Isochem®

Model GMC1

Low Flow Magnetically Driven Sealless Gear Pump

Installation Operation Maintenance Instruction Manual

Bulletin No. GMC1-IOM-02 Rev. 1

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Manufactures of Quality Pumps, Controls and Systems

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Change History

Rev #	Date	Author	Section	Nature of Change
0	10/31/2001	FS/NV	Manual	NEW
		pp	Drawings	NEW
1	11/19/2003	MRG	Drawings	Std of set screws & cplg, remove opts “T” & “E”

Conventions

For the remainder of this bulletin, the following Conventions are in effect.



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.



Tips have been included within this bulletin to help the operator run the equipment in the most efficient manner possible. These “Tips” are drawn from the knowledge and experience of our staff engineers, and input from the field.



This is a procedure heading. A Procedure Heading indicates the starting point for a procedure within a specific section of this manual.

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1. INTRODUCTION

Isochem Model GMC1 gear pumps employ magnetically driven seal-less technology that eliminates the need for a rotary mechanical seal and enables the pump to safely handle hazardous fluids with zero leakage.

Isochem Model GMC1 gear pumps mount to standard foot mounted NEMA 42C, 48C and 56C motors and IEC 63 and 71 B14 flanged motors. This enables the pumps to be close coupled, which provides greater assembled strength, complete isolated enclosure of all moving parts, and compact design. This also eliminates the need for special base plate mounting, shaft couplings and guards, complicated drives, and pump bearing lubrication and maintenance, while minimizing plant real estate for optimum pump installation.

All Isochem Model GMC1 gear pumps transmit rotational torque from the motor shaft to the pump shaft by means of a magnetic drive coupling. The principle of operation of the magnetic drive coupling is that an encapsulated driven magnet assembly is mounted on the end of the pump shaft. It is then contained by a closed end containment shell or "containment can" which seals against the pump front housing with a static PTFE 0-ring. Then a drive magnet assembly attached to an electric motor shaft rotates around the containment can. When the drive magnet assembly rotates, lines of magnetic flux or force cause the driven magnet assembly to rotate which in turn causes the pump shaft to rotate.

The magnetic drive couplings for all Isochem Series are designed for satisfactory operation of the pump. The magnetic couplings have an integral safety feature that allows them to "decouple" if the coupling torque limit is exceeded. This situation might occur if foreign material were to jam the pump gears or if unusually high torque was developed on pump start-up. Isochem pumps use permanent rare earth Samarium Cobalt magnets that can run decoupled without losing their magnetic strength provided magnet temperatures do not exceed 450^0F (232^0C).



If the pump is allowed to run for an extended period of time decoupled, high temperatures could be generated through opposing magnetic forces that ultimately would cause the loss of magnetic strength.

Isochem Model GMC1 gear pumps feature continuous operation over wide temperature and pressure variations, constant volume pulsation free flow, the ability to handle wide viscosity variations, and ease of inspection and maintenance.

To achieve successful operation and maximum life from your pump, make sure that the pump selection and materials are compatible with the service and operating conditions of your application. The pump model number specifies the pump materials of construction and other details. This, along with the "Significant Model Numbering System and Selection Table" will fully describe the components of the pump.

2. EQUIPMENT INSPECTION

2.1 Check all equipment for completeness and accuracy against the order and for any evidence of shipping damage. Shortages or damage should be reported immediately to the freight carrier and to your Isochem representative.

2.2 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.

2.3 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 Isochem order be kept with this manual as well as a written record of the pump model and serial number, which is on the nametag attached to the pump. Pump records can be recorded in the form supplied in Appendix H of this manual.

3. INSTALLATION

3.1 Pump installation site should provide easy access for routine maintenance and where possible to protect the pump from environmental elements and from leaks or drips from nearby process equipment. See FIGURE 1 for typical installation diagram.

3.2 Bolt the pump motor down firmly to mounting surface. Provide for air movement and circulation over electric motor to enhance proper cooling.

3.3.1 While looking at the pump from the magnetic drive end, the suction port is to the right when the pump drive shaft rotates clockwise and is located below the ports. Reversing drive shaft rotation reverses flow and thus suction and discharge ports. Verify proper motor rotation before final piping is established.

3.4 Installation of vacuum or pressure gauges in the suction and discharge piping is recommended to properly monitor system operation.

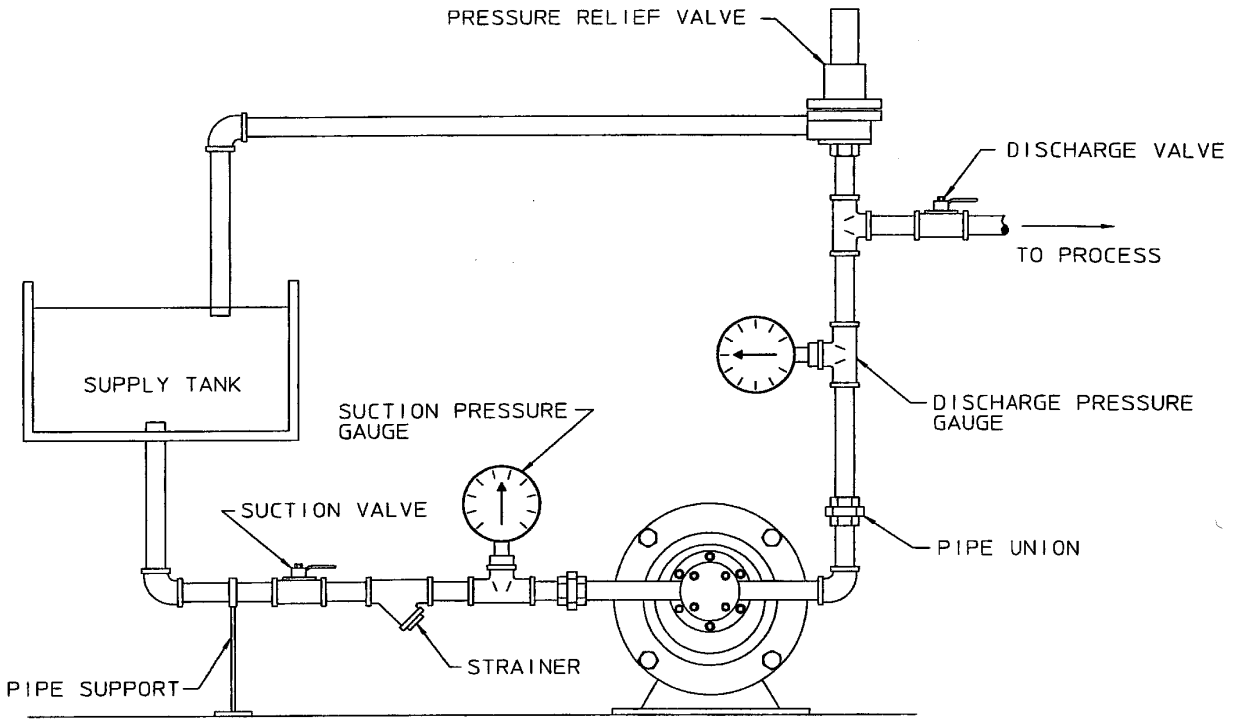
3.5 Keep suction piping system short and straight to minimize friction loss to the pump. Make sure that the pump will not run dry. Flooded suction or gravity fed fluid to pump inlet is generally preferred.

3.6 Use only full-bore ball valves or gate valves in the suction piping. If suction strainers are used, size them to minimize pressure drop and select those of a type that are easily cleaned and maintained.

3.7 Arrange all suction piping and fittings to prevent formation of air pockets. Make sure all joints are airtight.

3.8 Flush and blow out all suction lines prior to mating to pump. Use nipples and unions, for ease of maintenance.

3.9 Do not force, bend, or spring either suction or discharge piping when mating up to the pump. Use supports or hangers at intervals as required in an effort to compensate for piping strain due to vector forces and bending moments. When necessary, install thermal expansion joints or accessories so minimal piping strain is placed upon the pump.



TYPICAL PUMP INSTALLATION
FIG. 1

3.10 Check all bolts and nuts for tightness. Correct any conditions that could cause destructive vibration or leakage.

3.11 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.

3.12 If flexible suction lines are used, be sure their selection and installation will prevent wall collapse and thus a starved suction condition.

3.13 When taking suction from a tank or vessel, avoid entry of sludge or solids into suction line by placing suction line inlet above maximum expected level of solids.

3.14 Discharge line should be fitted with properly sized pressure relief valve to protect both pump and discharge system. Pressure relief valve outlet should be piped back to the supply tank.

3.15 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 cavitation. If it is absolutely necessary to pipe by-pass back to the pump suction line, the point of entry should be at least one foot away from the suction inlet. Provision for cooling should be made in the event of excessive heat buildup through fluid recirculation cavitation.

3.16 Where pumped fluids may solidify, crystallize, or precipitate, provisions should be made to thoroughly flush pump and piping prior to periods of shutdown. Pay particular attention to proper flushing and draining of the magnetic coupling area because this area will not self drain.

4. OPERATION

4.1 Prior to operation, make sure all suction piping is air tight and clean. Check that electrical service to motor agrees with nameplate ratings. Jog the motor to check rotation and for signs of binding. To check rotation, observe the motor fan. Rewire motor if necessary.

4.2 Isochem Model GMC1 gear pumps are designed to handle clear fluids at viscosities up to 1000 cps.

- No magnetically coupled pumps should be run dry since non-cooled eddy currents cause significant temperature increase and permanent magnet damage.

- No gear pump should be run dry. Damage to wear surfaces will result.

- Pumping fluids containing abrasives should be avoided, as accelerated pump wear will result.

4.3 It is recommended that pumps with metallic drive and idler gears not be run with fluids having a viscosity less than 500 SSU (100 CPS).

4.4 The pump will self prime if fluid is supplied at the pump inlet. If foot valves are used, the valve should be of the flapper type and sized to minimize friction loss.

4.5 If the pump operates near the boiling point of the pumpage, a recirculation loop can be set up between the discharge and suction connections with provisions for flow control in the recirculation loop.

4.6 Do not operate the pump against a closed discharge. Doing so will cause the magnetic drive to decouple. High temperatures will then be created which can cause the fluid to boil or damage the magnet assemblies, as excessive heat will cause thermal expansion of internal pump components. If decoupling occurs, stop the motor and restart after the obstruction has been cleared. As a safety precaution, a pressure relief valve by-pass system is highly recommended. Ideally, the pressure relief valve is set for a low pressure at start-up.

4.7 Start pump with discharge and suction valves open and check for proper operation. Excessive noise or vibration is an indication of harmful cavitation, which may be due to insufficient NPSH (Net Positive Suction Head).

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. For motor maintenance instructions consult the motor manufacturer.



Before performing any maintenance requiring pump disassembly, be sure to flush and drain pump/magnetic drive thoroughly with a neutralizing fluid. Wear protective clothing and handle equipment with proper care.

5.1 When changing a pump from one service to another, be sure to check that all wetted parts of the pump are compatible with the fluid to be handled and that the motor is sufficiently sized for the application. If in doubt contact your Isochem representative for assistance.

All Isochem Model GMC1 gear pumps transmit rotational torque from the motor shaft to the pump shaft by means of a magnetic drive coupling. The principle of operation of the magnetic drive coupling is that an encapsulated driven magnet assembly is mounted on the end of the pump shaft. It is then contained by a closed end containment shell or "can" which seals against the pump front housing with a static PTFE 0-ring. Then, a drive magnet assembly attached to an electric motor shaft rotates around the containment can. When the drive magnet assembly rotates, lines of magnetic flux or force cause the driven magnet assembly to rotate which in turn causes the pump shaft to rotate.



All magnetic drive couplings have a specific maximum torque limit. If this torque is exceeded the drive will decouple. Operation in the decoupled mode should be avoided as high temperatures could be generated.

Whenever gear pumps exhibit reduced flow rates, inability to maintain pressures, noisy or otherwise abnormal operation, first refer to the troubleshooting section at the end of this manual. If the problem cannot be resolved the pump must be inspected for wear or damage. Isochem Model GMC1 gear pumps can be easily opened for cleaning and inspection without disturbing piping connections by removing the pump front housing cover.

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



Carbon bearing/wear plate assemblies must be used when temporary dry run or closed discharge operation is anticipated.

5.3 RECOMMENDED SPARES

KOPkits – The basic Isochem Model GMC1 gear pump KOPkit consists of the following parts, which are recommended as typical spare parts:

- Drive Gear and Shaft Assembly
- Idler Gear and Shaft Assembly
- Bearing/Wear Plate Assemblies
- Housing O-Rings
- Can O-Ring

A KOPkit is completely identified by placing a letter "K" before the pump significant model number and deleting the hyphens. Example: A KOPkit for a GMC1-ACC-QQF pump would be designated as KGMC1ACCQQF.

5.3.1 General maintenance precautions to observe are:

- Non-magnetic tools and non-magnetic work surfaces are recommended to perform any disassembly or maintenance of the pump.

- Do not wear a wristwatch in the vicinity of the drive or driven magnets, wristwatches may be damaged by the transmission of magnetic flux.

- Do not allow credit cards, security badges, or magnetic strips to be in the vicinity of the pump magnets since the information stored on the magnetic strips could be erased pump magnetic flux transmitted by the pump magnets.

- Take precautions in handling pump magnets if you have prosthetic devices or other metal inserts installed in your body. Consult your physician for guidance in handling magnets.

- Drain and flush pump and magnetic drive before any pump disassembly.

- The exposed magnets on the drive magnet assembly are very fragile and will chip easily. Use extreme care in handling them.

- Take care to avoid magnetic particles or objects from attaching themselves to the drive magnets. It is difficult to remove small particles, and larger objects could be attracted with enough force to break the magnets.

- Be careful during disassembly and reassembly of the drive and driven magnet assemblies. The magnetic attraction forces are high, and when the magnets come close together there is a strong tendency to snap together suddenly, potentially causing injury to fingers or flesh.



Do not machine the magnets or magnet carriers in the drive or driven magnet assemblies. The magnetic dust that would be produced is highly flammable.

5.3.2 The significant model number stamped on the pump nameplate identifies the pump type and other details. Refer to the significant model number chart if you are unsure of exactly what type of pump you have.

5.3.3 Always refer to the full model and serial number in any correspondence with your Isochem representative. Drawings and consolidated bill of materials for each Isochem pump is included in this manual. Recommended spare parts are identified on the consolidated bill of materials.

5.4 Disassembly Instructions:

5.4.1 Close all suction and discharge valves.

5.4.2 Disconnect power source to the motor.

5.4.3 Flush and drain pump. Then remove the piping.



The can area will not fully drain and will contain process fluid.

5.4.4 Remove the four motor bolts and slide the adapter and pump straight off the motor.



Any process fluid remaining in the pump may drain out of the ports.

5.4.5 Do not remove the drive magnet from the motor unless it or the motor is to be replaced.

5.4.6 Place the pump in an appropriate tray to catch any process fluid.

5.4.7 Remove the four cover screws from the cover and center housing using a #8 socket Allen Head Wrench.



Any process fluid left in the pump or can area may drain out.

5.4.8 Separate the bearings and gears from the center housing.



The bearings and gearing will be removed at the same time. Use caution not to drop or damage them.

5.4.9 Inspect all parts for signs of wear or damage. Shafts, bearings, or center housings that are scored or show excessive wear must be replaced.

5.4.10 If inspection or cleaning of the driven magnet or can is to be completed, follow Steps 5.4.11 through 5.4.15. If the can area is clean and no further disassembly is required proceed to reassemble.

5.4.11 Remove the six clamp retaining screws and two clamp rings using a #10 socket Allen Head Wrench.

5.4.12 Remove the front housing.

5.4.13 Remove the driven magnet.

5.4.14 Remove the can.

5.4.15 Inspect all parts for signs of wear or damage.

5.4.15 Replace parts as required to restore optimum pump performance

5.5 Reassembly Instructions:

5.5.1 Clean all parts prior to assembly.

5.5.2 If the can and driven magnet have been removed proceed to Step 5.5.3. Otherwise, proceed to Step 5.5.7.

5.5.3 Slide the can into the motor adapter.

5.5.4 Place the driven magnet into the can. The splined end should be facing out.

5.5.5 Place a new o-ring onto the front housing, align to the motor adapter and place into the can bore.

5.5.6 Place the two clamp rings onto the front housing and tighten screws with #10 socket Allen Head Wrench to 20 -25 inch-lbs. torque. They should be tightened in a criss-cross pattern to ensure even distribution of torque.

5.5.7 Install the two alignment pins into the center housing.

5.5.8 Install one bearing into the center housing on the side with the pins.

5.5.9 Insert the splined end of the drive shaft into the center housing and lower bearing bore.

5.5.10 Install the idler gear into the center housing and upper bearing bore.

5.5.11 Install the second bearing into the center housing.

5.5.12 Install new o-rings into the center housing.

5.5.13 Align the pump unit to the motor adapter and front housing.

5.5.14 Place the cover and cover screws on and tighten screws to 20 – 25 inch lbs. Torque using a #8 socket Allen Head Wrench.

NOTE

The cover has a groove inline with bearings and must be installed as such. Insure the side marked 'TOP' is installed as marked.

5.5.14 If the drive magnet has been removed, reinstall it onto the motor shaft so that the inside bore is flush to the end of the motor shaft and fully tighten the setscrew. See FIGURE 2.

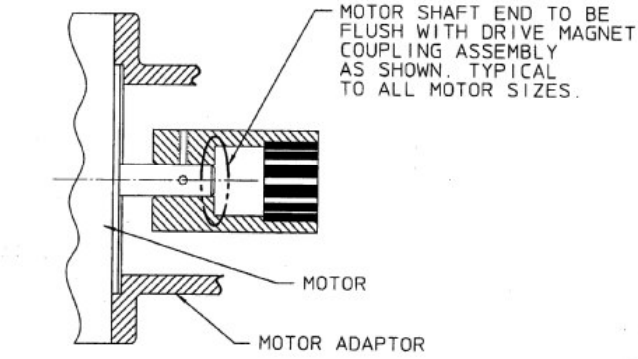


FIGURE 2

5.5.15 Slide the pump and motor adapter onto the motor and install the four motor bolts.

5.5.15 Reinstall the pump into the system and verify piping conditions in the Installation Section. Of this manual

5.5.16 The pump is ready to restart.

6. Troubleshooting Guide

Symptom	Probable Cause	Remedy
No Liquid Delivered	Pump not primed.	Prime pump.
	Motor Incorrectly wired.	Check wiring diagram.
	Air leak in suction.	Locate and repair leak.
	Rotation direction incorrect.	Reverse rotation.
	Suction and/or discharge valves closed.	Open valves.
	Suction lift too high.	Do not exceed vapor pressure of liquid.
	Magnetic coupling decoupled.	Stop motor, eliminate blockage or jamming and restart. If no blockage exists verify that operating conditions do not exceed capabilities of the pump.
Low Liquid Delivery	Discharge head higher than calculated.	Reduce discharge restrictions e.g.: Open throttle valve.
	Air leak in suction.	Locate and repair leak.
	Rotational speed incorrect.	Check speed and wiring.
	Rotation direction incorrect.	Reverse rotation.
	Suction lift too high.	Increase suction pressure.
	Gears or housing worn.	Inspect and repair as required.
	Wear plates worn.	Inspect and repair as required.
Low Discharge Pressure	Rotational speed incorrect.	Check Speed.
	Air leak in suction.	Repair leak.
	Air or gas in liquid.	Eliminate air or gas.
	Gears or Housing worn.	Inspect and repair as required.
	Wear plates worn.	Inspect and repair as required.
Pump Gradually Loses Prime	Air pocket in suction line.	Eliminate pocket.
	Air entering suction line.	Keep suction inlet submerged at all times.
Pump Noisy	Pump worn or damaged.	Inspect and repair as required.
	Air or gas in liquid.	Eliminate air or gas.
Motor runs hot or Overloads	It is normal for motors to feel hot even when not overloaded.	Check the actual temperature of the motor housing with suitable instrumentation. Verify the figures with the motor manufacturer.
	Motor wired incorrectly.	Check wiring diagram.
	Voltage or frequency low.	Correct condition.
	Motor not sized correctly for the flow.	Higher pressures may require more power than the motor is capable of.
	Heavy or viscous liquid being pumped.	Pumping fluids heavier or more viscous than water requires a properly sized, higher powered motors.
	Binding internal pump parts.	Inspect and correct condition.

Appendix A - Specifications

Isochem® Model GMC1 - General Specifications

Model GMC1 General Specifications	
Port Size and Type	¼" FNPT or BSPT
Direction of Rotation	Bi-directional
Theoretical Displacement	0.03 gal / 100 rev. (1.1 cc / rev.)
Maximum Differential Pressure	100 psig (697 kPa)
Maximum Allowable Working Pressure	300 psig (2091 kPa)
Maximum Speed	3450 rpm
Maximum Capacity at 0 psig	0.75 USGPM (0.17 m3/hr.)
Maximum Viscosity	1000 cps
Maximum Process Fluid Temperature	450 F (232 C)
Minimum Process Fluid Temperature	-100 F (-73 C)
Fluid pH Range	0-14
Gear Type	Compact Spur Gear Design
Bearing Type	Sleeve Bearing Integral Wear Plate
Magnetic Torque Rating	15 in-lbs. (1.7 N-m)
Motor Frame Sizes - NEMA	42C, 48C, and 56C
Motor Frame Sizes - IEC	63 and 71 B14 Flange
Pump Housing Materials of Construction	316SS, Alloy 20, Hastelloy-C, Hastelloy B, or Titanium
Gear Materials of Construction	Ryton, PEEK, GFTFE, 316SS, Alloy 20, Hastelloy-C, Hastelloy B, or Titanium
Wear Plate Materials of Construction	Carbon Filled Ryton, GFTFE, Carbon, PEEK
Can Materials of Construction	316SS, Hastelloy-C, or Titanium
Inner Magnet Materials of Construction	Samarium Cobalt
Outer Magnet Materials of Construction	Samarium Cobalt
O-ring Seal Materials	PTFE
Approximate Weight	7 lbs. (14.7 kg) less motor

Appendix B – GMC1 Model Numbering System

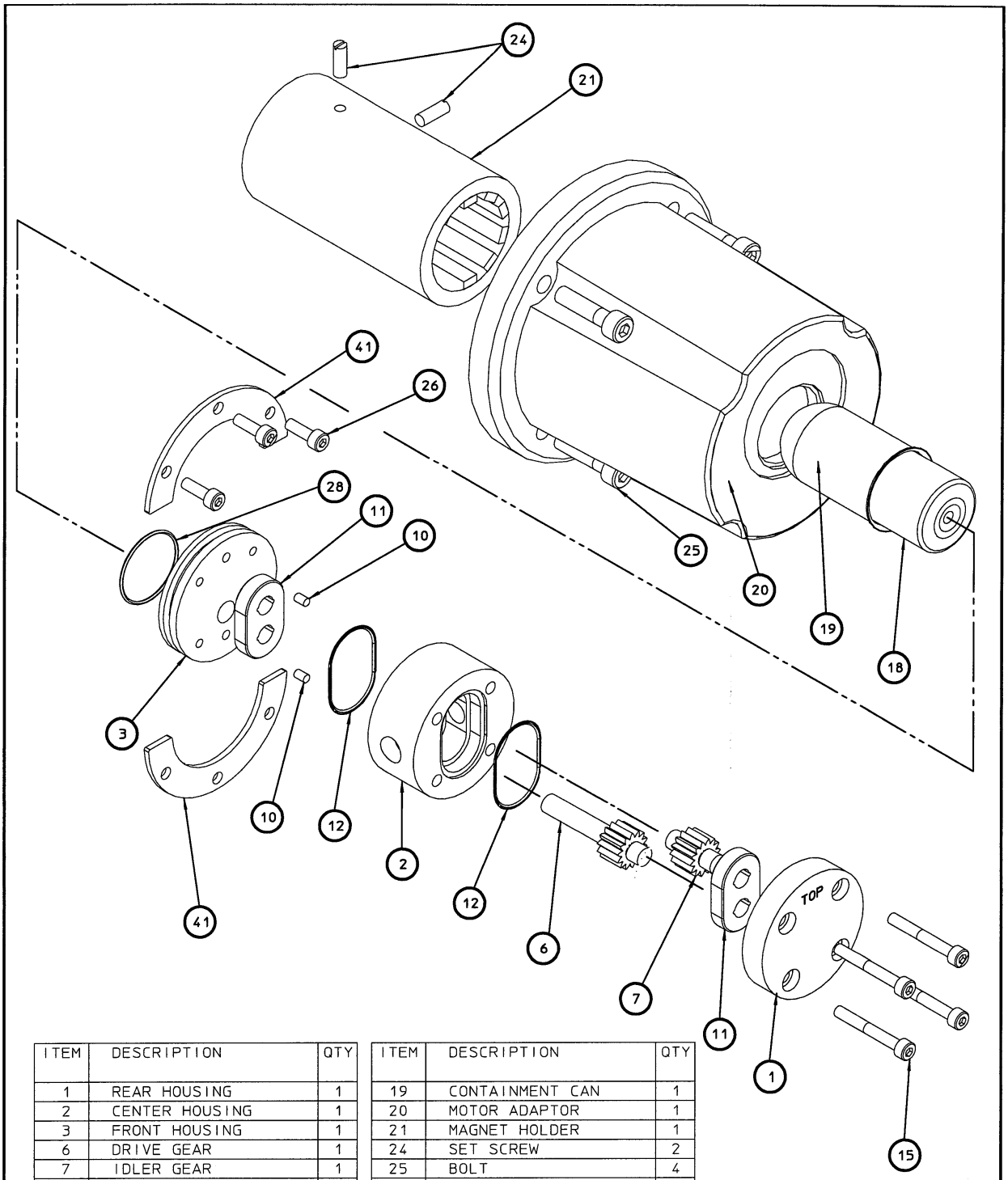
SIGNIFICANT MODEL NUMBERING SYSTEM AND SELECTION TABLE

POSITION 1	Isochem® Magnetically Driven Sealless				
	GMC1 = C-Face Motor Mounting Assembly				
POSITION 2	Pump Size				
	Port Size (inches) ¼ FNPT OR FBSPT				
	Capacity (GPM MAX.)				
	Differential Pressure (PSIG MAX.) 100				
POSITION 3	Available Pump Metallurgies and Type Port Connection				
	A = 316SS FNPT				
	B = Alloy B FNPT				
	C = Alloy C FNPT				
	D = Alloy 20 FNPT				
	F = Titanium FNPT				
	K = 316SS FBSPT				
	L = Alloy B FBSPT				
	M = Alloy C FBSPT				
	N = Alloy 20 FBSPT				
	O = Titanium FBSPT				
POSITION 4 and 5	Drive/Idler Shaft and Gear Material				
	A = 316SS				
	B = Alloy B				
	C = Alloy C				
	D = Alloy 20				
	E = Peek , with Metal Shaft Q = Ryton® , with Metal Shaft				
	F = Titanium				
	Q = Ryton® , with Metal Shaft				
POSITION 6 and 7	Wear Plate / Bearing Assembly Material				
`	K = Carbon (76)				
	Q = Ryton®				
POSITION 8	Magnetic Drive Mounting Arrangement				
STANDARD NEMA C-FACE MOUNTING (See note 1)					
	B = 42C Frame				
	C = 48C Frame				
	F = 56C Frame				
STANDARD IEC METRIC FRAME B14 FACE MOUNTING (C-FACE) (See note 1)					
	H = 63 Frame				
	J = 71 Frame				
POSITION 9,10, and 11	Options				
	Consult your local representative for options to meet your special requirements.				

Notes:

1. GMC1 pumps require motors with feet.

Appendix C- Model GMC1 Exploded View



ITEM	DESCRIPTION	QTY
1	REAR HOUSING	1
2	CENTER HOUSING	1
3	FRONT HOUSING	1
6	DRIVE GEAR	1
7	IDLER GEAR	1
10	ALIGNMENT PIN	2
11	WEAR PLATE	2
12	HOUSING O-RING	2
15	SCREW	4
18	DRIVEN MAGNET ASSY	1

ITEM	DESCRIPTION	QTY
19	CONTAINMENT CAN	1
20	MOTOR ADAPTOR	1
21	MAGNET HOLDER	1
24	SET SCREW	2
25	BOLT	4
26	SCREW	6
28	CAN O-RING	1
41	RETAINER CLAMP	2

ALL DIMENSIONS ARE IN INCHES

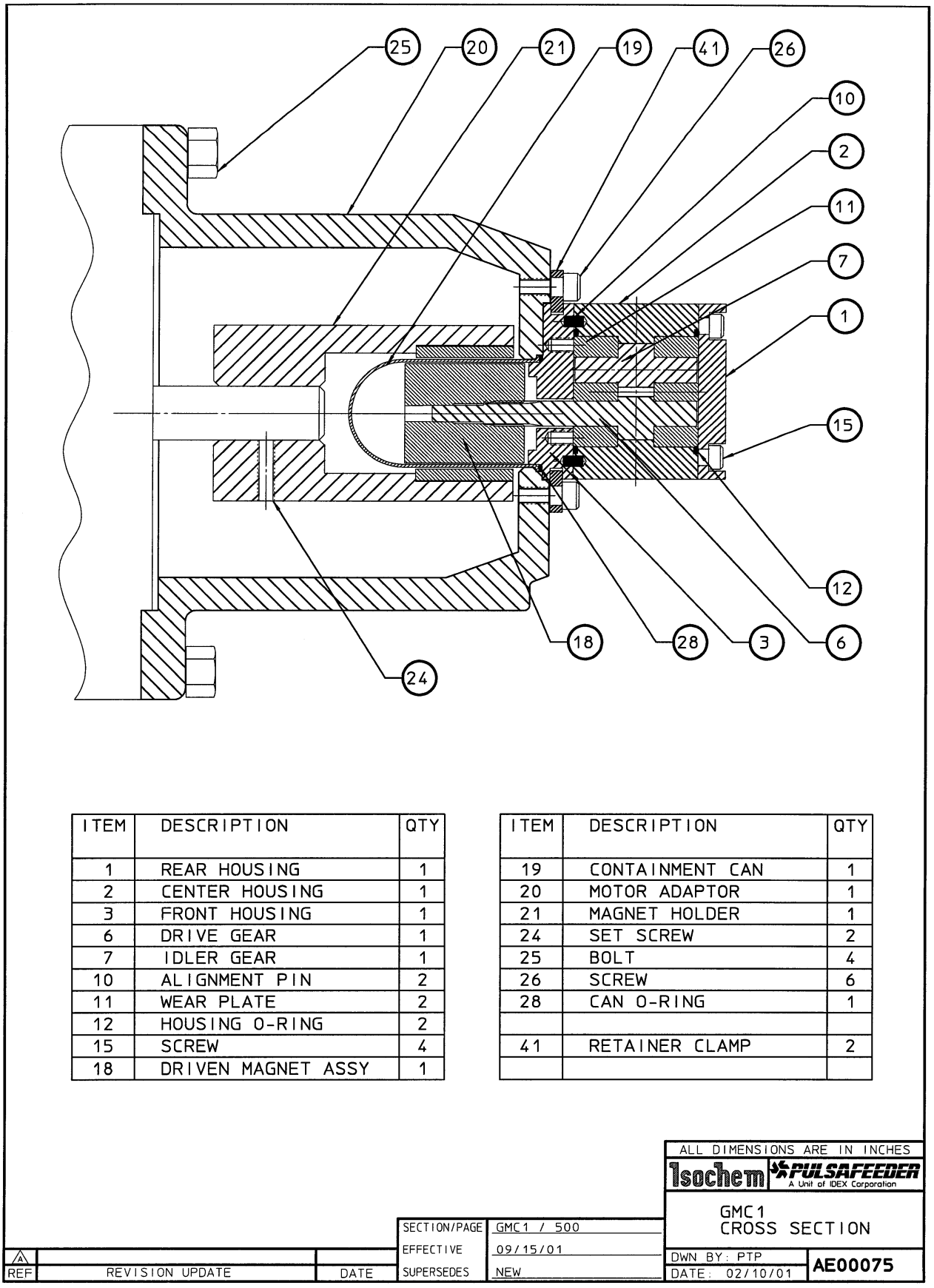
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GMC1
EXPLODED
ISOMETRIC

			SECTION/PAGE	GMC1 / 400	
A	UPDATE ISO VIEW	08/23/01	EFFECTIVE	09/15/01	DWN BY: PTP
REF	REVISION UPDATE	DATE	SUPERSEDES	NEW	DATE: 02/26/01

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Appendix D – Model GMC1 Cross Sectional View



ITEM	DESCRIPTION	QTY
1	REAR HOUSING	1
2	CENTER HOUSING	1
3	FRONT HOUSING	1
6	DRIVE GEAR	1
7	IDLER GEAR	1
10	ALIGNMENT PIN	2
11	WEAR PLATE	2
12	HOUSING O-RING	2
15	SCREW	4
18	DRIVEN MAGNET ASSY	1

ITEM	DESCRIPTION	QTY
19	CONTAINMENT CAN	1
20	MOTOR ADAPTOR	1
21	MAGNET HOLDER	1
24	SET SCREW	2
25	BOLT	4
26	SCREW	6
28	CAN O-RING	1
41	RETAINER CLAMP	2

ALL DIMENSIONS ARE IN INCHES

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GMC1
CROSS SECTION

REF	REVISION UPDATE	DATE
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SECTION/PAGE	GMC1 / 500
EFFECTIVE	09/15/01
SUPERSEDES	NEW

DWN BY: PTP
DATE: 02/10/01

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Appendix E – Consolidated Bill of Materials

Consolidated Bill of Material

			Position 3 Standard Pump Metallurgies Port Connection						
			316SS (A) OR (K)		ALLOY C (C) OR (M)		ALLOY 20 (D) OR (N)		
	Description	Qty	Part No.	Material	Part No.	Material	Part No.	Material	Item
STANDARD PUMP – NON-VARIABLE COMPONENTS									
	HOUSING, REAR	1	NG050001-316	316SS	NG050001-HC0	ALLOY C	NG050001-020	ALLOY 20	1
	HOUSING, CENTER FNPT	1	NG040001-316	316SS	NG040001-HC0	ALLOY C	NG040001-020	ALLOY 20	2
	HOUSING, CENTER FBSPT		NG040016-316	316SS	NG040016-HC0	ALLOY C	NG040016-020	ALLOY 20	
	HOUSING, FRONT	1	NG030001-316	316SS	NG030001-HC0	ALLOY C	NG030001-020	ALLOY 20	3
	+ O-RING, CENTER HOUSING	2	W078419-TFE	PTFE	W078419-TFE	PTFE	W078419-TFE	PTFE	12
	PIN, ALIGNMENT	2	40801	188SS	40801	188SS	40801	188SS	10
	SCREW, CENTER HOUSING	4	W770272-188	188SS	W770272-188	188SS	W770272-188	188SS	15
	CLAMP, PUMP RETAINER	2	NG990001-000	300SS	NG990001-000	300SS	NG990001-000	300SS	41
	SCREW, CLAMP	*6	W770010-188	188SS	W770010-188	188SS	W770010-188	188SS	26
	NAMEPLATE	1	41210	188SS	41210	188SS	41210	188SS	--
	ALLEN WRENCH (FOR ITEM #15)	1	NG990007-000	STEEL	NG990007-000	STEEL	NG990007-000	STEEL	--
	ALLEN WRENCH (FOR ITEM #26)	1	NG990008-000	STEEL	NG990008-000	STEEL	NG990008-000	STEEL	--
	MANUAL, INSTL/OP/MAINT/INSTR	1	GMC1-IOM	--	GMC1-IOM	--	GMC1-IOM	--	--
POSITION 4, – DRIVE SHAFT and GEAR MATERIALS									
A	+ 316 SS DRIVE	1	NG010001-316	316 SS	NG010001-316	316 SS	NG010001-316	316 SS	6
C	+ Alloy C, DRIVE	1	NG010001-HC0	ALLOY C	NG010001-HC0	ALLOY C	NG010001-HC0	ALLOY C	
D	+ Alloy 20, DRIVE	1	NG010001-020	ALLOY 20	NG010001-020	ALLOY 20	NG010001-020	ALLOY 20	
Q	+ Ryton® w/ Pos 3 Material DRIVE Shaft.	1	NG010001-RTA	316SS W/ RYT	NG010001-RTC	ALLOY C W/ RYT	NG010001-RTD	ALLOY 20 W/ RYT	
E	+ Peek w/ Pos 3 Material DRIVE Shaft.	1	NG010001-PKA	316SS W/ PEEK	NG010001-PKC	ALLOY C W/ PEEK	NG010001-PKD	ALLOY 20 W/ PEEK	
POSITION 5 – IDLER SHAFT and GEAR MATERIALS									
A	+ 316 SS DRIVE	1	NG010002-316	316 SS	NG010002-316	316 SS	NG010002-316	316 SS	7
C	+ Alloy C, IDLER	1	NG010002-HC0	ALLOY C	NG010002-HC0	ALLOY C	NG010002-HC0	ALLOY C	
D	+ Alloy 20, IDLER	1	NG010002-020	ALLOY 20	NG010002-020	ALLOY 20	NG010002-020	ALLOY 20	
Q	+ Ryton® w/ Pos 3 Material IDLER Shaft.	1	NG010002-RTA	316 SS W/ RYT	NG010002-RTC	ALLOY C W/ RYT	NG010002-RTD	ALLOY 20 W/ RYT	
E	+ Peek w/ Pos 3 Material IDLER Shaft.	1	NG010002-PKA	316 SS W/ PEEK	NG010002-PKC	ALLOY C W/ PEEK	NG010002-PKD	ALLOY 20 W/ PEEK	
POSITION 6, and 7 – WEAR PLATE / BEARING ASSEMBLY MATERIALS									
KK	+ Carbon	2	NG220001-CBN	CARBON	NG220001-CBN	CARBON	NG220001-CBN	CARBON	11
QQ	+ Ryton®	2	NG220001-RYT	RYTON	NG220001-RYT	RYTON	NG220001-RYT	RYTON	
POSITION 8 – STANDARD NEMA C-FACE and IEC METRIC FRAME MAGNETIC COUPLING ARRANGEMENT and MATERIALS									
COMMON PARTS	+ O-RING, CONTAINMENT CAN	1	W078419-TFE	PTFE	W078419-TFE	PTFE	W078419-TFE	PTFE	28
	CAN, CONTAINMENT	1	NG210001-316	316 SS	NG210001-HC0	316 SS	NG210001-020	316 SS	19
	MAGNET, DRIVEN	1	NG200002-RYT	RYT	NG200002-RYT	RYT	NG200002-RYT	RYT	18
42C FRAME COMPONENTS									
B	ADAPTER, MOTOR 42C	1	NG110002-000	ALU	NG110002-000	ALU	NG110002-000	ALU	20
	BOLT	4	W770022-188	188SS	W770022-188	188SS	W770022-188	188SS	25
	HOLDER ASSY	1	NG200006-000	STEEL	NG200006-000	STEEL	NG200006-000	STEEL	21
	SET SCREW	1	W771004-021	STEEL	W771004-021	STEEL	W771004-021	STEEL	24
48C FRAME COMPONENTS									
C	ADAPTER, MOTOR 48C	1	NG110002-000	ALU	NG110002-000	ALU	NG110002-000	ALU	20
	BOLT	4	W770022-188	188SS	W770022-188	188SS	W770022-188	188SS	25
	HOLDER ASSY	1	NG200011-000	STEEL	NG200011-000	STEEL	NG200011-000	STEEL	21
	SET SCREW	1	W771004-021	STEEL	W771004-021	STEEL	W771004-021	STEEL	24

* COMPONENT QUANTITY MAY BE CUMULATIVE OVER THE ENTIRE BILL OF MATERIALS
\+ DENOTES RECOMMENDED SPARE PART.

Consolidated Bill of Material

			Position 3 Standard Pump Metallurgies Port Connection						
			316SS (A) OR (K)		ALLOY C (C) OR (M)		ALLOY 20 (D) OR (N)		
	Description	Qty	Part No.	Material	Part No.	Material	Part No.	Material	Item
56C FRAME COMPONENTS									
F	ADAPTER, MOTOR 56C	1	NG110001-000	ALU	NG110001-000	ALU	NG110001-000	ALU	20
	BOLT	4	W770425-188	188SS	W770425-188	188SS	W770425-188	188SS	25
	HOLDER ASSY	1	NG200010-000	STEEL	NG200010-000	STEEL	NG200010-000	STEEL	21
	SET SCREW	1	W771004-116	STEEL	W771004-116	STEEL	W771004-116	STEEL	24
63 FRAME (B14 FACE MOUNTING) COMPONENTS									
H	ADAPTER, MOTOR 63C	1	NG110003-000	ALU	NG110003-000	ALU	NG110003-000	ALU	20
	BOLT	4	NP990479-188	188SS	NP990479-188	188SS	NP990479-188	188SS	25
	HOLDER ASSY	1	NG200014-000	STEEL	NG200014-000	STEEL	NG200014-000	STEEL	21
	SET SCREW	1	NP991004-001	STEEL	NP991004-001	STEEL	NP991004-001	STEEL	24
71 FRAME (B14 FACE MOUNTING) COMPONENTS									
J	ADAPTER, MOTOR 71C	1	NG110004-000	ALU	NG110004-000	ALU	NG110004-000	ALU	20
	BOLT	4	NP990482-188	188SS	NP990482-188	188SS	NP990482-188	188SS	25
	HOLDER ASSY	1	NG200015-000	STEEL	NG200015-000	STEEL	NG200015-000	STEEL	21
	SET SCREW	1	NP991004-001	STEEL	NP991004-001	STEEL	NP991004-001	STEEL	24

* COMPONENT QUANTITY MAY BE CUMULATIVE OVER THE ENTIRE BILL OF MATERIALS
\+ DENOTES RECOMMENDED SPARE PART.

Consolidated Bill of Material

			Position 3 Standard Pump Metallurgies Port Connection						
			TITANIUM (F) OR (O)		ALLOY B (B) OR (L)				
Description		Qty	Part No.	Material	Part No.	Material	Part No.	Material	Item
STANDARD PUMP – NON-VARIABLE COMPONENTS									
HOUSING, REAR		1	NG050001-TIT	TITANIUM	NG050001-HB0	ALLOY B			1
HOUSING, CENTER FNPT		1	NG040001-TIT	TITANIUM	NG040001-HB0	ALLOY B			2
HOUSING, CENTER FBSPT			NG040016-TIT	TITANIUM	NG040016-HB0	ALLOY B			
HOUSING, FRONT		1	NG030001-TIT	TITANIUM	NG030001-HB0	ALLOY B			3
+ O-RING, CENTER HOUSING		2	W078419-TFE	PTFE	W078419-TFE	PTFE			12
PIN, ALIGNMENT		2	40801	188SS	40801	188SS			10
SCREW, CENTER HOUSING		4	W770272-188	188SS	W770272-188	188SS			15
CLAMP, PUMP RETAINER		2	NG990001-000	300SS	NG990001-000	300SS			41
SCREW, CLAMP		*6	W770010-188	188SS	W770010-188	188SS			26
NAMEPLATE		1	41210	188SS	41210	188SS			--
ALLEN WRENCH (FOR ITEM #15)		1	NG990007-000	STEEL	NG990007-000	STEEL			--
ALLEN WRENCH (FOR ITEM #26)		1	NG990008-000	STEEL	NG990008-000	STEEL			--
MANUAL, INSTL/OP/MAINT/INSTR		1	GMC1-IOM	--	GMC1-IOM	--			--
POSITION 4, – DRIVE SHAFT and GEAR MATERIALS									
F	+ TITANIUM DRIVE	1	NG010001-TIT	TITANIUM	NG010001-TIT	TITANIUM			6
B	+ Alloy B, DRIVE	1	NG010001-HB0	ALLOY B	NG010001-HB0	ALLOY B			
Q	+ Ryton® w/ Pos 3 Material DRIVE Shaft.	1	NG010001-RTT	TITANIUM W/ RYT	NG010001-RTB	ALLOY B W/ RYT			
E	+ Peek w/ Pos 3 Material DRIVE Shaft.	1	NG010001-PKT	TITANIUM W/ PEEK	NG010001-PKB	ALLOY B W/ PEEK			
POSITION 5 – IDLER SHAFT and GEAR MATERIALS									
F	+ TITANIUM DRIVE	1	NG010002-TIT	TITANIUM	NG010002-TIT	TITANIUM			7
B	+ Alloy B, IDLER	1	NG010002-HB0	ALLOY B	NG010002-HB0	ALLOY B			
Q	+ Ryton® w/ Pos 3 Material IDLER Shaft.	1	NG010002-RTT	316 SS W/ RYT	NG010002-RTB	ALLOY B W/ RYT			
E	+ Peek w/ Pos 3 Material IDLER Shaft.	1	NG010002-PKT	316 SS W/ PEEK	NG010002-PKB	ALLOY B W/ PEEK			
POSITION 6, and 7 – WEAR PLATE / BEARING ASSEMBLY MATERIALS									
KK	+ Carbon	2	NG220001-CBN	CARBON	NG220001-CBN	CARBON			11
QQ	+ Ryton®	2	NG220001-RYT	RYTON	NG220001-RYT	RYTON			
POSITION 8 – STANDARD NEMA C-FACE and IEC METRIC FRAME MAGNETIC COUPLING ARRANGEMENT and MATERIALS									
COMMON PARTS	+ O-RING, CONTAINMENT CAN	1	W078419-TFE	PTFE	W078419-TFE	PTFE			28
	CAN, CONTAINMENT	1	NG210001-TIT	TITANIUM	NG210001-HB0	ALLOY B			19
	MAGNET, DRIVEN	1	NG200002-RYT	RYT	NG200002-RYT	RYT			18
42C FRAME COMPONENTS									
B	ADAPTER, MOTOR 42C	1	NG110002-000	ALU	NG110002-000	ALU			20
	BOLT	4	W770022-188	188SS	W770022-188	188SS			25
	HOLDER ASSY	1	NG200006-000	STEEL	NG200006-000	STEEL			21
	SET SCREW	1	W771004-021	STEEL	W771004-021	STEEL			24
48C FRAME COMPONENTS									
C	ADAPTER, MOTOR 48C	1	NG110002-000	ALU	NG110002-000	ALU			20
	BOLT	4	W770022-188	188SS	W770022-188	188SS			25
	HOLDER ASSY	1	NG200011-000	STEEL	NG200011-000	STEEL			21
	SET SCREW	1	W771004-021	STEEL	W771004-021	STEEL			24

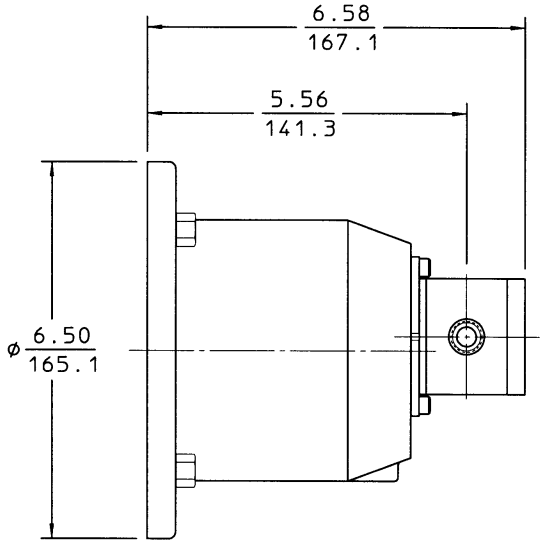
* COMPONENT QUANTITY MAY BE CUMULATIVE OVER THE ENTIRE BILL OF MATERIALS
+ DENOTES RECOMMENDED SPARE PART.

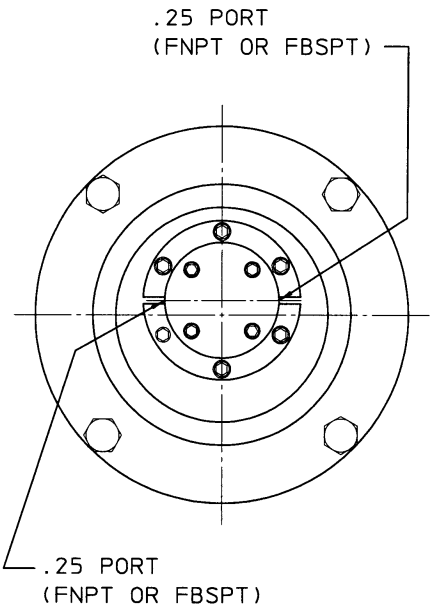
Consolidated Bill of Material

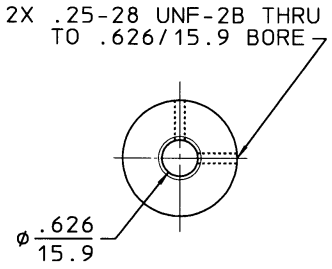
			Position 3 Standard Pump Metallurgies Port Connection						
			TITANIUM (F) OR (O)		ALLOY B (B) OR (L)				
	Description	Qty	Part No.	Material	Part No.	Material	Part No.	Material	Item
56C FRAME COMPONENTS									
	ADAPTER, MOTOR 56C	1	NG110001-000	ALU	NG110001-000	ALU			20
F	BOLT	4	W770425-188	188SS	W770425-188	188SS			25
	HOLDER ASSY	1	NG200010-000	STEEL	NG200010-000	STEEL			21
	SET SCREW	1	W771004-116	STEEL	W771004-116	STEEL			24
63 FRAME (B14 FACE MOUNTING) COMPONENTS									
	ADAPTER, MOTOR 63C	1	NG110003-000	ALU	NG110003-000	ALU			20
H	BOLT	4	NP990479-188	188SS	NP990479-188	188SS			25
	HOLDER ASSY	1	NG200014-000	STEEL	NG200014-000	STEEL			21
	SET SCREW	1	NP991004-001	STEEL	NP991004-001	STEEL			24
71 FRAME (B14 FACE MOUNTING) COMPONENTS									
	ADAPTER, MOTOR 71C	1	NG110004-000	ALU	NG110004-000	ALU			20
J	BOLT	4	NP990482-188	188SS	NP990482-188	188SS			25
	HOLDER ASSY	1	NG200015-000	STEEL	NG200015-000	STEEL			21
	SET SCREW	1	NP991004-001	STEEL	NP991004-001	STEEL			24

* COMPONENT QUANTITY MAY BE CUMULATIVE OVER THE ENTIRE BILL OF MATERIALS
\+ DENOTES RECOMMENDED SPARE PART.

Appendix F – Dimensional Drawings





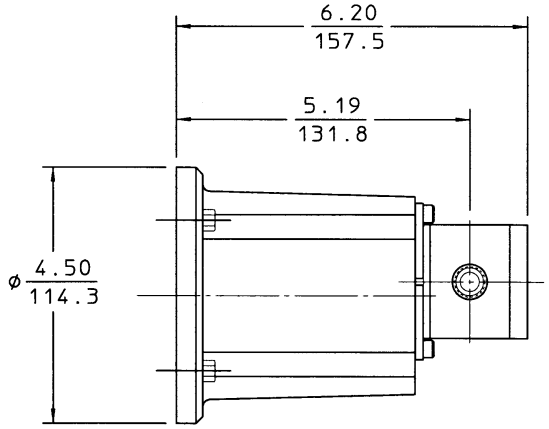


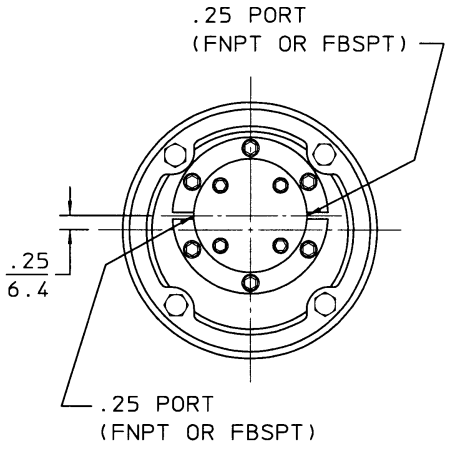
DETAIL 56C

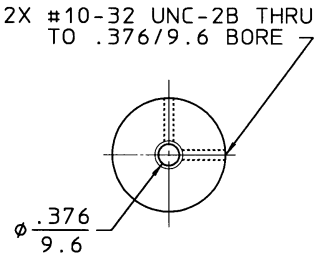
DRIVE COUPLING BORE

NOTE:
1. SUCTION AND DISCHARGE PORT LOCATION DEPENDENT ON DIRECTION OF DRIVE SHAFT ROTATION.

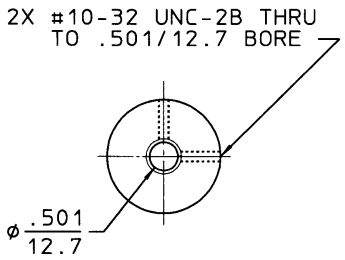
ALL DIMENSIONS ARE INCHES/MM			
Isochem / PULSAFEEDER (A Unit of IDEX Corporation)			
GMC1 DIMENSIONAL DWG 56C FRAME			
DWN BY: PTP	DATE: 02/10/01	SD-2937-000	
SECTION/PAGE	GMC1 / 300		
EFFECTIVE	10/22/02		
SUPERSEDES	09/15/01		
A	UPDATE DRAWING	10/22/02	
REF	REVISION UPDATE	DATE	







DETAIL 42C



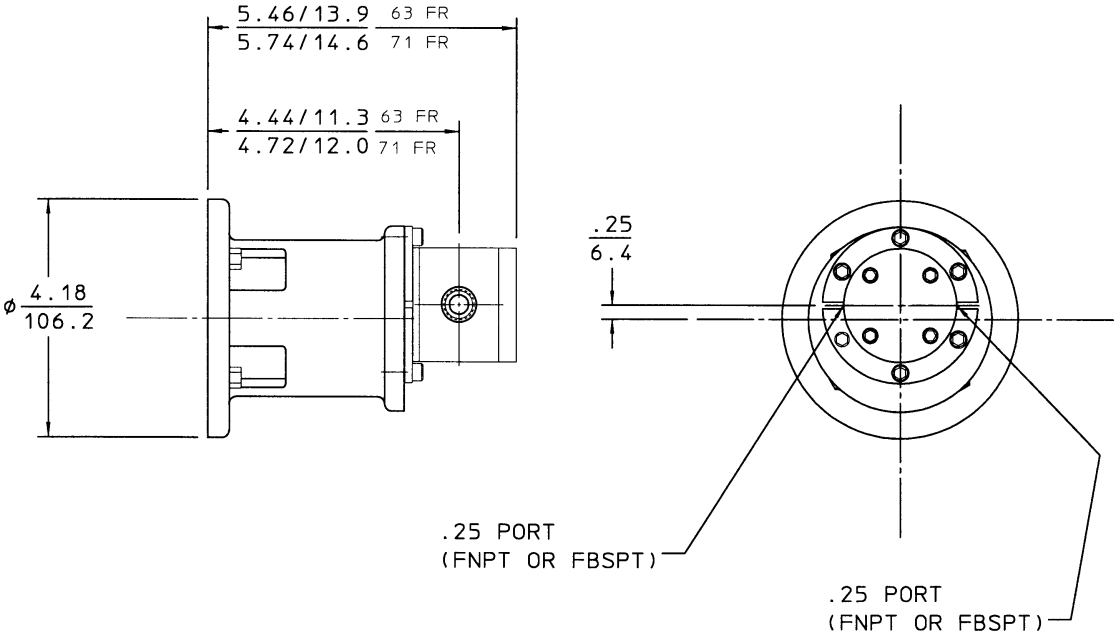
DETAIL 48C

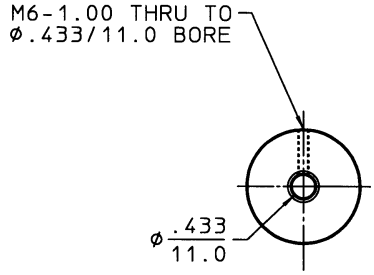
DRIVE COUPLING BORE

NOTE:
1. SUCTION AND DISCHARGE PORT LOCATION DEPENDENT ON DIRECTION OF DRIVE SHAFT ROTATION.

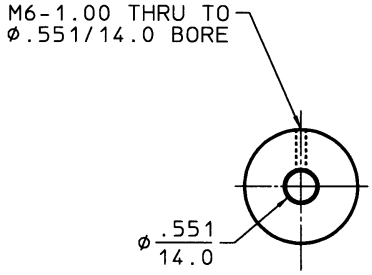
ALL DIMENSIONS ARE INCHES/MM			
Isochem / PULSAFEEDER (A Unit of IDEX Corporation)			
GMC1 DIMENSIONAL DWG 42C/48C FRAME			
DWN BY: PTP	DATE: 02/10/01	SD-2938-000	

SECTION/PAGE	GMC1 / 302		
EFFECTIVE	10/22/02		
SUPERSEDES	09/15/01		
A	UPDATE DRAWING	10/22/02	
REF	REVISION UPDATE	DATE	





DRIVE CPLG BORE DETAIL 63

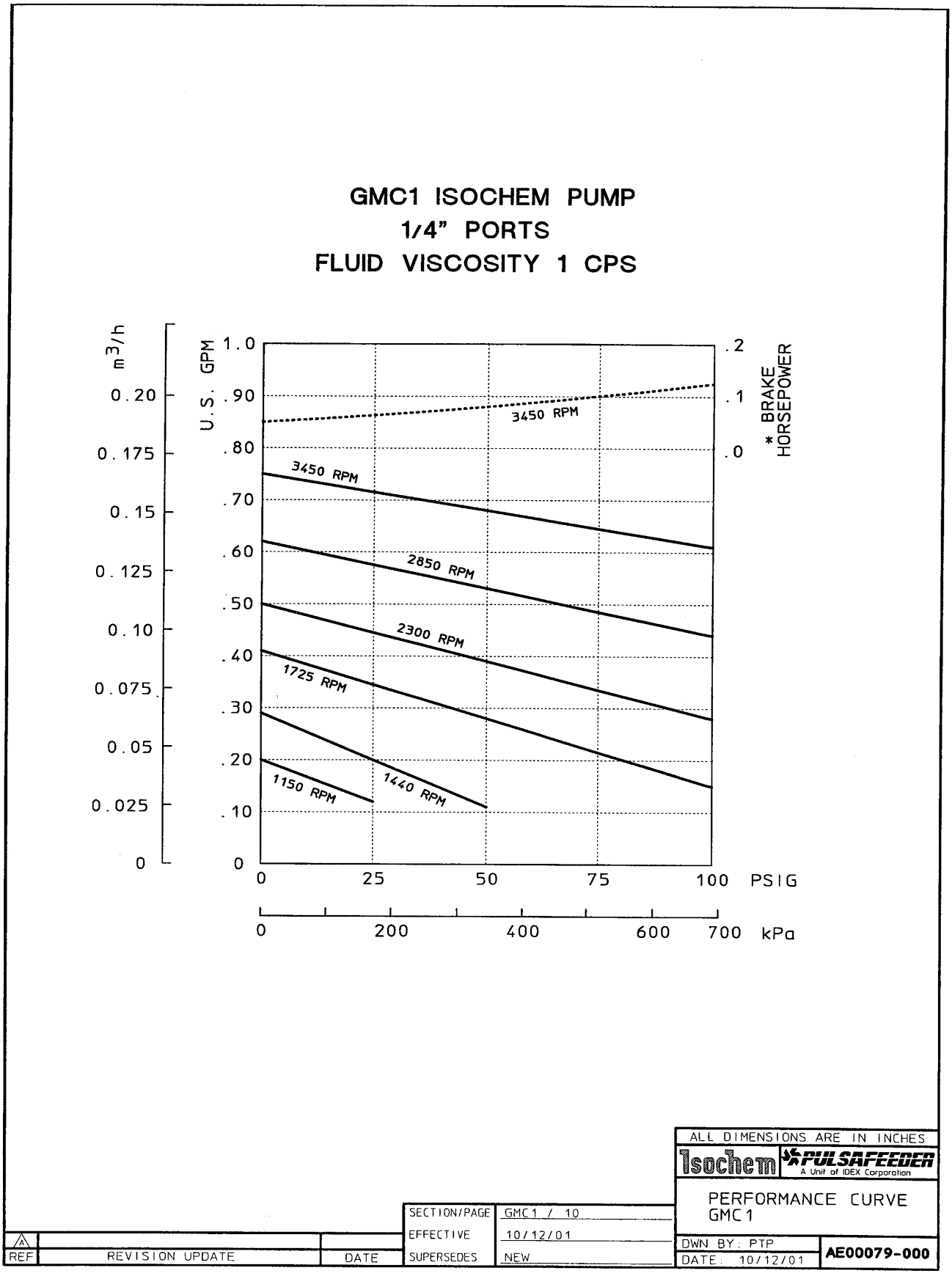


DRIVE CPLG BORE DETAIL 71

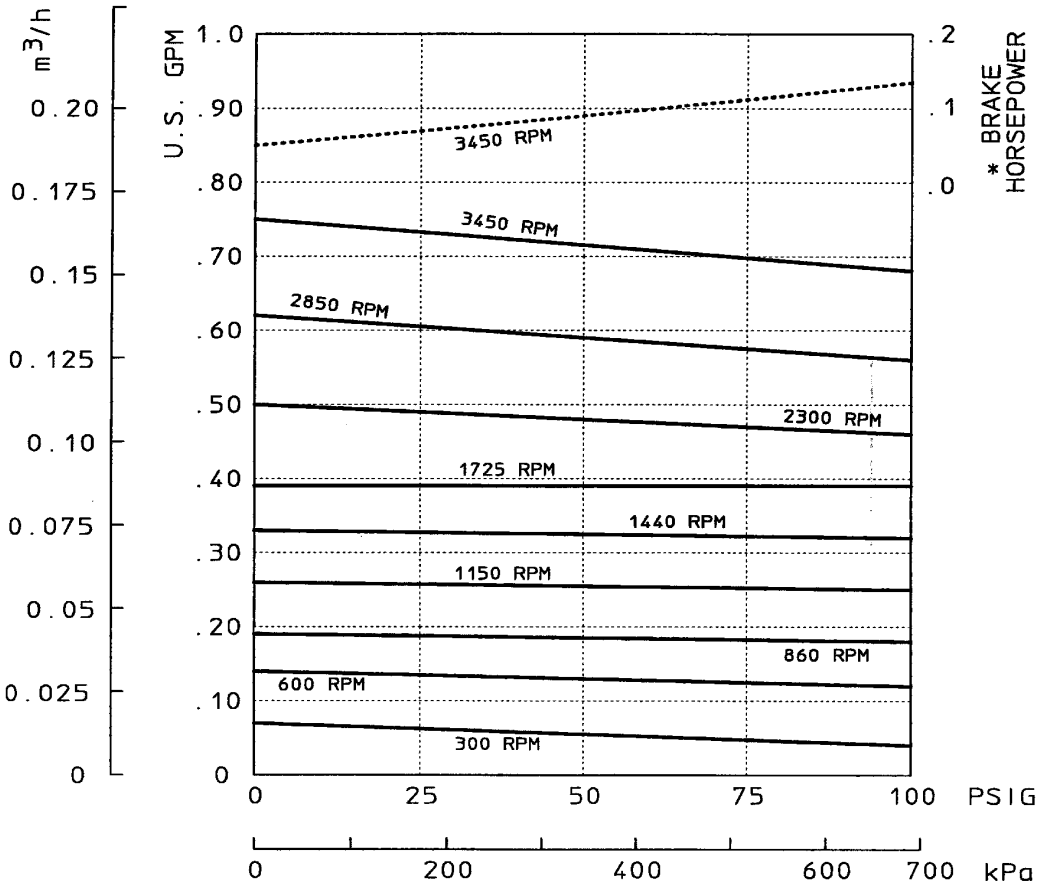
NOTE:
1. SUCTION AND DISCHARGE PORT LOCATION DEPENDENT ON DIRECTION OF DRIVE SHAFT ROTATION.

ALL DIMENSIONS ARE INCHES/MM			
Isochem / PULSAFEEDER (A Unit of IDEX Corporation)			
GMC1 DIMENSIONAL DWG 63C / 71C FRAME			
SECTION/PAGE	GMC1 / 304		
EFFECTIVE	10/22/01	DWN BY: PTP	SD-2939-000
SUPERSEDES	9/15/01	DATE: 02/28/01	
⚠ UPDATRED DRAWING	10/22/02		
REF REVISION UPDATE	DATE		

Appendix G – Pump Performance Curves



GMC1 ISOCHEM PUMP
1/4" PORTS
FLUID VISCOSITY 100 CPS



ALL DIMENSIONS ARE IN INCHES

Isochem | PULSAFEEDER A Unit of IDEX Corporation

PERFORMANCE CURVE
GMC1

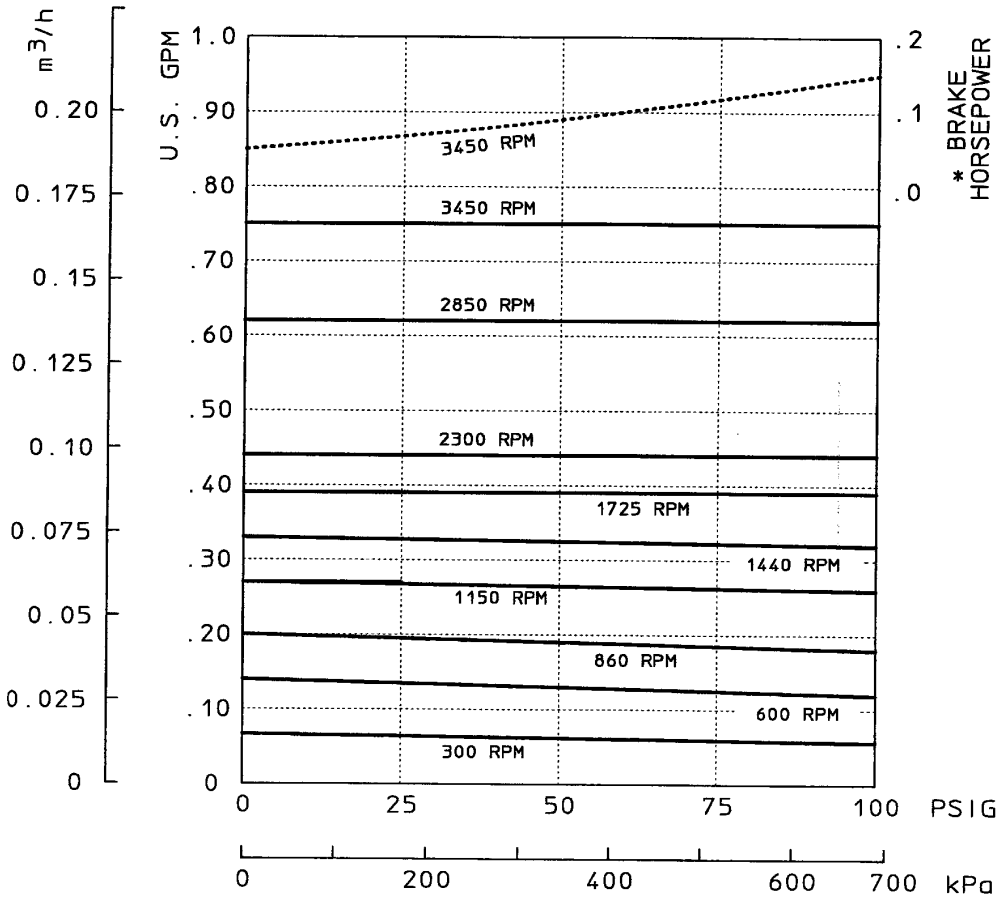
REF	REVISION UPDATE	DATE

SECTION/PAGE	GMC1 / 11
EFFECTIVE	10/12/01
SUPERSEDES	NEW

DWN BY: PTP
DATE: 10/12/01

AE00080-000

GMC1 ISOCHEM PUMP
1/4" PORTS
FLUID VISCOSITY 250 CPS



ALL DIMENSIONS ARE IN INCHES

Isochem | PULSAFEEDER A Unit of IDEX Corporation

PERFORMANCE CURVE
GMC1

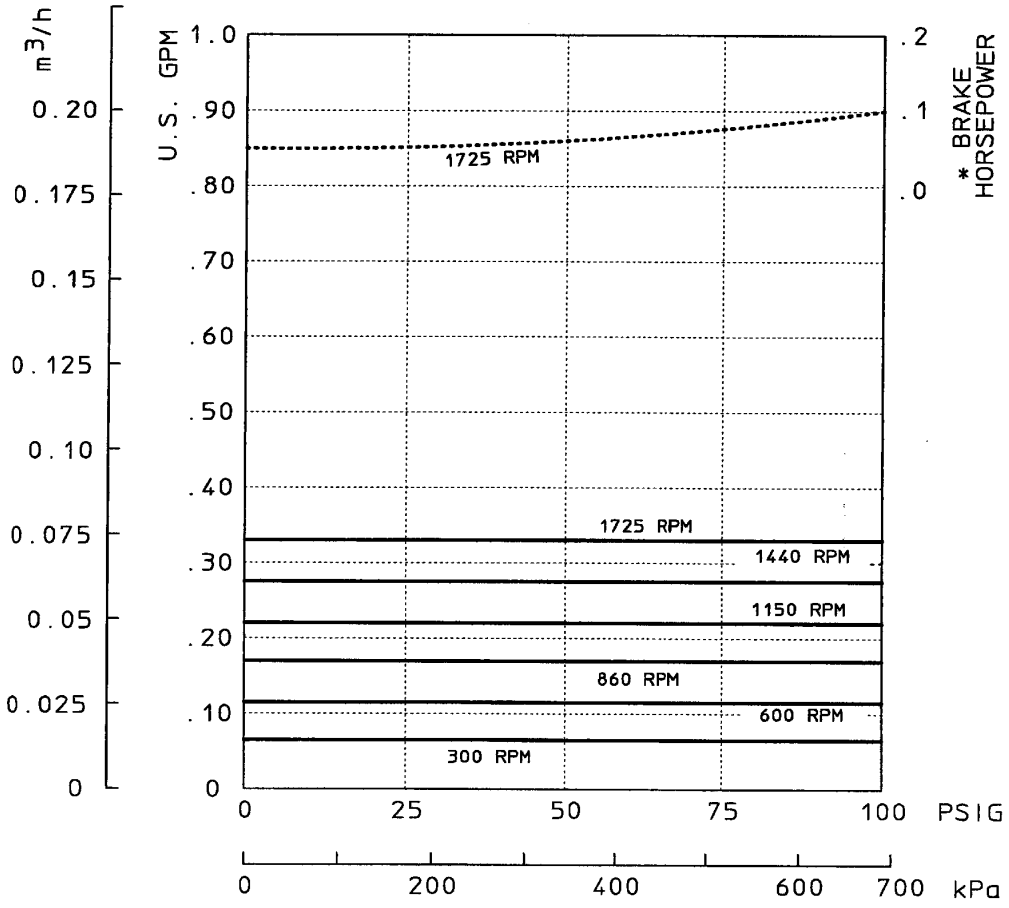
REF	REVISION UPDATE	DATE
A		

SECTION/PAGE	GMC1 / 12
EFFECTIVE	10/12/01
SUPERSEDES	NEW

DWN BY: PTP
DATE: 10/12/01

AE00081-000

GMC1 ISOCHEM PUMP
1/4" PORTS
FLUID VISCOSITY 600 CPS



REF	REVISION UPDATE	DATE
A		

SECTION/PAGE	GMC1 / 13
EFFECTIVE	10/12/01
SUPERSEDES	NEW

ALL DIMENSIONS ARE IN INCHES

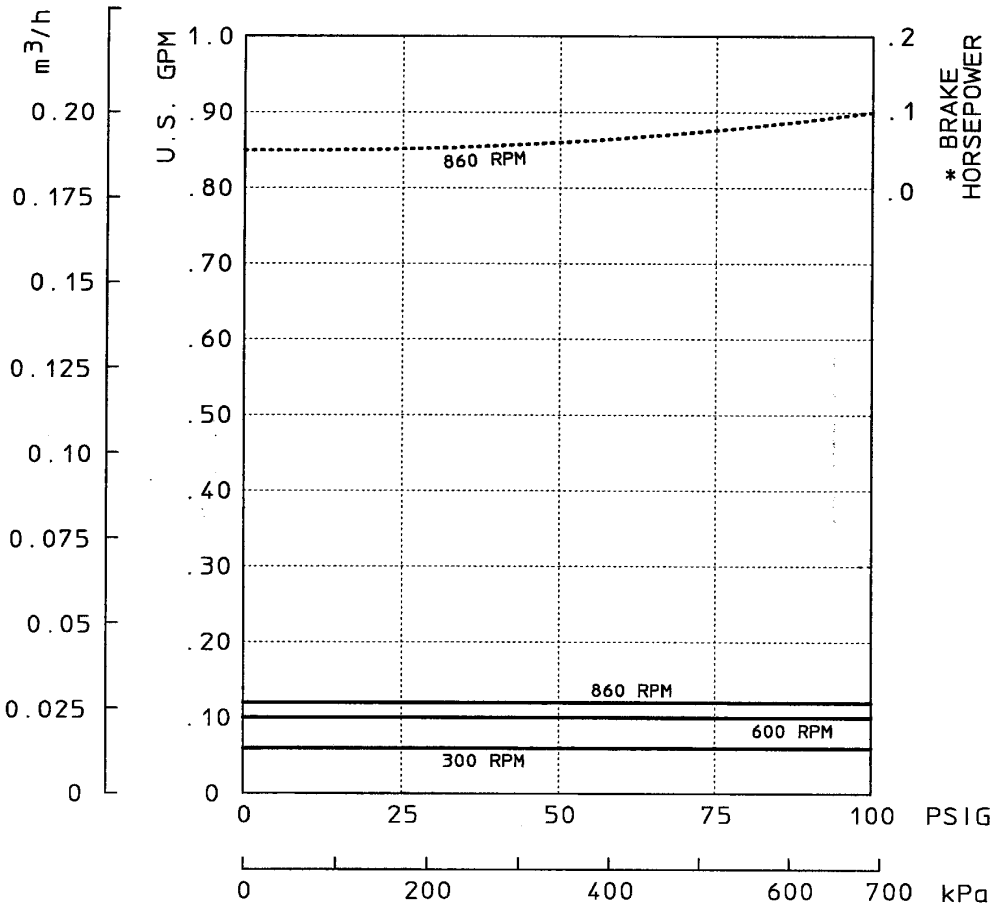
Isochem | PULSAFEEDER A Unit of IDEX Corporation

PERFORMANCE CURVE
GMC1

DWN BY: PTP
DATE: 10/12/01

AE00082-000

GMC1 ISOCHEM PUMP
1/4" PORTS
FLUID VISCOSITY 1000 CPS



ALL DIMENSIONS ARE IN INCHES

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PERFORMANCE CURVE
GMC1

REF	REVISION UPDATE	DATE
A		

SECTION/PAGE	GMC1 / 14
EFFECTIVE	10/12/01
SUPERSEDES	NEW

DWN BY: PTP
DATE: 10/12/01

AE00083-000

Appendix H - MODEL GMC1 MAINTENANCE RECORDS

Model Number: _____

KOPKIT Number: _____

Serial Number: _____

Date of Purchase: _____

Application: _____

Materials of Construction: _____

Fluid: _____

Temperature: _____

Viscosity: _____

Specific Gravity: _____

Specific Heat: _____

Solids: _____

Other Fluid Characteristics: _____

Flow Rate: _____

Differential Pressure: _____

Suction Pressure: _____

Discharge Pressure: _____

Hydraulic Power: _____

Driver Characteristics: _____

Relief Valve Characteristics: _____

Maintenance Schedule				
DATE	**DESCRIPTION OF SERVICE**			



PULSAFEEDER

A Unit of IDEX Corporation



IDEX

IDEX CORPORATION

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Rochester, New York 14623
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