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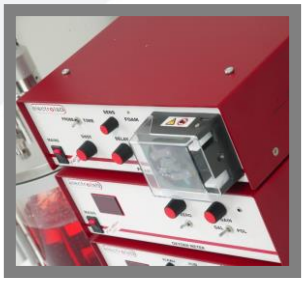
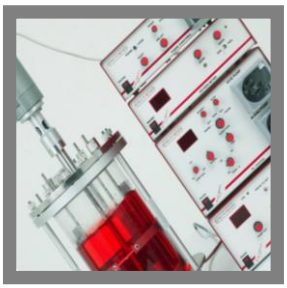
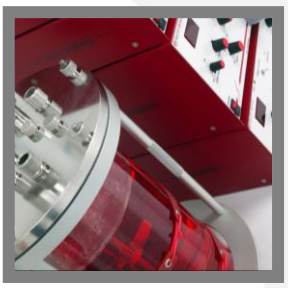
The FerMac 200 Series – Flexible enough to grow with you

Operating Instructions FerMac 200 Series







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Health & Safety

As manufacturers of scientific equipment, Electrolab Biotech Ltd is obliged under the terms of the Health & Safety at Work Act 1974 (applicable to the UK) to provide users with instructions on the safe installation, operation and maintenance of our equipment.

Our equipment is designed to accepted standards and does not entail any special hazard if used in accordance with the instructions provided.

The following safety precautions should be observed by all personnel using this equipment.

General

1. Read and understand this manual. If in any doubt contact:-

Electrolab Biotech Limited
E2, Northway Trading Estate
Tewkesbury,
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Web: www.electrolabtech.co.uk

2. Laboratory equipment is complex and is intended to be used only by suitably qualified and trained personnel.

3. A risk assessment should be carried out by a suitably qualified member of staff before working with this equipment.

4. Observe good housekeeping practices at all times. Keep the equipment and adjacent areas clean, dry and uncluttered.

5. Take sensible precautions. Wear the correct protective clothing when handling liquids, gases or mechanical items.

6. Vessels and other moveable parts may be heavy. Take care when lifting.

7. Should any malfunctions occur or be suspected, immediately call a qualified service engineer or supervisor to investigate.

8. No information contained in this manual suggests unsafe use, nor is it designed to encourage unsafe practices.

Electrical Hazards

1. Do not remove any covers. There are voltages in excess of 24 volts AC behind the covers. There are no operable controls other than those referred to in this manual.

2. An electrical safety check should be carried out annually.

Mechanical Hazards

1. Take extra care when using peristaltic pumps:-

   a) **Always** ensure the pump switch is in the OFF position before loading tubing.
   b) **Never** put fingers into the pump even when switched off.
   c) **Always** ensure the clear plastic cover of the pump is in place and closed when the pump is in use.

2. Beware of the rotating agitation (stirrer) shaft:-

   a) **Never** run the agitator (stirrer) without a vessel in place.
   b) **Never** run the agitator (stirrer) without the shaft safety shield in place. Even with the safety shield in place, it may be possible to touch the shaft - take care!

Pressure

The glass vessel supplied with Electrolab bioreactors is **not** a pressure vessel and should **never** be pressurised. **Always** ensure the exit to the vessel is clear.

Gases into the vessel should be regulated at a pressure of up to 0.5 BAR.

Heat

1. When in use, beware the external side of the heater; it will get hot in use.

2. The agitation motor can get hot, particularly when operated at speeds over 800rpm for an extended period. **Always** use thermal gloves when removing the motor.

3. Take great care when handling the vessel during the autoclaving process. After autoclaving, ensure the vessel has not been damaged by the autoclaving process before handling. **Always** use a trolley to transport the vessel. **Always** support the vessel properly, using 2 hands either side of the headplate when lifting the vessel. **Never** lift the vessel by the driveshaft!

Glass

1. Extra care should always be taken when handling glassware.

2. **Never** pressurise any glassware. The glass vessel supplied with Electrolab bioreactors is not a pressure vesel - **do not** pressurise.

3. **Never** use glassware which has scores, chips, hairline cracks or is damaged in any other way.

4. Examine your glassware on a regular basis to ensure that there are no chips, cracks or other damage which may have gone unnoticed.

5. **Never** lift the vessel by the driveshaft!

WARNING!

THIS EQUIPMENT SHOULD ONLY BE USED AS SPECIFIED IN THIS OPERATING MANUAL

IF OPERATED IN A MANNER NOT SPECIFIED, THE PROTECTION PROVIDED MAY BE IMPAIRED

NEVER TAKE CHANCES WITH SAFETY!
IF IN DOUBT, ALWAYS ASK!

Declaration of Conformity

This is to certify that the following Electrolab units:-

FerMac 231 Agitation & Temperature Control Module
FerMac 240 Temperature Control Module
FerMac 251 Oxygen Control Module
FerMac 260 pH Control Module
FerMac 280 Anti-Foam Module

Comply with **Electromagnetic Compatibility Directive** 2004/108/EC and **Low Voltage Directive** 2006/95/EC and that:-

FerMac 231 Agitation & Temperature Control Module

also complies with **Machinery Directive** 98/37/EC

The units are built and designed to generally comply with European Standard EN61010.

CE

J. PLINT, Director
For and on behalf of **Electrolab Biotech Ltd**

Warranty

All equipment manufactured by ELECTROLAB BIOTECH LIMITED of Unit E2, Northway Trading Estate, Tewkesbury, Gloucestershire GL20 8JH, UK carries a full **12 Months Warranty** from date of delivery.

During this period:-

- all faulty or worn parts will be supplied and fitted free of charge
- all faults will be repaired free of charge

Wherever possible, the equipment should be returned to our workshop for repair. Where this is not possible, an engineer will visit, but we reserve the right to charge for travelling should no fault be found.

Our Warranty **excludes:-**

- accidental damage
- damage caused through misuse
- glassware
- electrodes *(which are normally covered by the manufacturer's guarantee)*

HOW TO CONTACT US

By Post: Electrolab Biotech Limited
Unit E2
Northway Trading Estate
Tewkesbury
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By Telephone: +44 1684 291007

By Fax: +44 1684 291006

By Email: *Sales & Service* sales@electrolabtech.co.uk

Service Enquiries
When contacting us for service, please endeavour to provide the **Model** and **Serial Number** of your equipment. This is shown on the Serial Number label affixed to the rear of the equipment.

When ordering **parts**, if possible please use the appropriate Electrolab part number. If this is not available, emailing a photograph of the part required will enable us to identify it and deal with the enquiry.

SERVICE CONTRACT

Your Electrolab FerMac equipment comes with a full warranty – covering all parts and labour (excluding accidental damage etc) for 12 months.

For your peace of mind, we can offer you a fully inclusive Service Contract which will ensure your equipment remains in tip-top condition, minimising any possible down-time in your laboratory.

The package includes:-

- **All parts***
- **Labour**
- **Preventative Maintenance Visit**
- **Written report & certificate of conformity**

If you would like further information, contact our sales department:-

Tel: 01684 291007
Fax: 01684 291006
Email: sales@electrolabtech.co.uk

**Excludes electrodes and accidental damage.*

PRE-INSTALLATION REQUIREMENTS

The Electrolab FerMac 200 fermenter is easy to install and requires very few special services.

However, because the fermenter is left unattended for long periods of time, it is essential that all piped supplies are pressure and leak proof.

Site

The siting of the fermenter is not critical. Ideally, it should be in a room with a moderate temperature of 10-30°C with low humidity. The unit should be sited away from sources of high electro-magnetic radiation.

Bench Space

Although the FerMac 200 is a compact unit, to allow adequate workspace and room for vessels, bottles etc., we recommend space is allocated as follows:-

Width of clear bench space	:	1000mm (39”)
Minimum depth	:	500mm (20”)

The FerMac 200 will require a sturdy bench.

Electrical Services

The FerMac 200 Modular system has interconnecting electric power cables between each module. It will run from a single phase domestic type supply outlet of 10 amp 230 volt capacity.

Air Services

As a guide, the air requirement can be taken as 2 x vessel working volume (eg 5 litre vessel = 10 litres/min). Air should be clean, oil-free and filtered. For safety reasons it is essential that the air is pressure regulated (*See Table 1).* Electrolab can supply a pressure regulator kit if required.

Table 1

Air Requirements	
Regulated Pressure	0.5 BAR
Air Volume	2 x vessel volume

! ***Warning!***
The glass vessel is not a pressure vessel and should never be pressurised. Always ensure that the exit to the vessel is clear and that gases into the vessel are regulated at a pressure of up to 0.5BAR.

Air is supplied to the Service Plate *(See Section 3 of the Instruction Manual)* using the 6mm OD black flexible tubing (Part No. 1207) which is provided.

For the service end of the air supply, we provide a shut-off tap to take the 6mm OD black flexible tubing and a ¼" BSP (NPT) thread. You will need to connect this to your air supply.

It should be possible to obtain adapters for these connections to suit your existing pipework from your local merchant.

Cooling Water Services

Cooling water should be clean and, ideally, a water filter should be fitted. Water flow is low – only 1 litre per minute – and water temperature is dependent on customer application *(See Table 2).*

Table 2

Water Requirements	
Water Pressure	Max 4 BAR, Min 1 BAR
Water Flow	1 litre per minute, typically
Water Temperature	Dependent on application:- *Cooling* - at least 5°C below the lowest temperature at which the fermenter will be run. *Condenser* - at least 20°C below the running temperature of the vessel.

All connections must be able to take full mains water pressure.

Cooling water is provided to the Service Plate *(See Section 3 of the Instruction Manual)* using 6mm OD black flexible tubing (Part No. 1207) which is provided.

For the service end of the water, we provide a shut-off tap to take the 6mm OD black flexible tubing and a ¼" BSP (NPT) thread. You will need to connect this to your water supply.

It should be possible to obtain adapters for these connections to suit your existing pipework from your local merchant.

If a chilled water supply is required, Electrolab can supply a chiller unit capable of running up to 4 fermenters.

Drain

Because the drain is a closed system, the drain tube does not rely on gravity and can be run over doors, ceilings etc.

The drain is taken from the Service Plate *(See Section 3 of the Instruction Manual)* and uses 6mm OD black flexible tubing (Part No. 1207) which is provided.

The outlet end of the tubing should be placed in a suitable drain or sink. Ensure that it is tied in place so that it cannot work loose or come out of the drain.

FERMAC 200 MODULAR FERMENTATION SYSTEM

OVERVIEW

The FerMac 200 is designed as a modular system. If more than one module is purchased, mounting pillars are supplied which enable the modules to be stacked firmly and neatly together. Inter-connecting power cables are also supplied so that only one electrical supply connection is required.

There are several modules available for the FerMac 200 Series:-

- The FerMac 231 Agitation & Temperature Control Module
- The FerMac 251 Oxygen Controller Module
- The FerMac 260 pH Measurement & Control Module
- The FerMac 280 Foam/Feed Pump Module

MODULE STACKING

! Warning

*When stacking the units together, the FerMac 231 Agitation & Temperature Control Module must **always** be the bottom module as it is the heaviest and has the highest power rating.*

1. Check the voltage selector switch on the base of each module (*Figure 1)* to ensure that it is set to the correct voltage for your geographical area.

Figure 1

2. Identify the mounting pillars *(Figure 2)*.

3. Remove the screws in the top of the module and replace with the mounting pillars. *(Figure 3)*.

Figure 2

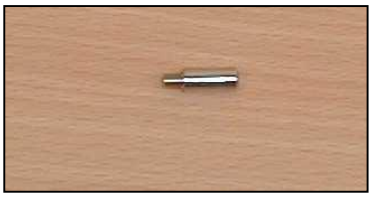


Figure 3

4. Identify the rubber grommets on the base of the module *(Figure 4)*.

5. Line up the modules so that the mounting pillars slot into the grommets. *(Figure 5)*.

Figure 4

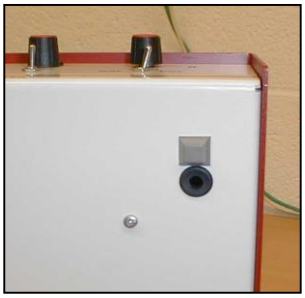


Figure 5

Warning : Risk of electric shock.
Never push anything into the grommet holes in the base of the module. Only use the mounting pillars provided to connect modules together.

CONNECTIONS

Electrical Power Supply

1. Plug the main electrical power supply cable into the inlet (lower) socket at the rear of the bottom module which should always be the FerMac 231 Agitation & Temperature Control module as it has the highest power rating. *(Figure 6)*.

Figure 6

2. Identify the inter-connecting cable *(Figure 7)* and plug into the outlet (upper) socket of the bottom module *(Figure 8).*

Figure 7

Figure 8

3. Use further inter-connecting cables to link all the modules in the stack to the main electrical power supply *(Figure 9).*

Figure 9

Warning

The main inlet/outlet socket system should only be used for equipment specifically designed for our modular system. Other equipment should not plugged into this socket as it has a maximum capacity of only 6.3 amps.

Other Connections

Each module has its own specific connections (for electrodes, heater, motor etc) clearly labelled at the rear. For further details, please refer to the instructions for the relevant module.

FERMAC 200 VESSEL

OVERVIEW

The FerMac 200 Vessel is normally supplied assembled and consists of the frame, glassware and stainless steel top plate.

The vessel top plate has two port sizes : 6.3mm and 12mm. To avoid contact with the impellers, longer accessories which extend to the bottom of the glassware should be located in ports toward the outer edge of the top plate. *(See Suggested Top Plate Layouts Pages 2.7 to 2.9).*

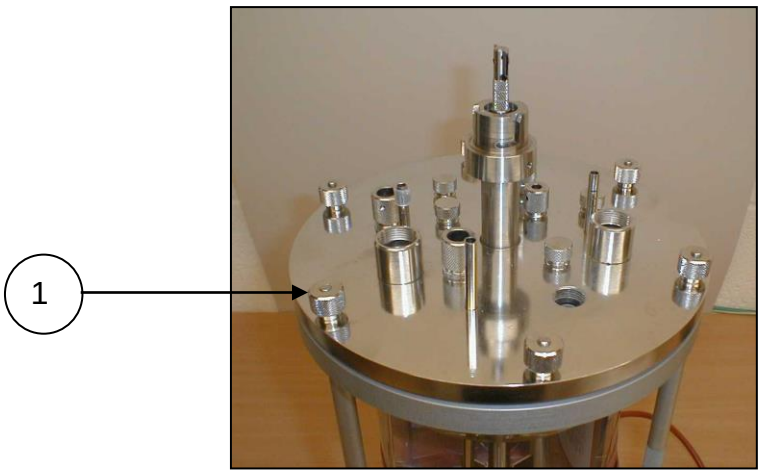
Extending through the top plate is the agitation drive shaft to which the motor is attached *(See Page 2.5)*.

! ***Warning!***
The glass vessel is not a pressure vessel and should never be pressurised.

DISASSEMBLING THE VESSEL

1. Unscrew and remove the 6 thumb nuts which secure the top plate to the vessel *(Figure 1.1).*

Figure 1



2. Remove the top plate from the glassware *(Figure 2).*

! ***Warning***
Never use the agitator drive shaft (Figure 1.2) to lift or carry the top plate. Always lift or carry by the top plate itself.

3. Lift the glassware from the aluminium frame *(Figure 3).*

Figure 2

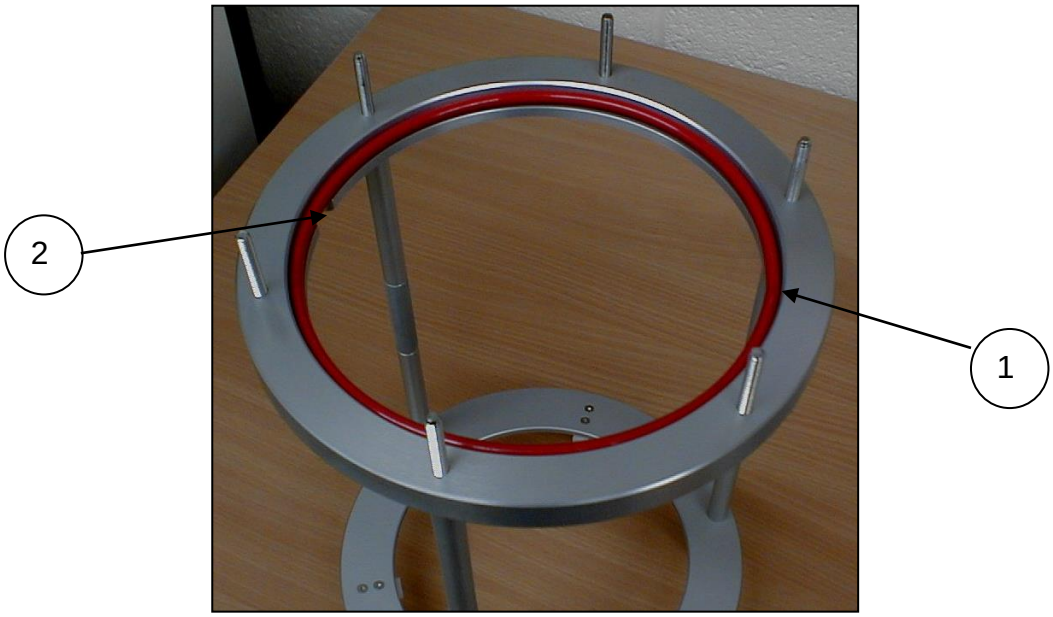
Figure 3

3. If required, the split ring in the top of the frame can be removed.

PREPARING THE VESSEL FOR USE

1. Ensure the split ring is located in the top of the frame so that the split in the ring *(Figure 4.1)* is on the opposite side of the frame to the frame cut-out *(Figure 4.2).*

Figure 4

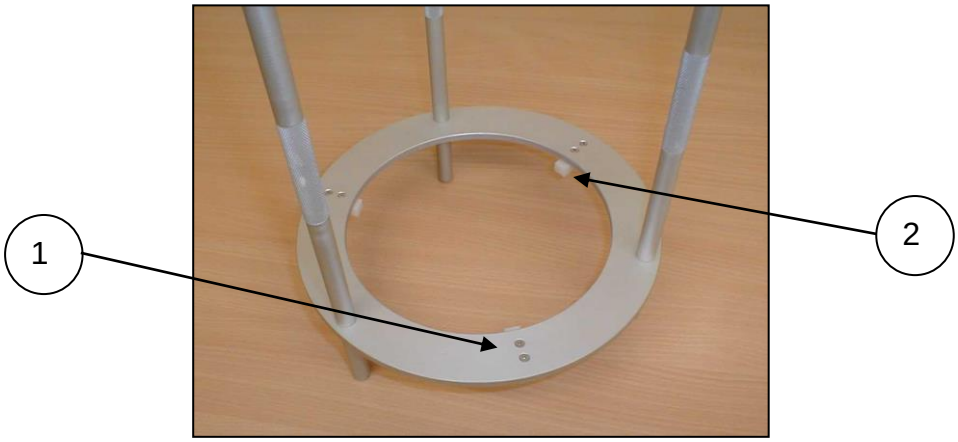


2. Place the glassware in the frame. The flange at the neck will automatically centralise it and it should protrude above the frame by 2-5mm *(Figure 5)*.

Figure 5

3. If necessary, unscrew the fixing screws in the base of the frame *(Figure 6.1)* and adjust the 3 nylon blocks *(Figure 6.2)* so that they just touch the glassware in order to stabilise it within the frame.

Figure 6



4. Lightly grease the top of the glassware and the O ring on the underside of the top plate with silicone grease.

5. Fit the top plate onto the vessel and screw down the 6 thumb nuts. Only moderate hand pressure is required in order to seal the top plate O ring.

6. Instal the accessories required into the top plate and ensure that:-

   a) All O rings are in place, and
   b) All O rings and port screw threads are lightly greased.

   Seal the O rings by tightening the port screw.

! ***Note***
Only minimum finger pressure is required.

Most of the accessories can be adjusted for height as follows:-

a) Loosen the port screw and the grub screw in its side.
b) Raise the accessory to the desired height.
c) Tighten the grub screw in the side of the port screw which will lock the accessory into position.
d) Re-tighten the port screw onto the top plate.

! ***Notes***

1. *The locking grub screw should <u>never</u> be used on the foam probe (See Section 7)*
2. *All electrodes have their own special fittings.*

Suggested top plate layouts are shown at the rear of this section *(Pages 2.7 to 2.9)*.

ATTACHING THE MOTOR

Warning
Ensure agitation control on the FerMac 360R is switched off before attaching or detaching the motor.

The agitation motor can get very hot particularly at speeds in excess of 800rpm. Always use thermal gloves when removing the motor.

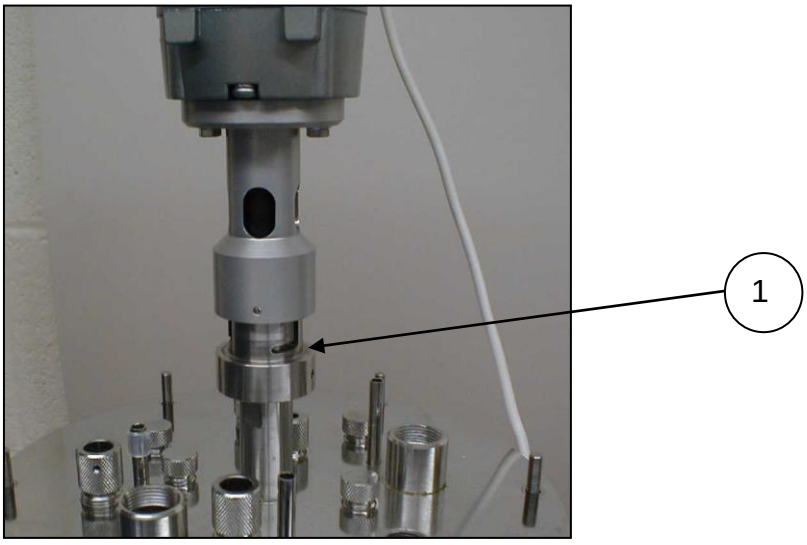
1. Line up the motor coupling *(Figure 7 - shown for clarity with cover removed)* with the drive plate *(Figure 8)* of the agitation drive shaft.

Figure 7

Figure 8

2. Lower the motor onto the drive shaft and rotate slowly until the pins are aligned with the slots in the bearing housing. The motor will drop into place. *(Figure 9.1).*

Figure 9



3. Rotate the motor clockwise to lock the motor in place.

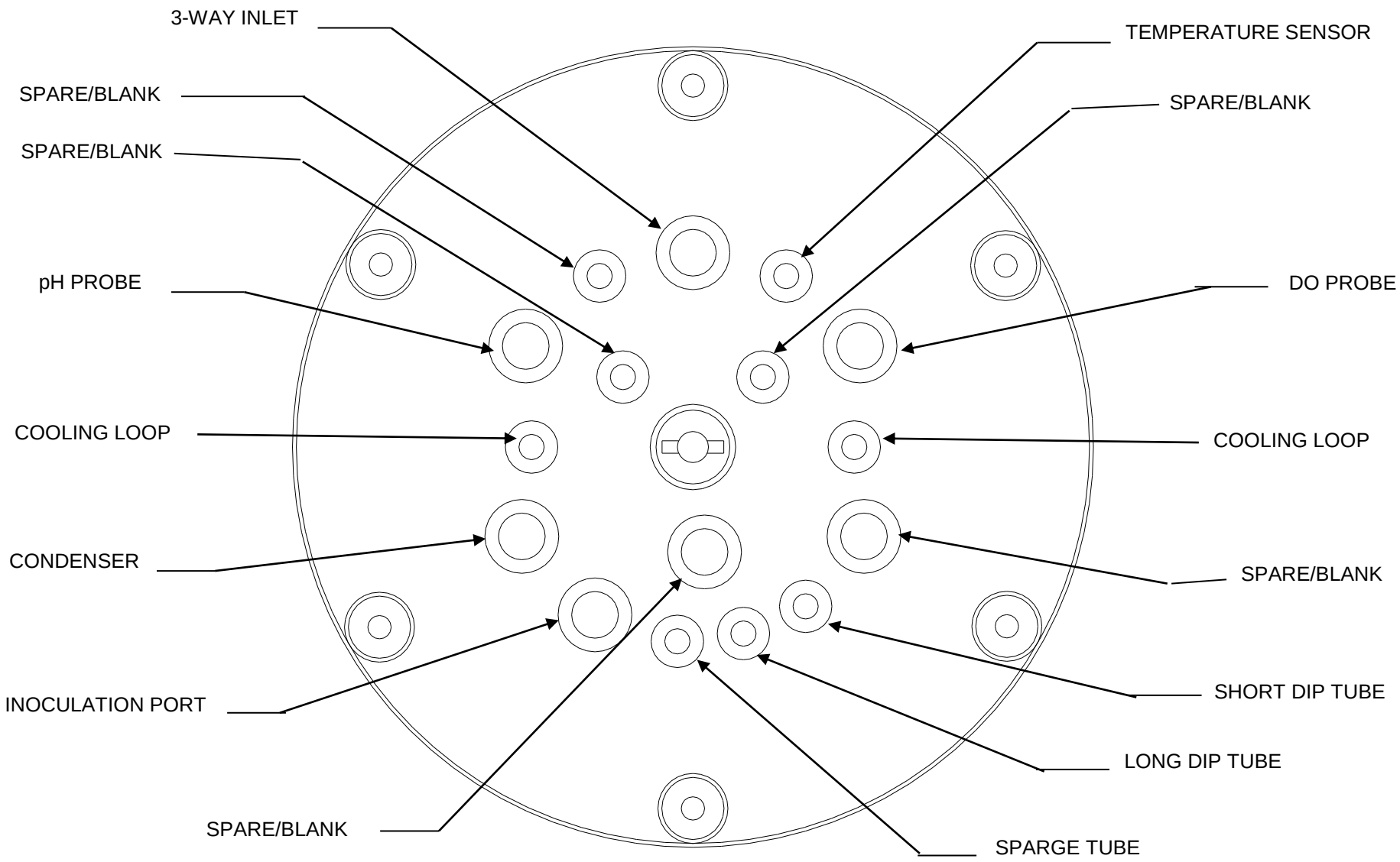
REMOVING THE MOTOR

1. Rotate the motor anti-clockwise to release from the slots in the bearing housing and lift off.

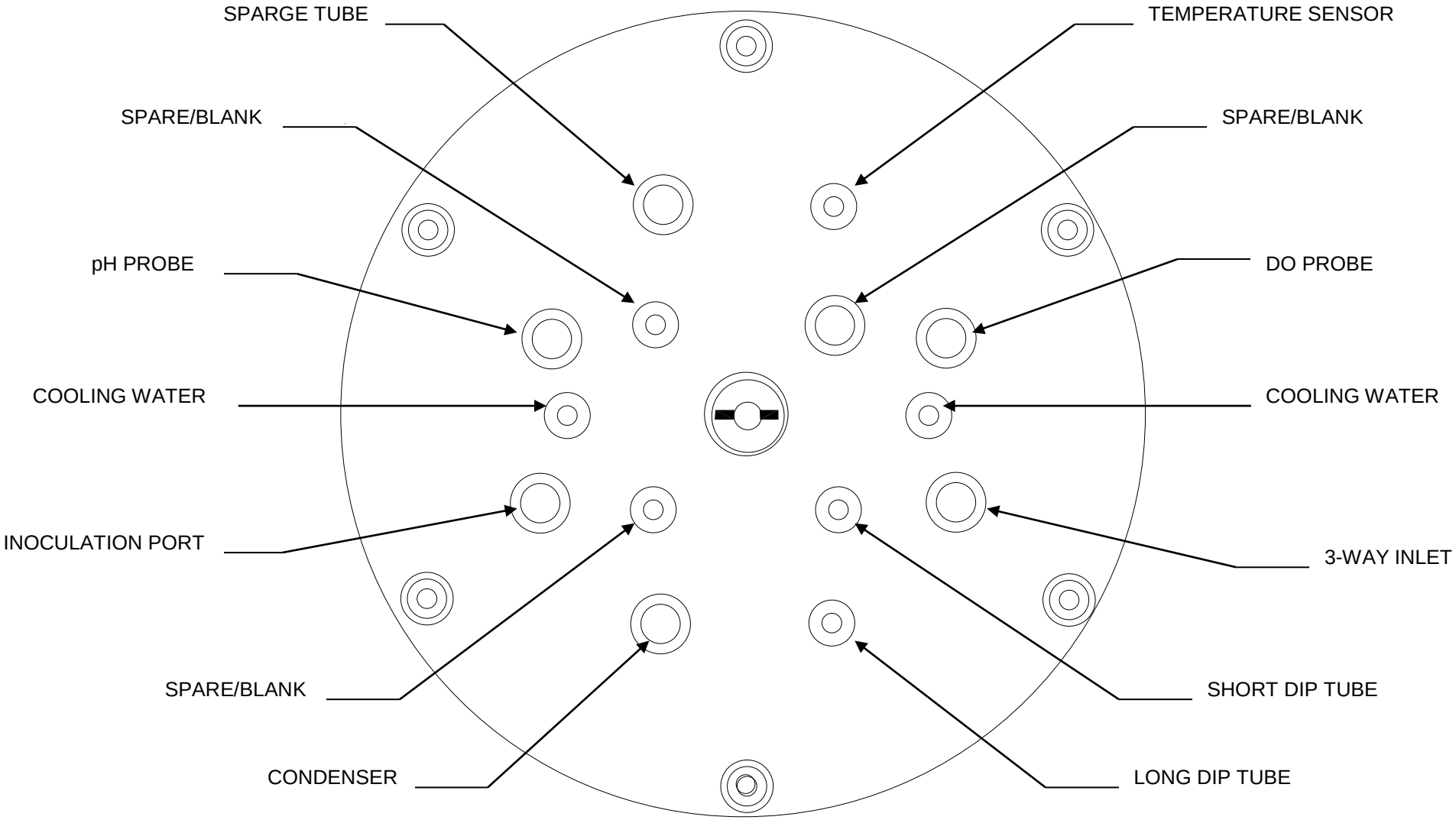
2. When placing on a bench, the motor should rest on its 3 small feet to prevent rolling *(Figure 10).*

Figure 10

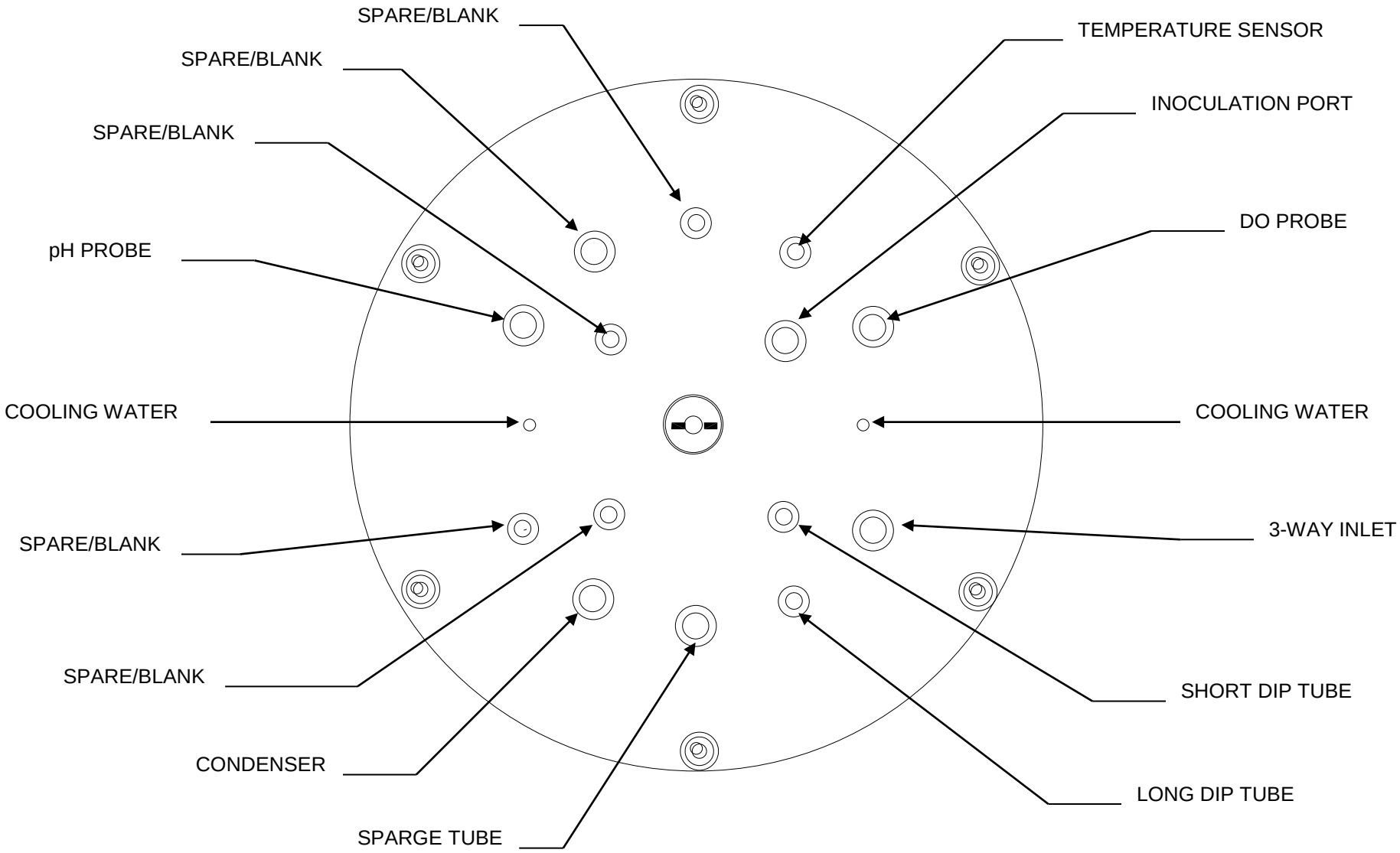
Suggested Top Plate Layout for 2 Litre Vessel



Suggested Top Plate Layout for 5 Litre Vessel



Suggested Top Plate Layout for 10 Litre Vessel



STERILISATION OF THE FERMAC 200 VESSEL VIA AUTOCLAVING

OVERVIEW

Normally, autoclavable vessels are sterilised along with their feed bottles, sampling device, tubing etc.

The autoclaving time varies dependent upon your autoclave and the size of vessel, media etc. Typically a temperature of 121°C will be needed for 20 minutes to sterilise the vessel. It is recommended that the vessel is removed from the autoclave whilst still hot.

It is important to ensure that the vessel is ventilated to prevent a build-up of pressure or vacuum during the autoclaving period. This is accomplished by leaving the condenser exit from the vessel open or plugged only with cotton wool. Similarly, feed bottles should have their caps left loose to allow equalisation of pressure or vacuum.

The exact method for preparing a vessel for autoclaving will vary dependent on application and particular laboratory procedures/circumstances. The following is a suggested procedure which can be adapted to suit individual situations.

SUGGESTED PROCEDURE

1. Wash out and clean the glassware, top plate and accessories.

2. Lightly grease the top surface of the glassware and the O rings.

3. Remove the Pt100 temperature sensor from the thermowell. The Pt100 temperature sensor and its cable are **NOT** autoclavable. Plug the thermowell with cotton wool and cover with aluminium foil. *(See Page 4.4 for further details).*

4. Remove the wrap-around heater from the vessel. The heater and its cable are **NOT** autoclavable.

5. For most applications, the media is added to the vessel so that it is autoclaved with the vessel. However, if it is intended to autoclave the vessel empty, a small amount of water (approximately 10mm) should be left in the bottom of the vessel to generate steam and keep the electrodes moist.

6. Disconnect the flow and return of the Cooling Water at the Service Plate. Allow any water to drain out of the tubing and neatly curl the tube onto the top plate. *(See Page 3.4 for further details).*

7. Disconnect the cable from the pH electrode. This cable is **NOT** autoclavable. Fit the sealing cap provided with the pH electrode and cover with aluminium foil. *(See Page 5.8 for further details).*

8. Disconnect the cable from the DO electrode. This cable is **NOT** autoclavable. Fit the sealing cap provided with the DO electrode and cover with aluminium foil. *(See Page 6.5 for further details).*

9. Cover the stirrer shaft with aluminium foil.

10. The Air Inlet Filter and tubing should be left connected to the vessel for autoclaving but the tubing between the Vessel Sparge Tube and the Air Inlet Filter should be securely clamped with the white thumb clamp provided. The free end of the Air Inlet Filter should be plugged with cotton wool and covered with aluminium foil. *(See Page 3.2 for further details).*

11. If an Exit Gas Filter is being used, cover this with aluminium foil. If an Exit Gas filter is *not* being used, plug the outlet of the condenser loosely with non-absorbent cotton wool and cover with aluminium foil.

12. The Sample Device is normally autoclaved along with the vessel and the tubing should be clamped off close to the vessel.

13. Normally, feed bottles for acid, base, anti-foam etc., are autoclaved with the vessel. They can, however, be autoclaved separately and then connected to the vessel using sterile techniques.

14. After autoclaving, remove the aluminium foil wrapping from the pH electrode, DO electrode and stirrer shaft to allow any condensation to evaporate.

FERMAC 200
SERVICE PLATE

OVERVIEW

The Service Plate is normally supplied with the FerMac 200 Vessel. It controls the supply of air and cooling water to the vessel.

The Service Plate has two types of connections:-

a) Push-in connection for Air *(Figure 1).* To connect, simply push the white connector on the tubing into the socket. To disconnect, depress the silver lever on the socket and gently pull the tubing from the socket *(Figure 2)*.

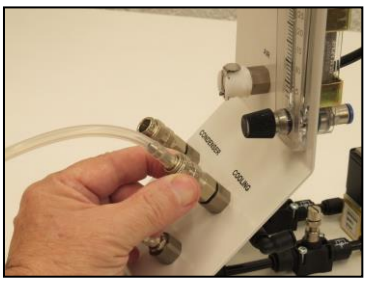
Figure 1

Figure 2

b) Metal quick dis-connects for Water. There are two sizes to ensure that the flow and return cannot be reversed. To connect, push the connector on the end of the tubing onto the receptor until it clicks into position *(Figure 3)*. To disconnect, push back the knurled locking ring *(Figure 4)* and the connector will spring apart.

Figure 3

Figure 4



The quick dis-connect receptors on the service plate automatically close off the water when they are disconnected.

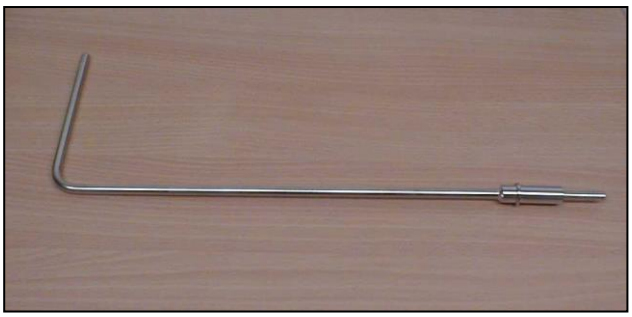
When connecting or disconnecting the cooling water or condenser, to avoid spillage it is best to connect the flow and return simultaneously. If possible, we would recommend that the water supply is turned off.

ASSEMBLY & CONNECTIONS

Air Sparging

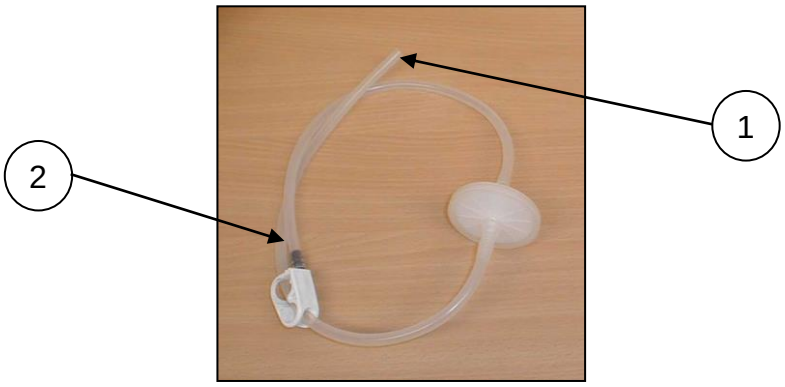
1. Identify the air sparge tube (normally ready fitted in the vessel). The exact size and shape of sparge tube varies with vessel type – a typical tube is shown below *(Figure 5).*

Figure 5



2. Identify the air inlet filter with tubing and clamp and attach the tubing *(Figure 6.1)* to the air sparge tube.

Figure 6



3. Insert the white connector *(Figure 6.2)* onto the socket on the Service Plate labelled AIR *(Figure 7).*

4. Connect your air supply to the blue connector *(Figure 8.1)* at the rear of the Service Plate using the 6mm black tubing supplied.

Figure 7

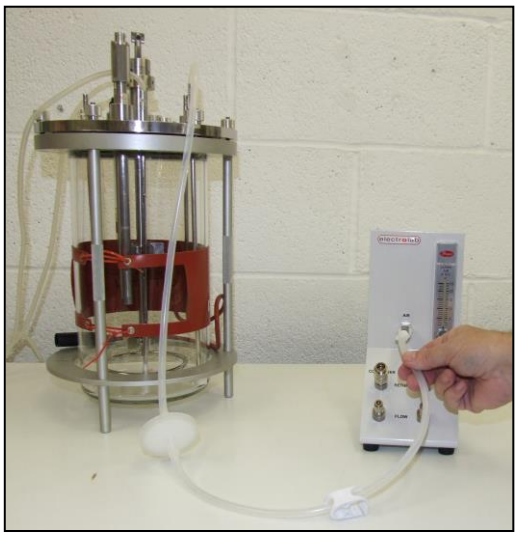
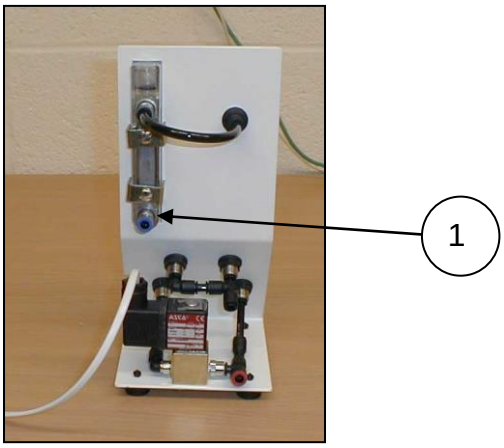


Figure 8



! ***Warning!***
The glass vessel is not a pressure vessel and should never be pressurised.

! ***Warning!***
Always ensure that the exit to the vessel is clear and that gases into the vessel are regulated at a pressure of up to 0.5BAR.

Cooling

1. Identify the cooling valve cable *(Figure 9.1)* and plug into the socket labelled COOLING at rear of the FerMac 230 module *(Figure 10)*.

Figure 9

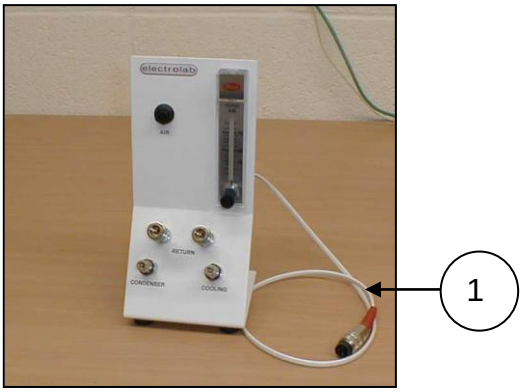
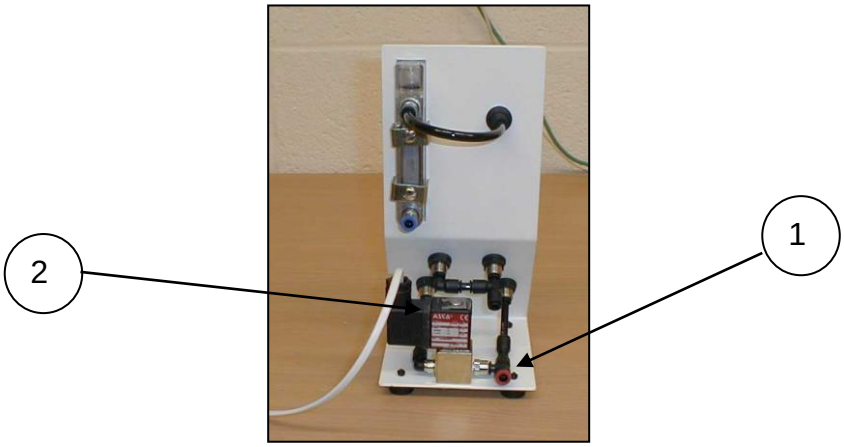


Figure 10

2. Connect your cooling water supply to the red connector *(Figure 11.1)* at the rear of the Service Plate using the 6mm black tubing supplied.

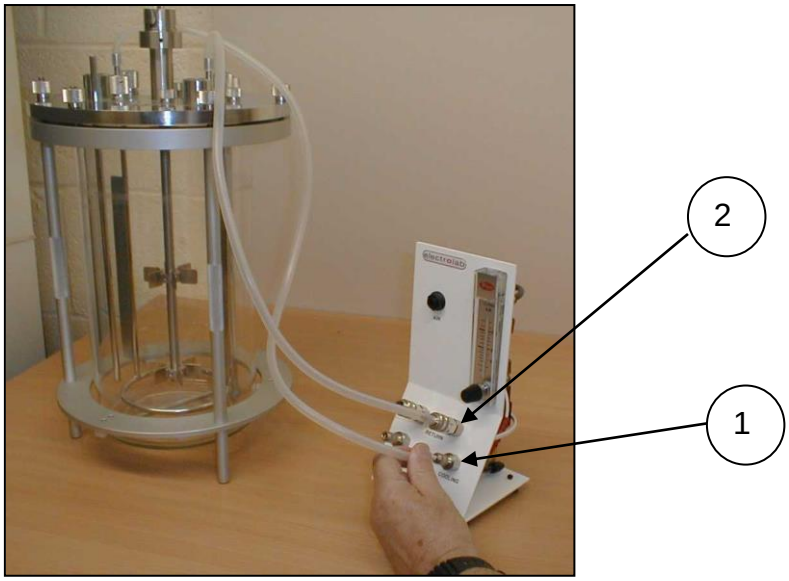
Figure 11



3. Attach one end of the 6mm black tubing supplied for drain to the drain water outlet *(Figure 11.2)* and place the other end in your drain outlet.

4. Connect the two silicone tubes attached to the vessel cooling coil to the Service Plate. The tube with the small connector should be inserted into the socket labelled COOLING *(Figure 12.1)*. The tube with the large connector should be inserted into the socket labelled RETURN *(Figure 12.2).*

Figure 12



Fitting the Condenser

1. Identify the condenser with its tubing and 12mm port attachment *(Figure 13)*.

2. Using the 12mm port attachment, screw the condenser firmly into the top plate *(Figure 14) (See Suggested Top Plate Layouts in Vessel Section Pages 2.7 to 2.9).*

Figure 13

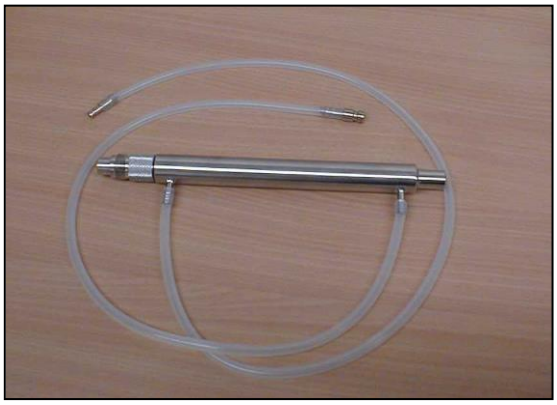


Figure 14

3. Loosen the grub screw in the side of the port attachment *(Figure 15)* and rotate the condenser until the water inlet and outlet points are in a convenient position. Re-tighten the grub screw.

4. Ensure the condenser is seated firmly against the shoulder of the port attachment *(Figure 16).*

Figure 15

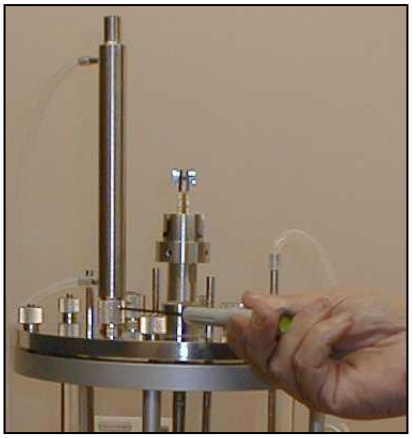


Figure 16

5. Connect the two silicone tubes attached to the condenser to the Service Plate. The tube with the small connector should be inserted into the socket labelled CONDENSER. The tube with the large connector should be inserted into the socket labelled RETURN.

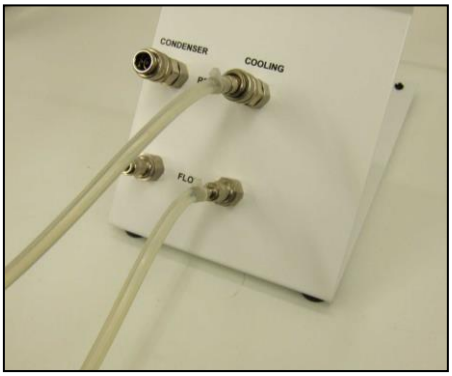
WATER FLOW ADJUSTMENT

The water flow for vessel and condenser cooling are pre-set by Electrolab and would not normally need to be re-set. However, the actual water flow can vary dependent on your local water pressure. If you suspect the water flow requires adjustment because the condenser does not feel cold or you don't have adequate cooling, it can be adjusted as follows:-

Condenser Cooling Water Flow

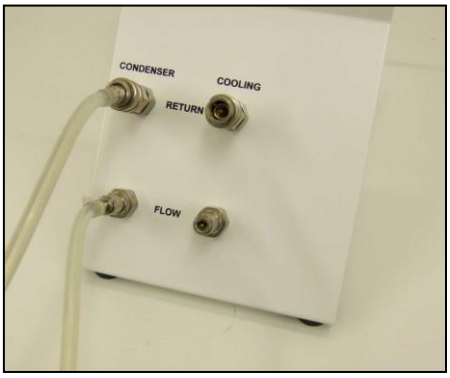
1. Disconnect the flow and return water quick-disconnect fittings for Vessel Cooling *(See Figure 17).*

Figure 17



2. Connect the flow and return water for the Condenser *(See Figure 18)*.

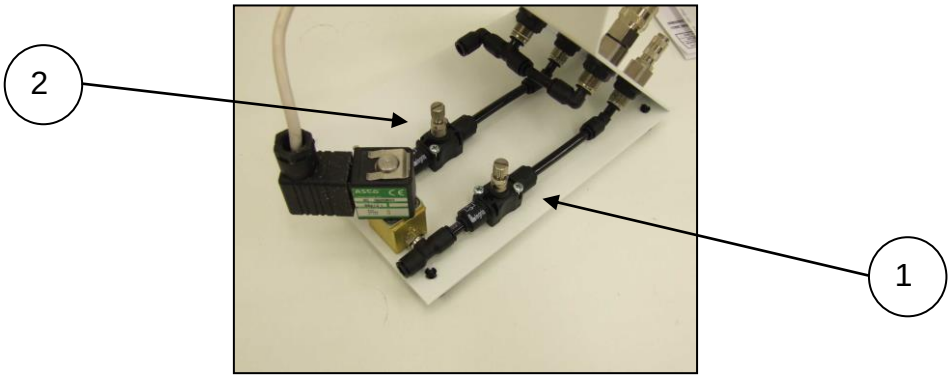
Figure 18



3. Ensure the water is turned on at the supply.

4. Measure the drain (output flow) of water from the Service Plate and adjust to approximately 1 litre per minute (0.7-1.5 l/min) with the needle valve *(See Figure 19.1)*.

Figure 19



Vessel Cooling Water Flow

1. Disconnect the flow and return quick-disconnect water fittings for the Condenser *(See Figure 18)*.

2. Connect the flow and return water for Vessel cooling *(See Figure 17)*.

3. Ensure the water is turned on at the supply.

4. With the FerMac 230 module switched on, switch the control for temperature set point adjustment to the On (up) position. Set the temperature set point to below ambient temperature (eg 10°C). The cooling light *(See Section 4, Figure 2.8)* will illuminate and the solenoid valve on the rear of the Service Plate will be heard to click open.

5. Measure the drain (output flow) of water from the Service Plate and adjust to approximately 1 litre per minute (0.7-1.5 l/min) with the needle valve *(See Figure 19.2).*

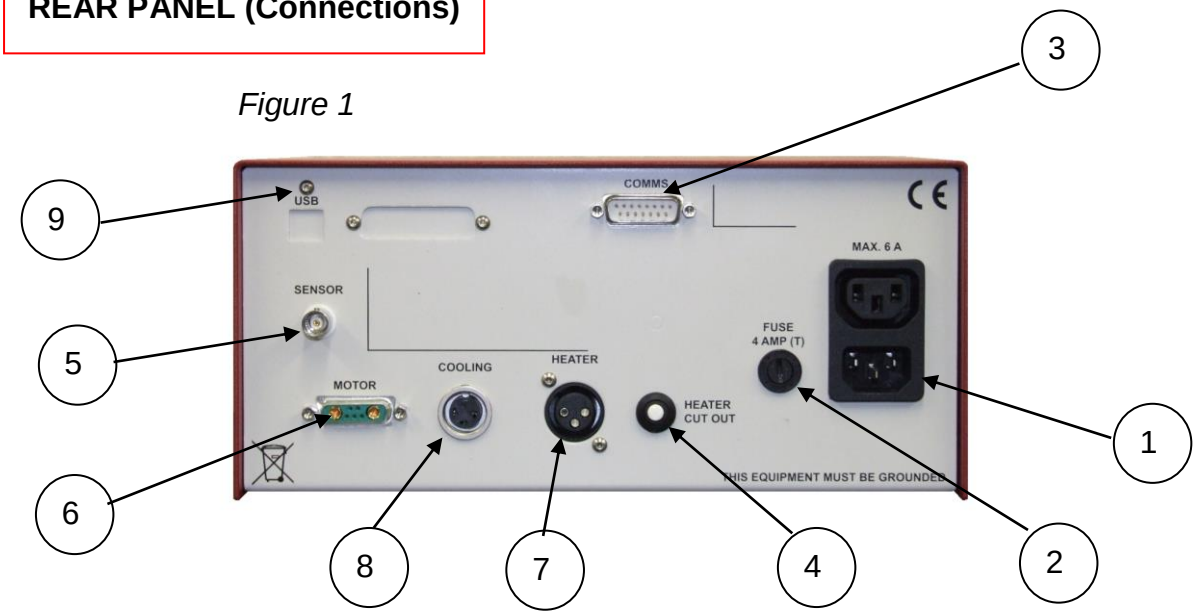
FERMAC 231
AGITATION & TEMPERATURE CONTROL MODULE

OVERVIEW

The FerMac 231 Agitation & Temperature Control Module is designed to control the vessel temperature, using a standard Pt100 temperature sensor with heating and cooling, and the vessel agitation speed.

REAR PANEL (Connections)

Figure 1



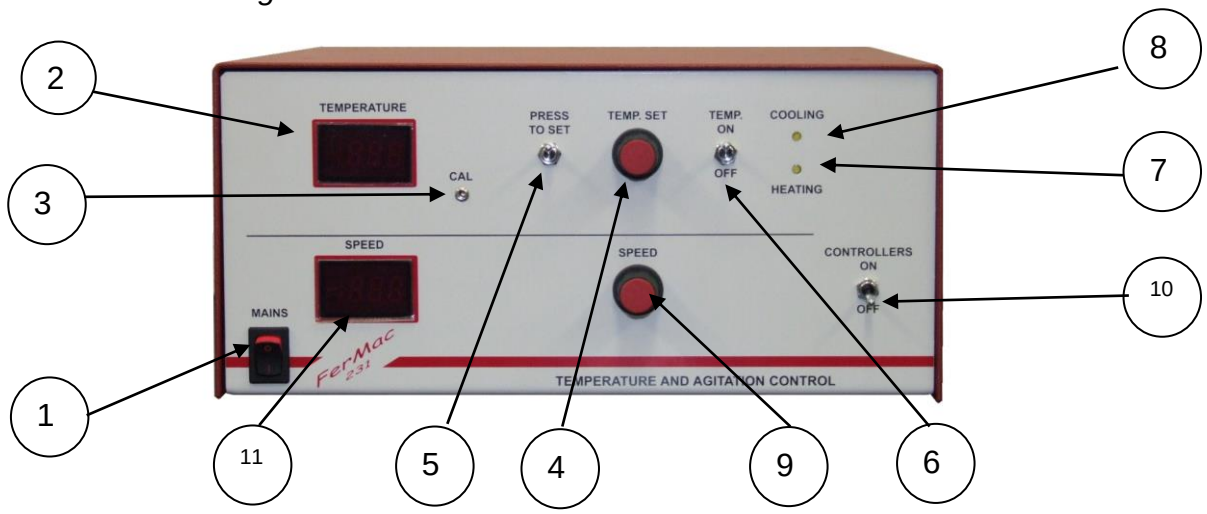
1. Inlet socket for electrical power supply.
2. Electrical supply fuse*.
3. COMMS socket providing an analogue output for data logging.
4. Heater overload cut-out
5. Pt100 temperature sensor connection.
6. Motor connection.
7. Heater connection.
8. Cooling valve connection.
9. USB port for Electrolab eLogger software (if supplied).

Warning

**This fuse should only be replaced by a competent electrician.*

FRONT PANEL (Controls)

Figure 2



1. On/Off switch for electrical power supply to individual module.
2. Display of temperature in °C
3. Calibration control for temperature.
4. Control for temperature set point adjustment.
5. Press switch for temperature control adjustment.
6. On/Off switch for temperature control.
7. Heating indicator light.
8. Cooling indicator light.
9. Agitation speed control.
10. On/Off switch for the agitation motor and temperature.
11. Display of speed in rpm.

CONNECTIONS

Electrical Power Supply

1. Check the voltage selector switch on the base of the module to ensure that it is set to the correct voltage for your geographical area.

2. If used as a stand-alone module, plug the main electrical power supply cable into the inlet (lower) socket at the rear of the module.

3. If used in conjunction with other modules, see instructions for Module Stacking & Electrical Power Supply Connections in Section 1.

Warning

The main inlet/outlet socket system should only be used for equipment specifically designed for our modular system. Other equipment should not plugged into this socket as it has a maximum capacity of only 6.3 amps.

Motor Connection

Warning

The FerMac 231 module should NEVER be switched on UNTIL the agitation motor has been connected to the rear of the module.

1. Ensure the On/Off switch for the main electrical power supply *(Figure 2.1)* is in the Off position.

2. Identify and carefully unpack the agitation motor and cable *(Figure 3).*

3. Plug the motor cable connector into the rear of the FerMac 230 *(Figure 4)*.

Figure 3

Figure 4

4. Ensure the Controllers switch for the agitation motor & temperature *(Figure 2.10)* is in the Stop (down) position.

5. Fit the agitation motor onto the vessel assembly *(See Vessel Section Page 2.5).*

Warning

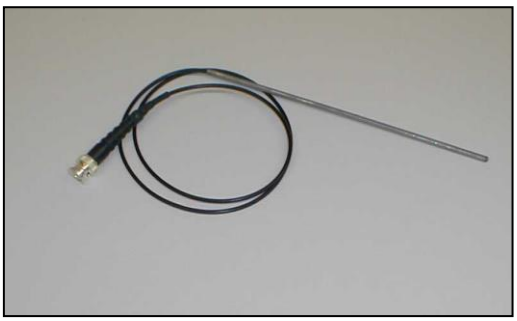
The motor should always be connected to the rear of the FerMac 231 module before the FerMac 231 module is switched on.

Temperature Control Connection

1. Ensure the power supply to the FerMac 231 module is switched off *(Figure 2.1).*

2. Identify and carefully unpack the Pt100 temperature sensor *(Figure 5).*

Figure 5



3. Identify the thermowell pocket *(See Suggested Top Plate Layouts in Vessel Section Pages 2.7 to 2.9)* and insert the Pt100 temperature sensor *(Figure 6).*

! Note
The thermowell pocket is normally used dry.

4. Plug the Pt100 temperature sensor cable connector into the rear of the FerMac 231 *(Figure 7).*

Figure 6

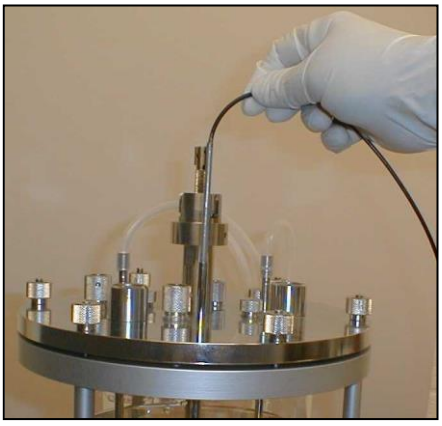
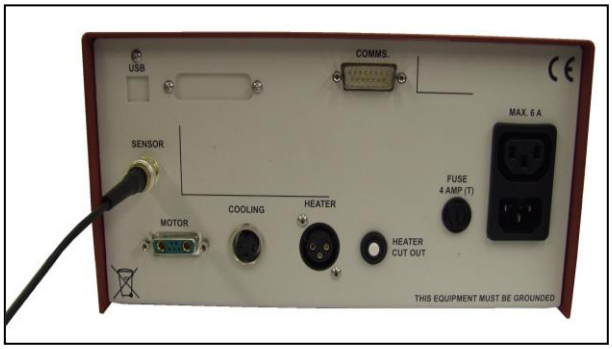


Figure 7



5. Identify the heater *(Figure 8).*

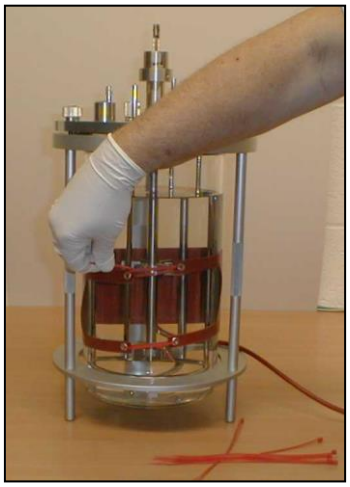
! ***Note***
Design & size of heater may vary with different vessels.

Figure 8

6. Place the heater around the vessel at approximately one third from the base of the vessel *(Figure 9)* and secure with tie-wraps (Part No.1545) *(Figure 10).* The excess ends of the tie-wraps may be cut off.

Figure 9

Figure 10



7. Plug the heater cable into the rear of the FerMac 231 *(Figure 11).*

Figure 11

Cooling Connections

See Service Plate Section, Pages 3.4 to 3.6.

OPERATION

Agitation Control

Warning
The FerMac 231 module should NEVER be switched on UNTIL the agitation motor has been connected to the rear of the module.

1. Ensure the agitation motor is properly and securely fitted onto the vessel.

2. Ensure the temperature on/off switch *(Figure 2.6)* is in the Off (down) position.

3. Set the required agitation speed with the Agitation Speed control knob *(Figure 2.9).*

4. Switch the On/Off agitation motor switch *(Figure 2.10)* into the On (up) position *(See warning above)*. The agitator will now run.

Temperature Control

1. Ensure the temperature on/off switch *(Figure 2.6)* is in the Off (down) position.

2. With the FerMac 231 switched on, the display *(Figure 2.2)* will show the vessel temperature.

3. To adjust the temperature set point, press and hold the temperature "Press to set" switch *(Figure 2.5)* and adjust the temperature set control *(Figure 2.4)* until the display shows the desired set point.

4. Release the temperature control adjustment switch and the display will revert to showing the actual vessel temperature.

5. Switch the On/Off switch for temperature control *(Figure 2.6)* into the On (up) position. The On/Off controllers switch *(Figure 2.10)* should also be in the On (up) position.

6. If the vessel temperature is below the desired set point, the Heating indicator light *(Figure 2.7)* will illuminate. If the vessel temperature is above the desired set point, the Cooling indicator light *(Figure 2.8)* will illuminate. At the set point, the heating and cooling lights will come on as required.

Calibration of the Pt100 Temperature Sensor

The Pt100 temperature sensor type is generally very stable. The following calibration check should be performed when the unit is first installed and every 3 months thereafter:-

1. Set the temperature set point to the normal running temperature of the vessel.
2. Allow the vessel temperature to stabilise.
3. Using a reference thermometer, check the actual temperature of the vessel.
4. Adjust the CAL control *(Figure 2.3)* until the temperature reading on the display exactly matches that of the reference thermometer.

FERMAC 260
pH MEASUREMENT & CONTROL MODULE

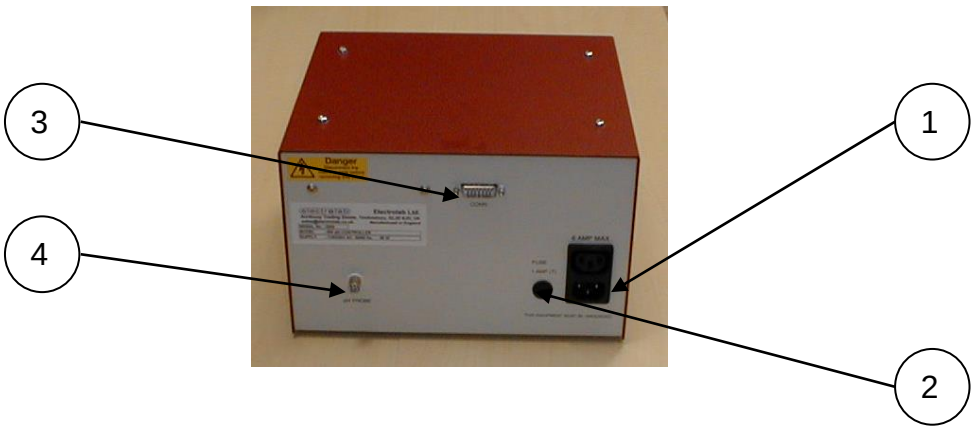
OVERVIEW

The FerMac 260 pH Measurement & Control module uses the same basic measuring functions as a bench pH meter and is calibrated in a similar way.

An autoclavable, industrial standard pH probe is used for pH measurement and the level is controlled by the addition of either acid or base, which is pumped into the vessel using two peristaltic pumps.

REAR PANEL (Connections)

Figure 1

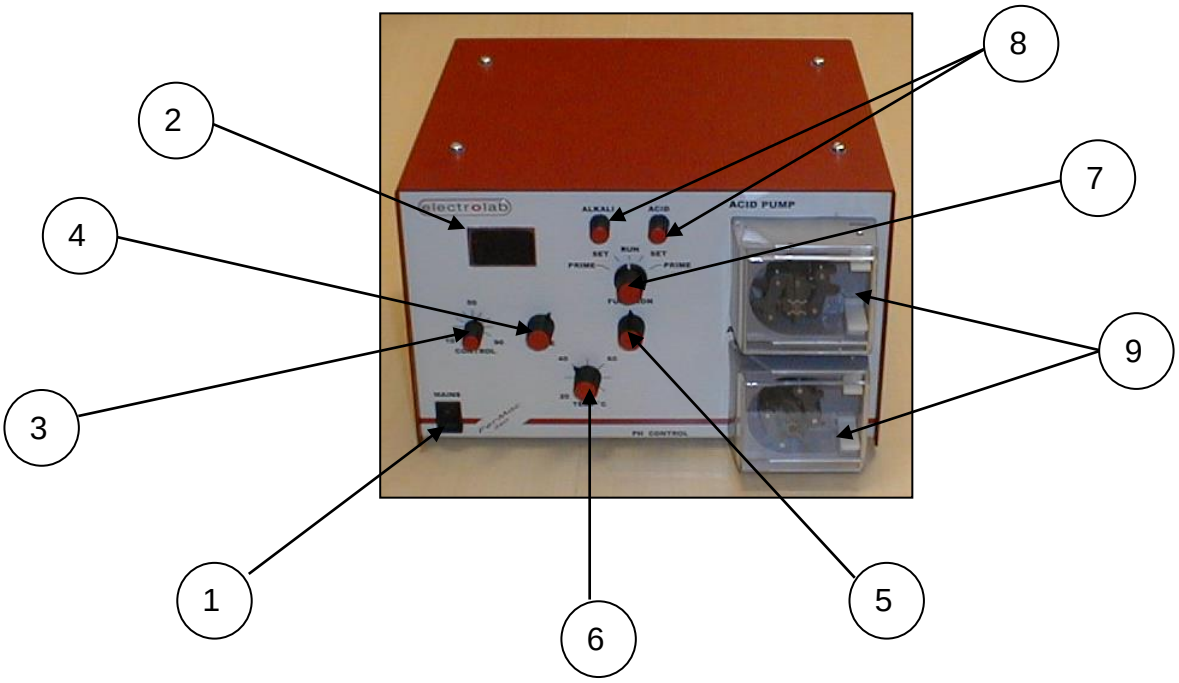


1. Inlet socket for electrical power supply.
2. Electrical supply fuse*.
3. COMS socket providing an analogue output for data logging.
4. Input socket for pH electrode.

Warning
**This fuse should only be replaced by a competent electrician.*

FRONT PANEL (Controls)

Figure 2



1. On/Off switch for electrical power supply to individual module.
2. Display of pH.
3. CONTROL adjusts the proportional control range.
4. SLOPE adjusts the slope, or gain, of the pH amplifier. Normally used to calibrate pH 10 (or pH 4).
5. CAL gives calibration control for 7pH.
6. TEMP °C compensates the pH reading for different temperatures.
7. FUNCTION has 5 positions. Reading left to right:-
   - *Prime* – primes the alkali pump
   - *Set* – displays the alkali set point (see below).
   - *Run* – operates the unit
   - *Set* – displays the acid set point (see below).
   - *Prime* – primes the acid pump.
8. ALKALI/ACID adjusts the set point control value of alkali or acid when the FUNCTION switch is in the *Set* position (see above).
9. ALKALI/ACID PUMPS pump either acid or alkali into the vessel.

CONNECTIONS

Electrical Power Supply

1. Check the voltage selector switch on the base of the module to ensure that it is set to the correct voltage for your geographical area.

2. If used as a stand-alone module, plug the main electrical power supply cable into the inlet (lower) socket at the rear of the module.

3. If used in conjunction with other modules, see instructions for Module Stacking and Electrical Power Supply Connections in Section 1.

Warning

The main inlet/outlet socket system should only be used for equipment specifically designed for our modular system. Other equipment should not plugged into this socket as it has a maximum capacity of only 6.3 amps.

pH Electrode

1. Identify and carefully unpack the pH electrode and its cable *(Figure 3).*

Figure 3

.

2. Insert the connector of the pH cable into the socket marked pH PROBE at the rear of the module *(Figure 1.4).*

3. Identify the 13.5PG fitting (Part No. 1135) *(Figure 4).*

4. Gently screw the 13.5PG fitting onto the pH electrode *(Figure 5).*

Figure 4

Figure 5

5. Moisten the tip of the pH electrode and insert it into the pH port on the vessel top plate *(Figure 6)*.

! ***Warning***
Take care when handling the electrode as the tip is very fragile. Ensure the space below the electrode position is not obstructed.

6. Tighten the electrode in place using the 13.5PG fitting *(Figure 7).*

! ***Warning***
Do not over-tighten the electrode fitting - only gentle hand pressure is required to seal the electrode O ring.

Figure 6

Figure 7

6. Connect the pH cable to the electrode, holding the electrode with one hand to prevent it rotating, whilst screwing on the cable connector with the other.

OPERATION

Setting the pH Set Point

The set points for acid and alkali are set independently.

Alkali Set Point

1. Place the FUNCTION switch in the SET ALKALI position *(Figure 2.7).*
2. Adjust the alkali set point (the lower set point) using the ALKALI control knob *(Figure 2.8).* As the pH drops (becomes more acidic), the alkali pump *(Figure 2.9)* will run to correct the reading back to the set point.

Acid Set Point

1. Place the FUNCTION switch in the SET ACID position *(Figure 2.7).*
2. Adjust the acid set point (the higher set point) using the ACID control knob *(Figure 2.8).* As the pH rises (becomes more alkali), the acid pump *(Figure 2.9)* will run to correct the reading back to the set point.

Control Function

The CONTROL function *(Figure 2.3)* sets the range of the proportional control band.

Proportional control automatically adjusts the on-time in proportion to the distance between the set point and the actual pH value. The output from the pumps is reduced as the set point approaches.

The CONTROL knob is numbered 10 to 90. 10 gives a proportional control range of 1pH and therefore the least aggressive control action. 90 gives a proportional control range of 0.1pH and therefore the most aggressive control action. 50 suits most applications.

PUMP OPERATION

There are two single speed peristaltic pumps for the addition of acid and base. Each has a clutch which enables the pump to be turned manually in a clockwise direction to help with the loading of tubing or to give a manual dose.

Loading the Pump Tubing (Note: The figures show the Anti-Foam module)

1. Switch off the electrical supply to the module *(Figure 2.1)*.

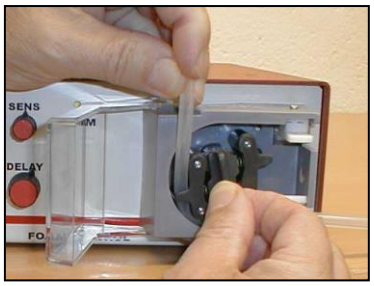
Warning
It is essential to ensure that the power supply is switched off before loading the tubing. Failure to do so may result in trapped fingers should the pump start automatically.

2. Lift the pump cover and clamp the tubing in the lower white nylon clip *(Figure 8)* .

3. Feed the tubing around the pump rollers whilst turning the rotor assembly clockwise by hand *(Figure 9)*.

Figure 8

Figure 9



4 Continue to feed the tubing around the rollers and clamp it in the upper white nylon clip *(Figure 10)*.

5. Turn the rotor gently by hand in a clockwise direction for one or two rotations to centralise the tubing *(Figure 11)*.

Figure 10

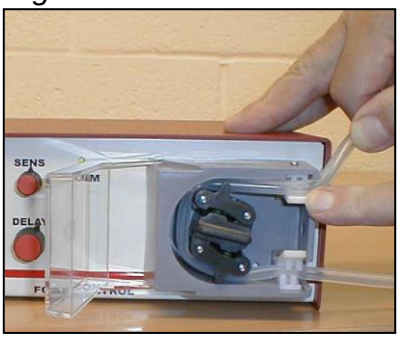
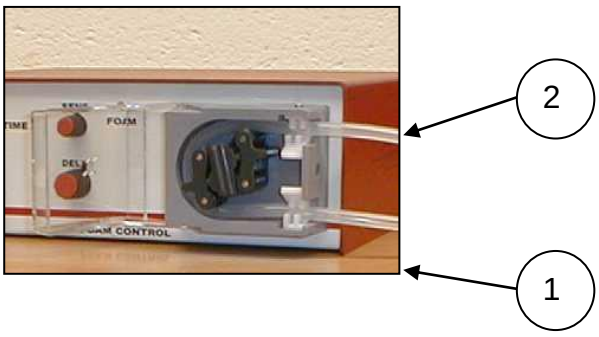


Figure 11

6. The lower tubing is the inlet to the pump *(Figure 12.1)* and the upper tubing is the outlet from the pump *(Figure 12.2).*

Figure 12



Priming the Pump Tubing

When the FUNCTION switch is in either PRIME position, the relevant pump will run continually, allowing the tubing to be primed with acid or alkali. The pump rotor can be turned by hand to speed up this function.

Running

When the FUNCTION switch is in the RUN position the acid and alkali pumps will run automatically in order to make the required pH corrections.

Tubing Life

A continuous length of tubing is used. This allows the tubing to be easily moved along to a new section as it begins to wear. This should be done every 5-10 days or when the tubing begins to flatten.

Silicone tubing is normally supplied in our start-up kit which is suitable for most applications. Other tube materials are available.

Flow Rates

Using 1.6mm (1/16") wall silicone tubing:-					
Bore Diameter	0.5mm (1/50")	0.8mm (1/32")	1.6mm (1/16")	3.2mm (1/8")	4.8mm (3/16")
Standard 4rpm 50Hz motor	0.09 ml/min	0.20 ml/min	0.87 ml/min	3.17 ml/min	6.40 ml/min
Standard 4.8rpm 60Hz motor	0.11 ml/min	0.24 ml/min	1.04 ml/min	3.80 ml/min	7.68 ml/min

pH Calibration

We would normally recommend calibration in two stages. Firstly a two point calibration prior to autoclaving with buffers outside the fermentation vessel. Secondly a single point (often called a grab calibration) performed after the vessel has been autoclaved and the temperature and pH levels have stabilised.

Two-Point Calibration

To calibrate pH, two buffers are used : one must be pH 7. The second can be either pH 10 or pH 4 whichever is closest to your running pH.

1. Ensure the electrode is connected to the FerMac 260 module.
2. Remove the electrode from the vessel and place in a retort clamp.
3. Place the FUNCTION switch in the RUN position.

4. Set the TEMP °C to the temperature of the buffers used.
5. Wash the electrode tip with de-ionised water and dry with a soft tissue.
6. Place the electrode in buffer pH 7.
7. Adjust the CAL control until the display reads 7 (or the exact value of the buffer used).
8. Wash the electrode tip with de-ionised water and dry with a soft tissue.
9. Place the electrode in a second buffer pH 10 (or pH 4) and allow the reading to stabilise.
10. Adjust the SLOPE control until the display reads the exact value of the buffer.

Single Point Calibration

It is not uncommon for the pH electrode output to vary after autoclaving. It is also possible for the pH electrode output to drift during a fermentation run. For this reason, a single point calibration is normally carried out after sterilisation and every 5-10 days during a long run.

1. Allow the vessel and the pH electrode to stabilise to their running temperature after autoclaving.
2. Using sterile techniques, take a sample from the vessel.
3. Using a recently calibrated laboratory pH meter, measure and note the pH value of the sample.
4. Adjust the CAL control until the pH value displayed on the pH controller is the same as that obtained from your laboratory pH meter.

! ***Note***
Be sure to allow for the higher sample temperature.

Autoclaving the Electrode

1. Fit the electrode into the vessel.
2. Disconnect the cable from the electrode (the cable is not autoclavable).
3. Fit the protective cap which is supplied with the electrode and cover with aluminium foil.
4. After autoclaving, remove the aluminium foil and protective cap whilst the vessel is still hot.
5. Reconnect the electrode cable.
6. Switch on the FerMac 260 module.

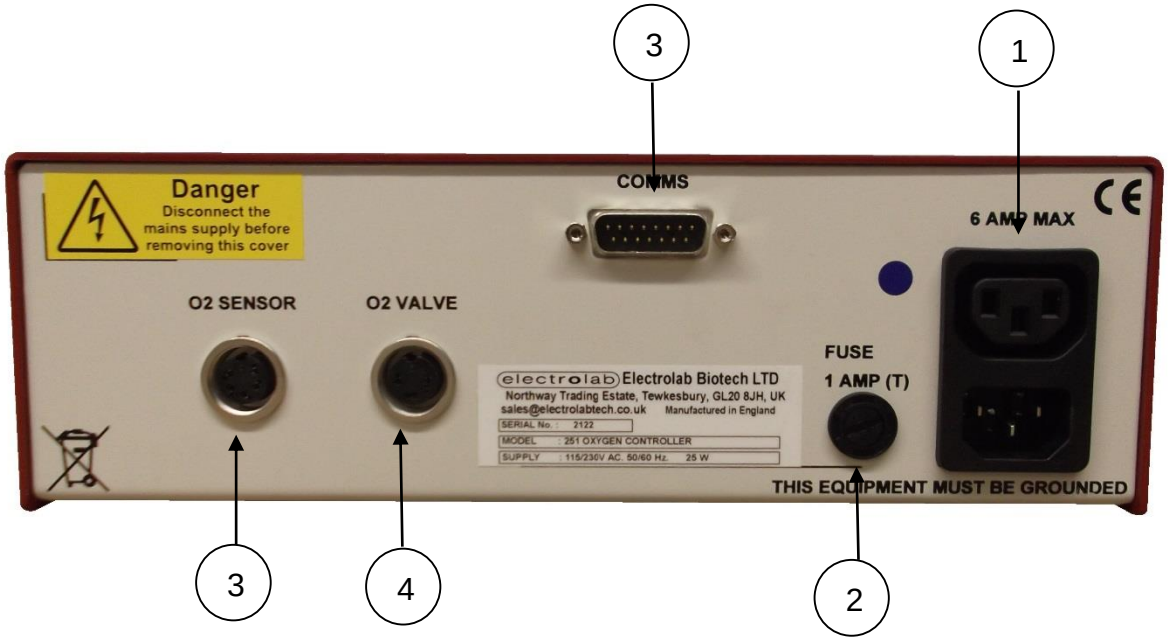
FERMAC 251
OXYGEN CONTROLLER

Overview

The FerMac 251 Oxygen Controller is designed to measure the dissolved oxygen (air) within the fermentation vessel. If the measured value falls below the desired setpoint, a solenoid valve (fitted to the service plate) is opened, allowing the flow of air into the vessel. When desired setpoint is achieved, the valve is automatically shut off. Alternatively, it can be used to just monitor dO. The FerMac 251 can be used with both standard polarographic or optical dO sensors, providing they have with integrated temperature compensation (NTC) within the sensors themselves.

Rear Panel (Connections)

Figure 1

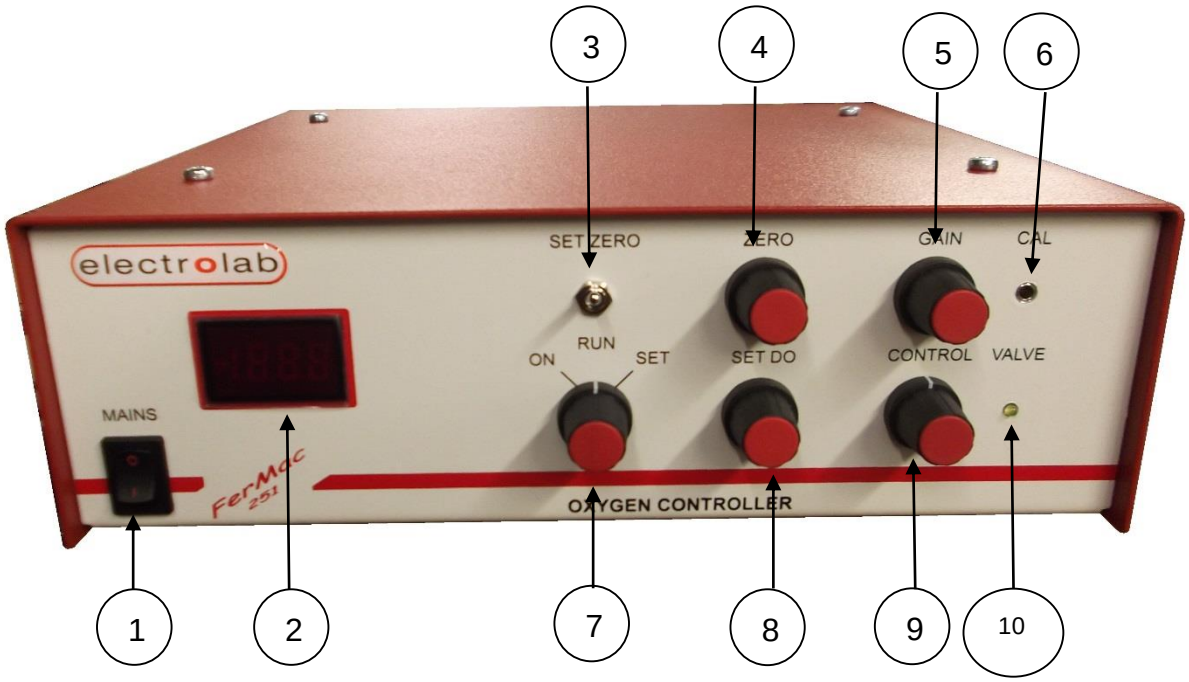


1. Inlet socket for electrical power supply (110-240V AC, 50-60H_z).
2. Electrical supply fuse*.
3. COMMS socket providing an analogue output for data logging.
4. Input socket for air/O_2 solenoid valve.
5. Input socket for a stainless steel polarographic or optical sensor.

Warning
Fuse should only be replaced by a competent electrician.

Front Panel (Controls)

Figure 2



1. On/Off switch for electrical power supply to individual module.
2. LED Display of dissolved oxygen %.
3. Zero switch to set the amplifier/sensor zero.
4. Zero control to correct for zero reading.
5. Gain control to correct for the gain of the sensor.
6. Gain control coarse adjustment.
7. ON-RUN-SET control switch.
8. Set dO control adjustment.
9. Controller output adjustment.
10. Valve status LED.

Connections

Electrical Power Supply

1. The unit is designed to accept input voltages of between 110 and 240V AC (50 -60 H_z)

2. If used as a stand-alone module, plug the main electrical power supply cable into the inlet (lower) socket at the rear of the module.

3. If used in conjunction with other modules, see instructions for Module Stacking and Electrical Power Supply Connections in Section 1.

Warning
The main inlet/outlet socket system should only be used for equipment specifically designed for our modular system. Other equipment should not plugged into this socket as it has a maximum capacity of only 6.3 amps.

Oxygen (dO) Sensor

1. Identify and carefully unpack the dO sensor and its corresponding cable *(Figure 3).* Please note – the style of sensor and cable may vary depending on type. Optical dO sensor are used with a cable that has a separate power connection.

2. Insert the connector of the dO cable into the socket marked O2 SENSOR at the rear of the module *(Figure 4).*

Figure 3

Figure 4

3. Identify the 13.5PG fitting (Part No. 1135) *(Figure 5).*

4. Gently screw the 13.5PG fitting onto the dO sensor *(Figure 6).*

Figure 5

Figure 6

5. Moisten the tip of the dO sensor and insert it into the PG13.5 port fitting on the vessel top plate *(Figure 7).*

Warning
Take care when handling the sensor as the tip is very fragile. Ensure the space below the sensor position is not obstructed.

6. Tighten the sensor in place using the PG13.5 collar *(Figure 8).*

Warning
Do not over-tighten the sensor fitting - only gentle hand pressure is required to seal the sensor O-ring.

Figure 7

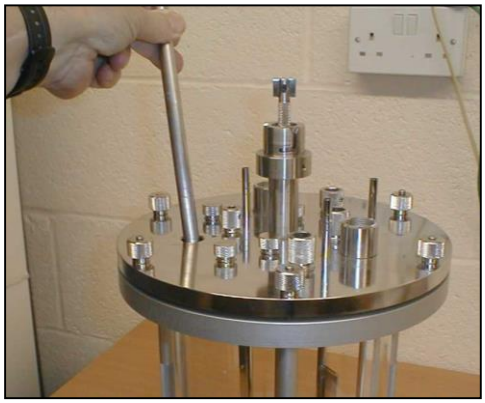
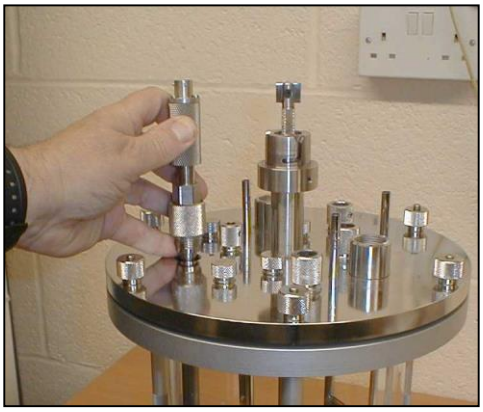


Figure 8



6. Connect the dO cable to the sensor (holding the sensor with one hand to prevent it rotating), whilst screwing on the cable connector with the other *(Figure 9).* Be careful to ensure the cable connector is correctly aligned – the use of force will most likely damage the cable and/or sensor – this is not covered under warranty.

Figure 9

8. Fitted to the solenoids on the service plates are 2 cables, marked O2 VALVE and COOLING *(Figure 10)*. Select the O2 Valve cable and connect it to the O2 VALVE socket on the back of the controller *(Figure 2.4)*

Figure 10

Operation

The dO sensor supplied as standard with the FerMac 251 Oxygen Controller is a stainless steel polarographic sensor manufactured by Hamilton. Optionally, the Hamilton VisiFerm optical dO sensor may have been supplied. **All new sensors should be conditioned, operated and maintained following the manufacturer's instructions supplied.**

Function Check

Before using the sensor, we recommend that a quick function check is performed to ensure that it is operating correctly, as follows:-

1. Examine the membrane/sensor cap to ensure that it is undamaged.
2. (If applicable) Unscrew the membrane to check the electrolyte level and change as necessary – we recommend changing the electrolyte at least every couple of runs.
3. With the dO sensor plugged in to the FerMac 251, switch on and allow to stabilise for a minimum of 30 minutes.
4. Place the sensor in a beaker of well-aerated water.
5. Adjust the gain control to give a reading on the display of approximately 100 (between 50-150).
6. Place the sensor in a beaker with saturated solution of metabisulfite and after a few minutes the dO reading should start to drop, normally to a reading of 5-10%.
7. Return the sensor to aerated water and the reading should begin to rise again.

This will not calibrate the sensor, nor will it condition it correctly: it is simply a quick check to verify that it responds to changes in dissolved oxygen concentration.

Autoclaving the Sensor

1. Fit the sensor into the vessel.
2. Disconnect the cable from the sensor (the cable is not autoclavable).
3. Cover the cable connection with either cotton wool and foil, or a suitable sensor cap.
4. Autoclave the vessel as per your usual cycle, ensuring that the autoclave is set to a 'wet' cycle – a dry cycle, such as used to sterilise surgical instruments, will have a sudden depressurisation at the end – this is likely to damage the sensor. Such damage is not covered under warranty.

Reconnecting and de-polarising the Sensor

1. After autoclaving, remove the protective cap.
2. Reconnect the cable between the sensor and FerMac 251 module.
3. Switch on the FerMac 251 module.
4. For polarographic sensors, leave the equipment switched on for at least 8 hours / overnight, so the sensor is conditioned (de-polarised).

Note
This should be done as soon as possible after autoclaving as the sensor takes up to 8 hours to polarise fully.
Optical sensors do not require de-polarising.

Calibration

The dO sensor is usually calibrated after autoclaving. The calibration is normally a single point calibration where the 100% gain is adjusted. Calibration must only be done once the sensor is fully de-polarised (where applicable), otherwise the readings will be unstable and/or incorrect.

Procedure for Single Point dO Calibration

1. Set the vessel to the running temperature and agitation, and allow the temperature to stabilise.

2. Set the amplifier zero:-

   a) Push down and hold the zero switch *(Figure 2.3)* and adjust the DO reading on the display *(Figure 2.2)* to zero using the zero control *(Figure 2.4)*.

   b) Saturate the vessel with 100% air:-

      i) Turn the ON-RUN-SET control switch *(Figure 2.7)* to the ON position (this will energise the valve and allow air into the vessel). Run the stirrer at the maximum speed it is intended to use during the fermentation run.
      ii) Increase the air flow using the air flow valve on the Service Plate to the maximum it is intended to use during the fermentation run.

The vessel should aerate quickly and after about 30 minutes the DO reading should stabilise.

3. Adjust the DO reading on the display *(Figure 2.2)* up to approximately 120% and then back to 100% with the gain control *(Figure 2.5).*

4. If you are not able to achieve the correct gain using the gain control *(Figure 2.5)*, adjust the coarse control CAL *(Figure 2.6)* with the small trim-pot driver supplied.

5. Allow the reading to stabilise for 10 minutes or so and, if necessary, re-adjust the gain control to read 100%.

Adjusting dO setpoint

Procedure for adjusting the dO setpoint

1. Turn the ON-RUN-SET control switch *(Figure 2.7)* to the ON position.

2. Turn the Set DO Control adjustment *(Figure 2.8)* until the value in the display *(Figure 2.2)* is correct.

3. Return the ON-RUN-SET control switch to RUN. You will see the Valve status LED *(Figure 2.10)* illuminate when the solenoid valve is opened.

4. As the FerMac 251 does <u>not</u> accept nitrogen, it is only performing a one-way (upwards) dO control. It cannot reduce the dO concentration in the vessel if there is an overshoot.

If the controller overshoots setpoint

The FerMac 251 is a one-way dO controller. This means that it is only capable of adding one gas until the desired setpoint is reached.

If that setpoint is exceeded, there is no functionality within the FerMac 251 to add a secondary gas (ie N_2) to reduce the value.

For the majority of aerobic microbial processes, an overshoot in the dO saturation of the media will not cause any particular problems. However, there are a couple things you can try to reduce the chance or severity of an overshoot.

1. Adjusting the “CONTROL” potentiometer (Figure 2.9) will change the “ON/OFF” ratio of the air valve as the oxygen value approaches the set point. Turning the control anticlockwise will make the addition less aggressive but will take longer to reach the set point.
2. If you are using O_2 or oxygen-enriched air, try reducing the percentage of O_2 in the mix, or use plain air. This will result in a less aggressive change to the value.
3. Use the needle valve on the rotameter to reduce the flow rate.

FERMAC 280
FOAM/FEED MODULE

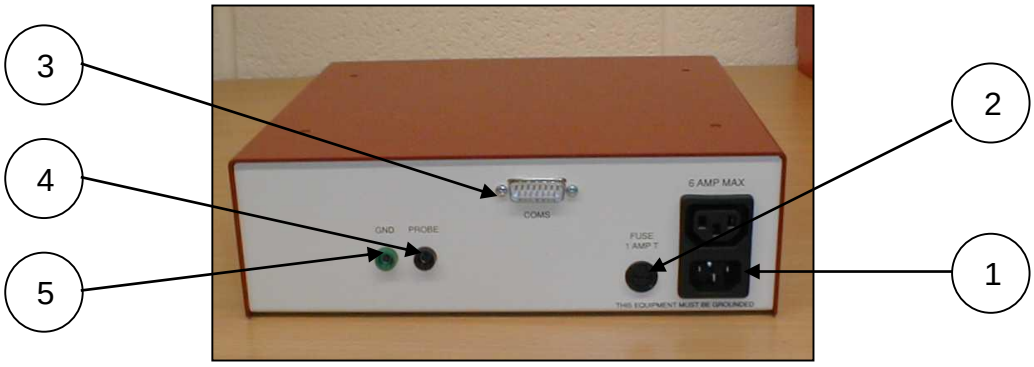
OVERVIEW

The FerMac 280 Foam/Feed Module is designed to detect foam in the vessel using a conductivity probe to detect the electrical conductivity of the foam using the metal parts of the vessel as the conductivity ground. The probe activates a pump which pumps foam inhibitor (anti-foam) into the vessel. Without the conductivity probe, the Foam/Feed Module can also be used to continually add small doses of foam inhibitor.

In this mode, the FerMac 280 Foam/Feed Module can also be used as a general purpose pump for media feed.

REAR PANEL (Connections)

Figure 1



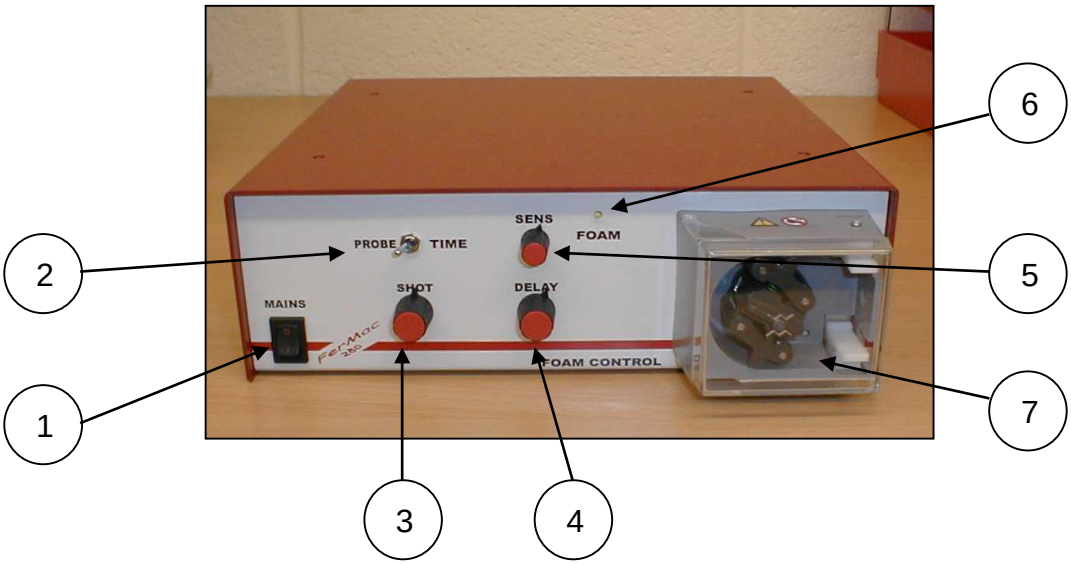
1. Inlet socket for electrical power supply.
2. Electrical supply fuse*.
3. COMS socket (unused).
4. Input socket for conductivity probe.
5. Input socket for conductivity ground.

Warning

**This fuse should only be replaced by a competent electrician.*

FRONT PANEL (Controls)

Figure 2



1. On/Off switch for electrical power supply to individual module.
2. Probe/Time switch for either pump activation by probe or continuous timer.
3. Shot Control to adjust the shot (or on) time for each addition of foam inhibitor.
4. Delay Control to adjust the delay (or off) time for each addition of foam inhibitor.
5. Sensitivity Control to adjust the sensitivity of the conductivity probe for different foam conditions.
6. Foam detected indicator light.
7. Pump for the addition of foam inhibitor or media feed.

CONNECTIONS

Electrical Power Supply

1. Check the voltage selector switch on the base of the module to ensure that it is set to the correct voltage for your geographical area.

2. If used as a stand-alone module, plug the main electrical power supply cable into the inlet (lower) socket at the rear of the module.

3. If used in conjunction with other modules, see instructions for Module Stacking and Electrical Power Supply Connections in Section 1.

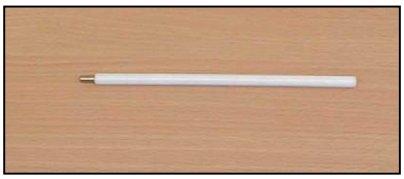
Warning

The main inlet/outlet socket system should only be used for equipment specifically designed for our modular system. Other equipment should not plugged into this socket as it has a maximum capacity of only 6.3 amps.

Foam Conductivity Probe

1. Identify the foam conductivity probe *(Figure 3).*

Figure 3



2. Insert the foam probe into the vessel top plate *(See Suggested Top Plate Layouts in Vessel Section Pages 2.7 to 2.9)* using a 6.3mm port as follows.

3. Unscrew the 6.3mm port screw.

4. Remove and put aside the grub screw from the side of the 6.3mm port screw.

5. Insert the foam probe through the 6.3mm port screw *(Figure 4)*.

6. Insert the foam probe into the top plate and adjust to the required height gently tightening the port screw *(Figure 5).*

Figure 4

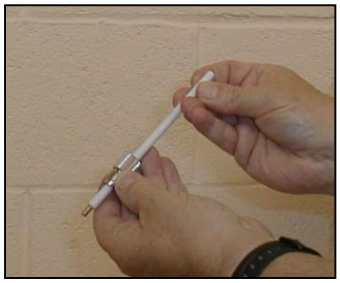
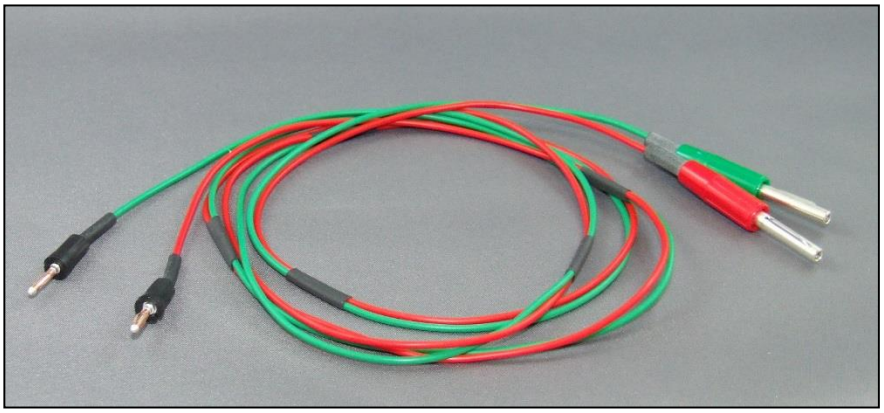


Figure 5

7. Identify the foam probe cable set *(Figure 6).*

Figure 6



8. ***The Red Cable***

a) Insert the 2mm black connector of the red cable into the top of the foam probe *(Figure 7).*

b) Insert the 4mm red connector (black on older units) of the red cable into the the socket marked PROBE at the rear of the FerMac 280 Module *(Figure 8).*

Figure 7

Figure 8

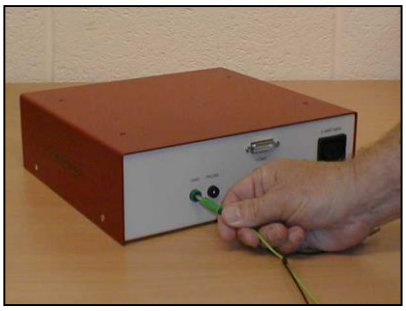
9. ***The Green Cable***

a) Insert the 2mm black connector of the green conductivity ground cable into the hole drilled into the edge of the vessel top plate *(Figure 9).*

b) Insert the 4mm green connector of the green conductivity ground cable into the socket marked GND at the rear of the FerMac 280 Module *(Figure 10).*

Figure 9

Figure 10



OPERATION

For Use as a Foam Controller

1. Position the foam probe approximately 20mm above the maximum level of liquid in the vessel.

2. Set the Shot time to give the desired amount of foam inhibitor for each shot. It is adjustable from 2 to 40 seconds, 20 seconds being mid-way.

3. Set the Delay time to give sufficient time for mixing and for foam to die down between each shot. It is adjustable between 2 and 47 seconds, 24 seconds being mid-way.

4. Using the foam detected light as an indicator, adjust the Sensitivity control by experiment (mid-way suits most purposes).

When foam is detected, the foam indicator light will illuminate. After the delay time, the pump will start to pump foam inhibitor into the vessel for the period set by the Shot Control. The pump will then stop for the period set by the Delay Control. As soon as foam is no longer detected, the Shot and Delay timers will re-set.

For Use as a Level Controller

1. Position the foam probe at the maximum required level of liquid in the vessel.

2. Turn the Shot control fully clockwise to give maximum pump on-time (or as required).

3. Turn the Delay control fully anti-clockwise.

4. Using the foam detected light as an indicator, adjust the Sensitivity control by experiment (mid-way suits most purposes).

5. When the level is reached, the foam detected indicator light will illuminate and the pump will start to run. In this case, the inlet and the outlet of the pump are reversed. The pump will pump media out of the vessel until the foam probe is exposed and the required level is reached. At which point, the pump will stop.

For Use as a Feed Pump

1. The foam probe is not used.

2. Set the Probe/Time switch to the Time position.

3. Set the Shot and Delay controls so as to give a proportion of the continuous flow rate,

   eg Shot (on) time of 5 seconds, Delay (off) time of 20 seconds =

   $\frac{5}{5+20}$ = 0.2 x 3.17mls/min (flow with 3.2mm tubing at 50 Hz) = 0.634mls/min

In this mode, the pump runs continually under the control of the Shot/Delay timers until switched off.

PUMP OPERATION

Loading the Pump Tubing

1. Switch off the electrical supply to the module *(Figure 2.1)*.

Warning
It is essential to ensure that the power supply is switched off before loading the tubing. Failure to do so may result in trapped fingers should the pump start automatically.

2. Lift the pump cover and clamp the tubing in the lower white nylon clip *(Figure 11)* .

3. Feed the tubing around the pump rollers whilst turning the rotor assembly clockwise by hand *(Figure 12)*.

Figure 11

Figure 12

4 Continue to feed the tubing around the rollers and clamp it in the upper white nylon clip *(Figure 13)*.

5. Turn the rotor gently by hand in a clockwise direction for one or two rotations to centralise the tubing *(Figure 14)*.

Figure 13

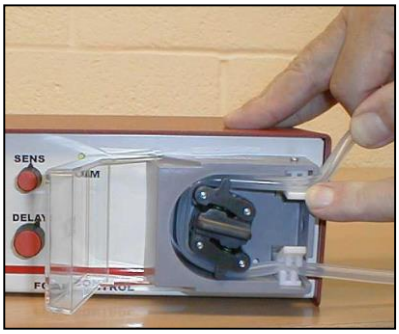
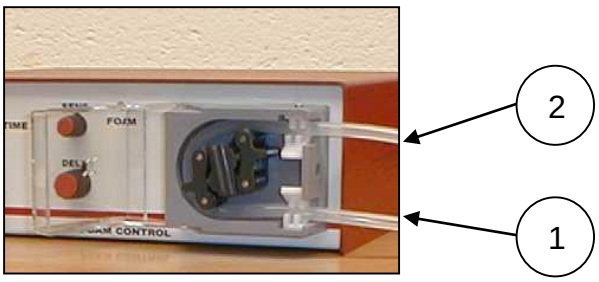


Figure 14

6. The lower tubing is the inlet to the pump *(Figure 15.1)* and the upper tubing is the outlet from the pump *(Figure 15.2).*

Figure 15



Priming the Pump Tubing

1. Turn the pump rotor in a clockwise direction until the tubing is fully primed, **or**

2. With the Probe/Time switch set to Time, turn the Shot control fully clockwise and the Delay control fully anti-clockwise until the tubing is fully primed.

Tubing Life

A continuous length of tubing is used. This allows the tubing to be easily moved along to a new section as it begins to wear. This should be done every 5-10 days or when the tubing begins to flatten.

Silicone tubing is normally supplied with our start-up kit which is suitable for most applications. Other tube materials are available.

Flow Rates

Using 1.6mm (1/16") wall silicone tubing:-					
Bore Diameter	0.5mm (1/50")	0.8mm (1/32")	1.6mm (1/16")	3.2mm (1/8")	4.8mm (3/16")
Standard 4rpm 50Hz motor	0.09 ml/min	0.20 ml/min	0.87 ml/min	3.17 ml/min	6.40 ml/min
Standard 4.8rpm 60Hz motor	0.11 ml/min	0.24 ml/min	1.04 ml/min	3.80 ml/min	7.68 ml/min

electrolab biotech

SECTION 8

USER SPARE PARTS

USER SPARE PARTS LIST
FerMac 200 Modular Series

231 Agitation & Temperature Control Module

Item	Part Number
Heaters	
2 Litre 24 VAC (300x80mm Strap-on)	1458-04
5 Litre 24 VAC (340x100mm Strap-on)	1479-04
10 Litre 24 VAC (540x200mm Strap-on)	1570-04
Tie Wraps for securing all strap-on heaters – Pack of 100	1545
Temperature Sensor & Pockets	
Pt100 Temperature Sensor for all systems – with 1300mm cable length	1397-01
Thermowell pocket for Pt100 Temperature Sensor – 2 Litre 295mm long	1008
Thermowell pocket for Pt100 Temperature Sensor – 5 Litre 370mm long	1009
Thermowell pocket for Pt100 Temperature Sensor – 10 Litre 450mm long	1005

250 Oxygen Module

Item	Part Number
BJC Oxygen Electrodes	
BJC stainless steel polarographic, 12x220mm long, suitable for 2 & 5 litre vessels, with K9* connector	3091
BJC stainless steel polarographic, 12x320mm long, suitable for 10 litre vessels, with K9* connector	3092
Cable 1M long for above	3094
Cable 3M long for above	3095
DO Electrolyte Solution 25ml for 10 refills	3077
DO Electrode Replacement Cartridge Kit (Single cartridge & electrolyte solution)	3078
DO Electrode Replacement Cartridge Kit (4 cartridges & electrolyte solution)	3079
Other manufacturers and types available	

**See annex for details of connectors.*

260 pH Module

Item	Part Number
BJC pH Electrodes	
BJC gel filled with K9* connector, 12x200mm, suitable for 2 litre vessels	3030
BJC gel filled with K9* connector, 12x225mm, suitable for 5 litre vessels	3031
BJC gel filled with K9* connector, 12x325mm, suitable for 10 litre vessels	3032
Cable 0.6M long for above	3056
Cable 1M long for above	3050
Cable 3M long for above	3051
pH Electrode Storage Solution 500ml	3075
Other manufacturers and types available	

**See annex for details of connectors.*

280 Anti-Foam Module

Anti-foam Probe complete with cable	1636-5

Vessels

Item	Part Number
Glassware	
2 Litre Flat Bottom	1107
5 Litre Flat Bottom	1092
10 Litre Flat Bottom	1597
A side arm weir for continuous culture can be fitted to any of above vessels *(Positioned at 2/3 from base unless otherwise specified)*	
'O' Rings	
For vessel top plate 2 litre	1015
For vessel top plate 5 litre	1044
For vessel top plate 10 litre	1706
For 12mm port screw & blanking plug	1020
For 12mm port screw & blanking plug (Per 100)	1020-1
For 6.35mm port screw & blanking plug	1023
For 6.35mm port screw & blanking plug (Per 100)	1023-1
For Bearing Housing	1029
For Inoculation Port	1220

Item	Part Number
Vessel Miscellaneous	
Impeller 55mm diameter (fitted as standard on all vessels)	1035
Clamp Nut for vessel top plate	1816
Port Screw 12mm	1021
Port Screw 6.35mm	1024
Blanking Plug 12mm	1136
Blanking Plug 6.35mm	1137
Port Screw 12mm to 6.35mm Adapter	1549
Port Screw 12mm to 13.5PG Adapter (for pH and DO electrodes)	1135
Dip Tube 80mm long	1346
Dip Tube 260mm long for 2 litre vessels	1324
Dip Tube 310mm long for 5 litre vessels	1347
Dip Tube 410mm long for 10 litre vessels	1348
Exhaust Air Filter	1236
Inlet Air Filter	1077
Inoculation Port Assembly	1242
Septa for Inoculation Port (Per 25)	1222
Sample Device Assembly Complete	1463
Short Sample Tube for Sampling Device	1140
Universal Bottle Glass for Sampling Device	1145
Silicone Sealing Washer for Sampling Bottle	1144

Item	Part Number
Long Inoculation Tube for Sampling Device	1141
Thumb Clamp for Sampling Device	1149
Syringe Filter for Sampling Device	1148
Syringe for Sampling Device	1147
Condenser	1134-1
3-way Inlet	1126

Miscellaneous

Item	Part Number
Tubing	
Silicone Pump Tubing 3.2mm ID one metre *(used as standard for peristaltic pumps giving a flow rate of 3.17 ml/min maximum)* *(Also used as general purpose tubing for connecting cold finger, sampling devices etc)*	1192
Silicone Pump Tubing 3.2mm ID 20 metres *(used as standard for peristaltic pumps giving a flow rate of 3.17 ml/min maximum)* *(Also used as general purpose tubing for connecting cold finger, sampling devices etc)*	1192-20
Silicone Tubing 4.5mm ID one metre *(used for connecting up the air inlet)*	1461
Silicone Tubing 4.5mm ID one metres *(used for connecting up the air inlet)*	1461-20

Item	Part Number
Silicone Pump Tubing 4.8mm ID one metre *(an alternative tube for peristaltic pumps giving a higher flow rate – maximum 6.4 ml/min)*	1547
Silicone Pump Tubing 4.8mm ID 20 metres *(an alternative tube for peristaltic pumps giving a higher flow rate – maximum 6.4 ml/min)*	1547-20
Silicone Tubing 8mm ID per 0.3 metre *(used for connecting the outlet condenser to the exhaust filter)*	1462
Polyurethane Tubing 4mm ID 25 metres *(used for pressure connections for water, air & gas supplies)*	1207

Feed Bottles	
Feed Bottle Top Assembly for Media Bottles with GL45 thread (excluding glass bottle)	1454
Filter for Feed Bottle	1152
PTFE Dip Tube for Feed Bottle – to suit all size bottles (Per 0.5 metre)	1160
2-way Bottle Top for GL45 Bottles	1476
3-way Bottle Top for GL45 Bottles	1456
250ml Standard Glass Duran Schott Bottle complete with polypropylene cap and pouring ring GL45	1153
500ml Standard Glass Duran Schott Bottle complete with polypropylene cap and pouring ring GL45	1154
Other sizes and types of Duran Schott Bottles available	
Sundries	
Fuse 1A (110 and 230V) for 250, 260 & 280 modules	1217
Fuse 3A (110 and 230V) for 230 module	1599
Pump Cassette for Electrolab Multi-Channel Pumps	1335
Mains Cable UK 2 metre	1353
Mains Cable Europe Schuko 2.5 metre	1354
Mains Cable North America 115V 2 metre	1355

Other Equipment/Options

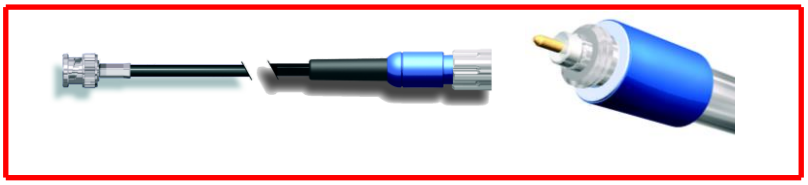
Item	Part Number
Carat 114 Compressor – oil free compressor and pressure regulator, 20 litres/min @ 6 BAR	1634
FL601 Chiller enables operation at below ambient temperature and replaces a standard water supply	1638
FerMac 368 Gas Analyser to provide readings of gaseous O_2 and CO_2	
Side Arm Weir for continuous culture fitted to your existing glassware (which has to be returned to us) and positioned at 2/3 from the base unless otherwise specified	

ANNEX A

BJC Electrode Connectors

pH Electrode K9 Connector

DO Electrode K9 Connector



DO Electrode 4-pin Connector

OPTIONS

P/N 1463-3 SAMPLE DEVICE, FOR UNIVERSAL BOTTLE (MK.2)

INSTRUCTIONS FOR USE

The Electrolab Biotech Sample Device (MK.2) is designed to be used with either glass or plastic universal sample bottles, without the need for changing internal spacers.

Remember, when using this sample device the sample itself will not be sterile. Once the first bottle has been exchanged, the sample device will probably not be sterile either. Following the prescribed method on the second page of these instructions minimises the chances of contaminating the bioreactor. It is essential the operator employs good aseptic technique when exchanging sample bottles, or the risk of accidental contamination will increase. Using this method means the net flow of liquid will always be out of the sterile bioreactor and into the sample device.

When autoclaving the bioreactor with the sample device in place, ensure it is fitted with either a glass, or an autoclavable plastic (such as polypropylene) sample bottle. Be aware; not all brands of universal bottle have identical threads, so we strongly suggest you check yours for compatibility. The bottle should thread on easily – using undue force may risk damaging the bottle. Suitable universal bottles are available from Electrolab Biotech Ltd.

Preparation (please refer to the next page for parts identification and setup)

1. Mount the sample device hood (1) onto the vessel and secure using one of the headplate mill nuts (2). We suggest mounting the hood as close as possible to the long dip tube/sample pipe (3). Ensure the white gasket (4) in the sample device hood is in place and in good condition (if not, replace it).

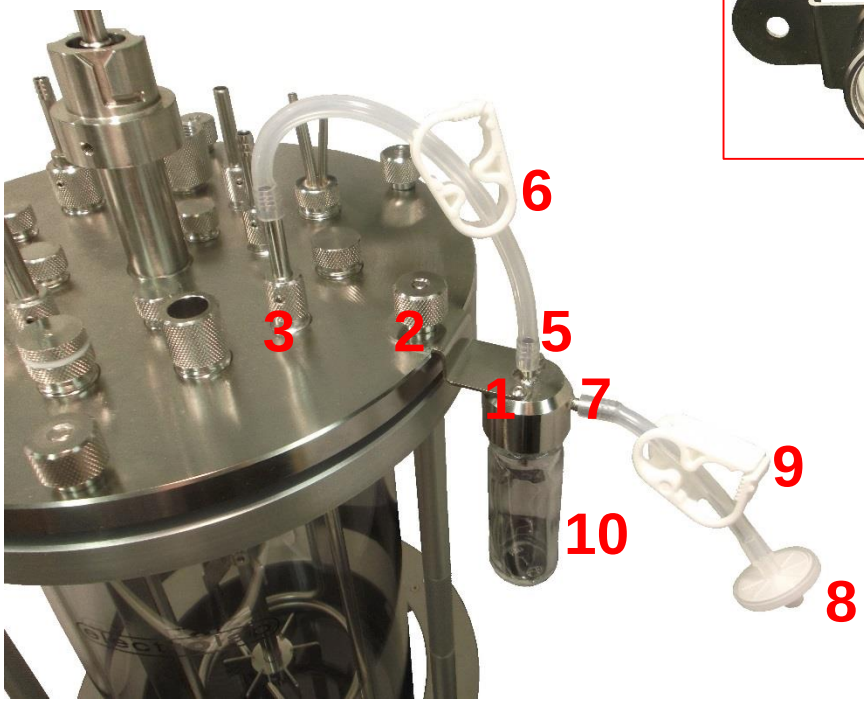
2. Connect a length of silicone tube (approximately 15-20 cm, depending on bioreactor size) to the central inlet pipe of the sample device hood (5). Add a suitable tubing clamp (6) to the tubing, and connect the other end onto the bioreactor long dip-tube/sample pipe (3). Close the tubing clamp.

3. Connect the side arm (7) of the sample device hood to the syringe filter (8) with a shorter length of silicone tube (approximately 8cm), again fitting it with a tubing clamp (9). Leave the tubing clamp open.

4. Screw a suitable sample bottle in place (10) before autoclaving.

Warning!
When autoclaving the sample device, ensure that the tubing clamp closest to the syringe filter is OPEN, and that the tubing clamp on the sample line is CLOSED. Failure to observe these precautions may cause damage to the sample bottle.

Sample Device Parts Identification



Taking a Sample

Using this method minimises the risk of bioreactor contamination.

1. With the plunger fully in, connect a syringe to the syringe filter (8).
2. Ensure tubing clamp 6 is fully closed and tubing clamp 9 is open.
3. Pull back on the syringe plunger to create a vacuum in the sample bottle. You should feel resistance. Before releasing the plunger, fully close tubing clamp 9.
4. Remove the syringe from the filter.
5. Gently release the tubing clamp 6. Media should be seen to flow along the tubing and into the sample bottle.
6. Fully close tubing clamp 6.
7. Using best aseptic technique, exchange the sample bottles as quickly as possible to minimise the risk of contamination. Then cap the used sample bottle.
8. Discard the first bottle, as it is likely to contain an unrepresentative sample.
9. Repeat the process (steps 1-7) to take the first proper sample.
10. If the volume taken into the bottle is insufficient, repeat steps 1-6, without first exchanging the bottle.

ELECTROLAB FEED BOTTLE TOP WITH GL45 CAP

The Electrolab Feed Bottle Top is fitted with a GL45 bottle cap which is designed to fit all media bottles using the GL45 cap size, which covers a range of 25ml to 20 litres.

The bottle top is supplied fitted with a length of PTFE tube which screws in from the bottom. Insert the PTFE tube into the media bottle and screw on the cap. Should you need to replace the PTFE tube, unscrew it from the bottle top in an anti-clockwise direction. Screwing the replacement tubing into the bottle top in a clockwise direction will make an airtight seal.

The bottle top is also supplied with a filter which screws into the side of the bottle top. We recommend that the thread of the filter is lightly greased prior to insertion into the bottle top.

It is essential that the cap is left slightly loose during autoclaving. Uneven heating or cooling of the autoclave can create moisture which in turn can cause the PTFE membrane in the filter supplied with the bottle top to "blind". In this event, pressure can build up resulting in the bottle fracturing in the autoclave.

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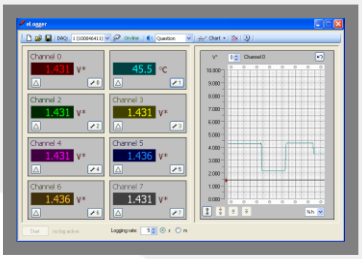
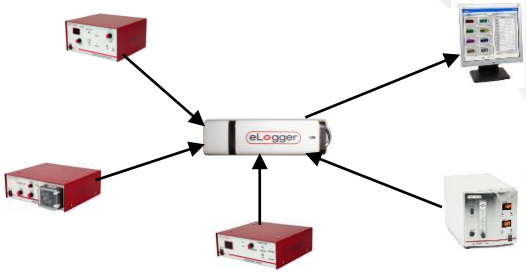
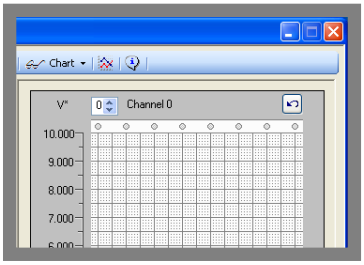
Electrolab eLogger - More than just a Data Acquisition System

Instructions Electrolab eLogger Software







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ELECTROLAB eLOGGER
DATA LOGGING & GRAPHING SOFTWARE

Uninstalling the software

Electrolab eLogger software can be uninstalled by using Windows Control Panel, "Add and Remove Programs".

Running the software

From the START menu, select "All Programs", hover over Electrolab and then select eLogger from the drop-down menu.

Using the software for the first time

When the Electrolab eLogger is used for the first time or when a new Data Acquisition System (DAQ) is added, the Registration dialogue box will appear (Figure 1).

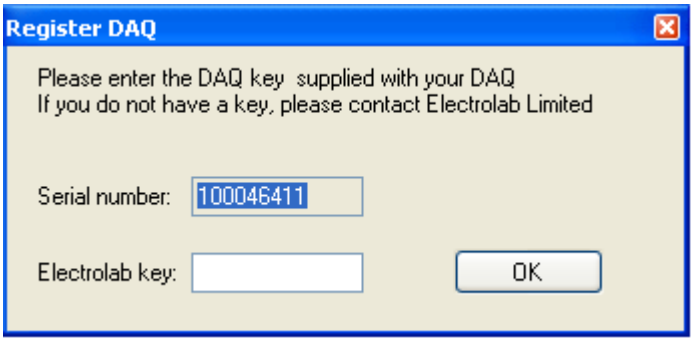

Figure 1

Enter the Electrolab key which is supplied with each DAQ. Each DAQ has a unique key which is printed on the base of the interface module and can only be used for that individual DAQ. If the key should be lost, email Electrolab (sales@electrolabtech.co.uk) with the serial number of your DAQ and a new key will be issued.

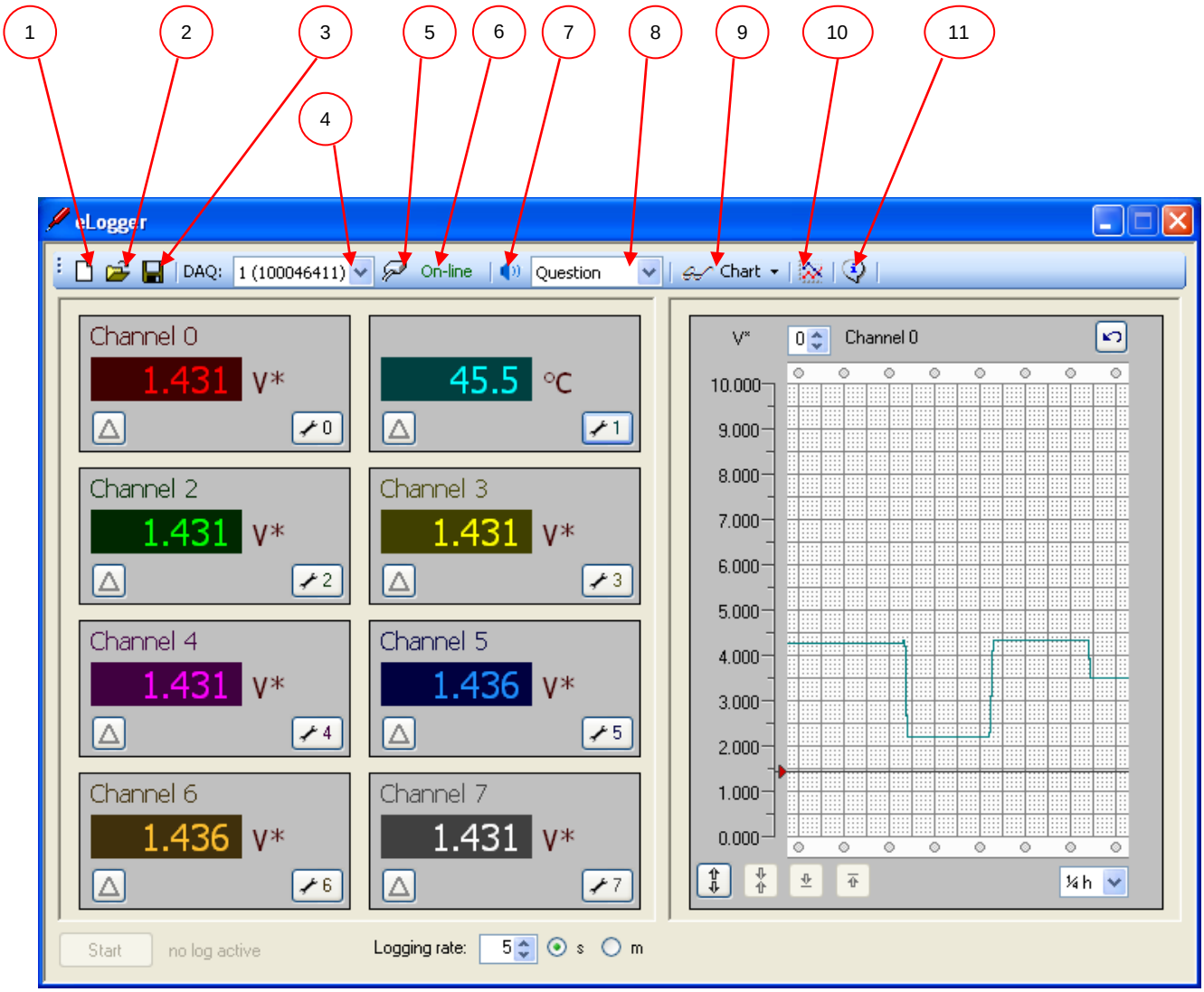

Figure 2

Figure 2.1
This will open a new log. The "Create New Log" dialogue box will open and a new file name will be requested. The data file is saved at the start of each log to prevent accidental loss in the event of a computer failure. Logs can be saved into any directory. We would suggest creating a new directory (eLogs) within "My Documents" but they can be stored in any directory you choose.

Figure 2.2
This will open an existing eLogger file (*edb) where it can be re-started. The "Open Existing Log or Template File" dialogue box will open and the selected eLogger file can be selected. By changing the file type (See Figure 3), an existing Template file (*etp) can be selected (See also Figure 2.3 below).

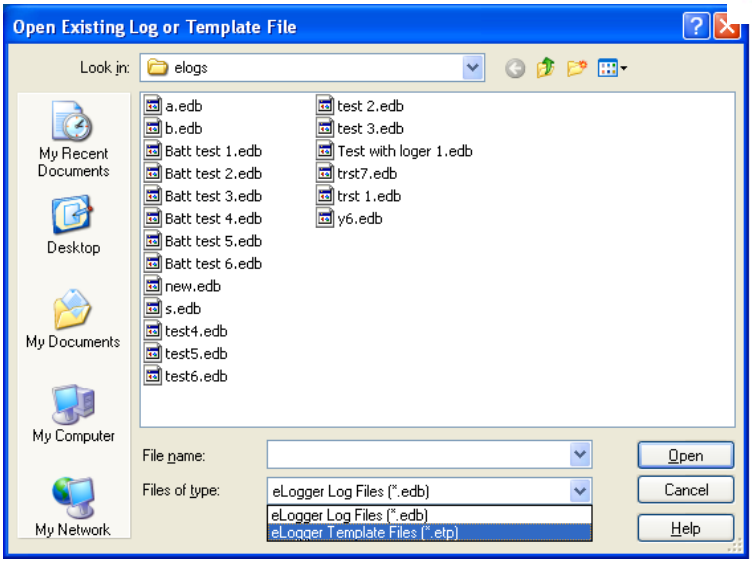

Figure 3

Figure 2.3
This will save your current configuration as a Template file (*etp).

NOTE:
There is no separate "Save File" function as your log is automatically and continuously saved once logging has started.

Figure 2.4
This will allow you to select the DAQ you are using. It is possible to have several DAQs connected to your computer for different applications but only one can be used at a time.

Figure 2.5
If you have more than one DAQ connected to your computer and the required DAQ does not appear in the Select DAQ drop-down menu, this will scan your computer to locate all DAQs connected.

Figure 2.6
This will tell you whether the DAQ you have selected is On-line (active), Idle (not selected) or Off-line (a fault or the DAQ has been disconnected).

Figure 2.7
This allows you to turn the audible warning alarm On or Off (See Alarms - Page 8)

Figure 2.8
This allows you to select from the drop-down menu the audible warning alarm sound you require.

Figure2.9
This allows you to select and view from the following:-

Chart - This gives a trend chart of your process (See Chart - Page 10)
Event - This gives a view of all events, eg alarm, log stop/start (See Events - Page 11)
Notes - This provides a location to add any notes which are time stamped. (See Notes - Page 12)

Figure 2.10
This takes you to the eLogger Graphing Program (See eGrapher - Page 14)

Figure 2.11
This is where information about your version of Electrolab eLogger and contact details for Electrolab Limited can be found.

MEASUREMENT CHANNELS - VIEWS & SETTINGS

The left hand side of Figure 2 shows the 8 channels available. Each channel has its own identity number. Figure 4 shows Channel 1 but all channels are configured in the same way.

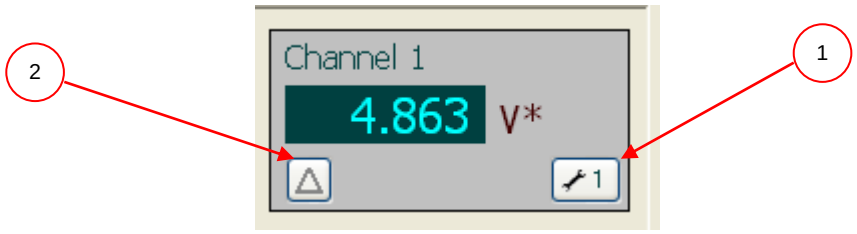

Figure 4

Configure Channel Settings

NOTE:
Channel settings can only be changed at the start of a new log. They cannot be changed for a log which has already started.

Click on "Configure Channel Settings" (Figure 4.1) to bring up the Channel Settings dialogue box (Figure 5).

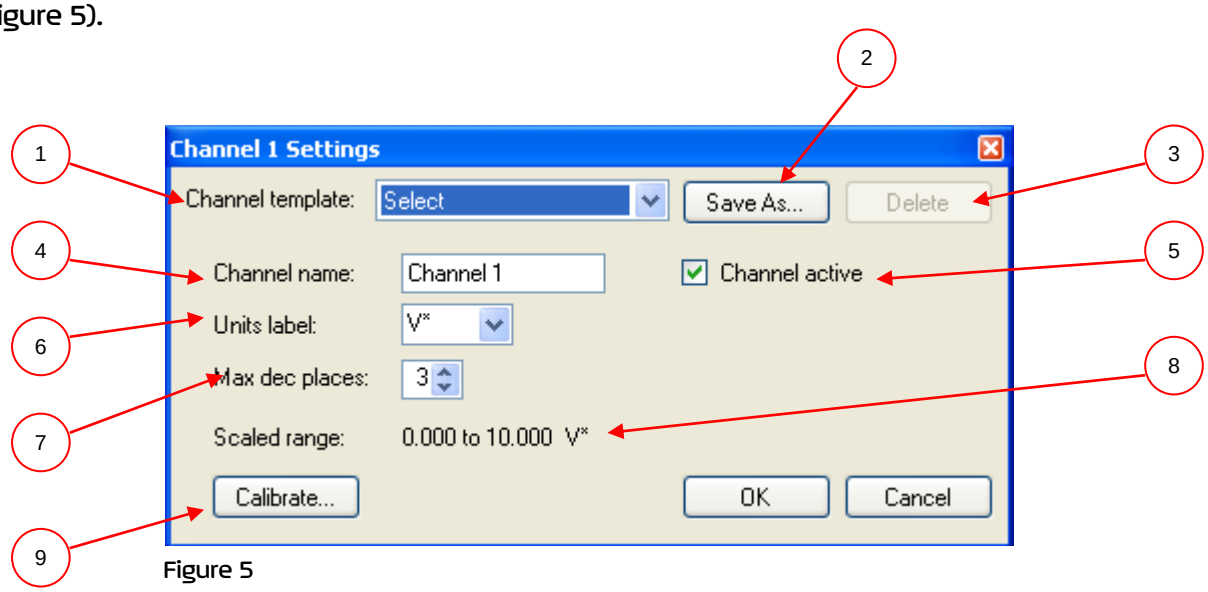

Figure 5

Figure 5.1
This enables a pre-determined channel template or set-up calibration for the template to be selected and brought forward. (See Calibration Page 5)

Figue 5.2
This allows you to save, using a new name, a new or modified existing set of channel settings creating a new channel template.

Figure 5.3
This allows you to delete the selected channel template.

Figure 5.4
This allows you to give the channel a name, eg "Temperature Value 1".

Figure 5.5
Selecting this box will activate the channel. If the box is de-selected, the channel will be made inactive and its display will be blank.

Figure 5.6
This allows you to select from the drop-down menu the measurement units you want to use.

Figure 5.7
This allows you to select the number of decimal places you wish to record.

Figure 5.8
This displays the scale calibrated range of the DAQ.

Figure 5.9
This takes you to the Calibration screen (See Figure 6).

CALIBRATION

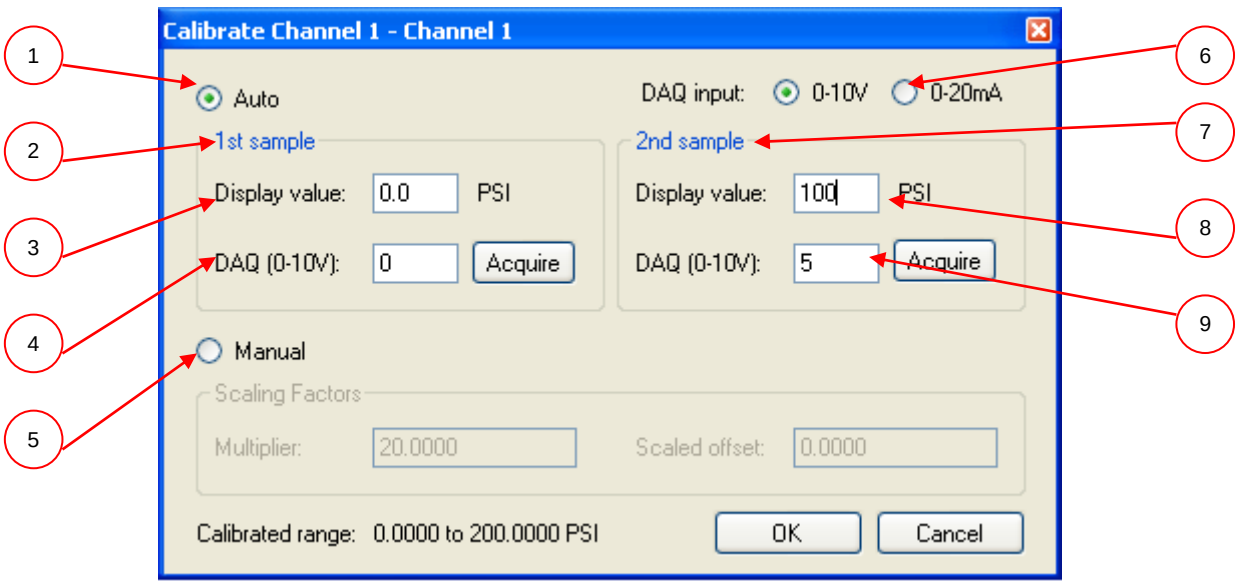

Figure 6

Figure 6.1
This allows you to select automatic or semi-automatic calibration (See Automatic Calibration Page 6)

Figure 6.2
This is the First Sample label which is normally the lower of the two samples.

Figure 6.3
This allows you to input manually the displayed value of the first sample in units, eg PSI.

Figure 6.4
This is the input voltage for the DAQ for the first sample which can either be entered manually or automatically by clicking the Acquire button.

Figure 6.5
This allows you to select manual calibration. (See Manual Calibration Page 7).

Figure 6.6
This allows you to select the correct DAQ input range for the DAQ supplied.

Figure 6.7
This is the Second Sample label which is normally the higher of the two samples.

Figure 6.8
This allows you to input manually the displayed value of the second sample in units, eg PSI.

Figure 6.9
This is the input voltage for the DAQ for the second sample which can either be entered manually or automatically by clicking the Acquire button.

Automatic Calibration

Automatic calibration can operate in two scenarios:-

1. Where the relationship between the output voltage (mA) and measurement reading is known.

   For example:
   To calibrate a transmitter reading 0-100psi which has an output voltage of 0-5 volts:-

   a) For the first sample (normally the lower value), enter the voltage 0 into the DAQ box (Figure 6.4).
   b) Enter the display value 0 psi into the display value box (Figure 6.3).
   c) For the second sample (normally the higher value), enter the voltage 5 into the DAQ box (Figure 6.9).
   d) Enter the display value 100 psi into the display value box (Figure 6.8).
   e) Click OK to accept the calibration.

2. Where the exact relationship between the output voltage and the measurement reading is not known or may not be correct.

For Example:
To calibrate a temperature transmitter whose output is not known or has had a different sensor fitted which needs to be recalibrated:-

a) For the first sample (normally the lower value), place the temperature sensor in cold water where the temperature is measured to be exactly 4.1°C.
b) Click the Acquire button (Figure 6.4) which will read the voltage from the DAQ.
c) Enter the exact temperature measured value of 4.1°C into the display value box (Figure 6.3).
d) For the second sample (normally the higher value), place the temperature sensor in hot water where the temperature is measured to be exactly 45.55°C.
e) Click the Acquire button (Figure 6.9) which will read the voltage from the DAQ.
f) Enter the exact temperature measured value of 45.55°C into the display value box (Figure 6.8).
g) Click OK to accept the calibration.

NOTE:
Even if the relationship between the input voltage and the measurement reading is known, the second method can be more accurate, providing you are able accurately to measure the variable in question, as it can eliminate any measuring errors between the transmitter and the logger.

Manual Calibration

Manual calibration is only recommended if you want to use the basic DAQ range or a convenient multiplier and offset factor.

Once you have accepted the calibration in the Calibrate Channel screen, you will be taken back to the Channel Settings screen. (Figure 5).

You can either:-

- Click OK to accept, or
- Save the calibration settings as a Channel template by entering a new name in the Channel Template box (Figure 5.1) and clicking Save As (Figure 5.2). This allows several different types of sensors to be used for each channel.

ALARMS

Click on "Set Alarms" (Figure 4.2) to bring up the Channel Alarms dialogue box (Figure 7).

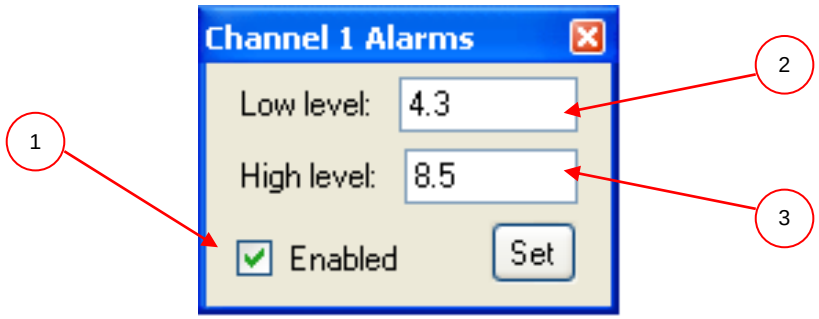

Figure 7

Figure 7.1
This allows you to enable or disable the alarm

Figure 7.2
This allows you to enter the low level for an alarm.

Figure 7.3
This allows you to enter the high level for an alarm.

Click on SET to confirm the settings or X to cancel.

NOTE:
If the SET button is "greyed out", the low or high settings are wrongly set or reversed.

1. When the Alarm is disabled the Alarm button (Figure 4.2) will be "greyed out".
2. When an Alarm is set, the Alarm button (Figure 4.2) will be green.
3. When there is an Alarm condition, the Alarm button will be red and an adjacent arrow will indicate whether the alarm is low or high.
4. If the audible warning alarm is enabled, the audible warning will sound and will continue until the alarm is acknowledged.
5. When the Alarm button is clicked to acknowledge the alarm, the button will be orange.
6. The alarm condition can then be investigated and corrected, or the alarm low and high values adjusted.
7. If a log has started, the alarm condition will be entered into the Events Diary (See Events Diary Page 11).

LOGGING RATE

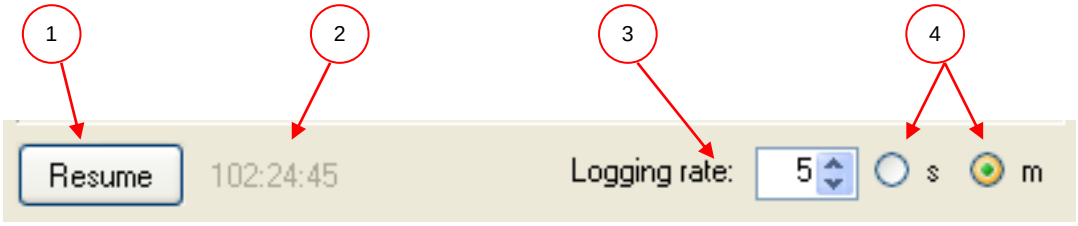

Figure 8

Figure 8.1
This will display START when a new log has been selected. Once the log has started it will change to display STOP. If the log is stopped during a log, it will change to display RESUME.

Figure 8.2
This will display the logging time. The indicated logging time freezes when the log is stopped but the timer continues to run in the background so that when the logging is resumed, it will read the full time since the log was started. On the graph, the time period when the logging is stopped will appear blank (See eGrapher Page 14). A record of stops and resumes is kept in the Events Diary (See Events Diary Page 11).

Figure 8.3
This is the period at which each log point is made.

NOTE:
This can only be set before the start of a new run. It cannot be changed during a run.

Figure 8.4
This will allow you to select the range of the logging rate between 5 to 60 seconds, or 1 to 60 minutes.

SELECT VIEW (See Figure 2.9)

This allows you to select and view the following:-

Chart
Event
Notes

Chart
This provides a trend chart of the logs. It is not intended to give a full graphing facility (See eGrapher Page 14) but merely to indicate the trend or direction of the measured values being logged. This chart runs continuously and is not saved.

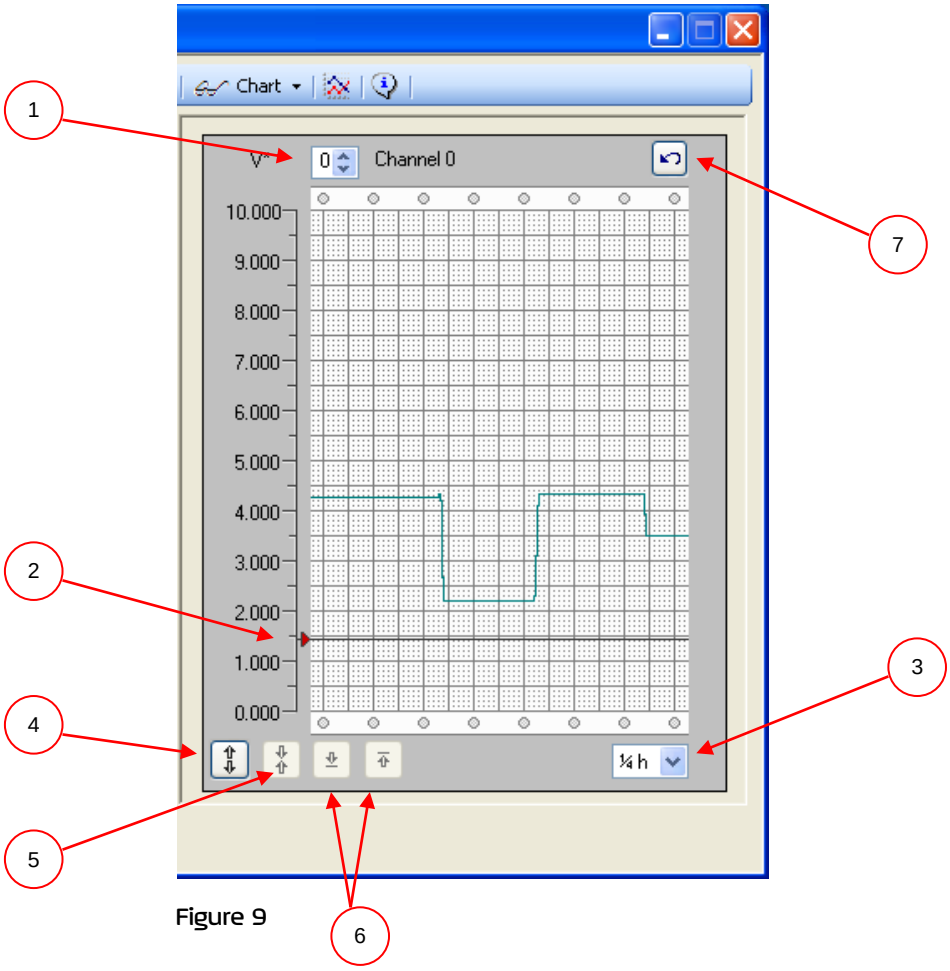

Figure 9

Figure 9.1
This allows you to select the channel to be viewed. The scale will change to reflect the channel being viewed.

Figure 9.2
This pointer on the scale indicates the channel being viewed.

Figue 9.3
This allows you to select the time span of the chart and has a range of 1/4 hour to 8 hours.

Figure 9.4
This allows you to expand the scale shown on the screen (the Y axis), eg 0 to 10 volts expanded to 0 to 5 volts.

Figure 9.5
This allows you to compress the scale shown on the screen (the Y axis).

NOTE:
When the scale is either expanded or compressed, the measuring point will automatically be located at the centre of the scale range.

Figure 9.6
Having selected either expand or compress, these allow the scale to be shifted up or down.

Figure 9.7
This allows you to erase the trend chart and set the time back to zero.

Events Diary

Once a log has started, the events diary automatically records and saves details of all events which occur during the log.

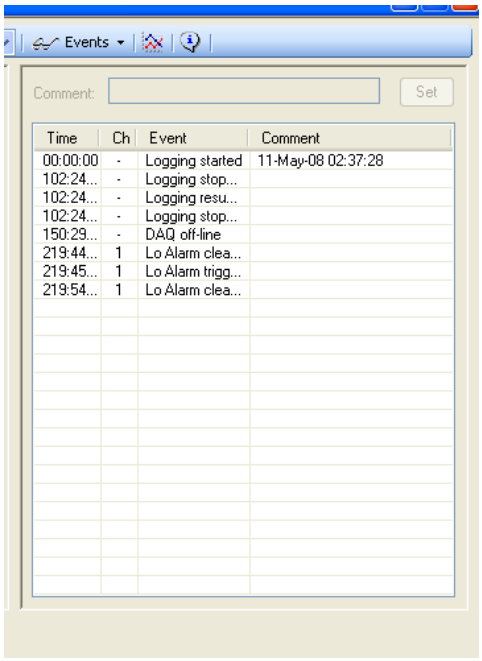

Figure 10

The events recorded are:-

Log started (together with date & time)
Log stopped
Log resumed
Alarm triggered - High
Alarm triggered - Low
Alarm cleared
DAQ online/offline

All these events are time stamped.

Comments may be added to events of interest (eg the reason for stopping a log, or why an alarm was recorded).

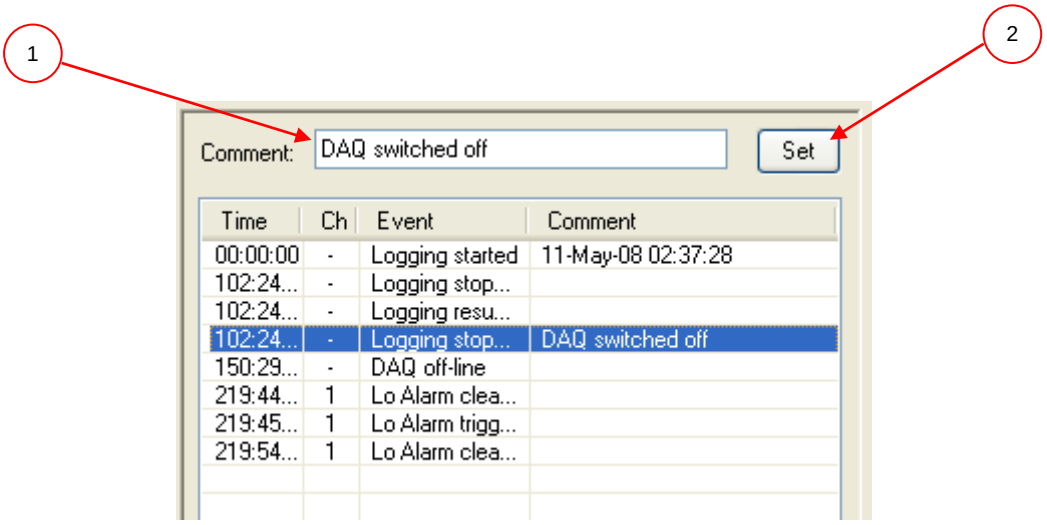

Figure 11

To enter a comment, select the event of interest, type the comment in the Comment box (Figure 11.1) and click Set (Figure 11.2).

To edit a comment, select the event of interest. The comment will reappear in the Comment box where it can be edited and re-saved keeping its original time stamp by clicking Set. A comment can only be deleted by deleting the text in edit mode.

Notes

This allows you to add notes and general comments (eg manual readings from sample, or any problems which may have occurred) throughout the log.

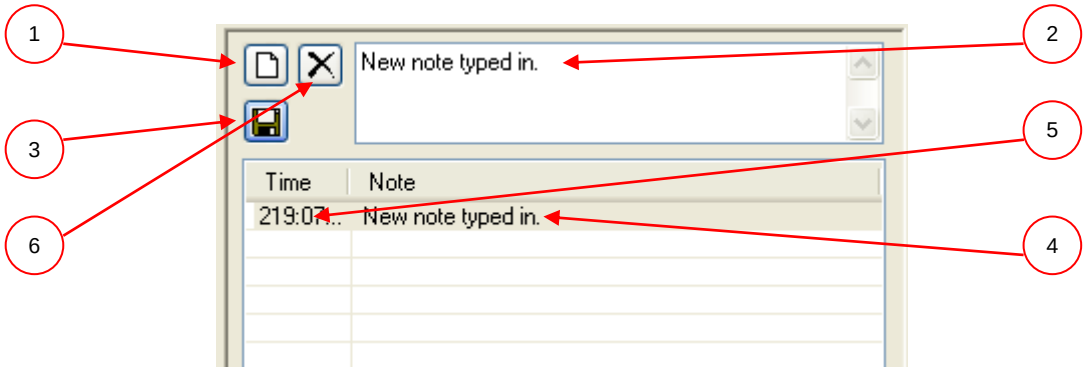

Figure 12

Figure 12.1
Select New Note.

Figure 12.2
Type the note/comment in the Notes box.

Figure 12.3
Select Save.

Figure 12.4
The note will be recorded in the Notes diary.

Figure 12.5
The note will be time stamped.

Figure 12.6
A selected note can be deleted.

Selecting a note recalls it to the Notes box where it can be edited and re-saved, keeping its original time stamp.

NOTE:
The actual time stamp cannot be modified or back-dated.

ELECTROLAB eGRAPHER

The Electrolab eGrapher is a sister program to the eLogger and is normally opened by clicking the eGrapher button (Figure 18.1) on the main screen (Figure 2.10).

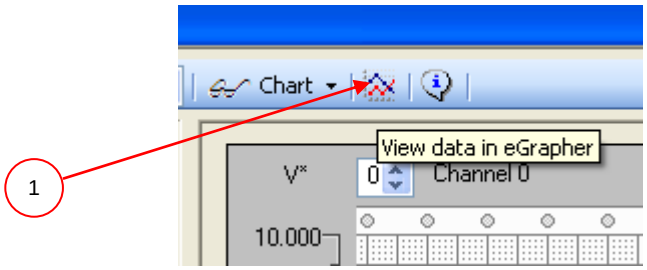

Figure 13

eGrapher opens in a separate window and also opens the log which the eLogger is currently logging. The eGrapher can also be used as a separate program independent of the eLogger by opening directly from the program menu (Figure 19).

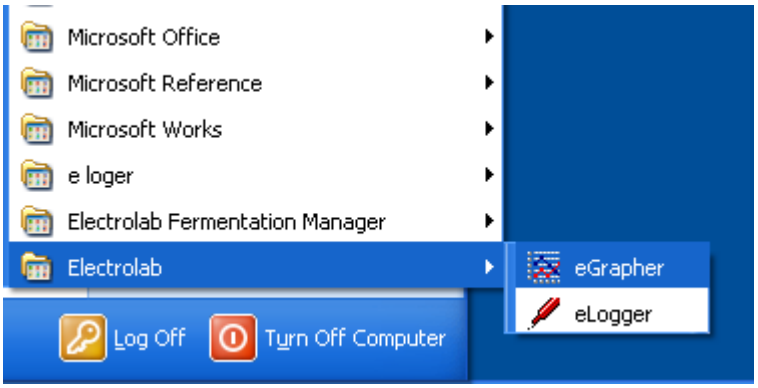

Figure 14

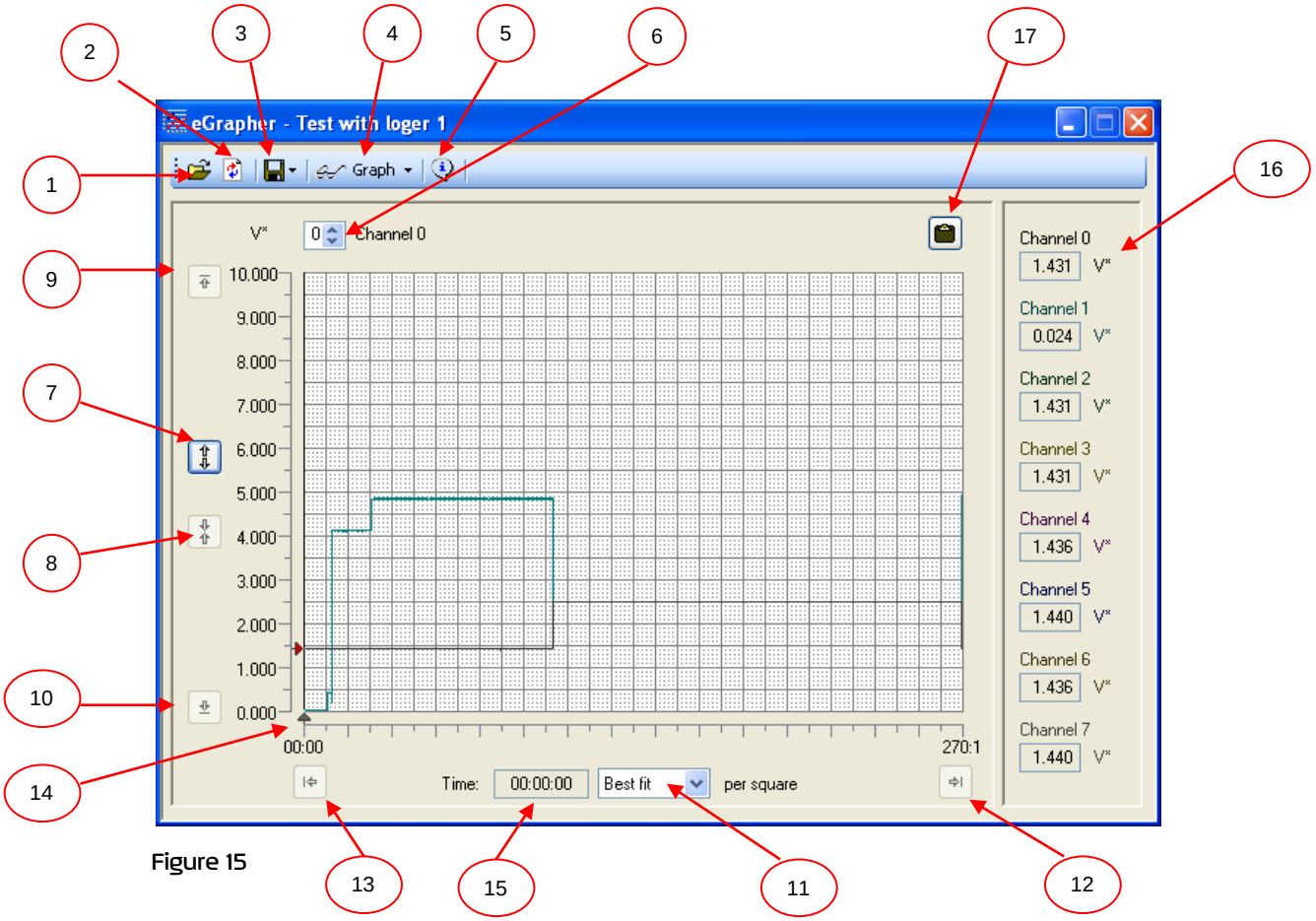

Figure 15

Figure 15.1
This will open an existing log into the eGrapher program.

Figure 15.2
This will refresh and add any new data to the current view from a log which is still running.

Figure 15.3
This allows you to select Data, Events or Notes to be exported to another program.

Figure 15.4
This allows you to select a view of the following:-

Graph - a graphic view (Figure 15)
Commentary - a view of the events log and notes diary (Figure 16)

Data - a view of the numerical data (Figure 17)

NOTE:
The data has to be read from the hard drive so can take some time to appear.

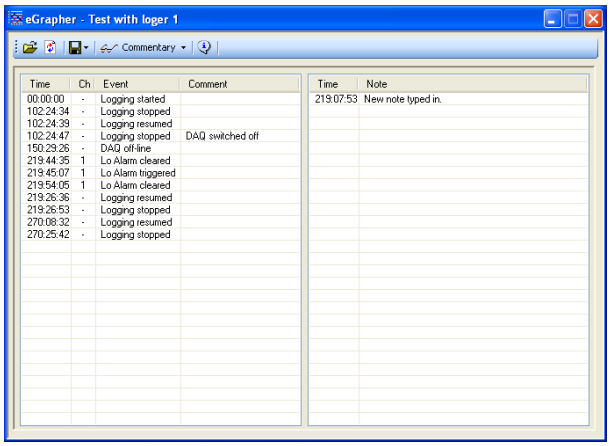

Figure 16

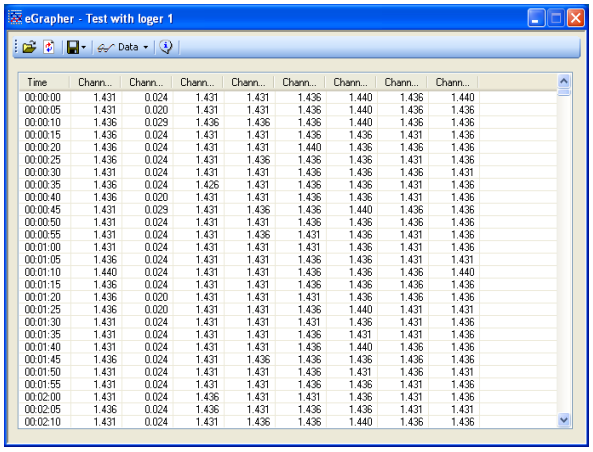

Figure 17

Figure 15.5
This is where information about your version of Electrolab eGrapher and contact details for Electrolab Limited can be found.

Figure 15.6
This allows you to select the channel to be viewed. The scale will change to reflect the channel being viewed.

Figure 15.7
This allows you to expand the scale shown on the screen (the Y axis), eg 0 to 10 volts expanded to 0 to 5 volts.

Figure 15.8
This allows you to compress the scale shown on the screen (the Y axis).

Figure 15.9
This allows you to shift the Y axis up.

Figure 15.10
This allows you to shift the Y axis down.

Figure 15.11
This allows you to select the time base you require from the drop-down menu (Figure 18).

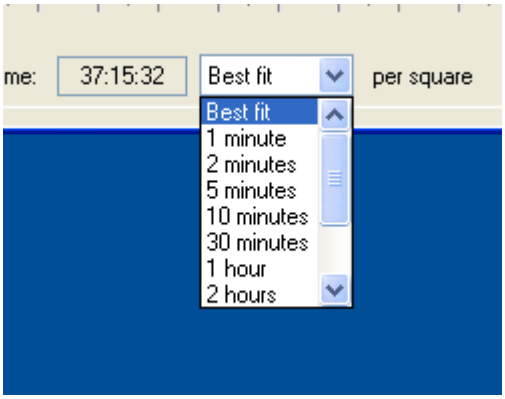

Figure 18

Best fit will show the full log on the screen. Selecting a time allows you to view the X axis in more detail, eg selecting 10 minutes changes the view of the graph to be 10 minutes per division.

Figure 15.12
When a time has been selected, this allows you to shift the X axis to the right a division at a time. It is not available when Best Fit is selected.

Figure 15.13
When a time has been selected, this allows you to shift the X axis to the left a division at a time. It is not available when Best Fit is selected.

Figure 15.14
This pointer can be moved along the X axis. As it moves along the axis, the exact time will be shown in the time box (Figure 15.15) and the value for the individual channel will be shown on the right hand side (Figure 15.16).

Figure 15.15
This will indicate the exact time of the log at the pointer on the X axis.

Figure 15.16
As the pointer moves along the X axis, this will show the value for the individual channel.

Figure 15.17
This allows you to copy the graph on the screen to the clipboard for insertion into another document.