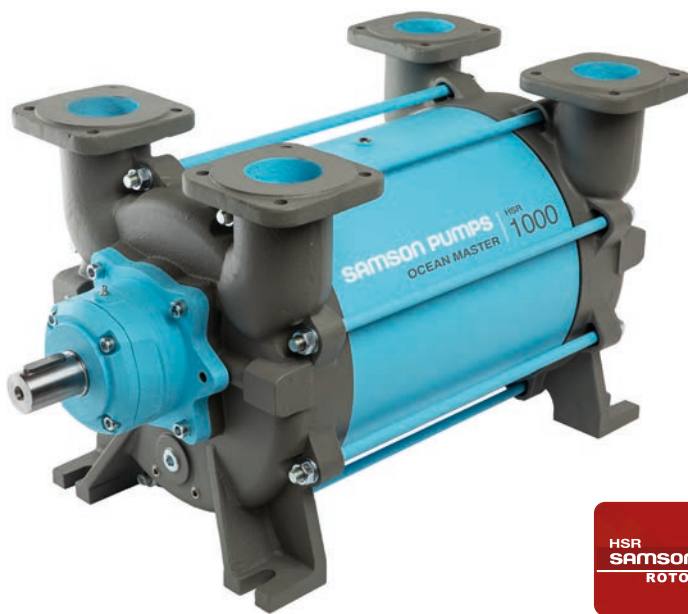


## ASSEMBLY INSTRUCTIONS

### LIQUID RING PUMP



ASSEMBLY INSTRUCTIONS FOR  
SAMSON LIQUID RING PUMPS, TYPES:

OCEAN MASTER<sup>®</sup> 500, 700, 1000, SVF27 & TRUCK MASTER<sup>®</sup> 1600

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OCEAN MASTER 500, 700, 1000, SVF27 & TRUCK MASTER 1600		Liquid ring pump	

Date:	Revision:	Text:
13/05-15	A	Seal for ATEX pumps added.
24/06-15	B	Torque requirements modified on page 5.
01/04-16	C	Various corrections, incl. volume of grease in bearings.
07/06-16	D	Various ATEX corrections.
01/09-17	E	Layout modified.
31/10-17	F	Implementation of assembly tools.
13/11-17	G	BOM updated.
13/03-18	H	Logo updated.
04/07-19	I	Layout updated.
20/08-20	J	Various ATEX corrections.



- Bolt, radial shaft seal and O-rings lubricated with a thin layer of grease prior to assembly, unless indicated otherwise.
- Document Test Report RE8.6-02-01 to be completed.
- For service see chapter 13.



- This symbol indicates that the step in question must be performed for ATEX pumps!
- Document RE8.6-02-03\_ATEX Zone 0-1\_Check sheet to be completed.

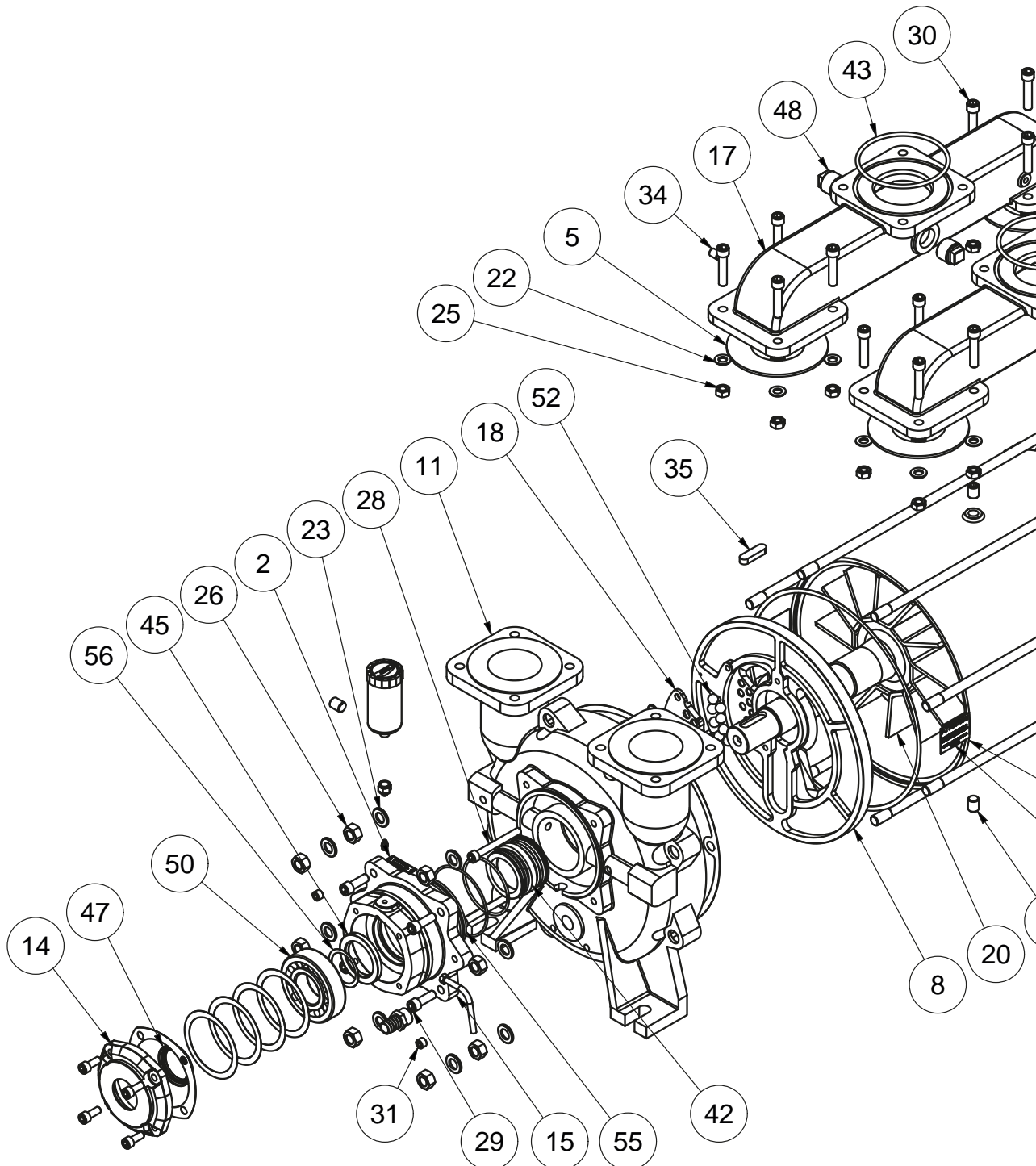
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## 1 Component overview

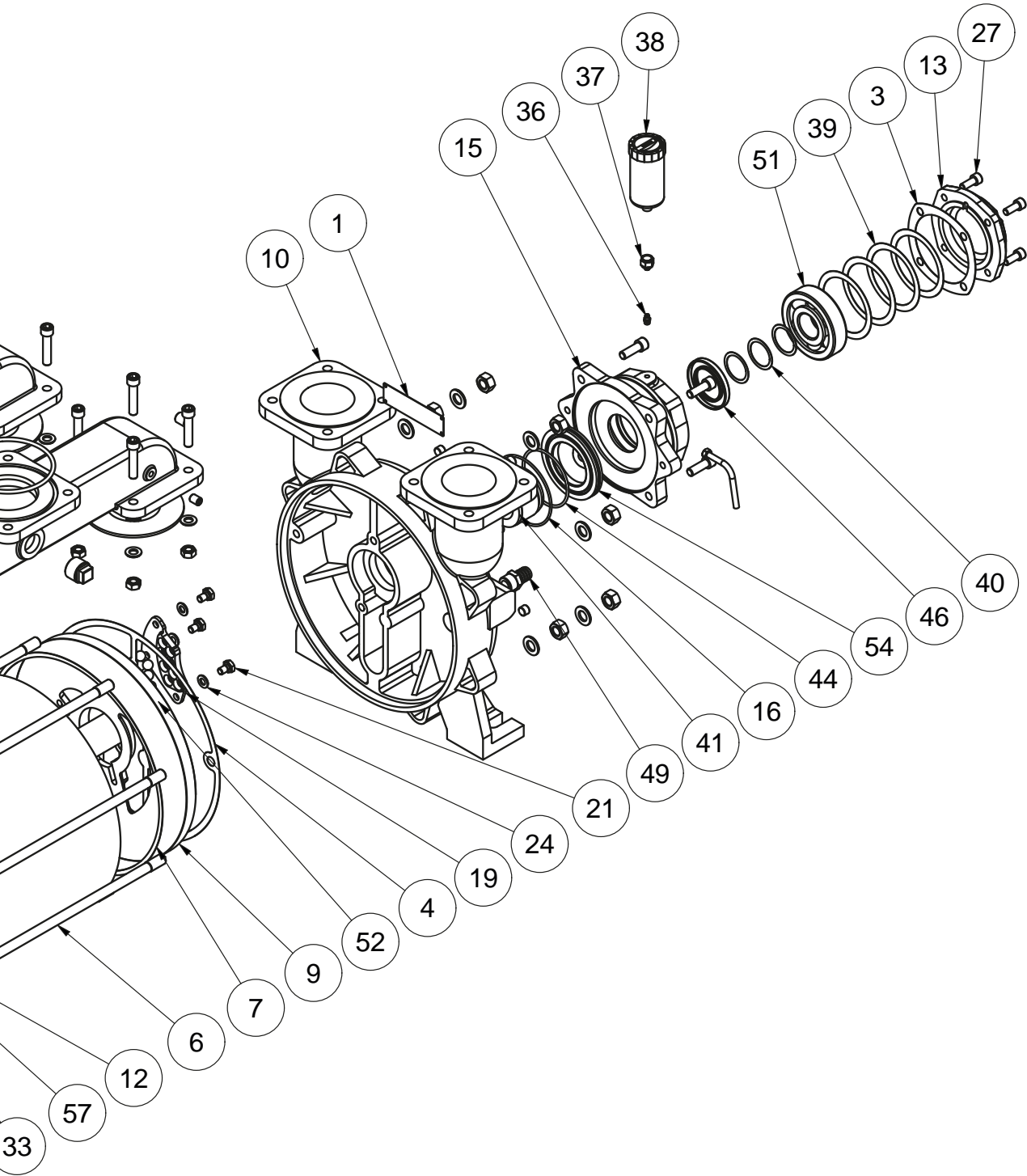


Product no.

OCEAN MASTER 500, 700, 1000, SVF27 & TRUCK MASTER 1600

Product name:

Liquid ring pump



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Pos.	Part number	Description	Qty.	Material
1	-	Identification plate	1	Stainless steel
2	-	Direction arrow	1	Aluminum
3	15054-P	Gasket set	1	-
4	15054-P	Gasket set	1	-
5	151.418	Gasket branch pipes	4	Rubber
6	1619058	Stay bolt	8	Steel
7	15054-P	Gasket set	1	-
8*	157.320	Flow plate	1	Cast iron
	157.337	Flow plate	1	Bronze
9*	157.319	Flow plate	1	Cast iron
	157.338	Flow plate	1	Bronze
10	1619037	Pump housing NDE	1	Cast iron
11	1619038	Pump housing DE	1	Cast iron
12*	1619040	Shell	1	Cast iron
	1618076	Shell	1	Stainless steel
13	1619046	Bearing cover NDE	1	Cast iron
14	1619048	Bearing cover DE	1	Cast iron
15	1619199	Bearing housing	2	Cast iron
16	15054-P	Gasket set	1	-
17	1619076	Branch pipe	2	Cast iron
18	1619150	Ball guide DE	1	Plastic
19	1619151	Ball guide NDE	1	Plastic
20*	152.336	Rotor R	1	Stainless steel
	152.354	Rotor L	1	Stainless steel
21	910000145	Screw	6	Stainless steel
22	910100016	Washer	16	Steel
23	910100022	Washer	16	Steel
24	910100135	Washer	6	Stainless steel
25	910200014	Nut	16	Steel
26	910200021	Nut	16	Steel
27	910300053	Allen screw	8	Steel
28	910300067	Allen screw	4	Steel
29	910300075	Allen screw	8	Steel
30	910300080	Allen screw	16	Steel

- \* - Type depends on configuration of pump.  
\*\* - Optional. Not equipped as standard.  
\*\*\* - Only available on KS510, KS625 and KS910.

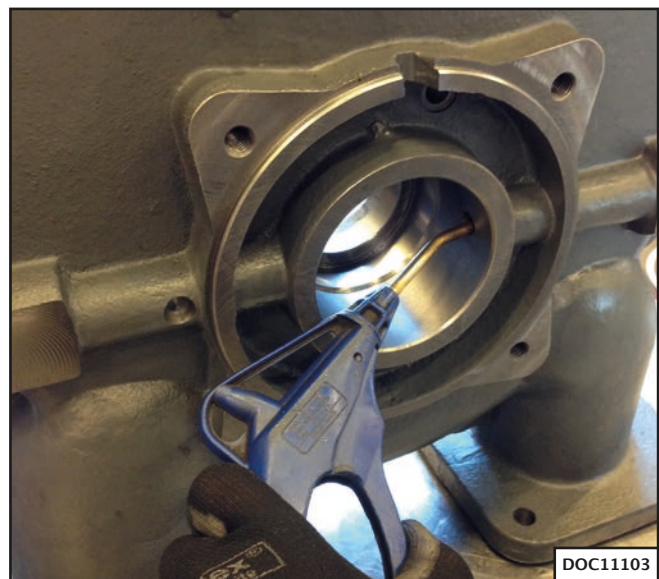
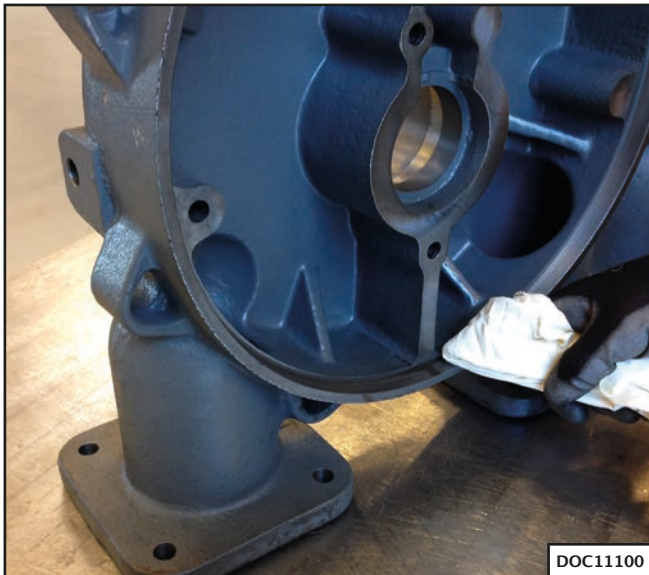
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Pos.	Part number	Description	Qty.	Material
31	910300185	Plug	6	Steel
33	910300188	Plug	4	Steel
34	910300470	Plug	2	Stainless steel
35	915000021	Parallel key	1	Steel
36	915000050	Grease nipple	2	Steel
37**	1634773	Nipple	2	Brass
38**	915000225	Automatic lubricator LAGD 125/WA2	2	Plastic / grease
39	15054-P	Gasket set	1	-
40	15054-P	Gasket set	1	-
41	922000039	Mechanical shaft seal	1	Steel
42	922000043	Mechanical shaft seal	1	Steel
43	922100085	O-ring Ø134,30x5,70	2	Rubber
44	15054-P	Gasket set	1	-
45	15054-P	Gasket set	1	-
46	15054-P	Gasket set	1	-
47	15054-P	Gasket set	1	-
48	925000136	Plug	4	Steel
49	925000240	Hose nipple	2	Brass
50	930000002	Roler bearing spherical	1	Steel
51	930000087	Ball bearing	1	Steel
52	962000046	Valve ball	16	Plastic
54	1619168	Insert for bearing housing	1	Stainless steel
55	1619169	Insert for bearing housing	1	Stainless steel
56	15054-P	Gasket set	1	-
57	1624020	Sticker Warning!	2	Plastic foil

- \* - Type depends on configuration of pump.  
\*\* - Optional. Not equipped as standard.  
\*\*\* -Only available on KS510, KS625 and KS910.

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## 2 Pump housing and flow plate

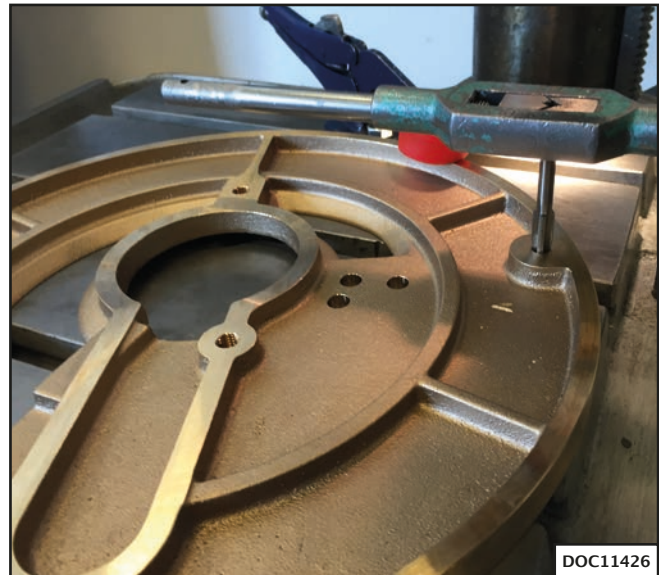
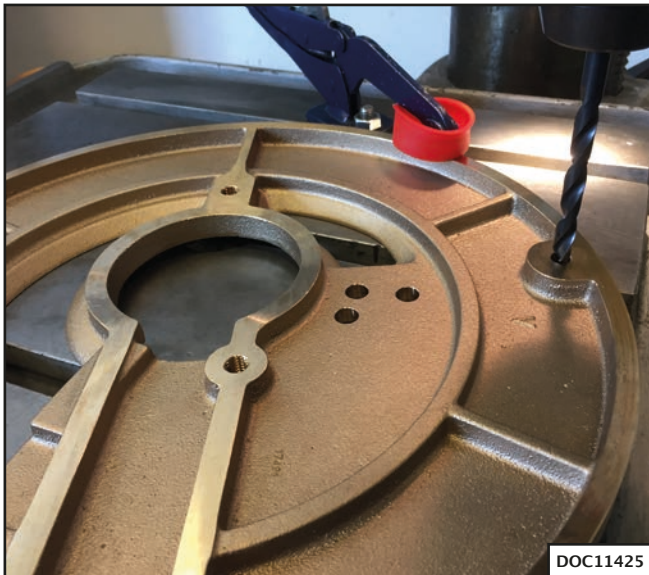


- Clean the pump housing on the machined surfaces and blow the water channels with compressed air.
- Clean the flow plates, especially on the sealing surfaces.



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The procedure below applies to Zone 0 pumps only

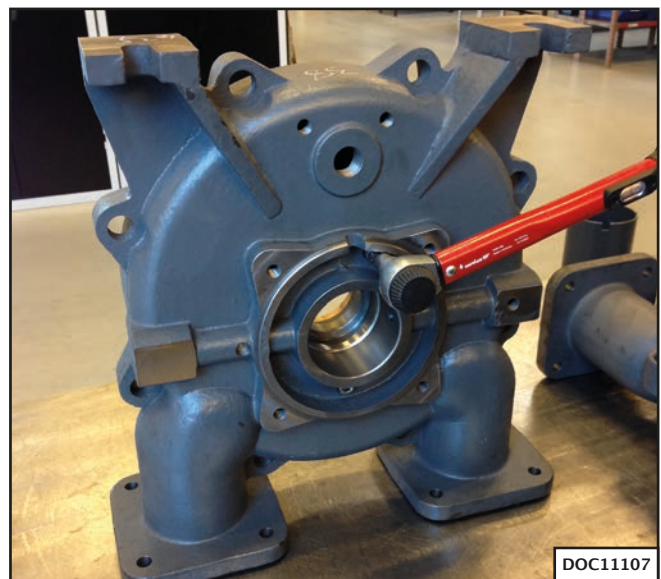
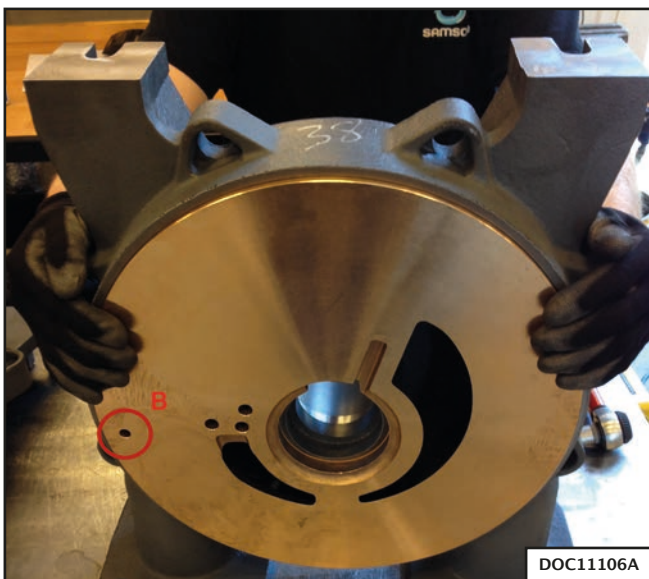
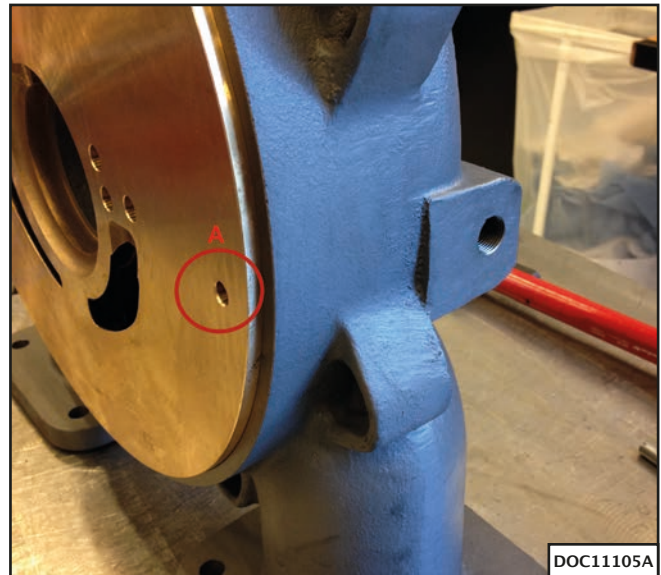
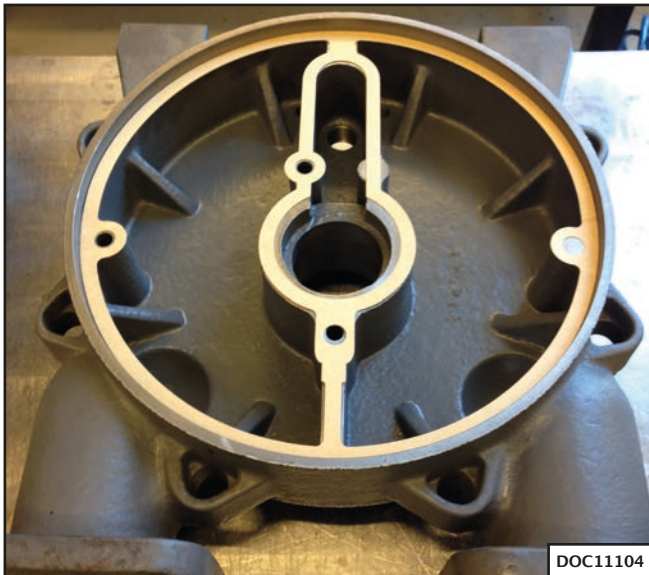


- A hole is drilled into the flow plate with Ø8.6 mm drill bit.
- Cut a 1/8" thread.
- Apply a drop of thread sealant to the stainless steel cap and mount.
- Complete this step on both flow plates.



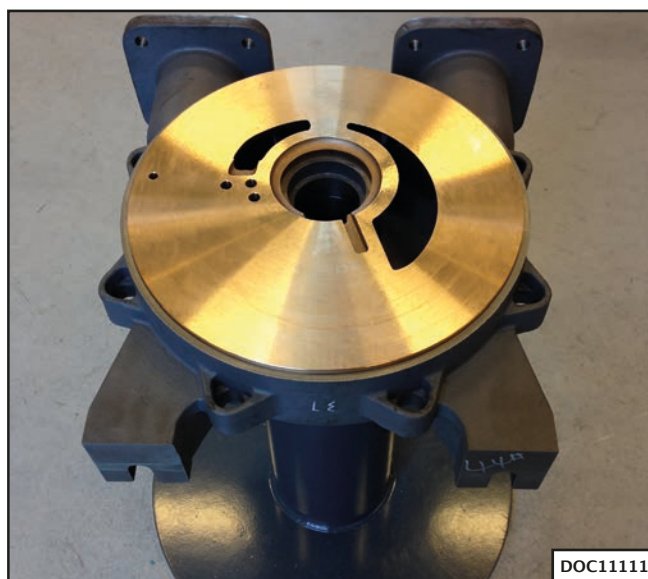
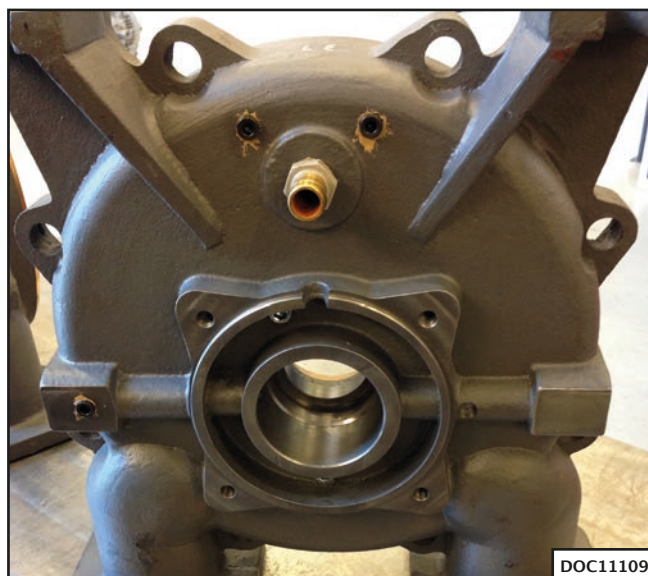
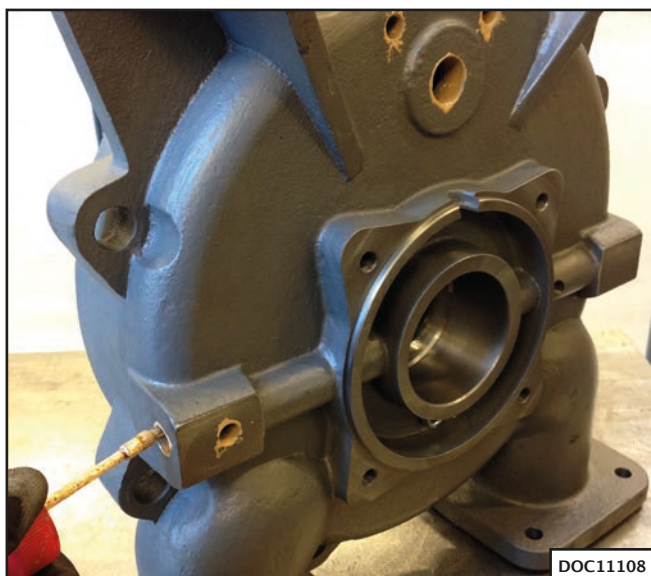
1 Close flush channel in flow plates. Zone 0

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- Mount paper gasket correctly in both pump housings. Note the holes in the paper gasket.
- On KS510, KS625 and KS910, ball guides and valve balls are mounted on both flow plates.
- Mount the flow plates in the pump housing and tighten the bolts to 25 Nm.
- The hole in the flow plate and the hole in the pump housing must be on the same side.
- Apply screw locking to the bolts in the ball guide and tighten to 12 Nm.
- For ATEX Zone 0 pumps, the flush channel must be closed. (A+B)

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- Grease various filler plugs with thread sealant and mount in the thread holes.
- Mount a hose nipple on the rear pump housing. A right pump is shown in these instructions. (Clockwise rotation - CW).
- The rear pump housing is lifted onto an assembly stand with the flow plate facing up.

In this example it is a **right pump**, so the vacuum cylinder (the large one) will become gradually larger when the rotor turns in a **clockwise direction**.



2 Hose nipples are mounted on both pump housings. Zone 0

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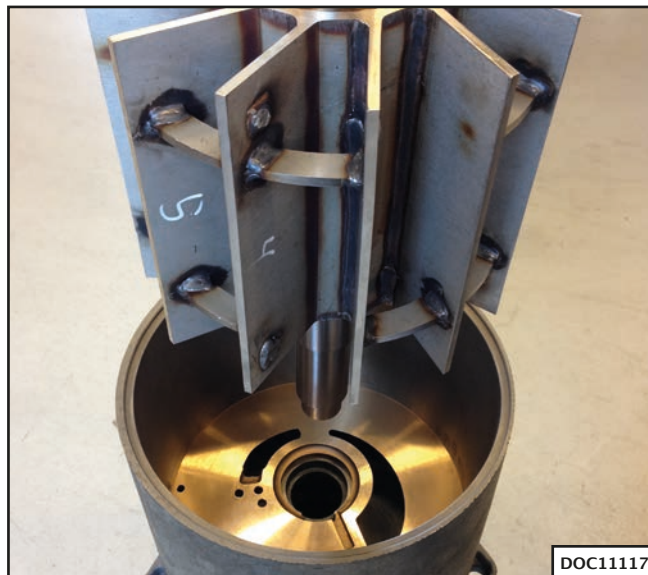
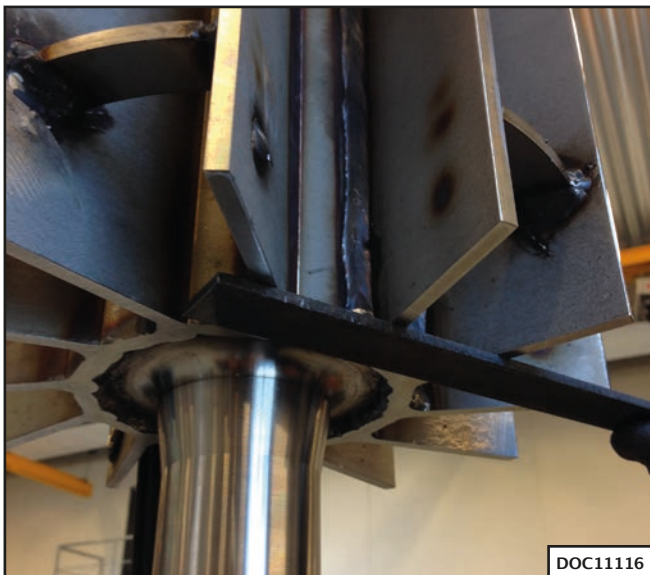
### 3 Shell and base gasket



- Clean shell, especially on the sealing surfaces.
- Using a crane, lift the shell into the thread holes and mount on top of the flow plate in the stand. The shell's thread holes must be in between the feet on the pump. (Top/bottom of the pump).
- By hand, carefully lift alternately at 3 points and place a facet washer in between them in order to raise the shell a couple of millimetres from the pump housing.
- Mount a paper gasket (1 mm) from the inside of the shell between the flow plate and shell.
- After correct mounting of the paper gasket and with the drain hole centred between the feet of the pump, remove the 3 facet washers and the shell will now be resting on the flow plate with the paper gasket between them.

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#### 4 Rotor, preparing and dimensioning

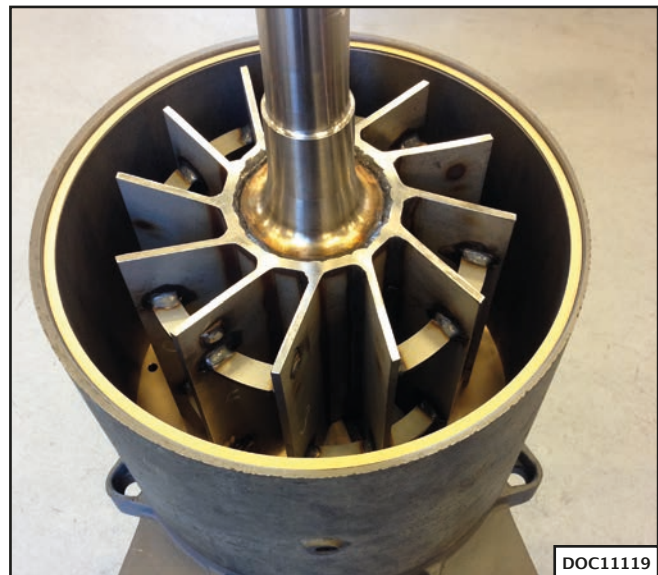


- Clean the rotor at the blade ends and scrape any loose welding slag etc. from the blades.
- Mount the rotor inside the shell using a lifting eye.
- Lift the rotor at the front end and lower it into the shell, back end first.
- Carefully lower the rotor until it is resting on the flow plate.



3 Perform a visual inspection of the welds on the rotor. Zone 0

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- Measure the distance between the gasket surface on the shell and the top of the rotor blades at the front end of the pump.

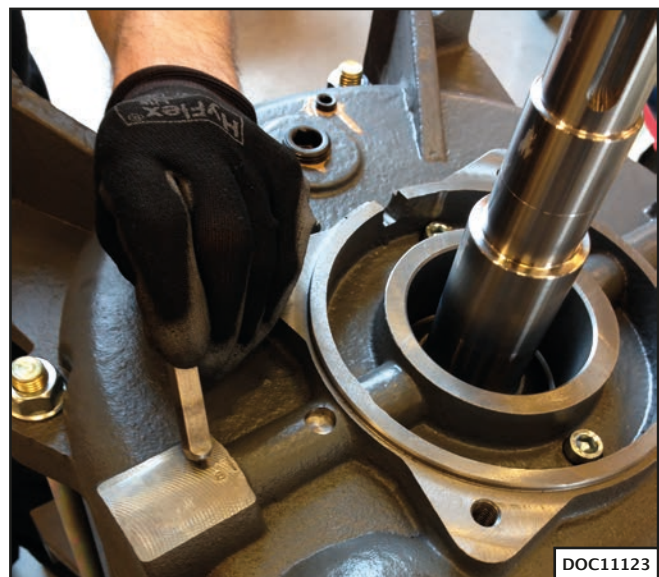
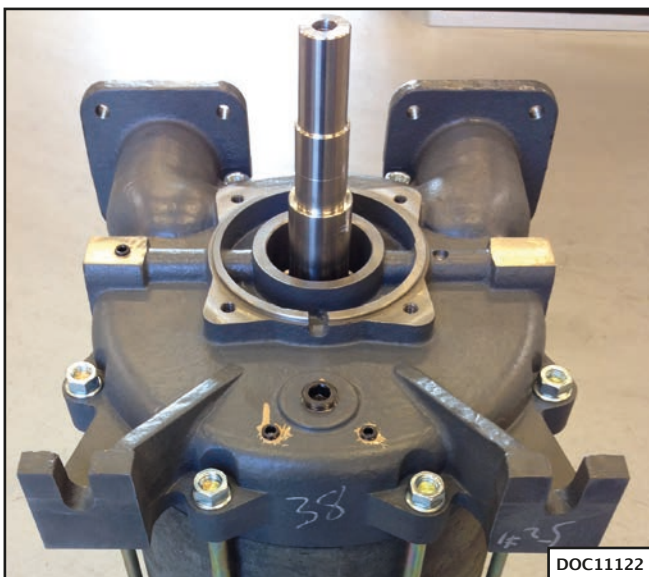
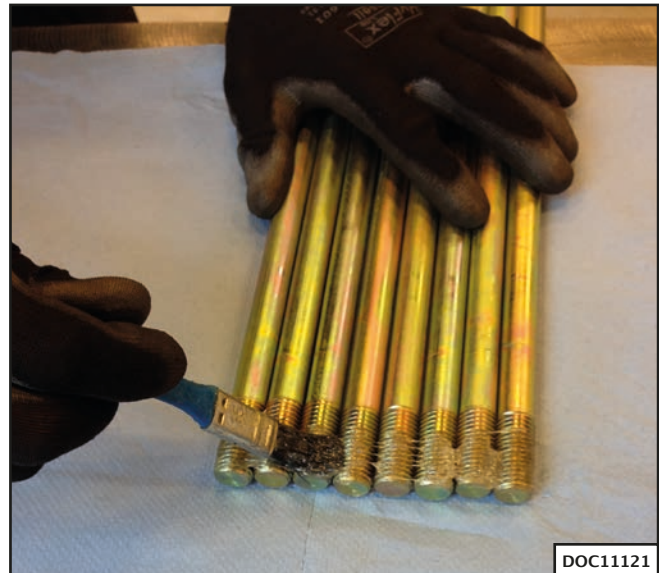
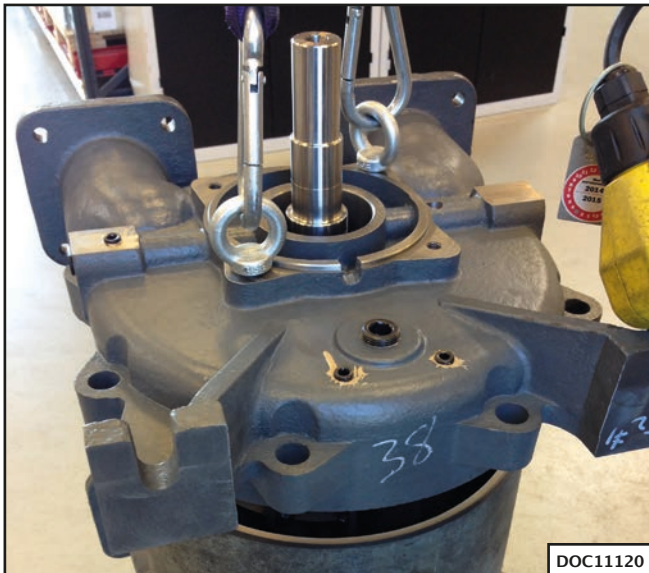
In the table\* below, you can see which gasket must be mounted in relation to the measured distance:

Measured value	Gasket
0.8 > 1.0	0.5
0.6 > 0.8	0.8
0.4 > 0.6	1.0

\* The values in the table are intended as guidelines and deviations may occur.

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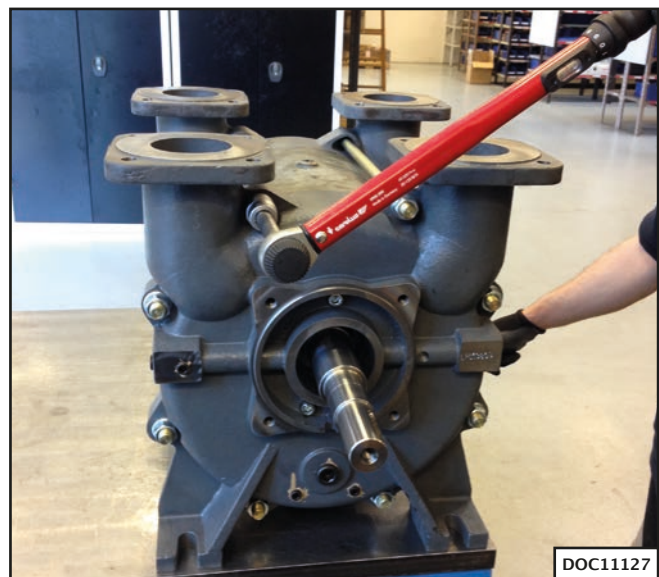
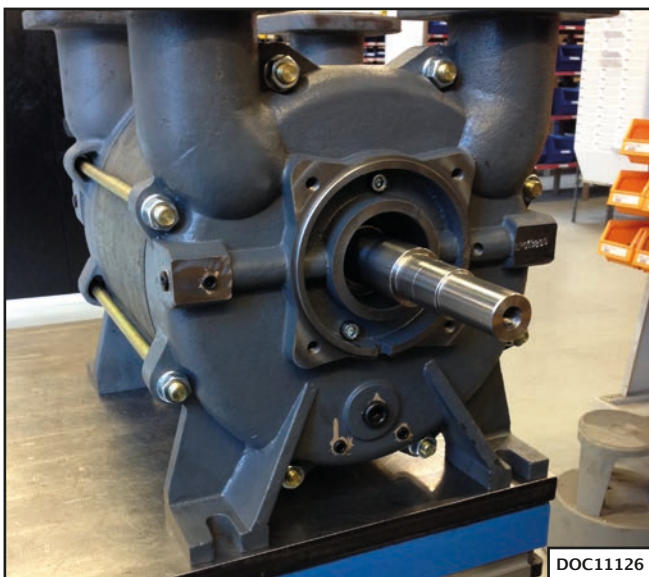
## 5 Assembling pump with rod bolts



- The front pump housing is lifted with a crane and lowered carefully down over the paper gasket in the shell.
- Grease the rod bolts at both ends and mount a washer and nut in one end. Tighten the nut approx. 5 mm in over the thread.
- Mount all the rod bolts and tighten the 4 rod bolts with a wrench. The rest can be tightened loosely by hand, and must not squeeze the pump housing.
- The OP/LP number is hammered into the front pump housing.
- Apply thread sealant onto 3/8" filler plugs and mount in both thread holes in the shell.

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## 6 Alignment of pump feet

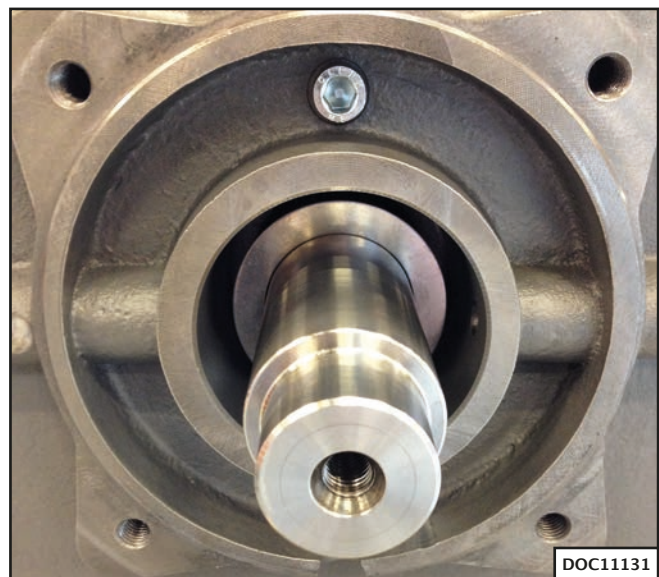
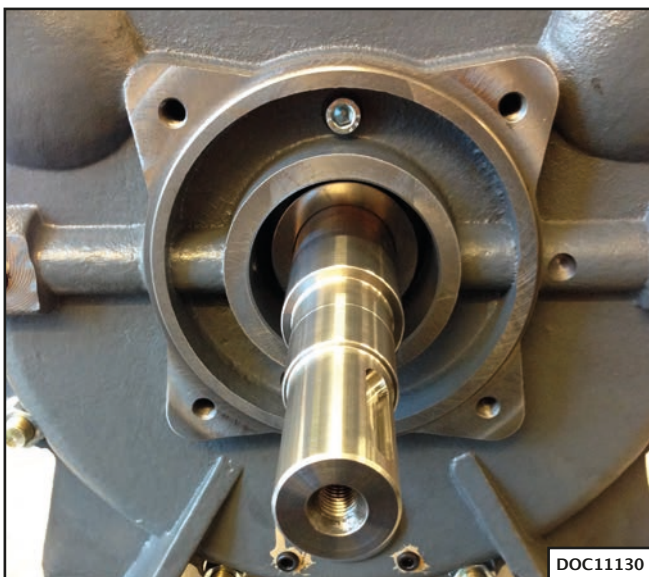


- Lift the pump up off the stand using the lifting strap and lower it carefully down onto the table.
- Loosen the 4 bolts that have been tightened with a wrench and the pump feet will now align themselves in line with the tabletop. If necessary, use a plastic hammer to tap the top of the pump housing.
- All rod bolts must now be tightened to 110 Nm.



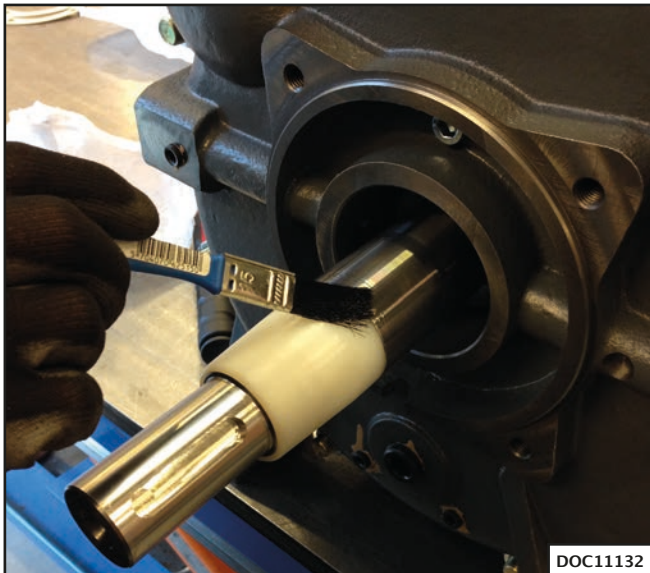
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## 7 Shaft seals and bearing housings

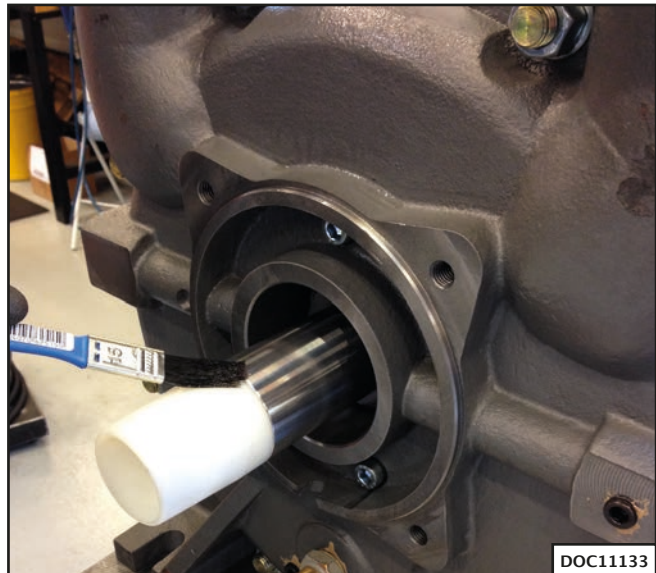


- Unpack the shaft seals from the boxes.
- Mount 1 support washer (comes with each shaft seal) at either end of the rotor. (Front and rear)
- Check the sealant surface on the shaft seal for impurities/defects.
- If necessary, clean the sealant surface.

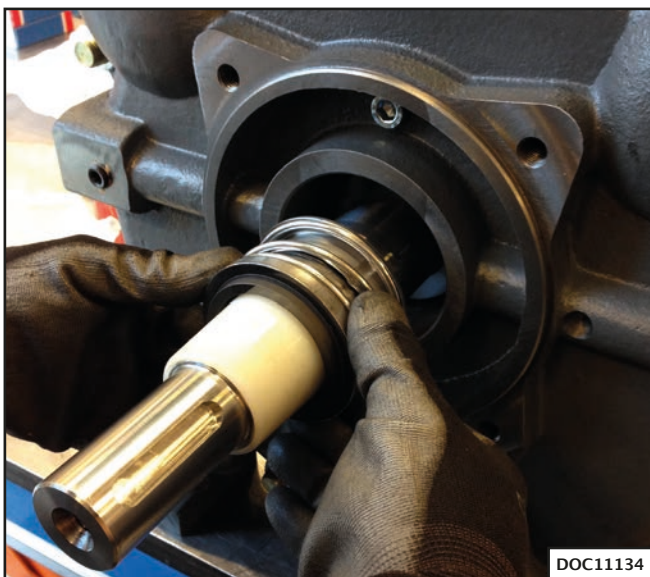
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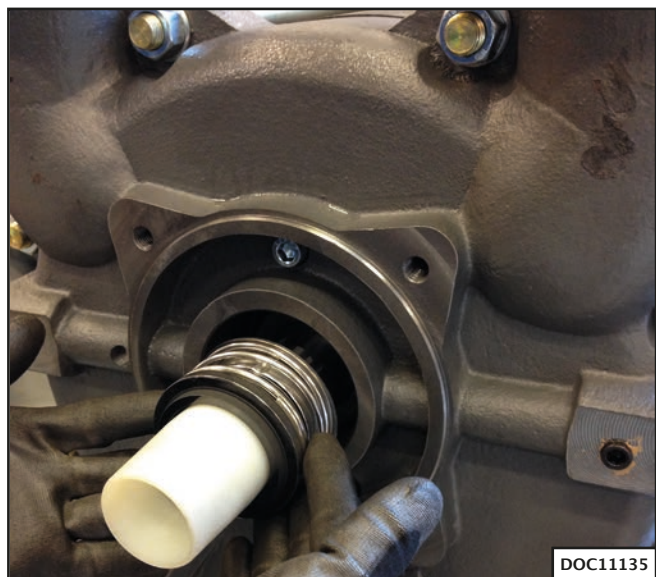
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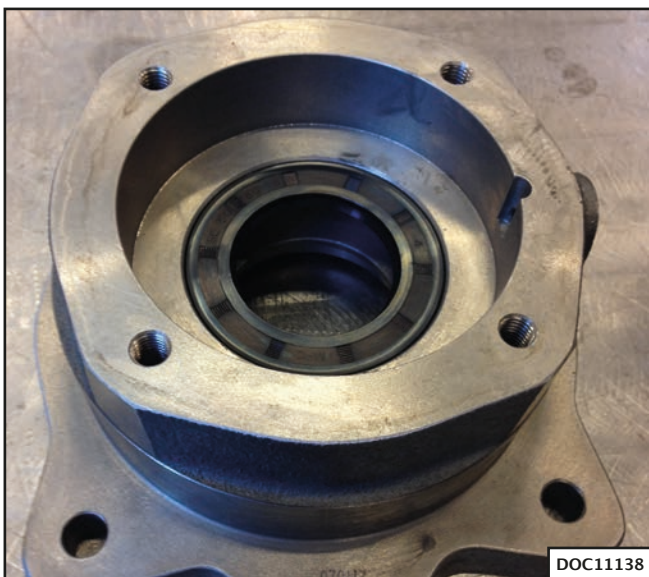
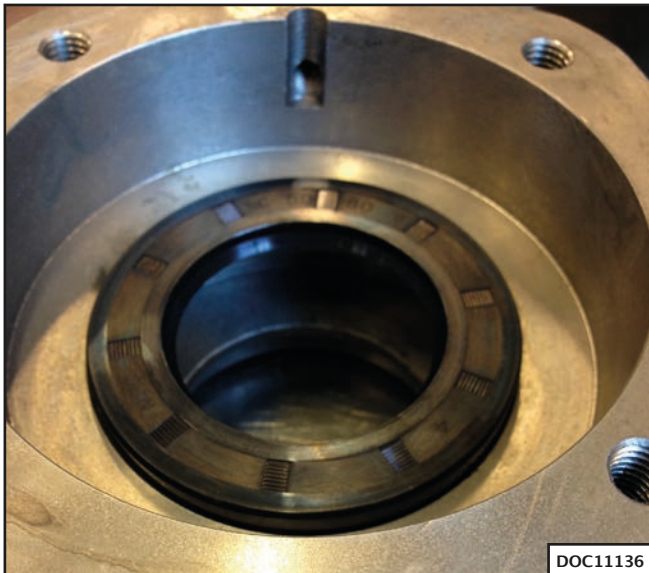
DOC11134



DOC11135

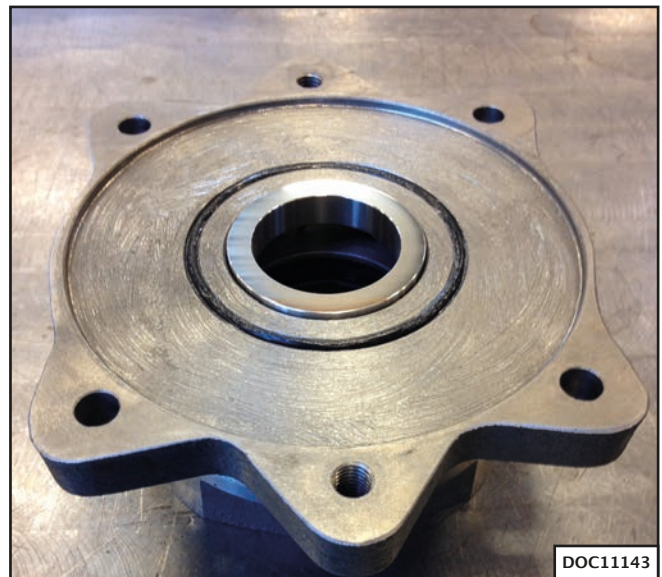
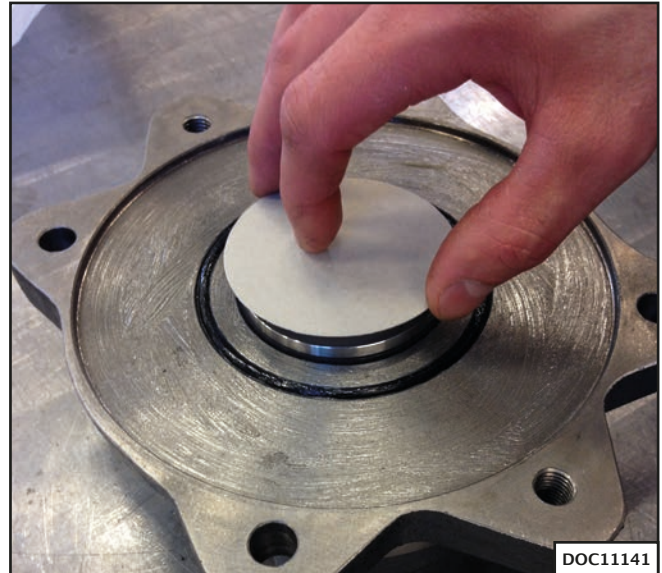
- Mount mounting bushings at either end of the rotor.
- Grease the mounting bushings with White Oil.
- Grease the rubber on the inside of the shaft seals.
- Mount the shaft seals onto the rotor shaft with the sealant surface facing outwards. It may be necessary to use a screwdriver to push the shaft seal rings all the way to the bottom until resistance is felt from the support washer.
- The sealant surfaces on the shaft seals must be completely clean after mounting.

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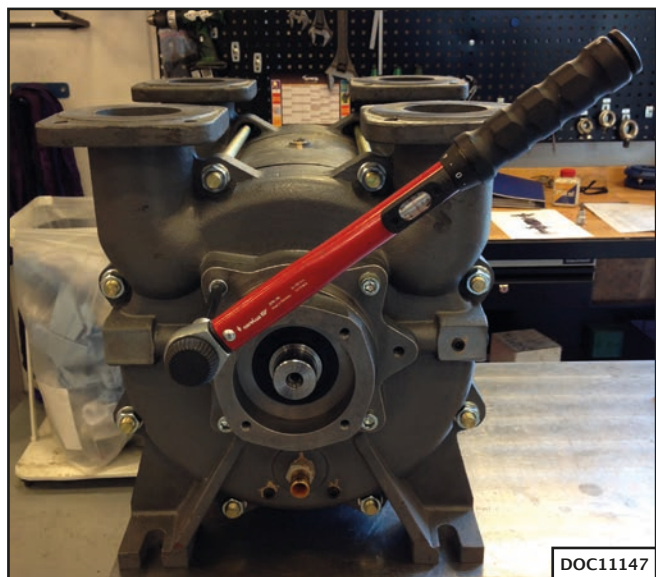
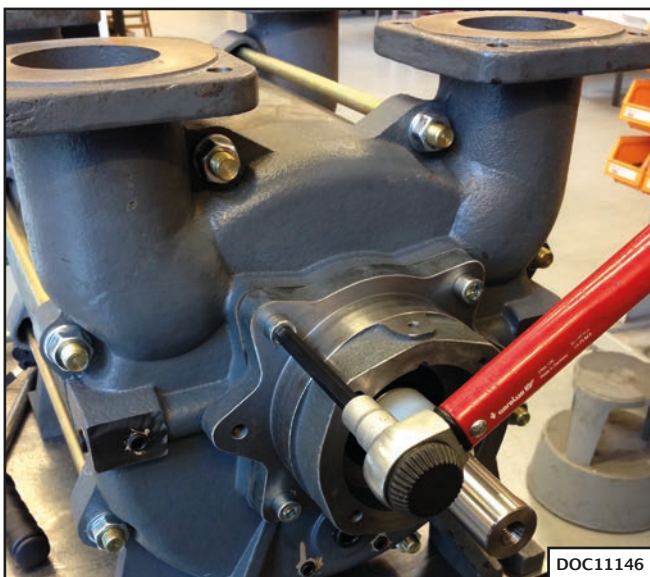
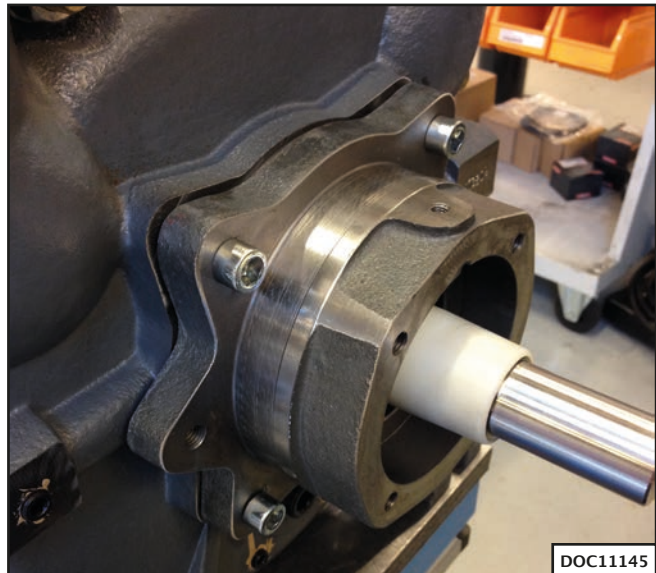
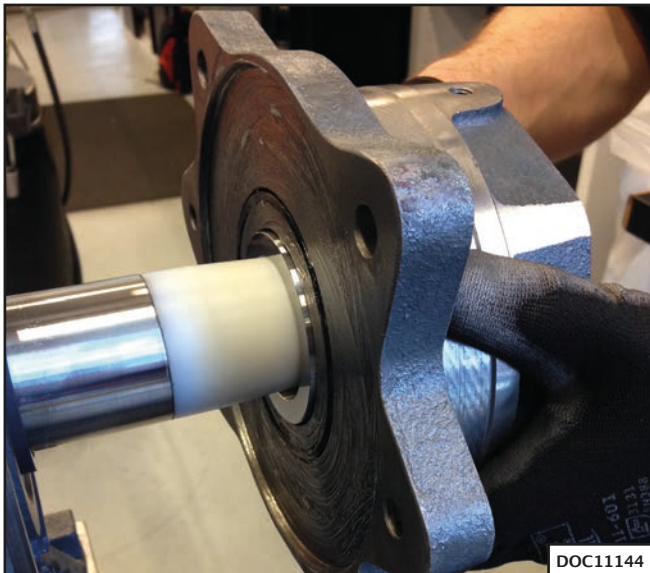
- Clean the bearing housing on the machined surfaces. Blow air through the thread hole to the grease nipple with an air gun.
- Mount the radial shaft seal correctly in the bearing housing and grease the sealing lips (can be hammered or pushed in).
- Grease the inside of the bearing housing, including the slot where the O-ring will sit.
- Grease the bearing housing where the sealing ring will be mounted.
- Mount the O-ring in the slot and lubricate with grease.

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- Mount the shaft sealing ring carefully down into the bearing housing, with the finely polished surface facing upwards.
- Then check that the finely polished surface is free of impurities/scratches, and clean if necessary.

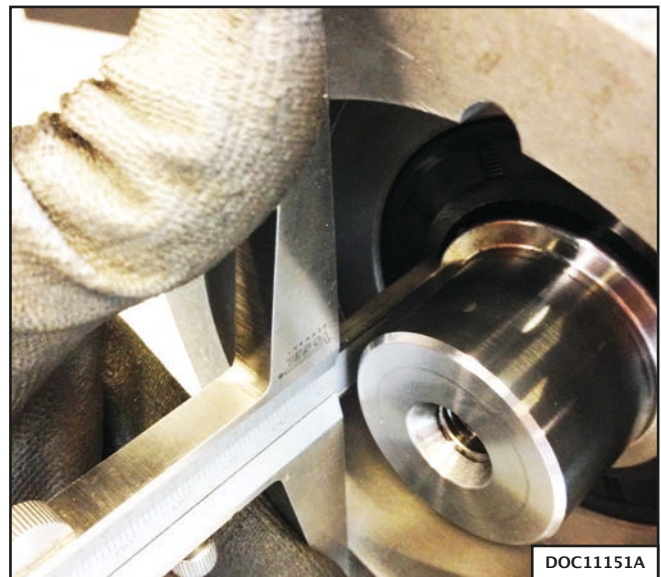
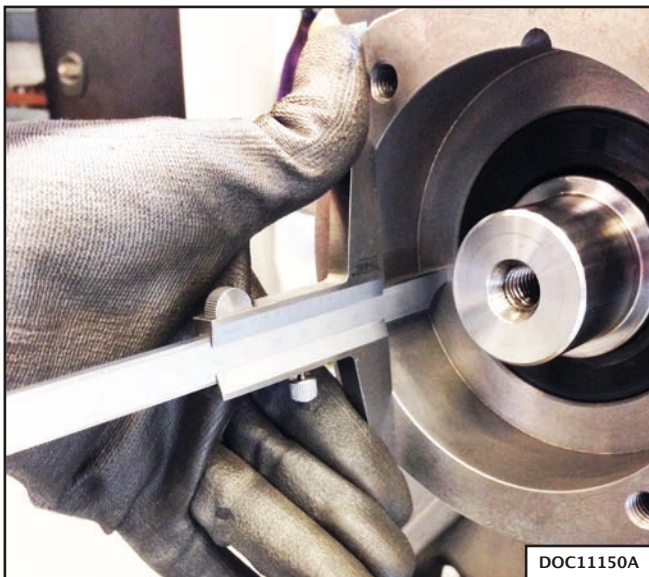
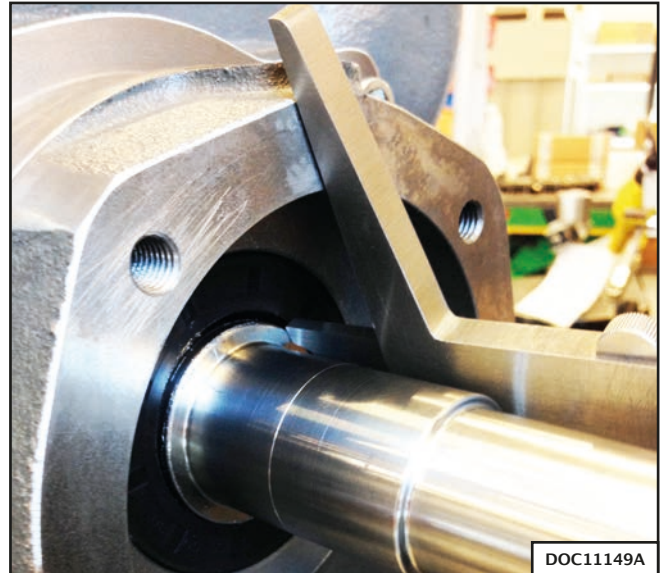
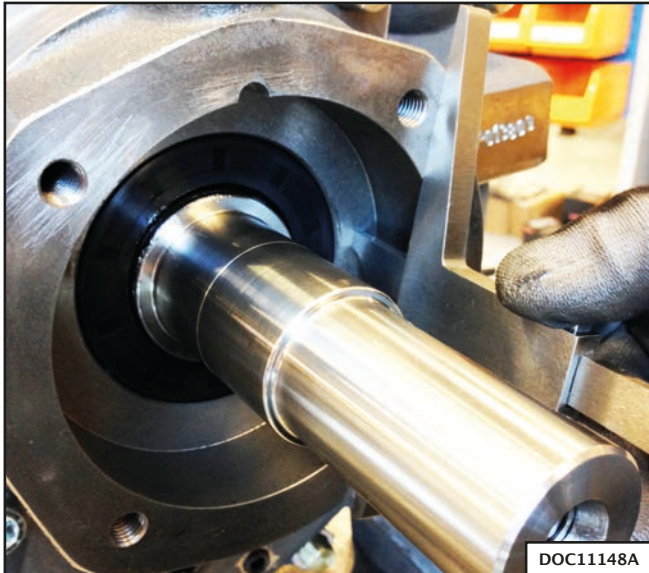
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- Carefully mount the front and rear bearing housings onto the pump housing.
- The hole for the grease nipple must face upwards.
- Tighten the 4 bolts to 75 Nm.

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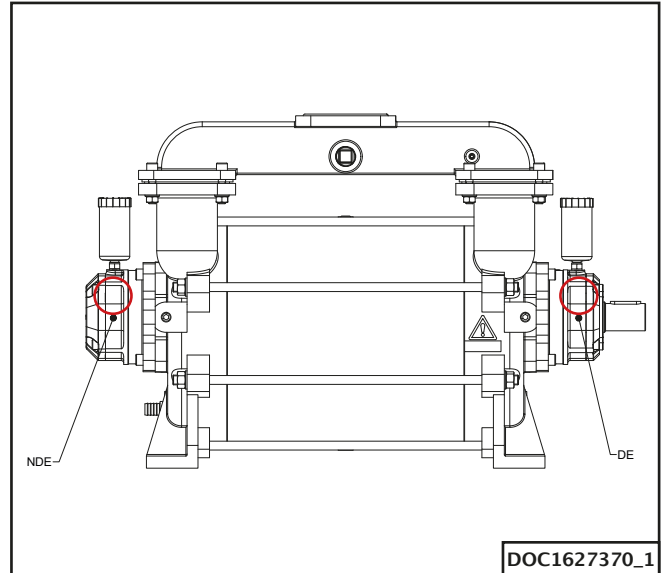
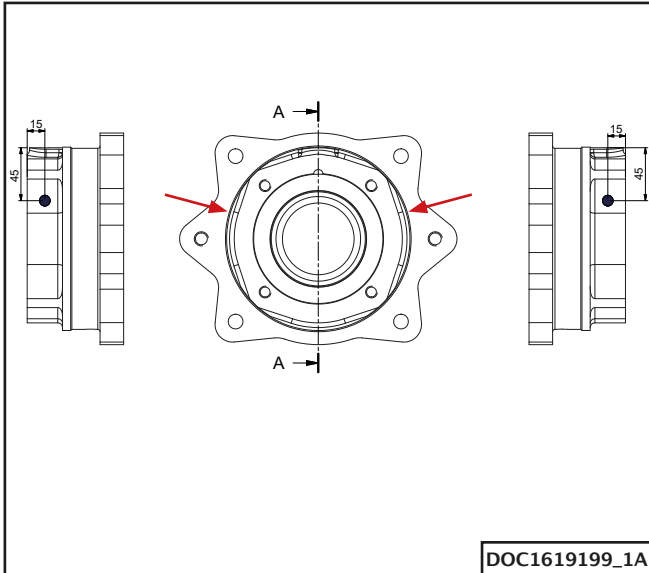
## 8 Shims behind bearing and mounting of bearings



- With a depth gauge, measure the distance between the outer edge of the bearing housing and the base of the bearing fit.
- Push the rotor in towards the pump.
- With a depth gauge, measure the distance between the outer edge of the bearing housing and the surface of the rotor shaft.
- There should be a 1 mm difference. If the difference is less than 1 mm, adjust the distance using the shims on the rotor shaft (behind the bearing).
- Do this at both ends of the pump.

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## Procedure below only applies to Zone 0 pumps

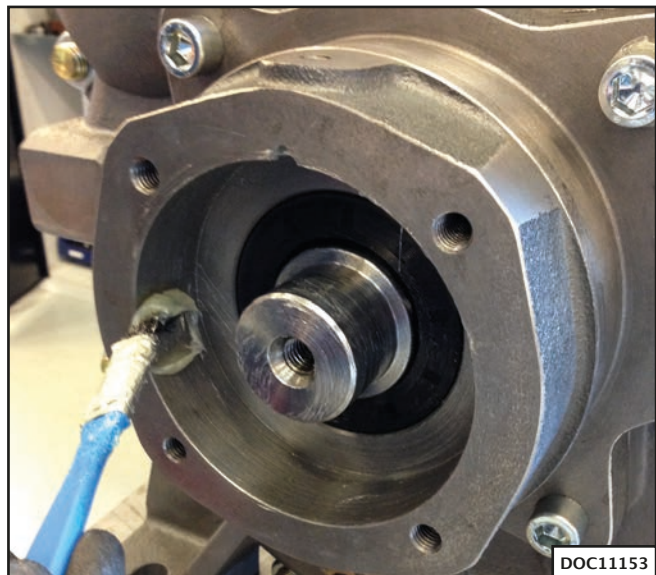
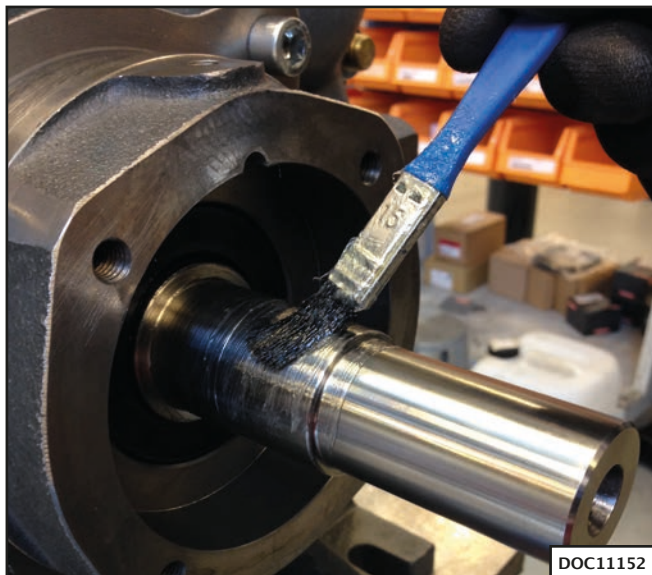


### 4 M10x1 threaded hole to be drilled in both bearing housings. Zone 0

- Drill a  $\varnothing 9$  mm hole in bearing housing 15 mm from edge, 45 mm downwards and a depth of 15 mm. See illustration.
- As it says in DOC1619199\_1A, to be drilled 2 pcs. holes in front bearing housing and 2 pcs. holes in back bearing housing. These holes are used to mount a temperature sensor.
- Cut M10x1 thread in the drilled holes.

**NOTE.-** Be careful of the hole depth and avoid steel shavings inside pump!

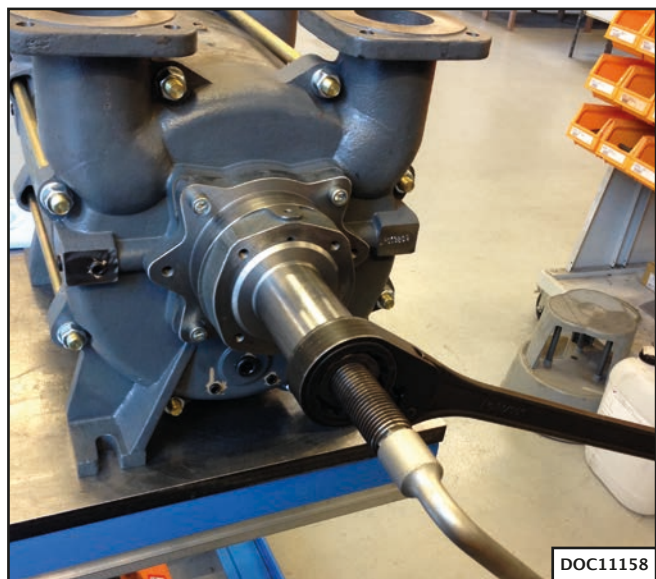
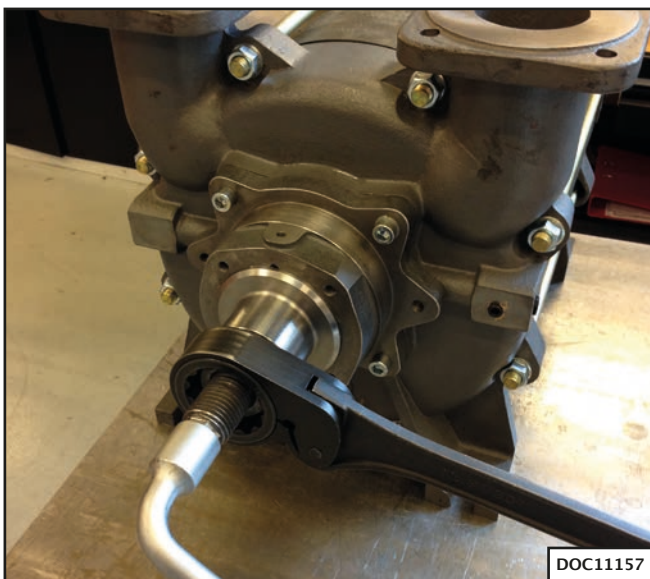
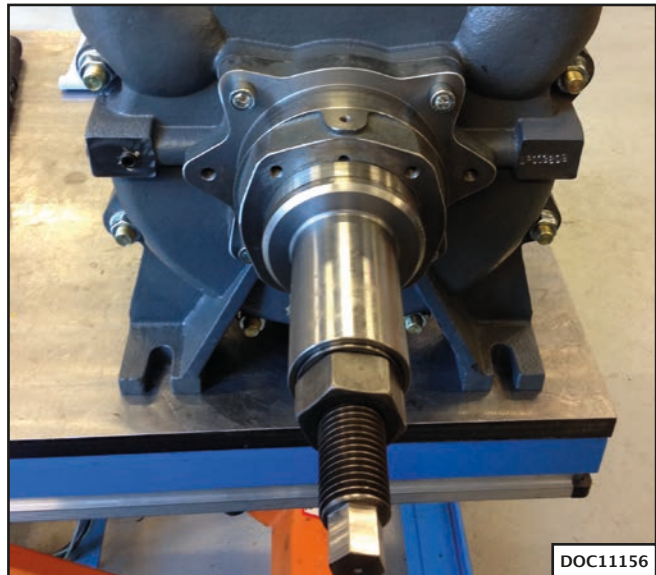
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- Grease the bearing thread surfaces on the rotor shaft at front and back.
- Grease the bearing housings.
- Grease the back of the bearings. (Side without writing)



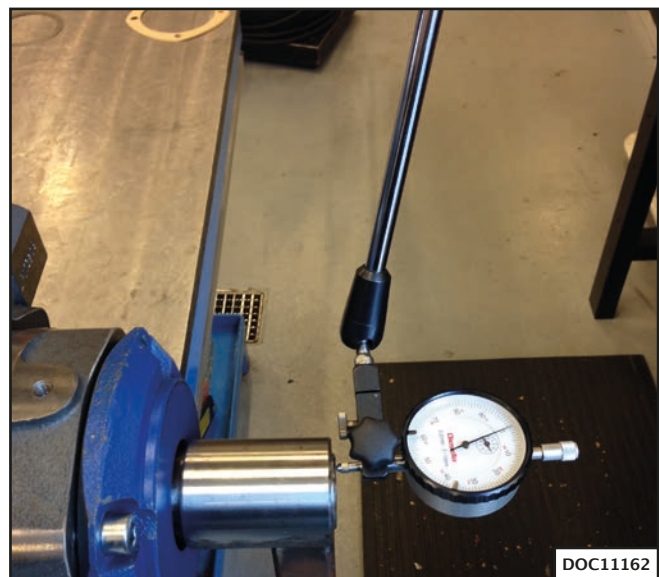
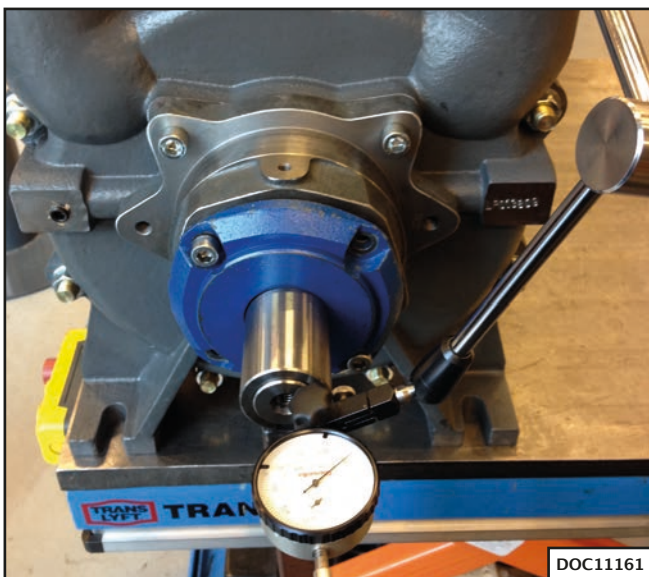
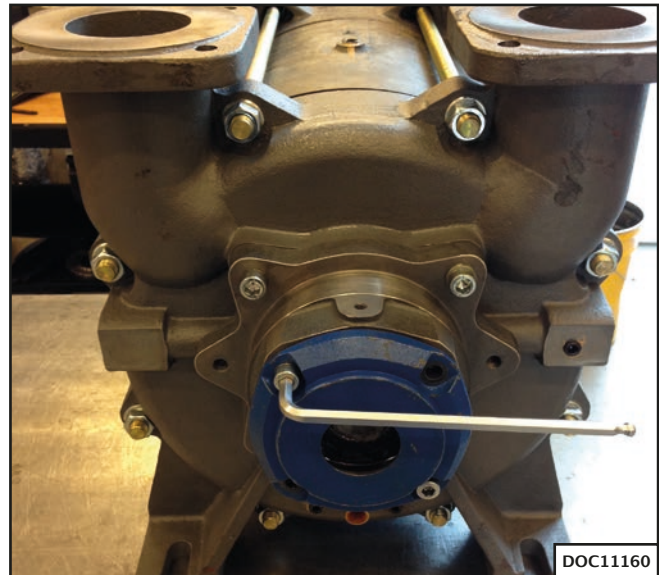
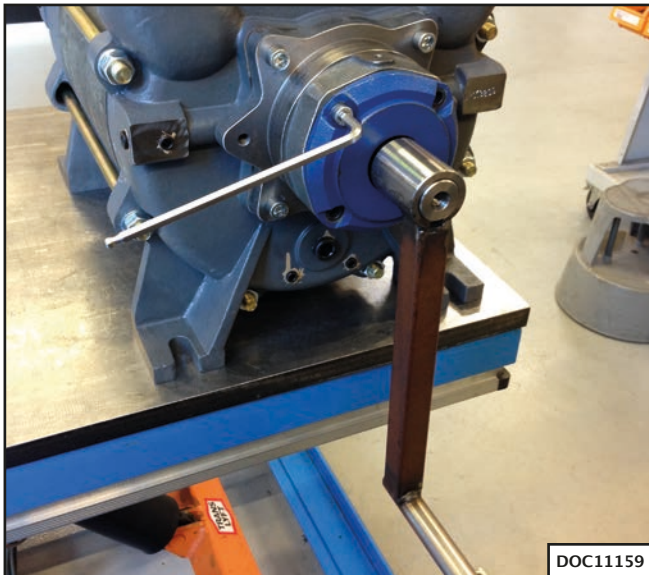
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- Press in the bearings using a special tool. The writing on the bearings must be facing upwards, so it can be read from above.
- Press the bearings all the way to the bottom until resistance can be felt.

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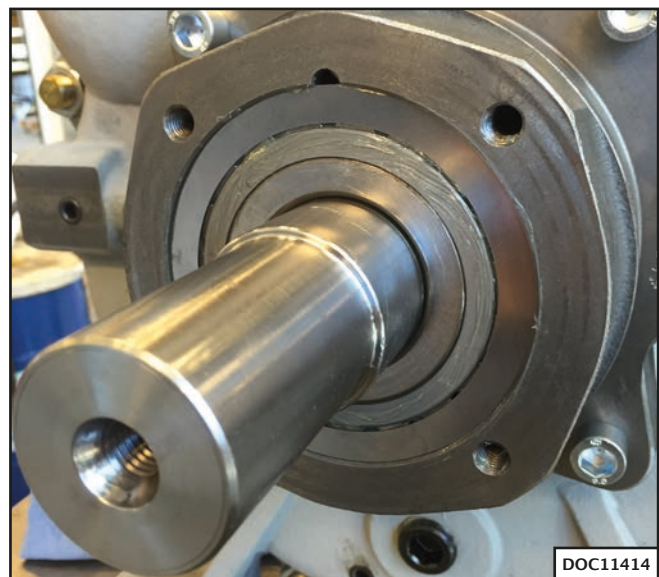
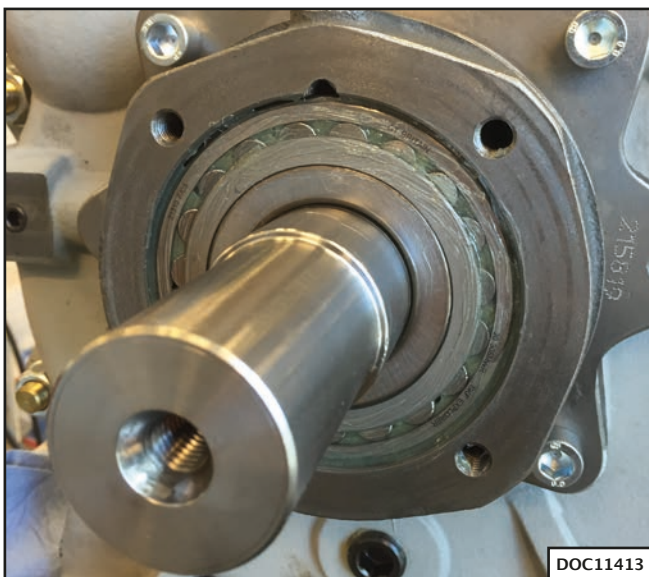
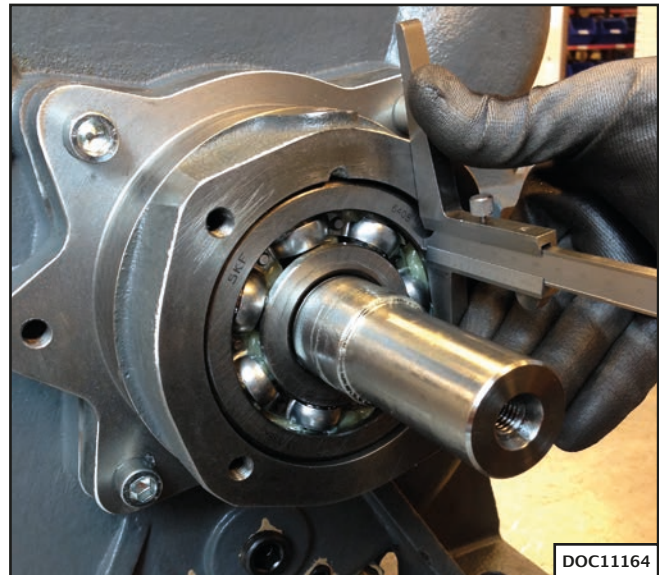
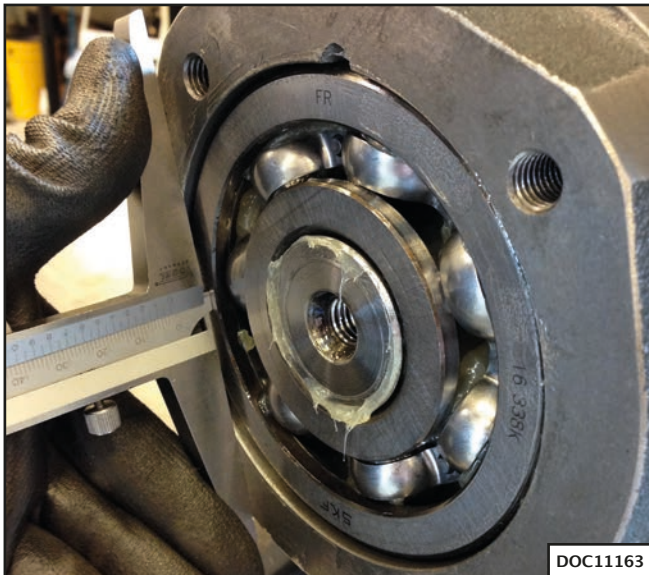
## 9 Axial rotor displacement and adjustment to centre position



- Loosely mount custom-turned bearing cover to the front and rear ends of the pump.
- Start at the front end of the pump by tightening the 2 bolts on the bearing cap, which will push the rotor towards the back flow plate.
- Check the rotor to ensure it is completely against the rear flow plate and cannot be turned around.
- Mount a dial indicator on the rotor shaft at the front of the pump and reset the indicator.
- Loosen the 2 bolts in the front bearing cover.
- Tighten the 2 bolts in the rear bearing cover, which will press the rotor against the front flow plate.
- Check the rotor to ensure it is completely against the front flow plate and cannot be turned around.
- Read the dial indicator.
- The read value is equal to the total axial rotor displacement in the pump.
- Loosen the 2 bolts in the rear bearing cover.
- The rotor must now be in the centre position, in order to have an equal distance between the rotor blades and the front/rear flow plates.
- Tighten the 2 bolts in the front bearing cover carefully in order to push the rotor towards the rear end, until the dial indicator shows half of the total axial rotor displacement. E.g. (Total rotor displacement = 0.6 mm)/2 = 0.3 mm
- Carefully remove the custom-turned bearing covers.

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## 10 Shimming the bearings



- Measure the distance from the outer edge of the bearing housing to the outer ring of the ball bearing. Note down the value.
- In order to determine the total thickness of the shims that need attaching, insert the measured value into an equation.
- Equation: Measured value - bearing cover with gasket (1.6) - bearing tolerance (0.2) = Total thickness of shims

Example of measurement:

Rear: Measured value 2.3 mm =>  $2.3 - 1.6 - 0.2 = 0.5$  mm; total thickness of shims

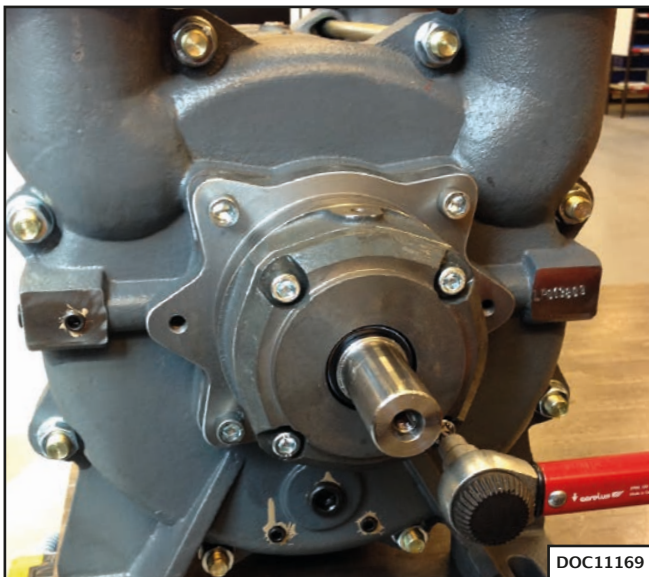
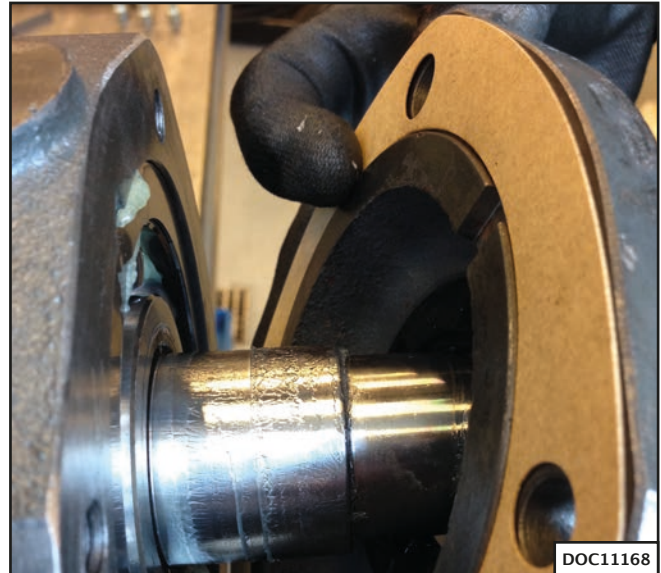
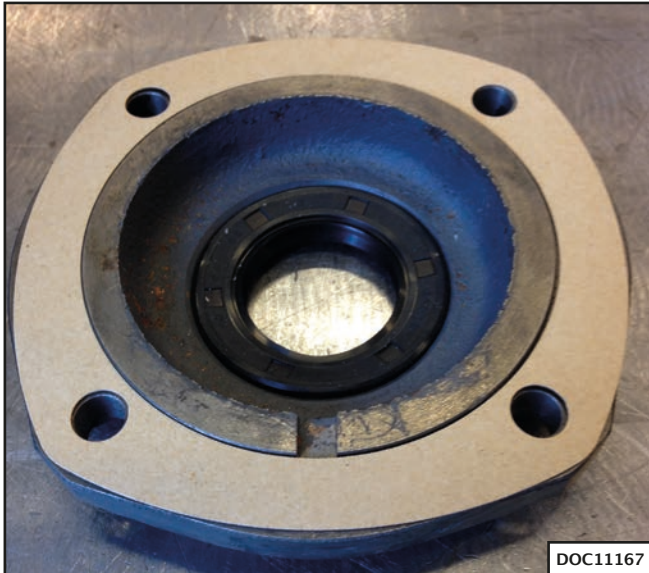
Front: Measured value 2.4 mm =>  $2.4 - 1.6 - 0.2 = 0.6$  mm; total thickness of shims

A 0.5 mm shim is placed at the back end.

A 0.6 mm shim is placed at the front end.

- Before mounting the shims, the bearing must be greased completely on the outside.
- Mount shims.

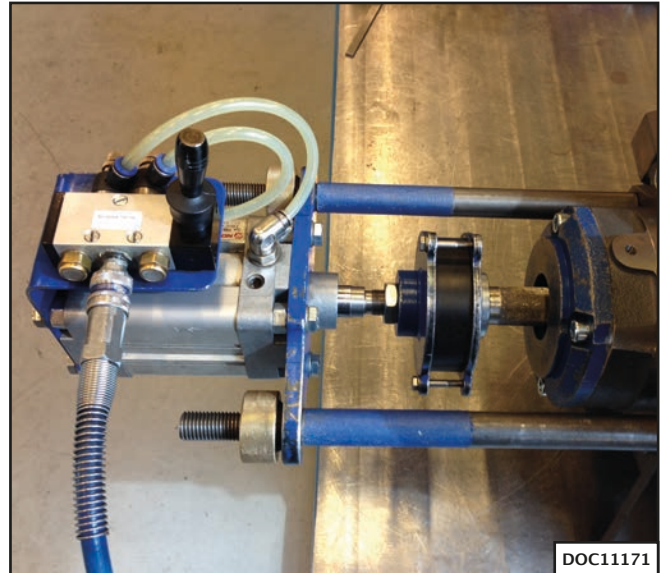
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- Clean the insides of both end covers and mount a radial shaft seal in the front one.
- Hammer/push down the radial shaft seal into the bearing cover with the closed surface facing up.
- Mount the paper gasket on the front bearing cover and mount at the front end of the pump with the inner milled groove facing up.
- Tighten the front end cover to 40 Nm.

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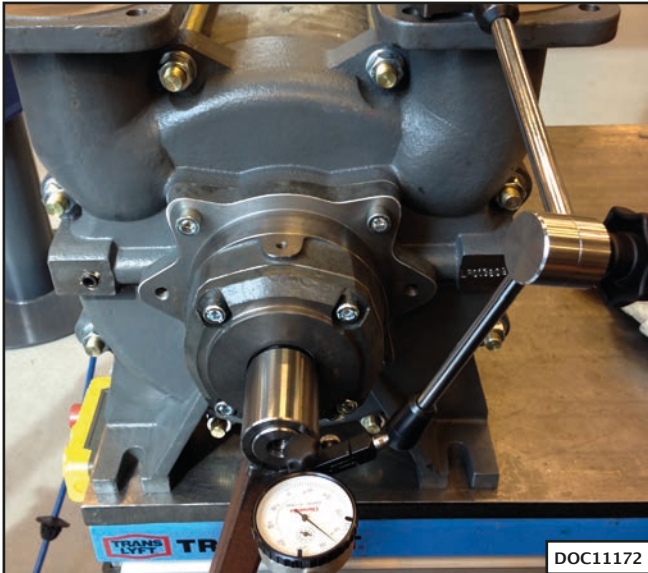
## 11 Check of shimming



- Mount the paper gasket on the test cover which is in the pressing tool.
- Mount the test cover at the rear end of the pump.
- Mount the pressing tool at the rear end of the pump and apply air pressure.
- Move the lever forwards to press the rotor against the front end of the pump and turn the rotor around.
- Move the lever backwards to push the rotor towards the rear of the pump and turn the rotor around.
- The rotor must not touch the flow plates when it is rotated with the lever in either position.
- The rotor should move easily and without any kind of rumbling noise.
- Specialist tool must remain mounted.

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## 12 Measuring bearing clearance



Checking bearing clearance:

- Mount a dial indicator at the front of the rotor shaft.
- Push the rotor towards the rear of the pump using a pressing tool.
- Reset the dial indicator to zero.
- Push the rotor forwards using the pressing tool.
- Read the measured value.
- The value must be a minimum of 0.15 mm.
- If the value is less than 0.15 mm, remove shims from front/back bearings until the value is acceptable.
- If shims are removed, it is important to recheck that rotor does not touch either the front or back flow plate with the pressing tool activated.
- If the dial indicator shows the minimum value or more and the rotor turns around freely and easily without touching the front or back flow plate under pressure, then the pump has been properly adjusted.
- Complete items 1 and 2 in the test report RE8.2.4-02-01 for ATEX pumps.
- For ATEX pumps, an ATEX specialist must be called and item 2 signed.
- Remove the pressing tool and test cover.

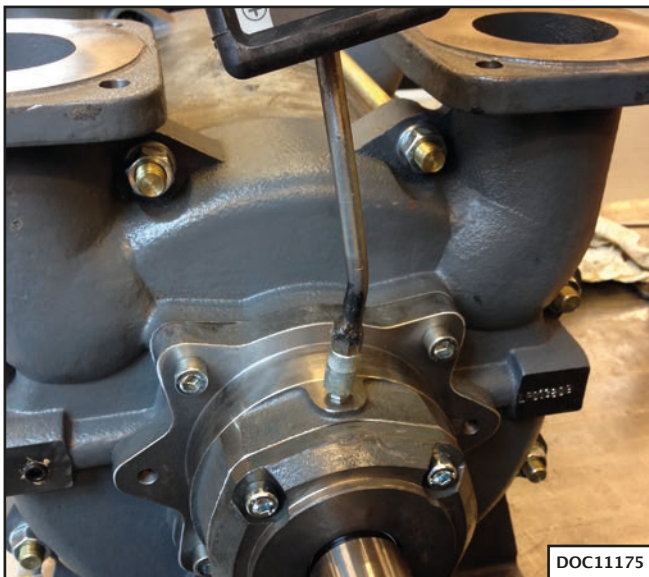
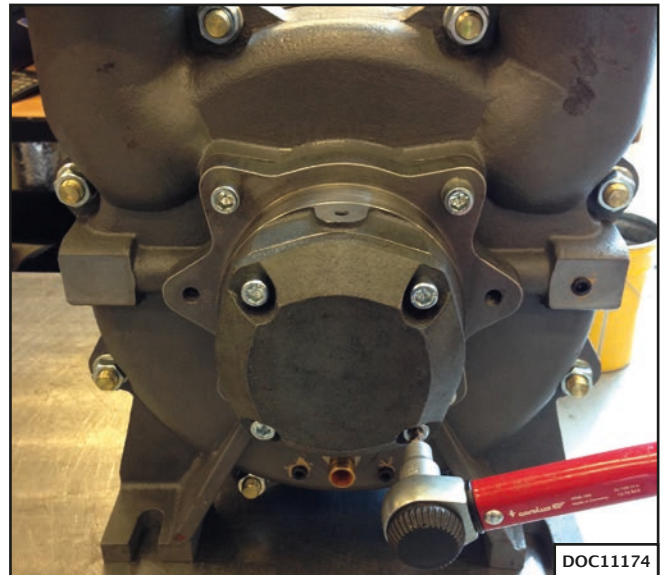
NOTE:

Be aware of any shims that must remain mounted on the bearing and do NOT fall off or stick to the test cover when it is removed.



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## 14 Mounting of rear cover and greasing bearings

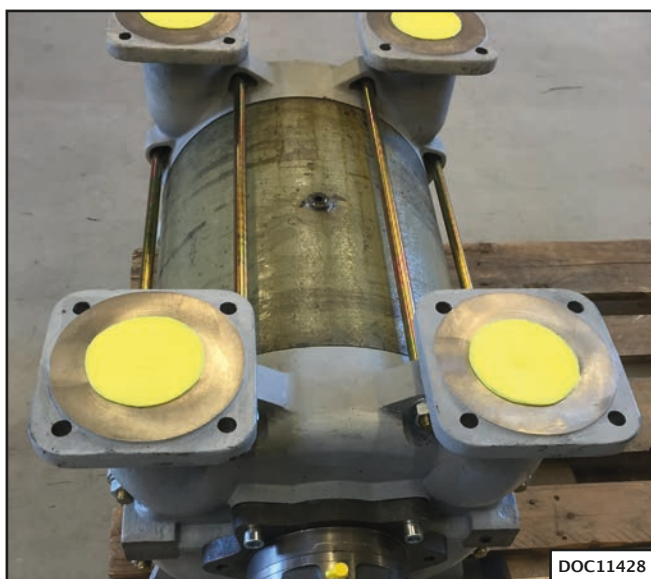
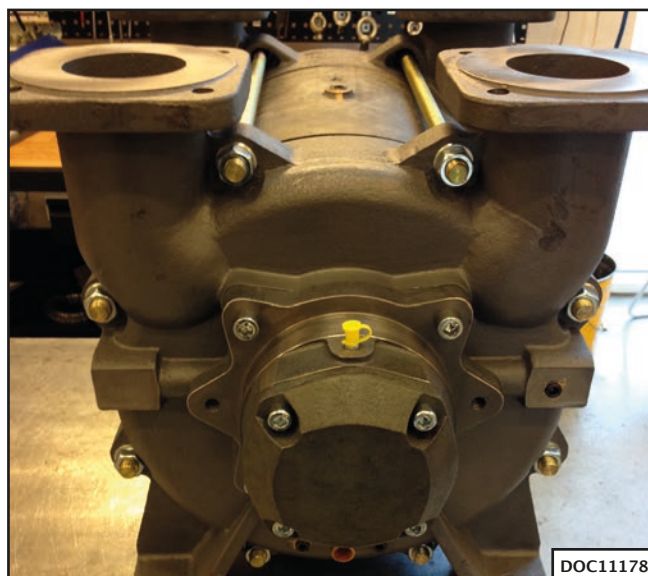
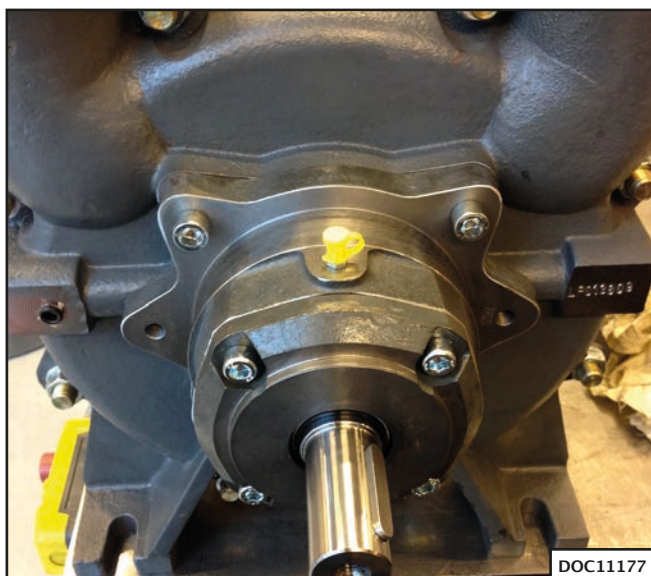


- Mount the paper gasket on the rear end cover.
- Mount the end cover on the pump with the inner milled groove facing up.
- Tighten the end cover to 40 Nm.
- Mount grease nipples in the bearing housing.
- Lubricate the bearings with the correct amount of grease.
- Grease in bearings: Front 36 g  
Rear 44 g

A table to determine how much grease to apply to bearings can be found at the end of this assembly instruction manual.



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- Mount DBI Caps on the grease nipples.
- The pump is ready for testing.
- After testing, the pump must be prepared for painting.



- 5 Test report RE8.6-02-01 filled out and signed by ATEX approval person. Zone 0+1
- 6 Operating test performed on test stand and Test rapport RE8.6-02-01 filled Zone 0+1
- 7 Checking bearing temperature in test stand. Zone 0+1
- 8 Insert plugs into all holes. Zone 0
- 9 M10x1 screws to be mounted in both ends. (Holes for temp. sensor) Zone 0
- 10 Attach DBI covers. Zone 0
- 11 Tighten screws and bolts as indicated in the assembly instructions. Zone 0+1

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## 15 Finishing pump after painting



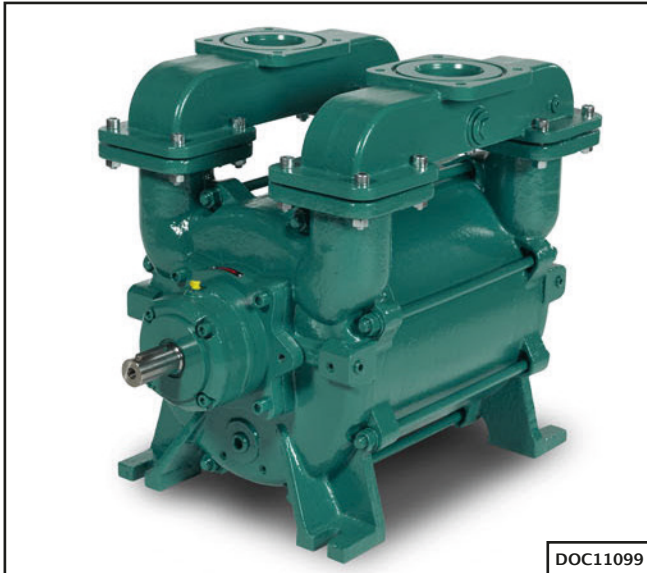
- After the pump has been returned from the painter, the remaining steps must be carried out.
- Affix the directional arrow to the front bearing housing; the direction is specified in the order. (Right/ left-facing)
- Insert plug into the water inlet.
- Affix stickers onto the right and left sides of the pump on the front pump housing.
- With the correct tools, carefully affix the data plate onto the rear pump housing.
- Attach yellow DBI caps to the suction/pressure and shaft.
- If the pump is painted grey or with primer, 1 directional arrow and 3 rivets must be packed in a bag and sent with the pump. (Does not apply to Zone 0+1)
- The pump is now ready for shipment.
- For pumps that are delivered with manifolds.
- ATEX pumps must be sealed.
- Grease cartridges must be mounted on ATEX pumps.



12 Affix the ATEX data plate. Zone 0+1

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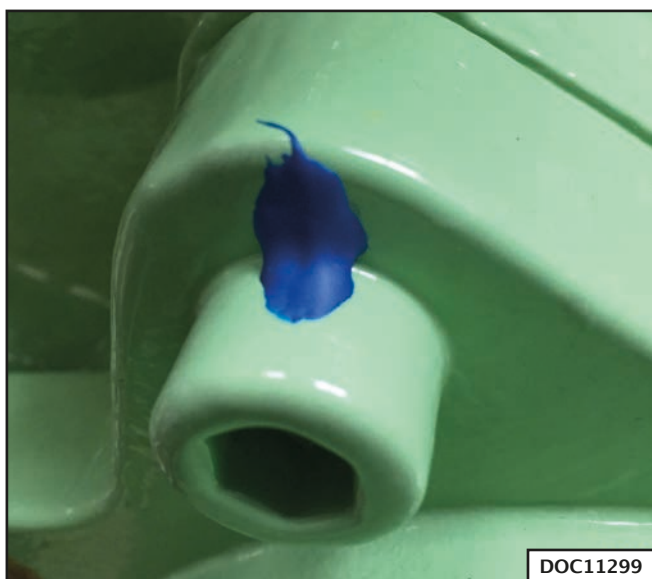
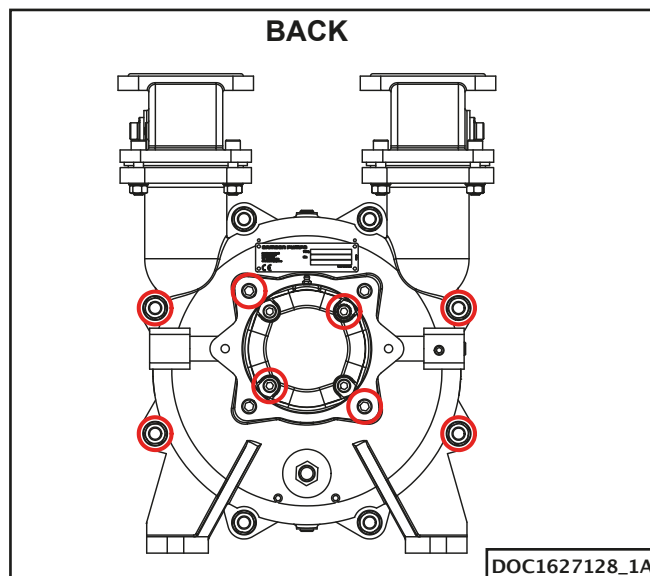
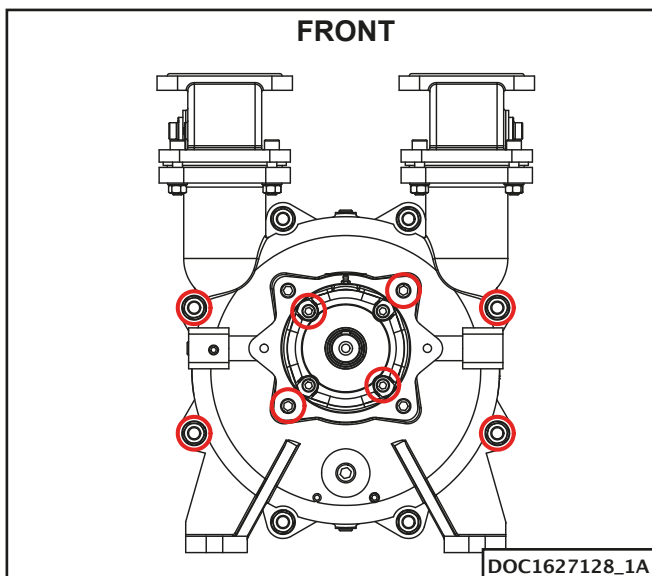
## 16 Mounting manifolds



- Using a threaded plug, manifolds are fitted to the vacuum limiter on the suction side.
- Tighten bolts to 75 Nm.

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## 17 Sealing the pump



Sealing:

- Apply a drop of Loctite 7414 to the bolts marked red.



13 Pump sealed in accordance with the assembly instructions. Zone 0+1

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## 18 Mounting grease cartridges



Mounting grease cartridges on ATEX pumps:

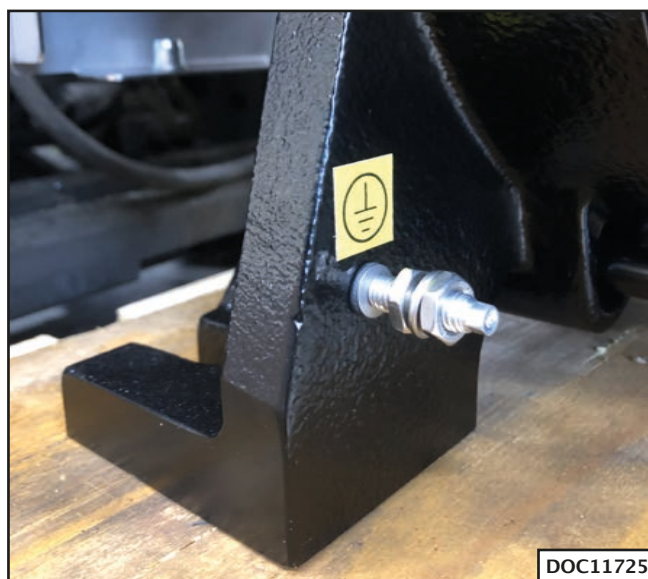
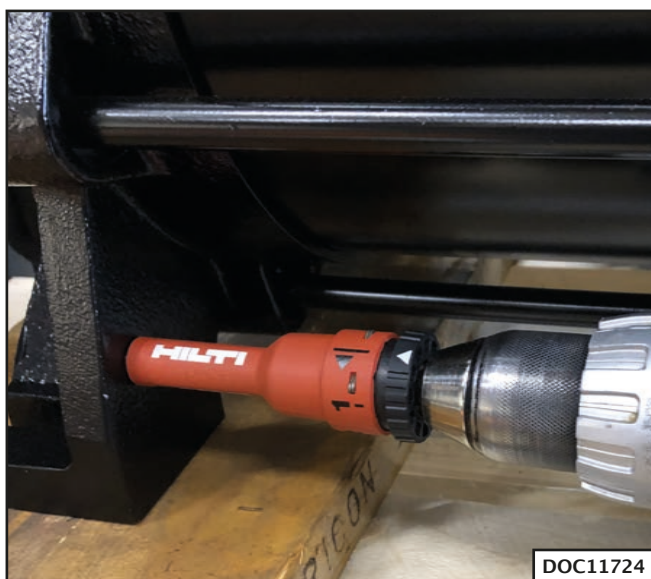
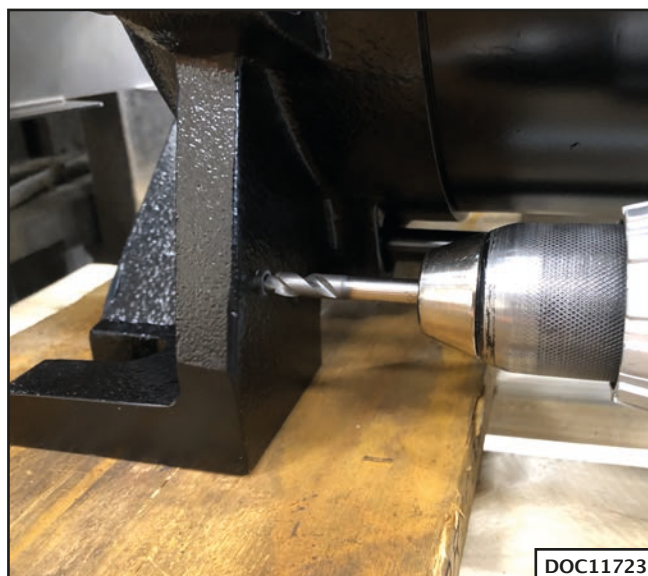
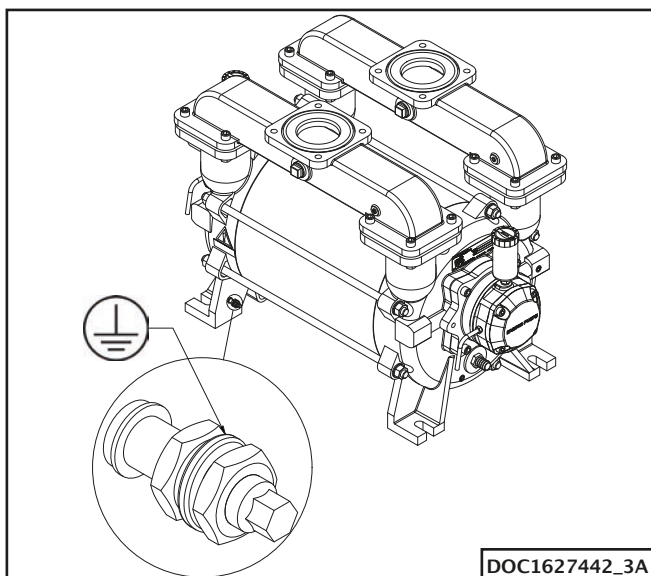
- Mount grease cartridges in the front and rear ends of the pump.
- Affix red tag to both grease cartridges.
- The grease cartridges must NOT be activated.



14 Mount grease cartridges. Zone 0

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## 19 Mounting earth threaded stud



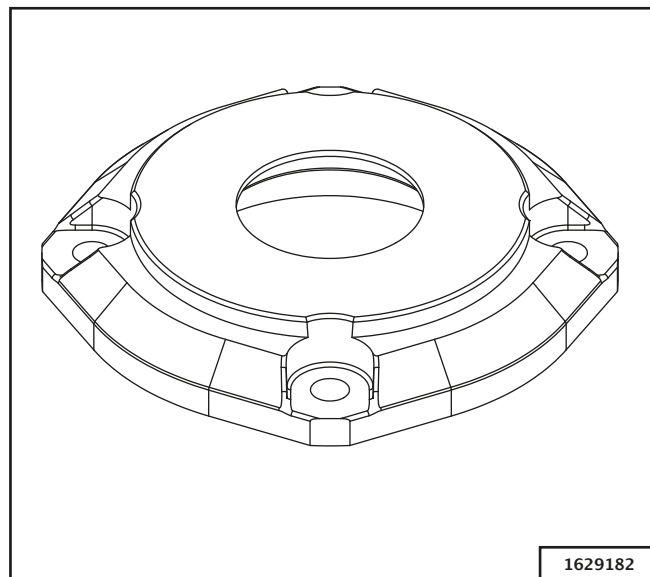
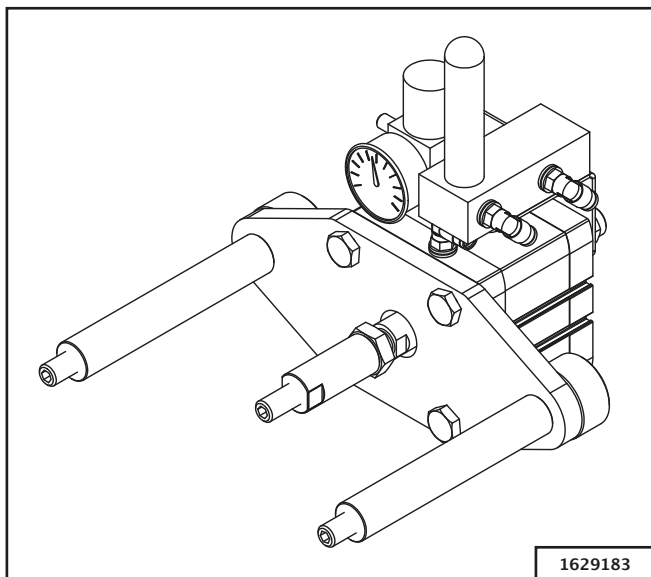
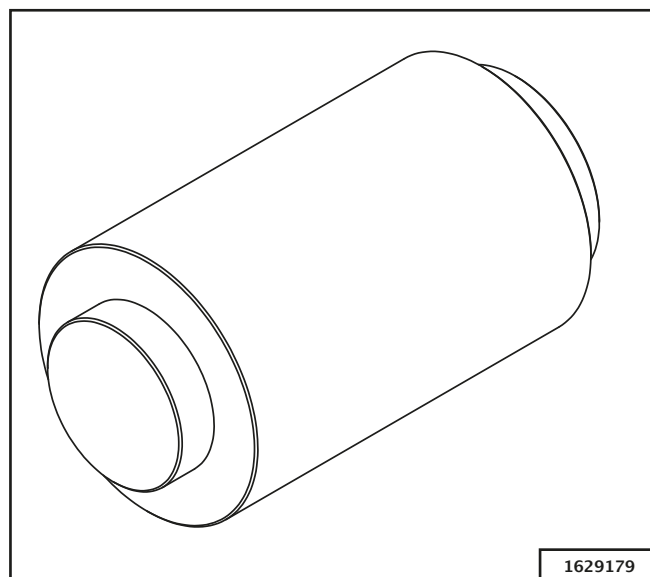
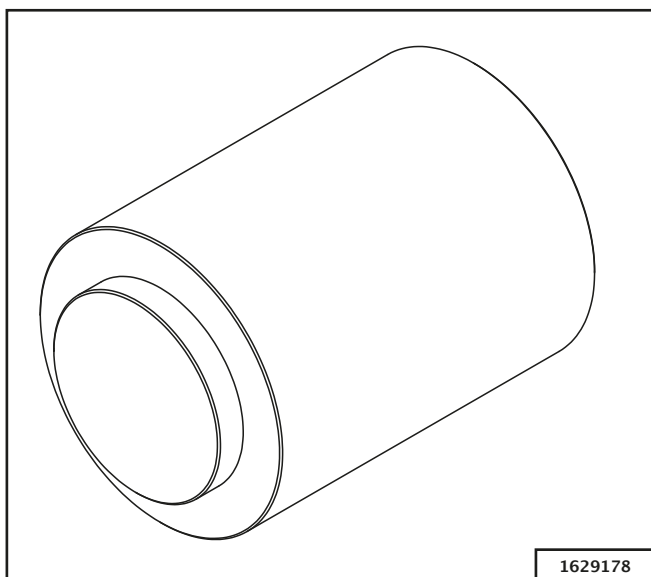
- Drill a hole with the special drill bit. Location of the hole to be approx. as on picture.
- Mount the special socket on a drill machine and insert a earth threaded stud in the socket.
- Start drilling until the special socket clicks and stop. The stud is mounted and tightened correctly.
- Mount 2 nuts and 1 spring washer between as shown on picture, inclusive earth sticker.



15 Mount earth threaded stud. Zone 0+1

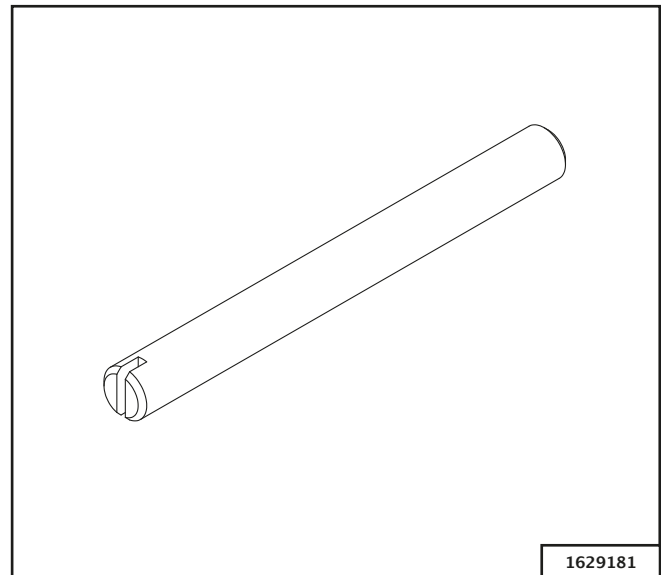
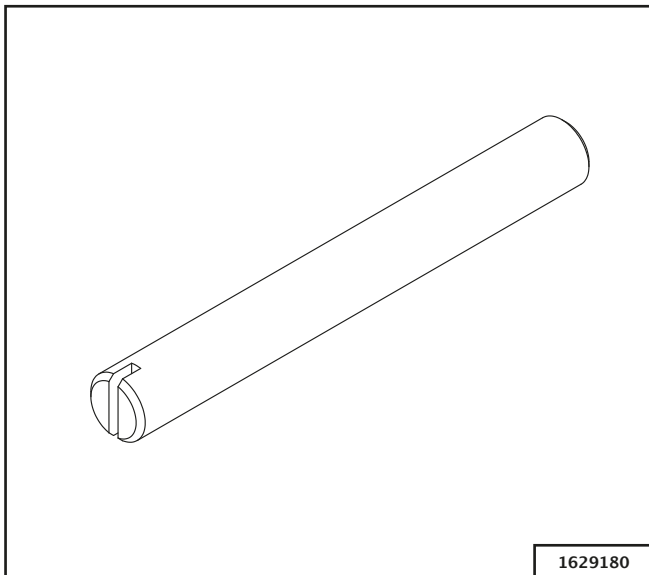
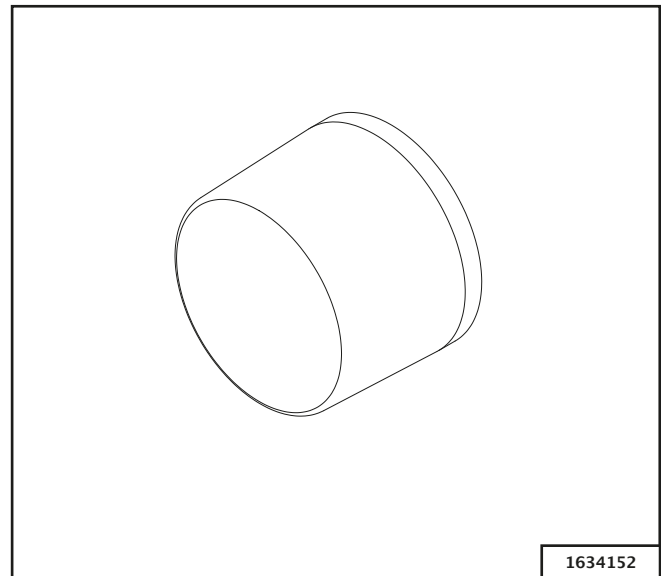
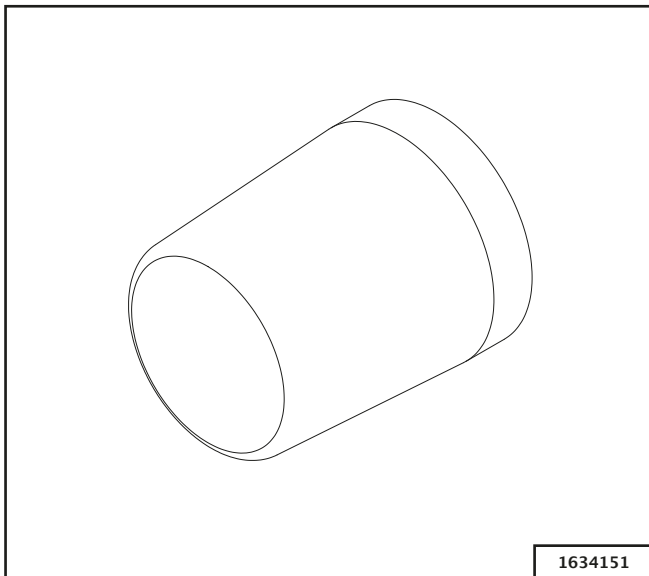
<b>SAMSON PUMPS</b>	Document Name:		
	Assembly instructions	Doc. No.:	DOC5105
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OCEAN MASTER 500, 700, 1000, SVF27 & TRUCK MASTER 1600		Liquid ring pump	

## 20 Assembly tools – Samson Pumps



- **1629178** - Radial shaft seal tool  $\varnothing 50 + \varnothing 55$ .
- **1629179** - Radial shaft seal tool  $\varnothing 40 + \varnothing 50$ .
- **1629183** - Bearing tool.
- **1629182** - Rotor adjustment tool.

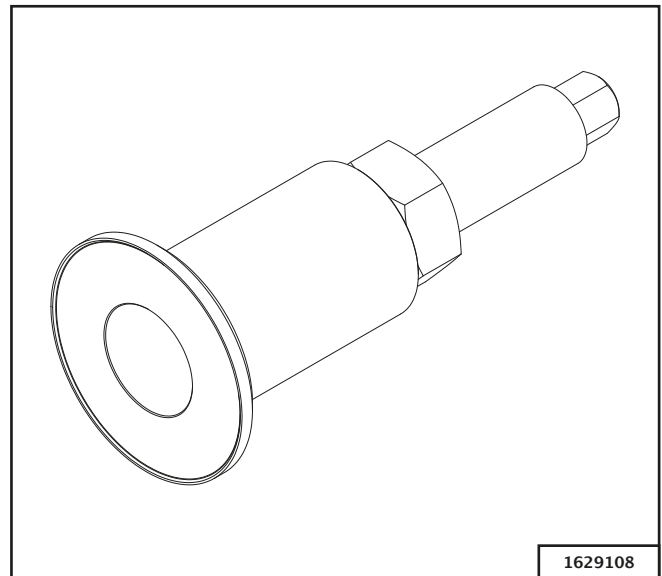
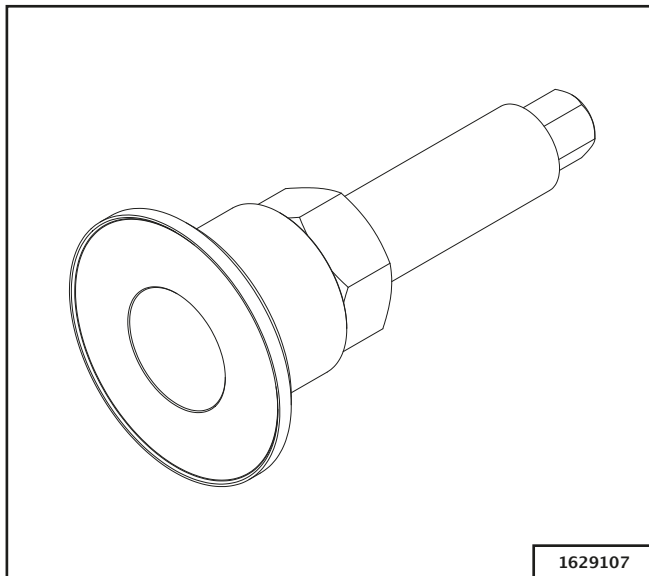
<b>SAMSON PUMPS</b>	Document Name:		
	Assembly instructions	Doc. No.:	DOC5105
		Rev.:	J
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Product no.		Product name:	
OCEAN MASTER 500, 700, 1000, SVF27 & TRUCK MASTER 1600		Liquid ring pump	



- **1634151** - Mechanical shaft seals tool Ø50.
- **1634152** - Mechanical shaft seals tool Ø55.
- **1629180** - Guide pin M12. 2 stk.
- **1629181** - Guide pin M10. 2 stk.



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	Assembly instructions	Doc. No.:	DOC5105
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- **1629107** - Bearing mounting tool NDE.
- **1629108** - Bearing mounting tool DE.

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	<b>Assembly instructions</b>	Doc. No.:	DOC5105
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<b>Product no.</b>		<b>Product name:</b>	
OCEAN MASTER 500, 700, 1000, SVF27 & TRUCK MASTER 1600		Liquid ring pump	

## 21 Assembly tools – Standard

Recommended tools accessible:

Crane, compressed air, straps, carabiners, lifting hooks 3/8" for shell and M12 for rotor and pump housing.

Description	Specification
Nylon head hammer	-
Torque wrench ½"	15-110 Nm
Allen wrench socket ½"	8 mm, 12 mm, 10 mm-140, 1/4"
Socket ½"	17 mm, 24 mm long
Flat file	-
Straight edge	320 mm
Depth gauge	-
Magnetic stand + dial gauge	-
Hammer + Number and letter punches	-
Bearing grease	-
Whiteoil	-
Small brush	2 pcs.
Grease gun	-
Ratchet wrench / adjustable open-end wrench	55 mm
Angled socket wrench / adjustable open-end wrench	24 mm
Combination wrench / adjustable open-end wrench	27 mm
Flat screwdriver	1,2 x 6,5 x 150 2 pcs.
Combination wrench / adjustable open-end wrench for grease nipples	9 mm
Angled allen key	8 mm
Drill bit for direction arrow	2,2 mm
Drill bit til huller for identification plate	3,3 mm
Warranty seal	Loctite 7414
Thread sealant	-
Thread locker	-



## **SAMSON PUMPS**

Samson Pumps is the only company in the world to specialise exclusively in liquid ring vacuum pumps. Samson pumps are made in Denmark and used around the globe. We offer worldwide delivery, and we export to more than 80 countries around the world.

For over 40 years, our name has been synonymous with the strongest pumps for vacuum trucks and tankers. We constantly adapt our products to meet the changing needs of our customers. Today, it is not enough to simply produce a pump. Products must be refined so the customer can concentrate on what they do best. We therefore offer a wide range of standardised components that allow our customers to build vacuum systems without the need for specialist in-house expertise.

Strength and durability are our hallmarks! We have often heard from customers that our pumps are working in many years, and in most cases without the need for maintenance or repair. This emboldens us to say that we have the strongest program of pumps on the market.