



## Chlorolab 3

**Advanced system for the study of photosynthesis & respiration in larger sample volumes**

- ✓ Convenient, system for the advanced study of photosynthesis & respiration measurements in liquid-phase samples under illumination
- ✓ DW3 liquid-phase electrode chamber with for samples up to 20ml
- ✓ OxyLab unit for direct PC control and data acquisition
- ✓ Sample mixing by integral stirrer driving a magnetic follower
- ✓ Illumination via LH36/2R red LED array via front optical port
- ✓ Quantitherm light/temperature sensor for light calibration
- ✓ System calibration & control via Windows® Software



## Hansatech Instruments

Hansatech Instruments is a small, British, scientific instrument company located in the heart of rural Norfolk. For over 40 years, our efforts have been concentrated towards the design & manufacture of high quality instrumentation for teaching and research in the fields of cellular respiration and photosynthesis. Our instruments are now in use in a wide range of programs in more than 100 countries throughout the world and have gained an enviable reputation for quality, reliability and excellent price/performance.



## Products

Hansatech Instruments product range covers a wide range of applications in the fields of photosynthesis and cellular respiration. We manufacture oxygen measurement systems based on Clark type polarographic oxygen sensors, chlorophyll fluorescence measurement systems for both continuous excitation and pulse-modulated measurement techniques and optical instrumentation for the measurement of sample chlorophyll content.



## Support

Purchasers of Hansatech Instruments products can be assured of ongoing support and prompt and efficient attention to enquiries at all times. Customers are encouraged to register their instruments on our website which allows access to our Support Ticketing System in addition to instruments manuals and software upgrades.



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## Overview

Chlorolab 3 provides a sophisticated system for the advanced study of respiration and photosynthesis from larger volume (up to 20ml) liquid samples under automated illumination. The system provides the ability to automate the acquisition of oxygen evolution/uptake rate over a user-defined light intensity rate and to determine the apparent quantum yield. The system is ideally suited to busy research facilities where demands on equipment performance are high but is equally at home in teaching environments for under & post-grad plant biology studies of the photosynthetic processes. The system comprises the Oxylab control unit, S1 Clark type electrode disc, DW3 liquid-phase electrode chamber, LH36/2R light source and QRT PAR/temperature sensor for light source calibration. All necessary accessories and spares are also included (excluding circulating water bath and PC).

The DW3 is best suited to measurements of larger samples such as macroalgae or seaweed sections which can be suspended securely in liquid a medium of up to 20ml. DW3 is also suitable for suspensions of extracted chloroplasts, micro-algae etc when larger sample volumes are required. Changes in oxygen concentration of the sample medium are determined by the integral S1 oxygen electrode mounted in the base of the chamber.

The Oxylab oxygen electrode control unit operates in conjunction with the user-friendly O<sub>2</sub>view data acquisition and system control software to provide PC control of oxygen uptake or evolution measurements from the electrode. Up to 2 individual Oxylab control units may be connected to a PC providing a convenient method of comparing signals from 2 channels simultaneously. Additionally, Oxylab may be configured to accept an optional auxiliary input signal (e.g. temperature, pH, chlorophyll fluorescence, TPP+ or other specific ion electrodes etc) using the appropriate accessory apparatus therefore extending the flexibility of the system.

Oxylab provides automation of complex light intensity changes during light response assays in conjunction with the LH36/2R light source. Light tables (or photon flux density tables) are created within the O<sub>2</sub>view software via a user-friendly interface. The Oxylab control unit connects to the serial port of a Windows® PC either directly or using a HAN/USB adapter (for newer PC's with no serial ports). The control unit features a built-in magnetic stirrer and all the electronics required to control and measure the signal from the S1 oxygen electrode disc.

O<sub>2</sub>view Windows® software controls all major hardware and data acquisition functions including signal gain and back-off and simple calibration routines for both liquid and gas-phase measurements. Data from the S1 electrode disc, optional auxiliary input signal and temperature signal from a QTP1 PAR/Temperature probe sensor are plotted as a chart recorder emulations in realtime with post-measurement data analysis tools included within the program. Completed experiments are saved in .CSV (Comma Separated Values) format which then may be opened directly in other Windows® data analysis applications such as Excel®.

## Technical Specifications

### OXYL1 Oxylab Electrode Control Unit

<b>Measuring Range:</b>	0 - 40% oxygen
<b>Min. O<sub>2</sub> Resolution:</b>	10 x 10 <sup>-6</sup> μmol/s/ml at 20 °C
<b>Magnetic Stirrer:</b>	150 - 900 rpm
<b>Polarising Voltage:</b>	700 mV
<b>Gain:</b>	Up to x50 (10 bit resolution)
<b>Back off:</b>	12 bit resolution
<b>Integral Test Resistor:</b>	Yes
<b>Acquisition Rate:</b>	0.2 - 10 readings/s
<b>Signal Inputs:</b>	Electrode disc, Aux., QTP1 probe
<b>Communications:</b>	RS232, USB via HAN/USB adapter
<b>Dimensions (w x d x h):</b>	250 x 126 x 65mm - 650g
<b>Power Supply:</b>	95 - 260V universal input mains supply. Output 12V DC 2.5A

### DW3 Oxygen Electrode Chamber

<b>Suitability:</b>	Liquid-phase (sea water) respiration/photosynthesis
<b>Construction:</b>	Black acetel
<b>Sample Chamber:</b>	Square section borosilicate glass
<b>Sample Volume:</b>	1 - 20ml (min. 15ml if illuminated)
<b>Optical Ports:</b>	Optical port (26mm dia), quartz window (36mm dia)
<b>Temperature Control:</b>	Water jacket connected to circulating water bath
<b>Dimensions:</b>	110 (w) x 75 (d) x 100mm (h). Weight: 400g

### S1 Oxygen Electrode Disc

<b>Electrode Type:</b>	Clark type polarographic oxygen sensor
<b>Electrode Output:</b>	1 μA at 21% O <sub>2</sub>
<b>Residual current:</b>	Typically 0.02 μA in 0% O <sub>2</sub>
<b>Response Time:</b>	10 - 90% typically < 5s
<b>Oxygen Consumption:</b>	Typically < 0.015 μmol hr <sup>-1</sup>

### LH36/2R LED Light Source

<b>Lamp Type:</b>	36 x red LED (650 nm peak)
<b>Power Supply:</b>	Powered by Oxylab oxygen electrode control unit
<b>Intensity Adjustment:</b>	Automatic intensity control via Oxylab oxygen electrode control unit & software
<b>Dimensions:</b>	74 mm (dia) x 52 mm (h). Weight: 270g
<b>Max. Intensity:</b>	900 μmol m <sup>-2</sup> s <sup>-1</sup> in DW3

### QRT1 PAR/Temperature Sensor

<b>Measuring Range:</b>	0 - 50000 μmol m <sup>-2</sup> s <sup>-1</sup> (+/- 5%) in 2 ranges (0 - 5000 and 0 - 50000) in 400 - 700nm band
<b>Resolution:</b>	1 μmol m <sup>-2</sup> s <sup>-1</sup> at 0 - 5000, 10 μmol m <sup>-2</sup> s <sup>-1</sup> at 5001 - 50000
<b>PAR Sensor:</b>	Silicon photodiode/optical filter combination with white acetel diffuser (7mm dia)
<b>Temperature Sensor:</b>	RT curve matched bead type thermistor. 0 - 50°C/32 - 122°F. 0.02°C resolution
<b>Signal Display:</b>	Handheld display unit. 16 x 2 LCD display. 0 - 5V analogue output of PAR/ temperature values
<b>Power Requirement:</b>	4 x 1.5V AA (LR6) cells. Typically 100 hours battery life
<b>Dimensions Display:</b>	146 (h) x 92 (w) x 32mm (d).
<b>Weight:</b>	300g (including batteries).
<b>QTP1 probe:</b>	9.5 (dia.) x 107mm (length).
<b>Weight:</b>	50g

**Hansatech**  
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