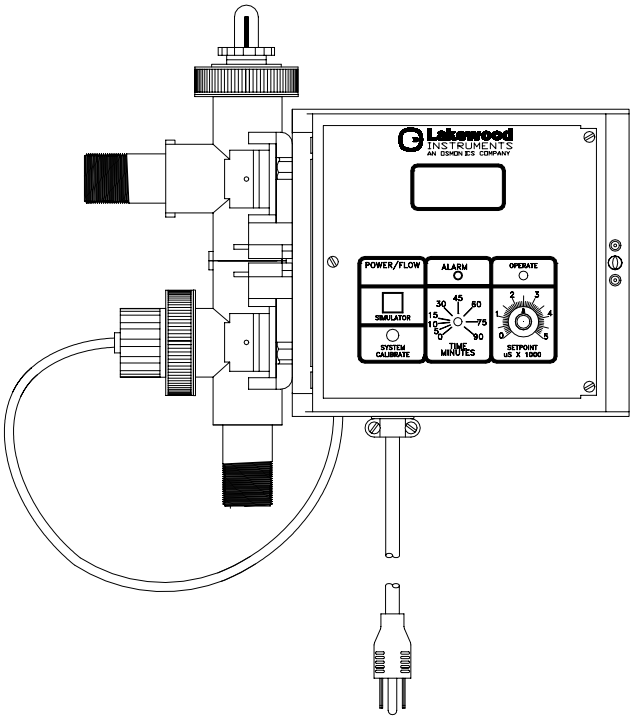
LAKEWOOD INSTRUMENTS
MODEL 101 SERIES

COOLING TOWER CONDUCTIVITY CONTROLLERS

INSTALLATION & OPERATION MANUAL

SERIAL #:_____



Model 161-FS

Lakewood Instruments
7838 North Faulkner Road, Milwaukee, WI 53224 USA
Phone (800) 228-0839 • Fax (414) 355-3508
h t t p : / / w w w . l a k e w o o d i n s t r u m e n t s . c o m

IMPORTANT NOTICE

CAUTION: CHEMICAL FEED

All electromechanical devices are subject to failure from a variety of causes. These include mechanical stress, component degradation, electromagnetic fields, mishandling, improper setup, physical abuse, chemical abuse, improper installation, improper power feeds and exposure.

While every precaution is taken to insure proper functioning, extra precautions should be taken to limit the ability of over-feeding by limiting chemical quantities available, secondary shut-downs, alarms and redundancy or other available methods.

CAUTION: POWER SOURCE AND WIRING

Low voltage wiring and high voltage (110 plus) should not be run in the same conduit. Always run separately. Even shielded low voltage is not a guarantee of isolation.

Every precaution should be taken to insure proper grounding and elimination of shorting or Electromagnetic field (EMF) interference.

CAUTION: ELECTRICAL SHOCK

To reduce the risk of electrical shock, this equipment has a grounding-type plug that has a third (grounding) pin. This plug will only fit into a grounding-type outlet. If the plug does not fit into the outlet, contact a qualified electrician to install the proper outlet. ***DO NOT*** change the plug in any way.

Lakewood Instruments

Congratulations on your purchase of a Lakewood Instruments controller. We would like to take this opportunity to welcome you to the Lakewood Instruments product family.

With proper care and maintenance, your controller should give you many years of trouble-free service. Please take the time to read and understand the operation manual, paying special attention to the sections on **INSTALLATION** and **MAINTENANCE**.

If, in the future, any parts or repairs are required, we strongly recommend that only original replacement parts be used. Our Customer Service Department would be happy to assist you with your parts or service requests.

We thank you for your selection and purchase of a Lakewood Instruments product.

MODEL 101 SERIES

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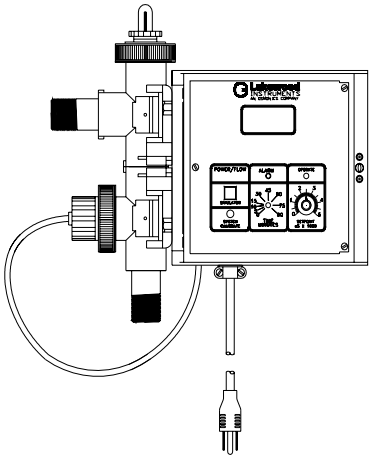
COOLING TOWER CONDUCTIVITY CONTROLLERS



Model 161-FS

The Model 101 Series are basic bleed-and-feed cooling tower controllers. These controllers are also ideal for closed-loop systems when configured with reverse setpoint. The basic units are available with digital displays and chemical feed limit timers. Other options are flow switches, custom ranges and more. All 101 Series Controllers have a simulator button for testing the sensor input. Four models of conductivity controller are covered in this manual. Basic features are listed below.

101 Conductivity controller with sensor, plumbing, power cord and outlets. No display. Configurable for reverse setpoint. UL Listed. Range: 0-5,000 µS.

111 Conductivity controller with sensor, plumbing, power cord, outlets and a digital display. Configurable for reverse setpoint. UL Listed. Range: 0-5,000 µS..

151 Conductivity controller with 90-minute chemical feed limit timer, sensor, plumbing, power cord and outlets. Configurable for reverse setpoint. No display. UL Listed. Range: 0-5,000 µS.

161 Conductivity controller with 90-minute chemical feed limit timer, sensor, plumbing, power cord outlets and digital display. Configurable for reverse setpoint. UL Listed. Range: 0-5,000 µS.

Features, Benefits, Specifications

A conductivity controller monitors the electrical conductance of the cooling water. If the conductivity of the cooling water exceeds the front panel set point, the controller activates a "blowdown" process. During blowdown, some of the highly conductive water is released and chemicals are added to the tower water. On some models, an alarm timer limits potential chemical overfeed if blowdown fails.

As the tower water level drops during blowdown, fresh make-up water flows into the tower and dilutes the concentrated cooling tower water. When the conductivity level falls below the setpoint, the controller shuts down the blowdown process.

SPECIFICATIONS

Inputs		**Controller**	
Power	120 VAC 120/240 VAC w/-WP	Conductivity Range	0-5,000 (standard), 0-250 or 0-500 or 0-1000
Sensor	2 electrode Conductivity		or 0-2,500 or 0-10,000 µS
Flow switch	Dry contact		(optional)
Outputs		Accuracy	± 50 µS
Relays	3 Amps @ 120 VAC	Resolution	10 µS
0-1 mA	Non-isolated	Deadband	Adjustable
4-20 mA	Isolated, internal power w/-35	Setpoint	Direct or Reverse (configurable in field)
Plumbing		Ambient Temperature	32-158°F (0-70°C)
Pressure	140 psi (9.7 bar) @ 100°F (38°C)	Electrical Rating	UL Listed
		Enclosure Rating	ABS Plastic
Max. Temperature	140°F (60°C)		
Min. Flow	1 gpm		

Ordering Information

ADDITIONAL SENSOR ASSEMBLY OPTIONS (optional, select one only)

-FS	Flow switch and flow sight with check valve.
-RSFS	Remote conductivity sensor, sensor tee, flow switch and 20 ft cable.
-RS	Remote conductivity sensor, sensor tee and 20 ft cable. Flow switch not included.
-RB2S	48 inch PVC 2-electrode sensor with 20 ft cable. For submersion applications.

CUSTOM RANGE OPTIONS (optional, select one only)

-CR1	0-10 range front panel, conductivity range: 0-10,000 µS.
-CR2	0-25 range front panel, conductivity range: 0-2,500 µS.
-CR10	0-10 range front panel, conductivity range: 0-1000µS.
-CR20	0-25 range front panel, conductivity range: 0-250µS.
-CR30	0-5 range front panel, conductivity range: 0-500µS.

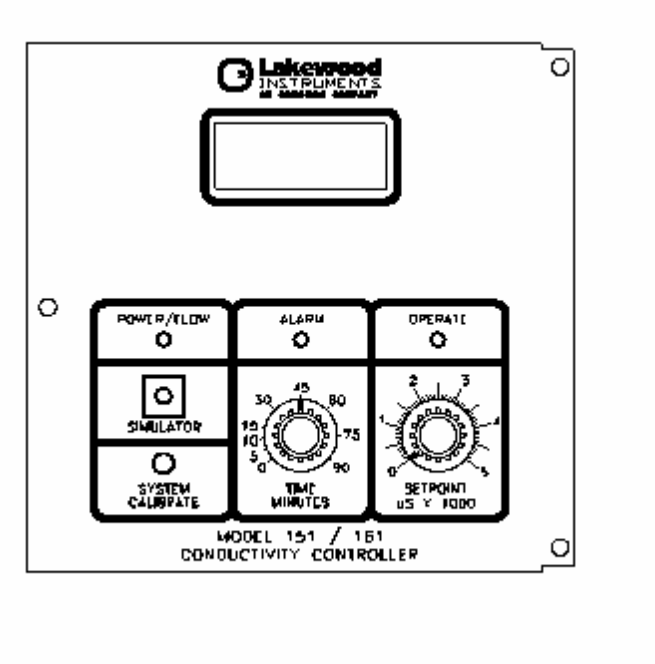
ENCLOSURE OPTIONS (optional)

-WP	Watertight enclosure with 120/240 VAC 50/60 Hz power switch. ½ inch conduit knockouts. No outlets or power cord.

PLUG-IN OUTPUT OPTIONS (optional)

-35	Isolated 4-20 mA output for conductivity remote data acquisition.

Front Panel Controls



Generic Model 101 Series Front Panel

The Model 101 Series controllers feature up to three front panel lights, three adjustment controls, a simulator button, and an optional flow switch.

- The **POWER** light is ON when there is power to the controller. Units with the -FS option will indicate FLOW rather than POWER.
- The **OPERATE** light is ON when the conductivity exceeds the front panel set point and blowdown results.
- On Models 151 and 161, the **ALARM** light is ON when the controller has not satisfied the conductivity setpoint due to blowdown failure. The chemical pump will shut off to prevent chemical overfeed.
- The **SETPOINT** adjustment establishes the desired level of conductivity to be maintained. When the conductivity level exceeds the setpoint, blowdown occurs. Once the setpoint level is achieved, the controller shuts down the blowdown process. Consult with your Water Treatment Engineer to establish the proper setpoint for your system.
- The **CALIBRATION** adjustment allows you to calibrate the controller to match the actual cooling water conductivity.

- The **ALARM TIMER** (Models 151 and 161 only) can be set between 5 and 90 minutes. To prevent chemical overfeed, the alarm timer shuts down the chemical pump if the conductivity setpoint cannot be achieved within the set time limit. If the blowdown valve does not open due to an obstruction or faulty solenoid, a controller without an alarm timer continues to pump chemical trying to reach the conductivity setpoint. As a result, the pump drains the chemical drum, wasting expensive chemicals.

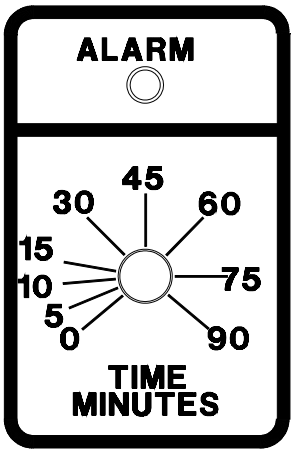
  The alarm timer limits the amount of time that chemical is fed. Simply put, if the alarm times out, the chemical pump shuts off.

  In normal operation, when the setpoint is achieved the blowdown valve closes, the chemical pump turns off, the OPERATE light goes off, and the alarm timer is automatically reset for the next blowdown process.

  An alarm output is also available to activate an alarm horn or bell. Refer to the electrical drawings in the back of this manual for wiring instructions. Wire the alarm device between Terminal TA8 for the alarm output (120 VAC or 240 VAC) and either Terminal TA4 or 5 for the neutral (ACC).

  Do not use the alarm timer to limit the chemical feed when the unit is normally operating. This will actually prevent the controller from holding the proper chemical residual with changing loads.

<u>NOTE</u>: ONLY USE THE ALARM TIMER TO LIMIT CHEMICAL OVERFEED IF THE BLOWDOWN VALVE DOES NOT FUNCTION PROPERLY.



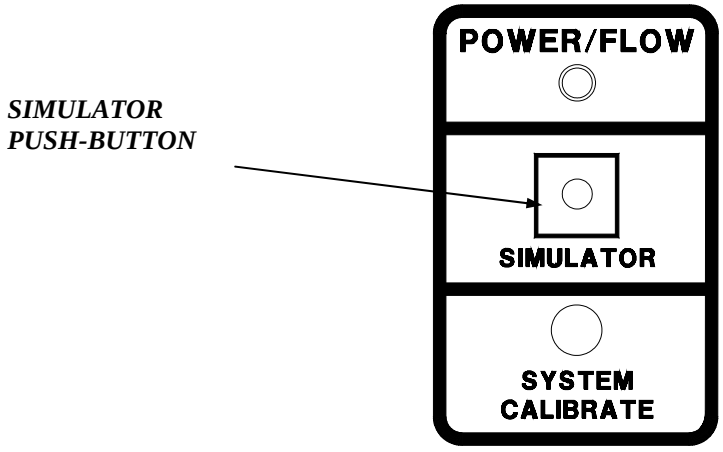
The 100 series controller comes equipped with a conductivity **Simulator**. The **Simulator** button (see below) can be used to provide a quick check of the circuit integrity when the controller will not calibrate properly.

When the simulator button is pushed, a fixed resistance value is substituted for the sensor and the indicated reading should be able to be adjusted, using the system calibrate screw, to read 2500uS. Normally, the system calibrate screw will be pointing almost straight up when the simulator button is pushed and the reading indicated on the controller is 2500uS.

If the controller reading cannot be adjusted to read 2500uS using the simulator button and system calibrate screw, then the circuit integrity is suspect. Contact technical support for assistance.

If the controller reading can be adjusted to read 2500uS using the simulator button and system calibrate screw, then the sensor is suspect. Refer to the maintenance section of this manual for sensor maintenance. If, after performing the sensor maintenance, the controller still will not calibrate, replace the sensor.

NOTE: The conductivity Simulator should not be used for calibration purposes. It is intended as a troubleshooting tool only.



Checking

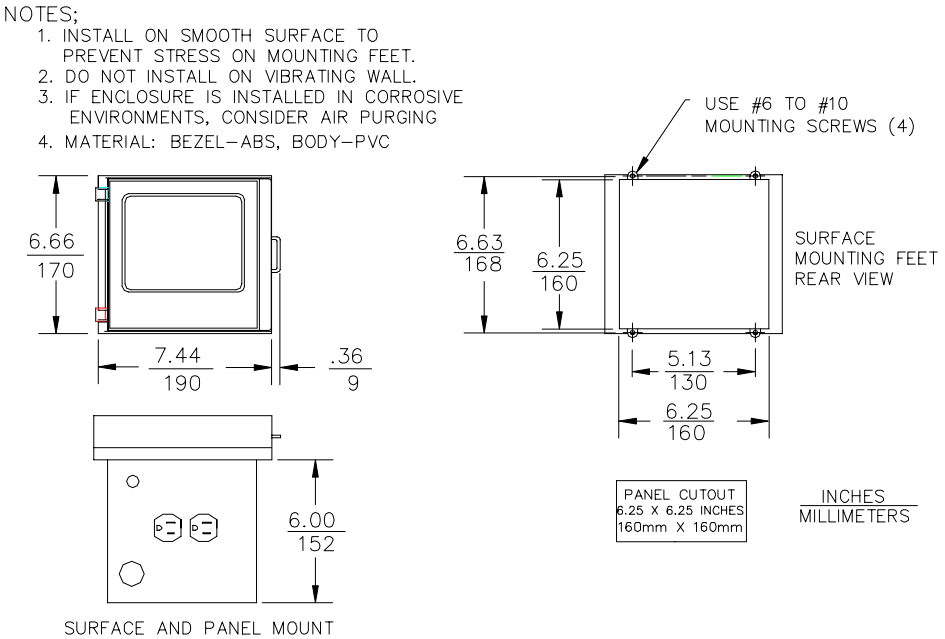
- Inspect the shipping carton for any obvious external damage. Note on the carrier's Bill of Lading the extent of the damage and/or notify the carrier.
- Save the shipping carton until the controller is started up. If there was shipping damage, return the controller to the factory in the original carton (refer to the Technical Service/Return Material Procedure section for more information).

Mounting

- Mount the controller or prefabricated system on a FLAT, NON-VIBRATING wall.
- Avoid drilling or punching additional holes in the controller enclosure. Stray metal chips can ruin the circuit board components.
- Use #6 or #8 bolts/screws/studs.
- Do not over-tighten. Snug is enough.

<u>CAUTION</u>: FOR MODELS WITH AN LCD, THE UNIT SHOULD NOT BE MOUNTED IN DIRECT SUNLIGHT. EXCESSIVE HEAT AND DIRECT SUNLIGHT EXPOSURE WILL EVENTUALLY DARKEN THE LCD MAKING IT IMPOSSIBLE TO READ. IT MAY ALSO SHORTEN THE LIFE OF OTHER ELECTRICAL COMPONENTS.

Outline and Dimensions



SETUP AND CALIBRATION

Start Up

- Check the power wiring. Make sure that the controller is powered from 115 VAC, unless it is specifically setup for 230 VAC.
- If you do not have the -FS option, make sure that you wire the power to the controller so that it turns off whenever the cooling system turns off.
- Check the wiring to the blowdown solenoid valve. Make sure that the solenoid is plugged into the BLEED OFF outlet on the bottom of the controller or wired internally through the conduit knockouts to the VALVE OPEN terminal lug.

WARNING: IF THE SOLENOID IS WIRED INTO THE CHEM PUMP OUTLET ON A MODEL 151/161, THE ALARM TIMER WILL SHUT OFF THE BLOWDOWN VALVE (BLEED VALVE) INSTEAD OF THE CHEMICAL PUMP AND YOU WILL EMPTY A DRUM OF CHEMICAL INTO THE COOLING WATER.

- Make sure that the controller plumbing has been done according to the suggested installation drawing (refer to the drawing section in the back of this manual).
- Check for proper flow direction.
- Check the chemical pump fittings. Make sure they are well secured, but not too tight.
- After you turn the inlet flow on, check the plumbing for leaks.

WARNING: MAKE SURE THAT THE RED LOCK RING(S) ON THE CONTROLLER (TWO ON THE -FS OPTION) ARE SECURED BEFORE TURNING ON THE SAMPLE LINE FLOW. YOU MAY DAMAGE THE FLOWSIGHT ASSEMBLY, SENSOR, AND THE CONTROLLER IF THEY ARE NOT SECURELY LOCKED.

Flow Switch Option

- The **FLOW SWITCH** (-FS OPTION) available for all models. The FLOW SWITCH shuts off all outputs if the sample line inlet flow stops. This prevents the controller from operating when the cooling system is shut down.
- A controller with the -FS option is equipped with a built-in back check valve that limits reverse flow. If the inlet flow is stopped, the back check valve protects the flow switch and the conductivity electrodes from any chemicals that were injected downstream.
- About 1 gpm is needed to raise the float. While minimal flow elevates the float in the flowsight, it is best if the float is fully raised. The float has a magnet that closes a reed switch when the float rises allowing normal operation. (Refer to the Maintenance section of this manual for removal and cleaning instructions.)
- If you have the -FS option, turn on the water flow and make sure the float rises in the flowsight. Turn the sample line inlet flow OFF again and the float should drop. When the float drops the BLEED OFF and INH PUMP outlets should be inoperative.
- Turn the inlet flow back ON for the rest of the setup.

Calibration

You have several optional methods for calibrating your controller. Read through the following methods and select the process that is best suited for your situation.

Use a Hand-held Conductivity Meter (Models 101 and 151)

You can use a properly calibrated hand-held conductivity meter, such as a Myron-L unit, or other similar meters. Take a sample of cooling tower water. If you have one, use a sample valve spout to get the water directly from the inlet flow line. Let the water run for a few seconds to get a good sample. For the example below, the conductivity level used is 2500 µS.

- Measure the water conductivity level with the meter. Make careful note of the level.
- Turn the controller setpoint dial to read the same as the hand-held meter. The setpoint should be at 2.5, which is 2500 µS.
- Turn the conductivity CALIBRATE screw on the front panel very slowly until the OPERATE light comes on.
- You can verify that the calibration is correct by turning the setpoint dial knob very slowly to 2600 µS and then back to 2400 µS to make sure the OPERATE light goes OFF at 2600 and is ON at 2400 µS.

NOTE: SOME HAND-HELD CONDUCTIVITY METERS READ IN PARTS PER MILLION (PPM) OF TOTAL DISSOLVED SOLIDS. IT IS OKAY TO CALIBRATE THE CONDUCTIVITY INSTRUMENT IN PPM INSTEAD OF µS. (REFER TO THE TABLE ON THE NEXT PAGE FOR CONVERSION OF PPM TO µS EQUIVALENTS.)

Use a Hand-held Conductivity Meter (Models 111 and 161)

You can use a properly calibrated hand-held conductivity meter, such as a Myron-L unit, or other similar meters. Take a sample of cooling tower water. If you have one, use a sample valve spout to get the water directly from the inlet flow line. Let the water run for a few seconds to get a good sample.

- Measure the water conductivity level with the meter. Make careful note of the level.
- Turn the conductivity calibrate screw on the front panel until the display matches the hand-held conductivity meter.

Use the Simulator (Resistor Simulation)

- Turn the SETPOINT dial to 2500 µS.
- Press the SIMULATOR push-button.
- On the 101/151, slowly adjust the CALIBRATE screw until the OPERATE light just comes on.
- On the 111/161, slowly adjust the CALIBRATE screw until the display reads 2500.
- Verify operation of the controller with the push-button pushed in.

NOTE: THIS IS ONLY A ROUGH CALIBRATION. USE HAND-HELD METER METHOD FOR GREATER ACCURACY.

Conductivity vs. PPM Table

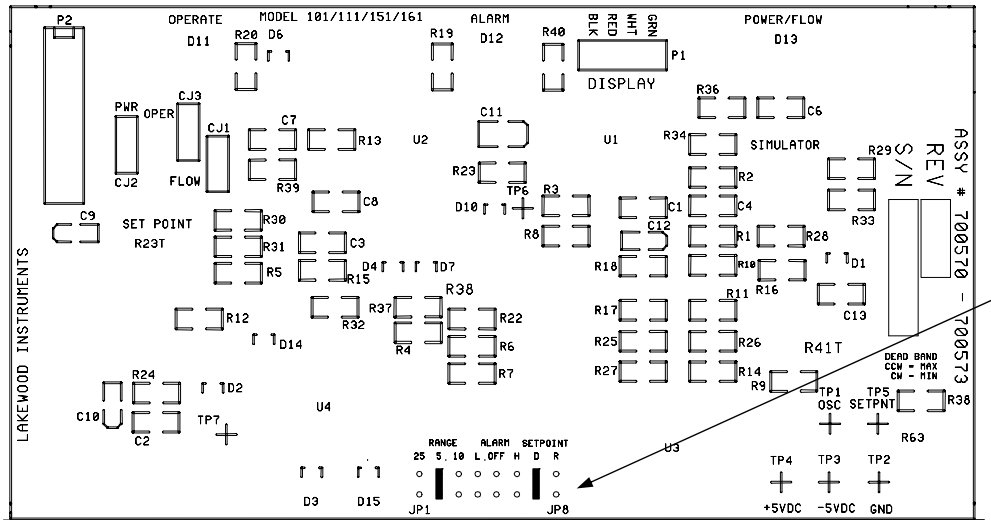
µS/cm	ppm	µS/cm	ppm	µS/cm	ppm
2	1	120	68	900	560
4	2.1	140	80	950	600
6	3.2	160	91	1000	630
8	4.2	180	100	1500	970
10	5.2	200	115	2000	1300
12	6.4	220	127	2500	1700
14	7.4	240	139	3000	2000
16	8.5	260	150	3400	2400
18	9.6	280	164	4000	2750
20	11.0	300	176	4500	3150
25	13.5	350	210	5000	3500
30	16.0	400	240	5500	3900
35	19.0	450	270	6000	4300
40	22.0	500	300	6500	4700
45	24.5	550	335	7000	5000
50	27.5	600	370	7500	5400
60	33.0	650	400	8000	5800
70	39.0	700	435	8500	6200
80	45.0	750	470	9000	6600
90	51.0	800	500	9500	7000
100	56.0	850	530	10,000	7400

Establish Setpoints

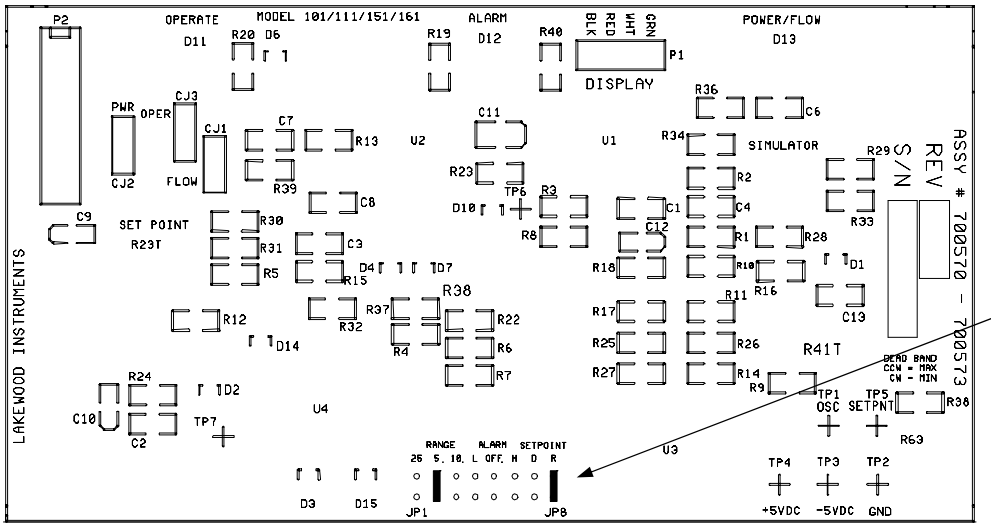
Direct or Reverse Setpoint Configuration

The Model 100 series can be configured for a direct or reverse setpoint. Direct setpoints are used in cooling tower applications while reverse setpoints are used in chill loop systems. Reverse set point allows a user to configure chemical feed into his chill loop based on conductivity.

The 100 series controllers are shipped as direct setpoint and can be configured in the field as reverse setpoint. This is accomplished by simply removing a jumper block from the D position to the R position (see figures below and on next page for more detail).



Direct Setpoint for Cooling Towers

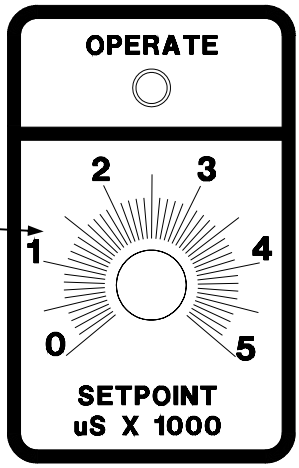


Reverse setpoint for Closed Loops

Adjusting your Setpoint

After you have calibrated the controller, adjust the setpoint to the conductivity level you want to maintain. Consult with your Water Treatment Engineer to determine the proper level for your system. In most cases, however, you can take the level of your cooling tower make-up water and multiply it by the number of cycles of concentration that you want to maintain. That means if your make-up water measured 500 µS and you want to maintain 3 cycles, your setpoint would be 1500 µS (1.5 on the Setpoint dial).

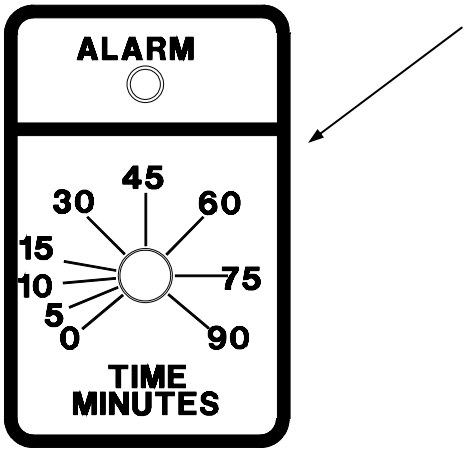
NOTE that 1.5 on this dial is the equivalent of 1500 µS.



Set Alarm Timer

Set the alarm timer for 60 minutes. If the conductivity setpoint is not satisfied in 60 minutes, increase the blowdown rate. You may also need to put in a larger solenoid valve.

Try 60 minutes first, then either increase blowdown rate or put in larger solenoid valve.



Set the Chemical Pump

Since the chemical pump turns on at the same time the conductivity controller actuates the blowdown valve, the chemical feeds proportionally to blowdown. The pump feeds to replace the chemical lost to blowdown.

Set the chemical pump to one gallon per day feed rate until advised otherwise by your Water Treatment Engineer. The actual amount of chemical fed will be about ¼ to ½ gallon per day.

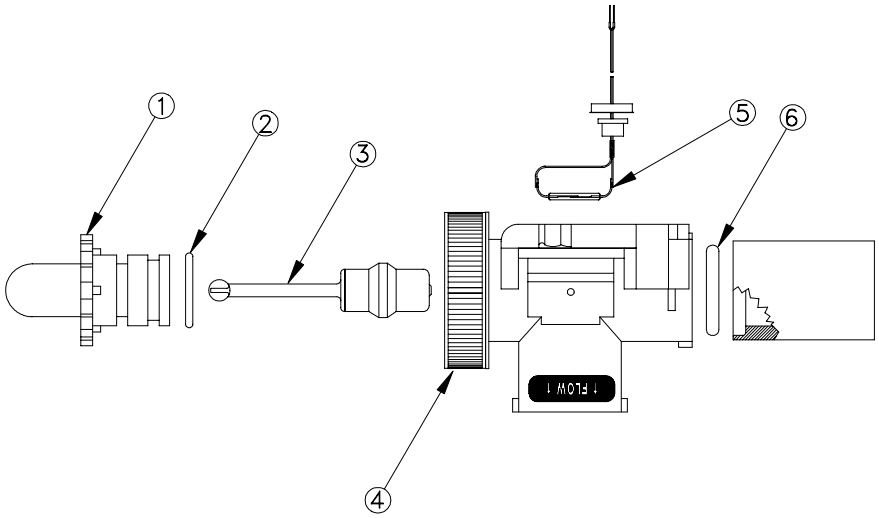
<u>CAUTION</u>: DO NOT FEED ALKALINE CORROSION SCALE INHIBITOR INTO A SAMPLE LINE. SCALE INHIBITOR SHOULD BE ADDED DIRECTLY INTO THE COOLING TOWER. PLEASE ASK YOUR WATER TREATMENT ENGINEER FOR MORE INFORMATION AND DIRECTIONS ON PROPER FEED METHODS.

Flow Switch

If you have the flow switch option (-FS), you may need to periodically clean out the wetted parts in this assembly.

- Shut off the inlet flow and the power to the controller.
- Turn the red lock ring for the flow switch counterclockwise.
- Pull out the clear flowsight tube and remove the float with your fingers.
- Use a bottle brush on the float, flowsight and the flow switch assembly to remove any residue.
- Clean off and lubricate the "O" ring, if it is dry, with a silicone-based lubricant (petroleum-based lubricants will cause the O-ring to swell).
- Lock down the red lock ring after you replace the components.
- Turn the inlet flow back on and check for leaks.

Flow Switch Assembly, P/N 67215



Find No.	Part No.	Part Description
1	1167266	Flowsight
2	1166418	O-Ring (flow sight)
3	1167234	Flow Magnet
4	1169740	Red Locking Ring Kit
5	1167235	Reed Switch
6	1166417	O-Ring (check valve)

Reed Switch

If you ever need to replace the reed switch for the flow switch, follow the procedure below.

- Shut off the inlet flow and the power to the controller.
- Remove the three screws holding the flow switch.
- Remove the screws holding other plumbing components.
- Pull hard on the green wires to remove the reed switch.
- Install and wire the new reed switch.
- Re-install plumbing.
- Turn the inlet flow back on and restore power to the controller.

Conductivity Sensor

Routine maintenance is necessary in order to maximize the efficiency and accuracy of your sensor and the extent of its life. Clean the electrode end of the conductivity sensor at least once per month.

- Shut off the sample flow and the power to the controller.
- Unlock the red lock ring and remove the sensor.
- Dip the end of the sensor in Muriatic acid or 10% HCl. Be careful when handling the acid.
- As an alternate, but less effective method, you can gently use a coarse cloth to clean the carbon tips.
- Wash the sensor off with tap water.
- Under certain conditions, or due to extreme neglect, the electrodes can get fouled with a hard scale. In such cases, use a soft brass brush to burnish the carbon tips. Don't do this more often than absolutely necessary. After you burnish the carbon tips, allow the controller to operate for several hours to stabilize the electrodes.
- Re-calibrate the controller.

Technical Service/Return Material Procedure

☎ **Technical Support for Lakewood Instruments can be reached by calling (800) 228-0839 or faxing (414) 355-3508, Monday through Friday, 7:30 a.m. - 5:00 p.m. CST.**

✉ **Mail and returns should be sent to:**

Lakewood Instruments
7838 North Faulkner Road
Milwaukee, WI 53224 USA

When any merchandise is returned to the factory, please call and obtain a return goods authorization (RGA) number and have the following information available:

- Customer's name, address, phone and fax numbers (shipping and billing).
- A hard copy purchase order number (no exceptions) for cases where repairs or parts are required that are not under warranty.
- A contact person's name and phone number to call if the equipment is beyond repair or to discuss any other warranty matter.
- Equipment model and serial numbers.
- Reason for return, e.g., repair, warranty, incorrect part, etc.

We will then fax to your attention an RGA form that must accompany the returned item.

NOTE: THE RGA NUMBER MUST BE CLEARLY WRITTEN ON THE OUTSIDE OF THE PACKAGE(S) BEING RETURNED.

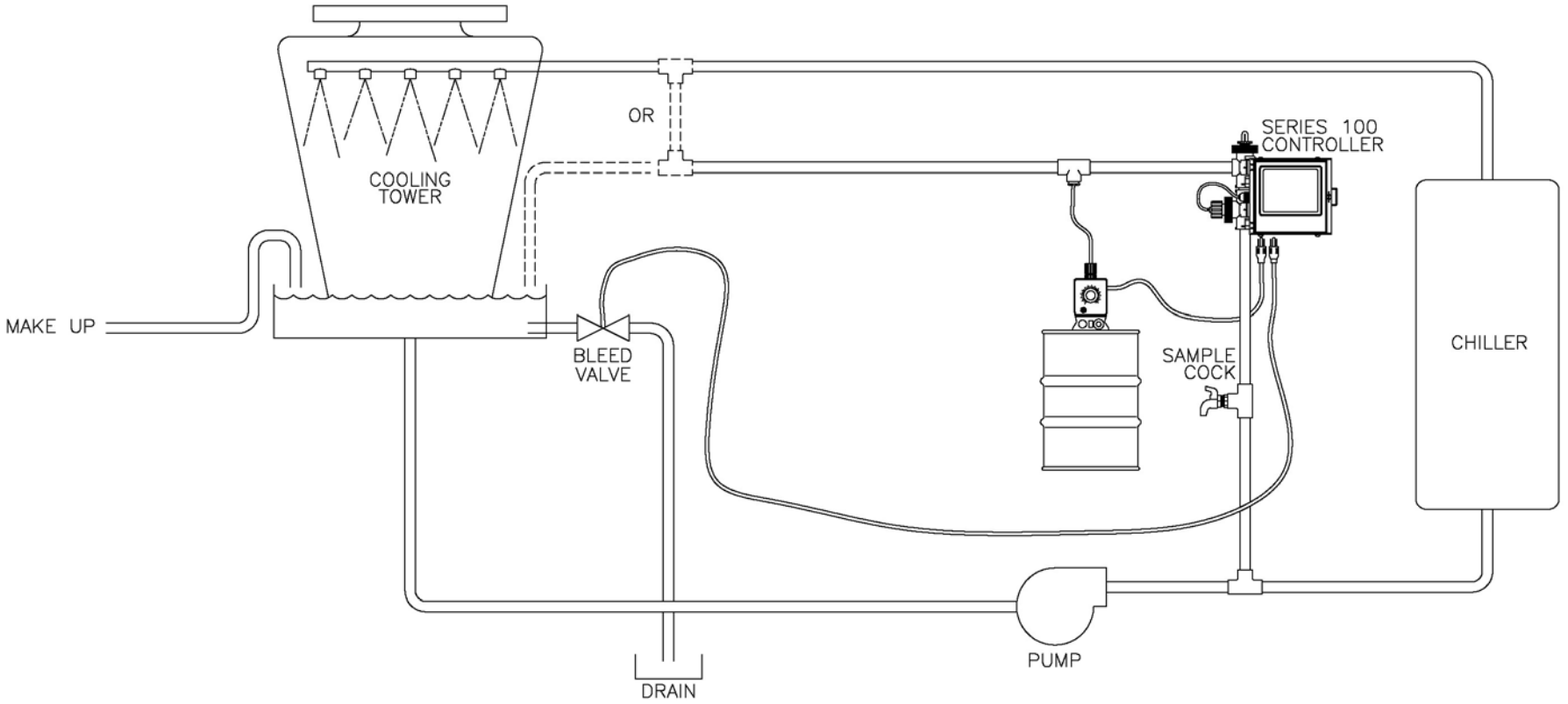
ANY ITEMS SENT BACK TO THE FACTORY WITHOUT AN RGA NUMBER WILL BE REFUSED AND RETURNED TO SENDER

Troubleshooting

PROBLEM	WHAT THIS MEANS	CORRECTIVE ACTION
Controller is inoperative.	The controller is not receiving power or a fuse needs replacing.	1. Verify that the power outlet is 115 VAC. 2. Plug in the power cord and check 115 VAC across terminal block TA lugs 2 and 3. 3. Check continuity through the 10 Amp fuse on the rear circuit board. The fuse is located above terminal block TA.
Conductivity control is inoperative.	The sensor is surrounded by air or the Setpoint dial is defective. For units with -FS option, there may be no flow to the controller.	1. Verify flow so that sensor is known to be immersed in water. 2. Turn the Setpoint dial fully counterclockwise to "0". The OPERATE light should come on and the blowdown valve should open. 3. If the Setpoint is "0" and the OPERATE lights doesn't come on, return the front panel to the factory for repair. 4. Verify float is in the "up" position (-FS option).
The OPERATE light comes ON with the Setpoint but the valve doesn't open.	There is no power to the blowdown valve, the relays are bad, or the valve itself is bad. For units with -FS option, there may be no flow to the controller.	1. Check for 115 VAC at the blowdown valve terminal when the OPERATE light is on. 2. Replace the relays if necessary. 3. Refer to the blowdown valve instructions and thoroughly check the valve and wiring. 4. Clean -FS assembly.
There is no conductivity reading above zero.	The sensor needs cleaning or the front panel is defective.	1. Refer to the maintenance section of this manual to clean the sensor. 2. Push the SIMULATOR button. Does the controller work at 2500 µS? 3. Replace the conductivity sensor. 4. Replace the panel if still no reading above zero with SIMULATOR button pushed.
Conductivity of the water is always below the setpoint.	Continuous blowdown or plugged sample line.	1. Check for hidden continuous blowdown. 2. Check for tower overflowing into drain pipe. 3. Check for tower overflowing when shut down at night. 4. Check for blowdown valve stuck open. 5. Check for plugged sample line.
Alarm light on. (Models 151 and 161 only.)	Blowdown took longer than the alarm timer setting.	1. Check for plugged sample line. 2. Check for blowdown too restricted. 3. Check for plugged blowdown valve or strainer. 4. Did the make-up water change?
Controller drifts downward over long periods.	Sensor is fouled or sample flow rate incorrect.	1. Is the sample flow rate too low? 2. Is the sensor clean? 3. Before recalibrating, clean sensor. If conductivity increases after sensor is cleaned, you may still have a fouled or dirty sensor (this may not always be visible to the naked eye).

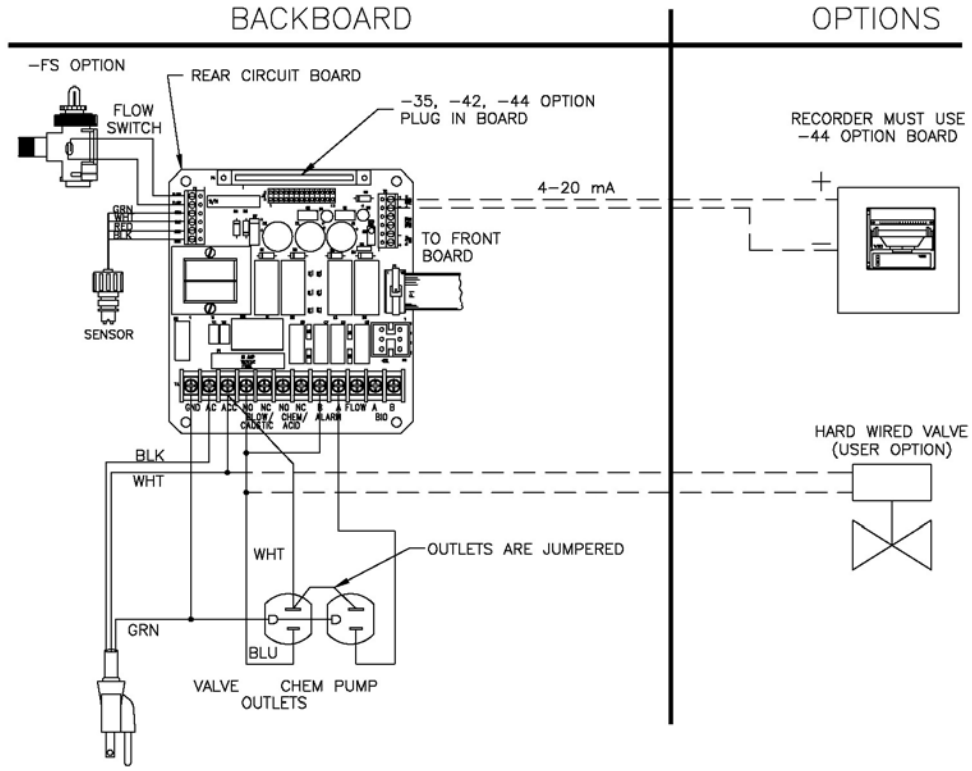
DRAWINGS

REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
A	RELEASE	1408	EV	10/28/97	



MATERIAL	TOLERANCES UNLESS NOTED FRAC ±1/16 DECIMALS .X ± .1, .XX ± .03, .XXX ± .010 ANGLES ±.5°	OSMONICS PHOENIX OPERATIONS
FINISH		TITLE: INSTALLATION DRAWING COOLING TOWER, 101 SERIES
ORDER NO.	DWN EV DATE 10/28/97	
CUSTOMER	CHKD DATE	SIZE B THIRD ANGLE; DWG NO/PN 1105362; REV A
CUSTOMER LOC.	APVD DATE	
DO NOT SCALE	APVD DATE	SCALE NONE; FILE TYPE .DWG; SHEET 1 OF 1

REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
A	RELEASE	1408	EV	10/29/97	



MATERIAL	TOLERANCES UNLESS NOTED FRAC DECIMALS ANGLES .X ± .1	
FINISH	.XX ± .03 ±1/16 .XXX ± .010 ±.5°	
ORDER NO.	DWN EV	DATE 10/29/97
CUSTOMER	CHKD	DATE
CUSTOMER LOC.	APVD	DATE
DO NOT SCALE	APVD	DATE

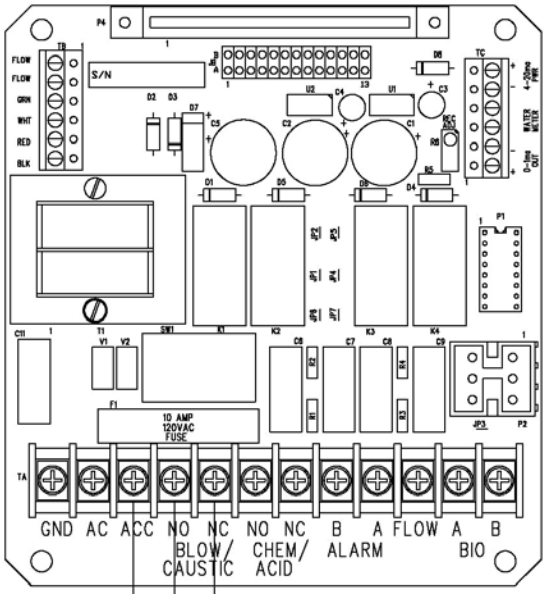
OSMONICS
PHOENIX OPERATIONS

TITLE
WIRING DIAGRAM
100 SERIES CONNECT

SIZE	DWG NO/PN	REV
B (THIRD ANGLE)	1105363	A

SCALE	FILE TYPE	SHEET
NONE	.DWG	1 OF 1

REVISION HISTORY					
REV	DESCRIPTION	ECO	DWN	DATE	APVD
A	RELEASE	1408	EV	10/29/97	



BRN — VALVE CLOSED

BLUE — VALVE OPEN

WHITE — ACC

MATERIAL	TOLERANCES UNLESS NOTED FRAC ±1/16 DECIMALS .X ± .1 .XX ± .03 .XXX ± .010 ANGLES ±.5°	
FINISH		
ORDER NO.	DWN EV	DATE 10/29/97
CUSTOMER	CHKD	DATE
CUSTOMER LOC.	APVD	DATE
DO NOT SCALE	APVD	DATE

OSMONICS
PHOENIX OPERATIONS

TITLE
WIRING DIAGRAM
MOTORIZED BALL VALVE CONN., 101/200

SIZE	DWG NO/PN	REV
B (THIRD ANGLE)	1105364	A

SCALE	FILE TYPE	SHEET
NONE	.DWG	1 OF 1

Printed in USA, P/N 1168904 Rev. 3

For more information call toll free in the USA (800) 228-0839

Manufactured in the USA

Lakewood Instruments
7838 North Faulkner Road, Milwaukee, WI 53224 USA
Phone (800) 228-0839 • Fax (414) 355-3508
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