STERLCO TEMPERATURE CONTROL UNIT

SERVICE AND INSTRUCTION MANUAL

MODEL 7300
HEAT EXTRACTOR

STERLING, INC.
5200 West Clinton Avenue
Milwaukee, Wisconsin 53223

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

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Parts and Service Department

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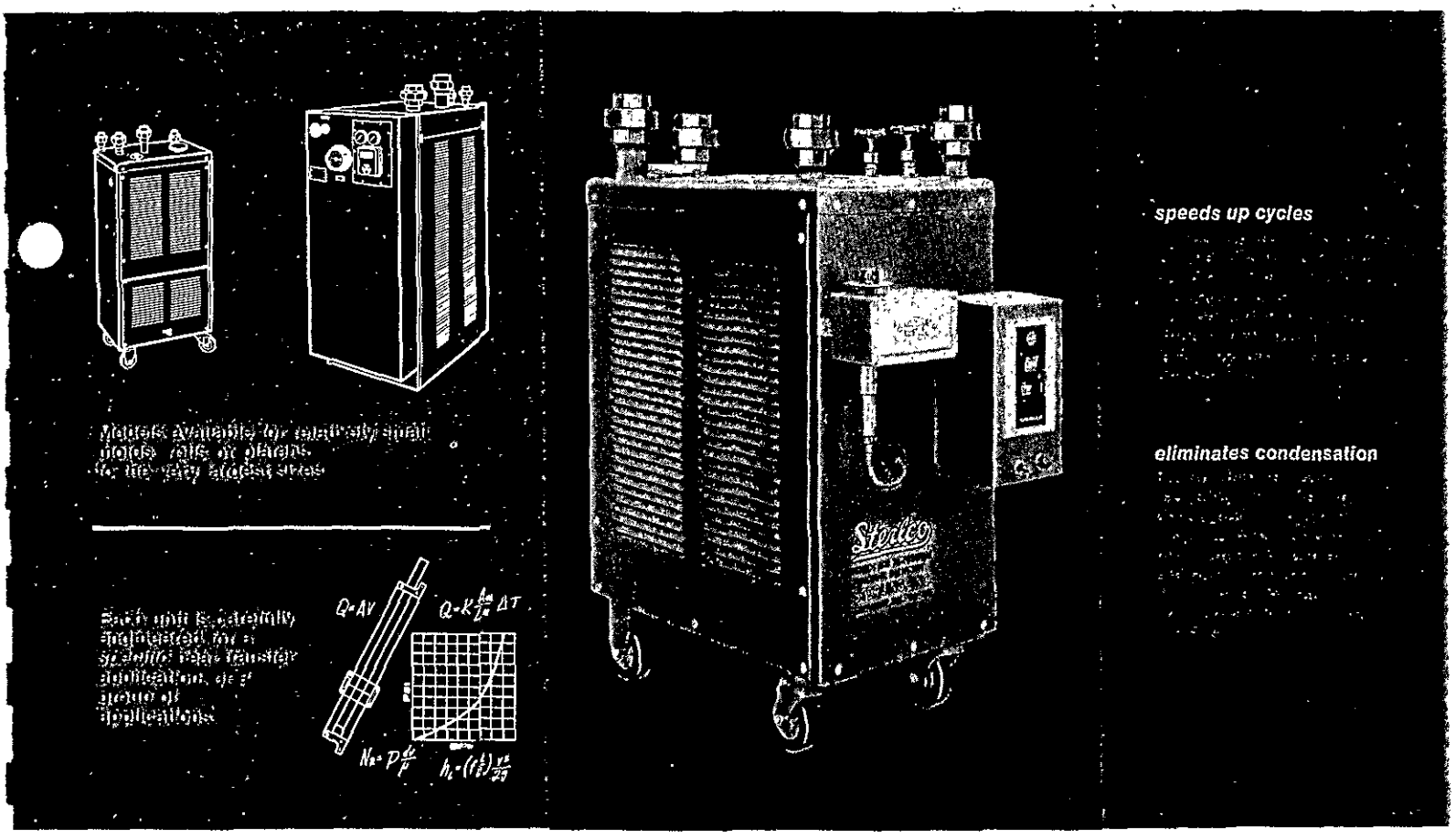
NEW CONCEPT!

HEAT EXTRACTORS

by Sterlco

Unique "turbulent" fluid flow means faster, more efficient heat removal from molds, rolls, platens and dies.



The torrential flow created by the Heat Extractors results in a wildly swirling water action that pulls heat from molds or rolls faster than the laminar fluid flow produced by regular units. Temperature uniformity in the process areas is exceptionally good. Heat Extractors are carefully engineered for specific applications or range of applications to produce a very high Reynolds Number for the fluid flow. Not only the special pump and impeller, but the entire system is designed to give the user the fastest possible rate of heat transfer in his process area. If you are plagued by condensation, or want to speed up production . . . let us give you more information.

LITHO IN USA 6-76

Sterling, inc. 5200 West Clinton Avenue
Milwaukee, Wisconsin 53223

DESCRIPTION

The Heat Extractor is a water-circulating temperature control device which is intended to force a recirculated torrent of turbulent water through the customer's mold, roll or platen. In so doing, the unit pulls heat from the mold at a rapid rate, and it also maintains precise temperature control. The Heat Extractor owes much of its success to our proper sizing for the job, and also to the specially constructed pumps and their very unique impeller designs.

When properly engineered for the job, the unit delivers fluid flow with a very high Reynolds number - which assures that the flow will be turbulent in the mold passages. Turbulent flow provides a wiping-away of insulating layers of water laminations and actually pulls the heat away from the inner wall of the channel. Turbulent flow is much more effective than laminar flow, for fast heat transfer.

The unit cools by mixing tap water with the circulated water, under conditions of precise control. It is well suited for use with chillers, towers, or municipal water supplies, or with well water.

For the user to obtain the best from this unit it is highly important that he carefully follow our recommendations concerning the hookup of hoses, and fittings. This may often require a change away from his present standards for hose and connector sizes and types, but this whole concept is a new one and it should be approached with that definite thought in mind. The results should be most rewarding and well worth the minor changes required.

ELECTRICAL CONNECTION

A three phase electrical power supply should be brought to the starter and connected to the terminals of the starter. TO prevent accidents, the unit should be positively grounded before the power is turned on. DO NOT CHECK ROTATION OR RUN THE PUMP YET.

Delivery and Return Connections

The delivery and return connections at the unit are 1-1/4" female union fittings. Success of the Heat Extractor installation depends greatly upon the user's selection of hose and fitting sizes. It is strongly urged that:

1. If the mold has more than one inlet and outlet, run a separate line from the Heat Extractor to each inlet and outlet. Simple manifolds or headers can be easily assembled and installed to permit the largest possible number of lines to be used. This is imperative. To obtain a high volume of fluid flow in the mold, we must make provision to get it there and back.

2. Hoses and fittings should be the largest size possible. Small fittings, and quick-disconnect fittings should not be used. It is most important that the power of the pump be used inside the mold itself. This will not happen if the power is used just to get fluid through the hoses and fittings. In many cases the users will have to change from their usual type mold hookup. Success of the Heat Extractor depends upon the user following these recommendations.

Water Supply and Drain - The unit is equipped with 1" female union connections for waters supply and drain. Unless the cooling load is extremely heavy, a 3/4" hose for water supply and a 3/4" hose for drain would be ample. If there is a back pressure on the drain line, we must be certain the water supply pressure is substantially higher in pressure.

OPERATION

With the power off, and with the start switch off, the following steps should be taken to put the unit into operation:

1. Turn on the water supply to the unit.

2. Open the two blowoff valves and allow them to blow for approximately one minute. Then close them securely.

3. Set the thermostat dial for a temperature of approximately 100oF. (or 10 or 15 degrees above the cooling water temperature.)

4. Turn on the electrical power supply to the unit.

5. Push the prime button and hold until the system is completely purged of air. This should take about a minute.

6. For installations made for the first time:

   A. Rotation must be checked immediately. Remove the side panel on the operator's left when looking at the front of the unit. The arrow on the motor will show the proper direction or rotation. By looking into the slot at the base of the pump, the operator can see a flat rubber washer, approximately 1/8" thick, which turns with the shaft. The pump starter should be "jogged" until correct rotation can be established. Do not allow the pump to run backwards, even for a short time.

7. With the motor running in the right direction, the unit is now fn full operation. The thermostat should be set for the desired temperature.

GETTING RESULTS WITH THE EXTRACTOR

OBJECTIVE - The heat extractor should enable the user to draw heat from his mold at a faster rate than before. This can allow a higher mold temperature than before (to overcome condensation), or it can allow faster cycles, or a combination of both.

HIGHER MOLD TEMPERATURE TO STOP CONDENSATION - With the plastic process in production, the intial tests should be run at same fluid temperature as used proviously. Then the thermostat setting should be set up to 100 and the unit allowed to run for approximately ten minutes. If process conditions remain stable, the thermostat should be set up another ten degrees and allowed to stabilize. After a few of these increases a maximum allowable water temperature should become apparent.

FASTER CYCLES - In the case of injection molding, the cylinder heats and injection pressures should be reduced, after the steps above have established the most suitable water temperature. Because the mold is now warmer, it should be easier to fill and would not require the same high injection pressure and cylinder heat as before. All this means less heat input, and less need for heat removal. Therefore, faster cycles should be sought.

MAINTENANCE AND REPAIR

TP954A PNEUMATIC INDICATING TEMPERATURE CONTROLLER

INTRODUCTION

The following instructions cover general maintenance and repair procedures for the TP954A Pneumatic Indicating Temperature Controller.

When ordering any individual parts or assemblies, indicate "QUANTITY", "PART No.", "DESCRIPTION", complete Ordering Specification Number (O.S. No.) and Series No. of controller (see example below).

Remove the cover from the TP954A--The O.S. Number and Series Number are stamped on the faceplate of the Dial and Plate Assembly. See Figure 1.

QUANT.	PART NO.	DESCRIPTION
1	314620A	Case & Element Assembly for TP954A 1004 2

NOTE: Price and availability are subject to change without notice.

SPECIAL SOLVENTS & LUBRICANTS

Molykote powder type Z - lubricant, available at hardware stores.

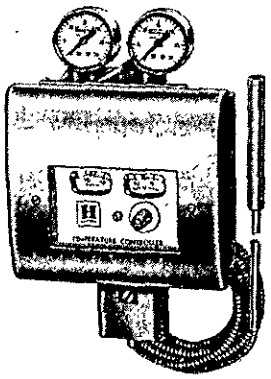
Chlorothene or Vythene - for removal of dirt or grease. available at most office supplies stores.

CAUTIONS

Special care should be exercised in the use of solvents. Have proper ventilation, avoid prolonged inhalation and/or contact with the skin. Careless handling of solvents can result in permanent damage to the respiratory system and skin tissue.

Before removal of any of the parts of the TP954A, note;

1. If the Dial & Plate Assembly is to be removed, turn the knob clockwise and adjust the control index to its lowest setting. See Figure 1.



2. When replacing the Feedback Assembly (see Figure 2B on page 5), do not allow the Indicator (#314583B) to snap against the Flapper (#314586A).
3. Before changing the setting on the Proportional Band (from Reverse to Direct Acting, or Direct to Reverse Acting), turn the knob counterclockwise and adjust the Control Index to the highest setting.

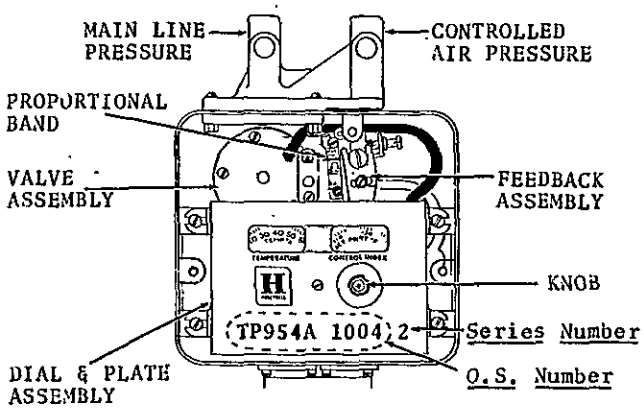


FIGURE 1: INTERNAL VIEW OF THE TP954A

MAINTENANCE

To be performed as required:

1. Check the physical condition of capillary tubing and element, making certain that neither is damaged.
2. Remove the Manifold Assembly and replace the Screen and Filters (#313981 and #314180 Figure 2).
3. Remove cover and clean all parts with a brush and solvent.

REPAIR

Refer to the PARTS LIST on pages 2, 3, 4, 5, 6 and 7 for proper identification and replacement of parts.

For calibration procedure and specification information of the TP954A, refer to Installation Instructions Form No. 95-5515 and Specification Data Form No. 77-9289.

Lubricate Plungers (#112140 & 112141 Figure 2A1), ball on Indicator #314583B Figure 2B), and Lever (#314574A Figure 2B).

NOTE: The ball and plungers can only be lubricated prior to reassembly.

OPERATIONAL CHECK

Apply heat to the sensing bulb and observe the operation of the device:
If the device is Direct Acting, the pressure should build up.
If the device is Reverse Acting, the pressure should drop down.

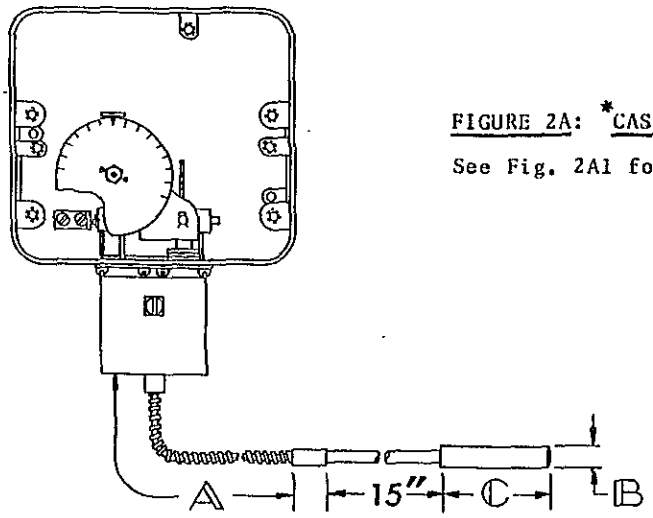


FIGURE 2A: *CASE & ELEMENT ASSEMBLY

See Fig. 2A1 for Parts Breakdown

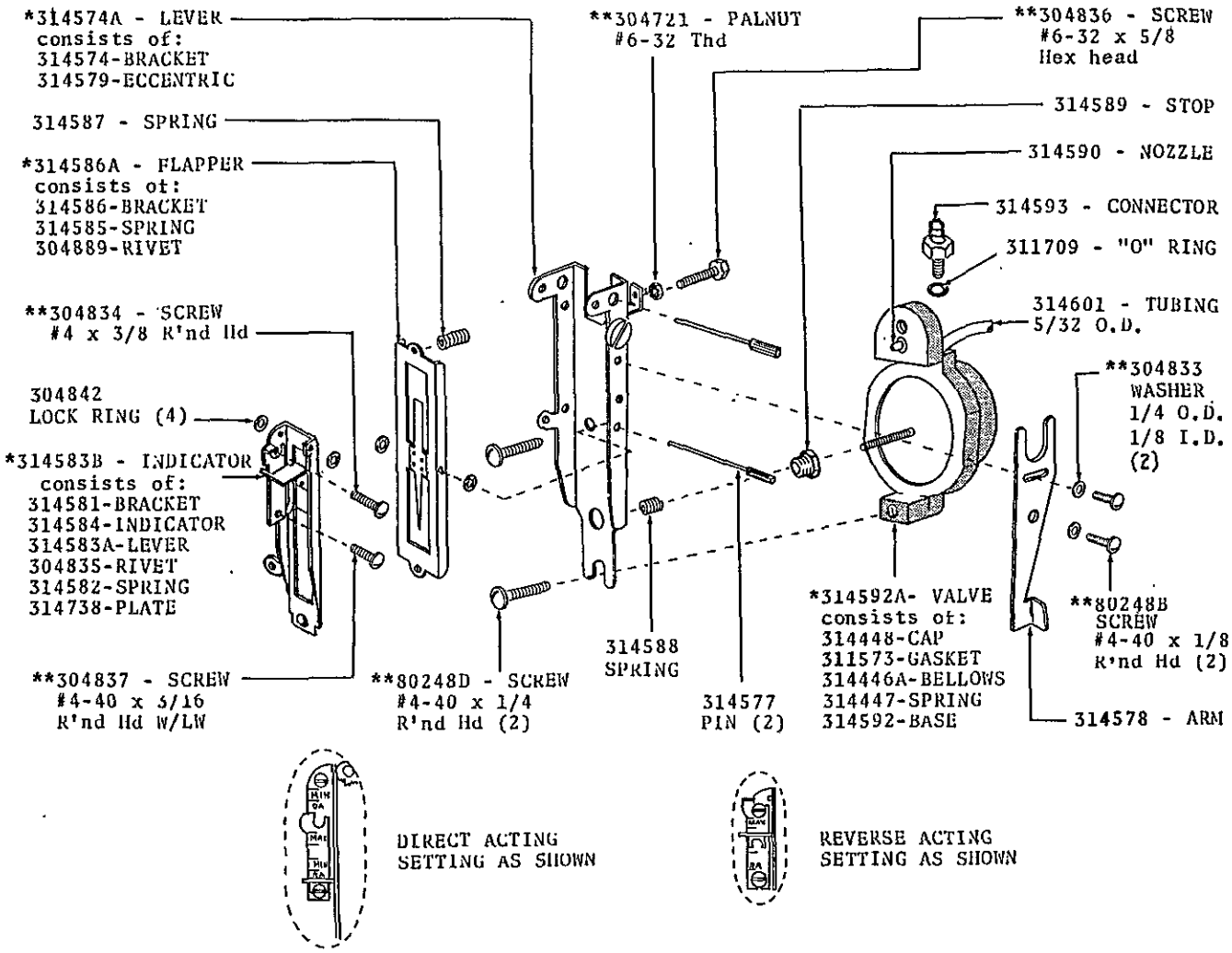
TABLE I

PARTS LIST FOR CASE AND ELEMENT ASSEMBLY

TP954A MODEL No.	CASE & ELEMENT PART No.	TEMPERATURE RANGE	ARMORED CAPILLARY A	BULB & CAPILLARY MAT'L	BULB SIZE & LENGTH B x C	ARMOR MAT'L
1004	314620A	-50 to 100°F	120"	COPPER	3/8 x 5-13/16	BRASS
1012	314620B	-150 to 150°F	120"	"	3/8 x 2-7/8	"
1020	304620C	-0 to 150°F	120"	"	3/8 x 5-13/16	"
1038	314620D	50 to 250°F	120"	"	3/8 x 4-9/32	"
1046	314620E	50 to 400°F	120"	"	3/8 x 3-1/8	"
1053	314620F	50 to 800°F	120"	SST	3/8 x 5-13/32	"
1061	314620G	50 to 1200°F	120"	SST	3/8 x 3-9/16	SST
1079	314620H	-40 to 40°C	120"	COPPER	3/8 x 5-13/16	BRASS
1087	314620J	-15 to 65°C	120"	"	3/8 x 5-13/16	"
1095	314620K	-100 to 60°C	120"	"	3/8 x 2-7/8	"
1103	314620L	10 to 120°C	120"	"	3/8 x 4-9/32	"
1111	314620M	10 to 200°C	120"	"	3/8 x 3-1/8	"
1129	314620N	10 to 425°C	120"	SST	3/8 x 5-13/32	"
1137	314620P	10 to 650°C	120"	SST	3/8 x 3-9/16	SST
1145	314620R	-50 to 100°F	240"	COPPER	3/8 x 5-13/16	BRASS
1152	314620S	-150 to 150°F	240"	"	3/8 x 2-7/8	"
1160	314620T	0 to 150°F	240"	"	3/8 x 5-13/16	"
1178	314620U	50 to 250°F	240"	"	3/8 x 4-9/32	"
1186	314620V	50 to 400°F	240"	"	3/9 x 3-1/8	"
1194	314620W	50 to 800°F	240"	SST	3/8 x 5-13/32	"
1202	314620Y	50 to 1200°F	240"	SST	3/8 x 3-9/16	SST
1210	314620Z	-40 to 40°C	240"	COPPER	3/8 x 5-13/16	BRASS
1228	314620AA	-15 to 65°C	240"	"	3/8 x 5-13/16	"
1236	314620AB	-100 to 60°C	240"	"	3/8 x 2-7/8	"
1244	314620AC	10 to 120°C	240"	"	3/8 x 4-9/32	"
1251	314620AD	10 to 200°C	240"	"	3/8 x 3-1/8	"
1269	314620AE	10 to 425°C	240"	SST	3/8 x 5-13/32	"
1277	314620AF	10 to 650°C	240"	SST	3/8 x 3-9/16	SST
1285	314620AG	50 to 250°F	120"	SST	3/8 x 4-9/32	SST
1293	314620AH	0 to 150°F	120"	SST	3/8 x 5-13/16	SST
1301	314620AJ	10 to 120°C	120"	SST	3/8 x 4-9/32	SST

*The individual parts for this sub-assembly are welded, staked together or require special adjustment or disassembling equipment; therefore, it is recommended that the complete sub-assembly be ordered.

FIGURE 2B: *314574E FEEDBACK ASSEMBLY



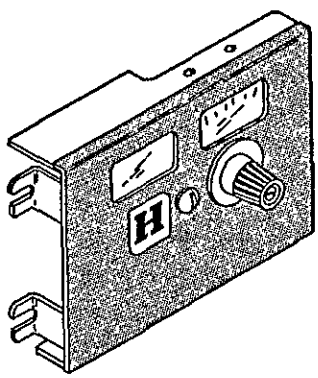


FIGURE 2C: *DIAL & PLATE ASSEMBLY

See Fig. 2C1 for Parts Breakdown

TABLE 2

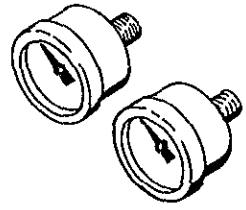
PARTS LIST FOR DIAL AND PLATE ASSEMBLY

TP954A MODEL No.	DIAL & PLATE ASSY PART No.	TEMPERATURE RANGE
1044 & 1145	314618A	-50 to 100°F
1012 & 1152	314618B	-150 to 150°F
1020, 1160 & 1293	314618C	0 to 150°F
1038, 1178 & 1285	314618D	50 to 250°F
1046 & 1186	314618E	50 to 400°F
1053 & 1194	314618F	50 to 800°F
1061 & 1202	314618G	50 to 1200°F
1079 & 1210	314618H	-40 to 40°C
1087 & 1228	314618J	-15 to 65°C
1095 & 1236	314618K	-100 to 60°C
1103, 1244 & 1301	314618L	10 to 120°C
1111 & 1251	314618M	10 to 200°C
1129 & 1269	314618N	10 to 425°C
1137 & 1277	314618P	10 to 650°C

*The individual parts for this sub-assembly are welded, staked together or require special adjustment or disassembling equipment; therefore, it is recommended that the complete sub-assembly be ordered.

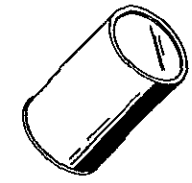
**These items are standard hardware parts which should be purchased from local suppliers.

ACCESSORIES

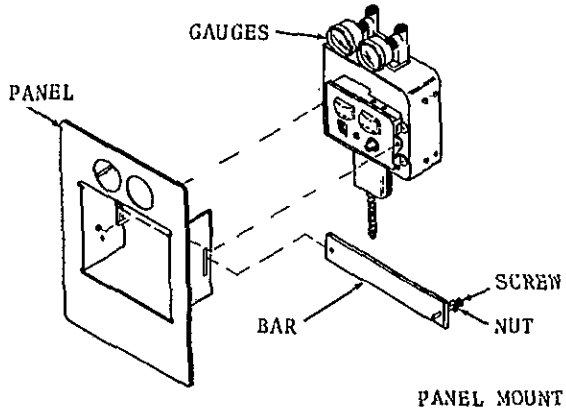


305909A - GAGE PACKAGE (consists of two 1-1/2" 0 to 30 psig gages).

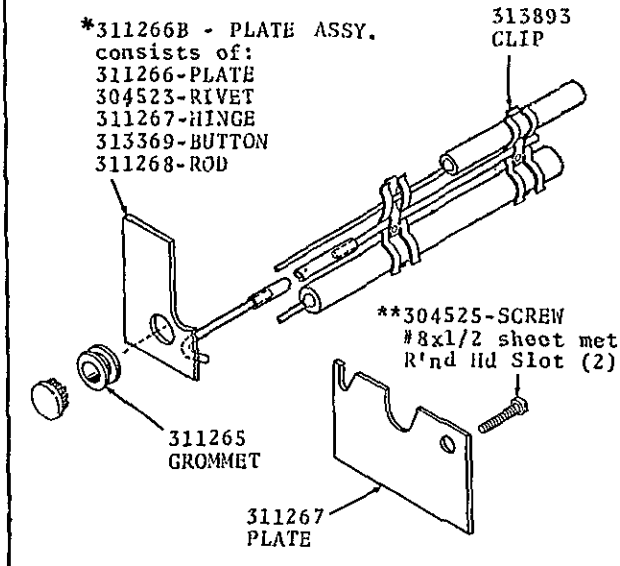
305910A - GAGE PACKAGE (consists of two 1-1/2" 0 to 2 kg/cm^2 gages).



107408 - HEAT CONDUCTIVE COMPOUND (one four oz. can)



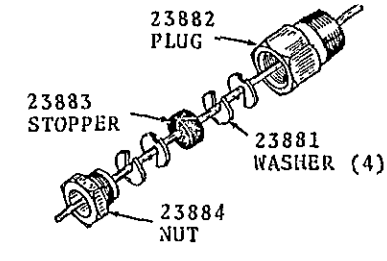
PART NO.	DESCRIPTION	PANEL MOUNTING ADAPTER 314654 A	314654 B	305910 C	305909 D
314654	PANEL, blue gray	1	1		
314654	PANEL, gray beige			1	1
305910	GAUGE, 0-2 kg/cm^2		2		2
305909	GAUGE, 0-30 psi	2		2	
304919	**SCREW, 1/4-28 x 2-1/2 Rnd Hd Slot	2	2	2	2
304219	**NUT, 1/4-28 x 7/16 Hex	2	2	2	2
315043	BAR	1	1	1	1



311266D - BULB HOLDER ASSEMBLY

PRESSURE FITTINGS

Bag Assembly	Material	Tubing Diameter	Max. Temp. (F)
7617AAS	Brass	3/16 x 1/2 NPT	250°
7617AAT	SST	3/16 x 1/2 NPT	250°
7617AAZ	Brass	3/16 x 3/4 NPT	400°
7617ABA	SST	3/16 x 3/4 NPT	400°
7617AAW	Brass	3/16 x 5/8-27 UNS	400°
7617AAY	SST	3/16 x 5/8-27 UNS	400°

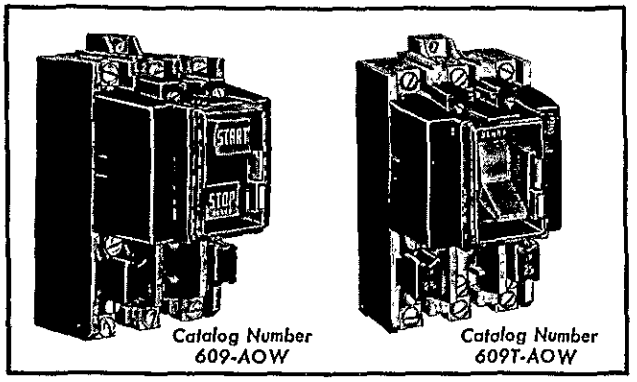


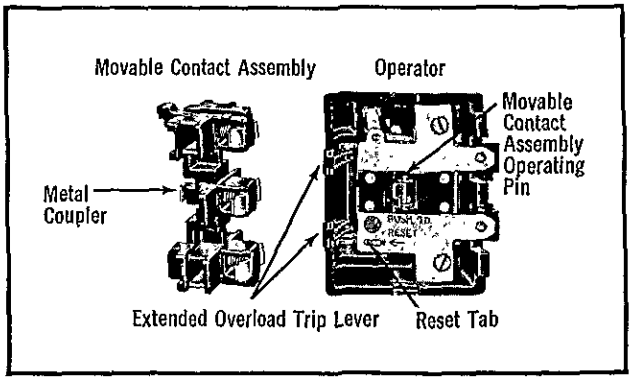
*The individual parts for this sub-assembly are welded, staked together or require special adjustment or disassembling equipment; therefore, it is recommended that the complete sub-assembly be ordered.

**These items are standard hardware parts which should be purchased from local suppliers.

Time and trouble can be saved by arranging with Honeywell for a maintenance agreement which will guarantee expert, economical care and insure maximum life and efficiency from your control system.

Repair parts or assemblies may be ordered from your local Honeywell office or Honeywell, 1885 Douglas Drive North, Minneapolis, Minnesota 55422. (In Canada - Honeywell Controls Limited, Vanderhoof Avenue, Leaside-Toronto 17, Ontario, Canada.)

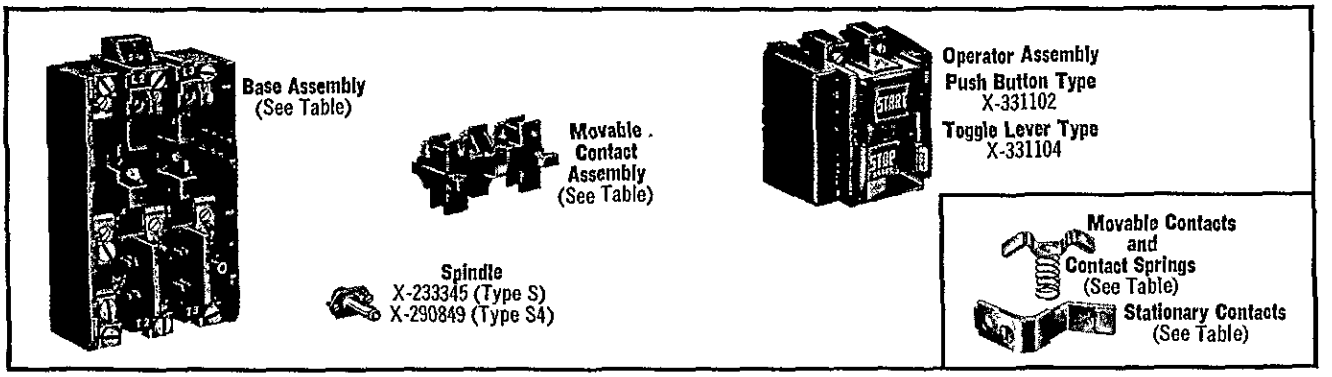




CONTACT AND SPRING REPLACEMENT — Place the starter in the "Stop" position, then loosen the two captive screws that secure the operator assembly to the base assembly and lift out the complete operator assembly. The stationary contacts can now be removed from the base assembly. The movable contact assembly, attached to the operator, carries the movable contacts and springs. Depress the contact spring slightly and the movable contact can be lifted from the movable contact assembly. New contacts and springs can be slipped in place easily.

MOVABLE CONTACT ASSEMBLY REPLACEMENT — To uncouple the movable contact assembly from the operator assembly, place the operating means in its "Start" position. In the event that the extended overload trip lever (see illustration) is accidentally tripped, the movable contact assembly operating pin will retract into the operator housing. To extend the operating pin again, complete the following procedures. Simultaneously, place the operating means in its "Stop" position and depress the reset tab (see illustration). Now return the operating means to its "Start" position and the operating pin will again extend. Should the operating pin fail to extend indicates the procedures were not completed simultaneously.

Recouple the movable contact assembly to the operator assembly by hooking the "L" shaped metal coupler (see illustration) beneath the operating pin and placing the operating means in its "Stop" position.



Size	No. of Poles	★Base Assembly [1] (w/ Stationary Contacts)			★Base Assembly [1] (w/o Stationary Contacts)			★Movable Contact Assb. (w/ Contacts and Springs)	★Movable Contact Assb. (w/o Contacts and Springs)	★Set of Stationary Contacts	★Set of Movable Contacts and Springs	Set of Stationary Contacts, Movable Contacts & Springs
		1 O.L. Relay	2 O.L. Relay	3 O.L. Relay	1 O.L. Relay	2 O.L. Relay	3 O.L. Relay					
		Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.	Part No.
0	2 3	X-331320 X-331317	— X-331314	— X-331311	X-382546 X-382549	— X-382548	— X-382547	X-331098 X-331097	X-331099	Z-33738 Z-33739	Z-21104 Z-21105	Z-31910 Z-31911
1	2 3	X-331303 X-331300	— X-331297	— X-331294	X-382550 X-382553	— X-382552	— X-382551	X-331095 X-331094	X-331096	Z-33740 Z-33741	Z-21108 Z-21109	Z-31912 Z-31913
1P	2	X-331325	—	—	X-382554	—	–	X-331263	X-331096	Z-33742	Z-31035	Z-31914

[1] Base Assemblies **do not** include spindles.

NOTE — Bulletin 609D switches use 3 pole switches with one overload relay. The first two poles are connected in series and the connecting wire should be retained for use on the replacement base assembly. Bulletin 609RS and Bulletin 609TS use two switches mechanically interlocked.

ORDERING INFORMATION — Your order cannot be entered unless the following information is given: Part number, description of part and the catalog number and series letter of the switch. This renewal parts list applies also to the above switches when used on control apparatus listed under other Bulletin numbers.

★Added or changed since previous issue.

Renewal Parts List 609-703—March, 1970
Supersedes Parts List 609-703 Dated January 1967

Honeywell

TP954A PNEUMATIC INDICATING TEMPERATURE CONTROLLERS

Instruction 95-5515-1

APPLICATION

The TP954A Pneumatic Indicating Temperature Controller is designed for proportioning temperature control of pneumatic industrial equipment. The controller provides continuous readout of the actual temperature to monitor corresponding equipment. In a typical application, the TP954A is used to proportion the air supply to a pneumatic valve. The valve is used to regulate heat flow to the controlled medium for either heating or cooling.

FEATURES

The TP954A is fully enclosed with a steel case and a zinc die cast cover, providing excellent resistance to environmental effects. Temperature and setpoint indication are visible through separate windows on the front of the control. The manifold, valve unit assembly, and feedback lever assembly are common for all temperature ranges so that they may be interchanged on any TP954A Controller.

Control setpoint is easily set by a front accessible setpoint knob. Proportional band is adjustable by means of a sliding indicator accessible from within the case. The TP954A is shipped from the factory direct acting, but can be changed to reverse acting in the field. Ambient compensation is built into the TP954A to compensate for temperature effect on the case and capillary.

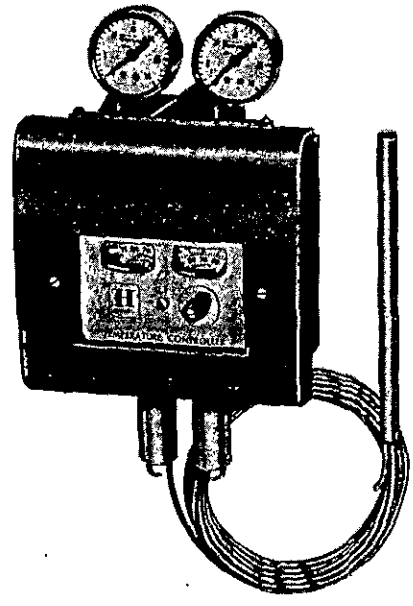
SPECIFICATIONS

AMBIENT TEMPERATURE COMPENSATION RANGE–
–1 to 54°C (35 to 130°F)

SCALE LENGTH–
4-1/2 inches, 240 angular degrees.

MAXIMUM SAFE OPERATING TEMPERATURE–
110% of full scale.

PROPORTIONAL BAND–
Direct Acting–
Adjustable from 2 to 10%.
Reverse Acting–
Adjustable from 3 to 11%.



SUPPLY AIR PRESSURE–
20 psig.

CONTROLLED AIR OUTPUT–
3 to 15 psig.

MAXIMUM SAFE AIR PRESSURE–
25 psig.

ACCURACY–
Typically within 1% of full scale range; error will not exceed 2%.

CAPILLARY LENGTH–
1.83 or 6.29 meters (6 or 20 feet).

DIMENSIONS–
Refer to Figure 1.

MOUNTING–
Surface mounting with brackets. Flush mounting requires panel adapter. See "Accessories Available" section of ORDERING INFORMATION.

AIR CONNECTIONS–
1/8 - 27 NPT.

Rev 6/74 95-5515-1

Process Control Division/Fort Washington 1100 Virginia Drive, Fort Washington, Pa. 19034

Printed in U.S.A.

INSTALLATION

CAUTION: *If the device being installed has a range of 50 to 600°F, 50 to 800°F, 50 to 1200°F, or an equivalent centigrade range, do not cut and be careful not to break the remote bulb or capillary. Elements of these ranges contain NaK. Very small amounts of moisture will ignite NaK which could burn exposed skin. NaK filled elements can be best disposed of by burial.*

SURFACE MOUNTING

1. Attach three brackets, included, to the case (two screws per bracket).
2. Mount case on vertical surface (1 # 10 screw per bracket).
3. Add pressure gages if desired.
4. Remove cover, turn control index to its minimum position, and carefully pull out the shipping stops.

FLUSH MOUNTING WITH PANEL MOUNTING ADAPTER

Order panel mounting adapter separately.

1. Cut 6 x 10-inch hole in panel. See Figure 2.
2. Remove TP954A cover, turn control index to its minimum position, and carefully pull out the shipping stops.
3. Add panel mounting adapter plate to TP954A case, using three screws (1) from 7617AZ Bag Assembly. Line up the case edge and adapter face. Tighten screws.
4. Insert TP954A through panel hole. From the rear, fasten adapter plate to panel by sliding adapter bar (2) through slots in plate. Tighten screws (3) and lock with nuts (4).

CAPACITY TANK

If the pipe or tubing from the TP954A controlled air outlet to the valve is a relatively short run, a pulsating condition may develop. Increase the volume of the run by adding a simple capacity tank to the line.

MOUNTING THE SENSING ELEMENT

Plan the location of the sensing element in the controlled medium where average temperature conditions exist, away from hot or cold inlets. Mount the TP954A case in any convenient location, limited only by the length of the capillary. Vertical distance between controller and sensor does not affect operation. Fix the sensor by using a bulb holder, pressure fitting, or separable well.

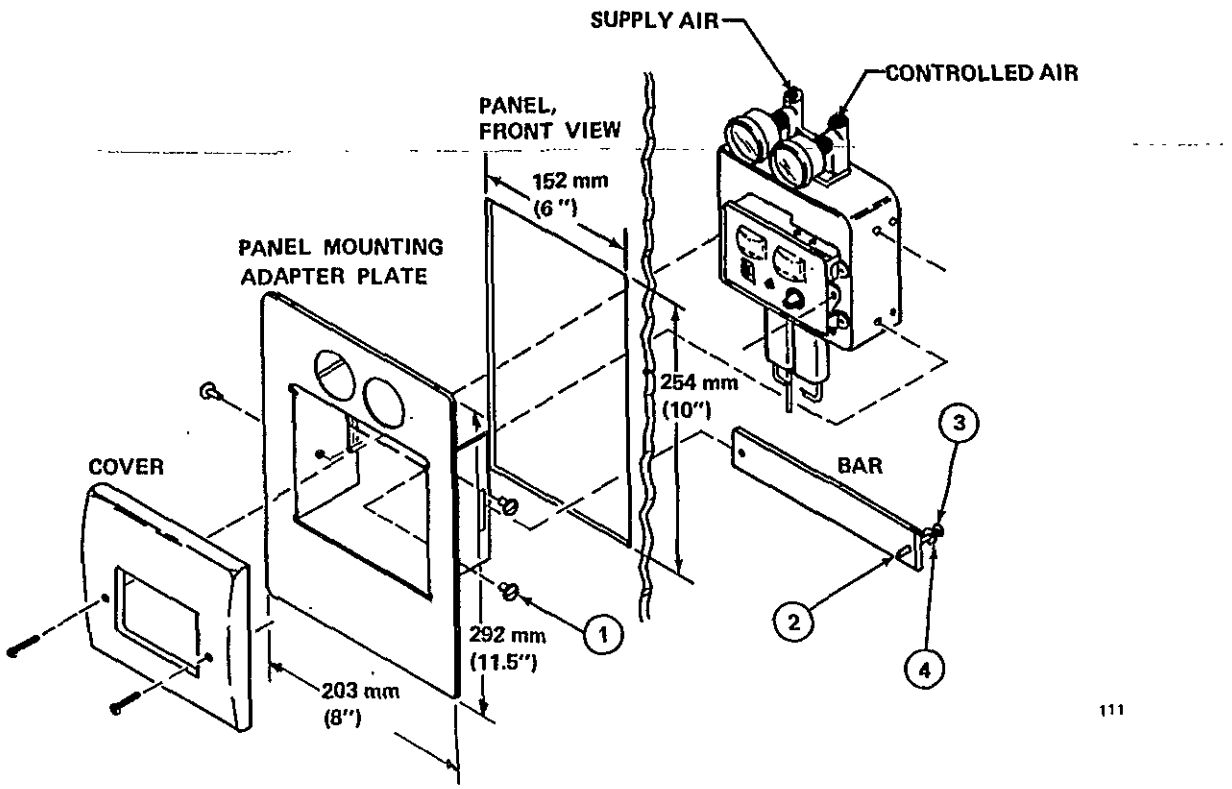


Figure 2- Mounting with Panel Mounting Adapter.

IMMERSION WELL APPLICATIONS

Order immersion well separately. See Table II.

1. Provide a suitable threaded tapping in the tank, boiler, pipe, etc. at a location which will expose the well to the *average* temperature of the controlled liquid. Avoid areas near hot or cold inlets.
2. If using the heat conductive compound for faster heat response in the lower temperature ranges, squeeze enough compound into the well to fill it about 2/3 full.
3. Install the well in the tapping, and tighten securely to prevent leakage.
4. Uncoil capillary carefully without kinking or bending sharply.
5. Insert sensing element bulb into well until it bottoms. Secure the seal ring, and clamp to hold the capillary firmly in place.

DIRECT INSERTION APPLICATIONS

Order pressure assembly separately. See Table III.

1. Prepare hole in duct, tank, or pipe wall for insertion of element at location which will give average temperature condition of the air or gas.
2. Mount waste nut (see Figure 3) or floor flange, if needed, to outer surface to provide a threaded fitting for the pressure assembly.
3. Assemble the pressure fitting on the capillary as shown in Figures 4 and 5.
4. Screw the boiler plug into the threaded opening (or waste nut or floor flange) with sensing element projecting into the area to be controlled.

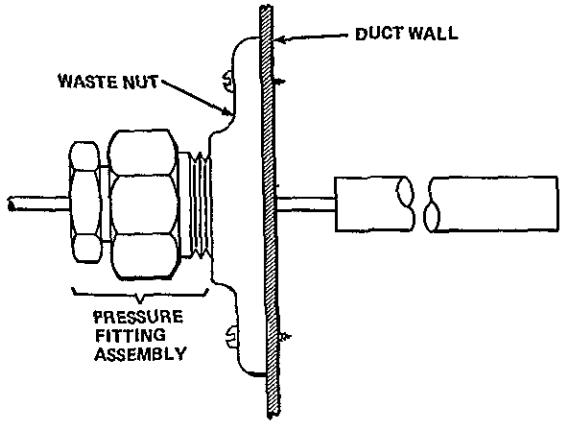


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Figure 3—Pressure Assembly with Waste Nut.

5. Hold the capillary in the position desired, and tighten the packing nut firmly.

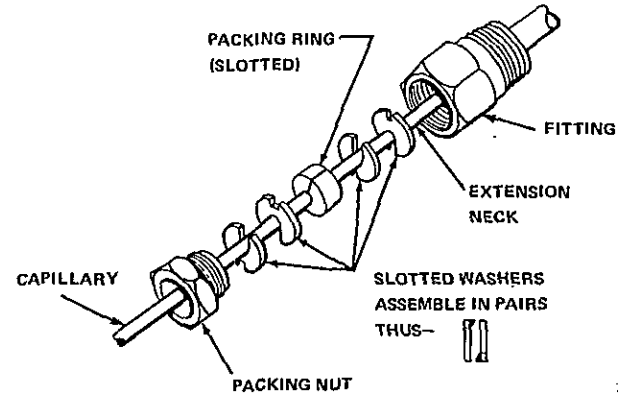

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Figure 4—Assembly of Pressure Fitting.

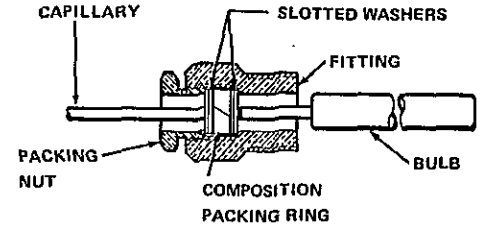

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Figure 5—Pressure Assembly Mounted in Tank Wall.

TP954A ADJUSTMENT

CHANGING PROPORTIONAL BAND SETTING

(Refer to Figure 6 for identification of parts.)

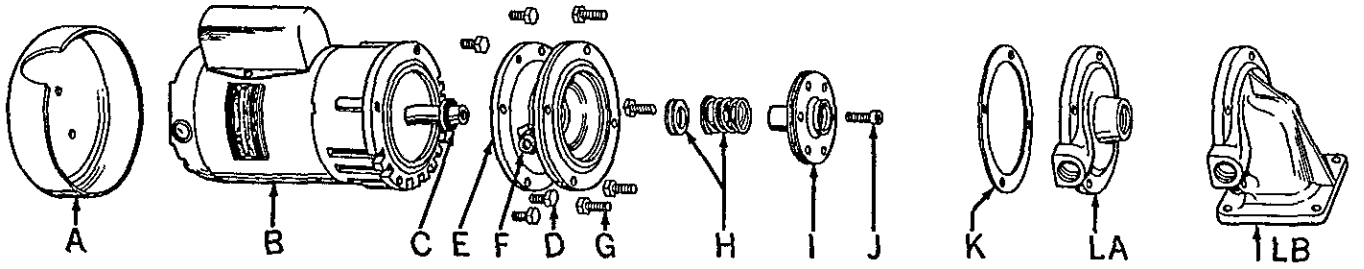
The TP954A proportional band is factory set at approximately 9 degrees, the midpoint of its adjustable range. To change this setting:

1. Install pressure gage in the port provided for the controlled air line.
2. Remove TP954A cover. Set control index at maximum.
3. Adjust proportional band indicator (1) up or down for wider or narrower band, as desired.
4. Set control index to read same as temperature (dew point) indicator.
5. Loosen, do not remove, lock screw (7). Slowly turn eccentric (6) until controlled air pressure is 9 psi. If not reached within 45-degree turn, rotate in opposite direction. Tighten lock screw, (7). Replace cover.

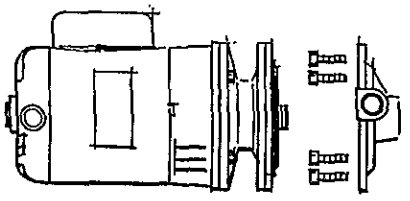
REPLACING ROTARY SEAL ASSEMBLY ON STERLCO PUMP AND MOTOR

PARTS

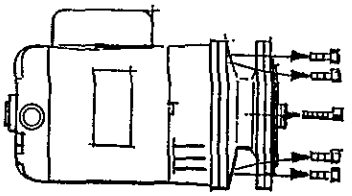
A. Drip Cover
B. Motor
C. Water Slinger
D. Motor Screws
E. Bracket
F. Prime Cock
G. Pump Screws
H. Rotary Seal Assembly
I. Impeller
J. Impeller Screw
K. Housing Gasket
L. Volute - A or B



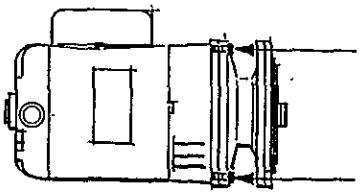
Step No. 1 — Dis-assembling (Removal of old seal assembly)



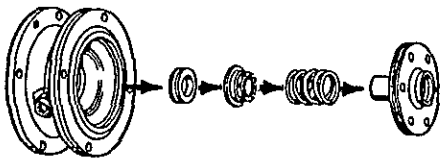
a) Remove volute from motor bracket and impeller assembly by removing pump screws.



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).



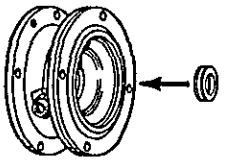
c) Insert two of the pump screws into the two threaded holes in the bracket. Tighten them slowly and evenly to force the impeller and bracket off the shaft. **Do not pry the impeller or bracket!**



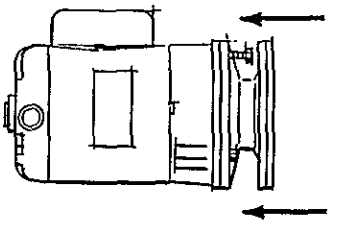
d) Remove old seal parts from impeller hub and bracket. Be sure water slinger is in place.

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.

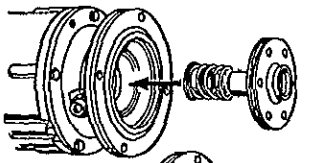
Step No. 2 — Re-assembly (Installation of new seal assembly)



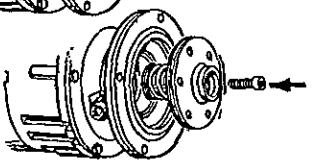
f) Coat outside edge of new seat with 3% detergent solution and slip it into the bracket. Press into bracket with thumbs or wooden dowel. Handle seat carefully so seating surfaces are not scratched or chipped . . . be sure it is squarely seated.



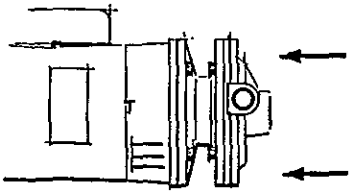
g) Remount bracket on motor.



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.

STERLING, INC. 5200 W. Clinton Ave., Milwaukee, Wisconsin 53223

Form I-4100-E1

Litho In U.S.A. 6/62

- OTHER STERLCO FEATURES AND UNITS -

ALL BRASS water circulating systems can be provided in most water unit models if required. This would include an all brass pump and an all brass heater tank in addition to the all brass piping. The piping system is actually brass pipe and not thin walled tubing.

SEVERAL TYPES of water units are available since we offer our units in single zone, dual zone, and triple zone construction as well as units based on JIC construction. We also offer a compact single zone unit which is intended to be mounted on or near the device being controlled. Explosion-proof units are available in many models. Units are also available which provide continuous circulation and controlled cooling without heating facilities.

OTHER WATER UNITS are available for specific applications. This would include units with the closed water circuit and equipped with heat exchanger so that the same water is constantly recirculated to the mold. These units are cooled through the heat exchanger so that raw water is not continuously introduced to the system. These closed circuit types are available in singles, duals and triples.

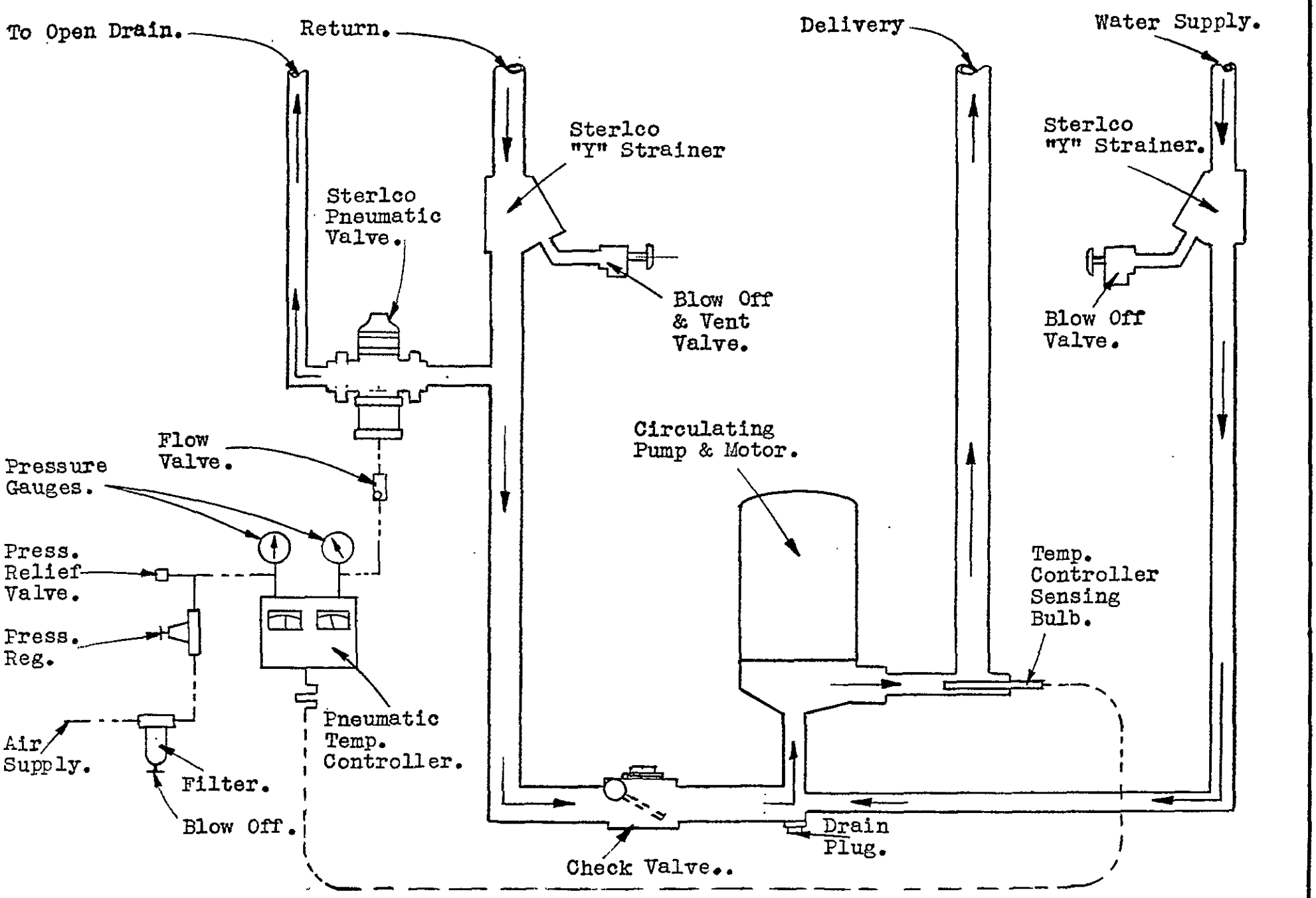
HIGH PUMP CAPACITY units are also available since we offer several types with pumps of 40 GPM, 60 GPM, 100 GPM and 125 GPM against substantial discharge pressures. Along with this, heaters of 12, 18, and 24 KW capacity are available. In addition, large cooling capacities are available which would involve 1" cooling control or 2" cooling control.

HIGH TEMPERAUTRE UNITS are regularly built. These units operate through a temperature range of 100 to 550 degrees F. using a synthetic heat transfer fluid. These units are available as single and dual zone controls and are available with heaters ranging from 12 KW to 100 KW. Pump rates are available from 10 GPM to 100 GPM. Optional cooling, automatically controlled, is available if required on many of these models. The high temperature units feature low circulating pressures and safe, clean, dependable operation.

TEMPERATURE CONTROL VALVES for hydraulic oil cooling. Sterlco self-acting control valves provide thermostatic control of the cooling water flow through the oil coolers of hydraulic presses. This gives a constant oil temperature (and constant viscosity) along with substantial conversation of water.

If we can tell you about other models of Sterlco units or features of these units, please be certain to let us know and we would be happy to send you the information which you require.

DWG. NO. 1 8



STERLING, INC. MILWAUKEE, WIS.	TITLE Flow Sheet	DR. Lt.	CH'K.	DATE 11-20-67	SCALE None	ISSUE 2	DRG. NO. 18508

STERLCO PARTS LIST

PART NO.	DESCRIPTION	PRICE
081-00022	Rotary Seal - Ni-resist and Carbon	$ 13.45
545-00001	Housing Gasket - 1 Required per Pump	.45
R-150-FC	Temperature control (Cooling) Valve, Specigy Range and Capillary Length	105.75
724-00033	Thermoswitch, Specify Range (6002, 6012, 6015, 6022, 6031)	46.00
724-00025	Thermostat (6210, 6211, 6221, 6231, 6111-C, 6121-C, 6131-C)	111.30
162-00012-05	Thermostat Ass"y. (Bulb, Capillary & Plunger) Only for Above	43.90
162-00012-03	Microswitch (RR 441), Heat	6.45
162-00012-04	Microswitch (GR 441), Cool	6.45
162-00012-06	Dial and Knob Assembly for 724-00025 Only	7.45
147-00004	Thermoswitch Pointer for 724-00033 Thermostat Only	.75
037-00004	Thermometer (6012, 6015, 6022, 6031)	25.80
037-00009	Thermometer (6210, 6211, 6221, 6231, 6111-C, 6131-C, 6121-C) (Above with Fittings)	26.25
722-00051-08	230 Volt Immersion Heater, 9000 Watt, 3 ph., Threaded Type	59.00
722-00051-09	460 Volt Immersion Heater, 9000 Watt, 3 ph., Threaded Type	59.00
722-00051-10	230 Volt Immersion Heater, 4500 Watt, 3 ph., Threaded Type	59.00
722-00051-11	460 Volt Immersion Heater, 4500 Watt, 3 ph., Threaded Type	59.00
722-00051-02	550 Volt Immersion Heater, Electric 9KW, 3ph., Threaded Type	75.00
722-00051-16	208 Volt Immersion Heater, 9000 Watt, 3 ph., Threaded Type	80.00
717-04001	Heater Switch - Cooling Switch	3.75
715-10025	Pilot Light Receptacle (Red Lens)	3.10
715-10026	Pilot Light Receptacle (Amber Lens)	3.10
715-02001	Pilot Light Bulb	.90
729-00012	Contactor, Size 1	64.00
729-00011	Contactor, Size 0	58.00
682-01419-01	Transformer 460/230/115 Volt, 1 KVA with Conversion Kit	96.00
733-00006	Pressure Switch less Adaptor (A-B)	43.00
044-00149	Pressure Relief Valve 1/2"	9.00
572-00004	Screen for 1/2" and 3/4" Strainers	.65
720-09026	Single Phase Motor, 1/2 HP	69.00
720-09026-02	Single Phase Motor, 1/2 HP, General Electric	86.00
720-09027	Three Phase Motor, 1/2 HP TENV (Delco $105.00, G.E. $103.00)	95.00
605-00007-02	Complete Pump and Motor Ass'y. 12/ HP, Single Phase	136.00
605-00007-05	Complete Pump nad Motor Ass"y. 1/2 HP, 3 ph., TENV (Adjust for G.E. and Delco)	158.00
695-16119-01	Motor & Impeller Ass"y., Single Phase 1/2 HP (695-00003-03)	138.00
695-16119-03	Motor & Impeller Ass'Y., 3 ph., 1/2 HP, TENV (Adjust for G.E. and Delco)	157.00
044-00041	Vent Priming Cock	.65
001-06850	Impeller Screw	.40
542-10404-00	Water Slinger	.16
615-13341-01	Bracket E - Per Form I-4100-EI	22.50
615-14921-00	Volute A - Per Form I-4100-EI	16.00
614-14951-00	Volute B - Per From I-4100-EI	26.00
695-13359-00	Impeller, Standard Brass	15.50
726-00030	Pump Starting Switch, less Element	10.50
731-00011	Heater Element for Pump Start Switch (Specify AMP Rating)	1.85
106-00002	Heat Exchanger 3.7 sq. ft. (6111, 6131)	177.00
732-00020	Solenoid Vlave 1/4" (6210, 6211, 6221, 6231)	21.50
732-00011	Solenoid Valve 1/2" (6111-C, 6121-C, 6131-C) 230 Volt Coil	35.30

NOTE: PARTS NOT DESIGNATED FOR SPECIFIC UNITS ARE USED ON ALL MODELS. PLEASE GIVE MODEL NUMBER AND SERIAL NUMBER WHEN ORDERING PARTS. PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. NET 30 DAYS F.O.B. MILWAUKEE, WISCONSIN. THIS LIST APPLIES TO ALL 6000, 6100 & 6200 UNITS.

STERLING, INC. 5200 W. Clinton Avenue, Milwaukee, Wisconsin 53223
PHONE: (414) 354-0970 TELEX: 2-6805

April 27, 1977

STERLING, INC.
PARTS LIST
STERLCO PUMP 1/2 -- 3 HP

ITEM	PART NO.	DESCRIPTION	PRICE EA.
O	001-05915	Motor screw, four required	$ .15
P	542-10404	Water Slinger	.16
Q	B615-00001	Bracket	59.30
R	081-00022	Rotary seal assembly	13.45
S		Impeller - specify part no. and dia. (See pump - nameplate)	44.00
T	525-00001	Lock Washer	.45
U	535-00001	Impeller Nut	1.65
V	545-00002	Housing Gasket	.58
W-A	615-00003	Threaded inlet Casting	23.85
W-B	615-00002	Tank inlet Casting	42.60
X-A	001-05915	Pump screw for pump w/threaded suction (8 req'd.)	.15
X-B	001-05915	Pump screw for pump w/tank suction (6 req"d.)	.15
X-B	001-05923	Pump screw for pump w/tank suction (2 req"d.) (Above parts illustrated on Form MPI)	.15
	M-160-(*)	Motor drip cover (**)	3.10
	N-720-09001	Electric motor 1/2 hp - 3/60/230-460 volt open (#)	68.50
	N-720-09007	" " " " " " " TEFC (#¢)	94.15
	N-720-09002	" " 3/4 hp " " " open (#)	79.20
	N-720-09008	" " " " " " TEFC (#¢)	106.00
	N-720-09003	" " 1 hp " " " open (#)	97.40
	N-720-09009	" " " " " " TEFC (#¢)	128.50
	N-720-09004	" " 1-1/2 hp " " " open (#)	113.50
	N-720-09010	" " " " " " TEFC (#¢)	154.00
	N-720-09005	" " 2 hp " " " open (#)	151.00
	N-720-09011	" " " " " " TEFC (#¢)	183.00
	N-720-09006	" " 3 hp " " " open (#)	212.00
	N-720-09012	" " " " " " TEFC	261.00

* State motor manufacturer
** Used only on drip proof motors
# State motor manufacturer if preferred
¢ State special specification
(i.e. 7EQ-Spec., 7E-spec., etc.)
Sterling part numbers apply to non-special motors

PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE. TERMS: Net 30 days f.o.b. Milwaukee, Wisconsin

STERLING, INC. 5200 West Clinton Avenue Milwaukee, Wisconsin 53223

Phone: (414)354-0970 Telex: 2-6805

May 9, 1977