

CR, CRN 95 to 255

50/60 Hz

Service instructions



CR, CRN 95 to 255

English (GB)

Service instructions 4

English (GB) Service instructions

Original service instructions

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1. General information



Read this document before you install the product. Installation and operation must comply with local regulations and accepted codes of good practice.

1.1 Hazard statements

The symbols and hazard statements below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.

**DANGER**

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

**WARNING**

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

**CAUTION**

Indicates a hazardous situation which, if not avoided, could result in minor or moderate personal injury.

The hazard statements are structured in the following way:

**SIGNAL WORD****Description of the hazard**

Consequence of ignoring the warning

- Action to avoid the hazard.

1.2 Notes

The symbols and notes below may appear in Grundfos installation and operating instructions, safety instructions and service instructions.



Observe these instructions for explosion-proof products.



A blue or grey circle with a white graphical symbol indicates that an action must be taken.



A red or grey circle with a diagonal bar, possibly with a black graphical symbol, indicates that an action must not be taken or must be stopped.



If these instructions are not observed, it may result in malfunction or damage to the equipment.



Tips and advice that make the work easier.

1.3 Safety

DANGER

Electric shock

Death or serious personal injury



- Switch off the power supply before you start any work on the product.
- Make sure that the power supply cannot be switched on accidentally.

WARNING

Falling objects

Death or serious personal injury



- Follow the lifting instructions.
- Use lifting equipment which is approved for the weight of the product.
- Keep the product in a stable and fixed position when working on it.
- Persons must keep a safe distance to the product during lifting operations.
- Wear personal protective equipment.

For lifting instructions, see the instructions provided with the product.

WARNING

Corrosive liquids

Death or serious personal injury



- Wear personal protective equipment.

WARNING

Toxic liquids

Death or serious personal injury



- Wear personal protective equipment.

CAUTION

Hot or cold liquid

Minor or moderate personal injury



- Wear personal protective equipment.

CAUTION

Hot or cold surface

Minor or moderate personal injury



- Make sure that no one can accidentally come into contact with hot or cold surfaces.

We recommend that you repair pumps with motors of 7.5 kW and up at the pump site. Necessary lifting equipment must be available.

1.4 Contaminated products

CAUTION

Biological hazard

Minor or moderate personal injury



- Flush the pump thoroughly with clean water and rinse the pump parts in water after dismantling.

The product will be classified as contaminated if it has been used for a liquid which is injurious to health or toxic. If you request Grundfos to service the product, contact Grundfos with details about the pumped liquid before returning the product for service. Otherwise, Grundfos can refuse to accept the product for service.

Any application for service must include details about the pumped liquid.

Clean the product in the best possible way before you return it. Costs of returning the product are to be paid by the customer.

1.5 Servicing the motor

Grundfos MG and MGE motors

Service documentation is available in Grundfos Product Center at <http://product-selection.grundfos.com/>.

Motors of other makes

Contact the motor manufacturer.

2. Preparing the dismantling of the product

2.1 Lifting the product

Lifting procedures are described in the installation and operating instructions. Use the QR code or link below:



<http://net.grundfos.com/qr/i/99078486>

3. Dismantling and assembling the product

Parts are indicated by numbers and refer to the drawings in the section on drawings.

Tools are indicated by letters and refer to the section on special service tools.

Related information

[7.3 Special service tools](#)

[7.5.1 Overview of drawings](#)

[7.5.2 Exploded views](#)

[7.5.3 Sectional views](#)

3.1 Motor and coupling

3.1.1 Removal

1. Disconnect the power supply and remove the power cable.
2. Remove screws (7a) and coupling guards (7).
3. Remove screws (9) and coupling halves (10a). It may be necessary to gently loosen the coupling halves with a plastic hammer.
4. Remove the cylindrical pin (10) from the pump shaft (51).
5. Attach approved lifting equipment to the motor to prevent it from falling before proceeding with any further dismantling. For correct attachment of lifting equipment, see instructions supplied with the pump.
6. Remove the screws (28), washers (32) and nuts (36).
7. Carefully lift the motor off the pump using approved lifting equipment. For lifting the motor correctly, see the instructions supplied with the pump.

3.1.2 Installation

1. Carefully lift the motor onto the motor stool (1a) using approved lifting equipment.
2. Install the screws (28), washers (32) and nuts (36).
3. Lubricate and tighten the nuts (36) to the specified torque.
4. Install the cylindrical pin (10) in the pump shaft (51).
5. Install the coupling halves (10a).
6. Lubricate and cross-tighten the screws (9).
7. Install the coupling guards (7) and tighten the screws (7a).

Related information

[7.1 Torques](#)

[7.2 Lubricants](#)

3.2 Shaft seal, motor stool, pump head cover, sleeve and chamber stack

3.2.1 Preparations

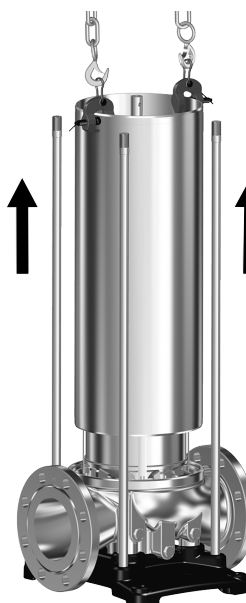
1. Remove the motor as described in the section on motor and coupling removal.
2. Close the isolating valves, if fitted, to avoid draining the pipe system.
3. Drain the pump by loosening the vent screw (18) and removing the plugs (25) and O-rings (38).

Related information

[3.1.1 Removal](#)

3.2.2 Dismantling

1. Clean the end of the shaft (51) with a cloth.
2. If the shaft seal (105) is to be reused, remove any marks or scratches on the shaft (51) by using service tool E together with a piece of fine emery cloth.
3. Loosen the three set screws (113) of the shaft seal (105). Note that the set screws must be loosened no more than 1/4 turn.
4. Loosen the shaft seal by using service tool A, together with service tools O and P.
5. Carefully lift the shaft seal (105) off the shaft (51). Note that the shaft seals fitted on pumps with Ø28 and Ø36 pump shafts can be fitted with new wear parts. See the section on renewing shaft seal wear parts.
6. Attach approved lifting equipment to the motor stool (1a) to prevent it from falling before proceeding with any further dismantling.
7. Remove nuts (36) and washers (66a).
8. Remove the motor stool (1a).
9. Remove the pump head cover (2). It may be necessary to loosen it from the sleeve (55) using a plastic hammer.
10. Remove the O-ring (37) from the pump head cover.
11. Pull out the outlet part (44a) from the pump head cover (2).
12. CR pumps only: Remove the four screws (2d) and the brackets (2c) from the pump head cover (2).
13. Fit service tool N on the pump sleeve (55). See the figure below.



Service tool N fitted on sleeve (55)

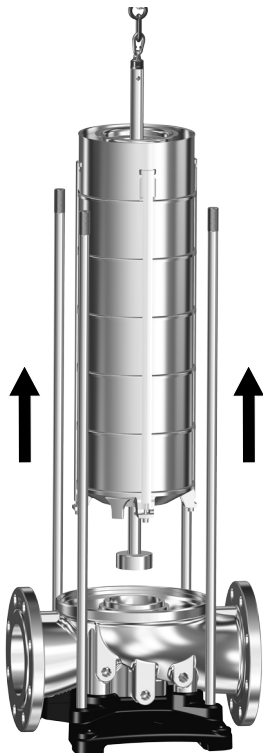
14. Attach approved lifting equipment to service tool N and lift the sleeve (55) up and away from the chamber stack.

15. Fit service tool B in the top of the pump shaft.



When handling the chamber stack, it is important to pay close attention in order not to damage the thrust-handling device (120), if fitted.

16. Attach approved lifting equipment to service tool B and lift up the chamber stack.



TM071900

Lifting the chamber stack

17. Lay down the chamber stack in a fixed position so that it cannot move.
18. Remove the O-ring (37) from the pump base.

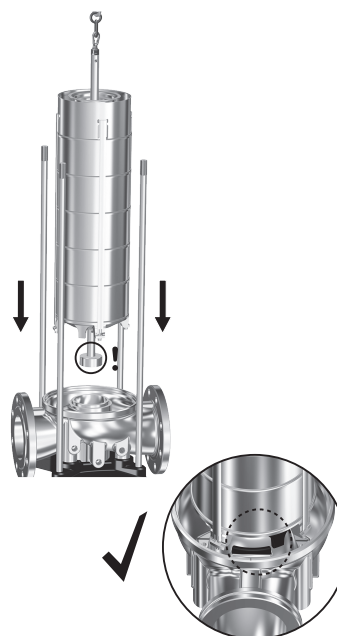
Related information

[6. Renewing shaft seal wear parts](#)

[7.3.1 Special tools](#)

3.2.3 Assembly

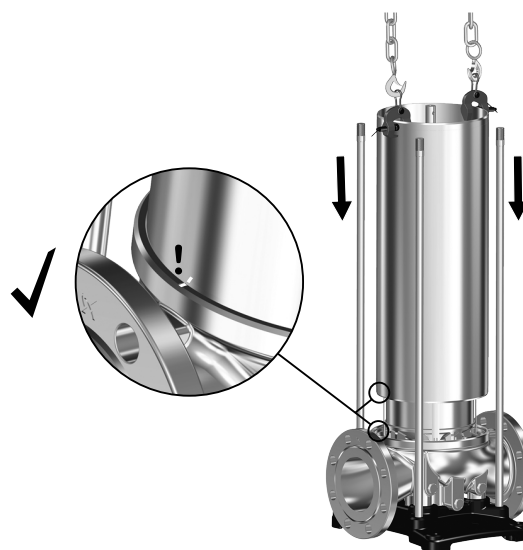
1. Lubricate and install a new O-ring (37) in the pump base (6). See the section on lubricants.
2. Carefully lift the chamber stack with approved lifting equipment and lower it into the pump base.
Make sure to align the pump inlet part (44) with the tap in the pump base (6). See the figure below.



TM071742

Aligning inlet part (44) in pump base (6)

3. Fit service tool N on the pump sleeve (55).
4. Attach approved lifting equipment to service tool N and lift the sleeve (55) onto the pump base (6).
Make sure to align the sleeve (55) according to the alignment marks on the sleeve (55) and on the pump base (6). Also ensure that the sleeve (55) is pressed fully home in the pump base (6).

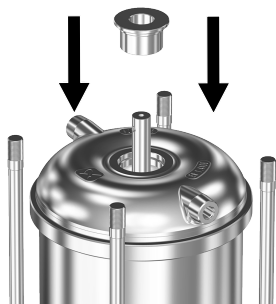


TM070849

Aligning sleeve (55) in pump base (6)

5. Lubricate and install a new O-ring (37) in the pump head cover. See the section on lubricants.
6. CR pumps only: Install the four screws (2d) and the brackets (2c) in the pump head cover (2). See the section on torques.
7. Install the outlet part (44a) in the pump head cover (2).

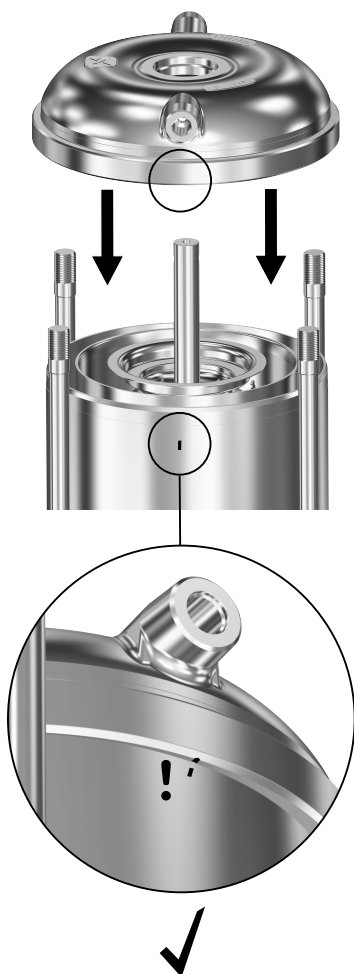
8. Install the pump head cover (2) on the sleeve (55). Use service tool J to centre the chamber stack in the pump head cover (2). See the figure below.



TM071901

Fitting service tool J in the pump head cover (2).

Make sure to align the pump head cover (2) according to the alignment marks on the pump head cover (2) and on the sleeve (55). See the figure below.



TM071741

Aligning pump head cover (2) and sleeve (55)

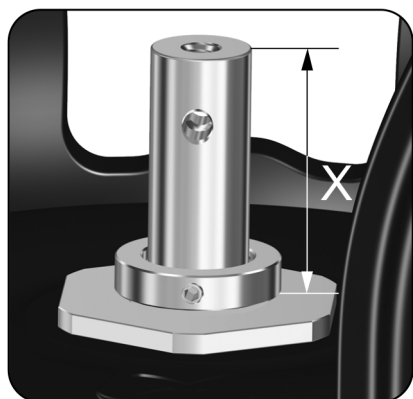
9. Attach approved lifting equipment to the motor stool (1a) and lift the motor stool (1a) onto the pump head cover (2).
10. Install washers (66a) and nuts (36).
11. Lubricate the threads of the staybolts (26) and cross-tighten the nuts (36) to the specified torque. See the sections on torques and lubricants.
12. Remove service tool J.
13. Clean and smooth the shaft (51) using service tool E with an emery cloth supplied with the shaft seal kit.
14. Lubricate the O-rings in the shaft seal (105). See the section on lubricants.
Avoid lubrication on the seal faces.

15. Install the shaft seal (105) on the shaft (51) and press it home against the pump head cover (2).

16. Tighten the shaft-seal hexagon nut to the specified torque by using service tool A, together with service tools O and P. See the section on torques.

17. Check that the height X is maximum 71 mm. See the figure below.

If the measured height is not within the specifications, the pump has not been assembled correctly, and the pump must be dismantled to find the reason.

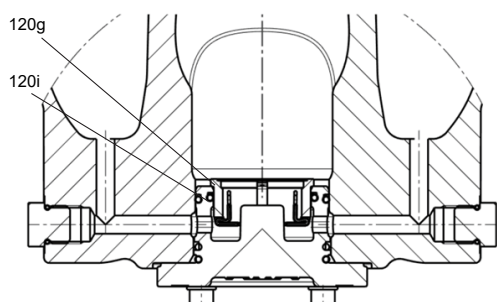


TM070969

X: 69 ± 2 mm

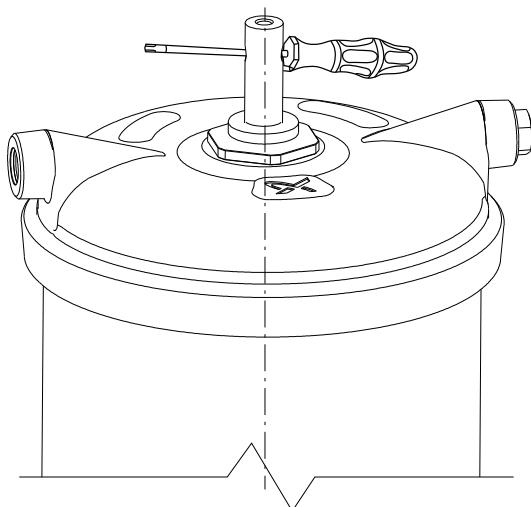
Note that the below text applies only for pumps with motor sizes 75 to 200 kW (100-300 hp) and fitted with a thrust-handling device.

During assembly of the pump, there is a risk that the O-ring (120i) causes the stationary ring (120g) to stick. As a result, the entire chamber stack will not be fully seated inside the pump. This can lead to malfunction and eventually damage to the pump if it is started. See the figure below.



TM083369

Before making the shaft height adjustment, make sure the shaft with impellers is placed as much downwards as possible inside the pump. This can be checked by rotating the shaft by means of a screwdriver inserted in the cross-hole at the top of the shaft.



TM083256

- If the friction is with high scattering or peaks caused by the axial metal-to-metal contact between impeller and chamber, then the shaft with impellers is positioned correctly and you can go on with the shaft height adjustment using the adjustment fork.

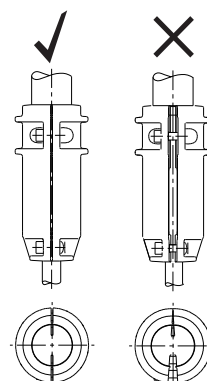
- If rotating freely with very little friction, try rotating CCW and CW until the shaft binds and you feel the metallic contact between the chambers and impellers.
- If you cannot feel the metallic contact between the chambers and impellers, the pump must be disassembled, and the stationary ring (120g) must be pressed fully down in the pump base so that it is seated completely against the lifting plate (120h) and the flange (120k).

18. Install the cylindrical pin (10) in the pump shaft (51).

19. Install the coupling halves (10a).

20. Lubricate and tighten the screws (9), but leave loose. See the section on lubricants.

21. Check that the gaps on either side of the coupling halves are equal. See the figure below.

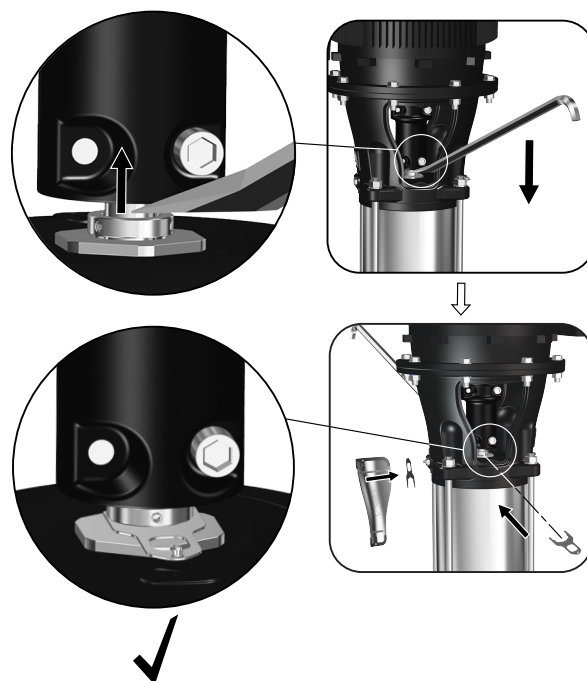


TM071744

Gap between coupling halves

22. Tighten the three set screws (113) to the specified torque. See the section on torques.

23. Lift the pump shaft with a crowbar and insert the adjusting fork F. See the figure below.



TM070868

Lifting pump shaft and fitting adjusting fork.

24. Cross-tighten the screws (9) to the specified torque. See the section on torques.

25. Pull the adjusting fork F free of the shaft (51) and place it on the backside of one of the coupling guards (7). See the figure below.



TM071743

Fitting adjusting fork F on the backside of coupling guard (7)

26. Install the coupling guards (7) and tighten the screws (7a). See the section on torques.

Related information

[7.1 Torques](#)

[7.2 Lubricants](#)

[7.3.1 Special tools](#)

3.3 Thrust-handling device

This section applies only for pumps fitted with a thrust-handling device (120).



All parts for the thrust-handling device must be handled very carefully in order to avoid damaging them.

There are two ways to service the thrust-handling device:

- by completely dismantling the entire pump.
See instructions in the section on servicing the thrust-handling device by dismantling the entire pump.
- by positioning the pump horizontally and accessing the thrust-handling device from the pump base.
See instructions in the section on servicing the thrust-handling device from the pump base.

Related information

[3.3.1 Servicing the thrust-handling device by dismantling the entire pump](#)

[3.3.3 Servicing the thrust-handling device from the pump base](#)

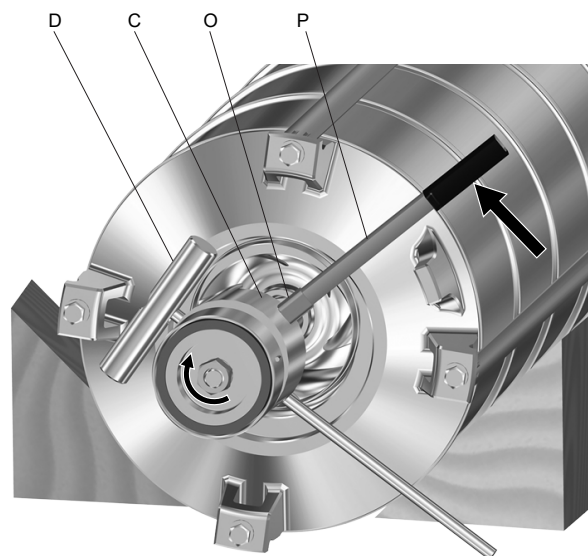
3.3.1 Servicing the thrust-handling device by dismantling the entire pump

Preparations

Removing the thrust-handling device requires that the pump has been dismantled as described in the sections on removal of the motor and coupling and dismantling of the shaft seal, motor stool, pump head cover, sleeve and chamber stack.

Dismantling

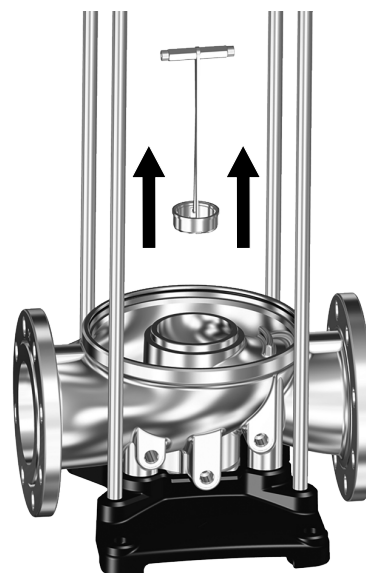
1. Lay down the chamber stack on a solid surface and take the necessary precautions to prevent the chamber stack from moving while working on it.
2. Loosen and remove the nut (120f) and washer (120e). Note that the nut features a left-handed thread. Use service tools C, D, O and P to hold the shaft when loosening the nut (120f).



TM071746

Dismantling thrust-handling device from pump shaft

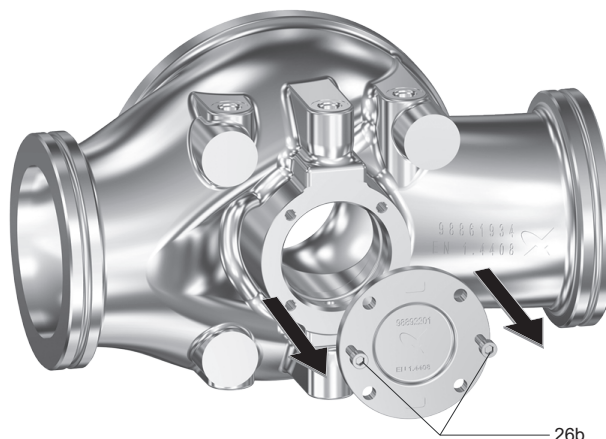
3. Remove thrust-handling-device wear parts (120a, 120b, 120c, 120d). The parts come out together.
4. Remove the stationary ring (120g) together with the lifting plate (120h) by using service tool G for pulling out the parts.



TM071745

Removing stationary ring (120g) and lifting plate (120h)

5. Remove the bolts (26b) from the pump base (6).
6. Remove the flange (120k) by using two bolts (26b) as extractors.



TM071747

Extracting the flange

- To renew the thrust-handling-device wear parts, see the section on renewing thrust-handling-device wear parts.

Related information

3.1.1 Removal

3.2.2 Dismantling

4. Renewing thrust-handling-device wear parts

3.3.2 Assembly

- Install the flange (120k) in the pump base (6).
- Fit and tighten the four screws (26b).
- Fit the stationary ring (120g) together with the lifting plate (120h) by using service tool G.
- Fit thrust-handling device parts (120a, 120b, 120c, 120d).
- Fit the washer (120e) and nut (120f).
- Tighten the nut (120f).
Note: Left-hand thread.
- Follow the assembly instructions described in the section on shaft seal, motor stool, pump head cover, sleeve and chamber stack assembly.

Related information

3.2.3 Assembly

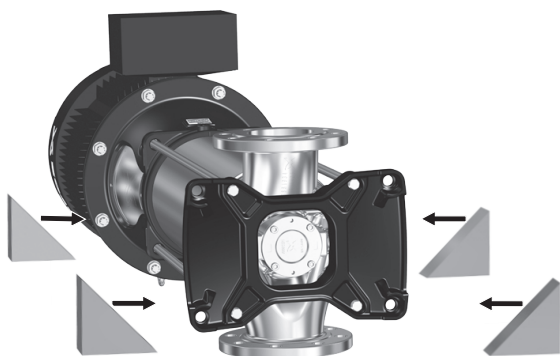
7.1 Torques

7.3.1 Special tools

3.3.3 Servicing the thrust-handling device from the pump base

Preparations

- Disconnect the power supply and remove the power cable.
- Close the isolating valves, if fitted, to avoid draining the pipe system.
- Drain the pump by opening the vent screw (18) and removing the plugs (25) with O-rings (38).
- Secure the pump with approved lifting equipment.
- Loosen the pipe connections to the pump.
- Loosen the base-plate bolts.
- Place the pump horizontally with adequate work space around the pump base (6). Follow the lifting instructions supplied with the pump.
- Make sure that the pump cannot move when working on it. See the figure below.



Inserting wedges for the pump not to move when working on it

Dismantling

- Loosen and remove bolts (26b) from the pump base (6).
- Remove the flange (120k) by using two bolts (26b) as extractors. See the figure below.



TM071749

Extracting the flange

- Pull out thrust-handling-device wear parts (120g, 120h). You can use service tool G for this.
- Loosen and remove the nut (120f) and washer (120e). Note that the nut features a left-handed thread. Use service tool D to hold the pump shaft (51) when loosening. For information on holding the pumps shaft (51) with service tool D, see the section on assembly.
- Pull out thrust-handling-device parts (120a, 120b, 120c, 120d). The parts come out together.
- To renew the thrust-handling-device wear parts, see the section on renewing thrust-handling-device wear parts.

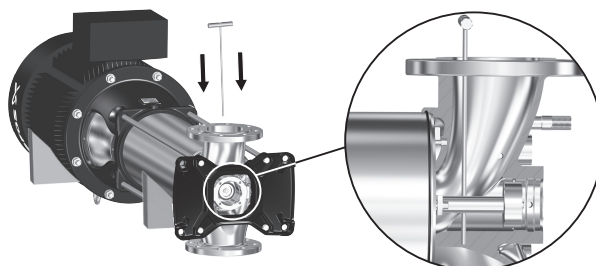
Related information

3.3.4 Assembly

4. Renewing thrust-handling-device wear parts

3.3.4 Assembly

- Fit thrust-handling-device parts (120a, 120b, 120c, 120d).
- Fit the washer (120e) and nut (120f).
- Tighten the nut (120f). Use service tool D to hold the pump shaft (51) when tightening. See the figure below.
Note that the nut features a left-handed thread.



TM071895

Holding the pumps shaft (51) with service tool D.

- Lubricate the stationary ring (120g) on the sides only, and avoid lubrication of the seal face.
- Install the lifting plate (120h) in the stationary ring (120g).
- Install the stationary ring (120g) with lifting plate (120h) in the flange (120k).
- Fit the stationary ring (120g) together with the lifting plate (120h) in the flange (120k).
- Install the flange (120k) in the pump base (6).
- Fit and tighten the four bolts (26b).

Related information

7.1 Torques

4. Renewing thrust-handling-device wear parts

Preparations

Renewing the thrust-handling-device wear parts requires that the thrust-handling device (120) has been removed as described in the section on servicing the thrust-handling device by dismantling the entire pump or in the section on servicing the thrust handling device from the pump base.

Dismantling

1. Remove the rotating lock ring (120d) from the thrust disc (120a).
2. Remove the rotating ring (120b) from the thrust disc (120a).
3. Remove the O-ring (120c) from the thrust disc (120a).
4. Remove the O-ring (120i) and the three O-rings (120j) from the flange (120k).

Assembly

1. Install the O-ring (120i) and the three O-rings (120j) on the flange (120k).
2. Install the O-ring (120c) in the thrust disc (120a).
3. Install the rotating ring (120b) in the thrust disc (120a).
4. Install the rotating lock ring (120d) in the thrust disc (120a).

Related information

[3.3.1 Servicing the thrust-handling device by dismantling the entire pump](#)

[3.3.3 Servicing the thrust-handling device from the pump base](#)

4.1 Chamber stack

The chamber stack can be serviced in two ways depending on which service tool is used for the work:

- Service tool for vice mounting (H1), see the section on servicing the chamber stack in service tool for vice mounting.
- Service tool for pump base mounting (H2), see the section on servicing the chamber stack in service tool for pump base mounting.

Related information

[4.1.1 Servicing the chamber stack in service tool for vice mounting](#)

[4.1.2 Servicing the chamber stack in service tool for pump base mounting](#)

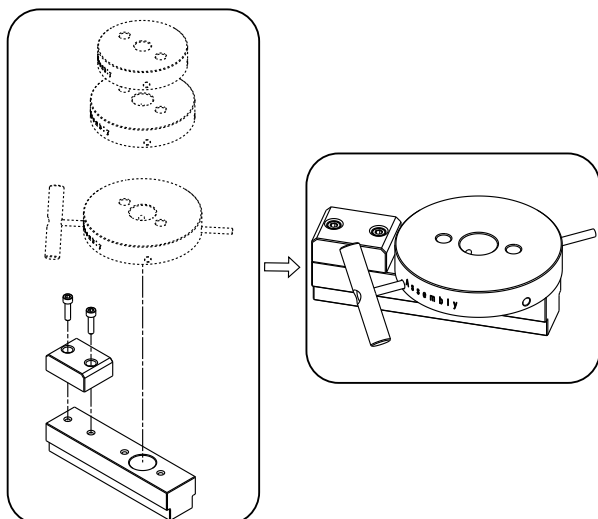
[7.3.1 Special tools](#)

4.1.1 Servicing the chamber stack in service tool for vice mounting

Preparations

Removing the chamber stack requires that the pump has been dismantled as described in the section on removal of the motor and coupling, the section on shaft seal, motor stool, pump head cover, sleeve and chamber stack and the section on thrust-handling device.

- Assemble service tool H1. See the figure below.



Service tool H1

TM071902

Procedure

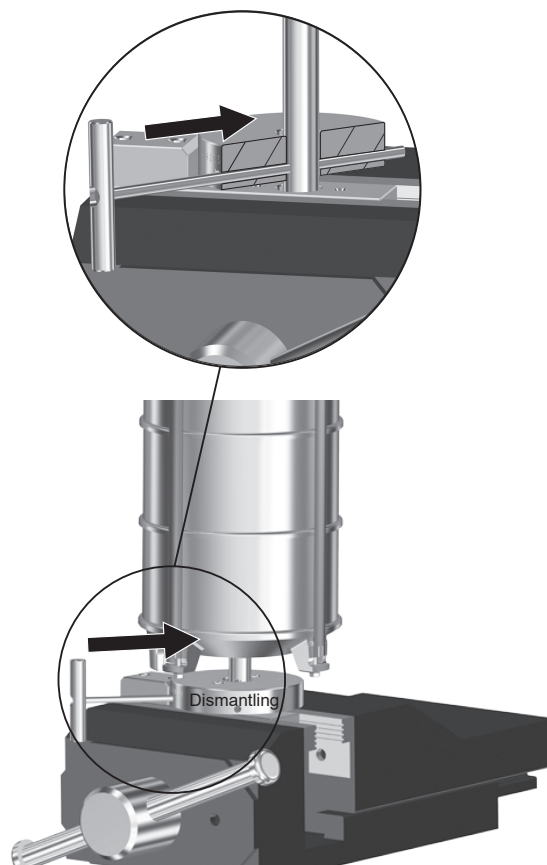
1. Place service tool H1 securely in a vice. See the figure below for correct positioning.
2. Fit service tool B in the end of the pump shaft (51).
3. Attach approved lifting equipment to service tool B and lift the chamber stack out of the pump base (6).
4. Lift the chamber stack onto service tool H1. See the figure below. Make sure the pump-shaft end engages with the service tool.



TM071750

Positioning the chamber stack in service tool H1

5. Align the hole in the pump shaft with the hole in service tool H1 marked "Dismantling". See the figure above.
6. Fit service tool D in the hole marked "Dismantling".



TM071751

Locking the shaft in service tool.

7. Continue to the section on dismantling the chamber stack.

Related information

3.1.1 Removal

3.3 Thrust-handling device

4.1.3 Dismantling the chamber stack

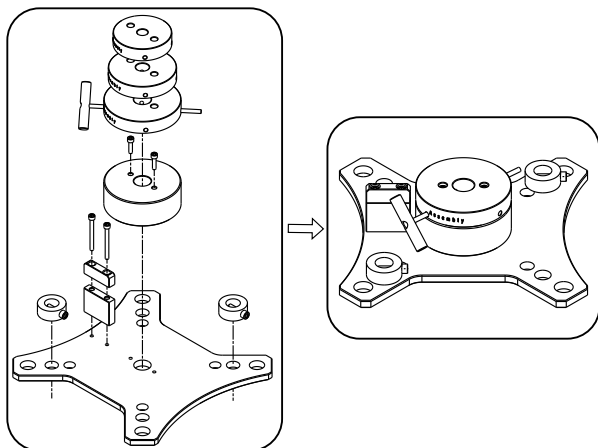
7.3.1 Special tools

4.1.2 Servicing the chamber stack in service tool for pump base mounting

Preparations

Removing the chamber stack requires that the pump has been dismantled as described in the section on removal of the motor and coupling, the section on shaft seal, motor stool, pump head cover, sleeve and chamber stack and the section on thrust-handling device.

- Assemble service tool H2. See the figure below.

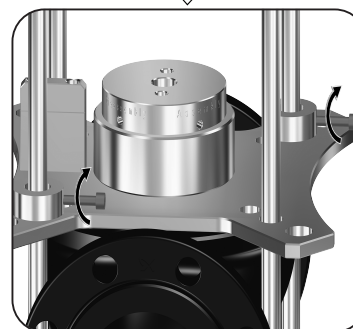
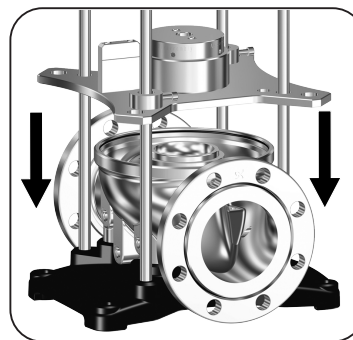


TM071903

Service tool H2

Procedure

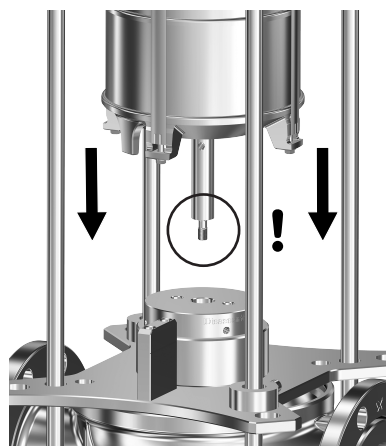
1. Fit service tool B in the end of the pump shaft (51).
2. Attach approved lifting equipment to service tool B and lift the chamber stack out of the pump base (6).
3. Lay down the chamber stack on a solid working surface and take the necessary precautions to prevent the chamber stack from moving around.
4. Install service tool H2 securely on the pump base (6). See the figure below for correct positioning and installation.



TM071777

Service tool H2 for mounting on pump base

5. Lift the chamber stack onto service tool H2. See the figure below. Make sure the pump-shaft end engages with the service tool.

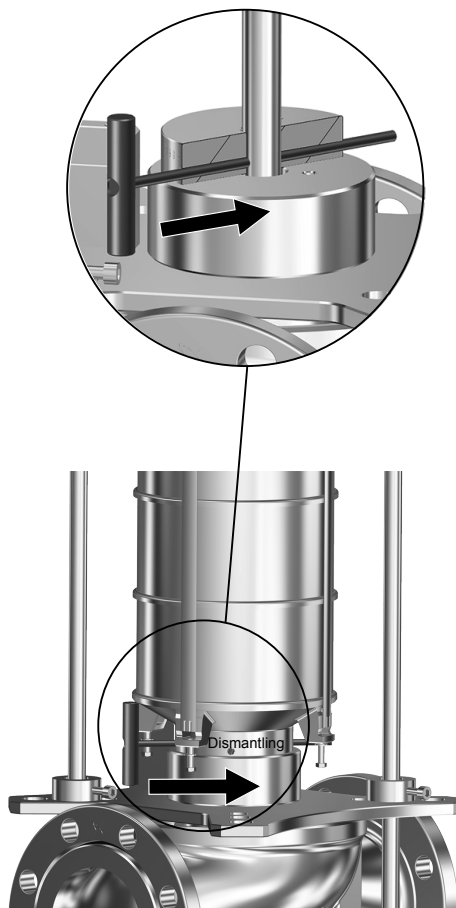


TM071752

Positioning the chamber stack in service tool H2

6. Align the hole in the pump shaft with the hole in service tool H2 marked "Dismantling". See the figure below.

7. Fit service tool D in the hole marked "Dismantling". See the figure below.



Locking the shaft in service tool H2

8. Continue to the section on dismantling the chamber stack.

Related information

[3.1.1 Removal](#)

[3.3 Thrust-handling device](#)

[4.1.3 Dismantling the chamber stack](#)

[7.3.1 Special tools](#)

4.1.3 Dismantling the chamber stack

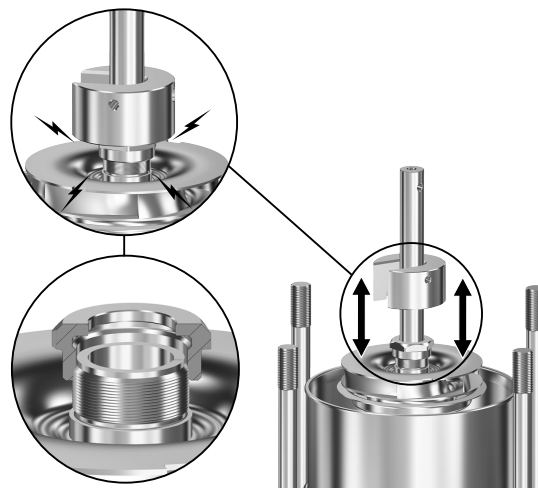
Preparations

Removing the chamber stack requires that the pump has been dismantled as described in the section on removal of the motor and coupling and the section on shaft seal, motor stool, pump head cover, sleeve and chamber stack

Dismantling the chamber stack also requires that it is mounted in service tool H1 or H2 as described in the sections on servicing the chamber stack in service tool for vice mounting or servicing the chamber stack in service tool for pump base mounting.

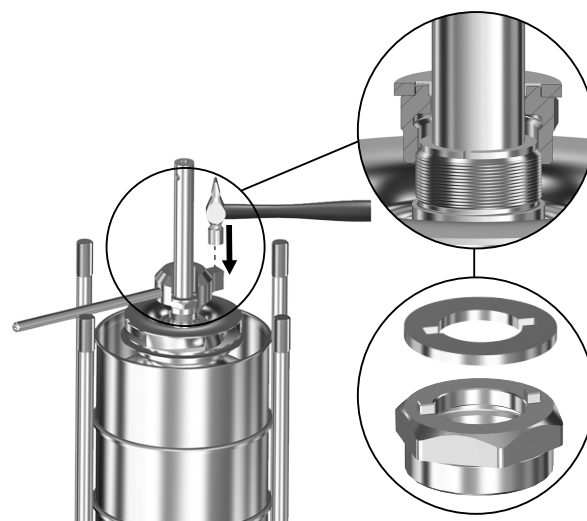
Procedure

1. Loosen the screws (26 b) and remove the straps (26a).
2. Remove the top chamber (3 or 3a).
3. Loosen the split-cone nut (48) using service tool C, but leave it so that it is still engaged with a few turns of thread on the impeller (49 or 49a).
4. Install service tool I on top of the pump shaft (51) to protect the shaft recess. Note that this applies only if the top of the pump shaft has a reduced diameter compared to the rest of the shaft.
5. **For pumps with Ø22 pump shaft:** Turn service tool C around and knock it against the split-cone nut (48) to loosen the impeller (49 or 49a) from the split-cone (49b). See the figure below.



Loosening the impeller (49 or 49a) with service tool C

6. **For pumps with Ø28 or Ø36 pump shaft:** Insert service tool M on top of the split-cone nut (48) and use a hammer to knock service tool Q against the split-cone nut (48) to loosen the impeller (49 or 49a) from the split cone (49b). See the figure below.



Loosening the impeller (49 or 49a) with service tool Q

7. Remove the split-cone nut (48), split cone (49b) and impeller (49 or 49a).

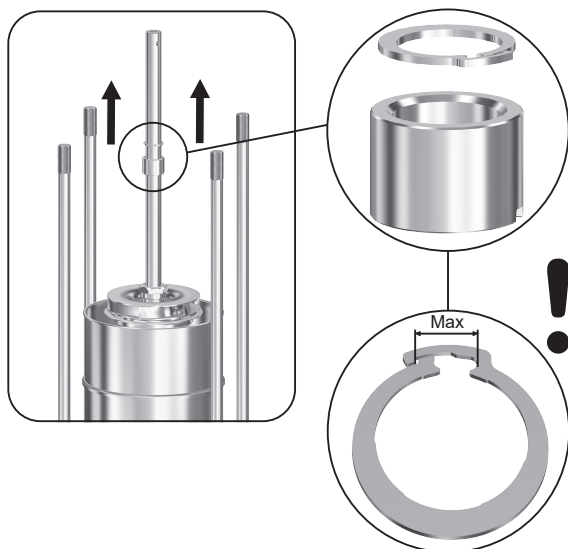
8. Continue removing the remaining chambers (4 or 4a), split-cone nuts (48), split cones (49b), impellers (49 or 49a) and bearings (47a).

For pumps with Ø28 or Ø36 pump shaft:

Note that for pumps with Ø28 or Ø36 pump shaft, you must also remove the lock ring (47g). See the figure below.



Do not open the lock ring (47g) further than the restriction of the integrated locking mechanism. See the figure below.



TM072074

Maximum permissible opening of lock ring (47g)

9. Remove the inlet part (44).
10. To renew the chamber wear parts, see the section on renewing chamber wear parts.

Related information

[3.1.1 Removal](#)

[4.1.1 Servicing the chamber stack in service tool for vice mounting](#)

[4.1.2 Servicing the chamber stack in service tool for pump base mounting](#)

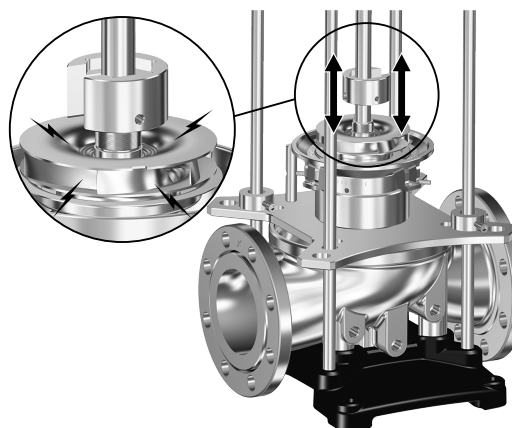
[5.1 Neck ring \(45\)](#)

[7.3.1 Special tools](#)

4.1.4 Assembling the chamber stack

For chamber types, see the section on order of assembly for chambers and impellers.

1. Install the inlet part (44) over the pump shaft (51) which is placed in service tool H1 or H2.
2. Fit the impeller (49 or 49a) which was removed as the last one during dismantling.
3. Fit a split-cone (49b) in the impeller (49 or 49a).
4. Turn service tool C around and knock it against the split-cone (49b) to fixate the impeller (49 or 49a) to the pump shaft (51). See the figure below.



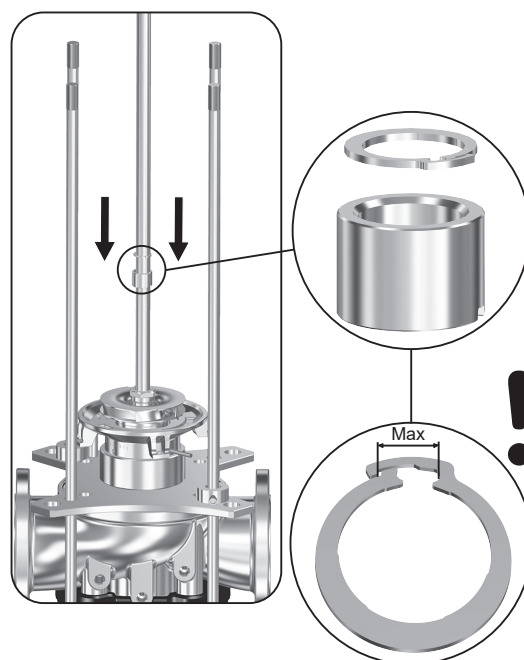
TM071896

Fixating the impeller (49 or 49a) to the pump shaft (51) with service tool C

5. Fit a split-cone nut (48) to the impeller.
6. Hold the impeller (49 or 49a) with a hook spanner. Tighten the split-cone nut (48) using the service tools C, O and P.
7. Lubricate and fit the bearing (47a).
8. **For pumps with Ø28 or Ø36 pump shaft:** Note that for pumps with Ø28 or Ø36 pump shaft, you must also fit the lock ring (47g). See the figure below. Make sure that the lock ring (47g) tightens firmly around the pump shaft and holds the bearing (47a) fixed on the pump shaft.



Do not open the lock ring (47g) further than the restriction of the integrated locking mechanism. See the figure below.



TM072073

Maximum permissible opening of lock ring (47g)

- 9. Fit the bottom chamber with bearing (4a), and press it home on the inlet part (44).
- 10. Continue installing the remaining chambers (4), split-cone nuts (48), split cones (49b), impellers (49 or 49a) and bearings (47a).
- 11. Fit the outlet part (44a) on the top chamber.
- 12. Fit the strap (26a), washers (26c) and screws (26b). Lubricate and tighten the screws.
- 13. Carefully lift the chamber stack with approved lifting equipment.
- 14. Follow the assembly instructions described in the section on shaft seal, motor stool, pump head cover, sleeve and chamber stack assembly.

Related information

- 3.2.3 Assembly
- 7.1 Torques
- 7.2 Lubricants
- 7.3.1 Special tools
- 7.4 Order of assembly for chambers and impellers

5. Renewing chamber wear parts

5.1 Neck ring (45)

Neck rings (45) and neck-ring retainers (65) are installed in chambers (4 or 4a) and in the inlet part (44). See the sections on dismantling and assembly for the renewal of neck rings in chambers as well as in the inlet part.

5.1.1 Dismantling

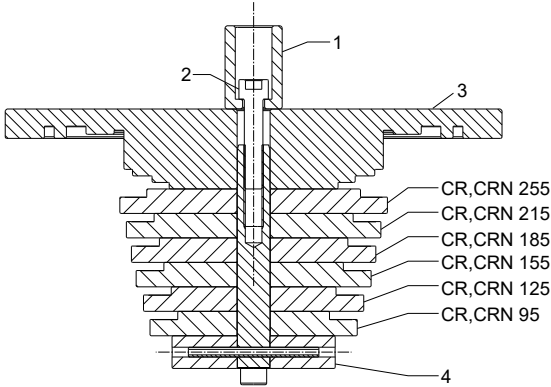
- 1. Free the neck-ring retainer (65) from the chamber (4 or 4a) or inlet part (44) by using a flat-blade screwdriver.
- 2. Remove the neck ring (45).

5.1.2 Assembly

- 1. Use service tool L and select the disc size for the pump which is being serviced and remove the remaining discs from the service tool. See the figure below.



Make sure that service tool L and the neck rings are completely clean during assembly. If particles are present between the tool and the pump parts, it may result in the neck rings being installed wrongly.

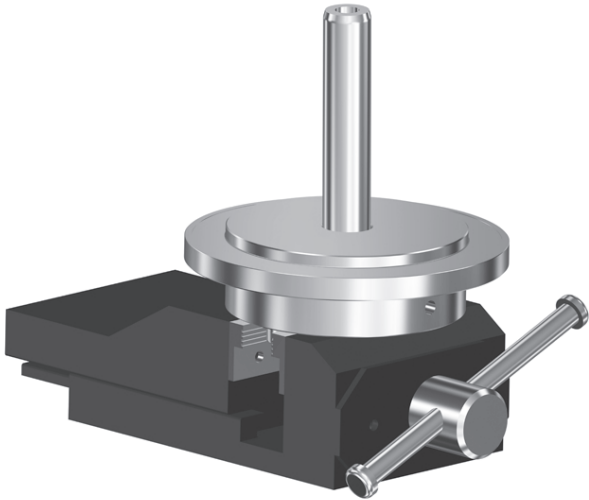


TN071781

Service tool L for installing the neck ring

Pos.	Description
1	Distance piece
2	Screw
3	Top cover
4	Base

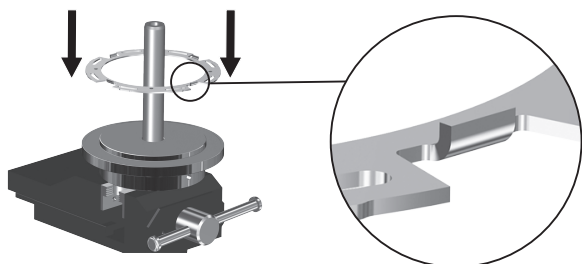
- 2. Place service tool L in a vice. See the figure below.



TN071782

Service tool L placed in a vice

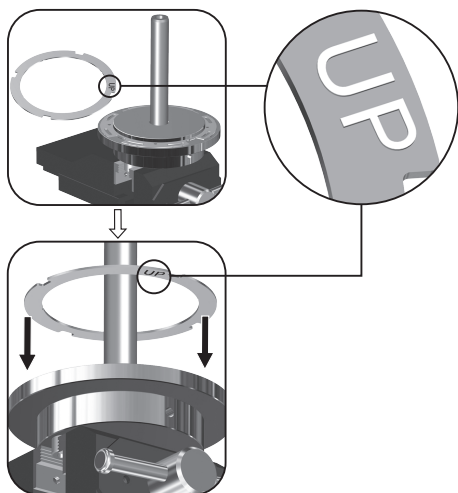
3. Place the neck-ring retainer (65) on top of the disc with the driving dogs upwards. See the figure below.



TM071783

Neck-ring retainer (65) placed in service tool with the driving dogs pointing upwards

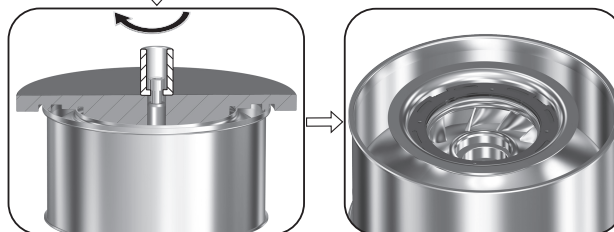
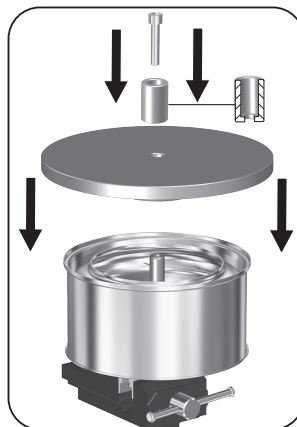
4. Place the neck ring (45) on top of the neck-ring retainer (65). Note that the text "UP" which is stamped into the neck ring (45) must point down towards the neck ring (65). See the figure below.



TM071784

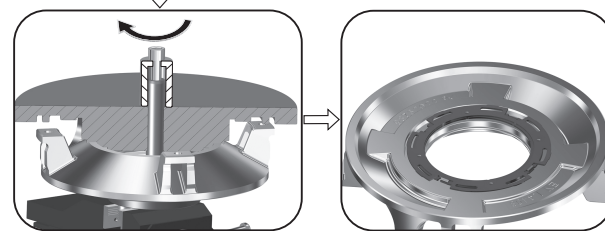
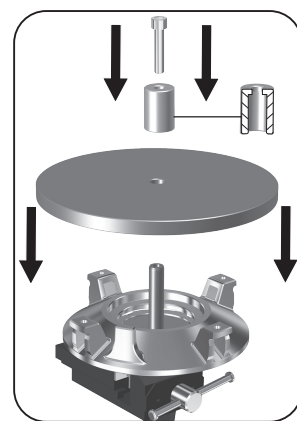
Placing neck ring (45) with the text "UP" pointing down towards the neck-ring retainer (65)

5. Place the chamber (4 or 4a) or inlet part (44) over the neck ring (45) and neck-ring retainer (65). See fig. 'Neck ring, neck-ring retainer and chamber positioned in service tool L' and 'Neck ring, neck-ring retainer and inlet part positioned in service tool L'.
6. Place the top plate of service tool L on top of the chamber or inlet part and align it so it fits. See fig. 'Neck ring, neck-ring retainer and chamber positioned in service tool L' and 'Neck ring, neck-ring retainer and inlet part positioned in service tool L'.
7. Fit the distance piece and screw on the top plate of service tool L. See fig. 'Neck ring, neck-ring retainer and chamber positioned in service tool L' and 'Neck ring, neck-ring retainer and inlet part positioned in service tool L'.
8. Tighten the screw to 20 Nm.



TM071785

Neck ring, neck-ring retainer and chamber positioned in service tool L



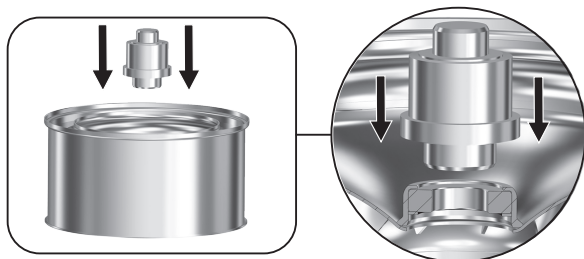
TM071897

Neck ring, neck-ring retainer and inlet part positioned in service tool L

5.2 Bush (47c) and retaining ring (47d)

5.2.1 Dismantling

1. Place the chamber on a flat surface.
2. Press the bush (47c) and retaining ring (47d) out of the chamber using service tool K.

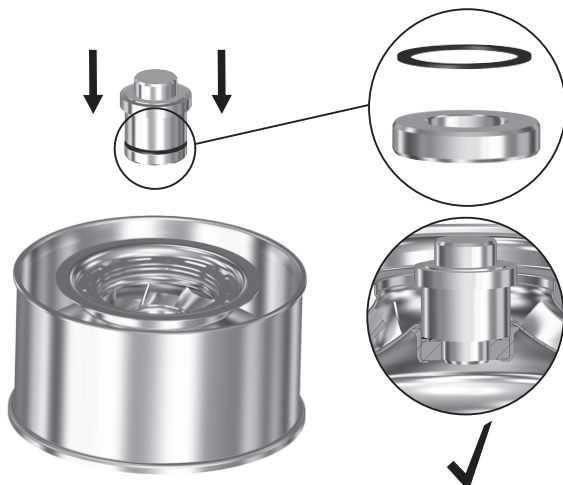


TM071786

Pressing out the bush (47c) and retaining ring (47d) with service tool K

5.2.2 Assembly

1. Place the chamber on a level and solid surface with the neck ring (45) facing downwards.
2. Place the bush (47c) and retaining ring (47c) on service tool K.
3. With a pressing tool, press the retaining ring (47d) and bush (47c) home in the chamber by using service tool K.



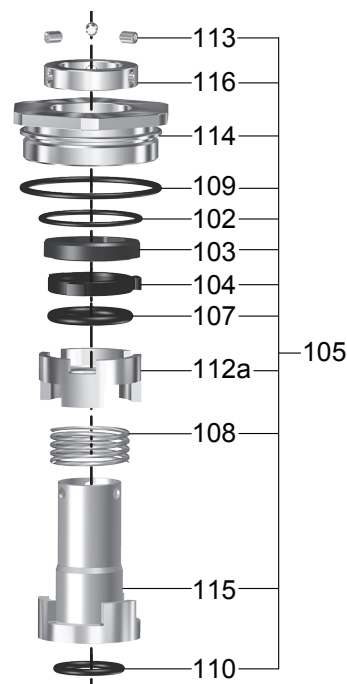
TM071787

Installing the bush (47c) and retaining ring (47d) with service tool K

6. Renewing shaft seal wear parts

This section applies only to shaft seals with an inner diameter of $\varnothing 28$ or $\varnothing 36$.

Shaft seals with an inner diameter of $\varnothing 22$ cannot be serviced but must be replaced instead.



TM071904

Shaft seal parts for $\varnothing 28$ and $\varnothing 36$ shaft seals

6.1 Dismantling

1. Place the shaft seal (105) on a work table.
2. Press down the shaft seal and compress the spring (108) with one hand while removing the three set screws (113).
3. Remove the lock ring (116).
4. Remove the stationary seal-ring retainer (114) together with the rotating seal ring (104).
5. Remove the O-ring (109) from the stationary seal-ring retainer (114).
6. Remove the stationary seal ring (103) from the stationary seal-ring retainer (114) by using a small flat-bladed screwdriver.
7. Remove the O-ring (102) from the stationary seal-ring retainer (114).
8. Remove the upper seal driver (112a).
9. Remove the O-ring (107) from the upper seal driver (112a).
10. Remove the spring (108).
11. Remove the O-ring (110) from the shaft seal cartridge (115).

6.2 Assembly



Do not touch the seal faces of the stationary seal ring (103) or rotating seal ring (104). Only hold these parts on their sides.



Do not apply any kind of grease or lubricant on the stationary seal ring (103) or rotating seal ring (104) since this can result in malfunction of the shaft seal.



Handle all shaft seal parts very carefully and avoid scratching or denting them.

1. Clean and de-grease all parts.
 2. Lubricate the new O-ring (110) and install it in the shaft seal cartridge (115).
 3. Install the spring (108) on the shaft seal cartridge (115).
 4. Install the upper seal driver (112a) on the shaft seal cartridge (115).
 5. Install a new O-ring (107) on the shaft seal cartridge (115).
 6. Install a new rotating seal ring (104) on the shaft seal cartridge (115).
 7. Lubricate the new O-ring (109) and install it on the stationary seal-ring retainer (114).
 8. Install a new O-ring (102) in the stationary seal-ring retainer (114).
 9. Install a new stationary seal ring (103) in the stationary seal-ring retainer (114).
 10. Install the stationary seal-ring retainer (114) on the shaft seal cartridge (115).
 11. Fit the three set screws (113) in the lock ring (116).
 12. Install the lock ring (116) on the shaft seal cartridge (115).
 13. Press down on top of the lock ring (116) while aligning the three set screws (113) with the holes in the shaft seal cartridge (115).
 14. Screw in the three set screws (113) only so much that they engage with the holes in the shaft seal cartridge (115) and keep the shaft seal parts together.
- Note that the screws (113) must not protrude on the inside of the shaft seal cartridge (115) since this will make it difficult to re-install the shaft seal (105) on the pump shaft (51).

7. Additional information



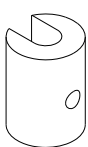

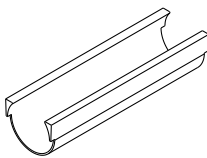
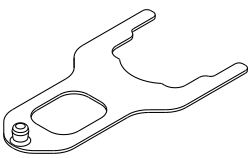
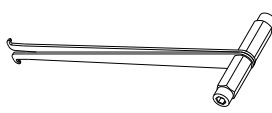
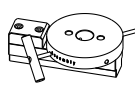
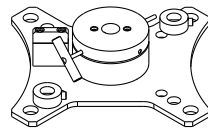
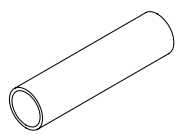
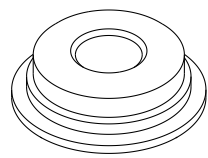
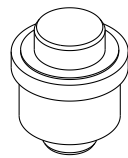
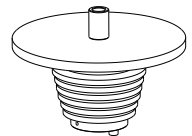

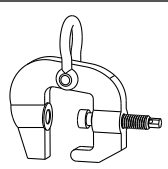
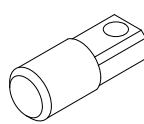
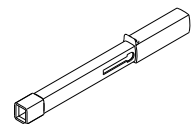
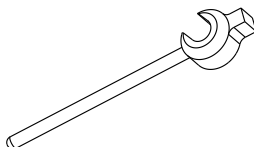
7.1 Torques

Pos.	Description	Dimensions	Torque [Nm]
2d	Screws for bracket	M6	6.5
7a	Coupling-guard screws	M5	4
9	Coupling screws	M10	85
		M16	100
18	Vent screw	1/2"	35
19	Plug	1/2"	35
25	Plug	1/2"	35
26b	Hexagon-socket head-cap screw	M8	15
36	Staybolt nuts	M16 (CR, CRN 95, PN 16/25/30)	160
		M20 (CR, CRN 95, PN 25)	220
		M20 (CR, CRN 95, PN 30/40)	320
		M20 (CR, CRN 95/125/155, PN 16)	190
		M20 (CR, CRN 125/155, PN 25/30)	320
		M24 (CR, CRN 125/155, PN 16)	190
		M24 (CR, CRN 125/155, PN 25/30/40)	625
		M30 (CR, CRN 185/215/255, PN 16)	410
		M30 (CR, CRN 185/215/255, PN 25)	710
		M30 (CR, CRN 185/215/255, PN 40)	950
36	Motor-stool nuts	M12	40
		M16	80
		M20	150
48	Split-cone nut	Ø22 shaft (Hex 34)	70
		Ø28 shaft (Hex 46)	130
		Ø36 shaft (Hex 60)	290
105	Shaft seal	Hex 60	100
		Hex 75	150
113	Shaft-seal-set screws	M6 x 8	6
120f	Nut with left-hand thread	M12	60
		M16	140
L	Tool for installing neck ring	-	15

7.2 Lubricants

Pos.	Description	Lubricant	Product no.
9	Hexagon-socket screw	Un Lock	96611372
26	Staybolt		
36	Nut		
36			
37	O-ring	Rocol Sapphire Aqua-Sil	00RM2924
47a	Bearing		
109	O-ring for shaft seal (105)		
110	O-ring for shaft seal (105)		
120c	O-ring		
120g	Stationary ring		
120j	O-ring		

7.3 Special service tools

A	B	C	D
			
E	F	G	H
			<div>H1</div>  <div>H2</div> 
I	J	K	L
			
M	N	O	P
			
Q			
			

7.3.1 Special tools

Pos.	Description	For pos.	Further information	Part number
A	Service tool for loosening and tightening shaft seal	105	For Ø22 pump shafts	99072586
			For Ø28 and Ø36 pump shafts	99072587
B	Eyebolt with swivel function	51	M10 × 1.5	-
C	Key for split-cone nut	48	For Ø22 pump shafts	SV0004
			For Ø28 pump shafts	99072584
			For Ø36 pump shafts	99072585
D	T-pin	51	-	99072581
E	Service tool for smoothening out marks on shaft	51	-	-
F	Adjusting fork	105	For Ø22, Ø28 and Ø36 pump shafts	92582580
G	Hook for thrust-handling device	120h	-	99176979
H1	Service tool for chamber stack		For vice	99081919
H2			For pump base	
I	Protection pipe for shaft	51	For Ø28 pump shafts reduced to Ø22 shaft ends	99081891
			For Ø36 pump shafts reduced to Ø22 shaft ends	99081920
			For Ø36 pump shafts reduced to Ø28 shaft ends	99081890
J	Service tool for alignment of pump head, sleeve and chamber stack	2, 51	For Ø22 pump shafts	99072588
			For Ø28 pump shafts	99072589
			For Ø36 pump shafts	99072590
K	Punch tools for bush	47, 47c, 47d	For Ø22 pump shafts	98369955
			For Ø28 and Ø36 pump shafts	99081918
L	Tool for installing neck ring	45a	For CR, CRN 95 - 255	99447875
M	Protective disc	48	For Ø28 pump shafts	99381867
			For Ø36 pump shafts	99381868
N	Screw-clamp for outer sleeve	55	-	99139064
O	Pin for torque wrench	105	14 × 18 × Ø14	SV0402
P	Torque wrench	105	-	-
Q	Hammering tool	48	For Ø28 pump shafts	99424834
			For Ø36 pump shafts	99424835

7.4 Order of assembly for chambers and impellers

The assembly of the pump is illustrated in the following drawings.
Each symbol corresponds to a different chamber.

7.4.1 Standard impellers

Pos. 49 is the standard size impeller.

7.4.2 Impellers with reduced diameter

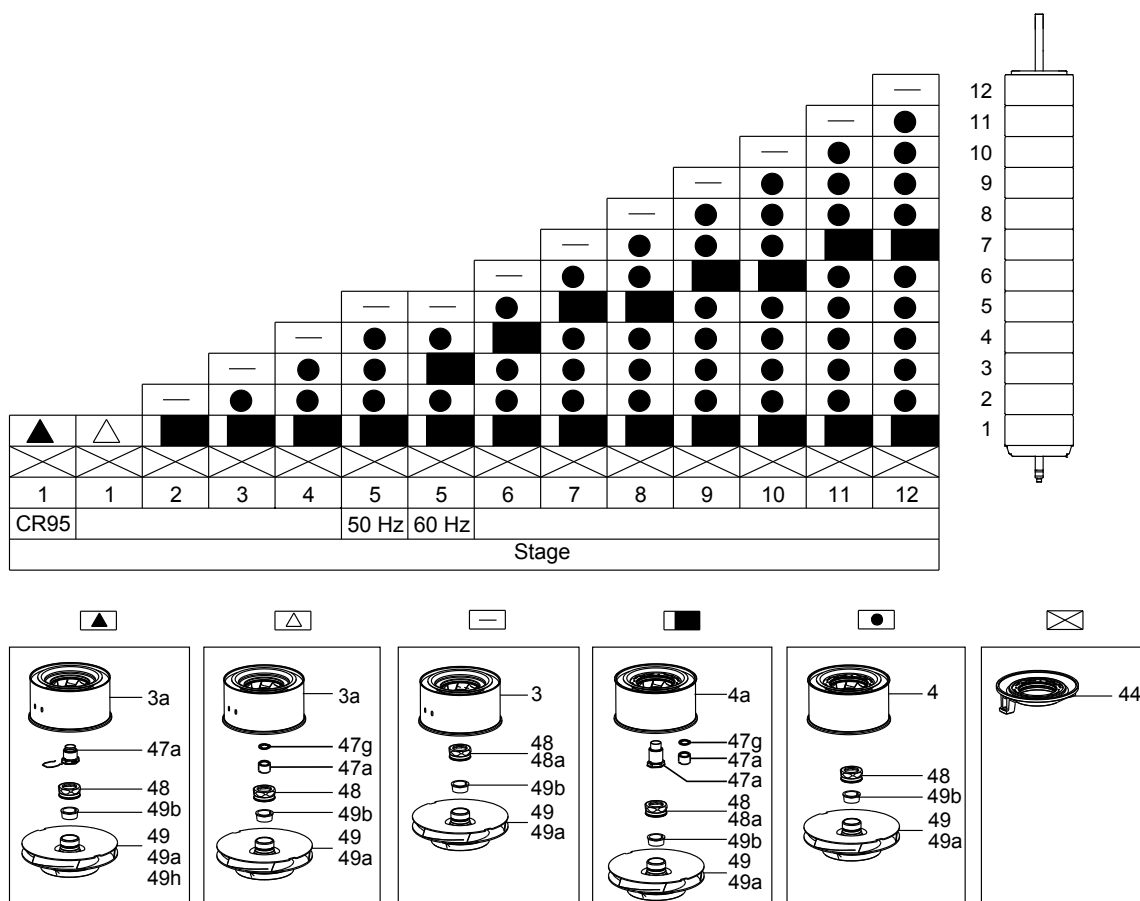
Pos. 49a is an impeller with reduced diameter, 2/3 of standard size.

Impellers (49a) must be fitted as the last stages which are at the upper part of the pump stack.

Pos. 49h is an impeller with reduced diameter and a larger front shroud diameter. These impellers are only fitted in pumps which also contain impellers (49a) with reduced diameter.

Impeller (49h) must be fitted as first stage of the pump which is placed just above the inlet part (44). Impellers with pos. 49h can be identified by having one of the below listed part numbers which is engraved into the impeller:

- 99549699
- 99547569
- 99553557
- 99553558
- 99553559
- 99553560



TM068473

7.5 Drawings

7.5.1 Overview of drawings

Pumps without thrust-handling device

Drawing type	Pump
Exploded drawing	Pumps with Ø22 shaft
	Pumps with Ø28 and Ø36 shaft
Sectional drawing	Pumps with Ø22 shaft
	Pumps with Ø28 and Ø36 shaft

Pumps with thrust-handling device

Drawing type	Pump
Exploded drawing	Pumps with Ø28 and Ø36 shaft
Sectional drawing	

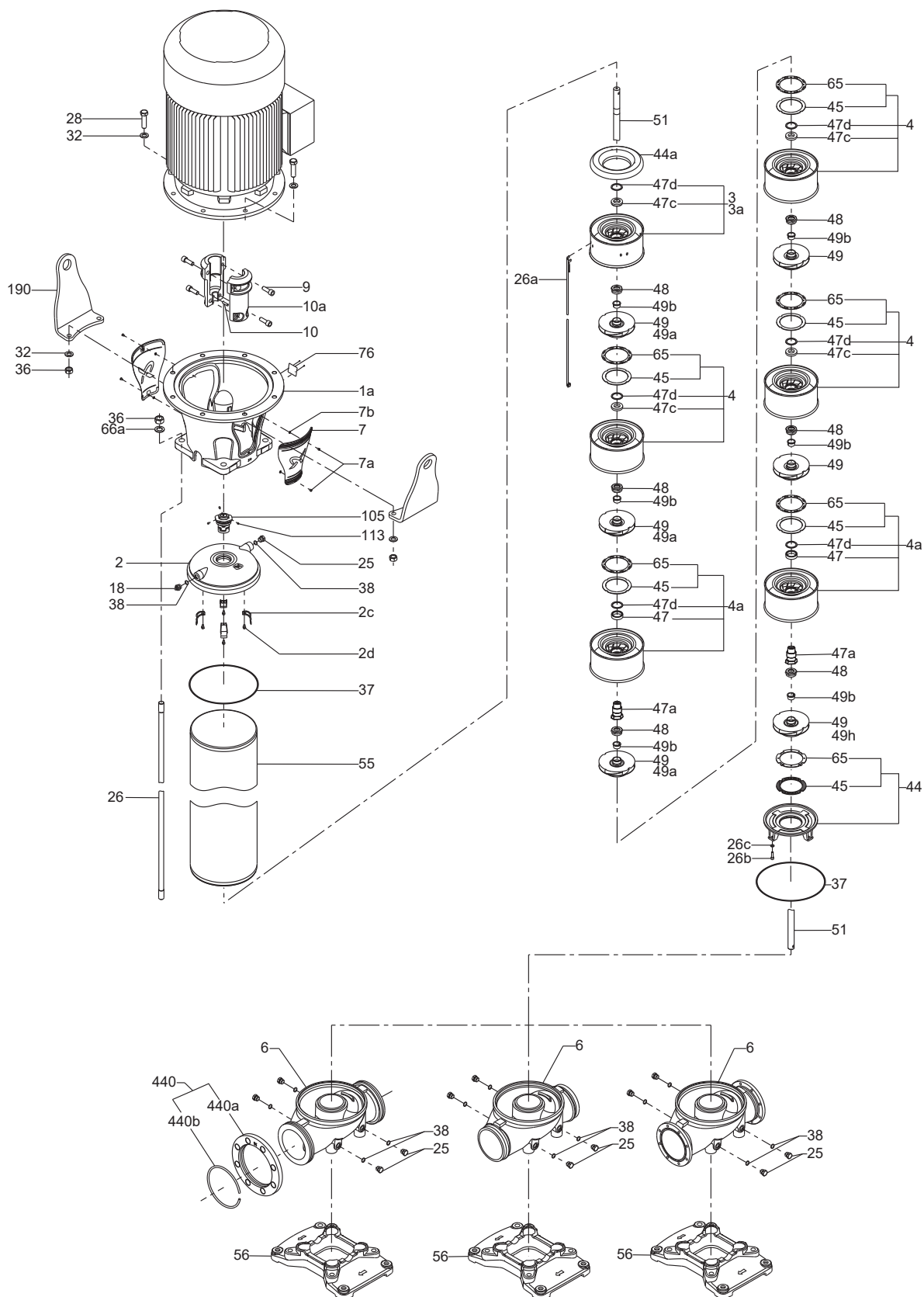
Related information

[7.5.2 Exploded views](#)

[7.5.3 Sectional views](#)

7.5.2 Exploded views

Pumps with Ø22 shaft and without thrust-handling device



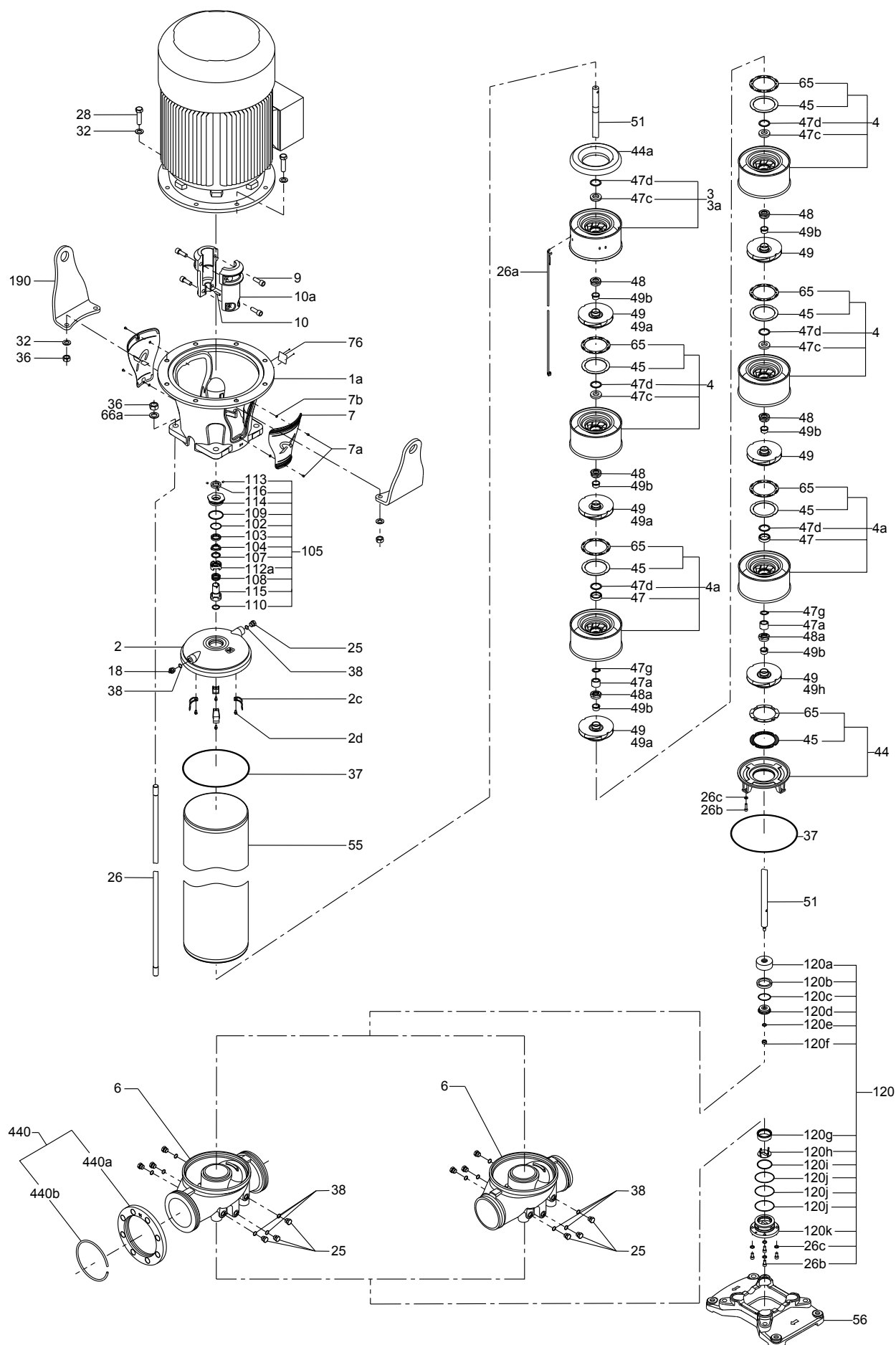
Exploded view of a CR, CRN pump with Ø22 shaft and without thrust-handling device

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Exploded view of a CR, CRN pump with Ø28 or Ø36 shaft and without thrust-handling device

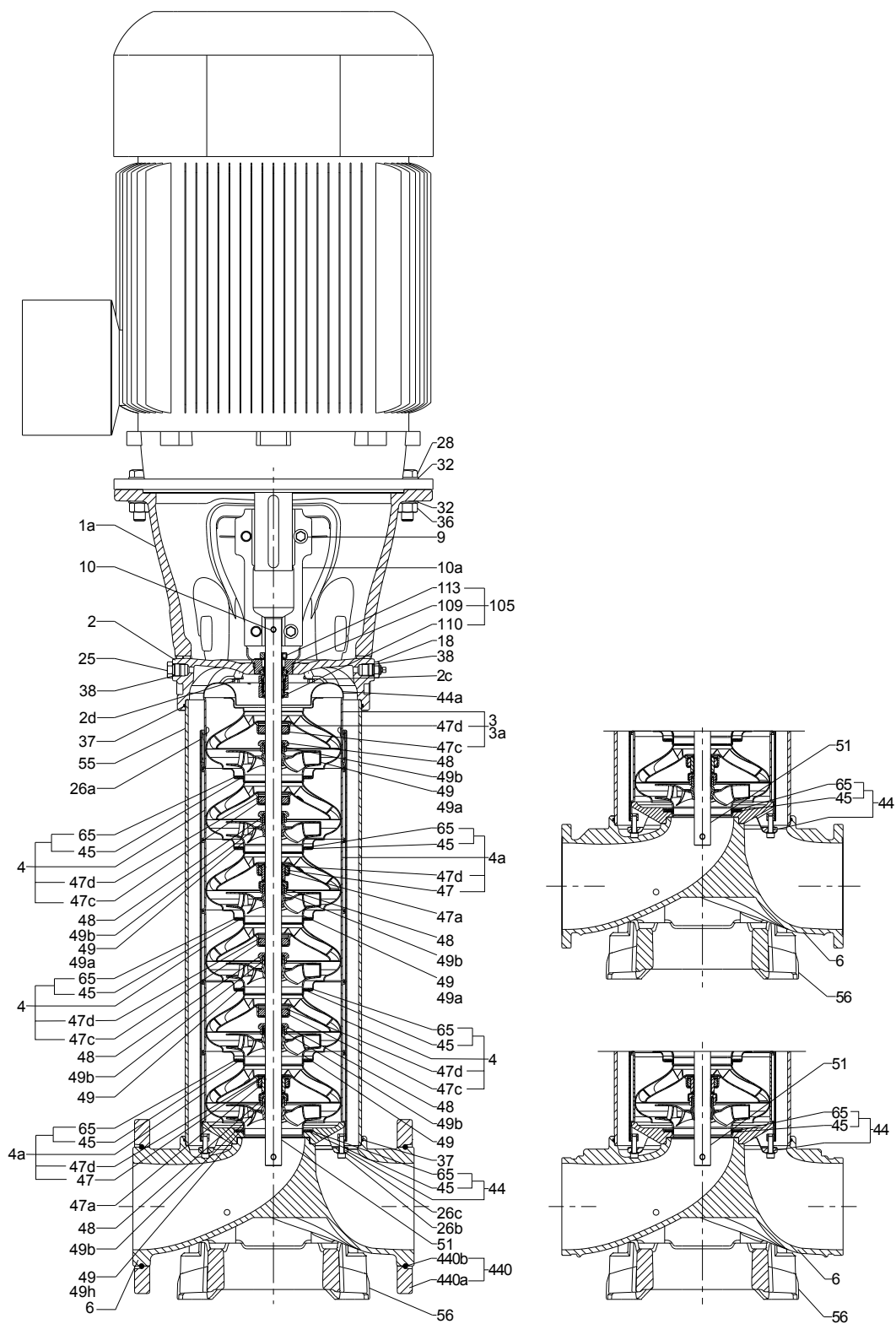
Pumps with Ø28 or Ø36 shaft and with thrust-handling device



Exploded view of a CR, CRN pump with Ø28 or Ø36 shaft and with thrust-handling device

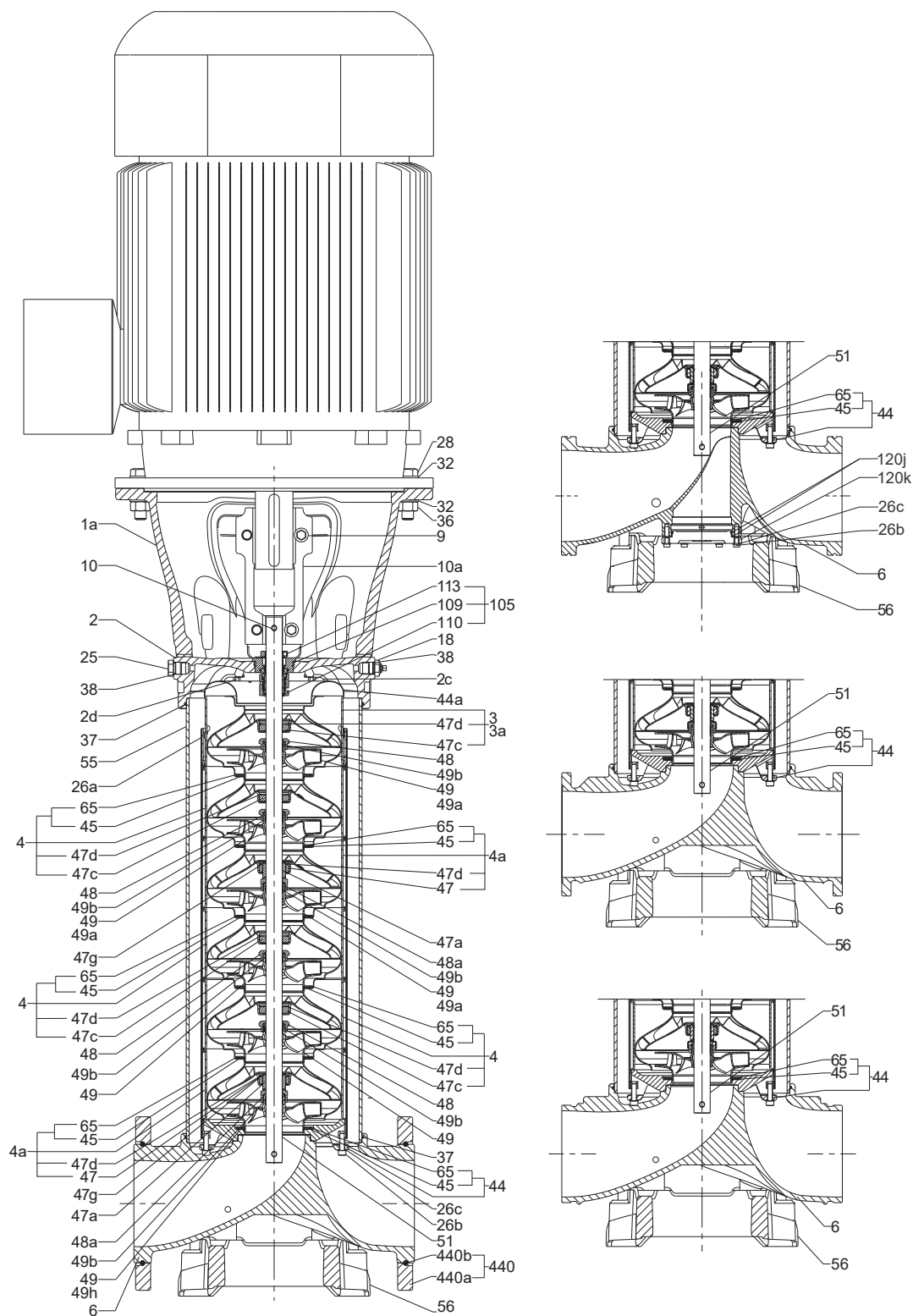
7.5.3 Sectional views

Pumps with Ø22 shaft and without thrust-handling device



Sectional view of a CR, CRN pump with $\varnothing 22$ shaft and without thrust-handling device

Sectional view of a CR, CRN pump with $\varnothing 28$ or $\varnothing 36$ shaft and without thrust-handling device

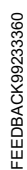




Sectional view of a CR, CRN pump with $\varnothing 28$ or $\varnothing 36$ shaft and with thrust-handling device

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