OxyScan

Graphic

Operating Instructions

UMS Micro-oxygen sensor 501®

Microprocessor instrument

Introduction

Thank you for choosing the UMS Micro Oxygen Sensor 501® - a highly advanced product! Please read these operating instructions carefully to avoid damaging the sensor and the measuring instrument.

Contents

1. Scope of delivery

- the measuring device
- the sensor and protective cap
- the calibration chamber
- the power supply for charging the integrated accumulator
- the carrying case
- these operating instructions

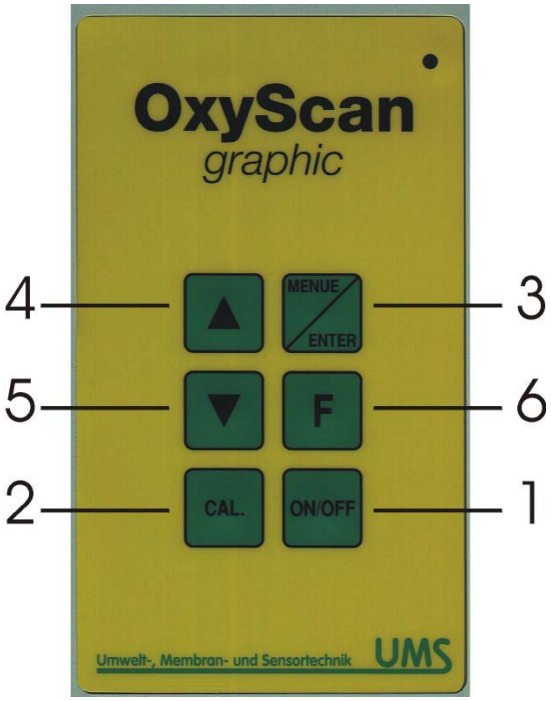
Carefully unpack the measuring system and check that all components have been supplied.

2. Instructions for handling the instrument

The delicate sensor tip forms the core component of the oxygen sensor.

The membrane at the tip of the sensor of the oxygen electrode can be damaged if it is accidentally struck against an object. If the values displayed on the screen constantly increase, this indicates that the membrane is damaged. If this is the case, the sensor must be replaced or regenerated.

3. Description of the control elements



1 On / off switch

2 Calibration button

3 Menu/Enter: For confirming a selection or to enter the menu

4 “Up”: Button for moving up within a menu

5 “Down”: Button for moving down within a menu

6 F - key: Only for customer-specific options, see enclosed sheet where available

4. Commissioning

The connections for
- the measuring cable of the sensor (connection in the centre - 5 pin),
- the charger (connection on the left – 7 pin)

are located at the top of the measuring device.

Plug the sensor cable plug into the connection at the measuring device (middle connection – 5 pin).

Connect the charger with the charger socket on the left at the top of the measuring device to charge the accumulators. The charging circuit will then operate independently until the accumulator has reached its full charge capacity. We recommend turning the measuring device off during the charging process.

The measuring device can be kept connected to the charger when the measuring device is not being used to keep the integrated accumulator fully charged. The charging circuit integrated in the measuring device controls the charging process.

If the red LED on the keypad is on, the accumulator is being charged.

5. Calibration

To calibrate the sensor, place the sensor inside the calibration chamber and press the CAL button on the measuring device. The calibration process then starts automatically and stops once a sufficiently stable calibration value has been reached.

The bottom part of the calibration chamber is fitted with a black plug, which holds a plastic sponge. The sponge must be moistened approx. every 4 weeks. To do so, proceed as follows:

- Pull out the black plug.
- Sprinkle a few drops of water onto the plastic sponge until it is damp.
- Close the calibration chamber.
- The unit can be used for calibrating after about 15 minutes.

The sensor can also be stored in the calibration chamber. When doing so, it must be ensured that the sponge in the calibration chamber is always damp (see above).

Note:

This oxygen measuring system is a highly advanced product. Your contribution to achieving accurate oxygen content measurements consists of calibrating the system.

Frequent calibration increases the accuracy of your measurements!

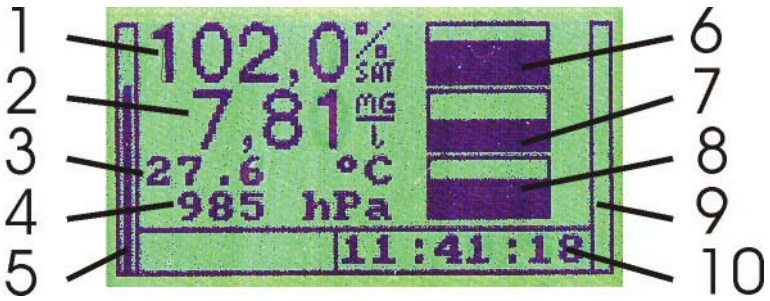
6. Measurement

Once the measuring system has been calibrated, the oxygen content of the respective medium can be measured.

Note:

The tip of the sensor must be positioned at a medium depth inside the container (although at a minimum depth of 5 cm below the surface). The sensor always requires either a minimum level or constant flow. Please also take this into account when permanently installing the sensor in a system!

7. Description of the display in measuring mode



1: Oxygen content in % saturation
2: Oxygen content in mg/l
3: Temperature in °C
4: Air pressure in hPa
5: Bar chart showing the charge level of the integrated accumulator (0..100 %)
6: Diagram of the last 30 measuring values in % saturation (0..160 %sat)
7: Diagram of the last 30 measuring values in mg/l (0..16 mg/l)
8: Diagram of the last 30 temperature measuring values (0..48 °C)
9: Bar chart showing the free capacity level of the measuring value memory (0..5000 values)
10: Current time

8. Description of the menu items

You can enter the main menu, from which the submenus described in the following can be selected, by pressing the “MENU/ENTER” button.
The submenu items can be selected by using the “Up” and “Down” buttons. Once the relevant submenu item has been selected, it can be opened by pressing “MENU/ENTER”. Pressing “CANCEL” will bring you back to the measurement screen. Items within the submenus are selected in the same way as described above.

8.1. Settings

This menu can be used to configure the following functions:

Adjust time: The current time shown by the clock can be adjusted as follows:
1. Move the cursor to the number that is to be adjusted by using the arrow keys
2. Press “MENU/ENTER”
3. Adjust the number using the arrow buttons
4. Press “MENU/ENTER”
5. Go back to point 1 and repeat the process or select “BACK” and press “MENU/ENTER”

NTC correction: For adjusting the temperature correction value using the arrow keys, then press “MENU/ENTER”.

Pressure correction: For adjusting the air pressure correction value using the arrow buttons, then press “MENU/ENTER”.

Device information: Displays the serial number of the device and supplied sensor, the firmware version and important device information for use in error diagnostics.

Language: Languages available are German and English. These operating instructions refer to the English version.

Note:

The value used for the NTC correction depends on the sensor that is being used and has been adjusted at the factory to the supplied sensor. This value normally only requires changing if a sensor other than the one supplied is being used.

The value used for the air pressure correction does not normally require changing.

8.2. Continuous measurement

Select this submenu item to perform continuous measurements.

This submenu can be used to configure the following functions:

Measuring interval: For adjusting the time intervals between individual measurements.

Start now: To start a continuous measurement immediately.

Start time: To specify a time at which a continuous measurement is to be started. This time is selected in the same way as described under point 8.1. “Adjust time”.

Stop measurement: To stop the continuous measurement.

Note:

The continuous measurement will continue even if the measuring device is turned off, although this will result in higher power consumption and hence a reduction in the accumulator’s operating time. The shorter the selected measuring intervals, the faster the accumulator will use up its charge.

8.3. Measuring values

You can select this menu item to view or further process the measuring values recorded during the continuous measurement:

Display values: Displays the recorded measuring values in tables. Specific measuring values can be selected by using the arrow keys. Press “MENU/ENTER” to return to the menu.

Display diagram: Displays the recorded measuring values as a diagram. Press “MENU/ENTER” to return to the menu.

Delete values: Deletes all measuring values.

Send IR: To transmit the recorded measuring values via the IR interface (optional). See section 8.3.1.

Note:

The “Send IR” menu item is only available on measuring devices that are equipped with an IR interface (optional).

8.3.1. Data transfer

Only available for units equipped with an IR interface!

The supplied IR adapter also enables data to be transferred to non-IR capable devices. In principle, this means that data can be transferred to all devices that enable the following configuration:

19.2 kBps, 8 data bits, no parity, 1 stop bit (= “8N1”)

The measuring device can also be connected to a printer as it transmits data as tables in text format.

Use a terminal program for transmitting data to a PC and save the transmitted data in a text file. As the individual measuring values are separated by tabs, and the rows of measuring values by additional lines, the text file can be further processed in most spread sheets (e.g. MS Excel) and databases.

It is absolutely vital that the space between the measuring device and the IR adapter is not blocked. If the distance between the measuring device and the IR adapter is greater than 50 cm, the devices may have to be aligned with one another. If the devices are precisely aligned, the distance between them can be increased to up to 5 metres.

Caution:

Never look directly into the infrared windows!
Looking into the infrared windows can cause eye damage!

9. Storing the sensor

The sensor is supplied inside the calibration chamber. It must be ensured that the calibration chamber is always kept damp (see point 5, “Calibration”).

If it is not possible to regularly check the calibration chamber, the sensor can also be stored in another container, in which case it must be ensured that the tip of the sensor is always immersed in water.

10. Additional functions / firmware update

Depending on its equipment, the microprocessor-controlled measuring device may have additional functions that are not listed in these operating instructions. If this is the case, the description of these functions is usually provided on a separate enclosed sheet.

The measuring device can also be equipped with additional functions at a later date. Due to the special microcontroller technology used in the device, we are also able to equip the device with customer-specific functions. Please get in touch for further information on this option!

All of the measuring device's functions are controlled by a microcontroller in accordance with a program developed by UMS. This program (= firmware) is stored in a memory module which should only be replaced by UMS or other authorized personnel.

The firmware used in the measuring device has been thoroughly tested. We are nonetheless constantly working on upgrades and improvements. If you would like to obtain our latest firmware, just give us a call and tell us your current firmware version (see point 8.1, "Device information"). We will then be able to tell you what additional functions a firmware update would provide.

11. Operating principle of the sensor

The oxygen sensor is based on the Clark principle and measures the dissolved oxygen in the water. The oxygen diffuses through the membrane at the tip of the sensor and is reduced at the cathode. The electrons released during this process flow to the anode and generate a current that can be electronically analysed in the measuring device.

The current flow in the sensor is, however, not only determined by the oxygen content of the water, but also by the temperature of the water and the air pressure. In order to compensate for those factors, the measuring device for our oxygen sensor is equipped with an automatic temperature and air pressure compensation function.

12. Liability and warranty

We reserve the right to make technical changes!

We do not accept any liability for any damage caused by improper use, incorrect application or functional failures of the device.

The entire measuring system is covered by a statutory 6 month guarantee.
If the device fails during the warranty period, please return the sensor or measuring device to us together with the test certificate.

13. Technical data

Measuring ranges

Concentration	Range:	0.0 – 19.99 mg/l
Resolution:	0.01 mg/l	
Accuracy:	± 0.1 mg/l +/- 1 digit	
Saturation index	Range:	0.0 – 199.9 %sat
Resolution:	0.1 %sat	
Accuracy:	± 0.5% ± 1digit	
Temperature	Range:	0.0 – 50.0 °C
Resolution:	0.1 K	
Accuracy:	0.5 K ± 1digit	
Air pressure	Range:	800 – 1150 mbar
Resolution:	1 mbar	
Accuracy:	10 mbar	
Temperature compensation	automatic, range: 0 ... 50 °C	
Air pressure compensation	automatic, range: 800 ... 1150 mbar	
Ambient temperature (Measuring device)	0°C - 70°C	
Display	graphics capable LCD 128 x 64 pixels	
Electrode	Pt cathode, Ag anode	
Power supply	integrated accumulator 3.6 V / 2.1 Ah, NiMH	
Measuring device dimensions	223 x 105 x 40 (LxWxH, mm)	
Sensor dimensions	200 x 4,7	(Lx∅, mm)
Measuring device weight	approx. 500 g	
Sensor weight	approx. 20g	
Polarization voltage	750 mV	
Polarization time	max. 5 min	
Sensor response time	approx. 30s	

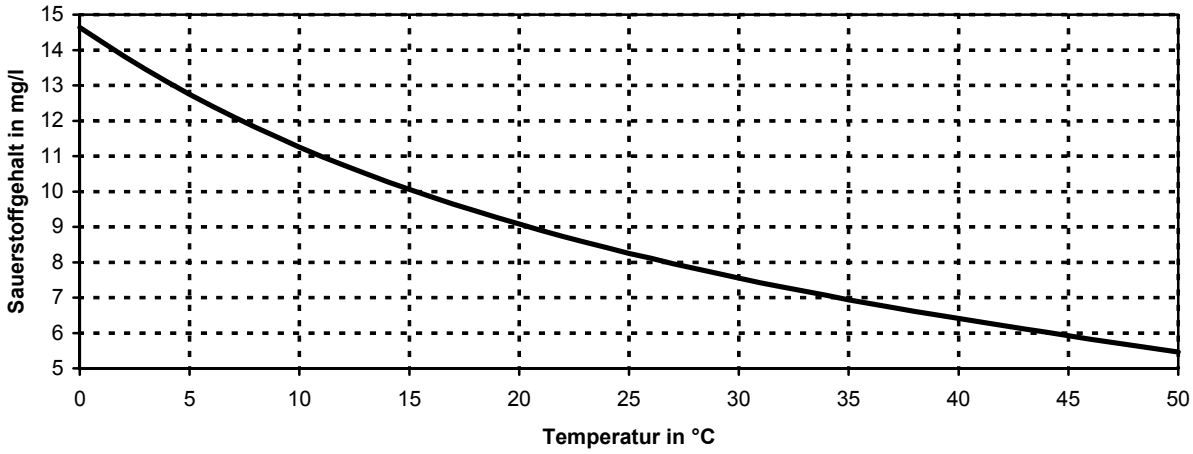
The useful life of the electrolytes amounts to approx. 2 years. The sensor is miniaturized and can therefore not be regenerated by the user. This also eliminates a number of potential error sources that can arise as a result of the regeneration process.

14. Appendix

(The following tables only apply in reference to the outlined conditions)

Table and diagram

Oxygen content of freshwater at saturation in dependence on the water temperature



Maximum **dissolved oxygen content in freshwater** in mg/l at different temperatures and normal pressure
(1013hPa = 760Torr)

°C	mg/l	°C	mg/l	°C	mg/l	°C	mg/l
0	14.64	10	11.25	20	9.08	30	7.55
1	14.23	11	10.99	21	8.90	31	7.42
2	13.83	12	10.75	22	8.73	32	7.30
3	13.45	13	10.51	23	8.57	33	7.18
4	13.09	14	10.28	24	8.41	34	7.06
5	12.75	15	10.06	25	8.25	35	6.94
6	12.42	16	9.85	26	8.11	36	6.83
7	12.11	17	9.64	27	7.96	37	6.72
8	11.81	18	9.45	28	7.82	38	6.61
9	11.53	19	9.26	29	7.69	39	6.51
10	11.25	20	9.08	30	7.55	40	6.41

Oxygen content of seawater at saturation in dependence on salt content (density) and temperature at normal pressure (1013hPa = 760Torr)

Density in g/cm^3	10°C O_2 in mg/l	15°C O_2 in mg/l	20°C O_2 in mg/l	25°C O_2 in mg/l	30°C O_2 in mg/l
1.000	11.25	10.06	9.09	8.26	7.49
1.005	10.81	9.69	8.76	7.96	7.21
1.010	10.38	9.32	8.44	7.65	6.93
1.015	9.94	8.95	8.11	7.35	6.65
1.020	9.51	8.58	7.79	7.05	6.38
1.025	9.07	8.21	7.46	6.74	6.10
1.030	8.64	7.85	7.14	6.44	5.82

Salt content (salinity in g/l = ‰) **of seawater** in dependence of temperature and density

Density in g/cm^3	10°C salinity in ‰	15°C salinity in ‰	20°C salinity in ‰	25°C salinity in ‰	30°C salinity in ‰
1.000	0	0	0	0	0
1.005	6.7	7.5	8.5	10.8	13.1
1.010	13.2	14.4	15.6	17.2	18.8
1.015	19.6	20.9	22.1	23.6	25.1
1.020	26.0	27.3	28.6	30.6	32.6
1.025	32.5	33.9	35.3	37.1	38.9
1.030	38.8	40.4	42.0	44.2	46.4

If you have any technical queries or want to order additional accessories or sensors, please contact your distributor or get directly in touch with

UMS GmbH & Co. KG
Wolfsgrube 7
D-98617 Meiningen
Germany

Phone: +49-36 93-94 03 50
Fax: +49-36 93-94 03 59
info@ums-gmbh.de