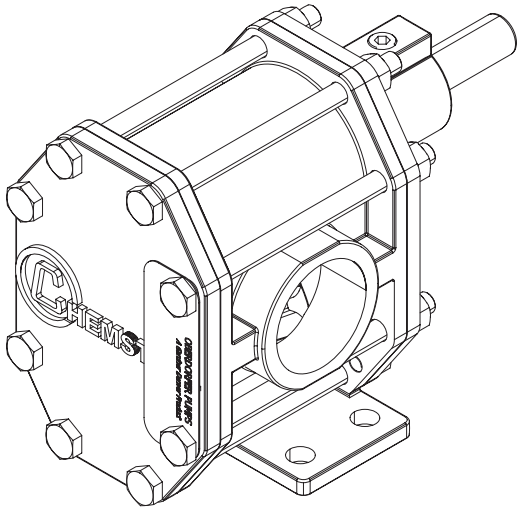
OPERATOR'S MANUAL CHEMSTEEL S9/ SM9

INCLUDING: OPERATION, INSTALLATION AND MAINTENANCE

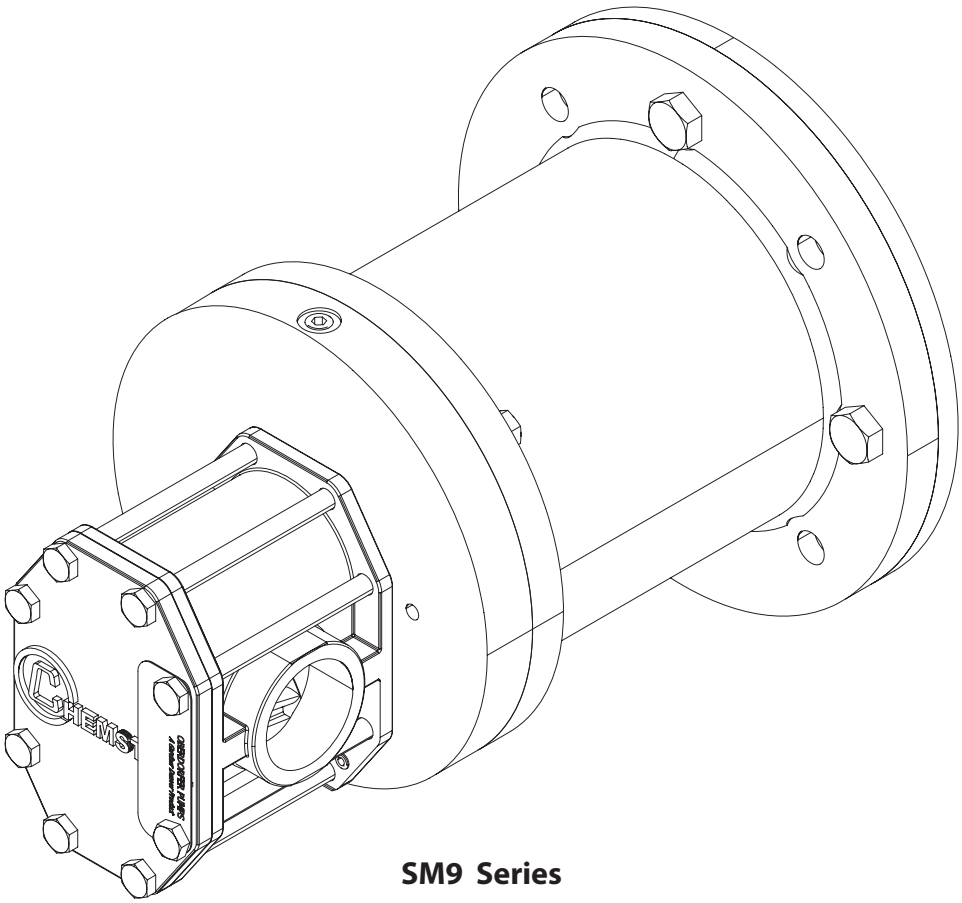
RELEASED: 6-10-22
(REV: A)

READ THIS MANUAL CAREFULLY BEFORE INSTALLING, OPERATING OR SERVICING THIS EQUIPMENT.

It is the responsibility of the employer to place this information in the hands of the operator. Keep for future reference.



S9 Series



SM9 Series

Figure 1

INGERSOLL RAND COMPANY INC
34800 BENNETT DR, FRASER, MI 48026
1-800-448-1668 • support@ oberdorferpumps.com
www.gardnerdenver.com/en-us/oberdorferpumps

OBERDORFER Ingersoll Rand

GENERAL DESCRIPTION

Chemsteel S9 / SM9:

Chemsteel pumps are designed to handle common and highly corrosive liquids that must be pumped under pressure. Manufactured to extremely precise tolerance, the Chemsteel pump line prevents system contamination while maintaining the purity and integrity of the liquid being pumped. Its rugged, three-section, o-ring sealed thru-bolt construction provides ease of servicing and parts replacement.

Helical gearing offers noise reduction by as much as 10db, while the tandem pumps double the output flow for a single fluid, or with isolation, handle other fluids in direct ratio to the first. Additionally, Chemsteel pumps offer bi-directional operation for applications requiring reversing flow.

MODEL DESCRIPTION CHART

Model Code Explanation OB S9 XX X X X X X

Basic Pump Series S9

Flow Rate

Code
02
03
04
06

Housing and Shaft Material

Code
1
3

Gear Material Combination

Code
1
2
3
4
5
6
7
8
9
A
B
C
D
E
F
H

Bearing Material

Code
C
P
J

Shaft Seal

Code
B
J
H
Z
A
C
D
F
V
G
L
W

Additional Options

Code
C1 - C7
T1 - T13
B
E
XX
M1 - M7

NOTICE: All possible options are shown in the chart, however, certain combinations may not be recommended. Consult a representative or the factory if you have questions concerning availability.

MODEL CODE EXPLANATION

Example:

OBS91716CCB

Flow Rate Code

Code	Max Flow GPM @ 1725 RPM
02	0.5
03	1
04	1.5
06	2.0

Housing and Shaft Material

Code	Housing Material	Shaft Material
1	316 Stainless Steel	316 Stainless Steel
3	Alloy C	Alloy C

Bearing Material

Code	Material
C	Carbon Graphite Resin
P	PTFE
J	Rulon / Glass filled PTFE

Gear Material Combination

Code	Drive	Idle
1	PPS	PPS
2	316 Stainless Steel	PEEK
3	PEEK	PEEK
4	Alloy C	Alloy C
5	Alloy C	PTFE
6	W88	W88
7	PTFE	PTFE
8	W88	PTFE
9	Alloy C	PEEK
A	Alloy C	PPS
B	316 Stainless Steel	PPS
C	W88	PPS
D	W88	316 Stainless Steel
E	316 Stainless Steel	316 Stainless Steel
F	316 Stainless Steel	PTFE
H	W88	PEEK

Shaft Seal

Code	Style			Material			
				Rotary Head	Stationary Head		
	Deign	Seals	Case	Face	Elastomer	Face	O-Ring
B	Bellows	Single	316 SS	Carbon	FKM	Ceramic	FKM
J	Bellows	Single	316 SS	Silicon Carbide	EPDM	Silicon Carbide	EPDM
H	Bellows	Double	316 SS	PTFE	FKM	Ceramic	FKM
Z	Bellows	Single	316 SS	Silicon Carbide	FKM	Silicon Carbide	FKM
A	Wedge	Single	316 SS	Carbon	PTFE	Ceramic	FFKM
C	Wedge	Single	316 SS	Carbon	PTFE	Silicon Carbide	FFKM
D	Wedge	Single	Alloy C	Carbon	PTFE	Ceramic	FFKM
F	Wedge	Single	Alloy C	Carbon	PTFE	Silicon Carbide	FFKM
V	Wedge	Single	Alloy C	Silicon Carbide	PTFE	Silicon Carbide	FFKM
G	Wedge	Double	316 SS	Carbon	PTFE	Silicon Carbide	FFKM
L	Two Lips Seals		304 SS	FKM Backed By PTFE			
W	Mag-Coupled			Samarium Colbalt			

Additional Options

Code	Option
C1 - C7	Factory installed close coupled adapter
T1 - T13	Non-Metallic Gear • Temperature Trim
B	Bearing Flush Ports
E	BSPT Threads
XX	Specials - Consult Factory
M1 - M7	Factory Installed Close Coupled Adapter - Mag-Coupled

PRESSURE AND TEMPERATURE TRIMS

The selection of the appropriate Chemsteel pump to fit a given application depends upon full knowledge of the application including both system parameters and fluid properties. Follow the guidelines given below when selecting a Chemsteel gear pump.

Chemical Compatibility: Select the basic materials of construction for the pump based upon chemical compatibility. Refer to Chemical Resistance Charts to decide on acceptable materials of construction. Then, consider the fluid's lubricity.

Lubricity: As a general rule, use only metal/plastic, plastic /plastic, or W88/W88 gear combinations for non lubricating fluids, typically viscosities less than 25 centipoise. Drive / Idle gear combinations of 316 / 316 and Alloy-C / Alloy-C must only be used with lubricating fluids to avoid galling.

Pressure: Refer to the following table for limitations on pressure for various constructions. (Not applicable to tandem pumps, consult factory.)

Gears and Bearings

Gear Combination	Maximum Differential Pressure		
	Carbon Bearings	PTFE Bearings	Rulon Bearings
Plastic / Plastic	50 psi (3.4 bar)	50 psi (3.4 bar)	50 psi (3.4 bar)
Metal / Plastic	100 psi (6.9 bar)	50 psi (3.4 bar)	75 psi (6.9 bar)
Metal / Metal	150 psi ** (10.3 bar)	Not Available	100 psi (6.9 bar)

** Mag Drive limited to 110 psi (7.6 bar).

Housing

Housing	Maximum Differential Pressure	Maximum System Pressure
Metal	150 psi (10.3 bar)	300 psi (20.7 bar), R1/ RM1 and S2 / SM2 Series
Metal	150 psi (10.3 bar)	225 psi (15.5 bar), S4 SM4 and S9 / SM9 Series

Temperature, when using plastic gears and/or bearings: Refer to the following table for selection of the appropriate Trim Code when using plastic gears. PTFE or PEEK gears must be trimmed for applications exceeding 110° F (43.3° C). PPS gears (to a maximum temperature of 200° F (93.3° F)) in either a metal housing are thermally stable and do not require trimming.

Trim Code	PTFE / Rulon	Peek
T1	115° to 134° F (46° to 57° C)	200° to 239° F (93° to 115° C)
T2	135° to 154° F (57° to 68° C)	240° to 279° F (116° to 137° C)
T3	155° to 174° F (68° to 79° C)	280° to 319° F (137° to 159° C)
T4	175° to 194° F (79° to 90° C)	320° to 359° F (160° to 182° C)
T5	195° to 215° F (90° to 102° C)	360° to 400° F (182° to 204° C)
T6	216° to 236° F (102° to 113° C)	
T7	237° to 257° F (114° to 125° C)	
T8	258° to 278° F (-51° to 138° C)	
T9	279° to 299° F (126° to 148° C)	
T10	300° to 320° F (149° to 160° C)	
T11	321° to 341° F (161° to 172° C)	
T12	344° to 362° F (173° to 183° C)	
T13	363° to 383° F (184° to 195° C)	

Code	Magnet Material	Temp. Limit
W	Somarium Cobalt	450° F (232° C)

Chemsteel pumps can be applied for temperatures as low as -50° F (-45.5° C) for pumps of metal construction.

SPECIFICATIONS

	S923 / SM923	S930 / SM930	S935/ SM935	S946 / SM946
Maximum flow (gpm) / (lpm) @1750 rpm	15 / 56.8	20 / 75.7	23 / 87.1	30 / 113.6
Theoretical displacement (CC / Revolution)	38.4	50.1	57.8	76.9
Maximum differential pressure (psig / bar)	150 / 10.3	150 / 10.3	150 / 10.3	150 / 10.3
Maximum system pressure (psig / bar)	225 / 15.5	225 / 15.5	225 / 15.5	225 / 15.5
Maximum speed (RPM)	1800	1800	1800	1800
Maximum fluid temperature	450° F (232.2° C)	450° F (232.2° C)	450° F (232.2° C)	450° F (232.2° C)
Minimum fluid temperature	-50° F (-45.5° C)	-50° F (-45.5° C)	-50° F (-45.5° C)	-50° F (-45.5° C)
NPSHR @ 1750 RPM	2 ft (0.6 meters)	4 ft (1.2 meters)	6 ft (1.8 meters)	10 ft (3 meters)
Standard port size	1 1/2" (38.1 mm) FNPT 1 1/2" BSPT	1 1/2" (38.1 mm) FNPT 1 1/2" BSPT	1/2" (12.7 mm) FNPT 1/2" BSPT	1/2" (12.7 mm) FNPT 1/2" BSPT
Weight (lbs / kgs)	10 / 4.5	10 / 4.5	10 / 4.5	10 / 4.5

Maximum pressures and temperatures may be limited by Gear / Bearing / Seal selection.

OPERATING AND SAFETY PRECAUTIONS

READ, UNDERSTAND, AND FOLLOW THIS INFORMATION TO AVOID INJURY AND PROPERTY DAMAGE.


EXCESSIVE AIR PRESSURE
STATIC SPARK


HAZARDOUS MATERIALS
HAZARDOUS PRESSURE

⚠ WARNING Be sure hoses and other components can withstand fluid pressures developed by this pump. Check any hoses for damage or wear. Be certain dispensing device is clean and in proper working condition.

⚠ WARNING IMPROPER GROUNDING. Can increase spark and electrical shock risk, resulting in severe injury or death. Ground pump and pumping system.

- The pumping system must be grounded when it is pumping, flushing, recirculating, or spraying flammable materials such as paints, solvents, lacquers, etc. or used in a location where surrounding atmosphere is conducive to spontaneous combustion. Ground the dispensing valve or device, containers, hoses, and any object to which material is being pumped.
- Secure pump, connections, and all contact points to avoid vibration and generation of contact or static spark. Consult local building codes and electrical codes for specific grounding requirements. After grounding, periodically verify continuity of electrical path to ground. Test with an ohmmeter from each component (e.g., hoses, piping, pump, clamps, motor, base plate, etc..) to ground to ensure continuity. Ohmmeter should show 0.1 ohms or less.

⚠ WARNING HAZARDOUS PRESSURE. Can result in serious injury or property damage. Do not service or clean pump while the system is pressurized.

⚠ WARNING HAZARDOUS MATERIALS. Can cause serious injury or property damage. Do not attempt to return a pump to the factory or service center that contains hazardous material. Safe handling practices must comply with local and national laws and safety code requirements. Obtain Material Safety Data Sheets on all materials from the supplier for proper handling instructions.

⚠ CAUTION Check pump seals, elastomers, and all wetted parts to assure compatibility before using commission of the product.

- Verify the chemical compatibility of the pump wetted parts and the substance being pumped, flushed or recirculated. Chemical compatibility may change with temperature and concentration of the chemical(s) within the substances being pumped, flushed or circulated. For specific fluid compatibility, consult the chemical manufacturer.

⚠ CAUTION Maximum temperatures are based on mechanical stress of seals and elastomers only. Certain chemicals will significantly reduce maximum safe operating temperature. Consult the chemical manufacturer for chemical compatibility and temperature limits.

⚠ CAUTION Be certain all operators of this equipment have been trained for safe working practices, understand it's limitations, and wear safety goggles / equipment when required.

⚠ CAUTION Do not use the pump for the structural support of the piping system. Be certain the system components are properly supported to prevent stress on the pump parts.

⚠ CAUTION Prevent unnecessary damage to the pump. Do not allow pump to operate in a dry run condition or under cavitating conditions for extended periods.

⚠ CAUTION Use only genuine MP Pumps® replacement parts to assure compatible pressure rating and longest service life.

⚠ CAUTION The mechanical seal in the pump must not be operated dry.

⚠ CAUTION If a pump will be idle in freezing weather it should be drained or filled with the proper anti-freeze.

NOTICE Pump should be installed in the position consistent with the manufactures specifications.

NOTICE Re-torque all fasteners before operation. Creep of housing and gasket materials may cause fasteners to loosen. Re-torque all fasteners to insure against fluid leakage.

⚠ WARNING	= Hazards or unsafe practices which could result in severe personal injury, death or substantial property damage.
⚠ CAUTION	= Hazards or unsafe practices which could result in minor personal injury, product or property damage.
NOTICE	= Important installation, operation or maintenance information.

STORAGE PRECAUTIONS

Drain pump, flush with water, and dry before prolonged storage after initial use.

INSTALLATION

Inspection:

Upon receipt of any pump or pump unit, check carefully for possible damage or shortages. Be sure that the shaft has not been bent or damaged. Rotate the pump by hand to be sure it is free and without tight spots. If the pump is to be stored, it should be kept in a dry location.

Mounting Bases:

Pump units should be mounted on either a concrete or metal foundation of sufficient weight and strength to properly support the entire pump unit. It should be located as close to the liquid source as is practical, while allowing for accessibility for normal pump maintenance. The foundation should be made flat and smooth to ensure correct alignment of the pump. Provisions should be made to bolt the unit securely in place.
Do not locate the pump unit in a pit unless provisions have been made for proper drainage and ventilation.

Alignment:

Correct alignment is absolutely essential for satisfactory pump life. Complete pump units are set and aligned at the factory on a flat surface plate and shims are inserted where necessary to provide perfect alignment. However, all baseplates are somewhat elastic and as a result we cannot assume responsibility for mechanical operation unless the shop alignment is reproduced when the unit is secured to its foundation. Since no foundation is perfectly flat or level, it is therefore necessary to shim the baseplate until the pump and motor shafts are level and parallel.
Recommended drive arrangement for pump only is direct motor drive. For belt or pulley drive applications, a pillow block bearing must be used to achieve acceptable pump life. However, it is important to ensure that the pump and motor shafts are parallel and in line. Recheck the alignment after the piping has been connected to the pump.
After the unit has been completely set and piped, check that the pump rotates freely by hand before activating the driver.
When pumps only are supplied for field mounting, it is important that the proper alignment between pump and drive is maintained. The baseplate should be secured to a flat surface plate and the driver and pump set so that the shafts are level and parallel.
The use of flexible coupling will not compensate for poor alignment. Parallel alignment can be determined by use of a straight edge across the rim of both coupling halves at four positions, ninety degrees apart. Couplings aligned in this manner should be true to within .005″ at any position. Angular alignment can be check by gauging the coupling gap at several points.
It is particularly important that pumps driven through a flexible coupling be mounted in such a manner as to ensure sufficient gap between the coupling components to allow for any end play in the driver.

TORQUE SPECIFICATIONS

BODY BOLTS - Stainless Steel and Alloy C

Pump Series	Number of bolts	Bolt thread	Bolt / Nut Head	Torque
Series S9	8	M6	13 mm hex	85 in-lbs (9.6 Nm)

OTHER MAG DRIVE BOLTS

Bolt thread	Bolt / Nut Head	Torque
M6	3mm socket head	28 in-lbs (3.16 Nm)
M5	4mm socket head	42 in-lbs (4.74 Nm)
M6	10mm hex head or 5mm socket head	45 in-lbs (5.08 Nm)
M8	13mm hex head or 6mm socket head	85 in-lbs (9.6 Nm)

PRESSURE - FLOW - POWER GRAPH

S923:

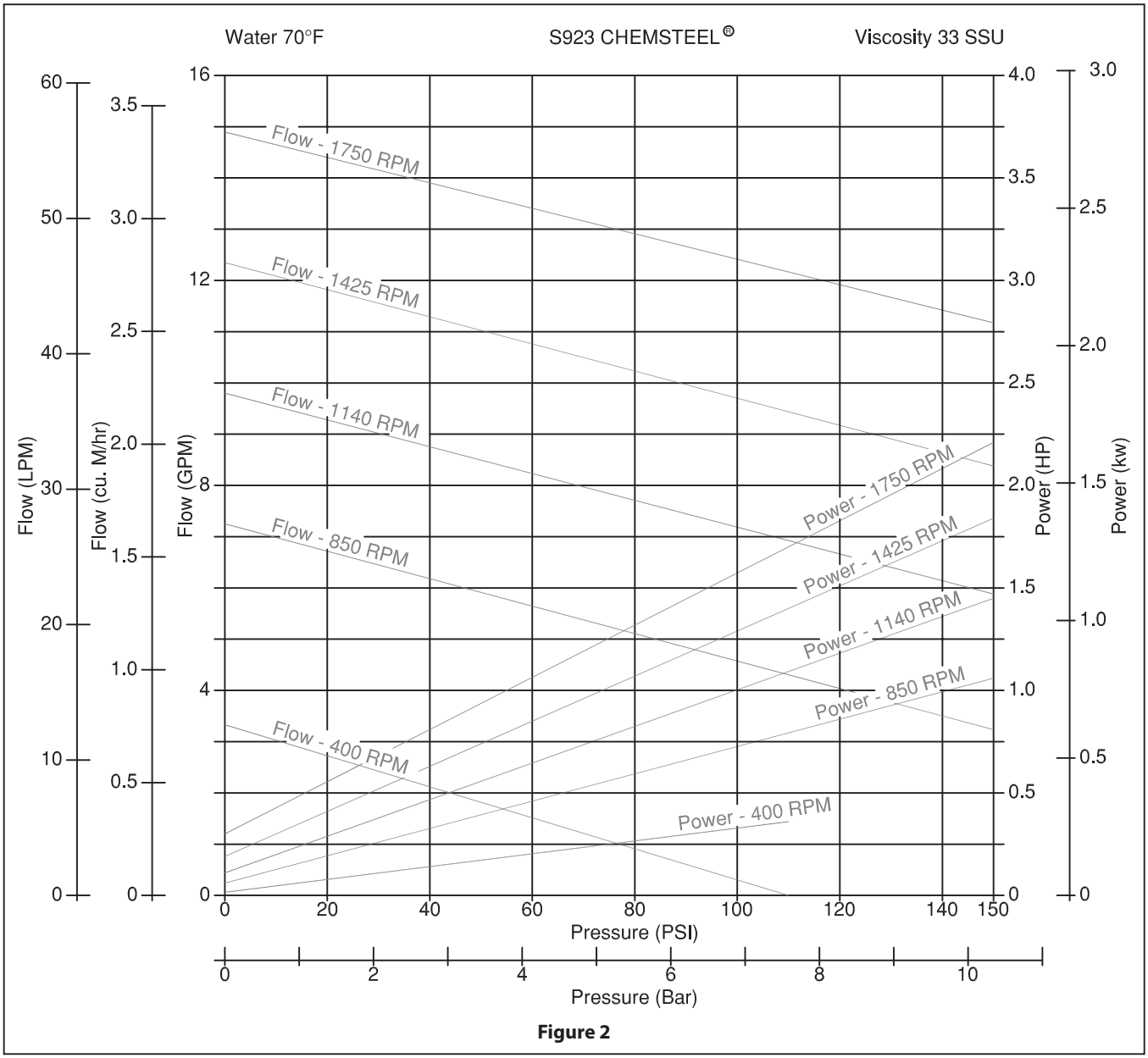


Figure 2

PRESSURE - FLOW - POWER GRAPH

SM923:

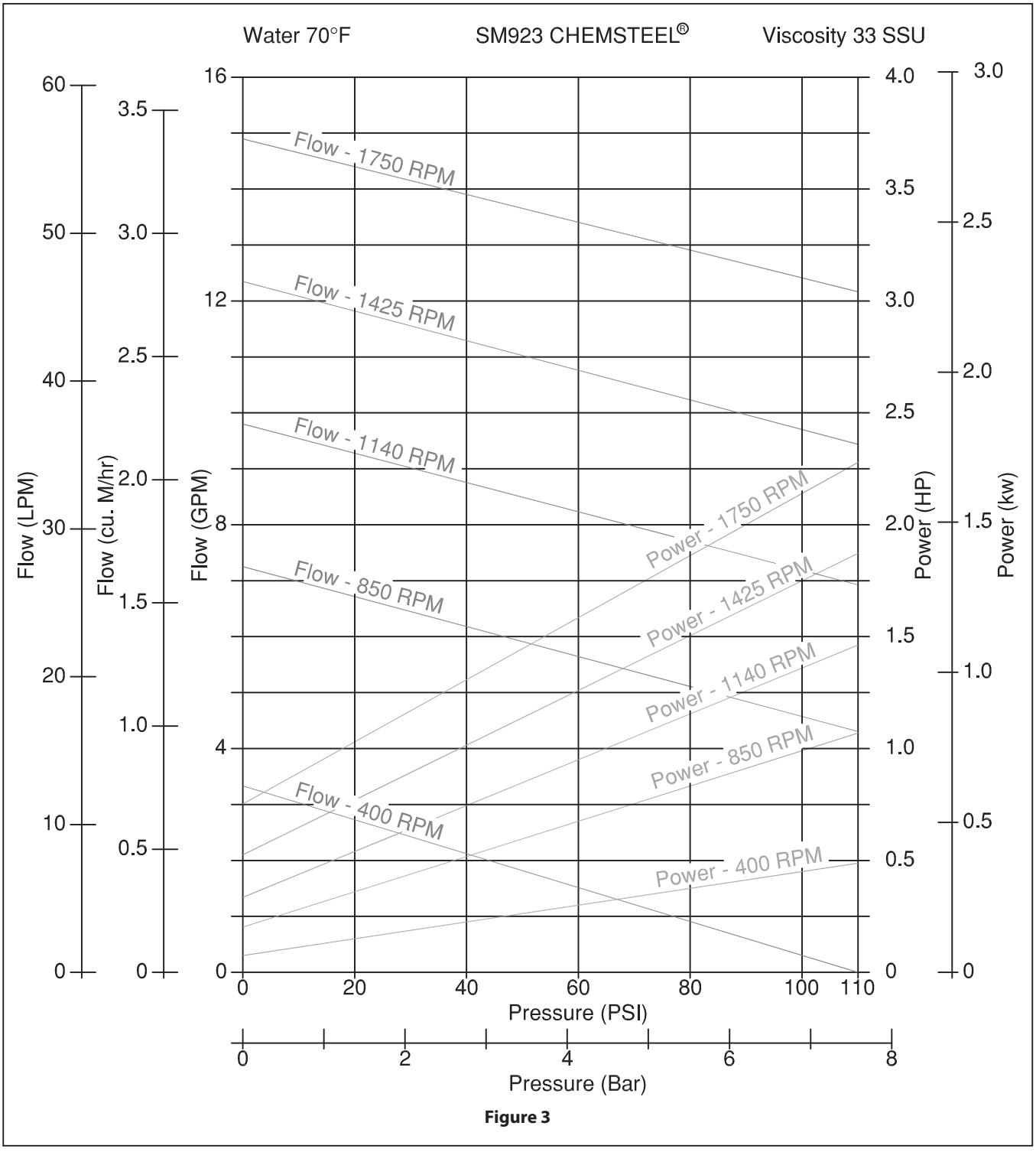


Figure 3

PRESSURE - FLOW - POWER GRAPH

S930:

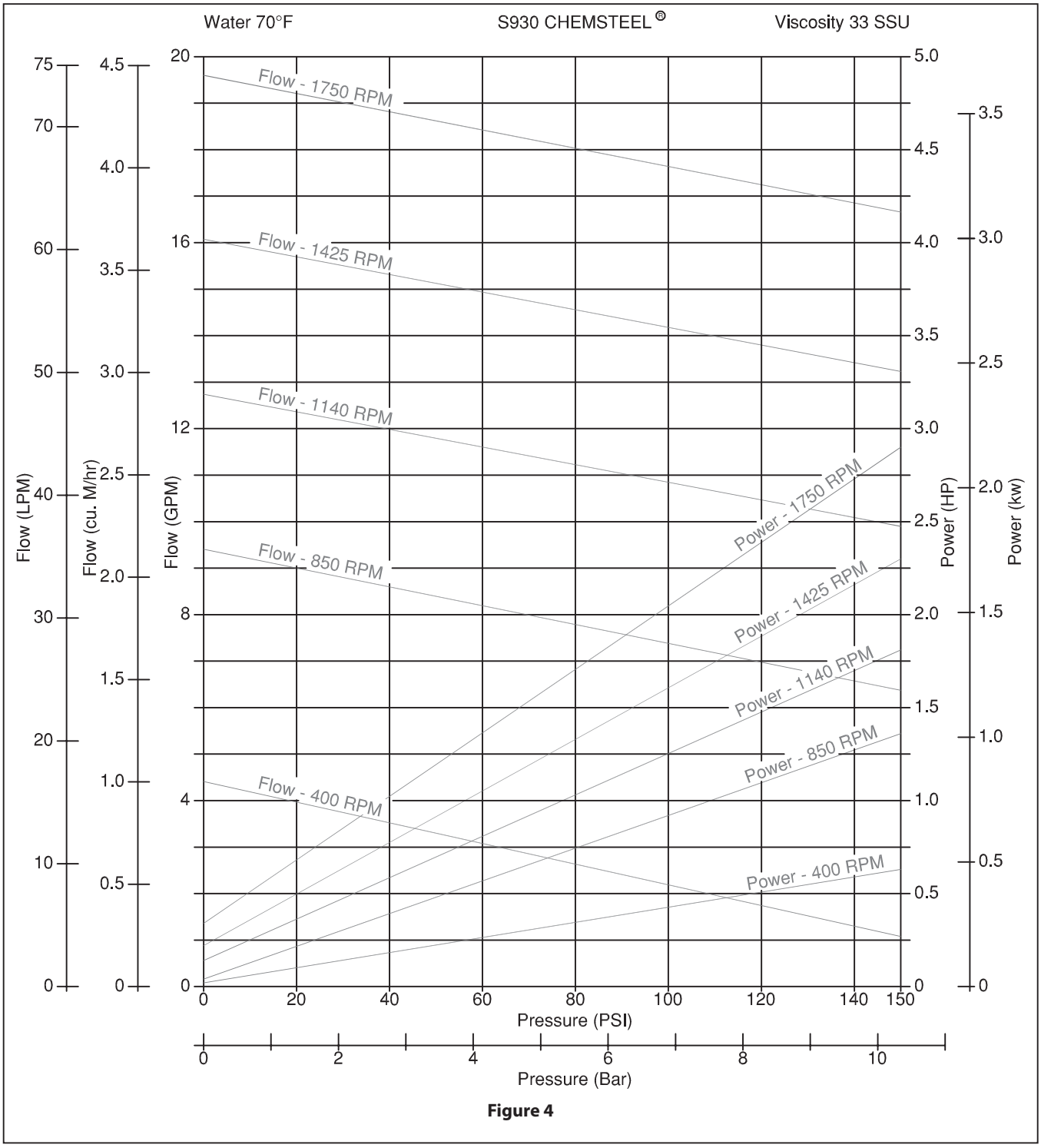


Figure 4

PRESSURE - FLOW - POWER GRAPH

SM930:

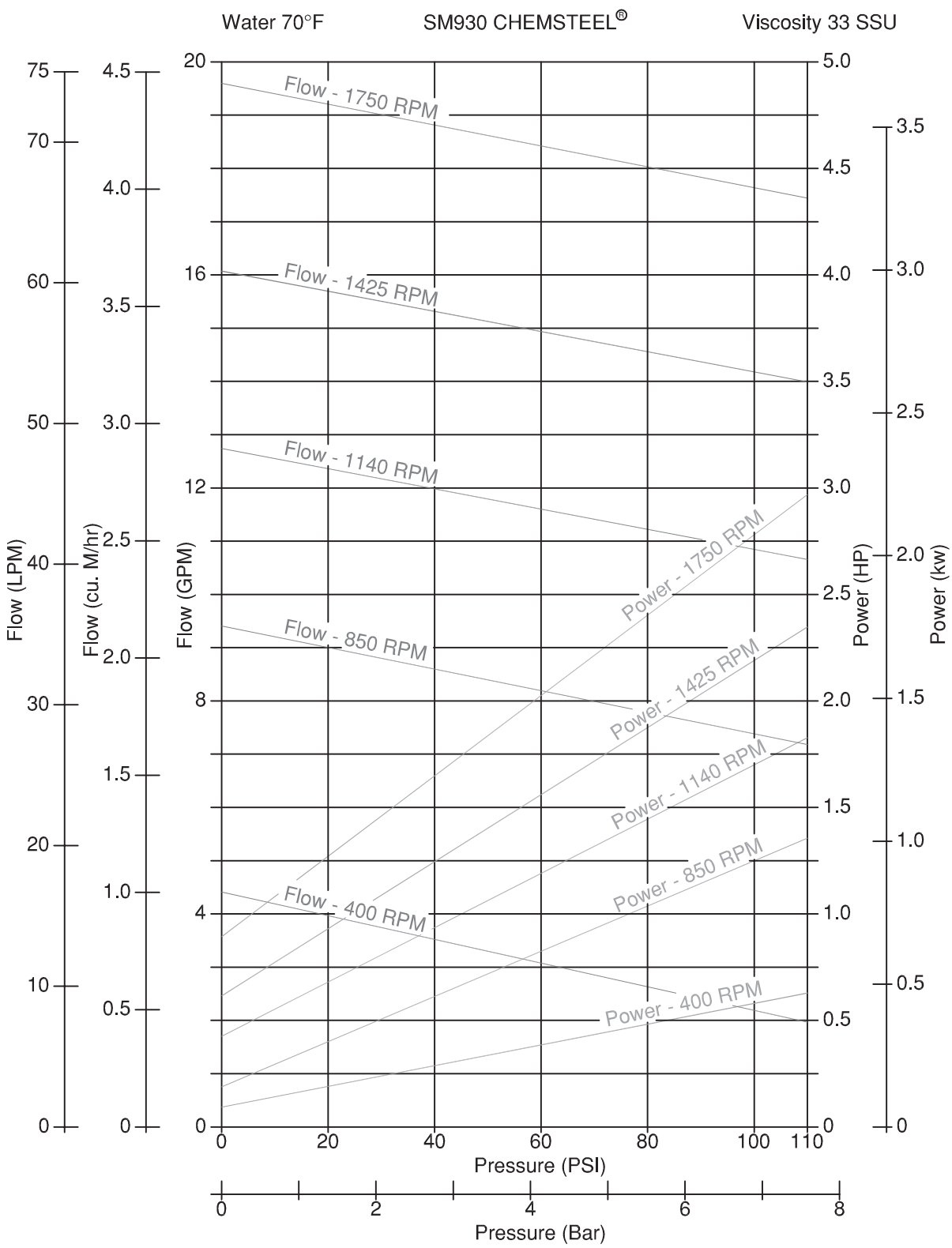


Figure 5

PRESSURE - FLOW - POWER GRAPH

S935:

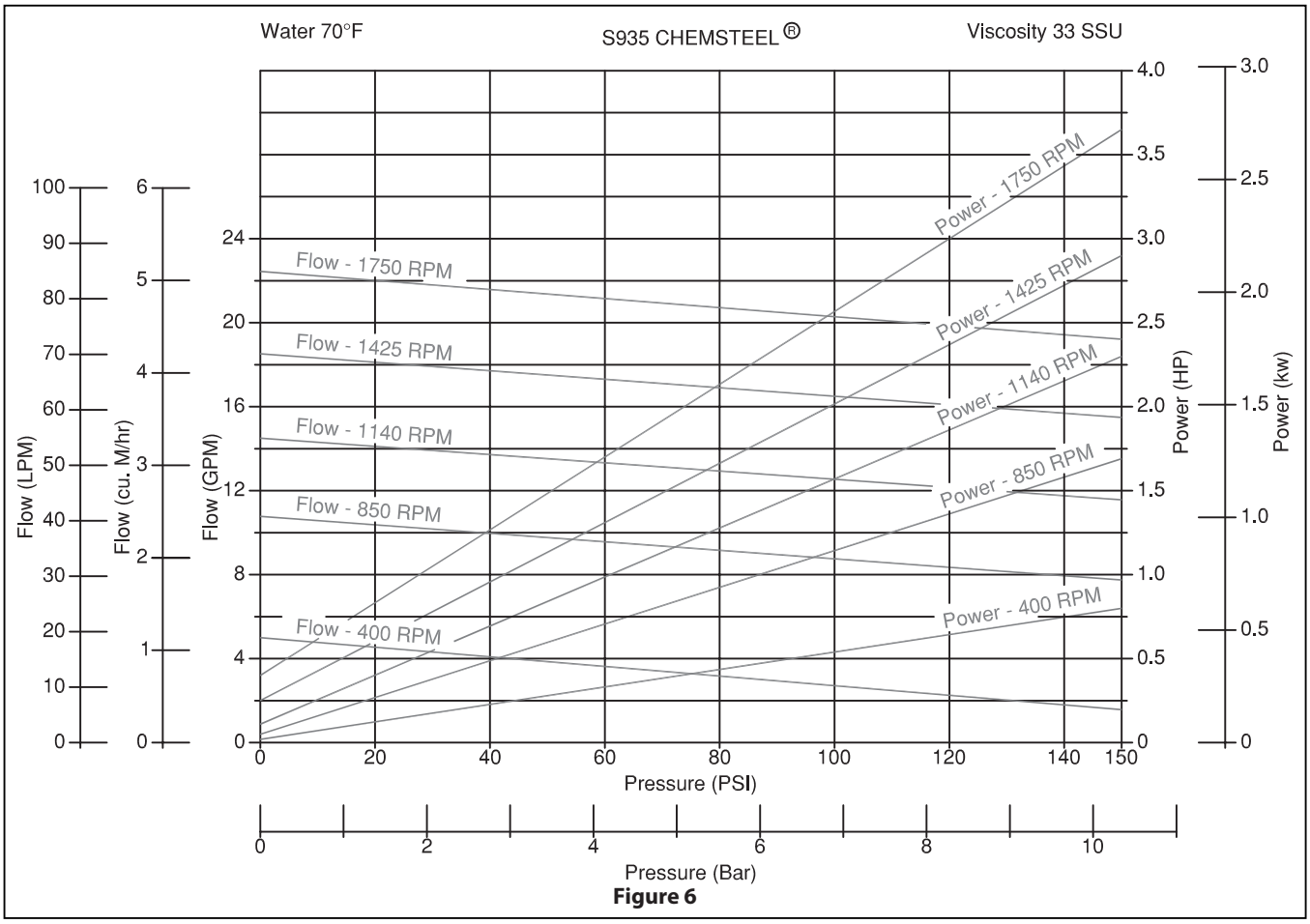


Figure 6

SM935:

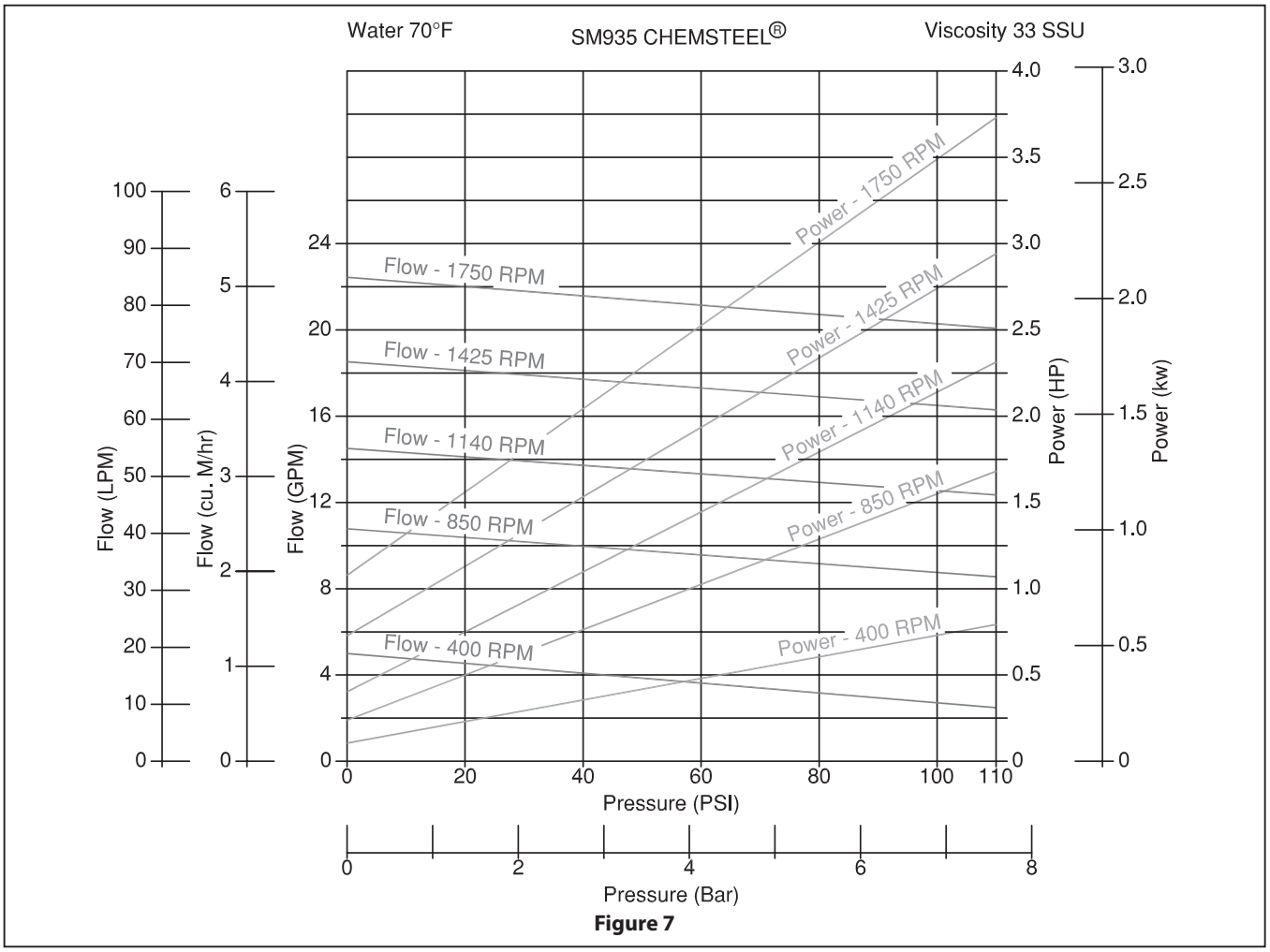


Figure 7

PRESSURE - FLOW - POWER GRAPH

S946:

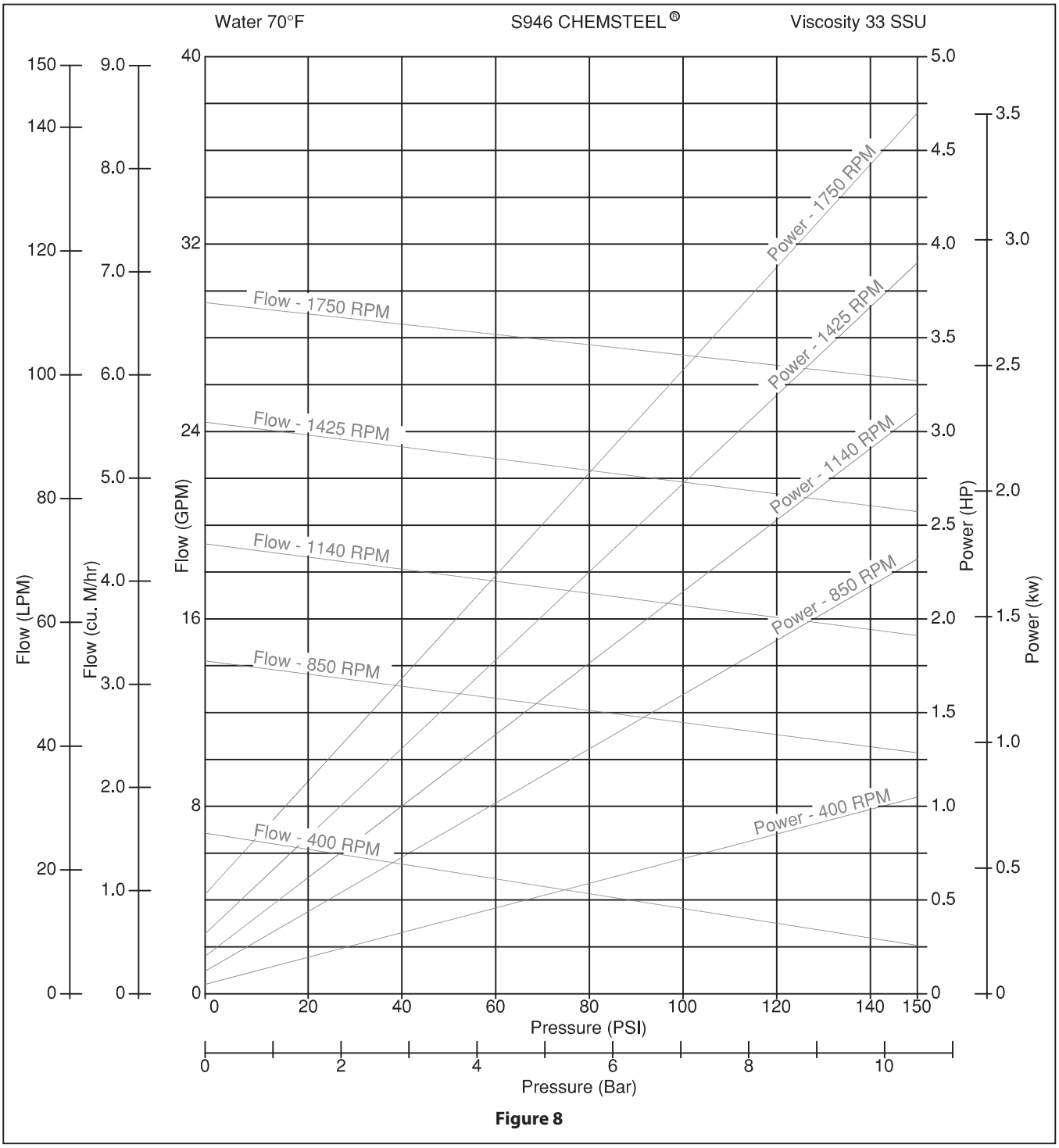


Figure 8

PRESSURE - FLOW - POWER GRAPH

SM946:

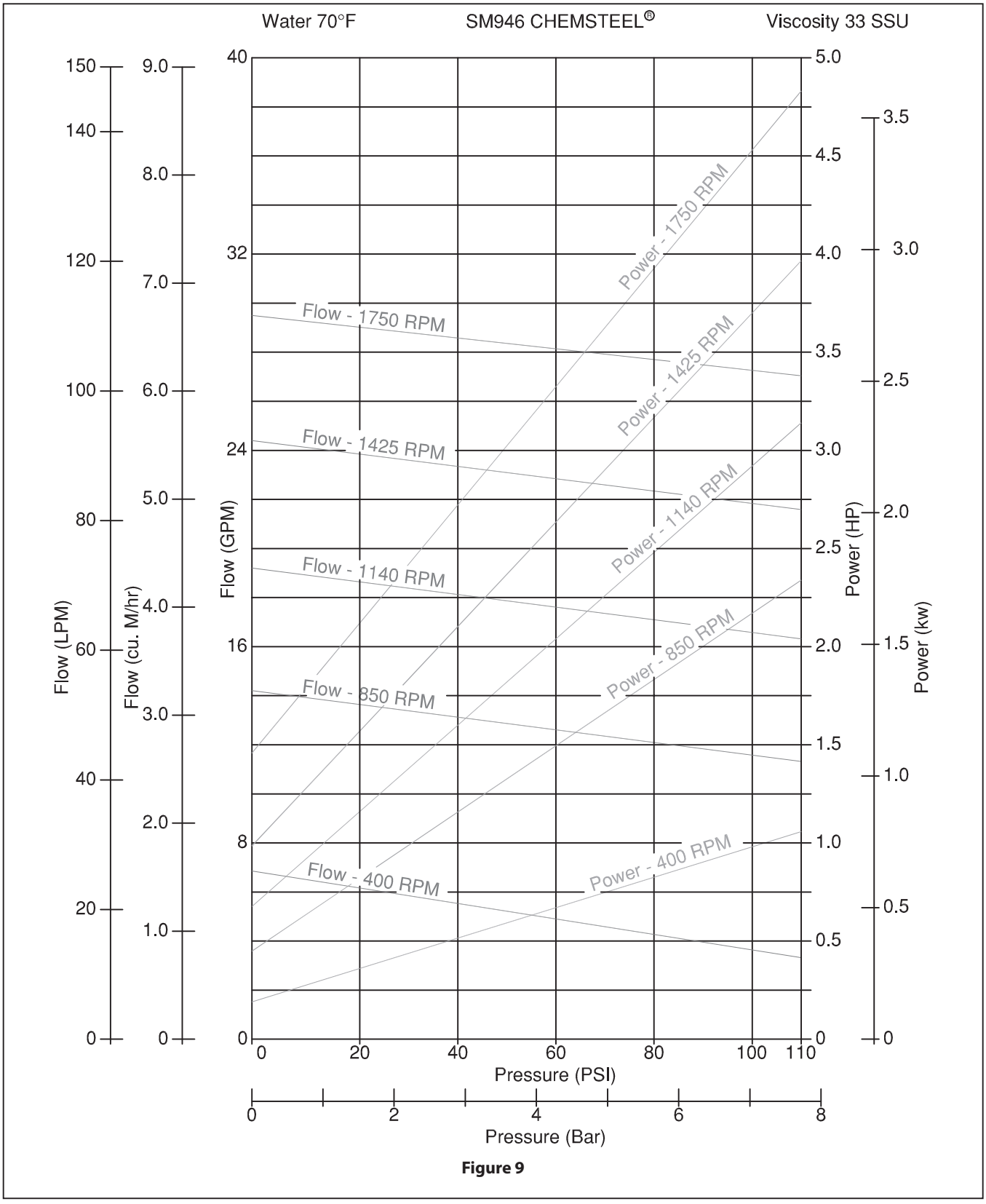


Figure 9

VISCOSITY vs SHAFT SPEED

1. Viscosity				2. Maximum Shaft Speed	3. Multipliers for Horsepower (Multiply X Water Horsepower)					
Liquid @ 70° F (21.1° C)	Centipoise CP @ 0.8 S.G.	Centistokes CS	Viscosity SSU	RPM	2 psi	20 psi	40 psi	60 psi	80 psi	100 psi
Water	1	1	5	1750	1.00	1.00	1.00	1.00	1.00	1.00
	9	11	50	1750	1.00	1.05	1.00	1.00	1.00	1.00
No. 2 Fuel Oil @ 57° F (13.9° C)	17	22	100	1700	1.10	1.10	1.05	1.05	1.00	1.00
	43	54	250	1600	1.20	1.15	1.10	1.10	1.05	1.05
SAE 10 Oil @ 62° F (16.7° C)	86	108	500	1500	1.30	1.25	1.20	1.15	1.10	1.10
	130	162	750	1400	1.45	1.35	1.25	1.20	1.15	1.15
SAE 30 Oil @ 72° F (22.2° C)	173	216	1000	1300	1.60	1.50	1.40	1.30	1.25	1.20
	432	540	2500	1200	1.90	1.75	1.60	1.45	1.35	1.30
SAE 60 Oil @ 70° F (21.1° C)	864	1080	5000	1000	2.20	2.00	1.80	1.60	1.50	1.40
	1296	1620	7500	850	2.60	2.30	2.00	1.80	1.70	1.60
SAE 70 Oil @ 60° F (15.6° C)	1728	2160	10000	600	3.00	2.60	2.20	2.00	1.90	1.80
	4320	5400	25000	500	3.50	3.00	2.70	2.40	2.20	2.00
No. 6 Fuel Oil @ 70° F (21.1° C)	8640	10800	50000	400	4.00	3.60	3.20	2.80	2.50	2.20
	12960	16200	75000	300	4.50	4.10	3.60	3.15	2.75	2.35
No. 6 Fuel Oil @ 60° F (15.6° C)	17280	21600	100000	200	5.00	4.50	4.00	3.50	3.00	2.50

NPSHr vs SHAFT SPEED

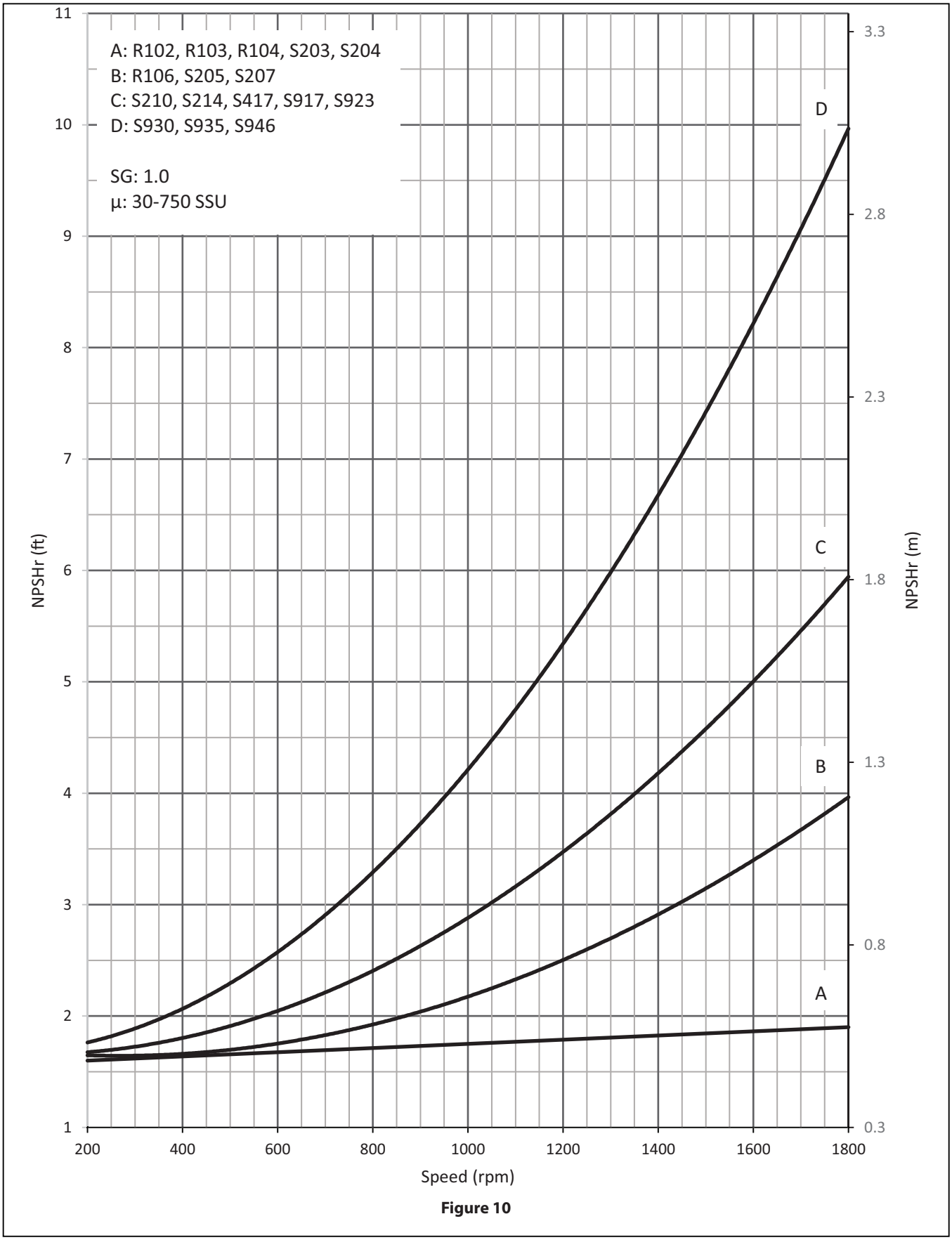


Figure 10

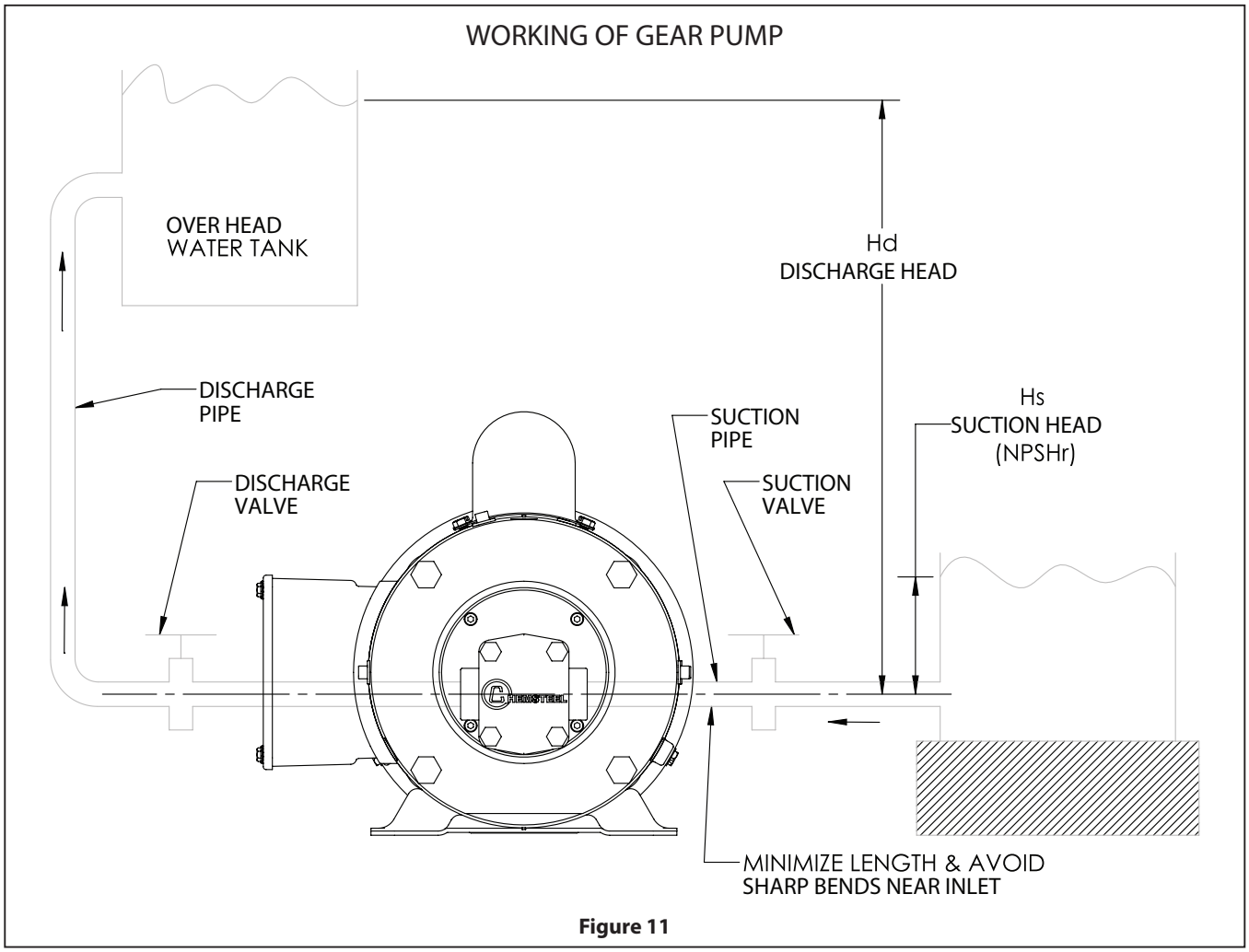


Figure 11

Suction Piping:

Chemical Gear pumps are capable of operating at 17.7 inches mercury suction (20 feet water). If the static lift plus pipe friction losses combine to exceed this figure, pump operation will be erratic or no pumping at all will be realized.

The most desirable pump installations are those with the shortest suction lines. It is therefore important to locate the pump as close to the liquid source as is practical. Suction piping should never be less in diameter than the pump suction opening. When handling thick liquids with appreciable viscosity, the suction pipe should be increased to a greater size than the pump opening.

It is particularly important that the suction line be air tight. Use a good pipe joint compound or tape at all joints. If the suction line is not tight and air is allowed to enter the pump capacity will be noticeably reduced or it may not pump at all.

Be sure that the suction line is completely clean and free of any foreign matter. Avoid high spots in piping, which will tend to trap air. It is good practice to install either a foot valve or check valve in the suction line to ensure that the pump will prime quickly when started.

When handling highly volatile chemicals, it is necessary to reduce the suction height to a point where vaporization will not occur. In some instances, a positive suction head will be required.

Suction Strainers:

Gear pumps are designed and fitted with very close internal clearances. The entry of foreign material or abrasives will cause rapid wear or extensive damage to the pump. It is therefore necessary to install a strainer at the pump suction.

Select a strainer of proper size and material with as fine a mesh as is practical, being careful that the pressure drop through the strainer will not add to the suction lift to exceed the suction capability of the pump. Install the strainer as near the pump suction as is practical and in such a manner that it can be easily opened and cleaned. Be sure to arrange a regular inspection on the strainer basket to avoid clogging.

Discharge:

Select pipe of sufficient size to ensure that the resulting friction loss does not add to the discharge head an amount that will exceed the design capability of the pump or motor. It is advisable to install a fitting in the discharge line adjacent to the pump to allow for priming or venting and installation of a pressure gage for both system and pump performance evaluation. To avoid excessive pressure build-up due to a closed or blocked discharge line, or due to an increase in liquid viscosity, it is often necessary to install a relief valve in the pumping system.

Chemical Gear pumps are not available with a relief valve built onto the pump. When required, it is necessary that the relief valve be installed in the discharge piping and piped back to the source of supply. Heat is better dissipated over large surface areas. The relief valve should be set at a pressure of approximately 10 PSI in excess of the designed operating pressure, but not so high as to overload the drive or the pump itself.

Product Contamination

All Chemical Gear pumps are tested using water soluble synthetic coolant. Unless specified, some of this solution remains in the pump during shipment to ensure some lubrication during start-up.

If this solution is detrimental to the system, it will be necessary to dismantle the pump and clean all parts thoroughly. Before starting, be sure to prime the pump with the liquid being pumped or with a good grade of clean, light lubricating oil compatible with the pumped fluid.

OPERATION

Priming:

Before operating the pump, make sure that it is thoroughly primed. If at all possible, use the liquid being pumped or a good grade of clean, light lubricating oil compatible with the pumped fluid. Failure to properly prime the pump could cause immediate damage to the working parts.

Lubrication:

The liquids being pumped lubricate the internal bearings in all Chemical Gear pumps. Outboard pillow block support bearings and motor bearings should be lubricated as covered by the manufacturer's instructions.

Direction of Rotation:

Upper shaft drive is standard and standard direction of rotation is clockwise when facing shaft end of the pump. When rotated in this manner and the pump and/or piping must be installed so that the suction line is connected to the port on the left hand side of the pump. If the right hand port is to be the inlet or suction, the rotation must be counter clockwise when facing the pump from the shaft end.
Chemical Gear pumps are designed to operated in either direction of rotation.

REPAIR

Disassembling Pump:

Repair kits are available for all Chemical Gear pump models. Each repair kit includes replacement o-ring, seal, gears, shafts, bearings, keys, and, retaining rings.
Oberdorfer Chemical Gear pumps are constructed of three sections - a rear cover, a body section, and a front cover. The covers are bolted to the body with socket head cap screws.
Remove the screws and separate pump sections by tapping lightly while forcing sections apart. Pump body and front cover are doweled together. Ease body off of front cover dowel pins by lightly tapping and forcing apart. Lightly tapping on exposed pump drive shaft aids separation of pump section.

- Remove rear bearings.
- Slide out idler gear and shaft assembly and the front idler bearing.
- Slide out the drive gear and shaft assembly and remove o-rings from body.
- For mechanical seal models, the drive gear and shaft assembly also includes a seal retaining ring and seal head and may also include a thrust washer.
- Two set screws may secure the seal head to the drive shaft. If so, loosen both set screws and slide the seal head from the drive shaft.
- Removal of the seal retaining ring ("C" ring) allows sliding off the thrust washer, if included and upper front bearing. Remove the mating seal parts in the front cover chamber (seal wear face and seal seat). They can be pried out by using a hook tool or by pushing a 1/8" diameter drift through the push-out hole or pushed out after removal of the snap ring.
- Metal gears are pinned (non-separable) or keyed to pump shafts. Metal or plastic gears that are driven via a woodruff key are positioned and retained over the key by retaining rings. Gear and shaft components are also normally provided as already assembled assemblies.
- Replace any parts where wear is evident.

Re-Assembling Pump:

Carefully clean all parts and lubricate lightly with the liquid being pumped or with a good grade of clean, light lubricating oil compatible with the pumped fluid. Make sure pump body faces are clean and free of nicks or scratches. If new bearings are used, try in body and on shaft before re-assembling pump.
For mechanical seal models, prepare the front cover for re-assembly by inserting the seal wear face with seal seat into the cover's seal chamber and replacing the snap ring, as required. Use of a quality elastomer lubricant will aid in this step, remove excess.

- Insert o-ring into the groove at each end of the pump body.
- Prepare the drive gear assembly by sliding on the front bearing, and thrust washer, if any.
- Install seal retaining ring into the groove provided on the shaft.
- Slide the mechanical seal head onto the shaft (metal end first) and position against the seal retaining ring. Use of a quality elastomer lubricant will aid in this step, remove excess.

NOTE: The lapped black carbon sealing face on the other end of the mechanical seal head must be clean and lubricated with light oil. It must also be free of marks or scratches when in contact with the seal wear face.

- Tighten the two seal head set screws, if provided, to insure it will rotate with the shaft and carefully insert the complete drive gear and shaft assembly into the pump body.
- Tighten in increments to maintain seal centering on the shaft.
- Assemble the lower front carbon bearing into pump body. Assemble front cover by engaging dowel pins into body. Insert socket head cap screws into front cover and thread into body, hand tight.
- Insert idle gear shaft assembly and remaining bearings into the pump body section.
- Assemble rear cover (no dowel pins) in the same manner as the front cover.

- Tighten screws in diagonal sequence carefully, please refer page no 6 for torque values. Rotate drive shaft by hand to insure alignment and pump looseness.

NOTE: Chemical Gear pump internal tolerances are held extremely close. Pump parts are manufactured to precise dimensions and most rigid quality control standards. The smallest foreign particle or damage in the form of a nick or gouge could jam the gears and bind the pump. Extreme cleanliness and care is essential for proper pump assembly.

Operating Temperatures and Pressures:

Please refer page no 4.

Starting:

Never start or run the pump dry. This will inevitably cause galling or seizing of the internal parts. Always prime the pump with the liquid being pumped or with a good grade of clean, light lubricating oil compatible with the pumped fluid. Before starting, rotate the pump by hand. It should rotate freely without tight spots. Check that all suction and discharge valves are open and that any relief valves have been "backed off". After priming, start the driver and allow pump to operate at a reduced load while observing for unreasonable noise, heat, or vibration. Check to be sure that pump is delivering liquid. If not, shutdown immediately and review foregoing instructions.

Gradually bring pump up to operating pressure by tightening relief valve adjustment until the pressure gauge indicates that the system design pressure has been reached. Again check pump for excessive noise, heat, or vibration. Check that the pump is delivering the required capacity and that the vacuum is not in excess of design conditions. If it is determined that the pump is meeting the required conditions, it is important to check that the driver I not overloaded.

Be sure that the overload protection for the electric motor is properly sized. Check that the electric motor is operating within the nameplate amperage limitations.

MAINTENANCE

General:

Chemical Gear pumps are designed to be lubricated by the liquid being pumped and therefore do not require lubrication maintenance. Barrel type carbon or PTFE bearings are self-lubricating.

Lubrication for a reduction gear drive, outboard bearing support and electric motor should be maintained as specified in the manufacturer's instructions furnished with the shipment.

PARTS LIST S923 / S930 / S935 / S946

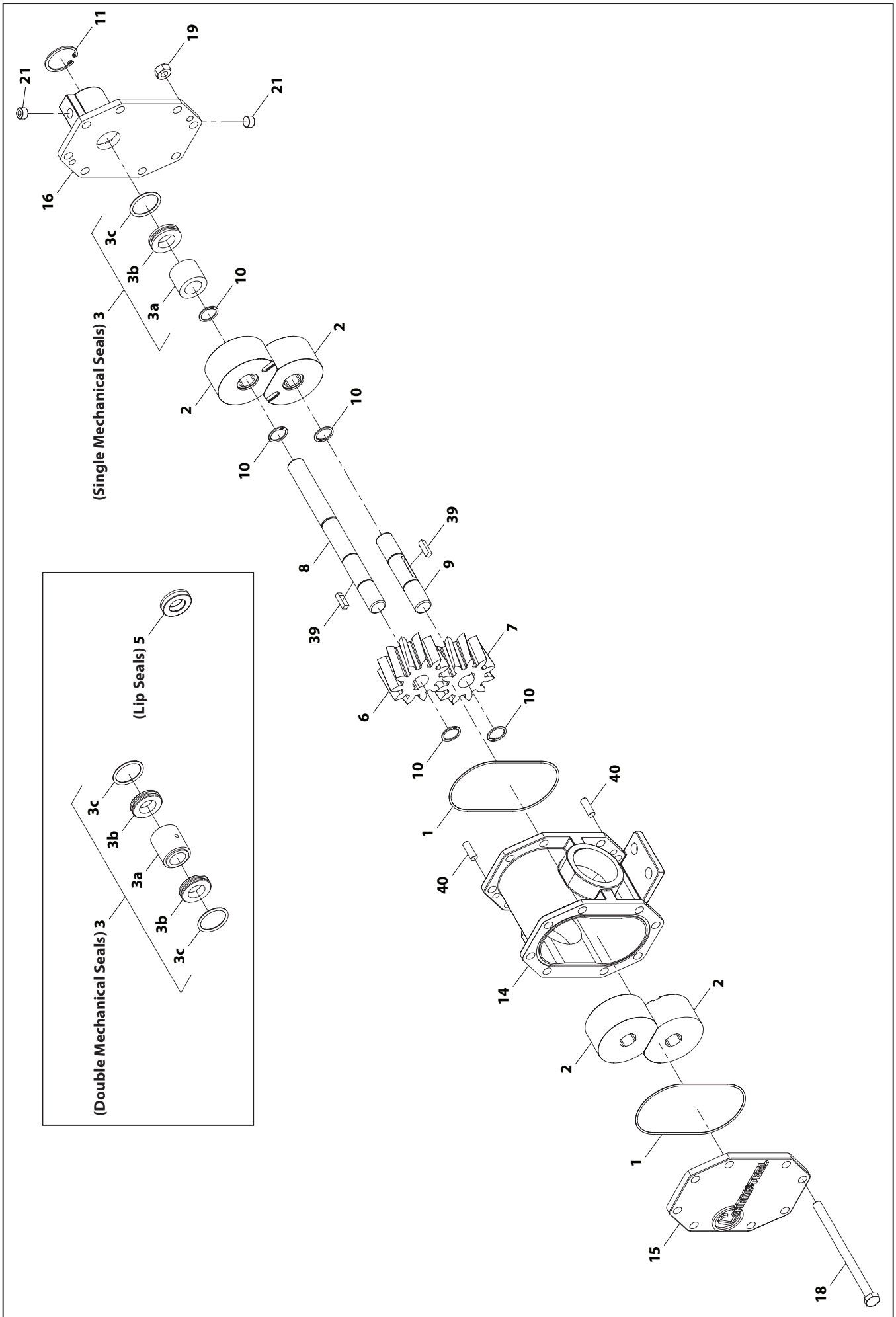


Figure 12

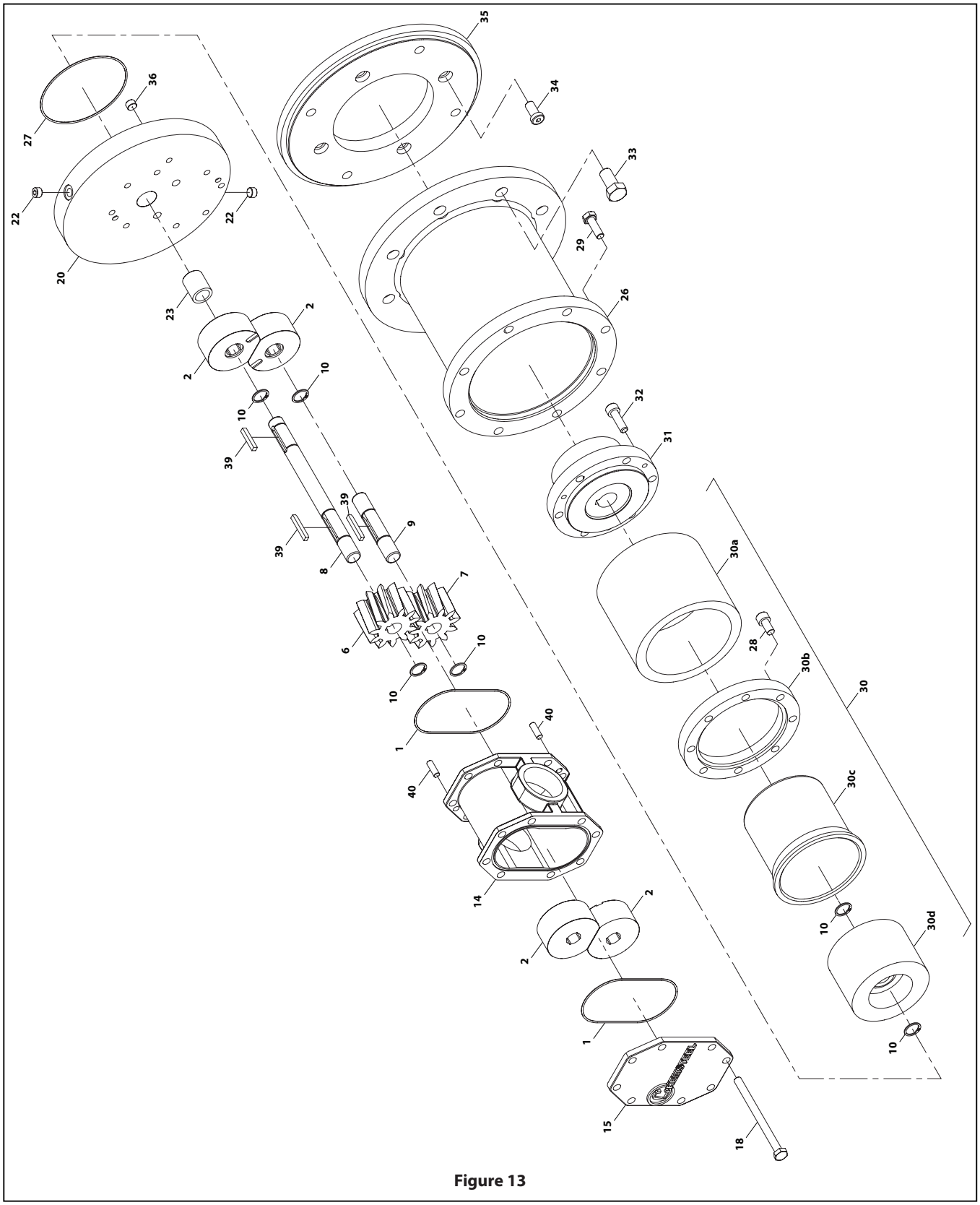


Figure 13

PARTS LIST S923 / S930 / S935 / S946 AND SM923 / SM930 / SM935 / SM946

⅄Item 3a, 3b and 3c are included in 3 (Mechanical Seal).
✦Item 30a, 30b, 30c and 30d are included in 30 (Magnet kit).
★ Item 31, 32, 33, 34 and 35 are included in Mag power kit.

COMMON PARTS

Item	Description (size)	Qty	Part No.	Mtl
1	O-Ring	2	OB9355-044	PTFE
⅄3	Single Mechanical Seal	1	OB32923	Seal Code A
	Single Mechanical Seal	1	OB32924	Seal Code D
	Single Mechanical Seal	1	OB33071	Seal Code C
	Single Mechanical Seal	1	OB33072	Seal Code F
	Single Mechanical Seal	1	OB32917	Seal Code B
	Single Mechanical Seal	1	OB33074	Seal Code J
	Double Mechanical Seal	1	OB33077	Seal Code G
	Double Mechanical Seal	1	OB33080	Seal Code H
	Single Mechanical Seal	1	OB33108	Seal Code Z
5	Lip Seal	2	OB2750	Seal Code L
14	Body (1/2" NPT Ports)	1	OB8246S-5	316 SS
	Body (1/2" NPT Ports)	1	OB8246H-5	Alloy C
15	Rear Cover	1	OB8247S-1	316 SS
	Rear Cover	1	OB8247H-1	Alloy C
16	Front Cover	1	OB8248S-3	316 SS
	Front Cover	1	OB8248H-3	Alloy C
	Front Cover, (Only Lip Seal)	1	OB8865S-5	316 SS
18	Hex Head Cap Screws	8	OB9366-120	304 SS
	Hex Head Cap Screws (Mag Drive)	8	OB9366-107	304 SS
19	Hex Nuts	8	OB9368	304 SS
20	Pump Adapter (Mag Drive only)	1	OB2488S-9	316 SS
	Pump Adapter (Mag Drive only)	1	OB2488H-9	Alloy C
21	Hex Head Pipe Plug (Mag Drive only)	2	OB6600-01	316 SS
	Hex Head Pipe Plug (Mag Drive only)	2	OB6600-02	Alloy C
22	Allen Head Pipe Plug (Mag Drive only)	2	OB2919-01	316 SS
	Allen Head Pipe Plug (Mag Drive only)	2	OB2919-02	Alloy C
23	Bearing (Mag Drive only)	1	OB5091-01	Carbon Graphite
	Bearing (Mag Drive only)	1	OB2064	Rulon

Item	Description (size)	Qty	Part No.	Mtl
26	Bell Housing (Mag Drive only)	1	OB2100	
27	O-Ring (Mag Drive only)	1	OB9355-044	PTFE
28	Socket Head Cap Screws (Mag Drive only)	8	OB2462-016	316 SS
29	Hex Head Cap Screws (Bell/Pump Adapter) (Mag Drive only)	4	OB2484-025	
✦30	Magnet Kit, (Mag Drive only)	1	OB2023-30SS	316 SS
	Magnet Kit (Mag Drive only)	1	OB2023-30SH	Alloy C
36	Orifice Plug (0.015")	1	OB2919H-025	Hastelloy
39	Key, Woodruff (Mag Drive only)	1	OB2475	Hastelloy
	Key, Woodruff	2	OB2741	316 SS
40	Dowel Pin	2	OB9794	316 SS

	Mounted Adapter Code (includes item 31, 32, 33, 34 and 35)	Kit Part No	Motor Frame
★35	C1	M9AD56	56
	C2	M9AD45T	143TC 145TC 182C 184C
	C4	M9AD80E	IEC 71, B14 Face
	C5	M9AD90E	IEC 90, B14 Face
	C6	M9AD84T	182TC 184TC 213C 215C
	C7	M9AD100E	IEC 100, B14 Face

BEARING OPTIONS S923 / SM923

Item		Part No.	Qty	Mtl	BEARING CODE		
					C	P	J
2	BEARING	OB2744TC-A	4	Carbon Graphite	✓		
2		OB2745TC-A	4	PTFE		✓	
2		OB2213TC	4	Rulon			✓

BEARING OPTIONS S930 / SM930

Item		Part No.	Qty	Mtl	BEARING CODE		
					C	P	J
2	BEARING	OB2781TC-A	4	Carbon Graphite	✓		
2		OB2782TC-A	4	PTFE		✓	
2		OB2214TC	4	Rulon			✓

BEARING OPTIONS S935 / SM935

Item		Part No.	Qty	Mtl	BEARING CODE		
					C	P	J
2	BEARING	OB8036TC-A	4	Carbon Graphite	✓		
2		OB9411TC-A	4	PTFE		✓	
2		OB8649TC-A	4	Rulon			✓

BEARING OPTIONS S946 / SM946

Item		Part No.	Qty	Mtl	BEARING CODE		
					C	P	J
2	BEARING	OB2765-A	4	Carbon Graphite	✓		
2		OB2871-A	4	PTFE		✓	
2		OB2215	4	Rulon			✓

PARTS LIST S923 / S930 / S935 / S946 AND SM923 / SM930 / SM935 / SM946

DRIVE GEAR / IDLE GEAR OPTIONS S923 / SM923

Item		Part No.	Qty	Mtl	GEAR CODE													
					1	2	3	4	5	6	7	8	9	A	B	C	E	F
6	DRIVE GEAR	OB2663-01A	1	PPS	✓													
6		OB2660-01A	1	316 SS		✓									✓		✓	✓
6		OB2665-01A	1	PEEK			✓											
6		OB2662-01A	1	Alloy C				✓	✓				✓	✓				
6		OB2661-01A	1	W 88						✓		✓				✓		
6		OB2664-01A	1	PTFE							✓							
7	IDLE GEAR	OB2663-02A	1	PPS	✓									✓	✓	✓		
7		OB2660-02A	1	316 SS													✓	
7		OB2665-02A	1	PEEK		✓	✓						✓					
7		OB2662-02A	1	Alloy C				✓										
7		OB2661-02A	1	W 88						✓								
7		OB2664-02A	1	PTFE					✓		✓	✓						✓

DRIVE GEAR / IDLE GEAR OPTIONS S930 / SM930

Item		Part No.	Qty	Mtl	GEAR CODE													
					1	2	3	4	5	6	7	8	9	A	B	C	E	F
6	DRIVE GEAR	OB2826-01A	1	PPS	✓													
6		OB2823-01A	1	316 SS		✓									✓		✓	✓
6		OB2828-01A	1	PEEK			✓											
6		OB2824-01A	1	Alloy C				✓	✓				✓	✓				
6		OB2825-01A	1	W 88						✓		✓				✓		
6		OB2827-01A	1	PTFE							✓							
7	IDLE GEAR	OB2826-02A	1	PPS	✓									✓	✓	✓		
7		OB2823-02A	1	316 SS													✓	
7		OB2828-02A	1	PEEK		✓	✓						✓					
7		OB2824-02A	1	Alloy C				✓										
7		OB2825-02A	1	W 88						✓								
7		OB2827-02A	1	PTFE					✓		✓	✓						✓

DRIVE GEAR / IDLE GEAR OPTIONS S935 / SM935

Item		Part No.	Qty	Mtl	GEAR CODE													
					1	2	3	4	5	6	7	8	9	A	B	C	E	F
6	DRIVE GEAR	OB9397-01A	1	PPS	✓													
6		OB9662-01A	1	316 SS		✓									✓		✓	✓
6		OB9398-01A	1	PEEK			✓											
6		OB8867-01A	1	Alloy C				✓	✓				✓	✓				
6		OB8337-01A	1	W 88						✓		✓				✓		
6		OB8859-01A	1	PTFE							✓							
7	IDLE GEAR	OB9397-02A	1	PPS	✓									✓	✓	✓		
7		OB9662-02A	1	316 SS													✓	
7		OB9398-02A	1	PEEK		✓	✓						✓					
7		OB8867-02A	1	Alloy C				✓										
7		OB8337-02A	1	W 88						✓								
7		OB8859-02A	1	PTFE					✓		✓	✓						✓

DRIVE GEAR / IDLE GEAR OPTIONS S946 / SM946

Item		Part No.	Qty	Mtl	GEAR CODE													
					1	2	3	4	5	6	7	8	9	A	B	C	E	F
6	DRIVE GEAR	OB2457-01A	1	PPS	✓													
6		OB2454-01A	1	316 SS		✓									✓		✓	✓
6		OB2459-01A	1	PEEK			✓											
6		OB2455-01A	1	Alloy C				✓	✓				✓	✓				
6		OB2456-01A	1	W 88						✓		✓				✓		
6		OB2458-01A	1	PTFE							✓							
7	IDLE GEAR	OB2457-021A	1	PPS	✓									✓	✓	✓		
7		OB2454-02A	1	316 SS													✓	
7		OB2459-02A	1	PEEK		✓	✓						✓					
7		OB2455-02A	1	Alloy C				✓										
7		OB2456-02A	1	W 88						✓								
7		OB2458-02A	1	PTFE					✓		✓	✓						✓

PARTS LIST S923 / S930 / S935 / S946 AND SM923 / SM930 / SM935 / SM946

DRIVE SHAFT / IDLE SHAFT OPTIONS S923 / SM923

Item	Description	Part No.	Qty	Mtl	GEAR CODE										
					A	B	C	D	F	G	H	J	Z	L	W
8	Drive Shaft (Single Mechanical Seals)	OB2434	1	316 SS	✓	✓	✓					✓	✓		
8	Drive Shaft (Single Mechanical Seals)	OB2435	1	Alloy C				✓	✓			✓			
8	Drive Shaft (Double Mechanical Seals)	OB2436	1	316 SS						✓	✓			✓	
8	Drive Shaft (Double Mechanical Seals)	OB2437	1	Alloy C						✓	✓				
8	Drive Shaft (Mag)	OB2440	1	316 SS											✓
8	Drive Shaft (Mag)	OB2441	1	Alloy C											✓
9	Idle Shaft	OB2438	1	316 SS	✓	✓	✓			✓	✓	✓	✓	✓	✓
9	Idle Shaft	OB2439	1	Alloy C				✓	✓	✓	✓				✓

DRIVE SHAFF / IDLE SHAFT OPTIONS S930 / SM930

Item	Description	Part No.	Qty	Mtl	GEAR CODE										
					A	B	C	D	F	G	H	J	Z	L	W
8	Drive Shaft (Single Mechanical Seals)	OB2408	1	316 SS	✓	✓	✓					✓	✓		
8	Drive Shaft (Single Mechanical Seals)	OB2409	1	Alloy C				✓	✓			✓			
8	Drive Shaft (Double Mechanical Seals)	OB2410	1	316 SS						✓	✓			✓	
8	Drive Shaft (Double Mechanical Seals)	OB2411	1	Alloy C						✓	✓				
8	Drive Shaft (Mag)	OB2414	1	316 SS											✓
8	Drive Shaft (Mag)	OB2415	1	Alloy C											✓
9	Idle Shaft	OB2412	1	316 SS	✓	✓	✓			✓	✓	✓	✓	✓	✓
9	Idle Shaft	OB2413	1	Alloy C				✓	✓	✓	✓				✓

DRIVE SHAFF / IDLE SHAFT OPTIONS S935/ SM935

Item	Description	Part No.	Qty	Mtl	GEAR CODE										
					A	B	C	D	F	G	H	J	Z	L	W
8	Drive Shaft (Single Mechanical Seals)	OB2424	1	316 SS	✓	✓	✓					✓	✓		
8	Drive Shaft (Single Mechanical Seals)	OB2425	1	Alloy C				✓	✓			✓			
8	Drive Shaft (Double Mechanical Seals)	OB2426	1	316 SS						✓	✓			✓	
8	Drive Shaft (Double Mechanical Seals)	OB2427	1	Alloy C						✓	✓				
8	Drive Shaft (Mag)	OB2430	1	316 SS											✓
8	Drive Shaft (Mag)	OB2431	1	Alloy C											✓
9	Idle Shaft	OB2428	1	316 SS	✓	✓	✓			✓	✓	✓	✓	✓	✓
9	Idle Shaft	OB2429	1	Alloy C				✓	✓	✓	✓				✓

DRIVE SHAFF / IDLE SHAFT OPTIONS S946/ SM946

Item	Description	Part No.	Qty	Mtl	GEAR CODE										
					A	B	C	D	F	G	H	J	Z	L	W
8	Drive Shaft (Single Mechanical Seals)	OB2416	1	316 SS	✓	✓	✓					✓	✓		
8	Drive Shaft (Single Mechanical Seals)	OB2417	1	Alloy C				✓	✓			✓			
8	Drive Shaft (Double Mechanical Seals)	OB2418	1	316 SS						✓	✓			✓	
8	Drive Shaft (Double Mechanical Seals)	OB2419	1	Alloy C						✓	✓				
8	Drive Shaft (Mag)	OB2422	1	316 SS											✓
8	Drive Shaft (Mag)	OB2423	1	Alloy C											✓
9	Idle Shaft	OB2420	1	316 SS	✓	✓	✓			✓	✓	✓	✓	✓	✓
9	Idle Shaft	OB2421	1	Alloy C				✓	✓	✓	✓				✓

RETAINING CLIP OPTIONS

Item	Description	Part No.	Mtl	GEAR CODE																					
				A	Qty	B	Qty	C	Qty	D	Qty	F	Qty	G	Qty	H	Qty	J	Qty	Z	Qty	L	Qty	W	Qty
10	Retaining Clip	OB5382	15-7 PH SS	✓	5	✓	5	✓	5	✓	5	✓	5	✓	4	✓	4	✓	5	✓	5	✓	4	✓	6
10	Retaining Clip	OB2066	Alloy C	✓	5	✓	5	✓	5	✓	5	✓	5	✓	4	✓	4	✓	5	✓	5	✓	4	✓	6

RETAINING RING OPTIONS

Item	Description	Part No.	Mtl	GEAR CODE																					
				A	Qty	B	Qty	C	Qty	D	Qty	F	Qty	G	Qty	H	Qty	J	Qty	Z	Qty	L	Qty	W	Qty
11	Retaining Ring	OB7557	15-7 PH SS																			✓	3		
11	Retaining Ring	OB9845	15-7 PH SS	✓	1	✓	1	✓	1	✓	1	✓	1	✓	1	✓	1	✓	1	✓	1	✓	1		

SERVICE KITS

NOTE: Pump model should match the kit number exactly and end in K, if they don't see their pump listed, contact the factory for a new kit number.

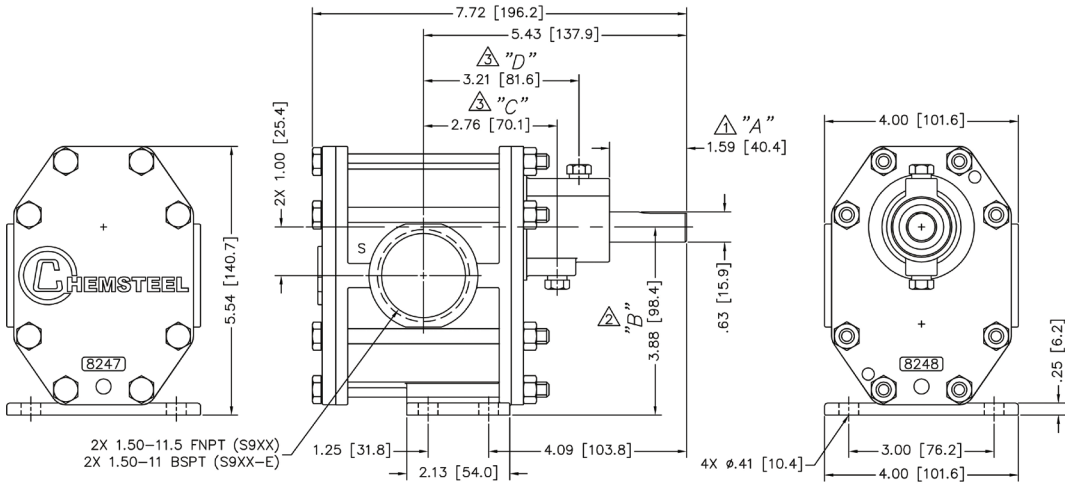
PUMP MODEL	KIT TYPE	SERVICE KIT
OBS923	GEAR PUMP CHEMKIT STAINLESS	OBS92316CAK
	GEAR PUMP CHEMKIT STAINLESS	OBS92316CZK
	GEAR PUMP CHEMKIT STAINLESS	OBS92316JUK
	GEAR PUMP CHEMKIT STAINLESS	OBS92316PBK
	GEAR PUMP CHEMKIT STAINLESS	OBS92317CAK
	GEAR PUMP CHEMKIT STAINLESS	OBS9231BPBK
	GEAR PUMP CHEMKIT STAINLESS	OBS9231ECBK
	GEAR PUMP CHEMKIT STAINLESS	OBS9231FCAK
	GEAR PUMP CHEMKIT STAINLESS	OBS9231FCBK
	GEAR PUMP CHEMKIT STAINLESS	OBS9231FCZK
	GEAR PUMP CHEMKIT STAINLESS	OBS9231FJAK
OBSM923	GEAR PUMP - CHEMKIT - MAG SS	OBSM92312CWK
	GEAR PUMP - CHEMKIT- MAG SS	OBSM92316CK
	GEAR PUMP - CHEMKIT- MAG SS	OBSM92316CWK
	GEAR PUMP - CHEMKIT- MAG SS	OBSM92317CWK
	GEAR PUMP - CHEMKIT- MAG SS	OBSM9231CCW-X1K
	GEAR PUMP MAG STNLSS CHEMKIT	OBSM9231FCWK
	GEAR PUMP MAG STNLSS CHEMKIT	OBSM9231FPWK
	GEAR PUMP MAG ALLOY C CHEMKIT	OBSM92334CWK
	GEAR PUMP , MAG ALLOY C CHEMKIT	OBSM92339CWK
OBS930	GEAR PUMP CHEMKIT STAINLESS	OBS93011CBK
	GEAR PUMP - CHEMKIT STAINLESS	OBS93012CBK
	GEAR PUMP-CHEMKIT STAINLESS	OBS93016CAK
	GEAR PUMP - CHEMKIT STAINLESS	OBS93017CJK
	GEAR PUMP CHEMKIT STAINLESS	OBS9301FCAK
	GEAR PUMP - CHEMKIT STAINLESS	OBS93039JDK
OBSM930	GEAR PUMP MAG STAINLESS CHEMKIT	OBSM93012CWK
	GEAR PUMP MAG STAINLESS CHEMKIT	OBSM93012PWK
	GEAR PUMP MAG STNLSS CHEMKIT	OBSM93016CWK
	GEAR PUMP MAG STNLSS CHEMKIT	OBSM9301FCWK
OBS935	GEAR PUMP-CHEMKIT STAINLESS	OBS9351HCBK
	GEAR PUMP ALLOY C REPAIR KIT	OBS93535PDK
	GEAR PUMP CHEMKIT-STAINLESS	OBS93512CBK
	GEAR PUMP - CHEMKIT STAINLESS	OBS93516CAK
	GEAR PUMP CHEMKIT STAINLESS	OBS93516CB-X1K
	GEAR PUMP STAINLESS CHEMKIT	OBS93516CZK
	GEAR PUMP CHEMKIT STAINLESS	OBS93516JCK
	GEAR PUMP CHEMKIT STAINLESS	OBS93516PBK
	GEAR PUMP CHEMKIT STAINLESS	OBS93518PBK
	GEAR PUMP CHEMKIT STAINLESS	OBS9351ECBK
	GEAR PUMP CHEMKIT STAINLESS	OBS9351BCBK
	GEAR PUMP CHEMKIT STAINLESS	OBS9351DCAK
	GEAR PUMP - CHEMKIT STAINLESS	OBS9351FJAK
	CHEMKIT STAINLESS-T1 TEMP TRIM	OBS9351FJA-T1K
	GEAR PUMP-CHEMKIT STAINLESS TANDEM	OBS9351FJC-HK
	GEAR PUMP CHEMKIT STAINLESS	OBS9351FPBK
OBSM935	GEAR PUMP MAG STAINLESS CHEMKIT	OBSM93512CWK
	GEAR PUMP MAG STNLSS CHEMKIT	OBSM93516CWK
	GEAR PUMP MAG STAINLESS CHEMKIT	OBSM93517CWK
	GEAR PUMP MAG STNLSS CHEMKIT	OBSM93517JWK
	GEAR PUMP MAG STNLSS CHEMKIT	OBSM93517PWK
	GEAR PUMP CHEMKIT SST TANDEM	OBSM9351FCW-HK
	GEAR PUMP MAG ALLOY C CHEMKIT	OBSM93534CWK
	GEAR PUMP MAG ALLOY C CHEMKIT	OBSM93535CWK
	GEAR PUMP MAG ALLOY C CHEMKIT	OBSM93539CWK
	GEAR PUMP MAG ALLOY C CHEMKIT	OBSM93539JWK

SERVICE KITS

PUMP MODEL	KIT TYPE	SERVICE KIT
OBS946	GEAR PUMP CHEMKIT STAINLESS	OBS94612CAK
	GEAR PUMP CHEMKIT STAINLESS	OBS94612CZK
	GEAR PUMP-CHEMKIT STAINLESS	OBS94616CAK
	GEAR PUMP - CHEMKIT STAINLESS	OBS94616CA-X1K
	GEAR PUMP CHEMKIT SST	OBS94616CBK
	GEAR PUMP CHEMKIT STAINLESS	OBS94616CCK
	GEAR PUMP CHEMKIT STAINLESS	OBS94616CJK
	GEAR PUMP CHEMKIT STAINLESS	OBS94616CZK
	GEAR PUMP CHEMKIT STAINLESS	OBS94616JAK
	GEAR PUMP CHEMKIT SST	OBS9461BCAK
	GEAR PUMP CHEMKIT SST	OBS9461BJAK
	GEAR PUMP-CHEMKIT STAINLESS	OBS9461ECJK
	GEAR PUMP CHEMKIT SST	OBS9461FCAK
	GEAR PUMP CHEMKIT SST	OBS9461FCBK
	GEAR PUMP CHEMKIT SST	OBS9461FCB-T2K
	GEAR PUMP CHEMKIT SST	OBS9461FPAK
	GEAR PUMP CHEMKIT SST	OBS9461HCBK
	GEAR PUMP CHEMKIT ALLOY C TANDEM	OBS94635CD-HK
	GEAR PUMP-CHEMKIT STAINLESS	OBS9461EJL-EK
	GEAR PUMP CHEMKIT SST	OBS9461DCBK
	GEAR PUMP CHEMKIT STAINLESS	OBS94613CAK
OBSM946	GEAR PUMP - CHEMKIT - MAG ALLOY C	OBSM94634CWK
	GEAR PUMP - CHEMKIT- MAG ALLOY C	OBSM94639CWK
	GEAR PUMP - PINNED CHEMKIT- MAG ALLOY C	OBSM94639CW-X1K
	CHEMKIT - MAG ALLOY C	OBSM94639JWK
	GEAR PUMP MAG STAINLESS KIT	OBSM94613CWK
	GEAR PUMP - CHEMKIT- MAG SS GRAINGER	OBSM94616CK
	GEAR PUMP - CHEMKIT- MAG SS	OBSM94616CWK
	GEAR PUMP - CHEMKIT- MAG SS	OBSM94616JWK
	GEAR PUMP MAG STAINLESS CHEMKIT	OBSM9461FCWK
	GEAR PUMP MAG STAINLESS CHEMKIT	OBSM9461FJWK
	GEAR PUMP MAG STAINLESS CHEMKIT	OBSM9461FPWK

DIMENSIONAL DATA

S923/ S930 / S935 / S946 PEDESTAL MOUNT DIMENSIONS



1 *DIMENSION "A" IS APPROXIMATELY 1.26 [32.0] FOR PACKING PUMPS WITH PACKING NUT INSTALLED. DIMENSION "A" IS 1.54 [39.1] FOR LIP SEAL PUMPS.*

2 *STANDARD UPPER DRIVE SHOWN. FOR LOWER DRIVE ARRANGEMENT DIMENSION "B" IS 1.88 [47.6].*

3 *FOR LIP SEAL PUMPS DIMENSION "C" IS 2.61 [66.3]. FOR LIP SEAL PUMPS DIMENSION "D" IS 2.61 [66.3].*
(MECHANICAL SEAL PUMP SHOWN)

Figure 14

DIMENSIONAL DATA

SM923/ SM930 / SM935 / SM946 CLOSE-COUPLED DIMENSION

CLOSE - COUPLED DIMENSIONS C1,C2, C4, C5, C6 and C7:

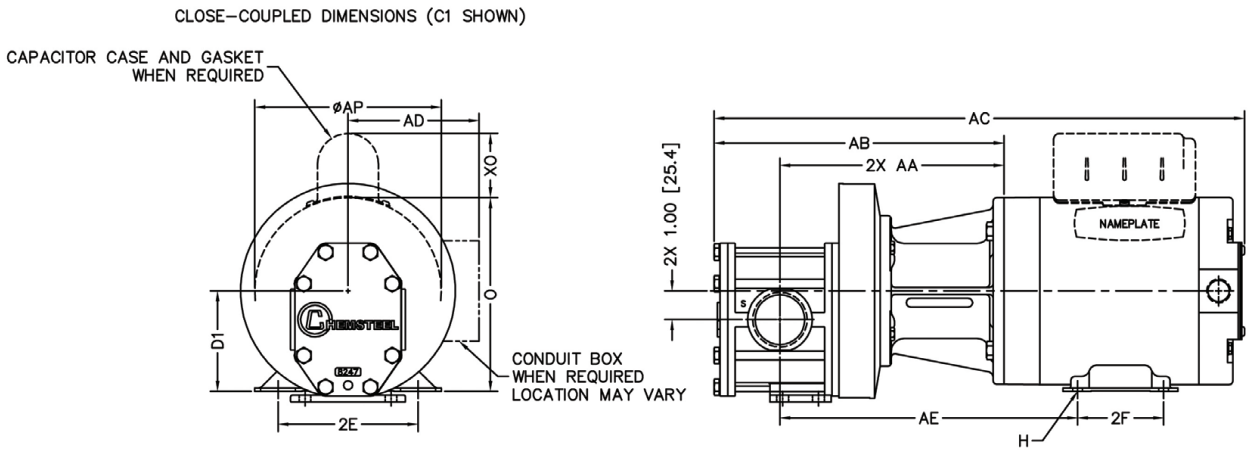


Figure 15

Mounted Adapter Code	Kit Part No	Motor Frame			D1	2E	2F		H	① O	① AP	① XO	AA	AB	① AC		① AD	AE
C1	M9AD56	56C		Inches	3.50	4.88	3.00		∅ 0.34 Slot	6.88	6.63	2.25	7.88	10.18	18.56		---	10.44
				mm	88.9	124	76.2		∅ 8.6 Slot	174.8	168.4	57.2	200.2	258.6	471.5		---	265.2
C2	M9AD45T	143TC	145TC	Inches	3.50	5.50	4.00	5.00	∅ 0.34 Slot	6.88	6.63	2.25	7.88	10.18	19.75	21.25	---	10.26
				mm	88.9	139.7	102	127	∅ 8.6 Slot	174.8	168.4	57.2			501.7	539.8		260.6
		143TC	145TC	Inches	4.50	7.50	4.50	5.50	∅ 0.41 Slot	8.69	7.88	2.38	200.2	258.6	22.47	21.69	---	10.76
				mm	114.3	190.5	114.3	139.7	∅ 10.41 Slot	220.7	200	60.3			570.7	550.9		273.3
C4	M9AD80E	IEC 80, B14 Face		Inches	3.15	4.92	3.94		∅ 0.39 Slot	6.00	5.69	---	7.38	9.68	19.22		4.51	9.35
				mm	80	125	100		∅ 10.0 Slot	152.4	144.5	---	187.5	245.9	488.2		116	237.5
C5	M9AD90E	IEC 90, B14 Face		Inches	3.54	5.51	3.94		∅ 0.39 Slot	6.81	6.61	---	7.88	10.18	20.98		5.12	9.90
				mm	90	140	100		∅ 10.0 Slot	173	168	---	200.2	258.6	532.9		130	251.5
C6	M9AD84T	182TC	184TC	Inches	4.50	7.50	4.50	5.50	∅ 0.41	8.69	7.88	2.38	8.69	10.99	23.28	22.5	---	10.63
				mm	114.3	190.5	114.3	139.7		220.7	200	60.3			591.3	571.5		270
		213C	215C	Inches	5.25	8.50	5.50	7.00	∅ 10.4	10.25	9.56	2.75	220.8	279.2	23.5	25.12	---	11.38
				mm	133.4	215.9	139.7	177.8		260.4	242.8	69.9			596.9	638		289.1
C7	M9AD100E	IEC 100, B14 Face		Inches	3.94	6.30	4.41		∅ 0.47	7.91	7.88	---	8.07	10.37	23.35		5.88	10.19
				mm	100	160	112		∅ 12	180	200	---	205	263.4	593.1		149.2	258.8

① These Dimensions vary depending on HP, Enclosure and Motor manufacture. Specifications are subject to change without notification.

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
No liquid delivered.	1. Pump not primed.	1. Reprime pump, check that pump and there are no obstructions in the suction line.
	2. Discharge valve closed	2. Check discharge valve.
	3. Suction line clogged.	3. Remove obstructions.
	4. Wrong direction of rotation.	4. Change rotation to concur with direction indicated on bearing housing or pump casing.
	5. Total head is too high.	5. Re-evaluate head conditions.
	6. Driver is not operating at rated speed.	6. Check electric motor voltage;check engine rpm.
	7. Pump is vapor bound	7. Manually add some liquid to pump inlet to assist priming.
	8. Foot valve or suction pipe opening not submerged enough	8. Consult factory for proper depth. Use baffler to eliminate vortices.
Pump not producing rated flow or head.	1. Air leak through seal (suction lift condition)	1. Replace seal
	2. Outlet clogged	2. Check outlet piping
	3. Worn suction side plate or wear rings.	3. Replace defective parts as required.
	4. Pump is not properly primed.	4. Reprime pump, check that pump and there are no obstructions in the suction line. Check NPSHa to ensure that there is enough liquid for pump operation.
	5. Driver is not operating at rated speed.	5. Check electric motor voltage; check engine rpm
	6. Pump is vapor bound	6. Provide additional pressure on liquid being pumped by elevating liquid source. or consider installing an air release valve in the discharge line to remove the air to allow the pump to become dynamic.
	7. Insufficient suction head.	7. Ensure that suction line shutoff valve is fully open and line is unobstructed.
	8. Worn or broken gear.	8. Inspect and replace if necessary.
Pump starts then stops pumping.	1. Excessive air in liquid.	1. Clean and tighten all suction connections; relocate suction inlet in liquid source.
	2. Defective packing or seal.	2. Replace packing or seal.
	3. Pump is vapor bound.	3. Provide additional pressure on liquid being pumped by elevating liquid source. or consider installing an air release valve in the discharge line to remove the air to allow the pump to become dynamic.
	4. Air or vapor pockets in suction line.	4. Rearrange piping to eliminate air pockets.
	5. Air leak in suction line.	5. Repair leak.
	6. Back pressure too high (mag drive)	6. Reduce back pressure, increase pump size
Bearings or magnet run hot.	1. Improper alignment.	1. Re-align pump and drive.
	2. Improper lubrication.	2. Check lubricate for suitability and level.
	3. Lube cooling.	3. Check cooling system
	4. Magnet flush port clogged	4. Clear orifice plug (see parts list)

TROUBLESHOOTING

PROBLEM	PROBABLE CAUSE	REMEDY
Pump is noisy or vibrates.	1. Improper pump/driver alignment.	1. Align shafts.
	2. Broken gear or bent shaft	2. Replace as required.
	3. Foundation not rigid.	3. Tighten bolts of pump and motor or adjust stilts
	4. Worn bearings.	4. Replace.
	5. Suction or discharge piping not anchored or properly supported.	5. Anchor per Hydraulic Institute Standards Manual recommendation.
	6. Pump is cavitating.	6. Check NPSHa, Air leaks to ensure that there is enough liquid for pump operation.
Excessive leakage from stuffing box/seal chamber.	1. Worn mechanical seals.	1. Replace worn parts.
	2. Overheating mechanical seal.	2. Check lubrication and cooling lines.
	3. Shaft damage	3. Replace as required
Motor requires excessive power.	1. Reduce motor RPM	1. Check fluid viscosity, Consult factory.
	2. Speed is too high.	2. Electric motor wiring is wrong. Replace motor.
	3. Wrong direction of rotation.	3. Check wiring diagram.
	4. Gear or bearing swell.	4. Check torque required to turn pump. lap rear bearings .001 if needed.
	5. Gears are binding.	5. Check for particulate in pump or swell from chemical exposure.
	6. Driver and pump are misaligned.	6. Realign driver with pump.
	7. Power frame shaft is bent.	7. Replace shaft.
	8. Liquid heavier than expected.	8. Check specific gravity and viscosity.
	9. Rotating parts bind.	9. Check internal wearing parts for proper clearances
Pump fails to prime or loses its prime.	1. Air leaks in suction line.	1. Clean and tighten all suction connections; relocate suction inlet in liquid source.
	2. Suction strainer is clogged. Suction lift is too high.	2. Clean debris from strainer. Re-evaluate pump requirements and correct suction conditions.
	3. Defective priming valve.	3. Replace valve.
	4. Defective seal.	4. Replace seal.
Insufficient pressure.	1. Excessive air in liquid.	1. Clean and tighten all suction connections; relocate suction inlet in liquid source.
	2. Driver is not operating at rated speed.	2. Check electric motor voltage; check engine rpm
	3. Wrong direction of rotation.	3. Change rotation to concur with direction.
	4. Total head is too high.	4. Re-evaluate head conditions. may lead to magnet decoupling
	5. Worn suction side plate or wear rings.	5. Replace defective parts as required.
	6. Broken or bent drive shaft.	6. Replace as required.
	7. Air leak through O-rings.	7. Replace gasket.
	8. Liquid is vaporizing	8. Provide additional pressure on liquid being pumped by elevating liquid source. Check temperature of liquid being pumped'