

SKYWATCH®

# GEOS N°11

## *Instruction Manual*



SWISS  MADE



## ***How to use this Manual***

We thank you for selecting a SKYWATCH® instrument.

Even though this instrument was designed for ease of use in mind, we recommend that you nonetheless spend a little time reading this Manual in order to be able to use it to its full potential.

### ***Where to find information***

All the headlines and sub-headlines are regrouped under the 'Table of Contents'. Throughout the Manual, you will discover special symbols which will bring to your attention important aspects, general information and warnings. The diagrams showing some of the screens are also aimed at helping you fully understand how the instrument operates.

### ***Symbols used in this Manual***



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*Remark or additional information*

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**The instrument may be damaged or not work adequately if this instruction is not heeded.**

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**Warnings point out the precautionary measures to be taken in order to avoid some undesirable situations.**

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# Table of Contents

<b>How to use this Manual</b> .....	<b>2</b>
<i>Where to find information</i> .....	<b>2</b>
<i>Symbols used in this Manual</i> .....	<b>2</b>
<b>Table of Contents</b> .....	<b>3-5</b>
<b>Introduction</b> .....	<b>6</b>
<i>Background information</i> .....	<b>6</b>
<b>WARNING</b> .....	<b>6</b>
<i>Description of Instrument</i> .....	<b>7</b>
<i>Functions (Measuring Modes)</i> .....	<b>7</b>
<i>Description of the Sections of the Display Screen</i> .....	<b>8</b>
<i>Display principle with regard to functions</i> .....	<b>8</b>
<i>Distribution of basic modes over the standard screen</i> .....	<b>8-9</b>
<b>Starting up the Instrument</b> .....	<b>9</b>
<i>First Use (out of factory)</i> .....	<b>9-10</b>
<i>Instantaneous State</i> .....	<b>10</b>
<i>Normal State (on)</i> .....	<b>10</b>
<b>Switching the Instrument off</b> .....	<b>10-11</b>
<b>Basic Measuring Mode (Standard Screen)</b> .....	<b>11</b>
<i>General Use of Buttons</i> .....	<b>11</b>
<b>Wind speed</b> .....	<b>12</b>
<i>Measuring modes</i> .....	<b>12</b>
<i>Resetting the maximum wind speed to zero</i> .....	<b>12</b>
<i>Selecting the unit of measurement</i> .....	<b>12</b>
<b>Temperature</b> .....	<b>12</b>
<i>Measuring modes</i> .....	<b>12-13</b>
<i>Selecting the unit of measurement</i> .....	<b>13</b>
<i>Resetting the minimum and maximum values to zero</i> .....	<b>13</b>
<b>Humidity</b> .....	<b>13</b>
<i>Measuring modes</i> .....	<b>13</b>
<i>Resetting the minimum and maximum humidity to zero</i> .....	<b>14</b>
<b>Pressure</b> .....	<b>14</b>
<i>Measuring modes</i> .....	<b>14</b>
<i>Selecting the unit of measurement in relation to altitude</i> .....	<b>14</b>
<i>Calibration of the altitude</i> .....	<b>14-15</b>
<i>Resetting the maximum altitude and the QFE height</i> .....	<b>15</b>

Selecting the unit of measurement in relation to pressure ..	15
Calibration of relative pressure (QNH) .....	15-16
QFE height.....	16
Resetting the Maximum Altitude and the QFE Height.....	16
Calibration of QFE pressure .....	17
<b>Compass.....</b>	<b>17</b>
Display .....	17-18
Calibration.....	18
<b>Flight Level.....</b>	<b>19</b>
Display .....	19
<b>Special Screens.....</b>	<b>19</b>
<b>Special Measuring Modes.....</b>	<b>19</b>
<b>Special Menu.....</b>	<b>19</b>
Display .....	19-20
Enabling a Special Mode .....	20
<b>Date and Time .....</b>	<b>21</b>
Display .....	21
Operation .....	21
Calibration.....	21
<b>Barometric Tendency.....</b>	<b>21</b>
Display .....	21
Operation .....	21-23
<b>Chronometer .....</b>	<b>23</b>
Display .....	23
Operation .....	24
<b>Density Altitude .....</b>	<b>24</b>
Display .....	24
Operation .....	24
<b>Magnetic Field in <math>\mu</math>Tesla + Compass Heading.....</b>	<b>25</b>
Display .....	25
Operation .....	25
Calibration.....	25
Magnetic declination .....	25-26
<b>Variometer .....</b>	<b>26</b>
Display .....	26
Operation .....	26
<b>Finesse .....</b>	<b>26</b>
Display .....	26
Operation .....	27
<b>Memories, Viewing and Settings .....</b>	<b>27</b>

<b>Manual Recordings</b> .....	<b>27</b>
Display .....	27
Operation .....	28
Viewing .....	28
<b>Measurements Based on Selected Rate</b> .....	<b>29</b>
Display .....	29
Operation .....	29
Viewing .....	29
Selecting the rate of recordings .....	29
<b>History</b> .....	<b>30</b>
Display .....	30
Operation .....	30
Viewing and rate selection.....	30
<b>Other</b> .....	<b>30</b>
<b>States of the Instrument</b> .....	<b>30</b>
Storage .....	31
OFF.....	31
Automatic Stop .....	31-32
Permanent operation .....	32
Data transfer to a PC.....	32
Other states .....	33
<b>Resets</b> .....	<b>33</b>
Memory reset (deletion).....	33
Screens reset.....	33
General reset.....	33-34
Instrument reset.....	34
<b>Power Supply, Battery Replacement</b> .....	<b>34</b>
Batteries fitted in the instrument .....	34-35
Batteries of the Light Emitting Diode (LED )Lamp.....	35
Condition of the instrument battery.....	35-36
<b>LCD Display Test</b> .....	<b>36</b>
<b>Temperature Compensated Quartz</b> .....	<b>36</b>
<b>Calibration of the Pressure Sensor</b> .....	<b>37</b>
<b>Technical Specifications</b> .....	<b>37-38</b>
<b>LIMITED WARRANTY</b> .....	<b>39</b>

# ***Introduction***

## ***Background information***

The GEOS N°11 is a high performance instrument used by professionals, the culmination of our 25 years of experience in the development and manufacturing of measuring devices. It is solely built with industrial-quality components and uses Swiss-made barometric pressure, wind speed, humidity, and temperature sensors.

The instrument is put together with great care in our Swiss manufacturing facility, where sensor accuracy is controlled using our quality-certified laboratory equipment.

The GEOS N°11 is specially designed for intensive use in extremely harsh conditions. Yet, in order to maintain its aspect and accuracy, we recommend that you treat it with care and that you read this Manual carefully.

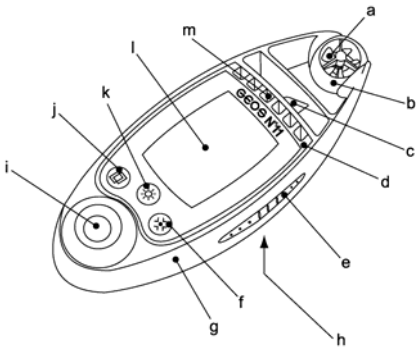
## **WARNING**

This instrument is designed as an aid to users who are in an open air environment, but IT CANNOT replace advice and warnings from the local weather station. This means that you should regularly check and compare the measurements provided by your instrument with the information put out by the weather station.

Open-air climatic conditions can sometimes change quite dramatically and this can happen very quickly indeed. Sunny weather can, for example, change to thunderstorm conditions in the space of half an hour and sometimes less. You should therefore always follow basic safety rules whenever you undertake open air activity.

Under no circumstances shall JDC ELECTRONIC SA be held liable for any consequence, be it direct or indirect, and for any damage that may occur as a result of using this instrument.

# Description of Instrument



## Legend

- |   |                                       |   |                                  |
|---|---------------------------------------|---|----------------------------------|
| a | wind sensor (impeller)                | h | lid of battery compartment       |
| b | protective sphere around the impeller | i | light emitting diode (LED) lamp  |
| c | weather vane                          | j | selection (SEL) button           |
| d | black metal case                      | k | luminosity (LUM) button          |
| e | ribbed rubber strip                   | l | mineral glass window             |
| f | modification (MOD) button             | m | protection slots for the sensors |
| g | plastic frame                         |   |                                  |

# Functions (Measuring Modes)

## Wind speed:

- instantaneous
- average
- maximum

## Temperature :

- instantaneous
- minimum
- maximum
- windchill
- minimum windchill
- maximum windchill

## Humidity:

- current relative

- minimum relative
- maximum relative
- Dew point:

## Pressure:

- absolute
- relative pressure (QNH)
- ground pressure (QFE)
- altitude
- maximum altitude
- density altitude
- QFE height
- flight level
- finesse
- variometer

- barometric tendency

## Compass (magnetic or true North):

- analogue
- digital

## Clock:

- date, time
- chronometer

## Other:

- battery voltage check
- diode lamp

# Description of the Sections of the Display Screen



- A *Upper block*
- B *Large block*
- C *Middle block*
- D *Lower block*
- E *Analogue compass block*

## Display principle with regard to functions (measuring modes)

Each measuring mode occupies a very particular space on the screen. Measuring modes are always displayed following the same principles, i.e.:

- **1 standard screen containing all the basic measuring modes.**
- **1 screen per special mode**, when activated.
- **1 'special menu'** used to enable/disable the special modes, view memories and carry out some adjustments.

## Distribution of basic modes over the standard screen

Each *block* (with the exception of the *large* one), accommodates several measuring modes; however, only one mode may be displayed at the same time per *block*. The basic measuring modes are displayed on the standard screen as follows:


*upper block*: average and maximum wind speed

*large block* : instantaneous wind speed

*middle block*: all the temperature and humidity measuring modes, including dew point

*lower block*: digital compass and all the functions relating to pressure, including altitude, flight level, and height

*compass block*: analogue compass (1 mark located under the bargraph indicates the heading)

The SEL () button is used to select a *block* (the *block* flashes when selected). The selection time (flashing) is 5 seconds. Each time the



button is pressed briefly, the next *block* is selected in the following order: *upper, large, middle, lower, upper*, etc. If one (or several) special mode has (have) been activated, the selection will take place as follows: *upper, large, middle, lower, special mode screen, upper*, etc.

The MOD (⊗) button is used to modify the display of a *block* (it scrolls down the various modes of the *block*), and will only work if the *block* is selected.

**Remark:** The last mode displayed on a *block* becomes the default mode for this *block*, which means that if the instrument is switched off than turned back on, the standard screen configuration will be the same as the configuration displayed before it was switched off.

## Starting up the Instrument

### First Use (out of factory)



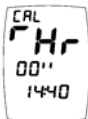
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*When fresh out of the production line, the instrument is supplied in a storage state, i.e. with all the sensors disabled, including the internal clock. This state allows the storage of the instrument for a long period of time without running the battery down.*

---



Press and keep down the ⊕ button, then release it; this activates the instrument which asks you to set the date. Select by pressing briefly the ⊕ button the direction of the setting (↗ increment, ↘ decrement) as well as the display format (02Apr or Apr02). Pressing briefly of the ⊗ button will scroll the days 02Apr, 03Apr, 04Apr.....30Apr, 01May, etc. To increase scrolling speed, keep the ⊗ button down, to switch to an even greater scrolling speed, release then keep the ⊗ button down again, etc. (4 speed levels). The year (displayed with 3 digits, here 006 = 2006) cannot be set individually, but changes automatically when passing from December 31st to January 1st. Once the date is set, keep the ⊕ button down to confirm your settings.



You are now about to set the time. With the ⊕ button select the scrolling direction (↗ increment, ↘ decrement) and the time format (A for AM and P for PM, or 24:00 format). Setting the time is also achieved with the help of the ⊗ button, and in the same way as with the date setting (please see above). Once the time is set, keep the ⊕ button

down to confirm your setting, the instrument is then activated and displays the standard screen.


Remark: Setting the date and time may also be carried out at a later stage. Please refer to Section on 'Special Modes'; 'Date and Time'.



## **Instantaneous State**

**(The instrument remains turned on for only 5 seconds)**

This state allows you to see the current measured values at a glance, while saving the battery.




When the instrument is off, **pressing the  button briefly** lights up the instrument, while the **inS** message displayed, meaning instantaneous, flashes on the *upper block* (see opposite). The instrument displays the default screen.

A second brief pressure on the  button displays the date (analogous day, month, hours, and seconds). By pressing briefly on the , the day of the week can be displayed instead of **inS**, and the year instead of the time.

With the third push of the button or after 5 seconds, the instrument turns off.

## **Normal State (on)**



When the instrument is in the OFF or instantaneous state, **keep pressing the  button down for 2 seconds**. The instrument displays the default screen.

## **Switching the Instrument off**

In order to manually turn off the instrument, keep any of the buttons down for 3 seconds; the stop screen is displayed and a countdown takes place on the *large block*: 3, 2, 1, 0, followed by the deactivation of the instrument. The *middle block* indicates the time before the automatic stop (new parameters may be entered, as shown under Section 'Other'; 'Automatic stop'). On the other hand, the **non STOP** message means that the instrument is in the permanent operating state. Following a manual stop, the instrument sets itself back by default in the auto-stop

state. Releasing the button during the countdown, brings back the default screen on the instrument.

## Basic Measuring Mode (Standard Screen)



*Reminder: All the basic modes that are described hereafter are available on the same screen ( standard screen), only the special modes avail of a screen per mode (see relevant section).*

*The last measuring mode displayed on a block becomes the default mode for this block; when you turn your instrument off and back on again (instantaneous and normal states), the configuration of your standard screen will be the same as that displayed when the instrument was turned off.*

### General Use of Buttons



**SElection Button:** a brief push of the button selects a *block* of the standard screen or a special screen, the **block flashes** when it is **selected** (the selection/flashing time is 5 seconds). When settings are entered or when looking at data, pressing it briefly makes it possible to change the direction of the adjustment. As a rule, pressing the button for 2 seconds will bring the standard screen back up, allow to terminate a calibration, or exit the special menu. By pressing it for a long time (3 seconds) in a flashing state it is possible to access the settings of a number of values. If the standard screen is normal (not flashing), pressing the button for a long time will turn off the instrument.



**LUMminosity Button:** a brief push of the button switches on the backlighting for 5 seconds, or turns it off if it is already on. Pressing the button for 1 second turns on the backlighting for a duration of 20 seconds. Activating a button when the backlighting is on, keeps it on for another 20 seconds, this in order to stop it from switching off while performing an adjustment for instance. Pressing the button for a long time turns off the instrument.



**MODification Button:** a brief push of the button changes the display of the selected *block* and gives access to the memories. Pressing the button for a long time makes it possible to change the unit of measurement of the selected *block* and reset certain values. Pressing the button for a long time turns off the instrument.

# Wind speed

## Measuring modes

---



Instantaneous wind speed    Maximum wind speed    Average wind speed

The measuring modes for the maximum and average wind speeds are displayed on the *upper block*, while the instantaneous wind speed is displayed on the *large block*. In order to access the measuring mode for the maximum reached or average wind speed, select (with the help of the  $\odot$  button) the *upper block* (it flashes), then use the  $\otimes$  button to modify the *block* display and switch from one measuring mode to another.

## Resetting the maximum wind speed to zero

---

Select the *upper block* and display the measuring mode for the maximum wind speed (it flashes), then press the  $\otimes$  button for 2 seconds.

## Selecting the unit of measurement

---

The instrument features 6 units of measurement in relation to wind speed: **km/h** (kilometres per hour), **mph** (miles per hour), **knots**, **m/s** (metres per second), **fps** (feet per second) and **Beaufort** (Beaufort scale).

To change the unit of measurement, select the *large block* (it flashes), then keep the  $\otimes$  button down; when the desired unit appears, release the button to confirm your choice.

# Temperature

## Measuring modes

---



Ambient temperature



Minimum temperature



Maximum temperature





Instantaneous windchill temperature



Minimum windchill temperature




Maximum windchill temperature

The various measuring modes in relation to temperature are displayed on the *middle block*. In order to access a measuring mode, select (with the help of the ) the *middle block* (it flashes), then use the  button to change the display on the *block* and switch from one measuring mode to another.

## Selecting the unit of measurement


---

The instrument features 2 units of measurement in relation to temperature: °C (degrees Celsius) and °F (degrees Fahrenheit)

To change the unit of measurement, select the *middle block* and display the measuring mode in relation to temperature (it flashes), then keep the  button pushed down; when the desired unit is displayed, release the button to confirm your choice.

## Resetting the minimum and maximum values to zero

---

Select the *middle block* and display the measuring mode that you wish to reset (it flashes), then press the  button for 2 seconds.

# Humidity

## Measuring modes

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Relative humidity



Minimum humidity



Maximum humidity





Dew point




*The dew point of air is the temperature at which, while keeping the current barometric conditions as they are, the air becomes saturated with water vapour. It is the phenomenon of condensation which occurs when the dew point is reached that creates the clouds, mist and dew.*

---

The various measuring modes in relation to humidity (including the dew point) are displayed on the *middle block*. In order to access a measuring mode, select (with the help of the ) the *middle block* (it flashes), then use the  button to change the display on the *block* and switch from one measuring mode to another.



## Resetting the minimum and maximum humidity to zero

Select the *middle block* and display the measuring mode that you wish to reset (it flashes), then press the  button for 2 seconds.

## Pressure


### Measuring modes



The various measuring modes in relation to pressure are displayed on the *lower block*. In order to access a measuring mode, select (with the help of the ) the *lower block* (it flashes), then use the  button to change the display on the *block* and switch from one measuring mode to another.

### Selecting the unit of measurement in relation to altitude

The instrument features 2 units of measurement in relation to altitude: **m** (metres) and **ft** (feet).

To change the unit of measurement, select the *lower block* (it flashes), then keep the  button down; when the desired unit appears, release the button to confirm your choice.









### Calibration of the altitude



The instrument calculates altitude by using air pressure. It is therefore quite normal for the altitude to change when the air pressure changes. For this reason the instrument needs to be calibrated as often as possible.

**Stabilization of the altitude:** each time it is turned on, the instrument carries out an automatic calibration based on the drift of the weather driven trend, this in order to avoid displaying an altitude that is too far off. This calibration does not occur when the data is accessed instantaneously.



Select the lower block and display the measuring mode in relation to altitude (it flashes), then keep pushing the  button down. **CAL** starts flashing on the *upper block*. Release the button as soon as you enter the calibration function (screen opposite). Use the  button to select which way the setting is made ( increment,  decrement), then set the value of the altitude using the  button. Pressing briefly on the button sets the value in increments of 0.1 unit. Keep the  button down to set increments of one unit. Release then press the  button again for a faster setting. Repeat a second time the “release/keep down” operation to obtain increments of 10 units and repeat a third time if you wish the setting to go in 100-unit increments. Confirm and exit the calibration by keeping the  button down; the instrument goes back to the standard screen. Remark: Setting the altitude is limited to the plausible range with regard to the pressure currently being measured.




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*If you do not know your altitude, you can find it by calibrating the QNH pressure, provided you know the latter exactly.*

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### *Resetting the maximum altitude and the QFE height*

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Select the *lower block* and display the measuring mode that you wish to reset (it flashes), then press the  button for 2 seconds.

### *Selecting the unit of measurement in relation to pressure*

---

The instrument features 2 units of measurement in relation to pressure, with the choice between:

**hPa** (hectopascals, equivalent to the millibar) and **inHg** (inches of Mercury).

To change the unit of measurement, select the *lower block* (it flashes), then keep the  button down; when the desired unit appears, release the button to confirm your choice.

### *Calibration of relative pressure (QNH).*

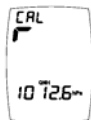
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*The relative atmospheric pressure is a value that is calculated at sea level on the basis of the local absolute pressure. As a result, it is taken as a reference to assess the atmospheric conditions and the evolution of weather throughout the country. This is the value shown on TV and radio weather bulletins. It is also the aeronautical atmospheric pressure (Q) at Nautical Height (NH) given to air pilots by the control tower in order for them to know their exact altitude in the area.*

---



Select the *lower block* and display the measuring mode in relation to relative pressure (it flashes), then keep pushing the  button down. **CAL** starts flashing on the *upper block*. Release the button as soon as you enter the calibration function (screen opposite). Use the  button to select which way the setting is made ( increment,  decrement), then set the value of the pressure using the  button. Pressing briefly on the button sets the value in increments of 0.1 unit. Keep the  button down to set increments of one unit. Release then press the  button again for a faster setting. Repeat a second time the “release/keep down” operation to obtain increments of 10 units and repeat a third time if you wish the setting to go in 100-unit increments. Confirm and exit the calibration by keeping the  button down. The instrument goes back to the standard screen.

## QFE height

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*In aeronautics, the QFE height corresponds to the difference between the flight altitude and the altitude of the landing runway (the runway is at 0 metre). It is also possible to use this function to measure any height/depth, the height of a building, or the depth of an abyss for instance.*

---


The QFE value is calculated in relation to the atmospheric pressure of the landing runway. When you are on the runway (at ground level), the QFE is equal to the absolute pressure.

Two scenarios are offered to you when determining your height/depth:

1. You are at ground level (on the landing runway), in which case reset the height to zero (see next Section). Your instrument will display 0.0m (0ft) when you are on the ground, then the value will increase/decrease depending on whether you are ascending or descending.
2. You are in flight (or in an elevated or deep position) and you have the exact value of the QFE (pressure at ground level), in which case calibrate the QFE pressure (see next Section), and your instrument will then display your height. You will be back to 0.0m (0ft) when you are on the ground.

## *Resetting the QFE value (at ground level) to zero*

---

Select the *lower block* and display the measuring mode for the QFE height (it flashes), then press the  button for 2 seconds.



## Calibration of QFE pressure









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*In aeronautics, the QFE pressure corresponds to the pressure on the landing runway (ground level), and is used as the basis for calculating the height above ground level. Air traffic control will give you this pressure value.*

---



Select the *lower block* and display the measuring mode in relation to the QFE height (it flashes), then keep pushing the  button down. **CAL** starts flashing on the *upper block*. Release the button as soon as you enter the calibration function (screen opposite). Use the  button to select which way the setting is made ( increment,  decrement), then set the value of the pressure using the  button. Pressing briefly on the button sets the value in increments of 0.1 unit. Keep the  button pressed down in order to enter the settings in one unit increments. Release then press the  button again for a faster setting. Repeat a second time the “release/keep down” operation to obtain increments of 10 units. Confirm and exit the calibration by keeping the  button down. The instrument goes back to the standard screen.

**Remark:** The instrument will display the QFE value (QFE abbreviation displayed) instead of the absolute pressure, and this as long as the instrument remains switched on. If turned off and back on again, the instrument will display the absolute pressure again, but the height will still remain based on this QFE setting (which can be accessed via **CAL**).



**DO NOT MODIFY THE CALIBRATION OF THE SENSOR WHICH IS ACCESSIBLE VIA THE MEASURING MODE FOR ABSOLUTE PRESSURE, please refer to Section 'Other'; 'Calibration of the Pressure Sensor'.**

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## Compass

### Display

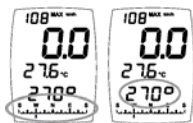
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


*The impeller should not be rotating to ensure an accurate reading. This is due to the fact that the impeller communicates the speed via a small magnet fitted on its axis. When it rotates, the impeller generates a magnetic field that interferes with the compass. It is therefore recommended when using the compass, to rotate the sphere containing the impeller so as to stop the wind from making it turn.*

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There are two types of compass display:




**bargraph** on the *compass block* (always visible) and digital display on the *lower block*. Select the *lower block* with the  button (it flashes), then display the compass using the  button.



---

*WHICH MEANS : The default setting of the compass is for the magnetic North, and not for true North. It is however possible for the instrument to display it, provided the value of the magnetic declination has been entered; see 'Special Modes'; 'Magnetic Field'.*

*Remark: The compass displays - - -  if it has never been calibrated, or if it cannot give the heading, when the instrument is at too much of angle for instance*

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## Calibration





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**IMPORTANT ! Calibrate the compass before you use it for the first time. At a later stage, we advise you to recalibrate your compass each time you are in a new environment or whenever you change the batteries.**

---

Select the *lower block* and display the compass (it flashes), then keep the  button pressed down for 2 seconds, **CAL** starts flashing on the *upper block*. Release the  button as soon as you access calibration. To calibrate the compass, hold the instrument **vertically** and turn around once slowly in a circle (or the instrument alone). Each time a cardinal point is acquired, a section of the 'square' symbol lights up on the *large block*. The calibration process is complete when the whole symbol is displayed (); calibration is complete. Confirm and exit the calibration by keeping the  button down. The instrument goes back to the standard screen.

The level of magnetic field expressed in micro Tesla ( $\mu\text{T}$ ) and displayed on the *lower block* during the calibration is the mean value measured by the sensors, compensated by the previous calibration. While carrying out a revolution, the microprocessor measures all the field values detected according to directions, in order to eventually isolate the earth's magnetic field while removing the local disturbing magnetisations.

**At a later stage, the instrument will need to be in the same position as during the calibration in order to provide an accurate reading of heading.**

# Flight Level

## Display



---



In aeronautics. The Flight Level corresponds to an altitude expressed in hundreds of feet above the isobaric surface 1013.25 hPa, which allows all aeroplanes in the world to fly alongside each other risk-free, irrespective of the pressure values governed by local meteorological conditions.

---



Select the *lower block* using the  button (it flashes), then display the Flight Level with the help of the  button.

In this case, the Flight Level is 14, which corresponds to 1,400 feet above the 1013.25 hPa level.

## Special Screens

### Special Measuring Modes

- Date and time (dAt)
- Barometric pressure tendency (t E n d P)
- Chronometer (E h r)
- Density altitude (ALd)
- Magnetic field in  $\mu$ Tesla (M T)
- Variometer (U A r,  $\omega$ )
- Finesse (F, n E S)



These modes are displayed on separate dedicated screens (1 screen per mode). In order to display one or more of these modes, you must have enabled it (them) beforehand in the special menu; please refer to next Section.

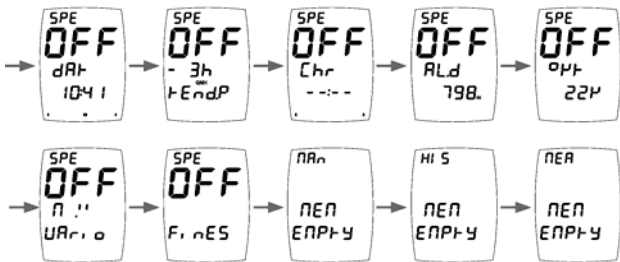
### Special Menu



#### Display

---

This menu is used to enable/disable the special screens, view the 3 types of memory, and carry out various settings and calibrations.




To display the special menu, press and hold simultaneously the  and  buttons, *SPE* flashes on the *upper block*. When *SPE* stops flashing, release the buttons. The special menu features 10 screens (7 screens for special modes and 3 screens for the memories):



Navigate (switch from one screen to another) in the special menu with the help of the  button. To exit the menu, keep pressing the  button for 2 seconds.

### Enabling a Special Mode

In an effort to simplify the use of the instrument as much as possible, the special modes are only displayed if they are so enabled beforehand; this avoids overloading the screens with data for which some users may have no use.

To enable/disable one or several special mode(s), enter the special menu and display the screen of the desired special mode; then, using the  button, select *On* to enable or *OFF* to disable the mode. Confirm your choice and exit the special menu by pressing the  button for 2 seconds. Once activated, a special mode is displayed on a 'separate' special screen. In order to access a special mode that has been enabled, you only need to press briefly the  button from the standard screen.




---

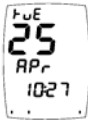
*To find out more on the display and use of a special mode once it has been enabled, please refer to the following sections*

---

# Date and Time

## Display

---



*upper block:* day of the week  
*large block :* date  
*middle block:* month  
*lower block:* time and year  
+ seconds on the bargraph

## Operation

---

The year is displayed by pressing briefly the button, release the button, and the time is shown again. The seconds are marked on the compass bargraph.

## Calibration

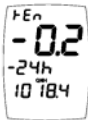
---

Select the date and time screen (it flashes), then keep the button pressed down. CAL starts flashing on the *upper block*. Release the button as soon as you access calibration. The settings are entered in the same way as described under the 'Starting up the Instrument' Section.

# Barometric Tendency

## Display

---



*upper block:* indicates FEn or FTE/LTE when viewed  
*large block :* tendency (here variation within 24 hours)  
*middle block:* time shift  
*lower block:*

1. Instantaneous state (turned on for 5 sec) or normal state (except when viewing tendency); displays the **current pressure (QNH)**.
2. When viewing the tendency or by pressing briefly the button, displays the **pressures recorded in the past**. (Please refer to examples below)

## Operation

---

Exactly on the hour, every hour (09:00, 10:00, etc.), the instrument records the current QNH value or extrapolates a QNH if there are sudden pressure variations which indicate that it is in motion.

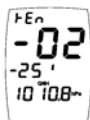
The tendency is displayed using 63 values. The first 3 values show the variations in relation to the current pressure, the next 46 values in relation to the last measured pressure on the hour, and the last 14 in relation to the last pressure read at noon.

**To view the tendency** (only if the special mode is enabled, please refer to Section: 'Enabling a Special Mode'): display the barometric tendency mode, select the *middle block* (it flashes), then by pressing briefly the  $\odot$  button, access the screens showing the tendency (the signs  $\uparrow$  and  $\downarrow$  will show you which way the data is displayed, whether in increasing or decreasing order; change the order using the  $\oplus$  button). The last shift displayed becomes the default shift in the display, and will therefore appear next time the 'Pressure Tendency' special screen is accessed.

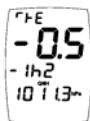
### Examples of tendency display screens

---

**Examples of display screens** in relation to tendency at 11:25 on May 1<sup>st</sup>, with a current relative pressure (QNH) of 1010.8.



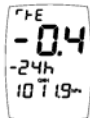
The pressure displayed is the current pressure. The instrument compares the current pressure (1010.8) with the pressure recorded 25 minutes ago. This shows, as a result, that in the time span of 25 minutes, the pressure has dropped by 0.2 hPa. If the time was 11:43, the instrument would display -43', etc.



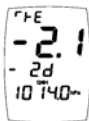
The pressure displayed is the pressure taken 1h and 25 min ago, or the pressure read at 10:00. The instrument compares the current pressure (1010.8) with the pressure recorded 1h and 25 min ago and displays the difference. This shows that in the time span of 1h and 25 min the pressure has dropped by 0.5 hPa. If the time was 11:43, the instrument would display -1h4, etc.



The pressure displayed is that of 3 hours ago, i.e. the pressure read at 08:00. The instrument compares the last pressure read on the hour (here, the pressure measured at 11:00, 1011.0) with that taken 3 hours earlier and displays the difference. This shows that the pressure has dropped by 0.8hPa in the time span of 3 hours.



The pressure displayed is that read 24 hours ago, i.e. the pressure measured at 11:00 the day before (April 30<sup>th</sup>). The instrument compares the last pressure read on the hour (here, the pressure measured at 11:00 on May 1<sup>st</sup>, 1011.0) with the pressure recorded 24 hours earlier and displays the difference. This shows that the pressure has dropped by 0.4 hPa in 24 hours.



The pressure displayed is that of 2 days earlier, i.e. the pressure recorded at noon (12:00) on April 28<sup>th</sup>. The instrument compares the last pressure read at noon (here, the pressure measured at noon on April 30<sup>th</sup>, 1011.9) with the pressure recorded 2 days earlier and displays the difference. This shows that the pressure has dropped by

2.1hPa in 2 days.

Please note that the display will change 35 minutes later, since, when it is 12:00, the instrument will take this latest reading taken at noon to compare it with the next. The pressure displayed will be that of April 29<sup>th</sup>, and the instrument will compare it with the latest pressure reading taken at noon, that of today in this case, but it will still show the pressure variation over 2 days.

If the clock has been changed and readings have been lost, the instrument displays the **Err.dH** message on the *lower block*.



In the case of a significant variation in pressure (change in altitude), the instrument extrapolates the QNH in order to offer as plausible a barometric tendency as possible. Once stabilised, the instrument will show the real QNH again. The instrument signals when the QNH is extrapolated with the indication **---** **---** on the *compass block* (see opposite).



In the same way, the instrument will display the indication **-----** to signal that a calibration has been carried out (see opposite).



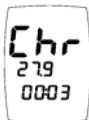

---

*The tendency is always operating, even if the Tendency special mode has not been enabled (OFF in the special menu). To disable the tendency (and save the battery), access the special menu and display the pressure tendency screen, then push the **⊕** button for some time, **CAL** starts flashing on the upper block; release the button as soon as you access calibration. Using the **⊕** button set the recordings to the OFF position (indicates **r EC OFF**). This operation also cancels the automatic adjustment of altitude. Proceed in the same way when you decide to reactivate the tendency recordings (**r Ec ON**).*

---

## Chronometer

### Display



The chronometer mode is displayed as follows:



*middle block:* seconds.1/10<sup>th</sup> of a second



*lower block:* hours:minutes

*Example opposite:* 3 minutes 27 seconds and 9 tenths

## Operation

---

Pressing both the  and  buttons briefly at the same time launches the chronometer (brief display of the message *ፎካር በለገ ስተዳራት*). This can be done from any screen, and whether the instrument is turned on or off.

Pressing briefly the  button freezes the screen, which allows to read an intermediate time (the instrument keeps counting the time while the display is frozen). The chronometer returns to normal mode at the end of 10 seconds or by pushing on  twice.

Remark: At a later stage it is possible to view all the times recorded by the chronometer via the memory display, since every time you start a chronometer, you carry out a manual recording of all the measurements.

## Density Altitude

### Display

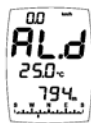
---



---

*The density altitude is the current altitude should the air be in a standard air environment. The density altitude is corrected using the real air density; it therefore constitutes an essential factor in the computation of the performance of an engine or the lift of an aircraft.*

---



The density altitude is displayed as followed:

*upper block:* Wind speed

*large block :* ALd indication

*middle block:* default mode (here temperature)


*lower block:* density altitude

+ compass heading

### Operation

---

You have the option of changing the measuring mode displayed on the *middle block*, which shows the default basic mode of the standard screen.

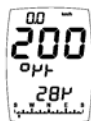
To change the display, select this *block* (it flashes), then press the  button briefly: you can display either the ambient temperature or the relative humidity.



# Magnetic Field in $\mu$ Tesla + Compass Heading

## Display

---



This mode is displayed as follows:

*upper block*: wind speed

*large block*: heading in degrees

*middle block*: indicates  $0.0T$ , = degree (unit of the *large block*) and  $T$  = micro Tesla (unit of the *lower block*)

*lower block*: magnetic field in  $\mu$ Tesla

## Operation

---

The role of this mode is twofold:

1. allow a larger display of the heading in degrees
2. know the value of the magnetic field drift in  $\mu$ Tesla in relation to the calibration. This will give you an indication as to whether an external element (steady magnetic field) is interfering with your compass; 0  $\mu$ Tesla will indicate that no magnetic field is interfering with your compass and that your instrument therefore offers you the highest level of accuracy.

To measure the value of an external magnetic field (a magnet for instance), display 0  $\mu$ T on the screen and bring the magnet close to the instrument: the display shows the magnetic field output expressed in  $\mu$ T.

## Calibration

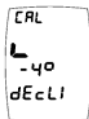
---

Calibration is carried out as with the compass (please refer to relevant section). If you already have calibrated the compass basic mode in the standard screen, there is no need to do it again, unless you have just entered a different environment. Please note that if you carry out a calibration in this special mode, it will also be valid for the compass basic mode.

## Magnetic declination

---

If you want the compass to indicate true North instead of the magnetic North, enter the declination (in degrees) of the location where you are at.



To adjust this declination, access the special menu and then display the Magnetic Field screen. While the  $0.0$  or  $0.0T$  indication is flashing, keep the  $\text{CAL}$  button pressed down,  $CAL$  starts flashing on the *upper block*. Once in the calibration function (see opposite) release the button. Use the  $\text{CAL}$

button to select the direction of the adjustment (↗ increment, ↘ decrement), then set the value in degree of the declination with the help of the ⓧ button. Keep the ⓪ button down to confirm your setting, release it, and then press it down again to exit the special menu.



---

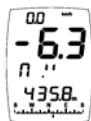
**IMPORTANT !** When a declination has been stored, all the display modes of the compass will show true North and no longer the magnetic North. Should you wish to display the magnetic North at a later stage, you will need to reset the declination.

---

## Variometer

### Display

---



*upper block:* wind speed

*large block :* value

*middle block:* unit (here M.) (metres per second)

*lower block:* default mode of the standard screen  
+ compass heading

### Operation

---

The *Large block* shows your speed. The value is positive, this corresponds to the rate of ascent, whereas a negative value indicates a rate of descent. There is a choice of two units: M. = m/s (metre per second) and hf. ' hft/min (100 feet per minute). To change the unit, select the *middle block* (it flashes) and keep pressing the ⓧ button down; release the button when the desired unit is displayed.

## Finesse

### Display

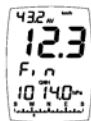
---



---

*Finesse is the ratio between the horizontal velocity and vertical velocity. It indicates the gliding performance of a paraglider or hang-glider. This function is only of use to those individuals who practise hang-gliding and paragliding.*

---



Finesse is displayed as follows:

*upper block:* mean wind speed

*large block :* finesse

*middle block:* F, m indication

*lower block:* default mode (here relative pressure)  
+ compass heading

## Operation

---

It is not possible to modify any data on the finesse screen. It is necessary for the impeller to rotate and there must be a drop in altitude for finesse to be displayed. To calculate finesse, the instrument takes the mean wind speed as the horizontal velocity and the data supplied by the variometer as the vertical velocity.

# Memories, Viewing and Settings



*24,480 sets of memories are available. One set contains all the readings from all the sensors (including a combination of sensors) at the time of recording. The 24,480 sets are shared between the 3 types of memories. A new recording (set) deletes the oldest if the memory capacity is full.*

The instrument features 3 types of memories:

- Manual recordings (MNR)
- Measurements at selected rate (MSR)
- History (H 5)

Each type of memory has its own screen (please refer to next sections). The memory screen can only be viewed and configured through the special menu.

### Memory capacity (24,480 records):

The duration of the recording allowed will depend on the selected rate, for instance:

*2.5 days are possible if the recording takes place every 10 seconds*

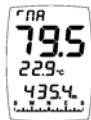
*2.5 months are possible if the recording takes place every 5 minutes*

## Manual Recordings

### Display

---

MNR ENR 5 is displayed if the memory is empty (no recordings).





The default screen is used to display the memory content. In the example shown opposite, the standard screen with the basic measuring modes (wind speed, temperature, altitude, compass heading) is the screen used to that effect. The *upper block* displays MNR or MNR / ENR which flashes when being accessed.

## Operation

---




This type of memory displays all the recordings carried out manually.

To record manually (from any screen, whether instrument turned on or off), press simultaneously the  and  buttons for a short time. The message **ፎኩ በለጠ ስተላርት** indicates that the recording has indeed been made. Please note that this button combination is also used to launch the chronometer, hence the **ፎኩ** indication.


Each manual recording features the time and date and stores all the readings of all the sensors (including the combination of sensors) at the time of the recording.

## Viewing

---

To view manual recordings, go to the special menu and display the Manual Recordings (**በለጠ**) screen, view the recorded values by pressing briefly on the  button. The indication **↗** or **↘** on the *upper block* lets you know which way the data is viewed (increasing or decreasing order). To change direction, press briefly the  button when the indication **↗** or **↘** is flashing. To view the date and time of each recording, double-click on the  button when you have accessed the recording in question (when the indication **↗** or **↘** is flashing).

When viewing recordings, the **ፎንገ** message is displayed when you get to the end of the recordings (there is an **ፎንገ** at the beginning and at the end of the recordings). If the message **ሚላር** appears, this means that the instrument is currently searching for data. You need to wait until the indication disappears.

The instrument automatically exits the view mode after 5 seconds or by pressing the  button for 2 seconds.

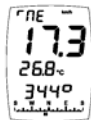
The default screen is used to display the memory content. However, you may view other values, since the instrument stores all the readings of all the sensors (including the combination of sensors) during each recording.

*Example: You view the manual recordings and you realize that the altitude is displayed on the lower block, when instead of the altitude at the time of recording, it is the height that you want to know. Exit the special menu and display the standard screen; select the lower block and then display the height. Once this operation is completed, go back to the special menu and display the screen for manual recordings, you will then see that it is the value of the height (at the time of the recording) which is displayed and no longer the altitude.*

# Measurements Based on Selected Rate

## Display

---



MEM EMPTY is displayed if the memory is empty (no recordings).

The default screen is used to display the memory content. In the example shown opposite, this screen is the standard screen with the basic measuring modes (wind speed, temperature, digital and analogue compass heading).

The upper block displays MEM or MEM / MEM which flashes when being accessed.

## Operation

---

This type of memory displays all the automatic recordings made based on the selected rate (configurable from 0.5 second to 24 hours). **The data is only recorded when the instrument is switched on.** Each recording features the time and date and stores all the readings of all the sensors (including the combination of sensors) at the time of the recording.

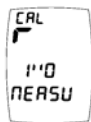
## Viewing

---

To view the recordings made automatically, go to the special menu and display the Measurements based on selected rate (MEM), then press briefly the  $\odot$  button to view the recorded values. The viewing process is the same as that followed for 'Manual Recordings' (please refer to previous Section).

## Selecting the rate of recordings

---



Go to the special menu and display the 'Measurements Based on Selected Rate' screen (MEM), then press the  $\odot$  button for some time. Release the button as soon as you enter the calibration function (screen opposite). Use the  $\odot$  button to select the direction of the adjustments ( $\blacktriangleleft$  increment,  $\blacktriangleright$  decrement), and set the rate with the help

of the  $\odot$  button. Keep the  $\odot$  button down to confirm your setting.

# History

## Display

---



MEM EMPTY is displayed if the memory is empty (no recordings).

The default screen is used to display the memory content. In the example shown opposite, this screen is the standard screen with the basic measuring modes (wind speed, humidity, relative pressure and compass heading).

The upper block displays  $\text{MEM}$  or  $\text{MEM}$  /  $\text{MEM}$  which flashes when being accessed.

## Operation

---

This type of memory displays all the automatic recordings made based on the selected rate (configurable from 0.5 second to 24 hours). **The data is constantly being recorded, whether the instrument is turned on or off.** Each recording features the time and date and stores all the readings of all the sensors (including the combination of sensors) at the time of the recording.

## Viewing and rate selection

---

The process for viewing and selecting the rate is the same as that used for Measurements based on Selected Rate; please refer to previous sections.

## Other

## States of the Instrument

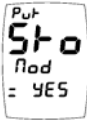
The instrument features several operating states. To find out which operating state your instrument is currently in (off or on), press 3 buttons simultaneously and briefly, then release them. For 2 seconds, your instrument displays: the state, the software version, and the battery level. When the instrument is turned off, the two possible states are Storage and OFF, while when it is switched on, the possible states are Stop Auto, Permanent and Out PC.

## Storage

---



The example shown opposite indicates that the instrument is in the storage state; the clock and sensors have stopped, and there is no automatic recording. This is the default state of the instrument when it comes off the production line, thus avoiding the depletion of the battery if the instrument is stored for a long period of time.



Should you wish to set the instrument into the storage state yourself, please proceed as follows: when the instrument is turned off, keep the 3 buttons pressed down for at least 4 seconds; when the screen shown opposite is displayed, release the buttons then keep the MOD (⊗) button down. The message *Sto Put done* means that the 'storage' state is activated.

## OFF

---



The instrument is off. Both the screen and sensors are off, but the clock and automatic recordings are still active.

The instrument switches to the OFF state after being turned off manually or automatically (please refer to the Section entitled "Turning the Instrument Off").

## Automatic Stop

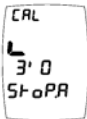
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



The *A.S* (auto stop) state means that the instrument will switch off automatically three minutes after one of the buttons was last pressed (default setting), or when turned off manually (see Section entitled "Turning the Instrument Off").



Whenever it is turned off (whether automatically or manually), the instrument displays a countdown on the *large block* and shows the time left until the auto stop (at the end of 3 minutes in this case), or the message *STOP STOP* if the instrument was set for a state of permanent operation.




The time elapsed before the automatic stop may be adjusted (from 20 seconds to 24 hours). Default setting: 3 minutes. To change this time span: turn off the instrument manually and, when the countdown is displayed, release

the button, then keep the  button down (CAL flashes on the *upper block*). In the calibration mode (opposite screen), release the button. Set the time: pressing briefly on the  button will change the direction of the setting ( increment and  decrement), and short and long pushes on the  button are used to change the value. Once the adjustment is made, keep the  button down for 2 seconds to confirm your setting and exit the calibration mode.

## Permanent operation

---



The instrument remains constantly on (it no longer turns off). To set the instrument in permanent operation, switch it off manually (please refer to the Section entitled “Turning the Instrument Off”), then during the countdown leading to the stop, release the button and press briefly on the  button; the instrument displays *non STOP*, which means that it has switched to the permanent operation state. To go back to the ‘Automatic Stop’ state, redo the same operation, or switch the instrument off.



---

**If the instrument remains constantly turned on, the battery is depleted faster, keep that in mind!**

---

## Data transfer to a PC

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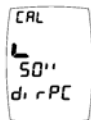
---






**This requires the use of the interface and the SkywatchLog software (available as an option). SkywatchLog itself controls the instrument remotely.**

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When the instrument is transferring data to a PC, the screen displays the message *oPC*.

Using induction, the instrument transfers the current sensor readings at a selected rate. You can set the transmission frequency from 0.5 seconds to 24 hours. Go to the special menu and display the screen of manual recordings, then press on  for a long time, CAL starts flashing on the *upper block*. Release the button as soon as you enter the calibration function (screen opposite). Select the scrolling direction by pressing



briefly on the  button ( increment and  decrement), then change the value using the  button (" = second, ' = minute and h = hour). Please note that the default value is *OFF* (no transmission). Confirm your setting by keeping the  button down, then release.



## Other states

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The instrument features another two states: normal (turned on) and instantaneous (please refer to the Section entitled “Starting up the Instrument”).

## Resets

### Memory reset (deletion)

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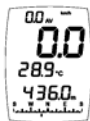
Empties the 3 types of memory, and resets the rates of automatic recordings.

To erase all the memories, go to the special menu and display one of the 3 types of memory, then press and keep down simultaneously the 3 buttons. When the screen displays  $\text{ELR NEN Nod} = \text{YES}$ , release the buttons and keep the MOD (⊗) button down for 2 seconds to confirm. The instrument displays the message  $\text{ELR NEN donE}$ , informing you that the deletion has indeed been successful (also resets lengths of time).

### Screens reset

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Reboots the display configuration by de-activating all the special screens and formatting the standard screen as follows:



- upper block*: mean wind speed
- large block*: instantaneous wind speed
- middle block*: ambient temperature
- lower block*: altitude
- compass block*: heading

In order to reset, first display the standard screen featuring the basic measuring modes (no selection), then keep the 3 buttons pressed down simultaneously. When the screen displays  $\text{ELR Scr Nod} = \text{YES}$ , release the buttons and keep the MOD (⊗) button down for 2 seconds to confirm. The instrument displays the message  $\text{ELR Scr donE}$  informing you that the reset operation has indeed been carried out.

### General reset

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This resets the screens and the memories, and reboots all the calibrations (except for the time and date). To carry out this general reset operation: when the instrument is off, keep the 3 buttons pressed down simultaneously. When the screen displays all the segments (display test), release, and once more keep the 3 buttons down simultaneously. When

the screen displays the message `CLR ALL Mod: YES`, release the buttons and press the MOD (⊛) button down for 2 seconds to confirm. The instrument displays the message `CLR ALL done` informing you that the reset operation has indeed been carried out.

### *Instrument reset*

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Remove the batteries for 20 minutes.

## **Power Supply, Battery Replacement**



*The instrument is supplied with two new batteries already in place (one battery for power supply, and one for backup).*

*As for the diode lamp, it is entirely independent from the instrument, and is therefore relying on its own batteries for supply (also pre-fitted), which are the same as those used for the instrument.*

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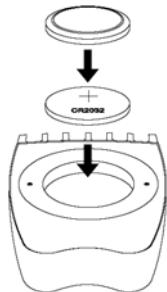
### *Batteries fitted in the instrument*

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The instrument operates on a 3V ‘button’ type battery, with the reference CR2032, which is placed behind the lid at the back of the instrument. A second identical battery is located inside the compartment, thus acting as a spare battery. Important note: the spare battery is also there to hold the active battery in place, which means that the **instrument can only work properly when fitted with both batteries**.

*To replace the battery(ies) of the instrument:*

1. Unscrew both screws and then remove lid.
2. Remove both batteries (the top battery is the spare battery, while the battery located at the bottom of the compartment supplies the power).
3. Place the spare battery (provided it is new) at the bottom of the compartment (+ facing outward).
4. Put a spare battery back on to the supply battery in order to keep the latter in place. The spare battery should be placed “upside down” on the supply battery (+ against +). Simply use the used battery if you do not have a new battery.



5. Check that the round seal is properly positioned in its groove, screw the lid back on using the 2 screws.



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**Always pay attention to the polarity, as positioning the batteries the wrong way may cause damage.**

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## Batteries of the Light Emitting Diode (LED) Lamp



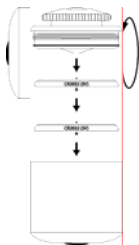
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**It is imperative that the batteries of the LED lamp are replaced at the same time; do not use a battery that is already used or flat together with a new battery.**

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*To replace the batteries of the lamp:*


1. Pull the LED lamp out of the instrument. Turn the instrument over, and with one finger, push the lamp out of its housing.
2. Unscrew the cap (the part containing the LED), see picture opposite.
3. Remove both used batteries and replace them with 2 new batteries. Be mindful of the polarity. The + facing down (see picture opposite).
4. Screw the cap tightly back on.
5. Put the LED lamp back into the casing of the instrument.



## Condition of the instrument battery

The instrument gives you the possibility to check the condition of the battery at any time. This can be checked in 2 ways:



1. When first starting up the instrument (brand new): when the instrument is off, press briefly on the  button: the following indications will appear: *Sto* (this means that the instrument is in *storage mode*), *GEO* (GEOS), *127* (the software version), and *Ub2.99* (in this example, the battery voltage is 2.99 Volts).



- While the instrument is on, press simultaneously on the 3 buttons and then release: the following indications will appear: *Au.5* (the instrument is in the automatic stop mode), 127 (the software version) and the segments that are lit up (1 segment = 0.025V, no segment: <2.3V, all the segments lit up: >3.1V).



**This information is only valid for the battery supplying the instrument. As for the Light Emitting Diode lamp, a significant decrease in the brightness of the light will indicate that you need to replace the batteries.**


## Battery lifetime

In the storage state	: > 12 years
Turned off (OFF state)	: 6 years
Permanent operation	: 6 weeks
Constant operation + history with a rate of 1 recording per second)	: 3 weeks







**A lifetime of at least 1 year when in standard use.** A practical example: instrument turned on once a day for 30 minutes + history with a rate of 1 recording every 20 seconds.

## LCD Display Test



This test is used to check if all the LCD segments are operating. With the instrument switched off, press down simultaneously the 3 buttons for 2 seconds; all the segments light up (as shown opposite). To stop the instrument, keep  down.

## Temperature Compensated Quartz

The instrument uses a temperature compensated quartz clock. Should you notice a drift however, you have the possibility of correcting this deviation by -6.35 to +6.35 seconds per day. Go to the special menu and display the chronometer screen, then keep the  button down, *CAL* starts flashing on the *upper block*. Release the button when you have accessed the calibration. Use the  button to select the direction of the adjustment ( increment,  decrement), then set the value using the  button. Keep the  button down to confirm your setting, release it, and then press it down again to exit the special menu.

# Calibration of the Pressure Sensor



This operation is reserved to those professionals who hold a highly accurate laboratory standard. The consequence of any wrong calibration will be to supply erroneous data on all the measurements relating to pressure.

Calibration is carried out from the measuring mode for absolute pressure. Proceed in the same way as with the other calibrations. The number displayed on the *middle block* indicates the shift in 1/32th hectopascals, and the *lower block* shows the absolute pressure on the sensor. Other calibrations are possible, but only via SkywatchLog.

## Technical Specifications

### Precision

Wind speed	± 2%
Temperature	± 0.5°C at 25°C
Humidity	± 2% at 50%rH
Pressure	± 0.5% at 25°C
Compass	± 3°
Clock	<0.1 second per day possible if calibrated

### Display resolution

Wind speed	0.1 unit <99.9 then 1 unit >100 0.1 at 25.0 Beaufort
Temperature	0.1° <99.9° then 1° >100
Windchill temperature	0.1° <99.9° then 1° >100
Dew point	0.1° <99.9° then 1° >100
Humidity	0.1%rH
Pressure	0.1 hPa - 0.01inHg
Altitude	0.1m from -999.9m to 3,000m 0.5m from 3,000 to 10,000m 1m from 10000 to 21,535m
Density altitude	1 unit
QFE height	0.1 m - 1 ft (foot)
Variometer	0.1 unit
Barometric Tendency	0.1hPa - 1inHg
Compass	1°

### Response time of sensors

Wind speed	instantaneous
Temperature	From a few seconds to several minutes depending on wind speed

<b>Humidity</b>	From a few seconds to several minutes depending on wind speed
<b>Pressure</b>	instantaneous
<b>Compass</b>	instantaneous

### Measuring range of sensors

<b>Wind speed</b>	0 to 300 (peak) km/h
<b>Temperature</b>	-40°C to +85°C
<b>Humidity</b>	0.1 to 100%rH
<b>Pressure</b>	10 to 1,100hPa
<b>Altitude</b>	-1,000 to 21,535m
<b>Perpetual calendar</b>	until 2175
<b>Serial transmission</b>	5mm between induction coils

### Measurement units

<b>Wind speed</b>	km/h - m/s - knots - Beaufort - mph - fps
<b>Temperature</b>	° Celsius - ° Fahrenheit
<b>Pressure</b>	hPa (mbar) - inHg (inches of Mercury)
<b>Altitude</b>	m - ft (feet)
<b>Variometer</b>	m/s - hft/min (100 feet per minute)

### Operational temperatures

<b>Easy reading</b>	from -10°C to + 70°C
<b>Possible reading</b>	from -20°C to -10°C
<b>Very slow display but instrument able to work (the sensors and recordings are operating correctly)</b>	from -40°C to -20°C

### Miscellaneous

<b>Power Supply</b>	instrument: 4 x 3V lithium CR2032 button batteries supplied <i>1 for the instrument, 1 spare, and 2 for the LED lamp</i>
<b>Impeller</b>	Diameter 17.8mm (replaceable)
<b>Dimensions</b>	46 x 120 x 32 mm
<b>Weight</b>	171g
<b>Waterproofness</b>	5 minutes at 1 metre <i>Wait for the humidity sensor to dry off completely before re-using the instrument</i>

## **LIMITED WARRANTY**

JDC ELECTRONIC SA extends a 12 months' warranty over parts and labour for this instrument, effective from the date of purchase.

JDC ELECTRONIC SA reserves to itself the right to repair or replace any component which may have become faulty in the course of normal use. This repair or replacement shall be carried out at no charge to the customer (parts or labour). Transport costs however shall be borne by the customer. This warranty does not cover damages caused by an accident, abnormal or excessive use, or resulting from an unauthorised modification or repair.

To avail of this warranty, please send the instrument postage paid and in a suitable packaging to your dealer. As a proof of purchase date and warranty consideration, it is necessary to include in the parcel a copy of the original invoice.

