

GREISINGER

— electronic —

Operating Manual Precision Barometer

from Version 1.5

GTD 1100



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1 Intended use

The device measures the absolute pressure of air. The current altitude can also be calculated

Field of application

- Barometric measurements (weather)
 - Elevation determination
- etc...

The safety instruction (see safety instructions) have to be observed.

The device must not be used for purposes and under conditions for that the device had not been designed.

The device must carefully dealt with and has to be used according to the specifications (do not throw, knock, etc.). It has to be protected against dirt.

2 General advice

Read through this document attentively and make yourself familiar to the operation of the device before you use it. Keep this document in a ready-to-hand way in order to be able to look up in the case of doubt.

3 Disposal notes



Dispense exhausted batteries at destined gathering places.

This device must not be disposed as “residual waste”.

To dispose this device, please send it directly to us (adequately stamped).

We will dispose it appropriately and environmentally friendly.

4 Safety instructions

This device has been designed and tested in accordance to the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using it.

1. Trouble-free operation and reliability of the device can only be guaranteed if it is not subjected to any other climatic conditions than those stated under "Specification".
Transporting the device from a cold to a warm environment condensation may result in a failure of the function. In such a case make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.
2. Whenever there may be a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting. Operator safety may be a risk if:
 - there is visible damage to the device or the device is not working as specified
 - the device has been stored under unsuitable conditions for a longer time
 In case of doubt, please return device to manufacturer for repair or maintenance.
3. **Warning:** Do not use this product as safety or emergency stop device, or in any other application where failure of the product could result in personal injury or material damage.
Failure to comply with these instructions could result in death or serious injury and material damage.

5 Operation and maintenance

- If the symbol "LOBAT" is displayed at the left side of display, the battery is weak, measuring can be continued for a short period. If "bAt" is displayed in the main display the battery is used up and needs to be replaced. Measuring is no more possible.
- The battery has to be removed, when storing device above 50 °C.

Hint: *We recommend removing the battery if device is not used for a longer period of time! Risk of leakage*

6 Operation

6.1 Display elements



1: Main display

Display of current measuring value or of minimal measured value ("Lo" blinking) or maximal value ("Hi" blinking)

LOBAT

Indicates low battery

6.2 Pushbuttons



on/off:

on/off switch, press key long to switch device off

mode:

press short: changes between actual measuring value, the minimal measured value ("Lo" blinking) and maximal measured ("Hi" blinking) value.

zero:

press >2s: reset Min and Max value

press >2s: activates / deactivates the "Zero-function"

7 Starting

Switch the device on with button



After the segment test () the device displays some information to its current configuration:

OFFS, if offset correction is active

SCAL, if scale corrections active

hPA (=hPA) | mmHg (=mmHg), Unit of meas.

SEAL, if sea-level correction is active

P.off, if auto power-off is active

Afterwards the device is ready for measuring.

8 Min-/max- value memory

Display MIN-value (Lo):	Press button mode shortly	Display changes between 'Lo' and min-value
Display MAX-value (Hi):	Press mode shortly again	Display changes between 'Hi' and max-value
*)sum of ascents (ASC):	press 'Mode' shortly again	display changes between 'ASC' and sum of ascents
*)sum of descents (DESC):	press 'Mode' shortly gain	display changes between ,DESC' and sum of descents
*)sum 'all' (ALL=asc-desc):	press 'Mode' shortly again	display changes between ,ALL' and sum
Display actual value again:	Press mode shortly again	Actual value is displayed
Delete MIN/MAX:	Press button mode for 2 s	MIN&MAX are deleted. 'CLr' (Clear) is displayed shortly

The Min-/max- display is automatically set to actual value display after 10 s.

The Min-/max- values are deleted if the device is switched on after it had been turned off.

*) Summing functions only with slide switch at "alti": During the instrument is switched on this functions of the altimeter are summing up the travelled altitude distances since the last clearing:

- Sum Ascent: The sum over all ascents.
- Sum Descent: The sum over all descents.
- Sum All: The travelled altitude distance (ASC-DESC).

The summing functions are not cleared by switching Off and On again! Whereas min and max are cleared.

Note: When using the summing functions the auto power off function should be deactivated. Please refer to „configuration of the device – I.) Auto Power Off Time“

9 Zero-function (relative measuring)

With help of the Zero-function relative measurements can be realized: press "zero"-button for 2s.

"nULL" is displayed shortly and the displayed value is set to 0. Press again "zero" for 2s to display the absolute value again.

Note: Setting and resetting the Zero function will delete your min-/max- value memory.

Field of application: Over/ Under pressure measurement, please mind the measuring range!

10 Measurements and functions

10.1 Measuring atmospheric pressure (slide switch at "baro")

The device measures the absolute pressure of the ambient atmosphere. This value should not be confused with the values at sea level given by weather stations! Usually the sensor is placed above sea level. If the value at sea level is to be measured, the pressure decay caused by the elevation has to be considered! The device can correct the pressure. Therefore SEA.L (Sea Level correction) has to be activated in the configuration and the elevation above sea level (Alti = Altitude in [m]) has to be entered to get the correct value. An atmosphere of $T_0 = 15^\circ\text{C}$ is assumed for the calculation. The tendency of the absolute pressure (falling or rising) can be used as an important indicator for weather forecasts.

The display of the tendency can be activated via device configuration.

10.1.1 Tendency display

Slide switch at "baro", not during min- or max-value display

The tendency during the last 4 hours will be displayed alternating to the currently measured value, if the display is activated:

„riSE“: abs. pressure has been rising
 „FALL“: abs. pressure has been falling

As long as the pressure keeps constant (e.g. change $<0.2\text{mbar/h}$), no tendency will be displayed.

Note: The tendency display is supposed to be used during stationary operation. The operation during changing altitude is nonsense, because the instrument can not distinguish between variation in pressure because of changing weather or because of changing altitude.

Note: When using the tendency display the auto power off function should be deactivated. Please refer to „Configuration Of The Device “Auto Power Off Time .)

10.2 Measuring altitude / elevation (slide switch at "alti")

The meter calculates the current altitude from the absolute pressure: Pressure falls with rising altitude.

It has to be considered that not only changes in altitude but also changes in the weather have influence to the altitude display. To correct the weather influence the displayed altitude can be corrected by the keys.

To do so press the keys “up” and “down” ( ) simultaneously, ‘Corr’ will flash in the display.

By means of the keys “up” and “down” the displayed value in m or ft (dep. on the configuration) can be

corrected. The input will be finished by pressing the left “enter” key () or after 20 seconds without changes. If the display was corrected at a known altitude of a landmark (e.g. contour lines in maps, marks at railway stations, buildings or other landmarks) and the weather is stable, the display is very precise (e.g. deviation within a view meters per day). At instable weather conditions with changing pressure measuring faults of 10 meters per hour are possible! (see “Accuracy of altitude measuring”)

If used in alpine terrain the weather phenomenon ‘Inversion’ as a potential source of error has to be also considered. Also the altitude calculation is temperature dependent.*)

Hint: *At begin of an observation of the altitude e.g. at the start of a tour, don’t forget to reset the min/max and sum memories, see below!*

If the exact altitude was entered at the beginning of a tour and in the following there are measuring errors of more than 5m per hour a change in the weather is probable! E.g. measuring is to high -> the weather probably gets worse.

10.2.1 Accuracy of altitude measuring

With proper calibration (reference point) and stable weather conditions:

In the range 0 to 4000 m in theory, an accuracy of ± 5 meters can be achieved.

(Accuracy + sensor barometric formula). In practice, however, deviations occur in the barometric formula for the actual atmospheric layering:

When looking at small differences in height (<200 m) within a short time, in practice, accuracy $\pm 1.5 \text{ m} \pm 3\%$ is achievable. Highest correlation is achieved when the reference temperature of the formula amount will be adjusted to actual conditions.*)

In unstable weather, increased deviations occur in the measurement. This error is independent of the technical accuracy of the measuring instrument (which is actually very high!)

For example: If weather changes, the ambient pressure can change up to 3 mbar / hour, the display to sea level changes within this hour to about 25m, although the altimeter has not moved. Thunderstorms can cause even larger errors. But keep in mind: This error source is equal to any barometric altimeter.

Weather-Example:
Absolute pressure at 340 meters above zero.
Changes up to 1mbar/h!
1mbar change is equal to about 8.5m.



*) Reference temperature of altitude measuring (standard 15 °C). An actual temperature of 25 °C at 1000m altitude causes a measurement error of about 40m. To compensate for this effect, the temperature can be entered in the configuration.

11 Configuration of the device

Follow these instruction to configure the functions of the device:

- Switch the device off.

- Press **mode** button and keep it pressed. Turn the device on. Release the mode button after the segment test () finished. The first parameter "P.oFF" is displayed.
- If a parameter should be changed press key up or down ( ) the present setting of the parameter will be shown and can be changed via up/down keys.

The parameter setting is confirmed by pressing  .

- Jump to the next parameter with  .

Parameter	value	information
button 	buttons  	
P.oFF	Auto Power-Off (turn-off delay) factory setting: 20 min.	
	1 ... 120	Auto Power-Off (turn-off delay) in minutes. If no key is pressed for the time adjusted in this parameter, the device is automatically switched off to safe battery power. (adjustable range 1 to 120 min)
	oFF	automatic power-off is deactivated (continuous operating)
Unit	Unit and range of display Dependent of The Slide Switch Position	
	baro	hPA 300,0 ... 1100,0 hPa, resolution 0.1 hPa
		nnHG 225,0 ... 825,0 mmHg, resolution 0.1 mmHG
	temp	°C -10,0 ... +50,0 °C, resolution 0,1 °C
		°F -13,0 ... +122,0°F, resolution 0,1 °F
	alti	n (m) -500 ... -200 m, resolution 1m -199,5 ... +1999,5 m, resolution 0,5m 2000 ... 9000 m, resolution 1m
Ft (feet) -1640 ... -655 ft, resolution ~5ft -654 ... +1999 ft, resolution ~2ft 2000 ... 19999 ft, resolution ~5ft		
tREF	Reference temperature for altitude measuring factory setting: +15°C	
	-25,0 ... 50°C	Reference temperature for altitude measuring only for slide switch at „alti“
	-13,0 ... 122,0 °F	
SEA.L	Sea-level correction factory setting: off	
	oFF	Sea-level correction off
	oN	Sea-level correction on
ALti	Altitude input for sea-level correction factory setting: 340	
	-500 ... 9000	-500 ... 9000 m selectable
tEnd	Tendency Display For Barometer	
	oN	Tendency on
	oFF	Tendency off

Pressing  again stores the settings, the instruments restarts (segment test)

Please note: *If there is no key pressed within the menu mode within 2 minutes, the configuration will be cancelled, the entered settings are lost!*

12 Adjusting of the instrument

To adjust the instruments according to your needs proceed like follows:

- Switch instrument off.
- Press **zero** button and keep it pressed. Turn the device on. Release the mode button after the segment test () finished. The first parameter “5cL” is displayed.
- If a parameter should be changed press key up or down ( ) the present setting of the parameter will be shown and can be changed via up/down keys.

The parameter setting is confirmed by pressing  .

- Jump to the next parameter with  .

Parameter	value	information
button 	buttons  	
OFFS	Offset of sensors <i>factory setting: off</i>	
	oFF -5,0 ... +5,0 -3,7 ... +3,7 -9,0 ... +9,0	Adjustment have an effect on °C, hPa, mmHg °F
SCAL	Scale correction <i>factory setting: off = 0%</i>	
	oFF -5.00 ... +5.00	Adjustment in %

Pressing  again stores the settings, the instruments restarts (segment test)

Please note: *If there is no key pressed within the menu mode within 2 minutes, the adjusting will be cancelled, the entered settings are lost!*

13 Notes to the calibration services

Calibration certificates - DKD-certificates - other certificates:

If device should be certificated for its accuracy, it is the best solution to return it with the referring sensors to the manufacturer. (please state desired test values, e.g. 1bar abs)

Only the manufacturer is capable to do efficient recalibration if necessary to get results of highest accuracy!

14 Error and system messages

Er. 1	measuring range has been exceeded
Er. 2	measured value has fallen below permitted range
Er. 3	display range has been exceeded (>19999)
Er. 4	measuring value has fallen below displayable range (< -1999)
Er. 7	System fault - the device has detected a system fault (defective or far outside allowable ambient temperature range)
Er.11	Sensor error or value could not be calculated

If the symbol “LOBAT” is displayed at the left side of display, the battery is weak, measuring can be continued for a short time.

If “bAt” is displayed in the display the battery is used up and needs to be replaced. Measuring is no more possible.

15 Specification

Meas. range	Abs. Pressure	300,0 ... 1100,0 mbar abs., 225,0 ... 825,0 mmHg abs.,	resolution: 0,1 mbar resolution: 0,1 mmHg
	Temperature	-10,0 ... +50,0 °C, -13,0 ... +122,0°F,	resolution: 0,1 °C resolution: 0,1 °F
	Altitude:	-500 ... -200 m, -199,5 ... +1999,5 m, 2000 ... 9000 m, -1640 ... -655 ft, -654 ... +1999 ft, 2000 ... 19999 ft,	resolution: 1m resolution: 0,5m resolution: 1m resolution: ~5ft resolution: ~2ft resolution: ~5ft
Accuracy: (±1 digit) (at nominal temperature = 25°C)	Temperature: ±0.05% of measured value ±0.5% FS Abs. Pressure: ±1.5mbar (750...1100mbar) with calibration certificate: ±0.5mbar (750...1100mbar) height determination: see accuracy of height determination		
Max. overload:	4000 mbar abs.		
Pressure connection:	sensor integrated in device		
Measuring frequency:	1 measurement per second		
Offset and scale:	digital offset and scale adjustment for air pressure measurement		
Min-/max-value memory:	min- and max- value are stored		
Sea level correction:	The displayed value can be referenced to sea level. Therefore the current height above sea level has to be entered.		
Summing Functions:	Only for altimeter: The covered altitude distance is calculated (ascent, descent, sum) resolution 2m		
Tendency:	Only for barometer: display of falling/rising pressure		
Zero-function:	relative measurement: the displayed value is set to "zero"		
Display:	approx. 13 mm high, 4½-digit LCD display		
Pushbuttons:	3 membrane keys for on/off, min-/max-value request, offset adjustment		
Working conditions:	-10 to 50 °C; 0 to 80 % RH (non condensing)		
Storage temperature:	-20 to 70 °C		
Power supply:	9V-battery, typ. 6F22 (included in scope of delivery)		
Current consumption:	ca. 50 µA (Operating time with standard zinc-carbon battery >6000 hours)		
Display for weak battery:	automatically if battery consumed "BAT", warning: "LOBAT"		
Auto-off function:	If activated: device will be automatically switched off if not operated for longer time (selectable 1..120min)		
Housing:	impact resistant ABS housing, front side IP65		
Dimensions:	approx. 106 x 67 x 30 mm (H x W x D) , without connecting nozzle		
Weight:	approx. 135g incl. battery		
EMC:	The device corresponds to the essential protection ratings established in the Directives of the European Parliament and the council on the approximation of the laws of the member states relating to the electromagnetic compatibility (2004/108/EG). Additional error: <1%		