CI/CE
Close Coupled Pumps

302-003A

Installation and Operation Instructions

SUPERSEDES: 302-003A dated 1994 EFFECTIVE: March 31, 2002

Plant ID No. 001-923

A: INSTALLATION

SAFETY REQUIREMENTS

1. **IMPORTANT!** These instructions should be read completely prior to installation of the equipment. A copy of these instructions should be retained on file for future reference.
2. This pump is intended for the circulation of water or other suitable HVAC media. It is not intended for hazardous, corrosive, or flammable liquids.
3. Pump must not be operated until all plumbing and/or electrical connections are in place.
4. Proper care and suitable equipment should be used to move and install this heavy equipment.
5. Care should be taken when installing pipe systems to avoid placing an excessive load on the pump unions.
6. Refer to motor installation instructions to determine proper terminal connections in order to obtain correct pump rotation.
7. When the system piping is used as an earth bonding path for the building electrical services (check local codes), the pump should not be relied upon as part of the circuit. A properly installed bridging connection should be provided.
8. If electrical connection is to be made using any means other than rigid conduit, proper strain relief must be provided (min 100N tension).
9. Pump should be installed according to local electrical and safety codes using appropriate size wire and suitable over current protection. It should use a lockable isolator or circuit breaker conforming to EN60947-3.
10. It is recommended that the pump be fitted with a suitable “emergency stop” per the requirements of EN418.
11. It is recommended that sound (noise) level reading be taken following installation per requirement of EN809.

RECEIVING PUMP

1. Check pump for shortage and damage immediately after arrival. Prompt reporting to the carrier’s agent, with notations made on the freight bill, will expedite satisfactory adjustment by the carrier.
2. Unload and handle the unit by lifting around the motor frame. Do not lift by pump casing or flanges.
3. Pumps are shipped from the factory ready to mount on a solid base. They are painted with one finish coat. Required accessories are packaged in a separate container and shipped with the pump.
4. If the pump is not to be installed and operated soon after arrival, store it in a clean dry place having slow moderate change in ambient temperature. Rotate the shaft weekly to coat the bearings with lubricant and to retard oxidation and corrosion. Follow motor storage recommendations.

A1: LOCATION

Locate pump in an easily accessible place with sufficient space around it for maintenance and servicing. On larger pumps allow head room for the use of hoists or overhead cranes. Locate pump on a dry and clean place so that motor will be protected from moisture and dust.

On closed heating systems, place compression tank at the suction side of the pump. When pump head is less than 20 feet, it is permissible to connect compression tank to discharge side of the pump.

On open systems, install pump close to liquid supply and make suction piping as short and as straight as possible.

A2: FOUNDATION

The foundation serves to carry the pump weight and to absorb vibration. Normally, the foundation is made of a concrete block, preferably tied in with the floor or ground. Make the foundation block about 4" longer and 4" wider than the base of the frame. Height of the block may vary from ⅔ to 1 times the width of the foundation (Fig. 1). When foundation is poured, provide a hole near each of the four (4) corners. To simplify installation and maintenance use lead Anchors. Place the front Anchor about 2" from the edge of the foundation to clear overhanging casings (Fig. 2).

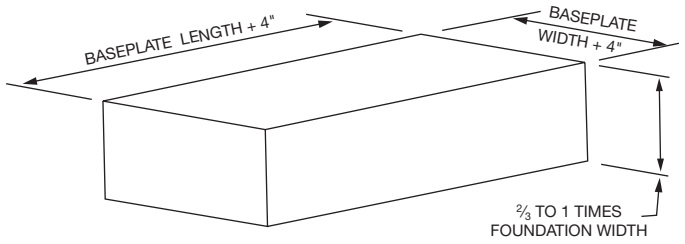

Fig. 1 – Foundation Block

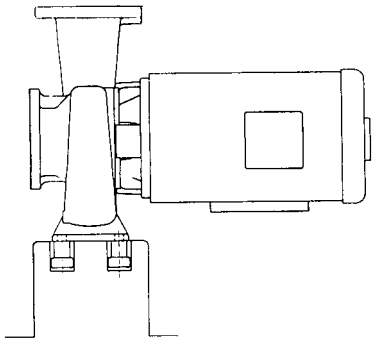

Fig. 2 – Length Side of Foundation

Problem Analysis

A. NO DISCHARGE

1. Pump not primed
2. Speed too low (when direct connected to electric motor, determine whether or not motor is across the line and receives full voltage)
3. System head too high
4. Suction lift higher than that for which pump is designed
5. Impeller completely plugged
6. Wrong direction of rotation
7. Air leak in the suction line
8. Air leak through stuffing box

B. INSUFFICIENT DISCHARGE

1. Air leaks in suction line or stuffing box
2. Speed too low (when direct connected to electric motor, determine whether or not motor is across the line and receives full voltage)
3. System head higher than anticipated
4. Insufficient NPSH (net positive suction head). Suction lift too high. Check with gauges. Check also for clogged suction line or screen.
5. Not enough suction head for hot or volatile liquids
6. Foot valve too small
7. Impeller partially plugged
8. Mechanical defects:
   - Wearing rings worn
   - Impeller damaged
   - Foot valve or suction opening not submerged enough
   - Wrong direction of rotation

C. INSUFFICIENT PRESSURE

1. Speed too low (when direct connected to electric motor, determine whether or not motor is across the line and receives full voltage)
2. System head less than anticipated
3. Air or gas in liquid
4. Mechanical defects:
   - Wearing rings worn
   - Impeller damaged
   - Impeller diameter too small
   - Wrong direction of rotation

D. LOSS OF SUCTION FOLLOWING PERIOD OF SATISFACTORY OPERATION

1. Leaky suction line
2. Waterseal plugged
3. Suction lift too high or insufficient NPSH
4. Air or gas in liquid
5. Casing gasket defective
6. Clogging of strainer

E. EXCESSIVE POWER CONSUMPTION

1. Speed too high
2. System head lower than rating, pumps too much liquid
3. Specific gravity or viscosity of liquid is too high
4. Mechanical defects:
   - Shaft bent
   - Rotating element binds
   - Stuffing boxes too tight
   - Wearing rings worn

F. VIBRATION

1. Air leak in suction line
2. Air or gas in liquid
3. Impeller partially plugged
4. Mechanical defects:
   - Damaged impeller
   - Misalignment of pump and driver
   - Bearing worn
   - Rotor out of balance
   - Shaft bent
5. Foundation not rigid

G. MOTOR RUNS HOT

1. Speed too high
2. Specific gravity or viscosity of liquid pumped is too high
3. Mechanical defects:
   - Shaft bent
   - Rotating element binds
   - Defects in motor
   - Voltage and/or frequency lower than rating
   - Misalignment of pump and driver

H. PUMP BEARINGS OVERHEAT

1. Contaminated lubricant
2. Mechanical defects:
   - Shaft bent
   - Rotor out of balance
   - Misalignment of pump and driver

Limited Warranty

Commercial Pump Warranty Terms

(Models FI, CI, FE, CE, KV, KS, TA)

Taco, Inc. will repair or replace without charge (at the Company's option) any commercial pump product or part which is proven defective under normal use within one year from date of start-up or one year and six months from date of shipment (whichever occurs first).

In order to obtain service under warranty, it is the responsibility of the purchaser to promptly notify the Company in writing and promptly deliver the item in question, delivery prepaid to the factory. For complete details on warranty returns, the purchaser should contact a local Taco stocking distributor or the Company. If the product or part in question contains no defect as covered in this warranty, the purchaser will be billed for parts and labor charges in effect at time of factory examination or repair.

Motors provided on commercial pumps are not covered by this warranty, and are warranted by the motor manufacturer. For complete details on motor warranty returns, the purchaser should contact the motor manufacturer's local service repair center or contact the motor manufacturer directly.

Seals provided on commercial pumps are not covered by this warranty.

Any Taco product or part not installed or operated in conformity with Taco instructions or which has been subjected to misuse, misapplication, the presence of certain chemicals (such as solvents, acids, etc.) or other abuse will not be covered by this warranty. For complete information on chemical and application restrictions, the purchaser should contact the company.

Taco, Inc. reserves the right to make changes in details of design, construction, or arrangement of materials of its products without notification.

Taco, Incorporated offers this warranty in lieu of all other express or implied warranties. No warranties are made for merchantability or fitness for use and there are no warranties which extend beyond the description contained herein. Taco, Inc. will not be liable for any special, incidental, or consequential damages.

Do it Once. Do it Right.

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Visit our web site at: http://www.taco-hvac.com

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B: PUMP START-UP & OPERATION

B1: LUBRICATION

Motor Bearings:

CAUTION: Overgreasing bearings can cause premature bearing failures. Do not mix dissimilar greases. Do not lubricate while pump is running. Do not remove or install drain plug while pump is running.

On Close Coupled Pumps, motor bearings carry both pump and motor load. Therefore, it is of the utmost importance to have the bearings properly lubricated at all times.

The recommended lubricants for CI/CE motors are Chevron “SRI No. 2” and Shell “Dolium R”.

Ball Bearings:

Ball bearings are greased at the factory. Grease will not flow out during shipment, so no checking will be required at start-up.

Regrease bearings as indicated by motor manufacturer’s instructions. Normally greasing is required every two (2) years or 3,000 hours of operation. On motors, grease is usually introduced with a grease gun through a grease fitting (Fig. 4).

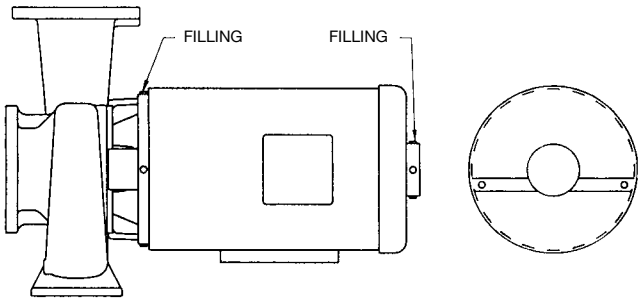

Fig. 4 – Lubrication Points

B2: MOTOR WIRING & ROTATION

Check wiring of motor before starting to make sure that connections are wired properly for the voltage in use. Overvoltage can burn out motor windings. Check heater element in magnetic starter to see that it is rated the same as the motor.

Before attempting to check out rotation of pump, fill pump with water to provide lubrication of the seal. **Never operate the pump dry!!!**

Next throw the switch and see if direction of rotation corresponds with arrows on frame of pump. The direction of rotation is counterclockwise facing the suction end of pump. Direction of rotation of three phase motors can be easily reversed by interchanging two of the three wires at the terminal board of the motor. Reversing of single phase motors is done by interchanging some internal wires or clamps. Instructions for reversing are found either on the motor nameplate or inside the motor terminal cover.

B3: PUMP START-UP

After you have checked lubrication and wiring, you are ready to start the pump.

Open the gate valve in the suction side and close the valve on the discharge side. Start motor, wait until unit has come to full speed and then open discharge valve slowly. Do not run pump for more than a few minutes with completely shut valves. If system conditions call for part-time operation against shut valves, install a bypass line from discharge to suction.

B4: MECHANICAL SEAL

Mechanical seals are the most delicate component of the pump. Special care has to be given to them to assure trouble-free operation.

The sealing element of a mechanical seal consists of a carbon washer rotating against a stationary ring.

Surfaces of both are highly lapped to assure sealing.

Any dirt that penetrates between the two mating parts will cause a rapid wear of the seal faces and will ultimately result in seal leakage.

New heating systems are usually contaminated by various materials such as construction debris, welding slugs, pipe joint compound, mill scale, etc. It is of utmost importance that such systems be cleaned out thoroughly before putting pump into continuous operation.

Cleaning of a heating system is simple and easy. First flush out system with cold water at city pressure to remove all loose foreign matter that penetrated into the system. Afterwards, boil out system with chemicals to remove dirt adhering to pipes.

Chemicals most commonly used for this procedure are sodium triphosphate, sodium carbonate, or caustic soda but any non-foaming detergents as used in dishwashers can be applied.

Fill system with clean water, add cleaning chemicals (1 lb. for every 40 to 50 gallons of water or manufacturer’s instruction). Start pump and heat up system. Let system run for a few hours and then drain and refill with fresh water. Your pumps are now ready for continuous duty.

CAUTION: The addition of certain chemical additives to systems utilizing TACO equipment voids the warranty.

A3: PIPING

Correct piping is of prime importance for the proper operation and long life of the pump. Stresses induced by piping will cause excessive wear of seals and bearings that could ultimately destroy these elements.

Both suction and discharge piping should be suspended close to the pump connections so that no pipe weight rests on the pump. Pipe flanges and pump flanges **must** align perfectly before connections are made. Piping should **never** be drawn by force into place.

Thermal expansion of piping requires special attention on heating installations. If no room is provided for pipe expansion, stresses are induced in the piping that will exert a load on the pump. Forces created by pipe stresses can exceed by far the load exerted through pipe and water weight. Stress forces can distort pump, bend shafts, wear out seals and impeller wear rings and ultimately burn out bearings. To protect pump from thermal pipe stresses, provide spring hangers and flexible connectors that are suitable to compensate for pipe expansion. (Fig. 3A)

Install gate valves on both suction and discharge side of the pump to allow servicing without draining the system. Also provide a flanged nipple (Spool) between gate valve and suction end of the pump to enable you to take the pump apart without disturbing piping (Fig. 3 B). In order to have them easily accessible, the pump and flange nipples should not be covered with insulation.

On open pumping systems drawing water from a level below the pump (suction lift), install a foot valve with strainer. On open systems where the pump is located below the suction water level (suction head), install a check valve in the discharge line close to the pump.

A4: PUMP SETTING

To set pump attach Anchor Blocks finger tight to pump frame and place in position with Anchor Blocks suspended freely in the four holes in the concrete foundation.

Next, level pump by inserting four wedges, one under each corner of the frame. At the same time, also check level and squareness of suction and discharge flanges. If everything checks out, pour concrete (right up to the bottom of the frame) into the four holes at the corners and let set for thirty six (36) to forty eight (48) hours before tightening bolts.

WARNING: UNEXPECTED STARTUP HAZARD
Disconnect and lockout power before servicing. Failure to follow these instructions could result in serious personal injury or death, or property damage.

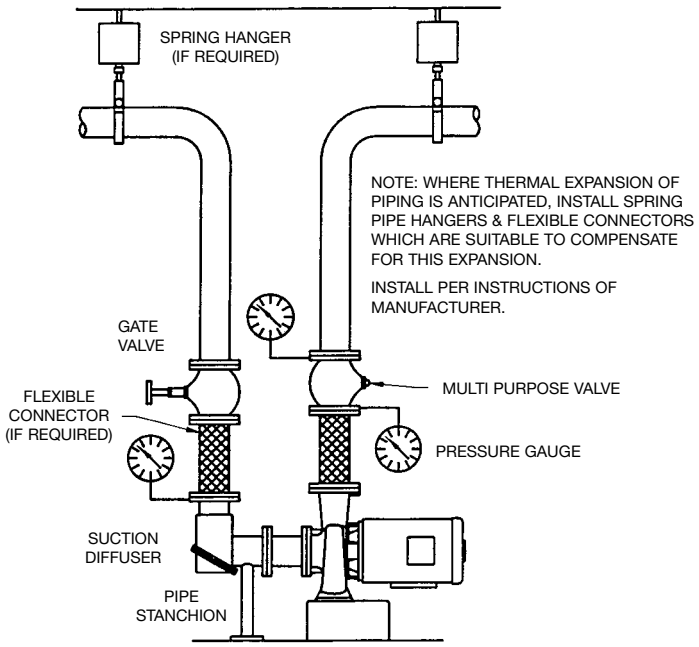

Fig. 3A – Typical Installation – Vertical Piping

A5: CONNECTING PIPING

Piping may now be connected to pump. Make certain that pump and pipe flanges are strictly parallel and properly spaced for the gaskets that will be used. Also check that pipes are supported properly and **do not** rest on pump flanges. **Never** draw pipes by force to pump flanges.

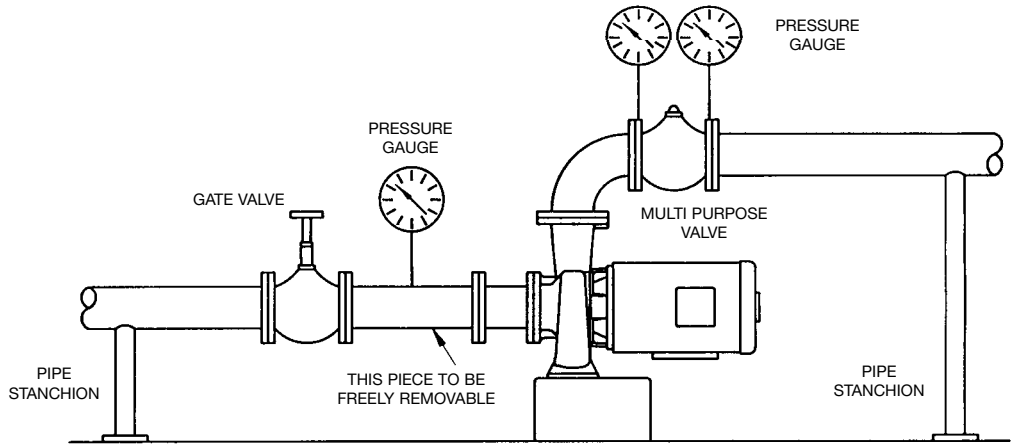

Fig. 3B – Typical Installation - Horizontal Piping