OxyGuard Handy Polaris TGP

Instrutions for use

OxyGuard®

GENERAL

OxyGuard Handy Polaris TGP is a hand-held meter with built-in datalogger. It measures the **T**otal dissolved **G**as **P**ressure, the oxygen (DO) partial pressure and the temperature. The instrument calculates the pressure of other dissolved gases from the total pressure and DO partial pressure. It can operate in three modes:

A) As a standard Polaris dissolved oxygen and temperature meter.

B) As a TGP meter that shows pressures as “percent saturation” values with relation to water that is completely saturated with air. These are automatically compensated for changes in the atmospheric pressure.

C) As a TGP meter that shows pressures as volume percentages relative to air at the actual barometric pressure.

When measuring in air-saturated fresh water at 24°C the following will be shown:

A) “Show Oxygen” mode:
100% SAT (O2); 8.40 mg/l (O2); 24.0 °C (temp.)

B) “Show TGP % Sat” mode:
100% SAT (O2); 100% TGP (total); 100% RES (rest; other gases)

C) “Show TGP % Vol” mode:
21% O2; 100% TGP (total); 79% RES (rest; other gases)

Messages on the display and menu functions make the Handy TGP easy to use. If a menu is displayed, you can always go to the measurement display by pressing "ESC" several times. **To turn it on or off hold the on/off button (⏻) depressed for 3 seconds.** TGP measurements take some time (20 or more minutes), so make sure that the probe can be fixed in place in the water whilst the measurement is made. We recommend that you fix the probe in place and leave it for 20 minutes before you switch on and make the measurement.

Immerse the probe about 30 cm under the water surface. There should be some movement in the water; 5–10 cm/sec is enough. Gas diffusion through water is extremely slow, so movement helps the probe achieve gas pressure equilibrium with the water and thus improves response time. Wait until the reading is steady before noting it or storing it.

After use, rinse the probe in clean water and wipe the meter dry if it is wet.

Press an arrow button to select which parameter is shown in large figures. Press "OK" to go from the measurement display to the menus. The arrow buttons can then be used to make a selection and the "OK" button to confirm or go to the next level. "ESC" is used to move back. If an error occurs, a warning will blink in the display. More information is shown in the status list.

The residual gas pressure is obtained by subtracting the oxygen partial pressure from the total pressure. If wanted the residual value can be compensated for dissolved CO2 in the water and for the water vapour pressure at the instrument. A carbon dioxide content of 20 mg/l results in a reduction in the measured TGP of 1.4%.

Compensation for water vapour pressure can be made because the %sat values are corrected for changes in barometric pressure sensed by a pressure sensor in the instrument, where the water vapour pressure can be low. In the water, the water vapour partial pressure corresponds to 100% humidity. The default value for water vapour compensation assumes a relative humidity at the instrument of 80%. This results in a reduction in the measured TGP in the water of 0.4%.

The probe is calibrated in fresh air. The calibration procedure, which is automatic, calibrates the oxygen sensor and aligns the gas pressure sensor in the probe with the barometric pressure sensor in the instrument.

MENU

From measurement use “OK” and the arrow buttons to reach the desired function. The options are:

1) Calibrate
2) Start log or stop log (depending on present setting)
3) Show Oxygen
4) Show TGP %Sat
5) Show TGP %Vol
6) Setup
7) Show Log
8) Transfer to PC
9) Status list (only if there is an error)

1) Calibrate

Accurate measurements need accurate calibration, which in turn needs stable conditions. Polaris TGP checks and only permits calibration if conditions are stable. The sensitivity of this check can be changed - see "Setup – Calib. Precision". **The “Field” setting is recommended.**

A good way of checking calibration is to do so in the morning before taking the Polaris into use. If you have stored it in its pouch in a place where the temperature is moderate and stable, and leave the probe in the pouch when you turn it on and check, conditions for the probe should be very stable!

Turn the Polaris on and observe the display. The following values are acceptable:

“Show oxygen”: 100.5% +/- 1%
“Show TGP %Sat”: 100% +/- 1%
“Show TGP %Vol”: 100% +/- 1%

If calibration is needed select "Calibrate" and press "OK" to start. Progress is shown on the display. When "Calibration done" is shown press "OK" to measure.

If “Calibration error - unstable conditions” appears check that the “field” calibration precision is chosen and try again.

2) Start log

Use this menu function to start or stop logging. When viewing measurements logging can also be started or stopped by holding “OK” or “ESC” respectively depressed for 3 seconds.

3) Show Oxygen

Select this to make the instrument act as a standard Polaris 2 DO and temperature meter.

4) Show TGP %Sat

Select this to make the instrument show partial pressure measurements as percentages related to the actual atmospheric pressure, where a 100% value is the partial pressure obtained when the water is saturated with air. Three values are shown, %TGP, %02 and %RES:

%TGP is the total dissolved gas pressure

%O2 is the oxygen (partial) % sat value, which is the same %sat value as given by a standard OxyGuard Polaris DO meter.

%RES is the residual gas (partial) % sat value. If the CO2 compensation is set to 0 mg/l, the CO2 partial pressure will be included in the residual pressure.

5) Show TGP %Vol

If you select this the instrument will show 20.9% O2, 79.1% RES and 100% TGP when measuring in water that is 100% saturated with air.

6) Setup

This has 6 sub-menus:

a) User Interface
b) Compensation
c) Log Setup
d) Date & Time Menu
e) Calib Precision
f) Information

a) User Interface:
Language: The options depend on the language version.
Temperature Units: You can choose between °C and °F.
Display format % sat: You can choose with or without tenths.
Auto shutdown: The default of 2 minutes is recommended.
Light intensity: “Low” ensure longest battery lifetime.

b) Compensation:
You can set compensation for Salinity, the CO2 content of the water and the relative humidity found in the air around the instrument when clalibrationg. If you set the humidity to “0” then humidity compensation is disabled.

c) Log Setup
“Log mode”: lets you choose one-shot or interval logging.
Use “Log interval” to set the interval time for interval logging.

Use “Log Values” to select what should be logged. The options are “Barometer”, “Rest gases”, “oxygen mg/l” and “oxygen %Vol”. Press “OK” and choose “Off or On” to select.

“Max Log ID” sets the number of groups of logs the memory is divided between. Store all measurements made the same place (both one-shot and interval) Under the same ”Log ID”. Each measurement has specific date and time information.

“Full log handling” lets you choose between over-writing (recycle) or stopping when the memory is full.

“Erase Log” lets you do just that.

“Log Status” shows the present setting of the datalogger.

d) Date and Time Menu
Dette menupunkt har tre underpunkter:
Set Date and Time
Set Date Format
Show Date and Time

e) Calib precision
Here you can choose between
“Field” (recommended, factory setting)
“Normal”
“High”

If conditions are stable "Field" can give just as accurate calibration as "Normal" or "High". “Normal” ensures very precise measurements, and ”High” is the most sensitive. “High” needs very stable conditions indeed.

f) Information
This shows the software version and serial numbers of probe and instrument.

7) Show Log:
“Graph” will show the logged data as graphs
“Table” will show data as tables
You will be asked for the memory block ID number you want to see.
Choose “0” to see all ID’s.

8) Transfer to PC

An OxyGuard Polaris Link is used to connect to a PC. Fit the link to the Handy TGP. Plug the USB connector of the link into the PC. Select “Transfer to PC” on the Polaris TGP, then start the program on the PC and select "Receive log" on the PC. Data will be transferred. Load the data into an Excel spreadsheet for further treatment.

9) Status List:

This only appears if there has been an error. Use ”OK” to see a list, select an error and press “OK” again to see details. Use “ESC” to go back.

MAINTENANCE:

Keep the probe clean, rinse it after use. It is not advisable to leave it in the water for long periods of time because this will permit the growth of deposits on it. The probe can be cleaned in soapy water. Use a very soft brush if necessary. Replace the bobbin if needed.

Keep the instrument itself dry. It can tolerate being dropped into the water, but should be wiped dry afterwards. If you drop a warm Polaris into cold water condensation might form inside it, so if this has happened take the instrument to a dry place and open the back plate. Inspect it carefully and make sure that it is completely dry inside before closing it again.

Change the battery when “Low Batt” appears in the display. Do not wait until the battery has run down completely. The Polaris TGP uses more power than a Polaris for DO alone, so we recommend that rechargeable batteries are used and exchanged regularly, for example every 14 days.

Battery Exchange

Use the tool to unscrew the rear plate. The battery can then easily be exchanged. Take care not to pull the battery wires. Take care not to disturb the ribbon cable. Make sure that you tighten the rear plate well, and do NOT get the inside of the meter wet!

Sensor Element Replacement

Take the probe up, rinse it well and dry excess water from it. Unscrew the protector. Carefully unplug the sensor element from the top part, ensuring that the connection stud comes out of the top part. Make sure that the hole to the sensor is clean. Plug in a new element and screw the protector into place. Take care not to damage the stud or tube.

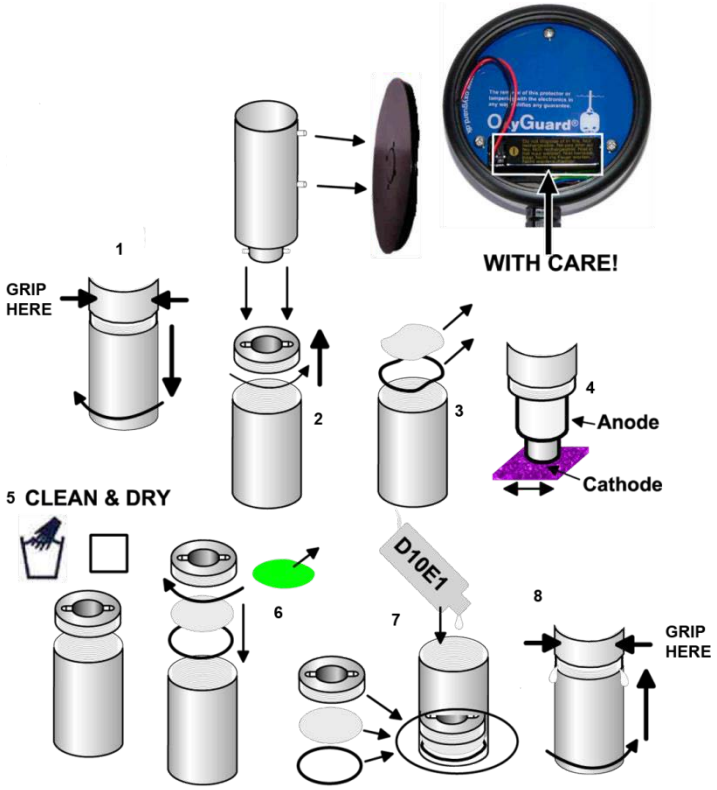
Protector and retainer
H08XPR

TGP Sensor Element
H08XSE

DO Sensor Renovation

Do NOT do this unless a message in the display tells you so. Remove the bobbin as above and follow the instructions in the drawings to renovate the DO sensor. Take care to make sure that you only turn the cap. If the cap is difficult to unscrew grip the top part just above the cap with a tool (as shown below, fig. 1).

Do NOT screw the cap very tightly. Note that the new membrane must not wrinkle (see below, stage 6). If this happens try again with a new membrane and O-ring. **Wait a few hours before calibrating,** since the probe will take a little time to settle down. Check the calibration during the next few days.
NB: For health and safety purposes treat the electrolyte as concentrated salt water.



Specifications:

Dimensions, meter:	98 mm diameter, hight 36 mm
Dimensions, meter:	Dia. 58 mm, height 110 mm + cable gland
Cable Length:	Standard 3 m. other on request
Operating Conditions:	Probe: -5 to +45° C, meter -20 to +60°C.
Encapsulation (meter):	Short-term immersion proof to 5m depth.
Display:	Graphical LCD display. Variable backlight.
Parameters measured:	Oxygen partial pressure, total dissolved gas pressure, temperature at probe.
Oxygen Probe Type:	Galvanic cell, self polarizing, self temperature compensating.
Self-check of:	Probe function, meter function, cable, battery
Useful battery life:	35 days with 20 measurements per day (2 minutes “on” time per measurement)
Accessories included:	Storage pouch, DO probe membranes with o-rings & electrolyte, cathode cleaning pad.

Parametre displayed:

A) “Show Oxygen” mode:

In this mode the Handy TGP displays:
DO in mg/l, range 0-60.0 ppm (mg/l)
DO in % sat, range 0-600% saturation
Accuracy depends on calibration accuracy. Typically better than +/- 1% of measured value +/- 1 digit within the standard range.
Repeatability typically better than +/- 0.5% of measured value.
DO measurement automatically compensated for temperature and barometric pressure. Manual salinity compensation between 0-59 salinity.
Temperature, range -5 to +45° C, accuracy +/- 0.2°C.

B) “Show TGP % Sat” mode:
100% SAT (O2), accuracy +/- 1% of value +/- 1 digit
100% TGP (total)
100% RES (rest, other gases)
Accuracy TGP and rest +/- 2% af værdi +/- 1 ciffer

C) “Show TGP % Vol” mode:
21% O2 +/- 1% of value +/- 1 digit
100% TGP (total)
79% RES (rest, other gases)
Accuracy TGP and rest +/- 2% of value +/- 1 digit

Pressure range: to over 200% on all pressure measurements.

H08:	OxyGuard Polaris 2 TGP complete with accessories
H08XSE:	Replacement TGP sensor element
H08XPR:	Probe protector and sensor element retainer
H10LINK:	OxyGuard Polaris Link for transfer of data to PC
H10ACC:	DO Accessory kit: membrane cap, 5 membranes and O-rings, 50 ml electrolyte and tool
D10E1500:	500 ml electrolyte for DO probe
D10E11L:	1 liter electrolyte for DO probe
H10CAP:	Membrane cap with membrane for DO probe
H10CB6:	Extra cable per meter
H10PO:	Pouch

OxyGuard International A/S
Farum Gydevej 64, 3520 Farum, Denmark
Tel +45 4582 2094; Fax +45 4582 1994
oxyguard@oxyguard.dk; www.oxyguard.dk

H08 Handy TGP manual GB 2018 01
Data subject to change without notice