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# SERVICE INFORMATION

## CONTROLS

**Date:** 02-01-05

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**To:** Service Manual Holders
National, International and Canada
Field Sales and Waynesboro Personnel

**Subject: EZ Cool LIOC setup with the Quantum™ LX Control Panel**

Use the write-up on the following pages as a guide to setting up and tuning the EZ Cool LIOC with the Quantum LX Control Panel.

You may obtain more information on the Quantum™ Control Panel by visiting www.frickcold.com

Please feel free to contact me direct at 717-765-2472 if you have any questions regarding this letter or any other controls related issue you may have.

Sincerely,

Product Support Specialists
York Refrigeration / Frick Controls
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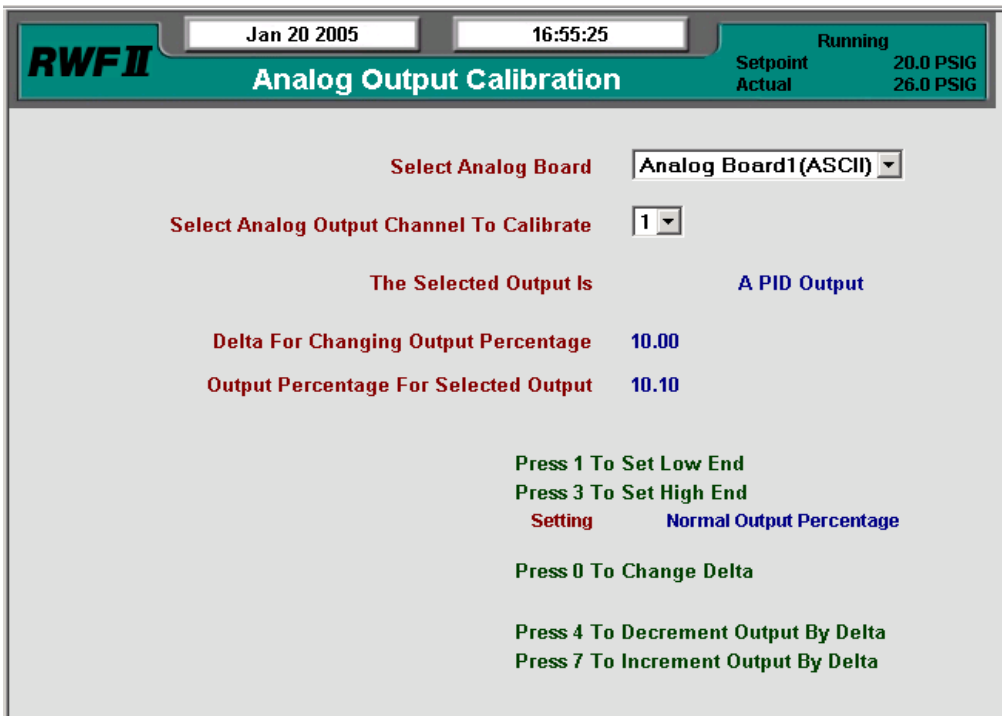
# EZ Cool LIOC setup with the Quantum LX Control Panel

Use the following directions in setting and tuning the EZ Cool LIOC with a Quantum LX Control Panel. Also, please see manual S90-022 O (Operation-Service) for an overview of PID control with the Quantum LX control panel.

The first procedure that needs to be completed is the calibration of the analog output used for EZ Cool LIOC. Typically this will be analog output #1 for PID #1.

- Power down the panel and remove the two control wires for the valve from terminals 1 & 2 of the P11A terminal strip of analog board #1.
- Place the leads of a calibrated, quality meter to terminal one (positive) and terminal two (negative). Set the meter to read mA DC and power up the panel.
- Set operating session to session [2] and go to the screen shown in fig. 1 by pressing [**Menu**] > [**Calibration**] > [**Analog Outputs**] > [**Output Calibration**].

Fig.1




- Press #1 on the keypad to drive the output to the low end. Using numbers 4, 7 and 0 on the keypad to increase and decrease the output and change the “Delta For Changing Output Percentage” setpoint, set the output to 4mA.
- If the read value is less than the objective of 4 or 20mA use 7 on the keypad increase the output by the delta. If the read value is more than the objective use 4 to decrease the value by the delta.
- Use the 0 key to change the delta from 10 to 1, .10 or .01% to tune the output to the objective of 4 or 20mA.
- Press #3 on the keypad to set the output to the high end and repeat the process in the preceding steps to set the output to 20mA.
- Power down the panel, remove the meter and reconnect the control wires for the EZ Cool LIOC valve as they were removed to terminals 1 & 2 of the P11A terminal strip of analog board #1.

**Description of the Proportional Band and the Gain setpoints**

- **Proportional Band** – This setpoint determines the size of a region either above or below the Control Setpoint. Within this region the Proportional component of the PID Output value is the number between 0% and 100% that directly corresponds to the difference between the Control Input (*Actual*) and the Control Setpoint (*Setpoint*). Outside of this region the Proportional component is either 100% or 0%. If the PID Action is Forward, the Proportional Band extends above the Control Setpoint. If the PID Action is Reverse, the Proportional Band extends below the Control Setpoint.

- **Proportional Gain** - This value is calculated from the Proportional Band setpoint and is the same value that was entered as a Proportional Gain setpoint in the Quantum. The control setpoint will not be achieved with proportional control only. Integral control is needed to further correct the control input to achieve the setpoint.

- **Integral Gain** - This setpoint controls the influence the Integral component exerts on the PID Output value. The Integral component works to push the Control Input toward the Control Setpoint by tracking the difference between the Control Input and the Control Setpoint over time.

- **Derivative Gain** - This setpoint controls the influence the Derivative component exerts on the PID Output value. The Derivative component reacts to rapid changes in the value of the Control Input by predicting the direction the Control Input is traveling and then turning it back toward the Control Setpoint.

**Example of Proportional Only Control:**

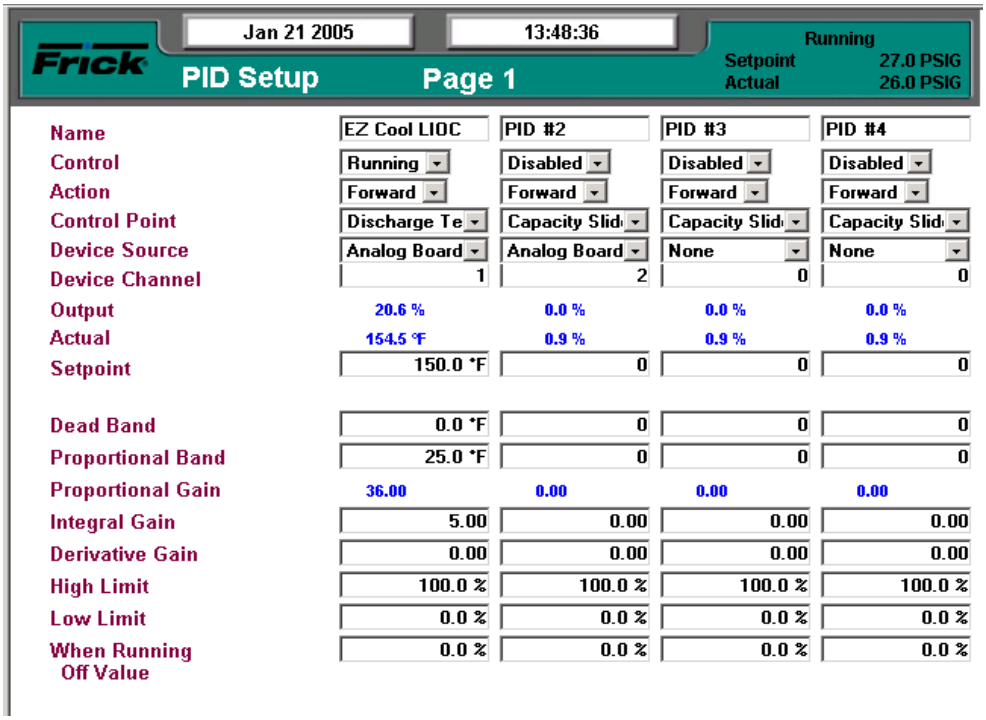
Control Input: Discharge Temperature
Control Setpoint: 150° F
Dead Band: 0° F
Proportional Band: 25
Action: Forward

- Using the chart below, as long as the control input is 155°F the output will be at 20% with proportional control only. Integral control will increase the output in increments, over time, to correct the control input to the setpoint

| Control Input | Output % |
|---|---|
| 150° F | 0% |
| 155° F | 20% |
| 160° F | 40% |
| 165° F | 60% |
| 170° F | 80% |
| 175° F | 100% |

Based on these descriptions set PID #1 for EZ Cool LIOC per Fig. 2 as a starting point. Tuning of the output will be required. There should be no need to use a derivative gain.

Fig. 2




Notes:

A. It is advised to set the “Liquid Slugging” Alarm and Shutdown setpoints to 90 to prevent nuisance shutdowns during the tuning process. Be sure to return these setpoints to their original values when finished.

B. While the discharge temperature will be the Control Point, it reacts quickly to adjustments. Be sure to allow an adjustment to the proportional band or integral gain setpoints the opportunity to counter and correct the control input (discharge temperature) before making additional adjustments.

C. Tune the output by making small adjustments of 1-5 to the Proportional Band and .1-.5 of the Integral Gain setpoints. Adjust only one at a time, allowing each adjustment time to settle out.