CR, CRN 95 to 255

50/60 Hz

Service instructions

be
think
innovate

GRUNDFOS

Original service instructions

CONTENTS

Read this document before starting service work on the product. Installation and service work must comply with local regulations and accepted codes of good practice.

Observe the safety instructions in the installation and operating instructions for the product.

1. General information

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 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 details to be aware of when working on the product

DANGER

Electric shock

Death or serious personal injury

- Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

WARNING

Falling objects

Death or serious personal injury

- Follow the lifting instructions.
- Use lifting equipment which is approved for the weight of the product.
- 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

Falling objects

Death or serious personal injury

- Keep the product in a stable and fixed position when working on it.

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 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 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 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 > 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 section *7.5 Drawings*.

Tools are indicated by letters and refer to section *7.3 Special service tools*.

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 cylindrical pin (10) from the pump shaft (51).
5. Attach approved lifting equipment to the motor in order 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 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. See section *7.1 Torques*.
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). See sections *7.1 Torques* and *7.2 Lubricants*.
7. Install the coupling guards (7) and tighten the screws (7a). See section *7.1 Torques*.

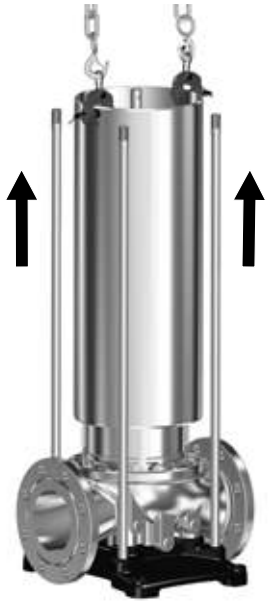
3.2 Shaft seal, motor stool, pump head cover, sleeve and chamber stack

3.2.1 Preparations

1. Remove the motor as described in section *3.1.1 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).

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: Shaft seals fitted on pumps with ∅28 and ∅36 pump shafts can be fitted with new wear parts. See section *6. Renewing shaft-seal wear parts*.
6. Attach approved lifting equipment to the motor stool (1a) in order 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 fig. 1.



TM07 1740 2218

Fig. 1 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.

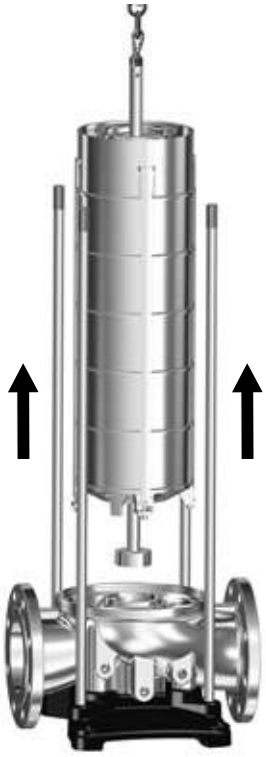


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Fig. 2 Lifting the chamber stack

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.

3.2.3 Assembly

1. Lubricate and install a new o-ring (37) in the pump base (6). See section *7.2 Lubricants*.
2. Carefully lift the chamber stack with approved lifting equipment and lower it into the pump base.
   Note: Make sure to align the pump inlet part (44) with the tap in the pump base (6). See fig. 3.

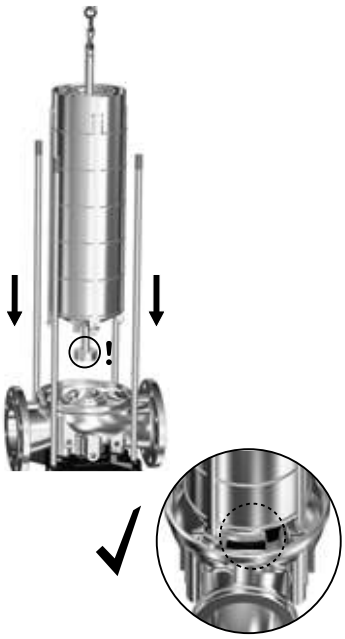

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Fig. 3 Aligning inlet part (44) in pump base (6)

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).
   Note: 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).

TM07 0849 1418

Fig. 4 Aligning sleeve (55) in pump base (6)

5. Lubricate and install a new o-ring (37) in the pump head cover. See *7.2 Lubricants*.
6. CR pumps only: Install the four screws (2d) and the brackets (2c) in the pump head cover (2). See section *7.1 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 fig. 5.
   Note: 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 fig. 6.

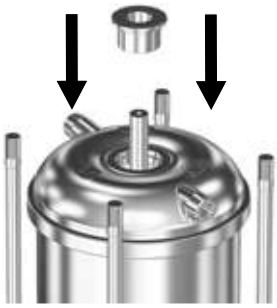

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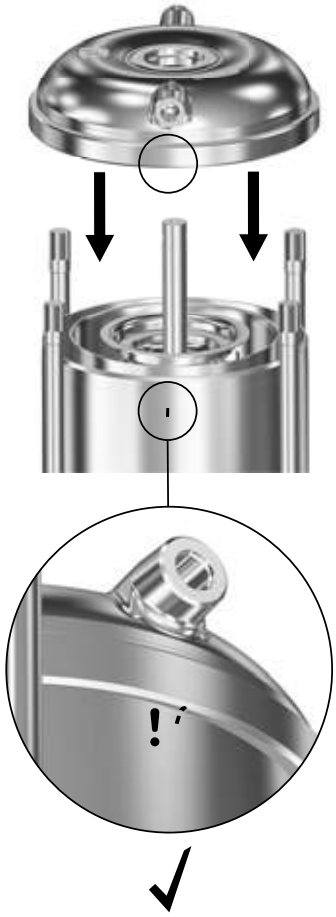
Fig. 5 Fitting service tool J in the pump head cover (2).



TM07 1741 2218

Fig. 6 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 sections *7.1 Torques* and *7.2 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 section *7.2 Lubricants*.
    Note: 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 section *7.1 Torques*.
17. Check that the height X is maximum 71 mm. See fig. 7.
    Note: 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.

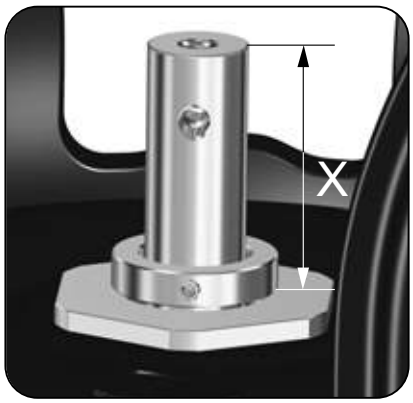


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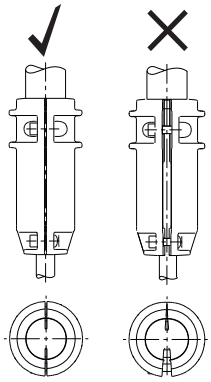
Fig. 7 Height measurement X

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 section *7.2 Lubricants*.
21. Check that the gaps on either side of the coupling halves are equal. See fig. 8.



TM07 1744 2218

Fig. 8 Gap between coupling halves

22. Tighten the three set screws (113) to the specified torque. See section *7.1 Torques*.
23. Lift the pump shaft with a crowbar and insert the adjusting fork F. See fig. 9.

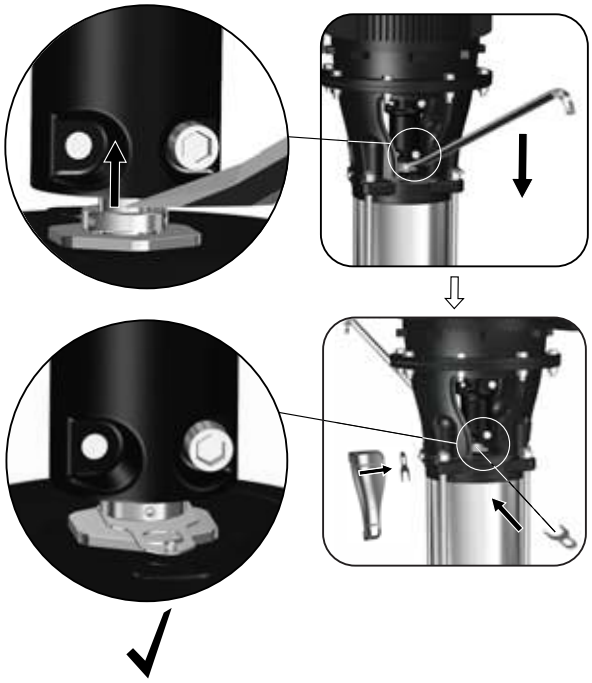


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Fig. 9 Lifting pump shaft and fitting adjusting fork.

24. Cross-tighten the screws (9) to the specified torque. See *7.1 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 fig. 10.

TM07 1743 2218

Fig. 10 Fitting adjusting fork F on the backside of coupling guard (7)

26. Install the coupling guards (7) and tighten the screws (7a). See section *7.1 Torques*.

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 section *3.3.1 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 section *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 following sections:

- *3.1.1 Removal*
- *3.2.2 Dismantling*.

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) (Note: left-hand thread) and washer (120e). Use service tools C, D, O and P to hold the shaft when loosening the nut (120f).

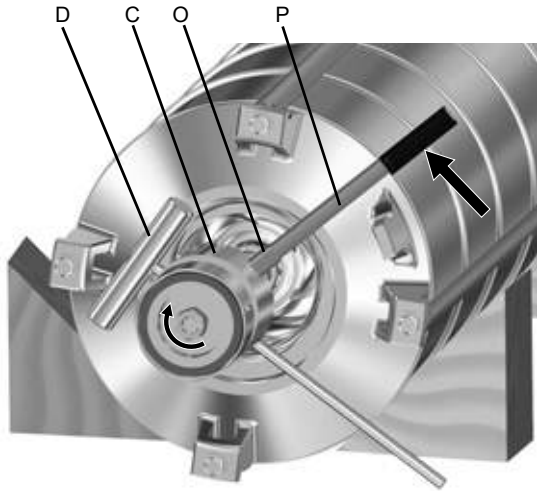

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Fig. 11 Dismantling thrust-handling device from pump shaft

3. Remove thrust-handling device 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.

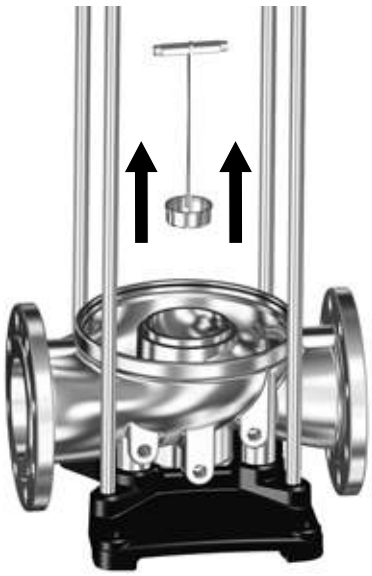

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Fig. 12 Removing stationary ring (120g) and lifting plate (120h)

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

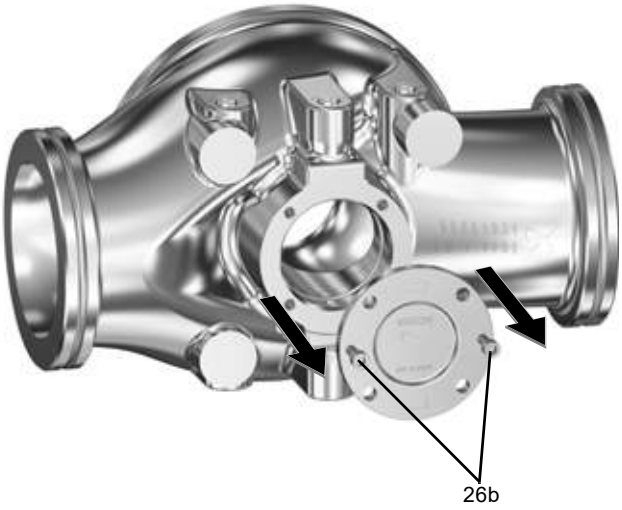

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Fig. 13 Extracting the flange

7. To renew the thrust-handling device wear parts, see section *4. Renewing thrust-handling device wear parts*.

3.3.2 Assembly

1. Install the flange (120k) in the pump base (6).
2. Fit and tighten the four screws (26b). See *7.1 Torques*.
3. Fit the stationary ring (120g) together with the lifting plate (120h) by using service tool G.
4. Fit thrust-handling device parts (120a,120b, 120c, 120d).
5. Fit the washer (120e) and nut (120f).
6. Tighten the nut (120f). See *7.1 Torques*.
   Note: Left-hand thread.
7. Follow the assembly instructions described in section *3.2.3 Assembly*.

3.3.3 Servicing the thrust-handling device from the pump base

Preparations

1. Disconnect the power supply and remove the power cable.
2. Close the isolating valves, if fitted, to avoid draining the pipe system.
3. Drain the pump by opening the vent screw (18) and removing the plugs (25) with o-rings (38).
4. Secure the pump with approved lifting equipment.
5. Loosen the pipe connections to the pump.
6. Loosen the base-plate bolts.
7. Place the pump horizontally with adequate work space around the pump base (6). Follow the lifting instructions supplied with the pump.
8. Make sure that the pump cannot move when working on it. See fig. 14.

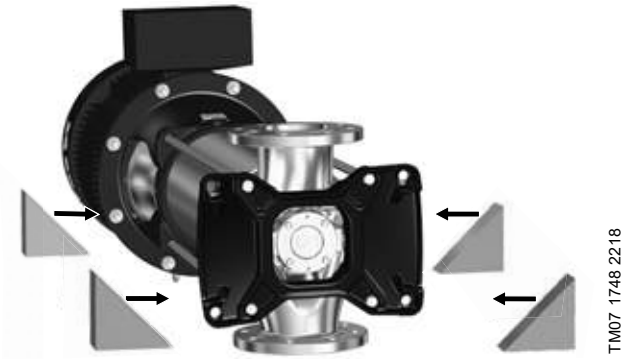

Fig. 14 Inserting wedges to avoid that the pump moves when working on it

Dismantling

1. Loosen and remove bolts (26b) from the pump base (6).
2. Remove the flange (120k) by using two bolts (26b) as extractors. See fig. 15.

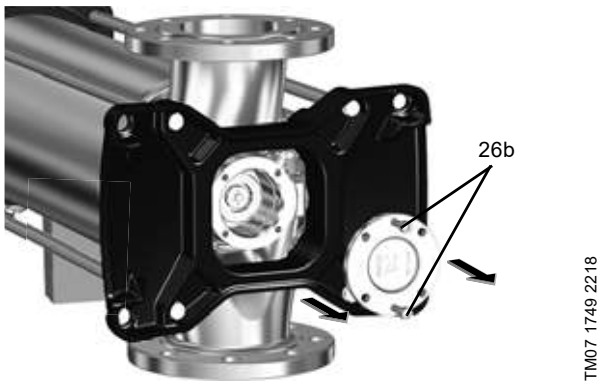

Fig. 15 Extracting the flange

3. Pull out thrust-handling device parts (120g, 120h). You can use service tool G for this.
4. Loosen and remove the nut (Note: left-hand thread) (120f) and washer (120e). Use service tool D to hold the pump shaft (51) when loosening. See fig. 16
5. Pull out thrust-handling device parts (120a, 120b, 120c, 120d). The parts come out together.
6. To renew the thrust-handling device wear parts, see section *4. Renewing thrust-handling device wear parts*.

3.3.4 Assembly

1. Fit thrust-handling device parts (120a, 120b, 120c, 120d).
2. Fit the washer (120e) and nut (120f).
3. Tighten the nut (120f). Use service tool D to hold the pump shaft (51) when tightening. See fig. 16.
   Note: Left-hand thread.
   See section *7.1 Torques*.

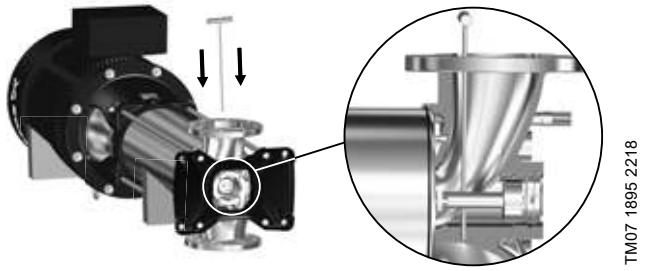

Fig. 16 Holding the pumps shaft (51) with service tool D.

4. Lubricate the stationary ring (120g) on the sides only, and avoid lubrication of the seal face.
5. Install the lifting plate (120h) in the stationary ring (120g).
6. Install the stationary ring (120g) with lifting plate (120h) in the flange (120k).
7. Fit the stationary ring (120g) together with the lifting plate (120h) in the flange (120k).
8. Install the flange (120k) in the pump base (6).
9. Fit and tighten the four screws (26b). See section *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 one of the following sections:

- *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*.

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).

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 section *4.1.1 Servicing the chamber stack in service tool for vice mounting*.
- Service tool for pump base mounting (H2), see section *4.1.2 Servicing the chamber stack in service tool for pump base mounting*.

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 following sections:

- *3.1.1 Removal*.
- *3.2 Shaft seal, motor stool, pump head cover, sleeve and chamber stack*.
- *3.3 Thrust-handling device*.
- Assemble service tool H1. See fig. 17.

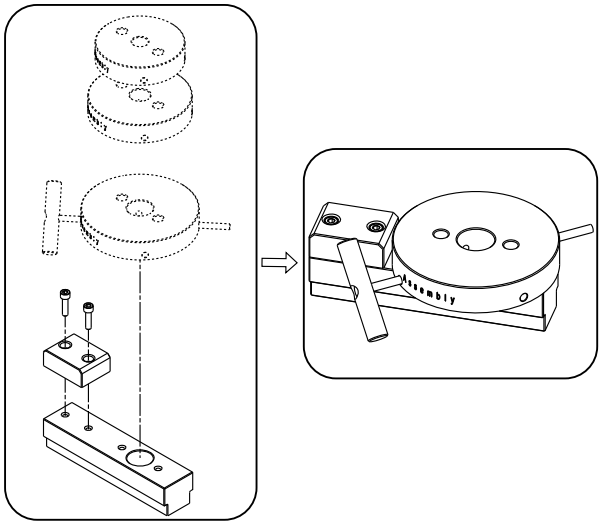

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Fig. 17 Service tool H1

Procedure

1. Place service tool H1 securely in a vice. See fig. 18 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 fig. 18. Make sure the pump-shaft end engages with the service tool.

TM07 1750 2218

Fig. 18 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 fig. 18.
6. Fit service tool D in the hole marked "Dismantling".

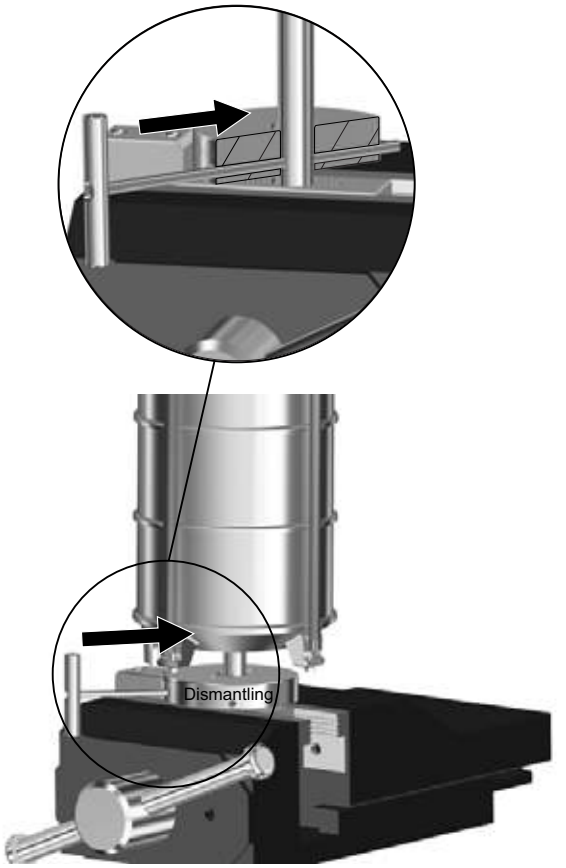

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Fig. 19 Locking the shaft in service tool H1.

7. Continue to section *4.1.3 Dismantling the chamber stack*.

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 following sections:

- *3.1.1 Removal*.
- *3.2 Shaft seal, motor stool, pump head cover, sleeve and chamber stack*.
- *3.3 Thrust-handling device*.
- Assemble service tool H2. See fig. 20.

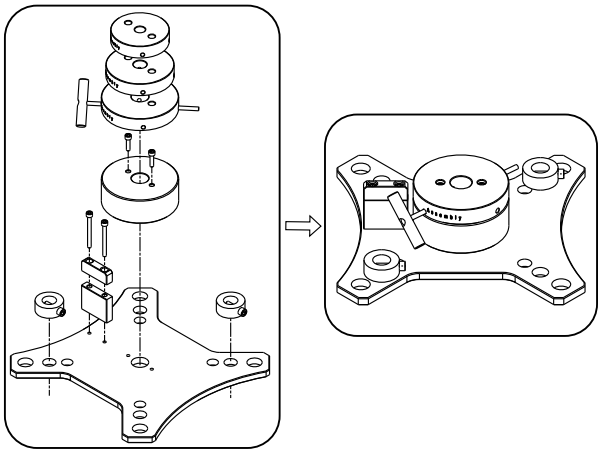

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Fig. 20 Service tool H2

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 fig. 21 for correct positioning and installation.

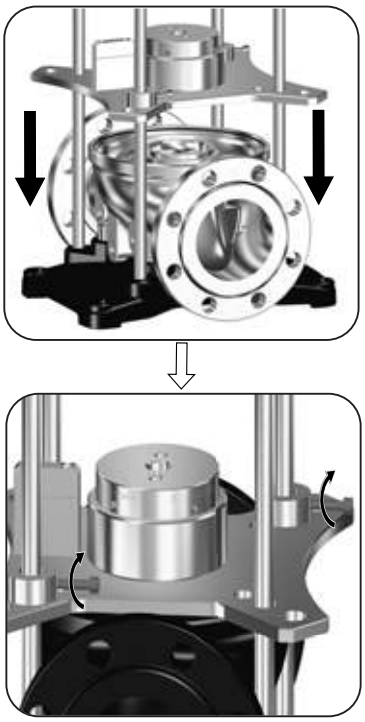

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Fig. 21 Service tool H2 for mounting on pump base

5. Lift the chamber stack onto service tool H2. See fig. 22. Make sure the pump-shaft end engages with the service tool.

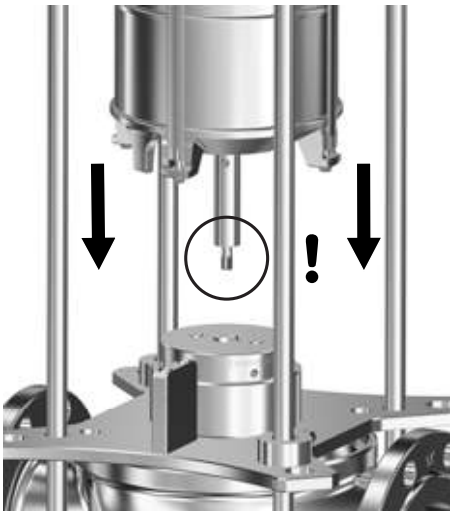

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Fig. 22 Positioning the chamber stack in service tool H2

6. Align the hole in the pump shaft with the hole in service tool H2 marked "Dismantling". See fig. 23.
7. Fit service tool D in the hole marked "Dismantling". See fig. 23.

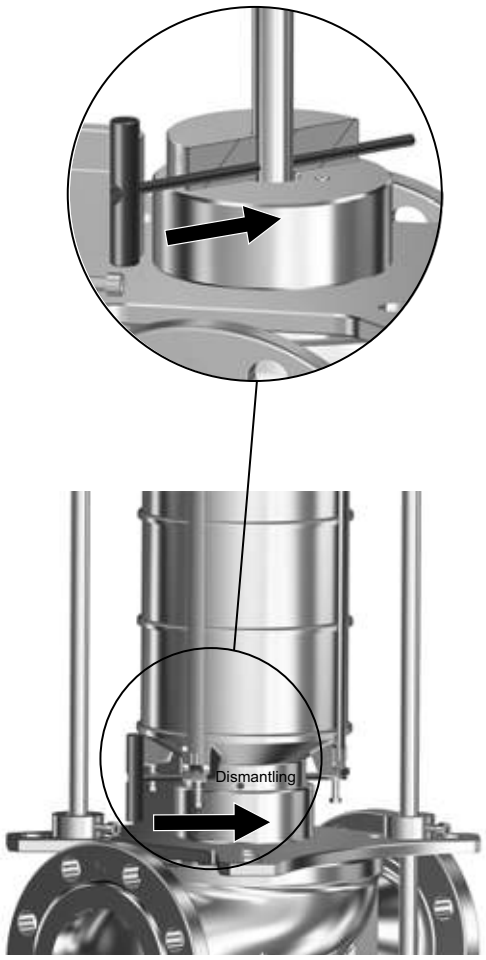

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Fig. 23 Locking the shaft in service tool H2

8. Continue to section *4.1.3 Dismantling the chamber stack*.

4.1.3 Dismantling the chamber stack

Preparations

Removing the chamber stack requires that the pump has been dismantled as described in the following sections:

- *3.1.1 Removal*.
- *3.2 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 sections *4.1.1 Servicing the chamber stack in service tool for vice mounting* or *4.1.2 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 ∅22 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 fig. 24.

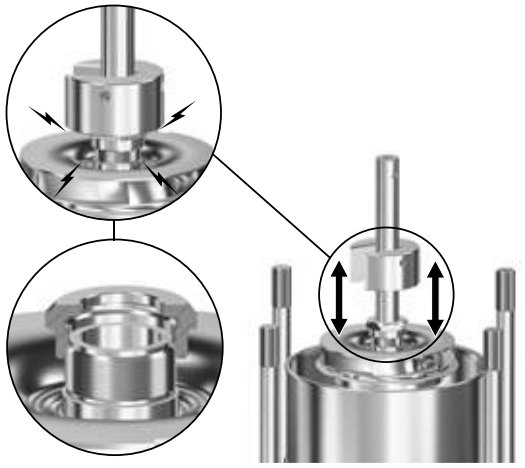

Fig. 24 Loosening the impeller (49 or 49a) with service tool C

6. **For pumps with ∅28 or ∅36 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 fig. 25.

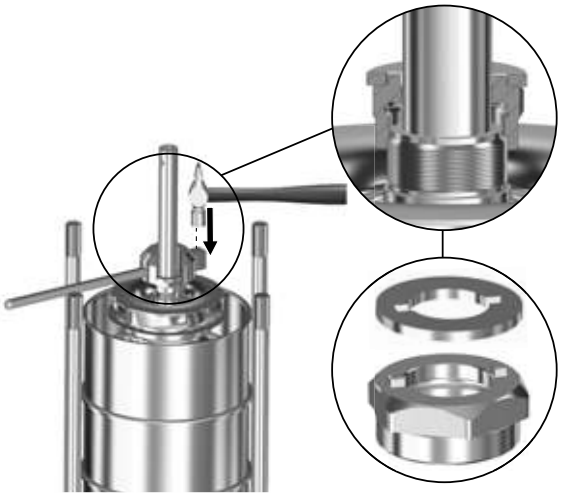

Fig. 25 Loosening the impeller (49 or 49a) with service tool Q

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 ∅28 or ∅36 pump shaft:
   Note that for pumps with ∅28 or ∅36 pump shaft, you must also remove the lock ring (47g). See fig 26.

Do not open the lock ring (47g) further than the restriction of the integrated locking mechanism. See fig 26.

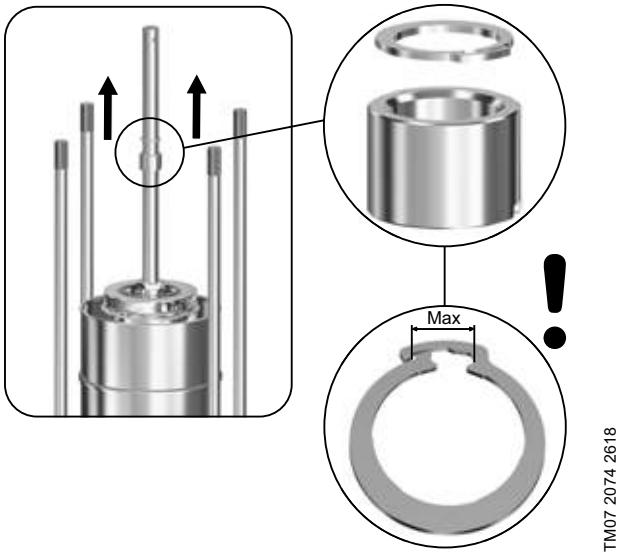

Fig. 26 Maximum permissible opening of lock ring (47g)

9. Remove the inlet part (44).
10. To renew the chamber wear parts, see section *5. Renewing chamber wear parts*.

4.1.4 Assembling the chamber stack

For chamber types, see section *7.4 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 fig. 27.

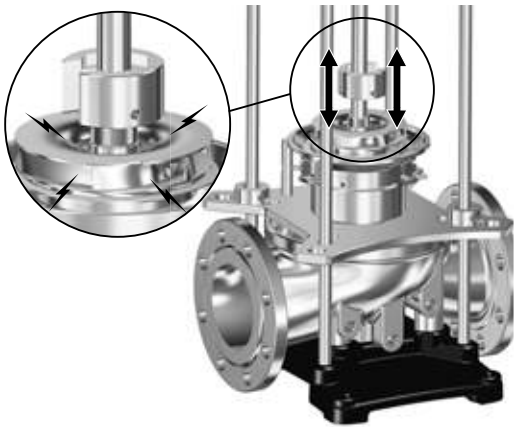

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Fig. 27 Fixating the impeller (49 or 49a) to the pump shaft (51) with service tool C

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. See section *7.1 Torques*.
7. Lubricate and fit the bearing (47a). See section *7.2 Lubricants*.
8. **For pumps with ∅28 or ∅36 pump shaft:** Note that for pumps with ∅28 or ∅36 pump shaft, you must also fit the lock ring (47g). See fig. 28.
   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 fig. 28.

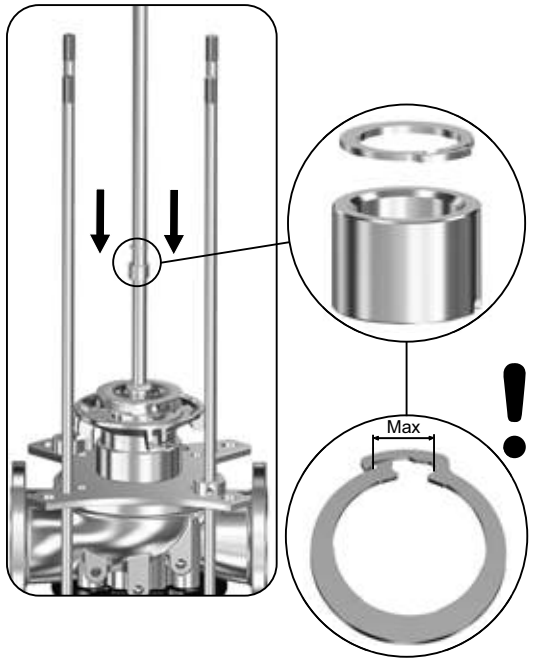

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Fig. 28 Maximum permissible opening of lock ring (47g)

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. See sections *7.1 Torques* and *7.2 Lubricants*.
13. Carefully lift the chamber stack with approved lifting equipment.
14. Follow the assembly instructions described in section *3.2.3 Assembly*.

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). Below procedure covers the renewal of neck rings in chambers as well as in 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 fig. 29.

Make sure that service tool L and 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.

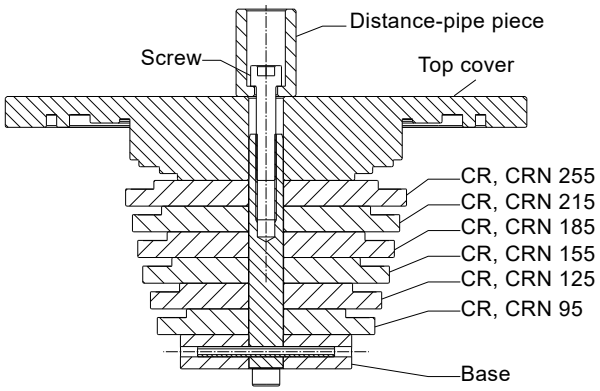


Fig. 29 Service tool L for installing the neck ring

2. Place service tool L in a vice. See fig. 30.

Fig. 30 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 fig. 31.

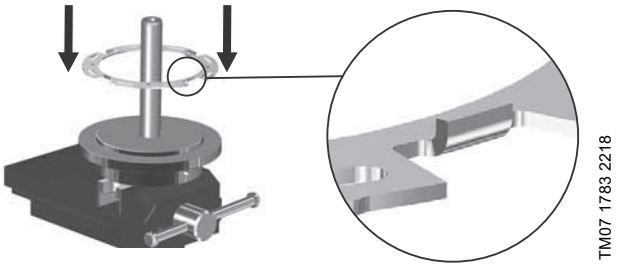


Fig. 31 Neck-ring retainer (65) placed in service tool with the tabs pointing upwards

4. Place the neck ring (45) on top of the neck-ring retainer (65). Note: The text "UP" which is stamped into the neck ring (45) must point down towards the neck ring (65). See fig. 32.

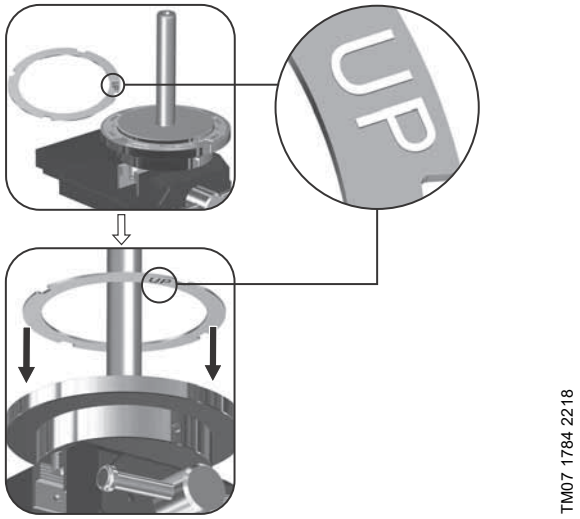


Fig. 32 Placing neck ring (45) with the text "UP" pointing down towards the neck-ring retainer (65)

5. Place the chamber (4 or 4a) or inlet part (44) over the neck ring (45) and neck-ring retainer (65). See fig. 33 and 34.
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. 33 and 34.
7. Fit the distance-pipe piece and screw on the top plate of service tool L. See fig. 33 and 34.

8. Tighten the screw to 20 Nm.

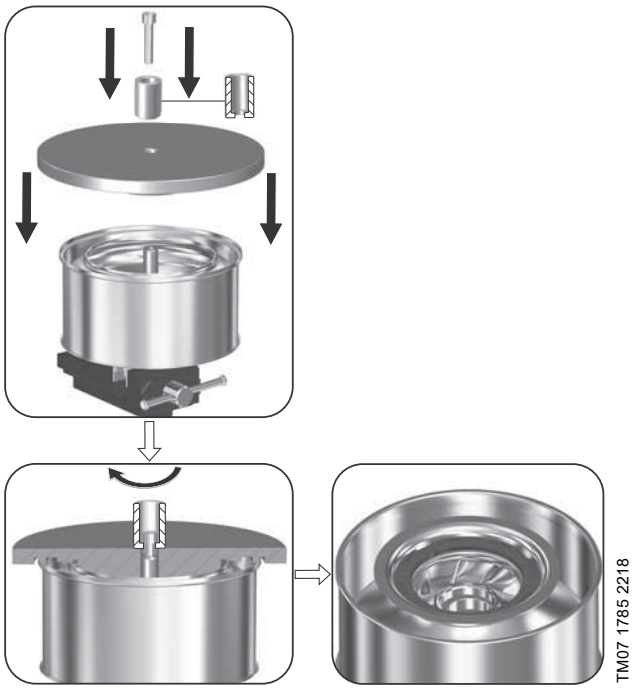


Fig. 33 Neck ring, neck-ring retainer and chamber positioned in service tool L.

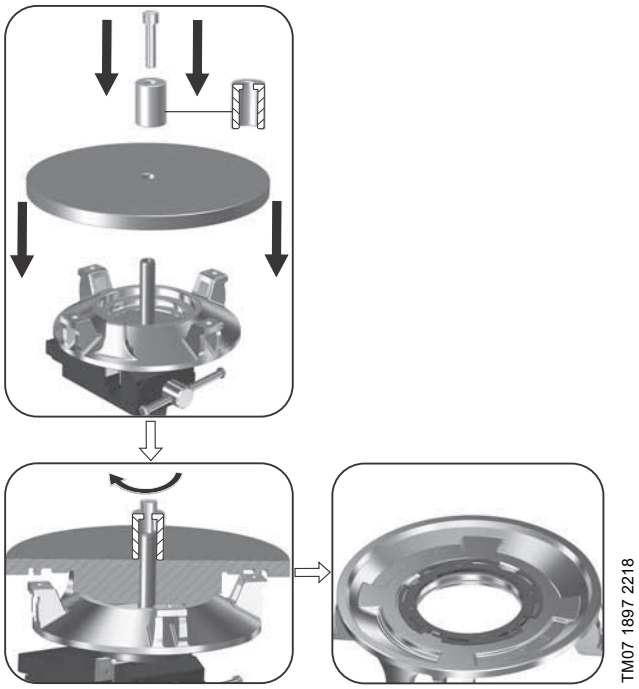


Fig. 34 Neck ring, neck-ring retainer and inlet part positioned in service tool L

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.

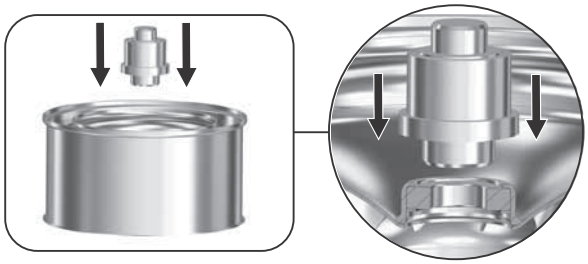


Fig. 35 Pressing out the bush (47c) and retaining ring (47d) with service tool K

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.

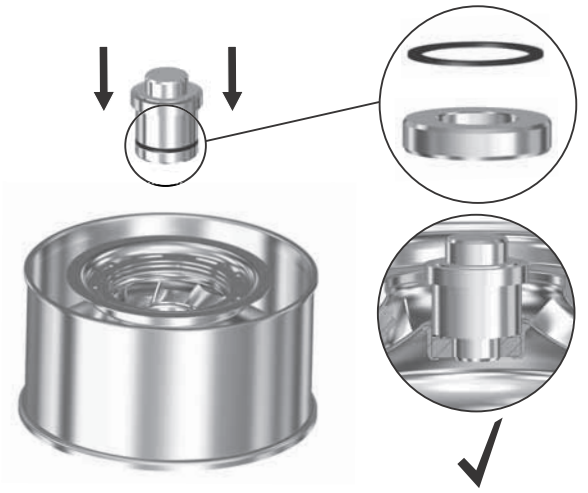


Fig. 36 Installing the bush (47c) and retaining ring (47d) with service tool K

6. Renewing shaft-seal wear parts

This section applies only for shaft seals with an inner diameter of ∅28 or ∅36.

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

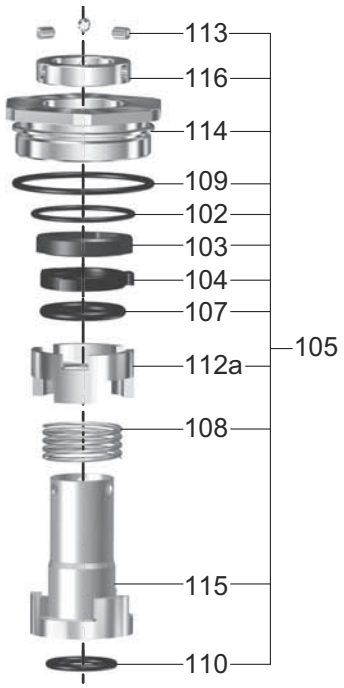


Fig. 37 Shaft-seal parts for ∅28 and ∅36 shaft seals

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 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: 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

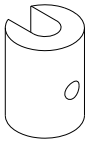
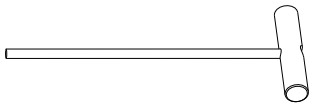
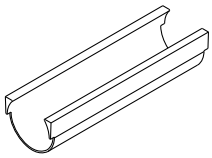
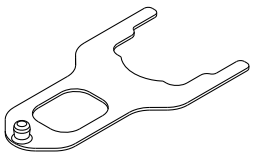
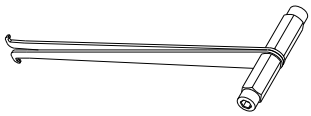
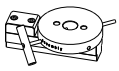
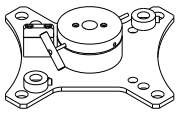
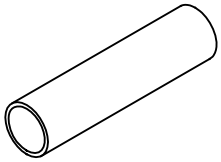
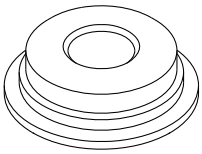
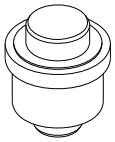
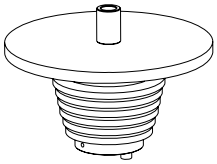
7.1 Torques

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	∅22 shaft (Hex 34)	70
		∅28 shaft (Hex 46)	130
		∅36 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**
			**H1**  **H2** 
I	**J**	**K**	**L**
			
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	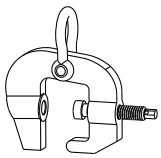		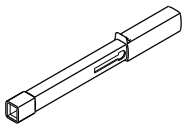
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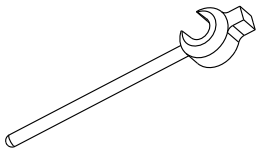
			

7.3.1 Special tools

Pos.	Description	For pos.	Further information	Part number
A	Service tool for loosening and tightening shaft seal	105	For ∅22 pump shafts	99072586
			For ∅28 and ∅36 pump shafts	99072587
B	Eyebolt with swivel function	51	M10 x 1.5	-
C	Key for split-cone nut	48	For ∅22 pump shafts	SV0004
			For ∅28 pump shafts	99072584
			For ∅36 pump shafts	99072585
D	T-pin	51	-	99072581
E	Service tool for smoothening out marks on shaft	51	-	-
F	Adjusting fork	105	For ∅22, ∅28 and ∅36 pump shafts	-
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 ∅28 pump shafts reduced to ∅22 shaft ends	99081891
			For ∅36 pump shafts reduced to ∅22 shaft ends	99081920
			For ∅36 pump shafts reduced to ∅28 shaft ends	99081890
J	Service tool for alignment of pump head, sleeve and chamber stack	2, 51	For ∅22 pump shafts	99072588
			For ∅28 pump shafts	99072589
			For ∅36 pump shafts	99072590
K	Punch tools for bush	47, 47c, 47d	For ∅22 pump shafts	98369955
			For ∅28 and ∅36 pump shafts	99081918
L	Tool for installing neck ring	45a	For CR, CRN 95 - 255	99447875
M	Protective disc	48	For ∅28 pump shafts	99381867
			For ∅36 pump shafts	99381868
N	Screw-clamp for outer sleeve	55	-	99139064
O	Pin for torque wrench	105	14 x 18 x ∅14	SV0402
P	Torque wrench	105	-	-
Q	Hammering tool	48	For ∅28 pump shafts	99424834
			For ∅36 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.

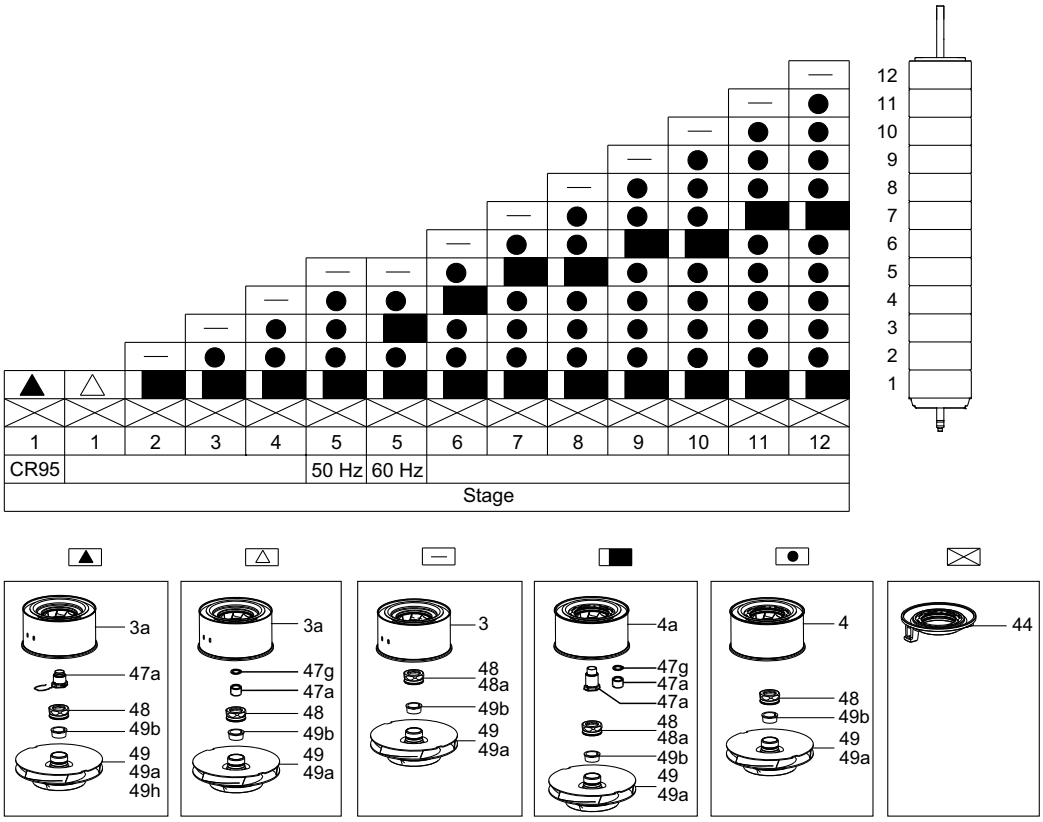
7.4.2 Impellers with reduced diameter

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



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7.5 Drawings

7.5.1 Overview of drawings

Pumps without thrust-handling device

Drawing type	Pump	Page number
Exploded drawing	Pumps with ∅22 shaft	22
	Pumps with ∅28 and ∅36 shaft	23
Sectional drawing	Pumps with ∅22 shaft	25
	Pumps with ∅28 and ∅36 shaft	26

Pumps with thrust-handling device

Drawing type	Pump	Page number
Exploded drawing	Pumps with ∅28 and ∅36 shaft	24
Sectional drawing		27

7.5.2 Exploded views

Pumps with ∅22 shaft and without thrust-handling device

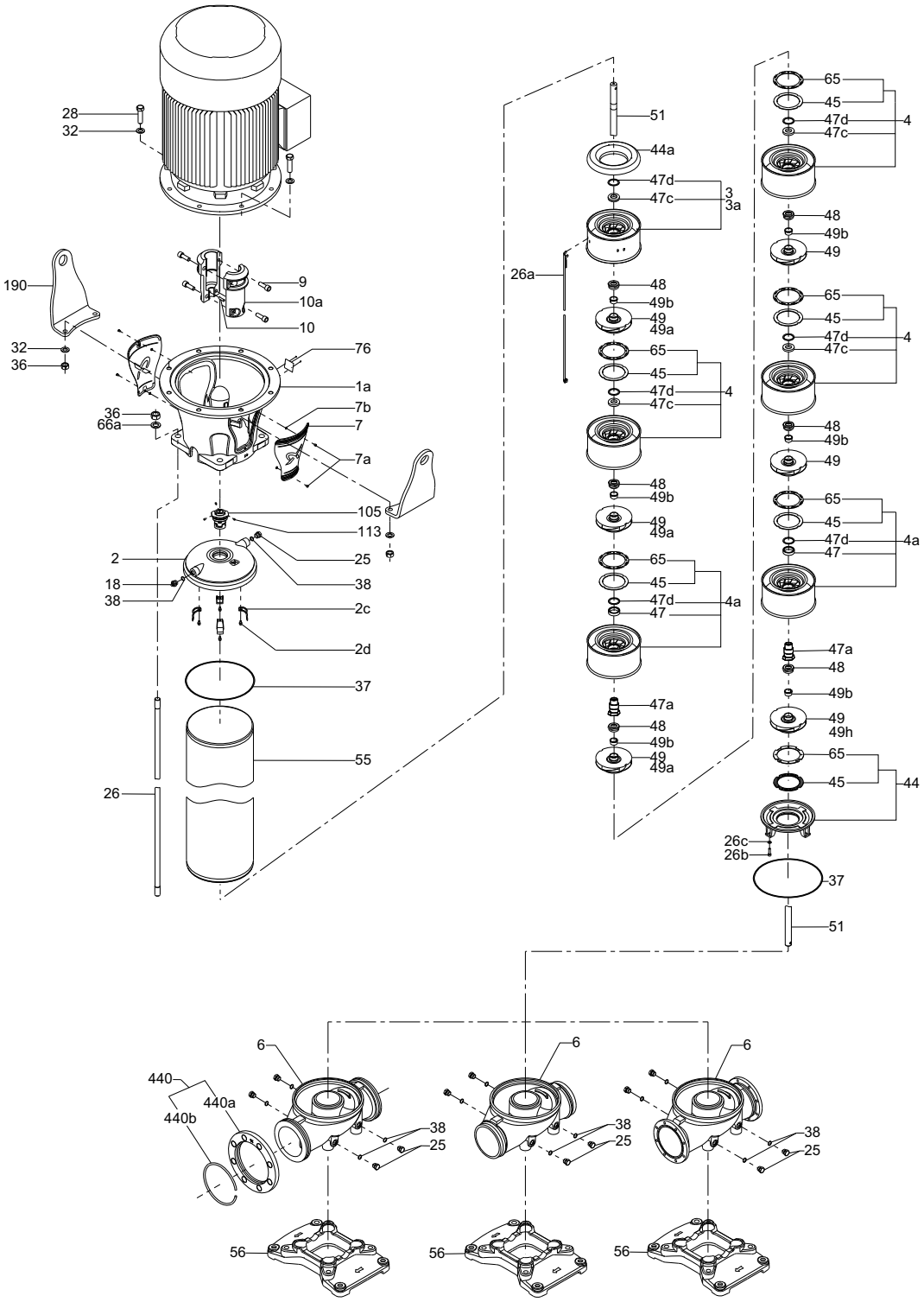

Fig. 38 Exploded view of CR, CRN pump with ∅22 shaft and without thrust-handling device

Pumps with ∅28 or ∅36 shaft and without thrust-handling device

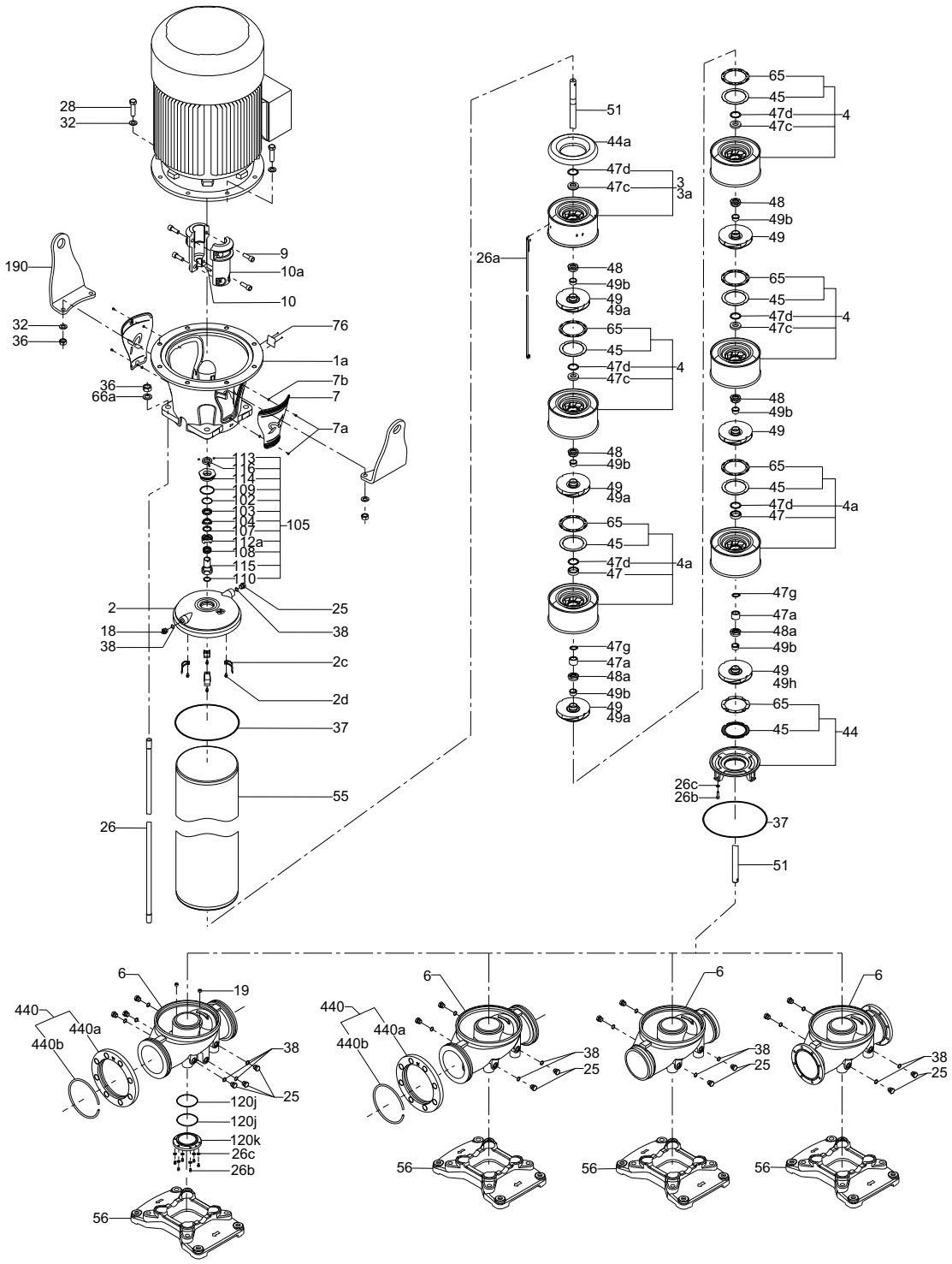

Fig. 39 Exploded view of CR, CRN pump with ∅28 or ∅36 shaft and without thrust-handling device

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

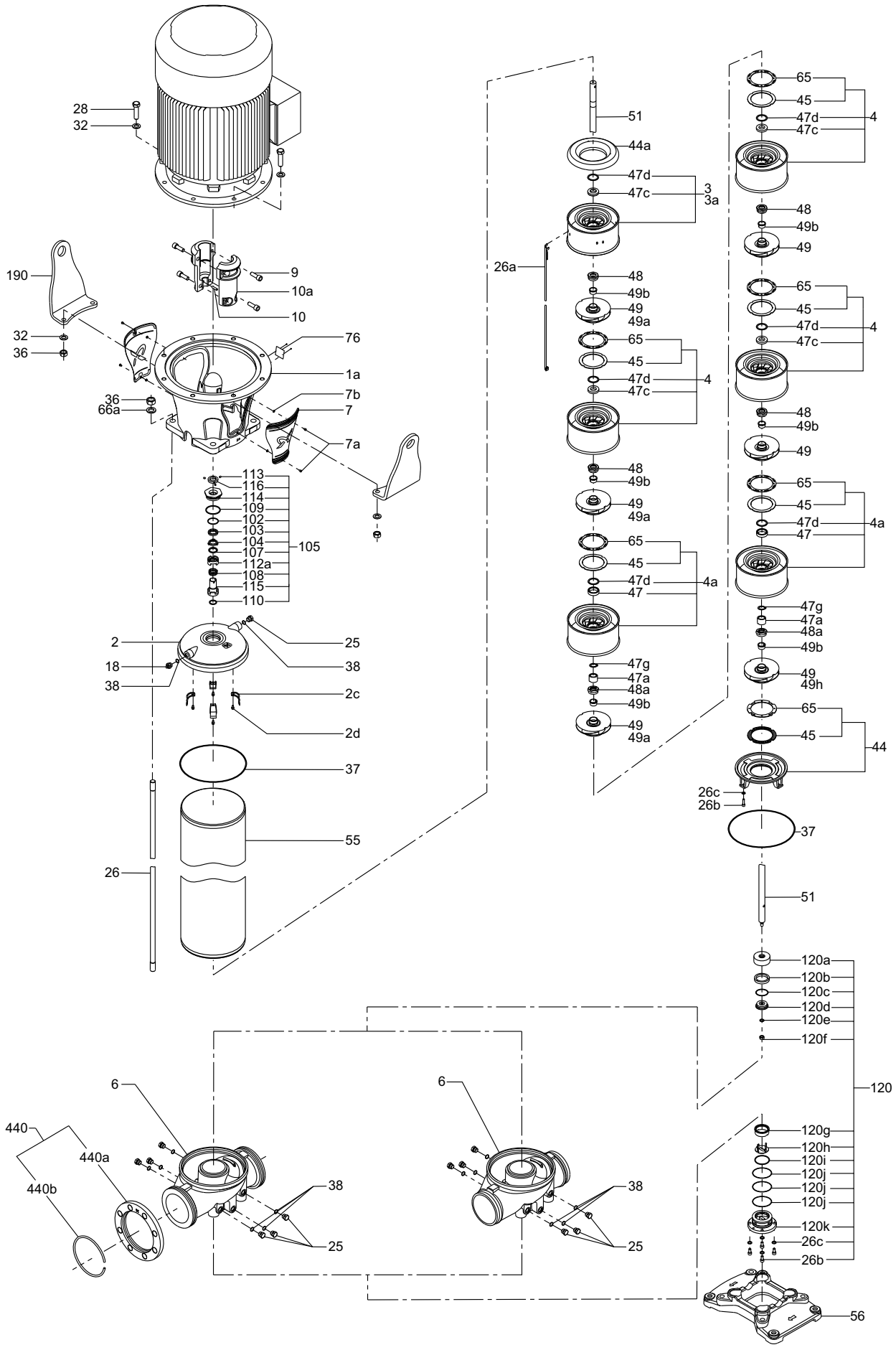

Fig. 40 Exploded view of CR, CRN pump with ∅28 or ∅36 shaft and with thrust-handling device

7.5.3 Sectional views

Pumps with ∅22 shaft and without thrust-handling device

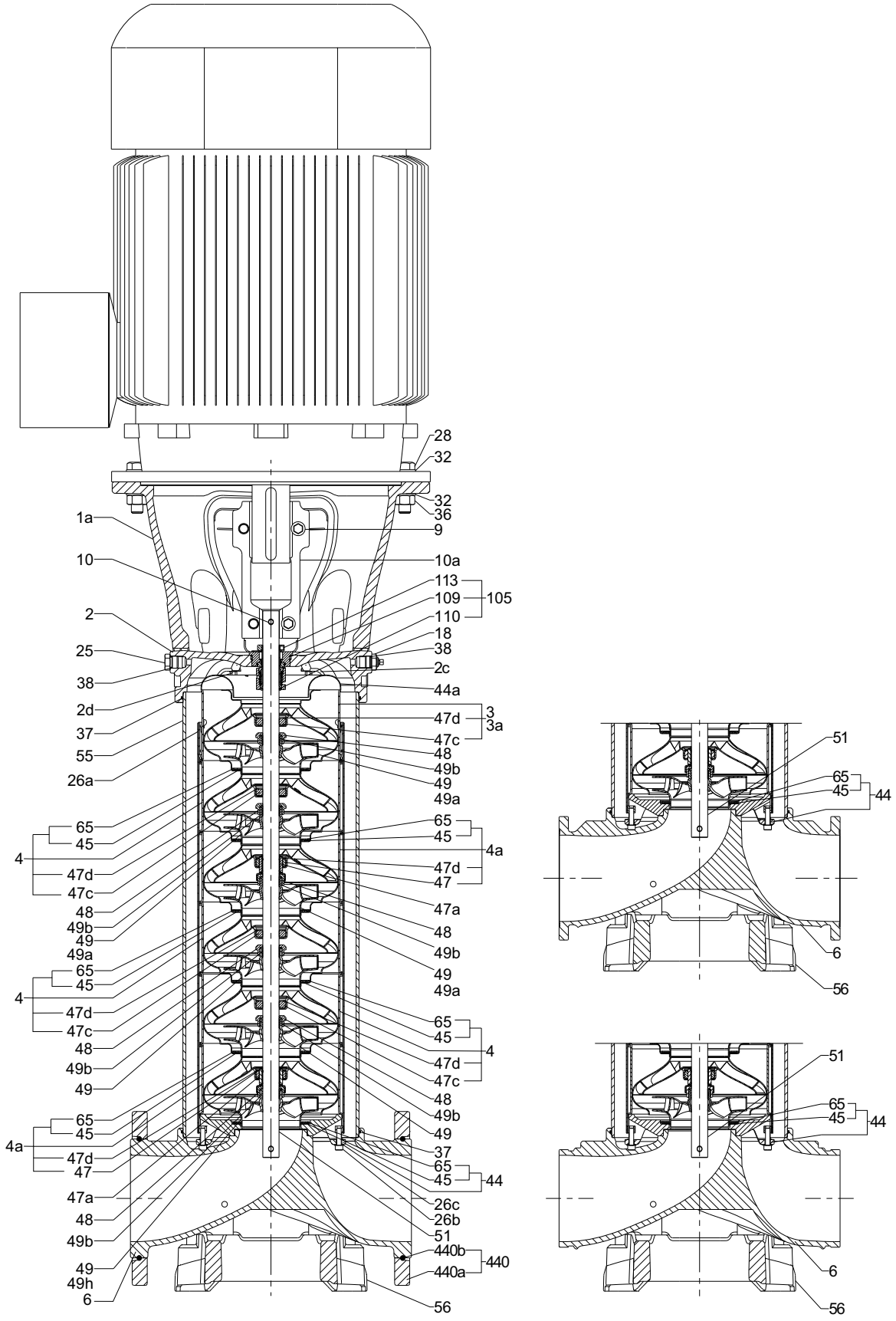

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Fig. 41 Sectional view of CR, CRN pump with ∅22 shaft and without thrust-handling device

Pumps with ∅28 or ∅36 shaft and without thrust-handling device

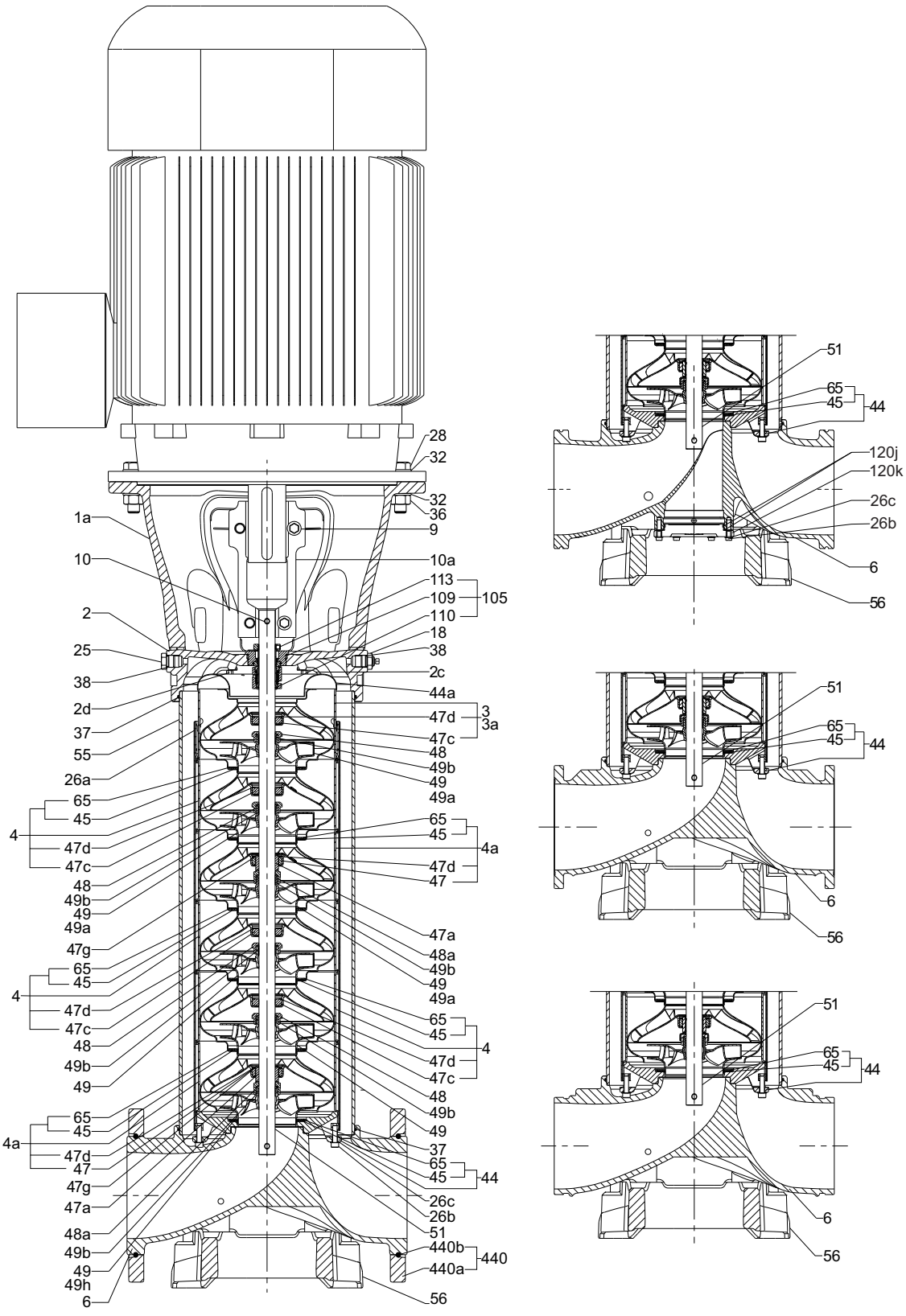

Fig. 42 Sectional view of CR, CRN pump with ∅28 or ∅36 shaft and without thrust-handling device

Pumps with ∅28 or ∅36 shaft and with thrust-handling device

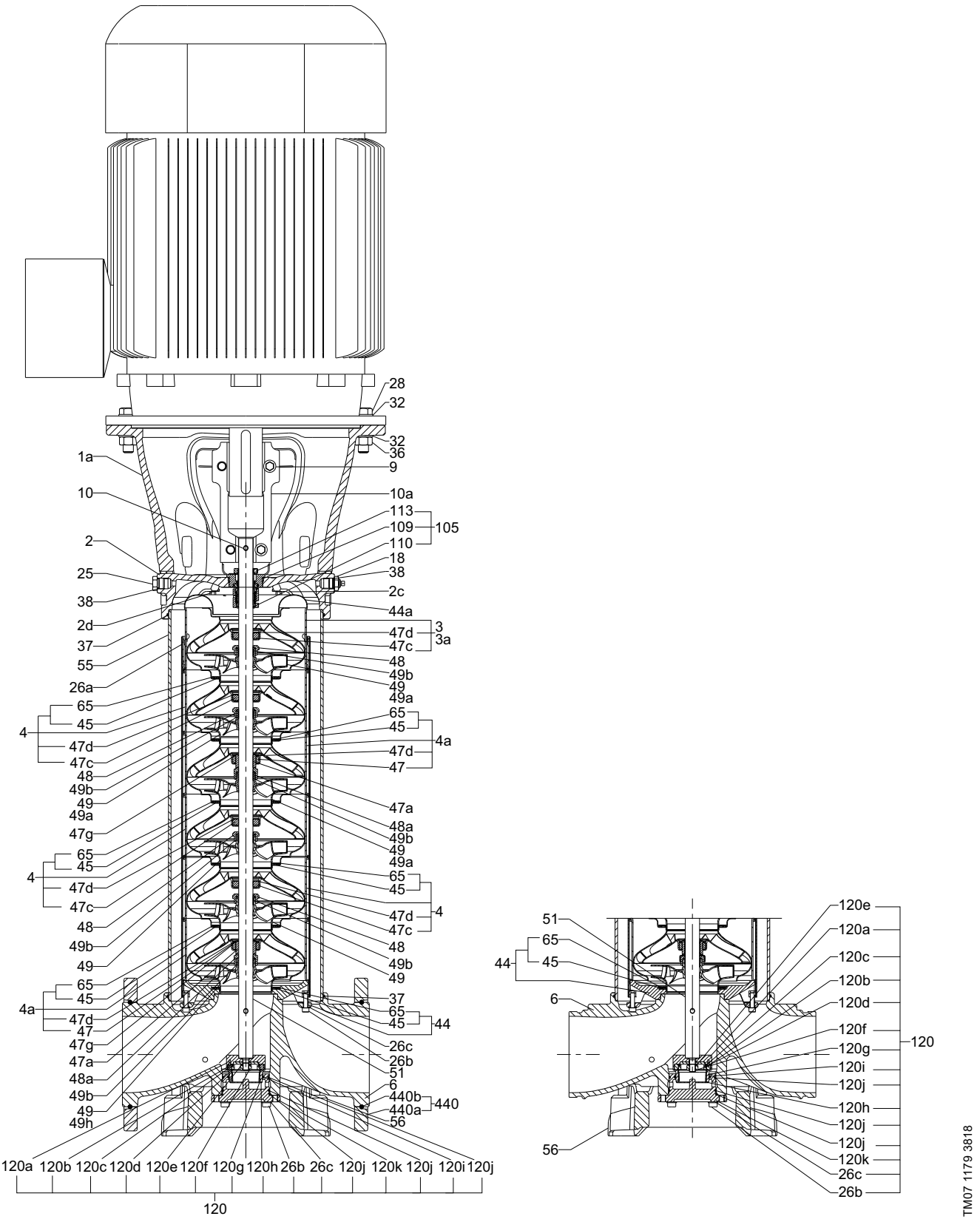

Fig. 43 Sectional view of CR, CRN pump with ∅28 or ∅36 shaft and with thrust-handling device

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