

Series 840



Limit Control

User's Manual



WATLOW

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W840-DA10-8901

January, 1989

Supersedes:

W840-DA10-8726

June, 1987

General Description

The Watlow Series 840 is a high and low latching limit control. It accepts an input from a single thermocouple to sense process temperature. An LED display provides process temperature or limit set point information. Discrete LEDs tell the operator the status of the unit. High and low limit set points are screwdriver-adjustable through the front panel. The output device is a DPDT mechanical relay. The 840 has an interface for a customer-supplied external audible alarm.

The 840 incorporates auto power reset. In a non-limit condition, auto power reset will automatically energize the output relay and silence the audible alarm when power is applied. If a limit condition exists, the output relay will latch in a de-energized state and the audible alarm will sound.

The output relay can be re-energized and the audible alarm silenced by the front panel "Alarm Reset" switch or a customer-supplied remote reset switch, only when the limit condition no longer exists. There is also a front panel "Alarm Silence" switch which will allow the user to silence the audible alarm even though a limit condition still exists.

Specifications

Control Mode

Limit Latching

- High and low limit with auto power reset.
- Reset via front panel push button or by customer supplied remote contacts.

Operator Interface

- 1/2" LEDs displaying process input value and when high or low limit push-to-set depressed, it will display that value.
- Red LED indicating high limit, a yellow LED indicating low limit, and a green LED indicating normal operation.
- Front panel mounted Alarm Silence and Alarm Reset buttons.
- °F or °C selection by internal jumper block.
- Screwdriver adjustable push-to-set for both low limit and high limit set points.

Input

- Thermocouple Types J, K or T input. Isolated or grounded.
- Automatic cold junction compensation.
- Sensor break protection de-energizes output to protect system. Display will indicate "- . . ."

- Lead resistance effect for thermocouple input: 200Ω of lead resistance will cause less than 1°F error. Refer to lead wire manufactures specification on ohms per double foot for type and gauge of wire listed.

Output:

Control

- A double pole-double throw (DPDT), dual Form C, relay rated 8A @ 115VAC, 6A @ 250VAC, and 8A @ 30VDC per contact.

Indication

- MV output of linearized process input signal. Scaled 5mV/LSD for 3-digit ranges and 2mV/LSD for 4-digit ranges.

Alarm

- Less than 50mA @ 12VDC.

Accuracy

- Calibration Accuracy: $\pm 0.25\%$ of span at $77^\circ\text{F} \pm 5^\circ\text{F}$ ($25^\circ\text{C} \pm 3^\circ\text{C}$) ambient & rated line voltage $\pm 1\%$.
- Linearization Accuracy: $\pm 0.25\%$ of span, ± 1 digit at $77^\circ\text{F} \pm 5^\circ\text{F}$ ($25^\circ\text{C} \pm 3^\circ\text{C}$) ambient & rated line voltage $\pm 1\%$.
- MV Signal I/O: $\pm 0.25\%$ of span.
- Accuracy Span: 1000°F or 540°C minimum.
- Temperature Stability: $\pm 2\mu\text{V}/^\circ\text{F}$ (3.6mV°C) ambient.
- Voltage Stability: $\pm 0.01\%$ of span/% of rated line.

Terminals

- #6 screws on barrier strip.

Power

- 120/240VAC $\pm 10\%$, 60Hz $\pm 5\%$.
- 110/220VAC +10% -5%, 50Hz $\pm 5\%$.
- 6VA.

Operating Environment

- 30 to 130°F/0 to 55°C.
- 0 to 90% RH, non-condensing.

Dimensions

- Height: 3.8 in. (96 mm)
- Width: 3.8 in. (96 mm)
- Overall Depth: 6.7 in. (170.2 mm)
- Behind Panel Depth: 6.0 in. (152.4 mm)
- Weight: 1.5 lb. or (0.7 kg)

Ordering Information

Control

Series 840 = Digital indicating temperature limit, DPDT, 8A relay, 1/4 DIN.

Output Type

A = 8A Mechanical Relay

Voltage

- 1 = 120VAC
- 2 = 240VAC

Input & Range

(Thermocouple)

- 600 = T -140 to 392°F
 -100 to 200°C
- 601 = K -4 to 1999°F
 -20 to 1095C
- 602 = J -4 to 1004°F
 -20 to 540°C

Color/Finish

- 0 = Black front panel and case
- 1 = Grey front panel and case

Product Accessories
Z100-0423-0000, Extender Board
0003-0077-0000, Output Relay

Installation and Dimensional Information

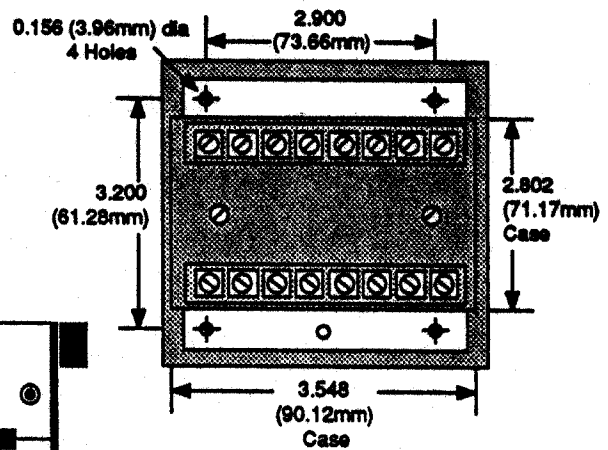
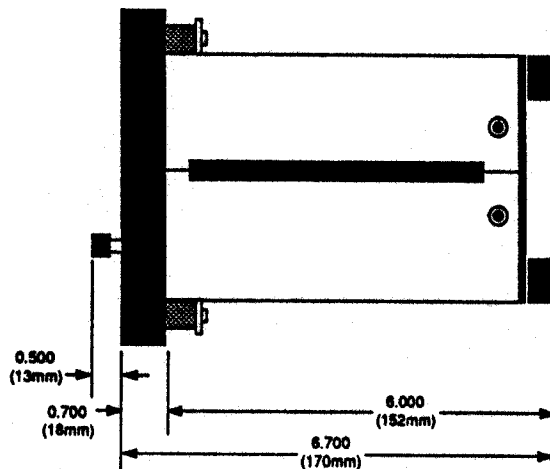
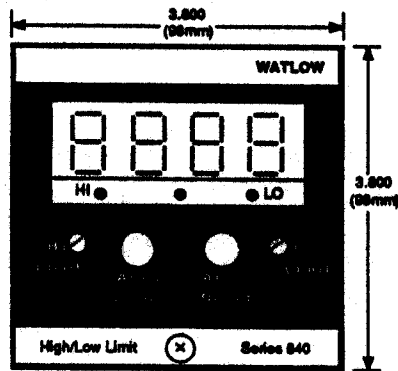


Figure 1 - Case Dimensions

Installation and Dimensional Information

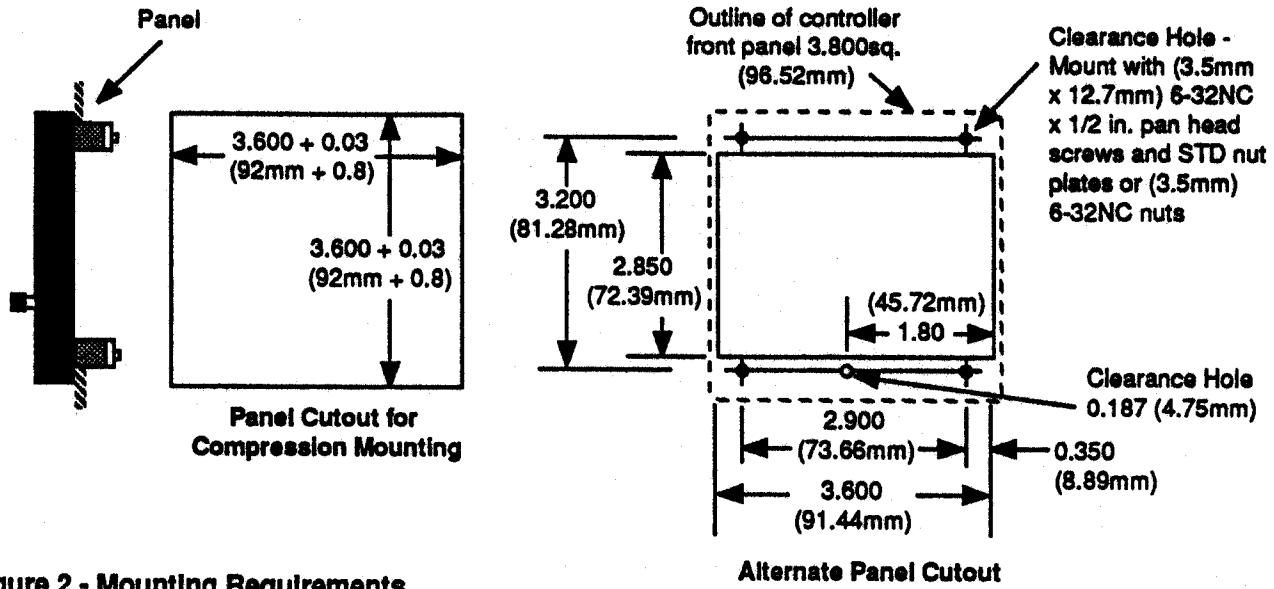


Figure 2 - Mounting Requirements

Wiring

Line Voltage



WARNING:

To avoid potential electric shock, use National Electric code safety practices when wiring and connecting this unit to a power source and to electrical sensors or peripheral devices. All wiring and fusing should conform to the National Electric Code and to any locally applicable codes also.

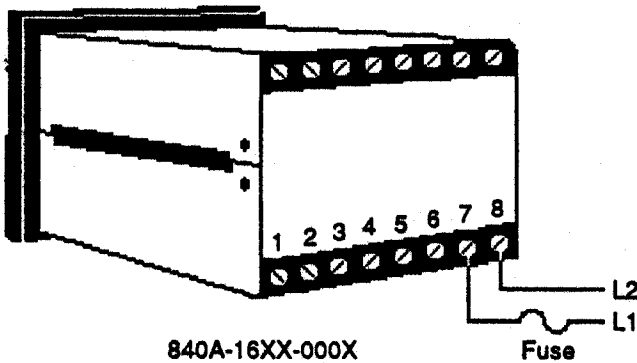


Figure 3 - 120VAC Power Wiring

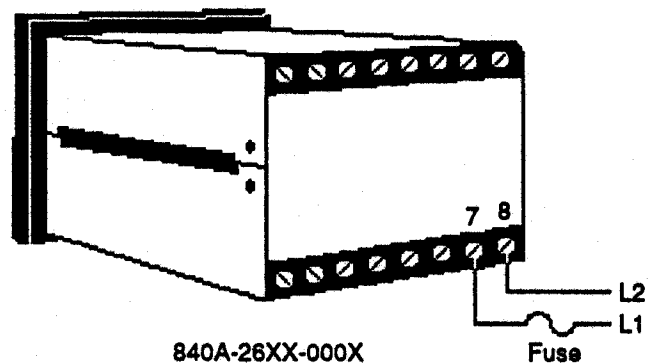
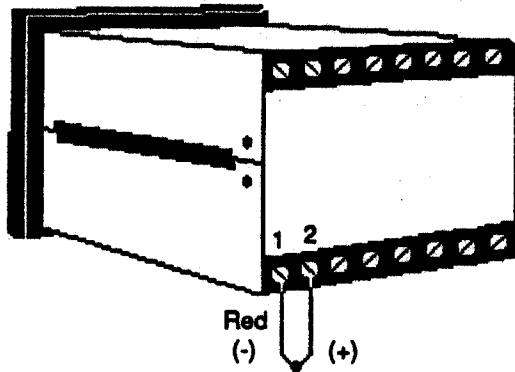


Figure 4 - 240VAC Power Wiring

Input Wiring

Wiring

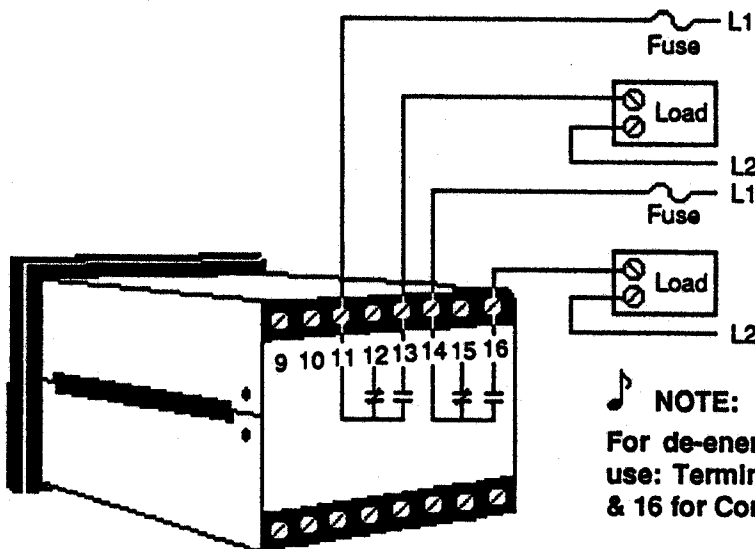


NOTE:

You must use an isolated or ungrounded T. C. If an external monitoring device with a non-isolated circuit common is connected to the millivolt output (Terminals 3 & 4). Extension wires for the T. C. must be of the same alloy as the T. C. itself to limit errors.

Figure 5 - Input Wiring

Output Wiring

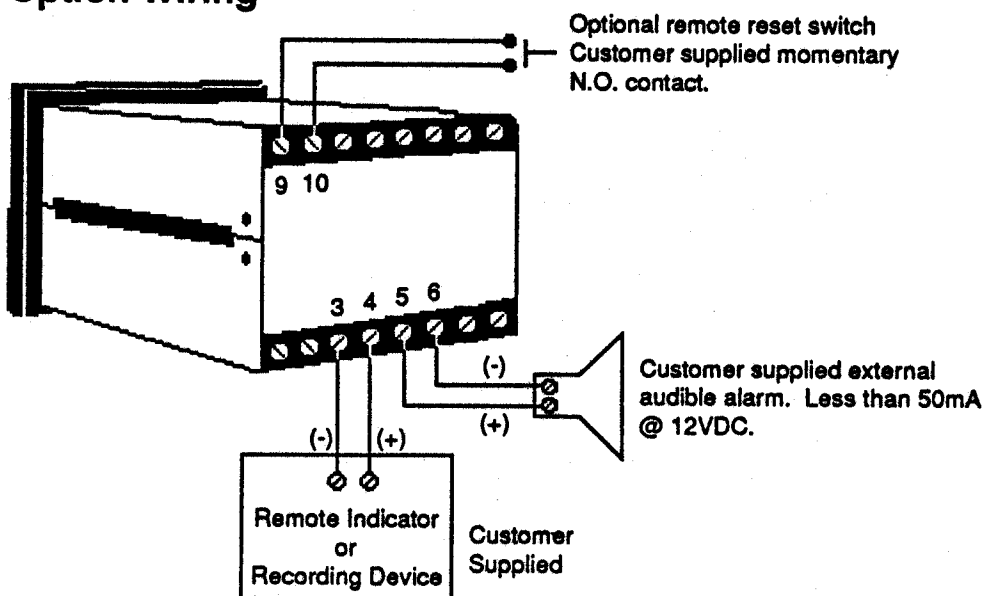


NOTE:

For de-energized contact when in limit condition use: Terminals 11 & 13 for Contact #1. Terminals 14 & 16 for Contact #2.

Figure 6 - Output Wiring

Option Wiring



Terminal Designation Sticker

1.	T.C. -	
2.	T.C. +	
3.	S.C. Out External	-
4.		
5.	Audible Alarm Output	-
6.		
7.	L1	*
8.	L2	
9.	Remote Reset Switch	-
10.		
11.	Common	Form C #1
12.	N.C.	
13.	N.O.	Relay
14.	Common	
15.	N.C.	Form C #2
16.	N.O.	

Figure 7 - Option Wiring

* See note on Input Wiring

Field Calibration Procedure

840A-X6XX-000X

NOTE:

This calibration information is provided as a service. Proper field calibration can be achieved by following this procedure. If your control is in warranty, that warranty will be void if this field calibration procedure is performed improperly.

Equipment Required

- Precision MV source.
- Appropriate reference compensator with reference junction at 32°F/0°C.
- 3-1/2 digit digital voltmeter.
- Extender board may be used for ease of servicing, Watlow P/N: Z100-0423-0000.

Procedure

1. Connect millivolt source and compensator leads to thermocouple inputs, Terminals 1 (-) and 2 (+). Connect digital voltmeter to Terminals 3 (-) and 4 (+).
 2. Place Jumper W8 on J7 (°C), See Figure 8, Page 6. Connect power to the control. Let the control stabilize before calibration begins.
- * See Figure 8, for the location of the calibration pots. Refer to Table 1 below for calibration values.

3. Set the millivolt source to _____ Lo mV. Adjust the Lo °C pot for _____ °C Lo volts on the DVM.
4. Set the millivolt source to _____ Hi mV. Adjust the °C Hi pot for _____ °C Hi volts on the DVM.
5. Repeat Steps 3 and 4 until all readings are correct with no further adjustment.
6. Move Jumper W8 to J6 (°F).
7. Set the MV source to _____ Lo mV. Adjust the °F Lo pot for _____ °F Lo volts on the DVM.
8. Set the MV source to _____ Hi mV. Adjust the °F Hi pot for _____ °F Hi volts on the DVM.
9. Adjust the FS pot for a reading of _____ FS Temp on the display of the control.
10. Repeat Steps 7 through 9 until all readings are correct with no further adjustment.
11. Replace Jumper W8 in the desired position: J7 = °C, J6 = °F.

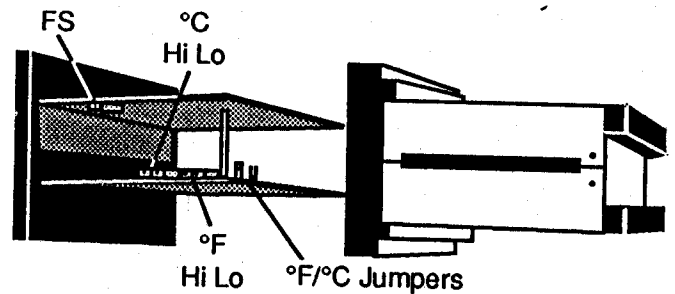


Figure 8 - Jumper Position and Pot Location

Code	Range		Type	Millivolts vs. Temperature						
	Low/High			Low mV	°C Lo Volts	°F Lo Volts	Hi mV	°C Hi Volts	°F Hi Volts	FS Temp
600	-140 to -100	392°F to 200°C	T	-3.378	-0.500	-0.740	9.286	1.000	1.960	392°
601	-4 to -20	1999°F to 1095°C	K	0.000	100°F	0.064	44.729	2.180	3.988	1994°
602	-4 to -20	1004°F to 540°C	J	0.000	220°F	0.064	29.642	1.080	2.008	1004°

Table 1 - Calibration Values Per Input Code

Wiring

Terminal Designation Sticker	
1.	T.C. -
2.	T.C. +
3.	S.C. Out External
4.	
5.	Audible Alarm Output
6.	
7.	L1
8.	L2 *
9.	Remote Reset Switch
10.	
11.	Common
12.	N.C.
13.	N.O.
14.	Common
15.	N.C.
16.	N.O.

Range: -100 to 200°C/-140 to 392°F
Line Voltage: *

* Dependent upon model number.
840A-1600-000X = 120VAC
840A-2600-000X = 240VAC

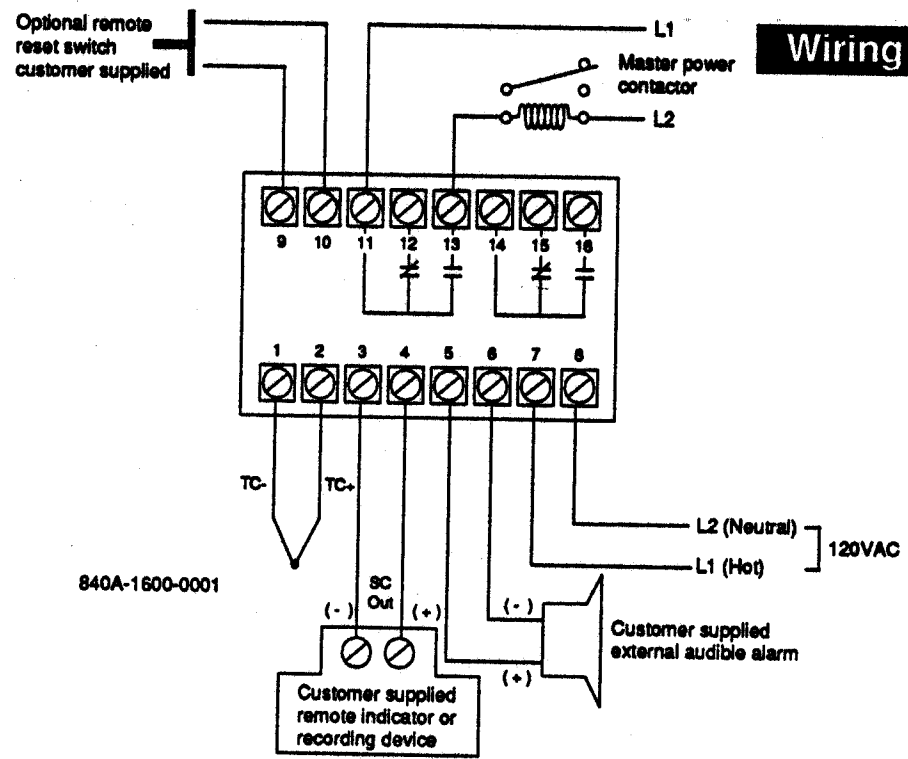


Figure 9 - Wiring Example

Troubleshooting

Problem	Probable Cause	Action
No display.	A.C. input is not connected or is connected improperly.	Check A.C. input connections. If not present or proper, connect per wiring line voltage. See Page 4, Figure 3 or 4. If present and proper, return unit to factory.
Display indicates "-... " & yellow Lo limit LED is ON.	Open thermocouple.	Repair or replace thermocouple.
Display error.	Sensor is connected improperly.	Check sensor location, connections, and sensing element. Repair or replace sensor as required. Place jumper wire across thermocouple terminals. Indicator is functioning properly if display indicates room temperature.
Display indicates "-000" with flashing.	Jumper W8 for °F/°C selection is not installed or is installed improperly.	Install Jumper W8 in desired location for °F or °C. See Page 6, Figure 8.
Control is in a Low or High limit condition and cannot be reset.	Actual temperature is below Low limit set point or above High limit set point.	Check Low limit and High limit set points. If actual temperature is not between Low and High set points, it cannot be reset, though alarm can be silenced.
	If external reset switch is used:	Check wiring of external reset switch. See Page 5, Figure 7.

Warranty Information

The Watlow Series 840 is warranted to be free of defects in material and workmanship for 18 months after delivery to the first purchaser for use, providing that the unit has not been misapplied.

Watlow cannot guarantee against failure, since Watlow has no control over use, and sometimes misuse. Watlow's obligations hereunder, at Watlow's option, are limited to replacement, repair, or refund of purchase price, on any parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse or abuse.

Watlow Controls

Watlow Controls is a division of Watlow Electric Manufacturing Company of St. Louis, Missouri. Watlow is an established manufacturer of industrial electric heating products, in business since 1922. Watlow boasts the ability to begin with a full set of specifications and to complete an industrial product that is manufactured totally in-house, in the U.S.A. Products designed and manufactured by Watlow are electric heating elements, sensors, electronic temperature controls and power switching devices.

The Winona operation has been designing solid state electronic control devices since 1962, and has earned the reputation as an excellent supplier to original equipment manufacturers. These OEMs depend upon Watlow Controls to provide compatibly engineered controls which they can incorporate into their products with confidence.

Watlow Controls resides in a 100,000 square foot marketing, engineering and manufacturing facility in Winona, Minnesota.

Returning Merchandise

The following procedure applies for any products returned to the factory:

1. You must call Watlow Customer Service, 507/454-5300, for a Return Material Authorization (RMA) number before returning any item for repair. We need this information:

- Ship-to address
- Contact name
- Ship via
- Name and phone number of person returning the material
- Symptoms and/or special instructions
- Bill-to address
- Phone number
- P.O. number

We will not accept a return without an RMA number. The RMA number must appear on the outside of the carton and on all paperwork. Cartons without RMA numbers will be returned. Ship on a freight prepaid basis.

2. You need prior approval and an RMA number from the Customer Service Department when you are returning an unused product for credit. Also, we must apply a 20 percent restocking charge for all returned stock controls and accessories.
3. After we receive your return, we will enter a repair order, replacement order or issue credit for material.
4. In cases of manufacturing defect, we will return it to you with a letter of explanation. Repair costs will not exceed 50 percent of the original cost.

Shipping Claims

When you receive your Watlow control, examine the package for any signs of external damage it may have sustained enroute. If there is apparent damage either outside the box or to its contents, make a claim with the shipper immediately. Save the original shipping carton and the packing material.