
CLASS GAX & GSX

Instructions

INSTALLATION, OPERATION AND MAINTENANCE OF

Types GAC, GAF, GAS, GSC and GSS Rotary Pumps

Note: It is important that the entire contents of this booklet be studied before installation.




Ingersoll-Dresser Pumps

FOREWORD

1. The GAX and GSX product lines are designed based on over 100 years of experience. It will give trouble free, efficient operation with minimum maintenance and repair.
2. This instruction manual will familiarize both management and operating personnel with important details and correct procedures for the installation, operation and maintenance of your pump. The information in this manual is for the standard pump and the most common options. The manual does not cover all design details and variations, nor does it provide for every possible contingency that may be encountered. When information cannot be found in this manual, consult your Ingersoll-Dresser Pumps Distributor, Sales Office, Service Center or the Chesapeake factory.
3. On receipt of the pump, the packing case and its contents should be examined as detailed in Section 2.
4. Before lifting the pump, please read the appropriate information detailed in Section 2.
5. Before placing the pump in storage, please read the appropriate information detailed in section 2.
6. Should there be any doubt regarding the suitability or the installation of the pump, consult your Ingersoll-Dresser Pumps: Distributor, Sales Office, Service Center or the Chesapeake factory.
7. It is important to make a correct identification of a pump before carrying out any maintenance, or before consulting Ingersoll-Dresser Pumps. Identification is obtained from the nameplate, secured to the pump body. An example of a typical nameplate is shown on page 5. The pump serial number should always be provided.
8. To ensure continued satisfactory operation, replacement parts to the original design specifications should be obtained from Ingersoll-Dresser Pumps. To order replacement parts see Section 7.
9. This manual is also applicable, in large part, to the GA and GAFT Series pumps in types GA, GAM, GAMI, GAU, GAUM, GAUMI, GAD, GADM, GADMI, GADUM, GADUMI, GAY, GAUY, GAYM, GAYMI, GAUYM, GAUYMI, GAFT, GAFTM, GAFTMI, GAUFT, GAUFTM, GAUFTMI, GADFT, GADFTM, GADFTMI, GAUDFT, GAUDFTM, GAUDFTMI, GAYFT, and GAYFTM.

WARNINGS


OBSERVE EXTREME CAUTION WHEN VENTING AND/OR DRAINING HAZARDOUS LIQUIDS. WEAR PROTECTIVE CLOTHING IN THE PRESENCE OF CAUSTIC, CORROSIVE, VOLATILE AND FLAMMABLE OR HOT LIQUIDS. DO NOT BREATHE TOXIC VAPORS. DO NOT ALLOW SPARKING, FLAMES OR HOT SURFACES IN THE VICINITY OF THE EQUIPMENT.




Ingersoll-Dresser Pumps

WARNING

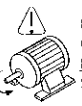
ESSENTIAL PROCEDURES BEFORE STARTING




INSTALL AND OPERATE EQUIPMENT IN ACCORDANCE WITH THE INSTRUCTION MANUAL SUPPLIED SEPARATELY.




ENSURE UNIT IS ON A FIRM FOUNDATION AND THAT COUPLING FACES ARE IN CORRECT ALIGNMENT PRIOR TO AND AFTER BOLTING BASEPLATE DOWN AND FIXING PIPEWORK. SEE MANUAL FOR TOLERANCES.




ENSURE CORRECT DRIVER DIRECTION OF ROTATION WITH COUPLING ELEMENT/PINS REMOVED; OTHERWISE SERIOUS DAMAGE MAY RESULT.




ENSURE PRESSURE RELIEF VALVES ARE INSTALLED; FAILURE TO DO SO MAY CAUSE PIPEWORK OR PUMP TO BURST.



ENSURE GUARDS ARE SECURELY IN PLACE.



ENSURE ALL EXTERNAL CONNECTIONS TO THE PUMP/SHAFT SEALING ARE CONNECTED AND OPERATIONAL.



FULLY PRIME UNIT AND SYSTEM. DO NOT RUN UNIT DRY.


FAILURE TO FOLLOW THESE PROCEDURES MAY RESULT IN PERSONAL INJURY OR/AND EQUIPMENT DAMAGE. 

Figure 1

SAFETY

THIS IS A SUMMARY OF CONDITIONS AND ACTIONS TO PREVENT INJURY TO PERSONNEL AND DAMAGE TO EQUIPMENT.

1. PREVENT EXCESSIVE EXTERNAL PIPE LOAD.

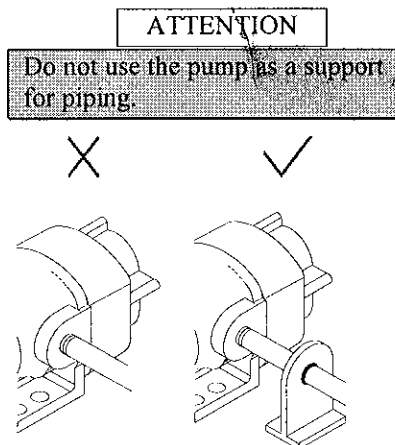


Figure 2

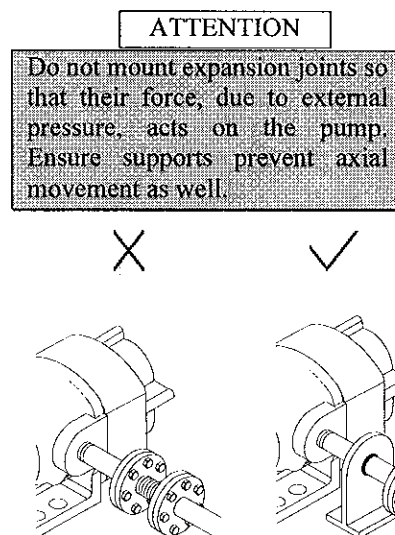


Figure 3

2. MOTOR ROTATION

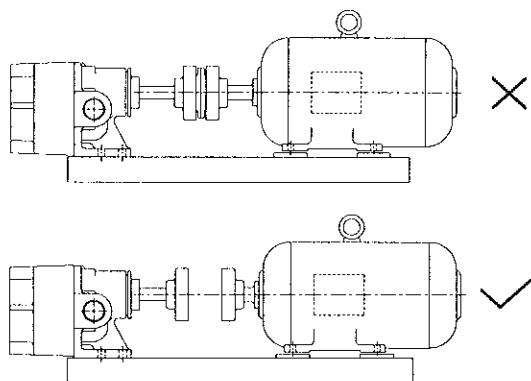
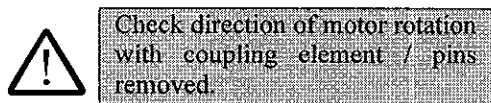


Figure 4

- Standard rotation for this type of rotary gear pump is clockwise when viewed from the motor (CW-HI). All GAX and GSX models may be run in either rotation without damage with the exception of pumps equipped with the internal relief valve option. These pumps have rotation arrows; to reverse rotation, the relief valve must be repositioned to the discharge side by rotating the pump body 180 degrees.

3. OUTLET VALVE

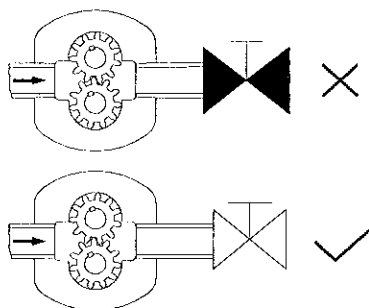
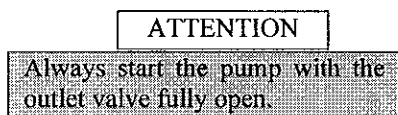


Figure 5

- The pump is a positive displacement type and a closed discharge valve or blocked discharge line may cause the pump or pipework to burst. A relief valve or bypass valve must be fitted to protect against this eventuality.
- If the built in relief valve accessory is provided, it is only to be used as a safety device. If used as a continuous bypass, the fluid will experience rapid, excessive heating.

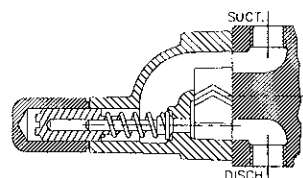


Figure 6

4. INLET VALVE

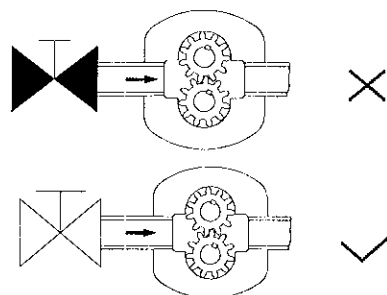
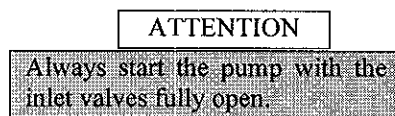


Figure 7

- Running the pump at low flow continuously will cause the shaft, packing or mechanical seal to run hot and fail within a short time.
- ## 5. DO NOT OPERATE THE PUMP AT ABNORMALLY HIGH PRESSURE.
- Operating at a pressure higher than normal may over-pressurize the pump or pipework, overload the motor and cause excessive bearing wear.



NEVER DO MAINTENANCE WORK WHILE THE UNIT IS CONNECTED TO POWER.

6. DRAIN PUMP AND ISOLATE PIPEWORK BEFORE DISMANTLING THE PUMP.

- The appropriate safety precautions should be taken where the pumped liquids are hazardous.

7. THERMAL SHOCK

- Rapid changes in the temperature of the liquid within the pump can cause thermal shock, which can result in damage or breakage of components. Thermal shock should be avoided.

8. HOT (and cold) PARTS

- When the pumped products are hot, require auxiliary heating supplies or are below freezing, the site installation shall be designed to prevent accidental contact with the hot (or cold) parts and pipework. Note that drive motors may also become hot during operation.

9. HAZARDOUS LIQUIDS



When the pump is handling hazardous liquids, care must be taken to avoid contact using the appropriate health and safety procedures. Pump location and personnel access/training should consider and address these site dangers.

NAMEPLATE AND NOMENCLATURE

Below is an example of the basic nameplate. Underneath the nameplate is an excerpt from the Pricebook, which shows the nomenclature of the GAX and GSX product lines.

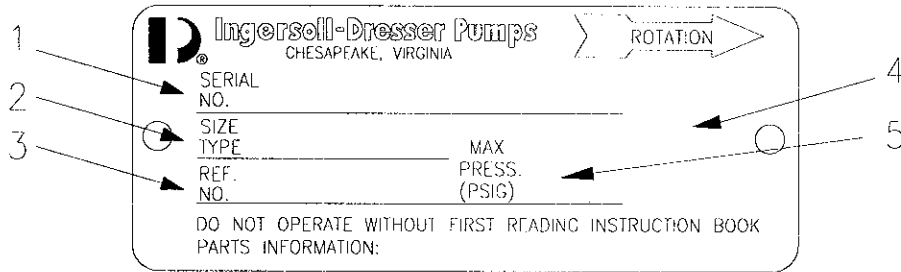


Figure 8

- 1 – Serial Number
- 2 – Size and type (see nomenclature below)
- 3 – Reference number
- 4 – Placement of the CE Mark (where applicable)
- 5 – Maximum operating pressure

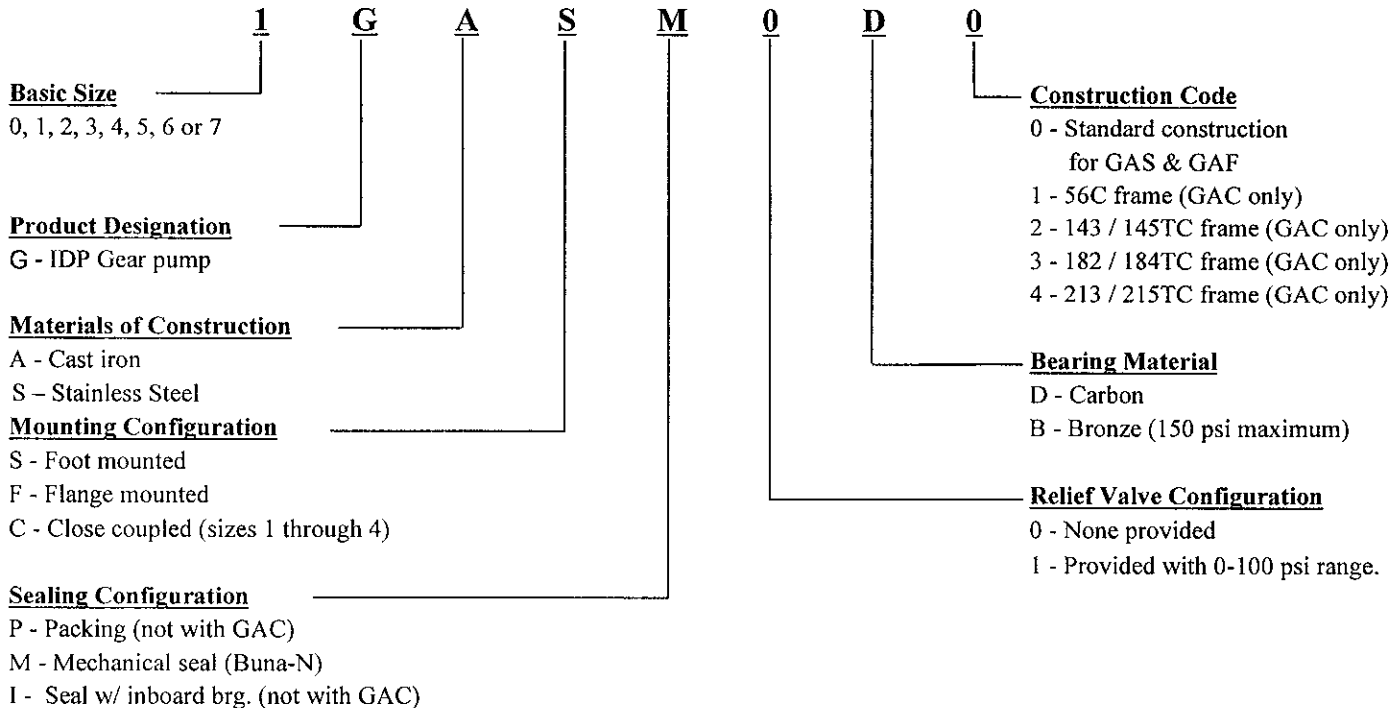


Figure 9

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SECTION 1 – GENERAL INFORMATION

Safety

Ingersoll – Dresser Pumps has ensured, so far as is reasonably practical, that our equipment has been designed and constructed to be safe and without risk to health when properly used. Provided that the recommendations contained in this manual are carefully adhered to, our equipment will present no health or safety hazard.

PRODUCT DESCRIPTION

Refer to Section 7 – Spare Parts for part number references.

Introduction

These pump models are positive displacement pumps that use meshing gears to impart energy to the fluid. The pumps are manufactured in different sizes for various pumping capacities.

For ease of maintenance, the pumps are constructed so that pipe connectors do not have to be disturbed when internal maintenance is required.

Pump Body (part 2)

The body has close clearances with the gears. An optional relief valve is available to protect against over-pressurization of the pump.

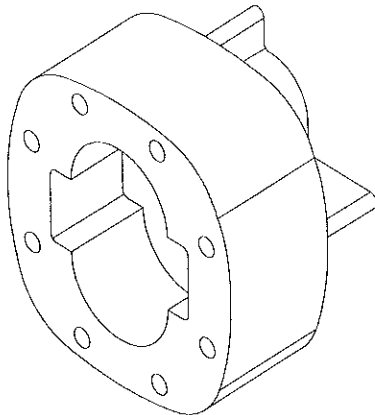


Figure 10

Gears (parts 21, 22)

Precision herringbone gears are used to impart energy to the fluid.

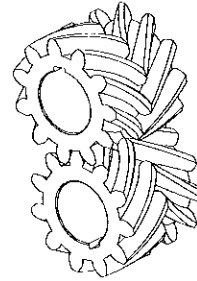


Figure 11

Shaft (part 4)

The large diameter, stiff shaft has a keyed drive end. The gears are pressed onto the shaft to prevent axial movement of the gear relative to the shaft.

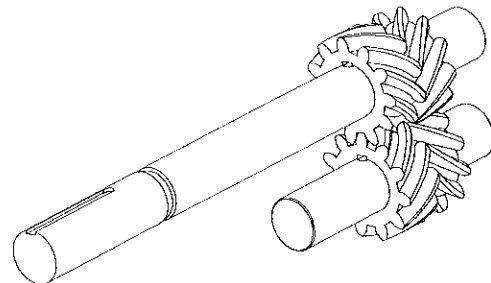
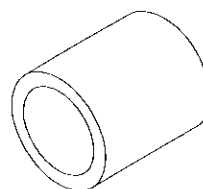


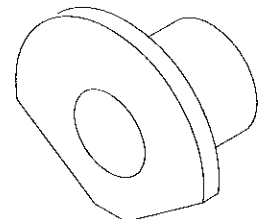
Figure 12

Pump Bushings (part 27) and Lubrication

Renewable journal bushings are provided for ease of maintenance. These journal bearings are product lubricated.



GAX



GSX

Figure 13

Mounting Bracket (part 1)

The mounting bracket provides the method for attaching the pump to the foundation for GAS and GSS pumps. The mounting bracket also includes a stuffing box for shaft sealing.

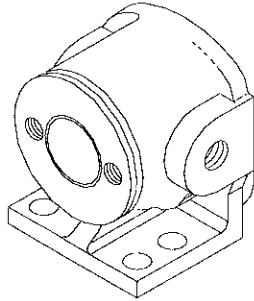


Figure 14

For GAF pumps, the configuration is designed for connecting to the motor mounting bracket face.

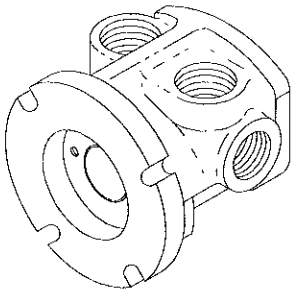


Figure 15

For GAC and GSC pumps, the mounting bracket connects directly to a "C" – faced motor.

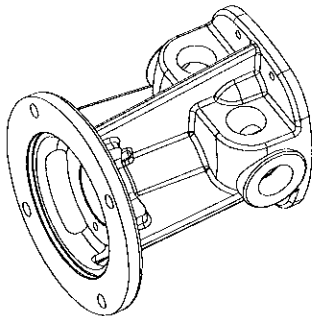


Figure 16

Motor Mounting Bracket

The motor mounting bracket provides a means of connecting GAF pumps to motors through the use of a coupling.

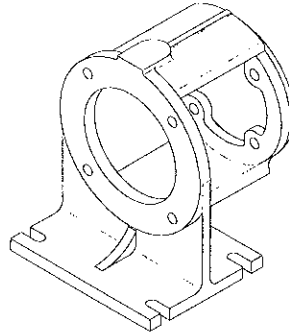


Figure 17

Shaft Seal

Adjustable gland packing is provided on GASP, GAFP and GSSP configurations to control stuffing box leakage.

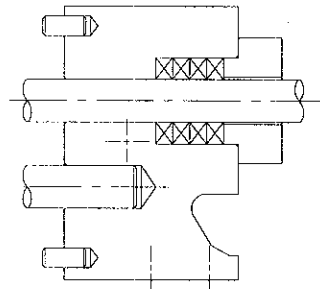


Figure 18

A mechanical seal is fitted on the GASM, GAFM, GACM, GSSM and GSCM configurations.

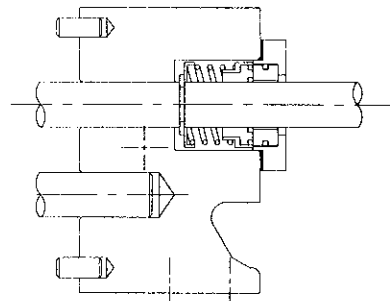


Figure 19

Driver

The driver is normally a direct drive electric motor. Different drive configurations may be fitted such as internal combustion engines, turbines, hydraulic motors, etc. All drivers may be configured using couplings, belts, gearboxes, etc. for GAS and GAF configurations. Drive configurations producing side load on pump shafts (i.e. bolts) require either the GASI or GAFI configuration.

Consult Ingersoll – Dresser Pumps for suitability.

Accessories

Accessories may be fitted when specified by the customer.

PUMP TECHNICAL DATA

Performance

When specified by the contract, performance data has been supplied separately to the purchaser and should be obtained and retained with this manual if required.

Noise Level

When pump noise level exceeds 85dBa, attention must be given to prevailing Health and Safety Legislation to limit the exposure of plant operating personnel to the noise. The usual approach is to control exposure time to the noise or to enclose the machine to reduce emitted sound. You may have already specified a limiting noise level when the equipment was ordered, however, if no noise requirements were defined, then machines above a certain power level will exceed 85dBa. Pump noise level is dependent on a number of factors – the type of motor fitted, the operating capacity, pipework design, and acoustic characteristics of the building. The levels specified in the following table give a general guide to the level to expect under the worst operating conditions.

The dBa values are based on the noisiest direct - drive electric motors that are likely to be encountered. They are sound pressure levels at one meter from the directly driven pump, for “free field over a reflecting plane.” If a pump unit has been purchased, for fitting with your own driver, then the “pump only” noise levels

from the table should be combined with the level for the driver obtained from the supplier. Consult a Noise Specialist for this calculation.

For units driven by equipment other than electric motors or units contained within enclosures, see the information sheets and manuals that accompany this manual where applicable.

GAX & GSX Noise Levels (Worst Case)			
Size	Speed (RPM)	Noise (dBa)	
		Pump Only	Pump and Motor
0	1800	82	84
	1200	80	81
1	1800	82	84
	1200	80	81
2	1800	82	84
	1200	80	81
3	1800	86	87
	1200	86	86
4	1800	91	91
	1200	90	90
5	1800	86	89
	1200	88	88
6	1800	85	88
	1200	87	87
7	1800	91	92
	1200	91	91

Table 1

Pressure Limits

See Table 2 or Table 4 for the maximum allowable working (or discharge) pressure as well as the maximum recommended differential pressure.

GAX Pressure Limits (psi)			
Size	Max. Allow. Working Press.	Viscosity (SSU)	Max. Allow Diff. Press.
0, 1, 2 & 3	250	Below 100	100
		Above 100	250
4 & 5	200	Below 100	100
		Above 100	200
6	150	Below 100	100
		Above 100	150
7	100	Below 100	50
		Above 100	100

Table 2

GSX Pressure Limits (psi)			
Size	Max. Allow. Working Press.	Viscosity (SSU)	Max. Allow. Diff. Press.
0, 1, 2 & 3	250	Below 100	100
		Above 100	250
4 & 5	200	Below 100	100
		Above 100	200
6	150	Below 100	100
		Above 100	150
7	100	Below 100	50
		Above 100	100

Table 3

Pump Lubricants

These pumps are internally product lubricated. No external lubricants are required.

Recommended Screw Torque

Recommended Screw Torque		
Screw Type	Size	Torque
Body	0 to 6	30 lb-ft (40.7 N-m)
Body	7	40 lb-ft (54.2 N-m)
Gland (Packing)	all	4 lb-ft (5.4 N-m)
Gland (Seal)	0 to 6	20 lb-ft (27.1 N-m)
Gland (Seal)	7	25 lb-ft (33.9 N-m)

Table 4

External Pipe Load

The permissible pipe loading is dependent on a number of factors such as dimensions, pressure, temperature, material, pump configuration, etc. The recommendations contained in the section on pipework connections should be followed to eliminate these loads.

Temperature Limits

The temperature limit varies depending on the sealing option chosen.

Operating Temperature Limits		
Seal Type	Minimum	Maximum
Buna N Seal	-20°F (-29°C)	240°F (115°C)
Viton Seal	-20°F (-29°C)	350°F (176°C)
Packing	-20°F (-29°C)	350°F (176°C)

Table 5

Wearing Clearances

There are three areas within the pump in which the wearing clearances may become an issue. Also note that these clearances apply to the pump as brand new. If there are any questions concerning a deviation in these clearances, consult Ingersoll – Dresser Pumps.

Total Axial Clearance is measured lengthwise between the gear and the pump body. Note that the values given are a total, not on either side.

Total Axial Clearance (in.)		
Size	Minimum	Maximum
0 & 1	.0025	.0050
2, 3, 4, 5 & 6	.0055	.0080
7	.0070	.0100

Table 6

Gear/Bore Clearance is measured between the outer diameter of the gear and the inner diameter of the bore in the body. The values given on the table are diametrical.

Gear/Bore Clearance (in.)		
Size	Minimum	Maximum
0, 1 & 2	.005	.007
3 & 4	.007	.009
5 & 6	.008	.010
7	.008	.011

Table 7

Bushing Clearance is measured between the shaft's outer diameter and the bushing's inner diameter. It also is diametrical.

Bushing Clearance (in.)		
Size	Minimum	Maximum
0, 1 & 2	.0029	.0044
3, 4, 5 & 6	.0049	.0064
7	.0040	.0055

Table 8

SECTION 2 – INSTALLATION

STORAGE

Store the pump in a clean, dry location away from vibration. Leave piping connection covers in place to keep dirt and other foreign material out of the pump. If the pump is of the “packed box” configuration, the packing must be removed and requires attention for storage. If fitted with a mechanical seal, turn the pump shaft at intervals to prevent seal faces from sticking.

The pump may be stored as above for up to six months. Consult Ingersoll-Dresser Pumps for preservative actions when a longer storage period is needed.

Warranty period for the pumps will normally be for 12 months or 18 months from shipment. Extension of this period can only be achieved with the prior agreement of Ingersoll-Dresser Pumps and may require inspection, prior to putting the pump into service.

RECEIVING THE PUMP

Unpacking and Inspection

The pump should be checked against packing list and any damage or shortage reported immediately to Ingersoll - Dresser Pumps. Any crate/carton/wrappings should be checked for any spare parts or accessories that may be packed with the pump.

Handling

Boxes, crates, pallets or cartons may be unloaded using forklift vehicles or slings depending on their size and construction.

The pump set should be handled as shown in the appropriate diagram.

When lifting the GAS or GSS configured pump and motor, care should be taken to support both the pump and the motor.

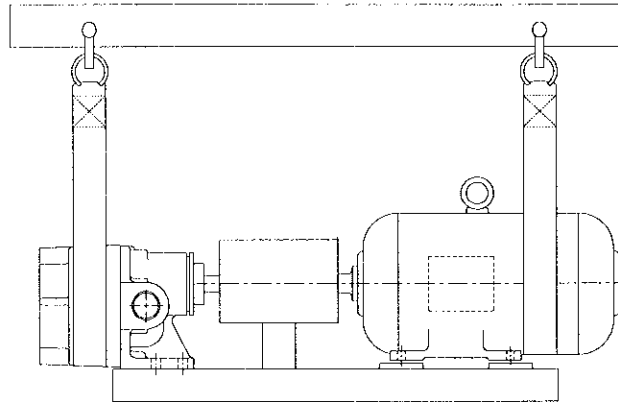


Figure 20

The GAC, GAF and GSC are similar in that they do not require a baseplate and therefore can be lifted by supporting the pump and the motor. A GAF is shown below as an example.

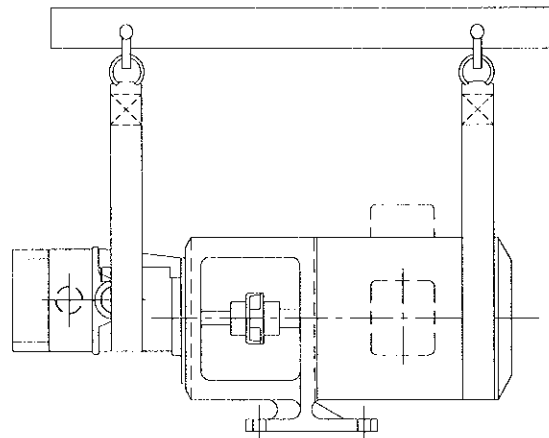


Figure 21

Location

The pump should be located to allow room for access, ventilation, maintenance and inspection with ample headroom for lifting, and should be as close as possible to the supply of liquid being pumped.

INSTALLATION PROCEDURE

The following section concerning the foundation typically applies only to the GAS and GSS, as the GAC, GAF and GSC are normally installed directly on the foundation.

Foundation

There are many methods of installing pump units to their foundations. The correct method depends on the size of the pump unit, its location and noise vibration limitations. Non-compliance with the provision of correct foundation and installation may lead to failure of the pump, and as such would be outside the terms of the warranty.

The baseplate should be mounted onto a firm foundation, either an appropriate thickness of quality concrete or sturdy steel framework. It should NOT be distorted or pulled down onto the surface of the foundation but should be supported to maintain the original alignment.

Install the baseplate onto packing pieces evenly spaced and adjacent to foundation bolts.

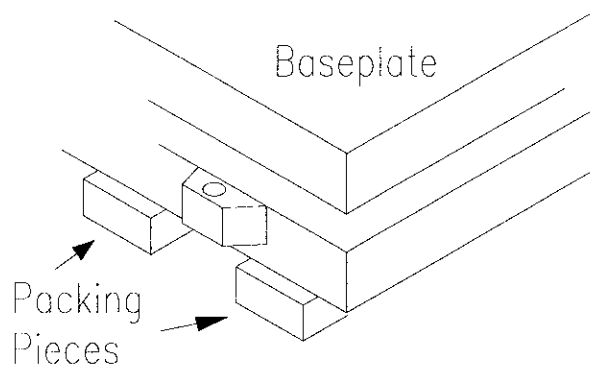


Figure 22

Leveling

Level with shims between baseplate and packing pieces. The pump and driver have been aligned before delivery on units supplied with baseplates. Check alignment of pump and motor half coupling. If this is incorrect, it indicates that the baseplate has become twisted and should be corrected by re-aligning. See alignment section for details.

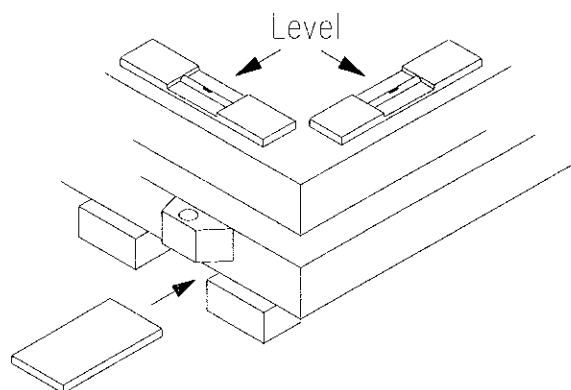


Figure 23

Grouting

Grouting provides solid contact between the pump unit and foundation, prevents lateral movement of vibrating equipment and dampens resonate vibrations.

Where applicable, grout in the foundation bolts.

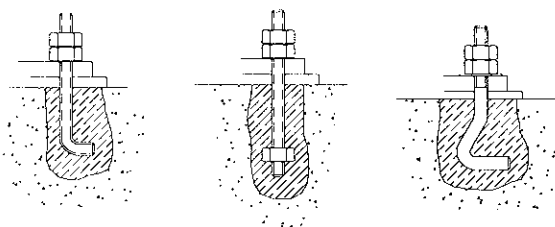


Figure 24

After adding pipework connections and rechecking the coupling alignment, the baseplate should then be grouted in accordance with good engineering practice. Fabricated steel baseplates can be filled with grout. Folded steel baseplates should be grouted to locate their packing pieces. If in any doubt, please contact your nearest service center for advice.

Alignment Procedure

The diagrams contained in this section are of the GAS and GSS configuration.

Correct alignment is absolutely essential to successful operation. Every baseplate or supporting frame is elastic, no matter how heavy, and will spring to some extent. The flexible coupling will not compensate for misalignment of the pump and driver that may result from shipping, piping strains, shocks or other causes. Alignment should be checked periodically and, if necessary, be corrected to bring the pump half coupling in perfect alignment with the driver half coupling.

Generally, permissible misalignment is .005" for motors up to 30 hp.

Thermal Expansion

The pump and motor will normally have to be aligned at ambient temperature and should be corrected to allow for thermal expansion at operating temperature.

In pump installations involving high liquid temperature, the unit should be run at the actual operating temperature, shut down and the alignment checked immediately. Due to the higher pump temperature, the allowance as in Figure 25 will be necessary.

The same procedure applies towards alignment where the operating temperature for the motor is higher. Due to the higher motor temperature, the allowance as in Figure 26 will be necessary.

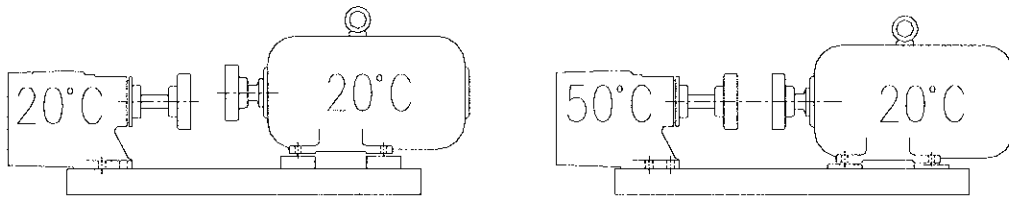


Figure 25

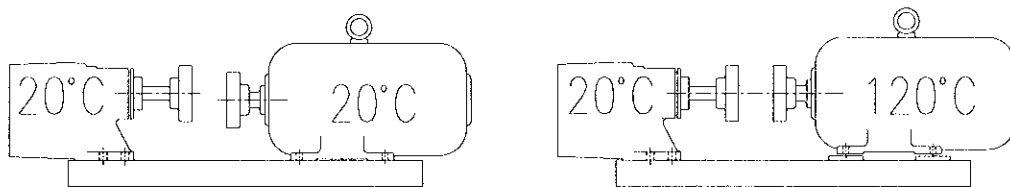


Figure 26

Alignment Methods

Ensure the pump and motor half couplings are disconnected.

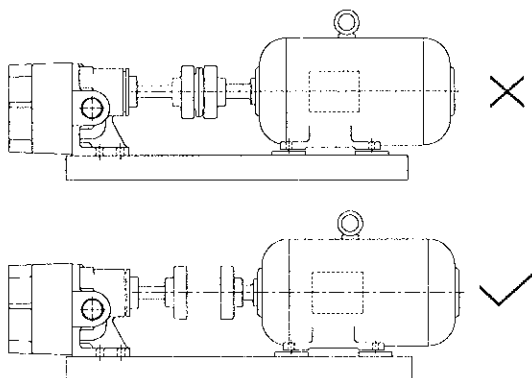


Figure 27

Align the motor to the pump, not the pump to the motor. Alignment is achieved by adding or removing shims from under the motor feet and also moving the motor horizontally as required.

For couplings with narrow flanges, use a dial indicator gauge as shown.

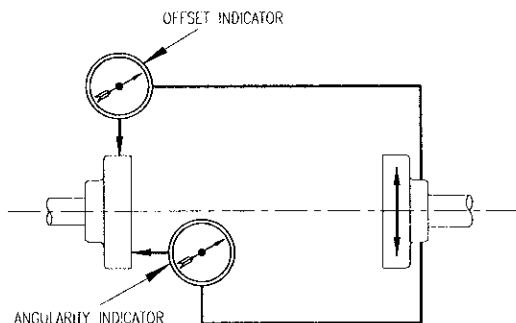


Figure 28

When checking parallel alignment, the total indicator read-out (TIR) shown is twice the value of the actual shaft displacement.

Electrical Connections

A qualified electrician should make electrical connections in accordance with the local, national and international regulations.

The motor must be wired up in accordance with the motor manufacturer's instructions (normally supplied with the terminal box) including any temperature, earth leakage, current and other protective devices as appropriate. The identification nameplate should be checked to ensure the power supply is appropriate.

A device to provide emergency stopping shall be fitted.

If not supplied pre-wired to the pump unit, the controller/starter electrical details will also be supplied within the controller/starter.

ATTENTION

See paragraphs on "direction of rotation" in Section 3 before connecting the motor to the electrical supply.

Pipework Connections

Protective covers are fitted to the pipe connections to prevent foreign bodies from entering during transportation and installation. Ensure that these covers are removed from the pump before connecting any pipes.

Maximum forces and moments allowed on the pump flanges vary with the pump size and type. To minimize these forces and moments which may cause misalignment, worn bushings and couplings, vibration and the possible failure of the pump casing, the following points should be strictly followed:

ATTENTION

Prevent excessive external pipe load. Never draw piping into place by applying force to the pump connections.

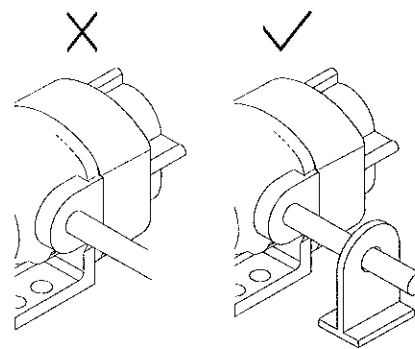


Figure 29

ATTENTION

Do not mount expansion joints so that their force, due to internal pressure, acts on the pump. Ensure supports prevent axial movement as well.

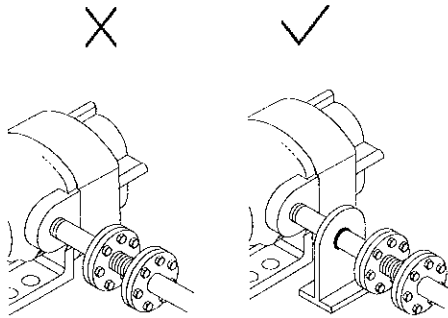


Figure 30

Piping and fittings should be flushed before use. The inlet pipe should be one or two sizes larger than the pump inlet size and pipe bends should be as large a radius as possible. On suction lift the piping should be inclined upward toward the pump inlet with eccentric reducers incorporated to prevent air locks as shown below.

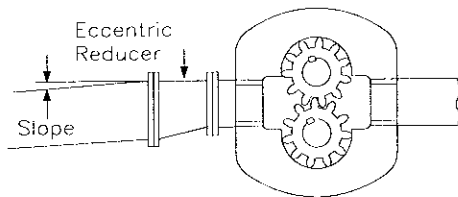


Figure 31

On positive suction, the inlet piping must have a downward slope toward the pump.

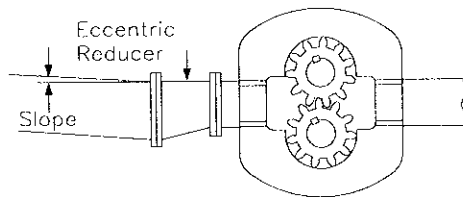


Figure 32

Allow for a minimum of two pipe diameters of straight section between the inlet and the nearest elbow.

A strainer is recommended if the liquid contains large foreign objects that might clog suction lines or jam the gears. It is generally impractical to filter out fine abrasives, though they can cause rapid wear of bearings or close clearances. A strainer should have a net area of three to four times that of the suction pipe and should permit easy cleaning.

Ensure all pipe joints are air – tight to prevent the air leakage well as loss of capacity. This is critical on “suction lift” applications, as air leakage will break the pump prime.

Fitting isolator and non-return valves can allow easier maintenance. Never throttle pump on suction side and never place a valve directly on the pump inlet nozzle.

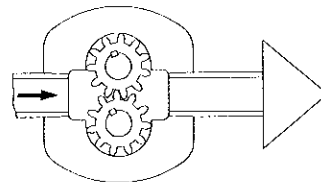


Figure 33

The non-return, “check”, valve should be located in the discharge pipework to protect the pump from excessive backpressure, and therefore reverse rotation when the unit is stopped.

ATTENTION

External relief valves should be fed back to the suction source, NOT the pump entry.

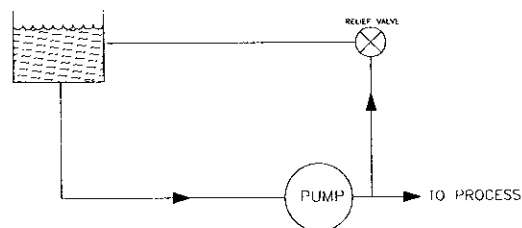


Figure 34

Where the pump operates on suction lift, the discharge pipework should be arranged so that it rises immediately after the pump discharge connection. This will ensure liquid is retained on the discharge side of the gears at startup to enable the clearances to be filled with liquid so that the pump will prime itself.

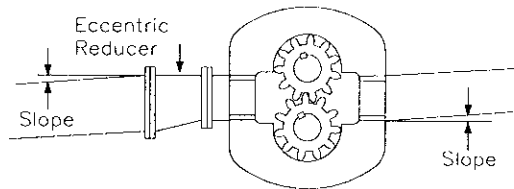


Figure 35

Final Piping Check

After connecting piping to the pump:

Rotate the shaft several times by hand to ensure there is no binding and all parts are free.

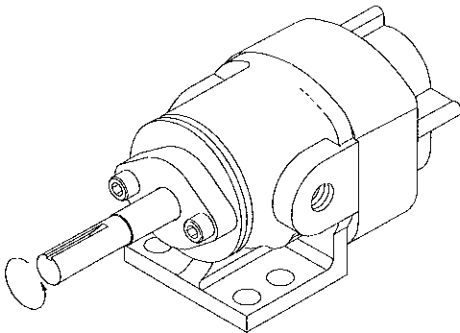


Figure 36

Recheck the coupling alignment, as previously described, to ensure there is no pipe strain, which can cause misalignment. If misalignment occurs, correct the piping, not the alignment.

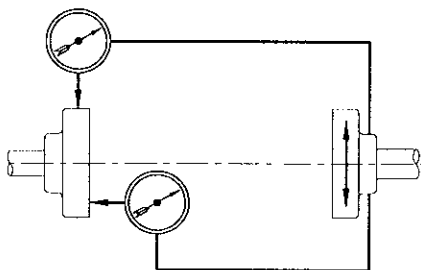


Figure 37

Relief Valve Setting

Refer to "Section 7 – Spare Parts" for pictures of parts referred to. Their part numbers have been added for convenience.

Install a pressure gauge in the outlet piping near the pump. The pressure gauge must have a scale of 1.5-2 times the operating pressure.

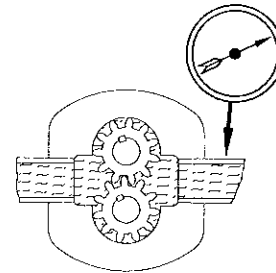


Figure 38

SHUT THE PUMP OFF AND RELIEVE ALL PRESSURE FROM THE SYSTEM.



Never completely remove the adjusting screw during operation.

Remove the cover nut (part 18) and gasket (part 19) from the adjusting screw (part 17). Remove the adjusting screw by turning it counter – clockwise.

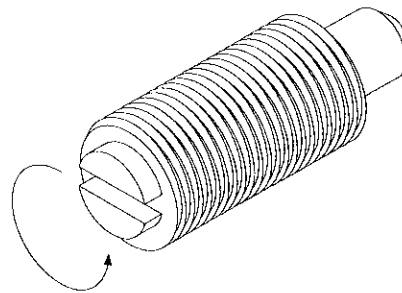


Figure 39

Refer to Table 9 below for the pump type and spring range.

Read down the column labeled "Pressure Setting (psi)" to the desired set pressure for a given spring range (each spring range is for a different spring, the color of which is included).

Read across the required pressure setting until pump size and type is reached. This value is the approximate number of turns of the adjusting screw required to achieve the desired set pressure.

Spring Settings										
Size 0 - 6 Spring Range	Pressure Setting (psi)	Size							Size 7 Spring Range	
		0	1	2	3	4	5	6		7
0 - 50 PSI	10		4 3/4	8	3 1/2	3 1/2	3	3	16 1/2	0 - 35 PSI (inner spring only)
	20		7	10 1/4	6 1/2	6 1/2	6 3/4	6 3/4	20 1/2	
	30		9 1/4	12 3/4	9 1/2	9 1/2	10	10	24	
	40		11 3/4	15	12 1/2	12 1/2	13 3/4	13 3/4	14	
	50		14	17 1/2	15 1/2	15 1/2	17 1/2	17 1/2	16	
50 - 100 PSI (Red)	50		4 1/4	8 1/2	5	5	2 3/4	2 3/4	16	35 - 100 PSI (inner / outer spring)
	60		5 3/4	10 1/4	7	7	5	5	18	
	70		7	12	9	9	7	7	20	
	80		8 1/2	13 3/4	10 3/4	10 3/4	9	9	22	
	90		10	15 1/2	12 1/2	12 1/2	11	11	24	
	100		11 1/2	17 1/4	14 1/2	14 1/2	13	13	26	
100 - 250 PSI (Yellow)	150		8	8 1/4	8	8	9			
	160		8 1/2	8 3/4	8 1/2	8 1/2	9 3/4			
	170		9	9 1/4	9	9	10 1/4			
	180		9 1/2	9 3/4	9 1/2	9 1/2	10 3/4			
	190		10	10 1/4	10	10	11 1/2			
	200		10 1/2	10 3/4	10 3/4	10 3/4	12			
	210		11	11 1/4	11 1/4					
	220		11 1/2	11 3/4	11 3/4					
	230		12	12 1/4	12 1/4					
	240		12 1/2	12 3/4	12 3/4					
	250		13	13 1/2	13 1/4					

Table 9

Replace the adjusting screw by engaging it approximately 1/4 of a turn in the body.

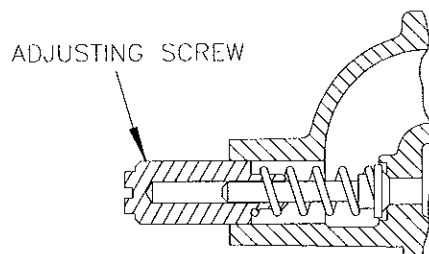
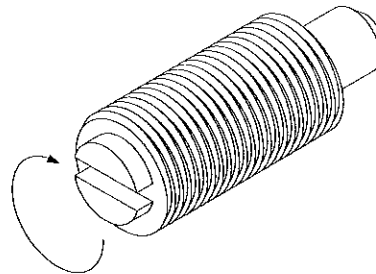


Figure 40

Turn the adjusting screw clockwise the required number of turns determined by Table 9. These values are not exact; they are only intended to



give the user an approximate value.

Figure 41

Re-install the gasket and cover nut.

SECTION 3 – OPERATION

PREPARATION

Direction of Rotation

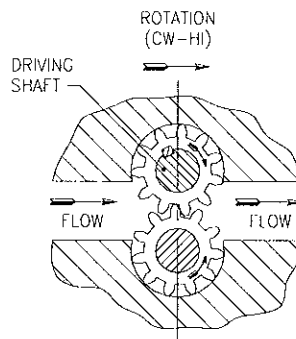
Serious damage can result if the pump is started or run in the wrong direction of rotation.

The pump is shipped with the coupling element removed. Ensure the direction of rotation of the motor is correct before fitting the coupling element.

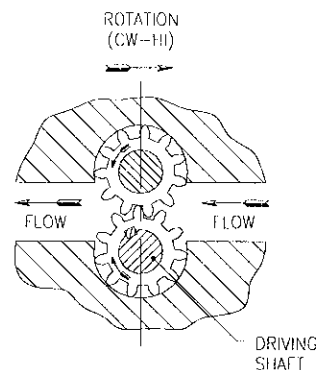
If maintenance work to the site's electricity supply has been done, the direction of rotation should be rechecked, as above, in case the supply phasing has been altered.

The standard rotation for GAX and GSX is clockwise as viewed facing the pump shaft (CW-HI). This means for GAS and GSS the suction will be on the left side and discharge on the right. With GAF, GAC and GSC the opposite is true, with suction on the right and discharge on the left. This is because the upper shaft drives the GAS and GSS, while the lower shaft drives the GAF, GAC and GSC (see figure below).

All GAX and GSX are bi-directional, but when reversing pumps with integral relief valves, the relief valve must be reversed as well. This is done by removing the body from the bracket, rotating it 180 degrees, and then re-installing it.



Standard GAS & GSS rotation



Standard GAF, GAC & GSC rotation

Guarding

Guarding is supplied fitted to the pump set.



If this has been removed or disturbed, ensure that all the protective guards are securely replaced prior to startup.

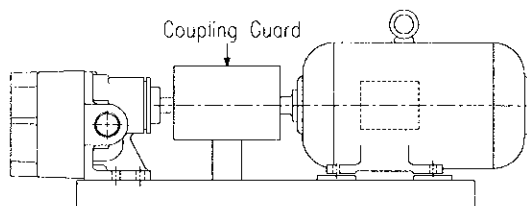


Figure 42

Primary and Auxiliary Supplies

Ensure all electrical, hydraulic, pneumatic and sealant systems are connected and operational.

Filling and Priming

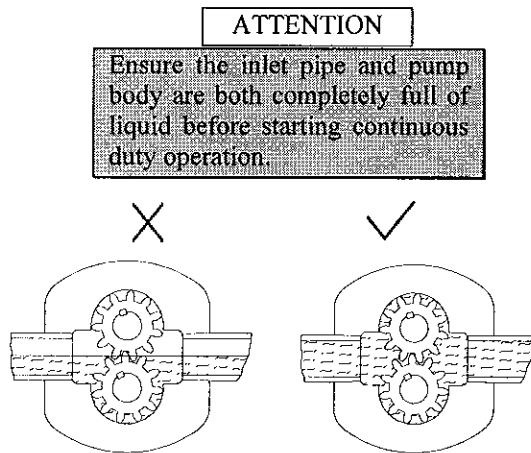


Figure 43

Priming may be carried out with an ejector, vacuum pump interceptor or other equipment, or by flooding from the inlet source.

STARTING THE PUMP

OPEN ALL OUTLET VALVES

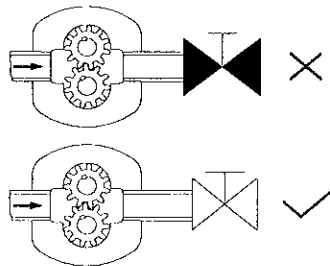


Figure 44

As these are positive displacement pumps, it is essential that the discharge pipework and the pump be protected from over-pressurization by either a pump relief valve or a pipework/system relief valve. A typical GAX or GSX, fitted with a relief valve, is shown below.

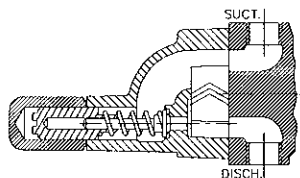


Figure 45

OPEN ALL INLET VALVES.

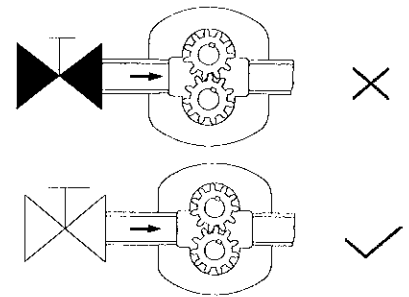


Figure 46

Prime the pump using one of the methods described in "Filling and Priming."

Start the motor and check outlet pressure.

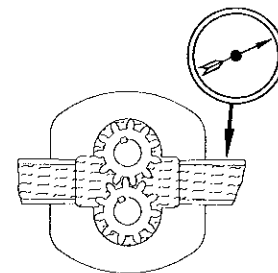


Figure 47

If the flow is satisfactory, slowly CLOSE the outlet valve until the desired operational pressure is achieved.

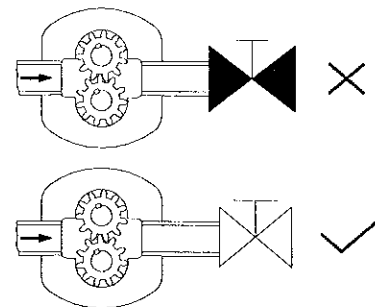
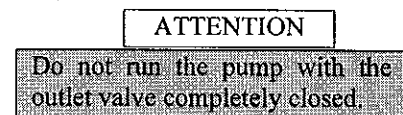


Figure 48

If NO flow, or LOW flow, STOP the pump. Refer to Table 10 Fault Diagnosis to troubleshoot operating difficulties.

Relief Valve Operation

Turn on the pump and slowly increase the pressure until the relief valve opens. This can be detected audibly, by an inability to build pressure or by a decrease in downstream flow. If this pressure does not agree with the desired setting, repeat the procedure outlined in Section 2.



Never turn the adjusting screw while the pump is operating.

If the desired set pressure cannot be achieved, the relief valve spring may have to be changed.

Relief Valve Spring Changing

If it has been determined that it is necessary to change the relief valve spring, the following instructions will assist in the task.

TURN OFF THE PUMP



Isolate the pump and relieve all pressure.

Remove the relief valve cover nut (part 18) by turning it counter - clockwise. Also remove the relief valve gasket (part 19).

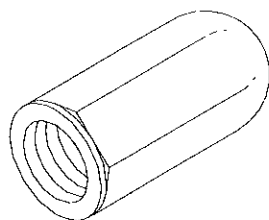


Figure 49

Remove the adjusting screw (part 17) by turning it counter - clockwise.

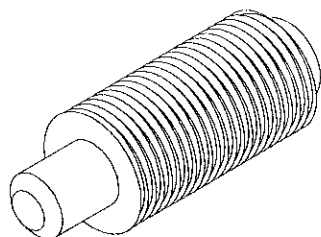


Figure 50

Pull out the spring (part 16) and valve stem (part 15).

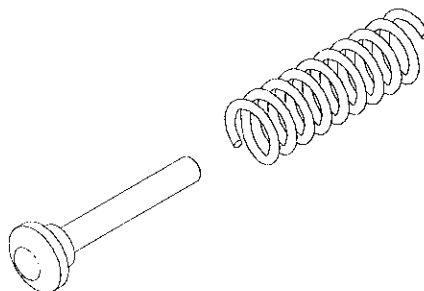


Figure 51

Replace existing spring with the appropriate one selected from Table 9. Now place the valve stem and the new spring in the relief valve.

Note that the 7 GAX and GSX require both springs in order to achieve 100 psi. The smaller is to be nested within the larger spring.

Start the threads of the adjusting screw in the pump body by turning clockwise.

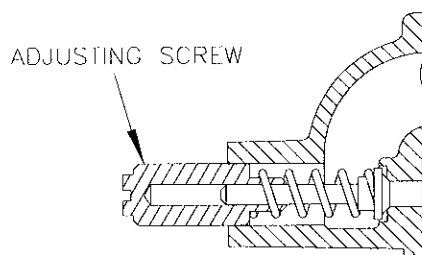


Figure 52

Refer to "Relief Valve Setting" for adjustment of the set pressure. Replace the relief valve gasket and the cover.

RUNNING THE PUMP

Refer to "Section 7 - Spare Parts" for pictures of parts referred to. Their part numbers have been added for convenience.

Pumps fitted with Packed Glands

If the pump has a packed gland, there must be a small amount of leakage from the gland to lubricate the packing. Gland screws (part 7A) should initially be finger-tight only. Leakage should take place soon after the stuffing box is pressurized. If no leakage takes place, the packing (part 28) will begin to overheat. If there is no leakage, the pump should be stopped and allowed to cool before being restarted. When the pump is restarted, it should be checked to ensure leakage is taking place at the packed gland.

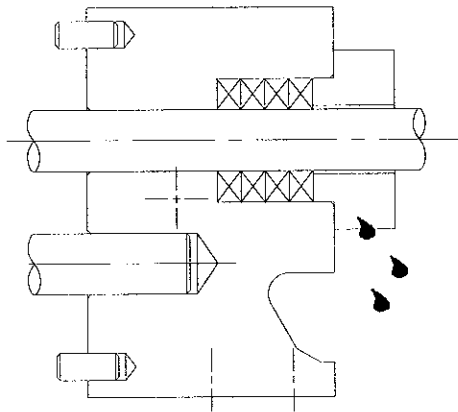


Figure 53

If hot liquids are being pumped, it may be necessary to loosen the gland screws to achieve leakage.

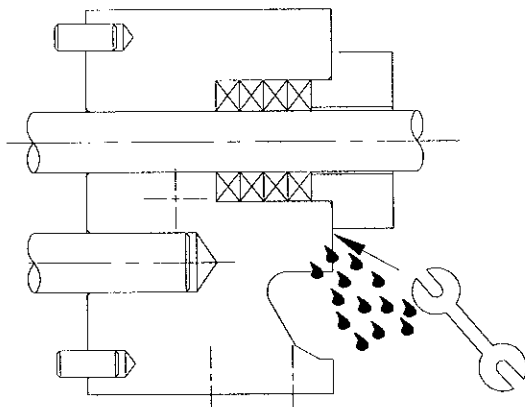


Figure 54

The pump should be run for ten minutes with steady leakage and the gland screws tightened slightly until leakage is reduced to an acceptable level, normally 30 to 120 drops per minute. Bedding of the packing may take another 15 minutes.

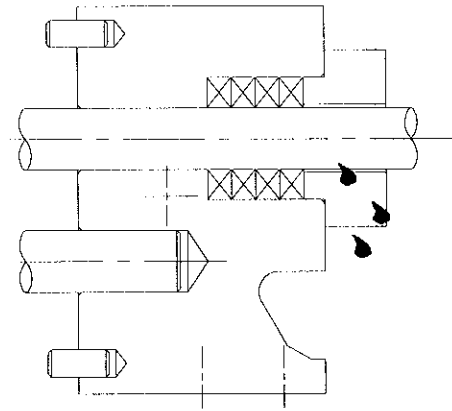


Figure 55

Pumps fitted with Mechanical Seals

Mechanical seals require no adjustment.

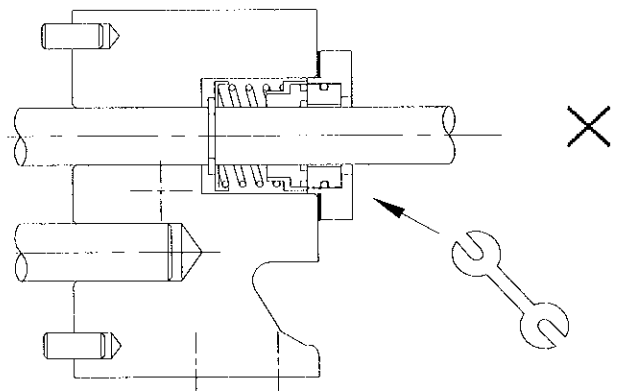


Figure 56

STOPPING THE PUMP

Close the outlet valve, but ensure that the pump runs in this condition for no more than a few seconds.

Stop the pump.

For prolonged shutdowns, and especially when ambient temperatures are likely to drop below freezing point, the pump and any cooling and flushing arrangements must be drained or otherwise protected.

SECTION 4 – OPERATING DIFFICULTIES

General

This section gives information on fault diagnosis and possible remedies to operating difficulties. Table 10 details a list of possible symptoms to which the probable cause or causes may be ascertained and corrected.

Table 10 Fault Diagnosis

TROUBLE	POSSIBLE CAUSE	CORRECTIVE ACTION
Pump fails to discharge STOP PUMP IMMEDIATELY!!!	Not properly primed	Reprime from discharge side.
	Wrong direction of rotation	Reverse wiring at motor.
	Speed too low - entire pump capacity slips through clearances	Change drive to increase speed. Check driver to see that it is up to rated speed.
	Valves closed or an obstruction exists in the suction or discharge pipe	Open all valves. See that no obstruction exists in suction or discharge pipe.
	Strainer clogged	Remove strainer, clean and be sure it has ample area.
	Suction pipe end not submerged in enough liquid (vortexing)	Increase length of suction pipe or raise liquid level in supply tank.
	Foot valve stuck	Ensure foot valve is functional. Check to see that suction pipe has not been screwed into foot valve far enough to hold it closed.
	Suction lift too high	Check with vacuum gauge.
	Bypass valve open	Examine all bypass and return lines for open valves. Close them if open. A relief valve stuck open may bypass the entire pump capacity.
	Air leaks in suction	Paint and tighten all suction pipe gaskets and threaded joints. Check stuffing box packing.
	Check valve backed up by hydraulic pressure	Install an air-release valve between check valve and pump.
	Pump badly worn -excessive clearances will cause slip equal to pump displacement	Replace parts – see Section 7 for spares.
Pump is noisy	Insufficient liquid supply	Increase suction pipe size and reduce its length. Lower position of pump to prevent cavitation.
	Air leaks in suction	Paint all pipe joints, replace faulty flange gaskets and repack stuffing box to stop crackling noise due to air in pump.

TROUBLE	POSSIBLE CAUSE	CORRECTIVE ACTION
Pump is noisy (cont.)	Pump out of alignment	Align drive with pump. Check piping to determine if strain is applied to pump casing, causing metallic contact between rotating elements and casing.
	Bent drive shaft that causes rotating elements to operate unevenly with consequent noise.	Replace shaft.
	Excessive pressure	Check pressure. Install a relief valve.
	Coupling out of alignment	Align driver and pump to prevent coupling cover from slapping.
	Relief valve chatters	Change pressure adjustment or check size and type of relief valve.
	Excessive entrained or dissolved air in liquid.	Change system to reduce / eliminate entrained or dissolved air.
Pump wears rapidly	Abrasives in liquid	Consider adding suction strainer.
	Pipe strain on pump casing	Release piping and align it in independent supports before connecting to pump.
	Pump operating against excessive pressure	Install relief valve to protect pump, or use a heavier duty pump.
	Corrosion that roughens rubbing surfaces	Consult local Ingersoll – Dresser Pumps representative.
	Pump runs dry	Provide ample supply of liquid at all times. Do not allow pump to operate under conditions where liquid supply may fail.
	Severe belt drive or coupling misalignment.	Realign assembly according to specifications.
	Excessive end thrust on driving shaft either from driver or coupling	Realign assembly according to specifications.
Pump not up to capacity	Suction lift too high	Bubbles form to usurp part of the pump displacement. Check with vacuum gauge.
	Suction strainer partly clogged or of insufficient area	Clean the screen. If all danger of foreign material has passed and screen has insufficient area, remove screen.
	Suction pipe insufficiently submerged, causing vortices to form	Increase suction pipe length to obtain greater submergence.
	Suction pipe too small, too long or has many fittings to increase pipe friction abnormally	Simplify the suction line and increase its size to reduce pipe friction.
	Stuffing box improperly packed, causing air to be drawn in	Repack box
	Seal installed incorrectly	Check installation against specifications
	Air leaks in suction piping	Paint all pipe joints. Replace gaskets where necessary.
	Speed too low	Check driver for speed and overload. Change drive speed ratio.

TROUBLE	POSSIBLE CAUSE	CORRECTIVE ACTION
Pump not up to capacity (cont.)	Hand bypass or return line partly open	Close all bypass valves and see that they seat properly.
	Relief valve improperly seated or incorrectly set.	Regrind valve on its seat. Be sure valve does not open until desired pressure is reached.
	Pump parts worn	Replace parts and adjust clearances to eliminate excessive slip.
Starts, then loses suction	Suction line not submerged sufficiently	Increase suction pipe length so that liquid is not drawn down to the end of pipe.
	Liquid vaporizes in suction line	Reduce suction lift so, as liquid approaches tank bottom, it will not vaporize.
	Air or gas pockets in system	Reduce size of pockets in suction system, or provide a partly open bypass to maintain pump prime.
	Air leaks in suction line	Check for air leakage into pump suction.
	Liquid supply exhausted	Check suction tank.
Pump takes too much power	Speed too high or liquid heavier or more viscous than specified for pump	Reduce speed or heat liquid to reduce viscosity.
	Obstruction in discharge line causes pump to operate above rated pressure	If new installation, recalculate what the pressure should be. Include pressure loss due to friction in pipe and fittings. Check this pressure against rated pump head. Check pressure developed by pump with pressure gauge. An obstruction in discharge line or partly closed valve may increase pressure above normal. If pressure cannot be reduced to give safe load on motor, reduce pump speed or install larger motor.
	Stuffing box packing too tight	Check packing. If too tight, make necessary adjustment or replace packing with correct type properly installed.
	Seal installed incorrectly	Check installation against specifications.
	Shaft bent or out of alignment	Check shaft, pump and motor alignment. If shaft is bent, install a new one. Properly align pump and motor.
	Rotating element binds and wears excessively	Pipe connection out of line distorts the pump casing. Disconnect piping to check alignment. Support pipes separate from pump. Check fit of rotating parts to make sure they do not bind, or have not moved axially on shaft to rub body or bracket.

SECTION 5 – PREVENTATIVE MAINTENANCE

Maintenance Schedule

A preventative maintenance schedule can greatly extend the life of your pump.

Our service personnel can help with preventative maintenance records and provide condition monitoring for temperature and vibration to identify the onset of potential problems.

Routing Inspection

The following checks should be made and the appropriate action taken to remedy any deviations.

Check operating behavior; ensure noise and vibration levels are normal.

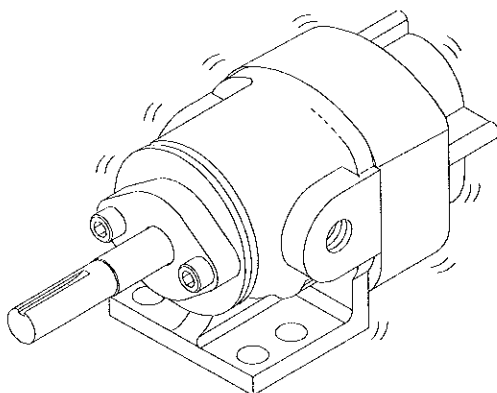


Figure 57

Check that there are no abnormal fluid or lubricant leaks (static and dynamic seals).

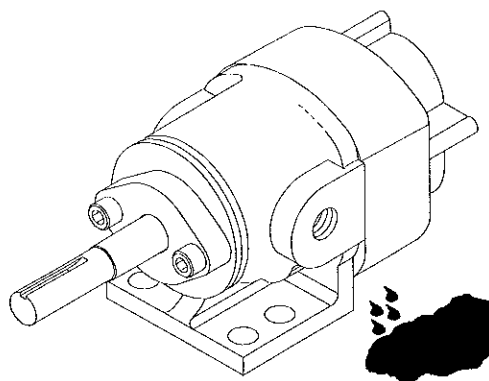


Figure 58

Check that shaft seal leaks are within acceptable limits.

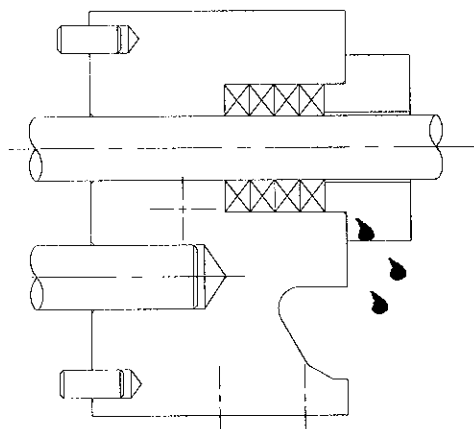


Figure 59

Check that the relief valve set pressure is correct.

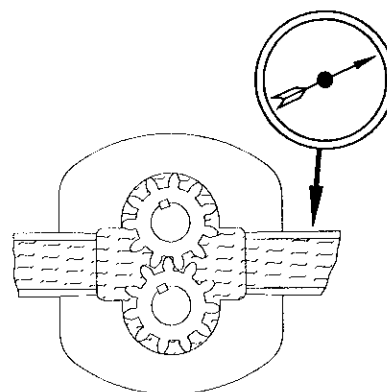


Figure 60

Refer to the manual of any associated equipment for routine checks needed.

Periodic Inspection (6 Monthly)

Check foundation bolts for security of attachment and corrosion.

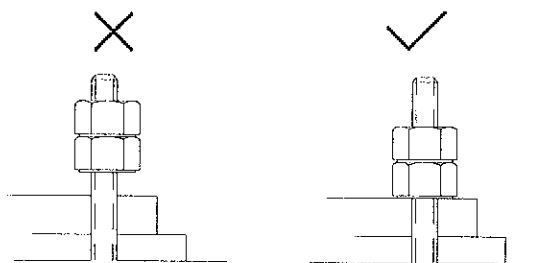


Figure 61

The coupling should be checked for correct alignment and worn driving elements.

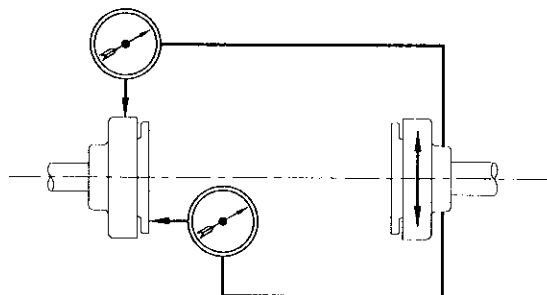


Figure 62

Gland Packing

With the pump shut off, the stuffing box gland can be withdrawn to permit repacking or the addition of extra rings of packing.

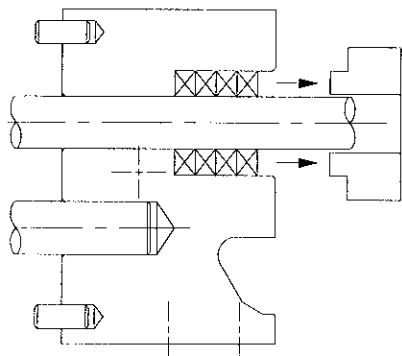


Figure 63

Mechanical Seal

When leakage becomes unacceptable, the seal will need replacement.

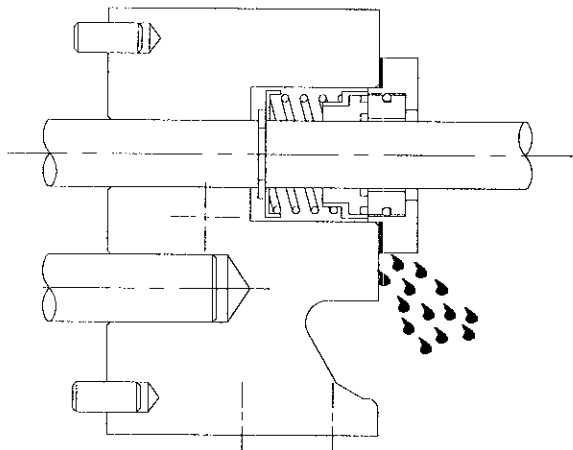


Figure 64

Operating Difficulties

Please refer to Table 10 Fault Diagnosis when operating difficulties are encountered.

SECTION 6 – DISMANTLING AND ASSEMBLY

DISMANTLING



Refer to safety section before dismantling the pump.

Before dismantling the pump for overhaul, ensure that genuine Ingersoll – Dresser Pumps replacement parts are available.

Consult the sectional drawing for references to part numbers where necessary.

Motor Removal

Disconnect motor and lock or tag out power supply.

Disconnect all auxiliary pipes and tubes where applicable.

Remove the coupling guard and disconnect the coupling.

Remove the mounting bracket screws.

Packing Removal

Once again, the GAS configuration was deemed appropriate for the following diagrams:

Remove the coupling key (part 4B).

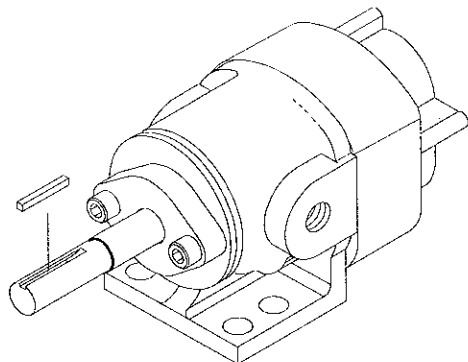


Figure 65

Remove the gland screws (part 7A).

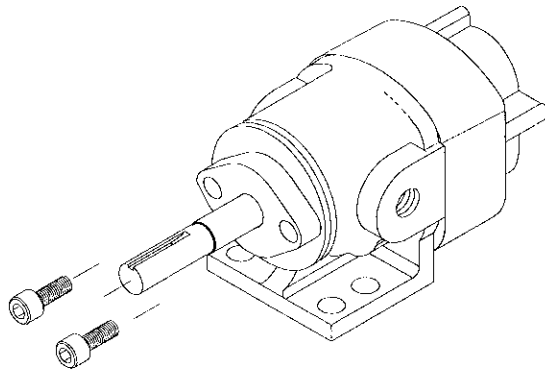


Figure 66

Take off the gland (part 7) and the packing (part 28).

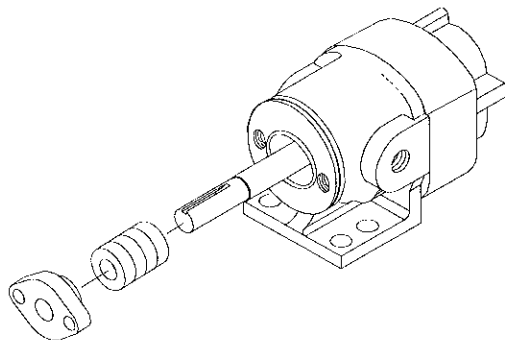


Figure 67

Mechanical Seal Assembly

The seal manufacturer's instructions should be followed for dismantling and assembly, but the following guidance should assist with most seal types.

Remove the coupling key (part 4B).

Remove the gland screws (part 7A), and inboard bearing (part 10) if applicable.

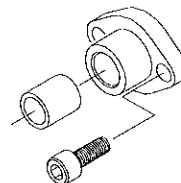


Figure 68

CAREFULLY remove the gland (part 7B,7C), with the mechanical seal stationary seat, and mechanical seal rotating element (part 9).

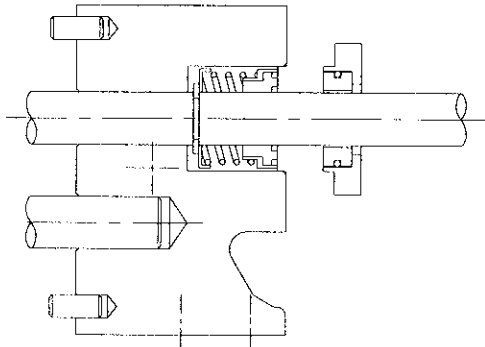


Figure 69

Remove the retaining ring (part 20) using a tool similar to the one shown below for GASM, GAFM and GSSM.

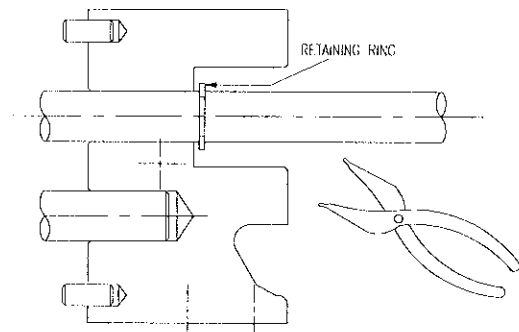


Figure 70

Pump Body

Remove the pump body screws (part 3A).

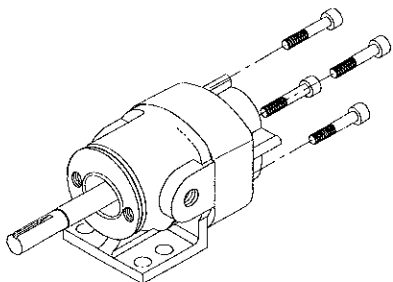


Figure 71

Separate pump body from mounting bracket. A rubber mallet may be required.

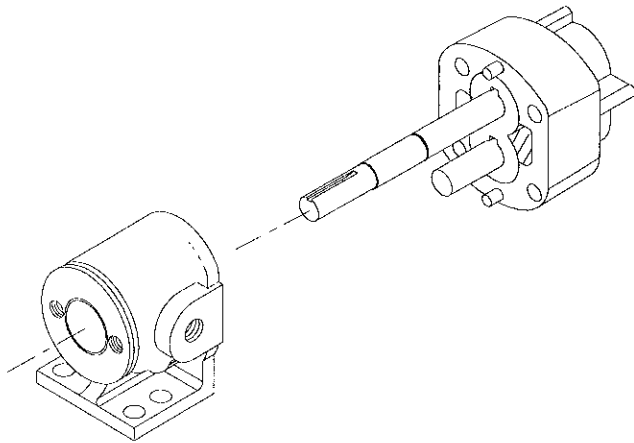


Figure 72

Remove body gasket (part 13) and discard. A replacement gasket will be required for assembly.

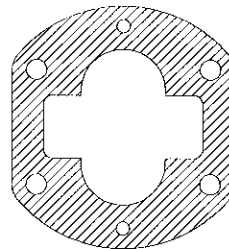


Figure 73

Rotors are now accessible for removal. Gears must be pressed off the shafts.

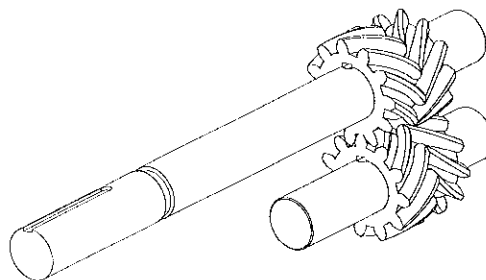


Figure 74

Clean gasket mating surfaces.

Relief Valve

On pumps fitted with a relief valve, the valve should be removed only if it is to be replaced.

See Section 3 – Relief Valve Changing for instructions on the dismantling and assembly of the relief valve.

EXAMINATION OF PARTS

Used parts must be inspected before assembly to ensure the pump will subsequently run properly. In particular, fault diagnosis is essential to enhance pump and plant reliability.

Gaskets and O – Rings

After dismantling, discard and replace.

ASSEMBLY

General

To aid in assembling the pump, consult the exploded view drawings.

Ensure the gasket and o-ring mating surfaces are clean.

Press gears onto shafts (use Figure 77 for values), taking care to line up the keys and the keyways. This assembly is referred to as a rotor. Cover mating surfaces of the pump body and mounting bracket with a liquid gasket compound prior to placing the gasket onto the body.

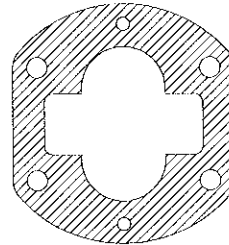


Figure 75

Mesh the gears of the two shafts together, and insert the pair into the pump body.

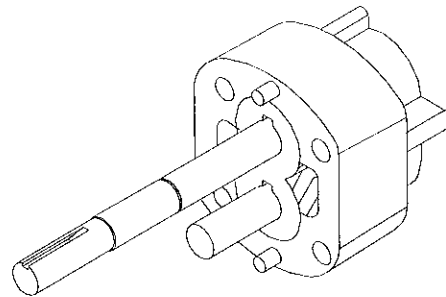
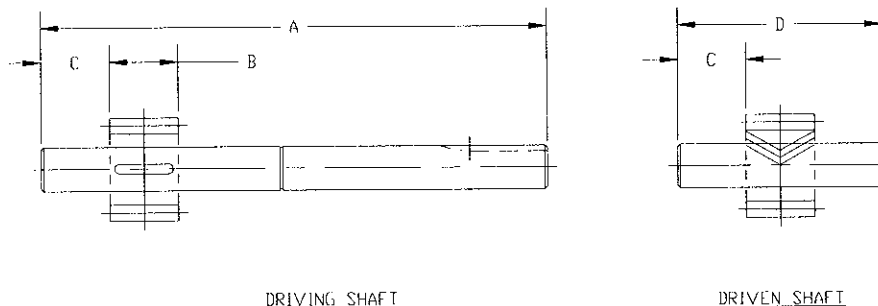


Figure 76



Size	A	B	C	D
0	6.08	.454	.875	2.20
1	6.50	.878	.875	2.63
2	7.75	1.376	1.062	3.50
3	9.25	1.126	1.375	3.88
4	9.88	1.750	1.375	4.50
5	11.13	1.751	1.750	5.25
6	11.88	2.501	1.750	6.00
7	13.81	3.460	2.050	7.50

Figure 77 Rotor Dimensions

Install the mounting bracket onto the body/rotors.

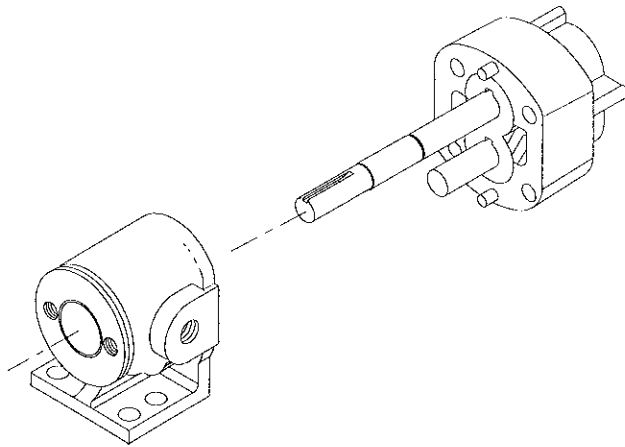
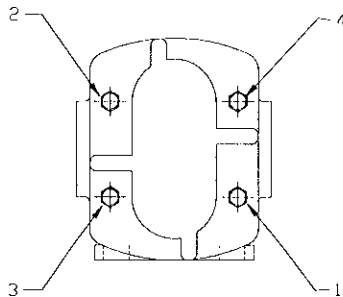


Figure 78

Bolt the assembly together using the crossing pattern similar to the one shown below and the torque values from Section 1 – Pump Technical Data.



1. HAND TIGHTEN BOLTS UNTIL SNUG.
2. FOLLOWING BOLT PATTERN AS ILLUSTRATED, TORQUE TO STANDARD TORQUE LIMITS.

Figure 79

Packing Assembly

Assemble the gland packing into the stuffing box housing before fitting onto the shaft.

Stagger the joints in the gland packing by 90 degrees.

Position the gland squarely against the last ring and tighten the gland nuts finger-tight only.

Mechanical Seal Assembly

Extreme cleanliness is required. The sealing faces and shaft surface must be free from scratches or other damage.

Install the retaining ring onto the shaft into the groove using a tool similar to the one shown below.

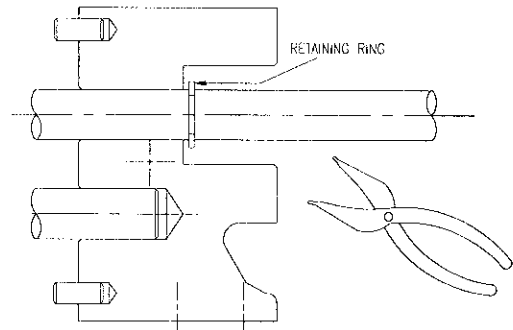


Figure 80

Place the seal rotor into the stuffing box. Carefully press the stationary seal into the gland, ensuring that the seating ring is not deformed.

Place the gland gasket onto the stuffing box face, lining up the bolt holes.

Place the gland onto the stuffing box and bolt the gland to the mounting bracket. Take care to tighten the bolts evenly.

SECTION 7 – SPARE PARTS

GENERAL

Ordering of Spares

Ingersoll – Dresser Pumps keeps records of all pumps that have been supplied. When ordering spares, the following information should be quoted.

1. Pump serial number
2. Pump size
3. Part name
4. Part number
5. Quantity of parts required

The pump size and serial number are shown on the pump nameplate.

To ensure continued satisfactory operation, replacement parts for the original design

specification should be obtained from Ingersoll-Dresser Pumps. Any change to the original design specification (modification or use of a non-standard part) will invalidate the pump's safety certification.

Recommended Spares

See the following pages to determine the necessary spares. The pages are organized by the type of pump purchased.

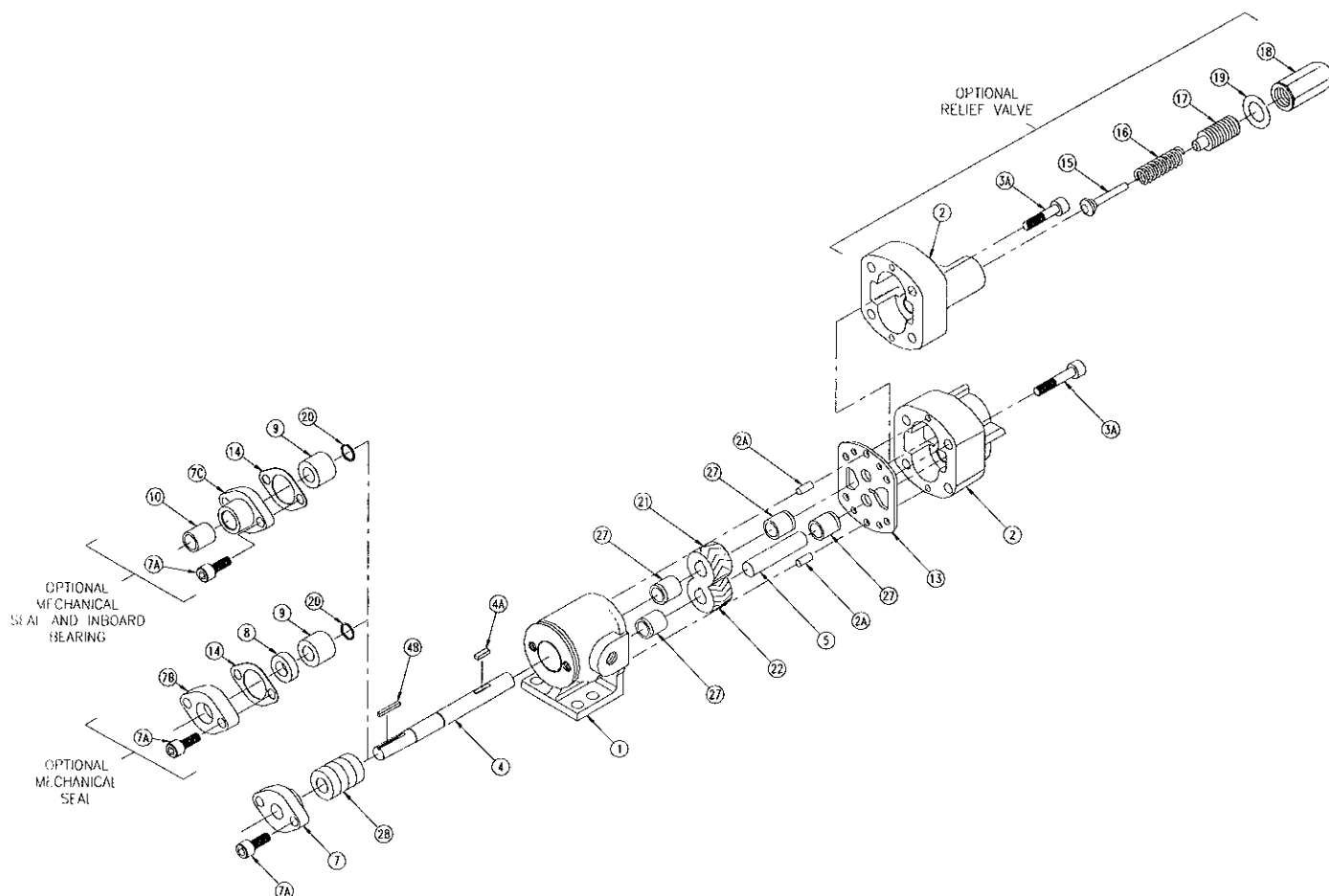
Storage of Spares

Spare parts should be stored in a clean, dry area away from vibration. Inspection and treatment of metallic surfaces (if necessary) with preservative is recommended at 6 month intervals.

Suggested Spare Parts - GAS Series

The figure below shows the basic GAS pump along with the options available and the spare parts recommended with each option. These are categorized by the following definitions:

- Class 1 - **Normal Maintenance Items**
- Class 2 - **Major Overhaul Items**
- Class 3 - **Critical Service Items** to restore the pump to "as new" condition



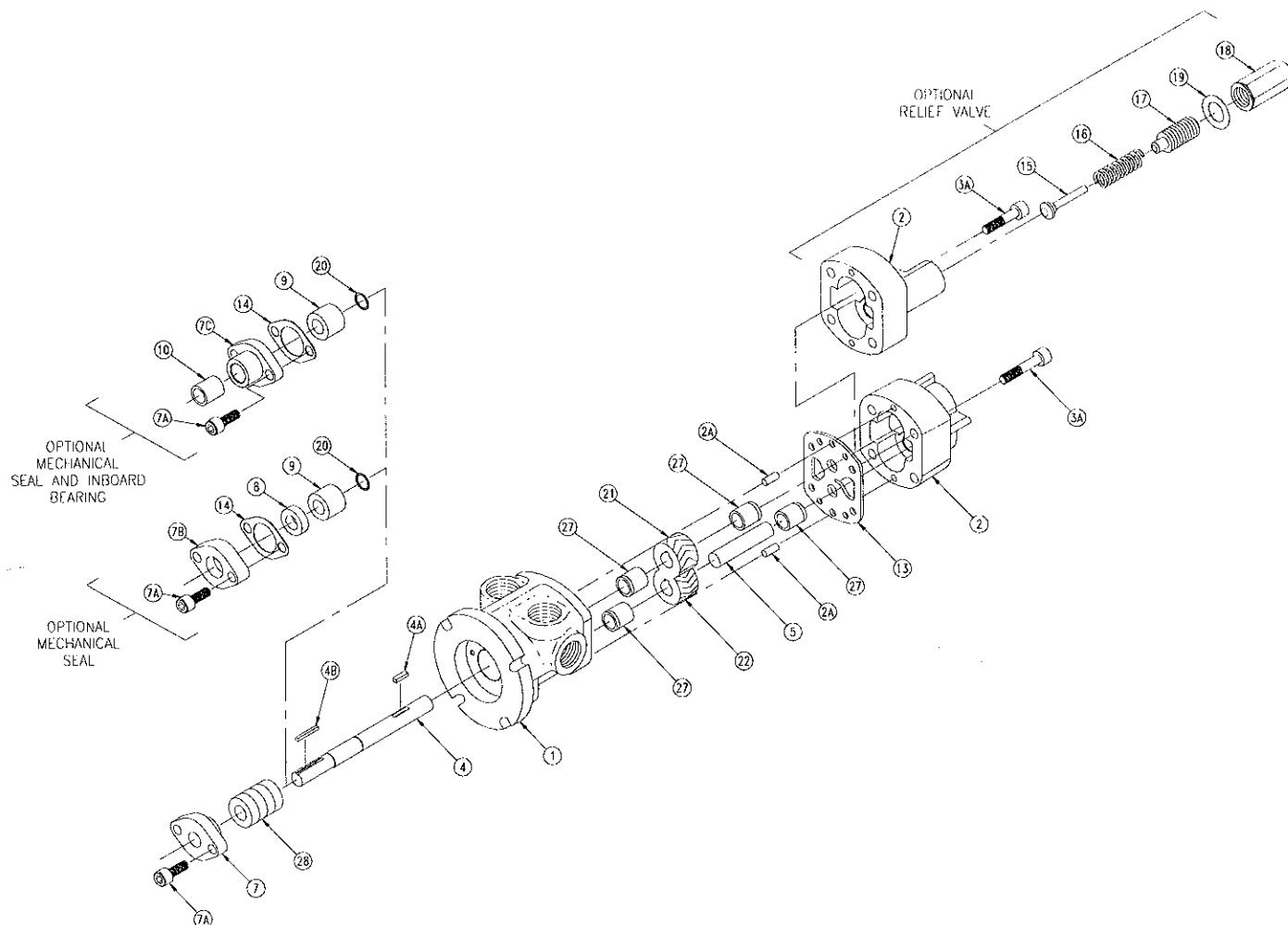
Item	Description	1	2	3	Item	Description	1	2	3
1	Mounting Bracket			✓	10	Bearing - Inboard	✓	✓	✓
2	Body		✓		13	Gasket - Body	✓	✓	✓
2A	Dowel Pin			✓	14	Gasket - Gland	✓	✓	✓
3A	Screw - Body			✓	15	Valve			✓
4	Driving Shaft		✓	✓	16	Spring			✓
4A	Key - Gear			✓	17	Adjusting Screw			✓
4B	Key - Coupling			✓	18	Cover Nut			✓
5	Driven Shaft		✓	✓	19	Gasket - Relief Valve	✓	✓	✓
7	Packing Gland			✓	20	Retaining Ring	✓	✓	✓
7A	Screw - Gland			✓	21	Gear - Driving		✓	✓
7B	Mechanical Seal Gland			✓	22	Gear - Driven		✓	✓
7C	Bearing Bracket ¹	✓	✓	✓	27	Bushing	✓	✓	✓
8	Mechanical Seal Seat ¹	✓	✓	✓	28	Packing	✓	✓	✓
9	Mechanical Seal Rotor	✓	✓	✓					

¹On 7 GAS's the mechanical seal and bearing option has the seal seat as in integral part of the bearing bracket.

Suggested Spare Parts - GAF Series

The figure below shows the basic GAF pump along with the options available and the spare parts recommended with each option. These are categorized by the following definitions:

- Class 1 - **Normal Maintenance Items**
- Class 2 - **Major Overhaul Items**
- Class 3 - **Critical Service Items** required to restore the pump to "as new" condition



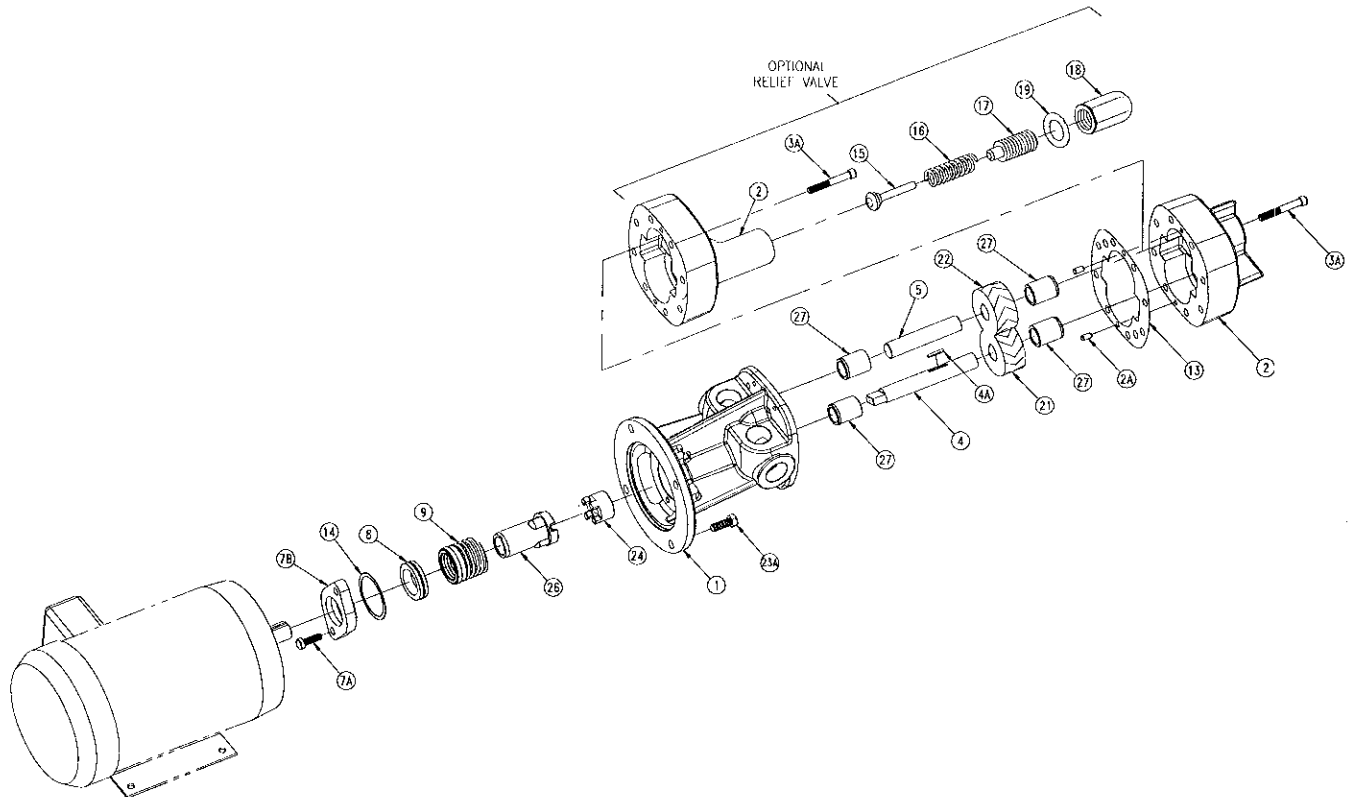
Item	Description	1	2	3	Item	Description	1	2	3
1	Mounting Bracket			✓	10	Bearing – Inboard	✓	✓	✓
2	Body			✓	13	Gasket – Body	✓	✓	✓
2A	Dowel Pin			✓	14	Gasket – Gland	✓	✓	✓
3A	Screw - Body			✓	15	Valve			✓
4	Driving Shaft		✓	✓	16	Spring			✓
4A	Key – Gear			✓	17	Adjusting Screw			✓
4B	Key - Coupling			✓	18	Cover Nut			✓
5	Driven Shaft		✓	✓	19	Gasket - Relief Valve	✓	✓	✓
7	Packing Gland			✓	20	Retaining Ring	✓	✓	✓
7A	Screw - Gland			✓	21	Gear - Driving		✓	✓
7B	Mechanical Seal Gland			✓	22	Gear – Driven		✓	✓
7C	Bearing Bracket ¹	✓	✓	✓	27	Bushing	✓	✓	✓
8	Mechanical Seal Seat ¹	✓	✓	✓	28	Packing	✓	✓	✓
9	Mechanical Seal Rotor	✓	✓	✓					

¹On 7 GAF's the mechanical seal and inboard bearing option has the seal seat as in integral part of the bearing bracket.

Suggested Spare Parts - GAC Series

The figure below shows the basic GAC pump along with the options available and the spare parts recommended with each option. These are categorized by the following definitions:

- Class 1 - **Normal Maintenance Items**
- Class 2 - **Major Overhaul Items**
- Class 3 - **Critical Service Items** required to restore the pump to "as new" condition

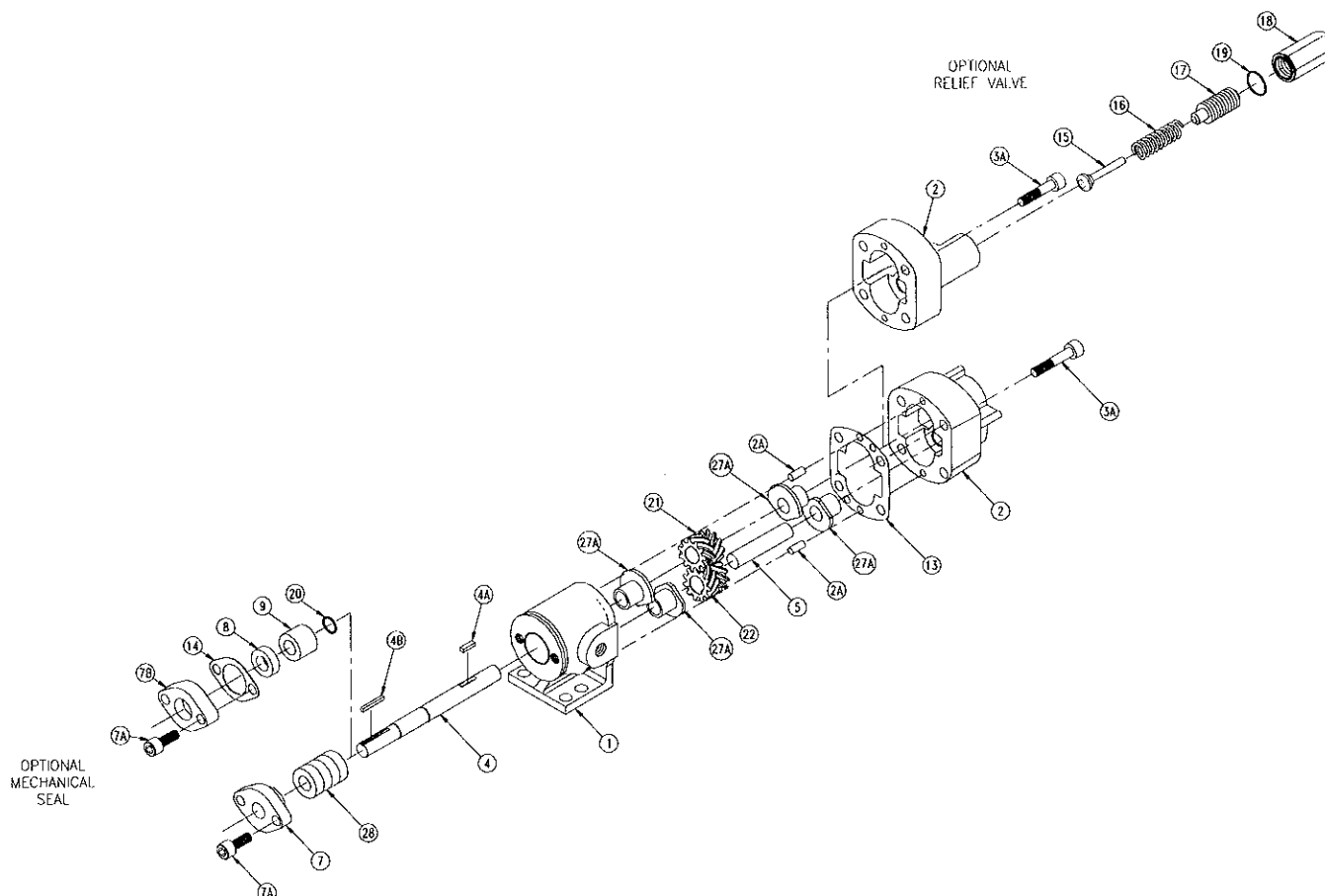


Item	Description	1	2	3	Item	Description	1	2	3
1	Mounting Bracket			✓	14	Gasket - Gland	✓	✓	✓
2	Body			✓	15	Valve			✓
2A	Dowel Pin			✓	16	Spring			✓
3A	Screw - Body			✓	17	Adjusting Screw			✓
4	Driving Shaft		✓	✓	18	Cover Nut			✓
4A	Key - Gear			✓	19	Gasket - Relief Valve	✓	✓	✓
4B	Key - Coupling			✓	20	Retaining Ring	✓	✓	✓
5	Driven Shaft		✓	✓	21	Gear - Driving		✓	✓
7A	Screw - Gland			✓	22	Gear - Driven		✓	✓
7B	Mechanical Seal Gland			✓	24	Coupling - Driven Half		✓	✓
8	Mechanical Seal Seat	✓	✓	✓	26	Coupling - Driving Half		✓	✓
9	Mechanical Seal Rotor	✓	✓	✓	27	Bushing	✓	✓	✓
13	Gasket - Body	✓	✓	✓					

Suggested Spare Parts - GSS Series

The figure below shows the basic GSS pump along with the options available and the spare parts recommended with each option. These are categorized by the following definitions:

- Class 1 - **Normal Maintenance Items**
- Class 2 - **Major Overhaul Items**
- Class 3 - **Critical Service Items** required to restore the pump to "as new" condition

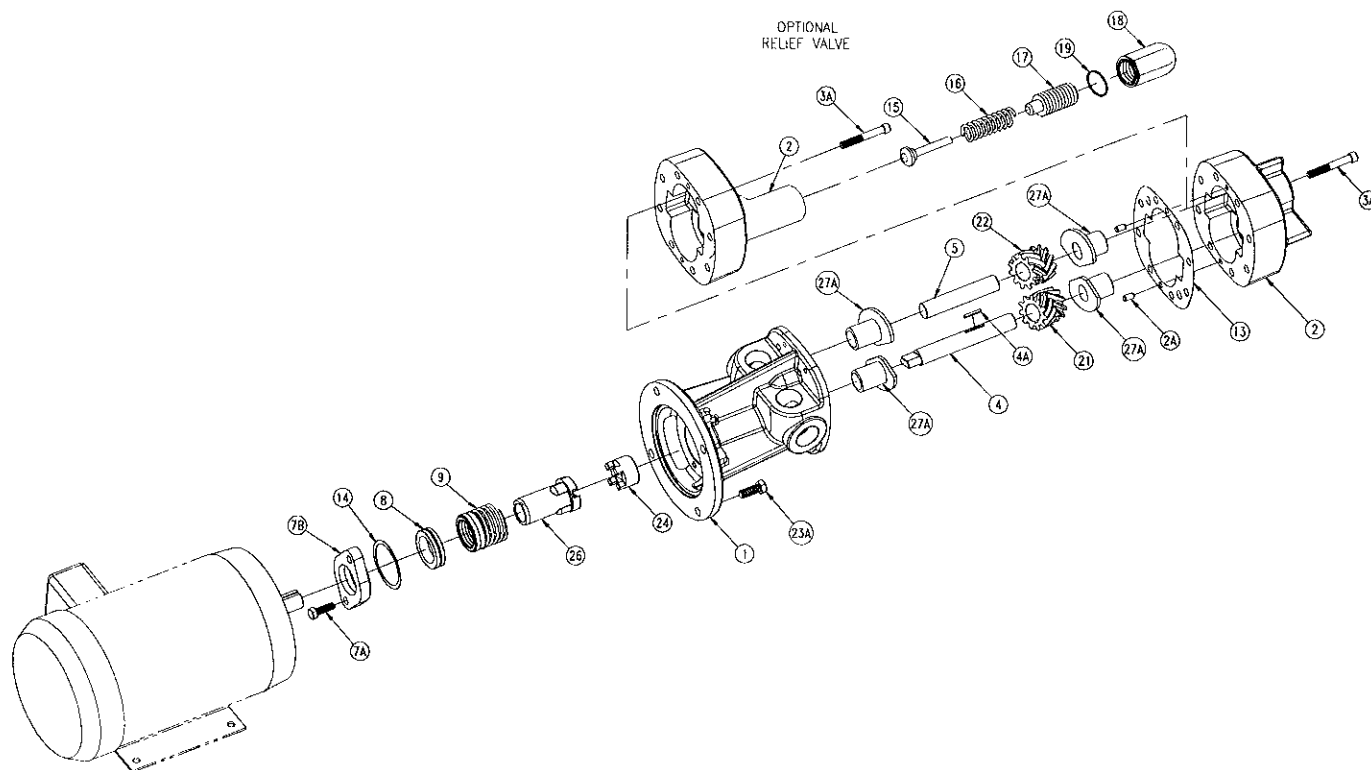


Item	Description	1	2	3	Item	Description	1	2	3
1	Mounting Bracket			✓	13	Gasket – Body	✓	✓	✓
2	Body			✓	14	Gasket – Gland	✓	✓	✓
2A	Dowel Pin			✓	15	Valve			✓
3A	Screw - Body			✓	16	Spring			✓
4	Driving Shaft		✓	✓	17	Adjusting Screw			✓
4A	Key – Gear			✓	18	Cover Nut			✓
4B	Key - Coupling			✓	19	Gasket - Relief Valve	✓	✓	✓
5	Driven Shaft		✓	✓	20	Retaining Ring	✓	✓	✓
7	Packing Gland			✓	21	Gear - Driving		✓	✓
7A	Screw - Gland			✓	22	Gear – Driven		✓	✓
7B	Mechanical Seal Gland			✓	27	Bushing	✓	✓	✓
8	Mechanical Seal Seat	✓	✓	✓	28	Packing	✓	✓	✓
9	Mechanical Seal Rotor	✓	✓	✓					

Suggested Spare Parts - GSC Series

The figure below shows the basic GSC pump along with the options available and the spare parts recommended with each option. These are categorized by the following definitions:

- Class 1 - Normal Maintenance Items
- Class 2 - Major Overhaul Items
- Class 3 - Critical Service Items required to restore the pump to "as new" condition



Item	Description	1	2	3	Item	Description	1	2	3
1	Mounting Bracket			✓	14	Gasket - Gland	✓	✓	✓
2	Body			✓	15	Valve			✓
2A	Dowel Pin			✓	16	Spring			✓
3A	Screw - Body			✓	17	Adjusting Screw			✓
4	Driving Shaft		✓	✓	18	Cover Nut			✓
4A	Key - Gear			✓	19	Gasket - Relief Valve	✓	✓	✓
4B	Key - Coupling			✓	20	Retaining Ring	✓	✓	✓
5	Driven Shaft		✓	✓	21	Gear - Driving		✓	✓
7A	Screw - Gland			✓	22	Gear - Driven		✓	✓
7B	Mechanical Seal Gland			✓	24	Coupling - Driven Half		✓	✓
8	Mechanical Seal Seat	✓	✓	✓	26	Coupling - Driving Half		✓	✓
9	Mechanical Seal Rotor	✓	✓	✓	27	Bushing	✓	✓	✓
13	Gasket - Body	✓	✓	✓					

SECTION 8 – GENERAL ARRANGEMENT DRAWINGS

General

The typical general arrangement drawing and any specific drawings required by the contract will be sent to the Purchaser separately. If required, these should be obtained from the Vendor and retained with this manual.

SECTION 9 – ADDITIONAL INFORMATION

Certification

Any certificates e.g. materials, hydraulic tests, conformities, performance test curves, etc. will be sent to the Purchaser separately. If required, these should be obtained from the Vendor and retained with this manual.

Supplementary Manuals

See also the supplementary instruction manuals supplied with this manual e.g. for electric

motors, controllers, engines, gearboxes, sealant systems, etc.

Change Notes

Change notes and errata (if any) will be included on a separate page(s) within this manual.

If changes are made to the pump after supply, this manual will require updating.

Nothing contained in this brochure is intended to extend any warranty or representation, expressed or implied, regarding the products described herein. Any such warranties or other terms and conditions of sale of products shall be in accordance with Ingersoll-Dresser Pumps' standard terms and conditions of sale for such products, which are available on request.

We recommend use of original IDP replacement parts in the maintenance of your unit. Precise tolerances, metallurgy, manufacturing processes and heat treatment are important factors in the design of each component and the services it will provide. Failure of any component can possibly result in extensive damage to your unit. Warranty may be terminated based on the installation of non OEM parts.

IDP Regional Entry Centers are designed to be responsive when replacement parts are needed quickly. Direct lines connecting our Parts Distribution Center, Distributors and Pump Repair Centers create a network able to respond almost instantly to your requests.

FASTRAQ (Fast Transactions/Responses/Answer/Quotations) can be accessed by our Order Entry Group or an IDP Distributor to give accurate, up-to-the-minute information on needed parts. In addition, FASTRAQ can provide quotes and place orders.

For repair parts service contact your nearest IDP pump sales office or Pump House distributor. They're in the Yellow Pages.

For the name, address and
phone number of your nearest authorized
Ingersoll-Dresser Pump distributor,
Call 1-800-728-7867



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