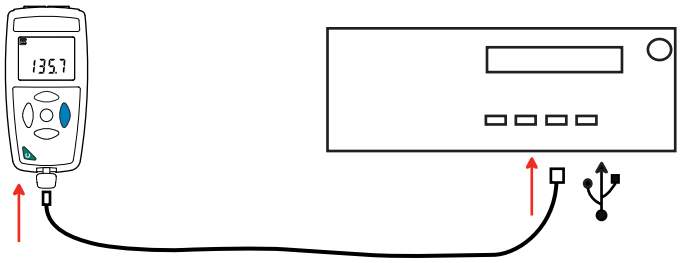
Updating the embedded software may reset the configuration and cause the loss of the recorded data. As a precaution, save the data in memory to a PC before updating the embedded software.

Embedded software update procedure

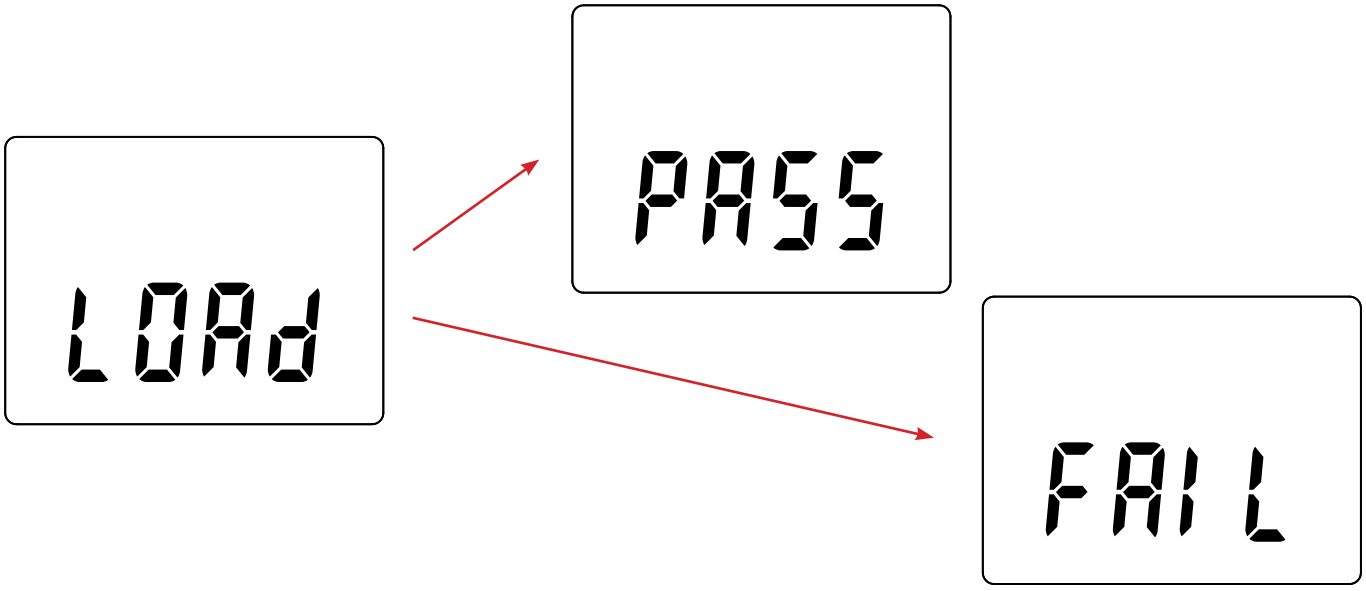
- Download the .bin file from our web site, then press and hold the **MEM** key and switch the instrument on by pressing the ⏻ key. The instrument displays BOOT.



- Release the keys and the instrument displays COPY, indicating that it is ready to receive the new software.
- Connect the instrument to your PC using the USB cord provided.



- Copy the .bin file to the instrument as if were a USB key.
- When the copying is done, press the MEM key and the instrument displays LOAD, indicating that the software is being installed.



- When installation is done, the instrument displays PASS or FAIL according to whether or not the operation succeeded. If installation fails, download the software again and repeat the procedure.
- Then the instrument restarts normally.

After the internal software is updated, it may be necessary to reconfigure the instrument; see §4.5.

7. WARRANTY

Except as otherwise stated, our warranty is valid for **twelve months** starting from the date on which the equipment was sold. Extract from our General Conditions of Sale provided on request.

The warranty does not apply in the following cases:

- Inappropriate use of the equipment or use with incompatible equipment;
- Modifications made to the equipment without the explicit permission of the manufacturer's technical staff;
- Work done on the device by a person not approved by the manufacturer;
- Adaptation to a particular application not anticipated in the definition of the equipment or not indicated in the user's manual;
- Damage caused by shocks, falls, or floods.

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