Dissolved Oxygen Sensor set

for the LogIT Microsense® system

Instructions & Resources

Introduction

The LogIT Dissolved Oxygen Probe (DO2) has been designed especially for LogIT and is easy to set up and use.
It features simple single control calibration and requires no battery as the membrane is polarised by an internal rechargeable cell. The unit is designed to measure 0 to 200% Saturation with automatic temperature compensation.
It has also been specially designed to work alongside the LogIT pH Amplifier and standard pH electrode thus avoiding any interference problems which can occur with electrochemical devices (note the DO2 probe must be polarised and calibrated before it is used with other sensors).

The probe itself is based on the Clarke cell principle using polarographic measuring technique. As such it uses a KCl electrolyte contained by a semi-permeable membrane. As with any polarographic oxygen sensor, the measurement is dependent upon temperature in two ways. The diffusion of oxygen across the membrane is temperature dependent and is expressed by the temperature coefficient of the membrane. This temperature variation is corrected in the LogIT adapter. In addition the solubility of oxygen in solution is temperature dependent and is expressed by means of a solubility coefficient. This also varies with dissolved salts.

Contents

- LogIT DO2 adapter
- LogIT DO2 electrode
- 3 membranes
- A 50 ml bottle of electrolyte (KCl solution) with integral spout and dropper
- Polishing paper (crocus paper) for anode.

Note: Spare membranes and KCI are available as a separate kit (DCP ref D100107)

Specification

Cathode:	Silver
Anode:	Silver
Range:	0-200% Saturation
Temperature Range:	5 °C to 45 °C with automatic temperature compensation
Temperature Coefficient:	1.5% / °C
Polarising Time:	20 minutes
Accuracy:	Nominal +/- 7%
Dimensions:	Custom Clarke cell 12mm OD x 105mm length Cap diameter 18mm OD, overall length 180mm
Cable Length:	1 metre

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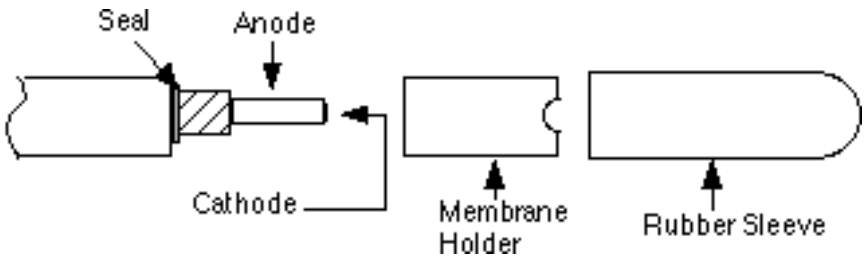
Example Applications

- Effect of temperature change on respiration rates e.g. of locusts, yeast or maggots
- Oxygen in fermentation
- Change in oxygen content of inhaled and exhaled air
- Oxygen levels in ponds in relation to depth
- Photosynthesis.

Assembly of Electrode



1. Hold membrane module in a vertical position and fill to half full with electrolyte. Ensure that no bubbles are trapped in the electrolyte. If bubbles are trapped simply flick the module with a finger to dislodge them.

2. Ensure electrode is clean and free from grease

3. Hold electrode vertically down and slowly screw membrane module up until the electrolyte is emitted from the thread. Very slowly screw the membrane module up until it is almost completely fitted. Then unscrew slightly to release any pressure.

4. Finally screw membrane fully onto the electrode until it is just tight. Do not over tighten.

5. Check that the membrane is not pressurised. It should not be bulging out away from the cathode although the cathode should press against it pushing out slightly.

6. If the electrode is not going to be used immediately place the plastic cover provided on the end to protect the membrane - see Care and Maintenance instructions.

Note: The removal of the end cap can be achieved with a gentle pushing action as shown below rather than pulling. This prevents the sudden 'giving' of the cap and the potential hazard of an elbow flying backwards. If this does not work, try a gentle twist of the cap to break any seal that may have formed.

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Using the sensor
Carefully remove the cover on the membrane if still fitted. If the cap is difficult to remove after trying the 'push' method, try a gentle twist of the cap to break any seal that may have formed.

The membrane is very thin and care should be taken not to damage it.
The LogIT Dissolved Oxygen Probe does not use batteries, the membrane being polarised by an internal rechargeable cell, so the adapter MUST be charged before use. However, all electrodes of this type require polarising and so the LogIT sensor is designed to charge and polarise at the same time - this process takes approximately 20 minutes, depending on the initial state.
To charge/polarise the sensor you simply plug it into a data logger and ensure that the data logger is on. To charge the interface and take readings for calibration follow the instructions for the type of data logger you are using.

In air the reading will be constant. In water the diffusion of oxygen through the water will cause a stir effect. This means that if the water is not stirred the reading will fall as a depletion layer is formed around the electrode.

Before using the sensor for logging you will need to calibrate it. *See 'Calibration'.*

Real Time logging - ie connected to computer - any LogIT data logger
Once calibrated, connect the data logger to the computer in the normal way for standard logging.
If using uLog adapter, SensorLink, Black Box or LIVE, you may well already have done this for calibration purposes.
You can now run the data logging software using the sensor as you would any other Microsense® sensor.
Please note that when powering most LogIT remote loggers on a power pack or direct USB supply, they will charge and polarise the DO2 adapter and electrode, even when the datalogger is switched off (not LogIT SL - see below)

Remote data logging - not uLog adapter, Black Box, SensorLink or LIVE
Connect the sensor. For Voyager and Datameter, hold down the green button for 'meter mode' and charge/calibrate. *See 'Calibration'.*
When remote logging for any length of time with a Voyager or Datameter, it is important to make sure the data logger will go into 'sleep' mode to save battery power. Check that a flashing 'M' is NOT in the bottom left hand side of the display. If it is, this indicates the logger is still in 'Meter mode' and will not turn off. Press the Red button to switch off, then press any button to switch on and commence normal remote logging. For DataVision, the 'Power off' option is found by selecting 'Menu' and 'Options'. Make sure this is set to 'Automatic'.

LogIT SL - Real time and remote logging
If a CheckIT display is available plug it into the LogIT SL and turn it on by holding down the Green key (puts LogIT SL in meter mode, indicated by a flashing 'm' in the bottom left corner of the display). Connect the sensor and charge/calibrate. *See 'Calibration'.* Before you commence remote data logging quickly turn LogIT SL off using the red button then turn it on by pressing the green button and the commence logging . With real time logging simply connect the LogIT SL to your computer and run your logging software as normal.
If a CheckIT is not available connect LogIT SL to the computer in the normal way for logging and run the data logging software you use. Select the software's 'Test' mode (if available) - this ensures that the LogIT SL remains on, as the computer displays a readings constantly taken from LogIT SL. If your software does not have a test facility you will need to log data, using bars or graph.

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Calibration
To calibrate, only one adjustment is required for 100%. When first connected the sensor will over-range but after several minutes the reading will fall below 200%.

It will continue to fall for about 10-20 minutes as the electrode polarises, however the reading will be substantially stable after a few minutes. Allow the sensor and the adapter to stabilise for some minutes before taking readings.

Note that no harm will come to the adapter or electrode if it is left charging or polarising for an extended period of time.

The recommended method is to calibrate the sensor within air which is saturated with water. This can be achieved by placing a sponge, which has been soaked in water, in the bottom of a beaker or container and then holding the sensor slightly above the sponge - do not touch the sponge (a retort stand is ideal to hold the sensor while adjustment is made). Allow the reading to settle as the temperature equalises through the sensor then adjust to read 100%.

Adjustment can be made by inserting a **small** flat blade screwdriver through the hole in the adapter unit and gently turning until a reading of 100% is achieved - **be careful not to over-turn the control.** The unit is then calibrated.

An alternative to the above method is to place the polarised electrode into a beaker of water that is being constantly stirred. The use of a magnetic stirrer can be advantageous and more convenient than stirring by hand but simply agitating the water can be enough. The goal is to remove the 'depletion layer' from around the tip of the probe. This layer is where a small amount of oxygen has diffused through the membrane and will result in a lower reading. By agitating, this layer is removed and a more accurate calibration can be achieved.

Again, allow the reading to settle for several minutes as the temperature equalises through the sensor. Then carefully adjust the sensor control as above so that the reading is 100%.

The probe is calibrated and ready for use.

Note: **Gently turn the adjustment screw.** If 100% saturation cannot be achieved then this is nearly always a membrane issue, tarnish on the Anode or old electrolyte.

See fault finding for help resolving calibration issues.

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Logging
During logging remote loggers like Voyager, DataMeter and DataVision automatically power up, take a reading and then 'sleep' until the next sample. This helps to 'top up' the DO2 rechargeable battery.

However after a prolonged time the rechargeable cell will fall below the critical charge level and the polarisation voltage will decay. This means that as the LogIT wakes up the sensor will start to repolarise and the readings will be too high - this effect will increase over the logging period.

The adapter is designed to last for at least 24 hours during logging provided it is fully charged at the start of the logging period. The precise time available for logging depends on the state of charge at the start and the logging rate etc.

Note: If remote loggers like Voyager and DataVision are powered by direct USB or a mains pack for Datameter and DataVision, the rechargeable cell in the adapter will be constantly charged. The same is true for other loggers like uLog adapter, Black Box, LogIT SL/LIVE with CheckIT when in meter mode.

Important care and maintenance

• The electrolyte should be replenished regularly if in constant use or if the probe is only used occasionally it should be changed before calibration.

• Ensure that the cathode tip is not scratched or damaged as this will effect the electrode performance.

• Treat the membrane carefully as it is fragile. No grease, oil or organics should come into contact with the membrane. Avoid contact with the membrane to prevent punctures.

• The membrane does not need to be stored wet. If not used for long periods it is best stored disassembled and dry which will prolong its life considerably or it can be stored in 1m KCl solution.

• Over a period of use the silver anode is plated with silver chloride, black/grey in colour, which needs cleaning off. This can be done with "crocus paper" (very fine emery paper). **Do not clean the cathode (tip) in this way as it must not be scratched.**

• The probe and cable are water proof but the LogIT adapter is not so do not expose it to liquid or steam.

• Never disassemble the probe or adapter other than to change the membrane and clean the anode.

• Only use the special LogIT Dissolved Oxygen Probe with this adapter.

Fault finding

Fault	*Possible*	*Cause Remedy*
No Response	Split membrane	Replace membrane & electrolyte
Sluggish response	Electrolyte depletion	Replace electrolyte
Excessive output	Stretched membrane	Replace membrane & electrolyte
High zero reading	Air in electrolyte	Replace electrolyte

Should you have any difficulty please contact DCP technical support by telephone, fax or eMail (support@dcpmicro.com)
Also you can check the support pages on the LogIT website www.logitworld.com

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UPGRADING - Software, DataMeter and CheckIT

If, when using the sensor for the first time, your software does not recognise the sensor, DataMeter displays ??? or CheckIT displays mV then they require upgrading.

Upgrading Software
Download and install the latest version of your software from www.logitworld.com

The DO2 probe should now be recognised.

Upgrading Datameter
If you use SensorLab or LogIT Lab, download and install the latest version from www.logitworld.com and after plugging in the Datameter, use the 'Administrator' option under 'File' to reload the loggers system software.

If you use Insight software, then you can download 'SensorLab' or 'LogIT Lab' and perform the same procedure as detailed above.

The DO2 probe should now be recognised.

Upgrading CheckIT
CheckIT displays are used with the older LogIT SL and LIVE data loggers.

If your CheckIT requires upgrading, please contact DCP or email support@dcpmicro.com

Please note that there will be a charge with upgrading your CheckIT

The DO2 probe should now be recognised.

NOTES

DCP microdevelopments

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Waste electrical and electronic products must not be disposed of with household waste.
Please recycle where facilities exist.
Check with your Local Authority or Retailer for recycling advice.

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