



English

Installation, Operation and Maintenance Instructions

XG Range

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Warranty

1. Pumps manufactured by Mono Pumps (Australia) Pty Ltd are covered by warranty for a period of twelve months from installation.
2. Mono Pumps will make good by repair, or at their option, the replacement of faulty parts under warranty, providing always that:
 - The equipment was correctly installed and properly used in accordance with Mono Pumps Installation and Operating Instructions and accepted codes of good engineering practice.
 - Any claim under warranty arises solely from faulty design, material or workmanship.
 - Repairs are carried out with the written approval of Mono Pumps (Australia) Pty Ltd who may choose to carry out the repair themselves or at their option nominate an approved repairer for the purpose.
 - All costs other than the direct repair costs are borne by the purchaser.
3. Auxilliary equipment not of Mono Pumps manufacture but supplied by Mono Pumps as part of a package will be protected by the original manufacturers warranty. Mono Pumps warranty is limited to that extent.
4. Mono Pumps warranty does not cover any of the following:
 - Claims for third party liability for damage caused by the failure of any of the company's products.
 - Damage caused by abnormal operating conditions, war, violence, storm cataclysm or any other force.
 - Damage caused by the equipment being used for an application for which the product is not recommended.
5. The decision of Mono Pumps in relation to any claims or disputes over warranty is final.
6. The warranty is in lieu of all other warranties and conditions expressed or implied, written or oral, statutory or otherwise, which are hereby negated and excluded.
7. This express warranty does not exclude any conditions of warranty implied by the Trade Practices Act 1974 or separate State laws and is in addition to any other right that the original purchasers or any subsequent purchaser may have at law.

The equipment covered by this warranty is supplied under the conditions detailed in Mono Pumps (Aust) Pty Ltd "Conditions of sale" which should be read in conjunction with the statements herein.

In the case of claim please contact your Authorised Mono Pumps Dealer or contact Mono Pumps (Australia) Pty Ltd direct with details.

Specifications

3" Pump

Connections/Interface

| | |
|--------------|-----------------------|
| Inlet/Outlet | 3" 150 lb ANSI Flange |
| Shaft Dia | 1.125" |
| Key | 1/4" x 1/4" x 3" |
| Rotation | Either Direction |
| Weight | 70 kg |

Materials

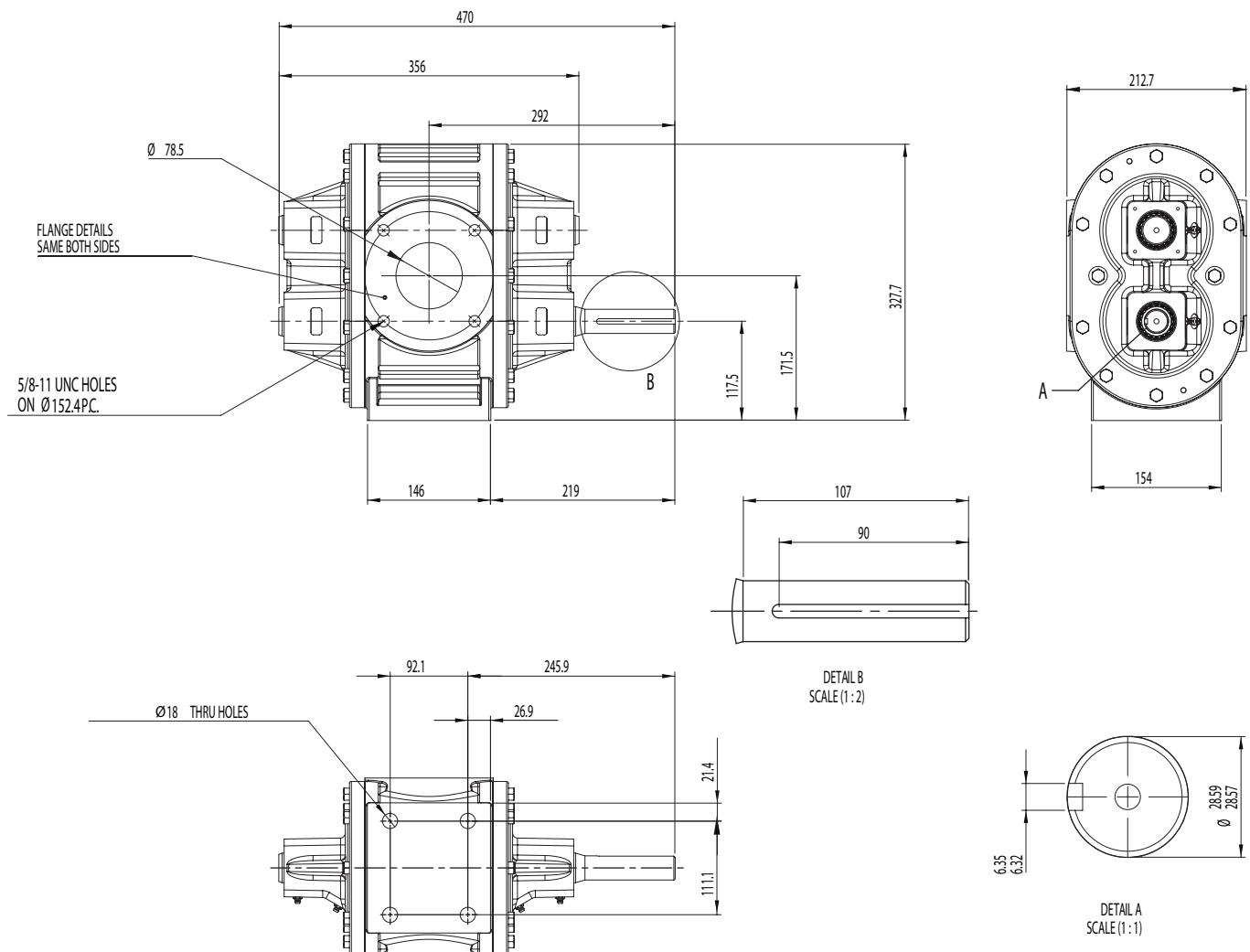
| | |
|-----------|------------------------------------|
| Pump Body | 316 Stainless Steel (cast) |
| Gears | Nitrile Rubber (over steel insert) |
| Shafts | 440C Stainless Steel |
| Gaskets | Fibre |
| Fasteners | 316 Stainless Steel |
| Lip Seals | Viton / Steel |

Operating Limits

| | |
|------------------|---------|
| Max Speed | 300 rpm |
| Max Pressure | 800 kPa |
| Min. Temperature | -5 °C |
| Max Temperature | 80 °C |

Lubrication

| | Bearings | Lip Seals |
|--------|--------------------|-----------|
| Grease | BP Energrease LC2 | |
| Access | 8 x Grease Nipples | |



Installation

1. INSTALLATION

1.1 Installation and Safety Recommendations

In common with other items of process plant a pump must be installed correctly to ensure satisfactory and safe operation. The pump must also be maintained to a suitable standard. Following these recommendations will ensure that the safety of personnel and satisfactory operation of the pump is achieved.

1.2 General

When handling harmful or objectionable materials, adequate ventilation must be provided in order to disperse dangerous concentrations of vapours. It is recommended that wherever possible, Mono pumps should be installed with provision for adequate lighting, thus ensuring that effective maintenance can be carried out in satisfactory conditions. With certain product materials, a hosing down facility with adequate draining will simplify maintenance and prolong the life of pump components.

1.3 System Design & Installation

At the system design stage, consideration must be given to provision of air vents (for priming), and the installation of isolating valves.

1.4 Horizontal Mounting

Pumps are normally installed in a horizontal position, mounted on a flat surface or baseplate. If inclined or vertical installation is required, check with Mono Pumps Limited.

1.5 Handling

During installation and maintenance, attention must be paid to the safe handling of all items. Where a pump or its components weigh in excess of 20 kg (45lb) it is recommended that suitable lifting tackle should be used to ensure that personal injury or damage to components does not occur.

For safe handling of both bareshaft pumps and pump units (pump/gearbox/motor etc.), ideally slings should be used. The position of the slings will depend upon the specific pump/unit construction and should be carried out

by personnel with the relevant experience to ensure that the pump is not damaged and injury to personnel does not occur.

If eyebolts do exist then these should only be used for lifting the individual components for which they are supplied.

1.6 Storage

1.6.1 Short Term Storage

Where a pump has to be stored for 6 months or less then the following steps are advised:

Store pump inside wherever possible or if this is not feasible then provide protective covering. Do not allow moisture to collect around the pump.

1.6.2 Long Term Storage

If the pump is to be kept in storage for more than six months then in addition to the above the following procedures should be carried out regularly (every 4 - 5 weeks if possible).

If practicable rotate the pump by hand several revolutions to avoid brinelling of the bearings.

1.7 Coupling

Mono Gear pump is designed to be driven by a flexible coupling, mounted on the 1.125" drive shaft. Care must be taken to ensure the coupling doesn't transmit any axial loads as this will push the gear against the Side Plate causing rubbing, wear, heat and degradation of the rubber.

1.8 V-Belt Drive

Mono Gear Pump can be driven by v-belts and pulleys, but bearing life will be significantly shortened by extra radial loads imposed on bearings.

Installation

1.9 Hydraulic Motor Drive

When the motor is being connected and checked for rotation, the start/stop sequence must be as short as practicable in order to prevent pressurising of upstream equipment. The drive installation should include appropriate isolating equipment to ensure that the pump unit is safe to work on.

1.10 Electric Motor Drive

When the motor is being wired and checked for rotation, the start/stop sequence must be as short as possible to prevent pressurising upstream equipment. The electrical installation should include appropriate isolating equipment to ensure that the pump unit is safe to work on.

1.11 Relief Valves / Over Pressurisation

It is recommended that a suitable safety device is installed on the discharge side of the pump to prevent over-pressurisation of the system.

IMPORTANT

The pump must never run against a closed inlet or outlet valve, as this could result in mechanical failure.

1.12 General Safety

WITH THE BARESHAFT PUMP SUPPLIED THE ONUS IS ON THE USER TO FIT ADEQUATE GUARDS IN COMPLIANCE WITH THE RELEVANT REGULATIONS.

All nuts and bolts, securing flanges and base mounting fixtures must be checked for tightness before operation. To reduce vibration, the pump must be correctly aligned with the drive unit, and all guards must be securely fixed in position. When commissioning the plant, all joints in the system must be checked thoroughly for leakage.

If, when starting, the pump does not appear to operate correctly, the plant must be shut down immediately and the cause of the malfunction established before operations are recommenced. It is recommended that depending upon plant system operation, a pressure gauge fitted to the outlet port, to continuously monitor the pump operating conditions.

1.13 Duty Conditions

Pumps should only be installed on duties for which Mono Pumps have specified the materials of construction, flow rates, pressure, temperature, speed etc. Where dangerous materials are to be pumped, consideration must be given to the safe discharge from relief valves, gland drains etc.

IF THE DUTY SHOULD BE CHANGED MONO PUMPS SHOULD BE CONTACTED AND THEIR RECOMMENDATIONS SOUGHT IN THE INTEREST OF APPLICATION, SAFETY OF PLANT, EFFICIENCY AND PUMP LIFE.

Start Up Procedure

2. START-UP PROCEDURE

2.1 Priming

Pumps should be filled with liquid before starting for priming purposes.

When the pump is stopped, sufficient liquid will normally be trapped between the gears to enable priming upon restarting. If, however, the pump has been left standing for an appreciable time, moved to a new location, or has been dismantled and reassembled, it must be refilled with liquid and given a few turns before starting.

2.2 Dry Running

CONTINUAL DRY RUNNING COULD PRODUCE HARMFUL OR DAMAGING EFFECTS.

2.3 Pump Rotation Details

Pump is symmetrical and can be run in either direction with equal efficiency and safety.

2.4 Lubrication

Bearings and Lip Seals are supplied with grease from the factory, although they require periodic inspection and replenishment if necessary.

Regular inspection is necessary for optimum bearing and lip seal performance. The most expedient time to inspect is during periods of regular scheduled equipment downtime - for routine maintenance or for any other reason.

Under tropical or other arduous conditions, however, a more frequent examination may be necessary. It is therefore advisable to establish a correct maintenance schedule for periodic inspection.

BP Energrease LC2 Grease or its equivalent must be used for both bearings and lip seals. See Specification page for details of lubricant.

2.5 Pump Units

Where a pump unit is dismantled and reassembled consideration must be given to ensure that where appropriate the following steps are covered.

1. Correct alignment of pump/gearbox

2. Use appropriate couplings and bushes.

3. Use of appropriate belts and pulleys correctly tensioned

2.6 Warning/Control Devices

Prior to operating the pump, if any warning or control devices are fitted these must be set in accordance with their specific instructions.

2.7 Pump Operating Temperature

The range of temperatures the pump surfaces will develop is dependant on factors such as product temperature and ambient temperature of the installation. There may be instances where the external pump surface can exceed 50°C. In these instances, personnel must be made aware of this and suitable warnings/guarding used.

2.8 Noise Levels

The noise sound pressure level will not exceed 85dB at one metre distance from the pump. This is based on a typical installation and does not include noise from other sources.

2.9 Cleaning Prior to Operation

During the commissioning of a new pump or re-commissioning of an overhauled pump, it is advisable to clean the pump prior to the initial operation of the pump in the process.

2.10 Explosive Products/Hazardous Atmospheres

In certain instances the product being pumped may well be of a hazardous nature. In these installations consideration must be given to provide suitable protection and appropriate warnings to safeguard personnel and plant.

Start Up Procedure

2.11 Pumps for Food Use

CLEANING PRIOR TO OPERATION

When a pump has been supplied for a food application it is important to ensure that the pump is clean prior to initial operation of the pump. Therefore, it is important that a clean-in-place treatment is executed on the pump at the following times.

1. When the pump is first commissioned for use.
2. When any spare components are fitted into the wetted area of the pump.

A recommended CIP procedure is as follows:

1. 2.5% W/V sodium hydroxide for 20 minutes at 80 °C.
2. Towns water for 20 minutes at 80 °C.
3. 2.0% V/V nitric acid for 20 minutes at 80 °C.
4. Towns water for 20 minutes at 80 °C.

The four stages constitute one cycle and we recommend that this cycle is used to clean the pump before use on food.

Once the pump has been commissioned the cleaning process will depend upon the application. The user must therefore ensure that their cleaning procedures are suitable for the duty for which the pump has been purchased.

2.12 Maintenance of Wearing Components

2.12.1 Rubber Gears

The wear rate on these components is dependent on many factors, such as product abrasivity, speed, pressure etc.

When pump performance has reduced to an

unacceptable level both gear/shaft assemblies will need replacing.

2.12.2 Lip Seals

The wear rate of the lip seals is dependent on a number of factors such as product abrasivity, temperature, pump speed (rpm), and possible product crystallisation. Replacement of lip seals and possibly gear/shaft assemblies may be necessary if seals start to leak.

Assembly & Dismantling

3. ASSEMBLY AND DISMANTLING

Section 4 contains the steps to dismantle and re-assemble the pump. All fastenings must be tightened securely and when identified the appropriate torque figures should be used.

3.1 Seals

The Mono Gear Pump utilizes 2 lip seals per shaft per side (8 in total): one a high pressure seal, exposed to the pumpage, one a low pressure (back-up) seal separated from the high pressure seal by a grease-filled cavity.

When re-installing or replacing these seals, it is very important that they have the correct orientation to ensure the inner (high pressure) seal holds against pump pressure, and the outer (low pressure) seal will give way if there is a build-up of pressure in the cavity due to an excess of grease being pumped in.

The inner (high pressure) seal should have its open side facing into the pump internals, ie exposed to the pumped liquid.

The outer (low pressure) seal should have its open side (garter spring visible) facing outwards (towards the bearing). Refer diagram on p16 in Section 4 for correct arrangement.

3.2 Tightening Torques

The 12 x 3/8" setscrews fastening each Side Plate to the Main Body should be tightened evenly to 42Nm.

3.3 Gaskets/Shims

The gaskets (0.4 mm thick) between the Side Plates and Main Body also serve as shims to ensure axial clearance between the gears and the inner walls of the Side Plates.

Although hydraulic performance is optimised by having the smallest possible clearance, compression of the gaskets and possible thermal expansion of the gears (particularly at higher temperatures) dictate caution when selecting the number of gaskets/shims to be used.

Generally one gasket is used for the first Side Plate to Main Body joint, while up to four gaskets are then used to shim the second Side Plate, after the protrusion of the gears has been measured. Refer p17 in section 4 for shimming chart.

3.4 Use of items not approved or manufactured by Mono Pumps

The pump and its components have been designed to ensure that the pump will operate safely within the guidelines covered by the legislation. As a consequence Mono Pumps have declared the machine safe to use for the duty specified as defined by the Declaration of Incorporation or Conformity that is issued with this Instruction Manual.

The use of replacement items that are not approved by or manufactured by Mono Pumps may affect the safe operation of the pump and it may therefore become a safety hazard to both operators and other equipment. In these instances the Declaration provided will, therefore become invalid.

The guarantee referenced in the Terms and Conditions of Sale will also be invalidated if replacement items are used that are not approved by or manufactured by Mono Pumps.

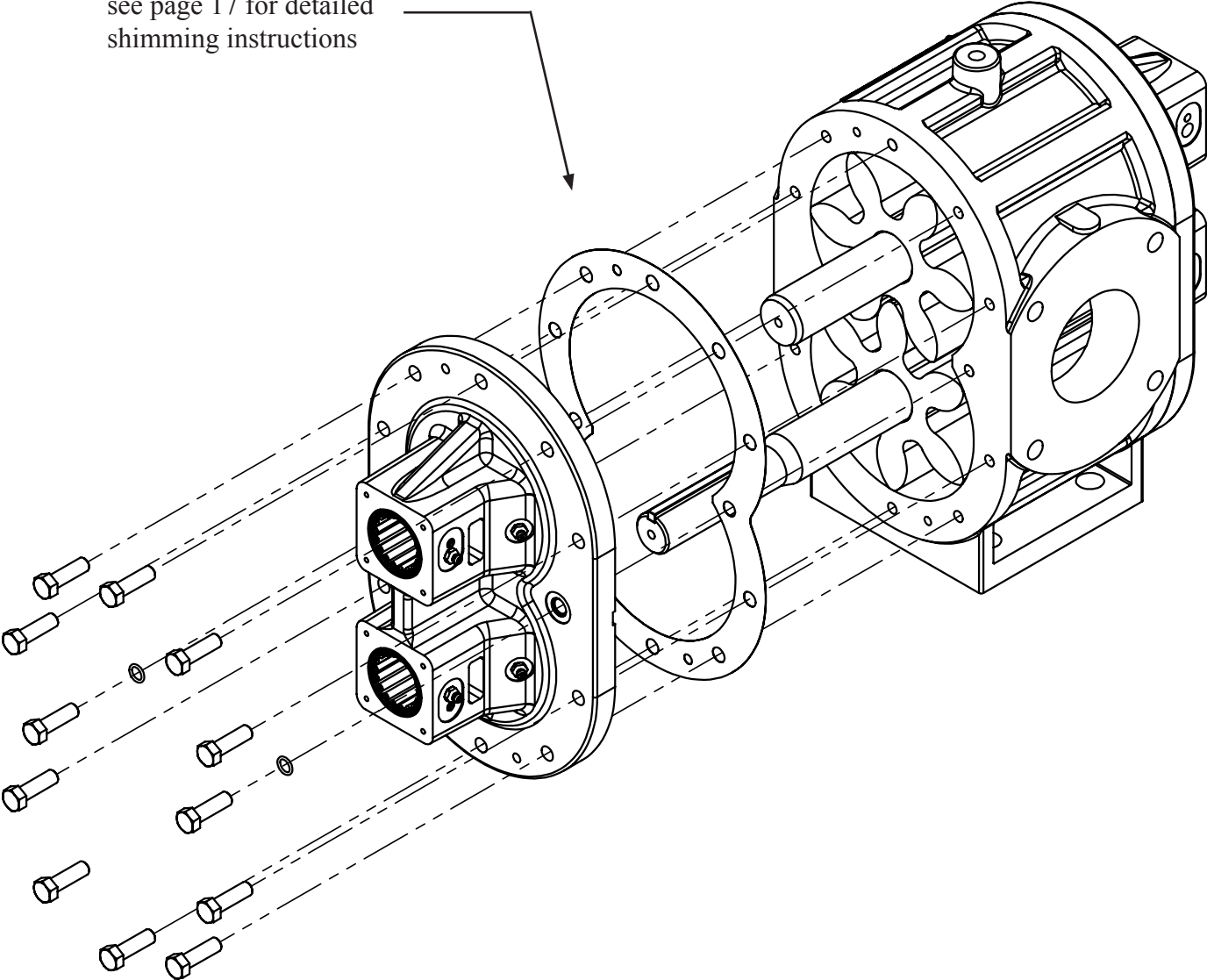
Diagnostic Chart

| SYMPTOMS | | POSSIBLE CAUSES |
|-----------------|----------------------------------|---|
| 1. | NO DISCHARGE | 1, 2, 3, 4, 22, 23 |
| 2. | LOSS OF CAPACITY | 3, 4, 5, 6, 7, 8, 9, 10, 11, 14, 18, 19, 20, 21 |
| 3. | IRREGULAR DISCHARGE | 3, 4, 5, 6, 7, 8, 13 |
| 4. | PRIMING LOST AFTER START | 3, 4, 5, 6, 7, 8, 13 |
| 5. | PUMP STALLS AT START UP | 8, 11, 20 |
| 6. | PUMP OVERHEATS | 8, 9, 11, 15, 17, 20 |
| 7. | EXCESSIVE POWER ABSORBED BY PUMP | 8, 11, 13, 15, 17, 20 |
| 8. | NOISE AND VIBRATION | 3, 4, 5, 6, 7, 8, 9, 11, 13, 15, 16, 17, 18, 19, 20 |
| 9. | PUMP ELEMENT WEAR | 9, 11 |
| 10. | SEAL LEAKING | 11, 12, 15, 17, 22 |
| 11. | SEIZURE | 9, 11, 17, 20 |

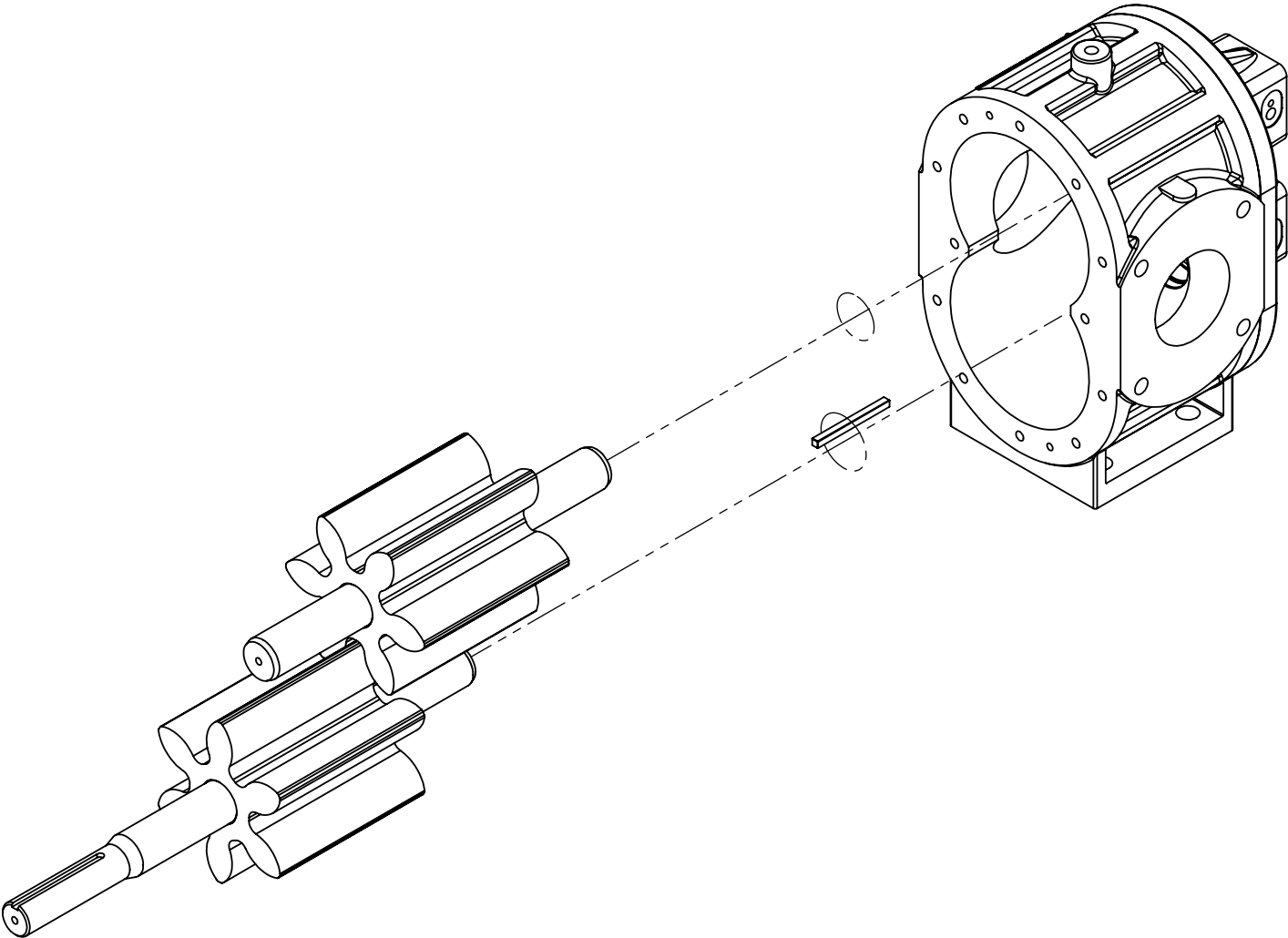
| LIST OF CAUSES | | REMEDIAL ACTIONS | |
|-----------------------|--|-------------------------|---|
| 1. | INCORRECT DIRECTION OF ROTATION | 1. | REVERSE MOTOR |
| 2. | PUMP UNPRIMED | 2. | BLEED SYSTEM OF AIR / GAS, PACK PUMP WITH PUMPAGE |
| 3. | INSUFFICIENT NPSH AVAILABLE | 3. | INCREASE SUCTION HEAD OR REDUCE SPEED / TEMP |
| 4. | PRODUCT VAPORISING IN SUPPLY LINE | 4. | INCREASE NPSH AVAILABLE (SEE 3 ABOVE) |
| 5. | AIR ENTERING SUPPLY LINE | 5. | CHECK PIPE JOINTS |
| 6. | INSUFFICIENT HEAD ABOVE SUPPLY VESSEL OUTLET | 6. | RAISE VESSEL / INCREASE PIPE SIZE |
| 7. | FOOTVALVE / STRAINER OBSTRUCTED OR BLOCKED | 7. | CLEAN OUT SUCTION LINE / VALVES |
| 8. | PRODUCT VISCOSITY ABOVE RATED FIGURE | 8. | DECREASE PUMP SPEED / INCREASE TEMP. |
| 9. | PRODUCT TEMP ABOVE RATED FIGURE | 9. | COOL THE PRODUCT |
| 10. | PRODUCT VISCOSITY BELOW RATED FIGURE | 10. | INCREASE PUMP SPEED / REDUCE TEMP. |
| 11. | DELIVERY PRESSURE ABOVE RATED FIGURE | 11. | CHECK FOR BLOCKAGES IN DELIVERY LINE |
| 12. | DAMAGED LIP SEAL(S) | 12. | REPLACE LIP SEALS |
| 13. | PUMP SPEED ABOVE RATED FIGURE | 13. | DECREASE PUMP SPEED |
| 14. | PUMP SPEED BELOW RATED FIGURE | 14. | INCREASE PUMP SPEED |
| 15. | COUPLING MISALIGNED | 15. | CHECK AND ADJUST ALIGNMENT |
| 16. | INSECURE PUMP / DRIVE MOUNTING | 16. | CHECK AND TIGHTEN ALL PUMP MOUNTINGS |
| 17. | SHAFT BEARING WEAR / FAILURE | 17. | REPLACE BEARINGS |
| 18. | WORN GEARS | 18. | FIT NEW PARTS |
| 19. | RELIEF VALVE CHATTER | 19. | CHECK CONDITION OF VALVE / RENEW |
| 20. | SIDE CLEARANCE INCORRECTLY SET | 20. | READJUST SIDE CLEARANCE (GASKET SHIMS) |
| 21. | BELT DRIVE SLIPPING | 21. | RE-TENSION BELTS |
| 22. | DRIVE TRAIN BREAKAGE | 22. | CHECK AND REPLACE BROKEN COMPONENTS |
| 23. | DISCHARGE BLOCKED / VALVE CLOSED | 23. | REVERSE PUMP / RELIEVE PRESSURE / CLEAR BLOCKAGES |

Dismantling Diagram

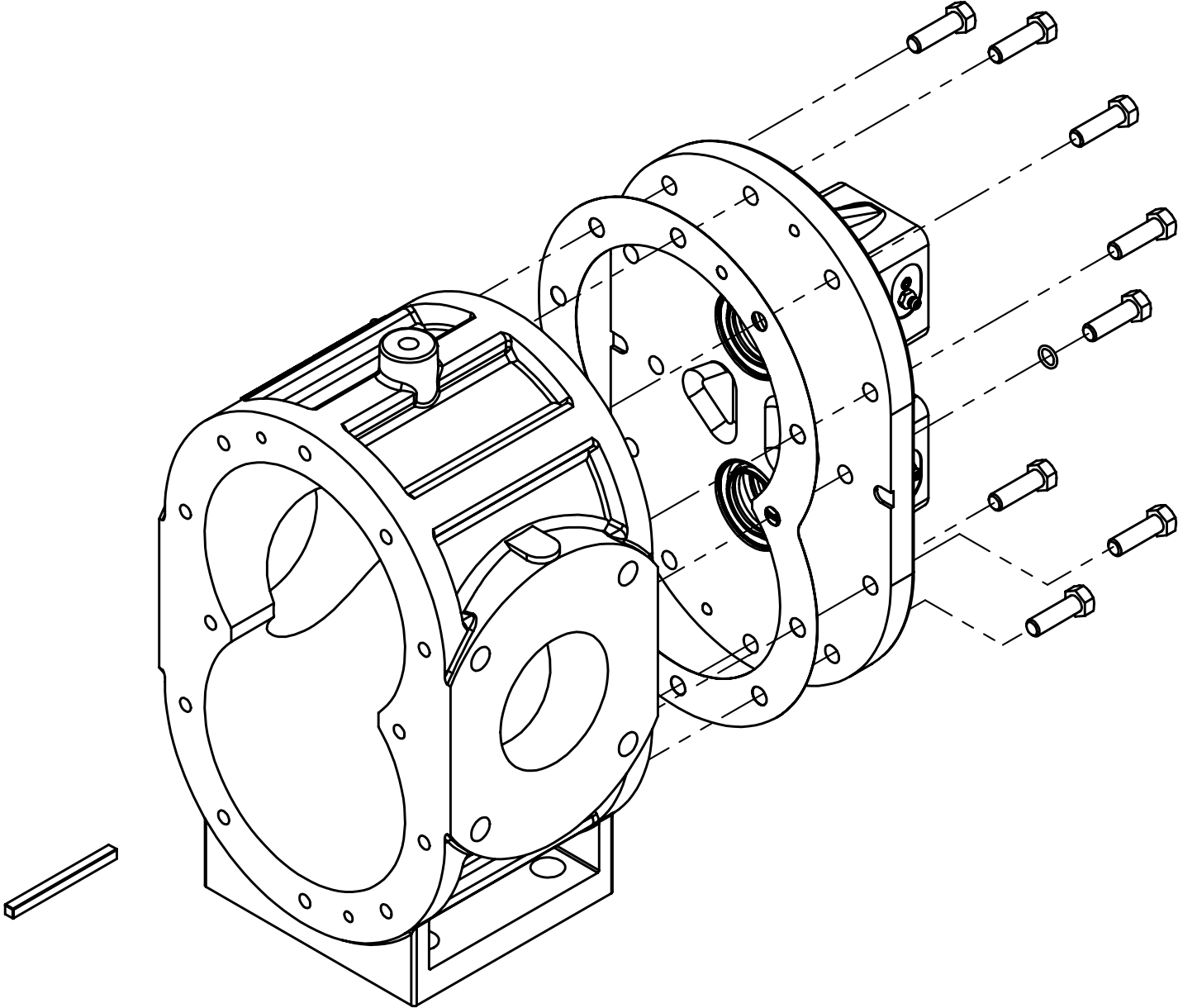
For reassembling gaskets,
see page 17 for detailed
shimming instructions



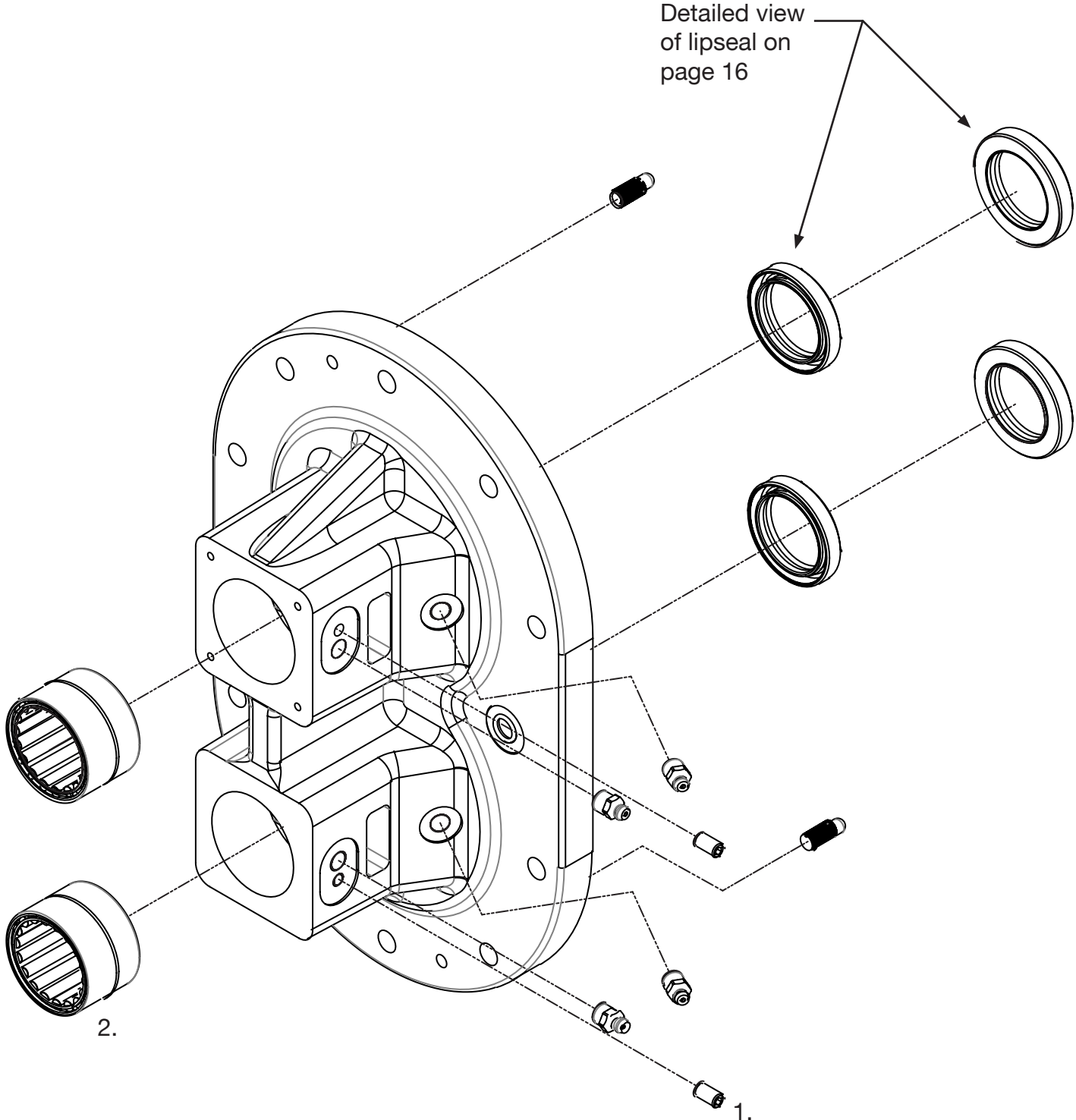
Dismantling Diagram



Dismantling Diagram



Dismantling Diagram

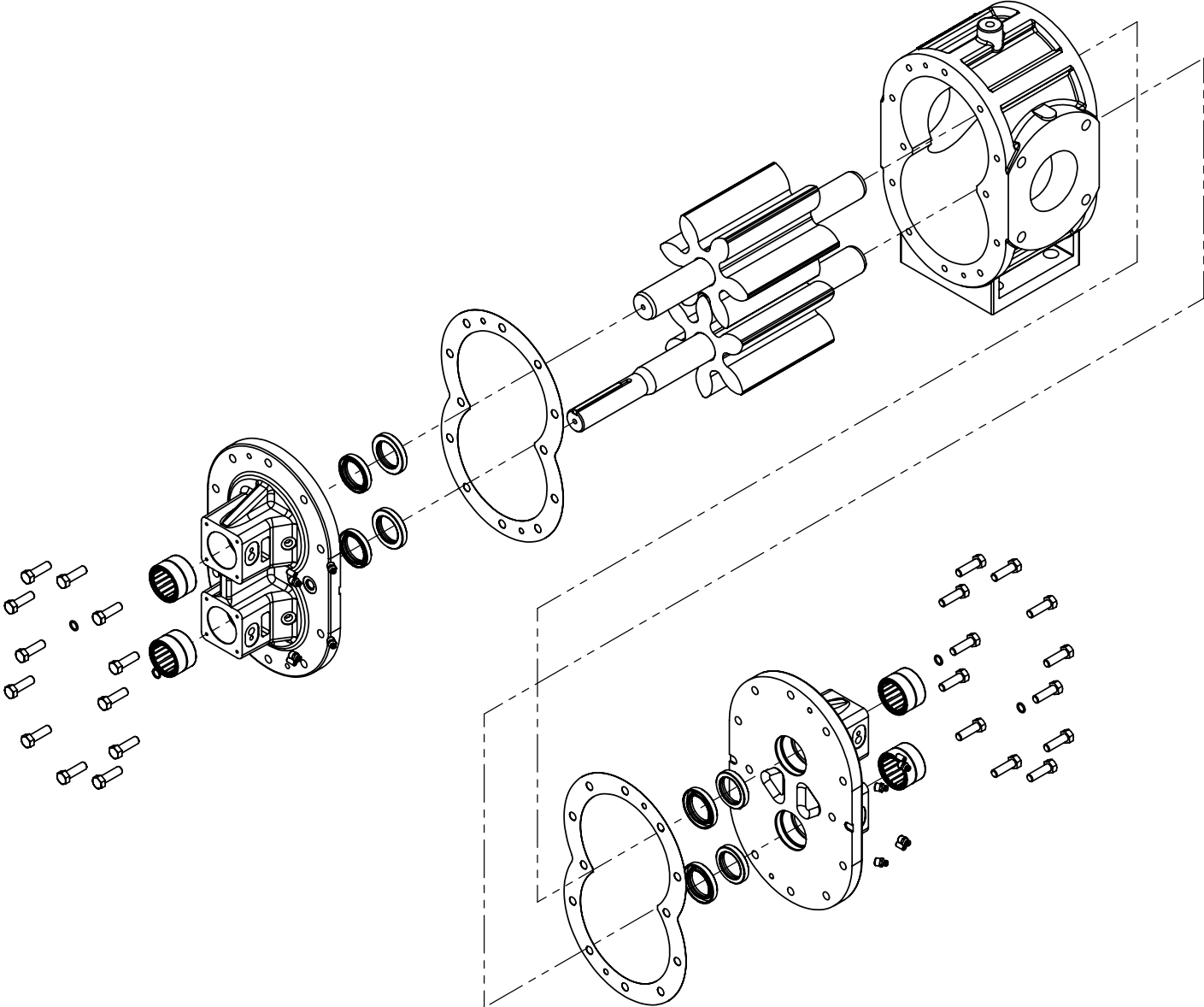


Part Reference Numbers

| PART DESCRIPTION | ITEM NO. | QTY. |
|------------------------|----------|------|
| 3" Main Body | 01A | 1 |
| Side Plate | 24A | 2 |
| Gasket | 20A | 1 |
| Gear Assembly - Driver | 25A | 1 |
| Gear Assembly - Idler | 25B | 1 |

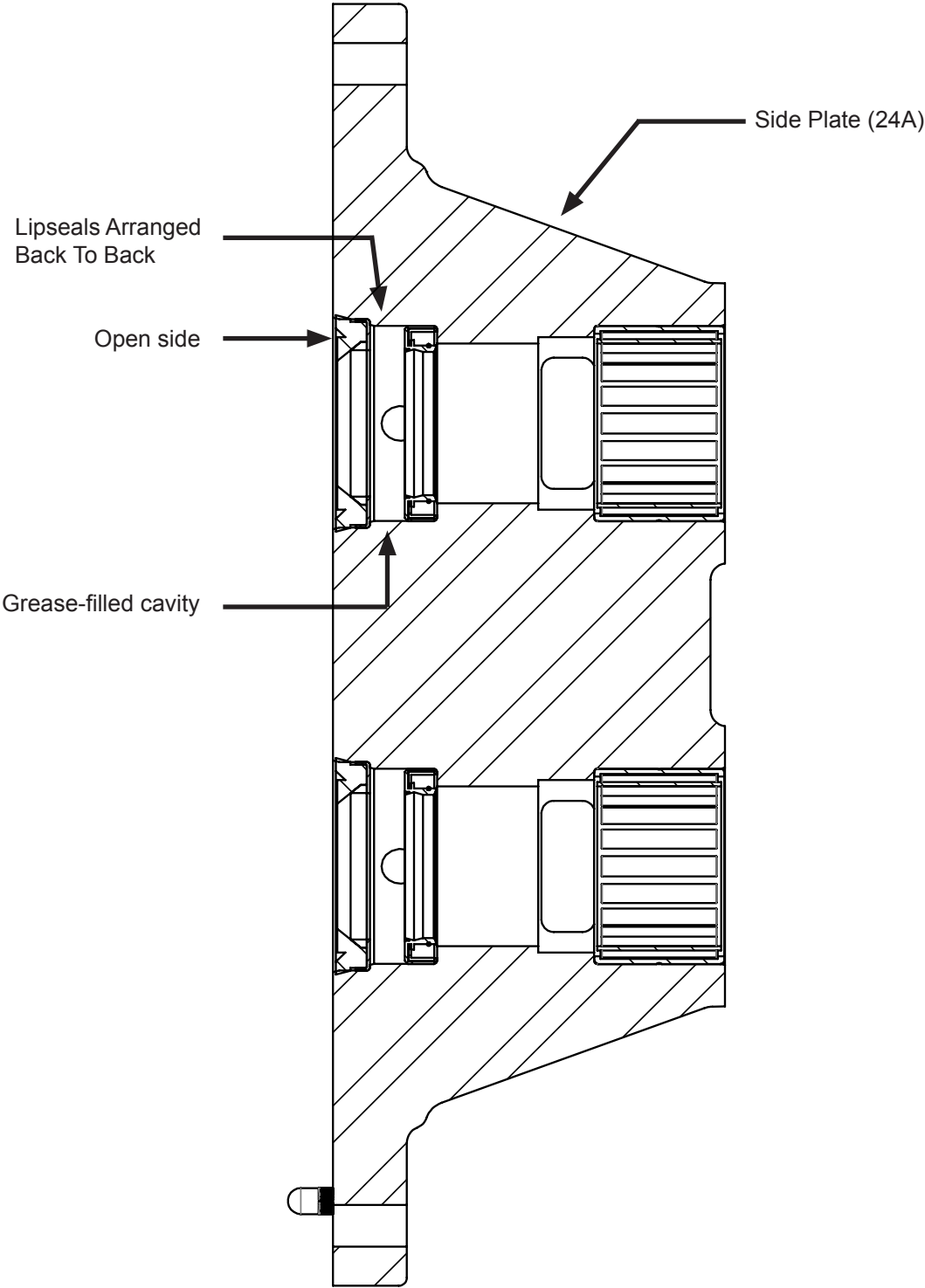
| PART DESCRIPTION | ITEM NO. | QTY. |
|----------------------------|----------|------|
| Needle Roller Bearing | P101 | 4 |
| Lipseal (Inner) | P102 | 4 |
| Lipseal (Outer) | P103 | 4 |
| Set Screw 3/8 UNC x 1.25" | P104 | 24 |
| Locating Pin | P105 | 4 |
| Grub Screw 1/4" UNF x 1/2" | P106 | 4 |
| O-Ring BS 012 | P107 | 4 |
| Grease Nipple | P108 | 8 |

Exploded View



Exploded View

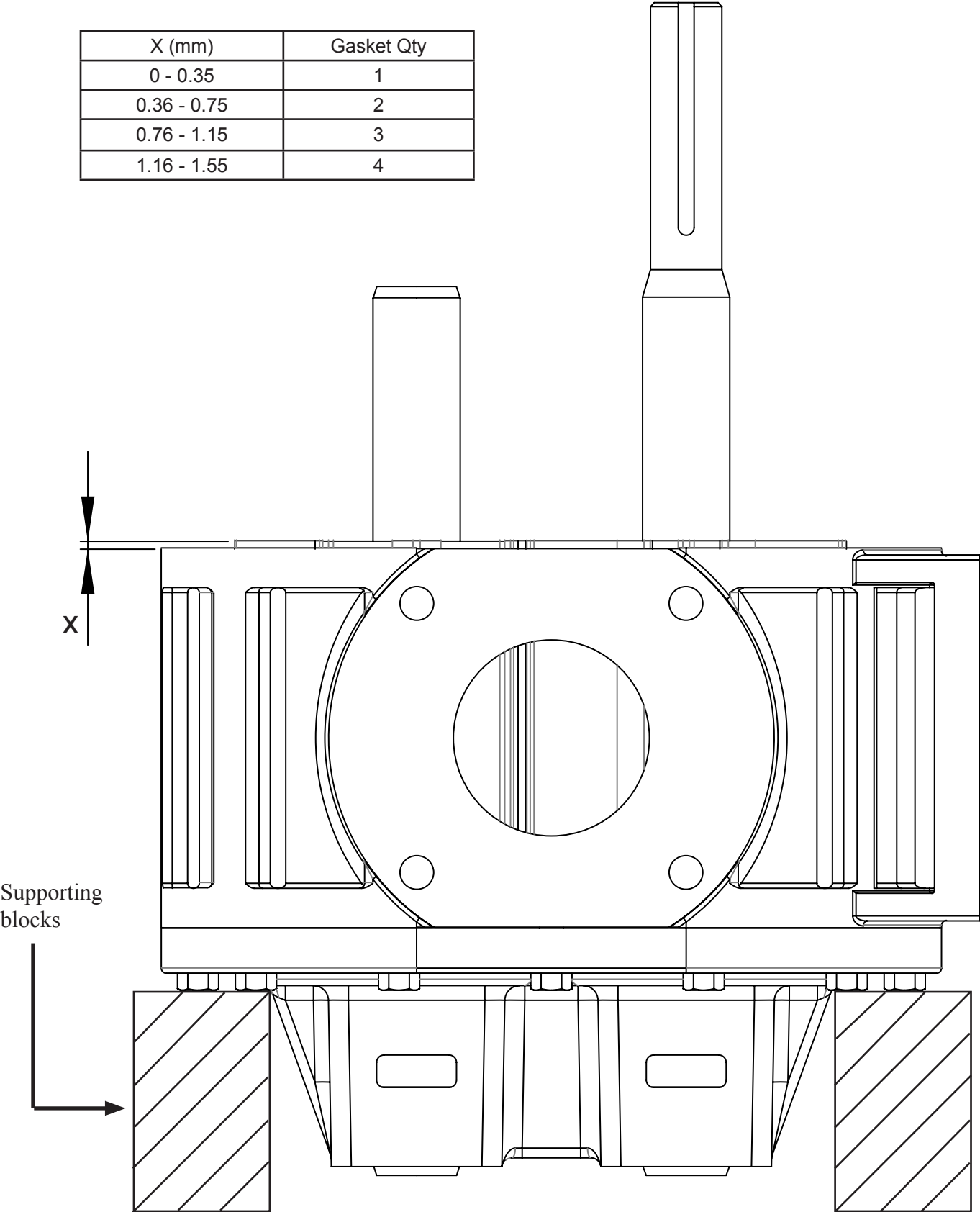
Please ensure correct orientation of all lipseals



Shimming Guide

Measure all gear teeth, select largest distance for 'X'

| X (mm) | Gasket Qty |
|-------------|------------|
| 0 - 0.35 | 1 |
| 0.36 - 0.75 | 2 |
| 0.76 - 1.15 | 3 |
| 1.16 - 1.55 | 4 |



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NOV Mono

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