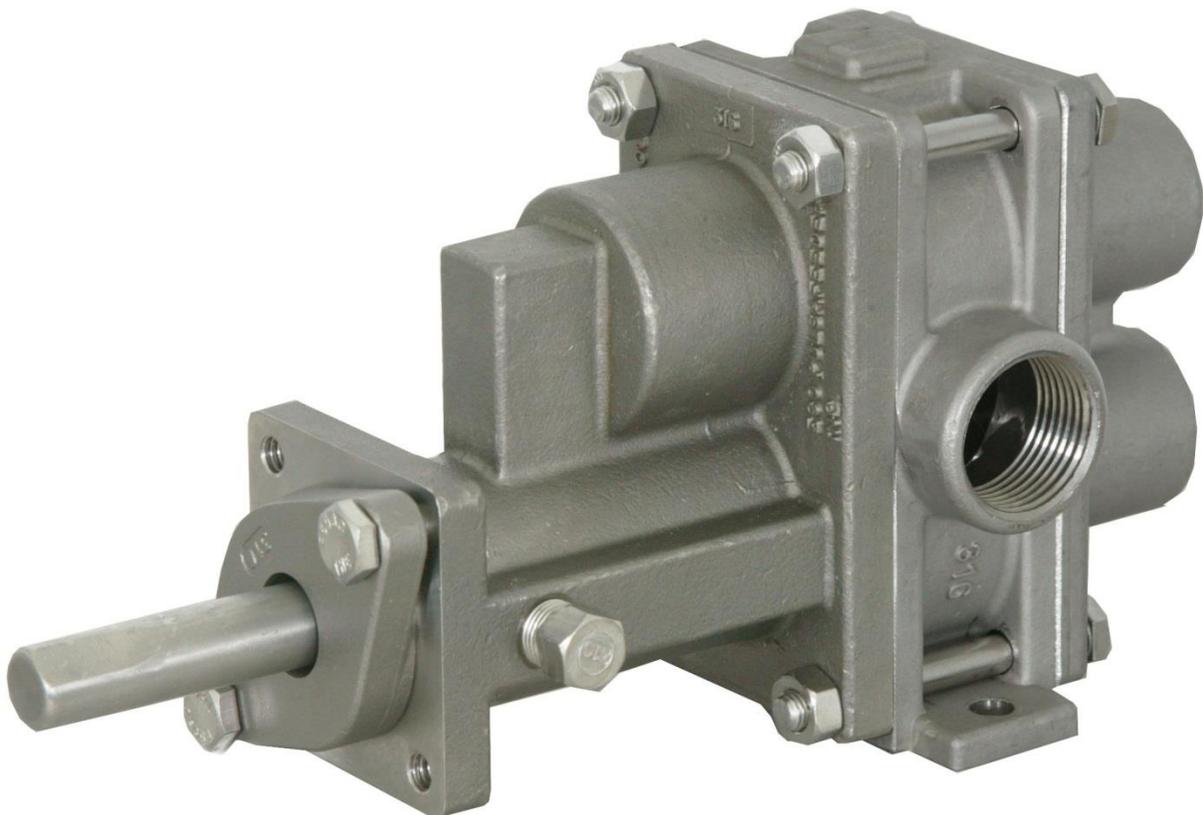


ECO®

**GEARCHEM PUMPS
GA/GC SERIES**



Installation, Operation & Maintenance Manual

Bulletin: IOM ECO 3000 REV C

ECO® FACTORY SERVICE POLICY

Should you experience a problem with your *ECO* pump, first consult the troubleshooting guide in your operation and maintenance manual. If the problem is not covered or cannot be solved, please contact your local Pulsafeeder Sales Representative, or our Technical Services Department for further assistance.

Trained technicians are available to diagnose your problem and arrange a solution. Solutions may include purchase of replacement parts or returning the unit to the factory for inspection and repair. All returns require a Return Authorization number to be issued by Pulsafeeder. Parts purchased to correct a warranty issue may be credited after an examination of original parts by Pulsafeeder. Warranty parts returned as defective which test good will be sent back freight collect. No credit will be issued on any replacement electronic parts.

Any modifications or out-of-warranty repairs will be subject to bench fees and costs associated with replacement parts.

TRADEMARKS

ECO® is a registered trademark of Pulsafeeder, Inc.

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SAFETY CONSIDERATIONS:

- Read and understand all related instructions and documentation before attempting to install or maintain this equipment
- Observe all special instructions, notes, and cautions.
- Act with care and exercise good common sense and judgment during all installation, adjustment, and maintenance procedures.
- Ensure that all safety and work procedures and standards that are applicable to your company and facility are followed during the installation, maintenance, and operation of this equipment.

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CONVENTIONS



A WARNING DEFINES A CONDITION THAT COULD CAUSE DAMAGE TO BOTH THE EQUIPMENT AND THE PERSONNEL OPERATING IT. PAY CLOSE ATTENTION TO ANY WARNING.



NOTES ARE GENERAL INFORMATION MEANT TO MAKE OPERATING THE EQUIPMENT EASIER.

REVISION HISTORY

Revision #	Implemented By	Revision Date	Approved By	Approval Date	Reason
B	Kristin Lenzi	June 2021	Phuoc Pham	6/7/2021	New format General update Recommended torque values and statement regarding Teflon gears and wear plates.
C	Kristin Lenzi	06/14/2021	Kristin Lenzi / Jeff Martin	06/15/2021	Updated the IOM with the following new drawings: SD-2847, SD-2848, SD-2849, SD-2854, SD-2855, SD-2856

TABLE OF CONTENTS

ECO® FACTORY SERVICE POLICY	2
TRADEMARKS	2
1. INTRODUCTION	5
2. EQUIPMENT INSPECTION	5
3. INSTALLATION	6
3.1 MECHANICAL SEALS	7
3.2 PACKED STUFFING BOXES	7
4. OPERATION	7
5. MAINTENANCE	8
5.1 RECOMMENDED SPARES	10
5.2 DISASSEMBLY	10
5.3 REASSEMBLY	12
5.4 BOLT-ON THERMAL JACKETS INSTALLATION	14
5.5 REMOVAL.....	15
6. TROUBLESHOOTING	16
7. TORQUE CHART	17
8. PUMP SPECIFICATION CHART	18
9. EXPLODED VIEW DRAWING – G2 & G4 SERIES	19
10. EXPLODED VIEW DRAWING – G6 & G8 SERIES	20
11. EXPLODED VIEW DRAWING – GH8 SERIES	21
12. EXPLODED VIEW DRAWING – GA12 & GA16 SERIES	22
13. SEAL ARRANGEMENT DRAWINGS	23
14. PUMP TO MOTOR ASSEMBLY INSTRUCTIONS	28
15. GEARCHEM PUMP PRESSURES	29

1. INTRODUCTION

Eco Gearchem pumps are constructed in 316SS, Alloy 20 and Alloy C. Gears are available in Alloy C, Alloy 20, glass filled TFE, Carbon/Graphite and PEEK. These pumps are used for the reliable handling of clear lubricating and non-lubricating fluids. These pumps operate over a broad range of temperatures, pressures and corrosive services for transfer applications, cyclic operations or continuous production systems.

Self-priming Gearchem pumps can be operated over the entire pH range, for indoor and outdoor service, at system pressures from as low as 1 mm Hg abs (vacuum) to 100 psi differential pressure and over a temperature range from -100°F to + 450°F (-73°C to +232°C). Gearchem pumps are available in flows up to 55 gpm and can be used to pump liquids with viscosities ranging from less than 1 cps up to 100,000 cps with reduced speeds.

Gearchem pumps may be quickly inspected in the field. All that is required to inspect the internal components is the removal of the rear housing. Before attempting an inspection or repair be sure to read and thoroughly understand this maintenance manual.

Pumps may be repaired either in the field or at an authorized Eco Repair Center (contact your Eco distributor for details). Field repairs can be done very quickly using an Eco KOPkit which includes all the parts necessary to cover practically all routine maintenance requirements.

2. EQUIPMENT INSPECTION

1. Check all equipment for completeness against the order and for any evidence of shipping damage. Shortages or damage should be reported immediately to the carrier and to your Eco distributor.
2. If the pump is not going to be installed immediately, the following steps should be taken.
 - Leave pump in original shipping carton.
 - Store indoors in a dry ambient atmosphere. Avoid temperature variations.
 - Leave all shipping plugs in place.
 - Contact the motor manufacturer for specific motor storage information.
3. Occasionally during shipment, possible misalignment or other damage such as cracked mechanical seal faces can occur. For this reason, it is recommended that each unit be tested with water in some convenient area prior to piping into the actual process system.
4. These instructions should be read carefully by the personnel responsible for installation, operation and maintenance of the equipment and kept in a convenient place for ready reference. It is recommended that a copy of the Eco order be kept with this manual as well as a written record of the pump model number which is on the name tag attached to the pump. A space has been provided inside the front cover of the manual to record this number.

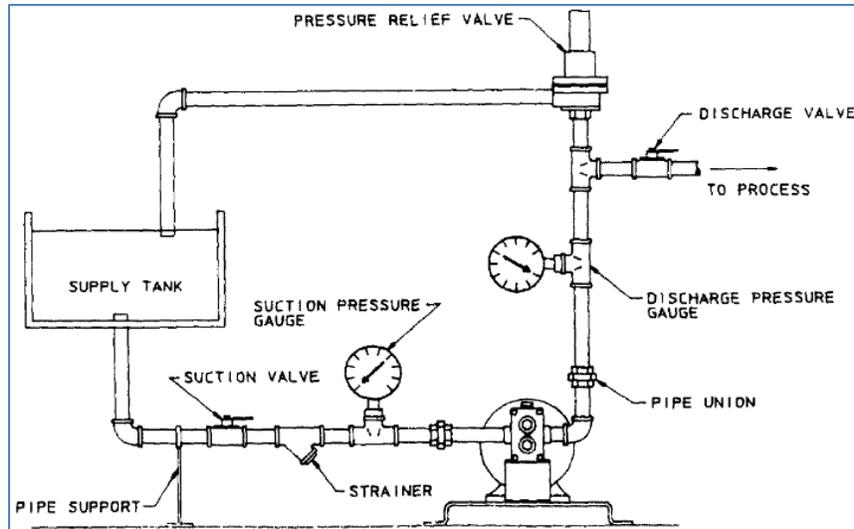


Figure 1

3. INSTALLATION

1. Pump installation site should be selected to provide easy access for routine maintenance and to protect the pump from damage by the elements or from leaks or drips from nearby process equipment.
2. Suction and discharge ports of Eco Gearchem pumps can be determined as follows:
 - A. Looking at the pump drive shaft, the suction port is to the right of the shaft, when the shaft rotates clockwise and the drive shaft is located below the ports for standard configuration on Model G2, G4, G6, GB and GHB.
 - B. Looking at the pump drive shaft, the suction port is to the left of the shaft, when the shaft rotates clockwise, and the drive shaft is located above the ports for standard configuration on Models GA 12 and GA 16.
 - C. Reversing drive shaft rotation reverses flow and thus suction and discharge ports for all models.
3. Keep suction lines short, straight and of sufficient size to minimize friction loss to the pump. Make sure there is sufficient suction supply, so that pump will not starve or run dry. Flooded suction or gravity feed of fluid to pump inlet is generally preferred.
4. Use only full-bore ball valves or gate valves in the suction piping. If suction strainers are required, size them to minimize pressure drop and select those of a type that are easily cleaned.
5. Arrange all suction piping and fittings to prevent formation of air pockets. Make sure all joints are tight.
6. Flush and blow out all suction lines prior to mating up to pump. Use nipples and unions, or spool pieces with flanged pumps, for ease of maintenance.
7. Do not spring piping, either suction or discharge, when mating up to pump. Use supports or hangers at intervals as required. When necessary, provide for thermal expansion and contraction so that no strain is placed upon the pump.
8. Check carefully alignment of pump and motor or drive system. Improper alignment is one of the most common causes of seal and stuffing box problems, as well as a major cause of rapid bearing wear and eventual pump failure.
9. Check all bolts and nuts for tightness. Correct any conditions which could cause destructive vibration or leakage.
10. Where required, provide proper system for seal flush, and/or drain. Observe any special instructions for packing lubrication.
11. If start-up screens are used be sure they do not clog and starve suction. Start-up screens should be removed prior to placing system into regular operation.

12. If flexible suction lines are used be sure their selection and installation will prevent wall collapse and thus a starved suction condition.
13. When taking suction from a tank or vessel, avoid entry of sludge, solids, etc. into suction line by placing suction line inlet above maximum expected level of solids.
14. Discharge lines from Gearchem pumps should be fitted with properly sized relief valves to protect both pump and discharge system. Relief valve outlet should be piped back to suction vessel.
15. When a by-pass system is used to control flow from the pump, the bypassed fluid should be piped back to the suction vessel to prevent heat build-up due to recirculation. If it is absolutely necessary to pipe by-pass back to the pump suction line, the point of entry should be at least 10 pipe diameters away from the suction inlet. Provision for cooling should be made in the event of excessive heat buildup through fluid recirculation.
16. Where pumped fluids may solidify, crystalize, precipitate etc., provision should be made to thoroughly flush pump and piping during periods of shutdown. Pay particular attention to proper flushing of seal or stuffing box area.

3.1 MECHANICAL SEALS

Three basic seal types are offered as standard: internal, external, and double seal. All mechanical seals require cooling and lubrication. For long and trouble-free seal life:

1. Do not run pump dry. Make sure pump is primed, suction is not starved, sufficient NPSH is available and your system is such that seal surfaces are wet. If a seal flush system is used, make sure that it is operating while the pump is operating. Double seals require a seal flush.
2. Keep abrasives out of the seal area. Dirty flush streams, whether piped from the pump discharge or from a separate source, will destroy the rotating and stationary seal mating surfaces.
3. Make sure pump and driver are properly aligned. Misaligned seal mating surfaces will not function. Excessive vibration will also prevent proper seal function and cause early failure.
4. Determine that seal materials of construction are compatible with pumped fluid. Be sure to check this when changing application.

3.2 PACKED STUFFING BOXES

The basic housekeeping procedures for mechanical seals also apply to packed pumps. For proper operation, the stuffing box area must be cooled and lubricated. Do not overtighten packing. Where packing lubricant IS required, use it. Run in new packing carefully. Care and time taken at this stage will minimize down time and maintenance costs. Misalignment and vibration also shorten packing life. Flush streams to lantern ring stuffing boxes are as important as flush streams to mechanical seals.

4. OPERATION

1. Prior to operation, recheck installation according to instructions. Be sure electrical service to motor agrees with nameplate requirements. Jog to check rotation and rewire motor if necessary.
2. Lubricate packing, if required, using suitable lubricant. Where pump is equipped with lantern ring stuffing box and recirculating flush check for proper piping from pump discharge to lantern ring nipple. Where thorough flush of lantern ring stuffing box is intended, check flush stream piping to and from stuffing box.
3. Check mechanical seal flush arrangements where used. Pressurized flush to double seal chamber must be in operation, at an inlet pressure of 10 to 15 psi above intended pump discharge pressure, prior to and when operating pump. Flush must

continue when pump is stopped until pump pressure is reduced to within 20 psi of double seal chamber pressure.

4. Where external seal cooling is required, provide for drip feed of cooling liquid over rotating seal head. Where internal seal cooling and lubrication by flush stream is intended, check piping from pump discharge to seal housing or from external source to seal housing. Make sure all flush streams are clean.
5. Make sure discharge valves are open, start pump and check for proper operation. Adjust packing as necessary, but allow sufficient time for proper run in. Check flush streams for proper operating pressure and flow. If pump bearing areas run hot, or seal/stuffing box areas run hot, shut pump down and determine cause.
6. Do not run dry.
7. Do not pump abrasives.
8. Do not run metal/metal gears below 100 cPs or faster than 1450.
9. For pumps with Teflon gears and wear plates, hand-tighten the rear housing bolts. Slowly increase the speed and pressure. Gradually increase the torque value of the housing bolts until the pressure is achieved. Do not exceed the recommended torque values.

5. MAINTENANCE

The timing for maintenance of the pump is established primarily on past performance. Each installation is different. Therefore, detailed maintenance records of past performance can be invaluable for determining future preventative maintenance intervals. During routine pump inspections pay particular attention to the mechanical seal and bearing areas because those areas will determine future maintenance intervals. For motor maintenance instructions consult the motor manufacturer.



WARNING: BEFORE PERFORMING ANY MAINTENANCE REQUIRING PUMP DISASSEMBLY, BE SURE TO FLUSH PUMP THOROUGHLY WITH A NEUTRALIZING FLUID. WEAR PROTECTIVE CLOTHING AND HANDLE EQUIPMENT WITH PROPER CARE.

1. Changing Service

When changing a pump from one service to another, be sure to check that all wetted parts of the pump (including seals) are compatible with the fluid to be handled and that the motor is sufficiently sized for the application. If in doubt, contact your Eco distributor.

2. Inspect for Wear

Whenever gear pumps exhibit reduced flow rates, inability to maintain pressures, noisy or otherwise abnormal operation, first refer to the troubleshooting section. If the problem cannot be resolved the pump must be inspected for wear or damage. Eco Gearchem pumps can be easily opened for cleaning and inspection without disturbing piping connections by removing the pump rear housing.

Where inspection shows wear, rebuilding the pump using an Eco KOPkit is strongly recommended. Where pumps are equipped with two metallic or plastic gears, replacement with a new set is preferred. Pumps have a metallic drive gear and plastic idler gear can often be restored to original performance by replacing the idler gear alone.

3. Mechanical Seal Design

Eco Gearchem pumps equipped with mechanical seals use either single internal, single external, or a double seal. In addition, there is a variation for vacuum service, of the external seal whereby the seal housing is lengthened between the seal and the pump. All seals are Type 9. These configurations are illustrated in Drawing SD-2652 and SD-2778.

All mechanical seal types used in Eco Gearchem pumps consist of a rotating seal head fixed to the shaft with set screws and a stationary seal face (or faces in the case of double seals) mounted in the seal housing with a TFE O-ring gasket.

4. Mechanical Seal Maintenance

For proper seal functioning, the following conditions must be met:

- A. The seal faces must be smooth, free of cracks, chips, or ridges and free of score marks particularly those which emanate radially. Seal faces showing only light scratches or marks may be re-lapped. Eco lapping standards are smooth and flat to 3 helium light bands. Avoid touching sealing faces.
- B. The seal faces must be perpendicular to the shaft axis and run true. A bent shaft can prevent proper sealing.
- C. Secondary sealing elements such as O-rings and Teflon® wedges must be installed so as not to pinch, cut or damage them. The use of a "bullet" to introduce the seal head onto the shaft helps prevent damage. Also the use of a lubricant that IS compatible with the fluid being pumped is helpful.
- D. The shaft must be free of nicks and scratches in the sealing area, particularly spiral scratches. When reinstalling a Type 9 seal head make sure the setscrews are backed out so as not to damage the shaft when sliding the seal on.
- E. Install the seal with the correct compressive contact. Dimensions and directions are given for each model in the Reassembly Section.
- F. A seal flush must be used for all double seal installations. The flush must be clean and introduced at a pressure about 10 to 15 psi higher than discharge pump pressure. For best results the flush inlet should be connected to the lower of the two flush connections.
- G. When reinstalling refurbished seal seats, always use a new seal seat O-ring. Slowly heat TFE O-ring in water or other suitable solution until temperature reaches 160° - 175°F. Slip over seal set into position on O-ring groove and let cool. Do not use any pointed or sharp-edged instruments that might cut or damage the O-ring during this operation. New seal seats shipped from the factory include the O-ring already fitted to the seat.

5. Stuffing Box Design

Eco Gearchem pumps with packing use either a plain stuffing box or one equipped with a lantern ring. GH8, GA-12 and GA-16 packed pumps are supplied only in the later configuration.

6. Stuffing Box Maintenance

Install packing rings carefully in the sequence noted on the drawings. Be sure gland is clean and that shaft is not scored. New packing on a damaged shaft will not seal. Where lantern rings are used, check to make sure they are properly positioned under the fitting so that flush streams or lubricants will have access to the lantern ring.

Recommended lubricants are:

Service

- Solvents
- Acids/Alkalis
- High temperatures

Lubricant

- Soap-free grease
- Fluorocarbon grease
- Silicone/Carbon/Graphite

Typical Source

- Keystone 5P9
- Halocarbon 25!20M
- Dow Corning 41

Do not overtighten packing. Run in a new set carefully, taking up on the gland nut a little at a time. If the gland runs hot, it is generally a sign that the packing is too tight. Damage to both shaft and packing will result. A properly packed and adjusted stuffing box will leak perhaps 10 drops every 3 to 5 minutes

7. Significant Model Number

The significant model number stamped on the pump nameplate identifies the pump type, the seal arrangement, and other details. Refer to the significant model number chart in this manual if you are unsure of exactly what type of pump or seal you have.

Always refer to the full model number in any correspondence with your Eco distributor. Drawings and a consolidated parts list for each Gearchem pump are included in this manual. Recommended spare parts are denoted on the consolidated parts list.

5.1 RECOMMENDED SPARES

KOPkit: The basic Gearchem KOPkit consists of the following parts which are recommended as spares:

- Drive Shaft Idler Shaft Drive Gear Idler Gear
- Drive Gear Key
- Idler Gear Key
- Bearings Wear Plates Bearing Lock Pins Housing O-Rings
- Drive Gear Retaining Rings
- Idler Gear Retaining Rings
- Shaft Seal Arrangement as Required*

*(Packing or Mechanical)

A KOPkit is completely identified by placing the letter "K" before the pump significant model number and deleting the hyphens. Example: A KOPkit for G6-ACT-KKT would be KG6ACTKKT.

5.2 DISASSEMBLY

Prior to any disassembly please:

- Close discharge and suction valves
- Disconnect power source to motor
- Flush and drain pump

A. Single Internal Mechanical Seal (G2, G4, G6, G8)

Reference drawing SD-2537, SD-2538

1. Loosen gland lock nut (Item 35) and unscrew gland nut (Item 36).
2. Pull out seal seat (Item 55) with seat O-ring. Inspect as noted previously.
3. Remove either pipe plug (Item 62) and rotate shaft to allow access to seal head set screws. Loosen screws sufficiently to allow removal of seal head (Item 60).
4. Turn pump so that drive shaft is pointing down thereby allowing seal head to slide off shaft. If seal head does not come out easily, it will be necessary to remove the seal housing (Item 30)
 - a. Back off seal housing lock nut (Item 32).
 - b. Unscrew seal housing (Item 30) to expose seal head (Item 60).

- c. When reassembling, fit new seal housing gasket (Item 31).
- d. Inspect seal head as noted previously.

B. Single Internal Mechanical Seal (GH8, GA12, GA16)

Reference drawing SD-2613, SD-2775

1. Remove seat retainer bolts (Item 39A) and seat retainer (Item 36) with seat retainer pin, drive end seal seat (Item 55) with seat ring and seat retainer O-ring (Item 37).
2. Visually inspect drive end seal seat (Item 55).
3. If replacement is required, carefully remove drive end seal seat (Item 55) by inserting an "L" shaped tool between seal seat and seat retainer (Item 36) and exert a firm pulling action.
4. Remove pipe plug (Item 62 or 63) on top of drive end of front housing (Item 1) and rotate shaft to allow access to seal head (Item 60) set screws. Loosen screws sufficiently to allow removal of seal head (Item 60) and withdraw over shaft. Inspect seal head. Replace if necessary.

C. Single External Mechanical Seal (G2, G4, G6, G8)

1. Loosen set screws in seal head and slide seal head off shaft.
2. Loosen gland Jock nut (Item 35) and unscrew gland nut (Item 36).
3. Pull out seal seat (Item 55) with seat O-ring.
4. Inspect seal seat and seal head as noted previously.

D. Double Mechanical Seal (G2, G4, G6, G8)

Reference Drawings SD-2537, SD-2538

1. Loosen gland lock nut (Item 35) and unscrew gland nut (Item 36).
2. Pull out drive end seal seat (Item 55) with seat O-ring. Inspect as noted previously.
3. Remove flush connection so as to give access to seal head set screws. Rotate shaft to allow access to seal head set screws and loosen set screws to allow removal of seal head (Item 60). With G6 pumps, seal housing must be unscrewed to allow access to set screws. (See Step 5).
4. Remove seal head (Item 60) and inspect as noted above.
5. Loosen seal housing lock nut (Item 32) and unscrew seal housing (Item 30).
6. Pull out pump end seal seat (Item 56) with seat O-ring. Inspect as noted previously.

E. Double Mechanical Seal (GH8, GA12, GA16)

Reference Drawing SD-2613, SD-2775

1. Remove seat retainer bolts (Item 39A) and seat retainer (Item 36) with seat retainer pin holding the drive end seal seat with seat ring and seat retainer O-ring.
2. Visually inspect drive end seal seat.
3. If replacement is required, carefully remove drive end seal seat by inserting an "L" shaped tool between seal seat and seat retainer (Item 36) and exert a firm pulling action.
4. Remove pipe plug (Item 62 or 63) on top of drive end of front housing (Item 1) and rotate shaft to allow access to seal head and withdraw over drive shaft (Item 4). Inspect seal head. Replace if necessary.
5. Visually inspect pump end seal seat.
6. If replacement is required, it will be necessary to remove front housing (Item 1) from the pump. Disconnect any piping from front housing to allow disassembly.
7. Unbolt front housing (Item 1) from enter housing (Item 2) and carefully slide the front housing over drive shaft (Item 4).
8. To replace pump end seal seat carefully remove by inserting an "L" shaped tool between seal seat and front housing and exert a firm pulling action.

F. Pump Internals

Reference Drawings SD-2537, SD-2538, SO 2613, SD-2775

1. After removing the mechanical seal assembly, if it is necessary to either inspect or repair the pump internals, remove the pump housing bolts and rear housing (Item 3).
2. The gears (Items 6, 7) and wear plates (Item 15) are now accessible and can readily be removed along with the drive and idler shafts (Items 4, 5) from the center/front housings (Items 2, 1).
3. The gears can be removed from the shafts by removing one of the retaining rings and sliding the gears off their respective shafts.
4. Inspect all parts for signs of wear or damage. The maximum diametral clearance (bearing I.D. - shaft O.D.) that is acceptable is .010 inches. Shafts and bearings that are scored or worn must be replaced. Gears and wear plates with excessive wear or scoring must also be replaced.
5. Clean all parts before reassembly.

5.3 REASSEMBLY

A. Pump Internals

It is recommended that an Eco KOPkit be used when repairing a pump. The KOPkit comes with gears already assembled to the shafts and significantly reduces the repair time. If a KOPkit is being used proceed to Step 2.

1. Install the drive and idler gear (Items 6, 7) onto their respective shafts (Items 4, 5) using keys (Items 8, 9) and retaining rings (Items 10, 11). Take care not to scratch the shafts when installing the rings. Check the ends of the rings for sharp burrs. If a plastic and metal gear set are being used, the plastic gear is always the idler gear.
2. Install new bearings (Items 12, 13) in both the front and rear housing. Make sure that bearing lock pins (Item 14) are installed on each bearing.
3. Install (2) new O-rings (Item 16) in the groove on each side of the center housing.
4. Install a pair of wear plates (Item 15) on the front housing. Bring the front and center housing together with the (2) housing pins (Item 17) installed in their location holes.
5. Install the drive and idler gear shaft assemblies into the center/front housings assembly.
6. Install a pair of wear plates (Item 15) into the rear housing and assemble the rear housing to the pump along with (2) more housing pins.
7. Install the 4 housing bolts and nuts and tighten.

B. Single Internal Mechanical Seal (G2, G4, G6, G8)

Reference Drawings SD-2537, SD-2538

1. Prior to installation of new seal, clean seal housing (Item 30) and shaft. Burrs, etc. on shaft may damage the TFE wedge when passing over the shaft.
2. Lightly coat seal head face and I.D. with oil or TFE spray and carefully slip over shaft and into seal housing with the face end out.
3. If using a refurbished seal seat (Item 55), install new TFE O-ring (Item 55A) and pass over shaft, pushing seal head (Item 60) in front of it until inboard side of O-ring groove in seal seat (Item 55) comes flush with end of seal housing (Item 30)
4. Carefully tighten seal head set screws through pipe plug port in seal housing, taking up on each gradually while rotating shaft.
5. Reinstall gland nut (Item 36) and tighten, thereby compressing seal seat surface against spring loaded seal face.
6. Tighten gland nut and gland lock nut (Item 35).

C. Single Internal Mechanical Seal (GH8, GA12, GA16)

Reference Drawing SD-2613, SD-2775

1. Before replacing seat assembly, lubricate seal ring with lightweight machine oil or other lubricant compatible with pumped fluid. Then carefully align slot in seal seat (Item 55) with seat retainer pin. Place protective material over polished seal seat surface and press seal seat into seat retainer (Item 36).
2. To reassemble, install seal head (Item 60) on drive shaft and remove holding clips. Adjust seal head so that seal face is approximately 1/45 inches back from the front surface of the front housing on GA12/16 models. On GH8 model center set screw on seal head in pipe plug port.
3. Tighten seal head set screws through tapped port. Replace pipe plug (Item 62 or 63).
4. Assemble seat retainer (Item 36) with seal seat installed and a new seat retainer O-ring (Item 55A) over drive shaft (Item 4).
5. Tighten seat retainer bolts (Item 39A) which will set proper compression on seal head.

D. Single External Mechanical Seal (G2, G4, G6, G8)

Reference Drawing SD-2537, SD-2538

1. Prior to installation of either refurbished or new seal parts, clean housing and shaft. Remove any burrs or buildup which could damage TFE wedge. Make sure there are no sharp edges on end of shaft or on shaft flat.
2. If using refurbished seal seat install with a new TFE O-ring, and slide over shaft into the front housing (Item 1) with the lapped side facing out.
3. Screw on gland nut (Item 36) to position seat and tighten.
4. Tighten gland lock nut (Item 35)
5. Lightly coat seal head face and I.D. with oil or TFE spray. Carefully and gently, push seal head over shaft, taking care not to damage TFE wedge or seal face.
6. Pull shaft away from pump as far as built-in end play will allow it, then fully compress seal head face against seal seat, and then back off seal head until 1/32" of seal face becomes visible. Tighten seal head set screws securely.

E. Double Mechanical Seal (G2, G4, G6, G8)

Reference Drawing SD-2537, SD-2538

1. Install new seal housing gasket (Item 31), screwing it down the front housing hub until it meets the lock nut.
2. Install new or refurbished pump end seal seat (Item 56) with new O-ring. Slide seal seat over shaft until O-ring is still visible and has not yet entered front housing (Item 1).
3. For G2 and G4 pumps, replace seal housing (Item 30) and install new or refurbished seal head (Item 60), making sure set screws are backed out and will not mar shaft. Do not tighten set screws.
4. For G6 and G8 pumps, install new seal head as above, but prior to replacing seal housing (Item 30), push seal head against pump end seal seat (Item 56) compressing seal face as far as it will go. Tighten seal head set screws.
5. Screw seal housing tightly on pump hub, compressing O-ring and locking pump end seal seat firmly in place.
6. Push seal housing gasket (Item 31) up against recessed bore in seal housing and tighten lock nut (Item 32).
7. Install new or refurbished drive end seal seat (Item 55) with new seat O-ring.
8. Screw on gland nut (Item 36) and tighten firmly compressing seat O-ring and locking drive end seal seat in place. Tighten gland lock nut (Item 35).
9. With G2 and G4 pumps, center seal head setscrews with seal housing port and tighten set screws.
10. Reinstall flush connections.



IT IS RECOMMENDED THAT SEAL BE TESTED AT THIS POINT BY PRESSURIZING SEAL HOUSING WITH SUITABLE FLUID AT 10-15 PS1 ABOVE PUMP DISCHARGE PRESSURE ROTATE SHAFT BY HAND AND OBSERVE FOR ANY LEAKAGE ALONG THE SHAFT IN EITHER DIRECTION. IF LEAKAGE RATE IS SMALL SOMETIMES A RUN IN PERIOD OF 5-20 MINUTES WILL CAUSE EVERYTHING TO SEAT PROPERLY

F. Double Mechanical Seal (GH8, GA12, GA16)

Reference Drawing SD-2613, SD-2775

1. Before replacing seat, lightly lubricate seat ring. Then carefully align slot in seal seat with pump end seat pin. Place protective material over polished seal seat surface and press seal seat into front housing (Item 1).
2. Reassemble front housing to pump. Replacement of housing O-ring (Item 16) is recommended. Install seal head on drive shaft (Item 4). Remove holding clips. Adjust seal head so that contact is made with pump end seal seat. Assemble seat retainer with drive end seal seat, previously installed and a seat retainer O-ring (Item 37). Tighten seat retainer bolts (Item 39A) which will set proper compression on seal head.
3. Tighten seal head set screws through port. Replace pipe plug (Item 62 or 63) and previous piping for flushing of double seal.
4. Test seal installation before returning pump to service. Using flush connections in front housing, pressurize the seal cavity in the front housing at 10-15 psi above pump discharge pressure. To be sure components are seated properly, rotate shaft by hand several times. Remove front drive bearing flush plug to observe pump end of shaft. Observe shaft and gland at coupling end. There should be zero leakage from either end.

5.4 BOLT-ON THERMAL JACKETS INSTALLATION

The following tools are required:

- Suitable wrenches (open end socket or adjustable) to bolt jacket halves together with 1/4", 3/8", or 1/2." Bolts provided with jacket.
 - Heat transfer cement (Term on "standard grade:" or equivalent) to fill any slight clearance between the interior surface of the bolt-on jacket and the exterior surface of the pump.
 - A suitable mason's trowel to apply heat transfer cement to the interior surface of the jacket.
 - Damp paper towels or rags for clean-up.
1. Install Gearchem pump that is to be jacketed in the process line.
 2. Visually inspect pump to be jacketed and remove any foreign material (debris, packing lists, or identification tags) which might come between the inner jacket surface and the pump.

PUMPS HAVING PAINTED SURFACES REQUIRE NO SPECIAL PREPARATION. PAINT SHOULD BE DRY.

3. Check for proper fit of the bolt-on jacket halves by removing bolts which hold the halves together, and place both halves around the pump. Normally there is a slight clearance between the inner jacket surface and the pump.
4. Remove jacket halves from the pump and lay them on a clean, dry, work area, inner surfaces face up.
5. With a trowel, coat the inner surfaces of the jacket halves with heat transfer cement. Coating should be approximately 1/8" to 1/4" thick. Also dab a small quantity of the cement on the back of the pump flanges in three or four places.

6. Place jacket halves with heat transfer cement on pump and press firmly in place. Bolt jacket halves together with jacket bolts removed in Step 3.
7. Tighten bolts alternately to assure snug, even seating of the jacket halves on the pump.



AS BOLTS ARE TIGHTENED ALTERNATELY EXCESS HEAT TRANSFER CEMENT WILL EXTRUDE FROM EDGES OF THE JACKETS AND AT FLANGE INTERFACES. REMOVE THIS EXCESS CEMENT WITH TROWEL.

8. Use damp rags or paper towels to clean any excess heat transfer cement from the installation. Make sure there is no heat transfer cement on the threads of the valve stems.
9. Allow heat transfer cement to dry for 24 hours (above 32°F) before applying heating medium to the bolt-on jacket

5.5 REMOVAL

The following tools are required:

- Rubber or plastic mallet to dislodge jacket halves from heat transfer cement and pump.
 - Suitable wrenches (open-end, socket or adjustable) to remove bolts holding jacket halves on pump.
 - A hand chisel to remove any chunks of heat transfer cement that adhered to the inner surfaces of the bolt-on jacket.
1. Turn off heating medium supply and allow jacket/pump to cool to ambient temperature. Remove heating medium jump overs from jacket halves with suitable wrenches.



IF JACKET HALVES ARE BEING REMOVED TO REPAIR THE PUMP OR REPLACE IT WITH AN IDENTICAL COMPONENT AND FLEXIBLE METAL HOSES ARE USED AS JUMPOVERS, IT IS NORMALLY UNNECESSARY TO REMOVE THE JUMPOVERS. WORK ON THE PUMP CAN PROCEED WITH THE JACKET HALVES DISLODGED FROM THE PUMP WHILE THE HEATING MEDIUM JUMPOVERS REMAIN CONNECTED TO THE DRAIN AND SUPPLY COUPLINGS.

2. Remove bolts holding jacket halves on the pump. Tap the jacket halves lightly with a rubber or plastic mallet to dislodge them from the pump.



JACKET HALVES MAY BE PRIED APART WITH A SCREWDRIVER OR HAND CHISEL, BUT THIS SHOULD BE DONE VERY CAREFULLY WITH ONLY NOMINAL FORCE.

3. In most instances, the heat transfer cement adheres to the pump and not the inner surfaces of the jacket. The cement can be easily chipped away from the pump surface with a hand chisel. Any chunks of the heat transfer cement adjoining to the inner surface of the jacket halves should be removed also. Residual traces of heat transfer cement on the inner surfaces of the jacket halves need not be removed. These traces neither affect a good fit nor inhibit good thermal performance.
4. When inside surfaces of jacket halves are clean, the jacket is ready for re-use. If the gear pump is to be repaired and reused, be sure to remove heat transfer cement adhering to its surface before reinstalling the ECO bolt-on jacket.



For additional information or to locate the Pulsafeeder Representative in your area, you can log onto www.pulsa.com and select “Find a Rep or Distributor”. If additional assistance is needed, you can call Pulsafeeder at 585-292-8000.

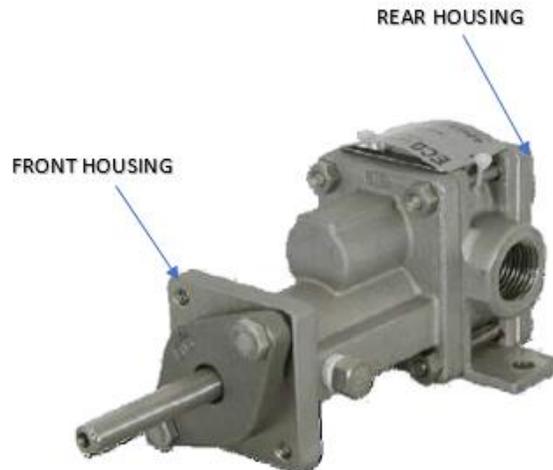
6. TROUBLESHOOTING

DIFFICULTY	PROBABLE CAUSE	REMEDY
No liquid delivery	Pump not primed Suction and/or discharge valve closed Wrong direction or rotation Suction plugged Air leak in suction Suction lift too high Motor incorrectly wired	Prime pump Open valves Reverse rotation Eliminate plug Locate and repair leak Do not exceed vapor pressure Check wiring diagram
Low liquid delivery	Discharge pressure higher than expected Air leak in suction Rotational speed incorrect Pump worn or damaged internal parts	Reduce pressure Locate and repair leak Check speed and wiring Inspect and repair as required
Pump gradually loses prime	Air leak in suction Suction lift too high Air or gas in liquid Pump worn or damaged	Locate and repair leak Increase suction pressure Eliminate air or gas Install (or clean) strainer in inlet pipe
Pump noisy	Pump cavitating Pump worn or damaged Air or gas in liquid Foreign particles in liquid	Increase suction pressure to provide sufficient NPSH Inspect and repair as required Eliminate air or gas Install (or clean) strainer in inlet pipe
Motor runs hot or overloads	It is normal for motors to feel hot even when not overloading Discharge pressure too high Liquid viscosity higher than expected Rotational speed too high Binding internal pump parts Motor wired incorrectly	Check motor amp draw to be sure Lower pressure, check pressure relief valve setting and for defective discharge pressure gauge Thin liquid or install larger motor Reduce speed Inspect and correct condition Check wiring diagram
Seal leaks	Operated pump dry (starved suction, dry prime) Solids in product Material incompatibility with product Viscosity	Open valves and prime pump Add strainer in suction piping (100 mesh) Consult Factory Consult Factory

7. TORQUE CHART

**** Start with hand tightening and then tighten up to recommended Torque valve. ****

Pump Model	Bolt Position	Bolt size	Recommended Torque in-lbs. (Nm).
G2 GA2	Rear Housing Bolts	10x32	30 (3.4)
	Gland Nut Bolts	1/4x20	60 (6.8)
GC2	Rear Housing Bolts	10x32	30 (3.4)
	Gland Nut Bolts	1/4x20	60 (6.8)
	Motor Adaptor Bolt	3/8x16	120 (13.5)
G4 GA4	Rear Housing Bolts	10x32	30 (3.4)
	Gland Nut Bolts	1/4x20	60 (6.8)
GC4	Rear Housing Bolts	10x32	30 (3.4)
	Gland Nut Bolts	1/4x20	60 (6.8)
	Motor Adaptor Bolt	3/8x16	120 (13.5)
G6 GA6	Rear Housing Bolts	1/4x28	60 (6.8)
	Gland Nut Bolts	1/4x20	60 (6.8)
GC6	Rear Housing Bolts	1/4x28	60 (6.8)
	Gland Nut Bolts	1/4x20	60 (6.8)
	Motor Adaptor Bolt	3/8x16	120 (13.5)
G8 GA8	Rear Housing Bolts	1/4x28	60 (6.8)
	Gland Nut Bolts	1/4x20	60 (6.8)
GC8	Rear Housing Bolts	1/4x28	60 (6.8)
	Gland Nut Bolts	1/4x20	60 (6.8)
	Motor Adaptor Bolt	3/8x16	120 (13.5)
GH6	Rear Housing Bolts	1/4x28	60 (6.8)
	Gland Nut Bolts	1/4x20	60 (6.8)
GH8	Rear Housing Bolts	1/4x28	60 (6.8)
	Gland Nut Bolts	1/4x20	60 (6.8)
G12	Rear Housing Bolts	5/16x18	132 (14.9)
	Gland Nut Bolts	5/16x18	132 (14.9)
G16	Rear Housing Bolts	5/16x18	132 (14.9)
	Gland Nut Bolts	5/16x18	132 (14.9)



8. PUMP SPECIFICATION CHART

PUMP SPECIFICATION CHART

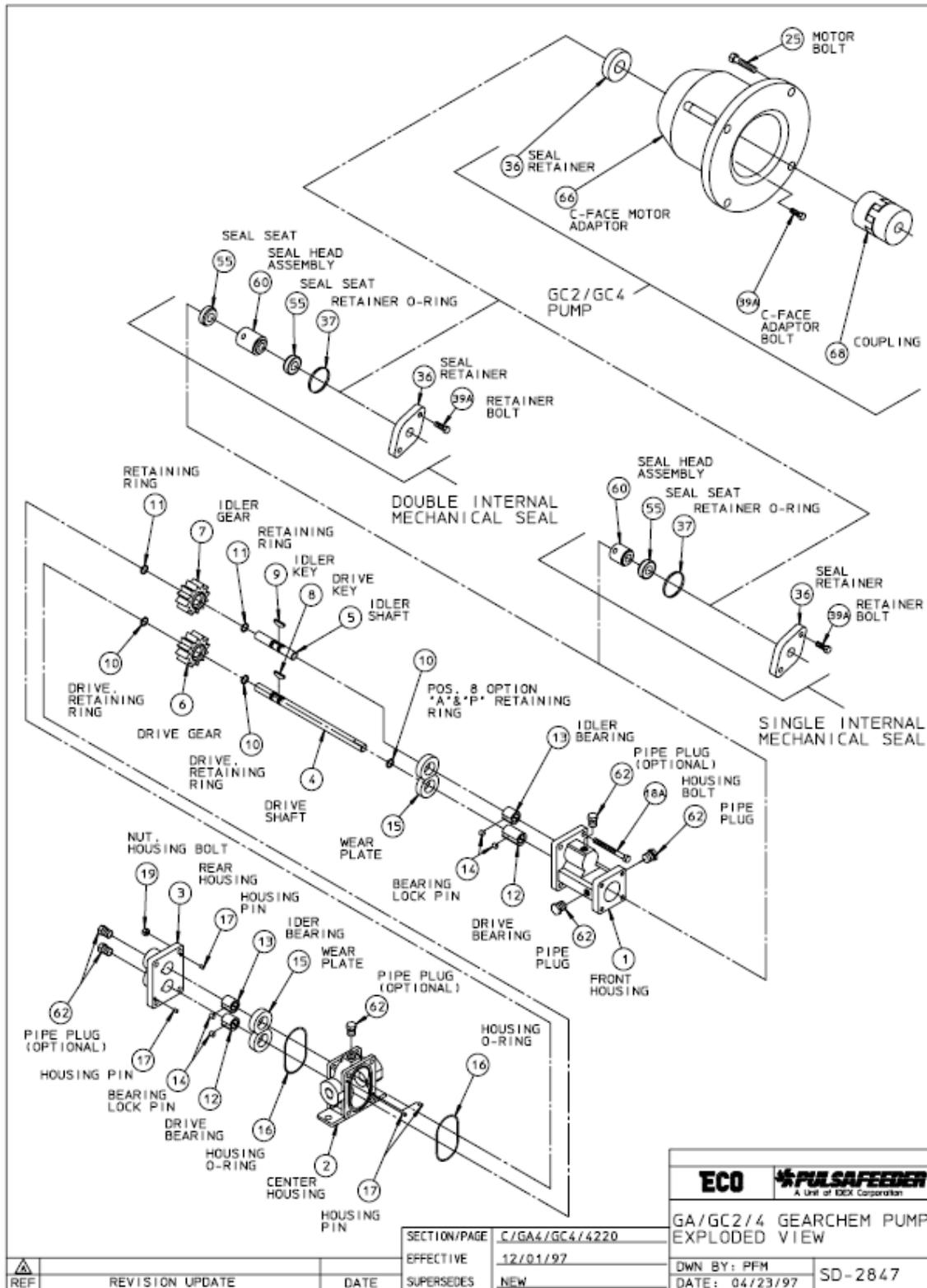
	PUMP SIZE				
	GH8	GA12	GA16	GA8	
(1)	MAXIMUM FLOW @ 1750 RPM, 0 PRESSURE THEORETICAL DISPLACEMENT MAXIMUM DIFFERENTIAL PRESSURE MAXIMUM CASING PRESSURE TEMPERATURE RANGE : METAL/PLASTIC GEARS METAL/PEEK GEARS PEEK/PEEK GEARS	1.5 (3.2) 1.0 (2.3) 1.08 (2.4) 100 (6.9) 50 (3.45) 150 (10.3) -100 TO +450 °F (-73 TO +232 °C)	3.0 (6.8) 2.0 (4.5) 1.89 (7.15) 100 (6.9) 50 (3.45) 150 (10.3) -100 TO +450 °F (-73 TO +232 °C)	10.0 (22.3) 6.4 (14.5) 6.64 (25.89) 50 (6.9) 50 (3.45) 150 (10.3) -100 TO +450 °F (-73 TO +232 °C)	22.0 (50.1) 17.5 (39.3) 1.3687 (51.78) 50 (6.9) 50 (3.45) 150 (10.3) -100 TO +450 °F (-73 TO +232 °C)
(2)	MAXIMUM VISCOSITY : METAL/METAL GEARS MINIMUM VISCOSITY : CERAMIC WEAR PLATES MAXIMUM ROTATIONAL SPEED INLET PORT SIZE OUTLET PORT SIZE ROTATION DIRECTION DRIVE SHAFT DIAMETER BEARING TYPE AVAILABLE SEALING ARRANGEMENTS: PACKING UCLIP MECHANICAL SEALS	0 TO +210 °F (-18 TO +99 °C)	0 TO +210 °F (-18 TO +99 °C)	0 TO +210 °F (-18 TO +99 °C)	0 TO +210 °F (-18 TO +99 °C)
(3)	PUMP WEIGHT	500000 (1000000) 500 (100) 500 (100) 1750 RPM 1450 RPM 1/2 THD 1/2 THD REVERSIBLE 3/75 (9.525) INTERNAL SLEEVE BY PUMPED FLUID STD OR VANDERN RING SGL,DBL,EXTERNAL SGL	500000 (1000000) 500 (100) 500 (100) 1750 RPM 1450 RPM 1/2 THD 1/2 THD REVERSIBLE 3/75 (9.525) INTERNAL SLEEVE BY PUMPED FLUID STD OR VANDERN RING SGL,DBL,EXTERNAL SGL	500000 (1000000) 500 (100) 500 (100) 1750 RPM 1450 RPM 3/4 THD 1 THD REVERSIBLE 500 (12.7) INTERNAL SLEEVE BY PUMPED FLUID STD OR VANDERN RING SGL,DBL,EXTERNAL SGL	500000 (1000000) 500 (100) 500 (100) 1750 RPM 1450 RPM 1 THD 1 THD REVERSIBLE 500 (12.7) INTERNAL SLEEVE BY PUMPED FLUID STD OR VANDERN RING SGL,DBL,EXTERNAL SGL

	PUMP SIZE			
	GH8	GA12	GA16	
(1)	MAXIMUM FLOW @ 1750 RPM, 0 PRESSURE THEORETICAL DISPLACEMENT MAXIMUM DIFFERENTIAL PRESSURE MAXIMUM CASING PRESSURE TEMPERATURE RANGE : METAL/METAL GEARS METAL/CARBON GEARS METAL/PEEK GEARS	22.0 (50.1) 14.5 (32.3) 1.3687 (51.78) 100 (6.9) 150 (10.3) -100 TO +450 °F (-73 TO +232 °C)	28.0 (62.4) 2.792 (105.7) 100 (6.9) 150 (10.3) 150 (10.3) -50 TO +450 °F (-45 TO +232 °C)	55.0 (122.5) 5.584 (211.4) 100 (6.9) 100 (6.9) 150 (10.3) -50 TO +450 °F (-45 TO +232 °C)
(2)	MAXIMUM VISCOSITY : METAL/METAL GEARS MINIMUM VISCOSITY : CERAMIC WEAR PLATES MAXIMUM ROTATIONAL SPEED INLET PORT SIZE OUTLET PORT SIZE ROTATION DIRECTION DRIVE SHAFT DIAMETER BEARING TYPE AVAILABLE SEALING ARRANGEMENTS: PACKING MECHANICAL SEALS	0 TO +210 °F (-18 TO +99 °C)	0 TO +210 °F (-18 TO +99 °C)	0 TO +210 °F (-18 TO +99 °C)
(3)	PUMP WEIGHT	500000 (1000000) 500 (100) 500 (100) 1750 RPM 1450 RPM 1 THD 1 THD REVERSIBLE 1.000 (25.4) INTERNAL SLEEVE BY PUMPED FLUID STD OR VANDERN RING INTERNAL SGL, DBL	500000 (1000000) 500 (100) 500 (100) 1150 RPM 1150 RPM 2 FLG 2 FLG REVERSIBLE 1.000 (25.4) INTERNAL SLEEVE BY PUMPED FLUID STD OR VANDERN RING INTERNAL SGL, DBL	500000 (1000000) 500 (100) 500 (100) 1150 RPM 1150 RPM 2 FLG 2 FLG REVERSIBLE 1.000 (25.4) INTERNAL SLEEVE BY PUMPED FLUID STD OR VANDERN RING INTERNAL SGL, DBL

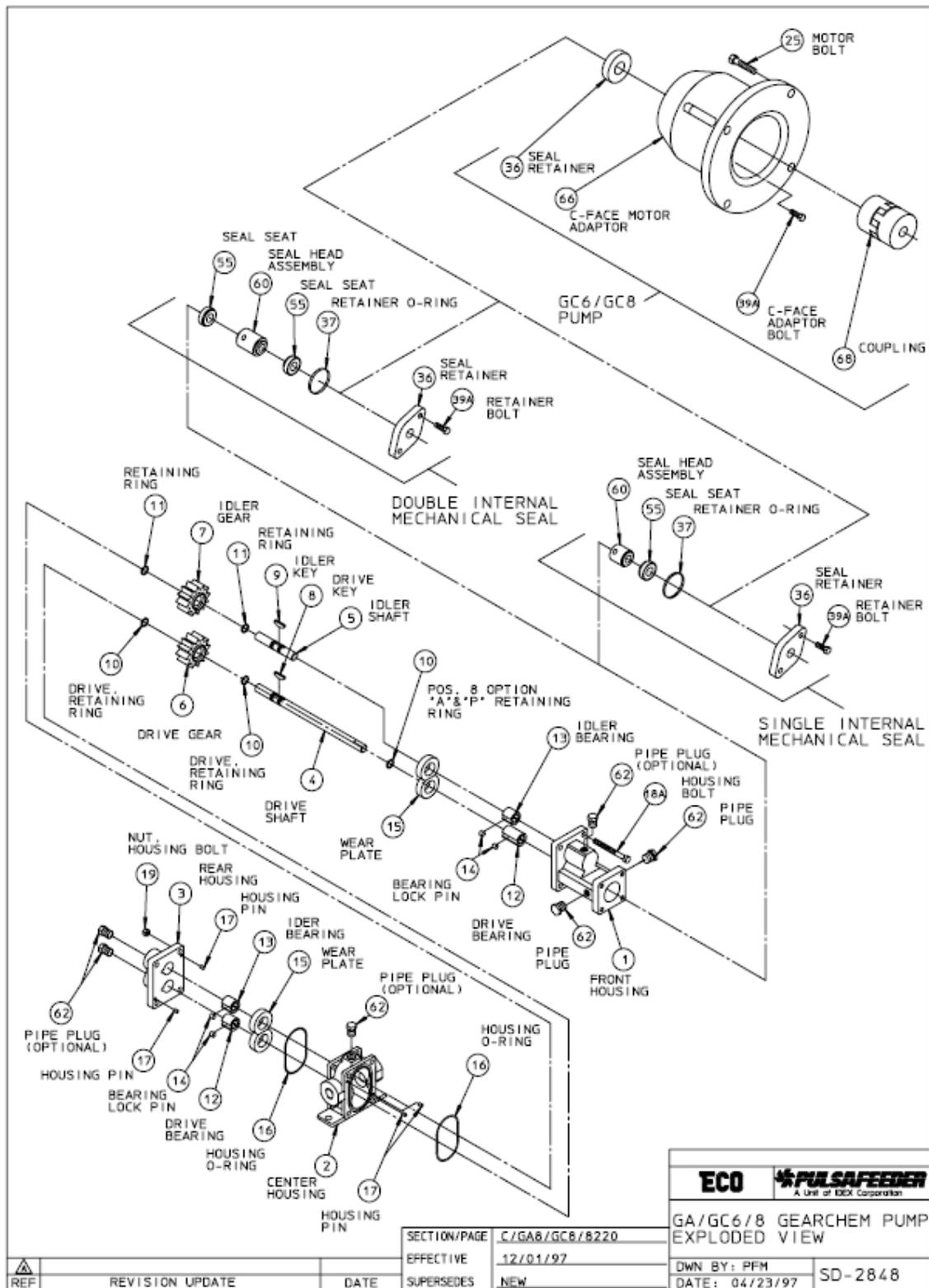
NOTES:
 (1) FOR TEMPERATURES OVER 110 °F TRIMMED PLASTIC GEARS ARE REQUIRED.
 (2) HIGHER VISCOSITIES REQUIRE REDUCED SPEEDS
 (3) THE ISOCH SERIES OF PUMPS OFFERS SEALLESS DESIGNS

DRAWING: GCSPEC

9. EXPLODED VIEW DRAWING – G2 & G4 SERIES



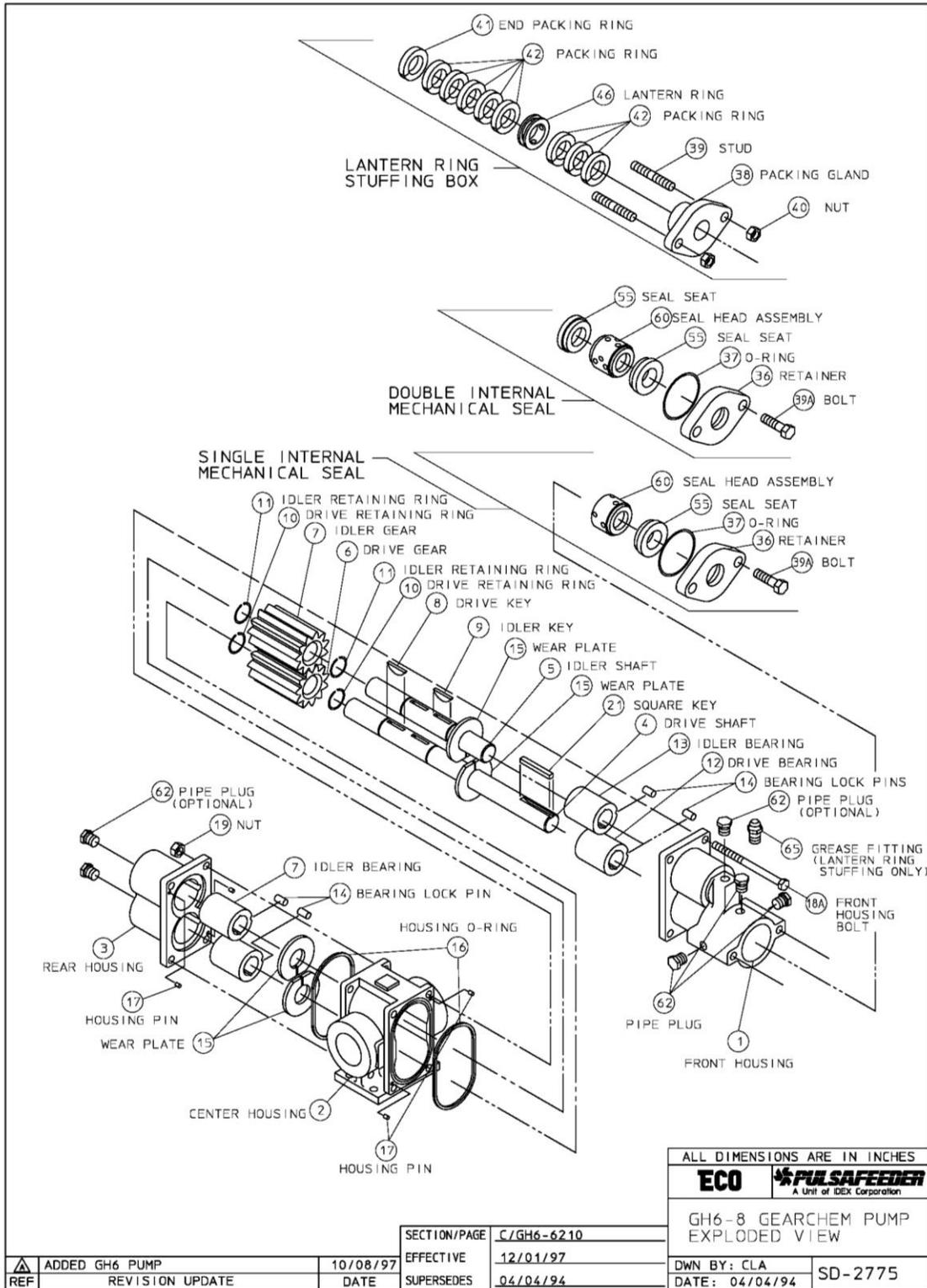
10. EXPLODED VIEW DRAWING – G6 & G8 SERIES



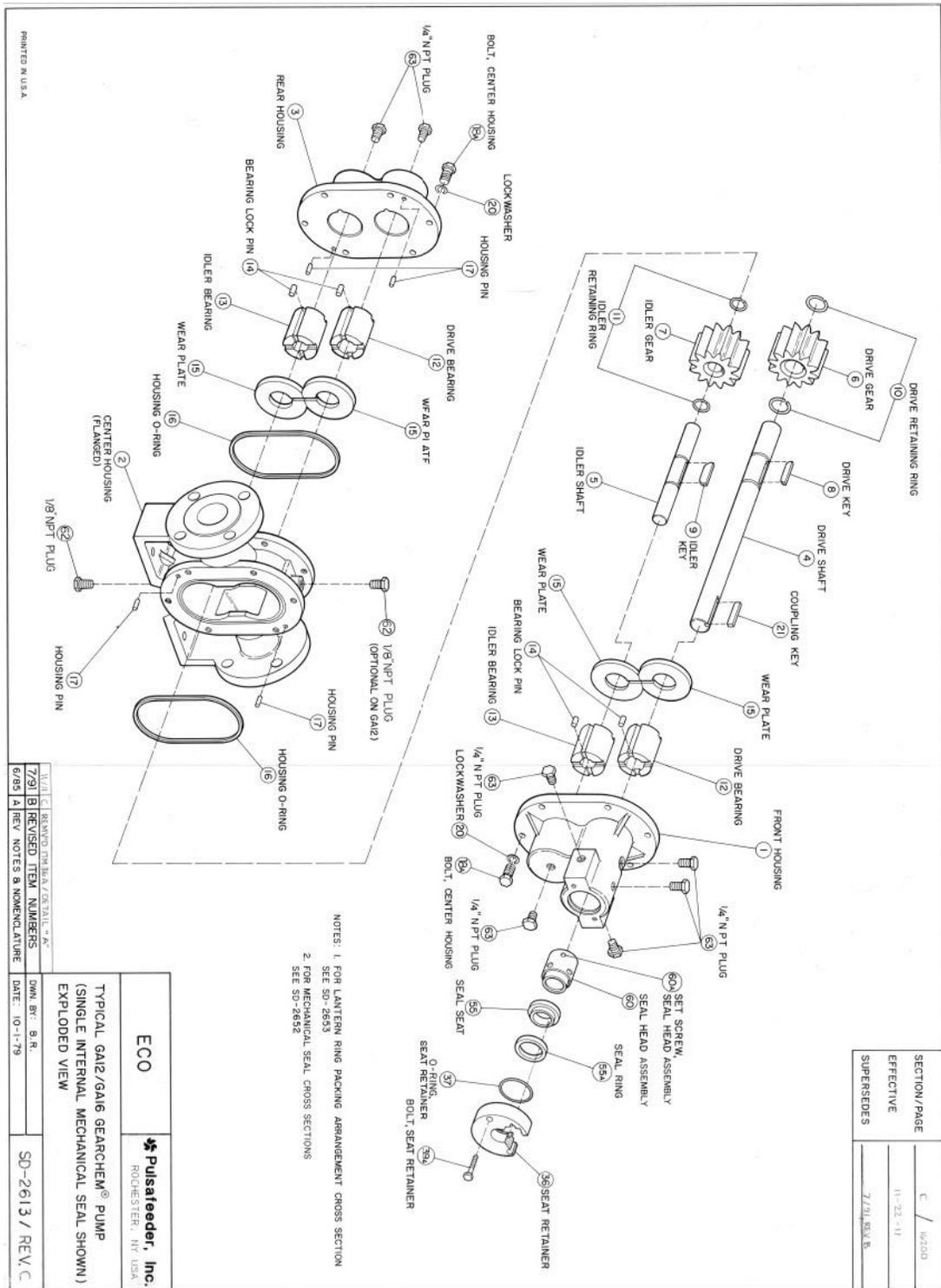
ECO		PULSAFEEDER A Unit of EDC Corporation	
GA/GC6/8 GEARCHEM PUMP EXPLODED VIEW			
SECTION/PAGE	C/GA8/GC8/8220	DWN BY:	PFM
EFFECTIVE	12/01/97	DATE:	04/23/97
SUPERSEDES	NEW		SD-2848

REF	REVISION UPDATE	DATE
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11. EXPLODED VIEW DRAWING – GH8 SERIES



12. EXPLODED VIEW DRAWING – GA12 & GA16 SERIES



13. SEAL ARRANGEMENT DRAWINGS

ITEM	PART NAME
1	FRONT HOUSING
4	DRIVE SHAFT
10	RETAINING RING
36	SEAL RETAINER
37	O-RING
39A	BOLT, RETAINER
55	SEAL SEAT
60	SEAL HEAD ASSEMBLY
62	PLUG, 1/8" NPT

NOTE: FOR CODE E USE EITHER PORT. (SETScrew IS NOT CENTERED IN PORT)

FRONT HOUSING TOP VIEW

EXTERNAL MECH. SEAL CODE V,W

SINGLE MECH. SEAL CODE Q,U

SEE NOTE 3

SINGLE MECH. SEAL CODE A,P

DOUBLE MECH. SEAL CODE E

DOUBLE MECH. SEAL CODE C

NOTES:

- REFER TO STANDARD SALES BILL OF MATERIALS.
- FOR ALL DOUBLE MECHANICAL SEALS, CIRCULATE SUITABLE FLUID AT 25-30 PSI ABOVE PUMP DISCHARGE PRESSURE. FLUID TEMPERATURE AND FLOW MUST BE ADEQUATE TO MAINTAIN A MAXIMUM TEMPERATURE OF 450° F IN SEAL HOUSING.
- ITEM 10 IS ONLY USED WITH POSITION 8 SEAL OPTION "A" & "P".

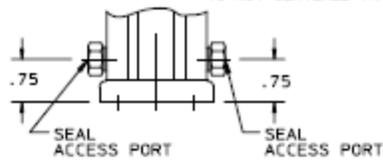
REF	UPDATED PICTORIALLY	10/14/98
	REVISION UPDATE	DATE

SECTION/PAGE	C/GA2/2221
EFFECTIVE	10/16/98
SUPERSEDES	12/01/97

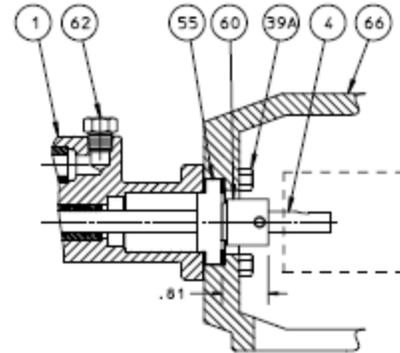
ALL DIMENSIONS ARE IN INCHES	
ECO	PULSAFEEDER A Unit of IDEX Corporation
GA2/GA4 GEARCHEM PUMP SEAL ARRANGEMENTS CROSS SECTIONAL VIEWS	
DWN BY: PFM	SD-2849
DATE: 04/15/97	

ITEM	PART NAME
1	FRONT HOUSING
4	DRIVE SHAFT
10	RETAINING RING
36	SEAL RETAINER
37	O-RING
39A	BOLT, RETAINER
55	SEAL SEAT
60	SEAL HEAD ASSEMBLY
62	PLUG, 1/8" NPT
66	C-FACE MOTOR ADAPTOR

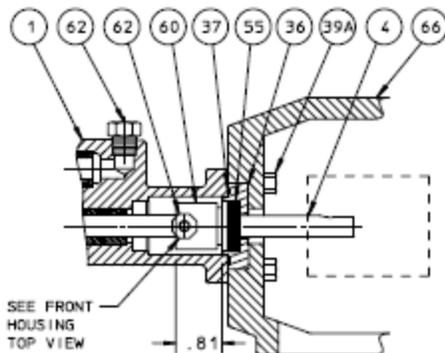
NOTE: FOR CODE E USE EITHER PORT. (SETSCREW IS NOT CENTERED IN PORT)



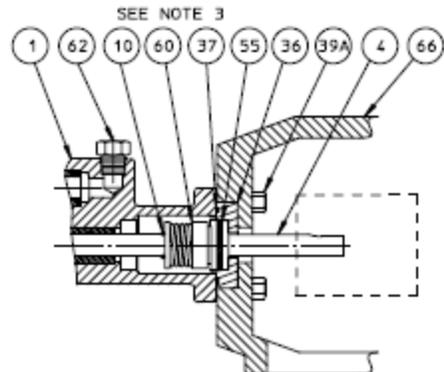
FRONT HOUSING TOP VIEW



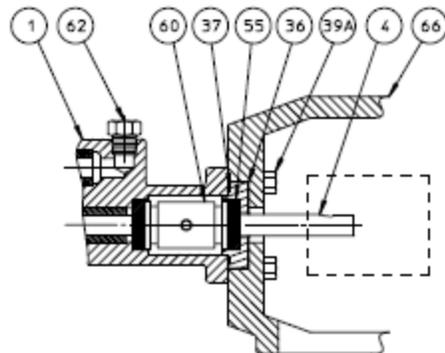
EXTERNAL MECH. SEAL CODE V,W



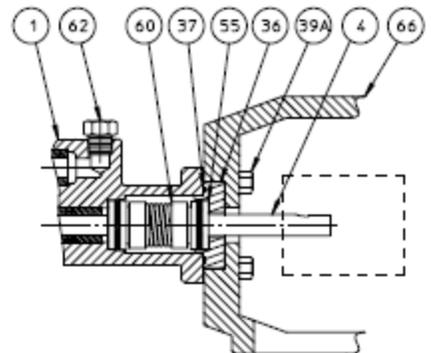
SINGLE MECH. SEAL CODE O,U



SINGLE MECH. SEAL CODE A,P



DOUBLE MECH. SEAL CODE E



DOUBLE MECH. SEAL CODE C

NOTES:

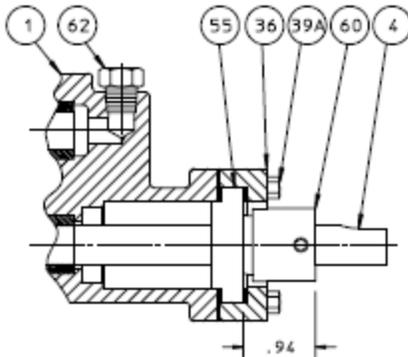
- 1.) REFER TO STANDARD SALES BILL OF MATERIALS.
- 2.) FOR ALL DOUBLE MECHANICAL SEALS, CIRCULATE SUITABLE FLUID AT 25-30 PSI ABOVE PUMP DISCHARGE PRESSURE. FLUID TEMPERATURE AND FLOW MUST BE ADEQUATE TO MAINTAIN A MAXIMUM TEMPERATURE OF 450° F IN SEAL HOUSING.
- 3.) ITEM 10 IS ONLY USED WITH POSITION B SEAL OPTION *A* & *P*.

REF	UPDATED PICTORIALLY	10/14/98
	REVISION UPDATE	DATE

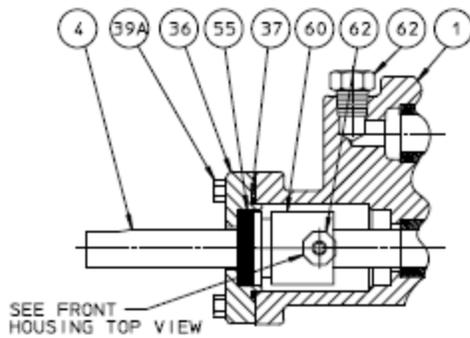
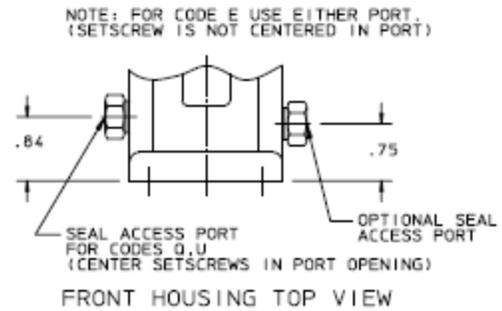
SECTION/PAGE	C/GC2/2222
EFFECTIVE	10/14/98
SUPERSEDES	12/01/97

ALL DIMENSIONS ARE IN INCHES	
ECO	PULSAFEEDER A Unit of IDEX Corporation
GC2/GC4 GEARCHEM PUMP SEAL ARRANGEMENTS CROSS SECTIONAL VIEWS	
DWN BY: PFM	SD-2854
DATE: 05/01/97	

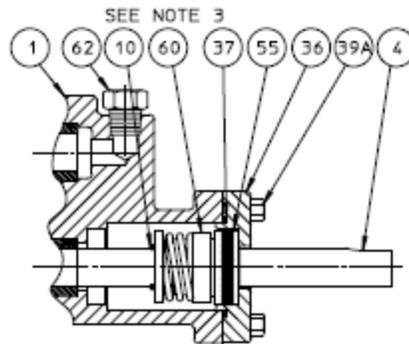
ITEM	PART NAME
1	FRONT HOUSING
4	DRIVE SHAFT
10	RETAINING RING
36	SEAL RETAINER
37	O-RING
39A	BOLT, RETAINER
55	SEAL SEAT
60	SEAL HEAD ASSEMBLY
62	PLUG, 1/8" NPT



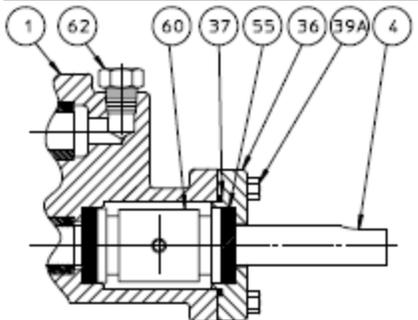
EXTERNAL MECH. SEAL CODE V,W



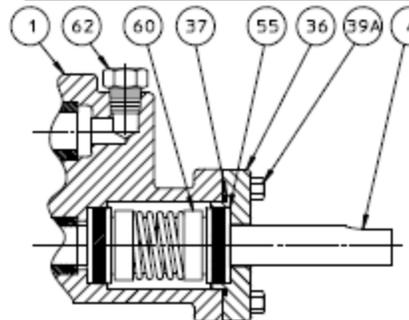
SINGLE MECH. SEAL CODE Q,U



SINGLE MECH. SEAL CODE A,P



DOUBLE MECH. SEAL CODE E



DOUBLE MECH. SEAL CODE C

NOTES:

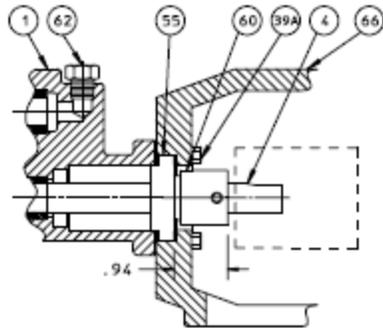
- REFER TO STANDARD SALES BILL OF MATERIALS.
- FOR ALL DOUBLE MECHANICAL SEALS, CIRCULATE SUITABLE FLUID AT 25-50 PSI ABOVE PUMP DISCHARGE PRESSURE. FLUID TEMPERATURE AND FLOW MUST BE ADEQUATE TO MAINTAIN A MAXIMUM TEMPERATURE OF 450° F IN SEAL HOUSING.
- ITEM 10 IS ONLY USED WITH POSITION 8 SEAL OPTION "A" & "P".

△	UPDATED PICTORIALLY	10/14/98
REF	REVISION UPDATE	DATE

SECTION/PAGE	C/GA8/8221
EFFECTIVE	10/14/98
SUPERSEDES	12/01/97

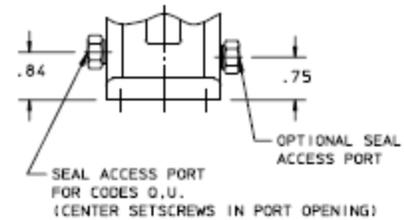
ALL DIMENSIONS ARE IN INCHES	
ECO	PULSAFEEDER A Unit of IDEX Corporation
GA6/GA8 GEARCHEM PUMP SEAL ARRANGEMENTS CROSS SECTIONAL VIEWS	
DWN BY: PFM	SD-2855
DATE: 05/01/97	

ITEM	PART NAME
1	FRONT HOUSING
4	DRIVE SHAFT
10	RETAINING RING
36	SEAL RETAINER
37	O-RING
39A	BOLT, RETAINER
55	SEAL SEAT
60	SEAL HEAD ASSEMBLY
62	PLUG, 1/8" NPT
66	C-FACE MOTOR ADAPTOR

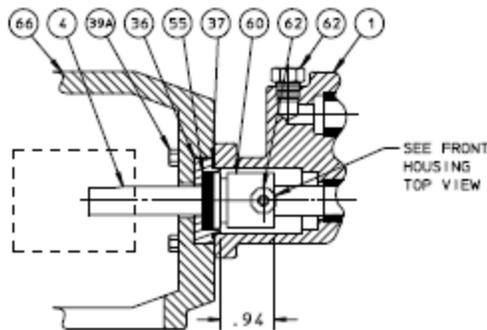


EXTERNAL MECH. SEAL CODE V,W

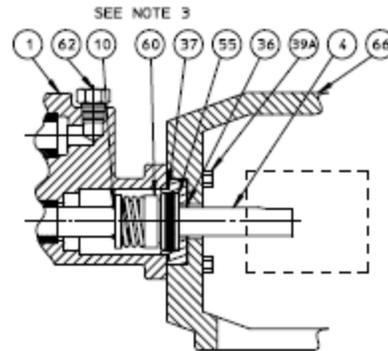
NOTE: FOR CODE E USE EITHER PORT.
(SETScrew IS NOT CENTERED IN PORT)



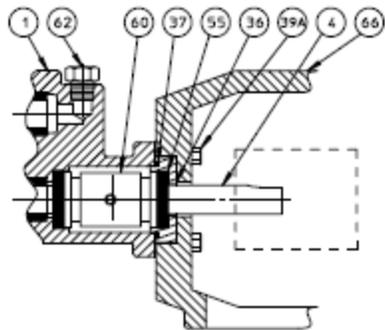
FRONT HOUSING TOP VIEW



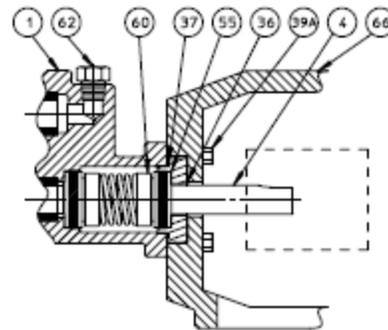
SINGLE MECH. SEAL CODE Q,U



SINGLE MECH. SEAL CODE A,P



DOUBLE MECH. SEAL CODE E



DOUBLE MECH. SEAL CODE C

NOTES:

- REFER TO STANDARD SALES BILL OF MATERIALS.
- FOR ALL DOUBLE MECHANICAL SEALS, CIRCULATE SUITABLE FLUID AT 25-30 PSI ABOVE PUMP DISCHARGE PRESSURE. FLUID TEMPERATURE AND FLOW MUST BE ADEQUATE TO MAINTAIN A MAXIMUM TEMPERATURE OF 450° IN SEAL HOUSING.
- ITEM 10 IS ONLY USED WITH POSITION 8 SEAL OPTION "A" & "P".

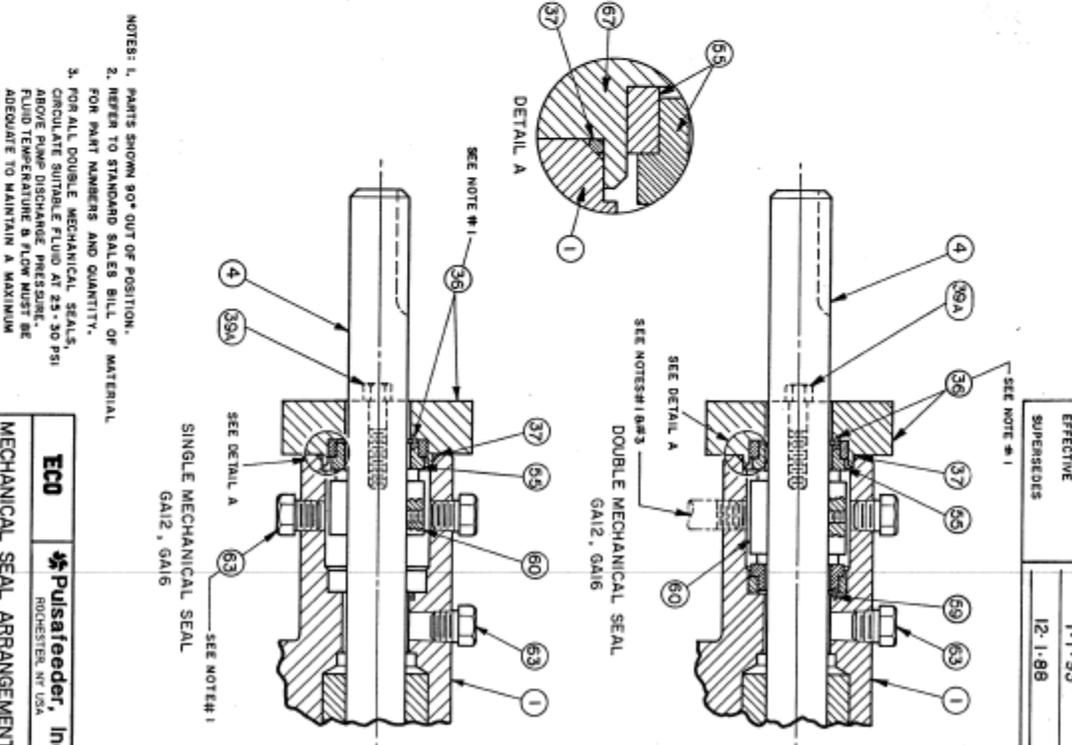
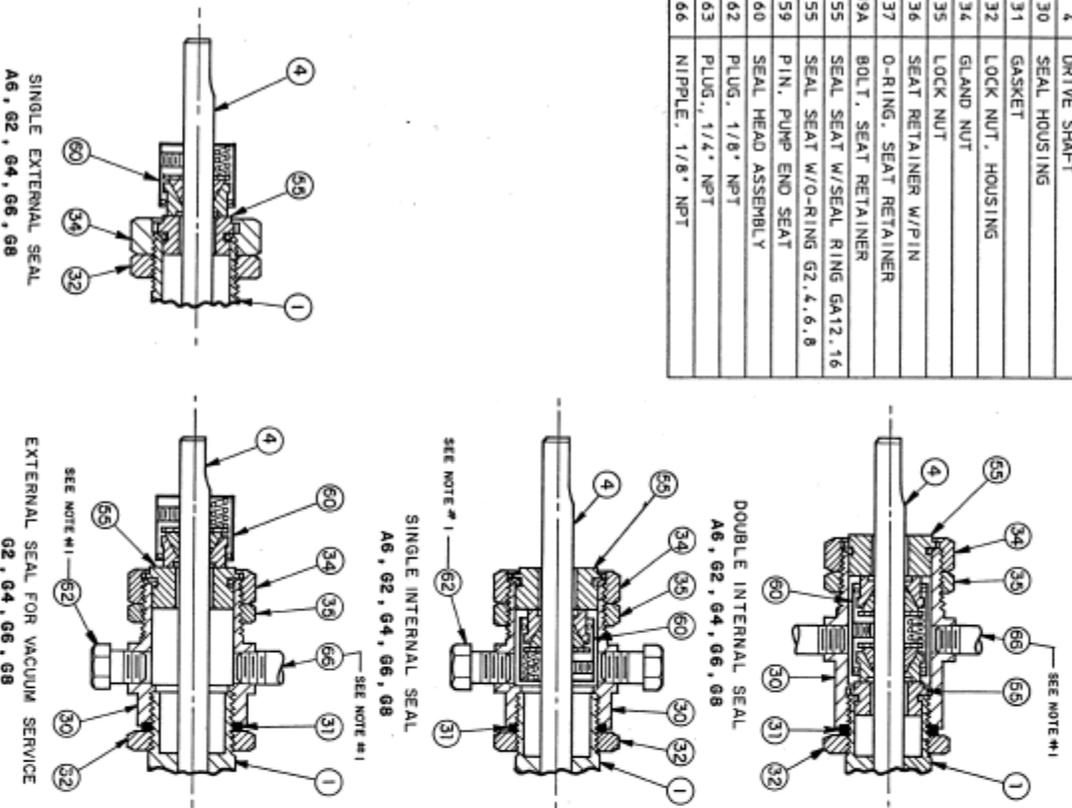
ALL DIMENSIONS ARE IN INCHES



GC6/GC8 GEARCHEM PUMP
SEAL ARRANGEMENTS
CROSS SECTIONAL VIEWS

SECTION/PAGE	C/GC6/6222	DWN BY: PFM	SD-2856
EFFECTIVE	10/14/98	DATE: 05/01/97	
REF	REVISION UPDATE	DATE	SUPERSEDES
			12/01/97

ITEM	PART NAME
1	FRONT HOUSING
4	DRIVE SHAFT
30	SEAL HOUSING
31	GASKET
32	LOCK NUT, HOUSING
34	GLAND NUT
35	LOCK NUT
36	SEAT RETAINER W/PIN
37	O-RING, SEAT RETAINER
39A	BOLT, SEAT RETAINER
55	SEAL SEAT W/O-RING GA12.16
59	SEAL SEAT W/O-RING GA2.4.6.8
60	PIN, PUMP END SEAT
62	PLUG, 1/8" NPT
63	PLUG, 1/4" NPT
66	NIPPLE, 1/8" NPT



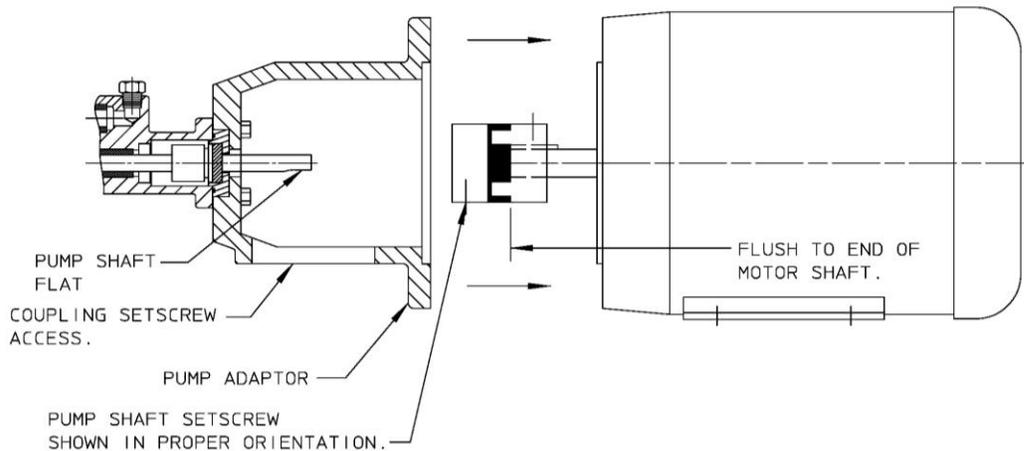
NOTES: 1. PARTS SHOWN 90° OUT OF POSITION.
 2. REFER TO STANDARD SALES BILL OF MATERIAL FOR PART NUMBERS AND QUANTITY.
 3. FOR ALL DOUBLE MECHANICAL SEALS, CIRCULATE SUITABLE FLUID AT 25-30 PSI ABOVE PUMP DISCHARGE PRESSURE. FLUID TEMPERATURE & FLOW MUST BE ADEQUATE TO MAINTAIN A MAXIMUM TEMPERATURE OF 150°F IN SEAL HOUSING.

7/79 | A UPDATED ITEM NUMBERS

SECTION / PAGE	C / 4202
EFFECTIVE	1-1-93
SUPPERSOBS	12-1-88
OWN BY /	KAT
DATE:	6-19-85
SD-2652	

ECO **Pulsafeeder, Inc.**
 MECHANICAL SEAL ARRANGEMENTS
 FOR GEARCHEM/ROTARY PUMPS
 ROCHESTER, NY USA

14. PUMP TO MOTOR ASSEMBLY INSTRUCTIONS



Instruction

1. Position pump shaft flat directly over coupling setscrew access
2. Setscrew coupling half, flush to end of motor shaft, assemble spider and other coupling half to motor half (optional, wrap coupling jaws and spider with masking tape)
3. Slide shaft of pump assembly into coupling mounted on motor, fasten pump adaptor to motor with bolts provided
4. By using coupling access in the pump adaptor, tighten the remaining setscrew on coupling to pump shaft

NOTE: This product may be assembled in more than one way, but we have determined this procedure to be the most time efficient.

15. GEARCHEM PUMP PRESSURES

GEARCHEM PUMPS PRESSURES TO 100 PSI

SIGNIFICANT MODEL NUMBER SYSTEM AND AVAILABILITY TABLE

POSITION NO.: 1 2 3 4 5 6 7 8 9

POSITION 1 GEARCHEM EXTERNAL SPUR GEAR PUMP G - ORIGINAL VERSION, FOOT MOUNTED ONLY - 2,4,6,8, GA- MECHANICAL SEAL, FOOT MOUNTED ONLY - 2,4,6,8,12,16 GC- MECHANICAL SEAL, C-FACE MOTOR MOUNTING ASSEMBLY - 2,4,6,8 GH- HIGHER PRESSURE MODEL, FOOT MOUNTED ONLY * - 8								
POSITION 2 PUMP SIZE	2	4	6	8	*8	12	16	
Port Size	.25"	.50"	.75"	1.00"	1.00"	1.50"	2.00"	
Capacity (GPM MAX)	1.5	3	10	20	20	26	55	
Differential pressure (PSI MAX)	100	100	100	50	100	100	100	
Max. Casing Pressure (PSIG MAX)	200	200	150	150	200	200	200	
POSITION 3 AVAILABLE PUMP METALLURGIES AND TYPE PORT CONNECTION								
A - 316SS FNPT	X	X	X	X	X	X		
C - ALLOY C FNPT	X	X	X	X	X	X		
D - ALLOY 20 FNPT	X	X	X	X	X	X		
K - 316SS FBSPT	X	X	X	X	X	X		
M - ALLOY C FBSPT	X	X	X	X	X	X		
N - ALLOY 20 FBSPT	X	X	X	X	X	X		
U - 316SS FLANGED	X	X	X	X	X	X		X
V - ALLOY C FLANGED	X	X	X	X	X	X		X
W - ALLOY 20 FLANGED	X	X	X	X	X	X		X
POSITION 4 DRIVE GEAR MATERIAL								
A - 316 SS	X	X	X	X	X	X	X	X
C - ALLOY C	X	X	X	X	X	X	X	X
D - ALLOY 20	X	X	X	X	X	X	X	X
T - TFE (Glass Filled) (1)	X	X	X	X	X	X	X	X
E - PEEK (1)	X	X	X	X	X	X	X	X
POSITION 5 IDLER GEAR MATERIAL								
A - 316 SS	X	X	X	X	X	X	X	X
C - ALLOY C (2)	X	X	X	X	X	X	X	X
D - ALLOY 20 (2)	X	X	X	X	X	X	X	X
K - Carbon	X	X	X	X	X	X	X	X
T - TFE (Glass Filled)	X	X	X	X	X	X	X	X
E - PEEK	X	X	X	X	X	X	X	X
POSITION 6 WEAR PLATE MATERIAL								
K - Carbon	X	X	X	X	X	X	X	X
T - TFE (Glass Filled)	X	X	X	X	X	X	X	X
Z - Ceramic (3)	X	X	X	X	X	X	X	X
E - Peek	X	X	X	X	X	X	X	X
POSITION 7 SHAFT AND BEARING MATERIAL								
K - Standard Carbon	X	X	X	X	X	X	X	X
T - TFE (Glass Filled)	X	X	X	X	X	X	X	X
L - Extended Life carbon	X	X	X	X	X	X	X	X
C - Extended Life Carbon - *CW* Shafts (14)	X	X	X	X	X	X	X	X
4 - Standard Carbon - Slotted							X	X
POSITION 8 SEAL ARRANGEMENT								
	<u>G</u> 2 - 4	<u>GA/GC</u> 2 - 4	<u>G</u> 6 - 8	<u>GA/GC</u> 6 - 8	<u>GH</u> *8	<u>GA</u> 12-16		
PACKING								
B - TFE Rings	X		X					
G - Grafoil Rings	X		X					
J - Viton Lip Seal. (4)	X		X					
N - TFE Rings / Lantern H-C Spring	X		X		X			
R - Grafoil / Lantern	X		X		X		X	X

* HIGHER PRESSURE MODEL

GEARCHEM PUMPS PRESSURES TO 100 PSI

SIGNIFICANT MODEL NUMBER SYSTEM AND AVAILABILITY TABLE

(CONTINUED)

POSITION 8 SEAL ARRANGEMENT	$\frac{G}{2-4}$	$\frac{GA/GC}{2-4}$	$\frac{G}{6-8}$	$\frac{GA/GC}{6-8}$	$\frac{GH}{*8}$	$\frac{GA}{12-16}$
MECHANICAL SEALS (5)						
BELLOWS						
A - Single Seal: (13) Carbon Rotary / Viton Ceramic Seat / Viton		X		X		
C - Double Seal: (6,13) Carbon Rotary / Viton Ceramic Seat / Viton		X		X		
P - Single Seal: (13) Siliconized Rotary / EPR Silicon CBD Seat / TFE		X		X		
WEDGE						
E - Double Seal: (6) Carbon Rotary / TFE Silicon CBD Seat / TFE		X		X	X	X
Q - Single Seal: Teflon Rotary / TFE Silicon CBD Seat / TFE		X		X	X	
U - Single Seal: Carbon Rotary / TFE Silicon CBD Seat / TFE		X		X	X	X
V - External Seal: (15) Carbon Rotary / TFE Metallic Seat / TFE	X		X			
W - External Seal: (15) Carbon Rotary / TFE Silicon CBD Seat / TFE			X			
Z - External Seal - Vacuum Carbon Rotary / TFE (15) Metallic Seat / TFE	X		X			
24 - Single Seal: Carbon Rotary / TFE Metallic Seat / TFE						X
44 - Double Seal: (6) Carbon Rotary / TFE Metallic Seat / TFE						X

POSITION 9 OPTIONS PUMP SIZE	2	4	6	8	*8	12	16
A - Bearing Flush Ports (7)	X	X	X	X	X	STD	STD
B - PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins (7)	X	X	X	X	X	X	X
C - Bearing Flush Ports PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins	X	X	X	X	X		
D - Bearing Flush Ports, PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins Slotted Bearings (8)	X	X	X	X	X		
E - Bearing Flush Parts, PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins Slotted Bearings (8) Slotted Wear Plates (9)	X	X	X	X			
F - GC Series Only 63 Frame Metric Motor	X	X					
G - GC Series Only 71 Frame Metric Motor	X	X	X	X			
J - GA12 with 1' Idler Shaft (10) (Metallic Gear Only)						X	
K - GC Series Only 80 Frame Metric Motor	X	X	X	X			
L - GC Series Only Large Coupling For 143T/182C/184C Frame Motors.	X	X	X	X			
M - GC Series Only 90 Frame Metric Motor			X	X			
N - Narrow Width Gears (11)		X	X				
T - Temperature Trimmed Plastic Gear	X	X	X	X	X	X	X
V - Center Hsg - Vent	X	X	X	X	X	X	STD
X - Special (12)	X	X	X	X	X	X	X

* HIGHER PRESSURE MODEL

GEARCHEM PUMPS PRESSURES TO 100 psi

SIGNIFICANT MODEL NUMBER SYSTEM AND AVAILABILITY TABLE

1. Maximum differential pressure allowed for plastic/plastic gears is 50 psi.
2. Pumps with metallic drive and idler gears require minimum viscosity of 100 cPs and are limited to 1440 rpm maximum speed for G2-GH8 pumps and 1150 rpm for GA12-16 pumps.
3. Ceramic wear plates with metallic gears require minimum viscosity of 100 cPs.
4. Viton® lip seals are limited to 25 psig
5. Not oil mechanical seals available in oil metallurgies.
6. Double mechanical seals must be pressurized with seal fluid 15 to 20 psig above the pump discharge pressure.
7. Standard GA12 and GA16 pumps furnished with bearing flush ports, metallic bearing lock pins, and slotted wear plates.
8. Slotted bearings (GA12 and GA16) listed POSITION 7.
9. Slotted wear plates reduce volumetric efficiency.
10. J OPTION available only with metal idler gear.
11. Designation for reduced capacity pump.
12. Consult Factory.
13. Position 8 options A, C and P seals are only available in 316SS.
14. "CW" means corrosion/wear shaft material.
15. External seals are limited to 50 psig.

COMMENTS

Specifications and availability are subject to change without notice.

GEARCHEM PUMPS EXTENDED PRESSURE PRESSURES ABOVE 100 PSI

SIGNIFICANT MODEL NUMBER SYSTEM AND AVAILABILITY TABLE

	<input type="checkbox"/>								
POSITION NO.:	1	2	3	4	5	6	7	8	9

POSITION 1 GEARCHEM EXTERNAL SPUR GEAR PUMP						
G = ORIGINAL VERSION, FOOT MOUNTED ONLY - 2,4,6						
GA= MECHANICAL SEAL, FOOT MOUNTED ONLY - 2,4,6,12						
GC= MECHANICAL SEAL, C-FACE MOTOR MOUNTING ASSEMBLY - 2,4,6						
GH= HIGHER PRESSURE MODEL, FOOT MOUNTED ONLY * - 6						
POSITION 2 PUMP SIZE	2	4	6	*6	12	
Port Size	.25"	.50"	.75"	.75"	1.50"	
Capacity (GPM MAX)	1.5	2.1	8.0	10	26	
Differential pressure (PSI MAX)	175	140+	125+	200	150	
Max. Casing Pressure (PSIG MAX)	200	200	150	210	200	
POSITION 3 AVAILABLE PUMP METALLURGIES AND TYPE PORT CONNECTION						
A = 316SS	FNPT	X	X	X	X	X
C = ALLOY C	FNPT	X	X	X	X	X
D = ALLOY 20	FNPT	X	X	X	X	X
K = 316SS	FBSPT	X	X	X	X	X
M = ALLOY C	FBSPT	X	X	X	X	X
N = ALLOY 20	FBSPT	X	X	X	X	X
U = 316SS	FLANGED	X	X	X	X	X
V = ALLOY C	FLANGED	X	X	X	X	X
W = ALLOY 20	FLANGED	X	X	X	X	X
POSITION 4 DRIVE GEAR MATERIAL						
A = 316 SS	X	X+	X+	X	X	
C = ALLOY C	X	X+	X+	X	X	
D = ALLOY 20	X	X+	X+			
POSITION 5 IDLER GEAR MATERIAL						
A = 316 SS	X	X+	X+	X	X	
C = ALLOY C	(2) X	X+	X+	X	X	
D = ALLOY 20	(2) X	X+	X+			
E = PEEK	X	X+	X+	X	X	
POSITION 6 WEAR PLATE MATERIAL						
K = Carbon	X	X	X	X	X	
T = TFE (Glass Filled)	X	X	X	X	X	
Z = Ceramic	(3) X	X	X	X	X	
E = Peek	X	X	X	X	X	
POSITION 7 SHAFT AND BEARING MATERIAL						
K = Standard Carbon	X	X	X	X	X	
L = Extended Life carbon	X	X	X	X	X	
C = Extended Life Carbon - "CW" Shafts (14)	X	X	X	X	X	
4 = Standard Carbon - Slotted					X	
POSITION 8 SEAL ARRANGEMENT						
	<u>G</u> 2 - 4	<u>GA/GC</u> 2 - 4	<u>G</u> 6	<u>GA/GC</u> 6	<u>GH</u> *6	<u>GA</u> 12
PACKING						
B = TFE Rings	X		X			
G = Grafoil Rings	X		X			
N = TFE Rings / Lantern	X		X		X	X
R = Grafoil / Lantern	X		X		X	X

+ MODEL REQUIRES OPTION "N" (Narrow Width Gears) IN POSITION 9.

* HIGHER PRESSURE MODEL

GEARCHEM PUMPS EXTENDED PRESSURE PRESSURES ABOVE 100 PSI

SIGNIFICANT MODEL NUMBER SYSTEM AND AVAILABILITY TABLE

(CONTINUED)

POSITION 8 SEAL ARRANGEMENT	$\frac{G}{2-4}$	$\frac{GA/GC}{2-4}$	$\frac{G}{6}$	$\frac{GA/GC}{6}$	$\frac{GH}{*6}$	$\frac{GA}{12}$
MECHANICAL SEALS (5)						
BELLOWS						
A - Single Seal: (13) Carbon Rotary / Viton Ceramic Seat / Viton		X		X		
C - Double Seal: (6,13) Carbon Rotary / Viton Ceramic Seat / Viton		X		X		
P - Single Seal: (13) Siliconized Rotary / EPR Silicon CBD Seat / TFE		X		X		
WEDGE						
E - Double Seal: (6) Carbon Rotary / TFE Silicon CBD Seat / TFE		X		X	X	X
Q - Single Seal: Teflon Rotary / TFE Silicon CBD Seat / TFE		X		X	X	
U - Single Seal: Carbon Rotary / TFE Silicon CBD Seat / TFE		X		X	X	X
24 - Single Seal: Carbon Rotary / TFE Metallic Seat / TFE						X
44 - Double Seal: (6) Carbon Rotary / TFE Metallic Seat / TFE						X

POSITION 9 OPTIONS PUMP SIZE	2	+4	+6	*6	12
A - Bearing Flush Ports	X	X	X	X	STD
B - PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins	X	X	X	X	X
C - Bearing Flush Ports PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins	X	X	X	X	
D - Bearing Flush Ports PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins Slotted Bearings (8)	X	X	X	X	
E - Bearing Flush Ports PFA Coated, SS Hsg O-Rings Metallic Bearing Lock Pins Slotted Bearings (8) Slotted Wear Plates (9)	X	X	X		
F - GC Series Only 63 Frame Metric Motors	X	X			
G - GC Series Only 71 Frame Metric Motors	X	X	X		
J - GA12 with 1' Idler Shaft (10) (Metallic Gear Only)					X
K - GC Series Only 80 Frame Metric Motors	X	X	X		
L - GC Series Only Large Coupling For 143T/182C/184C Frame Motors.	X	X	X		
M - GC Series Only 90 Frame Metric Motors				X	
N - Narrow Width Gears		REQ.	REQ.		
V - Center Hsg - Vent	X	X	X	X	X
X - Special (12)	X	X	X	X	X

+ MODEL REQUIRES OPTION 'N' (Narrow Width Gears) IN POSITION 9.
* HIGHER PRESSURE MODEL

GEARCHEM PUMPS PRESSURES TO 100 psi

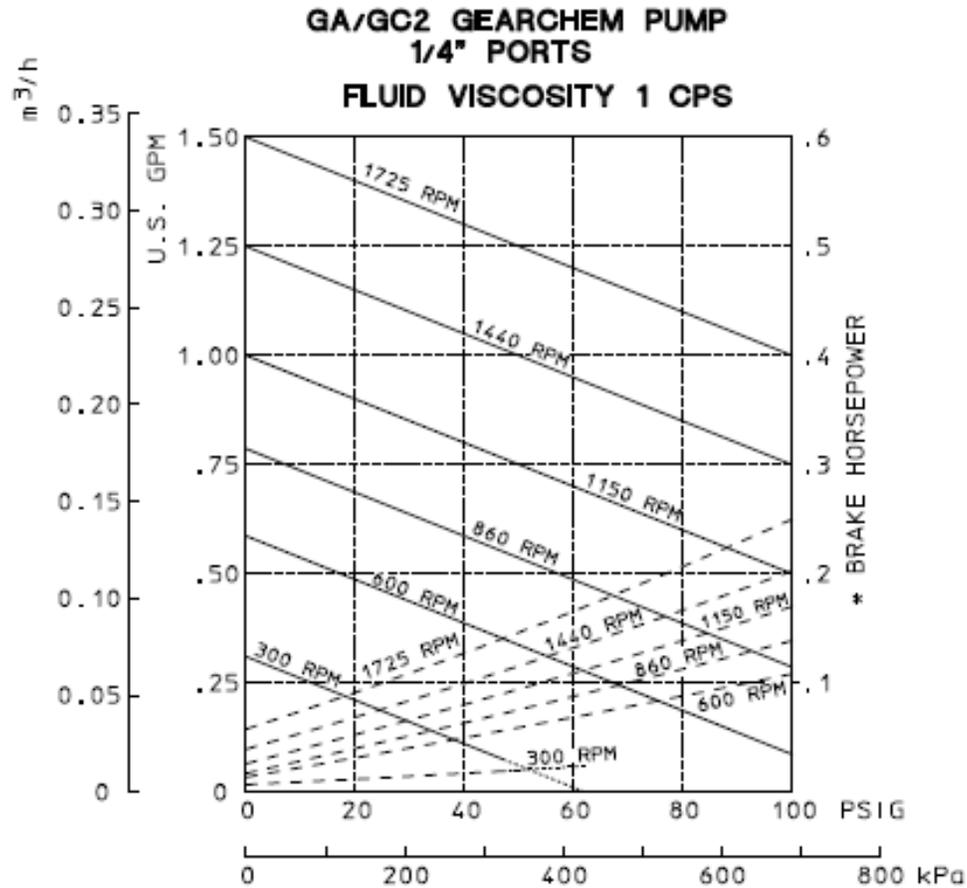
SIGNIFICANT MODEL NUMBER SYSTEM AND AVAILABILITY TABLE

1. Not applicable
2. Pumps with metallic drive and idler gears require minimum viscosity of 100 cPs and are limited to 1440 rpm maximum speed for G2-GH6 pumps and 1150 rpm for GA12 pumps.
3. Ceramic wear plates with metallic gears require minimum viscosity of 100 cPs.
4. Not applicable
5. Not applicable
6. Double mechanical seals must be pressurized with seal fluid 15 to 20 psig above the pump discharge pressure.
7. Standard GA12 pumps furnished with bearing flush ports, metallic bearing lock pins, and slotted wear plates.
8. Slotted bearings (GA12) listed POSITION 7.
9. Slotted wear plates reduce volumetric efficiency.
10. J OPTION available only with metal idler gear.
11. Not applicable
12. Consult Factory.
13. Position 8 options A, C and P seals are only available in 316SS.
14. "CW" means corrosion/wear shaft material.
15. External seals are limited to 50 psig.

COMMENTS

Specifications and availability are subject to change without notice.

15. PUMP PERFORMANCE CURVES

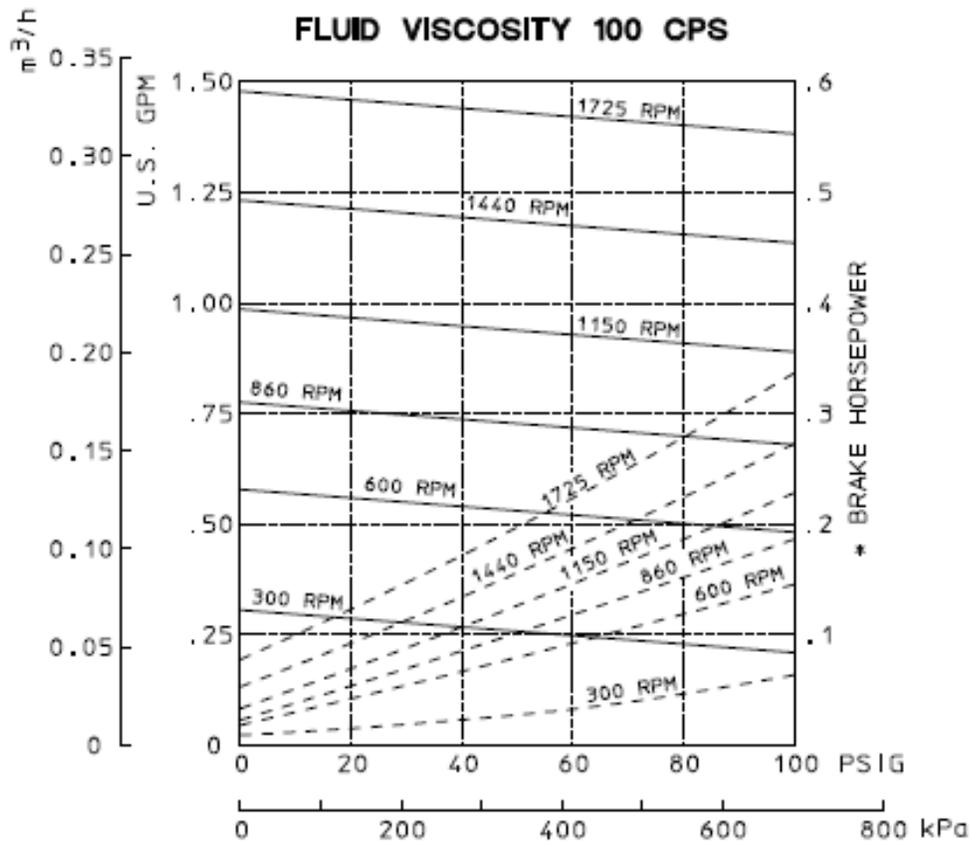


* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER A Division of EFC Corporation
PERFORMANCE CURVE GA / GC2	
DWN BY: PTP	AE00054-001
DATE: 02/11/98	

SECTION/PAGE	C/G2 / 2601
EFFECTIVE	08/15/13
SUPERSEDES	12/01/97
REF	REVISION UPDATE
DATE	08/15/13

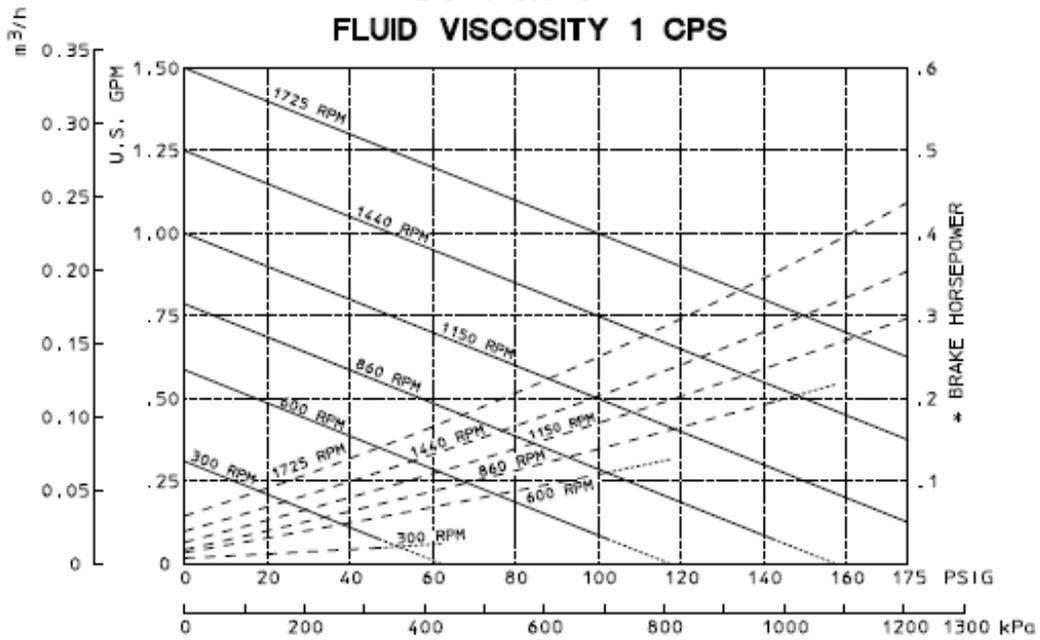
**GA/GC2 GEARCHEM PUMP
1/4" PORTS
FLUID VISCOSITY 100 CPS**



* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		SECTION/PAGE		C/G2 / 2402		ECO PULSAFEEDER A Unit of ECI Corporation	
		EFFECTIVE		08/15/13		PERFORMANCE CURVE GA / GC2	
REF		UPDATED DRAWING		08/15/13		DWN BY: PTP	
		REVISION UPDATE		DATE		DATE: 02/11/98	
		SUPERSEDES		12/01/97		AE00054-002	

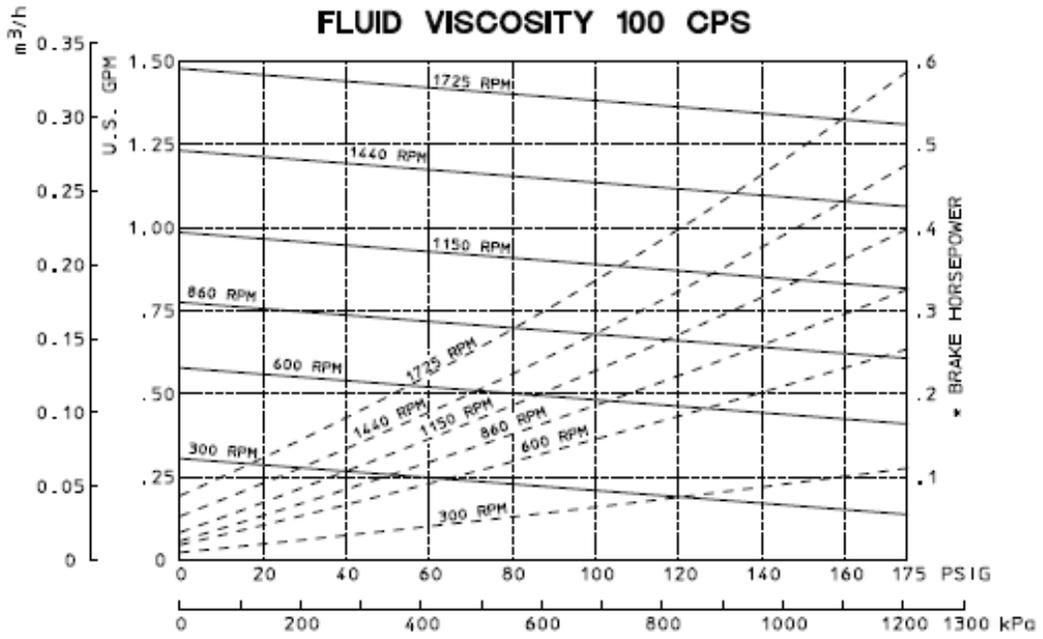
**GA/GC2 GEARCHEM PUMP
1/4" PORTS
FLUID VISCOSITY 1 CPS**



NOTES: 1. TFE GEARS AND BEARINGS LIMITED TO 100 PSIG
* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

▲	UPDATED DRAWING	08/15/13	SECTION/PAGE	C/G2 / 2603	ECO PULSAFEEDER <small>A Unit of TFX Corporation</small>	PERFORMANCE CURVE GA / GC2 EXTENDED PRESSURE
	REVISION UPDATE	DATE	EFFECTIVE	08/15/13		
REF			SUPSEDES	12/01/97	DATE: 02/11/98	AE00054-003

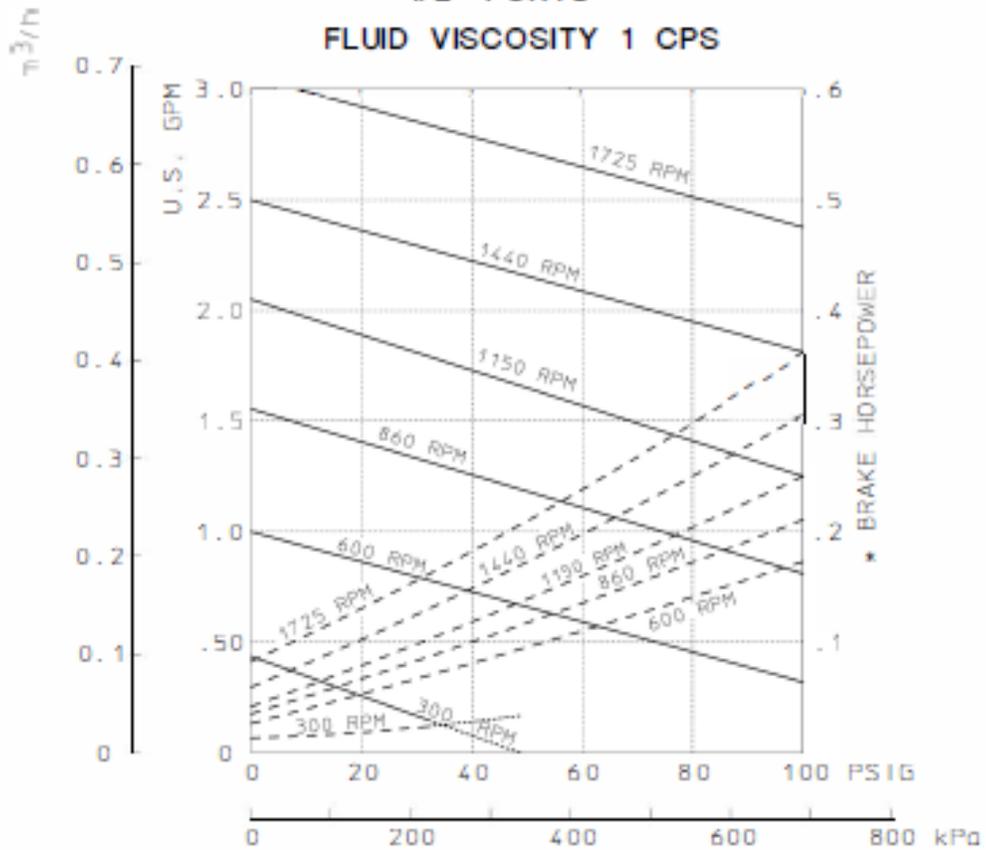
**GA/GC2 GEARCHEM PUMP
1/4" PORTS
FLUID VISCOSITY 100 CPS**



NOTES: 1. TFE GEARS AND BEARINGS LIMITED TO 100 PSIG
* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		SECTION/PAGE		C/G2 / 2604	
		EFFECTIVE		08/15/13	
▲	UPDATED DRAWING	08/15/13			
REF	REVISION UPDATE	DATE	SUPERSEDES	12/01/97	
				ECO PULSAFEEDER <small>A UNIT OF EDCI Corporation</small> PERFORMANCE CURVE GA / GC2 EXTENDED PRESSURE DWN BY: PTP DATE: 02/11/98 AE00054-004	

**GA/GC4 GEARCHEM PUMP
1/2" PORTS
FLUID VISCOSITY 1 CPS**

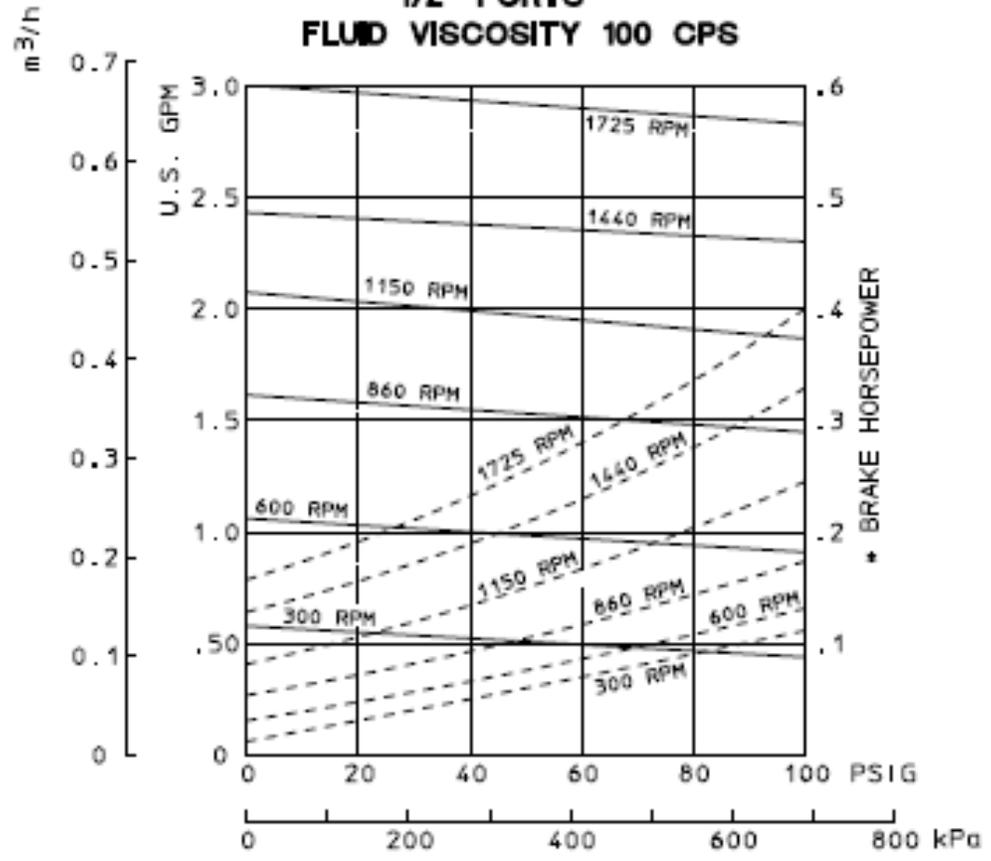


* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	APL SAFEFEDER <small>A Unit of EBC Corporation</small>
PERFORMANCE CURVE GA / GC4	
OWN BY: PTP	AE0005-001
DATE: 02/11/98	

SECTION/PAGE	C/D4 / 401	
EFFECTIVE	08/15/15	
SUPersedes	12/01/97	
Δ	UPDATED DRAWING	08/15/13
REF	REVISION UPDATE	DATE

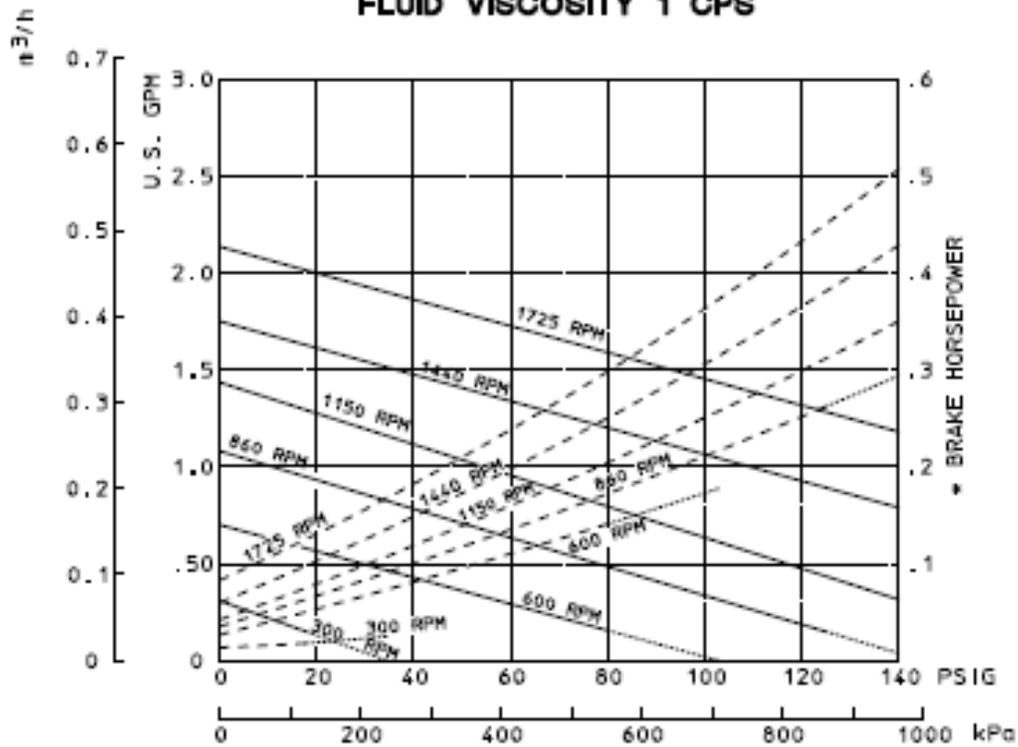
**GA/GC4 GEARCHEM PUMP
1/2" PORTS
FLUID VISCOSITY 100 CPS**



* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

				ECO	PULSAFEEDER <small>A Unit of DDC Technology</small>
				PERFORMANCE CURVE	
				GA / GC4	
SECTION/PAGE	C/G4 / 4602			DWN BY: PTP	AE00055-002
EFFECTIVE	08/15/12			DATE: 02/11/98	
REF	REVISION UPDATE	DATE	SUPPLIES		
		08/15/12	12/01/97		

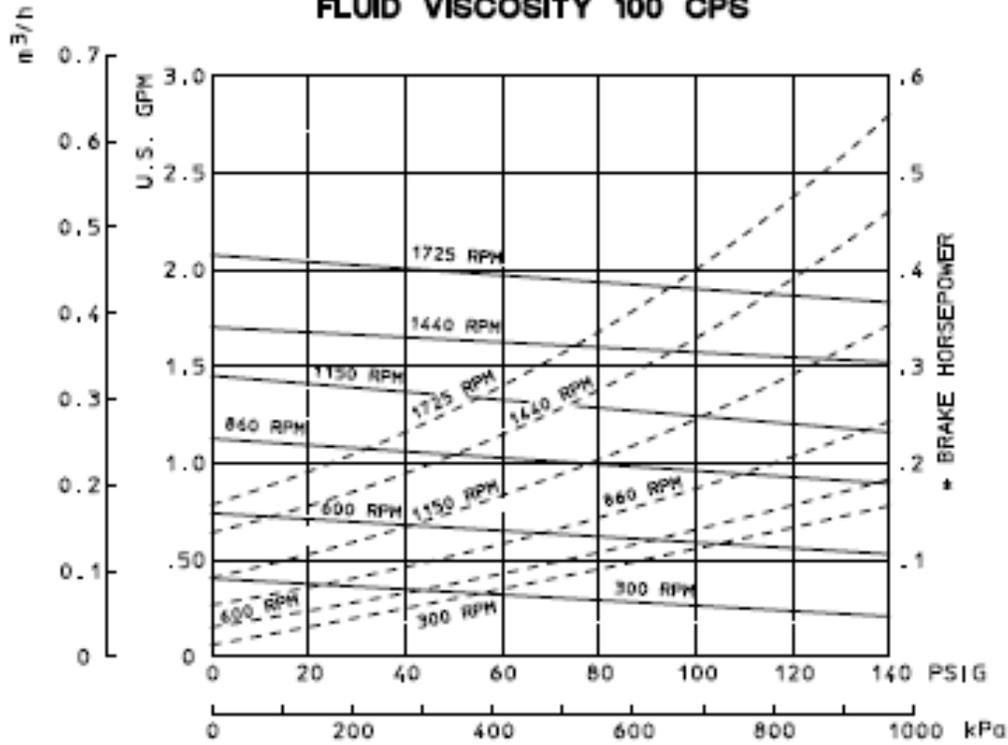
**GA/GC4 GEARCHEM PUMP
NARROW WIDTH GEARS
1/2" PORTS
FLUID VISCOSITY 1 CPS**



NOTES: 1. TFE GEARS AND BEARINGS LIMITED TO 100 PSIG
* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		SECTION/PAGE		7/04 / 4603		  A Unit of EPC Corporation
		EFFECTIVE		08/15/13		
▲	UPDATED DRAWING	08/15/13				PERFORMANCE CURVE GA / GC4 EXTENDED PRESSURE NARROW WIDTH GEARS
REF	REVISION UPDATE	DATE	SUPERSEDES	12/01/27		OWN BY: PTP DATE: 02/11/98 AE00055-003

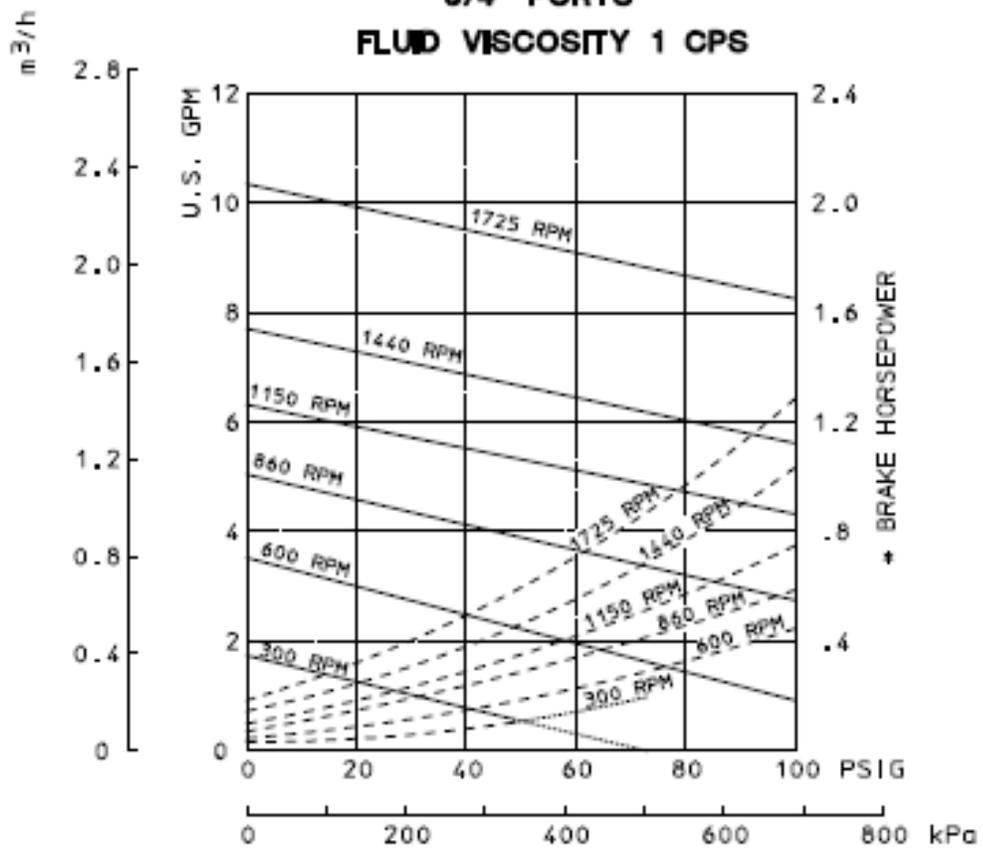
**GA/GC4 GEARCHEM PUMP
NARROW WIDTH GEARS
1/2" PORTS
FLUID VISCOSITY 100 CPS**



NOTES: 1. THE GEARS AND BEARINGS LIMITED TO 100 PSIG
 * BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		ECO PULSAFEEDER <small>A UNIT OF ECO Corporation</small>	
		PERFORMANCE CURVE GA / GC4 EXTENDED PRESSURE NARROW WIDTH GEARS	
	SECTION/PAGE	C / 54 / 4504	
▲	UPDATED DRAWING	08/13/13	EFFECTIVE
REF	REVISION UPDATE	DATE	08/13/13
		DATE	12/21/97
		DATE	02/11/98
			AE00055-004

**GA/GC6 GEARCHEM PUMP
3/4" PORTS
FLUID VISCOSITY 1 CPS**

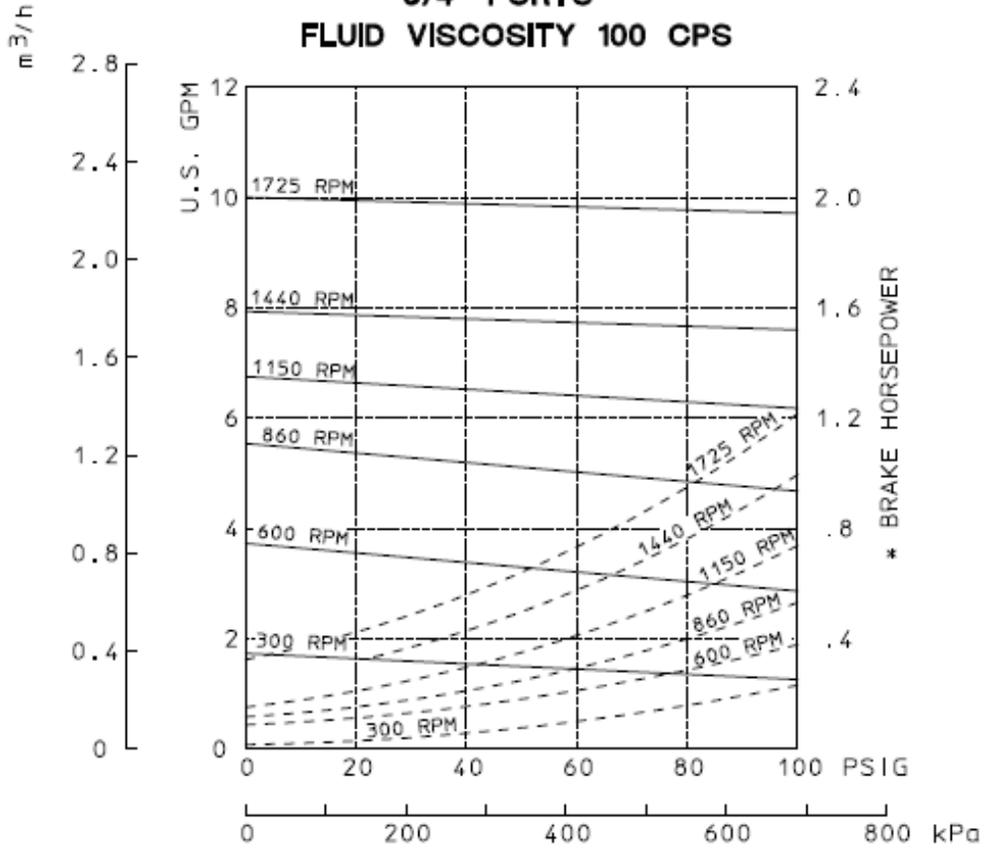


* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PERFORMANCE
PERFORMANCE CURVE GA / GC6	
SECTION/PAGE	C/06 / 6601
EFFECTIVE	08/16/13
SUPERSEDES	12/01/97
DWN BY: PTP	AE00056-001
DATE: 02/11/98	

updated drawing	08/16/13
REVISION UPDATE	DATE

**GA/GC6 GEARCHEM PUMP
3/4" PORTS
FLUID VISCOSITY 100 CPS**

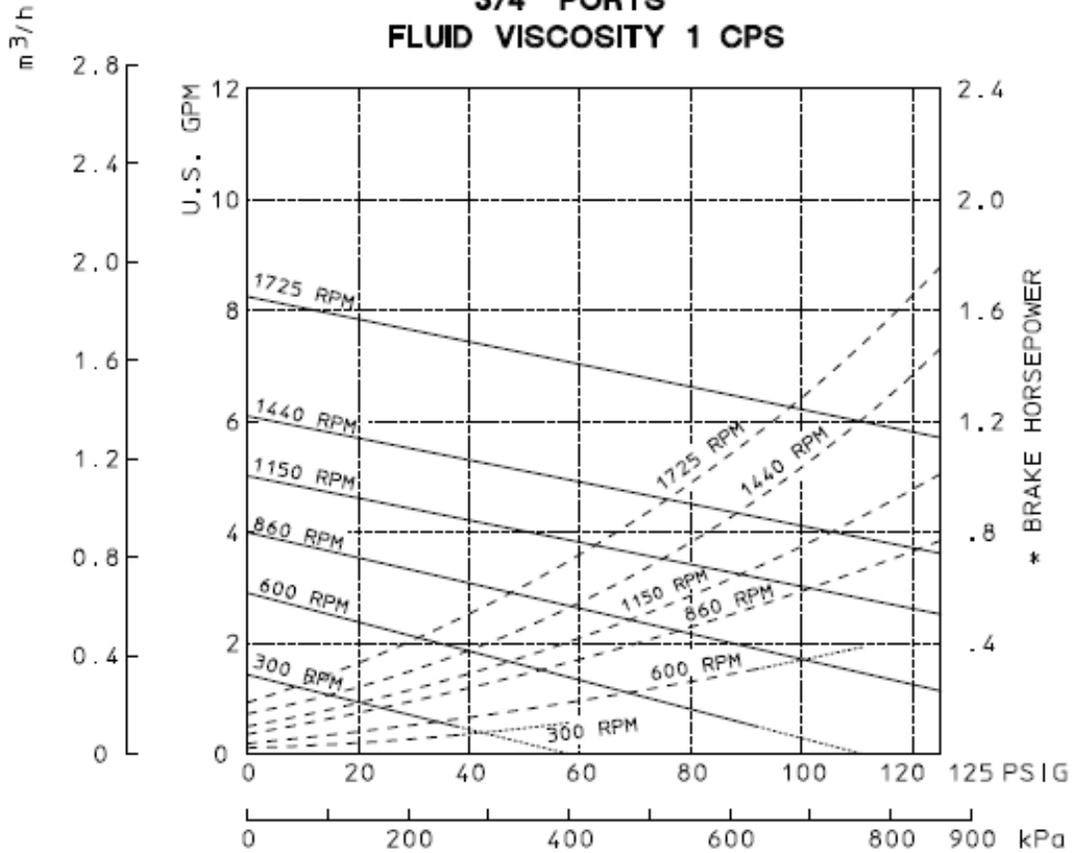


* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER A Unit of ECO Corporation
PERFORMANCE CURVE GA / GC6	
DWN BY: PTP	AE00056-002
DATE: 02/11/98	

SECTION/PAGE	C/G6 / 6602
EFFECTIVE	08/16/13
DATE	12/01/97
UPDATED DRAWING	08/16/13
REVISION UPDATE	DATE

**GA/GC6 GEARCHEM PUMP
(NARROW WIDTH GEARS)
3/4" PORTS
FLUID VISCOSITY 1 CPS**

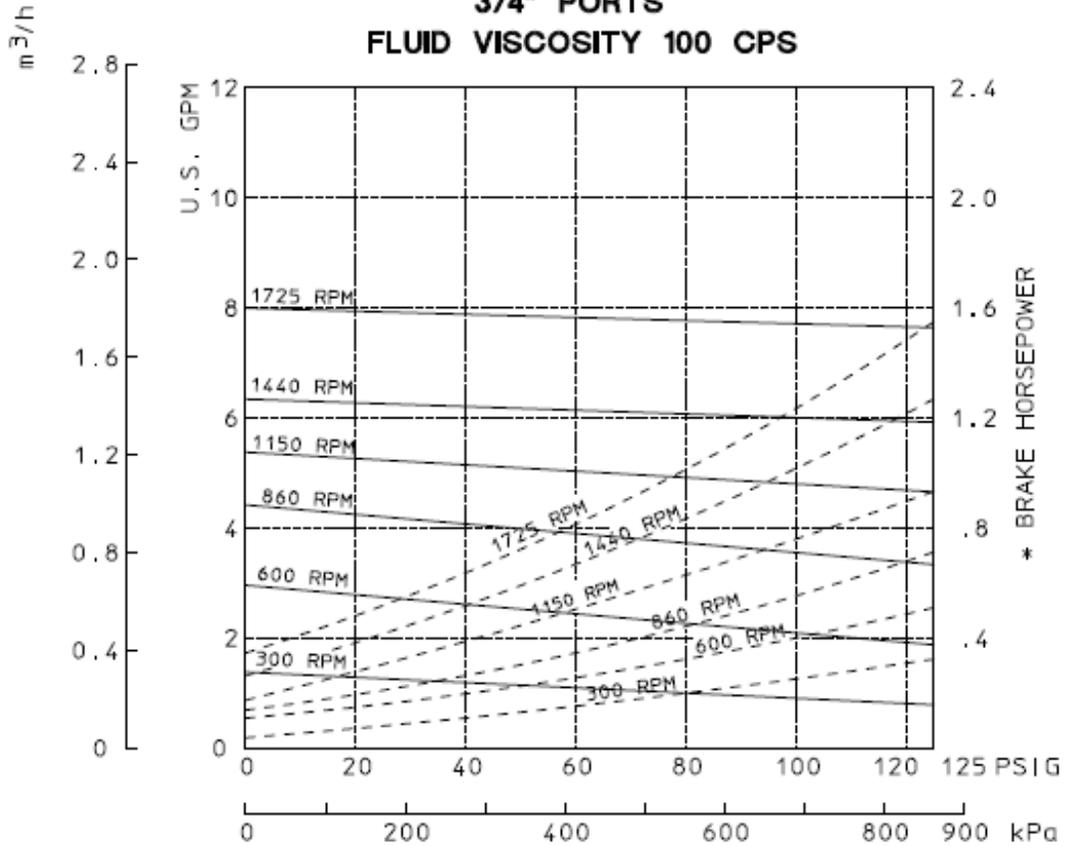


NOTES: 1. TFE GEARS AND BEARINGS LIMITED TO 100 PSIG

* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		ECO PULSAFEEDER <small>A Unit of ECK Corporation</small>	
		PERFORMANCE CURVE GA / GC6 EXTENDED PRESSURE NARROW WIDTH GEARS	
		DWN BY: PTP DATE: 02/11/98	
		AE00056-003	
		SECTION/PAGE	C/G6 / 6603
		EFFECTIVE	08/16/13
REF	UPDATED DRAWING	DATE	08/16/13
	REVISION UPDATE	DATE	05/26/99
		SUPERSEDES	

**GA/GC6 GEARCHEM PUMP
(NARROW WIDTH GEARS)
3/4" PORTS
FLUID VISCOSITY 100 CPS**

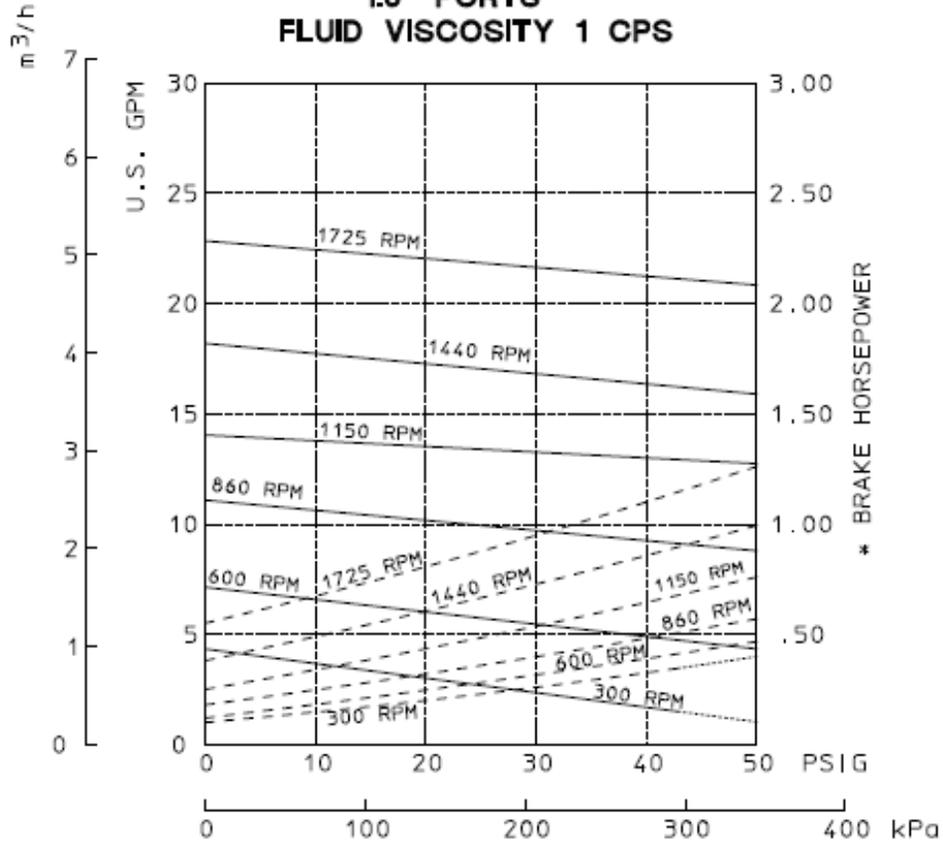


NOTES: 1. TFE GEARS AND BEARINGS LIMITED TO 100 PSIG

* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		ECO		PULSAFEEDER <small>A Unit of ECO Corporation</small>	
		PERFORMANCE CURVE GA / GC6 EXTENDED PRESSURE NARROW WIDTH GEARS			
				DWN BY: PTP	
				DATE: 02/11/98	
		AE00056-004			
		SECTION/PAGE		C/66 / 6604	
		EFFECTIVE		08/16/13	
REF		DATE		05/26/99	
UPDATED DRAWING		08/16/13			
REVISION UPDATE		DATE			

**GA/GC8 GEARCHEM PUMP
1.0" PORTS
FLUID VISCOSITY 1 CPS**

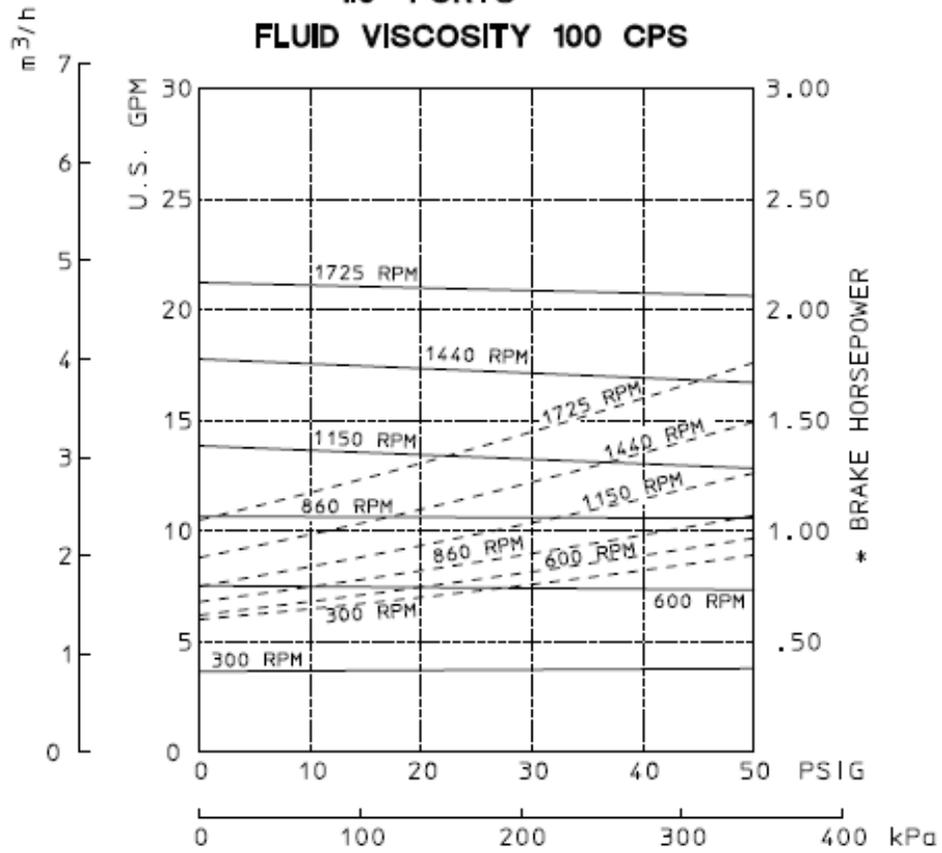


* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER A Unit of ECI Corporation
PERFORMANCE CURVE GA / GC8	
DWN BY: PTP	AE00058-001
DATE: 02/11/98	

SECTION/PAGE	C/G8 / 8601
EFFECTIVE	08/16/13
DATE	12/01/97
SUPERSEDES	
UPDATED DRAWING	08/16/13
REVISION UPDATE	DATE

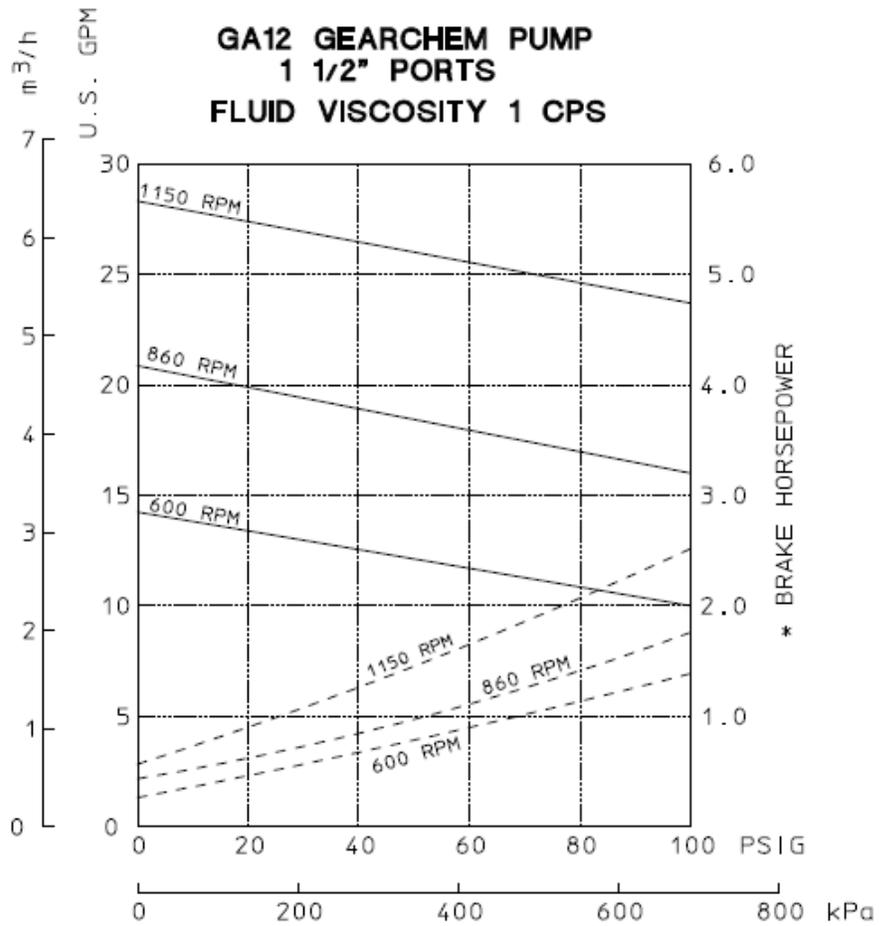
**GA/GC8 GEARCHEM PUMP
1.0" PORTS
FLUID VISCOSITY 100 CPS**



* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

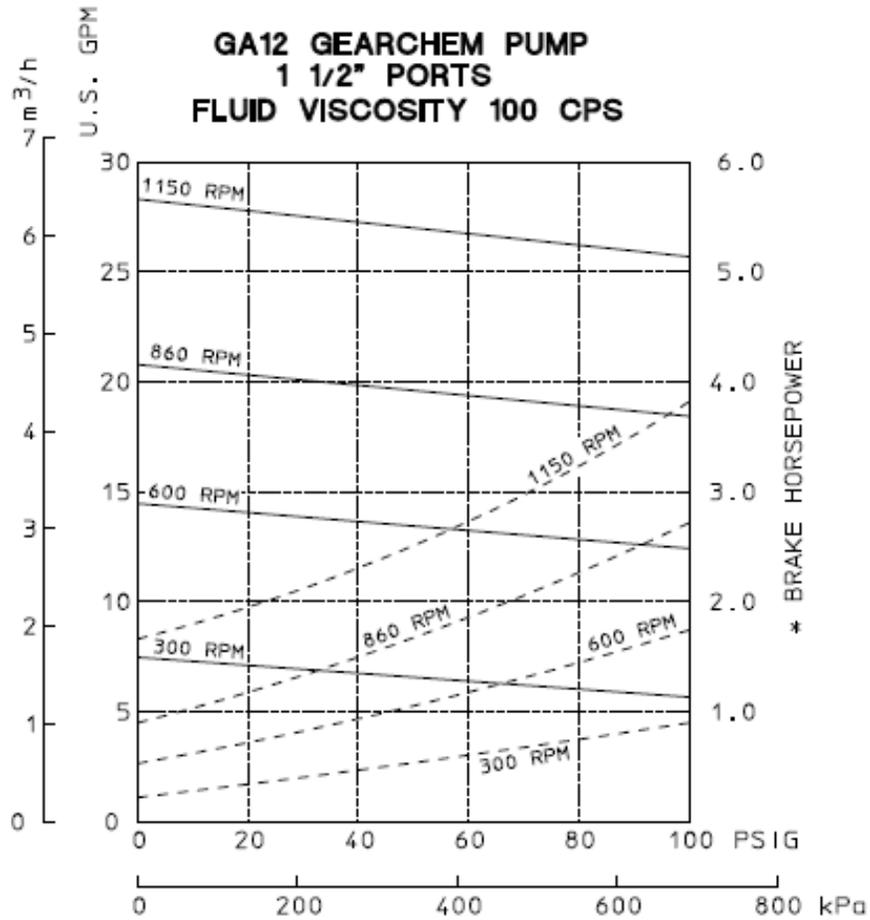
ECO	PULSAFEEDER A Unit of EDI Corporation
PERFORMANCE CURVE GA / GC8	
DWN BY: PTP	AE00058-002
DATE: 02/11/98	

	SECTION/PAGE	C/G8 / 8602
	EFFECTIVE	08/16/13
REF	UPDATED DRAWING	08/16/13
	REVISION UPDATE	DATE
	SUPERSEDES	12/01/97



* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		 <small>A Unit of IDEX Corporation</small>		PERFORMANCE CURVE GA12	
				DWN BY: PTP	
SECTION/PAGE	C/G12/ 12601	EFFECTIVE		DATE: 02/11/98	
UPDATE DRAWING	09/22/09	SUPERSEDES		05/20/08	
REV	REVISION UPDATE	DATE			

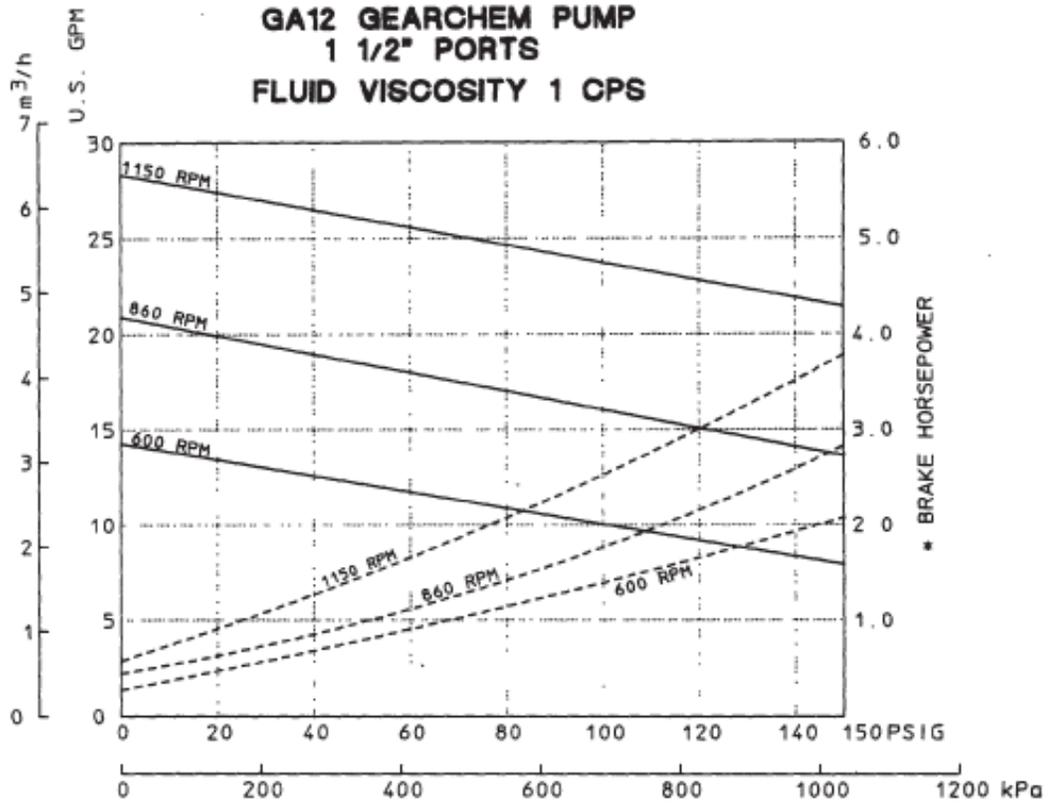


* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER A Unit of EPC Corporation
PERFORMANCE CURVE GA12	
DWN BY: PTP	AE00060-002
DATE: 02/11/98	

SECTION/PAGE	C/G12/ 12602
EFFECTIVE	09/22/09
SUPERSEDES	05/20/08
UPDATE DRAWING	09/22/09
REVISION UPDATE	DATE

**GA12 GEARCHEM PUMP
1 1/2" PORTS
FLUID VISCOSITY 1 CPS**

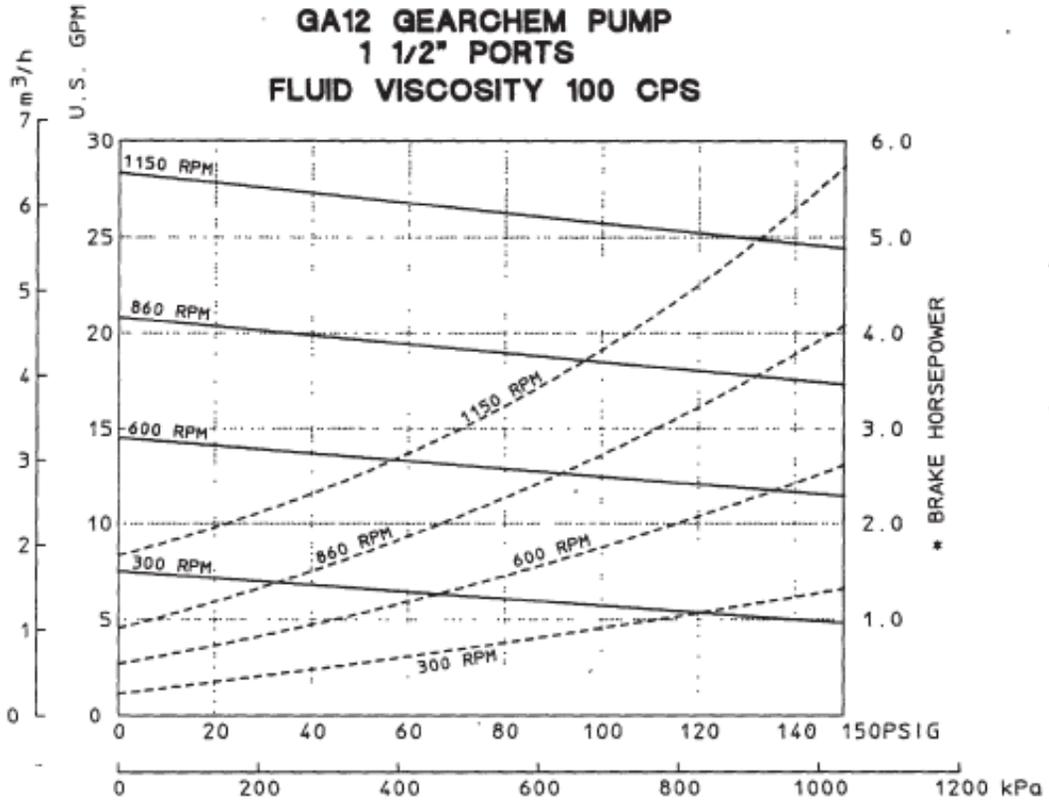


NOTES: 1. TFE GEARS AND BEARINGS LIMITED TO 100 PSIG

* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

		ECO		PULSAFEEDER A Unit of B&B Corporation	
		PERFORMANCE CURVE GA12 EXTENDED PRESSURE			
		SECTION/PAGE C/G12/ 12603		OWN BY: PTP	
		EFFECTIVE 12/01/97		DATE: 02/11/98	
		SUPERSEDES NEW		AE00060-003	
REF	REVISION UPDATE	DATE			

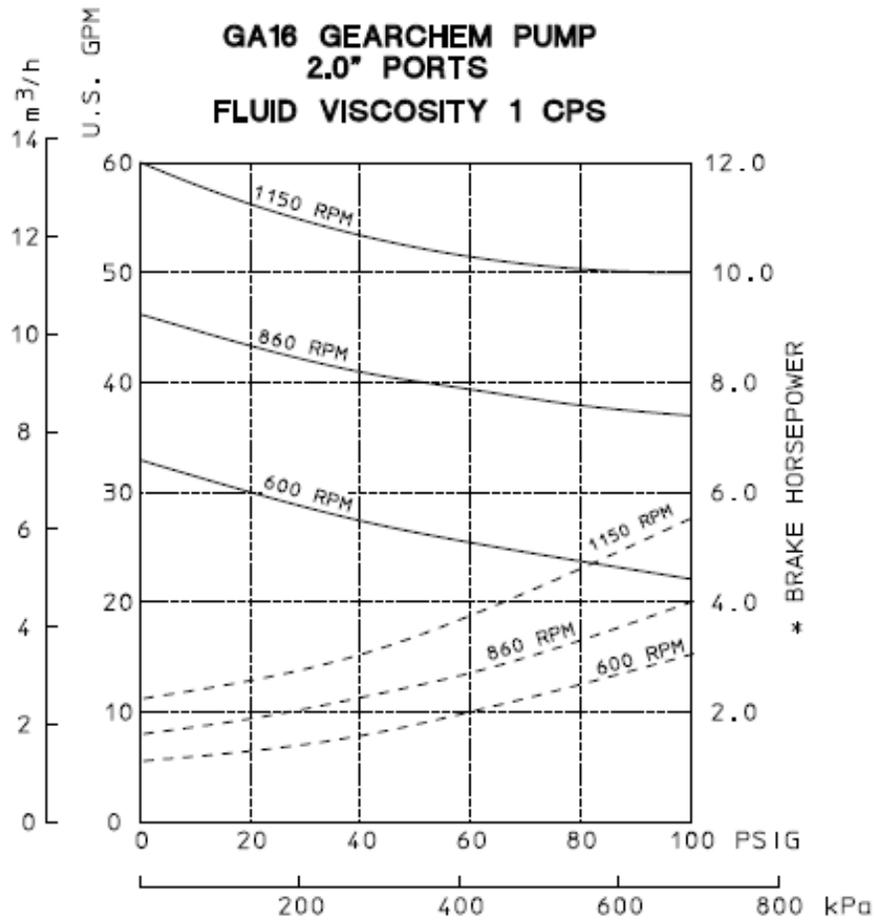
**GA12 GEARCHEM PUMP
1 1/2" PORTS
FLUID VISCOSITY 100 CPS**



NOTES: 1. TFE GEARS AND BEARINGS LIMITED TO 100 PSIG

* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

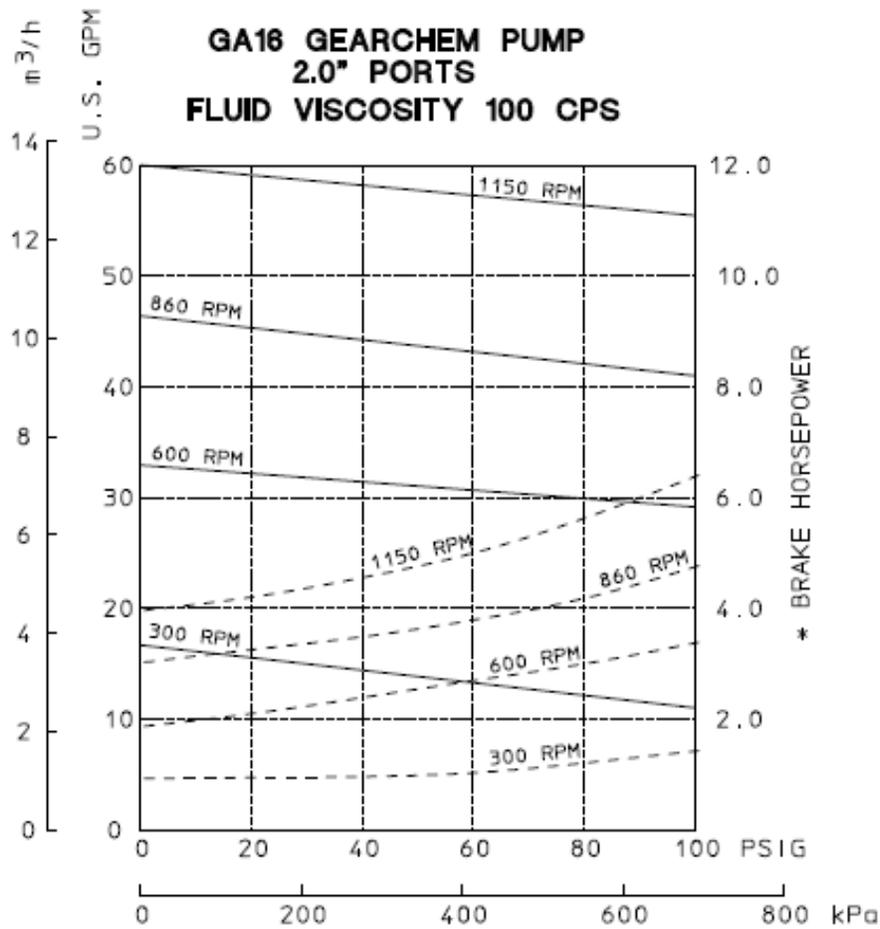
		ECO		PULSAFEEDER A Unit of B&B Corporation	
		PERFORMANCE CURVE GA12 EXTENDED PRESSURE			
		SECTION/PAGE C/G12/ 12694		DWN BY: PTP	
		EFFECTIVE 12/01/97		DATE: 02/11/98	
		SUPERSEDES NEW		AE00060-004	
REF	REVISION UPDATE	DATE			



* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER <small>A Unit of ERI Corporation</small>
PERFORMANCE CURVE GA16	
DWN BY: PTP	AE00061-001
DATE: 02/11/98	

SECTION/PAGE	C/G16/ 16298
EFFECTIVE	09/22/09
SUPERSEDES	06/12/08
UPDATE DRAWING	09/22/09
REVISION UPDATE	DATE



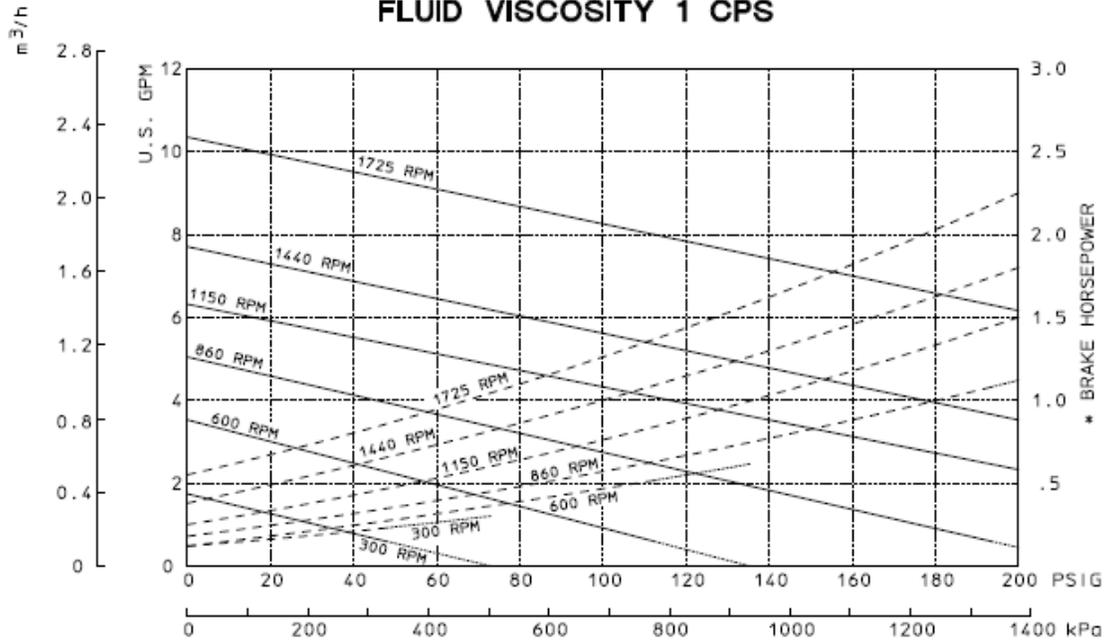
* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER A Unit of EDC Corporation
PERFORMANCE CURVE GA16	
OWN BY: PTP	AE00061-002
DATE: 02/11/98	

SECTION/PAGE	C/G16/ 16299
EFFECTIVE	09/22/09
DATE	09/22/09
SUPERSEDES	06/12/08

UPDATE DRAWING	09/22/09
REVISION UPDATE	DATE

**GH6 GEARCHEM PUMP
3/4" PORTS
FLUID VISCOSITY 1 CPS**

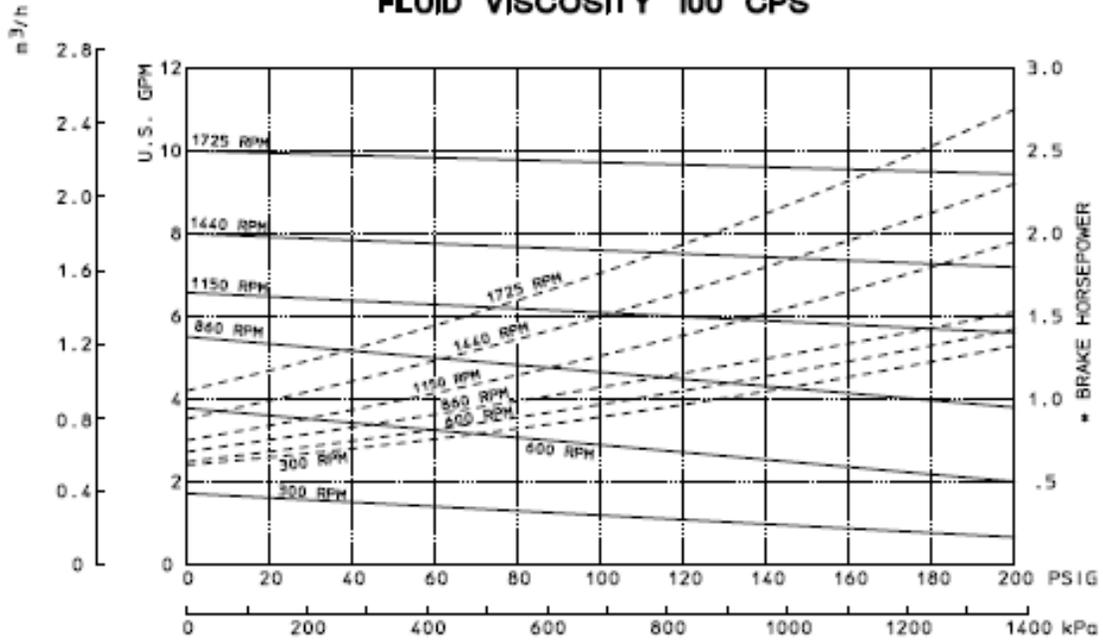


NOTES: 1. TFE BEARINGS LIMITED TO 150 PSIG

* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

REF	REVISION UPDATE	DATE	SECTION/PAGE	C/GH6/ 6612	ECO PULSAFEEDER <small>A Unit of IDEX Corporation</small> PERFORMANCE CURVE GH6 EXTENDED PRESSURE	DWN BY: PTP	AE00057-003
			EFFECTIVE	12/01/97			
			SUPERSEDES	NEW			

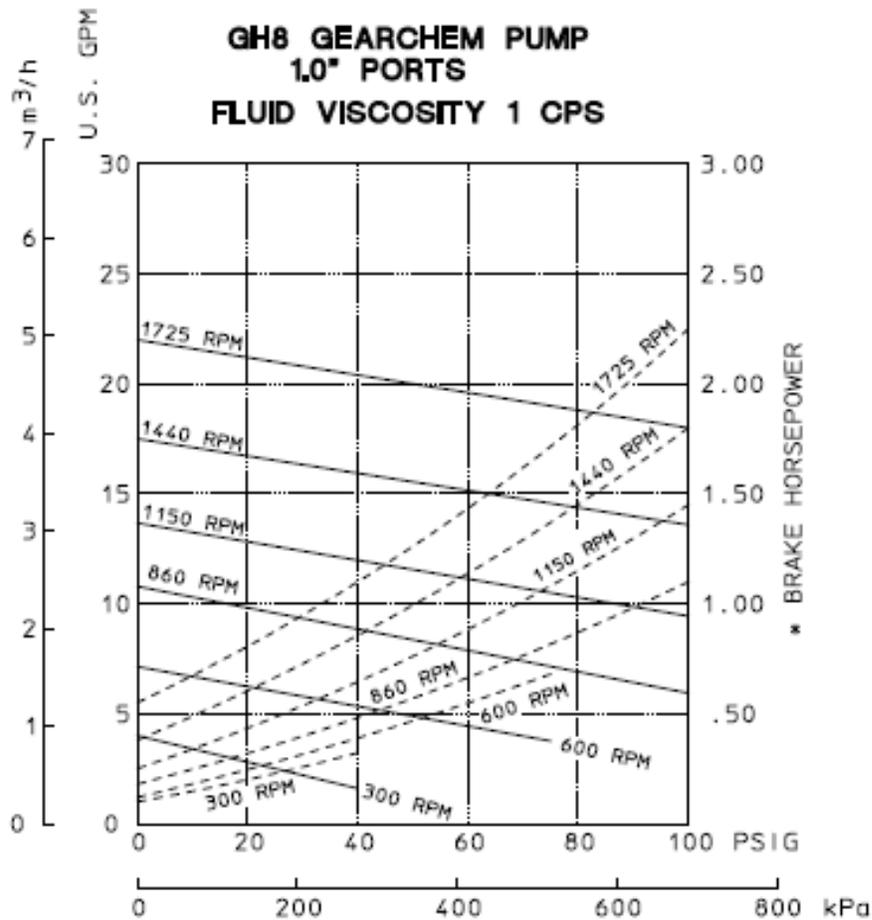
**GH6 GEARCHEM PUMP
3/4" PORTS
FLUID VISCOSITY 100 CPS**



NOTES: 1. TFE BEARINGS LIMITED TO 150 PSIG

* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

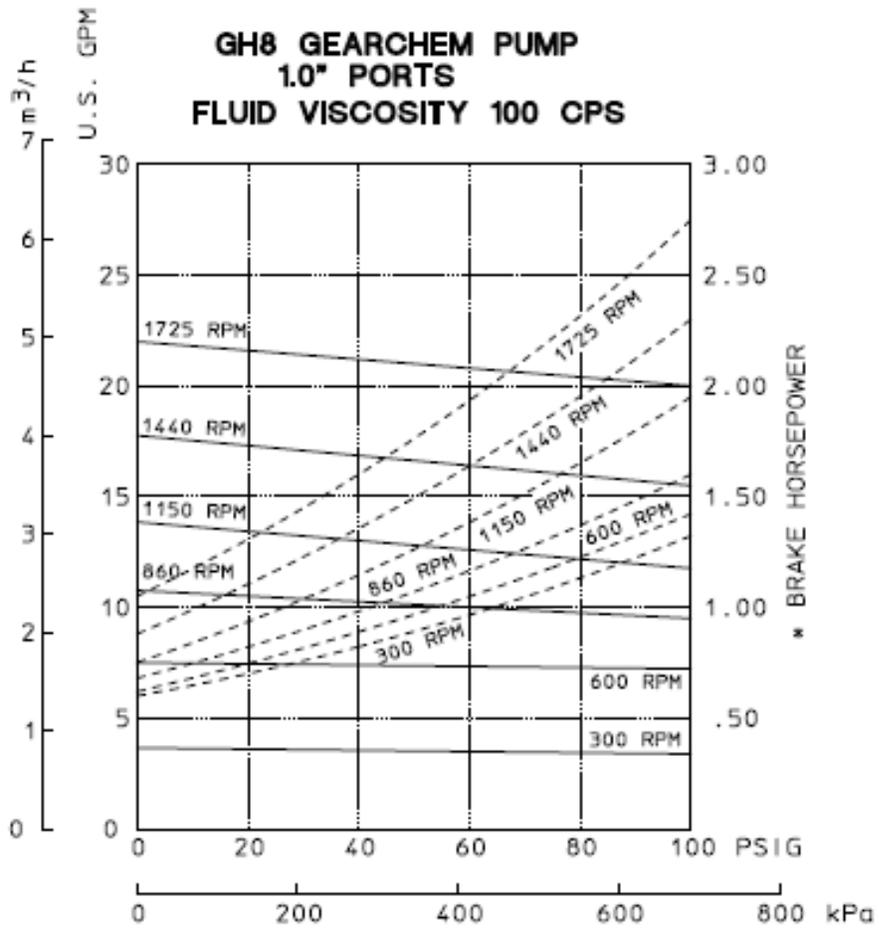
REF	REVISION UPDATE	DATE	SECTION/PAGE	I/GH6/ 6613	ECO PULSAFEEDER <small>A Unit of ECK Corporation</small> PERFORMANCE CURVE GH6 EXTENDED PRESSURE	DWN BY: PTP	AE00057-004
			EFFECTIVE	12/01/97			
			SUPERSEDES	NEW			



* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER A Unit of ECK Corporation
PERFORMANCE CURVE GH8	
DWN BY: PTP	AE00059-001
DATE: 02/11/98	

SECTION/PAGE	C/GH8/ 8610
EFFECTIVE	12/01/97
SUPERSEDES	08/15/94
REF	REVISION UPDATE
	DATE



* BRAKE HORSEPOWER SHOWN AS DASHED CURVES

ECO	PULSAFEEDER <small>A Unit of ECK Corporation</small>
PERFORMANCE CURVE GH8	
DWN BY: PTP	AE00059-002
DATE: 02/11/98	

SECTION/PAGE	I/GH8/ 8611
EFFECTIVE	12/01/97
SUPERSEDES	08/15/94

REF	REVISION UPDATE	DATE
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