# CR, CRI, CRN 1, 3, 5 Model A

## 50/60 Hz 1/3~

Service instructions


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GRUNDFOS

# CR, CRI, CRN 1, 3, 5 Model A



**English (GB)**

**Original service instructions**

## Table of contents



## 1. General information

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

### 1.1 Hazard statements

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

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

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

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

The hazard statements are structured in the following way:

**SIGNAL WORD**
**Description of the hazard**
Consequence of ignoring the warning
- Action to avoid the hazard.

### 1.2 Notes

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

Observe these instructions for explosion-proof products.

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

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

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

Tips and advice that make the work easier.

### 1.3 Safety details to be aware of when working on the product

**DANGER**
**Electric shock**
Death or serious personal injury
- Switch off the power supply before you start any work on the product.Make sure that the power supply cannot be switched on accidentally.

**WARNING**
**Falling objects**
Death or serious personal injury
- 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.

**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.

## 1.4 Contaminated products

**CAUTION**
**Biological hazard**
Minor or moderate personal injury

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

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

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

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

## 1.5 Servicing the motor

**Grundfos MG and MGE motors**

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

**Motors of other makes**

Contact the motor manufacturer.

# 2. Dismantling and assembling the product

## 2.1 General information

If it is necessary to dismantle the pump, either because it is choked or damaged, follow the instructions in the following sections.

Parts are indicated by numbers and refer to the section on drawings. Tools are indicated by letters and refer to the section on special tools.

**Related information**

*3.3 Special tools*

*4.1 CR, CRI, CRN 1, 3*

*4.2 CR, CRI, CRN 5*

### 2.1.1 Before dismantling

- Disconnect the power supply to the motor.
- Close the isolating valves, if fitted, to avoid draining the system.
- Remove the power 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.

### 2.1.2 Before assembly

- Clean and check all parts.
- Order the necessary service kits.
- Replace defective parts by new parts.
- Gaskets and O-rings must always be replaced when the pump is overhauled.

### 2.1.3 During assembly

- Lubricate and tighten the screws and nuts to the correct torque as stated in the sections on torques and lubricants.

**Related information**

*3.2 Torques*

*3.2.1 Lubricants*

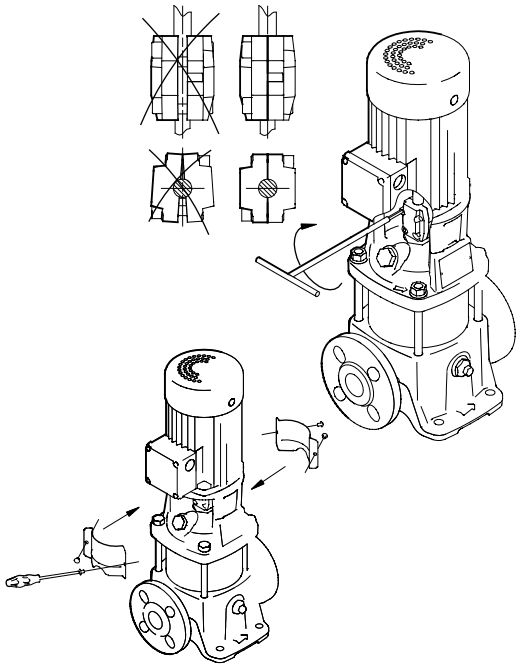
## 2.2 Replacing the motor

### 2.2.1 Dismantling

1. Remove the screws (7a) together with the coupling guard (7).
2. Remove the screws (9) together with the coupling halves (10a) and the shaft pin (10).
3. Remove the screws (28).
4. Lift the motor off the pump head (2).

### 2.2.2 Assembly

1. Fit the motor to the pump head.
2. Fit the screws (28), and cross-tighten them to the correct torque.
3. Fit the shaft pin (10) into the shaft pin hole.
4. Fit the coupling halves (10a) on the shaft and fit the screws (9). Tighten the screws and leave loose. Check that the gaps on either side of the coupling halves are equal.
5. Cross-tighten the screws (9) to the correct torque. Check that the gaps on either side of the coupling halves are equal. See the figure below.



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6. Fit the coupling guard (7) and the screws (7a).

## 2.3 Replacing the shaft seal

### 2.3.1 Dismantling

1. Remove the motor and the coupling. See the subsection on dismantling in the section on replacing the motor.
2. Loosen the three screws (113) by approximately a 1/4 of a turn so that the shaft seal is just free of the shaft.
3. Loosen the shaft seal (105) using the box spanner (B) until the thread is completely free of the pump head.
4. Pull the shaft seal off the shaft.

**Related information**

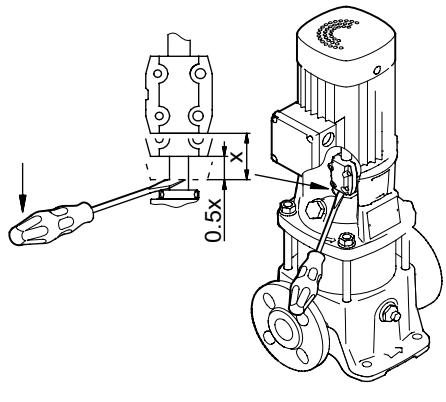
*2.2.1 Dismantling*

*3.3 Special tools*

### 2.3.2 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. Place the shaft seal in the box spanner (B), and press it down on the shaft.
4. Screw the shaft seal into the pump head, and tighten it to the correct torque.
5. Fit the shaft pin (10) into the shaft pin hole, and fit the coupling halves (10a) on the shaft. Fit the screws (9), tighten and leave loose. Check that the gaps on either side of the coupling halves are equal. See the figure in the subsection on assembly in the section on replacing the motor.
6. Fit the motor to the pump head.
7. Fit the screws (28), and cross-tighten them to the correct torque.

8. Insert a suitable screwdriver between the bottom of the coupling and the shaft seal, and raise the shaft or the coupling against stop. See the figure below.

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9. Lower the shaft or the coupling to half that height. See the figure above.
10. Hold the shaft or the coupling in this position, and tighten the four screws in the coupling (9) to the correct torque. Check that the gaps on either side of the coupling halves are equal. See the figure in the subsection on assembly in the section on replacing the motor.
11. Tighten the three screws (113) to the correct torque.
12. Fit the coupling guard (7) and the screws (7a).

**Related information**

*2.2.2 Assembly*
*3.3 Special tools*

## 2.4 Dismantling and assembling the pump main parts

### 2.4.1 Dismantling

1. Remove the shaft seal. See the subsection on dismantling in the section on replacing the shaft seal.
2. Remove the screws (36) together with the washers (66a).
3. Loosen the pump head (2) with a light blow on the edge, and lift it free of the staybolts (26). The top guide vanes or outlet part (50a) may stick to the pump head.
4. Loosen the top guide vanes or outlet part (50a) with a light blow of a rubber mallet if it was not removed with the pump head.
5. Remove the outer sleeve (55).
6. Lift the chamber stack off the base. If the bottom chamber (5a) is removed with the chamber stack, loosen it from the chamber stack; otherwise loosen it from the base (6).

**Related information**

*2.3.1 Dismantling*

### 2.4.2 Assembly

1. Fit the chamber stack in the base. The smooth shaft end must be upwards.
2. Fit the outer sleeve (55) in the base. The O-ring (37) must be lubricated.
3. Press the top guide vanes or outlet part (50a) into the recess of the top chamber.
4. Fit the pump head on the pump with the vent screw (18) in the direction required. The O-ring (37) must be lubricated.
5. Lubricate the threads of the staybolts.
6. Fit the washers (66a) and the nuts (36).
7. Cross-tighten the nuts (36) to the correct torque.

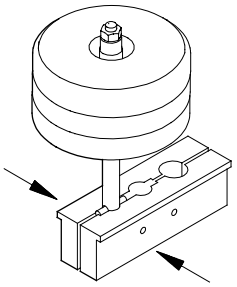
**Related information**

*3.2 Torques*
*3.2.1 Lubricants*

## 2.5 Dismantling and assembling the chamber stack

### 2.5.1 Dismantling

1. Remove the chamber stack. See the subsection on dismantling in the section on dismantling and assembling the pump main parts.
2. Place the shaft holder (A) in a vice, but do not tighten the vice.
3. Fit the shaft pin (10) into the shaft pin hole, and place the chamber stack in the shaft holder (A). See the figure below. Tighten the vice.



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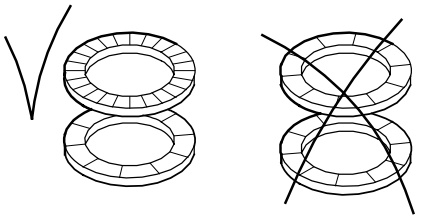
4. Remove the nut (67), the washer (66) and the clamp (64c).
5. Remove the chamber stack components: impeller, chamber, bearing ring and spacing pipe. See the section on the order of assembly for chambers and impellers.

**Related information**

*2.4.1 Dismantling*
*3.3 Special tools*
*5. Order of assembly for chambers and impellers*

### 2.5.2 Assembly

1. Place the shaft holder (A) in a vice, but do not tighten the vice.
2. Fit the shaft pin (10) into the shaft pin hole, and place the shaft in the shaft holder (A). Tighten the vice.
3. Fit the components on the shaft: impeller, chamber, spacing pipe and bearing ring. See the section on the order of assembly for chambers and impellers.
4. Fit the clamp (64c), the washer (66) and the nut (67). Tighten to the correct torque. The washer (66) consists of two washers glued together. If they have been separated, make sure that they are fitted correctly. See the figure below.



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5. Loosen the vice, and remove the chamber stack and the shaft pin (10).
6. Place the bottom chamber (5a) on the chamber stack.

**Related information**

*3.3 Special tools*
*5. Order of assembly for chambers and impellers*

## 2.6 Dismantling and assembling the base and the pump head

### 2.6.1 Dismantling the base

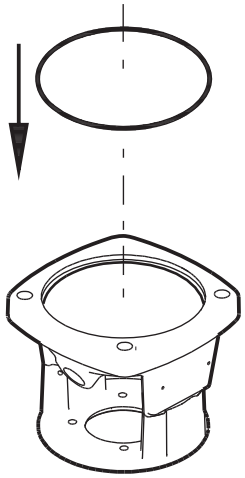
1. Remove the staybolts (26) from the base (6).
2. Remove the flange connection, if any:
   a. CR
      Oval flange: Remove the screws (35), the flange (12) and the gasket (39).
   b. CRI, CRN
      DIN, ANSI or JIS-flange: Remove the retaining ring (203).
3. Remove the drain plug (25) and the O-ring (38).
4. Remove the O-ring (37).

### 2.6.2 Dismantling the pump head

1. Remove the vent screw (18), the plug (23) and the O-ring (100).
2. Remove the O-ring (37).
3. Remove the pump head cover (77).
4. Remove the corrugated spring (60).

### 2.6.3 Assembling the base

1. Fit the O-ring (37). See the figure below.



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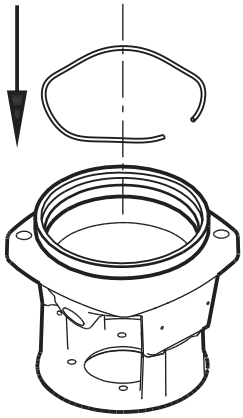
2. Fit the flange connection, if any:
   a. CR
      Oval flange: Fit the gasket (39), the flange (12) and the screws (35).
   b. CRI, CRN
      DIN, ANSI or JIS-flange: Fit the flange (201) and the retaining ring (203).
3. Lubricate the threads of the staybolts. Fit the staybolts in the base (6). Tighten the staybolts using your fingers.
4. Fit the O-ring (38) on the drain plug (25), and fit the plug into the base.

**Related information**

*3.2 Torques*
*3.2.1 Lubricants*

### 2.6.4 Assembling the CR pump head

1. Fit the O-rings (100) on the vent screw (18) and the plug (23). Fit the screw and the plug into the pump head.
2. Fit the corrugated spring (60) in the pump head. See the figure below.



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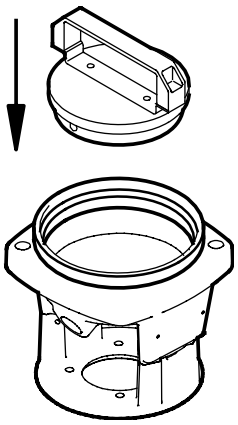
3. Fit the O-ring (37). See the figure in the subsection on assembling the base.

**Related information**

*2.6.3 Assembling the base*

### 2.6.5 Assembling the CRI, CRN pump head

1. Fit the pump head cover (77) in the pump head (2) and knock it home using a rubber mallet.
2. Fit the O-rings (100) on the vent screw (18) and the plug (23). Fit the screw and the plug into the pump head cover.
3. Fit the corrugated spring (60) in the pump head cover. See the figure below.



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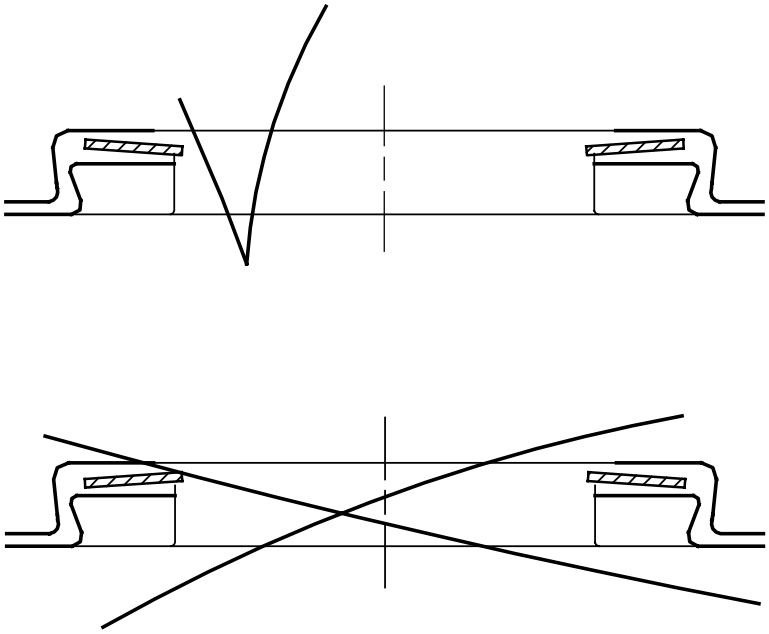
4. Fit the O-ring (37). See the figure in the subsection on assembling the base.

**Related information**

*2.6.3 Assembling the base*

## 2.7 Checking and replacing parts

| Check | Replace |
|---|---|
| **Impeller** | **Neck ring/retainer for neck ring** |
| • Check if it is necessary to replace the impeller due to friction between the neck ring and the impeller skirt.<br>If wear has caused a noticeable (use a finger nail) groove in the impeller skirt, the impeller must be replaced.<br>Neck rings and retainers for neck rings must always be replaced when the chamber stack is dismantled. | 1. Prise the retainer for the neck ring (65) up and free of the chamber using the puller (C).<br>2. Remove the neck ring (45).<br>3. Fit a new neck ring into the chamber. See the figure below.<br>4. Press a new retainer for a neck ring down on the neck ring and into the chamber.<br>It must be possible to move the neck ring freely (sideways) between the retainer and the chamber. |
| **Bearing rings** | |
| • Check if there is a visible and noticeable (use a finger nail) edge on the rotating bearing ring. | • Replace both bearing rings (47a) and the chamber with bearing ring (4a). |



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**Related information**

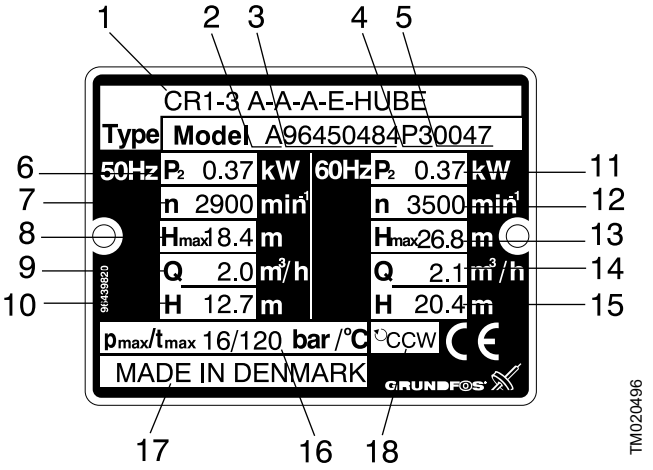
*3.3 Special tools*

## 3. Additional information

### 3.1 Identification

This section shows the type key, the nameplate and the codes that can appear in the variant type key. As codes can be combined, a code position may contain more than one letter.

#### 3.1.1 Nameplate




| Pos. | Description |
|---|---|
| 1 | Type designation. See the section on the type key. |
| 2 | Model |
| 3 | Product number |
| 4 | Place of production |
| 5 | Production year and week |
| 6 | $P_2$, 50 Hz |
| 7 | Speed, 50 Hz |
| 8 | Head against closed valve, 50 Hz |
| 9 | Rated flow rate, 50 Hz |
| 10 | Head at rated flow rate, 50 Hz |
| 11 | $P_2$, 60 Hz |
| 12 | Speed, 60 Hz |
| 13 | Head against closed valve, 60 Hz |
| 14 | Rated flow rate, 60 Hz |
| 15 | Head at rated flow rate, 60 Hz |
| 16 | Maximum pressure and temperature |
| 17 | Country of production |
| 18 | Direction of rotation (CCW = counterclockwise) |

**Related information**

*3.1.2 Type key*

#### 3.1.2 Type key

**Example**

**CR-3-10 X-X-X-X-XXXX**

| Code | Explanation |
|---|---|
| CR | Type range |
| 3 | Rated flow rate in $m^3/h$ |
| 10 | Number of stages |
| X | Code for pump version:<br>A = Basic version<br>U = NEMA version |
| X | Code for pipe connection:<br>A = Oval flange<br>CA = FlexiClamp coupling<br>FGJ = DIN, ANSI and JIS flange<br>P = PJE coupling |
| X | Code for pump materials:<br>A = Pump head and base: Cast iron<br>Other wetted parts: Stainless steel DIN W.-Nr. 1.4301<br>I = All wetted parts: Stainless steel, DIN W.-Nr. 1.4301<br>G = All wetted parts: Stainless steel, DIN W.-Nr. 1.4401 |
| X | Code for rubber parts:<br>E = EPDM<br>V = FKM |
| XXXX | Code for shaft seal:<br>HUBE/V = Balanced cartridge seal; rotating face: tungsten carbide; stationary seat: resin-impregnated carbon; O-rings, see the code for rubber parts.<br>HUUE/V = Balanced cartridge seal; rotating face: tungsten carbide; stationary seat: tungsten carbide; O-rings, see the code for rubber parts. |

**Related information**

*3.1.1 Nameplate*

### 3.2 Torques

| Pos. | Description | Number | Dimensions | Torque |
|---|---|---|---|---|
| 7a | Screw | 4 | M4 | 2 |
| 9 | Hexagon socket head screw | 4 | M6 | 13 |
| | | | M8 | 31 |
| | | | M10 | 62 |
| 18 | Vent screw (spindle) | 1 | ½" (M8) | 35 (3) |
| 23 | Plug | 1 | ½" | 35 |
| 25 | Drain plug with bypass valve (spindle) | 1 | ½" (M10) | 35 (5) |
| 26 | Staybolt CR<br>Staybolt CRI<br>Staybolt CRN | 4 | M12 | |
| 28 | Hexagon head screw | 4 | M6 | 10 |
| | | | M8 | 12 |
| | | | M12 | 40 |
| 35 | Hexagon head screw | 4 | M10 | 23 |

| Pos. | Description | Number | Dimensions | Torque |
|---|---|---|---|---|
| 36 | Nut CR<br>Nut CRI<br>Nut CRN | 4 | M12 | 50 |
| 37 | O-ring | 2 | ∅137.5 x 3.3 mm | |
| 47a | Bearing ring | See the section on the order of assembly for chambers and impellers. | | |
| 67 | Lock nut | 1 | M8 | 22 |
| 105 | Shaft seal | 1 | M28 | 35 |
| 113 | Hexagon socket set screw | 3 | M5 | 2.5 |

**Related information**

*4.1 CR, CRI, CRN 1, 3*
*4.2 CR, CRI, CRN 5*
*5. Order of assembly for chambers and impellers*

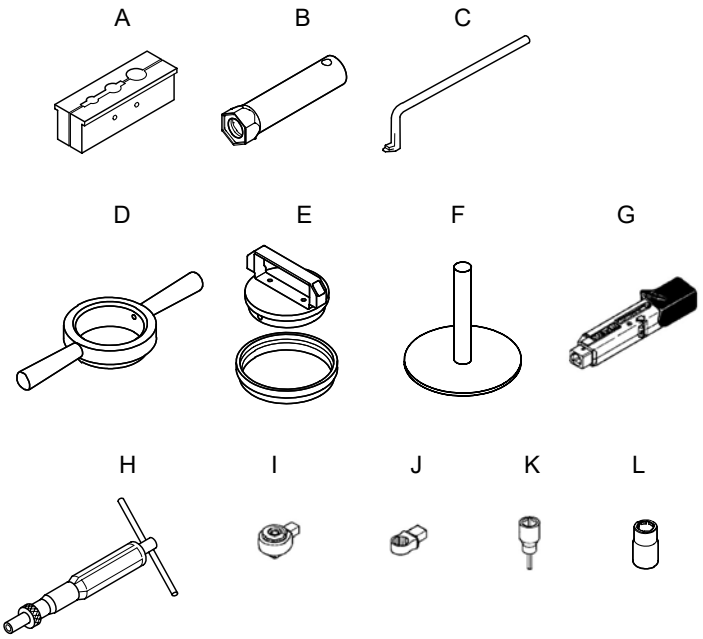
### 3.2.1 Lubricants

| Pos. | Description | Lubricant |
|---|---|---|
| 9 | Hexagon socket head screw | THREAD-EZE |
| 26 | Staybolt CR<br>Staybolt CRI | |
| 28 | Hexagon head screw | |
| 35 | Hexagon head screw | |
| 36 | Nut CR<br>Nut CRI | |
| 18 | Vent screw (spindle) | Soapy water |
| 23 | Plug | |
| 25 | Drain plug with bypass valve (spindle) | |
| 26 | Staybolt CRN | Gardolube L 6034 |
| 36 | Nut CRN | |
| 67 | Lock nut | |
| 37 | O-ring | Rocol 22 |
| 47a | Bearing ring | |

**Related information**

*4.1 CR, CRI, CRN 1, 3*
*4.2 CR, CRI, CRN 5*

### 3.3 Special tools

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| Pos. | Description | For pos. | Additional information | | Part number |
|---|---|---|---|---|---|
| A | Shaft holder for assembly | | | | SV0040 |
| B | Tubular box spanner for shaft seal | 105 | | | SV2007 |
| C | Puller | 65 | | | SV0239 |
| D | Tool for outer sleeve | 55 | CRI, CRN | | V7170478 |
| E | Tool for corrugated spring | 60 | CRI, CRN | | V7170227 |
| F | Tool for O-ring | 37 | CRI, CRN | | V7170230 |
| G | Torque wrench | N-O | 4-20 Nm | 9 x 12 mm | SV0292 |
| | | | 20-100 Nm | 9 x 12 mm | |
| | | | 40-200 Nm | 14 x 18 mm | |
| H | Torque screwdriver | J | 1-6 Nm | 1/4" | |
| I | Ratchet insert tool | L-O-P | 9 x 12 mm | 1/2" | |
| J | Ring insert tool | 28-L | M6 - 10 mm | 9 x 12 mm | |
| | | 28-L | M8 - 13 mm | 9 x 12 mm | |
| | | 28-L | M10 - 17 mm | 9 x 12 mm | |
| | | 36-L | M12 - 19 mm | 9 x 12 mm | |
| | | 18-23-25-L | M16 - 24 mm | 9 x 12 mm | |
| K | Hexagon socket driver | 9-N | M6 - 5 mm | ½" x ½" | |
| | | | M8 - 6 mm | ½" x ½" | |
| | | | M10 - 8 mm | ½" x ½" | |
| L | Socket spanner, purpose-ground | 67-L | M8 - 13 mm | 9 x 12 mm | |

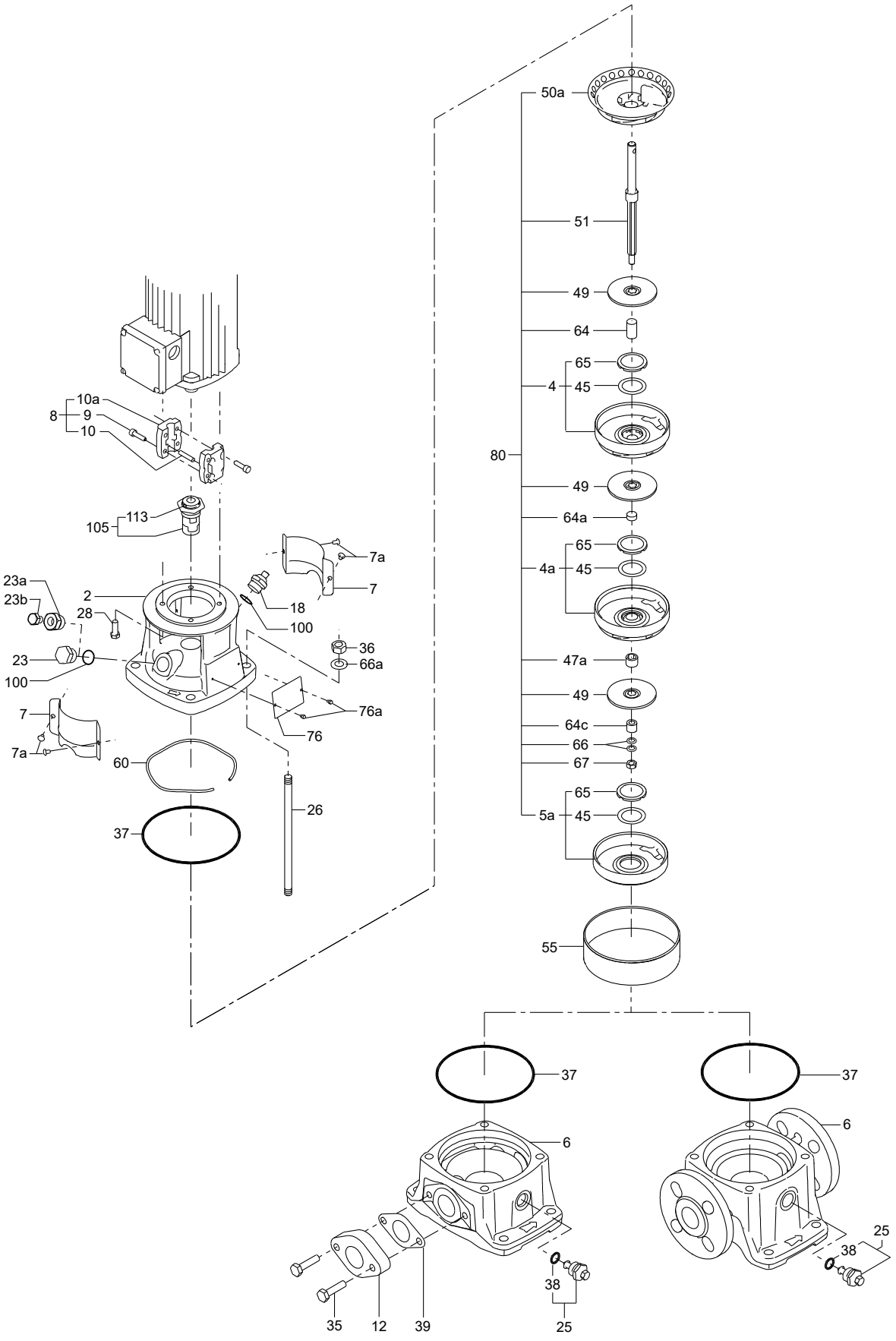
**Related information**

*4.1 CR, CRI, CRN 1, 3*
*4.2 CR, CRI, CRN 5*

## 4. Drawings

### 4.1 CR, CRI, CRN 1, 3

**Exploded view**

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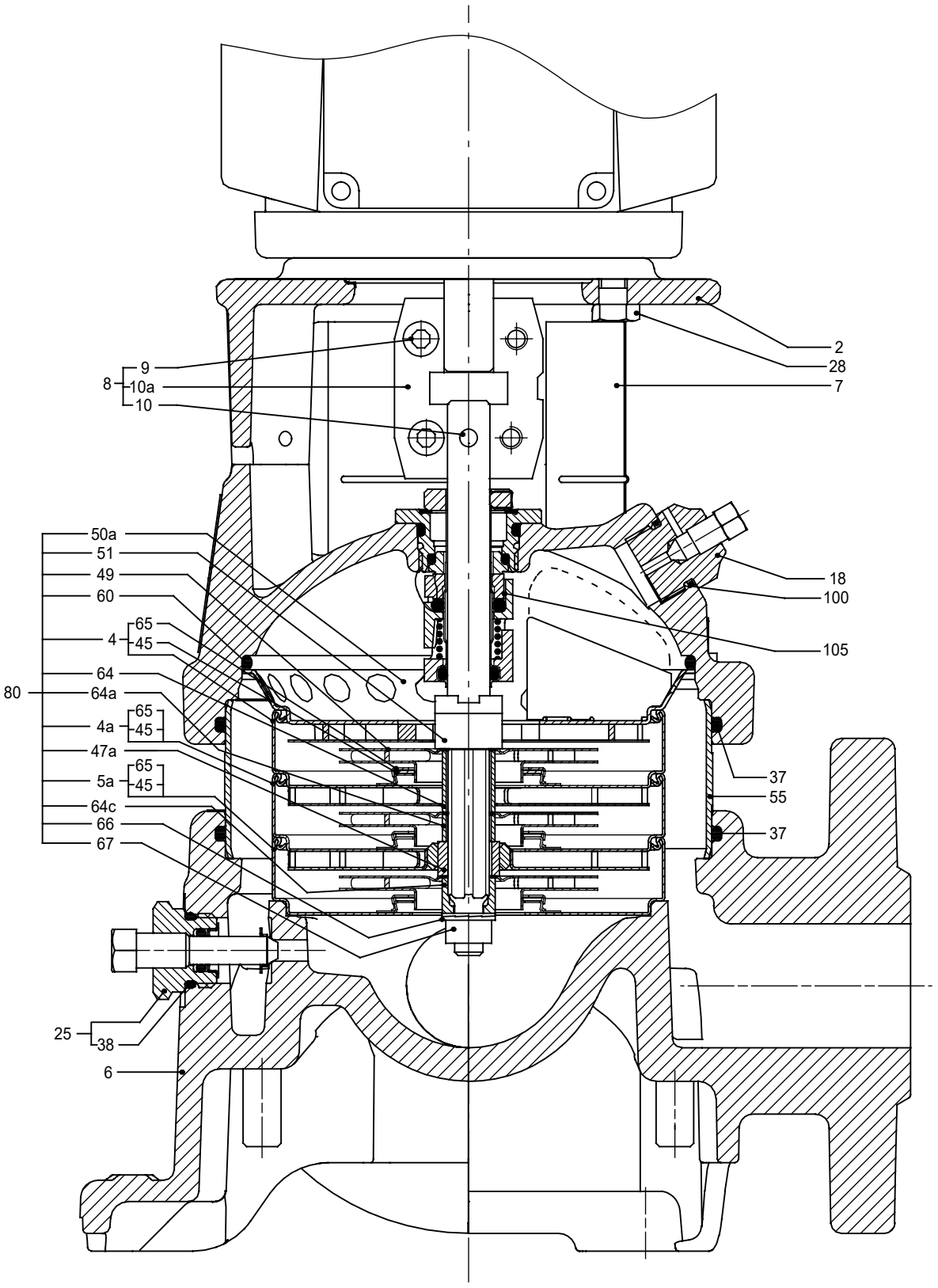
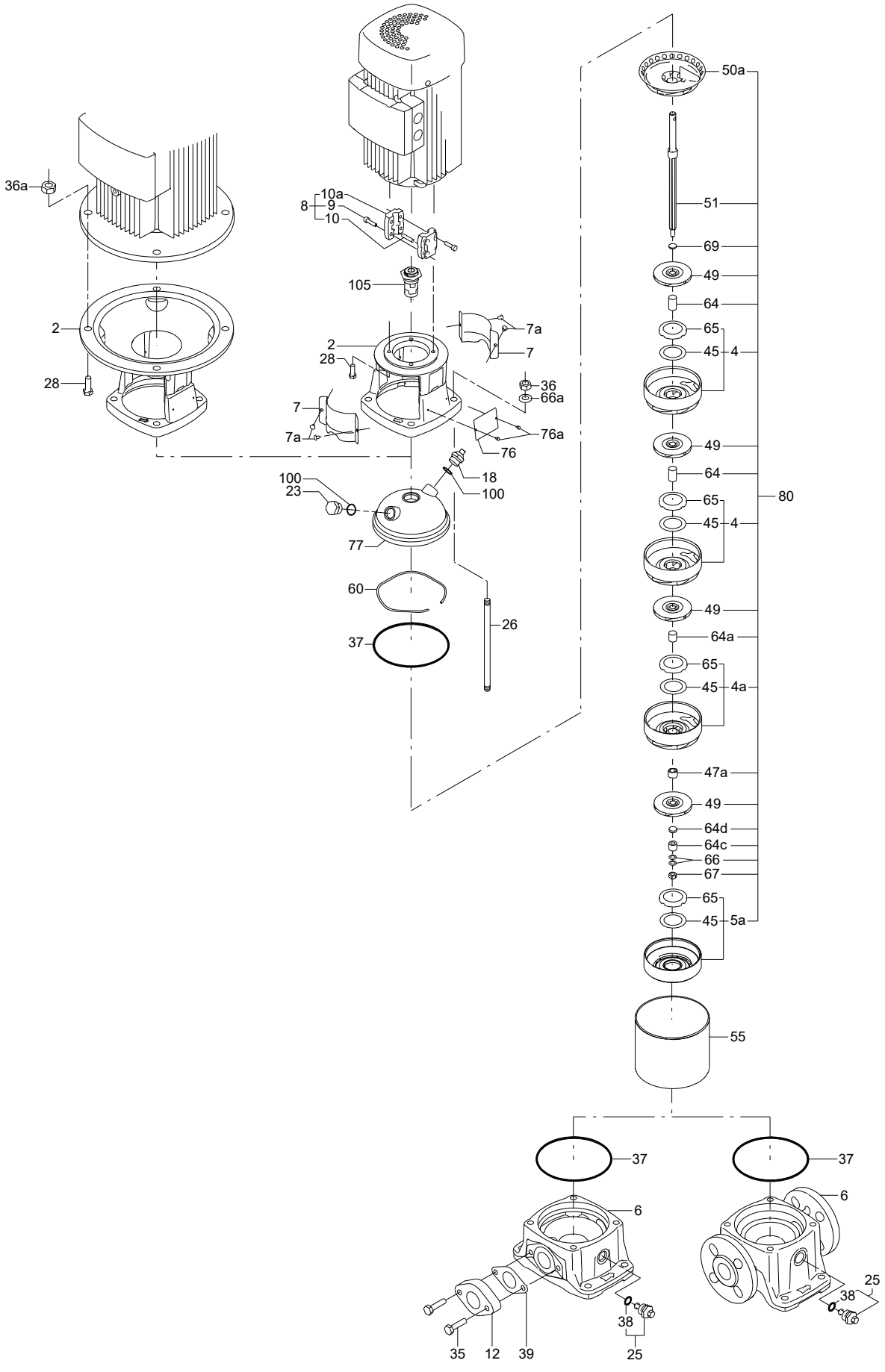
**Sectional drawing**

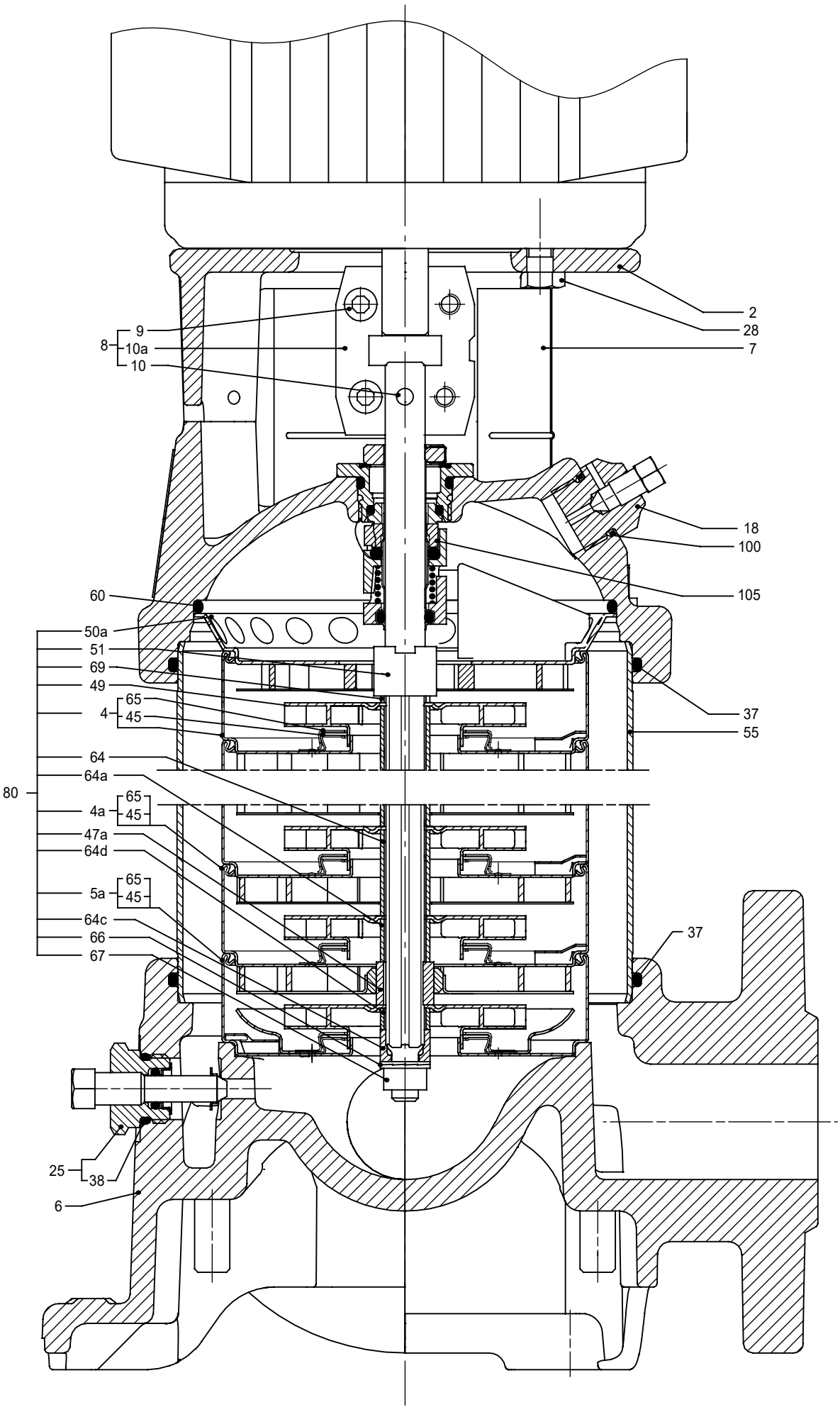


### 4.2 CR, CRI, CRN 5

**Exploded view**



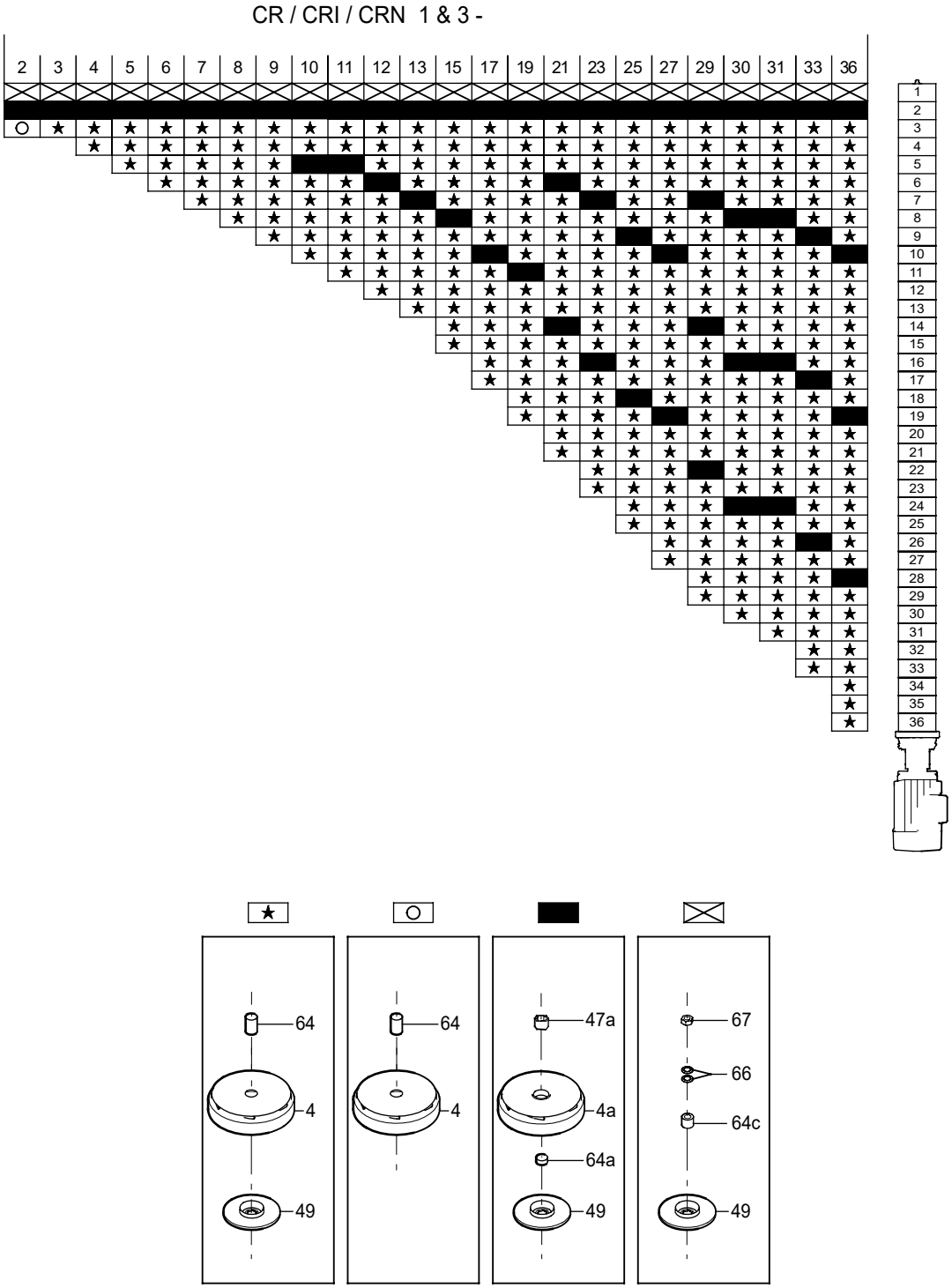
**Sectional drawing**



## 5. Order of assembly for chambers and impellers

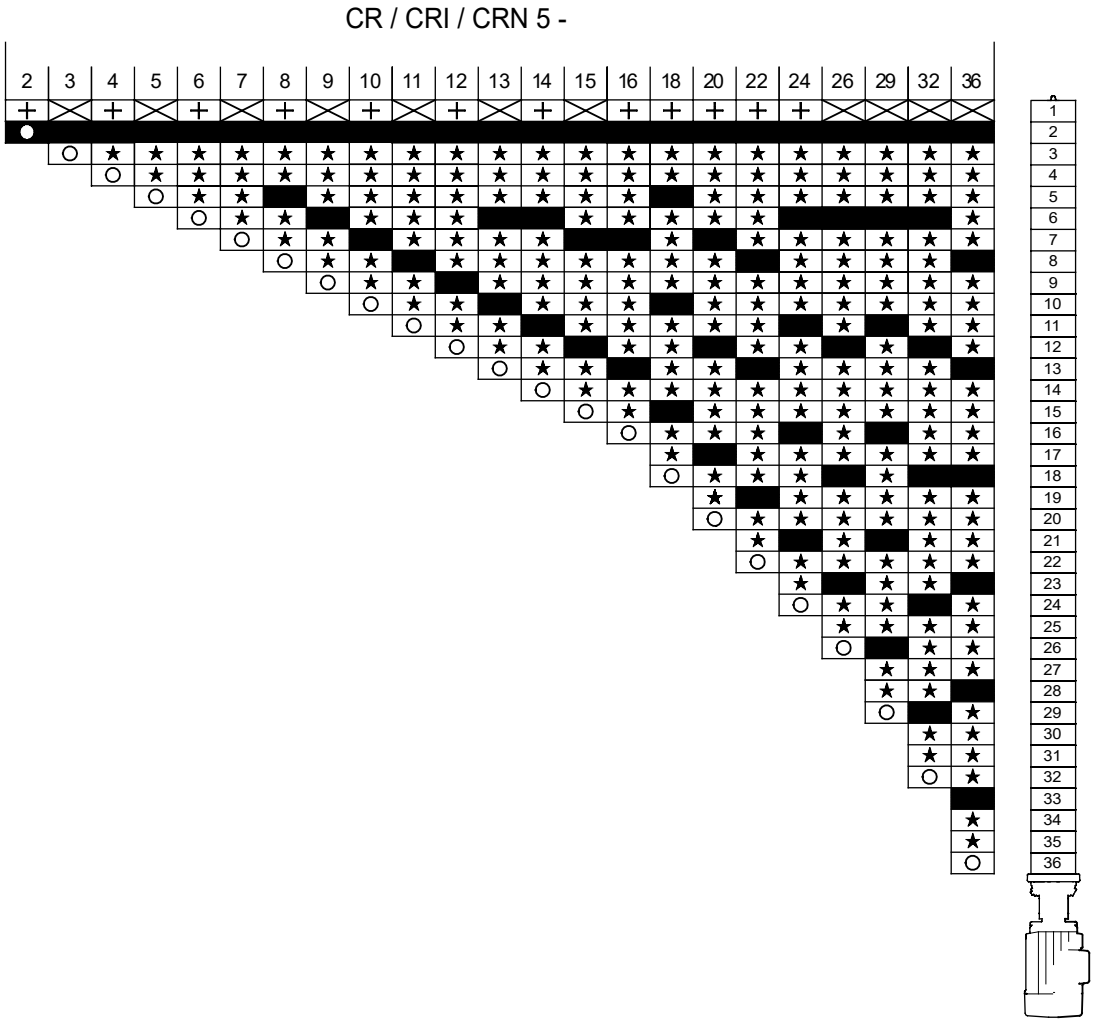
1. Determine the pump type and the stage variant. Find the pump in the relevant stage survey table.
2. Find the components of each stage in the symbol survey.

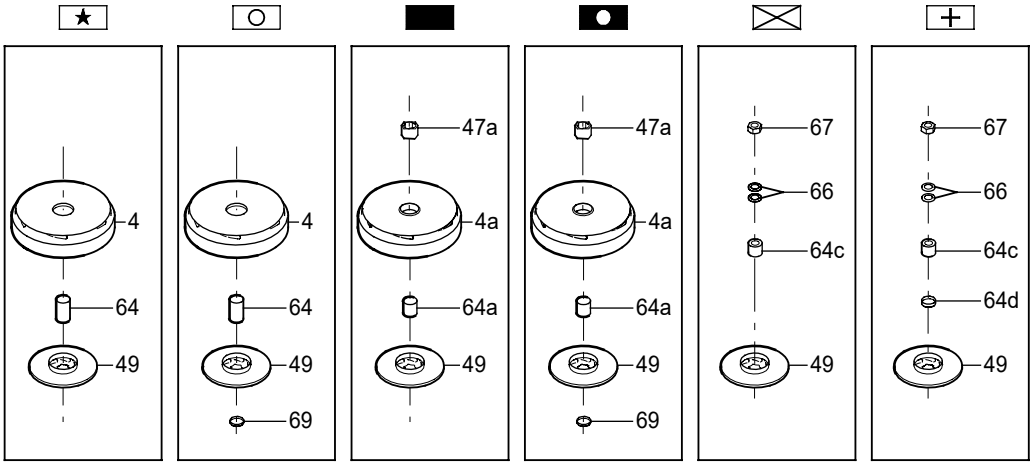
### 5.1 CR, CRI, CRN 1, 3




*Stage survey (top), symbol survey (bottom)*

### 5.2 CR, CRI, CRN 5




TM020444

*Stage survey (top), symbol survey (bottom)*

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