STERLCO TEMPERATURE CONTROL UNIT
SERVICE AND INSTRUCTION MANUAL
MODELS: S-6512-A

Engineered and manufactured by INDUSTRIAL CONTROL DIVISION
STERLING, INC.
5200 West Clinton Avenue, Milwaukee, Wisconsin 53223
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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The ACS Customer Service Group will provide your company with genuine OEM quality parts manufactured to engineering design specifications, which will maximize your equipment's performance and efficiency. To assist in expediting your phone or fax order, please have the model and serial number of your unit when you contact us. A customer replacement parts list is included in this manual for your convenience. ACS welcomes inquiries on all your parts needs and is dedicated to providing excellent customer service.

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MODELS: S-6512-A

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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 Sterltronic 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 Model S-6512-A is a complete direct-indirect temperature control.

The Process Water Supply line is used for the direct cooling.

The Raw Water Supply line is used for the indirect ccoling.

In addition, we have a Raw Water Drain line and a Process Water Drain line.

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 the solid-state electronic thermostat, automatic mechanical proportioning of heating and cooling, dual electronic sensing probes, pushbutton 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 exeeptionally 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.

MODELS: S-6512-A

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 manual indicating thermostat mounted on the front of the control panel.

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.

	240V, 480V, 600V	
4 1/2 KW	15 GPM @ 20 PSI	15,368 BTU/hr.
9 KW	15 GPM @ 20 PSI	30,717 BTU/hr.
12 KW	15 GPM @ 20 PSI	40,968 BTU/hr.

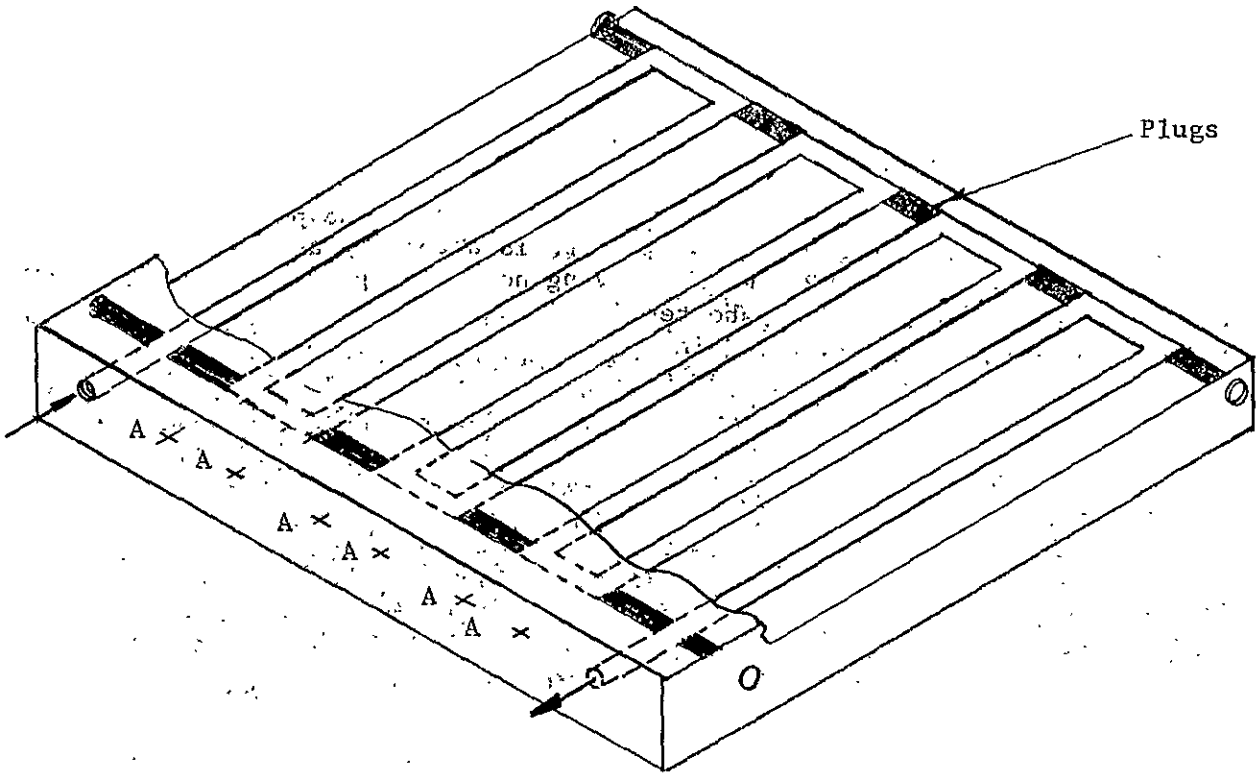
CIRCULATION:

PUMP:

The pump is a 1/2 HP 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 15 GPM @ 20 PSI. 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.

THE COOLING OPTION afford the opportunity of choosing either of two methods of cooling, providing greater flexibility. With the cooling selector switch in the "indirect" position, cooling is accomplished thru the use of a shell-and-tube heat exchanger of approximately four square ft. surface area, installed in the circulating system. This allows for the constant recirculation of the same water, thereby reducing the tendency for lime or scale formation in areas where water is of poor quality. While process water passes thru the tube bundle, it is cooled by passage of cold water, from the user's supply, thru the shell of the heat exchanger upon demand by the thermostat.

With the cooling selector switch in the "direct" position, cooling is accomplished by the automatic release of the required amount of warm process water to the drain. This permits an equal amount of cool water to enter the system from the process water supply. Cool water enters the system immediately ahead of the pump, which blends it with system water. Although the plant water supply temperature will govern the minimum operating temperature of the unit, the direct injection method of cooling affords the fastest cooling or a rapid cool-down period are required.



Modification of Platen
For Manifold

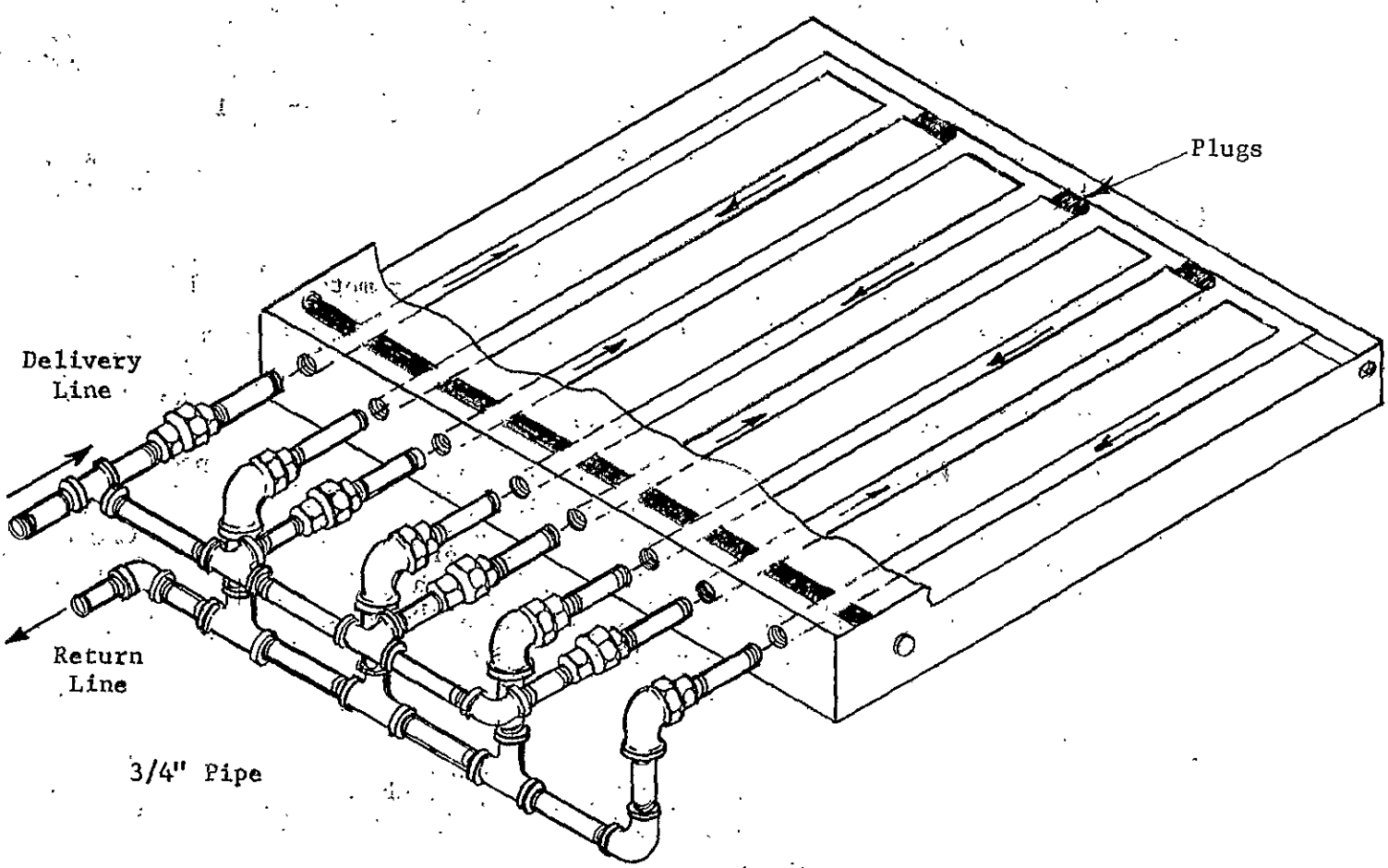


Fig.1

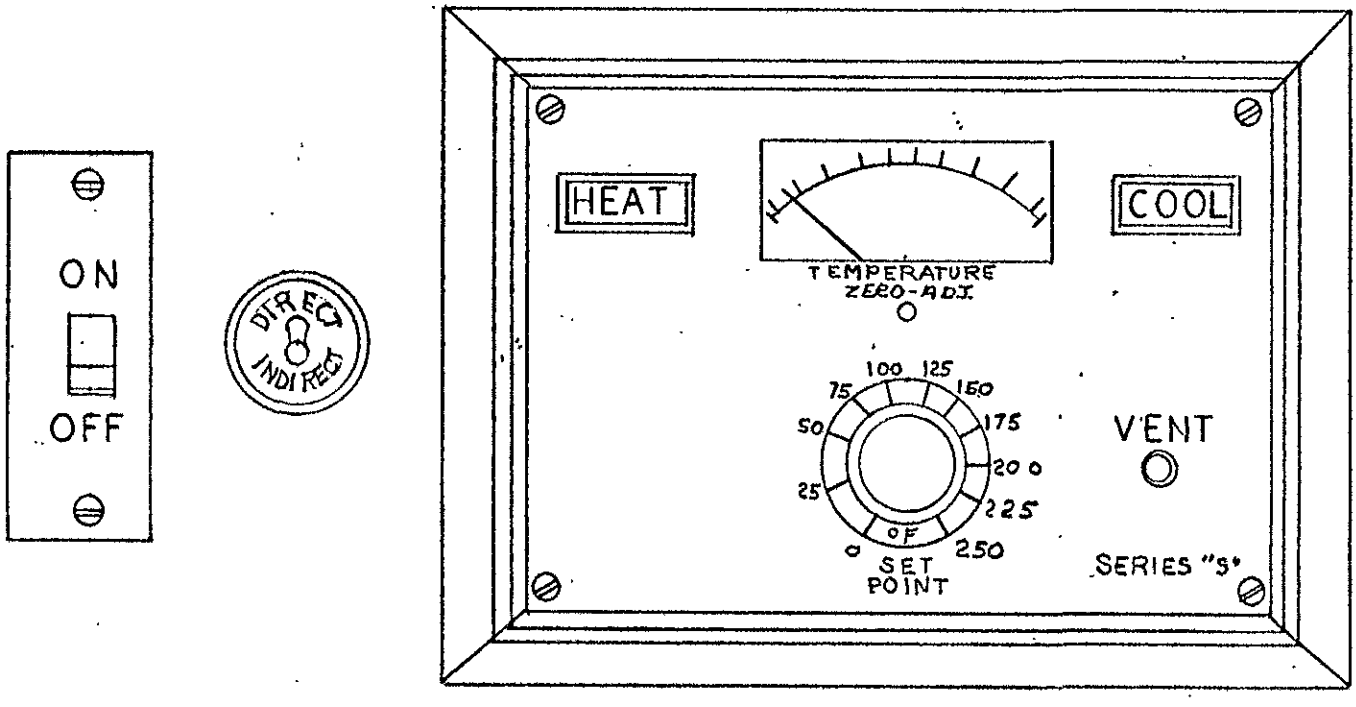
ELECTRICAL: The control circuit and pump operate on 220 volt, single phase current. In units built for 220 volt operation this current is taken from two legs of the three phase power supply. In 3/60/440 volt units a single phase transformer provides 220 volt single phase current for the control circuit and motor.

VENT PUSHBUTTON:

This pushbutton permits quick and complete purge of air from the operator's panel, before the unit is started. The "VENT" pushbutton 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.



A-682-04169

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:

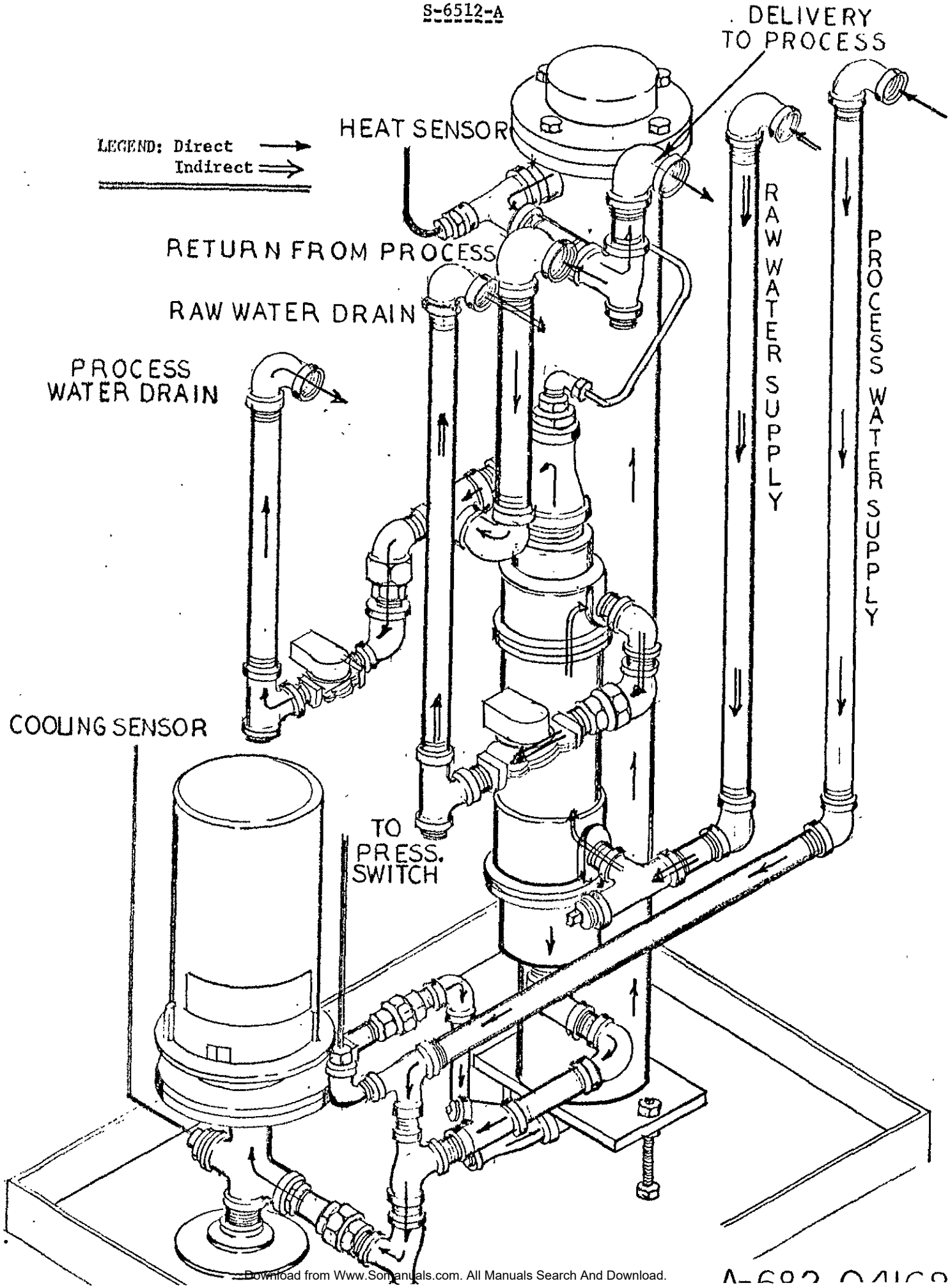
Knockouts are provided for entry or electrical service on each side of the cabinet.

HEATER CAP EACH CIRCUIT KW	TOTAL AMPS 3/60/240	TOTAL AMPS. 3/60/480	TOTAL AMPS. 3/60/600
4 1/2 KW	10.8 Amps	5.4 AMPS	4.3 AMPS
9 KW	21.6 AMPS	10.8 AMPS	8.7 AMPS
12 KW	28.8 AMPS	14.4 AMPS	11.5 AMPS

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

H.P.	RPM	208V	230V	380V	415V	460V	575V
1/2	1800	2.21	2.0	1.21	1.11	1.0	0.8

S-6512-A



A-682-0468

OPERATION:

Vent to the unit as described on page 4, position the "ON-OFF" switch to the "PM" position.

Set the control knob on the temperature controller to the desired heat.

As the unit is in the heating cycle, the Heat Indicator Light will illuminate "AMBER", if the heat of the water travels above the set point, the unit will automatically switch to the cooling cycle and the Cooling Indicator Light will illuminate "WHITE".

SHUTDOWN:

Prior to shutdown, the water supply to the unit should be shut off, depress the "VENT" button for a few seconds to relieve the internal pressure. Water supply and drain lines, delivery and return lines and the electrical supply may then be disconnected.

DRAINING:

If your Seerl-Tronic is to be taken out of service for a long time, or it will be exposed to freezing, it should be thoroughly drained. Drain plugs are provided at the base of the heater tank and water supply and drain lines.

CALIBRATION:

The following sequence of steps should be followed to properly and effectively calibrate your Sterlco Temperature Control Unit.

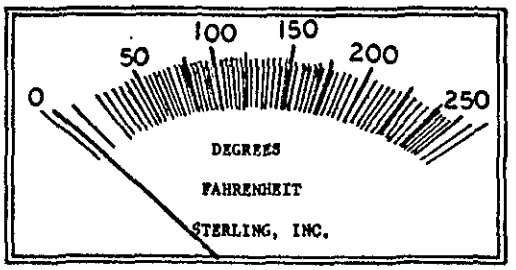
1.) Be certain that the water supply line is connected.

2.) Position the "ON-OFF" Switch to the "OFF" position.

3.) Zero the temperature indicator as shown in Dwg. B681-00031.

4.) Check the sensor wires at terminal 1, 2 & 3 of the solid state controller to make sure they are securely attached. If they are somewhat loose or oxidized, a false thermostat reading will be given.

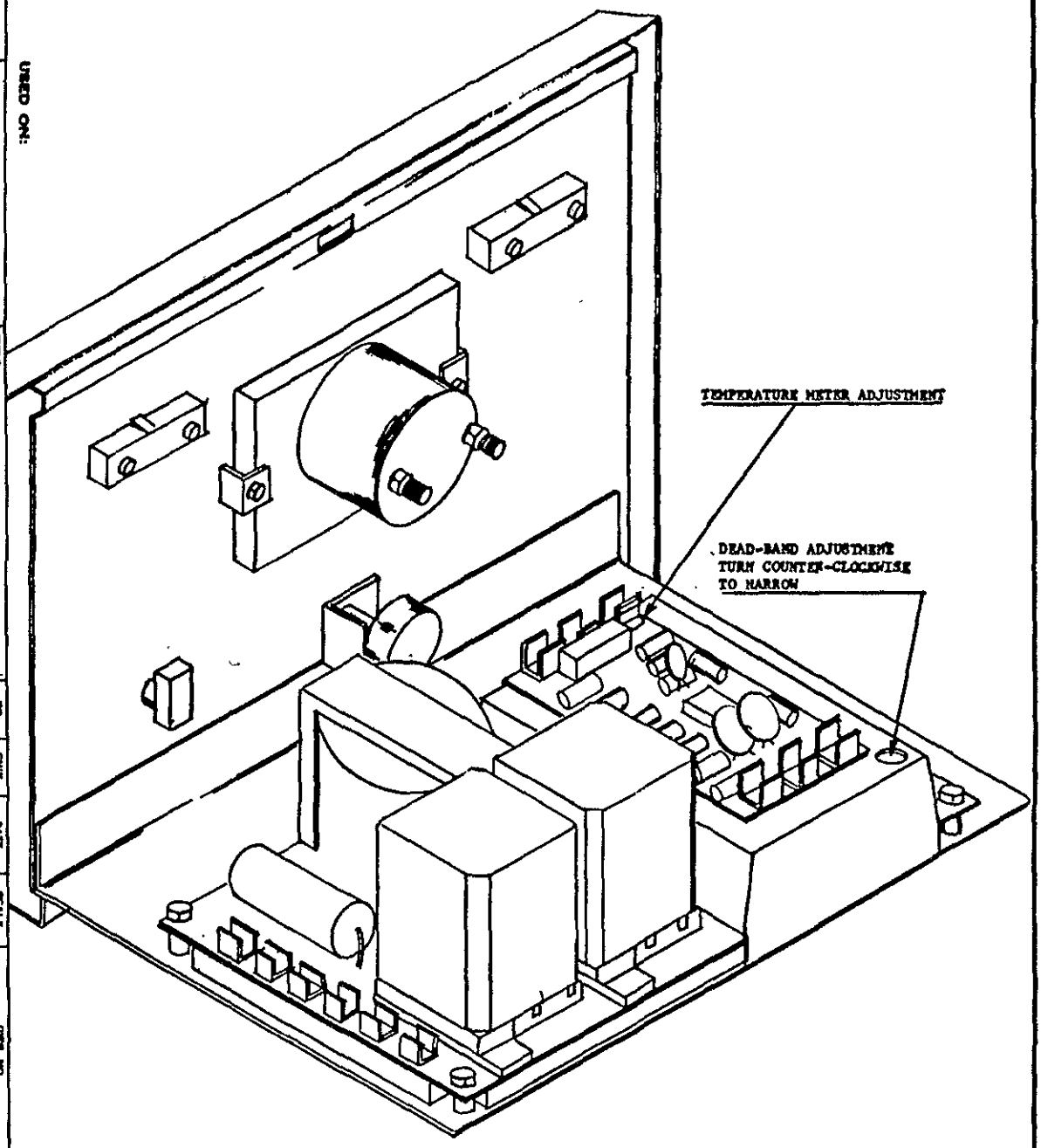
5.) Check the dead-band span by turning the front set knob up scale and down slowly to determine the amount of span between heating and cooling.



TEMPERTATURE
ZERO ADJ.

WITH THE UNIT STOPPED, THE TEMPERATURE INDICATOR SHOULD POINT TO ZERO. IF IT DOES NOT, THE "ZERO ADJUSTMENT" SHOULD BE USED TO BRING THE INDICATOR TO "ZERO". IF THE CORRECT TEMPERATURE IS NOT SHOWN WHEN THE UNIT IS OPERATED, PLEASE MAKE ADJUSTMENT FOR CORRECT TEMPERATURE ON THE POTENTIOMETER OF THE SOLID STATE BOARD, AS SHOWN BELOW

USED ON:



REV.

STERLING, INC.
MILWAUKEE, WIS.

TITLE: SERIES SI CONTROLLER

DR. BJM

CHK.

DATE 6/13/78

SCALE

DWG. NO. B-681-00031

TROUBLE SHOOTING:

TEMPERATURE FLUCTUATIONS: Alternate Overheating and Overcooling

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

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

2.) Very long lengths of hose 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.

SET TEMPERATURE NOT SAME AS "INDICATED" TEMPERATURE:

Through rough handling in transit, the "set" calibration of the potentiometer may be shifted slightly. This will cause the unit to control at an indicated temperature slightly different than the "set". The thermostat knob may be loosened and reset to agree with the temperature being maintained on the thermometer. This should only be done with a condition of good water flow and preferably near mid-range of the thermostat.

TROUBLE SHOOTING: (Continued)

4.) Perhaps it might be well to check the water supply pressure. If the water supply pressure drops below the setting of the pressure switch, the unit will stop.

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.

HEATER BURN-OUT:

A direct visual indication of heater burn-out is the presence of scorched or discolored paint on the heater tank. In almost all 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 start-up.

2.) A faulty heater (tank discoloration not always present.)

3.) A plugged system or b adly obstructed flow.

PUMPS AND SEALS:

Before leaving our factory, each unit is operated for some 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 sit 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 make a partial turn of the pump screws to stop a leaking condition.

In some cases, 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, and 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 up the pump and free the seal by hand, It is seldom necessary to install a replacement seal in a new unit unless the unit has been started without water.

TROUBLE SHOOTING: (Continued)

THERMOSTAT:

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 problem is and what steps to take to correct it.

I. PROBLEM - NO HEAT OR COOL:

1.) Loss of Power
(a) Check control circuit voltage between terminals #9 and #12 on solid state unit. Correct voltage is shown on brass nameplate of the unit.

2.) No connection on terminal #5 or broken wire from set pot wiper (red wire)

3.) Faulty contactor and solenoid on output of solid state unit.
(a) Rotate set pot to its maximum clockwise position and check for proper control circuit voltage across terminals #7 & #12.
(b) If voltage is present but contactor does not energize, coil is open and should be replaced.
(c) If no voltage appears across these terminals, visually, check the heat relay on the solid state controller for operation by rotating the set pot above and below the indicated temperature. If relay operates but no voltage appears across the contactor coil, the contacts on the relay are probably burned and should be cleaned with very fine sandpaper. This applies to the solid state unit with open type relay. If the unit has plastic covered plug-in type relays, simply remove the faulty one and replace with new. If relay does not operate, return defective solid state unit to Sterling for repair.
(d) Repeat step 1-3 for solenoid valve operation by rotating set pot counter, clockwise and checking voltage across terminals #8 and #12.

II. PROBLEM - COOLING STAYS ON, HEATING STAYS OFF REGARDLESS OF SETTING:

1.) No connection to terminal #2 on solid state unit.

2.) No connection to terminal #4 on solid state unit or broken wire from set pot (White wire).

TROUBLE SHOOTING: (Continued)

THERMOSTAT: (Continued)

VIII. HEAT AND COOL CONTROL BUT AT A HIGHER TEMPERATURE THAN INDICATED ON POT DIAL:

1.) First check to determine that knob has not slipped on potentiometer shaft, by turning pot to both ends of scale. If stop point is near end of scale at each end, proceed to "2" below. If stop is not near end of scale, loosen screw holding knob in shaft and remove knob. Turn shaft to a setting above mid-range. When unit has stabilized at temperature as shown on the thermometer.
2.) Short between terminals 5 and 6 on solid state unit indicating faulty probe.

IX. OUTPUT RELAY CHATTER:

1.) Check for loose connections on terminals 1 through 6 on solid state unit.
2.) Broken or intermittent connection on pot or probe wires.

X. DEAD BAND ADJUSTMENT: (See Dwg. B-681-00031)

The dead band adjustment is used to vary the span between Heat "off" and Cooling "on". The adjustment only affects the cool output, thereby, not changing the set point temperature. In the lower left corner of the black plastic cover of the solid state board is a small hole which provides access to the dead band adjustment. Adjustments should be made slowly and in small amounts. Do not force the adjustment beyond its stops.

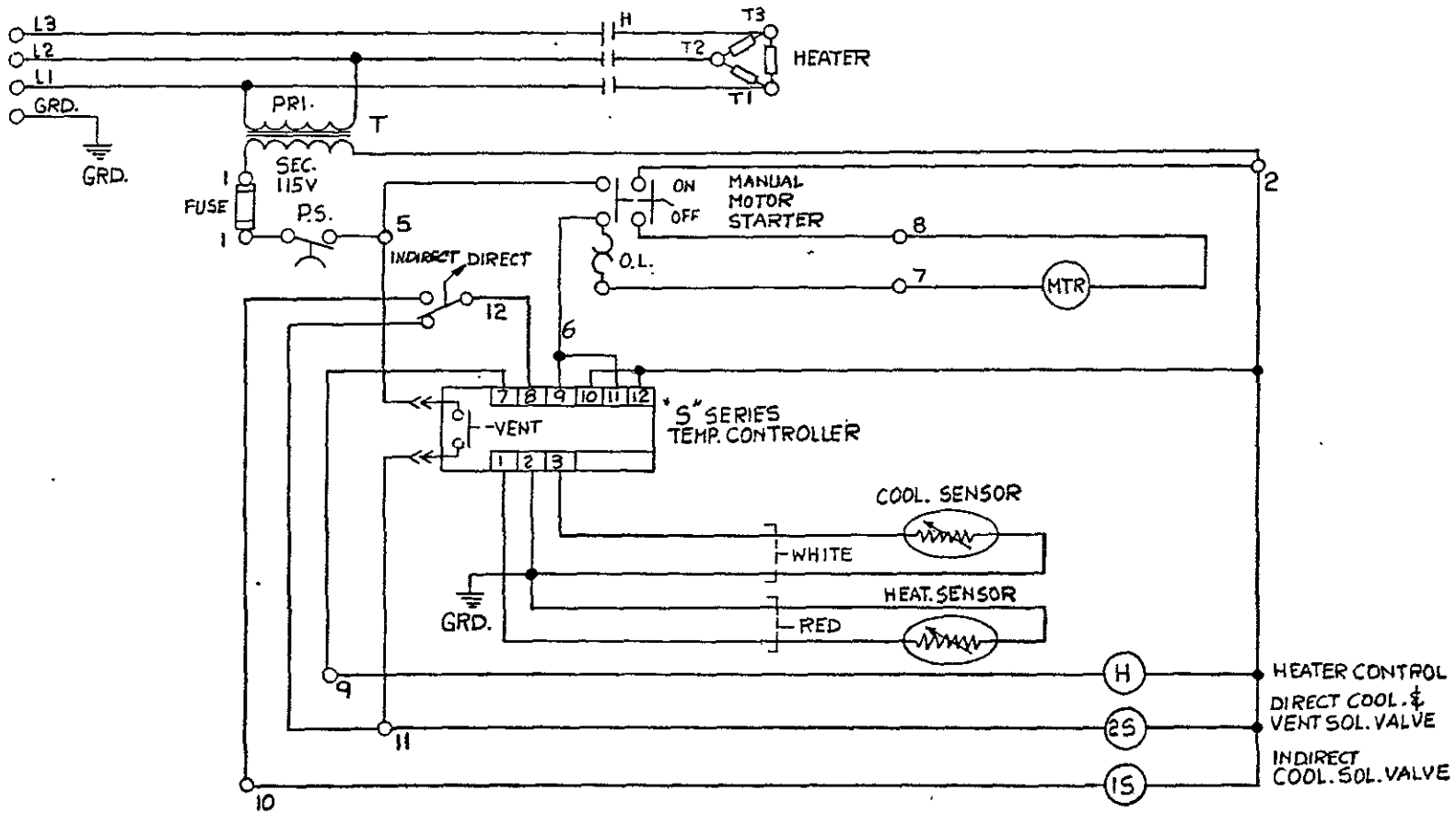
NOTE: The "TROUBLE SHOOTING" guide applies to the thermostat board only. The trouble shooting for the temperature meter board attached to the main board is as follows: In the event of disagreement between the potentiometer and the temperature meter, adjust the meter first.

TEMPERATURE METER "TROUBLE SHOOTING":

1.) Turn off all electrical power to the unit.
2.) Remove two (2) hold-down screws from top of panel and remove controller top panel leaving all wires connected. Caution is urged in this, especially on right side of controller which is the power side. Exercise great care to avoid shorting this side of controller.

After removal of controller, the following steps should be followed in locating the difficulty:

3.) Check power supply to main board terminals #9 and #12. Should be 115 Volt.
4.) Meter does not read -
   (a) Remove meter and shunt wire - if there is one in place.
   (b) Check for tight connections to terminals #3 & #6 on meter board.
   (c) Check positive (+) terminal on main board and terminal #2 on meter board for tight connections.



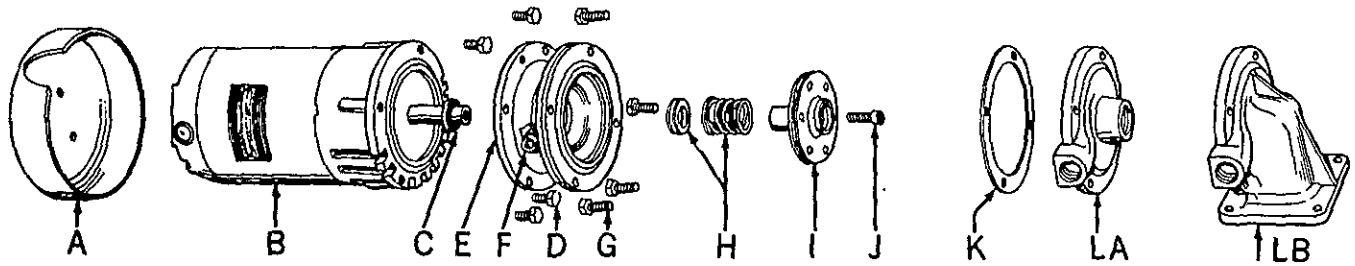
USED ON: S6512-A

REV.		STERLING, INC. MILWAUKEE WIS	TITLE 3/60/208 THRU 600V ELEMENTARY WIRING	DR. R.	DATE 4-2-73	SCALE	DWG. NO B682-00926

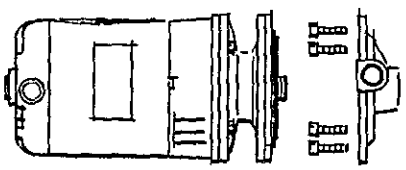
REPLACING ROTARY SEAL ASSEMBLY ON STERLCO PUMP AND MOTOR: ½ AND ¾ HP

PARTS

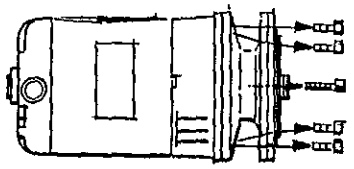
A. Drip Cover
B. Motor
C. Water Slinger
D. Motor Screws
E. Bracket
F. Prime Cock
G. Pump Screws
H. Rotary Seal Assembly
I. Impeller
J. Impeller Screw
K. Housing Gasket
L. Volute - A or B



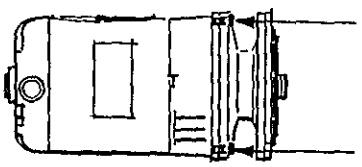
Step No. 1 — Dis-assembling (Removal of old seal assembly)



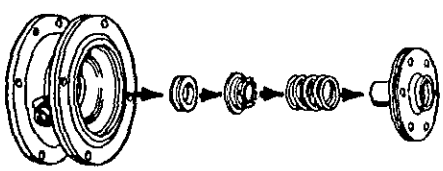
a) Remove volute from motor bracket and impeller assembly by removing pump screws.



b) Remove impeller screw and motor screws. (Note: opposite end of motor shaft is fitted with screw driver slot to hold shaft securely while impeller screw is being removed. Drip cover must be removed to get at screwdriver slot).



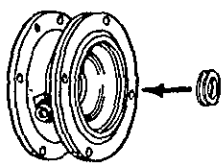
c) Insert two of the pump screws into the two threaded holes in the bracket. Tighten them slowly and evenly to force the impeller and bracket off the shaft. **Do not pry the impeller or bracket!**



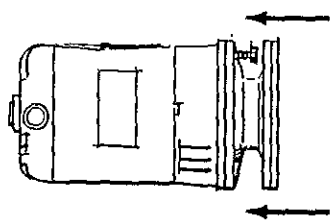
d) Remove old seal parts from impeller hub and bracket. Be sure water slinger is in place.

e) Clean impeller hub thoroughly . . . remove all loose particles of dirt, grease, etc. Use fine emery cloth if necessary. Also clean the recess in the bracket so the new seat will fit perfectly. Remove all particles and dirt on gasket surfaces of the two castings.

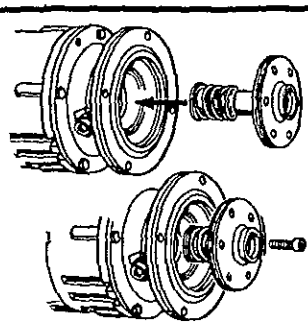
Step No. 2 — Re-assembly (Installation of new seal assembly)



f) Coat outside edge of new seat with 3% detergent solution and slip it into the bracket. Press into bracket with thumbs or wooden dowel. Handle seat carefully so seating surfaces are not scratched or chipped . . . be sure it is squarely seated.

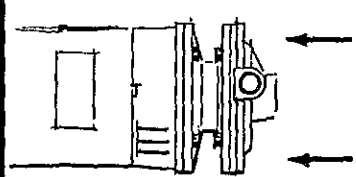


g) Remount bracket on motor.



h) Lubricate impeller hub 3% detergent solution . . . slip new bellows and spring onto impeller hub. Be sure bellows slides freely on impeller hub.

i) Replace impeller on motor shaft extension and secure with impeller screw. Hold shaft with screw driver slot while tightening screw.



j) Replace volute onto bracket, using new housing gasket. Use one gasket for condensate pump and for temperature control units. Secure with pump screws. Be certain gasket is seated properly.

NOTE: When ordering parts please indicate pump model number and serial number.

STERLCO® **Sterling, Inc.**

MODEL: S-6512-A
SPARE PARTS

PART NO.	DESCRIPTION
722-00044-7	Immersion Heater, 4-1/2 KW, 240 V.
722-00044-8	Immersion Heater, 4-1/2 KW, 480 V.
722-00044-11	Immersion Heater, 4-1/2 KW, 600 V.
722-00044-1	Immersion Heater, 9 KW, 240 V.
722-00044-2	Immersion Heater, 9 KW, 480 V.
722-00044-9	Immersion Heater, 9 KW, 600 V.
722-00044-3	Immersion Heater, 12 KW, 240 V.
722-00044-4	Immersion Heater, 12 KW, 480 V.
722-00044-14	Immersion Heater, 12 KW, 600 V.
695-00007-1	Pump & Motor
720-09159	Motor, 1/2 H.P.
615-13341-1	Motor Bracket (See 1-4100-E1)
542-10404	Water Slinger
081-00024.02	Rotary Seal Assembly
695-18409	Impeller Assembly 1/2 H.P.
615-14921	Volute
545-00001	Casket, Pump
691-00003-4	Sensor, Heating & Cooling ("S" Series)
691-00003-9	Sensor, Heating & Cooling ("S1" Series)
732-00024	Solenoid Valve, 1/4"
732-00012	Solenoid Valve, 1/2"
632-02858	Pressure Switch
729-00038	Contactor (C-H)
729-00045	Contactor (Rowan) replaced by 729.00084.00
704-00055	Transformer
725-00512	Fuse, Control (MDL-1)
601-00019-2	Temperature Controller ("S" Series - "0"-300° F) OBSOLETE
601-00019-6	Temperature Controller ("S1" Series - Dual Calib. "0"-300° F.)
692.83231.01	S1 to S3 Controller Retro Fit Kit

Sterling, Inc. ***QUALITY, SERVICE, RELIABILITY SINCE 1916***

5200 WEST CLINTON AVE. MILWAUKEE, WI 53223-0435 • 414-354-0970 • FAX 414-354-6421

MODEL: S-6512-F 2HP
SPARE PARTS LIST

PART NO	DESCRIPTION
722-00044-02	Immersion heater, 9kw, 230v
542-00007-06	Gasket, heater tank
605-00085-01	Pump & Mottor. 2HP
720-09005	Motor, 2HP
615-00001-00	Bracket
542-10404-00	Water Slinger
081-00034-00	Rotary Seal Assembly
695-00024-03	Impeller, 2HP
615-00003-00	Suction cover
545-00002-00	Gasket, pump
732-00024-00	Solenoid Valve, 1/4"
632-02858-00	Pressure Switch
044-00138-00	Pressure Relief Valve, 3/4"
682-80748-01	S1 - S3 Upgrade Kit for controller
692-07369-04	Probe for S3 controller
106-00011-00	Heat Exchanger