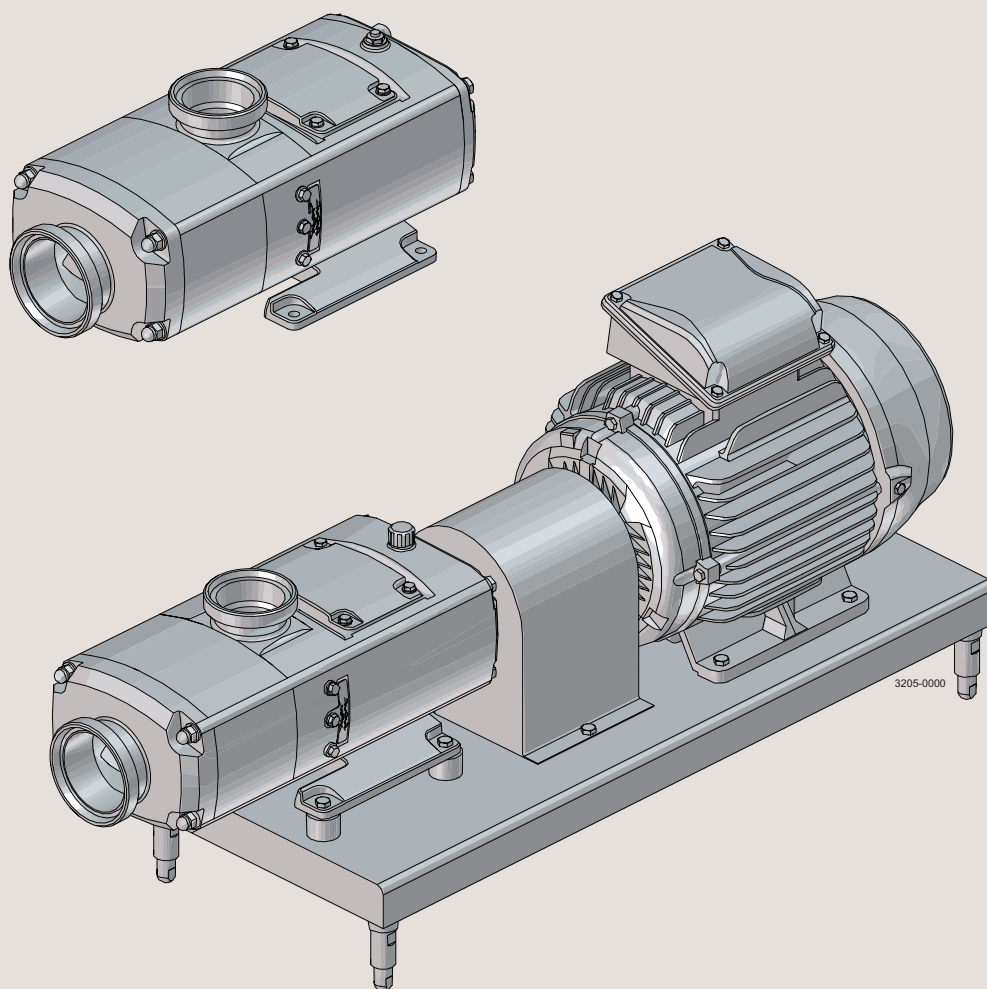




Instruction Manual

Alfa Laval OS Twin Screw Pump



100000817-EN1

2019-01

Original manual

The information herein is correct at the time of issue but may be subject to change without prior notice

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1 EC Declaration of Conformity

Revision of Declaration of Conformity 2009-12-29

The Designated Company

Alfa Laval Eastbourne, Alfa Laval Ltd
Company Name

Birch Road, Eastbourne, East Sussex BN23 6PQ
Address

+44 (0) 1323 412555
Phone No.

hereby declare that

Pump
Designation

OS22, OS24, OS26, OS32, OS34, OS36, OS42, OS44, OS46
Type

From serial number 10.000 to 1.000.000

is in conformity with the following directive with amendments:
- Machinery Directive 2006/42/EC


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

Global Product Quality Manager
HFH
Title

Lars Kruse Andersen
Name

Kolding
Place

2018-12-06
Date


Signature



2 General description

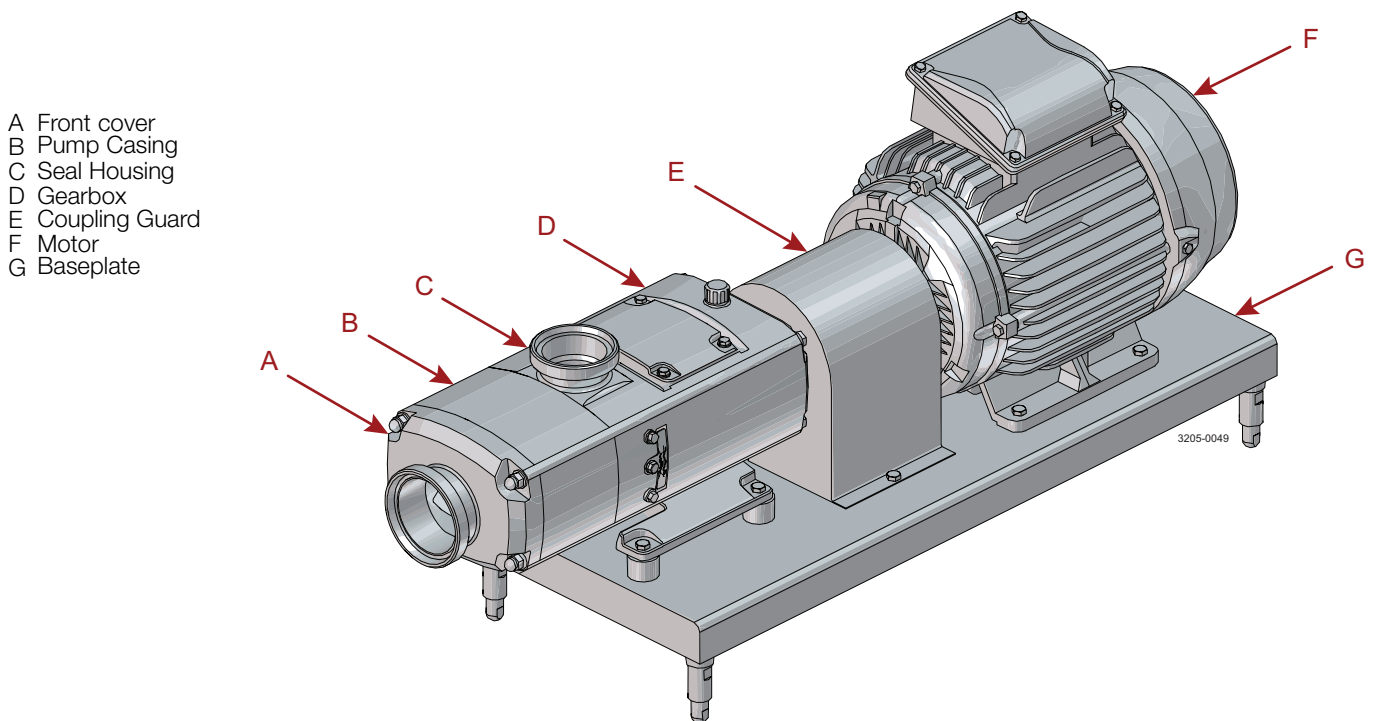
2.1 General description

The Alfa Laval OS range of pumps is of conventional Twin Screw pump design with the positive displacement being provided by non-contacting, contra rotating screws within a fully swept pump chamber.

Handling from low to high viscosity pumped media, the pump's characteristic smooth, low shear pumping action is ideal in application areas such as Brewing, Dairy and Food industries.

The pump can also be ran at high speeds for CIP (clean in place) cleaning of the pump and system.

Drawing shows only mounted unit



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.

Noise levels

Under certain operating conditions pumps and/or drives and/or the systems within which they are installed can produce sound pressure levels in excess of 80 dB[A]. When necessary, protection against noise should be taken.

*Unsafe practices and other important information are emphasized in this manual.
Warnings are emphasized by means of special signs.
Always read the manual before using the pump!*

3.1 Important information

WARNING

Indicates that special procedures must be followed to avoid serious personal injury.

CAUTION

Indicates that special procedures must be followed to avoid damage to the pump.

NOTE

Indicates important information to simplify or clarify procedures.

3.2 Warning signs

General warning:



Dangerous electrical voltage:



Caustic agents:



3 Safety

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

Warnings are emphasized by means of special signs.

Always read the manual before using the pump!

3.3 Safety precautions

Installation:

Always read the technical data thoroughly. (See chapter 6 Technical data)

Never start in the wrong direction of rotation with liquid in the pump.

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



Always have the pump electrically connected by authorized personnel. (See the motor instruction supplied with the drive unit)



Operation:

Always read the technical data thoroughly. (See chapter 6 Technical data)

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

Never stand on the pump or pipelines.

Never run the pump with either the suction side or the pressure side blocked.

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

Never run the pump unless fully assembled and all guards are securely fitted, i.e. pump head must not be removed from gearcase.



Only handle toxic and acidic liquids in accordance with the manufacturers instructions and recommendations.



Maintenance:

Always read the technical data thoroughly. (See chapter 6 Technical data)

Never service the pump when it is hot.

The pump and the pipelines must **never** be pressurised when the pump is serviced.

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

Installation and operation of the pump must always comply with health and safety regulations. Any hazardous and/or hot, drained or leaked, liquid shall be disposed in compliance with health and safety regulations. If requested at the time of order, the equipment can be supplied with means of safe removal of any hazardous and/or hot, drained or leaked liquid.



Always disconnect the power supply when servicing the pump.



Transportation:

Transportation of the pump or the pump unit:

Never lift or elevate in any way other than described in this manual

Always drain the pump head and accessories of any liquid

Always ensure that no leakage of lubricants can occur

Always transport the pump in it's upright position

Always ensure that the unit is securely fixed during transportation

Always use original packaging or similar during transportation

3.4 Recycling information

Recycling information.

- **Unpacking**

- Packing material consists 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 and wear parts in the machine are replaced.
- All metal parts should be sent for material recycling.
- Worn out or defective electronic parts should be sent to a licensed handler for material recycling.
- Oil and all non metal wear parts must be taken care of in agreement with local regulations.

- **Scrapping**

- At end of use, the equipment shall be recycled according to relevant, local regulations. Beside 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 the local Alfa Laval sales company.
-

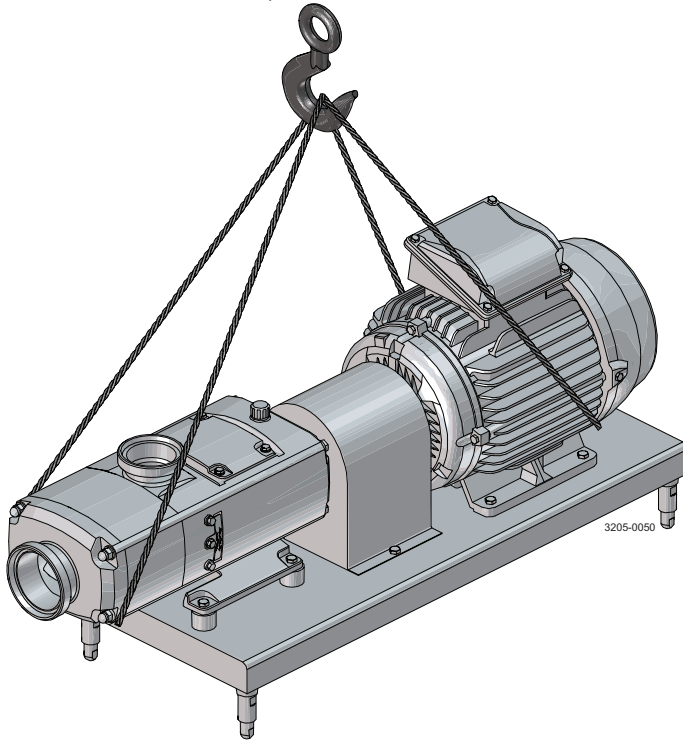
4 Installation

4.1 Unpacking, Handling and Storage

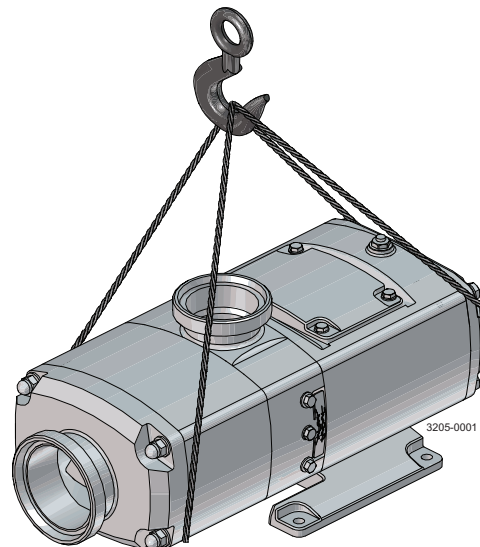
Step 1

Refer to the pump weights guide (See chapter 6 Technical data) before selecting and using any lifting gear. The drawings below are for guidance only. Lifting should only be carried out by trained personnel. Ensure that lifting equipment is correctly rated and used within these limits.

Pump with drive unit



Bareshaft pump



Step 2

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.

Step 3

After receipt and inspection, if the pump is not to be installed immediately, the pump should be repacked and placed in suitable storage. The following points should be noted:

- Plastic or gasket type port covers should be left in place.
 - Pumps received wrapped with corrosion inhibiting treatment material should have wrapping replaced.
 - A clean, dry storage location free from vibration should be selected. If a moist or dusty atmosphere is used for storage, further protect the pump or unit with a suitable cover.
 - Rotate the pump/pump unit by hand weekly, to prevent bearing damage.
 - All associated ancillary equipment should be treated similarly.
-

To ensure optimum operation it is important that any pump unit is installed correctly. When designing a pumping system the following should be taken into consideration.

4.2 System design and installation

Design:

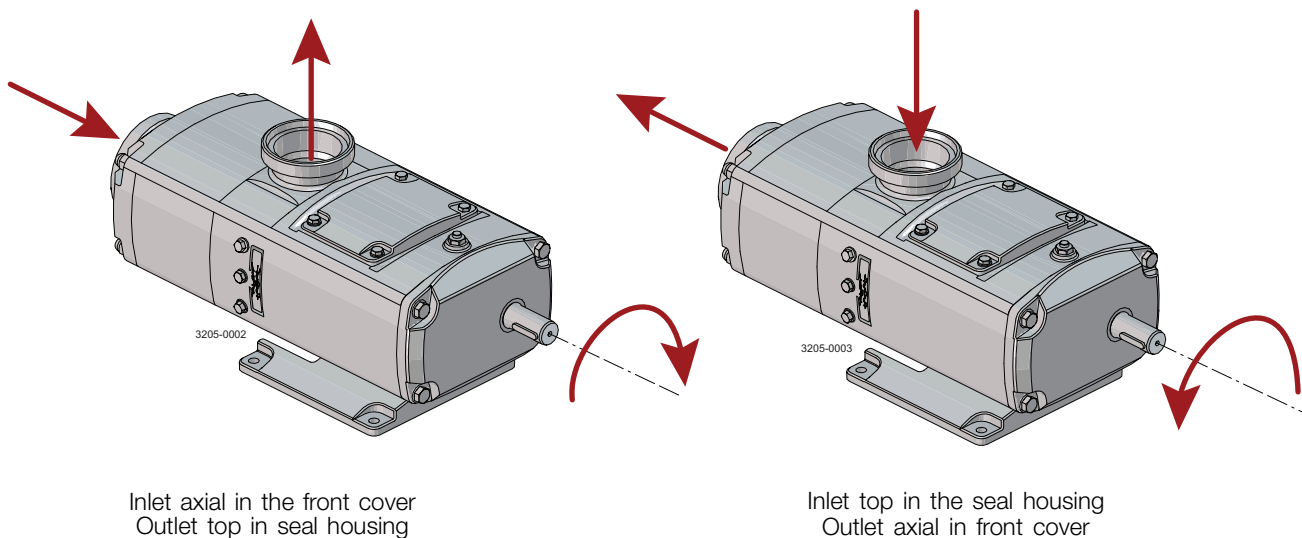
- Confirm the Net Positive Suction Head (NPSH) available from the system exceeds the NPSH required by the pump, as this is crucial for ensuring the smooth operation of the pump and preventing cavitation.
- Avoid suction lifts and manifold/common suction lines for two pumps running in parallel, as this may cause vibration 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 monitor points for diagnostic purposes.- Fit valves, if 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 for pump access/maintenance all around the pump
- Do not subject rotary lobe pumps to rapid temperature changes, as pump seizure can result from thermal shock.

Pipework:

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

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.



ATTENTION:

If reversing the direction of flow the rear bearing arrangement needs to be changed in the bearing frame and the screw housing needs to be removed, rotated 180° and reassembled. If this is not done pump damage may occur.

4 Installation

To ensure optimum operation it is important that any pump unit is installed correctly. When designing a pumping system the following should be taken into consideration.

Pump Lubrication:

The pump will be supplied filled with food grade oil with NSF/NSDA H1 Approval. It is recommended to change the oil every 4000 hours of pump operation. When changing the oil use one of the recommended oils listed below:

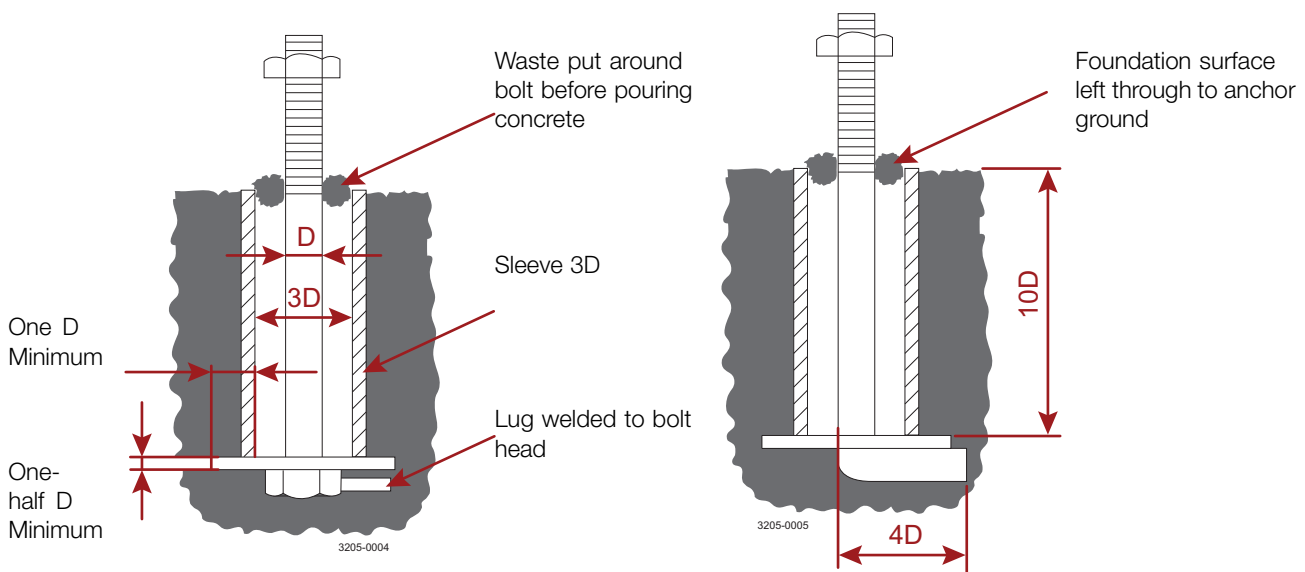
1. Castrol Optileb GT
2. Jax Flow-Guard Synth.#1
3. Fuchs Cassida FL or HF
4. Klüber UH1 6-100
5. Mobil SHC Cibus
6. Shell Cassida Fluid HF

All oils are poly-alpha-olefin based please check before mixing with other base oils #1 - Oil type used by Alfa Laval

Baseplate Foundations

Pumps when supplied with a drive unit are normally mounted on a baseplate. Our standard 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.

The foundation should be approx. 150 mm longer and wider than the baseplate. The depth of the foundation should be proportional to the size of the complete pump unit. For example, a large pump unit foundation depth should be at least 20 times the diameter of the foundation bolts.



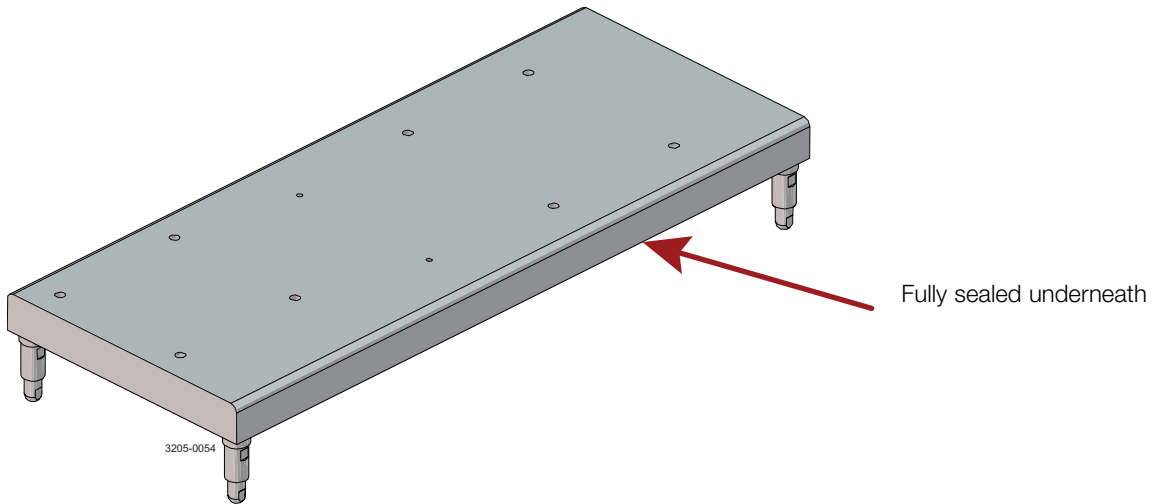
The drawing above shows two typical methods for foundation bolt retaining. The sleeve allows for “slight” lateral movement of the bolts after the foundation is poured. Rag or waste paper can be used to prevent the concrete from entering the sleeve while the foundation is poured. A minimum of 14 days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

4 Installation

To ensure optimum operation it is important that any pump unit is installed correctly. When designing a pumping system the following should be taken into consideration.

3A Approved Base Plates

For 3A approved mounted pumps a 3A approved ball foot baseplate is required.



4 Installation

To ensure optimum operation it is important that any pump unit is installed correctly. When designing a pumping system the following should be taken into consideration.

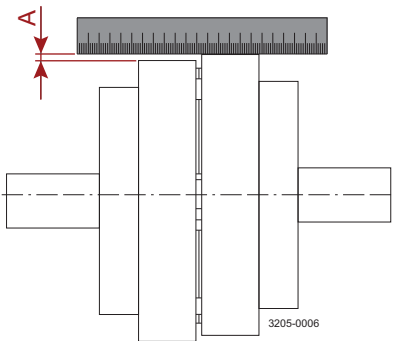
Coupling alignment:

Before the pump unit is installed it is 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.

Parallel misalignment

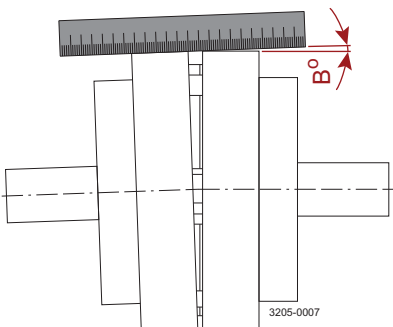
Measure 4 positions at 90° around coupling



Coupling size	Dimension A Maximum
70	0.3 mm
90	0.3 mm
110	0.3 mm
130	0.4 mm
150	0.4 mm
180	0.4 mm
230	0.5 mm
280	0.5 mm

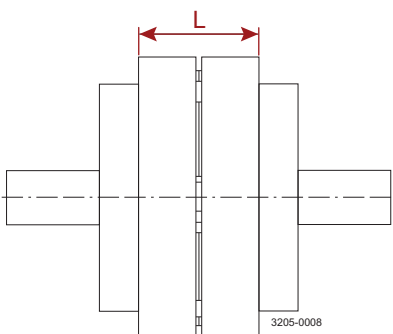
Angular misalignment

Measure 4 positions at 90° around coupling



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

Assembled length



Coupling size	Dimension L ± 1.0mm
70	25
90	30.5
110	45
130	53
150	60
180	73
230	85.5
280	105.5

Recommended bolt torques.

Thread Diameter	M6	M8	M10	M12	M16	M20	M24
Torque (Nm)	6	15	30	50	120	250	200

4.3 Flushing seal arrangement and pre-start up checks

Step 1

A flushed seal arrangement is fitted in order to cool or clean the seal area.

It is important that:

- The flush is correctly connected (see below)
- A compatible flushing fluid is used and supplied at the correct pressure and flow rate (See 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.

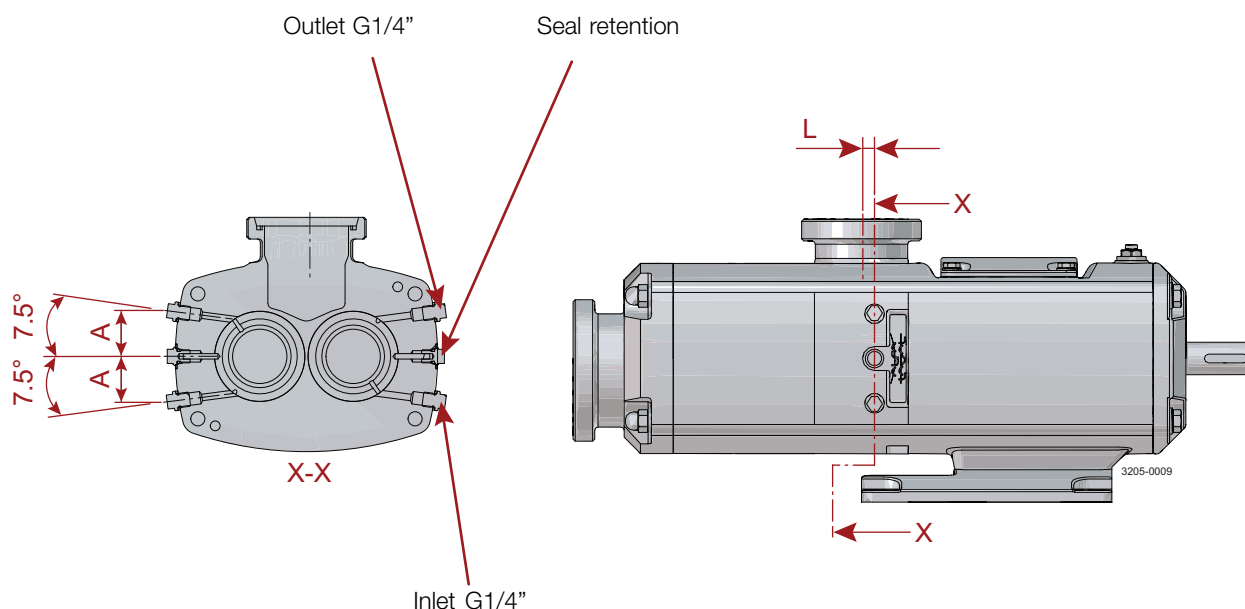
Step 2

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.

Step 3



Step 4

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 single flushed mechanical seal arrangements the temperature of 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.

Step 5

Flushing pressure and flow rate

Single flushed mechanical seal 0.5 bar (7 psi) maximum. Any further increase in pressure will result in lip seal failure.

The flushing flow rate must be adequate to ensure that the temperature limitation of the seals is not exceeded.

Minimum flow rate required per shaft seal is 30 l/hr

4 Installation

Step 6

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.
-

5.1 Cleaning in place (CIP)

The pump can be manually cleaned or cleaned in place (CIP). The following is an example of a typical CIP procedure. However specific advice for each application should be sought from the pump supplier.

Typical CIP procedure

1. Flush through the system with vold water or bore water (6°C) (43°F).
 2. Run hot caustic soda (70-80°C) (158-176°F) at 2.5% dilution through the system for 20-30 minutes.
 3. Final flush through with cold water again.
-

Warnings

- Never touch the pump or the pipelines as they can be extremely hot!
- Do not subject the pump to rapid temperature changes during CIP procedures, as pump seizure can result from thermal shock. A suitable by-pass is recommended.
- **Always** rinse well with clean water after using a cleaning agent.
- **Always** use rubber gloves and protective goggles when handling caustic agents.
- **Always** store/discharge cleaning agents in accordance with current rules/directives.



CIP process using separate CIP pumps/systems:

If CIP pumps or a central CIP unit are used for CIP, i.e. cleaning fluids simply flow through the OS twin screw pump as with all other system parts, please note the following:

- If the system pressure is >1bar, the OS pump must be locked to prevent turbinning
- If the pump runs slowly with the flow, the inlet pressure must be <1 bar, i.e. a negative differential pressure should be avoided.

SIP method

Dry running of the pump with steam will cause damage to the shaft seal.

When steam is flowing through the pipes, make sure that the pump is switched off.

Slow rotation with the shaft is possible if the pump has a single flushed seal or double shaft seal (<300 1/min).

The OS twin screw pumps are only suitable for the SIP (Sterilisation In Place) method in consultation with Alfa Laval.

Suitability depends on the choice of elastomers. The maximum process temperature is 145°C (293°F).

5 Maintenance

5.2 Maintenance schedule

It is advisable to install pressure gauges on both sides of the pump so that any problems within the pump/pipework can be monitored.

Maintenance schedule

Your weekly schedule should include:

- Checking the seals for leakage.
- Checking the lip seals for leakage.
- Check pumping pressures.

In certain operational circumstances the pump will pose a thermal hazard and as such should not be touched during operation. After shutdown the pump unit should be allowed time to cool.

Recommended Spare Parts

The table shows recommended spare parts that should be retained within your maintenance schedule.

Part description	Quantity
Service kit for the mechanical seal	1
Profiled elastomer kit for wet end	1

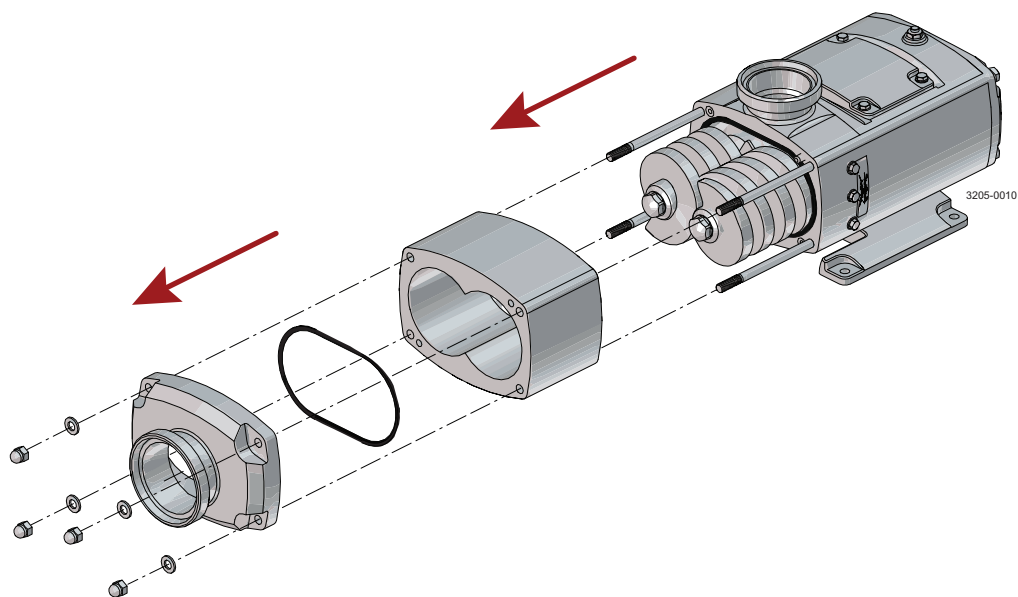
5.3 Dismantling

Step 1

Before disassembling the pump refer to safety precautions. See exploded view drawings (chapter 7 Parts list.)

Removing pump cover and pump casing

1. Remove front cover nuts, washers, front cover, front cover elastomer and pump casing.



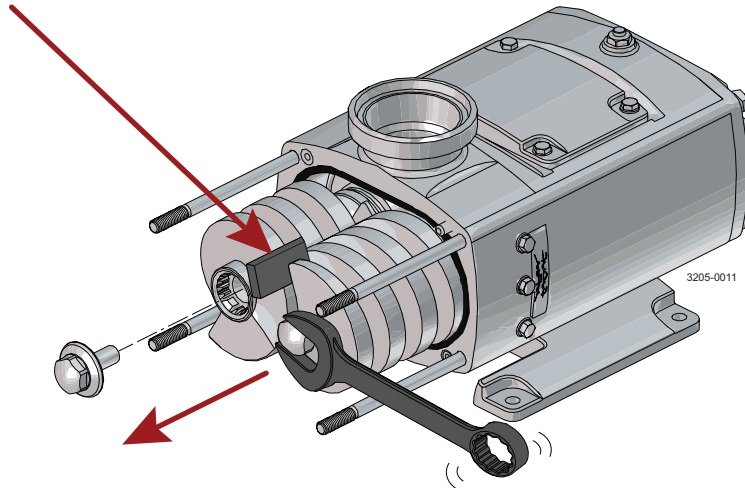
5 Maintenance

Step 2

Removing feed screws

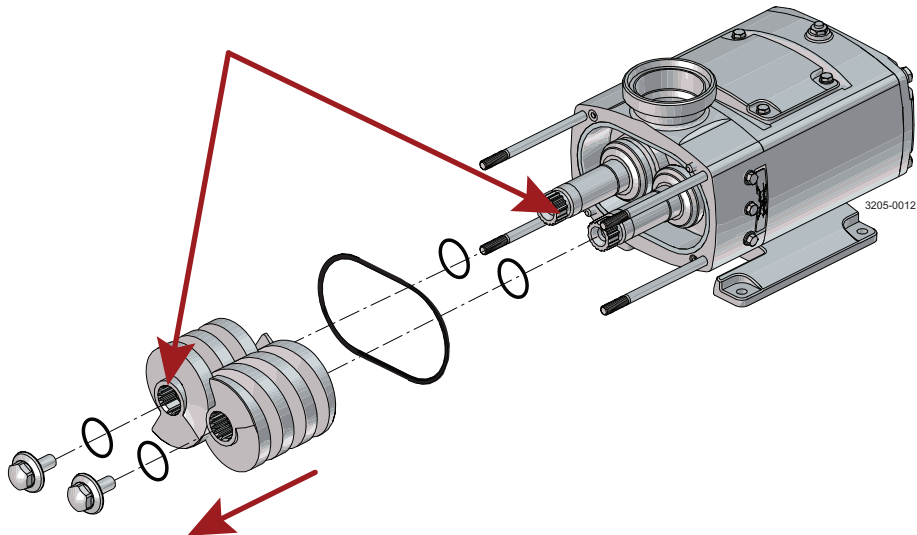
1. Insert a plastic/wooden block between the feed screw leading edge and opposite screw to prevent from turning.

Plastic/wooden block



2. Remove feed screw nuts, feed screw nut elastomer and feed screws
NOTE: the identification marking on the screws and the shafts.
3. Remove the pump casing elastomer and shaft sealing elastomers if these are to be replaced.

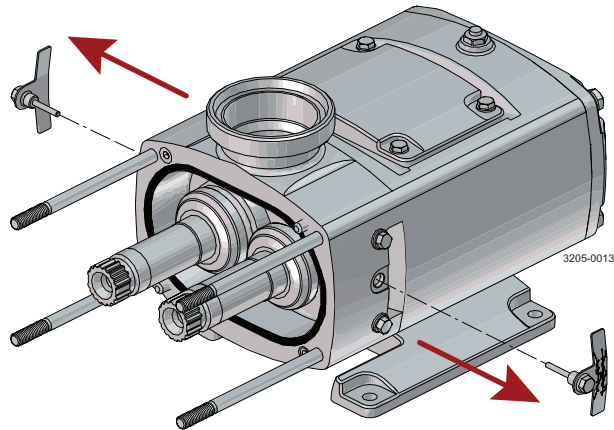
Identification Marks



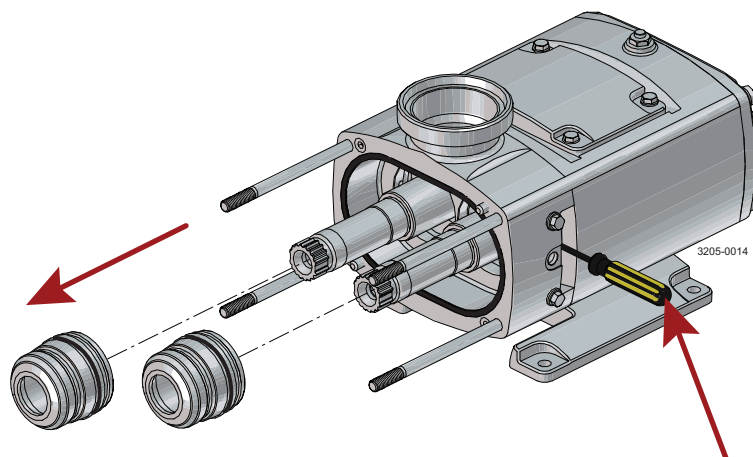
Step 3

Removing primary seal components

1. Remove seal retaining plugs, O-rings and gland guards



2. Gently ease cartridge seals from housing by levering against the gearcase and back of seal assembly if necessary.

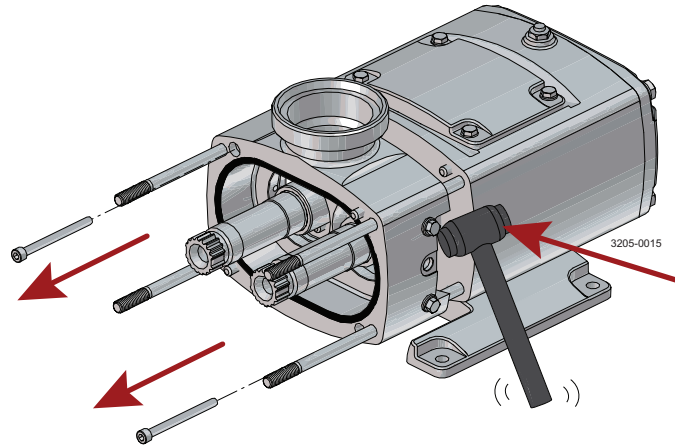


5 Maintenance

Step 4

Removing seal housing

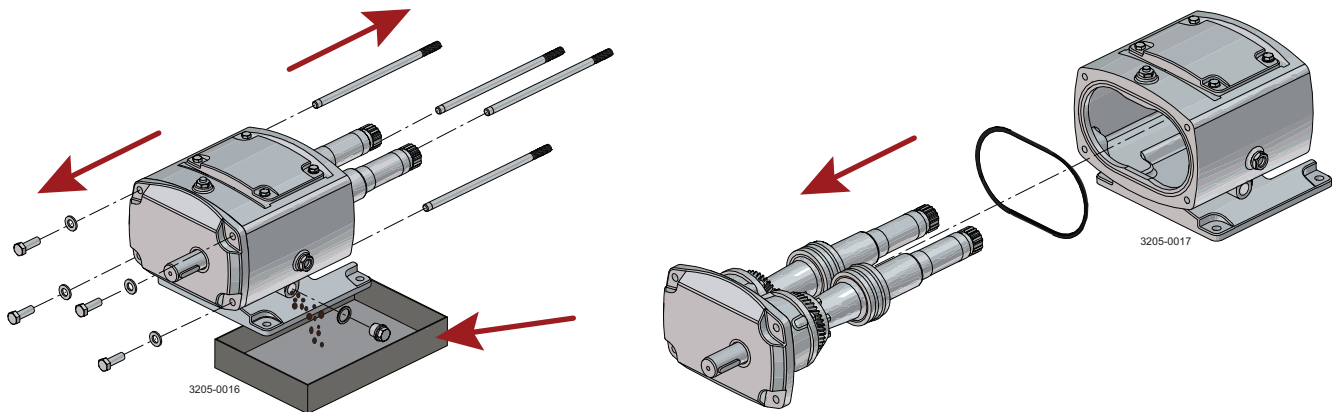
1. Remove the seal housing retention screws
2. Tap both sides of the seal housing with a soft mallet
3. Withdraw the seal housing along the pump casing studs to remove



Step 5

Disassembling of gearbox

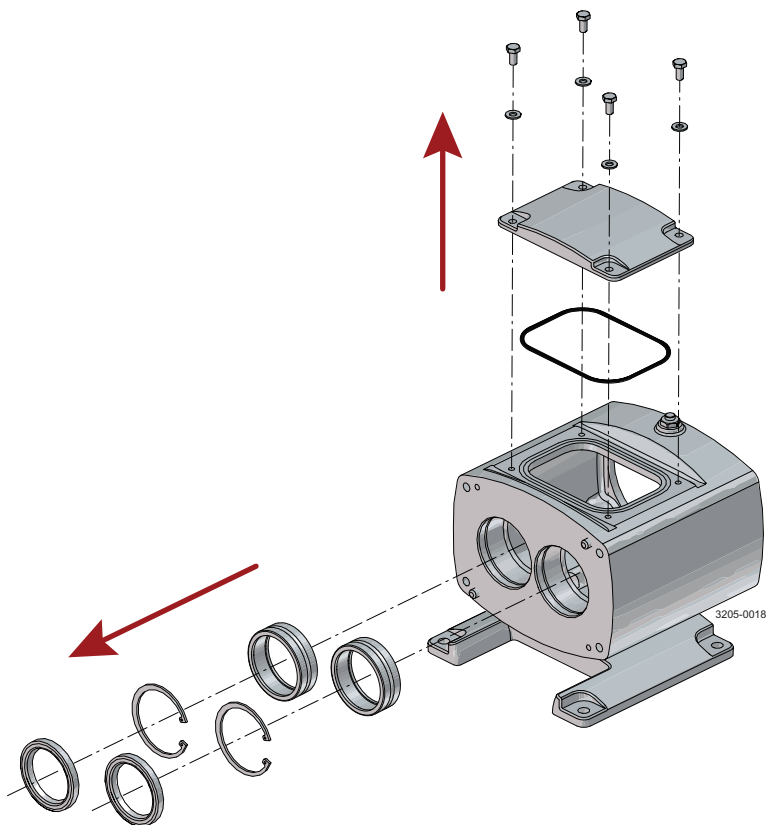
1. Remove pump casing studs
2. Place a tray under the oil drain to collect the waste lubricant.
3. Remove the oil drain plug and seal and allow lubricant to drain.
4. Remove the gearbox end cover bolts and washers
5. Pull out the whole axial bearing & shaft unit from the gearbox. To assist removal, tap shaft ends with a soft mallet.
6. Remove the gearbox O-ring. If this needs to be replaced.



Step 6

Disassembling of front gearbox

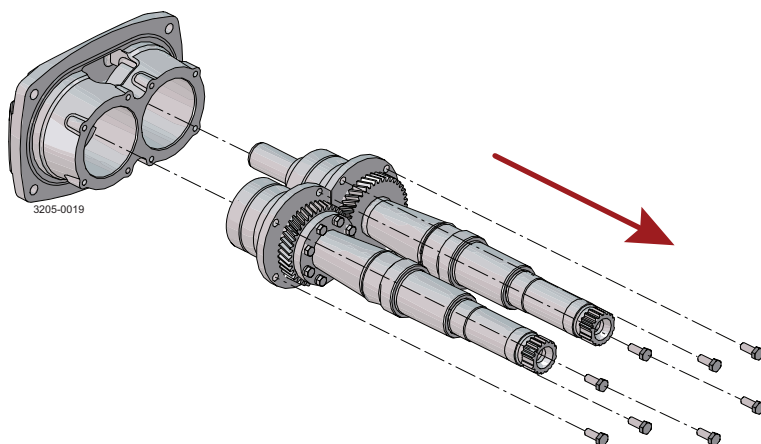
1. Remove gear top cover bolts, washers, gear top cover and gear cover O-Ring.
2. Remove lip seals
3. Remove needle bearing snap ring
4. Tap the needle bearings outer races out of their seat.



Step 7

Disassembling of bearing housing shaft assembly

1. Remove bearing retainer bolts and drive shaft key
2. Pull out the complete shaft assembly

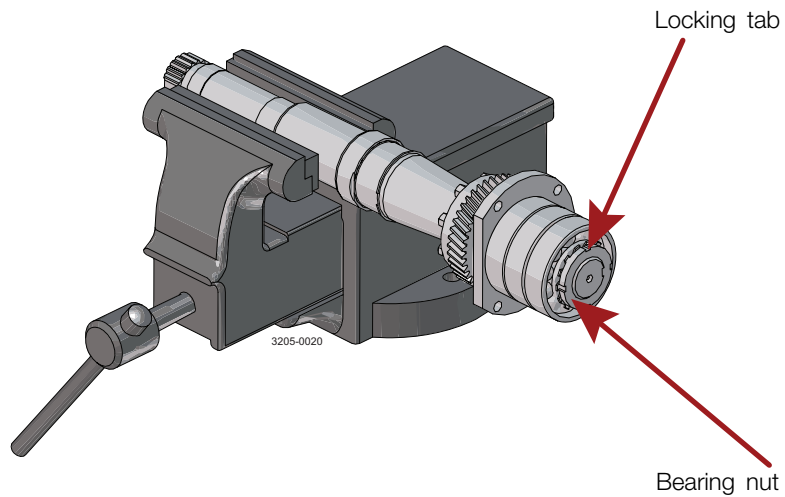


5 Maintenance

Step 8

Disassembling of shaft assembly

1. Fix the shaft assembly in a vice fitted with soft jaws taking care not to damage the shaft assembly
2. Bend up locking tab on washer from bearing nut
3. Loosen the bearing nut with a 'C' spanner by tapping sharply and remove it



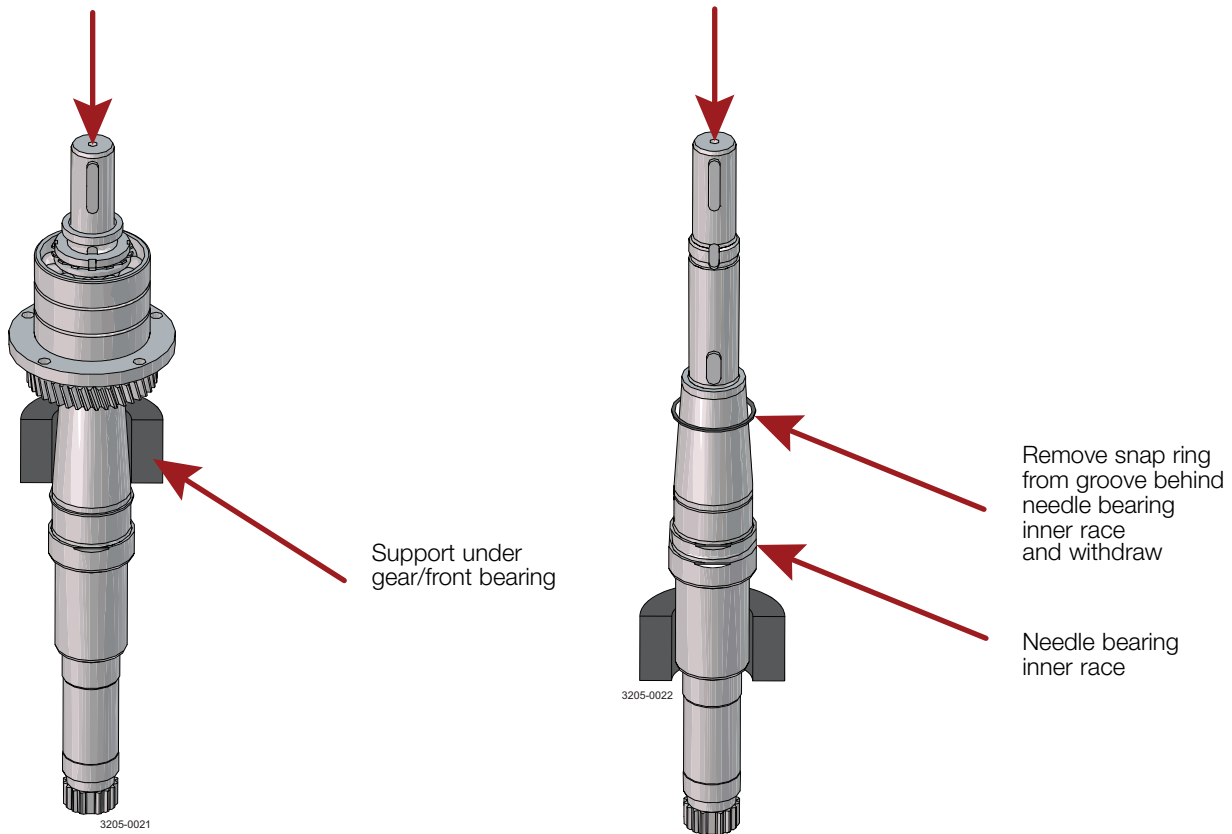
Step 9

Removing bearing and gear

1. Mount the shaft vertically in a press (splines pointing down) with a tool positively located against the gear and apply pressure to the top of the shaft so that the shaft passes through the bearings and gear.

CAUTION

2. Remove the needle bearing inner snap rings
3. Mount the shaft vertically in a press splines pointing down with a tool positively located against the needle bearing ring race and apply pressure to the top of the shaft so that the shaft moves through the bearing
4. Remove gear key from shaft

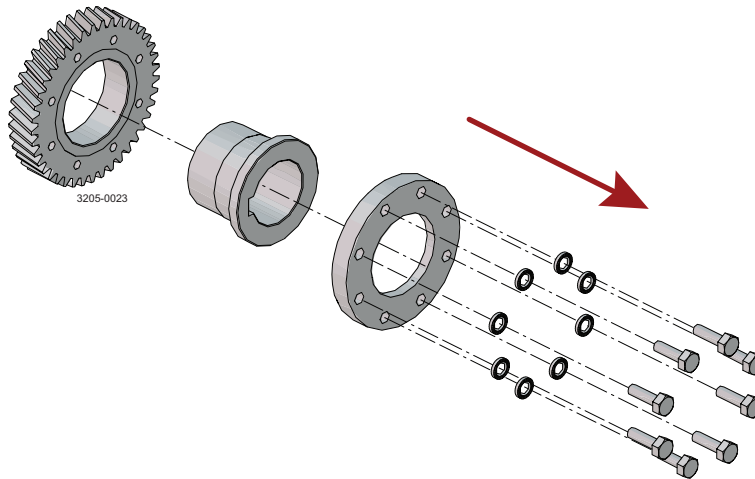


5 Maintenance

Step 10

Disassembly of adjustable timing gear

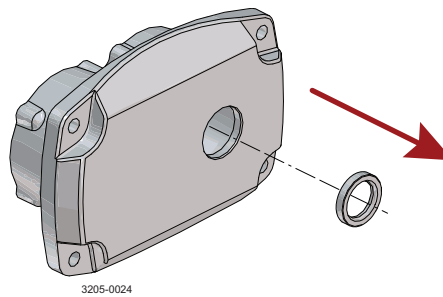
1. Remove timing gear assembly bolts and washers
2. Remove timing gear clamping plate and timing gear from gear sleeve



Step 11

Remove lip seal from gearbox end cover

1. Extract the lip seal from the gearbox end cover. It is essential to renew the lip seal prior to assembly.



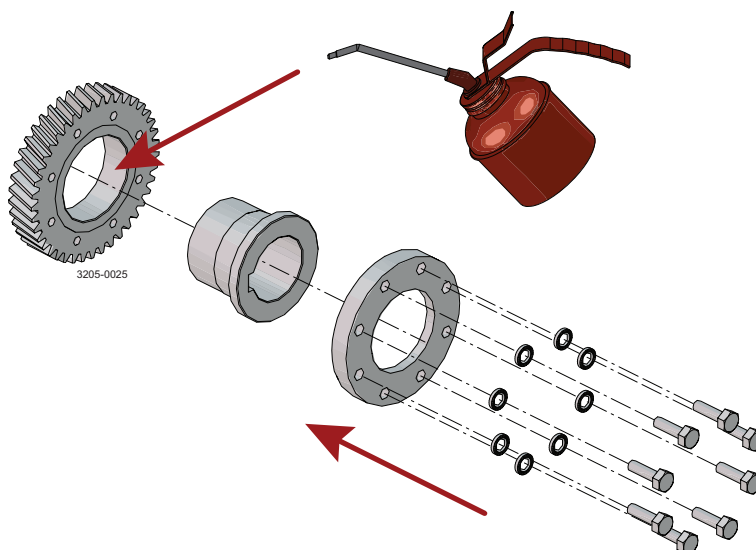
Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

5.4 Assembly

Step 1

Assembly of adjustable gear

1. Lubricate the inner diameter of the adjustable timing gear with oil
2. Slide the timing gear onto the gear sleeve with the threads facing the collar
3. Place the timing gear clamp plate from the other side and install the washers and gear sleeve bolts loosely
4. Make sure the assembly rotates freely



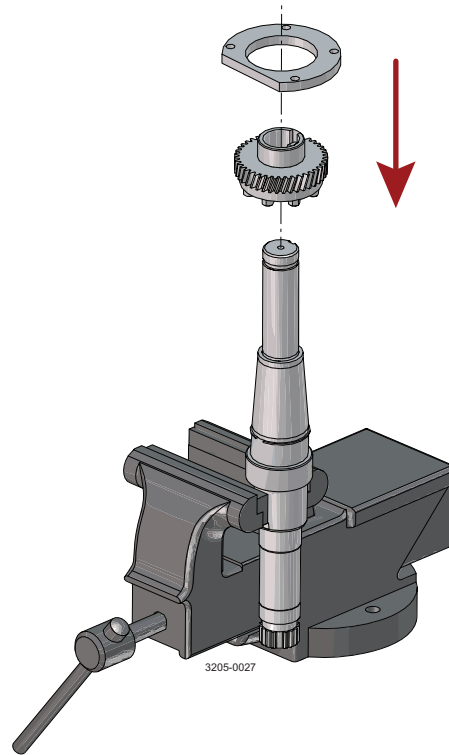
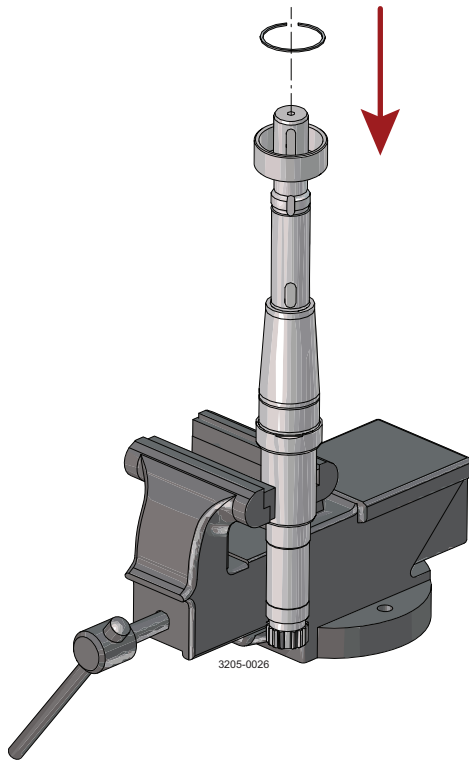
5 Maintenance

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 2

Fitting bearings to shaft

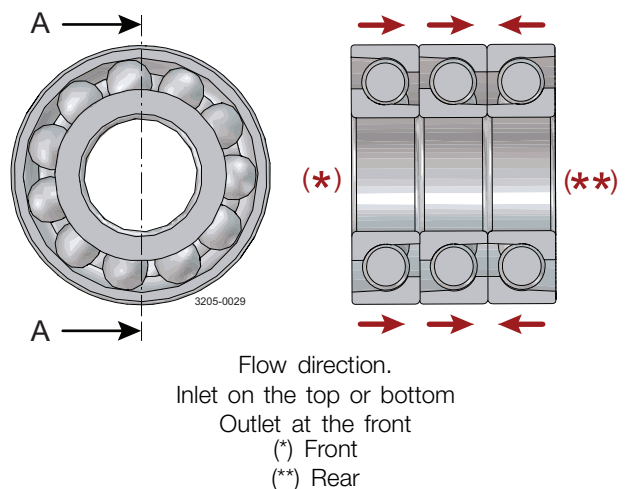
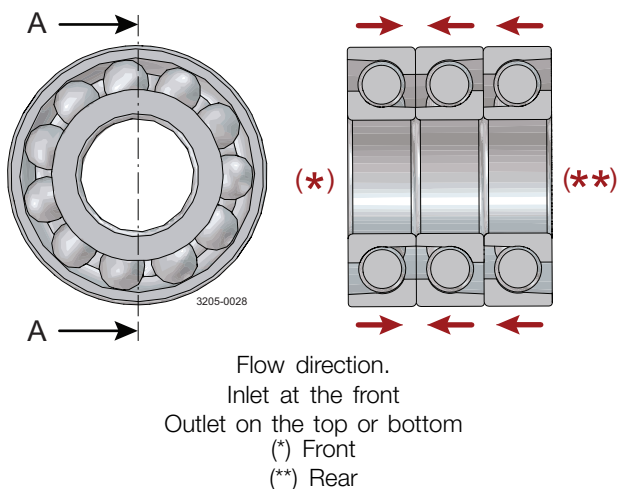
1. Fix the shaft vertically in a vice fitted with soft jaws- taking care not to damage the shaft
2. Heat needle bearing inner race up to 110°C (230°F) and shrink fit it onto its seat
3. Mount needle bearing inner snap ring
4. Fit gear key
5. Apply an anti-seize compound to the bearing seat
6. Slide gear over bearing seat until it sits against the shoulder
7. Place bearing retainer loosely over shaft and gear



8. Heat the 3 angular contact ball bearings up to 110°C (230°F) and slide over the shaft.

Note: The bearing positioning is dependent on the suction and discharge direction. Two bearings face one direction and the third bearing faces the opposite direction.

CAUTION



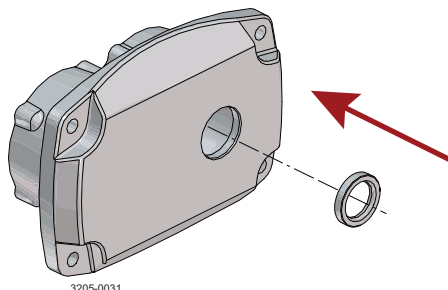
9. Place the tab washer in its position, make sure the inner tab is aligned in the shaft groove
10. Apply an anti-seize compound to bearing nut and shaft thread
11. Fit and tighten the bearing nut with a 'C' spanner by tapping sharply until one tab of the lock washer lines up with the bearing nut groove and fold the tab into the groove

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 3

Install lip seal in gearbox end cover

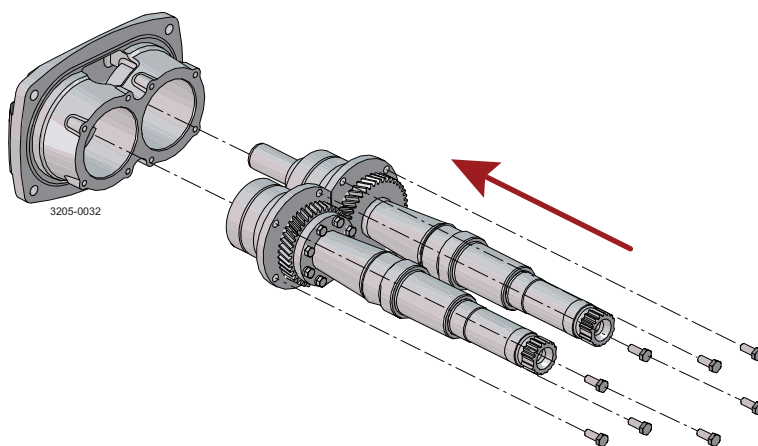
1. Install lip seal in gearbox end cover



Step 4

Fitting shaft assembly in gearbox end cover. Ensure correct torques are used.

1. Slide drive and auxiliary shaft assembly in gearbox end cover (Take care not to damage the lip seal)
2. Apply a thread locking compound to the bearing retainer bolts
3. Tighten the bearing retainer bolts to their recommended torque



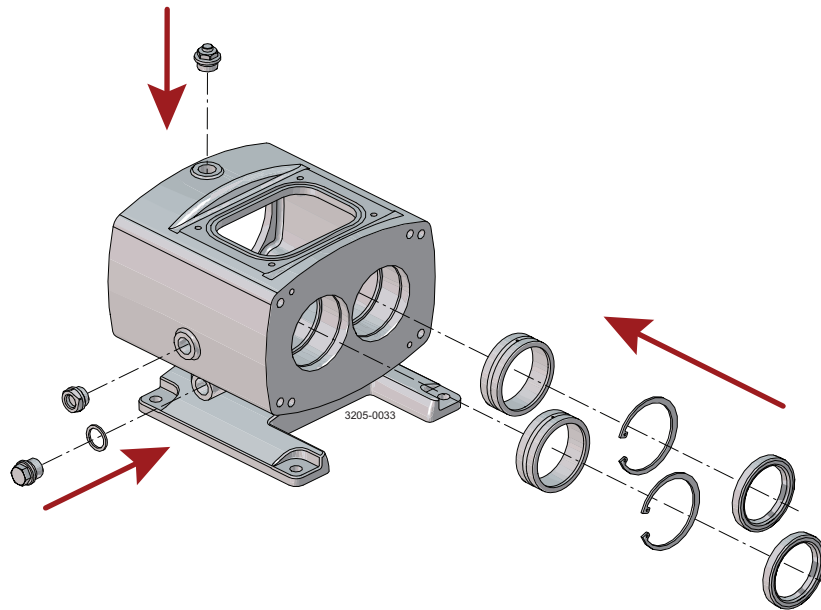
5 Maintenance

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 5

Assembling of gearbox. Ensure correct torques are used.

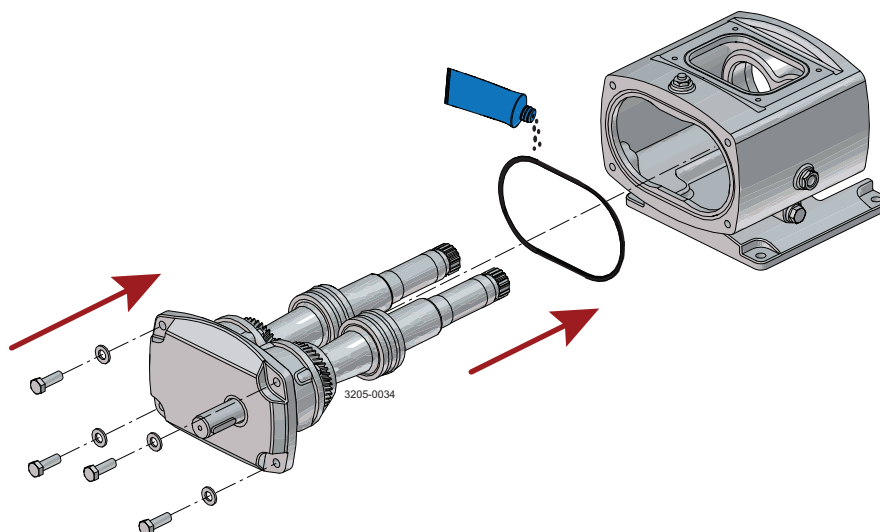
1. Tap the needle bearing outer races into their seat
2. Fit needle bearing snap ring
3. Fit lip seals
4. Fit filler plug
5. Fit oil sight glass
6. Fit drain plug and washer



Step 6

Assembling of gearbox. Ensure correct torques are used.

1. Fit gearbox O-Ring use grease to keep it in place
2. Push in the shaft assembly into the front gearbox. (take care not to damage the lip seals). Ensure that the drive shaft is in the correct position to realign with the motor coupling.
3. Fit the gearbox end cover bolts and washers and torque them to their recommended value
4. Fit drive shaft key

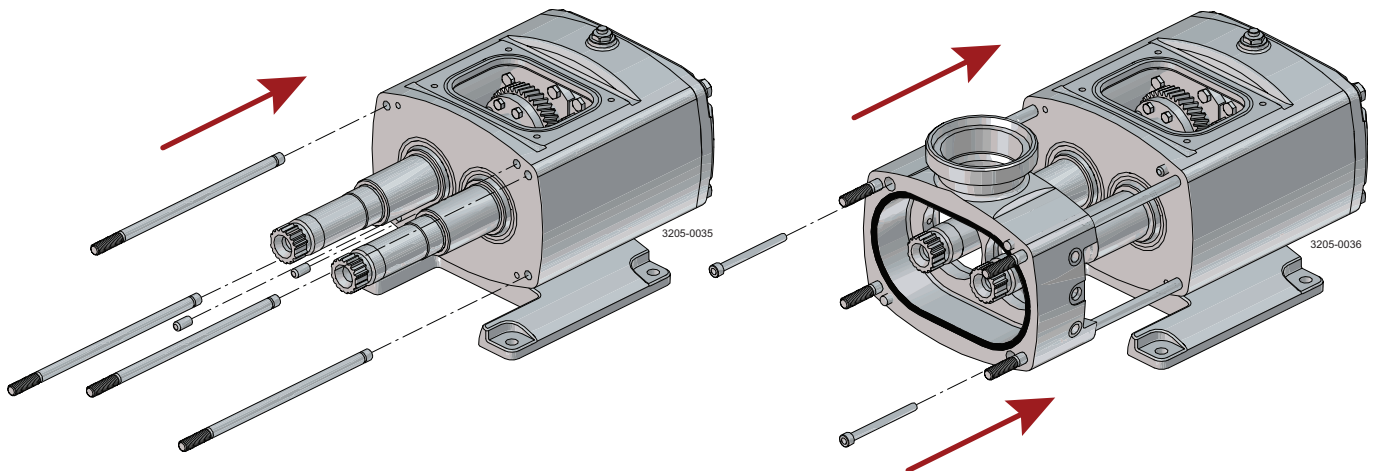


Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 7

Install seal housing. Ensure correct torques are used.

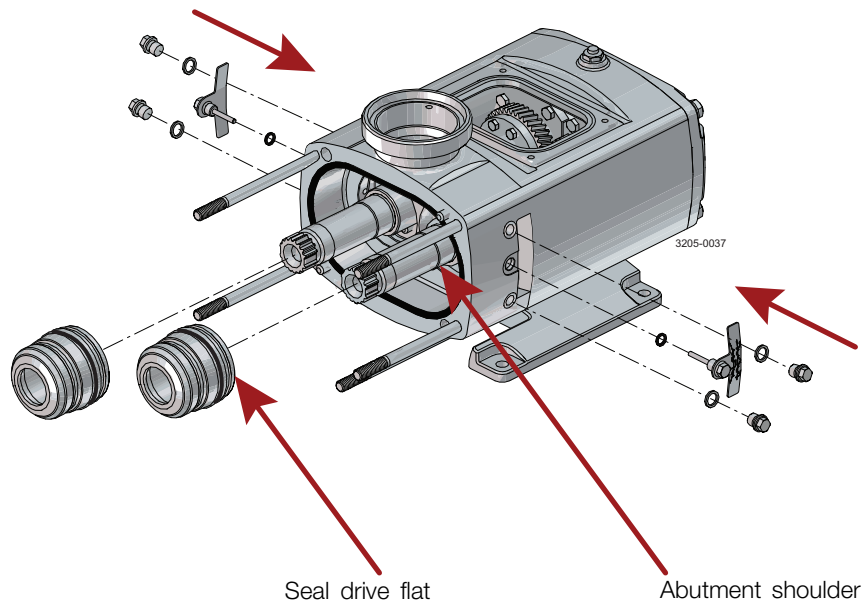
1. Fit the pump casing studs and dowel pins to the gearbox
2. Fit dowel pins in seal housing
3. Slide seal housing on the pump casing studs and push back locating onto the dowels. (Make sure the port connection is in the correct orientation)
4. Install the seal housing retention screws and tighten them.



Step 8

Installing primary seal components. Ensure correct torques are used.

1. Lubricate external elastomers.
2. Slide cartridge seal over shaft ensuring that the seal drive flat aligns with the corresponding flat in the seal housing. Press fully home into the seal housing and abutment shoulder.
3. Fit seal retention plug, pin, O-ring and gland guard.
4. Fit seal flushing fittings or plug and washers for single unflushed seals.



5 Maintenance

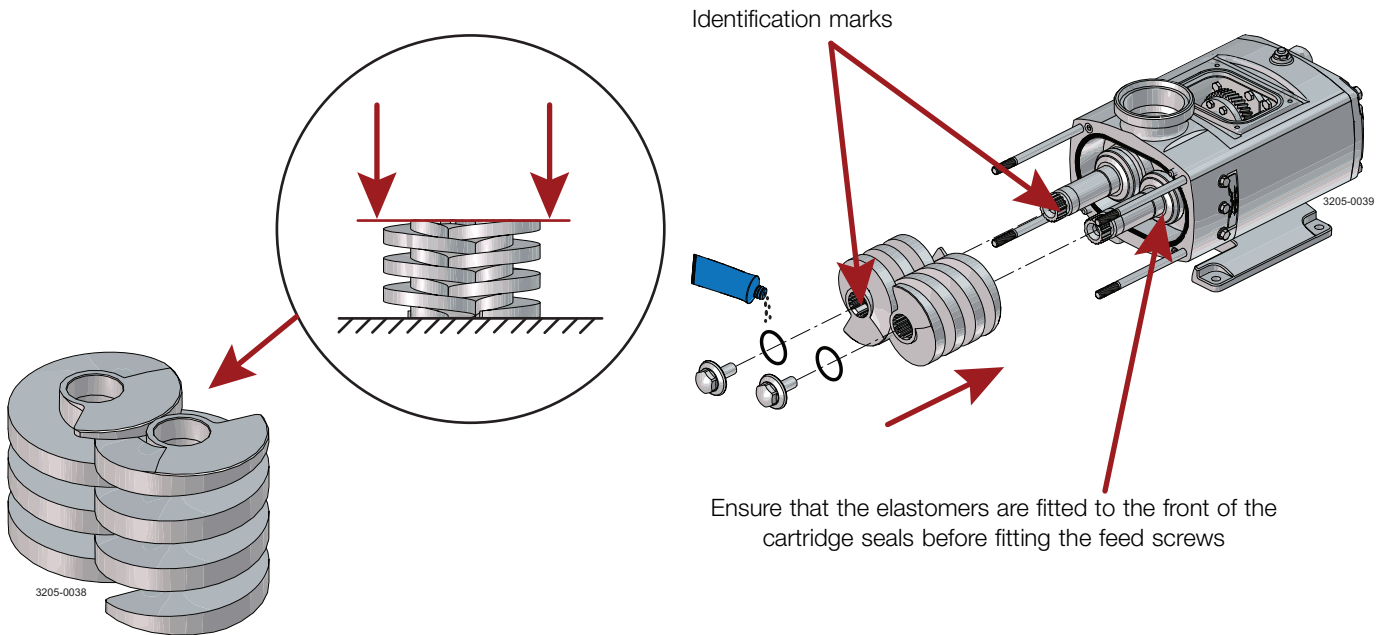
Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located

Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 9

Fitting feed screws. Ensure correct torques are used.

1. Place the feed screws on a flat surface and mesh them so that the ends are flush. Ensure that the screws are the correct way around and the indentation marks correspond with the markings on the shafts.
2. Fit both feed screws onto the shafts simultaneously and push them till they make contact with the mechanical seal sleeve. (To make the splines fit you may need to rotate the shafts until they match)
3. Apply a locking compound to the feed screw nut thread
4. Fit elastomer onto feed screw nut and lubricate it
5. Insert a plastic/wooden block between the feed screw run outs to stop them from turning
6. Tighten fluid screw nuts

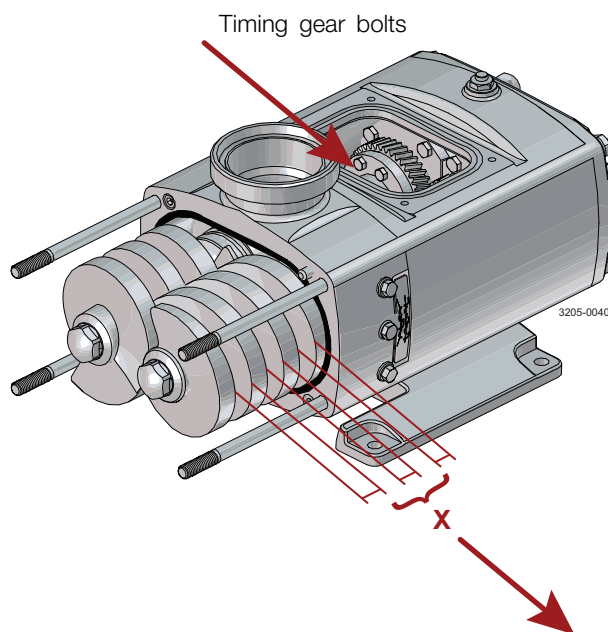


Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 10

Setting feed screw timing. Ensure correct torques are used.

1. Make sure the gear sleeve bolts are loose, and the gear rotates on the sleeve.
2. Turn the drive shaft and check the clearance between the feed screw flanks. Use feeler gauges to make sure the clearance is evenly divided between the flanks. Refer to Pump head clearance Information (6.2 Pumphead Clearance information)
3. Tighten the gear sleeve bolts in a cross pattern
4. Re-check the timing and ensure it is within specification (6.2 Pumphead Clearance information)



Ensure that the clearance is equal between all mesh points between the flanks

5 Maintenance

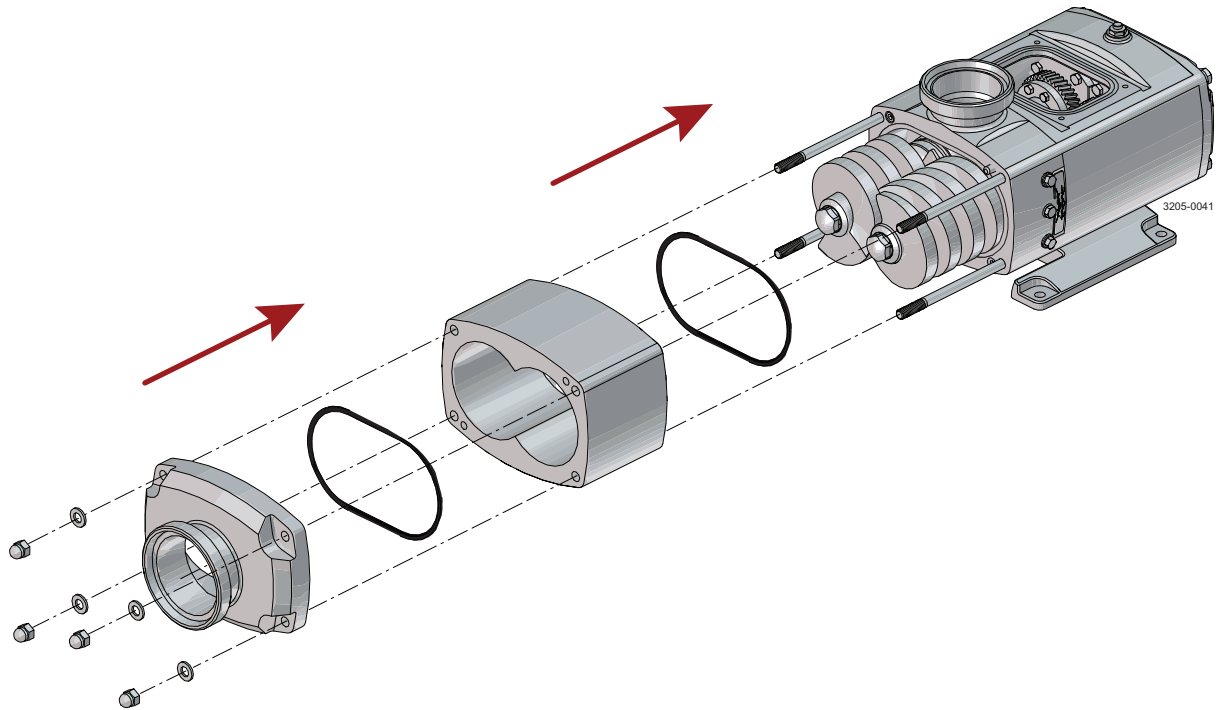
Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located

Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 11

Fitting pump casing and front cover. Ensure correct torques are used.

1. Fit the pump casing elastomer in seal housing and front cover
2. Fit pump casing over feed screws and engage with dowels (Attention, ensure the housing is in the same orientation as it was before it was removed)
3. Fit dowels in front cover
4. Fit front cover to pump casing
5. Fit front cover nuts, washers and torque them to their recommended value



Step 12

Function test

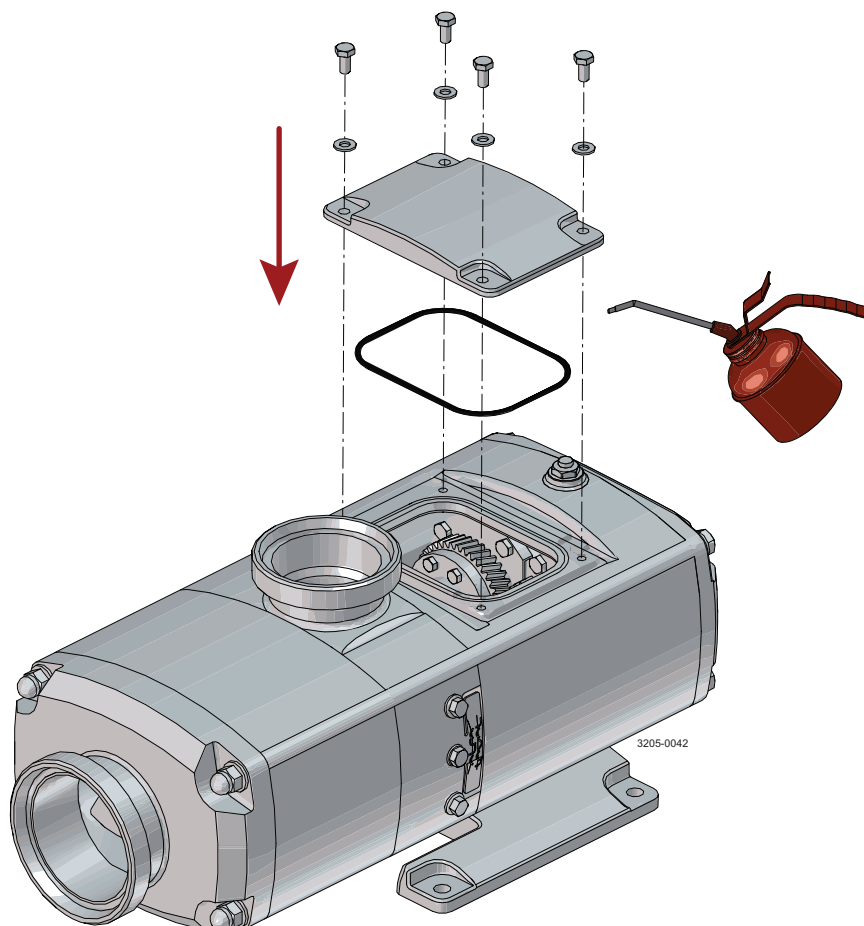
1. Rotate drive shaft clockwise to check for jamming

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 13

Adding lubricant

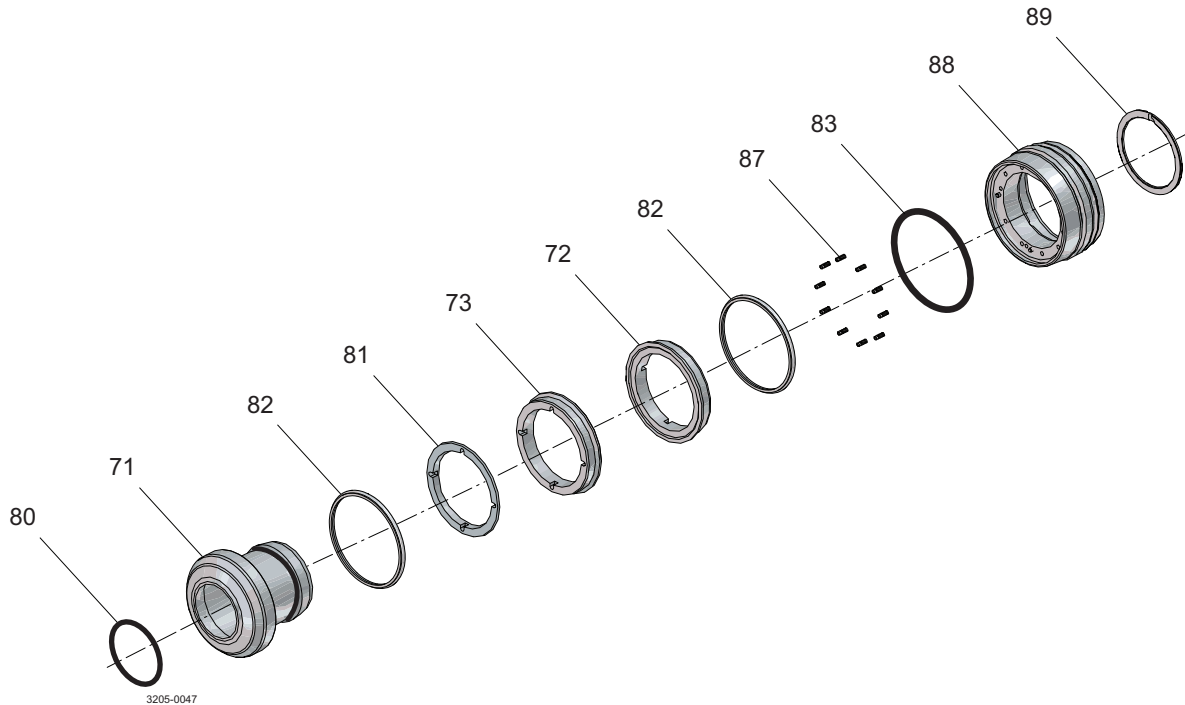
1. Pour the recommended oil lubricant into the gear top cover opening. (See section 6 Technical data for correct oil quality.)
2. Fit gear top cover
3. Fit the gear top cover and fix it with bolts and washers



5 Maintenance

*Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)*

5.5 Maintenance seals - Single Seal



Assembly

Check that all parts are accounted for and ensure no parts are damaged. Seal faces are brittle, and care must be taken not to chip these components during fitting of the seal. Ensure seal faces are clean throughout the fitment. If a need to be cleaned, use acetone or similar solvent sprayed onto lint free tissue.

Equipment to be used: Acetone, compatible lubricant and lint free tissues

Step 1

Lightly lubricate screw clamping profile elastomer (80) with suitable lubricant compatible with the application and fit to the rotary holder (71).

Step 2

Place plastic washer (81) in rotary holder (71) aligning the slots in the washer (81) with the pins fitted in the rotary holder bore (71).

Step 3

Lightly lubricate elastomer (82) with suitable lubricant and fit into rotary holder (71) groove.

Step 4

Align the slots in the rotary face (73) with the pins fitted in the rotary holder bore (71), then firmly press the rotary face (73) fully home into the rotary holder bore (71)

Step 5

Lightly lubricate the static face profile elastomer (82) with suitable lubricant compatible with the application and fit into seal housing (88) groove.

Step 6

Lightly lubricate the seal housing profile elastomer (83) with suitable lubricant compatible with the application and fit onto the seal housing (88).

Step 7

Drop coil springs (87) into coil spring holes in the seal housing (88).

*Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)*

Step 8

Align the slots in the static face (72) with the pins fitted in the seal housing (88), then firmly press the static face (72) fully home into seal housing bore (88).

Step 9

Spray acetone or similar solvent onto lint free tissue and wipe the sealing surfaces of the rotary face (73) and static face (72) clean. NOTE: Do not spray acetone directly onto the sealing surfaces.

Step 10

Turn the rotary assembly upside down and slide the sleeve carefully into the static assembly mating the sealing surfaces together.

Step 11

Turn the complete seal around whilst holding it together.

Step 12

Press the seal housing (88) down whilst fitting the circlip (89) into the groove in the seal housing (88)

Step 13

Validate the assembly by compressing the seal a few times, making sure it springs back out each time.

Carefully fit the mechanical seal onto the shaft and into the pump housing making sure the flat of the seal housing aligns with the flat in the pump housing and fit seal retaining screw and gland guard.

CHECK SCREW CLEARANCES AND RETIME PUMP IF NECESSARY

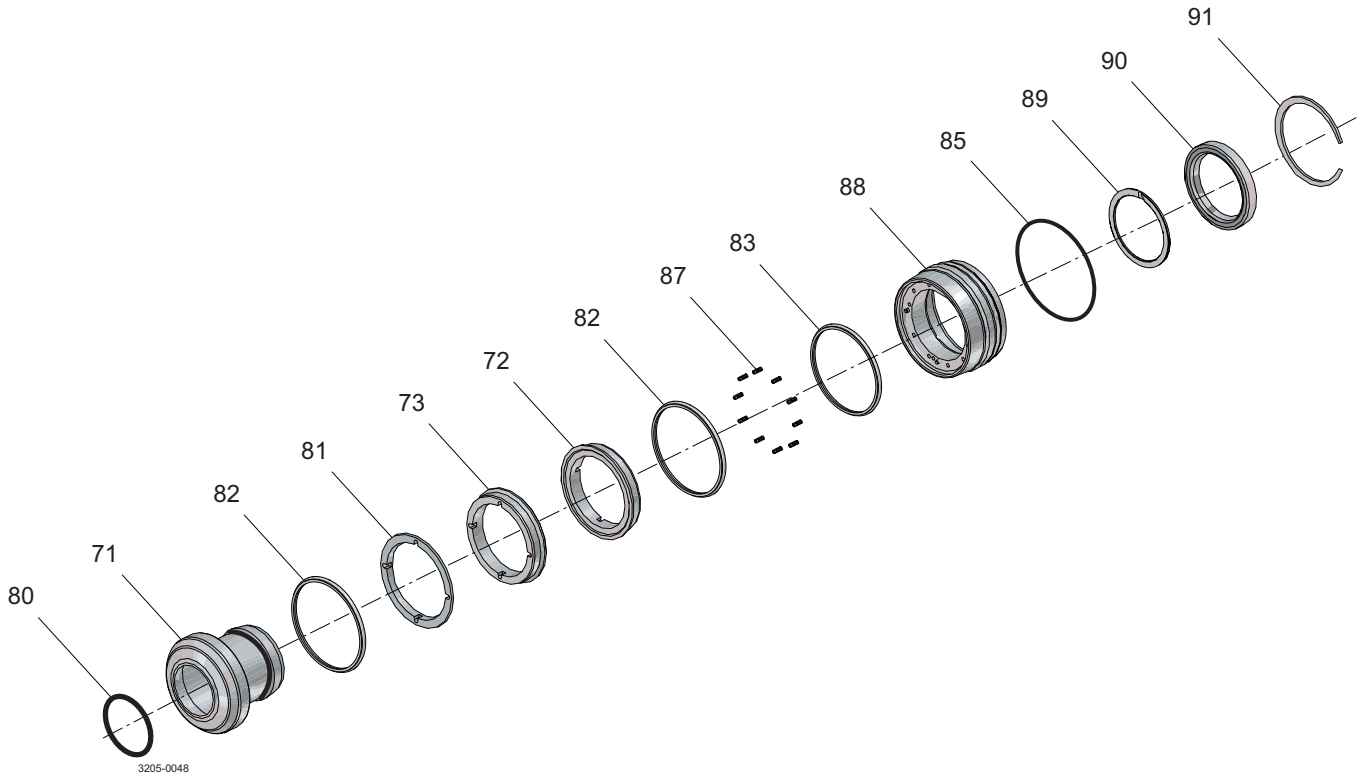
Disassembly

Disassembly of the mechanical seal is the reverse procedure of assembly, as above.

5 Maintenance

*Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)*

5.6 Single Flushed Seal



Assembly

Check that all parts are accounted for and ensure no parts are damaged. Seal faces are brittle, and care must be taken not to chip these components during fitting of the seal. Ensure seal faces are clean throughout the fitment. If a need to be cleaned, use acetone or similar solvent sprayed onto lint free tissue.

Equipment to be used: Acetone, compatible lubricant and lint free tissues

Step 1

Lightly lubricate screw clamping profile elastomer (80) with suitable lubricant compatible with the application and fit to the rotary holder (71).

Step 2

Place plastic washer (82) in rotary holder (71) aligning the slots in the washer (82) with the pins fitted in the rotary holder bore (71).

Step 3

Lightly lubricate elastomer (82) with suitable lubricant and fit into rotary holder (71) groove.

Step 4

Align the slots in the rotary face (73) with the pins fitted in the rotary holder bore (71), then firmly press the rotary face (73) fully home into the rotary holder bore (71)

Step 5

Lightly lubricate the static face profile elastomer (82) with suitable lubricant compatible with the application and fit into seal housing (88) groove.

Step 6

Lightly lubricate the seal housing profile elastomer (83) with suitable lubricant compatible with the application and fit onto the seal housing (88).

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 7

Drop coil springs (87) into coil spring holes in the seal housing (88).

Step 8

Align the slots in the static face (72) with the pins fitted in the seal housing (88), then firmly press the static face (72) fully home into housing bore (88).

Step 9

Spray acetone or similar solvent onto lint free tissue and wipe the sealing surfaces of the rotary face (73) and static face (72) clean. **NOTE:** Do not spray acetone directly onto the sealing surfaces.

Step 10

Turn the rotary assembly upside down and slide the sleeve carefully into the static assembly mating the sealing surfaces together.

Step 11

Turn the complete seal around whilst holding it together.

Step 12

Press the seal housing (88) down whilst fitting the circlip (89) into the groove in the seal housing (88).

Step 13

Lightly lubricate O-ring (85) and fit onto the seal housing (88).

Step 14

Lightly lubricate outside diameter of lip seal (90)

Step 15

Firmly press the lip seal (90) fully home into the housing bore (88).

Step 16

Fit circlip (91) into the groove in the seal housing (88).

Step 17

Validate the assembly by compressing the seal a few times, making sure it springs back out each time.
Carefully fit the mechanical seal onto the shaft and into the pump housing making sure the flat of the seal housing aligns with the flat in the pump housing and fit seal retaining screw and gland guard.

CHECK SCREW CLEARANCES AND RETIME PUMP IF NECESSARY

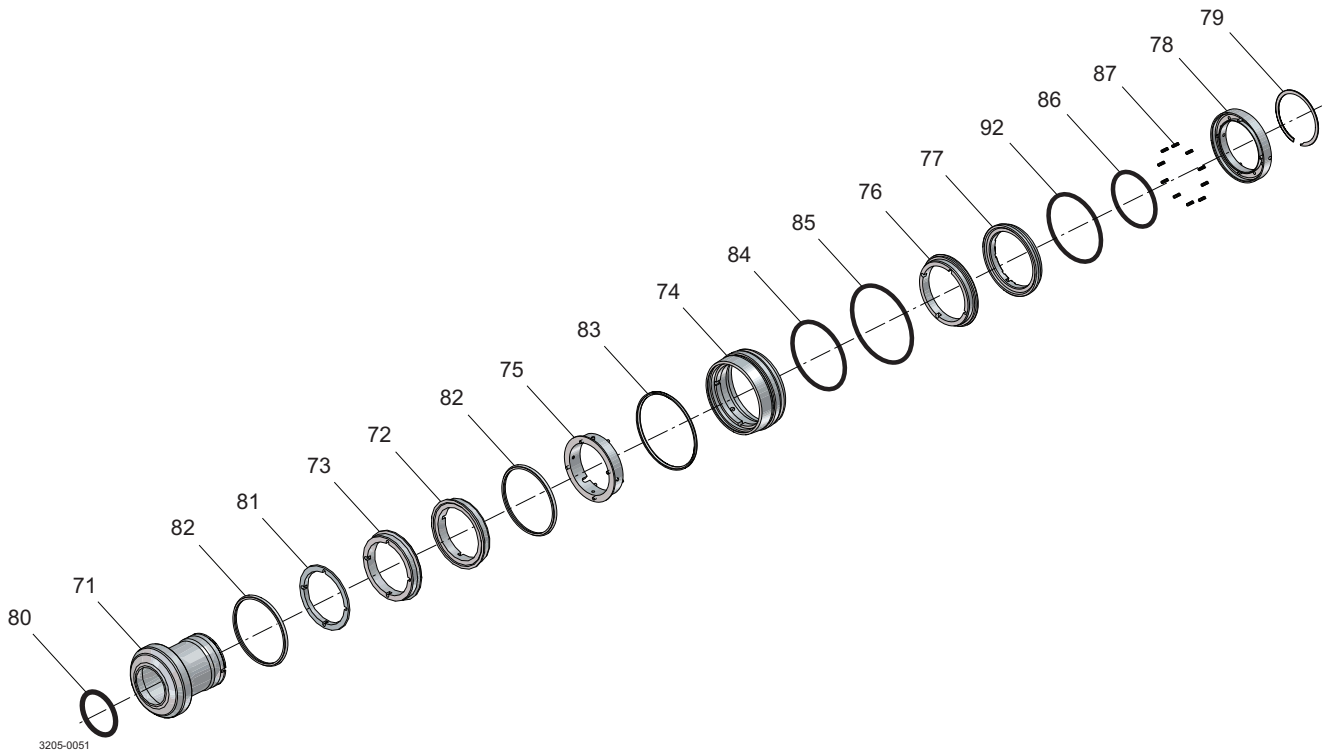
Disassembly

Disassembly of the mechanical seal is the reverse procedure of assembly, as above.

5 Maintenance

*Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)*

5.7 Double Seal



Assembly

Check that all parts are accounted for and ensure no parts are damaged. Seal faces are brittle, and care must be taken not to chip these components during fitting of the seal. Ensure seal faces are clean throughout the fitment. If a need to be cleaned, use acetone or similar solvent sprayed onto lint free tissue.

Equipment to be used: Acetone, compatible lubricant and lint free tissues

Step 1

Lightly lubricate screw clamping profile elastomer (80) with suitable lubricant compatible with the application and fit to the rotary holder (71).

Step 2

Place plastic washer (82) in rotary holder (71) aligning the slots in the washer (82) with the pins fitted in the rotary holder bore (71).

Step 3

Lightly lubricate elastomer (82) with suitable lubricant and fit into rotary holder (71) groove.

Step 4

Align the slots in the rotary face (73) with the pins fitted in the rotary holder bore (71), then firmly press the rotary face (73) fully home into the rotary holder bore (71)

Step 5

Lightly lubricate O-ring (86) and fit onto the rotary holder (71).

Step 6

Lightly lubricate the seal housing profile elastomer (83) with suitable lubricant compatible with the application and fit onto the seal housing (74).

Step 7

Lightly lubricate O-ring (85) and fit onto the seal housing (74).

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

Step 8

Lightly lubricate O-ring (84) and fit into the seal housing bore (74).

Step 9

Align radial pins in drive ring (75) with the anti-rotation slots in seal housing (74) and the slots in the drive ring (75) with the flush holes in the seal housing (74). Fit drive ring (75) into housing (74).

Step 10

Firmly press down static face (76) into the seal housing (74) while aligning the slots with the axial pins in the drive ring (75).

Step 11

Lightly lubricate the static face profile elastomer (82) with suitable lubricant compatible with the application and fit into seal housing (74) groove.

Step 12

Align the slots in the static face (72) with the axial pins fitted in the drive ring (75), then firmly press the static face (72) fully home into the seal housing bore (71).

Step 13

Drop coil springs (87) into coil spring holes in the drive ring (78).

Step 14

Lightly lubricate O-ring (92) and fit onto the rotary face (77).

Step 15

Gently place rotary face (77) onto the coil springs (87) while aligning the pin-slots with the pins in the drive ring (78). Make sure all coil springs sit firmly in all coil spring holes.

Step 16

Spray acetone or similar solvent onto lint free tissue and wipe the sealing surfaces of the rotary faces (73)(77) and static faces (72)(76) clean.

NOTE: Do not spray acetone directly onto the sealing surfaces.

Step 17

Place housing assembly on top of drive ring (78), mating static face (76) with rotary face (77).

Step 18

Pick assembly up and whilst holding the assembly compressed, turn it around and slide over sleeve assembly mating the rotary face (73) and static face (72).

Step 19

Press the drive ring (78) down whilst fitting the circlip (79) into the groove in the seal housing (74).

Step 20

Validate the assembly by compressing the seal a few times, making sure it springs back out each time.

Carefully fit the mechanical seal onto the shaft and into the pump housing making sure the flat of the seal housing aligns with the flat in the pump housing and fit seal retaining screw and gland guard.

CHECK SCREW CLEARANCES AND RETIME PUMP IF NECESSARY

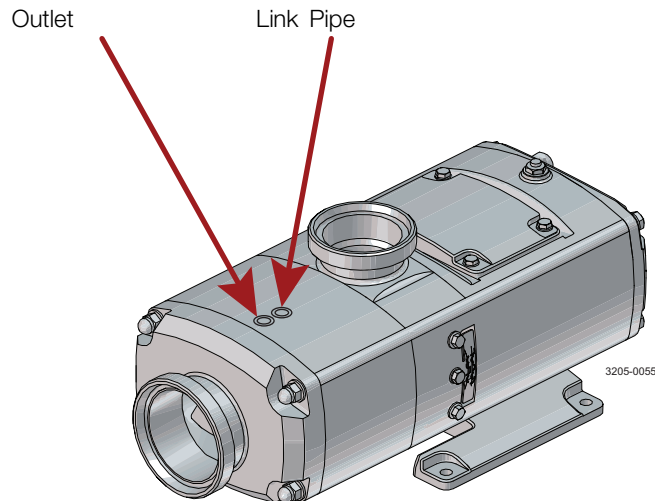
Disassembly

Disassembly of the mechanical seal is the reverse procedure of assembly, as above.

5 Maintenance

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

5.8 Heating (option)

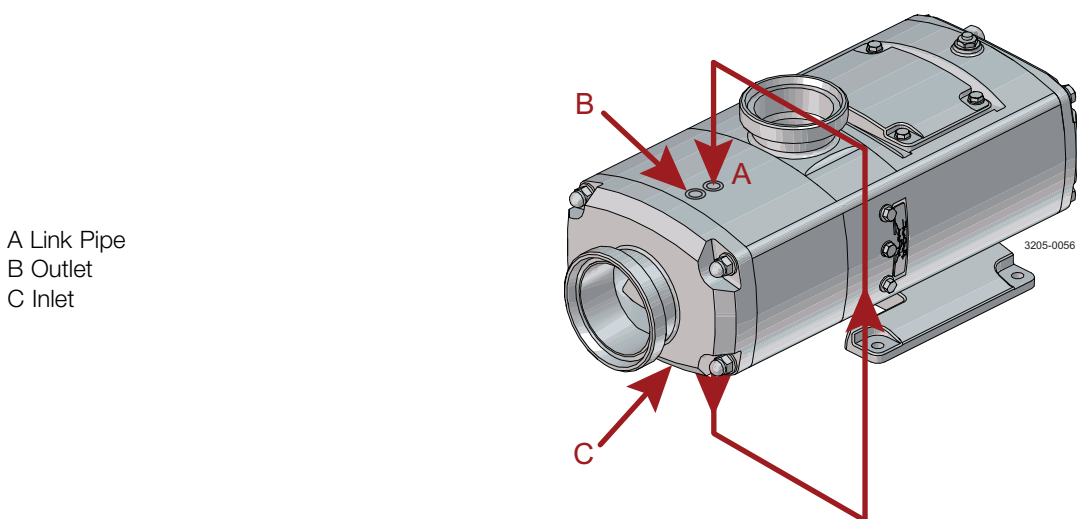


Ensure the pump is connected to the heating supply in the correct way.
Refer to connection size for pump models in the table.

Heating Connections	Size
OS22, OS24, OS26	G1/4"
OS32, OS34, OS36	G1/4"
OS42, OS44, OS46	G1/2"

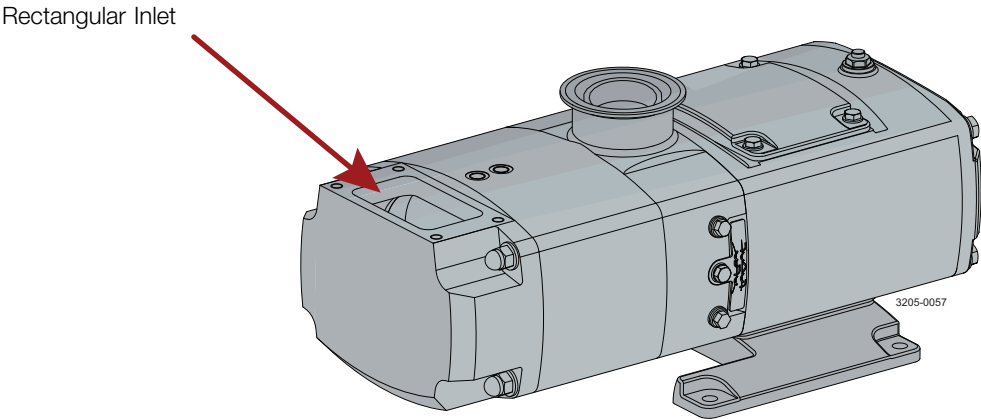
Inlet for heating fluid at the bottom, front connection.
Outlet for heating fluid at the top, front connection.
Ensure a link pipe is installed before heating fluid is turned on.

Cautions: Check for leaks, heating fluid could cause burns.

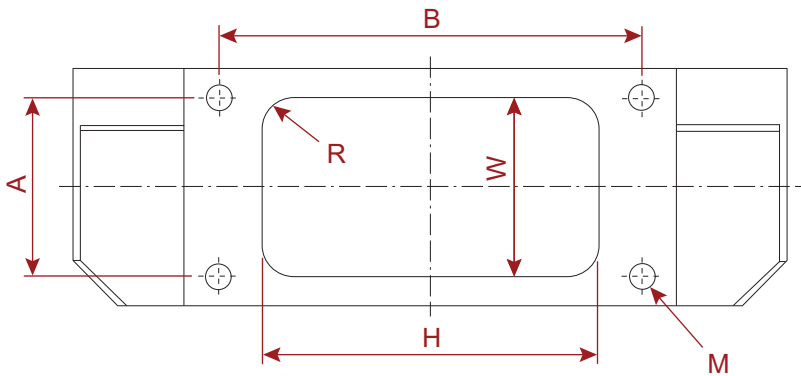


Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

5.9 Rectangular Inlet (option)



The mating adaptor and gaskets/seals should conform to country specific hygienic regulations such as 3A.
Fot sizes please see diagram and table below.



Dimension mm	Model		
	OS22, OS24, OS26	OS32, OS34, OS36	OS42, OS44, OS46
A	50	65	80
B	110	140	190
H	90	110	150
W	50	65	80
R	10	10	10
M	M8	M10	M12

5 Maintenance

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

5.10 Trouble shooting

Problem												Probable Causes	Solutions
No flow	Under capacity	Irregular discharge	Low discharge pressure	Pump will not prime	Prime lost after starting	Pump stalls when starting	Pump overheats	Motor overheats	Excessive power absorbed	Noise and vibration	Pump element wear		
✓				✓								Incorrect direction of rotation.	Reverse motor.
✓												Pump not primed.	Expel gas from suction line and pumping chamber and introduce fluid.
✓	✓	✓	✓	✓						✓		Insufficient NPSH available.	Increase suction line diameter. Increase suction head. Simplify suction line configuration and reduce length. Reduce pump speed.
	✓	✓	✓	✓						✓		Fluid vaporising in suction line.	Increase suction line diameter. Increase suction head. Simplify suction line configuration and reduce length. Reduce pump speed.
✓	✓	✓	✓	✓	✓	✓				✓		Air entering suction line. Strainer or filter blocked.	Remake pipework joints. Service fittings.
	✓			✓	✓	✓	✓	✓	✓	✓		Fluid viscosity above rated figure.	Increase fluid temperature. Decrease pump speed. Check seal face viscosity limitations.
✓	✓	✓										Fluid viscosity below rated figure.	Decrease fluid temperature. Increase pump speed.
						✓			✓	✓	✓	Fluid temp. above rated figure.	Reduce fluid temperature. Check seal face and elastomer temp. limitations.
					✓		✓	✓				Fluid temp. below rated figure.	Increase fluid temperature.
										✓	✓	Unexpected solids in fluid.	Clean the system. Fit strainer to suction line.
✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	Discharge pressure above rated figure	Check for obstructions i.e. closed valve. Service system and change to prevent problem recurring. Simplify discharge line to decrease pressure.
												✓ Seal flushing inadequate.	Increase flush flow rate. Check that flush fluid flows freely into seal area.
✓	✓							✓	✓	✓		Pump speed above rated figure.	Decrease pump speed.
✓	✓											Pump speed below rated figure.	Increase pump speed.
	✓						✓	✓	✓	✓	✓	Pump casing strained by pipework.	Check alignment of pipes. Fit flexible pipes or expansion fittings. Support pipework.
							✓		✓	✓	✓	Flexible coupling misaligned.	Check alignment and adjust mountings accordingly.
							✓	✓	✓	✓	✓	Insecure pump driver mountings.	Fit lock washers to slack fasteners and re-tighten.
							✓	✓	✓	✓	✓	Shaft bearing wear or failure.	Refer to pump maker for advice and replacement parts.
							✓	✓	✓	✓	✓	Insufficient gearcase lubrication.	Refer to pump maker's instructions.
✓	✓						✓	✓	✓	✓	✓	Metal to metal contact of pumping element.	Check rated and duty pressures. Refer to pump maker.
✓		✓		✓								Worn pumping element.	Fit new components.
✓				✓								Suction lift too high.	Lower pump or raise liquid level.
												✓ Fluid pumped not compatible with materials used.	Use optional materials.
											✓	No barrier in system to prevent flow passing.	Ensure discharge pipework higher than suction tank.
											✓	Pump allowed to run dry.	Ensure system operation prevents this. Fit single or double flushed mechanical seals.
								✓	✓			Faulty motor.	Check and replace motor bearings.
✓												Pumping element missing	Fit pumping element.

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

6.1 Technical data

6.1.1 Lubrication

Pump Model	Oil capacities litres (US Pints)
OS22	1.0 (2.11)
OS24	1.0 (2.11)
OS26	1.0 (2.11)
OS32	2.0 (4.22)
OS34	2.0 (4.22)
OS36	2.0 (4.22)
OS42	3.0 (6.34)
OS44	3.0 (6.34)
OS46	3.0 (6.34)

6.1.2 Weights

Pump Model	Bare Shaft Pump kg (lb)
OS22	55 (121)
OS24	55 (121)
OS26	55 (121)
OS32	105 (231)
OS34	105 (231)
OS36	105 (231)
OS42	215 (474)
OS44	215 (474)
OS46	215 (474)

6 Technical data

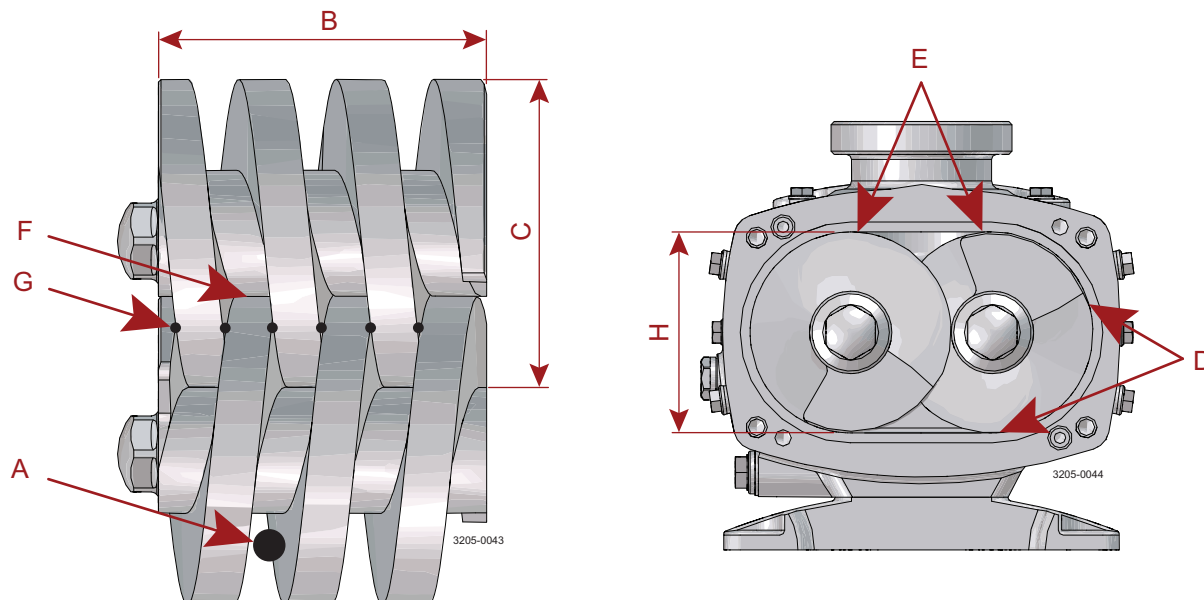
*Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)*

6.1.3 Tool requirements

Description	Tool required	Pump Model		
		22 / 24 / 26	32 / 33 / 36	42 / 44 / 46
Front cover, gearbox	Socket Size (mm)	17	19	24
	Torque (Nm)	36	63	143
	Torque (lbft)	26.5	46.5	105.5
Feed screw nut	Socket Size (mm)	24	30	36
	Torque (Nm)	60	120	160
	Torque (lbft)	44.3	88.5	118
Seal housing retention screw	Allan Key Size (mm)	5	6	8
	Torque (Nm)	7	18	36
	Torque (lbft)	5.2	13.3	26.6
Seal retention plug	Key Size (mm)	13	13	13
	Torque (Nm)	20	20	20
	Torque (lbft)	14.8	14.8	14.8
Gearbox end cover bolt	Socket Size (mm)	13	13	13
	Torque (Nm)	18	18	18
	Torque (lbft)	13.3	13.3	13.3
Gear sleeve bolts	Socket Size (mm)	8	10	13
	Torque (Nm)	7	11	26
	Torque (lbft)	5.2	8.1	19.2
Bearing retainer bolts	Socket Size (mm)	10	13	17
	Torque (Nm)	7	18	35
	Torque (lbft)	5.2	13.3	25.8
Gearbox foot screws	Allan Key Size (mm)	8	8	10
	Torque (Nm)	18	18	36
	Torque (lbft)	13.3	13.3	26.6
Gearbox drain plug	Key Size (mm)	19	19	19
	Torque (Nm)	15	15	15
	Torque (lbft)	11.1	11.1	11.1
Oil sight glass	Key Size (mm)	23	23	23
	Torque (Nm)	35	35	35
	Torque (lbft)	25.8	28.5	25.8

Take care not to damage shaft surfaces, in particular where bearings and lipseals will be located
Ensure all fastenings are tightened to the torque settings as shown in Technical Data (See chapter 6 Technical data)

6.2 Pumphead Clearance information



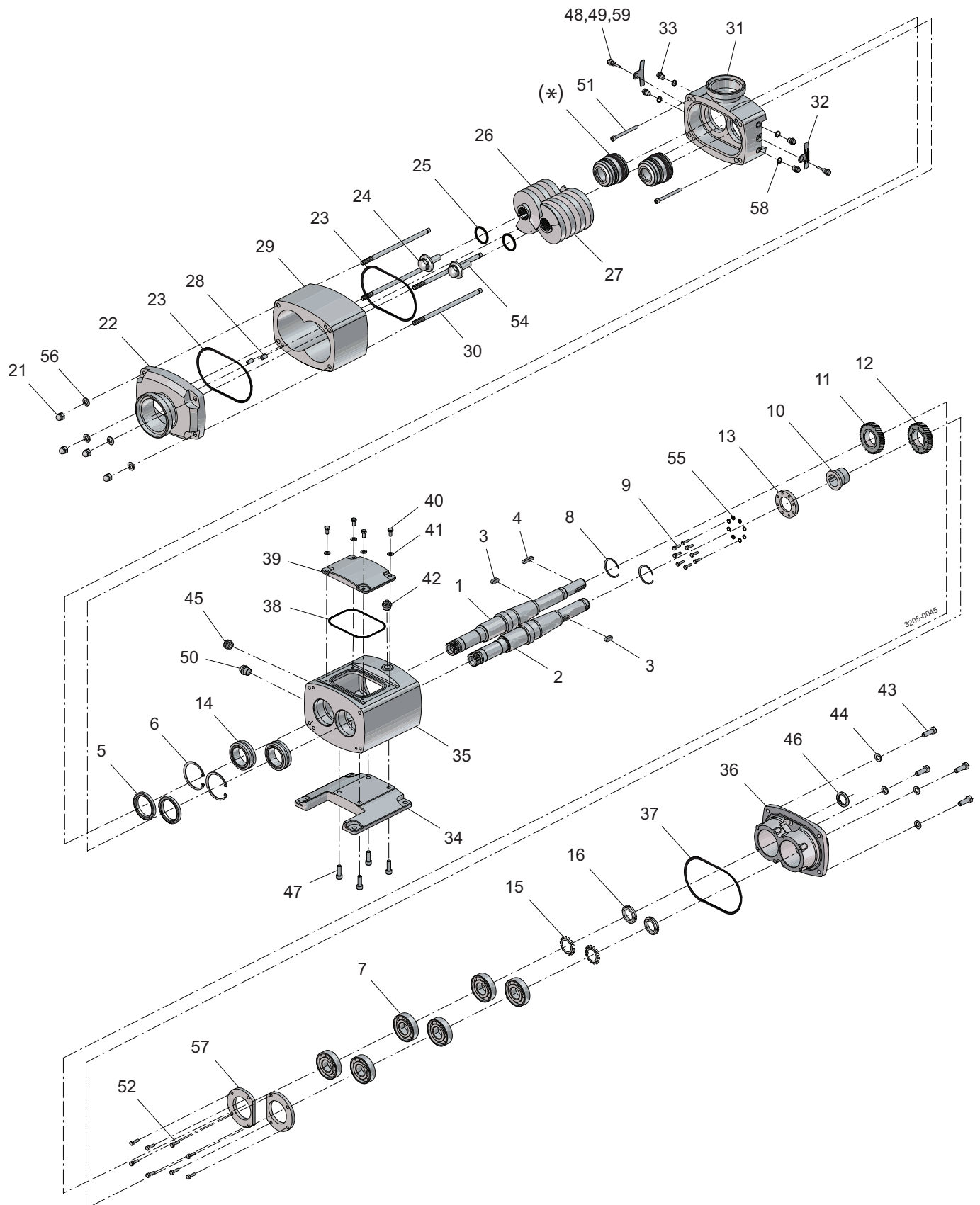
- A Solids handling max ball diameter
- B Screw Length
- C Screw Diameter
- D Radial
- E Radial Scollop Clearance
- F Root Clearance
- G Mesh Clearance
- H Screw Case Diameter

Minimum mesh clearance at any mesh position.
All dimensions in millimeters

	SOLIDS HANDLING MAX. DIAMETER	SCREW LENGTH	SCREW DIAMETER	RADIAL CLEARANCE	RADIAL SCOLLOP CLEARANCE	ROOT CLEARANCE	MINIMUM MESH
OS 20-22 16 BAR	13.0	100.0	min 93.690	min 0.173	min 0.293	min 0.187	0.085
OS 20-24 12 BAR	17.5	100.0	min 93.690	min 0.173	min 0.293	min 0.187	0.085
OS 20-26 8 BAR	26.0	100.0	min 93.690	min 0.173	min 0.293	min 0.187	0.100
OS 30-32 16 BAR	15.5	130.0	min 121.620	min 0.210	min 0.330	min 0.228	0.090
OS 30-34 12 BAR	23.0	130.0	min 121.620	min 0.210	min 0.330	min 0.228	0.090
OS 30-36 8 BAR	33.5	130.0	min 121.620	min 0.210	min 0.330	min 0.228	0.130
OS 40-42 16 BAR	22.5	175.0	min 162.530	min 0.255	min 0.375	min 0.273	0.105
OS 40-44 12 BAR	31.0	175.0	min 162.530	min 0.255	min 0.375	min 0.273	0.115
OS 40-46 8 BAR	45.5	175.0	min 162.530	min 0.255	min 0.375	min 0.273	0.190

7 Parts list

7.1 OS22, OS24, OS26, OS32, OS34, OS36, OS42, OS44, OS46 Twin Screw Pump Range



* Cartridge Seal

Parts list

Pos.	Qty	Denomination
1	1	Auxilliary Shaft
2	1	Drive Shaft
3	1	Gear Key
4	1	Drive Shaft Key
5 ●	2	Front Lip Seal
6	2	Circlip
7	6	Needle Bearing
8	2	Circlip
9	8	Gear Sleeve Bolts
10	1	Gear Sleeve
11	1	Timing Gear Drive Shaft
12	1	Timing Gear Auxilliary Shaft
13	1	Timing Gear Clamp Plate
14	2	Ball Bearing
15	2	Tab Washer
16	2	Bearing Nut
21	4	Front Cover Nut
22	1	Pump Cover
23 ▲	2	Pump Casing Elastomer
24	2	Feed Screw Nut
25 ▲	2	Feed Screw Elastomer
26	1	Feed Screw
27	1	Feed Screw
28	6	Pump Casing Dowels
29	1	Pump Casing Standard
30	4	Pump Casing Studs
31	1	Seal Housing
32	2	Gland Guard
33	4	Flush Plugs
34	1	Foot
35	1	Gearbox
36	1	Gearbox End Cover
37 ●	1	Gearbox End Cover O-Ring
38 ●	1	Gearbox Top Cover O-Ring
39	1	Gearbox Top Cover
40	4	Gearbox Top Cover Bolts
41	4	Gearbox Top Cover Washers
42	1	Filler Plug
43	4	Gearbox End Cover Bolts
44	4	Gearbox End Cover Washers
45	1	Sight Glass
46	1	Rear Lip Seal
47	4	Gearbox Foot Screw
48	2	Gland Guard Plug
49 ●	2	Seal Pin
50	1	Washer Gearbox Plug
51	2	Cap Screw
52	8	Hex Bolt
54	2	Stud bolt
55	1	Washer
56	4	Washer
57	2	Bearing Retainer
58	4	Washer Seal Ring
59 ●	2	Gland Guard Screw O Ring

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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