

Thermaflo Condensate Return Pumps

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**Operation, Maintenance and Installation Manual**

# **Condensate and Boiler Feed Units**

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# Operation and Installation Instructions

## Selection of Discharge Piping

In selecting condensate pumps and making proper piping connections, the friction in the discharge line from the pump to the boiler is very important. The pressure drop due to friction is sometimes much greater than the boiler pressure. In some cases, using larger discharge piping will make it possible to use a less expensive pump with a lower pressure rating. In all cases, adequate discharge piping will mean longer life and better service from your pump.

The pressure drop due to friction should always be estimated carefully, using the gallons-per-minute rating of the pump as a basis and referring to any standard pipe-friction tables or charts (be sure to make extra allowance for elbows, valves, etc.). The discharge pipe size and pump pressure rating should be selected so that the pump pressure rating will provide a generous margin of safety over and above the friction pressure drop plus the lift from pump to boiler water level (not to water inlet to boiler) plus the maximum pressure at which the boiler will operate.

Usually, the best discharge pipe size will be at least one size – sometimes two sizes – larger than the pump outlet tapping.

If possible, piping from the condensate pump outlet to the boiler inlet should be graded upward for the entire distance. In a downward run, or an ‘up-and-down’ run, air may be entrapped, restricting the flow of condensate. If an ‘up-and-down’ run cannot be avoided, it should be vented at the highest point.

## Float Switch Settings

When condensate pumps are tested in our factory, float switches are set according to the capacity rating. At the time of installation, the float switch should be checked to see that settings have not been disturbed during shipment and that they are correct for the particular job.

The travel of the float switch between the upper (ON) position and the lower (OFF) position determines the amount of condensate delivered to the boiler each time the pump operates. At our test, the float switch is set so that the amount is equal to or a little less than the GPM rating of the pump. For example, if the pump is rated 4000 sq. ft. EDR, 6 GPM, the switch is set to deliver about 4-6 gallons at each cycle. Depending upon the water capacity of the boiler and the other characteristics of the heating system, this float switch setting may require modification for best results.

If the float switch travel is too short for the job, only a small amount of condensate will be discharged each time the pump operates and consequently the motor

will have to start and stop too frequently. In normal operation, it is usually undesirable for a condensate pump to start and stop more than once every three minutes.

If the float switch travel is too long for the job, too much water will be discharged at each cycle. In this case, the boiler water level may fall too low before the pump starts. Then the boiler low-water cutoff will operate unnecessarily, or if there is a boiler-feed device it will supply make-up water unnecessarily and the heating system will become water-logged.

If the lower (OFF) position of the float switch is too low, the pump may continue running until it loses its prime and the rotary seal may be damaged by running dry. When starting up a new pump, always check the lower float switch position to be sure that the inlet from the tank to the pump is covered with water at all times.

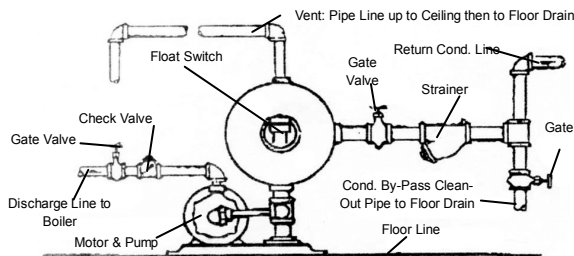
Any condensate pump can be used for a smaller capacity than its nameplate rating by decreasing the travel of the float switch. In addition, in the case of 4100, 4200, and 4300 series pumps, all units of the same horsepower are identical except for float switch settings. Therefore, many of these units can be used for larger capacities than the nameplate ratings by increasing the float switch travel. The table below shows standard float switch settings for 4100, 4200, and 4300 series pumps.

	Capacity Sq. Ft. EDR	GPM Rating	Pump Number	Approx. Inches Travel
1/3 HP Pump 8 Gal. steel tank or 6 Gal. CI tank or 8 Gal. stainless steel tank	8,000	12	4028 4222 4028-GS	3"
1/3 HP Pump 15 Gal. steel tank or 13.5 Gal. CI. tank or 15 Gal. stainless steel tank	2,000	3	4132 4232 4332	3"
	4,000	6	4124 4224 4324	5"
		9	4126 4226 4326	
	6,000	12	4128 4228 4328	7"
	8,000			8"
1/2 HP pump 30 Gal. steel tank or 24 Gal. CI tank or 30 Gal. stainless steel tank	10,000	15	41210 42210 43210	7"
	15,000	22.5	41215 42215 43215	10"

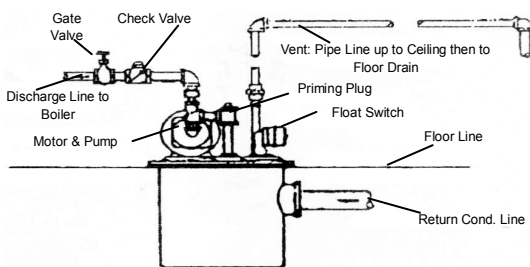
# Operation and Installation Instructions (continued)

The “travel” as listed is the vertical displacement between the water levels at the “On” and “Off” positions of the switch. The method of adjustment is indicated in the float switch instruction sheet or card that accompanies the pump. The “travel” distance can be checked by inserting a yardstick into the vent opening at the top of the tank.

## 3500 Series



## 3700 Series



### • Selection

Be sure to select a pump that is big enough for the job. Select a capacity rating adequate for the maximum amount of condensate expected under the most severe conditions. Remember that pressure rating must be sufficient to operate against maximum boiler pressure, plus lift and friction in piping between the pump and the boiler. **F Series** pumps have rated capacities of three times the maximum flow of condensate for the specified amount of radiation; in other words, when the heating system is running at maximum capacity, the pump should not be operating more than one-third of the time. This is a minimum factor of safety. If heavy overloads are possible, an oversized condensate pump should be selected.

For most applications, where the pump is above floor level and in a reasonably dry location, 4100, 4200 and 4300 series pumps (for smaller jobs) and 3500 series pumps (for larger capacities and higher pressures) provide a wide range of selection. When the return is below floor level, 3700 series pumps with cast iron tanks are recommended.

### • Heating Plant

Before a condensate pump can operate satisfactorily, the heating plant itself must be in good order.

The most important point to remember is that all heating units and return lines must be equipped with properly selected Armstrong traps in good working order. With improper or malfunctioning steam traps, steam or water above 190°F may return to the condensate pump. For best operation, condensate should be 160°F or less. Although Armstrong pumps can operate at higher temperatures, we cannot guarantee full capacity or satisfactory operation if condensate is allowed to go above 190°F. This is particularly important with 3700 series units, where there is a suction lift from the tank to the pump.

For unusually hot condensate, a specially designed unit may be required.

It is equally important to provide Armstrong strainers on all lines, to keep scale and dirt out of the tank and pumps

### • Location

Locate the pump as **close to the boiler** as practical. A more powerful pump will be needed if it must be far away from the boiler or below the boiler.

Locate the pump above floor if possible, in a position where it will be **clean, dry, and easily accessible**.

Locate the tank inlet below the lowest point of return lines. If the pump must be below floor level, use a 3700 series unit with cast iron tank and take all possible precautions to keep the motor and electrical equipment dry.

Set the pump on a substantial, level foundation – preferably off the floor, on a raised concrete base.

### • Pipe Connections

Typical condensate pump hookups are shown in the diagrams. No two individual installations will be exactly alike, but certain essentials apply to all:

The condensate inlet should be equipped with a strainer to keep scale and dirt out of the tank, unless all return lines are exceptionally well protected with strainers. In addition, there should be some means (such as the gate valve arrangement shown in the diagrams) of disposing

# Operation and Installation Instructions (continued)

of condensate temporarily when the condensate pump is disconnected.

At the pump outlet, there should be a check valve (reasonably close to the pump) to prevent water from flowing back out of the boiler. In addition, a gate valve should be provided for use when the pump is disconnected.

A gate valve or globe valve should be piped on the discharge of the pump after the check valve to throttle the flow as needed and to isolate the pump for servicing.

The vent opening at the top of the tank must be left open to the atmosphere. Good practice is to run a pipe from the vent up to the ceiling, then down to a point near the floor drain. This keeps dirt out of the tank and helps keep the motor dry. For priming the pump when starting up or testing, a union or a plugged tee at the vent opening is desirable.

**Unit is designed for atmospheric pressure operation. DO NOT PRESSURIZE RECEIVER!**

Many variations in piping arrangements are possible; and local codes vary widely. For example, in some cities there must be a bypass around the condensate pump with gate valves, so that the return line can be connected directly to the boiler when the pump is disconnected.

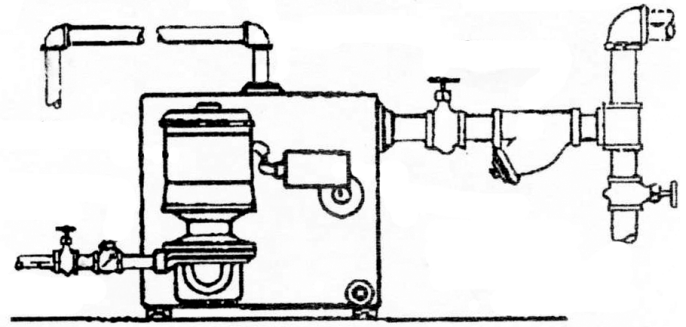
## • Vent Connection

Install a full sized vent to atmosphere from the receiver. **DO NOT** install any shut-off valves or other type of valves in the vent line.

## • Over flow Connection

Thermaflo strongly recommends the use of overflow piping on receiver tanks in open condensate return systems. Properly installed overflow piping increases efficiency of the system, while addressing potential safety issues involved with the unintentional escape of hot condensate. One suggestion would be the use of a "P"-trap to form a sufficient water seal. Be sure to check that a water seal has formed to prevent venting of steam through the overflow connection during operation.

- **F Series Pumps are always to be used as atmospheric units and will not pump condensate over 212F without seal and motor damage. Also to avoid cavitation set outlet setting valve at curve point. Always install a vented flash tank ahead of all F Series pumps to avoid this.**



**Thermaflo 4100, 4200 and 4300 Series**

## • Electrical Connections

Check the motor characteristics (phase, cycles, voltage) to be certain that they are correct for your power supply; otherwise, you may burn out the motor by running it on too high a voltage.

Be sure that only a qualified electrician makes the electrical connections to the pump. With small, single-phase units, the pump motor is commonly controlled directly by the float switch. On three-phase units, the float switch operates a motor starter, which starts and stops the pump motor. When a pump with a make-up water valve is used, the pump motor is controlled by a boiler water level control.

Be sure that all wiring is well protected from moisture.

Be sure that the motor is connected so that the pump rotates in the correct direction.

## • Starting and Operation

Do not operate the pumps without priming. If the pumps are run dry, even for a very short time, they may be severely damaged.

Be sure to keep the motor dry.

**WHEN STARTING UP A PUMP, ALWAYS ROTATE IT BY HAND TO BE SURE IT TURNS FREELY, BEFORE TURNING ON POWER.**

## • Ordering Replacement Parts

When ordering replacement parts for condensate pumps, only the following information is needed:

The name of the part assembly.

The pump type number and serial number, from the brass nameplate on the tank (on 3500 series units, the nameplate is on the base.)

# Operation and Installation Instructions (continued)

## • Storage Procedures

### **Keep Motors Clean:**

1. Store indoors.
2. Keep covered to eliminate airborne dust and dirt.
3. Cover openings for ventilation, conduit connections, etc, to prevent entry of rodents, snakes, birds and insects.

### **Keep motors Dry:**

1. Store in a dry area indoors.
2. Temperature swings should be minimal to prevent condensation.
3. Space heaters are recommended to prevent condensation.
4. Treat unpainted flanges, shafts and fittings with a rust inhibitor.
5. Check insulation resistance before putting motor into service.

### **Keep bearings lubricated:**

1. Once per month, rotate shaft several turns to distribute grease in bearings.
2. If unit has been stored more than a year, add grease before start-up.

## • Troubleshooting

### **Motor overheats or burns out, or pump does not deliver enough condensate to boiler, or pump runs continuously or almost continuously:**

Check the capacity and pressure rating of the pump; it may be too small for the job.

Check the temperature of condensate; the pump may not handle it if it is too hot.

Check the float switch; it may be damaged and jammed in the “on” position.

Check the lines and valves between the pump and boiler for clogging; check the pump for clogging.

### **Pump starts and stops too frequently:**

Check the float switch adjustment; too little travel between “on” and “off” positions.

### **Pump does not start until after boiler water falls below safe level:**

Check the float switch adjustment; too little travel between “on” and “off” positions.

### **Pump makes excessive noise:**

Has the pump been damaged by operating without prime or with hot condensate (above 190°F)?

Is the pump on a substantial foundation? Is a sound-deadening base required?

Is the noise being transmitted through piping? If so, short lengths of hose connected in delivery and return lines will usually improve conditions greatly.

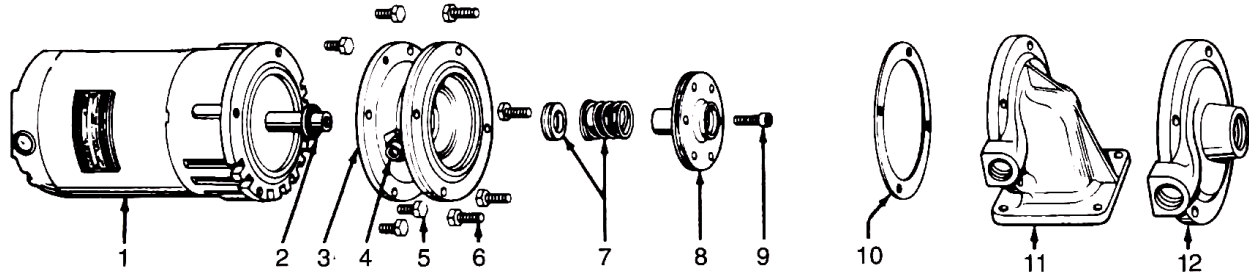
### **Pump leaks:**

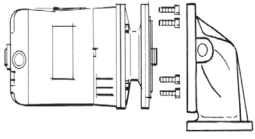
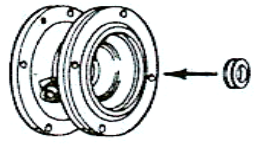
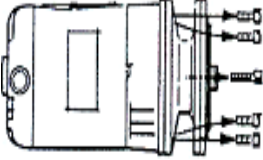
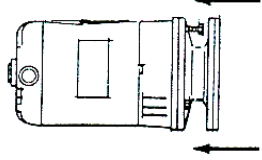
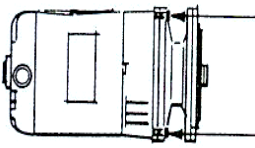
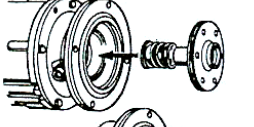
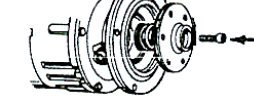
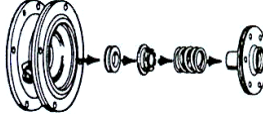
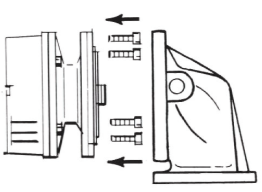
Unit may have been disassembled and reassembled improperly.

The rotary seal may be worn or scored or may have been installed improperly. If worn, has this been caused by abrasive material in lines?

# Replacing the Rotary Seal Assembly on G Series Pumps: 1/3, 1/2 and 3/4 HP

- |                  |                     |                         |                            |
|------------------|---------------------|-------------------------|----------------------------|
| 1. Motor         | 4. Tube Fitting     | 7. Rotary Seal Assembly | 10. Housing Gasket         |
| 2. Water Slinger | 5. Motor Screws (4) | 8. Impeller             | 11. Pump Housing           |
| 3. Motor Bracket | 6. Pump Screws (4)  | 9. Impeller Screw       | 12. Threaded Inlet Casting |



REMOVAL OF OLD SEAL ASSEMBLY	INSTALLATION OF NEW SEAL ASSEMBLY
 <p>A) Remove pump housing from motor bracket and impeller assembly by removing pump screws.</p>	 <p>F) Coat outside edge of new seat with seal lubricant 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.</p>
 <p>B) Remove impellers screw and motor screws (Note: opposite end of motor shaft is fitted with screwdriver slot to hold shaft securely while impeller screw is being removed.)</p>	 <p>G) Remount bracket on motor.</p>
 <p>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. <b>Do not pry the impeller or bracket!</b></p>	 <p>H) Lubricate impeller hub with seal lubricant. Slip new bellows and spring onto impeller hub. Be sure bellows slides freely on impeller hub.</p>  <p>I) Replace impeller on motor shaft and secure with impeller screw. Hold shaft with screwdriver slot while tightening screw.</p>
 <p>D) Remove old seal parts from impeller hub and bracket. Be sure water slinger is in place.</p> <p>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 two castings.</p>	 <p>J) Replace pump housing onto bracket, using a new housing gasket. Secure with pump screws. Be certain gasket is seated properly.</p>

# Replacing the Rotary Seal Assembly on J Series Pumps: 1/2 HP - 3 HP

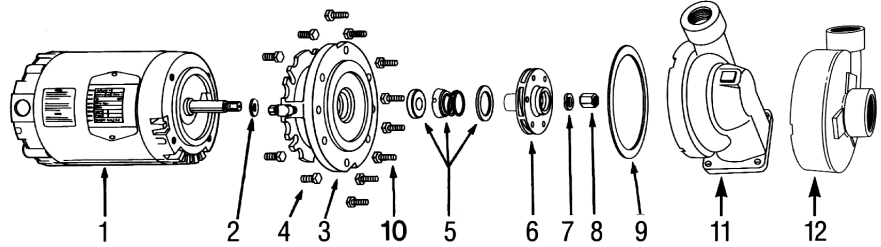
- 1. Motor
- 2. Water Slinger
- 3. Bracket
- 4. Motor Screws (4)

- 5. Rotary Seal Assembly
- 6. Impeller
- 7. Lock Washer
- 8. Impeller Nut

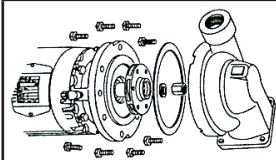
- 9. Housing Gasket
- 10. Pump Screws (8)
- 11. Vertical Inlet Casting
- 12. Horizontal Inlet Casting

## Tools Needed:

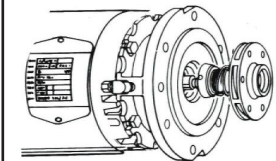
- Large Screwdriver
- 7/16" Wrench
- 9/16" Wrench
- 5/8" Socket
- 1" Socket
- Detergent (household)



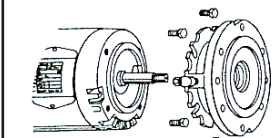
### REMOVAL OF OLD SEAL ASSEMBLY



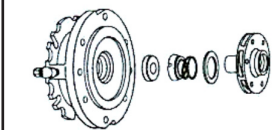
A) Remove 8 pump screws and lift out pump and motor; remove drip cover. Insert large screwdriver into slot at end of motor shaft; hold shaft steady and remove impeller nut and washer from nose of impeller by turning counterclockwise.



B) While still holding motor shaft steady with screwdriver, use 1" socket to remove impeller by turning counterclockwise.

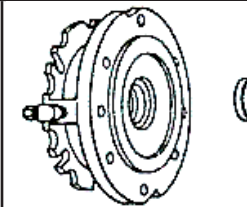


C) Remove the 4 motor screws and separate the bracket from the motor.

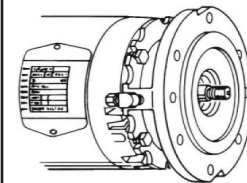


D) Remove old seal parts from impeller hub and bracket. Be sure water slinger is in place.

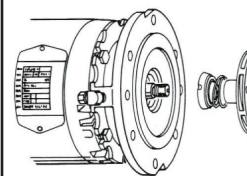
### INSTALLATION OF NEW SEAL ASSEMBLY



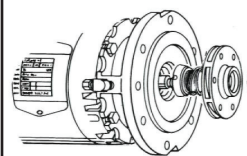
E) Coat outside edge of new seat with seal lubricant and slip it into the bracket. Press into bracket with thumbs or wooden dowel. Handle seat carefully so sweating surfaces are not scratched or chipped...be sure it is squarely seated.



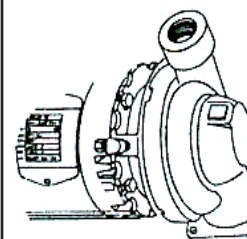
F) Remount bracket on motor.



G) Lubricate impeller hub with seal lubricant. Slip new bellows and spring onto impeller hub. Be sure bellows slide freely on impeller hub.



H) Thread impeller on motor shaft extension and secure with washer and impeller nut. Hold shaft with screwdriver.

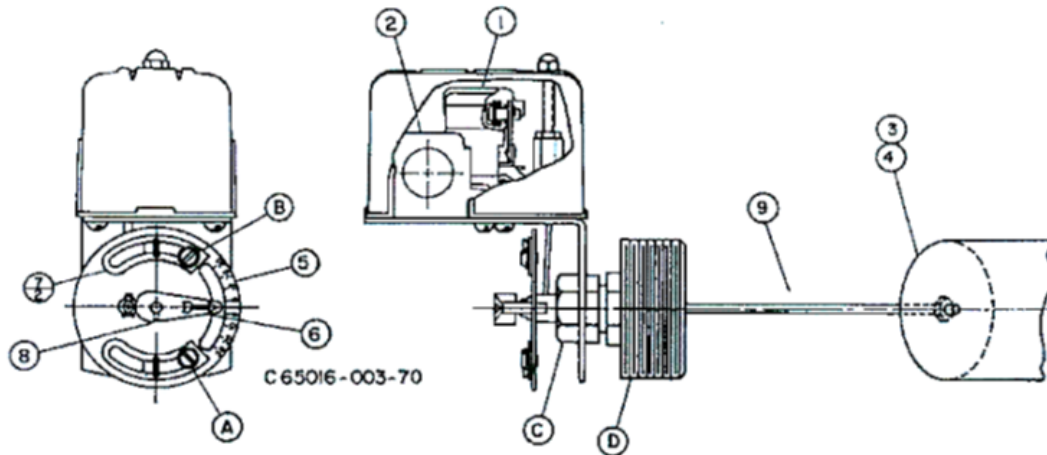


I) Replace motor assembly onto volute; using new housing gasket. Secure with pump screws. Be certain gasket is seated properly.



# Class 9037 Type HG Series A

## Float Switch



**CAUTION:** Switches are shipped with a bracket attached to the mounting plate. This bracket prevents the float and rod from moving in the tank during shipment. When installing the system, this clearly marked shipping bracket must be removed and discarded.

**APPLICATIONS:** For automatically controlling the liquid level in a closed tank by float movement.

**MOUNTING:** The Type HG Screw-in Tank Float Switches are mounted directly to the tank by means of the 2 ½" I.P.S. threaded fitting (D). Before screwing this fitting into the tank, loosen Nut (C) so that the fitting (D) is free to rotate in the switch bracket. Tighten the fitting (D) so that there will be no leak past the threads. Then revolve the switch case until it is horizontal and tighten Nut (C).

**ENCLOSURE RATING:** NEMA 1 ENCLOSURES ARE INTENDED FOR INDOOR USE PRIMARILY TO PROVIDE A DEGREE OF PROTECTION AGAINST CONTACT WITH THE ENCLOSED EQUIPMENT IN LOCATIONS WHERE UNUSUAL SERVICE CONDITIONS DO NOT EXIST.

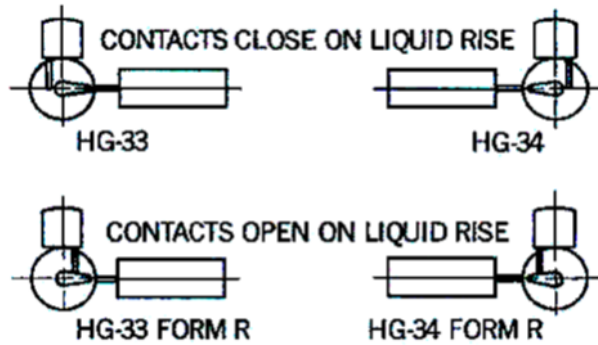
**WARNING: TO AVOID SHOCK HAZARD, DISCONNECT ALL POWER BEFORE INSTALLING OR SERVICING DEVICE.**

**ADJUSTMENTS:** Switches are shipped from the factory set for a specified float travel. Reasonable adjustment of float travel can be made in the field by moving adjusting strips (7) which are held in place by Screws (A) and (B). Loosening Screw (B) and moving upper adjustment strip (7) will affect the upper limit of float travel only. Loosening screw (A) and moving lower adjusting strip (7) will affect the lower limit of float travel.

### REPLACEMENT PARTS LIST

Item Number	Description	Number Req'd	Part Number
1	Set of Moveable and Stationary Contacts . . . . .	2	9998 PC-242
2	Switch Mechanism . . . . .	1	65079-502-51
3	Float (304 SS). . . . .	1	9049 HF3
4	Float (316 SS). . . . .	1	9049 HF4
5	Adjusting Plate Assembly . . . . .	1	2810-D7-G1
6	Operating Lever . . . . .	1	65079-042-01
7	Adjusting Strip . . . . .	2	2810-X8
8	Set Screw . . . . .	1	21801-14080
9	45° Connector and Rod Assy . . . . .	1	2810-C3-G9
9	90° Offset 3" Connector and Rod Assy . . . . .	1	2810-C3-G15
9	90° Offset 4-1/4" Connector and Rod Assy. . . . .	1	2810-C3-G19
9	90° Offset 5" Connector and Rod Assy. . . . .	1	2810-C3-G18
9	90° Offset 7" Connector and Rod Assy. . . . .	1	2810-C3-G6
-	Seal and Installation Kit (BUNA-N) . . . . .	1	9998 PC-337
-	Seal and Installation Kit (VITON) . . . . .	1	9998 PC-338

# Float & Link Positions



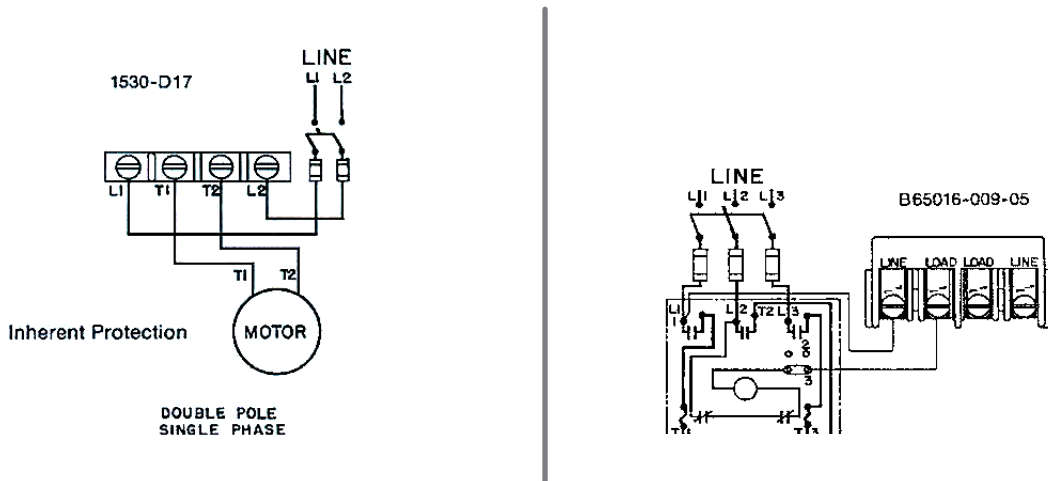
2810-D22

**PRESSURE:** In the use of any of these Float Switches, the pressure limit within the closed tank must not exceed 100 lbs.

**MOTOR PROTECTION:** A float switch of this type does not afford motor protection, however it is quite frequently used as a pilot to operate a starter providing these desirable features. The Square D Co. manufactures a complete line of motor protective switches, information on which will be sent upon request.

**REVERSE ACTION:** To change, relocate operating link as shown in table 2810-D22 above to the opposite slot in base plate and corresponding hole in adjusting plate (Item 5).

## TYPICAL WIRING DIAGRAMS



## ELECTRICAL RATINGS (HORSEPOWER)

Voltage	Single Phase AC	Polyphase AC	DC
115.....	2 HP	3 HP	1/2 HP
230.....	3 HP	5 HP	1/2 HP
460/575.....		1 HP	
32.....			1/4 HP

Control Circuit Rating: A600

# Class 9038 Type CG Series A

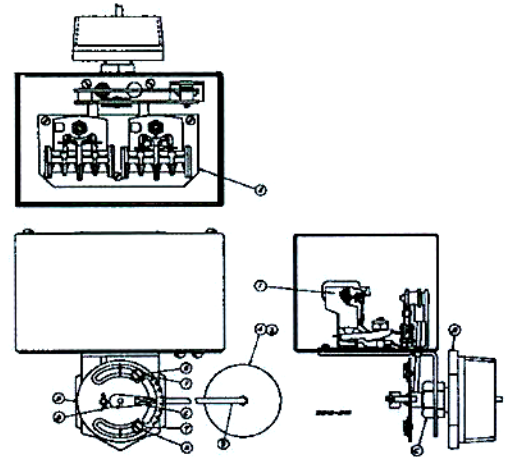
## Mechanical Alternator

**CAUTION:** Switches are shipped with a bracket attached to the mounting plate. This bracket prevents the float and rod from moving in the tank during shipment. When installing the system, this clearly marked shipping bracket must be removed and discarded.

**APPLICATIONS:** The Class 9038 Type C Mechanical Alternators serve to open and close an electric circuit by an upward and downward float movement. The forces are applied by means of a float operating between different fluid levels. The action is such that two switch units are alternated on successive cycles. If the liquid level continues to rise or fall with one pump in operation, the lever will continue to travel to a further position at which point the "second" switch will be operated, throwing the stand-by pump across the line.

**MOUNTING:** The Class 9038 Type C Mechanical Alternators are mounted directly to the tank by means of the 2 1/2" NPT threaded fitting (D). Before screwing this fitting into the tank, loosen Nut (C) so that the fitting (D) is free to rotate in the switch bracket. Tighten the fitting (D) so that there will be no leak past the threads. Then revolve the switch case until it is horizontal and tighten Nut (C).

**PRESSURE:** In the use of the CG Alternators, the pressure limit within the closed tank must not exceed 100 psi.



### ELECTRICAL RATINGS (HORSEPOWER)

Voltage	Single Phase AC	Polyphase AC	DC
115.....	2 HP	3 HP	1/2 HP
230.....	3 HP	5 HP	1/2 HP
460/575.....		1 HP	
32.....			1/4 HP

Control Circuit Rating: A600

**REVERSE OPERATION:** Form R controls are arranged for reverse action. In this form, the contacts will open on increase in liquid level. It is not recommended that a change be made in the field from standard to reverse operation or vice versa.

**MANUAL TRANSFER (LEAD-LAG) SELECTOR:** Form N3 switches have a manually engaged selector which voids alternation. The pump selected to lead always comes on first. With selector disengaged, the unit reverts to normal alternation.

**MOTOR PROTECTION:** A control of this type does not afford motor protection. However, it is quite frequently used as a pilot to operate a starter providing this desirable feature. The Square D Company manufactures a complete line of motor protective devices, information on which will be sent upon request.

**ENCLOSURE RATING:** NEMA 1 ENCLOSURES ARE INTENDED FOR INDOOR USE PRIMARILY TO PROVIDE A DEGREE OF PROTECTION AGAINST CONTACT WITH THE ENCLOSED EQUIPMENT IN LOCATIONS WHERE UNUSUAL SERVICE CONDITIONS DO NOT EXIST. **WARNING: TO AVOID SHOCK HAZARD, DISCONNECT ALL POWER BEFORE INSTALLING OR SERVICING DEVICE.**

**ADJUSTMENTS:** Switches are shipped from the factory set for a specified float travel. Reasonable adjustment of float travel can be made in the field by moving adjusting strips (7) which are held in place by screws (A) and (B). Loosening screw (B) and moving upper adjusting strip (7) will affect the upper limit of float travel only. Loosening screw (A) and moving lower adjusting strip (7) will affect the lower limit of float travel.

# Class 9038 Type CG Series A

## Mechanical Alternator (continued)

### REPLACEMENT PARTS LIST

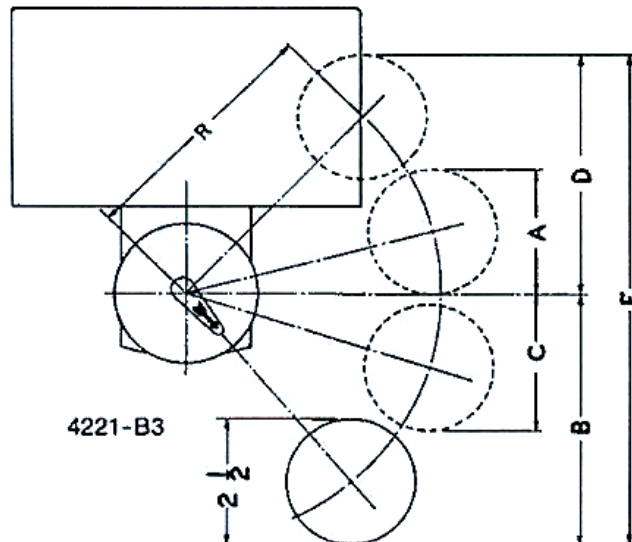
Item Number	Description	Number Req'd	Part Number
1	Set of Moveable and Stationary Contacts . . .	2	9998 PC-242
2	Switch Mechanism . . . . .	1	65079-502-51
3	Float (304 SS). . . . .	1	9049 HF3
4	Float (316 SS). . . . .	1	9049 HF4
5	Adjusting Plate Assembly . . . . .	1	2810-D7-G1
6	Operating Lever . . . . .	1	65079-042-01
7	Adjusting Strip . . . . .	2	2810-X8
8	Set Screw . . . . .	1	21801-14080
9	45° Connector and Rod Assy . . . . .	1	2810-C3-G9
9	90° Offset 3" Connector and Rod Assy . . . . .	1	2810-C3-G15
9	90° Offset 4-1/4" Connector and Rod Assy. . . . .	1	2810-C3-G19
9	90° Offset 5" Connector and Rod Assy. . . . .	1	2810-C3-G18
9	90° Offset 7" Connector and Rod Assy. . . . .	1	2810-C3-G6
-	Seal and Installation Kit (BUNA-N) . . . . .	1	9998 PC-337
-	Seal and Installation Kit (VITON) . . . . .	1	9998 PC-338

\*WHERE SEPARATE POWER SUPPLIES ARE PROVIDED, THE DISCONNECT MEANS FOR EACH MOTOR MUST BE GROUPED TOGETHER AND PROVIDED WITH SUITABLE WARNINGS IN ACCORDANCE WITH THE NATIONAL ELECTRICAL CODE AND ALL OTHER APPLICABLE CODES AND STANDARDS.

### EXPLANATION OF FLOAT TRAVEL AND POSITION

NORMAL OPERATION: Switches will cut in and out at the high point and low point of distance A plus B, given in the tables. Under normal conditions, as long as one pump alone is able to handle the incoming water, the pumps will alternate at this distance. With the water level continuing to rise, the second switch will cut in and start the second pump when the float reaches the top of distance D. Both pumps will continue to run until the float returns to the low point of distance D plus C, where one pump will cut out. The other pump will continue until the float reaches the low point of distance B.

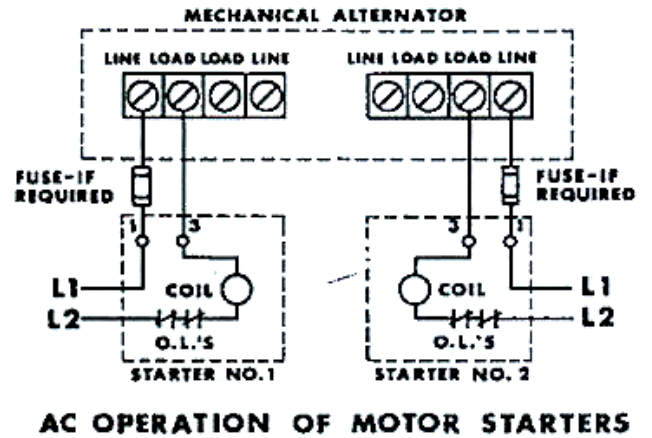
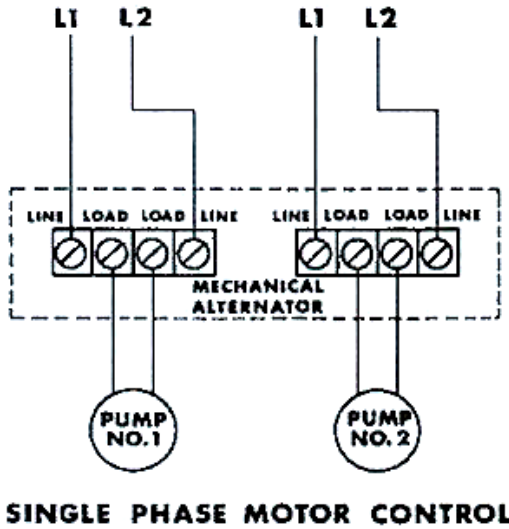
Type CG



# Class 9038 Type CG Series A

## Mechanical Alternator (continued)

### CLASS 9083 MECHANICAL ALTERNATOR- WIRING DIAGRAMS\*

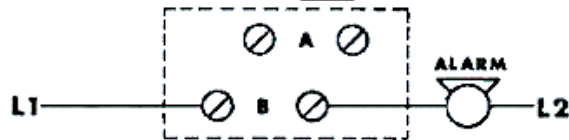


#### ELECTRICAL RATING OF ALARM SWITCH ONLY CLASS 9007 TYPE AO1

C65016-004-33

AC PILOT DUTY			D.C. PILOT DUTY SINGLE THROW			
VOLTS	BREAK	MAKE	VOLTS	115	220	600
110	15A	40A	AMPS	0.5 A	0.25A	0.05A
220	10A	20A	DOUBLE THROW			
440	6A	10A	VOLTS	115	220	600
600	5A	8A	AMPS	0.25A	0.1	—

C65016-004-33



CIRCUIT A CLOSING ON FALLING LIQUID LEVEL  
CIRCUIT B CLOSING ON RISING LIQUID LEVEL  
(SWITCH CONTACTS MUST BE SAME POLARITY)

**FORM N5 HIGH LEVEL ALARM**

# Adjusting a NEMA 1 Square-D, 9038 Series Mechanical Alternator

## PURPOSE OF ALTERNATOR

Normally used to automatically control the liquid level, by float movement, within a closed tank. In addition, the switch automatically alternates pump operation on successive cycles of float travel. It also offers overflow protection if the liquid level within the tank continues to rise with only one pump in operation – a second contact is activated as the float continues to rise, turning on the second pump.

## ORDERING CORRECT SWITCH ORIENTATION

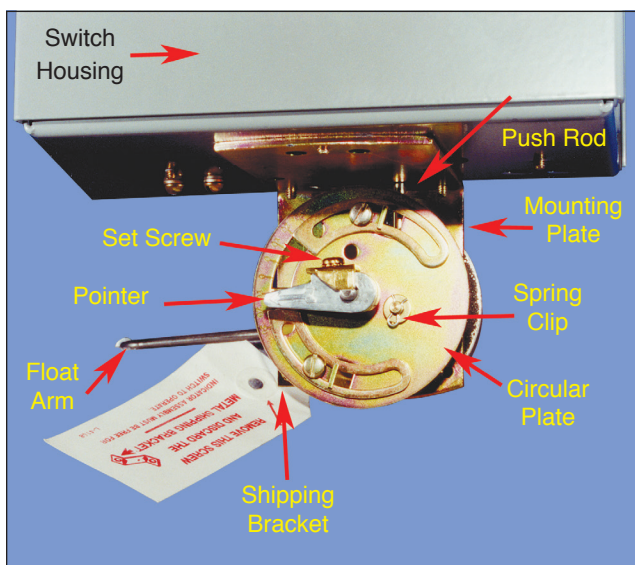


Figure 1

### WHEN ORDERING

Float and push rod are on opposite sides for contacts to close when liquid level rises. **Thermaflo** orders the mechanical alternator with the required float orientation preset—float on either the right side (Figure 2-A) or left side (Figure 2-B) as required for specific job. **Thermaflo** applications typically use a “float on left” orientation.

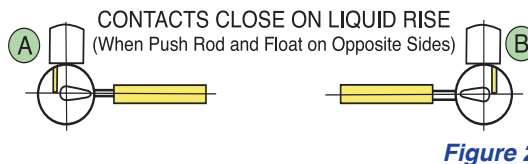


Figure 2

### WHEN INSTALLING

The alternator is shipped with a shipping bracket (see Figure 1) attached to the mounting plate to prevent the float from moving in the tank during shipment. When installing the alternator, this bracket, clearly marked with a tag, must be removed for float mechanism to operate correctly.

### WARNING!

The pressure limit within the closed tank must not exceed 20 pounds per square inch (psi).

## FLOAT TRAVEL EXPLANATION

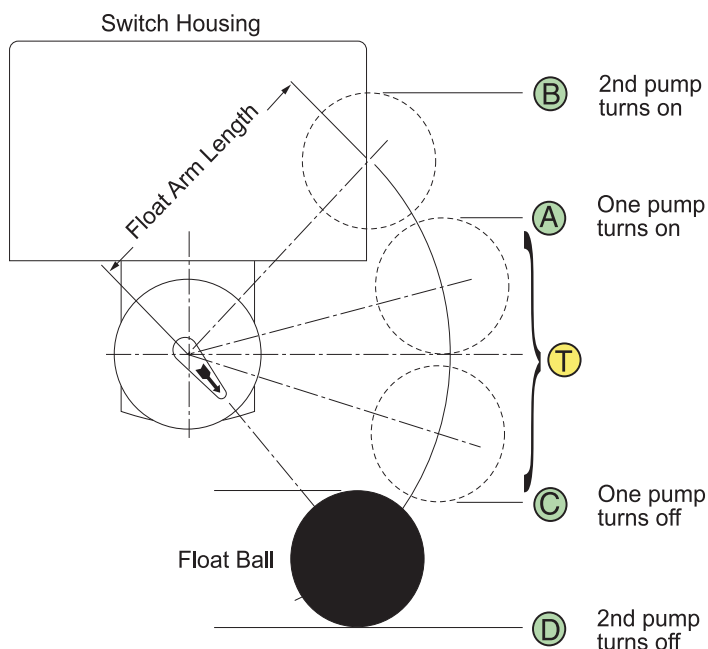


Figure 3

- Under typical operating conditions, the contacts (located inside the switch housing) will close a circuit as the float rises, turning on a pump. Then as the float falls, the contacts open a circuit, turning off a pump.
- As the water level rises, the first contact will close when the float level reaches high point **A**.
- As long as one pump can handle the flow of incoming water, the pumps will operate within “normal” float travel range **T** and alternate on each successive rise / fall cycle of float.
- If the water level continues to rise, the second contact will close, when the float reaches high point **B**, turning on the second pump.
- Both pumps will continue to run until the float falls to the low point **C** where one pump turns off.
- The other pump will continue to run until the float falls to low point **D** where the second pump turns off. With both pumps off, the float will begin to rise again and the cycle will repeat.

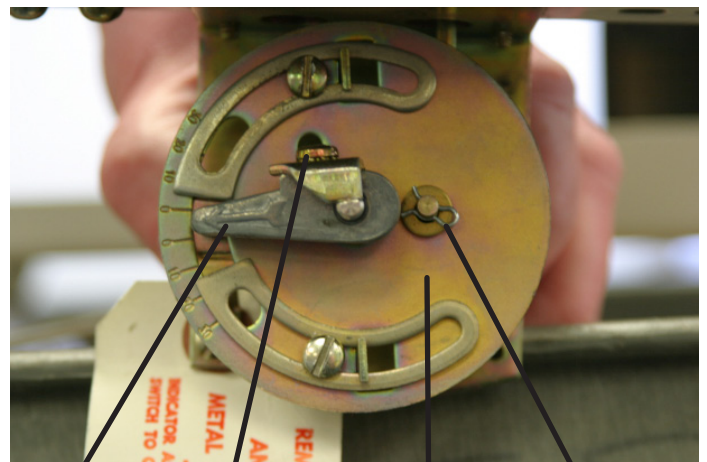
See reverse side for additional adjustments

# Float Switch/Alternator Adjustment Instructions

Figure 1-A



Figure 1



**Warning:** Switch is shipped with a bracket attached to a mounting plate to prevent the float from moving in the tank during shipment. When installing the unit, this bracket, clearly marked with a tag, MUST be removed for float switch to operate.

Figure 2

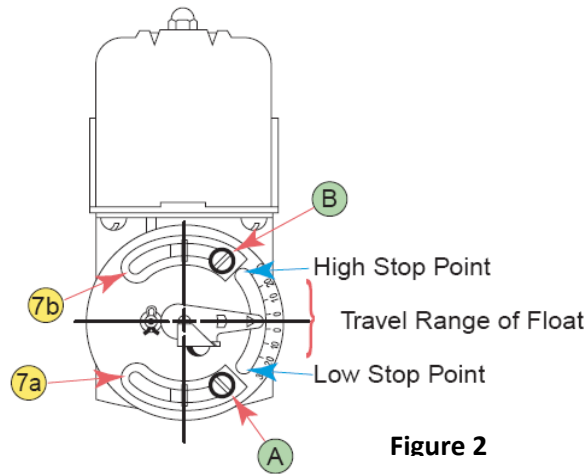


Figure 2

Figure 1 comes with a shipping bracket (Figure 1-A) towards the bottom; make sure to remove that bracket before start up.

Figure 2 above shows a left-hand dial, but also shows the (2) "0" points on the typical scale.

- 7b designates the upper scale.
  - B designates the set screw to be loosened to adjust upper scale.
- Set the upper scale to 7 before you start the pump. (Minor adjustments may be needed after start up.)

- 7a designates the lower scale.
  - A designates the set screw to adjust the upper scale.
- Set the upper scale to 7 before you start the pump. (Minor adjustments may be needed after start up.)

## ADJUSTING TRAVEL RANGE OF FLOAT ARM

See Figure 4

### Allow float to go higher

- Loosen adjusting strip **screw** (B).
- Slide the float travel **adjusting plate** (7b) to the left. This will allow the float arm to rise higher.
- Tighten adjusting strip **screw** (B).

### Allow float to go lower

- Loosen adjusting strip **screw** (A).
- Slide the float travel **adjusting plate** (7a) to the left. This will allow the float arm to drop lower.
- Tighten adjusting strip **screw** (A).

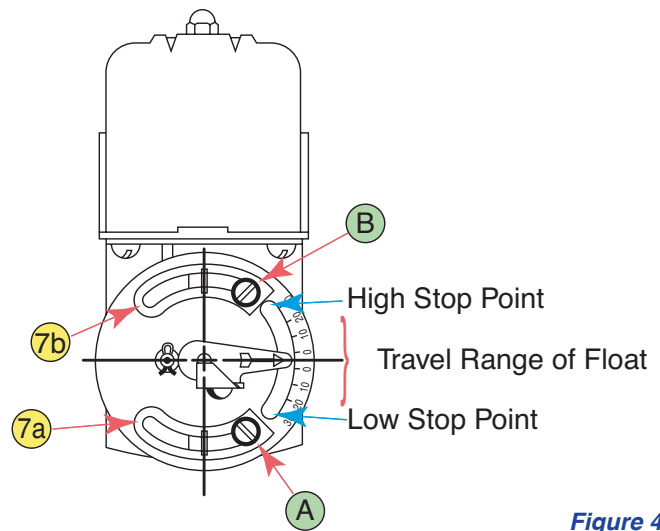


Figure 4

## REPLACING Z-20 SEAL

See Figure 1

**Step 1** – Remove **shipping bracket**

**Step 2** – Loosen **set screw** on pointer

**Step 3** – Remove **pointer**

**Step 4** – Remove **spring clip** to release **circular plate**

**Step 5** – Remove **circular plate**

See Figures 5-6a & 6b

**Step 6** – Remove **hex nut** (C)

**Step 7** – Remove **housing bracket** with **switch housing**

**Step 8** – Remove **spring clip** (9)

**Step 9** – Remove **brass bushing** (F) that fits inside the threaded brass fitting that hex nut (C) screws onto

**Step 10** – Remove old **Z-20 seal**

**Step 11** – Insert new **Z-20 seal**

**Step 12** – Reinsert **brass bushing**

**Step 13** – Reattach **spring clip** (9) into groove on float shaft

**Step 14** – Reattach **housing bracket** onto float shaft and tighten hex nut (C)

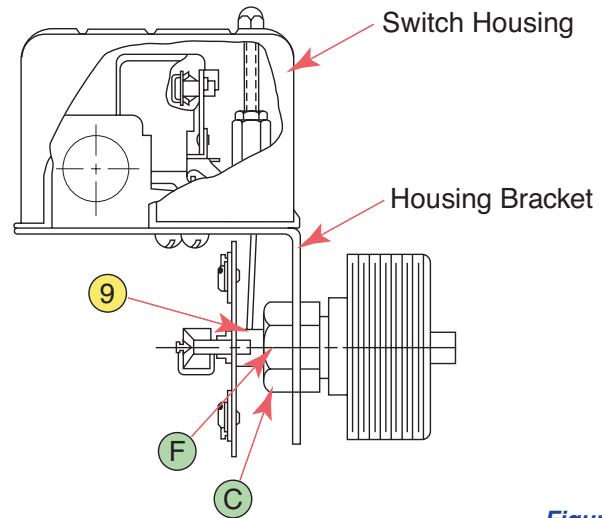


Figure 5

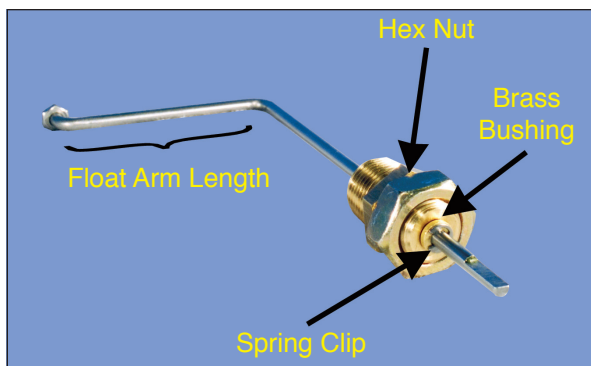


Figure 6a

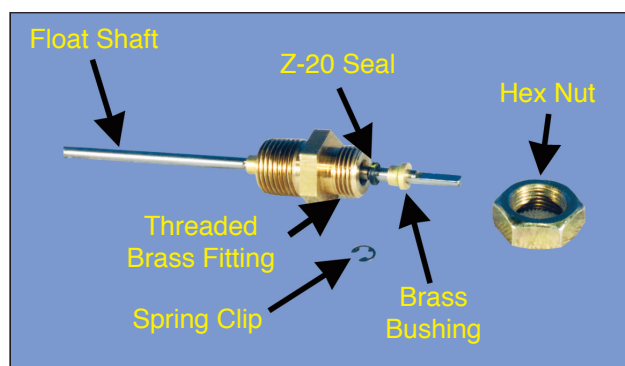


Figure 6b

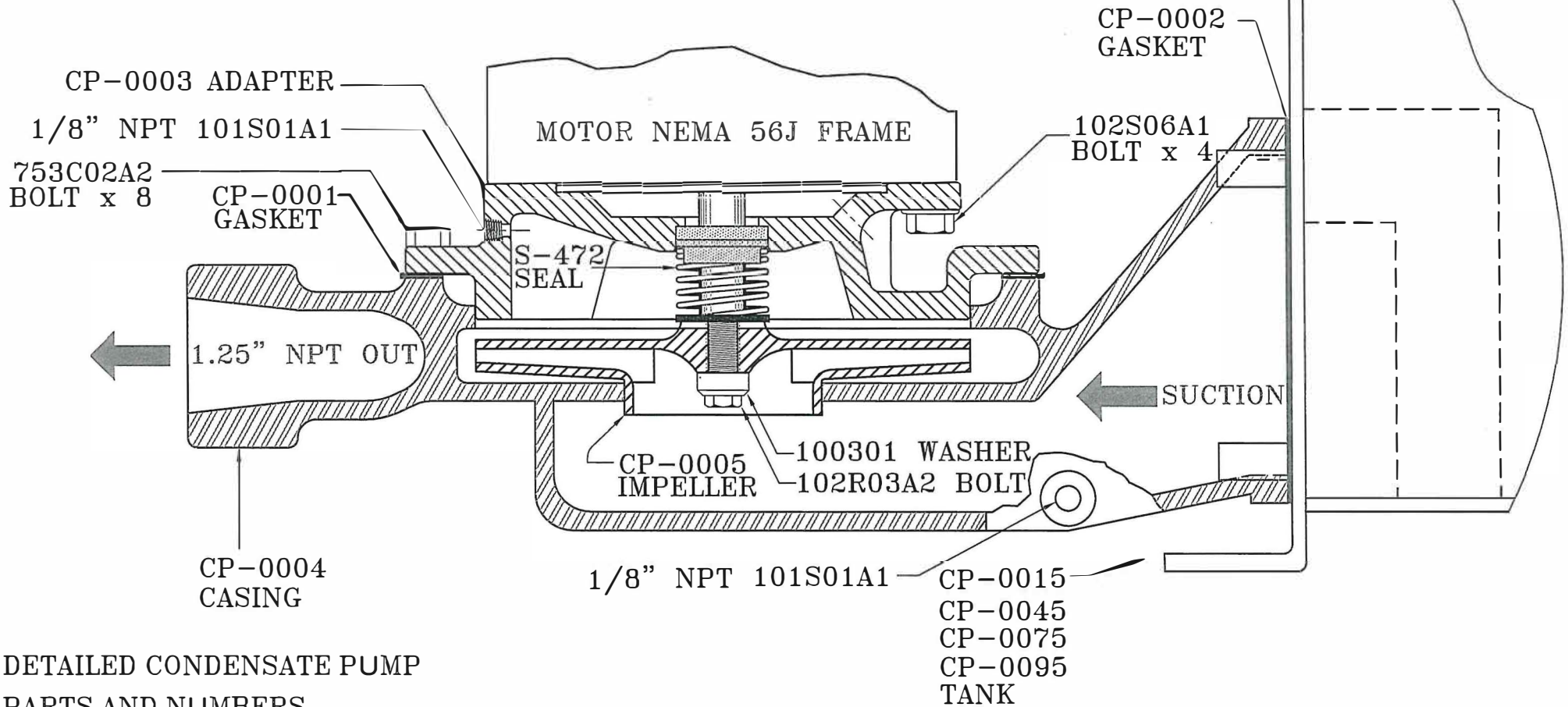
Note: The Z-20 Seal is located behind the brass bushing. Both the brass bushing and Z-20 Seal fit inside the threaded brass fitting under the hex nut.





## CONDENSATE PUMP ASSEMBLY

SCALE 1:1 FILE NAME: CPASSEMBLY



DETAILED CONDENSATE PUMP  
PARTS AND NUMBERS

Thermaflo Engineering Inc. 2880 Fair Avenue Newberry, South Carolina 29108  
704-940-1228 [www.thermafloengineering.com](http://www.thermafloengineering.com)