OxiMax

Water Disinfection



OxiMax MTLS440/2

Manufactured by: Water Engineers Australia Pty Ltd

Exclusively for: ProMinent Australia

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OxiMax MTLS Series

Swimming Pool Electrochlorinator

1.0 INTRODUCTION:

The MTLS Series of electrochlorinators are specifically designed for low salinity (4 – 6 g/l) swimming pools, water features and other “on line” water treatment applications. They generate a powerful oxidizing solution safely, reliably and economically.

MTLS Series Power Supplies and Cells are compact and modular, meaning they can easily be expanded and they require a minimum of space in existing plant rooms.

Each machine consists of one or more OxiMax Cells, a Power Supply containing one or more power modules, Flow and Temperature Sensors and a number of control valves. MTLS electrochlorinators are available with outputs ranging from 70 – 2,200 grams chlorine equivalent per hour.

The Cells are manufactured from a clear plastic material allowing excellent visibility through each cell and the flow lines are designed to give high flow velocity over the electrode surfaces to give a self cleaning effect.

High efficiency electronic Power Supplies are used in the MTLS Series and each Cell has its own power module. This gives great flexibility with control systems, allowing individual Cells to be powered as required. It also minimizes the spares inventory and allows sequential changeover of Cells and power modules when maintenance is required.

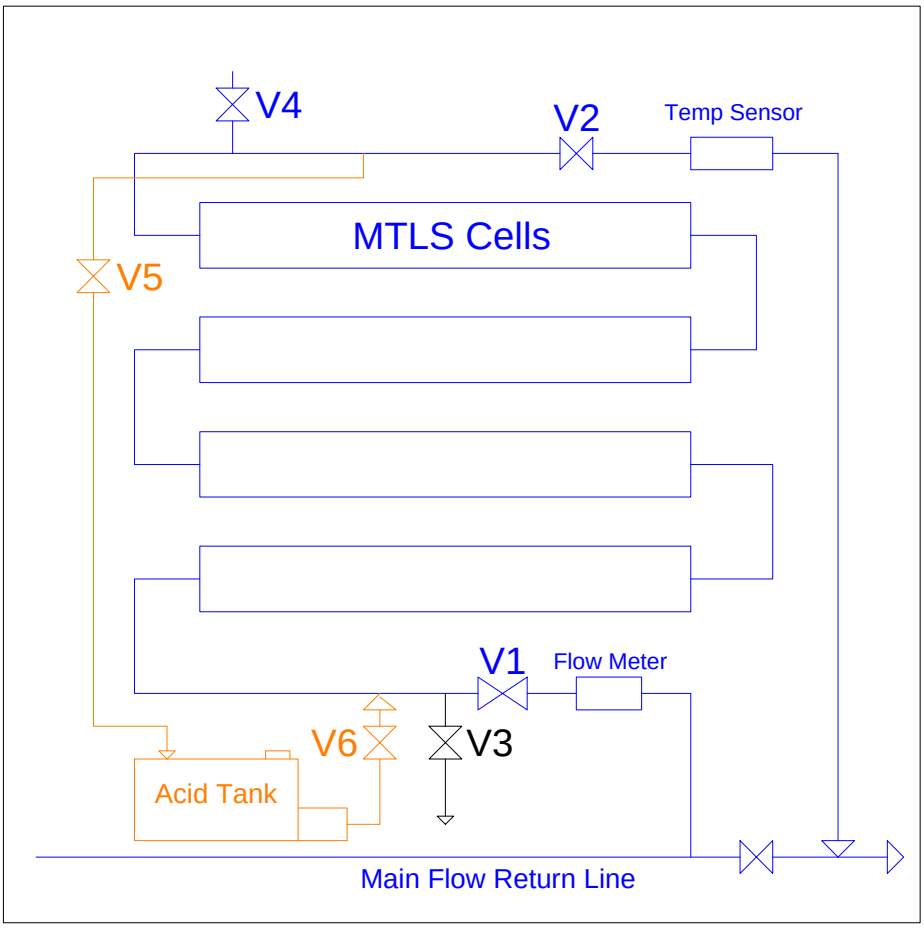
2.0 THE PROCESS:

Common granular bulk or bagged salt is added to the pool to raise the salinity to 4 – 6 grams/litre, making the water lightly saline (about 1/6th seawater). This level of salinity is similar to the natural salinity of our eyes, hence most people find swimming in this environment far more pleasant than fresh water.

The raw materials for electrochlorination are common salt, water and power and while the actual reactions are complex, the key Hypochlorite production reaction can be represented as follows:

$$NaCl + H_2O + energy \rightarrow HOCl + NaOCl + H_2$$

HOCl (Hypochlorous Acid) and NaOCl (Sodium Hypochlorite) are powerful oxidizing agents, which are ideal for swimming pool disinfection and general water treatment.



A branch line is taken from the main filter flow return line and the water is diverted through the Cells. The MTLS Series generates Hypochlorite continuously whenever there is adequate water flow and power is applied to the Cells.

The system is simple, reliable and is controlled by either relays, or a PLC which continuously monitors the performance of the machine and makes the appropriate control decisions. ORP, chlorine analysis or time may be used to control the operation of the machine.

3.0 SPECIFICATION SHEET:

Model	MTLS440/2

Cell Design

No of Cells	**2**
Output per Cell (g/hr)	220
Rated output (g/hr)	**440**
Rated output (kg/day)	10.5
Electrode Gap (mm)	3
Electrode Width effective (mm)	82
Electrode length (mm)	1000
No. of electrodes / cell	6
No. of series connections /cell	5

Power Supply Specifications

Power Supply Model	RSP1500
No. of Power Modules	2
Input Voltage Range	176 - 264 V AC
Input Frequency Range	47 - 63 Hz
Operating DC Volts Range per Cell	**21 - 25**
Max Operating Voltage	26.4
Recommended Operating Amps per Cell	**50**
Max Operating Amps	63.5
System Output DC (kW)	2.8
System Input AC (kW)	3.0
Required AC amps per Cell at 240 Volts	20.0
Connected AC amps per Phase	20
Power Consumption AC (kWh/kg Cl2)	6.82

System Specifications

Water Flow Range (litres/sec)	2.5 – 4.0
Max Hypo Concentration (mg/litre)	55
Operating pressure range (kPa)	100 - 250
Volume of Hydrogen Generated (m3/hr)	0.23
Inlet water Temperature range (°C)	15 - 30
Recommended Salinity (g/l)	4.5

Flow Meter Model	Burkert 8032
Temp Sensor	EGO
Size of Electrolyser (lxwxh)	1200 x 300 x 1800
Dry weight Electrolyser skid	65
Size Power Supply Enclosure (lxwxh)	600 x 350 x 600
Weight Power Supply (kg)	50

4.0 INSTALLATION:

1. The MTLS Series electrochlorinator should be installed indoors in a well ventilated room.

2. The Power Supply is designed to be wall mounted. It should be located adjacent to the Cells and protected from any possible water ingress. Inlet and outlet air vents must be clear for at least 150mm and ambient temperatures should not exceed 30°C in the vicinity of the power supply.

3. The Electrolyser Cells are also designed to be wall mounted. It is important that the flow lines are connected as follows:

   INLET: This branch line should be taken after the swimming pool filters (and heaters) allowing clean filtered water (with no abrasives) to enter the base of the Cells. The flow should be as per the Specification Sheet and the flow line should be straight for at least 300mm prior to the inlet flange to allow the Flow Meter to operate correctly.

   OUTLET: This return flow line contains low strength hypochlorite and hydrogen and it is important that the line returns via the main filter line back to the pool with no possible areas where Hydrogen may accumulate. (See Hydrogen Section).

4. The Temperature Sensor probe should be located on the outlet flow pipe using cable ties and the insulating sleeve to ensure accurate temperature sensing.

5. It is important that the water flowing through the Electrolyser cells is maintained within the correct flow, pressure and temperature

range. Operating outside these ranges may cause a hazard and damage to the equipment.

6. The mains power supply should be 415 volts 3 phase with the neutral included. Note that the power connected to each Power Module must be single phase 176 - 264 volts AC (ideally 220 - 240 volts, 50 Hz) with at least 20 Amps available per Module. All electrical work must be carried out by a qualified Electrician.

5.0 START UP and NORMAL OPERATION:

Once all components are in position and water and power are available the machine should be started in the following sequence.

5.1 CELLS:

1. Close Acid Line Valves V5 and V6, Drain Valve V3 and Vent Valve V4 and open Control Valve V2.

2. Gradually open Valve V1 (starting any pumps and operating any flow diversion valves) and allow water to start to circulate through the cells. Carefully check all joints for any leaks.

3. Gradually increase the water flow until the recommended flow setting is achieved, checking that the pressure does not exceed the correct operating range.

5.2 POWER SUPPLY:

1. Each Power Module has an individual circuit breaker / isolator.

2. Power to each Power Module must be 240 V single phase.

3. During initial set up, the Power Modules need to be set for optimum balance and performance. Once the correct water flow is established through the Cells, the Power Supply should be energized and the Volts and Amps set (with a DC Voltmeter and a DC Clamp Meter) as per the recommended settings in the Specification Sheet. It is possible to adjust the settings on the power supply modules using a small screwdriver to adjust the trim pot situated beside the green power light. These adjustments should be made carefully by qualified personnel

when the Electrochlorinator is running. Allow several minutes for the readings to stabilize.

4. Note that the power readings will vary with pool water salinity and temperature. For a given voltage the amperage will increase with increasing water salinity and temperature. It is important that the readings do not exceed the recommended maximum values in the Specification Sheet. These readings should be checked regularly.

6.0 FLOW METER:

The Burkert Model 8032 Flow Meter should be installed in the inlet flow line with at least 300mm straight pipe before and after the Flow Tube. This model has relay outputs to allow flow control set points to be set. Minimum Flow should be set at 0.5 litres/sec and Maximum Flow at 5.0 litres/sec. Refer to the separate Instruction Manual for full details.

7.0 HYDROGEN:

During the electrochlorination process, Hydrogen will be produced in quantities as shown in the Specification Sheet. It is important that the water flow lines allow the Hydrogen to be carried quickly through the system and efficiently vented to atmosphere with no possible areas where accumulation may occur.
It should be noted that Hydrogen is lighter than air and if allowed to accumulate at levels above 5% in air, there is the possibility of ignition and the potential for an explosion.

Notes:
a) Smoking or naked flames are not permitted in the vicinity of the machine or near any Hydrogen outlet.
b) It is most important that the plant room has adequate ventilation (particularly from the roof or ceiling space) so that Hydrogen cannot accumulate under any circumstances.

8.0 TEMPERATURE SENSOR:

The bulb of the Temperature Sensor must be inserted between the outlet pipe and the black insulation sleeve. During normal operation it is important that the temperature of the outlet water from the Cells does not rise more than 15°C above the inlet temperature.

For normal operation the EGO Control Thermostat should be set at 35°C and the system will shut down if this temperature is exceeded.

9.0 ALARMS:

LED alarms indicate the following faults:

Flow Fault: Water flow outside preset range 0.5 – 5.0 l/sec.
Over Temp: Water outlet Temperature above set point (35°C).

Power to the Cells will stop in the event of a fault and will automatically restart when the fault is corrected. If LED alarms are indicated the fault must be corrected by suitably qualified operators.

10.0 MAINTENANCE:

The MTLS Series machines operate automatically and need little regular maintenance. However, it is recommended that a 200 hour or weekly observation is carried out to ensure correct function of all components. Check the following items:

- All water flows are correct and sensors are functioning correctly.
- The Volts and Amps readings are correct (see the Specification Sheet) for each Power Module.
- There is no physical damage, leaks or any signs of corrosion or overheating.
- Check all Fans for correct operation. Replace any worn or defective parts.
- Clean or replace any ventilation filters.
- Inspect the Cells for any signs of Calcium / Magnesium deposits on the electrode plates. If the deposit is greater than 1 mm thick, acid cleaning is required (see Acid Cleaning).

It is recommended that a Log Book be kept on site to regularly record machine readings (Amps, Volts, Run Hours) plus any maintenance or service work.

10.1 50,000 HOUR MAINTENANCE:

After every 50,000 hours, or 5 years operation, a major service should be carried out. This service includes replacement or exchange of major components and will ensure continued reliable service from the equipment:

1. Replace all Fans and Filters.
2. Carefully inspect all wiring, electrical connections and circuit boards for any signs of corrosion, overheating or incorrect function. Replace as required.
3. Replace all Power Modules.
4. Exchange all OxiMax MTLS Cells.
5. Carefully check the performance of all sensors and replace as required.

Note: All maintenance should be carried out by suitably qualified personnel and all relevant Occupational Health and Safety practices must be observed.

11.0 ACID CLEANING PROCEDURE:

Depending on the water hardness, salt quality and duty cycle of the machine, it is expected that acid cleaning will be required once every 2 – 6 months.

Make up a solution of about 5% Hydrochloric Acid in the Acid Tank by adding concentrated Hydrochloric Acid (30 – 35%) to water in the ratio 1 part acid to 5 parts water. Always carefully add acid to water and make sure all relevant safety procedures are followed.

Note: This procedure must be carried out with care in a well ventilated area. Read and observe the relevant Material Safety Data Sheet (MSDS) and always wear Hydrochloric Acid resistant protective clothing, gloves, a face shield and a mask. Observe all relevant O.H. & S. procedures.

1. Turn OFF power to the Cells and close Control Valves V1 and then V2.
2. Drain the Cells by opening Drain Valve V3 and then Vent Valve V4 to allow the water to drain from the system.
3. Once the Cells have drained, close Drain Valve V3 and Vent Valve V4.

4. Open Acid Inlet Valve V6 and Acid Return Valve V5, then open the Acid Tank air vent and the Acid Pump Inlet valve (if fitted).
5. Turn ON the acid pump and allow the acid to circulate for 10 – 20 minutes, during which time all Calcium and Magnesium deposits should dissolve.
6. Turn the acid pump OFF and open Vent Valve V4 to allow the acid to drain back into the Acid Tank.
7. Close Acid Line Valves V5 and V6 and close Vent Valve V4.
8. Slowly open Control Valve V2 and then V1 to allow water to flow through the Cells.
9. Turn Power ON to the Cells and resume normal operation.

Notes:
The Hydrochloric Acid solution can be reused several times before needing replacement, at which time it should be neutralized and dumped in an environmentally sound manner.

The number of times the acid can be reused can be determined by measurement of the acid strength (by standard titration), or more simply by observing when the cleaning effect on the Cells declines to the point where the Cells are not cleaned after 20 minutes of circulation.

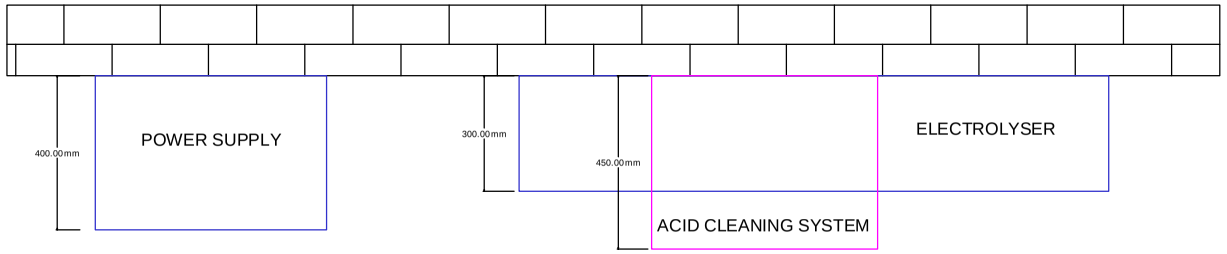
Never leave Hydrochloric Acid in contact with the Cells for any more than 30 minutes, or permanent damage to the electrodes may occur.

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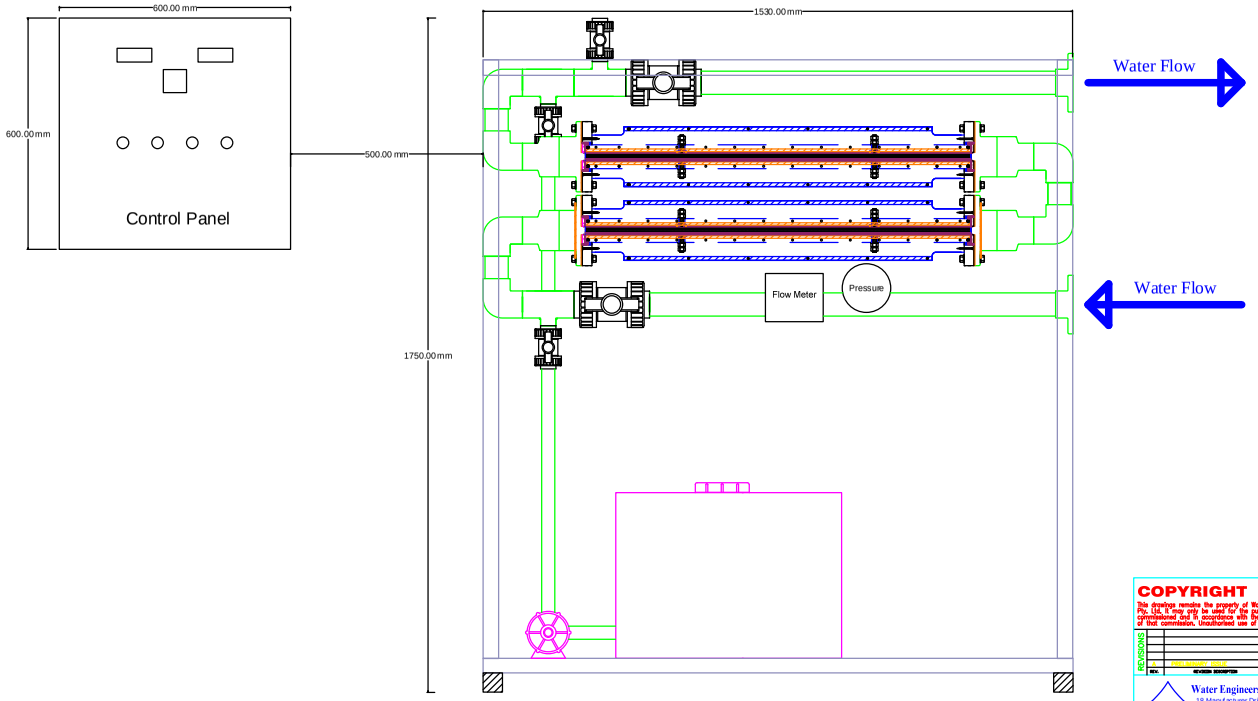
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PLAN VIEW



FRONT ELEVATION



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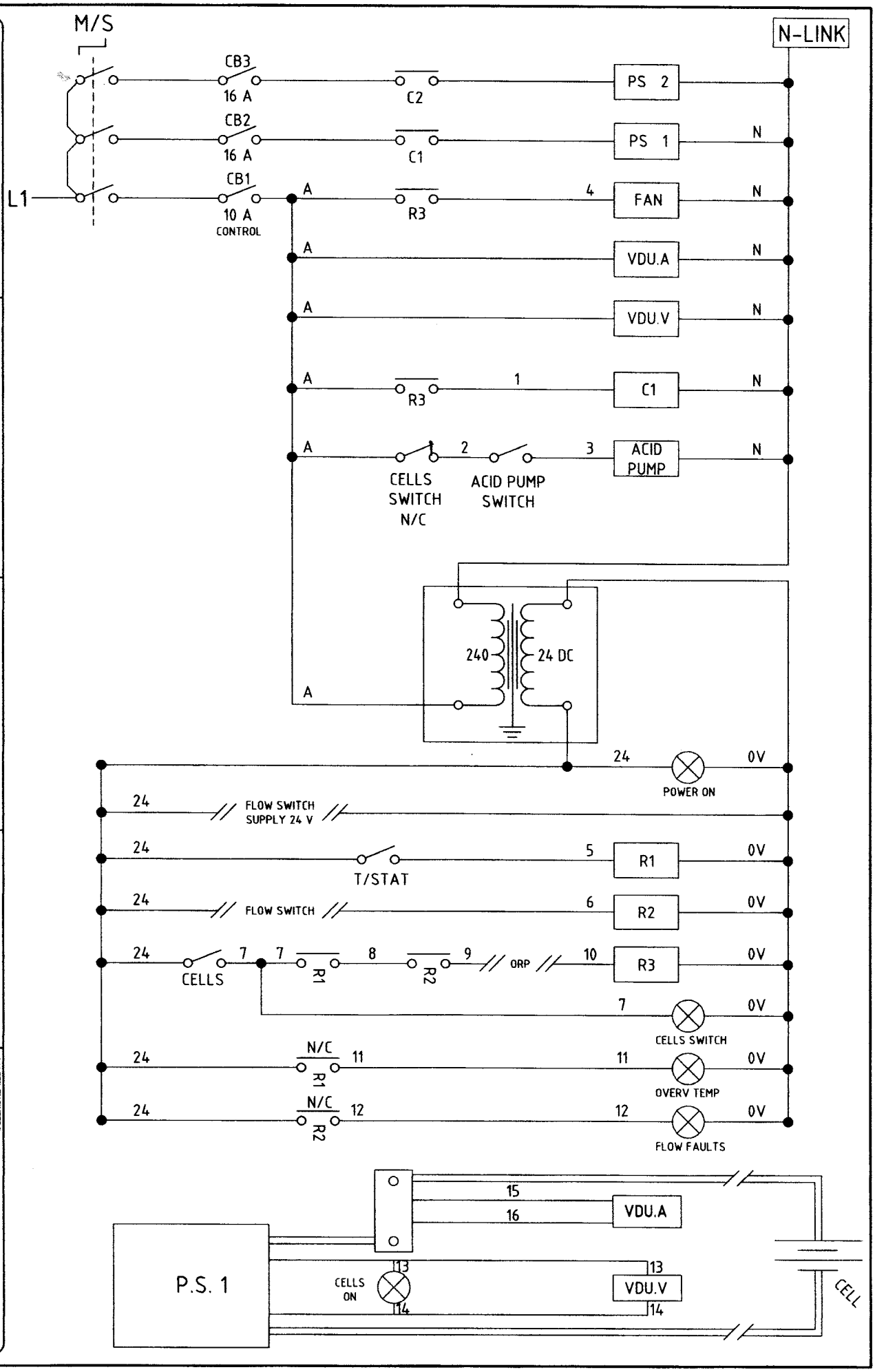
REVISIONS

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A	Initial Issue	KV	KV	KV	04.07.07

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PROJECT:
OxiMax MTLS440 Assembly

DRAWN	K. V.	SCALE	N.T.S.	DWG No.	MTLS Series	REV.	A
DATE	04.07.07			SHEET	1 of 1		



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SCALE: NTS

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WATER ENGINEERS

LINE DIAGRAM LAYOUT
CHLORINATOR
D.C.POWER SUPPLY SCHEMATIC

CAD Ref: W.E.001.dwg
STATUS: PRELIMINARY
A3
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