STERLCO TEMPERATURE CONTROL UNIT
SERVICE AND INSTRUCTION MANUAL

MODELS: 6312-C, D, E, F & G
6322-C, D, E, F & G
6332-C, D, E, F & G

X= Ramp Warm Up and
Ramp Cool Down Feature
With Feeder Pump Application

Engineered and manufactured by INDUSTRIAL CONTROL DIVISION
STERLING, INC.
P.O.Box 23435 5200 West Clinton Avenue, Milwaukee, Wisconsin 53223-0435
Manufacturers of Temperature Control Equipment Since 1916

Please note that our address and phone information has changed. Please reference this page for updated contact information.

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INTRODUCTION

We are pleased to provide a Water Circulating Temperature Control Unit for your application. It is built by skilled craftsmen with the most modern and precision machines available today. The simplicity of design and compactness engineered into the unit resulted in less maintenance and less floor space.

The Sterl-Tronic High Temperature Control Unit; designed and tested over a period of many years, represents one of the most significant advances ever in the field of self-contained, closed systems - portable units for heating water and circulating it at controlled temperatures - through molds, rolls or jackets of processing equipment.

The Models 6312, 6322, 6332-C, D, E, F & G are complete single, dual and triple zone heating, circulating and control units, with one, two and three delivery and return lines, plus one water supply and a drain line for cooling.

C = 3/4 H.P. PUMP & MOTOR
D = 1 H.P. PUMP & MOTOR
E = 1-1/2 H.P. PUMP & MOTOR
F = 2 H.P. PUMP & MOTOR
G = 3 H.P. PUMP & MOTOR

The Sterl-Tronic Temperature Control Unit is designed to circulate water through your process and to precisely, automatically, and reliably maintain this water at the selected temperature. The operating range of the Sterl-Tronic unit is from supply water temperature up to 250° F. maximum. The unit is well suited for use with a city water supply, water from portable or central chillers, towers or with well water.

Many new improved designed features have been incorporated into the Sterl-Tronic; among them solid-state electronic thermostat, automatic mechanical proportioning of heating and cooling, dual electronic sensing probes, push button air vent.

The relatively small total amount of water, rapidly recirculated by the Sterl-Tronic, provides assurances of a close and uniform temperature relationship between the delivery and return lines of the unit. This assures uniform and stable temperature control as well as a very even temperature throughout the work area. Also, the high rate of recirculation, combined with the large immersion heater and high cooling rate, gives the unit exceptionally fast response in bringing the process up to temperature and in making changes of settings when necessary.

These standard units may have many variations of optional features added to them, relative to the customers application of specific desires.

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DESCRIPTION

Water Heating

Heating of the water is accomplished through the specially designed low watt density electrical immersion heater inserted into the heater tank; the immersion heater temperature is controlled by the solid-state thermostat mounted on the front of the control panel, and by choice of "pulse heating" or "full heating"output selection.

These Models can be supplied with either 4-1/2, 9 or 12 KW low watt density immersion heaters; the higher the ratings, the faster the fluid will heat up - relative to the setting of the indicating thermostat.

KW ratings of the immersion heaters are rated at the following standard voltages.

208V., 240V., 480V., 600V.

4-1/2	KW	15,368 BTU/HR.
9	KW	30,717 BTU/HR.
12	KW	40,968 BTU/HR.

CIRCULATION

Pump

The pump is a straight centrifugal type, bronze-fitted. It has a high output capacity with good discharge pressure and is well suited for the conditions under which the unit is designed to operate. The circulating capacity available to the user, outside the unit is as stated below. A special seal-flush system in the pump helps keep the seal clean thereby extending seal life. The seal itself is the finest type available for this type of service and provides an excellent combination of long wearing ability, high abrasion resistance and heat resistance.

1 HP	30 GPM @ 25 PSI
1-1/2 HP	40 GPM @ 30 PSI
2 HP	50 GPM @ 35 PSI
3 HP	45 GPM @ 40 PSI

Cooling

Cooling is accomplished by automatic release of the required amount of warm water from the system to the drain. This permits an equal amount of cool water to enter the system from the plant water supply. Naturally, the plant water supply temperature will govern the minimum operating temperature of the unit. The cool water enters the system immediately ahead of the pump which blends it with system water. A selectro switch also provides the option of "pulse cooling" or "full cooling".

MODELS: 6312-C, D, E, F & G
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On the Models 6312-C, D, E, F & G the water supply and drain lines are 1/2" N.P.T. The return and delivery lines are 1-1/4" N.P.T. On the Models 6322 and 6332-C, D, E, F & G the water supply and drain lines are 3/4" N.P.T. The return and delivery lines are 1-1/4" N.P.T.

Connection lines and connectors between the Temperature Control Unit and the process should be selected by the customer to suit the needs and requirements of the application.

1) If your unit has a maximum operating temperature of 250° F., the connection lines and connectors should have a service rating of at least 250° F. and 150 PSIG.

2) If your unit has a maximum operating temperature of 300° F. the connection lines and connectors should have a service rating of at least 300° F. and 150 PSIG.

These connection lines and connectors should be inspected frequently to ensure that the original service rating has not been reduced by age and/or deterioration. If the flow is restricted by too small of connecting hoses or hoses with excess bends, loops, etc., the pressure will increase and the flow through the process will be greatly reduced.

If your mold, i.e. has already been made with serpentine channeling, we would suggest modification as shown in Dwg. A682-03844 and using a manifold, preferably of 3/4" N.P.T. pipe.

In order to eliminate any back pressure - it would be advisable to drill holes at points "A" and tap for 3/4" pipe.

Several parallel runs are far more practical than one long serpentine run and, in many cases, can make a difference between precise control and erratic operation.

WATER SUPPLY

It is very important that the water supply to the unit meet certain requirements. We recommend a full sized connection equal to the pipe size of our water supply connection and without restricting fittings. Usable pressure should be in excess of 20 PSI (1.4 KG/CM^2) and preferably 25 PSI (1.75 KG/CM^2) at the unit, if the unit is expected to operate at temperatures 250° F. (93° C.). This minimum pressure is necessary to keep the process water from flashing to steam at the pump inlet, where pressure is the lowest in the system. The pressure switch inside the unit will keep the unit from running until the unit has been subjected to a minimum water supply pressure.

The water supply line should be open to the unit whenever the unit is running. While a certain minimum supply pressure is necessary as stated above, supply pressure over 75 PSI (5.27 KG/CM^2), while serving no useful purpose, may indeed cause damage to the unit and shorten its life. If your water pressure is excessively high it is recommended that a pressure regulator be installed in the supply line with a relief valve downstream from the regulator and set slightly higher than the regulator.

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WATER SUPPLY (cont.)

Hard or corrosive water can be damaging to the unit and your equipment, especially since the temperatures at which the system operated tend to accelerate deposits or corrosion. Also, bad water can build layers of scale or lime on the surfaces of the unit, slowing down water flow and causing control problems and eventual damage to the equipment. Since the corrective maintenance and downtime often caused by bad water are costly, it is well worthwhile to treat that water. In general, we have found that people with good water seldom buy parts. Industrial water treatment to neutralize these conditions is relatively inexpensive and in many cases is truly a wise investment.

300° F. UNITS

If the unit is expected to operate at temperatures of 290° F. (143° C.), usable water supply pressure should be in excess of 45 PSIG (3.2 KG/CM^2) and preferably 50 PSIG (3.5 KG/CM^2).

MODELS: 6300-C, D, E, F & G
6400-C, D, E, F & G

FEEDER PUMP APPLICATION

CIRCULATION (Cont.)

Cooling (6400)

Cooling is not recommended for this application due to minimum "LMTD" (Logarithmic Temperature Difference) between process circulated fluid and feeder tank fluid.

Connection Lines

On the single zone units the water supply and drain line are 1/2" N.P.T. On the dual and triple zone units these lines are 3/4" N.P.T.

Connection lines and connectors between the Temperature Control Unit and the process should be selected by the customer to suit the needs and requirements of the application.

1) If your unit has a maximum operating temperature of 250° F., the connection lines and connectors should have a service rating of at least 250° F. and 150 PSIG.

2) If your unit has a maximum operating temperature of 300° F. the connection lines and connectors should have a service rating of at least 300° F. and 150 PSIG.

These connection lines and connectors should be inspected frequently to ensure that the original service rating has not been reduced by age and/or deterioration. If the flow is restricted by too small of connecting hoses or hoses with excess bends, loops, etc. the pressure will increase and the flow through the process will greatly reduce.

If your mold, i.e. has already been made with serpentine channeling, we would like to suggest modification as shown in Dwg. A682-03844 and using a manifold, preferably of 3/4" N.P.T. pipe.

In order top eliminate any back pressure, it would be advisable to drill holes at points "A" and tap for 3/4" pipe.

Several parallel runs are far more practical than one long serpentine run and, in many cases, can make a difference between precise control and erratic operation.

WATER SUPPLY

It is very important that the water supply to the unit meet certain requirements. We recommend a full sized connection equal to the pipe size of our water supply connection and without restricting fittings. Usable supply pressure should be in excess of 20 PSI (1.4 KG/CM^2) and preferably over 25 PSI (1.75 KG/CM^2) at the unit. The pressure switch inside the unit will keep the unit from running until the unit has been subjected to a minimum water supply pressure supplied by the feeder pump.

MODELS: 6300-C, D, E, F & G
6400-C, D, E, F & G

FEEDER PUMP APPLICATION

WATER SUPPLY (Cont.)

The water supply line should be open to the unit whenever the unit is running. While a certain minimum supply pressure is necessary as stated above, supply pressures over 75 PSI (5.27 KG/CM^2) while serving no useful purpose may indeed cause damage to the unit and shorten its life. If your water pressure is excessively high, it is recommended that a pressure regulator be installed in the supply line with a relief downstream from the regulator and set slightly higher than the regulator.

HEATER

The heater is a three phase immersion heater, 9 KW is standard capacity of low watt density contruction to minimize fouling and to promote longer heater life. A 4-1/2 KW and a 12 KW low watt density heater may be provided as an alternate.

ELECTRICAL

The pump motors and the immersion heaters operate on three phase, full line voltage with the control circuit operating at 115 V single phase. The control circuit voltage is provided by a single phase transformer wired across two legs of the three phase power supply. Magnetic motor starters with overload and high/low voltage protection are used for the pump motors. The 115 V control circuit is fused.

The feeder pump motor and magnetic starter control circuit operate across the line voltage of the unit. A selector switch "ON-OFF" is supplied with separate self contained magnetic starter.

MODELS: 6300-C, D, E, F & G
6400-C, D, E, F & G

FEEDER PUMP APPLICATION

PRESSURE SWITCH

The pressure switch is built into each unit to insure that the unit will not start until the feed pump has been turned on and the unit is subjected to water supply pressure. This is intended to provide a strong measure of protection for the pump seal and the heater so that they will not be damaged through operation without water. The final measure of protection must come from the operator in venting before start-up. The pressure switch itself is set at approximately 10 PSI prior to leaving Sterling.

PERFORMANCE

The simplicity of design and the highly engineered controller make these units almost self-operated.

The "ON-OFF" control, the "VENT" button and the "TEMPERATURE CONTROLLER" are all that is required to operate these units, and selection of "pulse heating" or "full heat" & "pulse cool" or "full cool" toggle switches. After the water supply has been connected up to the "WATER SUPPLY LINE" (the pressure must be in excess of 20 PSI and preferably over 25 PSI, but not to exceed 50 PSI) and the process water has been added to feed tank, check for proper rotation of feed pump. A direction arrow is provided on feed pump to show proper rotation.

When proper rotation has been established, turn feed pump motor on.

When the "VENT" button is depressed and held for at least one minute, the solenoid valve opens electrically.

As the water comes in on the process supply line and as the check valve is closed, the water must enter the pump, down through the bottom of the tank, up through the tank and out through the "DELIVERY LINE", through the process, back through the "RETURN LINE", and through the open solenoid valve and back into feed tank.

"START" - "STOP" SWITCH

"START POSITION"

When the switch is in the "START" position, the starter is manually energized and supplies the power to the motor and the temperature controller, which in turn regulates either "heating or cooling".

"STOP POSITION"

When the switch is in the "STOP" position, the starter is de-energized, cutting the voltage to the motor and the temperature controller.

"CONTROL FUSE"

This fuse protects the complete 115 volt control circuit.

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HEATER

Heater is a three phase immersion heater of low watt density construction to minimize fouling and to promote longer heater life.

SYSTEM TEMPERATURES

The System Temperatures are easily read on the meter which is part of the thermostat. Its long thin needle with close calibration permits the detection of small temperature variations.

ELECTRICAL

The pump motors and the immersion heaters operate on three phase, full line voltage with the control circuit operating at 115V single phase. The control circuit voltage is provided by a single phase transformer wired across two legs of the three phase power supply. Magnetic motor starters with overload and high/low voltage protection are used for the pump motors. The 115V control circuit is fused.

VENT PUSH BUTTON

This Push Button permits quick and complete purge of air from the operators panel, before the unit is started. The "VENT" push button actuates the solenoid valve which permits the flow of trapped air and water out through the drain, insuring that the unit is properly filled and primed prior to start-up.

PRESSURE SWITCH

The Pressure Switch is built into each unit to insure that the unit will not start until the water supply has been turned "ON" and the unit subjected to water supply pressure. This is intended to provide a strong measure of protection for the pump seal and the heater so that they will not be damaged through operation without water. The final measure of protection must come from the operator in venting before start-up. The pressure switch itself is set at approximately 10 PSI prior to leaving Sterling.

300° F. UNITS

The pressure switch itself is set at approximately 45 PSIG prior to leaving Sterling.

MODELS: 6312-C, D, E, F & G
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INSTALLATION

INITIAL PROCEDURE

These units are supplied for three phase operation for a selected voltage. Caution must be taken to provide a correctly sized power supply to the unit. These units must be correctly grounded.

All connections must be secure and should be checked before starting.

ELECTRICAL

Knockouts are provided for entry for electrical service on each side of the cabinet.

HEATER CAP EACH CIRCUIT KW	TOTAL AMPS 3/60/240	TOTAL AMPS 3/60/480
4-1/2 KW	10.8 AMPS	5.4 AMPS
9 KW	21.6 AMPS	10.8 AMPS
12 KW	28.8 AMPS	14.4 AMPS

R.P.M. Listed for 60 HZ Application
Full Load AMPS @ 50 HZ 2% More Than Listed

HP	RPM	208V	230V	380V	415V	460V	575V
3/4	1800	3.32	3.0	1.82	1.66	1.5	1.2
1-1/2	3500	5.09	4.6	2.78	2.55	2.3	1.85
1-1/2	1800	5.31	4.8	2.91	2.66	2.4	1.92
1-1/2	1200	5.09	4.6	2.78	2.55	2.3	1.84
2	3500	5.97	5.4	3.27	3.00	2.7	2.16
2	1800	6.75	6.1	3.69	3.38	3.05	2.44
2	1200	6.86	6.2	2.75	3.44	3.1	2.48
2	900	8.85	8.0	4.84	4.4	4.0	3.2
3	3500	8.07	7.3	4.42	4.05	3.65	2.92
3	1800	9.95	9.0	5.45	4.98	4.5	3.6
3	1200	10.6	9.6	5.81	5.32	4.8	3.84
3	900	13.3	12.0	7.3	6.6	6.0	4.8

X= Ramp Warm up Feature
Ramp Cool Down Feature

MODELS: ALL STERLTRONIC UNITS

"PULSE HEAT-FULL HEAT" TOGGLE SWITCH:

"Full"Position:

When the switch is in the "full" position, the heating output from the controller is direct to heating control circuit and continuous heating takes place as long as controller calls for heat.

"Pulse" Position:

When the switch is in the "Pulse" position, the heating output from the controller is direct to a cycle timer control which controls the total "on" and "off" time of heating control. This pulse heating, takes place for as long as the controller calls for heat and "pulse" position of toggle switch is maintained.

"PULSE RATE" COUNTING DIAL:

The duration of "on" and "off" time can be regulated by adjusting the pulse rate of dial. The adjustment required varies according to the users process needs.

"PULSE COOL - FULL COOL" TOGGLE SWITCH:

"Full" Position:

When the switch is in the "full" position, the cooling output from the controller is direct to cooling control circuit and continuous cooling takes place as long as controller calls for cool.

"Pulse" Position:

When the switch is in the "pulse" position, the cooling output from the controller is direct to a cycle timer control which controls the total "on" and "off" time of cooling control. This pulse cooling, takes place for as long as the controller calls for cool and "pulse" position of toggle switch is maintained.

"PULSE RATE" COUNTING DIAL:

The duration of "on" and "off" time can be regulated by adjusting the pulse rate of the dial. The adjustment required varies according to the users process needs.

TROUBLESHOOTING

TEMPERATURE FLUCTUATIONS. Alternate Overheating and Overcooling.

While the user might be inclined to believe the trouble to be in the controller, this fluctuation can most always be traced to poor water flow, resulting from one or more of the following conditions:

1. Small connectors or small water passages. Slow water flow will create a long reaction time which causes overheating and overcooling.

2. Very long connecting lines or long serpentine flow of water in and out of the mold in series rather than in parallel. Refer to the page on installation.

3. Blocked water line in the mold. New molds sometimes contain metal chips or other foreign particles inside the water lines. Old molds sometimes contain lime or rust accumulations.

4. Quick disconnect fitting with check valves. (A source of very serious obstruction.) The check valves should be removed.

5. Lime buildup in the piping or fittings.

NOTE: The unit itself can be checked out for normal control by the use of a short line of 3/4" or 1/2" hose connected directly from the delivery to the return line. This will provide a condition of very good flow and will establish whether the blockage is in the unit or the piping.

RAPID CYCLING FROM HEAT TO COOL

This condition is traceable to the same causes as the temperature fluctuations indicated above.

UNABLE TO HEAT PROPERLY

When the temperature will not rise above a certain temperature, the cause will generally be traced to continuous loss of water from the system (allowing cooling water to enter). This can be checked by observing the drain. Under some conditions it is possible to have the solenoid valve close on a particle of grit which, of course, will allow the valve to continuously leak. This solenoid valve can be flushed out easily by having the operator adjust the "set point" up and down scale several times to open and close the solenoid. If it continues to leak, the unit should be stopped and the electric power and water turned off and the solenoid valve should be taken apart and cleaned or replaced, as required.

Another cause would be traceable to a leaking hose or fitting somewhere in the system. It is also possible that the immersion heater might be inoperative or defective. Most any qualified electrician can check this out readily. Heater terminals are readily accessible for checking.

NO HEAT AT ALL

Check to be sure that the contactor goes "in" and "out" in response to signals from the controller. This can be done by adjusting the controller up and down the scale. The contactors should be made to go in and out as the setting passes unit temperature. If it does not function, the controller may be faulty and the section of this manual dealing with controller diagnosis should be studied and followed. If the contactor does function, but if no heat is produced, the problem is likely within the heater itself, assuming of course that the steps listed under "Unable to Properly Heat" have been followed first.

UNABLE TO COOL

In order to cool, the unit must pass water to the drain directly, or through the heat exchanger if the unit has a heat exchanger. Therefore, if your unit does not provide cooling, the following steps should be taken to help locate the cause.

1. Check to see that the water supply is open at all times while the unit is in operation.

2. Check to see if water flows to the drain when the unit calls for cooling.

3. Check the solenoid valve for proper operation - observe the drain. Water should flow to drain in response to solenoid action. If the drain cannot be seen, a simple method of check is by "feel" of the drain piping at the unit, with the solenoid alternately open and closed.

4. If the solenoid valve is operating properly, a "no flow" condition could be the result of a plugged heat exchanger which could reduce or stop the cooling water flow on those units which contain heat exchangers.

5. High back pressure from the drain could easily cause a limited ability to cool, since the unit depends upon the pressure differential between the water supply and drain for the amount of cooling which it can provide.

TROUBLESHOOTING

HEATER BURN OUT

A direct visual indication of heater burn out is the presence of scorched or discolored paint on the heater tank. In most cases, the water level inside the tank at the time of burn out can be determined because the paint on the exterior of the tank below the water level will not be scorched. Causes of heater burn out are generally traceable to:

1. The unit not being filled with water and purged of air prior to startup.
2. A faulty heater (tank discoloration not always present).
3. A plugged system or badly obstructed flow.

PUMPS AND SEALS

Before leaving our factory, each unit is operated for a considerable period of time and calibrated. After this test, the unit is drained and blown out with warm air to remove most of the water from the piping systems. If the unit is allowed to stand idle for a long time before being installed in your factory, the housing gasket at the pump can dry out and will possibly leak when the unit is started. In many cases these gaskets will soon swell and form a tight seal, while in other cases it may be necessary for you to tighten the pump screws to stop a leaking condition.

It is possible to have the pump seal surface separate slightly because of rough handling or considerable vibration during transit from our plant to yours. This, of course, would cause a leak at the pump seal when the pump is started, but in most cases the surface will mate again after the pump is allowed to run for short periods of time. If they do not mate, you might find it necessary to open the pump and free the seal by hand. It is seldom necessary to install a replacement seal in a new unit unless the seal has been damaged because the unit has been started without water.

Our pump seals should give a long period of service life. There are conditions, of course, which tend to shorten the seal life - such as presence of grit, operation of the unit without water, sustained high water temperatures or the presence of certain chemicals in the water. Our pump seal assembly has been developed to resist abrasive particles which we find present in many water systems. It is also fitted with high temperature flexible components for a maximum amount of heat resistance. These same components remain flexible even at low temperatures. Thus, the standard seal has a fine combination of heat resistance and wear resistance.

TROUBLESHOOTING

After the unit has been in service for a period of years where abrasive conditions are present, you may find that the pump casting, which is designated as our "bracket", can be eroded away in the area around the seat of the rotary seal. This area should provide a straight, smooth surface against which the O-ring of the seal seat should bear. Should your casting show signs of erosion in this area, we would strongly recommend that the casting be replaced, since the replacement cost of the casting is a very modest investment when compared with downtime and maintenance cost for replacing a seal which has been installed in a worn out pump. A small puddle underneath the unit is a sign of rotary seal wear, and if your investigation confirms the pump as the source of the leak we would recommend that the seal be replaced as soon as practical. If allowed to leak, the water will eventually find its way to the lower motor bearing and cause further damage. The water slinger is intended to provide temporary protection against this possibility, but a continued and substantial leak will, undoubtedly, ruin the motor bearing.

Even though your maintenance people may have had many years of experience in dealing with pumps in general, we would strongly suggest that they follow our Form I-4100-E1 when overhauling the pumps. Careful attention to these instructions will help assure a proper installation and minimum downtime.

Under some conditions users find that the pump will not start. After turning off the power supply it would be well to check the motor shaft to be certain that it is free to turn. By removing the drip cover atop the motor, access is provided to the end of the shaft, which has been slotted so that it might be turned with a screwdriver. If the shaft is found free to turn, we would suggest that the power supply to the unit be checked on all legs to be certain that the power is available to the motor. If these two items have been checked, we would then recommend that a competent electrician be called upon to check the motor and its circuit.

"R" Series

TROUBLE SHOOTING GUIDE

The following is a general outline for diagnosing possible problems in the temperature control system. By following the checkout procedure given below, one should be able to determine what the problems are and what corrective action to take.

I. No Heat or Cool
   A. Loss of Power -
      1.) Check control circuit voltage (120 VAC) on terminals 1 & 2 of controller enclosure.
      2.) Check for blown fuse on controller chassis (3/10 A Slo-Blo fuse required)
      3.) Unit not inserted far enough into enclosure. The two thumb screws provided to hold controller into enclosure must be snug.
      4.) Control voltage of main unit not on due to lack of water pressure or blown fuse.

II. Units Controls Properly, Meter Pegs at Full Scale.
      1.) Faulty meter
      2.) Faulty amplifier board - (this is the plug-in board on the right side of chassis as one faces the unit).

III. Unit Controls Properly, Meter Remains at Zero.
      1.) Faulty meter
      2.) Faulty amplifier board

IV. Unit Controls Properly, Heater Contactor &/or Cooling Solenoid Chatters.
      1.) Loose connections on terminal 8,9 or 10 of controller enclosure
      2.) Chassis not inserted properly in enclosure.
      3.) Span adjustment set too close.
      4.) Plug-in boards may have a film on the gold-plated tabs - Remove boards & clean tabs with fine emery paper.
      5.) Faulty power supply or amplifier board.

V. No Heat - Cooling Operates Properly.
      1.) Heat probe open - if this happens meter will read full scale.
      2.) Faulty amplifier board.

VI. No Cool - Heat Operates Properly.
      1.) Probe possibly shorted - check terminals 8 & 10. Remove wire from terminal #10 - if cooling operates, probe is shorted. Replace
      2.) Faulty amplifier board

VII. Heat Stays on Regardless of Setting.
      1.) Heat probe shorted - if this happens the meter will remain at zero - Open terminal #9 - if meter pegs at full scale probe should be replaced.
      2.) Faulty amplifier board.

VIII. Cooling Stays on Regardless of Setting.

1.) Probe open circuited - short terminals 8 & 10 - if cooling stops - probe should be replaced.
2.) Faulty amplifier board.

METER ADJUSTMENT - In event the temperature shown on the meter is not correct, an adjustemtn can be made to bring the meter to a true reading. First stop the unit and make certain that the meter is properly "zeroed" - see paragraph above. Secondly, restart the unit and allow the temperature to stabilize at a given true temperature, indicated by some external thermometer. Pull out the controller and make adjustment using the potentiometer on the power supply circuit board. The adjustments should be made in gradual amounts and the controller will have to be "plugged-in" to check on the progress of the adjustment. The power supply board is the one on the left (facing the unit). The potentiometer is approx. 5/16" square and 1-1/4" long with the adjusting screw at one end, and is blue in color. After re-calibrating the meter, it may be necessary to re-set the pointer on the "set" potentiometer to agree.

THERMOSTAT

1. Check the following terminal connections of the controller, located on the back side of the controller box, to be certain they are correct and tight.

2. Check the voltage between terminals #1 and 2. The correct voltage at this point is 115 VAC.

3. Terminal #1 from transformer secondary (115v. side) internally located in the unit.

4. Terminal #2 from transformer secondary (115v. side) internally located in the unit.

5. Terminal #3 from heater contactor.

6. Terminal #4 from heater contactor.

7. Terminal #5 from solenoid valve.

8. Terminal #6 from solenoid valve.
   Note: R6400 Series has jumper wire from Terminal #5 to Terminal #7.

9. Terminal #7 solenoid valve.
   Note: R6300 and R6500 only. There should not be a jumper wire from Terminal #5 to Terminal #7 on the above units.

10. Terminal #8 - common for sensing probes.

11. Terminal #9 - "heat" sensing probe.

12. Terminal #10 - "cool" sensing probe.