

**WATER
ENGINEERS
GLOBAL**



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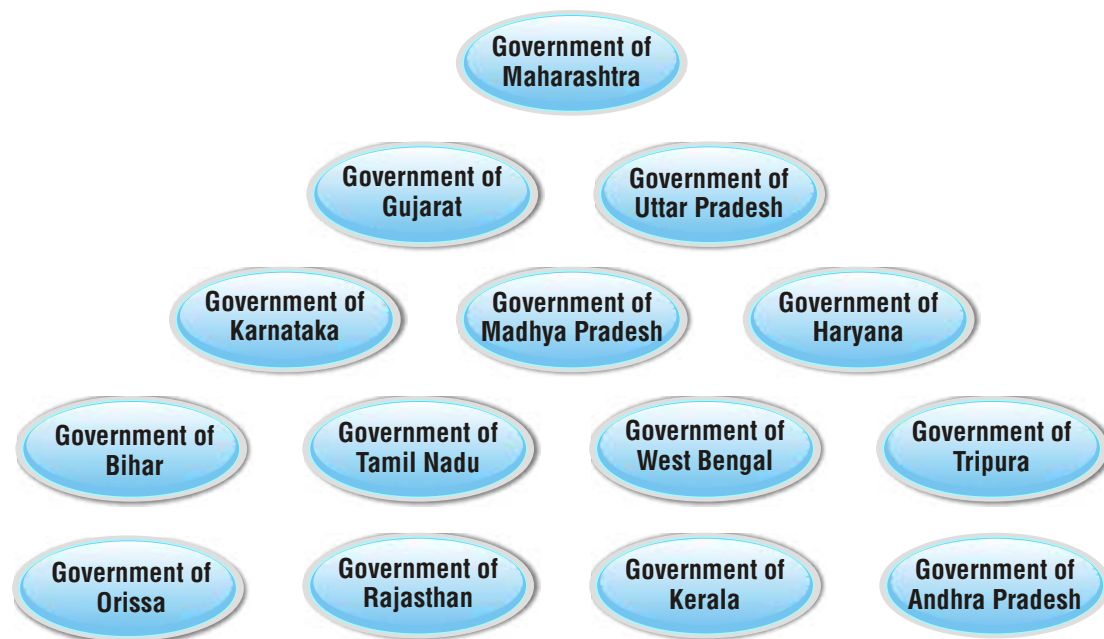
**ELECTROCHLORINATION
SYSTEMS**



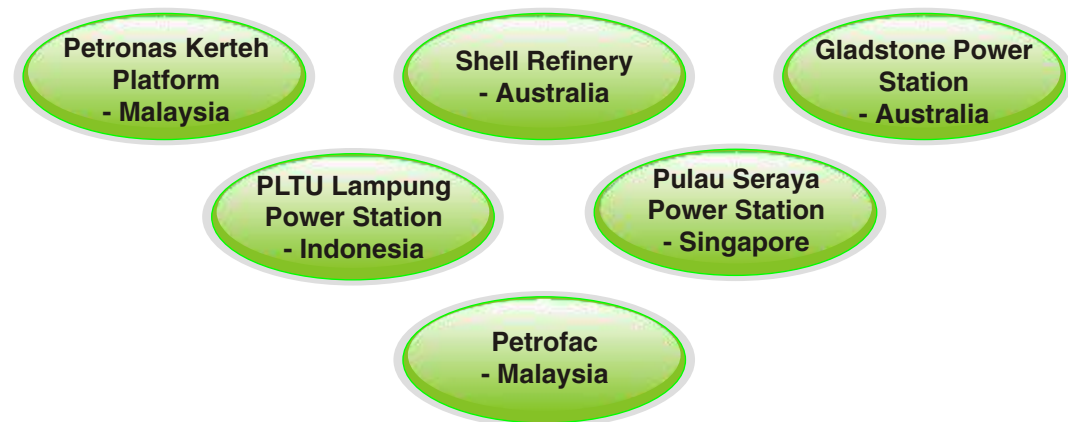
Australia • India • Singapore

OxiMax Users

National



International



... and many more

**Driven by Expertise,
Delivering Excellence**

HES Water Engineers (India) Pvt. Ltd., a group company of Water Engineers, Australia specialises in the design and manufacture of water treatment equipment and media throughout the world. The company aims to provide efficient and cost effective solutions to meet the clients' needs through innovation and technological advancement. With factories in India, Australia and Singapore, and business associates across the globe, HES Water Engineers (India) Pvt. Ltd. excels in business conduct and embraces best practices in corporate governance. The company nurtures the entrepreneurial spirit, takes the challenges head on and masters change. HES Water Engineers (India) Pvt. Ltd. has established themselves as the market leaders, revolutionizing the way water is purified.

It has always been the company's endeavour to provide effective, sustainable and economical technologies for improving the quality of water in our country. Our product lineup includes microbiological disinfection through electrochlorination, fluoride removal through our biological media 'Bio-F', Iron & Arsenic removal in collaboration with Defence Research & Development Organization (DRDO), Government of India and 'ReAqua' Grey water treatment systems for reuse of grey water.

Water Engineers, Australia have worked in the field of Electrochlorination for over 20 years. Water Engineers India was founded in the year 2005 in Nagpur.

What is OxiMax Electrochlorination?

OxiMax Electrochlorination Systems produce the disinfectant Sodium Hypochlorite from Salt & Water (brine) or Seawater on your own site. Sodium Hypochlorite is a chemical compound with the formula NaOCl. Sodium hypochlorite solution, commonly known as bleach is frequently used as a disinfectant or a bleaching agent.

In simple terms
Salt + Water + Energy = Sodium Hypochlorite

More technically
 $\text{NaCl} + \text{H}_2\text{O} + \text{DC Electricity} = \text{NaOCl} + \text{H}_2$

Benefits of Electrochlorination

- ◆ No wastage
- ◆ Fully automated
- ◆ Consistent sodium hypochlorite strength
- ◆ Make your own sodium hypochlorite on demand, eliminate dependency on outside suppliers
- ◆ Control and lower cost : operating, supply and maintenance cost
- ◆ Reduced down time due to reduced maintenance time
- ◆ Increased safety : no handling of hazardous chemicals.

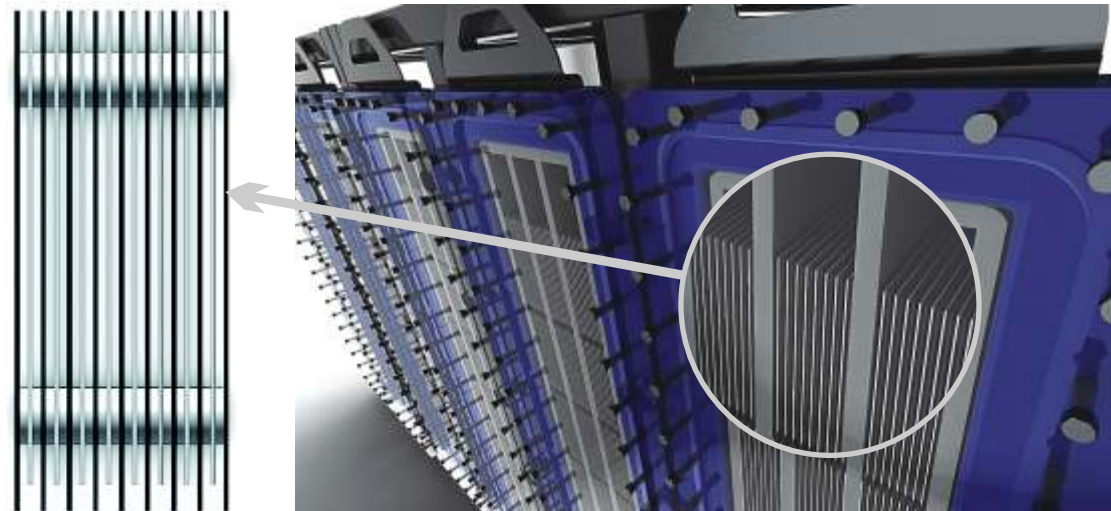
Applications

- ◆ Power Generation
- ◆ Petrochemical
- ◆ Offshore and Marine
- ◆ Desalination
- ◆ Municipal Water Treatment
- ◆ LNG Facilities
- ◆ Paper Mills
- ◆ Recreation (Water Parks and Swimming Pools)

Solutions

- ◆ Biofouling Control
- ◆ Water Disinfection
- ◆ Algae Control

What's so different about Oximax?



OxiMax has made a large incremental change to the design of today's electrochlorination systems that has set a new standard for the industry. OxiMax not only have a clear acrylic cover to allow the operator see inside of the cells, we have also turned the cell bundle around so the operator can now see every anode and cathode through the acrylic cover.

Seeing every Anode and Cathode means:

- ◆ You can stop guessing when to acid clean
- ◆ You can stop guessing whether the acid cleaning has been 100 % effective
- ◆ You save time and money in terms of acid cleaning and uptime
- ◆ Prevention of cell destruction as a result of incorrect acid cleaning.

With OxiMax you acid clean **ONLY** when you need to – it's that simple.

Superior SC 12 MMO Coatings

- ◆ Enhance energy transmission and Cl_2 production refurbishing.
- ◆ Guarantees many years of service before refurbishing or recoating is required.
- ◆ Longer uptime, extremely low maintenance cost and low cost of ownership.

Safety Features

- ◆ Safety controls and system shut downs are programmed into the system to ensure EC plant and personnel safety.

Customisable System

- ◆ Modular cell design to give smaller or larger Cl_2 generating capacities.
- ◆ Modular cell design allows for easy maintenance.
- ◆ PLC controlled system complete with HMT Touch Screen.
- ◆ Programming and control philosophy customised to meet process requirements.

Rectifiers/ DC Power Supplies

- ◆ Custom design for electrochlorination systems.
- ◆ Constant DC output.

Why is OxiMax a preferred brand?

- ◆ The advanced OxiMax technology overcomes problems associated with other technologies and brands.
- ◆ Recognized leadership - OxiMax is an undisputed leader in cell design.
- ◆ Superior in-house technology, engineering, design, manufacturing and quality control.
- ◆ Worldwide installations. Proven technology.
- ◆ An ISO 9001-2008 company with TQM philosophy.
- ◆ Simple automatic operation with safety features designed into the system.
- ◆ Strategically located, full time dedicated 24x7 service network.
- ◆ Less raw material consumption. 3.5 to 4.0 kg of common salt/kg of chlorine as against 4.5 to 5.0 kg consumed by other electrochlorinators.
- ◆ Wide range of models to suit every need.

OxiMax Electrochlorination Cell Range MC/ MA Series



OxiMax MM Series - Continuous Process Models

Description :

OxiMax Electrochlorination Systems produce the disinfectant Sodium Hypochlorite from Salt & Water (brine) or Seawater on your own site. Sodium Hypochlorite is a chemical compound with the formula NaOCl.

Applications :

Rural and Urban Water Supply Schemes, Ground Water, Railway stations, Waste & Swerage treatment, Swimming pools, Cooling systems, Health services.

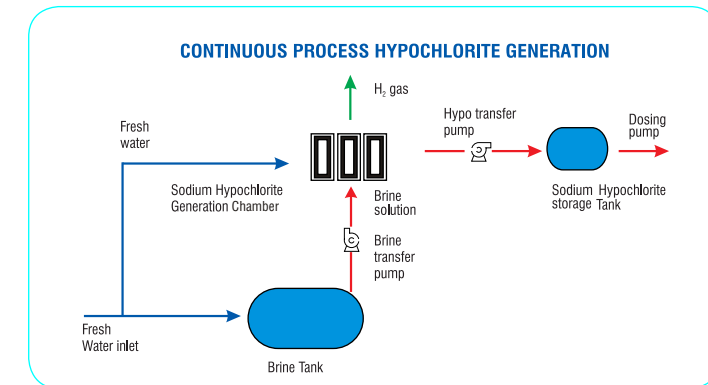
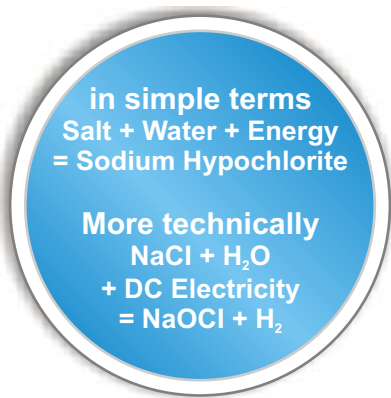
Process :

In simple terms we pump brine through an electrochlorination cell (the electrolyser). We apply DC electricity to the cell and the resultant product at the outlet of the cells is Sodium Hypochlorite (NaOCl).

We pass the NaOCl straight to your process or we can store it in tanks for later dosing/shock dosing. NaOCl when mixed with water in your process in sufficient quantities can prevent biofouling, kill bacteria and prevent the growth of algae. OxiMax MM Series requires only 3.5 to 4 kg salt for generating 1 kg active chlorine. The typical power consumption is around 4.0 kwh/kg of chlorine produced.

OxiMax MM electro chlorination systems are advanced systems with unmatched features and technology. Some of the features are as under :

- ◆ Entire system is controlled by a single microprocessor thus making the operation more user-friendly, automatic and less dependent on operator.
- ◆ Only system in India using reference cell technology which helps in measuring the salinity level in hypo generator, thus keeping the hypo strength constant as per design parameters.
- ◆ OxiMax cell casing is of acrylic material which makes the cell transparent for ease of monitoring.
- ◆ Salt saturation tank can contain salt of up to 7-10 days and therefore no need of putting the salt on day to day basis. The system shall automatically pick up the salt necessary for generation. In most of the other systems, salt has to be poured on daily basis. We call it "Fill it – Shut it – Forget it"



Advantages

The OxiMax Sodium Hypochlorite Generators (electrochlorinators) have the following major advantages over other similar facilities:

- Economical method of Chlorination
- Innovative design - See every Anode and Cathode
- Controlled by microprocessor based pre-programmed logic control system
- SC12 MMO coatings on Anodes for increased efficiency
- Built with engineering plastics
- Reference cell incorporated to check salinity accuracy
- High visibility cells, high efficiency electrodes
- Optimum electrical and hydraulic efficiency
- Low maintenance. Minimum operator intervention
- Many years trouble free service
- Direct communication with manufacturer regarding system design & customization.

PRODUCT RANGE

| Sr. No. | Water Quantity (litres/day) | Dosage @ 1ppm | Capacity active Chlorine generation per hour | OxiMax Electrochlorinator Model recommended |
|---------|-----------------------------|---------------|--|---|
| 1 | 50,000 litres/day | 1 ppm | 5gm/hr | MM 5 |
| 2 | 1,00,000 litres/day | 1 ppm | 10gm/hr | MM 10 |
| 3 | 2,00,000 litres/day | 1 ppm | 25gm/hr | MM 25 |
| 4 | 3,00,000 litres/day | 1 ppm | 35gm/hr | MM 35 |
| 5 | 5,00,000 litres/day | 1 ppm | 50gm/hr | MM 50 |
| 6 | 10,00,000 litres/day | 1 ppm | 100gm/hr | MM 100 |
| 7 | 15,00,000 litres/day | 1 ppm | 150gm/hr | MM 150 |
| 8 | 20,00,000 litres/day | 1 ppm | 250gm/hr | MM 250 |
| 9 | 30,00,000 litres/day | 1 ppm | 350gm/hr | MM 350 |
| 10 | 50,00,000 litres/day | 1 ppm | 500gm/hr | MM 500 |
| 11 | 75,00,000 litres/day | 1 ppm | 750gm/hr | MM 750 |
| 12 | 1,00,00,000 litres/day | 1 ppm | 1000gm/hr | MM 1000 |
| 13 | 1,50,00,000 litres/day | 1 ppm | 1500gm/hr | MM 1500 |
| 14 | 2,00,00,000 litres/day | 1 ppm | 2000gm/hr | MM 2000 |
| 15 | 2,50,00,000 litres/day | 1 ppm | 2500gm/hr | MM 2500 |
| 16 | 3,00,00,000 litres/day | 1 ppm | 3000gm/hr | MM 3000 |

*Higher capacity also available

Running time of 10hrs/day assumed

If the System is running for 24 hrs., then water disinfection quality can be accordingly increased

OxiMax MMb Series

OxiMax MMb Series

Batch models with advance features and modular design

Description :

OxiMax MMb Batch Models are designed to generate Sodium Hypochlorite in a batch of 4 to 8 hours.

MMb Series are best suitable for locations where very low capacity of water needs to be disinfected.

Applications :

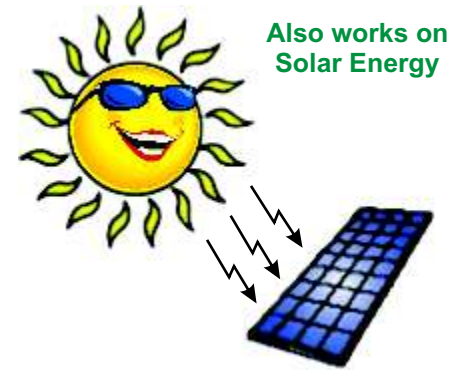
Rural water supply schemes, Zilla Parishad, Panchayati Raj, Swimming Pools and Hospitals.

Process :

Salt is added to the tank and fresh water passed through the inlet till the reaction tank is filled up.

The power supply is switched on and the timer set for 4/8 hrs. and the brine solution formed above starts producing chlorine. The power supply will stop once the preset time is elapsed.

NaOCl is ready. Now open the valve and empty the NaOCl into the storage tank.



Product Range MMb

| OxiMax Electrochlorinator Model recommended | Capacity active Chlorine generation per batch of 8 hrs | Water Quantity that can be treated in 1 batch of 8 hours @1 PPM (litres/batch) |
|---|--|--|
| MMb 5 | 5 grams/ batch | 40,000 litres/ batch |
| MMb10 | 10 grams/ batch | 80,000 litres/ batch |
| MMb 15 | 120 grams/ batch | 1,20,000 litres/ batch |
| MMb 25 | 200 grams/ batch | 2,00,000 litres/ batch |
| MMb 50 | 400 grams/ batch | 4,00,000 litres/ batch |
| MMb 100 | 800 grams/ batch | 8,00,000 litres/ batch |
| MMb 150 | 1200 grams/ batch | 12,00,000 litres/ batch |
| MMb 250 | 2000 grams/ batch | 20,00,000 litres/ batch |
| MMb 500 | 4000 grams/ batch | 40,00,000 litres/ batch |

Single batch working of 8 hours/day assumed

* The system can be run in multiple batches of 4 to 8 hours/day



Brine Water

Brine Water

OxiMax MA Series

Description

The OxiMax MA Series is designed to produce Sodium Hypochlorite (NaOCl) from Salt & Water (brine). The MA Series is used when there is no seawater available.

Applications

Applications are refineries, water and waste water treatment plants, steel plant, inland industrial plants, water theme parks and large swimming pools.

These heavy duty, high performance cells use an injection moulded PVC casing and a bipolar electrode arrangement for maximum energy efficiency and NaOCl production.

Using the OxiMax MA Series as the method of disinfection eliminates the safety, handling and transporting issues of using Cl₂ gas or bulk hypochlorite. The only material that requires handling is salt.

Process

Salt is supplied to a salt saturator where a 25-30% saline solution is produced. This solution is diluted to 3% with the addition of fresh water and fed to the OxiMax MA Electrochlorination cells where DC power is applied. This results in the production of a 0.6-1.0% hypochlorite solution.

The NaOCl solution flows to a storage tank where it is stored for future use within the process (water treatment plant etc.) the byproduct of hydrogen is safely diluted by

OxiMax MA Series

air blowers and then purged to atmosphere to ensure complete safety. From the storage tank the hypochlorite is dosed (via dosing pumps and/ or venturis) to the process using flow pacing and/ or chlorine analysis (or ORP) control.

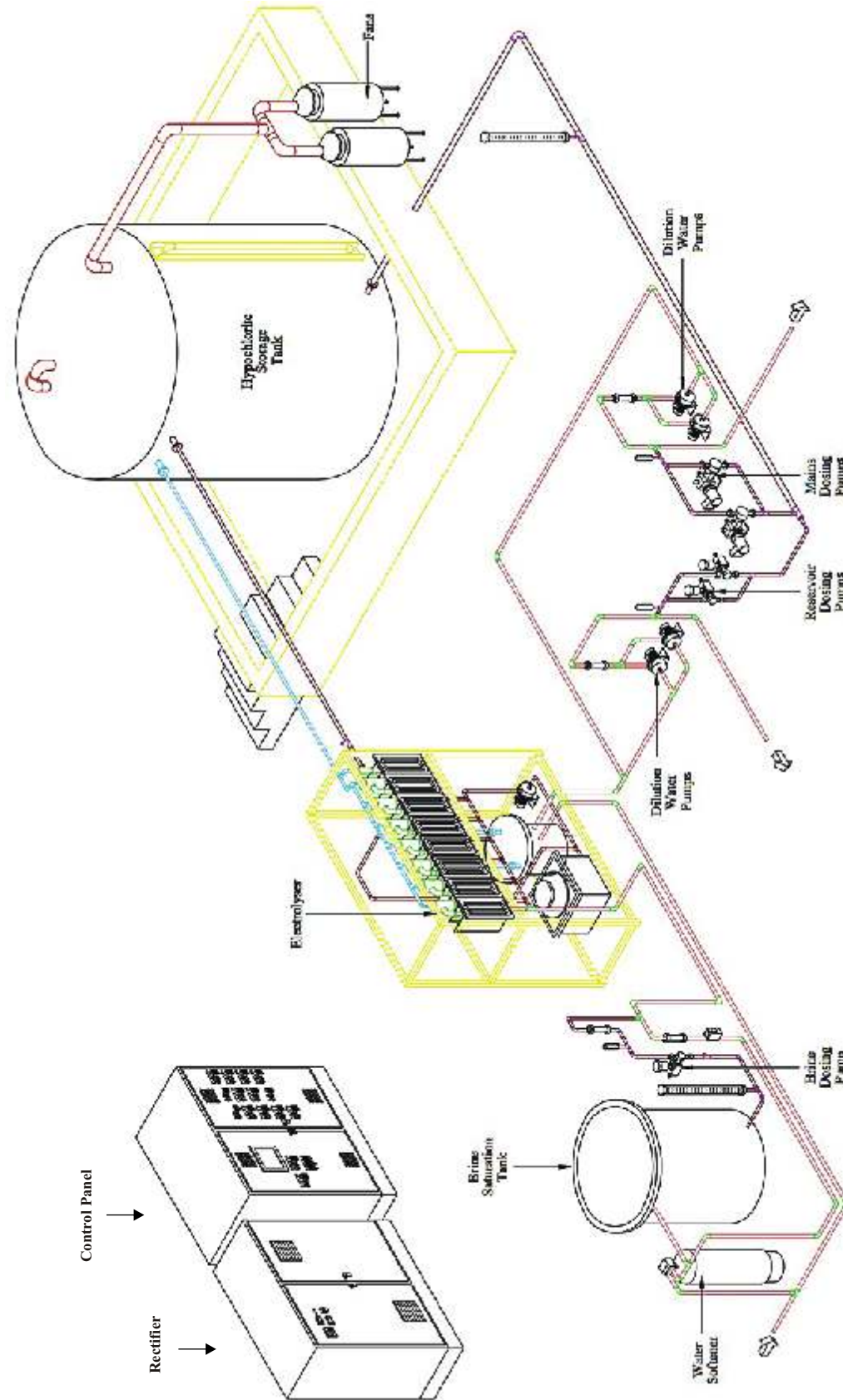
The OxiMax MA Series system is controlled by PLC with touch screen operator interface for ease of control. The system is designed to maintain a constant level of NaOCl in the storage tank to ensure there is always enough for use in the process.

Advantages

- ♦ See every Anode and Cathode
- ♦ Fully insulated – no exposed DC busbars or electrical connections for greater personnel safety
- ♦ Cell casings are **Thermomoulded PVC** for a long life and increased strength
- ♦ Cost effective and reliable
- ♦ Low maintenance and easy cell removal
- ♦ Completely automatic Sodium Hypochlorite (NaOCl) production
- ♦ Skid mounted for easy installation
- ♦ Modular configuration
- ♦ Forced air hydrogen gas dilution and purging
- ♦ SC 12 MMO Coatings on Anodes for increased efficiency
- ♦ Integral Voltage Monitoring
- ♦ 5 years warranty on electrodes.



A typical "Brine Water Based" OxiMax Electrochlorination System



OxiMax MA Series Electrochlorination System Sizing



Typical power consumption around 4.0kwh/kg of Cl₂ produced.

A typical system of OxiMax MA Series consists of some or all of the following:

- ◆ Brine Pump(s)
- ◆ Fresh Water(s)
- ◆ Water Softener(s)
- ◆ Salt Saturator(s)
- ◆ DC Rectifier(s)
- ◆ OxiMax MA Series Electrochlorination Cell(s)
- ◆ Control System(PLC/HMI)
- ◆ H2 Blowers
- ◆ Degassing and Storage Tank(s)
- ◆ Dosing Pump(s) and/or Venturi Dosing System
- ◆ Instrumentation
- ◆ Chiller(s)

The system includes all of the components to automatically generate NaOCl. This includes a salt saturator, water softener (if required), electrolyser, transformer/ rectifier, NaOCl storage tank and control system.

MA Series - Cell capacities

| Cell Models | Capacity (kg/hr) |
|-------------|------------------|
| MA | 1 |
| MAA | 2 |
| MAB | 4 |
| MAC | 8 |

| Cell Series | Chlorine required in Kg/hr (per Train) | | | | | | | | | | | | | | | |
|-------------|--|----|-----|----|-----|----|-----|---|-----|----|----|----|----|--|--|--|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 16 | 32 | 64 | | | |
| MA | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | NA | NA | NA | | | |
| MAA | NA | NA | 2+1 | 2 | 2+1 | 3 | 3+1 | 4 | 4+1 | 5 | 8 | 16 | NA | | | |
| MAB | NA | NA | NA | 1 | 1+1 | 1+ | 1+ | 2 | 2+1 | 2+ | 4 | 8 | 16 | | | |
| MAC | NA | NA | NA | NA | NA | NA | NA | 1 | 1+1 | 1+ | 2 | 4 | 8 | | | |



Use the MA, MAA, MAB or MAC cells as the basic building blocks to form an entire OxiMax MA Series electrolyser train (MAB12000 = 12kg/hr shown)

Example 1

If you require 10kg/hr or Cl₂ gas equivalent we would offer an
 MAB10000/5 = 5 x 2kg/hr cell
 MA 10000/10 = 10 x 1kg/hr cell

Example 2

If you require 32kg/hr of Cl₂ gas equivalent we could offer an
 MAA32000/16 = 16 X MAA(2kg/hr) cells, MAB32000/8 = 8 X MAB (4kg/hr) cells or MAC32000/4 = 4 X MAC(8kg/hr) cells.

OxiMax MC Series

Description

The OxiMax MC Series is designed to produce Sodium Hypochlorite (NaOCl) from seawater. These heavy duty, high performance cell use an injection moulded PVC casing and a bipolar electrode arrangement for maximum energy efficiency and NaOCl Production.

Applications

Power Stations located next to the sea are the perfect applications for the OxiMax MC Series Electrochlorination Systems.

Seawater is normally used for cooling in the condensers of thermal power stations i.e. a "once through system". Disinfection of the seawater is required to prevent biofouling from molluscs, mussels, slime and algae.

The raw materials of seawater and power necessary for production of Sodium Hypochlorite are readily available – seawater is free and the power used only represents an opportunity cost.

Process

A side stream of seawater is taken from the discharge of the power station cooling water pumps directly to the EC Plant. This seawater is strained to 400 micron and passed into the electrolyser cells. DC power is applied to the seawater inside the cells which results in the production of Sodium Hypochlorite (NaOCl).

The OxiMax MC Series employs staged removal of the hydrogen (H₂) throughout the electrolyser train via multiple hydrogen cyclones, resulting in superior NaOCl production and energy savings. All H₂ is passed to either the degassing/ storage tanks or to H₂ seal pots. The H₂ is

the diluted and purged to the atmosphere.

The Sodium Hypochlorite (NaOCl) leaves the last cell and is passed to the degassing/ storage tanks where it is stored for later dosing/ shock dosing.

Dosing via dosing pumps to the power station cooling water intakes prevents biofouling of the mechanical equipment such as the cooling water pumps, the bar screens, drum screens and condensers as well as the cooling water pipelines of the water pipelines of the power stations.

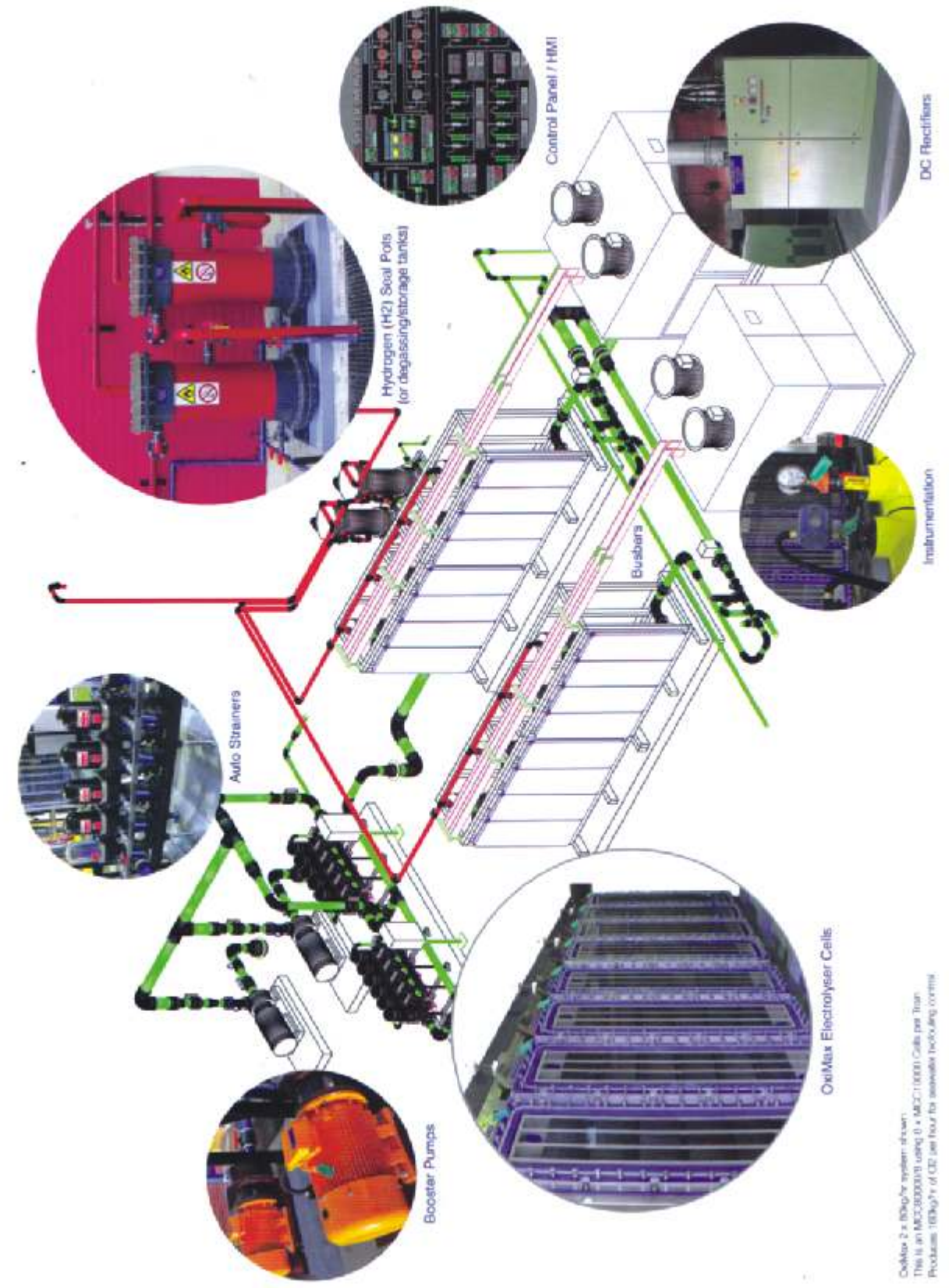
The OxiMax MC Series system is controlled by PLC with Touch Screen operator interface for ease of control.

Advantages

- ♦ See every Anode and Cathode
- ♦ Complete biofouling control
- ♦ Fully insulated – no exposed DC busbars or electrical connections for greater personnel safety
- ♦ Cell casings are **Thermomoulded PVC** for a long life and increased strength
- ♦ Staged hydrogen removal for increased efficiency
- ♦ Cost effective and reliable
- ♦ Low maintenance and easy cell removal
- ♦ Completely automatic Sodium Hypochlorite (NaOCl) production
- ♦ Skid mounted for easy installation
- ♦ Modular configuration
- ♦ Forced air hydrogen gas dilution and purging
- ♦ SC 12 MMO Coatings on Anodes for increased efficiency
- ♦ Integral Voltage Monitoring
- ♦ 5 years Warranty on electrodes.



A typical "Sea Water Based" OxiMax Electrochlorination System



OxiMax 2 is 100kg/hr system shown.
This is an MCE00000000 using 0 x MCE10000 Cells per Train.
Produces 100kg/yr of OCl₂ per hour for seawater including commissioning.

OxiMax MC Series Electrochlorination System Sizing



Typical power consumption around 4.0kwh/kg of Cl₂ produced and up to 4 months between acid cleans.

A typical system of OxiMax MC Series consists of some or all of the following:

- ◆ Seawater Booster Pump(s)
- ◆ Seawater Auto Strainer(s)
- ◆ DC Rectifier(s)
- ◆ Hydrogen Seal(S)
- ◆ Shock dosing Pumps(s)
- ◆ Hydrogen Blowers
- ◆ Degassing and Storage Tank(s)
- ◆ Control System(PLC/HMI)
- ◆ OxiMax MC Series Electrochlorination Cell(S)
- ◆ Instrumentation

Production Capacity per cell

| Cell Modules | Capacity (kg/hr) |
|--------------|------------------|
| MCA2500 | 2.5 |
| MCB 5000 | 5 |
| MCC 10000 | 10 |

Chlorine required in Kg/hr (per Train)

| Cell Series | No of Cells required | | | | | | | |
|-------------|----------------------|----|----|----|----|-----|-----|-----|
| | 5 | 10 | 20 | 40 | 80 | 120 | 160 | 240 |
| MCA | 2 | 4 | 8 | 16 | NA | NA | NA | NA |
| MCB | NA | 2 | 4 | 8 | 16 | NA | NA | NA |
| MCC | NA | 1 | 2 | 4 | 8 | 12 | 16 | 24 |

Example 1

If you require 120 kg/ hr of Cl₂ gas equivalent we would offer an MCC120000/12 = 12 X MCC (10kg/ hr) cells.

Example 2

If you require 40 Kg/ hr of Cl₂ gas equivalent we could offer an MCA40000/16 = 16 X MCA (2.5kg/ hr) cells, MCB40000/8 = 8 x MCB (5kg/hr) cells or MCC40000/4 = 4 x MCC (10kg/ hr) cells



Use the MCA, MCB or MCC cells as the basic building blocks to form an entire OxiMax MC Series electrolyser train (MCC60000 = 60kg/hr shown)

Worldwide Service and Support

- ◆ Dedicated staff focused on customer satisfaction
- ◆ Installation, commissioning and maintenance staff available 24 hours a day; always on stand-by
- ◆ Training for customers provided before handover
- ◆ All warranty parts stocked and available for immediate delivery

Why choose Water Engineers India ?

- ◆ Dynamic company with a reduced overhead structure that allows competitive pricing/ reduced installation costing
- ◆ A team with superior skills and expertise in disinfection, electrochlorination, filtration, and related processes
- ◆ Innovative products and systems
- ◆ Direct communication with the manufacturer (s) regarding system design & customization
- ◆ Global references
- ◆ Patented systems and products
- ◆ Warranties on systems and products

