Operating Manual for Air Oxygen Measuring transducer

OXY 3690 MP

CE

Specification:

Measuring range:	0.0 to 100.0 % air oxygen (sensor temperature –20.0...50.0°C)
Output signal:	refer to type plate
Accuracy: (at nominal temperature)	
Display	±0.1% oxygen ±1Digit
Output signal:	±0.2 % FS
Connection:	4 - 20 mA (2-wire) Voltage (3- resp. 4-wire)
Electric isolation:	input electrically isolated
Auxiliary energy: (supply voltage)	Uv = 12 - 30 V DC (4-20mA) Uv = 18 - 30 V DC (0-10V) or refer to type plate
Reverse voltage protection:	50V permanent
Perm. impedance (at 4-20mA)**:**	R_A(Ohm) < ((Uv - 12V) / 0.02A) *Example: for Uv = 18V: R_A < (18V - 12V) / 0.02A => R_A < 300 Ohm*
Permissible load (at 0-...V)**:**	R_L(Ohm) > 3000 Ohm
Sensor:	Special partial oxygen sensor GGO369S/MU (in scope of supply!)
Electrolyte:	acid electrolyte
Cross sensitivities:	signal of <0,002 % O_2 100% CO_2, 100% CO, 3000ppm NO in N_2, 1000ppm H_2 in N_2, 100% C_3H_8, 2000ppm H_2S in N_2, 2000ppm SO_2 in N_2, 1000ppm Benzene in N_2
Response time:	90% in <5sec., depending on temperature
Nominal sensor life	>1 200 000 % O_2-hours
Warranty period:	12 months (assuming appropriate usage according to the manual)
Operating pressure:	0.5 to 2.0 bar abs.
Dimensions of housing:	Ø approx. 38 mm, housing with M16 x 1-screw thread (sensor can be connected to line tubes by means of an additional adapter), length: GGO369...: approx. 95 mm (150 mm incl. anti-buckling glanding), GOO369...: approx. 105 mm (160 mm incl. anti-buckling glanding)
Sensor connection:	5 pole screwable socket
Temperature compensation:	integrated in oxygen sensor
Calibration:	via keypress at ambient air
Display:	approx. 10 mm high, 4-digit LCD-display
Nominal temperature:	25°C
Operating temperature:	0 to 50 °C (sensor: -5 to 50°C)
Relative humidity:	0 to 95 % RH (non-condensing)
Storage temperature:	-20 to 70 °C (sensor: -15 to 60°C)
Housing:	ABS (IP65 - with the exception of sensor and temperature probe connection sockets)
Dimensions:	82 x 80 x 55 mm (without elbow-type plug and sensor sockets)
Mounting:	With fixing holes for wall mounting (in housing - accessible after cover has been removed).
Mounting distance:	50 x 70mm, max. shaft diameter of mounting screws is 4 mm.
Electric connection:	elbow-type plug conforming to DIN 43650 (IP65), max. wire cross section: 1.5 mm², wire/cable diameter from 4.5 to 7 mm
EMC:	The OXY 3690 MP 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). In accordance with EN50081-1 and EN50082-1 Additional error: <1%

Operating Advice:

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

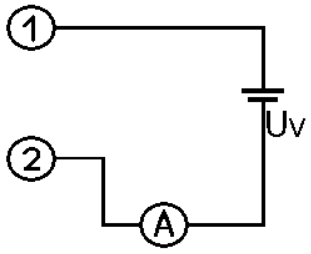
Screwing the cap on the sensor during storage increases sensor lifetime.

sensor with protection cap

sensor without protection cap

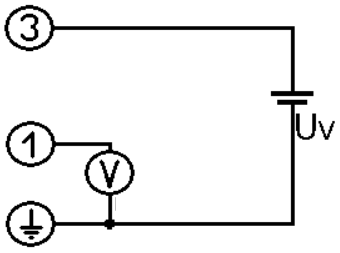
Assignment of elbow-type plug:

2-wire connection (4-20mA)



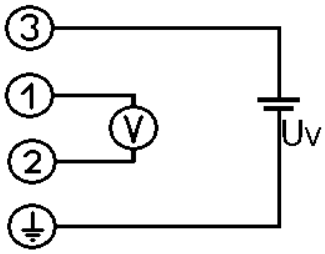
1 = supply voltage +Vs
2 = GND / signal

3-wire connection (voltage)



1 = signal +
3 = supply voltage +Vs
⏚ (4) = supply voltage -Vs
signal -

4- wire connection (voltage)



1 = signal +
2 = signal -
3 = supply voltage +Vs
⏚ (4) = supply voltage -Vs

General installation instructions:

To mount the connection cable (2-, 3-, or 4-wire depending on type of device) the elbow-type plug screw has to be loosened and the coupling insert has to be removed by means of a screw driver at the position indicated (arrow). Pull out connection cable through PG glanding and connect to the loose coupling insert as described in the wiring diagram. Replace loose coupling insert onto the pins at the transducer housing and turn cover cap with PG glanding in the direction desired till it snaps on (4 different starting positions at 90° intervals). Re-tighten the screw at the angle plug.

⚠ Safety instructions:

This device has been designed and tested in accordance with 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 the device.

1. Trouble-free operation and reliability of the device can only be guaranteed if the device 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 cause 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. General instructions and safety regulations for electric, light and heavy current plants, including domestic safety regulations (e.g. VDE), have to be observed.
3. If device is to be connected to other devices (e.g. via PC) the circuitry has to be designed most carefully. Internal connection in third party devices (e.g. connection GND and earth) may result in not-permissible voltages impairing or destroying the device or another device connected.
4. 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 for a longer time.

   In case of doubt, please return device to manufacturer for repair or maintenance.
5. **Warning:**
   Do not use these product as safety or emergency stop devices, 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.

Display functions:

During normal operation the **oxygen content** of the air is displayed in the unit **[%]**. By pressing the Key 2 (down) the temperature at the sensor can be shown, pressing key 3 (up) shows the **state of the sensor** in **[%]**. The state is calculated and stored during the calibration (see below). The displays of the state and the temperature of the sensor are marked by small arrows at the upper end of the display. After 5 seconds the transducer display switches automatically back to the oxygen value.

display dissolved oxygen

display sensor temperature

display state of sensor

Calibration of the sensor:

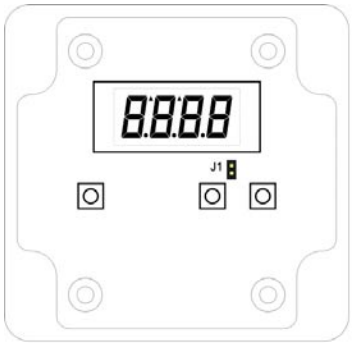
Expose sensor to the ambient air, wait until the temperature has adopted to the ambient conditions.
Press key "SET" for 2 sec., The display shows "CAL".
After approx. 10 sec's the transducer is calibrated or a referring error message will be shown:

Display	Meaning	Possible fault causes	Remedy
CFE.1	temperature out of allowed range	temperature has to be within 5 to 40°C	calibrate again at correct temperature
	sensor error	temperature sensing defective	check cable & connection, replace sensor if necessary
CFE.3	wrong signal: to low	sensor element used up	replace sensor element
CFE.4	wrong signal: to high	calibration surrounding not valid	check Calibration surrounding
CFE.6	instable signal	calibration surrounding not valid	check Calibration surrounding

During calibration the state of the sensor is evaluated: 100% means perfect state, 40 % means e.g. sensor element has a weak output signal and needs to be replaced soon (p.r.t. sensor manual). The state of the sensor can be displayed with key 3 (down).

Configuration of the device

For the correct function of the device in its application, it has to be configured to meaningful settings. For doing this the cover has to be removed. Then the jumper **J1** right above of key 2 has to be set.



Then use following configuration procedure:

1. Press key one more than 4 sec's until PAbS appears in the display
   Now PAbS and the referring setting are shown alternating

I.) Average ambient absolute pressure „PAbS" (function of the altitude above sea level):

Necessary for a correct evaluation of the state of the sensor. If the application works for example at an altitude of 350 m above sea level, 980mbar is a correct setting. Please refer to Appendix A

2. Enter the desired value by using keys 3 (up) and 2 (down).
   Input range: 500...2000 mbar
3. Acknowledge the value with key 1 (set).
4. The settings are stored. The unit starts up again. (8888 in display)

Attention: Bring back the jumper j1 to the ‚parking position' after configuration (one contact connected, the second contact ‚on air')!
Then the device can be calibrated by key 1 and the configuration data is protected.

Error and System Messages

Display	Description	Possible fault cause	Remedy
FE 1	measuring range exceeded	Calibration is wrong	Recalibrate the transducer.
FE 2	Measuring values below measuring range	Wrong signal	Check the connections, cable and sensor.
FE 7	System fault	Error in device	Disconnect from supply and reconnect. If error remains: return to manufacturer
FE 9	Input signal is not valid	Sensor not connected or cable defective	Check sensor, cable and connections
8.8.8.8	Segment test	The transducer performs a display test for 2 seconds after power up. After that it will change to the display of the measuring.	
	Input signal is not valid	Permissible input range is exceeded	Check if not a wrong sensor is connected. Replace sensor.
		Sensor not connected	Check sensor, cable and connections

Appendix A: abs. ambient pressure as a function of the altitude above sea level

Altitude [m]	Pabs [mbar]	Altitude [m]	Pabs [mbar]	Altitude [m]	Pabs[mbar]
-100	1025	600	943	1600	835
0	1013	700	932	1800	814
100	1001	800	920	2000	794
200	989	900	909	2500	746
300	977	1000	898	3000	701
400	966	1200	877	4000	616
500	954	1400	856		

Values between are to be interpolated

Appendix B: oxygen sensor

Application of the different sensor types GGO369S/MU (standard) and GOO369S/ MU (option)

GGO 369 S (closed sensor)
For measurements at atmosphere and in systems without over or under pressure the GGO 369 is sufficient. Additionally the GGO can be screwed impermeable to systems with low over or under pressure.
Attention! If the sensor cannot be calibrated at exactly the same pressure, the measurement will be faulty! For such applications we have integrated a manual pressure compensation. Then the GGO can be connected to systems with a known pressure in the range of 0.5 ...2 bar. The pressure can be entered to the device an will compensated by the device such no additional measuring error will occur.

GOO 369 S (open sensor)
The sensor is equipped with drillings at the end and because of its special construction the measuring gas streams optimally around the sensor. No pressure can appear while gas blows to the sensor, which otherwise would result in erroneous measures.
The temperature compensation speed of the sensor also is optimised by this design. The measuring gas escapes into the air. Especially the measuring of gases from compressed gas bottles, where the expansion of the gas leaving the bottle lowers the temperature, is optimised with regard to the temperature compensation and pressure errors. The gas flow should be chosen in a suitable range, where no overpressure can happen, esp. if the sensor is connected directly to the source e.g. by means of a tube.

Oxygen measuring notes

Calibration and measuring are depending of the absolute pressure at the sensor.
Therefore check the absolute pressure before calibration and measuring.

Sensor temperature and gas temperature should be the same.
Temperature differences may cause additional measuring errors! In worst case conditions it may take up to several hours until both temperatures are adjusted. A suitable flow of the gas around the sensor element increases the adjustment significantly.