

# CRYOGENIC EXPERTS, INC.

531 SANDY CIRCLE

OXNARD, CA 93030 - 0971  
World Wide Web <http://www.cexi.com>

Toll Free 1-800-FOR CEXI  
E-mail: [cexi@cexi.com](mailto:cexi@cexi.com)

Phone (805) 981-4500  
Facsimile (805) 981-4501

## Thermalogic AA3201-188 Change Out Procedure to Athena Series 88 Controller

Date: 12/21/00

Steps for changing out the Thermalogic thermocouple unit to the Athena Series 88 Controller

1. Turn off and lock off the power to the unit.
2. Check that the power is off in the unit with a voltmeter to be sure that the power is turned off before touching any of the electrical components.
3. Mark the wires with the terminal numbers on the Thermalogic that is installed in the unit. See the attached wiring diagram for the Numbers / Wire locations
4. Remove the wires from the old Thermalogic unit.
5. Remove the old Thermalogic unit from the vaporizer.
6. Install the new Athena Unit using the same bolt-holes. The Athena can be removed from its plastic mounting channel to allow the holes to be drilled into the channel to match the holes in the Thermalogic unit.
7. Remove the Thermistor from the thermowell or the casting (depending on whether it is a direct to process or pressure build unit)
8. Install the thermocouple in the same position that the thermistor was located. Make sure that thermocouple leads are not located near any power wire or 120-vac wire. If the thermocouple wire is routed with 120 vac or higher voltage wires, the controller may perform incorrectly. The high voltage may induce a voltage in the thermocouple wire.
9. Connect the thermocouple to the connections on the controller per the wiring diagram. Red to Minus and Blue to Plus. These connections are located on the opposite end of the controller from the main power terminals.

The wire transfer is as follows

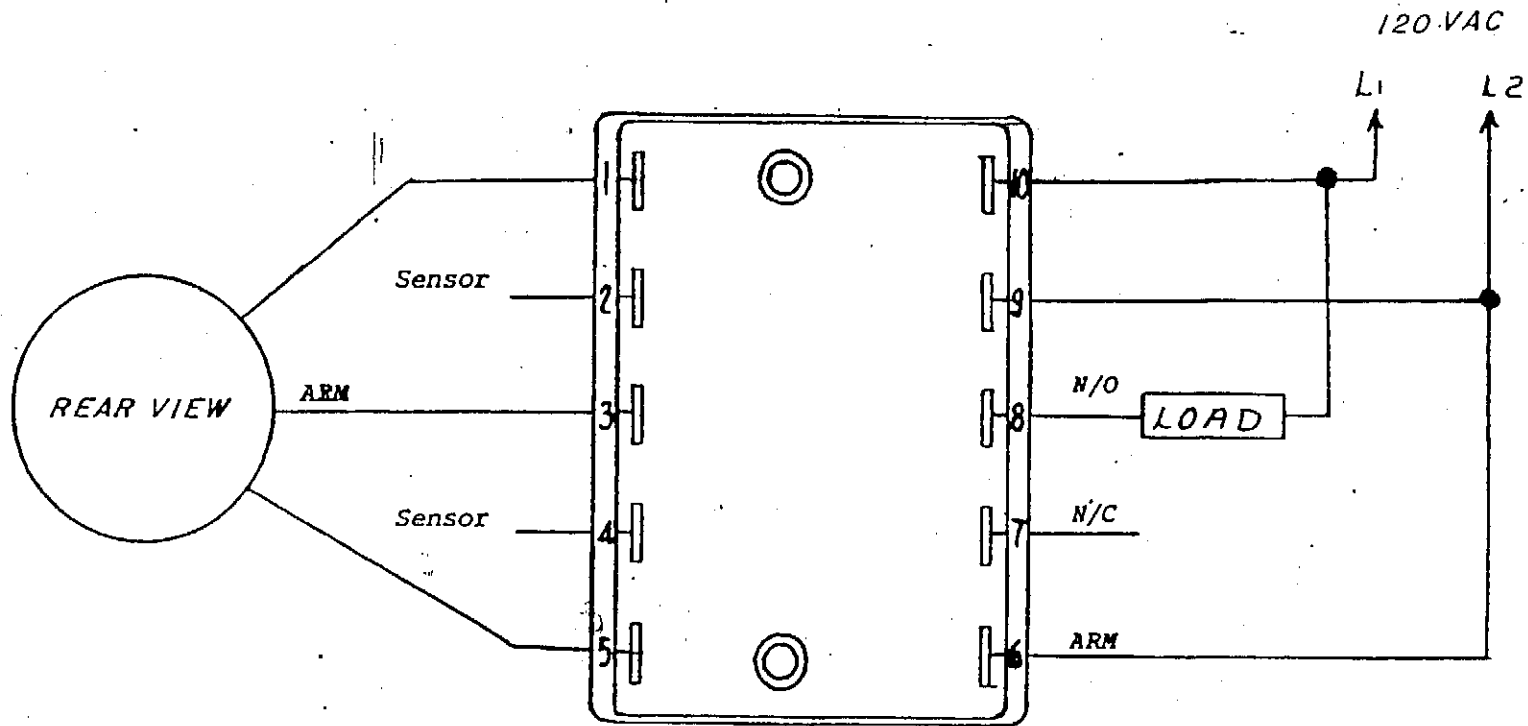
Old Thermalogic Terminal No.	New Athena Terminal No.
Terminal 10	120 Terminal
Terminal 9 (White wire)	LN Terminal (should be the white wire)

Terminal 6  
Terminal 8  
Terminal 7

C Terminal  
NO Terminal  
N/C Terminal

The potentiometer from the Thermalogic is to be removed - the Athena pot is attached to the controller simplifying the installation.

Model: 3201-999 Temperature Controller  
 Range: -58 TO 122°F



Calibration Procedure

1. Connect the module and its accessories as shown in the wiring diagram.
2. Connect the 7320 ohm calibration resistor in place of the sensor.
3. Place an indication mark on the panel the setpot is mounted to.
4. Connect dial to setpot.
5. Turn power on and slowly rotate dial until relay just turns on and off.
6. Loosen the dial set screw and rotate the dial only until the calibration point on the dial coincides with the indication mark on the panel.
7. Tighten the set screw.
8. Turn power off and reconnect sensor in place of calibration resistor.
9. Calibration is now complete and controller is ready for operation.



**Thermalogic**  
 Division of DYTRON, Inc.

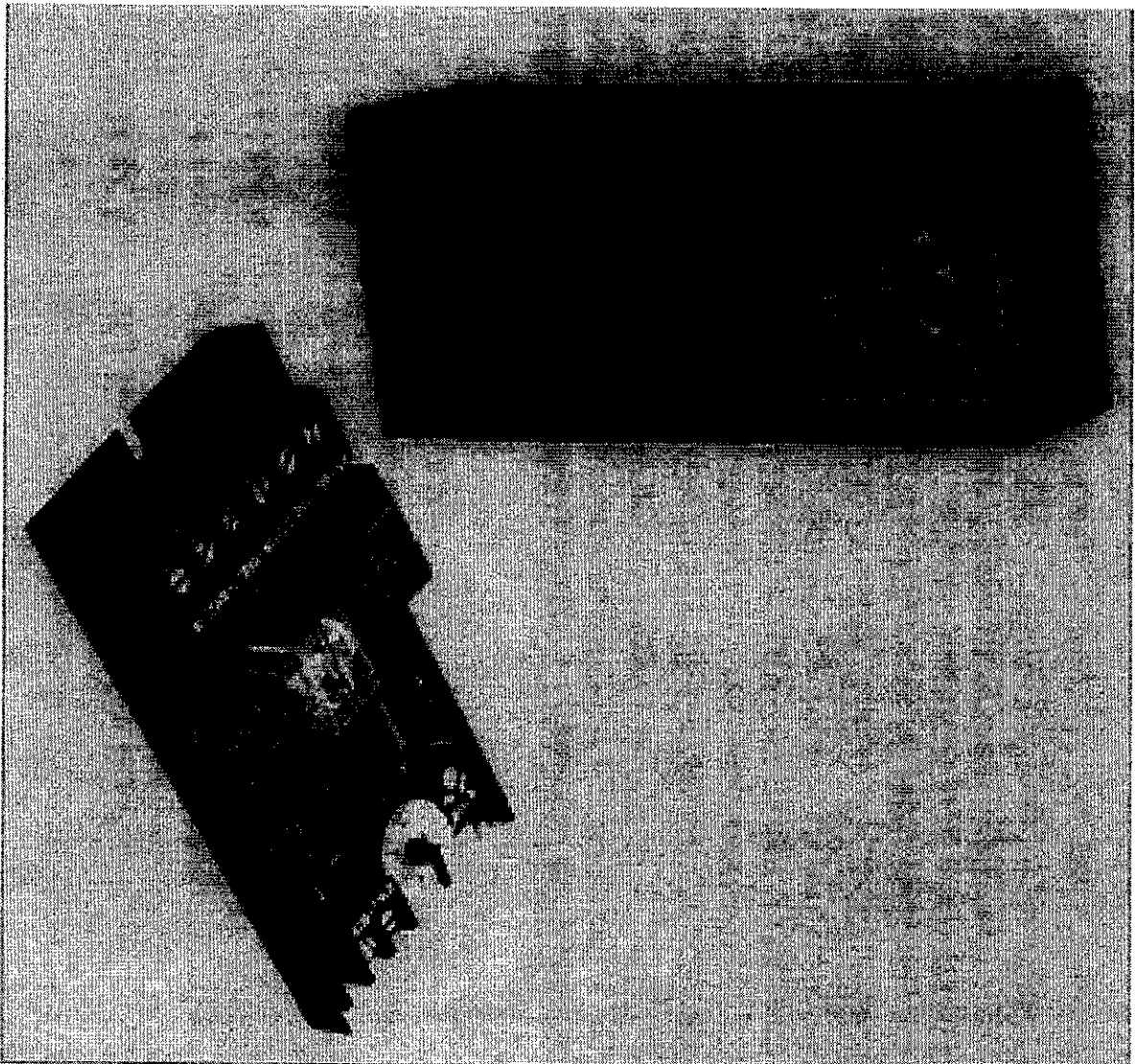
241 CRESCENT STREET, WALTHAM, MASS. 02154

TITLE		
Wiring Diagram		
BY	MODEL NO.	NUMBER
R.T.		3201-999
APP'D	DATE	
REV.	SHEET	OF

# SERIES 80 TEMPERATURE CONTROLLERS

---

Instruction Manual



MADE IN  
U.S.A.



---

# ATHENA

---

### **Warranty Limitations**

Other than those expressly stated herein, THERE ARE NO OTHER WARRANTIES OF ANY KIND, EXPRESS OR IMPLIED, AND SPECIFICALLY EXCLUDED BUT NOT BY WAY OF LIMITATION, ARE THE IMPLIED WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY.

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 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 THAT SUCH REMEDY SHALL BE BUYER'S ENTIRE AND EXCLUSIVE REMEDY.

# CONTENTS

<b>SECTION 1</b>	<b>GENERAL INTRODUCTION</b>	
1.1	General Description and Cautions	1
1.2	Configurations	1
1.3	Specifications	2
<b>SECTION 2</b>	<b>PRELIMINARY INSTRUCTIONS</b>	
2.1	Unpacking	3
2.2	Locating	3
2.3	Mounting	3
2.4	Wiring	5
2.5	Thermocouple Placement	5
<b>SECTION 3</b>	<b>OPERATION/MAINTENANCE</b>	
3.1	Operation	5
3.2	Limit Control	5
3.3	Adjustments	5
3.4	Maintenance	6
<b>SECTION 4</b>	<b>TROUBLESHOOTING</b>	
4.1	Troubleshooting Steps	7
<b>SECTION</b>	<b>REPLACEMENT PARTS</b>	
5.1	Replacement Part Numbers	8

## SECTION 1 GENERAL INTRODUCTION

### 1.1 GENERAL DESCRIPTION AND CAUTIONS.

The Athena Series 80 Controllers are designed for accurate temperature control of ovens, molds, hot stamping machines, packaging machinery, heat tracing, and for replacement of bulb and capillary type temperature controllers. Limit configurations have FM approval.

**CAUTION**

*Possible Fire Hazard. Because these temperature controls or associated equipment may not always fail safe, an approved temperature and/or pressure safety control should be used for safe operation.*

### 1.2 CONFIGURATIONS.

- A - Open PCB unit with set point on the PCB
- B - Open PCB unit with remote set point
- \* D - T case with set point on the case
- L - High limit controller, D configuration with reset button on case

\* - T case 86 series only

### 1.3 SPECIFICATIONS.

<b>Set Point:</b>	Single turn, 270° rotation Potentiometer (Local or Remote)
<b>Set Point Resolution:</b>	1% with circuit board potentiometer 1/4% with remote potentiometer
<b>Calibration Accuracy:</b>	1% at calibration points with remote potentiometer 2% at calibration points Potentiometer on circuit board
<b>Ambient Temperature Range:</b>	30° to 130° F Series 82 & 86 30° to 150° F Series 88
<b>Cold Junction Compensation:</b>	Internal electrical bridge
<b>Differential/Proportional Band:</b>	Adjustable from differential of 5° F to proportional band of 25° F
<b>Thermocouple Break Protection:</b>	UPSCALE
<b>Output:</b>	B - S.P.S.T. relay 10A/5A H - S.P.S.T. relay 15A S - Pulsed D.C. 0-20Vdc T - S.P.S.T. SS relay 1A
<b>Supply Voltage:</b>	120/240 ± 10% V 50/60 Hz.
<b>Power Consumption:</b>	2 watts
<b>Weight:</b>	1 pound, 8 oz. (0.68 kg) with case and cover



## SECTION 2 PRELIMINARY INSTRUCTIONS

### 2.1 UNPACKING.

Carefully unpack the instrument and inspect for shipping damage. Report any damage to the carrier immediately.

### 2.2 LOCATING.

Select a location for the controller where it will not be subjected to excessive shock, vibration, dirt, moisture and/or oil. The ambient temperature of the area should be between 30° F and 130° F (Series 82 & 86) 30° F and 150° F (Series 88)

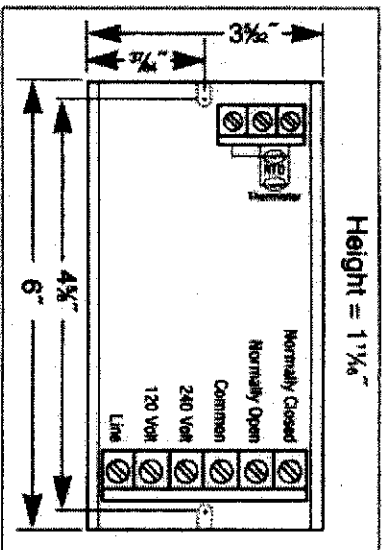
### 2.3 MOUNTING. (SERIES 82,86,88)

#### Panel Mounting, External Set Point:

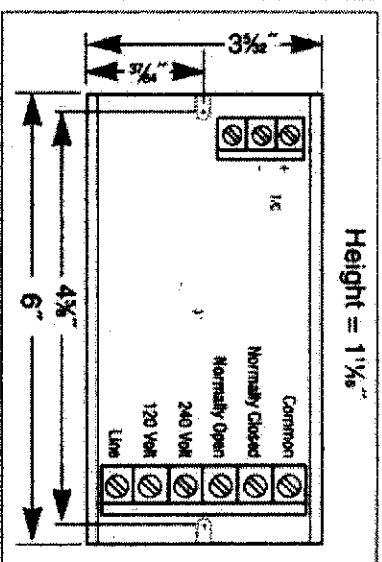
1. Remove knob with small screwdriver and take off the nut holding the scale to the potentiometer.
2. Mount potentiometer through a 3/8" hole in your panel; put scale over shaft and tighten nut.
3. Turn shaft counter clockwise until it stops.
4. Now put knob back on and line up its indicating mark with the arrow on scale.
5. Tighten knob. The unit is now calibrated.

#### Metal Mounting Case:

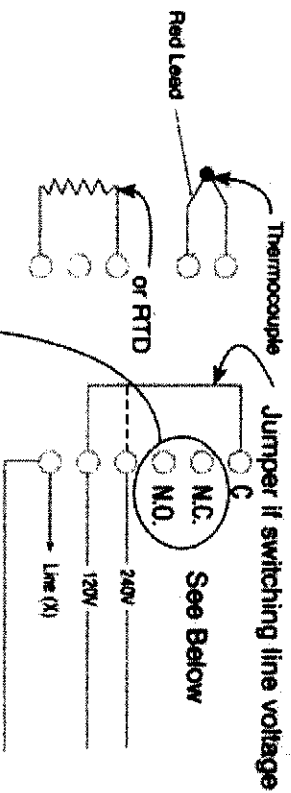
1. Remove the two screws holding the cover. Remove the cover.
2. Carefully spread the plastic holding track and remove the circuit board.
3. Mount the base and plastic track with the appropriate hardware (not supplied) through the two 11/64" dia. mounting holes.
4. Replace circuit board by aligning one side in track and then gently press in the opposite side. Replace the cover.



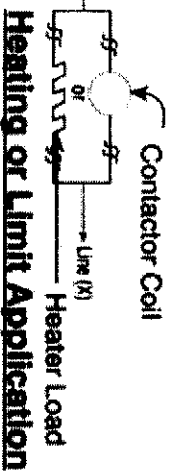
**Series 82 Wiring & Mounting**



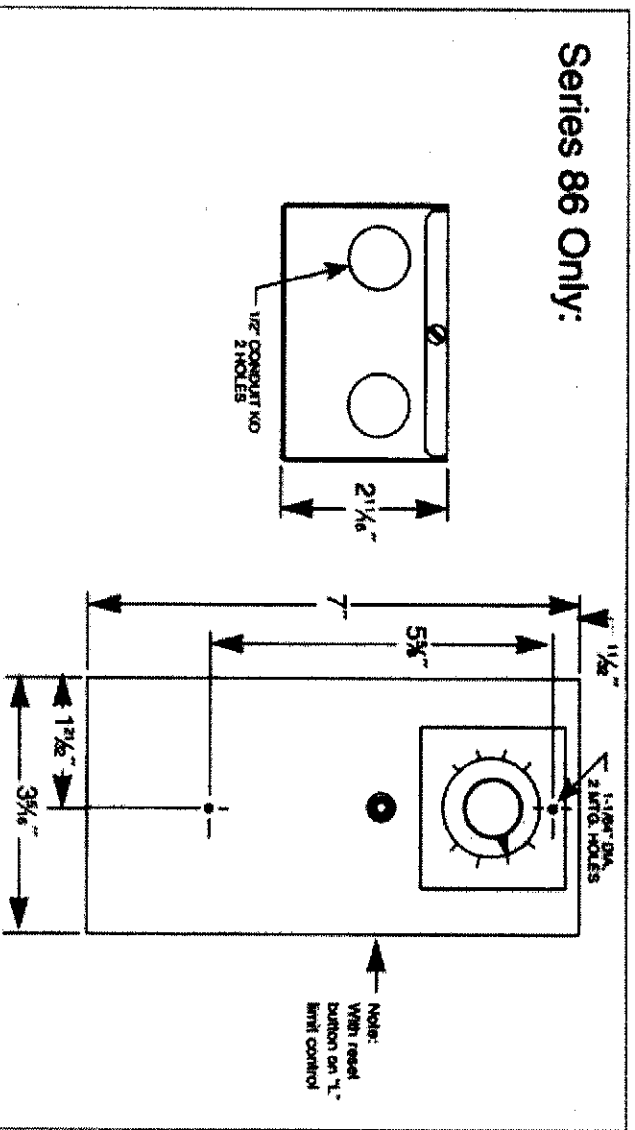
**Series 86/88 Wiring & Mounting**  
(Series 88 has push-on terminals)



**Applications**



**Series 86 Only:**



## **2.4 WIRING.**

Consult the wiring diagrams on page 4. The unit can be operated with 120/240V 50/60 Hz line voltage. Be certain that the correct voltage is applied to the proper terminals. Cooling loads can be driven from the "N.C." terminal.

## **2.5 THERMOCOUPLE PLACEMENT.**

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 heat demand is variable, the probe should be close to the work area. Some experimenting with probe location will provide optimum results. Extension wires must be of sufficient size so that on long runs the thermocouple circuit resistance does not exceed 100 ohms.

# **SECTION 3 OPERATION/MAINTENANCE**

## **3.1 OPERATION.**

After all connections are completed, adjust the Setpoint knob to the desired temperature and apply line voltage. Adjust the MODE potentiometer as per section 3.3. If Proportional operation has been selected, the output will cycle on and off continuously. If On-Off mode has been selected, the output will change state only as temperature varies around the setpoint.

## **3.2 LIMIT CONTROL.**

Adjust the Setpoint to the desired limit temperature. Apply power and press the Manual Reset button. The Control relay is now latched, the normally open and common contacts closed. When the process temperature being monitored by the limit thermocouple reaches the set value, the limit relay will change state and remain in that state until the monitored temperature falls below the setpoint and the Manual Reset button is depressed. An option is available to provide automatic reset of the limit upon application of control power.

## **3.3 ADJUSTMENTS.**

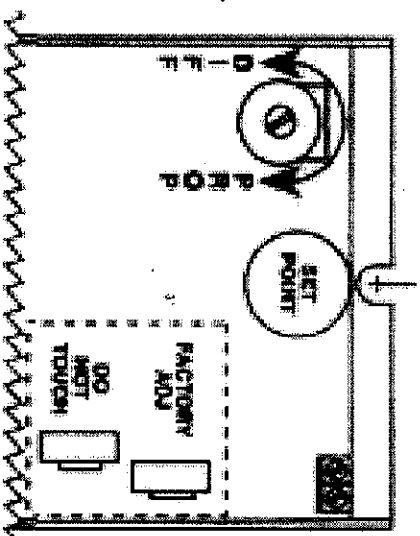
The MODE adjustment allows the control mode to be proportional to On-Off.

For processes requiring very accurate control, adjust the MODE

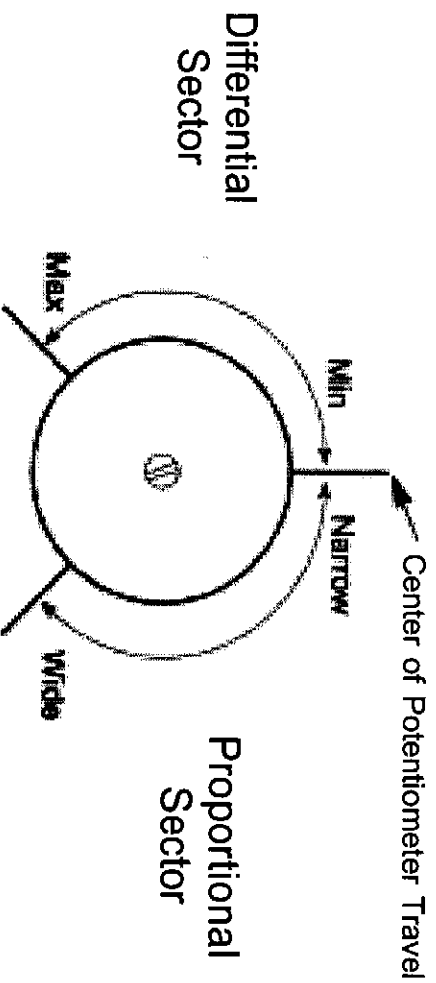
potentiometer clockwise in the Proportional sector until process temperature oscillations just stop.

For processes such as mechanical refrigeration systems, fans, and solenoid valves, and wherever continuous cycling would be detrimental to the load handler, On-Off control should be used. Adjusting the

MODE potentiometer counterclockwise from its center of travel provides On-Off control. The amount of hysteresis (differential) is increased with further ccw adjustments of the MODE potentiometer. Adjustment here provides a compromise between closest temperature control and minimum cycling of the load handler.



### Adjustments



### 3.4 MAINTENANCE.

1. Keep the controller fairly clean and protect it from dirt, water, and corrosive fumes.
2. Periodically recheck electrical connections.
3. Replace the relay if the contacts become electrically worn.

# WARNING

*Applying incorrect voltage will damage controller. Shorted heaters or wires can damage the relay. For maximum protection, fuse incoming power lines with a fast 10A fuse.*



## SECTION 5 REPLACEMENT PARTS

### 5.1 REPLACEMENT PART NUMBERS.

“B” Plug-In Module	Part number: 218B006U01
	Description #A-60G2-6
“H” Solder-In Relay	Part number 218B008U01
“H” Plug-In Relay	Part number 218B003U01
“H” Plug-In Base	Part number 241A00SU01
“T” Plug-In Module	Part number 218B007U01
	Description #A-60G2-2

#### Authorized Athena Service Centers

Athena Controls, Inc.  
5145 Campus Drive  
Plymouth Meeting, PA 19462  
610-828-2490

Athena Controls, Inc.  
1640 E. Acorn Lane  
Glendora, CA 91740  
818-963-5045

Allied Instrument Service  
3136 Clarence Avenue  
Berwyn, IL 60402  
708-788-1912

**SERIES 88 ELECTRONIC TEMPERATURE CONTROLLER**

**SPECIFICATIONS**

- |                             |   |
|-----------------------------|---|
| Control Mode:               | Adjustable from hysteresis of 5° F to proportional of 25° F |
| Control Power:              | 120/240 Vac ±10%  |
| Input:                      | Thermocouple, sensor break protection                       |
| Ambient Temperature:        | 32° to 150° F (0° to 66° C)                                 |
| Humidity:                   | 5 to 95% non-condensing                                     |
| Output:                     | SPDT relay 20 A 120/240 Vac                                 |
| Cold Junction Compensation: | Internal electrical bridge                                  |
| Power Consumption:          | <2 watts  |
| Connections:                | Fast-on lugs  |

