Operating Manual
Air Oxygen Measuring Device
GOX 100

Specification

Measuring range:	0.0 ... 100.0 %O_2 (oxygen concentration)
Accuracy: (at nominal temperature = 25°C)	± 0.1 %O_2 ± 1 digit (calibrated device)
Sensor connection:	via approx. 0.7m long connection cable with jack connector
Oxygen sensor:	partial oxygen pressure sensor, integrated in sensor housing (type for replacement: GOEL 369) **Attention:** Remove Cap before measuring/calibration. Storing with cap can increase sensor lifetime
Response time:	90% in < 10 sec., depending on temperature
Operating life:	guaranteed 12 months (assuming appropriate usage at air pressure)
Operating pressure:	0.5 to 2.0 bar absolute.
Measuring Frequency:	1 measuring per second
Display:	approx. 13 mm high, 3½-digit LCD
Operation Elements:	3 keys for ON/OFF, min-/max-value display, calibration
Min-/Max-Value Memory:	Min and max measured value are stored
Nominal temperature:	25°C
Ambient temperature:	-5 to 50°C (sensor), -20 to 50°C (device)
Relative humidity:	0 to 95 %RH (not condensing)
Storage temperature:	-15 to 60°C (sensor), -20 to 70°C (device)
Power Supply:	9V-battery type JEC 6F22 (in scope of supply)
Power Consumption:	approx. 120µA (battery life with standard zinc carbon battery more than 2500 hours!)
Battery Change Indicator:	automatically if battery is used up: "BAT"
Auto-Off-Function:	when the Auto Off Function is activated, the device switches automatically off, if keypad is not attended for a longer time (selectable 1..120min).
Housing:	impact-resistant ABS, transparent panel, front side IP65
Dimensions:	approx. 106 x 67 x 30 mm (L x W x D) without sensor cable
Weight:	approx. 185g incl. battery and sensor
EMC:	The device corresponds to the essential protection ratings established in the Regulations of the Council for the Approximation of Legislation for the member countries regarding electromagnetic compatibility (89/336/EWG). Additional fault: <1%

Operating Advice

Attention: Before measuring or calibrating the protection cap has to be removed from the sensor !

Screwing the cap on the sensor during storage increases sensor lifetime.

sensor with protection cap

sensor without cap

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”.
   If the device is transported 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. If there is 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
   - the device is not working as specified
   - the device has been stored under unsuitable conditions

   In case of doubt, please return device to manufacturer for repair or maintenance.
3. **Warning:** Do not use these 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.
4. The battery has to be taken out, when storing device above 50°C.
   It is recommended to take the battery out, when storing device for a longer period of time.

Measuring And Functions

Oxygen measuring

The meter measures oxygen partial pressure in the first step. Considering the entered barometric pressure (Configuration P.Ab) the oxygen concentration [% O2] of the gas to be measured.

To get a correct measuring a calibration on air has to be performed previously (p.r.t. calibration).

The result depends on the current barometric pressure. If the pressure during the measuring differs from the pressure during calibration, a proportional deviation is the result. This error can be compensated by the entering of the correct pressure value in the configuration 'P.Ab' (pressure absolute). For measuring results with highest precision it is suggested to calibrate the instrument previously to the measuring at exactly the same barometric pressure and temperature (p.r.t. calibration). When measuring at atmosphere and previous calibration at the same conditions the pressure value has not to be adjusted necessarily, because the same pressure is used for calibration and measuring. Just the precision of the valuation of the electrode state will suffer a bit.
When measuring pressured gases and preceding calibration at air it is necessary the enter the correct pressure values both before calibration and before measuring. Keep the maximum working pressure of the sensor in mind!

The sensors temperature dependency is compensated internally. However for best results try to keep the same temperature both during calibration and measuring.
Temperature differences between sensor and gas may cause additional errors! Therefore wait an appropriate period of time until the sensor has adjusted its temperature to the gas to be measured. Observe: it may take from several minutes up to several hours (depending on the measurement set-up) until both temperatures are adjusted. A suitable flow of the gas around the sensor increases the adjustment significantly. Try not to warm the sensor by touching it during measuring or calibration.

Attention: When measuring bottled gas, consider that the gas coming out is cooler than the ambient because of the pressure loss!
Strong air flows can produce an over pressure at the sensor – possible source of measuring/calibration erros!

Calibration

In order to compensate for ageing of the sensor, the sensor has to be calibrated at regular intervals. The device is equipped with a easy to handle calibration function. We recommend to calibrate at least once week or, for optimum measuring results, directly before starting the measuring process. Check the absolute pressure at the configuration point "P.ab" before carrying out a calibration.

Calibration: The sensor will be calibrated to the atmospheric oxygen concentration of 20.95%. Sensor has to be subjected to air (make sure that rooms are thoroughly aired).Press CAL-key for approx. 2 sec. till the display shows CAL. The calibration is started. The calibration will be automatically completed as soon as the measuring values for oxygen are stable (takes a few seconds). After calibration the device will shown for a short time the valuation of the sensor state.
If an error message (CE.3, CE.4, CE.6) is displayed, the previous calibration is restored after restarting by pressuring a key.

Valuation of sensor state

Watch sensor state:	press key "CAL" shortly once	display show for a short time xx.P

The valuation is displayed in 10 Percent steps: 100% means optimal sensor condition. Lower values are indicating that the sensor life time will be reached soon. But also a erroneous pressure entry may be the cause of low valuation values.

Min-/Max- value memory

watch MIN value (Lo):	press key "Mode" shortly once	display changes between 'Lo' and MIN value
watch MAX value (Hi):	press key "Mode" shortly once again	display changes between 'Hi' and MAX value
restore current value:	press key "Mode" shortly once again	current value is displayed
clear MIN-/MAX- value:	press key "Mode" for 2 seconds	MIN and MAX value are cleared. The display shows shortly 'CLr'. *note: min/max values are autom. cleared when switching on the instrument*

Configuration Of The Device

To configure the instrument proceed like follows:

1. Switch off the instrument.
2. Press the 'Mode' key while switching on the instrument, keep 'Mode' key pressed until 'P.oF' appears (after about 3 seconds)

I.) Auto Power Off Time „P.oF":

The auto power off time in minutes. If no key is pressed, the instrument switches itself off automatically after the entered period of time.

3. Press 'up' or 'down' key, the currently selected power off time will be displayed (off, 1..120min)
4. Enter the desired time by pressing 'up' or 'down' key. **(factory setting: 20)**
   Possible input: off: the auto power off function is deactivated (permanent operation)
   1...120: auto power off time in minutes.
5. Confirm the value by pressing left key, 'P.Ab' appears in the display.

II.) Air Pressure „P.Ab": Editing only necessary when measuring gases under pressure or in high altitudes

Here the absolute pressure (or pressure of the gas to be measured) has to be entered. **(factory setting: 980mbar)**

6. Press 'up' or 'down' key, the currently selected air pressure will be displayed
7. Enter the desired pressure by pressing 'up' or 'down' key. Possible input: 500.. 1999mbar
8. Confirm with left key: values will be stored, the instrument will restart (segment test). End of configuration.

Please note: If during the configuration no key is pressed within 60 seconds, the configuration will be aborted. Eventually made changes won't be stored!

System Messages

CE. 3 = calibration error: sensor voltage are to low (sensor spent or wrong chosen air pressure)
CE. 4 = calibration error: sensor voltage are to high (sensor wrong connected or wrong chosen air pressure)
CE. 6 = calibration error: sensor voltage not stable
Er. 1 = measuring range has been exceeded
Er. 2 = measuring value has fallen below perm. range
Er. 7 = System fault - the device has detected a system fault (defective or far outside allowable ambient temperature range)
If the symbol **"BAT"** is displayed at the left side of display, the battery is weak, measuring can be continued for a certain time.
If "bAt" is displayed in the main display the battery is used up and needs to be replaced. Measuring is no more possible.