

Relay Master



User's Manual



WATLOW

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WRMO-DA20-8822

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Supersedes:

WRMO-DA10-8741

General Description

The Watlow Relay Master is a patent pending enclosed ON/OFF temperature control that mounts onto a Watlow mercury relay. The unit features a Type "J" thermocouple input, LED load light, UL/CSA approval, and the choice of integral or remote setpots, both with °F/°C scales.

The Relay Master is capable of snapping onto any Watlow KD, LD, or MD mercury relay, including relays already in the field. Simply remove the coil screws from the relay and replace them with the coil studs provided for installation; just snap the Relay Master onto the relay.

Specifications

Control Mode

- ON/OFF with 3°F switching hysteresis.

Operator Interface

Setpot, Integral

- Adjusted from the control module face.
- Dual °F/°C scales.

Setpot, Remote

- 2.6" dial scale calibrated to compensate for sensor non-linearities.
- Dual °F/°C scales.
- 24" leads with #6 spade terminals or bare wires.
- LED indication of energized output (load light).

Input

- Thermocouple, Type "J".
- Automatic cold junction compensation.
- Sensor may be isolated or grounded.
- Thermocouple break protection de-energizes output.
- Maximum power: 14ma @ 240VAC; 28ma @ 120VAC.

Output

- Mercury Displacement Relay (MDR) contact loads; 25, 35, or 60A depending on MDR selected.
- Relay capable of driving desired MDR's for an extended period of time.

Accuracy

- Repeatability: ±1% of operating span. (Setpot rotated clockwise from counter-clockwise stop.)
- Set Point Stability, Ambient Temperature Stability, Ambient Compensation Accuracy: Sum of these three components not to exceed 5µV/°F or 9µV/°C referred to the input.
- Absolute Control/Dial Scale Accuracy:
 - Integral setpot: ±2 1/2% of span at 25°C.
 - Remote setpot: ±3% of span at 25°C.
- Resolution: ±1% of span at 25°C.

Agency Approval

- UL approval, CSA pending, UL873, UL197.

Terminals

- #6 screw terminal connections.

Power

- 120VAC, ±10%, 50/60 Hz ±3 Hz.
- 208VAC, ±10%, 50/60 Hz ±3 Hz.
- 240VAC, ±10%, 50/60 Hz ±3 Hz.

Operating Environment

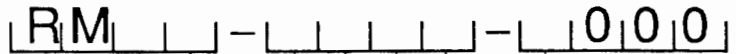
- 30°F - 104°F/0°C to 40°C.
- 10 to 90% RH, non-condensing.
- Storage Temperature: 30°F to 150°F, 0°C to 66°C.

Dimensions

- | | | |
|--------------------------------------|--------------|----------|
| • Length: | 2.625 in. | 66.68 mm |
| • Width: | 3.7 in. | 93.98 mm |
| • Height: | 3.2 in. | 81.28 mm |
| • Depth from knob to front of relay: | 2.0 in. | 50.8 mm |
| • Weight: | 0.55 lb. max | 0.25 kg |

Control

Relay Master = Totally enclosed, ON/OFF temperature control that snaps onto a Watlow mercury relay.



Options

Relay/Poles

- 00 = No Relay
- K1 = 25A KD Series single pole
- K2 = 25A KD Series double pole
- K3 = 25A KD Series triple pole
- L1 = 35A LD Series single pole
- L2 = 35A LD Series double pole
- L3 = 35A LD Series triple pole
- M1 = 60A MD Series single pole
- M2 = 60A MD Series double pole
- M3 = 60A MD Series triple pole

Supply

- 1 = 120VAC
- 2 = 240VAC
- 5 = 208VAC

Range

Thermocouple

- 600 = J 50 to 500°F
10 to 260°C
- 601 = J 50 to 1000°F
10 to 538°C

Optional Separate Remote Set Point Assembly (Order Separately)	Setpot Value
A006-0 _ _ _ _	
484	1KΩ
485	1KΩ

Setpot

- A = Integral
- R = Remote (Order Setpot Separately)

Dimensional Information

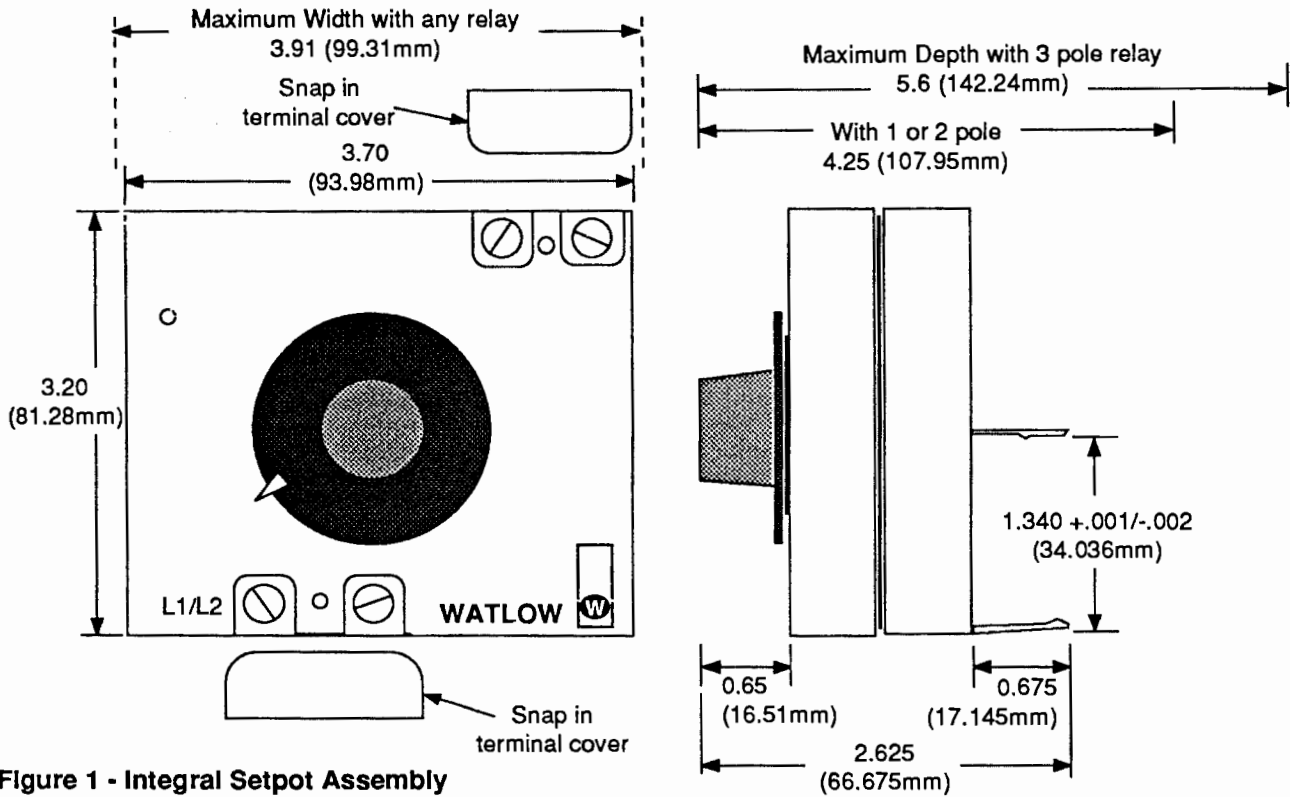


Figure 1 - Integral Setpot Assembly

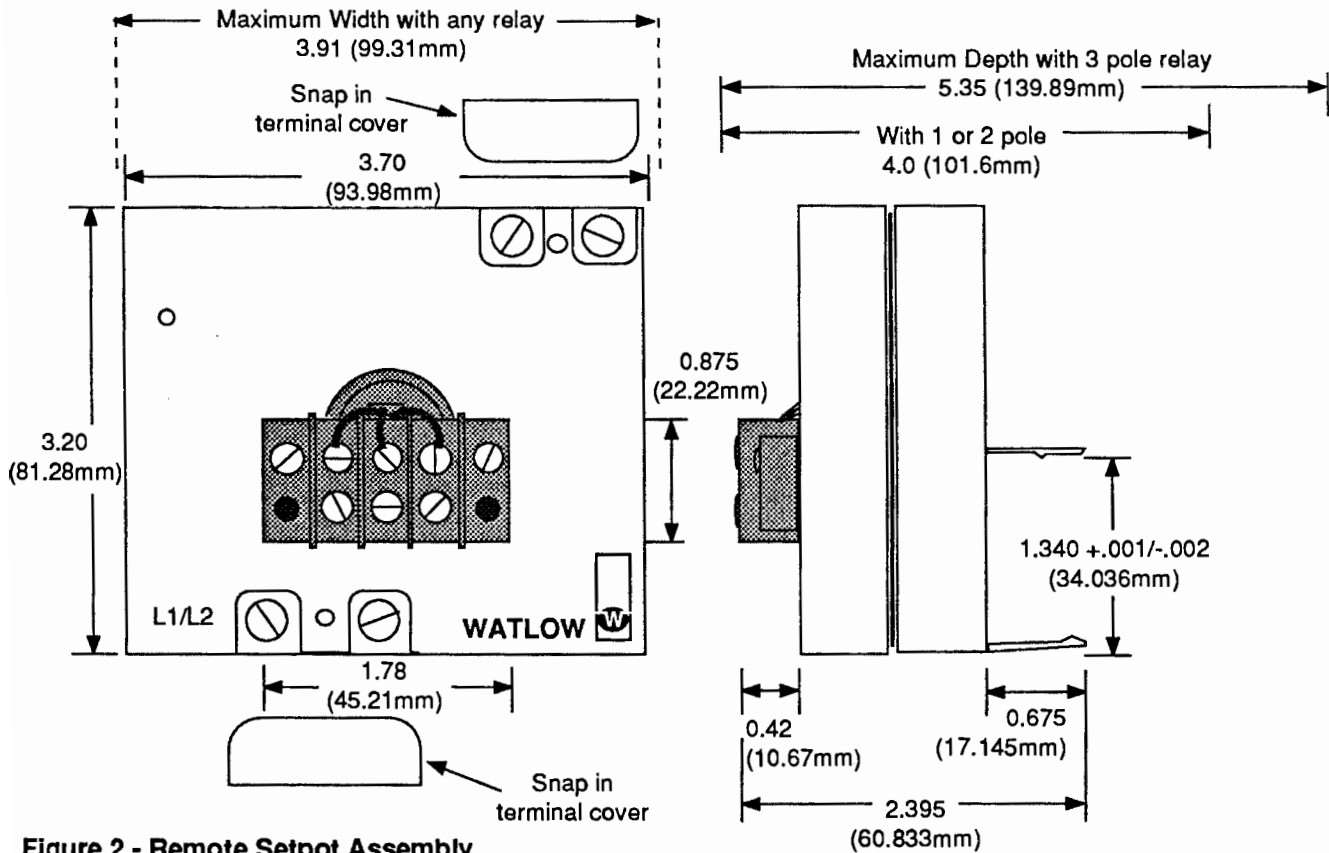


Figure 2 - Remote Setpot Assembly

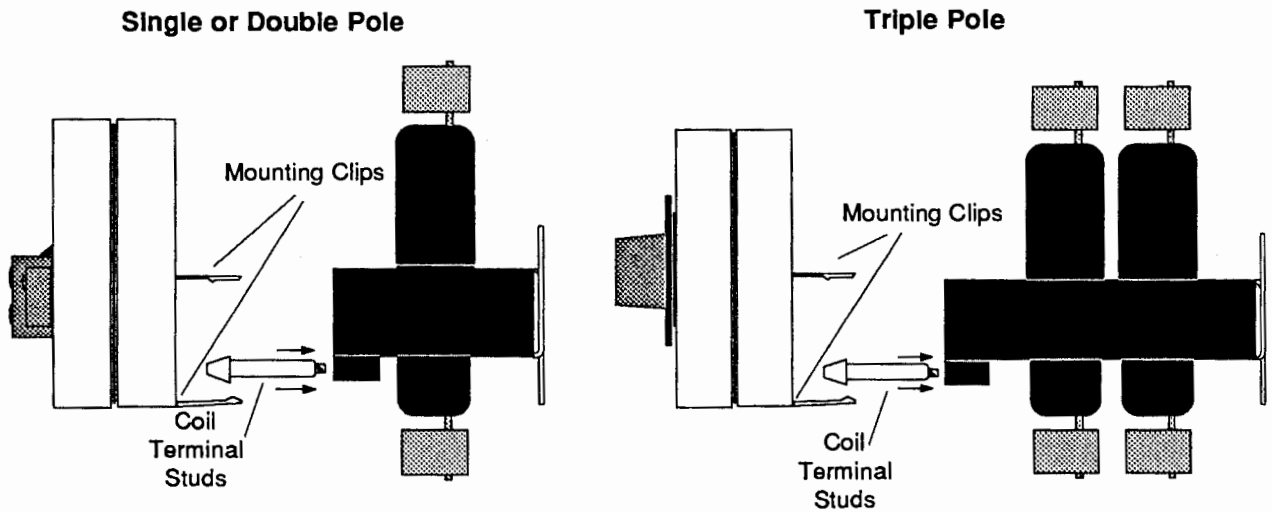


Figure 3 - Relay Master Installation

Mounting Your Mercury Relay

1. Mercury relays must be mounted vertically to function properly. Using your mercury relay as a location template, center and mark all mounting holes on the relay with a center punch.
2. Drill four 0.188" diameter holes in the desired panel location. Only two holes are required for single pole relays. Refer to your mercury relay data sheet.
3. Mount the relay with two or four screws, depending upon your relay.
4. Connect the load per the Wiring diagram. Refer to your mercury relay data sheet.

Mounting Your Relay Master

1. Remove the two coil screws from the mercury relay and replace them with the two coil terminal studs; tighten securely.
2. Align the coil studs to the appropriate holes on the Relay Master. If the holes are not open, pull

the appropriate plugs out with a needle-nose pliers, and place them in the unused holes. Any alignment holes that are open, may be filled with the plugs. Snap the Relay Master onto your relay, by placing the bottom mounting clips in place first. Then push the upper part towards the mercury relay. See Figure 3 or 4, for the location of the mounting clips. The control module should be centered on the relay.

3. Remove the terminal covers and wire the Relay Master per the Wiring diagram. See Page 7, Figure 6 or 7.
4. Replace the terminal covers to cover the exposed connections.
5. To remove the Relay Master from the mercury relay, pull forward firmly on the top of the Relay Master with an up and down rocking motion. This will release the upper mounting clips, allowing the Relay Master to detach from the relay.

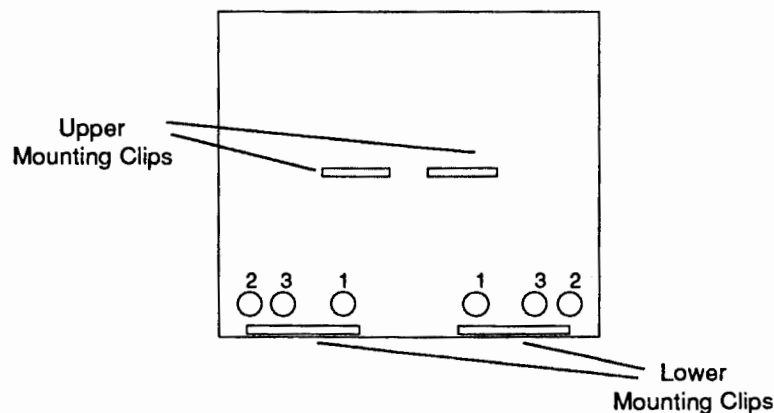


Figure 4 - Back Side of the Relay Master

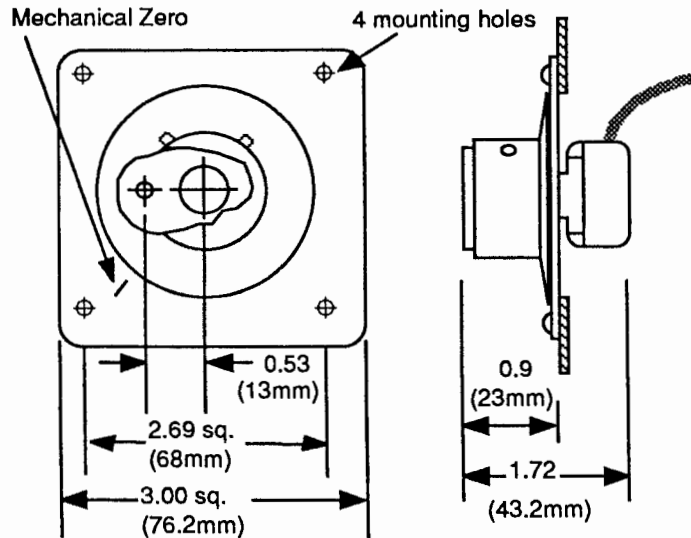


Figure 5 - Setpot Dimensions and Mechanical Zero Location

For Units with Remote Setpot Assembly:

1. Drill a 2.000" diameter hole at the center of the desired remote setpot assembly location. See Figure 5.
2. Using the dial scale as a location template, center and mark all four holes on the dial scale with a centerpunch.
3. For a bolted dial scale assembly, drill four 0.125" diameter clearance holes. If you are using a screw assembly, use a tap drill. Tap drill sizes used are:

Tap drill size	for	Screw/thread size
#44 - 0.086 dia.		#4-36
#43 - 0.089 dia.		#4-40
#42 - 0.093 dia.		#4-48

4. Connect sensor, load, and remote setpot assembly to your Relay Master per the Remote Setpot Wiring diagram, Figure 7.
5. Align the remote setpot assembly dial scale to mechanical zero.

Remote Assembly Dial Scale Alignment to Mechanical Zero:

NOTE:

The Relay Master with integral setpot needs no alignment.

1. Turn the dial scale knob completely counter-clockwise (to mechanical zero).
2. If the "Indicator" line on the setpot knob skirt, and "Mechanical Zero" (represented by a small line beyond the low end of the scale) are not aligned, loosen both set screws on the setpot knob, and rotate the knob until both lines meet.
3. Tighten both set screws.

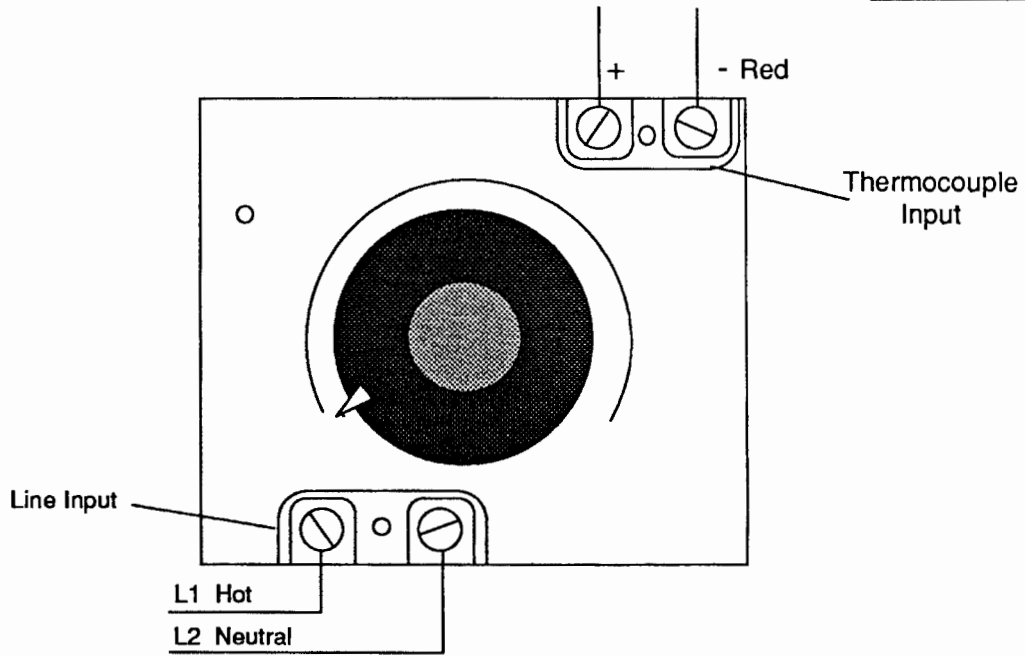


Figure 6 - Integral Setpot Wiring

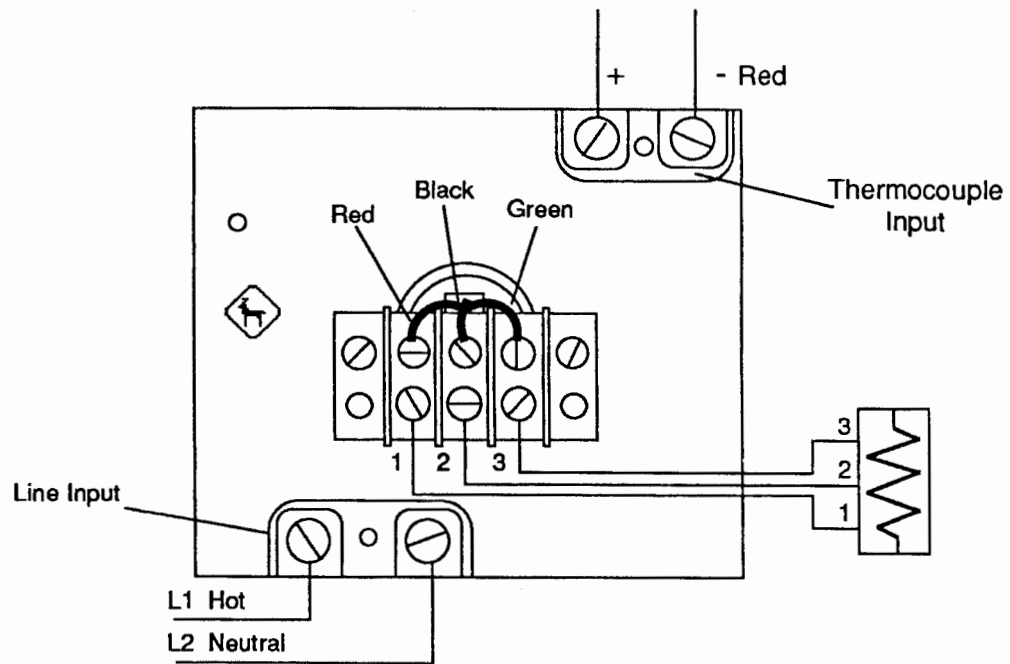


Figure 7 - Remote Setpot Wiring



CAUTION:

Do not interchange the three colored wires connected to the inside of the Relay Master. Doing so may result in erroneous readings from the setpot.

Wiring Example

NOTE:

Use correctly specified and properly applied limit control devices wherever an application requires limit control protection.

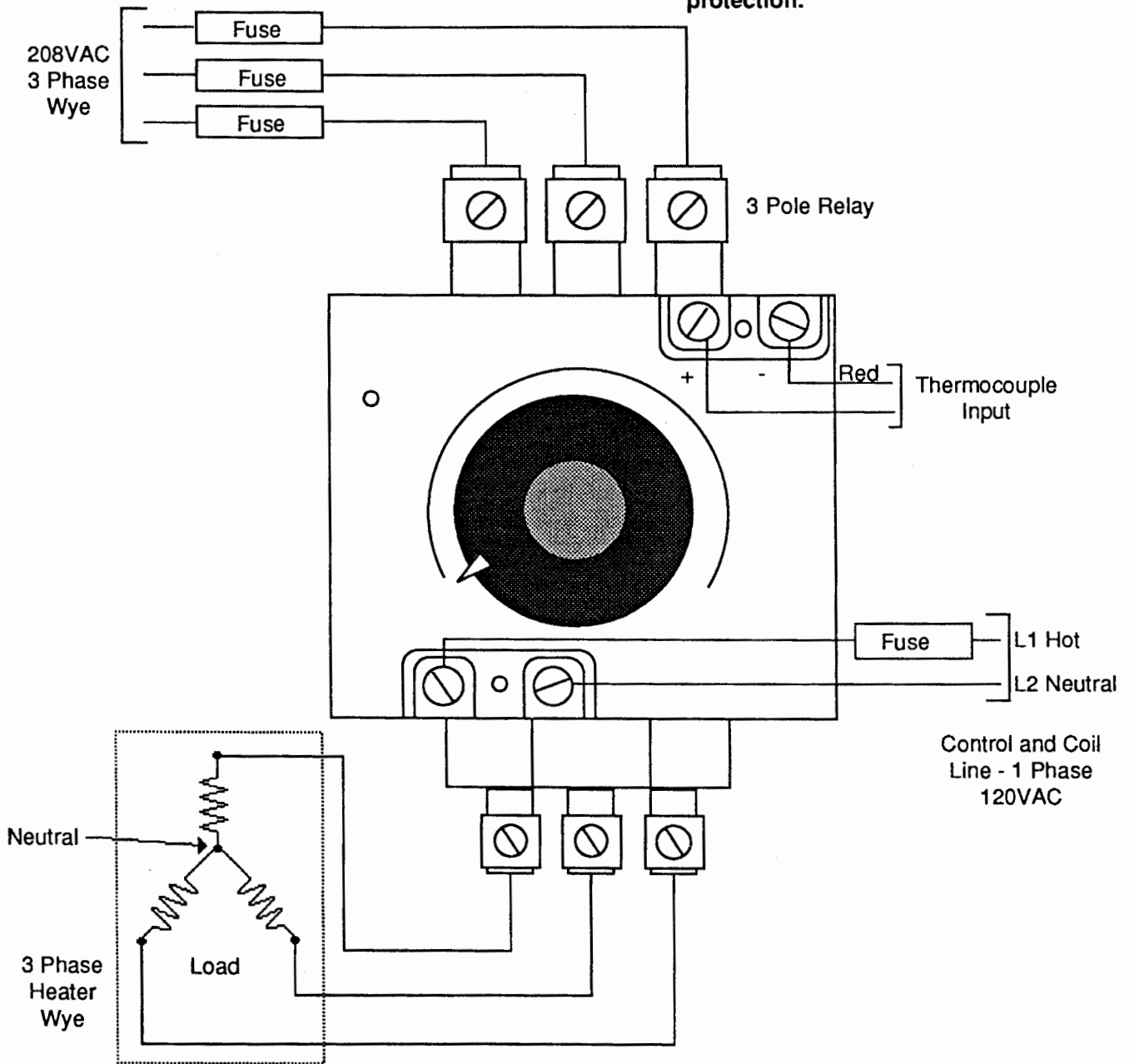


Figure 8 - Relay Master System Wiring Example

T/C Field Calibration Procedure

Equipment required:

- Precision millivolt source.
- Type "J" cold junction reference compensator.
- A calibrator with a built in reference compensator may be used in place of the millivolt source and the reference compensator.

Set up:

1. Wire your control for the correct line voltage and connect the remote setpot. See Installation and Wiring, Pages 5 - 7.
2. Connect the millivolt source to the T/C reference compensator, and the compensator to the T/C input on the control. Red is (-).
3. Apply power to the Relay Master.

600 = Type "J" Thermocouple.

Range: 50 - 500°F

Procedure:

1. Set the offset potentiometer fully clockwise. This calibration pot is located on the top of the Relay Master. See Figure 9.
2. Turn the setpot fully counter-clockwise.
3. Set the millivolt source to 4.906. If you are using a calibrator, set it to 200°F.
4. Adjust the setpot to 200°F.
5. Slowly rotate the offset potentiometer counter-clockwise until the load LED just energizes.

6. Adjust the setpot to 350°F.
7. Set the millivolt source to 9.206 or 341°F on the calibrator. The load LED should be ON.
8. Set the millivolt source to 9.883 or 363°F on the calibrator. The load LED should be OFF.
9. If your control does not calibrate, consult the factory.

601 = Type "J" Thermocouple.

Range: 50 - 1000°F

Procedure:

1. Set the offset potentiometer fully clockwise. This calibration pot is located on the top of the Relay Master. See Figure 9.
2. Turn the setpot fully counter-clockwise.
3. Set the millivolt source to 11.023 or 400°F for the calibrator.
4. Adjust the setpot to 400°F.
5. Slowly rotate the offset potentiometer counter-clockwise until the load LED just energizes.
6. Adjust the setpot to 700°F.
7. Set the millivolt source to 19.671 or 681°F on the calibrator. The load LED should be ON.
8. Set the millivolt source to 20.958 or 723°F on the calibrator. The load LED should be OFF.
9. If your control does not calibrate, consult the factory.

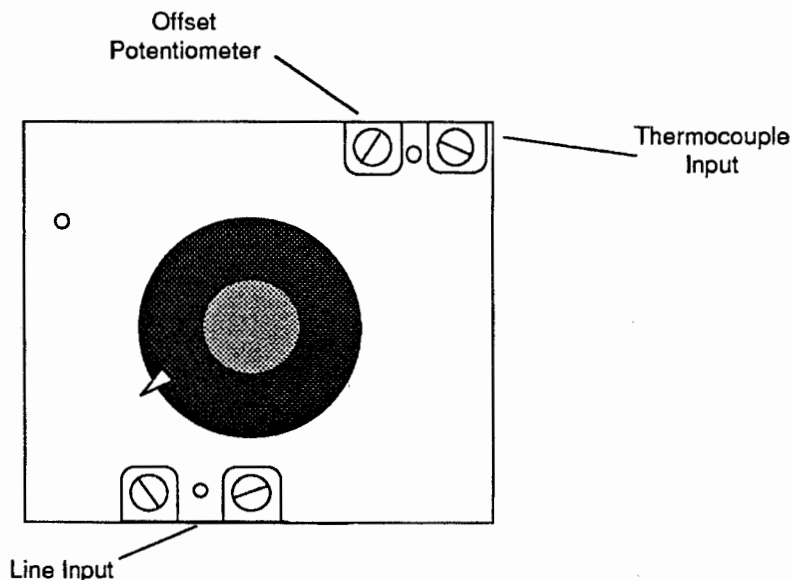


Figure 9 - Relay Master Potentiometer Location

Troubleshooting

Problem	Probable Cause	Action
The control will not operate.	There is no voltage present at the A.C. input or load output.	Check the fuses & circuit breakers. Check the power source. Check the wiring. If not present or proper, connect per the Wiring diagram. See Page 7, Figure 6 or 7.
The relay will not energize or de-energize.	If the relay does switch at room temperature, the sensor is at fault.	Place a jumper wire across the t/c input. If the control switches at room temperature, it's operating properly.
	The sensor is miswired or the sensor lead wires are open.	Rewire per the Wiring diagram. See Page 7, Figure 6 or 7.
	Verify that the sensor is functional.	Check the sensor location, connections, & the sensor element.
	The relay coil studs are not installed properly.	Remove the control module and check to see that they are installed properly.
	A faulty Mercury Relay.	Remove the control module and apply the proper coil voltage to the mercury relay. The mercury relay should energize. The relay should de-energize when power is not applied.
	The relay is not mounted vertically.	See the Installation instructions in your mercury relay data sheet.
The load will not turn ON.	An open sensor.	Repair or replace the sensor.
	The load circuit is open.	Check the fuses, circuit breakers and the load.
	The remote setpot is not connected or is connected improperly.	Connect per the Wiring diagram. See Page 7, Figure 6 or 7.
	A faulty control.	Return the control to the factory.
The load will not turn OFF.	The polarity is reversed on the t/c.	Connect per the Wiring inputs. See Page 7, Figure 6 or 7.
	The setpot is full clockwise.	Adjust the setpot accordingly.
The control is out of calibration.	The remote setpot leads are connected improperly.	Rewire per the Wiring diagram. See Page 7, Figure 6 or 7.
	The remote setpot assembly control knob is not set to mechanical zero.	Adjust the remote setpot assembly and control knob per the Installation procedure. See Pages 5 and 6.
The mounting clips will not stay in place.	The coil studs on the front of the relay are not straight.	Push the coil studs up or down, until they are perpendicular to the relay.

Returns

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

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 examine it to determine the cause for your action.
4. In cases of manufacturing defect, we will enter a repair order, replacement order, or issue credit for material.
5. If the unit is unrepairable, we will return it to you with a letter of explanation. Repair costs will not exceed 50 percent of the original cost.
6. The Relay Master and mercury relays are in an enclosed case. Repair work done is on a limited basis, and is at the discretion of Watlow.

Warranty

The Watlow Relay Master 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.

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