



DO102X* & DO5020 Series Dissolved O₂ Monitor/Controller

User Manual

***Note: Software functionality covers**

DO1021-1022 & 1024-1026 variants with Galvanic probe

Including new DO5020-5024 with Optical probe (below)



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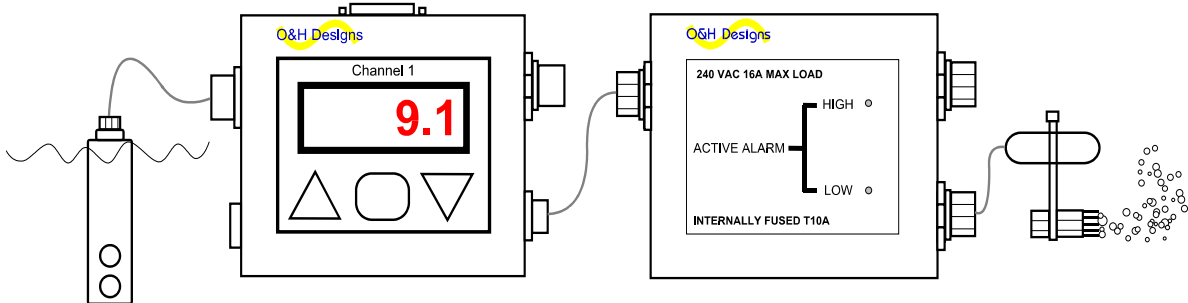
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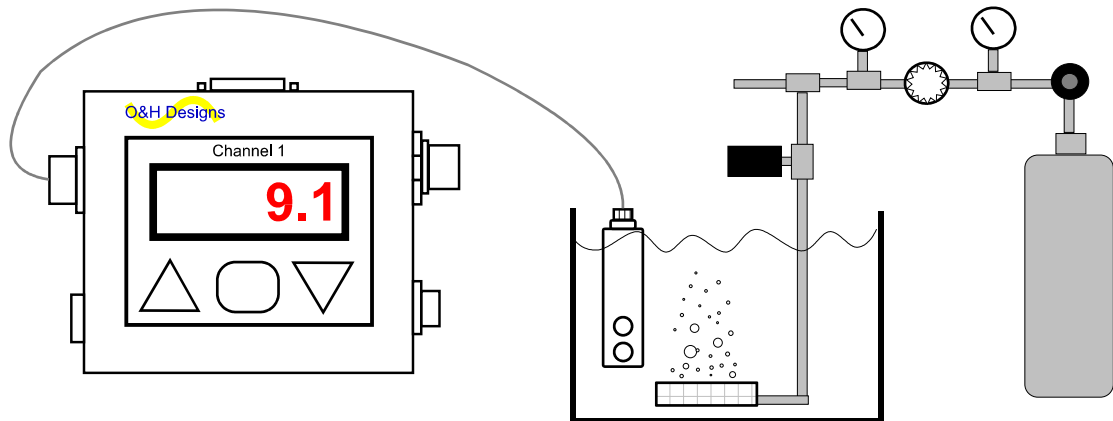
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1. Introduction

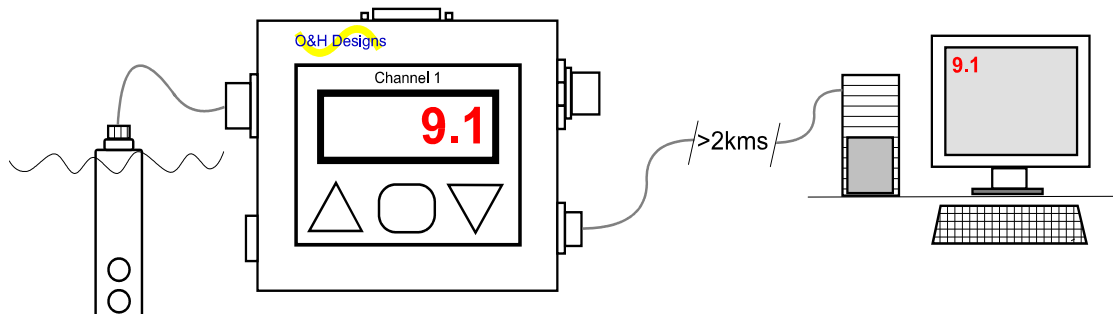
The DO102X & DO502X series are advanced microprocessor controlled Dissolved Oxygen monitors. They will provide long periods of unattended service and can be used in monitoring or control applications. Typical set-up for single channel versions is shown below.



Measuring Dissolved Oxygen levels in tanks, ponds and lakes and turning on the installed aeration system when it's actually required thus saving energy.



The system can also be used to control DO₂ in both static and transportation tanks.



Static monitoring of DO₂ with remote link with up to 24 units connected.

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.

SAS are not responsible for errors in usage or connection and accept no responsibility for consequential losses.

3. Electrical Safety

The system should be installed by a qualified electrician familiar with IEEE ed. 18th regulations or VDE. Users should be fully trained in safe operational conditions of mains based equipment.

12/24VDC versions can be installed with minimal electrical training.

Note that all IP integrity ratings quoted are when the units are screwed together, and all mating seals are compressed. SAS accepts no responsibility for personal injury or equipment failure due to water ingress because of poor installation. It is advised to shield from the elements.

4. Mounting

The units can be used as a standalone system and installed both indoors and outdoors using customer preferred mountings.

Alternatively, both series are designed to be mounted to a 65mm OD pole or with appropriate fixings to a wall using the 'option B' kit.

For remote applications, the 'option A' system can be connected to a P.C up to 2 kms distance via RS485. The display & power switch can therefore be mounted near to the probe and remote readings can be obtained and logged onto a computer.

When monitoring Oxygen levels in transportation tanks, ensure that the probes are continually immersed during use. Do not position the probe direct over the Oxygen diffusers. The same rule applies to aerators.

5. Specifications

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

Environmental

Temperature (Electronics)..... -10°to 40°C
 Storage..... -20° to 50°C
 Sealing..... IP65

Weight (approximate)...DO102X..... 450gms
 Weight (approximate)...DO1024..... 1100gms

Dimensions DO1021 & 5020 (display & power switch)

Width.....	100 mm
Height.....	60mm
Depth.....	100mm

Dimensions DO1024

Width.....	213 mm
Height.....	119 mm
Depth.....	185 mm

Power supply

Mains (factory set).....	90-230 VAC
Power consumption.....	2 watts
Low voltage option (factory set).....	12-24 VDC

Battery Versions

NimH internal battery.....	7.2VDC
Consumption.....	1.4 watts
Battery life at 20°C	7 hours

Measurement parameters

Probe type.....	Sealed Galvanic or Optical
Probe lead length (max).....	8m standard
Probe operating temperature range	0° to 40°C
DO ₂ range	0 to 40mg/l
DO ₂ accuracy (instrument minus probe).....	3% rdg ±0.1mg/l
DO ₂ display resolution	0.1mg/l
Maximum Probe Depth.....	2.5 mtrs

6. Abbreviations

Note: Abbreviations are the same in singular or plural.

DO ₂	Dissolved Oxygen	LED	LightEmitting Diode
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
mm/Hg	millimeters of mercury	mb	millibar

7. Initial Usage - D01021

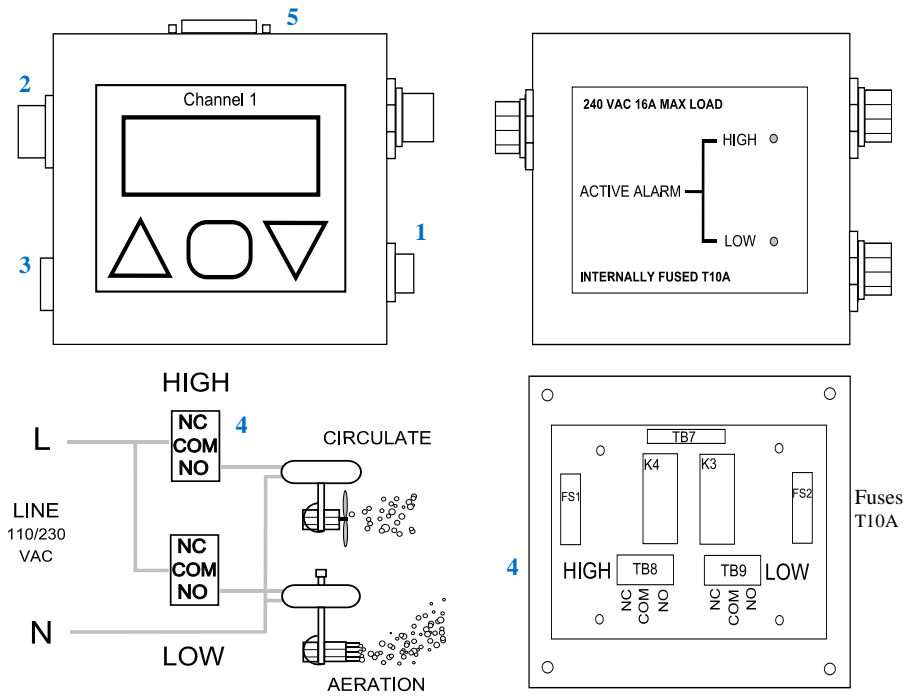
If supplied, connect the power switch or O₂ control valve to the 5 pin connector ¹ on the side of the unit.

Connect the DO₂ probe to the 4 way connector ² via the side of the unit, or via the comms board in the power switch. Connection ⁵ is only fitted with option 'A' RS485.

Remove the cover from the power switch and connect the mains device to the relevant output via the terminal blocks ⁴ High or Low.

Connect and turn on mains power, The unit will turn on and the system will go through a self test

The default display units are now shown in mg/l of DO₂.



When the unit is powered up allow at least 5 minutes for stabilisation.

8. Initial Usage – DO5020

Connect the DO₂ probe to the 4 way connector on the side of the unit. Ensure these are only finger tight. The DO5020 has connections as below



When the unit is powered up, allow at least 5 minutes for stabilisation.

If a valve control system is used, connect to the 8 way control socket and 2 way valve power using the supplied cables.

8.1 Display Probe Temperature and alternative DO₂ units.

Note: This function applies to all variants

The default reading on power-up is mg/l.

Pressing the



key will give a probe temperature reading in °C

Pressing again will display DO₂ % Saturation. Pressing again will display mg/l saturation.

9. Probe Placement

Ensure that any protective sealing caps are removed prior to deployment.

During operation, place the probe in a vertical position with the probe tip facing downwards.

As a 'Rule-of-thumb', place the probe around ¼ of the overall depth from the surface of the water.

When positioning the probe in the water to be monitored. Take care to locate away from the direct influence of aerators/Oxygen diffusers. Actual position when immersed is dependant on depth profile, width and length, therefore actual placement position will be found by 'in-situ' testing. When a new probe has been installed, allow 1 hour before calibration.

10. Calibration

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

It is recommended that the sensor is recalibrated at regular intervals. This is dependant upon the suspended solids and build up of algal growth during that period.

Regular checks are necessary. Use a soft brush or moistened tissue to remove buildup from the probe tip. It is not necessary to remove all deposits around the probe tip, just that the window is clear.

The DO5020 is supplied with an Optical membrane. This should be kept clean as per the Galvanic variant but some 'DOs and DON'Ts' may not apply. Please note that although the calibration interval is a lot longer for the Optical probe (3 months), it still needs cleaning.

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 chemicals such as Isopropyl Alcohol.

Allow contact with the membrane whilst calibrating the 100% point.

Take readings directly after immersion in water. Allow at least 10 mins for the DO² probe tip and internal compensation electronics 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 1 hour before calibration to allow the DO₂ probe to reach equilibrium with ambient conditions.

Replace any protective caps half filled with de-ionised water. This is only required if stored for long periods.

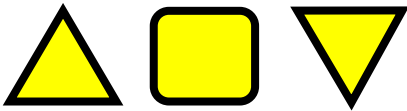
Dry any excess water from the probe tip before calibration. Use of a soft tissue is advised.

11. Method

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

The zero 0% point is extremely stable and factory set, it therefore requires no calibration adjustment. The following method details calibration for the *100% point.

Enter the calibration menu by pressing the following keys together for 3 seconds:

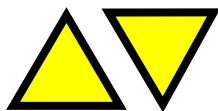


Quick Cal: You can also get to the DO₂ calibration by holding the middle key down for 5 seconds

The calibration menu on the **DO1020** range will now be available, for DO5021 see next chapter:

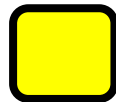
DO2 SAL PrES rtd TC End

Use the keys



to scroll through the menu

Select **DO2**



DO2 SAL PrES rtd TC End

The *100% calibration point is now shown.

Use the keys





to adjust to **105% saturation***

Press the key



twice when readings are stable to accept.

To quit, use   to select DO2 SAL PrES rtd TC **End**

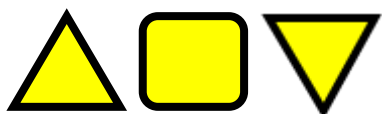
Press the key  to quit

The display will now read the calibrated value in mg/l.

*** Usually calibrate at 105% to allow for localised O₂ consumption**


DO5020 range

Enter the calibration menu by pressing the following keys together for 3 seconds:




Quick Cal: You can also get to the DO₂ calibration by holding the middle key down for 5 seconds


DO2 °C disp addr End

Use the keys   to scroll through the menu

Select **DO2**  **DO2 °C disp addr End**

The *100% calibration point is now shown.

Use the key  This will show 100% cal point, release the key

Press the key  **twice** when readings are stable to accept.

To quit, use   to select DO2 °C disp addr **End**

Press the key  to quit

The display will now read the calibrated value in mg/l.

12. Setting DO₂ High and DO₂ Low alarms

The upper setting is normally used for circulators when high oxygen levels are present (supersaturation). High output circuitry is fitted on request.

Lower DO₂ outputs set the lower limits to either sound an alarm or turn on aeration or oxygenation.

HIGH DO₂ Alarm

Hold the keys   for 1 second to select **HIGH** menu


The display will flash **HI**

The HI alarm menu will now be available:

HI dLYH rST End



Press the key  to adjust the HIGH setting

Use the keys   to adjust high alarm setting.

Press the key  to accept the high alarm setting

The delay timer **dLYH** will run for the time in minutes, commencing when the **HI** value is reached.

NOTE: By selecting the **rST** function the delay timer can be reset.

Use the keys   to adjust delay timer setting in minutes.


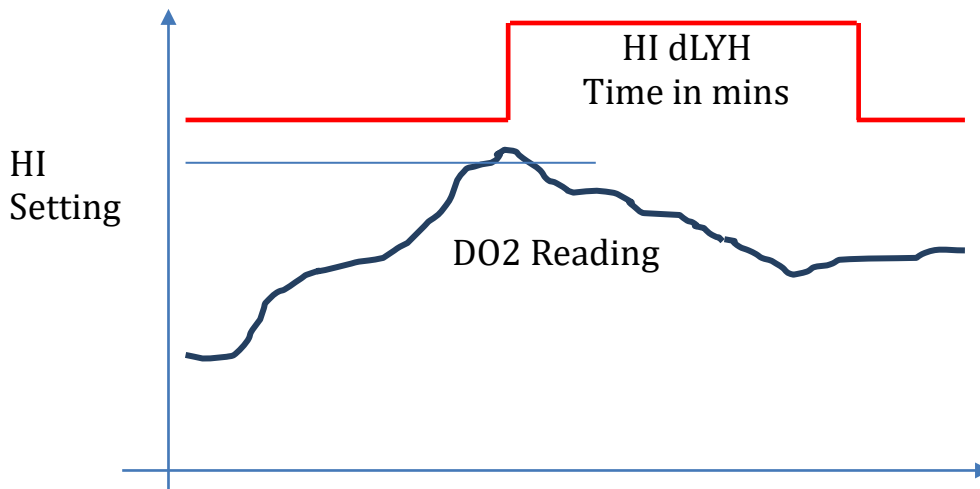


Press the key  to accept the delay timer setting



Illustration to show **HI** timer typical operation:



When completed, use the keys  to select End

Press the key  to return to normal readings.

LOW DO2 Alarm

Hold the keys   for 1 second to select **LOW** setting

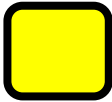
The display will show **LO1**

The LO alarm menu will now be available:

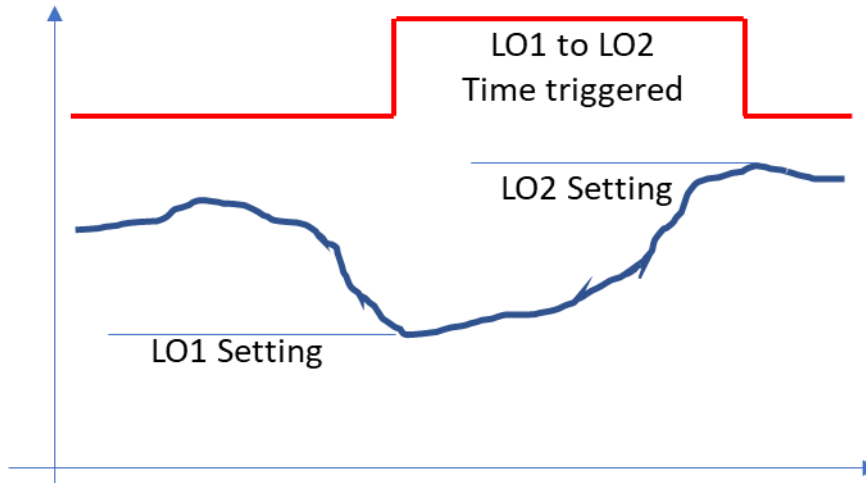
LO1 LO2 End

The **LO1** value is the minimum value when the **LO1** alarm relay is triggered

Use the keys   to **LO1** alarm setting.


Press the key  to accept the **LO1** alarm setting

Repeat for the LO2 setting.




When the **LO1** is triggered the LO alarm relay will be activated until **LO2** is reached.

When completed, use the keys   to select End


Press the key  to return to normal readings.


When either the High or Low alarms are exceeded, the display will flash, and the appropriate power switch or valve connected will operate until the readings return to a normal level.

The low alarm can be over-ridden manually. If you press the  key for 5 seconds, 'Or' is displayed. The low alarm output will activate until any key is pressed back to normal operation.

13. Minimum & Maximum readings

The minimum & maximum feature allows upper & lower trends in readings to be recorded. This can be useful for collecting DO₂ data. E.g collection of upper & lower DO₂ readings during fish transport or capturing diurnal variations in lakes & ponds.

Press the key  to display the minimum reading since reset.

Press the key  to display the maximum reading since reset.

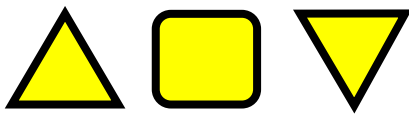
To reset, press  High & Low will now be reset.

The display will flash **rSt**

14. Setting Atmospheric Pressure (DO1020 range only)

If large swings in atmospheric pressure occur due to either altitude or weather variations, readings can be corrected for maximum accuracy. Table 1 (pg11) illustrates the relative corrections that can be applied.

Enter the calibration menu by pressing the following keys together for 3 seconds:



The calibration menu will now be available:

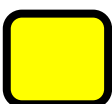
DO2 SAL PrES rtd TC End

Use the keys  to scroll through the menu

Select **PrES**  DO2 SAL **PrES** rtd TC End

The display will show the default of 760 mm/Hg

Use the keys  to adjust if required

Press the key  to accept the pressure reading

The display will flash **dOnE**

Use the keys  to select **End**

Press the key  to quit to normal reading

The effects of adjustment of pressure are shown below. The DO102X will apply the relevant correction factors.

Table 1

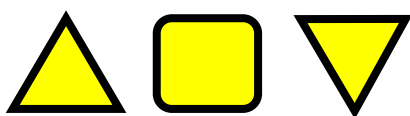
(m)height	Pressure (mmHg)	Factor
0	760	1
100	750	1.01
200	741	1.03
300	732	1.04
400	723	1.05
500	714	1.06

15. Setting Salinity (DO1020 range only)

If the instrument is used in brackish or seawater then a salinity correction factor can be applied to obtain maximum accuracy.

Table 2 (pg12) illustrates the relative corrections that can be applied

Enter the calibration menu by pressing the following keys together for 3 seconds:



The calibration menu will now be available


DO2 **SAL** PrES rtd TC End

Use the keys  to scroll through the menu.

Select **SaL**  DO2 **SAL** PrES rtd TC End

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.

The display will flash **dOnE**

Use the keys   to select **End**.

Press the key  to quit to normal reading

The table below shows the effects of salinity on the readings and the factor the DO102X will apply.

Table 2

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

16. Temperature (Internal Platinum Resistance probe)

The platinum resistance probe (RTD) provides an accurate temperature reading used for correcting for DO₂ probe variations.

This is shown as °C in the calibration menu.

DO2 °C disp addr End

This reading is normally factory calibrated and should not require re-calibration during normal service life of the probe. Contact SAS for details of re-calibration

17. Probe Temperature Coefficient – (DO1020 range only)

This is shown as TC in the calibration menu.

DO2 SAL PrES rtd **TC** End

Do not adjust this value as the probe will display incorrect readings at differing temperatures. Defaults values are typically 0.0.

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

18. Service & Warranty

For more information on the DO102X & 5020 series contact us directly or an approved agent.

SAS 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

SAS provides a service capability for their products. Replacement probes and other spare parts are available direct.

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

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