LAKewood INSTRUMENTS
MODEL 174
COUNTER/TIMER
INSTALLATION & OPERATION MANUAL

SERIAL #: ____________
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.
# MODEL 174

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The Model 174 uses a contacting head water meter input and has two reset timers in one package, one for a blowdown valve and one for a chemical feed pump. Each timer is set independently, for a predetermined time, using the setpoint knobs on the front panel. Both timers start at the same time. A standard 174 will start both timers each time a pulse is received from the water meter. Voltage on the wires to the water meter will not exceed 24 VDC.

Available options are also listed following this introduction. With the -CT option you can program how many pulses you want, (up to 99) before the Model 174 will start the timers. For example, if the water meter sees 10 gallons per contact and you want 100 gallons to pass before enabling the timers, you should set the counter option at 10.

The elapsed time is shown on the LCD display and continues until both timers have reached their setpoints. Then both timers automatically reset and the display will read 0.0 minutes. Caution should be taken not to overlap pulses with elapsed time. Overlapping occurs when the required number of pulses have come in from the water meter before both timers have timed out. If this occurs, simply increase the capacity of the chemical pump and shorten the run timer by a proportional amount.
Note that any controller-initiated changes to the cooling tower system operation requires several hours for the system to stabilize at the new value. Once you get a starting point, however, it is easy to reach the final desired values by adjusting the time, water meter counts, or chemical pump settings. For example, if the chemical residual is 1/3 the desired value after the first try, increase the chemical pump output or feed time by a factor of three.

Front Panel Description

- **DISPLAY**: Displays the elapsed time in minutes.
- **POWER**: 115 VAC power light to the instrument.
- **BLOWDOWN AUTO**: Reset timer control for blowdown.
- **BLOWDOWN MANUAL**: Blowdown valve ON.
- **FEED AUTO**: Reset timer control for chemical pump.
- **FEED MANUAL**: Chemical pump ON.
- **MINUTES SETPOINT**: Sets operate time for blowdown and chemical feed.

Specifications

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Controller</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power</td>
<td>Counts to bleed/feed</td>
</tr>
<tr>
<td>120 VAC</td>
<td>1 Standard; 1-99</td>
</tr>
<tr>
<td>120/240 VAC w/-WP</td>
<td>w/-CT Option</td>
</tr>
<tr>
<td>Water Meter Input</td>
<td>Feed Timer</td>
</tr>
<tr>
<td>Outputs</td>
<td>0-10 minutes</td>
</tr>
<tr>
<td>Contacting head only.</td>
<td>Ambient Temperature</td>
</tr>
<tr>
<td>Relays</td>
<td>32-158°F (0-70°C)</td>
</tr>
<tr>
<td>3 Amps @ 120 VAC</td>
<td>Electrical Rating</td>
</tr>
<tr>
<td>non isolated</td>
<td>UL Listed</td>
</tr>
<tr>
<td>0-1 mA</td>
<td>ABS Plastic</td>
</tr>
<tr>
<td></td>
<td>NEMA-4X Optional</td>
</tr>
</tbody>
</table>

Ordering Information

174 Dual independent adjustable timer with 2 water meter actuated 10-minute reset timers and digital display.

ENCLOSURE OPTIONS (optional)

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

CONTROLLER OPTIONS (optional)

-CT Water meter impulse counter 1-99 water meter counts.
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.

**CAUTION: 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

**Figure 2: Model 174 Enclosure Dimensions**
SETUP AND CALIBRATION

Start Up
- Check the power wiring. Make sure that the controller is connected to 120 VAC unless it is specifically set up for 220 VAC.
- Check recorder or other low power wiring. Make sure that NO power wiring is connected to low power circuits.
- Check the chemical pump fittings. Make sure they are safe. Make sure that the controller is piped per the suggested installation drawing.
- See DWG #5101439 in the back of this manual.

Setpoints
- Set the BLOWDOWN and FEED TIMER setpoint knobs to the desired starting points. If unsure, set the BLOWDOWN and FEED TIMER setpoints for one minute.
- Set the chemical pump output to 20%. This is just a starting point.
- Allow the system to stabilize for a day. Any changes to the cooling tower system operation requires several hours for the system to stabilize at new values.
- Check the chemical residual and conductivity of the tower. Adjust accordingly. For example, if the chemical residual is 1/3 the desired value after the first try, increase the chemical pump output or feed time by a factor of three.

-CT Option
- If the controller is equipped with the -CT option, set the counter for the desired number of water meter counts.
- There are two rotary switches on the -CT card (on the back of the front circuit board). The first switch is TENS. The second switch represents UNITS.
- See DWG #5101515 for locations of these switches.

Water Meter Simulator Button
- Verify operation of the water meter input by pressing the water meter simulator button the number of counts the unit is set for, to activate the timers.
- See DWG #5101515 for locations of this button.

Speed Up Timer Button
- A speed up button, increases the reset timer speed by 1,000 for testing.
- See DWG #5101515 for locations of this button.

Calibration
No calibration is required for this device.
Calculating Chemical Dosages

For scale and/or corrosion inhibitor, fed on the basis of a make up water meter with a contacting head, the following data is needed.

**NOTE: THE FOLLOWING EQUATIONS ASSUME THAT THE INHIBITOR WEIGHS ABOUT 10 LB. PER GALLON.**

1. Cooling water recirculation rate in Gallons Per Minutes (GPM).

2. Chemical pump size available in gallons per hour maximum (P).

3. Parts Per Million (PPM) required of the chemical drum contents desired in the cooling water. Note that this will be higher than the actual PPM of the chemical in the system because of the inert (non-active) materials in the solution.

4. Gallons per contact closure of the water meter. Choose 10, 100, 500, 1000, etc., depending upon the size of the system (GPC).

5. Desired cycles of concentration, often three. (C).

6. Number of gallons of make up water necessary to trigger the reset timers (MUGAL or Make Up Gallons).

\[
\text{Reset timer run time setting in minutes} = \frac{(GPC) \times (PPM)}{20,000 \times (P)}
\]

\[
\text{How often the reset timer actuates} = \frac{(GPC)}{(GPM)}
\]

\[
\text{Make up} = \frac{GPM \times (.01) \times C}{C-1}
\]

\[
\text{Minutes of make up to reach MUGAL} = \frac{\text{MUGAL}}{\text{Make up}}
\]

\[
\text{Blowdown rate required} = \frac{\text{Make up}}{C}
\]

\[
\text{Set blowdown time to} = \frac{\text{Minutes of time to reach MUGAL}}{C}
\]
Technical Service/Return Material Procedure

Technical Support for Lakewood Instruments can be reached by calling (602) 931-7377 or faxing (602) 931-7527, Monday through Friday, 7:00 a.m. - 4:30 p.m. MST.

Mail and returns should be sent to:

LAKewood instruments
7838 N. FAulkner road
MiLWAUKEE, wi 53224

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 (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 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.

ANY ITEMS SENT BACK TO THE FACTORY WITHOUT AN RMO NUMBER WILL BE REFUSED AND RETURNED TO SENDER
<table>
<thead>
<tr>
<th>PROBLEM</th>
<th>WHAT THIS MEANS</th>
<th>CORRECTIVE ACTION</th>
</tr>
</thead>
</table>
| Water meter doesn't start reset timers. | Problem may be with either the wiring to the instrument or the water meter switch. | 1. Press the water meter simulator button to check the instrument. Refer to DWG #5101515 for component location.  
2. If reset timer starts, check wiring to the water meter. Check water meter switch closure with a continuity tester.  
3. If reset timer still doesn't start, make sure the timers are set off of zero. Check the counter for zero, tens, and one unit counts. Remove orange terminal block from connector TC and try the simulator button again.  
4. If timer still doesn't start, return front panel for repair. |
| Timer works OK but chemical residual is too low. | Overlapping of water meter pulses and elapsed time has occurred. | 1. Increase the chemical pump output.  
2. Increase the reset timer time. |
| Nothing happens at all. Controller doesn't turn ON. | Power is not reaching the controller. | 1. Is there power to the controller?  
2. Is the fuse on the rear circuit board blown?  
3. Is there power to the terminals on the rear circuit board? |
<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
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<tbody>
<tr>
<td>700318</td>
<td>Front circuit board and Panel</td>
</tr>
<tr>
<td>700323</td>
<td>Rear circuit board with relays</td>
</tr>
<tr>
<td>-CT</td>
<td>Water meter impulse counter</td>
</tr>
</tbody>
</table>
1. INSTALL ON AN EVEN VIBRATION FREE SURFACE.
2. USE #6 OR #8 BOLTS/SCREWS STUDS.
3. DO NOT OVER TIGHTEN. SNUG IS ENOUGH.

CAUTION: DO NOT ATTEMPT TO OPEN RED RING IF SYSTEM IS UNDER PRESSURE

ENCLOSURE

KEEP OUT OF DIRECT SUNLIGHT IF POSSIBLE. CONTROLLER RUNS COOLER IN THE SHADE
NOTES: UNLESS OTHERWISE SPECIFIED:
1. FOR 1-9 COUNT, SET TENS SWITCH TO ZERO.
2. TO INSTALL -CT OPTION IN FIELD:
   a) REMOVE CD4001 I.C. FRONT SOCKET
   b) INSTALL STAND OFF HARDWARE.
   c) CAREFULLY MOUNT -CT IN SOCKET.
   d) LOCATE AND INSTALL TWO(2) SCREWS.

MODEL -CT CIRCUIT BOARD
COUNTER SET SWITCHES
SPEED UP TIMER CHECK X1000
RANGE JUMPER 0-5000 uMHOS

16 PIN CONNECTOR TO PLUG IN FRONT BOARD CIRCUIT BOARD
WATER METER SIMULATOR BUTTON

USED IN:

Lakewood INSTRUMENTS INC.
DRAWING - ASSEMBLY
WATER METER PULSE COUNTER -CT OPTION

CONTRACT NO.
APPROVALS | DATE
--- | ---
DRAWN BY | JY 9/86
CHECKED BY | 5/94
ENG.B. | A
DESIGN ACTIVITY: |
ACCEPTED BY |

DRAWING NUMBER: 5101515
REV. | 1 OF 1

MODEL 174 OR 175 FRONT P.C.B. SOLDER SIDE

ZONE | REV | DESCRIPTION | DATE | APPROVALS
--- | --- | --- | --- | ---
NEW | NEW | ISSUE | JY 9/86 |
NOTES: UNLESS OTHERWISE SPECIFIED:

1. PULL ON TERMINAL BLOCK WITH PLIERS
   FOR EASE OF WIRING.

2. INSTALL WIRES, THEN PUSH TERMINAL
   BLOCK ON PIN HEADER.