

BOWIE PUMPS

OPERATION - MAINTENANCE

PUMPING PRINCIPLE:

The meshing of the gears cause a slight depression, with the resulting enmeshing of the gears causing a vacuum drawing the fluid being pumped into the space between the teeth of the gear. The liquid is carried between the teeth and the case to the opposite side of the pump. The fluid is also forced into the discharge line by the meshing of the gears. *Bowie Pumps* are positive displacement pumps. The pumping gears are of equal size and are the only two moving parts in the pump, which promotes longer life.

PUMP CAPACITY:

The Series 300, 400, and 500 -2" and 3" *Bowie Pumps* are designed and recommended to be operated not to exceed 400 RPM and not in excess of 100 PSI of pressure. At this speed the 2" *Bowie Pump* will deliver approximately 140 GPM at no discharge pressure and the 3" will deliver approximately 238 GPM. The Series 8100 and 9100, 1¼" - 1½" are designed and recommended to be operated not to exceed 780 RPM. At this speed either size will deliver approximately 48 GPM and not in excess of 100 PSI of pressure. The *Bowie Pumps* is a rotary pump, and the delivery rate will vary some with the differential pressure and the viscosity of the liquid. The *Bowie Pumps* operate either clockwise or counterclockwise with equal efficiency. No alterations are necessary relative to connections, but it must be remembered that when reversing rotation, the flow of liquid is also reversed in that the suction line becomes the discharge line and visa versa. The suction line must always be at least the same size of the suction port.

LUBRICATION:

Bowie Pumps require lubrication only where grease fittings are provided. All bearings and bushing type pumps require a good grade of gun grease to insure longer life of the pumps. No lubrication is required on bushing or bearing type pumps if oil is pumped exclusively. This is the only exception. Periodic lubrication is of utmost importance in the care of the *Bowie Pumps*. This point cannot be over emphasized. Depending upon use this lubricating should be done every four (4) hours of continuous operation.

ADJUSTMENT FOR CLEARANCE: All Series BOWIE PUMPS

Should it be necessary to adjust the pumps due to excessive clearance from normal wear of the impellers between the front and back plate housing, remove the back plate and remove one, two or three, etc. pump gaskets as may be required to take up the slack. Replace back plate, being careful that the remaining gaskets do not crimp or wrinkle, and tighten the bolts diametrically opposed to each other (see fig. 1) tightening the bolts evenly.

MAINTENANCE ON STANDARD BOWIE PUMPS: Series 300 and 8100/9100

The standard or stock sleeve bearing *Bowie Pump* is furnished with a high grade, braided type of asbestos packing, lubricated with graphite and impregnated with lubricant. No further lubrication is needed for normal operation of this packing. When tightening the packing nut do not compress the packing too greatly that can cause excessive binding on the shaft. Another type of packing used is the graphite rubber packing ring. This type is preferred by many, however; great care must be taken when installing this ring to insure that the packing nut is not too tight causing binding on the shaft. This type packing tends to bind easier than the asbestos packing, due to friction on shaft and packing causing heat which swells the rubber. When installing bronze or teflon bushings in the standard *Bowie Pump*, care must be taken not to "scar" the bushings. It is preferable to press the bushings rather than tap or hammer them.

The purchase of replacement gears for *Bowie Pumps* are sold with the gears installed on the shafts. Shafts may be purchased separately. Often when shafts are pressed into the gears the shafts will bend and cause pump malfunction. If this is done by someone other than the *Bowie Pump* factory, care must be taken to insure that the shafts are perfectly straight.

MAINTENANCE OF BALL BEARING PUMPS: Series 400/OB/POB and 500/IB

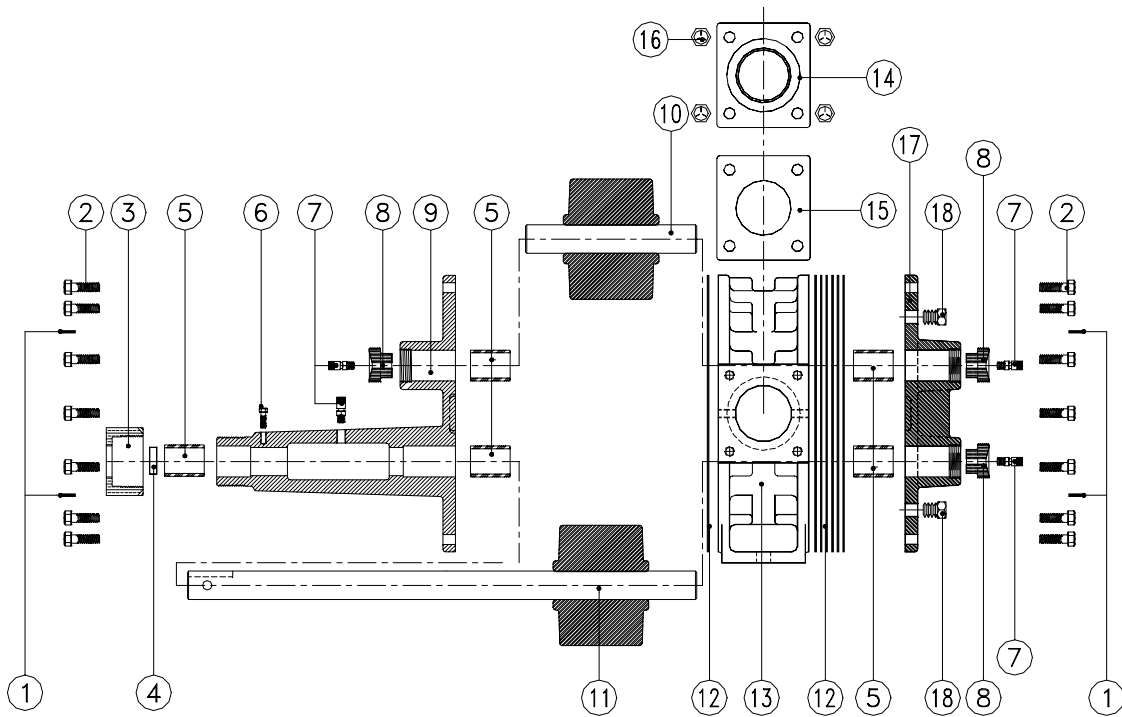
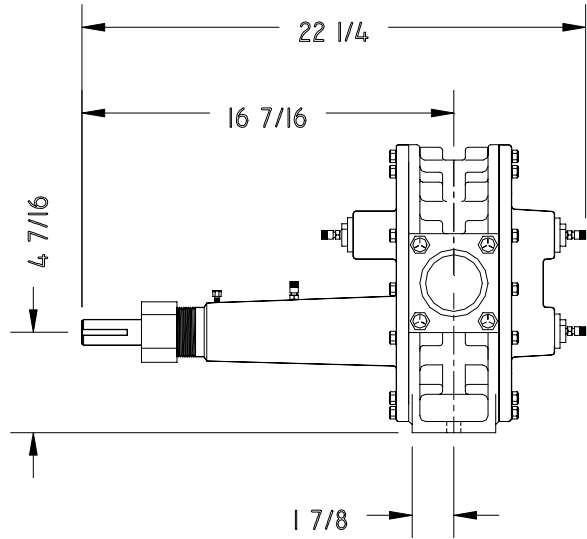
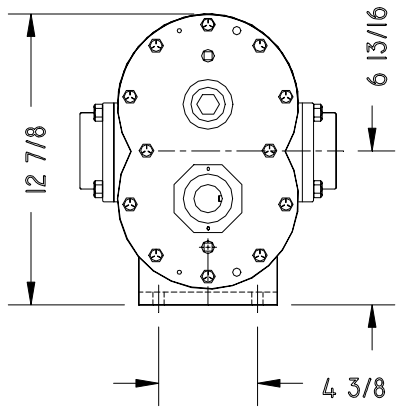
On each plate of the ball bearing *Bowie Pumps* are two (2) 3/8" threaded bolt holes which aid in the removal of the plates when disassembling for maintenance. Merely insert a 3/8" USS (approximately 2" in length) bolt and turn into threaded holes, this operation should be done in a manner where both bolts pull the plates evenly to prevent binding on the bearings and shafts.

When replacing shafts in plates use extreme care on the bearing type pumps to ensure that the seals are not damaged. A good method to guard against damage is to grease these seals thoroughly so that the shaft may slip in without binding and turning the lips of the seal backwards.

Upon replacing bearings in the *Bowie Pump* exercise caution as not to damage the bearing by hammering, prying, pulling, etc.

Problem	Probable Cause	Solution
No Flow, Pump not Turning	Missing or Sheared Key(s)	Replace Key
	Gears Sheared	Inspect, replace defective part(s)
	Rotation in Wrong Direction	Reverse Direction
	Clogged or Restricted Inlet	Cear Line, Clean Filters, etc.
	Air Leaks Due to Bad Seals or Pipe Connections Pump Speed too Slow	Replace Seals, Repair Leaks in Lines Increase Speed (never past suggested max. speeds) Filling Inlet Lines with Fluid may Allow Initial Start-up Foot Valve may Solve Start-up Problems
	Liquid Drains or Siphons from System when Off	Use Foot or Check Valves
	Extra Clearance Gears, Worn Pump	Increase Speed; Use Foot Valve for Priming Remove one or More Gaskets from Back Plate
	Relief Valve not Properly Adjusted, or Held Off Seat by Foreign Material (Flow recirculated to Inlet)	Adjust or Clear Valve
Insufficient Flow	Speed Too low to Obtain Desired Flow Air Leaks	Check Flow Speed Chart Check Seals, Check Inlet Fittings
Fluid Vaporization (Starved Pump Inlet)	Strainers, Foot Valves, Inlet Fittings, Lines Clogged	Clear Lines, If Problem Persists Change Inlet System
	Inlet Line too Small; Inlet Length too Long; too Many Fittings or Valves; Foot Valves, Strainers too Small	Increase Line Size, Reduce Length; Minimize Direction and Size Changes; Reduce Number of Fittings
	NIPA too Low	Raise Liquid Level in Source Tank; Increase Raising or Pressurizing Source Tank; Select Larger Pump w/ Smaller NIPA
	Fluid Viscosity Greater than Expected	Reduce Pump Speed and Accept Lower Flow or Change System to Increase NIPA
Insufficient Flow, Fluid Being Bypassed	Relief Valve not Adjusted or Jammed	Adjust or Clear
	Flow Diverted in Branch Line (Valve Open, Etc)	Check System and Controls
Insufficient Flow High Slip	Hot (HC) or Extra Clearance Gears on Cold Fluid and/or Low Viscosity Fluid	Replace with Standard Clearance Gears
	Worn Pump	Replace Gears, Recondition Pump
	High Pressure	Reduce Pressure by System Changes
Noisy Operation	Worn Gears	Rebuild with New Gears, Lubricate Regularly
	Relief Valve Chattering	Readjust, Repair or Replace
	MECHANICAL NOISES (Gear to Body Contact) Improper Assembly	Check Clearances with Pump Gaskets
	CAVITATION High Fluid Viscosity; High Vapor Pressure Fluids; High Temperature	Slow Down Pump; Reduce Temperatures; Change System
	AIR or GAS in FLUID Leaks in Pump or Piping	Correct Leaks
	Dissolve Gas or Naturally Aerated Products	Minimize Discharge Pressure; (also see CAVITATION)
	ROTOR to BODY CONTACT Distortion of Pump Due to Improper Piping Installation	Reassemble Pump or Reinstall Piping
	Pressure Higher than Rated	Reduce Pressure
	Worn Bearings or Bushings	Rebuild with New Bearings/Bushings, Lubricate
	Pump Requires Excessive Power; Over Heats; Stalls; High Current Draw; Breaker Trip	Higher than Expected Viscous Losses
Higher Than Expected Pressure		Reduce Pump Speed; Increase Line Sizes
FLUID CHARACTERISTICS Fluid Colder Than Expected		Heat Fluid; Insulate/Heat Trace Lines; Use Pump with More Running Clearances
Fluid Sets Up in Line and Pump During Shut Down		Insulate/Heat Trace Lines; Install 'Soft Start' Drive; Install Recirculating Bypass System; Flush Lines
Fluid Builds Up on Pump Surfaces (I.e. Latex, Chocolate, Fondants, Etc)		Use Pump With More Running Clearance

Short' Pump Service Life	High Corrosion Rate	Upgrade Material in Pump Parts
	Pumping Abrasives	Larger Pumps at Slower Speeds
	Speeds and Pressures Higher Than Rated	Reduce Speeds & Pressures by Changes in System
	Worn Gears and Bearings Due to Improper Lubrication	Set and Follow a Regular Lubrication Schedule
	Misalignment of Drive and Piping; Excessive Overhung Load or Misaligned Couplings	Check Alignment and Loads



Dwg. ID	Part No.	Description	Qty Req'd	Dwg. ID	Part No.	Description	Qty Req'd
18	2318	Drain Plug	2	9	2302	Front Plate	1
17	2307	Back Plate	1	8	2308B	End Plug	3
16	2312	Flange Bolt	8	7	2316	Grease Fitting	4
15	2311	Flange Gasket	2	6	2317	Lock Screw	1
14	2310	Adapter Flange	2	5	2309	Bushing	5
13	2303	Center Case	1	4	2313	Graphite Packing Ring	1
12	2306	Body Gasket	8	3	2301	Packing Nut	1
11	2305	Drive Gear/Shaft	1	2	2314	End Plate Bolt	24

10	2305	Idler Gear/Shaft	1	1	2315	Taper Pin	4
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