

Chloroview 1

Entry-level system for the study of photosynthesis & respiration



Hansatech
Instruments



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- > Convenient, entry-level system for the study of photosynthesis & respiration measurements in liquid-phase samples under illumination
- > Clear cast acrylic DW1 oxygen electrode unit with integral S1 electrode disc sensor
- > Oxygen electrode control & signal acquisition via Oxyview control unit
- > Oxygen signal output from Oxyview to recording device via 0 – 5V analogue output
- > Illumination via LS2 high-intensity tungsten-halogen white light source
- > LS2 intensity adjustable by insertion of neutral density filters
- > Quantitherm light/temperature sensor for light source calibration

Oxyview control unit

The OXYV1 Oxyview control unit has been designed as a convenient, low cost oxygen electrode control unit for teaching studies of photosynthesis and cellular respiration using the oxygen electrode measurement technique.

The Oxyview control unit is fully compatible with the range of oxygen electrode chambers produced by Hansatech Instruments thus allowing a wide range of different assays to be performed in both liquid and gas-phases.

The Oxyview is configured and controlled via a front mounted control panel featuring 4 touch-sensitive buttons. Configuration is achieved by navigating through a series of simple menu screens and following the displayed guidelines for each step of the setup process. These configuration steps include setting of the stirrer speed (for liquid-phase measurements) and back-off and gain settings. Once configured, the Oxyview control unit provides an accurate and stable reading of the oxygen content of the sample in question.

The Oxyview control unit has an integral magnetic stirrer for liquid-phase applications allowing the overall footprint of the Oxyview 1 system to be minimal (90 x 135mm); convenient when multiple setups are required for teaching programmes in limited space.

The Oxyview control unit is powered by a 12V DC wall cube which connects directly to the rear of the unit. Also at the rear is a 0 – 5V analogue output. This allows the measured values from the control unit to be logged to an external recording device such as a chart recorder or similar datalogger accepting a 0 – 5V analogue input.

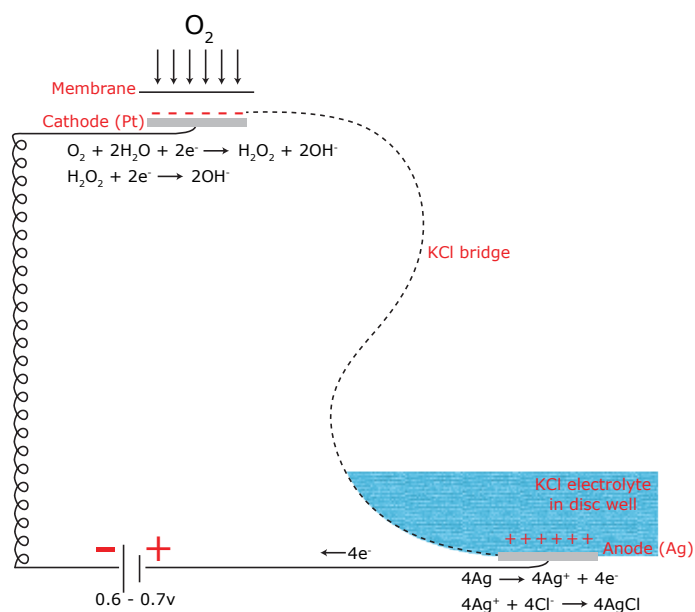


Oxygen electrode disc

Since its original design in the early 1970's by Tom Delieu and David Walker, the S1 Clark-Type Oxygen Electrode disc remains largely unchanged – a true testament to the quality and reliability of the sensor. The S1 consists of a platinum cathode and silver anode set into an epoxy resin disc and is prepared for use by trapping a layer of 50% saturated KCl solution beneath an oxygen permeable PTFE membrane. A paper spacer placed beneath the membrane acts as a wick to provide a uniform layer of electrolyte between anode and cathode.

When a small voltage is applied across these electrodes (with the platinum negative with respect to the silver), the current which flows is at first negligible and the platinum becomes polarised (i.e. it adopts the externally applied potential). As this potential is increased to 700 mV, oxygen is reduced at the platinum surface, initially to hydrogen peroxide H_2O_2 so that the polarity tends to discharge as electrons are donated to oxygen (which acts as an electron acceptor). The current which then flows is stoichiometrically related to the oxygen consumed at the cathode.

When connected to Oxyview, the S1 provides a fast, effective and accurate method of detecting small changes in oxygen tension in a liquid-phase sample.





DW1 electrode chamber

A component that has proved itself time and again over 4 decades, the DW1 electrode chamber offers quality and versatility in measurements of dissolved oxygen. Developed in conjunction with the great Prof. David Walker, the DW1 provides a highly flexible solution for a wide range of applications covering both teaching and research in plant and biomedical science.

The reaction vessel of the DW1 is constructed from precision bore borosilicate glass tube with a prepared S1 electrode disc forming the floor of the vessel. Precision temperature control of sample and sensor is delivered via a concentric water jacket with suitable connection ports for a thermoregulated circulating water bath.

DW1 is fitted with an adjustable plunger with a stoppered central bore. The height of the plunger may be adjusted easily to suit liquid-phase sample volumes of between 0.2 - 2.5ml whilst the central bore easily accommodates Hamilton type syringes allowing additions/subtractions to/from the reaction vessel during an experiment.

The clear acrylic construction allows high sample visibility and uniform sample illumination using external light sources where necessary.



LS2 white light source

The LS2 light source is a high-intensity (100W) tungsten-halogen light source which is powered from a stabilised power supply.

The lamp housing contains a cooling fan, infrared reducing "Hot-Mirror" and optics to provide light with minimum variation of intensity across the beam and little divergence from parallel. 2 slots are provided to accept 50mm square optical filters or a manual shutter plate.

A range of light intensity steps may be achieved by adding permutations of the 4 A5 neutral density filters supplied (0.1, 0.3, 0.6 and 1.0 O.D.) to attenuate the light intensity. Maximum sample illumination intensities vary depending on the type of electrode chamber in use.

When used with the DW1 electrode chamber the LS2 can achieve a maximum intensity of $1800 \mu\text{mol m}^{-2} \text{s}^{-1}$ when mounted horizontally with respect to the electrode chamber.





Quantitherm PAR/temperature sensor

The QRT1 consists of a handheld display unit combined with the QTP1+ probe sensor. For use as a calibration tool for the LS2 light source, the QTP1+ probe connects directly to the control unit allowing real-time measurement of light intensity via the built in screen. The light intensity of the LS2 Light source can then be adjusted using the neutral density filters provided.

The QRT1 quantum sensor provides a displayed resolution of $1 \mu\text{mol m}^{-2} \text{s}^{-1}$ throughout the 0 to 5,000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ range and up to a maximum of 50,000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ with a displayed resolution of 10 $\mu\text{mol m}^{-2} \text{s}^{-1}$.

System components

Chloroview 1 systems are supplied with the following components:

- > OXYV1+: Oxyview electrode control unit
- > DW1: Electrode chamber
- > LS2 : High-intensity white light source
- > QRT1: Quantitherm PAR/temperature sensor
- > S1: Oxygen electrode disc and SMB-SMB connection cable
- > A5: Neutral density filter set
- > A2: Membrane applicator to assist with smooth application of electrode membrane
- > A3: Top plate key and alignment jig to dismantle and reassemble DW1 for cleaning
- > S2/P: Pack of 5 magnetic followers
- > S3: Pack of 2 replacement borosilicate glass reaction vessels
- > S4: Reel of PTFE membrane (0.0125mm x 25mm x 33m)
- > S7A: Set of replacement o-rings for DW1
- > S16: Cleaning kit for the S1 electrode disc.



Technical specifications

Oxyview 1 electrode control unit

Measuring range:	Oxygen: 0 - 100%
Signal inputs:	Oxygen electrode (SMB)
Resolution:	10×10^{-6} $\mu\text{mol/ml}$ at 20 °C
Polarising voltage:	Selectable between 0.4 - 0.9V (0.7V recommended default)
Gain:	Coarse: x1, x2, x5, x10, x20, x50, x100. Fine: 1mV steps
Back off:	Signal back off in 1mV steps
Analogue output:	0 - 5V electrode signal
Dimensions (HWD):	90 x 135 x 85mm
Weight:	320g
Power:	95 - 260V universal input mains supply. Output 12V DC 2.5A

DW1 electrode chamber

Suitability:	Liquid-phase respiration/ photosynthesis
Construction:	Clear cast acrylic
Sample chamber:	Precision bore, borosilicate glass tube
Sample volume:	0.2 - 2.5ml
Temperature control:	Water jacket connected to thermoregulated circulating water bath
Dimensions (DH):	65 x 105mm
Weight:	100g
Plunger:	Variable height plunger assembly with central bore for sample additions

S1 oxygen electrode disc

Electrode type:	Clark type polarographic sensor
Electrode output:	Typically 1.6 μA at 21% O_2
Residual current:	Typically 0.04 μA in 0% O_2

Response time:	10 - 90% typically < 5 seconds
Oxygen consumption:	Typically <0.015 $\mu\text{mol/hr}^{-1}$

LS2 light source

Lamp Type:	100W tungsten-halogen (50W available on request)
Power Supply:	Mains, stabilised power supply. 12V DC 10A. 120/240V 60/60Hz
Intensity Adjustment:	Via combinations of 4 neutral density filters (supplied)
Max Intensity in DW1:	1800 $\mu\text{mol m}^{-2} \text{s}^{-1}$
Dimensions:	Light housing: 145 x 65 x 75mm. Weight 1.0kg Power supply: 86 x 150 x 140mm. Weight 1.4kg

QRT1 PAR/temperature sensor

Measuring range:	0 - 50000 $\mu\text{mol m}^{-2} \text{s}^{-1}$ (+/- 5%) in 2 ranges (0 - 5000 & 0 - 50000) in 400 - 700nm band
Resolution:	1 $\mu\text{mol m}^{-2} \text{s}^{-1}$ at 0 - 5000 10 $\mu\text{mol m}^{-2} \text{s}^{-1}$ at 5001 - 50000
PAR sensor:	Silicon photodiode & optical filter with white acetal diffuser
Temperature sensor:	RT curve matched bead thermistor. 0 - 50°C/32 - 122°F (0.02°C resolution)
Signal display:	Handheld display unit. 16 x 2 LCD display. 0 - 5V analogue output of PAR/ temperature values
Power requirements:	4 x 1.5V AA (LR6) cells Typically 100 hours battery life
Dimensions (display):	146 x 92 x 32mm - 300g
Dimensions (QTP1):	9.5 x 107mm - 50g



Hansatech Instruments is a British company that has been developing high quality scientific instrumentation for over 40 years. Our systems are used widely for teaching & research in cellular respiration & photosynthesis programs in more than 100 countries throughout the world. We have gained an enviable reputation for quality, reliability & excellent price/performance.



Our product range consists of a range of modular solutions for the measurement of oxygen using Clark type polarographic sensors. We also develop chlorophyll fluorescence measurement systems using both continuous excitation & pulse-modulated measurement techniques with further optical instrumentation for the measurement of sample chlorophyll content.



Purchasers of Hansatech Instruments products can be assured of ongoing support & prompt & efficient attention to enquiries at all times. Support is available both directly & from our global distributor network. Customers are encouraged to register their instruments on our website which allows access to our Support Ticketing System in addition to instruments manuals & software upgrades.

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