

# Skidmore™

## installation and operating instructions

bulletin SM-30  
April 1992

HSS-HCPS UNITS

### KEEP THESE INSTRUCTIONS NEAR THE PUMP FOR USE OF OPERATOR

#### INSTALLATION INSTRUCTIONS

**LOCATING PUMP:** Install unit in a clean, dry, well ventilated and drained location for required inspection, care and maintenance.

**CAUTION:** Be sure the pump foundation is level before unit is bolted down, so there WILL NOT be a strain on the motor-pump unit or the base on which it is mounted.

**PIPING:** Connect suction and discharge piping to pump with a gate valve in each line, and a union or flange joint next to pump openings. Include necessary drains or by-pass lines. Install Swing Check Valve in pump discharge line and as close to the pump as possible. If discharge line is longer than 50 feet, increase to one pipe size larger to reduce friction loss. PIPING MUST BE OF CORRECT LENGTH AND IT SHOULD BE SUPPORTED INDEPENDENTLY OF PUMP, SO THERE WILL NOT BE A STRAIN ON THE PUMP CASING. Allow or arrange for pipe elongation or expansion, if lines are unusually long.

**WIRING:** Be sure Electric Power Supply available corresponds to the characteristics of the electric motor furnished with pump. Connect the Power Supply to the pump motor, using either a Manual Starter with overload protection only or a Magnetic Starter with both overload and undervoltage protection.

**FUSES:** If disconnect switches are used, be sure fuses installed comply in size with National Electric Code or Local Code requirements. When fuses blow out, it indicates that something may be wrong in either the motor, pump, starter, fuse rating or electric service. DO NOT replace fuse until the cause for its blowing out has been determined and corrected.

#### OPERATING INSTRUCTIONS

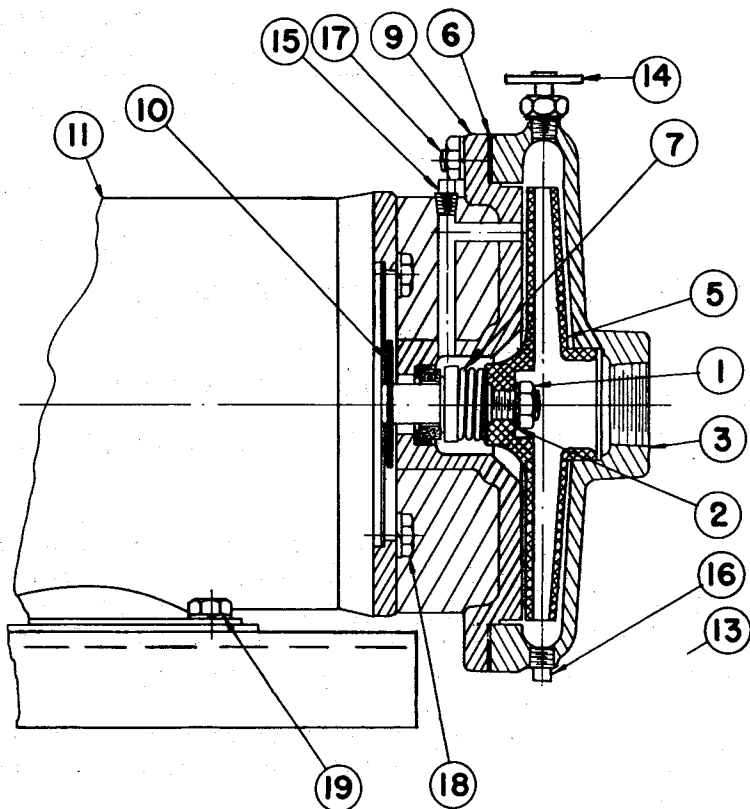
**CAUTION:** New or repaired condensate pipe line systems should be operated for several days with the return or suction piping open to sewer or drain until water appears clean, in order to thoroughly flush and clean the lines to prevent clogging or damage to pump when it is put into operation. This may take from a few days to several weeks depending upon job conditions.

This pump is equipped with a Mechanical Shaft Seal. NEVER RUN THIS PUMP DRY. Be sure pump is fully primed or full of water before starting, because the Mechanical Seal WILL BE DAMAGED IF RUN DRY.

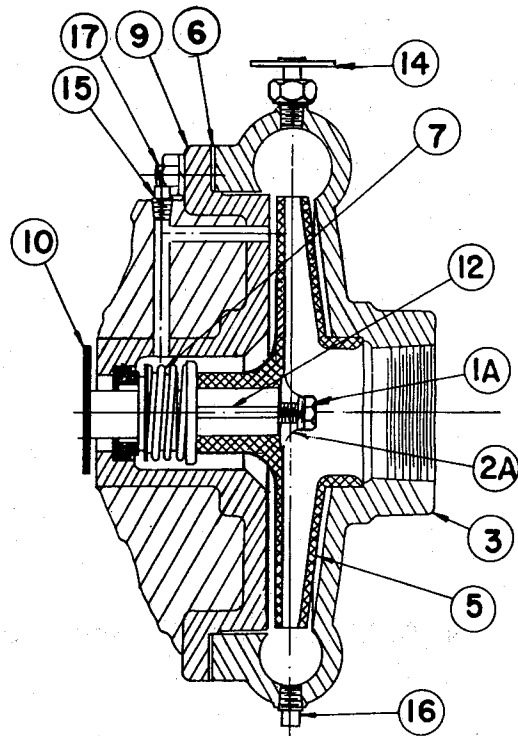
**INITIAL LUBRICATION:** None required for pump proper. Required lubrication depends upon service motor is subjected to and cleanliness of location. When motor bearings become noisy, lubrication or replacement of ball bearings becomes necessary.

#### INSPECTION BEFORE STARTING UNIT FOR FIRST TIME

- 1 - Check motor shaft and be sure it rotates freely. If shaft is tight, inspect pump end and also motor for foreign matter clogging pump or lodging in motor.
- 2 - Check characteristics of voltage, phase and frequency stamped on motor nameplate and be sure they correspond with the service available. Check connections in motor terminal box with motor wiring diagram, and be sure that fuses and thermal overloads of proper size are installed.
- 3 - Be sure that piping connections to the pump have been made as per instructions.
- 4 - Be sure pump is rotating in proper direction. Throw switch to 'ON' for an instant and make sure rotation is in same direction as arrow on pump casing (suction side). This is very IMPORTANT BECAUSE WRONG ROTATION CAN CAUSE DAMAGE to the motor and pump.
- 5 - Be sure that the characteristics of the pump unit are identical to the capacity, discharge pressure and other requirements of the complete piping system.
- 6 - Be sure that pilot switches for automatically starting pump motor are in proper working order.



**Detail Of Pump Section With  
Fractional Horse Power Motor Sizes**



**Detail Of Pump Section With  
Integral H.P. Motor Sizes**

**STARTING PUMP:** Open valves in discharge and suction lines and close valves in drain or by-pass lines. Open pet-cock on top of pump casing to vent out air and allow pump to become primed. When water appears, close pet-cock. Throw the switch quickly to the 'ON' position. If motor comes up to speed, the unit should be ready for service.

**POSSIBLE TROUBLE IN STARTING:** If the motor hums, but does not start, throw switch quickly to 'OFF' position and check for free rotation. If shaft is free to turn, one of the main line fuses may be blown out, or there could be a loose connection in motor terminal box or automatic switches. If motor starts unusually slow, it might be a low voltage condition or unusually heavy load against the pump.

**CAUTION – DO NOT RUN PUMP DRY:** Should the pump lose its prime, do not run it dry, as the Mechanical Shaft Seal, which is lubricated only by the liquid being pumped, will be damaged and ruined.

### **INSPECTION AFTER STARTING**

- 1 - Be sure all pipe connections are tight and there are no leaks.
- 2 - Be sure pump and motor rotate in proper direction as indicated by arrow on pump casing.
- 3 - Check to see if there is a leak at mechanical shaft seal. If a leak is present, water will be visible on water days. slinger between end-bell of motor and motor bracket.
- 4 - Check motor bearings against overheating.
- 5 - Check automatic switches controlling pump motor to be sure they are functioning properly.
- 6 - Observe operation of unit closely for about 2 or 3 hours after starting and at regular intervals for at least 10 days.

### **CARE OF UNIT**

**INSPECTION:** To insure the best operation of the unit, make a systematic inspection at least once a week.

**CLEANLINESS:** Keep the exterior and interior of electric motor and any switches free from moisture, oil and dirt. Avoid over-lubrication and wipe up excess grease drip from bearings. Occasionally drain pump and piping system to remove sediment and scale.

**MOTOR BEARINGS:** Check periodically for over-heating, which causes bearings to wear and results in noise. Lubricate if necessary, frequency depending upon type of pump service and cleanliness of location. When bearings are worn and unit becomes noisy, replace worn bearings immediately, so as not to injure or damage other rotating parts.

## PARTS LIST

- 1 - Impeller Locknut
- 1A - Impeller Lockscrew
- 2 - Impeller Lockwasher
- 2A - Impeller retaining collar
- 3 - Volute
- 5 - Centrifugal Impeller
- 6 - Gasket - Motor Bracket to Volute
- 7 - Mechanical Seal Assembly

- 9 - Motor Bracket
- 10 - Water Slinger
- 11 - Electric Motor
- 12 - Impeller Key
- 13 - Base - Channel Steel
- 14 - Vent Cock
- 15 - Pipe Plug
- 16 - Drain Plug
- 17 - Hex. Nut, Lockwashers and Studs
- 18 - Hex. Cap Screw and Lockwasher
- 19 - Hex. Cap Screw and Lockwasher

RECOMMENDED SPARE PART LIST - For 120 or 180 day period		
PART NO.	DESCRIPTION	QUANTITY
1 OR 1A	Impeller Locknut or Lockscrew	1
2 OR 2A	Impeller Lockwasher or Retaining Collar	1
6	Gasket - Motor Bracket to Volute	1
7	Mechanical Seal Assembly	1
10	Water Slinger	1

NOTE: When ordering parts, be sure to give Part No. and description, also Pump Type No. and Serial number appearing on SKIDMORE Nameplate (attached to pump base).

**MECHANICAL SHAFT SEAL:** Occasionally examine water slinger No. 10 on motor shaft and look for water leakage. Any leakage will also be visible on No. 9 motor bracket. Leakage indicates that the seal surfaces are worn and Part. No. 7 will need replacing. (For proper procedure in replacing seal, refer to instructions under REPLACING MECHANICAL SHAFT SEAL AND RE-ASSEMBLING PUMP.)

**SHUTTING DOWN:** At seasonal shutdown period, open disconnect switch, close valves in pump suction and discharge lines, open pet-cock on top of pump casing, remove plug from bottom of casing and drain. If necessary, cover electric motor and switches to protect them against dirt, moisture, etc.

**CAUTION:** NEVER OPERATE PUMP WHEN IT IS DRY, BECAUSE THE MECHANICAL SHAFT SEAL WILL BE DAMAGED. NEVER EXPOSE PUMP TO FREEZING TEMPERATURES WHEN FULL OF WATER.

### REMOVING PUMP AND MOTOR UNIT

- 1 - Disconnect pipe unions or flanges in pump discharge and suction lines.
- 2 - Disconnect conduit and wiring at motor terminal box and swing away from pump.
- 3 - Remove Part No. 19 Hex. cap screw or stud nut and lift pump and motor unit from base.

### DISMANTLING PUMP AND MOTOR UNIT

For pump units with FRACTIONAL H. P. Motor, proceed as follows:

- 1 - Remove Hex. nuts No. 17 and take off No. 3 Volute.
- 2 - Remove the shaft cover from the end of the motor cover. Insert a large screwdriver into the slotted shaft and securely hold the shaft.
- 3 - Remove No. 1 impeller locknut with a socket head wrench by turning COUNTER-CLOCKWISE. Also remove bronze lockwasher No. 2.
- 4 - Still holding motor shaft securely, remove No. 5 impeller by turning COUNTER-CLOCKWISE. Impeller hub is threaded and screws onto threaded motor shaft.
- 5 - Remove No. 7 Mechanical Seal Assembly by sliding it along the motor shaft. The ceramic portion of the seal will remain housed in the motor bracket No. 9.
- 6 - Remove No. 18 Hex cap screws and take off No. 9 bracket from motor. Water slinger No. 10 is now visible and can also be removed.

For pump units with INTEGRAL H. P. Motor, proceed as follows:

- 1 - Remove Hex nuts No. 17 and take off No. 3 Volute.
- 2 - Insert screwdriver blade into one of the peripheral vane openings of impeller No. 5 to keep it and the motor shaft from turning. Then take a socket wrench and remove No. 1A, lock screw by turning COUNTER CLOCKWISE.
- 3 - Remove No. 2A retaining collar, and with two (2) screwdriver (blades 180° apart and between impeller No. 5 and bracket No. 9) pry impeller forward off the shaft. The impeller hub has a straight bore and motor shaft is straight with a key and keyway.
- 4 - Remove NO. 7 Mechanical Seal Assembly by sliding it along the motor shaft. The ceramic portion of the seal will remain housed in the motor bracket No. 9.
- 5 - Remove No. 18 Hex head cap screws and take off bracket No. 9. The water slinger No. 10 is now visible and can also be removed.

## **REPLACING MECHANICAL SHAFT SEAL AND REASSEMBLING PUMP**

- 1 - Pump and motor unit must be completely dismantled (refer to dismantling pump and motor unit section).
- 2 - Remove the ceramic portion of the mechanical seal assembly from motor bracket No. 9.
- 3 - Be sure counter-bore in bracket No. 9 is perfectly clean before inserting new ceramic seat and ring.
- 4 - Use a water based lubricant on the entire diameter of vibration ring and press it together with the ceramic seat into the machined bore of No. 9 motor bracket. Press as far as it will go and make sure that the seat surface is at a perfect right angle in respect to motor shaft. Use CAUTION so as NOT TO SCRATCH OR MAR lapped surface of ceramic seat.
- 5 - Attach No. 9 motor bracket to motor with Hex. cap screws and lockwashers No. 19.
- 6 - Use water based lubricant on lower end of motor shaft and slip No. 7 rotating seal assembly onto motor shaft as far as it will go. CAUTION: Be careful not to SCRATCH OR MAR lapped surface of carbon seal ring.
- 7 - Insert seal spring and be sure it seats properly against seal rotating member.
- 8 - FRACTIONAL H. P. MOTORS: Hold top end of motor shaft with screwdriver and screw No. 5 impeller CLOCKWISE onto motor shaft until it is tight. The seal spring will center itself on hub of impeller and it will be properly compressed for seal tension.
- 9 - Replace No. 2 lockwasher and No. 1 locknut and turn locknut CLOCKWISE until tight. Replace shaft cover on motor.
- 8A - INTEGRAL H.P. MOTORS: Replace impeller key in motor shaft and follow with No. 5 impeller. With impeller in proper place, the inside hub will be almost flush with end of motor shaft and seal spring will have proper compression.
- 9A - Insert screwdriver blade in one of impeller peripheral openings to keep it from turning, and replace No. 2A retaining collar and No. 1 lockscrew and washer. Tighten lockscrew by turning CLOCKWISE.
- 10 - Replace No. 6 gasket and also No. 3 volute and tighten No. 17 stud nuts securely.
- 11 - Replace pump and motor unit on base and secure with No. 19 screw or stud nut. Re-connect unions or flanges in pump discharge and suction lines and replace wiring at motor terminal box.

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### **TROUBLE CHART**

Should trouble develop with the unit, the information given below may enable the operator to locate it and correct it without the aid of a factory service man.

#### **NO CONDENSATE DISCHARGE**

- 1 - Not enough condensate in return line to prime pump.
- 2 - Speed too low.
- 3 - Discharge head too high.
- 4 - Impeller loose on shaft, plugged or worn.
- 5 - Wrong direction of rotation.
- 6 - Blown fuses or tripped O/L reset.

#### **INSUFFICIENT CONDENSATE DISCHARGE**

- 1 - Air or water leak at Mech. shaft seal or gasket.
- 2 - Plugged pump vent cock.
- 3 - Speed too low (check for blown fuses or voltage problem).
- 4 - Discharge head higher than anticipated.
- 5 - Impeller loose on shaft, plugged or worn.
- 6 - Wearing rings worn.
- 7 - Wrong direction of rotation.

#### **PUMP IS NOISY**

- 1 - Bearings are bad (these are sealed ball bearings in motor).
- 2 - Pump may be operating at a low enough head to be in cavitation range. Cavitation sounds like pebbles rattling in a pail. Throttle discharge valve to correct pressure and lock. (If cavitation noise disappears it may be wise to inst diameter impeller, reduce speed, or install an orifice or venturi on discharge.)
- 3 - Pump is operating too near shut-off head. Check discharge piping to lower the head. If this cannot be accomplished, contact factory.
- 4 - Internal parts rubbing.
- 5 - Motor has magnetic hum or high windage noises. Check with motor manufacturer.

#### **LOSS OF SUCTION FOLLOWING PERIOD OF SATISFACTORY OPERATION**

- 1 - Air leak at mechanical shaft seal or pump gasket.
- 2 - Pump vent cock plugged, so that air would not be expelled to prime the pump unit.
- 3 - Air or gasses in condensate or condensate too hot.
- 4 - Excessive wear on impeller hub.

#### **PUMP DOES NOT START**

- 1 - Motor lead connections may be wired wrong.
- 2 - Blown fuses in disconnect switch.
- 3 - Bad coil in starter.
- 4 - Loose connection in disconnect switch, starter, or motor leads.
- 5 - Overload protection in starter or motor damaged or not Re -Set.
- 6 - Rotating assembly is bound. Try turning motor shaft from top side of motor with screwdriver.

#### **EXCESSIVE POWER CONSUMPTION**

- 1 - Speed too high (check motor wiring with available system voltage).
- 2 - Loose wiring connections.
- 3 - Mechanical defects:
  - (a) Motor shaft bent.
  - (b) Rotating element binds.
  - (c) Foreign elements between impeller and volute.

# **Skidmore®**

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