Rotor-Tech,® Inc.

INSTRUCTION MANUAL

Electrically Driven Specialized Gear Pumps

Model GS 4400 Series

October 08, 2013

10613 Stebbins Circle · Houston, Texas 77043 · Phone 713-984-8900 · Fax 713-984-9425
E-Mail - info@rotor-tech.com · Web Site - www.rotor-tech.com

CAUTION!

The ROTOR-TECH electric drive specialized gear pump (Model GA, GC or GS) is a precision device that depends upon very tight fit between the pumping gears and the housing in which they rotate. Clearances of less that ½ thousandth of an inch are common (.012mm).

When **hot** glycol is suddenly drawn from the storage tank into the pump (particularly on a new start-up), the gears **expand** more rapidly than the housing. On start-up, the pump is at **ambient** temperature. As glycol is suddenly drawn from the surge tank, it enters the pump **hot**, resulting in a sudden rise in temperature. This can cause a momentary **lockup** of the pump, which will result in **internal pump damage**.

When starting an electric pump, you **MUST** "jog" the motor by turning the power **on** and off for short periods of time, pausing between "jogs" to allow the heat to react in the pump. This **MUST** be done until the pump housing has reached the temperature of the fluid being pumped. The pump can then be turned on as normal, and flow rates adjusted as required.

In extremely cold climates, it is often advisable to insulate the outside of the pump to keep it near the temperature of the glycol and the gears. Rotor-Tech can supply very effective insulators if needed.

The GS models are not nearly as susceptible to damage from thermal shock as are the GA & GC models. Usually one "jog" is sufficient. Perhaps two "jogs" in extremely cold conditions with glycol temperatures above 175ºF at the pump.

Rotor-Tech manufactures a Thermocouple Control System that provides totally automatic and proper "jogging" of the electric motor to eliminate thermal shock. All the operator does is turn on the motor and forget it.

Operation must have properly specified suction filter installed and functioning. Please contact your Rotor-Tech representative for specification assistance.

Rotor-Tech, Inc.

10613 Stebbins Circle · Houston, Texas 77043 · Phone 713-984-8900 · Fax 713-984-9425
E-Mail - info@rotor-tech.com · Web Site - www.rotor-tech.com

"ROTOR-TECH SPECIALIZED GEAR PUMPS"

Important Information
Concerning the Rotor-Tech Electrically Driven Glycol Pumps
GS Series

Please read all of this before installing or start up.

I. Check Valve MOST IMPORTANT

The single most important and most necessary item that must be provided by the user when installing a "ROTOR-TECH SPECIALIZED GEAR PUMP," is a good check valve in the high-pressure discharge line.

If the pump is turned off for any reason it is absolutely necessary that a check valve prevent high-pressure fluid from flowing back through the pump. If high-pressure fluid is allowed to back up into the pump and if simultaneously a suction line valve were closed, then the high pressure could cause the pump shaft seal to leak. This could allow fluid to flow into the oil reservoir. This leakage of oil and fluid (glycol) would be undesirable, requiring cleanup and could be dangerous to personnel in the vicinity.

Another possibility can occur if high-pressure fluid would act upon the pump with the suction line valve open. In this case the pump becomes a hydraulic motor and could damage the electric motor.

Most glycol dehydrators and similar production or process equipment are already equipped with good check valves to enhance the safety of their systems. Be certain to test any check valve for proper operation before installing the "ROTOR-TECH SPECIALIZED GEAR PUMP."

II. Bleed Valve

The "ROTOR-TECH SPECIALIZED GEAR PUMP" must be primed before it will pump at high pressure. The pump is self-priming if the air in the pump is bled off so that liquid can be drawn into the pump from the suction supply. It is recommended that an air bleed-off valve be installed in a T between the pump discharge port and the check valve. Many installations have the Rotor-Tech "Flo-Gage" installed in the suction line to the pump. With this arrangement it is very easy to bleed off air into the "Flo-Gage" through it's bottom NPT connection. No fluid will be lost to the environment if the "Flo-Gage" is used. As soon as the pump is primed, close the "Flo-Gage" through its bottom NPT connection.

Rotor-Tech, Inc.
10613 Stebbins Circle · Houston, Texas 77043 · Phone 713-984-8900 · Fax 713-984-9425
E-Mail - info@rotor-tech.com · Web Site - www.rotor-tech.com

Do not allow the pump to run dry. The gears and shafts in the pump rely upon the fluid being pumped to lubricate and cool them. The pump can be damaged of allowed to run dry for more than a few seconds.

III. Rotation

The electric motor must be wired to provide rotation in the correct direction. Note the "ROTATION" arrow that is fastened to the top of the oil reservoir. This indicates the direction of rotation. Continued rotation in the wrong direction could damage the pump.

IV. Flow

Flow through the pump is from right to left as indicated by the "FLOW" arrow on the face of the pump End Cover. This arrow is marked "IN" for the suction side of the pump and "OUT" for the high-pressure discharge side. If it is absolutely necessary that flow be from left to right due to existing piping conditions the pump can be indexed 180° to accomplish this change. Or, if necessary, the pump can be indexed 90° to achieve flow in a vertical direction from top to bottom. Never install a gear pump to pump upward from bottom to top. Do not attempt to index the pump until you have a complete understanding of Section V below.

V. Indexing the Pump to Change Flow Direction (GA & GC Models Only)

1. To index the pump, four 5/16 – 18 UNC hex-head cap screws (1/2" open-end wrench size) must be removed with their lock washers. These four bolts are on the pump flange nearest the aluminum oil reservoir. If the pump is removed, oil should run out of the large bore in the end of the reservoir. Or oil can be drained from the oil reservoir through the 1/2 NPT plug in the bottom of the oil reservoir. There is a gasket between the pump and the reservoir. It must be undamaged and in place when re-assembling. It is not necessary to completely remove the pump from the oil reservoir to accomplish the indexing

2. If the pump is completely removed then remount the entire pump with the arrow pointing in the direction best suited for piping. Note that the pump shaft has a square on its end that must be simply stabbed into the motor coupling. No keys or setscrews are necessary to reconnect the pump to the motor. Also be sure the pump mounting gasket is undamaged and in proper position before remounting the pump to the reservoir. If a new gasket is installed, it should be oil coated before use. A dry gasket will often stick to both surfaces and will tear or split when removed. Oil coating prevents this.

3. Remove the standpipe on the oil reservoir and pour in enough lube oil to cover the motor-to-pump shaft coupling. Re-install the standpipe. If the oil reservoir is overfilled, the excess amount will run out of the standpipe pressure relief valve while the motor is running. Wipe away the excess oil until it stops running out; equilibrium will have been achieved.

   New Units usually have regular automotive type 30-wt. motor oil (any brand) furnished with the assembly. Any good lube oil such as 10W-40 motor oil or ATF Fluid will do just as well.

4. Additional comments about indexing the pump to accommodate piping arrangements:

   A. Direction of rotation must not be changed.

   B. Direction of flow must always be in the direction indicated by the "FLOW" arrow, "IN and OUT" attached to the pump

   C. If flow is reversed by indexing 180°, then the nameplate with the serial number will be on the bottom or underneath the pump and the arrow will read "upside down."

   D. DO NOT DISASSEMBLE THE PUMP TO CHANGE FLOW DIRECTION. Only the 4 – 5/16-18 UNC flange bolts are to be removed to index the pump.

   E. Again, never install the pump to flow upward. Right to Left is most common. Top to bottom is best and left to right is ok with 180° index.

VI. Installing and Piping

The motor feet can be bolted into the desired position at the jobsite. Shims or equivalent alignment members should be installed under the base to facilitate alignment with existing or new piping. Fine vertical adjustments for alignment can be made by shimming with washers between the motor feet and the mounting base.

IMPORTANT

The "ROTOR-TECH SPECIALIZED GEAR PUMP" is a precision device that depends upon a very close fit between the pumping gears and the housing in which they rotate. Clearances of less than ½ thousandth of an inch are common. If piping alignment is not good, it is possible to strain the gear housing enough to cause bending, and thus rubbing of the gears on the inside of the housing. If this occurs, severe damage could result and, at best, the life of the unit will be reduced.

Therefore, great care should be taken to insure the piping is not in misalignment with the inlet and outlet of the pump.

It is recommended that flat-faced unions or the proper hydraulic fittings be used in connecting the pump. These unions or fittings make it very easy to remove the pump for replacement or servicing. If flat faced unions are used, the pump can be removed by simply unscrewing the two union nuts and removing the four 5/16-18 UNC Hex-head screws (1/2" hex or open end wrench size). The pump is then simply pulled off the oil reservoir with no interference from the unions. Standard unions often require heavy prying of the piping to remove the pump. This is difficult and time-consuming. An alternate way to insure piping alignment and ease of replacement is to connect the pump using one or two lengths of flexible tubing or high-pressure hydraulic hose.

VII. Pressure Relief Valve

The oil reservoir has a short standpipe extending upward. This pipe has a two "O" Ring and ball pressure relief valve in it. The purpose of this relief valve is to prevent pressure from building up in the oil reservoir. If the reservoir is overfilled, excess oil will run out of the pressure relief valve until equilibrium is reached. Also, as the air and oil in the reservoir heat up, the relief valve will prevent pressure build up. If the pump seal fails or leaks and there is simultaneously positive suction pressure, the seal leakage will be evidenced by oil or the pumped fluid exhausting from the pressure relief valve.

VIII. Oil Reservoir for Seals

An additional oil reservoir is provided to lubricate the two Oil Seals in the "C" Face Adapter or often call the Motor Adapter. There is a ¼ NPT hollow hex pipe plug to fill and drain this small reservoir. Check the oil level occasionally by removing the Fill Plug on top of the "C" Face Adapter. Add oil if necessary and replace the plug. Excess oil will simply be pushed under the Oil Seals without damage.

IX. Weep Hole for Oil Seals

If oil begins to leak out of the weep hole, it means that the Oil seals are worn too much to prevent leaking. A little leakage is not important, but when noticed, one should plan to replace the oil seals as soon as possible.

MODEL GS SERIES

All of the precautions and procedures referred to in "Instruction Manual for Electrically Driven Specialized Gear Pumps" apply to the GS series pumps.

DISASSEMBLY PROCEDURE

Refer to Exploded View/Parts List:

1. Score a line or center punk marks on each of the three main parts (Stator 5, Gear Housing 9 and End Cover 11). Do not center punch close enough or hard enough to the mating surfaces to cause bulging of the flat surfaces. These marks will be helpful for alignment during assembly.
2. Grip the pump in a vise with shaft pointing downward. Here again do not tighten the vise on or near the mating flat surfaces or damage could occur.
3. Remove the four Cap Screws 13 and washers 12 (washers are optional).
4. Remove the End Cover 11. The Pressure Wear Plate 7, may remain in the Gear Housing 9. Be very careful in removing the Pressure Wear Plate. Do not mar or scratch any of the flat surfaces.
5. Lift up and remove the Gear Set 10. Keep the two gears together as removed. They have been run together and will be most efficient if kept mated the same on re-assembly.
6. Remove the Gear Housing 9 by lifting it straight up. Remove and keep the four dowel pins. Inspect the two Housing Gaskets 8. If damaged, they should be replaced.
7. Remove Pressure Wear Plate(s) 7 from Gear Housing 9. Be very careful not to damage any of the components. If the pressure Wear Plates 7 are stuck be very careful to remove with light prying. Light tapping with a wooden handle may be necessary. Never use a metal hammer or strike any part of a gear pump. This will certainly damage some components and can cause chipping and possible injury to the eyes of the worker. Remember that the gears, shafts etc. are very hard and brittle and can chip easily if struck with a hard metal hammer. After the Pressure Wear Plates 7 are free, remove the channel seals from the backside and discard.
8. Place Stator 5 in vise with Snap Ring 1 facing up. Remove Snap Ring 1, Ball Bearing 2 and Seal Back-up 3. Eye protection should always be worn when working with snap rings. Inspect the Shaft Seal 4 for damage and excessive wear. If replacement is necessary remove Seal with screwdriver.
9. Inspect the two DU Bushings in Stator 5 and two in End Cover 11 for excessive wear. If replacement is necessary, use OTC Expansion Collet #33864 tool to remove the four bushings.

ASSEMBLY PROCEDURE

1. Inspect all flat surfaces and lap then on a piece of 400-grit sandpaper on a very clean surface plate. If shiny high spots are found continue lapping until you are positive that no high spots remain. Thoroughly wash all parts that are to be reused.
2. To install a new Shaft Seal 4, carefully clean and degrease the seal seating area in Stator 5. Apply grease to the outside of the "O" Ring on the new Shaft Seal 4. Press the seal in with lip pointing toward the gears. Use a metal bar of proper diameter and an arbor press to install the Seal. Do Not hammer on the seal or use a punch type tool or the seal will be distorted and it will leak.
3. Install Seal Backup 3 with lip toward seal.
4. Install Thrust Bearing 2.
5. Install Snap Ring 1. Wear eye protection.
6. To install new DU Bushings 6 in Stator 5 and/or End Cover 11 use an arbor press or hydraulic press to press in Bushings 6. Do not use a hammer. Install the top Bushings in Stator 5 and End Cover 11 with the broach groove in the 12:00 O'clock position. Install the bottom Bushings with broach groove in the 6 O'clock position. Be sure all Bushings are perfectly even with the top surface of the Stator 5 and End Cover 11. It may be necessary to lap the Stator and End Cover again after installing the Bushings to ensure they are even with surfaces.
7. Place Stator 5 in a vise with Bushings side up. Insert two dowel pins. Inspect Gear Housing 9 for wear. If wear is excessive, replace with new housing. Fill one gasket groove on Gear Housing 9 with grease. Insert Housing Gasket 8 in groove. The grease will keep the Gasket from falling out during assembly. Position Gear Housing 9 over Stator 5 with Gasket down and the large suction port on the right side. Tap the Housing down with a rubber mallet.
8. Inspect the Pressure Wear Plates 7. Of they are worn replace with new ones. Install a new channel seal on back of Pressure Wear Plate7. Do not get grease or oil on the channel seal side. Place the Pressure Wear Plate 7 in Gear housing 9 with high-pressure groove to the left side (see drawing on exploded parts drawing). Press the Pressure Wear Plate to the bottom o f Gear housing with the channel seal side down toward the Stator and the flat surface toward you.
9. Inspect the shaft and gear surfaces for wear. If wear is excessive, replace with new parts.
10. Grease the area of the drive shaft that rides in the Bushing. Place a seal installation tool over Spline end of the drive shaft. Spray outside of tool with WD-40 or equivalent. Install drive shaft through Gear Housing 9 and Shaft Seal 4. Do not apply excessive force as it could damage the Shaft Seal 4.
11. Insert two dowel pins in Gear Housing 9.
12. Insert Housing Gasket 8 in groove in Gear Housing 9. Apply a light film of grease to the gasket. Install channel seal in the back of the Pressure Wear Plate 7, then install in Gear Housing 9 with high-pressure groove to the left

side. The channel seal on top of the Pressure Wear Plate should be facing you. DO not get grease or oil on the channel seal.

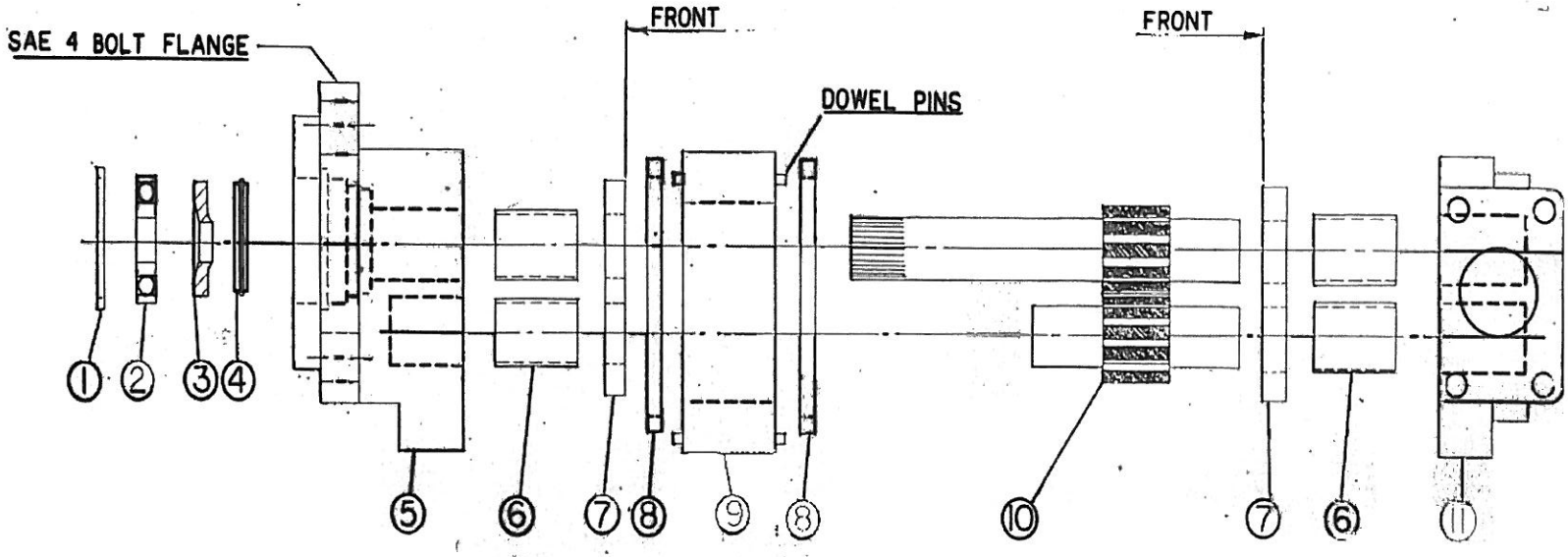
13. Place End Cover 11 on Gear Housing 9. Install four Cap Screws 13 and using a torque wrench tighten cap screws to 100 foot pounds. Test the pump's ability to rotate by turning Spline shaft with pliers.

MODEL GS 4400 SERIES GLYCOL PUMPS ONLY

PARTS AND PRICE LIST
REF. GS EXPLODED PARTS LIST ITEM NUMBERS

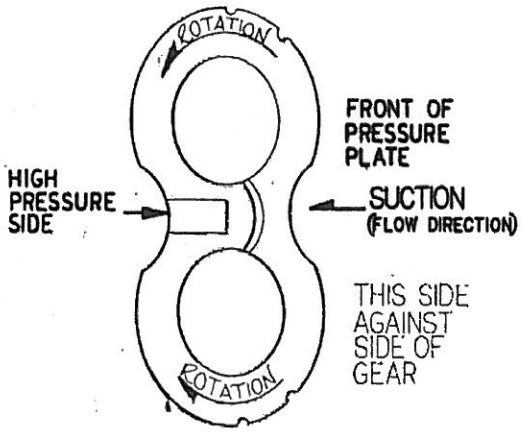
ITEM NO. ON EXPLODED VIEW	DESCRIPTION	MODEL GS-4400 SERIES	PART NUMBER	QTY. PER UNIT	X
1	Snap Ring	All GS 4400	2240025	1	
2	Thrust Ball Bearing	All GS 4400	2030171	1	
3	Seal Backup	All GS 4400	2590064	1	
4	Shaft Seal	All GS 4400	2122291	1	
5	Stator W/DU Bushings	All GS 4400	2180050	1	
6	DU Bushings Only	All GS 4400	2130054	4	
7	Pressure Wear Plates	All GS 4400	2450440	2	
8	Gaskets	All GS 4400	2260303	2	
9	Gear Housing	GS 4408 P	2054408	1	
9	Gear Housing	GS 4410 P	2054410	1	
9	Gear Housing	GS 4412 P	2054412	1	
9	Gear Housing	GS 4414 P	2054414	1	
9	Gear Housing	GS 4416 P	2054416	1	
9	Gear Housing	GS 4418 P	2054418	1	
9	Gear Housing	GS 4420 P	2054420	1	
10	Gear Set – 1-1/4 – 14T Spline	GS 4408 P	2204408	1	
10	Gear Set – 1-1/4 – 14T Spline	GS 4410 P	2204410	1	
10	Gear Set – 1-1/4 – 14T Spline	GS 4412 P	2204412	1	
10	Gear Set – 1-1/4 – 14T Spline	GS 4414 P	2204414	1	
10	Gear Set – 1-1/4 – 14T Spline	GS 4416 P	2204416	1	
10	Gear Set – 1-1/4 – 14T Spline	GS 4418 P	2204418	1	
10	Gear Set – 1-1/4 – 14T Spline	GS 4420 P	2204420	1	
11	End Cover W/DU Bushings	All GS 4400	2100478	1	
12	Washers	All GS 4400	2133002	4	
13	Cap Screws X 5"	GS 4408 – 4410	2130141	4	
13	Cap Screws X 5 ½"	GS 4412 – 4414	2130142	4	
13	Cap Screws X 6"	GS 4416 - 4418	2130143	4	
13	Cap Screws X 6 ½"	GS 4420	2130144	4	

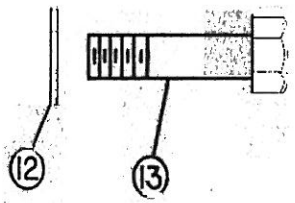
Rotor-Tech, Inc.©
10613 Stebbins Circle · Houston, Texas 77043 · Phone 713-984-8900 · Fax 713-984-9425
E-Mail - info@rotor-tech.com · Web Site - www.rotor-tech.com



GS 4400 SERIES PUMP

ITEM	DESCRIPTION
1	SNAP RING
2	THRUST BALL BEARING
3	SEAL BACKUP
4	SHAFT SEAL
5	STATOR W/ DU BUSHINGS
6	DU BUSHINGS
7	PRESSURE WEAR PLATES
8	HOUSING GASKET
9	GEAR HOUSING
10	GEAR SET
11	END COVER W/ DU BUSHINGS
12	WASHERS
13	CAP SCREWS

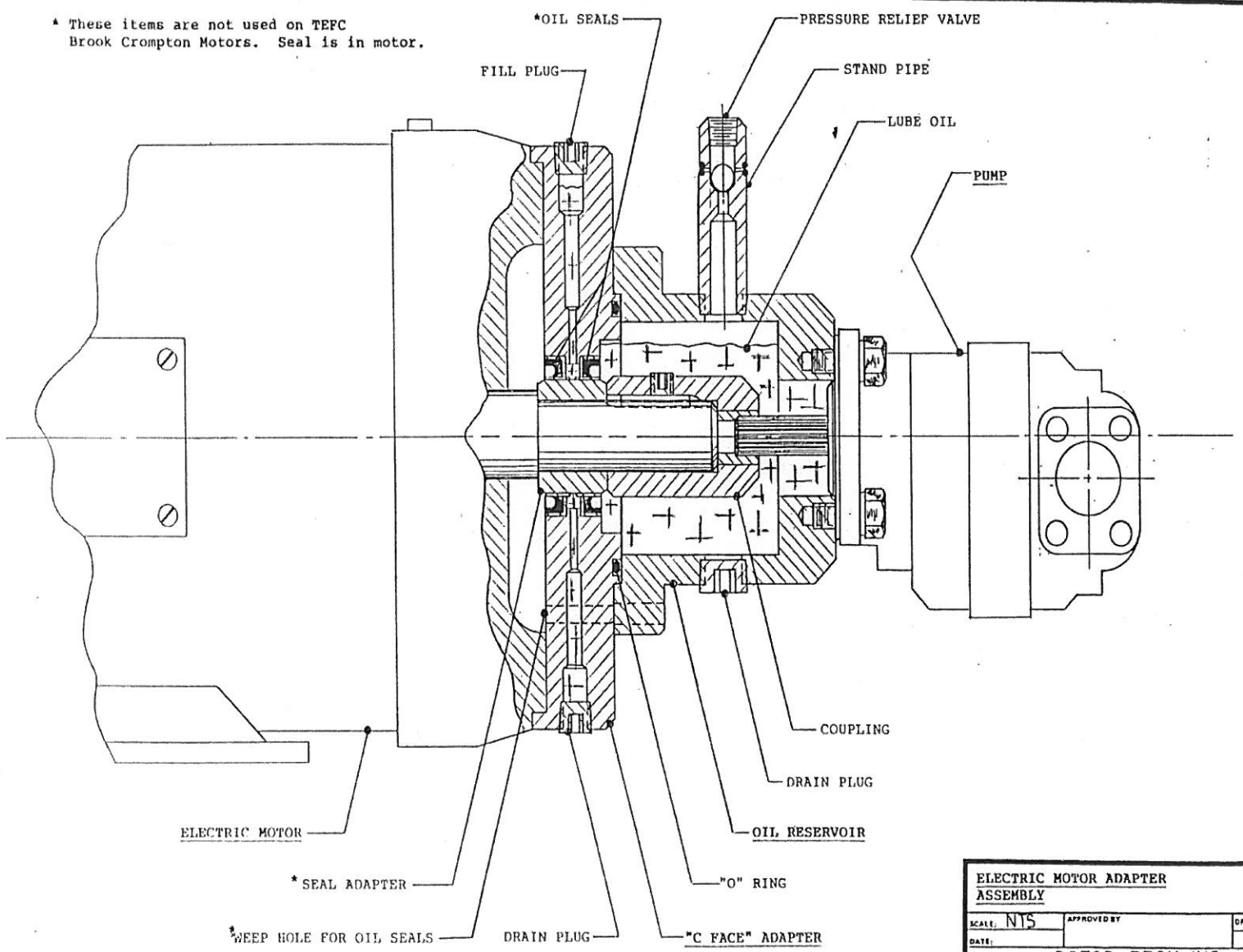




ROTOR-TECH INC
HOUSTON, TEXAS

REV	TITLE
	EXPLODED PARTS LIST GS 4400
DRWN JLS 6/6/94 CHKD [illegible]	SCALE / DRAWING NO. 1011044
APPROVED 6/6/94 RHG	

* These items are not used on TEFC Brook Crompton Motors. Seal is in motor.



ELECTRIC MOTOR ADAPTER ASSEMBLY

SCALE: NTS	APPROVED BY	DRAWN BY: TWA
DATE:		

ROTOR-TECH INC
HOUSTON TEXAS

GS 4400 | DRAWING NUMBER: N/A

LUBRICATION

All Rotor-Tech electrically driven glycol pumps have an oil reservoir and a "C Face" adapter. Refer to the cross sectional drawing on the opposite page to locate these two components. To change oil in the oil reservoir remove the Drain Plug (1/2" NPT Socket type) in the bottom of the oil reservoir. Check old oil for signs of glycol contamination. A thick, ropy, grayish, opaque appearance indicates glycol contamination of the oil. If this occurs it may indicate that the pump lip seal is leaking. Occasionally a new pump seal will leak for a short while and then stop all together. If the pump is fairly new, simply clean the oil reservoir and pour in new oil. Remove the "Stand Pipe" or top plug (1/2" NPT Socket type) to pour in new oil. Run the pump a few days and check again. If contaminated again, the pump lip seal should be replaced. Pour in oil to just cover the coupling. This is adequate to lubricate open ball bearing and the lip seal in the pump. Also, the front oil seal in the "C Face" adapter will be lubricated.

If the oil reservoir is overfilled the excess will be forced out of the "O" ring covers near the op of the standpipe. Simply wipe away the excess oil until equilibrium is reached. Increased temperature is summer will cause expansion of the oil and a small additional amount may come out. Again, just wipe it away. When the proper level is reached no more oil will be forced out. High-speed motors (3600 RPM) will force out more oil than slow speed (1800 or 1200 RPM) at 50 HZ this is of course 3000 RPM and 1500RPM.

In the "C Face" Adapter there are two oil seals. These are lubricated by a very small additional oil reservoir between them. Note: "Fill Plug" and "Drain Plug" that are small (1/4" NPT Socket type) at top and bottom of the "C Face" adapter. Remove the Fill Plug, fill the cavity completely full. Screw the Fill Plug back tightly. Any excess oil will be forced out into the larger reservoir. If the motor is mounted on floor plate it is impossible to remove the lower drain plug. If it can be easily removed it is good to drain the small reservoir and replace the oil. This is not very important, simply checking and filling at the top is all that is really necessary for many years of operation.

Oil Seals in the "C Face" Adapter will eventually wear out. Indication of this will be from oil from the large Oil Reservoir will run out of the "weep hole for oil seals" and will be evidenced by slow seepage at the front flange of the Oil Reservoir. When this occurs, usually after years of operation, the oil seals must be replaced.

All oil reservoirs are pre-filled by Rotor-Tech before shipping the pump/motor assemblies, unless being shipped overseas by Rotor-Tech. We use any good regular automotive motor oil. 10W-30, 30W, 5W-50 or any ATF (Automatic Transmission Fluid) can be used. In very cold climates use the same very light oils used in automobiles for these climates. Special "Chain Oils" that pour (very slowly) at - 70°F are available in Canada, Norway, etc.

Electric motor ball bearings should be regreased annually with the grease recommended by the electric motor manufacturer. The recommended grease is Chevron SRI, Shell Dolium R or any of the many equivalents.

To grease the motor ball bearings, first remove the lower plugs (usually 1/8" NPT). Install a grease fitting on top, either 1/8NPT or 10-24-thread type. Using a grease gun pump in several strokes until old grease is forced out of the lower plugholes. Run the motor for about 30 minutes with the lower plug holes still out. Then reinstall the lower plug. Some electric motors already have grease fittings installed and some have open lower holes without plugs.

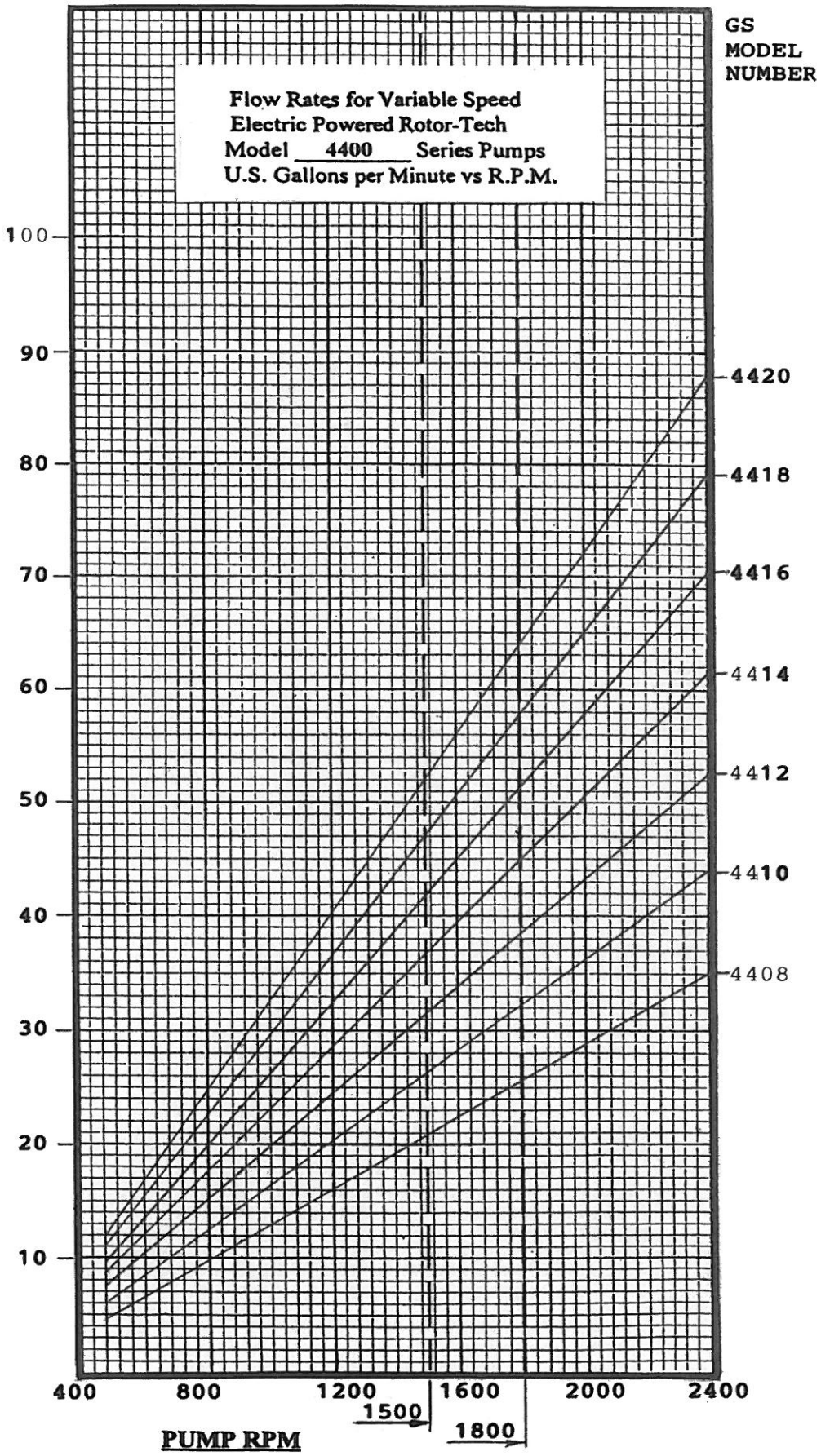
Rotor-Tech, Inc.
10613 Stebbins Circle
Houston, TX 77043
Phone: 713-984-8900
Fax: 713-984-9425
http://www.rotor-tech.com

Flow Rate
US Gallons
Pumped per minute
(Theoretical*)

***Note:**
Actual Flow Rate
Depends on temperature, viscosity & pressure of fluid being pumped.

60HZ
Recommended Minimum
__575__ R.P.M. @ __20__ Hz

50HZ
Recommended Minimum
__480__ R.P.M. @ __17__ Hz



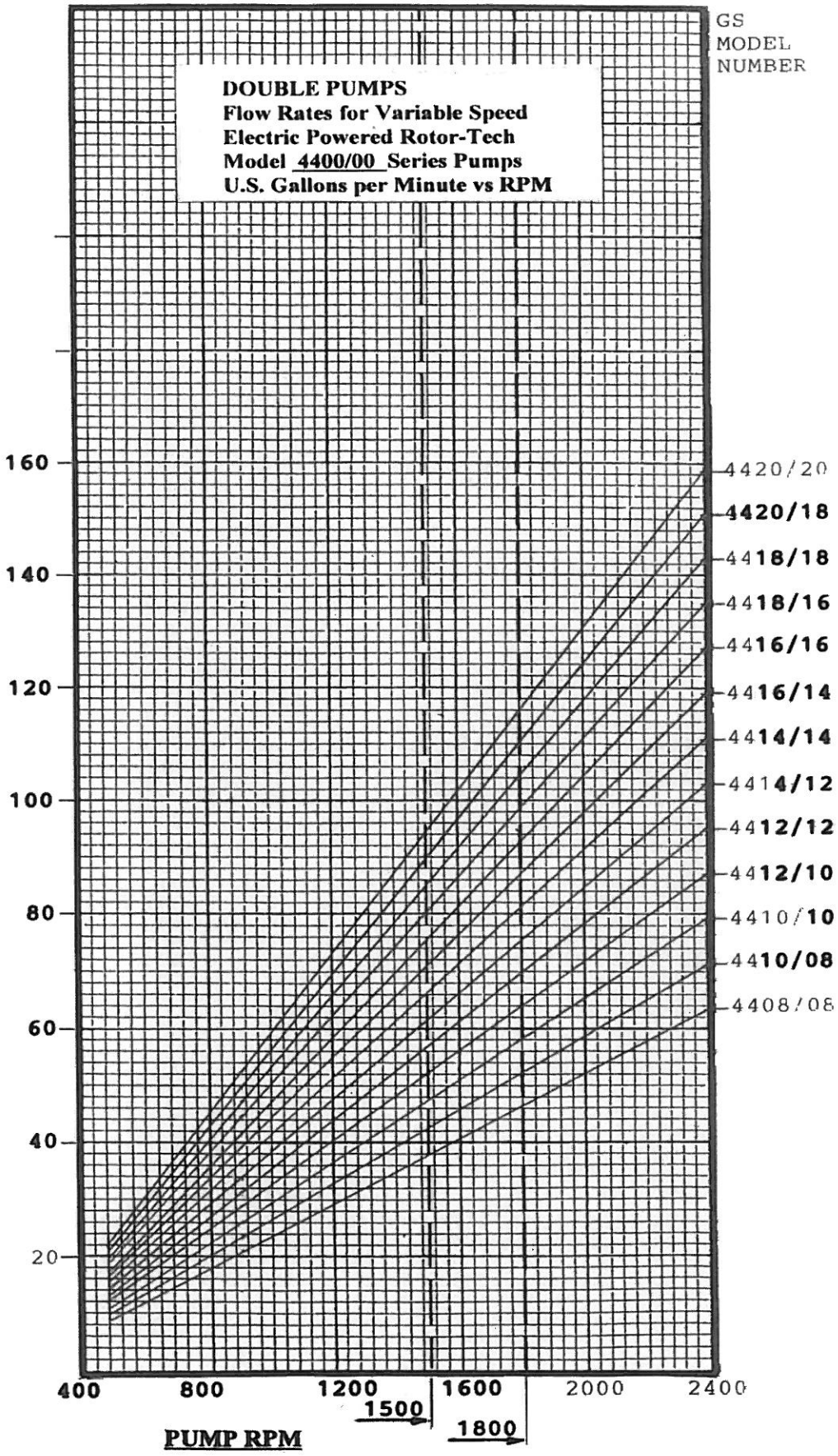
Rotor-Tech, Inc.
10613 Stebbins Circle
Houston, TX 77043
Phone: 713-984-8900
Fax: 713-984-9425
http://www.rotor-tech.com

Flow Rate
US Gallons
Pumped per minute
(Theoretical*)

***Note:**
Actual Flow Rate
Depends on temperature, viscosity & pressure of fluid being pumped.

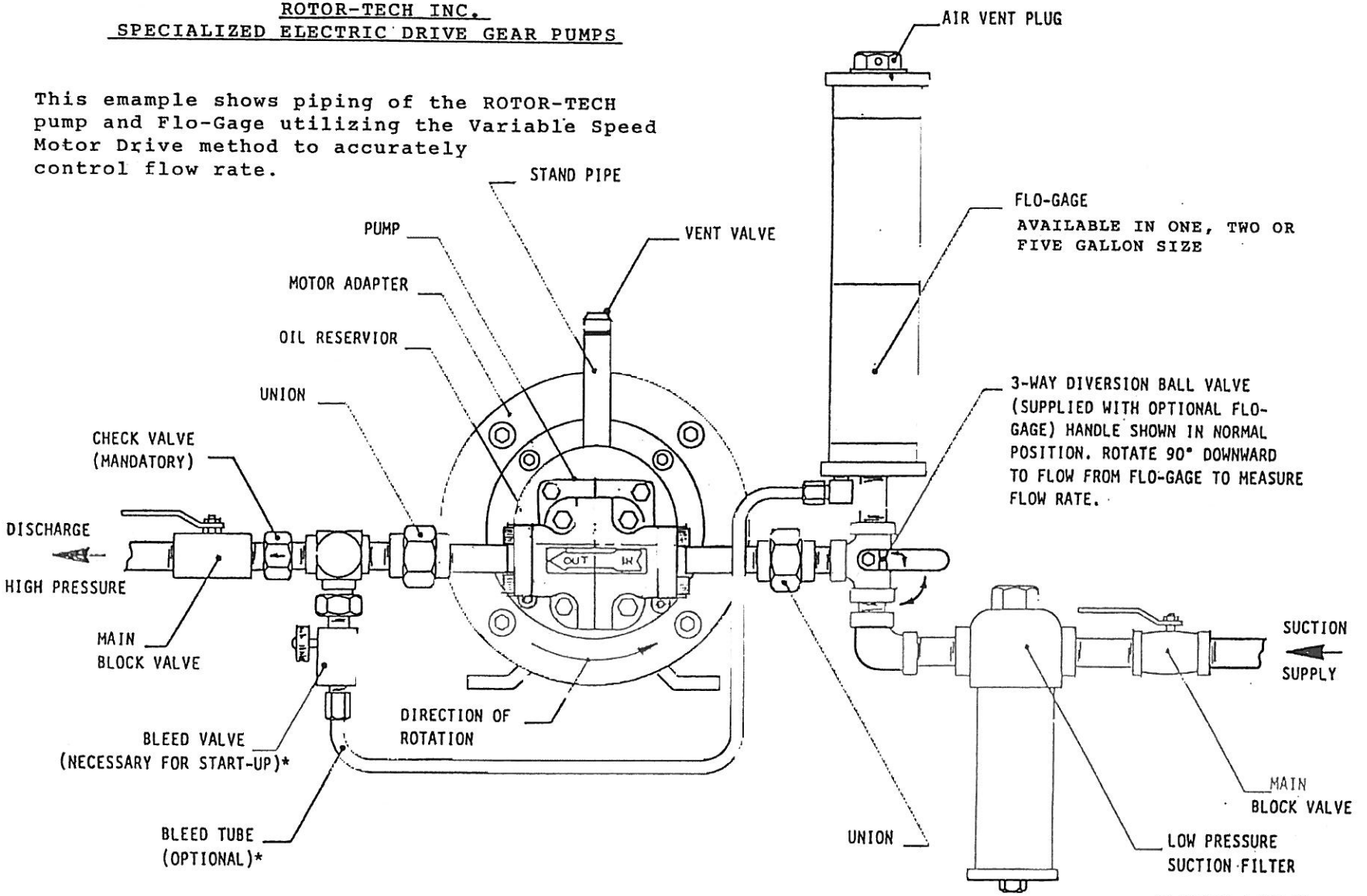
60HZ
Recommended Minimum
575 R.P.M. @ 20 Hz

50HZ
Recommended Minimum
480 R.P.M. @ 17 Hz



ROTOR-TECH INC.
SPECIALIZED ELECTRIC DRIVE GEAR PUMPS

This emample shows piping of the ROTOR-TECH pump and Flo-Gage utilizing the Variable Speed Motor Drive method to accurately control flow rate.



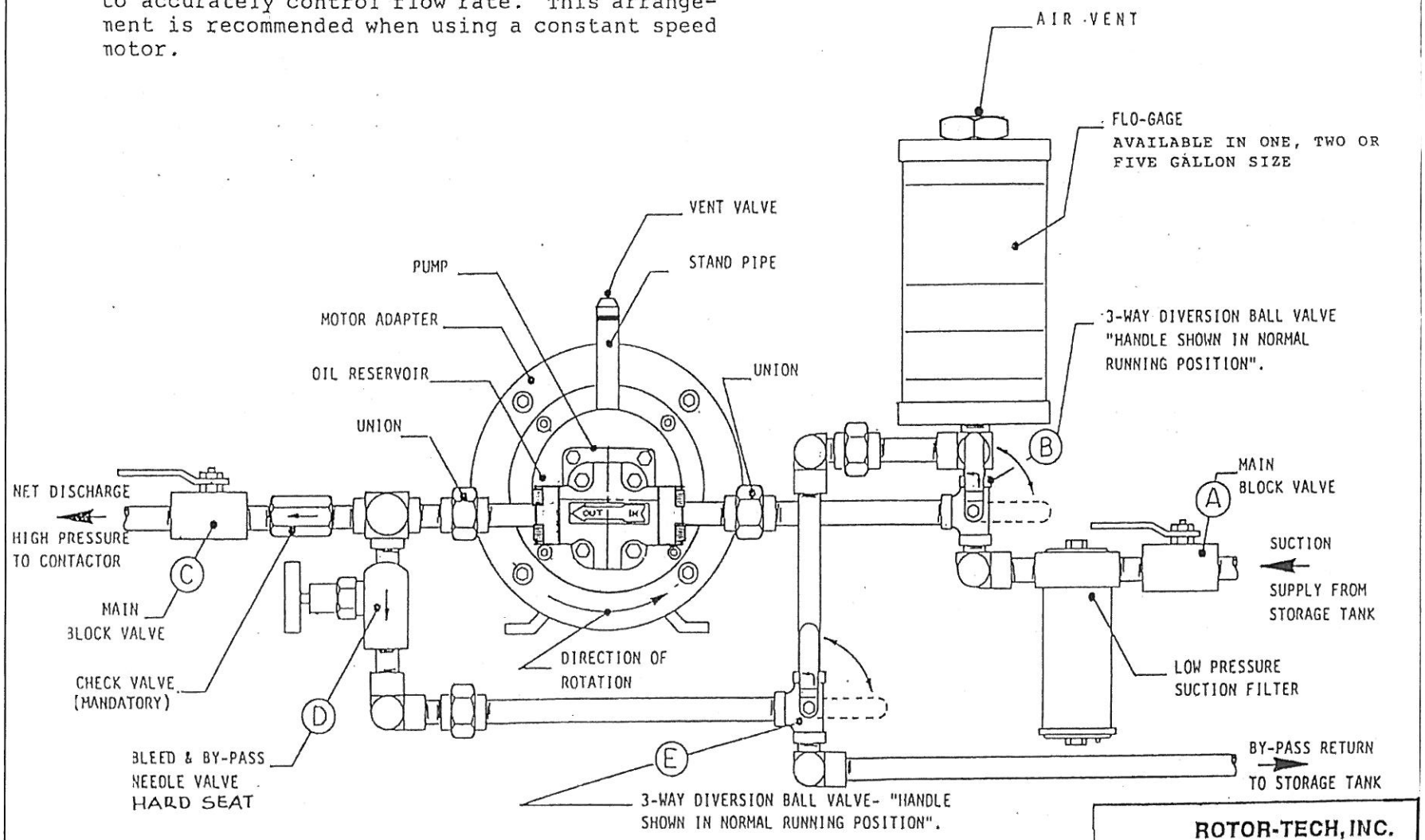
ROTOR-TECH, INC.

*BLEED VALVE IS NECESSARY TO BLEED AIR FROM PUMP ON START-UP.
BLEED TUBE IS USED TO FILL FLO-GAGE FOR FLOW MEASUREMENTS.

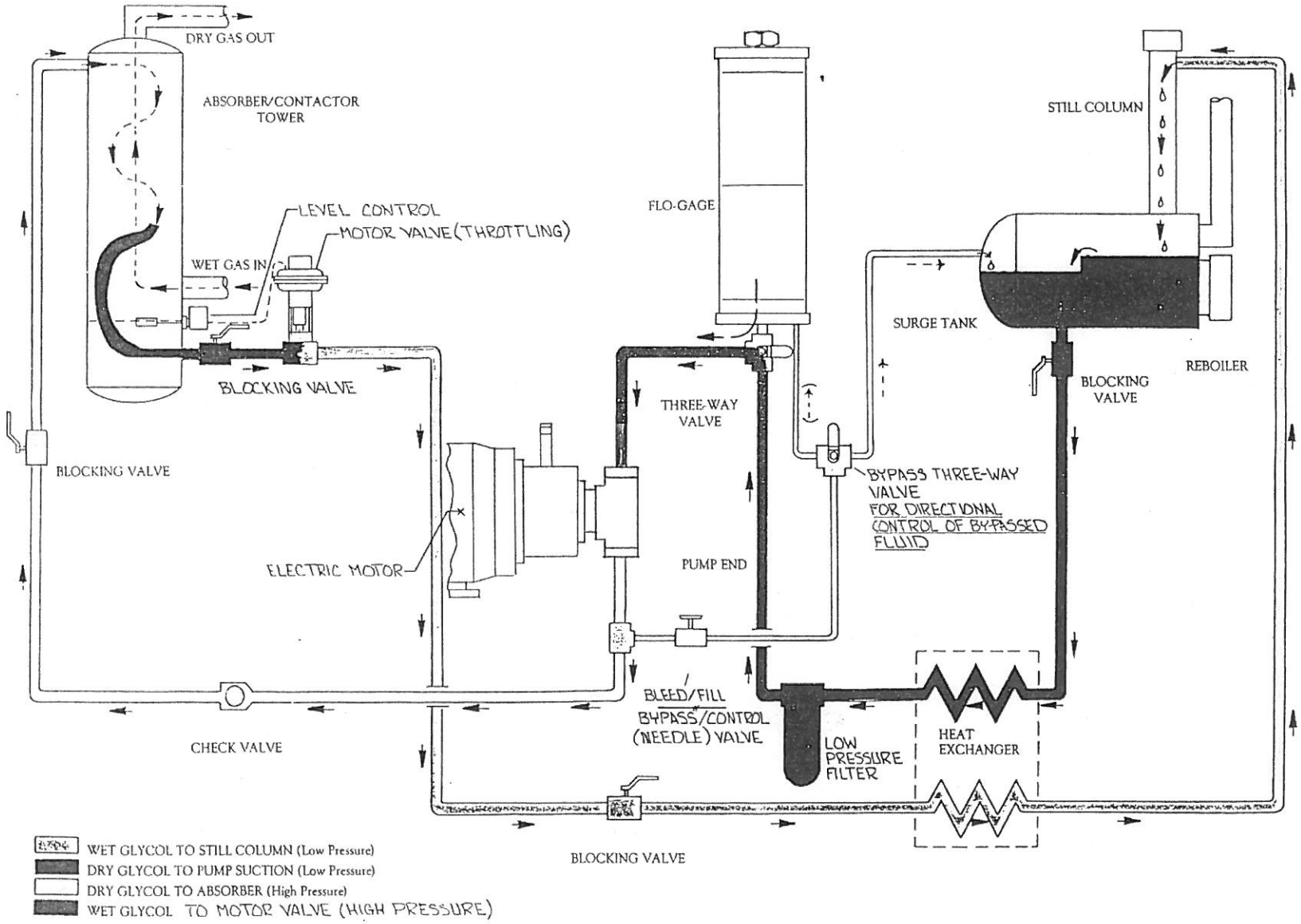
* Check with Rotor-Tech representative for proper filtration requirements.

ROTOR-TECH, INC.
SPECIALIZED ELECTRIC DRIVE GEAR PUMPS

This example shows piping of the ROTOR-TECH pump and Flo-Gage utilizing the By-Pass method to accurately control flow rate. This arrangement is recommended when using a constant speed motor.



ROTOR-TECH, INC.


DRY GAS OUT
ABSORBER/CONTACTOR TOWER
LEVEL CONTROL MOTOR VALVE (THROTTLING)
WET GAS IN
BLOCKING VALVE
BLOCKING VALVE
ELECTRIC MOTOR
FLO-GAGE
THREE-WAY VALVE
PUMP END
STILL COLUMN
SURGE TANK
REBOILER
BLOCKING VALVE
BYPASS THREE-WAY VALVE FOR DIRECTIONAL CONTROL OF BYPASSED FLUID
BLEED/FILL BYPASS/CONTROL (NEEDLE) VALVE
LOW PRESSURE FILTER
HEAT EXCHANGER
CHECK VALVE
BLOCKING VALVE
WET GLYCOL TO STILL COLUMN (Low Pressure)
DRY GLYCOL TO PUMP SUCTION (Low Pressure)
DRY GLYCOL TO ABSORBER (High Pressure)
WET GLYCOL TO MOTOR VALVE (HIGH PRESSURE)

WARNING

To: Any manufacturer or end user of Rotor-Tech Glycol Pumps.

DO NOT APPLY HIGH PRESSURE HYDROSTATIC TEST FLUID TO ANY ROTOR-TECH GEAR PUMPS OR MOTORS.

Rotor-Tech gear pumps and motors, as used on energy exchange glycol (TEG) pumps, or pumps that are driven electrically or pneumatically, are designed to operate at pressures to 2500 PSIG.

The shaft seal in the pump or motor is a special very high quality Teflon alloy lip seal. However, these seals should never be subjected to pressure exceeding 100 PSIG. They are intended only to separate glycol from lubricating oil in all Rotor-Tech pumps.

The construction of Rotor-Tech gear pumps and motors is such that a small pressure bleed-off hole is drilled from the low-pressure port (suction of a pump and discharge of a motor) to the seal face cavity. This is commonly called the "internal drain." It prevents build-up on the shaft seal.

If high pressure hydrostatic testing is done to Rotor-Tech pumps or motors, the shaft seal could fail allowing the test water to enter the oil reservoir. The water will displace all of the oil and will ruin the ball bearings and other pump or motor internals.

All Rotor-Tech gear pumps and motors are thoroughly run-in and hydrodynamically tested in TEG at high pressure before shipping.

When hyrodstatically testing the dehydrator, close off all four blocking valves to the energy exchange pumps or the two blocking valves to the electric or pneumatic powered pumps. Be certain to drain off all water after testing. Do not allow water to enter a Rotor-Tech gear pump or motor. Water remaining in these components will corrode the close fitting gears and cause difficult starting and future problems. If water is allowed to freeze inside a pump or motor very serious damage will occur.

Rotor-Tech, Inc.

Rotor-Tech, Inc.

LETTER OF GUARANTEE AND WARRANTY

The products supplied under the above mentioned purchase order manufactured by Rotor-Tech, Inc., Houston, Texas are **guaranteed** to circulate triethylene glycol (TEG) in conventional gas dehydrators as well as certain other specified fluids in various types of applications when the units are properly installed, operated, maintained and cooled. The TEG or other specified fluid should be kept clean by proper filtration and not be allowed to become severely degraded. Fluid pH should also be maintained at adequate levels. Temperature of the fluid should be maintained below 200 degrees F (93.3 degrees C). **Note: The pump seals and internals are designed for TEG operating temperatures up to those stated above but it should be understood that temperatures should be maintained below this level for maximum pump efficiency and life.** Since there are extreme variations in field conditions, etc. and since Rotor-Tech has no control over the installation, use, care and maintenance of the Rotor-Tech product once it leaves our plant, there is **ABSOLUTELY NO GUARANTEE BY ROTOR-TECH, INC.** as to the operational life of the above listed products.

Rotor-Tech, Inc. **warrants** that should any pump or any part thereof prove to have been defective in material or workmanship at the time of shipment, such entire unit, or part, will be replaced FOB our factory without charge, for a period of 12 months after commissioning or 18 months after shipping, providing permission is first obtained from our factory, and the unit or the parts are returned, transportation charges prepaid. No allowances will be made for cost of labor, transportation, or other charges or costs involved in the replacement of parts, or an entire unit. Our warranty does not extend to any circumstantial or incidental damages (including loss of use or loss of profit) caused by failure of any glycol pump or accessories including, but not limited to, cost for removal and replacement, inspection, cost of return or warehousing, cost of engineering, procurement and construction management services.