

Service guide

Energy Recovery Device

MPE 70

Disassembling and assembling

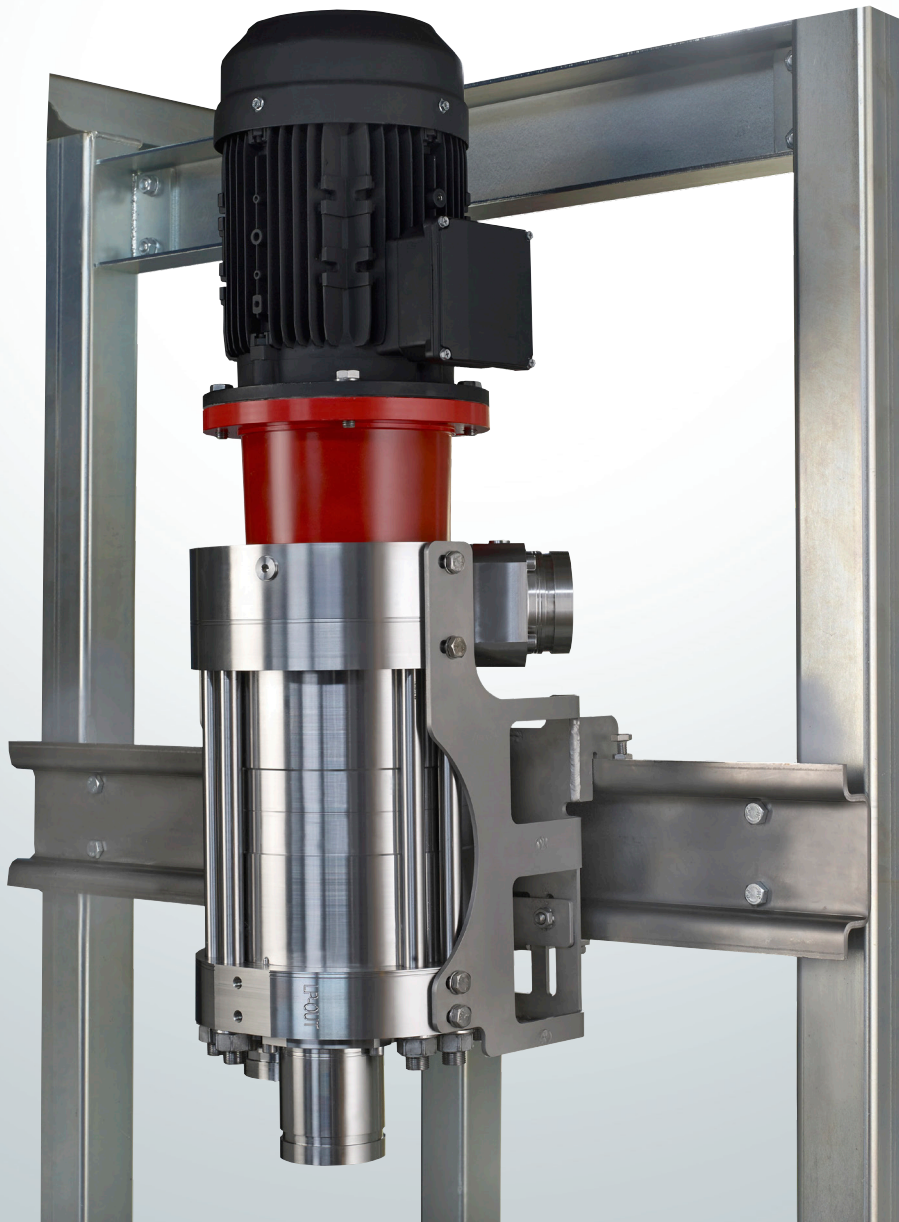


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1. Introduction

This document covers the instructions for disassembling and assembling the MPE 70.

Important: It is essential that the MPE 70 is serviced in conditions of absolute cleanliness.

For a better understanding of the MPE 70, please see the exploded view in the section 4.

- 2 x Screw M8x50
- Tool for backup ring
- 2 x Tool for valve plate
- Tool for shaft seal
- Calibration tool
- 4 x Feet
- 8 x M10 x25 (feet)
- 8 x Washers Ø12.6 for feet

The weight of the MPE 70 alone is about 114 kg (251 lb) dry and it must be lifted with suitable lifting equipment.

To prevent cold welding, Danfoss recommend only to use food grade lubricants for all screw threads for assembling the MPE (here after only referred to as lubricate) and first tighten the screws by hand.

Tool set for servicing the MPE 70 (180F4177)

- Parts included in tool set:
- Lifting eye M6
 - Lifting eye M8
 - 2 x Lifting eye M12
 - Torque wrench 4-20 Nm
 - Torque wrench 20-100 Nm
 - Torque wrench 60-340 Nm
 - Extension 3/8" , length 250 mm
 - 2 x Screwdriver 5,5 x 1 mm
 - Screwdriver small
 - Nylon Hammer
 - Wrench 10 mm
 - Wrench 30mm
 - Hex socket 6 mm, 3/8"
 - Hex Socket 10 mm, 3/8"
 - Hex Socket 30 mm
 - Socket 17mm 3/8
 - Allen key 2.5 mm
 - Allen hex head 5 mm (3/8)
 - Allen hex head 8 mm (3/8)
 - 2 x Screw M6x60
 - 2 x Washer Ø12.0/Ø6.4
 - 2 x Nut M6



Transport and Handling

Personnel involved in lifting and transportation of the equipment must be trained in proper handling and safety procedures. Observe the local regulations regarding lifting. Use suitable, permitted lifting equipment. Be aware of individuals located in the operation area while lifting the component.

The weight of the MPE 70 including electric motor can be found in the data sheet. Use suitable lifting devices, e.g. an overhead crane or forklift.

For servicing:

The MPE 70 can be serviced in two ways - either be removed from the rail incl. the bracket disassembled on the rail (leaving the bracket and port flange on the rail). The second option has the advantage that the connectors to the port flange (HP-in and LP-out) can stay and the bracket will keep the position and does not require a new alignment.

The second option is described in chapter 5.



When lifting the unit use the lifting eyes. Make sure that the load is balanced before attempting the lift.



Do not use connections/nozzles for lifting.

2. Removing the MPE 70 incl. bracket from the rail and prepare for servicing

The motor and bell housing can either be removed before or after the unit is removed from the rail.

Safety screws

Screws on bottom piece

1. Remove the two safety screws and loosen the two screws on the bottom piece.

2. Install the lifting eyes from the tool kit into the thread holes of the motor flange of the MPE 70. Use jacking beam and two slings connected to the two lifting eyes. Carefully lift the unit off the rail.

Install the protective plastic caps on the connectors.

Remove the bracket by removing the eight M 10 bolts using 17 mm socket.

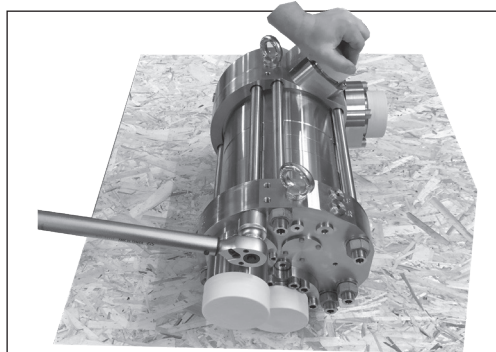
3. Remove the electrical motor from the bell housing by unscrewing the 4 bolts using a 19 mm wrench.

Remove the bell housing from the MPE 70 by unscrewing the 4 bolts inside the bell housing and remove the bolts and washers using a 13 mm socket and extension tool.

Carefully remove the bell housing from the MPE 70.

4. Loosen the screw in the coupling using a 4 mm Allen key. Carefully remove the coupling without damaging the shaft (sometimes a puller is needed). Remove the key in the shaft.

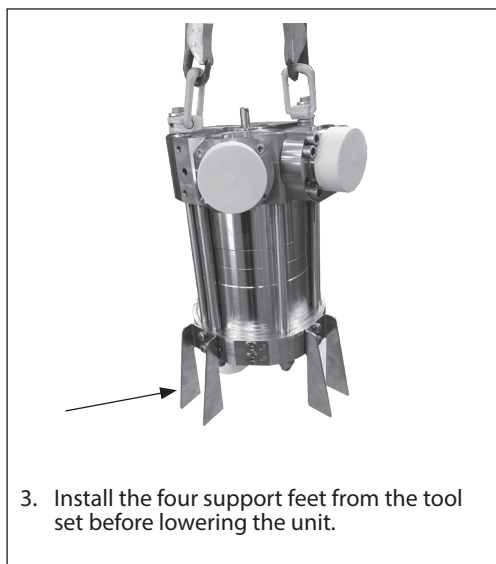
3. Disassembling the MPE 70



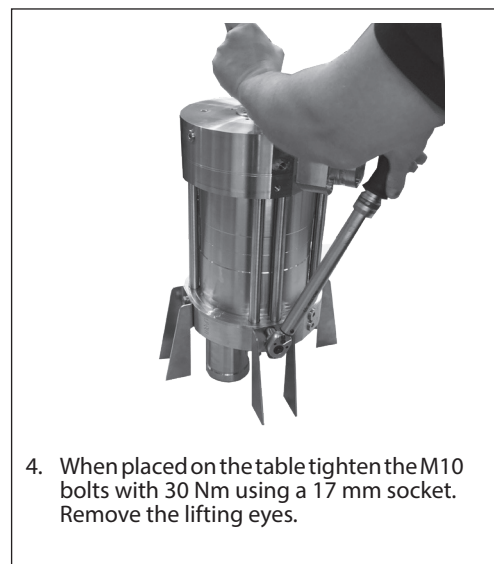
1. Place the MPE 70 with plastic caps on the connectors on a wooden board. Loosen the M20 nuts on the stud bolts using 30 mm socket.



2. Install the lifting eyes from the tool set to the thread holes at the shaft end of MPE 70. Carefully lift the unit into vertical position **without damaging the connectors**.



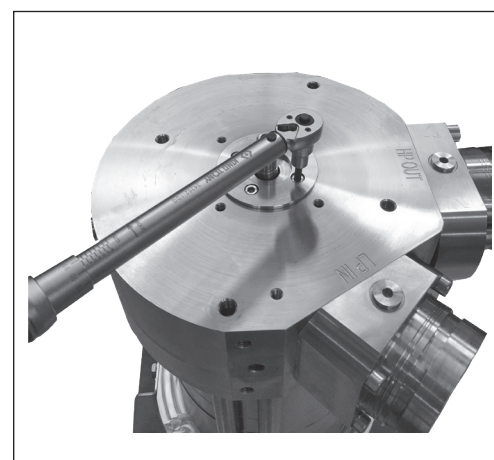
3. Install the four support feet from the tool set before lowering the unit.



4. When placed on the table tighten the M10 bolts with 30 Nm using a 17 mm socket. Remove the lifting eyes.



5. By hand remove the dust cap (pos. 143) from the shaft.



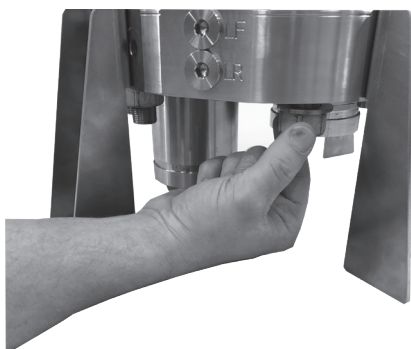
6. Remove the four M6 screws from the shaft seal cover using a 6 mm Allen key or socket.



7. Remove the cover. If the shaft seal cover can't be removed easily, screw in 2 x M8x50 bolts from the tool set which will push out the shaft seal cover.



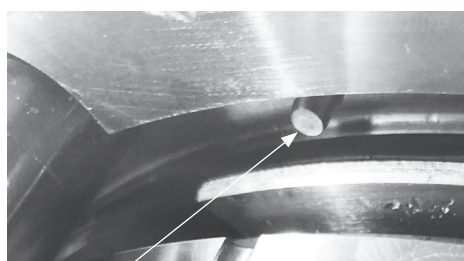
8. Lubricate the shaft seal with clean filtered water and carefully remove the shaft seal using 2 screwdrivers.



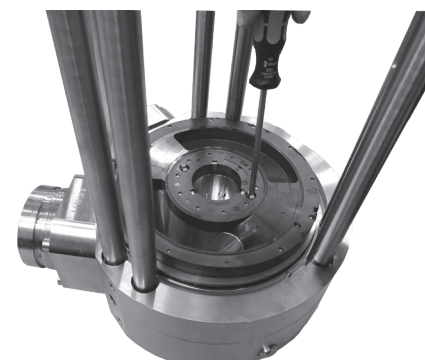
9. Remove the nuts for the M20 stud bolts and washers.



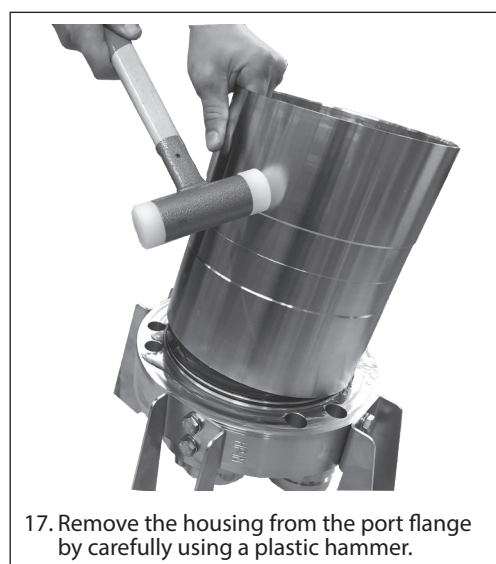
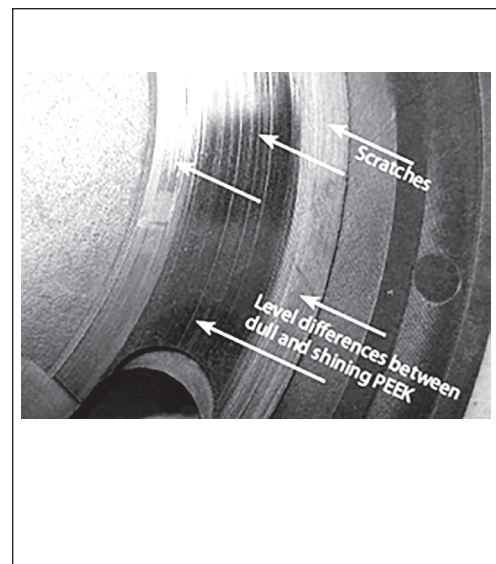
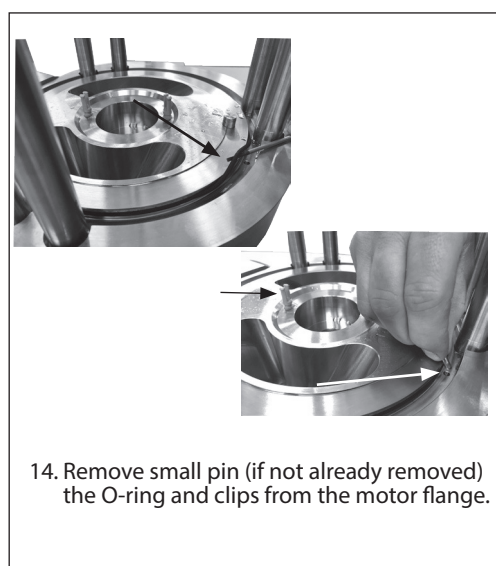
10. Carefully lift off the motor flange.

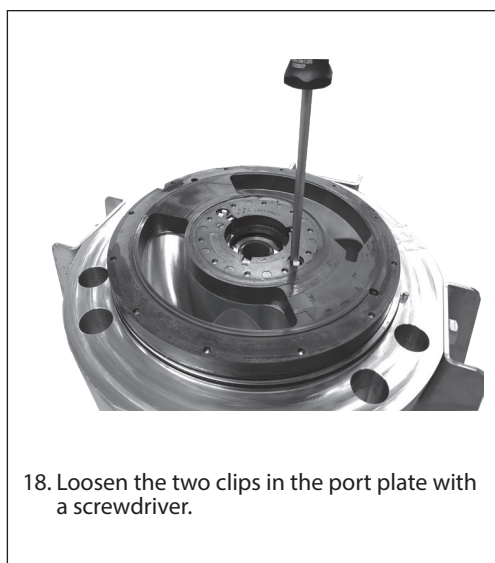


11. Remove pin (pos 113) (the pin may fall out) on bottom side of the motor flange.

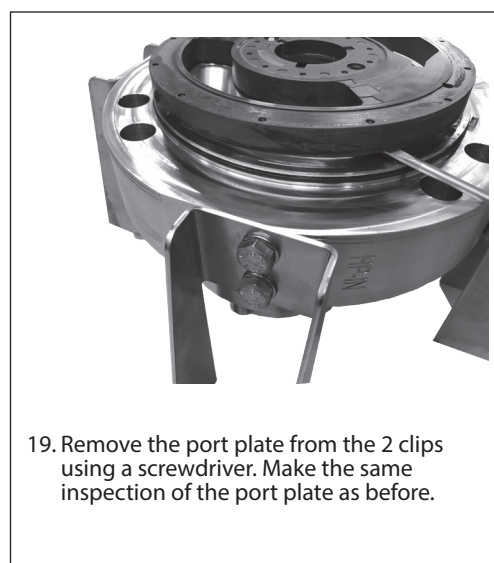


12. Place the motor flange on the table and loosen the two clips in the port plate with a screwdriver.





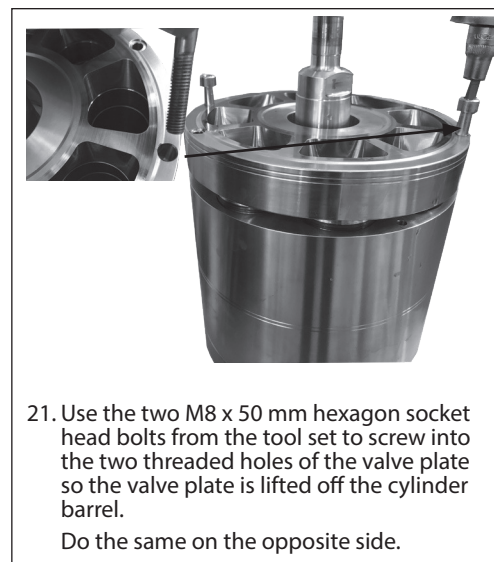
18. Loosen the two clips in the port plate with a screwdriver.



19. Remove the port plate from the 2 clips using a screwdriver. Make the same inspection of the port plate as before.



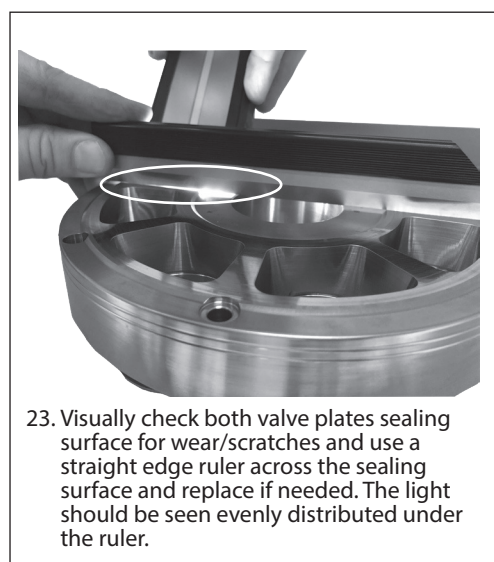
20. Remove the O-ring, clips and small pin (the pin may fall out) from the port flange.



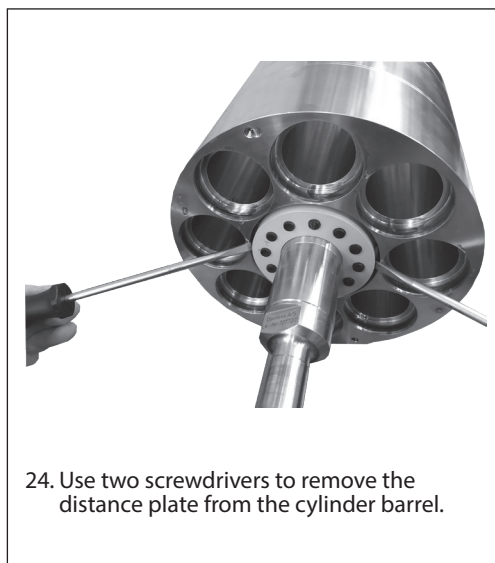
21. Use the two M8 x 50 mm hexagon socket head bolts from the tool set to screw into the two threaded holes of the valve plate so the valve plate is lifted off the cylinder barrel. Do the same on the opposite side.



22. Remove O-rings and back-up rings from valve plates using a small screw driver.



23. Visually check both valve plates sealing surface for wear/scratches and use a straight edge ruler across the sealing surface and replace if needed. The light should be seen evenly distributed under the ruler.



4. Assembling the MPE 70

WARNING:

Do not use silicone when assembling the MPE 70. Do not reuse disassembled O-rings and the shaft seal as they might be damaged.

Always use new O-rings.

Lubrication:

- To prevent seizing-up, lubricate all threads.
- It is important to lubricate ALL parts to be assembled with clean filtered water (Especially all PEEK parts).

Important:

It is essential that the MPE 70 is serviced in conditions of absolute cleanliness. All parts must be completely clean before mounting.



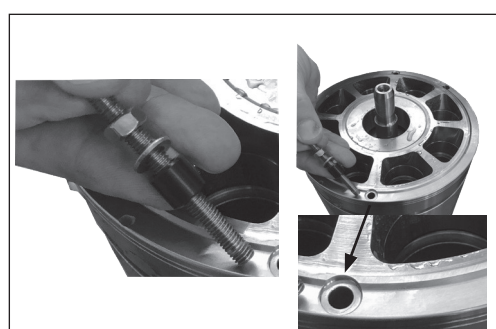
1. Lubricate the new back-up rings, O-rings and the valve plates with clean filtered water. Place the back-up rings in the grooves. **Make sure back-up rings are not twisted.** Calibrate the backup rings using the calibration tool from the tool set.




2. Mount the O-rings. **Proper mounting is very important!!!**




3. Before assembly lubricate all parts with clean filtered water.




4. On the cylinder barrel side with the short shaft end:
Place the valve plate with the 2 holes with the undercut over the 2 thread holes in the cylinder barrel.
Mount the tool for valve plate (2 x M6 screws, 2 x M6 nuts, 2 x M6 washers and bushings) only by hand in the holes with the undercut.



5. Cross tighten the 2 x M6 nuts to press down the valve plates equally all the way in until you feel a small resistance (max. 10 Nm). Remove the tool for valve plate.




6. On the cylinder barrel side with the long shaft end: Install new or reset distance plate to the cylinder barrel.



Before **After**

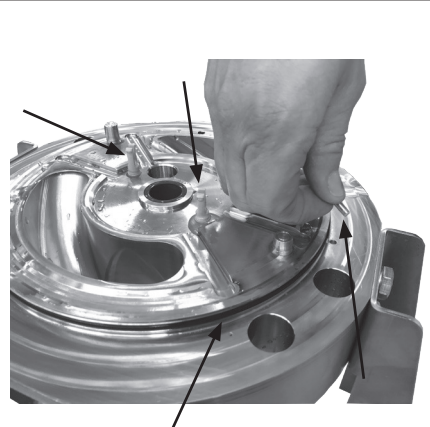
7. Instruction to reset distance plate:
On a used distance plate, the pins will be pressed into the disc.
Before reinstalling the distance plate, the pins must be pressed into the disc so that they protrude 4,25 mm +/- 0,5 mm both sides. Use e.g. two nylon tubes. One with an outside diameter of Ø45 mm to Ø 50 mm. The other with an outside diameter of min. 60 mm.



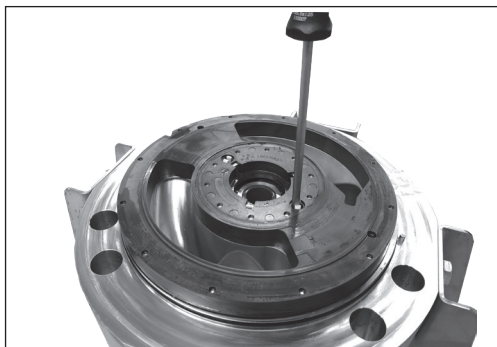
8. Place the valve plate with the 2 holes with the undercut over the 2 thread holes in the cylinder barrel. Mount the tool for valve plate only by hand in the holes with the undercut.



9. Mount the 2 x M16 washers from the tool set equally between the 2 screws. Cross tighten the 2 x M6 nuts to press down the valve plates equally. The valve plate should only be pressed in until it is still possible to remove the 2 x M16 washers (2-3 mm space left). Remove the tool for valve plate and the M16 washers.



10. On the port flange replace the O-ring, clips and small pin with new ones.



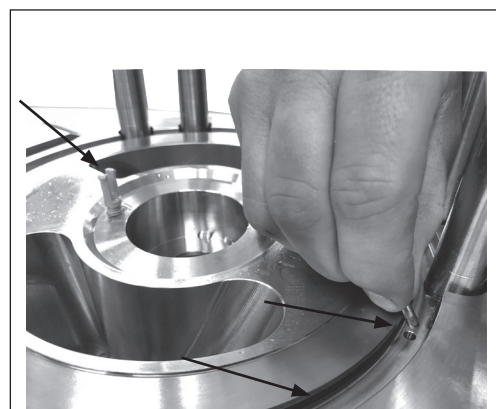
11. Lubricate the port flange and port plate with clean filtered water.
Reassemble the port plate to the port flange and screw in the two new clips with a screwdriver. Do not use force!
Make sure that the clips are below the port flange surface.



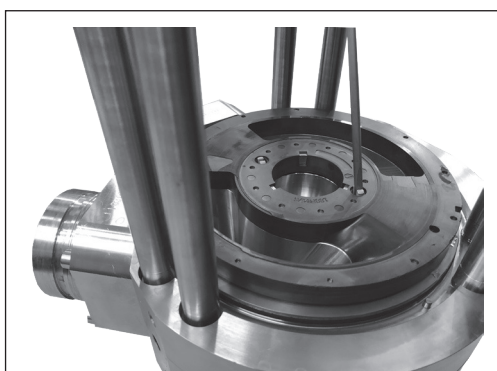
12. Install the housing onto the port flange: Check that the new pin is still placed in the port flange and place the hole for the pin in the housing carefully over the pin.



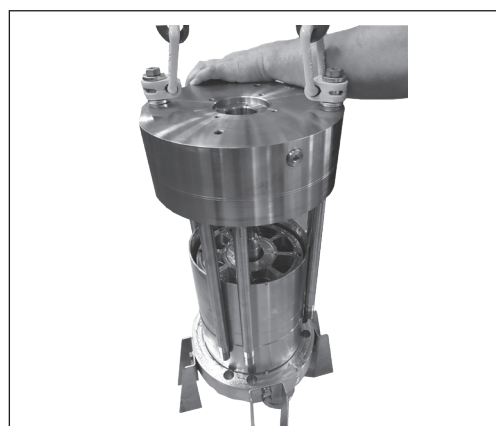
13. Mount the M6 lifting eye on the cylinder barrel big shaft end and carefully lower the cylinder barrel straight into the housing. Afterwards remove the lifting eye.



14. On the motor flange replace the O-ring, clips and small pin (lubricate to prevent dropping out), with new ones



15. Lubricate the motor flange and port plate with clean filtered water. Reassemble the port plate to the motor flange and screw in the two new clips with a screwdriver. Do not use force!
Make sure that the clips are below the port flange surface.



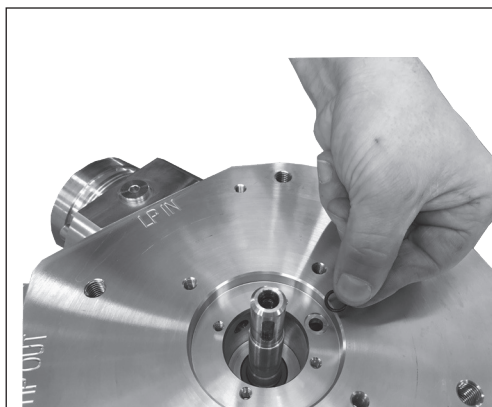
16. Install the lifting eyes from the tool set to the motor flange. Lubricate the stud bolt threads. Align stud bolts to the holes in the port flange.



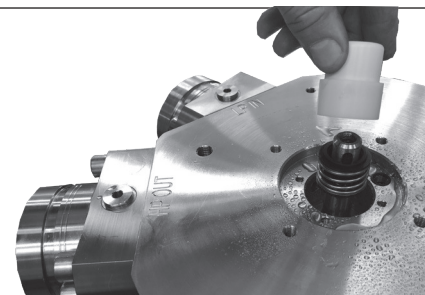
17. Lower the motor flange. Check that the new small pin is still placed in the motor flange and place the flange carefully into the hole for the pin in the housing.



18. Install washers (shiny side towards nut) and nuts to the stud bolts. Cross tighten the nuts with 40 Nm so both flanges are evenly in contact with the housing. Final tightening is done later when the MPE is placed horizontally on the table.



19. Install new O-ring at drain hole.



20. Only lubricate the new shaft seal with clean filtered water (do not use silicone grease) and mount the shaft seal over the shaft end **with the carbon surface upwards**. The rubber seal face must turn into the motor flange. By hand press down the shaft seal to the shoulder/recess of the shaft using the tool for shaft seal, large diameter first. Be careful not to damage the carbon seal face on the shaft seal.



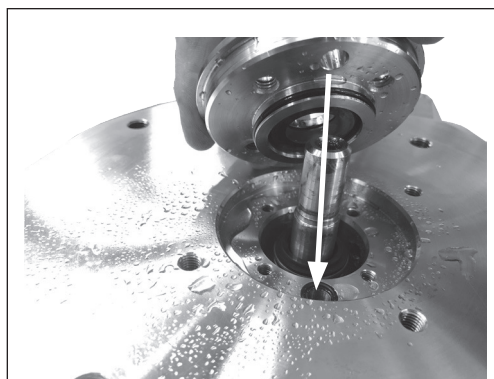
21. Remove the ceramic ring of the shaft seal in the shaft seal cover using a screwdriver. Lubricate the new shaft seal with clean filtered water and press the new ceramic ring into the shaft seal cover using the tool for shaft seal.

Warning:

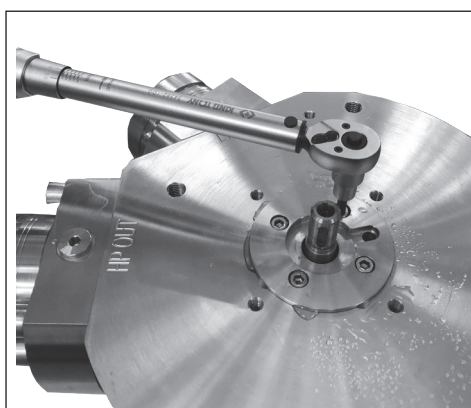
Ensure that the face with rubber seal is positioned against shoulder/recess in shaft seal cover and the ceramic ring upwards.



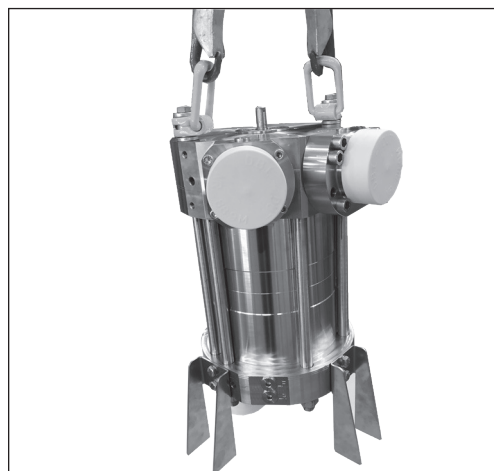
22. Install new O-ring at shaft seal cover.



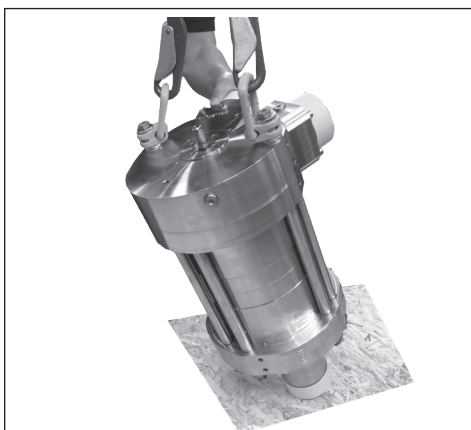
23. Install shaft seal cover with the thread less hole aligned to the drain hole with O-ring in motor flange.



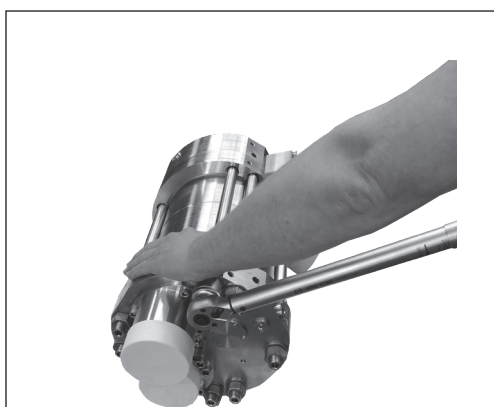
24. Install the four M6 screws and cross tighten with 10 Nm.



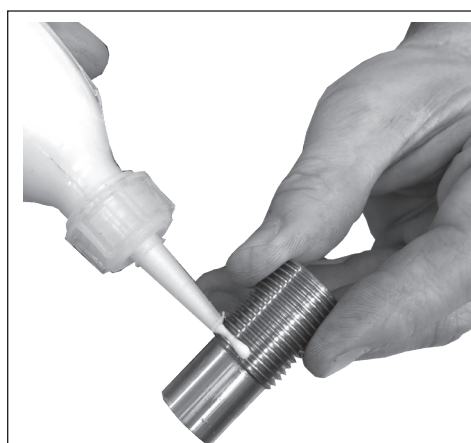
25. Install the lifting eyes from the tool set. Lift the unit and remove the four support feed.



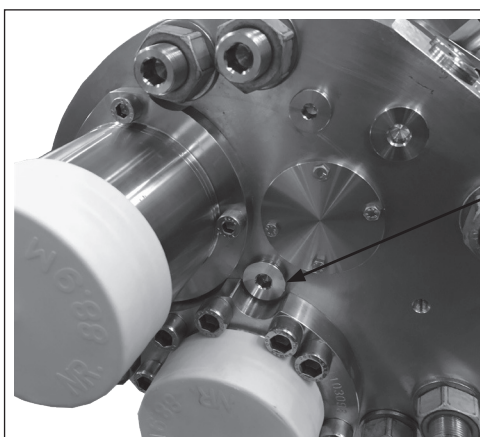
26. Install the plastic caps to the connectors. Placed on a wooden board carefully lower the MPE 70 to horizontal position. Be careful not to damage the connectors.



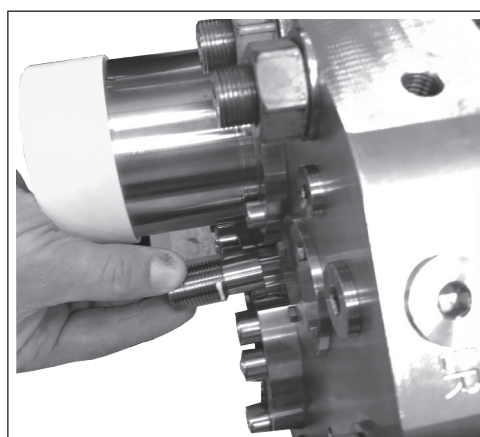
27. Cross tighten the nuts for the stud bolts to 160 Nm using a 30 mm socket.



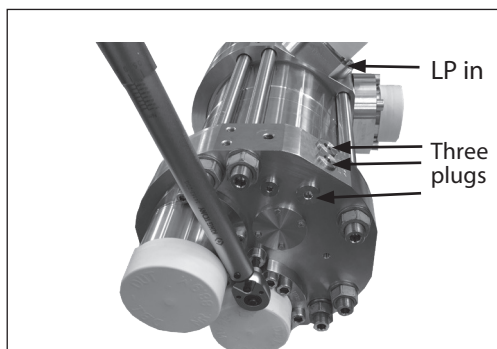
28. Lubricate the calibration tool from the tool set.



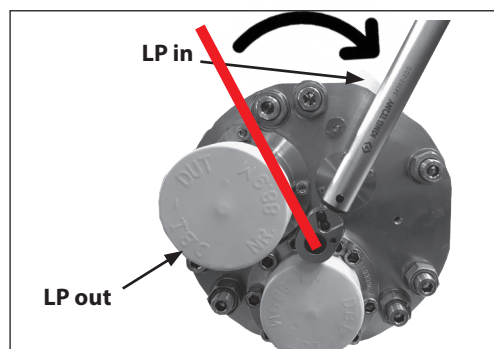
29. Remove the plug at the center of the port flange. Keep for later.



30. Install the calibration tool into the thread hole in the center of the port flange. Tighten by hand all the way in until you feel resistance.

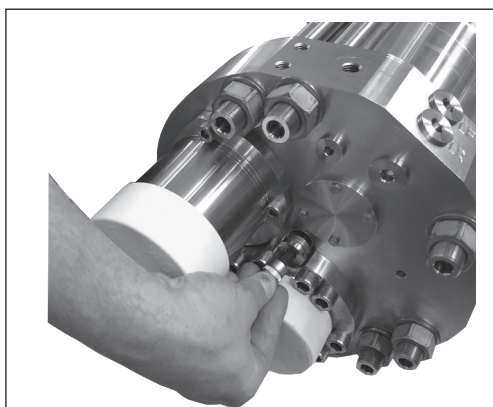


31. Put an 8 mm hexagon socket onto the head of the calibration tool. Put the torque wrench from the tool set onto the calibration tool and position against the long LP-out connector. Again, by hand turn the socket only (not the wrench) CW until you feel resistance.



32. Turn the torque wrench into a position in line with the LP-in port and the three plugs (about 40 degrees), see photo:

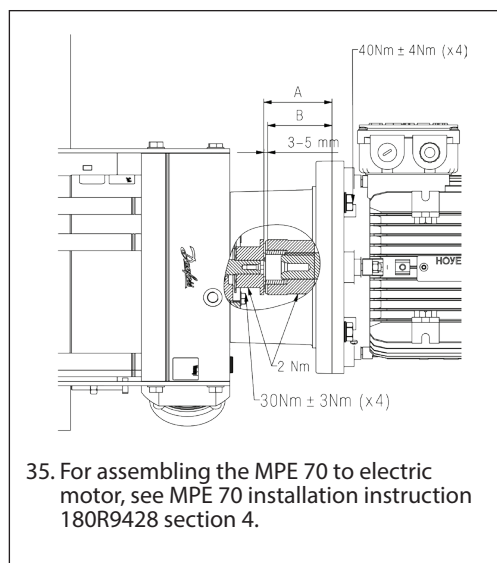
 **Turn the wrench in one single smooth move. Do not readjust the position!**



33. Remove the calibration tool and replace by plug. Tighten with 30 Nm.

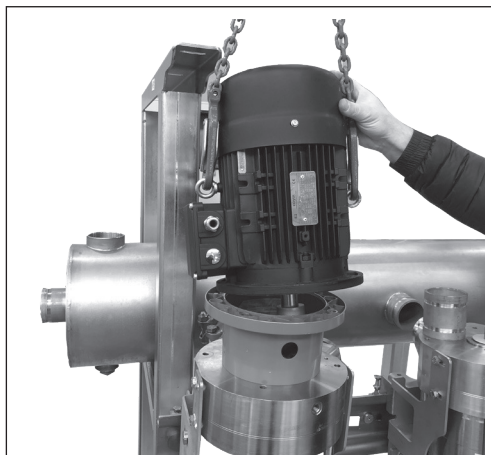


34. Lubricate the shaft. Mount the dust cap onto shaft. Mount key. Mount the coupling onto the shaft all the way down to the dust cap and press down for tight contact. Tighten the screw inside the coupling to 2 Nm using a 4 mm Allen key. Mount the spider.

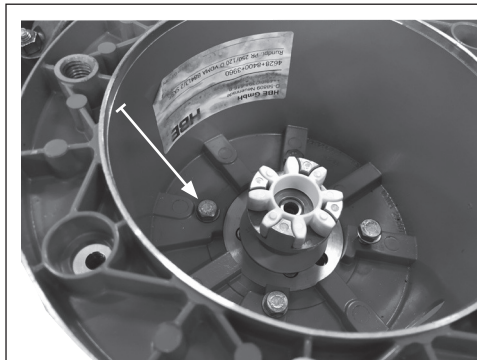


5. Disassembling and assembling the MPE 70 when mounted on the rail

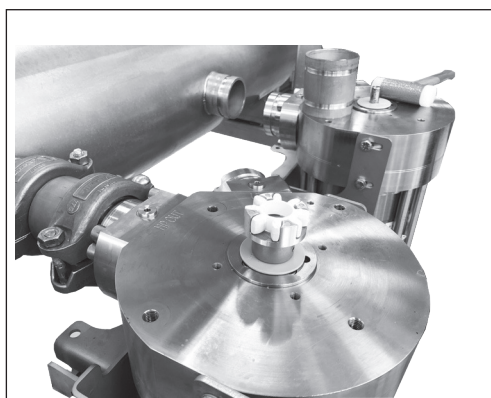
5.1 Disassembling



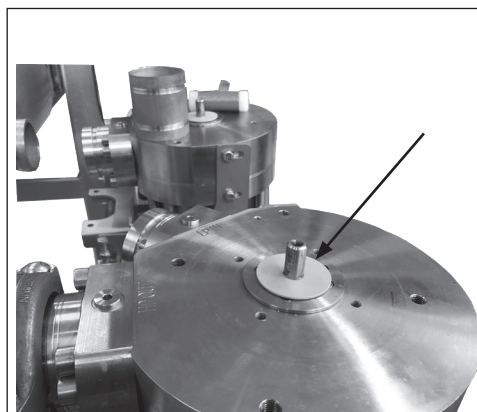
1. Remove the electrical motor from the bell housing by unscrewing the 4 bolts using a 19 mm wrench.



2. Remove the bell housing from the MPE 70 by unscrewing the 4 bolts inside the bell housing and remove the bolts and washers using a 13 mm socket and extension tool. Carefully remove the bell housing from the MPE 70.



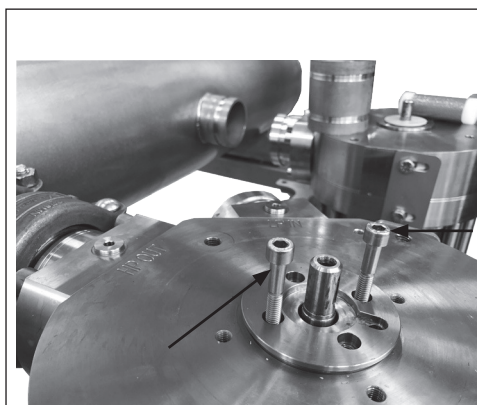
3. Loosen the screw in the coupling using a 4 mm Allen key. Carefully remove the coupling without damaging the shaft (sometimes a puller is needed). Remove the key in the shaft.



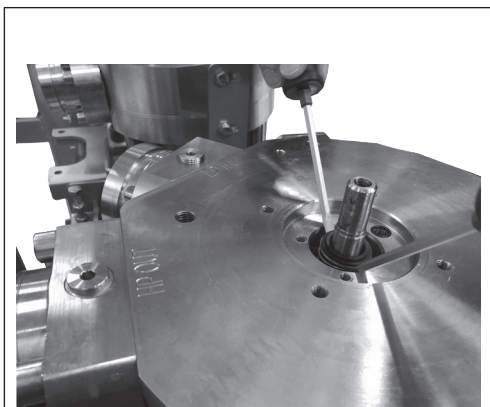
4. By hand remove the dust cap from the shaft.



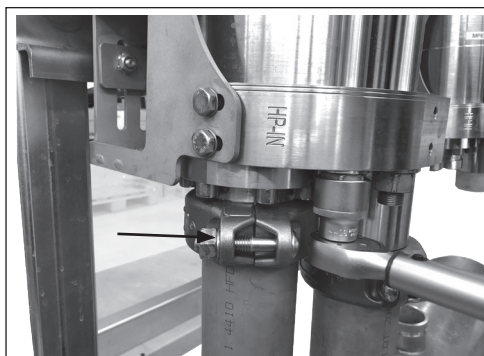
5. Remove the four M6 screws from the shaft seal cover using a 6 mm Allen key or socket.



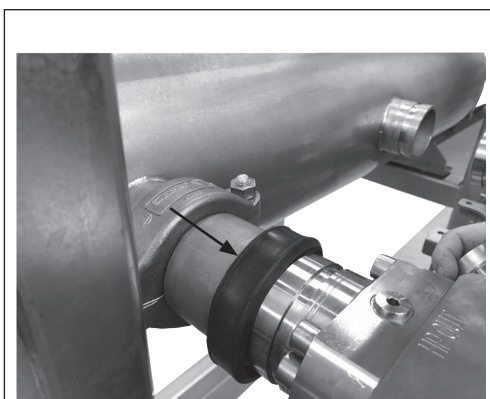
6. Remove the cover. If the shaft seal cover can't be removed easily, screw in 2 x M8x50 bolts from the tool set which will push out the shaft seal cover.



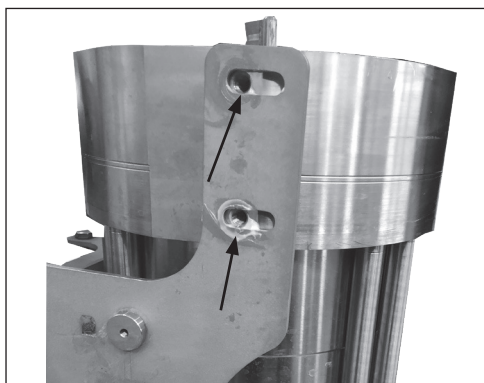
7. Lubricate the shaft seal with clean filtered water and carefully remove the shaft seal using 2 screwdrivers.



8. Using 30 mm socket gradually loosen all the M20 nuts on the stud bolts. Remove the nuts. On the HP-in connector the Victaulic clamp should be positioned like shown on the photo to have space for the 30 mm socket and wrench. It can be necessary to loosen the clamp and turn it into this position also for later servicing.

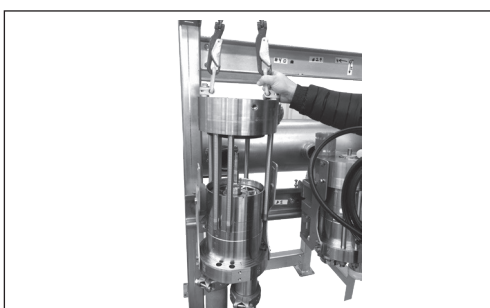


9. On the motor flange remove the Victaulic clamps on the HP-out and the LP-in connectors and move rubber gasket away from the MPE connector.



10. Remove the four M 10 bolts in the top of the bracket in the motor flange using 17 mm socket.

Let the M10 bolts in the bottom of the bracket in the port flange stay!

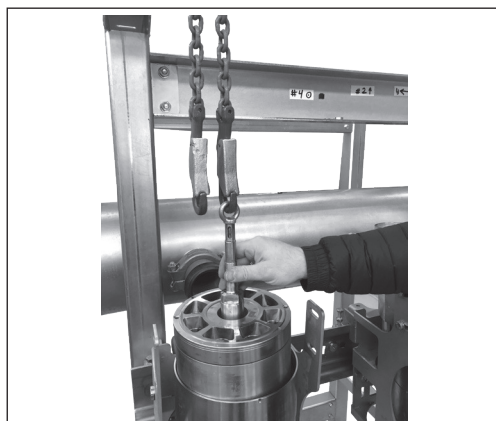


11. Install the lifting eyes from the tool kit into the thread holes of the motor flange of the MPE 70. Carefully lift off the motor flange. Install the protective plastic caps on the connectors and place the motor flange on a table.

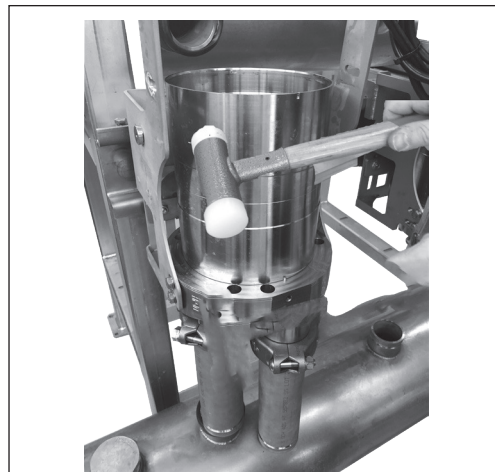
Be very careful not to drop items into the unit! The items might drop into the manifold and will then be hard to retrieve.



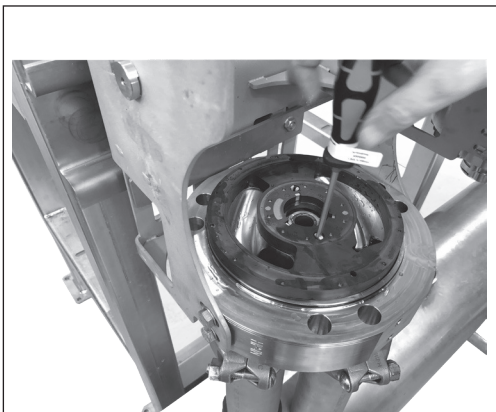
12. Remove pin (pos 113) (the pin may fall out) on bottom side of the motor flange.



13. Install M6 lifting eye onto shaft and carefully lift the cylinder barrel out of the housing. Place the cylinder barrel horizontal on table and make sure it can't roll. Remove the lifting eye.



14. Remove the housing from the port flange by carefully using a plastic hammer.



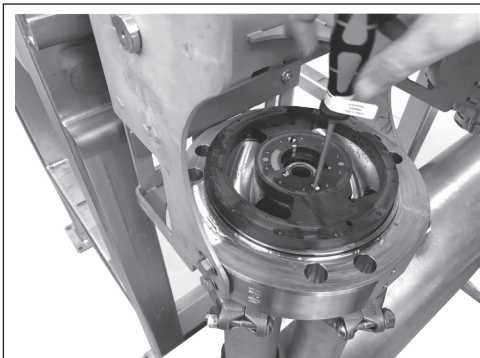
15. Loosen the two clips in the port plate with a screwdriver and remove the port plate from the port flange using a screwdriver.



16. Be careful when lifting the port plate off the port flange to keep the two pins in the port flange.

**Now all the parts for servicing are removed from the rail.
The servicing can now be done as described in chapter 3 from page 6 onward.**

5.2 Assembling the MPE on the rail



1. Lubricate the port flange and port plate with clean filtered water. Reassemble the port plate to the port flange and screw in the two new clips with a screwdriver. Do not use force!
Make sure that the clips are below the port flange surface.



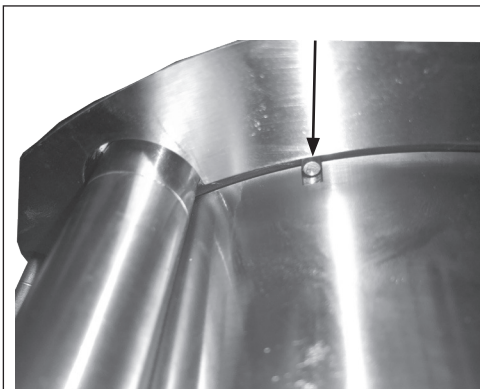
2. Mount the M6 lifting eye on the cylinder barrel big shaft end and carefully lower the cylinder barrel straight onto the port plate. Afterwards remove the lifting eye.



3. Lubricate the housing with clean filtered water. Install the housing onto the port flange: Check that the new pin is still placed in the port flange and place the hole for the pin in the housing carefully over the pin.



4. Install the lifting eyes from the tool set to the motor flange. Lubricate the stud bolt threads. Align stud bolts to the holes in the port flange.



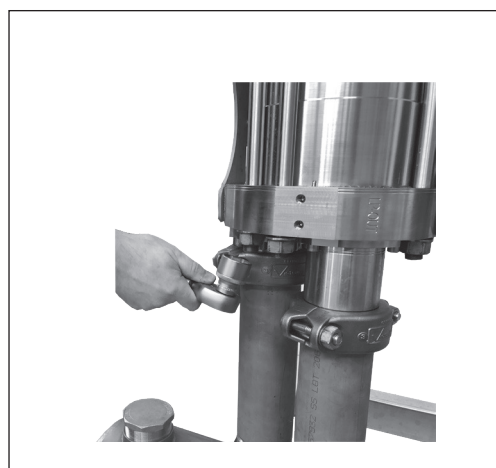
5. Lower the motor flange. Check that the small pin is still placed in the motor flange (lubricate with grease to prevent dropping out). Place the flange carefully into the hole for the pin in the housing.



6. Install washers (shiny side towards nut) and nuts to the stud bolts. Cross tighten the nuts using a 30 mm socket to 40 Nm so both flanges are evenly in contact with the housing.



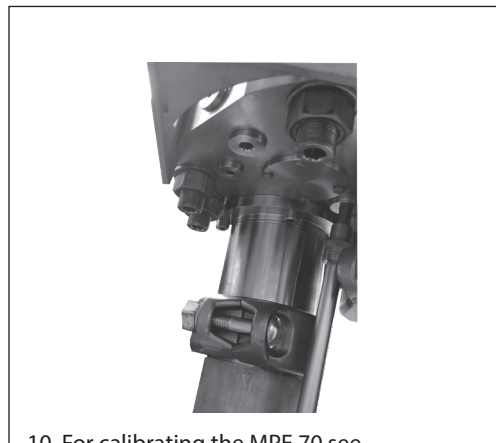
7. Mount the four M 10 bolts in the bracket in the motor flange tighten to 45 Nm using 17 mm socket.



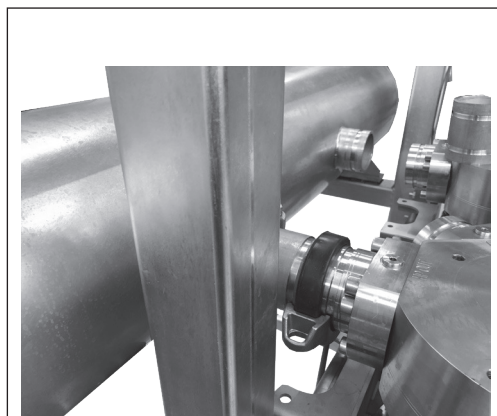
8. Make the final tightening of the nuts on the stud bolts by cross tightening to 160 Nm.



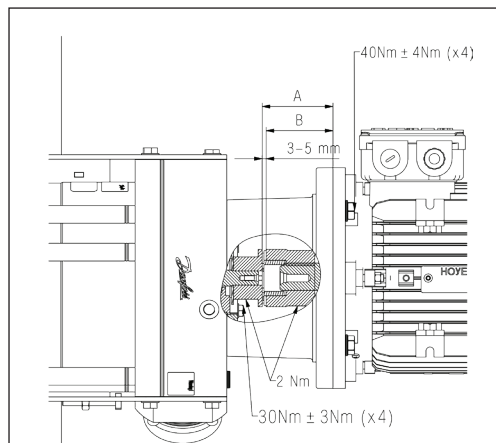
9. For installing shaft seal, shaft seal cover and coupling, see instructions described in chapter 4, page 12-13 items 19-24 and page 14 item 34.



10. For calibrating the MPE 70 see instructions described in chapter 4, pages 13-14, items 28 -33. To turn the plug and calibration tool use 8 mm hexagon socket with extension.



11. Mount the rubber gaskets and the Victaulic clamps to the connections HP-out and LP-in on the motor flange.



12. For assembling the MPE 70 to electric motor, see MPE 70 installation instruction 180R9428 section 4.

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