

## L7224 Series Oil Electronic Aquastat® Controller

### TECHNICIAN'S QUICK REFERENCE GUIDE

The following service procedure provides a quick overview for L7224 Series Controllers. For more information, refer to form 69-1384.

On the L7224U the High Limit, High Limit Differential, Low Limit, and Low Limit Differential can be adjusted to the settings recommended by the boiler OEM.

### Adjusting Settings

To discourage unauthorized changing of Aquastat® settings, a procedure to enter the adjustment mode is required. To enter the adjustment mode, press the **UP**, **DOWN**, and **I** buttons simultaneously for three seconds. Press the **I** button until the feature requiring adjustment is displayed:

- HL—High Limit.
- LL—Low Limit.
- Ldf—Low Limit differential.
- F - C—°F or °C.

Then press the **UP** and/or **DOWN** buttons to move the set point to the desired value. After 60 seconds without any button inputs, the control will automatically return to the READ mode.

To use the L7224U in a cold start boiler application, disable the Low Limit function by pressing the **UP** arrow button, **DOWN** arrow button and **I** buttons simultaneously for three seconds. Then push the **I** button until **LL** is displayed. Then press the down arrow button until **OFF** is displayed.

### Display

In the RUN mode, the Aquastat® will flash "bt" (boiler temp) followed by the temperature (i.e., 220), followed by °F or °C.

To read boiler settings, press the **I** key to read the parameter of interest. For example, press **I** (HL) High Limit is displayed, followed by a three-digit number, i.e., 220, followed by °F or °C.



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Pressing the I button again will display the **LL** (Low Limit) followed by a three-digit number and the corresponding degree designator. See the table below for an explanation of display readout.

After approximately 60 seconds without any key presses, the display will enter a dim display mode. To return to the bright display mode, simply press and release any key.

Text	Description	Display Shows
<i>bt</i>	Boiler Temperature	bt
<i>HL</i>	High Limit	HL
<i>LL</i>	Low Limit	LL
<i>Hdf</i>	High Limit Differential	Hdf
<i>Ldf</i>	Low Limit Differential	Ldf
<i>tt</i>	Local Thermostat Status	tt
<i>tte</i>	EnviraCom Thermostat Status	tteE
<i>brn</i>	Burner Status	brn
<i>cir</i>	Circulator Status	cir
<i>Zc</i>	Zone Control	Zc
<i>Zr</i>	Zone Request	Zr
<i>err</i>	Error Code	err
<i>f</i>	Degrees Fahrenheit	oF
<i>c</i>	Degrees Celsius	oC

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**Table 1. LED Error Codes**

Error Code	Cause/Action
Err1	Sensor fault; check sensor.
Err2	ECOM fault; check EnviraCOM. wiring.
Err3	Hardware fault; replace control.
Err4	B1 fault; check B1 wiring/voltage.
Err5	Low Line; Check L1-L2, 110 Vac.
Err6	Fuse; Check ECOM wires, Replace fuse.
Err7	EEPROM, HL, LL, Hdf, Ldf, Reset to default values.
Err8	Repeated B1 fault (voltage present at B1 when output is turned off); check B1 wiring/voltage.

**Table 2. L7224 Controller Operating Sequence**

Action	System Response
Thermostat calls for heat.	Circulator starts when water temperature is above Low Limit setting (if applicable). Boiler temperature is checked. Burner starts when water temperature is below High Limit setting.
Boiler exceeds the High Limit.	Burner is turned off. Burner restarts when the water temperature drops below the High Limit setting minus the differential.
Thermostat is satisfied.	Circulator and burner turn off.
Error conditions 1-5.	If an error condition is detected, all outputs except ZC are shut down. Burner is off. Control continues to function and restarts when error is corrected. During the error check sequence, the system checks for drift in the sensor and corrosion in the connections.
Error conditions 6-7.	If error condition 6 or 7 occurs, the control has reset the High Limit, Low Limit and Differential Setting to a default setting and will continue to run at those settings. Performance of the system will be degraded.
Error condition 8.	If the error condition is detected, all outputs except ZC are shut down. Burner is off. Control continues to function and restarts when all three user keys have been pressed longer than 60 seconds.

## Troubleshooting

When attempting to diagnose system performance, reference the LED display to help identify specific areas not working properly. The LED display will scroll "err", followed by a digit (1-8). See Table 1 for a description of the error and suggested actions. See below for a troubleshooting guide.

**Table 3. Troubleshooting Guide<sup>a</sup>.**

System Condition	Diagnostic Condition	Check	Action
Boiler is cold, house is cold	Display is OFF	120 Vac system power.	Turn system power on.
	Display is ON; TT-LED is OFF	24 Vac T-T	No 24V; replace control
	Display is ON; TT-LED is OFF	24V present; disconnect thermostat, short T-T	Boiler starts, check wiring and thermostat

<sup>a</sup>. Refer to Fig. 5 for Display and LED locations.

<sup>b</sup>. ZC LED ON indicates ZC terminal power is OFF.

<sup>c</sup>. ZC LED OFF indicates ZC terminal power is ON.

**Table 3. Troubleshooting Guide<sup>a</sup>.**

<b>System Condition</b>	<b>Diagnostic Condition</b>	<b>Check</b>	<b>Action</b>
Boiler is cold, house is cold	Display is ON; TT-LED is ON B1 LED is ON	120 Vac at B1-B2	<ul style="list-style-type: none"> <li>• If no, replace control.</li> <li>• If yes, check burner and wiring</li> </ul>
	Display is ON; TT-LED is ON	Refer to <b>err</b> on display	—
Boiler is hot, house is cold	Display is ON; TT-LED is ON C1 LED is ON	120 Vac at C1-C2	<ul style="list-style-type: none"> <li>• 120 Vac at C1-C2, check wiring to pump</li> <li>• Wiring ok, is pump running? If not, replace the pump.</li> <li>• If pump is running, check for trapped air or closed zone valves.</li> </ul>
	Display is ON; TT-LED is ON C1 LED is OFF; ZC LED is ON <sup>b</sup>	Boiler below the Low Limit temperature, wait for boiler to go above Low Limit temperature.	
	Display is ON; TT-LED is ON ZC LED is OFF <sup>c</sup>	Boiler above LL? If yes, check for 120 Vac between ZC and L2	<ul style="list-style-type: none"> <li>• If no 120 Vac, replace control.</li> <li>• If yes, check zone relays, circulators and wiring.</li> </ul>

<sup>a</sup>. Refer to Fig. 5 for Display and LED locations.

<sup>b</sup>. ZC LED ON indicates ZC terminal power is OFF.

<sup>c</sup>. ZC LED OFF indicates ZC terminal power is ON.

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