

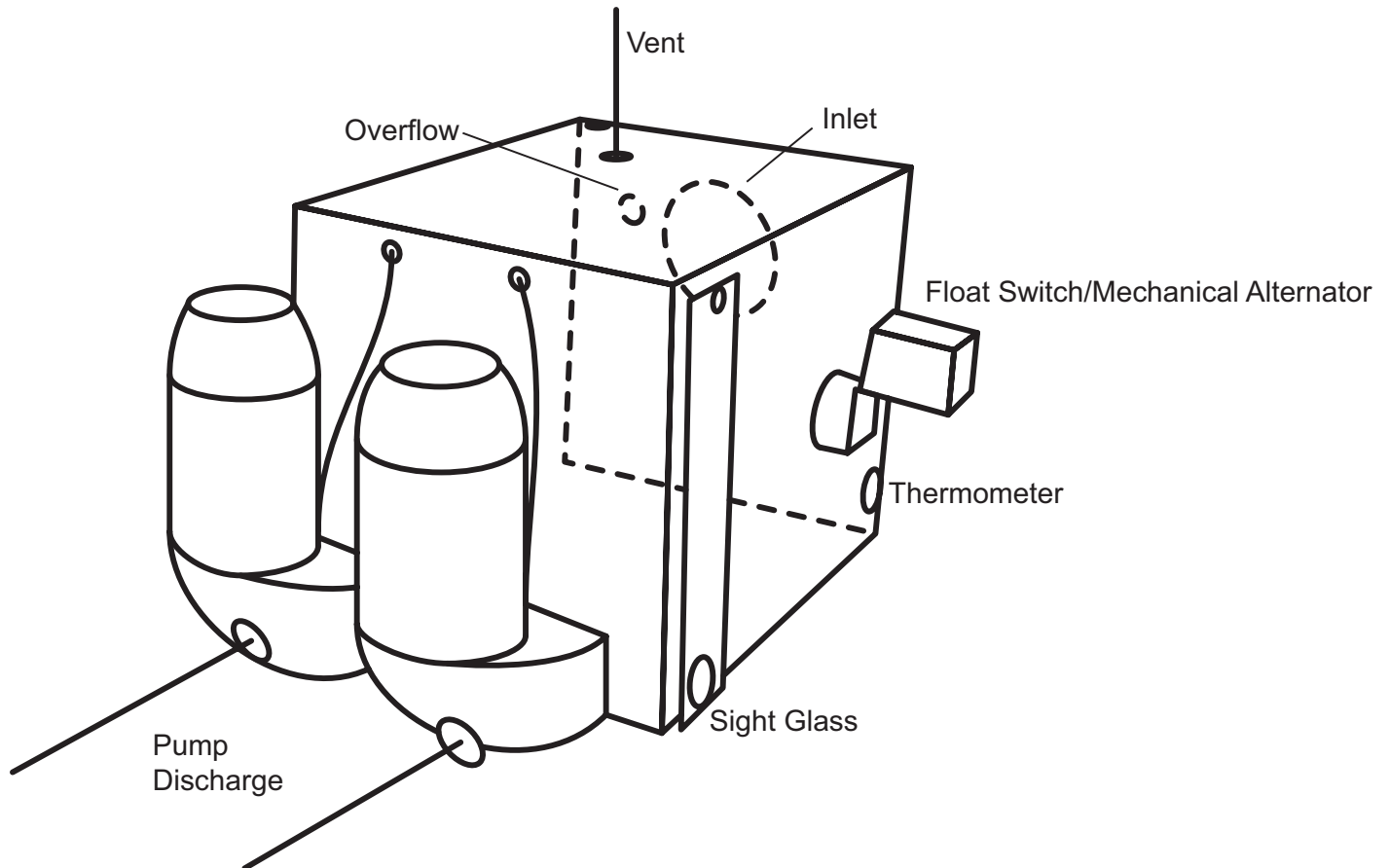


# Series 4400

## Condensate Return Systems

### Installation, Operation and Maintenance

#### Typical Installation



*This bulletin should be used by experienced personnel as a guide to the installation of the Series 4400 Condensate Return System. Selection or installation of equipment should always be accompanied by competent technical assistance. You are encouraged to contact Armstrong International, Inc. or its local sales representative for additional information.*

## Description

Pumps are float operated to return accumulated condensate to a boiler feed tank.

### Preliminary Inspection

Assure that there is no shipping damage.

### Handling

Use care in installing unit.

### Location

Place unit for easy access to all parts. Allow adequate space for servicing. Check ambient conditions.

### Notice / Temperature Limits

Motors are designed to operate in 104°F (40°C) max ambient.

Insulate or ventilate as required.

### Piping (General)

Pipe the unit per the Elementary Piping Diagram. Locate and support piping so as to not load the pump discharge.

### Piping (Returns)

Gravity return lines from system should be properly pitched down to unit inlet. Returns must also be trapped to prevent steam entry into the unit. An inlet basket strainer is recommended.

Bypass piping to a drain is recommended per the piping diagram.

### Piping (Vent)

Install a vent pipe to atmosphere. Pipe to be size of vent port on unit. Do not restrict or reduce vent opening.

### Float Switches & Mechanical Alterations

**Floats are locked in place to prevent damage during shipment.**

**Remove shipping locks.** Check factory settings. Floats and mechanical alternators are adjustable for various levels of operation.

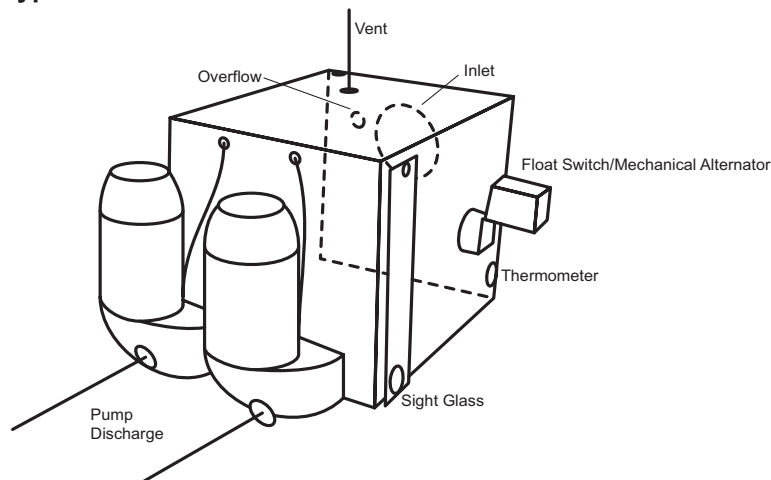
The lead pump should start with tank 3/4 full and shut off at 2" or more above pump inlet. Lag pump should start before the tank overflows. Settings should avoid "short cycling" of the pump.

### Electrical Wiring & Controls

Connect power wiring per NEC. Recheck nameplate vs. specifications and conditions. All single phase motors have internal thermal protection.

Three phase motors must use starters with properly sized overload relays. Overload relays furnished are designed for manual reset.

### Typical Installation



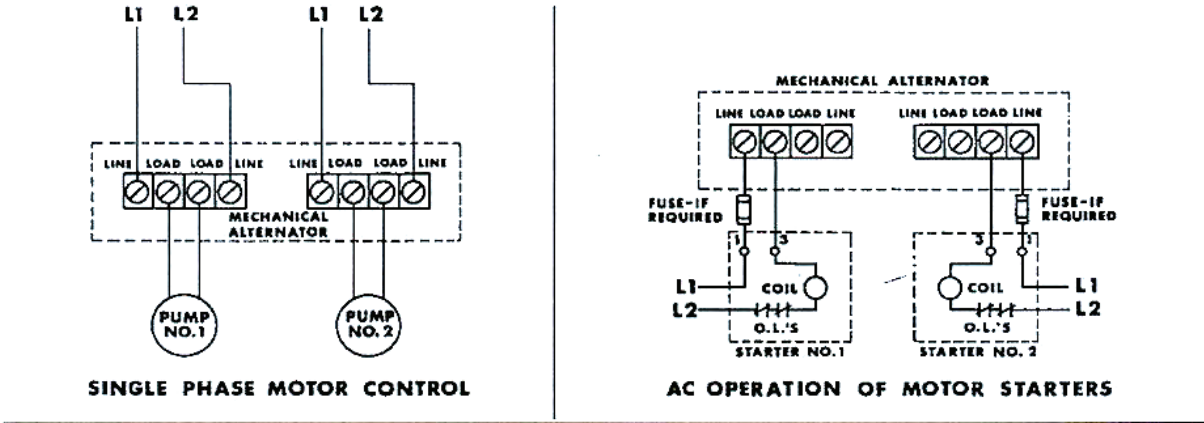
### Putting the Unit into Service

1. Assure that the unit is piped in accordance with instructions in this manual.
2. Isolate tank before performing any system leak test. Do not pressurize the tank as part of the leak test. Failure to do this can result in serious injury or death.
3. Check floats and alternators for free operation.
4. Wire unit per National Electrical Code.
5. Install drain plugs if necessary.
6. Fill receiver half full of water to prime pump (s) and prevent damage to pump seals. Avoid freezing conditions after unit receiver has been filled.
7. Check for proper rotation of electric phase motors. Rotation must be clockwise looking down on the motor as indicated by directional arrow on pump casting. If pump runs backwards, interchange two wires (3 phase only).
8. **Assure all shipping locks have been removed from all float switches.**
9. If possible, observe operation thru several cycles.

# Representative Wiring Diagrams

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

## CLASS 9038 MECHANICAL ALTERNATOR - WIRING DIAGRAMS\*

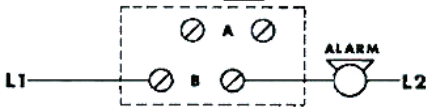


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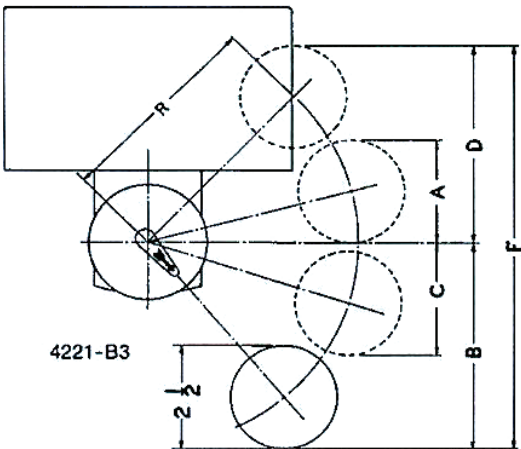
ELECTRICAL RATING OF ALARM SWITCH ONLY  
CLASS 9007 TYPE AO1

AC PILOT DUTY			D.C. PILOT DUTY SINGLE THROW		
VOLTS	BREAK	MAKE	VOLTS	115	220
110	15A	40A	AMPS	0.5 A	0.25A
220	10A	20A	DOUBLE THROW		
440	6A	10A	VOLTS	115	220
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**



### 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 reached 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

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## Operation and Maintenance

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Operators must be familiar with all sections of this manual to understand the operation of the unit.

Hot water, steam and electricity can be hazardous. Check motor nameplate for any lubrication requirements.

Pumps require no lubrication.

### Notice / Auto Restart

Single phase motors will restart automatically after thermal overload protector trips.

Overload thermal relays in starters must be reset manually.

A properly installed unit should function unattended for long periods of time. Periodic checks to assure proper operations are highly recommended. Refer to trouble shooting section when necessary.

A variety of control options are available and are furnished in accordance with user specifications. Refer to wiring diagrams (when furnished) to determine control switch settings.

The inlet strainer (when furnished) is intended to protect the pump and system. Periodic cleaning should be included in maintenance schedule. Check frequently in new systems.

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## Tank Float Switch Instructions

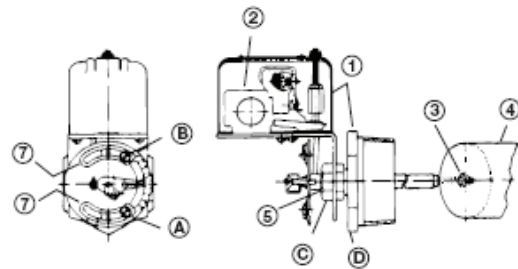
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**Application** - For automatically controlling the liquid level in a closed tank by float movement.

**Mounting** - Screw-In Tank Float Switches are mounted directly to the tank by means of the 2 1/2" I.P.S. threaded fitting (D). Before screwing this fitting into 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 resolve the switch case until it is horizontal and tighten Nut (C).

**Adjustment** - 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 places by Screws (A) and (B). Loosen 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.

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



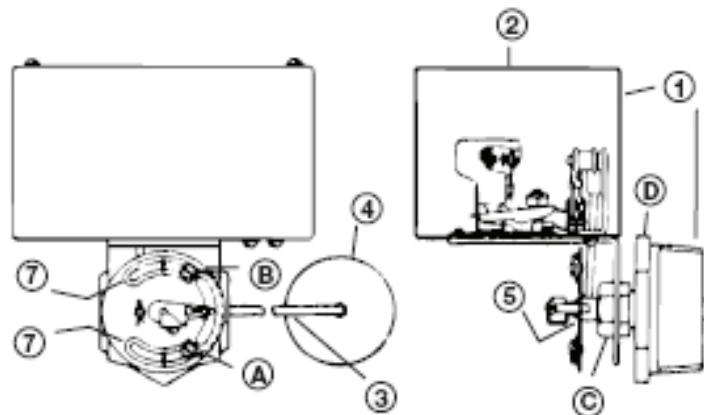
## Mechanical Alternator Instructions

**Application** - 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 liquid 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** - Mechanical alternators are mounted directly to the tank by means of the 2 1/2" I.P.S. threaded fitting (D). Before screwing this fitting into a 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).

**Adjustment** - 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). Loosen 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.

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



## **Troubleshooting Procedure**

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All units are thoroughly tested at the factory before shipment.

They should operate satisfactorily without further adjustment if properly installed and providing they have not been damaged by rough handling in transit. If system or unit performance is not satisfactory, refer to the following check list.

### **Pump Will Not Start**

1. The power supply has been interrupted, disconnect switch is open, or selector switch is improperly positioned.
2. Incorrect voltage for motor. Check voltage and wiring with motor characteristics.
3. Incorrect starter coil for power supply.
4. The overload relays and the starter have tripped out and must be reset. Ambient temperature may be too high.
5. Check pump controls or other controls for proper operation.
6. Wiring to control cabinet is incorrect or connections are loose.
7. The strainer is dirty causing the flow to be restricted. Clean periodically.

### **Pump Runs Continuously**

1. Pump is running backward. Rotation of three phase motors may be corrected by interchanging any two of the three wires. Rotation should be clockwise looking down on motor.
2. Steam traps are blowing through causing condensate to return at excessive temperatures. This may reduce the capacity of pump below its rating, depending on the unit and type of pump furnished. Traps should be repaired or replaced.
3. The total required pressure at the pump discharge is greater than the pressure for which the pump was designed. Check the total pressure which includes atmospheric pressure, the friction head and the static head.
4. A valve in the discharge line is closed or throttled too tightly. Check valve is installed backwards.
5. The impeller eye is clogged.
6. Pump is too small for system.

### **Condensate Pump is Noisy**

1. Excessive condensate temperature. Correct system conditions.
2. Magnetic hum or bearing noise in motor. Consult motor manufacturer's authorized service station nearest unit location.
3. Starter chatters. Trouble is caused by low line voltage, poor connections, defective starter coil, or burned contacts.
4. Pump is running backward.

### **The System is Noisy**

1. Banging in steam mains is usually caused by steam "imploding" in condensate lying in low points in lines. These problems can be eliminated by dripping low points, properly supporting the pipe, or by increasing the pitch of the lines.
2. Improper dripping of the steam mains and risers; where there is a rise in the steam main, or where it branches off into a riser, a drip trap must be installed in the drain line.
3. The piping is too small to drain properly.
4. A defective trap's backing up condensate.