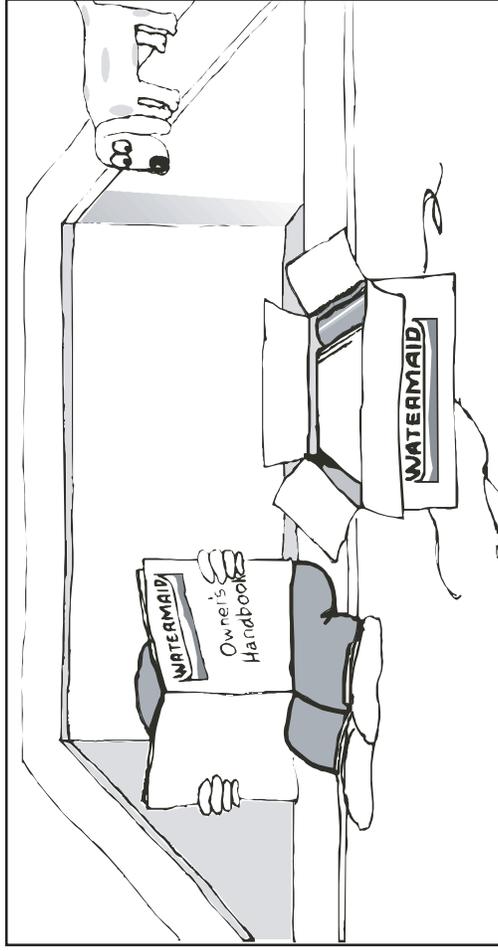


WATERMAID™

PROVEN PERFORMANCE SINCE 1971

POOL CHLORINATION WITH SALT

OWNER'S HANDBOOK



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WATERMAID

This Owner's Handbook contains information relating to WATERMAID salt water chlorinators as well as general pool maintenance. Pictured below are the current models of WATERMAID chlorinators available for swimming pools.



AUTO CELL CLEANING POWER SUPPLY with optional timeclock



EZ300
Domestic Pools



QT300 CELL
Domestic Pools

QT400 CELL
Commercial Pools

IMPORTANT:

- * Ensure that the WATERMAID Power Supply is OFF or in standby mode [refer to section 4] when:
 - a) Backwashing the filter
 - b) Vacuuming the pool
 - c) Dissolving salt
 - d) Water flow is restricted
- * The WATERMAID Cell must be installed so that ALL the water from the filter passes through the WATERMAID Cell before any diversions or breakouts.
- * The WATERMAID QT SERIES Cells must be installed with a gas-trap to prevent any gases getting back into the filter.
- * To avoid hazard, the supply cord if damaged, must be replaced by the manufacturer or its service agent or a similarly qualified person.
- * **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.

WATERMAID WARRANTY

Effective 1 January 2004, replaces all undated Warranties and all Warranties dated before 1 January 2004.

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 Trade Practices Act, 1974 and the State legislation which confers certain rights upon consumers. The following WARRANTY supplements these.

(including lightning strikes), harsh chemicals, incorrect water balance, wear and tear, accident, non-observance of installation, operating and/or cleaning instructions or any other conditions outside of the control of WATERMAID PTY LTD;

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

2. WATERMAID WARRANTY

a) WATERMAID PTY LTD warrants that the Watermaid Power Supply (excluding any timeclock component) shall remain free of defects in manufacturing or workmanship for a period of two (2) years from the date of purchase.

(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.

b) WATERMAID PTY LTD warrants that the timeclock component contained in a Watermaid Power Supply shall remain free of defects for a period of one (1) year from the date of purchase.

(v) Where the Power Supply or Cell has been subject to any use other than NORMAL DOMESTIC POOL USE.

3. FREIGHT

Subject to the purchaser'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.

4. OTHER LIABILITY

Subject to the purchaser's 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.

5. CLAIMS UNDER WARRANTY

If a defect covered by this warranty arises, the owner should contact WATERMAID PTY LTD as soon as the defect arises and advise WATERMAID PTY LTD of the nature of the defect. Claims made after the warranty period has expired will not be covered by warranty.

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

(i) To any defect or failure caused by misuse, abuse, abrasion, buildup on Cell electrodes, electrical faults, power surges

Troubleshooting and Eliminating Problems



The following is a list of possible causes to commonly encountered problems.

CHLORINE RESIDUAL LOW OR NIL

- * Not enough chlorine being produced [refer to section 7(i)]
- * Heavy bather load - insufficient running times to cope [refer to section 9]
- * Strong sunlight conditions and/or insufficient chlorine stabiliser level [refer to section 1(b)]
- * pH too high or low [refer to section 1(c)]
- * Poor water circulation [refer below]
- * Algae has been added within the last 4 weeks [refer to section 12]
- * Excessive calcium level causing scale on Cell electrodes [refer to sections 5 & 7(iii)]
- * Cell is old and needs replacing [refer to section 7(v)]

CHLORINE LEVELS HIGH IN THE MORNING AND NIL AT NIGHT

- * Heavy bather load [refer to section 9]
- * Extreme sunlight conditions and/or insufficient chlorine stabiliser level [refer to section 1(b)]

RED LIGHT

- * Nil or insufficient water flow in Cell or poor circulation [refer below]
- * Problem with Cell connection [refer section 3(v)]
- * Excessive calcium level causing scale on gas sensor [refer to sections 4, 5 & 7(iii)]

NO GREEN LIGHTS

- * Low salt level [refer to section 3(ii) and 8]
- * Excessive calcium level causing scale on Cell electrodes [refer to sections 5 & 7(iii)]
- * End of Cell life [refer to section 7(v)]
- * Fault inside Power Supply

NO LIGHTS AT ALL

- * No power to WATERMAID chlorinator [refer to section 3(vi)]
- * Timeclock incorrectly set or faulty [refer to section 6]
- * Problem inside Power Supply - refer to qualified service technician for repair

SCALE BUILD-UP ON CELL ELECTRODES [for removal refer to section 7(iii)]

- * Excessive calcium level in water [refer to section 5]

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 etc] [refer to section 1(c) and section 11]

POOR CIRCULATION

- * Dirty and clogged filter
- * Skimmer baskets full of leaves, hair, debris etc
- * Faulty pump
- * Low speed pump
- * Water level is low
- * Cell is clogged with scale [refer to section 7(iii)]

FILTER PROBLEM

If the WATERMAID chlorinator is capable of registering above 12 amps, but the pool water is cloudy, there may be a filter problem.

- * Filter may need backwashing [refer to section 7(vii)] [also refer to filter manual]
- * Body fat or oil build up on pads
- * Sand filters: The sand in a sand filter should be changed every 5 years
- * Diatomaceous earth filters: Insufficient diatomaceous earth over the pads

FOR EARLIER WATERMAID MODELS

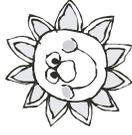
For WATERMAID models manufactured prior to 2004, if the light is green then the WATERMAID is producing chlorine and functioning correctly.

If the light stays red, it indicates one or more of the following:

- > a deposit has formed on the Cell electrode(s) or its sensing tang (12mm metal tang located at the top of the electrodes on the inside of the Cell) and requires cleaning [refer section 7(iii)]; or
- > there is no water flow in the Cell, or
- > the wires inside the black terminal box connecting the Cell to the Power Supply are loose, burnt, corroded or wired together incorrectly [refer to section 3(v)] or,
- > the pool's salt level is low or,
- > the Cell is at the end of its life.



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1. ESSENTIALS FOR A HEALTHY POOL

There are three fundamental requirements in maintaining a swimming pool:

- a) FILTRATION
- b) CHLORINATION
- c) pH

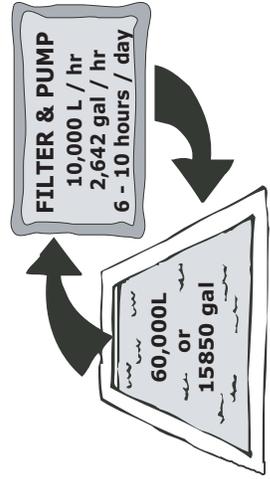
The WATERMAID pool chlorinator takes care of the chlorination aspect of these requirements. As mild saline water flows through the WATERMAID Cell it is converted, by electrolysis, into chlorine as sodium hypochlorite.

A pool should be looked at daily to check that the water is clean and clear and the finest details of the pool walls can be seen at the deepest part of the pool. This will indicate whether the pool has had enough filtration and chlorination for the load conditions that were applicable **yesterday**. Any other condition requires testing and rectification before bathers swim in the pool.

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 1 1/2 times the total volume of water. **However, about 65% only of the actual water and debris will have passed through the filter.**

Generally, at dawn and at dusk, wind dies down and these 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.

b) CHLORINATION

After filtration, chlorine is required to react with any remaining debris (both visible and non-visible), remove stains by oxidation and to sterilise the water of harmful bacteria. A chlorine residual (or reserve) is required for any imminent bather load.

As a general guide, if a total of 1 ppm of chlorine is introduced during a 1 1/2 filtration cycle (relative to the pool's volume), then the pool should remain in 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 some 140 minutes and is the only way to help maintain a chlorine residual in the pool on hot sunny days.

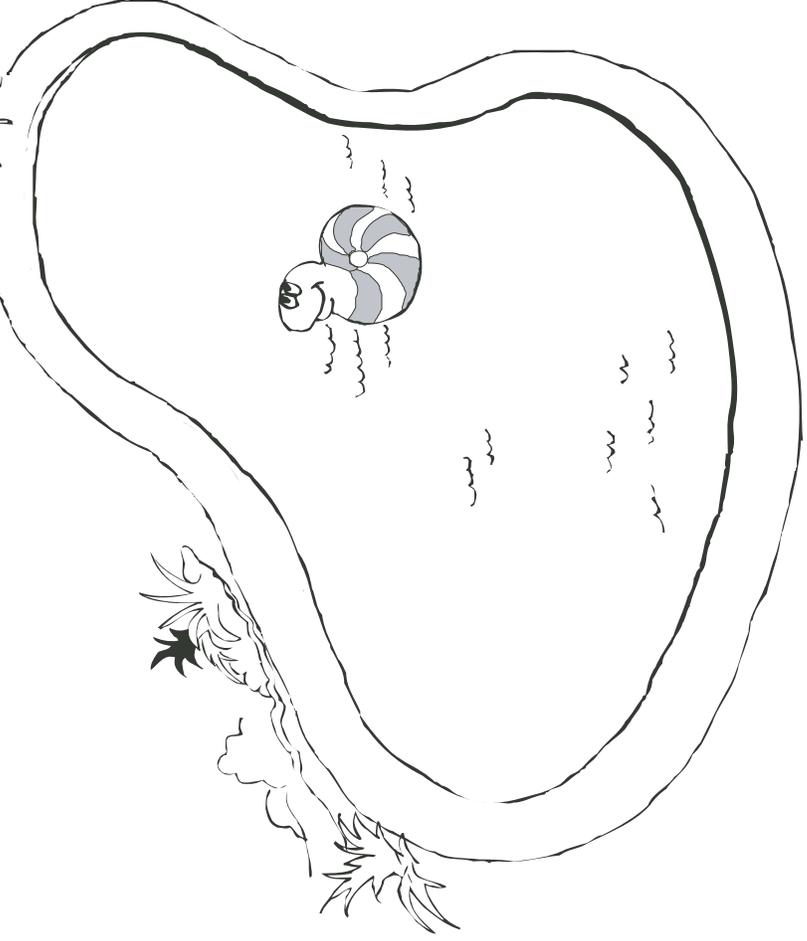
At the **beginning** of the summer season, **chlorine stabiliser** (Iso-cyanuric acid) should be added to the pool and circulated by filtration.

For an average 60,000 litre (15,850 gal) pool, **add 2 1/2 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. **Do not exceed 80 ppm.**



Recommended chlorine stabiliser level: 30 - 50 ppm

Longer filtration cycles can reduce the chlorine requirement and conversely, more chlorine can reduce the filtration requirement. The level of chlorine in the pool is **A FUNCTION OF WHAT IS GOING ON IN THE POOL.**



spores can resist chlorine levels of up to 10 ppm. Salt chlorinators do not achieve those conditions and a manual chlorine dose would need about 1-2 Kg (2-4 pt) of hypochlorite equivalent to be effective. **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 (approx. 2 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:

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. About 1 heaped tablespoon of copper sulphate (approx. 70 grams or 3 ounces) dissolved in 10 litres (approx. 3 gal) of water spread around the pool is the most economical method. 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.**

4. Floc the pool with a clarifier. A blanket of debris will settle on the pool floor overnight and **can then be vacuumed directly to waste (i.e. NOT through the filter).** Following this, the pool should attain a clean, clear condition after a few days of 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.

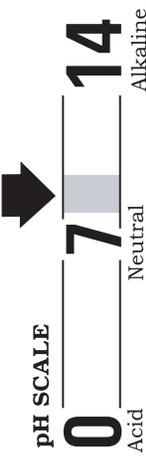
Factors such as sunlight, filter and pump efficiency, stabiliser level, bather load, debris, water temperature, salt level, water level, chemical balance and age of the Cell, ALL AFFECT THE FINAL CHLORINE LEVEL.

c) pH

pH refers to the acid/alkaline balance of the water. **pH 14 is alkaline, 0 is acid and 7 is neutral.**

Within the pH range of 7.0 to 7.4, chlorine will work most effectively as a steriliser, and the precipitates formed will be at their maximum size and easily picked up by the filter.

RECOMMENDED
7.0 - 7.4



*At pH 8.0 - chlorine is only 21% effective.

*At pH greater than 8.0 - the water is alkaline and can cause skin rashes.

*At pH below 7.0 - monochloramines are formed and will sting sensitive skin and eyes.

Marblesheen, pebbled, quartzon and tiled pools stabilise naturally between pH 7.6 and 8.2 so the **effects of chlorine are disadvantaged** (compared to pools with inert surfaces such as fibreglass, fibreglassed concrete, painted concrete and vinyl-lined pools).

For marblesheen, pebbled, quartzon and tiled 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. **Keeping the total alkalinity between 150 and 200 ppm will help to keep the pH below 7.8** (to achieve the desired total

alkalinity, refer to tables, section 11).

Adding sodium bicarbonate (pH buffer) 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 pool 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 (measured by the Langlier Index calculation, refer to section 11).

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

Fibreglass, fibreglassed concrete, painted concrete and vinyl-lined pools have a naturally occurring total alkalinity of 80 - 100 ppm, which is an ideal situation. Therefore there is no need to add sodium bicarbonate (pH buffer) to these pools.

If hydrochloric acid is used to lower pH, it is advisable to add it **SPARINGLY** and only according to the instructions given by an Acid Demand Test Kit, as the acid will attack the pool walls causing the calcium level in the water to rise.

2. THE CHEMISTRY INVOLVED

The WATERMAID Cell, by electrolysis, produces sodium hypochlorite (NaOCl). In water, sodium hypochlorite dissociates into sodium (Na⁺) and hypochlorite (OCl⁻) ions.

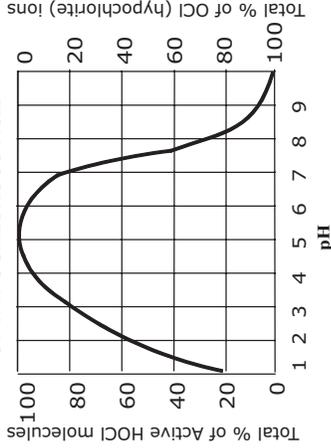
It is the hypochlorite ions that form with the hydrogen (H⁺) ions (from the water) to form hypochlorous acid (HOCl), the active agent that destroys bacteria and algae, and oxidizes organic matter.

HOCl & THE IMPORTANCE OF pH

The chart on the following page shows the effect of pH on the reversing reaction of HOCl (hypochlorous acid) in water.

It can be seen that HOCl is more effective as a sterilising agent at pH levels below 7. However, for swimming conditions it is recommended that the pH be kept within the range of 7.2 - 7.6.

THE EFFECT OF pH ON THE DISSOCIATION OF HYPOCHLOROUS ACID



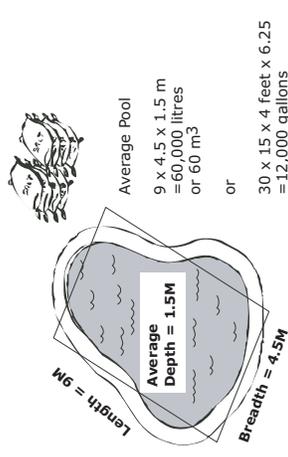
3. INSTALLATION

The WATERMAID chlorinator may be installed by the owner, pool technician or plumber. 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.

When the owner is unsure what to do after reading the following, then an experienced pool technician or plumber should carry out the installation.

(i) MEASURE THE POOL SIZE

Measuring the size of the pool is important for determining the amount of salt to add. If the pool 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.



(ii) ADDING SALT TO THE POOL

If the chlorinator has already been installed, it should be turned off or to standby mode (refer to section 4)

before adding salt. Watermaid recommends a salt concentration in the pool of 6000 ppm (parts per million) (refer to section 8).

For pool water with no salt, align "0 ppm" in either of the following Metric or U.S. Measurements tables with the column that represents the size of the pool, e.g. a 60,000 litre pool with no salt would need 360 Kg (approx. 14 x 25 Kg bags) of salt. **One bag of salt usually contains 25 Kg or 40 lb.**

For pool water containing salt, find the **salt level (in ppm)** of the water (using a WATERMAID hydrometer or reading from a pool shop) and align this value with the column that represents the size of the pool, e.g. an 80,000 litre pool with a salt reading of 4000 ppm would need to add 160 Kg (approx. 6 x 25 Kg bags) of salt.

	POOL SIZE (METRIC)					
	40,000 L	60,000 L	80,000 L	100,000 L	120,000 L	120,000 L
0 ppm	240 Kg	360 Kg	480 Kg	600 Kg	720 Kg	720 Kg
1000 ppm	200 Kg	300 Kg	400 Kg	500 Kg	600 Kg	600 Kg
2000 ppm	160 Kg	240 Kg	320 Kg	400 Kg	480 Kg	480 Kg
3000 ppm	120 Kg	180 Kg	240 Kg	300 Kg	360 Kg	360 Kg
4000 ppm	80 Kg	120 Kg	160 Kg	200 Kg	240 Kg	240 Kg
5000 ppm	40 Kg	60 Kg	80 Kg	100 Kg	120 Kg	120 Kg

	POOL SIZE (U.S. MEASUREMENTS)					
	10000gal	15000gal	20000gal	25000gal	30000gal	30000gal
0 ppm	500 lb	750 lb	1000 lb	1250 lb	1500 lb	1500 lb
1000 ppm	417 lb	625 lb	833 lb	1042 lb	1250 lb	1250 lb
2000 ppm	333 lb	500 lb	666 lb	833 lb	1000 lb	1000 lb
3000 ppm	250 lb	375 lb	500 lb	625 lb	750 lb	750 lb
4000 ppm	167 lb	250 lb	334 lb	417 lb	500 lb	500 lb
5000 ppm	83 lb	125 lb	167 lb	208 lb	250 lb	250 lb

Empty the contents of the required salt bags into the shallow end of the pool and run the filter and pump simultaneously while the WATERMAID chlorinator is off or in standby mode to circulate the water and dissolve the salt. **Do not** throw the salt bag into the pool as chemicals and inks on the bag can interfere with the water balance.

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
10	395mL	10	893gm
20	580mL	20	1.70Kg
30	1.22L	30	2.60Kg
40	1.60L	40	3.40Kg
50	2.00L	50	4.30Kg
60	2.40L	60	5.20Kg
70	2.82L	70	6.00Kg
80	3.20L	80	6.80Kg
90	3.60L	90	7.60Kg
100	4.05L	100	8.40Kg

Table A

level means that the total alkalinity becomes a function of pH and water temperature and will then find its own equilibrium.

Adding sodium bicarbonate will also help to lower the calcium level to about 60 ppm. About 40 - 50 Kg (88 - 110 lb) may be needed to do this. Keeping the calcium level no higher than 120 ppm is necessary to minimise the amount of scale formation.

The ideal water balance is:

- * Water temperature of 150C - 300C (590F - 860F)
- * Calcium level of 60 - 120 ppm
- * Magnesium level of greater than 20 ppm
- * Iso-cyanuric acid level 30 - 50 ppm
- * Total Alkalinity >150 ppm and pH 7.4 - 7.8 for Concrete, Quartzon, Pebble, or Tiled Pools
- * pH 7.0 - 7.6 for Fibreglass or Painted Pools

HOW TO MAINTAIN WATER IN BALANCE

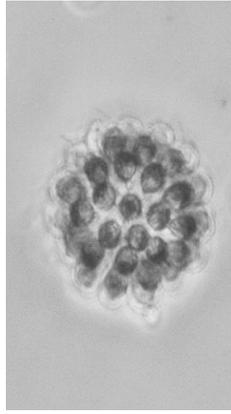
To maintain water in balance for alkaline surfaced pools (such as marblesheen, pebbled, quartzon and tiled) the total alkalinity should be greater than 150 ppm if the pH is to be kept below 7.8. Consult tables A and B (above) to achieve the correct total alkalinity.

U.S. Measurements Conversion Formulae:

To convert from Litres to Gallons: x 0.2642
To convert from Kilograms to Pounds: x 2.205

12. 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 photo 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 water 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 and sand filters are able to filter 5+ microns and 20+ microns respectively.

Algae will die from doses of chlorine as low as 0.05 ppm concentration, but

(b) Bather load. With sufficient running times during bather load, the WATERMAID chlorinator will 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 such as sunscreen oils and urine, as well as from animals **will dramatically destroy chlorine.**



11. THE LANGLIER INDEX

The Langelier Index calculation table (below) can be used to check the pool water balance. 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 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 inert-surfaced pools (fibreglass, fibreglassed concrete, painted concrete or vinyl-lined) is simply a WASTE of chemicals. The unchanging calcium

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

If the pool has no main drain at the bottom, 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 WATERMAID chlorinator OFF to circulate the undissolved salt in the water.

Quality pool salt (with low levels of iron and other impurities) should be used, with finer grades of salt usually dissolving faster. Alternatively, sea water may be used.

Salt may take 24 - 48 hours to dissolve in summer and longer in winter.

For WATERMAID models manufactured before 1993, if the chlorinator is not switched OFF when adding salt to the water, then undissolved salt may pass through the Cell and cause the Power Supply to draw a higher current than normal. As there is no overload protection in these units, damage may result.

(iii) MOUNT THE POWER SUPPLY

The WATERMAID Power Supply should ideally be enclosed within a splash-proof housing (e.g. in a filter box) and mounted in a position that complies with local regulations.

1. Locate a suitable position for the WATERMAID Power Supply and that allows for box dimensions of 240mm wide x 315mm high x 150mm deep (9.4 x 12.4 x 5.9 in). [Allow at least 20 mm (0.8 in) from the top of the WATERMAID Power Supply to any structure or fitting above]

2. For Brickwork:

a) Drill 2 x 8 mm (0.3 in) diameter holes, 30mm (1.2 in) deep, that are **156mm (6.1 in) apart and level.**

b) Insert 2 blue (8 mm or 0.3 inch diameter) wall plugs into the holes drilled.

c) Place the screws (provided) into the holes of the bracket (provided) and proceed to screw tight.

2. For Mounting onto Timber:

a) Drill 2 x 4mm (0.2 in) diameter holes into the timber, 30mm (1.2 in) deep, that are **156 mm (6.1 in) apart and level.**

b) Place the screws (provided) into the holes of the bracket (provided) and proceed to screw tightly to the timber.

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

Before installing the Cell, unplug the filter, pump and WATERMAID Power Supply. This is advisable so that the filter will not start inadvertently if a timeclock already exists. Also, close off the valves if the filter and pump are below pool surface level or if there are no valves, block off the inlet and outlet with cloth wadding or rubber stoppers.

(iv) INSTALL THE WATERMAID CELL

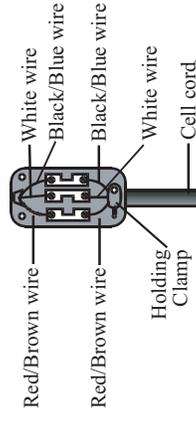
The WATERMAID Cell should be installed as per the model-relevant installation diagram given on page 6, 7 or 8. **TYPE P Pressure Solvent Cement (glue) must be used. Do NOT install the Cell too close to the heater or on the bend of the pipework, as distortion of the Cell casing may occur.**

The WATERMAID Cell must be installed so that ALL the water from the filter passes through the Cell before any diversions or breakouts. And it is imperative that a **gas trap** be incorporated into the installation, so that **NO gas generated by the WATERMAID Cell finds its way back to the filter, spa blower or any other equipment.**

(v) ATTACH CELL TO POWER SUPPLY

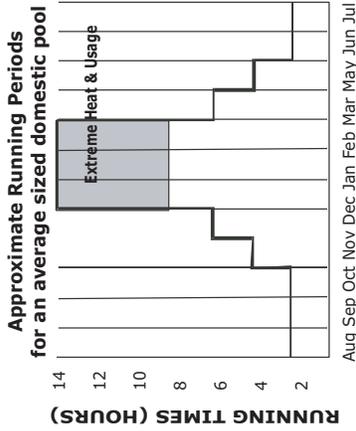
Using a screw driver, connect Cell wires to the Power Supply wires contained in the black junction box:

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



9. RUNNING TIMES

The timer should be set to operate the WATERMAID chlorinator and pump from **late afternoon (e.g. 4pm) to continue throughout the night as necessary.** Remember that UV rays destroy chlorine, which is why a chlorine stabiliser is recommended [refer to section 1(b)]. Suggested running times for an average-sized domestic pool are shown in the chart below.



The hours of operation required for summer may vary from 8 to 14 hours or more. This is because it takes at least 6 hours to pass the total volume of pool water once through the filter.

Public Pools may require multiple chlorinators, pumps and filters, as well as 24-hour operation of the pool equipment. **A "rule of thumb" is one litre (2 pt) of chlorine per 20 bathers per hour.**

Running times will depend on 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.

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.

Super chlorination and chlorinator operation during bather load are IN ADDITION to normal running times.

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

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 ppm**. The finest detail must be discernible at the bottom of the deep end of the pool.

For new pools, the WATERMAID chlorinator, pump and filter may need running continuously for a number of days before all debris is removed, stains oxidized and there is a chlorine residual in the pool.

To operate continuously: On an external timeclock, set the switch to the **MANUAL** setting. On a WATERMAID Power Supply's timeclock, set the switch to the "I" setting.

10. CHLORINE DEPLETION

There are two main causes of chlorine depletion:

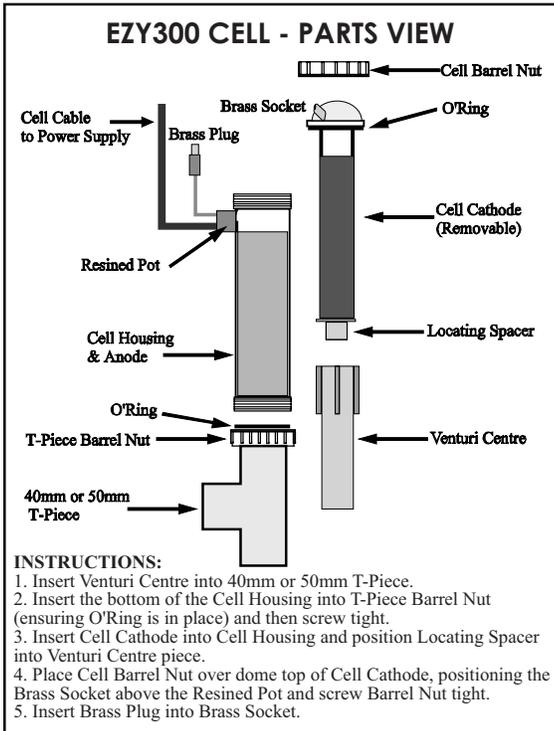
(a) The recent use of an algicide. Most algicides contain ammonium compounds and chlorine will degrade these compounds to nitrogen gas. Each litre (approx. 2 pints) of algicide will usually contain approximately 20% algicide (i.e. 200 grams [0.3 ounces] of 100% ammonium compounds).

For each unit of 100% ammonium compound, 9 units of chlorine will need to be produced or added before there is a free chlorine level.

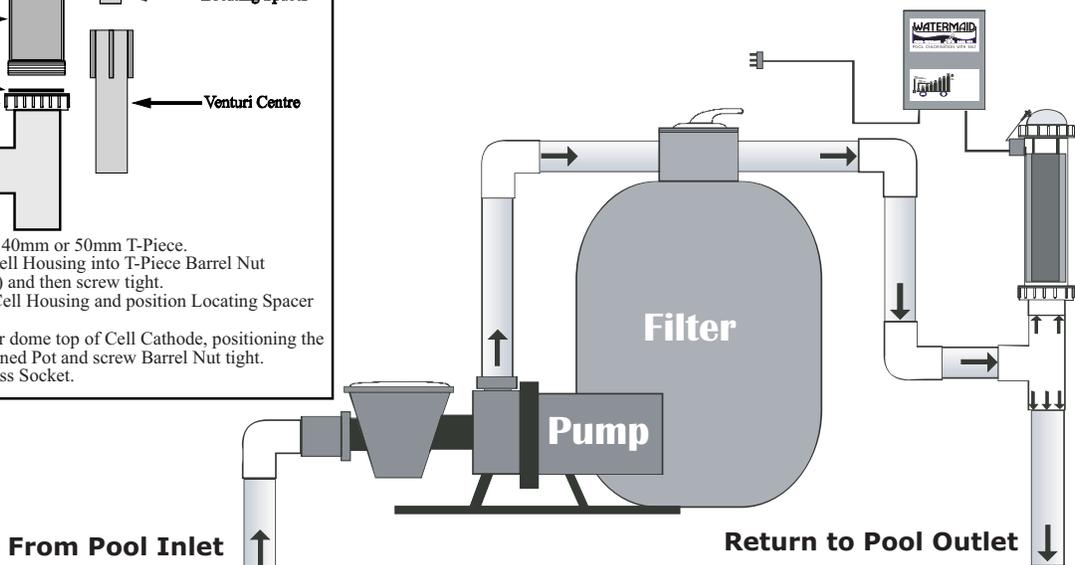
If 1 litre (approx. 2 pints) of algicide is added to the pool, close to 2 litres (approx. 4 pints) of chlorine will need to be produced or added to neutralize the algicide alone.

Also, any debris in the water will need additional chlorination.

EZY300 CELL - Installation Diagram



- * 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.
- * ALL WATER MUST FLOW THROUGH THE CELL.
- * The Cell must be installed AFTER any heater.
- * **EZY300 Cells incorporate their own gas traps in their vertical design.**
- * Use **TYPE P PRESSURE SOLVENT CEMENT** (glue).



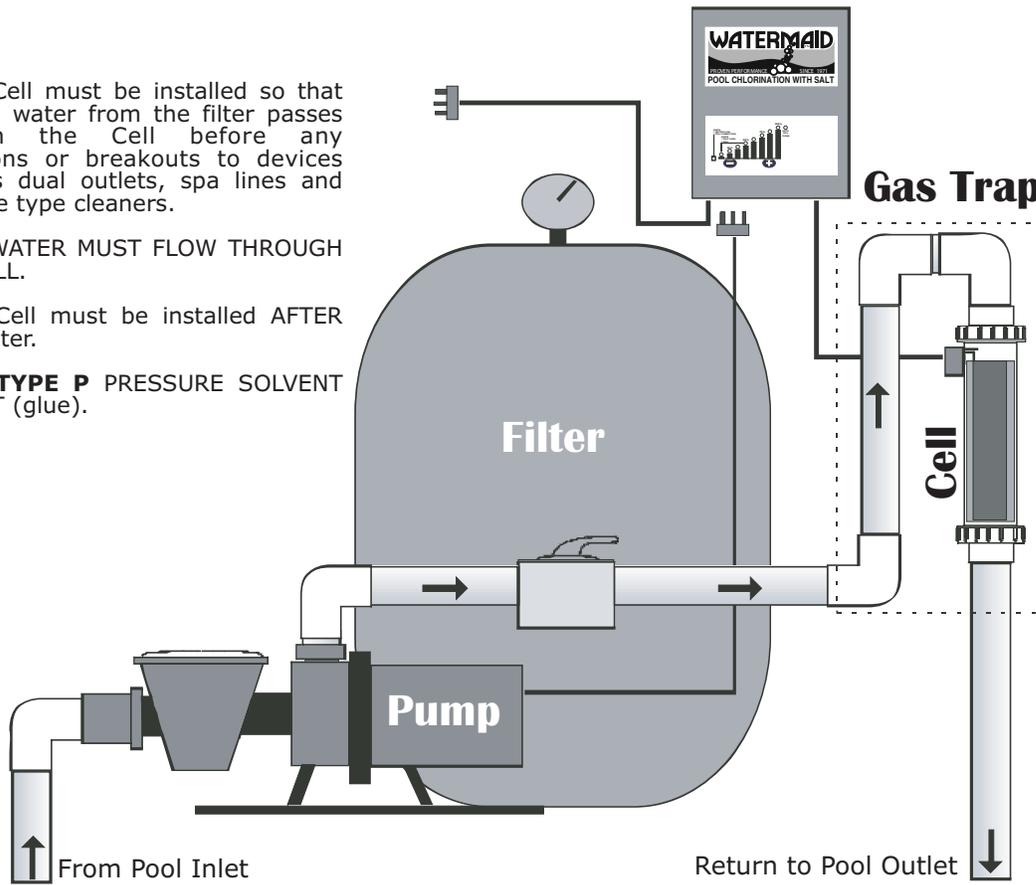
QT SERIES CELL - Vertical Installation Diagram

* 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.

* ALL WATER MUST FLOW THROUGH THE CELL.

* The Cell must be installed AFTER any heater.

* Use **TYPE P** PRESSURE SOLVENT CEMENT (glue).



Note:
For QT Cells, a gas trap must be installed to prevent the accumulation of hydrogen gas in the filter if the pump ever fails.

the water flow in the filter is **reversed**. In reversing the water flow, the accumulated waste material in the filter is flushed out.

When no water flows through the return-to-pool line, the WATERMAID Power Supply should be switched OFF or set to the standby mode (refer to section 4).

8. SALT LEVEL

At the beginning of the swimming pool season, the salt level should be checked to ensure that it is **6000 ppm (0.6 %)**.

A salt level of 9000 ppm is isotonic with body tissue, and in the case of accidental immersion, will cause less damage to lungs and other body organs than water without salt. Pool water at the recommended 6000 ppm is near isotonicity and the water is pleasant and does not irritate. **Refer to section 3(ii) for adding salt.**

Salt should be replaced after water has been lost from the pool in any way. **SALT IS NOT LOST** by the electrolysis process or when water evaporates. It can be 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.

Each year, approximately one-third of pool water is lost so the salt level will need to be adjusted accordingly. If an excessive amount of salt has to be added then the pool may have a leak.

WHEN ADDING SALT:

It is IMPORTANT to switch the Power Supply OFF or to standby mode while undissolved salt is in the water. The best way to dissolve salt is to run the filter and pump. **(without the chlorinator)**, which will circulate the water.

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.

*When reconnecting the wires, ensure the connection is **TIGHT** and that the wires are connected correctly [refer to section 3(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 solid centre 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 usually means a WATERMAID Cell will have a 5-10 year life.

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

Poor water flow, overheating, and heavily encrusted electrodes allow chlorine gas to etch the titanium base and allow the precious coating to shed.

Such conditions VOID WARRANTY. Obvious signs of these conditions are a whitening of the Cell casing and a change in colour of the anode.

To check the Cell's performance, place it in a 25 litre (approx. 7 gal) bucket of pool water with **6000 ppm** salt. The Cell should produce a 1 ppm chlorine level within 5 seconds using the 7.4VDC WATERMAID Power Supply if the salt level is 6000 ppm and the water temperature is 20°C (68°F). 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 water fails to flow to the return-to-pool line (e.g. in the case of blocked skimmers, closed valves, draining of the pool or during backwashing) and the WATERMAID Cell is without water while it is switched on, hydrogen gas can build up, heat may generate and the Cell casing may expand and turn white, until the gas sensor switches the Cell off. This practice is **NOT** recommended.

N.B. Backwashing is the process whereby

disconnect the Cell from the Power Supply when cleaning.

2a) For QT SERIES Cells, unscrew the white barrel unions at the top and bottom of the Cell (see #) and remove the Cell from the pipe work. **The top barrel nut is unscrewed anticlockwise and the bottom barrel nut is unscrewed clockwise.**

Aim a strong jet of water from a tap or hose into the Cell. If all scale is removed successfully proceed to step 4, otherwise proceed to step 3.

b) For EZY300 Cells: If the mesh electrode is clean, then separate the electrodes by pulling the brass plug out of its socket, unscrewing the barrel nut anticlockwise (see #) and lifting the centre electrode out. The centre electrode only (being solid titanium) may be scraped clean. If all scale is removed successfully proceed to step 4. Otherwise proceed to step 3.

If both the mesh electrode and the centre electrode contain scale, then remove the entire Cell by unscrewing the T-Piece Barrel Nut (see # and refer to parts view, p7). **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. Hot water can be poured over the union and/or a little vaseline over the thread may make the next removal easier.

3. A dilute acid solution prepared according to the following procedure may be used. Alternatively, a **PHOSPHATE-FREE** premixed "Cell-Cleaning Solution" (available from a pool shop) may be used.

i) In a GLASS or PLASTIC container add 8 - 10 parts of hot (not boiling) water.

ii) THEN add 1 part hydrochloric acid to the water.

iii) Either submerge the Cell or pour the dilute acid solution into the Cell. **QT Cells** can be submerged in the solution or the solution can be poured into the Cell if one end is blocked. One end may be blocked by using a cleaning cap with barrel nut, or sink plug. **For EZY300 Cells, avoid** holding the 3 wires.

(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 at the base of the WATERMAID Power Supply.

* Unscrew the single screw holding the Cell and Cable, as well as the 3 brass screws holding the 3 wires.

submersion of the brass plug and socket. To clean both the anode and cathode, the EZY300 Cell may be turned upside-down as one end is blocked and the solution poured inside. **To clean just the cathode,** submerge only the electrode part in the solution.

The mixture may effervesce for up to 30 minutes, and thereafter should be discarded.

If the scale is stubborn, step 3 may need to be repeated.

4. Rinse the electrodes with tap water and return to pipe-work ensuring not to overtighten the barrel unions.

IMPORTANT:

* **It is important to note that for BOTH EZY300 and QT Series Cells, the sensing tang (the small metal tang located on the inside of the Cell casing above the mesh electrode) also needs to be kept clean and free of scale.**

* **Do NOT** tap the Cell casing with any instruments.

* Boiling water is **NOT** recommended in Cell cleaning as it may discolour the Cell casing.

* **NEVER POUR UNDILUTED ACID DIRECTLY INTO THE CELL.**

* **ALWAYS ADD THE ACID TO THE WATER.**

* **WEAR RUBBER GLOVES** when handling acid.

* Always have nearby either a hose or a bucket of water for accidental spills. Please read the manufacturer's safety precautions when handling acid.

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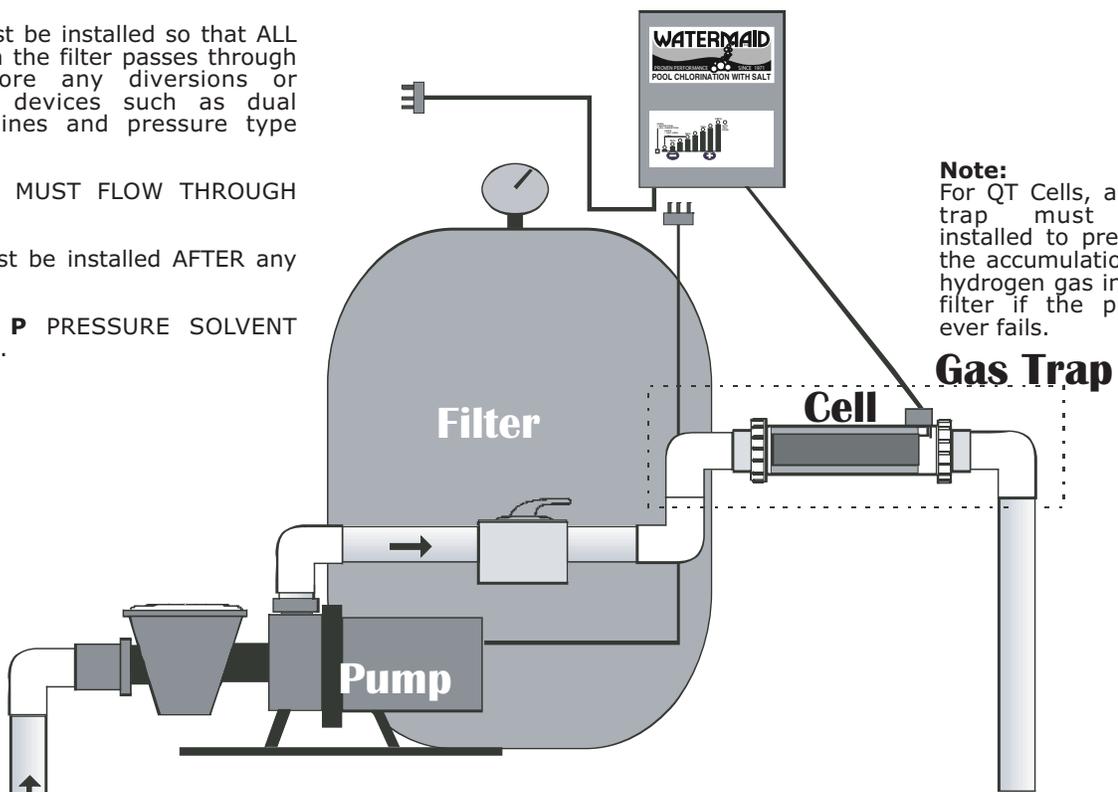
QT SERIES CELL - Horizontal Installation Diagram

* 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.

* ALL WATER MUST FLOW THROUGH THE CELL.

* The Cell must be installed AFTER any heater.

* Use **TYPE P** PRESSURE SOLVENT CEMENT (glue).



Return to Pool Outlet

the QT300 and EZY300 Cells will be obtained at the various salt levels listed in the following table.

Salt Level (ppm)	Chlorine Production %	Equates to Grams per Hour**	Transformer Temperature
4000	<37.5	8 - 10	20°C 68°F
5000	<50	10 - 14	25°C 77°F
6000	<75	12 - 20	30°C 86°F
7000	<100	20 - 30	40°C 104°F

* of 100% available chlorine

From this table, it can be seen that the transformer is under load when the salt level exceeds 6000 ppm salt. It is better to run the unit continuously at 6000 ppm salt in moderate climates and 5000 ppm salt in hot tropical regions. Good ventilation for the pump and chlorinator prevents breakdowns.

If the WATERMAID with pool water at 6000 ppm is unable to display any green lights and therefore unable to meet the above guide, then one or more of the following may be the cause:

- * the calcium level may be excessive, i.e. above 200ppm and therefore the Cell may need to be cleaned manually [refer to section 7(iii)].
- * the Cell may need replacing.

Chlorine production can be tested by taking a sample of water directly from the outlet flow. This reading should be greater at the outlet than elsewhere in the pool by approximately 0.5 ppm.

(ii) SCALE FORMATION

The scale that is inclined to form on the Cell electrodes is usually calcium carbonate, but can also include traces of magnesium, copper, iron, fats, oils and lotions.

If the pool surface is fibreglass, fibreglassed concrete, painted concrete, vinyl-lined, epoxy coated or some similar inert surface, then the scale can originate only from the water supply or and

chemicals which have been added to the water. Therefore scale formation is usually insignificant for Cells chlorinating these types of pools.

If the pool surface is marblesheen, pebbled, quartzon or tiled, then the scale that is inclined to form on the Cell electrodes may come from either the pool water, chemicals added to the water or minerals that leach out of the pool walls.

The rate of scale formation is different for every pool and is attributable to the:

- * **Calcium hardness of the water**
As a guide, the calcium level of sea water is about 1700 ppm calcium, some bore waters 400 ppm and city water supplies can range from 60 ppm to 200 ppm. **It is best to keep the calcium level in the pool between 60 and 120 ppm.**
- * **Pool water temperature**
As water temperature increases, so does scale formation.

- * **pH level**
As pH increases, so does scale formation.
- * **Chemicals added to the water**
Powdered chlorine contains approximately 40% calcium and will contribute to scale formation.

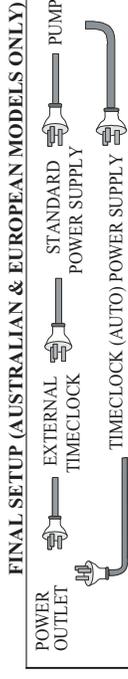
Adding pool acid to a marblesheen, pebbled, quartzon or tiled pool will cause calcium salts to be released from the pool surface thereby increasing the rate of scale formation.

If the calcium scale is allowed to engulf the centre cathode and outer mesh electrode, any or all of the following may result:

- * Restricted water flow
- * Interference to the electrical current
- * Nil chlorine production
- * Cell damage which may be beyond repair, voiding warranty

(iii) MANUALLY CLEANING THE CELL

1. Turn OFF the power to the chlorinator and pump. There is no need to



The WATERMAID unit cannot function if the wires are connected incorrectly. It 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**
The WATERMAID unit cannot function if the wires are connected incorrectly. It may appear to work for a brief period but may damage the Cell and Power Supply if left uncorrected.

For Australian and European models, insert the pump plug into the socket at the base of the WATERMAID Power Supply. Refer to "Final Setup" (above).

* For a timeclock Power Supply, insert the Power Supply's plug into the electrical power outlet.

* For a non timeclock Power Supply, insert the Power Supply's plug into an external timeclock and plug the timeclock into the electrical power outlet.

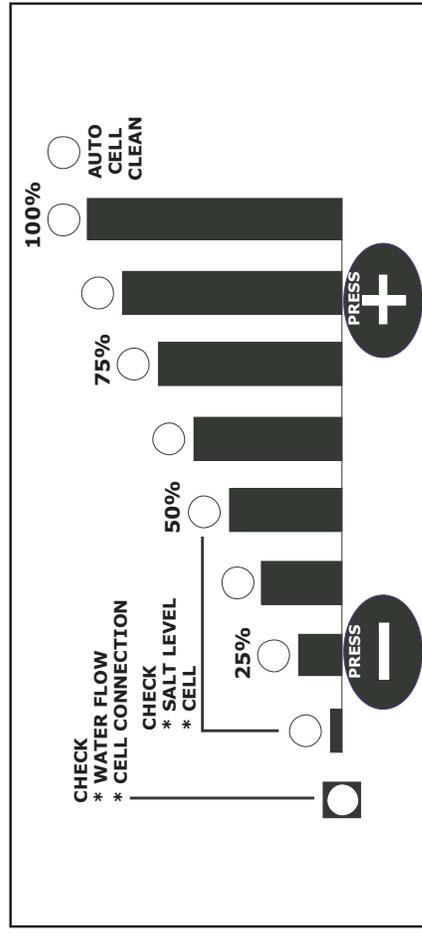
For U.S. models, the WATERMAID's power cord should be hard wired by a qualified technician to run in conjunction with the pump.

4. THE POWER SUPPLY

The WATERMAID Power Supply converts the normal 220 - 240 VAC electrical current from the power outlet to a low 7.4VDC system via a transformer and rectifiers. Automatic Electronic Overload

With a salt level of 6000 ppm and water temperature of 20°C (68°F), the QT300 and EZY300 Cells should run between 50 and 100%.

100% equates to 30 grams per hour of 100% available chlorine.



The time of year will influence the choice of setting on the scale for chlorine production (refer to section 9).

If the **red light** is on, this indicates that no chlorine is being produced and either the water flow is not sufficient or there is a problem with the connection of the Cell to Power Supply [refer to section 3(v)].

It is important to note that if the Cell's **gas sensing tang** (the 12mm metal tang located at the top of the electrodes on the inside of the Cell) is not free of deposit, the Power Supply will be unable to check for water flow and therefore unable to start producing chlorine.

If the most left amber light is flashing, the unit is in **standby mode**. Press the "+" button to activate chlorine production. The unit should be in standby mode or off altogether when adding salt to the water, backwashing the filter or draining the pool, otherwise damage to the Cell may result.

If the "+" button has been pressed several times, yet the lights will not light up past 50%, then the salt level may not be adequate or the Cell may require attention [refer to section 7(i)].

The **blue "Auto Cell Clean"** light indicates the WATERMAID unit is automatically self-cleaning. It is discussed more thoroughly in the next section.

* CIRCUIT BREAKER

The circuit breaker may need to be gently pressed to reactivate the WATERMAID Power Supply in the event of current overloading or a power surge to the primary side of the unit.

* **3-PIN POWER OUTLET FOR THE PUMP** (Australian and European models only).

ONE WATERMAID pump plug ONLY per Power Supply is recommended.

Avoid using low speed pumps as poor water flow from these may cause damage to the Cell.

* **TIMECLOCK** (timeclock models only) Refer to section 6 for setting the timeclock.

Any interference with the circuitry or other components will void any warranty claim. Full protection afforded by copyright and design legislation applies to the circuitry in this unit.

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.

5. AUTO CELL CLEAN CIRCUITRY

WATERMAID Power Supplies manufactured from 2004 onwards contain unique Cell-Cleaning circuitry (patents pending). These Power Supplies are programmed to commence a Cell-Cleaning cycle shortly after start-up and will progress through the following cycle:

1. The Power Supply will start producing chlorine for about 5 minutes after all air is cleared from the circuit.

2. The Power Supply will begin its Auto Cell Clean phase for approximately 5-10 minutes, indicated by a **blue** light.

3. As the Power Supply reverts back to chlorine production mode, the **red** light may light up for a few seconds while the unit checks the water flow and Cell connection.

4. The Power Supply will resume normal chlorine production until it cycles to Auto Cell Clean again.

As each pool environment is different, the amount of build-up that is generated will differ from one environment to another. For example, pools using sea water will experience higher levels of calcium in the water and so more build-up.

For best results, it is recommended that the WATERMAID chlorinator be used in conjunction with a 1HP or greater pump AND the addition of 25Kg/Year of Magnesium Sulphate ("Epsom Salts") in the pool water.

It is important that the pool owner

maintains water balance (refer to THE 3 SETTINGS ON THE SMALL WHITE SWITCH:

"I" setting - chlorinator will be ON permanently.

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

"O" setting - the chlorinator will be OFF permanently.

1) Set the current time by turning the clock face so that the arrowhead is aligned with the current time.

2) Now set the times for the chlorinator and pump to switch on and off.

For **On settings**, slide the pins away from the centre of the timeclock.

For **Off settings**, slide the pins towards the centre of the timeclock.

3) Position the small white switch to the clock setting.

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

7. THE CELL

The WATERMAID QT300 and EZY300 Cells are capable of chlorinating pools containing up to 150,000 litres (approx. 40,000 gal) of water.

WATERMAID Cells have a proven cylindrical electrode design, which has been used since 1971.

The solid titanium tube cathode (centre electrode) introduced in 1987 has resulted in:

- * Increased performance per surface area,
- * Less calcium build-up and
- * Longer expected Cell life.

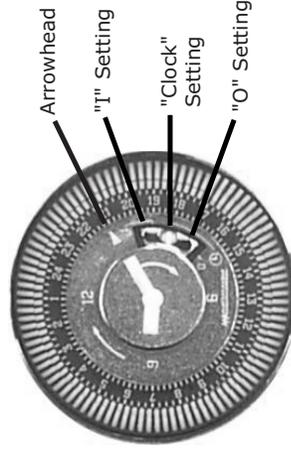
HOW TO SET THE ANALOGUE TIMECLOCK ON THE WATERMAID

The first step is to turn OFF the power to both the WATERMAID Power Supply and pump. This is so both devices do not start and stop erratically whilst the timeclock is being adjusted.

*One revolution equals a 24-hour cycle.

*The time is in 24 hour time (e.g. (i) **CHLORINE PRODUCTION** 18=6pm).

*Each pin equates to a 15 minute interval.



As a guide, it is estimated that the following chlorine production rates using