

# CR, CRI, CRN

Double shaft seal (tandem)

Service instructions



Original service instructions.

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### Warning

*Prior to service work, read these service instructions carefully. 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. Symbols used in this document



### Warning

*If these safety instructions are not observed, it may result in personal injury.*



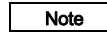
### Warning

*If these instructions are not observed, it may lead to electric shock with consequent risk of serious personal injury or death.*



### Caution

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



### Note

*Notes or instructions that make the job easier and ensure safe operation.*

## 2. General information

Position numbers of parts (digits) refer to drawings and parts lists; position numbers of tools (letters) refer to section 5. [Service tools](#).

Electrical parts must only be serviced by Grundfos or an authorised service workshop.



### Warning

*Use personal protective equipment if there is a risk of getting into contact with the pumped liquid.*

*Observe local regulations.*

### Before dismantling



### Warning

*Switch off the power supply and make sure that it cannot be accidentally switched on.*

*Check that other pumps or sources do not force flow through the pump even if the pump is stopped. This will cause the motor to act like a generator, resulting in voltage on the pump.*

- Close the isolating valves, if fitted, and make sure that they cannot be accidentally opened.
- Before starting work on the product, let the product and pumped liquid cool off.

### Before assembly

- Clean and check all parts.
- Replace defective parts with new parts.
- Order the necessary service kits.
- Always replace gaskets and O-rings.

### During assembly

- Tighten screws and nuts according to section 3. [Torques](#).
- Lubricate rings and screws according to section 4. [Lubricants](#).

### After assembly

If analog or digital inputs, the relay output or the CIM module has been removed from the pump, you must check the communication with external units after service.

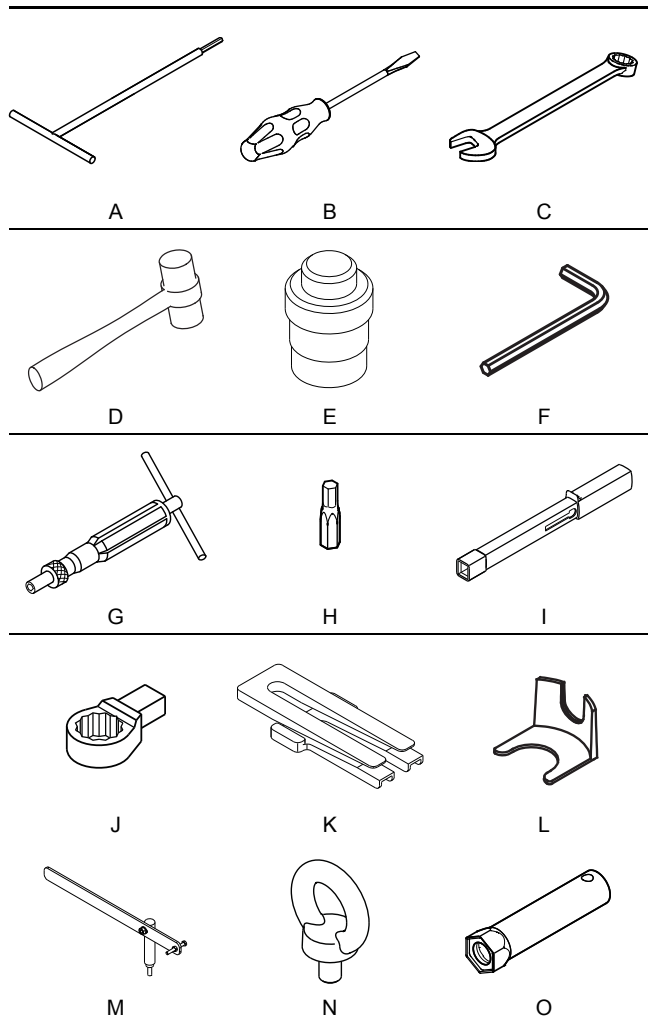
### 3. Torques

Pos.	Description	Pump	Dimensions	Torque
9	Coupling screws	CR, CRI, CRN	M6	13
		1, 3, 5, 10, 15, 20	M8	31
			M10	62
		CR, CRN 32, 45, 64, 90	-	85
		CR, CRN 120, 150	M10	85
		M16	100	
7a	Coupling guard screws	CR, CRN 32, 45, 64, 90, 120, 150	-	6
18, 18a, 18b	Air vent screws	CR, CRI, CRN 1, 3, 5, 10, 15, 20, 32, 45, 64, 90, 120, 150	-	35
23, 23a, 23b, 23c	Drain plugs		-	35
28	Motor stool screws	CR, CRI, CRN 1, 3, 5	M10	23
			M6	10
			M8	12
		CR, CRI, CRN 1, 3, 5, 10, 15, 20	3/8" UNC	23
			M12	40
			1/2" UNC	40
			M16	80
		CR, CRN 32, 45, 64, 90, 120, 150	-	62
36	Pump head nuts	CR 1, 3, 5	-	40
		CRI 1, 3, 5	-	50
		CRN 1, 3, 5	-	60
		CR, CRI 10, 15, 20	-	80
		CRN 10, 15, 20	-	100
		CR, CRN 32, 45, 64, 90	-	100
		CR, CRN 120, 150	-	120
		CR, CRN 120, 150 (55-75 kW)	-	80
58a, 58b, 58c	Seal carrier screws	CR, CRN 32, 45, 64, 90, 120, 150	-	62
105, 105b	Shaft seal	CR, CRI, CRN 1, 3, 5, 10, 15, 20	-	35
113	Shaft seal screws	CR, CRI, CRN 1, 3, 5, 10, 15, 20	-	2,5
		CR, CRN 32, 45, 64, 90, 120, 150	-	6

### 4. Lubricants

Pos.	Designation	Product No.
9		
28	THREAD-EZE	00SV9997
58a, 58d, 58c		
37a, 37b, 37c	Rocol Sapphire Aqua-Sil	00RM2924
51		
105, 105b	Soapy Water	-
109a, 109b		
110, 110b	Rocol Sapphire Aqua-Sil	00RM2924

5. Service tools



Pos.	Designation	For pos.	CR, CRI, CRN	Tool size	Product No
A	Tee screwdriver	113	1, 3, 5, 10, 15, 20	2.5	-
			120, 150	3	SV0153
B	Slot screwdriver	7a	1, 3, 5, 10, 15, 20	1.4	-
			18, 18a, 23a, 23b	24	SV0122
			1, 3, 5, 10, 15, 20	10 13 19	SV0083 SV0055 SV0054
			32, 45, 64, 90, 120, 150	8	SV0273
C	Ring/open-end spanner	28	1, 3, 5	19	SV0054
			10, 15, 20, 32, 45, 64, 90, 120, 150	24	SV0122
			36	24	SV0122
D	Rubber hammer				SV0349
E	Punch	105b	32, 45, 64, 90		SV0015

Pos.	Designation	For pos.	CR, CRI, CRN	Tool size	Product No
9			1, 3, 5, 10, 15, 20	5 6 8	SV0196 SV0032
			32, 45, 64, 90	8	SV0032
			120, 150	8 10	SV0032 SV0033
F	Hexagon key	113	1, 3, 5, 10, 15, 20	2.5	SV0277
			32, 45, 64, 90, 120, 150	3	-
			32, 45, 64, 90, 120, 150	8	SV0032
			32, 45, 64, 90, 120, 150	8	SV0032
G	Torque screwdriver	113, 7a	1, 3, 5, 10, 15, 20, 32, 45, 64, 90, 120, 150	1-6 Nm	SV0435 SV0438
9			1, 3, 5, 10, 15, 20	5 6 8	SV0010
			32, 45, 64, 90	8	SV0010
			120, 150	8 10	SV0010
H	Hexagon bit	113	1, 3, 5, 10, 15, 20	2.5	SV0012
			120, 150	3	-
			32, 45, 64, 90, 120, 150	8	SV0010
			28	4-20 Nm	SV0092
I	Torque wrench	28	1, 3, 5, 10, 15, 20	20-100 Nm	SV0269
			9, 18, 23, 28, 36, 58	40-200 Nm	SV0400
			18, 18a, 23a, 23b	24	SV0524
J	Ring insert tool	28	1, 3, 5, 10, 15, 20	10 13 19	SV0310 SV0513 SV0519
			32, 45, 64, 90, 120, 150	8	SV0411
			1, 3, 5	19	SV0519
			10, 15, 20, 32, 45, 64, 90, 120, 150	24	SV0524
K	Sliding guide	8	120, 150		-
L	Adjusting fork	105	10, 15, 20		96483950
			32, 45, 64, 90, 120, 150	22	985924
M	Lifting tool	51	120, 150		97536386
N	Eye bolt	28b	32, 45, 64, 90, 120, 150		ID2779
O	Tabular box spanner	105, 105b	1, 3, 5, 10, 15, 20	36	SV2007

## 6. CR, CRI, CRN 1, 3, 5

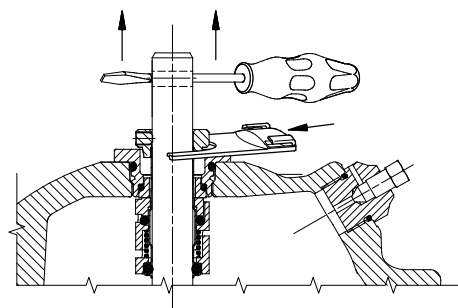
### 6.1 Dismantling

1. Remove screws (pos. 7a) and coupling guards (pos. 7).
2. Remove screws (pos. 9), coupling (pos. 8) and shaft pin (pos. 10a).
3. Remove screws (pos. 28) and the motor.
4. Slacken socket screws (pos. 113) and remove shaft seal (pos. 105).
5. Remove nuts (pos. 36).
6. CR: Remove motor stool (pos. 2) and O-ring (pos. 37b).  
CRI, CRN: Remove motor stool (pos. 2), pump head cover (pos. 77) and O-ring (pos. 37b).
7. Slacken socket screws (pos. 113) and remove lower shaft seal (pos. 105b).
8. Remove cover (pos. 77a).
9. Continue dismantling according to the instructions of the standard CR pump.

### 6.2 Assembly

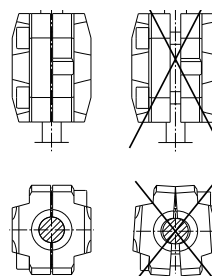
1. Fit O-ring (pos. 37a) and rubber springs (pos. 60) in cover (pos. 77a).
  2. Fit cover (pos. 77a) on the outer sleeve.
- Note** *Note that air vent screw (pos. 18a) in the cover is above drain plug (pos. 25) in the bottom plate.*
3. Lubricate shaft (pos. 51). Fit and tighten lower shaft seal (pos. 105b) in cover (77a).
  4. Press the shaft home, and tighten the socket screws of lower shaft seal (pos. 113), using the hole for air vent screw (pos. 18a).
  5. CR: Fit O-ring (pos. 37b) in motor stool (pos. 2) and fit the stool on the cover.  
CRI, CRN: Fit O-ring (pos. 37b) in pump head cover (pos. 77), and fit the pump head cover and the motor stool on the cover.

- Note** *Make sure that air vent screws (pos. 18 and 18a) are not positioned on the same side of the pump.*
6. Fit washer (pos. 66a) and cross-tighten nuts (pos. 36) on the staybolts.
  7. Lubricate shaft (pos. 51). Fit and tighten upper shaft seal (pos. 105) in motor stool (pos. 2) or pump head cover (pos. 77).
  8. Lift the pump shaft to its highest position, then push it down to half way of its lowest position, and tighten the socket screws of the upper and lower shaft seals.
  9. Lift the pump shaft, and fit the adjusting fork. See fig. 1.



**Fig. 1** Fitting the adjusting fork

10. Fit the motor and tighten screws (pos. 28).
11. Fit shaft pin (pos. 10a) in the shaft, coupling (pos. 8) and screws (pos. 9). See fig. 2.



**Fig. 2** Fitting the coupling

12. Remove the adjusting fork, and place it on the inside of one of the coupling guards (pos. 7).
13. Check that the pump shaft can rotate freely.
14. Fit coupling guards (pos. 7) and tighten screws (pos. 7a).

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## 7. CR, CRI, CRN 10, 15, 20

### 7.1 Dismantling

1. Remove screws (pos. 7a) and coupling guards (pos. 7).
2. Remove screws (pos. 9) and the coupling.
3. Remove screws (pos. 28) and the motor.
4. Slacken socket screws (pos. 113), and remove shaft seal (pos. 105).
5. Remove nuts (pos. 36).
6. CR: Remove motor stool (pos. 2) and O-ring (pos. 37b).  
CRI, CRN: Remove motor stool (pos. 2), pump head cover (pos. 77), and O-ring (pos. 37b).
7. Slacken socket screws (pos. 113) and remove lower shaft seal (pos. 105b).
8. Remove cover (pos. 77).
9. Remove rubber springs (pos. 60) from underneath the cover.
10. Continue dismantling according to the instructions of the standard CR pump.

### 7.2 Assembly

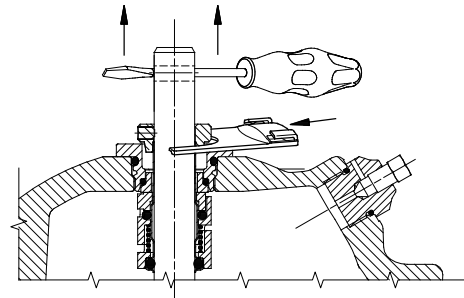
1. Lubricate O-ring (pos. 37a) and fit it into cover (pos. 77a).
2. Fit new rubber springs (pos. 60) underneath cover (pos. 77a) and fit the cover on the outer sleeve.

**Note** *Note that air vent screw (pos. 18a) in the cover is above drain plug (pos. 25) in the bottom plate.*

3. Lubricate pump shaft (pos. 51). Fit and tighten lower shaft seal (pos. 105b).
4. Press the shaft home and tighten socket screws (pos. 113) of lower shaft seal (pos. 105b).
5. CR: Fit O-ring (pos. 37b) in motor stool (pos. 2) and fit the stool on the cover.  
CRI, CRN: Fit O-ring (pos. 37b) in pump head cover (pos. 2), and fit the pump head cover and the motor stool on the cover.

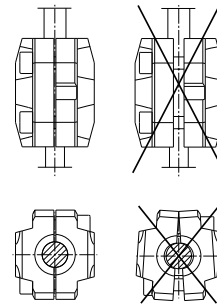
**Note** *Make sure that air vent screws (pos. 18 and 18a) are not positioned on the same side of the pump.*

6. Fit washers (pos. 66a) and cross-tighten nuts (36) on the staybolts.
7. Lubricate pump shaft (pos. 51). Fit and tighten upper shaft seal (pos. 105) in stool (pos. 2) or pump head cover (pos. 77).
8. Press the shaft home, and tighten socket screws (pos. 113) of upper shaft seal (105).
9. Lift the pump shaft, and insert the adjusting fork under the shaft seal driver. See fig. 3.



**Fig. 3** Fitting the adjusting fork

10. Fit the motor and tighten screws (pos. 28).
11. Fit shaft pin (pos. 10a) in the shaft, coupling (pos. 8) and screws (pos. 9). See fig. 4.



**Fig. 4** Fitting the coupling

12. Remove the adjusting fork, and place it on the inside of one of the coupling guards (pos. 7).
13. Check that the pump shaft can rotate freely.
14. Fit coupling guards (pos. 7) and screws (pos. 7a).

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## 8. CR, CRI, CRN 32, 45, 64, 90

### 8.1 Dismantling

1. Remove screws (pos. 7a) and coupling guards (pos. 7).
2. Remove screws (pos. 9) and coupling (pos. 8).
3. Attach the lifting device to eyebolts (pos. 28b).
4. Remove screws (pos. 28). Lift and remove the motor and motor stool (pos. 1a).

**Caution** *To prevent the motor from tipping over, hold it straight when using a lifting device.*

5. Remove the flushing pipes.
6. Slacken socket screws (pos. 113) of the upper shaft seal (pos. 105), and remove seal driver (pos. 112a).

**Note** *Note that the shaft seal is spring-loaded.*

7. Remove screws (pos. 58a).
8. Remove flushing chamber (pos. 77a).
9. Remove O-ring (pos. 109a).
10. Press stationary shaft seal ring (pos. 103) out of flushing chamber (pos. 77a), and remove O-ring (pos. 102).
11. Remove lower seal driver (pos. 112) with rotating shaft seal ring (pos. 104), upper seal driver (pos. 111), O-ring (pos. 107), spring retainer (pos. 106) and spring (pos. 108).
12. Remove O-ring (pos. 110b).
13. Slacken socket screws (pos. 113) and remove lower shaft seal (pos. 105b).
14. Continue dismantling according to the instructions of the standard CR pump.

### 8.2 Assembly

1. Lubricate the shaft and fit lower shaft seal (pos. 105b).
2. Press the shaft home and tighten sockets screws (pos. 113) of the lower shaft seal.
3. Lubricate and fit O-ring (pos. 110b) underneath lower seal driver (pos. 112).
4. Fit spring (pos. 108) and spring retainer (pos. 108) on the lower seal driver.

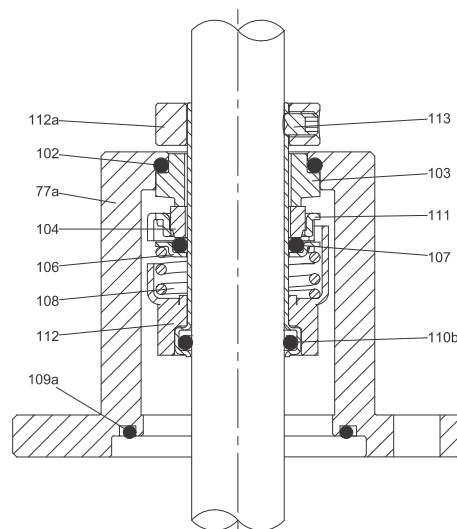
**Note** *The extruded part of the spring retainer goes against the spring.*

5. Lubricate and fit O-ring (pos. 107) underneath upper seal driver (pos. 111).
6. Fit the upper seal driver on the spring retainer.
7. Fit rotating seal ring (pos. 104) on the upper seal driver.

**Do not touch the seal faces with the fingers or any greasy tool.**

**Caution** *Make sure that the polished face of the rotating seal ring faces upwards.*

8. Lubricate and fit O-ring (pos. 102) into the stationary seal ring.
9. Fit the stationary seal ring into flushing chamber (pos. 77a).
10. Fit the lower seal driver into flushing chamber (pos. 77a); make sure that the lower seal driver emerges from the top of the chamber and that the lower and upper seal drivers engage.
11. Fit seal driver ring (pos. 112a) on top of the chamber and on the lower seal driver. Position it so that socket screws (pos. 113) are aligned with the holes of the lower seal driver.
12. Tighten the socket screws slightly so that they fit into the holes of the lower seal driver, but still leave room for the shaft to slide.



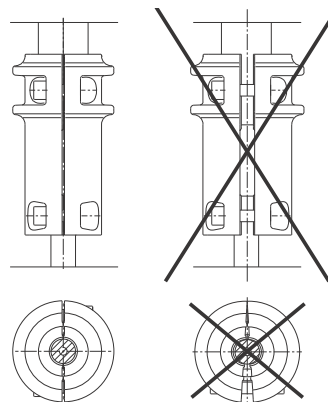
**Fig. 5** Fitting the upper shaft seal and flushing chamber

13. Fit the adjusting fork between the top of the flushing chamber and the seal driver ring.
14. Lubricate and fit O-ring (pos. 109a) underneath flushing chamber (pos. 77a).
15. Fit the flushing chamber on the shaft and press it home on the pump head.
16. Fit and cross-tighten screws (pos. 58a).
17. Press the pump shaft home and tighten the socket screws (pos. 113) of the upper shaft seal.
18. Attach the lifting device to the eyebolts. Carefully lift the motor with the motor stool and fit it on upper pump head (pos. 2a). Cross-tighten screws (pos. 28).

**Caution** *To prevent the motor from tipping over, hold it straight when using a lifting device.*

19. Fit coupling (pos. 8) and tighten screws (pos. 9). See fig. 6.

**Note** *Leave a gap of 2 mm between the bottom of the coupling and the top of the flushing chamber.*



**Fig. 6** Adjusting the coupling

20. Remove the adjusting fork and check that the pump can rotate freely.
21. Fit coupling guards (pos. 7) and tighten screws (pos. 7a).

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## 9. CR, CRN 120, 150

### 9.1 Dismantling

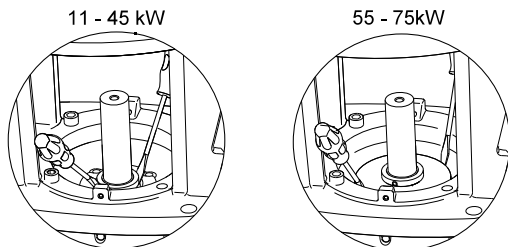
1. Remove screws (pos. 7a) and coupling guards (pos. 7).
2. Remove screws (pos. 9) and coupling (pos. 8).
3. Attach the lifting device to eyebolt (pos. 28b).
4. Remove hexagon socket screws (pos. 28).
5. 55-75 kW: Remove washers (pos. 66a) and nuts (pos. 36) from the motor stool.
6. Lift and remove motor and motor stool (pos. 1a).

**Caution** To prevent the motor from tipping over, hold it straight when using a lifting device.

7. Remove screws (pos. 58a).
8. 11-45 kW: Remove seal carrier (pos. 58).
9. Clean shaft (pos. 51) and slacken socket screws (pos. 113) of upper shaft seal (pos. 105a).

**Note** Slacken the screws only so much that the shaft seal can be removed from the shaft.

10. Pull shaft seal (pos. 105a) off pump head (pos. 2) and free of shaft (pos. 51) using two screwdrivers. See fig. 7.



**Fig. 7** Removing the upper shaft seal

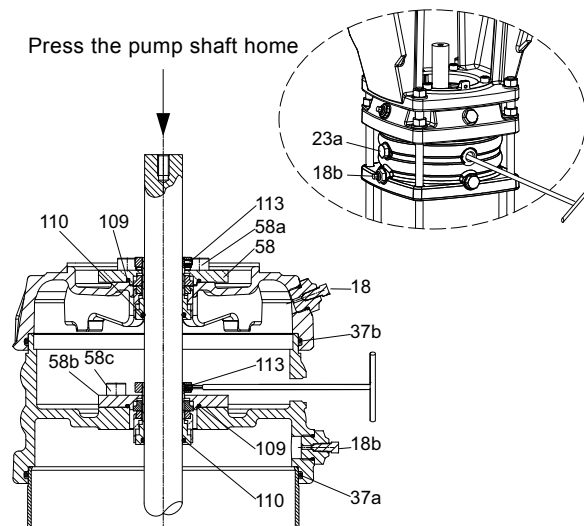
11. Remove nuts (pos. 36) and washer (pos. 66a) from upper pump head (pos. 2).
12. Remove upper pump head (pos. 2), it may be necessary to loosen it with a rubber mallet.
13. Clean the shaft above lower shaft seal (pos. 105b).
14. Loosen socket screw (pos. 113) of lower shaft seal (pos. 105b).
15. 11-45 kW: Remove screws (pos. 58c)
16. Remove seal carrier (pos. 58b).
17. Pull shaft seal (pos. 105b) off lower pump head (pos. 2b) and free of shaft (pos. 51) using two screwdrivers.
18. Continue the dismantling according to the instructions for dismantling of the standard pump.

### 9.2 Assembly

1. Clean and smooth shaft (pos. 51) using the holder with emery cloth supplied with the shaft seal kit.
2. Fit lower pump head (pos. 2b) on shaft (pos. 51) and carefully press it down on the shaft. When it reaches the outer sleeve press it with even force on the sleeve.
3. Press lower shaft seal (pos. 105b) down into position in lower pump head (pos. 2b).
4. 11-45 kW: Fit seal carrier (pos. 58b).
5. Cross-tighten screws (pos. 58c).
6. Fit O-ring (pos. 37b) in lower pump head (pos. 2b).
7. Fit O-ring (pos. 37b) in upper pump head (pos. 2).
8. Fit the upper pump head.

**Note** Make sure that air vent screws (pos. 18 and 18b) are positioned on the same side of the pump.

9. Fit washers (pos. 66a) and cross-tighten nuts (pos. 36).
10. Fit upper shaft seal (pos. 105).
11. Remove excess grease from shaft end (pos. 51) using a cloth.
12. 11-45 kW: Fit seal carrier (pos. 58).
13. Cross-tighten screws (pos. 58a).
14. Press the shaft home and tighten socket screws (pos. 113) of each shaft seals (pos. 105a and 105b). See fig. 8.



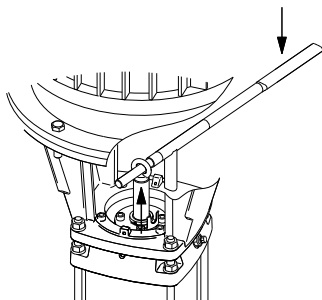
**Fig. 8** Tightening the lower shaft seal

15. Attach the lifting device to eyebolt (pos. 28b). Carefully lift the motor with the stool and fit it on upper pump head (pos 2b). Cross-tighten screws (pos. 28).

**Caution** To prevent the motor from tipping over, hold it straight when using a lifting device.

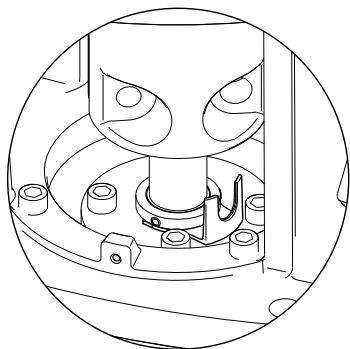


16. Turn the motor and motor stool (pos. 1a) to the required terminal box position, according to the installation instructions.
17. Cross-tighten screws (pos. 28).
18. 55-75 kW: Fit washers (pos. 66a) and cross-tighten nuts (pos. 36) on the stool.
19. Lift the pump shaft with the lifting tool. See fig. 9.



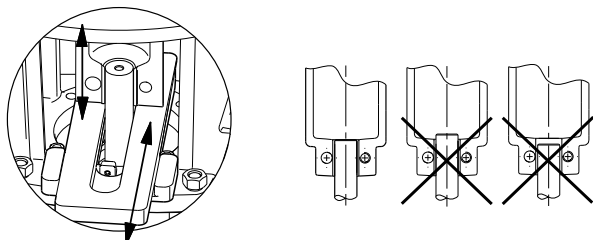
**Fig. 9** Lifting the pump shaft

20. Insert the adjusting fork between the shaft seal driver and carrier. See fig. 10.



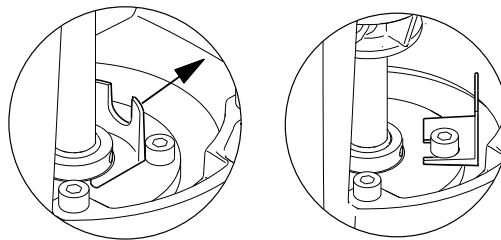
**Fig. 10** Inserting the adjusting forks

21. Fit coupling (pos. 8) on the shaft using the sliding guide or with your hand, depending on the pump size. The top of the pump shaft must be flush with the bottom of the clearance chamber in the coupling. See fig. 11.



**Fig. 11** Fitting the coupling

22. Lubricate and tighten screws (pos. 9), but leave loose.
23. Check that the gaps either side of the coupling halves are equal.
24. Tighten screws (pos. 9) two and two (one side at a time).
25. Remove the adjusting fork, and place it under one of the screws (pos. 58). See fig. 12.



**Fig. 12** Removing the adjusting fork and placing it under one of the other screws

26. Check that the pump shaft can rotate freely.
27. Fit coupling guards (pos. 7) and screws (pos. 7a).

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10. Exploded views

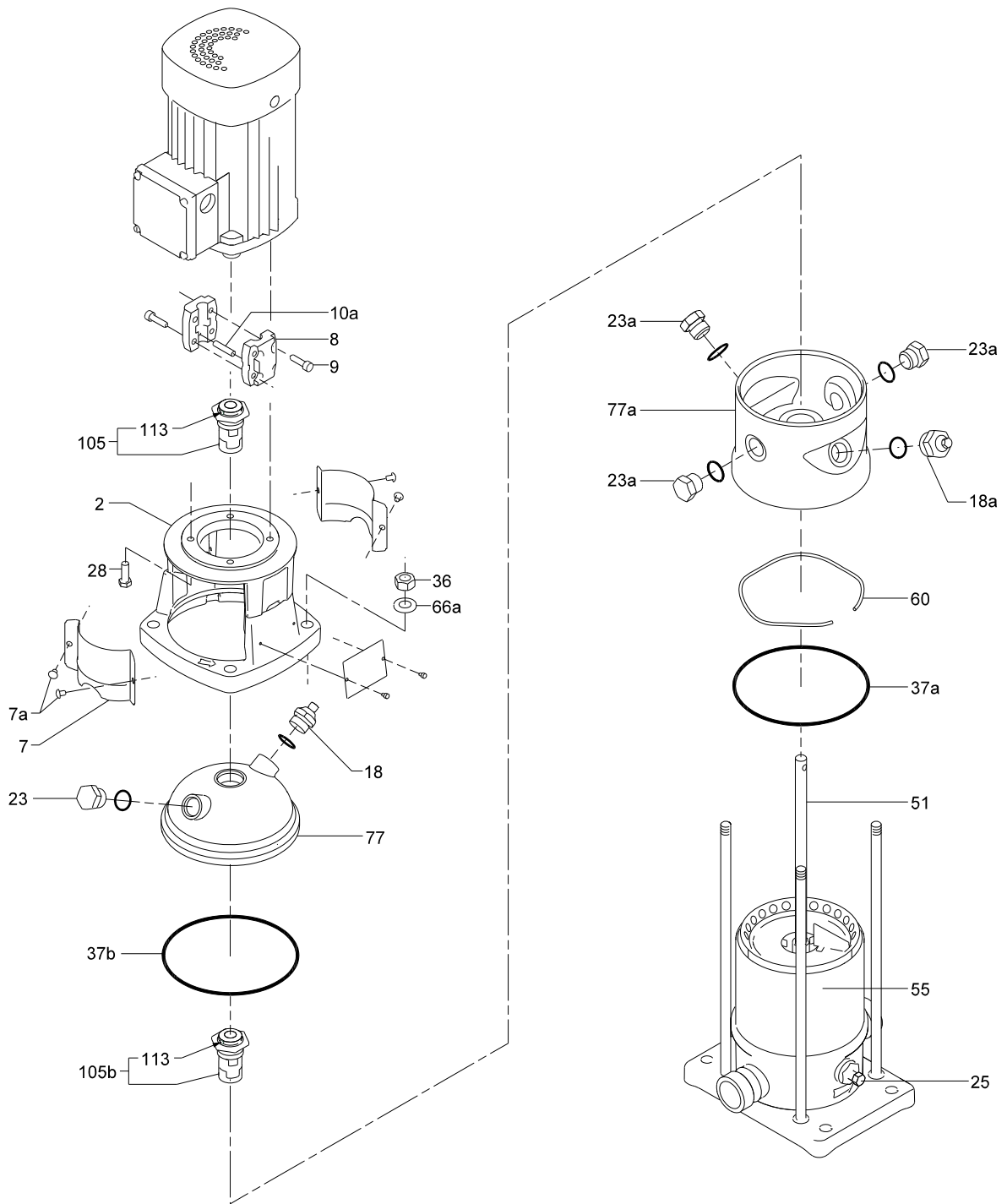


Fig. 13 CR, CRI, CRN 1, 3, 5

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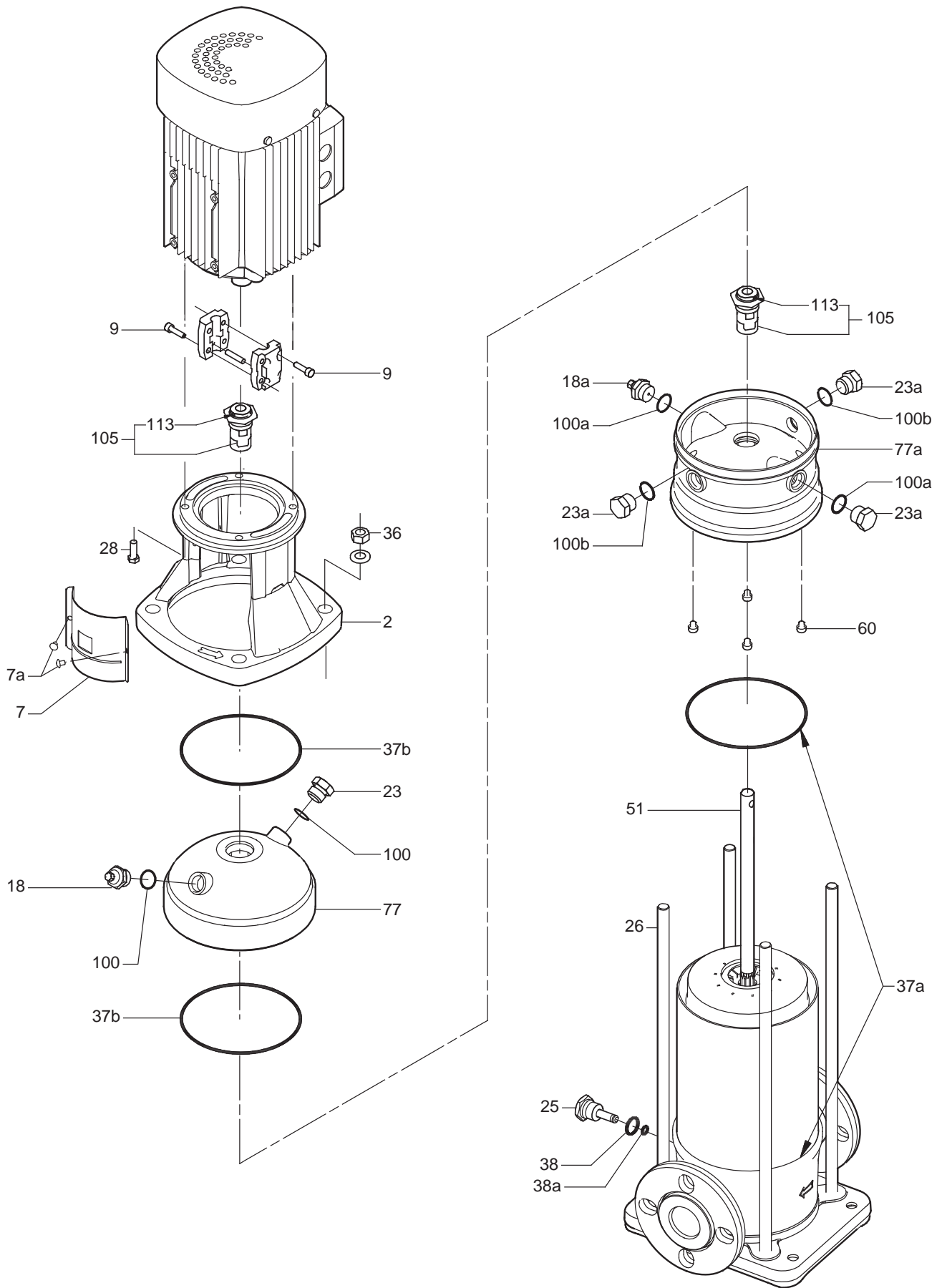


Fig. 14 CR, CRI, CRN 10, 15, 20

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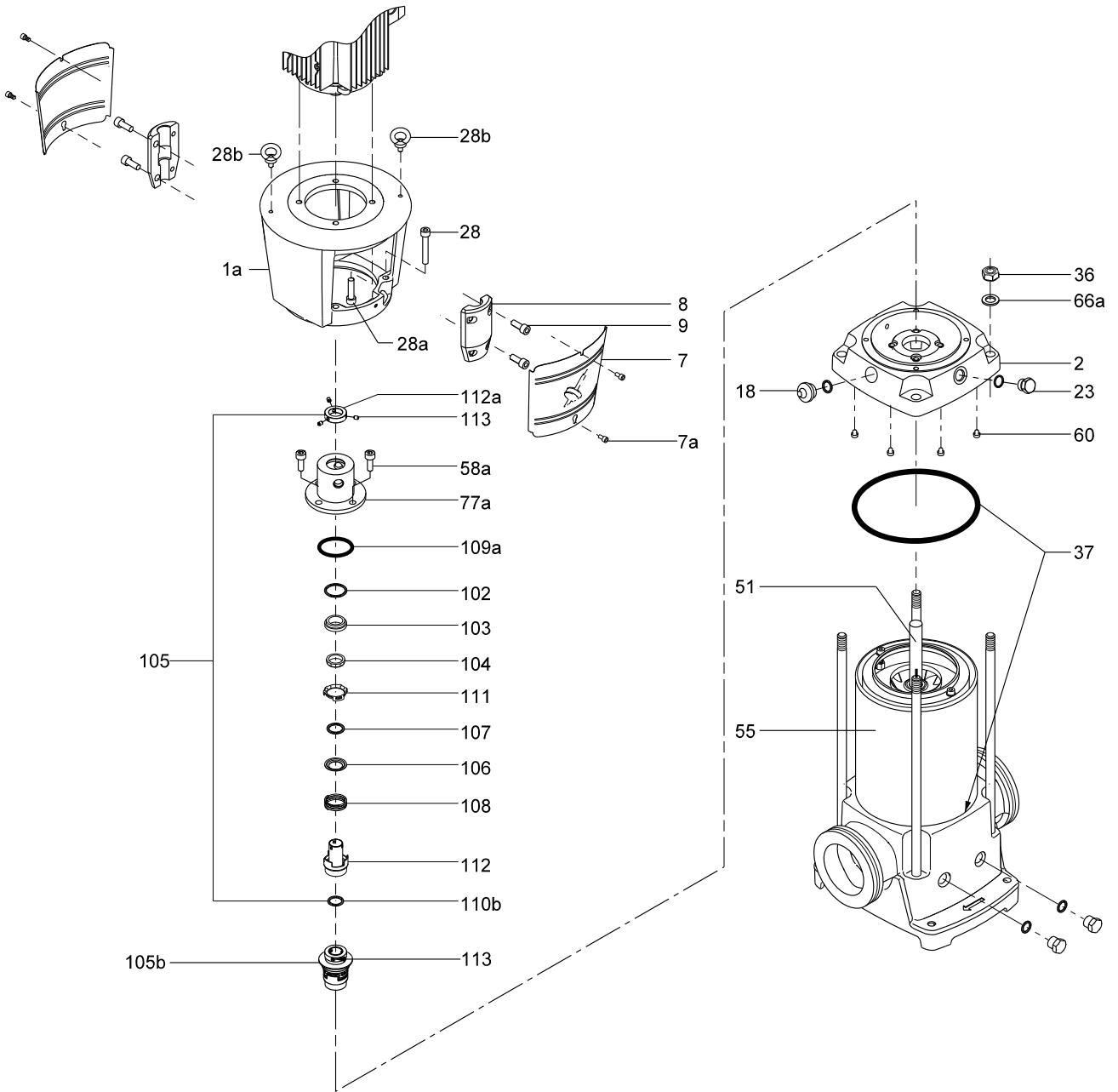


Fig. 15 CR, CRI, CRN 32, 45, 64, 90

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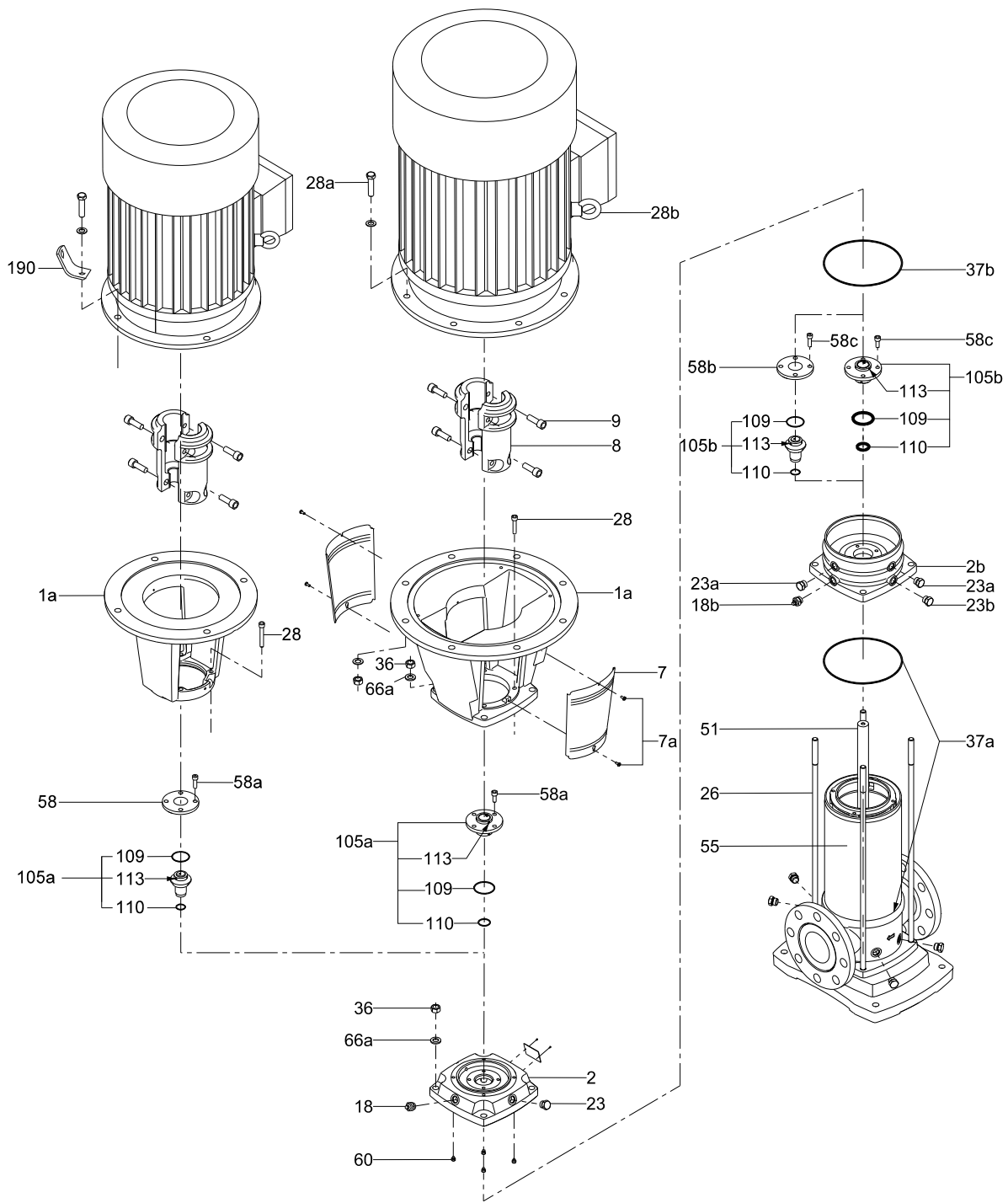


Fig. 16 CR, CRN 120, 150

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