

WATLOW SERIES 93 TEMPERATURE CONTROLLER

Equipment:	Silo Cone Heat	Date Issued:	6-2-05
Additional Reference:	Watlow Series 93 Users Manual	Revised:	no
By:	Ted Glassmire, and R. L. Worth Jr. Service Support Coordinators	Revision #:	0
		Astec Service Department	

PURPOSE:

The purpose of this document is to provide the end user with an understanding of the operation, installation, and set-up of the Watlow 93 temperature controller and associated components.



Figure 1: Watlow 93 Temperature Controller

PART NUMBERS:

Description	Astec Part Number	Vender Part Number
Watlow 93 Temperature Controller	069425	93AA1CD000RR
LV Series Limit Controller	074486	LV6HW00320600A
Din-A-Mite Power Controller	069426	BD20-60F0-0000

GENERAL DESCRIPTION:

The Watlow series 93 controller is used as the *Temperature Control* when the silo cone is heated by electric blanket. It will be connected to a *Power Controller* that actually controls the voltage to the blankets. Currently Astec is using a Watlow Din-A-Mite for this purpose. The Series 93 tells the Din-A-Mite how much voltage to pass, and thus is the *Temperature Control*. There will also be a *Limit Controller*. The *Limit Controller* will open a set of contacts ahead of the *Power Control* if the *Temperature Control* should fail. Please refer to **figure 2** and **figure 3** for a typical wiring example.

DANGER: There is a risk of electrical shock. This Conversion should only be performed by qualified personnel.

WIRING:

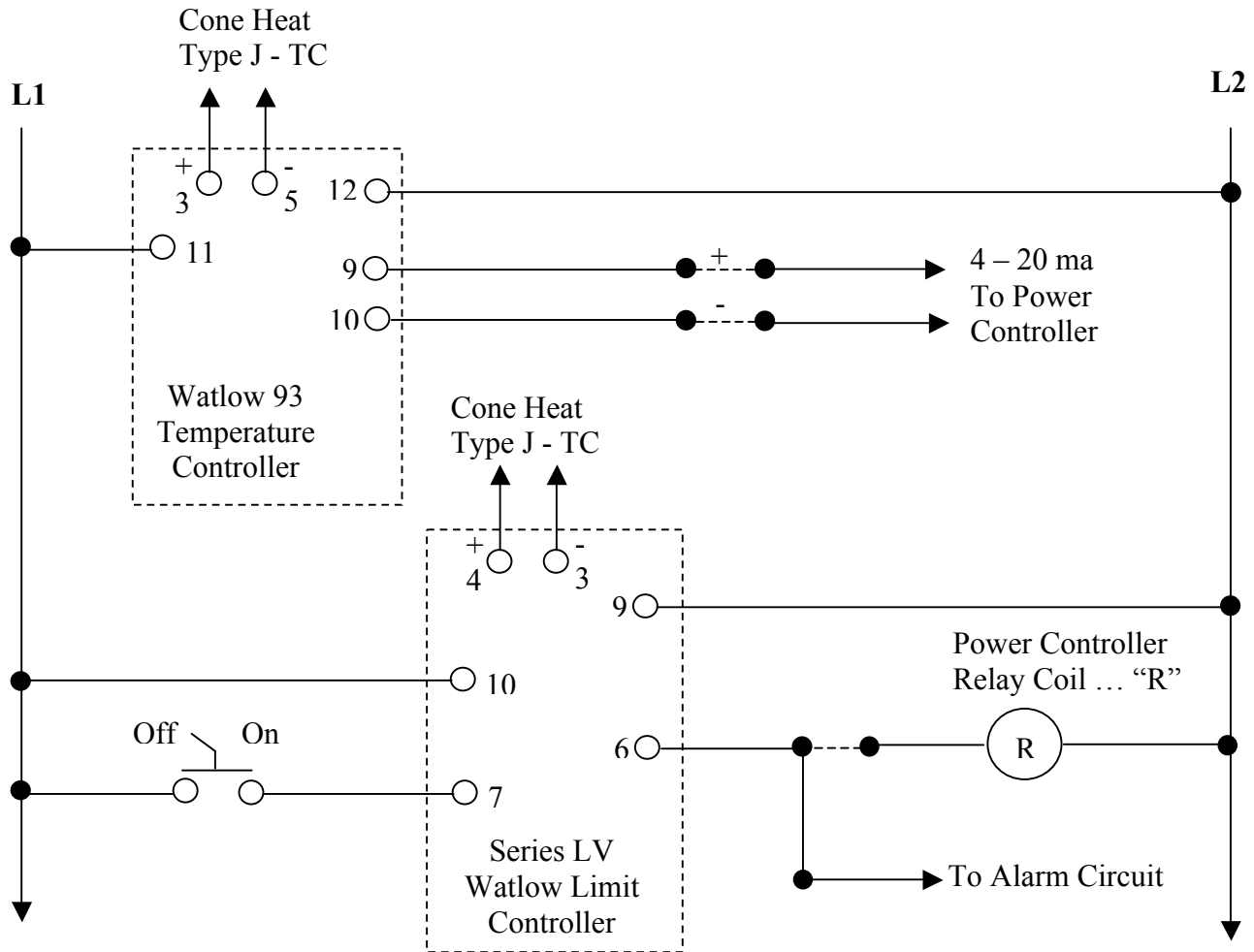


Figure 2: 110V Wiring

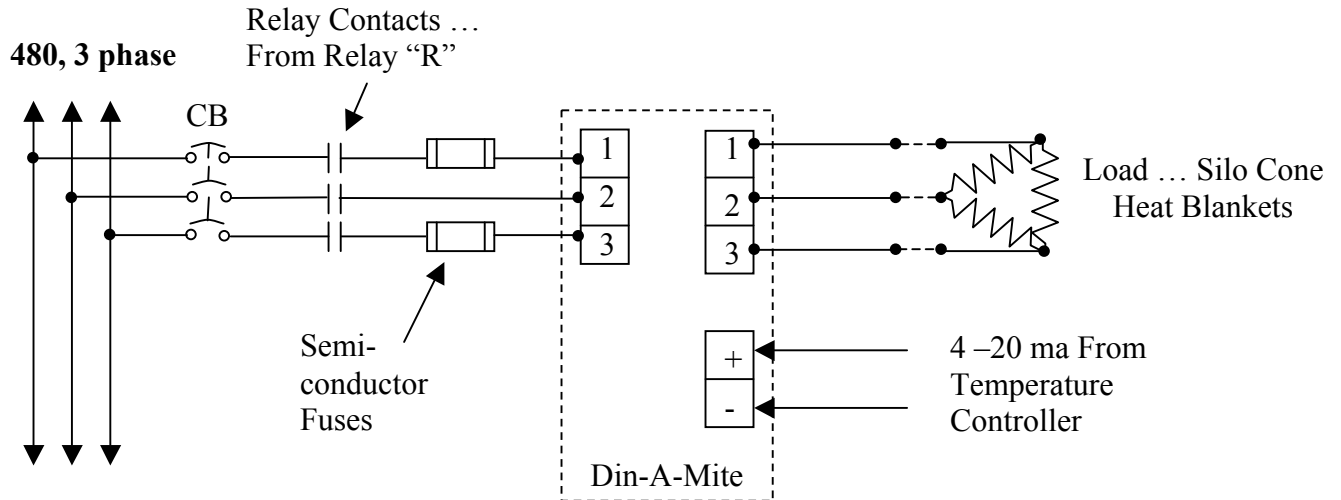


Figure 3: 480V Wiring

COMPONENTS and SETTINGS:

The Din-A-Mite *Power Controller* has no adjustments or settings. All options are selected by hard wiring changes. Refer to **figure 4**, for a picture of the front of the Din-A-Mite.



Figure 4: Din-A-Mite Power Controller.

The *Limit Controller* (Limit Series LV) has a dial on the front and a set / reset pushbutton. Please refer to **figure 5**. To change the set point you push the set / reset button and turn the dial to the desired set point. Turning the dial clockwise increases the set point. This setting needs to be above the desired temperature to be entered in the *Temperature Control*, yet below a temperature that might damage the blankets or other components. The blankets are good to 450° F, however it is recommended that this temperature be set just above (25 to 50 degrees F) the highest possible desired *Temperature Control* setting.



Figure 5: *Limit Controller*, Limit Series LV.

The Series 93 *Temperature Controller* is a microprocessor-based control and must be configured for the application. **Figure 1**, is a picture of the front of the unit. There is a DIP switch, which is internal in the unit, which also must be set.

INPUT DIP SWITCHES:

The input type must be selected. This is done via a DIP switch inside the control. The switch can be changed at any time, but must match the sensor selected under the *in* parameter. The switch is internal, however it can be accessed through the openings along the side of the unit. Please refer to **figure 6**, for the location of this switch. The switch body is the light blue rectangle the arrow is pointing to. The actual switches can be accessed through the opening above the one the switch body can be seen through.

Switch Options:

Thermocouple = 1off 2 on
Process = 1 on 2on
rtd = 1off 2off

Input DIP Switches.



Figure 6: Input DIP Switches.

CONTROLLER SETUP:

To enter the setup menu's:

1. Press the up and down arrows at the same time for 3 seconds (continuing to hold these down, will get you into the Calibration menu).
2. Lower display will say "loc".
3. The upper display will show the current level.
4. All keys will be "inactive until you release the up and down arrows.
5. To advance thru the menu's, press the button that shows the arrows chasing themselves (lower left hand corner).
6. The up and down arrows are used to select data for that menu.
7. If no buttons are pressed within 60 seconds the controller will go back to default settings.

The infinity key is used to clear alarms. Pressing once clears all the latched alarms. Also is used to switch between auto and manual control.

Note: if an alarm is silenced or cleared, the infinity key may be pressed again within 5 seconds to change from manual to auto, or vice versa.

While the controller is in manual, percent power displays in lower display.

Output-1 indicator light: lit when output 1 is energized.

Output-2 indicator light: lit when output 2 is active, this one can be configured as a control alarm output.

SETUP MENU

Parameter	Value	Default Value	Comments
LOC	2 or 3	0	0 allows full operation of all functions, including the changing of parameters (the unit must be in this position to change parameter values). 2 allows manual operation, this could be useful when troubleshooting. Position 3 is preferred for our application.
In	J	J	Type J thermocouple
dEC	0	0	Decimal placement. May not appear.
C_F	F or C	F	Degrees F or C
rL	250°F or 120°C	32°F or 0°C	Low limit of set point.
rh	350°F or 175°C	1382°F or 750°C	High limit of set point. The highest temperature you want the operator to be able to set the desired temperature to.
Ot 1	Ht	Ht	Heat (Ht) or Cool (Cl).
HSC	1	2	Hysteresis-control – Treat same as Prop Band
Ot 2	no	Con	Output action for secondary output.
rP	OFF	OFF	Ramping
dSP	nor	nor	Display (nor = normal)

OPERATION MENU

Parameter	Value	Default Value	Comments
SP	Desired Temperature		Appears first
Pb 1	25°f	25°f	Proportion Band 1
rE 1	.5	0.00	Reset Integral – helps eliminate droop
It 1	00.0	00.0	
rA 1	0.00	0.00	
dE1	0.00	0.00	
Ct 1	5.0	5.0	5 seconds Cycle Time
CAL	0	0	Calibration off set
AUt	0	0	Auto tune 0 = set to OFF 1 = set to “slow” 2 = set to “medium” 3 = set to “fast”

Setup Notes:

Parameters shaded in gray may not appear. **There are other parameters that may appear, until all the above parameters are set.** Go through the setup of the controller entering the above values. Then go back through the controller and check all parameters.

Setup will now be complete. After stepping through the menus the controller returns to the set point parameter under the operations menu. Allowing the controller to set for 60 seconds will allow it to return to the default display, Process over Set Point.