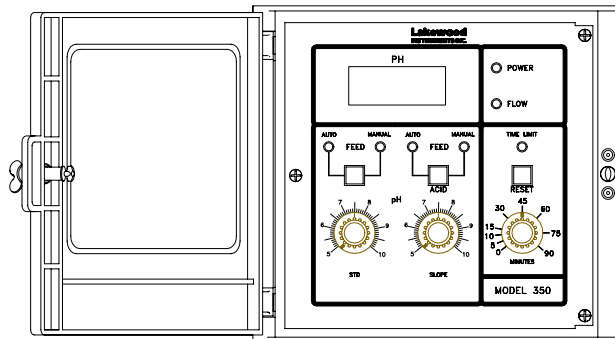


LAKWOOD INSTRUMENTS MODEL 350S

pH CONDENSATE CONTROLLER

INSTRUCTION MANUAL

SERIAL #: _____



Lakewood Instruments

7838 North Faulkner Road, Milwaukee, WI 53224 USA

Phone (800) 228-0839 • Fax (414) 355-3508

<http://www.lakewoodinstruments.com>

Lakewood Instruments

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

With proper care and maintenance, your product should give you 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 an Lakewood Instruments product.

MODEL 350S CAUTIONS

PLEASE READ THIS

IF THIS CONTROLLER IS USED TO FEED ACID ONLY FOR pH CONTROL:

1. Turn the caustic feed set point knob full counter-clockwise.
2. Make sure that the caustic AUTO/MANUAL switch is in AUTO.

FAILURE TO OBSERVE This will cause the acid pump to time out even if no acid is being pumped. This is because the caustic pump set point and control also actuates the alarm timer.

IF THIS CONTROLLER IS USED TO FEED BOTH ACID AND CAUSTIC:

1. Make sure that the low caustic set point is set at a lower pH than the acid feed set point.
2. Make sure that both AUTO/MANUAL switches are in AUTO.
3. DO NOT AT ANY TIME cause both acid and caustic to be pumped at the same time.

FAILURE TO OBSERVE this may cause both acid and caustic to be fed at the same time. The resulting reaction could be violent and extremely dangerous.

DO NOT turn the sensor lock ring with pressure in the sensor flow cell. Release the pressure first. The sensor may fly out of the flow cell if the pipe is under pressure and injure someone.

MODEL 350S

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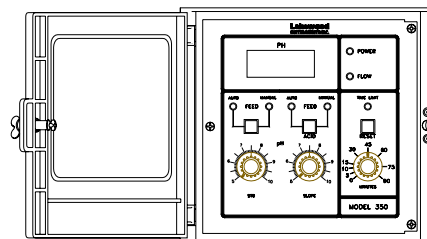
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MODEL 350S pH CONDENSATE CONTROLLER

The Model 350S pH Condensate Controller installed at critical condensate return points or in the deairator condensate return line allows you to determine the condensate pH and ensure the efficient management of your system. Monitoring boiler steam condensate allows you to detect corrosion due to process contamination that affects pH. Alarm contacts can be wired to divert the flow of the condensate or activate an alarm when necessary.

The rugged sensor assembly consists of a 316 SS ball valve with a stainless steel body. These sensors can be adjusted and even removed without shutting down the condensate return line. They can withstand process temperatures and pressures normally associated with steam line condensate.

These controllers use the latest technology available in pH electrode construction and amplifier interface techniques to allow for the widest range of applications with increased sensing accuracy. Sensor amplifiers employ the latest electronics technology to provide drift-free noise-free signal transmission. The amplifier output of 590 mV/pH is high enough for long-distance transmission without terminal block potential problems, loss of signal strength and noise pick-up.



FEATURES

- Model 520-2-7R-18-HT pH electrode suitable for high temperatures.
- Retractable sensor minimizes service interruptions.
- Alarm timer limits neutralizing amine overfeed.
- HIGH and LOW setpoints for alarms or to divert condensate.
- Control of condensate pH and corrosion potential.

BENEFITS

- Maximum efficiency of condensate corrosion and inhibitor feed.
- Diversion of contaminated condensate from the boiler in order to provide greater protection.
- Prevents costly damage of your boiler system, piping and related metal surfaces.

SPECIFICATIONS

Setpoints	HIGH & LOW	Temperature	-5 to 260°F (-20 to 130°C)
Setpoint Range	0-14 pH	Auto Temp. Comp.	10K Ohms, 32 to 212°F (0 to 100°C)
Display	LCD—3 digits (i.e., 7.00)	Sensor Materials	Glass/316 SS/Viton
Delayed Alarm	5-90 min. Locks out both feeds unless otherwise specified.	Sensor Removal	Retractable with 1" ball valve connection.
Deadband	.1 pH max.	Min. Cond. for Operation	5 µS
Resolution	0-14 pH	ENCLOSURE	
Accuracy	±.05 pH	Material	ABS and UV stabilized PVC.
Analog Output	4-20 mA w/-35 option.	Outlets	Duplex receptacle for chemical pumps.
Power	120/240 VAC 50/60 Hz	NEMA 4X watertight standard.	
Relay	3 Amps @ 120 VAC		
Ambient Temperature Rating	0 to 70°F UL Listed.		
pH SENSOR ASSEMBLY (520-2-7R-18-HT)			
Pressure	70 psi (4.8 bar)		

ORDERING INFORMATION

350S Condensate pH analyzer 0-14 pH. UL Listed. Includes retractable 316 S.S. High Temp. Sensor 520-2-7R-18-HT. Max. 260°F (130°C) @ 150 psi (10.2 bar). No power cord or outlets.

SYSTEM OPTIONS (optional, select one or more)

-AV Audible and visible alarm with "PUSH TO SILENCE" pushbutton.
-F 250 VAC 50 Hz power option.

CONTROLLER OUTPUT OPTIONS (optional, select one only)

-35 Isolated 4-20 mA output for remote data acquisition.
-39F Frequency output contact for electronically pulsed chemical pump.
-39P Percent on time modulating contact for solenoid chemical feed systems.
-42 HIGH/LOW dry alarm contacts with adjustable setpoints.
-44 Isolated 4-20 mA output plus HIGH/LOW alarms.

ENCLOSURE OPTIONS (optional)

-DU Duplex outlet for chemical pump, power cord.

MOUNTING OPTIONS

PM Panel mount 6 ¼" square cutout.
BM Bracket for pipe mounting.

MOTORIZED BALL AND DIVERTING VALVE OPTIONS

MBV1 Motorized ½" blowdown valve, with 1036 actuator; rated to 250 psi @ 400°F.
MBV2 Motorized ¾" blowdown valve, with 1036 actuator; rated to 250 psi @ 400°F.
MBV3 High pressure motorized ½" blowdown valve, with 1275 actuator; rated to 600 psi @ 550°F.
MBV4 High pressure motorized ¾" blowdown valve, with 1275 actuator; rated to 600 psi @ 550°F.
DV3/4 3-way full port motorized ball valve with actuator for ¾". Temperature rating and psi are inversely proportional (200-800 psi, 350SF-125F).
DV1 3 way full port motorized ball valve with actuator for 1". Temperature rating and psi are inversely proportional (200-800 psi, 350S°F-125°F).

INSTALLATION

Checking

Inspect the shipping carton for obvious external damage. Note on the carrier's bill-of-lading the extent of the damage, if any, and notify the carrier. Save the shipping carton until your Model 350S Controller is started up.

☎ If there was shipping damage, call the Lakewood Instruments Customer Service Department at (800) 228-0839 for authorization to return the controller to the factory in the original carton.

Check the power wiring. Make sure that the controller is powered from 120 VAC unless it is specifically set up for 220 VAC.

Check the recorder or other low power wiring. **MAKE SURE THAT NO POWER WIRING IS CONNECTED TO ANY LOW POWER CIRCUITS.**

Wiring

Refer to the diagrams in back of this manual for installation.

Setpoints

The Model-350S pH controller is intended for acid and/or caustic feed to maintain the water pH in condensate systems. It is necessary for sample piping to be run from a circulating water pump to the pH sensor.

As the pH rises over the acid feed set point, a relay closes the circuit to the acid pump and turns it on. Acid is fed into the water. As the pH drops below the set point due to the acid, the relay turns off the acid pump.

Low pH below the caustic feed set point will close the caustic feed relay and turn on the caustic chemical pump. As the pH rises about the set point, the relay will open and turn off the caustic pump.

Alarm Timer

The alarm timer limits the amount of continuous acid or caustic feed. For example, if the alarm timer is set on 30 minutes, only 30 minutes of acid can be fed continuously without the set point turning the acid pump off. The alarm timer automatically resets when the acid pump turns off or when the RESET button is pushed. The same applies to caustic feed.

If acid or caustic is not being used be sure to adjust the setpoint in a position where it will not turn on. 0 pH for caustic and 14 pH for acid.

To determine proper settings, consult your water treatment professional.

Flowswitch Input

The flow switch locks out all chemical feed and the alarm timer if there is no sample line flow. The flowswitch input requires a dry contact. A relay driven by the recirculating pump may be used.

pH Sensor

The pH sensor on the 350S requires a preamp. The pH sensor must be located within 15 feet of the preamp. The preamp to the 350S controller may be located several hundred feet away.

NOTE: NEVER ALLOW THE pH SENSOR BECOME DRY. DOING SO WILL DAMAGE THE SENSOR

Chart Recorder Output

The Model 51 inkless strip chart recorder requires two connections to the Model 350S back board. Refer to Figure 1.3. The chart recorder motor requires 120 VAC, 60 Hz unless specified otherwise.

The chart recorder manual is attached to this manual. Refer to the recorder manual for proper loading of the chart paper.

ADD ON OPTIONS

Only one add on option below can be added to the 350S controller

35 Isolated 4-20 mA output

The 35 plug in circuit board provides an isolated 4 to 20 mA output to a computer or control device. The load resistance must not exceed 800 ohms.

The output is factory preset for 5 pH = 4 mA and the 10 pH = 20 mA. ZERO and SPAN adjustments permit scaling the output to another desired conductivity range. Refer to drawing 5102611 for component locations.

Equipment required: pH simulator such as the Model APS2 and a current meter for the loop current. To set the range, make the Model 350S read the desired 4 mA pH valve. Then adjust the output board ZERO for 4 mA loop current. Next, set the Model 350S on the desired 20 mA pH valve. Then adjust the SPAN to give the 20 mA loop current.

39F Chemical pump frequency proportional output

This option provides a 100 mS relay closure. The frequency of operation is from 0 to 100 pulses per second maximum. The output is intended to operate a solenoid type chemical pump with external pulsing connection.

Equipment Required: a pH simulator such as the Model APS2.

ZERO and SPAN adjustments are on the board. Refer to drawing A-5103227 for component locations.

To set the range, make the Model 350S read the desired 4 mA pH valve. Then adjust the output board ZERO until the chemical pump just stops pulsing. Next, set the Model 350S on the desired pH for the maximum pulse rate output. Adjust the SPAN to give the maximum pulse rate at that pH.

42 HIGH/LOW alarms for remote alarm status or computer alarm log

To set alarms, simulate the LOW pH trip point with a Model APS2 simulator or zero shift of the Model 350S STANDARDIZE (STD). Make the Model 350S read the LOW trip point. Adjust the LOW alarm on the board until the relay just pulls in. To set the HIGH alarm, make the Model 350S read the desired HIGH pH trip point. Adjust the HIGH adjustment on the plug in board until the relay just pulls in.

44 4-20 mA output and HIGH/LOW alarms

The 44 card is a option that includes the features of the 35 and 42 card.

CALIBRATION

Method 1

- Measure a sample of condensate water with handheld meter.
- adjust the STANDARDIZE (STD.) to make sure the controller display agrees with the handheld.

Method 2

- Verify calibration with a millivolt/pH simulator such as the Lakewood APS2.
- At 7pH adjust the STANDARDIZE (STD.) to make sure the controller display agrees with the millivolt/pH simulator.

Method 3

- Obtain 7 pH buffer solution.
- Obtain a short piece of hook up wire.
- Attach one end of the hook up wire to Test point 1 on the rear of the front panel. Place the other end in the 7 pH buffer solution.
- Place the sensor tip in the buffer solution.
- Adjust the STANDARDIZE (STD) so that the display reads 7.00 pH.
- Place the sensor back in service.

STARTUP

Calibrate the pH on the 350S controller before any chemical feed control is top begin

Set the acid feed set point (HIGH set point) at the desired level. This is the pH at which the acid pump turns on when the pH is above the set point. Consult your water treatment engineer for the correct valve for the type of treatment used.

With water flow through the flow cell, press the ACID AUTO/MANUAL switch to MANUAL. The acid pump should turn on. Press the switch again to return to AUTO.


Set the caustic feed set point as required. This is the value that the caustic pump will turn on if the pH is below the set point as required.

With water through the flow cell, press the CAUSTIC AUTO/MANUAL switch to MANUAL. The caustic pump should turn on. Press the switch again to AUTO.

Always consult your water treatment professional for proper settings for you system.

Maintenance and Technical Service

Technical Service

 **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 material order (RMO) number and have the following information available:

- Customer's name, address, phone and fax numbers.
- A purchase order number (no exceptions) for cases where 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 (i.e., repair, warranty, incorrect part, etc.).

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

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

Service Guide

When calling Lakewood Instruments, please have the controller's complete model number and serial number available so that the technician can better assist you.

When any parts are returned to the factory, please indicate:

- Customer's name and address
- Individual at customer location to send the repaired controller or new part to
- The person (and phone number) to call if the equipment is beyond repair or for any warranty matter

Parts List

PART NUMBER	DESCRIPTION
67124	pH preamp
5207-HT w/15 ft of cable	pH Replacement tip

Troubleshooting

PROBLEM	CORRECTIVE ACTION
pH doesn't respond to changes or won't calibrate.	<ul style="list-style-type: none">• Replace the pH sensor• Check the controller with an APS2 simulator.
Wild pH swings with poor control.	<ul style="list-style-type: none">• Pump stroke set too high.• pH sensor too old. Needs replacement.
Alarm timer actuates.	<ul style="list-style-type: none">• Out of acid/caustic.• Acid/caustic pump lost prime.• Acid pump stroke set too low for the size of the cooling system.• Alarm Timer set too low.• Make up water changed.
No output to chemical pump.	<ul style="list-style-type: none">• Is the flow light on.• Defective pump. Plug into hot outlet.
Nothing happens.	<ul style="list-style-type: none">• Is there power to the controller?• Is the fuse on the rear circuit board blown?• Is there power to the terminals on the rear circuit board?

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

Manufactured in the USA

Lakewood Instruments

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