

Service instructions

CR, CRI, CRN 10, 15 and 20

50/60 Hz

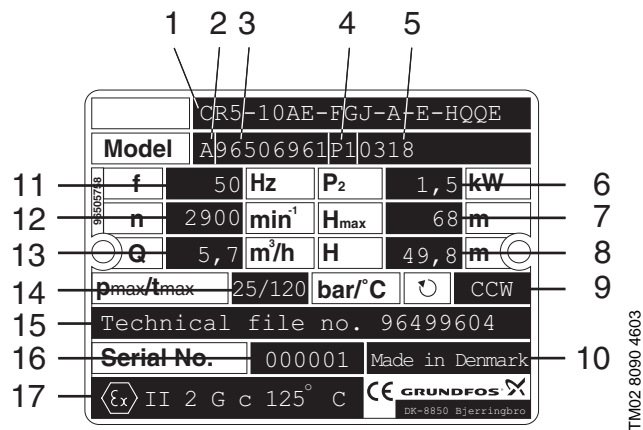
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1. Type identification

1.1 Nameplate



Pos.	Description	Pos.	Description
1	Type designation	10	Country of production
2	Model	11	Frequency
3	Product number	12	Speed
4	Place of production	13	Rated flow rate
5	Production year and week	14	Maximum pressure and temperature
6	P_2	15	The number of the copy of the technical file kept at KEMA (stated if the pump is ATEX classified)
7	Closed valve head, 50 Hz	16	The serial number of the pump (stated if the pump is ATEX classified)
8	Head at rated flow rate, 50 Hz	17	ATEX category (stated if the pump is ATEX classified)
9	Direction of rotation CCW: Counter-clockwise CW: Clockwise		

1.2 Type key

Example	CR	5 -	10	AE-	FGJ-	A-	E-	HUBE
Type range								
Rated flow rate m ³ /h								
Number of stages								
Code for pump version								
A = Basic version								
B = Oversize motor								
E = Certificate/approval								
F = Pump for high temperatures (air-cooled top)								
H = Horizontal version								
HS = High-pressure pump with over-synchronous speed and reversed chamber stack and direction of rotation								
I = Different pressure rating								
K = Pump with low NPSH								
M = Magnetic drive								
P = Undersize motor								
R = Horizontal version with bearing bracket								
SF = High-pressure pump with reversed chamber stack and direction of rotation								
T = Oversize motor (two flange sizes bigger)								
X = Special version, or the pump consists of more than two versions								
Code for pipe connections								
A = Oval flange								
B = NPT thread								
CA = FlexiClamp (CRI,CRN)								
CX = TriClamp (CRI,CRN)								
FGJ = DIN, ANSI and JIS flange								
GJ = ANSI and JIS flange								
G = ANSI flange								
J = JIS flange								
N = Changed diameter of ports								
O = Externally threaded, union								
P = PJE coupling								
W = Internally threaded								
X = Special version								
Code for materials								
A = Motor stool: Cast iron								
Other parts in contact with the pumped liquid: stainless steel DIN W.-Nr. 1.4301								
D = Carbon-graphite filled PTFE (bearings)								
G = Stainless steel parts of DIN W.-Nr. 1.4401 / AISI 316 or better class								
GI = Base plate and flanges of DIN W.-Nr. 1.4408 / AISI 316LN or better class								
I = Stainless steel parts of DIN W.-Nr. 1.4301 / AISI 304 or similar class								
K = Bronze (bearings)								
S = Silicon carbide bearings and PTFE neck rings (standard in CR)								
T = Titanium								
X = Special version								
Code for rubber parts								
E = EPDM (ethylene propylene)								
F = FXM (polytetrafluorethylene and propylene)								
K = FFKM (perfluor)								
P = NBR (nitrile)								
T = PTFE (polytetrafluorethylene)								
V = FKM (fluor)								
Code for shaft sea. See 1.3 Code for shaft seal.								

1.3 Code for shaft seal

The code for shaft seal always consists of four letters.

Example	H	Q	Q	E
Principal Grundfos type designation for shaft seal	1			
Material, rotating seal face	2			
Material, stationary seat	3			
Material, secondary seal	4			

The following codes are used:

Position	Code	Description
1	A	O-ring seal with fixed driver
	B	Rubber bellows seal
	C	O-ring seal with spring as seal driver
	D	O-ring seal, balanced
	E	Cartridge seal with O-ring
	F	Cartridge seal with rubber bellows
	H	Balanced cartridge seal with O-ring
	K	Type M as cartridge seal
	M	Shaft seal with metal bellows
	O	Double seal, back-to-back
2 and 3	P	Double seal, tandem
	R	O-ring seal, type A, with reduced sliding surfaces
	X	Special version
	B	Carbon, resin-impregnated
	C	Other types of carbon
	S	Chromium steel
	H	Cemented tungsten carbide, embedded (hybrid)
	U	Cemented tungsten carbide
4	Q	Silicon carbide
	V	Aluminium oxide
	X	Other ceramics
	E	EPDM
	F	FXM
	P	NBR (nitrile rubber)
	T	PFTE
	V	FKM
	K	FFKM

2. Tightening torques and lubricants

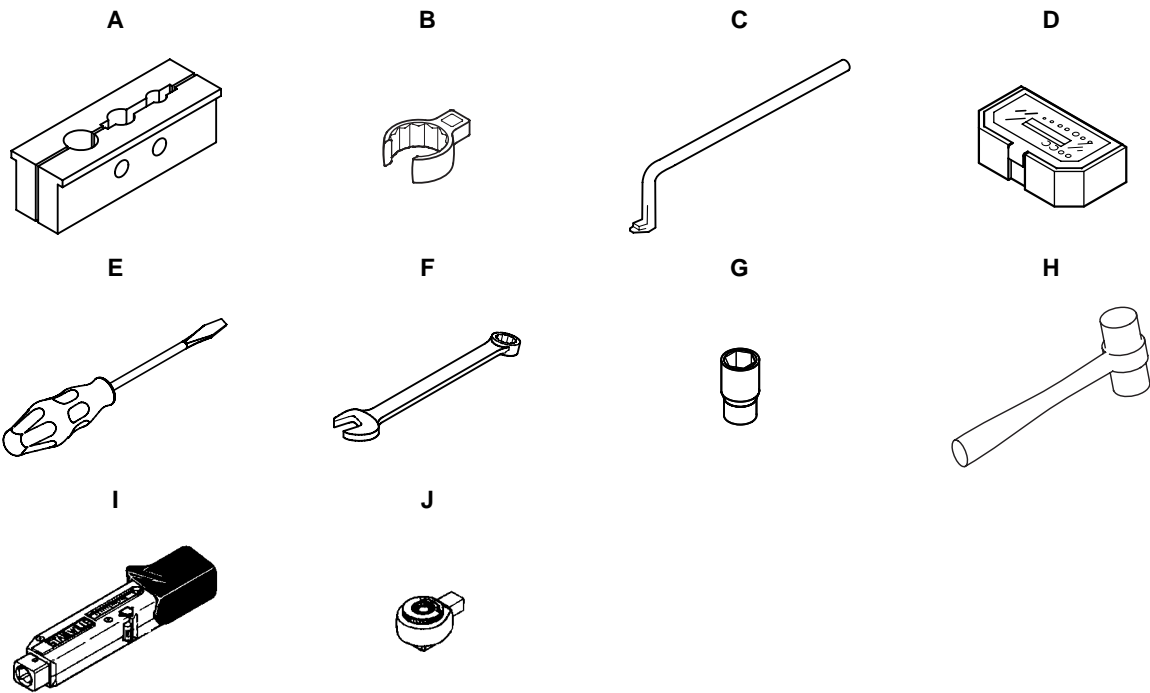
Pos.	Designation	Quantity	Dimensions	Torque [Nm]	Lubricant
7.a	Screw	4	M4	2	-
9	Hexagon socket head screw	4	M6	13	THREAD-EZE
			M8	31	
			M10	62	
18	Air vent screw	1	½"	35	-
	Air vent screw, spindle	1	M8	3	
23	Plug	1	½"	35	-
25	Priming valve	1	½"	35	-
	Priming valve, spindle	1	M10	5	
26	Staybolt CR / CRI	4	M16		THREAD-EZE
	Staybolt CRN	4	M16		Gardolube L 6034
26b	Hexagon socket head screw	2	M8	15	-
			M6	10	
			M8	12	
			M12	40	
28	Hexagon head screw	4	½" UNC	40	THREAD-EZE
			M16	80	
			M16	100	
35	Hexagon head screw	8	M16	100	THREAD-EZE
36	Nut for staybolt CR / CRI	4	M16	80	THREAD-EZE
	Nut for staybolt CRN	4	M16	100	Gardolube L 6034
37	O-ring	2	ø137.5 x 3.3		Rocol 22
67	Lock nut (should be replaced together with washer (pos. 66) if it is removed)	1	M8	22	Prelubricated from factory
100	O-ring	2			Rocol 22
105	Shaft seal	1	M33	35	-
113	Set screw	3	M5	2.5	-

THREAD-EZE, part no. 96611372 (0.5 l).

Gardolube L 6034, part no. SV9995 (1 l).

Rocol 22 (SAPPHIRE AGUA SIL), part no. RM2924 (1 kg).

3. Service tools



3.1 Special tools

Pos.	Designation	For pos.	Description	Part number
A	Shaft holder for assembly	80		SV0040
B	Ring insert tool for shaft seal + square adapter	105		SV2101 SV2100
C	Puller for neck ring	49, 65		SV0239

3.2 Standard tools

Pos.	Designation	For pos.	Description	Part number
D	Bits kit	9, 26b, 113		SV2010
E	Screwdriver	105 7a	Straight slot	-
			Torx TX20	-
			M6 - 10 mm	SV0083
			M8 - 13 mm	SV0055
F	Ring/open-end spanner	28, 36	M12 - 19 mm	SV0054
			½" UNC - 19 mm	
			M16 - 24 mm	SV0122
			M6 - 10 mm	SV0806
G	Socket	28, 36	M8 - 13 mm	SV0091
			M12 - 19 mm	SV0267
			½" UNC - 19 mm	
			M16 - 24 mm	SV0092
H	Plastic hammer	2	No. 2	SV0349

3.3 Torque tools

Pos.	Designation	For pos.	Description	Part number
I	Torque wrench	9, 26b, 28, 36, 105, 113	1-6 Nm	SV0438
			4-20 Nm	SV0292
			20-100 Nm	SV0269
J	Ratchet insert tool	H	9 x 12, ½" x ½"	SV0295

4. Dismantling and assembly

Position numbers

Position numbers of parts (digits) refer to exploded views, sectional drawings and parts lists; position numbers of tools (letters) refer to [3. Service tools](#).

Before dismantling

- Disconnect the electricity supply to the motor.
- Close the isolating valves, if fitted, to avoid draining the system.
- Remove the electric cable in accordance with local regulations.
- Note the centre of gravity of the pump to prevent it from overturning. This is especially important in the case of long pumps.

Before assembly

Gaskets and O-rings should always be replaced when the pump is overhauled.

- Clean and check all parts.
- Order the necessary service kits.
- Replace defective parts by new parts.

During assembly

- Lubricate and tighten screws and nuts to the torque stated. See [2. Tightening torques and lubricants](#).

4.1 Transport bracket

To protect the bearings and the shaft seal, a transport bracket must always be used when transporting the pump without motor.

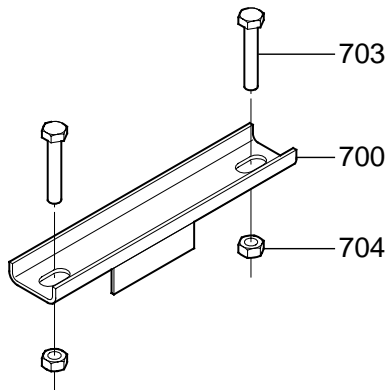


Fig. 1 Transport bracket (pos. 700)

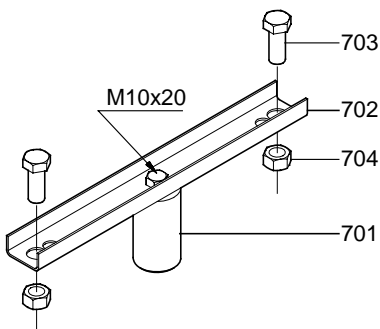


Fig. 2 Transport bracket (pos. 701 and 702)

Flange size	Fig. 1	Fig. 2		Hexagon head screw (pos. 703) (2 pcs.)		Nut (pos. 704) (2 pcs.)
	Transport bracket complete (pos. 700)	Shaft stub (pos. 701)	Rail (pos. 702)			
F85	96521627	-	-	ID8022	M6 x 20	96429513
F100	96521627	-	-	ID8023	M6 x 25	96429513
F115	96521626	-	-	ID8024	M8 x 20	ID0825
F130	96521626	-	-	ID8025	M8 x 25	ID0825
F265	-	96508079	96508073	ID7904	M12 x 30	-
F300	-	96508080	96508073	ID7905	M16 x 45	ID7908
56C	-	96508075	96508072	ID1839	UNC 3/8" x 25	96120884
182TC	-	96508076	96508074	ID1840	UNC 1/2" x 25	96467385
213TC	-	96508077	96508074	ID0185	UNC 1/2" x 1 1/2"	96467385
254TC	-	96508078	96508074	96491112		96467385
284TSC	-	96508078	96508074	ID1840		96467385

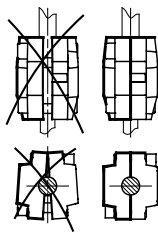
4.1.1 Fitting the transport bracket

1. Press home the shaft (pos. 51).
2. Press home the driver of the shaft seal (pos. 105) and tighten the three screws (pos. 113).
3. Lift the shaft (pos. 51) and fit the adjusting fork.
4. Fit the coupling (pos. 8) and the screws (pos. 9), but leave loose.
5. Fit the transport bracket (pos. 700) or (pos. 701 and 702).
6. Fit the two screws and nuts (pos. 703 and 704), but leave loose.
7. Tighten the screws (pos. 9) in the coupling. The coupling must be fitted so that it is possible to remove it without slackening the screws (pos. 703).
8. Tighten the screws (pos. 703).
9. Remove the adjusting fork.
10. The pump can now be transported without motor.

4.1.2 Removing the transport bracket

It is very important to proceed according to these instructions, as the shaft seal may otherwise be damaged.

1. Remove three of the screws (pos. 9).
2. Slacken the last screw (pos. 9), but do not unscrew it completely.
3. Hit the end of the hexagon key carefully with the flat of the hand to loosen one of the coupling halves.
4. Remove the last screw (pos. 9) and the loose coupling half.
5. Hit the flat part of the coupling half on the shaft end very carefully.
6. Remove the coupling half when it is loose.
7. Remove the screws (pos. 703) and the nuts (pos. 704) and remove the transport bracket.
8. Slacken the screws (pos. 113) by 1/4 turn.
9. Lift the shaft (pos. 51) and fit the adjusting fork.
10. Tighten the screws (pos. 113) with 2.5 Nm.
11. Fit the motor to the pump head.
12. Fit the screw (pos. 28), lubricate and tighten them diagonally to the torque stated. See [2. Tightening torques and lubricants](#).
13. Fit the pin (pos. 10) and the two coupling halves (pos. 10a).
14. Lubricate the four screws (pos. 9) with Thread-Eze and fit them.
15. Yellow-chromated couplings: Check that the gaps either side of the coupling halves are equal.



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Fig. 3 Gaps between coupling halves

16. Tighten the screws (pos. 9) to the torque stated, see [2. Tightening torques and lubricants](#), and remove the adjusting fork.
 17. Check that the shaft rotates freely and noiselessly.
 18. Place the adjusting fork on the inside of one of the coupling guards.
- Fit the coupling guards (pos. 7) and the screws (pos. 7a).

4.2 Dismantling the pump

4.2.1 Removing the motor, coupling and shaft seal

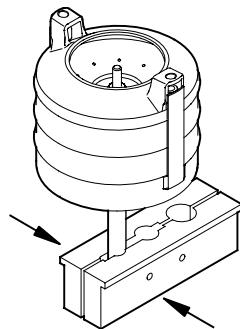
1. Remove the screws (pos. 7a) together with the coupling guards (pos. 7).
2. Remove the screws (pos. 9) together with the coupling halves (pos. 10a) and the shaft pin (pos. 10).
3. Remove the screws (pos. 28).
4. Lift the motor off the pump head (pos. 2).
5. Slacken the three screws of the shaft seal (pos. 113) by approx. $\frac{1}{4}$ of a turn.
6. Slacken the shaft seal (pos. 105) using the ring insert tool for shaft seal (pos. B) until the thread is completely free of the pump head.
7. Pull the shaft seal off the shaft.

4.2.2 Dismantling the pump main parts

1. Remove the shaft seal. See [4.2.1 Removing the motor, coupling and shaft seal](#).
2. Remove the nuts (pos. 36) together with the washers (pos. 66a).
3. Loosen the pump head (pos. 2) with a light knock on the edge and lift it free of the staybolts (pos. 26).
4. Remove the outer sleeve (pos. 55).
5. Lift the chamber stack off the base.
6. Remove the O-rings (pos. 37).

4.2.3 Dismantling the chamber stack

1. Dismantle the pump main parts. See [4.2.2 Dismantling the pump main parts](#).
2. Place the shaft holder (pos. A) in a vice, but do not tighten the vice.
3. Fit the shaft pin (pos. 10) into the shaft pin hole, place the chamber stack in the shaft holder (pos. A) and tighten the vice.



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Fig. 4 Fitting the chamber stack in the holder

4. Remove the screws (pos. 26b) and the washers (pos. 26c) holding the straps to the chamber stack.
5. Remove the straps (pos. 26a) and the inlet parts (pos. 44b) and 44a.
6. Remove the nut (pos. 67), the washer (pos. 66) and the splined clamp (pos. 64c).
7. Remove the chamber stack parts: impellers, spacing pipes, chambers and bearing rings. See [5. Order of assembly of chambers and impellers](#).
8. Remove the driver (pos. 61).
9. If the neck rings (pos. 45) in the chambers are worn, remove them by pressing off the retainer for neck rings using the puller for neck ring (pos. C).
10. **CR 15 and 20:**
If the wear rings of the impellers (pos. 49c) are worn, remove them with the puller for neck ring (pos. C).

4.3 Assembly

4.3.1 Assembling the chamber stack

1. Fit the neck rings into the chambers (pos. 45) if removed.
2. **CR 15 and 20:**
Fit the wear rings on the impellers (pos. 49c) if removed.
3. Place the shaft holder (pos. A) in a vice, but do not tighten the vice.
4. Fit the shaft pin (pos. 10) into the shaft pin hole, place the chamber stack in the shaft holder and tighten the vice.
5. Check that the lock ring of the shaft (pos. 51) is not damaged.
6. Fit the driver (pos. 61).
7. Fit the chamber stack parts on the shaft: chamber, spacing pipe, impeller and bearing ring. See [5. Order of assembly of chambers and impellers](#).

Note: When fitting the chamber stack make sure that bearings and other rotating parts are not dropped on the shaft. They must be slid carefully over the shaft to prevent any damage to bearings.

8. Fit the splined clamp (pos. 64c), washer (pos. 66) and nut (pos. 67) and tighten with 22 Nm.

Note: The washer (pos. 66) consists of two washers glued together. If they have been separated, make sure that they are fitted correctly. It is advisable to replace the washer (pos. 66) and nut (pos. 67) each time the chamber stack is dismantled.

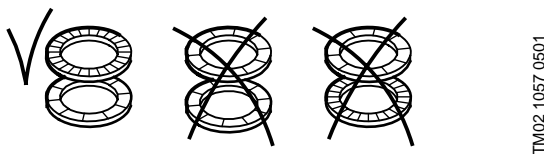


Fig. 5 Correct fitting of washer (pos. 66)

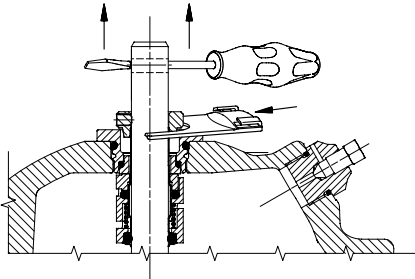
9. Fit the inlet parts (pos. 44a and 44b) and the straps (pos. 26a).
10. Fit the washers (pos. 26c) and the screws (pos. 26b) holding the straps to the chamber stack.
11. Check that the straps are straight (parallel with the shaft), and tighten the screws alternately to ensure that the chamber stack is clamped straight. Tighten with 15 Nm.
12. Slacken the vice and remove the chamber stack (pos. 80) and the shaft pin (pos. 10).

4.3.2 Fitting the pump main parts

1. Assemble the chamber stack. See [4.3.1 Assembling the chamber stack](#).
2. Fit the O-ring (pos. 37) in the pump head (pos. 2) and in the base (pos. 6) and lubricate them with Rocol 22.
3. Fit the chamber stack on the base taking care that the heads of the screws for straps do not touch the inlet pipe in the base.
4. Fit the outer sleeve (pos. 55) in the base and press it home in the base.
5. Check that the four rubber springs (pos. 60) are in the pump head.
6. Fit the pump head on the pump with the air vent screw (pos. 18) towards the discharge side.
7. Lubricate the threads of the staybolts (pos. 26). See [2. Tightening torques and lubricants](#).
8. Fit the washers (pos. 66a) and the nuts (pos. 36).
9. Tighten the nuts (pos. 36) diagonally to the torque stated. See [2. Tightening torques and lubricants](#).

4.3.3 Fitting the shaft seal, coupling and motor

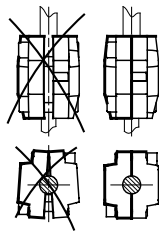
1. Fit the pump main parts. See [4.3.2 Fitting the pump main parts](#).
2. If necessary, clean and smooth the shaft end using the holder with emery cloth supplied with the shaft seal kit.
3. Moisten the shaft end with soapy water.
4. Press the shaft seal on the shaft, screw it into the pump head and tighten it with 35 Nm using the ring insert tool for shaft seal (pos. B).
5. Press the ring with the three set screws (pos. 113) against the hexagon plug.
6. Tighten the screws (pos. 113) with 2.5 Nm.
7. Lift the chamber stack by inserting a screwdriver or similar tool in the hole for the pin in the shaft and fit the adjusting fork, which is fitted to one of the coupling guards (pos. 7).



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Fig. 6 Fitting the adjusting fork

8. Fit the motor to the pump head.
9. Fit the screw (pos. 28), lubricate and tighten them diagonally to the torque stated. See [2. Tightening torques and lubricants](#).
10. Fit the pin (pos. 10) and the two coupling halves (pos. 10a).
11. Lubricate the four screws (pos. 9) with Thread-Eze and fit them.
12. Yellow-chromated couplings: Check that the gaps either side of the coupling halves are equal.



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Fig. 7 Gaps between coupling halves

13. Tighten the screws to the torque stated, see [2. Tightening torques and lubricants](#), and remove the adjusting fork.
14. Check that the shaft rotates freely and noiselessly.
15. Place the adjusting fork on the inside of one of the coupling guards.
16. Fit the coupling guard (pos. 7) and the screws (pos. 7a).

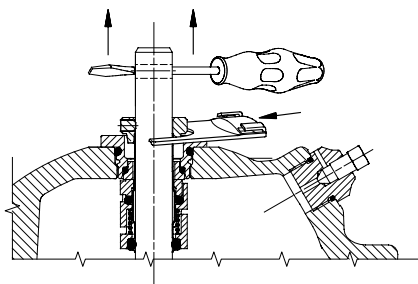
4.4 Replacing the shaft seal of pumps with spacer coupling

4.4.1 Dismantling

1. Remove the screws (pos. 7a) together with the coupling guards (pos. 7).
2. Remove the screws (pos. 9) together with the coupling halves (pos. 10a) and the shaft pin (pos. 10).
3. Slacken the three screws of the shaft seal (pos. 113) by approx. $\frac{1}{4}$ of a turn.
4. Slacken the shaft seal (pos. 105) using the ring insert tool for shaft seal (pos. B) until the thread is completely free of the pump head.
5. Pull the shaft seal off the shaft.

4.4.2 Assembly

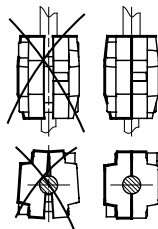
1. If necessary, clean and smooth the shaft end using the holder with emery cloth supplied with the shaft seal kit.
2. Moisten the shaft end with soapy water.
3. Press the shaft seal on the shaft, screw it into the pump head and tighten it with 35 Nm.
4. Press the ring with the three hexagon socket set screws (pos. 113) against the hexagon plug.
5. Tighten the screws (pos. 113) with 2.5 Nm.
6. Lift the chamber stack by inserting a screwdriver or similar tool in the hole for the pin in the shaft and fit the adjusting fork, which is fitted to one of the coupling guards (pos. 7).



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Fig. 8 Fitting the adjusting fork

7. Fit the pin (pos. 10) and the two coupling halves (pos. 10a).
8. Lubricate and fit the four screws (pos. 9).
9. Yellow-chromated couplings: Check that the gaps either side of the coupling halves are equal.



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Fig. 9 Gaps between coupling halves

10. Tighten the screws to the torque stated, see [2. Tightening torques and lubricants](#), and remove the adjusting fork.
11. Check that the shaft rotates freely and noiselessly.
12. Place the adjusting fork on the inside of one of the coupling guards.
13. Fit the coupling guard (pos. 7) and the screws (pos. 7a).

4.5 Checking and replacing impellers/wear rings and neck rings

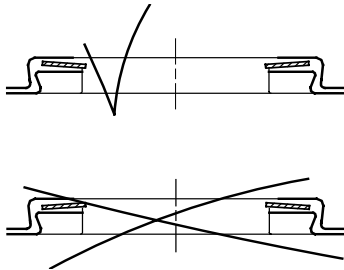
Impellers/wear rings

1. Check if there is a noticeable groove in the impeller skirts (CR 10) or wear rings (CR 15 and 20) caused by friction (use a finger nail).
2. If there is a groove, the impellers/wear rings must be replaced. The wear rings can be removed by means of the puller for neck ring (pos. C).

Neck rings

The neck rings (pos. 65) should always be replaced if the chamber stack has been dismantled.

1. Push the retainer for neck ring free of the chamber using the puller for neck ring (pos. C).
2. Remove the neck ring (pos. 45).
3. Fit a new neck ring into the chamber.



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Fig. 10 Correct fitting of neck ring

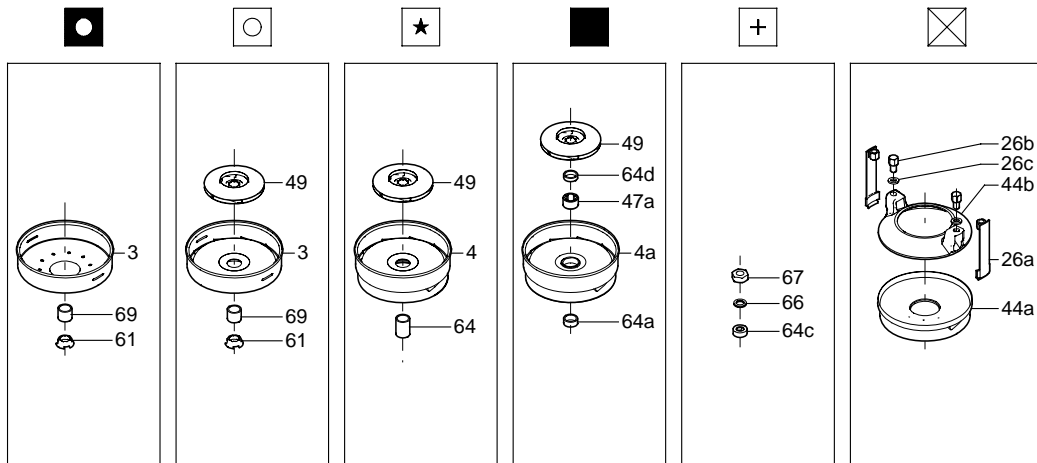
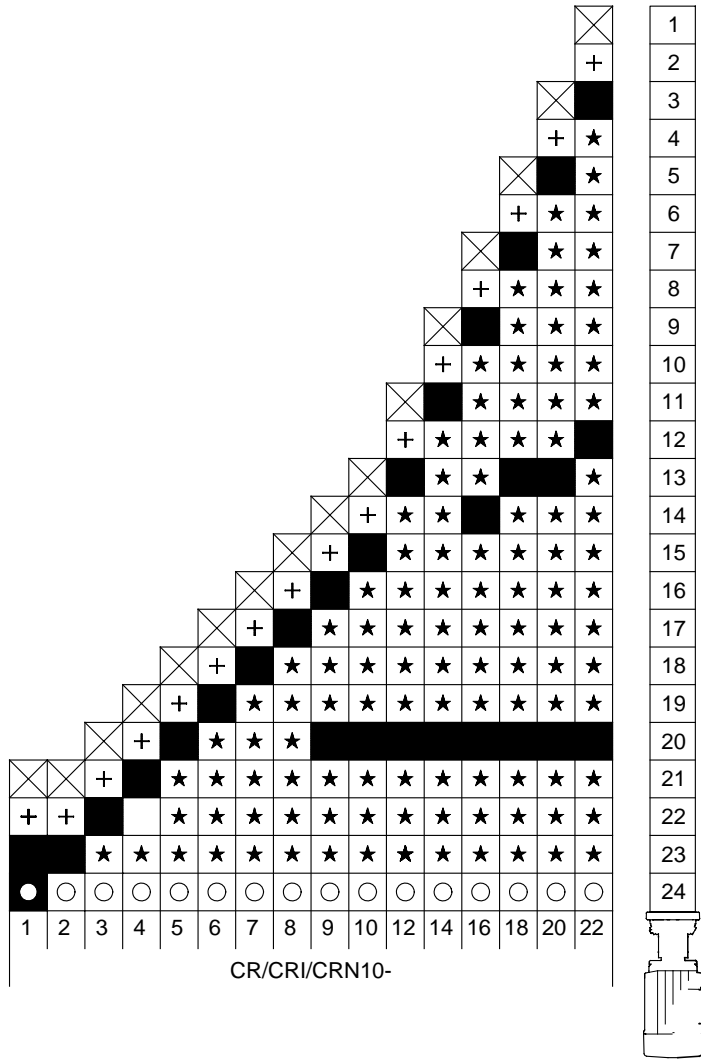
4. Press the retainer for neck ring down on the neck ring and make it engage with the chamber. It must be possible to move the neck ring freely (sideways) between the retainer and the chamber.

Bearing rings

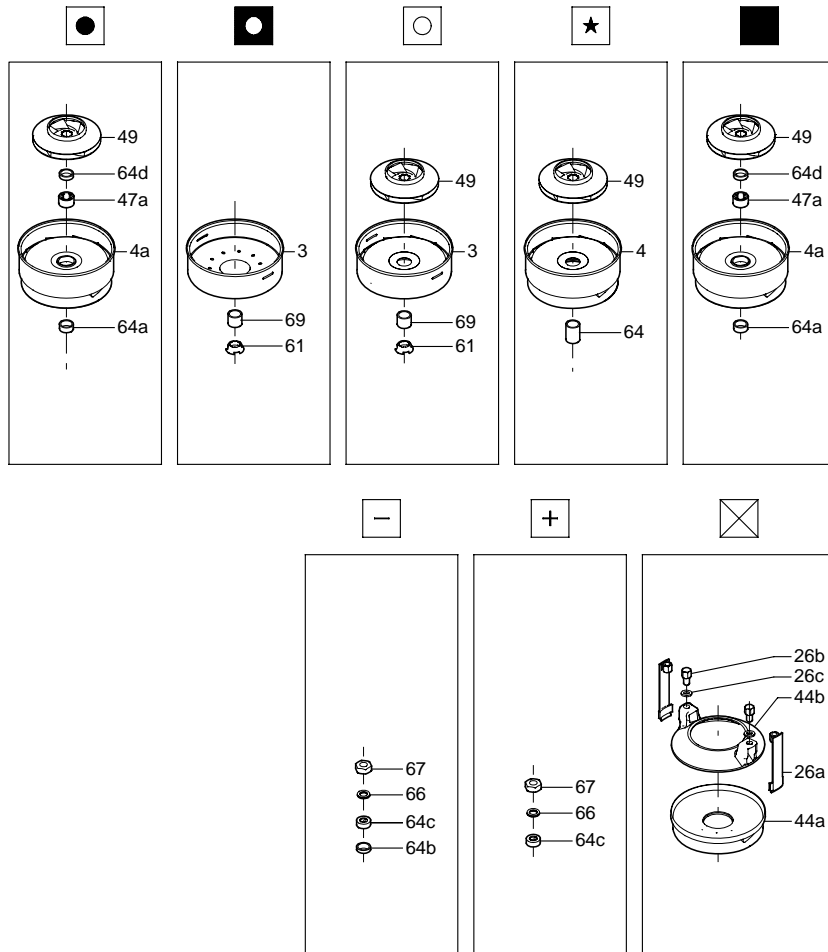
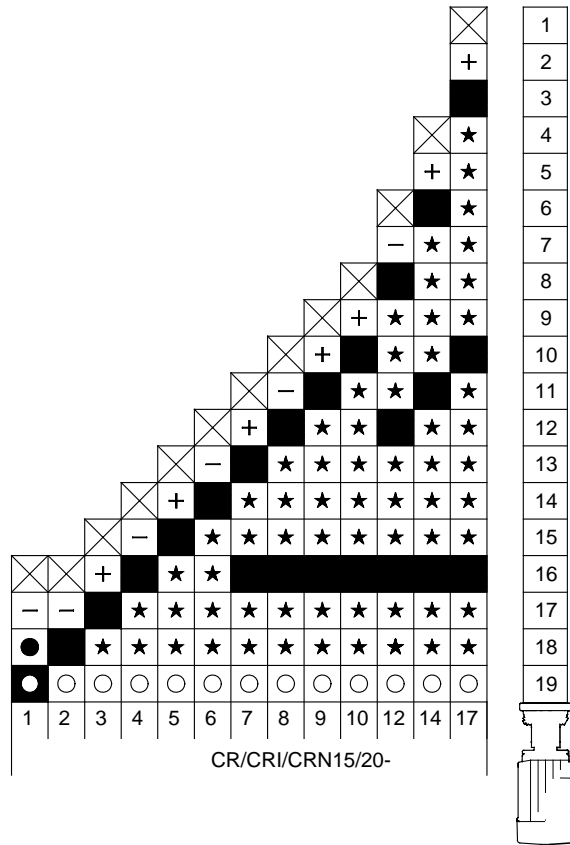
1. Check whether there is a visible or noticeable (use a finger nail) edge on the rotating bearing rings.
2. The bearing rings (pos. 47a) and the chambers with bearing ring (pos. 4a) must be replaced at the same time.

5. Order of assembly of chambers and impellers

CR, CRI, CRN 10



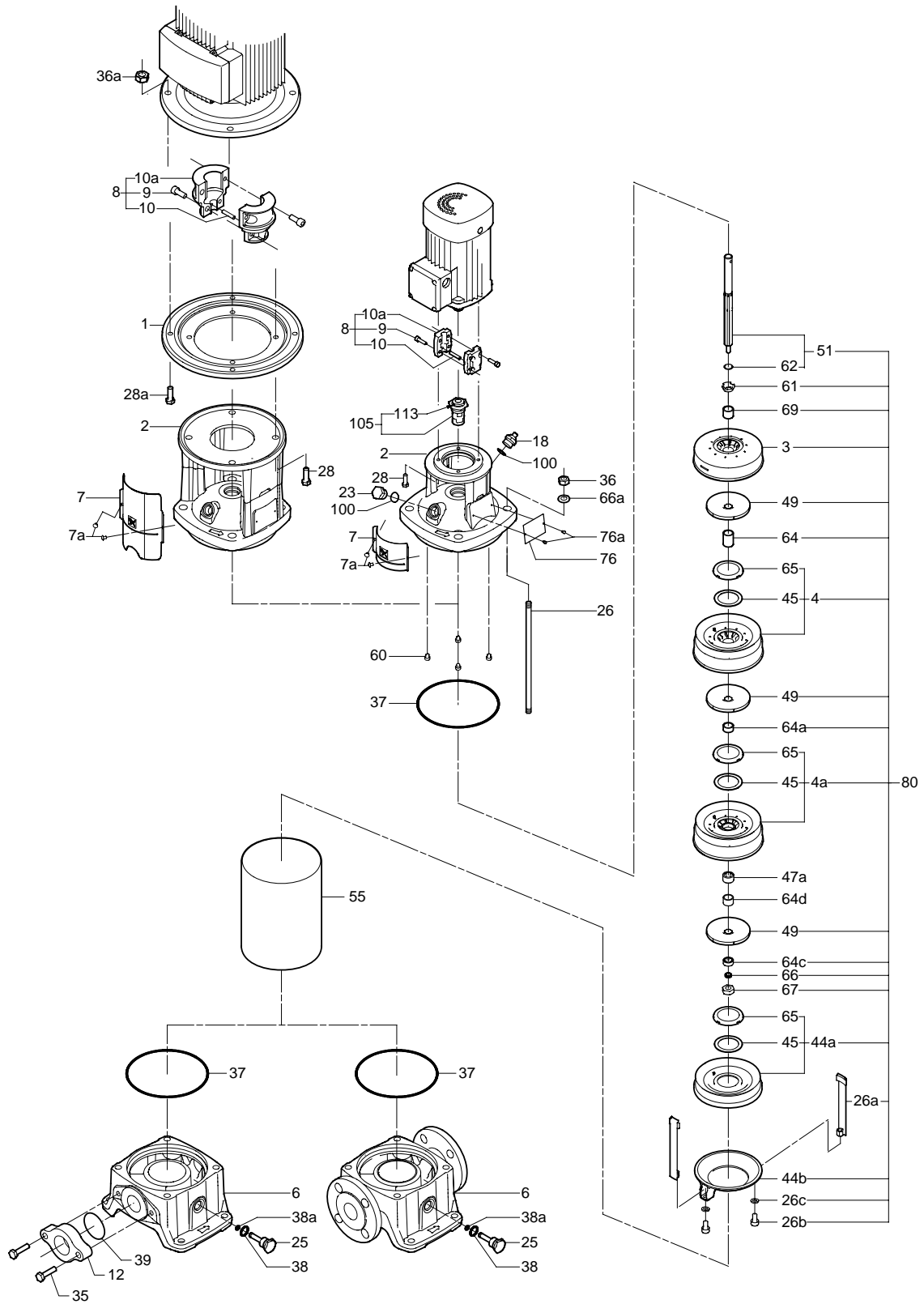
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6. Drawings

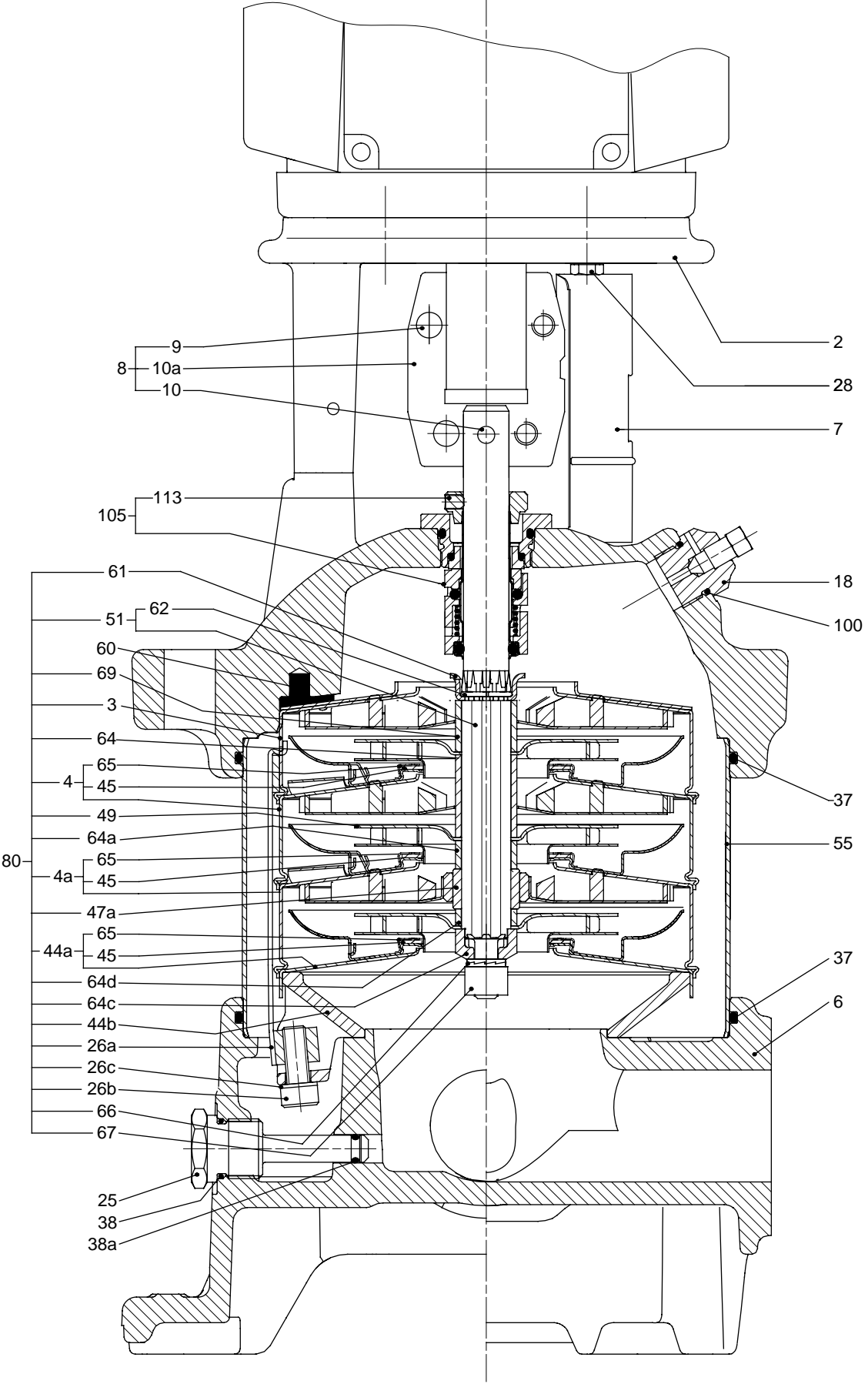
6.1 CR, CRI, CRN 10

Exploded view



TM02 6496 1003

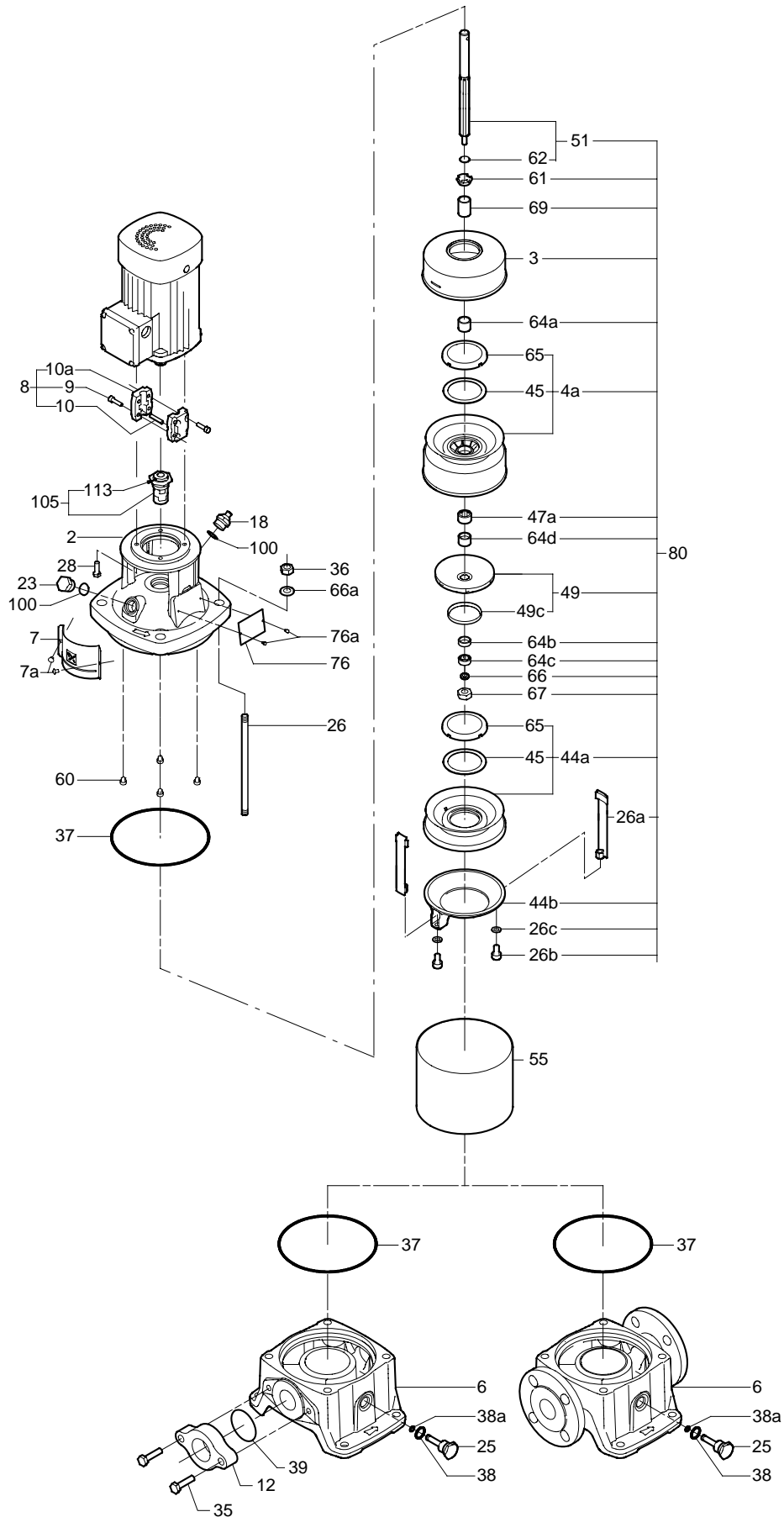
Sectional drawing



TM02 6543 1003

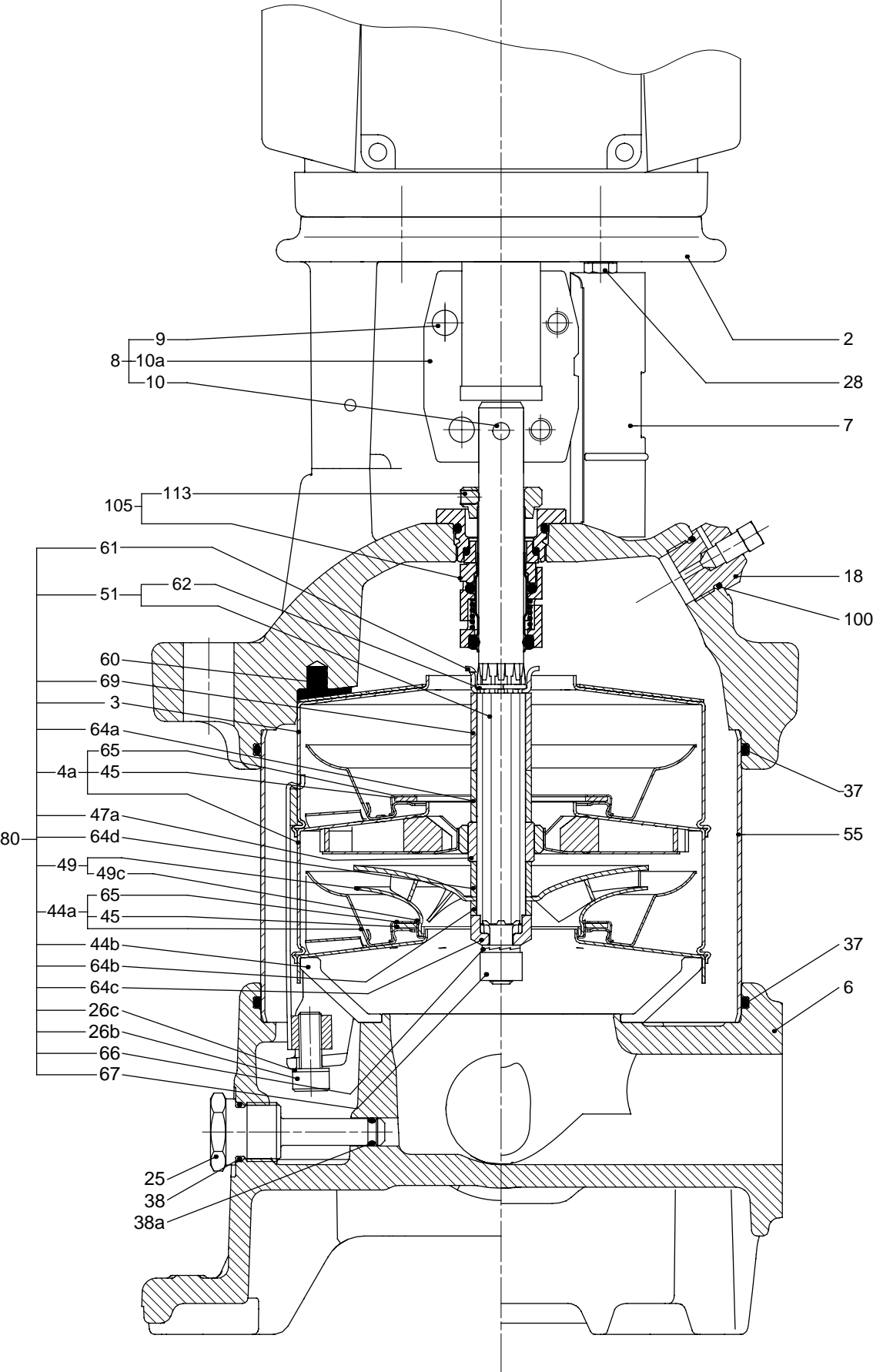
6.2 CR, CRI, CRN 15, 20

Exploded view



TM02 6582 1003

Sectional drawing



TM02 6580 1003