INSTALLING MOTOR ON PUMP ENDS

If you purchased a pump end without a factory supplied motor, you will need to install a motor to the pump end. A 56C Frame keyed shaft motor must be used with the BT4 pump ends. The table below outlines the minimum motor rating for your pump.

BT4 PUMP END MOTOR RECOMMENDATIONS

Pump End P/N	GPM	Stages	High SF	
			HP	SF
95920507	5	7	1/3	1.95
95920706	7	6		
95921005	10	5		
95920509	5	9	1/2	1.90
95920708	7	8		
95921007	10	7		
95921505	15	5		
95922004	20	4		
95920512	5	12	3/4	1.65
95920710	7	10		
95921008	10	8		
95921506	15	6		
95922005	20	5		
95922504	25	4		
95920515	5	15	1	1.65
95920714	7	14		
95921011	10	11		
95921508	15	8		
95922007	20	7		
95922506	25	6		
95920719	7	19	1.5	1.47
95921015	10	15		
95921512	15	12		
95922010	20	10		
95922508	25	8		
95921018	10	18	2	1.25
95921515	15	15		
95922012	20	12		
95922510	25	10		
95922015	20	15	3	1.15
95922513	25	13		

ATTACHING MOTOR TO PUMP END

1. If you are installing a three-phase motor onto the pump end, the motor rotation must be checked prior to connecting it to the pump. Instantaneously energize the motor to check for counterclockwise rotation as viewed from the pump end, or shaft end, of the motor. The proper rotation is also indicated by the rotation arrow label on the pump bracket. If it is not correct, reverse the rotation as instructed on the motor label. Failure to check rotation prior to assembly to the pump could result in pump damage if the rotation is wrong when the completed assembly is energized.
2. Apply one drop of Loc-Tite 242 to each set screw and install both of them into the shaft coupling. Screw them into the coupling to the point where they just protrude into the ID of the coupling. This position will allow you to align the shaft keyway with the set screws, but still allow the shaft to slide into the coupling ID.
3. Position the motor up to the pump bracket and slide into position after lining up the shaft adapter keyway with the coupling set screws.
4. Fasten the motor to the pump bracket with the four provided bolts, lock washers, and nuts. Lock washers should be located under the nut, and not under the bolt head. Tighten to 115 in-lbs torque.
5. Properly position the coupling by inserting a flat bladed screw driver between the pump bracket and the coupling. Pry the coupling all the way toward the motor with the screw driver.
6. Tighten the set screws to 75 in-lbs with a 5/32" Allen wrench, while holding the coupling in position with the flat bladed screw driver.

OPERATION

RATINGS

⚠CAUTION Maximum operating pressure is 500 psi. Maximum suction pressure is 75 psi. Maximum water temperature is 120 °F. Consult factory to pump liquids other than water. Avoid pumping abrasive or sandy water. Do not run pump dry.

PRIMING

Never run the pump dry. To prime (fill with liquid) fill the suction pipe, pump, and discharge piping completely with water. A foot valve is required in all installations where the pump is required to draw the water from a source below itself to prevent the priming liquid from draining out of the pump. A typical booster installation will be supplied by either a tank, or a pressurized water source, creating what is known as a flooded suction condition. A foot valve is not needed in flooded suction installations.

If the pump's installation will require frequent re-priming of the pump, it may be useful to add a capped "Priming T" to the suction line piping. This allows easy re-priming without removing or disassembling the rest of the system plumbing.

⚠WARNING **HAZARDOUS PRESSURE:** Do not run pumps against a closed discharge, or at a system operating pressure above what is mentioned by the pump manufacturer.

STARTING

Close all system outlets, then slightly crack one system outlet to allow excess air to bleed out of the system. Start the pump. Gradually, but immediately, begin opening the discharge valve to half open. If after a few minutes of running you do not get water, repeat priming process (the pump may be locked by excess air that is

trapped in the unit). Once the pump is operating, fully open the discharge valve and a system outlet, letting the pump operate until the water is running clear. If after a reasonable time your water continues to run sandy or dirty, check with a water systems professional for additional assistance. No further priming should be needed unless the pump is drained for repair or storage, there is a leak in the suction plumbing, or there is a failure of the system's foot or check valve.

ADJUSTING PUMP SO SYSTEM DEMAND IS NOT MORE THAN SYSTEM SUPPLY

Booster pumps are typically used to increase municipal water pressure anywhere from 10 psi to 70 psi above what is being supplied by the water utility. For the pump to operate properly as it boosts the municipal water to the desired pressure, a consistent and steady flow of water is required. The booster pump will fail prematurely if it is set to operate at a point beyond what can be supplied.

PROCESS TO ENSURE PUMP IS RECEIVING ENOUGH WATER TO MEET DEMAND

1. Install a shut-off valve in the plumbing near the discharge of the pump.
2. Close the valve, but make sure that the supply water is allowed to freely flow into the pump without restriction.
3. Turn on the pump and begin opening the discharge's shut-off valve.
4. Continue opening the discharge valve until cavitation noise is heard coming from the pump. Cavitation (which can destroy the pump over time), often sounds like there is gravel inside the pump. STOP opening the discharge valve once cavitation is heard.
5. Slowly close the discharge valve until the cavitation is no longer heard.
6. The pump is now adjusted so that the system demand will not exceed what can be supplied.

MAINTENANCE

LUBRICATION

The pump requires only water for lubrication and must never be run dry.

WARNING

Hazardous voltage. Can shock, burn, or cause death.

Ground pump before connecting to power supply. Disconnect power before working on pump, motor or tank.

WARNING Before disconnecting pump, be sure fuse box leads are disconnected or power is turned off. After reassembling the pump, refer to priming instructions before running.

WARNING Hazardous voltage can shock, burn or cause death. Disconnect power to pump before servicing unit.

DRAINING

NOTICE: Disconnecting the pump will not necessarily drain all other parts of the piping system. If there are any concerns with the proper procedure or necessity of draining the suction plumbing, contact a water systems professional.

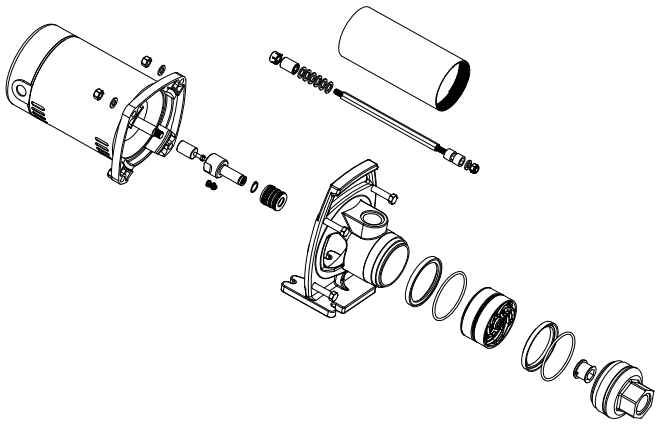
All piping and water tanks exposed to freezing weather should be drained. If there are any concerns with the proper procedure to drain the systems pressure tank, contact the tank manufacturer for assistance.

SERVICE AND DISASSEMBLY (Figure 6)

Torque settings: Coupling set screws – 75 in-lbs
Motor to pump end bolts – 115 in-lbs
Pump discharge head – 75 ft-lbs
Pump shaft nut – 30 in-lbs
Shaft screw - (3-phase only) 150 in-lbs

Tools required: 5/32" Allen wrench
3/16" Allen wrench (three-phase)
7/16" open end wrench
1/2" wrench
9/16" wrench (qty. 2)
5/8" open end wrench
1-1/8" open end wrench
1/4" nut driver
Vise grips
Workbench with vise
Large pipe wrench
Strap wrench
Snap ring pliers
Rubber mallet
Flat blade screwdriver

FIGURE 6 - SERVICE AND DISASSEMBLY



DISASSEMBLY FOR MOTOR REPLACEMENT

1. Loosen the 2 set screws on the coupling between the motor and pump end.
2. Remove the 4 bolts, nuts, and lock washers that hold motor to pump end.
3. Pull motor away from pump end.

Note: If your motor is a 56C Frame keyed shaft motor, you are now ready to replace the motor. If you have a square flange type motor, continue with steps 4 through 7 below. Remove the shaft adapter from your old motor so it can be installed on the replacement motor.

4. Remove motor canopy from wiring end of motor (Figure 7).

⚠WARNING Capacitor voltage may be hazardous. To discharge motor capacitor, hold insulated handle screwdriver BY THE HANDLE and short capacitor terminals together. Do not touch metal screwdriver blade or capacitor terminals or electrical shock could occur. If in doubt, consult a qualified electrician.

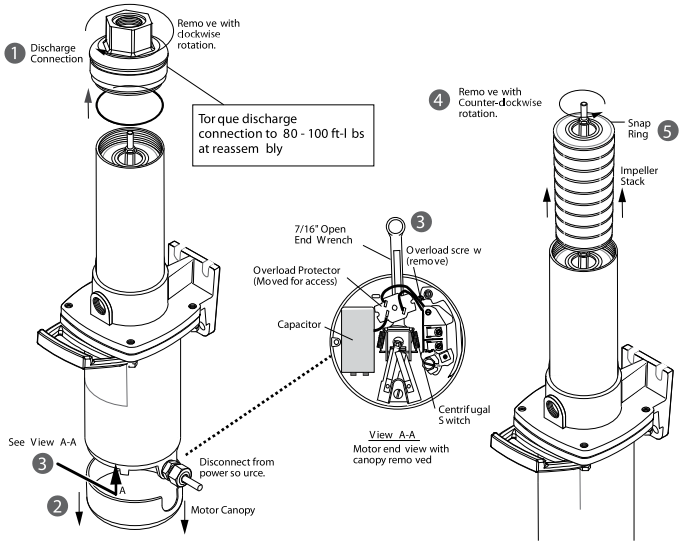
5. In order to gain access to the motor shaft, loosen screw that holds motor overload in place and move overload aside without disconnecting wires.
6. Insert 7/16" open end wrench onto exposed motor shaft flats. The motor shaft may have to be rotated until the open end wrench lines up with the flats on the shaft.
7. For three-phase motors - remove shaft screw from the center of the shaft adapter w/ 3/16" Allen wrench. This shaft screw has a left hand thread. Loosen by rotating in clockwise direction. Skip this step for single-phase motors which do not include this shaft screw.
8. Remove motor shaft adapter from pump end of the motor shaft with a 5/8" open end wrench, while holding the opposite end of the motor shaft with a 7/16" open end wrench. Some single-phase pumps do not have 5/8" flats on the shaft adapter. It must be removed using a pair of vice grips.
9. Installation of new motor is accomplished by reversing steps 1 through 8 above, and applying the torque values specified above. At the final step of assembly, before tightening the 2 set screws, the coupling should be pried with a flat blade screwdriver all the way toward the motor for proper positioning.

PUMP END DISASSEMBLY AND MECHANICAL SEAL REPLACEMENT

1. Remove motor as outlined in steps 1 through 3 of DISASSEMBLY FOR MOTOR REPLACEMENT.

⚠ATTENTION The next several steps involve disassembly of the pump end components. Special attention should be paid to the placement and orientation of every part to ensure that the pump is reassembled correctly. If you are not comfortable and/or familiar with this type of pump end work, please do not proceed.

FIGURE 7 - PUMP DISASSEMBLY FOR MOTOR REPLACEMENT



2. While holding the pump bracket in a vise, remove the pump discharge casting from the pump end with a pipe wrench and clockwise rotation looking into the discharge of the pump.
3. Remove discharge adapter ring and o-ring from assembly making special note of their position and orientation.
4. If the pump shell does not come off with the discharge casting, it will be necessary to remove the shell from the bracket using a strap wrench and clockwise rotation.
5. While holding the pump/motor coupling with a 1-1/8" open end wrench, remove the ½" nut from the pump shaft. Next, remove all washers, spacers, pump stages, thrust washers, adapter and o-ring from the shaft.

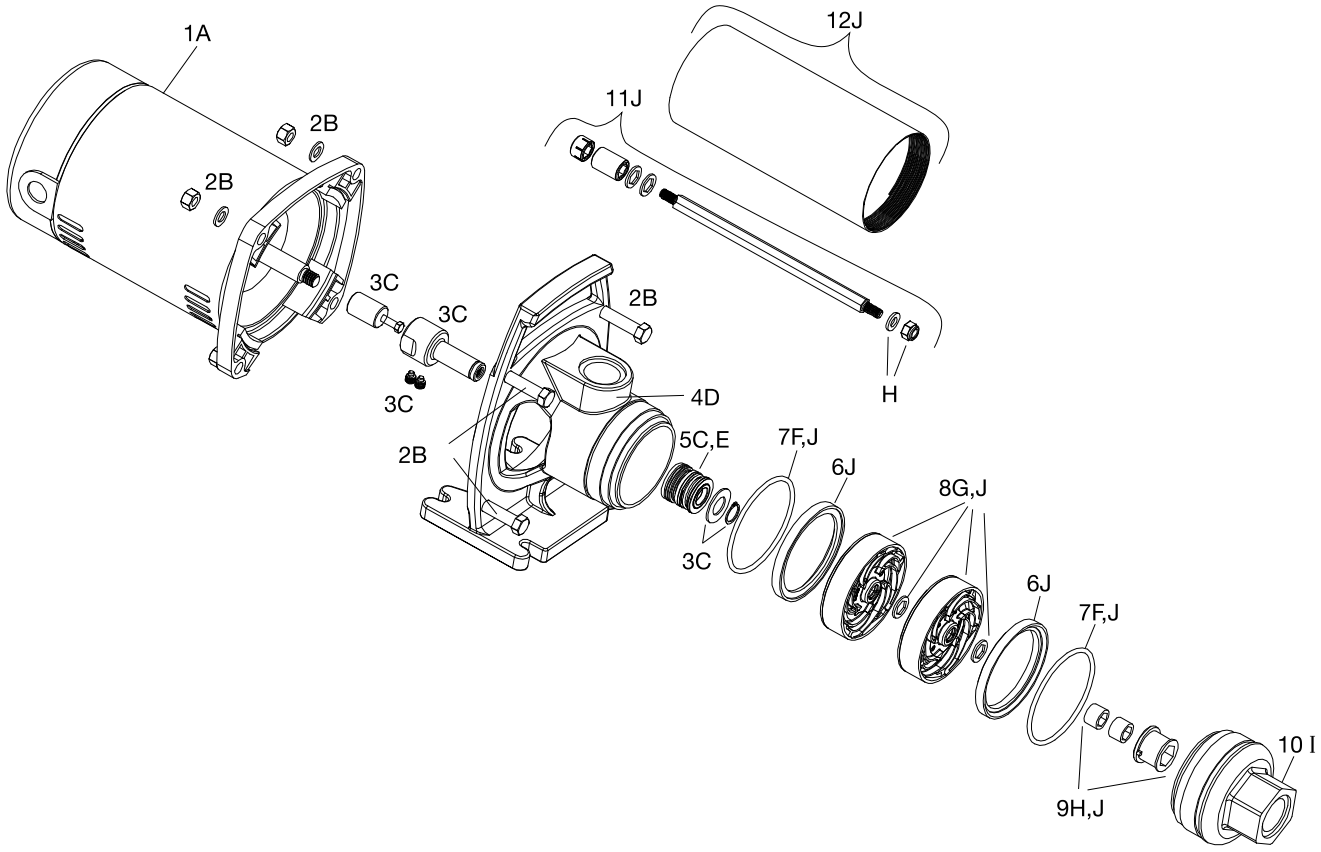
Pay careful attention to the placement and orientation of these components to ensure that they are reassembled correctly.

6. Remove the snap ring and mechanical seal retaining washer located on the pump end of the pump/motor coupling.
7. With a rubber mallet, tap the shaft/coupling assembly through the bracket in the direction toward the motor attachment. The spring half of the mechanical seal is now loose and can be removed from the assembly.
8. The ceramic seat and rubber boot can be tapped from the bracket using a flat blade screwdriver and rubber mallet.
9. Reassembly of the pump is accomplished by reversing steps 1 through 8 above, and applying the torque values listed above. Lubricating rubber components with soapy water will ease installation. Be careful not to contaminate the mechanical seal faces with foreign matter or the touch of your hands. Use the cardboard spacer provided with the new mechanical seal to tap the ceramic seat in place without contamination.

TROUBLESHOOTING

PROBLEM	POSSIBLE CAUSE
Motor will not start	(a) Disconnect switch open (b) Fuses blown or thermal overload open (c) Locked shaft, hydraulic components set incorrectly (d) Motor windings failed (e) Defective starting switch inside motor (f) Disconnected or defective wiring
Motor overheats	(a) Low or high voltage (b) Hydraulic components are rubbing (c) Inadequate ventilation
Pump delivers no water	(a) Pump not primed (b) Plugged suction or discharge line (c) Leakage of air in suction line
Low pump capacity or pressure	(a) Valves in suction or discharge lines partially closed (b) Suction or discharge line partially plugged (c) Wrong pump rotation
Noisy pump and motor	(a) Plugged suction line (b) Defective motor bearings (c) Valve in suction line partially closed (d) Suction line partially plugged (e) Impellers rubbing inside the pump end
Water leakage at pump shaft	(a) Defective seal assembly

PARTS FOR BT4 MODELS



PARTS FOR BT4 MODELS - CONTINUED

Figure No.	Description	Construction Material	Kit (1) Grouping Identifier	Repair Part Order Codes by Motor Size						
				1/3 HP (1.95SF)	1/2 HP (1.90SF)	3/4 HP (1.65SF)	1.0 HP (1.65SF)	1.5 HP (1.47SF)	2.0 HP (1.25SF)	3.0 HP (1.15SF)
1	Single-phase Motor (4)		A	305374908	305374903	305374906	305374907	305374909	305374911	305374912
	Three-phase Motor (4)				305374954	305374955	305374956	305374957	305374958	305374959
2	Fastener Kit (4)		B	305421901						
3	Coupling Kit (2) (4)	Stainless Steel	C	305421902						
		Brass		305421903						
3	Coupling Kit (2) (5)	Stainless Steel	C	305421001						
4	Pump/Motor Bracket (4)	Stainless Steel	D	305421904						
		Cast Iron		305421905						
4	Pump/Motor Bracket (5)	Stainless Steel	D	305421002						
5	Mechanical Seal (4)	Viton	E	305421906						
		Buna		305421907						
5	Mechanical Seal (5)	Viton	E	305421003						
6	Suction/Discharge Spacers	Not available as separate components. Included in the hydraulic overhaul kit only.								
7	O-ring Set		F	305421908						
8	Stage Assembly									
	5 GPM		G	305404911						
	7 GPM			305404912						
	10 GPM			305404913						
	15 GPM				305404914					
	20 GPM				305404915					
	25 GPM					305404916				
9	Top Bearing		H	305421909						
10	Discharge Head		I	305421910						
11	Pump Shaft (and Shaft Hardware)	Not available as separate components. Included in the hydraulic overhaul kit only.								
12	Pump Shell	Not available as separate components. Included in the hydraulic overhaul kit only.								
13	Hydraulic Overhaul Kit (3)									
	5 GPM		J	305422901	305422902	305422903	305422904			
	7 GPM			305422001	305422905	305422906	305422907	305422908		
	10 GPM			305422002	305422909	305422910	305422911	305422912	305422913	
	15 GPM				305422003	305422914	305422915	305422916	305422917	
	20 GPM				304422004	305422918	305422919	305422920	305422921	305422922
	25 GPM					305422005	305422923	305422924	305422925	305422926
13	Hydraulic Overhaul Kit (3)									
	5 GPM	Stage Count Reference		7	9	12	15			
	7 GPM			6	8	10	14	19		
	10 GPM			5	7	8	11	15	18	
	15 GPM				5	6	8	12	15	
	20 GPM				4	5	7	10	12	15
	25 GPM					4	6	8	10	13

(1) Items with like identifiers are sold/packaged together.
(2) Coupling kit ships with mechanical seal.
(3) Hydraulic overhaul kit is the combination of figure numbers 6, 7, 8, 9, 11, and 12.
(4) Square flange pump mounting.
(5) 56C pump end mounting.