

WATERMAID®

PROVEN PERFORMANCE SINCE 1971

POOL CHLORINATION WITH SALT

Owner's Handbook

For technical service or advice, contact:

AUSTRALIA

Watermaid Pty Ltd
24 Tepko Rd Terrey Hills NSW 2084
Ph: +61 2 9450 0244

Watermaid Pool Chlorinators
91 Carlisle St Ethelton SA 5015
Ph: +61 8 8242 4880

CANADA (Ontario)

Watermaid of Canada Inc.
Ph: +1 877 987 6243

SOUTH AFRICA (Johannesburg)

Ph: +27 11 794 1770

USA

Palm Coast, Florida Ph: 1 800 876 2027

Kailua, Hawaii Ph: +1 808 262 7258

AUSTRIA

Ph: +43 7229 831 740

CANARY ISLANDS

Ph: +34 922 491252

ITALY

Ph: +39 333 406 3815

MARTINIQUE

Ph: +596 612 072

SPAIN

Ph: +34 636 698501

SWITZERLAND

Ph: +417 1290 0888

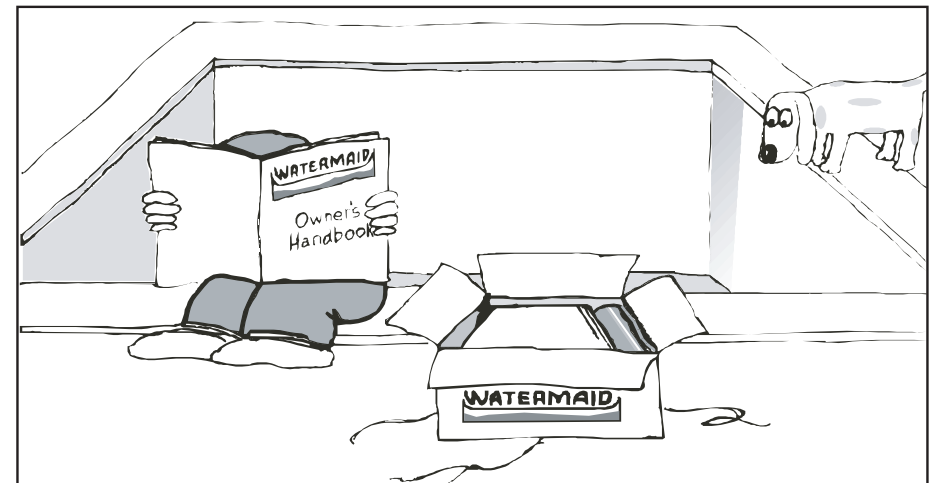
THAILAND

Ph: +662 938 5408

MODEL WM40A

for use on swimming pools & spas
Australian Approval SGSEA/100121
Registration No. 28114
Pest Control Products Act (PCPA)

Conforms to: AS3136, UL STD 1081
Certified to: CAN/CSA STD C22.2
NUMBER 218.1 Class 3 Enclosure



N14470



3075239



3075239

Copyright © Watermaid Pty Ltd

WATERMAID®

WM40

WATERMAID®

WM40 Power Supply (Time clock optional)



The WM40 Power Supply can be coupled to any one of the Cells below:



QT300 Cell
(40mm or 1½")
Salt Level: 6000ppm



QT400 Cell
(40mm or 1½")
Salt Level: 4000ppm



EZY300 Cell
(40 or 50mm, 1½ or 2")
Salt Level: 6000ppm
Patented Design



XT300 Cell
(50mm or 2")
Salt Level: 6000ppm



XT400 Cell
(50mm or 2")
Salt Level: 4000ppm

This Owner's Handbook contains information relating to WATERMAID® salt water chlorinators (as pictured above) as well as general information on pool maintenance. **Please read the SAFETY INSTRUCTIONS on page 20 before first use.**

WATERMAID® WARRANTY

Effective 1 January 2011. Replaces all undated warranties and warranties dated before 1 January 2011.

1 STATUTORY RIGHTS OF CONSUMERS

The warranty terms set out below do not exclude any conditions or warranties which may be mandatorily implied by law, and your attention is drawn to the provisions of the Australian Trade Practices Act, 1974 and the State legislation which confers certain rights upon consumers. The following warranty supplements these.

(ii) If the product has been serviced by a person not authorised to do so by WATERMAID PTY LTD or with non approved parts;

(iii) If any serial number or compliance label has been removed or defaced;

(iv) If the product has not been fully paid for by all parties to the sale or is repossessed under any financing agreements.

2. WATERMAID® WARRANTY

(a) WATERMAID PTY LTD warrants to the WATERMAID® owner that the WATERMAID® Power Supply (excluding any time clock component) shall be free of defects in manufacturing or workmanship for a period of two (2) years from the date of purchase.

(v) Where the WATERMAID® Power Supply or Cell has been subject to any use other than normal domestic pool use. The warranty applicable to commercial applications is limited to 12 months from the date of purchase.

(b) WATERMAID PTY LTD warrants to the WATERMAID® owner that the time clock component contained in the WATERMAID® Power Supply shall be free of defects for a period of one (1) year from the date of purchase.

3. FREIGHT

Subject to the WATERMAID® owner's statutory rights referred to in clause 1, WATERMAID PTY LTD reserves the right to charge for any services not covered by this warranty, including freight costs.

(c) WATERMAID PTY LTD warrants to the WATERMAID® owner that the WATERMAID® Cell shall be free of defects in manufacturing or workmanship for a period of twelve (12) months from the date of purchase. An additional forty eight (48) month pro-rata replacement warranty applies to the WATERMAID® Cell.

4. OTHER LIABILITY

Subject to the WATERMAID® owner's statutory rights referred to in Clause 1 and 2, WATERMAID PTY LTD hereby excludes to the maximum extent permitted by law all other liability in respect of the product.

Any parts in the WATERMAID® Power Supply or Cell found by WATERMAID PTY LTD to be operationally defective will be repaired or replaced at WATERMAID PTY LTD's sole discretion.

5. CLAIMS UNDER WARRANTY

If a defect covered by this warranty arises, the WATERMAID® owner should contact WATERMAID PTY LTD as soon as it arises and advise the nature of the defect. If a repair or replacement is made under warranty, the warranty period will not extend past the original expiration date of the warranty.

d) The WARRANTY as outlined in paragraphs 2(a), 2(b) and 2(c) above DOES NOT apply:-

6. REPAIRS

For a WATERMAID® Power Supply repaired by WATERMAID PTY LTD after the warranty period has expired; a three (3) month defect free warranty applies to any REPLACED PART. This warranty excludes any defect or failure caused by any condition outside the control WATERMAID PTY LTD.

(i) To any defect or failure caused by misuse, abuse, abrasion, buildup on Cell electrodes, electrical faults, power surges (including lightning strikes), insects, harsh chemicals, incorrect water balance, wear and tear, accident, non-observance of installation, operating and/or cleaning instructions or any other condition outside of the control of WATERMAID PTY LTD;

IMPORTANT SAFETY INSTRUCTIONS

WATERMAID® ELECTROLYTIC CHLORINATOR MODEL WM40LED CHLORINE GENERATING DEVICE
DOMESTIC - FOR RESIDENTIAL POOLS & SPAS
REGISTRATION NUMBER 28114 - PEST CONTROL PRODUCTS ACT (CANADA)

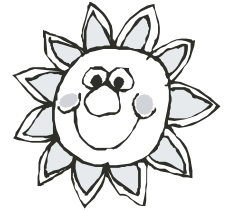
When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

READ AND FOLLOW ALL INSTRUCTIONS IN THIS OWNER'S MANUAL AND ON THE LABEL BEFORE USING.

- a) To reduce the risk of electric shock, the ground wire of this device must be connected to the grounding means provided in the electricity supply service panel with a continuous copper wire equivalent to the circuit conductors supplying the equipment.
- b) WARNING: KEEP OUT OF THE REACH OF CHILDREN.
- c) WARNING: Risk of electric shock. Connect only to a grounding type receptacle protected by a ground fault circuit-interrupter (GFCI). Contact a qualified electrician if you cannot verify that the receptacle is protected by a GFCI.
- d) Do not bury cord. Locate cord to minimise abuse from lawn mowers, hedge trimmers and other equipment.
- e) WARNING: To reduce the risk of electric shock, replace damaged cord immediately. To avoid hazard, the supply cord, if damaged, must be replaced by the manufacturer or its service agent or a similarly qualified person.
- f) WARNING: To reduce the risk of electric shock, do not use an extension cord to connect unit to the electricity supply; provide a properly located outlet.
- g) CAUTION: to prevent electric shock, switch OFF the power at the electrical power outlet before dislodging the WATERMAID® Power Supply. Do NOT remove the cover as there are no user serviceable parts inside. Refer to a qualified service technician for repair.
- h) Maintain water chemistry in accordance with manufacturer's instructions. It is recommended that:
 - » 25 Kg (55 lb) of magnesium chloride per year be added to the pool.
 - » NO products containing calcium are to be added to the pool, including granular chlorine.
- i) The unit MUST be installed AT LEAST 10 feet (3m) from the inside wall of the pool.
- j) Turn OFF the switch on the underside of the WATERMAID® Power Supply when there is no movement of water through the WATERMAID Cell (e.g. filter backwashing, closed valves and draining the pool) or while salt is dissolving.
- k) Do NOT strike the Cell with any kind of instruments.
- l) WARNING: Improper installation or operating the WATERMAID® electrolytic chlorinator model WM40LED without water flow through the Cell can cause a build up of flammable gases, which can result in FIRE or EXPLOSION.

Registrant:
Watermaid Pty Ltd
24 Tepko Rd
Terrey Hills NSW 2084
Australia
Ph: +61 2 9450 0244

Canadian Agent:
Watermaid of Canada Inc.
1497 Tenth Sideroad
Tottenham Ontario L0G-1W0
Canada
Ph: 905-936-5593 or 1-877-987-6243



CONTENTS

1. Essentials for a healthy pool.....	2
a) Filtration.....	2
b) Chlorination.....	2
c) pH.....	3
2. Installation.....	4
3. The WATERMAID® Power Supply.....	9
4. Auto Cell Cleaning.....	10
5. The Time Clock.....	10
6. The WATERMAID® Cell.....	10
7. Salt Level.....	13
8. Running Times.....	13
9. Zero Chlorine.....	14
10. The Langelier Index.....	15
11. Algae.....	16
12. Electricity Costs.....	17
Troubleshooting.....	18
Important Safety Instructions.....	20
WATERMAID® Warranty.....	21

1. ESSENTIALS FOR A HEALTHY POOL

The recommended daily levels for swimming pools and spas as determined by a test kit are given in the table below. Check the expiry date on the test kit, as test results may be inaccurate if used after that date.

	Pools	Spas
Free Available Chlorine (ppm)	1.0 - 3.0	3.0 - 5.0
pH	7.2 - 7.8	7.2 - 7.8
Total Alkalinity (ppm)	100 - 200	100 - 200

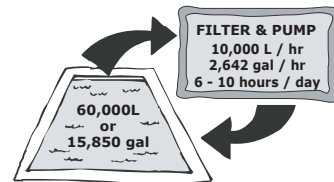
There are three fundamental requirements for maintaining a swimming pool or spa: a) Filtration, b) Chlorination and c) pH. A pool should be looked at daily to check that the water is clean and clear and the finest details of the walls can be seen at the deepest part. This will indicate whether the pool has had enough filtration and chlorination for the load conditions that were applicable the day before. Any other condition requires testing and rectification before entering the water.

a) FILTRATION

It is first necessary to pass water through a filter to remove debris. A standard sized pool pump with normal filter pressures will pump about 10,000 litres (2,642 gal) an hour, so an average 60,000 litre (15,850 gal) pool then requires six to ten hours of filtration a day in summer conditions. This will turn over the equivalent of 1½ times the total volume of water. **However, about 65% only of the actual water and debris will have passed through the filter.** For spas, the water usually turns over several times per hour.

Generally, at dawn and at dusk, any wind will die down, which are the best times to commence filtration. Leaves and floating debris will be swept to the skimmer box without restriction if the pool is well designed.

Longer filtration cycles can reduce the chlorine requirement and conversely, more chlorine can reduce the filtration requirement.



b) CHLORINATION

The WATERMAID® pool chlorinator takes care of the chlorination. As mild saline water flows through the WATERMAID® Cell, it is converted by electrolysis into chlorine as sodium hypochlorite. Chlorine is required after filtration to react with any remaining debris (both visible and invisible), remove stains by oxidation and sterilise the water of harmful bacteria.

A chlorine residual (or reserve) is required for any imminent bather load. A total of 1 to 3 ppm for pools and 3 to 5 ppm for spas of free available chlorine is required to maintain a clean clear condition.

Because of its instability, chlorine has a half-life of some 35 minutes in strong sunlight and even less in the presence of contaminants. Therefore, the use of a **chlorine stabiliser is strongly recommended** as it lengthens the half-life of chlorine to about 140 minutes and helps maintain a chlorine residual in the pool on hot sunny days. At the beginning of the summer season, chlorine stabiliser (iso-cyanuric acid) should be added to the pool.

For an average 60,000 litre (15,850 gal) pool, add 2½ Kgs (approx. 6 lb) of chlorine stabiliser. After this initial dose, the pool should be topped up with chlorine stabiliser throughout the hot summer period to maintain a level between 30 and 50 ppm.

Factors such as sunlight, filter and pump efficiency, stabiliser level, bather load, debris, water temperature, salt level, water level, chemical balance and age of the Cell, ALL affect the final chlorine level.

Note: Indoor pools do not require the addition of chlorine stabiliser. Nor do spas due to the high turnover rate of the water.

Recommended chlorine stabiliser level: 30 - 50 ppm
Do NOT exceed 80 ppm

TROUBLESHOOTING *(Continued)*



CHLORINE RESIDUAL LOW OR NIL

- * Not enough chlorine being produced
- * Insufficient running times and/or heavy bather load
- * Insufficient chlorine stabiliser level and/or strong sunlight conditions
- * pH too high or low
- * Poor circulation [refer below]
- * Algacide has been added within the last 4 weeks
- * Excessive calcium inhibiting chlorine production
- * Cell is old and needs replacing

NO LIGHTS AT ALL

- * No power to WATERMAID® Power Supply
- * Time clock incorrectly set or faulty
- * Problem inside WATERMAID® Power Supply - refer to qualified service technician for repair

SCALE BUILD-UP ON CELL ELECTRODES [refer to section 6]

- * Excessive calcium level in water
- * Insufficient magnesium in water

PH ALTERS RAPIDLY AND EASILY

- * Low total alkalinity in marblesheen, pebbled, quartzon or tiled pools and may be the result of contamination [e.g. debris, urine, surrounding vegetation etc]

POOR CIRCULATION

- * Dirty and/or clogged filter
- * Skimmer baskets full and require emptying
- * Faulty pump
- * Low speed pump
- * Water level is low
- * Cell is clogged with scale

FILTER PROBLEM

If the WATERMAID® chlorinator is capable of registering 75 - 100%, but the pool water is cloudy, there may be a filter problem.

- * The filter may need backwashing
- * Longer running times of the pool equipment may be required
- * Sand filters: The sand in a sand filter should be replaced every 5 years
- * Diatomaceous Earth (D.E.) filters: The pads may need changing



LIGHTS DISPLAYED

<p>100% CHLORINE PRODUCTION</p>	
<p>LOW RANGE CHLORINE PRODUCTION * Winter time / cold water temperature * Low salt level * Build up on cell electrodes * Cell electrodes worn out</p>	
<p>FLASHING BLUE LIGHT -AUTO CLEAN MODE * Factory preset to 5 min / hour, after the first hour</p>	
<p>SOLID RED LIGHT * Salt level above recommended level and/or hot water temperature in the pool. To rectify, when all lights light up, press the minus ("-") button 2 - 3 times, so that the WATERMAID® is not running at 100%. * Check there is no metal contact between the 2 electrodes.</p>	
<p>FLASHING RED LIGHT * Water flow problem. * Gas sensor error. Check sensing tang is clean and free of deposit; the white wire is connected inside the black junction box properly (metal to metal); and that the white wire is not water damaged or affected by corrosion.</p>	
<p>FLASHING AMBER LIGHT * The red & black Cell wires are either matched incorrectly inside the junction box or water damaged / affected by corrosion. * There is a break in the black wire. * After heavy rain, a layer of rain water, which is less dense and contains little salt will be at the top and feeding into the electrolytic Cell. * No load (Cell dead). * Standby mode - press the plus ("+") button to make a selection.</p>	
<p>FLASHING RED & AMBER LIGHTS IN SEQUENCE * There is a break in the red wire.</p>	

DISPLAY LIGHTS - LAYOUT



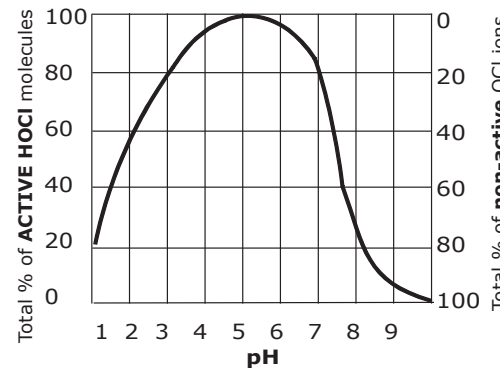
c) pH

pH is a measure of the concentration of hydrogen ions in a solution, or in simpler terms the acidity or alkalinity of a solution. A solution with pH of 7 is neutral. A solution with pH below 7 is acidic and a solution with pH above 7 is alkaline.

By electrolysis, the WATERMAID® Cell produces sodium hypochlorite (NaOCl), which in water dissociates into sodium (Na⁺) and hypochlorite (OCl⁻) ions. It is the hypochlorite ions that then form with the hydrogen (H⁺) ions (from the water) to form **hypochlorous acid (HOCl), the active agent that destroys bacteria and algae, and oxidizes organic matter.**

The chart (below) shows the effect of pH on the reversing reaction of HOCl in water. The greater the percentage of active HOCl molecules in the water, the better the sanitising effect. From the chart, it can be seen that at pH between 3 and 7, the percentage of active HOCl molecules in the water is at its highest, although it is not suitable for swimming because the water is acidic.

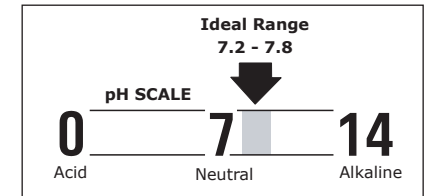
THE EFFECT OF pH ON HYPOCHLOROUS ACID



The ideal pH range for swimming conditions is between 7.2 and 7.8.

It is important to note from the chart that at pH 8.0, the chlorine in the water will only be 21% effective.

A pH above or below the ideal range can also cause irritation to the eyes and skin.



Marblesheen, pebbled, quartzon and tiled pools stabilise naturally between pH 7.6 and 8.2 so the effects of chlorine are disadvantaged. For these pools it is recommended that pH buffer (sodium bicarbonate) be used as this will help stabilise the pH between 7.6 and 7.8, as well as raise the total alkalinity.

Total alkalinity is a measure of the alkaline chemicals in the water such as bicarbonates and carbonates. It affects the speed and ease of pH change. If the total alkalinity is too high, keeping the pH within the desired range is difficult. **Keeping the total alkalinity between 150 and 200 ppm will help keep the pH below 7.8.**

Adding sodium bicarbonate will also help to protect newly-surfaced marblesheen, pebbled, quartzon and tiled pools, as it will react with calcium salts and form a coating of calcium carbonate over the surface. This in turn will slow down the leaching out of lime from the fresh cement (which contains up to 60% calcium oxides), thereby making it easier to achieve the desired water balance.

For an average sized pool, about 10 Kg (approx. 22 lb) of sodium bicarbonate will raise the total alkalinity 80 ppm.

The pH remains stable and within the required range for pools with inert surfaces such as fibreglass, fibreglassed concrete, painted concrete and vinyl-lined surfaces, which also have a naturally occurring total alkalinity of 80 - 100 ppm. As this is an ideal situation, there is no need to add pH buffer to these pools.

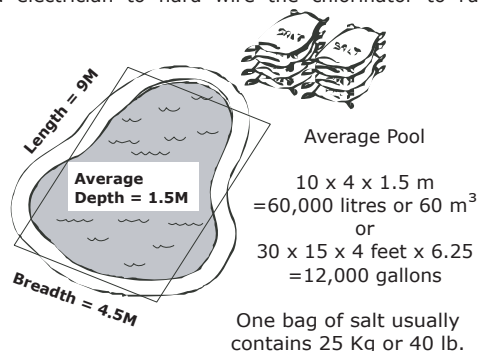
If hydrochloric acid is to be used to lower pH, it should be added SPARINGLY and only according to the instructions given by an ACID DEMAND Test Kit. Any excess acid will attack the pool walls causing calcium to be released into the water, which will then build up on the electrodes.

2. INSTALLATION

The WATERMAID® chlorinator may be installed by the pool owner (Australian and European models only). However, these instructions should be fully understood to ensure correct installation and safe operation. Incorrect installation may pose a danger and/or may damage the unit thus voiding warranty. If there is any doubt, then an experienced pool technician or plumber should carry out the installation. US and Canadian models will require a qualified electrician to hard wire the chlorinator to run in conjunction with the pump.

(i) MEASURE THE POOL

The size of a pool determines the amount of salt to add. If the pool shape is rectangular, then the length, breadth and average depth are multiplied. If the pool has an irregular shape, then the average of the measurements can be taken.



Pools that have used liquid chlorine for many years prior to having a WATERMAID® chlorinator may already have a significant salt level in the water. It is advisable to check the salt level before adding salt. This can be done by either using a WATERMAID® hydrometer or taking a sample of water to a pool shop.

The QT300, XT300 and EZ300 Cells are designed to operate with a salt level of 6000ppm.

If there is NO salt in the pool, the amount of salt required is worked out by the following calculation:

SALT REQUIRED (Kg) = POOL VOLUME (L) x 0.006 or
SALT REQUIRED (lb) = POOL VOLUME (gal) x 0.006 x 8.3453

The QT400 and XT400 Cells are designed to operate with a salt level of 4000ppm.

If there is NO salt in the pool, the amount of salt required is worked out by the following calculation:

SALT REQUIRED (Kg) = POOL VOLUME (L) x 0.004 or
SALT REQUIRED (lb) = POOL VOLUME (gal) x 0.004 x 8.3453

For a pool that already has salt in it, calculate:

SALT REQUIRED = (DESIRED SALT LEVEL - SALT LEVEL ALREADY IN POOL) x POOL VOLUME (L)

where ppm is "parts per million". Eg: 6,000ppm = 6,000 / 1,000,000 = 0.006

(ii) ADDING SALT

Empty the contents of the required salt bags into the shallow end. Run the filter and pump simultaneously to circulate the water and dissolve the salt. If the WATERMAID® chlorinator has already been installed, **the switch underneath the should be turned OFF while salt is dissolving.**

Quality pool salt (with low levels of iron and other impurities) should be used. Finer grades dissolve faster. **Salt may take 24 - 48 hours to dissolve in summer and longer in winter.** Alternatively, sea water may be used. The salt bag should NOT be thrown into the pool as chemicals and inks can interfere with the water balance.

If the pool has no main drain, place a vacuum hose head in the deep end, and sweep the salt toward the vacuum head. The other end of the vacuum hose should be placed in the skimmer box. Run the filter and pump with the Cell "On/Off" switch OFF to circulate the undissolved salt in the water.

WARNING: Never add chemicals directly to the skimmer basket as this may damage the Cell.

4. Floc the pool with a clarifier. After a few hours, a blanket of debris will settle on the pool floor and can then be vacuumed directly to waste (i.e. NOT through the filter). **The switch underneath the WATERMAID® Power Supply should be turned OFF while vacuuming to waste.** Following this, the pool should gradually attain a clean, clear condition after constant filtration and chlorination.

5. Finally, the use of lanthanum carbonate (or "Starver") is recommended to reduce the phosphorous content to less than 1 part per billion. This starves algae of an essential element for growth.

As a guide, the WATERMAID® chlorinator may need to be run non-stop for several days to overcome the addition of an algacide. Otherwise, a sufficient chlorine reading may be impossible to obtain for up to four (4) weeks.

For spas, it is often best to drain, clean and refill. Follow the manufacturer's recommended procedure.

12. ELECTRICITY COSTS

When an Australian 240VAC model WATERMAID® chlorinator is running at full capacity, it is using **300 watts of power.**

$$\{POWER \text{ (watts)} = VOLTS \times AMPS\}$$

Therefore the cost to run a WATERMAID® chlorinator at full capacity is worked out using the following formula:

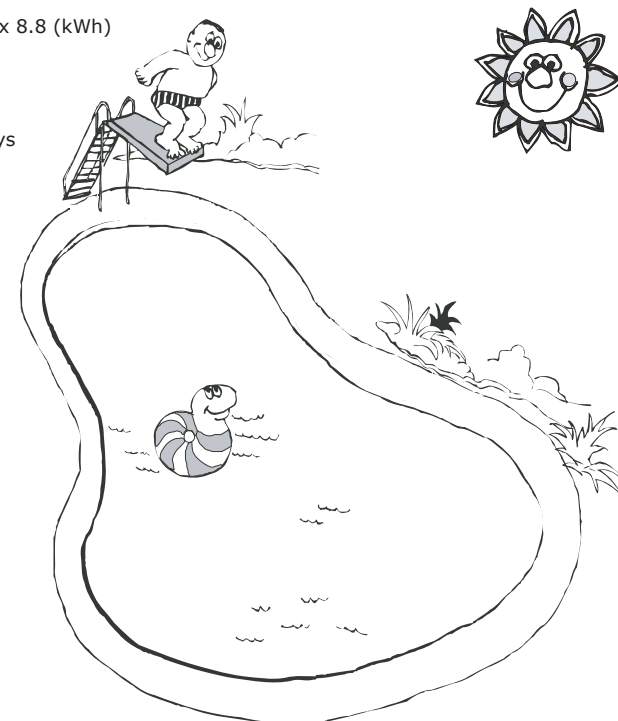
$$COST = \frac{No. \text{ of } TO \text{ Watts}}{RUN} \times Hours \text{ Run} \times Cost \text{ Per kWh}$$

For example, to run a WATERMAID® WM40 chlorinator for 10 hours per day during off peak hours, where the off peak rate of electricity is 8.8 cents/kWh, the electricity cost will be:

$$= 300 \text{ (Watts)} \div 1000 \times 10 \text{ (Hours)} \times 8.8 \text{ (kWh)}$$

$$= 26.4 \text{ c / day}$$

Off Peak Hours = 10pm - 7am, 7 days



TO LOWER TOTAL ALKALINITY USING LIQUID POOL ACID (HYDROCHLORIC ACID)				TO RAISE TOTAL ALKALINITY USING SODIUM BICARBONATE			
LOWER ppm	POOL VOLUME IN LITRES			INCREASE ppm	POOL VOLUME IN LITRES		
	50,000	75,000	100,000		50,000	75,000	100,000
10	395mL	554mL	790mL	10	893gm	1.34Kg	1.79Kg
20	580mL	1.20L	1.60L	20	1.70Kg	2.60Kg	3.40Kg
30	1.22L	1.85L	2.45L	30	2.60Kg	3.90Kg	5.20Kg
40	1.60L	2.40L	3.20L	40	3.40Kg	5.20Kg	6.80Kg
50	2.00L	3.05L	4.00L	50	4.30Kg	6.50Kg	8.60Kg
60	2.40L	3.65L	4.80L	60	5.20Kg	7.80Kg	10.40Kg
70	2.82L	4.25L	5.65L	70	6.00Kg	9.10Kg	12.00Kg
80	3.20L	4.85L	6.40L	80	6.80Kg	10.40Kg	13.60Kg
90	3.60L	5.45L	7.20L	90	7.80Kg	11.70Kg	15.60Kg
100	4.05L	6.10L	8.10L	100	9.00Kg	13.40Kg	18.00Kg

Table A

Table B

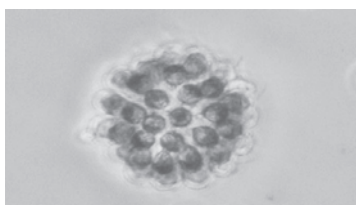
**U.S.
Measurement
Conversions:**

To convert from
Litres to Gallons:
x 0.2642

To convert
from Kilograms
to Pounds:
x 2.205

11. ALGAE

A common problem for any type of pool is algae growth. There are 24,000 known types of algae, all distinguishable by being single-celled organisms capable of photosynthesis (they produce their own food), mitosis (all cells can divide) and meiosis (reproduction is possible by combining with other algal cells).



A microscopic view of algae

The ideal environment for algal growth is when there are periods of zero chlorine. Algae blooms can take less than a day to turn a pool green.

At the first sign of adversity, the algae population goes into a reproduction phase to produce spores. The size of these spores is less than 0.2 microns. D.E. filters are able to filter 5+ microns and sand filters are only able to filter 20+ microns.

Algae will die from doses of chlorine as low as 0.05 ppm concentration, but **spores can resist chlorine levels up to 10 ppm**. Domestic salt chlorinators cannot achieve such a level.

Spores, however, cannot tolerate copper salts as copper attaches to the shell or endospore preventing germination. Hence, the most effective algaecides contain copper salts.

For a few black algal spots, suspending 50 grams (1.7 ounces) of stabilised chlorine in a weighted nylon bag over the trouble spots may remove them.

For a more serious algae problem, it is advisable to follow the procedure below:

1. Lower pH below 7, generally by the addition of up to 2 litres (4 pt) of pool acid, as this is an essential part of reducing algae resistance.

2. About 4 hours later, add a copper treatment to attain a 1 ppm copper level in the pool. One economical method is to mix about 1 heaped tablespoon of copper sulphate (approximately 70 grams or 3 ounces) dissolved in 10 litres (approximately 3 gal) of water spread around the pool. But the use of any commercial copper-based algaecide will do.

Note: Do not swim in the pool for at least 24 hours, as the copper treatment may discolour hair and clothing.

3. After about 12 hours, a stainless steel brush and a garden hose fitted with a brass jet gurney (available from hardware stores) can be used to **remove algae from the pool walls**.

(iii) MOUNT THE WATERMAID® POWER SUPPLY

The WATERMAID® Power Supply MUST be installed AT LEAST 3M (10 ft) from the inside wall of the pool. Ideally it should be enclosed within a splash-proof housing (e.g. filter box) and mounted in a position that complies with local regulations.

1. Locate a suitable position for the WATERMAID® Power Supply which allows for box dimensions of 240 mm wide x 320 mm high x 130 mm deep (9.4 x 12.6 x 5.1 ins. respectively). [Leave a gap of at least 20 mm (0.8 ins.) at the top of the WATERMAID® Power Supply to any structure or fitting above].

2. For mounting onto brick work:

- Drill two 8 mm (0.3 in) diameter holes, 30 mm (1.2 in) deep, that are 156 mm (6.1 in) apart and level.
- Insert two 8 mm (0.3 in) diameter wall plugs into the holes drilled.
- Place the screws (provided) into the holes of the bracket (provided) and tighten.

3. For mounting onto timber:

- Drill two 4 mm (0.2 in) diameter holes into the timber, 30mm (1.2 in) deep, that are 156 mm (6.1 in) apart and level.
- Place the screws (provided) into the holes of the bracket (provided) and tighten.

4. Lift the WATERMAID® Power Supply onto the bracket ensuring that it is secure on the wall.

N.B: The appliance must be installed such that the supply plug is accessible.

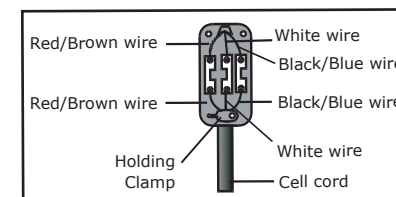
(iv) INSTALL THE WATERMAID® CELL

Before installing the Cell, unplug the pump and WATERMAID® Power Supply. This is advisable so that the filter will not start inadvertently if a time clock already exists. Also, close off any valves if the filter and pump are below pool surface level or if there are no valves, block off the inlet and outlet with rubber stoppers. The WATERMAID® Cell should then be installed as per the model-relevant installation diagram given on **page 6, 7 or 8**.

(v) ATTACH THE CELL TO POWER SUPPLY

If the Cell and Power Supply are not already connected, use a screwdriver to connect the Cell wires to the wires contained in the black junction box at the base of the WATERMAID® Power Supply as follows:

**Red or Brown - TO - Red or Brown
Black or Blue - TO - Black or Blue
White - TO - White**

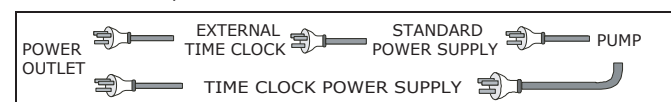


If the wires are connected incorrectly, the unit may appear to work for a brief period but may damage the Cell and Power Supply if left uncorrected.

(vi) CONNECT TO THE POWER OUTLET

Australian and European models: [refer to diagram below]

- Insert the pump plug into the socket at the base of the WATERMAID® Power Supply.
- For a time clock Power Supply, insert the WATERMAID® plug into the electrical power outlet.
- For a non time clock Power Supply, insert the WATERMAID® plug into an external time clock and plug the time clock into the electrical power outlet.



US and Canadian models:

1. For 110VAC models, insert the WATERMAID® Power Supply's plug into the electrical power outlet. The outlet must be wired by a qualified electrician so that no power is available to the unit if the pump is off.

2. For 220VAC models, the WATERMAID® Power Supply's power cord should be hard wired by a qualified technician to run in conjunction with the pump.

10. THE LANGEЛИER INDEX

The Langelier Index calculation table (below) can be used to check the water balance of a pool.

Readings of pH, water temperature, calcium hardness and total alkalinity are needed. These readings are used to obtain the corresponding factor readings from the table (below) and then, to perform the Langelier Index calculation. Add the pH, TF, HF and AF together. Then subtract 12.1 (K, a constant) to give the Langelier Index reading.

For example, if pool water had the following values; pH 7.4, temperature 24°C (or 75.2°F), calcium hardness 100 ppm, and total alkalinity 200 ppm, then the Langelier Index calculation would be worked out as follows:

Start with pH +7.4
 Add TF +0.6
 Add HF +1.6
 Add AF +2.3
 Subtract (K=12.1) -12.1

Langelier Index = -0.2

* If the result is **between -0.2 and +0.2**, then the pool water is **in balance**.

* If the result is lower than -0.2, then the pool water is **corrosive**.

* If the result is higher than +0.2, then the pool water is **scale-forming**.

To rectify corrosive water, the total alkalinity will need to be raised by adding sodium bicarbonate (Table B, next page).

To rectify scale-forming water, the total alkalinity will need to be lowered by adding hydrochloric acid (Table A, next page).

Please note: the use of sodium bicarbonate in an inert-surfaced pool (fibreglass, fibreglassed concrete, painted concrete or vinyl-lined) **is simply a waste of chemicals**. The unchanging calcium level means that the total alkalinity becomes a function of pH and water temperature and will then find its own equilibrium with time.

The **ideal water balance** is:

* Water temperature of 15°C - 30°C (59°F - 86°F)

* Calcium level of 60 - 120 ppm

* Magnesium level of greater than 20 ppm

* Iso-cyanuric acid level 30 - 50 ppm

* Total alkalinity >150 ppm

* pH 7.4 - 7.8 for quartzon, marblesheen, pebble or tiled pools or 7.0 - 7.6 for fibreglass, painted concrete or vinyl-lined pools.

To maintain water in balance for marblesheen, pebbled, quartzon and tiled pools, **the total alkalinity should be greater than 150 ppm if the pH is to be kept below 7.8**. Consult tables A and B (next page) to achieve the correct total alkalinity.

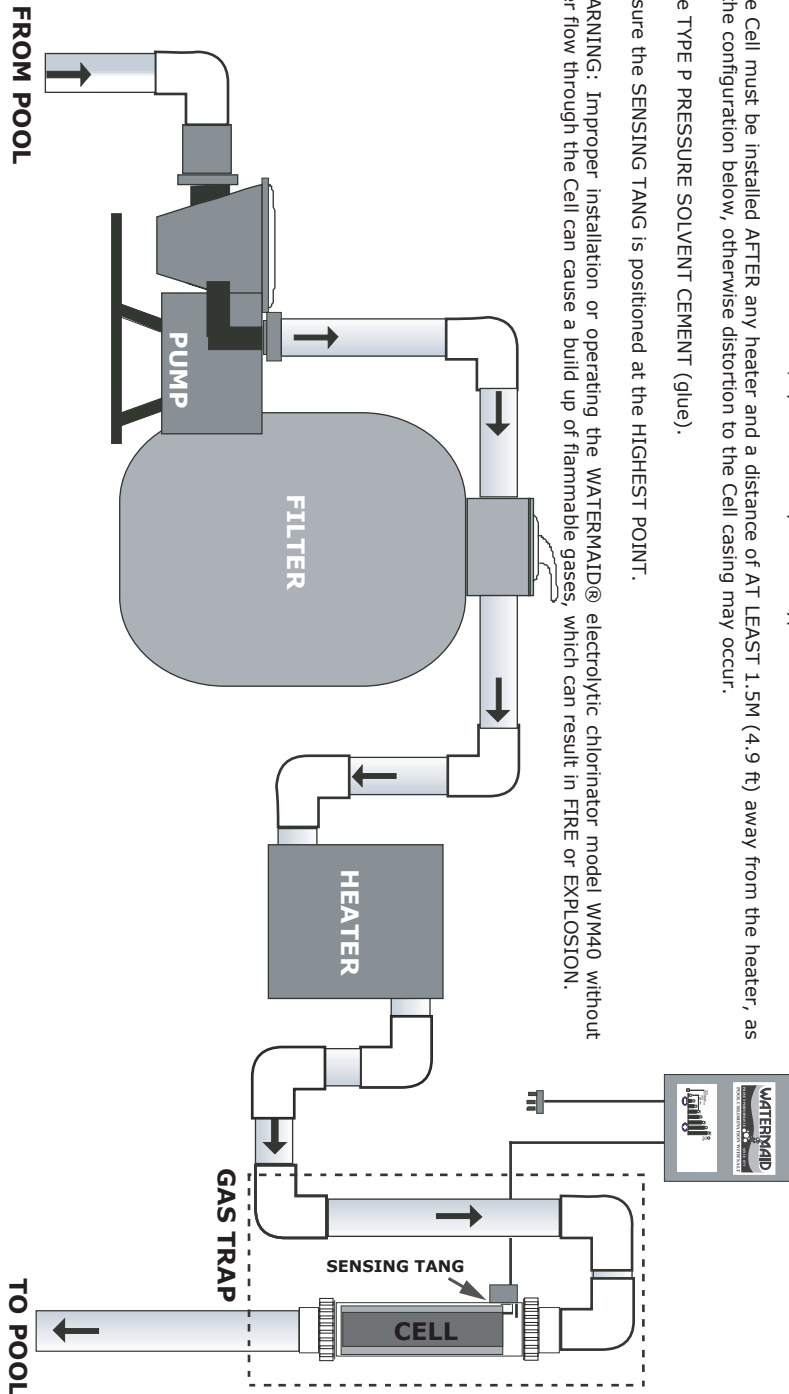
LANGEЛИER INDEX CALCULATION TABLE

Pool Water Temperature (°C)	Pool Water Temperature (°F)	Temp Factor (TF)	Calcium Hardness as CaCO ₃	Hardness Factor (HF)	Total Alkalinity as CO ₃	Alkalinity Factor (AF)
0	32.0	0.0	5	0.3	5	0.7
3	37.4	0.1	25	1.0	25	1.4
8	46.4	0.2	50	1.3	50	1.7
12	53.6	0.3	75	1.5	75	1.9
15	59.0	0.4	100	1.6	100	2.0
19	66.2	0.5	150	1.8	150	2.2
24	75.2	0.6	200	1.9	200	2.3
29	84.2	0.7	300	2.1	300	2.5
34	93.2	0.8	400	2.2	400	2.6
40	104.0	0.9	800	2.5	800	2.9
53	127.4	1.0	1000	2.6	1000	3.0

WATERMAID® QT & XT SERIES CELL - VERTICAL INSTALLATION DIAGRAM

IMPORTANT:

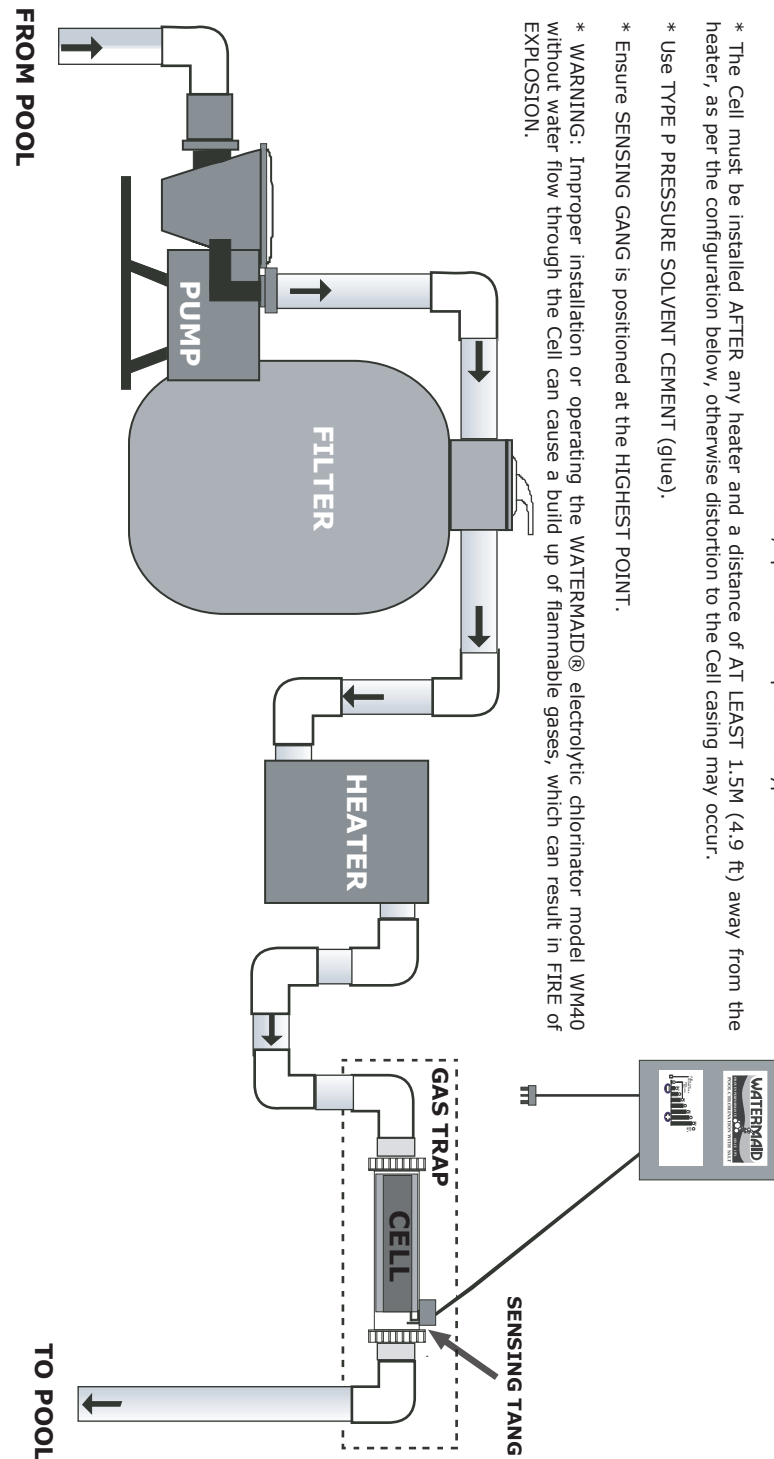
- * For QT & XT Cells, a GAS TRAP must be installed to prevent the accumulation of hydrogen gas in the filter if the pump ever fails (refer to diagram below).
- * The Cell must be installed so that ALL the water from the filter passes through the Cell BEFORE any diversions or breakouts to devices such as dual outlets, spa lines and pressure type cleaners.
- * The Cell must be installed AFTER any heater and a distance of AT LEAST 1.5M (4.9 ft) away from the heater, as per the configuration below, otherwise distortion to the Cell casing may occur.
- * Use TYPE P PRESSURE SOLVENT CEMENT (glue).
- * Ensure the SENSING TANG is positioned at the HIGHEST POINT.
- * **WARNING:** Improper installation or operating the WATERMAID® electrolytic chlorinator model WM40 without water flow through the Cell can cause a build up of flammable gases, which can result in FIRE or EXPLOSION.



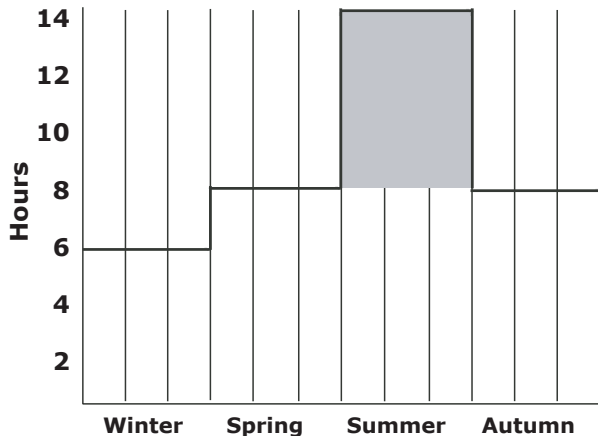
WATERMAID® QT & XT SERIES CELLS - HORIZONTAL INSTALLATION DIAGRAM

IMPORTANT:

- * For QT and XT Cells, a GAS TRAP must be installed to prevent the accumulation of hydrogen gas in the filter if the pump ever fails.
- * The Cell must be installed so that ALL the water from the filter passes through the Cell BEFORE any diversions or breakouts to devices such as dual outlets, spa lines and pressure type cleaners.
- * The Cell must be installed AFTER any heater and a distance of AT LEAST 1.5M (4.9 ft) away from the heater, as per the configuration below, otherwise distortion to the Cell casing may occur.
- * Use TYPE P PRESSURE SOLVENT CEMENT (glue).
- * Ensure SENSING GANG is positioned at the HIGHEST POINT.
- * WARNING: Improper installation or operating the WATERMAID® electrolytic chlorinator model WM40 without water flow through the Cell can cause a build up of flammable gases, which can result in FIRE or EXPLOSION.



SUGGESTED RUNNING TIMES (average-sized domestic pool)



PLEASE NOTE:

If a **solar heater** is installed and running times are set for chlorination and filtration in the daytime, then extra chlorination in non-sunlight hours may be required.

On a monthly basis in summer the WATERMAID® chlorinator, filter and pump should be run non-stop for at least 24 hours to **super chlorinate** and maintain a high polish in the pool.

The only way to determine the needs of the pool when varying the operating times between seasons is to monitor the pool daily and make adjustments accordingly. The overall aim of sufficient running times, operation during bather hours and superchlorination is to produce a chlorine reading of 1 - 3 ppm. The finest detail must be discernible at the bottom of the deep end of the pool.

Public Pools may require multiple chlorinators, pumps and filters, as well as 24-hour operation of the pool equipment. A "rule of thumb" is 1 Kg (2.2 lb) of 100% available chlorine per 20 bather hours (2 people/10 hrs etc).

Running times for **spas** is dependent on the bather load of the spa. Initial daily testing will help to determine the required running times. The overall aim of sufficient running times and operation during bather hours is to produce a chlorine reading of 3 - 5 ppm.

9. ZERO CHLORINE

If the recommended residual chlorine level cannot be obtained, check the following:

(a) If an algacide has been added in the last 4 weeks. Most algacides contain ammonium compounds (approximately 20%), which will react with chlorine to leave a zero chlorine reading in the water. As a guide, about NINE times the amount of ammonium compound IN CHLORINE will need to be produced or added before there is a free chlorine level in the water. Any debris in the water will need ADDITIONAL chlorination.

(b) If the filter is functioning properly. Take a sample of pool water in a clear glass and hold it up to the light. Floating debris will indicate that unfiltered water is getting back into the pool. If the filter is not functioning properly, there will not be enough chlorine in the water to cope with the debris.

It is important to note that the sand in a sand filter should be changed roughly every 5 years as the edges become rounded over time due to the constant abrasion during filtering and will not work as effectively.

(c) The bather load. With sufficient running times, the WATERMAID® chlorinator should be able to maintain a clean clear pool for about a **20 bather/hour ratio** (e.g. 4 people/5 hrs, 10 people/2 hours etc). It is important to note that contamination from sunscreen, urine and pets will dramatically destroy the chlorine.

(d) Incorrect pH. Chlorine is not as effective outside the correct pH range. Refer to chart, section 1(c).

Poor water flow, overheating, and heavily encrusted electrodes allow chlorine gas to etch the titanium base and cause the precious coating to shed. Such conditions VOID WARRANTY. Obvious signs of these conditions are a change in colour of the anode mesh and a whitening of the Cell casing.

To check Cell performance, place the Cell in a 25 litre (6.6 gal) bucket of pool water at 20°C (68°F) with 6000 ppm of salt. The dome section of EZ300 Cells should NOT be submersed. The Cell should produce a 1 ppm chlorine reading within 5 seconds. If the Cell fails this test and it has been cleaned, then a new Cell may be needed.

(vi) NO WATER FLOW AND THE CELL

If there is no movement of water through the WATERMAID® Cell (e.g. in the case of blocked skimmers, closed valves, draining of the pool or during backwashing) while the WATERMAID® Power Supply is switched on, then hydrogen gas can build up, heat may generate and the Cell casing may expand, distort and turn white, until the gas sensor switches the power off. This practice is NOT recommended, nor covered by warranty.

When there is no water flow through the WATERMAID® Cell, the power to the Cell should be switched OFF via the switch on the underside of the WATERMAID® Power Supply.

7. SALT LEVEL

At the beginning of the swimming season, the salt level should be checked to ensure that it is correct.

6000 ppm (0.6 %) for WATERMAID® QT300, XT300 and EZ300 Cells.

4000 ppm (0.4%) for WATERMAID® QT400 and XT400 Cells.

Each year, approximately one-third of pool water is lost, so the salt level will need to be adjusted accordingly. Refer to section 2(i) for calculating how much salt to add.

Salt is NOT lost by the process of electrolysis, nor when water evaporates. It is lost, only in the following ways:

1. Backwashing - after 20 backwashes approximately 1 bag of salt is lost.
2. Pool overflow (rainfall, flooding etc).
3. Splash out from bathers.
4. A leak in the pool or plumbing.

To reduce the amount of salt lost by backwashing for long periods of time, place the garden hose, turned on full, into the skimmer box during backwashing.

A salt level of 9000 ppm is isotonic with body tissue, and in the case of accidental immersion, water at close to this level will cause less damage to lungs and other body organs than water without salt.

8. RUNNING TIMES

Ideally, the time clock should be set to operate the WATERMAID® chlorinator from late afternoon (when the sun is off the pool) to continue throughout the night as necessary. As UV rays destroy chlorine, a chlorine stabiliser is recommended during summer for outdoor pools [refer to section 1(b)].

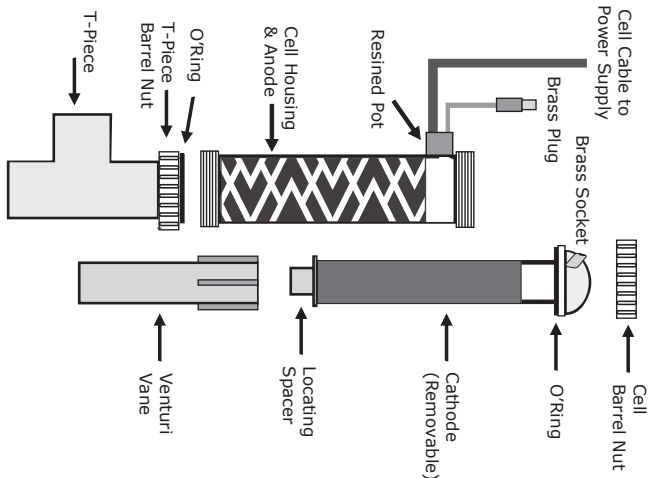
Suggested running times for an average-sized domestic pool are shown in the chart (next page). Please note: during summer, between 8 and 14 hours per day is recommended.

Running times will depend on pool volume, bather load, water temperature, time of year, pump efficiency, salt level, Cell age and condition, cyanuric acid levels, pH, sunlight, water chemistry and the effects of surrounding vegetation.

In addition to normal running hours, the WATERMAID® chlorinator, pump and filter should be run whenever bathers are in the pool.

WATERMAID® EZ300 CELL - INSTALLATION DIAGRAM

EZ300 PARTS VIEW

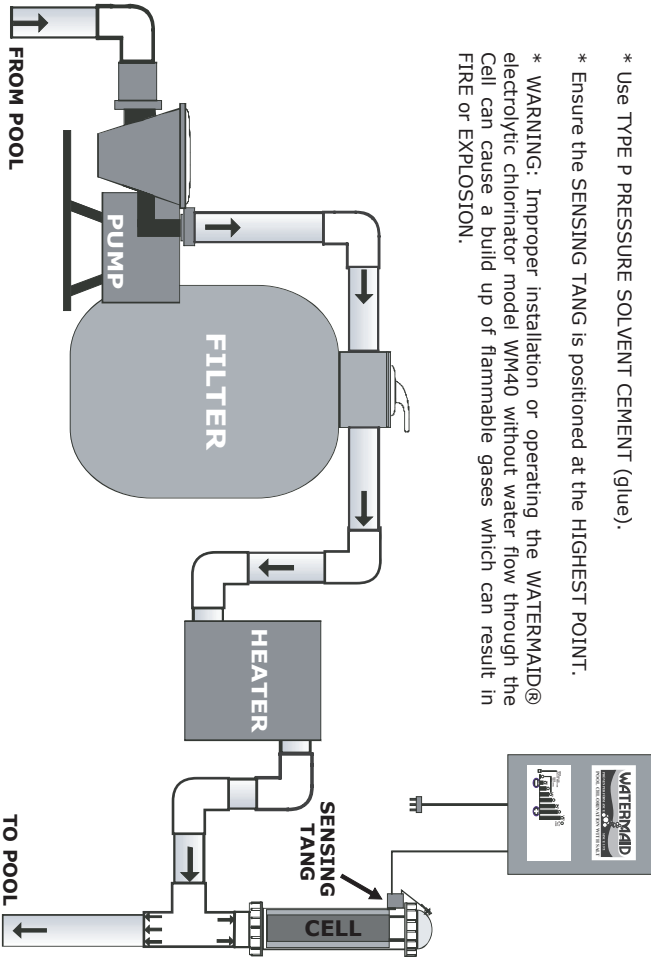


- ASSEMBLY:**
1. Insert Venturi Vane into T-Piece.
 2. Align bottom of Cell Housing with top of T-Piece and screw Barrel Nut tight (ensure O-Ring is in place).
 3. Insert Cathode into Cell Housing and position Locating Spacer into Venturi Vane.
 4. Place Cell Barrel Nut over dome top of Cell Cathode. Position Brass Socket above Resined Pot and screw Cell Barrel Nut tight.
 5. Insert Brass Plug into Brass Socket.

IMPORTANT:

- * The Cell must be installed so that ALL the water from the filter passes through the Cell BEFORE any diversions or breakouts to devices such as dual outlets, spa lines, and pressure type cleaners.
- * The Cell must be installed AFTER any heater and a distance of AT LEAST 1.5M (4.9 ft) away from the heater, as per the configuration below, otherwise distortion to the Cell casing may occur.
- * EZ300 Cells incorporate a gas trap in their vertical design.
- * Use TYPE P PRESSURE SOLVENT CEMENT (glue).
- * Ensure the SENSING TANG is positioned at the HIGHEST POINT.

* **WARNING:** Improper installation or operating the WATERMAID® electrolytic chlorinator model WM40 without water flow through the Cell can cause a build up of flammable gases which can result in FIRE or EXPLOSION.



3. A dilute acid solution prepared according to the following procedure may be used:

- i) In a glass or strong plastic container, add 1,000 mL (2.1 pt) of hot (not boiling) water.
- ii) THEN add 100 mL (3.4 fl.oz) hydrochloric acid to the water.
- iii) QT and XT series Cells can either be submersed in the solution or the solution can be poured into the Cell after one end of the Cell is blocked. One end may be blocked by using a WATERMAID® cleaning cap and barrel nut.

For EZ300 Cells, turn Cell upside-down (since one end is blocked already) and pour the solution inside. Avoid submersion of the brass plug and socket.

The mixture may effervesce for several hours, and thereafter should be discarded. If the scale is stubborn, step 3 may need to be repeated with a new solution.

Alternatively, white vinegar (without dilution) or a PHOSPHATE-FREE premixed "Cell-Cleaning Solution" (available from a pool shop) may be used.

- 4. Rinse the electrodes with tap water.
- 5. Return the Cell to pipe-work ensuring not to overtighten the barrel unions.

IMPORTANT:

- * **The sensing tang on all WATERMAID® Cells (which is the small metal "tang" located on the inside of the Cell, above the mesh electrode) needs to be kept clean.**
- * **Do NOT tap the Cell casing with ANY instruments.**
- * **Boiling water is NOT recommended in Cell cleaning as it may discolour the casing.**
- * **NEVER POUR NEAT (UNDILUTED) ACID DIRECTLY INTO THE CELL.**
- * **ALWAYS ADD ACID TO THE WATER.**
- * **WEAR RUBBER GLOVES when handling acid.**
- * **Always have either a hose or a bucket of water nearby for accidental spills. Please read the manufacturer's safety precautions when handling acid.**

(iv) DISCONNECTING THE CELL FROM POWER SUPPLY

- *Turn OFF the power to the WATERMAID® at the power outlet.
- *Unscrew the cover of the black junction box located on the underside of the WATERMAID® Power Supply.
- *Unscrew the single screw holding the Cell Cable, as well as the 3 brass screws holding the wires.

*When reconnecting the wires, ensure the connection is TIGHT and that the wires are connected correctly [refer to section 2(v)].

(v) AGE OF THE CELL

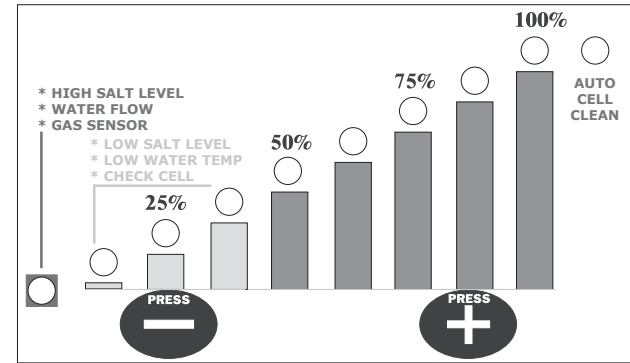
After a number of years the active coating on the anode (mesh) electrode will wear away. At a much slower rate, the centre solid electrode will also wear away. Calcification, acid cleaning, current density and solids in the water contribute to the wear rate of the electrodes.

Generally, the precious coating on the anode is lost at a rate of 1 microgram per amp hour. This means a WATERMAID® Cell should have a 5-8 year life.

The use of neat (undiluted) acid solutions will deteriorate the precious coating of the anode electrode, drastically shortening the life of the Cell.

3. THE WATERMAID® POWER SUPPLY

The Chlorine Production Scale (pictured below) on the WATERMAID® Power Supply indicates how much chlorine per hour the unit is producing.



At 100%, the WATERMAID® is producing 30 grams per hour of 100% available chlorine, shown by 3 amber AND 5 green solid lights simultaneously (see below).



The "+" and "-" buttons on the scale can be used to increase or decrease chlorine production. However, **chlorine production is dependent on the salt level AND water temperature.** If the salt level or water temperature are low, then less chlorine is produced.



At 6000 ppm salt and 20°C (68°F) water temperature, the QT300, XT300 and EZ300 Cells should run at 100%.

At 4000 ppm salt and 20°C (68°F) water temperature, the QT400 and XT400 Cells should run at 100%.

Areas with a hotter climate may have water temperatures around 30°C (86°F), in which case a salt level not exceeding 4000 ppm is recommended.

For a full explanation of the trouble lights on the WATERMAID® Power Supply, please refer to the troubleshooting section at the back of this handbook.

THE INTEGRATED CIRCUIT BREAKER/ROCKER SWITCH

If the Power Supply needs to be reactivated in the event of current overloading or a power surge to the primary side, the switch on the underside of the WATERMAID® Power Supply will need to be turned ON again.

It is recommended that this switch be turned OFF when dissolving salt, backwashing the filter, draining the pool or there is no water flow through the Cell.

POWER OUTLET (Australian and European models only)

The power outlet on the underside of the WATERMAID® Power Supply is designed to power ONE pool pump only.

This power outlet is rated to a MAXIMUM rating of 10 Amps and should NOT be overloaded with more than one device. Exceeding the outlet rating is not covered by warranty.

4. AUTO CELL CLEANING

The WATERMAID® Power Supply is programmed to perform the following cycle:

1. Produce chlorine for 1 hour and 5 minutes, once water is flowing through the Cell.
2. Auto Cell Clean for 5 minutes (indicated by a blue flashing light).
3. A quick check for error conditions (indicated by a red flashing light).
4. Produce chlorine for 55 minutes and then repeat steps 2 - 4, until the WATERMAID® is turned off.

5. THE TIME CLOCK

It is recommended that a time clock be used to control the pump, filter and WATERMAID® chlorinator, and this may be internal or external to the WATERMAID® Power Supply. For an internal time clock, the 3 settings are as follows:

"I" setting = chlorinator will be ON permanently.

"⌚" setting (position in the middle) - chlorinator will operate according to the time clock's programmed settings.

"O" setting - chlorinator is on standby.

TO SET THE TIME CLOCK

Turn OFF the power to both the WATERMAID® chlorinator and pump so that both do not start and stop erratically whilst the time clock is being adjusted.

1) Set the current time by turning the clock face in a clockwise direction so that current time aligns with the arrowhead (top right of time clock).

2) Set the desired times for the chlorinator to switch on and off (refer to section 8 "Running Times") by aligning the pins as follows:

For **On settings**, slide the pins away from the centre of the time clock.
For **Off settings**, slide the pins towards the centre of the time clock.

3) Now position the switch to the middle setting "⌚" (for time clock settings).

N.B. If the time clock on the WATERMAID® Power Supply is different to the one pictured above and has just two settings, only the "I" and "clock" settings will be applicable.

6. THE WATERMAID® CELL

(i) CHLORINE PRODUCTION

Each WATERMAID® Cell is capable of chlorinating a pool up to 120,000 litres (approx. 27,000 gal). **The recommended chlorine level is between 1 and 3 ppm for a pool, or between 3 and 5 ppm for a spa.** Chlorine production can be tested by taking a sample of water directly from the outlet flow. This reading should be greater than elsewhere in the pool by approximately 0.5 ppm.

The expected life of a WATERMAID® Cell is 5-8 years. As the Cell wears out, less and less chlorine will be produced.

Only a genuine WATERMAID® replacement Cell should be fitted, to ensure compatibility with the WATERMAID® Power Supply model WM40.

(ii) SCALE FORMATION

If the pool surface is fibreglass, fibreglassed concrete, painted concrete, vinyl-lined, epoxy coated or some similar inert surface, then scale can originate only from the water supply or chemicals which have been added to the water and is therefore usually insignificant. If the pool surface is marblesheen, pebbled, quartzon or tiled, then scale can originate from either the water supply, chemicals added to the water or **minerals that leach out of the walls.**

It has been observed for many years, that salt chlorination Cells used in sea water conditions rarely foul up with hard crystalline deposits. The soft mushy deposit in these cells can always be cleaned with a strong jet of water or the use of a dilute acid solution.

By contrast, Cells used in marblesheen, pebbled, quartzon or tiled pools that have had calcium hypochlorite (for hardness) or **copious amounts of acid added**, continually foul up and form deposits that are hard, crystalline and difficult to clean. This can then stop the Cell from working within a few days.

Scale is usually calcium carbonate, but can also include traces of other compounds. Sea water usually contains roughly 1700 ppm calcium and 400 ppm magnesium, whereas many swimming pools normally contain up to 400 ppm calcium but no magnesium. It has been noted that after the addition of magnesium, to a level of about 20 ppm, Cells begin to mimic the sea water experience and the effect can last some 6 to 9 months.

It is recommended that 25 Kg (55 lb) per year of magnesium chloride be added to the pool. All 25 Kg (55 lb) may be added to the pool at the one time. Magnesium chloride can replace all other chemicals for any 'hardness' requirement.

It is also recommended that the calcium level in the water be not more than 120 ppm. A calcium level above 200 ppm is considered excessive.

The use of chemicals containing calcium is NOT recommended for use with the WATERMAID® WM40 chlorinators. These chemicals include calcium chloride ("calcium hardness") and calcium hypochlorite ("granular/powdered chlorine").

Heavy scale build-up on the Cell electrodes can inhibit chlorine production, restrict water flow and damage Cell beyond repair (voiding warranty). To rectify, the Cell will need to be cleaned manually and the calcium level in the water reduced. To reduce the calcium level in the water, it may be necessary to empty some of the water from the pool and top it up with tap water or collected rain water. The salt will then need to be topped up to the appropriate level.

As each pool situation is different, the amount of build-up that is generated will also differ. It is important for pool owners to maintain water balance (refer to section 10).

(iii) MANUALLY CLEANING THE CELL

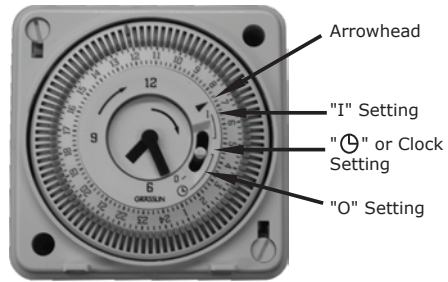
1. Turn OFF the power to the chlorinator and pump. There is no need to disconnect the Cell from the Power Supply when cleaning.

2a) For QT and XT series Cells, unscrew the white barrel nut at the top anti-clockwise and the bottom clockwise to remove the Cell from the pipe work. Aim a strong jet of water into the Cell. If all scale is removed successfully proceed to step 5, otherwise proceed to step 3.

b) For EZ300 Cells: If the mesh electrode is clean, then separate the electrodes by pulling the brass plug out of its socket, unscrewing the barrel nut anti-clockwise and lifting the centre electrode out. Aim a strong jet of water at the centre electrode to dislodge most of the scale, then use a rag to wipe the electrode clean. Only the centre electrode (being solid titanium) may be scraped clean. If all scale is removed successfully, proceed to step 5.

If both the mesh and centre electrodes contain scale, leave the Cell electrodes intact and remove the entire Cell by unscrewing the T-Piece Barrel Nut (refer to Parts View, page 8). **Do NOT attempt to clean the mesh electrode by abrasion.** Proceed to step 3.

If the barrel nut is difficult to unscrew, the use of rubber gloves will give a better grip or pour some hot (not boiling) water over it. A small amount of vaseline over the thread for next time may make removal easier.



*One revolution equals a 24-hour cycle.
*The time is in 24 hour time (e.g. 18=6pm).
*Each pin equates to a 15 minute interval.