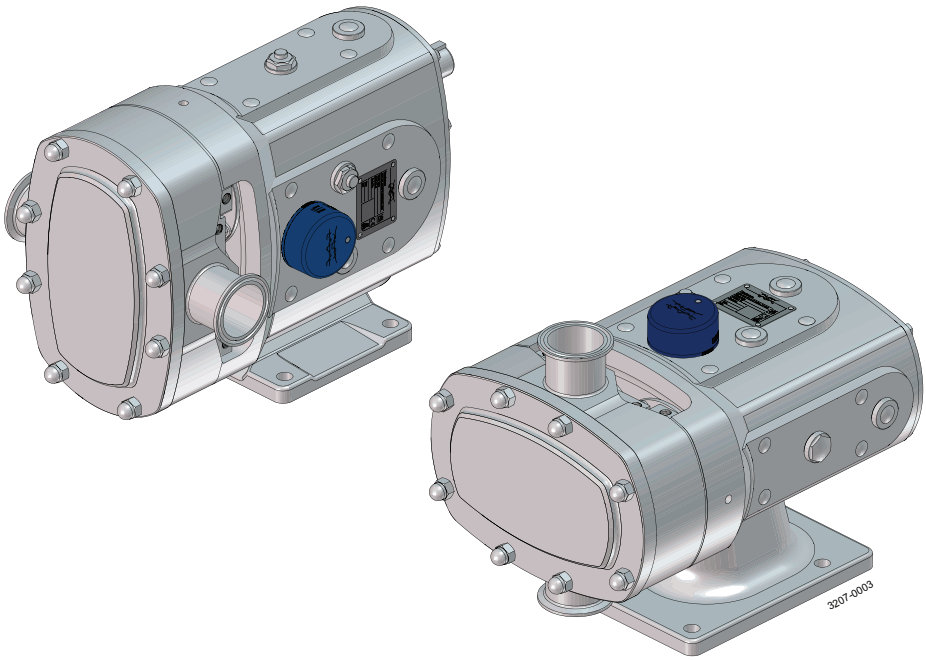
Alfa Laval MaxiLobe

Rotary lobe pumps



Lit. Code 200021706-1-EN-GB

Instruction manual

British English

Published by
Alfa Laval Kolding A/S
Albuen 31
DK-6000 Kolding, Denmark
+45 79 32 22 00

The original instructions are in English

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1 Declarations of Conformity

EU Declaration of Conformity

The designated company

Alfa Laval Kolding A/S, Albuen 31, DK-6000 Kolding, Denmark, +45 79 32 22 00

Company name, address and phone number

Hereby declare that

Pump

Designation

Maxilobe 22; 23; 32; 33; 42; 43; 52; 53; 62; 63; 72; 73

Type

AAB000000001-AAB999999999, AAX000000001-AAX999999999

Serial number

is in conformity with the following directives with amendments:

- Machinery Directive 2006/42/EC
- RoHS Directive 2011/65/EU and amendments

The person authorised to compile the technical file is the signer of this document.

Vice President Business Unit Hygienic Fluid Handling and Heat Transfer Technologies, Head of Product Management	Mikkel Nordkvist	
Title	Name	
Kolding, Denmark	2026-10-01	
Place	Date (YYYY-MM-DD)	Signature

DoC Revison_ 01_102026

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Serial number

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- Regulation (EU) 2023/1230 on machinery
- RoHS Directive 2011/65/EU and amendments

The person authorised to compile the technical file is the signer of this document.

Vice President Business Unit Hygienic Fluid Handling and Heat Transfer Technologies, Head of Product Management	Mikkel Nordkvist
Title	Name
Kolding, Denmark	2027-01-20
Place	Date (YYYY-MM-DD)



Signature

DoC Revison_02_012027

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Company name, address and phone number

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Type

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Serial number

is in conformity with the following directives with amendments:

- Machinery Directive 2006/42/EC
- RoHS Directive 2011/65/EU and amendments
- ATEX Directive 2014/34/EU

Pump Marking Options:

For specific marking see pump name plate and refer to "Special Conditions for Safe Use" in instruction manual.

For ATEX Directive 2014/34/EU the following harmonized standards EN 80079-36:2016 and EN 80079-37:2016 for Non-electrical equipment for explosive atmospheres have been applied.

ATEX Directive 2014/34/EU conformity for the motor and coupling is covered by the relevant EU type examination certificates and declarations supplied by the manufacturers.

Marking:

- II 2G Ex h IIB T4..T3 Gb
- II 2G Ex h IIC T4..T3 Gb
- II 3G Ex h IIB T4..T3 Gc
- II 3G Ex h IIC T4..T3 Gc

The Pump Technical file is stored with:

Teknologisk Institut, Kongsvang Alle 29, 8000 Aarhus C, Denmark

Notified Body no.: 0396

Archive no.: DTI 19ATEX0330

The person authorised to compile the technical file is the signer of this document.

Vice President Business Unit Hygienic Fluid Handling and Heat Transfer Technologies, Head of Product Management	Mikkel Nordkvist
Title	Name
Kolding, Denmark	2026-10-01
Place	Date (YYYY-MM-DD)

Signature

DoC Revison_01_102026

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Title	Name
Kolding, Denmark	2027-01-20
Place	Date (YYYY-MM-DD)



Signature

DoC Revison_02_012027

UK Declaration of Conformity

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Type

AAB000000001-AAB999999999, AAX000000001-AAX999999999

Serial number

is in conformity with the following directives with amendments:

- The Supply of Machinery (Safety) Regulations 2008
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012

Signed on behalf of: Alfa Laval Kolding A/S.

Vice President Business Unit Hygienic Fluid Handling and Heat Transfer Technologies, Head of Product Management	Mikkel Nordkvist
Title	Name
Kolding, Denmark	2026-10-01
Place	Date (YYYY-MM-DD)



Signature

DoC Revison_01_102026

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- The Supply of Machinery (Safety) Regulations 2008
- The Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment Regulations 2012
- The Equipment and Protective Systems Intended for use in Potentially Explosive Atmospheres Regulations 2016

Pump Marking Options:

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Title	Name
Kolding, Denmark	2026-10-01
Place	Date (YYYY-MM-DD)

DoC Revison_01_102026

1.1 ATEX Directive 2014/34/EU

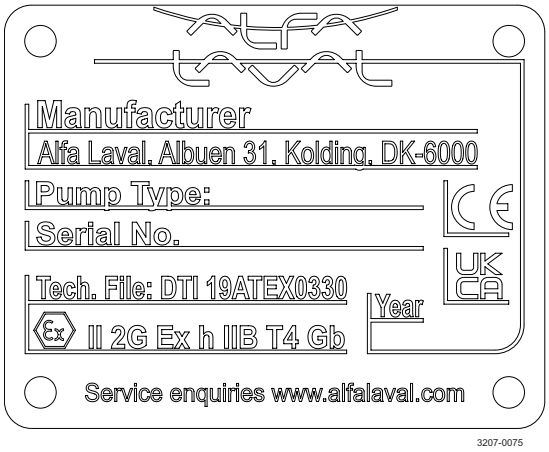
The ATEX Directive 2014/34/EU covers equipment and protective systems that will be used in areas endangered by potentially explosive atmospheres created by the presence of flammable gases, vapors and dusts.

Rotary Lobe Pumps supplied with an ATEX symbol are classified for use in potentially explosive atmospheres under ATEX Directive 2014/34/EU Group II, Category 2 and 3.

Type of Equipment:	Rotary Lobe Positive Displacement Pumps
Equipment Group:	Group II category 2 G (zone 1)
	Group II category 3 G (zone 2)
	Temperature class T4 and T3
Ignition Protection used:	EN13463-1, EN13463-5 (c), EN13463-6 (b), EN13463-8 (k)

1.2 ATEX Marking

Example nameplate



- Pump type
- Serial no.
- Production year
- Reference of technical file at notified body: DTI 19ATEX0330
- ATEX marking

Unsafe practices and other important information are emphasized in this manual.

Warnings are emphasized by means of special signs, see *Safety* on page 13.

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2 Safety

Read this first





This Instruction Manual is designed for operators and service engineers working with the supplied Alfa Laval product.

Operators must read and understand the ***Safety, Installation and Operating*** instructions of the supplied Alfa Laval product before carrying out any work or before you put the supplied Alfa Laval product into service!

Not following the instructions can result in serious accidents.

This documentation describes the authorized way to use the supplied Alfa Laval product. Alfa Laval will take no responsibility for injury or damage if the equipment is used in any other way.

This Instruction Manual is designed to provide the user with the information to perform tasks safely for all phases in the lifetime of the supplied Alfa Laval product.

The operator shall always read the chapter ***Safety*** first. Hereafter the operator can skip to the relevant section for the task to be carried out or for the information needed.

Always read the chapter ***Technical Data*** thoroughly.

This is the complete Instruction Manual for the supplied Alfa Laval product.

NOTE

The illustrations and specifications in this Instruction Manual were effective at the date of printing. However, as continuous improvements are our policy, we reserve the right to alter or modify the Instruction Manual without prior notice or any obligation.

The English version of the Instruction Manual is the original manual. Alfa Laval cannot be held responsible for incorrect translations. In case of doubt, the English version applies.

2.1 Safety Signs

Mandatory Action Signs

	General mandatory action sign.
	Refer to instruction manual.
	Use ear protection in noisy environments - noise protector.
	Use eye protection - safety glasses.
	Wear protective equipment - safety shoes.
	Use protective hand wear - safety gloves.
	Wear protective equipment - safety helmet.

Warning Signs

	General warning.
	Electricity.
	Transportation with forklift truck or other industrial vehicles if heavy.
	Heavy object lifting.
	Hot surface and burning danger.
	Sharp element.
	Crushing of hands.
	Corrosive substance.

2.2 Safety precautions

All warnings in the manual are summarised on this page. Pay special attention to the instructions below so that severe personal injury and/or damage to the Supplied Alfa Laval Product is avoided.

General



Technical data must be observed during installation, operation and maintenance.

All personnel should be informed about the technical data.

The rules of Intended use are absolute. Use of the supplied Alfa Laval product is allowed only when in compliance with the technical data supplied with the Intended use.

Differing utilisation, other than agreed with Alfa Laval Kolding A/S, exclude any liability and warranty.

No modification or alteration of the supplied Alfa Laval product is allowed, unless explicit permission is granted by Alfa Laval Kolding A/S.

To prevent unexpected start and contact with electrical live and moving parts.

Always disconnect the power supply safely:

- The power supply disconnecting device must be disconnected (in off position) and locked.
- In case the pump is capable of being plugged into an electrical supply, removal of the plug is sufficient, provided that the operator can check from any of the points to which he has access that the plug remains removed.

Always refer to the motor Instruction Manual for installation and maintenance of the motor.

Never touch the rotors through the inlet/outlet during start/stop as this can cause serious injury.

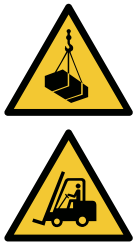
To prevent hazardous reactions between the processed fluid and the materials of construction, the materials of construction must be suitable for the application.

The auxiliary equipment chosen for the application must be suitable.

Personnel installing, operating or carrying out maintenance on the pump or any sub-component must have the necessary knowledge about the MaxiLobe pump range. Necessary knowledge includes the understanding of:

- Function of the pump, motor and shaft seal
- Maintenance/service of the pump unit, motor and shaft seal
- Operational limits for the MaxiLobe pump range
- Safety instructions

Transportation and Lifting

	**Never** lift or elevate in any way other than described in this manual. **Always** use the original packaging or similar during transportation. **Always** ensure that personnel must have experience with lifting operations. **Always** transport the pump in its upright position. **Always** drain the pump head and accessories of any liquid. **Always** ensure that no leakage of lubricants can occur.
	**Always** ensure that the unit is securely fixed during transportation. **Always** use predesigned lifting points if defined. Ensure that the lifting equipment is suitable for the supplied Alfa Laval product. **Always** ensure the lifting point to be in line with center of gravity. Adjust lifting point if necessary. **Always** use suitable transport device ie. forklift or pallet lifter. **Always** use appropriate lifting equipment for heavy parts when relevant. **Always** keep an eye on the load and stay clear during the lifting operation.

Installation

	If the local safety regulations prescribe that the installation has to be inspected and approved by responsible authorities before the supplied Alfa Laval product is put into service, consult with such authorities before installing the equipment and have the projected installation approved by them. **Always** ensure all pipe lines (product, air, and water) are depressurized and emptied before installation, inspection, assembling and disassembling. **Always** read the *Technical Data* on page 97 thoroughly. **Always** check the pump before operation. See . **Always** check direction is as required for the system design during installation. **Never** start the pump with the front cover removed. **Always** ensure that the pump unit is suitable for the application and will stay within the specifications in during normal operation. **Always** design the process system in a way so pressure shocks or over pressure is avoided. The large pump sizes are very heavy. **Always** use appropriate lifting equipment when handling the pump. Alfa Laval cannot be held responsible for incorrect unpacking. Alfa Laval cannot be held responsible for incorrect installation. Be aware that certain pump configurations can tilt, and therefore cause injuries to feet or fingers. The pump should be supported, when not installed in the process line. The 3A standard requires minimum clearance between the lowest part of the base, pump, motor or drive and for the floor to be no less than 100 mm / 4". The pump does not prevent back flow when intentionally or unintentionally stopped. If back flow can cause any hazardous situations, precautions must be taken e.g. a check valve can be installed in the system preventing hazardous situations. If the pump has been stored for longer period of time there is a risk that the seal faces may stick together and consequently cause damage to the seal at start-up. Please ensure that the pump shaft can be rotated by hand before start-up.
	**Never** start the pump if the front cover is removed.
	**Always** use a lifting crane when handling the pump.
	**Always** ensure all pipe lines (product, air, and water) are depressurized and emptied before installation, inspection, assembling and disassembling.
	**Always** have the pump electrically connected by authorised personnel. (See the motor instructions). Alfa Laval recommends the installation of a lockable repair breaker. If the repair breaker is to be used as an emergency stop, the colours of the repair breaker must be red and yellow. Alfa Laval recommends the supply disconnecting device shall be in accordance with EN60204-1. Always disconnect the supply disconnecting device safely after installation before continuing the installation.
	**Always** ensure the adaptor shield and motor fan guard are present and mounted correctly and allow no access to rotating parts before installing and starting the pump. **Never** put your hands or fingers inside the port connections or anywhere close to rotating parts.

	**ATEX Installation:**
	Always ensure that instructions for all ATEX compliant equipment and components are followed. **Always** make sure that pump gearbox is electrically earthed. **Always** read Operation before pump start up. **Ensure** correct alignment of pump and drive unit. **Never** install the pump or pump unit at an angle of more than 5° from the horizontal plane. **Never** cover up pump gearbox in any way that will reduce the cooling effects intended.

Operation

	**Always** read the *Technical Data* on page 97 thoroughly. **Never** stand on the pump or pipelines. **Always** ensure any guards are securely in place and in good condition. **Never** run the pump unless fully assembled, i.e. pump head must not be removed from gearcase. **Never** run the pump when partially installed or not completely assembled. **Necessary** precautions must be taken if leakage occurs as this can lead to hazardous situations. **Never** use the pump for products not mentioned in the Alfa Laval pump selection program. Study the instructions carefully and pay special attention to the warnings! Alfa Laval cannot be held responsible for incorrect operation/control. The shaft seal must not run dry. **Never** throttle the inlet side. The supplied product is designed for cleaning in place (CIP). Use clean water free from chlorides. **Always** ensure that the pump is operated within the specifications given in . **Necessary** precautions must be taken if leakage occurs as this can lead to hazardous situations. **Never** restart the pump automatically after a system lockout. At restart, it must be ensured that the pump is running within the specifications given in .
	**Never** run the pump with both the suction side and the pressure side blocked.
	**Never** put your hands or fingers inside the port connections or anywhere close to rotating parts.

	**Never** touch the supplied product or the pipelines when processing hot liquids or sterilizing. In certain operating conditions the external surface of the pump and/or ancillary equipment may exceed 80 °C / 176 °F. As such users should avoid touching the pump and/or ancillary equipment during operation taking precautions if it is unavoidable to do so. If pumps are sterilised using steam, standard 3A requires the process system to be designed to automatically shut down if the product pressure in the system becomes less than of the atmosphere and it cannot be started until the system is re-sterilised.
	**Always** follow the instructions in the safety data sheet for the cleaning agent. **Always** handle lye and acid with great care. **Always** handle toxic and acidic liquids in accordance with the manufacturer's instructions and recommendations. The cleaning agents must be stored/disposed of in accordance with current regulations and directives. **Always** rinse well with clean water after the cleaning.

	**ATEX Operation:**
	Ensure checks and running conditions for the pump unit during operation to be according to "Operation". **Never** operate the pump outside maximum duty conditions as described in *Technical data* on page 97, unless confirmed in writing from the pump manufacturer.

Maintenance



In order to optimise the operation of the supplied Alfa Laval product and to minimize the down time due repair activities, the maintenance should consist of:

- Inspection and maintenance of the supplied Alfa Laval product: strictly follow the technical documentation
- **Preventive maintenance:** visual inspection of the supplied Alfa Laval product followed by necessary adjustments and planned periodic replacement of wear and tear parts
- **Repairs:** unscheduled break-down of a component, often causing the system to stop. Damaged components shall be replaced or repaired
- **Stock of Alfa Laval genuine spare parts:** Alfa Laval recommend keeping a stock of genuine spare parts facilitating preventive maintenance and reducing down time in case of unplanned break-downs

Please refer to drive and coupling operating manuals supplied with the unit for maintenance instructions.

Always read the *Technical Data* on page 97 thoroughly.

Never service the pump if pressurised.

Always ensure any vent plugs, if fitted, are clean and free from blockage.

Always use Alfa Laval genuine spare parts.

Motors with grease nipples:

Always lubricate according to motor manufactures recommended procedures.

Always locate and remove grease vent plugs, if provided, prior to adding grease.

Always check motor nameplate for grease type and lubrication intervals.

Always ensure the pump and pipelines are de-pressurised when the pump is serviced.

Only use the grease type specified on the motor name plate.

For Motor Maintenance, see motor instruction manual.

Maintain the pump carefully.

Study the instructions carefully and pay special attention to the warnings!

Always keep spare shaft seals and rubber seals in stock.

Check the pump for smooth operation after service.

All scrap must be stored/disposed of in accordance with current regulations and directives.

If pump is not supplied with flush connections, the holes in the adaptor must be covered by the guard.

Always make sure that the specifications in *Operation* on page 43 are met before the pump is put back into operation.

Always refer to the pump serial no. on the name plate when ordering spare parts to ensure correct spares.

Always check for any abnormal sounds or running behaviors when starting up the pump after maintenance.



Never put your hands or fingers inside the port connections or anywhere close to rotating parts.



Never service the pump when it is hot.

Always ensure pump and ancillary equipment has been allowed to cool before touching.

	**Always** disconnect the power supply when servicing the pump. **Always** ensure the power supply is disconnected (in an off position) and is locked out to prevent accidental operation. **Always** disconnect the power supply when servicing the pump. Fit the electrical connections correctly if they have been removed from the motor during service.
	**Always** follow the instructions in the safety data sheets from the suppliers of cleaning agents, detergents, oils etc. **Always** follow the instructions in the safety data sheet for the cleaning agent.

Storage

	**Alfa Laval recommend:** • Store the supplied Alfa Laval product as supplied in original packaging • Port opening(s) should be protected against any ingress • Plastic or gasket type port covers should be left in place • Bare steel (not stainless) should be lightly oiled/greased • Store in a clean, dry place free from vibration and without direct sunlight or UV light • Temperature range -5 °C to 40 °C (23 °F - 104 °F) • Relative humidity less than 60% • If a moist or dusty atmosphere is used for storage, further protect the pump or unit with a suitable cover • No exposure to corrosive substances (including contained • Rotate the pump/pump unit by hand weekly, to prevent bearing damage • air) • All associated ancillary equipment should be treated similarly

Noise

	Under certain operating conditions, the supplied Alfa Laval product and/or the systems in which they are installed can produce high sound pressure levels. Appropriate noise protection measures should be taken when necessary and in accordance with local legislation.

Hazards

 	**Burn Hazard** • Lubrication oil, machine parts and various machine surfaces can be hot and cause burns. Wear protective gloves



Corrosive Hazard

- **Always** handle cleaning liquids, lye and acid with great care and in accordance with separate instructions for those fluids
- When using chemical cleaning agents and lubricants, make sure you follow the general rules and suppliers recommendation regarding ventilation, personnel protection etc.



Cut Hazard

- Sharp edges, especially on bowl discs and threads, can cause cuts. Wear protective gloves



Crushing Hazard

- Avoid placing hands in pinch points

Safety check



A visual inspection of any protective device (shield, guard, cover or other) on the supplied Alfa Laval product shall be carried out at least every 12 months. If the protective device is lost or damaged, especially when this leads to deterioration of safety performance, it shall be replaced. The fixing of the protective device should only be replaced with fixings of the same or an equivalent type.

Inspection acceptance criteria:

- It should not be possible to reach moving parts originally protected by a protective device
- The protective device must be securely mounted
- Ensure that screws for the protective device are securely tightened

Procedure in case of non-acceptance:

- Fix and/or replace the protective device

2.3 ATEX information



Installation

Always check that the components and equipment supplied is suitable for the area intended and corresponds with the order acknowledgement.

Always read all sections of the manual, including those referring to ATEX , as showing ATEX symbols prior to handling, installing, operating or maintaining the pump.

Always order genuine spare parts using the serial number of the pump, stated on the pump nameplate, for identification purposes.

Always ensure that intentionally or potentially mixing of fluids do not create hazardous reactions/situations (eg. process media and flush media).

Education:

Only personnel or approved operators with the necessary knowledge about the pump supplied including the mechanical seals can carry out any installation or maintenance work relating to the pump unit.

Necessary knowledge includes the understanding of the:

- Function of the pump unit including the mechanical seal
- Maintenance/service procedures of the pump unit including the mechanical seals
- Safety instructions
- Operational limits for the pump unit including the mechanical seals

Safety Critical Limitations for Specific ATEX Markings.

Table A

Pump marking options	Ambient temperature	Critical temperature range of process media
	-20 °C to +40 °C (Shroud NOT allowed)	-10 °C to +100 °C
	-20 °C to +40 °C (Shroud allowed)	-10 °C to +150 °C

Requirements for Measurements on the Flush Media

Table B Flush media limitations

Max. temperature	100 °C / 212 °F
Min. flow rate	30 l/h / 8 gal/h
Max. pressure (FSS)	0.5 bar / 7.25 psi
Max. pressure (DMS)	16 bar / 232 psi

2.4 Warning Signs in Text

Pay attention to the safety instructions in this Instruction Manual.

Below are definitions of the four grades of warning signs used in the text where there is a risk for injury to personnel or damage to the supplied Alfa Laval product.

DANGER

Indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate damage to the supplied Alfa Laval product.

NOTE

Indicates important information to simplify or clarify procedures.

2.5 Requirements of personnel

Operators

The operators shall read and understand this Instruction Manual.

Maintenance personnel

The maintenance personnel shall read and understand this Instruction Manual. The maintenance personnel or technicians shall be skilled within the field required to carry out the maintenance work safely.

Trainees

Trainees can perform tasks under the supervision of an experienced employee.

People in general

The public shall not have access to the supplied Alfa Laval product.

In some cases, specially skilled personnel may need to be hired (i.e. electricians, welders). In some cases the personnel has to be certified according to local regulations with experience of similar types of work.

2.6 Recycling information

Unpacking

Packing material may consist of wood, plastics, cardboard boxes and in some cases metal straps.

	• Wood and cardboard boxes can be reused, recycled or used for energy recovery • Plastics should be recycled or burnt at a licensed waste incineration plant • Metal straps should be sent for material recycling

Maintenance

During maintenance, oil (if used) and wear parts in the supplied Alfa Laval product should be replaced.

- Oil and all non-metal wear parts must be disposed of in accordance with local regulations
- Rubber and plastics should be burnt at a licensed waste incineration plant. If not available they should be disposed of in accordance with local regulations
- Bearings and other metal parts should be sent to a licensed handler for material recycling
- Seal rings and friction linings should be disposed of to a licensed land fill site. Check your local regulations
- All metal parts should be sent for material recycling
- Worn out or defected electronic parts should be sent to a licensed handler for material recycling

Scrapping

At end of use, the equipment must be recycled in accordance with the relevant local regulations. Besides the equipment itself, any hazardous residues from the process liquid must be considered and dealt with in a proper manner. When in doubt, or in the absence of local regulations, please contact your local Alfa Laval sales company.

How to contact Alfa Laval

Contact details for all countries are continually updated on our website.

Please visit *www.alfalaval.com* to access the information directly.

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3 Introduction

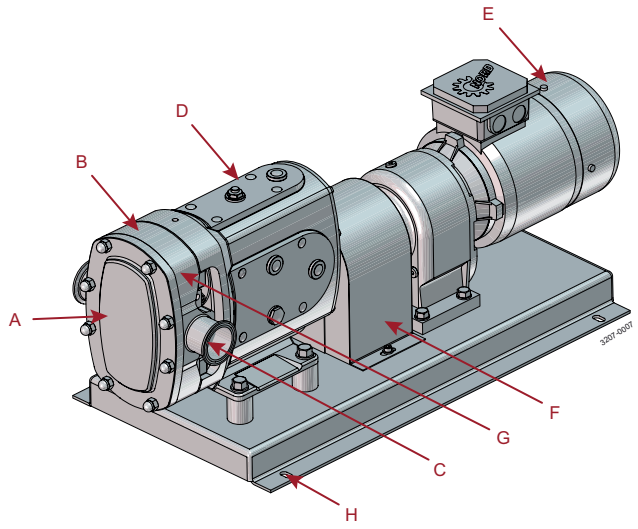
Get more from every production run with the Alfa Laval MaxiLobe®. Engineered for higher efficiency, a broader operating range, and simplified maintenance, these advanced hygienic rotary lobe pumps help reduce investment and operating costs while increasing yield. Reliable performance across varying process conditions delivers more uptime, consistent product quality, and a lower total cost of ownership. High volumetric efficiency and a wide performance envelope enable smaller pumps to be sized closer to actual process requirements while achieving the same duty at lower operating speeds, reducing energy consumption, wear, and product shear.

3.1 General information

The MaxiLobe pump supplied is a positive displacement rotary lobe pump, which may be supplied with or without a drive unit. The drawing shown indicates main components of the pump unit.

The MaxiLobe range has a universal gearbox design which enables the flexibility of mounting pumps with the inlet and outlet ports in either a vertical or horizontal plane. The port orientation, vertical or horizontal, may be changed by moving one of two available bolt-on feet on the gearbox. Port orientation should be specified when ordering, but the alternative foot design allows pumps that are already installed being changed should the need arise.

Drawing shows only mounted unit



A Rotorcase cover
B Rotorcase
C Ports
D Gearbox
E Drive unit
F Coupling guard (encloses coupling)
G Product seal area (inside rotorcase)
H Baseplate fixing holes

Pump duty conditions

The pump should only be used for the duty for which it has been specified. The operating pressure, speed and temperature limits have been selected at the time of order and MUST NOT be exceeded. These details are stated on the original order documentation and if not available may be obtained from your supplier quoting pump model and serial number.

Vibration Limits

Bare shaft pump units have been tested and found to be within the limits published under ISO 10816-7 Category 2 under normal operation conditions. Actual vibration of mounted units can be effected by numerous external factors such as mounting method, foundation, alignment, speed and duty point. As such, we recommend the maximum operating limit of 8.5 mm/s RMS with a trip limit of 10.6 mm/s RMS as per ISO 10816-7 Cat. 2 is observed in any monitoring equipment if used.

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4 Installation

4.1 Unpacking, Handling and Storage

WARNING

Always ensure any personnel undertaking lifting operations have the suitable experience and training to do so safely.

Ensure any lifting equipment used is in good condition and has been suitably tested, using lifting lugs when applied.

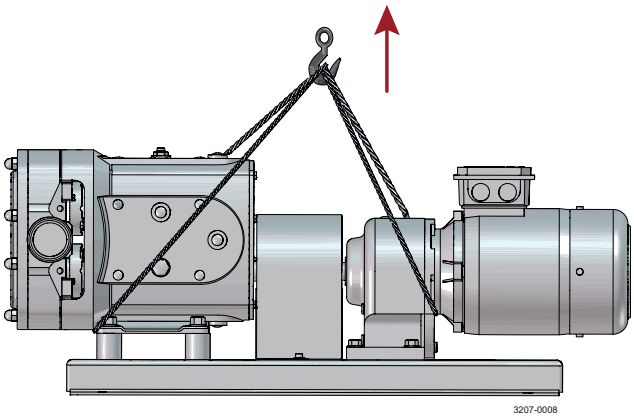
Ensure any lifting equipment used is rated for and used within the load limits. Refer to the pump weights guide.

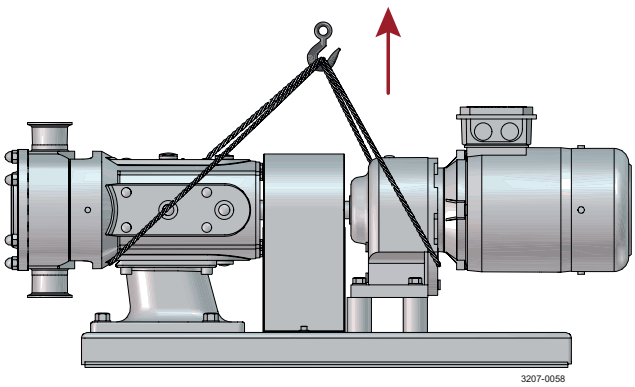
Always ensure that the lifting points are in line with the centre of gravity and adjust lifting point if necessary.

Always keep an eye on the load and stay clear during the lifting operation.

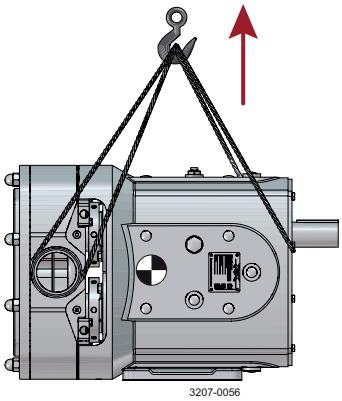
The diagrams below show examples of how the equipment should be lifted, however the user is to ensure this can be done safely with the equipment at hand:

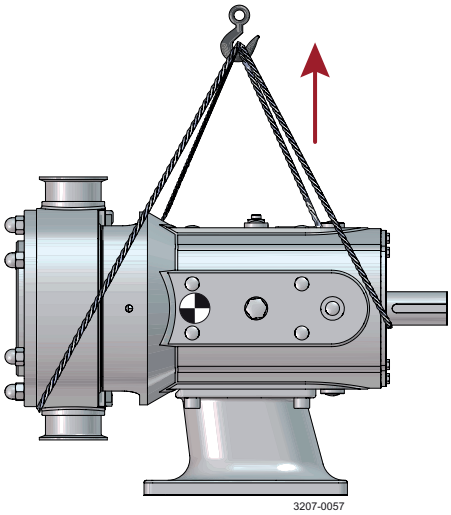
Pump with drive unit





Bareshaft pump (typical location of centre of gravity shown)





On receipt always:

- Check the delivery note against the goods received
- If motorised, check that the drive instructions are available
- Be careful not to discard any manuals that may be enclosed with the packaging
- Inspect the packing for signs of damage in transit
- Carefully remove the packing away from the pump
- Inspect the pump for any visible signs of damage
- Clean away the packing from the pump port connections
- Report any damage immediately to the carrier

After receipt and inspection:

If the pump is not to be installed immediately, the pump should be repacked in the original packaging and placed in suitable storage, see *Safety precautions* on page 16.

4.2 System Design, Installation and Operation

When designing, installing and operating pipework systems where pumps are used, especially where the pumped media is viscous, there are general recommendations and good engineering practices that should be employed to ensure long term, reliable pump and system operation.

4.2.1 System Design



- Confirm the Net Positive Suction Head (NPSH) available from the system exceeds the NPSH required by the pump, as this is crucial for ensuring the smooth operation of the pump and preventing cavitation.
- Avoid suction lifts and manifold/common suction lines for two pumps running in parallel, as this may cause vibration and/or cavitation.
- Protect the pump against blockage from hard solid objects e.g. nuts, bolts welding slag etc. Also protect the pump from accidental operation against a closed valve by using relief valves, pressure switches or current limiting devices.
- Fit suction and discharge pressure monitor points for diagnostic purposes.
- Fit valves, it two pumps are to be used on manifold/common discharge lines.
- Make the necessary piping arrangements if flushing is required for the seal.
- Allow at least 1 m / 3.3 ft for pump access/maintenance all around the pump.

4.2.2 Pipework

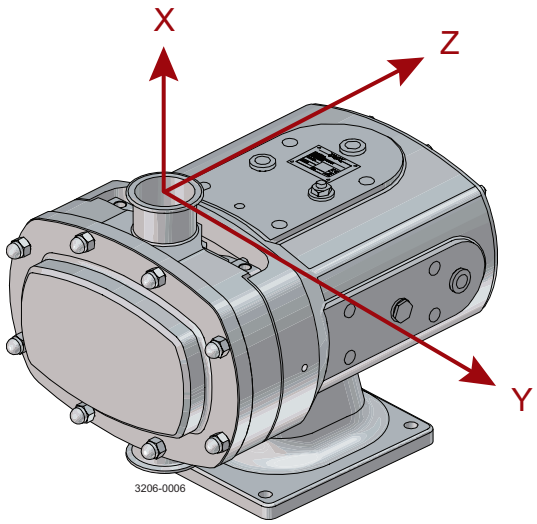
All pipework must be supported. The pump must not be allowed to support any of the pipework weight beyond the limits set as shown in the *Table of Maximum Forces and Moments* on page 34.

NOTE

Remember!

- **Pipework supports must also support the weight of the product being pumped.**
- **Design short straight suction lines to reduce friction losses in the pipework thereby improving the NPSH available from the system.**
- **Avoid bends, tees and any restrictions close to either suction or discharge side of pump. Use long radius bends wherever possible.**
- **Provide isolating valves on each side of the pump when necessary.**
- **Keep pipework horizontal where applicable to reduce air locks. Include eccentric reducers on suctions lines.**

4.2.3 Table of Maximum Forces and Moments



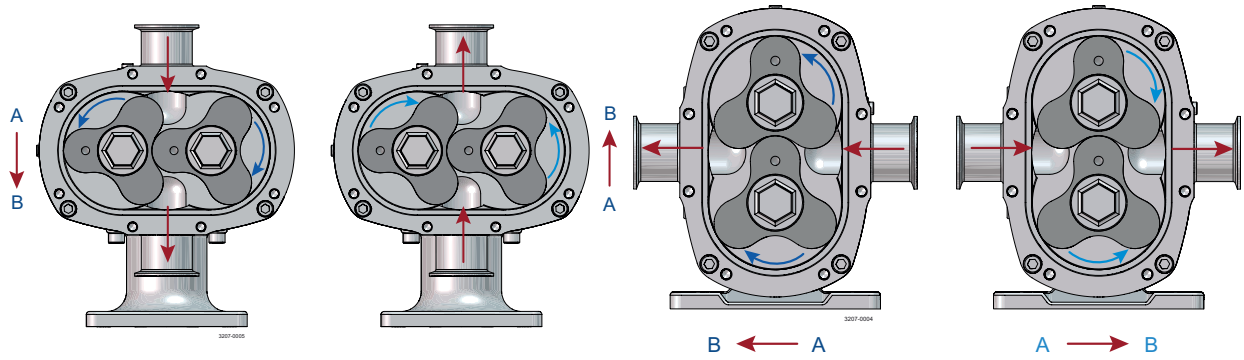
Port Size (mm)		Forces			Moments		
		Units	F (x, y or z)	F (total)	Units	M (x, y or z)	M (total)
25	1"	N	190	270	Nm	85	125
		lbf	43	61	lbf.ft	63	92
40	1½"	N	255	360	Nm	115	170
		lbf	57	81	lbf.ft	85	125
50	2"	N	295	420	Nm	145	210
		lbf	66	94	lbf.ft	107	155
65	2½"	N	360	510	Nm	180	263
		lbf	81	115	lbf.ft	133	194
80	3"	N	425	600	Nm	215	315
		lbf	96	135	lbf.ft	159	232
100	4"	N	505	720	Nm	260	385
		lbf	114	162	lbf.ft	192	284
150	6"	N	720	1020	Nm	385	565
		lbf	162	229	lbf.ft	284	417
200	8"	N	930	1320	Nm	500	735
		lbf	209	297	lbf.ft	369	542

NOTE

At no time shall the values of Fx, Fy and Fz or Mx, My and Mz be the maximum values.

4.2.4 Direction of Flow

The direction of flow is dictated by the direction of rotation of the drive shaft. Reversing the direction of rotation will reverse the flow direction.



A Suction
B Discharge

A Suction
B Discharge

4.2.5 Pump Lubrication

The pump will be supplied pre-filled with food grade (NSF-1) synthetic (PAO based) oil as standard.

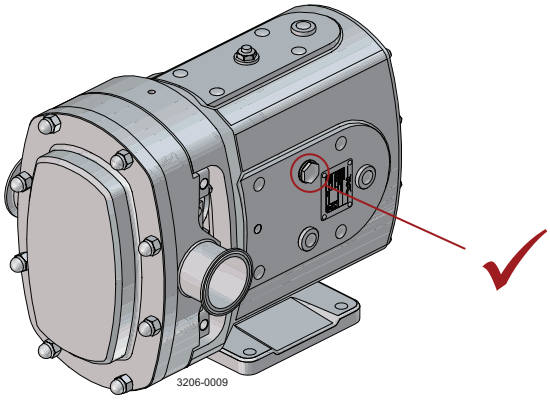
Oil level must be checked with the pump static using the oil sight glass fitted to the side of the gearbox.

The oil should be changed every 3000 hrs of operation or every 2 years, whichever is soonest.

Oil filling: Fill with oil through the filler plug to the mid level of in the sight glass.

NOTE

On horizontally ported pumps the sight glass must be fitted to the upper hole on the side of the gearcase.
Refer to *Technical Data* on page 97 for oil quantities required.



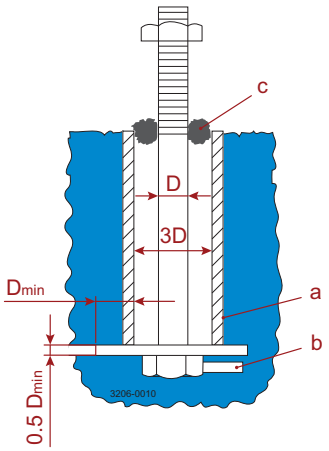
Food Grade Oil (NSF H-1) **-20 °C to +150 °C (-4 °F to 302 °F)**
Mobil SHC Cibus 150
Bel-Ray No-Tox HD Food Grade Oil 150 #62686
Castrol Optileb GT150
Kluber Kluberoil 4 UH1-150 N
Fusch Cassida GL/GLE
Mobil Glygole 150 (US/CAN)

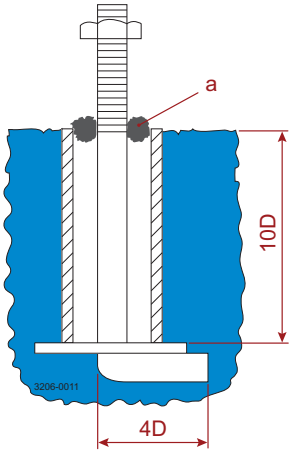
Above oil recommendations may use different base oil technologies (mineral or PAG) which are incompatible with the existing PAO based oil. Care should be taken to follow the oil manufactures recommendation on flushing if changing the oil type.

4.2.6 Baseplate Foundations

Pumps when supplied with a drive unit are normally mounted on a baseplate. Alfa Laval standard positive displacement pump baseplates have pre-drilled fixing holes to accept base retaining bolts. To provide a permanent rigid support for securing the pump unit, a foundation is required which will also absorb vibration, strain or shock on the pumping unit. Methods of anchoring the baseplate to the foundation are varied, they can be studs embedded in the concrete either at the pouring stage as shown below, or by use of epoxy type grouts. Alternatively, mechanical fixings can be used.

Ensure the floor is able to support the weight of the pump unit.





a Sleeve

b Lug welded to bolt head

c Waste put around bolt before pouring concrete

a Foundation surface left through to anchor ground

The drawing above shows two typical methods for foundation bolt retaining. The sleeve allows for "slight" lateral movement of the bolts after the foundation is poured. Rag or wastepaper can be used to prevent the concrete from entering the sleeve while the foundation is poured. A minimum of 14 days is normally required to allow the curing of the concrete prior to pump unit installation.

Ball Foot Baseplate with Adjustable Feet

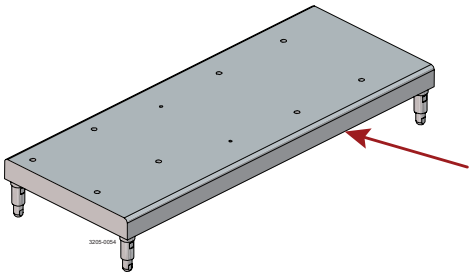
The pump can be supplied with an optional ball foot baseplate with height adjustable feet or pads.

When used:

- **Ensure** the floor is level and is able to support the weight of the complete unit
- **Ensure** the unit is supported by all feet equally

3A Approved Ball Foot Baseplate with Adjustable Feet

For 3A approved mounted pumps a 3A approved ball foot baseplate is required which has additional sealant applied to the underside.



4.2.7 Coupling Alignment

> **NOTE**
>
> Not for ATEX. For ATEX units please see included manufacturers instruction sheet.

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. 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 drive sideways on the baseplate. All bolts that have been loosened should be re-tightened to the stated torque figure.

The following dimensions and tolerances apply to standard supply couplings only (Fenner HRC Type).

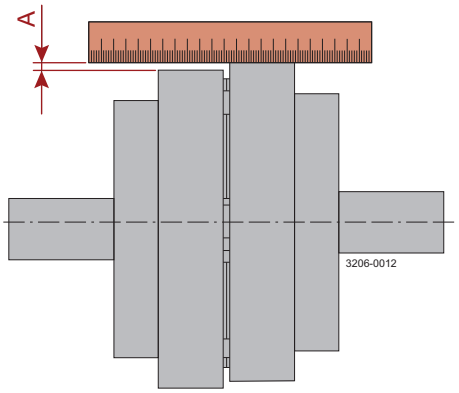
Recommended bolt torques for pump and motor mounting.

Thread Diameter	M6	M8	M10	M12	M16	M20	M24
Torque (Nm)	6	15	30	50	120	150	200
Torque (ft lbf)	4.4	11.0	22.1	36.8	88.5	110.6	147.5

Parallel Misalignment

Measure 4 positions at 90° around coupling

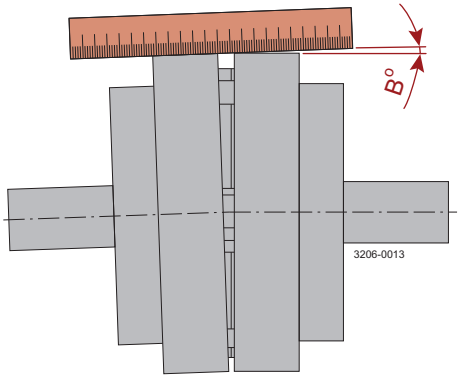
Coupling size	Dimension A Maximum
70	0.3 mm / 0.12 in.
90	0.3 mm / 0.12 in.
110	0.3 mm / 0.12 in.
130	0.4 mm / 0.16 in.
150	0.4 mm / 0.16 in.
180	0.4 mm / 0.16 in.
230	0.5 mm / 0.24 in.
280	0.5 mm / 0.24 in.



Angular Misalignment

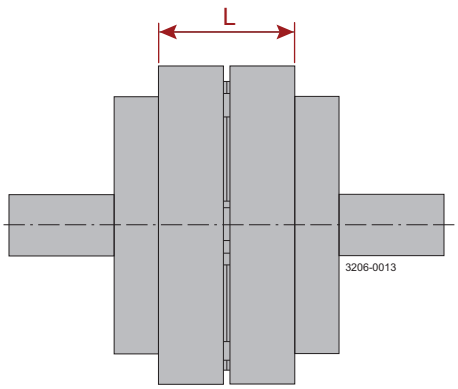
Measure 4 positions at 90° around coupling

Coupling size	Dimension A Maximum
70	1°
90	1°
110	1°
130	1°
150	1°
180	1°
230	1°
280	1°



Assembled length

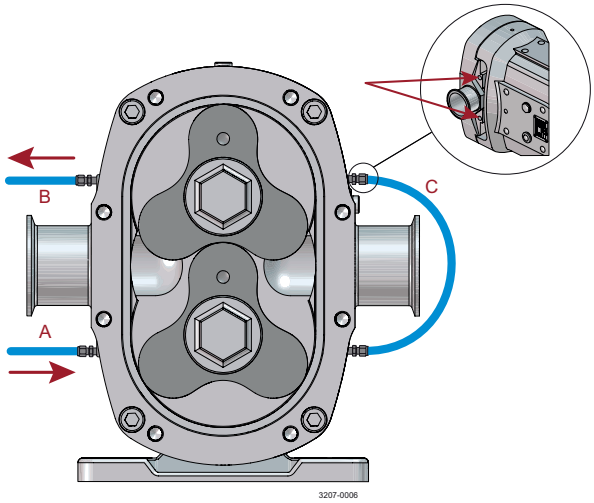
Coupling size	Dimension A Maximum
70	25.0 mm / 0.98 in.
90	30.5 mm / 1.20 in.
110	45.0 mm / 1.57 in.
130	53.0 mm / 2.08 in.
150	60.0 mm / 2.36 in.
180	75.0 mm / 2.95 in.
230	85.5 mm / 3.36 in.
280	105.5 mm / 4.15 in.



4.3 Flushing Seal Arrangement and Pre-Start Up Checks

1 A flushed seal arrangement may be fitted in order to cool, heat or clean the seal area (dependant on application). It is important that:

- The flush is correctly connected (see diagram)
- A compatible flushing fluid is used and supplied at the correct pressure and flow rate (see Flush Pressure and Flow Rates below)
- The flush is turned on at the same time/prior to starting the pump and turned off at the same time/after stopping the pump



A	Flush inlet
B	Flush outlet
C	Link pipe

2 **Connecting the flush**

The following equipment is strongly recommended when using a flushing system:

- Control valve and pressure gauge, to enable the correct flushing pressure to be obtained and monitored
- Isolation valve and check valve, so that the flush can be turned off, and to stop any unwanted substances flowing in the wrong direction
- A method of visibly indicating flushing fluid flow

Flush Connection Size (Female)

Model	Size
	BSP(G) / NPT w/Adaptor
22/23	⅛"
32/33	⅛"
42/43	⅛"
52/53	¼"
62/63	¼"
72/73	¼"

3 **Flushing fluid**

The choice of flushing fluid is dependent upon the fluid being pumped and duty conditions i.e. pressure and temperature.

Usually water is used for cooling or flushing water-soluble products.

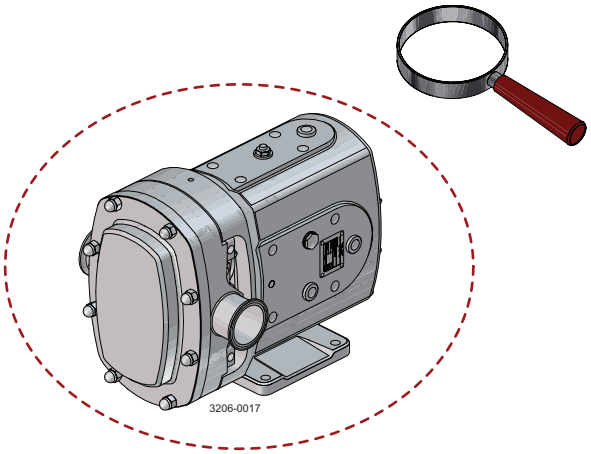
For both single flushed and double mechanical seal arrangements the temperature of the flush media should never be allowed to exceed the maximum temperature of the pumped media. For advice on selecting a suitable flushing fluid please contact pump supplier.

4 Flush pressure, flow and temperature limits

Single Mechanical Flushed, Max.:	0.5 bar / 7 psi
Double Seal, Max.:	1 bar / 14.5 psi above pump discharge up to 16 bar / 232 psi
Flush Media Flow (all seal types), Min.:	30 l/h / 8 usgph per seal

5 Pre-start up checks

- Check the pipework system has been purged to remove debris.
- Check all obstructions have been removed from pipework and pump.
- Check pump connections and pipework joints are tight.
- Check lubrication levels are correct.
- Check seal flushing is connected if applicable.
- Check all safety guards are in place.
- Check that inlet and outlet valves are open.



4.4 Bareshaft Pump Units

The Maxilobe RLP pump range requires an external rotary drive (such as a geared electric motor) to operate.

Where pumps are supplied as bare shaft (without drive and ancillary equipment) it is the responsibility of the entity and/or persons assembling and placing the completed machinery on the market to ensure all relevant safety standards are applied and undertake any risk assessments required.

Any drive and ancillary equipment (such as shaft couplings, drives and guards) should be selected according to the manufactures recommendations and be suitable for the application and duties points specified. Installation and operation of these components are to be made according to the manufactures instruction manuals.

For ATEX units, suitable ATEX certified components should be selected to meet or exceed the required ATEX area classification. Any ATEX ancillary items are to be selected, installed and used as per the manufactuers insturctions.

The assembled equipment should have suitble gaurding to reduce or eliminate the risk of injury from exposed rotating shafts.

In all cases, the limits of operation of the pump and the guidelines shown in this manual are to be followed.

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5 Operation

5.1 Recommended Cleaning

WARNING **Risk of burns!**

Never touch the supplied product or the pipelines when sterilizing.



CAUTION

Always handle lye and acid with great care.



NOTE

The supplied product is designed for cleaning in place (CIP).

NaOH = Caustic soda.

HNO_3 = Nitric acid.

The cleaning agents must be stored/disposed of in accordance with current regulations/directives.

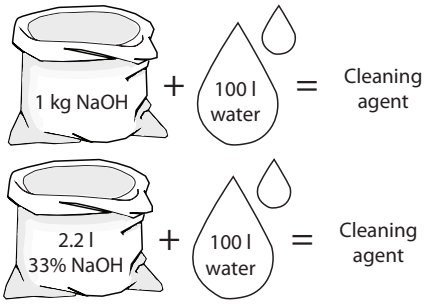
Examples of cleaning agents

NOTE

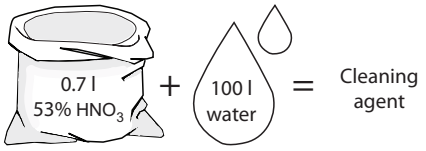
Use clean water free from chlorides.

Metric System

1. 1% by weight NaOH at 70°C

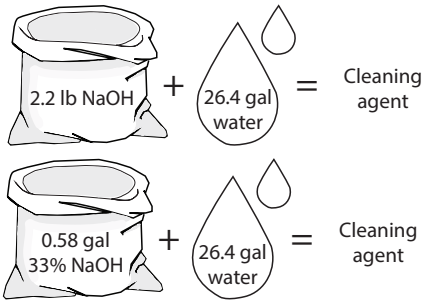


2. 0.5% by weight HNO_3 at 70°C

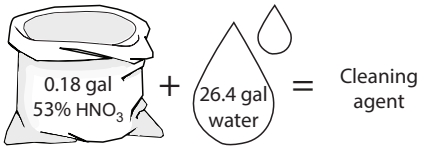


Imperial System

1. 1% by weight NaOH at 158°F



2. 0.5% by weight HNO_3 at 158°F

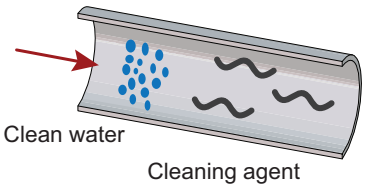


1. Avoid excessive concentration of the cleaning agent ⇒ **Dose gradually!**
2. Adjust the cleaning flow to the process **Milk sterilization/viscous liquids ⇒ Increase the cleaning flow!**

CAUTION

Always rinse well with clean water after the cleaning.

Always rinse!



5.2 ATEX Applications

Pumps intended for use in hazardous areas or in areas with an ATEX classification are to be selected based on the limits of operation stated in this manual. The material of construction is to be checked to ensure any pumped media is compatible with the pump materials of consturctions.

ATEX certified pumps are generally sized and specified based on specific product and duty conditions. As such, any changes made to the intedned duty or product could result in any ATEX certification becoming invalid. If any changes are made, please contact your local Alfa Laval distributor to check the certificaiton is still valid under the new conditions.

5.3 Operating Conditions

> **NOTE**
>
> Read the instructions carefully and pay special attention to the warnings!

General	
Maximum ambient temperature:	-10 °C to +40 °C for T4, motor without shroud -10 °C to +40 °C for T3
Maximum pump speed:	600 rpm or maximum design speed, whichever is lower.

Pump unit

Max. inlet pressure	
MaxiLobe:	16 bar / 232 psi

Temperature, Class T4	
Product temperature, EPDM, FPM, FFPM:	-10 °C to +100 °C
Ambient temperature, without shroud:	-20 °C to +40 °C

Temperature, Class T3	
Product temperature, EPDM:	-10 °C to +140 °C
Product temperature, FPM, FFPM:	-10 °C to +150 °C
Ambient temperature:	-20 °C to +40 °C

Shaft seal

Single shaft seal (SSS)

The SSS is lubricated and cooled by the processed media. It is therefore important to pay special attention to the operating limits of the pump unit.

Single flushed shaft seal (FSS)

The FSS is lubricated by the process media but has the additional flush media to provide additional cooling and residue removal. Therefore, both operating limits for the pumped media and flush media needs to be follow.

Double mechanical shaft seal (DMS)

The DMS is lubricated by the product media and/or the flush media and the buffer or barrier flushing principle can be used.

	Minimum pressure of buffer/barrier fluid	Maximum pressure of buffer/barrier fluid
Buffer fluid[1]:	> 0 bar / psi	0.5 bar / 7.25 psi
Barrier fluid[1]:	Pump inlet pressure plus 1 bar / 14.5 psi	16 bar / 232 psi

[1] Description of the two systems can be found in *Technical Data* on page 97

Minimum flow rate of buffer/barrier fluid:	30 l/h / 8 gal/h
Minimum temperature of buffer/barrier fluid:	-10 °C / 14 °F
Maximum temperature of buffer/barrier fluid:	70 °C / 158 °F during operation[1]

[1] When the pump is not in operation the flush system can be sterilized up to 125°C (260°F)

WARNING

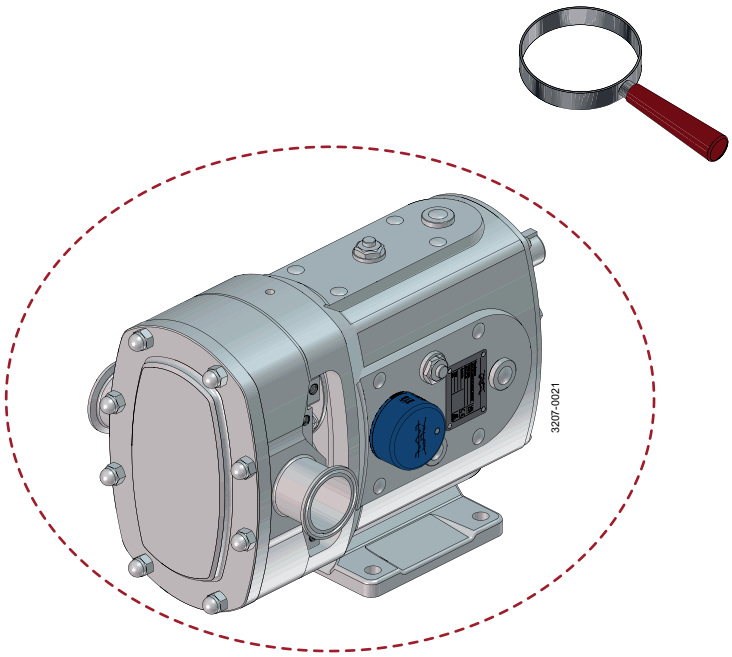
For ATEX applications the pump should be stopped if the flush temperature measured at the outlet of the seal housing reaches 100 °C / 212 °F

6 Maintenance

6.1 Maintenance Schedule

It is advisable to install pressure gauges on both sides of the pump the MaxiLobe pump range.

> **NOTE**
>
> The below checks are to be carried out when the pump is not operational and any electrical supply has been safely disconnected and isolated so accidental operation cannot occur.
>
> In certain operational circumstances the pump will pose a thermal hazard and as such should not be touched until allowed to reach a safe temperature before undertaking checks.



Any loss or damage to any guards or covers, especially if this leads to a deterioration of safety performance, shall be replaced immediately. The fixings of any guards or covers should only be replaced with fixings of the same type and specification.

If any problems are observed further investigation should be carried out and problems rectified before re-starting.

Weekly Checks

- Check oil levels and top up if required
- Check product seal for leakage and replace if necessary, see recommended spare parts
- Check gearbox lip seals for leakage and replace at the earliest opportunity, see recommended spare parts

Yearly Checks (in addition to the above)

- *Remove front cover and check wet end components for damage*
- Remove the rotors and check for signs of damage, condition of splines
- Check wet end clearances are within specification
- Drain and replace oil (3000 hours of operation or every 2 year)

Recommended Spare Parts

It is recommended that the below spare parts kits are retained within your maintenance schedule:

Qty.1 Complete Service Kit which contains 2 Mechanical Seal Kits, 1 Front Cover elastomer (5), 2 Rotor Nut elastomer (6) and 2 shaft o-rings (7)

Qty.1 Gearbox Elastomer Kit which contains 2 Lip Seals Gland End (36), 2 Seal Retainer O-ring (37), 1 Lip Seal Drive End (38).

Pos.	Qty.	Denomination
42	2	Mechanical Seal
65	2	O-Ring, Seal Housing
34	2	O-Ring, Sleeve/Shaft
43	2	O-Ring, Sleeve/Rotor

Pos.	Qty.	Denomination
10	2	O-Ring, Rotor Nuts
7	1	O-Ring, Front Cover
41	1	Lip Seal, Drive End
37	2	Lip Seal, Gland End

Service Instructions for 3A Standard 02-12

Rotor Nut O-Ring Seal Replacement Interval

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

Rotor Nut O-Ring Seal Inspection and Replacement

Periodically inspect the rotor nut elastomer seal for any discoloration, nicks, or cracks. If any of the defects above are noticed, the elastomer seal must be replaced following the procedure below for 3A compliance:

Cleaning Procedure for Soiled Rotor Nut Tapped Hole (3A)

1. Remove rotor nut from the shaft.
2. Submerge and soak nut for 5 minutes in COP tank with 2% caustic wash.
3. Scrub the hole with internal thread vigorously by plunging a clean sanitary bristle pipe brush in and out of the hole for two minutes while submerged.
4. Soak nut in acid sanitizer for 5 minutes, and then scrub the hole again with the pipe brush for two minutes.
5. Rinse well with clean water and blow-dry blind tapped hole with clean air.
6. Swab test the inside of the tapped hole to determine cleanliness.
7. Should the swab test fail, repeat steps 2 thru 6 above until swab test is passed. Should swab testing continue to fail, or time is of the essence, install a new rotor nut.

6.2 ATEX Maintenance

ATEX Daily Checks Shaft seals, all types

NOTE

Ensure there is no unacceptable leakage and consider replacement mechanical seals.

NOTE **Pump:**

Ensure the oil levels to be correct with no signs of oil contamination.

Ensure there are no signs of overheating.

Ensure there are no abnormal running conditions such as loose components, abnormal noise, vibration or oil leakage.

Ensure the pump duty conditions never exceed the limits specified in *Technical Data* on page 97.

Ensure that any dust deposits are removed.

ATEX Pump Gearbox

It is essential to ensure the oil level to be correct as specified in the standard instruction manual.

Pump Gearbox bearings changing intervals

The gearbox bearing life is heavily dependant on the operating conditions of the pump i.e pressure, ambient temperture, running speed and pressure variations.

It is recommended that the condition of the bearings is checked yearly or up to 9000 hours of operation, after which checks should be made every 2000 hours of operation.

The condition of the bearings can be monitored in several ways e.g. by means of vibration analysis or by physical checks (run out, smooth rotation).

If the any abnormal condition is found, the bearings should be replaced before returning the pump to operation.

ATEX Mechanical Seals

Replace the mechanical seals every 2 years or 9000 hours whichever comes first. Only genuine original Alfa Laval spare parts shall be used. Please contact your local Alfa Laval distributor.

When ordering ATEX spare parts please quote Pump Serial No.

6.3 Cleaning In Place (CIP)

The Maxilobe pump range has been designed for Clean in Place (CIP) operation with both 3A and EHEDG certification. However, due to variations in pumped products, system design, cleanliness requirements and chemicals used we recommend that users develop suitable CIP processes during commissioning on normal operating conditions and products and verify these meet the required levels of cleanliness ensuring a minimum flow velocity of 1.5 m/s (4.92 ft/s).

To ensure drainability to EHEDG certification requirements, the pump head must be specified with vertical porting (top/bottom).

Thermal Shock

Where metallic components are subjected to sudden changes in temperature the differing rates of contraction / expansion experienced, especially where there are very small clearances, can allow contact between the rotating and static parts potentially causing surface damage and pump seizure.

To minimise the risk of thermal shock occurring it is recommend that, during process steps, the rate of temperature change is limited to a maximum of 10 °C / 18 °F per minute. If a seal flush is being used the temperature should be limited to 30 °C / 86 °F during the cycle.

WARNING

Never touch the pump or the pipelines when pumping hot liquids or when sterilising.



A suitable by-pass is recommended.

WARNING

Always handle cleaning agents with great care and follow instructions in the safety datasheets.

Always rinse well with clean water after using a cleaning agent.

Always use rubber gloves and protective goggles when handling caustic cleaning agents.

Always store/discharge cleaning agents in accordance with current rules/directives.



6.4 Dismantling

NOTE

Before dismantling the pump refer to *Safety precautions* on page 16.

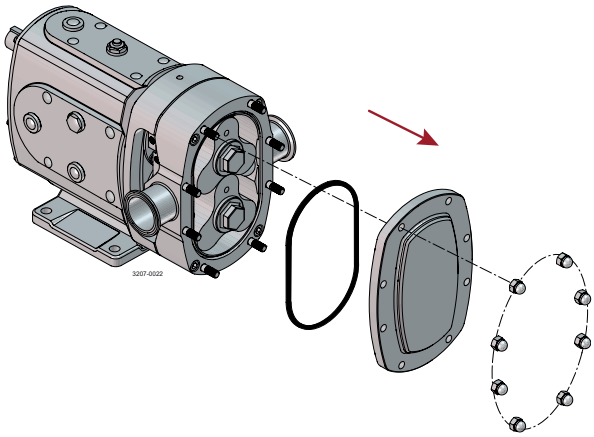
The items refer to *Parts lists and exploded views* on page 107.

It is recommended to mark the positions of the rotors and rotorcase (e.g. Top/Bottom or Left/Right) prior to removal to ensure parts are refitted in the same position.

1 Removing rotorcase cover

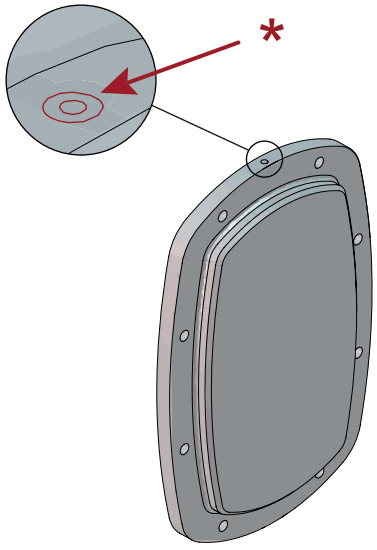
a) Remove rotorcase cover nuts (8) and cover (1).

b) Remove front cover P-ring (5).



NOTE

*) Pump models 62 to 73 are supplied with a M6 tapped hole in the front cover for use with a lifting eye (not supplied) to aid lifting.



2 Removing rotors

a) Insert a plastic (nylon) block between the two rotors (3) to stop them turning.

b) Remove rotor retention nuts (4).

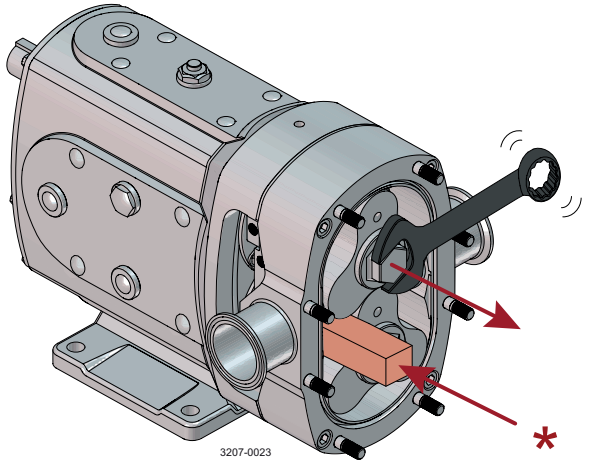
For model size 72 and above the rotors are retained by torque locking assemblies, TLA's (15), which can be removed by:

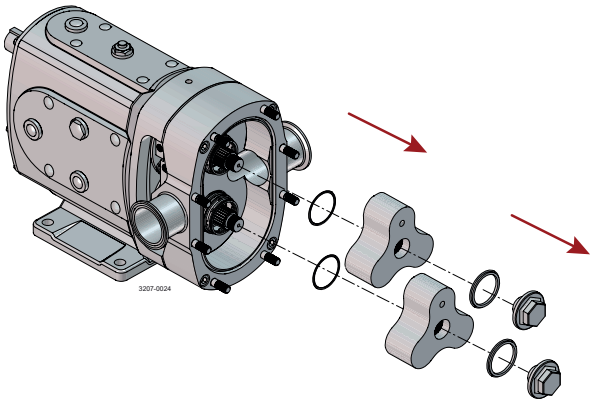
1. Remove rotor nut to reveal TLA
2. Loosen the TLA screws fully and remove TLA
3. If the TLA is difficult to remove, refit 2-3 screws and lightly tap with a mallet to loosen.

c) Before removing the rotors rotate them so the dimple on the front face of the rotor is aligned upwards (horizontal port) or to the left side (vertical ports). Mark the spline that aligns with the dimple for ease of refitting.

d) Remove rotors (3)

e) Remove the rotor nut P-rings (6) and rotor shaft O-rings (7).





* Plastic block

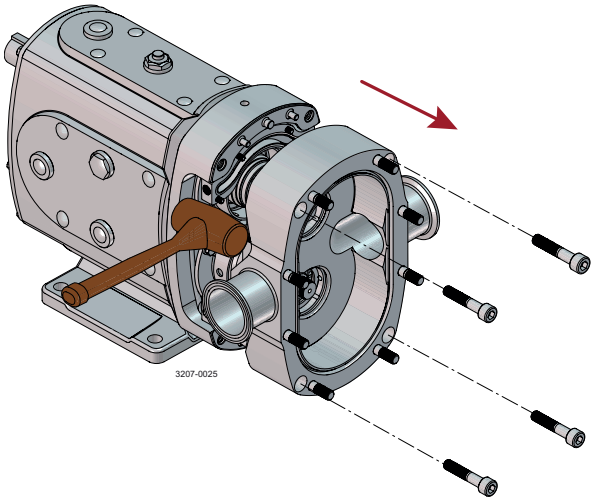
3

a) Remove rotorcase retaining screws (11).

b) Remove rotorcase (2) tapping both sides with a soft mallet if required.

c) If Double Mechanical seals are fitted remove from the shaft.

> **NOTE**
>
> Shim retainer (13) and Shims (12) should not be removed unless rotor clearances require resetting.

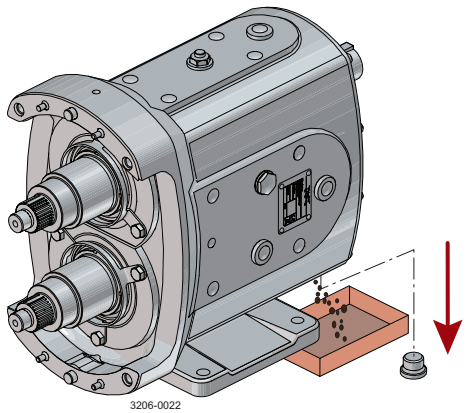


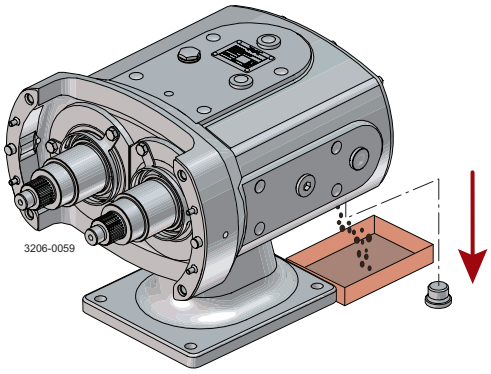
4 Draining pump lubrication

a) Place a tray under the gearcase to collect the waste lubricating oil.

b) Remove the lower drain plug (46) at the bottom of the gearcase (31).

> **NOTE**
>
> Used oil should be disposed of appropriately as per local regulations.



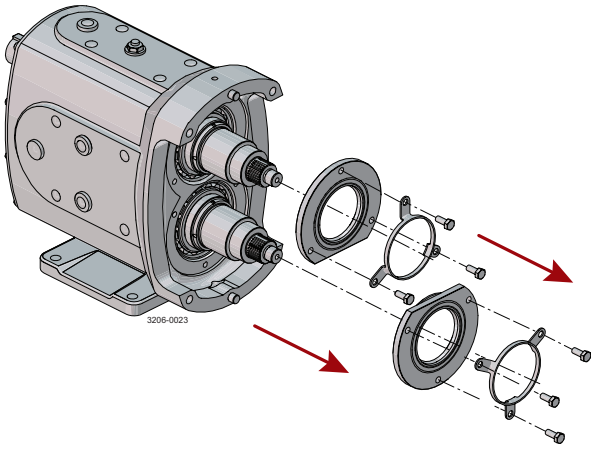


5 Removing gland guards seal retainers

a) Remove screws (40).

b) Then remove gland guards (22) and seal retainers (34).

c) Remove the lip seals (36) and seal retainer o-rings (37) from the seal retainers and dispose. It is essential to renew the lip seal and o-ring prior to reassembly.

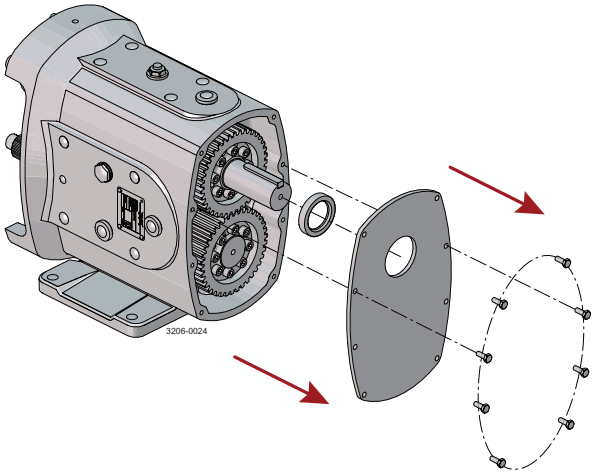


6 Removing Gearcase Cover

a) Remove drive key (65) and then remove rear cover screws (42).

b) Tap the center of the cover to help break the gasket seal then remove the gearcase cover (35).

c) Remove the lip seal (38) from the cover and dispose. It is essential to renew the lip seal prior to reassembly.

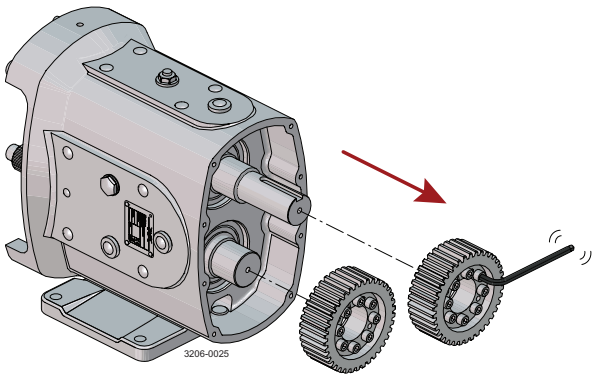


7 Removing timing gears

a) Lock the timing gear in position by placing a small soft rod between the gear teeth.

b) Loosen the torque lock assembly screws (39) but do not remove fully.

c) Remove gears (36) and torque lock assembly from the shafts (51 and 52)



> **NOTE**
>
> If the torque locking assembly is difficult to loosen from the shafts then three screws can be removed completely and inserted in the exposed threaded holes, tightening gradually in a radial pattern to remove.

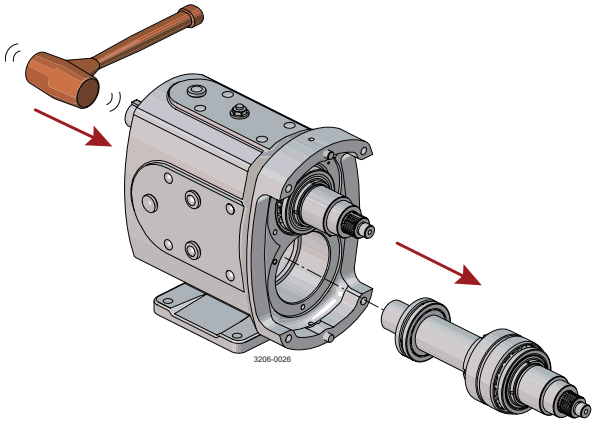
8 Shaft assembly removal

a) Using a soft mallet gently tap the rear end of each shaft (51 and 52) and remove through the front of the gearcase (31).

b) Support each shaft during removal from the gearcase.

c) Remove the shaft shims (53) fitted in to the bore marked by a dimple when viewed form the front.

d) Pump size 22 to 43 only: Remove the rear circlip (60) and outer rear bearing (58) race from the rear bearing bores.



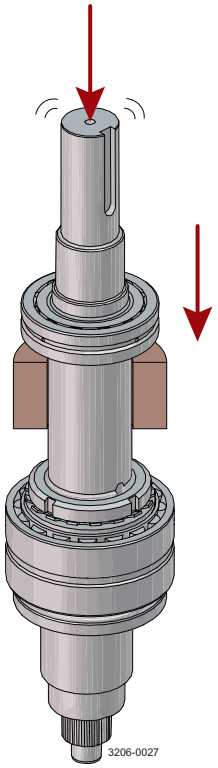
9 Bearing removal

> **NOTE**
>
> Removal of the bearings requires the use of a press. Ensure any tooling used is adequately rated for the job and in good working condition, appropriate personal protection equipment (PPE) is worn and the user is competent at using the tools safely.

Rear Bearing Removal

a) Remove the shaft circlip (59) from the shaft (51 and 52)

b) Mount the shafts vertically in a press with a tool positively located against the rear bearing inner race (58) as shown and apply pressure to the top of the shaft so that the shaft moves through the bearing. Ensure the shaft is supported and is not allowed to drop once bearing is removed.



Front Bearing Removal

a) Remove the shafts from the press and hold in a vice using soft jaws to protect the areas where the lip seals will be located.

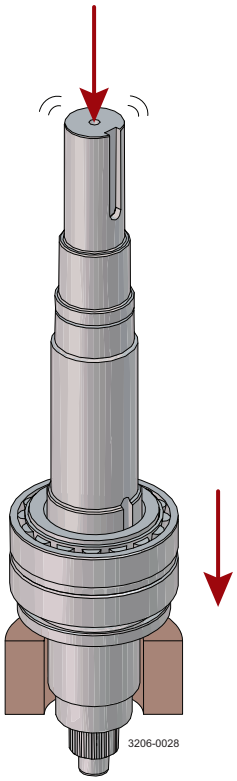
b) Bend the tab on the tabbed lock washer (56) up and remove the bearing nuts (57) using a 'C' spanner and tapping with a mallet.

c) Mount the shaft vertically in a press with a tool positively located against the front bearing inner race (54) as shown and apply pressure to the top of the shaft so that the shaft moves through the bearing and spacer pack.

d) Once the first bearing is free remove from the shaft together with the spacer (55) and the outer race of the second bearing (54).

e) Continue to apply pressure to the top of the shaft so that the inner race of the second bearing is free and remove. Good engineering practice suggests that if bearings are removed from the shafts for any reason they should be renewed.

f) Clean and examine all components for wear or damage. Renew where necessary.



6.5 Assembly

> **NOTE**
>
> Ensure all screws and nuts are torqued to the values stated in *Tool Requirements* on page 100.

1. Fitting bearings to shafts

   Take care not to damage shaft surfaces, in particular where the lip seals will be located.

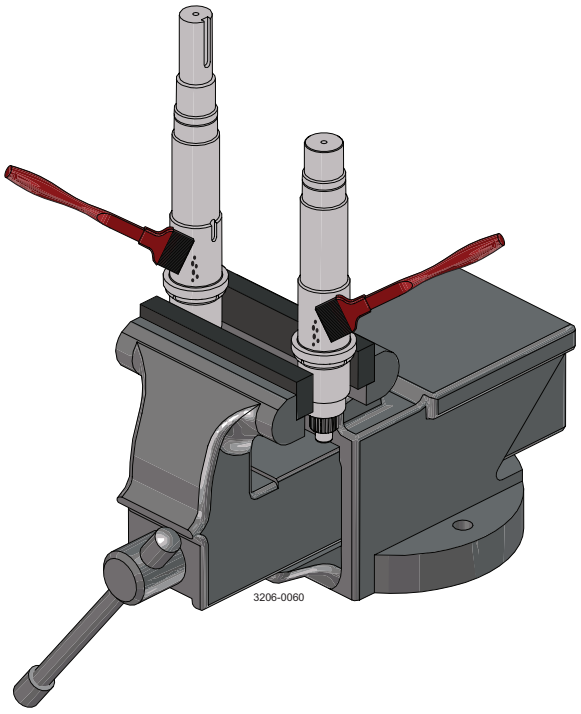
   On Maxilobe 22 to 43 models, bearings do not require heating.

   For Maxilobe 52 to 73 models, heat the bearing inner cones to 115° C / 239° F.

   Do not use any form of live flame when heating, as this will damage bearings.

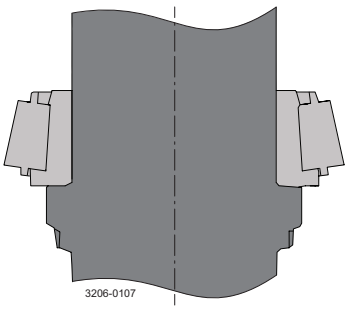
2. Front Bearings

   Position shafts (51 and 52) vertically in a vice using soft jaws and apply anti-seize compound to the bearing diameters.

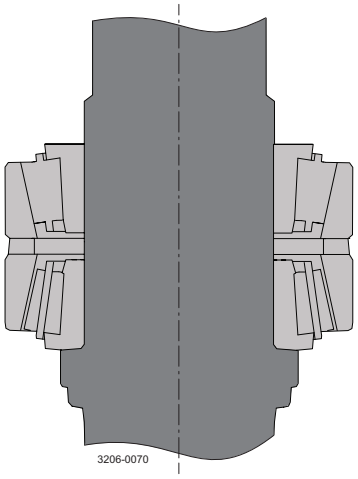


3. Maxilobe models 52 to 73 only: Heat the first inner bearing cone (54) using a bearing heater to 115 °C / 239 °F.

   Place the inner cone of the bearing (54) on the shaft as shown ensuring a positive fit against the shaft shoulder using a press and appropriate tool if required.



4 Fit the first bearing outer cup, bearing spacer (55) and rear bearing outer cup on the shaft as shown. Fit the second inner bearing cone to the shaft as per Step 2 above.

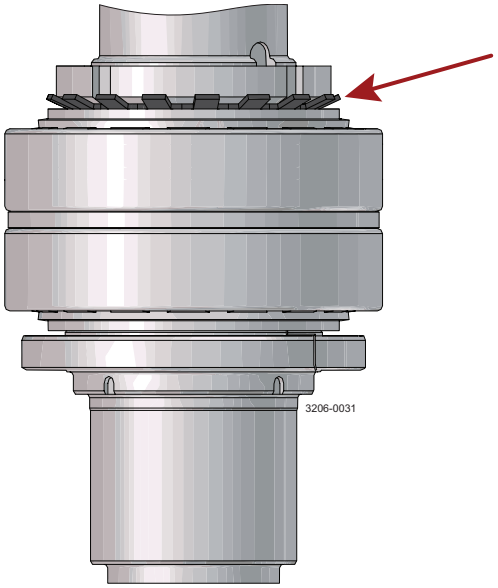


5 a) Maxilobe models 52 to 73 only: Allow bearings to cool to ambient temperature. Failure to do so will result in incorrectly set bearings.

b) Fit the tabbed lock washer (56) on the shaft with the tabs angled away from the bearing.

c) Locate and tighten the bearing nut (57), whilst at the same time rotating the bearings (54) and spacer (55). The bearings are correctly adjusted when the spacer can only be moved with a light tap of a mallet.

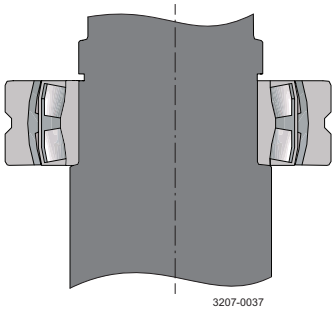
d) Once in place bend one of the tabs of the tabbed lock washer (56) in to the nearest cut out on the bearing nut (57). If no tab is aligned with the cut out on the bearing nut tighten the bearing nut slightly until aligned with a tab.



6 Rear Bearings

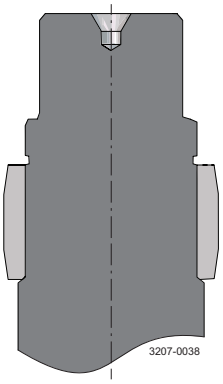
Position shaft (51 and 52) vertically in a vice using soft jaws and apply anti-seize compound to the bearing diameters.

7 Maxilobe models 52 to 73 only: Heat the rear bearing (58) using a bearing heater to 115 °C / 239 °F.



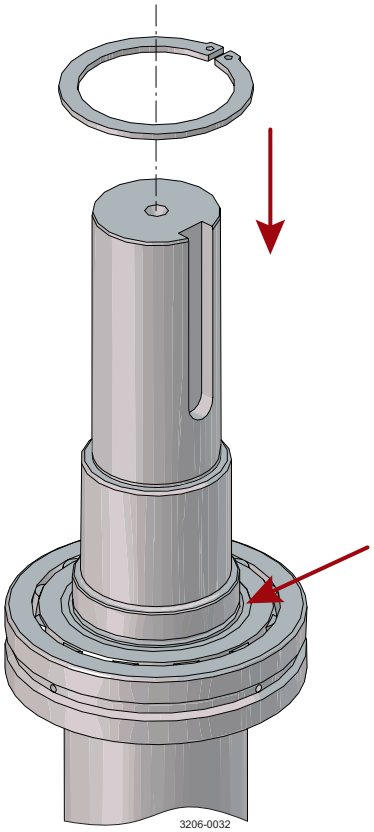
MaxiLobe 52-73

Place the bearing (58) (Inner race part only on the Maxilobe models 22 to 43) on the shaft as shown ensuring a positive fit against the shaft shoulder using a press and appropriate tool if required.



MaxiLobe 22-43

8 Fit the bearing shaft retaining circlip (59) in the groove on the shaft.



9 Apply small amount of recommended gearbox oil to the bearings.

10 Fitting Shaft Assemblies.

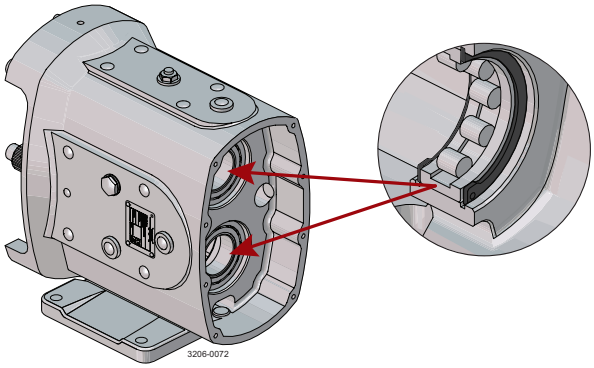
Maxilobe models 22 to 43 only:

a) Lightly oil the rear bearing bores of the gearcase (31) with gearbox oil.

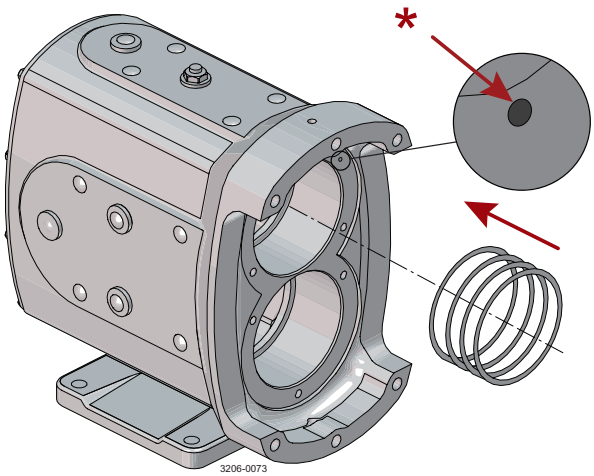
b) Fit first bearing circlip (60) in the inner most groove in the rear bearing bore of the gearcase (31).

c) Locate the outer race of the rear bearing (58) in the rear bearing bore.

d) Fit second bearing circlip (60) in the outer most groove in the rear bearing bore.



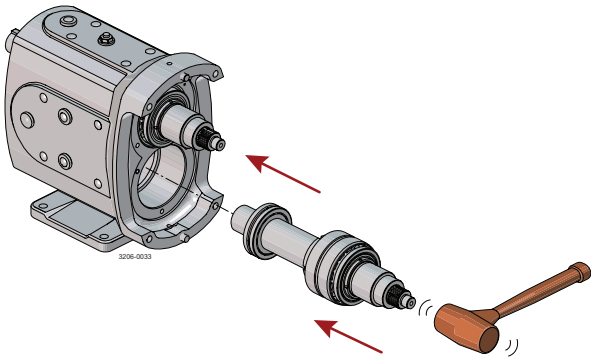
11 Replace the shaft shims (53) in to the bore marked with a dimple (as viewed from the front of the gearcase).



12 Identify the drive (51) and auxiliary (52) shaft positions according to the gearcase cover (5) orientation or original pump specification.

13 a) Lightly oil the bearing bores of the gearcase (31) with gearbox oil.

b) Using a soft faced mallet tap the shafts (51 and 52) into the gearcase (31).



NOTE

For Maxilobe 52 to 73 pump models ensure the outer race of the rear bearing (58) is kept perpendicular to the rear bearing bore to avoid hold up on the bore. Only light tapping with a soft mallet should be used and only if required. If the shaft does not easily slide into the bore check bearing alignment and front bearing tension.

14 Fitting and retainers and gland guards

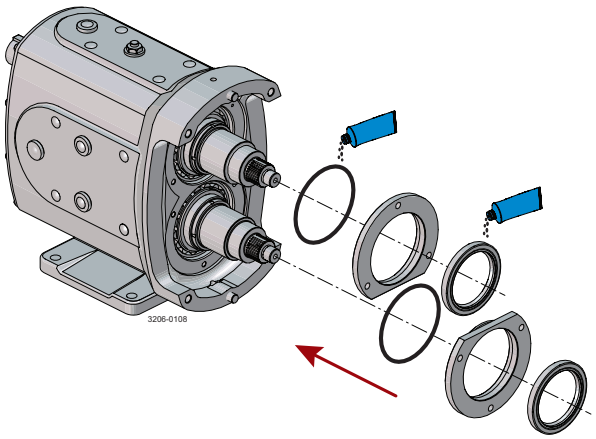
Clean the rear face of the seal retainers (14) and the front face of the gearcase (31), fit in position and tighten.

15 a) Check rotor alignment is correct by referring to the rotor abutment alignment in step 18 and adjust as required.

b) When rotor alignment is correct remove seal retainers and press new lip seals (36) until flush with front face.

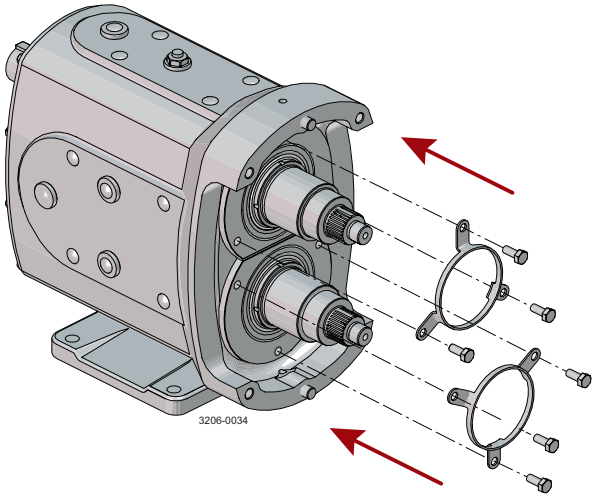
c) Lubricate with a small amount of lubricant and fit a new O-ring (37) to the seal retainer.

d) Apply a small amount of gearbox oil to the inner lip of the lip seal (36) and push the seal retainers into position. Make sure lip seals are not damaged when sliding them onto the shafts.

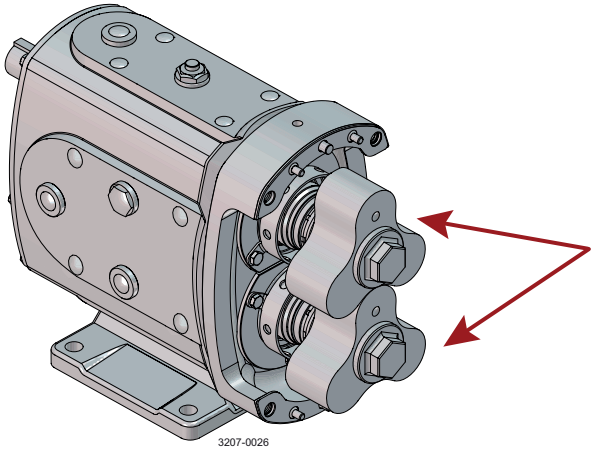


16 Position the gland guards (22) and tighten the screws (40).

If the rotor abutment has been checked and is within specification move to Step 20.



17 Checking rotor abutment alignment.



> **NOTE**
>
> Incorrect setting of rotor alignment will damage the pump.

a) Set the position of the master splines (marked before disassembly) in the 12 o'clock (horizontal ported) or 9 o'clock (vertical ports).

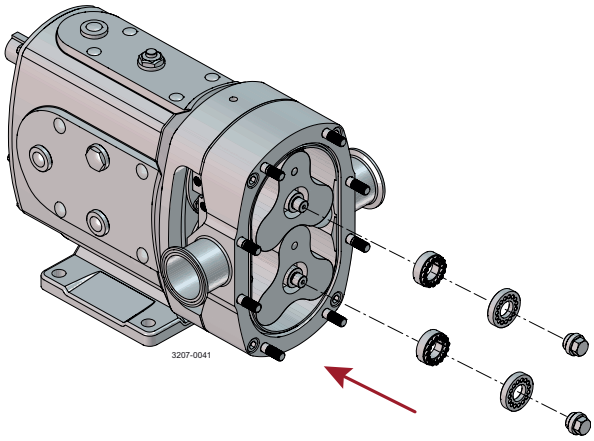
If new shafts have been fitted, or the shafts have not been marked, set the keyway of the driveshaft to the master spline position.

b) Fit the rotors (3) ensuring to align the master spline with the dimple on the rotor front face.

c) Fit the rotor nut (4) and tighten fully.

To tighten the rotor nuts fully it may be necessary to refit the rotorcase and lock the rotors using a plastic block.

Maxilobe 72 to 73



> **NOTE**
>
> If re-using the TLA ensure the surfaces of the TLA, screw, shaft and/or rotor does not show any signs of deformation or damage.

a) Ensure the surfaces of the TLA, shaft and rotor bore are clean and lightly coat in oil.

b) Ensure the TLA screws are loose and insert the TLA in to the rotor bore fully.

c) Fit the TLA clamp plate tool and screw (supplied with the pump) and tighten to the stated torque rating, ensuring the holes in the clamp plate align with the screws on the TLA.

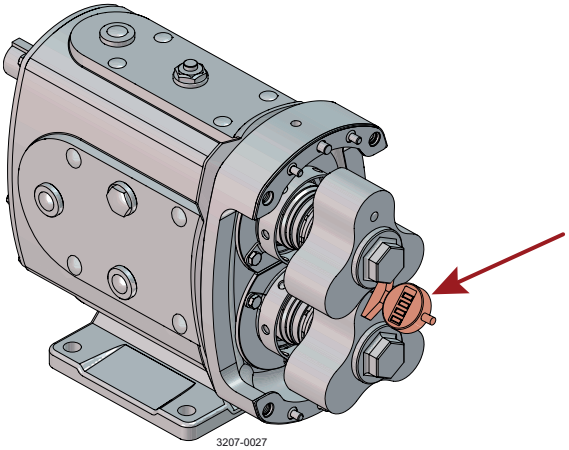
d) Tighten the TLA screws in the following steps:

1. 2 diametrically opposed screws until the it begins to tighten.
2. All screw to 50% of the stated torque in a criss-cross sequence.
3. Repeat to 100% of the stated torque in a criss-cross sequence.
4. All screws radially, checking the stated torque setting has been achieved.

18 a) Rotate the rotors to allow measurement of the rotor face to face axial alignment.

b) Using a depth micrometre ensure axial alignment is within a tolerance of 0.012mm (0.0005") across each lobe, rotating the rotors as required.

c) If the alignment is within tolerance move to step 15. If the alignment is incorrect, note the adjustment required and move to step 19 to adjust the abutment shims (37).



19 a) Remove the rotor nuts (4) and rotors (3).

b) Remove the seal retainer (34) only from the shaft position marked with the dimple on the gearcase (3).

c) Remove this shaft only (either 51 or 52) from the gearcase and remove the gearbox shims (53).

d) Measure the removed shims and adjust (add, swap or remove) shims by the required amount as noted during measurement above. Add shims to move the rotor position forward, remove shims to move the shaft backwards.

e) Refit the adjusted shim pack into the front bearing bore marked with the dimple of the gearcase.

f) Refit the shaft following the instructions in step 13.

g) Refit the seal retainer and tighten.

h) Repeat steps 17 and 18 above to verify rotor abutment is now within tolerance.

i) Return to step 15.

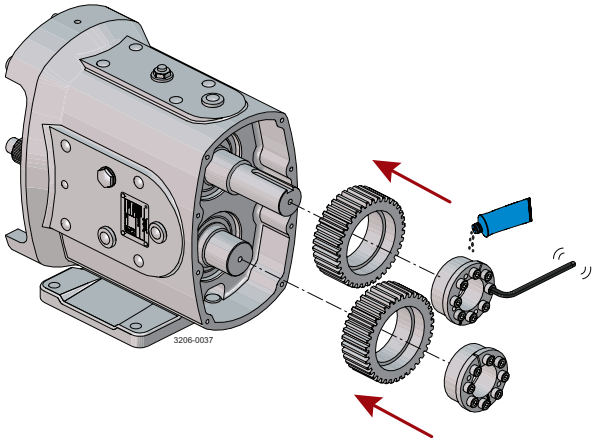
20 Fitting timing gears and torque locking assemblies (TLA).

a) If re-using torque locking assemblies (62) ensure the screws are fitted in the correct holes (i.e. not holes used for removal) and ensure the screws are fitted loosely.

b) Lightly lubricate the TLAs with the recommended gearbox oil.

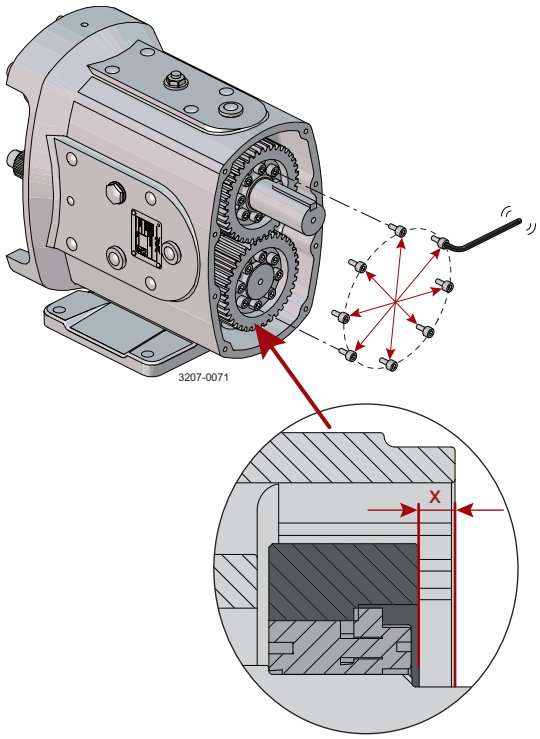
c) Ensure the recess of the timing gear (61) and rear face of the TLAs are free from debris and fit the TLA to the timing gear.

d) Slide the timing gear and TLA on to the shafts (51 and 52) together.



21 a) Tighten the TLA screws (62) on either the top shaft (for horizontally ported pumps) or the right hand shaft (for vertically ported pumps, when viewed from the front) in the following steps:

1. 2 diametrically opposed screws until the it begins to tighten.
2. All screw to 50% of the stated torque in a cross pattern.
3. Repeat to 100% of the stated torque in a cross pattern.
4. All screws radially, checking the stated torque setting has been achieved.



> **NOTE**
>
> Ensure the TLA pushed fully back on the shaft and that the timing gear is position correctly during tightening.

b) Tighten the TLA screws on the auxiliary shaft loosly, so the shaft can still rotate within the timing gear.

c) Check that the face of the timing gears do not sit proud of the rear face of the gearcase by checking the dimension from the rear face of the timing gear to the rear face of the gearcase is as per the table below. If not, loosen the TLA slightly and repeat the tightening sequence.

d) Timing adjustment is now required.

Model	Dimensions X (mm)
22/23	7.5
32/33	1.5
42/43	4
52/53	6
62/63	9.5
72/73	6

22 Adjusting rotor timing

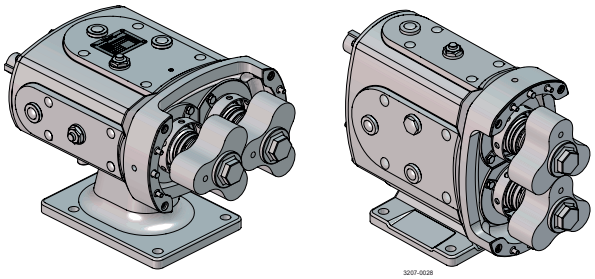
> **NOTE**
>
> If the rotor timing requires adjustment (and assuming the pump has not yet been re-built), it is important to establish the cause for the rotors mistiming before proceeding.

23 To allow timing adjustment ensure that one of shafts is fully tightened (as stated in Step 21) with the other shaft being loose and able to rotate within the TLA. If not, loosen the correct TLA until is able to rotate freely.

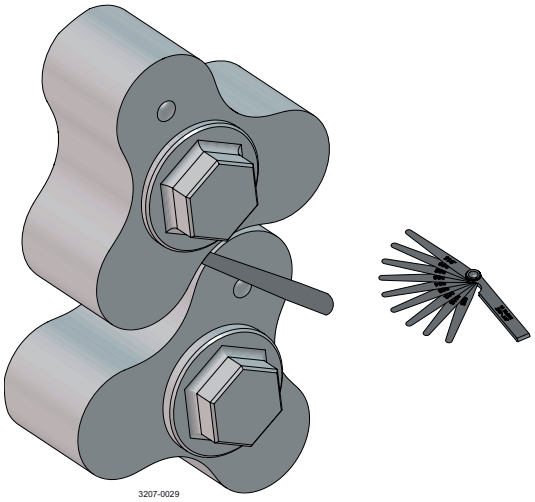
24 a) If the rotors are not installed, refit the rotors (3) and rotor nuts (4) and tigthen to the correct torque value.

b) Set the rotors (17) to the positions shown with the rotor dimples in the 6-12 o'clock plane (horizontally ported pumps) or 3-9 o'clock plane (vertically ported pumps).

For the rotor on the drive shaft the rotor dimple should be aligned with the drive shaft keyway.



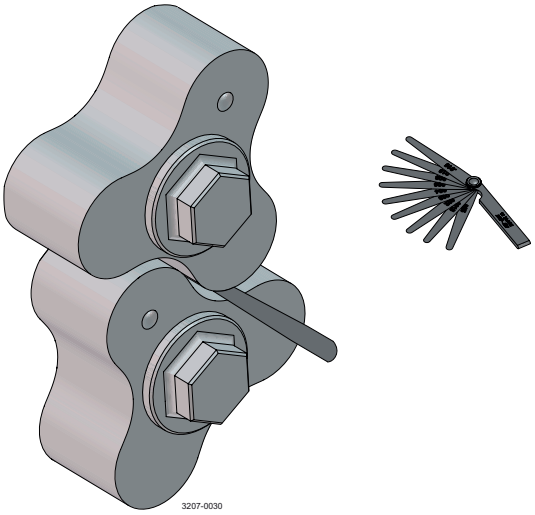
c) Turn the shaft so that the rotors are in the new positions as shown.



d) Using feeler gauges measure between the points indicated, turning the shaft as required.

e) If the measurement points are unequal tap the rotor which is on the free turning shaft until equal measurement through 6 points is achieved.

f) Tighten the torque locking assemblies or clamp plate screws. Confirm timing is still correct. Remove the rotors.

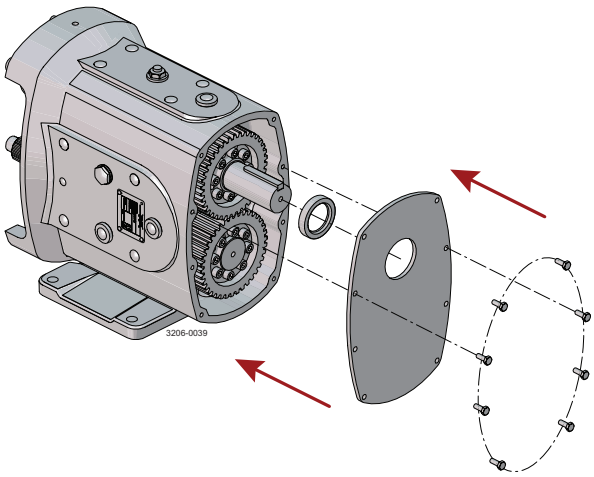


25 Fitting gearcase cover

a) Remove all old gasket material from both mating faces and wipe clean with a solvent. Clean the bore of the gearcase cover (35) and press a new lip seal (38) into the cover until flush.

b) Apply liquid gasket (such as Teroson MS930 or similar) to the rear face of the gearbox, ensuring the sealant is applied to the inner side of the cover screw thread holes.

c) Apply a small amount of gearbox oil on the inner lip of the lip seal and carefully slide the cover over the shaft ensuring the lip seal is centered and not cut or damaged then secure with the gearbox cover screws (42).



NOTE

It is recommended to allow the sealant time to set before filling with oil. Follow the recommendations of the sealant manufacture.

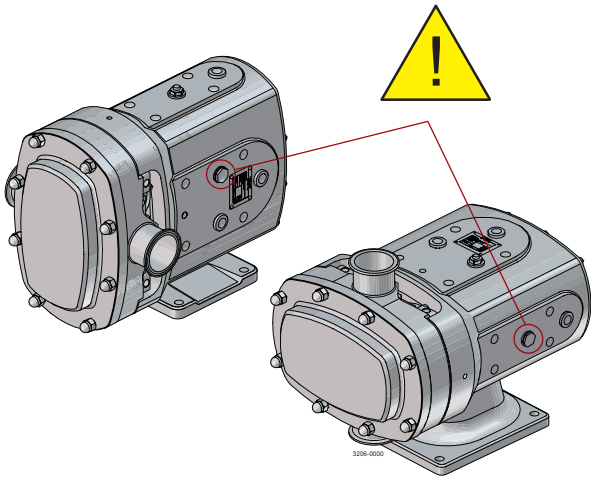
26 Refit any blanking plugs (45) removed during the disassembly checking the O-rings are not damaged and replacing as required.

Refit the oil sight glass (44) in the side of the gearcase (31) as shown.

Refill with the recommended oil (as stated in *Pump Lubrication* on page 35).

Quantity guidelines for each pump size and orientation as given in *Technical Data* on page 97, however oil should be added to the gearbox until the sight glass is filled with oil.

Check the pump for any signs of oil leakage and rectify as required.



27 Fitting and shimming of Rotorcase

Whenever the rotor case and rotors have been removed it is good engineering practice to check the clearances of the pump to ensure they are within specification shown in the clearance charts before putting back in to operation.

If the existing rotorcase and rotors are being refitted and no changes have been made to the rotor abutment setting (gearbox shims) then no changes to the rotorcase shims should be required. In this case please proceed to step 29.

If a new rotorcase and/or new rotors and/or changes to the rotor abutment setting (gearbox shims) has been made then reshimming of the rotorcase will be required. In this case please proceed to step 28.

> **NOTE**
>
> Your supplier can advise the correct clearances from the pump serial number. Any incorrect setting of clearances is likely to damage the pump in operation. Shims can be stacked unequally providing the clearances are achieved.

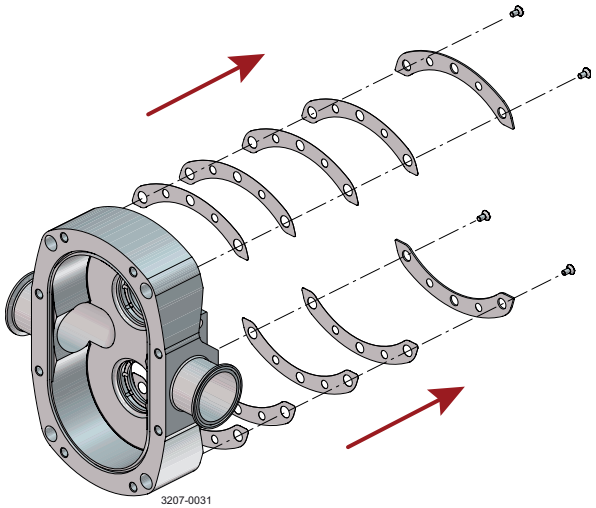
28

a) Remove the shim retainer screws (14), shim retainers (13) and shims (14) if fitted.

b) From the shim set select and measure out initial shims totalling as below:

- Maxilobe models 22 to 43: 0.5 mm / 0.019 in.
- Maxilobe models 52 to 73: 0.6 mm / 0.023 in.

c) Fit the shims, shim retainer and shim retainer screws and tighten to the correct setting. Ensure the shim retainer is fitted the correct way round with the counter sunk holes visible and check the screws do not sit proud of the shim retainer.

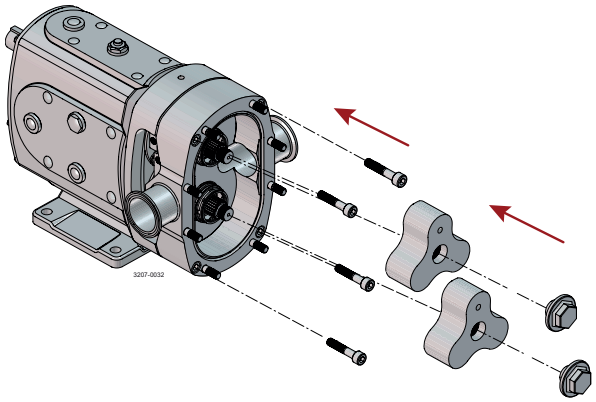


29

a) Ensure the shim retainers are correctly fitted to the rotorcase (3) and that the shim retainer screws (14) are not sitting proud of the shim retainers (13). If the shims have been removed during disassembly and not been kept in the matched sets please follow the instructions in step 30.

b) Refit the rotorcase to the gearcase (31) observing the correct orientation as marked during disassembly, refit the rotorcase screws (11) and tighten.

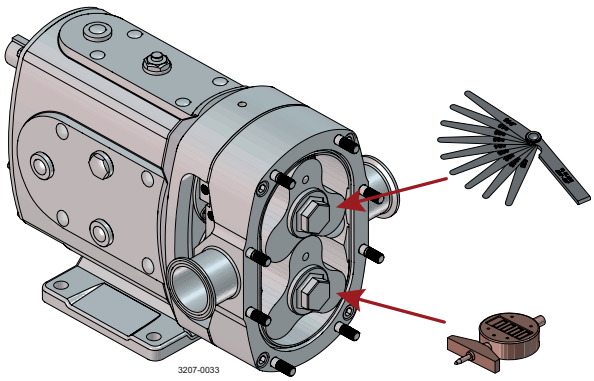
c) Refit the rotors (3) observing the correct position as marked during disassembly, refit rotor nuts (4) and tighten.



30 a) Using feeler gauges to check the back clearance (rear rotor face to rotorcase) and a depth micrometer to check the front clearance (front rotor face to rotorcase) record the values and check against the clearance charts for the appropriate pump model.

b) If the clearances are within the specification, then no further adjustment is required and can proceed to step 32.

c) If the clearances recorded are outside the specification, then adjustment to the rotorcase shims will be required.



31 a) Remove the rotor nuts, rotors and rotorcase and place face down on a suitable surface.

b) Remove the shim retainer screws (14), shim retainers (13) and shims (12) ensuring to make note of the position of each.

c) Measure the removed shims and adjust (add, swap, or remove) shims by the required amount as noted during measurement above. Add shims to move the rotorcase forward (decrease back clearance) or remove shims to move the rotorcase backwards (increase back clearance).

d) Fit the shims, shim retainer and shim retainer screws and tighten to the correct setting. Ensure the shim retainer is fitted the correct way round with the counter sunk holes visible and check the screws do not sit proud of the shim retainer.

e) Repeat step 30 above to recheck the clearances.

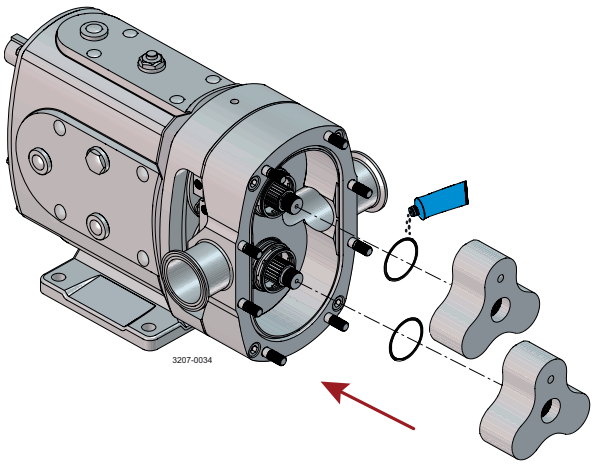
32 Once the clearances have been checked and are within specification remove the rotor nuts and rotors. Depending on the seal type fitted the rotorcase may need to be removed also. Please refer to *Primary Seals Removal and Fitting* on page 70 for seal fitting instructions.

33 Fitting rotors

a) Ensure the rotorcase is fitted and the rotorcase screws are tightened as per the specification in *Tool Requirements* on page 100.

b) Lubricate and fit new rotor O-rings (7) to the shaft (51 and 52).

c) Refit the rotors (3) ensuring to align the missing spline in the rotor with the shafts and observing the position marks made during disassembly if refitting existing components.



Maxilobe 72 to 73:

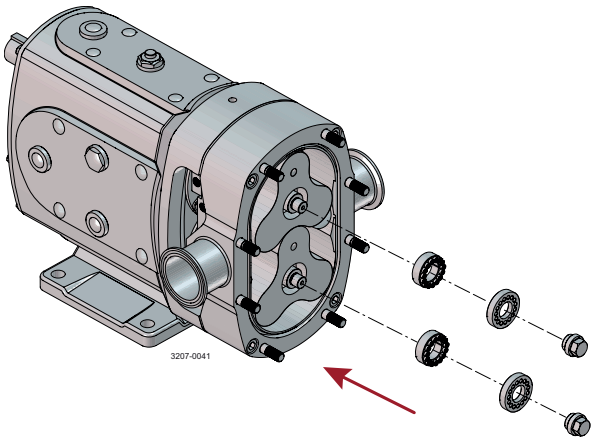
a) Ensure the surfaces of the Rotor TLA (15), shaft and rotor bore are clean and lightly coat in oil.

b) Ensure the TLA screw are loose and insert the TLA in to the rotor bore fully.

c) Fit the TLA clamp plate tool and screw (supplied with the pump) and tighten to the stated torque rating, ensuring the hole in the clamp plate align with the screw on the TLA.

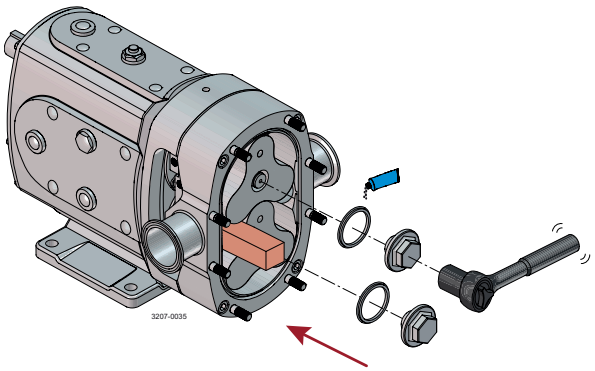
d) Tighten the TLA screws in the following steps:

1. 2 diametrically opposed screws until the it begins to tighten.
2. All screw to 50% of the stated torque in a criss-cross sequence.
3. Repeat to 100% of the stated torque in a criss-cross sequence.
4. All screws radially, checking the stated torque setting has been achieved.



34 a) Lightly lubricate and fit new P-ring elastomer (6) into the groove on the rotor nuts (4) ensuring the correct orientation.

b) Fit rotor nuts and tighten to torque shown in *Technical Data* on page 97. Use a plastic (nylon) block to stop the rotors from turning during tightening.



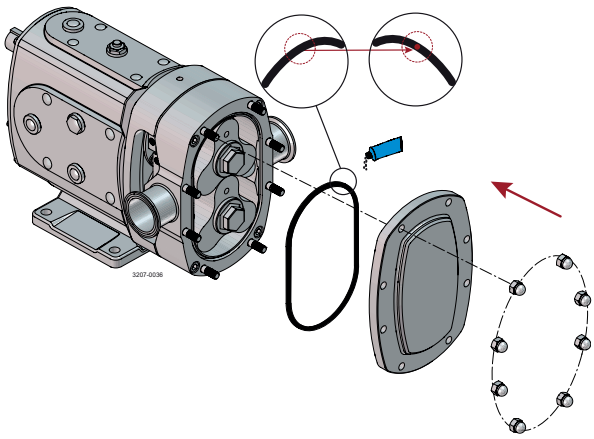
35 To check rotors are correctly synchronised turn the drive shaft (51) by hand and check all clearances with a suitable gauge against recommended clearance figures as shown in seperate addendum for Pump Head Clearances.

36 Fitting rotorcase cover

a) Lubricate and fit new P-ring elastomer (11) (Red ID Mark) to the rotorcase (2) ensuring the coloured mark is towards the rotor case and is fully seated in the groove.

b) Fit rotorcase cover (1) onto rotorcase (2) and tighten rotorcase cover nuts (8).

c) Refer to pump start up checks prior to operation.



6.6 Primary Seals Removal and Fitting

NOTE

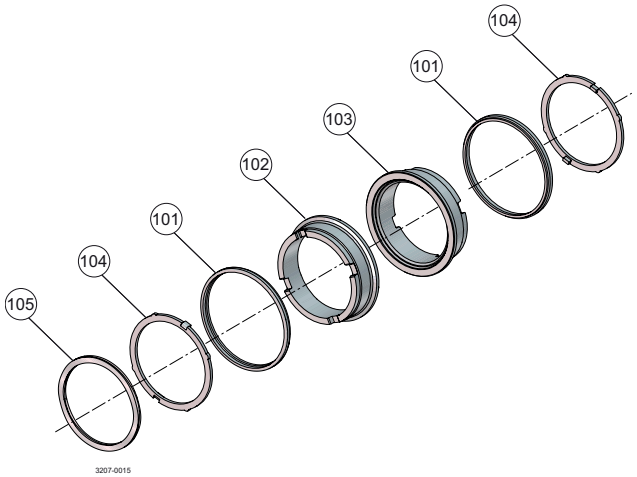
Mechanical seals are fragile. Take extreme care when handling.

Clean components before fitting, checking there is no damage to sealing faces.

New elastomeric parts should be fitted during assembly.

6.6.1 Single mechanical seal

Item	Description
101	Lip O-ring
102	Rotary Face
103	Static Face
104	Drive Ring
105	Wave Spring



1 Seal Removal

> **NOTE**
>
> It is recommended to mark the positions of the rotors and rotorcase (e.g. Top/ Bottom or Left/Right) prior to removal to ensure the parts are refitted in the same positions.
>
> The Lip O-ring, Seal Faces and Drive rings are interchangeable between the static and rotary sides. Therefore, if reusing the seal and elastomers, it is recommended to ensure they are refitted in the same position as removed.

a) Remove rotorcase cover (1) and rotors (3).

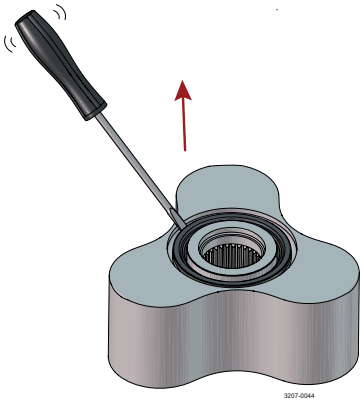
b) **Rotary Seal**

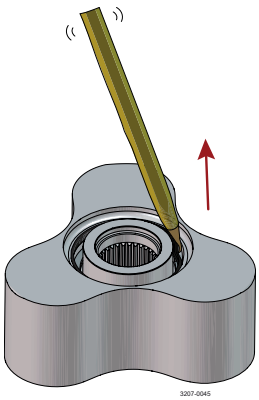
Place the rotors front face down on a flat, clean, using a clean shop towel if needed to ensure the surface is not scratch by debris.

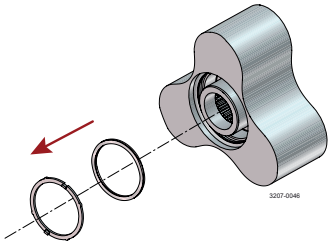
Using a small flat headed screwdriver, gentle lever the between the edge of the rotor and the seal to push out the rotary seal face (102) and remove.

Using a pick, remove the lip o-ring (101) from the groove.

Remove the drive ring (104) and wave spring (105) from the rotor.





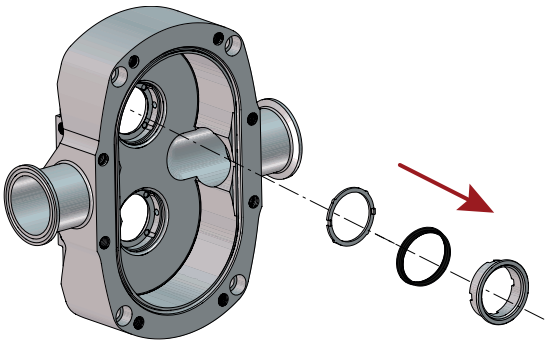


c) **Static Seal**

Using a small flat headed screwdriver, gentle lever between the edge of the rotorcase and the seal to push out the static seal face (103) and remove.

Using a pick, remove the lip o-ring (101) from the groove.

Remove the drive ring (104) from the rotorcase.



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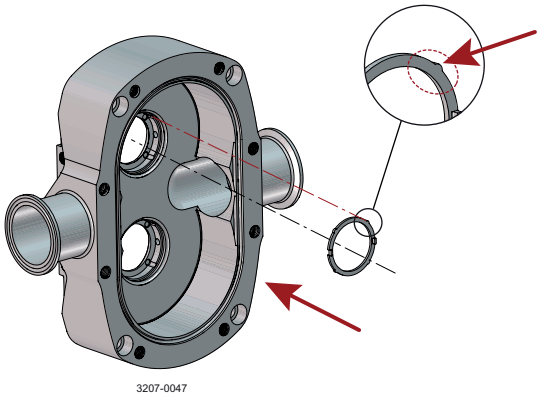
2 Seal fitting

> **NOTE**
>
> Ensure all screws and nuts are torqued to the values stated in *Tool Requirements* on page 100.
>
> Make sure the housing area is clean and free from any particles.

a) **Static Seal**

Make sure the housing area is clean and free from any particles

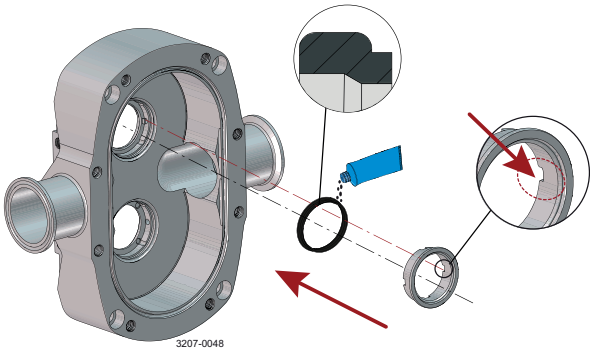
Fit the drive ring (104) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.



> **NOTE**
>
> When fitting ensure the tabs after facing outwards from the rotorcase.

Lightly lubricate the rear side of the Lip O-ring (101) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove.

Fit the static seal face (103) into the seal bore, being carful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.



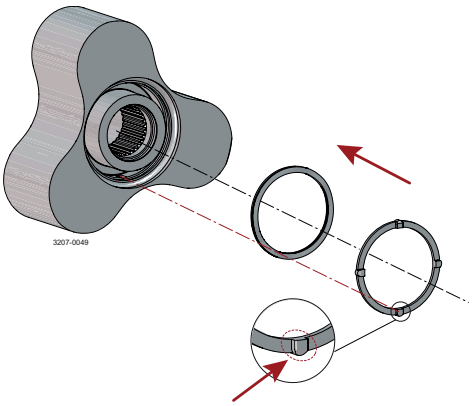
Push the seal ring firmly and evenly until it is fully seated.

b) **Rotary Seal**

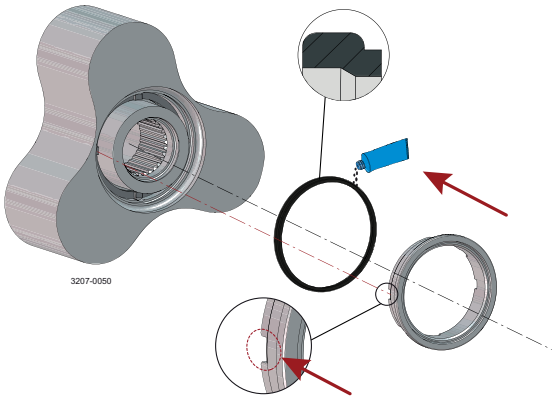
Make sure the housing area is clean and free from any particles

Fit the wave spring (105) in to the rotor bore, ensuring it is centered flat on both face.

Fit the drive ring (104) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.



> **NOTE**
>
> When fitting ensure the tabs after facing outwards from the rotorcase.



Lightly lubricate the rear side of the Lip O-ring (101) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove. If required, using a small flat head screwdrive, gently compress the drive ring to allow the lip oring to fully seat in the rotor seal bore groove.

Fit the rotary seal face (102) into the seal bore, being carful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.

Push the seal ring firmly and evenly until it is fully seated and check there is axial movement

c) **Assembly**

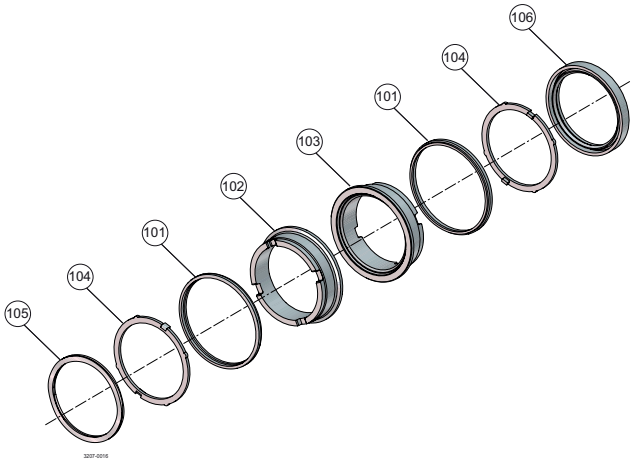
Clean the seal face witha suitible solvent and lint free cloth.

Refit the rotors in the marked position and fully tighten the rotor nuts as shown in *Assembly* on page 56.

Rotate the rotors and check for any abnormal noise or rotation.

6.6.2 Single flushed mechanical seal

Item	Description
101	Lip O-ring
102	Rotary Face
103	Static Face
104	Drive Ring
105	Wave Spring
106	Lip Seal (Flush)



1 Seal removal

> **NOTE**
>
> It is recommended to mark the positions of the rotors and rotorcase (e.g. Top/ Bottom or Left/Right) prior to removal to ensure the parts are refitted in the same positions. Ensure the flush system has been depressurised and isolated before continuing.

a) Remove rotorcase cover (1) and rotors (3).

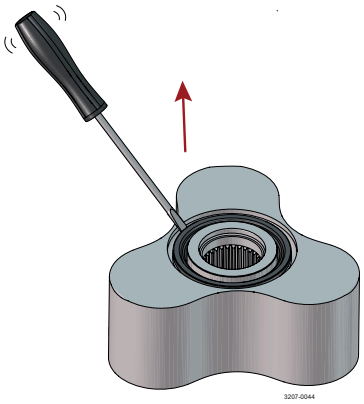
b) **Rotary Seal**

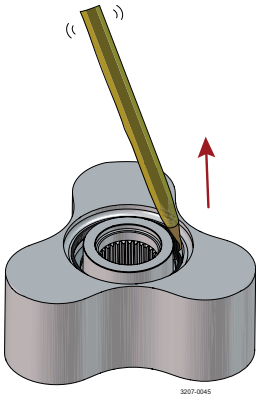
Place the rotors front face down on a flat, clean, using a clean shop towel if needed to ensure the surface is not scratch by debris.

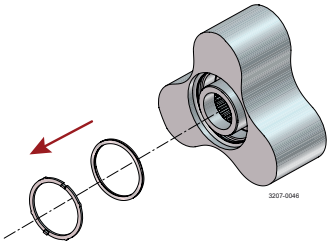
Using a small flat headed screwdriver, gentle lever the between the edge of the rotor and the seal to push out the rotary seal face (102) and remove.

Using a pick, remove the lip o-ring (101) from the groove.

Remove the drive ring (104) and wave spring (105) from the rotor.





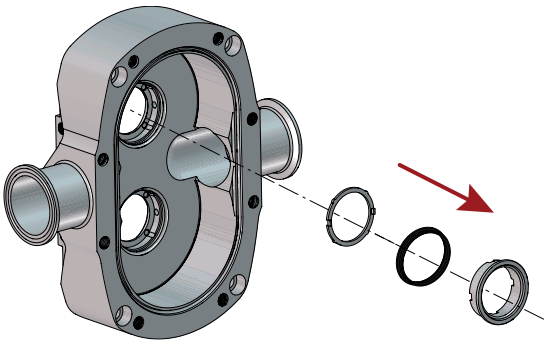


c) **Static Seal**

Using a small flat headed screwdriver, gentle lever between the edge of the rotorcase and the seal to push out the static seal face (103) and remove.

Using a pick, remove the lip o-ring (101) from the groove.

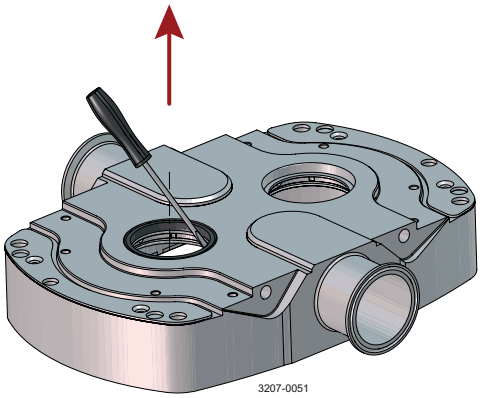
Remove the drive ring (104) from the rotorcase.



d) Remove the flush pipework to the rotorcase and then remove the rotorcase, placing it down on a suitable flat, clean surface.

e) **Flush Lip Seal**

Remove the lip seal (106) from the rear seal bore of the rotorcase.

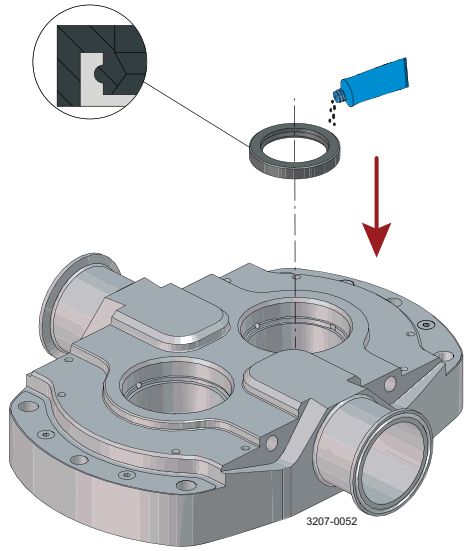


2 Seal Fitting

> **NOTE**
>
> Ensure all screw and nuts fitted during re-assembly are correctly tightened to the correct torque value, as stated in *Tool Requirements* on page 100.

a) Apply a small amount of suitable lubricant to the new lip seal (106), and press fit in to the rear seal bore of the rotorcase until flush.

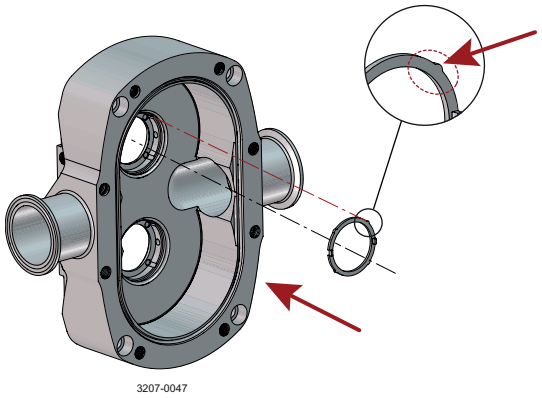
b) Refit the rotorcase, ensuring the rotorcase screws tightened to the correct torque value setting, as shown in *Technical Data* on page 97.



c) **Static Seal**

Make sure the housing area is clean and free from any particles

Fit the drive ring (104) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.

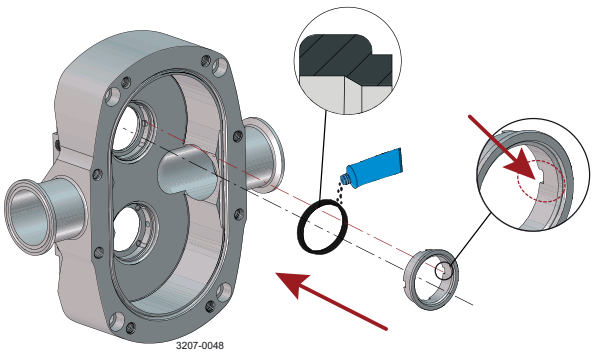


> **NOTE**
>
> When fitting ensure the tabs after facing outwards from the rotorcase.

Lightly lubricate the rear side of the Lip O-ring (101) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove.

Fit the static seal face (103) into the seal bore, being carful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.

Push the seal ring firmly and evenly until it is fully seated.

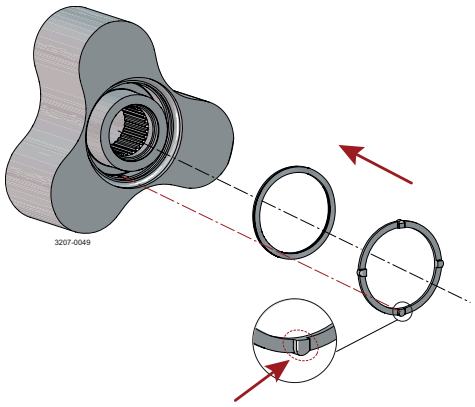


d) **Rotary Seal**

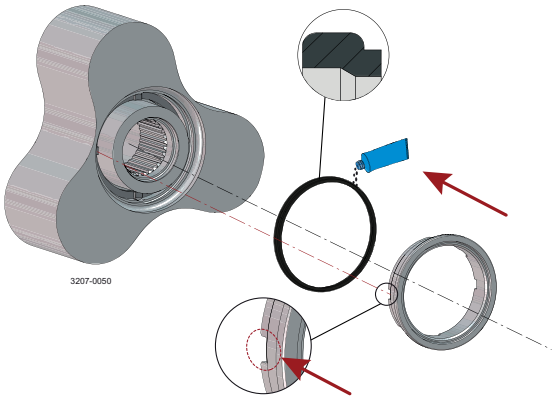
Make sure the housing area is clean and free from any particles

Fit the wave spring (105) in to the rotor bore, ensuring it is centered flat on both face.

Fit the drive ring (104) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.



> **NOTE**
>
> When fitting ensure the tabs after facing outwards from the rotorcase.



Lightly lubricate the rear side of the Lip O-ring (101) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove. If required, using a small flat head screwdrive, gently compress the drive ring to allow the lip oring to fully seat in the rotor seal bore groove.

Fit the rotary seal face (102) into the seal bore, being carful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.

Push the seal ring firmly and evenly until it is fully seated and check there is axial movement

e) **Assembly**

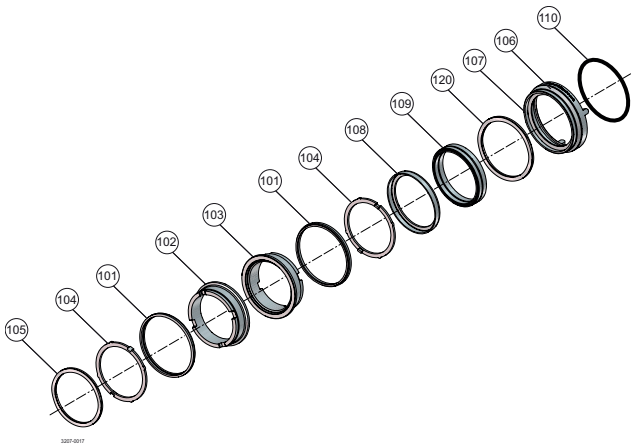
Clean the seal face witha suitible solvent and lint free cloth.

Refit the rotors in the marked position and fully tighten the rotor nuts as shown in *Assembly* on page 56.

Rotate the rotors and check for any abnormal noise or rotation.

6.6.3 Double flushed mechanical seal

Item	Description
101	Lip O-ring
102	Rotary Face
103	Static Face
104	Drive Ring
105	Wave Spring
106	Lip Seal (Flush)
107	Rotary Assembly (Outboard)
108	Static Face (Outboard)
109	L-cup
110	Rotary O-Ring (Outboard)
120	Wave Spring (Outboard)



1 Seal removal

> **NOTE**
>
> It is recommended to mark the positions of the rotors and rotorcase (e.g. Top/ Bottom or Left/Right) prior to removal to ensure the parts are refitted in the same positions. Ensure the flush system has been depressurised and isolated before continuing.

a) Remove rotorcase cover (1) and rotors (3).

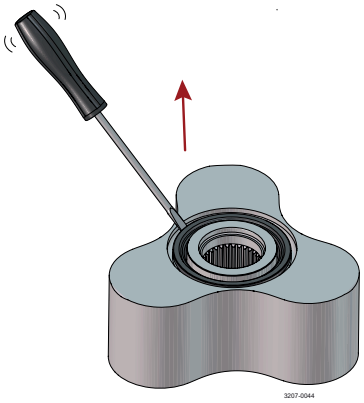
b) **Rotary Seal**

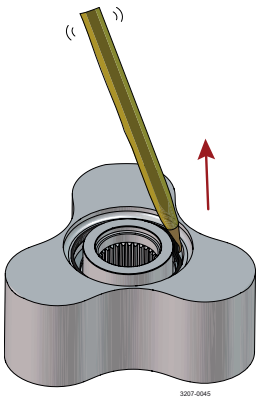
Place the rotors front face down on a flat, clean, using a clean shop towel if needed to ensure the surface is not scratch by debris.

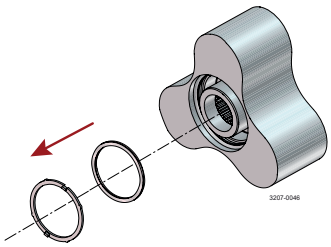
Using a small flat headed screwdriver, gentle lever the between the edge of the rotor and the seal to push out the rotary seal face (102) and remove.

Using a pick, remove the lip o-ring (101) from the groove.

Remove the drive ring (104) and wave spring (105) from the rotor.





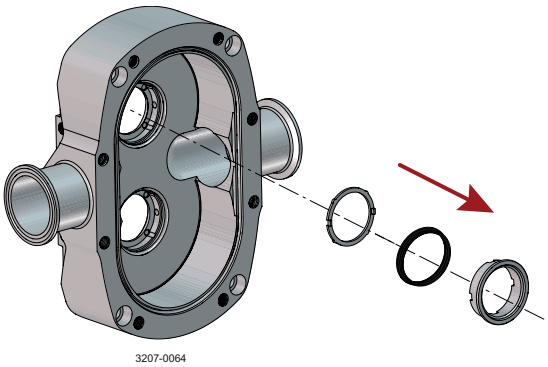


c) **Static Seal**

Using a small flat headed screwdriver, gentle lever between the edge of the rotorcase and the seal to push out the static seal face (103) and remove.

Using a pick, remove the lip o-ring (101) from the groove.

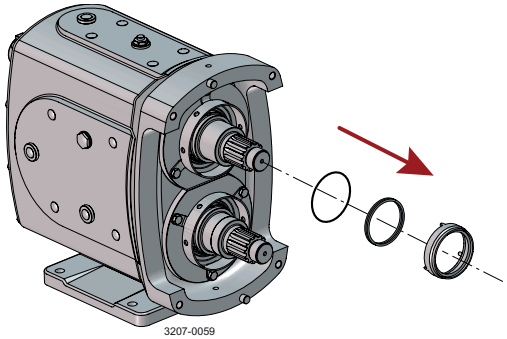
Remove the drive ring (104) from the rotorcase.


3207-0064

d) Remove the flush pipework to the rotorcase and then remove the rotorcase, placing it down on a suitable flat, clean surface.

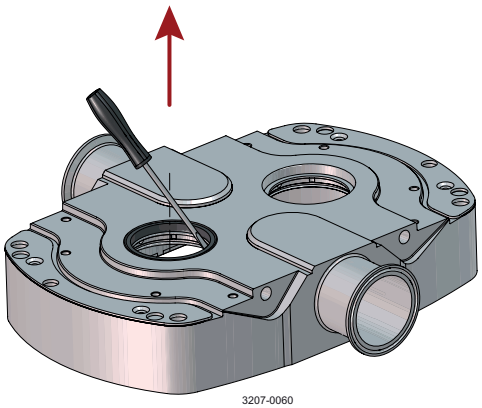
e) **Outboard Rotary Assembly**

Pull the rotary assembly (107) forward and remove from the shaft, ensure to also remove the o-ring (110) and wave spring (120) if still on the shaft. If required use a small flat head scredrive to gently loosen the static assmebly.


3207-0059

f) **Outboard Static Seal**

Remove the L-cup (109) and Static seal face (108) assembly from the rear rotorcase seal bore. If required, use a small flat head screwdriver to gently lever the assmebly out of the bore, being carful not to damage the rotorcase seal bore.


3207-0060

2 Seal fitting

> **NOTE**
>
> Ensure all screw and nuts fitted during re-assembly are correctly tightened to the correct torque value, as stated in *Tool Requirements* on page 100.
>
> Make sure the housing area is clean and free from any particles.

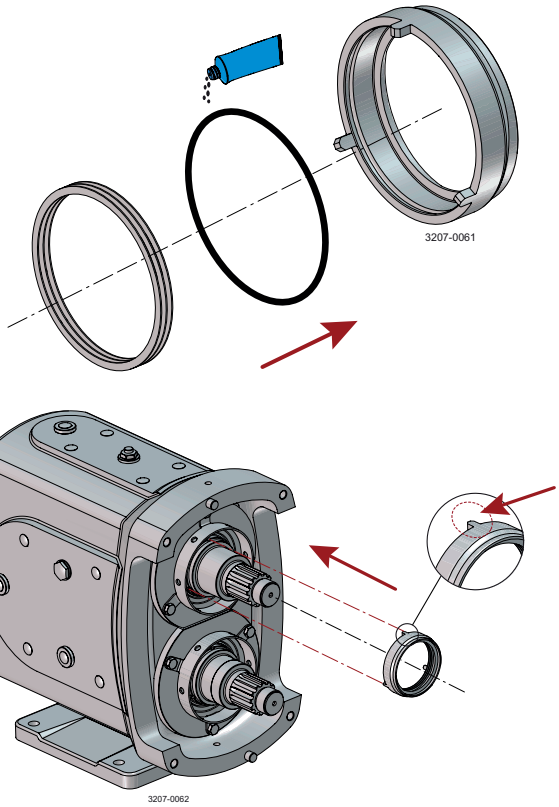
a) **Rotary Assembly**

Make sure the area where the seal fits is clean and free of debris.

Apply a small amount of suitable lubricant to the rotary assembly o-ring (110) and fit in to the groove inside the rotary assembly (107).

Insert the wave spring (120) in to the rotary assembly (107), ensuring it sits flat and against the inner step.

Slide the complete rotary assembly on to the shaft, ensuring the align the tabs with the cut outs on the shaft and push until fully seated against the shaft shoulder.



b) **Static Seal**

Make sure the rotorcase seal bore is clean and free of debris.

Lubricate the rubber L-cup (109) and static seal face (108) with water or a water/soap solution **only**. Do not use any grease or oil based lubricants.

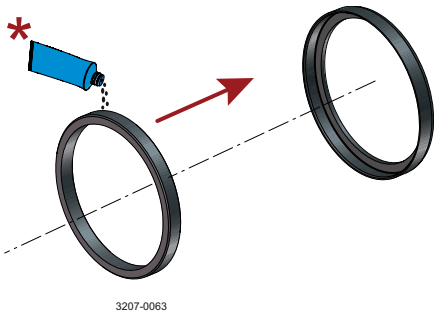
Fit the static seal face in to the rubber L-cup making a single assembly, ensuring the grooved face is face inwards to wards the rubber L-cup.

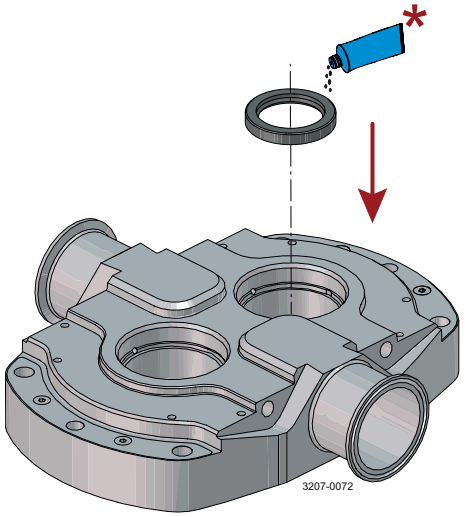
Fit the L-cup/static seal assembly in to the rear rotorcase seal bore by hand, until it is fully seated.

Refit the rotorcase, ensuring the rotorcase screws tightened to the correct torque value setting, as shown in *Technical Data* on page 97.

NOTE

*** Water or Soap solution only. Do not use any grease or oil based lubricants**

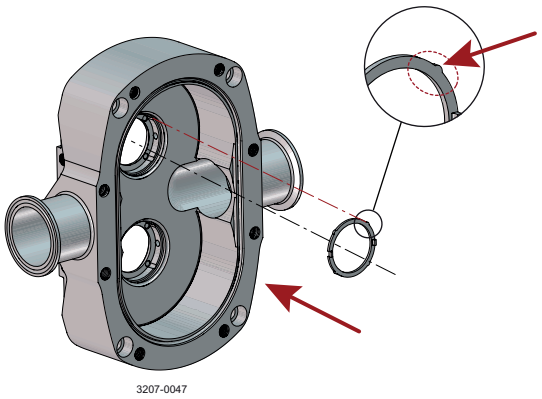




c) **Static Seal**

Make sure the housing area is clean and free from any particles

Fit the drive ring (104) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.

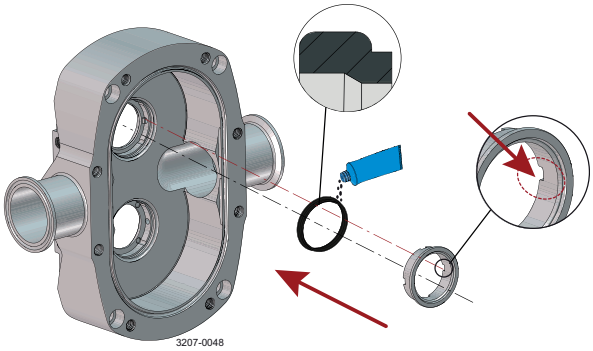


> **NOTE**
>
> When fitting ensure the tabs after facing outwards from the rotorcase.

Lightly lubricate the rear side of the Lip O-ring (101) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove.

Fit the static seal face (103) into the seal bore, being carful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.

Push the seal ring firmly and evenly until it is fully seated.

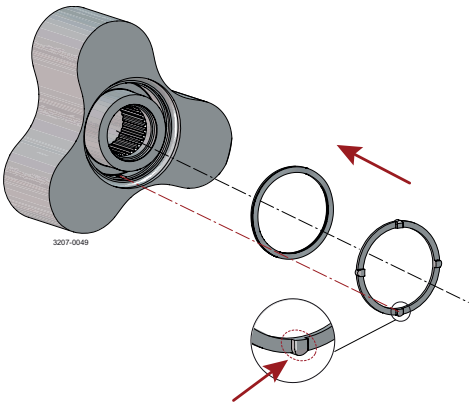


d) **Rotary Seal**

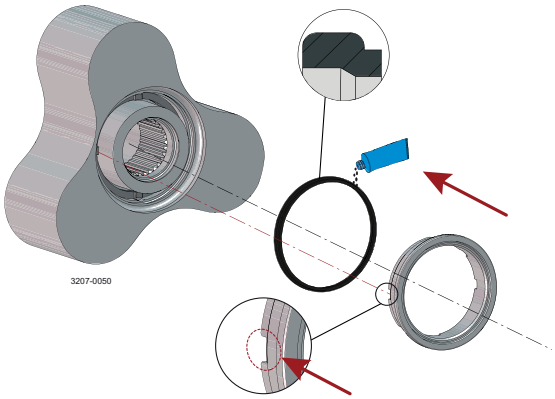
Make sure the housing area is clean and free from any particles

Fit the wave spring (105) in to the rotor bore, ensuring it is centered flat on both face.

Fit the drive ring (104) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.



> **NOTE**
>
> When fitting ensure the tabs after facing outwards from the rotorcase.



Lightly lubricate the rear side of the Lip O-ring (101) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove. If required, using a small flat head screwdrive, gently compress the drive ring to allow the lip oring to fully seat in the rotor seal bore groove.

Fit the rotary seal face (102) into the seal bore, being carful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.

Push the seal ring firmly and evenly until it is fully seated and check there is axial movement

e) **Assembly**

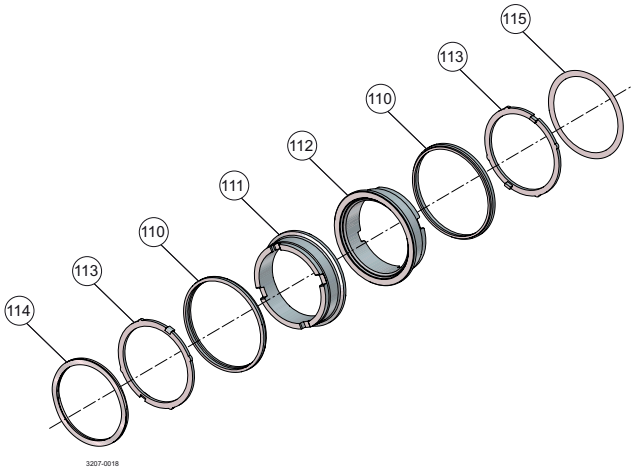
Clean the seal face witha suitible solvent and lint free cloth.

Refit the rotors in the marked position and fully tighten the rotor nuts as shown in *Assembly* on page 56.

Rotate the rotors and check for any abnormal noise or rotation.

6.6.4 Knife edge single mechanical seal removal and fitting

Item	Description
110	Lip O-ring
111	Rotary Face
112	Static Face
113	Drive Ring
114	Wave Spring
115	Damper



1 Seal removal

> **NOTE**
>
> It is recommended to mark the positions of the rotors and rotorcase (e.g. Top/ Bottom or Left/Right) prior to removal to ensure the parts are refitted in the same positions.
>
> The Lip O-ring and Drive rings are interchangeable between the static and rotary sides. Therefore, if reusing the seal and elastomers, it is recommended to ensure they are refitted in the same position as removed.

a) Remove rotorcase cover (1) and rotors (3).

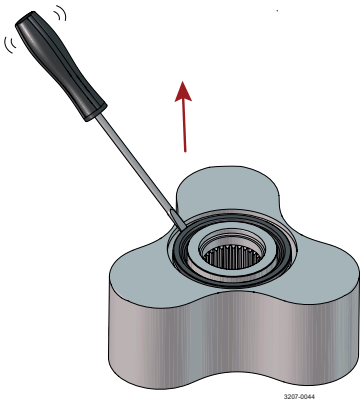
b) **Rotary Seal**

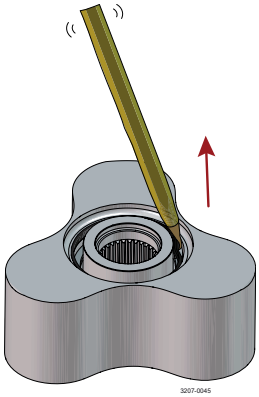
Place the rotors front face down on a flat, clean, using a clean shop towel if needed to ensure the surface is not scratch by debris.

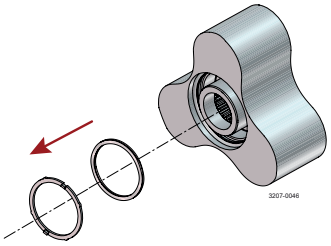
Using a small flat headed screwdriver, gentle lever the between the edge of the rotor and the seal to push out the rotary seal face (111) and remove.

Using a pick, remove the lip o-ring (110) from the groove.

Remove the drive ring (113) and wave spring (114) from the rotor.





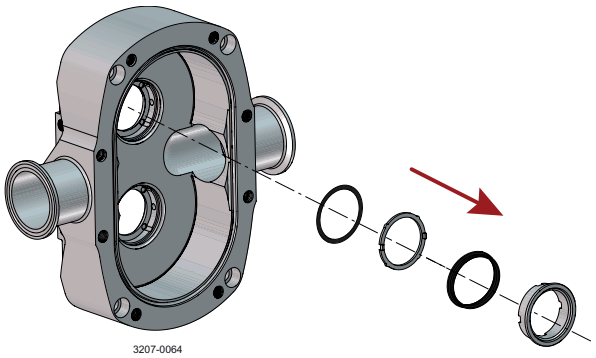


c) **Static Seal**

Using a small flat headed screwdriver, gentle lever between the edge of the rotorcase and the seal to push out the static seal face (112) and remove.

Using a pick, remove the lip o-ring (110) from the groove

Remove the drive ring (113) and rubber damper (115) from the rotorcase.



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2 Seal fitting

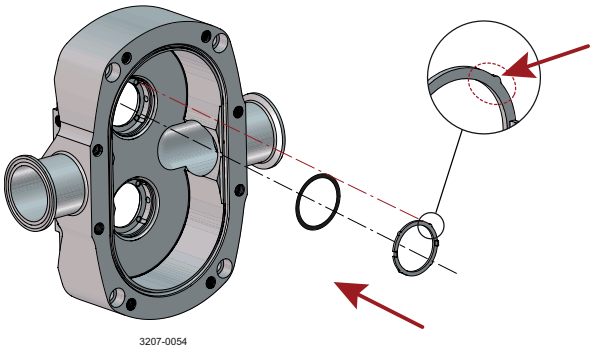
> **NOTE**
>
> Ensure all screw and nuts fitted during re-assmebly are correctly tightened to the correct torque value, as stated in *Tool Requirements* on page 100.
>
> Make sure the housing area is clean and free from any particles.

a) **Static Seal**

Make sure the housing area is clean and free from any particles and product residue.

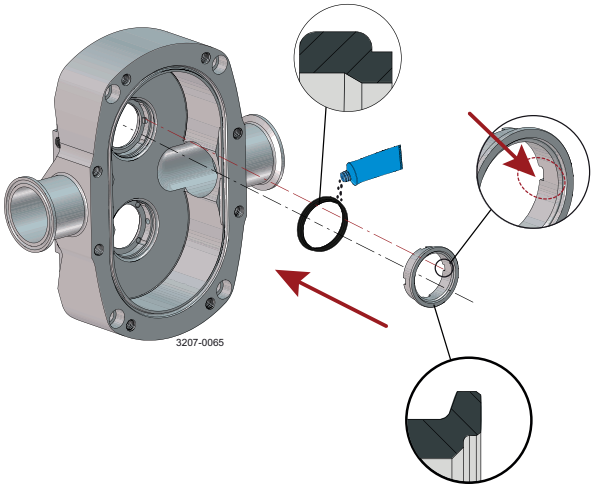
Fit the damper (115) into the rotorcase seal bore, ensure it sits flat.

Fit the drive ring (113) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.



> **NOTE**
>
> When fitting ensure the tabs are facing outwards from the rotorcase.

Lightly lubricate the rear side of the Lip O-ring (110) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove.



Fit the stationary seal face (112) (with the flat face) into the seal bore, being careful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.

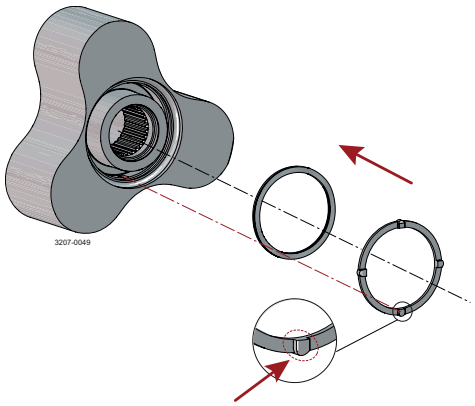
Push the seal ring firmly and evenly until it is fully seated.

b) **Rotary Seal**

Make sure the housing area is clean and free from any particles

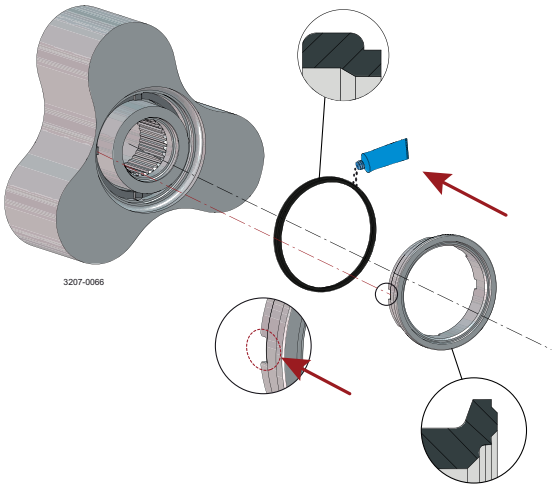
Fit the wave spring (114) in to the rotor bore, ensuring it centered falt on both face.

Fit the drive ring (113) into the rotorcase seal bore, ensuring to align the tabs with the cut outs in the rotorcase seal bore and push fully backwards.



> **NOTE**
>
> When fitting ensure the tabs after facing outwards from the rotorcase.

Lightly lubricate the rear side of the Lip O-ring (110) and fit into the groove, ensuring the narrow face of the lip o-ring is facing outwards and it is fully seated all the way around the groove. If required, using a small flat head screwdriver, gently compress the drive ring to allow the lip o-ring to fully seat in the rotor seal bore groove.



Fit the static seal face (112) (with the raised knife edge face) into the seal bore, being carful to align the cut out in the rear of the seal face with the tabs on the drive ring. A mark (dot or line) on the inner seal edge denoted the center of one of the cut out and can be used to align with the tab.

Push the seal ring firmly and evenly until it is fully seated and check there is axial movement

c) **Assembly**

Clean the seal faces with a suitable solvent using a lint free cloth.

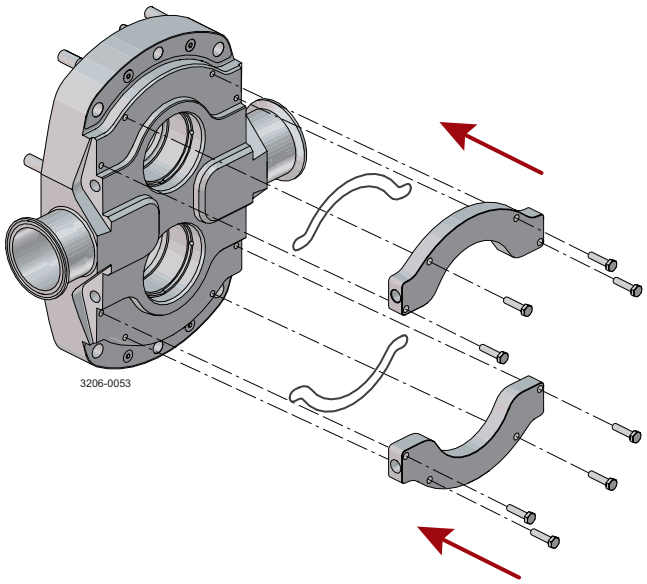
Refit the rotors in the marked position and fully tighten the rotor nuts as shown in *Assembly* on page 56.

Rotate the rotors and check for any abnormal noise or rotation.

6.7 Heating/Cooling Devices

The Maxilobe pumps have the option of being fitted with a heating/cooling jacket fitted on the rear of the rotorcase.

These are to be used for heating the pump head to maintain the pumped media viscosity and reduce risk of any crystallisation/solidification of the pumped product occurring. They may also be used for cooling purposes.



The maximum pressure and temperature of heating/cooling fluid is 3.5 bar (50 psi) and 150° C / 302° F respectively. Heating/cooling jackets should be in operation approximately 15 minutes prior to pump start up and remain in operation 15 minutes after pump shut down.

Heating Jackets in ATEX Applications

The maximum allowable pressure and temperature heating/cooling media is 3.5 bar (50 psi) and 150° C (302° F) respectively, except in ATEX zones with the T4 classification where the maximum allowable media temperature is limited to 100° C (212° F).

Any heating/cooling media used should be compatible with the pump materials and in itself should not effect the operation of the pump.

Weekly checks be made for any leakage of the heating jacket media and repair or replacement be undertaken before placing the pump back in to use.

6.7.1 Disassembly

> **NOTE**
>
> It is recommended to mark the positions of the rotors and rotorcase (e.g. Top/Bottom or Left/Right) prior to removal to the parts are refitted in the same position.

Ensure pump has been allowed to reach ambient temperature before continuing and that any heating / cooling media has been drained.

1. Remove rotorcase cover (1) and rotors (3).
2. Remove the jacket connection pipes.
3. Remove the rotorcase (2) and place face down on a suitable surface.
4. Remove the jacket screws (19) and the jackets (17) using a soft mallet to gently tap free if required.
5. Remove the o-ring (18) and replace.
6. Clean the jacket and the mating face of the rotor case of any debris or residue and ensure the port connections are not blocked.

6.7.2 Assembly

1. Wipe the mating surfaces of the rotorcase (2) and jacket (17) with a solvent and ensure the O-ring groove is clean and free of debris and damage (replace jacket if required).
2. Lightly lubricate new o-rings (18) and push firmly in the jacket O-ring groove.
3. Position the jacket on the rotorcase (2), fit screws (19) and tighten to the values given in the table below.
4. Refit the rotorcase (2), rotors (3), rotor nuts (4) and rotorcase cover (1) as per the main assembly instructions in *Assembly* on page 56.
5. Refit jacket connection pipes, refill and check for leaks.

	Torque Setting		Flush Connection
	Nm	**lbft**	**BSP(G) / NPT w/Adaptor**
22/23	5	4	⅛"
32/33	5	4	⅛"
42/43	5	4	⅛"
52/53	10	7	¼"
62/63	20	15	¼"
72/73	20	15	¼"

NOTE **All flush connections are Female.**

6.8 Fitting of Clariot VX conditon monitor

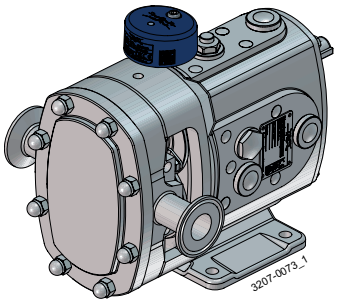
The Maxilobe range has been design to allow for easy installaiton of the Clariot VX conditon monitor on the gearcase for both horizontal and vertical porting options.

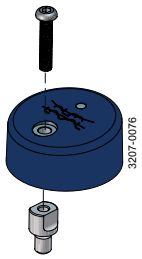
For Maxilobe models 32 and above, an Mx threaded hole is included on the gearcase flat to allow direct mounting of the Clariot VX unit.

For Maxilobe 22 and 23 models, due to restricted space, it is necessary to use a seperate adaptor and washer and this must be fitted in either of the 2 front M8 threaded holes, as showon in the diagram.

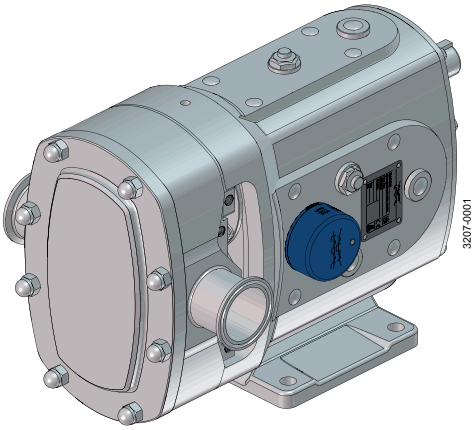
For further details of the Clariot VX unit, please see the operating manual included with the unit.

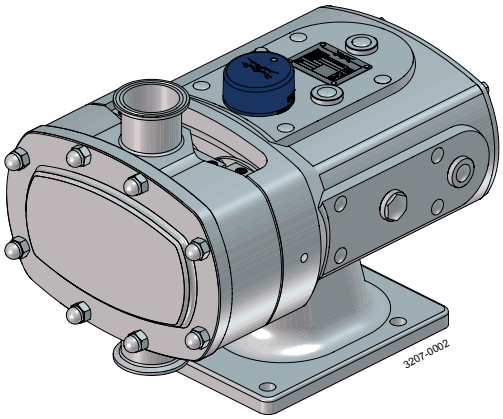
Maxilobe 22 and 23





Maxilobe models 32 to 73





6.9 Troubleshooting

Problem																Probable Causes	Solutions
No flow	Under capacity	Irregular discharge	Low discharge pressure	Pump will not prime	Prime lost after starting	Pump stall when starting	Pump overheats	Motor overheats	Excessive power absorbed	Noise and Vibration	Pump element wear	Syphoning	Seizure	Mechanical seal leakage	Mechanical seal leakage		
x				x												Incorrect direction of rotation	Reverse motor
x																Pump not primed	Expel gas from suction line and pumping chamber and introduce fluid
x	x		x		x					x						Insulficient NPSH available	Increase suction line diameter
																	Increase suction head
																	Simplify suction line configuration and reduce length
																	Reduce pump speed
	x		x		x					x						Fluid vaporising in suction line	Increase suction line diameter
																	Increase suction head
																	Simplify suction line configuration and reduce length
																	Reduce pump speed
x		x		x	x								x			Air entering suction line	Remake pipework joints
	x			x						x						Strainer or filter blocked	Service fittings
	x				x	x	x		x	x				x		Fluid viscosity above rated figure	Increase fluid temperature
																	Descrease pump speed
																	Check seal face viscosity limitations
x			x													Fluid viscosity below rated figure	Decrease fluid temperature
																	Increase pump speed
						x			x	x			x	x		Fluid temp. above rated figure	Cool the pump casing
																	Reduce fluid temperature
																	Check seal face and elastomer temp. limitations
					x		x	x								Fluid temp. below rated figure	Heat the pump casing
																	Increase fluid temperature
										x				x		Unexpected solids in fluid	Clean the system
																	Fit strainer to suction line
																	If solids cannot be eliminated consider fitting double mechanical seals
x	x	x			x	x	x		x	x			x		x	Discharge pressure above rated figure	Checks for obstructions i.e. closed valve
																	Service system and change to prevent problem re-curring
																	Simplify discharge line to decrease pressure
														x		Seal flushing inadequate	Increase flush flow rate
																	Check that flush fluid flows freely into seal area
	x							x	x	x						Pump speed above rated figure	Decrease pump speed
x																Pump speed below figure	Increase pump speed
	x						x		x	x			x			Pump casing strained by pipework	Check alignment of pipes
																	Fit flexible pipes or expansion fittings.
																	Support pipework
							x		x	x			x			Flexible coupling misaligned	Check alignment and adjust mounting accordingly
							x		x	x			x			Insecure pump driver mountings	Fit look washers to slack fasteners and retighten

Problem																Probable Causes	Solutions
No flow	Under capacity	Irregular discharge	Low discharge pressure	Pump will not prime	Prime lost after starting	Pump stall when starting	Pump overheats	Motor overheats	Excessive power absorbed	Noise and Vibration	Pump element wear	Syphoning	Seizure	Mechanical seal leakage	Mechanical seal leakage		
							x		x	x			x		x	Shaft bearing wear or faliure	Refer to pump maker for advice and replacement parts
							x		x	x			x			Insufficient oil lubrication	Refer to pump maker´s instructions
x	x							x				x		x		Metal to metal contact of pumping element	Check rated and duty pressure.
																	Refer to pump maker
x			x													Wam pumping element	Fit new components
x					x											Suction lift too high	Lower pump or raise liquid level
												x				No barrier in system to prevent flow passing	Ensure discharge pipework higher than suction tank
																Pump allowed to run dry	Ensure system operation prevent this
														x			Fit single or double flushed mechanical selas.
																	Fit flushed packed gland
									x							Faulty motor	Check and replace motor bearings
x																Pumping element missing	Fit pumping element

7 Technical Data

> **NOTE**
>
> Technical data must be observed during installation, operation and maintenance.
>
> All personnel should be informed about the technical data.

7.1 Technical data

Standard specification	
Product wetted steel parts:	EN 1.4404 (AISI 316L)
Inside surface finish:	Mech Ra ≤ 0.8 µm / 32 µin
Shafts:	Duplex EN 1.4460 (AISI 329)
Gear box:	Stainless steel
Base plate:	Stainless steel
Coupling guard:	Stainless steel
Product wetted elastomers:	EPDM
Other, non-wetted elastomers:	FPM
Shaft seal:	Single mechanical
Rotary seal face:	Silicon Carbide
Stationary seal face:	Carbon

Shaft seals	
Single mechanical, single mechanical with flush, double mechanical and knife-edge available.	
Max. flush pressure, single mechanical with flush:	0.5 bar / 7.25 psi
Max. flush pressure, double mechanical:	16 bar / 232 psi
Water consumption, single flush:	30 l/hr / 7 gallon/hour
Flush connections, MaxiLobe 22-43:	BSP/G 1/8" or NPT 1/8"
Flush connections, MaxiLobe 52-73:	BSP/G 1/4" or NPT 1/4"

Motor
Gear motor, 4 poles, to IEC metric standard, 50/60 Hz, suitable for frequency conversion, IP55, insulation class F.

7.2 Process data

Model	Displacement			Port Size		Differential pressure		Max. speed[1]	ATEX max. speed
	litres/rev	Imp gal / 100 rev	US gal/ 100 rev	mm	inch	bar	psi	rev/min	rev/min
22	0.06	1.32	1.59	25	1	16	232	1000	600
23	0.09	1.98	2.38	25 / 40	1 / 1.5	16	232	1000	600
32	0.14	3.08	3.7	25 / 40	1 / 1.5	16	232	1000	600
33	0.19	4.18	5.02	40	1.5	16	232	1000	600
42	0.29	6.38	7.66	40 / 50	1.5 / 2	16	232	1000	600
43	0.4	8.8	10.57	50	2	16	232	1000	600
52	0.59	12.98	15.59	50	2	16	232	1000	600
53	0.84	18.48	22.19	65 / 80	2.5 / 3	16	232	1000	600
62	1.22	26.84	32.23	65 / 80	2.5 / 3	16	232	600	600
63	1.78	39.16	47.03	80 / 100	3 / 4	16	232	600	600
72	2.78	61.15	73.45	100	4	16	232	500	500
73	3.72	81.83	98.28	100 / 150	4 / 6	16	232	500	500

[1] With knife-edge seal max. speed is limited to 350 rpm.

NOTE

Maximum pump differential pressure may be limited based on the connection type used as below:

- DIN11851 – 40 bar / 580 psi (25-40 mm), 25 bar / 362 psi (50-100 mm), 16 bar / 232 psi (150 mm)
- ISO (IDF) – 16 bar / 232 psi (1"-2"), 10 bar / 145 psi (2½" -4"), providing provision for support ring is to be made
- SMS – 10 bar / 145 psi (all sizes)
- RJT – 10 bar / 145 psi (all sizes)
- Tri-clamp (BS4825) – Pressure rating is dictated by the clamp band used (Refer to clamp band supplier)
- DIN11864-1 – 40 bar / 580 psi (25-40 mm), 25 bar / 362 psi (50-100 mm)
- DIN11864-2 – 25 bar / 362 psi (25-40 mm), 16 bar / 232 psi (50-100 mm)
- For size 150 mm on Maxilobe 73 pumps, only DIN11851, SRJT or Tri-clamp connections are available.

For units covered under EHEDG certification only the follwoing process connection type and gasket (supplied by others) combinations are EHEDG approved:

- DIN11851 with ASEPTO-STAR k-flex or SKS EHEDG gasket system
- Triclamp (BS4825 part 3) with Combifit T-Ring Gasket
- DIN11864-1
- DIN11864-2

7.3 Approximate Oil Capacities

Pump Model	Horizontal Ports		Vertical Ports	
	liters	us.gal	liters	us.gal
22/23	0.45	0.12	0.3	0.08
32/33	0.9	0.13	0.5	0.24
42/43	1.5	0.26	1	0.40
52/53	3.5	0.61	2.3	0.92
62/63	6.6	1.22	4.6	1.74
72/73	10.3	1.82	6.9	2.72

7.4 Weights

Pump Model	Bare Shaft Pump kg (lb)		Typical Mounted Pump & Drive kg (lb)	
	Port Orientation		Port Orientation	
	Horizontal	Vertical	Horizontal	Vertical
22	17 (37)	17 (37)	56 (123)	56 (123)
23	19 (41)	19 (41)	59 (130)	59 (130)
32	32 (70)	32 (70)	73 (160)	73 (160)
33	33 (72)	33 (72)	81 (178)	81 (178)
42	60 (132)	63 (138)	151 (332)	154 (339)
43	63 (138)	66 (145)	157 (346)	160 (352)
52	110 (242)	113 (249)	274 (604)	277 (610)
53	114 (251)	117 (257)	294 (648)	297 (654)
62	203 (447)	208 (458)	444 (979)	449 (990)
63	210 (463)	214 (471)	477 (1051)	481 (1060)
72	327 (721)	334 (736)	607 (1338)	614 (1353)
73	345 (760)	352 (776)	661 (1457)	668 (1472)

The above weights are for guidance purposes only and will vary dependent upon specification of pump, baseplate and drive unit.

7.5 Tool Requirements

Description	Balloon	Tool Reqd		Pump Model					
				22/23	32/33	42/43	52/53	62/63	72/73
Rotorcase Cover Dome Nut	8	Socket Size	mm	13	13	17	19	19	19
		Torque Setting	Nm	20	20	40	65	65	65
		Torque Setting	lbft	15	15	29	48	48	48
Rotor Retention Nut	4	Socket Size	mm	17	24	30	36	41	41
		Torque Setting	Nm	30	60	120	220	300	160
		Torque Setting	lbft	22	44	88	162	221	118
Rotor TLA		Key Size	mm	N/A					5
		Torque Setting	Nm						14
		Torque Setting	lbft						10
Rotor TLA Tool Screw		Socket Size	mm						32
		Torque Setting	Nm						120
		Torque Setting	lbft						88
Rotorcase Retaining Screw	11	Key Size	mm	6	6	8	10	10	14
		Torque Setting	Nm	20	20	40	65	65	120
		Torque Setting	lbft	15	15	29	48	48	88
Seal Retainer Screw	40	Socket Size	mm	10	10	10	13	13	13
		Torque Setting	Nm	10	10	10	20	20	20
		Torque Setting	lbft	7	7	7	15	15	15
Gearcase Cover Screw	42	Socket Size	mm	8	8	10	10	13	13
		Torque Setting	Nm	5	5	10	10	20	20
		Torque Setting	lbft	4	4	7	7	15	15
Timing Gear TLA	62	Hex Key Size	mm	3	5	5	6	6	6
		Torque Setting	Nm	5	17	17	41	41	41
		Torque Setting	lbft	4	13	13	30	30	30

Description	Balloon	Tool Reqd		Pump Model					
				22/23	32/33	42/43	52/53	62/63	72/73
Drain Plug	46	Hex Key Size	mm	10	10	10	10	10	10
		Torque Setting	Nm	65	65	65	65	65	65
		Torque Setting	lbft	48	48	48	48	48	48
Foot Bolt	41	Hex Key Size	mm	6	6	8	10	10	12
		Torque Setting	Nm	20	20	40	65	65	95
		Torque Setting	lbft	15	15	29	48	48	70
Shim Retainer Screw	14	Socket Size	mm	8	8	4	4	4	4
		Torque Setting	Nm	5	5	10	10	10	10
		Torque Setting	lbft	4	4	7	7	7	7
Heating Jacket Screw	19	Socket Size	mm	8	8	8	10	13	13
		Torque Setting	Nm	5	5	5	10	20	20
		Torque Setting	lbft	4	4	4	7	15	15
Vent	43	Socket Size	mm	27	27	27	27	27	27
		Torque Setting	Nm	10	10	10	10	10	10
		Torque Setting	lbft	7	7	7	7	7	7
Sight Glass	44	Socket Size	mm	22	22	22	22	22	22
		Torque Setting	Nm	2	2	2	2	2	2
		Torque Setting	lbft	1	1	1	1	1	1

7.6 Seal Operating Limits

Seal Type	Maximum Speed	Maximum Process Pressure	
	rpm	bar	psi
Mechanical Seal	Max. Pump Speed	Max. Pump Pressure	
Mechanical Seal (Knife Edge)	350	Max. Pump Pressure	

Maximum Flush Pressures	
Mechanical Seal – Single Flush	0.5 bar / 7.25 psi
Mechanical Seal – Double	1 bar above pump discharge upto 16 bar / 232 psi

7.7 Technical Information and Description of Mechanical Shaft Seals

General Considerations Regarding Mechanical Shaft Seals

The basic working principle of a mechanical seal is that the seal faces are cooled and lubricated by the process media or the flush media.

If the seal faces are not cooled and lubricated, the temperature of the faces will increase to be above the temperature at normal running conditions. This is referred to as “dry running”.

Dry running will shorten the lifetime of the seal and eventually cause the seal to fail. Dry running is not allowed in ATEX applications.

Due to this working principle, there will be a small controlled leakage from the seal during normal operation. This leakage will increase if seal failure occurs. When a seal is failing the degree of leakage can go from a drop leakage to a flush leakage depending on the type of failure.

> **NOTE**
>
> The risk of leakage from a failing seal must be considered if pumping products where leakage can lead to hazardous situations.

Single mechanical shaft seal (SSS)

The SSS is cooled and lubricated by the process media.

The process media must always be present during operation to avoid dry running.

The Critical temperature range and the minimum flow rate of the process media are stated in *Operating Conditions* on page 45.

Single Flush mechanical shaft seal (FSS)

Where the type of product makes a single seal unstable (such a crystalising, sticky or solidifying products) a FSS should be used.

The FSS is primarily lubricated and cooled by the process media, but additional lubrication and cooling is applied by the flush media. The flush media is enclosed in the flush housing by the use of a lip seal. It is important to ensure the flush media is compatible with both the process media and any material used in the FSS.

Flush media must always be present during operation of the pump to avoid dry running of the lip seal.

Requirements for minimum flows and max temperatures of the flush media are stated in *Operating Conditions* on page 45.

For FSS the buffer fluid principle is to be used:

- Buffer fluid system having a pressure lower than the pumped media. This principle will flush away possible solidifications and residues form the primary seal. It is the product media which lubricates the primary seal faces and flush media lubricates the lip seal.

Double mechanical shaft seal (DMS)

If continuous presence of process media cannot be guaranteed or leakage of the process media is unacceptable, a DMS should be applied.

The DMS is cooled and lubricated by the process media and/or the flush media.

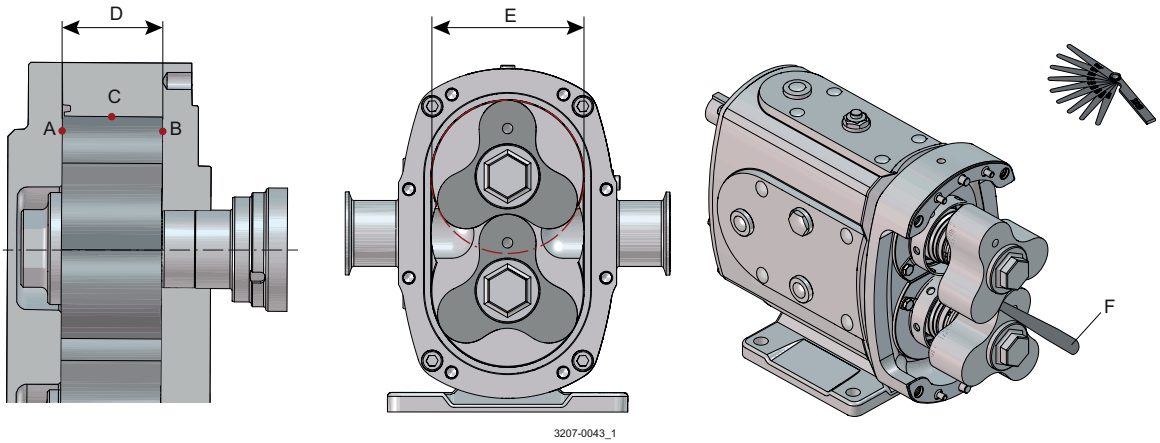
Flush media must always be present during operation of the pump to avoid dry running.

Requirements for minimum flows and max temperatures of the flush media are stated in *Operating Conditions* on page 45.

There are two basic flush principles for DMS:

- Buffer fluid system having a pressure lower than the pumped media.This principle will flush away possible solidifications and residues from the primary seal. It is the product media which lubricates the primary seal faces and the flush media lubricating the secondary seal faces.
- Barrier fluid system having a pressure of minimum 1bar above the pump inlet pressure.This principle will cool and lubricate both the primary and secondary seal.The barrier principle can be used in many applications but should be used if the seal configuration is SiC/SiC and the process media viscosity is less than 1cP.

7.8 Pumphead Clearance Information



Model	Front Clearance (A)	Back Clearance (B)	Radial Clearance (C)	Rotor Length (D)	Rotor Diameter (E)	Mesh Clearance (F)
22	0.13	0.04	0.12	17.340	73.650	0.12
	min.	0.07	min.	17.370	73.680	min.
23	0.16	0.07	0.18	25.780	73.525	0.18
	min.	0.10	min.	25.810	73.555	min.
32	0.12	0.08	0.12	27.200	89.675	0.12
	min.	0.11	min.	27.230	89.705	min.
33	0.13	0.09	0.20	38.180	89.620	0.15
	min.	0.12	min.	38.210	89.650	min.
42	0.15	0.06	0.15	31.890	117.590	0.15
	min.	0.09	min.	31.920	117.620	min.
43	0.20	0.09	0.18	44.810	117.560	0.18
	min.	0.12	min.	44.840	117.590	min.
52	0.16	0.09	0.23	39.900	151.430	0.23
	min.	0.12	min.	39.930	151.460	min.
53	0.24	0.15	0.25	56.760	151.420	0.23
	min.	0.18	min.	56.790	151.450	min.
62	0.20	0.10	0.20	49.800	199.520	0.20
	min.	0.13	min.	49.830	199.550	min.
63	0.27	0.10	0.30	66.730	199.250	0.25
	min.	0.13	min.	66.760	199.300	min.
72	0.28	0.15	0.40	73.660	239.475	0.20
	min.	0.18	min.	73.700	239.510	min.
73	0.35	0.20	0.50	98.550	239.175	0.35
	min.	0.23	min.	98.550	239.205	min.

8 Spare parts

For every delivered Alfa Laval Product, a spare part list is available.

This spare part list contains a range of the most common wear parts for the machinery. If any component not mentioned is required, please contact your local Alfa Laval representative for availability.

You can find our spare part catalogue at *https://hygienicfluidhandling-catalogue.alfalaval.com*.

Always use Alfa Laval genuine spare parts. The warranty of Alfa Laval products is dependent on use of Alfa Laval genuine spare parts.

8.1 Ordering spare parts

When ordering spare parts, please always state:

1. Serial number (if available)
2. Item number/spare part number (if available)
3. Capacity or other relevant identification

8.2 Alfa Laval service

Alfa Laval is represented in all larger countries of the world.

Do not hesitate to contact your local Alfa Laval representative, with any questions or requirement of spare parts for Alfa Laval equipment.

8.3 Warranty - Definition

WARNING

The rules of Intended use are absolute. Use of the supplied Alfa Laval product is allowed only when in compliance with the technical data supplied with the Intended use.

Differing utilisation, other than agreed with Alfa Laval Kolding A/S, exclude any liability and warranty.

No modification or alteration of the supplied Alfa Laval product is allowed, unless explicit permission is granted by Alfa Laval Kolding A/S.



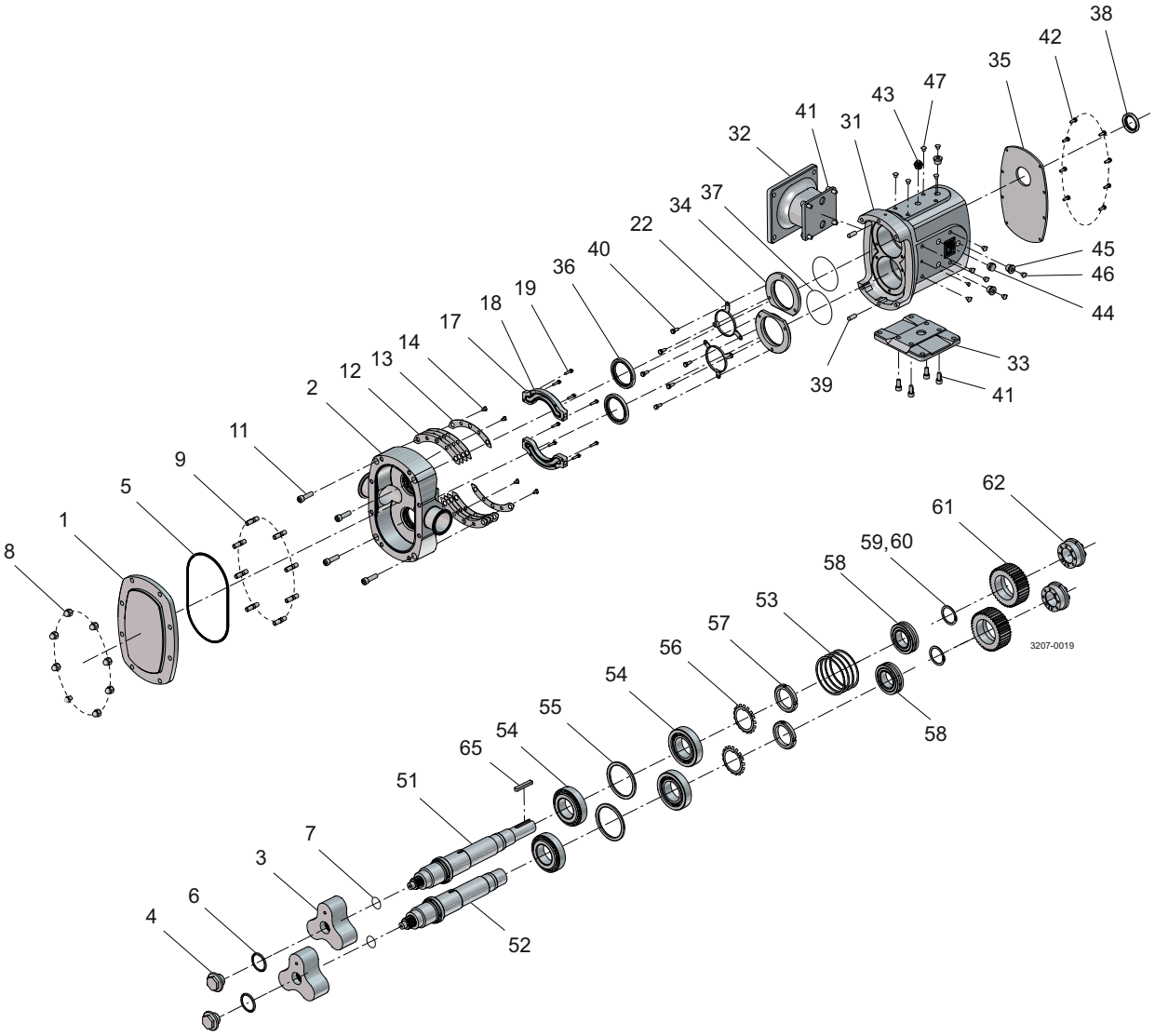
Liability and warranty are excluded:

- If advice and instruction of operating instructions are ignored
- For incorrect operation or for insufficient maintenance of the supplied Alfa Laval product
- For any kind of change of function of the supplied Alfa Laval product without prior written agreement by Alfa Laval Kolding A/S
- If supplied Alfa Laval product is modified by non-authorised persons
- If using the supplied Alfa Laval product without attention of appropriate safety regulations, (see *Safety* on page 13)
- If protection equipment is not used and vessel process / ancillary equipment is not brought to a standstill
- If the supplied Alfa Laval product and ancillary parts are not properly maintained (to be executed in intervals and including fitting of prescribed replacement parts)

When exchanging parts, only original replacement parts, released from the manufacturer, must be used.

9 Parts lists and exploded views

9.1 MaxiLobe



Pos.	Qty.	Denomination
1	1	Cover, Rotorcase
2	1	Rotorcase
3	2	Rotor
4	2	Nut, Rotor
5	1	P-Ring, Cover
6	2	P-Ring, Rotor Nut
7	2	O-Ring, Rotor Shaft
8	8	Nut, Dome
9	8	Stud, Rotorcase
10	2	Dowel, Rotorcase
11	4	Screw, Rotorcase
12	2	Shim, Rotorcase
13	2	Retainer, Shim
14	4	Screw, Shim Retainer
15 Not Shown	2	Torque Lock Assembly, Rotor (ML7x/8x Only)
17	2	Heating Jackets
18	2	O-Ring, Heating Jacket
19	8	Screw, Heating Jacket
22	2	Guard, gland
31	1	Gearcase
32	1	Foot, Vertical port
33	1	Foot, Horizontal port
34	2	Retainer, Seal
35	1	Cover, Gearcase
36	2	Lip Seal, Gland End

Pos.	Qty.	Denomination
37	2	O-Ring, Seal Retainer
38	1	Lip Seal, Drive End
39	2	Dowel, Gearcase
40	6	Screw, Seal Retainer
41	4	Screw, Foot
42	8	Screw, Gearcase Cover
43	1	Plug, Breather
44	2	Sight Glass
45	5	Plug, Gearcase
46	5	Plug, Blanking
47	12	Plug, Blanking
51	1	Shaft, Drive
52	1	Shaft, Auxillary
53	1	Shim, Gearbox
54	4	Bearing, Front
55	2	Spacer, Bearing
56	2	Washer, Tab Lock
57	2	Nut, Shaft
58	2	Bearing, Rear
59	2	Circlip, Shaft
60	4	Circlip, Gearcase (ML22-43 Only)
61	2	Timing Gear
62	2	Torque Locking Assembly
65	1	Key