

Dr.Oxygen

OXYGEN - CONTROLLER / DATALOGGER VERSION



INSTRUCTIONS FOR USE

NOTICE !

These instructions are a stripped version of the regular instructions for Dr.Oxygen oxygen-controller.

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1.0 Description

1.1 Measuring oxygen and temperature

Dr.Oxygen is a controller designed to maintain ideal oxygen tension on fish farms. The controller carries out continual metering of the oxygen tension and temperature of the water at the intake and outlet.

1.2 Adjustment to oxygen tension ideal for the fish

The ideal oxygen tension for fish at any given time depends on the temperature. Thus, it is not desirable to adjust for a fixed concentration in mg/l but for the ideal tension. What this means in practice is that the controller automatically adjusts the concentration in mg/l to suit the temperature. A figure of 100 is the ideal tension at a given temperature. Figures of 50 and 200 respectively are half and twice the numbers of milligrammes per litre required.

1.6 Datalogger

Dr.Oxygen has built-in data logging with a facility for displaying "historic" data. It can also be connected to a network - PARTYLINE - for central data collection and control by a PC.

2.1 Controls and display

In this instruction book the buttons are named in **BOLD FACE CAPITALS**.

All day-to-day information is displayed by pressing buttons. When a button is pressed a little light goes on the button concerned, so it is always obvious what is being displayed. The text on the button states its function.

The **ALARM SETTINGS** button is referred to here as **ALARM**.

The **TIME & DATE** button has two words on it separated by a line.

The first time the button is pressed the upper word applies and the second time the lower one.

The **SHIFT** button has a special function. When it is pressed, the buttons "shift" (change) to a new function.

Pressing **RETURN** returns into normal, default mode/function.

Examples.

Press **SHIFT** once followed by ① **AUT SET**₂ twice, is written as:-

SHIFT ²	① AUT SET ²	
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Buttons

Unit buttons	Info. displayed (only refers to oxygen tension buttons)
IDEAL	The IDEAL value calculated on the basis of mg/l and temp.
mg/l	mg/l, as measured by the oxygen probes.
%	%-age saturation, calculated on the basis of mg/l and temp.

Buttons	Information displayed
① O ₂	Oxygen tension, inlet.
① AUT SET	Not in use
② O ₂	Oxygen tension, outlet.
② SET	Not in use
① TEMP	Water temperature at the inlet.
① MIN SET	Minimum oxygen tension at the inlet. 100-130 IDEAL.
② TEMP	Water temperature at the outlet.
O ₂ OUTPUT%	Not in use
MAX	Retrieval at max. level in memory. Indicator function.
MIN	Retrieval at min. level in memory. Indicator function.
ALARM	Not in use
RETURN	Returns buttons to normal function
START STOP	Not in use
DATE	Date
TIME	Time
SHIFT	Change of button function: special values, regulatory parameters and adjustments.

2.2 Setting, altering values, general

If a figure needs changing, this is done by pressing: -

ARROW UP to increase the value, or

ARROW DOWN to decrease it.

The **arrow buttons repeat**, i.e. the value goes on changing as long as the button is kept pressed. After pressing 3 sec. (marked by an audible "beep") the value changes to the second lowest significant figure. This is to allow large-scale changes to be made quickly.

Measured and calculated figures cannot be changed.

For safety purposes, upper and lower limits for the variable values are built in.

2.3 Locking arrow buttons

The arrow buttons have a locking facility so that the figures cannot be changed. This is to prevent unauthorised operation.

The lock self-activates a certain number of minutes after the last time the buttons were pressed. Thus one only needs to unlock the system when necessary.

To unlock the buttons, press SHIFT and then both arrow buttons at once.

SHIFT	MAX	No. of minutes until self-locking activates.
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Eg if it is set at 10, it will lock after 10 minutes.
If it is set to 0, it will not lock.

2.4 Display of oxygen tension: IDEAL, mg/l, %-age saturation

Dr.Oxygen can display the oxygen tension in three ways: -

IDEAL	The IDEAL tension for the fish
mg/l	Volume of oxygen per litre.
%	Percentage saturation with oxygen.

4.0 Log function

Data are stored every 10-minutes, but since only variations are interesting, the data are only stored if the figure differs from what it was 10 minutes before. In the case of an ALARM and on start/stop of alarm monitoring, any changes are logged, whether 10 minutes have passed or not.

4.1 Recall of logged data, entering *historic mode*

Logged data can be displayed by pressing **ARROW DOWN** while

① O₂ ② O₂ ① TEMP or ② TEMP

activated, i.e. the light is on. The system is now in *historic mode* and the lamp will flash by the word "HISTORIC" to indicate that the readings displayed are not current. The display shows the last temperature reading different from the current one. Continuing pressing calls up older figures still.

ARROW UP is used to go forward through time again.

To see the time at which any particular event occurred, press **TIME** (and, where relevant, **DATE**).

When in historic mode, one can also go one or more days back in time by pressing **DATE** followed by **ARROW DOWN**. (**N.B.** If not in historic mode, this will alter the date.) On going back one or more days, the time shown will be 0000 hours, i.e. midnight. The historic time can then be changed by pressing **ARROW UP** or **ARROW DOWN**.

MIN or **MAX** can be used to display minimum or maximum values.

In datalogger version only mg/l is available

To return to normal function, press **RETURN**.

5.1 Various parameters

PRESS		PARAMETER
SHIFT		
	DATE	Year

5.3 Communication parameters

PRESS		PARAMETER
SHIFT	MIN	Unit's number. The PC asks for a unit's no. The sub with that number answers up. No two units can have the same number.

5.4 Communication with PCs

Unit's no. to be given.

Hard copy print-out to be switched OFF: **SHIFT - TIME** to show 0.

Dipswitch 4 to be ON = RS 232

Check **TIME**, **DATE** and year (**SHIFT - DATE**).

5.6 Adjustment of sensors and oxygen probes

Temperature probes are adjusted once and for all on installation.

Oxygen probes to be adjusted every 2 to 4 weeks when provision of oxygen is necessary.

ADJUSTMENT OF	INSTRUCTIONS
Temperature sensor, intake.	The temperature probe is calibrated by the manufacturer and supplied with a calibration figure, which should be keyed in: SHIFT - ① TEMP (Offset value for temperature sensor, intake).
Temperature sensor, outlet	The temperature probe is calibrated by the manufacturer and supplied with a calibration figure, which should be keyed in: SHIFT - ② TEMP (Offset value for temperature sensor, intake).
Oxygen probe, intake	The oxygen probe and temperature sensor to be removed from the water and hung up out of the sun. After at least ½ an hour's acclimatization time, press SHIFT - ① O₂ . Then press both arrow buttons at the same time. You will hear three rapid "beeps", and the probe is calibrated.
Oxygen probe, outlet	The oxygen probe and temperature sensor to be removed from the water and hung up out of the sun. After at least ½ an hour's acclimatisation time, press SHIFT - ② O₂ . Then press both arrow buttons at the same time. You will hear three rapid "beeps", and the probe is calibrated.

6.0 TECHNICAL DATA	
Cabinet	Polycarbonate; watertightness IP 65
Dimensions	Width x height x depth = 240 x 200 x 128 mms
Control panel	Film buttons, polycarb.; 20 buttons with indicator lamps
Display	4 figures, 13 mm red LED
Construction	Front lid with display print board and CPU print board. Connection print board with power supply, signal converter and relays. Thermostatically controlled frost protection heating.
Microprocessors	80C31
Inputs	2 analogs for temperature sensors 2 analogs for oxygen probes
Outputs	None
Communication	RS232 serial port RS485 "Partyline" for connection to net.
Power supply	220 V/6W
RAM back-up	The memory is protected by a lithium battery. I.e. the data in the memory are retained even with the power off.
Temperature sensors	The sensor consists of an embedded temperature transducer, AD590 from Analog Device. The transducer comprises a monolithic integrated circuit acting as a high impedance temperature-dependent source of electricity which generates a current proportional to the absolute temperature in degrees Kelvin. The output is $1\mu\text{A}/^\circ\text{K}$. $0^\circ\text{K} = -273.2^\circ\text{C}$, giving a reading of 0.2932 mA at 20°C . Linearity typically $<0.1^\circ\text{C}$. Offset variation $< 1.0^\circ\text{C}$. The sensor is calibrated by manufacturer, where the offset variation is determined. This is marked on the sensor and should be keyed in, insuring high precision measuring.
Oxygen probes	The oxygen probes generate a voltage proportional to the oxygen tension. The reading is of the order of 6mV per mg oxygen/litre.