TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE

VIKING PUMP®

ROTARY LOBE PRODUCT LINE: *STAINLESS STEEL*

MULTIPUMP® SERIES™

SIZES: 10, 20, 30, 40, 50

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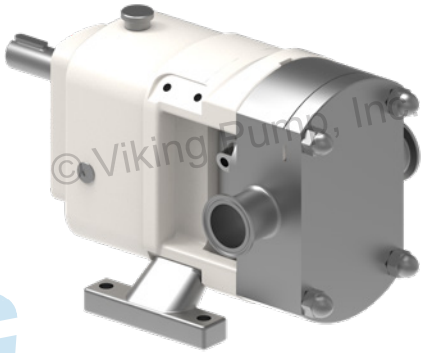
MODEL NUMBER CHART

MP10/0005/12	MP20/0020/12	MP30/0069/12	MP40/0180/12	MP50/0351/12
MP10/0008/08	MP20/0031/07	MP30/0113/07	MP40/0250/07	MP50/0525/08
MP10/0011/05				

FIGURE 1: MP20



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SAFETY INFORMATION & INSTRUCTIONS

IMPROPER INSTALLATION, OPERATION OR MAINTENANCE OF PUMP MAY CAUSE SERIOUS INJURY OR DEATH, AND/OR RESULT IN DAMAGE TO PUMP AND/OR OTHER EQUIPMENT. VIKING'S WARRANTY DOES NOT COVER FAILURE DUE TO IMPROPER INSTALLATION, OPERATION OR MAINTENANCE.

THIS INFORMATION MUST BE FULLY READ BEFORE BEGINNING INSTALLATION, OPERATION OR MAINTENANCE OF PUMP, AND MUST BE KEPT WITH PUMP. PUMP MUST BE INSTALLED, OPERATED AND MAINTAINED ONLY BY SUITABLY TRAINED AND QUALIFIED PERSONS.

THE FOLLOWING SAFETY INSTRUCTIONS MUST BE FOLLOWED AND ADHERED TO AT ALL TIMES.

⚠ **DANGER = FAILURE TO FOLLOW THE INDICATED INSTRUCTION MAY RESULT IN SERIOUS INJURY OR DEATH.**

⚠ **WARNING = IN ADDITION TO SERIOUS INJURY OR DEATH, FAILURE TO FOLLOW THE INDICATED INSTRUCTION MAY CAUSE DAMAGE TO PUMP AND/OR OTHER EQUIPMENT**

⚠ DANGER

DO NOT OPERATE PUMP IF:

- The front cover is not installed correctly.
- Any guards are missing or incorrectly installed.
- The suction or discharge piping is not connected.

⚠ DANGER

DO NOT place fingers, etc. into the pumping chamber or its connection ports or into any part of the gearbox if there is ANY possibility of the pump shafts being rotated. Severe injury will occur.

⚠ DANGER

DO NOT exceed the pumps rated pressure, speed, and temperature, or change the system/duty parameters from those for which the pump was originally supplied, without confirming its suitability for the new duty. Running the pump outside of its operating envelope can cause mechanical contact in the pump head, excessive heat and can represent a serious risk to health and safety.

⚠ DANGER

Installation and operation of the pump must always comply with health and safety regulations.

⚠ WARNING

A device must be incorporated into the pump, system, or drive to prevent the pump exceeding its stated duty pressure. It must be suitable for both directions of pump rotation where applicable. Do not allow pump to operate with a closed/blocked discharge unless a pressure relief device is incorporated. If an integral relief valve is incorporated into the pump, do not allow re-circulation through the relief valve for extended periods, refer to ***"Integral Pressure Relief Valves" on page 10.***

⚠ DANGER

The mounting of the pump or pump unit should be solid and stable. Pump orientation must be considered in relation to drainage requirements. Once mounted, shaft drive elements must be checked for correct alignment. Rotate pump shaft by at least one full revolution to ensure smoothness of operation. Incorrect alignment will produce excessive loading and will create high temperatures and increased noise emissions. It may also be necessary to earth the pump to avoid the build up of a potential charge difference that could cause a spark.

⚠ DANGER

The installation must allow safe routine maintenance and inspection (to check for leakage, monitor pressures, etc) and provide adequate ventilation necessary to prevent overheating.

⚠ WARNING

Fill all gearboxes with the recommended grades and quantities of lubricant (refer to ***"Start Up Procedure" on page 9*** and ***"Lubricants" on page 50***). Beware of over/under filling the gearbox as this could cause the pump to overheat and mechanical damage to occur.

⚠ WARNING

Before operating the pump, be sure that it and all parts of the system to which it is connected are clean and free from debris and that all valves in the suction and discharge pipelines are fully opened. Ensure that all piping connecting to the pump is fully supported and correctly aligned with its relevant connections. Misalignment and/or excess loads will cause severe pump damage. This could result in unexpected mechanical contact in the pump head and has the potential to be a source of ignition.

⚠ WARNING

Be sure that pump rotation is correct for the desired direction of flow (refer to ***"Start Up Procedure" on page 9***).

⚠ WARNING

Do not install the pump into a system where it will run dry (i.e. without a supply of pumped media) unless it is equipped with a flushed shaft seal arrangement complete with a fully operational flushing system. Mechanical seals require a thin fluid film to lubricate the seal faces. Dry running can cause excessive heat and seal failure.

⚠ WARNING

Pressure gauges/sensors are recommended, next to the pump suction and discharge connections to monitor pressures.

⚠ DANGER

DO NOT attempt to dismantle a pressure relief valve, which has not had the spring pressure relieved, is still connected to a pressurised gas/air supply or is mounted on a pump that is operating. Serious personal injury or death and/or pump damage may occur.

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⚠ DANGER

Caution must be taken when lifting the pump. Suitable lifting devices should be used as appropriate. Lifting eyes installed on the pump must only be used to lift the pump, not pump with drive and/or base plate. If pump is base plate mounted, the base plate must be used for all lifting purposes. If slings are used for lifting, they must be safely and securely attached.

⚠ DANGER

DO NOT attempt any maintenance or disassembly of the pump or pump unit without first ensuring that:

- The pump is fully isolated from the power source (electric, hydraulic, pneumatic).
- The pumping chamber, pneumatic relief valve and any shaft seal support system are depressurised and purged.
- Any temperature control devices (jackets, heat-tracing, etc) are fully isolated, that they are depressurised and purged, and components are allowed to reach a safe handling temperature.

⚠ WARNING

Use only genuine Viking Pump Hygienic parts.

All certification, standards, guarantees & warranties originally supplied with this pump will be invalidated by the use of non-genuine Service Parts.

⚠ DANGER

Surface temperature of pump is also dependent on the temperature of pumped medium.

⚠ DANGER

DO NOT loosen or undo the front cover, any connections to the pump, shaft seal housings, temperature control devices, or other components, until sure that such action will not allow the unsafe escape of any pressurised media.

⚠ DANGER

Pumps and/or drives can produce sound power levels exceeding 85dB (A) under certain operating conditions. When necessary, personal protection against noise must be taken. Typical noise emission data can be found in ***"Typical Noise Emission Data - MP10, MP20 and MP30 Pumps" on page 51*** and ***"Typical Noise Emission Data – MP40 and MP50 Pumps" on page 51***.

⚠ DANGER

Avoid any contact with hot parts of pumps and/or drives that may cause injury. Certain operating conditions, temperature control devices (jackets, heat-tracing, etc.), bad installation, or poor maintenance can all promote high temperatures on pumps and/or drives.

⚠ WARNING

When cleaning, whether by manual methods or by circulating cleaning solutions through the process system, the operator shall ensure that an appropriate cleaning procedure is established and followed in accordance with the application and system requirements.

Where cleaning solutions are circulated through the pump, a differential pressure of approximately 2 to 3 bar (30 to 45 psi) across the pump head may assist in achieving suitable flow velocities within the wetted areas.

The effectiveness of any cleaning procedure should be verified by the user for the intended application. The exterior surfaces of the pump should be cleaned periodically as required.

RISK ASSESSMENT

Risk assessment relating to the use Viking Pump MultiPump® rotary lobe pumps and units in potentially explosive atmospheres.

Note: For a feature to be suitable for an application, the feature must be fit for its designated purpose and also suitable for the environment where it is to be installed.

Source of Hazards	Potential Hazards	Frequency of Hazards	Recommended Measures
Unvented cavities	Build up of explosive gas	**Very Rare**	Ensure that pump is totally filled. Consider mounting ports vertically. See ***"Safety Information & Instructions" on page 2***.
Rotorcase, rotors, front cover	Unintended mechanical contact	**Rare**	Ensure that operating pressures are not exceeded. Ensure that sufficient NPSH to prevent cavitation. See ***"Safety Information & Instructions" on page 2*** / ***"Cleaning Considerations" on page 9*** / ***"Service History" on page 53***.
Pump external surfaces	Excess temperature. Electrostatic charging.	**Rare**	User must ensure temperature limits. Do not overfill gearboxes with lubricant. Provide a ground contact for pump. See ***"Safety Information & Instructions" on page 2*** / ***"O-ring Seal for MP50 Pump" on page 39*** / ***"Service History" on page 53***
Cover O-ring	Pump liquid leakage. Build up of explosive gas.	**Very Rare**	Check selection of elastomers are suitable for application. Ensure cover retaining nuts are tight. Service plan.
Pump casing, cover	Pump liquid leakage. Build up of explosive gas.	**Very Rare**	Stainless steel, corrosion resistant
Shaft seals	Excess temperature. Unintended mechanical contact. Leakage. Build up of explosive gas.	**Rare**	Selection of seal system must be suitable for application. See ***"MultiPump® Mechanical Seal Removal & Replacement" on page 33.*** Service plan. Seals must never run dry.
Auxiliary system for shaft sealing	Pump liquid leakage. Build up of explosive gas.	**Rare**	Selection of auxiliary seal system must be suitable for application. Seals must never run dry.
Rotation direction test	Excess temperature	**Very Rare**	If flushed seals are installed, ensure that flush is applied to seal assemblies. Only allow pump to run for minimum period - just a few seconds.
Closed valve condition	Excess temperature. Excess pressure. Mechanical contact.	**Rare**	Can cause excessive pressure, heat and mechanical contact. See ***"Safety Information & Instructions" on page 2***.
Shaft	Random induced current	**Very Rare**	Provide a ground contact for pump. See ***"Safety Information & Instructions" on page 2.***
Mechanical shaft coupling (Torque Protection)	Temperature from friction sparks from break up of shear pins. Electrostatic charging.	**Rare**	Coupling selection must suit application. See ***"Safety Information & Instructions" on page 2.***
Mechanical shaft coupling (Standard)	Break up of spider. Unintended mechanical contact. Electrostatic charging.	**Rare**	Coupling selection must suit application. Service plan. See ***"Safety Information & Instructions" on page 2.***

INTRODUCTION

GENERAL

MultiPump® rotary lobe pumps are manufactured by Viking Pump, a unit of the IDEX Corporation.

This manual includes all the necessary information for the MultiPump® and should be read prior to beginning installation, operation, or maintenance.

Should you require any additional information regarding the MultiPump®, contact Viking Pump or their local authorised distributor, refer to ***"Viking Pump Hygienic Distributors" on page 4***.

When asking for assistance please provide the pump model and serial number. This information can be obtained from the pump nameplate which is located on the side of the pump gearbox cover, refer to ***"Pump Model & Serial Number" on page 5***.

Should the nameplate be unreadable or missing, the serial number is also stamped on either side of the rotorcase refer to ***"Pump Model & Serial Number" on page 5***.

If the system or product characteristics are to be changed from the original application for which the pump was selected, Viking Pump or their authorised distributor should be consulted to ensure the pump is suitable for the new application.

VIKING PUMP HYGIENIC DISTRIBUTORS

Viking Pump distributes its products internationally via a network of authorised distributors. Throughout this manual where reference is made to Viking Pump, service and assistance will also be provided by any Viking Pump Hygienic authorised distributor for MultiPump®.

RECEIPTS & STORAGE

Upon receipt of the pump, immediately examine it for any signs of visible damage. If any damage is noted, contact Viking Pump or your Viking Pump Hygienic distributor and clearly mark upon the carriers' paperwork that the goods have been received in a damaged condition, with a brief description of damage.

If the pump is not required for immediate installation then it should be stored in a clean, dry environment. It is recommended that storage temperature should be between -10°C and 40°C (14°F and 105°F).

Further to the above, if the pump is not intended for installation or use within 18 months or more then refer to Viking Pump, or the Viking Pump Hygienic authourised distributor for storage recommendations.

CLEANING

The MultiPump® series is designed to facilitate cleaning by manual methods or by circulation of cleaning solutions through the process system. The suitability and effectiveness of any cleaning procedure should be determined and validated by the user for the intended application. Refer to ***"Cleaning Considerations" on page 9***.

It is recommended that the exterior of the pump be cleaned periodically with a non-aggressive, non-abrasive cleaning solution.

ATEX INFORMATION

ATEX Pump Requirements

Mechanical seals are a source of heat and must never be allowed to run dry. We would recommend provision be made to ensure that there is always flow or fluid around the pump seals. If there is a risk of the supply being interrupted, then a temperature monitoring system must be applied to ensure the pump does not exceed the Atex rating. The surface temperature of the pump is dependent on the temperature of the pumped fluid and a due account of this should be taken whilst undertaking your risk assessment of the installation. These pumps are Atex rated T3.

⚠ WARNING

Only use genuine spare parts that have been designed and verified Atex compliant by Viking Pump Hygienic, failure to use genuine spare parts will invalidate the Atex certification.

⚠ WARNING

Pumps that have the Atex certification will have an earthing point on the front cover, this needs to be electrically earthed before use.

⚠ WARNING

The service and maintenance intervals are increased on certified Atex units, refer to ***"Additional Routine Maintenance – Atex units" on page 10*** for the required routine maintenance. Failure to maintain the pumps to these intervals will result in the Atex certification being invalidated.

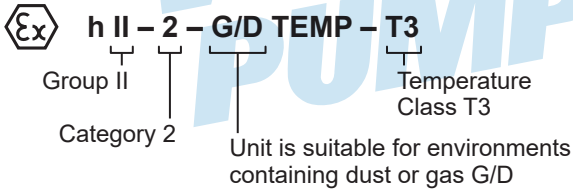
⚠ WARNING

When installing the unit make sure so far as reasonably practicable that the pump is aligned within 5 degrees to the horizontal – failure to align the unit could adversely affect the gearbox lubrication and could cause heat to build up.

It is the end user's responsibility to ensure that the Atex rating of the equipment supplied meets the requirements of the installation.

Equipment Groups & Categories

The pump range has been rated as:



The Atex rating is displayed on the pump nameplate, see

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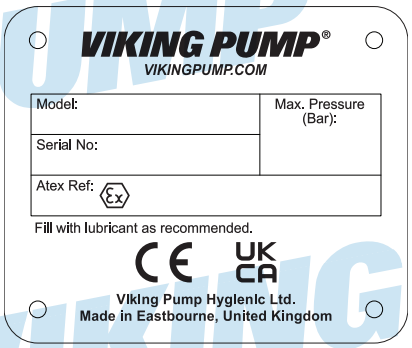
"Figure 2" on page 5.

FIGURE 2: NAMEPLATE

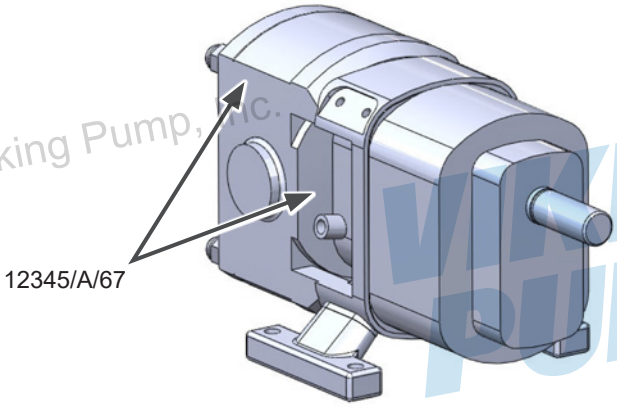


PUMP MODEL & SERIAL NUMBER

Should you require any information regarding your MultiPump® rotary lobe pump contact Viking Pump or your Viking Pump Hygienic distributor, providing the pump model and serial number as stated on the pump nameplate, see ***"Figure 2" on page 5***, which is fixed to the pump gearbox cover.

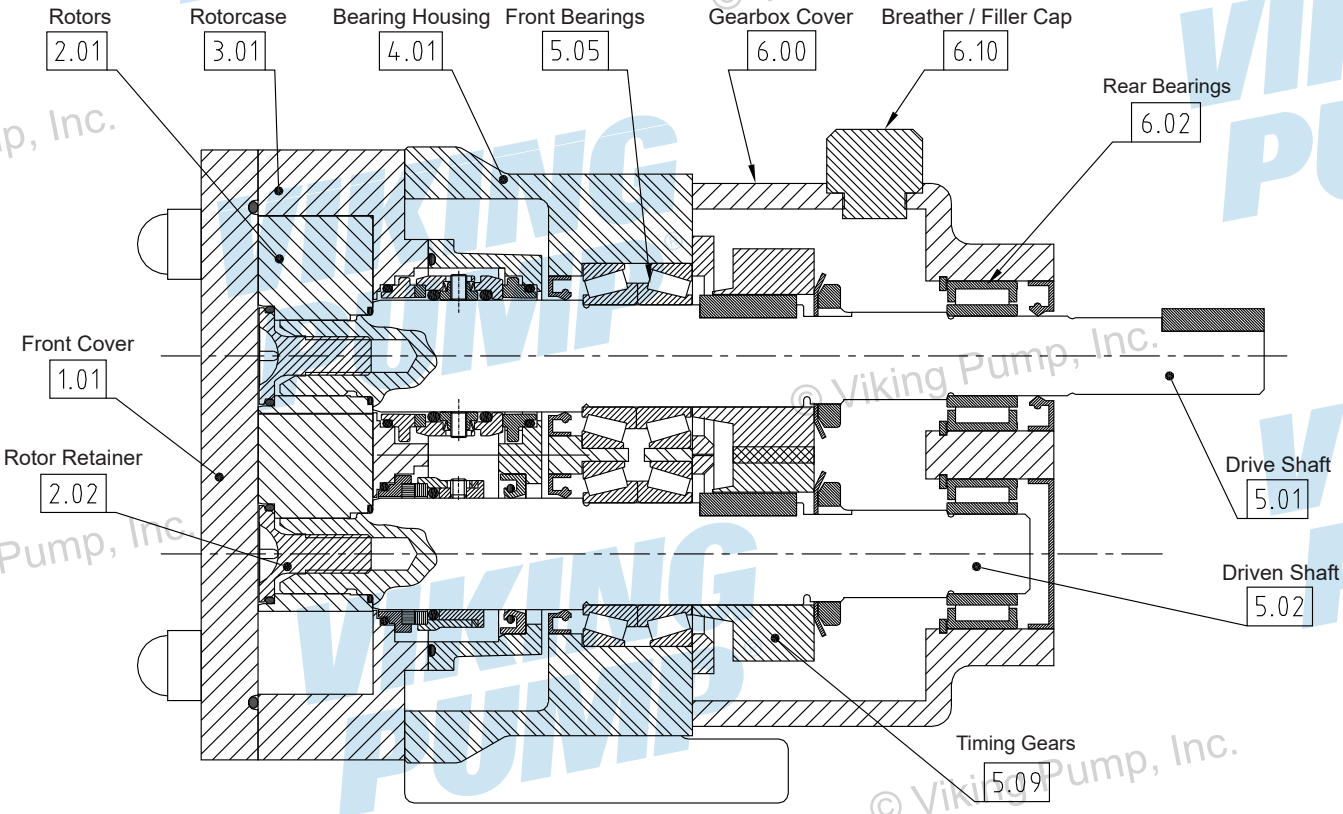
Should this be damaged or missing, the pump serial number is also stamped on opposite corners of the rotorcase or on the rear face of the rotorcase, (see ***"Figure 3" on page 5***).

FIGURE 3: SERIAL NUMBER POSITION ON ROTORCASE



STANDARD PUMP COMPONENT TERMS

FIGURE 4: PUMP COMPONENT TERMS



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GENERAL

MULTIPUMP® PUMPING PRINCIPAL

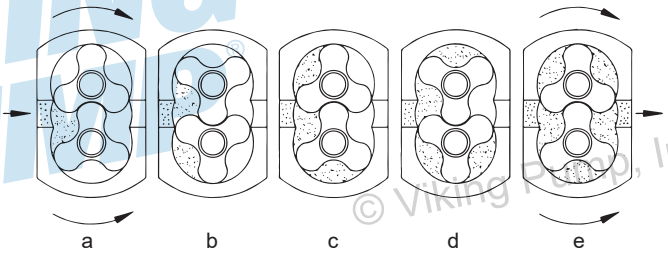
The pumping action of the rotary lobe pump principle is generated by the contra rotation of two pumping elements (rotors) within a chamber (rotorcase) - see ***"Figure 5" on page 6***. The rotors are located on shafts, which in turn are mounted within an external gearbox and supported by the bearings; the timing gears are also located on the shafts. The timing gears transfer the energy from the drive shaft to the driven shaft, synchronising the rotors such that they rotate without contact with each other.

As the rotors pass the suction port, see "a" in ***"Figure 5" on page 6***, the cavity generated increases creating a pressure decrease, which induces the pumped medium to flow into the rotorcase.

The pumped medium is carried around the rotorcase by the rotors; see "b" and "c" in ***"Figure 5" on page 6***, to the discharge side of the pump, "d" in ***"Figure 5" on page 6***. Here the cavity decreases and the pumped medium is discharged from the rotorcase, "e" in ***"Figure 5" on page 6***.

For pump component terms see ***"Figure 4" on page 5***.

FIGURE 5: ROTARY LOBE PUMPING PRINCIPLE



SYSTEM DESIGN

System Design & Installation

When incorporating any pump into a system it is considered good practice to minimize piping runs and the number of pipe fittings (tees, unions, bends etc.) and restrictions. Particular care should be taken in designing the suction line, which should be as short and straight as possible with a minimum of pipe fittings to minimise restricting product flow to the pump. The following should be considered at the design stage of any system.

⚠ DANGER

Be sure ample room is provided around the pump to allow for:

- Access to the pump and drive for routine inspection and maintenance, i.e. to remove pump front cover and rotors.
- Ventilation of the drive to prevent over heating.

⚠ DANGER

The exterior of the pump unit may exceed 68°C (154°F), Appropriate measures must be taken to warn or protect operators.

⚠ WARNING

The pump must not be used to support piping. All piping to and from the pump unit must be independently supported. Failure to observe this may distort the pump head components or assembly and cause serious consequential damage to the pump.

Valves should be provided adjacent to the pump suction and discharge connections to allow the pump to be isolated from the system for routine inspection and maintenance.

⚠ DANGER

Rotary lobe pumps are of the positive displacement type and therefore an overload protection device must be provided. This can take the form of:

- An in-line pressure relief system, i.e. external to the pump.
- Incorporation of a torque-limiting device in the drive system.

⚠ WARNING

It is recommended that all piping and associated equipment from the tank to the discharge point is thoroughly cleaned before installation of the pump to avoid the possibility of debris entering the pump and causing damage.

⚠ WARNING

Pressure gauges should be installed adjacent to the pump suction and discharge connections such that system pressures can be monitored. These gauges will provide a clear indication of changes in operating conditions and where a relief valve is incorporated in the system, will be necessary for setting and checking the functioning of the valve.

⚠ WARNING

It is imperative that the suction condition at the pump inlet meets the Net Positive Suction Head required (NPSHr) by the pump. Failure to observe this could cause cavitation, resulting in noisy operation, reduction in flow rate and mechanical damage to the pump and associated equipment.

⚠ WARNING

The Net Positive Suction Head available (NPSHa) from the system must always exceed the Net Positive Suction Head required (NPSHr) by the pump.

Observing the following general guidelines should ensure the best possible suction condition is created.

- Suction piping is at least the same diameter as the pump connections.
- The length of suction piping is kept to the absolute minimum.

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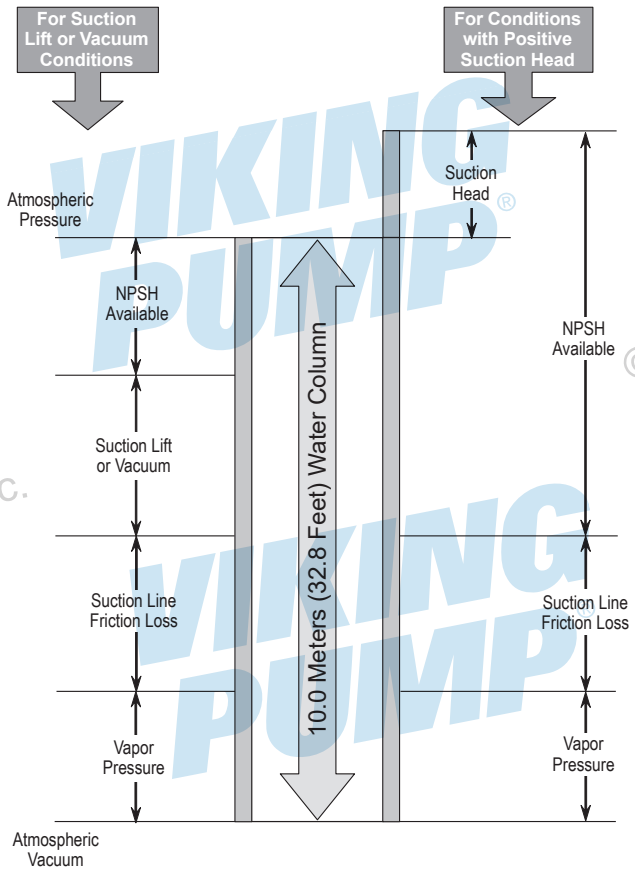
- The minimum number of bends, tees and pipework restrictions are used.
- Calculations to determine system NPSHa are carried out for the worst condition see below.

Should advice on pump or system NPSH characteristics be required contact the factory or their authorised distributor.

FIGURE 6: NPSH



When installing a pump complete with base plate, motor and drive, the following guidelines must be observed:

- The preferred drive arrangement for any rotary lobe pump is in-line direct coupled. If an alternative is required please contact Viking Pump or your Viking Pump Hygienic distributor.

⚠ DANGER

- Flexible couplings must always be incorporated and correctly aligned within the limits recommended by the coupling manufacturer. To check coupling alignment rotate the shaft by at least one full revolution and ensure that the shaft rotates smoothly.

  Couplings of a non-flexible design must never be used.

⚠ DANGER

- Couplings must always be enclosed in a suitable guard to prevent contact with rotating parts, which could result in personal injury. Guards should be of suitable material, and of sufficiently rigid design to prevent contact with rotating parts under normal operating conditions.

⚠ DANGER

- When the pump is installed in a flammable or explosive environment, or is used for handling flammable or explosive materials, special consideration must be given. Not only to the safety aspects of the drive unit enclosure but also to the materials used for both the coupling and the guard to eliminate the risk of explosion.

⚠ DANGER

- Base plates must be secured to a flat level surface such that distortion and misalignment are avoided. Once base plates are fastened in position the drive alignment must be re-checked.

- When using electric motor drives, ensure that the electrical supply is compatible with the drive and controls and that the method of wiring is correct for the type of starting required by the motor i.e. Direct On Line, or other similar method. Ensure all components are correctly grounded.

Pump & Motor Alignment

Before the pump unit is installed is it important to ensure that the mounting surface is flat to avoid distortion of the baseplate, which may cause pump/motor shaft misalignment and pump/motor unit damage. Once the baseplate has been secured, the pump shaft to motor shaft coupling alignment should be checked and adjusted as necessary. This is achieved by checking the maximum angular and parallel misalignment for the couplings as stated below, the recommended couplings are KTR Rotex. Shaft alignment that is outside the stated tolerances can be corrected by applying shims under the motor or pump foot, or, by moving the pump or driving sideways on the baseplate. All bolts that have been loosened should be re-tightened to the stated torque figure.

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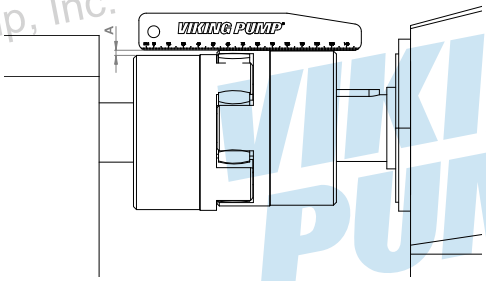
Radial tolerance: Measure 4 positions at 90° around coupling.

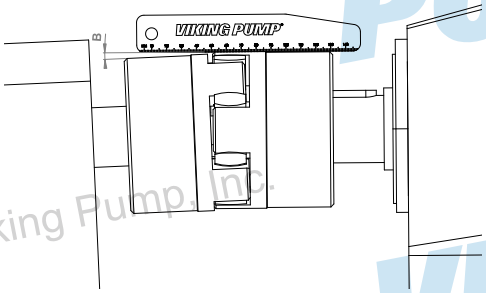
FIGURE 7



Size RX		14	19	24	28	38	42	48	55	65	75	90	100	110	125	140	160	180
Max. Radial (mm) Displacement "A" upto	1500 RPM	0.17	0.22	0.22	0.25	0.28	0.32	0.36	0.38	0.42	0.48	0.5	0.52	0.55	0.6	0.62	0.64	0.68
Max. Radial (Inch) Displacement "A" upto	1500 RPM	0.007	0.009	0.009	0.010	0.011	0.013	0.014	0.015	0.017	0.019	0.020	0.020	0.022	0.024	0.024	0.025	0.027

Angular tolerance: Measure 4 positions at 90° around coupling.

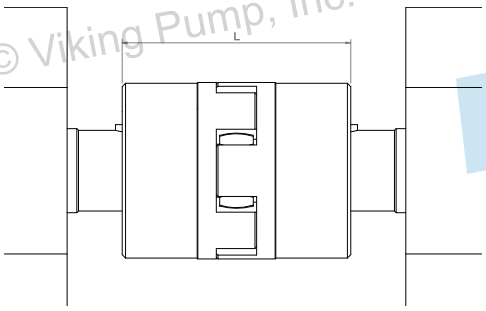
FIGURE 8



Size RX		14	19	24	28	38	42	48	55	65	75	90	100	110	125	140	160	180
Max. Angular (°) Displacement "B" upto	1500 RPM	1.1	0.8	0.8	0.9	0.9	0.9	1.0	1.0	1.1	1.1	1.1	1.1	1.2	1.0	1.1	1.1	1.1

Length Tolerance:

FIGURE 9



Size RX		14	19	24	28	38	42	48	55	65	75	90	100	110	125	140	160	180
Dimension L ± 1.0mm	1500 RPM	35	66	78	90	114	126	140	160	185	210	245	270	295	340	375	425	475
Dimension L ± 0.039"	1500 RPM	1.378	2.598	3.071	3.543	4.488	4.961	5.512	6.299	7.283	8.268	9.646	10.630	11.614	13.386	14.764	16.732	18.701

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Cleaning Considerations

The MultiPump® pump range is designed to facilitate cleaning of the wetted components. Where cleaning fluids are circulated through the pump, a differential pressure of 2 to 3 bar (30 to 45 psi) across the pump head is recommended to assist in achieving suitable cleaning fluid velocities. Cleaning procedures should be established and validated by the user for the intended application.

START UP PROCEDURE

⚠ WARNING

- Check that all piping and associated equipment are clean and free from debris and that all pipe connections are secure and leak free.

⚠ WARNING

- For pumps fitted with flushed product seals check all auxiliary services are in place and connected and provide sufficient flow and pressure for flushing purposes, refer to ***"Flushed Product Seals Auxiliary Services" on page 42***.

⚠ WARNING

- Ensure lubrication is provided for both pump and drive. The MultiPump® is shipped without oil as standard and should be filled to the level of the oil sight glass - refer to ***"Lubricants" on page 50*** for pump oil capacities and grades.

⚠ WARNING

- If an external relief valve is incorporated in the system, check that it is set correctly. For start up purposes, it is considered good practice to set the relief valve lower than the system design pressure. On completion of start up, the relief valve should be reset to the required setting for the application. The required setting should never exceed the lower of either the pumps maximum pressure rating or the system design pressure. For setting integral relief valves refer to ***"Setting & Operating Spring Loaded Valves" on page 11*** and ***"Setting & Operating Air Loaded Integral Pressure Relief Valves" on page 12***.

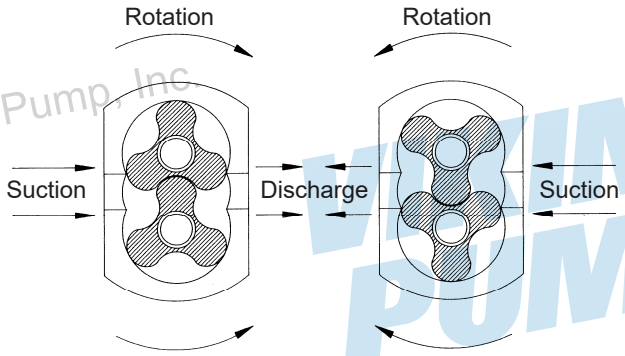
⚠ WARNING

- Be sure both suction and discharge valves are fully opened and that pipe work is free from all obstructions. The MultiPump® is a positive displacement type pump and should therefore never be operated against a closed valve as this would result in pressure overload, resulting in damage to the pump and possibly the system.

⚠ WARNING

- Make sure that the drive shaft rotation is correct for the direction of flow required. See ***"Figure 10" on page 9***.

FIGURE 10: ROTATION AGAINST SUCTION & DISCHARGE



⚠ WARNING

- Be sure product is available in the suction vessel before starting the pump. This is very important for pumps fitted with un-flushed product seals, as these sealing arrangements must never be allowed to run dry.

- Before beginning operation, it is considered good practice to momentarily start/stop the pump to check the direction of rotation and ensure that the pump is free of obstructions. Once this has been carried out, begin operation keeping a visual check on suction and discharge pressure gauges and monitor the pump temperature and absorbed power where possible.

SHUTDOWN PROCEDURE

⚠ DANGER

When shutting the pump down, stop pump, close both the suction and discharge valves and ensure that the necessary safety precautions are taken:

- The prime mover power source has been isolated.
- If installed, pneumatically operated integral relief valve has been depressurised.
- Flushed product seal auxiliary services have been isolated and depressurised.
- Pump head and piping have been drained and purged.
- Before undertaking any work on the pump refer to ***"MultiPump® Disassembly & Assembly" on page 12***, ***"MultiPump® Mechanical Seal Removal & Replacement" on page 33***, ***"MultiPump® Single O-ring Seals" on page 38*** and ***"Flushed Product Seals Auxiliary Services" on page 42***.

ROUTINE MAINTENANCE – NON ATEX UNITS

Oil

⚠ WARNING

- Check oil levels regularly.
- Change the oil every 12 months or 3000 operating hours, whichever is the sooner.

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For lubricant capacities and grades refer to ***"Lubricants" on page 50***.

Seal Replacement Interval:

It is recommended that the Rotor Retainer O-ring seal is replaced every 12 months to maintain a bacteria-tight seal.

Rotor Retainer Seal Inspection:

Periodically inspect the Rotor Retainer O-ring seal for any discolouration, nicks, or cracks. If any of the defects above are noticed, the O-ring seal must be replaced. Inspection and replacement refer to the seal replacement procedure.

Additional Routine Maintenance – Atex units

Oil

⚠ WARNING

- Check oil levels on startup.

- Check for any signs of overheating.
- Change the oil every 6 months or 1500 operating hours, whichever is the sooner.

For lubricant capacities and grades refer to ***"Lubricants" on page 50***.

⚠ WARNING

After 14000 hours of use, the pump will need a general overhaul and it will need to be re-certified for use within the Atex environment.

A general overhaul must include a full disassembly of all components and the following work carried out.

- Clean all pump components
- Examination of all components for damage/wear
- Replacement of all taper roller bearings
- Replacement of all elastomeric components
- Replacement of all seals, radial seals, and Gamma rings

The general overhaul must be carried out by qualified personnel in a specialist workshop with the appropriate equipment. Re-certification must then be carried out.

We highly recommend that the general overhaul is carried out by Viking Pump.

HEATING & COOLING JACKETS

The MultiPump® can be supplied with a jacketed front cover and rotorcase for circulation of a heating/cooling media.

The front cover and rotorcase jacket ports are strategically positioned such that the required thermal effect acts on the pumping chamber.

The pressure rating of the MultiPump® series jacketed front cover and rotorcase is 3 Bar (50 psi) and this should not be exceeded without consulting Viking Pump or your local Viking Pump Hygienic distributor.

Heating/cooling of the pump head is used to maintain, rather than increase/decrease the temperature of the pumped media and should be used as part of a complete system where suction and discharge lines and vessels are also heated/cooled.

Where heating/cooling devices are employed, the heating/cooling media should be circulated 15-20 minutes prior to pump start-up and should be allowed to continue for a similar period of time after the pump has been shut down. When a circulation of cleaning solutions is applied, then the heating/cooling media should continue to be circulated during the cleaning cycle.

INTEGRAL PRESSURE RELIEF VALVES

See ***"Figure 11" on page 10***, ***"Figure 12" on page 10***, ***"Figure 13" on page 11*** and ***"Figure 14" on page 11***.

The MultiPump® models MP10, MP20, MP30 and MP40 can be supplied with integral pressure relief valves. For the MP10, MP20 and MP30 both spring and air loaded versions are available. The function of the valves can be further enhanced with the option of manual or airlift override, offering particular benefits when a circulation of cleaning solutions is applied. Valves incorporating this option can be opened to regulate the flow of the cleaning media through the pump chamber, thereby avoiding the need for manual cleaning or external bypass.

Where the pump is mounted onto a portable base plate, complete with motor and drive to be used as a mobile set, an integral pressure relief valve should be installed.

FIGURE 11: SPRING LOADED INTEGRAL PRESSURE RELIEF VALVE MP10, MP20, MP30, MP40

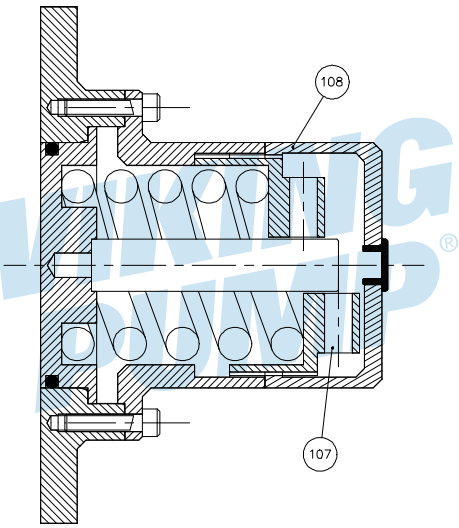

FIGURE 12: SPRING LOADED INTEGRAL PRESSURE RELIEF VALVE WITH MANUAL LIFT MP10, MP20, MP30

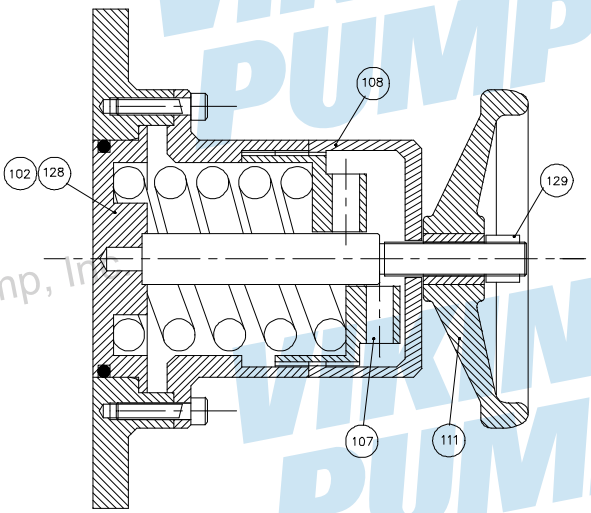

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FIGURE 13: SPRING LOADED INTEGRAL PRESSURE RELIEF VALVE WITH AIR LIFT MP10, MP20, MP30

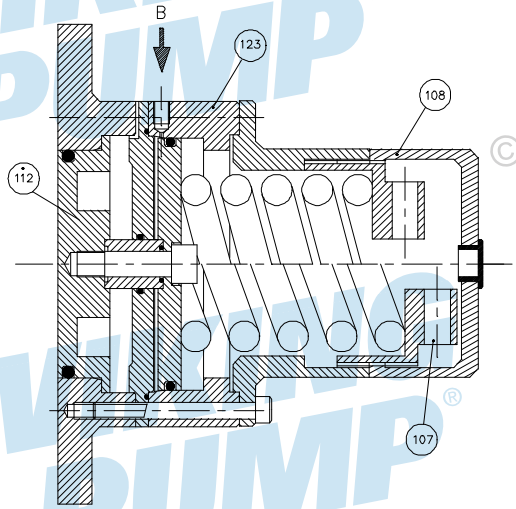
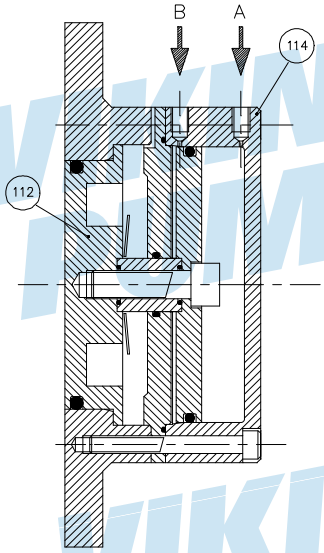


FIGURE 14: AIR LOADED INTEGRAL PRESSURE RELIEF VALVE WITH AIR LIFT MP10, MP20, MP30, MP40



The MultiPump® integral pressure relief valves available include:

Spring Loaded - see ***"Figure 11" on page 10***.

- Valve can be set to the required pressure relief setting.

Spring Loaded with Manual Lift - see ***"Figure 12" on page 10***.

- Valve can be set to the required pressure relief setting. Manual lift override can be used to open valve without disturbing pressure relief setting.

Spring Loaded with Air Lift - see ***"Figure 13" on page 11***.

- Valve can be set to the required pressure relief setting. Airlift override, which operates on an air supply of up to 7 Bar (102 psi) depending on pressure relief setting, can be used to open valve without disturbing pressure relief setting.

Air Loaded with Air Lift - see ***"Figure 14" on page 11***.

- Valve, which operates on an air supply of up to 7 Bar (102 psi) regulated for required setting, can be set to the required pressure relief setting. Airlift override, which operates on an air supply of up to 7 Bar (102 psi) depending on pressure relief setting, can be used to open valve without disturbing pressure relief setting.

Air actuated relief valves can be operated remotely and interfaced with other elements of the system or process control.

⚠ WARNING

Integral pressure relief valves are normally used to protect the pump from the effects of increases in system pressure caused, for example, by a restricted or closed discharge line. In response to a pressure increase, the valve opens and internally circulates the pumped media within the pump chamber. When the valve opens, because the volume of liquid circulating is relatively small, the temperature of the liquid in the pump chamber may rise if the pump continues to operate for an extended period. In severe cases, this may result in temperatures in excess of the pumps operating limits, or vaporisation of the liquid, both of which should be avoided. For these reasons when the valve is activated the cause of the system pressure increase should be eliminated as continuous operation of the pump with the valve open is not recommended and may cause severe damage to the pump.

If the pump on which the valve is fitted is to be installed within either a pressurised system or one incorporating a vessel under vacuum then the application of the valve should be referred to Viking Pump.

The selection, setting and application of integral relief valves is influenced by the viscosity and nature of the pumped media, the pumps operating speed and the required pressure relief setting and mode of operation. For these reasons and to cover the diverse range of products, the conditions under which they are pumped and application demands, it is not practical to factory-set integral relief valves and the setting of the valves should be carried out on site, under the proposed duty conditions for which the pump and valve were selected.

For setting and operating MultiPump® integral relief valves refer to ***"Setting & Operating Spring Loaded Valves" on page 11*** and ***"Setting & Operating Air Loaded Integral Pressure Relief Valves" on page 12***. Before beginning the relief valve setting procedure the pump should be installed, refer to ***"System Design & Installation" on page 6***, paragraph (vi), with a pressure gauge in the discharge line adjacent to the pump discharge port.

Setting & Operating Spring Loaded Valves

See ***"Figure 11" on page 10***, ***"Figure 12" on page 10*** and ***"Figure 13" on page 11***.

- Remove cover (108). For integral relief valve with manual lift, see ***"Figure 12" on page 10***; first remove nut (129) and hand wheel (111).

⚠ DANGER

- Unscrew nut (107) using pry bar in holes provided to relieve spring compression. For integral relief valve with airlift, see ***"Figure 13" on page 11***, the air cylinder must be exhausted prior to unscrewing the nut (107).

- Start pump - refer to ***"Start Up Procedure" on page 9***.
- Screw in nut (107) using pry bar in holes provided until the required pressure relief setting is reached.

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⚠ WARNING

Note: Care should be taken not to exceed the lower of either the pump's maximum pressure rating or the system design pressure.

- Reinstall cover (108). For integral relief valve with manual lift, see ***"Figure 12" on page 10***; reinstall hand wheel (111) and nut (129).
- The relief valve is now set.

For Integral Relief Valve with Manual Lift - see ***"Figure 12" on page 10***.

- To operate the manual lift, turn the hand wheel (111) clockwise, which will lift the valve head (102/128). To resume normal relief valve operation, turn the hand wheel (111) counter-clockwise.

For Integral Relief Valve with Air Lift - see ***"Figure 13" on page 11***.

- To actuate the airlift, connect an air supply not exceeding 7 Bar (102 psi) to the cylinder (123), connection 'B', which will lift the valve head (112). To resume normal relief valve operation, exhaust the cylinder (123).

Setting & Operating Air Loaded Integral Pressure Relief Valves

See ***"Figure 14" on page 11***.

- Connect an air supply, not exceeding 7 Bar (102 psi), via a regulating valve to the relief valve connection 'A' in the cylinder (114). Do not turn on the air supply.
- Start pump - refer to ***"Start Up Procedure" on page 9***.
- Using the regulating valve, gradually increase the air pressure until required pressure relief setting is reached. The air pressure must not exceed 7 Bar (102 psi).
- The relief valve is now set.

⚠ WARNING

Note: Care should be taken not to exceed the lower of either the pump's maximum pressure rating or the system design pressure.

⚠ DANGER

- To use the air lift system, the regulated air supply must be routed through a change-over valve in order to transfer air from the relief valve load air chamber, connection 'A', to the lift air chamber, connection 'B', while depressurizing the load chamber and vice versa. The change-over valve will actuate the air lift which will lift when the air supply is diverted to connection 'B', and will close, restoring normal relief valve operation, when the air supply is diverted back to connection 'A'.

⚠ DANGER

- **Under NO circumstances should any attempt be made to disassemble a pressure relief valve which has not had the spring pressure relieved, is still connected to a pressurized air supply or is mounted on a pump that is operating. Serious personal injury or pump damage may occur.**

MULTIPUMP® DISASSEMBLY & ASSEMBLY

⚠ DANGER

Before starting any work on the pump the recommended Shutdown Procedure should be followed, refer to ***"Shutdown Procedure" on page 9***.

⚠ DANGER

While disassembling or assembling the pump it is essential to ensure that the pump and/or components are secured to provide adequate stability.

⚠ DANGER

Large pump components or sub-assemblies should be installed using suitable devices. Use threaded holes for the attachment of lifting eyes where appropriate.

During disassembly or before assembly, all components should be inspected for fit, wear and damage. If worn or damaged the components should be replaced.

The position of all parts should be identified as they are removed to ensure they are reinstalled in the same position.

Lipseals and O-rings are incorporated within the gearbox assembly to contain the lubricant for the bearings and timing gears. Regular inspection and correct maintenance of these items will ensure that the lubrication is sustained and the pump maximum working life is achieved. To ensure this, it is extremely important that care is taken when removing and replacing new O-rings and lipseals. When removing and replacing lipseals ensure that the location bore for the outside diameter and the seat for the back of the lipseal is not damaged as this may create a leak path for the lubricant.

When removing lipseals or O-rings care should be taken to avoid cutting or tearing the sealing faces as they pass over keyways, splines, threads or other potentially sharp or abrasive edges. All lipseals and O-rings should be carefully examined and if damaged in any way, be replaced.

All O-rings and sealing lips of lipseals should be lightly lubricated with an appropriate lubricant (suitable for application) before installing.

When installing lipseals do not allow the rear face to come into contact with bearings or other rotating parts.

Prior to beginning assembly, ensure all parts are clean and free from burrs or damage. Where a vice is to be used then this should be installed with protective jaws to avoid damage to components. Do not hammer or apply undue force to install or position components.

⚠ WARNING

All fasteners are required to be tightened to the required torque setting during assembly, refer to ***"Fasteners & Torque Settings" on page 49***.

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⚠ DANGER

The preferred method of installing bearing cones is that they are heated to approximately 125°C (250°F) prior to installation. During this operation protective gloves should be used. Once bearing cones are installed in the correct position they should be allowed to cool before proceeding with assembly. As an alternative, bearing cones may be pressed into position providing the proper equipment is utilised and the necessary procedures are used to prevent component damage.

Under no circumstances should bearing cones or cups be hammered into position.

MP10, MP20 & MP30 PUMP - DISASSEMBLY & ASSEMBLY

MP10, MP20 & MP30 Front Cover & Rotor Removal

FIGURE 15: MP10 EXPLODED VIEW OF ROTORCASE & ROTOR ASSEMBLY

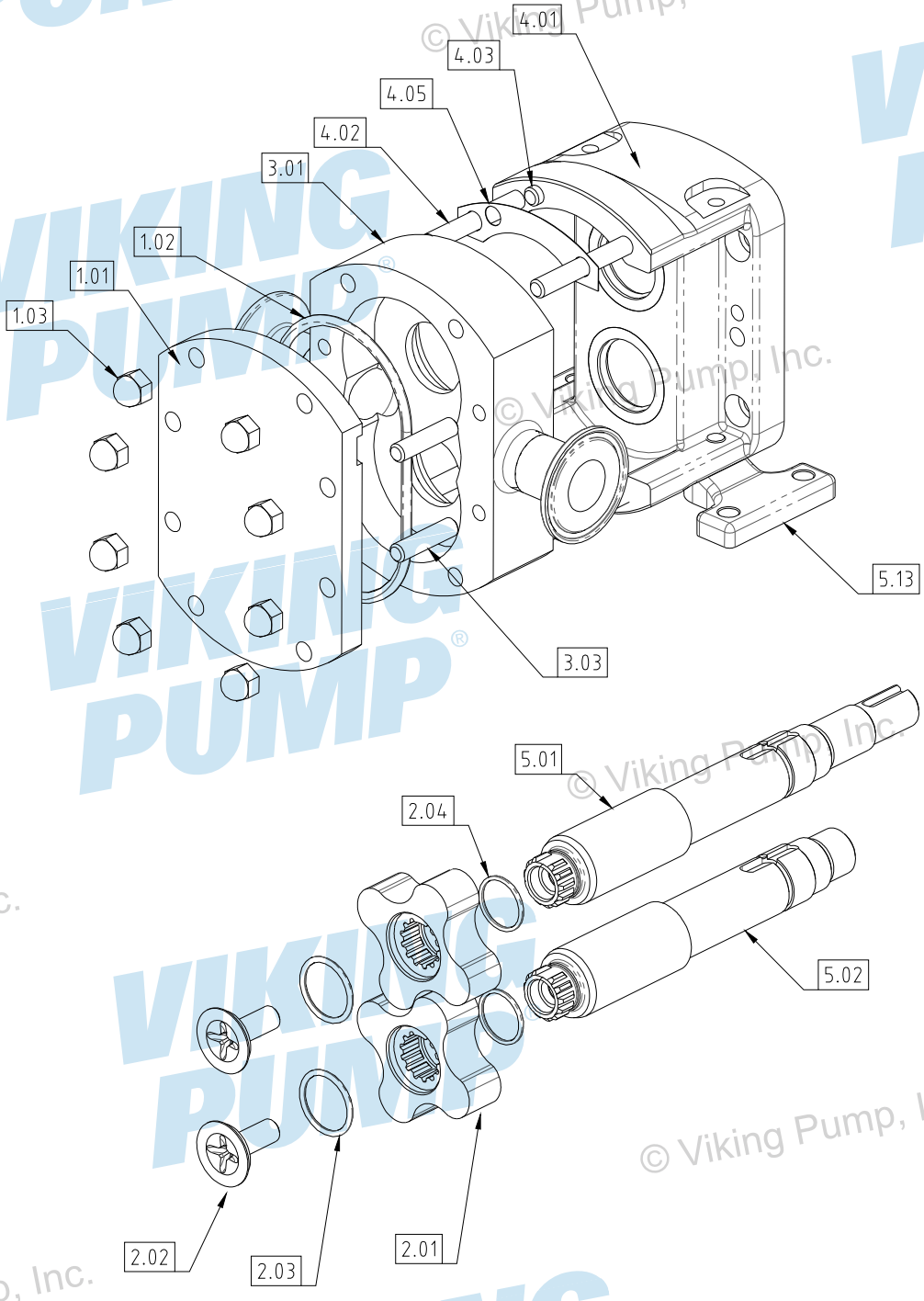

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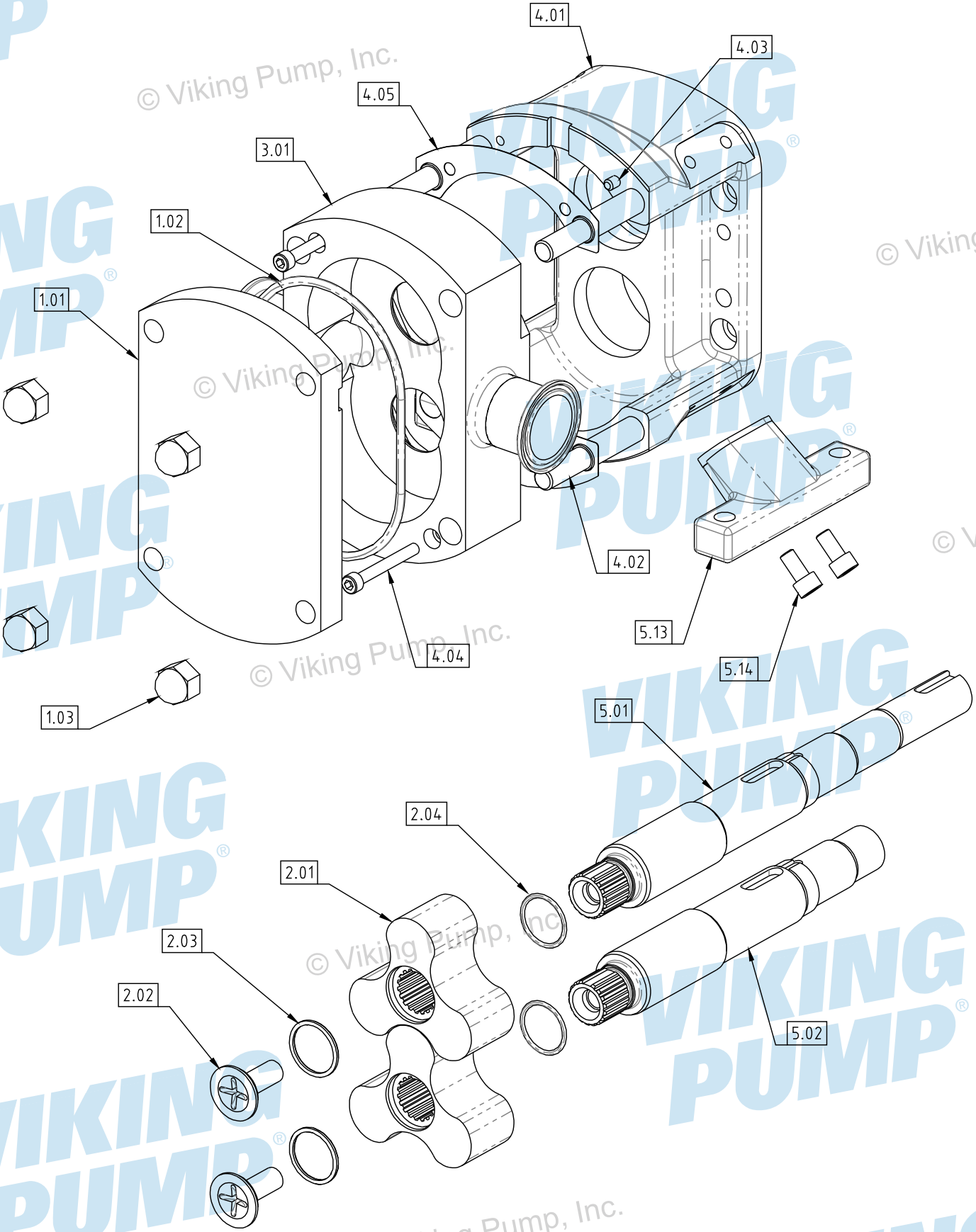
FIGURE 16: MP20 / MP30 EXPLODED VIEW OF ROTORCASE & ROTOR ASSEMBLY



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⚠ DANGER

- Follow recommended shutdown procedure. Refer to ***"Shutdown Procedure" on page 9***.
- For MP10 Pump – refer to ***"Figure 15" on page 13***.
- For MP20 Pump – refer to ***"Figure 16" on page 14***.

⚠ DANGER

- Gradually loosen front cover retaining dome nuts (1.03). Care should be taken as there may still be residual product and pressure in the pump head and as the dome nuts are loosened, this will vent to atmosphere.
- Remove dome nuts (1.03).

⚠ WARNING

Note: MP10 Pump Only - Do not rotate shafts at this stage as the rotorcase is held in place by the front cover retaining dome nuts (1.03).

- Failure to observe this will result in damage to the pump.
- Remove front cover (1.01) using lever slots where necessary and the front cover O-ring (1.02) or optional gasket (not shown).
- Remove rotor retainers' (2.02) with socket supplied (not shown).

⚠ WARNING

Note: The socket tool should always be used, the use of other tools may damage the retainer.

- Remove retainer O-rings (2.03).
- Remove rotors (2.01) from shafts (5.01 and 5.02).
- Remove rotor O-rings (2.04) – Not fitted on O-ring seal version of MP10.

Note: If the pump is fitted with O-ring Seals (instead of mechanical seals) then the O-ring seal will now be visible.

MP10, MP20 & MP30 Rotorcase Removal

⚠ WARNING

Note: Ensure all pipe work is disconnected before commencing rotorcase removal.

MP10, MP20 & MP30 Rotorcase Removal for Pumps fitted with Single Un-Flushed Mechanical Seals & Single O-ring Seals

MP10 Pump Only

(After completing ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13***)

- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

MP20 & MP30 Pump Only

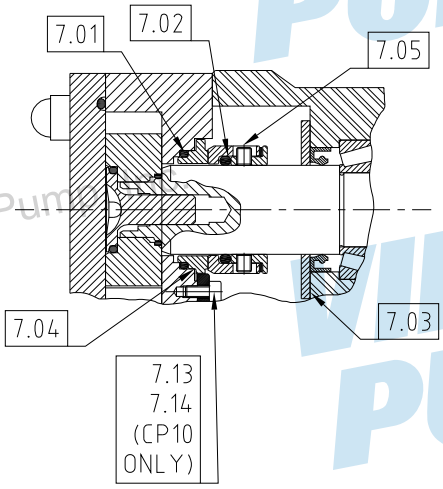
(After completing ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13***)

- Remove rotorcase retention socket cap head screws (4.04) with appropriate metric allen key (not supplied).
- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

Single Un-Flushed Mechanical Seal as shown in ***"Figure 17" on page 15***.

- See ***"MP10, MP20, MP30 & MP40 Single Mechanical Seal Removal" on page 34*** for removal and ***"MP10, MP20, MP30 & MP40 Single Mechanical Seal Replacement" on page 34*** for replacement.

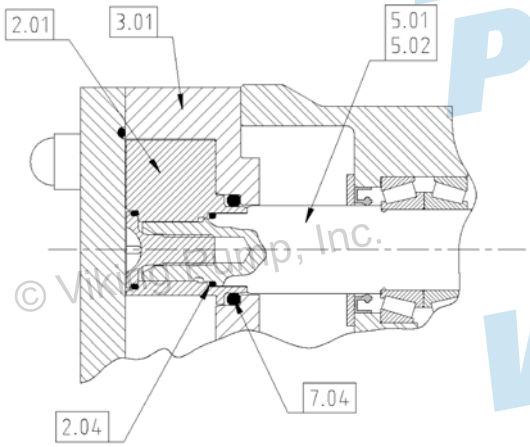
FIGURE 17: SINGLE UN-FLUSHED MECHANICAL SEAL



Single O-ring Seal as shown in ***"Figure 18" on page 15*** – see ***"MP10, MP20, MP30 & MP40 O-ring Seal Assembly & Removal" on page 39*** for removal and replacement.

- Remove rotor (2.01).
- Remove O-ring seal (7.04) from rotorcase (3.01).

FIGURE 18: O-RING SEAL



MP10, MP20 & MP30 Rotorcase Removal for Pumps Fitted with Single Flushed or Double Flushed Mechanical Seals

Prior to removal of rotorcase (3.01) for MP10, MP20 and MP30, remove seal housing screws (7.10) and separate housing (7.06) from rotorcase (3.01) noting it is located on dowels (7.09).

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MP10 Pump Only – (After completing ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13***) - see ***"Figure 15" on page 13***.

- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

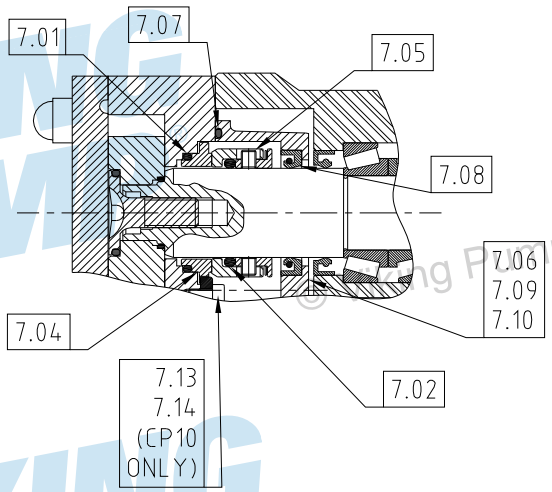
MP20 and MP30 Only – (After completing ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13***) - see ***"Figure 16" on page 14***.

- Remove rotorcase retention socket cap head screws (4.04) with appropriate metric allen key (not supplied).
- Slide rotorcase (3.01) from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

Single Flushed Mechanical Seal as shown in ***"Figure 19" on page 16***.

- See ***"MP10, MP20, MP30 & MP40 Single Flushed Mechanical Seal Removal" on page 34*** for removal and ***"MP10, MP20, MP30 & MP40 Single Flushed Mechanical Seal Replacement" on page 35*** for replacement.

FIGURE 19: SINGLE FLUSHED MECHANICAL SEAL



Double Flushed Mechanical Seal as shown in ***"Figure 20" on page 16*** and ***"Figure 21" on page 16***.

- **MP10 Pump** - see ***"MP10 Double Flushed Mechanical Seal Removal" on page 35*** for removal and ***"MP10 Double Flushed Mechanical Seal Replacement" on page 35*** for replacement.
- **MP20 and MP30 Pumps** – see ***"MP20, MP30 & MP40 Double Flushed Mechanical Seal Removal" on page 36*** for removal and ***"MP20, MP30 & MP40 Double Flushed Mechanical Seal Replacement" on page 36*** for replacement.

FIGURE 20: MP10 DOUBLE FLUSHED MECHANICAL SEAL

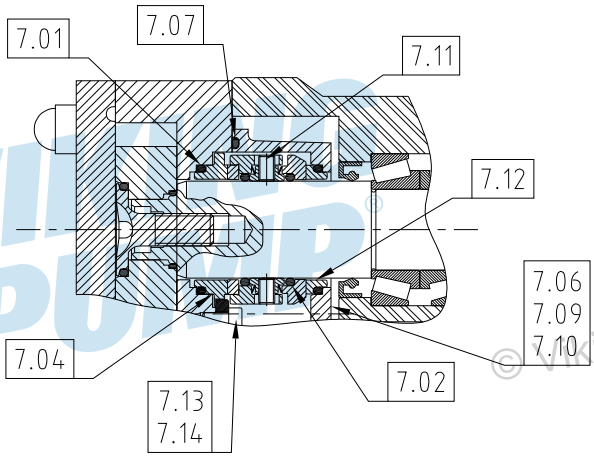
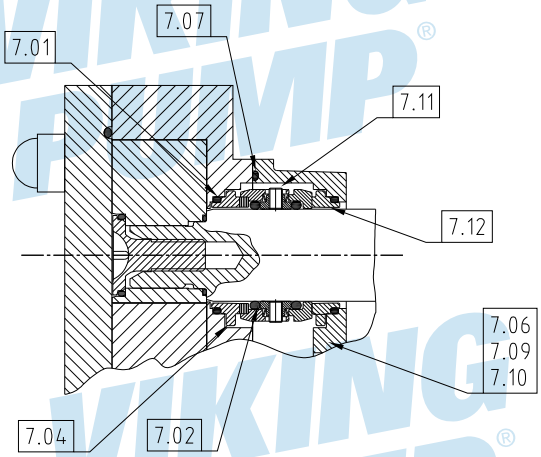


FIGURE 21: MP20 & MP30 DOUBLE FLUSHED MECHANICAL SEAL



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(After completing ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13*** or ***"MP10, MP20 & MP30 Rotorcase Removal" on page 15***).

FIGURE 22: MP10 COMPONENT PARTS

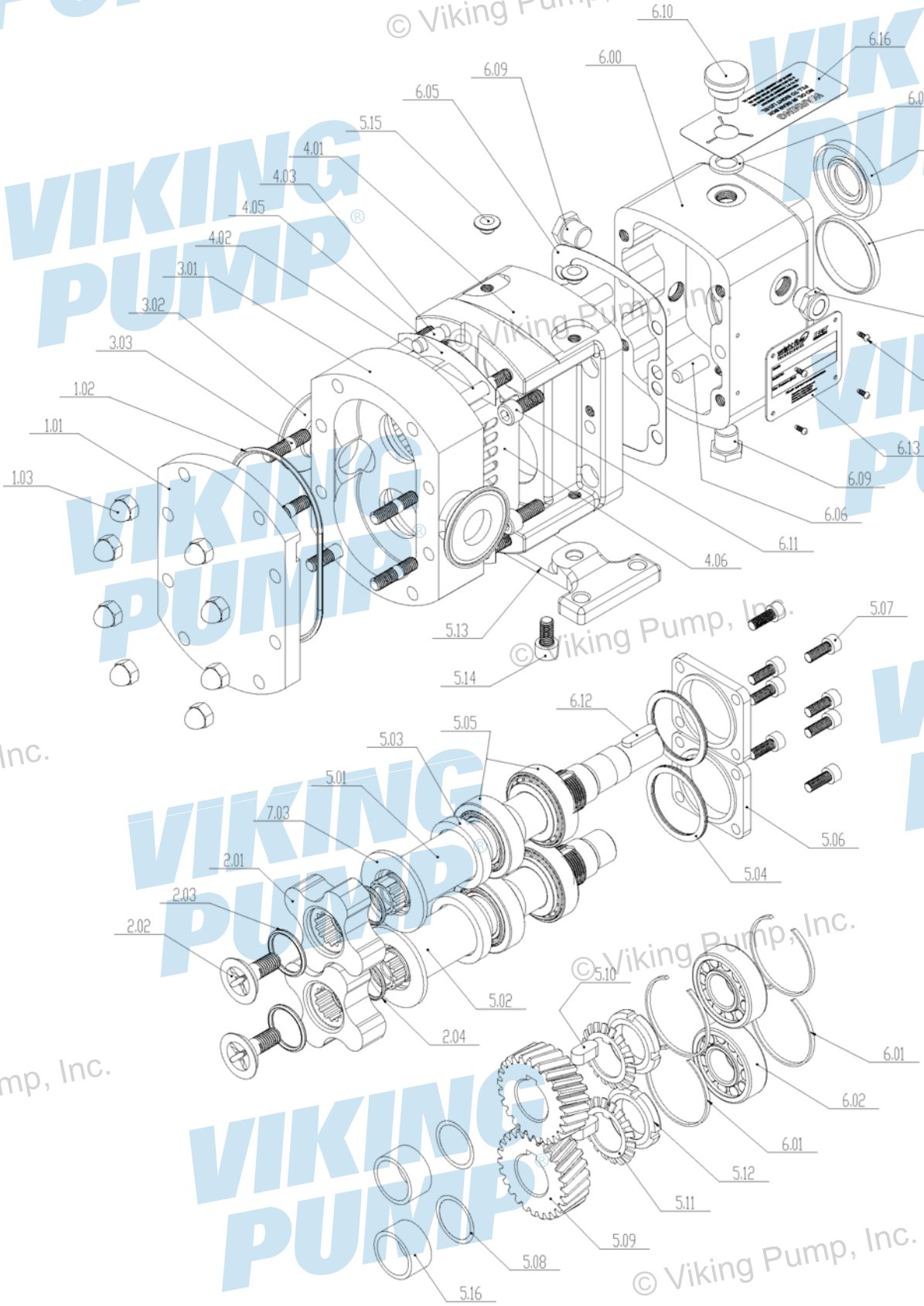

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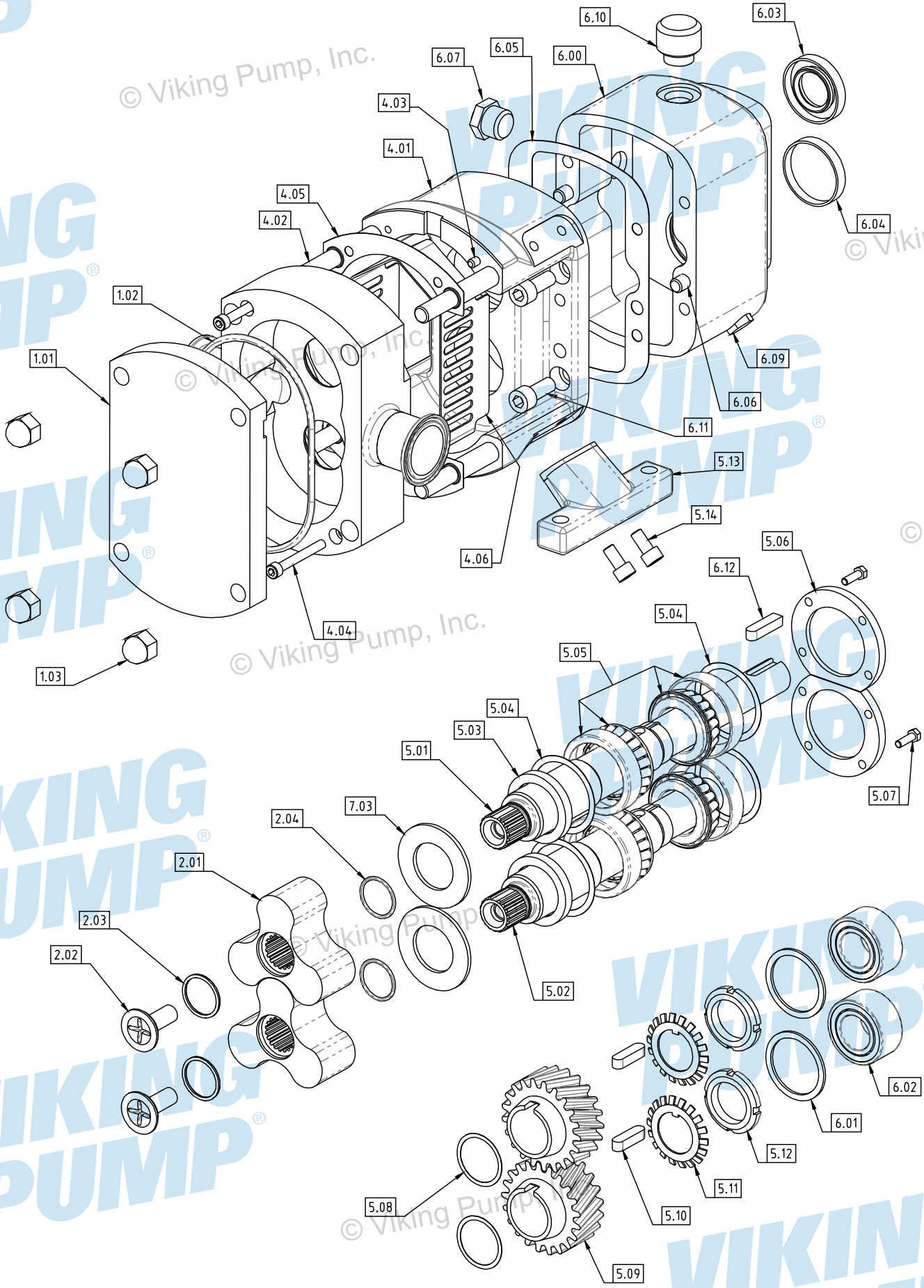
FIGURE 23: MP20 & MP30 COMPONENT PARTS



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Before starting disassembly of the gearbox remove product seals; refer to ***"MultiPump® Mechanical Seal Removal & Replacement" on page 33*** for Mechanical Seals, or ***"MultiPump® Single O-ring Seals" on page 38*** for O-ring seals.

The following procedure describes complete disassembly of the gearbox.

- Refer to ***"Figure 22" on page 17*** for MP10; Refer to ***"Figure 23" on page 18*** for MP20 and MP30.
- Remove guard (5.06).
- Remove drive key (6.12).
- Remove oil drain plug (6.09) and breather (6.10), drain oil into suitable container and retain if later inspection is required.
- Remove screws (6.11) and separate gearbox cover (6.00) from bearing housing (4.01). The gearbox cover (6.00) is located on dowels (6.06)

Note: The bearing housing (4.01) is provided with two jacking holes (tapped M8 on MP10; M10 on MP20; M12 on MP30), which can be used to separate the gearbox cover (6.00) from the bearing housing (4.01).

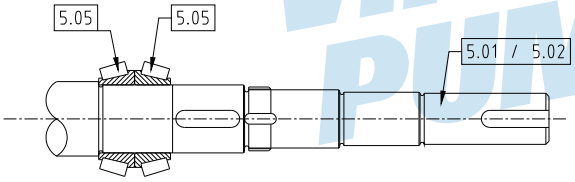
- Remove gasket (6.05) from gearbox cover (6.00) or bearing housing (4.01) depending upon which part the gasket is adhered to.
- Remove oil seal (6.03) and blanking cap (6.04) from gearbox cover (6.00).
- Remove retaining rings (6.01) from gearbox cover (6.00) and press out bearing outer rings (6.02).
- Remove bearing inner ring (6.02) from shafts (5.01 and 5.02).
- **MP10 & MP20 Pumps Only** - Remove lock nuts (5.12) and tab washers' (5.11).
- **MP30 Pumps Only** – Loosen locking screws from and lock nuts (5.12).
- Remove timing gears (5.09) and gear keys (5.10).
- **MP10 Pumps Only** - Remove shims (5.08) and spacers (5.16), keep shims and spacers in sets and identify position.
- **MP30 Pumps Only** - Remove shims (5.08) in sets and identify position
- Remove screws (5.07) and retainers (5.06) from bearing housing (4.01).
- Remove shafts (5.01 and 5.02) from bearing housing (4.01). Shafts (5.01 and 5.02) will be complete with bearings (5.05) and shims (5.04), keep shims in sets and identify position.
- Remove oil seals (5.03) from bearing housing (4.01).
- Remove bearing cups (5.05) and any associated shims (5.04) from bearing housing (4.01), keep bearing cups (5.05) and shims (5.04) in sets and identify position.
- Remove bearing cones (5.05) from shafts (5.01 and 5.02).

MP10, MP20 & MP30 Gearbox Assembly

Refer to ***"Figure 22" on page 17*** for MP10 or ***"Figure 23" on page 18*** for MP20 and MP30.

- Install bearing cones (5.05) to shafts (5.01 and 5.02) ensuring they locate against shaft shoulder. The cones are installed as shown in ***"Figure 24" on page 19***.

FIGURE 24: INSTALLATION OF BEARING CONES ONTO SHAFTS



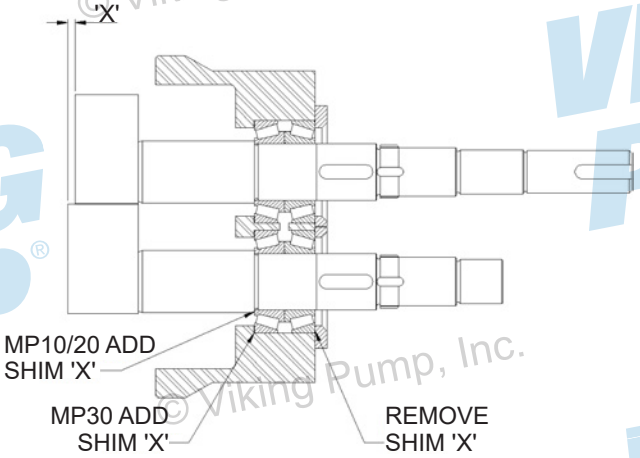
- Install two bearing cups (5.05) to bearing housing (4.01).
- Install shafts (5.01 and 5.02) in bearing housing (4.01).
- Install remaining bearing cups (5.05), shims (5.04) to nominal value of 0.60mm (0.024"), retainers (5.06) and secure with screws (5.07) tightened to correct torque refer to ***"Fasteners & Torque Settings" on page 49***.
- Using a torque wrench, check the rolling torque of each shaft assembly, referring to ***"Fasteners & Torque Settings" on page 49***. If necessary, adjust amount of shim (5.04), either by adding shim (5.04) to increase rolling torque or removing shim (5.04) to decrease rolling torque, until correct rolling torque has been achieved. If shim (5.04) is adjusted ensure screws (5.07) are tightened to correct torque before final check of rolling torque.
- Install rotors (2.01) on to shafts (5.01 and 5.02) with rotor retainers (2.02).

⚠ WARNING

Note: The socket tool (not shown) should always be used, the use of other tools may damage the retainer.

- Using a depth micrometer or similar device measure any difference (X) in rotor front face alignment, see ***"Figure 25" on page 19***. If a difference is found move shims (5.04) of thickness equal to the difference (X) from beneath the forward rotor's bearing retainer (5.06) and reposition under the front bearing (5.05) cup.

FIGURE 25: ROTOR / BEARING ABUTMENT SETTING



- After adjusting shim (5.04) check rotor front face

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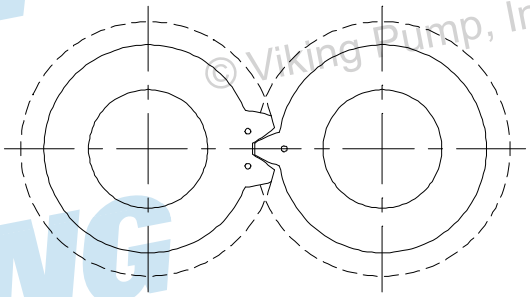
alignment and rolling torque.

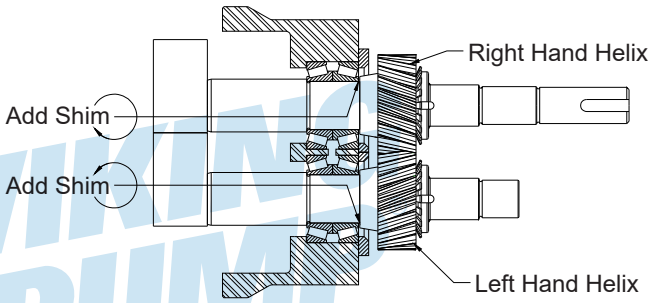
- Remove rotor retainers' (2.02) and rotors (2.01).
- **MP10 Pumps Only** – Install spacers (5.16) and gear keys (5.10) to shafts (5.01 and 5.02).
- **MP20 and MP30 Pumps Only** – Install gear keys (5.10) to shafts (5.01 and 5.02).
- **MP10 Pumps Only** - Timing marks and gear marks 'D' and 'L' on gears (5.09) should be visible when viewed on the drive end of the drive shaft.
- **MP20 and MP30 Pumps Only** - Timing marks and gear marks 'D' and 'L' on gears (5.09) should be visible when viewed on the drive end of the shafts (5.01 and 5.02), and the tapered shoulder on the gear (5.09) should face the bearings (5.05).

FIGURE 26: TIMING MARKS ON GEARS



- Install gears (5.09) to shafts (5.01 and 5.02). Gear marked 'D' should be installed to drive shaft (5.01). Gear marked 'L' should be installed to lay shaft (5.02) ensuring correct alignment of timing marks, see ***"Figure 26" on page 20***.
- **MP10 and MP20 Pumps Only** - Install tab washers (5.11) and lock nuts (5.12) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***. Do not secure tab washers (5.11).
- **MP30 Pumps Only** - Install locknuts (5.12) and tighten to correct torque (refer to ***"Fasteners & Torque Settings" on page 49***). Install, but do not tighten lock-screws (5.12) which are fitted in the locknuts (5.12).
- Install rotors (2.01) and rotor retainers (2.02)
- Check mesh clearance against the Clearance Chart (refer to ***"Clearance Chart" on page 47***).
- To adjust mesh clearance shims (5.08) will need to be inserted between the spacer (5.16) and the gear (5.09). As a guide for a mesh clearance change of one unit (say 0.1mm or 0.004"), shims (5.08) of four units' thickness (say 0.4mm or 0.016") need to be inserted. Further, for clockwise movement of the rotor (when viewed from the rotor end) insert shim (5.08) in between the spacer (5.16) on the MP10; or bearing (5.05) on the MP20 and MP30; and the gear (5.09) having a right hand helix, and vice versa, see ***"Figure 27" on page 20***.
- Having installed shim (5.08) ensure lock nuts (5.12) are tightened to correct torque (refer to ***"Fasteners & Torque Settings" on page 49***), before checking mesh clearance (refer to ***"Clearance Chart" on page 47***).
- **MP10 and MP20 Pumps Only** - Having achieved optimum mesh clearances the tab washers' (5.11) can be secured.
- **MP30 Pump Only** - Having achieved optimum mesh clearances the lock screws in the locknuts (5.12) can be secured.

FIGURE 27: PRELOAD SETTING



- Remove rotor retainers' (2.02) and rotors (2.01).
- Install bearing (6.02) inner races to shafts (5.01 and 5.02), positioning against shoulder on shaft.
- Install inner retaining rings (6.01), bearing (6.02) outers, outer retaining rings (6.01), lipseal (6.03), blanking cap (6.04), filler plug (6.10), sight glass (6.07) and drain plug (6.09) to cover (6.00).
- Install cover (6.00) to bearing housing (4.01) with gasket (6.05), locating on dowels (6.06), and secure with screws (6.11) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.

MP10, MP20 & MP30 Rotorcase, Rotor & Front Cover Assembly

- see ***"Figure 15" on page 13*** for MP10.
- see ***"Figure 16" on page 14*** for MP20 and MP30.
- Install rotorcase (3.01) to bearing housing (4.01) locating on dowels (4.03).
- **MP10 Pump Only** – Secure rotorcase (3.01) in position with nuts (1.03) using four temporary spacers (12mm long x 9mm bore or 0.472" long x 0.354" bore).
- **MP20 and MP30 Pumps Only** – Secure rotorcase (3.01) in position with socket cap head screws (4.04) using appropriate metric allen key (not supplied), tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***. For additional clamping whilst checking the clearances clamp the rotorcase on the opposite corners to the socket cap screws using washers (not supplied) and nuts (1.03).

⚠ WARNING

Note: The rotorcase must be clamped in position as above to enable front and rear rotor clearances to be checked.

- Install rotors (2.01) to shafts (5.01 and 5.02) with retainers (2.02).
- Using a depth micrometer or similar device measure front clearance (refer to ***"Clearance Chart" on page 47***) between the rotorcase and rotor front faces and check that this corresponds to the appropriate clearance as indicated on the Clearance Chart.
- To adjust front clearance, remove rotors (2.01) and rotorcase (3.01) and insert arch shims (4.05) between the rotorcase (3.01) and bearing housing (4.01).

⚠ WARNING

Note: It is essential that the thickness of arch shim (4.05) inserted is the same at both the top and bottom of the rotorcase (3.01).

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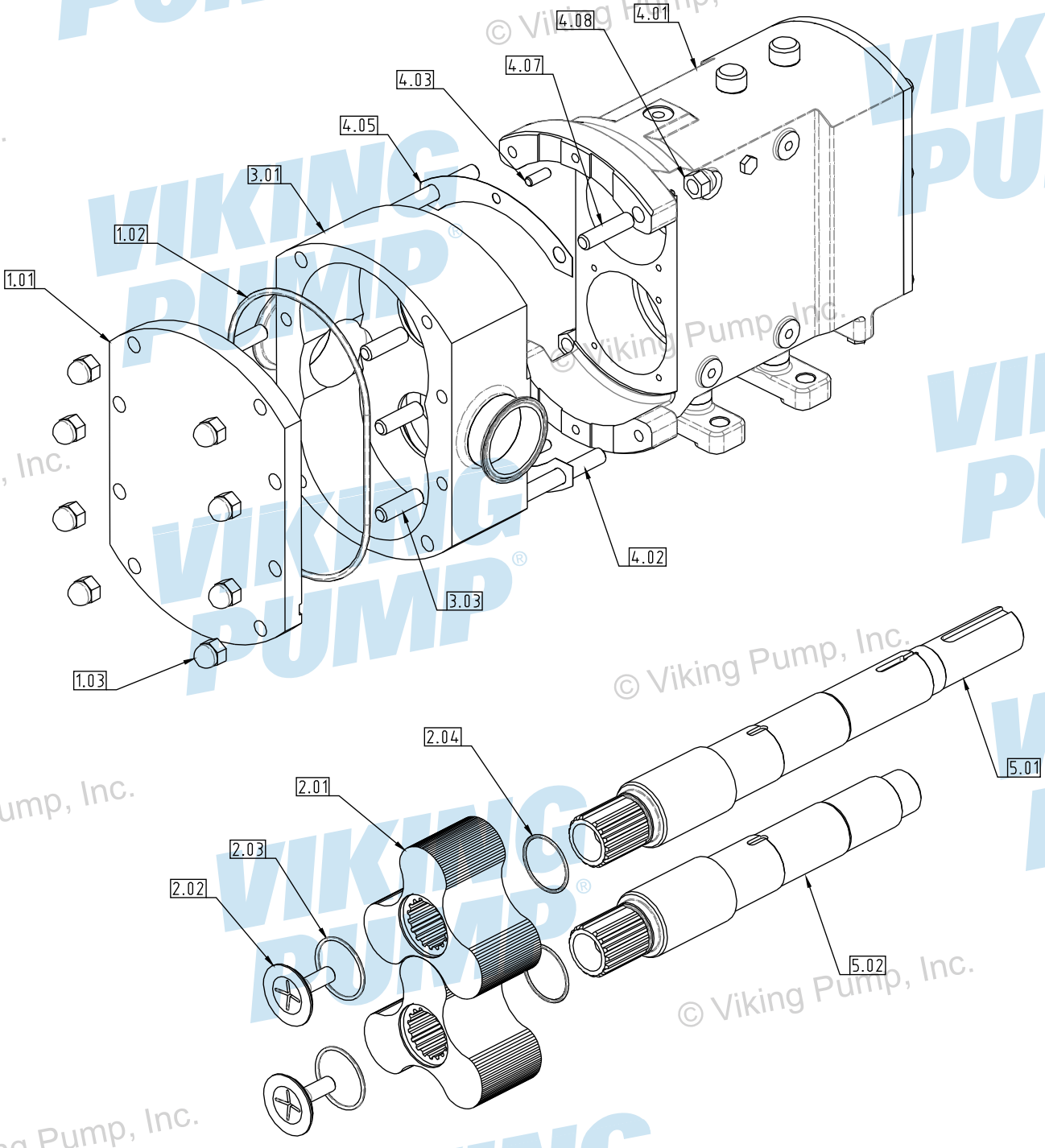
- Install product seals; refer to ***"MultiPump® Mechanical Seal Removal & Replacement" on page 33*** or ***"MultiPump® Single O-ring Seals" on page 38***.
- Install guard (5.06).
- Install rotorcase (3.01) securing in position with temporary spacers (MP10) or socket cap head screws, washers and nuts (MP20 and MP30) as before.
- Install rotors (2.01) with O-rings (2.03 and 2.04) and retainers (2.02) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***, using socket tool (not shown).
- Check all rotor clearances i.e. front, rear, top/bottom, sides' and mesh. (Refer to ***"Clearance Chart" on page 47***)
- **MP10 Pump Only** - Remove temporary spacers retaining rotorcase (3.01).
- **MP10, MP20 and MP30 Pumps Only** - Install front cover (1.01) with O-ring (1.02) or gasket and secure with nuts (1.03) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.

MP40 PUMPS - DISASSEMBLY & ASSEMBLY

MP40 Front Cover & Rotor Removal

FIGURE 28: FRONT COVER AND ROTORCASE REMOVAL FOR MP40



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⚠ DANGER

Follow recommended shutdown procedure - refer to *"Shutdown Procedure" on page 9*.

- Refer to *"Figure 28" on page 21*.

⚠ DANGER

- Gradually loosen front cover retaining dome nuts (1.03). Care should be taken as there may still be residual product and pressure in the pump head and as the dome nuts are loosened, this will vent to atmosphere.

- Remove dome nuts (1.03).
- Remove front cover (1.01), using lever slots as necessary.
- Remove front cover O-ring (1.02).
- Remove rotor retainers' (2.02) with socket (not shown).

Note: The socket tool supplied (not shown) should always be used to remove the retainer. The use of other tools may damage the retainer.

- Remove retainer O-rings (2.03).
- Remove rotors (2.01) from shafts (5.01 and 5.02).
- Remove rotor O-rings (2.04).

MP40 Rotorcase Removal

⚠ WARNING

Note: Ensure all pipe work is disconnected before commencing rotorcase removal.

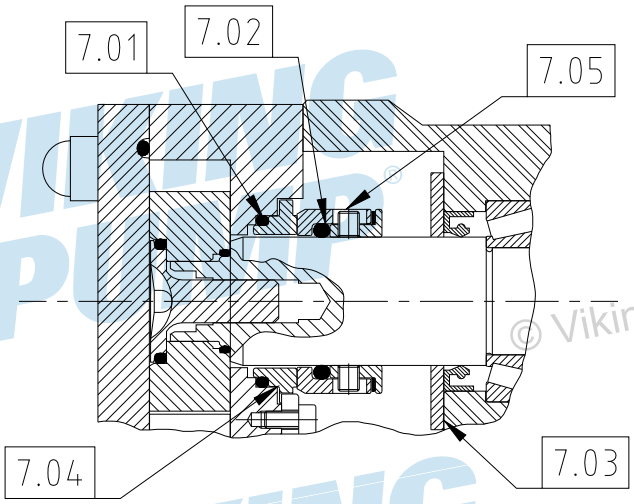
MP40 Rotorcase Removal for Pumps fitted with Single Un-flushed Mechanical Seals & O-ring Seals

(After completing 4.2.1)

- Remove dome nuts (4.08) fastening rotorcase (3.01) to gearbox (4.01).

Single Un-flushed Mechanical Seal for MP40 - see ***"Figure 29" on page 22*** and ***"MP10, MP20, MP30 & MP40 Single Mechanical Seal Removal" on page 34*** for removal and ***"MP10, MP20, MP30 & MP40 Single Mechanical Seal Replacement" on page 34*** for replacement.

FIGURE 29: SINGLE UN-FLUSHED MECHANICAL SEAL – MP40

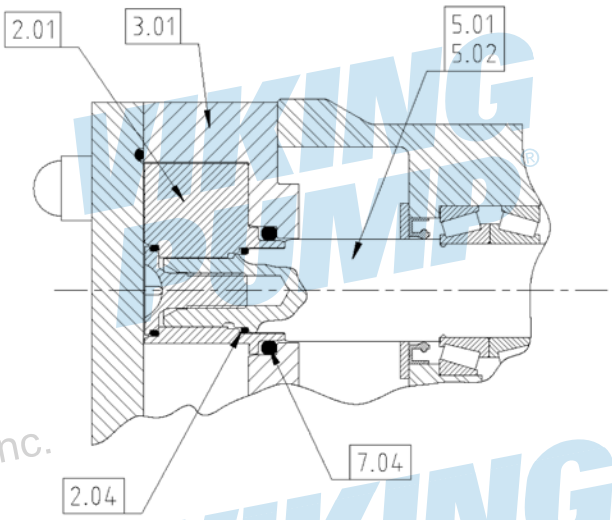


- Slide rotorcase (3.01) from gearbox (4.01) noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

Single O-ring Seal as shown in ***"Figure 30" on page 22*** – see ***"MP10, MP20, MP30 & MP40 O-ring Seal Assembly & Removal" on page 39*** for removal and replacement.

- Remove O-ring seal (7.04) from rotorcase (3.01).

FIGURE 30: O-RING SEAL



- Slide rotorcase (3.01) from gearbox (4.01) noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be reused.

MP40 Rotorcase Removal for Pumps Fitted with Single Flushed or Double Flushed Mechanical Seals

- Prior to removal of rotorcase (3.01) remove seal housing screws (7.10) and separate housing (7.06) from rotorcase (3.01) noting it is located on dowels (7.09).
- Slide rotorcase from bearing housing (4.01), noting it is located on dowels (4.03), keep arch shims (4.05) in appropriate sets if they are to be re-used

Single Flushed Mechanical Seal as shown in ***"Figure 31" on page 23*** and see ***"MP10, MP20, MP30 & MP40 Single Flushed Mechanical Seal Removal" on page 34*** for removal and ***"MP10, MP20, MP30 & MP40 Single Flushed Mechanical Seal Replacement" on page 35*** for replacement.

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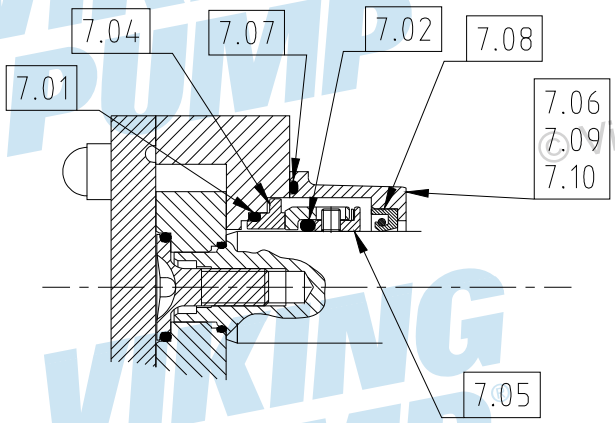
FIGURE 31: SINGLE FLUSHED MECHANICAL SEAL – MP40



Double Flushed Mechanical Seal as shown in ***"Figure 32" on page 23*** and see ***"MP20, MP30 & MP40 Double Flushed Mechanical Seal Removal" on page 36*** for removal and ***"MP20, MP30 & MP40 Double Flushed Mechanical Seal Replacement" on page 36*** for replacement.

FIGURE 32: DOUBLE FLUSHED MECHANICAL SEAL – MP40

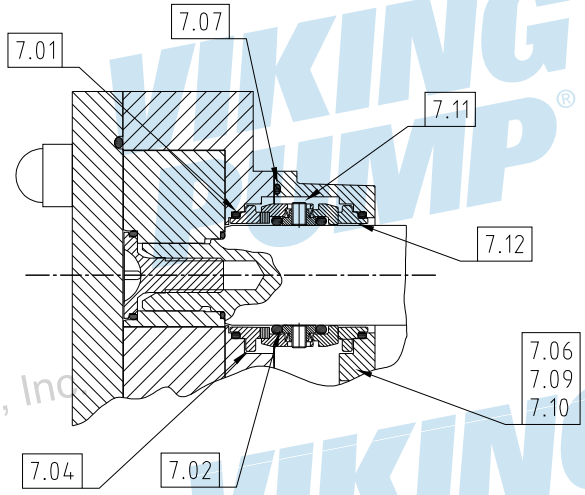


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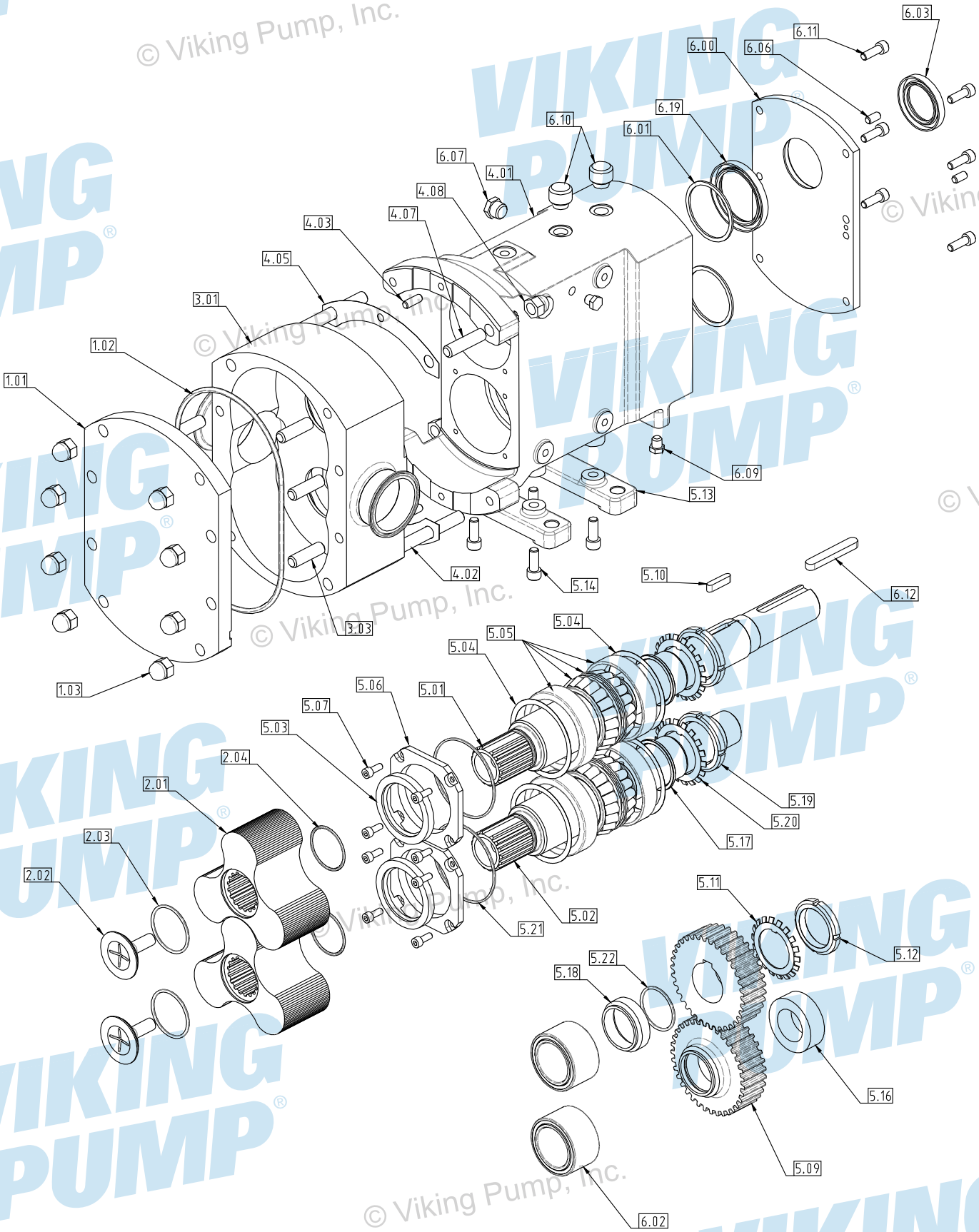
FIGURE 33: MP40 COMPONENTS



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Before proceeding with disassembly of the gearbox remove product seals; refer to ***"MultiPump® Mechanical Seal Removal & Replacement" on page 33*** or ***"MultiPump® Single O-ring Seals" on page 38***.

The following procedure describes complete disassembly of the gearbox, refer to ***"Figure 33" on page 24***.

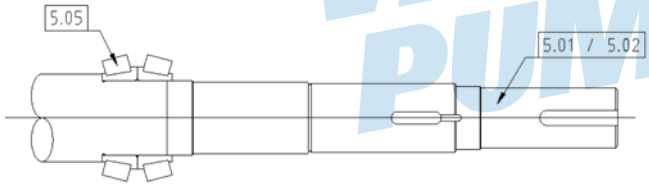
- Remove drive key (6.12), oil drain (6.09) and breather plugs (6.10), drain oil into suitable container and retain if later inspection is required.
- Remove screws (6.11) and gearbox cover (6.00). The gearbox cover (6.00) is located on dowels (6.06) and sealed with suitable liquid sealer.
- Remove oil seal (6.03) from gearbox cover (6.00).
- Loosen by 2 full turns all screws in retainer (5.16). Once this is done, the retainer may release its grip. If it does not become free, remove the two screws, which differ in colour (these may also have a washer under the head). Once these screws are removed, tapped holes will be revealed. Insert two jacking M8 x 40 setscrews into the tapped holes and tighten until the retainer's grip is broken. Remove the retainer.
- Remove lock nut (5.12) and tab washer (5.11).
- Remove timing gears (5.09), gear key (5.10), O-ring (5.22), spacer (5.18) and lipseal (6.19).
- Support pump with shafts in the vertical position with rotor end up.
- Remove guard (4.06) and slingers (7.03) – (only fitted on single un-flushed mechanical and single O-ring seal pumps).
- Remove screws (5.07).
- Remove bearing retainers' (4.01), O-rings (5.21) and shims (5.04), keep shims (5.04) in sets and identify position.
- Remove lipseals (5.03) from bearing retainers' (5.06).
- Remove shafts (5.01 and 5.02) from gearbox (4.01). Shafts (5.01 and 5.02) will be complete with bearings (5.05), spacers (5.18), lock nuts (5.19), lock washers (5.20) and bearing inner races (6.02).
- Remove bearing cups (5.05) from gearbox (4.01), keep any further shims (4.05) in sets and identify position.
- Remove lock nuts (5.19), lock washers (5.19), spacers' (5.18) and bearing cones (5.05) from shafts (5.01 and 5.02).
- Remove retaining rings (6.01) and bearing outers (6.02) from gearbox (4.01).

MP40 Gearbox Assembly

Refer to ***"Figure 33" on page 24***.

- Install bearing cones (5.05) to shafts (5.01 and 5.02) ensuring they locate against the shaft shoulder. The cones are installed as shown in ***"Figure 34" on page 25***.

FIGURE 34: INSTALLATION OF BEARING CONES ONTO SHAFTS



- Install spacers (5.17), tab washers (5.20) and lock nuts (5.14) to shafts (5.01 and 5.02) tightening to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***. Secure tab washers.
- Install bearing (6.02) inner races to shafts (5.01 and 5.02) positioning against shoulder on shaft.
- Install bearing (6.02) outer races and retaining rings (6.01) to gearbox (4.01).
- Install two bearing cups (5.05) to gearbox (4.01).
- Support gearbox (4.01) in a vertical position and install shafts (5.01 and 5.02) to gearbox (4.01).
- Install remaining bearing cups (5.05), shims (5.04) to nominal value of 0.6mm (0.024"), O-rings (5.21), retainers (5.06) and secure with screws (5.07) tightening to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.
- Using a torque wrench, check rolling torque of each shaft assembly, refer to ***"Fasteners & Torque Settings" on page 49***, if necessary adjust amount of shim (5.04) either by adding shim (5.04) to increase rolling torque or removing shim (5.04) to decrease rolling torque until correct rolling torque has been achieved. If shim is adjusted ensure screws (5.07) are tightened to correct torque before final check of rolling torque.
- Install rotors (2.01) onto shafts (5.01 and 5.02) with rotor retainers (2.02).

⚠ WARNING

Note: The socket tool (not shown) should always be used to remove the retainer. The use of other tools may damage the retainer.

- Using a depth micrometer or similar device measure any difference (X) in rotor front face alignment, see ***"Figure 35" on page 26***. If a difference is found move shims (5.04) of thickness equal to the difference (X) from beneath the lower rotors bearing retainer (5.06) and reposition under the front bearing (5.05) cup.

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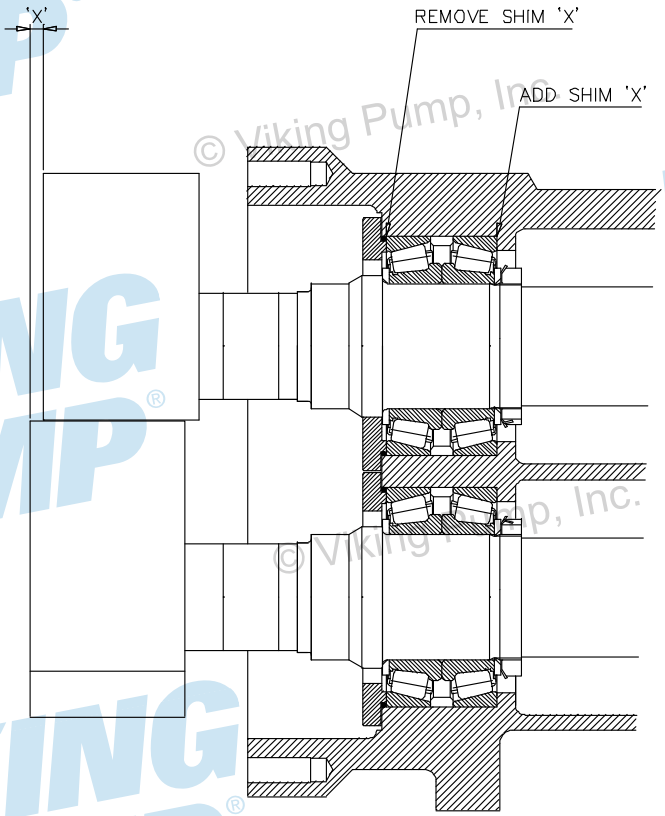
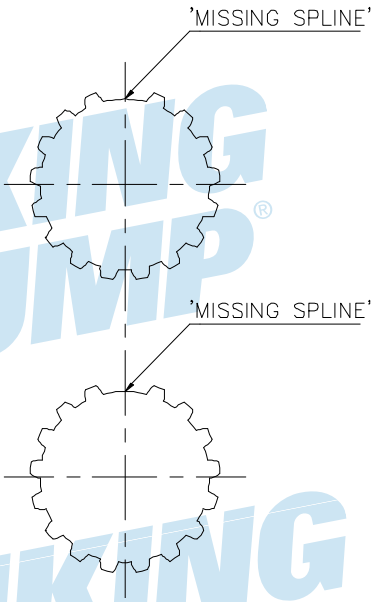
FIGURE 35: ROTOR FACE ALIGNMENT



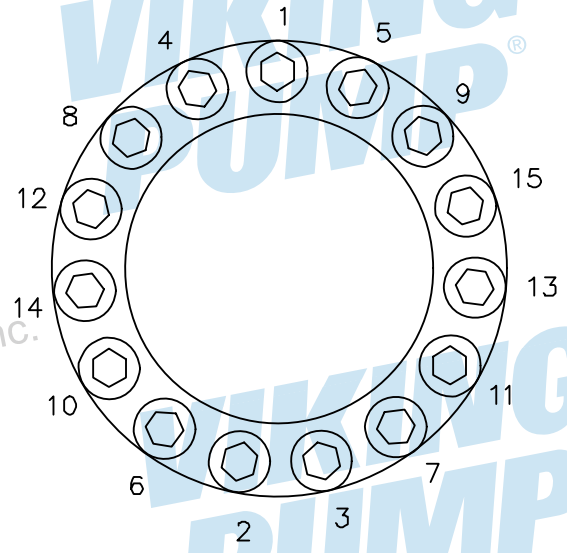
- After adjusting shim (5.04) check rotor front face alignment and rolling torque.
- Remove rotor retainers' (2.02) and rotors (2.01).
- Install lipseals (5.03) to bearing retainers' (5.06).
- Return pump to normal horizontal mounting position.
- Install lipseal (6.19) to gearbox (4.01). Install spacer (5.18) and O-ring (5.22) to drive shaft (5.01). Install gear key (5.10) to drive shaft (5.01).
- Install timing gears (5.09) to shafts (5.01 and 5.02).
- Install tab washer (5.11) and lock nut (5.12) tightening to correct torque - refer to ***"Fasteners & Torque Settings" on page 49***. Secure tab washer (5.11).
- Rotate shafts (5.01 and 5.02) so as to position the gaps made by the missing splines in the vertically uppermost positions, see ***"Figure 36" on page 26***.
- Lubricate retainer (5.16) with oil and mount to timing gear (5.09). Do not tighten.

FIGURE 36: MISSING SPLINE ALIGNMENT



- Install rotors (2.01) and rotor retainers (2.02) to shafts (5.01 and 5.02).
- Check rotor mesh clearance against Clearance Chart - refer to ***"Clearance Chart" on page 47***. To adjust the mesh clearance rotate shafts (5.01 and 5.02). Having achieved optimum mesh clearance, retainer (5.16) can be tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***, taking note of typical tightening sequence, see ***"Figure 37" on page 26***.

FIGURE 37: RETAINER TIGHTENING SEQUENCE



- After tightening of retainer (5.16) check mesh clearance, refer to ***"Clearance Chart" on page 47***.
- Remove rotors (2.01) and retainers (2.02).
- Install oil seal (6.03) to gearbox cover (6.00).
- Install gasket (6.05) to gearbox cover (6.00) and install to gearbox (4.01), locating on dowels (6.06) and securing with screws (6.11), tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.

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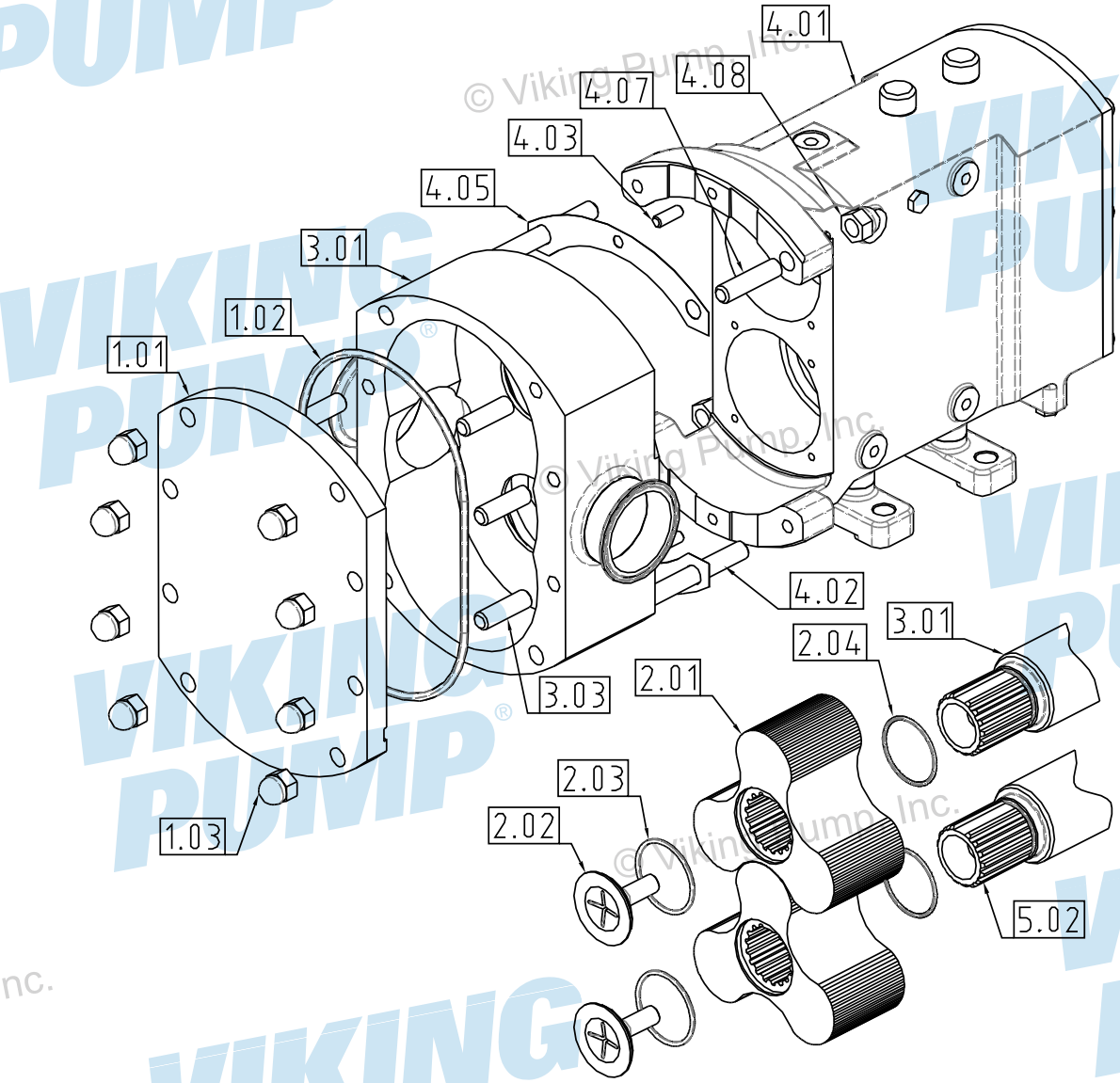
FIGURE 38: MP40 ROTORCASE ASSEMBLY



- Fit shaft slingers and guard (if fitted, depending upon seal configuration).
- Install rotorcase (3.01) to gearbox (4.01) locating on dowels (4.03) and secure with nuts (4.08) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.
- Install rotors (2.01) and rotor retainers (2.02). Using a depth micrometer or similar device measure front clearance (refer to ***"Clearance Chart" on page 47***), between the rotorcase and rotor front faces and check that this corresponds to the appropriate clearance.
- To adjust front clearance remove rotor retainers' (2.02), rotors (2.01), nuts (4.08) and rotorcase (3.01) and insert arch shims (4.05) between the rotorcase (3.01) and gearbox (4.01).

Note: It is essential that the thickness of arch shims (4.05) inserted is the same at both the top and bottom of the rotorcase.

- Install product seals; refer to ***"MultiPump® Mechanical Seal Removal & Replacement" on page 33*** or ***"MultiPump® Single O-ring Seals" on page 38***.
- Install rotorcase (3.01) to gearbox (4.01), noting it locates on dowels (4.03), securing with dome nuts (4.08).
- Install rotors (2.01) with O-rings (2.03 and 2.04) and retainers (2.02) tightening to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***, using socket tool supplied (not shown).
- Check all rotor clearances, front, rear, top/bottom, sides' and mesh, refer to ***"Clearance Chart" on page 47***.
- Install front cover (1.01) with O-ring (1.02) and secure with nuts (1.03) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.

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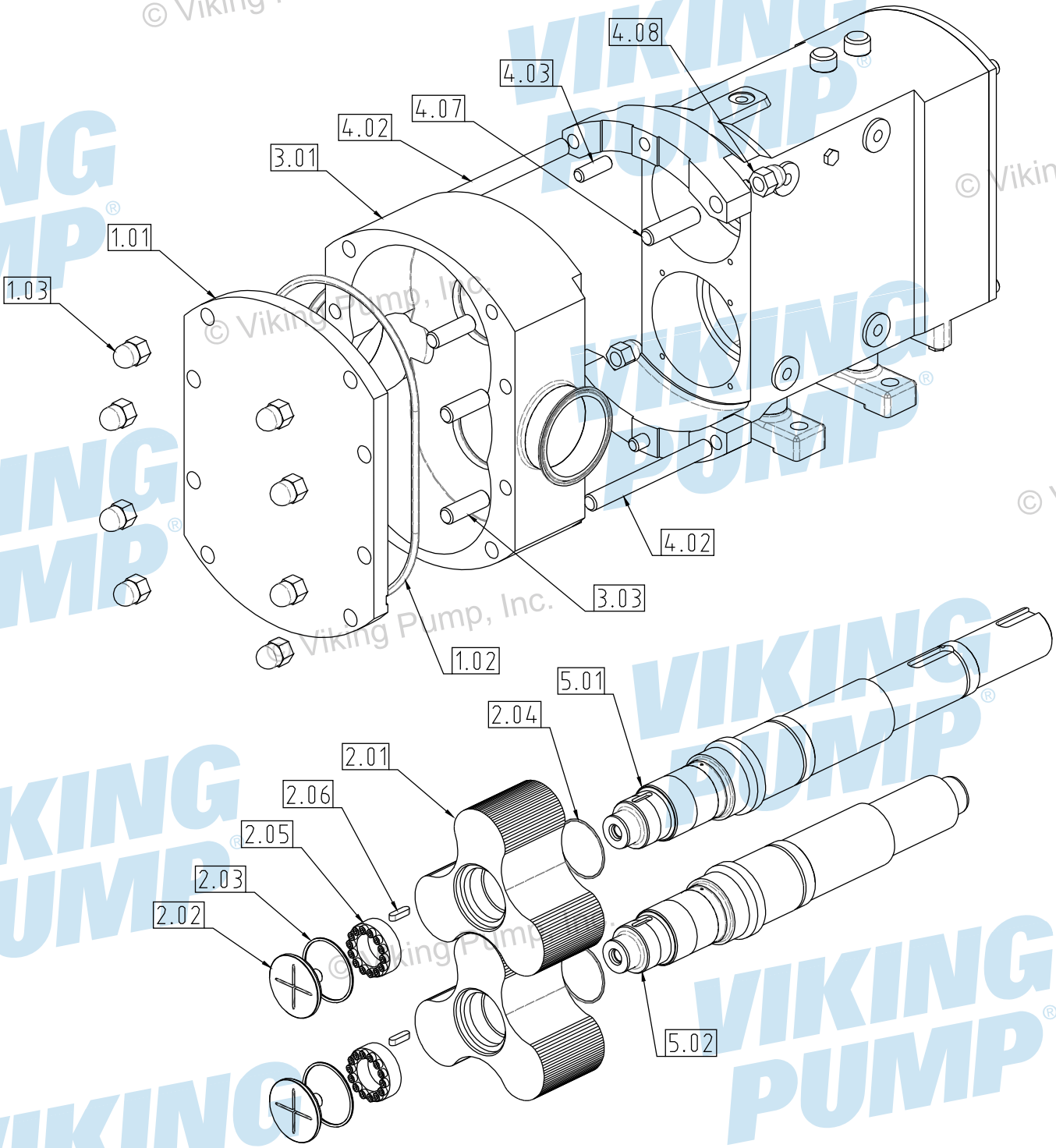
FIGURE 39: FRONT COVER AND ROTOR COMPONENTS



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⚠ DANGER

Follow recommended shutdown procedure - refer to ***"Shutdown Procedure" on page 9***.

- Refer to ***"Figure 39" on page 28***.

⚠ DANGER

- Gradually loosen front cover retaining dome nuts (1.03). Care should be taken as there may still be residual product and pressure in the pump head and as the dome nuts are loosened, this will vent to atmosphere.

- Remove dome nuts (1.03).
- Remove front cover (1.01), using lever slots where necessary and the front cover O-ring (1.02).
- Remove rotor caps (2.02) with tool (supplied, not shown).

⚠ WARNING

Note: The tool provided should always be used to remove the rotor cap. The use of other tools may damage the rotor cap.

- Remove rotor cap O-rings (2.03).
- Loosen by 2 full turns all screws in rotor retainer (2.05). Once this is done the retainer may release its grip. If it does not, loosen further the screws until the assembly becomes free to remove.

(On some brands of locking device there are two screws that are different in colour (these may also have a washer under the head). Once these screws are removed tapped holes will be revealed. By inserting two jackscrews (M8 x 40 setscrews), into the tapped holes and tightening, the retainer's grip is broken. Remove the retainers' (2.05).

- Remove rotors (2.01) from shafts (5.01 and 5.02).
- Remove O-rings (2.04) and keys (2.06).

MP50 Rotorcase Removal

⚠ WARNING

Note: Ensure all pipe work is disconnected before commencing rotorcase removal.

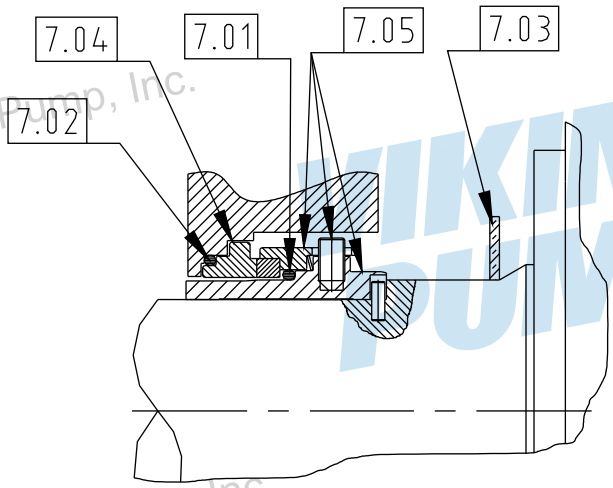
MP50 Rotorcase Removal for Pumps fitted with Single Un-flushed Mechanical Seals & O-ring Seals

(After completing 4.3.1)

- Remove dome nuts (4.08).
- Slide rotorcase (3.01) from gearbox (4.01), noting it is located on dowels (4.03).

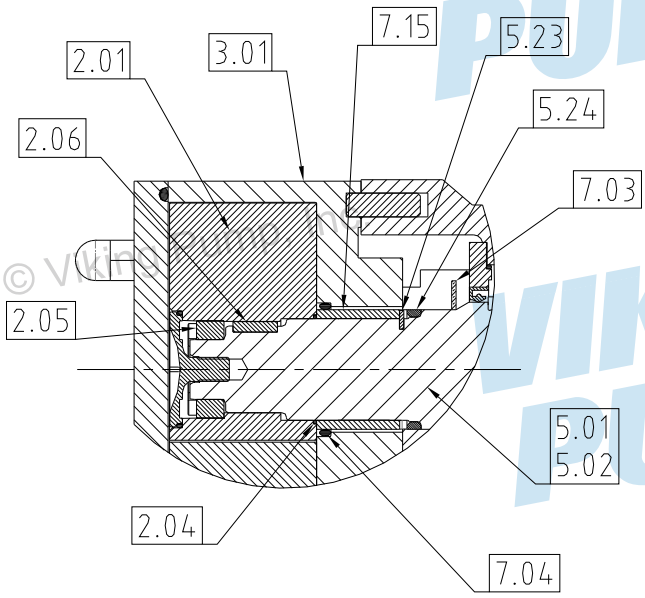
Single Un-flushed Mechanical Seals as shown in ***"Figure 40" on page 29*** and see ***"MP50 Single Mechanical Seal Removal" on page 37*** for removal and ***"MP50 Single Mechanical Seal Replacement" on page 37*** for replacement.

FIGURE 40: SINGLE UN-FLUSHED MECHANICAL SEAL – MP50



Single O-ring Seal for MP50 see ***"Figure 41" on page 29*** and see ***"MP50 O-ring Seal Assembly & Removal" on page 39*** for removal and replacement.

FIGURE 41: SINGLE O-RING SEAL MP50



- Remove O-ring seal (7.04) from rotorcase (3.01).
- Slide rotorcase (3.01) from gearbox (4.01) noting it is located on dowels (4.03).

MP50 Rotorcase Removal for Pumps fitted with Single Flushed & Double Flushed Mechanical Seals

- Refer to ***"Figure 42" on page 30*** for Single flushed mechanical seal for MP50.
- Refer to ***"Figure 43" on page 30*** for Double flushed mechanical seal for MP50.
- Prior to removal of rotorcase (3.01), remove seal housing nuts (7.18) from studs (7.17) and separate housing (7.06) from rotorcase (3.01).
- Remove dome nuts (4.08).
- Slide rotorcase from bearing housing (4.01), noting it is located on dowels (4.03).

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FIGURE 42: SINGLE FLUSHED MECHANICAL SEAL FOR MP50

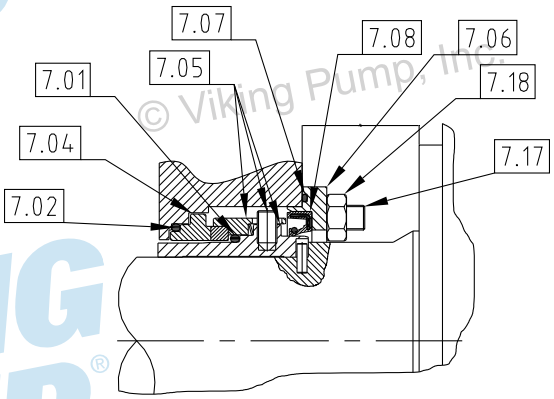
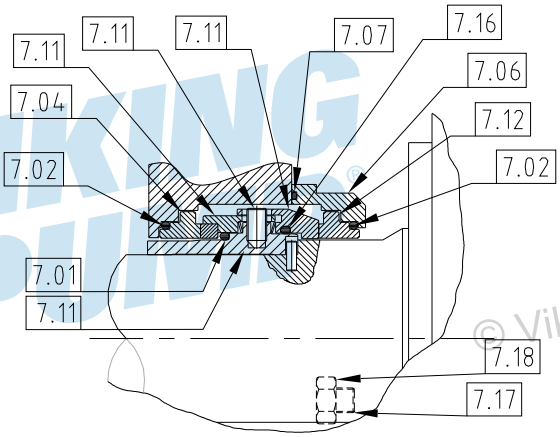
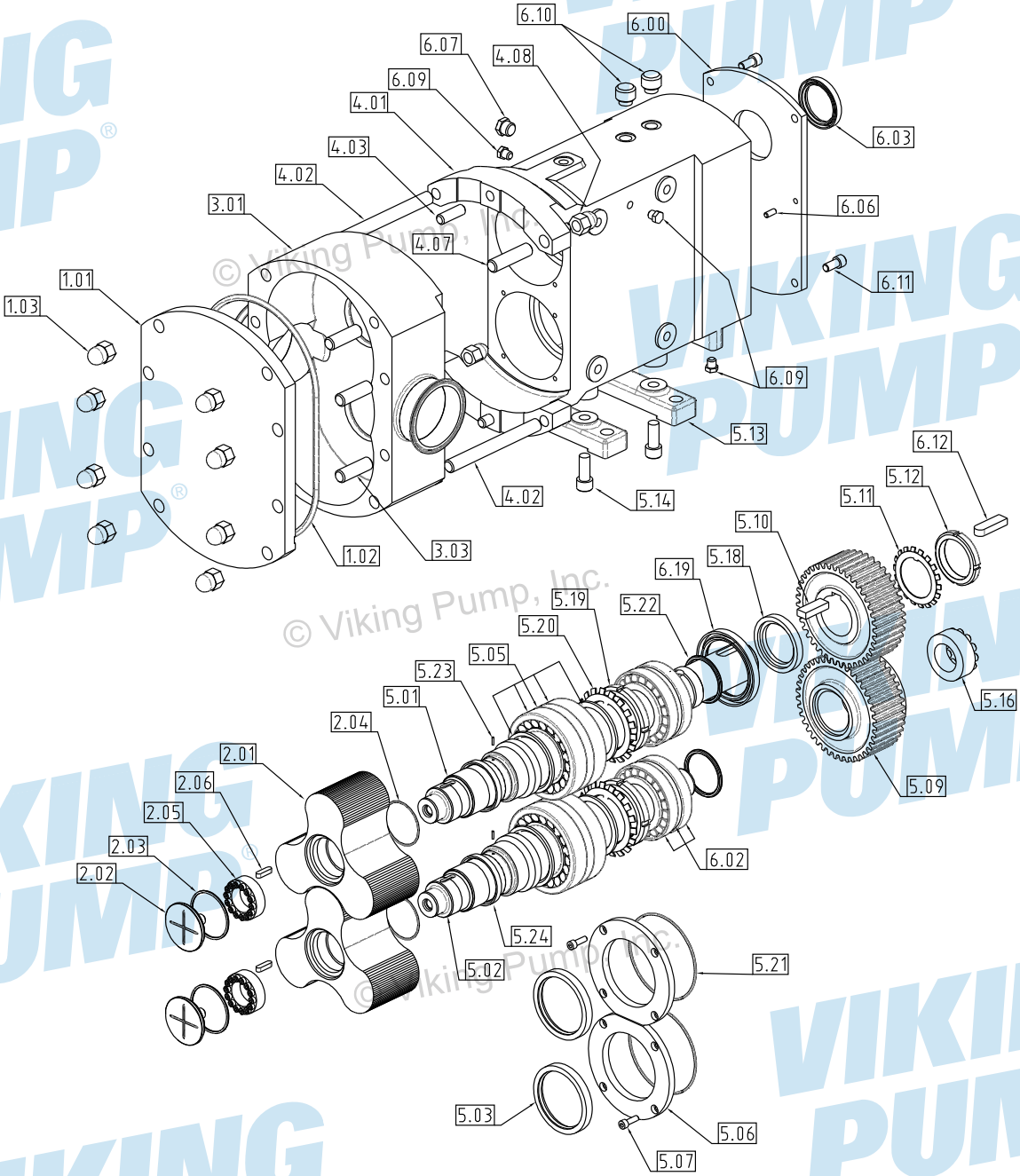


FIGURE 43: DOUBLE FLUSHED MECHANICAL SEAL FOR MP50



MP50 Gearbox Disassembly

FIGURE 44: MP50 COMPONENTS



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Before proceeding with disassembly of the gearbox remove product seals; refer to ***"MP50 Mechanical Seals" on page 36*** for Mechanical Seals and ***"O-ring Seal for MP50 Pump" on page 39*** for O-ring Seals.

The following procedure describes complete disassembly of the gearbox, refer to ***"Figure 44" on page 30***.

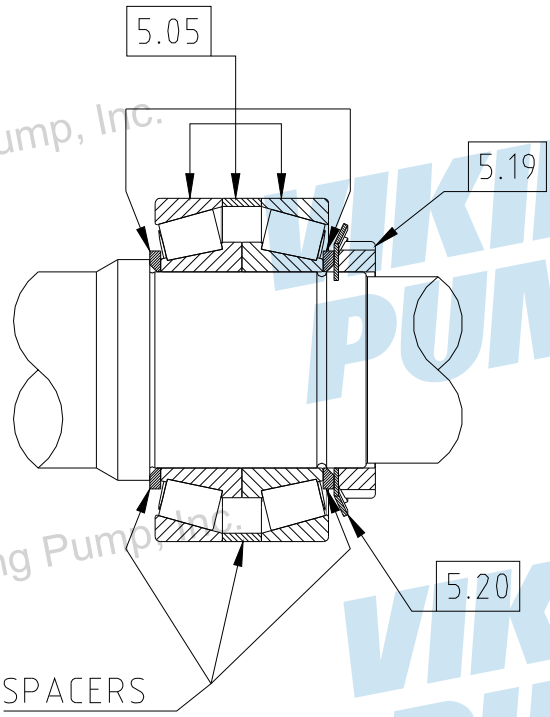
- Remove guard (4.06) and shaft slingers (7.03) if fitted.
- Remove drive key (6.12).
- Remove oil drain plugs (6.09) and breather plugs (6.10), drain oil into suitable container and retain (inspection may later be required).
- Remove screws (6.11) and gearbox cover (6.00). The gearbox cover (6.00) is located on dowels (6.06) and sealed with suitable liquid sealant.
- Remove oil seal (6.03) from gearbox cover (6.00).
- Loosen by two full turns all screws in retainer (5.16) on the lay shaft (5.02). Once this is done the retainer may release its grip. If it does not become free identify and remove the three screws which differ in colour (these may also have a washer under the head). Once these screws are removed tapped holes will be revealed. Insert three jackscrews (M10 x 40 setscrews), into the tapped holes and tighten until the retainer's grip is broken. Remove the retainer.
- Remove lock nut (5.12) and tab washer (5.11), then remove timing gears (5.09), gear key (5.10), spacer (5.18), O-ring (5.22) and lipseal (83).
- Support pump with shafts in the vertical position with rotor end up.
- Remove screws (5.07), and then remove bearing retainers' (5.06) and O-rings (5.21), then remove lipseals (5.03) from bearing retainers' (5.06).
- Remove shafts (5.01 and 5.02) from gearbox (4.01). Shafts (5.01 and 5.02) will be complete with pins (5.23), spacers (5.24), bearings (5.05), spacers (5.05), tab washers (5.20), lock nuts (5.19), bearings (6.02) and spacers (6.02).
- Remove bearings (6.02) complete with spacers (6.02) from shafts (5.01 and 5.02) keep them in matched sets and identify position.
- Remove lock nuts (5.19) and tab washers' (5.07).
- Remove bearings (5.05) complete with spacers (5.05) from shafts (5.01 and 5.02), keep them in matched sets and identify position.
- Remove shaft sleeve drive pins (5.23) from shafts (5.01 and 5.02), remove spacers (5.24), note fitting position.

MP50 Gearbox Assembly

The following procedure describes the assembly of the gearbox, refer to ***"Figure 44" on page 30***.

- Install bearings (5.05) complete with spacers (5.05) to shafts (5.01 and 5.02) ensuring correct positioning of all components as either removed in 4.3.3. Above or supplied as new replacement set, see ***"Figure 45" on page 31***.
- Install spacers (5.24), product seal sleeves (28 or 66), rotor keys (78) and rotors (41) to shafts (5.01 and 5.02) and secure with rotor retainers (35) using tool (58).

FIGURE 45: FRONT BEARING ASSEMBLY – MP50

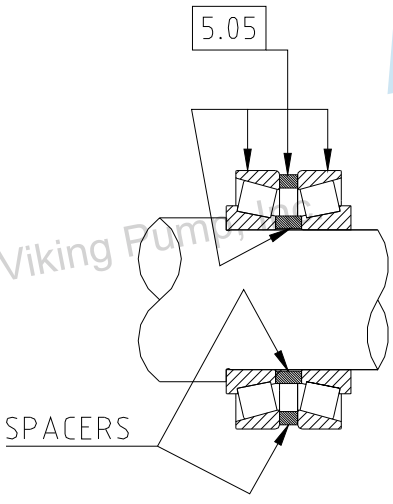


- Install tab washers (5.07) and lock nuts (5.19) tightening to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***. Secure tab washers.

Note: Ensure that the cups of the rear most bearings (5.05) are in position on inner races before proceeding.

- Install bearings (6.02) complete with spacers (6.02) to shafts (5.01 and 5.02) ensuring correct positioning of all components as either removed in ***"MP50 Gearbox Disassembly" on page 30*** or as supplied as new replacement set, see ***"Figure 46" on page 31***.

FIGURE 46: REAR BEARING ASSEMBLY – MP50



- Support gearbox (4.01) in a vertical position and install shafts (5.01 and 5.02) to gearbox (4.01).
- If not already installed install cups of front most bearings (5.05).
- Install lipseals (5.03) to bearing retainers' (5.09).
- Install retainers' (5.09) and O-rings (5.21) and secure with screws (5.07) tightening to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.
- Return pump to normal horizontal mounting position.

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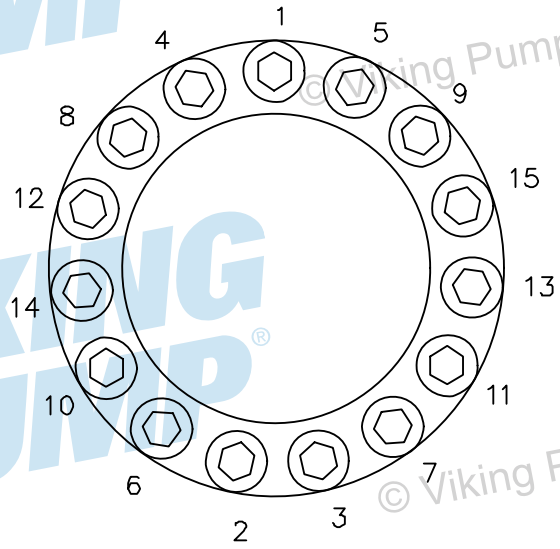
- Install lipseal (6.19) to gearbox (4.01). Install O-ring (5.22), spacer (5.18) and key (5.10) to drive shaft (5.01).
- Install timing gears (5.09) to shafts (5.01 and 5.02).
- Install tab washer (5.11) and lock nut (5.12) tightening to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***. Secure tab washer (5.11).
- Rotate shafts (5.01 and 5.02) such that keyways for rotor keys are vertically upwards.
- Lubricate retainer (5.16) with oil and install to timing gear (5.09). Do not tighten.

Note: Pins (5.23) should not be installed at this stage.

- Clamp gear (5.09) to shaft (5.02) using tool (supplied) and associated stud and nut, ensuring that two screws in retainer (5.16) are visible through holes in tool.
- Check rotor mesh clearance against Clearance Chart, refer to ***"Clearance Chart" on page 47***. Adjustment of mesh clearance is made by rotating the shafts (5.01 and 5.02). Having achieved optimum mesh clearance, partially tighten visible screws in retainer (5.16), to clamp gear in place. Remove tool and associated studs and nuts. Fully tighten screws in retainer (5.16) to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***, taking note of typical tightening sequence, see ***"Figure 47" on page 32***.
- After tightening of retainer (5.16) check rotor mesh clearance; refer to ***"Clearance Chart" on page 47***.

FIGURE 47: RETAINER TIGHTENING SEQUENCE



- Install oil seal (6.03) to gearbox cover (6.00).
- Install gasket (6.05) to gearbox cover (6.00) and install to gearbox (4.01), locating on dowels (6.06) and securing with screws (6.11), tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.
- Install drive key (6.12).
- Install drain plugs (6.09) and breather plugs (6.10).
- Remove rotor retainers (2.02) using tool, rotors (2.01) and spacers (5.24)

MP50 Rotorcase, Rotor & Front Cover Assembly

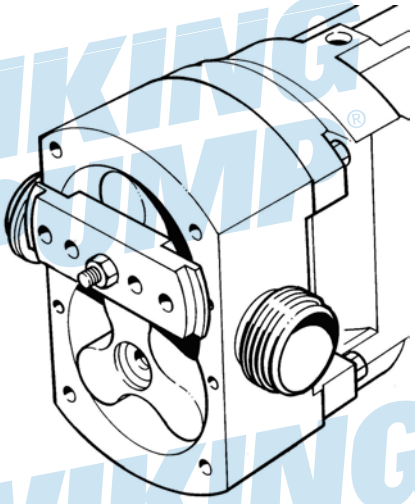
Referring to ***"Figure 39" on page 28*** and ***"Figure 44" on page 30***.

- Install spacers' (5.24) and product seal sleeves (7.15) to shafts (5.01 and 5.02).

Note: Pins (5.23) should not be installed at this stage.

- Install rotorcase (3.01) to gearbox (4.01) locating on dowels (4.03) and secure with dome nuts (4.08) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.
- Install rotors (2.01) to shafts (5.01 and 5.02).
- Clamp one rotor (2.01) to shaft (5.01 or 5.02) using tool and associated stud and nut see ***"Figure 48" on page 32***.

FIGURE 48: ROTOR CLAMPING TOOL FITMENT



- Using a depth micrometer or similar device, measure front clearance; refer to ***"Clearance Chart" on page 47***, between the rotorcase and clamped rotors front face and check that this corresponds to the appropriate clearance as indicated on the Clearance Chart. Note any discrepancy in front clearance.
- Remove tool and associated stud and nut (shown above).
- Repeat clamping and front clearance measurement for other rotor (again note any discrepancy in front clearance.
- Remove tool and associated stud and nut.
- Remove rotors (2.01), rotorcase (3.01) and product seal sleeves (7.15).
- If any discrepancies were noted in front clearances, between rotors and front face of rotorcase, then spacers (5.24) will require machining to shorten them to achieve the correct front clearance, refer to ***"Clearance Chart" on page 47***.

Note: If it is found that the measured front clearance is greater than that shown in the Clearance Chart, refer to *"Clearance Chart" on page 47*, then new spacers (5.24) will need to be obtained and machined to the correct lengths to achieve correct front clearance.

- Be sure faces of spacers' (5.24) are parallel after machining.
- After any machining of spacers' (5.24), check front clearances for both rotors, refer to ***"Clearance Chart" on page 47***.

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- Install spacers (5.24) to shafts (5.01 and 5.02) ensuring they are correctly located.
- Install pins (5.23) to shafts (5.01 and 5.02) using a liquid retainer (Loctite 648 or similar).
- Install product seals; refer to ***"MP50 Mechanical Seals" on page 36*** and ***"O-ring Seal for MP50 Pump" on page 39***.
- Install rotorcase (3.01) to gearbox (4.01) locating onto dowels (4.03) and securing with dome nuts (4.08) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.
- Install O-rings (2.05) and rotors (2.01) to shafts (5.01 and 5.02).
- Lubricate retainers' (53) with oil and install to shafts (5.01 and 5.02).
- Clamp one rotor (2.01) to shaft (5.01 or 5.02) using tool and associated stud and nut, see ***"Figure 48" on page 32***, ensuring that two of the screws in retainer (2.05) are visible through holes in tool.
- Moderately tighten visible screws in retainer (2.05) in clamped rotor to lock rotor in position. Remove tool and associated stud and nut, tighten fully screws in retainer (2.05) to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***, taking note of typical tightening sequence, see ***"Figure 47" on page 32***.
- Repeat clamping and retainer (2.05) tightening procedure for other rotor.
- Remove tool and associated stud and nut.
- Install O-rings (2.03) and retainers (2.02) tightening to correct torque refer to ***"Fasteners & Torque Settings" on page 49***, using tool.
- Check all rotor clearances, front, rear, top/bottom, sides' and mesh, refer to ***"Clearance Chart" on page 47***.
- Install front cover (1.01) with O-ring (1.02) and secure with nuts (1.03) tightened to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.

MULTIPUMP® MECHANICAL SEAL REMOVAL & REPLACEMENT

GENERAL PROCEDURES FOR INSTALLING MECHANICAL SEALS

"Quick summary" of mechanical seal installation.

- Mechanical seals are precision-engineered assemblies incorporating finely lapped seal faces and seats. They must be handled with care and will not give optimum performance unless installed carefully and according to instructions.
- When mechanical seals are to be reused, ensure seal components are kept in their appropriate sets. Do not mix old and new seal faces on the same seal.
- Remove any sharp corners and burrs that may damage any elastomers such as O-rings or lipseals.
- Be sure that all seal component fitting bores and housings are thoroughly cleaned before installation.
- The seal faces and seats must be handled with care and cleaned thoroughly before installation.
- Be sure that seal faces are undamaged and the O-rings are not cut, swollen or cracked.
- All O-rings should be lightly lubricated with a suitable lubricant (silicon grease, soap etc.) before installation but ensure there is no excessive amount of lubricant especially around the seal face area.
- Ensure when installing seals with brittle faces and seats such as silicon carbide that extra care is taken.
- Do not use any excessive force to install a mechanical seal. If it is difficult to position and assemble the seal then something is wrong.
- If you drop or damage a seal, do not install it before an inspection has been carried out.

⚠ WARNING

- Do not run a mechanical seal dry.

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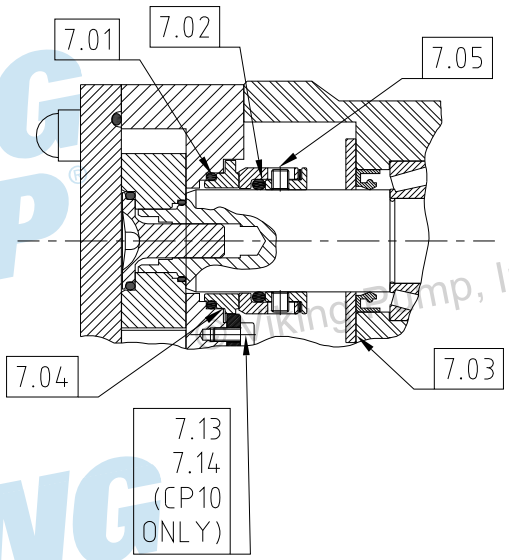
MP10, MP20, MP30 & MP40 MECHANICAL SEALS

MP10, MP20, MP30 & MP40 Single Mechanical Seal Removal

FIGURE 49: SINGLE UN-FLUSHED MECHANICAL SEAL



- Remove front cover (1.01), rotor retainers (2.02), O-rings (2.04) and rotorcase (3.01), refer to ***"MP10, MP20 & MP30 Rotorcase Removal for Pumps fitted with Single Un-Flushed Mechanical Seals & Single O-ring Seals" on page 15*** (MP10, MP20 and MP30) or ***"MP40 Rotorcase Removal for Pumps fitted with Single Un-flushed Mechanical Seals & O-ring Seals" on page 22*** (MP40).
- Loosen but do not remove screws in rotary cartridge assembly (7.05) which secure rotary seal cartridges to shafts (5.01 and 5.02).
- Remove rotary seal cartridges (7.05) with O-ring (7.02) from shafts (5.01 and 5.02).
- Remove stationary seal seats (7.04) and O-rings (7.01) from rotorcase (3.01).

MP10, MP20, MP30 & MP40 Single Mechanical Seal Replacement

Refer to ***"Figure 50" on page 34*** for MP10, MP20, MP30 and MP40

- Install O-rings (7.01) to stationary seal seat (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of O-rings (7.01).

⚠ WARNING

Note: On MP10 models the stationary seal seat (7.04) has a location recess which fits over the anti-rotation washer (7.13).

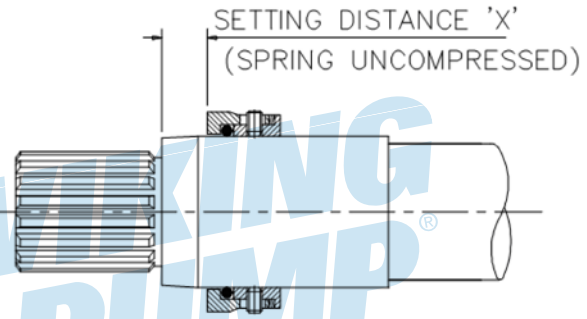
⚠ WARNING

Note: On MP20, MP30 and MP40 models the stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01) bore.

- Install rotary seal cartridges (7.05) with O-ring (7.02) to shafts (5.01 and 5.02) positioning to correct setting distance, see ***"Figure 50" on page 34*** and tighten screws (7.05) to correct torque, refer to ***"Fasteners & Torque Settings" on page 49***.

Pump Model	X (mm)	X (inches)
MP10	14.3	0.5630
MP20	10.8	0.4252
MP30	13.4	0.5276
MP40	17.5	0.6890

FIGURE 50: SETTING DISTANCE FOR SEALS

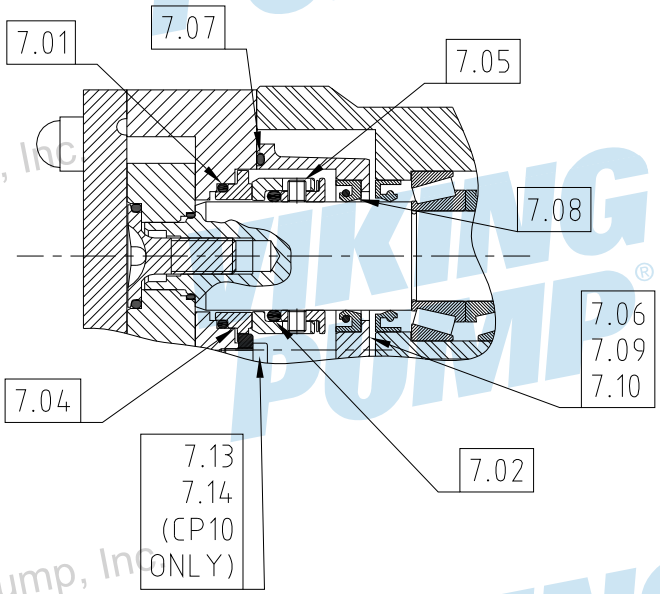


- Install rotorcase (3.01), O-rings (2.04), rotors (2.01), O-rings (2.03), rotor retainers (2.02) and front cover (1.01), refer to ***"MP10, MP20 & MP30 Rotorcase, Rotor & Front Cover Assembly" on page 20*** (MP10, MP20 and MP30) or ***"MP40 Rotorcase, Rotor & Front Cover Assembly" on page 27*** (MP40).

MP10, MP20, MP30 & MP40 Single Flushed Mechanical Seal Removal

Refer to ***"Figure 51" on page 34*** for MP10, MP20, MP30 and MP40

FIGURE 51: SINGLE FLUSHED MECHANICAL SEAL



- Remove front cover (1.01), rotor retainers' (2.02), O-rings (2.03), rotors (2.01), O-rings (2.04) and rotorcase (3.01), refer to ***"MP10, MP20 & MP30 Rotorcase Removal for Pumps fitted with Single Un-Flushed Mechanical Seals & Single O-ring Seals" on page 15*** and ***"MP10, MP20***

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& MP30 Rotorcase Removal" on page 15 (MP10, MP20 or MP30) or *"MP40 Rotorcase Removal for Pumps fitted with Single Un-flushed Mechanical Seals & O-ring Seals" on page 22* (MP40).

- Loosen but do not remove screws in rotary seal cartridge assemblies (7.05), which secure rotary seal cartridges to shafts (5.01 and 5.02).

Note: Access to screws in rotary seal cartridge (7.05) is through the flush pipe connections of housing (7.06).

- Remove rotary seal cartridges (7.05) with O-ring (7.02) from shafts (5.01 and 5.02).
- Remove housing(s) (7.06) complete with lipseals (7.08) and O-ring(s) (7.07) from shafts (5.01 and 5.02).
- Remove lipseals (7.08) and O-ring (s) (7.07) from housing(s) (7.06).
- Remove stationary seal seats (7.04) and O-rings (7.01) from rotorcase (3.01).

MP10, MP20, MP30 & MP40 Single Flushed Mechanical Seal Replacement

Refer to ***"Figure 51" on page 34*** for MP10, MP20, MP30 and MP40

- Install O-rings (7.01) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of O-rings (7.01).

⚠ WARNING

Note: On MP10 models the stationary seal seat (7.04) has a location recess which fits over the anti-rotation washer (7.13).

⚠ WARNING

Note: On MP20, MP30 and MP40 models the stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01) bore.

- Install lipseals (7.08) and O-rings (7.07) to housing(s) (7.06).
- Install housing(s) (7.06) to shafts (5.01 and 5.02).
- Install rotary seal cartridges (7.05) to shafts (5.01 and 5.02) positioning to correct setting distance, see ***"Figure 50" on page 34*** and tightening screws in rotary seal cartridge assemblies (7.05) to correct torque, refer to *"Fasteners & Torque Settings" on page 49*.

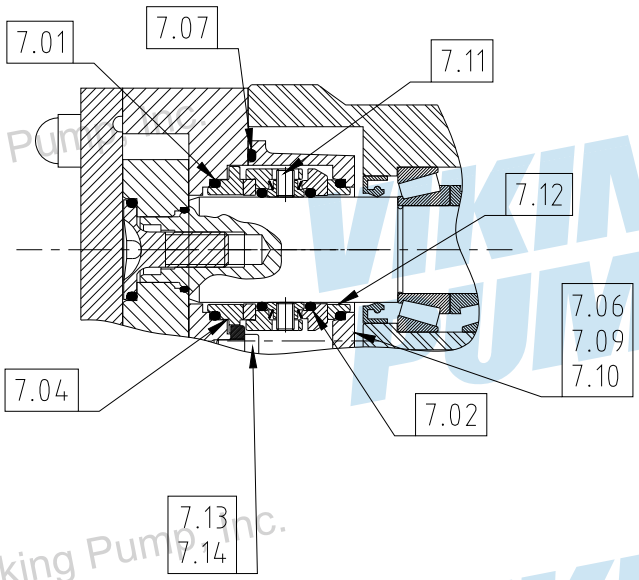
Note: Access to screws in rotary cartridge seal assemblies (7.05) is through the flush pipe connections of housing (7.06).

- Install rotorcase (3.01), O-rings (2.04), rotors (2.01), O-rings (2.03), rotor retainers (2.02) and front cover (1.01), refer to *"MP10, MP20 & MP30 Rotorcase, Rotor & Front Cover Assembly" on page 20* (MP10, MP20 and MP30) or *"MP40 Rotorcase, Rotor & Front Cover Assembly" on page 27* (MP40).
- Secure housing(s) (7.06) to rotorcase (3.01) with screws (7.10) ensuring correct location onto dowels (7.09).

MP10 Double Flushed Mechanical Seal Removal

Refer to ***"Figure 52" on page 35***.

FIGURE 52: DOUBLE FLUSHED MECHANICAL SEAL



- Remove front cover (1.01), rotor retainers' (2.02), O-rings (2.03), rotors (2.01), O-rings (2.04) and rotorcase (3.01), refer to *"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13* and *"MP10, MP20 & MP30 Rotorcase Removal" on page 15*.
- Loosen but do not remove screws (7.11), which secure rotary seal cartridge assemblies (7.11) to shafts (5.01 and 5.02).

Note: Access to screws (7.13) is through the flush pipe connections of housing (7.06)

- Remove rotary seal cartridges (7.11) with O-rings (7.02) from shafts (5.01 and 5.02).
- Remove housing (7.06) complete with O-ring (7.07), stationary seal seats (7.12) and O-rings (7.01) from shafts (5.01 and 5.02).
- Remove stationary seal seats (7.12), O-rings (7.01) and O-ring (7.07) from housing (7.06).
- Remove stationary seal seats (7.04) and O-rings (7.01) from rotorcase (3.01).

MP10 Double Flushed Mechanical Seal Replacement

Refer to ***"Figure 52" on page 35***

- Install O-rings (7.01) to stationary seal seats (7.04 and 7.12).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of O-rings (7.01).

⚠ WARNING

Note: The stationary seal seat (7.04) has a location recess which fits over the anti-rotation washer (7.13).

- Install O-rings (7.01) to stationary seal seats (7.11).
- Install stationary seal seats (7.11) to housing (7.06) ensuring correct location of O-ring (7.01).
- Install housing (7.06) to shafts (5.01 and 5.02).
- Clean faces of outboard seal (7.11 and 7.12) use a soft tissue and suitable solvent based cleaner for best results.

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- Install rotary seal cartridges (7.11) with O-ring (7.02) to shafts (5.01 and 5.02).

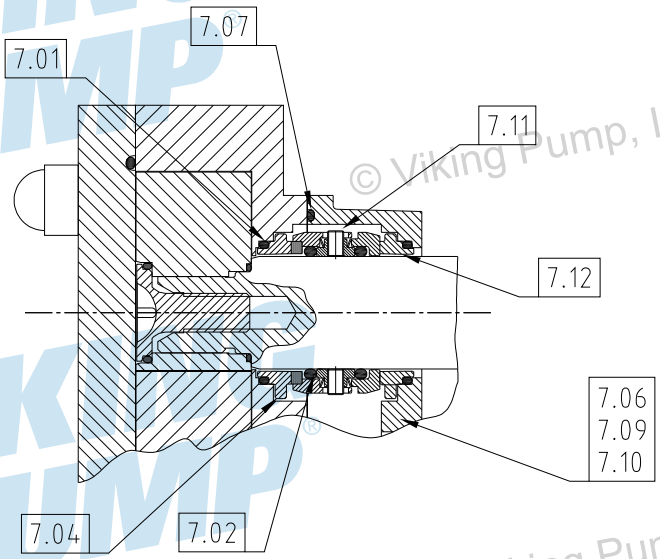
Note: For pumps installed with flange type rotorcase (3.01) connections, it may be easier to set the position of the rotary seal cartridge (7.11) onto the shafts (5.01 and 5.02) using the setting distance, see *"Figure 50" on page 34*, before installing the rotorcase (3.01). Screws in rotary seal cartridge assemblies (7.11) must be tightened to the correct torque refer to *"Fasteners & Torque Settings" on page 49*.

- Install rotorcase (3.01), O-rings (2.04), rotors (2.01), O-rings (2.03), rotor retainers (2.02) and front cover (1.01) - refer to *"MP10, MP20 & MP30 Rotorcase, Rotor & Front Cover Assembly" on page 20*.
- Secure housing (7.06) to rotorcase (3.01) with screws (7.10) ensuring correct location onto dowels (7.09).
- Rotate pump shafts by two or three full revolutions.
- If not already tightened, tighten screws (7.11) to correct torque, refer to *"Fasteners & Torque Settings" on page 49*.

Note: Access to screws (7.11) is through the flush pipe connections of housing (7.06)

MP20, MP30 & MP40 Double Flushed Mechanical Seal Removal

FIGURE 53: DOUBLE FLUSHED MECHANICAL SEAL



- Remove front cover (1.01), rotor retainers' (2.02), O-rings (2.03), rotors (2.01), O-rings (2.04) and rotorcase (3.01), refer to *"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13* and *"MP10, MP20 & MP30 Rotorcase Removal" on page 15* (MP20/MP30) or *"MP40 Front Cover & Rotor Removal" on page 21* and *"MP40 Rotorcase Removal" on page 22* (MP40).
- Loosen but do not remove screws in rotary seal cartridge assemblies (7.11), which secure rotary seal cartridge assemblies (7.11) to shafts (5.01 and 5.02).

Note: Access to screws (7.11) is through the flush connections of housings (7.06).

- Remove rotary seal cartridge assemblies (7.11) with O-ring (32) from shafts (5.01 and 5.02).
- Remove housings (7.06) from shafts (5.01 and 5.02) complete with stationary seal seats (7.12), O-rings (7.01) and O-rings (7.07).
- Remove stationary seal seats (7.04), O-rings (7.01) and O-rings (7.07) from housings (7.06).
- Remove stationary seal seats (7.04) and O-rings (7.01) from rotorcase (3.01).

MP20, MP30 & MP40 Double Flushed Mechanical Seal Replacement

Refer to *"Figure 53" on page 36*.

- Install O-rings (7.01) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of O-rings (7.01).

⚠ WARNING

Note: The stationary seal seats (7.04) have a triangular shape which must locate fully into the rotorcase (3.01) bore.

- Install O-rings (7.01) to stationary seal seats (7.12).
- Install stationary seal seats (7.12) to housings (7.06) ensuring both correct locations of O-ring (7.01) and stationary seal seats (7.04) in housings (7.06).

⚠ WARNING

Note: The stationary seal seats (7.12) have a triangular shape which must locate fully into the housing (7.06) bore.

- Install housings (7.06) to shafts (5.01 and 5.02).
- Clean faces of outboard seal (7.11 and 7.12) use a soft tissue and a suitable solvent based cleaner for best results.
- Install rotary seal cartridge assemblies (7.11) to shafts (5.01 and 5.02).

Note: For pumps installed with flange type rotorcase (3.01) connections, it may be easier to set the position of the rotary seal cartridge (7.11) onto the shafts (5.01 and 5.02) using the setting distance, see *"Figure 50" on page 34*, before installing the rotorcase (3.01). Screws in rotary seal cartridge assemblies (7.11) must be tightened to the correct torque refer to *"Fasteners & Torque Settings" on page 49*.

- Install rotorcase (3.01), O-rings (2.04), rotors (2.01), O-rings (2.03), rotor retainers (2.02) and front cover (1.01) refer to *"MP10, MP20 & MP30 Rotorcase, Rotor & Front Cover Assembly" on page 20* (MP20/MP30) or *"MP40 Rotorcase, Rotor & Front Cover Assembly" on page 27* (MP40).
- Secure housings (7.06) to rotorcase (3.01) with screws (7.10) ensuring correct location onto dowels (7.09).
- Rotate pump shafts by two or three full revolutions.
- If not already tightened, tighten screws in rotary seal cartridge assemblies (7.11) to correct torque, refer to *"Fasteners & Torque Settings" on page 49*.

Note: Access to screws in rotary seal cartridge assemblies (7.11) is through the flush connections of housings (7.06).

MP50 MECHANICAL SEALS

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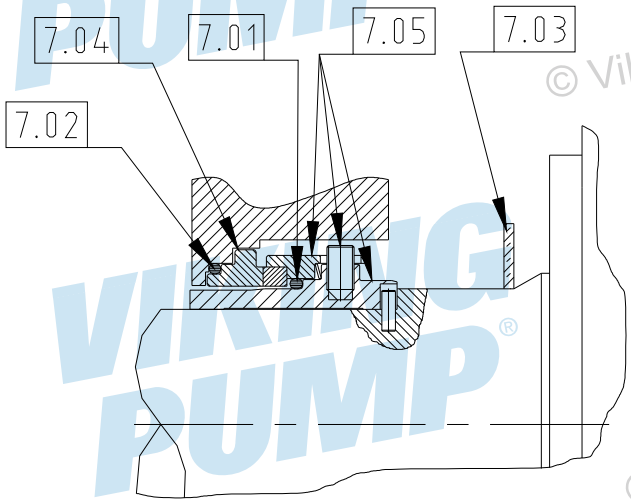
MP50 Single Mechanical Seal Removal

FIGURE 54: SINGLE UN-FLUSHED MECHANICAL SEAL MP50



- Remove front cover (1.01), rotor caps (2.02), O-rings (2.03), retainers' (2.05), rotors (41), O-rings (2.04) and rotorcase (3.01), refer to ***"MP50 Front Cover & Rotor Removal" on page 28*** and ***"MP50 Rotorcase Removal" on page 29***.
- Remove rotary seal cartridge assemblies (7.11) with O-ring (7.01) from shafts (5.01 and 5.02) by simply sliding off. Do not loosen screws in rotary seal cartridge assemblies (7.05).
- Remove stationary seal seats (7.04) and O-rings (7.02) from rotorcase (3.01).

MP50 Single Mechanical Seal Replacement

- Install O-rings (7.02) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of O-rings (7.02).

⚠ WARNING

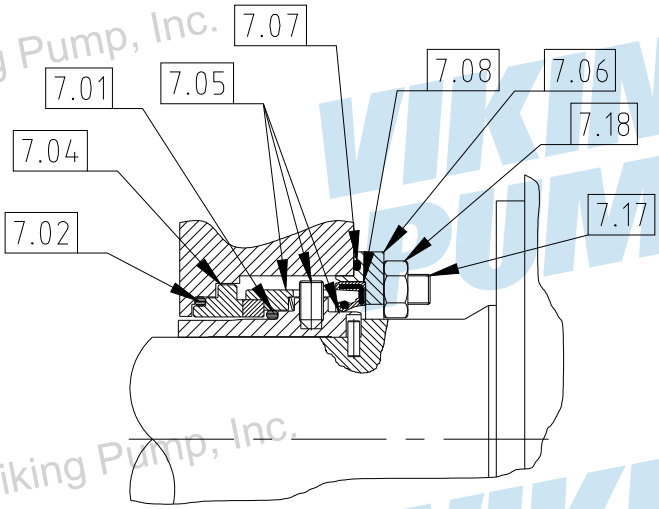
Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01), bore.

- Install rotary seal cartridge assemblies (7.11) with O-ring (7.01) to shafts (5.01 and 5.02) ensuring engagement of drive slots with pins (5.23) in shafts (5.01 and 5.02).
- Install rotorcase (3.01), O-rings (2.04), rotors (2.01), retainers (2.05), O-rings (2.03), rotor caps (2.02) and front cover (1.01) - refer to ***"MP50 Rotorcase, Rotor & Front Cover Assembly" on page 32***.

MP50 Single Flushed Mechanical Seal Removal

Refer to ***"Figure 55" on page 37***.

FIGURE 55: SINGLE FLUSHED MECHANICAL SEAL MP50



- Remove front cover (1.01), rotor caps (2.02), O-rings (2.03), retainers (2.05), rotors (2.01), O-rings (2.04) and rotorcase (3.01) refer to ***"MP50 Front Cover & Rotor Removal" on page 28*** and ***"MP50 Rotorcase Removal" on page 29***.
- Remove rotary seal cartridge assemblies (7.05) with O-ring (7.01) from shafts (5.01 and 5.02) by simply sliding off. Do not loosen screws in rotary seal cartridge assemblies (7.05).
- Remove housings (7.06) complete with lipseals (7.08) and O-rings (7.07) from shafts (5.01 and 5.02).
- Remove lipseals (7.08) and O-rings (7.07) from housings (7.06).
- Remove stationary seal seats (7.04) and O-rings (7.02) from rotorcase (3.01).

MP50 Single Flushed Mechanical Seal Replacement

Refer to ***"Figure 55" on page 37***

- Install O-rings (7.02) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of O-rings (7.02).

⚠ WARNING

Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01), bore.

- Install lipseals (7.08) and O-rings (7.07) to housings (7.06).
- Install housings (7.06) to shafts (5.01 and 5.02).
- Install rotary seal cartridge assemblies (7.05) with O-ring (7.01) to shafts (5.01 and 5.02) ensuring engagement of drive slots with pins (5.23) in shafts (5.01 and 5.02).
- Install rotorcase (3.01), O-rings (2.04), rotors (2.01), retainers (2.05), O-rings (2.03), rotor caps (2.02) and front cover (1.01) - refer to ***"MP50 Rotorcase, Rotor & Front Cover Assembly" on page 32***.
- Secure housings (7.06) to rotorcase (3.01) with nuts (7.18).

MP50 Double Flushed Mechanical Seal Removal

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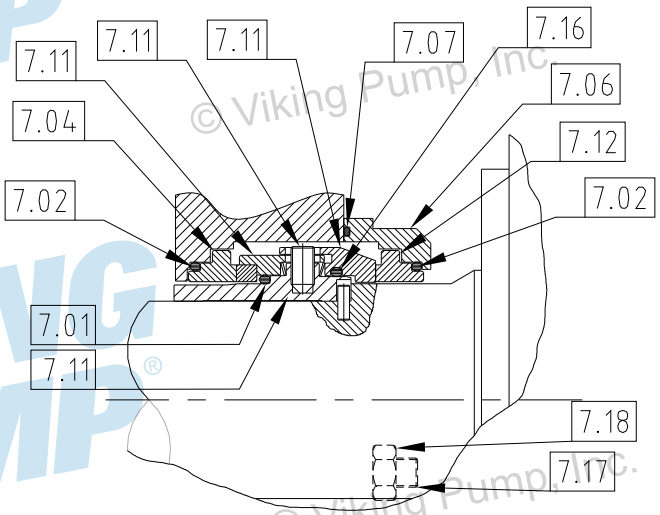
FIGURE 56: DOUBLE FLUSHED MECHANICAL SEAL MP50



- Remove front cover (1.01), rotor caps (2.02), O-rings (2.03), retainers (2.05), rotors (2.01), O-rings (2.04) and rotorcase (3.01), refer to ***"MP50 Front Cover & Rotor Removal" on page 28*** and ***"MP50 Rotorcase Removal" on page 29***.
- Remove rotary seal cartridge assemblies (7.11) with O-rings (7.01) and (7.16) from shafts (5.01 and 5.02) by simply sliding off. Do not loosen screws in rotary seal cartridge assemblies (7.11).
- Remove housings (7.06) from shafts (5.01 and 5.02) complete with stationary seal seats (7.04), O-rings (7.02) and O-rings (7.07).
- Remove stationary seal seats (7.04), and O-rings (7.07) from housings (7.06).
- Remove stationary seal seats (7.04) and O-rings (7.02) from rotorcase (3.01).

MP50 Double Flushed Mechanical Seal Replacement

Refer to ***"Figure 56" on page 38***.

- Install O-rings (7.02) to stationary seal seats (7.04).
- Install stationary seal seats (7.04) to rotorcase (3.01) ensuring correct location of O-rings (7.02).

⚠ WARNING

Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the rotorcase (3.01), bore.

- Install O-rings (7.02) to stationary seal seat (7.04).
- Install stationary seal seats (7.04) to housings (7.06) ensuring correct locations of O-rings (7.02) and stationary seal seats (7.04) in housings (7.06).

⚠ WARNING

Note: The stationary seal seat (7.04) has a triangular shape, which must locate fully into the housing (7.06), bore.

- Install housings (7.06) to shafts (5.01 and 5.02).
- Clean faces of outboard seal (7.11 and 7.04) use a soft tissue and a suitable solvent based cleaner for best results.
- Install rotary seal cartridge assemblies (7.11) with O-ring (7.01) and (7.16) to shafts (5.01 and 5.02) ensuring engagement of drive slots with pins (5.23) in shafts (5.01 and 5.02).
- Install rotorcase (3.01), O-rings (2.04), rotors (2.01), retainers (2.05), O-rings (2.03), rotor caps (2.02) and front cover (1.01), refer to ***"MP50 Rotorcase, Rotor & Front Cover Assembly" on page 32***.
- Secure housings (7.06) to rotorcase (3.01) with nuts (7.18).

MULTIPUMP® SINGLE O-RING SEALS

GENERAL PROCEDURES FOR FITTING SINGLE O-RING SEALS

"Quick Summary" of O-ring seal installation.

- O-ring seals are a simple but effective means of shaft sealing. They will provide optimum performance only if installed carefully in accordance to the following instructions below, ***"O-ring Seals for MP10, MP20, MP30 & MP40 Pumps" on page 38*** and ***"O-ring Seal for MP50 Pump" on page 39***.
- Remove any sharp corners and burrs that could damage O-rings.
- Always inspect for wear, the diameter on the rotor where the O-ring seal is located.
- Be sure that all seal component fitting bores, housings, followers, sleeves etc. are thoroughly cleaned before installation.
- All O-rings should be lightly lubricated with an appropriate lubricant (suitable for application) before installation.

⚠ WARNING

Note: Do not run an O-ring seal dry.

O-RING SEALS FOR MP10, MP20, MP30

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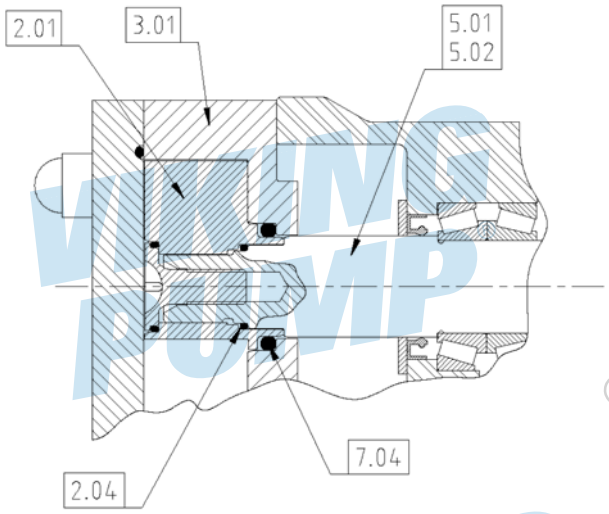
& MP40 PUMPS

MP10, MP20, MP30 & MP40 O-ring Seal Assembly & Removal

FIGURE 57: O-RING SEAL FOR AN MP10, MP20, MP30 AND MP40



DANGER

- Before assembly or disassembly of the seals, ensure pump is fully shutdown, refer to ***"Shutdown Procedure" on page 9***.

- Install O-ring (7.04) into the rotorcase (3.01).
- Install O-ring (2.04) onto shaft (5.01 and 5.02).

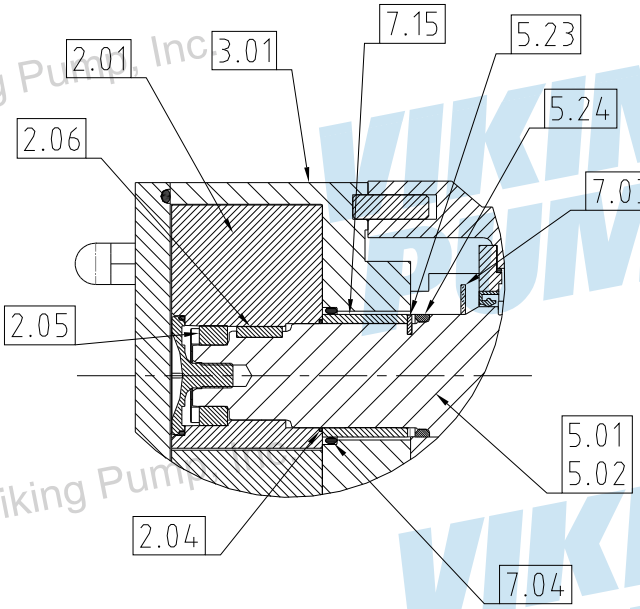
Note: During installing of the rotors to shafts care must be taken not to damage or unseat the O-ring seal when inserting the rotor (2.01) into O-ring (7.04).

- To disassemble reverse the above procedure.

O-RING SEAL FOR MP50 PUMP

MP50 O-ring Seal Assembly & Removal

FIGURE 58: MP50 O-RING SEAL



DANGER

- Before assembly or disassembly of the seals, ensure pump is fully shutdown, refer to ***"Shutdown Procedure" on page 9***.

- Install O-ring (7.04) into the rotorcase (3.01).
- Install rotary seal sleeves (7.15) onto shafts (5.01 and 5.02), ensuring engagement of slots in rotary seal sleeves (7.15) and drives pins (5.230
- Install O-ring (2.04 onto shaft (5.01 and 5.02).

Note: During installing of the rotors to shafts care must be taken not to damage or unseat the O-ring seal when inserting the rotor (2.01) into O-ring (7.04).

- To disassemble reverse the above procedure.

MULTIPUMP® PACKED GLAND SEALS

General Procedures For Fitting Packed Gland Seals

"Quick Summary" of packed gland seal installation.

- Packed gland seals are a simple but effective means of shaft sealing. They will provide optimum performance only if installed carefully and according to instructions.

WARNING

- **For satisfactory lubrication purposes the pumped media or the flushing media must always weep slowly out of the rear of the packed gland seal assembly. Never tighten so much as to completely stop leakage.**

- Remove any sharp corners and burrs that may damage packing rings or any elastomers such as O-rings or lipseals.
- Always inspect shaft sleeves for wear when the packed gland seal is dismantled or serviced.
- Be sure that all seal component fitting bores, housings, followers, sleeves etc. are thoroughly cleaned before

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installation.

- When inserting packing rings ensure that they are installed neatly to the rotorcase bores without loose strands.
- Be sure that ring joint gaps are set at approximately 120° to each other around the rotorcase bores so as not to create a leakage path.
- All O-rings should be lightly lubricated with a suitable lubricant (silicon grease, soap etc.) before installation.
- When installing PTFE encapsulated O-rings it is important to immerse them in hot water for several minutes to soften them.
- Where installed ensure lantern rings are positioned so as to match correctly the flushing ports.

⚠ WARNING

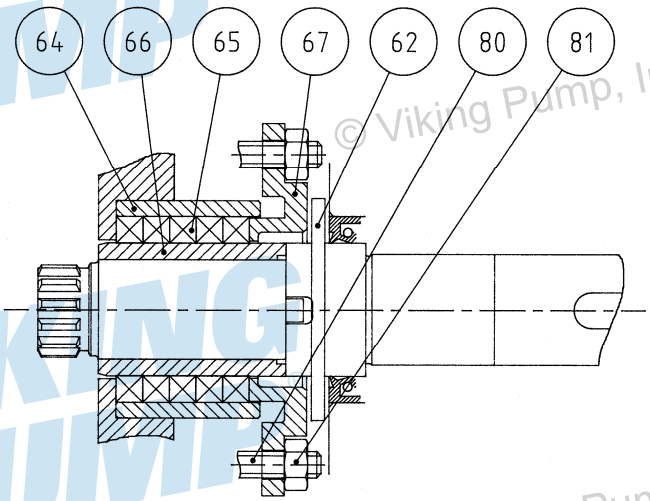
- Do not run a packed gland seal dry.

PACKED GLAND SEALS - MP10, MP20, MP30 AND MP40 SERIES PUMPS

Packed Gland Seal Removal

See ***"Figure 59" on page 40***

FIGURE 59



- Remove front cover (38), rotor retainers (35), O-rings (34), rotors (41), O-rings (25), dome nuts (87) and rotorcase (40) refer to ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13*** and ***"MP10, MP20 & MP30 Rotorcase Removal" on page 15*** (MP10/MP20/MP30) or ***"MP40 Front Cover & Rotor Removal" on page 21*** and ***"MP40 Rotorcase Removal" on page 22*** (MP40).
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67) and packing rings (65).

Note: It is not recommended that gland tubes (64) are removed unless replacement is necessary. They may be damaged during removal.

- Remove sleeves (60) and slingers (62) from shafts (9 and 10).

Packed Gland Seal Replacement

See ***"Figure 59" on page 40***

- Install slingers (62) and sleeves (66) to shafts (9 and 10).
- Install spacers (63), if previously removed.

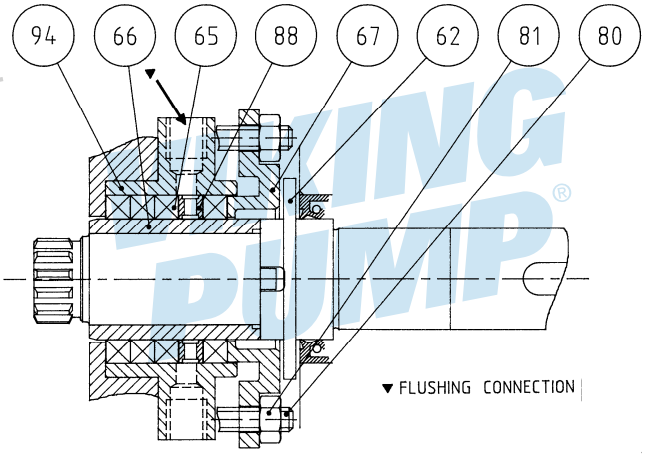
Note: If gland tubes (64) have been removed from rotorcase (40) they should be installed at this point. Apply liquid retainer (Loctite 640 or similar) to one end of tubes (64) on outside diameters to a width of approximately 5mm (3/16"), and similarly apply to inside diameters of rotorcase (40) bores. Press tubes (64) into rotorcase (40) bores. Remove any excess liquid retainer. Allow sufficient time for liquid retainer to fully cure.

- Install packing rings (65) and followers (67) to gland tubes (64).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40), dome nuts (87), O-rings (25), rotors (41), O-rings (34), rotor retainers (35) and front cover (38), refer to ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13*** (MP10/MP20/MP30) or ***"MP40 Front Cover & Rotor Removal" on page 21*** (MP40).
- Once pump is installed and started adjust packed gland seals by a slow and even tightening of nuts (81).

Flushed Packed Gland Seal Removal

See ***"Figure 60" on page 40***

FIGURE 60



- Remove front cover (38), rotor retainers (35), O-rings (34), rotors (41), O-rings (25), dome nuts (87) and rotorcase (40), (which is located on dowels (57)), refer to ***"MP10, MP20 & MP30 Front Cover & Rotor Removal" on page 13*** and ***"MP10, MP20 & MP30 Rotorcase Removal" on page 15***, (MP10/MP20/MP30) or ***"MP40 Front Cover & Rotor Removal" on page 21*** and ***"MP40 Rotorcase Removal" on page 22***, (MP40).
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67).
- Remove packing rings (65) and lantern ring (88) from housing (94) bores, carefully noting location of lantern rings (88).

Note: It is not recommended that housings (94) be removed unless replacement is necessary as they are tight press fit into rotorcase (40) and may be damaged during removal. For models MP30, it is necessary to remove additional nuts (81) before housings (94) can be

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removed.

- Remove sleeves (66) and slingers (62) from shafts (9 and 10).

Flushed Packed Gland Seal Replacement

See ***"Figure 60" on page 40***

- Install slingers (62) and sleeves (66) to shafts (9 and 10).

Note: If housings (94) have been removed from rotorcase (40) they should be installed at this point. Apply liquid retainer (Loctite 640 or similar) to outside diameter of location spigots of housings (94), and similarly apply to inside diameters of rotorcase (40) bores. Install housings (94) over studs (80) and press into rotorcase (40) bores. Remove any excess liquid retainer. For models MP30, install nuts (81) to studs (80).

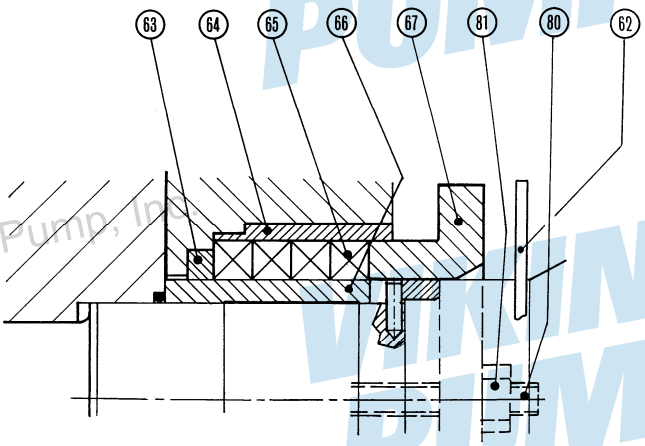
- Install packing rings (65) and lantern rings (88) to housing (94) bores, ensuring correct location of lantern rings such that they align with the liquid supply connection holes in housings (94).
- Install followers (67) to rotorcase (40) locating on studs (80).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40), (which locates onto dowels (57)), dome nuts (87), O-rings (25), rotors (41), O-rings (34), rotor retainers (35) and front cover (38), refer to ***"MP10, MP20 & MP30 Rotorcase, Rotor & Front Cover Assembly" on page 20*** (MP10/MP20/MP30) or ***"MP40 Rotorcase, Rotor & Front Cover Assembly" on page 27*** (MP40).
- Once pump is installed, ensure flush/quench supply is connected and operating correctly, refer to ***"O-ring Seal for MP50 Pump" on page 39***, then start pump. Adjust the packed gland seals by a slow and even tightening of nuts (81).

PACKED GLAND SEALS - MP50 SERIES PUMPS

Packed Gland Seal Removal

See ***"Figure 61" on page 41***.

FIGURE 61



- Remove front cover (38), rotor caps (35), O-rings (34), retainers (53), rotors (41), O-rings (25), dome nuts (87) and rotorcase (40), refer to ***"MP50 Front Cover & Rotor Removal" on page 28*** and ***"MP50 Rotorcase Removal" on page 29***.
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67), sleeves (66), slingers (62), packing rings (65) and sleeves (63).

Packed Gland Seal Replacement

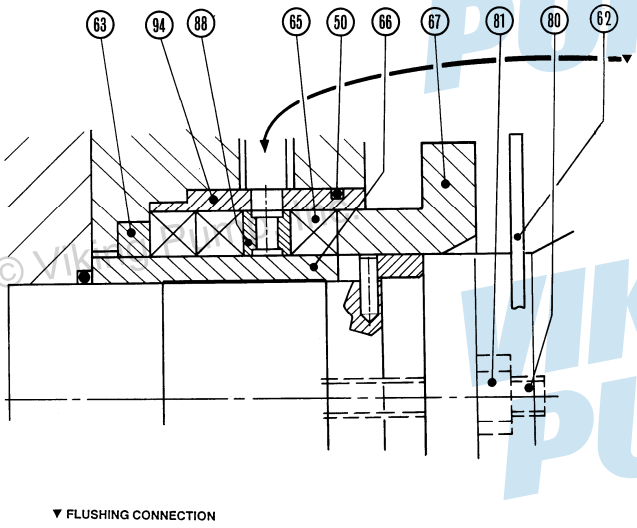
See ***"Figure 61" on page 41***

- Install slingers (62) and sleeves (66) to shafts (9 and 10) ensuring engagement of drive slots with pins (76) in shafts (9 and 10).
- Install sleeves (63), packing rings (65) and followers (67) to gland tubes (64).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40); dome nuts (87), O-rings (25), rotors (41), retainers (53), O-rings (34), rotor caps (35) and front cover (38) refer to ***"MP50 Rotorcase, Rotor & Front Cover Assembly" on page 32***.
- Once pump is installed and started adjust packed gland seals by slow and even tightening of nuts (81).

Flushed Packed Gland Seal Removal

See ***"Figure 62" on page 41***.

FIGURE 62



- Remove front cover (38), rotor caps (35), O-rings (34), rotors (41), O-rings (25), dome nuts (87) and rotorcase (40) (which is located on dowels (57)) -refer to ***"MP50 Front Cover & Rotor Removal" on page 28*** and ***"MP50 Rotorcase Removal" on page 29***.
- Remove nuts (81), which secure followers (67) to rotorcase (40).
- Remove followers (67).
- Remove packing rings (65) and lantern rings (88) from tube (94) bores, carefully noting location of lantern rings (88).
- Remove sleeves (66) and slingers (62) from shafts (9 and 10).

Flushed Packed Gland Seal Replacement

See ***"Figure 62" on page 41***

- Install slingers (62) and sleeves (66) to shafts (9 and 10) ensuring engagement of drive slots over pins (76) in shafts (9 and 10).

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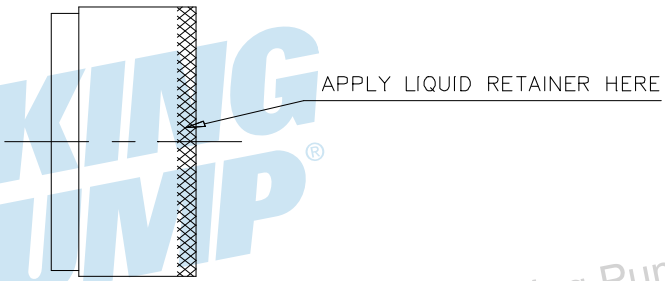
- Install packing rings (65) and lantern rings (88) to gland tube (94) bores, ensuring correct location of lantern rings such that they align with the liquid supply connection holes in tubes (94).
- Install followers (67) to rotorcase (40) locating on studs (80).
- Install nuts (81) to studs (80) but do not tighten.
- Install rotorcase (40), (which locates onto dowels (57)), dome nuts (87), O-rings (25), rotors (41), retainers (53), O-rings (34), rotor caps (35) and front cover (38) - refer to ***"MP50 Rotorcase, Rotor & Front Cover Assembly" on page 32***.
- Once pump is installed, ensure flush/quench supply is connected and operating correctly, refer to ***"Flushed Packed Gland Seal" on page 43***, then start pump. Adjust the packed glands seals by a slow and even tightening of nuts (81).

Seal Conversion to Packed Gland (With Shaft Sleeve)

See ***"Figure 61" on page 41***.

- Remove front cover (38), rotor caps (35), O-rings (34), retainers (53), rotors (41), O-rings (25), dome nuts (87) and rotorcase (40) (which is located on dowels 57)), refer to ***"MP50 Front Cover & Rotor Removal" on page 28*** and ***"MP50 Rotorcase Removal" on page 29***
- Remove all parts of the existing shaft seal arrangement including any stationary and rotary parts, housings, sleeves, O-rings etc.
- Apply liquid retainer (Loctite 640 or similar) to outer end of tubes (64) on outside diameters to a width of approximately 5mm (3/16") - see ***"Figure 63" on page 42***.

FIGURE 63



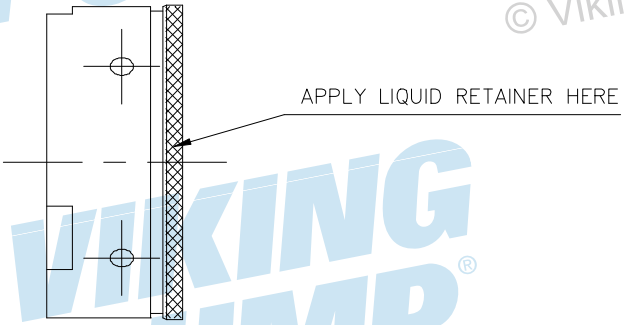
- Press tubes (64) into rotorcase (40) bore. Remove any excess liquid retainer.
- Apply liquid retainer (Loctite 270 or similar) to studs (80) and install studs (80) to rotorcase (40).
- Follow instructions for packed gland replacement, refer to ***"Packed Gland Seal Replacement" on page 40***.

Seal Conversion to Flushed Packed Gland (With Shaft Sleeve)

See ***"Figure 63" on page 42***

- Remove front cover (38), rotor caps (35), O-rings (34), retainers (53), rotors (41), O-rings (25), dome nuts (87) and rotorcase (40) (which is located on dowels (57)), refer to ***"MP50 Front Cover & Rotor Removal" on page 28*** and ***"MP50 Rotorcase Removal" on page 29***.
- Remove all parts of the existing shaft seal assembly including any stationary and rotary parts, housings, sleeves O-rings etc.
- Install O-rings (50) to tubes (94).
- Apply liquid retainer (Loctite 640 or similar) to outside diameter of tubes (94) adjacent to O-ring (50), see ***"Figure 64" on page 42***.

FIGURE 64



- Install tubes (94) to rotorcase (40) bores. Remove any excess liquid retainer.

Note: The tubes (94) have a triangular shape, which must locate fully into the rotorcase (40) bores.

- The tubes (94) have two sets of drillings for the flush/quench liquid to pass through. Ensure that one set of drillings aligns with the liquid supply connection holes in rotorcase (40) bores.
- Apply liquid retainer (Loctite 270 or similar) to studs (80) and install studs (80) to rotorcase (40).
- Follow instructions for flushed packed gland seal replacement - refer to ***"Flushed Packed Gland Seal Replacement" on page 41***.

FLUSHED PRODUCT SEALS AUXILIARY SERVICES

Terminology

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"Quench"

- To provide a liquid barrier that is not induced to flow through the seal area by any external means.

"Flush"

- To provide a liquid barrier that is induced to flow through the seal area by an external means.

Quench or Flush Media

⚠ WARNING

The media used for quenching or flushing a seal area must be fully compatible with the pumped media, and the relevant materials of construction of the pump.

⚠ DANGER

Special consideration must be given to the temperature limitations of the media to ensure that no hazards are created, e.g. risk of fire or explosion.

SINGLE MECHANICAL SEAL (FOR LOW-PRESSURE QUENCH OR FLUSH)

See ***"Figure 17" on page 15*** (MP10), ***"Figure 27" on page 20*** (MP20, MP30, MP40) & ***"Figure 50" on page 34*** (MP50).

This seal arrangement requires a supply of media to the outboard side of the mechanical seal to quench or flush the seal area. The nature of the pumped media and the specific duty conditions will determine whether a quench or a flush is required.

A quench provides a static head. The quench media vessel should be mounted a minimum of 0.5m (1.5 Feet) above the pump, preferably directly above the seal area. The interconnecting pipe work should be as straight as possible, avoiding horizontal runs, and with the minimum number of bends and restrictions.

For a suitable flush, the media must be supplied at a flow rate of 4.5 Litres per minute per shaft seal.

⚠ WARNING

Note: The limiting flush or quench pressure in any application is 0.7 Bar (10 psig).

DOUBLE MECHANICAL SEAL (FOR HIGH PRESSURE FLUSH)

See ***"Figure 18" on page 15*** (MP10), ***"Figure 28" on page 21*** (MP20, MP30, MP40) & ***"Figure 51" on page 34*** (MP50)

This seal arrangement requires a supply of media to be circulated between the inboard and outboard mechanical seals.

$$Q = \frac{(0.6 \times p + 0.25) \times n \times d^3 \times T}{M_P \times \rho \times 2.5 \times 10^9}$$

Q = Flow rate [l/hr]

p = Applied buffer / barrier pressure [bar]

n = Shaft speed [rpm]

d = Shaft diameter [mm]

- MP10/0005, 0008, 0011 – 30 mm
- MP20/0020, 0031 – 35 mm
- MP30/0069, 0113 – 50 mm
- MP40/0180, 0250 – 70 mm
- MP50/0351, 0525 – 80 mm

T = Temperature of processed media [°C]

ρ = Specific gravity of buffer / barrier fluid [kg/dm^3]

M_P = Specific heat capacity for buffer / barrier fluid [kJ/(kg x K)]

Typical values for some common barrier fluids:

Media	Density [kg/dm^3]	Specific Heat [kJ/(kg x K)
Water	1.0	4.2
Olive Oil	0.9	1.6
Mineral Oil	0.9	1.7
Acetone	0.8	2.2

The flush media must be supplied at a minimum flow rate of 0.5 Litres/ Minute per seal, this can be worked out by the following equation where “Q” is the flow rate.

The flush pressure must be a minimum of 1 Bar (15 psi) greater than the maximum discharge pressure created by, or the maximum suction pressure applied to, the pump, whichever is the greater.

⚠ WARNING

Note: The limiting flush pressure in any application is 13 Bar (188 psig).

Note: The liquid supply connections to flushed seals are made using the threaded ports on the sides of the seal housings (two per seal, except MP10 & MP20 models, which have common seal housings encompassing both shaft seals). For models MP30 to MP50 inclusive, one port on each housing should be used for flush 'in' and the other for flush 'out'. The pipe work should be arranged to provide an independent flush to each seal.

FLUSHED PACKED GLAND SEAL

See ***"Figure 61" on page 41*** (MP10, MP20, MP30 & MP40) & ***"Figure 63" on page 42*** (MP50)

This seal arrangement requires a supply of compatible liquid to be fed to the lantern ring, which is, located part way along the length of the packed seal so as to quench or flush the seal area, or to provide suitable lubrication.

⚠ WARNING

The flushing media should be supplied at a suitable flow rate and pressure so as to ensure, at minimum, a continuous weep out of the rear of the packed gland seal assembly.

FLUSHING DIMENSIONS

MP10

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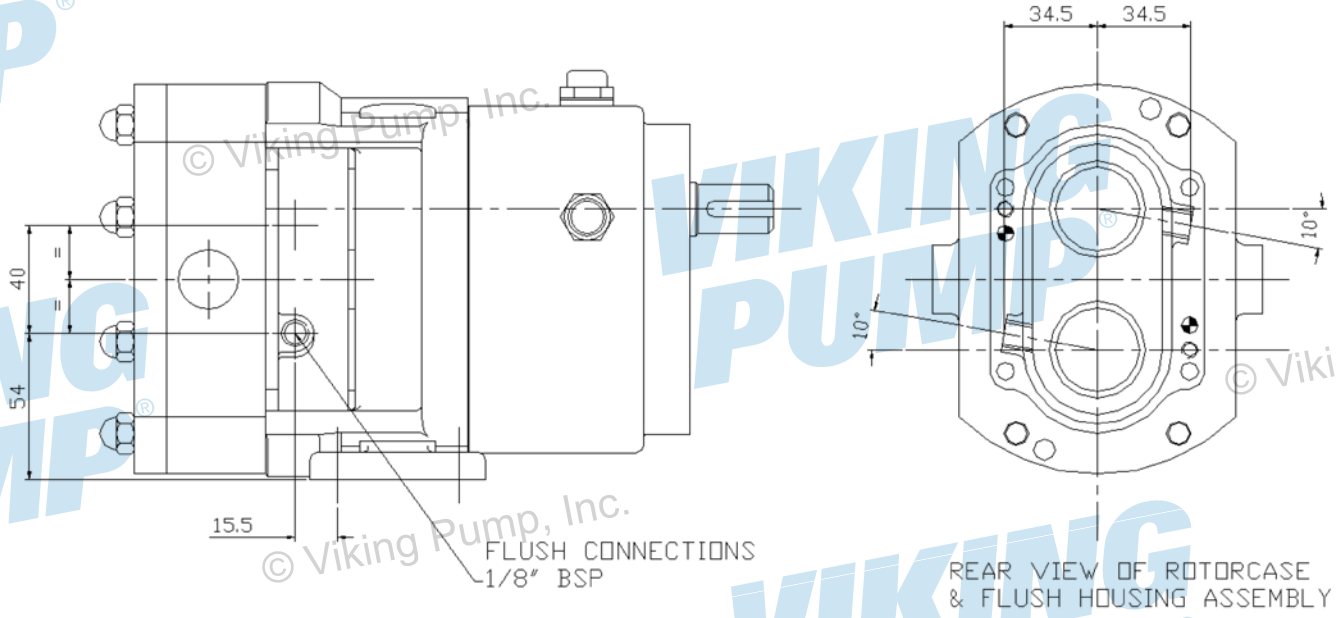
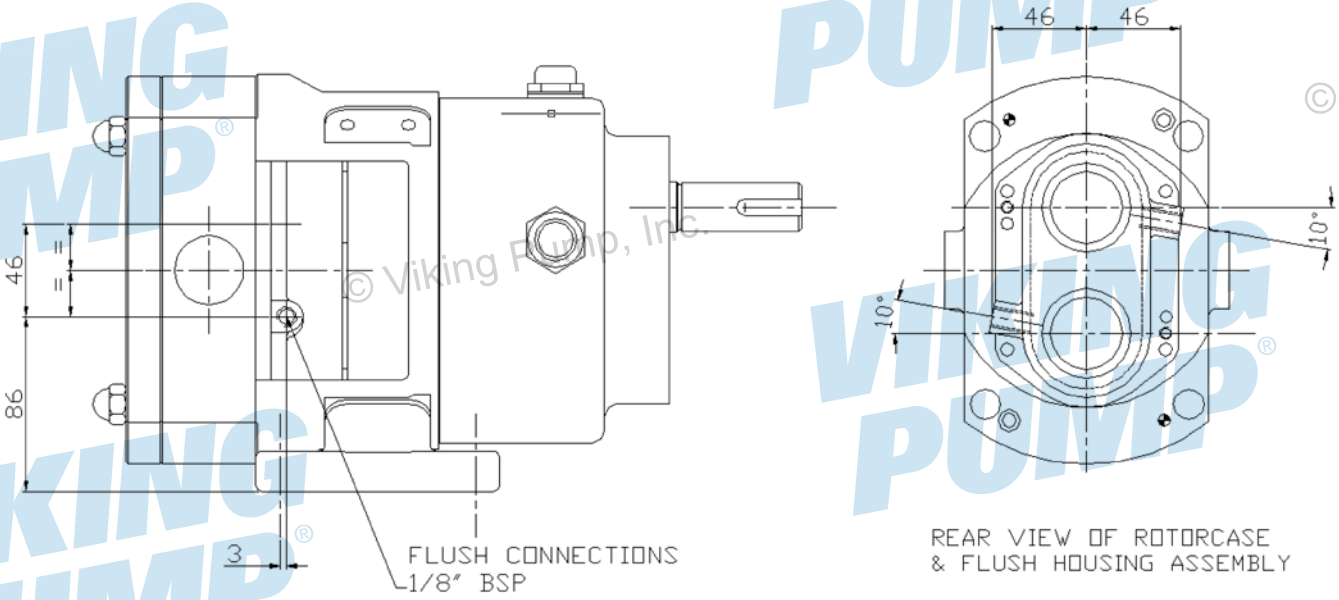


MP20



MP30

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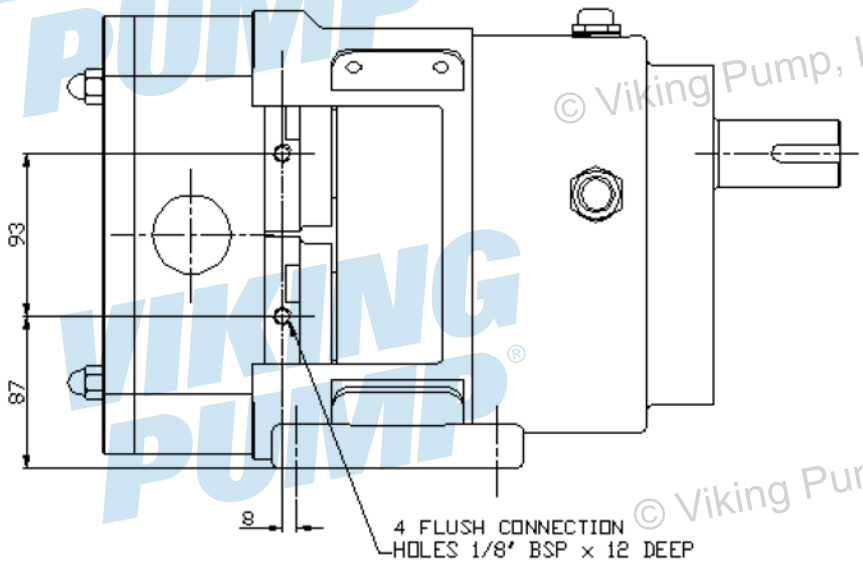
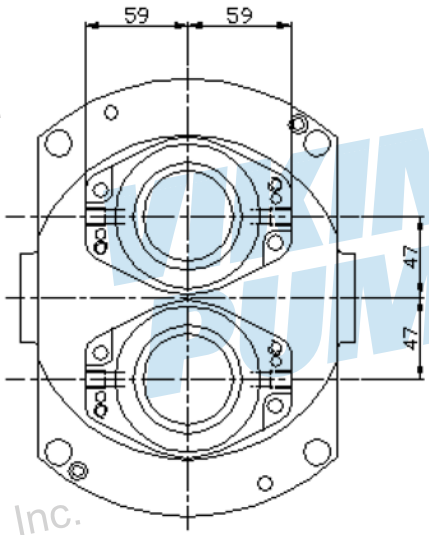
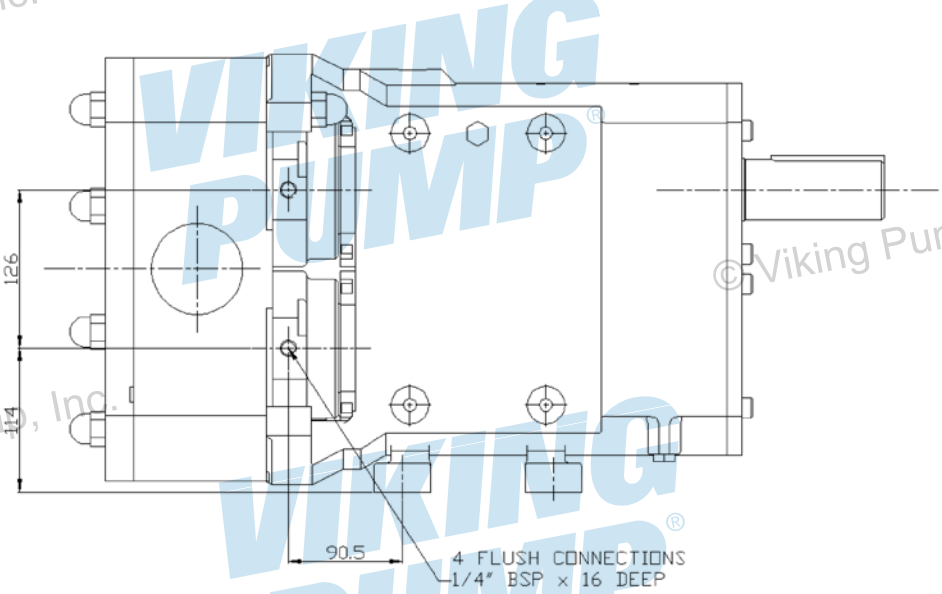
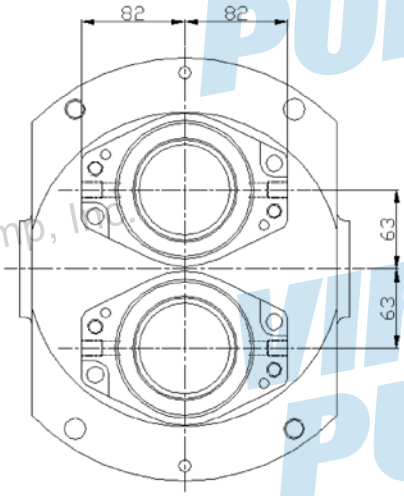




REAR VIEW OF ROTORCASE
& FLUSH HOUSING ASSEMBLY

MP40





REAR VIEW OF ROTORCASE
& FLUSH HOUSING ASSEMBLY

MP50 short

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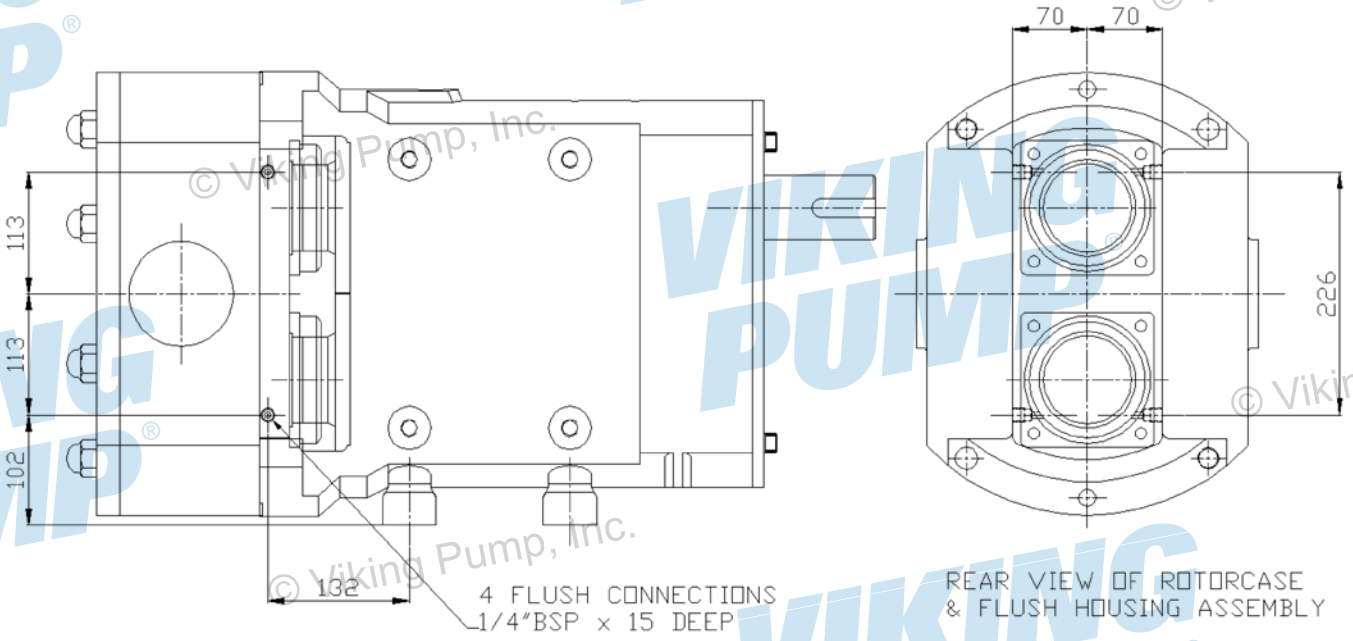
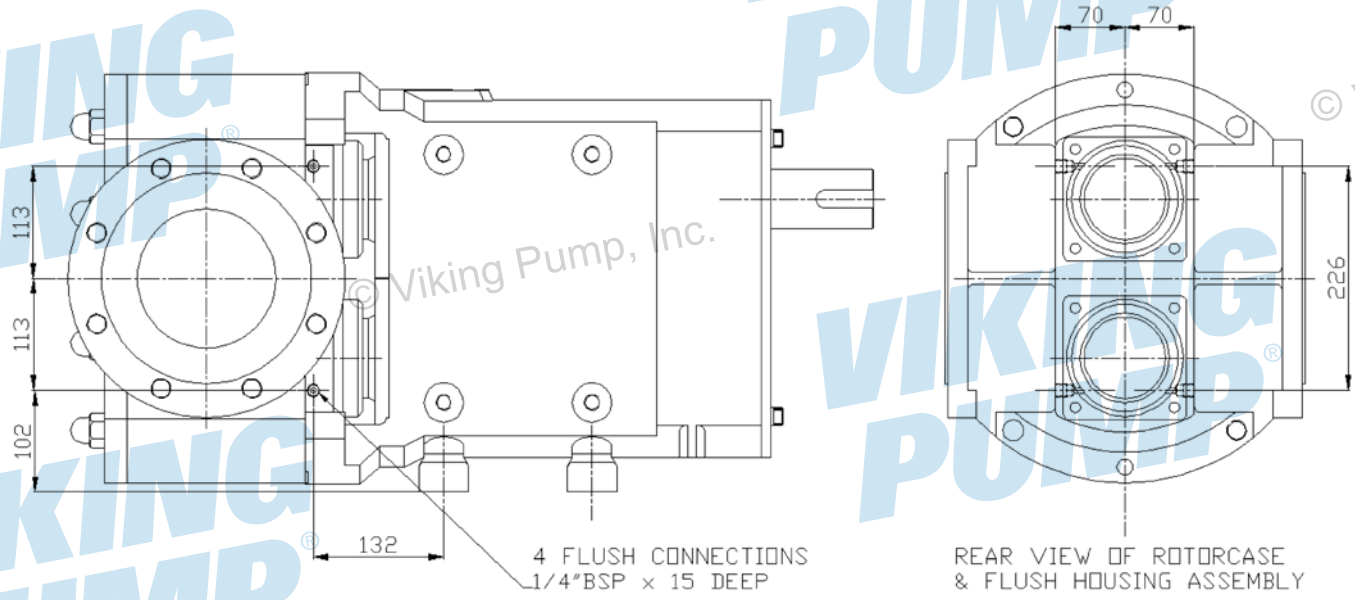


MP50 Long



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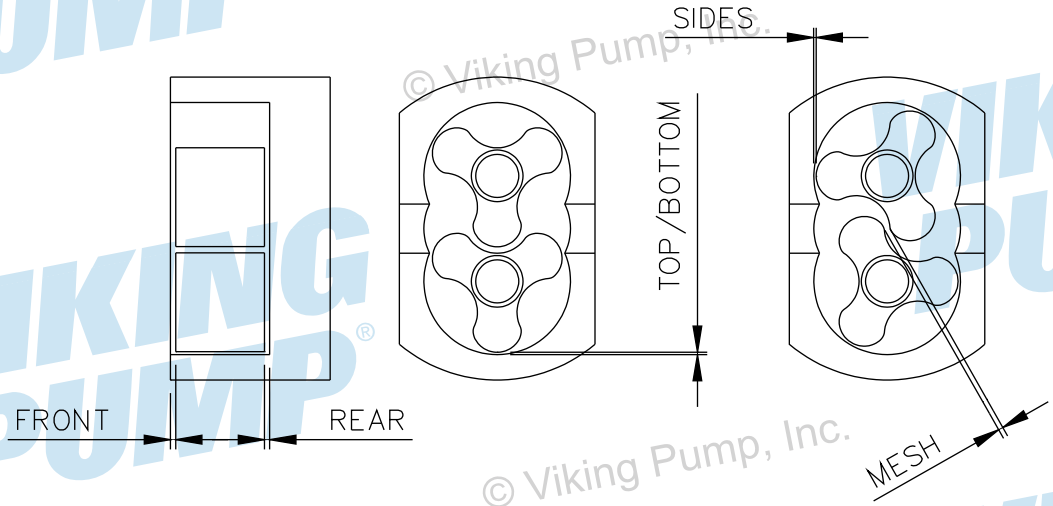
SPECIFICATIONS

CLEARANCE CHART



Pump Model	Rotor Class	Temp Max (°C)	Millimetres x 0.01									Temp Max (°F)	Inches x 0.001								
			Front		Rear		Top / Bottom		Side		Mesh		Front		Rear		Top / Bottom		Side		Mesh
			Min	Max	Min	Max	Min	Max	Min	Max			Min	Max	Min	Max	Min	Max	Min	Max	
MP10/0005	A	70	0.06	0.09	0.03	0.1	0.05	0.13	0.12	0.19	0.12	158	2.36	3.54	1.18	3.94	1.97	5.12	4.72	7.48	4.72
	B	100	0.09	0.12	0.05	0.12	0.06	0.14	0.14	0.21	0.12	212	3.54	4.72	1.97	4.72	2.36	5.51	5.51	8.27	4.72
	C	150	0.11	0.14	0.06	0.13	0.08	0.16	0.17	0.24	0.12	302	4.33	5.51	2.36	5.12	3.15	6.3	6.69	9.45	4.72
MP10/0008	A	70	0.1	0.13	0.06	0.13	0.08	0.16	0.15	0.22	0.12	158	3.94	5.12	2.36	5.12	3.15	6.3	5.91	8.66	4.72
	B	100	0.12	0.15	0.09	0.16	0.09	0.17	0.17	0.24	0.12	212	4.72	5.91	3.54	6.3	3.54	6.69	6.69	9.45	4.72
	C	150	0.14	0.17	0.11	0.18	0.13	0.21	0.21	0.28	0.12	302	5.51	6.69	4.33	7.09	5.12	8.27	8.27	11.02	4.72
MP10/0011	A	70	0.13	0.16	0.09	0.16	0.1	0.18	0.18	0.25	0.12	158	5.12	6.3	3.54	6.3	3.94	7.09	7.09	9.84	4.72
	B	100	0.16	0.19	0.13	0.2	0.13	0.21	0.21	0.28	0.12	212	6.3	7.48	5.12	7.87	5.12	8.27	8.27	11.02	4.72
	C	150	0.19	0.22	0.17	0.24	0.16	0.24	0.24	0.31	0.12	302	7.48	8.66	6.69	9.45	6.3	9.45	9.45	12.2	4.72
MP20/0020	A	70	0.14	0.17	0.09	0.16	0.13	0.23	0.23	0.31	0.28	158	5.51	6.69	3.54	6.3	5.12	9.06	9.06	12.2	11.02
	B	100	0.16	0.19	0.13	0.2	0.18	0.28	0.25	0.33	0.28	212	6.3	7.48	5.12	7.87	7.09	11.02	9.84	12.99	11.02
	C	150	0.18	0.21	0.14	0.21	0.2	0.3	0.28	0.36	0.28	302	7.09	8.27	5.51	8.27	7.87	11.81	11.02	14.17	11.02
	D	180	0.19	0.22	0.15	0.22	0.23	0.33	0.31	0.39	0.28	356	7.48	8.66	5.91	8.66	9.06	12.99	12.2	15.35	11.02
MP20/0031	A	70	0.15	0.18	0.16	0.23	0.23	0.33	0.3	0.38	0.28	158	5.91	7.09	6.3	9.06	9.06	12.99	11.81	14.96	11.02
	B	100	0.19	0.22	0.19	0.26	0.29	0.39	0.37	0.45	0.28	212	7.48	8.66	7.48	10.24	11.42	15.35	14.57	17.72	11.02
	C	150	0.21	0.24	0.22	0.29	0.32	0.42	0.39	0.47	0.28	302	8.27	9.45	8.66	11.42	12.6	16.54	15.35	18.5	11.02
	D	180	0.23	0.26	0.25	0.32	0.36	0.46	0.43	0.51	0.28	356	9.06	10.24	9.84	12.6	14.17	18.11	16.93	20.08	11.02
MP30/0069	A	70	0.18	0.21	0.16	0.23	0.22	0.35	0.3	0.41	0.35	158	7.09	8.27	6.3	9.06	8.66	13.78	11.81	16.14	13.78
	B	100	0.22	0.25	0.21	0.28	0.27	0.4	0.35	0.46	0.35	212	8.66	9.84	8.27	11.02	10.63	15.75	13.78	18.11	13.78
	C	150	0.24	0.27	0.24	0.31	0.33	0.46	0.4	0.51	0.35	302	9.45	10.63	9.45	12.2	12.99	18.11	15.75	20.08	13.78
	D	180	0.27	0.3	0.26	0.33	0.37	0.5	0.45	0.56	0.35	356	10.63	11.81	10.24	12.99	14.57	19.69	17.72	22.05	13.78
MP30/0113	A	70	0.24	0.28	0.25	0.32	0.44	0.58	0.51	0.63	0.35	158	9.45	11.02	9.84	12.6	17.32	22.83	20.08	24.8	13.78
	B	100	0.29	0.33	0.3	0.37	0.47	0.61	0.54	0.66	0.35	212	11.42	12.99	11.81	14.57	18.5	24.02	21.26	25.98	13.78
	C	150	0.33	0.37	0.33	0.4	0.51	0.65	0.59	0.71	0.35	302	12.99	14.57	12.99	15.75	20.08	25.59	23.23	27.95	13.78
MP40/0180	A	70	0.32	0.37	0.28	0.39	0.3	0.45	0.46	0.58	0.4	158	12.6	14.57	11.02	15.35	11.81	17.72	18.11	22.83	15.75
	B	100	0.35	0.4	0.32	0.43	0.35	0.5	0.51	0.63	0.4	212	13.78	15.75	12.6	16.93	13.78	19.69	20.08	24.8	15.75
	C	150	0.4	0.45	0.38	0.49	0.42	0.57	0.57	0.69	0.4	302	15.75	17.72	14.96	19.29	16.54	22.44	22.44	27.17	15.75
MP40/0250	A	70	0.4	0.45	0.4	0.53	0.45	0.6	0.61	0.73	0.4	158	15.75	17.72	15.75	20.87	17.72	23.62	24.02	28.74	15.75
	B	100	0.49	0.54	0.46	0.59	0.5	0.65	0.66	0.78	0.4	212	19.29	21.26	18.11	23.23	19.69	25.59	25.98	30.71	15.75
	C	150	0.55	0.6	0.53	0.66	0.59	0.74	0.75	0.87	0.4	302	21.65	23.62	20.87	25.98	23.23	29.13	29.53	34.25	15.75
MPS0/0351	B	100	0.43	0.48	0.41	0.54	0.41	0.64	0.66	0.86	0.45	212	16.93	18.9	16.14	21.26	16.14	25.2	25.98	33.86	17.72
	D	180	0.58	0.63	0.56	0.69	0.41	0.64	0.66	0.86	0.45	356	22.83	24.8	22.05	27.17	16.14	25.2	25.98	33.86	17.72
MPS0/0525	B	100	0.5	0.55	0.48	0.62	0.51	0.74	0.7	0.9	0.45	212	19.69	21.65	18.9	24.41	20.08	29.13	27.56	35.43	17.72
	D	180	0.65	0.7	0.63	0.77	0.51	0.74	0.7	0.9	0.45	356	25.59	27.56	24.8	30.31	20.08	29.13	27.56	35.43	17.72

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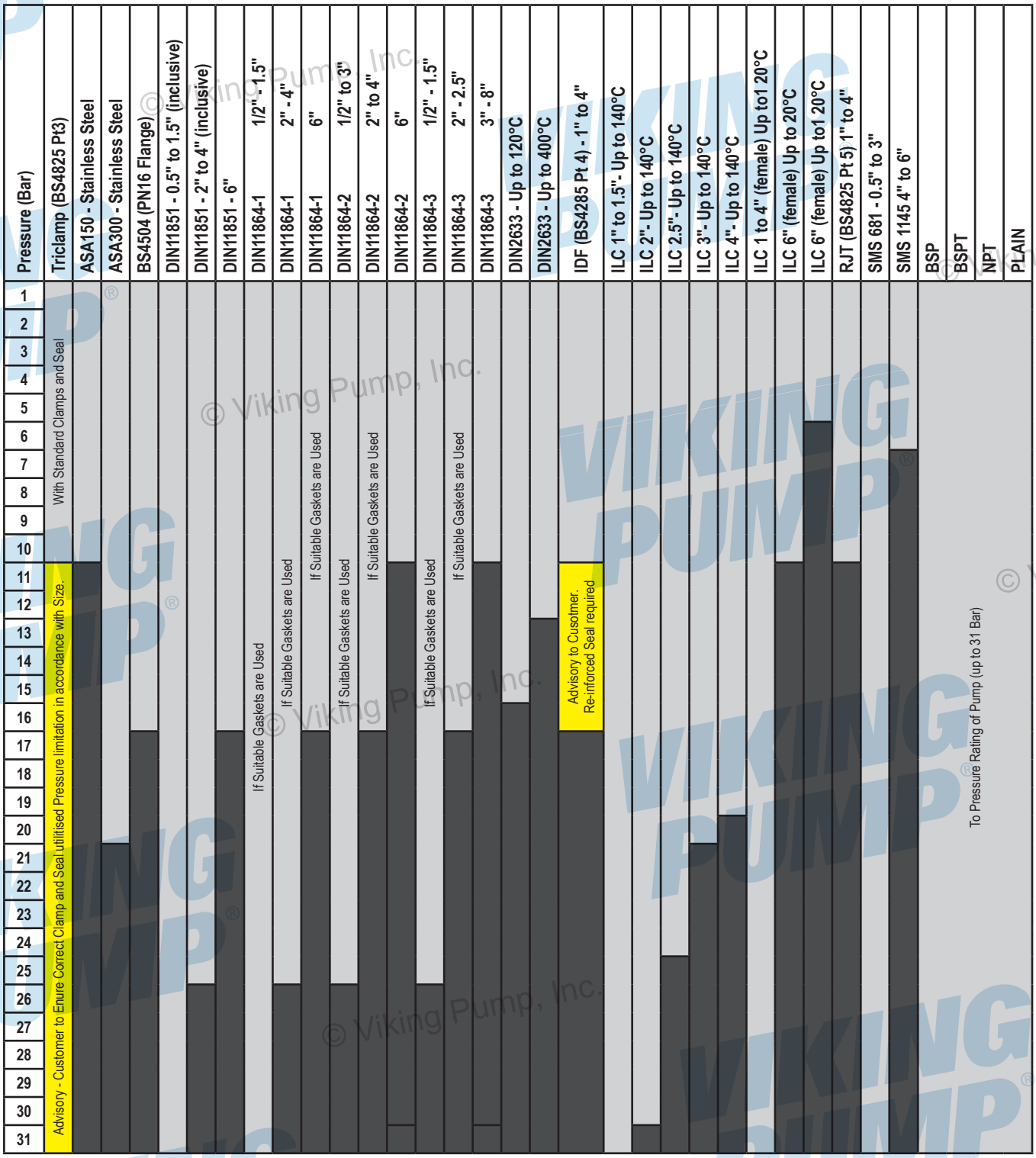
PRESSURE LIMITATION OF PORT TYPES



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FASTENERS & TORQUE SETTINGS

Item	Description	Position		MultiPump® Pump Model				
				MP10	MP20	MP30	MP40	MP50
1.03	Dome Nut (Acorn)	Front Cover / Rotorcase	Quantity / Pump	8	4	4	10	10
			Size (mm)	M8	M12	M12	M16	M20
			Torque (N/m)	17	55	55	100	130
			Torque (lbf ft)	12.54	40.56	40.56	73.75	95.88
2.02	Rotor Retainer	Rotor / Shaft	Quantity / Pump	2 (M10)	2 (M12)	2 (M16)	2 (M16)	2 (M16)
			Torque (N/m)	30	40	108	108	108
			Torque (lbf ft)	22.13	29.50	79.65	79.65	79.65
2.05	Ring Feder Retainer	Rotor / Shaft	Quantity / Pump	—	—	—	—	2
			Torque (N/m)					15
			Torque (lbf ft)					11.06
3.03	Stud	Front Cover / Rotorcase	Quantity / Pump	4	—	—	6	6
			Size (mm)	M8 x 31			M16 x 55	M20 x 70
			Torque (N/m)	17			100	130
			Torque (lbf ft)	12.54			73.75	95.88
4.02	Stud	Bearing Housing / Front Cover	Quantity / Pump	4	4	4	—	—
			Size (mm)	M8	M12	M12		
			Torque (N/m)	17	55	55		
			Torque (lbf ft)	12.54	40.56	40.56		
4.04	Socket Head Cap Screw	Rotorcase / Bearing Housing	Quantity / Pump	—	2	2	—	—
			Size (mm)		M6	M6		
			Torque (N/m)		7	7		
			Torque (lbf ft)		5.2	5.2		
5.01	Drive Shaft	Rolling Torque	Rolling Torque (N/m)	0.3 - 0.5	1.0 - 1.2	3 - 4	5 - 6	5 - 16
5.02	Driven Shaft		Rolling Torque (lbf ft)	0.22 - 0.37	0.74 - 0.89	2.21 - 2.95	3.69 - 4.43	3.69 - 11.80
5.07	Socket Head Cap Screw / Hex. Head Screw	Bearing Retainer	Quantity / Pump	8	8	8	8	8
			Size (mm)	M6 x 16	M5 x 16	M5 x 16	M8 x 20	M8 x 25
			Torque (N/m)	16	9	9	25	25
			Torque (lbf ft)	11.80	6.64	6.64	18.44	18.44
5.12	Locknut	Timing Gear / Shaft	Quantity / Pump	2	2	2	1	1
			Size (mm)	M25	M30	033-0141-0	M55	M65
			Torque (N/m)	60	110	125	125	130
			Torque (lbf ft)	44.25	81.13	92.19	92.19	95.88
5.12	Grub Screw	Timing Gear Locknut	Quantity / Pump	—	—	6	—	—
			Size (mm)			M8 x 8		
			Torque (N/m)			20		
			Torque (lbf ft)			14.75		
5.14	Socket Head Cap Screw	Feet	Quantity / Pump	2	4	4	4	4
			Size (mm)	M8 x 16	M8 x 16	M10 x 25	M12 x 25	M16 x 40
			Torque (N/m)	17	17	45	55	100
			Torque (lbf ft)	12.54	12.54	33.19	40.56	73.75
5.16	Ring Feder Retainer	Timing Gear Shaft	Quantity / Pump	—	—	—	1	1
			Torque (N/m)				45	45
			Torque (lbf ft)				33.19	33.19
5.19	Locknut	Shaft / Bearing	Quantity / Pump	—	—	—	2	2
			Size (mm)				M60	M80
			Torque (N/m)				180	200
			Torque (lbf ft)				132.75	147.50
6.11	Socket Head Cap Screw	Gearbox Halves / Rear Cover	Quantity / Pump	4	4	6	4	4
			Size (mm)	M8 x 20	M10 x 25	M12 x 25	M10 x 30	M12 x 25
			Torque (N/m)	25	45	80	45	55
			Torque (lbf ft)	18.44	33.19	59.00	33.19	40.56
6.15	Hammer Drive	Nameplate	Quantity / Pump	4	4	4	4	4
7.11	Grub Screw	Rotary Seal Cartridge	Quantity / Pump	6 or 8	6 or 8	6 or 8	6	—
			Size (mm)	M5	M5	M6	M8	
			Torque (N/m)	1.5	1.5	4	9.5	
			Torque (lbf ft)	1.11	1.11	2.95	7.01	

* Torque values above indicate nominal values. Deviation of +/-2.5% allowed.

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LUBRICANTS

Gearbox oil recommended for use with MultiPump® is an 'EP (Extreme Pressure) grade gear lube' for the following temperature ranges.

EP150: -20°C – 0°C (0°F – 32°F)

EP220: 0°C – 30°C (32°F – 85°F)

EP320: 30°C (85°F) and higher

Approximate lubricant capacities for the MultiPump®:

Pump Model	Mounting Attitude with Suction & Discharge ports in:			
	Horizontal Plane		Vertical Plane	
	Litres	US Pints	Litres	US Pints
MP10	0.25	.53	0.18	0.38
MP20	0.50	1.06	0.45	0.95
MP30	1.00	2.11	0.80	1.69
MP40* (Top Cavity)	0.35	0.74	See Note below referring to Sight Glass Oil Level.**	
MP40* (Bottom Cavity)	0.90	1.90		
MP50* (Top Cavity)	0.60	1.27		
MP50* (Bottom Cavity)	0.80	1.69		

* **Note: The MP40 and MP50 have two gearbox cavities that should be subject to the same maintenance program.**

** **Note: Always add oil to the level of the sight glass. The sight glass must be located in the uppermost position on the side of the gearbox.**

MATERIAL SPECIFICATIONS

	MP10	MP20	MP30	MP40	MP50
Rotorcase	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Front Cover	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Rotors	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Rotor Retainers	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel
Shafts	316 St.Steel	316 St.Steel	316 St.Steel	316 St.Steel	416 St.Steel
Shaft Sleeves	N/A	N/A	N/A	N/A	316 St.Steel
Gearbox	Cast Iron	Cast Iron	Cast Iron	Cast Iron	Cast Iron
Bearing Housing	Cast Iron	Cast Iron	Cast Iron	N/A	N/A
Gearbox Cover	N/A	N/A	N/A	Mild Steel	Mild Steel

TROUBLESHOOTING

No Flow	Irregular Flow	Under Capacity	Pump Overheats	Motor Overheats	Excessive Rotor Wear	Excessive Seal Wear	Noise / Vibration	Seizure	Pump Stalls on Start Up	CAUSES	ACTION
■										Incorrect Direction Of Rotation	Reverse Motor
■										Pump Not Primed	Expel Gas From Suction Line / Pump Chamber & Prime
■	■	■					■			Insufficient NPSH Available	Increase Line Diameter & Static Suction Head. Simplify Suction Line & Reduce Length. Reduce Pump Speed & Product Temperature
■	■	■					■			Product Vaporising In Suction Line	
■	■	■					■			Air Entering Suction Line	Remake Pipework Joints
■	■	■					■			Gas In Suction Line	Expel Gas From Suction Line / Pump Chamber
	■	■					■			Insufficient Static Suction Head	Raise Product Level To Increase Static Suction Head
			■	■			■		■	Product Viscosity Too High	Decrease Pump Speed / Increase Product Temperature
		■								Product Viscosity Too Low	Increase Pump Speed / Increase Product Temperature
		■	■		■		■		■	Product Temperature Too High	Cool Product / Pumping Chamber
				■					■	Product Temperature Too Low	Heat Product / Pumping Chamber
					■	■	■	■		Unexpected Solids In Product	Clean System / Fit Strainer On Suction Side Of Pump
		■	■	■	■		■	■	■	Discharge Pressure Too High	Check For Blockages / Simplify Discharge Line
			■	■	■		■	■		Rotorcase Strained By Pipework	Check Pipe Alignment / Support Pipework
				■			■			Pump Speed Too High	Decrease Pump Speed
		■								Pump Speed Too Low	Increase Pump Speed
			■	■	■	■	■	■		Seal Flush Inadequate	Increase Seal Flush To Required Pressure / Flow
			■	■	■	■	■	■	■	Bearing / Timing Gear Wear	Replace Worn Components

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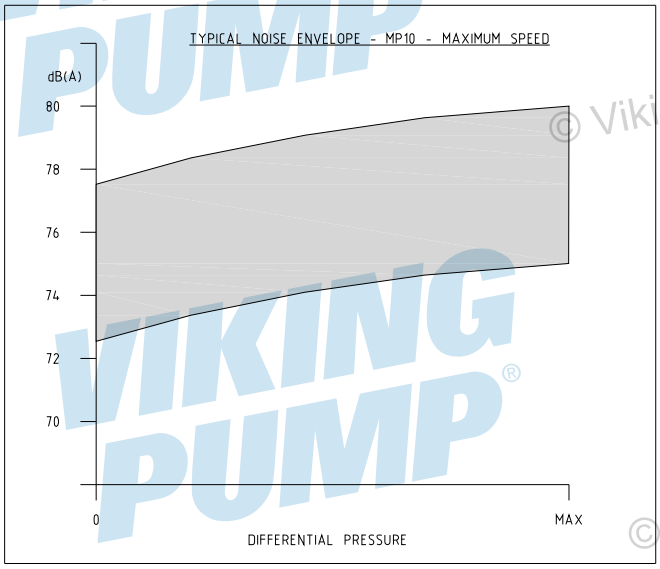
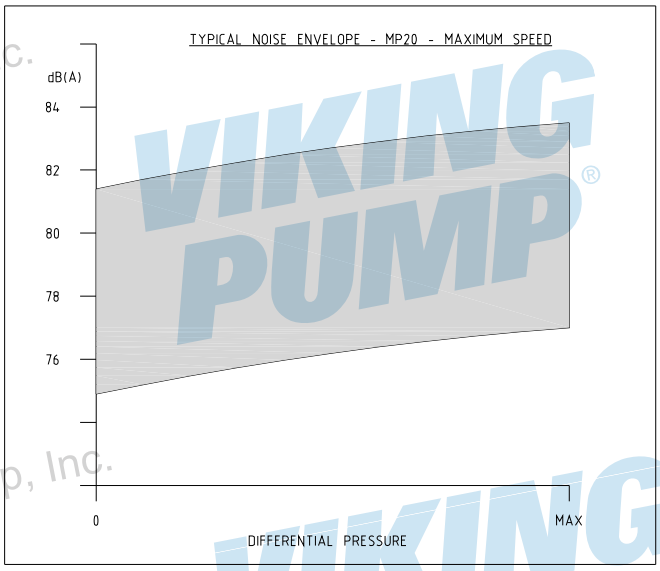
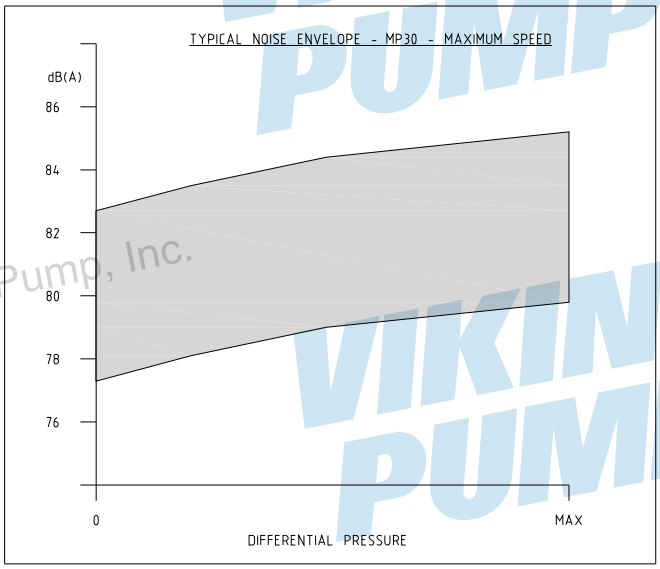
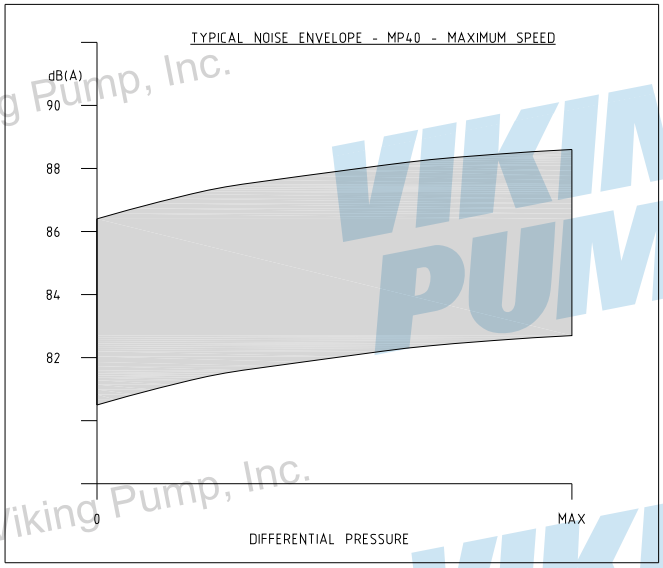
TYPICAL NOISE EMISSION DATA - MP10, MP20 AND MP30 PUMPS

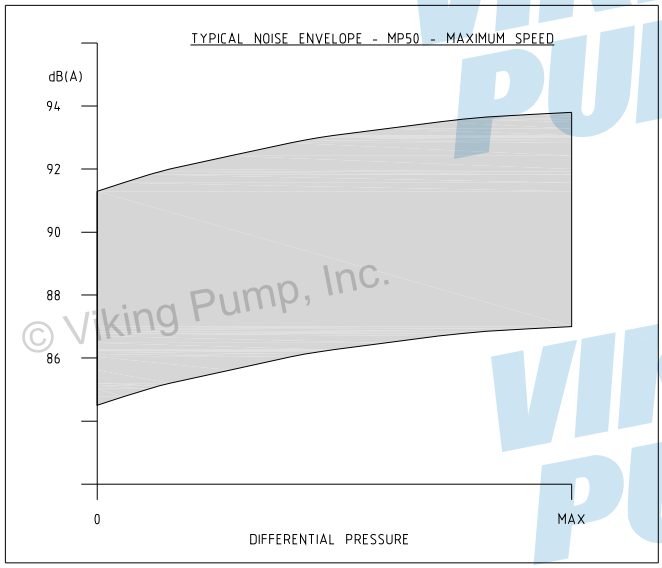






TYPICAL NOISE EMISSION DATA – MP40 AND MP50 PUMPS





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TOOL LIST

Listed below are tools required for the maintenance of the MultiPump® Series™ pump.

TYPE	SIZE OR RANGE	MP10	MP20	MP30	MP40	MP50
Combination Spanner	8 mm			•		
	10 mm	•				
	13 mm	•	•	•		
	17 mm	•			•	•
	19 mm		•	•		
	24 mm		•	•	•	•
	30 mm					•
	65 mm				•	
Hexagon (Allen) Key	1/4"	•	•	•	•	•
	2.5 mm	•	•			
	3 mm	•	•	•		
	4 mm	•	•	•		
	5 mm	•	•	•	•	•
	6 mm	•		•	•	•
	8 mm		•	•	•	
	10 mm			•		•
Hexagon (Allen) Key (Socket Driven)	3 mm	•	•	•		
	4 mm	•	•	•		
	5 mm	•		•	•	•
	6 mm	•			•	•
	8 mm		•		•	
	10mm			•		•
Torque Wrench	Adjustable to Min. 39 NM (28.76 ft-lb.)	•				
	Adjustable to Min. 107 NM (78.91 ft-lb.)		•			
	Adjustable to Min. 135 NM (99.56 ft-lb.)			•		
	Adjustable to Min. 130 NM (95.87 ft-lb.)				•	
	Adjustable to Min. 160 NM (117.99 ft-lb.)					•
Depth Micrometer	0 - 25 mm (0 - 1")	•	•	•	•	•
Feeler Gauge Set		•	•	•	•	•
Micrometer	0 – 25 mm (0 – 1")	•	•	•	•	•
Rolling Torque Meter	0 - 5 Nm (0 - 3.688 ft-lb.)	•	•			
	0 - 10 Nm (0 - 7.376 ft-lb.)			•	•	
Rotor Retainer Socket	Supplied with Pump	•	•	•	•	•
C – Spanner	To Suit Locknut Ø38.0 mm (1.496")		•			
	To Suit Locknut Ø45.0 mm (1.772")			•		
	To Suit Locknut Ø75.0 mm (2.953")				•	
	To Suit Locknut Ø85.0 mm (3.346")					•
Soft Faced Mallet		•	•	•	•	•
Screwdriver	Flat Blade, Medium	•	•	•	•	•
Circlip Pliers	Internal	•	•	•	•	
Pin Punch	Small	•	•	•	•	•
Steel Hammer	Small	•	•	•	•	•
FOR PUMPS WITH RELIEF VALVE INSTALLED:						
Pry Bar	Diameter 8.0 By 200 Long (0.315" By 7.874")	•				
	Diameter 13.0 By 400 Long (0.512" By 15.748")		•			
	Diameter 16.0 x 600 Long (0.63" By 23.622")			•		
Pin Spanner	Adjustable	•	•	•		

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SERVICE HISTORY

Pump Model: Pump Serial No:

DATE	COMMENTS

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TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE

VIKING PUMP®

ROTARY LOBE PRODUCT LINE: *STAINLESS STEEL*
MULTIPUMP® SERIES™
SIZES: 10, 20, 30, 40, 50

VIKING PUMP®

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