



FI/FE Base Mounted Pumps

302-012

Installation and Operation Instructions

SUPERSEDES: 302-012 dated 2001

EFFECTIVE: October 2014

Plant ID No. 001-937

A: INSTALLATION

SAFETY REQUIREMENTS

- 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.
- This pump is intended for the circulation of water or other suitable HVAC media. It is not intended for hazardous, corrosive, or flammable liquids.
- Pump must not be operated without guards in place.**
- Pump must not be operated until all plumbing and/or electrical connections are in place.
- Proper care and suitable equipment should be used to move and install this heavy equipment.
- Care should be taken when installing pipe systems to avoid placing an excessive load on the pump unions.
- Refer to motor installation instructions to determine proper terminal connections in order to obtain correct pump rotation.
- 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.
- If electrical connection is to be made using any means other than rigid conduit, proper strain relief must be provided (min 100N tension).
- 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.
- It is recommended that the pump be fitted with a suitable "emergency stop" per the requirements of EN418.
- It is recommended that sound (noise) level reading be taken following installation per requirement of EN809.

RECEIVING PUMP

- 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.
- Unload and handle the unit by lifting around the motor frame. Do not lift by pump casing or flanges.
- 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.
- 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 expansion tank at the suction side of the pump. When pump head is less than 20 feet, it is permissible to connect expansion 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 pad, preferably tied in with the floor or ground. Make the foundation pad about 6" longer and 6" wider than the base of the frame. Height of the pad should be at least 6". When foundation is poured, provide a hole near each of the four (4) corners to match the holes in the pump base. To simplify installation and maintenance use lead Anchors.

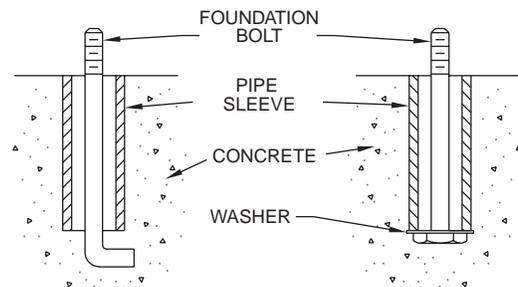


Fig. 1 – Anchor Bolts

A3: PUMP SETTING

When pump is set on its foundation, make sure to have it properly levelled. Place baseplate over foundation bolts. Place shims at corners of baseplate when required and level with a spirit gauge. Check also level of suction and discharge flanges.

A4: COUPLING ALIGNMENT

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.

Proper alignment of pump and driver will assure trouble-free operation and long life of the pump. Misalignment will cause rapid wear of seals, couplings and bearings. All pumps are carefully aligned before leaving the factory. However, experience indicates that alignment invariably changes in shipping and handling. Therefore, it is of utmost importance that alignment be checked at various steps of the installation process; i.e. after leveling, after piping and after first few weeks of operation.

FORMS OF MISALIGNMENT: (FIG 2)

To check for angular alignment, insert a pair of inside calipers or taper gauge at four points at 90 degree intervals around the coupling. Angular alignment is achieved when the measurements at all points around the coupling faces are within 0.005" of each other.

To check for parallel alignment, place a straight edge across both coupling rims at the bottom, and at both sides. Parallel alignment is achieved when all points around the OD of the coupler is within 0.005". Alignment adjustments can be made by shimming under the driver mounting feet. After each adjustment it is necessary to recheck all features of alignment.

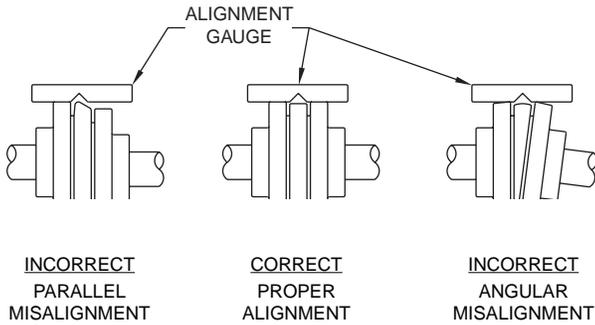


Fig. 2 – Coupling Alignment

Alignment should be performed after the baseplate has been properly set and grout has dried thoroughly according to instructions. Final alignment should be made by shimming driver only.

NOTE: Final alignment should be made at operating temperatures.

⚠ ROTATING COMPONENT HAZARD
 Do not operate pump without all guards in place. Failure to follow these instructions could result in serious personal injury or death, or property damage.

A5: GROUTING

When alignment is correct, the foundation bolts should be tightened evenly but not too firmly. The base plate can then be completely filled with grout, encasing the levelling shims or wedges. Foundation bolts should not be fully tightened until the grout is fully hardened, approximately 48 hours after pouring. Recheck alignment as outlined above.

A6: 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, bearings and couplings 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 should 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. 4)

Install gate valves on both suction and discharge side of the pump to allow servicing without draining the system.

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.

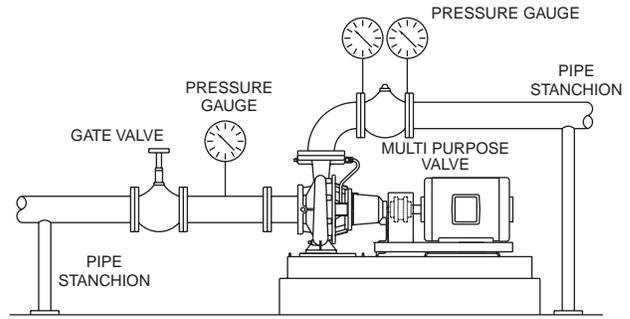


Fig. 3 – Typical Installation - Horizontal Piping

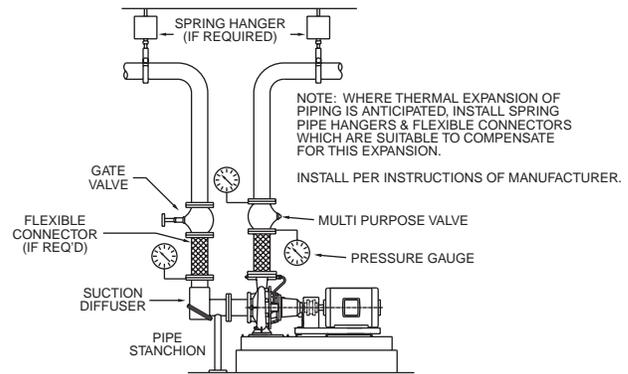


Fig. 4 – Typical Installation - Vertical Piping

A7: CONNECTING PIPING

Piping may now be connected to pump. Make sure that pump and pipe flanges are strictly parallel and properly spaced for the gasket 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. Recheck alignment after piping connections are made. If misalignment was caused by piping, it is a sign that pipe stresses distorted the pump. Correct piping to relieve stresses.

B: PUMP START-UP & OPERATION

Before starting up pump for the first time, several items are to be checked to avoid damaging pump.

B1: LUBRICATION

- **FRAME MOUNTED PUMPS** (Grease Lubricated Design)

NOTE: FI pump standard construction has permanently lubricated sealed bearings. For FI pumps with optional regreasable bearings and all FE pumps, follow instructions below.

Bearings are initially lubricated during manufacture. The regreasing interval depends upon the running speed of the unit:

PUMP RUNNING SPEED	REGREASING INTERVAL
1750 rpm	4250 hours
3450 rpm	2000 hours

To recharge the bearings with fresh grease, shut down pump (completely) and remove grease drain plug. Clean Alemite fitting and apply grease gun using enough strokes to equal 1.5 table-spoons. Restart pump and run for another fifteen minutes. Shut down pump (completely) and reinsert drain plug. Restart pump.

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.

RECOMMENDED GREASES	
MAKE	GRADE
Exxon/Mobil	Polyrex EM
Connoco	Polyurea 2
Mobil	Polyrex EP 2
Citgo	Polyurea 2

• **CLOSE COUPLED PUMPS**

The pump element is fixed directly to the motor shaft. Therefore, the motor bearings must be lubricated in accordance with the manufacturer's recommendations.

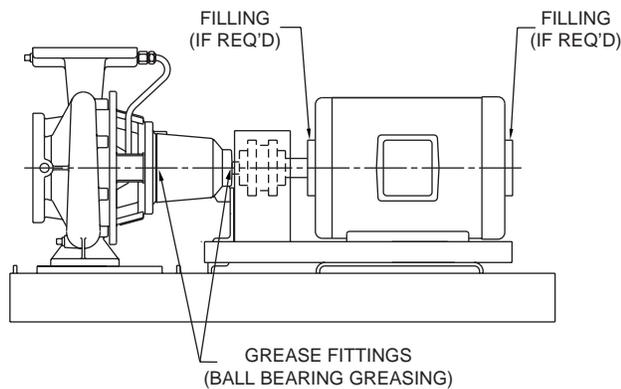


Fig. 5 – Lubrication Points

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 properly sized to adequately handle the full load amp draw of the motor.

Before attempting to check out rotation of pump, open isolation valves and 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.

Make sure the isolation valve is open on 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 discharge valve. If system conditions call for part-time operation against shut valves, install a bypass line from discharge to suction.

• **OPERATION - BEFORE STARTING**

The pump is ready for starting when:

- a) The unit base plate is grouted and bolted to the foundation.
- b) Motor is correctly wired to starter switch, ensuring correct rotation.
- c) Pump and driver are correctly aligned.
- d) Bearing lubrication is provided.
- e) Mechanical seal has been fitted.
- f) All rotating parts are found to be free when turned by hand.
- g) Pump is primed. **Never run the unit dry.** The liquid in the pump serves as a lubricant for close running fits within the pump and the pump may be damaged if operated dry. The pump may be primed by using an ejector, exhauster or vacuum pump. If a foot valve is used in the suction line, the pump may be primed by venting and filling the casing and suction line with liquid.

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 metallic or ceramic 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.

PROBLEM ANALYSIS



Caution: Always disconnect the pump from the electrical power source before handling. If the pump and driver fails to operate properly, carefully read instructions and perform checks noted below.

TROUBLESHOOTING		
SYMPTOM	POSSIBLE CAUSE(S)	CHECK
No Discharge	The pump is not primed.	If the case was vented and if suction and discharge valves are open.
	Speed is too low.	VFD settings.
	System head is higher than calculated.	The head calculations.
	Suction lift is higher than pump designed.	The NPSH required. Correct lift if NPSHR is higher than NPSHA.
	Impeller may be completely clogged.	The impeller visually, by dismantling the wet end.
	Incorrect direction of rotation.	The motor wiring.
		VFD settings.
Air leak in the suction line.	All pipe fittings.	
	All threaded & flanged connections.	
Insufficient Discharge Flow	Air leak in the suction line.	All pipe fittings.
		All threaded & flanged connections.
	Speed is too low.	The motor wiring.
		VFD settings.
	System head higher than anticipated.	The head calculations.
	Insufficient NPSHA. Suction lift too high.	Gages.
		For clogged suction line or screen.
Impeller is partially plugged.	The impeller visually, by dismantling the wet end.	
Mechanical defects: a. Worn wear rings. b. Impeller is damaged. c. Incorrect direction of rotation.	All major components by dismantling the wet end.	
Insufficient Discharge Pressure	Speed is too low.	The motor wiring.
		VFD settings.
	System head is less than anticipated.	Design parameters
	Air in the system.	All fittings for leaks.
		All air vents for leaks.
	Mechanical defects: a. Worn wear rings. b. Impeller is damaged. c. Impeller diameter is too small. d. Incorrect direction of rotation.	All major components by dismantling the wet end.
Clogged suction strainer.	The suction strainer.	
Loss of Suction	Leak in the suction line.	All pipe threads and flanged connections.
		All fittings.
	Suction lift is too high.	For air in suction line.
	Insufficient NPSHA.	NPSHA calculations.
	Air in the system.	All pipe threads and flanged connections.
		All fittings.
	Air through casing gasket or pump seals.	If leakage exists.
Clogged suction strainer.	The suction strainer.	
Excessive Power Consumption	Speed is too high.	The motor wiring.
		VFD settings.
	System head is lower than calculated.	The head calculations.
	Specific gravity of the liquid is too high.	The calculations for viscosity correction.
Mechanical defects: a. Bent Shaft b. Shaft is binding. c. Worn wear ring(s).	All major components by dismantling the wet end & bearing frame.	

Procedures for long-term storage

Here are some general suggestions for long term storage. The applicability of all, or some of these suggestions depend on several factors such as type of equipment, length of storage, and condition of the environment in which they are stored in:

1. Drain the casing completely and dry it thoroughly, including its bearing housing and stuffing box, or seal chamber. Apply a coat of soluble rust preventive solution both internally and externally.
2. Cover all openings. Flanged openings (such as suction and discharge nozzles) should be covered with blind flanges with elastomer gasket. Threaded openings should be covered with steel plugs or caps.
3. Remove the shaft coupling; it may cause the shaft to develop a permanent sag during prolonged storage.
4. Wrap the exposed shaft and key with corrosion inhibitor waterproof paper or waxed cloth.
5. Protect the bearing housing from moisture by placing bags of vapor phase inhibitor crystals around the housing.
6. Cover the equipment with industrial strength plastic, preferably transparent to allow its visual inspection, including its nameplate, without uncovering the unit.
7. Store the unit in its normal position in a dry, temperature controlled environment.
8. Inspect the unit periodically and turn the shaft a few times plus 1/4 turn at least once a week. Turning the shaft prevents pitting of finished surfaces. The extra 1/4 turn is to displace the sag and prevent the shaft from developing a permanent bow.

Visit our website www.taco-hvac.com for "How To" videos.



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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