

WATLOW ELECTRIC MFG CO.

Thermostat Control Installation & Maintenance Manual

I&M NUMBER 316-42-4-1

Date: 11/25/13

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Pre Installation

- Check to make sure that the thermostat received is the same as that ordered.
- Check capillary for kinks and damage to the bulb

Safety

Fire and electrical shock may result if thermostats are used improperly or are installed by unqualified personnel !! Care should be taken to read and completely understand the Installation and Maintenance manual before installing and wiring the thermostat. Any installation and maintenance performed on the thermostat shall be done by a qualified electrician, in accordance with the "National Electric Code" and other electrical codes as they apply. It is the users responsibility to ensure that the thermostat being used is properly selected and installed in the application.



The Caution Symbol (exclamation point) alerts you to a "**CAUTION**", a safety or functional hazard which could affect your equipment or its performance.



The warning symbol (lightning bolt) alerts you to a "**WARNING**", a safety hazard which could affect you and the equipment

Installation

Proper thermostat selection and installation will result in safe operation, and acceptable heater control.

1. Locate the thermostat in an area where ambient temperatures do not exceed 150°F (66°C)
2. If thermostat is not already enclosed in an electrical housing, then enclose the thermostat to:
 - prevent electrical shock to personnel through accidental contact
 - if applicable, prevent fire or explosion when flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings are present in accordance with articles 500 through 504 of the "National Electric Code" (NEC)
 - prevent contact with falling objects that might damage or cause electrical short
3. Locate sensing bulb in the process fluid so that the entire bulb is exposed to the heated media, but a sufficient distance from the heating element to negate the influence of the sheath temperature. **Care should be taken not to kink the capillary tubing of the thermostat while installing the thermostat.** It is not recommended that the thermostat be attached to the heater sheath for high limit protection.



WARNING: Install high temperature control protection in systems where an over temperature fault condition could present a fire hazard or other hazard. Failure to install temperature control protection where a potential hazard exists could result in damage to equipment and property, and injury to personnel.

Failure of components in a temperature control loop, such as the thermostat, and heater control relay can result in damage to a product in process, a melt down of a heater, and / or damaging fire.

To protect against this possibility, over temperature protection must be provided to interrupt or remove power from the heater circuit. **A bulb and capillary thermostat is not recommended for this function since it may not respond quickly enough to adequately protect the heater. In cases where the thermostat bulb gets too hot before the system is turned off, the thermostat bulb could rupture. This could result in the thermostat remaining in the "ON" condition since there is**

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insufficient fluid to move contacts apart. We recommend the temperature protection have appropriate third party approval, and be applied in the classification for which it was tested and approved.

In order to help prevent premature failure and a potentially hazardous condition in cases where consequences of failure may be severe, use an appropriate third party approved liquid level protection device. The liquid level should be such that the entire heater is fully submerged with enough liquid above the heater to adequately dissipate heat from itself as under normal operating conditions. Consult your local authorized sales representative for specific recommendations for your application.

3. Terminal Enclosures for thermostats

Terminal enclosures should be selected to be compatible with the environment in which the thermostat will be located. It is the users responsibility to determine the need for correct rating of the electrical housing. This should be based on appropriate national and local electrical codes. Failure to use a compatible enclosure could result in thermostat damage and personnel danger.

Although enclosures may be supplied with the thermostat, units should be located in an area that will minimize the chance of being hit by falling or moving objects.

In hazardous locations, (as defined in NFPA 70 NEC, Article 501) explosion resistant housings must be used.

5. Wiring

Electrical wiring to the thermostat must be installed in accordance with the National Electric Code and any state and local electrical code by qualified personnel.

Thermostats supplied have been pre-calibrated by the manufacturer and require no adjustment other than desired temperature setting prior to use. Thermostats are not recommended for high accuracy sensing. For high accuracy sensing, the use of a thermocouple and a solid state temperature controller is recommended.

When using thermostats as a Watlow heater control the succeeding factors should be considered:

1. The thermostat may be interconnected with the heater only if the following apply:
 - a) the heater only has one circuit
 - b) the ampere draw of the heater is lower than the rated ampacity of the thermostat at the prescribed voltage.
 - c) if the thermostat interconnected breaks enough power supply lines to cause the heater to discontinue operation.
2. Either a single or double pole thermostat may be interconnected with a single phase heater where the supply voltage does not exceed 277 VAC for SPST, and 480 VAC for DPST. Only DPST may be interconnected to a three wire three phase heater. This includes delta connections and 3 wire wye connections. See Figure 1 for more details.
3. In pilot duty situations (where the thermostat is not interconnected with the heater) a single pole thermostat should be used. See Figure 1 for more details.
4. When installing the thermostat maintain electrical clearance between the capillary and live conductors.
5. Thermostats should not be used as a power switch. The use of a disconnect switch or circuit breaker to shut down the heater for servicing or maintenance is necessary.

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6. All Watlow thermostats contacts open on temperature rise.
7. Refer to specific wiring schematic shipped with heater for interconnection with heater. If one is not provided, contact the factory for the applicable wiring diagram.
8. See figure 2 for information on all catalog thermostats.

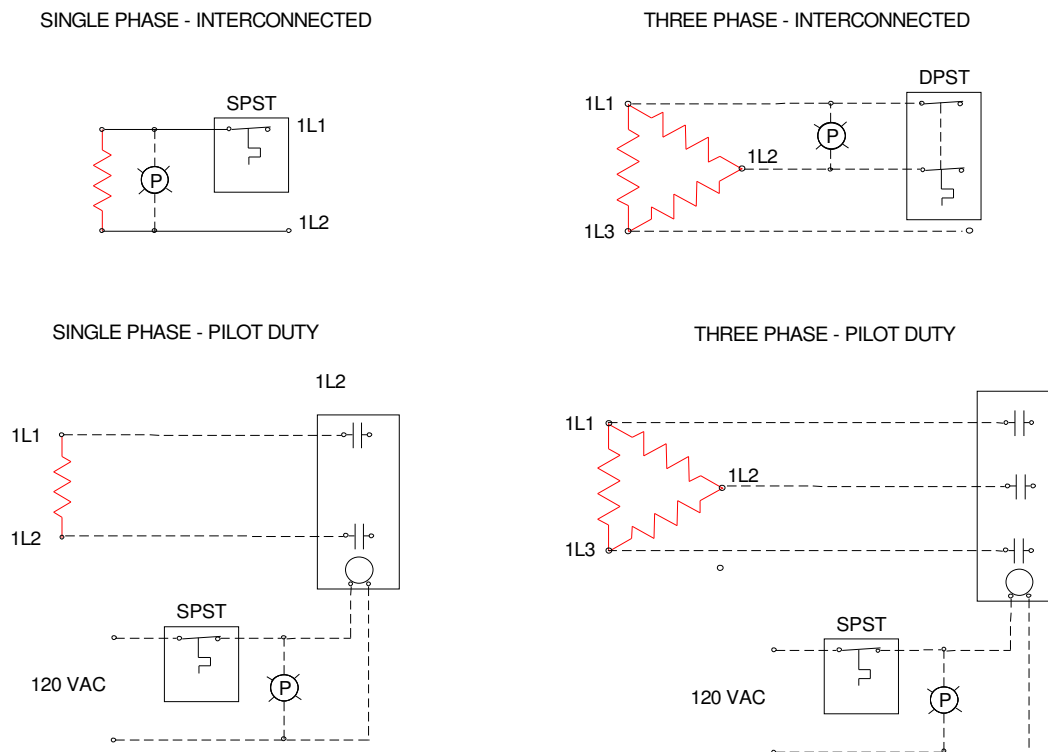


Figure # 1

		RANGE °F	AMPACITY				DIMENSIONS IN INCHES				TERMINAL TYPE	
			AT LINE VOLTAGE				BULB DIA.	BULB LGTH	CAP. LGTH	MODEL NO.		
			120	240	277	480						
ON / OFF CONTROL	SINGLE POLE	30-250°F	25	25	25	-	0.25"	3.50"	18"	2	#12 AWG STRANDED OR #8-32 SCREW LUG	
		30-250°F	25	25	25	-	0.25"	3.19"	84"	2A		
	SINGLE THROW (SPST)	175-550°F	25	25	25	-	0.25"	2.75"	18"	3		
		175-550°F	25	25	25	-	0.25"	2.75"	84"	3A		
	DOUBLE POLE SINGLE THROW (DPST)	300-700°F	25	25	22	-	0.38"	3.75"	60"	10		#8 - 32
		60-160°F	30	30	30	20	0.25"	4.38"	20"	12A		SCREW LUG
		30-110°F	30	30	30	10	0.38"	6.56"	48"	4		#10 - 32 SCREW LUG
60-250°F	30	30	30	10	0.38"	4.5"	48"	5				
60-250°F	30	30	30	10	0.25"	6.5"	48"	5A				
100-550°F	30	30	30	10	0.38"	3.88"	48"	7				
ON/OFF WITH MANUAL RESET	(DPST)	60-250°F	30	30	30	-	0.25"	8.88"	48"	8		
		100-550°F	30	30	30	-	0.19"	12"	48"	9		
	(SPST)	350°F (fixed)	30	30	20	-	0.25"	3.5"	36"	11		

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Figure # 2

Start Up

Before applying power through the thermostat the following items should have been checked with the heater power disconnected:

1. Immersed section of heater is completely covered by liquid if applicable
2. Electrical termination is tight and wiring is per wiring diagram supplied with thermostat or heater
3. Proper disconnecting means and fusing have been installed
4. The voltage rating of the thermostat or heater is the same as that being applied
6. Safety limiting devices are in place

After applying power to the system make sure that it is being controlled properly before leaving it to run unattended. Failure to do this could result in overheating resulting in personnel danger and fire.

Troubleshooting

PROBLEM	CAUSE / CORRECTION
The load will not turn ON	Check fuses, circuit breakers, load, and wiring. See wiring diagrams in Figure #1 or that sent with the Watlow heater A faulty unit, contact the factory
The load will not turn OFF	Check for kinks in the capillary A faulty unit, contact the factory
The unit is not controlling to set point	Check to make sure bulb is properly located in application Unit may be out of calibration, contact factory

Preventative Maintenance



CAUTION: HAZARD OF ELECTRIC SHOCK. TURN ALL POWER TO SYSTEM OFF, USE APPROPRIATE DISCONNECT LOCKOUTS AND ALLOW SYSTEM/HEATER TO COOL BEFORE PERFORMING ANY MAINTENANCE

Check line connections to make sure they are tight, free of oxide build-up, and that no dust or dirt build-up is present.

Check enclosure (inside) if provided for rust, dirt or dust. Remove rust if present, with steel wool (or equal) and thoroughly blow clean with dry, oil-free air.

If enclosure is moisture resistant, check condition of cover gasket. A replacement can be obtained from the factory.

Replacement Parts

WATLOW ELECTRIC MFG CO. - # 6 INDUSTRIAL LOOP RD. n HANNIBAL MO, 63401n PHONE 573-221-2816 n FAX 573-221-3723

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Reference the thermostat part number on the nameplate when ordering replacement parts.

Recommended spare parts would be : a thermostat.

Contact your local Watlow distributor for ordering replacement parts. Check the Yellow Pages under "Electrical Heating Elements" in the largest industrial area nearest you.

Warranty

Watlow warrants its products against defects in material and workmanship for 12 months from the date of delivery for custom products and 18 months for stock products providing such products are properly applied, used and maintained. Watlow does not warrant any product against damage from corrosion, contamination, misapplication, improper specification or operating conditions beyond our control. The terms of this warranty are the exclusive terms available to any person. No person has authority to bind the Company to representation or warranty other than this warranty. Watlow is not liable for incidental or consequential damages resulting from use of the product whether a claim for such damages is based upon warranty, contract, negligence or other fault. Should any product fail under these warranty conditions it will be repaired or replaced at no charge. Advanced authorization must be obtained within 30 days of failure.

Return Policy

1. Call Watlow Industries at 573-221-2816, for a Return Material Authorization (RMA) number before returning any item for repair or replacement. The following information is needed to process a returned heater expeditiously:
 - Customer name
 - Contact Name
 - Part number
 - Quantity
 - Reason for return
 - Application information
 - MSDS sheet of material(s) that came in contact with heater, if used.
 - Customer account number
 - Phone Number
 - P.O. number
2. Prior approval and an RMA number is needed when returning any unused product for credit. Make sure the RMA number is on the outside of the carton, and on all paperwork. Return all material Freight Prepaid basis.
3. Stock heaters and accessories which have not been used or modified can be returned to the plant for a 20% restocking charge. Modified stock units can only be returned, if they are not permanently modified, for a minimum 30% restocking charge.
4. All stock and modified stock must have a date code no later than 2 years from the date of shipment.

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REVISIONS

LEVEL	DESCRIPTION	INITIALS	DATE
1.00	Created Document		
2.00			
3.00			
4.00	ADDED "Date: 6/11/2008" TO HEADER PER ECO HAN2838	TBR	06-11-08
5.00	Revised TABLE #2 for Cotherm single pole thermostat. EC2247	DKM	04-15-13
6.00	Updated watlow company name, was Watlow IND EC2928	JPH	11-25-13