

OPERATING MANUAL

ECO 230

barometer | altimeter



B-H88.0.01.DK2-2.1



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1 About this documentation

1.1 Purpose of the document

Read this document carefully and familiarize yourself with the operation of the product before you use it.

Keep this document ready to hand and in the immediate vicinity of the product so that it is available to the personnel/user for reference at all times in case of doubt.

The user must have carefully read and understood the operating manual before beginning any work.

1.2 Legal notices

The liability and warranty of the manufacturer for damages and consequential damages are voided with misuse, disregarding this document, disregarding safety notices, assignment of inadequately qualified technical personnel and arbitrary modifications of the product.

This document is entrusted to the recipient for personal use only. Any impermissible transfer, duplication, translation into other languages or excerpts from this operating manual are prohibited.

The manufacturer assumes no liability for print errors.

1.3 Further information

Software version of the product:

- V1.7 or later

For the exact product name, refer to the type plate on the rear side of the product.

Note

For information about the software version, press and hold the ON button to switch on for longer than 5 seconds. The series is shown in the main display and the software version of the product is shown in the secondary display.

2 Safety

2.1 Explanation of safety symbols



Danger!

This symbol warns of imminent danger, which can result in death, severe bodily injury, or severe property damage in case of non-observance.



Caution!

This symbol warns of potential dangers or harmful situations, which can cause damage to the device or to the environment in case of non-observance.

Note

Blue underlining indicates processes, which can have a direct influence on operation or can trigger an unforeseen reaction in case of non-observance.

2.2 Foreseeable misuse

The fault-free function and operational safety of the product can only be guaranteed if applicable safety precautions and the device-specific safety instructions for this document are observed.

If these notices are disregarded, personal injury or death, as well as property damage can occur.



Danger Incorrect area of application!

In order to prevent erratic behavior of the product, personal injury and property damage, the product must be used exclusively as described in the chapter De-scription in the operating manual.

- ▶ The product is not suitable for use in explosion-prone areas!
- ▶ The product must not be used for diagnostic or other medical purposes on patients!
- ▶ For measurements requiring devices that are subject to authorization or special approvals, this product is not a substitute for such products and can only be used as an aid in preparatory or comparison measurements!
- ▶ Do not use in safety / emergency stop devices!

2.3 Safety instructions

Note

This product does not belong in children's hands!

2.4 Intended use

The device measures the absolute pressure in the air.

The ambient pressure is measured directly via the integrated sensor. Pressure equalization between the unit and the environment takes place via a water-impermeable membrane on the front side.

Applications include:

- Barometric measurements (e.g. weather)
- Elevation determination

The device must only be used under the conditions and for the purposes for which it was designed.

It must be handled with care and used according to the technical data (do not throw, strike, etc.). Suitable measures must be used to protect the pressure equalization opening and be protected from dirt.

2.5 Qualified personnel

For commissioning, operation and maintenance, the relevant personnel must have adequate knowledge of the measuring process and the significance of the measurements. The instructions in this document must be understood, observed and followed.

In order to avoid any risks arising from interpretation of the measurements in the concrete application, the user must have additional expertise. The user is solely liable for damages/danger resulting from misinterpretation due to inadequate expertise.

3 The product at a glance



Front view



3.1 Display elements

Display

	Battery indicator	Evaluation of the battery status
	Unit display	Display of the units or Min/Max/Hold information text
	Main display	Measurement of the current pressure or value for min/max/hold
	Auxiliary display	Measurement of the current pressure in Min/Max/Hold mode
	Bar display	Trend display in 7 steps ■□□□ / ■■□□ / □■□□ falling (strong / medium / slight) □□□□ stable □□□□ / □□■□ / □□□■ rising (slight / medium / strong)

3.2 Operating elements



On / Off button

Press briefly	Switch on the device Activate / deactivate lighting
Long press	Switch off the device  Reject changes in a menu



Up / Down button



Press briefly	 Display of the min/max value  Change value of the selected parameter
Long press	 Reset the min/max value of the current measurement
Both simultaneously	 Rotate display, overhead display



Function button

Press briefly	 Freeze measurement (Hold)  Call up next parameter
Long press, 2s	 Start menu "configuration", CONF appears in the display
Long press, 4s	 Activation of the Tare function NULL / altitude input

Operating status	 device is in measured value display  device is in the configuration menu
------------------	--

4 Operation

4.1 Opening the configuration menu

- 1 Press the Function key for 2 seconds to open the Configuration menu.
- 2 **CONF** appears in the display. Release the Function key.

Parameter	Values	Meaning
	 	
Unit	Display unit	
	hPa	Barometer in [hPa]
	mbar	Barometer in [mbar]
	PSI	Barometer in [psi]
	mmHg	Barometer in [mmHg]
	m	Altimeter/Elevation display in [m]
	FE	Altimeter/Elevation display in [feet]
rATE	Measuring rate	
	SLo	Slow measurement speed
	FRSt	Fast measurement speed <i>(not recommended for altimeter display)</i>
SEAL	SeaLevel-correction <i>(not available at altimeter/elevation display)</i>	
	no	Inactive, display measured air pressure directly
	YES	Active, display air pressure compensated to sea level
ALT	High above sea level	
	-500 .. 9000	Height above sea level in m for correction At altimeter: default value for altitude input
tEnd	Trend display	
	oFF	Bar display and tendency value display deactivated

Parameter	Values	Meaning
	1_5 / 60_5	Time base for bar display 1 second (0.2 hPa / bar level corresponds to ~1.7 m / 5 ft at sea level) or 60 seconds (12 hPa / bar level corresponds to ~100 m / 328 ft at sea level)
	1_h / 3_h	Time base for bar display 1 hour (1 hPa / bar level) or 3 hours (3 hPa / bar level) for usual meteorological assessments. The value will be renew every minute.
Lcd.2	Additional information	
	oFF	No additional information in auxiliary display
	°C	Temperature in °C
	°F	Temperature in °F
	With activated tEnd – display additionally:	
	tEnd	Trend value
	°C.tE	Temperature in °C and trend value
	°F.tE	Temperature in °F and trend value
	°C.P.t	Temperature in °C, trend value and air pressure (only available at diameter display units)
	°F.P.t	Temperature in °F, trend value and air pressure (only available at diameter display units)
PaFF	Shut-off time	
	oFF	No automatic shut-off
	0:15, 0:30, 1:00, 4:00, 12:00	Automatic shut-off after a selected time in hours:minutes, during which no buttons have been pressed
L.tE	Backlight	
	oFF	Backlight deactivated
	0:15, 0:30, 1:00, 2:00, 4:00	Automatic shut-off of the backlight after a select-ed time in minutes:seconds, during which no buttons have been pressed
	on	No automatic shut off of the backlight

Parameter	Values	Meaning
ln, t	Factory settings	
	no	Use current configuration
	YES	Reset device to factory settings. After confirming with the <i>function-button</i> , the display shows: $ln, t done$

4.2 Open the adjustment menu

The sensor adjustment can be adjusted with the zero point correction and the gradient correction. If an adjustment is made, you change the pre-adjusted factory settings.

This is signaled with the display text $Pr.oF$ or $Pr.SL$ when switching on.

- 1 Switch the device off.
- 2 Hold the down button and press the *On/Off button* to switch on the device and open the **Adjustment** menu.
- 3 The display shows the first parameter. Release the *down button*.

Parameter	Values	Meaning
		
$Pr.oF$	Zero point correction	
	0.0	No zero point correction
	-5.0 ... 5.0	Zero point correction [in selected display unit] (e.g. ± 5.0 hPa)
$Pr.SL$	Gradient correction	
	0.00	No gradient correction of the temperature
	-5.00 ... 5.00	Gradient correction in %

Formula:

Zero point correction: Displayed value = measured value - $Pr.oF$

Gradient correction: Display = (measured value - $Pr.oF$) * (1 + $Pr.SL$ / 100)

5 Measurement Basics

5.1 General information about absolute pressure measurement

The device measures absolute pressure. However, this should not be confused with the "sea level air pressure" indicated by weather stations. The altitude-based air pressure decrease is calculated for these pressure specifications.

The device is capable of correcting this air pressure altitude correction.

To do this, set the parameter value **SEPL** in the Configuration menu to YES and enter the current altitude above sea level in the parameter value **ALT**.

The nautical norm correction must be deactivated for vacuum measurements.

5.2 Altimeter

If meters or feet are selected as the display unit in the Configuration menu, the device is in altimeter mode. The unit calculates the current altitude from the current air pressure: At higher altitudes, the air pressure is lower. It is important to note that not only changes in altitude but also the weather influence the measurement. To correct this weather influence, the displayed altitude can be corrected via the keys.

Altimeter display: In the Altimeter operating mode, you will be prompted to enter the current altitude after pressing the Function key for 4 s.

Note: The first time you are prompted after switching on the device, the value is set to the alti value in the Configuration menu. (default value for starting point)
The current value is retained for all further calls.

Note on min/max display: in the secondary display, the sum of the altitude meters covered is also shown for min: dESC - descent, for max: ASC - ascent

5.3 Special functions

5.3.1 **nULL** Tare function

If a pressure unit is selected as the display unit in the **Configuration menu**, the device is in barometer mode.

After it is switched on, the device starts up in standard measuring mode, the special function "tare" is started by pressing and holding the Function key for 4 s..

Barometer display: The display can be zeroed by pressing the Function key for 4 s. If the tare function is activated, **nULL** blinks in the lower display. The tare function can be reset by pressing the Function key again for 4 s.

Note

The tare function is independent of the zero point correction accessible via the adjustment menu.

5.4 Use of the trend indicator

Note

For the trend display, it is necessary that the device has collected a sufficiently large number of measured values. This is the case for the time bases 1h and 3h only after this time has elapsed.

The value is therefore not shown in the display before this time has elapsed.

5.4.1 Meteorology: weather forecasting

Observation of variable weather conditions by assessing the rate of change of air pressure.

To do this, set the device to:

Unit	hPa	(international standard)
rATE	SLo	(power saving during continuous operation)
SEAL	YES	
Alt.		altitude of the location above sea level
tEnd	1_h or 3_h	1 hour (1 hPa / bar level) or 3 hours (3 hPa / bar level)
Lcd.2	°C.tE	
POFF	oFF	continuous operation

This results in the following display, for example:

	display unit hPa
	current pressure at sea level
	trend: + 0.4 hPa per hour
	□■□ stable (trend lower 1 hPa)

5.4.2 Hiking, cycling, flying, motor sports: use as a variometer

A variometer or inclinometer indicates the change in altitude per unit of time, i.e. the rate of ascent or descent. Common units are [ft/min] or [m/s] for flight and motor sports, or [m/h] for example in hiking/running.

Note

The output value of the tendency display in the setting 1_S or 60_S shows the current value for the tendency based on the measurements of the last 5 seconds, scaled to the selected setting. In the 60_S setting, the resolution is reduced to 1 m or 5 ft.

To do this, set the device to:

	Hiking, cycling	flying, motor sports	
Unit	m	ft or m	(Altimeter)
rate	SLo	FAST	(power saving during continuous operation) (fast measured value response) *1
ALt			default value for input start
tEnd	1_h	1_S or 60_S	(time base 1 second for m/s or 60 seconds for ft/min)
Lcd.2	tEnd	tEnd	or for more information: °C.P.t or °F.P.t
POFF	oFF	oFF	continuous operation

This results in the following display, for example:

	display unit m or m/s
	current altitude above sea level
	trend: - 2.8 m per s
	▣▣▣▣ slightly falling

* = Note: brief influence on the measured value possible when pressing buttons or housing disc

6 Operation and maintenance

6.1 Battery

6.1.1 Battery indicator

If the empty frame in the battery display blinks, the batteries are depleted and must be replaced. However, the device will still operate for a certain length of time.

If the BAT display text appears in the main display, the battery voltage is no longer adequate for operation of the product. The battery is fully depleted.

6.1.2 Changing battery



Danger Danger of explosion!

Using damaged or unsuitable batteries can generate heat, which can cause the batteries to crack and possibly explode!

- ▶ Only use high-quality and suitable alkaline batteries!



Caution Damage!

If the batteries have different charge levels, leaks and thus damage to the device can occur.

- ▶ Only use high-quality and suitable alkaline batteries!
- ▶ Do not use different types of batteries!
- ▶ Remove depleted batteries immediately and dispose of them at a suitable collection point.

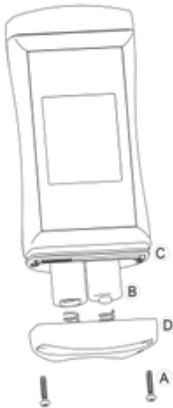
Note

Unnecessary unscrewing endangers the protection against moisture and should therefore be avoided.

Note

Read the following handling instructions before replacing batteries and follow them step by step.

If disregarded, the device could be damaged or the protection from moisture could be diminished.



- 1 Unscrews the Phillips screws (A) and remove the cover.
- 2 Carefully replace the two Mignon AA batteries (B). Ensure that the polarity is correct! It must be possible to insert the batteries in the correct position without using force.
- 3 The O-ring (C) must be undamaged, clean and positioned at the intended depth.
- 4 Fit the cover (D) on evenly. The O-ring must remain at the intended depth!
- 5 Tighten the Phillips screws (A).

7 Disposal

Separation by material and recycling of device components and packaging must take place at the time of disposal. The valid regional statutory regulations and directives applicable at the time must be observed.

Note



The device must not be disposed of with household waste. Return it to us, freight prepaid. We will then arrange for the proper and environmentally friendly disposal.

Private end users in Germany have the possibility of dropping off the device at the municipal collection center.

Batteries must be removed beforehand!

Please dispose of empty batteries at the collection points intended for this purpose.

8 Error and system messages

Display	Meaning	Possible causes	Remedy
----	Calculation not possible	<ul style="list-style-type: none"> • Measurement data acquisition is running 	<ul style="list-style-type: none"> ▶ Waiting for data collection
No display, unclear characters or no response when buttons are pressed	Battery depleted System error Product is defective	<ul style="list-style-type: none"> • Battery depleted • Error in the product • Product is defective 	<ul style="list-style-type: none"> ▶ Replace battery ▶ Send in for repair
bAt	Battery depleted	<ul style="list-style-type: none"> • Battery depleted 	<ul style="list-style-type: none"> ▶ Replace battery
Err.1	Measuring range exceeded	<ul style="list-style-type: none"> • Measurement too high • Product is defective 	<ul style="list-style-type: none"> ▶ Stay within allowable measurement range ▶ Send in for repair
Err.2	Measuring range is undercut	<ul style="list-style-type: none"> • Measurement too low • Product is defective 	<ul style="list-style-type: none"> ▶ Stay within allowable measurement range ▶ Send in for repair
Err.3	Display range has been exceeded	<ul style="list-style-type: none"> • Incorrect display unit • Value not displayable 	<ul style="list-style-type: none"> ▶ Correct setting
Err.4	Display range has been undercut	<ul style="list-style-type: none"> • Incorrect display unit • Value not displayable 	<ul style="list-style-type: none"> ▶ Correct setting
545 Err	System error	<ul style="list-style-type: none"> • Error in the product 	<ul style="list-style-type: none"> ▶ Switch product on/off ▶ Replace batteries ▶ Send in for repair

9 Technical data

Measuring range	Barometer	300.0 .. 1100.0 hPa (mbar) abs. 4.350 .. 15.950 PSI abs. 225.0 .. 825.0 mmHg (Torr) abs.
	Altimeter	-500.0 .. 9000.0 m -1640 .. 19999 ft.
	Temperature	-20.0 .. 50.0 °C -4.0 .. 122.0 °F
Accuracy	Barometer	± 1 hPa typical (at T: 0 .. 30 °C) ± 0.25 % FSS max. corresponds ± 2 hPa
	Altimeter	typ. ± 1 m relative (over a short period at constant ambient pressure @ 25°C)
	Temperature	typ. ± 0.5 °C @ 25°C
Overload		4000 hPa abs.
Measuring medium		Air
Pressure connection		No connection, integrated sensor Pressure equalization via diaphragm-protected opening
Measuring cycle		FAST: approx. 2.5 measurements per second SLO: approx. 4 seconds
Display		3-line segment LCD, additional symbols, illuminated (adjustable white, permanent illumination)
Standard function		Min/Max/Hold Trend display, time base selectable (1s, 60s, 1h, 3h) corresponds to Altimeter Variometer display with units m/s, ft/min, m/h, ft/h Only with altimeter function: The altitude meters covered are calculated (ascent <i>ASE</i> , descent <i>dESE</i> , resolution 1m)
Additional functions		<i>nULL</i> : Tare function
Adjustment		Zero point and gradient adjustment

Housing	Break-proof ABS housing
Protection rating	IP67
Measurements	108 * 54 * 28 mm
Weight	140 g, incl. batteries
Nominal temperature	25 °C
Operating conditions	-20 bis 50 °C; 0 to 95 %RH (short-term condensation possible)
Storage temperature	-20 bis 70 °C
Current supply	2 * AA batteries (mignon)
Current requirement (with slow measuring range)	approx. 0.4 mA, approx. 2.4 mA with backlight
battery life	Service life with alkaline batteries: approx. 6000 hours (without backlighting and with measuring rate = Slo)
Battery indicator	4-stage battery status indicator, Replacement indicator for depleted batteries: "BAT"
Auto-power-OFF function	The device switches off automatically if this is activated
Directives and standards	<p>The devices conform to the following Directives of the Council for the harmonization of legal regulations of the Member States:</p> <p>2014/30/EU EMC Directive 2011/65/EU RoHS</p> <p>Applied harmonized standards:</p> <p>EN IEC 61326-1:2021 Emission limits: Class B Immunity acc. to Table 1 Additional errors: < 1 % FS</p> <p>EN IEC 63000:2018</p> <p>The device is intended for mobile use and/or stationary operation in the scope of the specified operating conditions without further limitations.</p>

senseca.com



Senseca Germany GmbH
Hans-Sachs-Straße 26
93128 Regenstauf
GERMANY
INFO@SENSECA.COM

WEEE reg. no.: DE 93889386

