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Leaders in Managing Water

Electricide® CDE Electrochemical Chlorine Dioxide Generators

Why a Single-Chem ClO2 Generator?

Safe, Simple, Efficient, Effective

- Low disinfectant byproducts and corrosion potential
- No acid handling, only one precursor
- Near-zero waste, actually creates useable caustic
- Effective across pH range.

ALS C US

NSF/ANSI/CAN 61 & 372

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electricide
ClO_2

Chemical Reactions - Electrochemical ClO_2 Production

① Anode (oxidation): $ClO_2^- \rightarrow ClO_2 + e^-$

② Cathode (reduction): $2H_2O + 2e^- \rightarrow H_2 + 2OH^-$

① + ② (combined): $2ClO_2^- + 2H_2O \rightarrow 2ClO_2 + H_2 + 2OH^-$

WHAT IS ELECTROCHEMICAL GENERATION?

Chlorine dioxide is traditionally generated using the 2-chemical reaction (acid-chlorite) or the 3-chemical reaction (acid-chlorite-hypochlorite). Although these methods are robust and proven, there is concern about the safety risk of handling multiple chemicals, especially acid. The Electricide® electrochemical generators use only one precursor chemical: Electricide® – P1 and electrical energy to create chlorine dioxide. The Electricide® generator includes an electrochemical cell which has an anode (+) and cathode (-) side. Electrical current is applied to the cell electrodes where oxidation and reduction reactions occur. Oxidation at the anode electrode converts chlorite ion (ClO_2^-) to chlorine dioxide (ClO_2). The chlorine dioxide formed is dissolved in solution. Reduction at the cathode converts water to caustic (OH-) and hydrogen. Caustic can be collected or wasted and hydrogen is diluted with air and vented to atmosphere.

GAS TYPE OR SOLUTION TYPE

Chlorine dioxide produced in the recirculating anolyte loop of the Electricide® generator is extracted using a gas separator column and air. There are some applications where there is only one dosing point or where chlorine dioxide gas is required. The Electricide® type G generator has been designed specifically for these applications. For dosing into water systems, injection of chlorine dioxide gas utilises a booster pump and ejector. For gas phase reactions, chlorine dioxide is taken from the gas separator column to the mixing point. For applications requiring multiple dosing points, the Electricide® S type generator is ideally suited. Pure chlorine dioxide gas in a stable air mix is extracted from the gas separator and dissolved into water in a solution tank at nominally 2,000 ppm. The generator is equipped with a control system for automatic dosing to max. three (3) dosing points. It is possible to use the Electricide® generator as a central depot for chlorine dioxide to distribute it accurately under PID Residual, Flow Paced (FP), Flow Paced Residual Trim (FPRT) or Manual control.

PURITY WHEN DESIRED

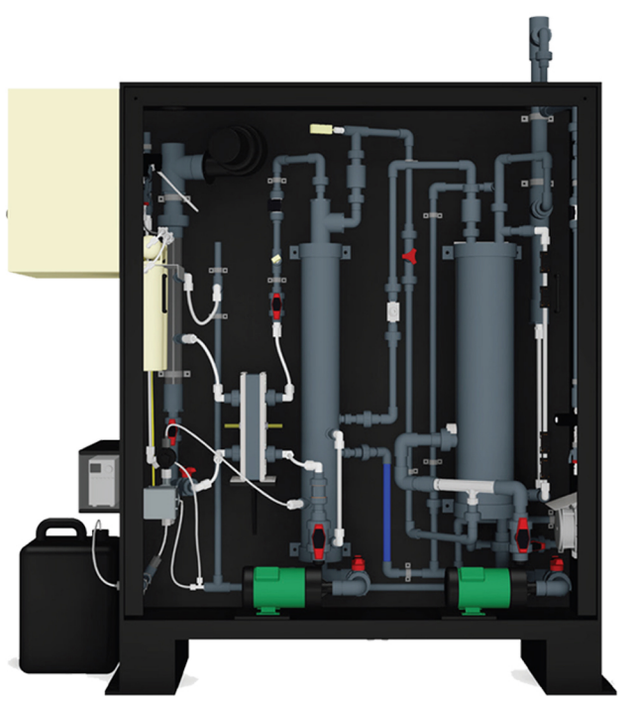
Potable water, food and beverage applications require the highest level of chlorine dioxide purity. The Electricide® generators produce chlorine dioxide gas which has been air-separated. No other impurities such as chlorine, chlorite, chlorate, chloride or sodium are included in the separated gas. Therefore, when the chlorine dioxide is dissolved into water, only chlorine dioxide is dissolved, producing high purity chlorine dioxide solution with no added TDS.

EVERYTHING INBUILT

The Electricide® generator is modular with all components mounted on a frame. The system is fully wired and piped and arrives ready for connection to site utilities. Operation is controlled via inbuilt PLC/HMI. Remote internet access is a standard inclusion.

CDEB GENERATOR FOR SMALL CAPACITY GENERATION

The Electricide® CDEB-2.5 has a generation capacity of 47 g/hr = 2.5 lb/day of ClO_2. This model was developed to meet the requirements of food processing, health care facilities and water disinfection circuits. All internal components are mounted on a floor-standing HDPE frame with splash shield, central electrical control panel, PLC, HMI and level controlled solution tank. Chlorine dioxide solution is produced at 2,000 ppm to be dosed to one or multiple dosing points. Dosing control is included and can be selected from a variety of flow/residual configurations.



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GENERATOR MODELS AVAILABLE

Model	Description	Capacity (as ClO2)
CDEB-2.5	• HDPE cabinet style generator.	47.2 g/hr = 2.5 lb/day
	• All components mounted inside enclosure.	
	• 15.6 L = 4.1 Gal solution tank.	
	• Polycarbonate splash shield.	
	• Control panel with 7 inch color touchscreen.	
	• Control of three ClO_2 solution dosing pumps. PID, Flow	
	• Paced, FPRT, Manual control selection.	
	• Remote internet access standard via 4G router.	
	• Type G (gas) or Type S (solution).	
CDE-10	• Stainless steel skid style generator.	189 g/hr = 10 lb/day
CDE-25	• All components mounted inside skid frame	472 g/hr = 25 lb/day
CDE-50	• CDE-10 60 L = 16 Gal solution tank.	945 g/hr = 50 lb/day
CDE-100	• CDE-25 100 L = 26 Gal solution tank.	1,890 g/hr = 100 lb/day
CDE-200	• Larger models have external titanium solution tank.	3,788 g/hr = 200 lb/day
CDE-300	• PVC drip tray with drain.	5,682 g/hr = 300 lb/day
	• PVC side and top covers.	
	• Control panel with 7 inch color touchscreen.	
	• Standard control of three ClO_2 solution dosing pumps. PID,	
	Flow Paced, FPRT, Manual control selection.	
	• Remote internet access standard via 4G router.	
	• Optional web camera.	
	• Type G (gas) or Type S (solution).	

Larger capacity generators available upon request

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ELECTRICIDE® CDE ELECTROCHEMICAL CHLORINE DIOXIDE GENERATOR

FEATURES AND BENEFITS

FEATURE	BENEFIT	WHAT THIS MEANS FOR YOU
High purity chlorine dioxide production. Chlorine dioxide solution produced contains only chlorine dioxide and dilution water.	No additional chloride, chlorite, chlorate, acid, sulfate, chlorine present to cause contamination to your product or process. With 2-chemical generators, some precursor chlorite is wasted by conversion to chloride. High chloride concentration can increase the risk of corrosion to stainless steel. The CDE generator does not add any chloride to the chlorine dioxide solution so this benefit will reduce the risk of corrosion.	You can safely use chlorine dioxide generated from the CDE generator in your food or potable water process with no fear of contamination or addition of unwanted chemicals or by-products. Risk of corrosion to stainless steel will be reduced.
Chlorine dioxide is generated chlorine free.	No production of THM's, AOX's, HAA's, chloramines or chlorophenols by chlorine dioxide made in the CDE generator. 3-chemical and chlorine-chlorite generators make chlorine dioxide in an excess of chlorine. This chlorine will enter your water circuit and make chlorinated organic by-products, chloramines and chlorophenols which are responsible for taste and odour problems. The CDE generator cannot make any of these by-products.	You can be confident that no chlorinated organic or inorganic reaction by-products will be produced by chlorine dioxide from the CDE generator.
Only one precursor chemical required: Electricide-P1.	You only need to handle one chemical. Other methods of generation require 2 or 3 chemical precursors. The CDE generator will therefore reduce the chemical storage and handling safety risk for your site. 2-chemical and 3-chemical generators require incompatible chemicals to be stored next to each other, which is an inherently greater safety risk. The CDE generator has only one chemical so this risk is removed.	You can be confident that no chlorinated organic or inorganic reaction by-products will be produced by chlorine dioxide from the CDE generator.
High precursor conversion to chlorine dioxide.	The CDE generator chlorite conversion within the electrochemical cell is near 100%. When chlorine dioxide solution is produced, chlorite conversion is greater than 80%.	High conversion equals low running cost.

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FEATURE	BENEFIT	WHAT THIS MEANS FOR YOU
Production of caustic is part of the CDE generator process.	Approx. 10% w/w sodium hydroxide is produced as a by-product from the CDE process. This can be used for cleaning or other pH control processes on site.	You get pure sodium hydroxide free of charge from the CDE process.
Inbuilt safety interlocks to maximize safety.	Flow, pressure, temperature, current monitoring of critical processes with high and low alarms will shut down the generator.	The CDE generator has been investigated by HAZOP analysis with engineering controls implemented to minimize risk.
The CDE generator comes complete “cabinet mount”. All components are mounted, plumbed and wired in an enclosure, ready to ship, install and operate.	Transportation to site and installation is easy. Just connect water, power, Electricide-P1 and control signals in; chlorine dioxide solution out and you are ready to run.	With relatively small involvement from mechanical and electrical trades, the CDE generator can be installed and running in a short time.
All mounting components used are chemically resistant to chlorine dioxide. Materials include UPVC, Titanium, PVDF, PTFE, Viton and Kynar.	Unlike other systems which use steel cabinets and fasteners (which are subject to corrosion), the CDE generator uses more expensive components which are chemically resistant.	The CDE generator will look new and operate reliably (without corrosion failure) many years after installation. The value for money will be realized as you see the low lifetime cost of ownership.
PLC controlled system with touchscreen HMI.	All items are controlled from a central PLC with the touchscreen providing an operator friendly way to view plant operation and status. Fault finding is simple.	It is easy to train operators and they will feel comfortable operating the plant. All the information you need and configuration capability is available at the HMI.
Inbuilt calibration cylinder for Electricide-P1 dosing pump.	The Electricide-P1 dosing pump can be properly calibrated so that dosing is accurate and consumption of Electricide-P1 minimized.	You can view and accurately control chlorine dioxide concentration and the amount of chlorine dioxide generated.
Inbuilt control modes: Flow Pacing; PID Residual Control; Flow Paced with Residual Trim; Manual Dosing.	Flexibility of control for whatever your process requires. For make-up to a cooling tower or to a water tank you can use flow pacing and dose into the make-up line. For a recirculating tank, you can use PID Residual Control. For potable water disinfection, you can use Flow Paced with Residual Trim.	Your process control scenario can be handled within the CDE generator and the HMI will provide you with the necessary feedback signals for verification.
Three dosing pumps can be independently controlled from the CDE generator.	The hardware and software control for three dosing points is built into the CDEgenerator.	You can quickly realize payback on your investment by using chlorine dioxide in many applications on site. Just add dosing pumps and you can get going. No need to have your own PLC control system, the CDE generator has it built in.

FEATURE	BENEFIT	WHAT THIS MEANS FOR YOU
Remote start/stop inputs for three chlorine dioxide solution dosing pumps.	Start and stop each dosing pump from remote PLC or switch contact. A flow switch, level switch or flow monitor can be used to stop/start the dosing pumps.	You will have full control of dosing into your process.
Pause inputs for three chlorine dioxide/ORP analyzers.	Chlorine dioxide dosing and PID control will be stopped if the sample flow switch inputs are not made.	In order to have proper residual control, it is necessary to have verified sample flow at the chlorine dioxide/ORP sensor. The sample flow switch input verifies that sample flow is present and residual control can occur. If not, dosing is stopped. You can be sure that overdosing will not occur from a non-representative sample to the sensor.
Ability to select chlorine dioxide residual or ORP for three channels	Flexible measurement options. Some water circuits are clean and can use amperometric chlorine dioxide sensors and others have suspended solids requiring ORP.	You can select the sensor and measurement type that best suits your application.
HMI selectable measurement range for residual analyzers.	You can select 4-20mA = 0 – x ppm or 0 – x mV.	No need to adjust the range at the residual analyzer. You can do all the adjustments at the HMI.
Remote internet access.	Users can log on to the HMI and view/operate the generator. Selected alarms will notify by email.	The speed of making a change to the generator or fault finding is greatly increased. In most cases, it will not be necessary to send a service person to site and this will save you time and money.

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SALES SUPPORT

We're here to help you select and correctly size a generator for your application. We have a good combination of Chemical Engineers, mechanical and electrical technicians with many years of practical ClO_2 experience.

INTEGRATION AND INSTALLATION

Having the correct unit is only half the equation. The other half is correctly integrating the unit into your process. General Arrangement (GA) drawings, electrical wiring schematics, operation and maintenance manuals are provided to enable correct installation and operation of the generator. In most cases, you can commission the generator using the information provided. If you need assistance, our technicians can provide remote or site support.

SUPPORT

EAI Water personnel and distributors will provide support throughout the lifetime of the unit. From the initial inquiry and unit selection through to operating questions over the phone, remote internet monitoring (with email alarms), scheduled preventative maintenance and precursor chemical supply, EAI Water is your partner in the disinfection process.

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