

# SE/SL 12-42 hp

Service instructions



Installation and operating instructions in English and other languages for 50/60 Hz

<http://net.grundfos.com/qr/i/98142268>



Service animation video, YouTube

**Original service instructions**

In this document there are references to the installation and operating instructions for SE, SL 12-42 Hp (9-30 kW) (98142268). The installation and operating instructions are accessible via the QR code and link on the front of this document.

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**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 text accompanying the three hazard symbols DANGER, WARNING and CAUTION is 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



Installation of products in pits must be carried out by specially trained persons.

Work in or near pits must be carried out according to local regulations.

#### DANGER

##### Electric shock



Death or serious personal injury

- It must be possible to lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.



Persons must not enter the installation area when the atmosphere is explosive.

For safety reasons, all work in pits must be supervised by a person outside the pump pit.



We recommend that you carry out all maintenance and service work when the product is placed outside the pit.

Pits for submerged sewage and wastewater pumps may contain sewage or wastewater with toxic and/or disease-causing substances. Therefore, all persons involved must wear appropriate personal protective equipment and clothing, and all work on and near the pump must be carried out under strict observance of hygienic regulations in force.

#### DANGER

##### Crushing hazard



Death or serious personal injury

- Always lift the product by its lifting bracket or by means of a forklift truck if the product is fixed on a pallet. Do not lift the product by the power cable.

## 2. Maintaining the product

Check pumps running normal operation every 3000 operating hours or at least once a year.

If the pumped liquid is very muddy or sandy, check the pump at shorter intervals.

Check the following points:

- **Power consumption**  
See pump nameplate.
- **Motor liquid level and liquid condition**  
When the pump is new or after replacement of the shaft seal, check the motor liquid level and water content after one week of operation.  
The motor liquid must be changed after 3000 operating hours or once a year.  
Use SML3 motor liquid, product number 795898 [5.25 qt (5 l)]. See section [2.3 Changing the motor liquid](#).
- **Pump parts**  
Check the impeller, pump housing, etc. for possible wear. Replace defective parts.  
See section [4. Dismantling and assembling the product](#) for dismantling and assembly of the pump.
- **Ball bearings**  
Check the shaft for noisy or heavy operation by turning the shaft by hand. Replace defective ball bearings.  
See section [4. Dismantling and assembling the product](#).  
In case of defective ball bearings or poor motor function, a complete overhaul of the pump is usually required.  
This work must be carried out by Grundfos or an authorized service centre.



Defective bearings may reduce the Ex safety.



On Ex pumps, the ball bearings may only be replaced by a FM-approved service centre.

- **O-rings and similar parts**

During service or replacement, make sure that the grooves for O-rings and seal faces have been cleaned before the new parts are fitted.



Never reuse used rubber parts.



Explosion-proof products must be checked by a FM-approved service centre once a year.

- **Measuring the insulation resistance**

Meggering must take place at a voltage of minimum 500 V. The insulation resistance measured must be minimum 50 kΩ.

## 2.1 Checking the motor liquid

You can check the ingress level of the media in the motor liquid. By use of a refractometer, the refractive index will show the ingress in percent.

Media ingress in %	Refractive index [°F (°C)]
0	-22.0 (-30)
5	-16.6 (-27)
10	-13.0 (-25)
15	-9.4 (-23)
20	-7.6 (-22)

If the refractive index is higher than -7 °F (-22 °C), change the motor liquid.

We recommend that you do not exceed this level of refractive index to ensure that the shaft seal and bearings are in the best possible condition for reliable operation.

## 2.2 Inspecting the shaft

### Only the SL pumps

You can check the leakage of the shaft seal by checking the upper seal housing chamber (58) for water.

1. Place the pump in a horizontal position on a plane surface with the drain plug (193a) pointing downwards.
2. Place a container under the drain plug (193a).
3. Remove the plug (193a).
4. If you drain less than 0.052 qt (5 cl), then the shaft seal is OK, and the shaft seal does not need to be replaced.
5. If you drain more than 0.052 qt (5 cl), replace the shaft seal. See section [4.3 Dismantling the pump](#).

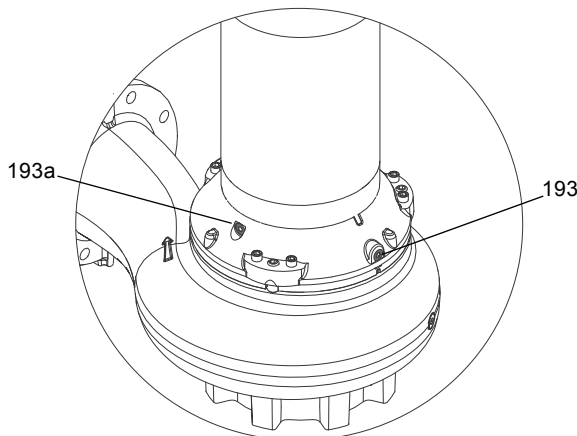


Fig. 1 Oil plugs

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## 2.3 Changing the motor liquid

When the pump is new or after replacement of the shaft seal, check the motor liquid level and water content after one week of operation.

Change the motor liquid after 3000 operating hours or once a year. See description below.

If you replace the shaft seal, change the motor liquid.

### WARNING

#### Pressurised system



Death or serious personal injury

- When loosening the screws of the motor liquid chamber, note that pressure may have built up in the chamber. Do not remove the screws until the pressure has been fully relieved.

### 2.3.1 SL pumps

#### Draining of motor liquid

1. Place a container under the pump which can contain 6.34 qt (6 l) of motor liquid.
2. Place the pump in a horizontal position on a plane surface with plug B pointing downwards. See fig. 2.
3. Remove plug B.
4. Allow all motor liquid to drain from the seal housing into the container. Remove plug A to get a better flow of the motor liquid.

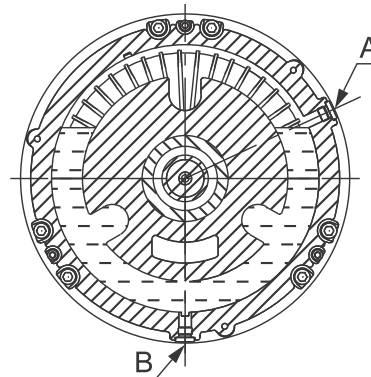


Fig. 2 SL pump, horizontal view

5. Replace the O-ring with a new ring on the plug.
6. Fit plug B and tighten it to the correct torque. See section [7.4 Tightening torques and lubricants](#).



If the motor liquid in the container contains more than 20 % water, the shaft seal may be defective and must be replaced.

If the quantity of motor liquid deviates considerably from the quantity stated in the table below, the shaft seal is defective.

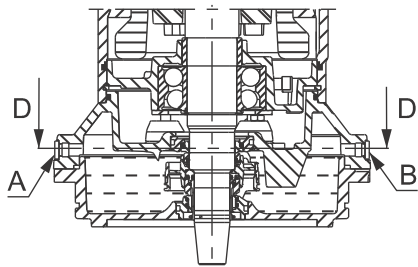


Dispose of used motor liquid (propylene glycol) in accordance with local regulations.

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**Filling with motor liquid, vertical installation**

1. Place the pump in vertical position.
2. Fill the shaft seal housing with motor liquid through hole A until the motor liquid reaches the level indicated by plug B. See fig. 3.
3. Replace the O-ring with a new ring.
4. Insert plugs A and B and tighten them to the correct torque. See section [7.4 Tightening torques and lubricants](#).



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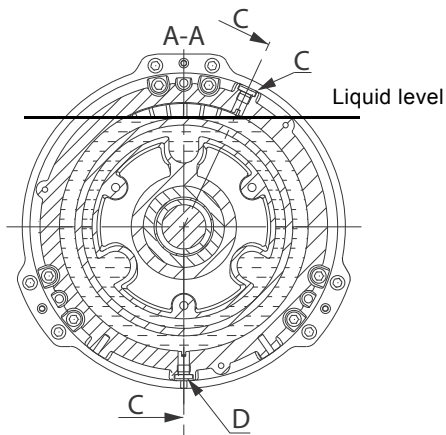
Fig. 3 SL pump, vertical view

**Filling with motor liquid, horizontal installation**

1. Place the pump in horizontal position with plug B mounted and facing downwards. Fill the shaft seal housing with motor liquid through hole A until the motor liquid reaches the level indicated in fig. 2. See also section [7.2 Motor liquid quantities](#).
2. Replace the O-ring with a new O-ring.
3. Insert plug A and tighten it to the correct torque. See section [7.4 Tightening torques and lubricants](#).

**2.3.2 SE pumps****Draining of motor liquid**

1. Place a container under the pump which can contain 15.85 qt (15 l) of motor liquid.
2. Place the pump in horizontal position on a plane surface with plug D pointing downwards. See fig. 4.
3. Remove plug D, and then remove plug C to get a better flow of the motor liquid.
4. Allow all motor liquid to drain from the seal housing into the container.
5. Replace the O-ring with a new ring on the plug.
6. Insert plug D and tighten it to the correct torque. See section [7.4 Tightening torques and lubricants](#).



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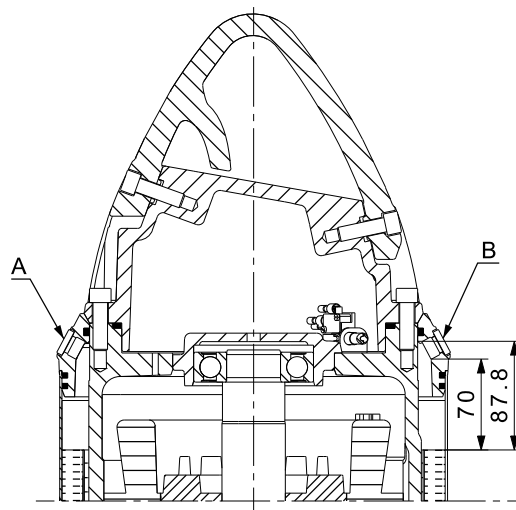
Fig. 4 SE pump, horizontal view

**Filling with motor liquid, vertical installation**

1. Remove plug A and B on both sides. This makes it possible to get the trapped air out while filling. See fig. 5.
2. Fill the shaft seal housing with motor liquid through hole A until the motor liquid reaches the level indicated in fig. 5.
3. Replace the O-rings with new rings, insert the plugs and tighten to the correct torque. See section [7.4 Tightening torques and lubricants](#).

**Filling with motor liquid, horizontal installation**

1. Remove plug C.
2. Fill the shaft seal housing with motor liquid through hole C until the motor liquid reaches the level indicated in fig. 4. See also section [7.2 Motor liquid quantities](#).
3. Replace the O-ring with a new ring.
4. Insert plug C and tighten to the correct torque. See section [7.4 Tightening torques and lubricants](#).



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Fig. 5 SE pump, vertical, top view

## 2.4 Inspecting and adjusting the impeller clearance

### DANGER

#### Electric shock



Death or serious personal injury

- Before inspection, make sure that the motor is switched off and that the main switch is locked in position 0.



Check the impeller clearance every time service is carried out to prevent hot surfaces in the hydraulic parts.

Pressure range	Impeller clearance X [in (mm)]
E = Extra low pressure	$0.028 \pm 0.004$ (0.7 $\pm$ 0.1)
L = Low pressure	$0.028 \pm 0.004$ (0.7 $\pm$ 0.1)
M = Medium pressure	$0.023 \pm 0.004$ (0.6 $\pm$ 0.1)
H = High pressure	$0.023 \pm 0.004$ (0.6 $\pm$ 0.1)
S = Super high pressure	$0.019 \pm 0.004$ (0.5 $\pm$ 0.1)

You can inspect the impeller clearance of installation types S and C directly through the pump inlet.

You can inspect and adjust the installation types D and H with the pump installed on the base stand and connected to the pipes.

### 2.4.1 Adjusting the impeller clearance

1. Loosen the set screws by two full turns each.
2. Close the impeller clearance by lightly tightening the fastening screws diagonally until the impeller touches the pump housing.



Do not use too much force when tightening the fastening screws as this may damage the bearings.

3. Loosen the fastening screws to make the correct gap under the heads of the fastening screws. See fig. 6.



Use the clearance stated in the impeller clearance table above.

4. Tighten the set screws tightly. For more information about torques, see section 7.4 *Tightening torques and lubricants*.
5. Tighten the fastening screws diagonally.

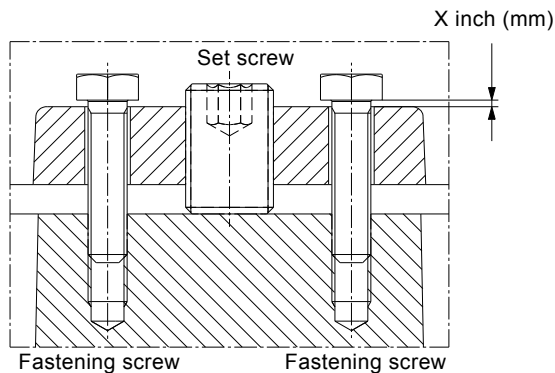


Fig. 6 Impeller clearance adjustment

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## 3. Preparing the dismantling of the product

### 3.1 Transporting the product

You can transport the pump in vertical or horizontal position. Make sure that the pump cannot roll or fall over.

See the installation and operating instructions for SE, SL 12-42 Hp (9-30 kW). Use the QR code and link on the front page of this document.

### 3.2 Handling and storing the product

#### 3.2.1 Contaminated products

### CAUTION

#### Biological hazard



Minor or moderate personal injury

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

#### 3.2.2 Lifting the product



Make sure that all lifting equipment is rated for the purpose.

Check the lifting equipment for damage before attempting to lift the product.

### DANGER

#### Crushing hazard



Death or serious personal injury

- Make sure that the shackles are tightened before attempting to lift the product. Tighten if necessary.

### DANGER

#### Crushing hazard



Death or serious personal injury

- Always lift the product by its lifting bracket or by means of a forklift truck if the product is fixed on a pallet.

Do not lift the product by the power cable.



It may result in electric short circuit and risk of chock when the product is connected to the mains. The cable and cable entry may be damaged, leading to loss of watertightness and consequent severe damage to the motor.

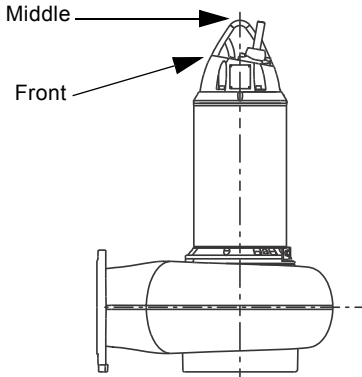
The product weighs between 639 and 1521 lb (290 and 690 kg) without accessories. It is therefore very important to use the correct lifting equipment. The product weight is stated on the pump nameplate.

**Installation types S, C and D**



Always handle the pump by means of the correct lifting points.

When lifting the pump, use the right lifting points to keep the pump balanced. SE, SL pumps installation types S, C and D are equipped with two lifting point which ensure that the pump can be lifted in a safe manner. See fig. 7 and the table below to find the correct lifting point.



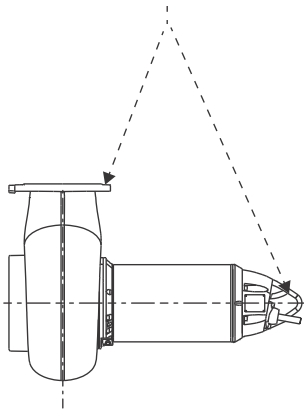
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**Fig. 7** Lifting points, installation types S, C and D

Outlet flange size	lifting point
NPS 3" (DN 80)	Middle
NPS 4" (DN 100)	
NPS 6" (DN 150)	
NPS 8" (DN 200)	Front
NPS 10" (DN 250)	
NPS 12" (DN 300)	

**Installation type H**

Installation type H can be lifted by a hole in the flange and the front lifting point. See fig. 8.

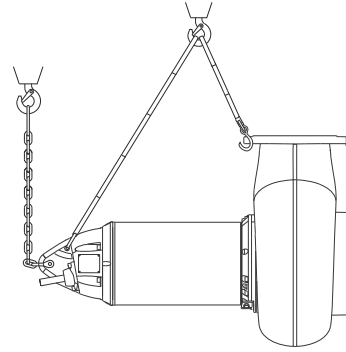


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**Fig. 8** Lifting points, installation type H

**3.2.3 Raising the pump to upright position**

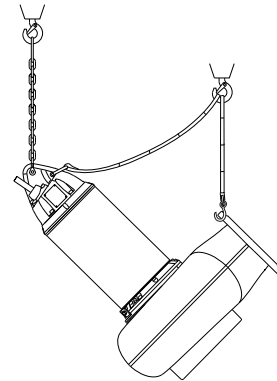
1. Fasten the lifting equipment as shown in the figure below.



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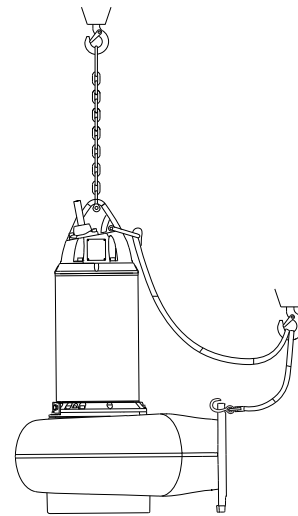
**Fig. 9** Lifting the pump

2. Lift at the top end of the pump as shown in the figure below.



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**Fig. 10** Lifting the pump



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**Fig. 11** Pump correctly raised to upright position

**3.2.4 Storing the product**

See the installation and operating instructions for SE, SL 12-42 Hp (9-30 kW). Use the QR code and link on the front page of this document.

## 4. Dismantling and assembling the product

### DANGER

#### Electric shock



Death or serious personal injury

- Before starting work on the product, make sure that the fuses have been removed or the main switch has been switched off. Make sure that the power supply cannot be accidentally switched on.

### WARNING

#### Crushing of hands



Death or serious personal injury

- Make sure that all rotating parts have stopped moving.

### WARNING

#### Crushing hazard



Death or serious personal injury

- At all times during service, make sure to secure the product against rolling over, for instance by placing a wooden wedge on either side of the motor.



Except for replacement or dismantling of pump housing, shaft seal, impeller, seal ring and wear ring, all other service work must be carried out by Grundfos or a FM-approved service centre.



Service must be carried out by specially trained persons.

Before starting any work on the product used in liquids, which could constitute a hazard to health, thorough cleaning or venting of the product, pit, etc. must be carried out according to local regulations.

### 4.1 Explosion-proof products



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

Only FM-approved service centres are allowed to intervene in the flameproof enclosure of the product. Service not affecting the explosion protection of the product and not violating the explosion-proof regulations may be carried out by service persons who are not FM-authorized.

Consequently, these persons are allowed to replace the following parts of explosion-proof products:

- pump housing
- impeller
- seal ring and wear ring
- shaft seal
- motor liquid

All other service work must be carried out by a FM-approved service centre. Violation of this requirement will invalidate the explosion-proof classification of the product.

## 4.2 General information



Position numbers of parts (numbers in brackets) refer to section [7.8 Exploded drawings](#).

Position numbers of tools (letters in brackets) refer to section [7.3 Special tools](#).

### Before dismantling the pump

- Switch off the power supply.
- Close the isolating valves, if fitted, to avoid draining the pipe system.
- Disconnect 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.

### Before assembling the pump

- Clean and check all parts.
- Use the drawing and follow the alignment grooves in order to place the components correctly. See [fig. 43](#).
- Replace defective parts by new parts.
- Order the necessary service kits.
- Always replace gaskets and O-rings.

### During assembling the pump

- Lubricate and tighten screws and nuts according to section [7.4 Tightening torques and lubricants](#).
- Use the drawing and follow the alignment grooves in order to place the components correctly. See section [7.13 Alignment grooves43](#).

## 4.3 Dismantling the pump



Position numbers of parts (numbers in brackets) refer to section [7.8 Exploded drawings](#).

Position numbers of tools (letters in brackets) refer to section [7.3 Special tools](#).



Except for replacement or dismantling of pump housing, shaft seal, impeller, seal ring and wear ring, all other service work must be carried out by Grundfos or a FM-approved service centre.



### 4.3.1 Removing the cable



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the screw (181a) in the cable entry (168).
2. Slightly lift the cable entry (168).
3. Using a screwdriver, disconnect both the signal wires and the power wires from the terminal block (176a). See fig. 12.



Remember to mark the position of the wires carefully.

4. Remove the O-ring (157d).



Do not loosen the lower cable entry (168a) as this will impair the water tightness.

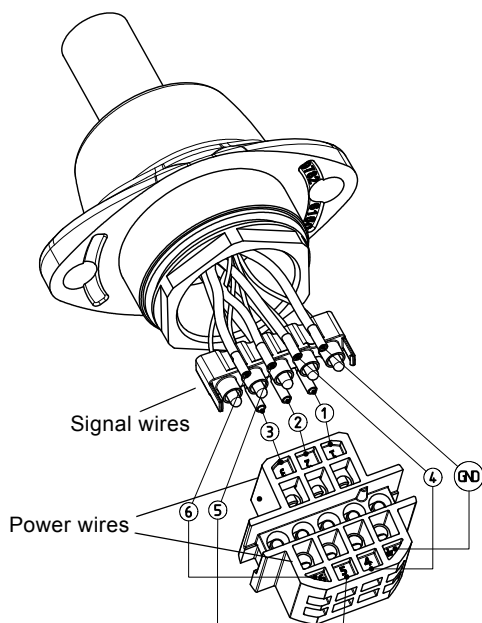


Fig. 12 Illustration of cable wires

5. Place the service tool for cable entry (D) in a vice.
6. Mount the cable entry (168) in the service tool for cable entry (D).
7. Disconnect the signal wires from the moxex plug using the moxex tool (A). Remember to mark the position of the wires carefully. See fig. 12.
8. Unscrew the lower cable entry (168a).
9. Push the cable (181) together with the rubber seal (198) out of the plug.
10. Remove the rubber seal (198), washers (198a and 198b) and disc spring (198c) from the cable. See fig. 13.
11. Pull and remove the cable (181) from the cable entry.

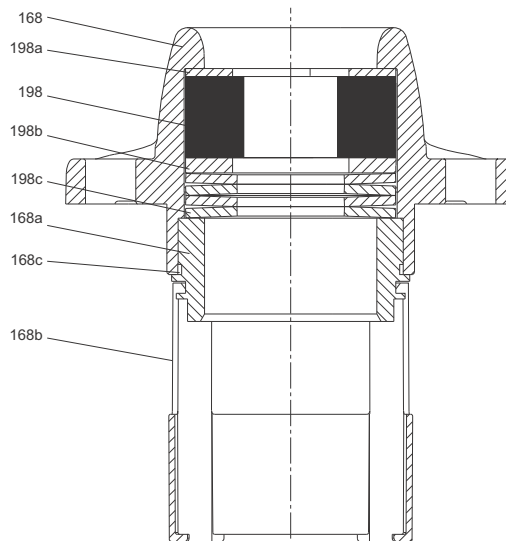


Fig. 13 Sectional drawing, cable entry

### 4.3.2 Draining of motor liquid

See section 2.3 [Changing the motor liquid](#).

### 4.3.3 Removing the motor top cover



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the cable. See section 4.3.1 [Removing the cable](#).
2. Drain the motor liquid. See section 2.3 [Changing the motor liquid](#).
3. Remove the moisture absorbing bag from the cables.
4. Remove the six screws (178) including washers.
5. Remove the motor top cover (164a).
6. Remove the O-ring (157).
7. Remove the pressure test plug (25).

### 4.3.4 Removing the upper bearing bracket



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove screws (183).
2. Use 3 x M10 x 80 screws to lift up the bracket in a balanced way, using the 0.433 in (11 mm) holes. See fig. 14.
3. Remove the upper bearing bracket (61).

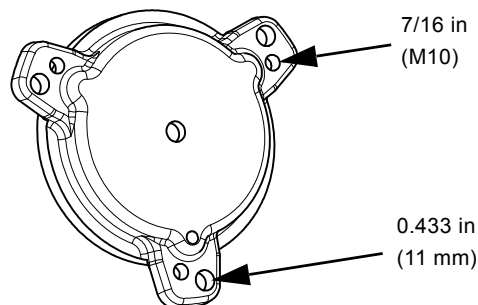


Fig. 14 Upper bearing bracket

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TM05 4343 2212

TM05 5624 3912

#### 4.3.5 Removing SM 113 and the moisture switch



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the screw and washer of the moisture switch (520).
2. Disconnect the moisture switch wires.
3. Disconnect all wires from SM 113. Remember to mark all wires carefully.
4. Loosen and remove the screws and washers for the bracket of SM 113, and remove the SM 113 and the bracket.

#### 4.3.6 Removing the cooling jacket ring (only SE pump)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the cooling jacket ring (754) by means of crowbars or by using the lifting points (if available). See fig. 15.
2. Remove O-rings (157c and 157b).
3. Remove outer cooling jacket (150c).
4. Remove O-rings (37a).

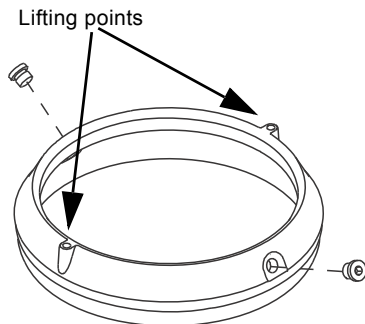


Fig. 15 Lifting points in cooling jacket ring

#### 4.3.7 Removing inner cooling jacket (only SE pump)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. See section [4.3.6 Removing the cooling jacket ring \(only SE pump\)](#)
2. Remove screws (150d).
3. Remove inner cooling jacket (150b).

#### 4.3.8 Removing the impeller and pump housing

1. Remove the outer screws (26).
2. Lift the pump including the impeller (49) out of the pump housing (50).
3. Remove the O-ring (37b).
4. Place the motor with impeller in horizontal position on a stable surface.
5. Bend down the tabs on the lock washer (66) and loosen the impeller screw (67).
6. Remove the impeller screw (67) and the washer (66).
7. Pull off the impeller (49) using a puller. Support the impeller with a hoist.



Protect the cone of the impeller shaft against scratches by taping in the cone or protecting it by other means.

#### 4.3.9 Removing the wear ring

1. Remove the screws (49b).
2. Push out the wear ring (49c) from the pump housing (50).

#### 4.3.10 Removing the lower seal housing



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Mount the shaft seal protection tool (C).

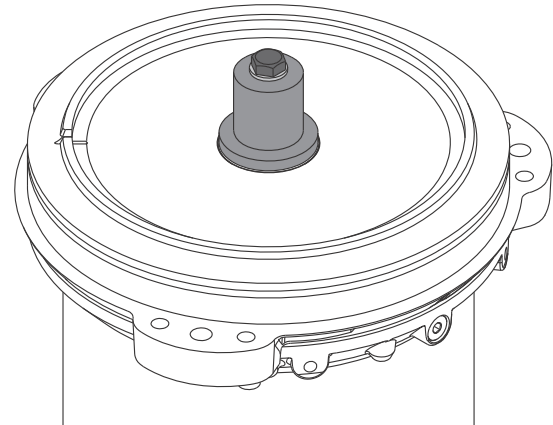


Fig. 16 Shaft seal protection tool

2. Remove screws (184b).
3. Gently remove the lower seal housing. You may use crowbars and a soft hammer.

#### 4.3.11 Removing the intermediate seal housing (only SE)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the three screws (185).
2. Dismantle the intermediate seal housing (58). You may have to use a soft hammer very gently.
3. Remove the O-rings (37b and 107).

#### 4.3.12 Removing the shaft seal cartridge



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Loosen and remove the shaft seal protection tool (C).
2. Remove the shaft seal spring (105a).
3. Withdraw the shaft seal cartridge (105) from the shaft using a puller.

#### 4.3.13 Removing the upper seal housing (only SL)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the screws (182b) including O-rings (182d) and washers (182c).
2. Remove the upper seal housing (58). Use a soft hammer very gently.
3. Remove the O-ring (72a).

#### 4.3.14 Removing the upper seal housing cover (only SE)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the screw (182b) including O-rings (182d) and washers (182c).
2. Remove the O-ring (72a).
3. Gently remove the upper seal housing (58a). Use crowbars and a soft hammer.

#### 4.3.15 Removing the shaft with rotor



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Remove the circlip (55a) using the locking-ring pliers (A).
2. Insert an eyebolt into the shaft end.
3. Lift the rotor and lower bearing housing slightly away from the stator housing (55) using the hoist.
4. Disconnect the plugs from the moisture switch and lower the bearing sensor, if fitted.
5. Lift the rotor away.

#### 4.3.16 Removing the bearings



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Place the rotor in a vice with soft jaws.
2. Remove the screw and washer of the leakage switch (521).
3. Remove the leakage switch (521).
4. Remove the circlip (187) and the washer (187a).
5. Remove the three screws (182) and the bearing bracket cover (59).

6. Remove the cable if the leakage switch (521) is fitted.
7. Pull off the lower bearing bracket (155) and the ball bearing (153) with a puller.
8. Knock out the bearing (153) of the lower bearing bracket (155) using a hammer and punch.
9. Remove the upper ball bearing (154) with a puller.
10. Remove the O-ring (72).

#### 4.4 Assembling the pump



Position numbers of parts (numbers in brackets) refer to section [7.8 Exploded drawings](#).

Position numbers of tools (letters in brackets) refer to section [7.3 Special tools](#).

##### 4.4.1 Fitting the bearings



Except for replacement or dismantling of pump housing, shaft seal, impeller, seal ring and wear ring, all other service work must be carried out by Grundfos or a FM-approved service centre.



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Heat the new upper bearing (154) to 248 °F (120 °C), and fit it on the rotor (172).
2. Place the new lower bearing (153) in the lower bearing bracket (155), and press it home by pressing on the outer bearing ring.
3. Place the lower bearing bracket with the new lower bearing on the rotor, and press the bearing home by pressing on the inner bearing ring.

##### 4.4.2 Fitting the leakage switch (if fitted)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Pull the cable of the leakage switch through the hole in the lower bearing bracket (155).
2. Fit the leakage switch (521) by means of its screws and washers.
3. Place the bearing bracket cover (59) and fit the screws (182) and tighten to 29.5 lbf-ft ± 1.5 (40 Nm ± 2).
4. Fit the washer (187a) and circlip (187) using locking-ring pliers.
5. Check that the bearings can rotate freely.

#### 4.4.3 Fitting the shaft with bearings and rotor



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Lubricate the O-ring (72) with Rocol Sapphire Aqua-Sil and fit it into the stator housing (55).
2. Turn the lower bearing bracket (155) so that the groove in its circumference is opposite the cable plug of the stator housing.
3. Lower the rotor (172) with lower bearing bracket (155) down to the stator housing (55) with only a small gap left.
4. Fit the cable plugs to the correct sensors.
5. Lower the rotor into place.
6. Fit the circlip (55a) using locking-ring pliers (A).

#### 4.4.4 Fitting the upper bearing bracket



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Place the upper bearing bracket (61) on the upper bearing.
2. Fit the 3 screws (183) very carefully and balanced, tighten the screws in such a way that the cover is pressed down over the bearing.
3. Tighten the screws (183) to 29.5 lbf-ft  $\pm$  1.5 (40 Nm  $\pm$  2).
4. Make sure the rotor can rotate freely.

#### 4.4.5 Fitting the upper seal housing cover (only SE)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Lubricate the O-ring (72a) with Rocol Sapphire Aqua-Sil, and fit the upper seal housing (58a) into place.
2. Fit the screws (182b) with washer (182c) and O-rings (182d).
3. Lubricate the O-rings with Rocol Sapphire Aqua-Sil.
4. Tighten the screws (182b) to 51.6 lbf-ft  $\pm$  3.0 (70 Nm  $\pm$  4).

#### 4.4.6 Fitting the upper seal housing (only SL)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Lubricate the O-ring (107 and 72a) with Rocol Sapphire Aqua-Sil and fit them on the upper seal housing.
2. Fit the screws (182b) with the washers (182c) and O-rings (182d).
3. Lubricate the O-rings with Rocol Sapphire Aqua-Sil.
4. Tighten the screws (182b) to 51.6 lbf-ft  $\pm$  3.0 (70 Nm  $\pm$  4).

#### 4.4.7 Fitting the shaft seal

1. Make sure the O-rings are fitted on the shaft seal housing. If the seal is to be fitted on an SE pump, remember to fit an O-ring (106).
2. Lubricate the O-rings with Rocol Sapphire Aqua-Sil.
3. Spray soap water on the shaft.
4. Push the seal on to the shaft, and make sure that the marks are placed correctly.

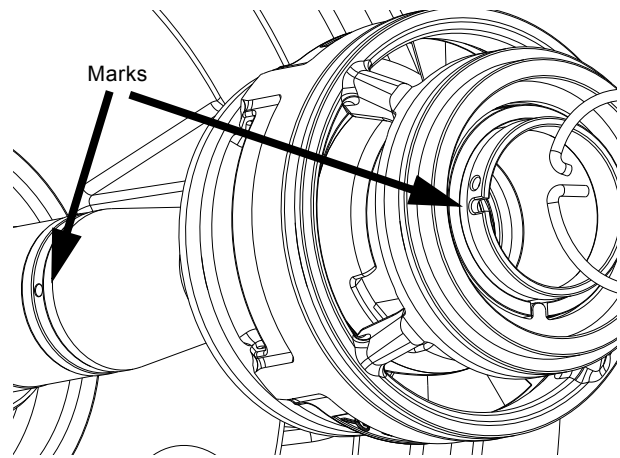


Fig. 17 Shaft seal assembly, marks

5. Press the shaft seal in place.



Protect the cone of the impeller shaft against scratches by taping in the cone or protecting it by other means.

6. Mount the locking ring in place by using the shaft seal tool (C).

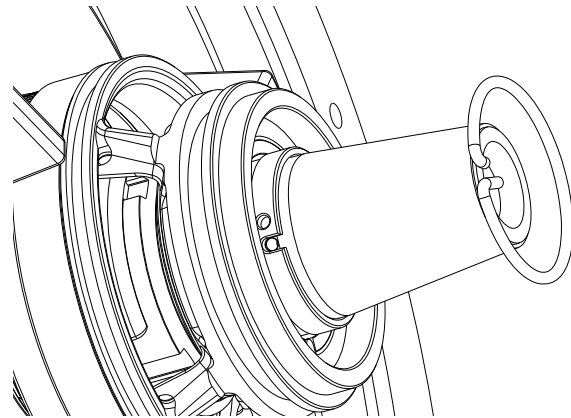


Fig. 18 Shaft seal assembly, locking ring

#### 4.4.8 Fitting the intermediate seal housing (only SE)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Mount the shaft seal protection tool (C).
2. Lubricate the O-rings (37b and 107) with Rocol Sapphire Aqua-Sil, and fit them on the intermediate seal housing. See section 7.8 Exploded drawings fig. 30 or fig. 32.
3. Fit the seal housing (58) and screws (185).
4. Tighten the screws (185) to 51.6 lbf-ft  $\pm$  3.0 (70 Nm  $\pm$  4).

#### 4.4.9 Fitting the lower seal housing



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Mount the shaft seal protection tool (C) if not fitted already.
2. Fit the lower seal housing (77) on the upper seal housing (58).
3. Fit the screws (184b) and tighten to 14.7 lbf-ft  $\pm$  1.5 (20 Nm  $\pm$  2).
4. Loosen and remove the shaft seal protection tool (C).

#### 4.4.10 Fitting the wear ring

1. Fit the wear ring (49c) to the pump housing (50).
2. Fit the screws (49b).

#### 4.4.11 Fitting the impeller

1. Fit an eyebolt in the shaft.
2. Lift the stator housing by the eyebolt by means of a crane.
3. Lay the stator housing on the side on a table or on a stable surface.
4. Clean the taper of the shaft and the impeller (49).
5. Fit the impeller.
6. Lubricate the screw head (67) and thread with Castrol Optimol Paste White T.
7. Fit the washer (66) and screw (67) and tighten to 125.4 lbf-ft  $\pm$  5.9 (170 Nm  $\pm$  4). Hold the impeller with a strap wrench.

#### 4.4.12 Fitting pump housing

1. Lift the motor by means of a crane.
2. Lubricate the O-ring (37b) with Rocol Sapphire Aqua-Sil, and fit it on the lower seal housing (77).
3. Carefully lower the pump into the pump housing (50).
4. Fit the screws (26) and the adjustments screws (12c).
5. Now make an adjustment of the impeller clearance. See section [2.4 Inspecting and adjusting the impeller clearance](#).
6. Check that the impeller can rotate freely.
7. After impeller adjustments place the pump in vertical position on a stable surface.

#### 4.4.13 Fitting the inner and outer cooling jackets (only SE)



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Fit the inner cooling jacket (150b).
2. Fit the screws (150d).
3. Lubricate and fit the O-rings (37a).
4. Fit the outer cooling jacket (150c).

#### 4.4.14 Fitting the cooling jacket ring (only SE)

5. Lubricate the O-rings (157c and 157b) with Rocol Sapphire Aqua-Sil and fit them on the cooling jacket ring (754).
6. Fit the cooling jacket ring (754).
7. Fit the screws (178) and tighten to torque 51.6 lbf-ft  $\pm$  3.0 (70 Nm  $\pm$  4).

#### 4.4.15 Fitting the motor top cover



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Fit the pressure test plug (25).  
**Note:** In explosion-proof models the plug must be locked with the screw (25a) and washer (25b).
2. Fit the O-ring (157).
3. Fit the moisture absorbing bag, 1 x zeolite [0.1 lb (50 g)] product number 96698050, to the cables coming from stator.



The pump must be closed within one hour after the new moisture absorbing bag has been exposed to atmospheric humidity.

4. Fit the motor top cover (164a).
5. Fit the six screws (178).

#### 4.4.16 Fitting the cable



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

1. Place the service tool for cable entry (D) in a vice.
2. Mount the cable entry (168) in the service tool for cable entry (D).
3. Push the cable through the cable entry.
4. Mount the washer (198b), rubber seal (198) and disc spring (198c) on the cable.

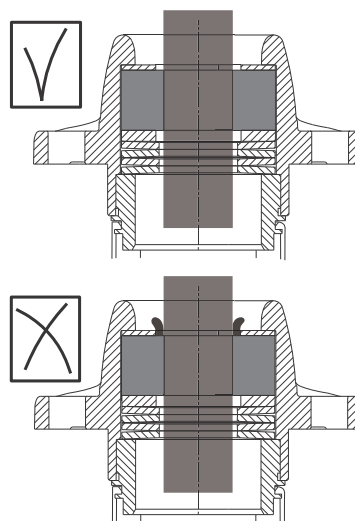


Fig. 19 Cable entry, rubber seal mounting

TM06 7518 0817

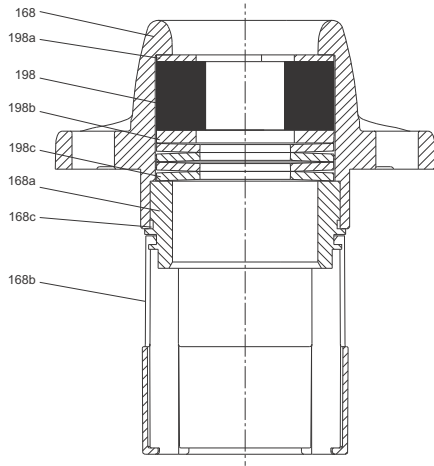


The inner diameter of the washer (198b) needs to fit with the outer diameter of the cable to avoid deformation of the rubber seal (198). See fig. 19.



Lubricate the rubber seal well with Rocol Sapphire Aqua-Sil.

5. Push cable into the cable entry.
6. Mount and tighten the lower cable entry (168a) to the bottom of the contact surface, and the tension on the disc spring are optimal.



**Fig. 20** Sectional drawing, cable entry

7. Connect the sensor wires to the sensor molex plug.
8. Lift out the terminal block from the top cover.
9. Connect the power wires to the terminal block using a screwdriver.
10. Push the sensor molex plug into the terminal block.



In order to connect the wires correctly, follow the marks made during dismantling.

11. Fit the cable entry on the motor cover, and fit the screws (181a).
12. Tighten the screws (181a) to 51.6 lbf-ft ± 3.0 (70 Nm ± 4).

## 5. Electrical connection

### 5.1 Motor protection

#### Galvanic separation

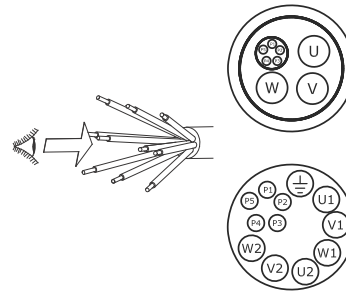
Double-insulated sensors for all measurements of high voltages ensure the electrical safety. Furthermore, there is a galvanic separation inside IO 113.

#### 5.1.1 Switches and sensors

All SE and SL pumps have thermal protection incorporated in the stator windings.

The pump may include the following switches and sensors:

- 3 thermal switches in the stator windings
- moisture switch in the top cover
- leakage switch in the chamber above the shaft seal or in the lower stator housing for explosion-proof versions
- Pt1000 in the stator winding (analog)
- Pt1000 in the top bearing (analog)
- Pt1000 in the main bearing (analog).



**Fig. 21** Cables seen towards the pump

The protection devices (that is the three thermal switches, one moisture switch and one leakage switch) are hard wired out of the pump via the conductors P1, P2 and P3. All other sensors are connected to SM 113 and the values are transferred to IO 113 via serial communication. See fig. 29. The table below shows the sensor versions for pump versions.

TM05 7898 0817

TM05 4254 2112

	Standard	Sensor version 1	Sensor version 2	Standard Ex.	Sensor version 1 Ex.	Sensor version 2 Ex.
Thermal switches (Klixon/PTC)	•	•	•	•	•	•
Moisture sensor, top	•	•	•	•	•	•
Leakage switch	•	•	•			
Leakage switch, stator housing				•	•	•
Pt1000 in stator winding		•	•		•	•
Pt1000 in upper bearing			•			•
Pt1000 in lower bearing			•			•
PVS3 vibration sensor			•			•
SM 113			•			•
IO 113			•			•

IO 113 is available with and without communication. IO 113 with communication is used when the number of sensors in the pump require installation of the sensor board (SM 113).

### 5.1.2 Thermal switches

The thermal protection against overheating is made with thermistors and with PTC as optional. The three thermal switches that are hard wired from the pump to the IO 113 unit will open if the stator windings become too hot. The thermal switches are of the reversible type and will close again when the motor has cooled down.

This generates both a hardware and software alarm in IO 113, and the alarm relay will open.

### 5.1.3 PT1000 (stator winding temperature)

It is an analog measurement from 32-356 °F (0-180 °C).

The value from sensor version 1 or Ex. 1 is measured by external SM 113 (in the control cabinet).

The value from sensor version 2 or Ex. 2 is measured by internal SM 113 (inside the pump) and transferred to IO 113 through serial communication.

### 5.1.4 PT1000 (bearing temperature)

It is an analog measurement from 32-356 °F (0-180 °C). The value is measured by SM 113 and transferred to IO 113 through serial communication.

## 5.1.5 Moisture and leakage switches

There are two switches placed in an explosion-proof pump, one in the top cover and one in the stator housing. See fig. 42, sections C-C and D-D.

There are also two switches in a non-explosion proof pump: a moisture switch which is placed in the top cover and a leakage switch which is placed in chamber above the shaft seal. See fig. 42, sections C-C and E-E.

The switches are hard wired from the pump to IO 113. The switches will open if moisture or leakage is detected and thus break an electrical circuit. This will generate both a hardware and a software alarm in IO 113, and the alarm relay will open.

Do not touch the expansion part, that is the cardboard discs, of the moisture switch with moist or oily hands.

The moisture and leakage switches must be stored in an air-tight packaging in order to protect the expansion part against moisture. The relay is factory-set to 0.196 in (5 mm) and requires no further setting.



We do not recommend that you exchange a moisture switch with a leakage switch as it may damage the pump.

### Installation of the leakage switch



Maintenance and service work on explosion-proof products must be carried out by Grundfos or a service workshop authorized by Grundfos.

During the installation of the leakage switch (521) on explosion-proof products an additional safety precautions must be taken.

The reason for this is to avoid the safety distance between the leakage switch and lower winding heads to be compromised.

Tests has proved that it is possible to reduce the distance by pulling the wires from the switch during installation. The reason for the sensor protector (521c) is to ensure that there is no risk of arching or spark if the minimum safety distance between the leakage switch and lower winding (48) head is compromised. See fig. 22.

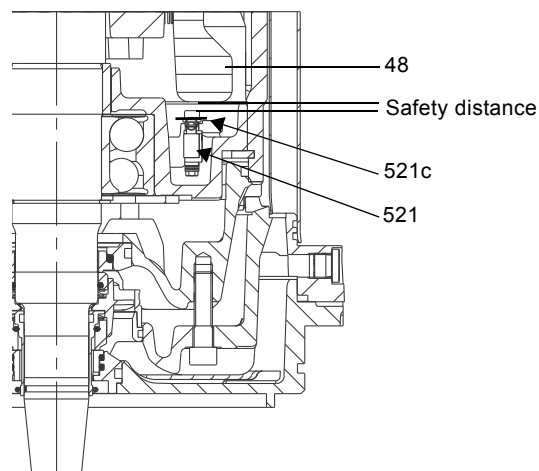


Fig. 22 Safety distance for leakage switch

### 5.1.6 PVS3

The PVS3 sensor is intended for use in medium- and large-sized Grundfos wastewater products.

The sensor monitors the vibration level of the pump in order to protect the pump and the pipe system from damage. Any change in the vibration level is an indication of an abnormal situation. The reason for this can be a clogged impeller, worn bearings, closed outlet valve, etc. indicating that a service inspection must be carried out before the pump or the pipe system is damaged.

The sensor is a 2-wire 4-20 mA transmitter consisting of the following main sections:

- 3-axes, 2g linear accelerometer with digital interface
- 8-bit micro controller
- output current generator.

The micro controller reads the digital output of the accelerometer at 640 Hz sampling rate per axis, and processes the 3-axes acceleration data into an analogue 4-20 mA output proportional to the RMS value of the total velocity.

The PVS3 sensor is designed for mounting in the junction box of the pump motor and must be firmly mounted on the pump structure with a tight connection on an even surface.

Output	Signal type
< 3.5 mA	Failure
4-20 mA	0-20 mm/s RMS
> 20 mA	Alarm

#### Technical data

Measuring frequency:	2-160 Hz
Supply voltage:	12-28 VDC, PELV
Breakdown voltage:	± 30 VDC
Ambient temperature:	32-158 °F (0-70 °C)

#### Electrical connection

A 2-wire screened cable is permanently connected to the sensor:

Brown wire:	Positive supply
White wire:	Negative supply
Screen:	To be connected to ground.

### 5.1.7 IO 113

IO 113 provides the interface between the pump equipped with sensors and the pump controller(s). The most important sensor status information is indicated on the front panel.

Only one pump can be connected to one IO 113.

Together with the sensors, IO 113 provides a galvanic isolation between the motor voltage in the pump and the connected controller(s).

IO 113 can do the following as standard:

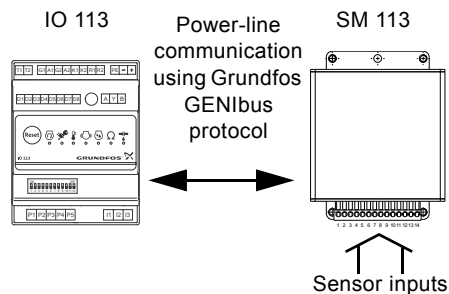
- Protect the pump against overheating.
- Monitor the status of these items:
  - motor winding temperature
  - leakage
  - moisture in pump.
- Measure the stator insulation resistance.
- Stop the pump in case of alarm.
- Remotely monitor the pump via RS-485 communication (Modbus or GENIbus).
- Control pump via a frequency converter.

When IO 113 is combined with SM 113, it is also possible to monitor the following:

- Bearing temperature
- vibrations in pump
- rotor speed when the motor is switched off.

### 5.1.8 SM 113

SM 113 is designed and used for the collection and transfer of additional sensor data. SM 113 works together with IO 113. IO 113 is available with or without communication module.



SM 113 is built into the top cover of the pump.

SM 113 can collect data from these devices:

- Current sensors, 4-20 mA
- Pt100\*/Pt1000\*\* thermal sensors
- \* Maximum three Pt100 sensors
- \*\* Maximum four Pt1000 sensors



## 6. Starting up the product



Do not start the pump if the liquid start level is lower than the stop level or if the atmosphere in the pit is potentially explosive.

### 6.1 General startup procedure



The pumps are fitted with impellers of S-tube<sup>®</sup> design. S-tube<sup>®</sup> impellers are wet balanced which will reduce the vibration during operation. If the pumps are started with the pump housing full of air, the vibration level will be higher compared to normal operation.

Local balancing of S-tube<sup>®</sup> impellers will damage the wet balancing and lead to higher vibration level during operation.

This procedure applies to new installations as well as after service inspections if startup takes place some time after the pump was placed in the pit.

1. Check that the impeller can rotate freely. Turn the impeller by hand.

#### WARNING

##### Sharp element

Death or serious personal injury

- The impeller can have sharp edges - wear protective gloves.



2. Check the condition of the motor liquid. See also section [4. Dismantling and assembling the product](#).
3. Check that the system, bolts, gaskets, pipes and valves etc. are in good condition.
4. Mount the pump in the system.
5. Switch on the power supply.
6. Check whether the monitoring units are operating satisfactorily.
7. **Pumps with sensor:** Switch on IO 113, and check that there are no alarms or warnings.  
See installation and operating instructions for IO 113.
8. Check the setting of the air bells, float switches or electrodes.
9. Check the direction of rotation. See section [6.2 Direction of rotation](#).
10. Open the isolating valves, if fitted.
11. Check that the liquid level is above the pump motor for S1 operation and to the middle of the pump motor for S3 operation. If the minimum level is not reached, do not start the pump. (S1 = continuous operation. S3 = intermittent operation).
12. Start the pump, and let it run briefly. Check whether the liquid level drops.
13. Check if the outlet pressure and input current are normal. If not, there might be air trapped inside the pump.



Remove trapped air from the pump housing by tilting the pump by means of the lifting chain when the pump is in operation.



In case of abnormal noise or vibrations from the pump, other pump failure, power supply failure or water supply failure, stop the pump immediately. Do not attempt to restart the pump until the cause of the fault has been found and the fault corrected.

14. After one week of operation or after replacement of the shaft seal, check the condition of the motor liquid in the seal housing.

For pumps without sensor, this is done by taking a sample of the liquid. See section [4. Dismantling and assembling the product](#) for procedure.

Every time the pump has been removed from the pit, go through the above procedure when starting up again.

### 6.2 Direction of rotation



The pump may be started for a very short period without being submerged to check the direction of rotation.



For FM pumps, the check must be carried out outside the explosion-proof area.

Check the direction of rotation before starting up the pump.

An arrow on the stator housing shows the correct direction of rotation. Correct direction of rotation is clockwise when viewed from above.

#### Checking the direction of rotation

The direction of rotation must be checked in the following way every time the pump is connected to a new installation.

#### Procedure

1. Let the pump hang from a lifting device, such as the hoist used for lowering the pump into the pit.
2. Start and stop the pump while observing the movement (jerk) of the pump. If connected correctly, the impeller will rotate clockwise, that is the pump will jerk counterclockwise. See [fig. 23](#).
3. If the direction of rotation is wrong, interchange any two of the phases in the power cable.

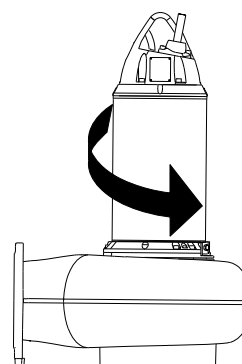


Fig. 23 Jerk direction

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## 7. Additional information

### 7.1 Refractive index

Use this table as a guideline. The table below shows the ingress of the four pump sizes of SE, SL 12-42 Hp (9-30 kW).

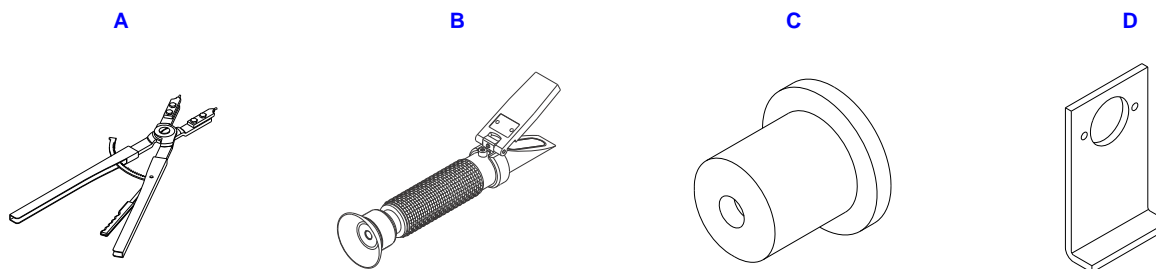
Media ingress in %	Liquid for submersible motor SML3		Refractive index	SL 2-4 pole 4.7 qt (4.5 l)	SL 6 pole 5.7 qt (5.4 l)	SE 2-4 pole 13.5 qt (12.8 l)	SE 6 pole 14.8 qt (14.1 l)
	RM5418 Grundfos HTF transfer fluid	RM0350 Demineralised water					
Percentage [%]	Percentage [%]	Percentage [%]	Degree [°F (°C)]	Amount of ingress [qt (ml)]	Amount of ingress [qt (ml)]	Amount of ingress [qt (ml)]	Amount of ingress [qt (ml)]
0	38	62	-22.0 (-30)	0	0	0	0
5	36	64	-16.6 (-27)	0.24 (225)	0.28 (270)	0.67 (640)	0.74 (705)
10	35	65	-13.0 (-25)	0.47 (450)	0.57 (540)	1.35 (1280)	1.48 (1410)
15	33	67	-9.4 (-23)	0.71 (675)	0.88 (810)	2.02 (1920)	2.23 (2115)
20	32	68	-7.0 (-22)	0.95 (900)	1.14 (1080)	2.70 (2560)	2.97 (2820)
25	30	70	-5.8 (-21)	1.18 (1125)	1.42 (1350)	3.38 (3200)	3.40 (3525)
30	29	71	-2.2 (-19)	1.42 (1350)	1.71 (1620)	4.05 (3840)	4.46 (4230)
35	28	72	-0.4 (-18)	1.66 (1575)	1.99 (1890)	4.73 (4480)	5.21 (4935)
40	27	73	1.4 (-17)	1.90 (1800)	2.28 (2160)	5.41 (5120)	5.95 (5640)
45	26	74	3.2 (-16)	2.13 (2025)	2.56 (2430)	6.08 (5760)	6.70 (6345)
50	25	75	5.0 (-15)	2.37 (2250)	2.83 (2700)	6.76 (6400)	7.44 (7050)

### 7.2 Motor liquid quantities

Use motor liquid, product No 96551348 [5.28 qt (5 l)].

Number of poles	Quantity of motor liquid	
	SE [qt (l)]	SL [qt (l)]
2	13.5 (12.8)	4.7 (4.5)
4	13.5 (12.8)	4.7 (4.5)
6	14.9 (14.1)	5.7 (5.4)

### 7.3 Special tools



Tool	Designation	Description	Product number
A	Locking-ring pliers	Circlip range 4.8"-15.7" (122-400 mm)	-
B	Refractometer	-	98676968
C	Shaft seal protection tool	-	98565931
D	Service tool, cable entry	-	98761439

## 7.4 Tightening torques and lubricants

Pos.	Designation	Quantity	Dimension		Torque		Lubricant
			ANSI	DIN	[lbf-ft]	[Nm]	
All	O-ring	All	-	-	-	-	Rocol
25	Plug	1	3/8"		29.5 ± 1.5	40 ± 2	-
26	Screw	6	1/2"	M12	51.6 ± 3.0	70 ± 4	-
67	Screw	1	5/8"	M16	125.4 ± 3.0	170 ± 4	Castrol Optimol
150d	Screw	2	1/4"	M6	5.9 ± 0.7	8 ± 1	-
173e	Screw	2	1/4"	M6	5.9 ± 0.7	8 ± 1	-
178	Screw	6	1/2"	M12	51.6 ± 3.0	70 ± 4	-
181a	Screw	2	1/2"	M12	51.6 ± 3.0	70 ± 4	-
182b	Screw	3	1/2"	M12	51.6 ± 3.0	70 ± 4	-
182	Screw	3	7/16"	M10	29.5 ± 1.5	40 ± 2	-
183	Screw	3	7/16"	M10	29.5 ± 1.5	40 ± 2	-
184b	Screw, 2-4 poles SL pump	3	5/16"	M8	14.7 ± 1.5	20 ± 2	-
	Screw, 6 poles SE pump	6	1/2"	M12	51.6 ± 3.0	70 ± 4	-
185	Screw	2	1/2"	M12	51.6 ± 3.0	70 ± 4	-
190b	Screw	2	1/2"	M12	51.6 ± 3.0	70 ± 4	-
193	Plug	4	3/8"		29.5 ± 1.5	40 ± 2	-
520a	Screw	1	3/32"	M3	0.4 + 0.1	0.5 + 0.2	-
520c	Screw	1	3/16"	M5	2.2 + 0.7	3 + 1	-
	Screw	1	1/4"	M6	5.9 ± 0.7	8 ± 1	-
521b	Screw	1	1/4"	M6	5.9 ± 0.7	8 ± 1	-
705	Screw (ANSI 10")	8	5/8"	M16	125.4 ± 5.9	170 ± 8	-
	Screw (ANSI 12")	12	3/4"	M20	243.4 ± 5.9	330 ± 8	-

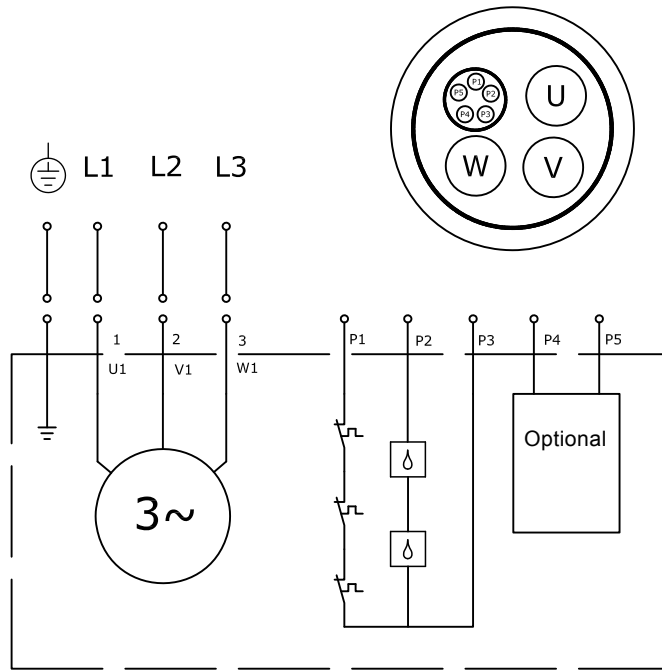
### Oils

- Rocol Sapphire Aqua-Sil, product number 00RM2924, [2.204 lb (1 kg)].
- Castrol Optimol Paste White T, product number V6001176, [0.42 qt (0.4 l)].
- Motor liquid SML3, product number 795898, [5.28 qt (5 l)].

### 7.5 Fault finding the product

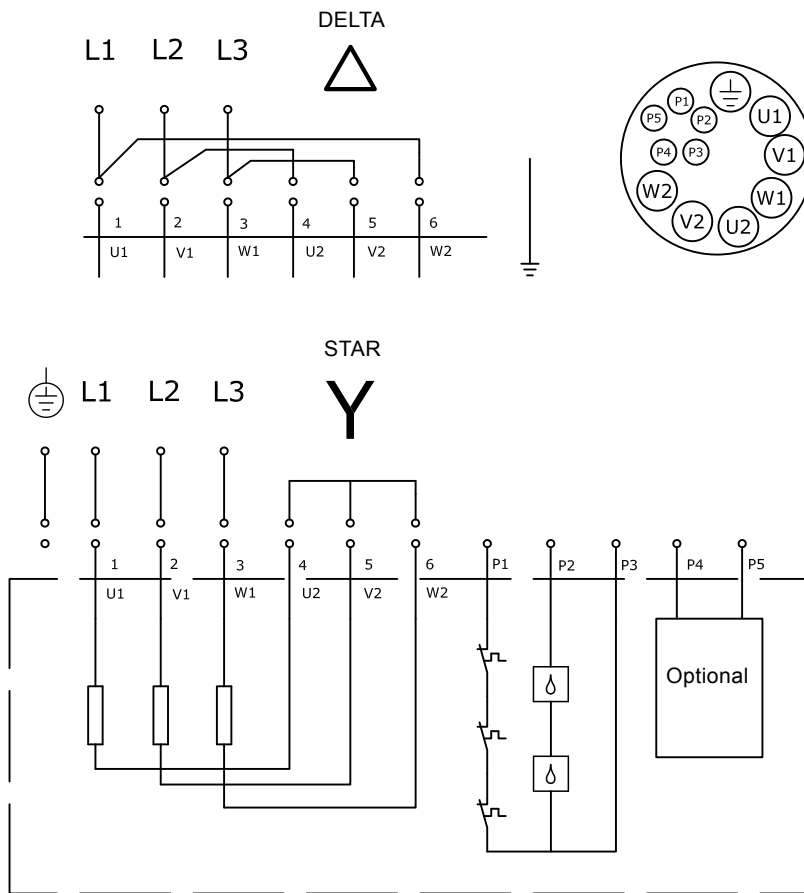
See the installation and operating instructions for SE, SL 12-42 Hp (9-30 kW). Use the QR code and link on the front page of this document.

7.6 Wiring diagrams



TM05 2694 0412

Fig. 24 Wiring diagram, 8-wire EMC cable



TM05 2695 0412

Fig. 25 Wiring diagram, 12-wire standard cable

## 7.7 Sensor connections

### 7.7.1 Sensor overview

	Standard	Sensor version 1	Sensor version 2	Standard Ex.	Sensor version 1 Ex.	Sensor version 2 Ex.
	Fig. 26	Fig. 27	Fig. 28	Fig. 26	Fig. 27	Fig. 28
Thermal switches (Klixon/PTC)	•	•	•	•	•	•
Moisture switch, top	•	•	•	•	•	•
Leakage switch	•	•	•			
Leakage switch, stator housing				•	•	•
Pt1000 in stator winding		•	•		•	•
Pt1000 in upper bearing			•			•
Pt1000 in lower bearing			•			•
PVS3 vibration sensor			•			•
SM 113			•			•
IO 113			•			•

Standard and standard Ex.

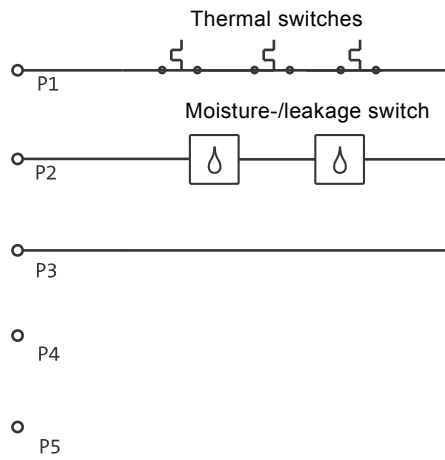


Fig. 26 Standard version and standard version, Ex pump

Sensor version 2 and Ex. 2

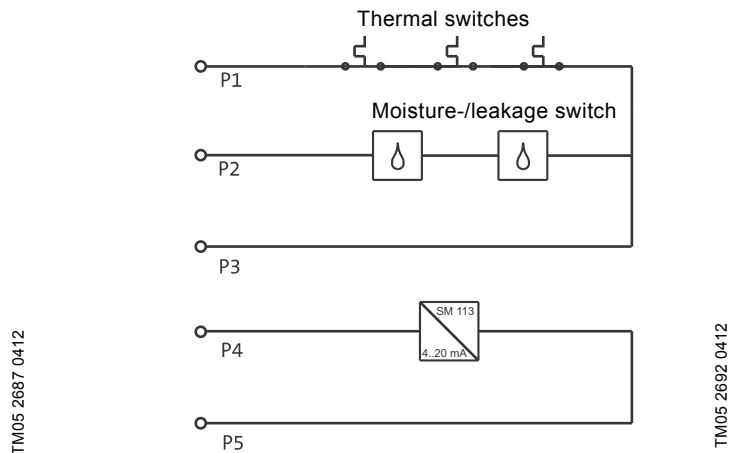


Fig. 28 Sensor version 2 and version 2 Ex

Sensor version 1 and Ex. 1

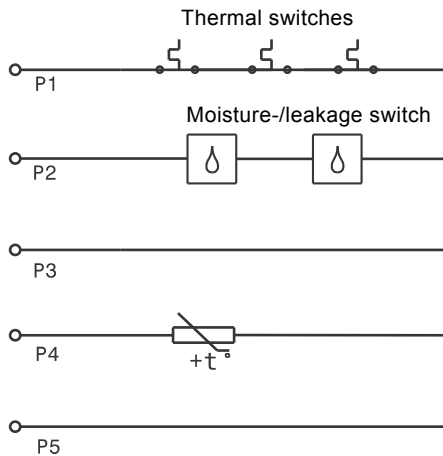


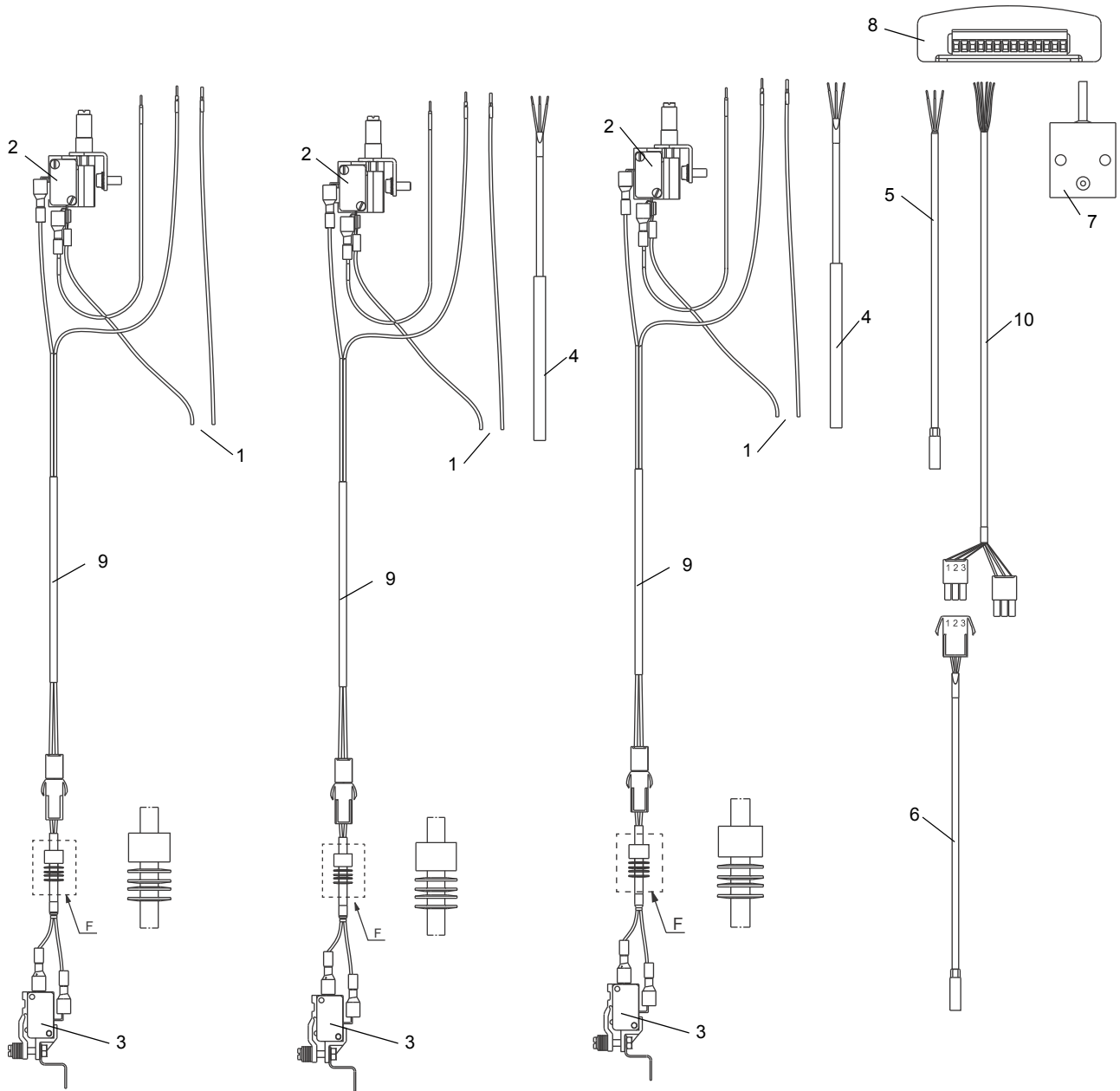
Fig. 27 Sensor version 1 and Ex. 1

7.7.2 Internal sensor wiring  
 Non-explosion-proof versions

Standard

Sensor version 1

Sensor version 2



Pos.	Description
1	Thermal switch wiring (Klixon or PTC)
2	Moisture sensor top
3	Leakage switch
4	Pt1000 stator winding
5	Pt1000 upper bearing
6	Pt1000 lower bearing
7	PVS3 vibration sensor
8	SM 113 sensor module
9	Wiring harness (leakage switch)
10	Wiring harness (Pt1000 sensor)

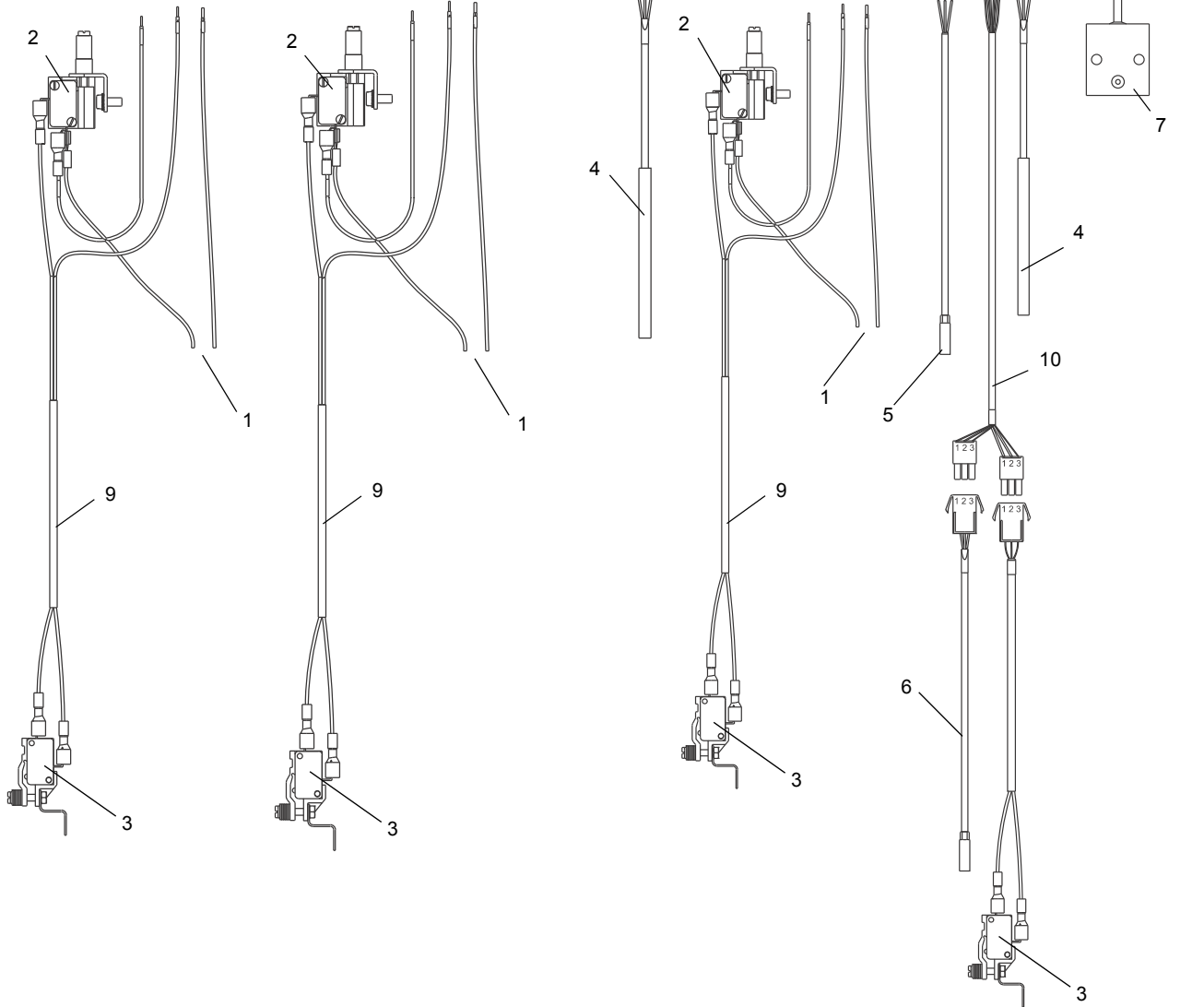
TM05 7828 1613 - TM05 7829 1613 - TM05 7830 1613

**Explosion-proof versions**

Standard Ex.

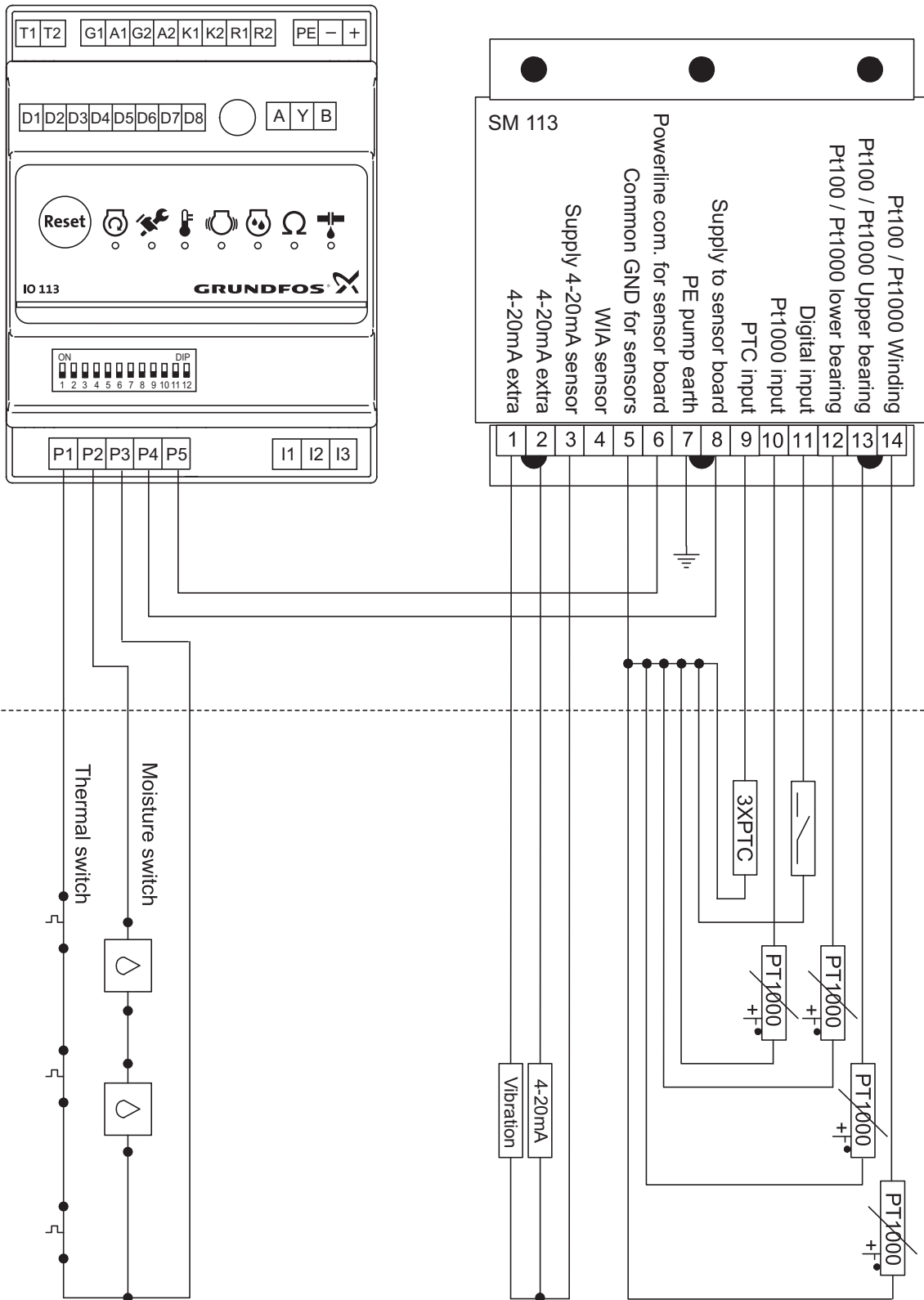
Sensor version 1 Ex.

Sensor version 2 Ex.



Pos.	Description
1	Thermal switch wiring (Klixon or PTC)
2	Moisture sensor top
3	Leakage switch
4	Pt1000 stator winding
5	Pt1000 upper bearing
6	Pt1000 lower bearing
7	PVS3 vibration sensor
8	SM 113 sensor module
9	Wiring harness (leakage switch)
10	Wiring harness (Pt1000 sensor)

TM05 7831 1613 - TM05 7832 1613 - TM05 7833 3017



TM05 4978 3112

Fig. 29 Sensor connections



7.8 Exploded drawings

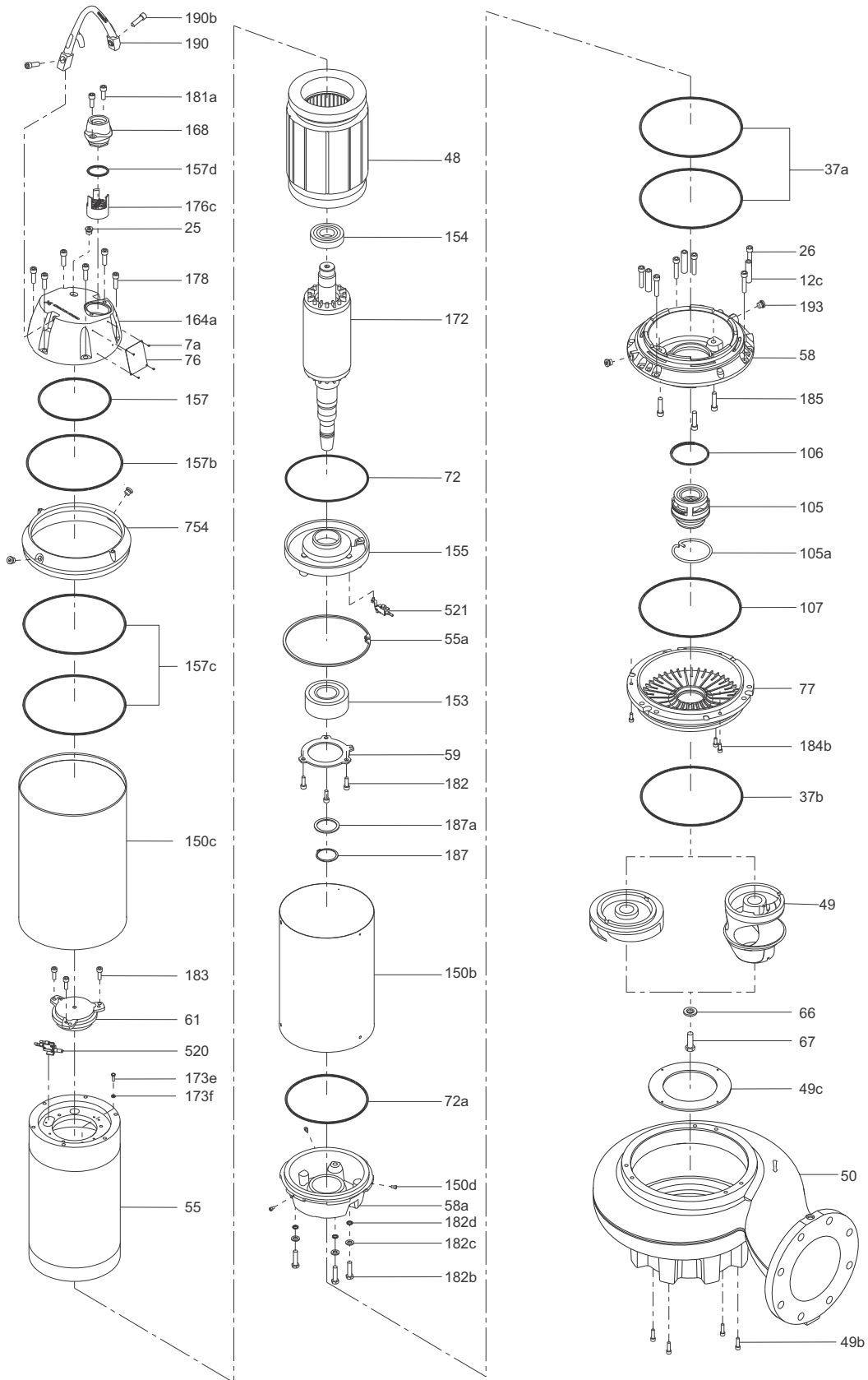


Fig. 30 Exploded view, SE pump, 2- and 4-poles

TM05 9693 1517

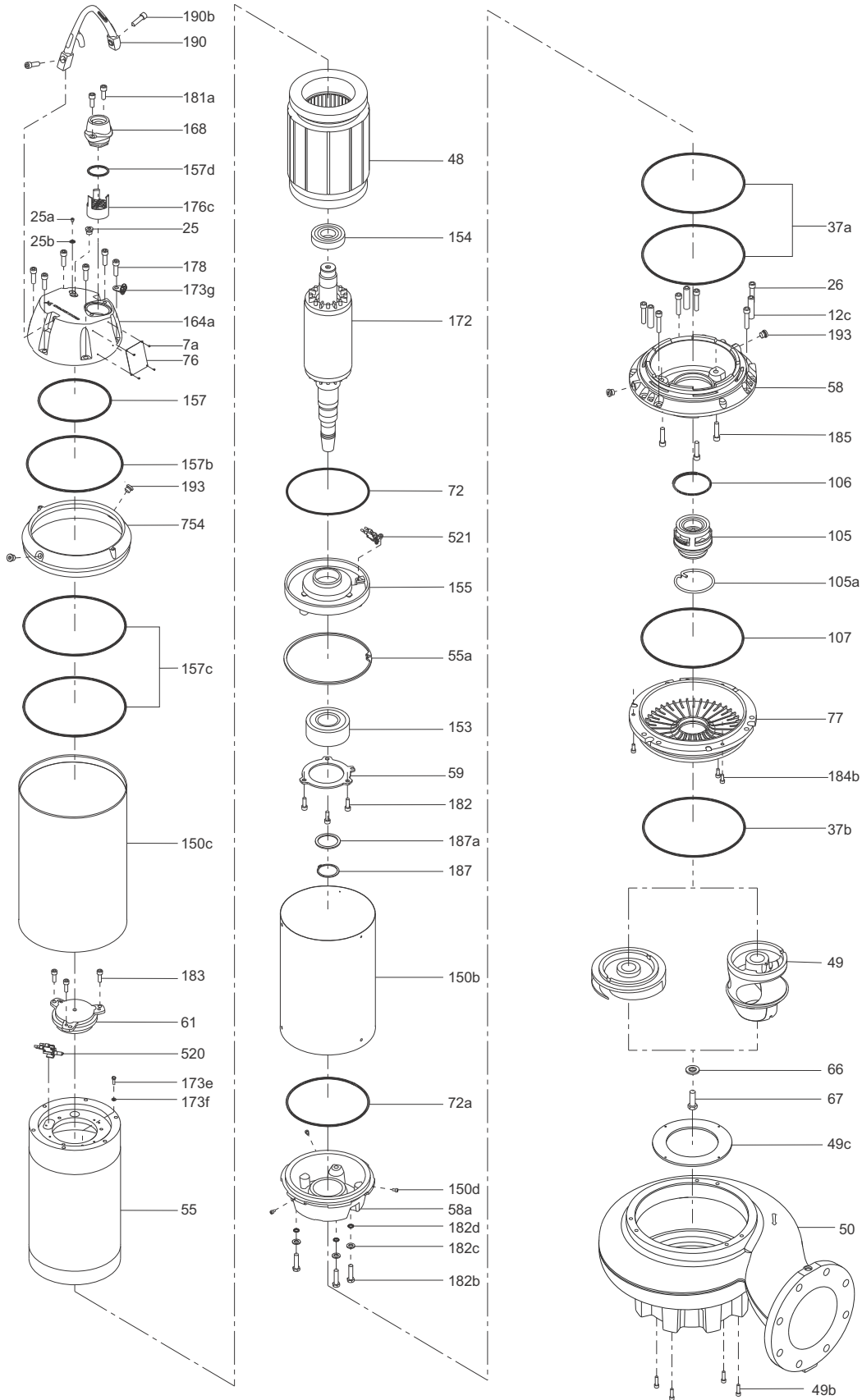


Fig. 31 Exploded view, SE pump, explosion-proof version, 2- and 4-poles

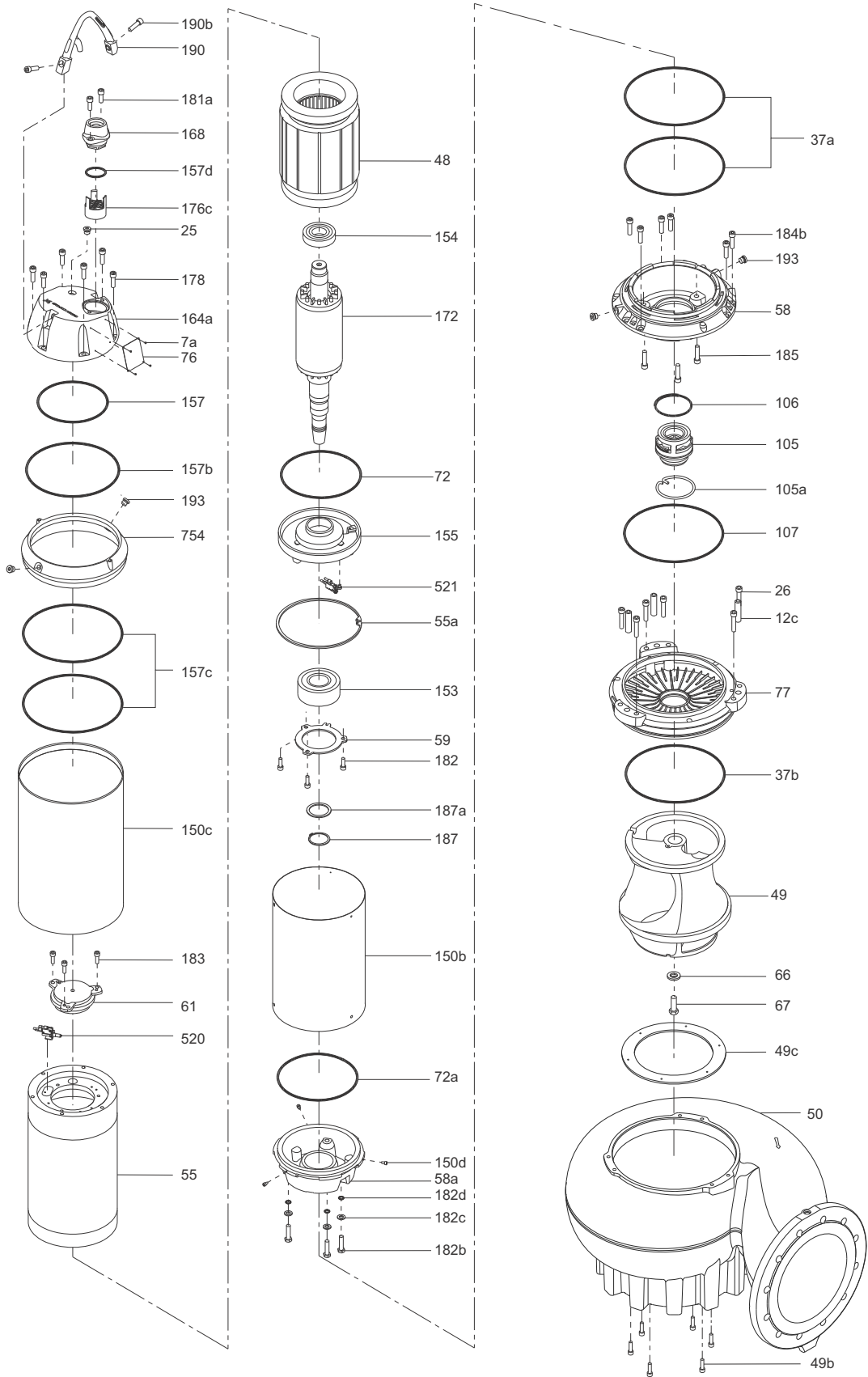


Fig. 32 Exploded view, SE pump, 6 poles

TM05 9689 1815

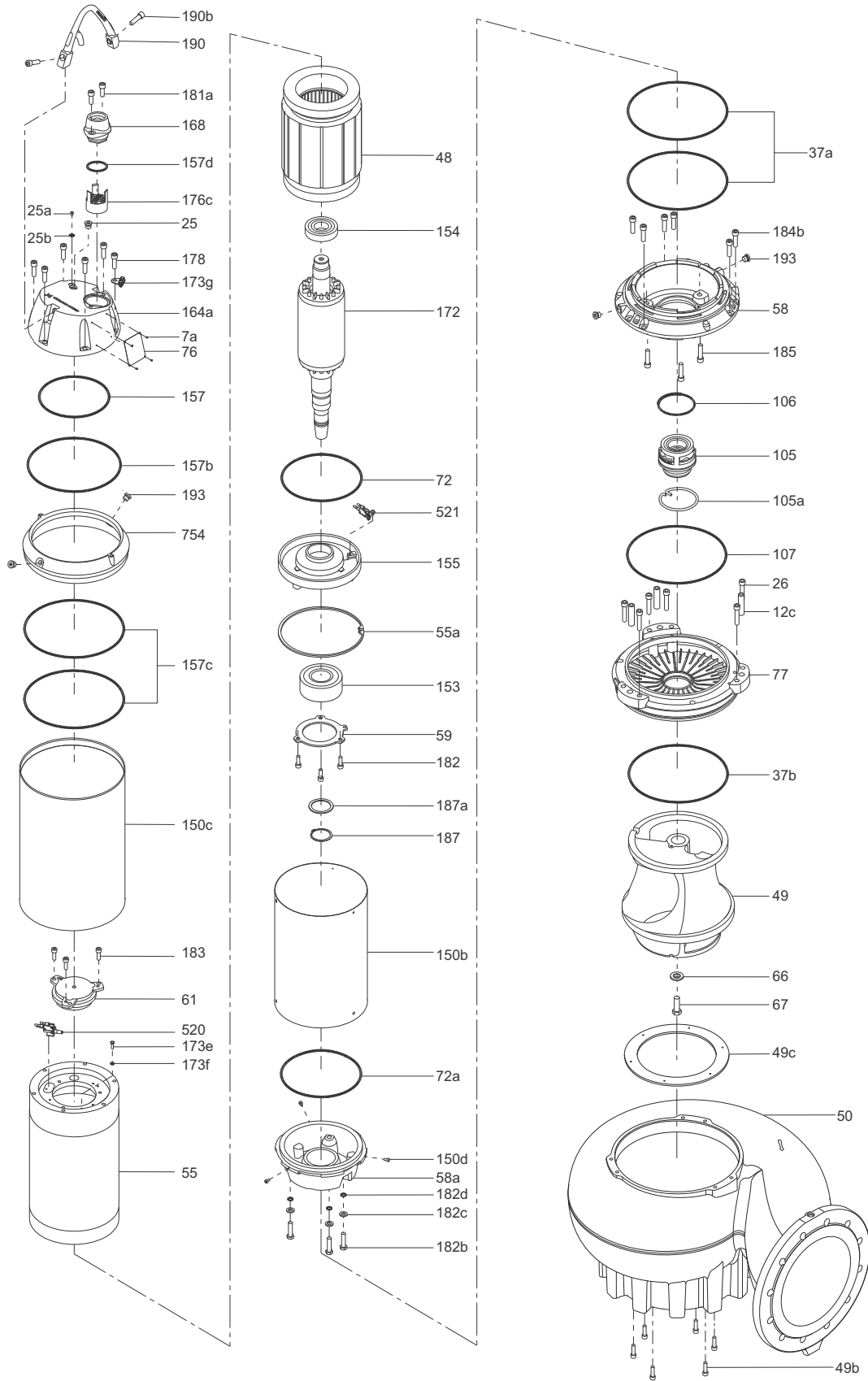


Fig. 33 Exploded view, SE pump, explosion-proof version, 6-poles

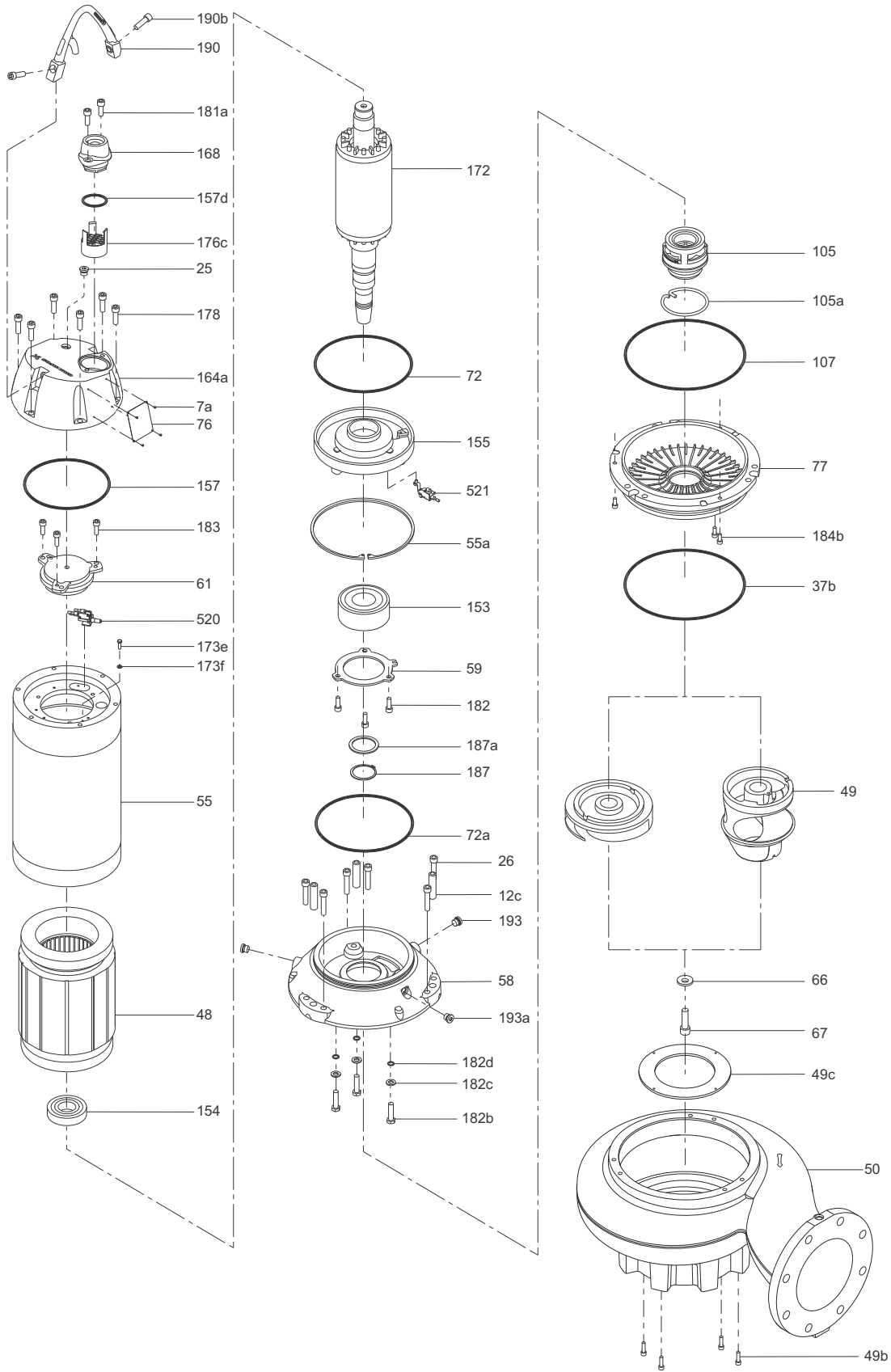


Fig. 34 Exploded view, SL pump, 2-4 poles

TM05 9687 1815

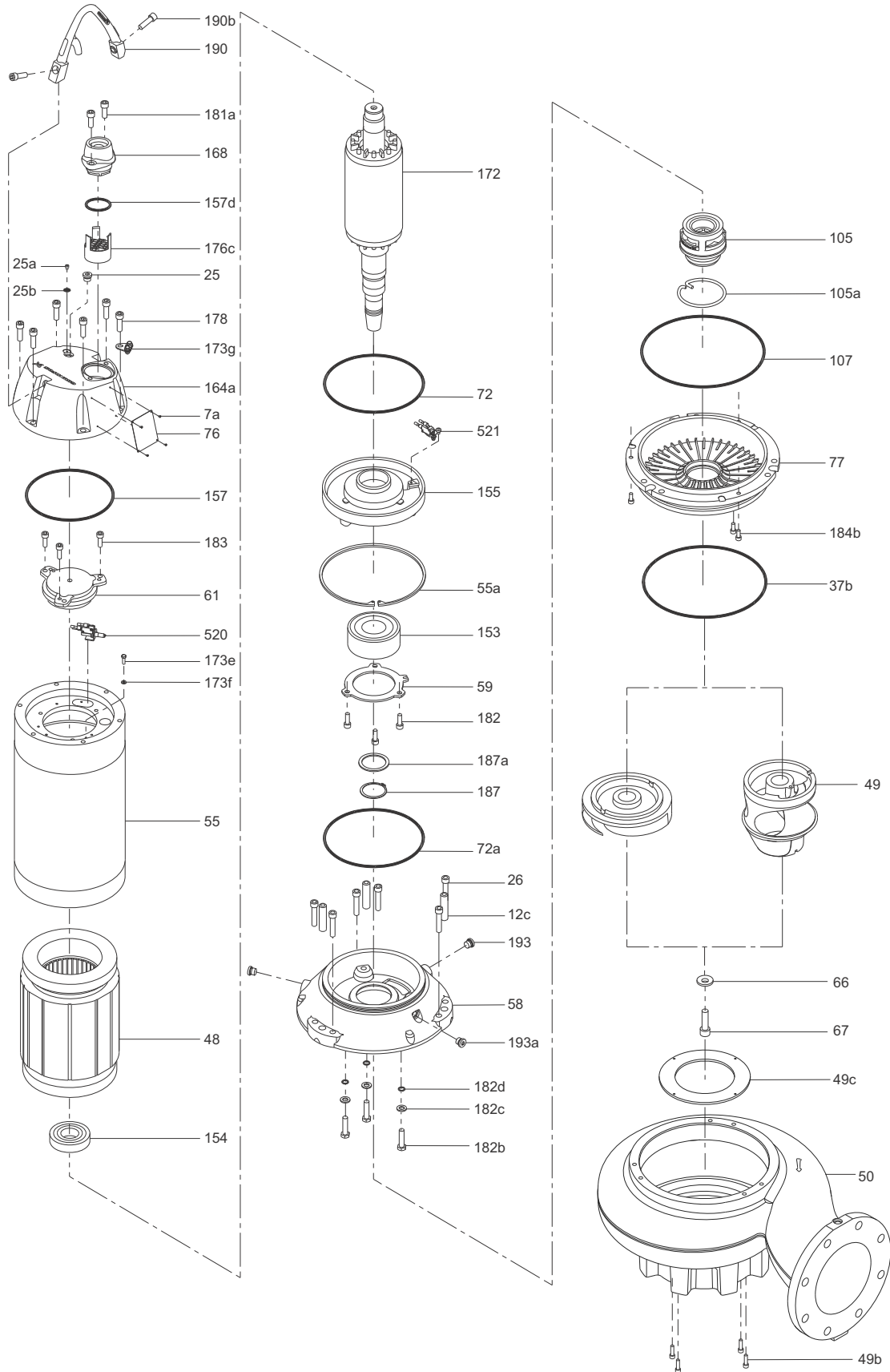


Fig. 35 Exploded view, SL pump, explosion-proof version, 2- and 4-poles

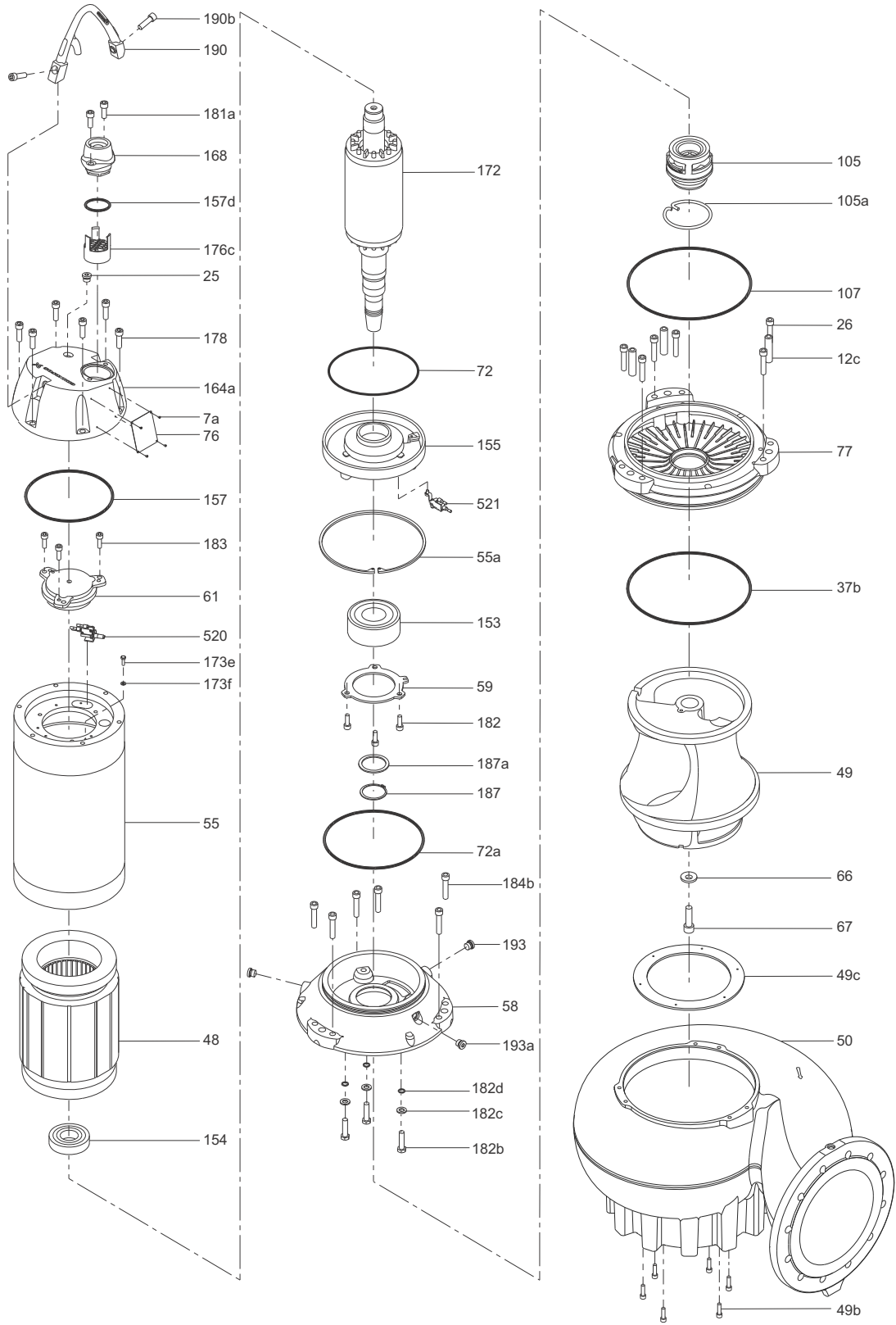


Fig. 36 Exploded view, SL pump, 6 poles

TM05 9691 1815

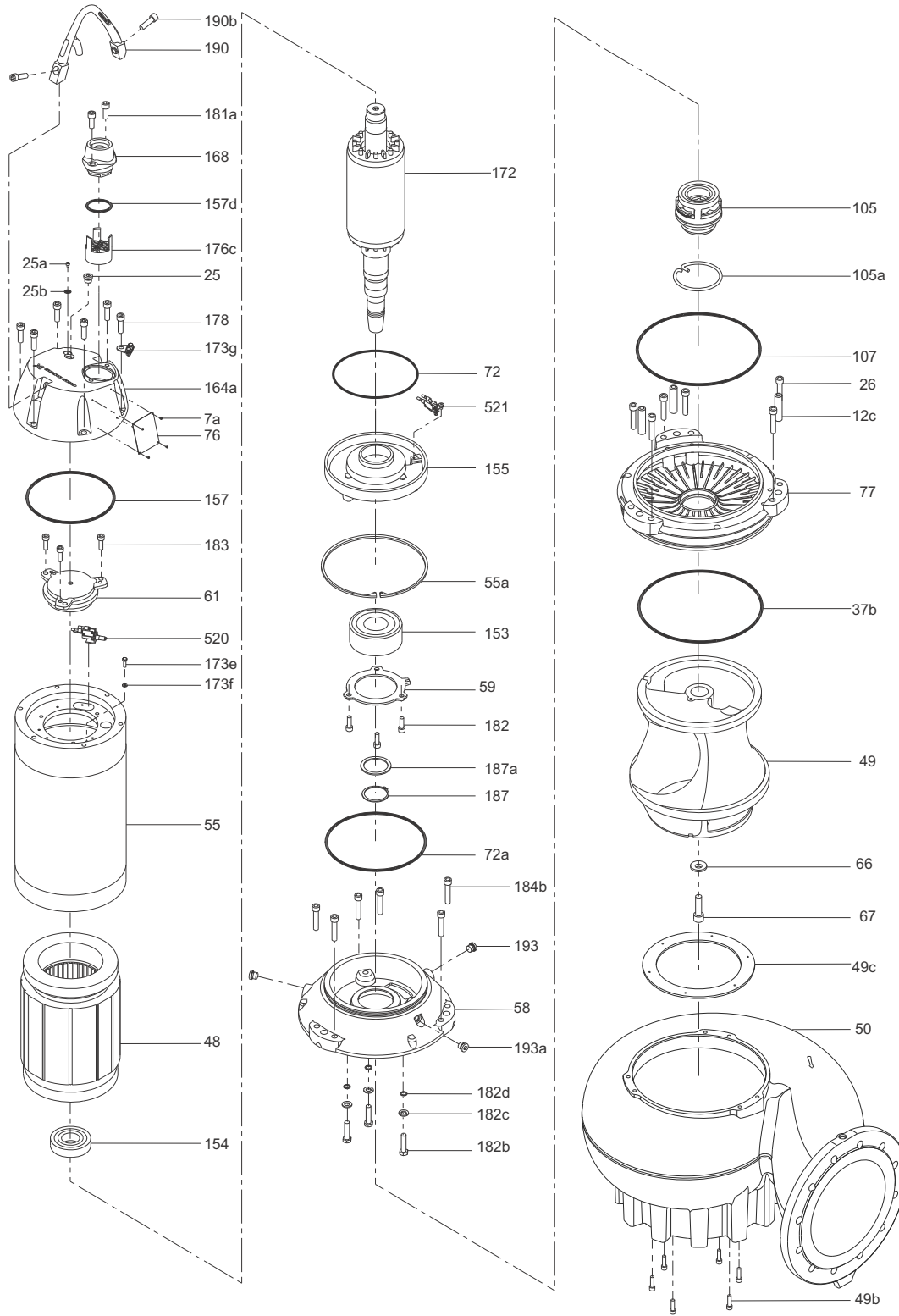


Fig. 37 Exploded view, SL pump, explosion-proof version, 6-poles



7.9 Motor drawings

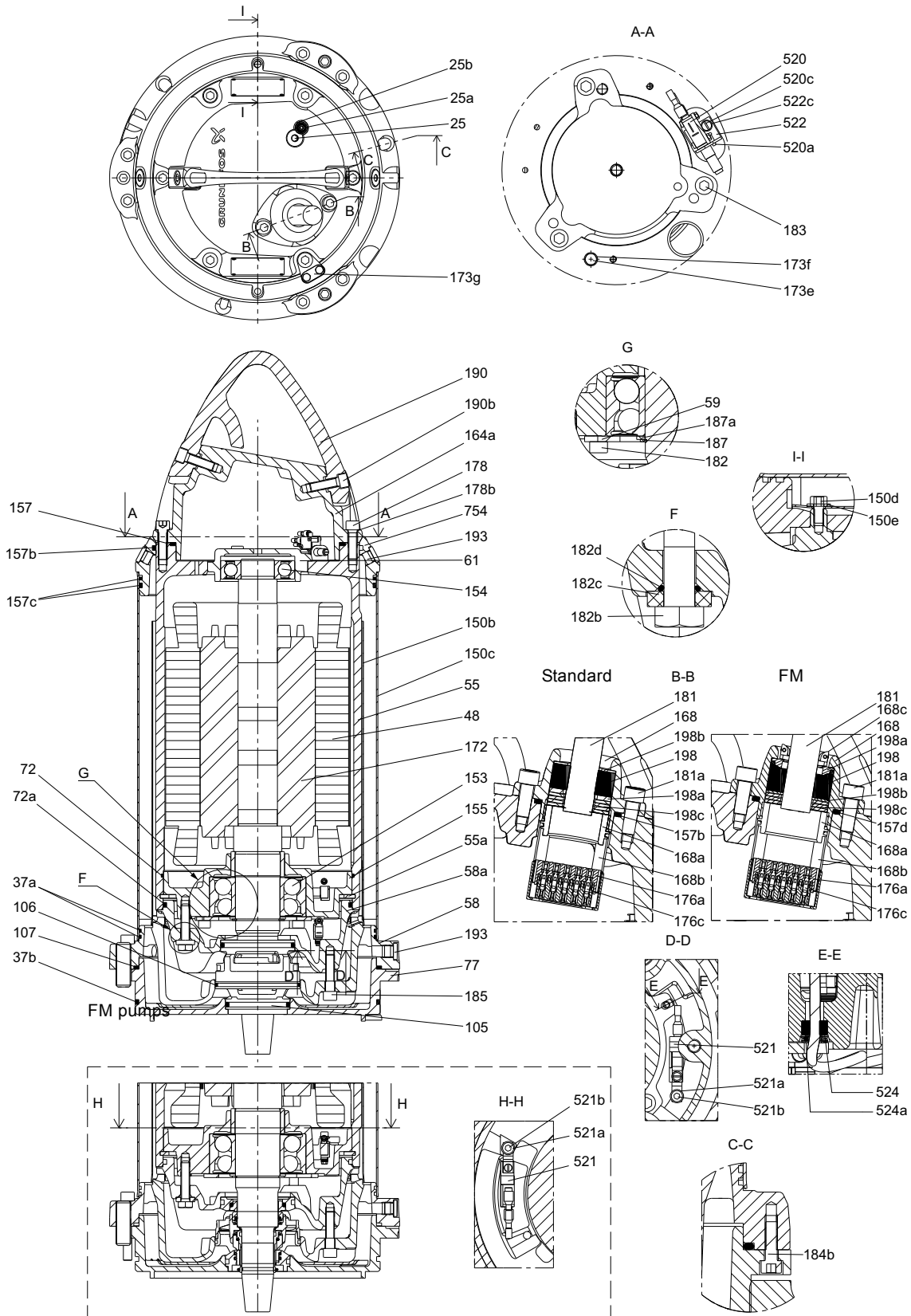


Fig. 38 Sectional drawing, SE pump with cooling jacket, 2-4 poles

TM06 8475 0817

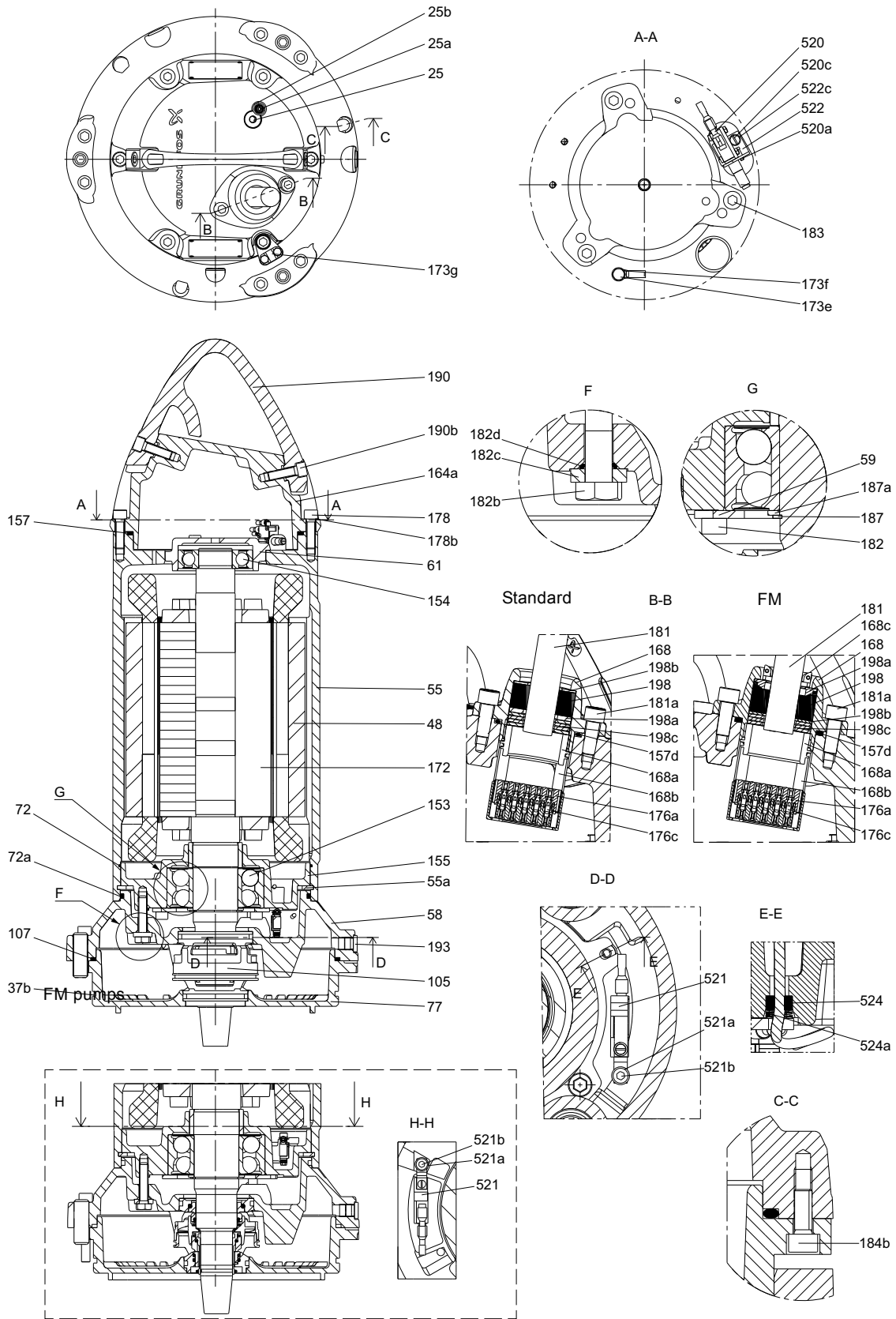


Fig. 39 Sectional drawing, SE pump without cooling jacket, 2-4 poles

TM06 8476 0817

7.10 Pump drawings

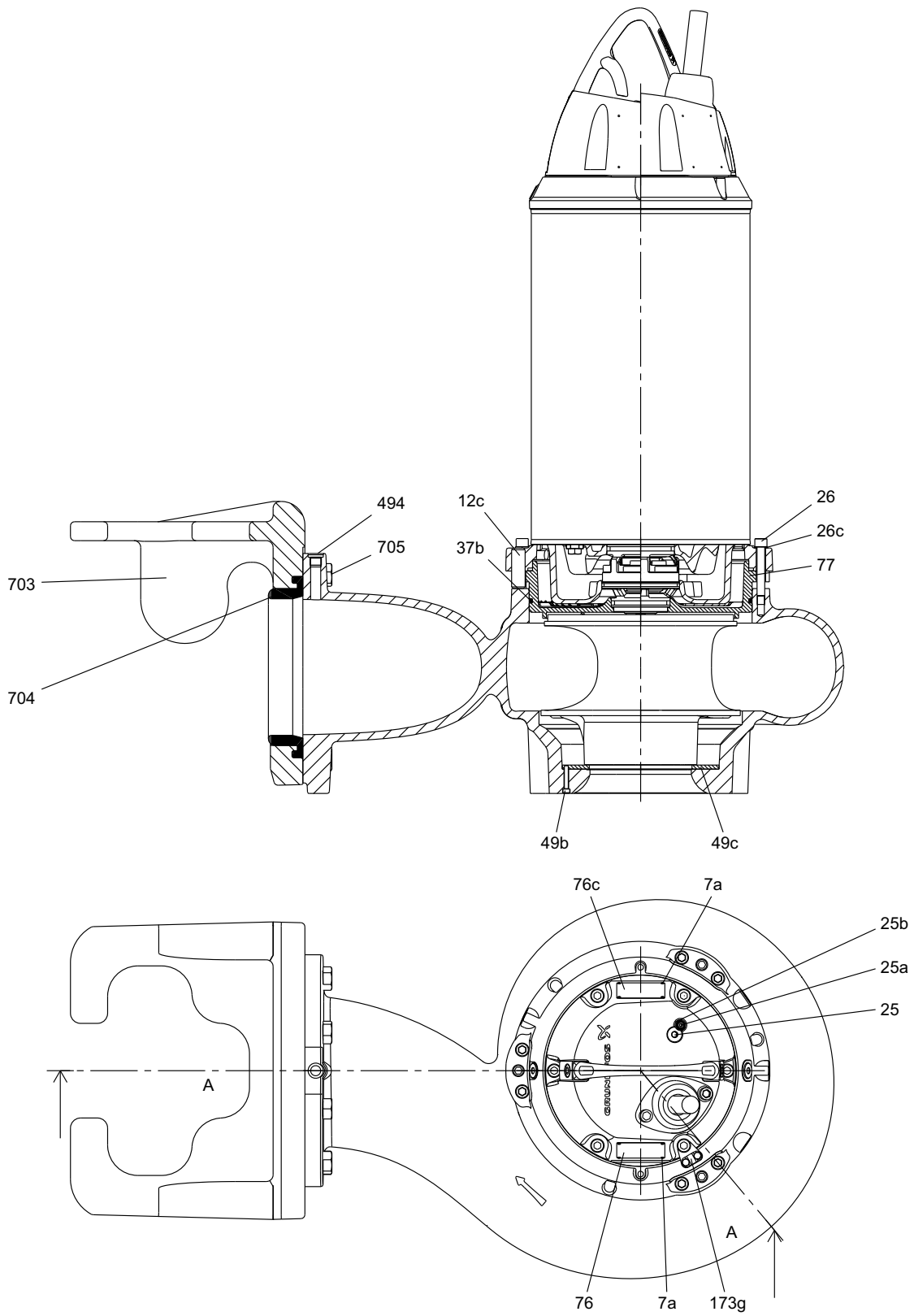


Fig. 40 Sectional drawing, SE pump with guide claw, 2-4 poles

TM06 8579 0817

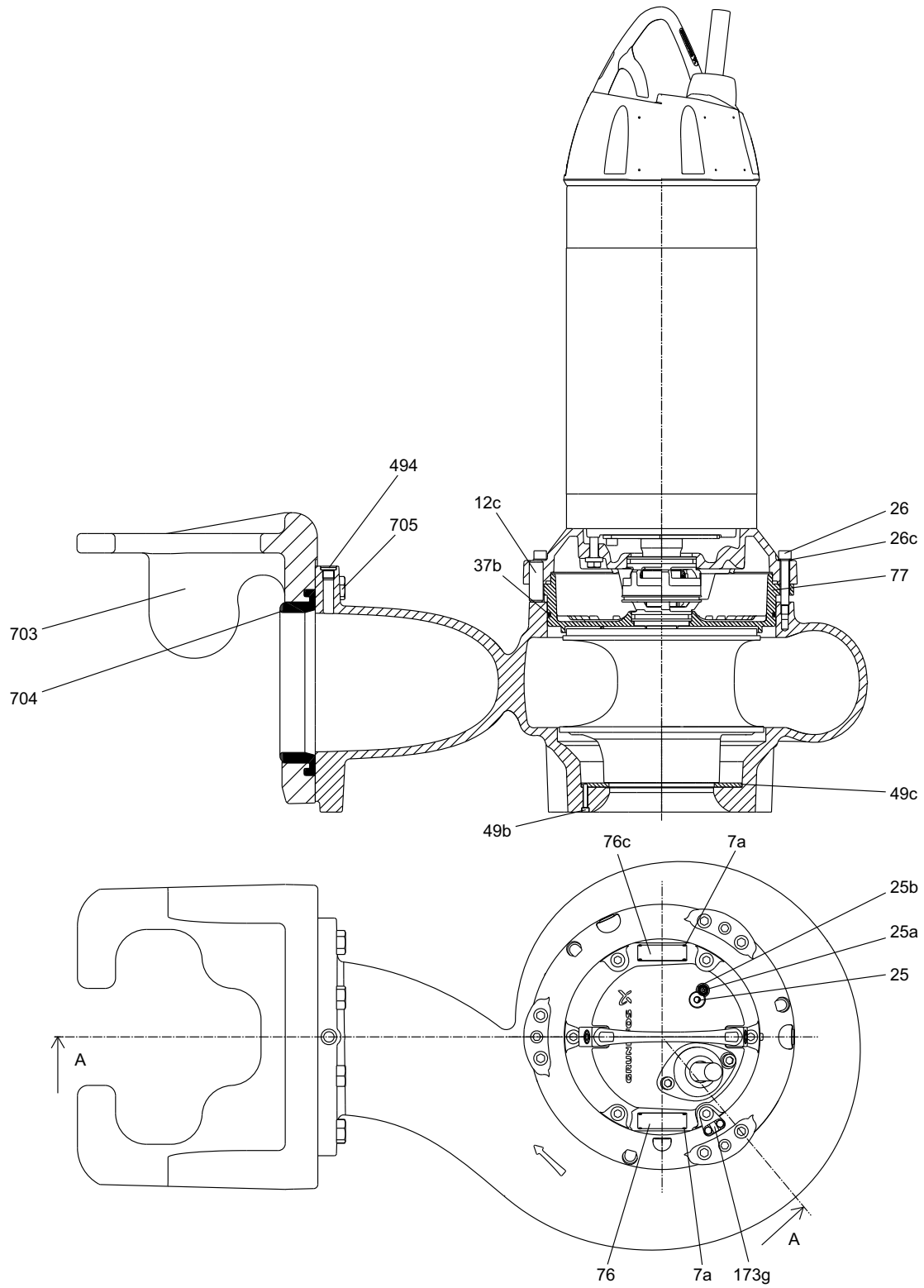


Fig. 41 Sectional drawing, SL pump with guide claw, 2-4 poles

TM06 8580 0817

## 7.11 Components and material specification

### Motor

Pos.	Component	Material	DIN W.-Nr. / EN standard	AISI/ASTM
25	Pressure test plug	Stainless steel	1.4436	316
25a*	Hexagon socket head cap screw	Stainless steel	1.4436	316
25b*	Lock washer	Stainless steel	1.4436	316
26c	Washer	Stainless steel	DIN 433	ANSI B18.22.1
37a	O-ring	NBR rubber		
48	Stator lamination			
55	Stator housing	Cast iron		
55a	Circlip		DIN 472	
58	Intermediate seal housing (SE install.)	Cast iron	EN-GJL-250	ASTM A48 class 35
	Upper seal housing (SL)			
58a	Upper seal housing cover	Cast iron	EN-GJL-250	ASTM A48 class 35
59	Bearing bracket cover	Cast iron	EN-GJL-250	ASTM A48 class 35
61	Upper bearing bracket	Cast iron	EN-GJL-250	ASTM A48 class 35
72	O-ring	NBR rubber		
72a	O-ring	NBR rubber		
77	Lower seal housing			
105	Shaft seal cartridge, complete	SiC/SiC or SiC/carbon		
105a	Locking ring			
106	O-ring for shaft seal			
107	O-ring	NBR rubber		
150	Outer cooling jacket	Stainless steel	1.4307	304
150b	Inner cooling jacket			
150d	Crosshead screw			
153	Ball bearing	Stainless steel		
154	Ball bearing	Stainless steel		
155	Lower bearing bracket	Cast iron	EN-GJL-250	ASTM A48 class 35
157	O-ring	NBR rubber		
157b	O-ring	NBR rubber		
157c	O-ring	NBR rubber		
157d	O-ring	NBR rubber		
164a	Motor top cover	Cast iron	EN-GJL-250	ASTM A48 class 35
168	Cable entry	PA or cast iron		
168a	Lower cable entry			
168b	Cover for connector			
172	Shaft with rotor	Stainless steel	1.4462	329
173e	Hexagon head screw	Stainless steel	1.4436	316
173f	Spring washer	Stainless steel	1.4436	316
173g	External ground connector	Stainless steel	1.4436	316
176a	Terminal block			
176c	Plug housing			
178	Hexagon socket head cap screw	Stainless steel	1.4436	316
178b	Washer	Stainless steel	DIN 433	ANSI B18.22.1
181a	Screw	Stainless steel	1.4436	316

Pos.	Component	Material	DIN W.-Nr. / EN standard	AISI/ASTM
181	Cable			
181b	EMC cable/shield			
182	Hexagon socket head cap screw	Stainless steel	1.4436	316
182b	Hexagon socket head cap screw	Stainless steel	1.4436	316
182c	Washer	Stainless steel		
182d	O-ring	NBR rubber		
183	Screw	Stainless steel		
184b	Screw	Stainless steel	1.4436	316
184c	Washer	Stainless steel	DIN 433	ANSI B18.22.1
185	Hexagon socket head cap screw	Stainless steel		
187	Circlip			
187a	Washer	Stainless steel	1.4436	316
190	Lifting bracket	Stainless steel	1.4408	CF8M
190b	Hexagon socket head cap screw	Stainless steel	1.4408	CF8M
193	Plug	Stainless steel	1.4408	CF8M
198	Rubber seal			
198b	Washer			
198a	Washer			
198c	Disc spring			
520a	Slotted screw	Stainless steel	1.4436	316
520	Moisture switch, top			
520c	Screw			
521	Leakage switch, bottom			
521a	Washer	Zn DIN 127		
521b	Screw			
522b*	Washer			
522	Bracket			
522c	Screw			
524	Rubber bush			
524a	Disc spring			
754	Cooling jacket ring			

\* Only in explosion-proofs pumps.

#### Material declaration:

- Grey cast iron is manufactured according to EN 1561:1997.
- Cast stainless steel is manufactured according to EN 10283:2010.
- Conversion to other standards such as AISI/ASTM is normative, and products are not manufactured according to these.

## Pump

Pos.	Component	Material	DIN W.-Nr. / EN standard	AISI/ASTM
7a	Rivet			
9a	Key (for keyway)	Stainless steel	1.4436	316
12c	Adjusting screw	Stainless steel	1.4436	316
26	Screw	Stainless steel	1.4436	316
37	O-ring	NBR rubber		
37b	O-ring	NBR rubber		
49	Impeller (S-tube)	Cast iron	EN-GJL-300	ASTM A48 class 40/45
	Impeller (Vortex)	Cast iron	EN-GJL-300	ASTM A48 class 40/45
		Stainless steel	EN-GJL-250	ASTM A48 class 35
49b	Screw			
49c	Wear ring	Carbon steel		
50	Pump housing	Cast iron	EN-GJL-250	ASTM A48 class 35
66	Impeller washer	Stainless steel	1.4436	316
67	Impeller screw	Stainless steel	1.4436	316
76	Nameplate			
150c	Outer cooling jacket	Stainless steel	1.4436	316
494	Plug	Stainless steel	1.4436	316

## Material declaration:

- Grey cast iron is manufactured according to EN 1561:1997.
- Cast stainless steel is manufactured according to EN 10283:2010.
- Conversion to other standards such as AISI/ASTM is normative, and products are not manufactured according to these.

## Accessories

Pos.	Component	Material	DIN W.-Nr. / EN standard	AISI/ASTM
487	Base stand, horizontal	Galvanized steel		
701	Auto-coupling base unit	Cast iron or stainless steel		
702	Guide rail bracket	Cast iron or stainless steel		
703	Guide claw	Cast iron or stainless steel		
704	Rubber seal	Neoprene 60		
705	Screw	Steel 8.8	DIN 933	ANSI B18.2.3.1M
731	Base stand, vertical	Galvanized steel		
732	Screw for base stand	Steel 8.8	DIN 933	ANSI B18.2.3.1M
733	Flange seal, upper, for base stand			
734	Flange seal, lower, for base stand			
749	Bend	Cast iron		
751	Ring stand	Galvanized steel		
752	Screw for ring stand	Steel 8.8	DIN 933	ANSI B18.2.3.1M
753	Flange seal for ring stand			
761	Hose connector	Cast iron or stainless steel		
762	Base plate			
762a	Screw for hose connector*	Steel 8.8	DIN 933	ANSI B18.2.3.1M
	Screw for base plate connector**			
763	Flange seal for hose connector			

\* For dry, vertical installation on base stand

\*\* For dry, vertical installation on concrete base

7.12 Sensor positions

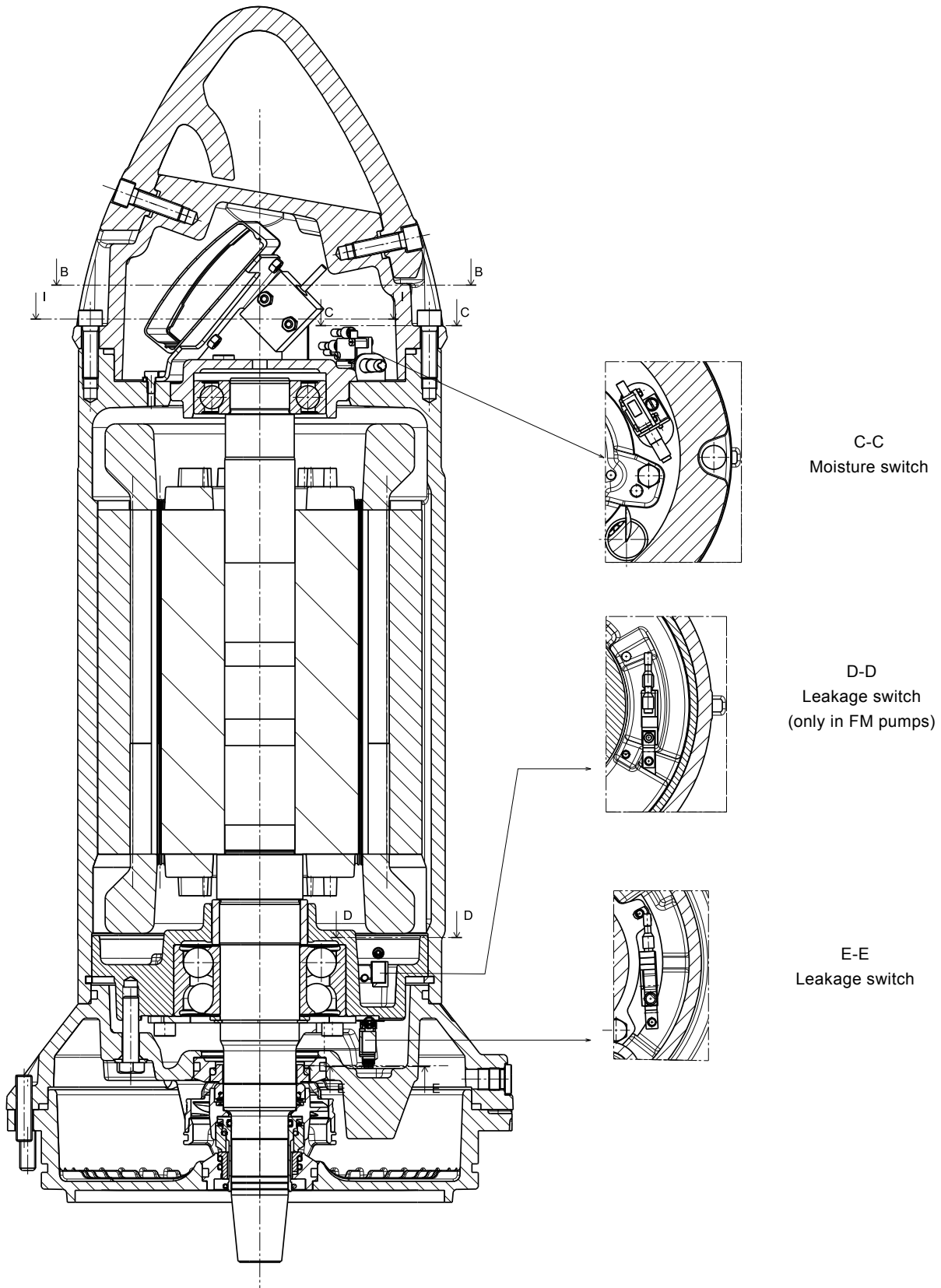


Fig. 42 Sectional drawing showing sensor positions

TM05 4342 2917

### 7.13 Alignment grooves

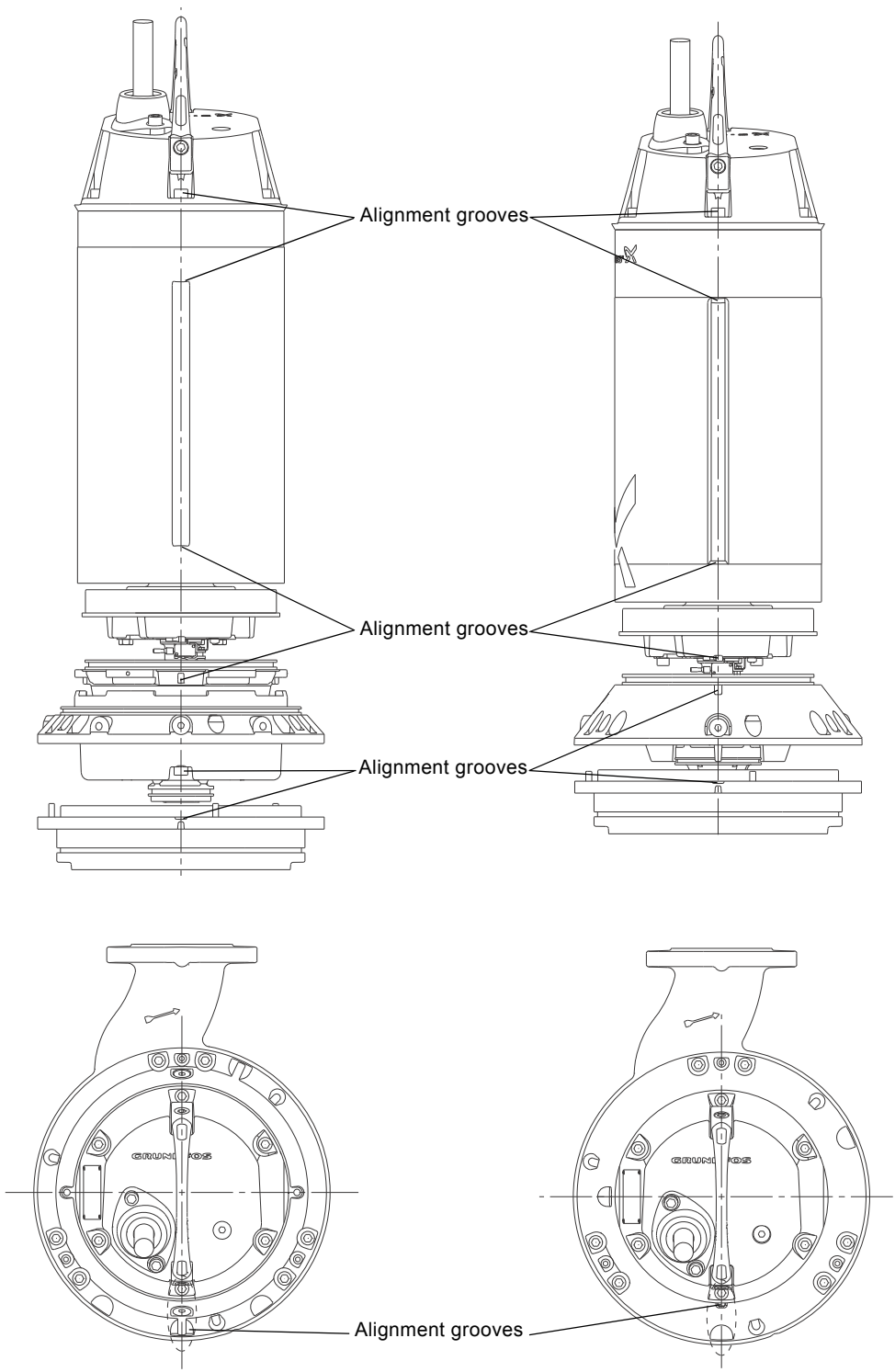


Fig. 43 Alignment grooves



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