

(Running Cont'd)

1. Check pump and piping for leaks. Repair immediately.
2. Record pressure gauge readings for future reference.
3. Record voltage, amperage per phase, and kw (if an indicating wattmeter is available).
4. Check bearings for lubrication and temperature.
5. Check and adjust stuffing box for correct operation. Check sealing water lines and valves.
6. Adjust pump output (capacity) ONLY with discharge valve. DO NOT throttle suction line.

Shutdown –

1. Close discharge valve slowly.
2. Shut down the motor.
3. Close seal-liquid valves (for packed pumps). (If pumped liquid is dirty or if leakage is to be prevented, these external lines should always be left open.)
4. Open drain valves as required.
5. Close suction line valves, to retain prime or to isolate pump.

Freezing Protection – Protect pumps shut down during freezing conditions by one of the following methods:

1. Drain pump, remove all liquid from the casing.
2. Keep fluid moving in pump and insulate or heat the pump to prevent freezing. If heated, do not let temperature go above 100° to 150° F.
3. Fill pump completely with antifreeze solution.

Troubles – Watch for signs of pump trouble at all times. Immediately correct any trouble to avoid costly shut down and repair. Refer to applicable maintenance manuals for list of symptoms and cures.

MAINTENANCE

Routine, regular maintenance is the best assurance of trouble-free, long-life pump and motor operation. In addition to having trained personnel, the best way to insure regular maintenance is by use of Pump and Motor Service Records (forms available on request to A-C Pump). Several more important items of good maintenance are (include others for adverse or unusual conditions):

Periodic Inspection – Each month measure bearing temperature by thermometer. If hot there may be too much grease. If not corrected by grease change, disassemble and inspect bearings.

Every 6 months check packing, shaft or shaft sleeve for scoring, and alignment of piping with pump.

Each year remove rotating element to inspect and clean thoroughly. Clean stuffing box passages or piping (if external). Inspect and clean check and foot valves.

Cleaning – Remove oil, dust, dirt, water, chemicals from exterior of motor and pump. Keep motor air inlet and outlet open. Blow out interior of open motors with clean, compressed air at low pressure. Regularly drain moisture from TEFC motors.

Labeled Motors – It is imperative for repair of a motor with Underwriters' Laboratories label that original clearances be held, that all plugs, screws, other hardware be fastened securely, and that part replacements be exact duplicates or approved equals. Violation of any of the above invalidates Underwriters' label.

Temperature – Total temperature, not the rise, is the measure of safe operation for a motor. If temperature by thermometer exceeds limits for insulation class, investigate and change operating conditions. When pumping hot liquids, shaft may provide an unsafe temperature for packing or bearings. In this case a jacketed stuffing box should be used, and cooled with water from external source.

Insulation – Measure insulation resistance regularly. Refer to Motor or Pump Maintenance Manuals, or to AIEE Standard No. 43.

Lubrication – Motor bearings are factory lubricated with grease to give 6 months service for normal conditions. Relubricate bearings each 6 months for horizontal motors, for vertical motors top bearing each 6 months or 1 year depending on speed, bottom bearing each 3 or 6 months depending on speed. Relubricate as follows:

1. Stop the motor. Lock out the switch.
2. Thoroughly clean off and remove plugs from fill and drain lines.
3. Remove hardened grease from drains with stiff wire or rod.
4. Add grease to fill line with hand gun until small amount of new grease is forced out drain. Agitate drain with wire or rod to aid grease movement. Catch used greaser in suitable container.
5. Replace plugs in fill lines.
6. Put motor back in operation.
7. Run motor for at least one hour to expel excess grease, then replace plugs in drain lines.

NOTE – Refer to Maintenance Manuals for other procedures applicable only to vertical motors. Inner cap of top bearing must be inspected and grease removed, or a procedure followed that provides grease above bearing and does not completely fill inner cap.

Packing Adjustment – Fiber packing should not be tightened to the point of no leakage. Without some leakage packing may burn and score shaft or sleeve. With new packing gradually take up gland with pump running to control leakage as packing seats. New metallic packing may smoke during run-in. When seated metallic packing forms a solid, bearing-like surface. Adjust gland with pump running, for either type, to provide leakage of 40 to 60 drops per minute. Pipe away all leakage. Never tighten gland with pump is idle.

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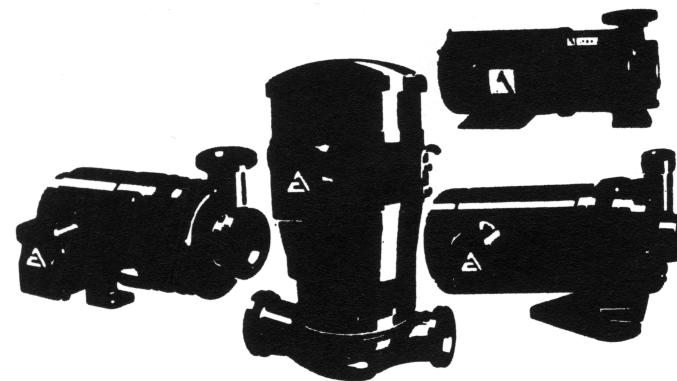
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INSTRUCTION MANUAL
AC0922

A-C Pump Series

CLOSE-COUPLED and IN-LINE CENTRIFUGAL PUMPS

Prime Pump Before Starting



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READ BEFORE INSTALLING AND OPERATING PUMP

RECEIPT

INSPECTION – Check pump for shortage and damage immediately upon arrival. Note damage or shortage on freight bill (bill of lading); immediately file claim with carrier. Notify the A-C Pump sales office.

Exterior – Pay particular attention to conduit box, external hardware and accessories. Touch up abrasions or scratches with approved paint. By hand, test that shaft rotates freely.

Interior – If extensive or serious external damage is noted, impeller is damaged (look in ports), or shaft binds or sticks, disassemble as required to permit internal inspection. Refer to applicable pump and/or motor maintenance manual for procedures.

Handling – Handle with care. Dropping or jarring can seriously damage motor bearing or break pump parts. Lift with device with capacity for pump weight, and use lifting hooks or eye bolts (if provided) or rig double sling around motor frame and pump casing. Do not use sling through pump-motor adapter nor around suction and discharge flanges.

Storage – Store pump in clean, dry, well ventilated area, free from rapid or wide changes in temperature. Suitably cover to keep chips, debris, dirt, dust from pump. Make sure heavy objects will not drop or fall on pump. For storage of 6 months or longer:

1. Coat exposed, machined surfaces with rust-preventive.
2. Consult applicable motor or pump maintenance manual for procedures to follow if atmospheric conditions are poor. (51x3963).
3. Rotate shaft several revolutions at least once each 6 months; once each month if conditions are poor.
4. Relubricate motor bearings every 2 years.
5. At the very least, drain moisture from TEFC motors regularly. Best to use desiccant and/or heaters to keep moisture from accumulating.
6. After long storage, particularly if conditions were poor, thoroughly clean, and dry, motor and pump before placing in service.

INSTALLATION

Location — Pump location should provide the following:

1. Install as close to suction supply as possible.
2. Shortest and most direct suction pipe practical. Suction lift must not exceed limit for pump. NPSH available must equal or exceed pump requirement.
3. Suction port below pumping level to provide priming.
4. Plenty of room for inspection and maintenance.
5. Easy protection from freezing when idle in cold weather.
6. Correct power supply to motor; all wiring should meet National Electrical and Local Codes and regulations.
7. If outdoors, protection from elements.

Base – Use a substantial base for horizontal shaft pumps; isolate if necessary, to keep vibrations from pump. Shim under feet to make shaft level. Check pump flanges with spirit level. Dowel the feet.

For vertical-shaft pumps that are wall, tank, or bracket mounted use a heavy rugged support that does not deflect when pump is mounted, nor when pump is running.

Piping – Suction and discharge gauges are useful to check pump operation and are excellent trouble indicators. Install gauges in the lines if pump nozzles do not have gauge taps. Observe these precautions when installing piping:

1. Support close to, but independently of pump.
2. Use at least next larger pipe size for suction and discharge.
3. Keep as straight as possible, with few or no bends and fittings.
4. Remove burrs, sharp edges, ream pipe cuts, and make joints air-tight.
5. Do not “spring” pipe to make connections. Strain must not be transmitted to pump.
6. Allow for pipe expansion with hot fluids; expansion joints are not recommended.

Suction – Size and install suction piping to keep pressure loss at minimum and to provide correct NPSH.

1. Straight length not less than 10 times suction pipe diameter should be provided at pump connection.
2. Size must never be smaller than suction port; for long runs use 1 or 2 sizes larger.
3. Pipe should slope upward to pump, even for horizontal run.
4. Use eccentric reducer at pump, eccentric side down.
5. Use 45-degree or long sweep 90-degree elbows.
6. Use flapper type foot valve, but only to hold prime when pump is shut down and suction level is below pump.
7. Use gate valves only, for parallel connection and for isolating pump when shut down. Stem must be horizontal or slope down. Never use globe valves in suction line.

Discharge - Some close-coupled pumps permit discharge port location at any of four positions, 90 degrees apart. Change by removing cover bolts, rotate casing, and replace bolts. Be sure there is adequate clearance with selected position - wall or tank, motor conduit box, for bearing lubrication, casing may extend beyond base or feet.

1. If discharge line is short, size may be same as discharge port; if long, use 1 or 2 sizes larger.
2. For long horizontal runs keep grade as even as possible, avoid high spots and loops. Trapped air will throttle flow and may result in erratic pumping.
3. Install check and gate valves in discharge line, check valve (if used) between pump and gate valve.

External-Injection Liquid – For packed stuffing boxes if pumped liquid will damage or deteriorate seal material, suitable clean liquid must be supplied from an outside source. Install valves in this piping to regulate flow and pressure to the box.

Stuffing Box — For packed pumps the stuffing box must have clean, clear liquid to flush and lubricate packing. The best means of assuring this is regulation of seal liquid pressure. In general, provide external liquid at 15 to 25 psi above pump suction pressure. If pumped liquid is used, adjust needle valve to give pressure 5 to 10 psi above maximum box operating pressure (must be found by trial). It is not possible to adjust this pressure on internal-liquid seal pumps not fitted with needle valves.

Adjustment or special procedures are not required for pumps having mechanical seals.

OPERATION

Pre-Start - Before initial start of the pump, check as follows:

1. Be sure that pump operates in direction indicated by the arrow on the pump casing (suction cover). Check rotation each time motor leads have been disconnected.
2. Check all connections to motor and starting device with wiring diagram. Check voltage, phase, and frequency of line circuit with motor nameplate.
3. Check suction and discharge piping and pressure gauges for proper operation.
4. Turn rotating element by hand to assure that it rotates freely.
5. Check stuffing box adjustment, lubrication, and piping.
6. Assure that motor bearings are properly lubricated.
7. Assure that pump is full of liquid (primed).

Priming – If pump is installed with a positive head on the suction, prime by opening suction valve and allowing liquid to enter the casing, at the same time venting all air out of the top of the casing.

If pump is installed with a suction lift, priming must be done by other methods, such as foot valves, ejectors, or by manually filling casing and suction line.

CAUTION – DO NOT RUN PUMP DRY WITH HOPE IT WILL SELF-PRIME. Serious damage may result if started dry.

Starting – Proceed as follows to start pump:

1. Close drain valves and valve in discharge line.
2. Open fully all valves in the suction line.
3. Turn on seal water to the stuffing box (for external-injection). (If pumped liquid is dirty or if leakage of air is to be prevented, this line should be always left open.)
4. Prime the pump. If pump does not prime properly, or loses prime during start-up, shut down and correct condition before repeating procedure.
5. For pumps moving high temperature liquids, open warm-up valve to circulate liquid for preheating. Close valve after pump is warmed up.
6. Start the motor (pump).
7. When pump is operating at full speed, open discharge valve slowly.
8. Adjust seal-liquid valves to produce a pressure of 15-25 psi more than pump suction pressure.

Running – Periodically inspect pump while running, but especially after first start, and following repair.