

SERIES: AL-AXL-AML-NR / BL-BXL-BXXL

MZC-I & MZC-II

BEARING REPLACEMENT MANUAL

English
Original English Manual
Revision: 1.0.0



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INDEX

1. General instructions	4
2. General information	5
2.1. Assembly drawing – Non Drive side [PAM]	6
2.2. Assembly drawing - Drive side [DSSU]	7
3. Non-Drive side bearing replacement	8
3.1. Follow steps from chapter 1 General instructions	8
3.2. Open the rotary valve and remove the rotor	8
3.3. Remove all the flanges from the Non-Drive side end cover	10
3.4. Placement of the new bearings	16
4. Drive side bearing replacement	24
4.1. Follow steps from chapter 1 General instructions	24
4.2. Removing the bearings from the Drive side end cover	24
4.3. Placing the bearings on the Drive side end cover	29
4.4. Replace linear bearings Drive Side Sliding Unit	34
5. Instruction – USDA accepted rotary valve	37
6. Tools	37

1. GENERAL INSTRUCTIONS



The Bearing replacement Manual may only be used in conjunction with the Operating instructions RV-01-00-xx, which was supplied as standard with the rotary valve.
[xx indicates the language of the manual]



First read the safety instructions in chapter 6 "Safety" of the manual RV-01-00-xx.



DANGER!

Repair work must only be performed by trained and authorized personnel!

When the valve is in operation no maintenance and repair work must be carried out!

When carrying out maintenance or repair work, always shut off the power and set secure against unexpected incoming power.

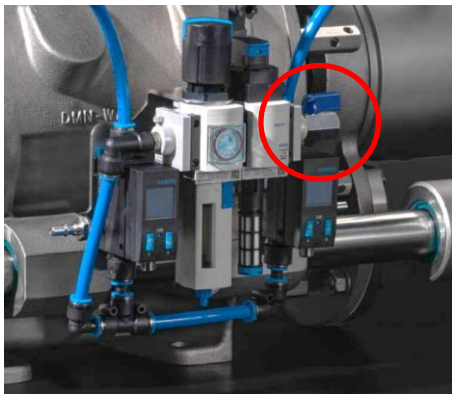
- Stop valve and isolate motor.

DANGER!

A lockable separator must be installed close to the valve so that the valve can be safeguarded against accidental activation during servicing and maintenance work



- Make sure that there is no more product above the valve
- Remove conveying pipeline of the Rotary valve type BL,BXL,BXXL
- Remove air / hoses



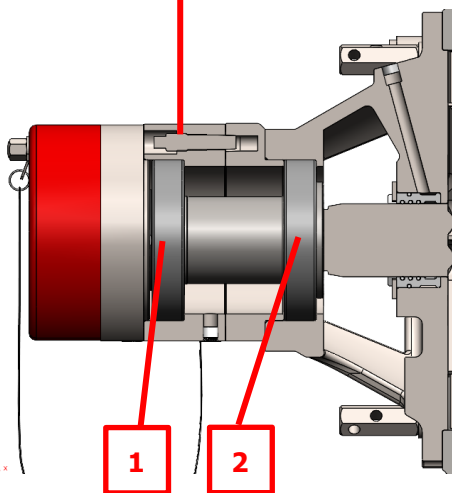
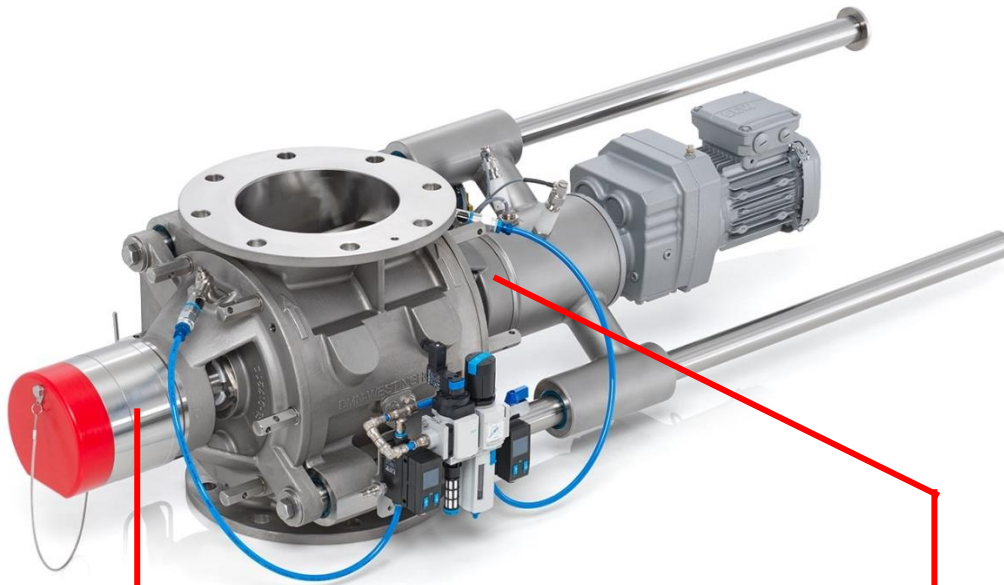
- Turn ball valve to shut of the air supply.



- Remove on both sides the air coupling at the end covers.

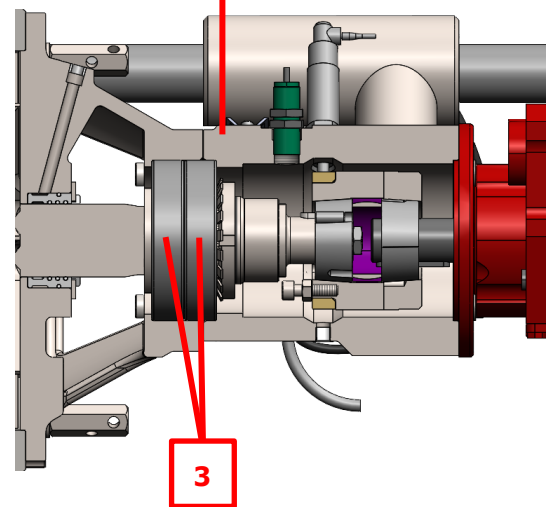
2. GENERAL INFORMATION

This manual is written to replace the following bearings shown in figure below.



Non drive side – Ball bearings

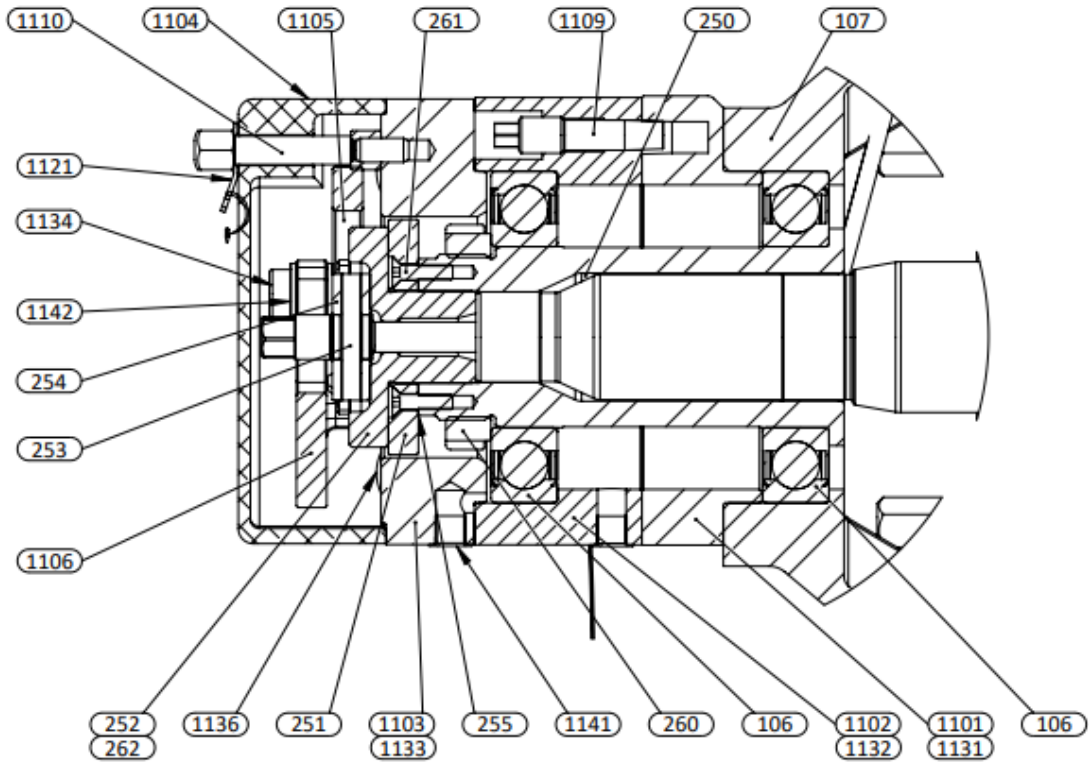
1. Adjustable flange
2. Shaft hub



Drive side – Ball bearings

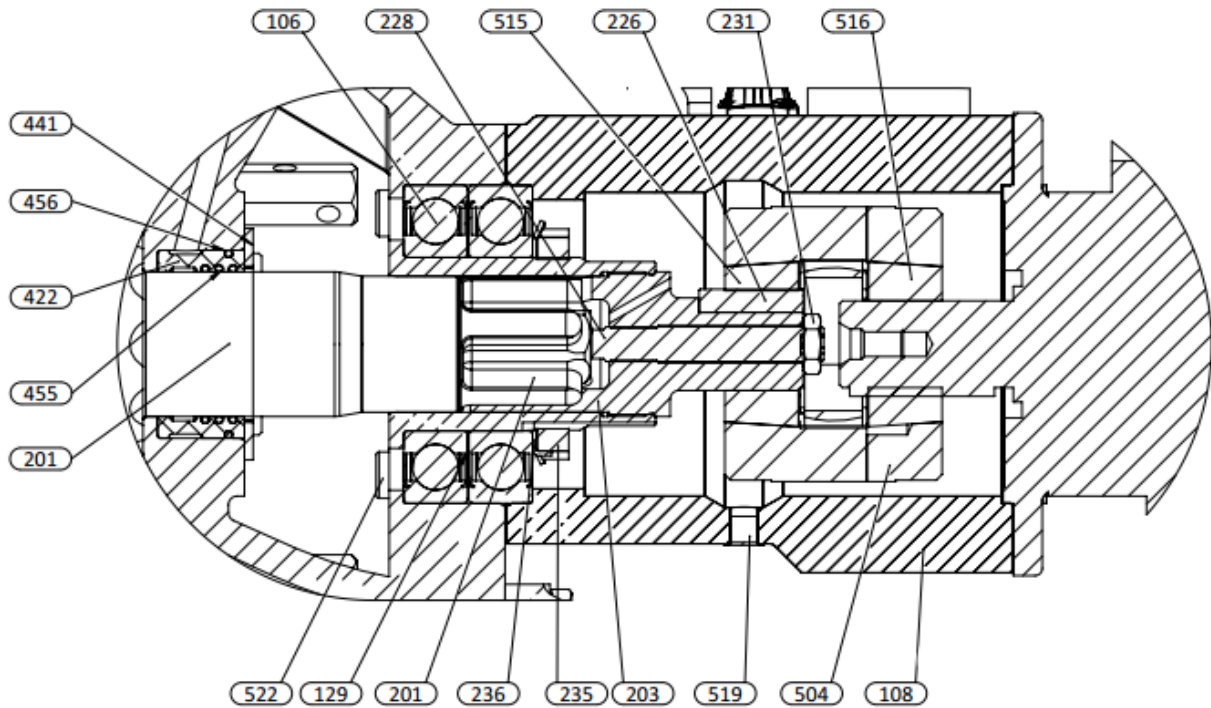
3. Drive shaft

2.1. ASSEMBLY DRAWING – NON DRIVE SIDE [PAM]



Position	Description	Position	Description
106	Bearing	1101	Base Flange
107	End Cover MZC-II	1102	Adjustment Flange
250	Shaft hub	1103	Cover Flange
251	Shim plate	1104	Safety cap
252	End Stop	1105	Lock Plate Handle
253	Center bolt	1106	Lock Plate
254	Plastic ring center bolt	1109	Taper bolt
255	Shim ring	1110	Bolt Safety Cap
260	Lock nut	1121	Cable ring
261	Counter sunk screw	1131	Cylinder screw with hexagon socket
262	Hexagon Head bolt	1132	Cylinder screw with hexagon socket
		1133	Cylinder screw with hexagon socket
		1134	Pass-shoulder screws with hexagon socket
		1136	Cap
		1141	Cap
		1142	Washer

2.2. ASSEMBLY DRAWING - DRIVE SIDE [DSSU]



Position	Description	Position	Description
106	Bearing	422	Lantern ring
108	Drive side sliding unit [DSSU]	441	Cover
129	Shim ring	455	O-Ring
201	Rotor	456	O-Ring
203	Drive shaft	504	Coupling
226	Parallel Key	515	Coupling bush
228	Safety Stop Screw	516	Coupling bush
231	Hexagon	519	Cap
235	Lock nut	522	Hexagon socket Thin Head Cap Screw
236	Lock ring		

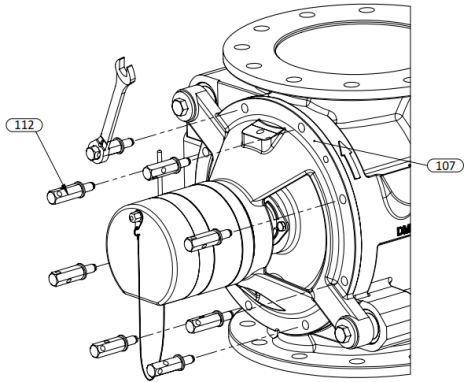
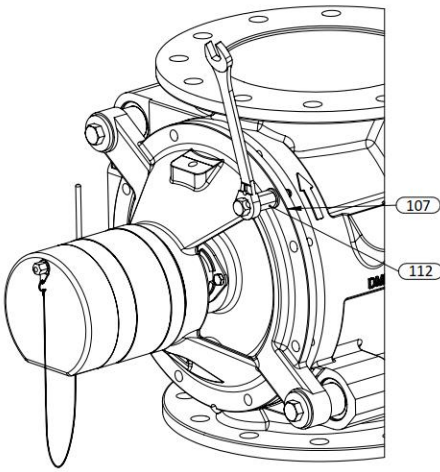
3. NON-DRIVE SIDE BEARING REPLACEMENT

3.1. FOLLOW STEPS FROM CHAPTER 1 GENERAL INSTRUCTIONS

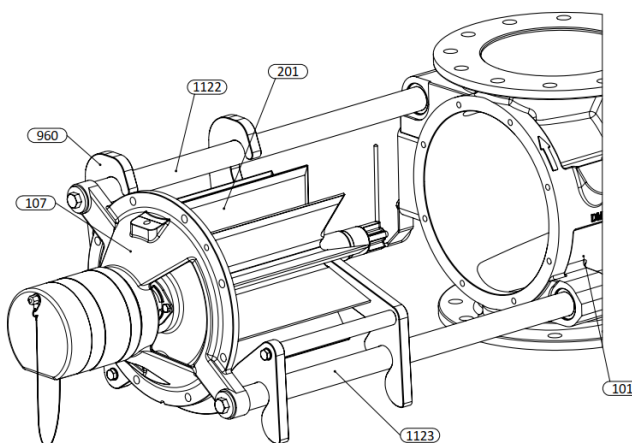
Make sure all the steps from chapter 1 General instructions are followed!

3.2. OPEN THE ROTARY VALVE AND REMOVE THE ROTOR

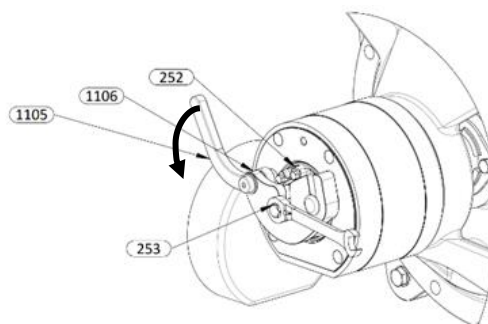
Open the rotary valve and remove the rotor and shaft seal from the end cover.

STEPS + TOOLS	FIGURE
<p>Remove bolts (112) from the end cover.</p>	 <p>The diagram shows a side view of a rotary valve assembly. A wrench is positioned to remove a bolt labeled '112' from the end cover, which is labeled '107'. Several other bolts are shown in the process of being removed from the end cover.</p>
<p>To remove the end cover (107) screw two of these bolts into the jacking holes in the end cover. Open the cover by sliding the rotor out of the body.</p>	 <p>The diagram shows the same rotary valve assembly as the previous figure. Two bolts labeled '112' are now inserted into the jacking holes of the end cover, labeled '107'. A wrench is shown turning one of these bolts to lift the end cover away from the main body of the valve.</p>

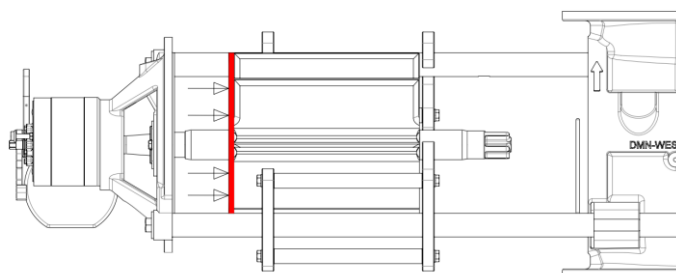
Place rotor support (960) on slide rails (1122-1123).



Remove Red cap.
To remove rotor from end cover.
Turn handle (1105) to locked position.
Turn centerbolt (253) anti clockwise until it rotates free.

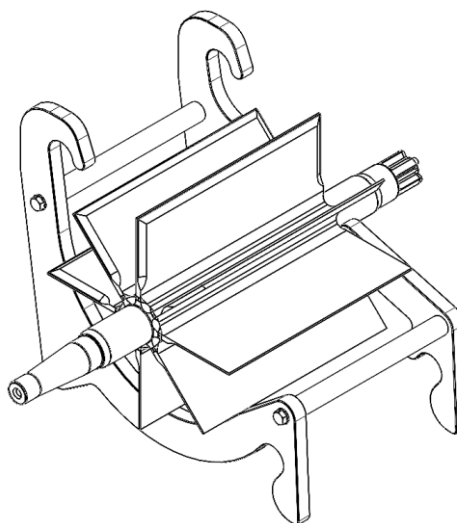


Warning: Only put force on the ROTOR while pulling it away from the end cover!

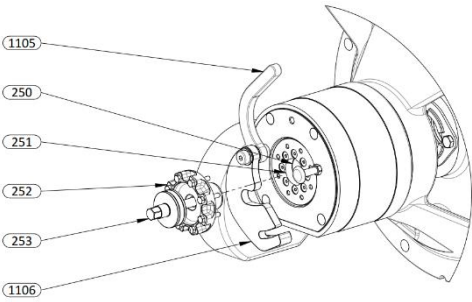
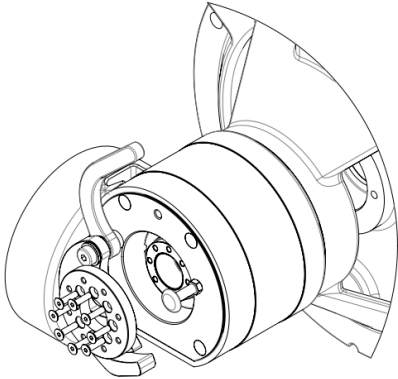
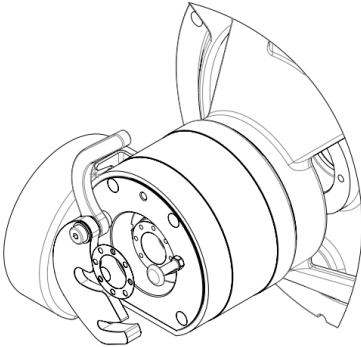
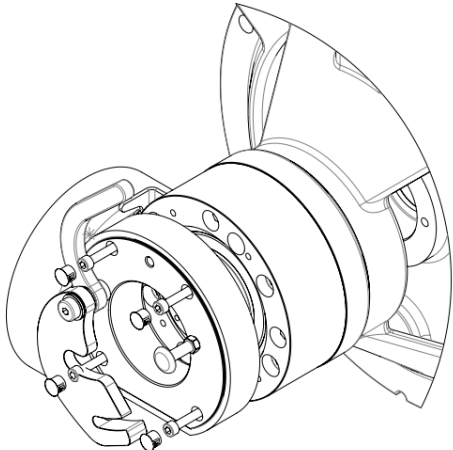


DO NOT USE THE CRADLE AS LIFTING GEAR!

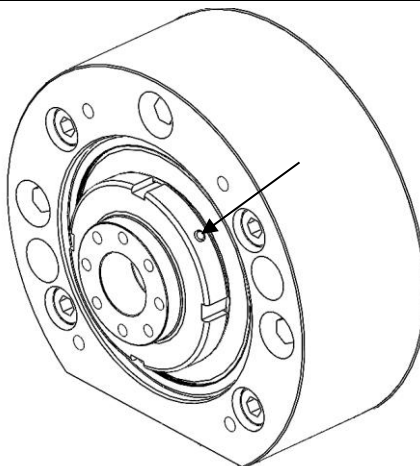
Remove rotor and place the rotor on a wooden surface or on the cradle to prevent the rotor blades from being damaged.



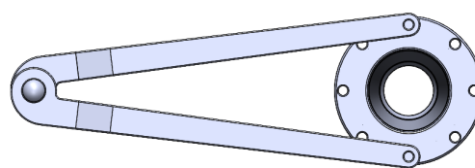
3.3. REMOVE ALL THE FLANGES FROM THE NON-DRIVE SIDE END COVER

STEPS + TOOLS	FIGURE
<p>Remove end stop (252) by loosening the bolts.</p> <p>150-175: Wrench 8 mm 200-250: Wrench 8 mm 300-350: Wrench 13 mm</p>	 <p>The diagram shows an exploded view of the non-drive side end cover. Callout 1105 points to the cover housing. Callout 250 points to a bolt on the end stop. Callout 251 points to the shim plate. Callout 252 points to the end stop itself. Callout 253 points to a bolt on the shim plate. Callout 1106 points to the cover flange.</p>
<p>Remove shim plate (251) by loosening the bolts.</p> <p>150-175: Torx 25 200-250: Torx 25 300-350: Allen key 5</p>	 <p>The diagram shows the non-drive side end cover with the shim plate (251) removed, revealing the internal components.</p>
<p>Remove Shims. Make sure they don't get damaged. (For the axial adjustment it is a good starting point to place back the old shims.)</p>	 <p>The diagram shows the non-drive side end cover with the shims removed, showing the internal components.</p>
<p>Remove white plastic caps (1136) with flat screwdriver. Remove cover flange (1103) by loosening the bolts.</p> <p>150-175: Allen key 5 200-250: Allen key 5 300-350: Allen key 6</p>	 <p>The diagram shows the non-drive side end cover with the cover flange (1103) removed, showing the internal components.</p>

Remove the lock nut: Loosen up the lock screw with an allen key.



Place the pin wrench in the holes of the shaft hub flange.



Loosen the lock nut (260) by blocking the shaft hub with the Pin wrench and then turning the hook wrench. Turn the lock nut left (anti-clockwise) to remove it.

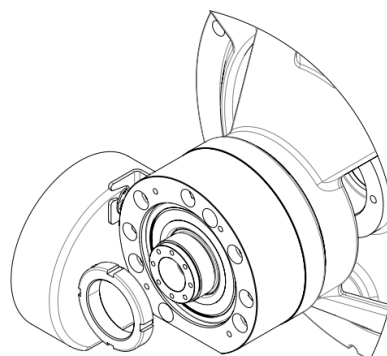
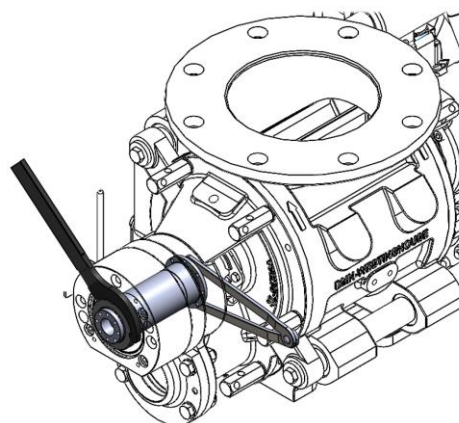
GEDORE Pin Wrench:

150-175, 200-250:

6354560 44 4 Face pin wrench 4 MM

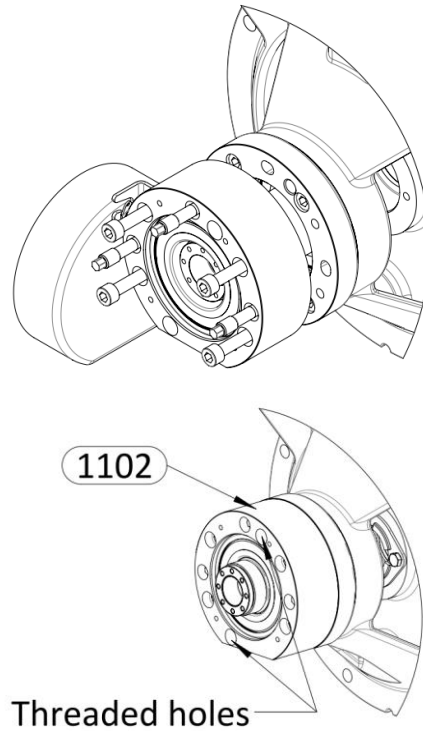
300-350:

6354720 44 6 Face pin wrench 6 MM



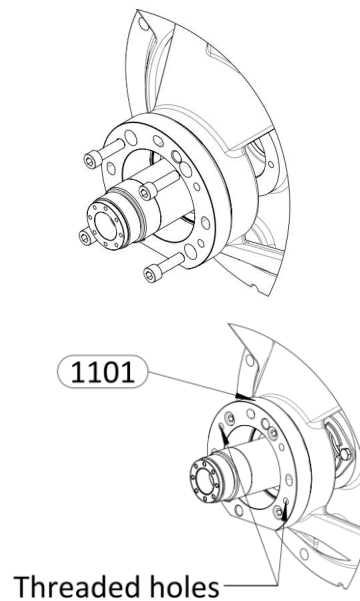
Remove adjustment flange (1102) by loosening the bolts.
Use the 2 threaded holes to push off the flange and bearing.

150-175: Allen key 6
200-250: Allen key 8
300-350: Allen key 10

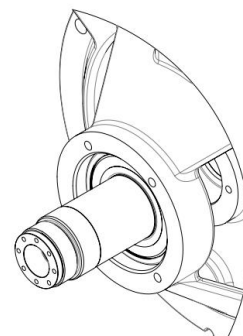


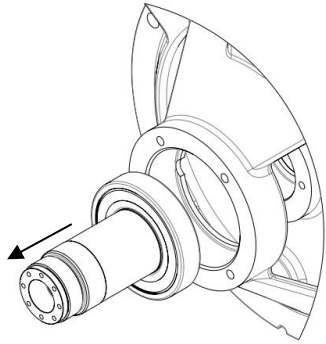
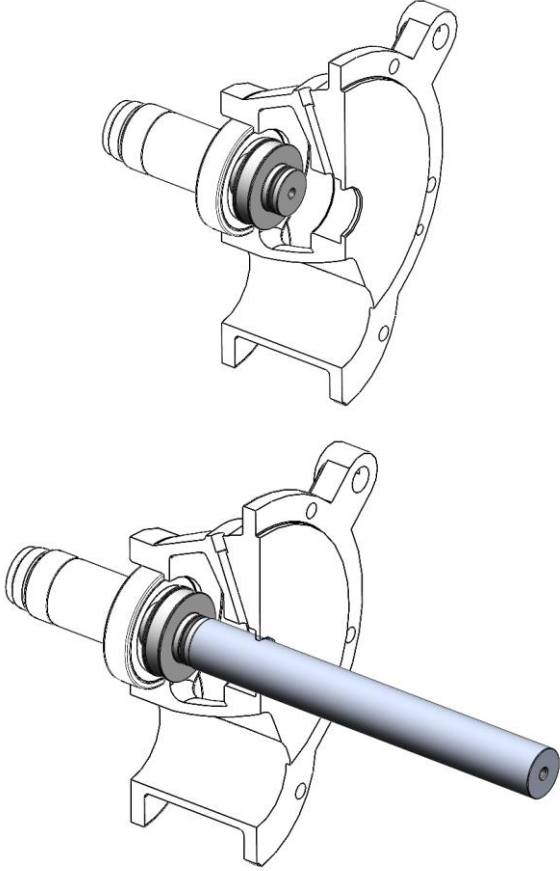
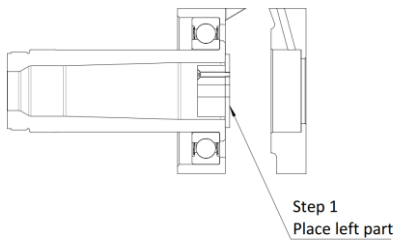
Remove base flange (1101) by loosening the bolts.
Use the 2 threaded holes to push off the flange and bearing.

150-175: Allen key 6
200-250: Allen key 8
300-350: Allen key 10

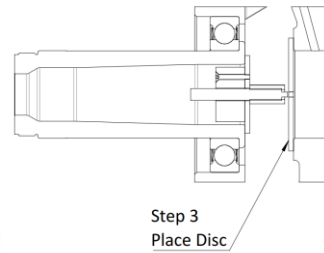
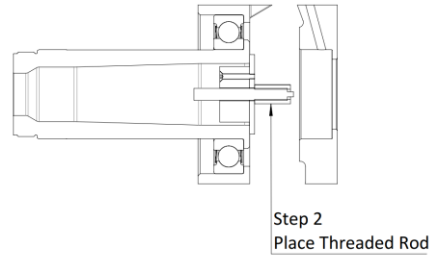


Pull out the shaft hub (250) with bearing, first try pulling by hand.

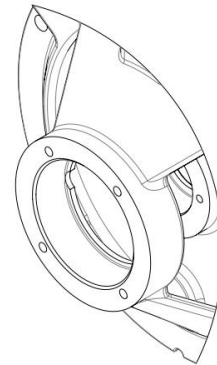


	
<p>[For 150-175 and 200-250] If the shaft hub and bearing are not moving use tool the Shaft/Hub removal tool E. Bearing Press Hub Protection.</p> <p>Place the POM with O-ring bush in the shaft hub. Screw the Aluminium rod (Tool F. Extension rod) with thread in the POM piece.</p> <p>Warning: Make sure that the Shaft hub doesn't get damaged by falling. Use the hammer to push out the bearing and shaft hub, by hammering the rod. Use second hand to grab the shaft hub.</p>	
<p>[For 300-350] Use Bearing press tool</p> <ol style="list-style-type: none"> 0. Lubricate Threaded Rod 1. Place POM bush in shaft hub 2. Place threaded Rod with nut in POM bush 3. Place lock disc on shaft seal bolt holes 4. Place the threaded nut in the lock disc 5. Turn the nut against the POM bush, this will push out the shaft hub and bearing assembly 	

6. Make sure the Shaft hub does not fall. Turn with one hand and use other to hold the shaft hub.

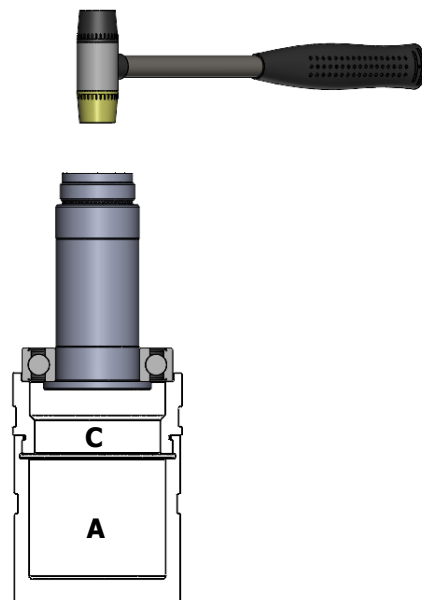


When the bearing is removed.
Clean the bearing fitting and mechanic stop thoroughly.



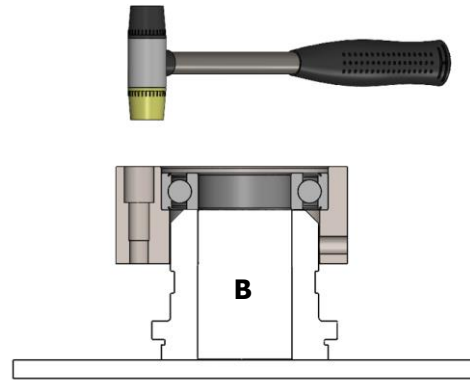
Demount the bearing from the shaft hub.
Mount tool **A. Bearing press** and tool **C. Outer ring** together.
Place the tool on an impact-resistant surface.
Place the shaft hub with bearing on tool C. Outer ring.
Hammer the shaft hub downwards away from the bearing.

NOTE: After this procedure, the bearings are damaged and must be discarded.



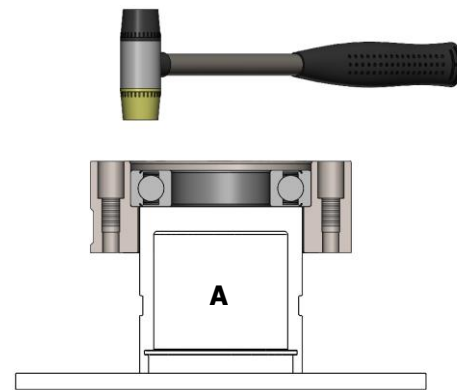
[For 150-175]

Demount the bearing from the adjustment flange. Place the tool **B. Inner ring** on an impact-resistant surface. Place the adjustment flange with bearing on tool **B. Inner ring**. Hammer the adjustment flange downwards away from the bearing, only use a plastic hammer.

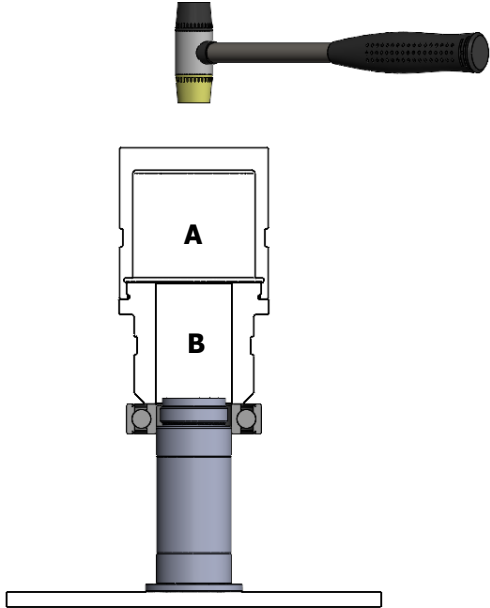
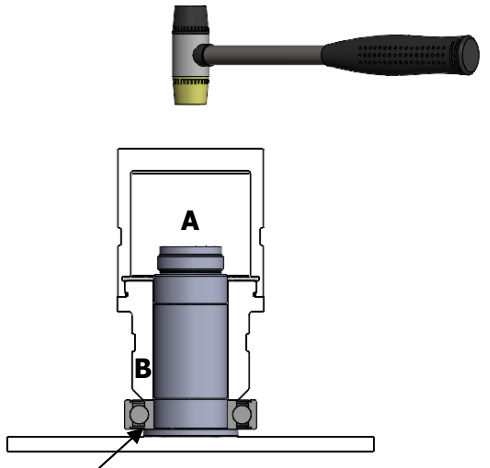
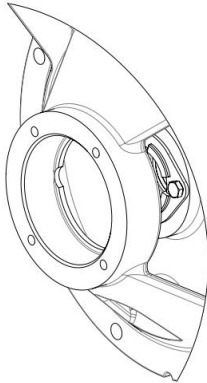


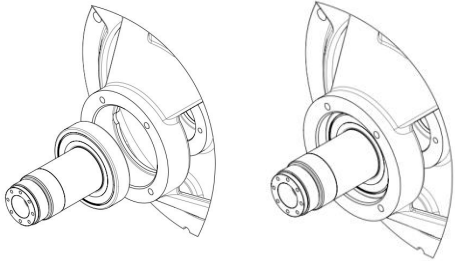
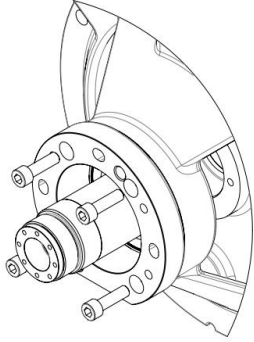
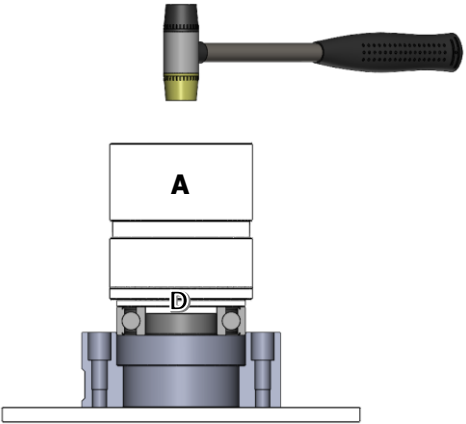
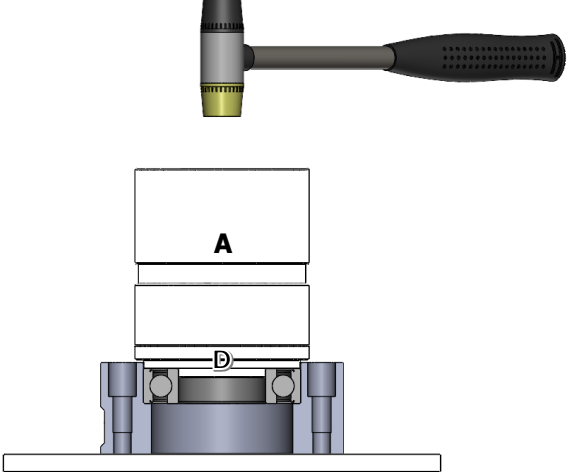
[For 200-250 and 300-350]

Demount the bearing from the adjustment flange. Place the tool **A. Bearing press** on an impact-resistant surface. Place the adjustment flange with bearing on tool **A. Bearing press**. Hammer the adjustment flange downwards away from the bearing, only use a plastic hammer.



3.4. PLACEMENT OF THE NEW BEARINGS

STEPS + TOOLS	FIGURE
<p>Mount the bearing on the shaft hub. Mount tool A. Bearing press and tool B. Inner ring together. Place the shaft hub on an impact-resistant surface. Place the bearing on the shaft hub, place tool B. Inner ring of the bearing. Hammer the bearing downwards on the shaft hub.</p>	
<p>Check with feeling gauges if there is no gap between the shaft hub flange and the inner ring from the bearing.</p>	
<p>Clean the bearing fitting and mechanic stop thoroughly.</p>	

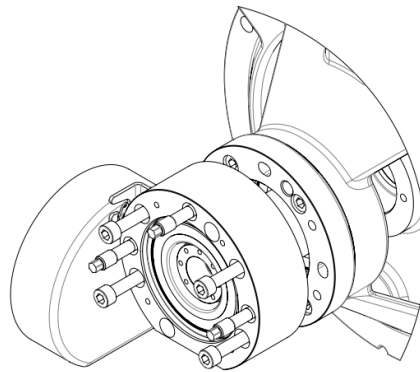
<p>Place the shaft hub with bearing in the end cover. Do not use a hammer on the shaft hub! In case it is needed, only on the outside bearing ring.</p>	
<p>Place the base flange (1101) with the 4 bolts. <i>USDA: Place FDA approved silicon kit between the flange and end cover.</i></p> <p>150-175: Allen key 6 200-250: Allen key 8 300-350: Allen key 10</p>	
<p>Mount the bearing on the adjustment flange. Mount tool A. Bearing press and tool D. Center ring together. Place the adjustment flange on an impact-resistant surface where it cannot damage from the surface. Place the tool on the bearing. Hammer the bearing downwards in to the adjustment flange.</p>	
<p>Make sure the bearing is totally in. Check this with a feeler gauge.</p>	

Place the adjustment flange and bearing on the shaft hub. **USDA: Place extra gasket between flanges!**

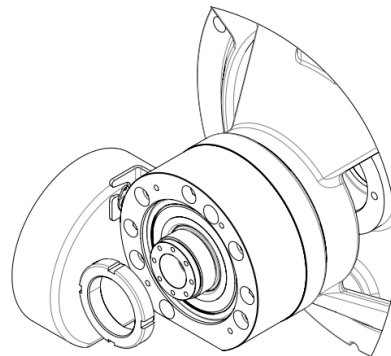
Do not turn the taper bolts in completely. Use only the first 2/3 threads of the taper bolts for mounting.

The fitting from bearing to shaft hub is slide fitting. When it is necessary only hammer on the inner ring of the bearing using the POM tool **A. Bearing press** and tool **B. Inner ring** together.

Tighten the cylinder bolts so all the play is pushed out. Than release all the bolt with a 90° turn left.
Place the tapered bolts back without any tension.



Place the lock nut on the thread of the shaft hub by hand, use (food grade) grease. Make sure the text on the lock nut is seen from the outside, this means the correct side of the lock nut is against the bearing.

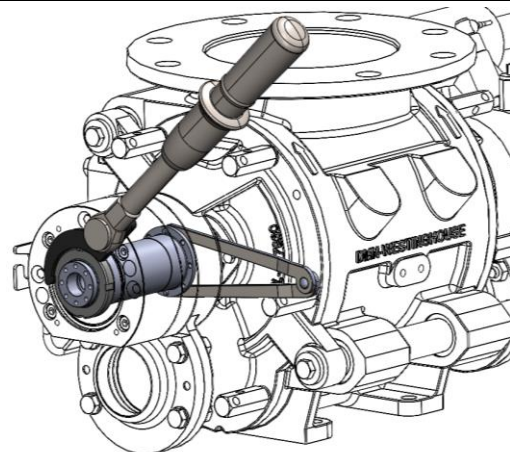


Put the lock nut on pre-tension. This makes sure that the play of the bearings and flanges. Use the following Torque settings:

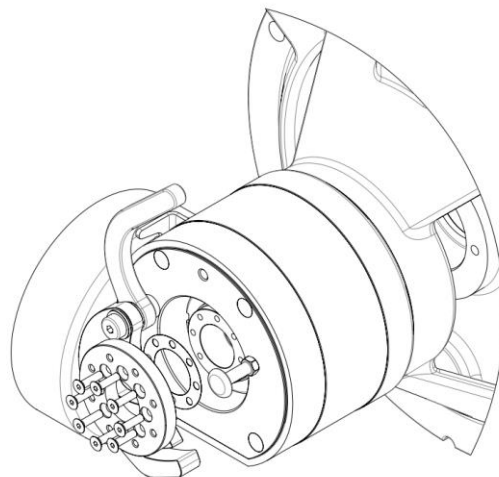
150-175: 15 Nm

200-250: 20 Nm

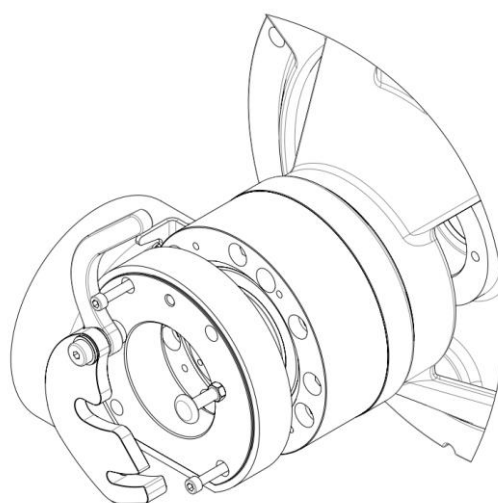
300-350: 25 Nm



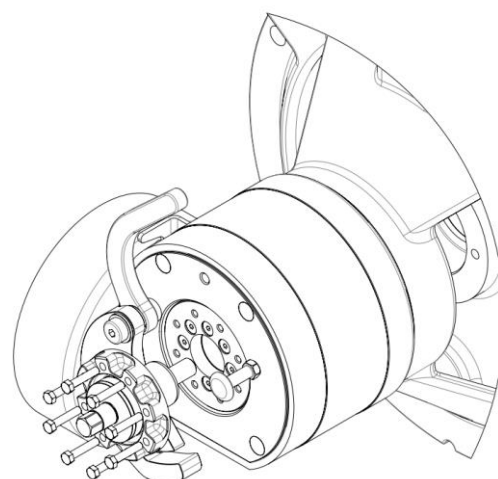
Put the Shims + Shim plate back in place



Mount the cover plate (2 bolts crosswise is enough)
Do NOT use the plastic caps



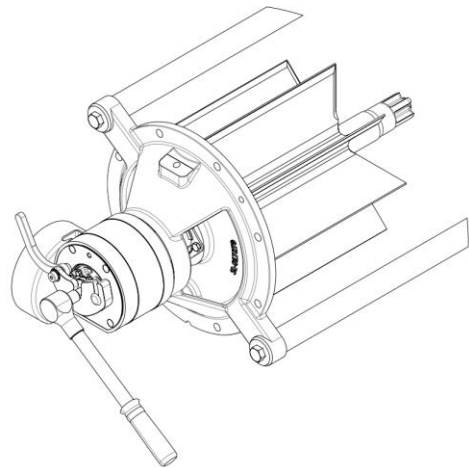
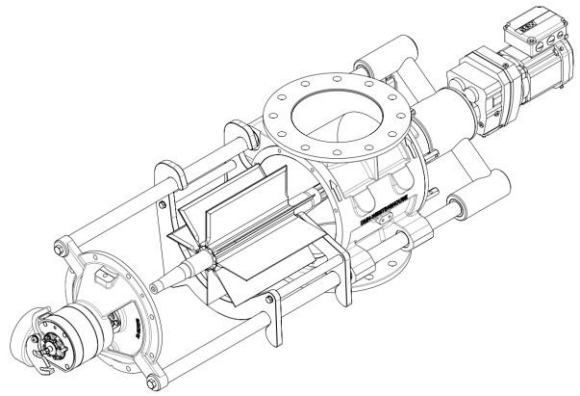
Mount the End stop



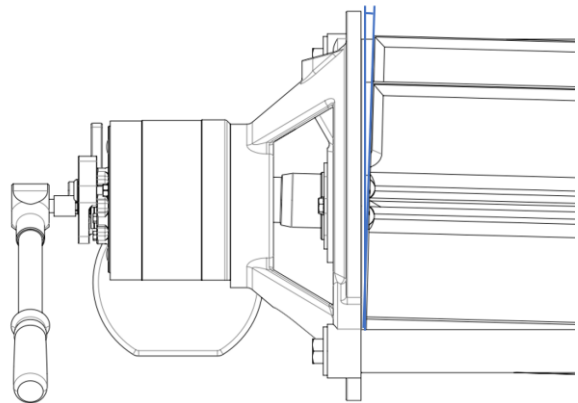
Slide the rotor in the shaft hub with use of the cradle and pull the rotor in with use of the Center bolt. Leave a gap axial of 1-2 mm between the end cover and the rotor at NDS.

Be careful to not damage the rotor and end cover by turning the rotor. If the rotor is in the shaft hub and the rotor alignment is not adjusted.

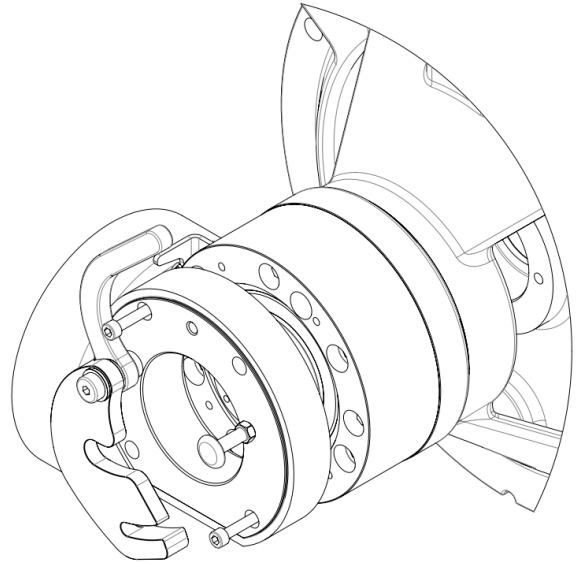
Remove the cradle



Now the rotor is not aligned.



Remove the cover Flange by loosening the two bolts.



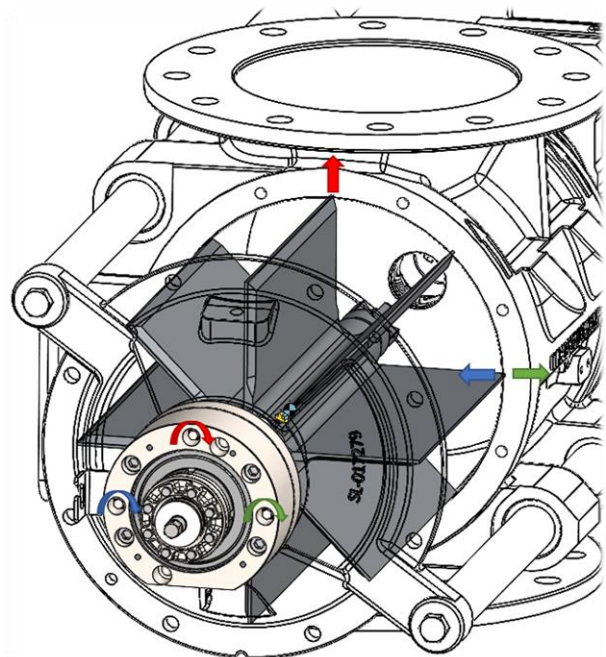
Adjust the rotor by tightening the taper bolts (1109) so that it is in the centre of the body. When tightening, the rotor moves *towards* the side of the bolt.

NOTE:

- **Tighten top taper bolt:** the rotor goes up, unscrewing it rotor goes down due to gravity.
- **Tighten left taper bolt:** the rotor goes to the left.
- **Tighten right taper bolt:** the rotor goes to the right.
- **Left** and **right** work together and cannot be tightened independently. If you want to tighten the left one, loosen the right one first a little bit.

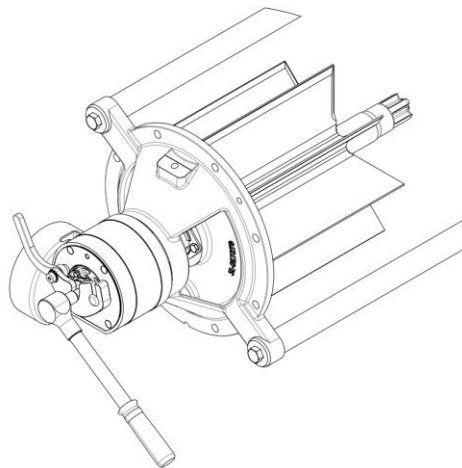
Turn the rotor when adjusting so that the rotor is not touching the body radial. Start with the smallest feeler gauge (0.05 mm), when the rotor can turn freely, take a bigger feeler gauge (0.08 mm) adjust so the rotor is rotating freely without getting stuck by the gauge on top, right, bottom, and left side.

When the prescribed clearance is bigger than standard, use thicker gauges.

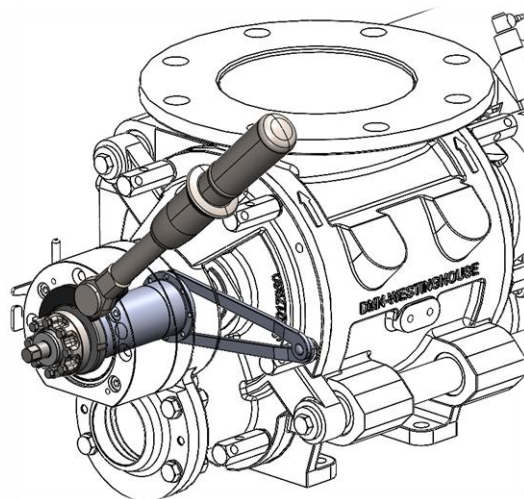


Pull the rotor against the end stop with use of the Center bolt. Following torque settings:
150-175: 17-21 Nm
200-250: 20-25 Nm
300-350: 35-40 Nm

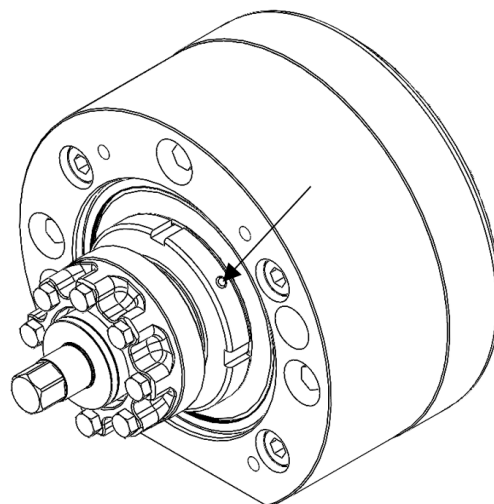
(This can be done with use of the pin wrench to block the shaft hub from moving. Otherwise place the cover flange back to block it.)



Put the lock nut on pre-tension. This makes sure that the play of the bearings and flanges. Use the following Torque settings:
150-175: 25 Nm
200-250: 30 Nm
300-350: 40 Nm



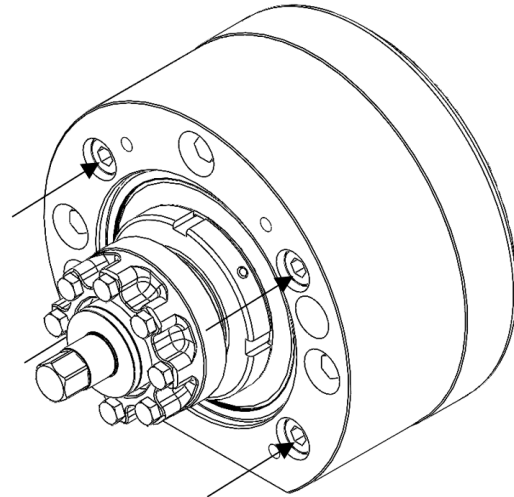
Tighten the lock nut: Tighten the lock screw with an allen key.



Tighten the adjustment flange (1102) by tightening the bolts.

150-175: Allen key 6
200-250: Allen key 8
300-350: Allen key 10

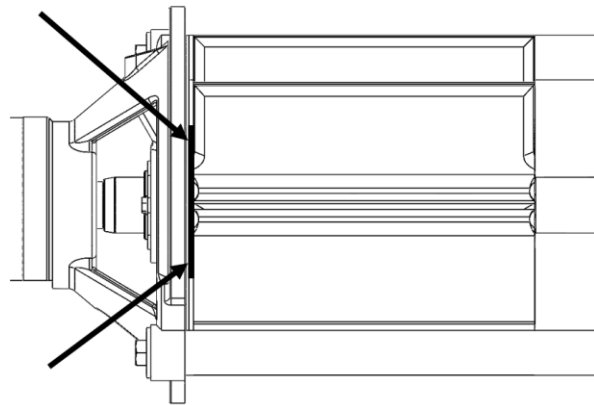
Check the radial clearance once again. If adjustment is needed. Loosen the cylinder bolt and make the adjustment. Repeat until satisfied.



Check the axial clearances with feeler gauges. The measured value needs to be within the order specific defined clearances. Otherwise an adjustment needs to be made.

When a shim is added the clearance between the NDS end cover and the rotor will be less.
When a shim is removed the clearance between the NDS end cover and the rotor will be more.

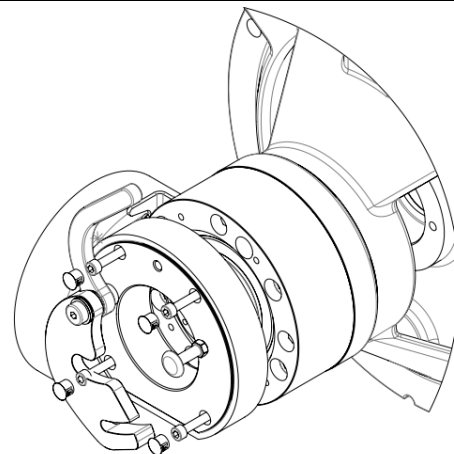
Check the clearances around the rotor shaft. Especially with the bigger valves. The guiding rods can bend and therefore the rotor and end cover can be on an angle compared to each other. This is minimal near the shaft.



Place cover flange (1103) by tightening the bolts.
USDA: Place extra gasket between flanges!

150-175: Allen key 5
200-250: Allen key 5
300-350: Allen key 6

Place white plastic caps (1136) with hand.
And place back the red cap.
The cover can stay open, excess needed removing the drive side bearings.



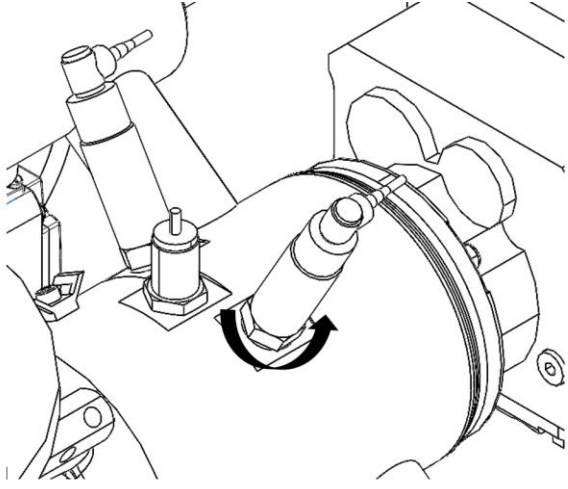
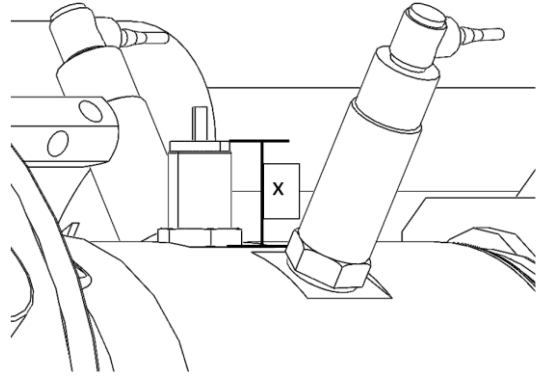
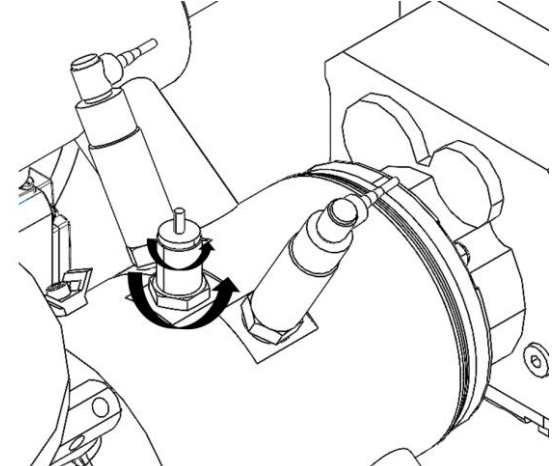
4. DRIVE SIDE BEARING REPLACEMENT

4.1. FOLLOW STEPS FROM CHAPTER 1 GENERAL INSTRUCTIONS

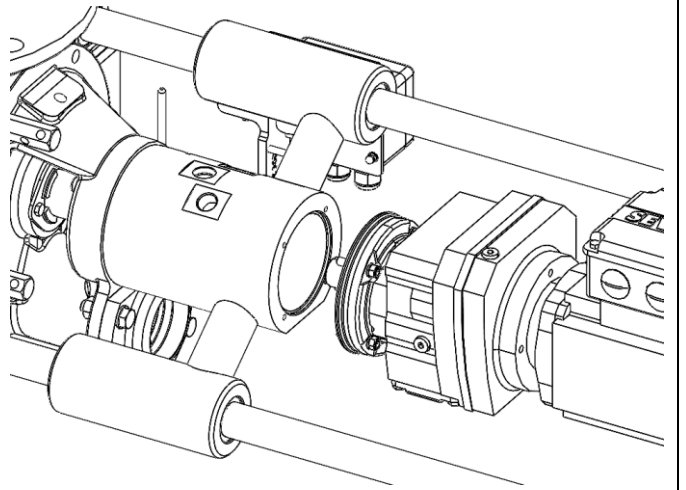
Make sure all the steps from chapter 1 General instructions are followed.

4.2. REMOVING THE BEARINGS FROM THE DRIVE SIDE END COVER

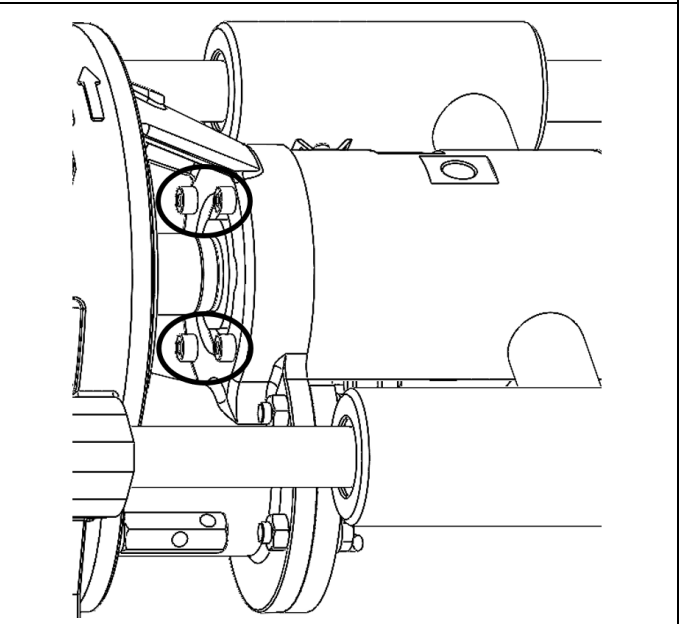
WARNING: When RID or zero speed sensor is applied remove the sensors **FIRST**. If not, damage will occur, causing these sensors to no longer function.

<p>[When RID is applied] Loosen RID connectors by hand and remove RID probes with wrench.</p>	
<p>[When a zero speed sensor is applied] Measure "Dimension X" and write this value down for reassembly usage.</p>	
<p>[When a zero speed sensor is applied] Loosen or remove inductive sensor. Use a wrench to loosen the nut. Loosen the sensor by hand.</p>	

Remove the drive by unscrewing the bolts. (For MZC-I and MZC-II)

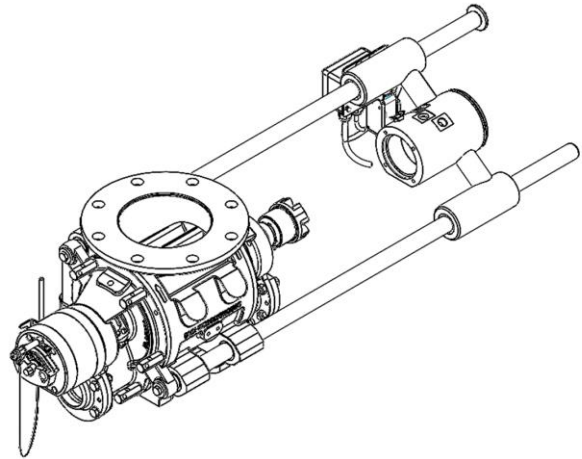


[For MZC-I and MZC-II]
Remove adaptor piece / DSSU loosen cylinder bolts (522).

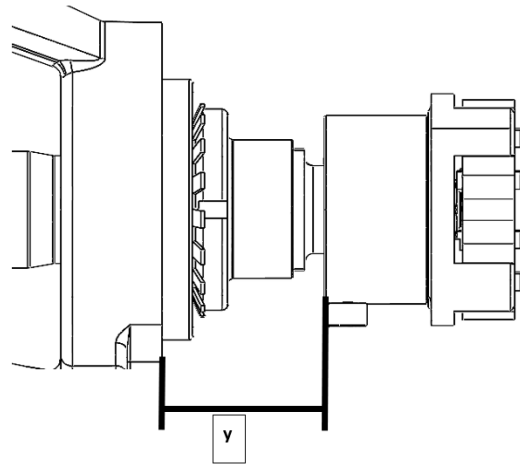


[For MZC-II bearing replacement]
Slide DSSU (108) away.

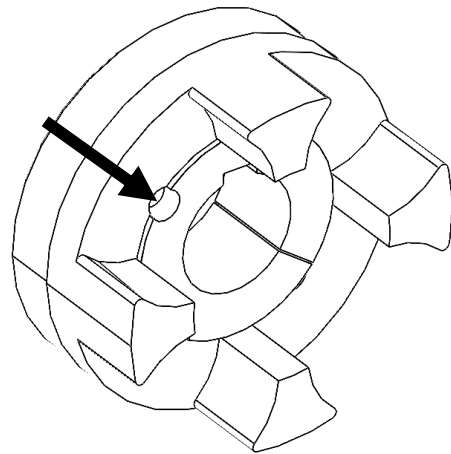
If linear bearings of the Drive Side Sliding Unit needs to be replaced. Go now to chapter 4.4 Replace linear bearings Drive Side Sliding Unit.



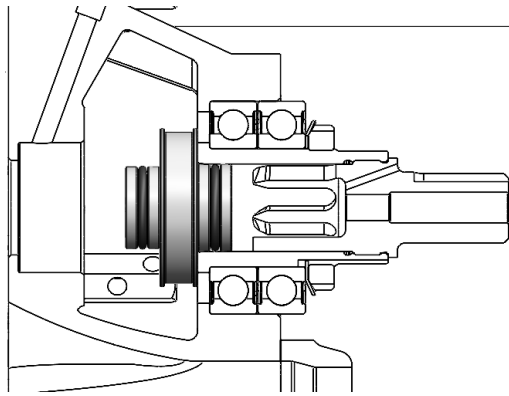
Measure "Dimension Y": distance from end cover to coupling (504) and write this value down for reassembly usage.



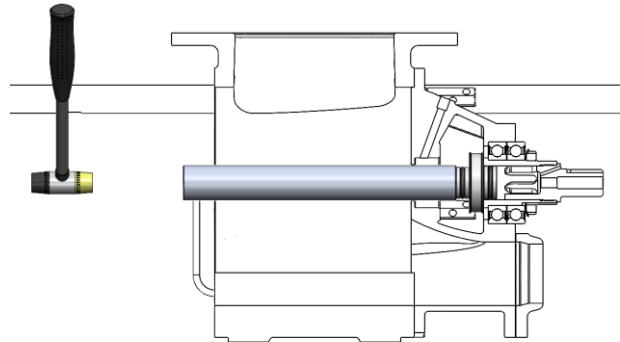
Remove Rotex coupling by loosening the setscrew(s)



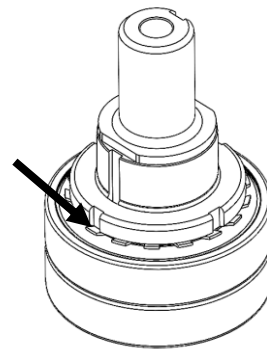
Place tool **E. Bearing Press Hub Protection** in drive shaft.



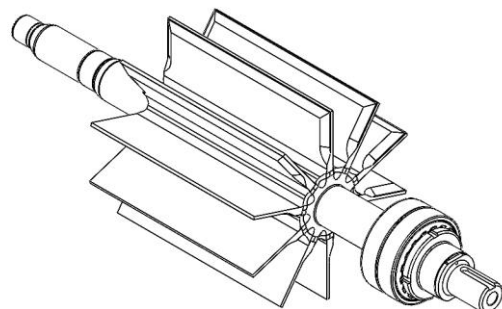
Use tool **F. Extension rod** and **E. Bearing Press Hub Protection** to remove the drive shaft from end cover drive side.
Tap from the inside to remove the drive shaft.



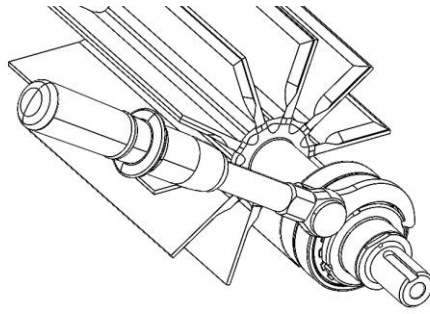
Tap on the bended lip of the lock ring (236) so it becomes straight.



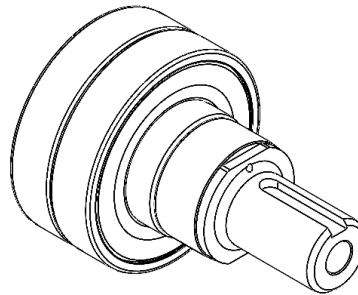
Remove coupling (504) and place drive shaft assembly on the rotor.



Loosen lock nut (235) with the Hook wrench.
(Remove safety stop lock nut and remove safety stop.)

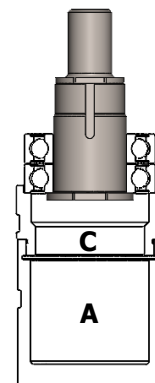


Remove lock nut (235) and lock ring (236).
Remove drive shaft from rotor.

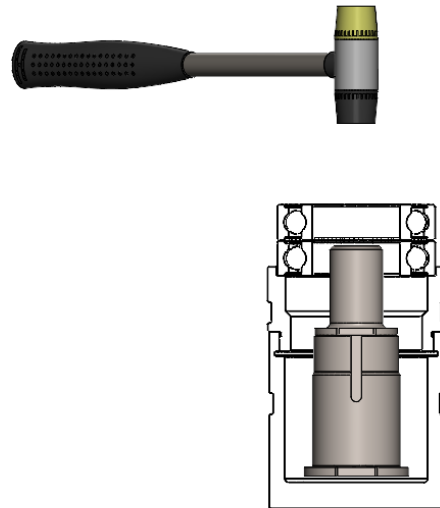


Mount tool **A. Bearing press** and tool **C. Outer ring** together and place the bearings on the tool. Tap the drive shaft through the bearings.

WARNING: This procedure destroys the bearing because force is put on the inner ring and the outer ring. Therefore the bearing balls will deform the rings.

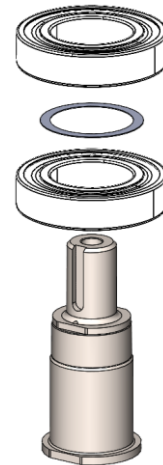


Tap until the drive shaft is totally loose from the bearings. **Save the shim between the bearings!**
Dispose the old bearings.



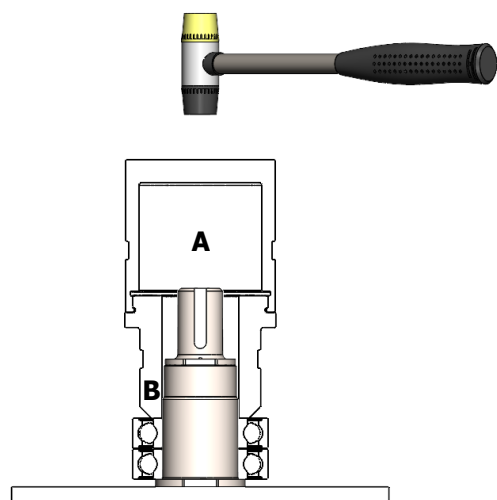
4.3. PLACING THE BEARINGS ON THE DRIVE SIDE END COVER

Place the bearings with the shim ring back on the drive shaft.

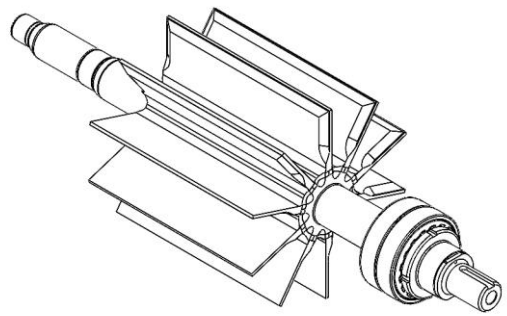


Use tool **A. Bearing press** and tool **B. Inner ring** to tap down the bearings.
Make sure that the bearings are against the flange of the drive shaft.

WARNING: Do not tap the outer bearing. This will destroy the bearings!

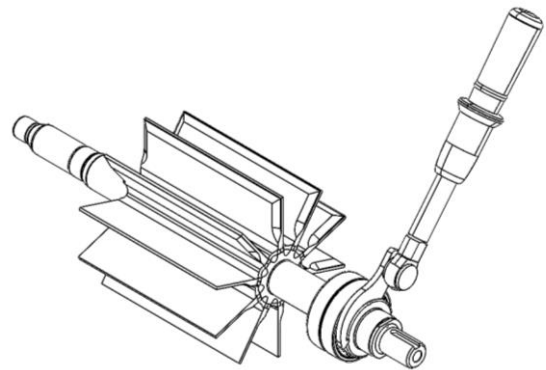


Place the drive shaft on the rotor drive side.

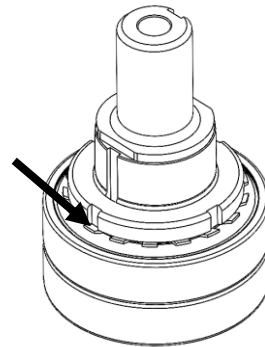


Turn the lock nut with the torque wrench and hook.
Use as minimum the following Torque settings:
150-175: 15 Nm
200-250: 20 Nm
300-350: 25 Nm

Then turn so far one lip of the ring aligns with the lock nut.

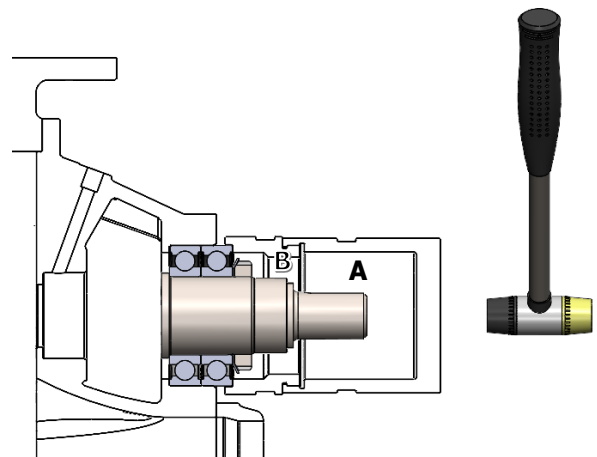


Tap on one of the lips of the lock ring (236) so it locks in one chamber of the lock nut.

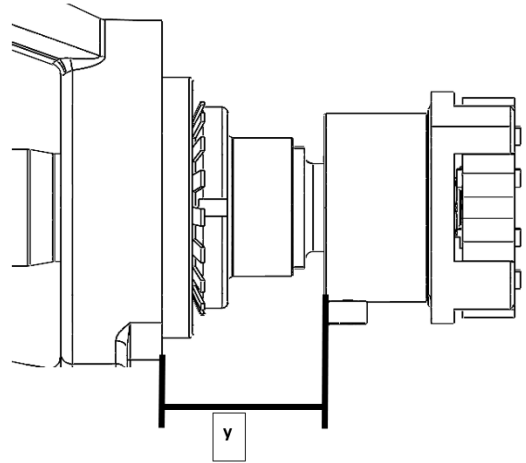


Place the drive shaft in the end cover and use tool **A. Bearing press** and tool **C. Outer ring** to tap in the bearings via the outer bearing rings.

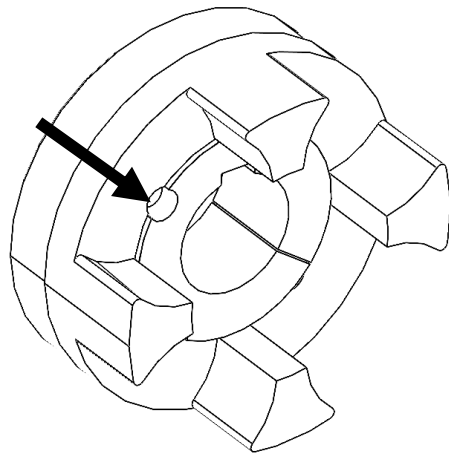
WARNING: Do not tap the inner bearing or drive shaft to get the bearings in. This will destroy the bearings!



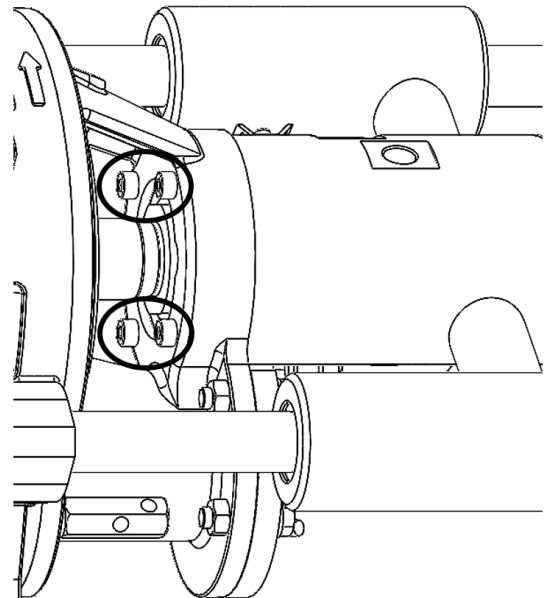
Place back the rotex coupling on dimension y (previously measured).



Lock rotex coupling with set screws.

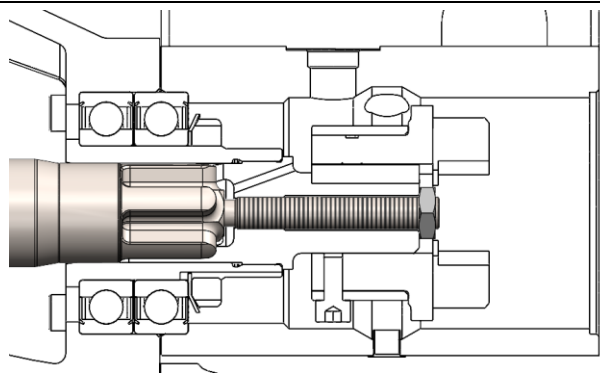


Place back the adaptor piece and mount the bolts.

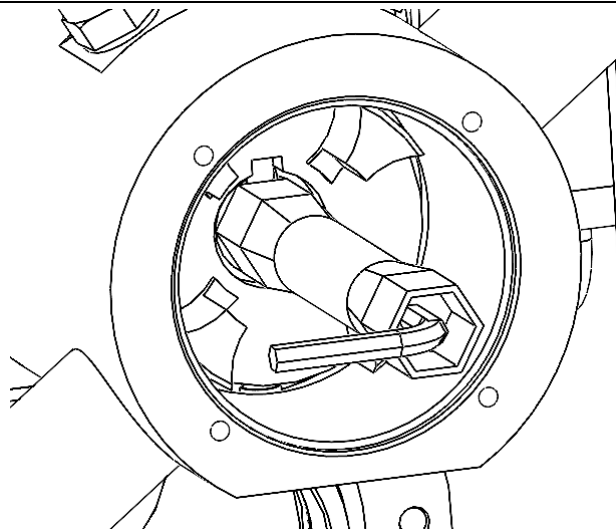


Place the safety stop with lock nut back in place with an allen key.

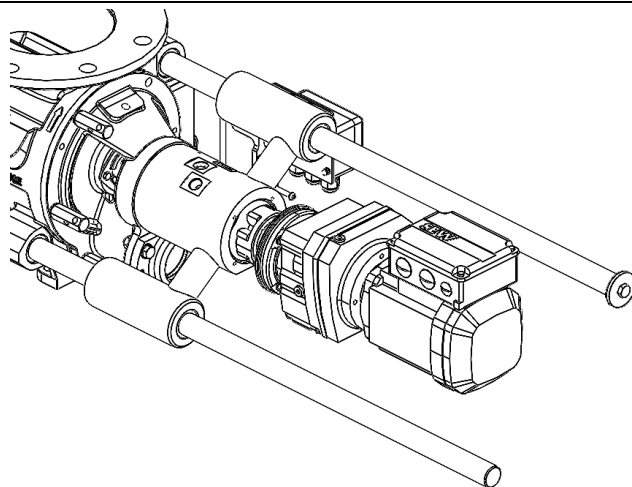
1. Place the lock nut at the end of the thread.
2. Turn the safety stop against the rotor so it barely touches with the allen key.



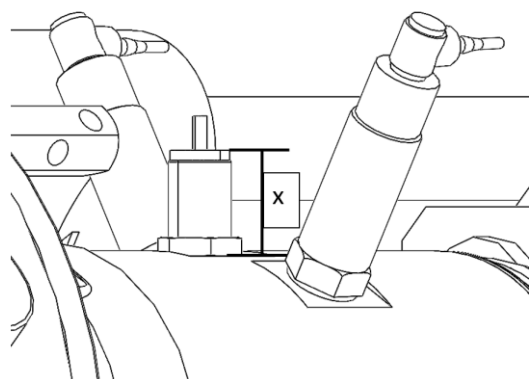
3. Place a tube wrench over the lock nut, than place the allen key in the safety stop. Lock the allen key on this position and turn the tube wrench so the safety stop is locked.



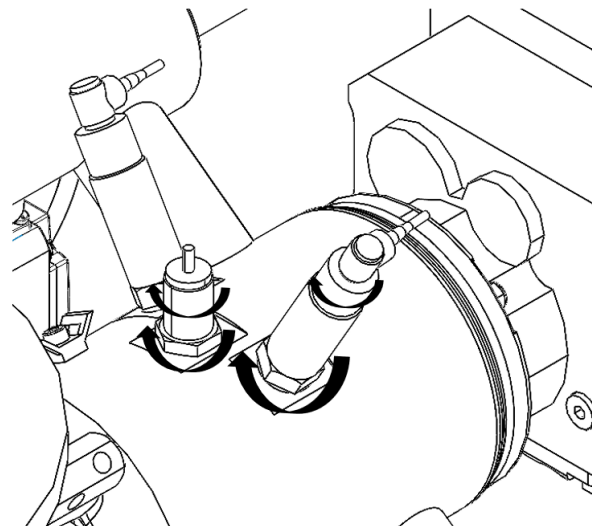
Place the drive back and bolt them with a wrench.



[When a zero speed sensor is applied]
Place inductive sensor and lock nut.
Measure the height and make it the same as the previously measured dimension x.
Use a wrench to tighten the nut.
Check height again.



[When RID is applied]
Place back the RID probes and tighten with a wrench.
Tighten RID connectors by hand.

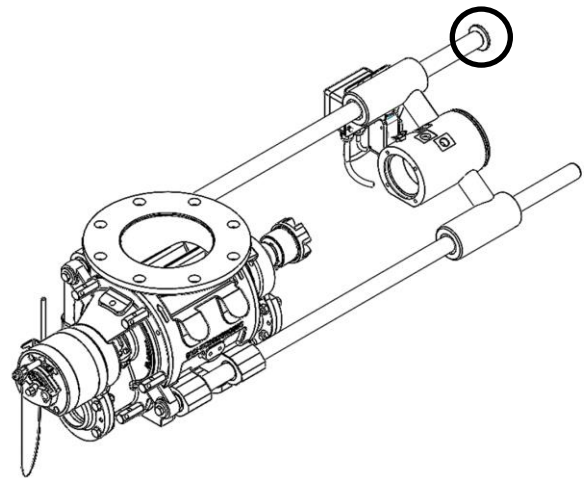


4.4. REPLACE LINEAR BEARINGS DRIVE SIDE SLIDING UNIT

Remove stopping plate with a wrench.

Warning: the DSSU is heavy, use lifting equipment!

Remove cables attached to the DSSU.
Slide DSSU (108) from the guiding rods.



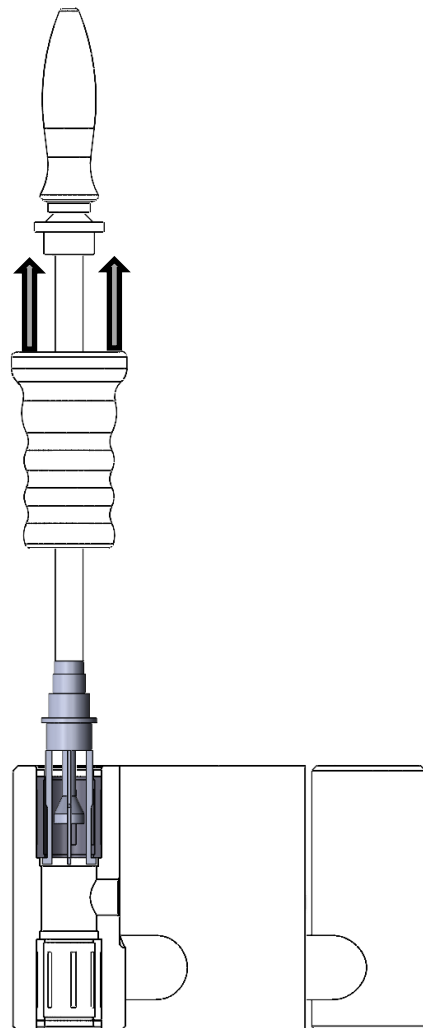
Place the DSSU on an impact-resistant surface.
Use the SKF Internal Bearing Puller Kit TMIP 30-60 to remove the bearings. Place the edges of the tool after the linear bearing. Open up the head by screwing. Tap out the bearings.

Do this for all the bearings that need to be changed.

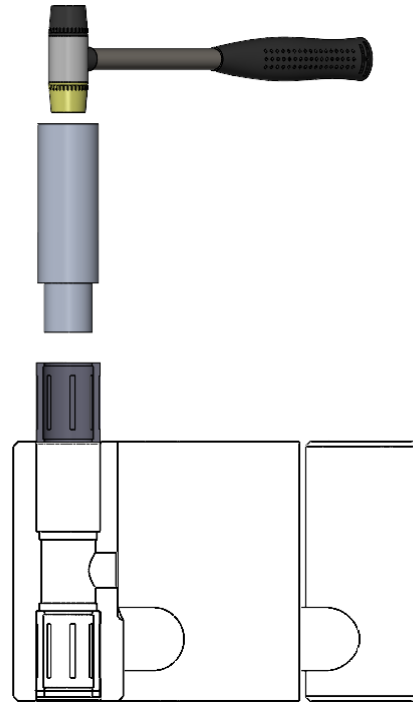
SKF user instructions:

<https://www.skf.com/group/products/maintenance-products/mechanical-tools-for-mounting-and-dismounting/bearing-pullers/internal-pullers>

QR code to SKF:

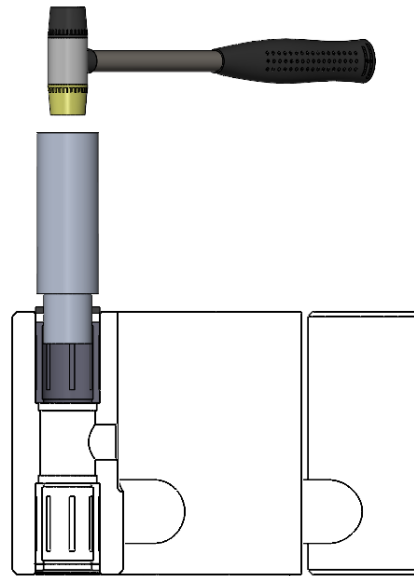


Clean the bearing fitting thoroughly.
Place the linear bearing on the fitting. Then place the aluminium rod in the bearing, tap down the bearing until it is against the stop edge.



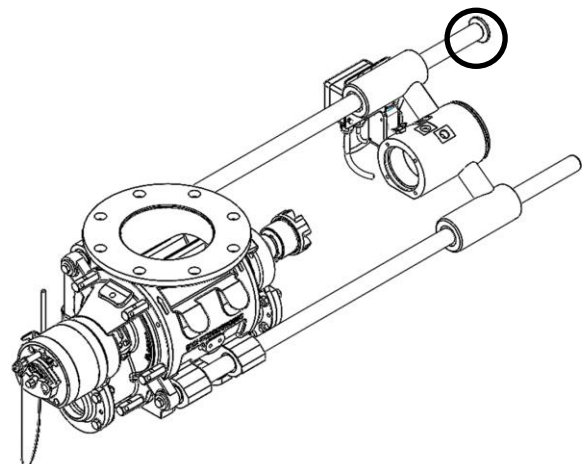
Then place the simmering with the lip aimed to the hammer. Place the aluminium rod and tap the simmering in the fitting until it is fully in the fitting.

Do this for all the bearings that need to be changed.



Warning: the DSSU is heavy, use lifting equipment!

Place the DSSU (108) on the guiding rods.
Place the stopping plate with a wrench.
Attach the cables to the DSSU.

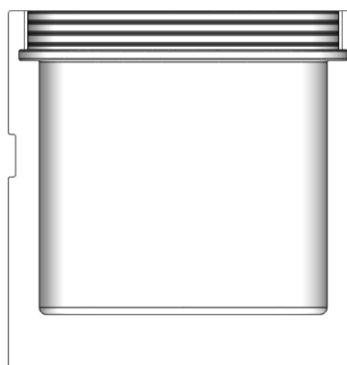


5. INSTRUCTION – USDA ACCEPTED ROTARY VALVE

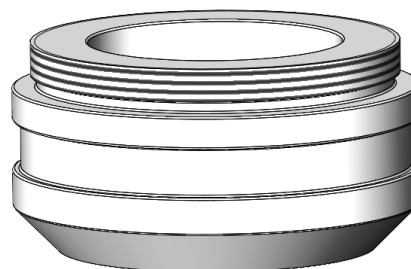
6. TOOLS

Tools in Service toolkit

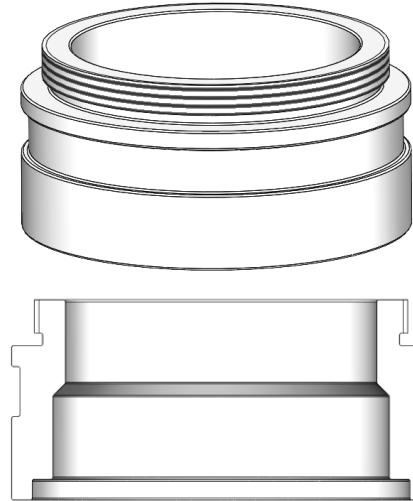
A. Bearing press



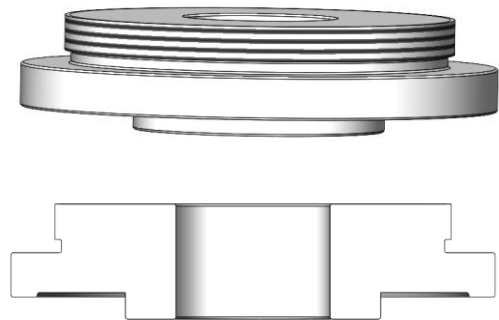
B. Inner ring



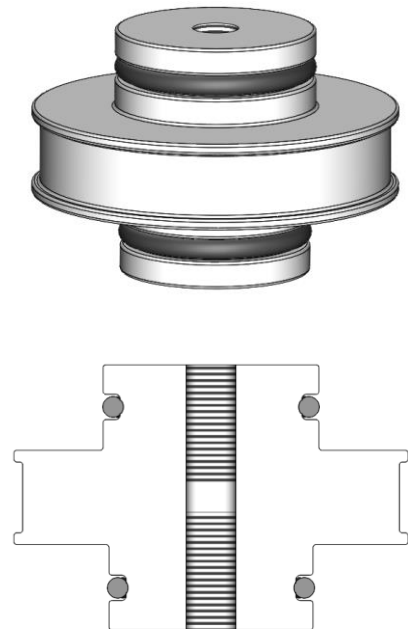
C. Outer ring


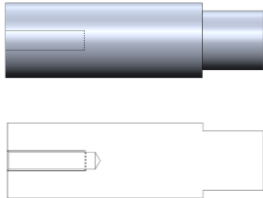
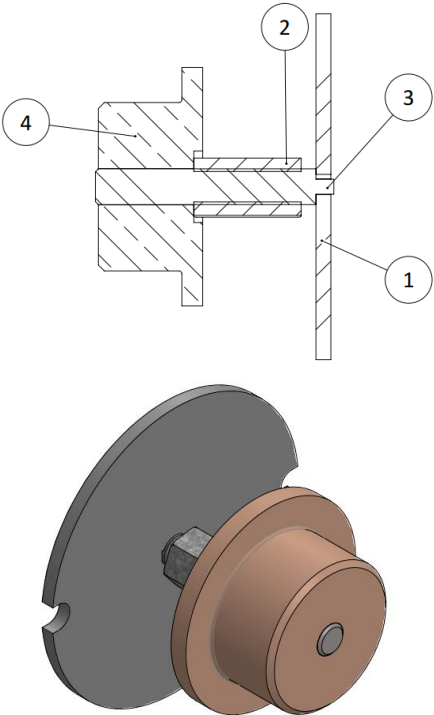


D. Center ring





E. Bearing Press Hub Protection (150-175 and 200-250)



<p>F. Extension rod</p>	
<p>G. Linear bearing bush</p>	
<p>H. Bearing press 300-350</p>	

Standard tools, not in Service toolkit

<p>SKF Internal Bearing Puller Kit TMIP 30-60</p>	
<p>GEDORE Pin Wrench: 150-175, 200-250: <i>6354560 44 4 Face pin wrench 4 MM</i></p> <p>300-350: <i>6354720 44 6 Face pin wrench 6 MM</i></p>	

<p>Beta Click-type torque bar Size: 006690205 669N/5</p>	
<p>Beta Adaptor hook spanner for torque wrench Size: 006590815 659/15</p>	
<p>Beta Hook wrench 006500968 650H 14X18-68/75 006500980 650H 14X18-80/90</p>	
<p>Tube wrench Wrench 19 Wrench 30</p>	