A vent filter heater system is an additional option for the Thermo Scientific HyClone Single-Use Bioreactor (S.U.B.) system. It is supplied as an accessory for those customers who require it to protect the vent filter on the standard S.U.B. BPC®.

Thermo Scientific HyClone Single-Use Bioreactor Vent Filter Heater

Overview:

The resistive heating element is fully insulated with molded silicone foam and is easily secured around the filter by use of two snap retainers. This custom molded heater creates a perfect fit that will fully encapsulate the exhaust filters for consistent temperature regulation. The temperature controller is preset specifically for the HyClone Single-Use Bioreactor (S.U.B.) at 50°C and has an adjustable temperature range of 0-220°C. Temperatures above 60°C are not recommended for the filters used on the S.U.B. The controller has programmable logic and is equipped with a low temperature alarm output. The vent filter heater system stands alone and does not integrate with the control system of the S.U.B. controller. The system consists of the following components: Heater, Controller and Power Cord. Refer to the vent filter user's manual included.

System Components and use:

1. Place heater over filter

Vent Filter in S.U.B. BPC
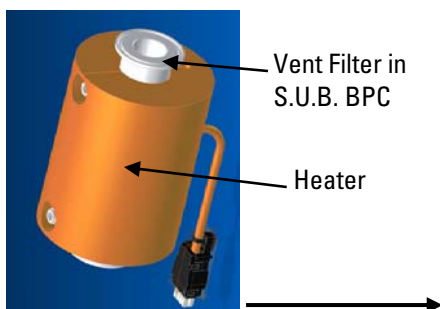
Heater

2. Attach connector to controller

MKS Controller

3. Attach controller to electrical supply

Power Cord

Ordering Information

Part Number	Description	Additional Information
SV50191.01	Vent Filter Heater with Programmable Controller (100-120 VAC)	Includes low temp alarm. Preset temperature 50°C
SV50191.02	Power Cord (100-120 VAC)	For use in U.S./Japan, NEMA 5-15P with 12' leads
SV50191.03	Vent Filter Heater with Programmable Controller (200-240 VAC)	Includes low temp alarm. Preset temperature 50°C
SV50191.04	Power Cord (240 VAC)	For use in United Kingdom, BS1363 with 10' leads
SV50191.05	Power Cord (240 VAC)	For use in Europe, CEE7/7 with 12' leads
SV50191.06	Power Cord (100-120 VAC)	For use in U.S./Japan, NEMA 5-15P with 12' leads and GFCI
SV50191.07	Power Cord (240 VAC)	For use in United Kingdom, BS1363 with 12' leads and GFCI
SV50191.08	Power Cord (240 VAC)	For use in Europe, CEE 7/7 with 12' leads and GFCI
SV50191.09	Extension Cord for Series 48 Heater (100-240 VAC)	For use between heater and controller, 10'
SV50191.10	Vent Filter Heater with RTD (two wire Pt-100), (100-120 VAC/17-24 W)	Includes sheathed 20' pig-tail lead

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Thermo
SCIENTIFIC

Series 48

Integrated Temperature Controller

User's Manual

For more information or literature, contact:

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Table of Contents

Introduction

The Series 48 Temperature Controller is a powerful instrument that integrates a temperature process controller, high-low temperature alert, and power switching with a safety high limit that meets UL® 1998 and CE 60730 requirements. The optional display and communications modules can be easily upgraded in the field to provide a digital display, adjustable control parameters, RS485 MODBUS communications and other interface features. The compact design, inherent reliability and integrated safety limit functions make this controller a tremendous value. The controller is designed for easy integration with HPS heaters providing additional value to simplify the engineering and component count on new equipment. CE compliance and UL recognition will reduce time and costs necessary for global agency testing and validation for OEMs.

Features & Benefits

Standard Base Module

- Re-settable high temperature safety limit device, eliminates thermal fuse and allows for easy reset after an over temperature event
    - Redundant limit circuitry with dedicated TC and limit relay
    - Limit relay is latching and can be reset by cycling power
- Low Temperature Alert / High Temperature Alert (LTA/HTA) integrated into control circuitry
- Dedicated mechanical relay output for LTA/HTA
- LED for local LTA/HTA alarm indication
- Set points for both LTA and HTA are field programmable
- Modular Communication and HMI Module
    - Separate plug-in module adapts to Base Control Unit
    - Can be retrofit in field at any time
    - Provides capability to display temperature, and adjust set point
    - Also provides capability to add serial communications
- 3 LEDs included to provide (1) Load Light, (2) HTA/LTA indication, (3) High Limit indication and general alarms
- Backwards compatible with Series 46 and Series 45
- Plug and play heater installation
- UL/C-UL Listed, CE, Semi S2

Optional Communications Module

- Field adjustable set point
- Access to PID parameters
- Modbus RTU Communications
- RS485 Interface
- 3-character, 7-segment LED display
- User Interface Software

Specification & Dimensions

- (2) Type K Thermocouple Inputs: Process Temperature Controller and Safety Limit.
- Isolated Universal Power Supply: 100 to 240VÅ (ac) 50/60Hz
- Ambient operating temperature range 0 to 70°C
- Process Temperature Output: 10 amp "No Arc" relay
- Safety Limit: 10 amp relay
- High-Low Temperature Alert: 2 amp, 30Vı (ac/dc), Form A relay
- On-Off and PID temperature control algorithm. Upgraded via communications to PID algorithm (minimum cycle time 5 seconds).
- Control Method: On/Off control mode, 3 Deg C hysteresis. PID control mode available with HMI Module. Receives set-point through display module, or communication link and stored in nonvolatile memory
- Address Assignment: via set up menu through keypad or software interface.
- Three LED's: Green (output action), Yellow (in range) Red (fault)
- Temperature Range: 0-220°C

Power
- Input Power: 85 - 264 VAC
- Control Output : Mechanical Relay, 277VAC Max, 50-60hz, 10.0A max
- Safety Limit Output: Mechanical Relay, 277VAC Max, 50-60hz, 10.0A max
- LTA/HTA Output: Mechanical Relay, 30 VDC Max, 2.0A Max

Environment
- Indoor use only
- Maximum Storage Temperature: 185°F (85°C)
- Minimum Storage Temperature: 0°F (-18°C)
- Maximum Operating Temperature: 158°F (70°C)
- Minimum Operating Temperature: 32°F (0°C)
- Relative Humidity: 5-95% (non condensing)

Dimensions

Configuration	Width	Depth	Height
Basic Unit	88.8 mm (3.496 in)	40.2 mm (1.582 in)	55.8 mm (2.196 in)
With Mounting Bracket	88.8 mm (3.496 in)	48.4 mm (1.907 in)	55.8 mm (2.196 in)
With communications display modules & mounting bracket	88.8 mm (3.496 in)	63.6 mm (2.503)	55.8 mm (2.196 in)

Safety Agency Testing
- UL/C-UL Listed, CE, Semi S2

Navigating the Front Panel

The three-character display normally shows the process temperature. Press the Mode Key once to view the Set Point value. The right decimal point will illuminate when viewing the Set Point value. Press the Up-Arrow or Down-Arrow Key to change the Set Point. Press the Mode Key again to return to the process temperature display. Otherwise the display will automatically return to showing the process temperature after three seconds.

To view or change parameter values, hold down both the Up-Arrow and Down-Arrow Keys for three seconds. This will display the Set Point High Limit prompt. Press the Mode Key to view the other parameter prompts. Press the Up-Arrow or Down-Arrow Key once to view a parameter's value. Press the Up-Arrow or Down-Arrow Key to increase or decrease that value. Press the Mode Key to again display the prompt and again to display the next prompt. Press the Mode Key at the Prototype Version prompt to return to the process value display.

Display	Parameter Name & Description	Range	Default	Access
	Set Point Set the set point.	0°C (32°F) to Set Point High Limit	150°C (302°F)	read/write
SLA	**Set Point High Limit Alarm** Set the temperature at which the limit will turn off the heater.	105 to 220°C (221 to 428°F)	200°C (392°F)	read/write
HEA	**High Alert Set Point** Set the high temperature that will trigger an alert.	1 to 99°C (2 to 178°F)	20°C (36°F)	read/write
LEA	**Low Alert Set Point** Set the low temperature that will trigger an alert.	-5 to -99°C (-9 to -178°F)	-20°C (36°F)	read/write
Cnt	**Control Mode Select** Select a control method.	onF on-off PId PID	onF on-off	read/write
HYS	**On-Off Hysteresis** Set the how far below the set point the temperature can drop before the heater turns on.	5 to 50	3°C (6°F)	read/write
Pb	**Proportional Band** Set the proportional band.	0 to 67°C (0 to 122°F)	0°C or F	read/write
InE	**Integral** Set the integral value.	0 to 999	0	read/write
dEu	**Deviation** Set the deviation value.	0 to 999	0	read/write
CE	**Cycle Time** Set the cycle time.	5 to 60	10	read/write
AbE	**Ambient Temperature** View the ambient temperature.			read only
Adr	**Modbus Device Address** View the controller release version.	1 to 247	1	read/write
bAU	**Modbus Baud Rate** Select the communication speed.	96 96 192 19,200 384 38,400	96 96	read/write
EU	**Temperature Units** Select the temperature scale.	F C	C	read/write
bru	**Base Release Version** View the controller's base release version.			read only
bPu	**Base Prototype Version** View the controller's base release version.			read only
bbu	**Base Build Number** View the controller's base build number.			read only
dru	**Interface Release Version** View the interface's release version.			read only
dPu	**Interface Prototype Version** View the interface's prototype version.			read only
dbu	**Interface Build Number** View the interface's build number.			read only

Keys and Indicator Lights

Alarm (flashing red)
Indicates that the process temperature is higher than the Set Point High Limit Alarm value.

Alert (solid red)
Indicates that the process temperature is higher than the High Alert Set Point

In Range (solid yellow)
Indicates that the process temperature is between the High Alert Set Point and Low Alert Set Point values.

Output (green)
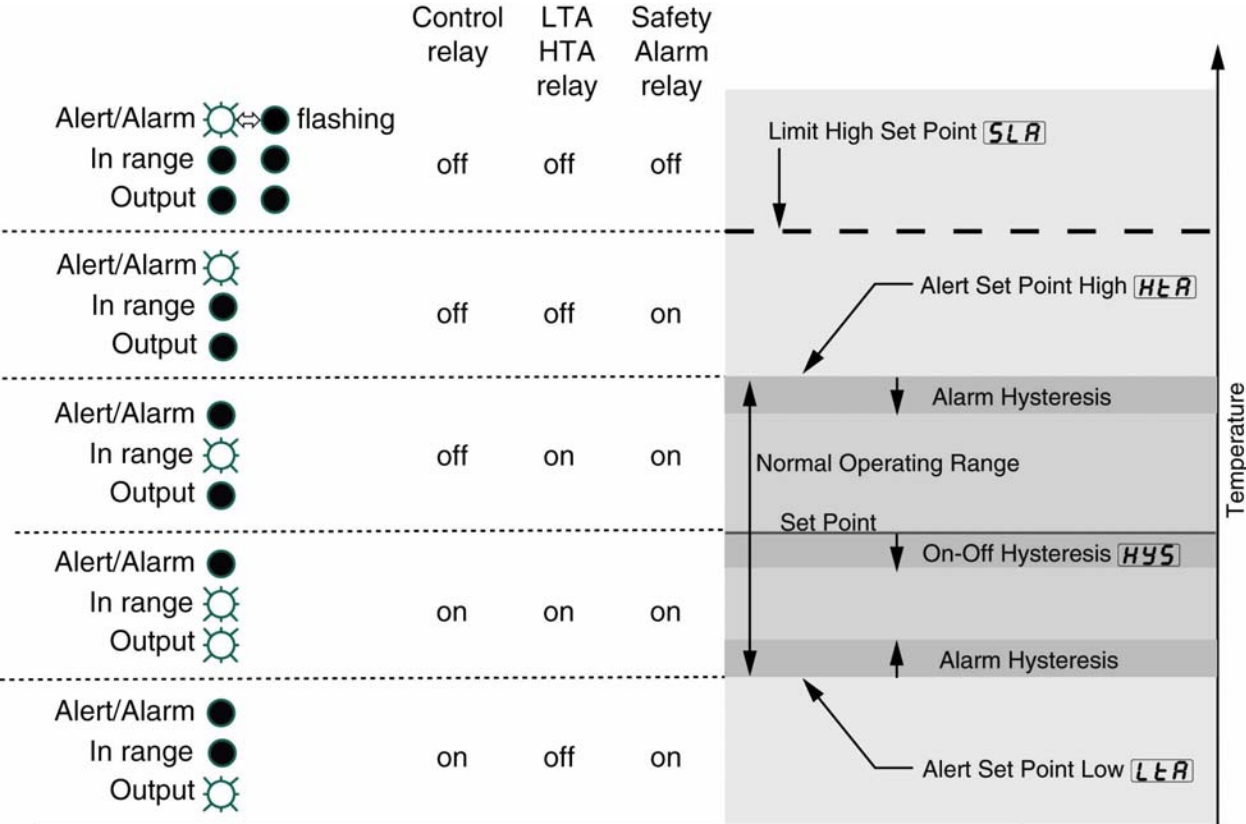Indicates that the process temperature is below the set point and the output is on.

Up-Arrow Key
Increases the displayed value.

Mode Key
Toggles the display between the set point and process temperature.

Down-Arrow Key
Decreases the displayed value.

Flashing Alert/Alarm (red)

In Range (yellow)

If they are flashing together, that indicates an Ambient Alarm (controller temperature higher than 85°C).

If they are flashing alternately, that indicates a Health Check Error.

Keys and Indicator Lights (cont.)

	Control relay	LTA HTA relay	Safety Alarm relay	
Alert/Alarm ☼⇔● flashing In range ● ● Output ● ●	off	off	off	Limit High Set Point $\boxed{5LR}$
Alert/Alarm ☼ In range ● Output ●	off	off	on	Alert Set Point High $\boxed{HLR}$
Alert/Alarm ● In range ☼ Output ●	off	on	on	Alarm Hysteresis Normal Operating Range Set Point
Alert/Alarm ● In range ☼ Output ☼	on	on	on	On-Off Hysteresis $\boxed{HY5}$ Alarm Hysteresis
Alert/Alarm ● In range ● Output ☼	on	off	on	Alert Set Point Low $\boxed{LLR}$
Alert/Alarm ☼⇔● flashing In range ☼⇔● flashing Output ● ●	off	off	off	Ambient Alarm $\boxed{RbL}$ 85°C
Alert/Alarm ☼⇔● alternate In range ●⇔☼ flashing Output ● ●	off	off	off	Health Check Error

Proportional Control

Some processes need to maintain a temperature or process value closer to the set point than on-off control can provide. Proportional control provides closer control by adjusting the output when the temperature or process value is within a proportional band. When the value is in the band, the controller adjusts the output based on how close the process value is to the set point. The closer the process value is to the set point, the lower the output power. This is similar to backing off on the gas pedal of a car as you approach a stop sign. It keeps the temperature or process value from swinging as widely as it would with simple on-off control. However, when the system settles down, the temperature or process value tends to "droop" short of the set point. With proportional control the output power level equals (set point minus process value) divided by the proportional band value.
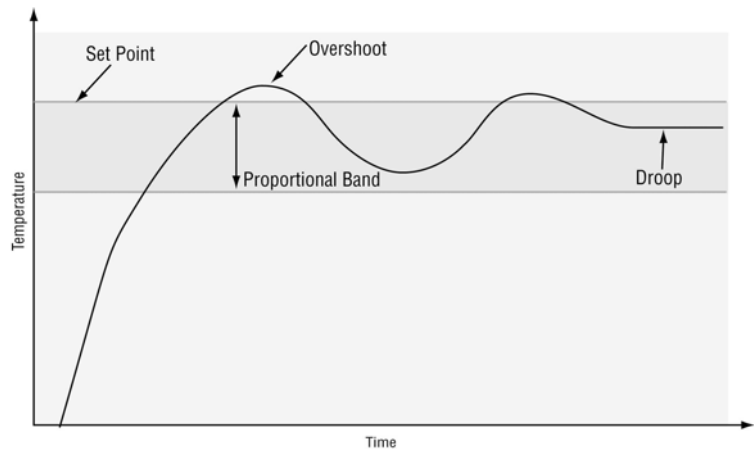
Proportional Control

Adjust the proportional band with Proportional $Pb.$

Proportional Plus Integral (PI) Control

The droop caused by proportional control can be corrected by adding integral control. When the system settles down, the integral value is tuned to bring the temperature or process value closer to the set point. Integral determines the speed of the correction, but this may increase the overshoot at startup or when the set point is changed. Too much integral action will make the system unstable. Integral is cleared when the process value is outside of the proportional band.

Integral Int is measured in minutes per repeat. A low integral value causes a fast integrating action.

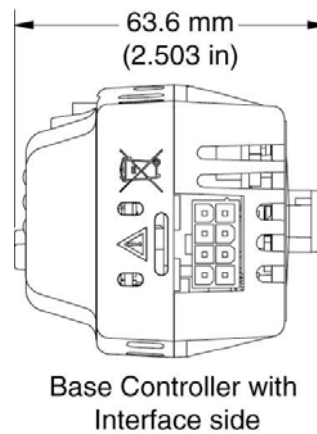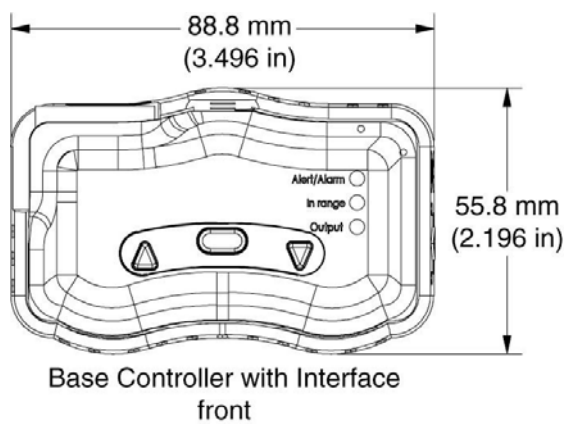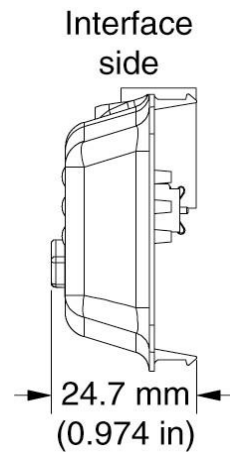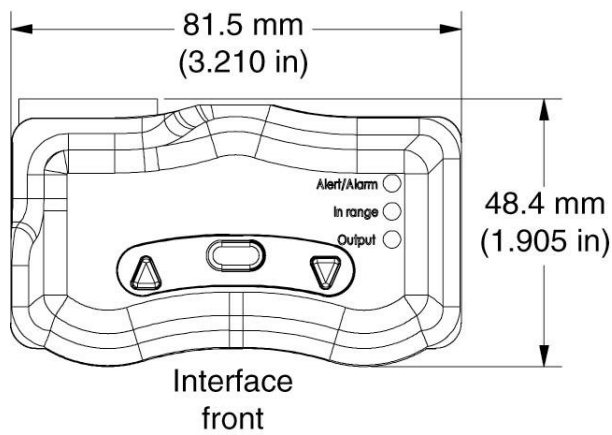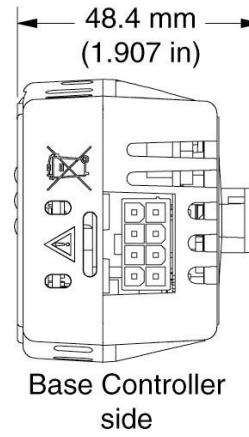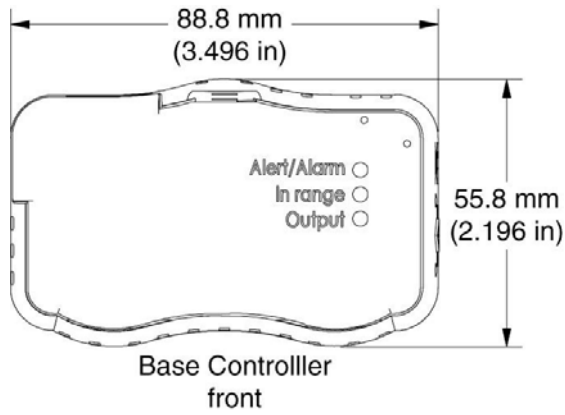## Proportional Plus Integral Plus Derivative (PID) Control

Use derivative control to minimize the overshoot in a PI-controlled system. Derivative $dE.u$ adjusts the output based on the rate of change in the temperature or process value. Too much derivative will make the system sluggish.
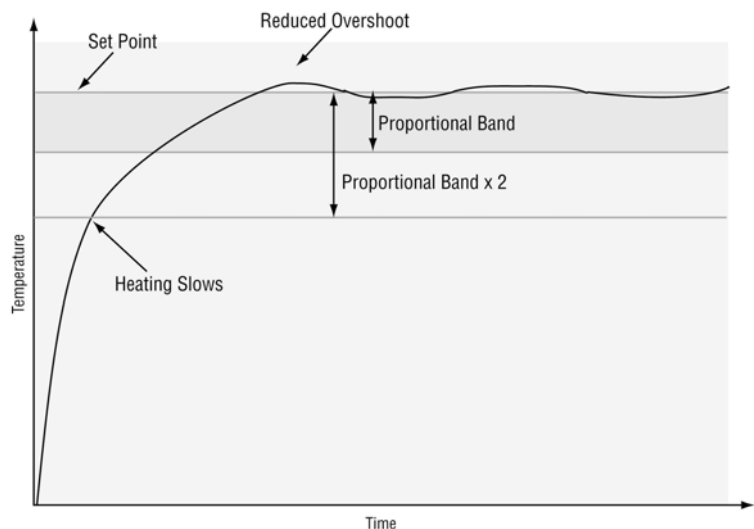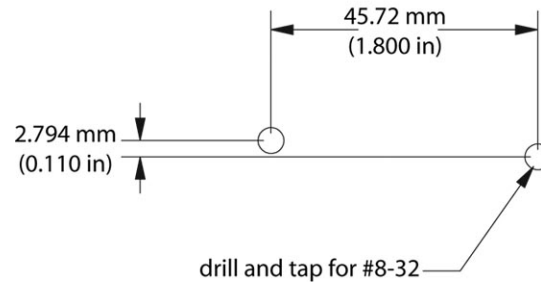

PID Control

Mounting the Series 48 Controller

88.8 mm
(3.496 in)

Alert/Alarm ○
In range ○
Output ○

55.8 mm
(2.196 in)

Base Controlller
front

48.4 mm
(1.907 in)

Base Controller
side

81.5 mm
(3.210 in)

Alert/Alarm ○
In range ○
Output ○

48.4 mm
(1.905 in)

Interface
front

Interface
side

24.7 mm
(0.974 in)

88.8 mm
(3.496 in)

Alert/Alarm ○
In range ○
Output ○

55.8 mm
(2.196 in)

Base Controller with Interface
front

63.6 mm
(2.503 in)

Base Controller with
Interface side

Mounting the Series 48 Controller

Panel Mount Dimensions


Mounting Bracket

The Series EHG SL 10 mounting bracket lets you mount the controller in any of four angles. After disconnecting both wiring connectors, gently rotate the controller counterclockwise until it unlocks from the mounting bracket. Re-orient the controller on the mounting bracket and gently rotate it clockwise until it locks.
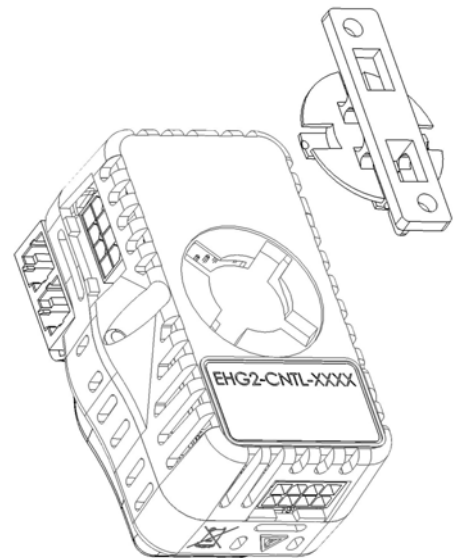
Wiring the Series 48 Controller
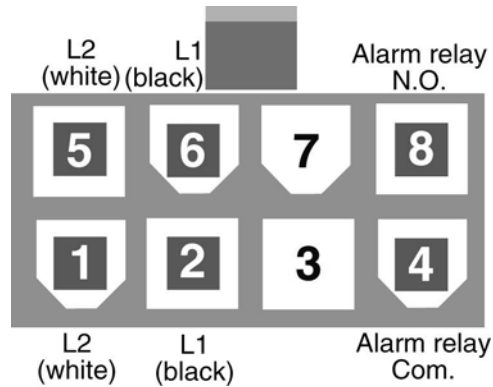
Power and relay connector
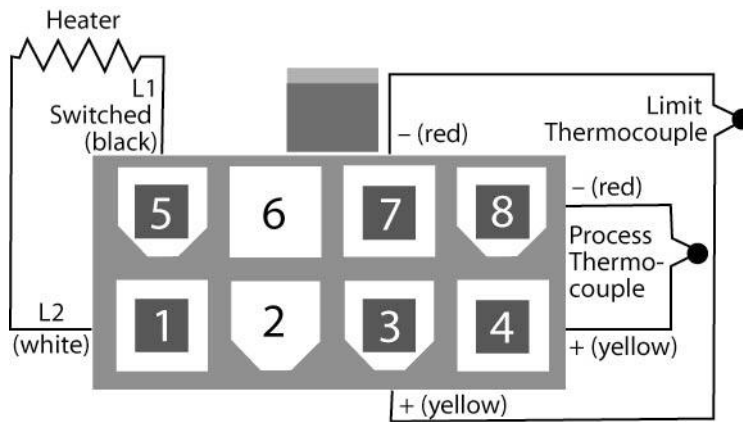
Thermocouple and heater connector

Ordering Information