

OPERATING MANUAL

ECO 240-1 / ECO 240-2

Vacuum meter | barometer



Picture show ECO 240-1 with UT

B-H88.0.1X.DK2-2.0



Table of contents

1	About this documentation	4
1.1	Foreword.....	4
1.2	Legal notices.....	4
1.3	Further information	4
2	Safety	5
2.1	Explanation of safety symbols	5
2.2	Foreseeable misuse.....	5
2.3	Safety instructions.....	6
2.4	Intended use	6
2.5	Qualified personnel.....	7
3	The product at a glance	8
3.1	Display elements	8
3.2	Connections	8
3.3	Operating elements	9
4	Operation	10
4.1	Opening the configuration menu	10
4.2	Open the adjustment menu	12
5	Measurement Basics	13
5.1	Vacuum measurements	13
5.2	Special functions	13
5.2.1	NVLL Tare function.....	13
5.2.2	AVR 0:02 / AVR 0:05 / AVR 0: 10.....	14
5.3	Pressure Connection.....	15
5.3.1	Replacement of pressure hoses	15
6	Operation and maintenance.....	17
6.1	Operating and maintenance notices	17
6.2	Battery	17
6.2.1	Battery indicator	17
6.2.2	Changing battery.....	17

7	Disposal	19
8	Error and system messages.....	20
9	Technical data	21
10	Service	23
10.1	Manufacturer	23
10.2	Calibration and adjustment service.....	23

1 About this documentation

1.1 Foreword

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:

- V1.1 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!
- ▶ Not for unattended operation on other pressure vessels/systems, especially if leaks, etc. hazards can arise.

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, clean water or in non-corrosive/non-ionizing gases. A direct measurement of the environmental pressure can take place or the measurement pressure is taken with a suitable hose connected to the port. Relative measurements can also be conducted with the integrated special function NVLL.

Applications include:	
ECO 240-1	ECO 240-2
Barometric measurements (e.g. weather)	Barometric measurements (e.g. weather)
Vacuum measurements (down to 0.0 hPa abs., negative pressure via hose or even with complete device evacuation)	Vacuum measurements (down to 0 hPa abs., negative pressure via hose or even with complete device evacuation)
	Pneumatic measurements (up to 14000 hPa abs. or 14 bar abs.)

The pressure connection is made at the supplied interchangeable pressure connection ports with suitable hoses - 4 different connection options are available as standard, many other connection options can be used easily and reliably with G 1/8 adapters.

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 connections and be protected from dirt.

Note

Complete evacuation see Vacuum measurements at page 13.

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.

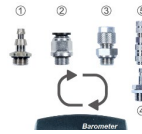
3 The product at a glance



LCD Display



Front view



Connection variants



Top view

3.1 Display elements



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

3.2 Connections

Universal connection

Interchangeable pressure connection via G1/8" thread.

3.3 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", (ONF appears in the display)

Long press, 4s




▶ Depending on the selected special function: Activation of the Tare function NVLL or rapid measurement with mean value AVR

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 (ONF appears in the display. Release the *Function* key.




Parameter	Values	Meaning
	 	
UN,T	Display unit	
	hPa	
	mBaR	
	BaR	(only available at ECO 240-2)
	PSI	
	mmKG	
FVN<	Activate able special functions	
	NVLL	Tara function available
	AVR 0:02 AVR 0:05 AVR 0:10	Rapid measurement with mean value over 2 s, 5 s or 10 s
RATE	Measuring rate	
	SLO	Slow measurement speed
	FAST	Fast measurement speed
SEA.L	SeaLevel-correction	
	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

Parameter	Values	Meaning
POFF	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 selected time in minutes:seconds, during which no buttons have been pressed
	ON	No automatic shut off of the backlight
IN,T	Factory settings	
	NO	Use current configuration
	YES	Reset device to factory settings. After confirming with the <i>function-button</i> , the display shows: IN,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	
	0.00	No zero point correction
	-5.00 ... 5.00	Zero point correction [in selected display unit] (e.g. at ECO 240-2: ± 500 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 Vacuum measurements

The device is especially suitable to measure rough vacuum via the pressure port very fast. But if the complete device is evacuated the following has to be considered:



Caution Damage possible by fast complete evacuation!

Due to the water tight construction a complete evacuation of the device may de-grade water protection. The keypad/display screen may break loose. If the device should still be used for this application, the following options are available:

- ▶ Remove the o-ring of the battery compartment! The Instrument then is no more water protected! Changing battery.
- ▶ Specialized variants ECO 240-1-VAC!

5.2 Special functions

With the special functions that can be selected via the **Configuration menu**, the device can be optimized for special measuring tasks. After it is switched on, the device starts up in standard measuring mode, the relevant special function is started by pressing and holding the *Function key* for 4 s.

5.2.1 NVLL Tare function

The special function FVNC NVLL has been selected in the configuration menu.

The display can be zeroed by pressing the *Function key* for 4 s. If the tare function is activated, NVLL 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.

5.2.2 AVR 0:02 / AVR 0:05 / AVR 0: 10

Fast measurement with mean value over 2 s / 5 s / 10 s

- Mean value mode for measurement of heavily fluctuating pressures.
- In the **Configuration mode**, a special function AVR 0:02, AVR 0:05 or AVR 0: 10 has been selected.
- By pressing and holding the Function key for 4 s the measurement with mean value can be activated.
- The different mean value times of 2, 5 or 10 seconds can be selected depending on the requirement.
- The first parameter is shown in the auxiliary display.

By pressing and holding the *Function key* for 2 s the special function can be deactivated. END FVNC appears in the display.

If the tare function is active when calling up the special function AVR, it can be reset by pressing the function key for 4 seconds. In order to reactivate tare, the special function must be changed in the configuration menu.

5.3 Pressure Connection

Note

Suitable hoses must be used for vacuum measurements, silicon is suitable as a hose material due to the low rigidity!



Caution Air pressure at port variant UT!

With higher pressures greater than 1 bar, the hoses must be secured to prevent unintended loosening. Suitable GDZ hose clamps are used for this purpose.

- ▶ 6x1 mm PVC (GDZ-01) up to 5 bar rel., vacuum-suitable!
- ▶ 6x1 mm PE (GDZ-02) up to 10 bar rel., vacuum-suitable!
- ▶ 6x1 mm PUR (GDZ-03) up to 9 bar rel., vacuum-suitable!








5.3.1 Replacement of pressure hoses

The pressure connections are screwed into the product with a standard G 1/8 inch thread with end seal. All common pressure connections with this design can be connected.

Note

Use a suitable tool for tightening and observe the maximum torque of 2 Nm!

Supplied connection:

Typ	Picture	Description
.. - UT		<p>Universal hose connection for 6 x 1 mm (4 mm inside) and 8 x 1 mm (6 mm inside) hoses.</p> <ul style="list-style-type: none"> The universal hose connection is suitable for plastic and silicon hoses with an outer diameter of 6 mm, for which purpose the hoses are simply connected to the upper part. Rubber/silicon hoses with a larger diameter (e.g. 8 mm) can also be connected. They are fit on the lower part for this purpose.
.. - QC6		<p>Quick-Connect for Ø 6 mm hoses.</p> <ul style="list-style-type: none"> The practical quick-change connection is only suitable for plastic hoses with 6 mm outer diameter. The hose end must be clean and undamaged for connection. It is fit by simply pushing it in until the mechanical stop is reached. It is disconnected by simultaneously pressing the ring on the upper end of the connection and pulling the hose.
.. - ST6		<p>Screw connection for 6 x 1 mm (Ø 4 mm inside) plastic hoses.</p> <ul style="list-style-type: none"> The secure screw connection is only suitable for plastic hoses with 6 mm outer diameter (Ø 4 mm inside). The hose end must be clean and undamaged for connection. The union nut must be loosened before connection. Then the hose is pushed onto the hose nipple up to the mechanical stop. The union nut is hand-tightened to secure the connection. Disconnection takes place by loosening the union nut and pulling on the hose.
.. - MCM		<p>MCM mini-quick-coupler plug connector.</p> <ul style="list-style-type: none"> Compatible quick-couplers with nominal width 2.7 mm can be used: 

6 Operation and maintenance

6.1 Operating and maintenance notices

Note

Pressure connections must be protected from soiling.

6.2 Battery

6.2.1 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 device. The battery is fully depleted.

6.2.2 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!

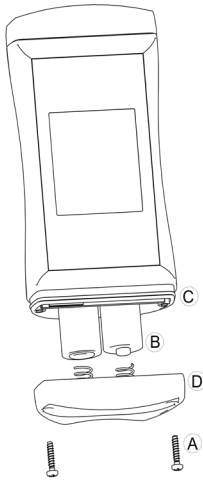
If the batteries have different charge levels, leaks and thus damage to the device can occur.

- ▶ 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.
- ▶ 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
SYS 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

ECO 240-1	
Measuring range	0.0 .. 1700.0 hPa (mbar) abs. 0.00 .. 25.00 PSI abs. 0.0 .. 1300.0 mmHg (Torr) abs.
Overload	Max. \pm 3000 hPa abs.
Accuracy	Typ.: \pm 2 hPa (at T: 5 .. 30 °C) Max.: \pm 1.25 % FSS

ECO 240-2	
Measuring range	0 .. 14000 hPa (mbar) abs. 0.00 .. 199.99 PSI abs. 0 .. 10500 mmHg (Torr) abs.
Overload	Max. \pm 20000 hPa abs
Accuracy	Typ.: \pm 0.02 % FSS \pm 0.1 % of m.v. (@ 25 °C) Max.: \pm 0.1 % FSS \pm 0.5 % of m.v.

Measuring medium	air, clean water or non-corrosive/non-ionizing gases
Pressure connection	1 hose connection, interchangeable with G1/8 universal ports
Measuring cycle	FAST: approx. 25 measurements per second SLO: approx. 2.5 measurements per second
Display	3-line segment LCD, additional symbols, illuminated (white, duration adjustable)
Standard function	Min/Max/Hold
Activatable special functions	NVLL: Tare function AVR: Averaging over 2 s / 5 s / 10 s
Adjustment	Zero point and gradient adjustment
Housing	Break-proof ABS housing
Protection rating	IP67 (pressure connections must be protected from soiling and moisture)

Housing	Break-proof ABS housing
Dimensions	108 * 54 * 28 mm, without pressure connection
Weight	140 g, incl. batteries
Nominal temperature	25 °C
Operating conditions	-20 to 50 °C; 0 to 95 %RH (short-term condensation possible)
Storage temperature	-20 to +70 °C
Current supply	2 * AA batteries (mignon)
Current requirement (with slow meas. range)	ECO 240-1: approx. 1 mA, approx. 3 mA with backlight ECO 240-2: approx.. 0.6 mA, approx. 2.6 mA with backlight
battery life	Service life with alkaline batteries: approx. 3000 hours (ECO 240-1) or 5000 hours (ECO 240-2) (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> <ul style="list-style-type: none"> • 2014/30/EU EMC Directive • 2011/65/EU RoHS <p>Applied harmonized standards:</p> <ul style="list-style-type: none"> • EN 61326-1:2013 Emission limits: Class B Immunity according to Table 1 Additional errors: < 1 % FS • EN 50581:2012 <p>The device is intended for mobile use and/or stationary operation in the scope of the specified operating conditions without further limitations.</p>

10 Service

10.1 Manufacturer

If you have any questions, please do not hesitate to contact us.

10.2 Calibration and adjustment service

The purpose of the calibration is to verify the precision of the measuring device by comparing it with a traceable reference.

Both ISO calibration certificates and DAkkS calibration certificates are available from Senseca.

Note

- The ISO standard 9001 is applied for the iso-calibration certificates. These certificates are an affordable alternative to the DAkkS calibration certificates and provide information of the traceable reference, a list of individual values and documentation.
- The DAkkS calibration is based on DIN EN ISO/17025, the accreditation basis is recognized worldwide. These certificates offer high-quality calibration and consistently high quality. The DAkkS calibration includes any necessary adjustment with the purpose of minimizing a deviation of the measuring device.
- The device is delivered with a test report. This confirms that the measuring device has been adjusted and tested, without making any further statement about the accuracy.
- Only the manufacturer can check the basic settings and make corrections if necessary.

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