ClearLine® System

Operation Manual

Model CL-1000-X1.5

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ElectroSea®

Warranty Policy

Please visit our website at **www.electrosea.com/warranty** to view our full warranty terms and conditions.

U.S. Patent No. 11,027,991 and 11,345,621, Foreign Patent No. I782112 and other U.S. and Foreign Patents Pending

ElectroSea®

ElectroSea was created when the owners of a sportfishing vessel invented “a better way” to prevent biofouling in their seawater cooling system. Solving complex technical problems is our expertise. With more than 100 issued U.S. patents and 350+ foreign patents in advanced technologies, our executive management team has been developing innovative solutions for more than 50 years. With an expert team of “old salts” who eat, sleep, and breathe boating, ElectroSea will improve your time on the water.

ClearLine® System

ClearLine is an innovative marine electrochlorination system that prevents biofouling and barnacle growth in a vessel’s seawater lines. ClearLine keeps air conditioners, chillers, and refrigerators operating at maximum flow rates and sea strainers clean longer. The patented ClearLine System includes the ClearLine Control Unit, which is the brain, and the ClearCell®, which is the heart of the system. ClearLine operates automatically 24x7x365 and is built for flawless and reliable performance.

Safety Considerations

WARNING Indicates a hazardous situation that, if not avoided, could result in death or serious injury.

CAUTION Indicates a hazardous situation that, if not avoided, could result in minor or moderate injury.

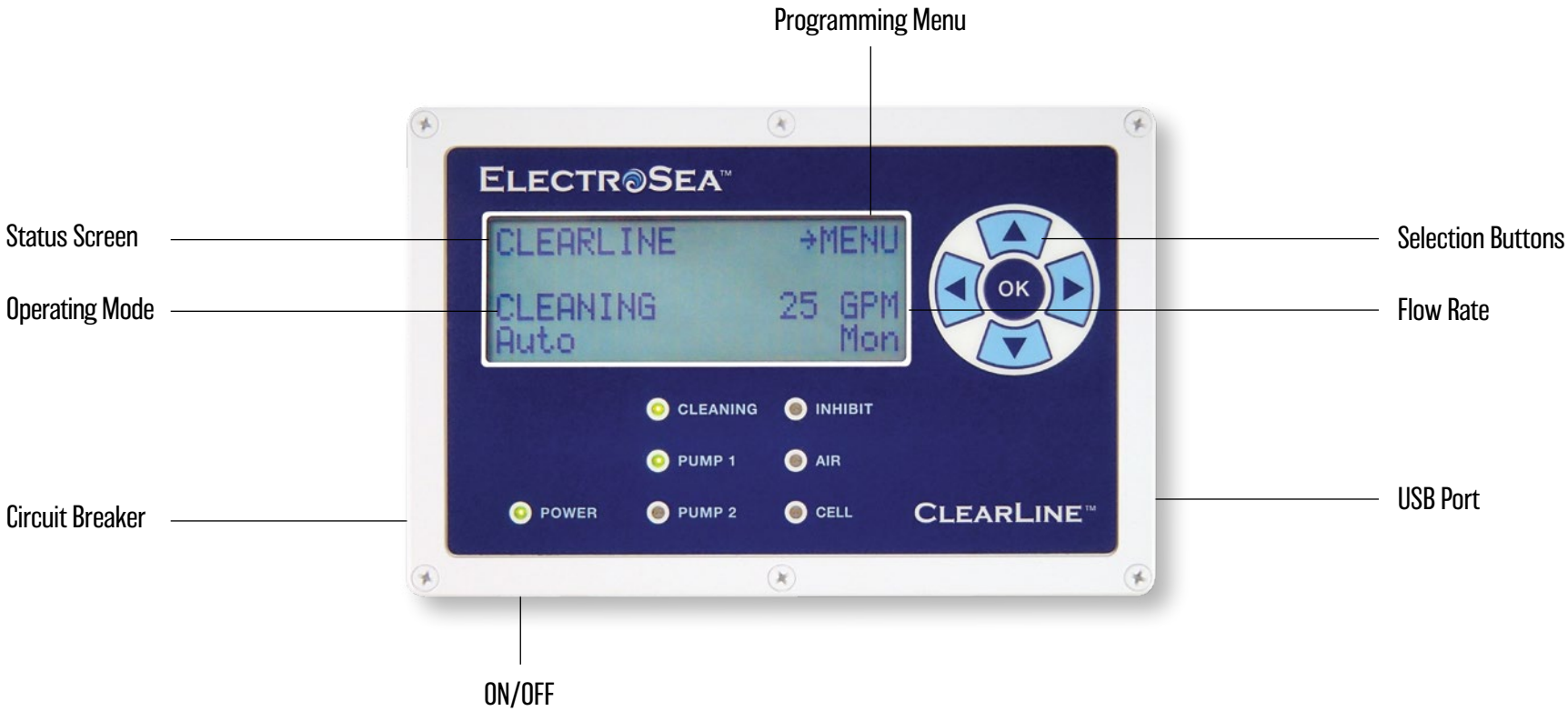
NOTICE Indicates a hazardous situation that can cause damage to personal property, the environment, or equipment.

U.S. Patent No. 11,027,991 and 11,345,621, Foreign Patent No. I782112 and other U.S. and Foreign Patents Pending

User Interface

Features and Functions

1. Power ON ClearLine. The Control Unit will complete a diagnostic self-test, and then the green “POWER” light will be illuminated.
2. The main status screen will be displayed.



Operating Modes

The Operating Mode displays the state of the ClearLine System. Modes include

- **OFF:** ClearLine is powered, but it is in the OFF mode and not Cleaning.
- **START-UP:** ClearLine is performing a diagnostic self-test. This mode lasts for approximately 30 seconds.
- **CLEANING:** ClearLine is ON and Cleaning. This is the normal operating mode for the ClearLine System.
- **FLOW ALERT:** ClearLine is ON and Cleaning, but the flow rate measured is less than or equal to the value set manually in the Flow Alert feature.
- **CELL INDICATOR:** ClearLine is sensing low salinity (brackish or fresh water), high resistance, or disconnection of the ClearCell Cable. This indicator may also mean that the ClearCell is at the end of its useful life. ClearLine will continuously attempt to generate chlorine and automatically resume standard operation when conditions are resolved.

Feature Overview

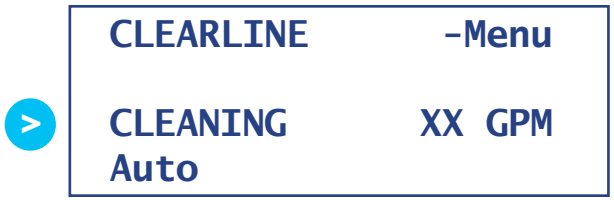
- **Flow Rate (GPM):** The flow rate is monitored in gallons per minute (GPM) or liters per minute (LPM) of seawater at the output of the ClearLine System. The flow rate is displayed for values of 4-50 GPM (15.1-189.3 LPM). ClearLine CL-1000-X1.5 should not be used with flow rates > 50 GPM (189.3 LPM).
- **Pump Mode:** This is an optional feature for vessels with two seawater intake pumps that require manual alternating of the pumps on a regular schedule. This feature automates the manual process of alternating between Pump #1 and Pump #2. When Pump #1 or Pump #2 is operating, the green pump light will be illuminated.
- **Pump Time:** This is an optional feature for vessels with two seawater intake pumps that are manually cycled. This feature sets the desired duration of time that Pump #1 or Pump #2 operates. Alternating time periods range from 10 minutes to 72 hours.
- **Flow Alert:** Flow Alert indicates that the flow rate is at or below a threshold level for a period of time. The Flow Alert threshold level is manually set by the user.
- **Display Contrast, Backlight, and Imperial/Metric Units:** Use this feature to adjust the LCD display contrast and backlight levels from Lo to Hi and to select between imperial and metric units for flow in GPM or LPM.
- **Default Update:** This feature is used to restore ClearLine to its original factory default settings or to update the ClearLine Control Unit firmware using a USB memory drive supplied by ElectroSea.

Power ON and Start-Up Delay

Power ON the ClearLine System. The Control Unit will complete a diagnostic self-test, and then the green "POWER" LED will be illuminated. "START-UP" will be displayed for 30 seconds.

Cleaning Mode

During normal operation the Control Unit will flash "CLEANING," and the green Cleaning LED will be illuminated. This indicates the ClearLine System is electrochemically generating chlorine to prevent biofouling in the vessel's seawater circuit. The System will display the flow rate at the output of the ClearLine System in gallons per minute (GPM) or liters per minute (LPM). If the flow rate drops below 4 GPM (15.1 LPM), the display will indicate "MIN FLOW." The ClearLine System will automatically stop generating chlorine if Min Flow (1-3 GPM/3.8-11.4 LPM) or No Flow (0 GPM) is reached.



Auto Mode

The ClearLine System automatically and continuously calculates the optimal level of chlorinated seawater to prevent biofouling in seawater lines using multiple input parameters, including seawater flow rate, key electrical parameters, and environmental temperature.

Display Backlight, Contrast and Imperial/Metric Units

Set Backlight, Contrast, or Units: The LCD display backlight, contrast, and imperial/metric units can be set. Use the Up or Down arrows to select and change settings.

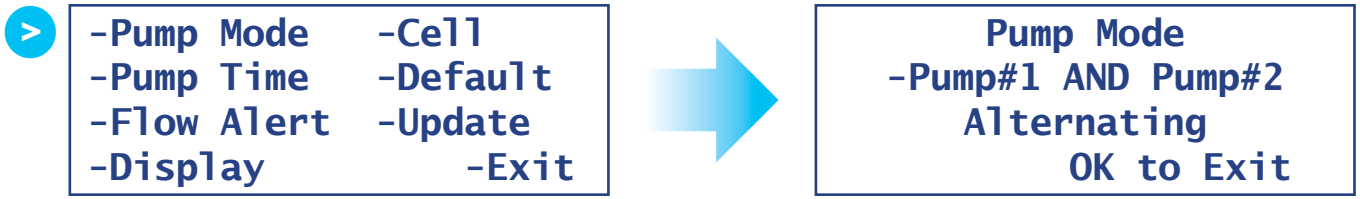
Inhibit Mode

Inhibit Mode: The ClearLine System can be wired to receive a signal from one (1) 24-VDC or 12-VDC and/or one (1) 240-VAC or 120-VAC input from equipment, such as a baitwell or reverse osmosis (RO) water system, that are incompatible with chlorine. These wired inputs trigger the ClearLine System to "inhibit" (stop) generating chlorine. ClearLine will flash the word "INHIBIT" on the status screen, and the green Inhibit LED will be illuminated.

NOTE: Inhibit is an OPTIONAL feature. It is NOT REQUIRED for the ClearLine System to operate properly. See the ClearLine Installation Manual for details.

Pump Mode and Time

Pump Mode: The ClearLine System can be wired to the vessel's seawater intake pump controller for monitoring and/or to automate the seawater pump-alternating process. This optional feature is useful for vessels that have two seawater intake pumps that require scheduled manual cycling. The Pump Mode and Time features automate the manual process of alternating the operation of Pump #1 and Pump #2 for a specific time duration (i.e., every 24 hours).



NOTE: Pump Mode and Time are OPTIONAL features. They are NOT REQUIRED for the ClearLine System to operate properly. See the ClearLine Installation Manual for details.

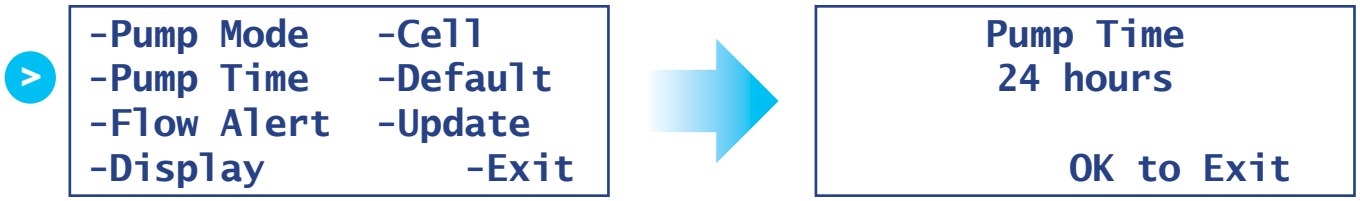
U.S. Patent No. 11,027,991 and 11,345,621, Foreign Patent No. I782112 and other U.S. and Foreign Patents Pending

Pump Mode and Time

The Pump Mode should be set up during the installation process. Refer to the table below to verify the Pump Mode is set correctly. Use the Up or Down arrow to select Pump Mode.

Mode	Description	Wiring Required
Pump Sense Not Used	Pump sensing is not being used. This is the factory default mode. *(Note: If your vessel does not have dual pumps and/or cannot be connected to ClearLine's automatic pump-cycling feature, then set Pump Mode to "Pump Sense Not Used").*	No
Pump#1 and Pump #2 Alternating	Two seawater intake pumps are wired to the ClearLine System. Pump #1 and Pump #2 can be alternated at a specific time duration from 10 minutes to 72 hours. The ClearLine System is controlling the ON/OFF pump operation.	Yes
Pump#1 and Pump #2 Monitors	Two seawater intake pumps are wired to the ClearLine System. Pump #1 and Pump #2 can be monitored. The ClearLine System is only monitoring and NOT controlling the ON/OFF pump operation.	Yes
Pump #1 ONLY Monitor	One seawater intake pump is wired to the ClearLine System. Pump #1 is for monitoring only.	Yes

Set Pump Time: This is an optional feature for vessels that have dual seawater intake pumps that are manually cycled. This feature sets the desired duration of time that Pump #1 or Pump #2 operates. The Pump Time can be set to 10 minutes or 1-hour intervals up to 24 hours, 48 hours, and 72 hours. Use the Up or Down arrow to select Pump Time.



Optimal Performance

Constant Chlorinated Seawater Flow: The ClearLine System should be powered ON and have seawater flowing through the ClearCell whenever possible. This provides the vessel's seawater circuit with constant chlorinated seawater to prevent unwanted marine growth. Intermittent or stagnant seawater that is not continuously electrochemically treated allows growth of marine microorganisms. Barnacles have the innate ability to close themselves off and survive intermittent exposure to biocidal agents:

- DO NOT turn off seawater pumps, air conditioners, or chillers for an extended period of time.

Inspect the vessel for problem areas:

- Pre-existing biofouling in seawater lines prior to ClearLine installation
- Clogged seawater strainers and intakes
- Impacted, blocked, or occluded lines from debris lodged in plumbing
- Sporadic demand valve areas (Depending on the system, valves that turn on and off can foster unwanted marine growth.)

Flow Alert

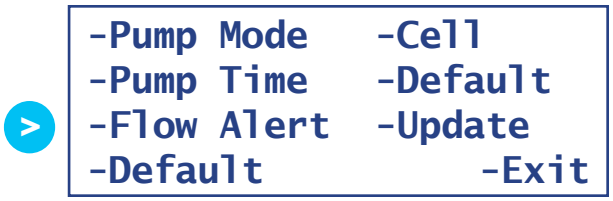
Flow Alert: The Flow Alert feature monitors seawater flow through the ClearCell. This feature allows the user to set a minimum flow rate threshold value and time duration. If the seawater flow rate drops below a minimum value for a period of time, "FLOW ALERT" will appear on the display (no audible alert). This feature notifies the user that some part of the seawater circuit, such as the intake, strainer, pump, or internal screen on the ClearCell, requires cleaning or is not functioning properly. Flow rate can be set in GPM or LPM, with the time duration set in minutes. To set the Flow Alert value, go to Menu, Flow Alert and enter the desired threshold flow rate and time duration for notification.

NOTICE **The Flow Alert feature is OFF by default and must be set up by the installer or end user.**

NOTICE **ClearLine will continue generating chlorine even after a Flow Alert occurs. Flow Alert does not prevent ClearLine from operating.**

If a Flow Alert occurs

1. Check vessel's strainers and intake grates for blockage.
2. Check seawater pump operation.
3. Check ClearCell Internal Screen (see pages 11-16).



Cell Indicator

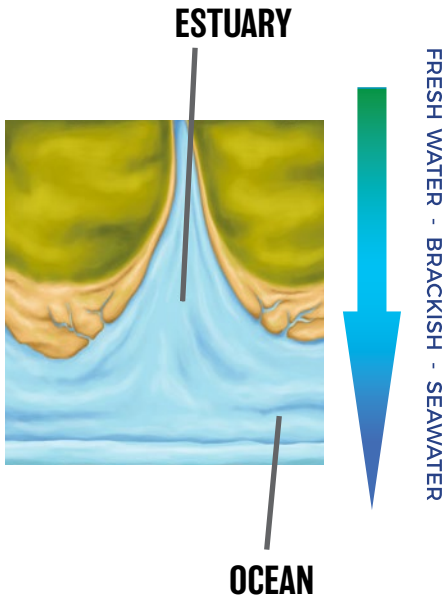
Cell Indicator: The Control Unit will display "SALINITY/CELL," "% OUTPUT," and illuminate the red Cell LED in various conditions. This is not an immediate cause for concern and may be temporary depending on seawater salinity level. ClearLine will continuously attempt to generate chlorine and automatically resume standard operation when conditions are resolved. The Cell Indicator will be illuminated if any of the following conditions occur for multiple consecutive days:

- Water salinity is below 20 parts per thousand. (This is the most common cause of a ClearLine Cell Indicator notice.)
- ClearCell Cable or its connectors have been compromised.
- ClearCell Electrode has excessive mud or other debris.
- ClearCell Electrode is at the end of its useful life.

Water Salinity

- Vessels often encounter brackish or fresh water when cruising inland or from extended storms and freshwater runoff.
- Low salinity is the most frequent cause of the ClearLine Cell Indicator.
- ClearLine will not display "CLEANING" or generate chlorine while the vessel is operating in fresh water.

  RESOLUTION: Return vessel to seawater with adequate salinity.



ClearCell Cable

- The ClearCell Cable and connections must not be spliced, cut, compromised, or damaged.
- Inspect the Control Unit-to-ClearCell Cable carefully. Look for any corrosion at the connectors.

  RESOLUTION: Replace the ClearCell Cable if it is compromised.

Excessive Mud or Other Debris

- If there is excessive mud or other debris, the ClearCell Electrode may require a brief rinse with fresh water.

  RESOLUTION: Follow instructions on pages 11-16.

ClearCell Electrode at End of Life

- When the ClearCell Electrode has reached the end of its useful life, it can no longer generate chlorine. The ClearCell Electrode life is dependent on flow rate, hours of use, seawater quality, and other factors. The ClearCell Electrode will be effective for many years before replacement is required.

  RESOLUTION: Contact your ElectroSea dealer.

ClearCell Internal Screen Care

Internal Screen: The ClearCell contains an internal screen to catch debris (tiny shells or other foreign materials that pass through the vessel's main strainer) before it reaches the flow sensor. The internal screen should be cleaned periodically and whenever debris gets caught in the screen and decreases seawater flow. Before accessing the ClearCell Electrode, double-check the list of Alerts and Indicators on pages 9 and 10 because the ClearCell infrequently requires rinsing.

NOTICE Low Salinity is the most frequent cause of a Cell Indicator notice. Do not open the ClearCell canister if you suspect the Cell Indicator notice is due to low salinity.

NOTICE

- **DO NOT PERFORM ACID DESCALING OF THE SEAWATER CIRCUIT AFTER THE CLEARLINE SYSTEM HAS BEEN INSTALLED.**
- **DESCALING ACIDS OR CLEANING CHEMICALS WILL DAMAGE THE CLEARCELL CANISTER AND CLEARCELL ELECTRODE AND VOID THE WARRANTY.**
- **DO NOT TOUCH THE CLEARCELL ELECTRODE PLATES OR USE ANY TYPE OF MECHANICAL BRUSH.**
- **THE CLEARCELL ELECTRODE PLATES CONTAIN A SPECIAL METAL OXIDE COATING THAT WILL BE PERMANENTLY DAMAGED IF YOU HANDLE IT.**

NOTICE **Low seawater flow may damage the cooling system and other components that depend on this water for proper operation. It is the owner's responsibility to monitor the vessel's seawater flow rate and perform any maintenance on the vessel's seawater pumps, strainers, and internal screen on the ClearCell.**

Spray screen with fresh water to remove debris.

ClearCell Internal Screen Access

Before accessing the ClearCell Electrode, double-check the list of Alerts and Indicators on pages 9 and 10 because the ClearCell infrequently requires rinsing.

To Access the ClearCell Electrode

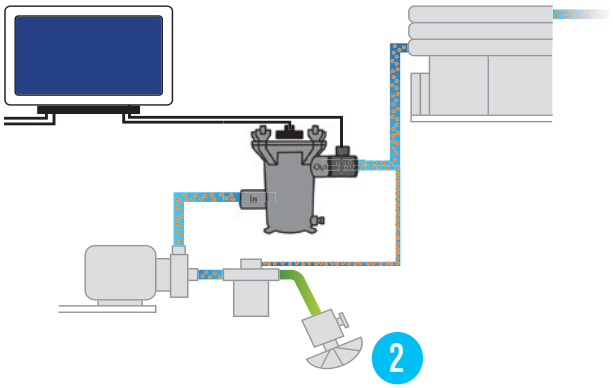
1. Power OFF the ClearLine Control Unit.
2. Turn OFF ALL seacock valves in the seawater circuit at or below the waterline. This includes any output seacocks to prevent back siphoning.

WARNING **Failure to turn OFF ALL seacock valves in the seawater circuit could result in sinking the vessel.**

3. Locate the 1' (30.5-cm) cable labeled "CELL" that is located at the top of the ClearCell unit. Disconnect this cable at the cable connector.

NOTICE **DO NOT UNSCREW THE TWO BLACK PLASTIC CAP NUTS ON TOP OF THE LID OR TITANIUM HARDWARE UNDER THE LID.**

1



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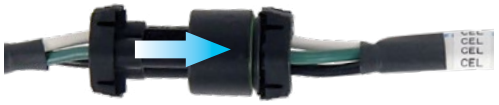
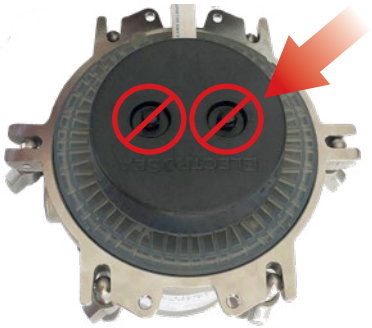
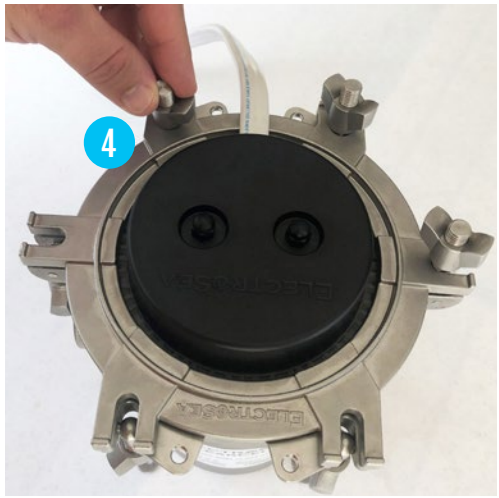


3

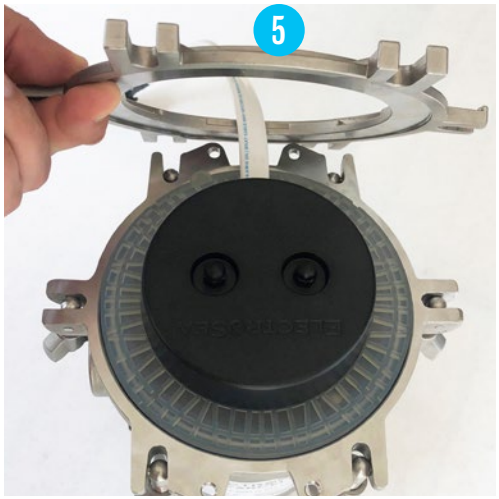
DO NOT UNSCREW PLASTIC CAP NUTS.



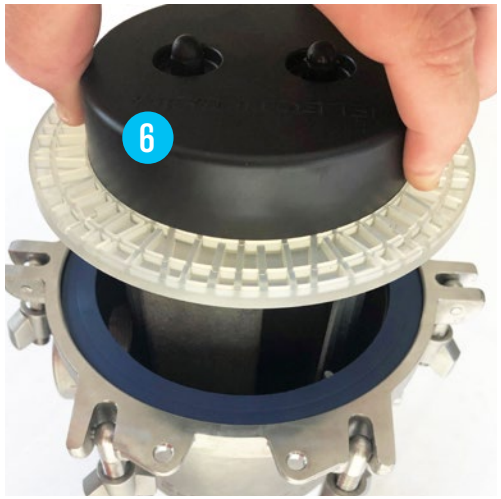
4. Remove the pressure ring by turning the wing nuts counterclockwise.



5. Remove the pressure ring.



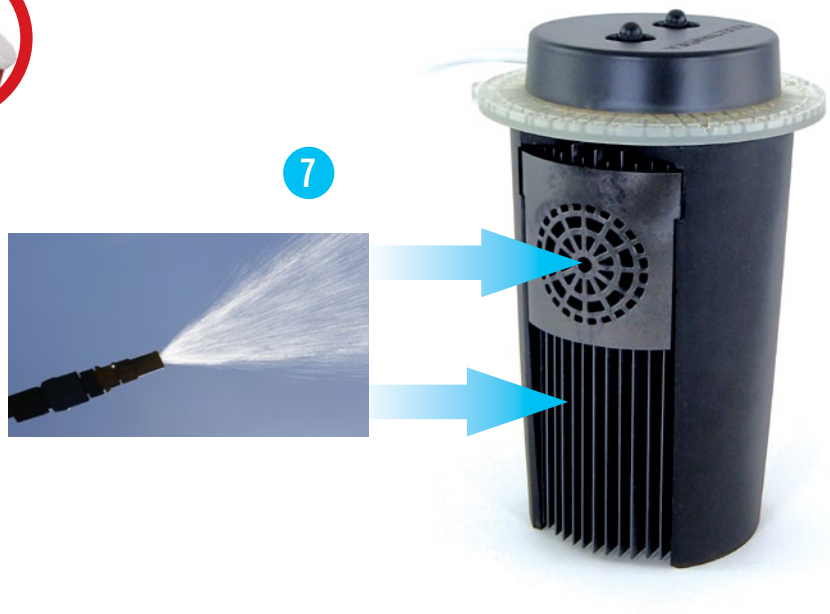
6. Remove the Electrode Assembly by lifting it straight up by the sides of the black plastic top. Do not lift or pull on the top cable connectors.



7. Spray the ClearCell Electrode Assembly with fresh water to remove any dirt or mud between the plates or debris in the internal screen.

NOTICE DO NOT TOUCH THE SURFACE BETWEEN THE ELECTRODE PLATES OR USE ANY TYPE OF MECHANICAL BRUSH. THE CLEARCELL ELECTRODE PLATES CONTAIN A SPECIAL METAL OXIDE COATING THAT WILL BE PERMANENTLY DAMAGED IF YOU HANDLE IT.

NOTICE DO NOT PUT ANY CHEMICALS, ACIDS, DESCALING SOLUTIONS, OR ZINCS IN THE CLEARCELL CANISTER OR ON THE ELECTRODES. THIS WILL DAMAGE THE ELECTRODE.

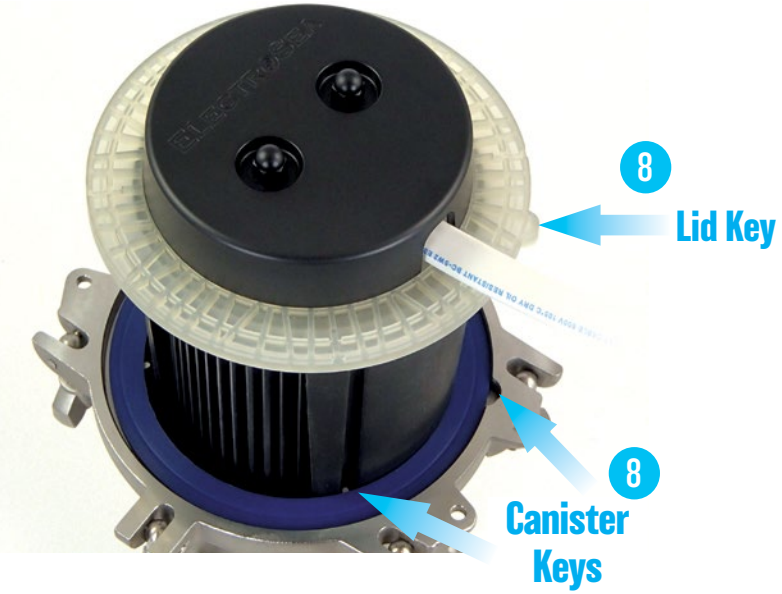


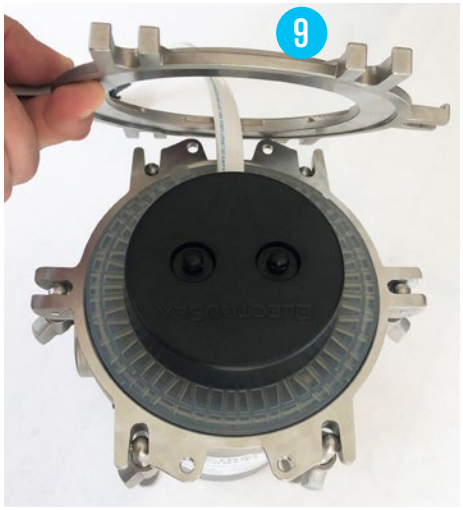
Spray plates and screen with fresh water.

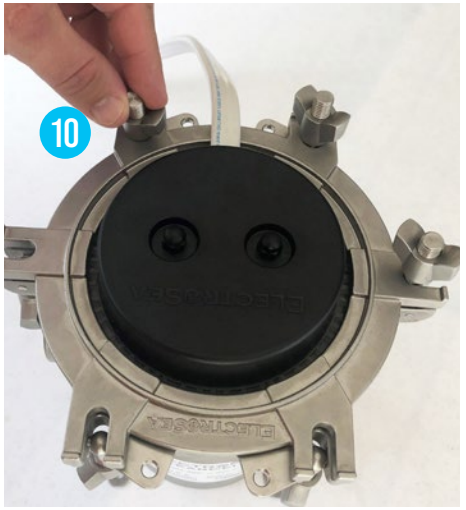
8. Insert the ClearCell Electrode Assembly back into ClearCell canister. The Electrode Assembly and Canister are keyed and can only be inserted in one direction. Align the Electrode Assembly key and the ClearCell canister key and insert it into the ClearCell canister.

9. Add the pressure ring and begin tightening down the wing nuts evenly. Bleed all air out of the ClearCell canister and then finish securing the wing nuts. DO NOT use any tools to perform this tightening process. Work in a star pattern so they are all evenly secure.

10. Double-check to ensure all fittings, hose clamps, and wing nuts are secure.



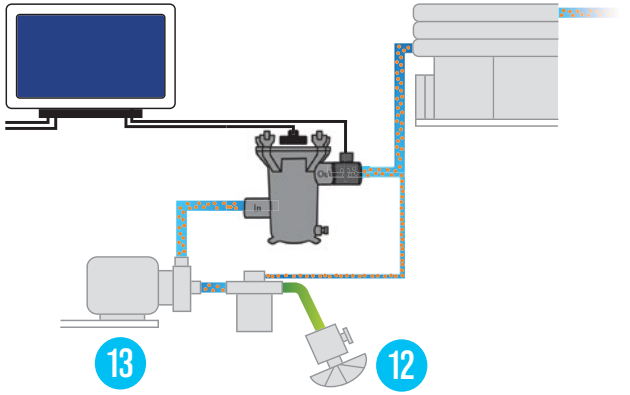




11. Reconnect the ClearCell Cable to the ClearLine Control Unit.

12. Open the seacocks and check for any leaks.

13. Turn the seawater intake pump on. The seawater intake pump must be on and pumping seawater at normal flow rates for the ClearLine System to operate.



NOTICE **Any air trapped in the ClearCell Canister must be bled out. Cycle the seawater intake pump and/or loosen the ClearCell Canister wing nuts to bleed out excess air, then re-tighten the ClearCell Canister.**

NOTICE **DO NOT restrict seawater flow to ClearCell Canister.**

14. Turn ON the ClearLine System. The ClearLine "CLEANING" LED should be illuminated in green, and the display should state it is in the Cleaning Mode.

15. If the Cell Indicator is still active, then one of the following conditions still persists:

- Water salinity is below 20 parts per thousand.
- ClearCell Cable or its connectors have been compromised.
- ClearCell Electrode has excessive mud or other debris.
- ClearCell Electrode is at the end of its useful life.

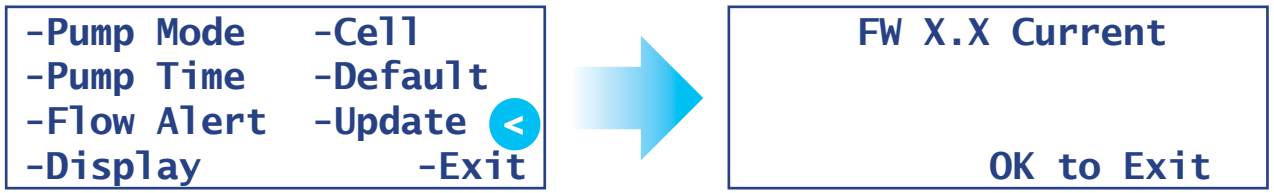
For further troubleshooting, see pages 10 or 20 or contact your ElectroSea dealer.

Factory Default and Firmware Updates

1. **Default:** This is the process to restore ClearLine to its original factory default settings. The user will press and hold the Up and Down arrows simultaneously for 10 seconds to restore factory default settings.

2. **Update:** This allows the user to update the firmware using a USB memory drive supplied by ElectroSea. To perform a firmware update
   a. Insert the ElectroSea USB memory drive.
   b. Go to the Update menu. Line 1 displays the current firmware version of the unit. Line 2 displays the available firmware version that is on the USB memory drive. It is possible to upgrade or downgrade the firmware version.
   c. Press and hold the Up and Down arrows simultaneously for 10 seconds, then release the arrows once the update begins.
   d. During the update, the Control Unit is in a locked mode and cannot be used. The bottom line of the display will show the update progress.
   e. Once the update is complete, the Control Unit will reboot.
   f. Confirm the update was successful by going back to the Update menu. The display will show that the FW X.X is up to date.

NOTICE **In the event that the firmware update fails, the Control Unit maintains a redundant copy of the existing firmware. The screen will display a result message at the end of an update attempt to confirm the update was successful. Repeat the steps above to retry the firmware update if necessary.**



Periodic Inspection

The ClearLine System should be viewed during regular inspection of the vessel's engine room. During normal operation, the ClearLine System status screen will flash the message "CLEANING," and the green LED will be illuminated. This indicates the ClearLine System is generating a safe and effective low level of chlorine preventing unwanted marine growth, barnacles, and biofilm in the seawater lines.

If there are any concerns during the regular inspection noted above, then perform a more thorough process:

- Visually inspect all wires and connections between the ClearLine Control Unit and the ClearCell.
- Disassemble the ClearCell and thoroughly flush and clean the internal screen. (See pages 11-16.)
- Visually inspect the Flow Sensor.
- Visually inspect seawater conduits to confirm marine growth prevention.

NOTICE **Inspection and maintenance are the responsibility of the vessel owner.**

Specifications

CLEARLINE SYSTEM

Power:	24 VDC
	7 amps max peak current
Normal Operating Flow:	18-50 GPM (68.1-189.3 LPM)
Maximum Pressure:	70 psi

CLEARLINE CONTROL UNIT

Size:	10.0 inches (25.4 cm) - width
	7.0 inches (17.8 cm) - height (without cables)
	3.25 inches (8.3 cm) - depth

CLEARCELL

Size:	10.2 inches (26 cm) - height
	8.4 inches (21.3 cm) - diameter/width

Modes, Descriptions and Actions

Mode	Description	Action
OFF	The unit is powered ON, but it is in the OFF state. No seawater is flowing through the ClearLine System.	This is a normal operating mode, provided there is no seawater flow.
Cleaning	The unit is in the mode for Cleaning and preventing biofouling by chlorinating seawater.	This is a normal operating mode. See page 6 for Cleaning Mode.
Auto	The unit is automatically optimizing the level of chlorinated seawater based on multiple input parameters, including flow rate, key electrical parameters, and environmental temperature.	This is a normal operating mode. See page 6 for Auto Mode.
Min Flow	The flow rate is 1-3 GPM (3.8-11.4 LPM) and is too low to chlorinate seawater.	The Min Flow indicator will disappear when the seawater flow rate is >4 GPM (15.1 LPM).
No Flow	The flow rate is 0 GPM.	The No Flow indicator will disappear when the seawater flow returns.
Inhibit	(1) 24-VDC or 12-VDC and/or (1) 240-VAC or 120-VAC input from a baitwell or reverse osmosis unit indicates that the ClearLine System should not generate chlorine.	This is a normal operating mode. See page 7 for Inhibit Mode.
Pump #1	Pump #1 is operating.	This is a normal operating mode. See pages 7-8 for Pump Modes.
Pump #2	Pump #2 is operating.	This is a normal operating mode. See pages 7-8 for Pump Modes.

Modes, Descriptions and Actions

Mode	Description	Action
Flow Alert	Flow Alert is a user-defined threshold value for visual alert and notification purposes. The user should manually set the desired Flow Alert value and time duration.	ClearLine will continue generating chlorine even after a Flow Alert occurs. Flow Alert does not prevent ClearLine from operating. **Note:** If the flow rate is less than or equal to 4 GPM (15.1 LPM), then a Min Flow alert will occur, and ClearLine will stop chlorinating seawater. If a Flow Alert occurs 1. Check vessel's strainers and intake grates for blockage. 2. Check seawater pump operation. 3. Check all other components in the seawater intake fluid path. 4. Check ClearCell Internal Screen and rinse according to instructions starting on page 11.
Cell Indicator	The Control Unit will display "SALINITY/CELL," "% OUTPUT," and illuminate the red Cell LED in various conditions. This is not an immediate cause for concern and may be temporary depending on seawater salinity level. ClearLine will continuously attempt to generate chlorine and automatically resume standard operation when conditions are resolved.	**Water Salinity** • Vessels often encounter brackish or fresh water when cruising inland or from storm runoff. • Low salinity is the most frequent cause of the ClearLine Cell Indicator. • ClearLine will not display "CLEANING" or generate chlorine while the vessel is operating in fresh water. **RESOLUTION: Return vessel to seawater with adequate salinity.** **ClearCell Cable** • The ClearCell Cable and connections must not be spliced, cut, compromised, or damaged. • Inspect the Control Unit-to-ClearCell Cable carefully. Look for any corrosion at the connectors. **RESOLUTION: Replace the ClearCell Cable if it is compromised.** **Excessive Mud or Other Debris** • If there is excessive mud or other debris, the ClearCell Electrode may require a brief rinse with fresh water. **RESOLUTION: Follow instructions on pages 11-16.** **ClearCell Electrode at End of Life** • When the ClearCell Electrode has reached the end of its useful life, it can no longer generate chlorine. The ClearCell Electrode life is dependent on flow rate, hours of use, seawater quality, and other factors. The ClearCell Electrode will be effective for many years before replacement is required. **RESOLUTION: Contact your ClearLine dealer or ElectroSea directly.**
High Temperature	ClearLine internal temperature is high.	Contact your ElectroSea dealer or ElectroSea directly as the ClearCell Electrode may be at the end of its useful life.

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