TECHNICAL SERVICE MANUAL: INSTALLATION, OPERATION & MAINTENANCE

VIKING PUMP®

ROTARY LOBE PRODUCT LINE: *STAINLESS STEEL*

RTP® SERIES

SIZES: 20, 30

TSM	1727
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MODEL NUMBER CHART

RTP20	RTP30

FIGURE 1

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. A 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 operations envelope can cause mechanical contact, 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 from exceeding its stated duty pressure. It must be suitable for both directions of pump rotation where applicable. Do not allow the 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 Valve" on page 11***).

⚠ 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, create high temperatures and increased noise emissions. Do not use any drive arrangements, which cause side loading of the drive shaft. It may also be necessary to earth the pump head to avoid the build-up of a potential charge that could cause a spark.

⚠ DANGER

The installation must allow safe routine maintenance and inspection (to replenish lubricants, 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 ***"Lubricants" on page 23***). Beware of over/under filling the gearbox as this could cause the pump to overheat and severe 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 section 3.1).

⚠ 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 will cause excessive heat and seal failure

⚠ WARNING

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

⚠ 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 baseplate. If the pump is baseplate mounted, the base plate must be used for all lifting purposes. If slings are used for lifting, they must be safely and securely attached. For weights of the bare shaft, pumps refer to ***"Typical Basic Pump Build (RTP20 Shown)" on page 24.***

⚠ 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

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.

⚠ 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

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 85-dB (A) under certain operating conditions. When necessary, personal protection against noise must be taken.

⚠ DANGER

Avoid any contact with hot parts of pumps and/or drives, which 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, either manually or by CIP method, the operator must ensure that a suitable procedure is used in accordance with the system requirements. During a CIP cleaning cycle, a pump differential pressure of between 2 and 3 bar (30 to 45 psi) is recommended to ensure suitable velocities are reached within the pump head. The exterior of the pump should be cleaned periodically.

⚠ DANGER

The surface temperature of the pump is also dependent on the temperature of the pumped medium.

RISK ASSESSMENT

Risk assessment relating to the use Viking Pump RTP® 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*** / ***"Start-Up Procedure" on page 9.***
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*** / ***"Service History" on page 26***
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 ***"Specifications" on page 21.*** 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

RTP® Series rotary lobe pump is manufactured by Viking Pump, a unit of IDEX Corporation.

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

Should you require any additional information regarding the RTP® Series pumps contact Viking Pump or their Viking Pump Hygienic authorised distributor (refer to **Viking Pump Hygienic Distributors**).

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, see ***"Figure 2" on page 5***. Should the nameplate be unreadable or missing, the pump serial number is also stamped on either side of the rotorcase, see ***"Figure 3" 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 Viking Pump Hygienic 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 RTP® Series pumps.

RECEIPT & 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 authorised distributor and clearly mark upon the carriers paperwork that the goods have been received in a damaged condition, with a brief description of the 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).

CLEANING

The RTP® Series pump series is suitable for both manual cleaning and CIP (Cleaning In Place), refer to ***"Pump & Motor Alignment" on page 7***.

The product seals are mounted directly behind the rotors and are designed and positioned to minimise product entrapment and maximise the effects of cleaning.

This strategic positioning of the product seals, combined with their ease of access provides an arrangement that can be more effectively cleaned by both manual and CIP procedures.

It is recommended that the exterior of the pump be cleaned periodically.

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.

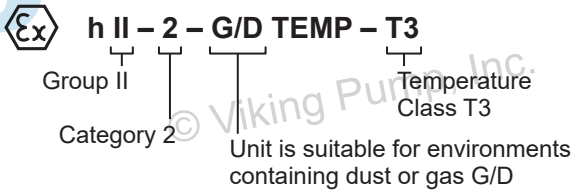
⚠ WARNING

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

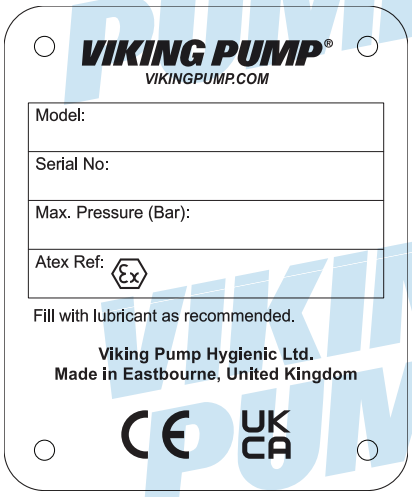
The pump range has been rated as



Equipment - groups (Annex I of the EC-Directive 94/9/EC)						
Group I (mines, mine gas and dust)		**Group II** (other explosive atmospheres gas/dust)				
Category M		**Category 1**		**Category 2**		**Category 3**
1	**2**	**G** (gas) **(Zone 0)**	**D** (dust) **(Zone 20)**	**G** (gas) **(Zone 1)**	**D** (dust) **(Zone 21)**	**G** (gas) **(Zone 2)**	**D** (dust) **(Zone 22)**
for equipment providing a very high level of protection when endangered by an explosive atmosphere	for equipment providing a high level of protection when likely to be endangered by an explosive atmosphere	for equipment providing a very high level of protection when used in areas where an explosive atmosphere is very likely to occur		for equipment providing a high level of protection when used in areas where an explosive atmosphere is likely to occur		for equipment providing a normal level of protection when used in areas where an explosive atmosphere is less likely to occur	

The Atex rating is displayed on the pump nameplate see ***"Figure 2" on page 5***.

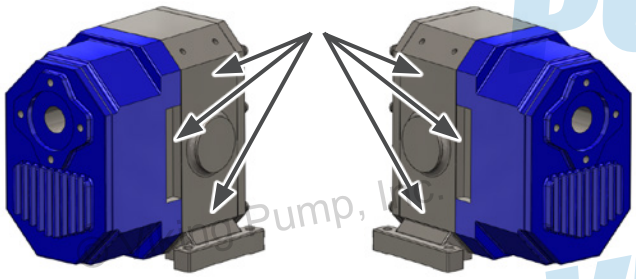
FIGURE 2: NAMEPLATE



PUMP MODEL & SERIAL NUMBER

Should you require any information regarding your RTP® Series rotary lobe pump contact Viking Pump or your Viking Pump Hygienic authorised distributor, providing the pump model and serial number as stated on the pump nameplate, see ***"Figure 2" on page 5*** in ***"Equipment Groups & Categories" 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, (see ***"Figure 3" on page 5***).

FIGURE 3: SERIAL NUMBER LOCATION



GENERAL

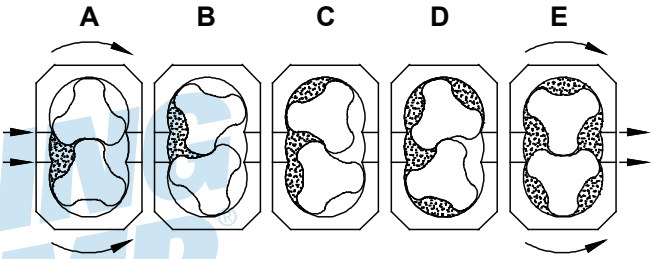
RTP® SERIES PUMPING PRINCIPLE

The pumping action of the rotary lobe pump principle is generated by the contra-rotation of two pumping elements (rotors) within a chamber (rotorcase), ***"Figure 4" on page 4***. The shaft assemblies comprise of, the shaft support bearings and the timing gears. The 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, ('A'), the cavity 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, ('B') and ('C'), to the discharge side of the pump, ('D'). Here the cavity decreases, and the pumped medium is discharged from the rotorcase, ('E').

FIGURE 4: ROTARY LOBE PUMP PRINCIPLE



⚠ WARNING

SYSTEM DESIGN & INSTALLATION

When incorporating any pump into a system it is considered a 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 overheating.

⚠ 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

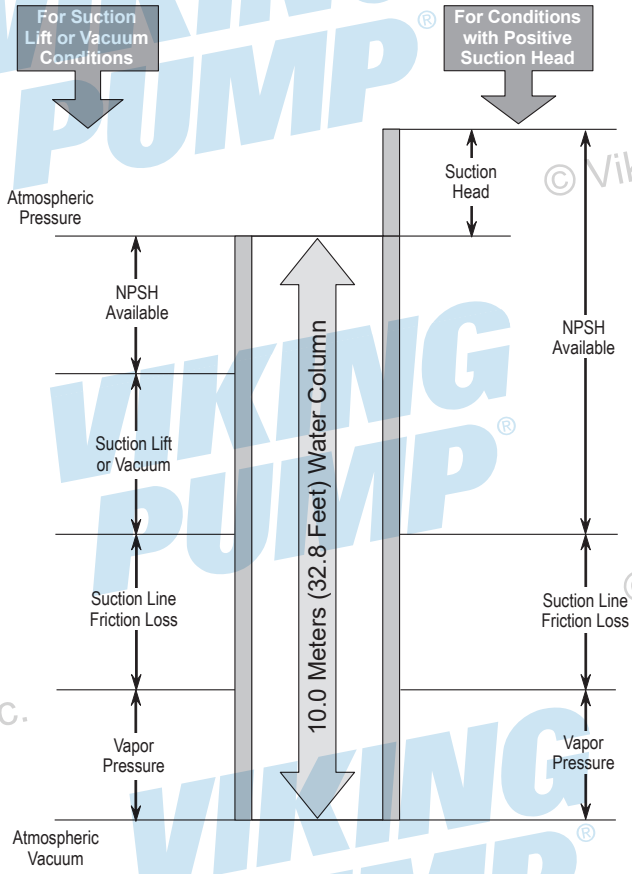
The Net Positive Suction Head available (NPSHa) from the system must always exceed the Net Positive Suction Head required (NPSHr) by the pump.

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.
- 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 advise on pump or system NPSH characteristics be required then contact the factory or their authorised distributor.

FIGURE 5: NPSH



Where motor mounting options are to be installed follow the manufactures recommended guidelines. However, when installing a pump complete with base and drive the following guidelines must be observed:

- The preferred drive arrangement for any rotary lobe pump is in-line direct coupled.

⚠ 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 that 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 installing pump sets in flammable or explosive environments, or 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

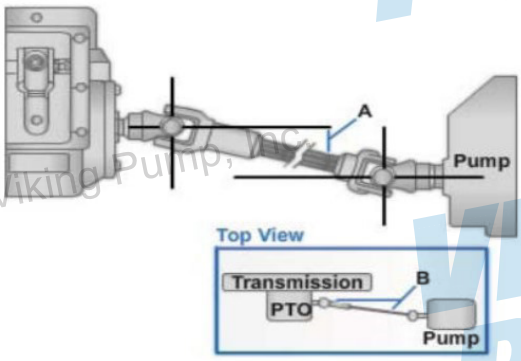
- Baseplates must be secured to a flat level surface such that distortion and misalignment are avoided. **Once baseplates are fastened in position the drive alignment must be re-checked.**

- 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 another similar method. Ensure all components are correctly grounded.

Pump Installation With PTO Shaft

RTP and RTPe pumps are typically driven by a close coupled hydraulic motor mounted directly to the back of the pump gearbox where the pump has a hollow drive shaft and an SAE mounting flange. The pump is also available with a conventional male drive shaft suitable for coupling to an electric motor via a flexible coupling, or for use with a Power Take Off shaft (PTO) driven from the vehicle's transmission gearbox.

If using a PTO shaft it is important that the angular offsets between the PTO output and the Pumps input shaft is minimised. The angles A & B in the drawing below should not exceed 8°.



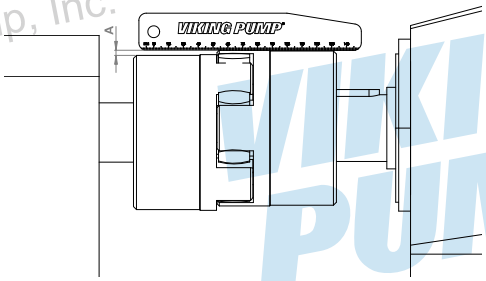
The use of a clutch or torque limiter is recommended for additional protection for the PTO system and pump, as is suitable guarding of the rotating elements. For other installation and safety guidlines please refer to the applicable Installation Operation & Maintenance Manuals for the Pump, PTO and transmission systems.

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.

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

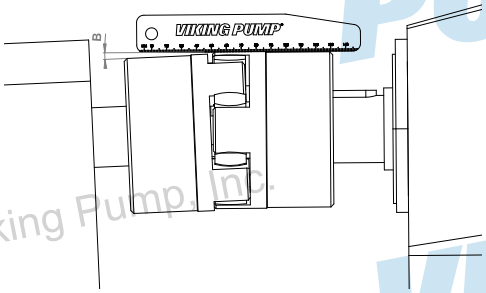
FIGURE 6



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.

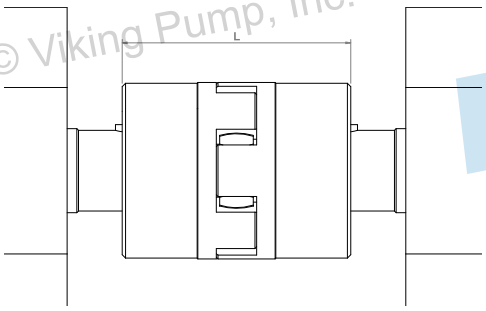
FIGURE 7



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 8



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

Installation with CIP Systems

The RTP® Series range has been designed to be effectively cleaned by the CIP procedures recommended for in-place cleaning of the process plant. To assist in maximising the effectiveness of cleaning within the pump head it is recommended that during the cleaning cycle a flow rate equivalent to a velocity of 1.5 metres per second; in a pipe of equal diameter to the rotor case connections is achieved. With a differential pressure of 2 to 3 bar (30 to 45 psi) being developed across the pump head

For applications where maximum drainage of the pump head is required, for example in the handling of 'Agri-Foodstuffs' and/or where CIP is employed, the pump ideally should be mounted with the rotor case connections in the vertical orientation. A procedure must be determined to ensure that the pump is effectively cleaned. It is recommended that this cycle would typically include a combination of some or all of the following: Acidic or Caustic based Detergents, 'Sanitisers', Disinfectants and Water rinses. These must be appropriate to both the products being handled and the materials of construction of the pump.

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 installed with flushed product seals check that all auxiliary services are in place and connected and provide sufficient flow and pressure for flushing purposes, refer to product seal ***"Product Seal Fitting & Removal" on page 16***.

⚠ WARNING

- Refer to ***"Lubricants" on page 23*** for lubricant capacities and grades.As standard, the pump is shipped with grease lubricant unless otherwise specified. The oil filled pumps differ in gearbox construction where breather, drain plug, and sight glasses are fitted.

⚠ WARNING

- If an external relief valve is incorporated in the system check that it is set correctly. For start-up purposes, it is considered a 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 ***"Integral Pressure Relief Valve" on page 11***.

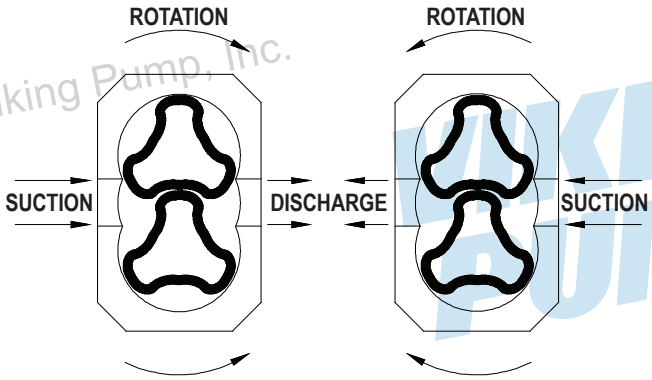
⚠ WARNING

- Ensure both suction and discharge valves are fully open, and pipework is free from all obstructions. RTP® Series pumps are of the positive displacement type 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

- Ensure rotation of the drive shaft is correct for the direction of flow required, see ***"Figure 9" on page 9***.

FIGURE 9: DIRECTION OF ROTATION



⚠ WARNING

- Ensure product is available at the inlet before starting the pump. This is very important for pumps installed with un-flushed product seals, as these sealing arrangements must never be allowed to run dry.

- Before beginning operation, it is considered a 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 pump temperature and power absorbed where possible.

SHUTDOWN PROCEDURE

⚠ DANGER

When shutting the pump down, stop the 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, flushed product seal auxiliary services have been isolated and depressurised.Pump head and piping have been drained and purged.

ROUTINE MAINTENANCE – NON ATEX UNITS

Grease

- Check for any signs of lubricant leakage
- Low maintenance gearbox, factory filled with EP 00 semi-fluid grease. The grease should not require replacement during the lifetime of the bearings or until 20,000 hours of operation.

Oil

⚠ WARNING

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

For lubricant capacities and grades refer to ***"Lubricants" on page 23***.

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

Grease

- Check for any signs of lubricant leakage on startup.
- Check for any signs of overheating.

Low maintenance gearbox, factory filled with EP 00 semi-fluid grease. The grease should not require replacement during the lifetime of the bearings or until 14,000 hours of operation.

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 23***.

⚠ 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.

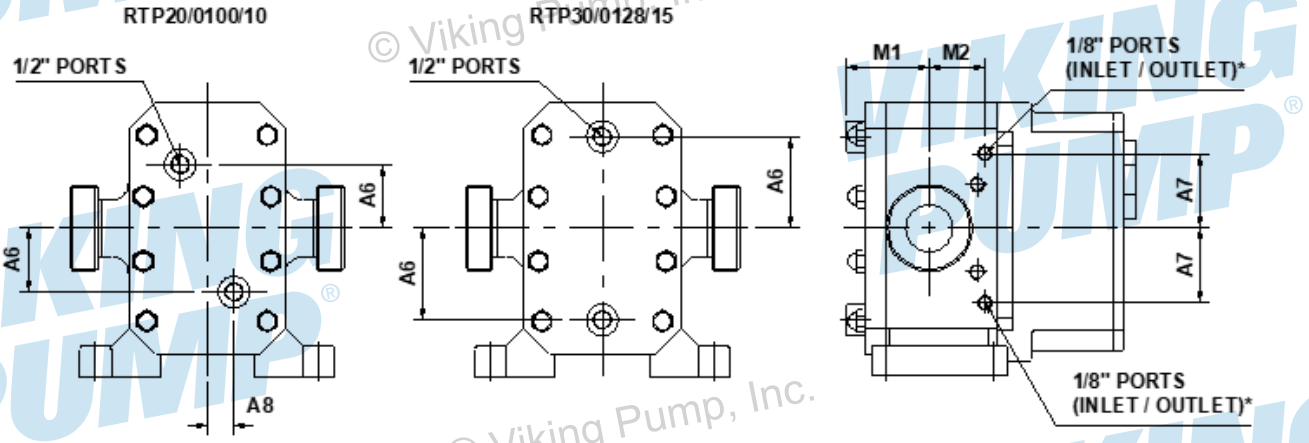
We highly recommend that the general overhaul is carried out by Viking Pump.

HEATING & COOLING DEVICES

See ***"Figure 10" on page 10***.

The RTP® Series model can be supplied with a jacketed front cover and rotorcase with ports for circulation of a heating/cooling media. The jacketed front cover and rotorcase heating and cooling ports are strategically positioned such that the required thermal effect acts on the pumping chamber and product seal area.

FIGURE 10: DIMENSIONS FOR HEATING/COOLING



	Dimensions in Millimeters:					*Dimensions in Inches:*				
	A6	**M1**	**A7**	**M2**	**A8**	**A6**	**M1**	**A7**	**M2**	**M2**
RTP20/0100/10	80	79	N/A	N/A	45	3.14	3.11	N/A	N/A	1.77
RTP30/0128/12	108	86	82.5	51	N/A	4.25	3.39	3.25	2.01	N/A

BSP Ports fitted as standard. N/A = Option not available.

⚠ DANGER

The pressure rating of the RTP® Series jacketed front cover and rotorcase heating/cooling ports are 3.5 bar g (50 psi) and should not be exceeded without consulting Viking Pump or your Viking Pump Hygienic authorised 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. Where a CIP cycle is employed as part of the process, the heating/cooling media should continue to be circulated during the cleaning cycle.

INTEGRAL PRESSURE RELIEF VALVE

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.

⚠ WARNING

When the valve opens, because the volume of fluid circulating is relatively small, the temperature of the fluid 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 fluid. For these reasons when the valve has 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.

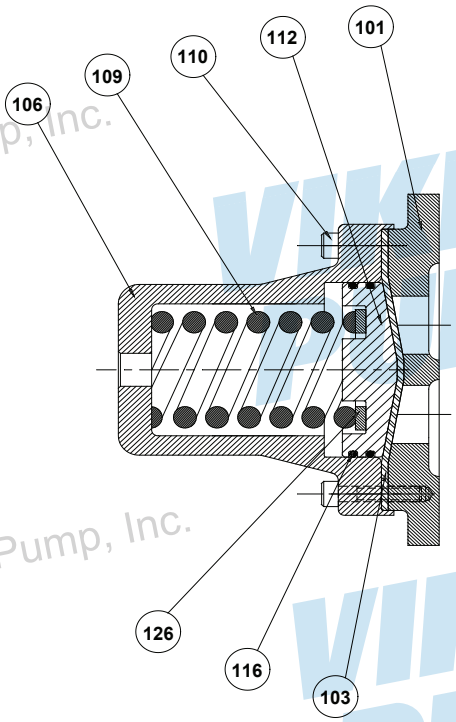
If the pump on which the valve is installed is to be installed in either a pressurised system or one incorporating a vessel under vacuum, the application of the valve should be referred to Viking Pump or their Viking Pump Hygienic authorised distributor. In addition to where the pump is mounted onto a mobile unit with drive, it is recommended that an integral pressure relief valve is installed.

⚠ WARNING

NOTE: Care should be taken not to exceed either the pumps maximum pressure rating or the system design pressure.

The spring housing component including spring, stem and valve; are manufactured as complete units and available in 7, 10 and 12 bar options. This must be specified at the time of order. If further adjustment is required to the assemblies consult Viking Pump or your local Viking Pump Hygienic authorised distributor.

FIGURE 11: PRE-SET RELIEF VALVE



ITEM	DESCRIPTION
101	RV Front Cover
103	Diaphragm (PTFE Face to the Product)
106	Spring Housing
109	Spring
110	Screw
112	Valve Head
116	O-Ring
126	Spacer (If Required)

⚠ DANGER

Under no circumstances should any attempt be made to dismantle a pressure relief valve which has not had the spring pressure relieved (where applicable) or is mounted on a pump that is operating. Serious personal injury or pump damage may occur.

RTP® PUMP DISMANTLING & ASSEMBLY

⚠ DANGER

Before undertaking any work on the pump the Shutdown Procedure should be followed in ***"Shutdown Procedure" on page 9***, and site safety practices must be observed.

⚠ DANGER

While dismantling 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 assemblies should be lifted using suitable devices. Use threaded holes for attaching lifting eyes where appropriate.

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

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

Lip-seals and O-rings are incorporated within the assembly. 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 installing new O-rings and lip-seals. When removing and replacing lip-seals ensure that the location bore for the outside diameter and the seat for the back of the lip-seal is not damaged as this may create a leakage path.

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

All O-rings and sealing lips of Lip-seals should be lightly lubricated with a suitable lubricant (silicon grease, etc.) before installing.

Prior to assembly, ensure all parts are clean and free from burrs or damage. When a vice is to be used, it should have protective jaws to avoid damage to components. Do not 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 21***.

Bearing cones may be pressed into position providing the proper equipment and procedures are employed to prevent component damage.

⚠ WARNING

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

For torque settings of fasteners and shaft rolling torque, see ***"Fasteners & Torque Settings" on page 21***.

DISASSEMBLY

Front Cover and Rotor Removal

See ***"Figure 12" on page 17***.

⚠ DANGER

Follow recommended Shutdown Procedure, referring to ***"Shutdown Procedure" on page 9***.

⚠ DANGER

Gradually loosen front cover retaining nuts (36). Care should be taken as residual product and pressure may still be present in the pump head. As the dome nuts are loosened this will vent to atmosphere.

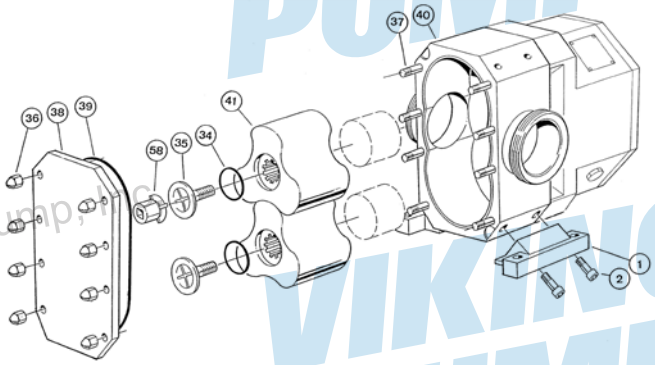
- Remove dome nuts (36).
- Remove front cover (38), using lever slots where necessary, continue and remove the front cover O-ring (39) from rotorcase (40).
- Remove rotor retainer's (35) using socket (58) provided.

⚠ WARNING

NOTE: The socket (58) should always be used. The use of other tools may damage the retainer.

- Remove retainer O-ring (34).
- Remove rotors (41) from shafts (9 and 10 – not shown), taking care not to damage the product seal components. Where viscous products are employed, a tool is available utilising the three M6 tapped holes, to aid in the removal of the rotors (41). Viking Pump or your Viking Pump Hygienic authorised distributor for details.
- Remove O-ring (25 – not shown) from shafts (9 and 10 – not shown).
- Remove product seals, refer to ***"Product Seal Fitting & Removal" on page 16***.

FIGURE 12: FRONT COVER & ROTOR REMOVAL



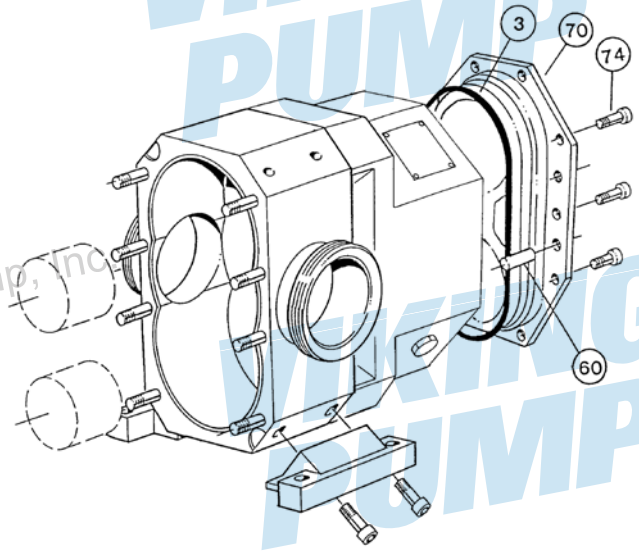
Gearbox Dismantling

(After Completing ***"Front Cover and Rotor Removal" on page 12***).

The following procedures assume that the pump has been removed from the base-plate and that the product seals have been removed (see ***"Product Seal Fitting & Removal" on page 16***).

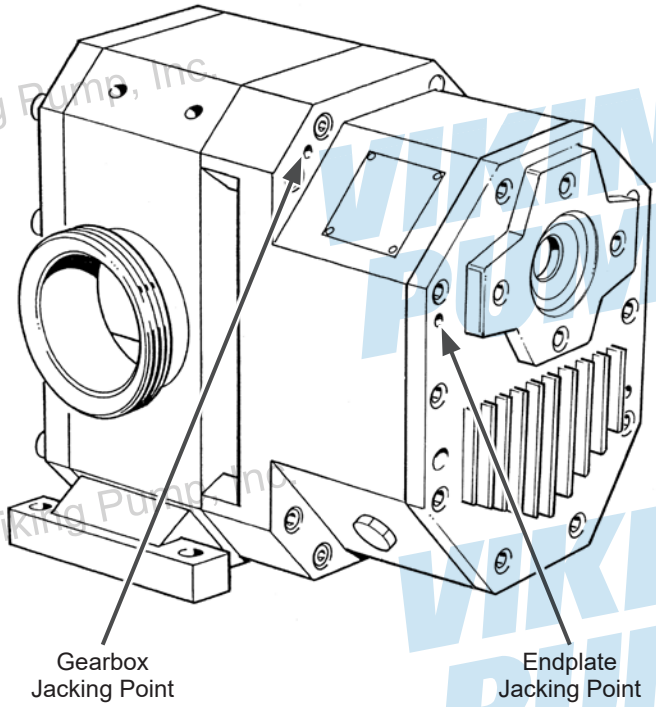
- Remove drain plug (5) and the breather (21). Drain lubricant into a suitable container and retain if later inspection is required.
- Remove retaining screws (74), and remove the endplate (70) from the gearbox (16) utilising the retaining screws (74) in the jacking points provided, see ***"Figure 14" on page 13***. The endplate is located on dowels (60) and is sealed by the O-ring (3), see ***"Figure 13" on page 13***.
- Remove the cups of the rear bearing (19, see ***"Typical Basic Pump Build (RTP20 Shown)" on page 24***) from the endplate (70).
- Remove the bearing pre-load shims (73, see ***"Typical Basic Pump Build (RTP20 Shown)" on page 24***). **The shims (73, see *"Typical Basic Pump Build (RTP20 Shown)" on page 24*) may be different for each assembly and therefore should be kept in their respective positions.**
- Remove rear Lip-seal (11, not shown).

FIGURE 13: ENDPLATE REMOVAL



- Remove shaft assemblies from the gearbox (16, see Figure 5.6). Shaft assemblies will be complete with gears (14), and bearings (24 and 19) – see ***"Figure 15" on page 13***.
- Remove Lip-seals (17) from the gearbox (16).
- Disassemble gearbox (16) from rotorcase (40) by removing the retaining screw (7). Utilising the retaining screws (7) in the jacking points on the gearbox; the gearbox (16) and rotorcase (40) can be separated, see ***"Figure 14" on page 13***.
- Remove bearing cup (24) from the gearbox (16).

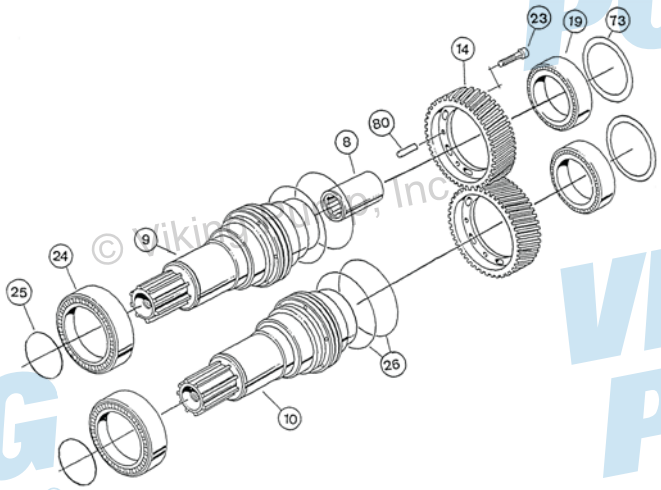
FIGURE 14: GEARBOX & ENDPLATE JACKING POINTS



Shaft Disassembly (RTP30 Shown)

- Remove the rear bearing assembly (19).
- Remove the timing gear screws (23).
- Remove the timing gear (14) and locating dowel (80).
- Remove O-rings (26) from the rear of the shaft (9 or 10).
- Remove O-rings (25) from the front of the shafts (9 or 10).
- Remove front bearing assembly (24).

FIGURE 15: BEARING & TIMING GEAR REMOVAL



NOTE: Right-hand helix for drive shaft gear (stamped D), left-hand helix for driven shaft gear (stamped L). When ordering spare timing gears it is essential to purchase and install these as a pair.

ASSEMBLY

Gearbox & Rotorcase Assembly

See ***"Figure 16" on page 14***.

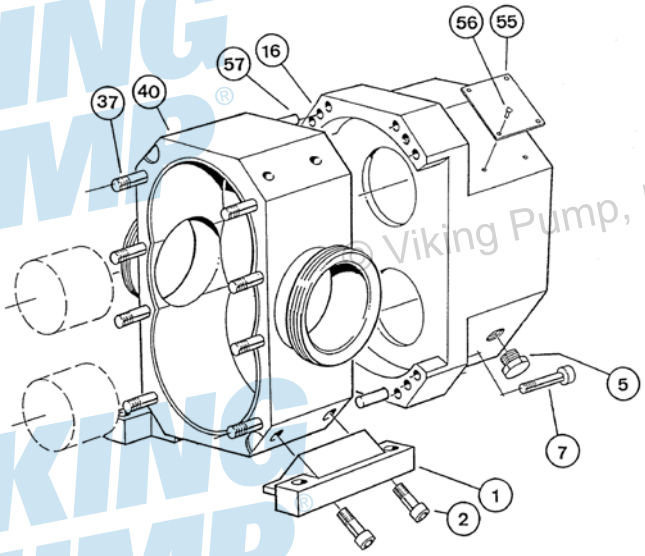
- Install front bearing cups (24 not shown).

⚠ WARNING

Do not install the front lip seals (17) until the bearing pre-load has been set. The lips may give a false rolling torque reading as well as increasing the risk of damage during assembly.

- Install rotorcase (40) to the gearbox (16) and secure using cap screws (7).
- Install drain plug (5), where required in required position in gearbox cover (16).
- If not already installed, mount feet (1) to rotorcase (40) in the required positions using cap screws (2). Install the seal sleeve (if required) see ***"Product Seal Fitting & Removal" on page 16***.

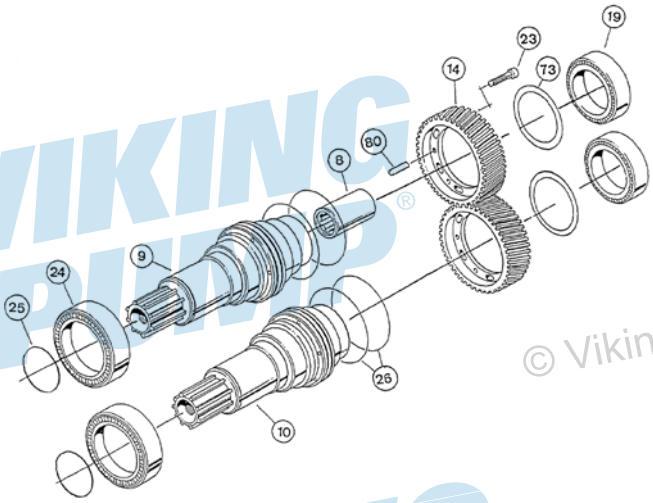
FIGURE 16: GEARBOX & ROTORCASE ASSEMBLY



Shaft Assembly – RTP20

- Install front bearing (24) to the shaft (9 or 10).
- Install O-rings (26 and 25), to shafts (9 or 10) in the appropriate grooves. Lightly lubricate all O-rings with a compatible lubricant.
- Install the gear (14) over the O-rings (26) and secure with retaining bolts (23). It is recommended that the screws be aligned at the centre of the slots provided to give an equal amount of adjustment in either direction. **They should also not be tightened to the correct torque at this point, as an adjustment to the timing may still be required.**
- place a nominal amount (0.05 mm) of shim (73) under the rear bearing cups
- Install rear bearing (19).

FIGURE 17: SHAFT ASSEMBLY



- Install the shaft assemblies into the gearbox (16) so that the cone and cup halves of the front bearing (24) are now one unit.

⚠ WARNING

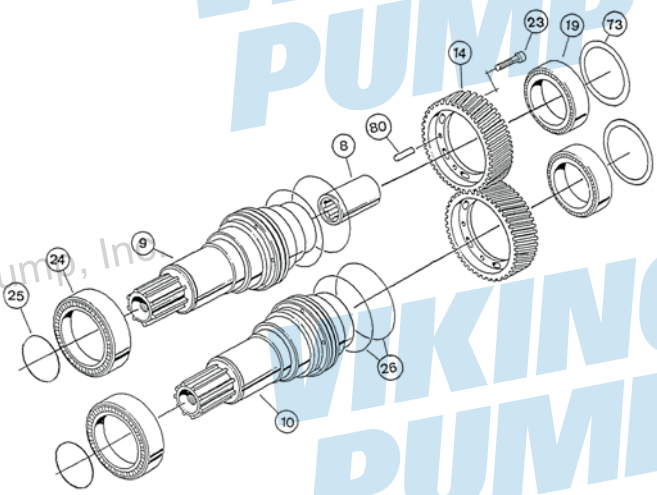
- Assemble the endplate by installing O-ring (3). **Do not install the rear lip seal (11) until the bearing pre-load has been set. The lips may give a false rolling torque reading as well as increasing the risk of damage during assembly.**

- Install endplate assembly onto the gearbox (16) locating on the dowel (60).

Shaft Assembly – RTP30

- Install front bearing (24) to the shaft (9 or 10).
- Install O-rings (26 and 25), to shafts (9 or 10) in the appropriate grooves. Lightly lubricate all O-rings with a compatible lubricant.
- Install the gear (14) over the O-rings (26) and secure with retaining bolts (23). It is recommended that the screws be aligned at the centre of the slots provided to give an equal amount of adjustment in either direction. **They should also not be tightened to the correct torque at this point, as an adjustment to the timing may still be required.**
- Install rear bearing (19).

FIGURE 18: SHAFT ASSEMBLY



- Install the shaft assemblies into the gearbox (16) so that the cone and cup halves of the front bearing (24) are now one unit.

⚠ WARNING

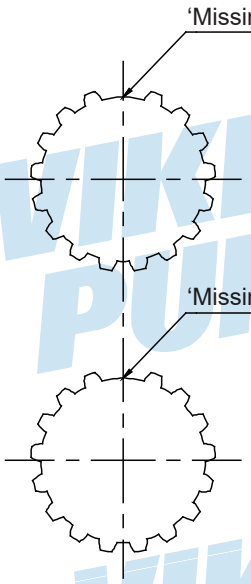
- Assemble the endplate by installing O-ring (3) and place a nominal amount (0.05 mm) of shim (73) under the rear bearing cups (19). **Do not install the rear lip seal (11) until the bearing pre-load has been set. The lips may give a false rolling torque reading as well as increasing the risk of damage during assembly.**

- Install endplate assembly onto the gearbox (16) locating on the dowel (60).

Timing

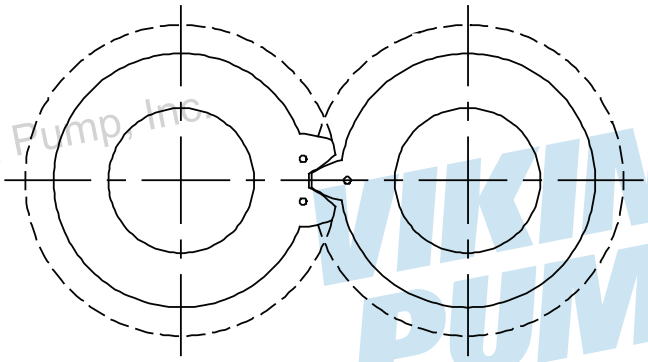
- Rotate the shafts (9 and 10) so as to position the gaps made by the missing splines, in the vertically uppermost position, See ***"Figure 19" on page 15***.

FIGURE 19: ALIGNING THE MISSING SPLINES



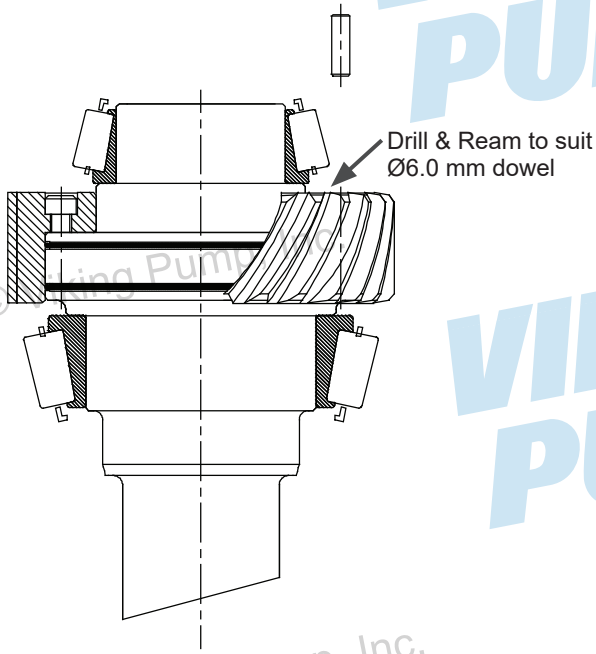
- Assemble the rotors (41), rotor retainers (35) and O-rings (34) onto the shafts (9 and 10).
- To achieve the correct timing clearance, rotate one shaft, whilst securing the other. The gear (14) will rotate on the lubricated O-rings until the correct mesh clearance is achieved. For mesh, clearances refer to ***"Clearance Chart" on page 21***.
- If the rotor clearances cannot be achieved, then the rotor assembly will need to be dismantled and the shaft assembly removed from the gearbox. Rotate one tooth on the gear mesh, replace the shaft, and re-adjust the timing once more.
- Once the correct clearances have been achieved, tighten the gear retaining screw (23) to the correct torque see ***"Fasteners & Torque Settings" on page 21***, and mark the teeth at the mesh point, see ***"Figure 20" on page 15***.
- **Recheck all clearances before moving on to the next stage.**

FIGURE 20: ALIGNING THE MESH POINT



- Remove the shaft assemblies from the gearbox (16).
- Using the holes provided drill and ream both gear (14) and shaft (9 and 10) to suit Ø6.0 mm dowel (80), as shown in ***"Figure 21" on page 15***. It is important to drill and ream the hole so that the dowel is positioned equally between the gears (14) and shafts (9 and 10).

FIGURE 21: INSTALLING & POSITIONING THE TIMING DOWEL



- Install the Ø6.0 mm dowel into the drilled and reamed hole; applying a suitable adhesive to ensure that the dowel stays in place.

Setting the rolling torque

⚠ WARNING

It is important that the product seals, both front and rear lip seals are not installed until the bearing pre-load has been set and the clearances checked. The seals may give a false rolling torque reading as well as increasing the risk of damage during assembly.

- Re-install one of the shaft assemblies into the gearbox (16) and replace the endplate assembly, ensure that the retaining screws (74) are tightened to the correct torque, see ***"Fasteners & Torque Settings" on page 21***.

- Using a torque meter, check the rolling torque of each shaft assembly (separately) referring to ***"Fasteners & Torque Settings" on page 21*** for the correct settings. If necessary, adjust the amount of shim (73) under the rear bearing cup (19). Either by adding shims (73) to increase the rolling torque or by removing shim (73) to decrease the torque until the correct setting is achieved.
- Repeat steps detailed above for the remaining shaft assembly.
- Once the rolling torque has been set for both shaft assemblies. If the gearbox assembly is still installed to the rotorcase assembly, remove retaining screw (7). Utilising the jacking points on the gearbox and the screws (7), disassemble the gearbox assembly from the rotorcase assembly, see ***"Figure 14" on page 13***. The lip seals (17) can be installed into the gearbox (16) and the 'slinger' disc (62) where applicable, requires lubricating with a compatible lubricant before assembly onto the shaft. The lip seal (11) can also be installed into the endplate (70).

Rotor Clearances

Install rotors (41) onto shafts (9 and 10) in rotorcase (40), install retainer O-ring (34) into the bore of the rotor and secure with rotor retainer (35). Set to correct torque (see ***"Fasteners & Torque Settings" on page 21***) using socket tool (58).

NOTE: The retainer O-ring (34) seals the shaft/rotor spline and should not be re-used if cut, distorted or damaged in such a way as to impair its ability to form a seal. If in doubt a new O-ring should always be installed.

- Using a depth micrometre or similar device measure front clearance between the rotorcase and rotor front faces. With a feeler gauge set or similar device measure the side and rear clearances.
- With rotors (41) installed, check all clearances, front (A), radial (C), rear (B) and mesh (D), against the Clearance Chart, refer to ***"Clearance Chart" on page 21***. Remove rotors (41) and install product seals, refer to ***"Product Seal Fitting & Removal" on page 16***, reassemble rotors (41) tightening to the correct torque.

⚠ WARNING

- Install O-ring (39) into the rotorcase (40). Install front cover (38) to rotorcase (40), securing with dome nuts (36), tightening to correct torque, refer to ***"Fasteners & Torque Settings" on page 21***.

PRODUCT SEAL FITTING & REMOVAL

General Procedures for Installing Seals

- Mechanical seals are precision-engineered assemblies incorporating finely lapped seal faces and seats. They must, therefore, be handled with care and will not give optimum performance unless installed carefully and according to instructions.
- Where mechanical seals are to be reused ensure that seal component is 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 lip seals.
- Ensure 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.
- Ensure that seal faces are undamaged, and the O-rings are not cut, swollen, or cracked.
- Lip-seals and O-rings within the seal assemblies should be lightly lubricated with an elastomer compatible, food-grade lubricant. Ensure there is not an excessive amount of lubricant especially around the seal face area. Lubrication points are available options, for more information contact Viking Pump or your Viking Pump Hygienic authorised distributor.
- When fitting PTFE encapsulated O-rings, it is important to immerse them in hot water for several minutes to soften them.
- Ensure seal seats are mounted squarely.
- Ensure when installing seals with brittle faces 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 any seal options dry.

Terminology

"Quench"

- To provide a liquid barrier, which 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.

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 'flush' is required.

A quench provides a static head. The media vessel should be mounted a minimum of 1.5 feet above the pump, preferably directly above the seal area. The interconnecting pipework 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 three litres per minute per shaft seal (0.8 US Gal per min).

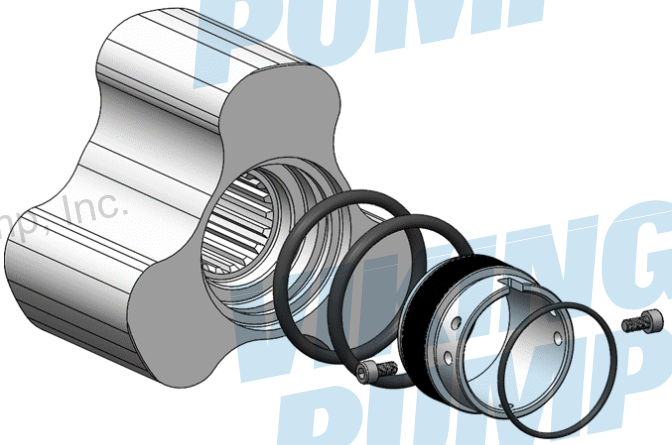
⚠ WARNING

NOTE: The limiting 'flush' or 'quench' pressure in any application is 0.5 bar (7 psi).

RTP20 O-ring Seal Removal and installation

(above orders # 61152)

FIGURE 22: O-RING SEAL



⚠ WARNING

NOTE: Extreme care should be taken when carrying out these procedures to ensure that the O-ring grooves, sleeve faces and O-ring are not damaged.

- Remove the front cover dome nuts, front cover, rotor retainer and rotor as per ***"Front Cover and Rotor Removal" on page 12***
- The seal O-rings in the rotor are now ready for inspection and replacement if needed (***"Figure 22" on page 17***).
- To remove the rotorcase sleeve remove the socket head screws and pull the sleeve out from the rotorcase (***"Figure 23" on page 17***).
- The sleeve and sleeve O-ring can now be inspected and replaced if needed.
- To install the sleeve, make sure the sleeve O-ring is in place and the location slot lines up with the drive pin When it is in place tighten up the grub screws and the assembly will be held in place.

FIGURE 23

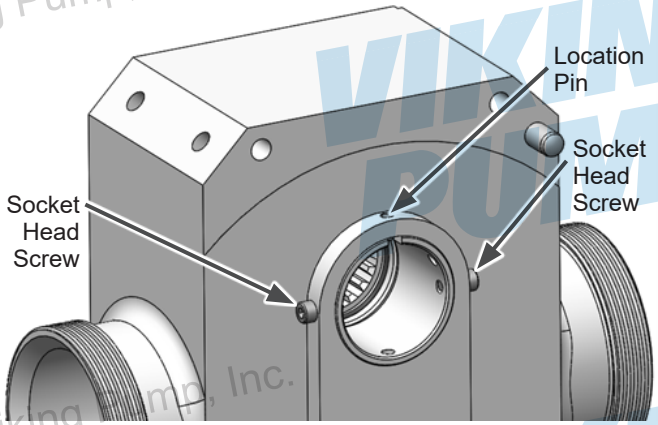
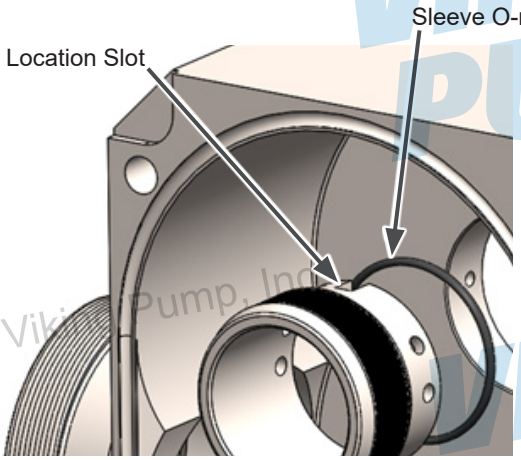


FIGURE 24



- To install the rotors, see ***"Rotor Clearances" on page 16*** Rotor clearance check – installation

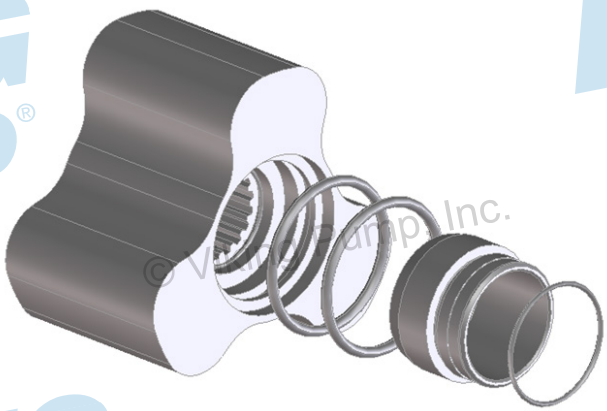
⚠ WARNING

NOTE: The grub screws are only required on the RTP20 O-ring seal.

RTP20 O-ring Seal Removal and installation

(pre-orders # 61151)

FIGURE 25: O-RING SEAL



⚠ WARNING

NOTE: Extreme care should be taken when carrying out these procedures to ensure that the O-ring grooves, sleeve faces and O-ring are not damaged.

- Remove the front cover dome nuts, front cover, rotor retainer and rotor as per ***"Front Cover and Rotor Removal" on page 12***
- The seal O-rings in the rotor are now ready for inspection and replacement if needed (***"Figure 25" on page 17***).
- To remove the rotorcase sleeve remove the screws and pull the sleeve out from the rotorcase (***"Figure 26" on page 18***).
- The sleeve and sleeve O-ring can now be inspected and replaced if needed.
- To install the sleeve, make sure the sleeve O-ring is in place and the location slot lines up with the drive pins When it is in place tighten up the grub screws and the assembly will be held in place.

FIGURE 26

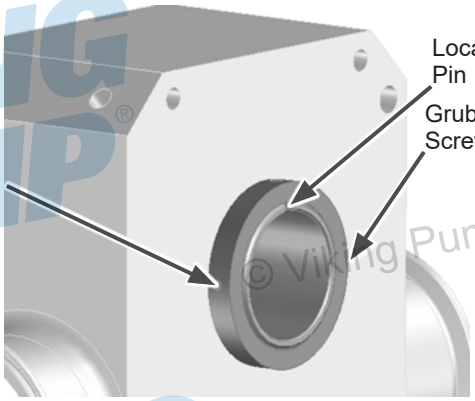


FIGURE 27

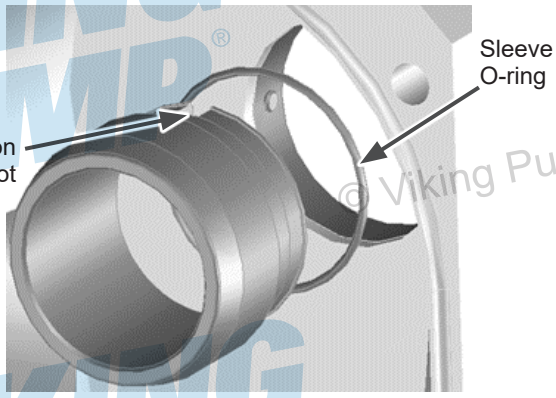
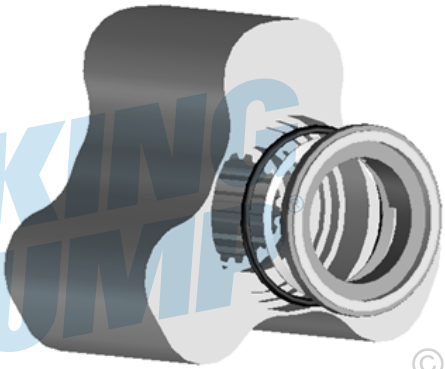
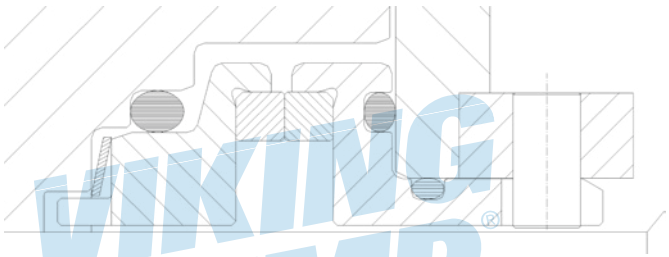


FIGURE 28: MECHANICAL SEAL





- Remove the static seal face using the seal extractor tool and inspect or replace the O-rings as required.
- To install the rotors see ***"Rotor Clearances" on page 16*** Rotor clearance check – installation

⚠ WARNING

NOTE: The grub screws are only required on the RTP20 O-ring seal

RTP20 Mechanical Seal

- Remove the front cover dome nuts, front cover, rotor retainer and rotor as per ***"Front Cover and Rotor Removal" on page 12***
- Remove the rotary seal face using the seal extractor tool and inspect or replace the O-rings as required. When installing the seal face ensure correct engagement of the two drive dogs (***"Figure 28" on page 18***).
-

FIGURE 29: MECHANICAL SEAL ASSEMBLY

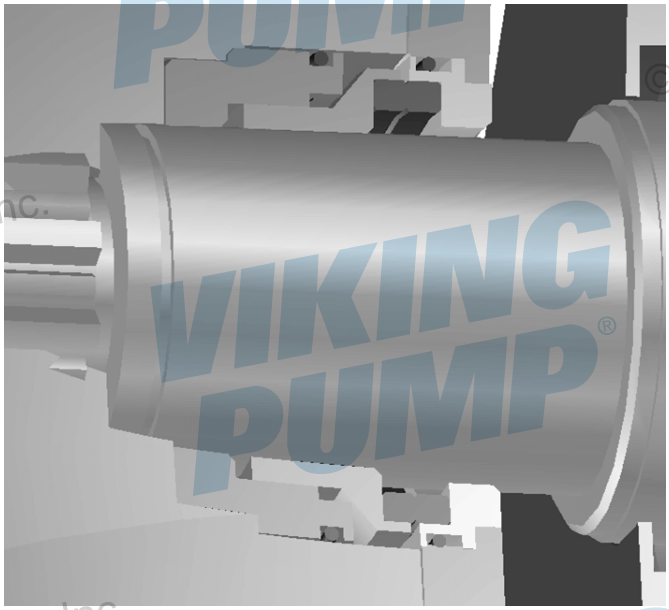
- When installing the static face into the rotorcase make sure that the slot in the static face lines up with the pin in the rotorcase (***"Figure 29" on page 18***).
- To install the rotors, see ***"Rotor Clearances" on page 16*** Rotor clearance check – installation

⚠ WARNING

NOTE: If replacing an O-ring seal for a mechanical seal remove the grub screw shown in *"RTP20 O-ring Seal Removal and installation" on page 17* and dispose of them as they can interfere with the operation of the mechanical seal.

RTP30 Class 1 Hygienic Mechanical Seal

FIGURE 30: CLASS 1 HYGIENIC MECHANICAL SEAL



- Read the general procedures before proceeding, refer to ***"General Procedures for Installing Seals" on page 16***.
- Remove the dome nuts (36), front cover (38), rotor retainers (35), rotors (41) and front cover O-ring (39), see ***"Disassembly" on page 12***.
- The seal can now be accessed for inspection.
- Remove the rotary seal face assembly from inside the rotor, taking care not to damage the O-rings.

⚠ WARNING

- Remove the stationary seal assembly from the rotorcase by releasing the retaining nut (12). Note that there is an anti-rotation device incorporated into the rotorcase (not shown) when replacing the seal, alignment between the seal and rotorcase must be achieved to prevent rotation.

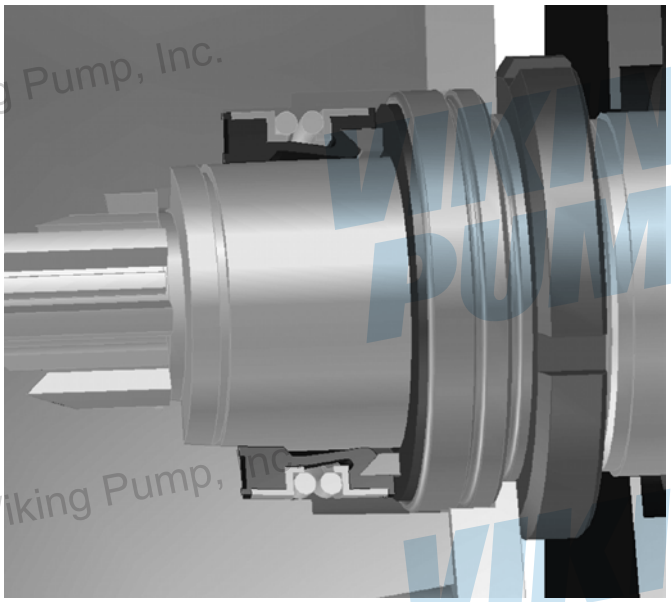
⚠ WARNING

NOTE: Extreme care should be taken when carrying out these procedures to ensure that the seal faces are not damaged. If seals are being refitted, ensure that seal faces remain matched.

- Assembly is the reverse of the above procedure, ensure that all faces are clean and free from damage.

RTP30 Class 2 Hygienic Mechanical Seal

FIGURE 31: CLASS 2 HYGIENIC MECHANICAL SEAL



Read the general procedures before proceeding, refer to ***"General Procedures for Installing Seals" on page 16***.

- Remove dome nuts (36), front cover (38), rotor retainers (35), rotors (41) and front cover O-ring (39), see ***"Disassembly" on page 12***.
- The seal can now be accessed for inspection.
- Remove O-ring (25), from the end of the shaft.
- Remove the rotary seal face assembly from the shaft.

⚠ WARNING

- If required, remove the seal housing (67) from the rotorcase by releasing the retaining nut (12), care should be taken as the stationary seal face may still be installed.

⚠ WARNING

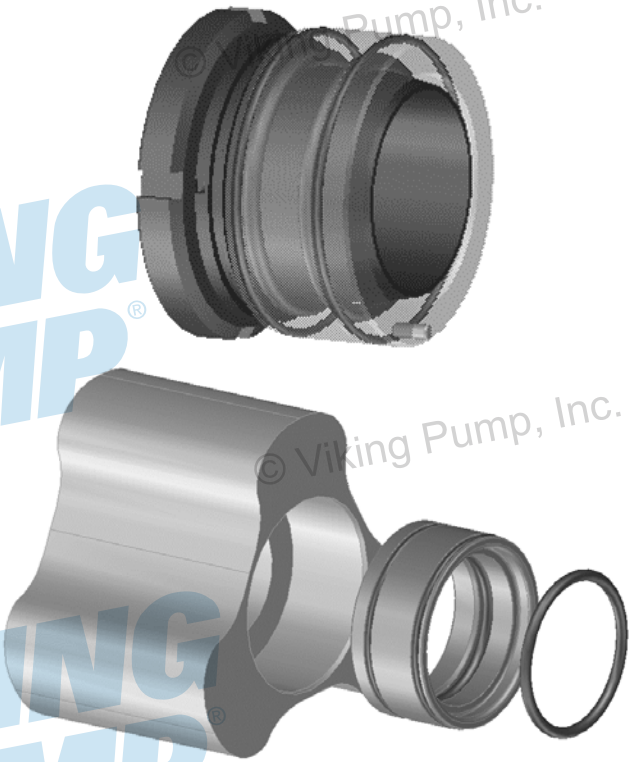
- If required, extract the stationary face from the seal sleeve, exposing the O-rings. Note that there is an anti-rotation device incorporated into the rotorcase (not shown) when replacing the seal housing (67), alignment between the seal sleeve and rotorcase must be achieved to prevent rotation.

⚠ WARNING

NOTE: Extreme care should be taken when carrying out these procedures to ensure that the seal faces are not damaged. If seals are being refitted, ensure that seal faces remain matched.

- Assembly is the reverse of the above procedure, ensure that all faces are clean and free from damage.

FIGURE 33: O-RING SEAL CARTRIDGE



Read the general procedures before proceeding, refer to ***"General Procedures for Installing Seals" on page 16***.

- Remove dome nuts (36), front cover (38), rotor retainers (35), rotors (41) and front cover O-ring (39), see ***"Disassembly" on page 12***.
- Remove the O-ring seal cartridge assembly from the rotor (41).
- The seals can now be accessed for inspection.
- The O-ring seals can now be removed and replaced (if required) from the cartridge.

⚠ WARNING

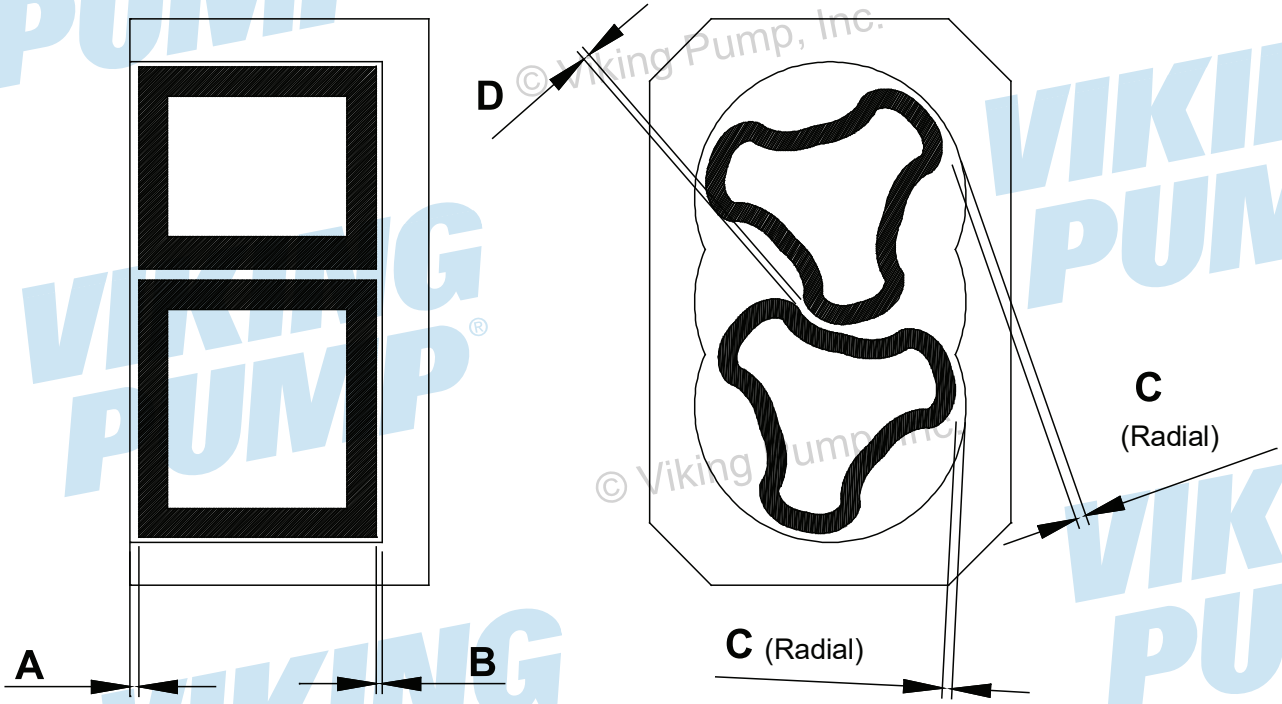
- If required, remove the seal sleeve (66) from the rotorcase by releasing the retaining nut (12), when replacing the seal sleeve (66), alignment between the seal sleeve and rotorcase must be achieved to prevent rotation.

⚠ WARNING

NOTE: Extreme care should be taken when carrying out these procedures to ensure that the seal faces are not damaged.

- Assembly is the reverse of the above procedure, ensure that all faces are clean and free from damage. Apply suitable lubricant to the second seals.

CLEARANCE CHART



		A		B		C		D
		Min	Max	Min	Max	Min	Max	Max
RTP20	Millimeters	0.3	0.6	0.25	0.55	0.45	0.65	0.25
	Inches	0.012	0.024	0.010	0.022	0.018	0.026	0.010
RTP30	Millimeters	0.3	0.7	0.25	0.6	0.55	0.75	0.35
	Inches	0.012	0.028	0.010	0.024	0.022	0.030	0.014

FASTENERS & TORQUE SETTINGS

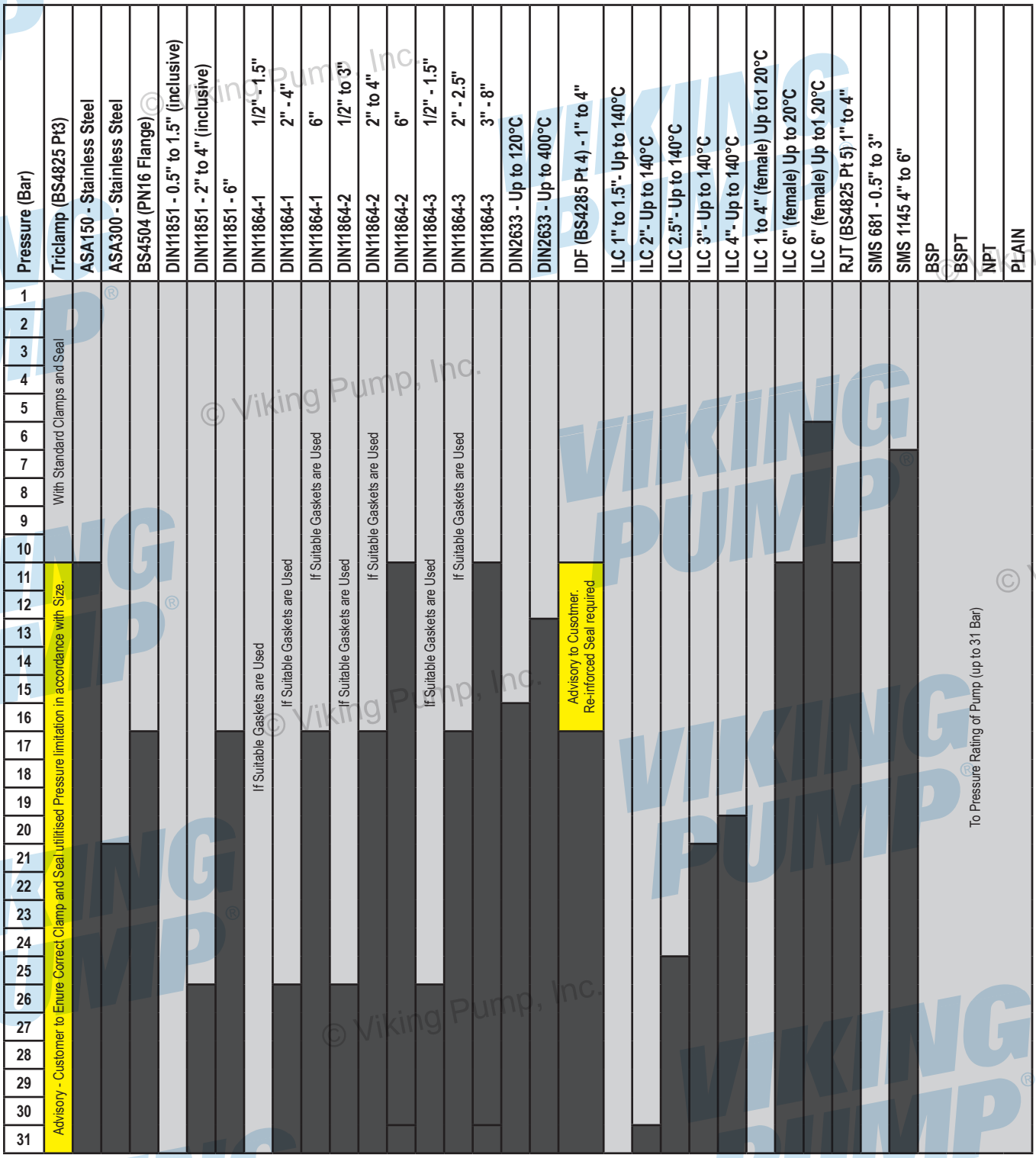
Item	Description	Position		RTP20	RTP30
2	Socket Head Cap Screw	Foot / Rotorcase	Quantity / Pump	4	4
			Size (mm)	M10 x 16	M10 x20
			Torque (N/m)	45	45
			Torque (lbf ft)	33.1	33.1
7	Socket Head Cap Screw	Gearbox / Rotorcase	Quantity / Pump	4	8
			Size (mm)	M10 x 55	M10 x 45
			Torque (N/m)	45	45
			Torque (lbf ft)	33.1	33.1
-	Seal Lock Nut (See 1.0)	Rotorcase	Quantity / Pump	N/A	2
			Size (mm)		M65 x 2.0
			Torque (N/m)		50
			Torque (lbf ft)		36.8
14	Socket Head Cap Screw	Timing Gear / Shaft	Quantity / Pump	10	5
			Size (mm)	M6 x 20	M6 x 20
			Torque (N/m)	16	16
			Torque (lbf ft)	11.8	11.8
35	Retainer	Rotor / Shaft	Quantity / Pump	2	2
			Part Number	G33-2052-01	C33-2051-01
			Torque (N/m)	108	108
			Torque (lbf ft)	79.6	79.6
36	Dome Nut (Acorn)	Front Cover / Rotorcase	Quantity / Pump	4	8
			Size (mm)	M12	M10
			Torque (N/m)	55	45
			Torque (lbf ft)	40.5	33.1

Item	Description	Position		RTP20	RTP30
37	Stud	Front Cover / Rotorcase	Quantity / Pump	4	8
			Size (mm)	M12 x 38	M10 x 30
			Torque (N/m)	—	—
			Torque (lbf ft)	—	—
56	Hammer Drive Screw	Nameplate / Gearbox	Quantity / Pump	4	4
			Size (mm)	—	—
			Torque (N/m)	—	—
			Torque (lbf ft)	—	—
74	Socket Head Cap Screw	Endplate / Gearbox	Quantity / Pump	10	6
			Size (mm)	M8 x 30	M10 x 25
			Torque (N/m)	16	45
			Torque (lbf ft)	11.8	33.1
110	Socket Head Cap Screw	PRV / Front Cover	Quantity / Pump	6	6
			Size (mm)	M8 x 40	M8 x 40
			Torque (N/m)	16	16
			Torque (lbf ft)	11.8	11.8
-	INDIVIDUAL Shaft Rolling Torque (Product & Lip Seal NOT Installed)		Rolling Torque (N/m)	2.0 to 2.75	2.0 to 2.75
			Rolling Torque (lbf ft)	1.47 to 2.02	1.47 to 2.02

NOTES: See product seal ***"Product Seal Fitting & Removal" on page 16*** where applicable.

For position of items, see ***"Typical Basic Pump Build (RTP20 Shown)" on page 24***, typical basic pump build.

PRESSURE LIMITATION OF PORT TYPES



LUBRICANTS

The recommended synthetic gearbox grease for use in the RTP® Series is one that is intended for 'sealed' units. Suitable for operating temperatures between 20°C and 120°C (-4°F to 248°F) and a base viscosity in the region of 150 Cst at 40°C (104°F).

The recommended gearbox oil for use in the RTP® Series is an "EP (Extreme Pressure) grade gear lube". The following grades should be used in these temperature ranges:

EP150: -18°C – 0°C (0°F – 32°F)

EP220: 0°C – 30°C (32°F – 85°F)

EP320: 30°C (85°F) and higher

Care should be taken not to overfill the gearbox.

Refer to manufacturers recommended operating conditions concerning limitations, servicing and application. In case of doubt, please consult the factory with details.

Approximate gearbox capacity when pump inlet/outlet ports are orientated in horizontal or vertical plane:

Model	litres	US Gallons
RTP 20	1.1	0.29
RTP 30	0.575	0.15

TOOL LIST

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

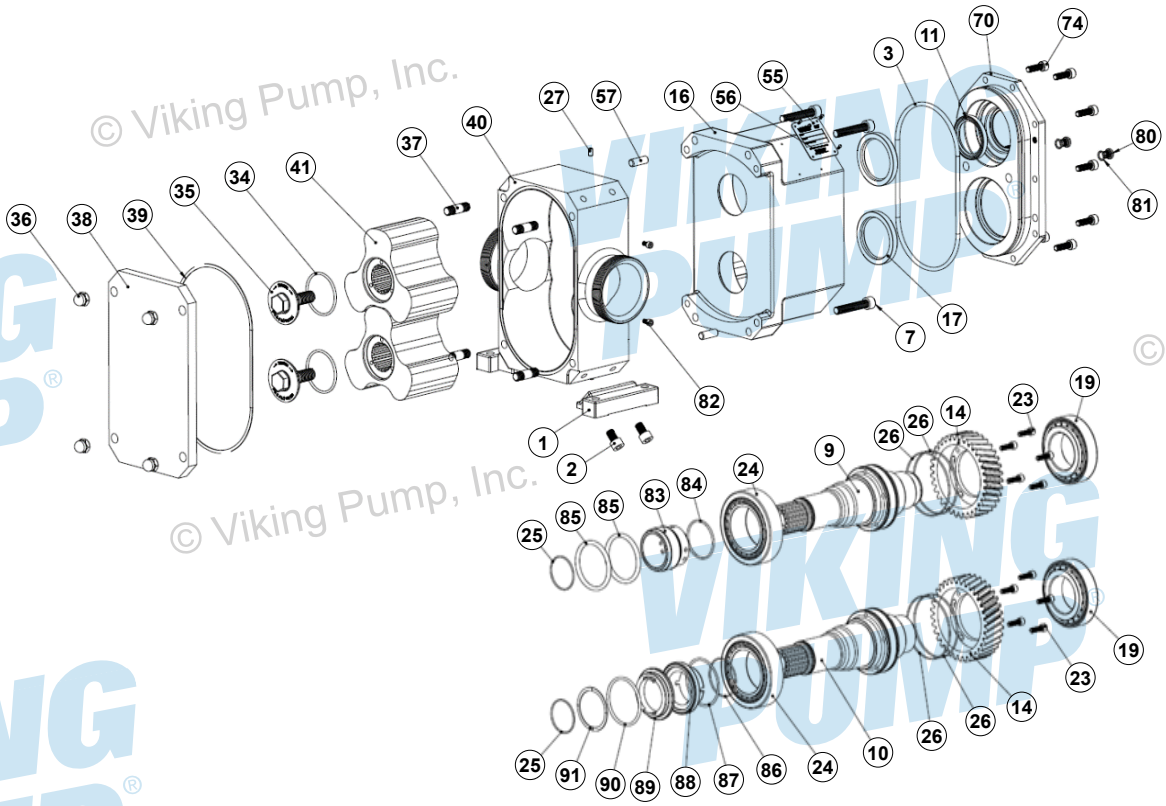
RTP20

TYPE	SIZE OR RANGE
HEXAGON (ALLEN) KEY	3 MM
HEXAGON (ALLEN) KEY	5 MM
HEXAGON (ALLEN) KEY	8 MM
COMBINATION SPANNER	19 MM
TORQUE WRENCH	Adjustable to min. 135 NM (99.57 FT-LB)
DEPTH MICROMETER	0 - 25 MM (0 - 1")
FEELER GAUGE SET	0.03 MM TO 0.50 MM (0.0012" TO 0.0197") – 388M
ROLLING TORQUE METER	0 - 5 NM (0 - 3.69 FT-LB)
SOFT-FACED MALLET	
STEEL HAMMER	Small

RTP30

TYPE	SIZE OR RANGE
HEXAGON (ALLEN) KEY	5 MM
HEXAGON (ALLEN) KEY	8 MM
COMBINATION SPANNER	17 MM
TORQUE WRENCH	ADJUSTABLE TO MIN. 135 NM (99.57 FT-LB)
DEPTH MICROMETER	0 - 25 MM (0 - 1")
FEELER GAUGE SET	0.03 MM TO 0.50 MM (0.0012" TO 0.0197") – 388M
ROLLING TORQUE METER	0 - 5 NM (0 - 3.69 FT-LB)
SOCKET FOR ROTOR RETAINER	SUPPLIED WITH PUMP
HOOK WRENCH (HN12)	TO SUIT LOCKNUT OUTSIDE Ø 85MM (3.346")
SOFT-FACED MALLET	
STEEL HAMMER	SMALL

TYPICAL BASIC PUMP BUILD (RTP20 SHOWN)



Item	Description	Item	Description	Item	Description
1	Rotor Case Foot	26	Timing Gear O-Ring	74	End Plate Screw
2	Foot Screw	27	Anti-Rotation Dowel	80	Plug
3	Endplate O-Ring	34	Rotor Retainer O-Ring	81	Fibre Washer
7	Gearbox Screw	35	Rotor Retainer - Hex Head	82	Grub (Sleeve) Screw
9	Drive Shaft	36	Front Cover Nut	83	Seal Sleeve - Non-Flush, Sleeve Screws
10	Lay Shaft	37	Front Cover Stud	84	Sleeve O-Ring
11	Drive Shaft Lip Seal	38	Front Cover	85	Dynamic O-Ring
14	Timing Gear	39	Front Cover O-Ring	86	Static Gasket
16	Gearbox - For Grease	40	Rotor Case	87	O-Ring
17	Gearbox Lip Seal	41	Trilobe Rotors	88	Mechanical Seal Face (Static)
19	Rear Bearing	55	Nameplate	89	Mechanical Seal Face
23	Timing Gear Screw	56	Nameplate Screw	90	O-Ring
24	Front Bearing	57	Gearbox Dowel	91	Wave Spring
25	Shaft O-Ring	70	End Plate		

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

SERVICE HISTORY

Pump Model: Pump Serial No:

DATE	COMMENTS

NOTES

VIKING PUMP®

WARRANTY

Viking pumps, strainers and reducers are warranted to be free of defects in material and workmanship under normal conditions of use and service. The warranty period varies by type of product. A Viking product that fails during its warranty period under normal conditions of use and service due to a defect in material or workmanship will be repaired or replaced by Viking. At Viking's sole option, Viking may refund (in cash or by credit) the purchase price paid to it for a Viking product (less a reasonable allowance for the period of use) in lieu of repair or replacement of such Viking product. Viking's warranty is subject to certain restrictions, limitations, exclusions and exceptions. A complete copy of Viking's warranty, including warranty periods and applicable restrictions, limitations, exclusions and exceptions, is posted on Viking's website (www.vikingpump.com/warranty#information). A complete copy of the warranty may also be obtained by contacting Viking through regular mail at Viking Pump, Inc., 406 State Street, Cedar Falls, Iowa 50613, USA.

THIS WARRANTY IS AND SHALL BE VIKING'S SOLE AND EXCLUSIVE WARRANTY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ALL WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE AND NON-INFRINGEMENT, ALL OF WHICH OTHER WARRANTIES ARE EXPRESSLY EXCLUDED.

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