

DAVEY

ECO  **matic™**

Commercial Series II Salt Water Pool System

120,240 & 400 g/h Models

Installation & Operating Instructions



Please pass these instructions on to the operator of this equipment.

DEPEND ON
DAVEY

WATER PRODUCTS



Rainbow Pool Products

PO Box 2388, Mansfield Qld 4122

Telephone STD 61-7-3849 5385

Facsimile STD 61-7-3849 5384

Email: info@rainbowpoolproducts.com.au

Web: www.rainbowpoolproducts.com.au



Commercial Series II Salt Water Pool System

Congratulations! You are now the proud owner of a renowned ECO-matic™ High Output Salt Water Chlorinator. Please read all information in this installation and operating instruction carefully before installing or operating your Salt Water Pool Chlorinator.

Table of Contents

Packing List.....	2	Control PCBA Overview	17
INSTALLATION INSTRUCTIONS	3	PCBA Supply & System Control Input.....	18
General, Power Supply and Control Panel.....	3	Voltage and Current Selectors & System Timing.....	19
Electrolytic Cell Assembly, Back-up Sanitation.....	4	Phase Control & Voltage and Current Displays.....	20
ELECTROLYTIC CELL PLUMBING	5	Phase Control Display	21
Simple Bypass Installation.....	5	Control Panel, Cell Production, Polarity & Temperature Display.....	22
Powered Bypass Installation	6	Operation & Winter Mode Switches.....	23
In - line Installation.....	8	Stand By LED	23
Balance Tank Installation.....	9	Cell Power & Flow I Gas LED.....	23
Gas Sensor and Pressure Switch Installation	10	External Control.....	23
ELECTRICAL CONNECTIONS	12	Low Conductivity Display & Shutdown	24
Mains Power, Cell Power and Control Panel.....	12	Low & High Temperature Shutdown	24
CHEMISTRY FOR ECO-MATIC COMMERCIAL SERIES	14	WATER CONDUCTIVITY	24
Salt	14	WINTER MODE.....	25
Pool Stabilizer (Cyanuric Acid/Cyanurates).....	15	MAINTENANCE (Problem checklist).....	26
Other Chemical Levels, Possible Chemical Problems	15	TECHNICAL INFORMATION & TROUBLESHOOTING.....	27
OPERATION OF THE ECO-MATIC COMMERCIAL	16	TROUBLE SHOOTING	28
SYSTEM.....	16	GUARANTEE	29
POWER SUPPLY	16		

Packing List

Included with your ECO-matic system are the following items, please check the contents of the box carefully prior to installing the product:

- | | |
|---------------------------|---------------------------------------|
| 1x POWER SUPPLY | 1x 'O'RINGS, 50mm or 80mm ADAPTOR |
| 1x PRESSURE SWITCH | 2x EUROPEAN ADAPTORS OR |
| 1x CONTROL UNIT | 2x 40/50mm AUS ADAPTORS |
| 1x GAS SENSOR | 1x GAS SENSOR T PIECE 50mm |
| 4x MOUNTING BRACKETS | 1x KEY |
| 1x CELL CABLE (PAIR) | 1x TAP FOR PRESSURE SWITCH (OPTIONAL) |
| 1x EXTERNAL CONTROL CABLE | 1x MANUAL |

INSTALLATION INSTRUCTIONS

General

This system is not intended for outdoor installation. If a pump/filter room is not available, a shelter providing shade and weather protection will be necessary. Please note that the installation area should be well ventilated and free of substances that could cause corrosion. **Installation must be done in accordance with any local regulations.**

When deciding on the position of the unit take care to allow for the cable lengths available.

Approximate maximum placement distances are:

Power Supply Control Panel - 1.5m

Power Supply to Electrolytic Cell- 3m

Control Panel to Gas Sensor (Cell) - 4

Actual distances will depend on how the cables between units are run. Check prior to installation.

**IMPORTANT: DO NOT PLACE ANY COMPONENT NEAR SOURCES OF HEAT OR
CHEMICAL VAPOURS (e.g. ACID DRUMS).**

The Power Supply and Electrolytic Cell are very heavy, allow for this during installation. If any components are dropped, damage will occur.

Power Supply

Should be wall mounted using brackets provided. The brackets provide a gap between the back of the unit and the wall for air flow. The unit should be mounted at about head height. That is approximately 1.5 metres above ground level. The brackets are designed for masonry bolts/wall plugs. The unit can be lifted on/off. **Note: this unit is heavy. Please allow for this when installing.**

Instructions for mounting bracket use are provided in the package containing the brackets

Control Panel

Should be mounted at approximately the same height as the Power Supply to allow easy access and viewing. This unit has a "keyhole" mount at center/top/rear. Once the unit has been hung on this mount, two locating screws can be placed at the bottom corners of the unit. These are under the lower cover plate on the front of the unit.

Electrolytic Cell Assembly

Should be installed vertically on its legs and placed down stream from the filter. The cell is heavy and great care should be taken in fitting the legs. **If the cell is dropped the internal housing can be damaged.**

Select the approximate position for the cell and screw the legs to the protruding bolts on the lower flange, **space them equally around the flange circumference.**

The cell should be lifted and then maneuvered until it is vertical and resting its legs. At least 2 people will be required for this operation. Do not attempt to pivot the cell on the legs, as they are not designed to carry a load in this way.

Mounting holes are provided in the leg bases as an option, use as required. The cell is now ready to be plumbed into the pool system.

Back - up Sanitation

In the unlikely event of a system failure or during periods of extreme bather loads and/or very hot weather extra chlorine may be required to maintain sanitation levels in the pool.

The extra chlorine can be provided by a simple chlorine injection device, such as a chlorine pump/feeder, or by simply keeping enough chemical chlorine on hand to manually cope with an emergency.

Remember that the Electrolytic Cell will need to be replaced/ re-conditioned periodically and this may mean a small amount of down -time for the system.

Flow Rates for Optimum Cell Efficiency

The following flow rates through the cell are recommended for optimum efficiency

Model	Flow Rate Litres per Minute	m ³ per Hour
1200	200	12
2400	400	24
4000	650	39

Testing Cell Flow Rate: A number of methods can be used. A flow meter can be installed into the cell line. This can be expensive. Provision can be made for an electronic flow meter to be installed when unit is initially set up, and for re-insertion for future testing.

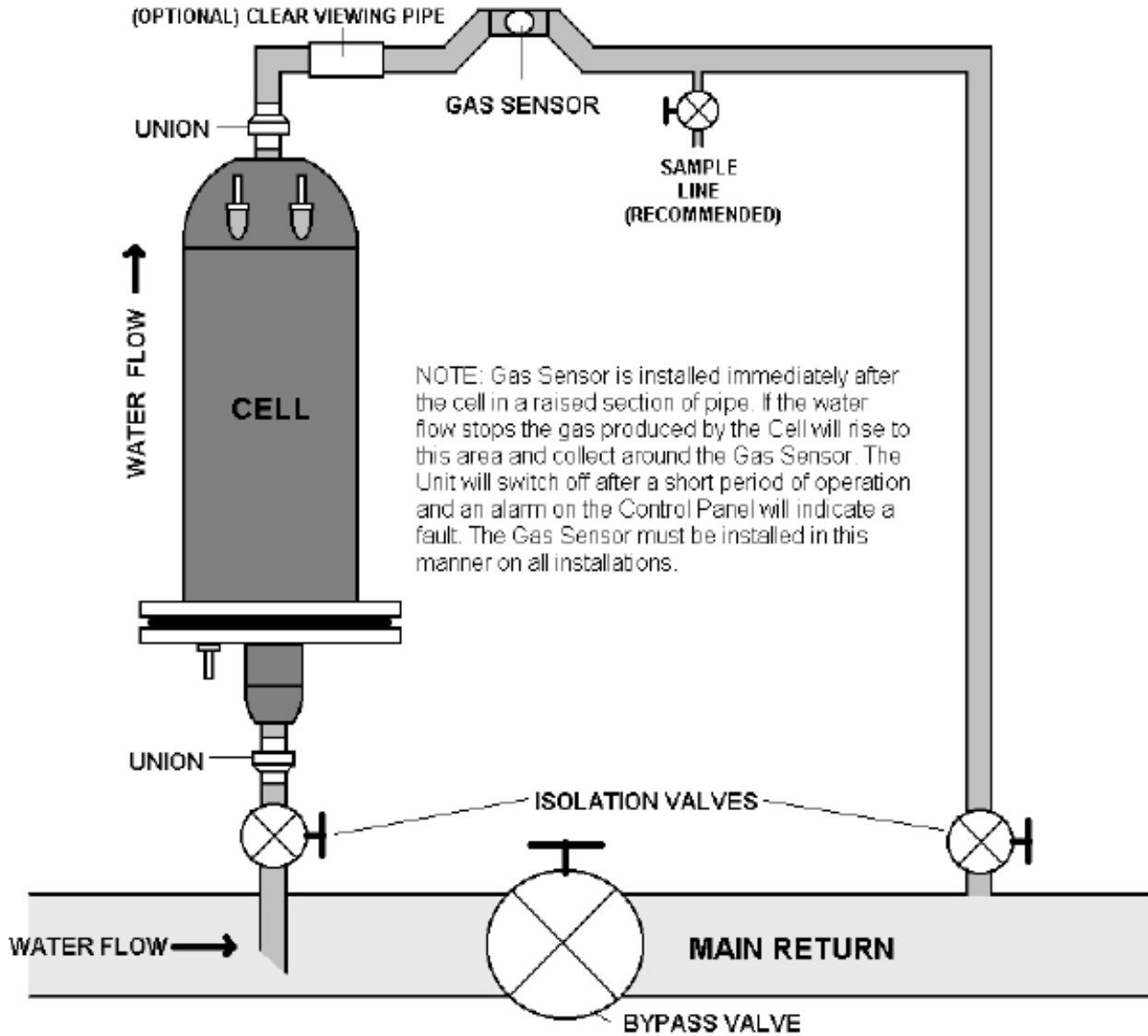
A simple means of testing for efficient cell operation is to test the residual at the cell outlet. If the residual is below 10ppm the cell is operating efficiently. If the residual is above this level the cell flow should be increased.

To test for 10ppm chlorine residual simply dilute the sample (1part sample with 3parts deionised water) and use a standard DPD test kit. The result is multiplied by four (ie test should show less than 2.5ppm).

ELECTROLYTIC CELL PLUMBING

The Electrolytic Cell has been designed to operate in a bypass on the pool return line. Water flow through the cell must be at or above the flow rates specified on page 4 and the water from the cell should be returned to the pool return line as quickly as possible. It is recommended that a sample line be installed to allow testing of water from the Cell. A clear viewing area is also useful to allow a visual check of electrolysis (cloudy water). A number of possible installation methods follow:

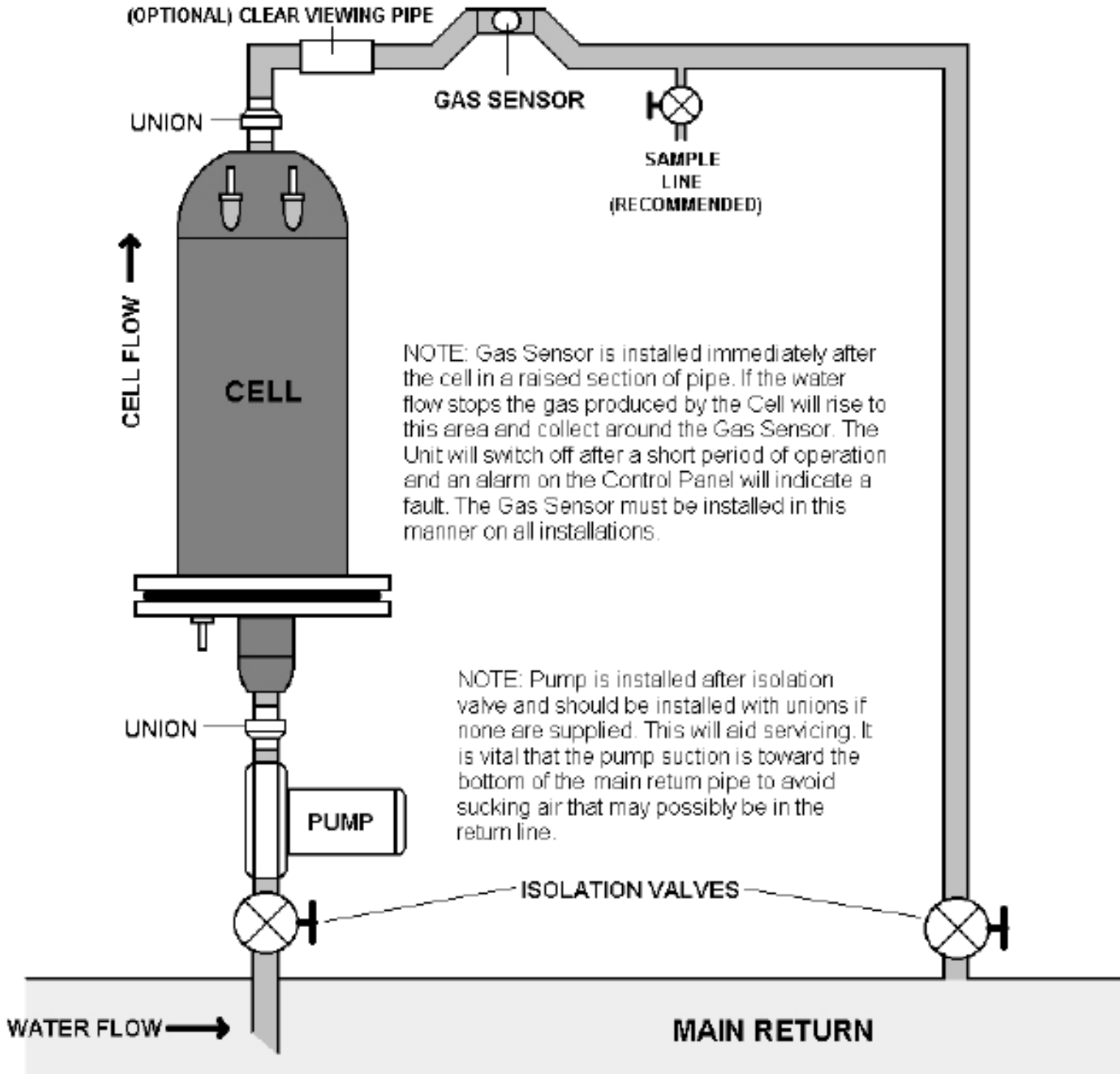
1. Simple Bypass Installation



In this installation the bypass valve is partially closed to force water into the cell bypass and back to the pool return. This will increase the back pressure to the pool pump/filter but should not affect performance unless the pump/filter performance is already poor. Note the use of the Gas Sensor, isolation valves and sample line. The sample line is a simple tap used to collect a sample of cell effluent for chlorine residual testing.

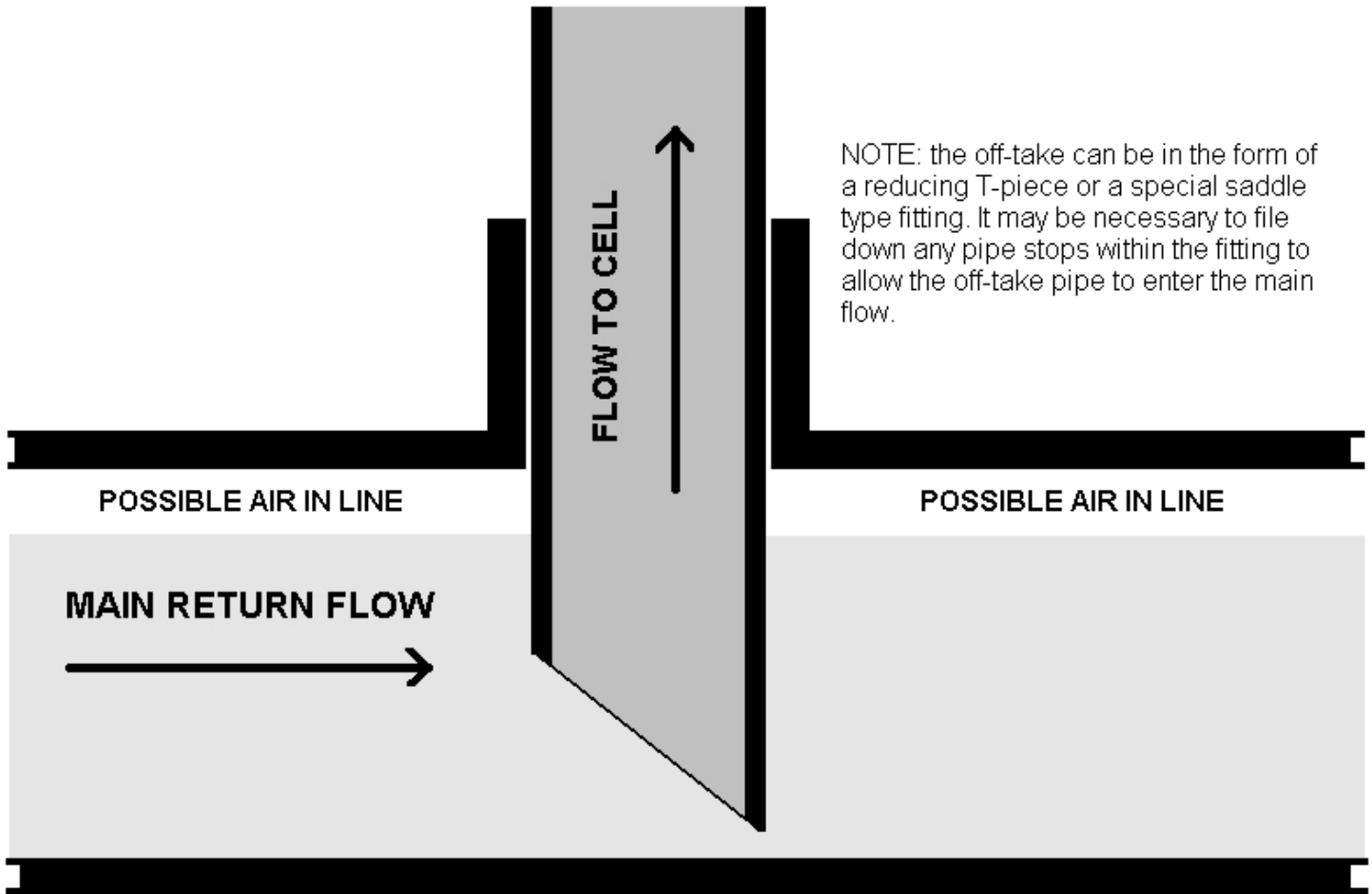
The off-take should be horizontal or pushed to near the return line bottom to avoid the possibility of air in the return line finding its way into the cell (see diagram page 7). The installation of a section of clear pipe before or after the Gas Sensor is beneficial in viewing water flow from the cell. This pipe must be suitable for chlorinated water.

2. Powered Bypass Installation



This installation uses a pump to create flow in the Cell bypass. Note the recommended sample line and optional clear viewing pipe. Please also note that care must be taken at the suction point to avoid air entering the bypass. The off-take could be horizontal or a vertical pipe could be inserted into the pool return to a depth just above the bottom of the pipe, please see the following diagram.

DETAIL OF BY-PASS OFF-TAKE

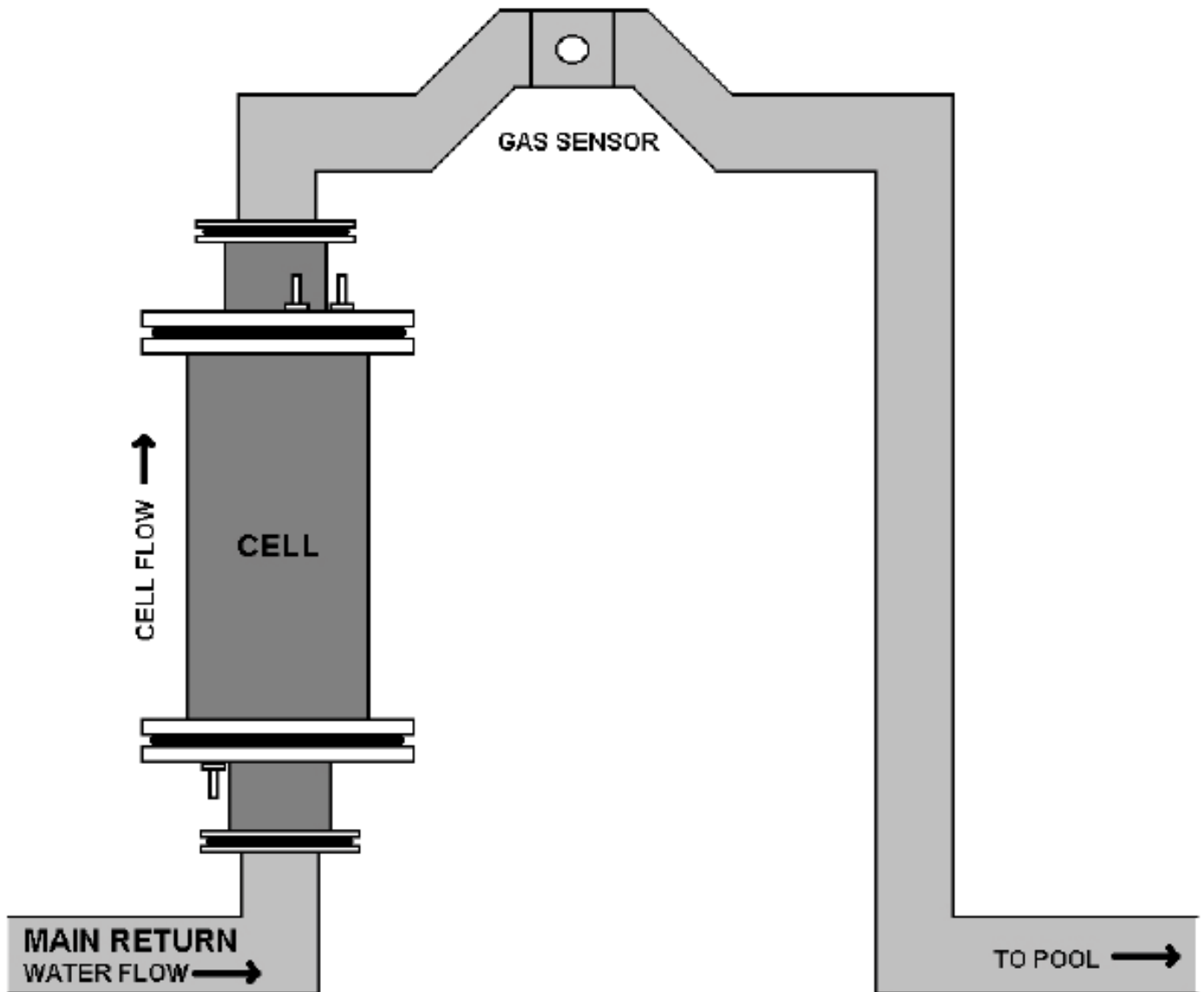


NOTE: the off-take can be in the form of a reducing T-piece or a special saddle type fitting. It may be necessary to file down any pipe stops within the fitting to allow the off-take pipe to enter the main flow.

IMPORTANT: The Bypass Pump must be electrically interlocked to the main pool pump(s). Further to this, a Pressure Switch should be installed in the return line prior to the Cell Installation so that main pump(s) failure can be detected and Chlorinator production turned off. See "Gas Sensor and Pressure Switch Installation".

3. In-line Installation

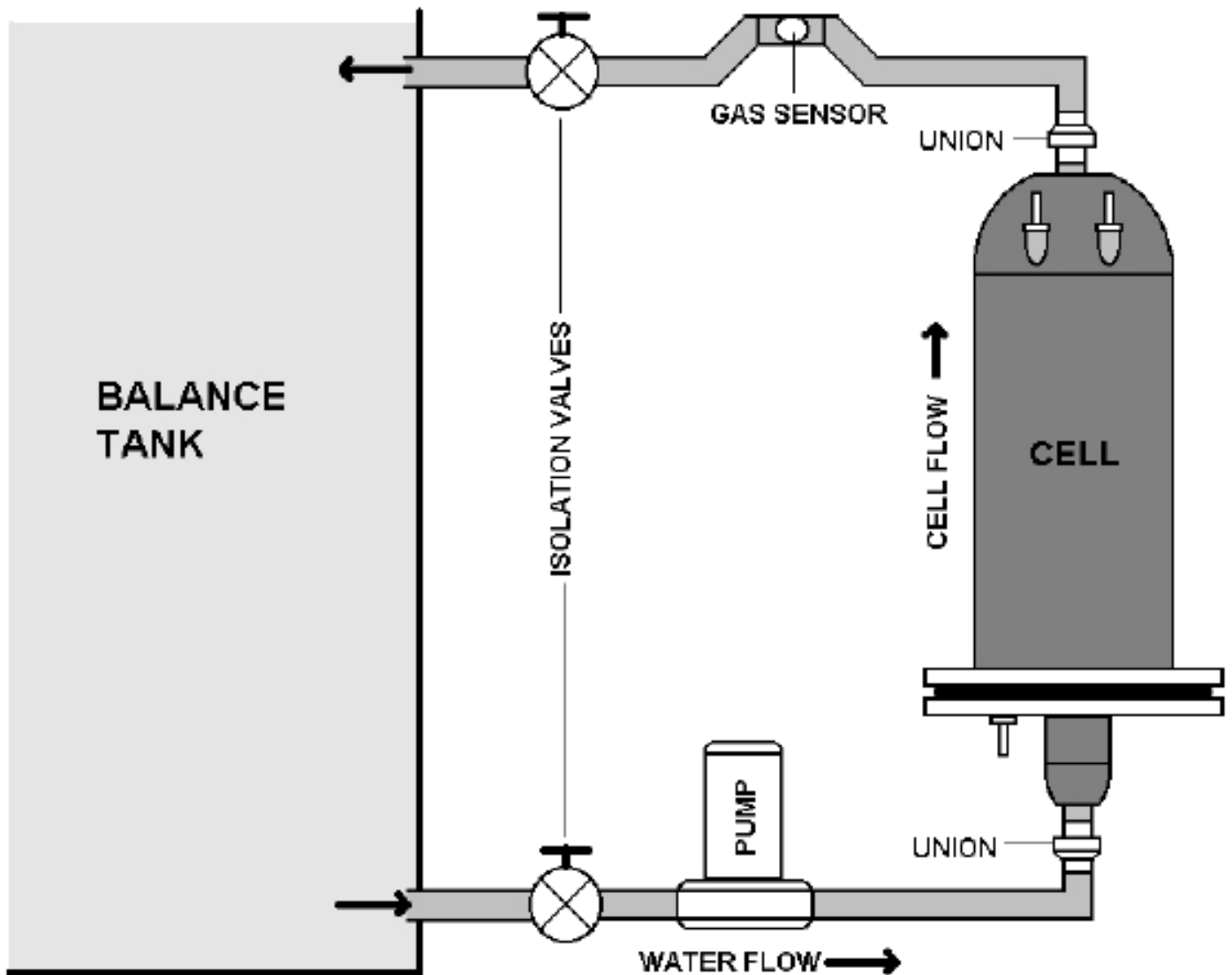
IMPORTANT: A specially engineered cell housing is required for pipe sizes larger than 80mm/3". This special housing is designed to mate with 150mm/6" flanges. Please contact your distributor regarding this installation, as it can be very expensive.



This is a simple installation method but can be very expensive to implement. The cell has 150mm flanges which are used to directly connect the cell into the return line. If the flow is high, the baffles in the cell inlet (shaped like a cross with a circular center) will create some back pressure on the return line.

Please note that there should be a means of maintaining pool water flow when the cell is removed. This is necessary, as the cell must be replaced / reconditioned periodically.

4. Balance Tank Installation

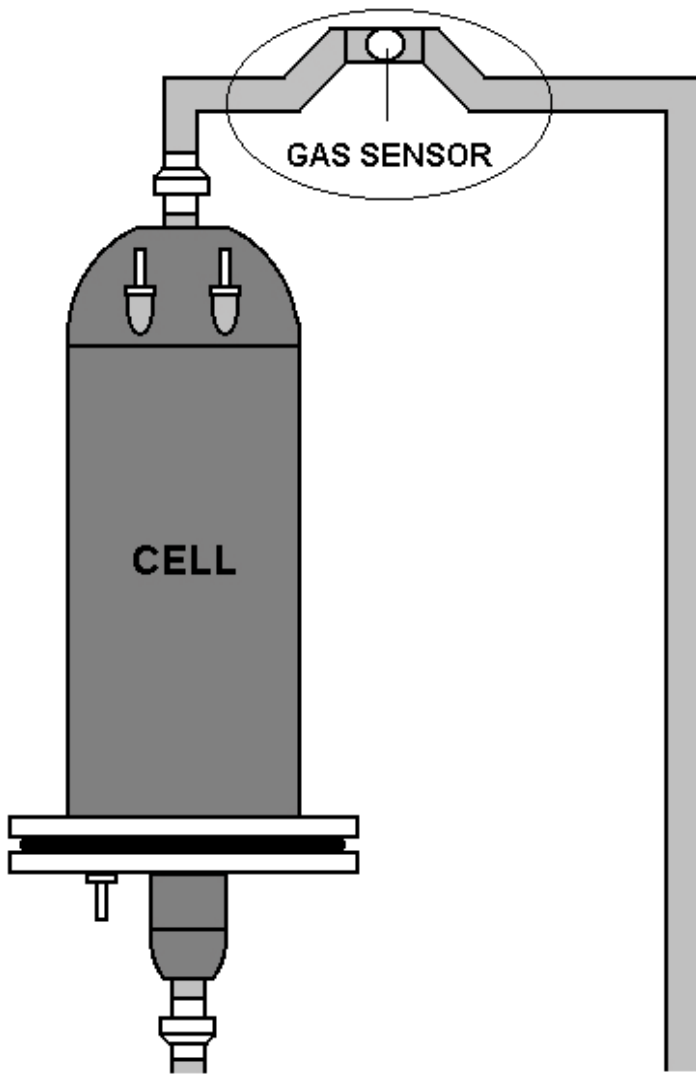


In this installation a pump/filter is used to provide water flow to the cell from the balance tank. The Gas Sensor and Pressure Switch must be used as in the Powered Bypass Installation.

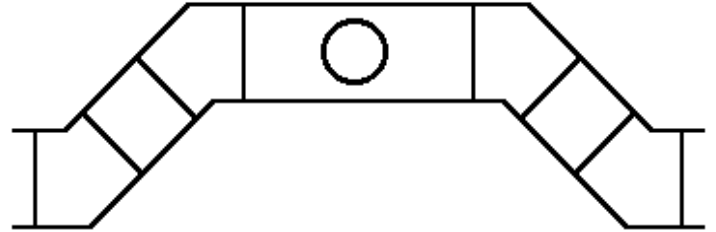
IMPORTANT: the return from the cell to the tank contains hydrogen gas. This must off-gas to the atmosphere before being drawn into the main pump/filter system. If this can not be achieved this installation method should not be used.

GAS SENSOR AND PRESSURE SWITCH INSTALLATION

THE GAS SENSOR SHOULD BE INSTALLED AFTER THE CELL IN THE FOLLOWING MANNER:



GAS SENSOR DETAIL

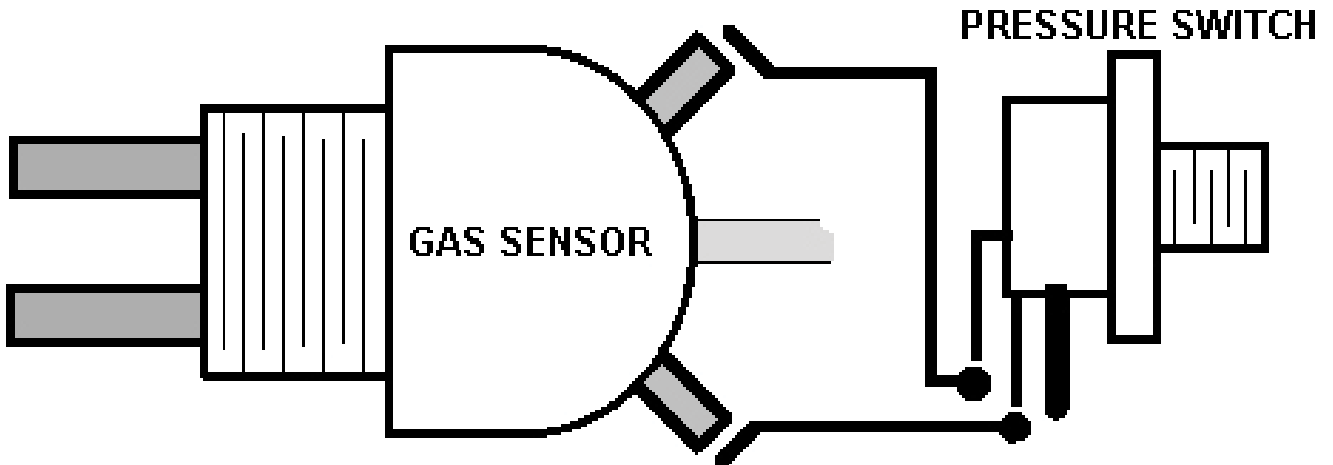


NOTE: the Gas Sensor has a 50mm/2" BSP threaded end for fitting into the water line. The water line will be either 50mm/2" or 80mm/3" and so appropriate fittings and pipe will be required by the installer. Generally there will be a T-piece and four 45 Elbows of the appropriate size needed. If a 3" to 2" threaded reducing T-piece is not available a 3" T-piece can be used with a slip-fit 3" to 2" threaded reducing bush.

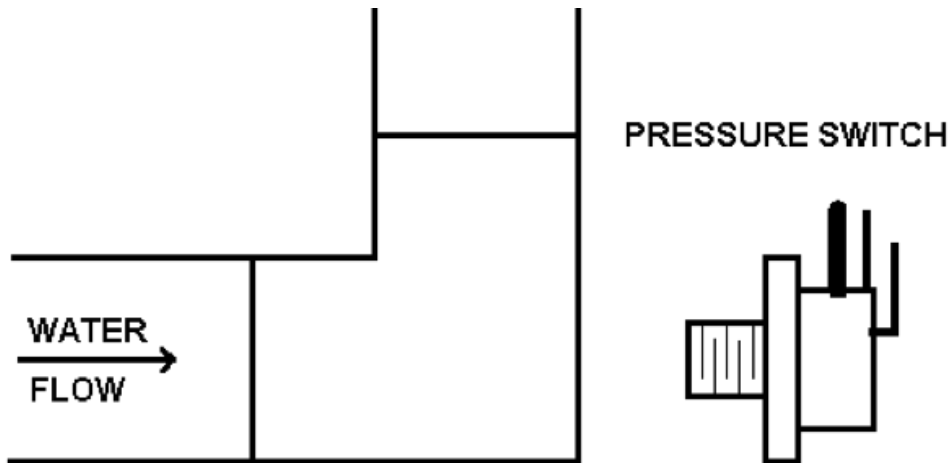
The Gas Sensor is always mounted horizontally and in a raised position to aid the accumulation of gas from the Cell.

Use of Pressure Switch

The Gas Sensor has 2 x 6.3mm spade terminals (male) on either side of its connecting lead. For normal operation these should be connected together with the short lead provided. If a Pressure Switch is to be used, the normally open terminals of the switch must be connected to the Gas Sensor terminals:



Pressure Switch Position - the Pressure Switch must activate when the main pump(s) are on and de-activate when they are off (i.e. no water flow). It could be placed between the pump(s) and filter to take advantage of filter back pressure, or in the return line if enough pressure is available. Placing the Pressure Switch at a bend can be effective:



The thread fitting of the Pressure Switch is 1/8" NPT and the unit can be sealed with Teflon thread tape.

The switch should be placed so that water leaks do not interfere with the electrical switch that is the switch should be mounted on the side or top of a pipe/fitting, not underneath.

Please note that the voltage at the Gas Sensor is isolated Extra Low Voltage and should not pose a shock hazard.

The Pressure Switch is adjustable for static pressure. There is a locking tab on its back – slide it up to allow the adjustment ring to be rotated. Rotation direction is embossed on the switch.

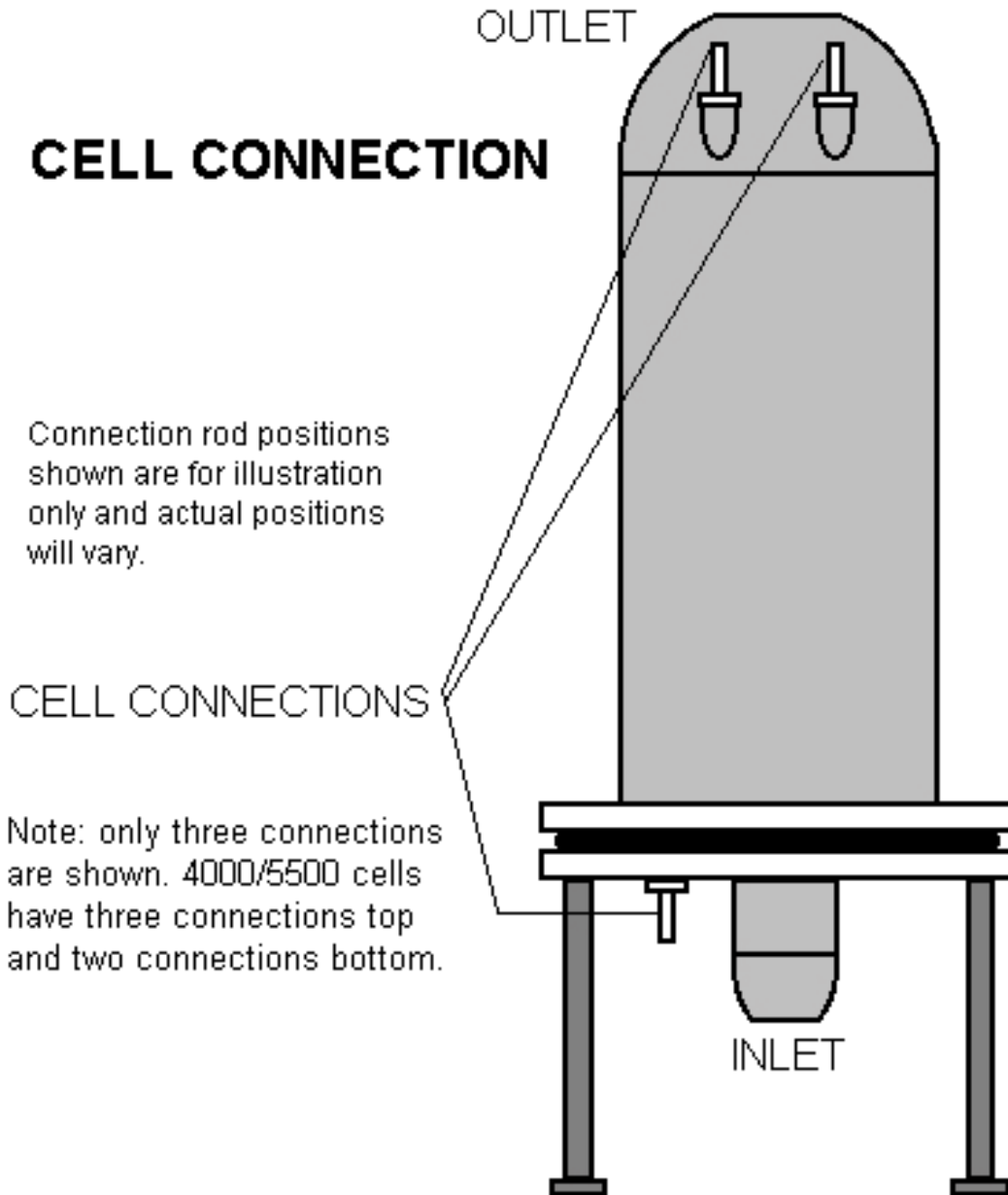
ELECTRICAL CONNECTIONS

1. Mains Power

The Power Supply has a power cord attached to the left-hand side of its bottom panel. The power cord should be terminated in the correct sized male plug - the earth must be connected. The General Purpose Outlet to which the unit is connected should be protected by a Residual Current Device (RCD Safety Switch), see local electrical regulations. **If the supply cord is damaged it must be replaced by a similar cord according to local electrical regulations.**

The electrical supply to the unit should be interlocked to the main pump(s). That is, if the main pump(s) are turned off, so is power to the unit. This can be very important when the Powered Bypass Installation is used. The bypass pump should also be interlocked to the main pump(s) supply.

2. Cell Power



The cell has connections both top and bottom. These protrude through the cell housing. You will find that the black and white 10mm² (or 16mm²) cell cables are terminated in male plugs and brass blocks resembling terminal block mechanisms. Simply fit the brass blocks to the cell connections.

The male plugs should be inserted into their sockets on the right hand side of the bottom panel of the Power Supply. To insert, simply push them in slowly until a click is heard, then try to pull them out. If they are locked in place the connection is correct.

If it is necessary to disconnect the cable, push the connector in further until a click is heard and then remove the connector. This should only be done when power to the cell is off as arcing can result. Arcing will damage the connector. The connector should be kept clean to ensure long life.

3. Control Panel

There are three connectors under the Control Panel (when it is mounted). From left to right, the first is for power and other signals to and from the Power Supply. This connector should be inserted and locked in place first. Do not attempt to connect the units with the power on - damage may result. The connectors are keyed and cannot be inserted the wrong way. **DO NOT FORCE THE CONNECTORS AS DAMAGE WILL RESULT** – the pins and socket contacts can be forced out of their positions if force is used to insert the connectors.

The second connector is for the Gas Sensor and should be connected only after the Gas Sensor has been installed. If the Gas Sensor must be removed it should be disconnected first.

The third connector is for EXTERNAL CONTROL and is normally left capped. A connector is supplied (with a length of lead) for interconnection to another controller, such as a timer or Chlorine Controller. Please note that the external controller must output 12 to 24V A.C./D.C. or have an isolated relay output (closed) to turn the Chlorinator on. Voltages in excess of those detailed will damage the unit. To use the EXTERNAL CONTROL simply connect the correct wires to your controller output. See EXTERNAL CONTROL detailed information further on in this manual.

POOL WATER CHEMISTRY FOR ECOMATIC COMMERCIAL SERIES II

1. Salt

At start - up of the Chlorinator System there must be at least 3,000ppm of salt (sodium chloride) in the pool water. The salt level should not exceed 7,000ppm. This is simple to achieve if the following steps are taken:

- (i) Know, with reasonable accuracy, the pool volume.
- (ii) Measure the pool water TDS (Total Dissolved Solids) prior to adding salt.
Note: the TDS Meter should be calibrated for sodium chloride.
- (iii) Calculate the required start - up salt dose and add it to the pool. This is simple - the required dose is -
3 x Pool Volume (m3) kg.
E.g. 250m3 pool will need 750kg of salt.

If the pool is already operating as a salt pool, simply add enough salt to bring the level to 4,000ppm + TDS caused by other chemicals (Total Alkalinity, Hardness, fill water TDS). A rule of thumb is to allow 500ppm. The formula in (v) below can be used.

- (iv) Backwash the filters and add the salt, either by dumping it in the shallow end of the pool, or loading the bags themselves into the shallow end. If loading in the bags, be aware that they will float and could foul surface skimmers. DO NOT load all the salt into one area, as it will take longer to dissolve. During the time the salt is dissolving, do not backwash the filters. Heavier salted water will tend to flow into the deep end of the pool and could be backwashed out via the bottom drains.
- (v) Once the salt has dissolved and mixed, re - test the pool TDS. It should be 4,000ppm above the original test done in (ii). If it is below what was expected then the pool volume might have been under estimated. Work out extra salt using the following equation:

$$\text{Extra Salt (kg)} = \frac{\text{Pool Vol. (m3)} \times [\text{Expected TDS} - \text{Measured TDS}]}{1000}$$

* TDS is in ppm.

If the TDS is higher than expected then the pool volume may have been over estimated. This is not a cause for concern as more salt is far better than not enough! (Unless the salt level is above 7,000ppm - contact the factory).

Salt is effectively not consumed by the ECO-matic process - the salt is recycled.

2. Pool Stabiliser (Cyanuric acid/Cyanurates)

- (i) Measure the stabilizer level using an appropriate test kit. It should be between 30 and 50ppm.
- (ii) If the pool has never had stabilizer added, then 50ppm of stabilizer should be added. Follow the directions for adding it or load it directly into the pool pump inlets.

IMPORTANT: Stabiliser is very slow to dissolve and if it is loaded into the pump inlets it can sit in the filters for a number of days. If the filters are backwashed it will be lost. Monitor the stabiliser prior to back washing.

- (iii) If there is some stabiliser present, but it is below 20ppm, add 30ppm to the pool and re - measure the level once it has dissolved. Then add enough to make up the 50ppm.

The amount of stabiliser to add is calculated as follows:

$$\text{Stabiliser (kg)} = \frac{(\text{Level required} - \text{Level measured}) \times \text{Pool Vol. (m}^3\text{)}}{1000}$$

E.g. a 250m³ pool has 30ppm of stabiliser present. Need to add 20ppm or 5kg.

IMPORTANT: stabiliser is for use in outdoor pools only. It is used to reduce the loss of chlorine due to the effect of sunlight. It should not be used in indoor pools as it may adversely affect pool chlorine demand.

3. Other Chemical Levels

The other chemical levels to be aware of are pH, Total Alkalinity and Hardness. Simply follow basic pool guidelines, bearing in mind the following:

- (i) pH should be adjusted with hydrochloric acid.
- (ii) Calcium Hardness should be kept as low as possible, while maintaining pool balance. Pool balance is variable with pH, Total Alkalinity and Total Hardness for a given pH. See Appendix C of Australian Standard AS - 3633 for details.
- (iii) Very high Total Hardness with Magnesium present in the water may present a problem to the Reverse Polarity system.

4. Possible Chemical Problems

- (i) The use of sulphate containing chemicals may promote the production of oxygen compounds at the cell, which can lead to slightly lower chlorine production, and the production of chemicals which can adversely affect ORP probes. Chemicals to avoid - Sulphuric acid and - Sulphate flocking compounds

Note: the use of potassium monopersulphate is acceptable.

- (ii) The use of quaternary ammonium compounds (Quats) as an algaecide can promote turbidity (cloudiness). This is caused by the very high chlorine levels in the cell reacting with the Quats compound. A common Quats compound is benzalkonium chloride.
- (iii) The use of Citric Acid as a "black spot remover" will cause the chlorine residual reading in the pool to fall to zero for an extended period of time.
- (iv) Hydrogen peroxide, peroxygen chemicals and peroxide in general do not interfere with the ECO-matic System but

OPERATION OF THE ECOMATIC COMMERCIAL SYSTEM

The ECO-matic System passes an electrical current through an electrolytic cell filled with a flowing mild salt solution. The electrolysis that takes place causes the production of a number of chemicals that act as oxidation agents and biocides. The predominant product is chlorine - the same type that occurs when chemical chlorine is added to pool water. The lesser products are usually oxygen compounds, some of which are extremely reactive and very useful in attacking contaminants that are not usually totally destroyed by chlorine alone. This is one of the reasons that salt systems usually produce a higher water quality than chemical only systems.

Your ECO-matic System is made up of three main components:

1. Power Supply
2. Control Panel (includes Gas Sensor)
3. Electrolytic Cell

As we have outlined above the operation of the Electrolytic Cell, the Power Supply and Control Panel is detailed below:

1. Power Supply

This component houses all the high power, heat generating elements of the ECO-matic System. This enclosure should remain closed at all times as mains voltages are present at some points - mostly on the left hand side of the enclosure.

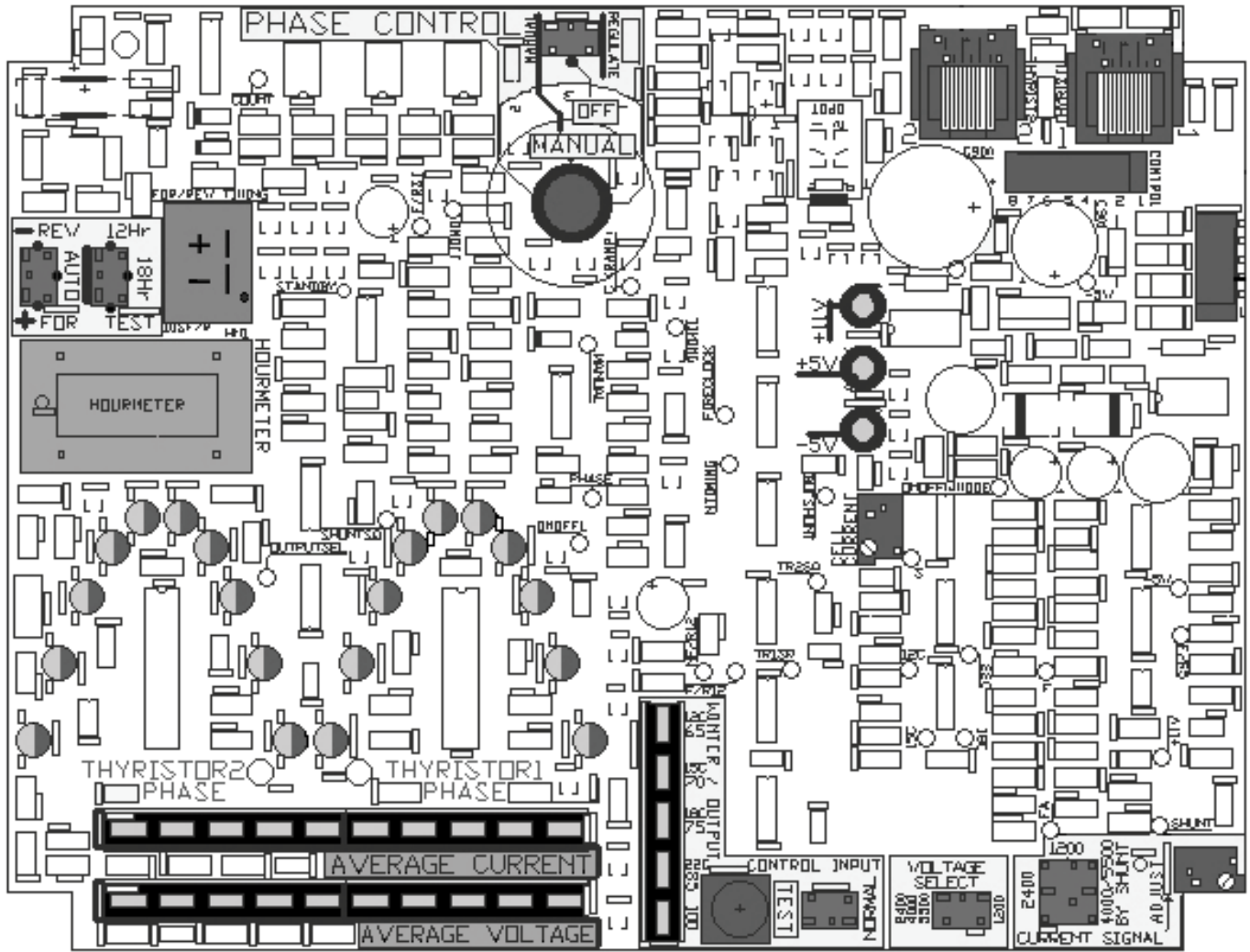
Safety isolation and a.c. to d.c. current rectification takes place inside this unit. There are two heat sinks on either side the enclosure which will become hot to the touch when operating. The inside of the enclosure is fan-cooled to help dissipate heat generated by the transformer and other components.

Inside the lower portion of the Power Supply is a plastic enclosure with a clear cover. To the left of this enclosure is a thermal switch which will trip in the event of power supply overheat.

Inside the enclosure is the Power Supply Control PCBA. It has a number of switches and displays that represent the operation of the Power Supply. The operation of these Power Supply sub-systems will be described.

It should be noted that the switches should be in certain positions for normal operation and that any deviation from their normal positions during normal operation may damage the unit. Read the following sections carefully and check switch positions before normal operation commences.

1. POWER SUPPLY CONTROL PCBA OVERVIEW:

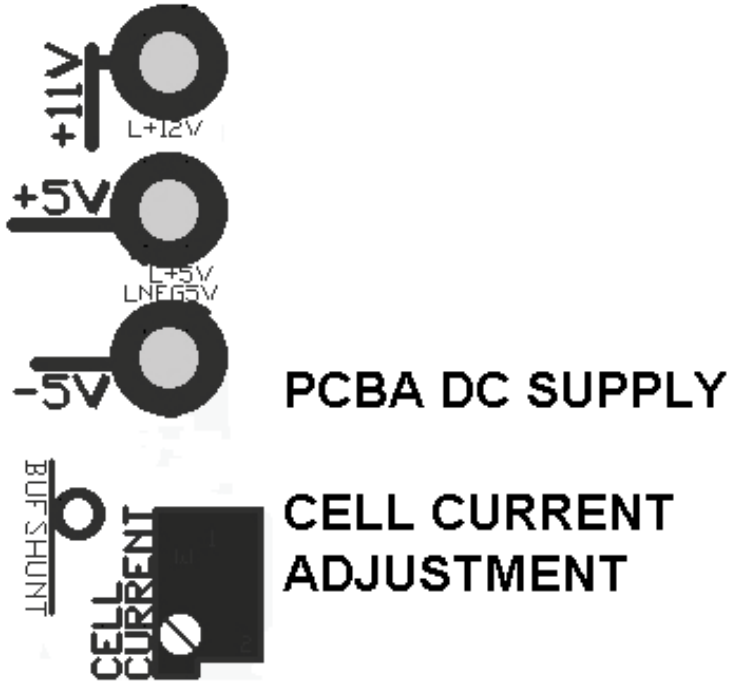


- DISPLAYS - HOURMETER, AVERAGE CELL CURRENT AND VOLTAGE
- LED DISPLAYS
- DISPLAY - SIMULATED PHASE CONTROL WAVEFORM
- CONTROL SYSTEMS
- CONTROL SYSTEM ADJUSTMENTS
- CONTROL SYSTEM SELECTOR SWITCHES
- CONNECTORS

POWER SUPPLY CONTROL PCBA

Descriptions of the areas shown in colour follow.

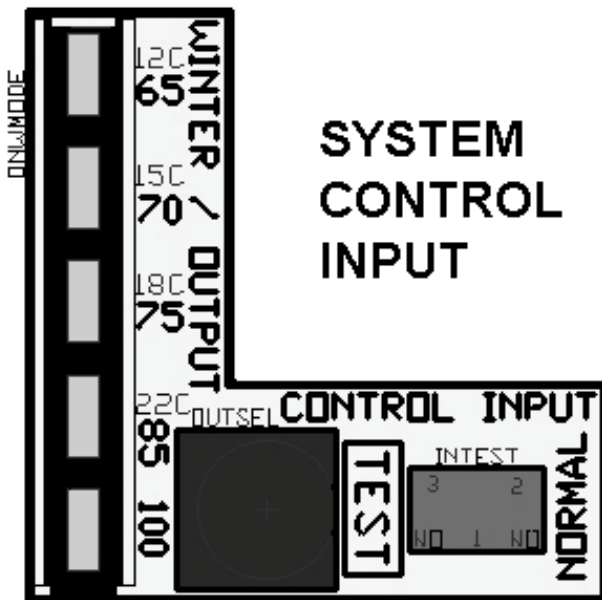
1.1 PCBA DC Supply



The three LEDs represent the dc power supply voltages used on the Power Supply PCBA. They should all be lit when power is applied to the unit.

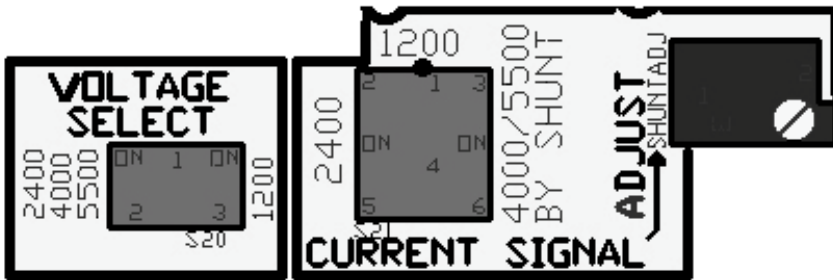
The Cell Current Adjustment is for testing and set-up only. It should not be adjusted under any circumstances unless by a technician or under factory advisement.

1.2 System Control Input



Switch should be in NORMAL position. The LEDs indicate the Cell Current selected by the Control Panel when in Auto Winter Mode. Approximate water temperatures and matching Cell Currents are shown. Note that Cell Current is shown as a percentage of maximum current to the Cell.

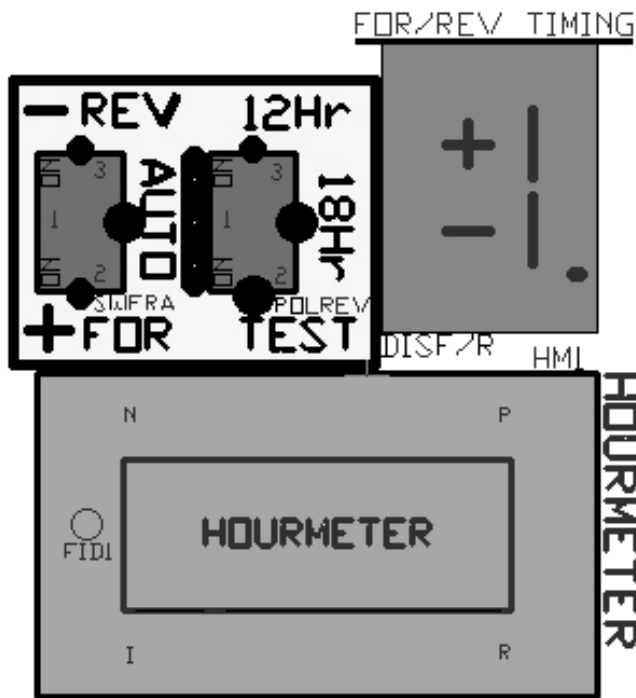
1.3 Cell Voltage & Current Selectors



Switch positions should match unit size. Current Signal Adjust should not be adjusted except by technician or under factory advisement.

**CELL VOLTAGE SELECTOR
CELL CURRENT SIGNAL ADJUST**

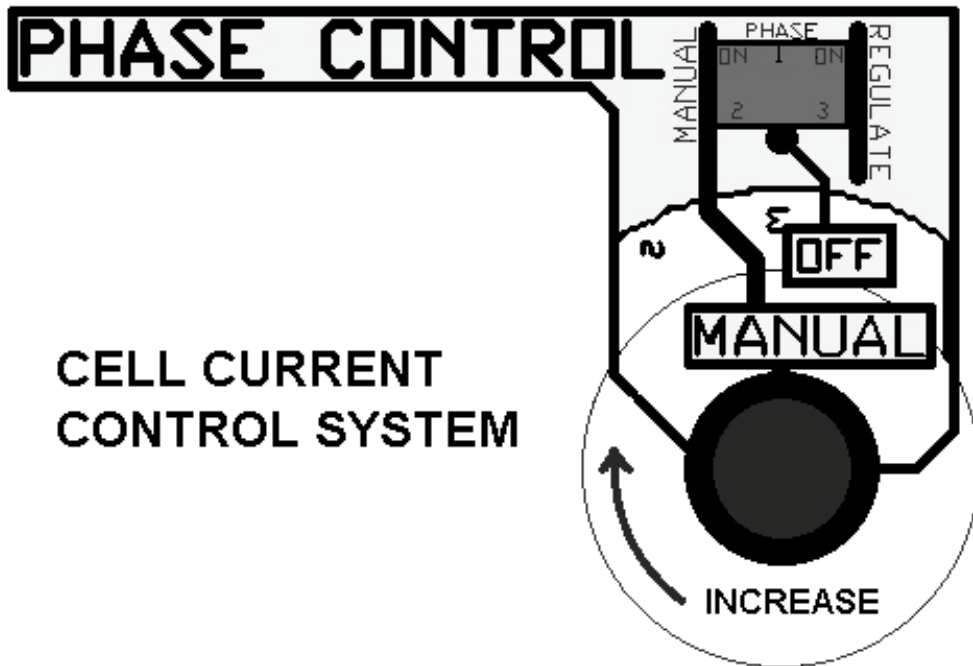
1.4 System Timing



For normal operation switches should be in AUTO and 12Hr or 18Hr positions. The other positions are for testing only. The 18Hr should be selected only in pools where hardness is low. The seven-segment display shows +/- polarity, the decimal point indicates that the timer is not running. The LEDs making up the "1" will flash alternately to show the timer "counting". When the timer is not operating (ie decimal point is ON) one segment of the "1" will be fixed ON. The hourmeter accumulates the hours that the cell operates.

**SYSTEM TIMING - POLARITY CONTROL
- CELL OPERATIONAL
HOURS**

1.5 Phase Control System



The switch should be in the REGULATE position for normal operation, with the control potentiometer turned fully anti-clockwise. It is possible to ensure that the Cell Current remains off by placing the switch in the OFF position. The MANUAL position allows the Power Supply to be controlled from off to full power (possibly exceeding maximum Cell Current) by rotating the potentiometer clockwise. This should only be done by a technician or under factory advisement.

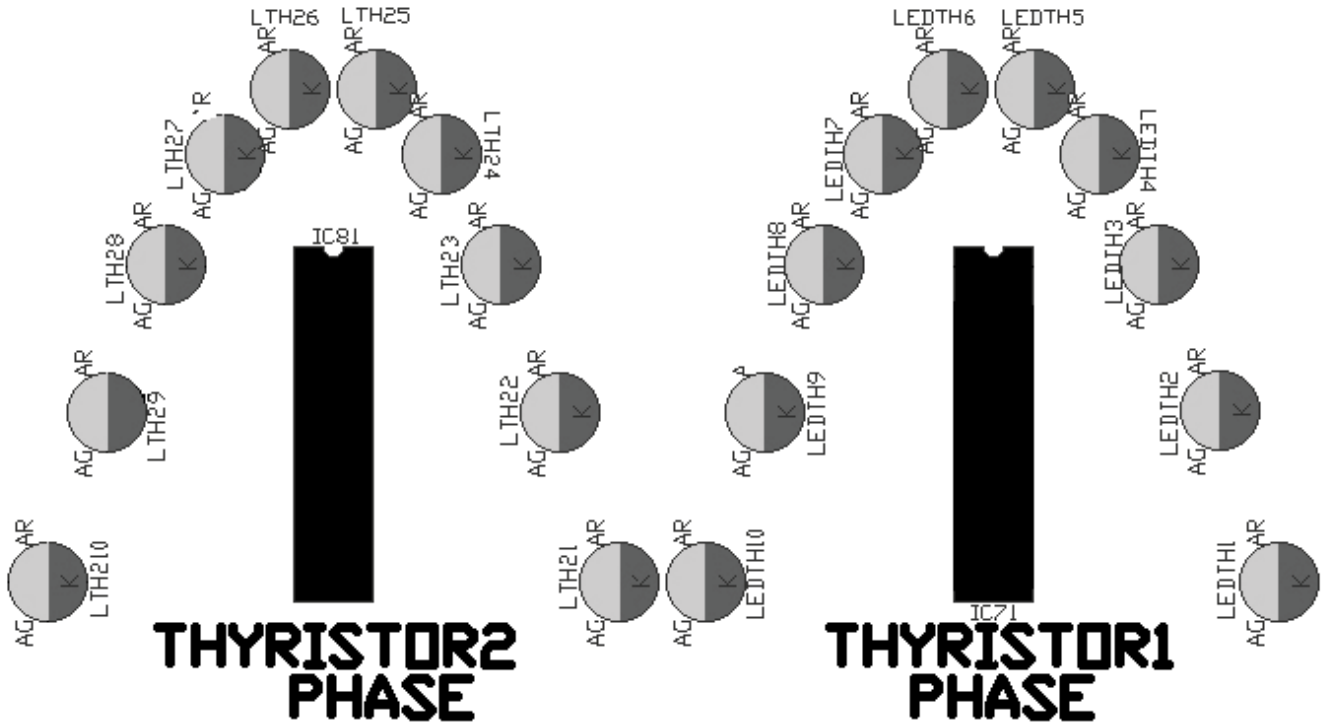
1.6 Output Voltage and Current Displays



CELL CURRENT & VOLTAGE DISPLAYS

The above displays show the averaged output of the Power Supply. Normal operation at 100 (%) will show approximately 8 LEDs lit on the Current display. The Voltage display will depend on the Cell Current selected and the salinity and water temperature. The displays are not intended as a measurement tool but rather as a visual display for easy checking of the units' operation.

1.7 The Phase Control Display



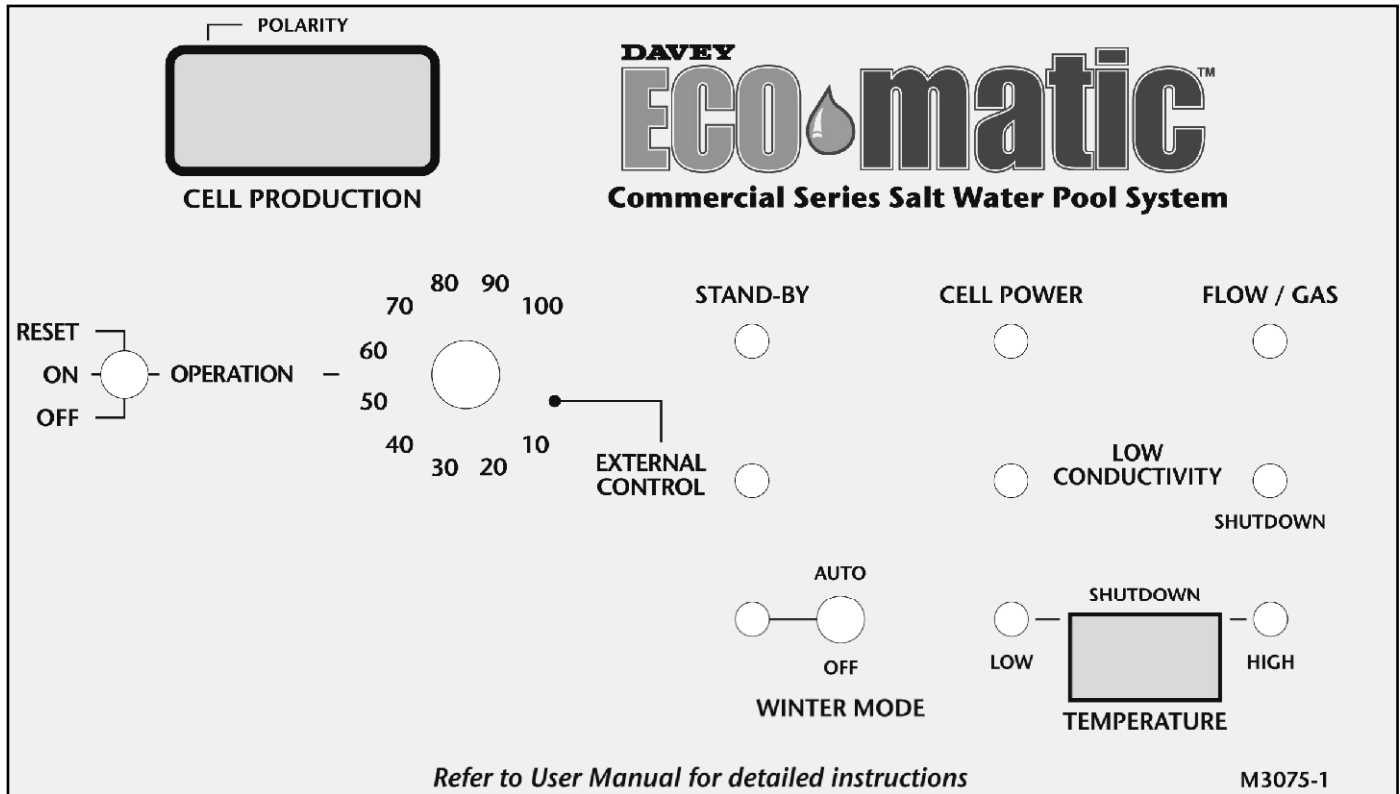
PHASE CONTROL DISPLAY SIMULATED CELL CURRENT WAVEFORM

The above display is a graphical rendering of the actual current and voltage being generated by the rectifying devices (thyristors) used in the Power Supply. The display shows an unfiltered full-wave rectified voltage and current, with phase control. Each half of the display represents one set of thyristors (there are two sets in the Power Supply). The display will change colour: Green for “+” polarity and Red for “-” polarity (or Forward and Reverse polarity).

The display allows a quick visual check of rectifier operation and can be used for fault finding in the event of a problem. It can also be used to assess the load on the Power Supply presented by the Cell. The less LEDs that are lit (both sets operating) the greater the load from the Cell. For example a pool with a high salinity may only show 5 LEDs each side operating for a Cell output of 100. This would indicate that the Power Supply is only supplying half voltage for the maximum cell current – ie the Cell is loading the Power Supply quite heavily. It should be noted that the Power Supply output is regulated (by phase control means) and is difficult to overload.

2. CONTROL PANEL

This enclosure determines the operation of the ECO-matic Commercial System. The enclosure is protected to IP68 to stop the penetration of dust and/or corrosive/moist atmospheres. The transparent door should be closed at all times other than when using the control panel.



The Control Panel has a number of features:

- 2.1 **CELL PRODUCTION AND POLARITY INDICATOR** - shows the magnitude and polarity of the electrical current applied to the cell. The Cell Production is shown as a percentage of maximum system output. It will read around 100 unless the unit is in Winter Mode, where it can read down to 65. If the Cell Power is off, it will be blank. Polarity is shown as “+” (positive, forward) or “-” (negative, reverse)
- 2.2 **TEMPERATURE INDICATOR** – displays the temperature of the water passing the Cell. This temperature is monitored and used by the Control Panel to adjust the units’ operation (see Winter Mode and High and Low Temperature Shutdown). The temperature sensor is integrated into the Gas Sensor fitting.
- 2.3 **OPERATION SWITCHES** - control the Cell Power:
 - OFF - Cell Power is not applied
 - RESET - resets all alarms and places unit into STANDBY mode. Cell Power can not be applied for approximately 2 minutes.
 - ON - allows Cell Power to be applied from 10% to 100% (all the time), or from the EXTERNAL CONTROL input (see below).

The System Output Control operates by a form of Pulse Width Modulation. This form of control works by switching the Cell current on and off over a period of time with the result that the system output is averaged. For example if the control is set at 50(%) the unit will operate at its normal output for only half the time that the unit is on with the averaged output being 50%.

2.4 WINTER MODE SWITCH

When Winter Mode is selected the unit will adjust its output to suit the water temperature of the pool. The amount of current that the Cell can draw is determined by the water conductivity, which in turn is influenced by salinity and water temperature. As the water temperature falls so does its conductivity. If there was no modification of the units' operation this reduction in conductivity would result in the eventual shutdown of the unit via the Low Conductivity Shutdown. With Winter Mode selected the output of the unit will reduce with temperature.

The reduction with temperature will approximately follow the table:

TEMPERATURE	OUTPUT
> 22°C	100
< 21°C	85
< 18°C	75
< 15°C	70
< 12°C	65

When Winter Mode is in operation (< 21°C approx.) the display LED will be Blue. See also High and Low Temperature Shutdown.

2.5 STANDBY LED

Red shows that the unit is waiting to produce chlorine, this occurs at polarity reversal, RESET and power - up of the unit. The STANDBY delay is approximately 2 minutes. After the delay the LED will be Green indicating readiness to produce chlorine.

2.6 CELL POWER LED

Red shows that the cell is not powered, Green shows that the cell is on. If the output is set at less than 100 the Cell will turn on and off automatically. This is how the output is reduced.

2.7 FLOW/GAS LED

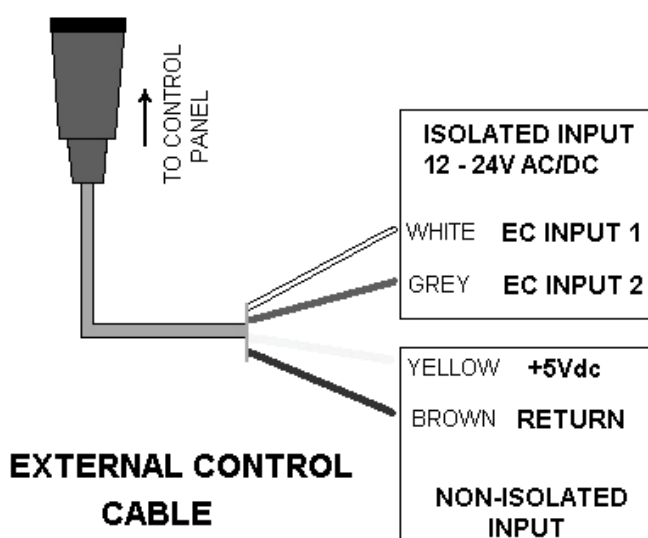
Red shows a problem with either water flow and/or a gas build up at the Gas Sensor. Green shows normal operation. When Red, the Cell Power will be turned off until the problem is rectified.

2.8 EXTERNAL CONTROL

The EXTERNAL CONTROL is a means of controlling the units' operation from an external controller. This can take the form of a timer or residual chlorine controller. The display LED will be Red to show that the external controller has the Cell Power turned Off. Green shows the Cell Power is turned On.

An EXTERNAL CONTROL Cable is supplied with the unit. The cable can be connected in a number of ways and extreme care must be exercised when it is connected into any external control device. The EXTERNAL CONTROL will respond to any input signal of 12V to 24V ac or dc (1 Watt maximum) – this input is electrically isolated from the unit. There is also provision for the connection of a relay – there is 5Vdc and a Return wire available from the CONTROL

PANEL. **The 5Vdc and return wires are not isolated from the unit and can only be used where an electrically isolated switch or electrically isolated relay is available.**



2.9 LOW CONDUCTIVITY DISPLAY & SHUTDOWN

This display consists of two LEDs, one to display LOW CONDUCTIVITY and the other to display the LOW CONDUCTIVITY SHUTDOWN. The first LED will show Red when the conductivity falls below a certain point. If the conductivity continues to fall the second LED will go Red and this will cut power to the Cell until the problem has been rectified. The LEDs will be Green for normal operation. In cases where the water temperature is dropping the unit should be operated in Winter Mode as low temperatures can cause these alarms to operate. For more information read "Water Conductivity".

2.10 LOW TEMPERATURE SHUTDOWN

Will be Blue if the water temperature falls below 10 - 12°C. Cell Power is turned off to protect the cell. At these temperatures people will not swim and algae cannot reproduce. The filter can be run to keep the pool clean. When the temperature rises again the unit will turn back on automatically.

2.11 HIGH TEMPERATURE SHUTDOWN LED

Will be Red if the cell water temperature rises to approximately 45°C. This is a safety feature included as the Cell can heat water. In the unlikely event of the failure of the pressure switch in a Powered Bypass Installation, the water would heat up and could possibly boil if given enough time. When the cell water temperature exceeds approximately 45°C, Cell Power is turned off.

Please note that if the Cell Power has been turned off by any of the fault conditions, an automated check procedure takes place approximately every 2 hours to see if the fault conditions have been rectified. The use of RESET will also re-start the system to see if the fault condition still exists.

2.7 FLOW/GAS LED

Red shows a problem with either water flow and/or a gas build up at the Gas Sensor. Green shows normal operation. When Red, the Cell Power will be turned off until the problem is rectified.

WATER CONDUCTIVITY

As the salt level in the pool decreases, the wear on the Cell increases. Although salt is not consumed in the ECO-matic process, it is lost through splashing, backwashing and on bathers as they leave the pool. The salt level is also reduced by rain, which causes dilution. Salt is not lost to evaporation. As the salt level in the pool falls toward the minimum the LOW CONDUCTIVITY LED will turn Red. At this point the salt level should be increased by 1,000ppm. This can easily be achieved by adding 25kg of salt per 25m³ of pool water. The addition of salt should not affect the ECO-matic as it is protected against overloads. If no action is taken and the salt level continues to fall, the LOW CONDUCTIVITY SHUTDOWN will also turn Red and turn off Cell Power.

The unit will not produce sanitiser in this state. It will turn ON approximately every 2 hours to check if salt has been added. If salt has not been added the Cell will turn OFF again.

There are other factors that can cause the Unit to shutdown.

1. Heavy Rain - Can cause very dilute pool water to pass over the Cell due to surface skimming. The unit will turn back ON after the rain has been mixed into the water unless the salt level has been reduced by dilution.
2. Cold Water - cold pool water reduces the ability of a Cell to carry electrical current. (Refer to Winter Mode). More salt can be added if desired.
3. Failing Cell - as the Cell ages there will come a time when the electrical current draw will drop. This can be compensated for with the addition of extra salt. A Cell is considered failed when it draws less than 80% of maximum current.

Please note that the **Low Conductivity and Low Conductivity Shutdown** are not like T.D.S. meters, which are temperature compensated Scientific Instruments. Their accuracy will be within 500ppm salinity and they are water temperature dependent, just as the Cell is.

WINTER MODE

Will When the Cell draws electrical current from the Power Supply, the amount of current drawn is dependent upon a number of factors. Two of these factors are **Salinity** and **Water Temperature**.

The LOW CONDUCTIVITY and LOW CONDUCTIVITY SHUTDOWN on your ECO-matic are designed to operate at swimming season water temperatures. When the pool begins to cool in the off season the temperature drop causes the Cell to behave differently - it will draw less electrical current. This can cause the LOW CONDUCTIVITY and LOW CONDUCTIVITY SHUTDOWN to assume that the salinity has fallen even if the salinity has remained relatively constant.

When the temperature of the pool water drops, the Winter Mode Switch should be placed in AUTO position (it can be left here all the time if desired).

This has two effects:

1. It alters the setting of the LOW CONDUCTIVITY and LOW CONDUCTIVITY SHUTDOWN Systems.
2. It reduces the Cell Output as the water temperature falls.

The Unit will now respond better to a cold pool environment.

The approximate temperature and Cell outputs are:

TEMPERATURE	OUTPUT
> 22°C	100
< 21°C	85
< 18°C	75
< 15°C	70
< 12°C	65

MAINTENANCE

Little or no maintenance should be required for your ECO-matic Commercial System. Its operation should be checked at least daily or whenever the operator is in the pump house or near the unit. Of particular importance are the two small fans under the Power Supply. If they are found in a failed state the unit should be tuned off until they are replaced.

Problem checklist:

1. Power to Power Supply, but Control Panel does not operate.

- Check all leads from the Power Supply to the Control Panel.
- Open the Power Supply and inspect the displays in the plastic enclosure in the lower portion of the Power Supply. They should be lit. If the Control Panel is not operating (is not lit) contact your factory/ECO-matic distributor.
- If the LED's are not lit, **disconnect Power** from the unit. First press the reset button on the thermal switch (left of the main PCB) if it clicks this indicates the unit has overheated, please check the fans are operating correctly. Otherwise check the Power Supply fuse/breaker in the bottom of the unit. If blown, replace it and re - connect power. If the fuse blows immediately, contact your factory/ECO-matic distributor.

2. System will not produce chlorine (keeps shutting down).

- Check cell connections.
- Check Control Panel to see which of the systems is causing the shutdown. If it is temperature related, check the pool temperature. If it is conductivity related, check the pool salt level. Remember it can be a combination of both temperature and salinity that can cause the Low Conductivity Shutdown.

3. Unit keeps shutting down when all chemical levels and temperatures are correct.

- Cell may have failed or is badly connected. The cell has a limited life span of approximately 30,000 hours. This is dependent on many factors such as salinity, other minerals in the water and water temperature. When the cell has failed contact your ECO-matic distributor. The cell will require replacement with either a new or reconditioned cell. Please note that it is the internal section of the cell that will be replaced, not the external housing.

4. Power Supply and Control Panel Faults.

- Should there be a problem with these components please contact your ECO-matic distributor.

PLEASE NOTE: Always ensure that your ECO-matic System is repaired only by an authorised ECO-matic Dealer and that only genuine ECO-matic parts are used.

TECHNICAL INFORMATION

DIMENSIONS AND WEIGHT:	Width mm	Height mm	Depth mm	Approximate Weight KG
Assembled:				
Control Panel all units	240	260	115	1
Power Supply 1200/2400	460	500	210	32
Power Supply 4000	460	500	210	42
Electrolytic Cell with Legs 1200*	450	1300	450	70
Electrolytic Cell with Legs 2400*	600	1400	600	109
Electrolytic Cell with Legs 4000*	600	1360	600	112
Leg Height			550	
Packed on skid for shipping:				
1200	1100	550	1000	105
2400	1200	700	1000	142
4000	1200	700	1000	145

*Note Cells are cylindrical in shape, Width/depth of cell shown above is diameter of cell at widest point.

Power Consumption	1200	2400	4000
Power Consumption Kilowatts approx.	0.60	1.20	2.10
Output 100% equivalent Chlorine grams per hour	120	240	400
Input Current Amps	2.5	5.0	8.5

All systems require 220-240 volt single phase 50 or 60 cycle power supply.

Minimum water flow rates for Cells:

Model	Flow Rate Litres per Minute	m³ per Hour
1200	200	12
2400	400	24
4000	650	39

TROUBLE SHOOTING

Little or no maintenance should be required for your ECO-matic Commercial System. Its operation should be checked at least daily or whenever the operator is in the pump house or near the unit. Of particular importance is the small fan under the Power Supply. If it is found in a failed state the unit should be tuned off until it is replaced.

Problem checklist:

1. There is power to Power Supply, but the Control Box does not operate.

- Check all leads from the Power Supply to the Control Panel.
- Open the Power Supply and inspect the displays in the plastic enclosure in the lower portion of the Power Supply. They should be lit. If the Control Panel is not operating (is not lit) contact your ECO-matic distributor.
- If the LED's are not lit, **disconnect Power** from the unit. First press the reset button on the thermal switch (left of the main PCB) if it clicks this indicates the unit has overheated, please check the fans are operating correctly. Otherwise check the Power Supply fuse/breaker in the bottom of the unit. If blown, replace it and re-connect power. If the fuse blows immediately, contact your ECOmatic distributor.

2. The system will not produce chlorine (keeps shutting down).

- Check cell connections and with unit powered off, ensure that all Power Supply connections are tight
- Check Control Panel to see which of the systems is causing the shutdown. If it is temperature related, check the pool temperature. If it is conductivity related, check the pool salt level. Remember it can be a combination of both temperature and salinity that can cause the Low Conductivity Shutdown.

3. The Unit keeps shutting down when all chemical levels and temperatures are correct.

- Cell may have failed or is badly connected. The cell has a limited life span. This is dependent on many factors such as salinity, other minerals in the water and water temperature. When the cell has failed contact your ECO-matic dealer. The cell will require replacement with either a new or reconditioned cell. Please note that it is the internal section of the cell that will be replaced, not the external housing.

4. Power Supply and Control Box Faults.

- Should there be a problem with these components please contact your ECO-matic dealer or distributor.

PLEASE NOTE: Always ensure that your ECO-matic System is repaired only by an authorised ECO-matic Dealer and that only genuine ECO-matic parts are used.

DAVEY® REPAIR OR REPLACEMENT GUARANTEE

In the unlikely event in Australia or New Zealand that this Davey product develops any malfunction within one year of the date of original purchase due to faulty materials or manufacture, Davey will at our option repair or replace it for you free of charge, subject to the conditions below.

Should you experience any difficulties with your Davey product, we suggest in the first instance that you contact the Davey Dealer from which you purchased the Davey product. Alternatively you can phone our Customer Service line on 1300 367 866 in Australia, or 0800 654 333 in New Zealand, or send a written letter to Davey at the address listed below. On receipt of your claim, Davey will seek to resolve your difficulties or, if the product is faulty or defective, advise you on how to have your Davey product repaired, obtain a replacement or a refund.

Your Davey One Year Guarantee naturally does not cover normal wear or tear, replacement of product consumables (i.e. mechanical seals, bearings or capacitors), loss or damage resulting from misuse or negligent handling, improper use for which the product was not designed or advertised, failure to properly follow the provided installation and operating instructions, failure to carry out maintenance, corrosive or abrasive water or other liquid, lightning or high voltage spikes, or unauthorized persons attempting repairs. Where applicable, your Davey product must only be connected to the voltage shown on the nameplate.

Your Davey One Year Guarantee does not cover freight or any other costs incurred in making a claim. Please retain your receipt as proof of purchase; you **MUST** provide evidence of the date of original purchase when claiming under the Davey One Year Guarantee.

Davey shall not be liable for any loss of profits or any consequential, indirect or special loss, damage or injury of any kind whatsoever arising directly or indirectly from Davey products. This limitation does not apply to any liability of Davey for failure to comply with a consumer guarantee applicable to your Davey product under the Australian or New Zealand legislation and does not affect any rights or remedies that may be available to you under the Australian or New Zealand Consumer Legislation.

In Australia, you are entitled to a replacement or refund for a major failure and for compensation for any other reasonably foreseeable loss or damage. You are also entitled to have the goods repaired or replaced if the goods fail to be of acceptable quality and the failure does not amount to a major failure.

Should your Davey product require repair or service after the guarantee period; contact your nearest Davey Dealer or phone the Davey Customer Service Centre on the number listed below.

For a complete list of Davey Dealers visit our website (davey.com.au) or call:



Davey Water Products Pty Ltd
Member of the GUD Group
ABN 18 066 327 517

© Davey & ECOMatic are registered trade marks of Davey Water Products Pty Ltd.
© Davey Water Products Pty Ltd 2012.

AUSTRALIA

Customer Service Centre
6 Lakeview Drive,
Scoresby, Australia 3179
Ph: 1300 367 866
Fax: 1300 369 119
Website: davey.com.au

NEW ZEALAND

Customer Service Centre
7 Rockridge Avenue,
Penrose, Auckland 1061
Ph: 0800 654 333
Fax: 09 527 7654
Website: daveynz.co.nz

* Installation and operating instructions are included with the product when purchased new. They may also be found on our website.