RED JACKET

Petroleum Products Service Manual

RJ 5190 3/93

It is imperative that time is taken in reading and understanding this manual thoroughly before installing and using Red Jacket Petroleum Equipment.

The following defined terms are used throughout this manual to bring attention to the presence of hazards of various risk levels, or to important information concerning the life of the product.

DANGER indicates presence of a hazard which *will* cause *severe* personal injury, death or substantial property damage if ignored.

WARNING indicates presence of a hazard which *can* cause *severe* personal injury, death or substantial property damage if ignored.

CAUTION indicates presence of a hazard which *will* or *can* cause *minor* personal injury or property damage if ignored.

NOTICE indicates special instructions on installations, operation, or maintenance which are important but not related to personal injury hazards.

For Technical Assistance Call:
1-800-2-MARLEY (262-7539)

NOTICE **Specifications and/or installation instructions are subject to change per manufacturer's recommendations.**

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REDJACKET®

The information and recommendations contained in the "Troubleshooting" sections of this manual are presented as a suggested guide to expedient solutions of problems specified. No attempt has been made to identify all possible problems. Even as to problems discussed, the information available to you may dictate different procedures and solutions.

Our liability with respect to the product and information herein is limited solely to the product warranty set forth in the Red Jacket Warranty Manual #5194 and on page 54 of this manual.

SOLVENT PUMPS
(4" Extracta and 6" Big-Flo)

The design of these units is basically the same as the petroleum pump. However, modifications are made including utilization of appropriate seals.

The product, which the unit was designed to pump, is specified on the pump identification nameplate.

See applicable petroleum pump sections for technical data.

For specific information on solvent pumps, see the following literature:

#5174	4" Solvent Pump
#051-116	4" Solvent Pump Parts & Installation
#5174	6" Solvent Pump
#051-121	6" Solvent Pump Parts & Installation
#5179	Solvent Specification Sheet

Section 1

4" "Extracta"/4""AG" Petroleum Pump

"Extracta" Model Numbers:	*Usage:*
P33R1 — 1/3 HP **P75S1 — 3/4 HP** **P150S1 — 1-1/2 HP**	• **Standard fuels - Gasoline & Diesel** **- up to 10% MTBE** **- up to 10% Ethanol** **- up to 10% Methanol**

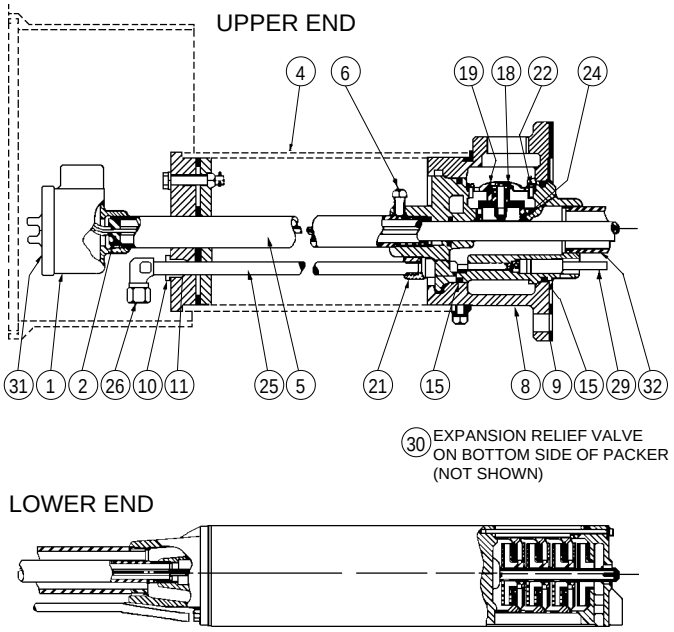
NOTICE **"Extracta" model pumps can be identified by their red paint.**

"AG" Model Numbers:	*Usage:*
AG/P33R1 - 1/3 HP **AG/P75S1 - 3/4 HP** **AG/P150S1 - 1-1/2 HP**	• **100% Gasoline** • **100% Ethanol** • **100% Methanol** • **Any combination of the above** • **100% Diesel** • **Up to 15% MTBE**

NOTICE **"AG" model pumps can be identified by their orange paint.**

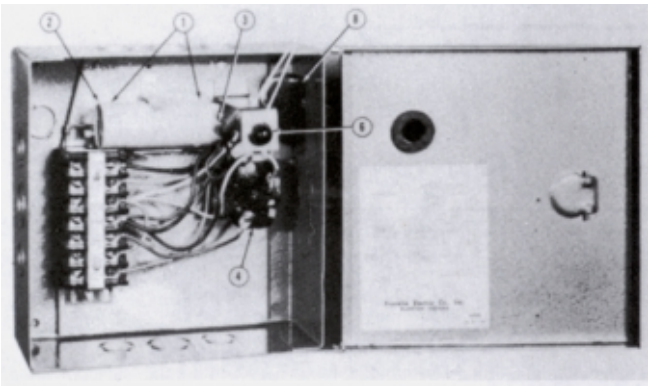
4" Petroleum Pump
(Manufactured prior to June 1963)

PARTS LIST - REMOTE PETROLEUM PUMP UNITS
(Models P33E1-6/6S, P33E1-8/8S, P50F1-6/6S, P50F1-8/8S & other length pump units with E or F in the model number)



Key No.	Description	No. Req'd.
1	Junction Box Complete	1
2	Conduit Seal Assembly	1
5	1" Approved Conduit — Obtain Locally	1
6	3/8"-16 x 3/4" Sq. Hd. Cup Point Set Screw	2
10	Packing Nut	1
11	Gasket	1
15	"O" Rings	2
17	"O" Rings (Replaces 72-76)	2
18	Check Valve Spring	1
19	Check Valve Disc & Holder	1
21	Syphon Check Valve Assembly	1
24	"O" Ring for Check Valve Seat	1
25	1/4" Galvanized Pipe — Obtain Locally	1
26	#10-32 x 1/4" Brass Binding Hd. Mach. Screw (for check valve seat not shown)	2
28	Tube Fitting 1/4" Pipe x 3/8" Tube	1
29	Syphon Injector Body & Tube Assembly	1
30	Expansion Relief Valve (not shown)	1
31	Cover only for Junction Box	1

PARTS LIST - MOTOR CONTROL FOR ABOVE PUMPS

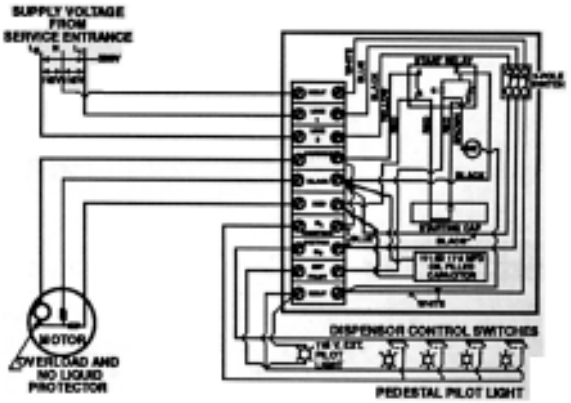


Key No.	Description	No. Req'd.
1	Overload & Capacitor Assembly	1
2	Starting Capacitor Only (50Mfd.-250V AC)	1
3	Overload Protector Only ("Klixon" MTA 1104)	1
4	Motor Starting Relay* (RBM91255-452-230V-5 HP)*	1
6	Pilot Light Only (General Electric NE51)	1
8	ON-OFF Switch (2 pole)	1
2	Starting Capacitor (50Mfd.-250V AC)	1
4	Motor Starting Relay* (RMB91255-452-230V-5 HP)*	1
4	Motor Starting Relay—2 Pole**(GE3ARR3BH3V2)**	1
6	Pilot Light Only (General Electric NE51)	1
8	ON-OFF Switch (2 pole)	1
8	ON-OFF Switch (3 pole)	1

In June of 1963, pump models P33E1, 1/3 HP, and P50F1, 1/2 HP, were discontinued. Both of these old models have been replaced with the new P33R1 and P75S1 pumps, and the pump/motor assemblies are interchangeable with the old models.

A 111-092 run capacitor is needed when replacing the old P33E1 and P50F1 pump/motors with either of the new models. The new P33R1 has nearly the same flow rate as the old P50F1. Where capacity is vital, the old P50F1 should be replaced with a new P75S1, 3/4 HP. The 1/3 HP replacement pump/motor model number is UMP33R1 and the 3/4 HP replacement unit model number is UMP75S1.

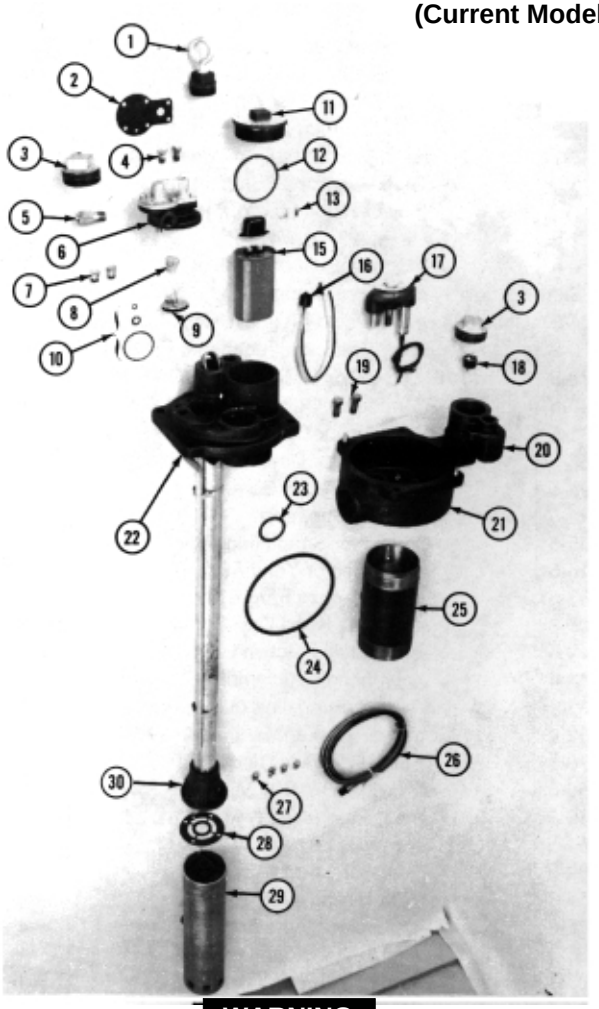
After disconnecting power supply, connect the 111-092 capacitor across RED and BLACK terminals in the control box as shown. Insulate the two connections on the capacitor with electrical tape and lay in the bottom of the control box.



NOTICE **Only various "O" Rings remain available for the above model. No other parts are available. However, current UMP complete pump-motor assemblies are interchangeable with above models. For instructions and modifications, please turn to p. 15.**

PARTS LIST — "EXTRACTA" MODELS (RED) P33R1, P75S1 & P150S1

(Current Models — Manfactured after 1963)



Key No.	Part No.	Part Description	Qty. Req'd.
1	139-040-4	Eye Bolt Assembly	1
2	017-165-5	Diaphragm (see p. 7)	1
3	027-086-3	Galv. Steel Pipe Plug	2
4	026-176-1	Steel Hex Hd. Cap Screw	2
5	188-079-5	Syphon Check Valve Assy.	1
6	141-062-5	Functional Element Assy. w/"O" Rings	1
7	027-031-1	Galv. Steel Pipe Plug	2
8 & 9	144-183-5	Stainless Steel Check Valve Kit (incl. check VIV. & spring)	1
	080-125-1	Spring	1
	188-238-4	Stainless Check Valve	1
10	172-003-5	Functional Element "O" Ring Pkg.	1
11	113-084-5	1/3 HP Capacitor Cover Assy w/"O" Ring	1
	113-085-5	3/4 HP Capacitor Cover Assy w/"O" Ring	1
	113-319-5	1-1/2 HP Capacitor Cover Assy w/"O" Ring	1
12	072-190-1	"O" Ring Capacitor Cover Assy.	1
13	113-098-5	Capacitor Clip & Screw Pkg.	1
15	111-092-5	Capacitor	1
16	113-105-5	Connector Snap Ring Type	1
17	313-002-5	Connector Yoke Assy.	1
18	176-033-5	Contractors Plug Assy.	1
19	026-205-3	Steel Hex Hd. Cap Screws	2
20	108-496-5	Conduit Junction Box	1
21	151-002-4	Manifold Assy.	1
22	call Red Jacket	Complete Packer/Manifold Assy.	1
23	076-382-1	Packer Discharge Seal	1
24	072-189-1	"O" Ring - Packer Manifold	1
25	065-149-3	Riser Pipe (Specify Length)	1
26	144-090-5	Plug & Lead Assy.	1
26A	144-091-5	Plug & Lead Assy. 17 ft.	1
27	026-355-3	Stainless Steel Hex Hd. Cap Screws	4
28	031-136-1	Discharge Head Gasket	1
29	852-004-5	1/3 HP Pump & Motor	1
	852-005-5	3/4 HP Pump & Motor	1
	852-044-5	1-1/2 HP Pump & Motor	1
N/S	144-087-5	Conduit Seal Assy.	1
N/S	072-195-1	Connector Yoke Snap Ring	1
30	136-056-5	1-1/2" Discharge Head Assy.	1
N/S	136-057-5	2" Discharge Head Assy.	1
N/S	166-169-5	Manifold Cover	1
N/S	144-106-5	Syphon RetroFit Kit (when not ordered w/pump)	1
N/S	072-106-1	"O" Ring	1
N/S	078-522-3	Conduit Sleeve	1
N/S	072-196-1	Conduit Sleeve "O" Ring	
N/S	076-146-1	Vent Closing Screw	1
N/S	066-794-1	Orange Cap	1
N/S	072-106-1	"O" Ring for Vent Closing Screw	1

WARNING

Failure to follow all instructions in proper order can cause personal injury or death. Read all instructions before installing. All installation work must comply with local code requirements. If no other codes apply, the latest issue of the National Electrical Code should be followed.

1. Red Jacket gasoline pumps are designed and U. L. listed to pump gasoline or diesel fuels only, having a maximum specific gravity of .95 and maximum viscosity of 70 S.S.U. at 15°C (the approximate weight and viscosity of diesel fuel). Red Jacket bears no responsibility if the installation is outside these parameters. Accessories and parts of models P33R1, P75S1, and P150S1 are not intended to be used in AG model pump applications.
2. Units should be installed with manholes or with the packer head above grade to allow for ease in servicing. Refer to p. 18.
3. Unit is cooled and lubricated by product pumped. Minimum flow required is 10% of maximum capability (1/3 HP-4 GPM, 3/4 HP-6 GPM, 1-1/2 HP-8 GPM).

WARNING **Red Jacket line leak detection systems do *not* function if the submersible pump runs continuously.**

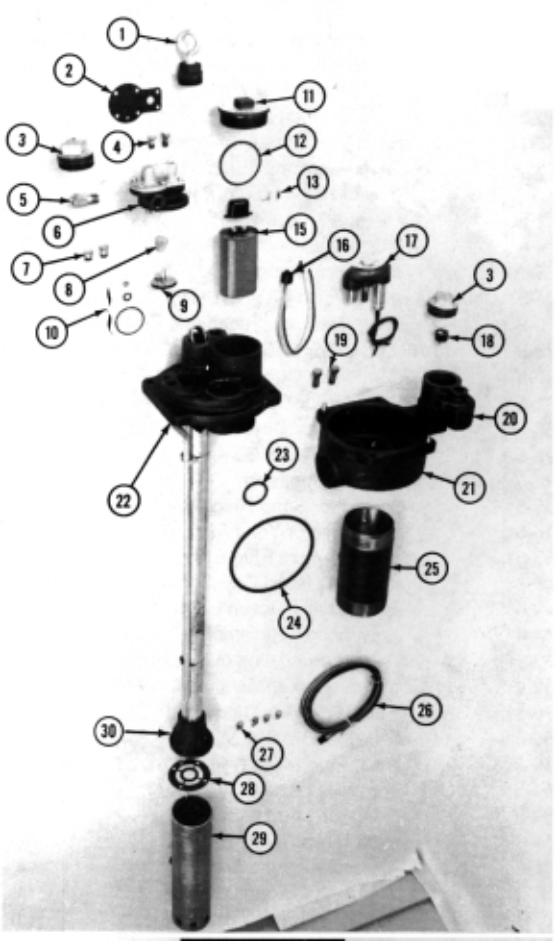
Never wire a submersible pump to run continuously at less than minimum flow rate. The units are designed to operate continuously at or above minimum flow rate, or with an intermittent duty cycle, not to exceed 20 on/off cycles per hour. Should it be necessary to operate a unit continuously or when the demand is at a rate less than required per the paragraph above, a bypass pipe should be installed in the piping to allow for continual product recirculation back into the storage tank. Regulation of the bypass flow back to the tank can be accomplished by correct sizing of the bypass line or use of a gate valve.

4. Red Jacket gasoline pumps are not designed to handle abrasives or foreign particles in the product being pumped.
5. Product temperature must never exceed 85°F as the submersible motors are equipped with thermal overload protection. Product temperature higher than 85°F may result in tripping of the thermal overload protector.
6. Pumping water will overload the motor and damage the bearings.
7. Standard-type line check valves should not be used, as the pump is equipped with a built-in check valve. Use of this type check valve will negate the pressure relief function of the pump and the effectiveness of the leak detector. However, whenever two pumps are manifolded together to the same discharge piping, check valves with expansion relief are required. (See p. 50 for details).
8. Red Jacket gasoline pumps are designed for Class 1 Group D atmosphere.
9. Red Jacket gasoline pumps are designed to run at 3450 RPM.
10. Maximum pressure applied to line when testing should not exceed 50 psi.

4" "AG" Petroleum Pump

Parts List

PARTS LIST — "AG" MODELS (ORANGE) AG/P33R1, AG/P75S1 & AG/P150S1



Key No.	Part No.	Part Description	Qty. Req'd.
1	139-041-4	Eyebolt Assembly	1
2 (N/S)	017-526-1	Diaphragm (see p. 7)	1
3	027-225-3	Pipe Plug 2" NPT	2
4	026-176-1	Plated Hex Head Cap Screw	2
6	233-025-5	Precision Functional Element Assy w/O-Rings (see p. 6)	1
7	027-031-5	Pipe Plug 1/4" NPT	2
8	188-240-4	Stainless Check Valve	1
9	080-125-1	Spring	1
	144-184-5	Stainless Check Valve Kit (incl. check vlv & spring)	1
10	144-150-5	O-Ring Kit for Precision Functional Element	1
11	113-479-5	1/3 HP Capacitor Cover Assy w/O-Ring	1
	113-480-5	3/4 HP Capacitor Cover Assy w/O-Ring	1
	113-481-5	1-1/2 HP Capacitor Cover Assy w/O-Ring	1
12	072-555-5	O-Ring Capacitor Cover Assy (B401)	1
13	113-098-5	Capacitor Clip & Screw Pkg.	1
15	111-092-5	Capacitor	1
16	113-105-5	Connector Snap Ring Type	1
17	313-015-5	Connector Yoke Assy	1
18	176-067-5	Contractors Plug Assy	1
19	026-205-3	Plated Hex Head Cap Screws	2
20	108-549-5	Conduit Junction Box	1
21	151-044-4	Manifold Assembly	1
22	164-138-4	Packer (casting only)	1
22A	264-132-4	Complete Packer/Manifold Assy	
23	076-370-1	Seal — Packer Discharge	1
24	072-556-5	O-Ring — Packer Manifold	1
25	065-149-3	Riser Pipe (specify length)	1
26	144-161-5	Plug & Lead Assy 13'	1
26A	144-162-5	Plug & Lead Assy 17'	1
27	026-355-3	Hex Head Cap 5/16"-18"	4
27A	026-435-3	Lockwashers 5/16"	4
28	031-136-1	Discharge Head Gasket	1
29	852-083-5	1/3 HP AG Pump & Motor	1
	852-084-5	3/4 HP AG Pump & Motor	1
	852-085-5	1-1/2 HP AG Pump & Motor	1
30	136-339-5	Discharge Head Assy	1
N/S	144-163-5	Conduit Seal Assy	1
N/S	072-492-1	Connector Yoke Snap Ring	1
N/S	079-980-3	Conduit Sleeve	1
N/S	072-536-1	Conduit Sleeve O-Ring	1

WARNING

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1. Red Jacket AG model pumps are designed and U.L. listed to pump 100% gasoline, methanol, ethanol and any combination of these, 100% diesel and up to 15% MTBE. These fuels must have a maximum specific gravity of .95 and maximum viscosity of 70 S.S.U. at 15°C (the approximate weight and viscosity of diesel fuel). Red Jacket bears no responsibility if the installation is outside these parameters.
2. Units should be installed with manholes of sufficient size to allow access for servicing. Refer to p. 18.
3. Unit is cooled and lubricated by product pumped. Minimum flow required is 10% of maximum capability (1/3 HP-4 GPM, 3/4 HP-6 GPM, 1-1/2 HP-8 GPM).

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4. Red Jacket AG model pumps are not designed to handle abrasives or foreign particles in the product being pumped.
5. Product temperature must never exceed 85°F as the submersible motors are equipped with thermal overload protection. Product temperature higher than 85°F may result in tripping of the thermal overload protector.
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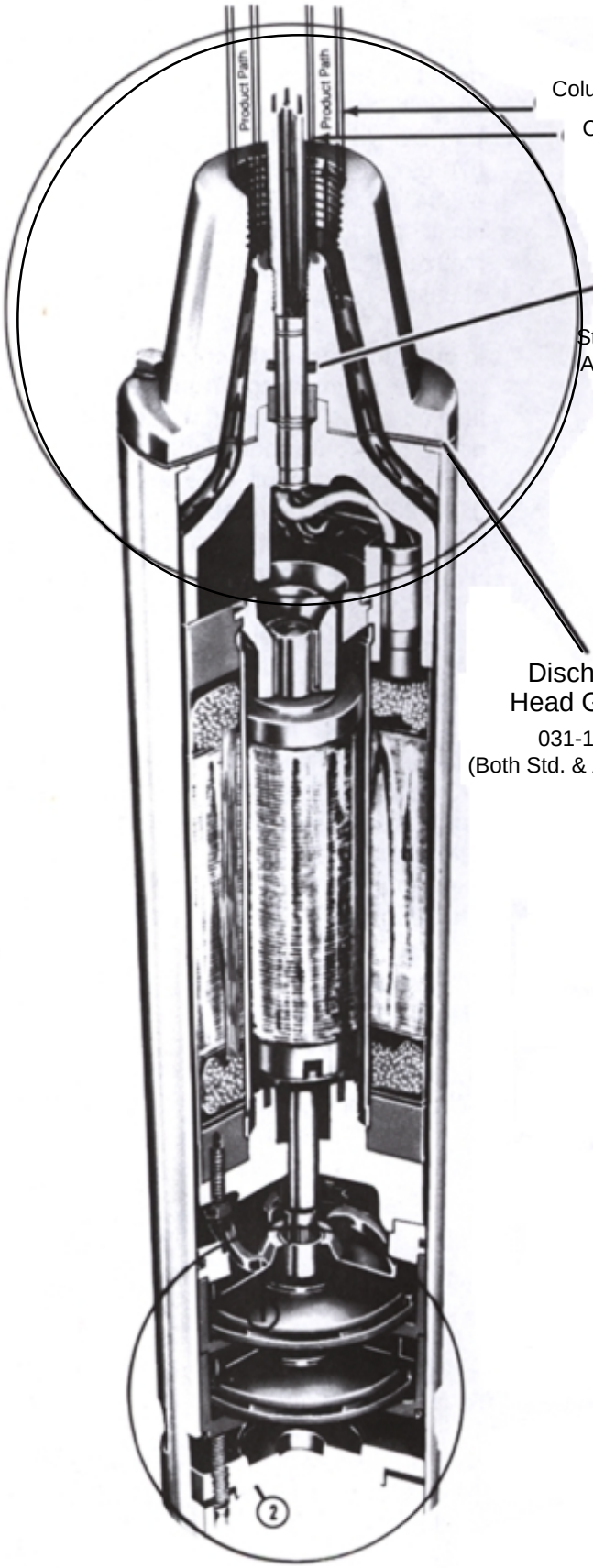
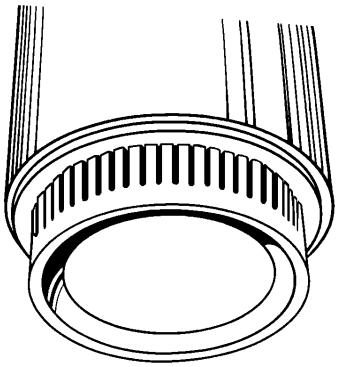
7. Standard-type line check valves should not be used, as the pump is equipped with a built-in check valve. Use of this type check valve will negate the pressure relief function of the pump and the effectiveness of the leak detector. However, whenever two pumps are manifolded together to the same discharge piping, check valves with expansion relief are required. (See p. 50 for details).
8. Red Jacket AG model pumps are designed for Class 1 Group D atmosphere.
9. Red Jacket AG model pumps are designed to run at 3450 RPM.
10. Red Jacket AG model pumps are orange in color (castings and intake) for easy identification.
11. Red Jacket AG model pumps are in accord with Rule 1170 (c) (1) of the South Coast Air Quality Management District.

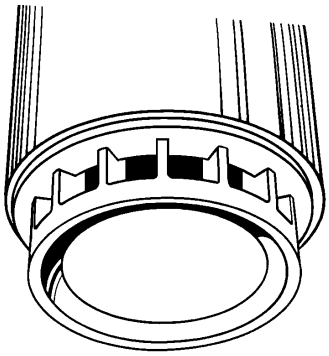
4" Petroleum Pump

Pump/Motor Assembly

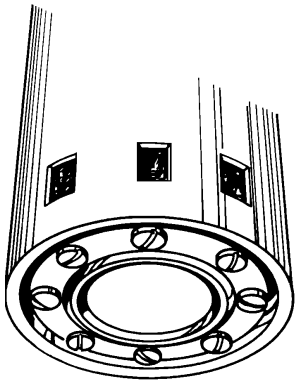




Current pump motor intake since second week of October, 1990.



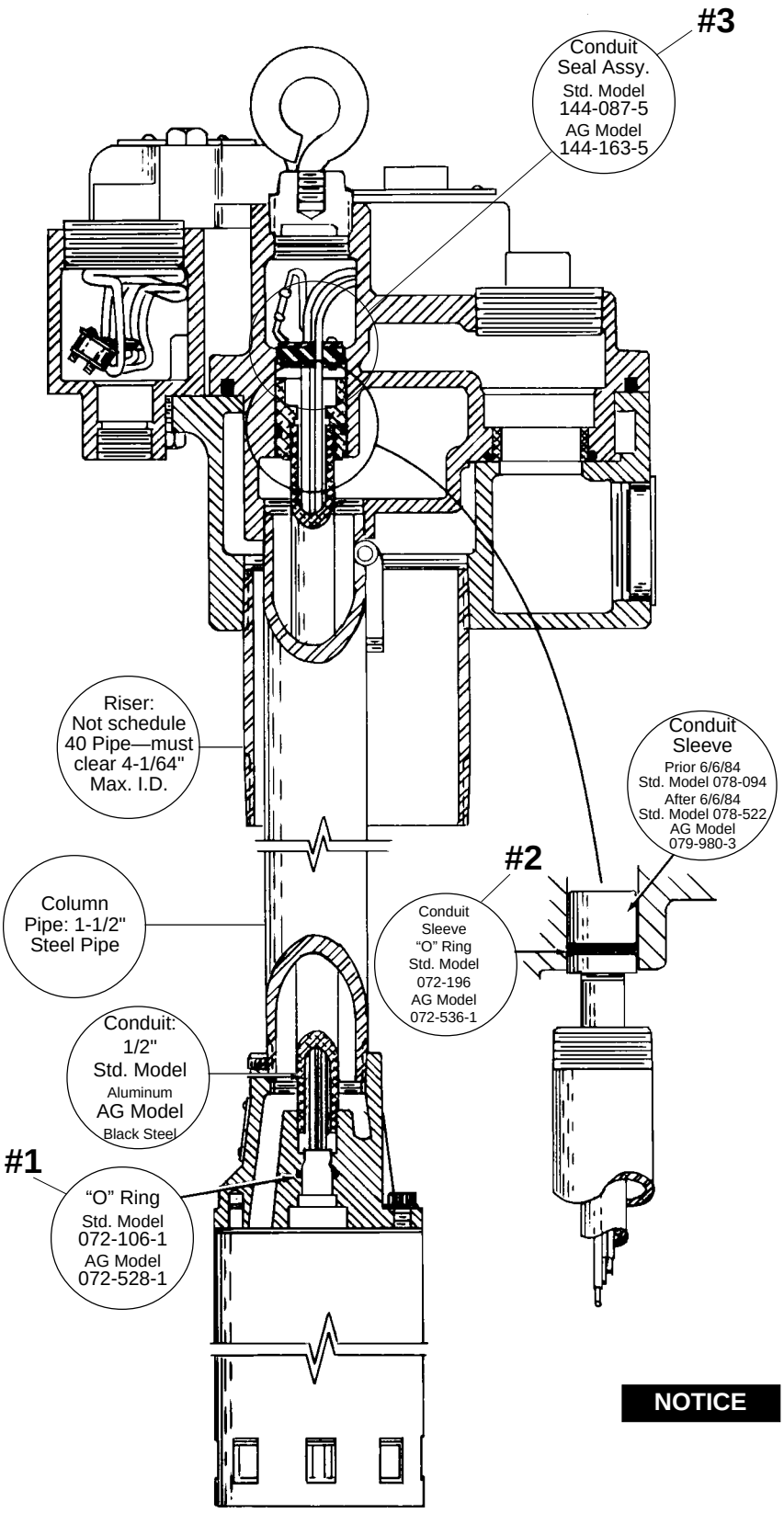
Pump End
From 9/1/82 through 10/5/90



Pump End
Prior to 9/1/82

4" "Extracta" Petroleum Pump

Piping/Seals



Top seal is accomplished as follows: column pipe threads into discharge manifold while conduit (2-5/8" longer) seals into manifold via "O" ring No. 072-196 on conduit sleeve No. 078-094, prior to 6/6/84 or No. 078-522 after 6/6/84. If failure of this seal ("O" ring) should occur, product could flow into conduit. This may result in the appearance of product in the capacitor cavity.

In order to present the most favorable conditions for maintaining an efficient seal when field adjusting the length of the pump, beginning 6/6/84 (date code 10684), we are using a new, longer conduit sleeve seal. Part No. 078-522-3 on petroleum pumps (prior to 6/6/84, No. 078-094-3) and No. 079-980-3 on AG and solvent pumps (prior to 6/6/84, No. 079-772-3). The "O" ring used on the conduit sleeve seal for petroleum pumps is No. 072-196-1 for AG and for solvent pumps is VITON 072-536-1 or EPR 072-424-1.

While the sleeve seal used prior to 6/6/84 (No. 078-094-3 petroleum or No. 079-772-3 solvent) can be used on all units regardless of date of manufacture, we recommend the use of appropriate new sleeve seal (No. 078-522-3 petroleum, No. 079-980-3 solvent).

However, it may be necessary, when using the new sleeve seal on units built prior to 6/6/84 (date code 10684) to shorten the conduit 1/4" in order to prevent the conduit seal (bottom plate or compression screws) from bottoming out on the conduit sleeve seal. This could result in an inadequate seal.

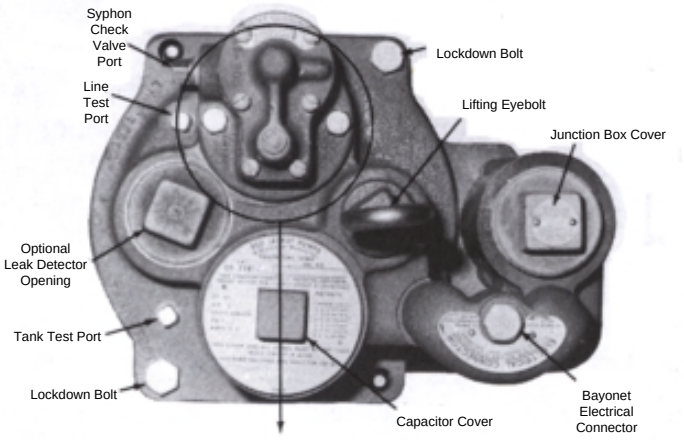
NOTICE

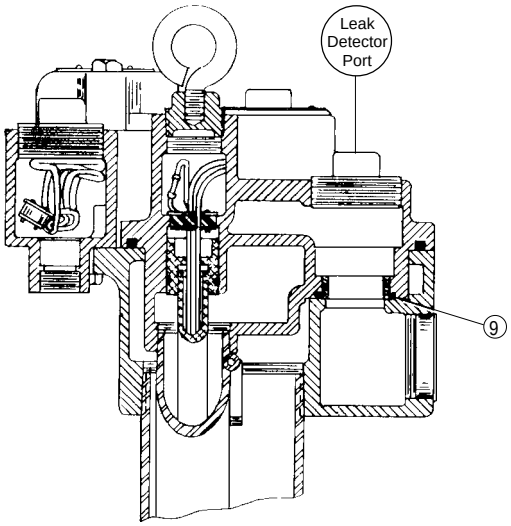
For troubleshooting information regarding the seals shown on this page, see page 8, section E.

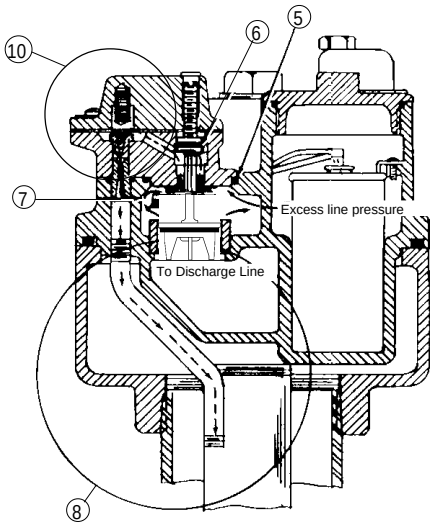
4" "Extracta" Petroleum Pump

Discharge Manifold Assembly/Functional Element

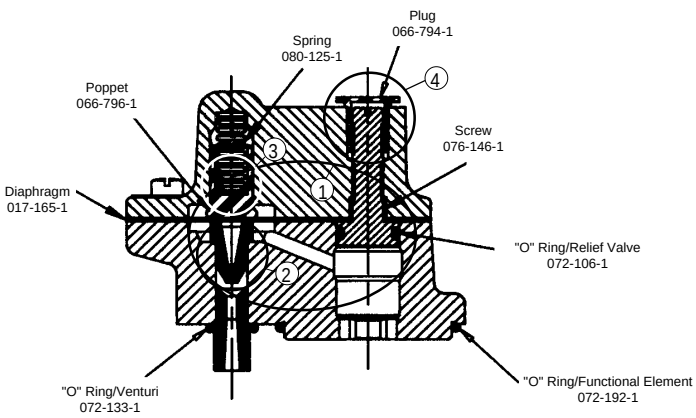
TOP VIEW OF DISCHARGE MANIFOLD





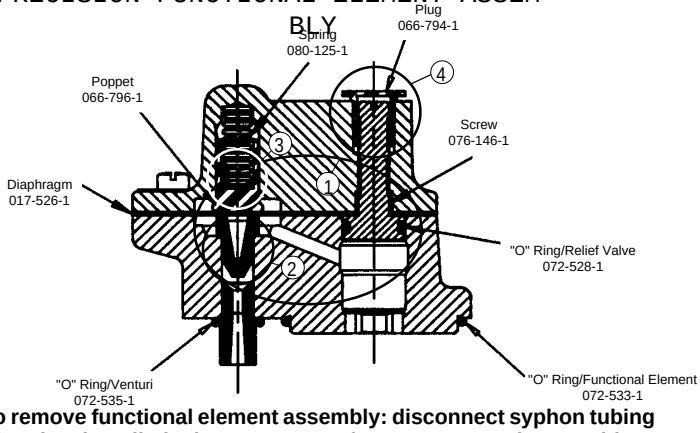


STANDARD MODEL
FUNCTIONAL ELEMENT ASSEMBLY



To remove functional element assembly: disconnect syphon tubing (if syphon installation). Remove two cap screws. Disassemble to check and clean.

AG MODEL
PRECISION FUNCTIONAL ELEMENT ASSEMBLY



To remove functional element assembly: disconnect syphon tubing (if syphon installation). Remove two 3/8" cap screws. Disassemble to check and clean. Reassemble by carefully aligning diaphragm into cap recess and diaphragm tabs into body recess. Tighten all screws until cap is metal to metal with the body.

4" "Extracta" Petroleum Pump

Check Valve/Troubleshooting

All Red Jacket submersible petroleum pumps manufactured prior to November 7, 1984 (Date code 21184) were supplied with a brass check valve. After this date, pumps were supplied with plastic check valves. Effective February 1993, pumps are supplied with a stainless steel check valve. Replacement should be as follows:

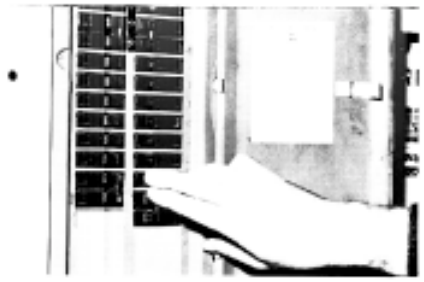
- Replace a brass check valve with a brass check valve #138-056.
- Replace a plastic check valve (white or red) with a red check valve #188-214.
- Replace a grey check valve with a grey check valve #144-143-5. (AG Pump PPM 4000 and RLM 9000)
- After February 1993 the stainless steel check valve was introduced:
  - — 144-183-5 replaces 138056 and 188214 in standard pumps.
  - — 144-184-5 replaces 144184-5 and replaces 144143-5 in AG pumps and Line Pressure Kits.

	Symptom	Probable Cause	Suggested Action
A.	Total or partial loss of vacuum and/or build up of pressure.	Obstruction in product flow path through functional element and "S" tube. —In port from check valve to cavity over nozzle (#1, p. 7) —Nozzle and/or venturi (#2, p. 7) —"S" Tube/Air Eliminator Tube (#8, p. 7) —Vent screw not all the way up (#4, p. 7) **NOTICE** **Do not screw vent screw down with excessive torque. Always replace dust cap.**	Remove functional element, clean out passageway, including nozzle and venturi, and reinstall. **NOTICE** **Use caution when disassembling functional element as spring, boot and shims contained in cap are loose (#10, p. 7).** Run flexible wire down "S" tube and air eliminator tube. Adjust to full up position. * Excessive sediment on the bottom of the tank can cause reoccurance of this problem. Turbulence occuring during filling of the tank places this sediment in suspension, allowing it to be drawn into the functional element or syphon check valve via the vacuum line or the pressure relief system. Removal of sediment from tank bottom may be necessary.
B.	Excess Line Pressure	See above (*Static) Pump oversized for application. Line type check valve installed in discharge line. (Expansion or pressure equalizing type is acceptable—not standard type.)	Refigure head loss and check performance curve. Remove.
C.	Loss of Line Pressure *(Static—Pump off, all discharge outlets closed.)	Failure of Seal (#5, p. 7) "O" Ring under functional element. (#6, p. 7) "O" Ring on vent screw. (#7, p. 7) Check valve seal. (#9, p. 7) Seal at top of discharge, between packer and manifold. **NOTICE** **Check valve can be isolated by closing same via vent closing screw.**	Examine seal and surface involved. Clean surfaces and replace seals if necessary. Same as above, plus if surface on discharge manifold is scratched, apply Permatex to area under "O" Ring.
	Loss of Line Pressure	Thermal Contraction Leaking Check Valve	Check Valve Isolation 1. Install gauge in line test port. 2. Energize pump—Observe pressure reading on gauge. 3. Close vent screw. 4a. If pressure drops off, this is an indication that there is a leak down-stream of the functional element (2" Packer-Discharge O-ring, or a possible leak in the product line). b. If pressure holds, shut off submersible. 5. If pressure then drops, re-energize the submersible. 6. If system re-pressurizes, this is an indication that the check valve is faulty. **NOTICE** **Pressure drop, after drop provided by pressure relief valve (to approx. 8-14 psi), will probably be slower with thermal contraction than by faulty seal.**
		Plunger over diaphragm binding (#10, p. 7).	Check and clean area and reinstall.
D.	Motor runs, but partial or no output by pump.	Vent screw not up all the way (#4, p. 7). Prevents full opening of check valve.	Back vent screw full up.
E.	Fuel in Capacitor Housing	Leaking seals or incorrect re-assembly after length of pump was altered in the field. (Seals #1, #2 and/or #3 shown on p. 6).	If pump is still in warranty period and length has not been altered, send unit back for warranty consideration. If pump is out of warranty period or length has been altered, the seals shown on page 6 will require replacement.
F.	Excess Line Pressure (Pump not running)	Standard line type check valve installed in discharge line. Only expansion or pressure equalizing type check valves can be used if a check valve is installed in the line.	Remove check valve from line and install the proper type check valve (expansion or pressure equalizing type).
	Excess Line Pressure (Pump running)	Dispenser pressure relief not operating or blocked. Hydraulic Hammer Pump oversized for application.	Recalculate head loss in system and check performance curve.

4" "Extracta" Petroleum Pump

Removing the "Extracta" Portion

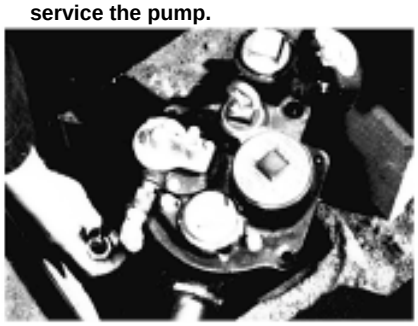
REMOVING THE PUMPING UNIT



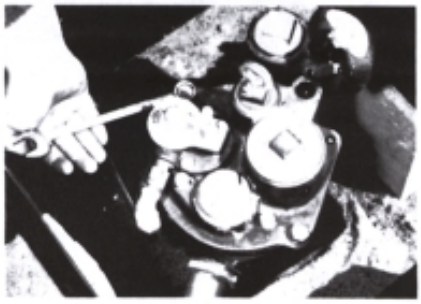
1. ALWAYS DISCONNECT and LOCK or TAG OUT the power before starting to service the pump.

2. Backout bayonet electrical disconnect bolt.

3. Swing electrical connector aside.

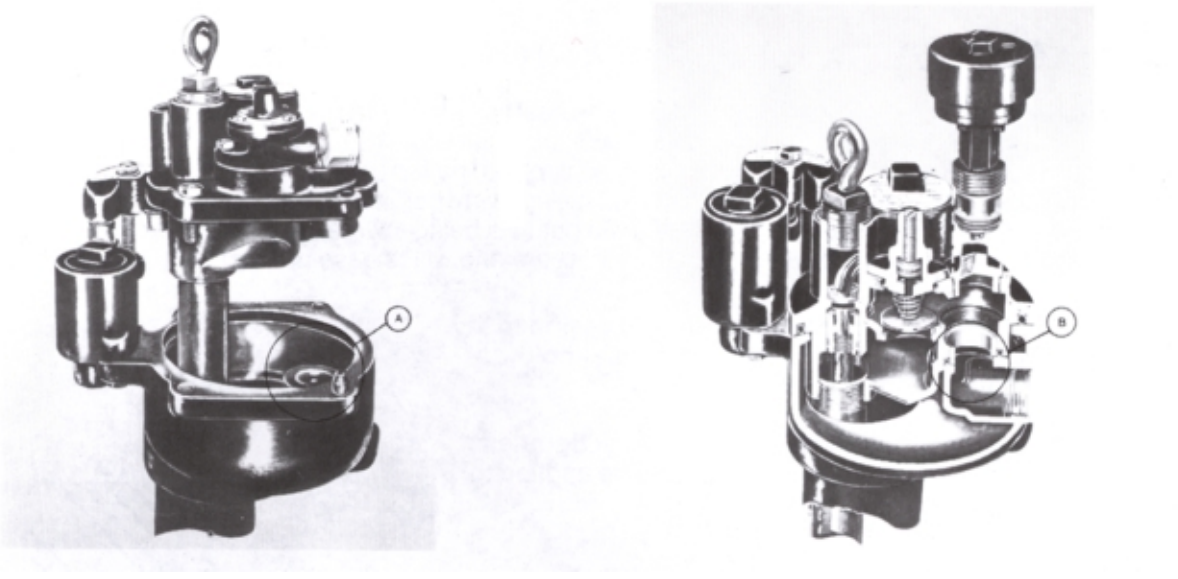


4. IF SYPHON SYSTEM: Disconnect syphon tubing.



5. Remove the two lockdown bolts.

6. Lift unit. Replace unit by reversing these steps.



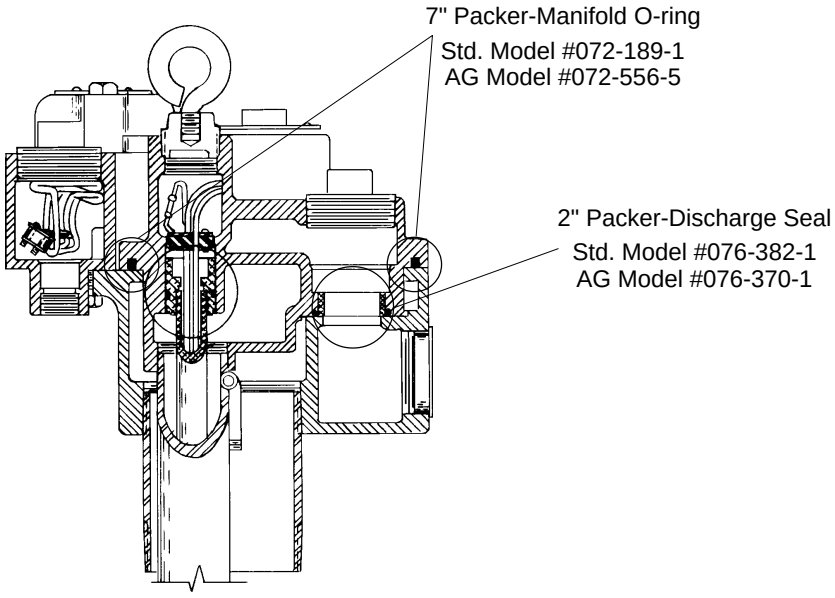
Never rest pump/motor on surface (A) when pulling extractable portion of unit.

If surface (A) is damaged, seal with "O" rings at location (B) may be impaired, resulting in loss of line pressure.

(See Loss of Pressure, Symptom C on p. 8)

4" "Extracta" Petroleum Pump

Packer Seals



WARNING **Careful attention must be paid to cleaning both the 2" sealing surface and the 7" sealing surface. Any foreign object, on either surface, will not allow either surface to seal properly.**

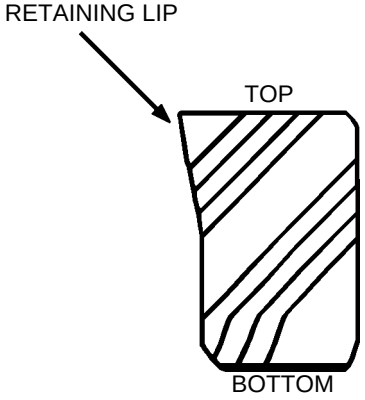
Any damage, mars or scratches on the 2" surface may not allow a good seal of the 2" seal.

INSTALLATION OF THE SEAL RING (Std. Model 076-382-1 or AG Model 076-370-1)

When installing the seal ring, first lay the seal flat. The seal has two different degrees of thickness. The thickest part of the seal angled inward with a retaining lip is the top of the seal. The narrowest or thinnest part of the seal is the bottom. (See drawing below). To install the seal, place the top part of the seal with the retaining lip into the bottom of the packer having the top of the seal facing away from the pump motor. A mating recess in the retaining sleeve will hold the seal in place while the pump is being lowered onto the packer. If the seal is not properly installed it will not maintain product line pressure and will release product back inside the tank.

CAUTION **The 7" Packer-Manifold O-ring is designed to keep water out of the Packer-Manifold assembly.**

If pressurizing the tank, for a tank tightness test, no more than 5 psi should be applied to this seal.



4" "Extracta" Petroleum Pump

Line and Tank Testing Guidelines

LINE TESTING

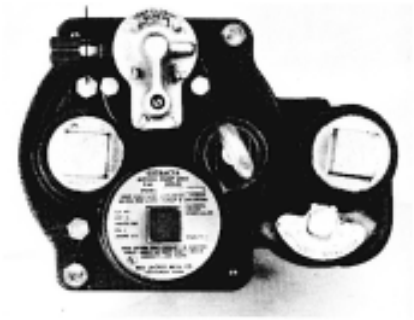
The vent closing screw, located on the functional element, is designed to perform two functions.

1. To secure the check valve in its closed position.
2. To disable the pressure relief function of the functional element.

NOTICE **The use of this vent closing screw allows the technician to pressurize the fuel piping system against the submersible pump. It is important to note that the 2" packer-discharge seal is still an active part of the piping system. A leak in this 2" seal will show up as a leak in the piping system.**

1. TO TEST PIPING. Block lines at each dispenser. (Trip dispenser shear valve.) Remove line test plug for this test.

2. Close pump check valve by turning the vent closing screw as far down as possible. DO NOT OVER TORQUE.

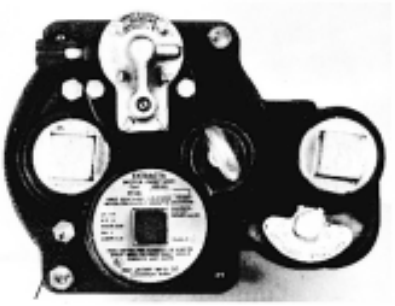


3. Apply line test pressure at line test port. (50 psi maximum.)

CAUTION **Excessive pressure (above normal test pressure of 50-55 psi) may damage check valve seat and other system components.**

TANK TESTING

When pressurizing a fuel tank to perform a tank tightness test, that pressure will also be seen through the riser pipe and into the packer-manifold assembly. The 7" packer-manifold O-ring is designed to hold 5 psi.



4. TO TEST TANK. Close pump check valve by turning the vent closing screw as far down as possible. Apply tank test pressure at tank test port.

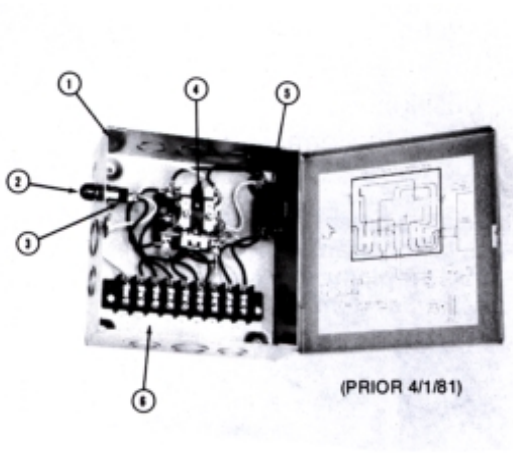
CAUTION **Excessive pressure (above normal test pressure of 50-55 psi) may damage check valve seat.**

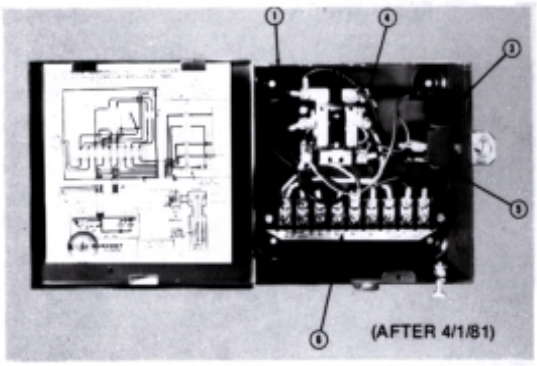
5. After completion of line and/or tank tests, release pressure by turning the vent closing screw as far up as possible.

6. After the installation is completed and tests have been made, purge system of air by pumping at least 15 gallons through each dispenser. Begin with the dispenser furthest from pump and work toward the pump.

4" Petroleum Pump

Control Box





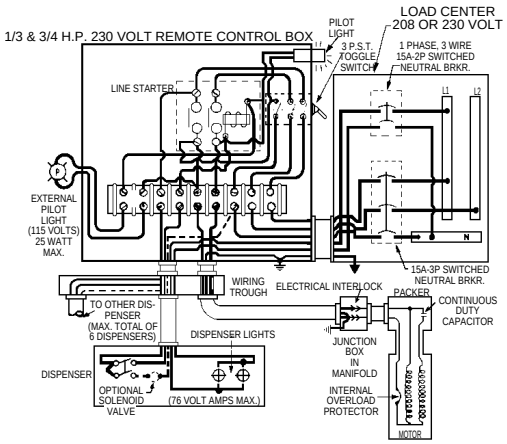
(PRIOR 4/1/81) **(AFTER 4/1/81)**

1/3 & 3/4 HP CONTROL BOX

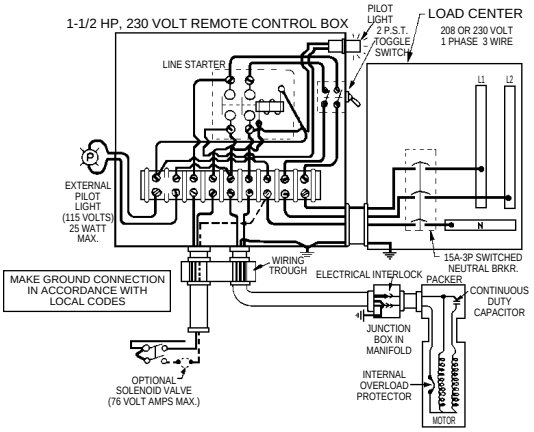
Key No.	880-002 Built Prior To 4/1/81 Part No.	880-029-5 Built After 4/1/81 Part No.	Part Description	Qty. Req'd.
1	108-321	108-514-4	Control Box	1
2	010-050		115V Bulb (NE-51)	1
3	147-004	247-001-5	Pilot Light Assy.	1
4	079-250	079-425-1	Line Contactor Relay	1
5	080-037	080-064-1	Toggle Switch	1
6	008-202	008-202-1	Terminal Block	1

NOTICE **Approved component only—Total system installed shall comply with all local codes.**

1/3 & 3/4 HP CONTROL BOX



1-1/2 HP CONTROL BOX



1-1/2 HP CONTROL BOX

Key No.	880-002 Built Prior To 4/1/81 Part No.	880-030-5 Built After 4/1/81 Part No.	Part Description	Qty. Req'd.
1	108-321	108-514-4	Control Box	1
2	010-050		115V Bulb (NE-51)	1
3	147-004	247-001-5	Pilot Light Assy.	1
4	079-425	079-425-1	Line Contactor Relay	1
5	080-062	080-062-1	Toggle Switch	1
6	008-202	008-202-1	Terminal Block	1

NOTICE **Approved component only—Total system installed shall comply with all local codes.**

4" "Extracta" Petroleum Pump

Pump/Motor Assembly

A) The permanent split capacitor motor gives you the option of using a control box or direct wiring.

B) An on-winding thermal over-current protector prevents premature motor failure from overheating.

Ambient temperature overload can occur as follows:

(1) 205°F = Overload Temperature
Overload protector opens at approximately this temperature and stops the motor. When the motor temperature drops to approximately 85°, the overload switch will re-engage allowing the motor to run.

(2) 120°F = Motor Heat Rise
85°F If ambient temperature or product is above this temperature, overload may occur.

(Check amperage draw before accepting this as cause for motor cut-off. If high amperage draw is present, it is probably not ambient temperature overload.)

(To determine position of overload, see procedure below.)

(1) Overload protector opens at approximately this temperature and stops motors.

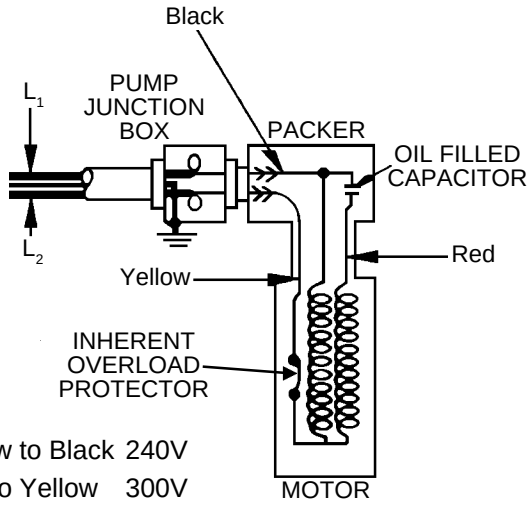
(2) Motor is continuous duty rated. Temperature rises to approximately 120°F and holds.

CAUTION **Unit is cooled and lubricated by the product it pumps. Approximately 10% of maximum flow capability is required to properly cool and lubricate unit (i.e., 1/3 HP — 4 GPM, 3/4 HP — 6 GPM, 1-1/2 HP — 8 GPM). NEVER RUN DRY.**

D) Unit is designed to pump petroleum fuels with a maximum specific gravity of .95 and maximum viscosity of 70 S.S.U. at 60°F. Attempts to exceed these limits will result in overheating.

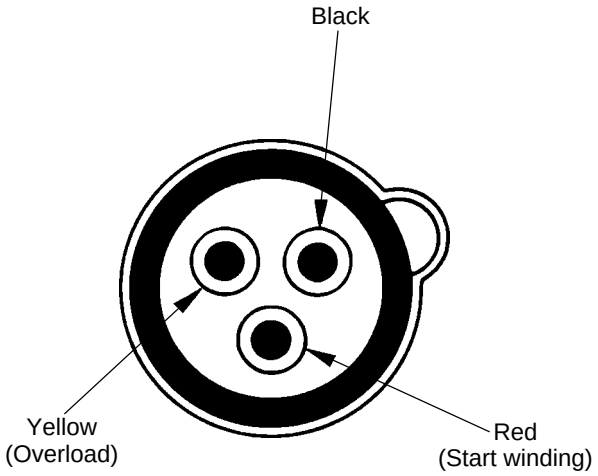
NOTICE **See page 14 for Troubleshooting of the Pump/Motor Assembly.**

Per Figure 1, when the inherent overload (on-winding thermal over-current protector) is closed, resistance readings will be per chart below. If the inherent overload is open, readings between black & yellow or red & yellow will indicate an open circuit.



Yellow to Black	240V
Red to Yellow	300V
Red to Black	370V

Pin and lead arrangement on plug to motor connection.



ELECTRICAL SERVICE INFORMATION

Model No.	HP	Volts Min.	Volts Max.	Max. Load Amps	Locked Rotor Amps	Winding Resistance (Ohms) Blk-Yellow	Red-Yellow	Black-Red
P33R1	1/3	200	250	4.0	13	7.4-8.3	16.1-17.9	23.5-26.2
P75S1	3/4	200	250	6.5	22	3.6-4.1	9.6-10.6	13.2-14.6
P150S1	1-1/2	200	250	10.5	42	2.0-2.1	5.2-5.6	7.2-7.7
50 Hz Single Phase Models								
P75S3-2	3/4	200	250	4.6	14.3	5.8-6.2	12.2-13.5	18.0-20.0
P75S3-3	3/4	200	250	5.8	18.6	4.5-4.9	11.7-13.0	16.2-17.9
P150S3-3	1-1/2	200	250	10.0	34.5	2.2-2.4	7.9-8.7	10.1-11.2

4" "Extracta" Petroleum Pump

Troubleshooting: 4" Pump/Motor Assembly

Symptom	Probable Cause	Suggested Action
Pump/motor will not start. May Hum May Show High Amperage Draw	Capacitor Failure	Test capacitor — Replace if needed. (See Page 17)
	Locked Rotor	Check amperage draw — replace pump-motor if amperage draw indicates locked rotor. (See Page 13)
	Improper Electrical Connection	Check wiring for continuity and impedance. (See Page 13)
Pump/motor runs & pumps intermittently	Improper Electrical Connection	(See Above)
	Binding of pump due to foreign object in impeller/diffuser area. (Abnormal noise usually present with this problem.) This will cause overheating of motor and subsequent cut-off by overload protector. (See Page 13 "B")	Remove extractable portion of unit. Remove center end cap from pump/motor assembly (friction fit). Check freedom & continuity of rotation of rotor shaft. Replace pump/motor if findings indicate resistance to free rotation or excessive play or wobble.
	Excessive or erratic bearing wear. (Usually caused by running unit dry or continuously.) Will affect overload and noise level as stated above.	Check amperage draw*. (Intermittent excessive amperage draw may occur.) Also see above suggestion on checking shaft rotation and appropriate actions to take. *See Page 13.
Motor runs, but pump output partially or totally impaired.	Impeller Wear (Pump/Motor)	Check static pressure of pump (**NOTICE** below). Replace unit if findings warrant.
	Foreign material obstruction. Intake ports or pump impellers. (i.e. rags, paper)	Investigate appropriate area for same and remove.
	Vent closing screw not all the way up.	Adjust to full-up position.
	Partially closed gate valve.	Open same.
	Malfunctioning Solenoid Valve	Replace if defective.
	Improper Voltage (High or Low)	Check voltage. Must be within 10%± of rated voltage (208/230V).
	Clogged filter or strainer.	Clean or replace.

NOTICE **Pump performance can be checked by installing a pressure gauge in the line test port in the discharge manifold.**

Approximate Normal Operating Pressure

Model	PSI Gas	PSI Diesel
1/3 HP	25	31
3/4 HP	27	34
1-1/2 HP	29	36
50 Hz Single Phase Models		
3/4 HP/2 stage/50 Hz	21	26
3/4 HP/3 stage/50 Hz	30	37
1-1/2 HP/3 stage/50 Hz	32	39

Model Number	HP	Length	Shipping Weight
UMP33R1 or AG/UMP33R1	1/3	15-1/2"	30 lbs.
UMP75S1 or AG/UMP75S1	3/4	17-1/2"	32 lbs.
UMP150S1 or AG/UMP150S1	1-1/2	20-1/2"	38 lbs.

1ø — 60 Hz — 208/230V

Previous to assuming motor failure, check capacitor.

4" "Extracta" Petroleum Pump

Replacement of Pump/Motor Assemblies

(All require 4" openings.) All units are interchangeable, only the length varies.

Maintain proper clearance from tank bottom — 5" optimum, 3" minimum.

NOTICE **Due to fluid incompatibilities, the standard UMP cannot be used to replace AG/UMP units.**

PROCEDURE

Please note the brand name and manufacture dates below:

Manufacturer	Motor Used	Date First Mfg.
Red Jacket	Red Jacket	June 1, 1963
Bennett	Franklin	1963
Bowser/Keene	Red Jacket	October, 1965
Gilbarco	Red Jacket	October, 1964
A.O. Smith	Franklin	1963
Wayne-Dresser	Franklin	October, 1963
Tokheim	Franklin	October, 1972

A. For units with the above manufacture dates or later, see Section "A".

B. For units with manufacture dates prior to the above, see Section "B".

C. For a Red Jacket unit with manufacture date prior to the above, see the following:

In June of 1963, models UMP33E1 1/3 HP and UMP50F1 1/2 HP were discontinued. These can be replaced by either UMP33R1 — 1/3 HP, UMP75S1 — 3/4 HP, or UMP150S1 — 1-1/2 HP. These units are interchangeable (only the length varies). Maintain proper clearance off the tank bottom, optimum 5" minimum 3".

A 111-092 split phase capacitor will be needed, see steps 1 through 5 in Section A and steps 12, 13 & 14 in Section B

SECTION A

On these units, the R.J. pump motor assembly is a direct replacement & requires no other parts.

1. Disconnect power.
2. Remove extractable portion of old pump from tank.
3. Remove old pump-motor assembly.
4. Replace the old gasket with the new one provided.
5. Align the positioning dowel of new pump-motor into the hole in the discharge head, push the new pump-motor as far as possible against the discharge head, insert the four cap screws and retighten.
6. Reinstall extractable portion in tank and test.

1. Remove the four screws holding motor to the head casting.

2. Rock unit while pulling away from discharge head until free.

3. TO RE-ASSEMBLE: Replace gasket, align dowel pin, draw in place with cap screws.

SECTION B

These units commonly used Reda, Leland, or General Electric Motors. The following Red Jacket parts will be needed to make the conversion:

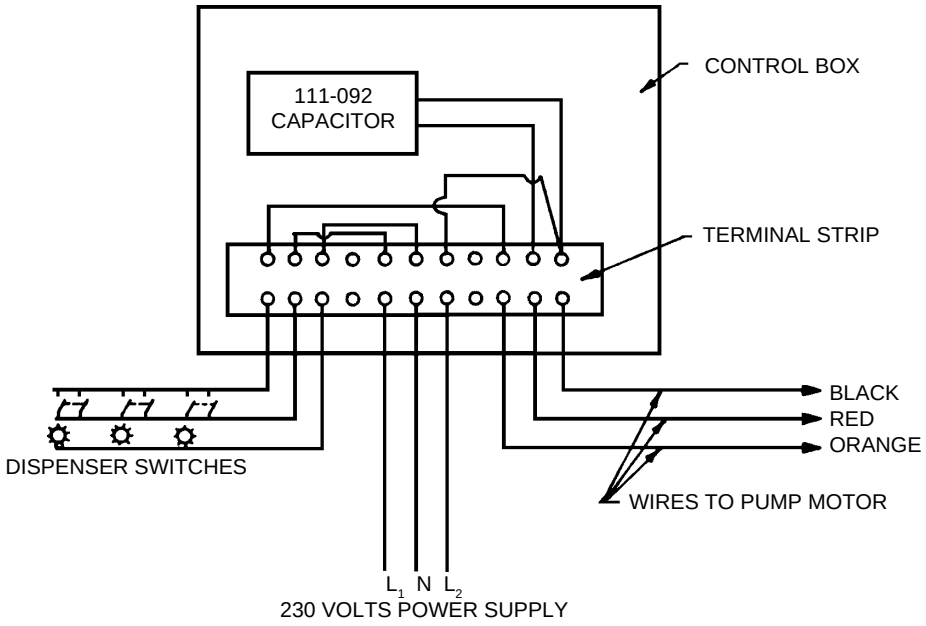
One (1) UMP33R1, UMP75S1 or UMP150S1;
One (1) 111-092 Capacitor;
One (1) 144-090 Plug & Lead Assembly;
One (1) 136-056 (1-1/2") or 136-057 (2") Discharge Head.

1. Disconnect power.
2. Remove extractable portion of old pump from tank. (It is recommended that conversion be done at the workshop).
3. Remove old pump-motor assembly.
4. Disconnect wires in packer assembly at top of unit.
5. Remove discharge head casting from column pipe & pull conduit & lead assembly from inside column pipe. Noting how it comes out will assist you in reinstalling the new wires.
6. Remove old wire and plug from conduit and remove conduit from discharge head.
7. Thread 1/2" conduit into 136-056 (1-1/2") or 136-057 (2") discharge head casting. (1/2" conduit must be used.) Thread discharge head onto column pipe, making sure slip-fit connector at top end of conduit is secured properly. Use proper pipe dope on all male threads.
8. Insert new plug and lead wire assembly through conduit from discharge head to the packer assembly at the top of the unit.
9. Apply the new gasket (provided) to the discharge head.
10. Align the positioning dowel of the new pump-motor into the hole in the discharge head. Push the new pump-motor up against the discharge head as far as possible. Insert the four cap screws and retighten.
11. Resplice the three wires (red, black, yellow) to the existing wires in the packer assembly, following the existing color coding.
12. To convert the old control box, remove everything but the terminal strip, insert the new #111-092 capacitor, and make connections per wiring diagram on top of page 16.
13. Incoming power lines should run through a circuit breaker or a fused disconnect.
14. Test the system.

4" "Extracta" Petroleum Pump

Suggested Wiring Diagrams

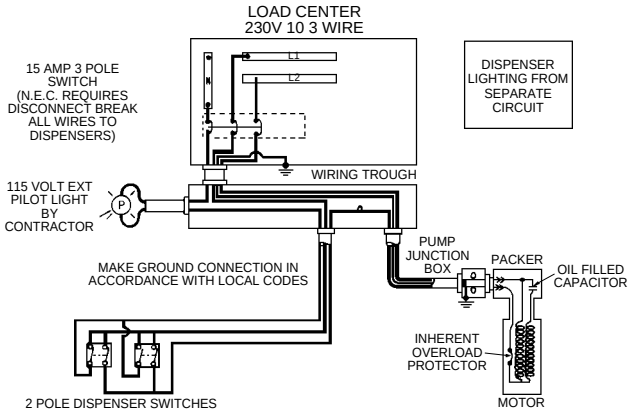
WIRING AFTER CONVERTING CONTROL BOX



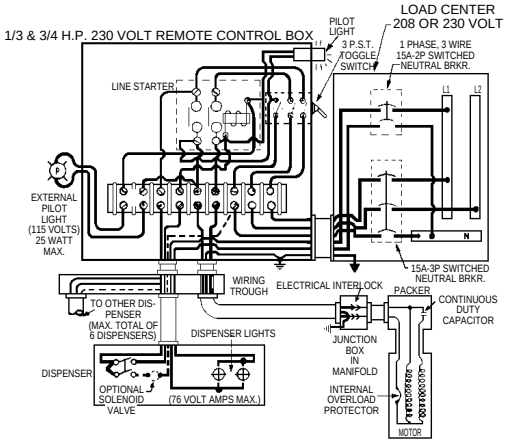
Suggested wiring diagram WITHOUT optional control box.

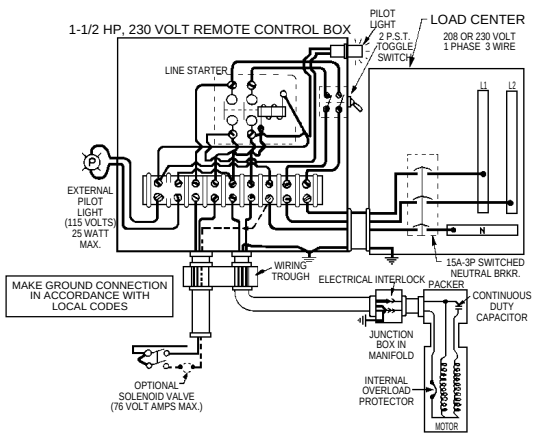
Combination of 2 pole dispenser switches or external pilot light.

- **Rated for twice the full load current of the motor:**
  1/3 HP - 8 amps, 3/4 HP - 13 amps,
  1 1/2 HP - 21 amps.
- **Rated for handling locked rotor current of the motor:**
  1/3 HP - 13 amps, 3/4 HP - 22 amps,
  1 1/2 HP - 42 amps.



Suggested wiring diagram WITH optional control box.

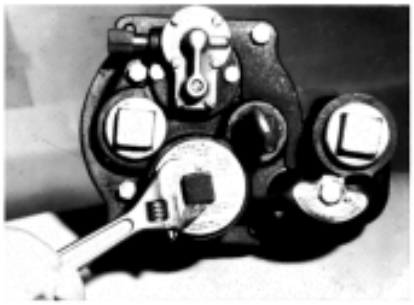




NOTICE **Use control box if solenoid in dispenser is rated at less than 1-1/2 HP.**

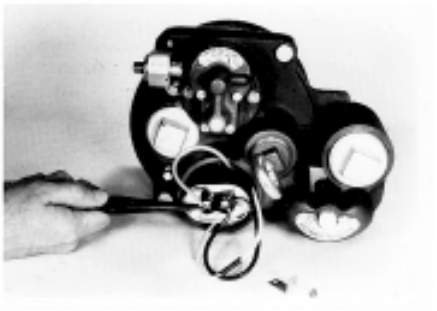
REPLACING THE CAPACITOR

NOTICE **Capacitor is 370V, 17.5 MFD, continuous duty.**

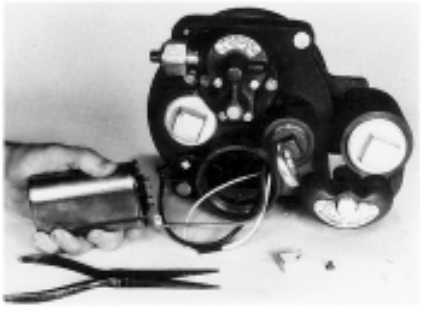


DANGER

1. ALWAYS DISCONNECT the power Remove the capcaitor cover.



2. Remove retaining clip. Pull quick-connectors



3. Remove capccitor. TO REPLACE: reverse these steps.

The permanent split phase capacitor motor gives you the option of using a control box or direct wiring. Values — 370V 17.5 MFD.

Symptom	Probable Cause	Suggested Action
Motor will not start. — May hum — May show high amperage draw.	Capacitor failure.	*Test capacitor — replace if needed.

(Also see Pump/Motor Assembly, page 14.)

**Testing the 111-092 Capacitor*

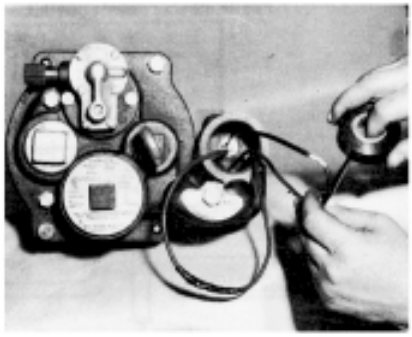
1. Place volt ohmmeter at x1000 range.
2. Place test leads on capacitor terminals (one on each). Needle should go all the way up and slowly fall back.
3. Reverse test leads on capacitor terminals. Reaction should be the same as in Step 2.
4. If needle on volt ohmmeter does not rise, or if it does not fall back, capacitor has failed and should be replaced.

WIRING

DANGER **ALWAYS DISCONNECT and LOCK or TAG OUT the power before starting to service the unit.**

1. Connect electrical conduit through approved fittings to junction box.

2. Remove cover from junction box. Remove compression seal. Provision has been made for 2 wire, or 3rd wire optional ground. Pull wires from power supply through seal and replace. Tighten seal securely.

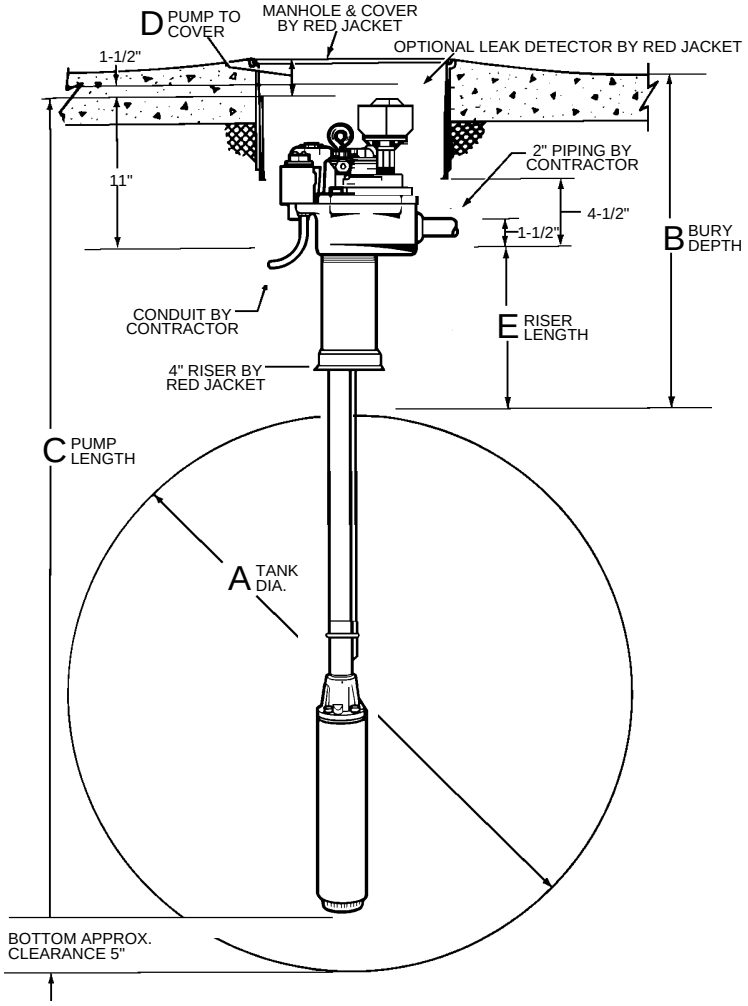


3. Connect wires from power supply to wire in the junction box. Make waterproof splice. Replace cover using waterproof thread sealant. Install optional ground wire if applicable.

4" "Extracta" Petroleum Pump

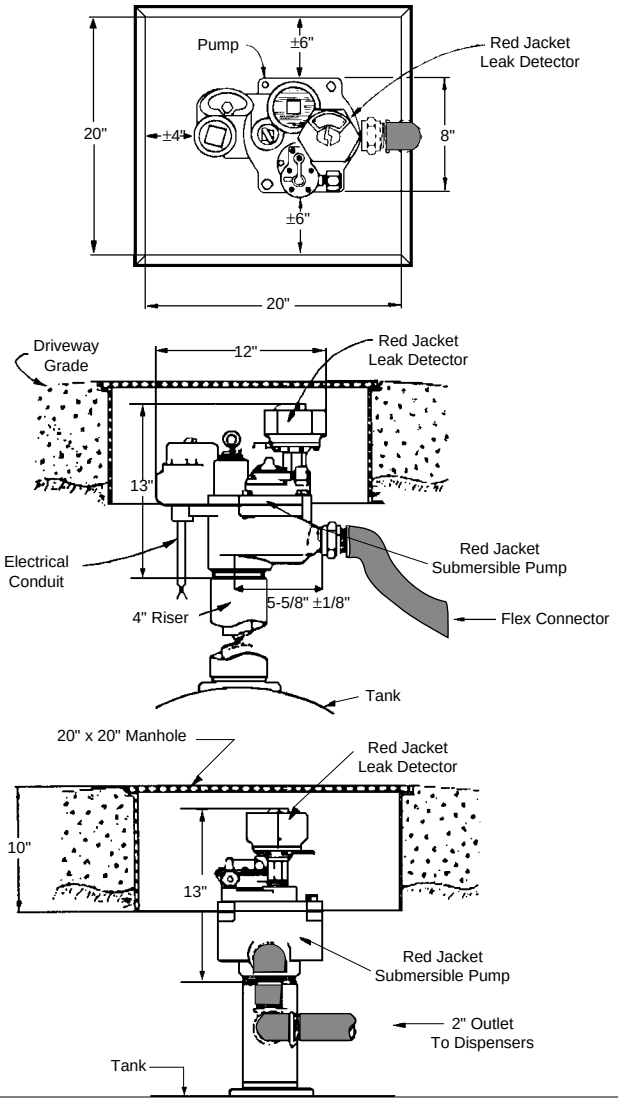
Dimensions

TABLE OF DIMENSIONS FOR PUMP SELECTION



NOTICE **Distance between center line of pump motor and center line of bottom fill tube should be 3' minimum. Air locking of pump after product delivery may occur at distances less than this.**

LEAK DETECTOR INSTALLATION AND MANIFOLD DIMENSIONS



NOTICE **Use this table for single wall tank applications only that do not involve manways or sumps.**

									8' Fiberglass Tanks			8' Steel Tanks				
"B" Bury Depth	"A" Tank Diameter	42" 3'6"	46" 3'10"	48" 4'0"	64" 5'4"	72" 6'0"	75 1/2" 6'3 1/2"	84" 7'0"	90" 7'6"	92" 7'8"	95" 7'11"	96" 8'0"	99 1/2" 8'3 1/2"	108" 9'0"	120" 10'0"	126" 10'6"
2'0"	"C" Pump Length	0409	0501	0501	0607	0701	0707	0801	0809	0809	0901	0901	0907	1001	1101	1109
24"	"D" Pump to Cover	4	4	6	4	6	4	6	4	6	5	6	4	6	6	4
	"E" Riser Length	9	9	7	9	7	9	7	9	7	8	7	9	7	7	9
2'6"	"C" Pump Length	0501	0507	0509	0701	0709	0801	0809	0901	0901	0907	0909	1001	1009	1109	1201
	"D" Pump to Cover	6	4	4	4	4	4	4	6	8	5	4	4	4	4	6
	"E" Riser Length	13	15	15	15	15	15	15	13	11	13	15	15	15	15	13
3'0"	"C" Pump Length	0509	0601	0601	0707	0801	0807	0901	0909	0909	1001	1001	1007	1101	1201	1209
36"	"D" Pump to Cover	4	4	6	4	6	4	6	4	6	5	6	4	6	6	4
	"E" Riser Length	21	21	19	21	19	21	19	21	19	20	19	21	19	19	21
3'6"	"C" Pump Length	0601	0607	0609	0801	0809	0901	0909	1001	1001	1007	1009	1101	1109	1209	1301
42"	"D" Pump to Cover	6	4	4	4	4	4	4	6	8	5	4	4	4	4	6
	"E" Riser Length	25	27	27	27	27	27	27	25	23	26	27	27	27	27	25
4'0"	"C" Pump Length	0609	0701	0701	0807	0901	0907	1001	1009	1009	1101	1101	1107	1201	1301	1309
48"	"D" Pump to Cover	4	4	6	4	6	4	6	4	6	5	6	4	6	6	4
	"E" Riser Length	33	33	31	33	31	33	31	33	31	32	31	33	31	31	33
4'6"	"C" Pump Length	0701	0707	0709	0901	0909	1001	1009	1101	1101	1107	1109	1201	1209	1309	1401
54"	"D" Pump to Cover	6	4	4	4	4	4	4	6	8	5	4	4	4	4	6
	"E" Riser Length	37	39	39	39	39	39	39	37	35	38	39	39	39	39	37

WARNING **A variety of tank types with various materials of construction are currently in use. The inside diameter, (I.D.) which is critical to determining correct pump length, can differ appreciably though outside diameters may be similar. Red Jacket Pumps are built to order to accommodate individual tank and bury depth requirements. Accurate tank and site measurements are critical to achieve the proper pump length and avoid damage to the pump or tank which can result in environmental damage. Petro Express Bulletin, RJ 23-25 (10/90) explains the information required for proper pump sizing.**

Section 2

6" Big-Flo® Petroleum Submersible Pump

*Model Numbers:**		
P100H1-1MB**	**1 HP**	**1Ø, 1 stage**
P150H1-1HB	**1-1/2 HP**	**1Ø, 1 stage**
P200H1-2MB	**2 HP**	**1Ø, 2 stage**
P200H3-2MB	**2 HP**	**3Ø, 2 stage**
P300H3-1K	**3 HP**	**3Ø, 1 stage**
P300H3-2HB	**3 HP**	**3Ø, 2 stage**
P500H3-2K	**5 HP**	**3Ø, 2 stage**

*An “S” at the end of the model number designates pump includes syphon capability.
**This model was discontinued February, 1988.

The Big-Flo® pumping system includes the following elements:

1. **Discharge Manifold Assembly** — installed below grade (NEC/Class I, Group D, Division I area)
2. **Motor/Pump Unit Assembly** — installed below grade (NEC/Class I, Group D, Division I area)
3. **Controls**

   A. Single phase units require use of the appropriate control box:
   for Model P150H1-1HB use Control Box No. 108-402-1
   for Model P200H1-2MB use Control Box No. 108-403-1

   B. Three phase units require use of the appropriate magnetic starter:
   Models: P200H3-2MB, P300H3-1K, P300H3-2MB, P500H3-2K → use Starter No. 279-231-5

   When starter is ordered, we will supply the appropriate heaters. All of the above are U.L. Listed when used as a complete system. An “all inclusive” nameplate will be found attached to the extractor nipple seal and can be inspected by removing the manhole cover directly over the pump. An additional nameplate will be found on the control box.

NOTICE **It is important to give the model number and serial number of this pump when corresponding with the factory for any reason.**

WARNING **Failure to follow all instructions in proper order can cause personal injury or death. Read all instructions before installing. All installation work must comply with local code requirements. If no other codes apply, the latest issue of the National Electrical Code should be followed.**

Installation of Red Jacket Petroleum Equipment should be performed only by personnel who are trained and qualified to do so.

1. Units should be installed with manholes, or with discharge manifold casting above grade, to allow for ease in servicing.

WARNING **Red Jacket line leak detection systems do not function if the submersible pump runs continuously. Running a pump continuously will cause line leak detection, death or property damage.**

2. Never wire a submersible pump to run continuously at less than minimum flow rate. The units are designed to operate continuously at or above minimum flow rate, or with an intermittent duty cycle, not to exceed 20 on/off cycles per hour. Should it be necessary to operate a unit continuously or when the demand is at a rate less than required per the paragraph above, a bypass pipe should be installed in the piping to allow for continual product recirculation back into the storage tank. Regulation of the bypass flow back to the tank can be accomplished by correct sizing of the bypass line or use of a gate valve.

Single Stage Units	Two Stage Units
P150H1-1HB=10 GPM	P200H1-2MB=15 GPM
P300H3-1K=20 GPM	P200H3-2MB=15 GPM
	P300H3-2HB=20 GPM
	P500H3-2K=25 GPM

3. Red Jacket submersibles are not designed to handle abrasives or foreign particles in the product being pumped.
4. Product temperature must never exceed 85°F as the submersible motors are equipped with thermal overload protection. Product temperature higher than 85°F may result in tripping of the thermal overload protector.
5. Pumping water will overload the motor and damage the motor bearings.
6. These units are designed for use in Class I, Group D atmospheres.
7. Install pumping system in accordance to applicable codes.

Proper motor protection must be used on the 2, 3, and 5 H.P. three phase pump models, or motor warranty is void. To maintain warranty, the magnetic starters used must be supplied by Red Jacket, or have equivalent protection features defined as follows: 3 leg protection, properly sized quick trip heaters, and ambient temperature compensated overloads.

FOLLOW DIRECTIONS CAREFULLY

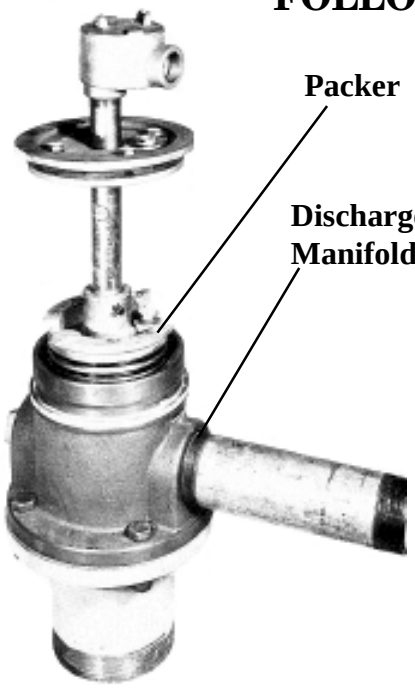


Fig. I

A. Installing Pumping Unit

CAUTION **Check these points before installing:**

a. Power supply against equipment voltage rating. For 3 phase units, request power company identify and tag service wires for L_1-L_2-L_3 phase sequence. All pumps are designed for use with 208, 220, 230 or 240 nominal system voltages.

b. Be certain that pump with syphon valve is installed in proper tank.

c. Check equipment received against table on Fig. VII for tank diameter and bury depth.

CAUTION **Use waterproof non-setting thread sealant approved for gasoline service on all threads.**

2. Install 6" Riser and Flange into tank opening.
3. Apply gasket compound to gasket and place on riser flange. Place Discharge Manifold on gasket to line up outlets as desired. Insert and tighten four cap screws.
4. Install piping from Discharge Manifold outlets to Dispensers and/or loading rack. One or both outlets can be used.

Fig. II

NOTICE **Installation of a Ball Valve is recommended on the discharge side of the pump or discharge of the Big Flo leak detector housing if used. This will aid in troubleshooting and line testing.**
Line check valves are not required as the pump is equipped with a built-in Check Valve. However, whenever two pumps are manifolded together to the same discharge piping, check valves with expansion relief are required and should be installed in the piping in discharge of each pump, as close to pump housing as possible.

5. Install 1-1/4" Conduit.
   a. On some installations, the short piece of 1-1/4" conduit furnished with the pump is of proper length.
   b. If not of proper length, a new piece of 1-1/4" conduit must be cut and threaded. Measure the length of the 8" diameter extractor nipple pipe. Cut and thread the 1-1/4" conduit 1-1/2" longer than the 8" diameter extractor nipple pipe. Thread the new piece of 1-1/4" conduit into the packer and tighten. Thread sealant should be used. Tighten the two set screws in the packer securely against the 1-1/4" conduit.
6. Install Pumping Unit.
   a. Apply a small amount of lubricating oil to each "O" ring on Packer. Also lubricate the "O" ring sealing surfaces inside the Discharge Manifold.
   b. Install the Pumping Unit through the Discharge Manifold. Care should be taken to lower the unit as near vertical as possible, and slowly to prevent damage to "O" rings or expansion relief valves.
   c. Refer to Figures I, II and III. The two "stops" on the locking ramps at the top of the packer must be lined up with the corresponding "tabs" at the top of the discharge manifold (see Fig. I).

      Lower the pumping unit through the manifold using rocking force, if needed, until the packer is down as far as possible (see Fig. II).

      Using a pipe wrench on the 1-1/4" conduit, turn counter-clockwise (to the left when viewed from the top), to lock the pumping unit in.

      As soon as the locking ramps engage under the "tabs" the unit is locked in place and does not require any further tightening (see Fig. III).

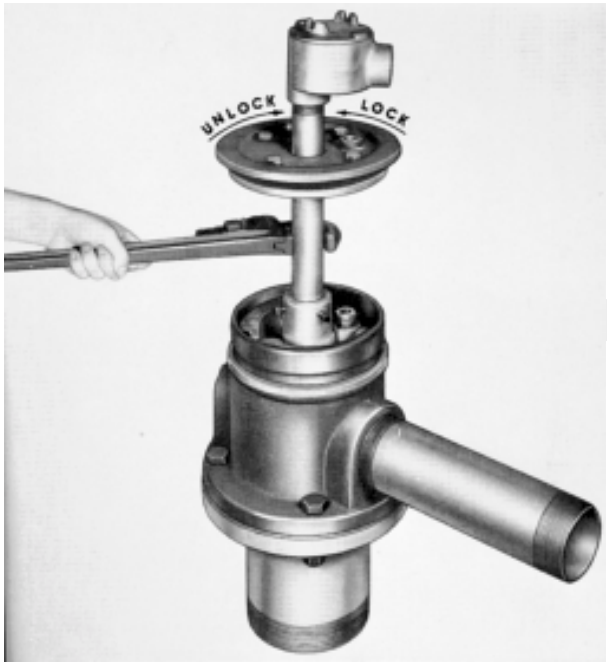
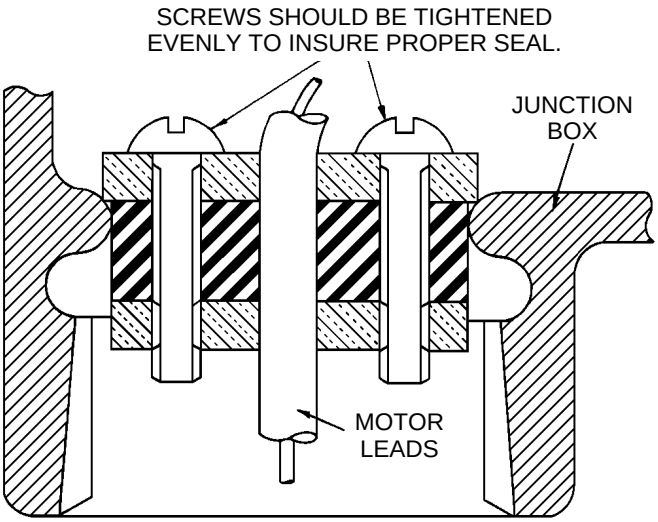


Fig. III

NOTICE **The locking action does not cause the "O" rings to make a seal; the weight of the unit maintains the sealing of the "O" rings.**

NOTICE

LOCK PUMP AS SHOWN IN FIG. III



CONDUIT SEAL ASSEMBLY

Fig. IV

7. Pumps with Built-In Syphon Valve (see Fig. VI, page 9).
   a. On some installations, the short piece of 1/4" vacuum pipe furnished with the syphon pumps is of proper length.
   b. If not of the proper length, replace with length of 1/4" pipe, 1" longer than the 8" diameter Extractor Nipple. Cover top of 1/4" pipe to keep clean during installation.
8. Install 8" Diameter Extractor Nipple (see table on page 27 for length).
   a. Position the end with set screws onto the rubber ring gasket on the Discharge Manifold. Tighten the four set screws evenly to pull the 8" pipe down on the ring gasket.
9. Install Extractor Nipple Seal.
   a. Install the extractor seal in position as shown on Fig. VI. After this seal is in place, tighten the four bolts to force the sealing rings against the extractor nipple and the conduit. Tighten nut which compresses the gasket around the 1/4" vacuum pipe on syphon pumps.
10. Install Elbow, Fittings & Syphon Check Valve. (This step applies to syphon units only.)
    a. Install elbow and syphon check valve on top of the 1/4" vacuum pipe and then run 3/8" copper tubing from the elbow to the bushing at the high point of the syphon manifold shown on page 41.
11. Install Junction Box.
    a. Next, install the Junction Box on top of the conduit. If necessary to readjust position, do so by tightening box if possible (not loosening box). When tightening Junction Box, hold 1-1/4" conduit secure with pipe wrench to prevent unlocking packer in discharge manifold. Replace rubber seal into bottom of Junction Box as shown on Fig. IV. After positioning as shown, tighten screws firmly to form a tight seal.

B. Wiring Instructions — 208-230V Single Phase Pumps

The motor control box must be located away from the loading rack in a non-hazardous location (see Fig. Va).

1. Connect the single phase 208 or 230V power supply from the distribution panel to terminals L_1 and L_2 in the motor control box. Each control box should be wired through a separate fused disconnect switch or circuit breaker (including neutral, when used), furnished by customer.
2. *Using properly color coded wires,* connect wires from terminals red, black and orange on motor control box terminal strip to the corresponding color coded wires in the junction box of the proper submerged pump.
   a. On 1-1/2 and 2 HP units, run two blue wires from two blue terminals on motor control box terminal strip, and connect to two blue wires in the junction box of the pump.
3. On 1 HP pumps, connect wires from terminals D_1 and D_0 in motor control box to dispenser control switches (if dispensers are used) and “on-off” controls at loading rack, as shown on Fig. Va and Vc. The “on-off” control station must be of explosion-proof construction. Where loading racks and dispensers are served by the same submerged pump, the 2-wire switches must be connected in parallel so the submerged pump can be controlled from any dispenser or any loading rack.
4. On 1-1/2 and 2 HP pumps, connect wires from terminal Blue-1 and terminal 3 in motor control box to dispenser control switches (if dispensers are used) and “on-off” switch at loading rack as shown in Fig. Va.
5. Manual Overload Reset Switch. The 1 HP pump has an automatic reset overload protector built into the motor. Power to the pump must be shut off 5 minutes to permit the protector to reset. The 1-1/2 and 2 HP pumps are equipped with a no-liquid, over-temperature switch in the motor and an overload switch in the motor control box which will cut out if the motor is overloaded. If the pump fails to operate, or stops, when there is sufficient product in the storage tank, check the manual overload reset switch in the control box cover. Wait 10 minutes for the overload protector to cool off and then press the reset button. If the reset button will not stay in position this indicates an overloaded motor, or a short or ground. This condition must be corrected. If the reset button stays in but the motor will not pump or continue to run, the tank is dry.

CAUTION **If the reset button will not stay in position this indicates an overloaded motor, or a short to ground. This condition must be corrected. If the reset button stays in but the motor will not pump or continue to run, the tank is dry.**

6. If an external pilot light is desired to indicate when the submerged pump is operating, wire as shown in Fig. Va. Should this light continue to burn when all switches at dispensers and loading racks are off, this indicates that one of the dispenser switches is out of adjustment. On installations with no external pilot light, the submerged pump should be checked to make sure it is not operating when all switches are turned off.

C. Wiring Instructions — 208-230V Three Phase Pumps

CAUTION **On some installations "phase converters" are used to obtain a three phase power supply from a single phase power source. The use of phase converters may cause an imbalance between the three phases and cause damage to the motor. For this reason, warranty coverage will not be extended on units installed with phase converters.**

1. Installations where magnetic starter is located away from the loading rack in a non-hazardous location. (See Fig. Vb.)

   a. Connect the three phase 208 or 230V power supply from the master panel to terminals L_1, L_2 and L_3 in the magnetic starter.

   b. *Using properly color coded wires,* connect a black wire from terminal T_1 in the magnetic starter to the black motor lead, in the junction box of the proper submerged pump. Connect an orange wire from starter terminal T_2 to the orange motor lead and a red wire from terminal T_3 to the red motor lead. (See Fig. Ve and Vf.)

   c. There are two remaining blue wires in the submerged pump junction box. Connect either blue wire to terminal L_3 in the Magnetic Starter. Connect the other blue wire to one side of the "on-off" controls. The "on-off" controls, if furnished by customer, must be of explosion proof construction.

   d. Installations using dispensers must be connected for 2-wire control as shown on Fig. Vb and Ve. Connect a black wire from the other side of the "on-off" switch to terminal 3 in the magnetic starter.

   e. Installations using loading racks only, may be connected for two or three wire control. (See Fig. Ve and Vf.) For three wire control, connect a black wire from terminal 3 in the magnetic starter to the "on-off" switch. Connect a red wire from terminal 2 in the magnetic starter to the "on-off" switch.

NOTICE **3-wire control requires the use of an auxiliary contact in the magnetic starter. This auxiliary contact is not standard equipment in the starters supplied by Red Jacket, and must be ordered as an option.**

WARNING **Installations with the magnetic starter in a hazardous location require explosion proof starters. The wiring is the same as for general purpose enclosures.**

2. Motor Rotation.

   Where it is not convenient to predetermine the power supply phase rotation, proper rotation can be determined by pump performance. Pump head pressure and capacity will be considerably less than rated when rotating backwards.

   Connect the pump motor leads to terminal T_1, T_2 and T_3 of the magnetic starter observing color code shown in Fig. Ve. With gasoline in the tank and the system purged of air, start the motor and make a pressure gauge reading of the system pressure with the discharge valves closed; or, open one valve and calculate pumping rate.

   Next, reverse power leads at L_1 and L_2. Repeat either head or capacity tests, as described above. If results are higher than the first test, the rotation of the second test is correct. If the second test gives lower performance than the first, reconnect the power leads to L_1 and L_2 (as under test 1) for correct rotation.

   Where the power supply has been properly marked L_1, L_2 and L_3 in accordance with accepted phase rotation standards, it is possible to predetermine the proper rotation of these units. The motor power leads are color coded black, orange and red, and if connected through the magnetic starter to L_1, L_2 and L_3 respectively, the motor pump unit will rotate in the correct direction. (See Fig. Ve.) It is recommended, however, that the performance tests always be made whether or not the power supply has been properly "phased out".

D. Starting the System and Completing the Installation

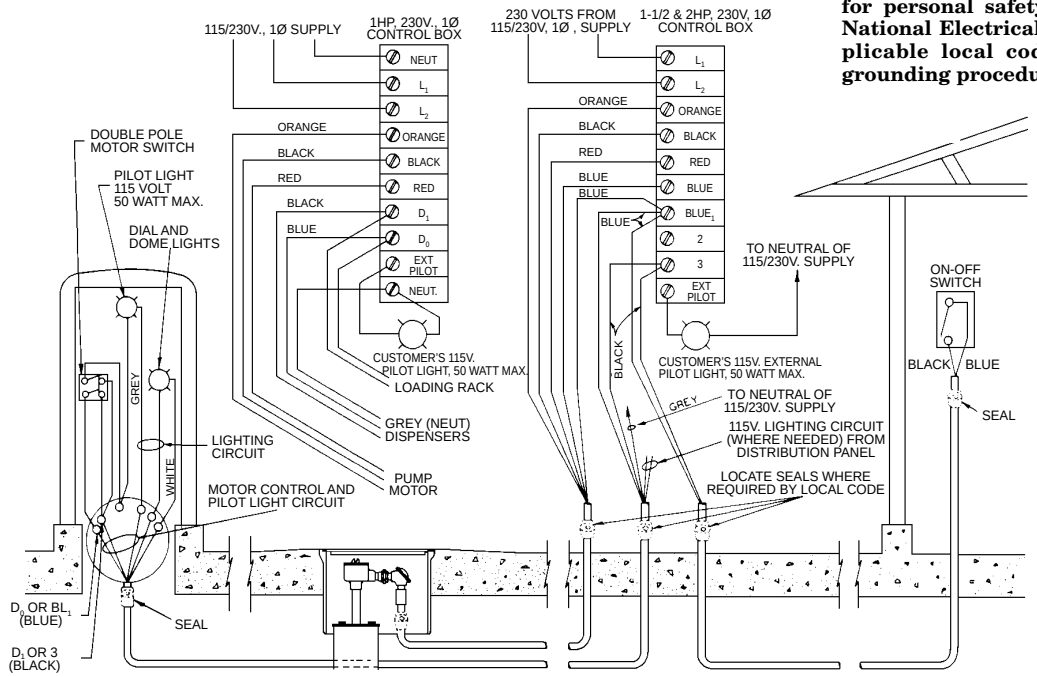
1. Do not start pumps unless ample product is in the storage tanks.

2. Pump sufficient product through each dispenser (150 gallons each is recommended) to purge the entire system of air. If all air is not purged, the computers may "creep" slightly when the dispenser switch is turned on, but no product has been dispensed.

3. On pumps equipped with built-in syphon, it is necessary to run the submerged pump at least 10 to 20

SINGLE PHASE SCHEMATIC

WARNING **The control box must be grounded for personal safety. Refer to the National Electrical Codes and applicable local codes for proper grounding procedures.**



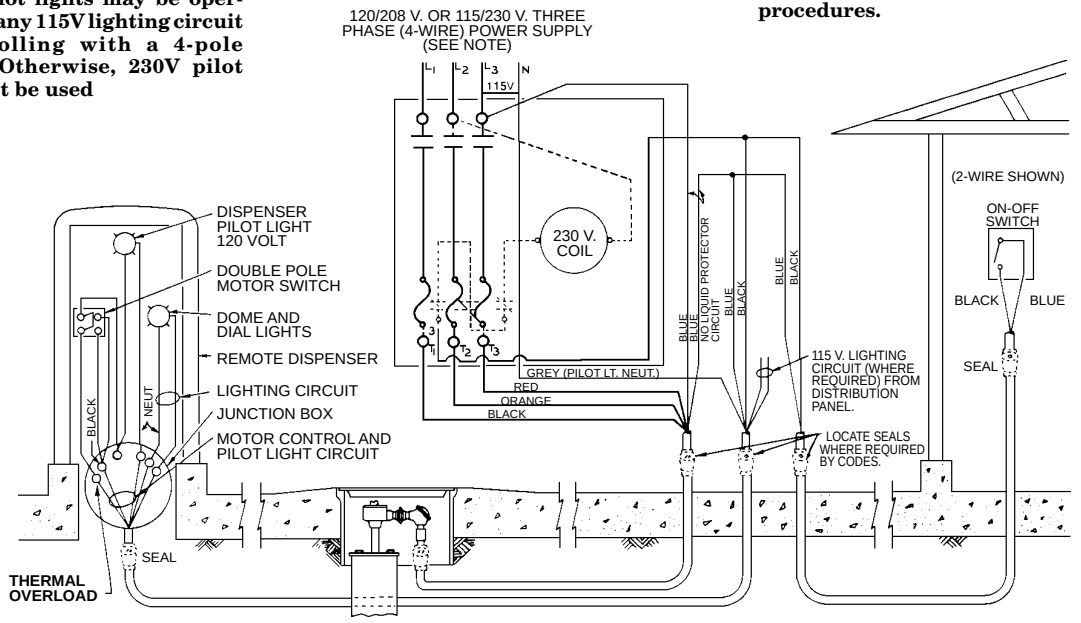
REPRESENTATIVE WIRING DIAGRAM, 1Ø, TWO WIRE CONTROL **Fig. Va**

SINGLE PHASE SCHEMATIC

NOTICE

If 115V is not available from power supply, pilot lights may be operated from any 115V lighting circuit by controlling with a 4-pole starter. Otherwise, 230V pilot lights must be used

WARNING **The control box must be grounded for personal safety. Refer to the National Electrical Codes and applicable local codes for proper grounding procedures.**

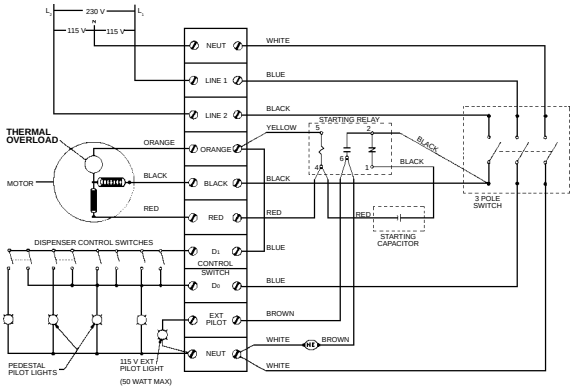


REPRESENTATIVE WIRING DIAGRAM, 3Ø, TWO WIRE CONTROL **Fig. Vb**

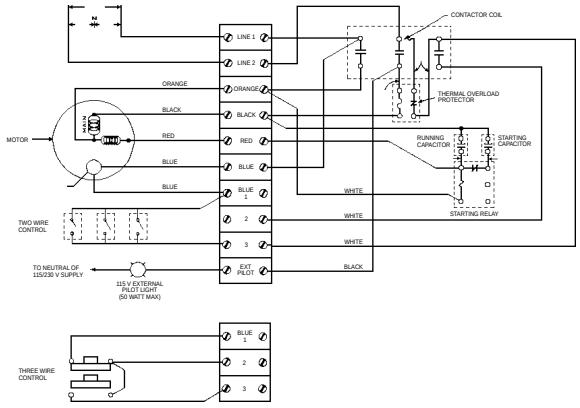
WARNING **The warnings on this page and throughout this manual indicate the presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.**

SINGLE PHASE SCHEMATICS

WARNING **The control box must be grounded for personal safety. Refer to the National Electrical Codes and applicable local codes for proper grounding procedures.**



MOTOR CONTROL BOX WIRING DIAGRAM - 1 H.P.
(5 TERMINAL RELAY)
(DISCONTINUED FEBRUARY, 1988) **Fig. Vc**



WARNING **The control box must be grounded for personal safety. Refer to the National Electrical Codes and applicable local codes for proper grounding procedures.**

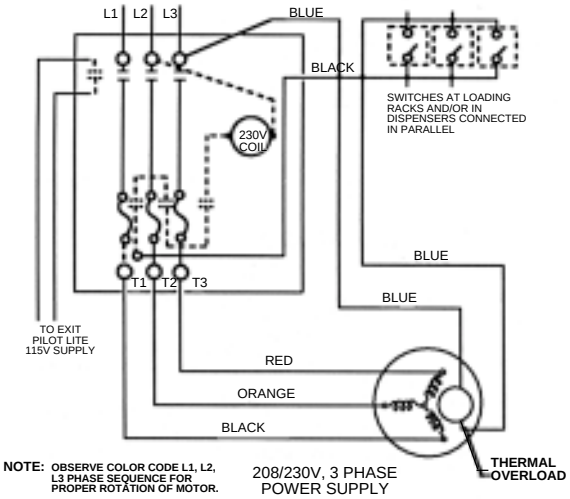
MOTOR CONTROL BOX WIRING DIAGRAM
1-1/2 & 2 H.P. **Fig. Vd**

Fig. V

THREE PHASE SCHEMATICS

WARNING **The control box must be grounded for personal safety. Refer to the National Electrical Codes and applicable local codes for proper grounding procedures.**

208/230V, 3 PHASE POWER SUPPLY



NOTE: OBSERVE COLOR CODE L1, L2, L3 PHASE SEQUENCE FOR PROPER ROTATION OF MOTOR.

208/230V, 3 PHASE POWER SUPPLY

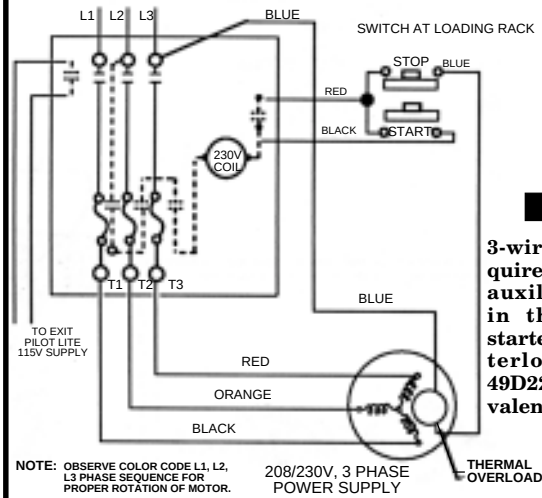
TWO WIRE CONTROL

3 PHASE MOTOR WIRING DIAGRAM

Fig. Ve

WARNING **The control box must be grounded for personal safety. Refer to the National Electrical Codes and applicable local codes for proper grounding procedures.**

208/230V, 3 PHASE POWER SUPPLY



NOTICE

3-wire control requires the use of an auxiliary contact in the magnetic starter. Furnas interlock kit or 49D221251 or equivalent.

NOTE: OBSERVE COLOR CODE L1, L2, L3 PHASE SEQUENCE FOR PROPER ROTATION OF MOTOR.

208/230V, 3 PHASE POWER SUPPLY

THREE WIRE CONTROL

3 PHASE MOTOR WIRING DIAGRAM

Fig. Vf

WARNING **The warnings on this page and throughout this manual indicate the presence of a hazard which can cause severe personal injury, death or substantial property damage if ignored.**

6" Big-Flo®

Manifold Dimensions

BIG-FLO® PACKER/MANIFOLD ASSEMBLY WITH SYPHON ATTACHMENTS

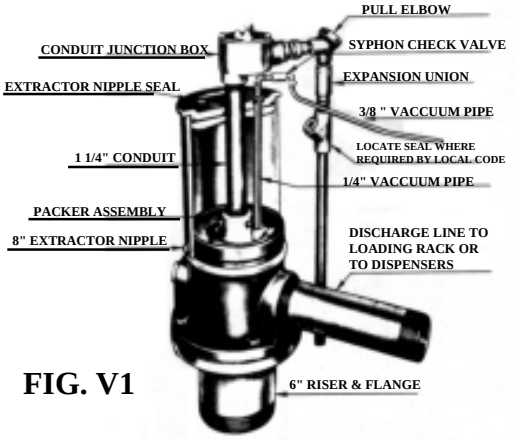


FIG. V1

BIG-FLO® LEAK DETECTOR SUGGESTED INSTALLATIONS MANIFOLD DIMENSIONS

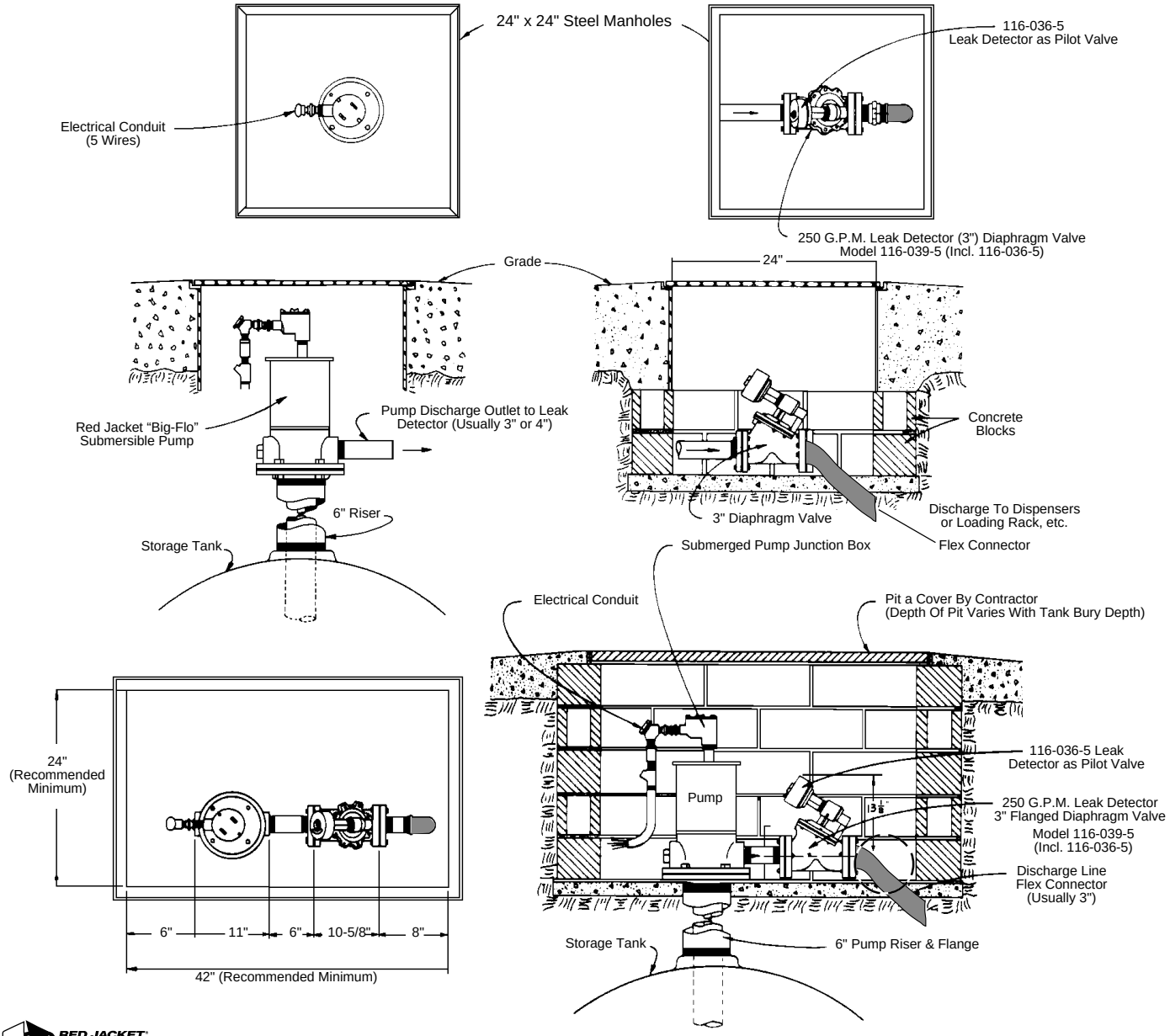


Table of Dimensions for Pump Selection

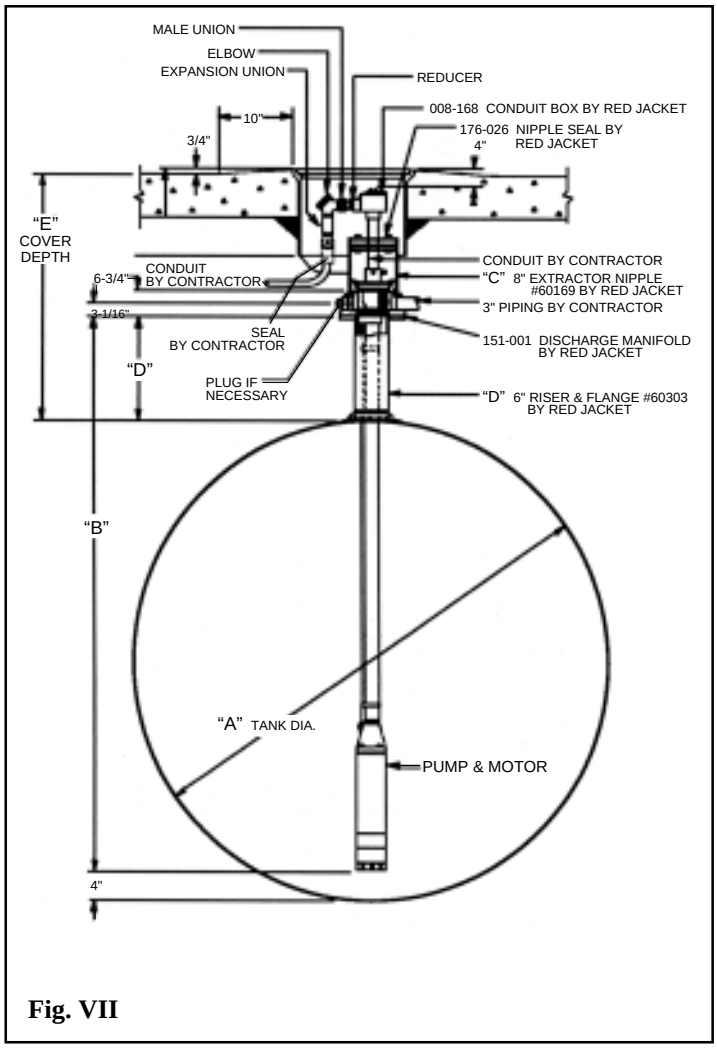


Fig. VII

NOTICE

Distance between center line of pump motor and center line of bottom fill tube should be 3' minimum. Air locking of pump may occur at distances less than this distance.

NOTICE **Use this table for single wall tank applications only that do not involve manways or sumps.**

Example: An 8' dia. steel tank buried 3'-0" will require a 99" long pump, 7" long riser & 13" long extractor nipple.

TABLE OF PUMP RISER & EXTRACTOR NIPPLE LENGTHS FOR VARIOUS TANK DIAMETERS & VARIOUS BURY DEPTHS

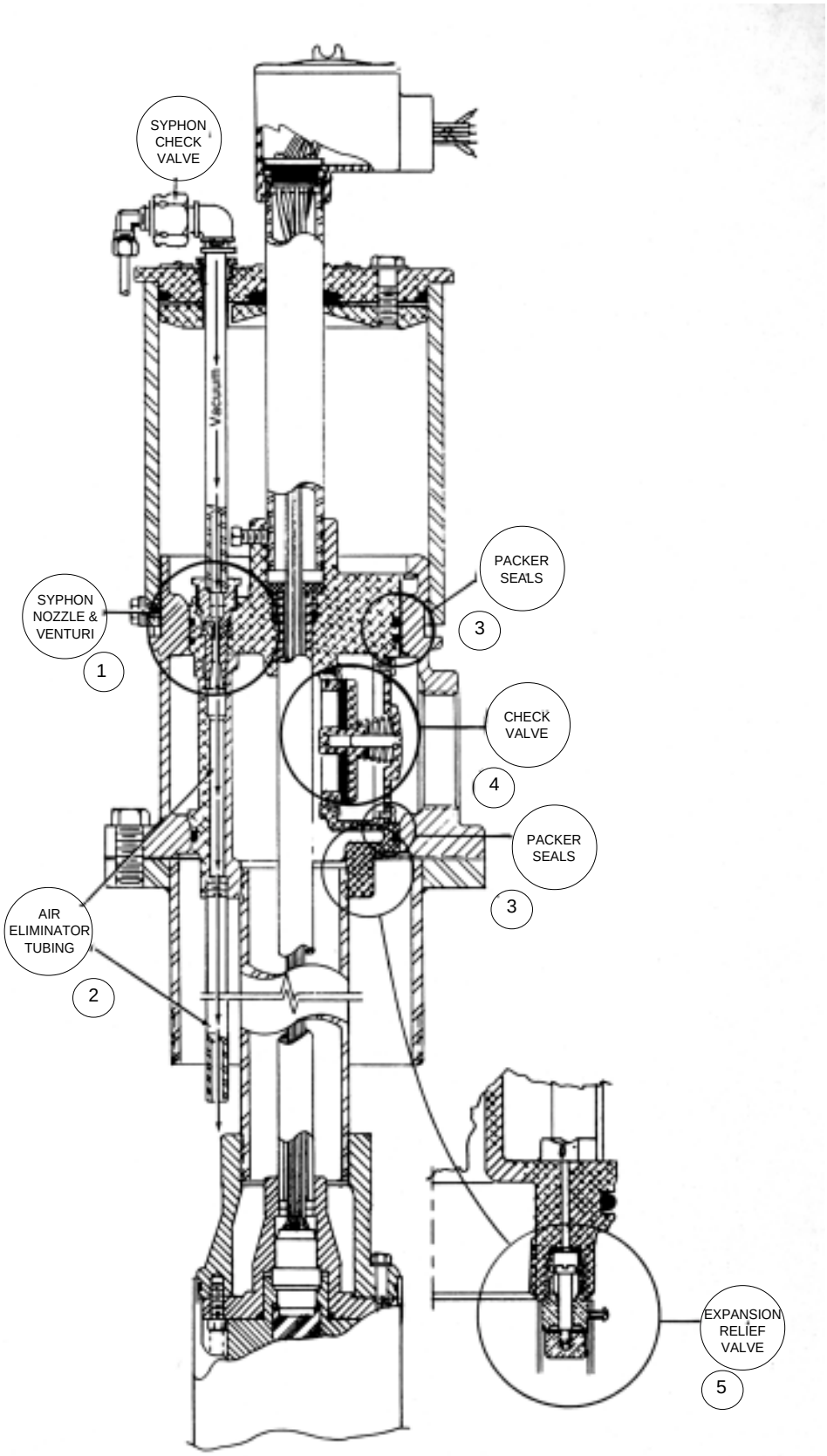
Diameter Storage Tank "A"	5'-4"	6'-0"	6'-3 1/2"	7'-0"	7'-6"	8'-0"	8'-3 1/2"	9'-0"	10'-0"	10'-6"	11'-0"	12'-0"
Pump Length "B"	5'-3"	6'-3"	6'-3"	7'-3"	8'-3"*	8'-3"	8'-3"	9'-3"	10'-7"	10'-7"	11'-3"	12'-3"
Riser Length "D"	5"	7"	4"	7"	13"	7"	4"	7"	11"	5"	7"	7"
Extractor Nipple "C" Length When Tank is Covered:												
2'-0" Bury	5"	5"	5"	5"	5"**	5"	5"	5"	5"	5"	5"	5"
2'-6" Bury	10"	7"	10"	7"	5"**	7"	10"	7"	5"	10"	7"	7"
3'-0" Bury	16"	13"	16"	13"	7"	13"	16"	13"	10"	16"	13"	13"
3'-6" Bury	22"	19"	22"	19"	13"	19"	22"	19"	16"	22"	19"	19"
4'-0" Bury	28"	25"	28"	25"	19"	25"	28"	25"	22"	28"	25"	25"

* Pump length for 2' bury will be 7'-7" long with a 5" riser length.
** 5" nipple not required.

WARNING **A variety of tank types with various materials of construction are currently in use. The inside diameter, (I.D.) which is critical to determining correct pump length, can differ appreciably though outside diameters may be similar. Red Jacket Pumps are built to order to accommodate individual tank and bury depth requirements. Accurate tank and site measurements are critical to achieve the proper pump length and avoid damage to the pump or tank which can result in environmental damage. Petro Express Bulletin, RJ 23-25 (10/90) explains the information required for proper pump sizing.**

6" Big-Flo®

Cutaway View



NOTICE **See page 29 for Troubleshooting Instructions.**

Troubleshooting/Electrical Data

Symptoms	Probable Cause	Suggested Action
Total or partial loss of vacuum and/or pressure reading at vacuum line.	Obstruction in syphon nozzle/venturi (#1) or air eliminator tubing (#2) is clogged. O.D. of this tubing must be 3/8" min.	Remove nozzle/venturi, clean and reinstall. Run flexible wire down air eliminator tubing. Replace tubing if it's too small.
Loss of line pressure. *(Static — pump off all discharge outlets closed.) Should be 25-35 PSI.	Failure of packer assembly seals (#3) or check valve seal (#4). Thermal contraction (see par. XIV & XV "Report on Leak Detectors" pg 51). Expansion relief valve not sealing (#5). Should relieve static line pressure to approx. 20-35 PSI.	Remove and inspect areas to ascertain that cause for failure is not still present (i.e., burr or damaged seal surface). Replace seal. Remove, clean and reinstall or replace.
Excess line pressure.	Failure of expansion relief valve (#5) (*Static) Pump oversized for applications. Line type check valve installed in discharge line. (Expansion or pressure equalizing type is acceptable, not standard type.)	Remove, clean and reinstall or replace. Refigure head loss and check performance curve. Remove same.
Low pump output on new installation of 3-phase unit.	Motor running in reverse.	Switch any two power leads L_1, L_2 or L_3 at starter.
Pump/motor runs and pumps intermittently.	Binding of pump due to foreign object in impeller/diffuser area. (Abnormal noise usually present with this problem.) This will cause overheating of motor and subsequent cut-off by overload protection device. Overload opens at 113°F, closes at 87°F-90°F. Do not operate pump with an ambient temperature higher than 132°F.	Check amperage draw. (Constant or intermittent excessive amperage draw may occur. See Electrical Data below.) Replace unit if findings dictate.
	Excessive or erratic bearing wear. (Usually caused by running unit dry or continuously.)	
	Improper electrical connection or voltage.	Check wiring for continuity and impedance (see below). Voltage must be within 10% ± of rated voltage.
Repetitive premature motor failure.	(see above)	
	If 3ø unit, possible phase unbalance is present.	See p. 30.
	Short in power supply leads to pump.	Check for ground with ohmmeter.
	Slight power drain via break in power lead wire insulation.	Check with 500V megger. Reading should be greater than 100,000 ohms to ground.
Motor runs, but pump output partially or totally impaired.	Foreign material obstructing intake ports or pump impellers (i.e., rags, paper).	Investigate appropriate area for same and remove.
	Partially closed gate valve.	Open same.
	Malfunctioning solenoid valve.	Replace if defective.
	Improper voltage.	Check voltage, must be within 10% ± of rated voltage (208/230V).
	Clogged filter or strainer.	Clean or replace.
	Confirm that motor is a two stage unit instead of a single stage unit. (A two stage motor unit is needed on any application involving a dispenser).	Check output PSI of pump to determine motor unit type. A single stage unit will have approximately one-half the output PSI of a two stage unit.

NOTICE **Pump performance can be checked by installing a pressure gauge at the discharge side of unit.**

APPROXIMATE NORMAL OPERATING PRESSURE

Model	PSI Gas	PSI Diesel	Model	PSI Gas	PSI Diesel
1 HP, 1 Stage	19	24	3 HP, 1 Stage	16	21
1-1/2 HP, 1 Stage	15	18	3 HP, 2 Stage	30	37
2 HP, 2 Stage	38	48	5 HP, 2 Stage	36	44

ELECTRICAL DATA

HP	Volts	Phase	Service Factor Cur. (Amps)	Idle (Amps)	Locked Rotor Cur. (Amps)	Branch Ckt. Fusetron (Amps)	Protection Ckt. Brkr. (Amps)	Overload Heaters*
1	208-230	1	7.5	4.4	35	15	15	NA
1-1/2	208-230	1	9.5	4.6	47	15	15	NA
2	208-230	1	12.0	5	61	20	20	NA
2	208-230	3	7.2	4.2	45	15	15	K-43
3	208-230	3	10.5	6	62	15	20	K-53
5	208-230	3	17.2	8.3	96	25	30	K-61

*Appropriate heaters are supplied with starters.

6" Big-Flo®

Three Phase Unbalance

Three phase current unbalance is a factor which can result in premature motor failure. It causes reduced starting torque, excessive and uneven heating and excessive motor vibration. Therefore, it is important that the electrical load to the submersible motor be balanced. The purpose of this service information is to describe how to check and correct phase unbalance, and what to do if it cannot be corrected.

1. Check for correct motor rotation by installing a pressure gauge in the discharge line. Start the pump and make a mental note of the pressure reading. Turn off the pump and change any two of the red, yellow or black leads in the control box. Restart the pump and again note the pressure reading. The rotation that gives the highest pressure is always the correct one.

CAUTION **Remember, before working inside the control box, always disconnect the power supply.**

2. When the correct motor rotation is established, the amount of current unbalance between the three legs of the power supply should be calculated.

   Current unbalance between legs should not exceed 5%. The percent of current unbalance is defined and calculated as follows:

$$\text{Percent Current Unbalance} = \frac{\text{Max. current diff.}}{\text{average current}} \times 100$$

Current readings in amps should be checked on each leg using the three possible connections shown in the illustration below. The best connection is the one that has the lowest percentage of unbalance.

To prevent changing motor rotation when taking these readings, the motor leads should be moved across the starter terminals by always moving them in the same direction, as shown in the illustration below.

The following is an example of current readings at maximum pump load (highest gpm) of each leg of the three-wire connection.

1st Connection	2nd Connection	3rd Connection
T1 = 51 Amps	T3 = 50 Amps	T2 = 50 Amps
T2 = 46 Amps	T1 = 48 Amps	T3 = 49 Amps
T3 = 53 Amps	T2 = 52 Amps	T1 = 51 Amps

Begin by adding the three readings for the 1st connection.

T1 = 51 T2 = 46 T3 = 53 Total = 150 Amps

Divide the total by three to obtain the average:

150 ÷ 3 = 50 Amps

Calculate the greatest Amps difference from the average:

50 - 46 = 4 Amps

Divide this difference by the average to obtain the percentage of unbalance:

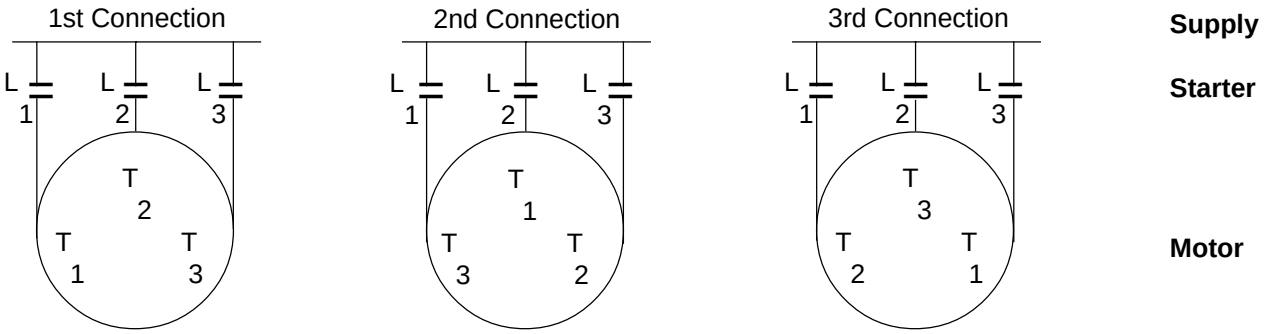
4 ÷ 50 = .08 or 8%

In this case, the current unbalance for the 1st connection is 8%. Using the same procedure, the maximum current unbalance for the 2nd connection is 4%, and for the 3rd connection is 2%. By comparing the percentage of unbalance on the three possible connections, connection #1 exceeds 5% and therefore should not be used. The 2nd and 3rd connections are less than 5% unbalance and therefore either is satisfactory. Since the 3rd connection had the lowest percentage of unbalance, it should be used to obtain maximum motor efficiency and reliability.

By observing where the highest current reading is on each leg on the various connections, you can determine if the unbalance is caused by the power source or the submersible motor. In the above example, the highest Amp reading was always on the same incoming power leg, L3. This indicates that most of the unbalance was from the power source.

If the high current were on a different incoming leg each time the motor leads were changed, this indicates the motor, or a poor connection, caused most of the unbalance.

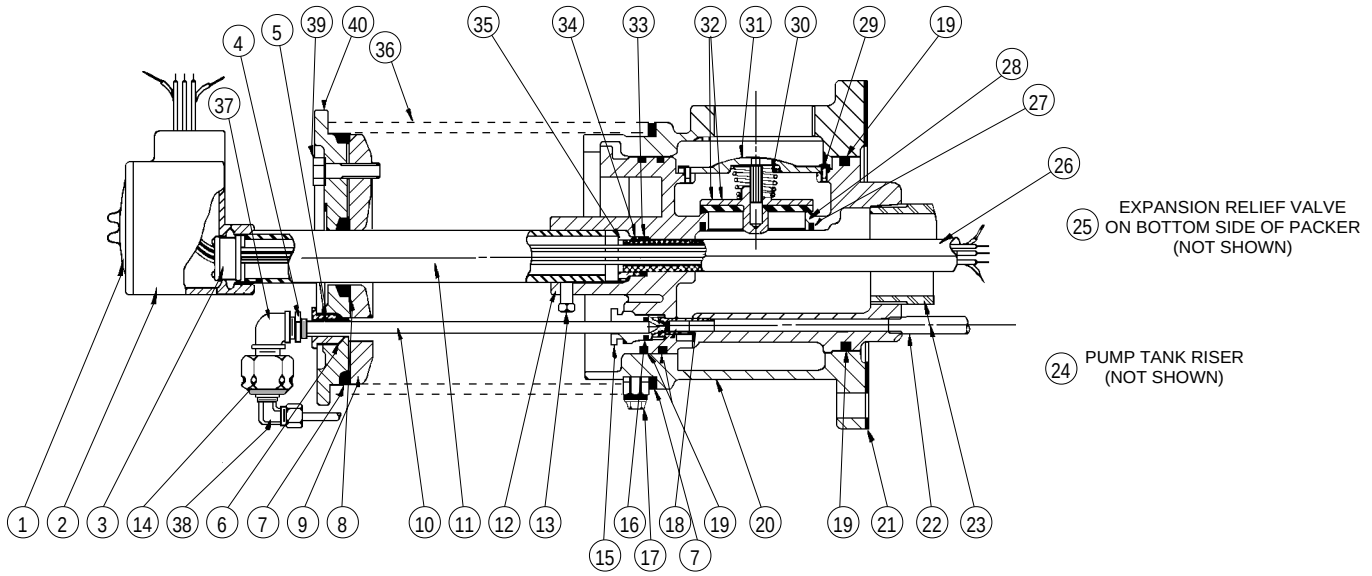
If an unbalance problem appears to be in the power supply and none of the three possible connections will reduce the percentage of unbalance to 5% or below, the power company should be contacted for additional aid in correcting the current unbalance to an acceptable level.



REPLACEMENT PARTS LIST — PACKER ASSEMBLY

(Packer Assembly is the same on All Model Big-Flo® Pumps)

Upper End

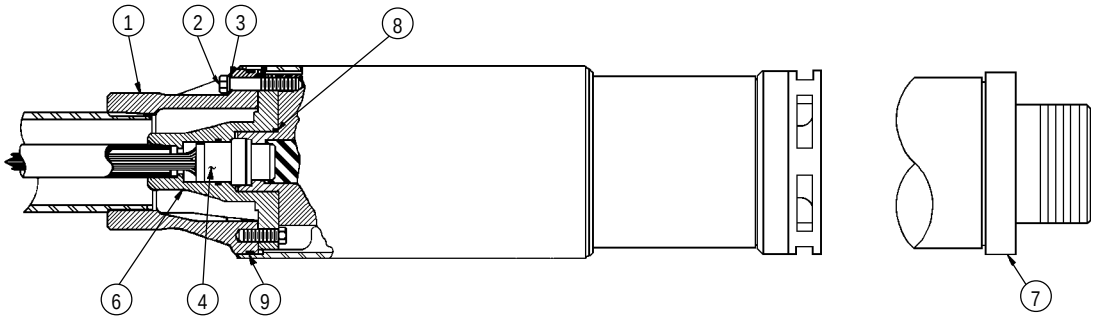


Key No.	Part No.	Description	No. Req'd.
2	008-168-1	Conduit Junction Box with Cover	1
3	110-038-4	Conduit Seal Assembly, All Models Except P100H1-1MB	1
3	110-039-4	Conduit Seal Assembly, Model P100H1-1MB	1
4	027-065-1	1/4 x 3/8 Fitting Syphon Take Off	1
5	060-048-3	Packing Nut Syphon Tube	1
6	031-097-1	Packing Nut Gasket	1
7	031-106-1	Extractor Nipple Gasket Outer	2
8	031-105-1	Extractor Nipple Gasket Inner	1
9	176-026-5	Extractor Nipple Seal Assembly Non-Syphon	1
9	176-025-5	Extractor Nipple Seal Assembly Syphon	1
10	065-073-1	1/4" Galvanized Syphon Pipe (Obtain Locally or Specify Length)	1
11	013-047-1	1-1/4" Conduit Pipe (Obtain Locally or Specify Length)	1
N/S	164-045-5	Packer Assembly without Syphon	1
12	164-046-5	Packer Assembly with Syphon	1
13	026-219-1	Locking Capscrew 3/4 x 16 x 3/8 (Obtain Locally)	2
14	188-079-5	Syphon Check Valve	1
15	058-029-3	Syphon Packing Nut and Nozzle	1
16	072-110-1	"O" Ring - Syphon Packing Nut (5/8 x 13/16 x 3/32)	1
17	026-414-1	Hex Head Cap Screw	4
18	008-167-3	Syphon Venturi	1
19	072-108-1	"O" Ring - Packer Assembly (5-1/2 x 6 x 1/4)	3
20	151-011-5	Discharge Manifold	1
21	031-108-1	Gasket - Mainfold to Riser	1
22	085-100-x	Air Eliminator Tube (Specify Length)	1
23	013-145-x	3" Column Pipe (Specify Length)	1
24	882-2xx-x	Pump Riser (Specify Length)	1
25	208-271-5	Expansion Relief Valve	1
26	013-882-3	3/4" Alum. Conduit (Specify Length)	1
27	072-107-1	"O" Ring - Check Valve Seat (3-1/4 x 3-1/2 x 1/8)	1
28	076-085-3	Check Valve Seat	1
29	026-627-1	Machine Screws (1/4 x 20 x 1/2)	2
30	079-161-1	Check Valve Spring	1
31	111-065-4	Cap & Stem Assembly Check Valve	1
32	138-049-5	Disc & Holder Assembly for Check Valve	1
33	072-104-1	"O" Ring - Seal Conduit (1 x 1-1/4 x 1/8)	2
34	072-129-3	Locking Ring	1
35	060-057-3	Packing Nut	1
36	882-2xx	Extractor Nipple (Specify Length) (Includes 1 Gasket 031-106)	1
37	027-068-1	Elbow 3/8"	1
38	027-138-1	Brass Elbow	1
39	031-107-1	Bolt Gasket	4
40	066-164-3	Top Plate	1
N/S	144-056-5	Syphon Conversion Kit	1
N/S	026-198-1	Manifold Screw	4
N/S	064-025-3	Packer Casting Only	1
N/S	144-186-5	Check Valve Kit	1

Check Valve Components

REPLACEMENT PARTS LIST — BIG-FLO® SUBMERSIBLE PUMPS

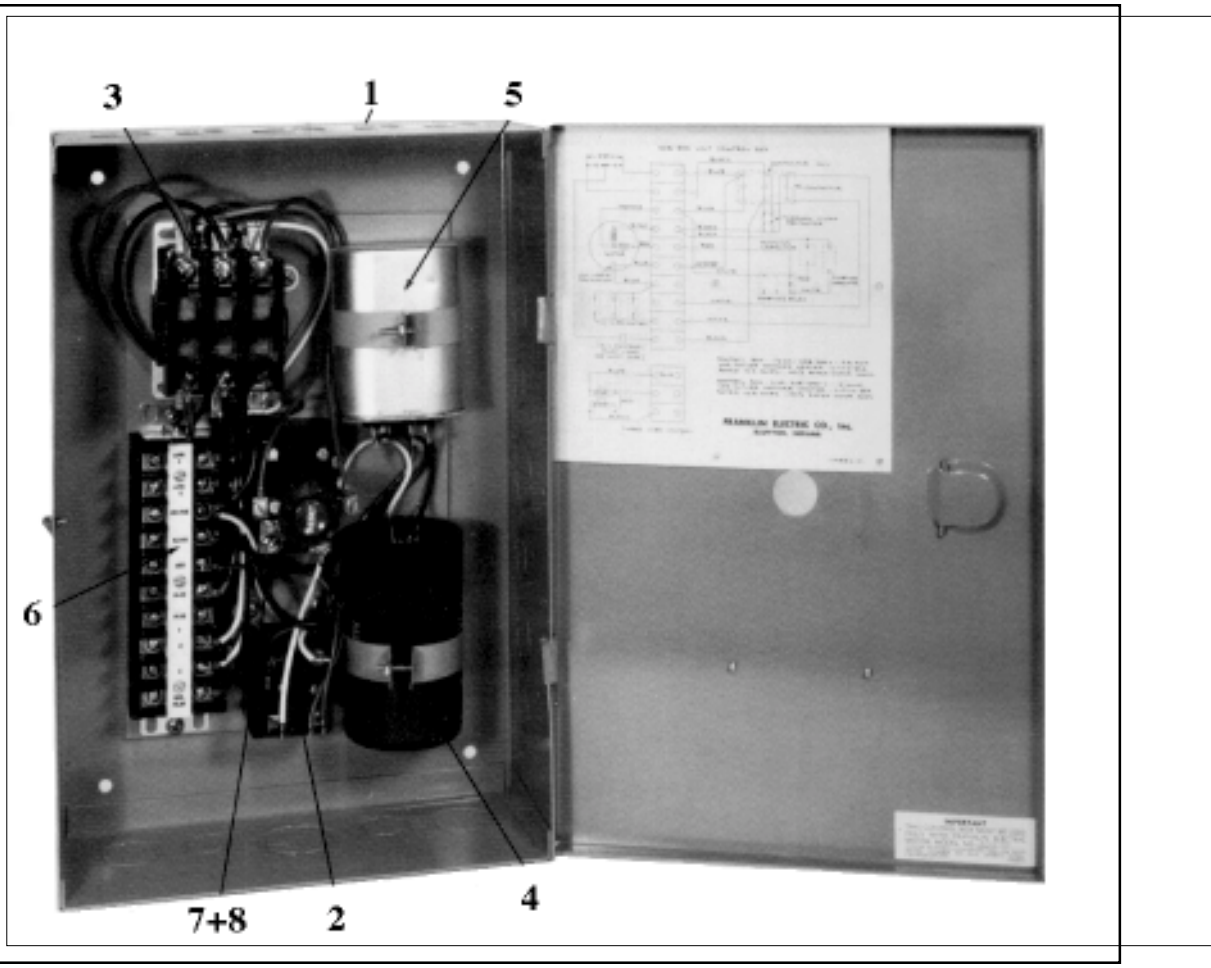
Lower End



Key No.	Part No.	Description	Number Required						
			P100H1-1MB	P150H1-1HB	P200H1-2MB	P200H3-2MB	P300H3-1K	P300H3-2HB	P500H3-2K
1	036-043-3	Motor Head 1	1	1	1	1	1	1	
2	3/8 x 16 x 2	Cap Screw (Obtain Locally)	4	4	4	4	4	4	4
3	3/8	Washer (Obtain Locally)	4	4	4	4	4	4	4
4	213-064-5	Plug & Pigtail Assembly	1	—	—	—	—	—	—
4	213-065-5	Plug & Pigtail Assembly	—	1	1	1	1	1	—
4	213-069-5	Plug & Pigtail Assembly	—	—	—	—	—	—	1
6	011-143-1	Discharge Casting	1	1	1	1	1	1	1
7	001-157-3	Floating Suction Adaptor	—	1	1	—	—	1	—
7	001-026-3	Floating Suction Adaptor	—	—	—	—	1	—	1
7	001-158-3	Floating Suction Adaptor	1	—	—	1	—	—	—
8	072-109-1	“O” Ring (5-5/8 x 5-7/8 x 1/8)	2	2	2	2	2	2	2
9	072-578-1	“O” Ring (1-7/8 x 2-1/8 x 1/8)	1	1	1	1	1	1	1

Only the above listed parts are available for repairs of the lower end of pump. If any other parts need replacing, order Red Jacket pump-motor assemblies. See page 35 for ordering numbers.

MOTOR CONTROL BOX FOR 1-1/2 & 2 HP PUMPS
MODELS P150H1-CB & P200H1-CB



DIMENSIONS:
15-1/4" Height
10-1/8" Width
4" Depth

Key No.	Part No.	Description	No. Req'd.
1	108-402-1	P150H1-CB Complete General Purpose Motor Control Box	1
1	108-403-1	P200H1-CB Complete General Purpose Motor Control Box	1
2	071-047-1	Starting Relay (3ARR3-J3V2)	1
3	071-061-1	Line Contactor Relay (RMB #109152-8)	1
4	011-402-1	Starting Capacitor (160MFD-250 Volt) P150H1-CB)	1
4	011-085-1	Starting Capacitor (200MFD-250 Volt) (P200H1-CB)	1
5	012-253-1	Running Capacitor (10MFD-330 Volt) (P150H1-CB)	1
5	012-253-1	Running Capacitor (15MFD-370 Volt) (P200H1-CB & P200H1CB)	1
6	008-180-1	Terminal Block	1
7	071-062-1	Overload Protector (Cutler Hammer 10-2149)	1
8	023-008-1	Overload Protector Heater Element (Cutler Hammer 10177H-30A) (P150H1-CB)	1
8	023-009-1	Overload Protector Heater Element (Cutler Hammer 10177H-33A) (P200H1-CB)	1

6" Big-Flo®

Magnetic Starter for 2, 3 & 5 HP 3 Phase Pumps

MODELS P200H3-2MB, P300H3-1K, P300H3-2HB, P500H3-2K

NOTICE **The only parts that are available for the Magnetic Starter from Red Jacket are the Overload Heaters. (See chart below)**

WARNING **Three phase model Big-Flo pumps require the use of a magnetic starter.**

HP	Volts	Phase	Magnetic Starter	Overload Heaters	
				Heater No.	Part No.
2	208-230	3	279231-5	K-43	036-072-1
3	208-230	3	279231-5	K-53	036-076-1
5	208-230	3	279231-5	K-61	036-080-1

Ordering Number	Model Number	HP	Volts	Phase	Pump Motor Assy. Length	Pump Motor Assy. Weight
882-841	UMP150H1-1HB	1.5	230	1	28-3/4"	106#
882-839	UMP200H1-2MB	2	230	1	32-1/8"	116#
882-840	UMP200H3-2MB	2	230	1	29-5/8"	116#
882-209	UMP300H3-1K	3	230	3	31-5/8"	120#
882-842	UMP300H3-2HB	3	230	3	34-5/16"	120#
882-211	UMP500H3-2K	5	230	3	42-1/2"	162#

PROCEDURE FOR REMOVAL OF PLUG-IN TYPE PUMP-MOTOR ASSEMBLY

1. Remove Red Jacket Pump from product storage tank.
2. Lay pump in horizontal position.
3. Block pump so that pump end is two inches above surface.
4. Remove four 3/8" cap screws.
5. Using hands, grip pump at extreme bottom and rock in arch not exceeding 1/4" path. This allows pump to free past dowel pin.
6. Slide pump away from column. Watch to be sure electrical (bayonet type) plug-in separates.
7. If plug-in does not disconnect, continue sliding pump motor until plug-in is exposed for hand separating.
8. Assemble new pump motor in reverse order. Check plug-in connection and dowel pin location.
9. Use new pump seal “O” ring which is supplied with pump motor assembly.
10. Lubricate pump “O” ring with silicone lubricant.
11. When drawing up 3/8" cap screws, be sure to draw evenly.

CONVERSION DATA

1 Atmosphere	= 14.7 PSI	1 Imperial Gal.	= 1.20 U.S. Gals.	1 PSI	= 2.04 In. of Hg.
	= 29.92 In. Hg.	1 Inch Hg.	= .491 PSI		= .0703 Kg./Sq. CM
1 Barrel	= 42 Gals. (oil)	1 Kilogram	= 2.2 Pounds	1 Lb.	= .4536 Kg.
1 Cu. Ft.	= 7.48 Gals.	1 Liter	= .264 U.S. Gals.	1 Kg./Sq. CM	= 14.22 PSI
1 Cu. Meter	= 264.17 Gals.	1 Meter	= 3.28 Ft.	1 U.S. Gal.	= .833 Imp. Gal.
1 Ft. Water	= .433 PSI		= 39.37 Inches		= 3.79 Liters

HEAD EQUIVALENTS

1 PSI	= 2.31 Feet of Water		1 In. Hg.	= 1.13 Feet Water	
	= 3.2 Feet Gasoline	(.72 Sp. Gr.)		= 1.57 Feet Gasoline	(.72 Sp. Gr.)
	= 2.9 Feet Kerosene	(.80 Sp. Gr.)		= 1.42 Feet Kerosene	(.80 Sp. Gr.)
	= 2.6 Feet Heating Oil	(.89 Sp. Gr.)		= 1.27 Feet Heating Oil	(.89 Sp. Gr.)

ELECTRICAL DATA

Model Number Pump Motor Assembly	HP	Volt	Phase	Winding Resistances (OHMS)			
				Yellow to Red	Yellow to Blk	Red to Blk	Blue to Blue
UMP100H1-1MB	1	208-230	1	9.5-10.5	3.0-3.6	12.5-14.1	—
UMP150H1-1HB	1.5	208-230	1	7.2-8.3	2.0-2.5	9.2-10.8	0-0.1
UMP200H1-2MB	2	208-230	1	5.4-6.2	1.5-2.0	6.9-8.2	0-0.1
UMP200H3-2MB	2	208-230	3	2.3-3.2	2.3-3.2	2.3-3.2	0-0.1
UMP300H3-1K	3	208-230	3	1.7-2.3	1.7-2.3	1.7-2.3	0-0.1
UMP300H3-2HB	3	208-230	3	1.7-2.3	1.7-2.3	1.7-2.3	0-0.1
UMP500H3-2K	5	208-230	3	.9-1.2	.9-1.2	.9-1.2	0-0.1

The above readings do not include the added resistance of the power supply wires to the submersible pump. Therefore, in order for the readings to fall within the above limits, the resistance should be checked at the submersible pump junction box. If the resistance readings are taken at the control box or magnetic starter, they will be slightly higher. Always make a complete power disconnect before taking resistance readings.

Notes

Section 3
Syphon Systems

Syphon Systems
Engineering Report

While syphon systems for submersible gasoline pumps have become fairly common, problems are still encountered with the priming and maintenance of prime. An outline is herein provided of the system, its proper operation, and means of checking when the system is not working.

Proper Installation

A syphon loop in the form of an inverted "U" is connected between two or more tanks. The syphon primer on the submersible pump is connected to the high point of the "U" loop so that air or vapor can be continually removed while the submersible pump is operating. The horizontal pipe should be provided with minimum of 1/8 inch per foot of rise to the primer connection, or more where room allows, to allow for settling of the tanks. The ends of the syphon loop, terminated in the tanks, should be between two and five inches off the bottom of the tank. If they are closer than this, it is possible to pull dirt or water from the bottom, or even to have the ends sealed off against the bottom if the tank should be flattened due to handling or backfilling.

A minimum number of fittings and pieces of pipes should be used to reduce the number of joints where a leak can occur.

NOTICE **Occasionally, a syphon loop will be connected between tanks of different grades and isolated by a valve so that the auxiliary tanks can be shifted to store different products. Many states' weights and measure authorities do not allow such a connection, but where it is allowed, care should be taken to see that the bonnets of the valves are tight and there is no possibility of a leak.**

Operation of Syphon Primer

All remote submersibles of today use a nozzle-venturi combination for creating vacuum used for priming the syphon loop. Depending upon the design, this nozzle-venturi combination will develop a vacuum of 10 to 25 inches of mercury by injecting some of the fluid of the discharge from the pump through the nozzle into the venturi causing a low pressure area (vacuum). One inch of mercury is equal to approximately 1.5 feet of gasoline; therefore, these primers are capable of priming gasoline syphon systems a vertical distance of 15-20 feet, depending on the vapor pressure of the product.

Again, depending on design, the depth of gasoline, the size of the tanks, and the size of the pipe and its length, the empty loop priming time will take from less than two minutes to as much as ten minutes for large tanks, nearly empty. Once the loop is primed, the purpose of the primer is to continue to remove any bubble of vapor or dissolved air which come out of the gasoline and form in top of the loop due to the low pressure in the loop.

The syphon primer system requires a syphon check valve to prevent the back flow of gasoline and the entrance of air when the pump is turned off. This check valve becomes necessary when the lower end of the syphon air-eliminator tube is above the level of liquid. Without the check valve, air would enter the tube and break the vacuum in the syphon loop.

It should be noted that most manufacturers extend the syphon-priming air-elimination discharge tube down to the head of the pump motor. With this arrangement, the leaking check valve will not cause loss of prime in the syphon loop until the level in the pump tank falls below the end of this tube. The end of this tube is roughly 27 inches off the bottom of the tank.

Situations Which Cause Loss of Prime

The indication of an improperly operating system is the fact that the fluid levels of the tanks do not drop together. A series of relatively simple tests can be made to isolate the problem which can be categorized into five areas:

(1) The submersible pump syphon primer not working.
(2) A syphon check valve not holding.
(3) A leak in the tube, fittings, or pipe of the syphon loop.
(4) One of the syphon pipes shorter than specified, causing the syphoning to cease operating at a given level.
(5) Blockage of the syphon pipe due to foreign material, such as a rag, or due to caving in of the tank bottom (or top) such that it can block the syphon loop pipe.

Troubleshooting Syphon System

CAUTION **Disable Power To The Pump**

Install the valves and vacuum gauge* assembly (Fig. 1) between the syphon check valve and the syphon loop. Special care should be taken to pretest this assembly to make sure that all of the fittings and valve bonnets are tight. Note the use of clear plastic (Ti-gon). This can save many hours of troubleshooting.

Steps for Isolating Problems When Clear Plastic Tube is Used Wtih Test Assembly

1. Syphon Primer

Start pump, leave dispenser nozzle closed, open valve No. 2, and observe the gauge. 10 to 25 inchesof mercury is considered normal. A reading below 10 inches may indicate a partially plugged nozzle or venturi in the pump or the passage leading to or from these parts, or a significant leak in the vacuum line. A zero pressure reading indicates a completely inoperative primer, or a completely plugged line from the primer to the valve assembly, or a plugged air eliminator 1/4-inch pipe which runs down to the submersible motor. A significant leak in the vacuum line connected to the pump will also cause the same indication.

2. **Leaving valve No. 2 closed,** turn off the submersible pump. The system should hold the vacuum (10 to 25 inches) for at least 15 minutes. If it fails immediately, recheck all the test fittings and, if tight, then the syphon check valve is not holding and should be replaced with a new one.

It may be that the check valve will hold adequately under a high vacuum, but may leak under a low vacuum. It is recommended that if it holds satisfactorily at the higher reading, then the vacuum should be bled off and a retest made to see if the check valve will hold properly at five inches.

NOTICE **See *Operation of Syphon Primer.***
***A compound gauge is recommended as a plugged primer valve can cause pressure under certain conditions.**

3. Syphon Loop

Start the pump, then open both valve No. 1 and No. 2; leave

the dispenser nozzles closed and observe the gauge for ten minutes. Normal priming will take from two to ten minutes. It will be noted that at first the vacuum gauge will indicate zero; after a while it will begin to show some vacuum. Remember, for every one inch of mercury vacuum, the level in the pipes above the fluid level in the tanks is about 1-1/2 feet. As the fluid rises in the pipes, the vacuum increases accordingly. Therefore, the maximum primer reading of 10 to 25 inches will not be obtained on this test.

When fluid enters the primer tube, it will first appear mixed with bubbles. It will be noticed that the gauge needle will dance as the mixture of air bubbles and gasoline passes through the test assembly. As the bubbles disappear and only fluid is in the tube, the gauge will settle down to a slightly higher value than was obtained just before fluid entered the plastic tube.

These bubbles should disappear in less than five minutes, if the system is tight, although it might take a little longer if the fluid levels in the tanks are considerably unequal. If bubbles continue to appear (the gauge needle will continue to dance) after 20 minutes, it can be definitely ascertained that there is a leak in the syphon loop, the tube, or in the connection to the loop.

With the above tests, the main causes of syphon trouble should have been isolated. If all of the tests appear positive and there is no indication of leaks or malfunction, then a period of time (see chart No. 1) should be used to gauge the levels in the tanks to see if the fluid is transferring after the system has primed. If the tanks level in the estimated period of time, it can be assumed that the system is operating properly at the time of the check. If the priming system appears to work properly but the tanks do not level within the expected amount of time, it may be assumed that the syphon "U" is plugged.

If the problem cannot be located, it might be caused by a leak below the present level of fluid in the tanks or due to a short vertical syphon pipe in one or both tanks. It is possible to determine this roughly by the test indicated "Pressure Method of Testing."

Syphon Test Made Without a Clear Plastic Tube

If clear plastic has not been used in the test set-up, then an additional series of tests are necessary to isolate the problem, as follows:

Repeat steps No. 1 and 2 under "Steps for Isolating Problems…" Next, repeat step No. 3 and as soon as the system is primed, as indicated by a sharp change in the gauge reading or needle dancing momentarily or continuously, allow the system to continue to operate for approximately 20 minutes. If the needle continues to dance, it is strong evidence that air is continually being pulled in. To further verify this, valve No.1 between the gauge and the syphon primer check valve is then closed. The reading on the gauge will indicate approximately the height of the fluid in the loop above that in the tanks to the gauge. This should be observed for at least 30 to 40 minutes. The gauge will hold constant for a while, even if there is a leak in the loop. This is because all of the fluid must drain out of the horizontal pipes first, and since there is not appreciable fall in level, it will be hardly noticed by the gauge reading.

When the horizontal pipe is finally drained, then the fluid will begin to lower in the vertical pipes and the vacuum will begin to fall off as indicated by the gauge. It should be noted that the higher the level of fluid in the tanks, the longer the period of time required for this action to take place. With nearly full tanks, it will be almost impossible to accurately determine this without visual observation, as could be obtained with a plastic tube.

If there is no change in the vacuum reading, after one hour, then attention should be directed to the syphon check valve. The valve No. 1 can then be opened and if the gauge begins dropping shortly after, then the syphon check valve is suspected and may be operating erratically. This test should be repeated, but the long period of time is not necessary and both valves should remain open. If the loss of vacuum occurs in a much shorter period of time than the original test, then it is very likely that there is a leak inside the syphon check valve and it should be replaced.

Pressure Testing the Syphon Loop

If the storage tanks are nearly full, it may be difficult to locate a leak in the syphon "U" with the vacuum tests. An alternate method is suggested using pressure. For this test it is necessary to have an accurate pressure gauge with 1/2-psi-or-finer divisions. (The maximum reading in a 12-foot tank will be less than 4 psi.)

Connect the gauge to the syphon primer system and install. Connect a tube with a "Shroeder" valve so that air pressure can be applied and held, as shown in figure 2.

Apply air until it bubbles from the bottom of the syphon "U." Stop the air and read the gauge. The gauge reading in psi x 3.1 (gasoline sp. gr. 0.74) indicates the feet of gasoline over end of the vertical pipe with the least submergence. Observe the gauge for one hour. If the gauge drops, then levels off at a value above zero, there is a leak in the vertical "U" pipe under fluid at the new psi reading x 3.1 feet under the gasoline levels. If the gauge drops to zero, there is a leak above the fluid levels.

For Example:

Two six-foot storage tanks connected by a syphon "U" with ends four inches off the bottom and tank levels at 68 and 60 inches (above the bottom) would give an initial psi reading of 1.5 psi.

$$\frac{(60" - 4" = 56")}{12"/\text{ft.} \times 3.1\ \frac{\text{ft.}}{\text{psi}}} = 1.5 \text{ psi}$$

If the pressure gradually fell to .75 psi and held, it would indicate a loose joint or crack approximately 28 inches down from the fluid surface in either of the vertical pipes. (If there is more than one leak, accurate determination becomes very difficult) .75 psi x 3.1ft./psi = 2.3 feet = 28" under the surface of the tank level. This would place it at 40 inches above the bottom of tank No. 1 (68-inch level) or 32 inches above bottom of tank No. 2 (60-inch level).

Eliminating a Troublesome Syphon Check Valve Problem

Experience has shown that on a few installations the syphon check valve cannot be made to hold consistently. This could be in a station located near a subway or heavy truck traffic. The constant vibration of the check valve prevents its seating consistently. It could also be a condition where an extreme amount of dirt is being pulled into the check valve. This is only a problem

Syphon Systems
Engineering Report (cont.)

after the fluid level drops below the end of the combination air-eliminator syphon-priming tube just above the motor, and is further aggravated in cases where only two or three feet of gasoline are normally kept in the storage tank.

If the dealer reports, "The syphon works fine until the level drops below about 27 inches in the pump tank, the product won't come over then from the other tank," this is a clue that the syphon check isn't holding at the time when the bottom end of the air-eliminator syphon-purge tube is above the liquid, and air goes up the tube and the vacuum in the loop is broken. (It could also be a short syphon loop pipe.) Once it is broken, the submerged pump usually must be run continuously to re-purge the loop and be kept running until the tank is level.

Where the replacement of the syphon check valve still does not cure the complaint, and a short syphon pipe has been eliminated as the cause, the solution is to eliminate the need for the syphon check. One is never needed if the air-eliminator syphon-purge tube is extended to the bottom of the tank, or at least to a point below the submerged pump intake. This is not a simple task since the pump-motor and tube will not pass through the riser at the same time. However, it can be done by following these instructions.

1) Turn off the power and remove submerged pump from storage tank.
2) Take off the 1/4-inch air-eliminator syphon-purge tube which terminates near top of the motor. (1/8-inch copper tubing was used on some pumps.)
3) Obtain a piece (about 30 inches) of high grade, gasoline resistant rubber tubing, such as driveway alarm bell hose. Clamp this securely to the end of the 1/4-inch tubing.
4) Insert the pump back into the tank, just far enough to pass the motor through the top of the tank, and hold the pump right there.
5) Insert the rubber tubing down alongside the 1-1/2 inch vertical pipe and into the tank, also.
6) Now, replace the upper end of the 1/4-inch tube back into position from which it was removed.
7) Securely clamp the 1/4-inch pipe to the 1-1/2 inch pipe at both top and bottom ends.
8) Next, lower the submersible pump all the way into the tank and lock it in place securely by replacing all bolts, etc. In so doing, the rubber end of the air-eliminator syphon will extend to, or near, the bottom of the tank.
9) Turn on power supply and pump five or ten gallons through each dispenser to purge air from the system.
10) Repeat test No. 2. Check the Syphon Check Valve. With the rubber tube extension hanging below the pump intake and possibly right on the bottom of the tank, the vacuum on the vacuum gauge will hold a value equal to the fluid column indefinitely, with the pump turned off, and assuming there are no leaks in the piping.

Approximate Transfer Rates in GPM Between Tanks at Various Differential Levels

Chart No. 1
(Assume: 25 feet pipe, two 90° elbows)

Tank Level	Transfer Rate—GPM		
Differential—Feet	**1-1/2" Pipe**	**2" Pipe**	**2-1/2" Pipe**
1/4	8	16	25
1/2	11	23	35
1	16	33	50
2	23	46	70
3	28	56	86
4	32	64	100
5	35	70	112
6	40	80	125
8	45	90	150

Approximate time for Tanks to Equalize

For a rough approximation of the time necessary to equalize the level in two tanks, the means average flow rate may be used:

e.g., Two 6000-gallon tanks 6'3" diameter
Connect with two-inch pipe
No. 1 tank 24-inch fluid (1740 gallons)
No. 2 tank 60-inch fluid (5300 gallons)
Differential level (H) = 36 inches = 3 feet
Flow rate at 3 feet differential head = 56 GPM
Average flow rate = 56/2 = 28 GPM

Gallons to equalize $\frac{5300-1740}{2}$ = 1780 gallons

Time to level (approx.) $\frac{1780 \text{ gal.}}{28 \text{ g/m}}$ = 64.5 min.

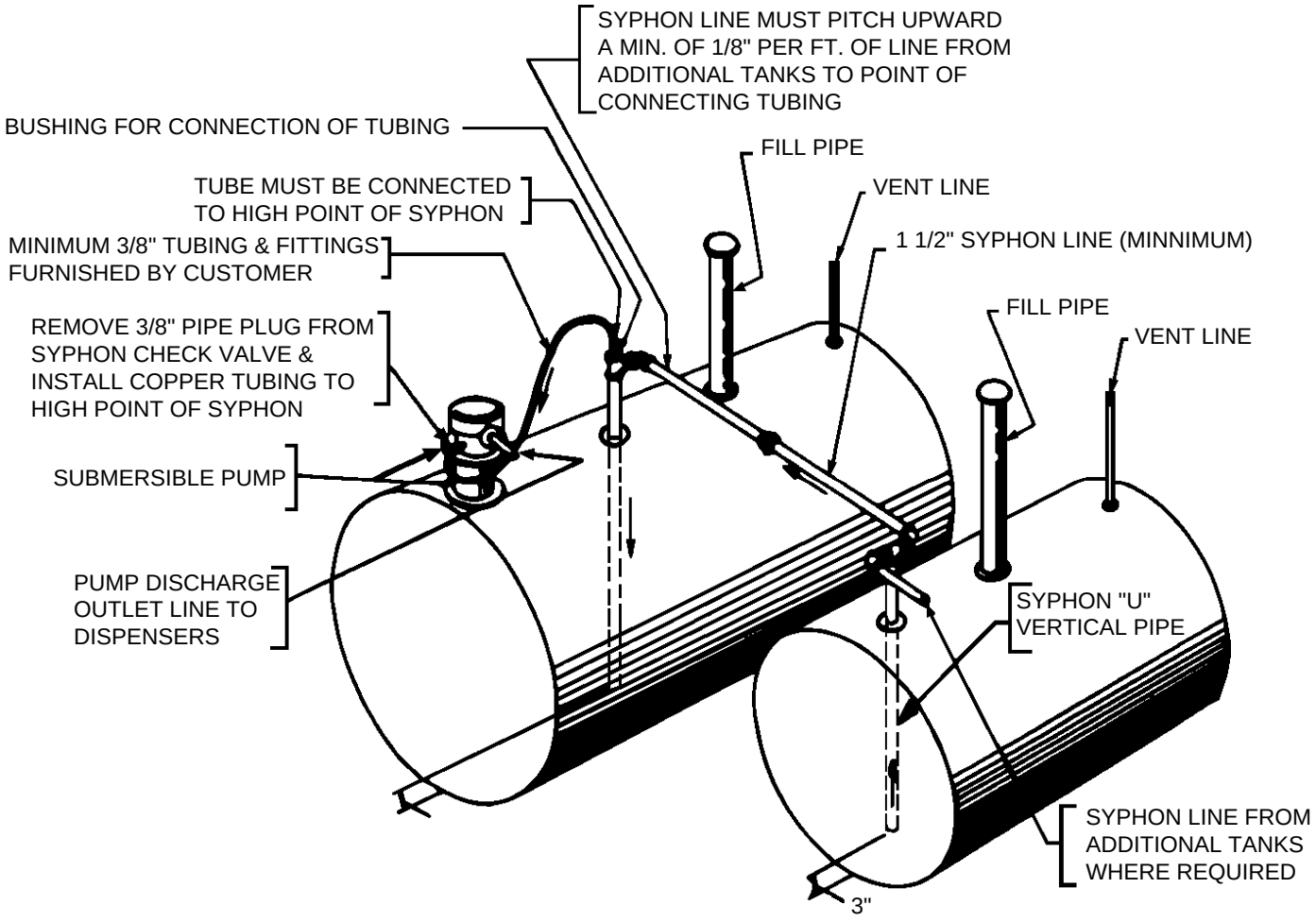
This solution assumes velocity and therefore flow rate to be linear, which it is not. It is actually parabolic, but for estimating purposes the linear assumption will give an adequate answer.

Approximate Priming Time

The time shown in the chart is based on two-inch piping, two tanks, ten feet of horizontal syphon piping, and the fluid levels approximately equal. If the levels are not equal, an average may be used for estimating purposes.

Chart No. 2

Distance to Fluid Level-Feet	Time to Prime-Minutes
1.0'	2.0
2.0'	2.3
3.0'	2.7
4.0'	3.0
5.0'	3.3
6.0'	3.7
7.0'	4.0
8.0'	4.3


SYPHON LINE MUST PITCH UPWARD
A MIN. OF 1/8" PER FT. OF LINE FROM
ADDITIONAL TANKS TO POINT OF
CONNECTING TUBING
BUSHING FOR CONNECTION OF TUBING
FILL PIPE
TUBE MUST BE CONNECTED
TO HIGH POINT OF SYPHON
VENT LINE
MINIMUM 3/8" TUBING & FITTINGS
FURNISHED BY CUSTOMER
1 1/2" SYPHON LINE (MINNIMUM)
FILL PIPE
REMOVE 3/8" PIPE PLUG FROM
SYPHON CHECK VALVE &
INSTALL COPPER TUBING TO
HIGH POINT OF SYPHON
VENT LINE
SUBMERSIBLE PUMP
PUMP DISCHARGE
OUTLET LINE TO
DISPENSERS
SYPHON "U"
VERTICAL PIPE
SYPHON LINE FROM
ADDITIONAL TANKS
WHERE REQUIRED
3"

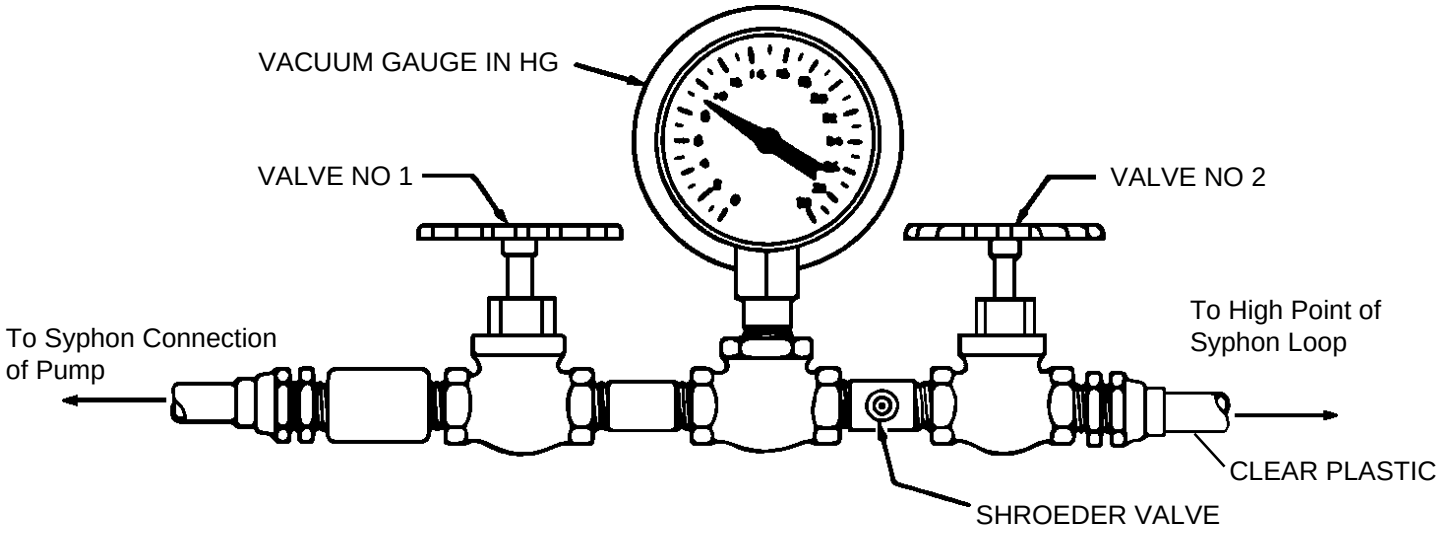


FIGURE 1 — VACUUM TEST

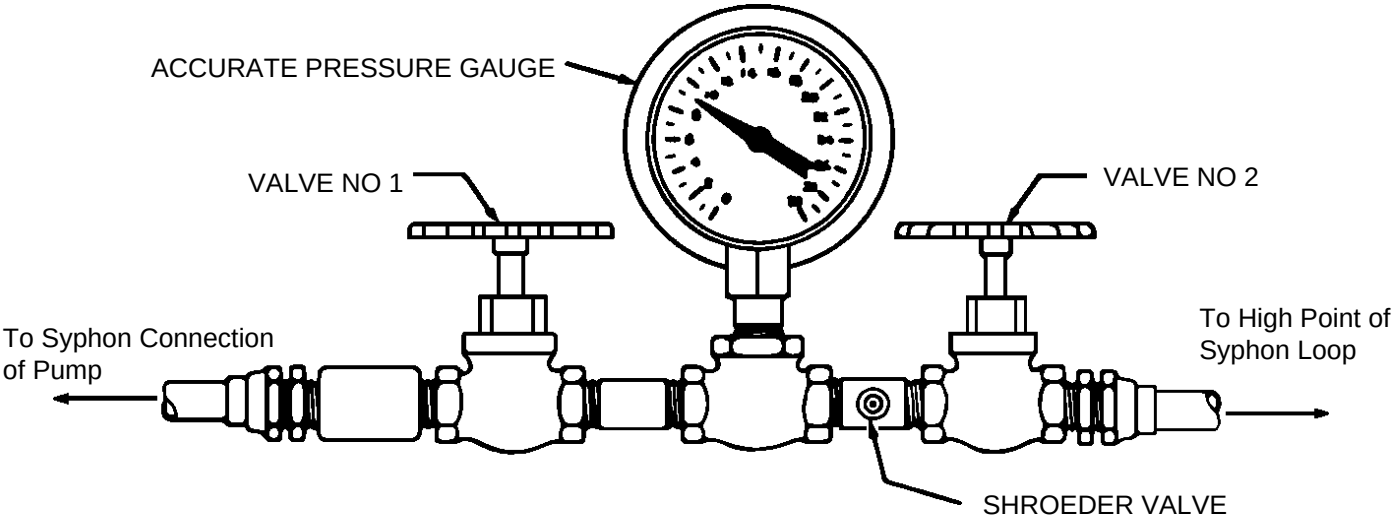


FIGURE 2 — PRESSURE TEST

"EXTRACTA" MODELS P33R1, P75S1 & P150S1

Effective March 1, 1991, the following changes were implemented on the subject units.

STANDARD "EXTRACTA" UNITS are shipped less syphon capability unless specifically ordered (less the coupling, and the 1/4" syphon pipe, that is attached to the "S" pipe leading from the bottom of the manifold and to the column pipe by steel bands, as well as the syphon check valve). This does not affect the operation of the unit in non-syphon installations. Syphon capability is an optional add-on.

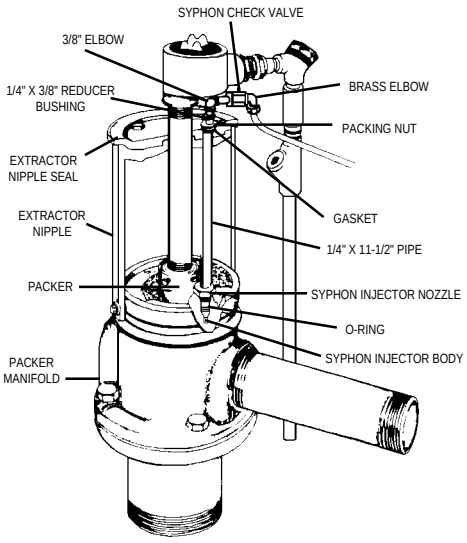
UNITS ORDERED WITH SYPHON will be shipped with the syphon coupling, pipe and syphon check valve complete.

FIELD RETROFIT SYPHON KIT

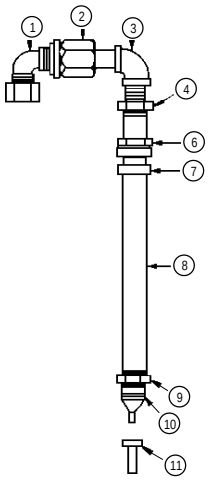
A field retrofit syphon kit is available in order to provide syphon capability to pumps already in the field. The retrofit part number is 144-106-5.

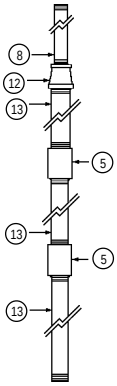
BIG-FLO® MODELS

UNITS ORDERED WITH SYPHON will be shipped with items listed below. These items are also available in a field retrofit kit, part number 144-056-5.



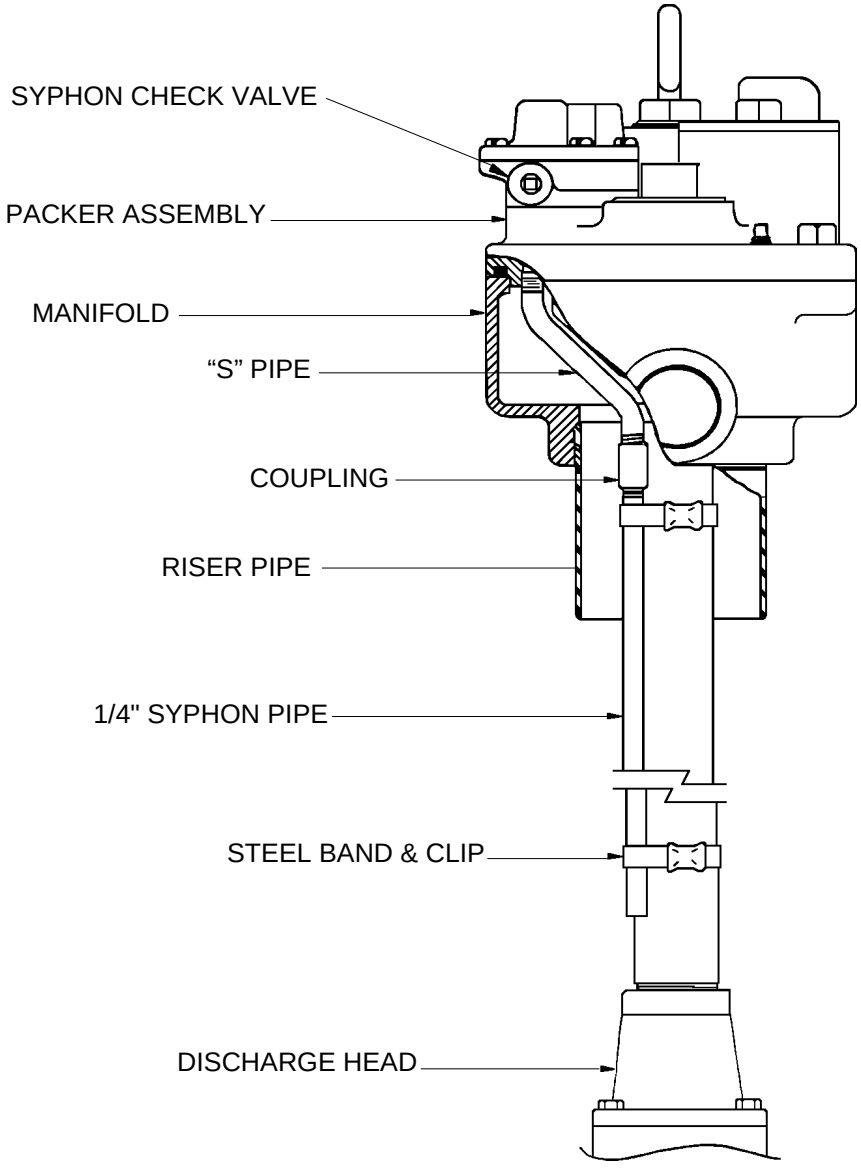
Item	Description	Part No.
1	Brass Elbow	027-138-1
2	Syphon Check Valve	188-079-5
3	3/8" Elbow	027-068-1
4	Reducer Bushing	027-065-1
5	3/8" Coupling	027-122-1
6	Packing Nut	060-048-1
7	Gasket	031-097-1
8	1/4" x 11-1/2" Nipple	065-073-1
9	Syphon Nozzle	058-029-3
10	O-Ring	072-110-1
11	Syphon Injector Body	008-167-3
12	Reducer Coupling	027-027-1
13	3/8" x 24" Pipe	065-523-3
	Packer O-Rings	072-108-1





Syphon Systems

Illustration



Symptom	Probable Cause	Suggested Action
NOTICE **Use of the test apparatus (Fig. #1, Pg. 42) with the instructions (beginning Pg. 38) are recommended as the most efficient method of determining the cause for malfunction.**		
Total or partial loss of vacuum and/or pressure reading at vacuum line.	Obstruction in syphon nozzle, venturi (#1) or air flexible wire down air eliminator tubing.	Remove nozzle & venturi clean & reinstall. Run eliminator tubing (#2).*
	4" Vent closing screw on functional element not all the way up (#3).	Adjust to full-up position.
Vacuum will not hold.	Malfunction syphon check valve (#4).*	Test same, replace if defective. (See engineering report pg. 38.)

*Excessive sediment on the bottom of the tank can cause reoccurrence of this problem. Turbulence occurring during filling of the tank places this sediment in suspension, allowing it to be drawn into the functional element via the vacuum line or the pressure relief system. Removal of sediment from tank bottom may be necessary.

Notes

Section 4

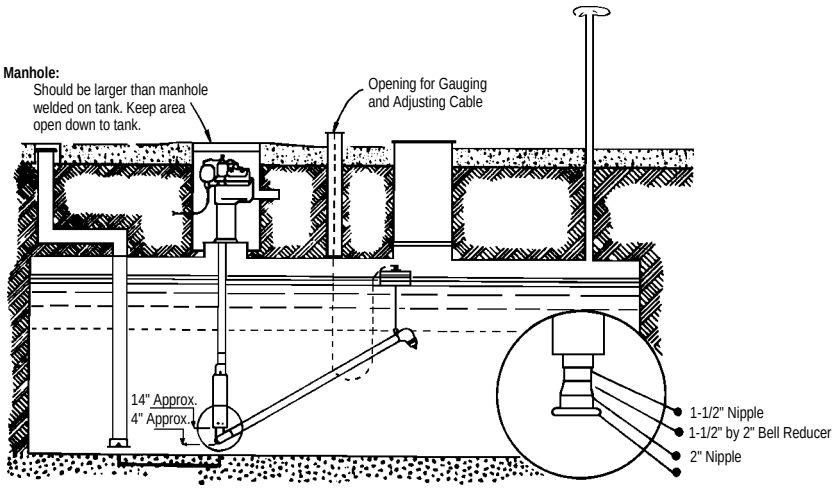
Floating Suction & Dual Pumps Manifolded to Same Discharge System

Floating Suction
Recommended Installation

RECOMMENDED FLOA TING SUCTION INST ALLA TION

NOTICE **Red Jacket supplies the adapter only; <u>not</u> the apparatus.**

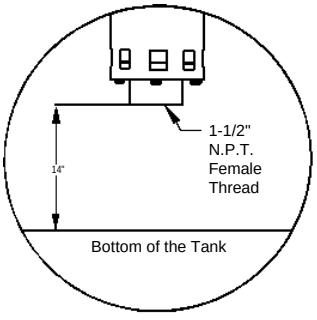
NOTICE **Red Jacket petroleum and solvent pumps are centrifugal type pumps and as such are not designed to pump product when the level is below the bottom end of the pump/motor assembly.**



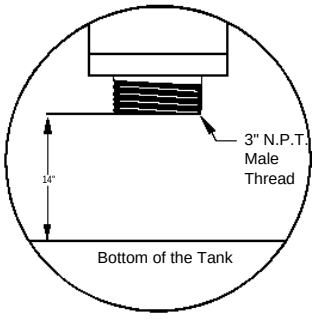
- The floating suction arm can be mounted to pump previous to installing in tank.

  See example of adaptation to floating suction assembly below.

- Easy service access is provided by unbolting manhold lid through which pump is mounted and removing entire assembly.



4" Petroleum Adapter



6" Petroleum Adapter

Adaptation to Floating Suction Assembly (use standard NPT threaded fittings).

Use proper thread sealant and insert gasket between flanges of floating suction and pump.

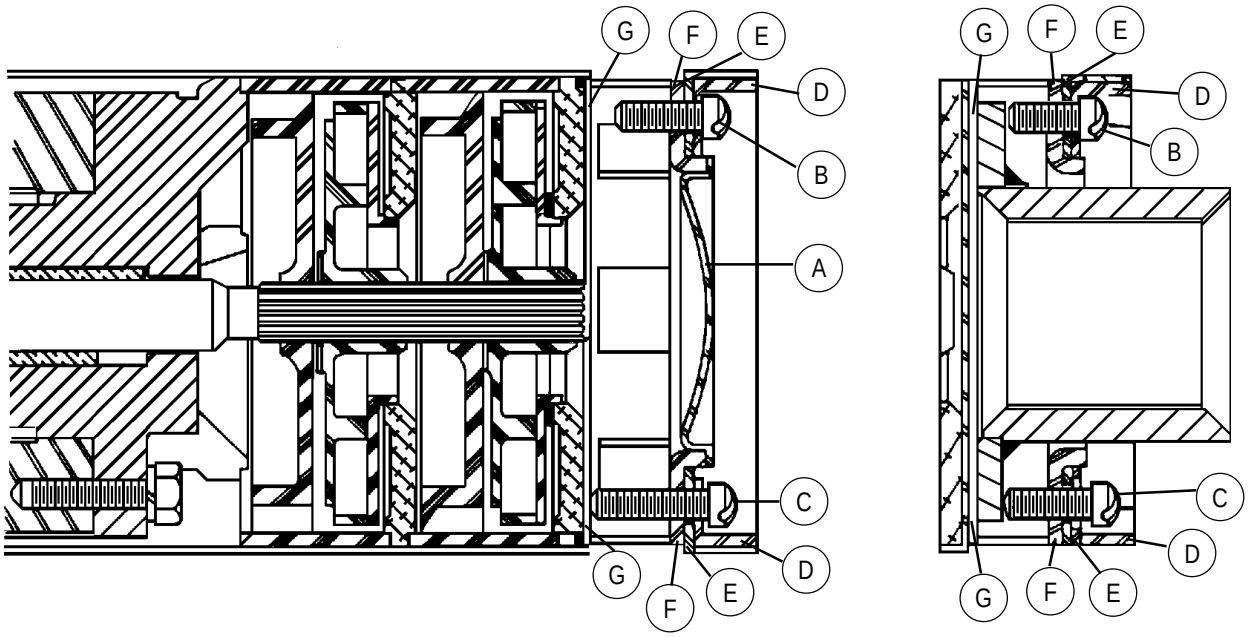
Floating Suction Adapter for Pumps Manufactured Prior to 9/1/82

Units manufactured after this date cannot be retrofitted. If floating suction adapter is desired, unit must be ordered equipped with same.

1. Remove cap (A) (no longer needed) by inserting tool under edge and prying upware (i.e., screwdriver, chisel, etc.).
2. Remove all screws (B & C); save for reuse.
3. Remove in order of appearance, spacers (D, E, F) last. The solid ring (G) “O” ring retainer is not to be removed.
4. Place gasket* on top of (G) ring.
5. Place floating suction adapter on gasket.
6. Replace in reverse order, as removed, spacers (F, E, D).
7. Replace screws (C & B) in original position and tighten as specified on drawing.

*Use ring (G) as a template and construct gasket of any gasoline resistant 1/8" gasket stock. A good improvision is to remove the center from a discharge head gasket part no. 031-136, shown as item 28 on page 3 of 4" Petroleum Pump Parts List in this manual.

NOTICE **Apply sealant to threads. Torque 27-33 inch/lbs.**



Dual Pumps

4" Pump Installation

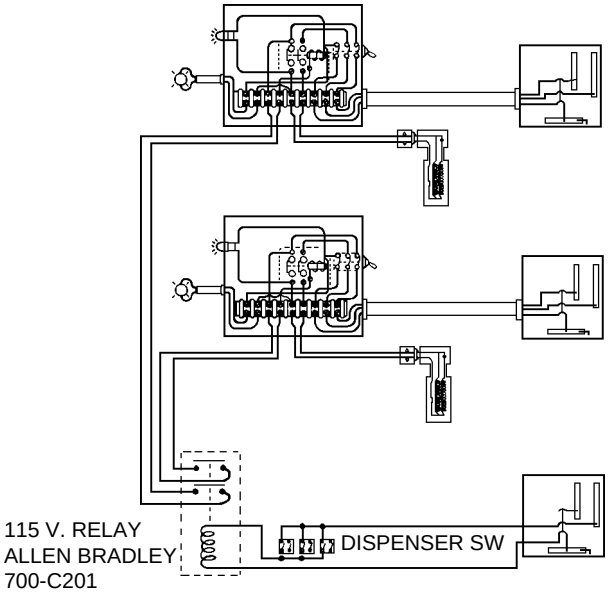
Installing dual submersibles manifolded in the same system.

This type of system is often used when greater flow rates are needed. If installed according to the illustration below (Fig. 1), manifolded systems offer back-up support in that operations could continue should one unit fail.

WARNING **Proper check valves, with pressure relief, must be installed in the discharge line of each pump to prevent product from being pumped through the pressure relief system of the adjacent pump when it is not running. Check valves must be compatible with the fuel blend being pumped.**

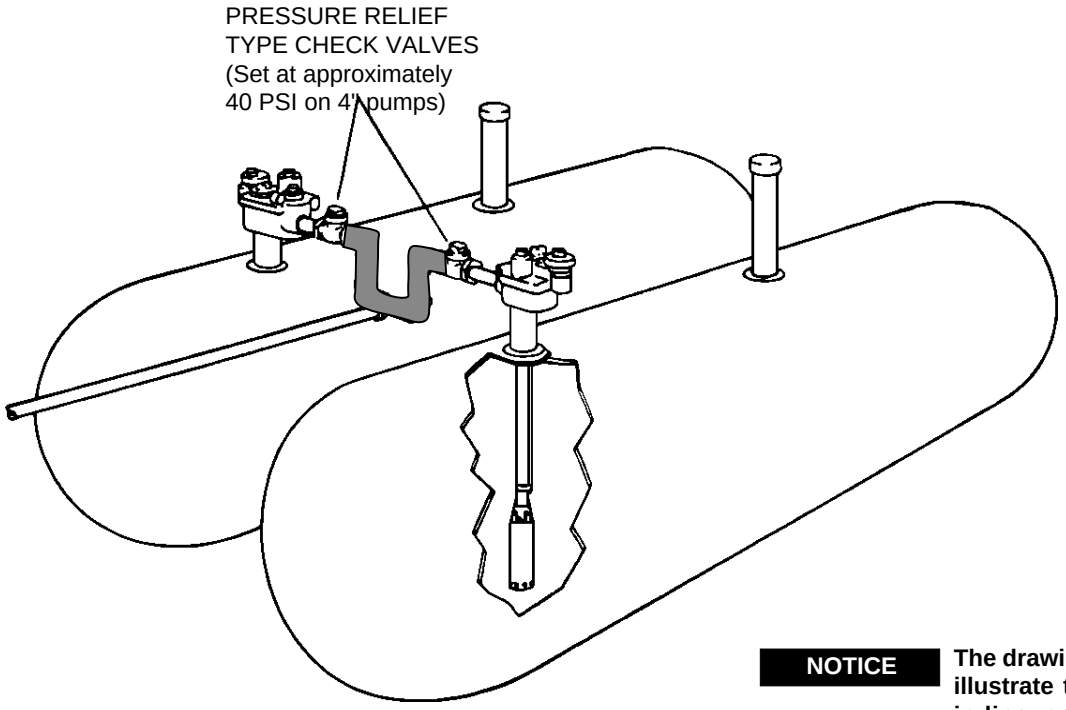
This diagram (Fig. 2) shows the wiring allowing both submersibles to operate simultaneously with any combination of dispensers turned on. To operate individually, the appropriate toggle switch, located externally on the side of the control box must be turned off manually. The check valves and 220/240 volt relay are not available from Red Jacket and should be purchased locally.

Fig. 2



Suggested diagram for wiring dual manifold system.

Fig. 1



NOTICE **The drawing shown here is to illustrate the requirement for in-line pressure relief type check valves. It is <u>not</u> a recommended guide for installation of piping downstream of the check valves.**

INSTALLING DUAL BIG-FLO ® SUBMERSIBLES MANIFOLDED IN THE SAME SYSTEM

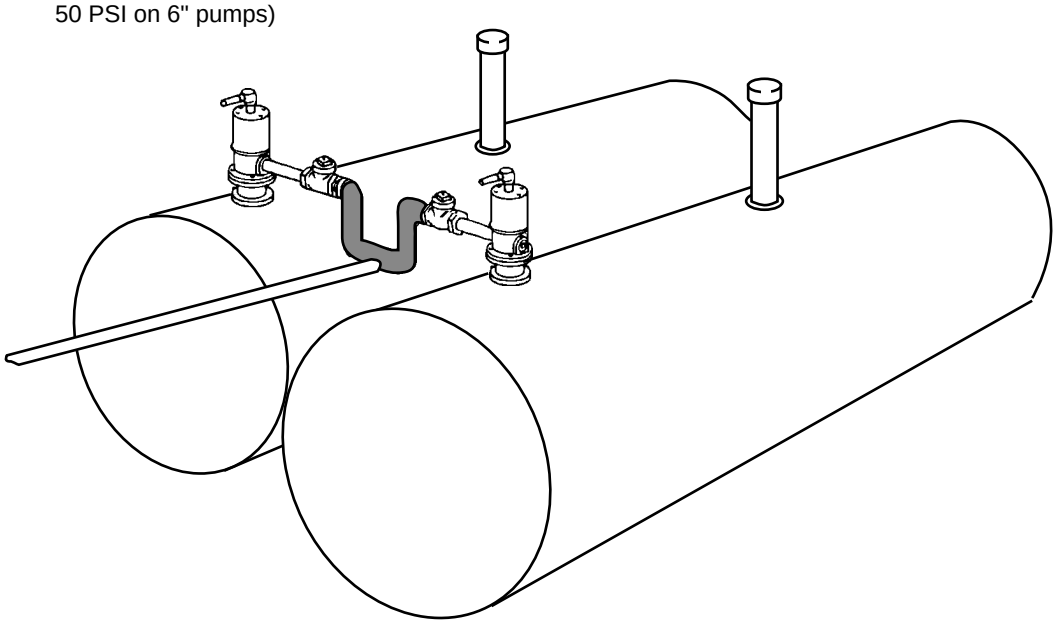
This type of system is often used when greater flow rates are needed. If installed according to the illustration below (Fig. IX), manifolded systems offer back-up support in that operations could continue should one unit fail.

The check valves shown installed in the discharge line of each pump are necessary to prevent product from being pumped through the pressure relief system of the adjacent pump, if that pump is not running. This is because the expansion relief valve operates at below pump pressures. If check valves without pressure relief were used, there would be no provision for thermal expansion between the valves and the dispensers.

It is preferable that the wiring allow both submersibles to operate simultaneously with any combination of dispensers turned on. To operate individually, the appropriate switch could be turned off manually.

Fig. IX

PRESSURE RELIEF
TYPE CHECK VALVES
(Set at approximately
50 PSI on 6" pumps)



NOTICE

The drawing shown here is to illustrate the requirement for in-line pressure relief type check valves. It is <u>not</u> a recommended guide for installation of piping downstream of the check valves.

Notes

Section 5
Warranty

For complete details
on Red Jacket's
Warranty Policy and Procedures,
see Manual #5194.

Warranty

Procedures

OUR PROMISE OF QUALITY:
The Marley Pump Company, a division of the Marley Company, guarantees Red Jacket products as to workmanship, material, and performance when they are properly installed, used and cared for.

OUR COMMITMENT WITHIN THE CONTINENTAL UNITED STATES:
Should any part(s) fail within the parts period specified below, it will be repaired or replaced and returned, free of charge, provided the part(s) is returned to Red Jacket's point of manufacture transportation prepaid.

Should any part(s) fail within the labor period specified below, Red Jacket will also pay for the reasonable services of an authorized service representative for on-site repair or replacement of the defective part(s).

SCHEDULE OF WARRANTY PERIODS:

Product	Parts From Date of Manufacture	Labor From Date of Installation*
Submersibles	18 Months	12 Months
Except: Solvent Pumps	6 Months	3 Months
Leak Detectors	18 Months	6 Months
Retractors	6 Months	None
Electronic Systems	18 Months	6 Months
Except: Vapor Probes	6 Months	None

* Installation date will revert to the Date of Manufacture without a previously submitted Installation Report #WAF01 which was received within 15 days after the installation. Regardless of installation date, under no condition can labor warranty extend beyond the parts warranty.

EXCLUSIONS:

Normal (Routine) Maintenance:
Normal or routine maintenance such as cleaning, lubricating or adjusting components and assemblies or for replacing consumable items such as paper, ribbons, filters, bulbs, etc., are excluded from this warranty.

Transportation Damage to Equipment:
Should equipment be damaged in transit or handling, it is the responsibility of the distributor or customer to file a damage claim with the responsible carrier. Latent damage must be reported to the carrier within 14 days of the date of delivery and an inspection by the carrier must be requested. Damage caused in transit or by handling is not the responsibility of Red Jacket and is not covered.

WARRANTY DISCLAIMER AND LIMITATION OF LIABILITY:
THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESAID EXPRESSED WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS AGREEMENT.

MANUFACTURER EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ARISING IN CONNECTION WITH THIS PRODUCT, INCLUDING WITHOUT LIMITATION PURCHASER'S LOSS OF STORED LIQUIDS OR DAMAGE TO THE GROUND, UNDERGROUND OR ENVIRONMENT, WHETHER ARISING UNDER THEORIES OF TORT, NEGLIGENCE, STRICT LIABILITY, CONTRACT OR OTHERWISE.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitation on the duration of implied warranties so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

DATE CODES PRIOR TO JANUARY 1, 1978

The location of the date code stamp is shown on the opposite side of this letter. On pumps manufactured prior to January 1978, the date code was stamped as shown below, using a letter code system.

Year	J	F	M	A	M	J	J	A	S	O	N	D
1972	AG	BG	CG	DG	EG	FG	GG	HG	KG	LG	MG	NG
1973	AH	BH	CH	DG	EG	FG	GH	HH	KH	LH	MH	NH
1974	AK	BK	CK	DK	EK	FK	GK	HK	KK	LK	MK	NK
1975	AL	BL	CL	DL	EL	FL	GL	HL	KL	LL	ML	NL
1976	AM	BM	CM	DM	EM	FL	GM	HM	KM	LM	MM	NM
1977	AN	BN	CN	DN	EN	FN	GN	HN	KN	LN	MN	NN

DATE CODES AFTER JANUARY 1, 1978

To eliminate the necessity of checking the above cross-reference table, all pumps manufactured after January 1, 1978, use the following date code system.

Example — 1 01 78

Year of Manufacture	(1978)
Month of Manufacture	(January)
Week of Month of Manufacture	(1st Week)

Warranty

Notes

For Additional Assistance,
Contact theTechnical Support Group-Petroleum Products
The Marley Pump Company
5800 Foxridge Drive
Mission, KS 66202
Phone: 1-800-2-MARLEY
(1-800-262-7539)

Notes

Warranty

Notes

Section 4

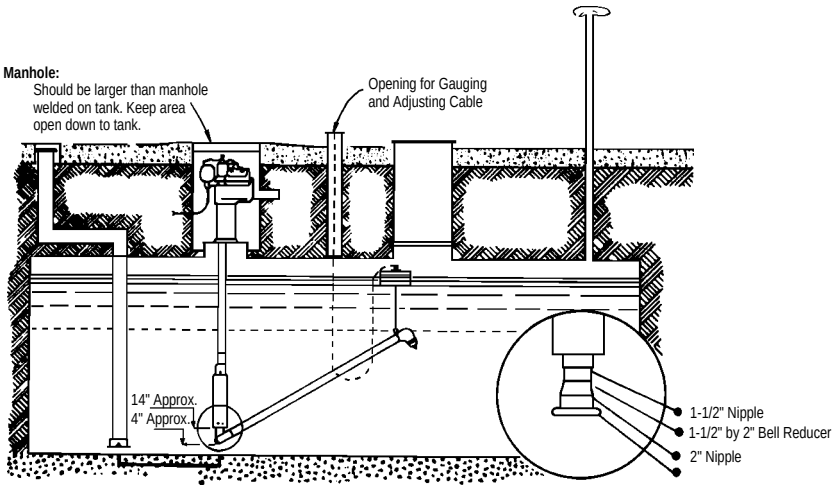
Floating Suction & Dual Pumps Manifolded to Same Discharge System

Floating Suction
Recommended Installation

RECOMMENDED FLOA TING SUCTION INST ALLA TION

NOTICE **Red Jacket supplies the adapter only; <u>not</u> the apparatus.**

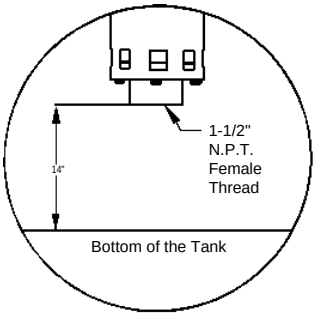
NOTICE **Red Jacket petroleum and solvent pumps are centrifugal type pumps and as such are not designed to pump product when the level is below the bottom end of the pump/motor assembly.**



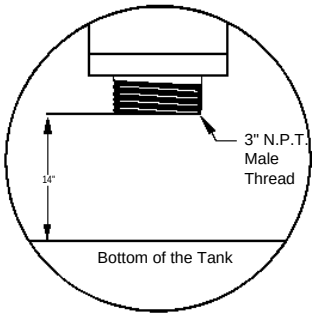
- The floating suction arm can be mounted to pump previous to installing in tank.

  See example of adaptation to floating suction assembly below.

- Easy service access is provided by unbolting manhold lid through which pump is mounted and removing entire assembly.



4" Petroleum Adapter



6" Petroleum Adapter

Adaptation to Floating Suction Assembly (use standard NPT threaded fittings).

Use proper thread sealant and insert gasket between flanges of floating suction and pump.

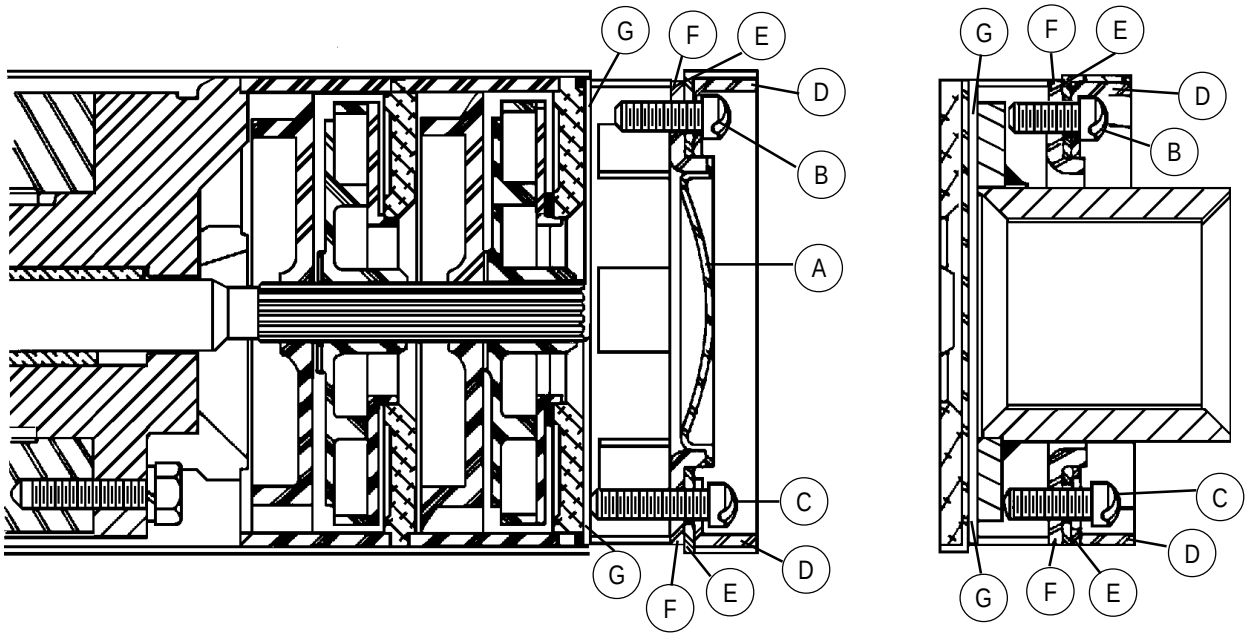
Floating Suction Adapter for Pumps Manufactured Prior to 9/1/82

Units manufactured after this date cannot be retrofitted. If floating suction adapter is desired, unit must be ordered equipped with same.

1. Remove cap (A) (no longer needed) by inserting tool under edge and prying upware (i.e., screwdriver, chisel, etc.).
2. Remove all screws (B & C); save for reuse.
3. Remove in order of appearance, spacers (D, E, F) last. The solid ring (G) “O” ring retainer is not to be removed.
4. Place gasket* on top of (G) ring.
5. Place floating suction adapter on gasket.
6. Replace in reverse order, as removed, spacers (F, E, D).
7. Replace screws (C & B) in original position and tighten as specified on drawing.

*Use ring (G) as a template and construct gasket of any gasoline resistant 1/8" gasket stock. A good improvision is to remove the center from a discharge head gasket part no. 031-136, shown as item 28 on page 3 of 4" Petroleum Pump Parts List in this manual.

NOTICE **Apply sealant to threads. Torque 27-33 inch/lbs.**



Dual Pumps

4" Pump Installation

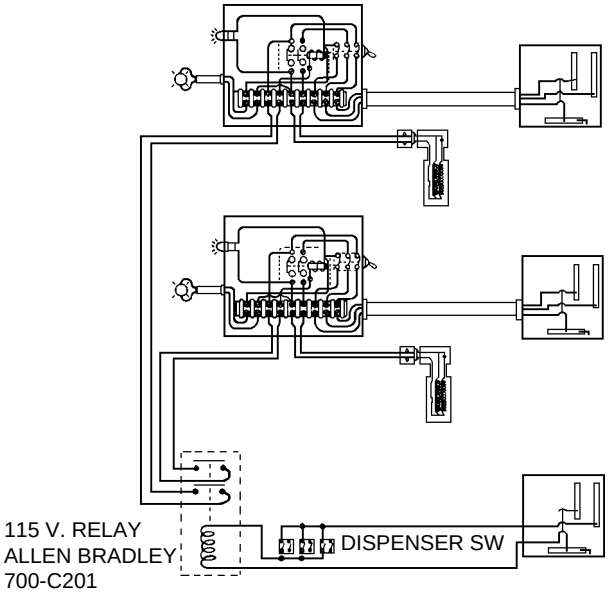
Installing dual submersibles manifolded in the same system.

This type of system is often used when greater flow rates are needed. If installed according to the illustration below (Fig. 1), manifolded systems offer back-up support in that operations could continue should one unit fail.

WARNING **Proper check valves, with pressure relief, must be installed in the discharge line of each pump to prevent product from being pumped through the pressure relief system of the adjacent pump when it is not running. Check valves must be compatible with the fuel blend being pumped.**

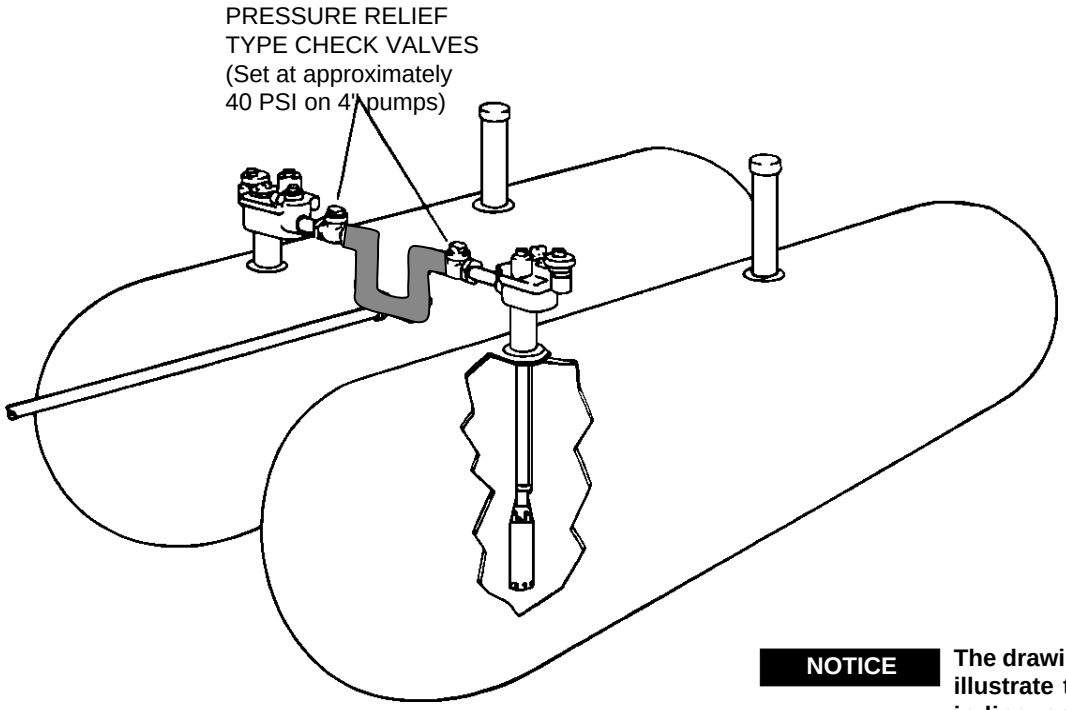
This diagram (Fig. 2) shows the wiring allowing both submersibles to operate simultaneously with any combination of dispensers turned on. To operate individually, the appropriate toggle switch, located externally on the side of the control box must be turned off manually. The check valves and 220/240 volt relay are not available from Red Jacket and should be purchased locally.

Fig. 2



Suggested diagram for wiring dual manifold system.

Fig. 1



NOTICE **The drawing shown here is to illustrate the requirement for in-line pressure relief type check valves. It is <u>not</u> a recommended guide for installation of piping downstream of the check valves.**

INSTALLING DUAL BIG-FLO ® SUBMERSIBLES MANIFOLDED IN THE SAME SYSTEM

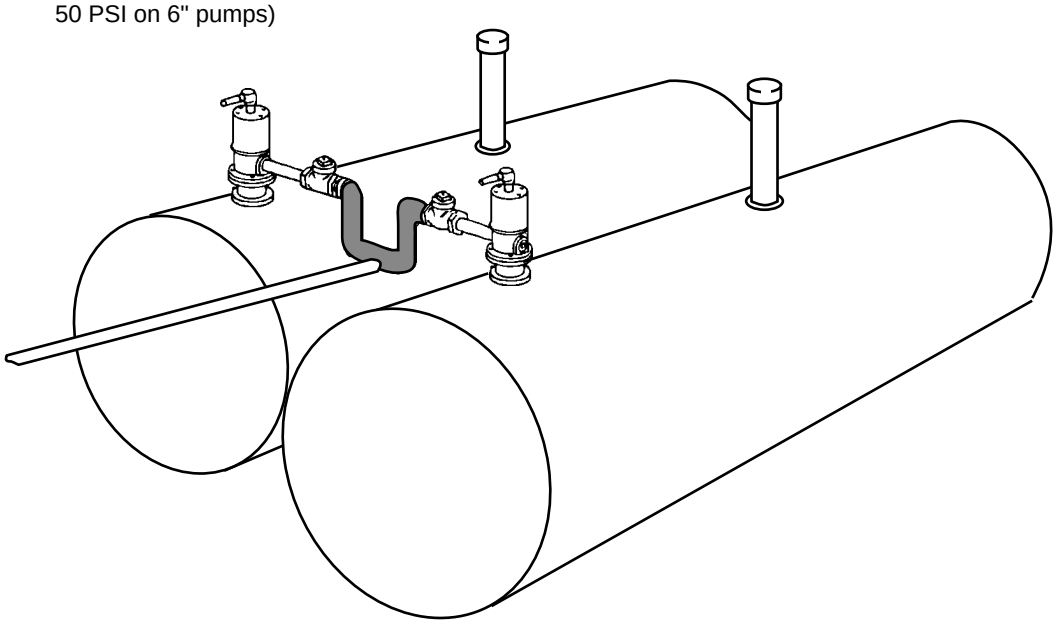
This type of system is often used when greater flow rates are needed. If installed according to the illustration below (Fig. IX), manifolded systems offer back-up support in that operations could continue should one unit fail.

The check valves shown installed in the discharge line of each pump are necessary to prevent product from being pumped through the pressure relief system of the adjacent pump, if that pump is not running. This is because the expansion relief valve operates at below pump pressures. If check valves without pressure relief were used, there would be no provision for thermal expansion between the valves and the dispensers.

It is preferable that the wiring allow both submersibles to operate simultaneously with any combination of dispensers turned on. To operate individually, the appropriate switch could be turned off manually.

Fig. IX

PRESSURE RELIEF
TYPE CHECK VALVES
(Set at approximately
50 PSI on 6" pumps)



NOTICE

The drawing shown here is to illustrate the requirement for in-line pressure relief type check valves. It is <u>not</u> a recommended guide for installation of piping downstream of the check valves.

Notes

Section 5
Warranty

For complete details
on Red Jacket's
Warranty Policy and Procedures,
see Manual #5194.

Warranty

Procedures

OUR PROMISE OF QUALITY:
The Marley Pump Company, a division of the Marley Company, guarantees Red Jacket products as to workmanship, material, and performance when they are properly installed, used and cared for.

OUR COMMITMENT WITHIN THE CONTINENTAL UNITED STATES:
Should any part(s) fail within the parts period specified below, it will be repaired or replaced and returned, free of charge, provided the part(s) is returned to Red Jacket's point of manufacture transportation prepaid.

Should any part(s) fail within the labor period specified below, Red Jacket will also pay for the reasonable services of an authorized service representative for on-site repair or replacement of the defective part(s).

SCHEDULE OF WARRANTY PERIODS:

Product	Parts From Date of Manufacture	Labor From Date of Installation*
Submersibles	18 Months	12 Months
Except: Solvent Pumps	6 Months	3 Months
Leak Detectors	18 Months	6 Months
Retractors	6 Months	None
Electronic Systems	18 Months	6 Months
Except: Vapor Probes	6 Months	None

* Installation date will revert to the Date of Manufacture without a previously submitted Installation Report #WAF01 which was received within 15 days after the installation. Regardless of installation date, under no condition can labor warranty extend beyond the parts warranty.

EXCLUSIONS:

Normal (Routine) Maintenance:
Normal or routine maintenance such as cleaning, lubricating or adjusting components and assemblies or for replacing consumable items such as paper, ribbons, filters, bulbs, etc., are excluded from this warranty.

Transportation Damage to Equipment:
Should equipment be damaged in transit or handling, it is the responsibility of the distributor or customer to file a damage claim with the responsible carrier. Latent damage must be reported to the carrier within 14 days of the date of delivery and an inspection by the carrier must be requested. Damage caused in transit or by handling is not the responsibility of Red Jacket and is not covered.

WARRANTY DISCLAIMER AND LIMITATION OF LIABILITY:
THE ABOVE WARRANTIES ARE IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, AND ALL IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE WHICH EXCEED THE AFORESAID EXPRESSED WARRANTIES ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS AGREEMENT.

MANUFACTURER EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY ARISING IN CONNECTION WITH THIS PRODUCT, INCLUDING WITHOUT LIMITATION PURCHASER'S LOSS OF STORED LIQUIDS OR DAMAGE TO THE GROUND, UNDERGROUND OR ENVIRONMENT, WHETHER ARISING UNDER THEORIES OF TORT, NEGLIGENCE, STRICT LIABILITY, CONTRACT OR OTHERWISE.

Some states do not allow the exclusion or limitation of incidental or consequential damages or limitation on the duration of implied warranties so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights and you may also have other rights which vary from state to state.

DATE CODES PRIOR TO JANUARY 1, 1978

The location of the date code stamp is shown on the opposite side of this letter. On pumps manufactured prior to January 1978, the date code was stamped as shown below, using a letter code system.

Year	J	F	M	A	M	J	J	A	S	O	N	D
1972	AG	BG	CG	DG	EG	FG	GG	HG	KG	LG	MG	NG
1973	AH	BH	CH	DG	EG	FG	GH	HH	KH	LH	MH	NH
1974	AK	BK	CK	DK	EK	FK	GK	HK	KK	LK	MK	NK
1975	AL	BL	CL	DL	EL	FL	GL	HL	KL	LL	ML	NL
1976	AM	BM	CM	DM	EM	FL	GM	HM	KM	LM	MM	NM
1977	AN	BN	CN	DN	EN	FN	GN	HN	KN	LN	MN	NN

DATE CODES AFTER JANUARY 1, 1978

To eliminate the necessity of checking the above cross-reference table, all pumps manufactured after January 1, 1978, use the following date code system.

Example — 1 01 78

Year of Manufacture	(1978)
Month of Manufacture	(January)
Week of Month of Manufacture	(1st Week)

Warranty

Notes

For Additional Assistance,
Contact theTechnical Support Group-Petroleum Products
The Marley Pump Company
5800 Foxridge Drive
Mission, KS 66202
Phone: 1-800-2-MARLEY
(1-800-262-7539)

Notes

Warranty

Notes