

Additional components

In most applications, for the successful performance of the Electroclear, the unit requires other components to be installed and operated as a complete system.

Component	Requirement
Waterco pH control System	The Electroclear Unit operates best at pH range of 7 to 8.0. If the pH of the water being treated is outside this range, then pH control will be required.
In-Line Static Mixer	An in-line static mixer will be required in applications where the flow rate is naturally low, or when the flow rate is reduced to facilitate contact time in the Electroclear Unit and/or increased settling time of the treated water. The size and number of in-line mixers will depend on the system flow characteristics.
Settling Tank (usually PVC with a conical bottom and a drain valve for ease of cleaning out the tank bottom)	All systems will require a settling tank. If it is desired to reduce settling time or reduce the size and/or number of settling tanks then the coagulants can be filtered out of the water. However, the media filter will have to be backwashed more frequently.
Biocide Dosing System (Waterco peristaltic pump or Waterco in line chlorine feeder)	Systems which will have a final storage tank for treated water will require some form of biocidal treatment. Systems which may exhibit biological problems (e.g. odour problems) in any part of the Electroclear System (e.g. the settling tanks) will require some form of biocidal treatment.
Polishing granular filter with Zeoplus (Zeolite)	All systems will require a "polishing" filter. Note: in some cases a mixed bed filter can be used to combine additional coagulant filtration as well as polishing filtration.
Water Storage Tank	Unless the treated water is going directly to drain then a storage tank will be required.
Automated controls	An automated system is required when the Electroclear is placed in remote locations, to reduce maintenance time, and when regulations require automation.

ELECTROCLEAR

The Electroclear simultaneously precipitates and coagulates a wide range of contaminants with the use of electricity.

Functions

- Electronically controlled release of coagulating and flocculating agents
- Reduces suspended solids
- Oxidizes iron
- Reduces Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), phosphates, Total Nitrogen and Sulphates

Features

- Minimum operator attention
- Low energy consumption and minimal maintenance
- Small footprint
- Quick and easy cell maintenance/replacement
- Minimal sludge production



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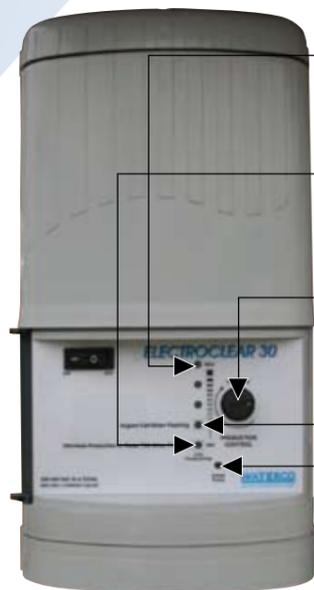
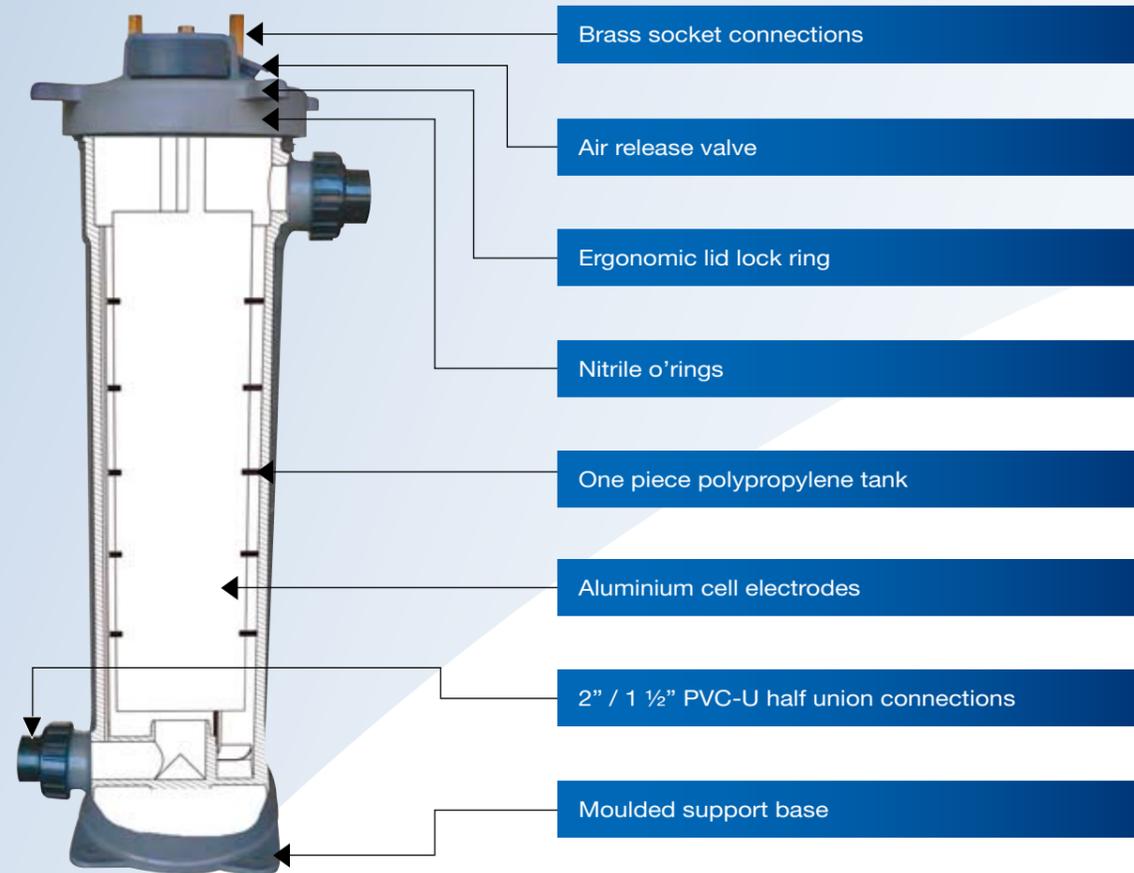
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Electronic clarification

The Electroclear applies an electric current to a set of aluminium electrodes to release aluminium ions into the water. These aluminium ions, as well as the electric current which is passed through the water, react with, and reduce organic contaminants and some inorganic contaminants.



Current Indicator LED's
A series of 5 LED's indicate (from Min to Max) how much current is flowing through the cell.

Low Conductivity Indicator LED
As well as functioning as a Current Indicator Light, this flashing Green LED also indicates low water conductivity, which can be set with the Production Control Dial.

Production Control Dial:
This controls the power going to the cell to maximise system efficiency in relation to power consumption and cell life.

Inspect Cell Indicator LED
As well as functioning as a Current Indicator Light, this flashing Green LED also indicates when the cell requires replacement.

Check Pump Indicator LED
This is a built in safety feature that disables the operation of the unit if there is a lack of water flow.

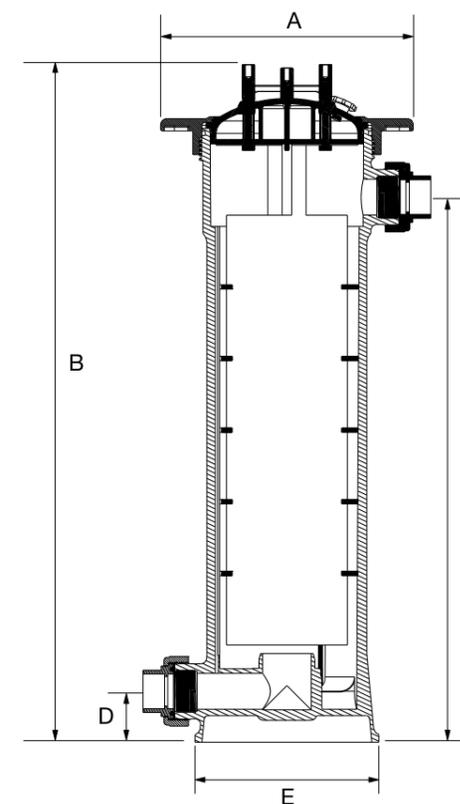
Technical Specifications

Minimum required TDS of water	50 mg/l
Recommended flow rate range	15 to 30 l/min / 0.9 to 1.8 m3/hr
Recommended operating pH range	7 to 8
Degree of protection to AS1939	IP23
Max ambient air temp	40°C

Electrical Specifications

	Input	Output	
	Powerpack	Cell	Pump
Voltage	240VAC	8VDC	240VAC
Current	10A	30A (max@20°C)	8A

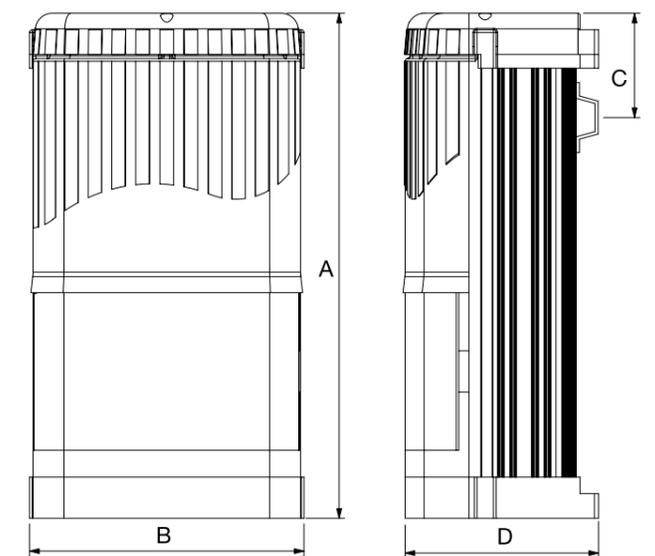
Electroclear



Dimensions

A	B	C	D	E
360 mm	960 mm	760 mm	71 mm	260 mm

Electroclear Control Box



Dimensions

A	B	C	D
368 mm	200 mm	70 mm	141 mm

Warranty

Waterco equipment is covered by a comprehensive 1 year warranty for commercial installations. Note that the cell is a consumable and as such is not covered by warranty.

Removal Percentages

The following table gives an indication the achievable removal percent of some contaminants using the Waterco Electroclear unit. Achieving and/or improving upon these indicated removal percentages is dependent upon quality of the pre-treated water and system operating parameters.

** BOD and COD reduction can and often does exceed the minimum of 40% but reduction of these contaminants is very dependent on system operating parameters.*

Parameter	Percentage Removal
Phosphate	>94
Sulphate	>50
Total Nitrogen	>50
Dissolved Iron	>70
Total Iron	>50
Dissolved aluminium	>50
Suspended Solids	>60
*BOD	>40
*COD	>40

Electronic versus Chemical coagulation

Chemical coagulation, one of the most practiced forms of coagulation, has become less acceptable today because of several major drawbacks including high operating costs, high sludge production, limited conversion of hazardous waste to non-hazardous waste and limited water reuse due to introduced chemicals.

Electronic Coagulation has proven to be environmentally and economically superior to chemical coagulation due to its distinct process benefits.

Potential for Water Reuse

The decrease in dissolved constituents allows re-use of the water and permits closed loop recycling..

Sludge Minimisation

Chemically coagulated sludge may be excessive and contain high levels of unwanted contaminants (especially if the chemical coagulant is overdosed). Electronic Coagulation generates less sludge in addition to creating highly stable sludge in the oxide form, which generally meets water treatment discharge standards and compliance requirements.

Low Operating Costs

Low energy consumption, and minimal maintenance requirements result in significantly lower operating costs than most chemical treatment methods.

Minimal Operator Attention

The metallic plates inside the clarifier simply require periodic replacement. The replacement period is dependent on the system operating parameters such as flow rate and water quality. A basic indication of the replacement time is built into the Electroclear controller..



Electroclear Case Studies

Examples of some case studies that were conducted using the Waterco Electroclear unit are illustrated below.

Table 1: results achieved after treatment of truck wash wastewater at JJ Richards, Underwood, Qld.

Parameter	Before	After	Percentage Removal
Phosphate	44.13	2.6	94
Sulphate	116.38	35	70
Dissolved Iron	6.23	1.55	75
Phosphate	37.48	9	76
Phosphate	709.75	254	64
Phosphate	394	227.5	42
Phosphate	1360	798.5	41

All units are in mg/l unless otherwise specified.

Table 2: results achieved after treatment of industrial laundry wastewater.

Parameter	Before	After	Percentage Removal
pH	6.55	5.95	-
Sulphate	110	9	92
Dissolved Iron	0.39	0.11	72
Phosphate	382	137	64
Phosphate	83	5	94

All units are in mg/l unless otherwise specified.

Table 3: results achieved after treatment of grey water on houseboat.

Parameter	Before	After	Percentage Removal
BOD	78	35	55
Phosphorus (total as phosphorus)	3.5	<1	>97
Dissolved Iron	10.7	3.6	66
Phosphate	170	58	66
Phosphate	55	3	95
Phosphate	2,000,000	6,800	99.66
Phosphate	6.74	7.97	-

All units are in mg/l unless otherwise specified.

Table 2: results achieved after treatment of industrial laundry wastewater.

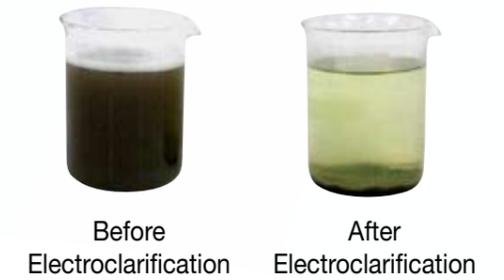
Parameter	Before	After	Percentage Removal
Total Petroleum Hydrocarbons	35	< 5	>86
Suspended Solids	598	30	95

All units are in mg/l unless otherwise specified.

Note: The case studies above only serve as an indication of the type of results that have been achieved using the Waterco Electroclear unit in various applications. The Electroclear's performance will vary from application to application as the technology is condition sensitive.

Organic Contaminant Reduction

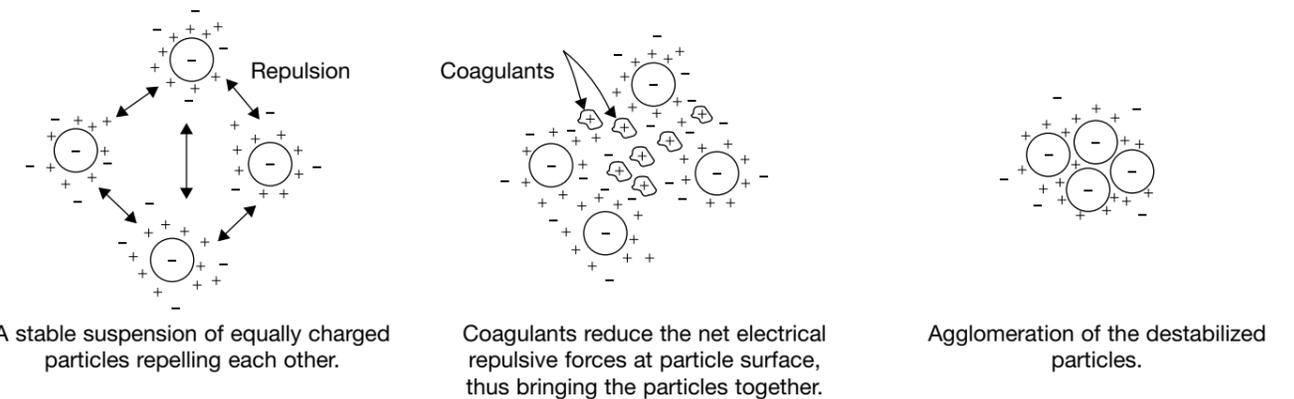
Most organic contaminants have an ionic charge which permits them to repel one another and stay in solution as colloidal particles; or as complex dissolved ions. The aluminium ions react with these colloidal particles and/or dissolved ions causing the ionic charges of the organic contaminants to neutralise and allows coagulation to take place. Once this coagulation takes place the contaminants gain mass which results in their separation from the solution. These "heavy" coagulated masses fall to the bottom of the settling tank and/or are filtered out, thus reducing the BOD and COD of the water.



Inorganic Contaminant Reduction:

The aluminium ions released by the Electroclear reacts with some inorganic dissolved ions, such as phosphate, forming a molecular structure which precipitates and is removed along with the organic "sludge" in the settling tank and/or filtered out. Inorganic contaminants can act as an energy source in the growth of microbiological organisms which in turn increases the BOD and COD of the water. Therefore, the reduction of inorganic contaminants, contributes to the overall reduction of BOD and COD.

Figure 1: Schematic representation of coagulation and flocculation of colloids.



Oxidation

In addition to the aluminium ion reactions, the passing of current through water also causes the splitting of the water molecules, resulting in hydrogen gas and hydroxide ion production. These highly reactive and unstable hydroxide ions act as oxidants to oxidise soluble matter such as iron, thus dropping them out of solution in the more stable oxide form.

Figure 2: Schematic representation of oxidation of contaminants.

