

**Myers®**

Pentair Pump Group

# 4WHV, V4WHV Non-Clog Pumps Installation and Service Manual



# 4WHV & V4WHV CROSS-SECTION

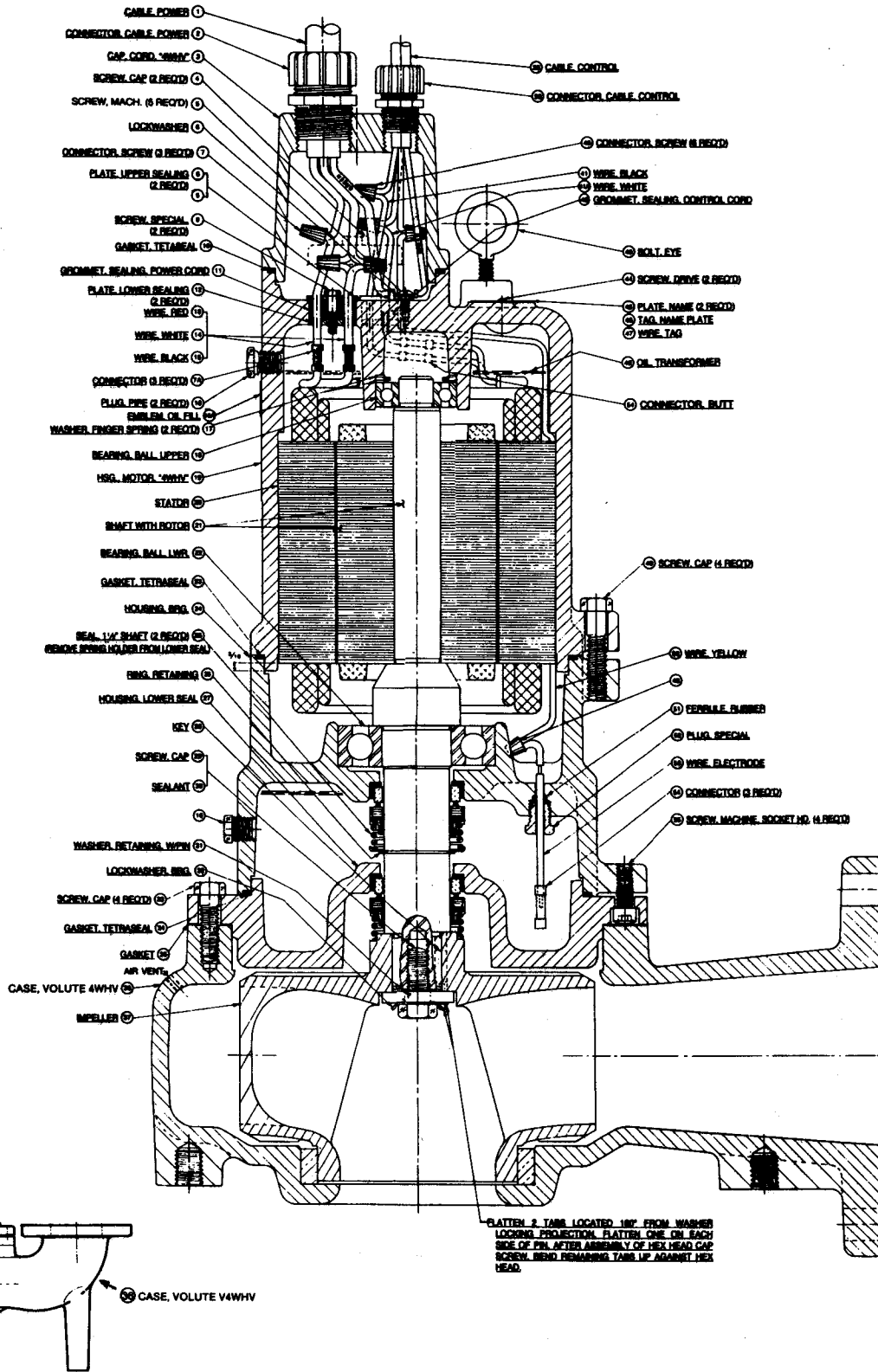


Fig. 1

# 4WHV & V4WHV PUMP DIMENSIONS

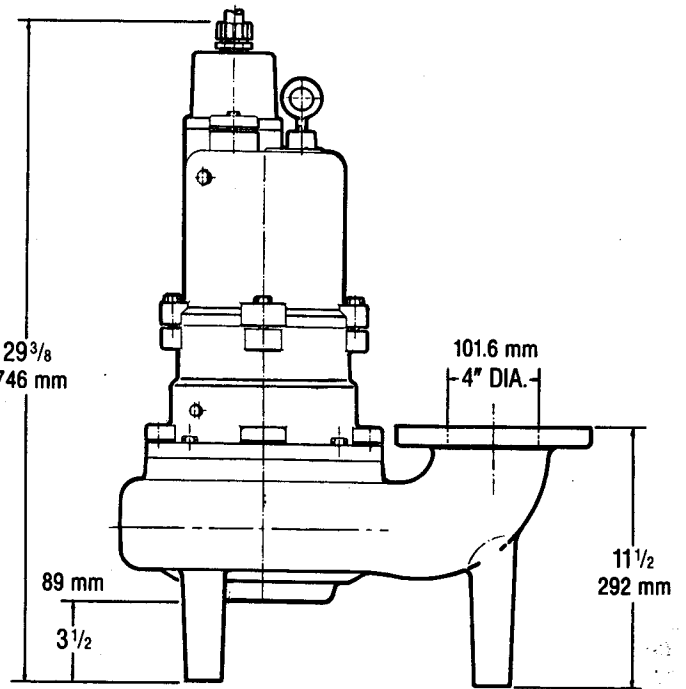
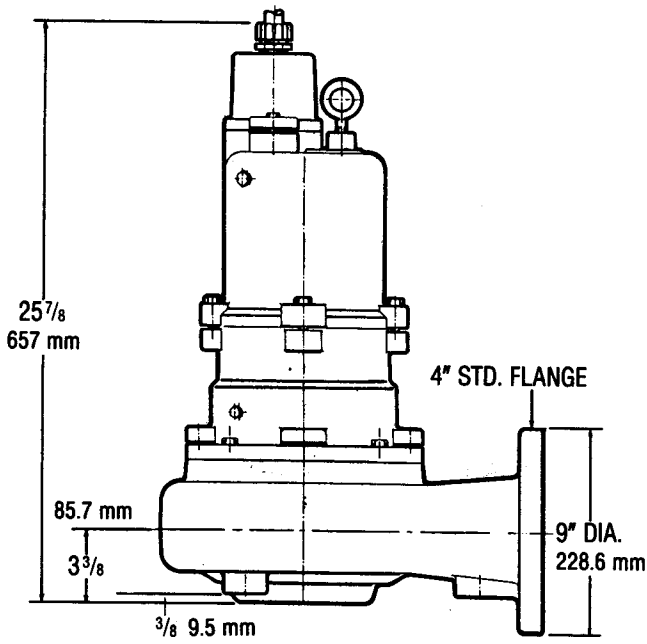
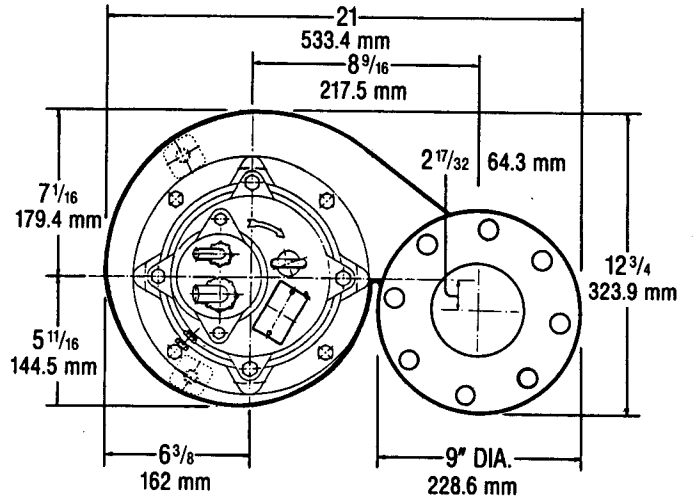
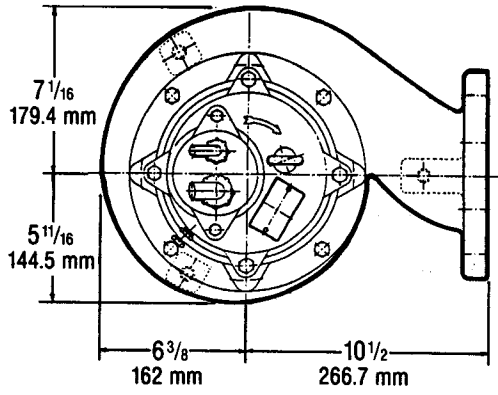


Fig. 2

**4WHV  
(SERIES)**

**V4WHV  
(SERIES)**

## PUMP MODELS

These instructions cover the installation and service of the 4WHV and V4WHV series of non-clog pumps and guide rail systems for the horizontal discharge models only. Both models are designed for handling raw sewage and wastewater. Do not use for acid waste water. The pumps have 2-vane, non-clog impellers. The 4WHV and V4WHV will pass 3" dia. solids and has a 4" std. flange discharge. Drawing Fig. 1 shows a cross-sectional view of the pump. Drawing Fig. 3 shows the overall dimensions of each pump.

**CAUTION:** In the initial installation, before sewage is admitted to wet well, there is no danger of entering the sump, but after sewage has been in the sump there is **danger**. Sewage water gives off methane and hydrogen sulfide gases, both of which are highly poisonous. Never enter wet well unless cover is open and an outside blower is used to force fresh air into the wet well. Also, the man in the wet well must wear a harness with rope to surface so that he can be pulled out in case of asphyxiation. One man should not work alone.

## SEAL FAILURE

The 4WHV and V4WHV pumps have a probe installed in the seal chamber, see Fig. 1, so that any leakage past the lower seal is detected. A red warning light at the control panel comes on if water enters the seal chamber. This is an indicator only and does not stop the motor. It warns that seal should be replaced within 2 to 3 weeks. **LONGER RUNNING WITHOUT SEAL REPLACEMENT COULD DAMAGE MOTOR. MOTOR MUST GO TO AUTHORIZED SERVICE STATION FOR SEAL REPLACEMENT.**

## HEAT SENSOR

All 4WHV and V4WHV single and three phase pumps have motor heat sensors which are externally wired to the control panel. Any motor temperature above the sensor rating will open the heat sensor and stop the motor. The sensor will automatically close upon cooling. It is important that the heat sensor wires and seal failure wires are connected at the panel terminal block. Warranty is void if wires are not connected or are jumped.

**CAUTION:** The single phase 4WHV and V4WHV pumps with automatic heat sensor reset will restart without warning as the motor cools. Therefore, never do service work on the pump unless power supply is disconnected.

**WARNING:** On three phase pumps only qualified persons shall conduct services and installation of this pump. The pump must be wired by a qualified electrician, using an approved starter box and switching device.

## MOTOR POWER CABLE AND CONTROL CABLE

Each power cord has 4 conductors - white, black, red and green. For 3 phase, the red, black and white conductors connect to the 3 line terminals and the green is connected to a good outside ground such as a ground rod at least 8 feet into soil. Interchanging any two of the three power conductors will reverse a 3 phase motor.

For single phase the white and black leads connect to the two-line terminals and the red connects to the start winding terminal. The green is for ground and must be connected to a good outside ground. The control cable has 4 conductors - black, white, red, and green. White and black connect to heat sensor terminals, red connects to the seal failure terminal, and green connects to the ground terminal. See Fig. 3.

**CAUTION:** Never pull pump or work on control box until incoming power is disconnected. Never run motor until green ground conductor is connected to a good outside ground. Never pull on electrical cable to lift pump.

Power cables attached to the pumps are No. 10 gauge wire. If the control panel is not located near the pump, consult Table 3 for permissible wire gauge to run between the control panel and the junction box at the wet well. Wire gauge No. 10 may be used for all pump models located within 200 feet of the control panel.

## OIL FILLED MOTOR

The motor chamber and seal chamber are dielectric oil-filled for good heat transfer and lubrication of bearings and seals. The motor requires no other lubrication. Oil level in the motor housing should be to the bottom of the oil fill plug with the pump in a vertical position. Do not overfill the motor housing since some space is required for oil expansion. Oil level in the seal chamber of the 4WHV and V4WHV should be checked with the pump laying horizontally with the fill plug at the top. The oil level should be approximately 3/4" from the outside surface of the housing. See Fig. 1 for oil levels. Transformer oil SOHIO Factopure SE40 should be used and may be purchased from your Myers dealer.

## AIR VENTING

Upon initial filling of the wet well with the water, air may be trapped in the pump volute. To vent off this air, a 5/32" diameter hole is located in the volute. **BE SURE THIS VENT HOLE IS CLEAN AFTER ANY SERVICE WORK ON PUMP.**

### PUMP MODEL TABULATION - Single and Three Phase

Available Models Standard (Also V4WHV models)	Motor Electrical Data											
	HP	Volts	Phase	Start Amps	Run Amps	Service Factor Amps	Run KW	Service Factor KW	Start KVA	Run KVA	NEC Code Letter	Service Factor
4WHV30M4-21	3	230	1	101	17.5	21	2.1	2.5	23.2	4.0	J	1.2
4WHV30M4-03	3	200	3	66.7	15	18	3.5	4.3	23.0	5.0	G	1.2
4WHV30M4-23	3	230	3	58	12	14.4	3.5	4.3	23.0	5.0	G	1.2
4WHV30M4-43	3	460	3	29	6	7.2	3.5	4.3	23.0	5.0	G	1.2
4WHV30M4-53	3	575	3	21.3	5	6	3.5	4.3	23.0	5.0	G	1.2
4WHV50M4-21	5	230	1	141	34	41	6.3	7.7	32.4	7.8	H	1.2
4WHV50M4-03	5	200	3	111	21.6	26	5.6	6.9	38.4	7.2	H	1.2
4WHV50M4-23	5	230	3	96	18	21.6	5.6	6.9	38.4	7.2	H	1.2
4WHV50M4-43	5	460	3	48	9	10.8	5.6	6.9	38.4	7.2	H	1.2
4WHV50M4-53	5	575	3	39	7.2	8.6	5.6	6.9	38.4	7.2	H	1.2
4WHV75M4-03	7.5	200	3	172	32.2	37	8.0	9.9	59.5	11.1	J	1.2
4WHV75M4-23	7.5	230	3	150	28	32	8.0	9.9	59.7	11.1	J	1.2
4WHV75M4-43	7.5	460	3	74.8	14	16	8.0	9.9	59.7	11.1	J	1.2
4WHV75M4-53	7.5	575	3	67.2	11.2	13	8.0	9.9	66.8	11.1	K	1.2
4WHV100M4-03	10	200	3	172	37	37	10.1	10.1	59.5	12.8	G	1.0
4WHV100M4-23	10	230	3	150	32	32	10.1	10.1	59.7	12.8	G	1.0
4WHV100M4-43	10	460	3	74.8	16	16	10.1	10.1	59.7	12.8	G	1.0
4WHV100M4-53	10	575	3	67.2	13	13	10.1	10.1	66.8	12.8	H	1.0

TABLE 1

### ELECTRICAL COMPONENTS - Single Phase Only

Model No.	H.P.	Start Cap. No.	Run Cap. No.	Start Relay, No.
4WHV30M4-21 V4WHV30M4-21	3	12141A8 220 VAC 430-516 MFD	23839A 370 Volt 30 MFD	21990A4 (43 Amp) PU, VL 290-310 DO, VL 95
4WHV50M4-21 V4WHV50M4-21	5	12141A6 220 VAC 270-324 MFD	23186A (2 in Parallel) 410-440 Volt 25 MFDS	21990A5 (23 Amp) PU, VL 220-240 DO, VL 80

TABLE 2

**CABLE SIZE REQUIRED DEPENDING ON MOTOR HORSEPOWER,  
VOLTAGE, AND DISTANCE OF CONTROL PANEL FROM PUMP**

Motor Horsepower	Phase	Voltage	MAX. OFFSET DISTANCE (FEET) PER WIRE GA.				
			14 A.W.G.	12 A.W.G.	10 A.W.G	8 A.W.G	6 A.W.G.
1	1	230	292	465	740	1175	1870
1½	1	230	245	385	615	980	1560
2	1	230	205	330	520	830	1320
3	1	230	153	245	385	615	980
5	1	230	92	145	230	370	590
1	3	200	315	500	790	1260	2000
1	3	230	430	685	1090	1730	2750
1	3	460	1720	2740	4360		
1	3	575	2690	4280			
1½	3	200	260	410	655	1040	1655
1½	3	230	345	545	870	1380	2195
1½	3	460	1375	2185	3475		
1½	3	575	2160	3435			
2	3	200	200	315	500	800	1275
2	3	230	260	420	665	1055	1680
2	3	460	1050	1670	2660		
2	3	575	1635	2600			
3	3	200	150	240	380	605	960
3	3	230	205	330	520	830	1320
3	3	460	825	1310	2085	3315	
3	3	575	1285	2050	3260		
5	3	200	110	170	270	430	690
5	3	230	150	235	375	600	950
5	3	460	595	947	1505	2395	3805
5	3	575	930	1480	2355	3740	
7½	3	200	80	125	200	320	510
7½	3	230	110	175	280	450	715
7½	3	460	450	710	1130	1795	2855
7½	3	575	700	1110	1765	2805	
10	3	200	65	105	170	270	430
10	3	230	90	140	225	360	575
10	3	460	360	560	900	1440	2300
10	3	575	560	875	1400	2250	3600

TABLE 3

### 4WHV & V4WHV WIRING DIAGRAMS

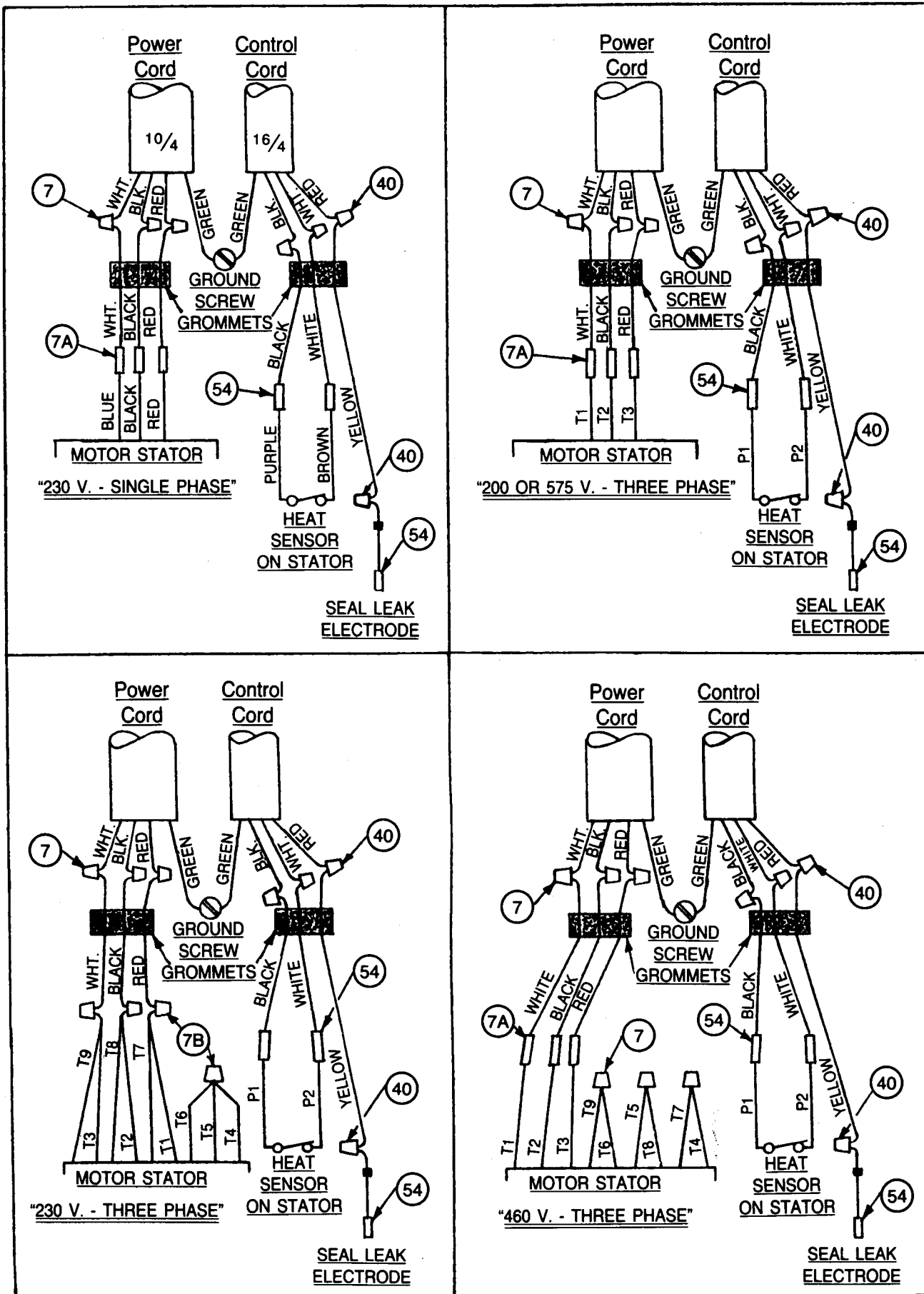


Fig. 3

## INSTALLING RAIL SYSTEM PARTS

### (Horizontal Models Only)

#### MOUNTING COVER, DISCHARGE BASE & RAILS

1. Set concrete cover with hatch opening in position. If basin cover is steel or aluminum, secure the cover to basin walls with expansion bolts.
2. Bolt rail guide plates, Fig. 4 to frame. Stainless steel bolts are screwed through frame angles when shipped and nuts are provided to hold the plate. Brackets have vertical slots so that they can be adjusted for final fit on rails. The plate has slots so the two plates in a duplex system can be adjusted to obtain 16" center-to-center distance between pumps.
3. Lower the base or base/elbow assembly into the basin. **IMPORTANT** — Concrete bottom must be level and smooth for mounting discharge base. See Fig. 6.
4. Position the base so that the pipe rail locating pins protruding from the top of the base are directly below the rail guides attached at the top of the basin. The rail guides should be positioned about mid-way in the vertical adjustment slots. Cut the pipe guide rails to the proper length and install them between the rail guides at the top of the basin and the pins on the base. Guide rails are  $\frac{3}{4}$ " Schedule 40, galvanized or stainless steel or fiberglass reinforced plastic pipe.
5. Using a bubble level held against the rails, move the base until both rails are vertical. Now mark the position of the base, hold down bolts, through the holes in the base.
6. Remove the guide rails and move the base aside to allow drilling of the concrete for  $\frac{5}{8}$ " expansion bolts  $2\frac{1}{2}$ " long. Then move the base over the bolt holes and re-install the guide rails. Recheck rails with bubble level and install the bolts.
7. Install discharge pipe as required by the particular job specifications. If one size larger discharge pipe is required, such as 6" pipe on a 4" pump, a reducing elbow may be attached to the base.
8. If the top rail guide plate can not be attached to the hatch cover frame, a special rail bracket (Fig. 5) can be furnished for mounting directly to a pipe cemented in the basin wall. This bracket is set and aligned with discharge base the same as described for the rail guide plate attached to the frame.

#### ATTACHING MOUNTING PLATE TO PUMP

1. With a gasket between the mounting plate and pump discharge, attach the mounting plate with the bolts supplied. See Fig. 6. The mounting plate should be turned so that two pins are horizontal and one pin vertical pointing up.

#### LOWERING PUMP TO DISCHARGE BASE

1. Attach lifting chains to eye bolts on top of the pump with the clevis furnished.
2. A hook is located on the top guide rail bracket to hold the upper end of the chain when not in use.
3. Check pump rotation if 3 phase. Connect power cords to motor control panel and lay pump on its side so that impeller can be seen. Turn all switches to off position.
4. Close main circuit breaker, then jog manual switch to ON then OFF. Note rotation direction of impeller. Impeller must turn counterclockwise when looking into the impeller's inlet. If rotation is wrong, interchange any two line leads to the motor. **BE SURE MAIN BREAKER IS OFF WHEN THIS CHANGE IS MADE. MARK WIRES SO THEY CAN BE REPLACED IN SAME ORDER.**
5. Mount the guide plate on the vertical pin of the mounting plate. Position the guide openings parallel with the face of the mounting plate. Snug the two set screws but do not overtighten at this time.
6. Slowly lower the pump down the guide rails to the base. Inspect the mating of the mounting plate face to the base face, they should be flat against one another. If necessary, loosen the two set screws of the guide plate and rotate the guide plate until an equal amount of clearance exists between the guide plate and the guide rails. Retighten the set screws. If no adjustment was necessary, check that the set screws are tight.
7. The pumps are now properly positioned for operation.



### TOP RAIL GUIDE PLATE FOR 4" LIFT-OUT SYSTEM

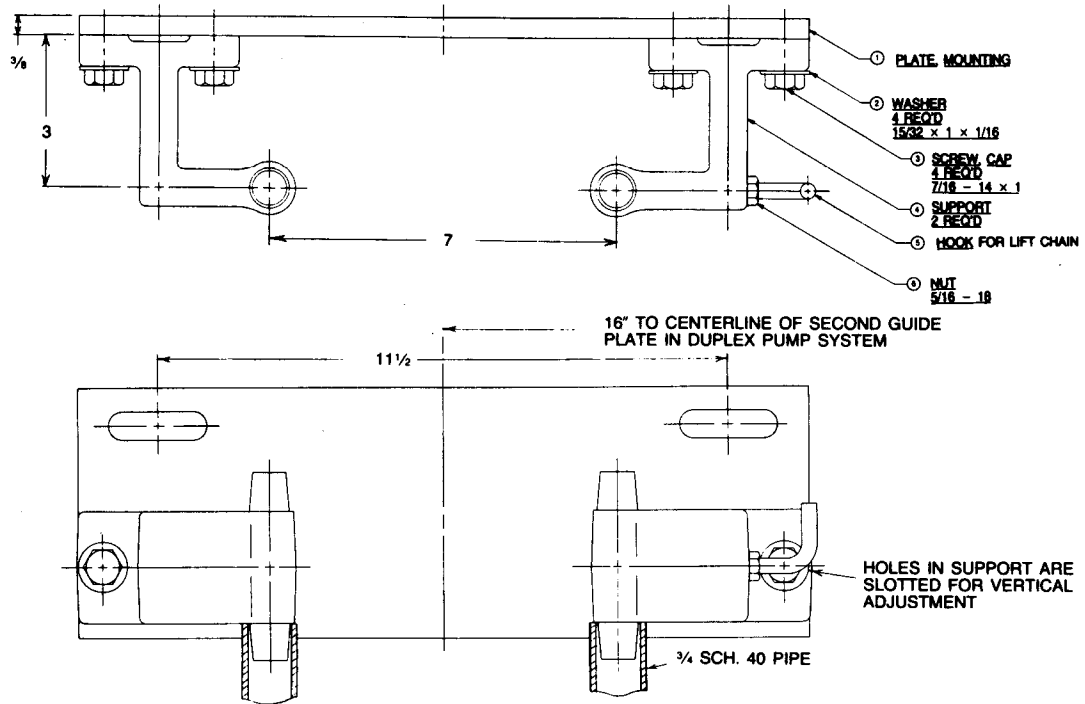


Fig. 4

### PIPE MOUNTED GUIDE RAIL BRACKET

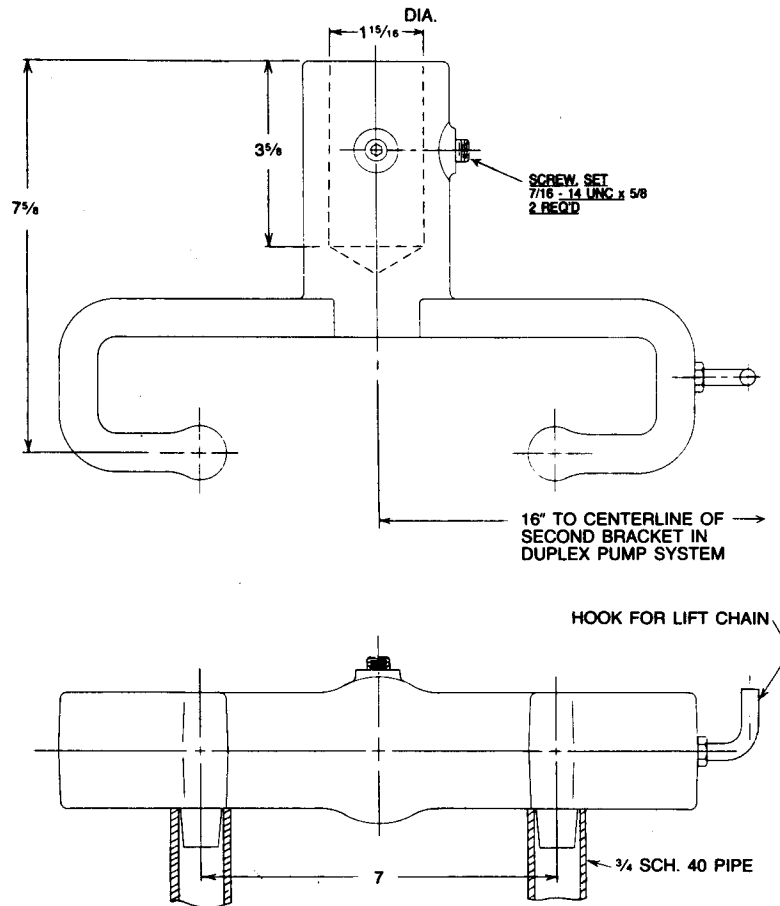


Fig. 5

# TYPICAL INSTALLATION

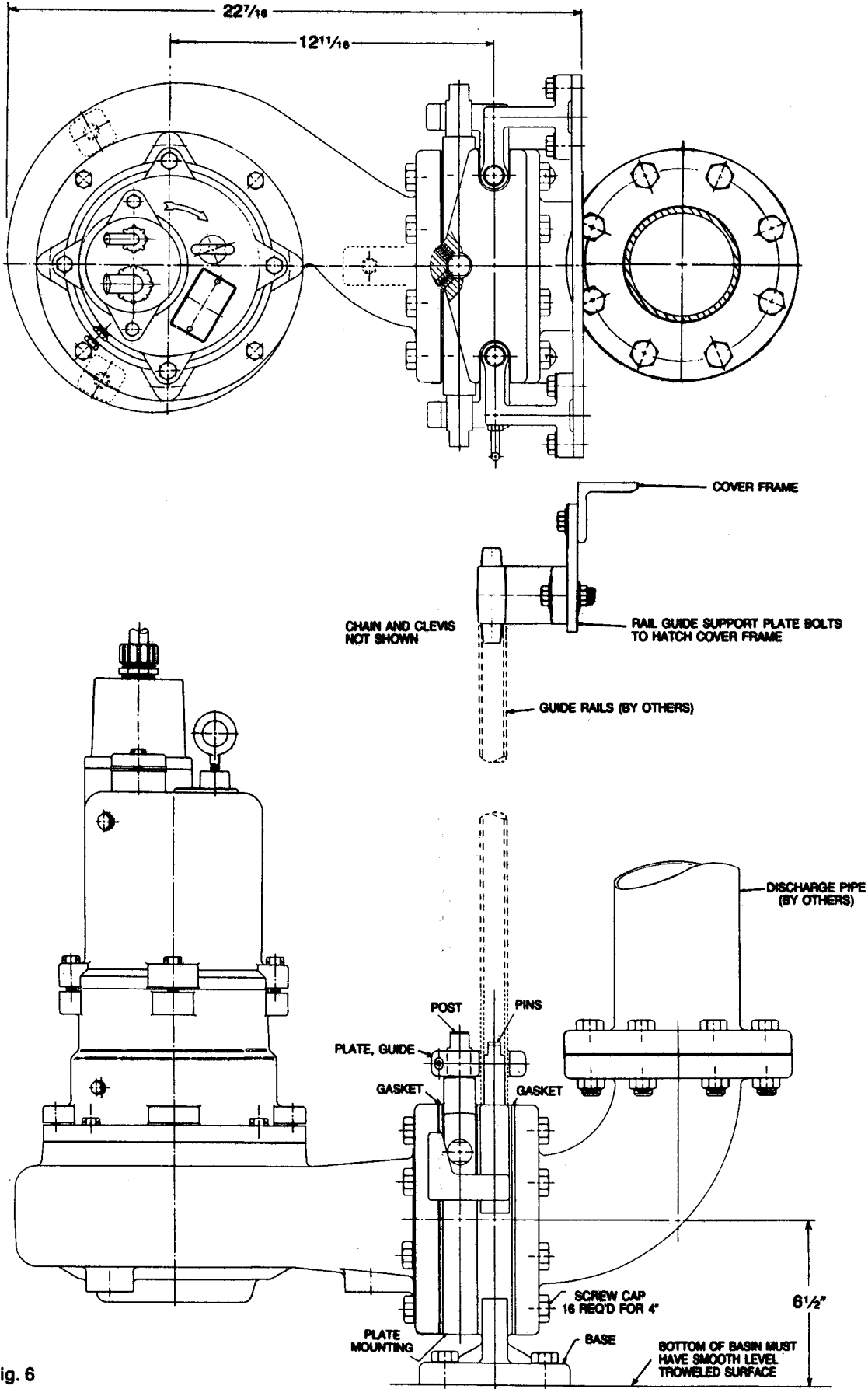
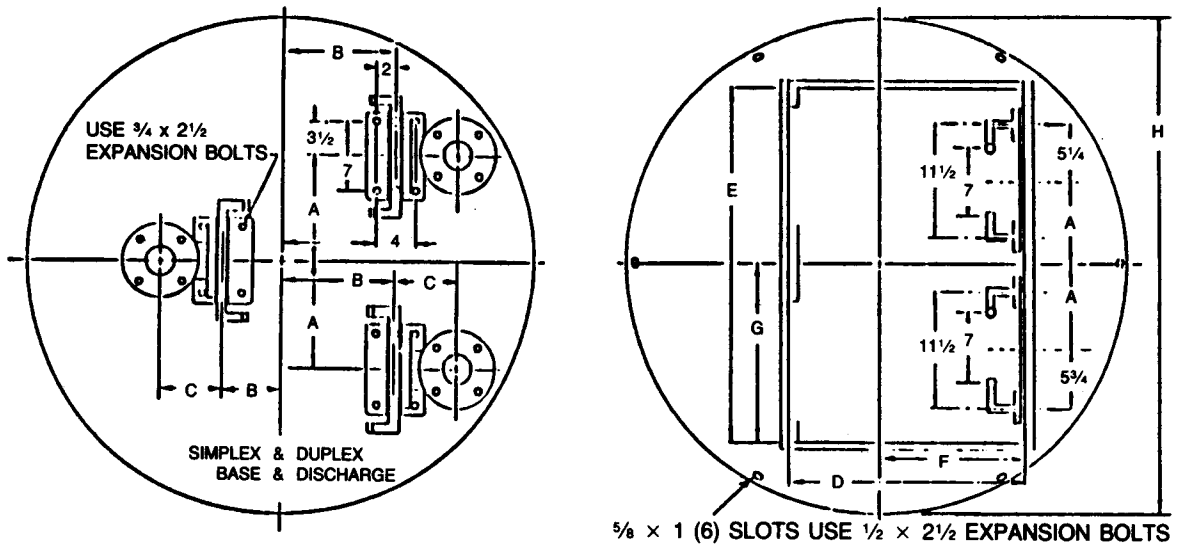


Fig. 6

**INSTALLATION DIMENSIONS FOR 4WHV PUMPS,  
LIFT-OUT SYSTEM, HATCH AND COVER**



SURFACE BELOW FRAME MUST BE SMOOTH AND NOT PROTRUDE INTO FRAME OPENING.

HATCH ASSEMBLY TO BE CEMENTED IN PLACE WHEN BASIN TOP IS POURED. ANCHORS AND PLATE MTG. BOLT HEADS ARE CEMENTED INTO TOP.

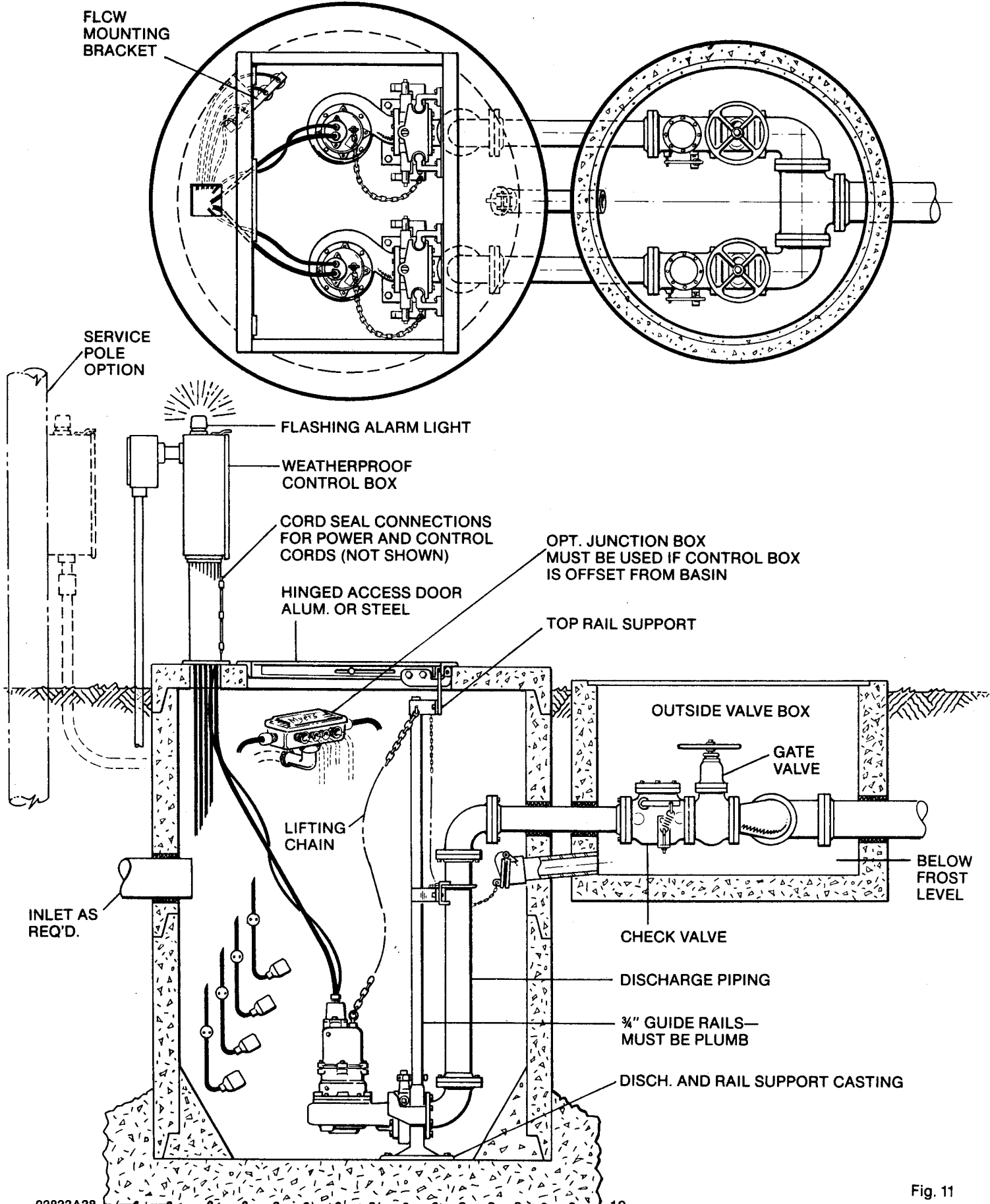
Fig. 7

**INSTALLATION DIMENSIONS**

Pump	Disch.	Basin	Cover/Hatch	A	B	C	D	E	F	G	H
4WHV Duplex	4"	60"	HCD-60-4WHV, HCR-60-4HWV, HA-60-4WHV, HS-60-4WHV	13	7 <sup>5</sup> / <sub>8</sub>	7 <sup>5</sup> / <sub>16</sub>	28	46	11	23	66

TABLE 4

TYPICAL INSTALLATION FOR DUPLEX SYSTEM  
WITH CONCRETE BASIN AND OUTSIDE VALVE BOX



FLCW  
MOUNTING  
BRACKET

SERVICE  
POLE  
OPTION

FLASHING ALARM LIGHT

WEATHERPROOF  
CONTROL BOX

CORD SEAL CONNECTIONS  
FOR POWER AND CONTROL  
CORDS (NOT SHOWN)

HINGED ACCESS DOOR  
ALUM. OR STEEL

OPT. JUNCTION BOX  
MUST BE USED IF CONTROL  
BOX IS OFFSET FROM BASIN

TOP RAIL SUPPORT

OUTSIDE VALVE BOX

GATE  
VALVE

LIFTING  
CHAIN

BELOW  
FROST  
LEVEL

INLET AS  
REQ'D.

CHECK VALVE

DISCHARGE PIPING

3/4" GUIDE RAILS—  
MUST BE PLUMB

DISCH. AND RAIL SUPPORT CASTING

## **ELECTRICAL CONTROLS**

### **(All Models)**

#### **FLOAT SWITCH INSTALLATION**

1. Level Controls are held by support bracket and cords are adjusted for proper depth.
  - a. Lower Turn-Off Control should be set so that pump stops when water level is about at the top of the volute.
  - b. First Turn-On Control is set to start pump when level is at height specified above pump.
  - c. Second Turn-On Control of a duplex pump system is set at height specified above first turn-on control.
  - d. Alarm Control is set about 6" to 12" above the highest Turn-On Control.
  - e. No Control should be set above basin inlet invert.

#### **MAKING ELECTRICAL CONNECTIONS**

1. If control panel is mounted directly on basin top, the power and control wires are taken directly to control box and are sealed in the cord palte with cord grip connectors.
2. If panel is installed remote from basin, the cords can be taken through a conduit to control panel, or junction box can be used in the basin to make

connections. The Myers junction box has a built-in sealing connector to seal the outgoing wires. If other than Myers junction box is used, a separate sealing connector must be used where wires leave the basin. See Wiring Diagrams Figs. 8 and 9.

**CAUTION:** If cords are taken directly through a conduit to control box, a seal fitting must be used at inlet of conduit to prevent gas vapors from getting to control box. This type of installation is generally not recommended because the sealing cement must be broken to remove a cord.

#### **MOTOR ELECTRICAL CONNECTIONS**

Single phase motors are for 230 volts only. A special control panel with start and run capacitors and start relay are required for these pumps.

These control panels must be obtained from Myers (or must be approved by Myers) or warranty on motor is void. Also, warranty is void if the heat sensor and seal fixture wires are not connected properly to control box terminal strip.

**CAUTION:** Pump motor is not to be taken apart in the field. Motors under warranty must be serviced by Myers authorized repair station or be sent to factory.

# IN SUMP CONNECTION BOX, SIMPLEX SYSTEM, FLCW 3 BALL CONTROL

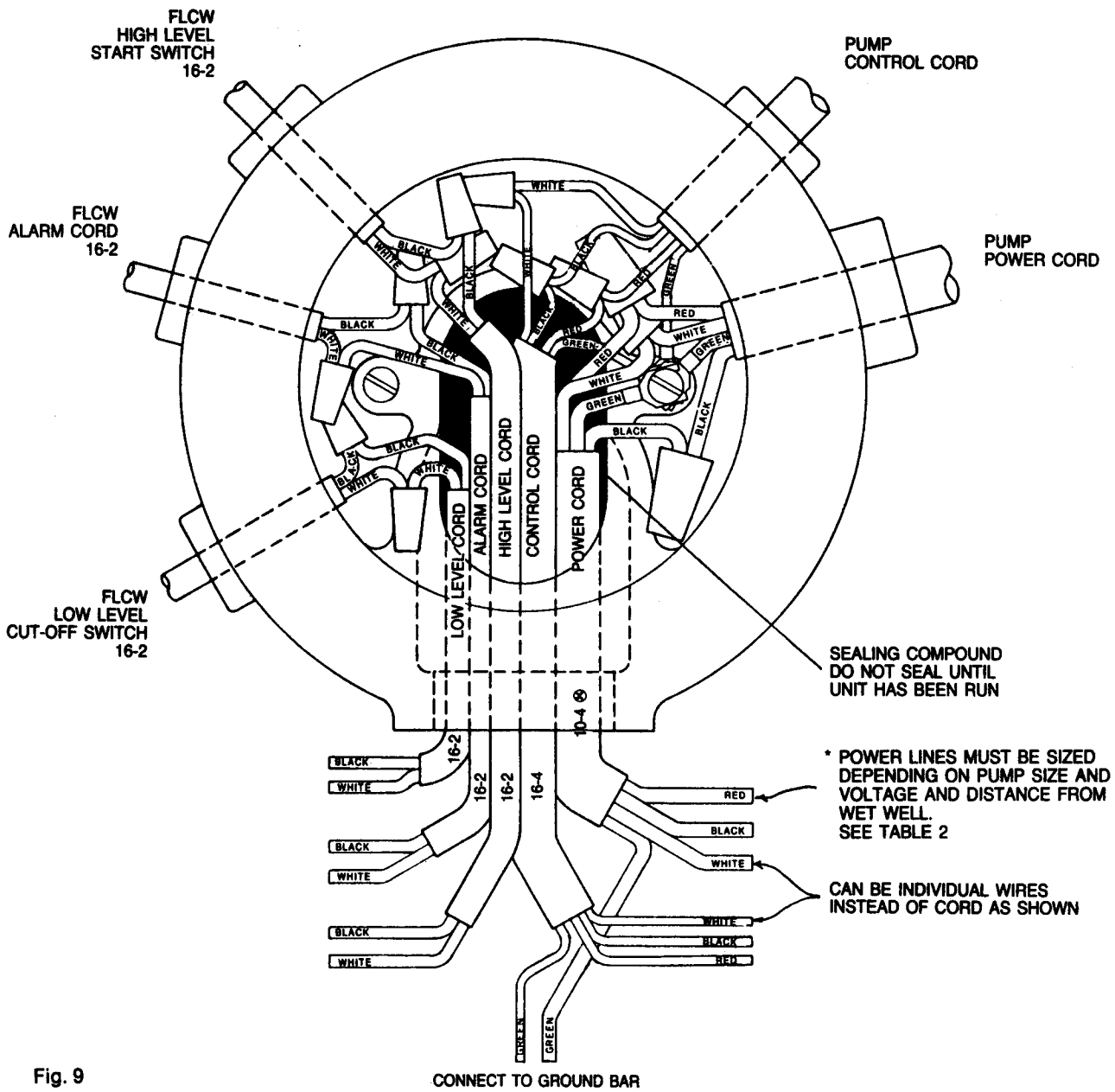


Fig. 9

# IN SUMP CONNECTION BOX, DUPLEX SYSTEM, FLCW 4 BALL CONTROL

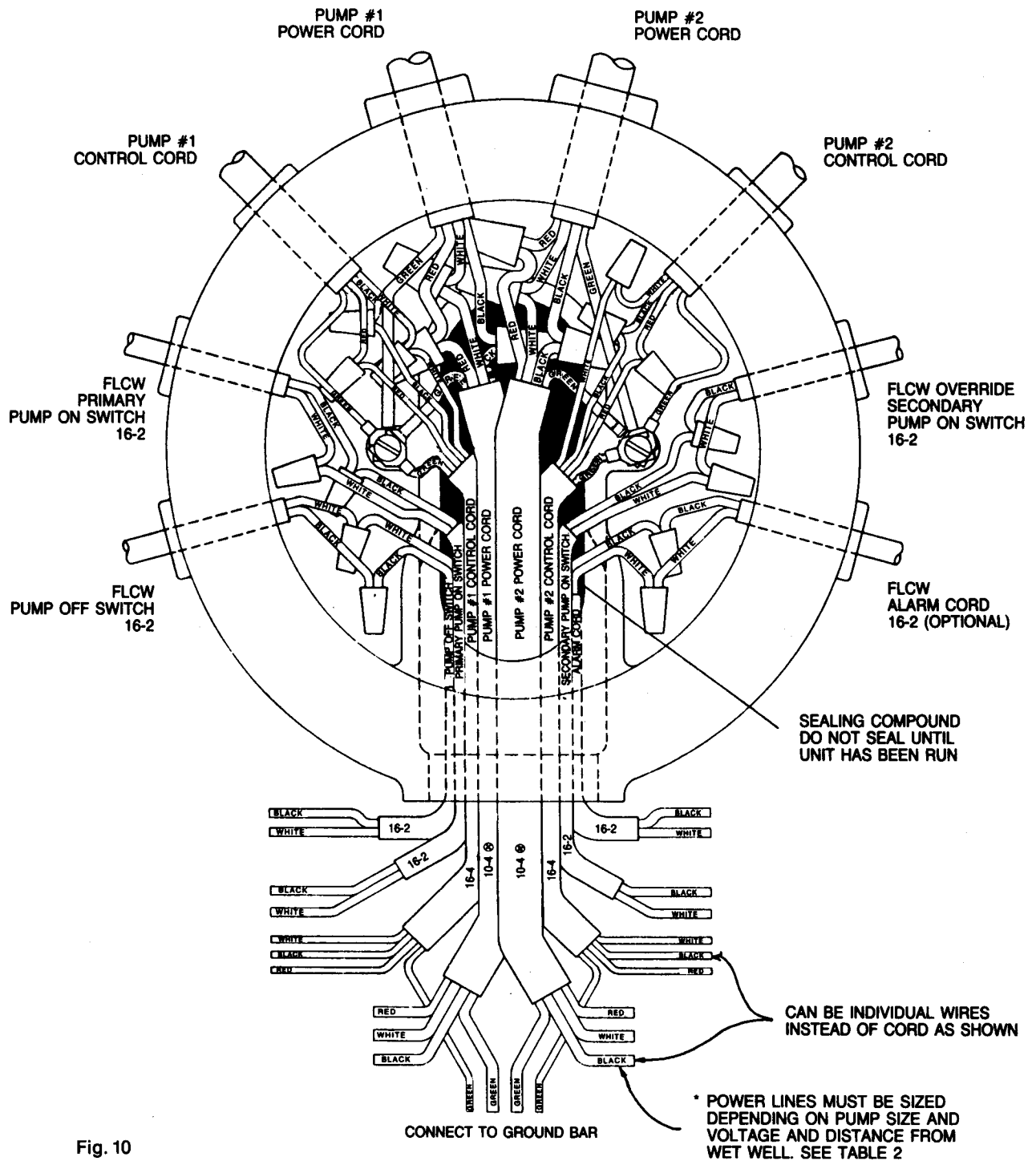


Fig. 10

## REMOVING PUMP CASE AND IMPELLER

In case of wear, damage due to dropping, plugged pump, or replacing a defective motor, the pump volute case and impeller can be removed in the field.

1. Remove bolts between seal housing flange and volute case. The motor and impeller can now be lifted off as a unit.
2. If necessary to remove impeller, lay pump on its side. With a screwdriver bend the tabs of the lockwasher away from the head of the hex head bolt.
3. Loosen and remove the bolt by turning counter-clockwise. Since Loctite™ is used to secure the bolt and is applied to the shaft/impeller interface, heating of the shaft end to 450° to 500°F will usually be required.
4. Impeller is mounted by a straight fit with driving key. Pry evenly on opposite impeller sides with two large screwdrivers or small bars behind the impeller.
5. Set motor on end with shaft up after removing impeller so that oil will not drain past the seal.

## REPLACING IMPELLER AND PUMP CASE

1. Apply Loctite™ #680: before assembly, in keyway, in the impeller bore (lower shaft O.D.), and on the threads of the hex head cap screw.
2. Before placing the impeller on the shaft, be sure the mechanical seal and its spring are in place.
3. Position retaining washer with long pin extension in keyway.
4. Obtain a new lockwasher and flatten two tabs located 180° from the locking projection on the inner edge of the washer. There should be one flattened tab on each side of the pin extending from the retaining washer.
5. Assemble hex head cap screw and tighten securely.
6. Bend lockwasher tabs up against hex head on the bolt, do not bend up the two tabs flattened of each side of the pin in the retaining washer.

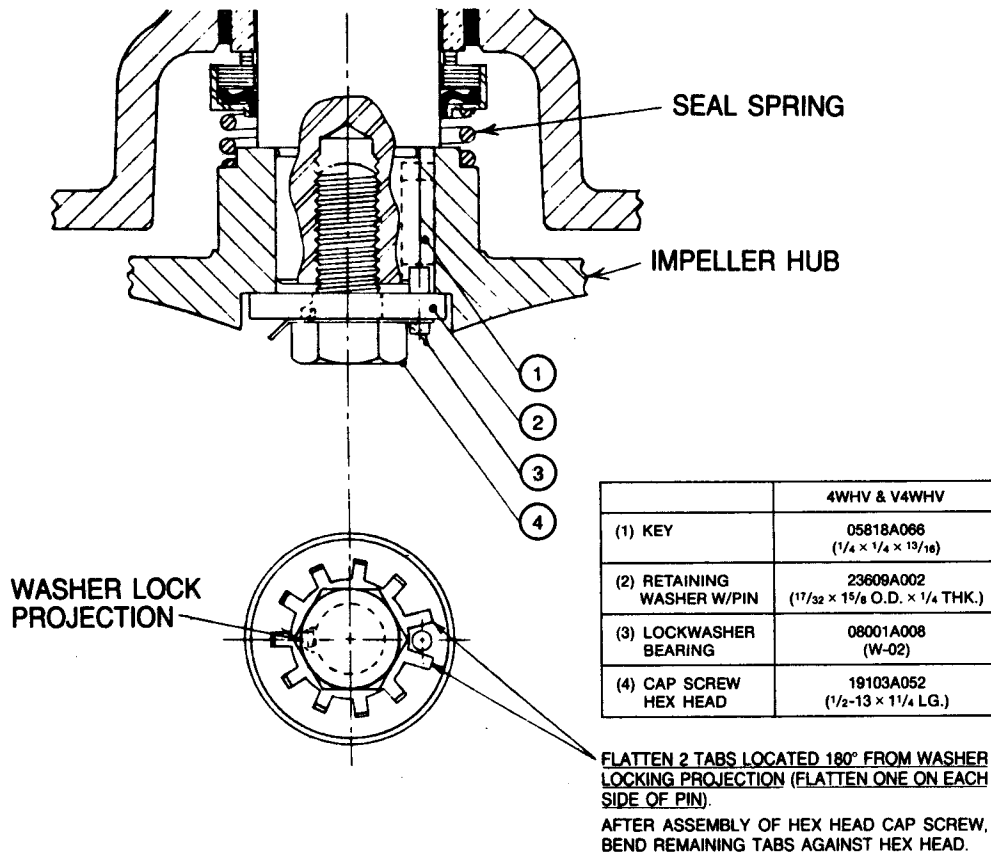


Fig. 8



## TROUBLE CHECK LIST

Troubles listed generally pertain to the pump and auxiliary components. Other troubles can occur from a faulty control box, these will be listed with the control box instructions.

### CONDITION

### PROBABLE CAUSE

Pump runs but does not pump liquid from basin.

1. Pump impeller may be air locked, this occasionally occurs on a new installation. Start and stop pump several times to purge air. Be sure air vent hole in volute case is clean. See Fig. 1.
2. Run additional water into basin so that pump will be submerged deeper to clear water.
3. If pump is three phase, rotation may be wrong. See instructions for checking proper rotation.
4. If pump has been installed for some time and does not pump, it may be clogged at inlet.
5. Discharge gate valve may be closed.
6. Discharge check valve may be clogged or have a broken clapper or spring.
7. Discharge head may be too high. Check elevation. Maximum pump head at zero flow is shown on pump curve sheet.
8. If above checks do not locate trouble, motor rotor may be loose on shaft which allows motor to run but will not turn impeller or only at low RPM.

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Red light comes on at control box.

This indicates some water has leaked past the lower seal and has entered the seal chamber and made contact with the electrode probe. Pump must be removed from basin within approximately two (2) weeks for replacement of lower seal. This preventive repair will save motor.

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Overload trips at control box and alarm buzzer or flashing red light comes on due to high water level in basin.

1. Push in on red reset button to reset overload. If overload trips again after short run, pump has some damage and must be removed from basin for checking.
2. Trouble may be from clogged impeller causing motor to overload or could be from failed motor.
3. Trouble may be from faulty component in control box. Always check control box before removing pump.

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Yellow run light stays on continuously.

1. Indicates H-O-A switch may be in the hand position.
  2. Level control switch may have failed causing pump to continue to operate when water is below lower control.
  3. Impeller may be partially clogged, causing pump to operate at very reduced capacity.
  4. Gate valve or check valve may be clogged causing low pump flow.
  5. Pump may be air logged. Lift arm on check valve to vent off air. Also, check that the  $\frac{5}{32}$ " vent hole in the volute is open.
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**CONDITION**

Circuit breaker trips.

**PROBABLE CAUSE**

1. Reset breaker by pushing clear down on handle then back to on position. If breaker trips again in a few seconds, it indicates excessive load which is probably caused by a short in the motor or control box. Check out instructions given with control box before pulling pump.
2. If this condition happens after an electrical storm motor or control box may be damaged by lightning.
3. Resistance reading of the motor with lead wires disconnected from the control box can determine if trouble is in motor or control box.

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Pump is noisy and pump rate is low.

1. Impeller may be partially clogged with some foreign objects causing noise and overload on the motor.
2. Impeller may be rubbing on wear ring due to bent shaft or misalignment.
3. Pump may be operating too close to shut-off. Check head.

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Grease and solids have accumulated around pump and will not pump out of basin.

1. Lower control which may be set too high.
  2. Run pump on manual operation for several minutes with a small amount of water running into basin to clean out solids and grease. This allows pump to break suction and surge, breaking up the solids. If level switch is set properly, this condition generally will not occur.
  3. Trash and grease may have accumulated around floats causing pump to operate erratically.
-