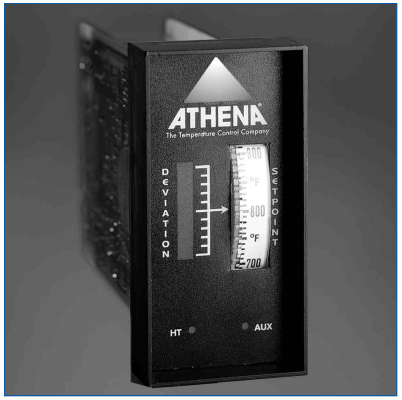
ATHENA
The Temperature Control Company

SERIES 1810

1/8 DIN TEMPERATURE CONTROLLER



Instruction Manual

Introduction

Congratulations on your purchase of an Athena Series 1810 Temperature Controller. It is designed for ease of use and reliability wherever accurate setpoint control is required.

Standard features of this controller include a choice of four output types: relay, triac, mAdc, or Vdc. An optional second output is also available. Both models indicate output status by illumination of an appropriate LED. Output 1 de-energizes when an open sensor is detected.

If you have questions or require any assistance regarding the use of this instrument, please contact your Athena representative or call technical support at 1-800-782-6776. Outside the U.S., please call 610-828-2490.

Note: Model identification is found on the serial number tag located on the case.

Precautions

After unpacking, inspect the instrument for any physical damage that may have occurred in shipping. Save all packing materials and report any damage to the carrier immediately.

Features

Rugged aluminum case

Four output types available: mechanical relay, solid-state relay (triac), 4-20 mAdc, and pulsed 20 Vdc for SS contactor drive

Selectable fixed-ratio control, with no operator adjustments and no overshoot

Auto-resets for a load change

Output #1 de-energizes when an open sensor is detected

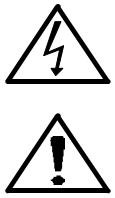
LED indication when output is present

LED indication when temperature exceeds setting and relay is energized (Dual output models)

Optional alarm

Optional proportional cooling available

Safety Warning



In addition to presenting a potential fire hazard, high voltage and high temperature can damage equipment and cause severe injury or death. When installing or using this instrument, follow all instructions carefully and use approved safety controls. Electrical connections and wiring should be performed only by suitably trained personnel.

Do not locate this instrument where it is subject to excessive shock, vibration, dirt, moisture, oil, or other liquids. The safe operating temperature range for this unit is 32°F to 140°F (0°C to 60°C).

Table of Contents

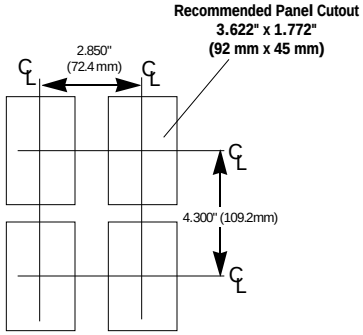
Installation

Measurements between centerlines of panel cutouts are the minimum recommended.

Unpacking and Inspection

1. Inspect shipping carton for obvious signs of mishandling.
2. After removing the controller from the shipping carton, inspect it carefully for damage. Never attempt to install and use a damaged unit.
3. Verify that the ordering code number indicated on the side of the controller matches what was ordered.

Figure 1.
Recommended Panel Layout for Multiple Controllers



Dimensions

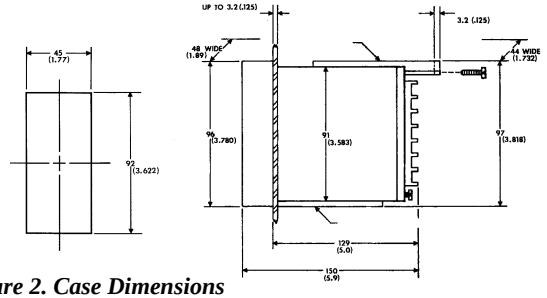


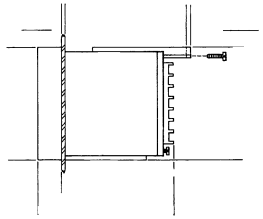
Figure 2. Case Dimensions

Mounting

Prior to mounting the Series 1810 in your panel, make sure that the cutout opening is of the right size, 1.77" x 3.622" (45 mm x 92 mm), and deburred to enable a smooth fit. A minimum of 4" (100 mm) of depth behind the panel is required.

Figure 3. Mechanical Components

The controller does not have to be removed from its housing for mounting. Remove the two screws in the back of the case that hold the mounting slides, and then remove the slides. Insert case from front of panel and reinstall the two slides and two screws. The length of the slides must be reduced if controller is to be mounted in an unusually thick panel.

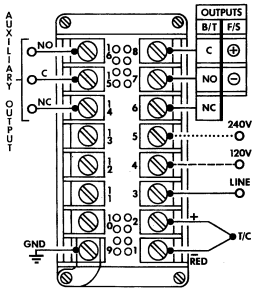


IMPORTANT: All electrical wiring connections should be made only by trained personnel, and in strict accordance with the National Electrical Code and local regulations.

Power and signal wires should always be kept separate. We recommend separating connecting wires into bundles: power; signal; alarms; and outputs. These bundles should then be routed through individual conduits. Shielded sensor cables should always be terminated at the controller end only, using the corner screw provided for that purpose.

If additional RFI attenuation is required, noise suppression devices such as an R.C. snubber at the external noise source may be used. If you wish, you may order this suppressor directly from Athena, part number 235Z005U01.

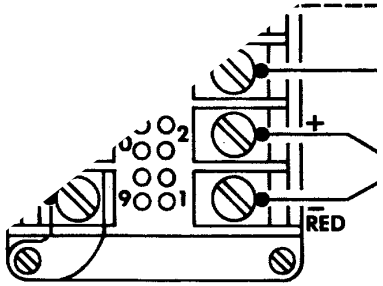
Figure 4. Contact Identification



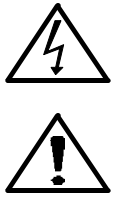
Thermocouple circuit resistance should not exceed 100 ohms for rated accuracy; errors will occur at higher resistance values. If shielded thermocouple wire is used, terminate the shield only at one end.

Figure 5. Thermocouple Input Wiring

Make sure that you are using the appropriate thermocouple and extension wire. Connect the negative lead (generally colored red in ISA-type thermocouples) to contact #2; connect the positive lead to contact #1. Extension wires must be the same polarity as the thermocouple.



Wiring



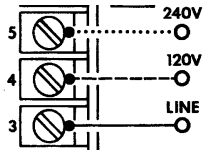
Power Wiring

The Series 1810 power supply accepts 120 or 240 V 50/60 Hz line power without any switch settings or polarity considerations. All connections should be made in accordance with the National Electrical Code and local regulations, using only NEC Class 1 wiring for all power terminals.

It is advisable, but not necessary, to fuse one leg of the incoming power line, contact #11, with a 2AG, 0.5 amp rated fuse. *It is recommended that instrument power and load power be fused independently.*

Make connections using proper size wire for rated controller load power circuits. (Use #14, 16, or 18 wire). Select proper terminal for power connection or damage to the controller may result.

Figure 8. Power Wiring Connection



Thermocouple Information

Proper thermocouple placement can eliminate many problems in the system. The probe should be placed so that it can detect any temperature change with little thermal lag. In a process that requires fairly constant heat output, the probe should be placed close to the heater. In processes where the heat demand is variable, the probe should be closer to the work area. Some experimenting with probe location can often provide optimum results.

After all connections are completed, set controller to the desired temperature and apply line voltage. If the temperature of the probe is below setpoint, the output LED on the front panel will light; simultaneously, the output will be activated to apply power to the load.

Standard Thermocouples

ISA Type	Materials	Color Code
J	Iron-Constantan (I/C)	White (+)/Red (-)
K	Chromel-Alumel (C/A)	Yellow (+)/Red(-)

3-Mode PID Setting

The 1810 PID controller has automatic reset action to anticipate overshoot and rapid load changes. The speed of correction can be selected with the 3-position slide switch located across from the setpoint dial. The mid position will match most process response times. For very fast systems, move the switch towards the middle of the board (as marked). Use this for sensor-on-heater, open coil forced air discharge, or other processes rising or falling at degree/seconds rates. For slow processes, such as storage tanks, massive blocks, or systems with large heater-to-sensor delays, move the switch out to the board edge to the slow position.

Output Types

Output Type	Description
Output 1	
B	10/8 A (120/240 Vac) relay, normally open, used for switching resistive loads. If relays or solenoids are to be driven, order snubber network 235Z005U01.
F	4-20 mA, full output to load with 1000 ohm impedance max. (suppressed).
S	0-20 Vdc pulsed, for solid-state relays.
T	1 A @ 120/240 Vac, solid-state relay, zero voltage-switched and optically isolated from drive signal. Larger loads may be controlled using an external contactor.
Output 2 (SPDT 2A/240 Vac relay)	
B	High alarm only
C	Low alarm only
D	High and low alarm
P	Proportional (cool)

Adjustments to Output #2

Alarm - B, C, D

Deviation alarm is triggered when the process deviates from the setpoint by a predetermined amount (±0.5% to ±5% of span). The 1810 can be ordered with either high, low, or high/low alarms.

1) Turn the adjustment (located behind the setpoint dial) clockwise to widen the span between the process setpoint and the alarm, or counterclockwise to narrow it.

2) To check the actual alarm point, simply change the setpoint until it agrees with the process indication (zero error). Then move the setpoint downward (for high alarm) or upward (for low alarm). When the alarm is triggered, check the display, it will show deviation in the amount that you have set on the alarm.

Cooling -P

The adjustment is located behind the setpoint dial. The range of adjustment is from 0.5% to 5% above setpoint. Turning clockwise will raise the cooling band above the heating band; counterclockwise will decrease the separation between the heating and cooling bands.

Technical Specifications

Input Specifications

Sensor	Thermocouple types J, K
Cold Junction Compensation	Electrical
Thermocouple Break Protection	Built-in upscale, failsafe to open sensor
Common Mode Rejection*	Maximum error ±1° C or equivalent ° F with 240 V 60 Hz applied as a common mode signal between sensor input and chassis ground
Series Mode Rejection*	Maximum error ±1° C or equivalent °F with series mode signal of 100 mV pk-to-pk at 60 Hz

*Applies to all models except “F” and “S” output types when used with other than Athena® SCRs or stagers.

Technical Specifications

Output Specifications

Output #1 Types	B = Mechanical relay, 10/8A @ 120/240 Vac T = SS relay, 1 A holding, 10 A inrush S = Pulsed dc, 0-20 Vdc F = 4-20 mAdc
Output #2 (optional)	SPDT 2A/240 Vac relay (for temperature deviation, adjustable ±0.5% to ±5% of span or for proportional cooling applications)

Performance Specifications

Temperature Range	32 to 131° F (0 to 55° C)
Setpoint Resolution	0.25% of span
Proportional Band	Heat: 5% fixed, Auto-adjust cycle time 10 second minimum Cool: 2% of range, fixed
Calibration Accuracy	±0.5% of span at calibrated points
PID Time Constant	
Fast	Rate (Derivative): 0.1 sec Reset (Integral): 20 sec
Medium	Rate (Derivative): 15 sec Reset (Integral): 80 sec
Slow	Rate (Derivative): 50 sec Reset (Integral): 330 sec

Technical Specifications

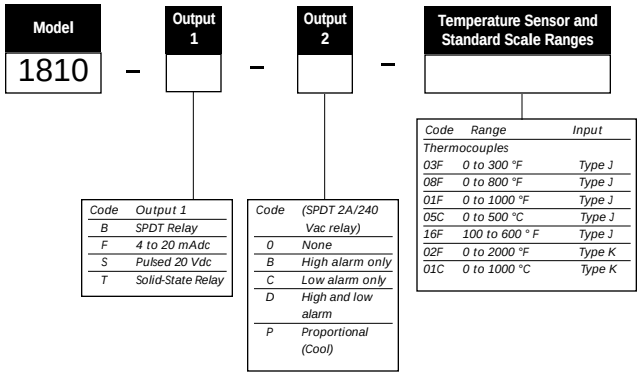
Displays and Indicators

Temperature	Direct-reading scale
Deviation	LED bar graph
Outputs	Red LEDs indicate when output is present and (dual output only) when temperature has exceeded the setting and the relay is energized.

Electrical Power Specifications

Input Voltage	120/240 V +10/-15%
Frequency	50/60 Hz
Power Usage	Less than 5 VA

Ordering Codes



Code	Output 1
B	SPDT Relay
F	4 to 20 mAdc
S	Pulsed 20 Vdc
T	Solid-State Relay

Code	(SPDT 2A/240 Vac relay)
0	None
B	High alarm only
C	Low alarm only
D	High and low alarm
P	Proportional (Cool)

Code	Range	Input
Thermocouples		
03F	0 to 300 °F	Type J
08F	0 to 800 °F	Type J
01F	0 to 1000 °F	Type J
05C	0 to 500 °C	Type J
16F	100 to 600 ° F	Type J
02F	0 to 2000 °F	Type K
01C	0 to 1000 °C	Type K

Warranty/ Repairs

Two-Year Limited Warranty

THIS EQUIPMENT IS WARRANTED TO BE FREE FROM DEFECTS OF MATERIAL AND WORKMANSHIP. IT IS SOLD SUBJECT TO OUR MUTUAL AGREEMENT THAT THE LIABILITY OF ATHENA CONTROLS, INCORPORATED IS TO REPLACE OR REPAIR THIS EQUIPMENT AT ITS FACTORY, PROVIDED THAT IT IS RETURNED WITH TRANSPORTATION PREPAID WITHIN TWO (2) YEARS OF ITS PURCHASE.

THE PURCHASER AGREES THAT ATHENA CONTROLS, INCORPORATED ASSUMES NO LIABILITY UNDER ANY CIRCUMSTANCES FOR CONSEQUENTIAL DAMAGES RESULTING FROM ITS USE OR FROM IMPROPER HANDLING OR PACKAGING OF SHIPMENTS RETURNED TO THE FACTORY.

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IT IS UNDERSTOOD AND AGREED THE SELLER'S LIABILITY WHETHER IN CONTRACT, IN TORT, UNDER ANY WARRANTY,

IN NEGLIGENCE OR OTHERWISE SHALL NOT EXCEED THE RETURN OF THE AMOUNT OF THE PURCHASE PRICE PAID BY THE PURCHASER AND UNDER NO CIRCUMSTANCES SHALL SELLER BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES. THE PRICE STATED FOR THE EQUIPMENT IS A CONSIDERATION IN LIMITING SELLER'S LIABILITY. NO ACTION, REGARDLESS OF FORM, ARISING OUT OF THE TRANSACTIONS OF THIS AGREEMENT MAY BE BROUGHT BY PURCHASER MORE THAN ONE YEAR AFTER THE CAUSE OF ACTION HAS ACCRUED.

SELLER'S MAXIMUM LIABILITY SHALL NOT EXCEED AND BUYER'S REMEDY IS LIMITED TO EITHER (i) REPAIR OR REPLACEMENT OF THE DEFECTIVE PART OR PRODUCT, OR AT SELLER'S OPTION (ii) RETURN OF THE PRODUCT AND REFUND OF THE PURCHASE PRICE, AND SUCH REMEDY SHALL BE BUYER'S ENTIRE AND EXCLUSIVE REMEDY. THE SPECIFICATIONS PUT FORTH IN THIS MANUAL ARE SUBJECT TO CHANGE WITHOUT NOTICE.

Unit Repairs

It is recommended that units requiring service be returned to an authorized service center. Before a controller is returned for service, please consult the service center nearest you. In many cases, the problem can be cleared up over the telephone.

Warranty/
Repairs

When the unit needs to be returned, the service center will ask for a detailed explanation of problems encountered and a Purchase Order to cover any charge. This information should also be put in the box with the unit. This should expedite return of the unit to you.

This document is based on information available at the time of its publication. While efforts have been made to render accuracy to its content, the information contained herein does not purport to cover all details or variations in hardware, nor to provide for every possible contingency in connection with the installation and maintenance. Features may be described herein which are not present in all hardware. Athena Controls assumes no obligation of notice to holders of this document with respect to changes subsequently made.

IEC Requirements

USE OF THIS EQUIPMENT IN A MANNER NOT SPECIFIED BY THE MANUFACTURER MAY IMPAIR PROTECTION PROVIDED BY THE EQUIPMENT!

The maximum supply current is line voltage dependent:

230 mA for a 24 Vac/dc input fuse rating=700 mA
35 mA for 120 V input fuse rating=100 mA

20 mA for 240 V input

Output Specifications

Output Type	Max current	Voltage	Leakage
B	8 A	250 Vac	1000 M ohms
T	1 A	250 Vpk	1 mA
S	20 mA	20 V	NA

CLEANING INSTRUCTIONS

1. Remove power from the unit prior to any cleaning operation.
2. Use a cotton cloth to gently and sparingly apply isopropyl alcohol only. Do not use cleaners or other solvents as they may damage the unit.
3. Allow the unit to dry completely prior to reapplying power.

Notes

For Technical Assistance in the U.S.,
Call Toll Free: 1-800-782-6776

ATHENA

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