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**LIQUIDATOR® ELECTRONIC IONIZATION SYSTEM**

**MANUFACTURED BY:** LiquiTech, Inc. 421 Eisenhower Ln. S., Lombard IL 60148 (800) 635-7873

The **LIQUITECH®** electronic copper/silver ionization process is an effective method of controlling *Legionella* in domestic water distribution systems. Prevents, controls *Legionella pneumophila* in both hot and cold water. *Legionella* are killed rather than suppressed. The key to the system is the controlled release of copper and silver ions into the domestic water distribution system. It is this protection that makes the Liquidator® system superior. The entire **LIQUITECH®** electronic ionization system including control module, flow cell and interconnecting wire are ETL (UL-1081 and UL-508), and CSA C22.2 Nos. 14-95 and 108-M89 certified. **LIQUITECH®** products conform to the European Union EMC Directive 89/336/EEC and Low Voltage Directive 72/23/EEC & bear the CE Mark. All **LIQUITECH®** flow cell wetted parts are NSF Standard 61 approved. **LIQUITECH®** products are protected by U.S. Patent Nos. 6,126,820 and 6,325,944, and other pending patent applications. **LIQUITECH®** Copper-Silver Alloy electrodes and associated equipment comply with all conditions and requirements as contained in BRL K14010-2/01 (Assessment The Kiwa certificate with product certificate for *Legionella* with alternative Techniques, Part 2: Electrochemical Techniques: copper/silver and anodic oxidation). CTGB *Legionella* Control Certification Number 13431 N.

**ACTIVE INGREDIENTS**

**NET WEIGHT**

**KEEP OUT OF REACH OF CHILDREN**

COPPER (as metallic) ..... 70%  
SILVER (as metallic) ..... 30%

14 lbs      7 lbs      3 lbs  
○            ○            ○

**CAUTION**

See side panel for additional precautionary statements.

**DIRECTIONS FOR USE:** It is a violation of federal law to use this product in a manner inconsistent with its labeling. When used as directed, this device provides effective control of *Legionella pneumophila* (ATCC 33153) in commercial potable water supplies. This device consists of a flow cell containing copper and silver electrodes that releases copper and silver ions into the water when electrically stimulated by a companion electronic controller that continually senses water flow rate and consumption in the water system. See Operation and Installation Manual for additional use directions.

**PRECAUTIONARY STATEMENTS:** Do not allow contamination of water by cleaning of equipment or disposal of waste.

**STORAGE AND DISPOSAL: PESTICIDE STORAGE:** Store the flow cell in a cool, dry place away from children.

**PESTICIDE DISPOSAL:** Non-reusable product. When spent, do not attempt to disassemble, recharge, or refill flow cells. Return spent flow cells to LiquiTech, Inc. for reconditioning and recycling.

**WARRANTY:** The system is warranted for five years against defects in manufacturing, workmanship, and materials when installed and maintained in accordance with the manufacturer's recommendations.

**Only approved LIQUITECH® parts can be used in order not to void both LiquiTech warranty and EPA product registration required by law.**  
EPA Registration No. 68250-1 • EPA Establishment No. 068250-IL-001

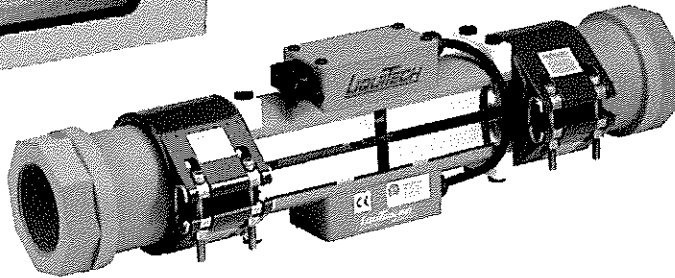
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# LIQUIDATOR® Electronic Ionization System

Operation and Installation Manual



**LIQUITECH® LIQUIDATOR®  
Series Electronic  
Controller Unit**



**LIQUITECH®  
Model QLTF Flow Cell**

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## **General Directions**

It is a violation of federal law to use this product in a manner inconsistent with its labeling.

Before using this product read the entire label and Operation and Instruction Manual.

The Liquidator® Electronic Ionization System uses a copper/silver ionization process to control *Legionella* (ATCC 33153) in domestic water distribution systems. This biocidal action is attributable to the positively charged copper and silver ions which form electrostatic bonds with negatively charged sites on the microorganism cells walls. These electrostatic bonds create stresses which in turn lead to distorted cell wall permeability, reducing the normal intake of life sustaining nutrients. The system maintains target levels of copper and silver below EPA allowable levels for drinking water.

## **Device Components**

The Liquidator® Electronic Ionization System consists of four basic components: Controller, Flow Cell, Flow Meter, and Remote Environmental Management System (REMS).

The Controller is a wall mounted, microprocessor-based device capable of controlling output current levels. The Controller applies a direct current across the Flow Cell's electrodes, stimulating the controlled release of ions. The Liquidator® Electronic Ionization System is designed to operate on either 100-120 VAC or 220-240 VAC, 50/60 Hz. The Controller incorporates a digital read out which displays current operating parameters and a keypad from which all system programming is performed. The Controller incorporates two fail-safe (energized) dry contact alarms. The alarm circuits will open when an alarm condition is detected or power is lost.

The Flow Cell is installed in the recirculation loop and houses the copper/silver electrodes which release ions into the water distribution systems. The Flow Cell is constructed from high temperature, high pressure, schedule 80 CPVC.

The Flow Meter detects the amount of hot water consumption. The current output of the Controller is automatically adjusted up or down based on the amount of water flowing through the Flow Meter.

The Remote Environmental Management System bi-directional communication collects, logs, and graphs important operational data as well as providing "Alarm" notifications of malfunctions which can be corrected remotely.

## Installation

The Liquidator® Electronic Ionization System is compatible with most building management systems and is equipped with remote internet Management and control capabilities. This device effectively controls *Legionella* (ATCC 33153) with an absolute minimum of attention and maintenance. See the equipment sizing table below to determine unit model number.

Flow Rate GPM	Max 75% - 80%	PPM Copper
2	S50	.56
5	S100	.44
9	S150	.41
17	S300	.41
25	S500	.45
45	S750	.40
60	S1000	.4

The Controller should be installed in an indoor, sheltered area away from direct sources of heat, sunlight and moisture. Power should be supplied to the controller using an electrical circuit with sufficient amperage to accommodate the system's peak current draw. The system can be programmed to automatically change output current on different days and time periods.

The Controller also automatically adjusts the output voltage from 0 to 100 volts DC to compensate for changes in water conductivity and flow cell electrode condition to maintain consistent copper/silver ion levels.

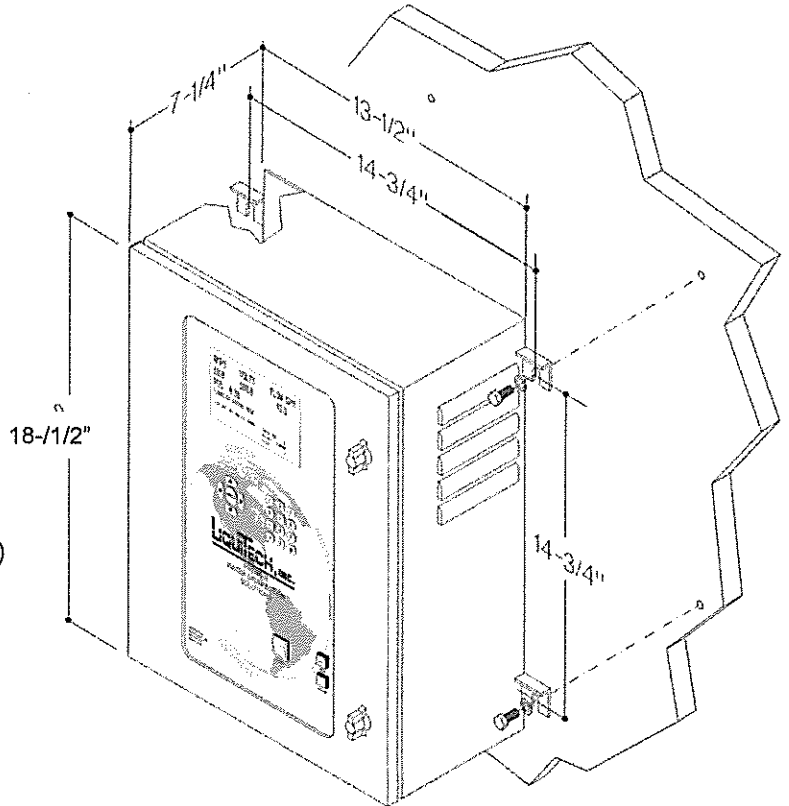
Enclosure: Metal powder-coated cabinet with 3/16 inch tempered glass inset on door. Meets NEMA 12 requirements.

Operating Temp.: 32° to 131°F (0° to 55°C).

Operating Humidity: 5 to 90% RH, non-condensing.

Signal Outputs: 4-20 mA analog output (current);  
4-20 mA analog output (voltage);  
4-20 mA analog output (flowmeter);  
4-20 mA analog output  
Two dry contact alarms (Alarm 1 and Alarm 2)

Signal Inputs: 4-20 mA analog output (remote control)  
4-20 mA analog output (unassigned)  
4-20 mA analog input (flowmeter);  
4-20 mA analog input  
Flow switch

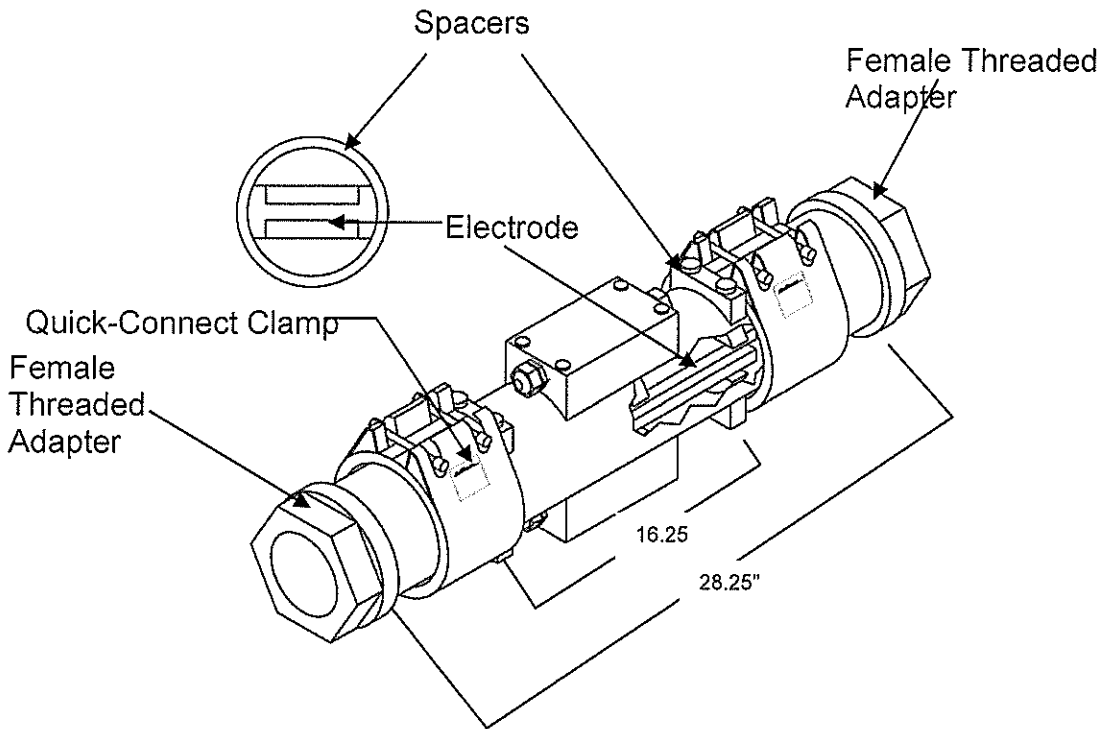


Electrical Data: 120/240 VAC, 50/60 Hz., single-phase; factory configured. DC output voltage for all models is 0 to 100 volts (self-adjusting).

(H x W X D)

Model	AC Power	Current Draw Holes	DC Output	Weight	Cabinet	Mounting
S1000	120 VAC	16 amps	10.0 amps	58 lbs.	18.5 x 13.5 x 7.25"	14.75 x 14.75"
	240 VAC	8 amps	10.0 amps			
S750	120 VAC	16 amps	7.5 amps	58 lbs.	18.5 x 13.5 x 7.25"	14.75 x 14.75"
	240 VAC	8 amps	7.5 amps			
S500	120 VAC	8 amps	5.0 amps	55 lbs.	18.5 x 13.5 x 7.25"	14.75 x 14.75"
	240 VAC	4 amps	5.0 amps			
S300	120 VAC	8 amps	3.0 amps	51 lbs.	18.5 x 13.5 x 7.25"	14.75 x 14.75"
	240 VAC	4 amps	3.0 amps			
S150	120 VAC	3 amps	1.5 amps	24 lbs.	15.0 x 12.5 x 6.25"	11.25 x 13.75"
	240 VAC	1.5 amps	1.5 amps			
S100	120 VAC	3 amps	1.0 amps	24 lbs.	15.0 x 12.5 x 6.25"	11.25 x 13.75"
	240 VAC	1.5 amps	1.0 amps			
S50	120 VAC	3 amps	0.5 amps	24 lbs.	15.0 x 12.5 x 6.25"	11.25 x 13.75"
	240 VAC	1.5 amps	0.5 amps			

The Flow Cell is easy and inexpensive to install on existing plumbing systems. The Controller applies a direct current across the Flow Cell's electrodes, stimulating the controlled release of copper and silver ions into the domestic water distribution system. The Flow Cell features a quick-connect clamp which simplifies Flow Cell removal for inspection and cleaning.



Model:	<u>QF14-4/4</u>	<u>QF7-4/4</u>
Cell Length:	16.25"	12.25"
Overall Length:	28.25"	24.25"
Cell Diameter (ID):	4"	4"
Threaded Adapter:	3"	3"
Electrodes:	2	2
Electrode Length:	14"	7"
Cell Weight:	24 lbs.	14 lbs.
Overall Weight:	39 lbs.	30 lbs.
Working Pressure:		
	@ 120°F	208 PSI
	@ 150°F	150 PSI
	@ 180°F	80 PSI

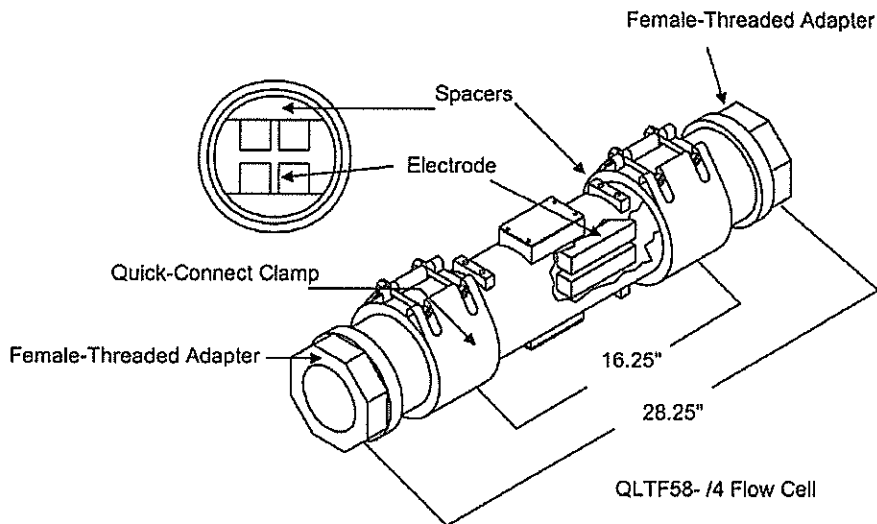
Materials: Schedule 80 CPVC (all models)

Connection: Quick-connect, powder-coated 304 stainless steel clamp connections standard. Must be tightened to torque of 10 ft. lbs.; torque wrench and 6 mm hex bit provided

Model:	<u>QLTF58- /4</u>	<u>QLTF5- /4</u>	<u>QLTF54- /3</u>	<u>QLTF42- /3</u>	<u>QLTF4- /3</u>
Cell Length:	16.25"	12.25"	18.5"	11.625"	7.0"
Overall Length:	28.25"	24.25"	29.5"	22.625"	18"
Cell Diameter (ID):	4"	4"	3"	3"	3"
Threaded Adapter:	3"	3"	2"	2"	2"
Electrodes:	8	4	4	2	2
Electrode Length:	7"	7"	7"	7"	3.5"
Cell Weight:	26.0 lbs.	15.0 lbs.	15.5 lbs.	8.0 lbs.	4.5 lbs.
Overall Weight:	37.0 lbs.	26.0 lbs.	22.5 lbs.	15.0 lbs.	11.5 lbs.
Working Pressure:					
@ 120°F	208 PSI	208 PSI	240 PSI	240 PSI	240 PSI
@ 150°F	150 PSI	150 PSI	173 PSI	173 PSI	173 PSI
@ 180°F	80 PSI	80 PSI	92 PSI	92 PSI	92 PSI

Materials: Schedule 80 CPVC (all models)

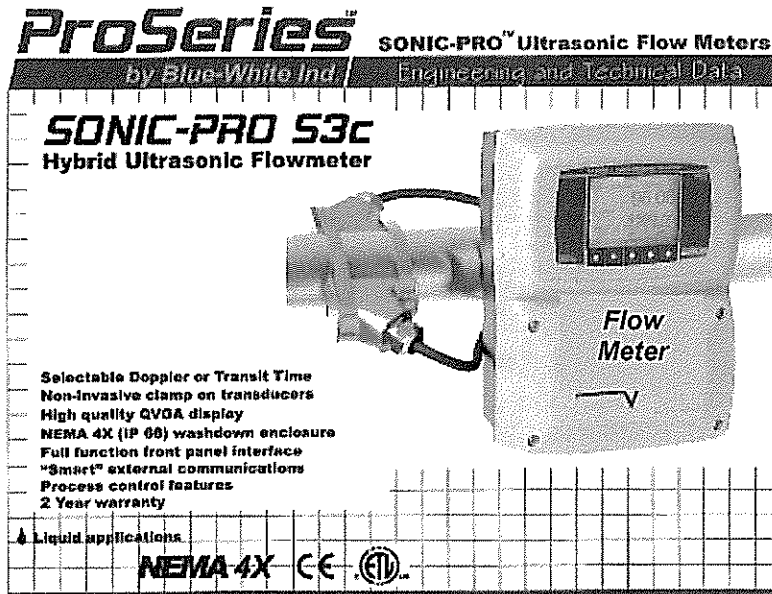
Connection: Quick-connect, powder-coated 304 stainless steel clamp connections standard. Must be tightened to torque of 10 ft. lbs.; torque wrench and 6 mm hex bit provided.



\* LIQUITECH<sup>®</sup> products are protected by U.S. Patent Nos. 6,126,820 and 6,325,944, and other pending patent applications.



The Flow Meter contains a "Closed Loop Proportional Control" which is capable of adjusting itself to produce the precise amount of ionization needed and ensures no under or over ionization.



## Copper Testing

### *Weekly Copper Testing*

Once the Liquidator® Electronic Ionization System has been fully commissioned, the level of copper in the water at designated sample sites before peak water consumption has begun should have a targeted level of 0.4 PPM copper, resulting in a target level of 40 PPB silver. These levels are optimal for controlling *Legionella* (ATCC 33153).

The actual copper to silver ratio may vary depending on electrode composition, water chemistry, ambient or transient copper in the water supply, and other conditions. To ensure that proper copper levels are being maintained, the water should be tested at least once each week, preferably early in the morning before water consumption has begun. A log sheet is provided in the back of this manual to help you track and record test results.

### *Testing Copper Levels*

A Copper Test Kit is supplied with each Liquidator® Electronic Ionization System. The kit is designed to measure copper levels between 0 and 5.0 PPM (parts-per-million).

#### Testing Tips

- Samples should always be collected in a clean glass or polyethylene bottle.
- Samples should be analyzed as soon as possible after collection.
- Discard tubes that are badly scratched.
- Observe the one year shelf life recommendations for the testing reagent (see *Copper Reagent Shelf Life* section below).

- Protect the reagent and other test kit components from sunlight, extreme heat, and extreme cold. The entire kit is best stored in a drawer or cabinet at normal room temperature (65° to 75°F).
- Never put wet tubes in the colorimeter.

#### Testing

1. Collect a 50 ml sample in the Water Sample Collecting Bottle.
2. Rinse a Colorimeter Tube with sample water.
3. Fill the rinsed Colorimeter Tube to the 10 ml line with the sample water. Cap and wipe dry.
4. Insert the filled Colorimeter Tube into the Colorimeter's light chamber, being sure to align the index line with the arrow on the meter. Close the lid. This tube is the blank zero.
5. Push the "Read" button to turn the meter on. Press the "Zero" button and hold it for two seconds until "bLA" is displayed. Release the button to take a zero reading (0 PPM)
6. Remove the Colorimeter Tube and add 5 drops of Copper Reagent.
7. Cap the tube and invert to mix. Wipe tube dry.
8. Insert the Colorimeter Tube into the Colorimeter's light chamber, being sure to align the index line with the arrow on the meter. Close the lid.
9. Push the "Read" button. Record the results as PPM copper on the log sheet.

➔ **NOTE:** *If the test reading displays Er2, copper levels are above 5 PPM. Repeat the procedure on a diluted sample and multiply the result by the appropriate dilution factor. See the DC-1200 Colorimeter Instruction Manual for more information.*

#### Copper Reagent Shelf Life

The Copper Reagent supplied with your test kit has a shelf life of approximately one year. You can determine the production date of the reagent by looking at the six digit lot number on the label of the bottle. The first two numbers are the week of production; the third number year of production.

- ➔ **EXAMPLE:** *Lot #457126 has a production date of the 45<sup>th</sup> week ("45") and a production year of 2007 ("7"). Therefore, the reagent should be used by the 45<sup>th</sup> week of 2008 (approximately November 2008)*
- ➔ **IMPORTANT:** *There are no visible indications when the reagent gets too old or has deteriorated. However, test results using reagent that is past the recommended shelf life may show a lower copper level than is actually present.*

## Troubleshooting

The following table summarizes the symptoms and causes of common operational problems, along with the action necessary to correct the situation.

<b>Problem/Symptom</b>	<b>Cause</b>	<b>Corrective Action</b>
Alarm: Open Circuit appears on display, Alarm 2 activated.	Circuit to flow cell open.  Blown fuse.	Check for loose or broken connections; correct as required and reset alarm.  Replace fuse as required and reset alarm.
Alarm: Short Circuit appears on display, Alarm 1 activated.	Electrodes shorting due excessive scaling or debris in Flow Cell.  Short at electrode terminal on Flow Cell.	Clean Flow Cell as required.  Determine cause of short; correct as required.
Alarm: High Voltage appears on display, Alarm 1 activated.	System voltage has exceeded setpoint.	Increase alarm setpoint as required.  Check electrodes for excessive scaling; clean as required.  Check electrodes for excessive wear; replace Flow Cell as required.
Alarm: Flowmeter appears on display, Alarm 2 activated.	No change in flow for programmed period.	Check for proper flow; restore flow or replace flowmeter as required.
Error: To: IO Board Com appears on display, Alarm 2 activated.	Main computer cannot establish communication with IO board.	Consult factory.
Error: To: Power Board Com appears on display, Alarm 2 activated.	Main computer cannot establish communication with power board.	Consult factory.
System can't achieve or maintain desired amperage.	Excessive scaling on electrodes. Excessive electrode wear.	Clean as required. Replace flow cell as required.
System can't achieve or maintain desired copper concentration level.	Copper setpoint too low. High water usage. Excessive scaling on electrodes. Excessive electrode wear.	Increase copper setpoint. Adjust system as required. Clean as required. Replace flow cell as required.
Display blank, power lamp off, Alarms 1 and 2 activated.	Loss of power.	Restore power.
Time/date setup screen appears when system is powered up	Dead or faulty battery	Replace battery, reset date/time, and restart system.