

DO501 Handheld DO₂ Monitor



User Manual



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1. Introduction

The DO501 is an advanced microprocessor controlled Dissolved Oxygen meter. It will provide long periods of service and can be used in monitoring or logging applications.

It can be used for measuring dissolved Oxygen (DO₂) levels in tanks, ponds and lakes and is ideal for spot checking areas that are prone to low DO₂ allowing corrective action such as aeration to be put in place.

The system can also be used to measure DO₂ in both static and transportation tanks on vehicles where flow meters alone cannot guarantee DO₂ levels.

2. Safety

The manufacturer has designed this product to be safe when operated correctly.

Please take care to read any safety instructions as these have been designed to protect the user from personal injury and the equipment from damage.

O&H Designs are not responsible for errors in usage or connection and accept no responsibility for consequential losses.

3. Charging the DO501

The DO501 contains an inbuilt NimH high capacity battery. This should be first charged for 20 hours. Subsequent charges of 12-14 hours are performed in normal use.

Only use the 12V charger provided with the DO501 kit.

4. General Usage

The DO501 contains sensitive electronics, however, the unit is robust and will stand knocks and drops. Do not open the top lid of the unit as the environmental seal will be damaged and warranty voided.

When the probe is stored, replace the protective cap provided with the kit. Do not leave the probe (and meter) in a car or van on a hot day as excessive temperatures will dry out the fluid in the probe.

Treat the DO501 as a precision instrument and replace in the protective case when not in use.

5. Specifications

Conformity..... EN61010, EN61326-1, 97/23/EC CE marked

Environmental

Temperature (Electronics)..... 0°to 50°C

Storage..... -20° to 50°C

Sealing..... IP65

Weight (approximate)..... 470gms

Dimensions

Width..... 100 mm

Height..... 190mm

Depth..... 38mm

Power supply

NimH internal battery.....7.2VDC

Consumption..... 0.05 watts

Battery life at 20°C120 hours

Measurement parameters

Probe type.....Sealed Galvanic

Probe lead length(max)..... 2.1m

Probe operating temperature range 0° to 40°C

DO₂ range 0 to 40mg/l

DO₂accuracy (instrument minus probe).....3% rdg ±0.1mg/l

DO₂display resolution 0.1mg/l

Maximum Probe Depth..... 2.5 mtrs

Pressure sensor accuracy.....±2 mbar

Temperature accuracy.....±0.8°C

6. Abbreviations

Note: Abbreviations are the same in singular or plural.

DO ₂	Dissolved Oxygen	LCD	Liquid Crystal Display
AC	Alternating Current	DC	Direct Current
RTD	Resistive Temperature Device	mg/l	milligrams per litre
°C	Degrees Celsius	P.C	Personal Computer
Kms	Kilometers	IP	Ingress Protection
gms	grammes	KCL	Potassium Chloride
mb	millibar	ppt	Parts per Thousand

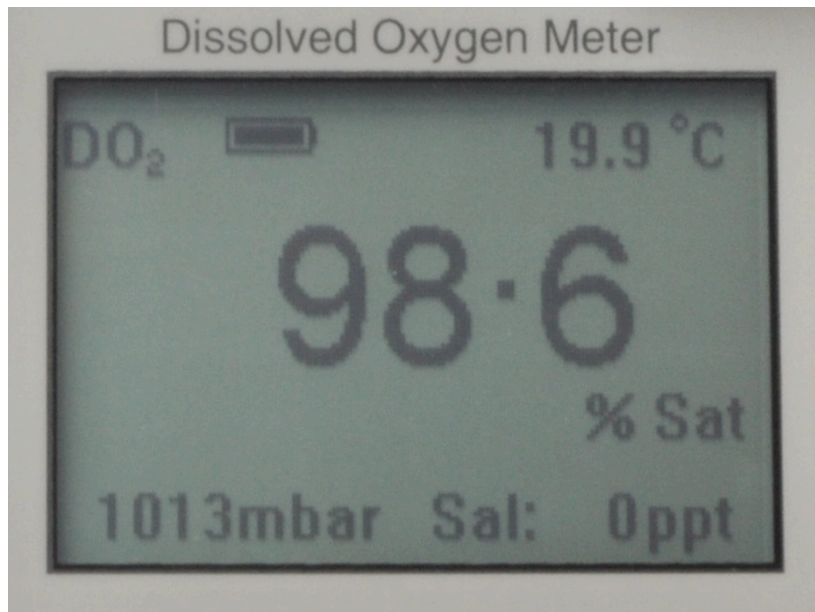
7. Initial Usage

Connect the DO₂probe to the 6 way connectoron the rear of the DO501.
Ensure this is only finger tight.

If charging is required, use the charger port on the top of the unit.
Pressing the power switch will turn the unit on and the DO501 will go through a self test.The default display units are % saturation of DO₂.

When the unit is powered up allow at least 1 minute for stabilisation.

Instrument LCD display



Battery charge level indicator (bar graph). Full charge represents approximately 120 hours of continuous operation.

When the charger is connected, the charge level indicator icon becomes dynamic, indicating that the battery is charging. The dynamic display stops when the battery is fully charged.

Backlight is switched on when a star logo is present in the display, this indicates that the backlight is turned on automatically when any key is pressed). Backlight remains on for the period set under set-up (default = 1 min).

Temperature probe reading (used to compensate DO₂ reading). Units will be as set-up (default = °C).

Dissolved oxygen reading (default = % Sat).

Salinity correction level (ppt). manually entered under set-up, (default = 0).

Barometric pressure display, (default = mbar). Used to automatically compensate the DO₂ reading for barometric pressure/altitude changes)

8. Set-up and Operation

When in the normal measurement mode (main screen displayed),

pressing and holding  the key for approx 1 sec will store the current screen in the next available memory. Confirmation that the screen has been stored is given by the screen temporarily switching to reverse video.

At the time of supply, the instrument is set-up with the following, factory set default parameters:

Temperature units **°C**

Pressure units **mbar**

D.O. Units **%Sat**

Backlight **ON**, 1 min on time duration

Power down **ON**, 10 min

9. Measurement Units

The units set-up menu allows the D.O., Temperature and Pressure units to be selected (default units given first).

Dissolved Oxygen units, **% Sat, mg/l, mV**

Temperature units, **°C or °F**

Pressure units, **mbar, psi, ft or m**

From the main screen, press the:

Menu/OK  button

Select units to change  DO, Temperature, Pressure

Use the keys   to select preferred units

Press the  key to accept new units

10. Setting Salinity

If required, this value can be adjusted if the DO501 is to be used in regions with brackish water or directly in seawater. DO501 Accuracy cannot be guaranteed at high salinities.

From the main screen, press the:

Menu/OK  button

Use the keys   to scroll through the menu.

Select **Salinity** 

The display will show the default of 0 parts per thousand(ppt)

Use the keys   to adjust if required.

Press the key  to accept the salinity reading.

Press the key  to quit back to normal readings

The table below shows the effects of salinity on the readings and the factor the DO501 will apply.

Salinity ppt	Factor
0	1
5	0.97
10	0.94
15	0.91
20	0.88
25	0.85
30	0.83
35	0.8

11. Atmospheric pressure

*If required, this value can be manually adjusted. This can correct for errors due to large variations in altitude or depressions in weather fronts. If the pressure is set to **auto** the internal pressure sensor will automatically correct for variations whilst in mg/l & ppm of dissolved oxygen*

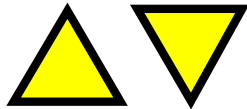
From the main screen, press the:

Menu/OK



button

Use the keys



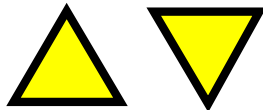
to scroll through the menu.

Select **Manual**



The display will show the default of 1013 mbar(1 atm)

Use the keys



to adjust if required.

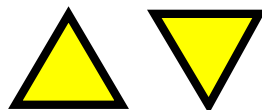
Press the key



to accept the pressure reading.

Alternatively, in the pressure menu:

Use the keys



to select **Auto**.

Press the key



to quit back to normal readings

The effects of adjustment of pressure are shown below. The DO501 will apply the relevant correction factors.

(m)height	Pressure (mmHg)	Factor
0	760	1
100	750	1.01
200	741	1.03
300	732	1.04
400	723	1.05
500	714	1.06

12. Recall Stored Data

This instrument has a 40 location memory, used for storing operational readings. Data stored during operation is accessed for transcription purposes from the first page of the top level menu under **Recall**.

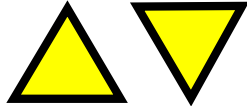
From the main screen, press the:

Menu/OK



button

Use the keys



to scroll through the menu.

Select **Recall**



View Data is selected automatically

After pressing the **Menu/OK** key

Using the keys



Scroll through the stored screens location by location. Stored screens are presented in reverse video and a camera icon, together with a memory location number is displayed in place of the battery level indicator.

Clear Screen Memory

To clear the screen memory, from the main screen

Press the **Menu/OK** key,

Use the keys



to select **Yes** or **No**.

Press the



to accept or reject

It is recommended that after transcribing the data, the memory be cleared, leaving it clear for another day's operation. Operating procedures vary within organisations but if the memory is not cleared, subsequent data saves will be placed in the next available memory location.

After all 40 locations have been written to, subsequent save operations will start to overwrite upwards from Location 1.

13. Backlight

The instrument is equipped with a backlight which can be set-up to come on for a preset period (1 to 99 sec), whenever any key is pressed.

To conserve battery power, the default setting is 10 sec, after which period the backlight goes off.

Alternatively, the backlight can be set to permanently off.

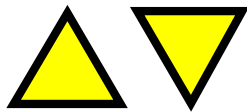
From the main screen, press the:

Menu/OK



button

Use the keys



to scroll through the menu.

Select **Backlight**



and follow the key sequence

When entering a timing period, holding the appropriate (up) or (down) arrow key will apply either continuous increments or decrements to the entered value until the key is released. Single presses of either provide a single increment or decrement.

14. Auto Powerdown

The instrument is equipped with an auto powerdown feature, designed to conserve battery power. This feature can be set to either on or off. When set to on, if the instrument is switched on and no controls are operated for a preset period (10 min default) the main display will give a 30 second warning that the instrument is about to switch off

"Powerdown in 30seconds".

Pressing any key during this period cancels the powerdown operation and resets the timer. Timer range is 1 to 99 minutes.

Alternatively, the auto **Powerdown** feature can be switched off.

After it has been switched on, the instrument will then remain on until it is either manually switched off, or until the battery is fully discharged.

From the main screen, press the:

Menu/OK



button

Use the keys



to scroll through the menu.

Select **Powerdown**



and follow the key sequence

When entering a timing period, holding the appropriate (up) or (down) arrow key will apply either continuous increments or decrements to the entered value until the key is released. Single presses of either provide a single increment or decrement.

Set-up Display Contrast

The instrument's display contrast can be adjusted with this utility. The display contrast is automatically corrected for varying temperatures.

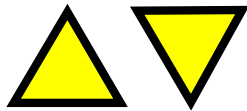
From the main screen, press the:

Menu/OK



button

Use the keys

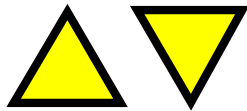


to scroll through the menu.

Select **Contrast**



Use the keys



to optimise the display.

Press the



key to accept or reject

15. Taking Readings

Ensure that the protective sealing cap is removed prior to deployment.

During operation, place the probe in a vertical position with the probe tip facing downwards. This is indicated on the side of the Probe housing.

When positioning the probe in the water to be measured, take care to locate away from the direct influence of aerators. Actual position in a water course is dependant on depth profile, width and length, therefore actual placement position will be found by 'in-situ' testing.

To achieve greatest accuracy, when in water to be measured, move the probe in a figure of eight motion to allow gentle movement of water across the probe tip.

16. Calibration

All DO501 systems are supplied with a full calibration at 0% & 100% water saturated air at 1013mb pressure. All normal readings are in mg/l.

It is recommended that the sensor is recalibrated at 2week intervals or less to maintain accuracy. A '[Quick Cal](#)' before use will guarantee maximum accuracy from the probe and electronics.

Regular checks are necessary. Use a soft brush or moistened tissue to remove any dirt or debris from the probe tip.

The probe is a Galvanic type and thus requires KCL solution for filling. Life expectancy in normal use is approx 60 months. Membranes can be changed as required.

DO NOT:

- *Direct high-pressure water jets onto the probe tip as this could damage the membrane.*
- *Use abrasive wipes on the probe membrane.*
- *Clean the probe with any chemicals or solvents.*
- *Allow contact with the membrane whilst calibrating the 100% point.*
- *Take readings directly after immersion in water. Allow at least 3 mins for the DO₂ probe tip and internal compensation to stabilise.*

DO:

- *Use clean de-ionised water to clean probe tip. Use of a soft brush is advised.*
- *Position the probe in a vertical position during calibration.*
- *Allow 5 mins before calibration to allow the DO₂ probe to reach equilibrium with ambient conditions.*
- *Replace the protective cap when not in use or in storage.*
- *Use water saturated air when calibrating the 100% point.*
- *Gently dry excess water from the probe tip prior to adjustment.*

General

Two calibration procedures are applicable to this instrument, a full calibration, and a '[Quick Cal](#)' (daily) calibration.

A full calibration is a two-point calibration carried out at **0%** saturation and **100%** saturation. Full calibration should be carried out at yearly intervals or whenever a new probe is fitted to the instrument.

'[Quick Cal](#)' daily calibrations are carried out only at the 100% saturation point, prior to commencing work with the instrument.

17. Method

Calibration should ideally be carried out in a temperature range of 15-25°C

Full Calibration Procedure

The following items will be required for the full calibration procedure.

- (a) Saturated sodium sulphite solution (zero point calibrant)
- (b) De-ionised water

Ensure that the protective cap is moved from the end of the probe.

Switch on the instrument.

Ensure that the instrument D.O. units are set to **%Sat.**

From the main screen, press the:

Menu/OK  button

Use the keys   to scroll through the menu.

Select **Calibration** 

Use the keys   enter the calibration PIN 116

NOTE: The initial PIN is set to 116. This can be changed by the user.

Press the  key to accept or reject

Use  the arrow key to select, **Dissolved O2 0%**

Press the  key to accept

Place the probe in the sodium sulphite solution and allow the D.O reading to stabilise. The actual display reading at this 0% level is shown to the left of the window and may not be exactly zero.

Press the  key to accept the 0% calibration

Remove the probe from the sodium sulphite solution, rinse well with de-ionised water and dry the probe tip with a soft tissue.

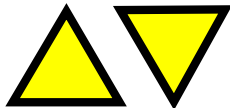
Press the ESC key to return to the calibration menu. Then, select **Dissolved O₂ 100%** and press the **Menu/OK** key.

Note: *There is a time-out period on all menu displays so if the instrument display has reverted to the main screen, the calibration menu will have to be re-selected.*

Being now placed in air, the probe reading will start to rise towards 100%. The actual display reading from the probe is shown to the left of the window showing 100.0% and may not reach 100%.

Wait whilst the reading is still rising (even if it rises above 100%) and when it stabilizes:

Press the  key to accept the 100% calibration

Use the keys  select **Yes** at the OK to accept prompt.

Select 

The probe calibration procedure is now complete. Press **ESC** three times to return to the main display.

For 'Quick Cal', daily calibrations are carried out only at the 100% saturation point, prior to commencing work with the instrument.

Refilling the probe with electrolyte

If the DO501 is supplied with a refillable probe type, then occasionally check that fluid is present in the probe end cap.

The DO501 is supplied with a small bottle of electrolyte and can be used to refill the probe as follows:

Unscrew the endcap anticlockwise, discard the existing fluid.

Check the end of the electrode for excessive deposits. The white coating is a normal reaction between the dissimilar metals used in the probe. This can be cleaned with a fine wet/dry cloth 1000 grit or higher

Fill the end cap ½ way with electrolyte and reattach to the probe. DO NOT OVERTIGHTEN

If a new end cap is fitted allow a couple of hours for the membrane to stabilise.

Do not refill the probe in direct sunlight

18. Calibration PIN number

The calibration PIN number is designed to protect the instrument's calibration from being inadvertently changed or lost. The PIN number can be changed (within the range 1 to 9999) as follows. Setting Zero as a PIN number effectively removes the PIN protection.

From the main screen, press the:

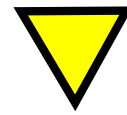
Menu/OK  button

Use the keys   to scroll through the menu.

Select **Calibration** 

Use the keys   enter the calibration PIN 116

NOTE: The initial PIN is set to 1.

Use the keys   select **Change PIN**

enter the new PIN number and press **Menu/OK**.

If Zero is set as a PIN, PIN protection is effectively removed.

Press 

19. Platinum Resistance Probe (Temperature)

This reading is factory calibrated and should not require re-calibration during normal service life of the probe. Contact O&H Designs for details of re-calibration

20. Probe Temperature Coefficient (T.C)

Do not adjust this value as the probe will display incorrect readings at differing temperatures.

The reading is factory calibrated and should not require re-calibration during normal service life of the probe. Contact O&H Designs for details of re-calibration

21. Service & Warranty

For more information on the DO501, contact us directly or an approved agent.

O&H Designs Guarantees the unit to be free of defects for a period of 12 months from date of manufacture.

This does not cover damage to the probe tip caused by unreasonable use.

This warranty excludes incidental or consequential damages arising from the use of this product

O&H Designs provides a service capability for their products. Replacement probes and other spare parts are available direct.

O&H Designs also offers a recalibration service for all environmental parameters. This can be on any interval as required by the customer.

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