# Temperature Controllers

## Designed to Control Thermoelectric Assemblies

**Stock Locator**

Laird Technologies' temperature controllers are specifically designed to control thermoelectric assemblies, (TEAs) in a closed loop system. Feedback from a temperature sensor is used to vary the output of the power supply to control the temperature of an enclosure. Laird offers three types of controllers: Single Directional Thermostatic, Bi-Directional Thermostatic, and Proportional Integral Derivative (PID) (Programmable).

A Single Directional Thermostatic Controller can maintain a constant temperature set point within an enclosure surrounded by a relatively constant ambient temperature. The set point tolerance is defined by a hysteresis range. Once the set point is achieved, the controller shuts off the TEA. When the control temperature changes to outside the hysteresis range, the controller turns on power to the TEA and restarts the cooling mode process. This cycle continues until the controller is shut down. Thermostatic control is often used in refrigeration mode in an indoor environment with climate control, where a narrow temperature swing can be tolerated. Laird Technologies offers two standard single directional thermostatic temperature controllers, QC-50 and QE-50.

A Bi-Directional Thermostatic Controller operates in the same manner as a Single Directional Controller, except output can operate in both Heating and Cooling mode. Controllers with a bi-directional output are used for maintaining a constant temperature within an enclosure surrounded by an ambient environment with a much larger temperature swing. This is commonly experienced in an outdoor environment. Laird Technologies offers two standard Bi-Directional Thermostatic Controllers, LE-80 and LK-81. Note these controllers are sold with the Outdoor Cooler Series only. They are not sold separately.

Proportional Controllers use proportional regulation to maintain a constant temperature with no swing in the control temperature. This is accomplished by using a PID algorithm to determine the output value and a Pulse Width Modulation (PWM) output to handle the physical control. Proportional Controllers are often used in heating and cooling systems where the temperature must stay constant (with no change) regardless of the change in ambient temperature. Laird Technologies offers two standard programmable controllers. The PR-59 is mountable at system level and comes with software to connect to PC. Settings can be adjusted while running TEA, which is beneficial for product development. The MTTC-1410 is a simpler bench top controller that can control TEA to specific set point by push button control. Temperature controllers can accommodate more advanced options. Outputs are available for fan, thermoelectric module, thermistor, tachometer sensor on fan, overheating thermostat switch, alarm and LED. However, interface with Laird Technologies is required to customize temperature controller settings to meet your unique application requirements. Consult with a Laird Technologies engineer on customized solutions relating to specific design criteria. MOQ applies.

**\*Note:** Bi-Directional Thermostatic controllers are sold as option for Outdoor Cooler Series TEAs. They are not sold separately.
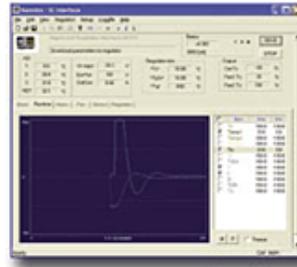




Snapshot of graphical user interface showing run time graph of temperatures and PID parameters for PR-59.

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| Item # | Item Name | Regulation Type | Settings | Accuracy | Hysteresis | Low Voltage Protection | Output Voltage |
|---|---|---|---|---|---|---|---|
| LK-81* | Bi-Directional Thermostatic | ON/OFF | Cool >25 ºC Heat <10 ºC | ±2.0 ºC | 3.0 ºC | Yes | N/A |
| LE-80* | Bi-Directional Thermostatic | ON/OFF | Cool >35 ºC Heat <5 ºC | ±2.0 ºC | 3.0 ºC | No | N/A |
| TC-XX-PR-59 | Programmable PID Controller | PWM | Sensor dependent | Sensor Dependent | Software Selectable | Software Selectable | N/A |
| TC-18-QC-50 | Single Directional Thermostatic | ON/OFF | Cool >5ºC Off <2 ºC | ±1.0 ºC | 3.0 ºC | Yes | N/A |
| TC-18-QE-50 | Single Directional Thermostatic | ON/OFF | Cool >35ºC Off | ±1.0 ºC | 3.0 ºC | Yes | N/A |
| MTTC-1410 | Benchtop Controller | PWM | N/A | N/A | N/A | N/A | 3, 7, 12 and 14 VDC |

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