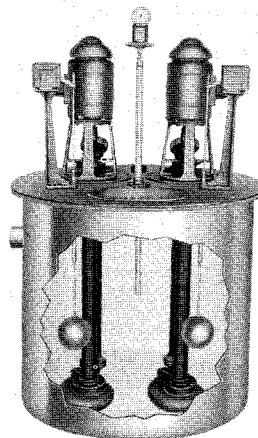


INSTALLATION INSTRUCTIONS AND OPERATING & MAINTENANCE MANUAL FEDERAL VERTICAL SUBMERGED PUMP TYPES VB, VF2, VSP, MF, VSA, VSAF, RV DATA NO. 507



UPON RECEIPT OF PUMPS

THESE INSTRUCTIONS COVER INSTALLING, OPERATING AND MAINTAINING FEDERAL VERTICAL SUBMERGED CENTRIFUGAL PUMPS. BY FOLLOWING THESE MAINTENANCE SUGGESTIONS, AFTER PROPER INSTALLATION, PUMP LIFE CAN BE GREATLY EXTENDED AND REPAIRS KEPT TO A MINIMUM.

AS SOON AS A SHIPMENT IS RECEIVED, INSPECT THE EQUIPMENT AND CHECK WITH THE SHIPPING MANIFEST. REPORT ANY DAMAGE OR SHORTAGE TO THE TRANSPORTATION COMPANY'S LOCAL AGENT IMMEDIATELY.

SYSTEMATIC INSPECTION OF THE PUMPING UNIT AT REGULAR INTERVALS IS RECOMMENDED. KEEP THE INTERIOR AND EXTERIOR OF THE MOTORS, FLOAT SWITCHES AND MOTOR CONTROLS FREE FROM MOISTURE, OIL AND DIRT. AT REGULAR INTERVALS, REMOVE ALL SAND, MUD OR OTHER FOREIGN MATTER FROM THE INSIDE OF THE PUMP BASIN.

IF THE PIT HAS BEEN PREVIOUSLY USED, CHECK THE WATER IN IT TO BE SURE THAT IT CAN BE PUMPED WITHOUT DAMAGE TO THE PUMPING EQUIPMENT.

INSTALLATION

THE UNIT SHOULD BE INSTALLED IN A CLEAN, DRY, WELL VENTILATED PLACE. THE PUMPS MUST BE EASILY ACCESSIBLE FOR INSPECTION AND MAINTENANCE, AND SO PLACED AS TO SIMPLIFY THE DISCHARGE PIPING ARRANGEMENT. LIQUID MUST FLOW INTO THE PIT OR RECEIVER BY GRAVITY. THE PIT OR RECEIVER COVER SHOULD NOT BE SET BELOW FLOOR LEVEL WHERE IT WILL CREATE A POCKET FOR WATER ACCUMULATION. BEFORE INSTALLING THE PUMPS, CHECK THE PIT OR BASIN AND REMOVE ALL SAND, CINDERS AND OTHER FOREIGN MATERIAL.

SET THE BASIN IN A LEVEL POSITION, PROPERLY TURNED SO THAT THE PUMP DISCHARGE AND BASIN INLET WILL BE IN THE DESIRED POSITIONS. IF THE PIT BOTTOM IS SOFT, SET THE BASIN ON A GRAVEL OR CONCRETE SLAB AND FILL AROUND THE BASIN WITH TAMPED GRAVEL OR SIMILAR MATERIAL, THEN POUR THE CONCRETE FLOOR AROUND THE RECEIVER.

PROVIDE SUFFICIENT HEAD ROOM FOR REMOVAL OF THE PUMPS FOR INSPECTION AND MAINTENANCE.

PIPING

REFER TO THE INSTALLATION DIAGRAM INCLUDED IN THESE INSTRUCTIONS. DISCHARGE PIPING SHOULD BE AS LARGE OR LARGER THAN THE PUMP DISCHARGE CONNECTION TO AVOID EXCESSIVE FRICTION LOSSES. A UNION (OR TWO FLANGES) SHOULD BE PLACED CLOSE TO THE PUMP AND A HORIZONTAL SWING CHECK VALVE PLACED AFTER THE UNION. TO AVOID CHATTERING, INSTALL THE CHECK VALVE ON A 45° ANGLE. INSTALL A GATE VALVE FOR EACH PUMP AFTER THE CHECK VALVE.

ALL DISCHARGE PIPING MUST BE FULLY SUPPORTED SO AS NOT TO EXERT A STRAIN ON THE PUMP. SUCH PIPING STRAINS CAN CAUSE BEARING WEAR, VIBRATION OR DAMAGE TO THE PUMP CASING.

DISCHARGE PIPING SHOULD BE AS SHORT AS POSSIBLE, WITH THE FEWEST POSSIBLE ELBOWS. IF A LONG DISCHARGE LINE IS REQUIRED, MAKE THE LINE ONE OR TWO SIZES LARGER THAN THE PUMP DISCHARGE CONNECTION.

PUMP ROTATION

IT IS IMPORTANT TO CHECK FOR PROPER PUMP ROTATION WHEN STARTING THE PUMPS. THE PUMP SHAFT (PART NO. 33) MUST ROTATE IN THE DIRECTION SHOWN BY THE ARROW ON THE MOTOR SUPPORT PEDESTAL (PART NO. 44). DIRECTION OF ROTATION CAN BE CHANGED ON A 3-PHASE UNIT BY SWITCHING ANY TWO MOTOR LEADS, AND ON A 1-PHASE UNIT IN ACCORDANCE WITH INSTRUCTIONS ON THE MOTOR TERMINAL COVER.

PUMP ADJUSTMENT

PUMPS ARE ADJUSTED AT THE FACTORY PRIOR TO SHIPMENT. HOWEVER, IF THE SHAFT (PART NO. 33) DOES NOT TURN FREELY BY HAND BEFORE STARTING, IT MAY INDICATE THAT THE IMPELLER (PART NO. 2) IS RUBBING IN THE PUMP CASING (PART NO. 1). SEE THE CROSS-SECTION DRAWING INCLUDED WITH THESE INSTRUCTIONS. ADJUSTING NUTS ARE PROVIDED TO RAISE OR LOWER THE SHAFT AND IMPELLER (EXCEPT FOR MODELS VA-1½ AND STD. VB-1½). TO MAKE THIS ADJUSTMENT (WHEN NECESSARY) LOOSEN THE BEARING CAP SET SCREW (PART NO. 46) AND BOTH OF THE ADJUSTING NUTS (PART NO. 45). NOTE THAT THE ADJUSTING NUTS HAVE LEFT HANDED THREADS. TURN THE SHAFT, PRESSING DOWNWARD, SO THAT THE IMPELLER RUBS AGAINST THE SUCTION PLATE (PART NO. 38). TIGHTEN THE BOTTOM ADJUSTING NUT UNTIL THE SHAFT TURNS FREE. SCREW THE UPPER ADJUSTING NUT DOWN TIGHTLY ON THE LOWER ADJUSTING NUT, WHILE HOLDING THE LOWER NUT STEADY WITH A WRENCH. TIGHTEN THE SET SCREW (PART NO. 46) IN THE BEARING CAP. THE PUMP IS NOW ADJUSTED FOR CORRECT IMPELLER CLEARANCE AND IS READY TO RUN.



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FLOAT CONTROL

Most vertical submerged pumps are controlled by a float switch which may either be pedestal mounted (as shown in the float switch assembly drawing included in these instructions) or motor mounted. Duplex pump units can be controlled either by two float switches, one alternating float switch or one alternating float switch plus one auxiliary float switch.

Floats may be either of the spud type where the float and rod rise with the water level, or of the hollow tube type where the float rises on the float rod.

For spud floats, two float stops are used. The float stop (Part No. 75) below the switch arm, should be set to cut in the float switch (Part No. 74) before the water level in the pit reaches the height of the pit inlet, and also before the top of the float strikes the lower end of the float rod guide pipe (Part No. 79). The float stop above the switch arm should be set to cut out the float switch before the water level drops to the top of the pump casing. (Press the rod guide pipe down as far as it will go into the switch pedestal (Part No. 85)).

For hollow tube floats, four float stops are used. Adjust the float stops above and below the float to control operating range, as described above. The two float stops which operate the float switch arm should be a few inches apart to permit the arm to move freely.

OPERATING PROBLEMS

The following is a list of common pump operating problems and their possible causes:

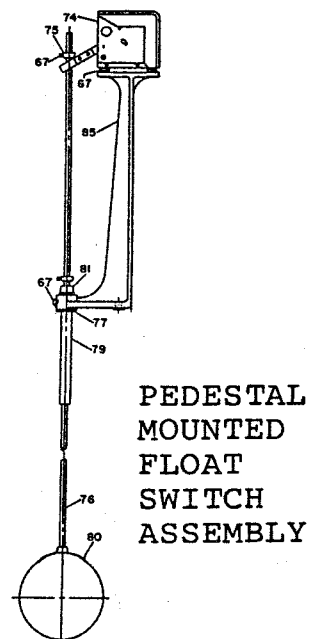
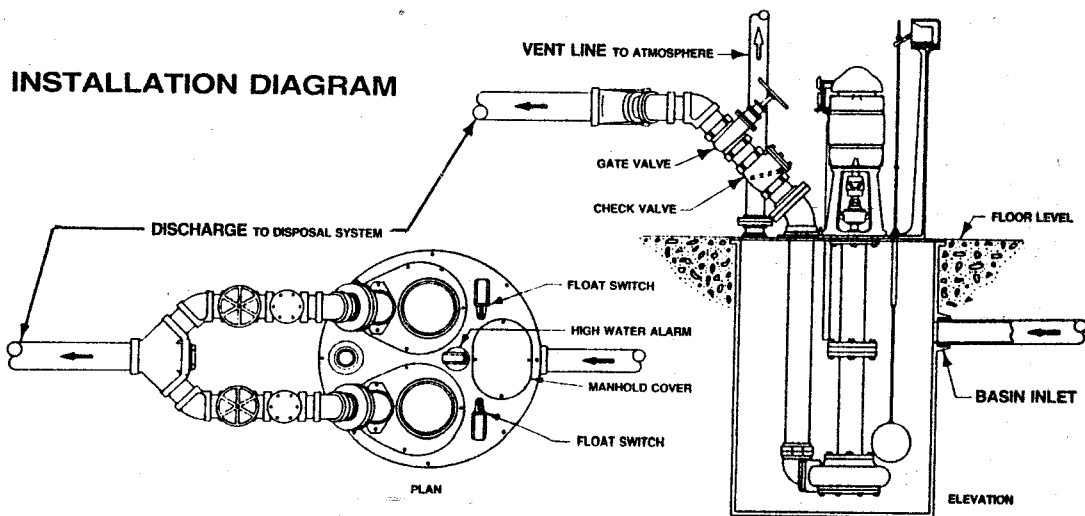
1. Failure to deliver water.
 - A. No water coming into basin or pit.
 - B. Insufficient speed. Check motor voltage and power supply.
 - C. Discharge pressure required by the system is greater than that for which the pump was designed.
 - D. Impeller clogged or shaft bound.
 - E. Wrong direction of rotation.
 - F. Pump is air bound.

- G. Discharge check valve inoperative.
- H. Float switch inoperative.
- I. Coupling halves disengaged.
- J. Water temperature too high.

2. Insufficient capacity.
 - A. Same causes as for failure to deliver water.
 - B. Mechanical defect; wearing surfaces worn, impeller damaged.
 - C. Impeller partly clogged or shaft bound.
 - D. Suction strainer (if provided) partly clogged.
 - E. Debris in bottom of pit or basin.
3. Pump overloads driver.
 - A. Speed too high.
 - B. Total dynamic head too low; pumping too much liquid.
 - C. Liquid pumped is of different specific gravity and/or viscosity than that for which the pump was designed.
 - D. Mechanical defects.
 - E. Shaft bound by fibers or cords.
4. Pump vibrates.
 - A. Piping strain on pump.
 - B. Impeller partly clogged.
 - C. Shaft bound.
 - D. Mechanical defects.
 - E. Worn bearings.
 - F. Pump running dry; wearing surfaces rubbing.

ORDERING REPAIR PARTS

When ordering repair parts, always provide the record number and unit number stamped on the pump nameplate, generally located on the motor pedestal (Part No. 44) or on the suspension plate (Part No. 53). Itemize each part required, using the item number and part name shown on the cross-section included with the pump. State the number of pieces required and the material of each. If motor parts are required, provide the motor serial number and style number from the motor nameplate, located on the motor (Part No. 110).



LUBRICATION

MOTOR BEARINGS

All motor bearings are grease lubricated. However, the motor bearings may be lifetime sealed (no field lubrication is required for the life of the motor), or they may require periodic greasing. See the motor nameplate or the motor manufacturer's instruction booklet for complete information.

Should the motor bearings require periodic greasing, it is important to avoid over-lubrication, especially of the top bearing, which may overflow onto the motor windings or cause overheating of the bearings during operation.

PUMP THRUST BALL BEARING (PART NO. 32)

The pump thrust ball bearing, located in the motor pedestal, requires periodic greasing. Since the thrust bearing has been lubricated prior to shipment, it is not necessary to lubricate it before starting the pump. This bearing should be greased every 4 to 6 months, depending on the continuity of service. Lubricate through the grease fitting (Part No. 82).

Ball bearings can be damaged from over-lubrication as well as from under-lubrication. An oversupply of grease produces heating due to friction and reduces bearing life.

INTERMEDIATE BEARINGS AND PUMP BEARINGS (PART NO. 57)

Those models showing "WATER" lubricated pump bearing do not require any lubrication of this bearing other than that automatically provided by the liquid being pumped. Those models showing "GREASE" lubricated intermediate bearings and pump bearings, require periodic lubrication. Grease should be inserted through the grease fitting(s) (Part No. 82) mounted on the pump suspension plate (one fitting for each bearing). Grease the bearings before starting the pumps and once a week for standard intermittent service (more frequent greasing is recommended for continuously operating pumps).

OIL LUBRICATED PUMP BEARINGS (PART NO. 57) FOR RV CONDENSATE UNITS

For those models showing "OIL" lubricated pump bearings, after installation of the pump, remove the plug in the end of the lubrication line on top of the suspension plate, and install the oil cup (Part No. 141) which has been wired to the unit for shipment. A sufficient amount of oil has been furnished in the suspension leg reservoir before shipment of the pump from the factory. No additional oil is required prior to starting the pump. Add oil each week for standard intermittent service or more often for continuous operating pumps.

RECOMMENDED GREASE AND OIL FOR LUBRICATION

For grease lubricated bearings use a lithium base grease that is not water soluble, such as the following greases or their equivalents:

Continental Oil Co. (CONOCO).....	SUPER-STA or SUPER LUBE
Union Oil Co. of California.....	UNOBA EP #2
Cities Service Oil Co. (CITGO).....	CITGO H-2
Shell Oil Co.....	DARINA GREASE 2
Standard Oil of Ohio.....	FACTRAN 2

For oil lubricated bearings use a medium SAE viscosity 30 or 40 engine oil, such as the following oils or their equivalents:

Continental Oil Co. (CONOCO).....	DECTOL 51 R&O OIL
Union Oil Co. of California.....	TURBINE OIL 700 or UNAX RX 700
Cities Service Oil Co. (CITGO).....	CITGO PACEMAKER 60
Shell Oil Co.....	TURBO OIL 41
Standard Oil of Ohio.....	FACTORIS 52

REPLACING GREASE LUBRICATED SLEEVE BEARINGS

If a grease lubricated sleeve bearing is replaced, after pressing the new bearing into the bearing housing, re-ream the bearing if necessary. Be sure that the grease groove inside the new bearing lines up with the grease hole in the housing. Then, drill a grease hole into the new bearing, so that grease can be inserted through the housing and the bearing and be distributed by the grease groove inside the bearing.

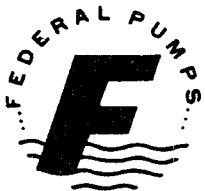
LUBRICATION TABLE

See Lubrication Table for Federal vertical submerged sump, sewage and condensate pumps on reverse of this page.

LUBRICATION TABLE

PUMP MODEL	MOTOR BEARINGS (BALL)	#32 THRUST BEARING (BALL)	#57 INTERMED. BEARING (S) (SLEEVE)	#57 PUMP BEARING (SLEEVE)
VB-1½	GREASE	SEALED	GREASE	WATER
VF-2	GREASE	GREASE	GREASE	WATER
VSP-2A	GREASE	GREASE	GREASE	WATER
VSP-2C, 3C	GREASE	GREASE	GREASE	GREASE
VSP-3F	GREASE	GREASE	GREASE	GREASE
VSP-3K, 4K	GREASE	GREASE	GREASE	GREASE
VSP-3L, 4L	GREASE	GREASE	GREASE	GREASE
MASTER-FLUSH	GREASE	GREASE	NO BRG.	WATER
VSA-3F, 4F	GREASE	GREASE	GREASE	GREASE
VSA-4A, 3A	GREASE	GREASE	GREASE	GREASE
VSA-4C, 4C, 6C	GREASE	GREASE	GREASE	GREASE
VSA-4E, 5E, 6E	GREASE	GREASE	GREASE	GREASE
VSA-6H	GREASE	GREASE	GREASE	GREASE
RV CODE A & C	GREASE	GREASE	GREASE	OIL
RV CODE CC & CG	GREASE	GREASE	GREASE	OIL

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FEDERAL PUMP CORPORATION

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