

OPERATOR'S MANUAL

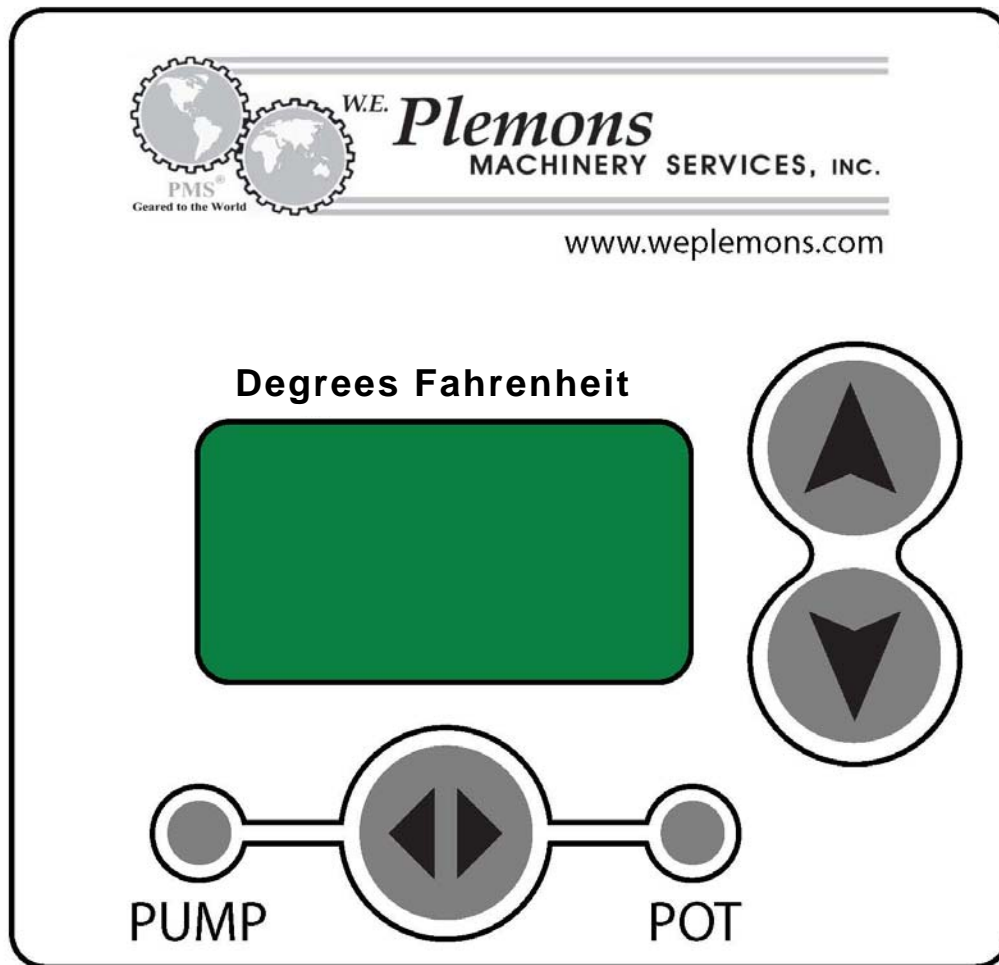


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Introduction

This two-channel temperature controller regulates and displays the temperature of two independent, electrically-heated regions nomenclated as ‘PUMP’ and ‘POT’. A single display can show the current temperature of either region.

An LED indicator lights to show which temperature is currently being displayed. While a channel’s temperature is being displayed, its current setpoint can be displayed by momentarily pressing either the ‘UP’ or ‘DOWN’ button.

Temperature sensing is done by two customer-supplied PT100 RTD temperature sensors.

Front Panel Operation

Overview

The front panel is shown in Figure 1. The gray regions with arrowheads are embossed buttons. The rectangular region represents the numeric LED display. Two buttons referred to as the ‘UP’ (with the up-facing arrowhead) and ‘DOWN’ (with the down-facing arrowhead) are located to the right of the numeric display. A channel-select button (with double horizontal arrowheads) is located between the two channel indicating LEDs under the numeric display.

The three digit LED display normally shows the temperature of either the pot or pump heater. The temperature being displayed is announced by the ‘PUMP’ and ‘POT’ indicators below the numeric display.

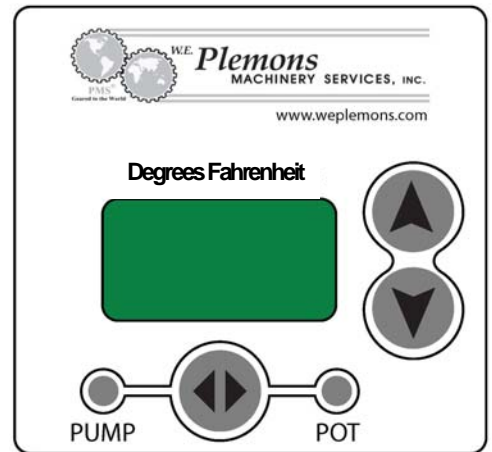


Figure 1: Controller Front Panel.
Actual size is about 2 3/4 x 3 inches.

Selecting channel display mode

The operator can manually select which temperature is being displayed with the channel-select button, or the controller can be set to automatically toggle between displaying the two temperatures.

In automatic display mode the controller alternately displays the PUMP and POT temperatures for about three seconds each. In manual display mode the temperature display changes to the other channel only when the channel-select button is pressed.

To change display modes, press and hold the channel-select button for several seconds until ‘PUMP’ and ‘POT’ LEDs as well as all the digits of the numeric display blink.

The controller will always immediately switch the display to the other channel when the channel-select button is pressed and released.

Viewing and altering setpoint

The setpoints of the heaters can be individually adjusted in 1 degree Fahrenheit increments.

Only the displayed channel’s setpoint can be viewed or altered. To view a channel’s setpoint, either wait for it to be displayed (in auto mode) or use the channel-select button

to force its display. Once the desired channel is displayed, momentarily press then release either the 'UP' or 'DOWN' button to the right of the temperature display. The display will briefly show 'SP' to indicate SetPoint mode and then the current setpoint for the active channel will be displayed as a blinking number.

To alter the setpoint, use the 'UP' or 'DOWN' buttons to alter the displayed temperature to the desired value while it is blinking. After several seconds of no button activity, the display stops blinking and again shows the current temperature of the selected channel. **The new setpoint is now in effect.**

Calibrating Probes

An offset calibration can be applied to both channels. This allows the temperature indicated by each channel's probe to be adjusted to agree with the end user's reference thermometer.

Only the displayed channel's setpoint can be calibrated. To adjust a channel's calibration, either wait for it to be displayed (in auto mode) or use the channel-select button to force its display. Once the desired channel is displayed, press and hold both the 'UP' or 'DOWN' buttons to the right of the temperature display until the display shows 'C O', then release both buttons and wait for the display to blink the current indicated temperature. While the temperature is blinking, it can be adjusted to the desired value using the 'UP' and 'DOWN' buttons.

After several seconds of no button activity, the display stops blinking and again shows the current temperature of the selected channel. **The new calibration is now in effect.**

Error Indications

The control monitors heater and probe operation. When any of the error conditions described below occur, the display is set to the error code (see Table 1), the channel indicator is set to the channel in error and both heaters are turned off.

The power to the controller must be turned off and back on to clear the error condition.

Probe malfunction

Both temperature sensors are continuously monitored for 'short' and 'open' conditions. If either condition is detected in a channel, the numeric temperature display for that channel is replaced by one of the probe error codes shown in Table 1 below.

An 'open' probe fault is due to a break in the probe leads, a poor connection at the screw terminal or a failure of the probe itself.

A 'shorted' probe failure is due to an unrealistically low resistance between the probe leads (possibly caused by pinched wires) or a failure of the probe itself.

Heater Failure

Both heaters are monitored for adequate heat output. If either channel can not get to setpoint in 45 minutes, the numeric temperature display for that channel is replaced by the 'Not Heating' error code shown in Table 1 below.

Reference Error

The reference for the temperature measurement system is tested periodically. If a problem is detected, the 'Reference Error' code shown in Table 1 below.

A 'Reference Error' is caused by circuit component failure and can not be repaired in the field.

Error Condition	Error Code Displayed	Comment
Probe Open	Er1	Heater drive is disabled while these errors are being displayed.
Probe Shorted	Er2	
Not Heating	Er3	
Reference Error	Er4	

Table 1: Error Code Display

Control Installation

Overview

The controller is implemented on a single circuit board intended for mounting onto four standoffs projecting behind a punched metal panel. A supplied lexan overlay provides front panel trim.

220 VAC operating power and heater loads are connected to spade lugs on the controller circuit board. The two 100-Ohm Platinum RTD sensors are each connected to a two position screw terminal.

Mechanical installation

Front Panel Preparation

Figure 2 shows the mechanical requirements for the front panel. The cutouts allow access to the buttons, indicators and numeric display. The four standoffs to which the circuit board mounts project from the back side of the panel.

Controller Circuit Board Installation

The controller circuit board is attached to the four standoffs projecting from the back of the metal panel using four #4-40 screws. The use of a lock washer under each screw is strongly recommended.

Front Panel Overlay Installation

The supplied, self-adhesive graphics overlay is applied to the front of the metal panel to provide the front panel trim.

The panel must be applied so that the three embossed button areas are centered on the three ½ inch diameter holes in the panel, and the rectangular window lines up with the rectangular display cutout.

Start by peeling the adhesive cover sheet down about ¼ inch from the top so that only a narrow strip of adhesive is exposed, then position the overlay and tack it in place with the exposed adhesive and verify correct location. Once the overlay is tacked down in the correct position, carefully peel off the adhesive cover sheet completely and rub the overlay firmly in place to set the adhesive.

Plemons two channel temperature controller

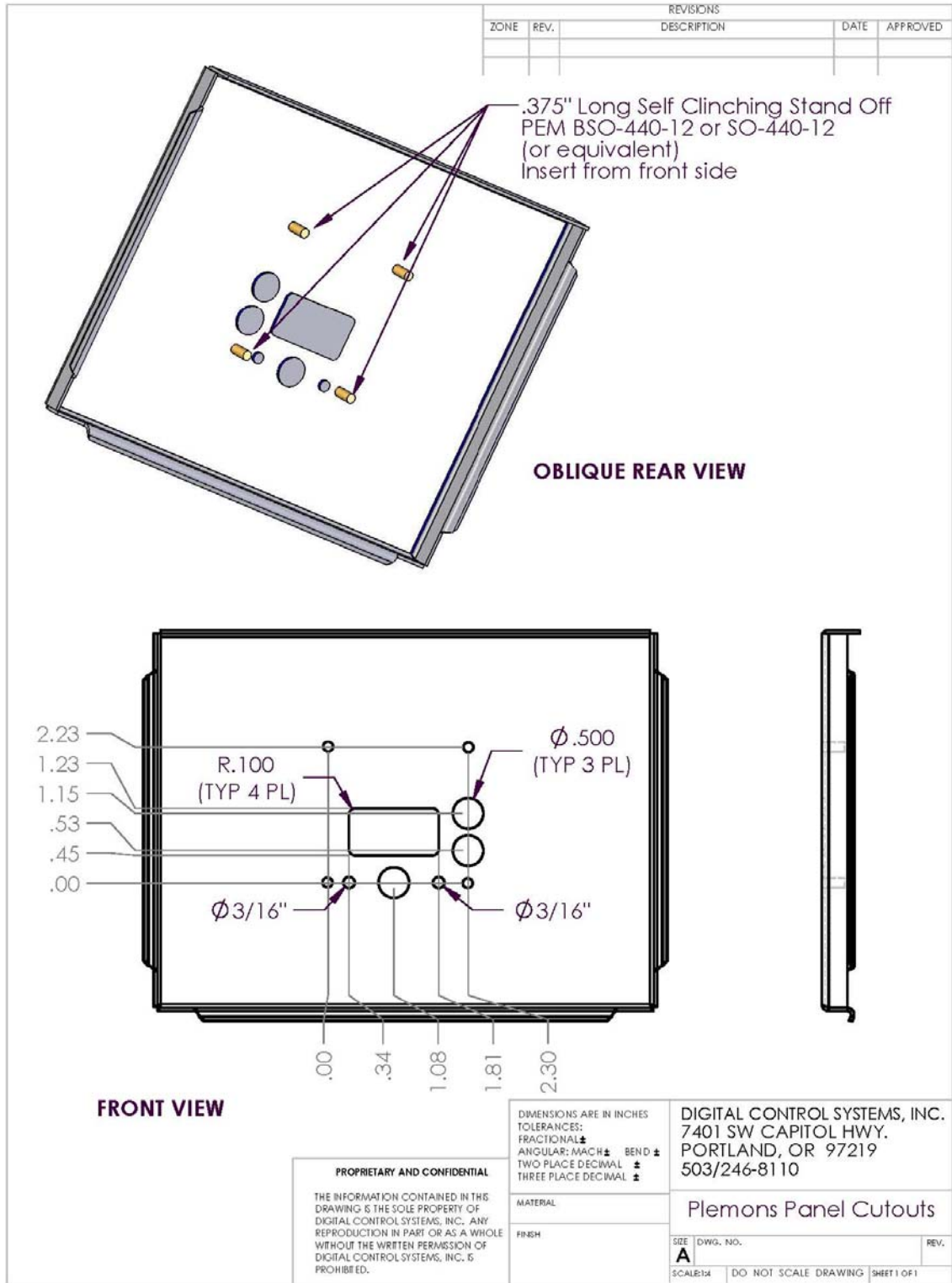


Figure 2: Front Panel Mechanical Drawing

Electrical Connection

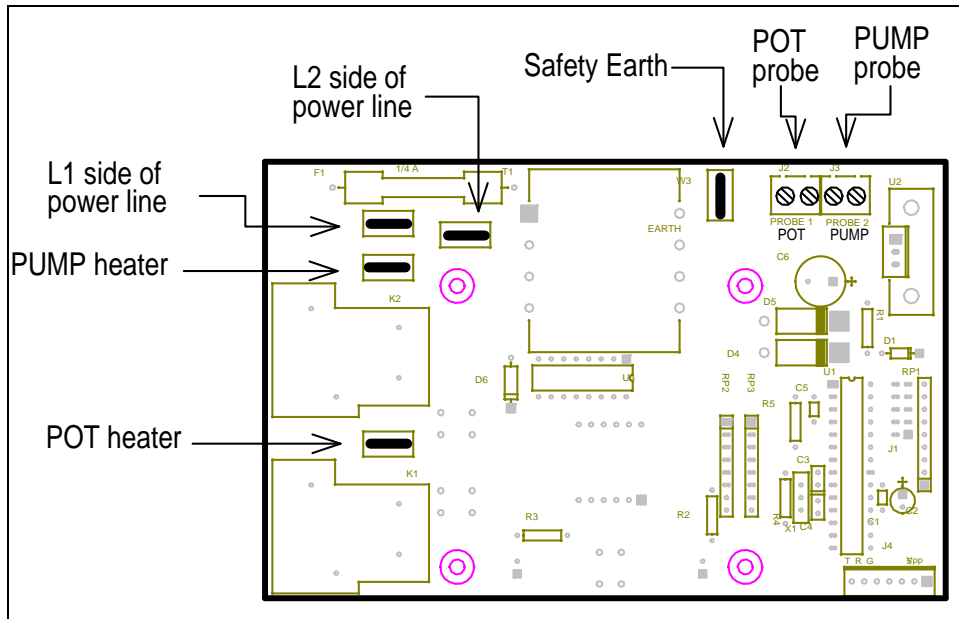


Figure 3: Back view of controller circuit board as seen when mounted to panel

Name	Function	Comments
L1 Side of Power Line	This terminal is electrically connected to the heater outputs when the respective heaters are energized by the controller	The full heater load current of both heaters flows through this connection.
L2 side of power line	Power line return connection for controller's operating power	Only the (very small) operating current of the controller itself flows through this connection.
Safety Earth	Earth ground is connected to this terminal	The ground side of the low voltage power supply is connected to earth.
PUMP heater	One side of the PUMP heater is connected here	The other side of both PUMP and POT heaters must be connected to L2 side of power line.
POT heater	One side of the POT heater is connected here	

Table 2: Power Connections

Overview

Figure 3 shows the back view of the controller circuit board with all the electrical connections. The temperature probes are connected to the two, 2 position screw terminals in the upper right hand corner. Operating power is 220 volts, single phase. All power connections are made with 1/4 " 'quick connect' spade lugs.

Plemons two channel temperature controller

Temperature sensor connection

This controller uses two PT100 RTD sensors to sense the temperature at the 'PUMP' and 'POT' locations. They are connected to two adjacent pairs of 2 position screw terminals located near the upper right hand corner of the controller circuit board. The temperature sensors are not polarized; either lead can be connected to either of the two terminals.

Power and Load Connection

All power and load connections are made to 1/4" 'quick connect' spade lugs mounted on the circuit board. The location of the power connections is shown in Figure 3. The individual connection points are described in Table 2 below.

Specifications

Parameter	Specification	Comments
Operating Voltage	240 Vac (nominal)	
Controller Power Consumption	Less than 10 W	Excluding load power
Ambient Temperature	160 °F	Max at controller ECB
Heater Channels	2	
Max Heater Current	9 AMPS rms	Per channel
Load Voltage	240 Vac (nominal)	
Power And Load Connection	1/4 " quick connect terminals (spade lugs)	
Control Relay Life	1.5 million cycles	Typical per manufacturer's testing
Temperature Sensor	100-Ohm RTD	User supplied
Temperature Sensor Connection	2 position screw terminal	Sensor is electrically isolated from mains
Controlled Temperature Range	60 – 400 °Fahrenheit	
Setpoint Range	60 – 400 °F	
Control Hysteresis	1 to 20 °F	Set to 5 °F at the factory
Display Resolution	1 degree Fahrenheit	
Numeric Display	3 digit green LED, 0.56" tall	
Error Detection	Sensor failure (open or short)	'Er1' or 'Er2' in temp display
	Heater failure	'Er3' in temp display

Limited Warranty and Remedies.

Unless otherwise stated, DCS warrants to Buyer that for **two years** from the date of shipment of Products to the Buyer that Products will substantially conform with the product specifications agreed to by DCS. This warranty is not transferable.

This warranty does not cover:

- Defects due to misuse, abuse, or improper or inadequate care, service or repair of Products;
- Defects due to modification of Products, or due to alteration or repair by anyone other than DCS; or
- Problems that arise from lack of compatibility between DCS' Products and other components used with those Products or the design of the product into which Products are incorporated. Buyer is solely responsible for determining whether Products are appropriate for Buyer's purpose, and for ensuring that any product into which Products are incorporated, other components used with DCS' Products, and the purposes for which DCS' Products are used are appropriate and compatible with those Products.

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To obtain service under this warranty, unless DCS agrees otherwise, Buyer must obtain a returned material authorization (RMA) number, pack any nonconforming Product carefully, and ship it, postpaid or freight prepaid, to the address provided when the RMA number is issued. Buyer must include a brief description of the nonconformity. Any actions for breach of this warranty must be brought within six months of the expiration of this warranty.

If DCS determines that a returned Product does not conform to the warranty in this section, it will either repair or replace that Product, at DCS's discretion, and will ship the Product back to Buyer free of charge. At DCS's option, DCS may choose to refund to Buyer the purchase price for a nonconforming Product instead of repairing or replacing it.

Units returned for service under this warranty and determined on examination to be operating properly are subject to a service charge.