

# SEG

50 Hz

Installation and operating instructions



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**GRUNDFOS** X

# English (GB) Installation and operating instructions

## Original installation and operating instructions

These installation and operating instructions describe Grundfos SEG pumps.

Sections 1-5 give the information necessary to be able to unpack, install and start up the product in a safe way.

Sections 6-11 give important information about the product, as well as information on service, fault finding and disposal of the product.

## CONTENTS

	Page
<b>1. General information</b>	<b>3</b>
1.1 Hazard statements	3
1.2 Notes	3
1.3 Target groups	3
<b>2. Receiving the product</b>	<b>3</b>
2.1 Transporting the product	3
<b>3. Installing the product</b>	<b>4</b>
3.1 Mechanical installation	4
3.2 Electrical connection	8
<b>4. Starting up the product</b>	<b>10</b>
4.1 Operating modes	11
4.2 Start and stop levels	11
4.3 Direction of rotation	12
4.4 Startup	12
4.5 Resetting the pump	13
<b>5. Handling and storing the product</b>	<b>13</b>
5.1 Handling the product	13
5.2 Storing the product	13
<b>6. Product introduction</b>	<b>13</b>
6.1 Product description	13
6.2 Applications	14
6.3 Pumped liquids	14
6.4 Potentially explosive environments	14
6.5 Approvals	15
6.6 Identification	16
<b>7. Protection and control functions</b>	<b>17</b>
7.1 LC and LCD level controllers	17
7.2 Thermal switches	17
7.3 CU 100 control unit	18
7.4 Frequency converter operation	18
<b>8. Servicing and maintaining the product</b>	<b>19</b>
8.1 Safety instructions and requirements	19
8.2 Contaminated pumps	20
8.3 Maintenance schedule	20
8.4 Oil check and oil change	21
8.5 Adjusting the impeller clearance	21
8.6 Replacing the grinder system	22
8.7 Cleaning the pump housing	22
8.8 Checking or replacing the shaft seal	23
8.9 Service kits	24

<b>9. Fault finding the product</b>	<b>25</b>
<b>10. Technical data</b>	<b>26</b>
10.1 Operating conditions	26
10.2 Electrical data	26
10.3 Dimensions and weights	26
<b>11. Disposing of the product</b>	<b>27</b>



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



This appliance can be used by children aged from 8 years and above and persons with reduced physical, sensory or mental capabilities or lack of experience and knowledge if they have been given supervision or instruction concerning use of the appliance in a safe way and understand the hazards involved.

Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children without supervision.

## 1. General information

### 1.1 Hazard statements

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

#### DANGER



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

#### WARNING



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

#### CAUTION



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

The hazard statements are structured in the following way:

#### SIGNAL WORD



##### Description of hazard

Consequence of ignoring the warning.

- Action to avoid the hazard.

### 1.2 Notes

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



Observe these instructions for explosion-proof products.



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



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



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



Tips and advice that make the work easier.

The Ex symbol refers to ATEX-approved and IECEx-approved products.

### 1.3 Target groups

These installation and operating instructions are intended for professional installers.

## 2. Receiving the product

The pump may be transported and stored in a vertical or horizontal position. Make sure that the pump cannot roll or fall over.

### 2.1 Transporting the product

All lifting equipment must be rated for the purpose and checked for damage before any attempts to lift the pump. The lifting equipment rating must under no circumstances be exceeded. The pump weight is stated on the nameplate.

#### WARNING

##### Crushing hazard

Death or serious personal injury

- Do not stack pump packages or pallets on top of each other when lifting or moving them.
- Always lift the pump by its lifting bracket or by means of a forklift truck if the pump is fixed on a pallet. Never lift the pump by means of the power cable or the hose or pipe.

#### CAUTION

##### Sharp element

Minor or moderate personal injury



- Make sure not to cut your hands on the sharp edges when opening the pump package.

The polyurethane-embedded plug prevents water from penetrating into the motor via the power cable.



We recommend that you keep the cable end protectors in storage for later use.

### 3. Installing the product



Pump installation in pits must be carried out by specially trained persons.  
Work in or near pits must be carried out according to local regulations.



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

#### 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.



#### DANGER

##### Electric shock

Death or serious personal injury

- Make sure there are at least 3 m free cable above the maximum liquid level.



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



We recommend that you make all maintenance and service work when the pump is placed outside the pit.

#### DANGER

##### Crushing hazard

Death or serious personal injury

- Make sure that the lifting bracket is tightened before attempting to lift the pump. Tighten if necessary.



Carelessness during lifting or transportation may cause personal injury or damage to the pump.

### 3.1 Mechanical installation



Make sure the pit bottom is even before installing the product.

#### DANGER

##### Electric shock

Death or serious personal injury



- Switch off the power supply and lock the main switch in position 0.
- Switch off any external voltage connected to the product before working on it.

#### CAUTION

##### Hot surface



Minor or moderate personal injury

- Make sure that the pump has cooled down before touching it.

#### DANGER

##### Electric shock

Death or serious personal injury



- Before installing the pump and starting it up for the first time, check the power cable for visible defects to avoid short circuits.

#### CAUTION

##### Biological hazard

Minor or moderate personal injury



- Flush the pump thoroughly with clean water and rinse the pump parts in water after dismantling.
- Pits for submersible sewage and wastewater pumps may contain sewage or wastewater with toxic and/or disease-causing substances.
- Wear appropriate personal protective equipment and clothing.
- Observe the local hygiene regulations in force.

Fit the extra nameplate supplied with the pump at the installation site or keep it in the cover of this booklet.

Observe all safety regulations at the installation site, for instance the use of blowers for fresh-air supply to the pit.

Check the oil level in the oil chamber before installing the pump. See section [8.4 Oil check and oil change](#).

The pumps are suitable for different installation types which are described in sections [3.1.2 Installation on auto coupling](#) and [3.1.3 Free-standing submerged installation](#).

SEG.50 (high-flow) pumps have a cast DN 50 outlet flange. All other pumps have a cast DN 40 outlet flange.

The pumps are designed for intermittent operation. When completely submerged in the pumped liquid, the pumps can also operate continuously (S1).



Always use Grundfos accessories to avoid malfunctions due to incorrect installation.



Only use the lifting bracket for lifting the pump. Do not use it to hold the pump when in operation.

## CAUTION

### Crushing of hands

Minor or moderate personal injury

- Do not put your hands or any tool into the pump inlet or outlet port after the pump has been connected to the power supply, unless the pump has been switched off by removing the fuses or switching off the main switch.
- Make sure that the power supply cannot be accidentally switched on.



## CAUTION

### Sharp element

Minor or moderate personal injury

- Do not touch the sharp edges of the impeller, grinder head, and grinder ring without wearing gloves.



## CAUTION

### Biological hazard

Minor or moderate personal injury

- Make sure to seal the pump outlet properly when fitting the outlet pipe, otherwise water might spray out of the sealing.



## 3.1.1 Lifting the product

### WARNING

#### Crushing of hands

Death or serious personal injury

- When lifting the pump, make sure your hand is not caught between the lifting bracket and the hook.

Carelessness during lifting or transportation may cause personal injury or damage to the pump.

### WARNING

#### Crushing hazard

Death or serious personal injury

- Make sure that the hook is fixed properly to the lifting bracket.
- Always lift the pump by its lifting bracket or by means of a forklift truck if the pump is fixed on a pallet.
- Never lift the pump by means of the power cable, hose or pipe.
- Make sure that the lifting bracket is tightened before attempting to lift the pump. Tighten if necessary.

Carelessness during lifting or transportation may cause injury persons or damage to the pump.

When lifting the pump, use the right lifting point to keep the pump balanced. Place the lifting chain hook in point A for auto-coupling installations and in point B for other installations. See fig. 1.

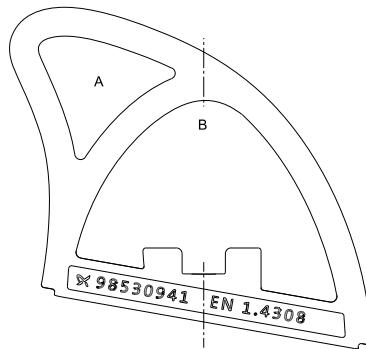


Fig. 1 Lifting points

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### 3.1.2 Installation on auto coupling

Pumps for permanent installation can be mounted on a stationary auto-coupling guide rail system or a hookup auto-coupling system.

Both auto-coupling systems facilitate maintenance and service as the pump can easily be lifted out of the pit.



Before beginning installation procedures, make sure that the atmosphere in the pit is not potentially explosive.

We recommend that you use loose flanges to ease the installation and to avoid pipe tension at flanges and bolts.



Make sure that the pipes are installed without the use of undue force. No loads from the weight of the pipes must be carried by the pump.



Do not use elastic elements or bellows in the pipes. Never use these elements as a means to align the pipes.

#### Auto-coupling guide rail system

See fig. 1 in [Appendix](#).

Proceed as follows:

1. Drill mounting holes for the guide rail bracket on the inside of the pit, and fasten the guide rail bracket provisionally with two anchor bolts.
2. Place the auto-coupling base unit on the bottom of the pit. Use a plumb line to establish the correct positioning. Fasten the auto coupling with heavy-duty anchor bolts. If the bottom of the pit is uneven, the auto-coupling base unit must be supported so that it is level when being fastened.
3. Assemble the outlet line in accordance with the generally accepted procedures and without exposing the line to distortion or tension.
4. Insert the guide rails in the auto-coupling base unit and adjust the length of the rails accurately to the guide rail bracket at the top of the pit.
5. Unscrew the provisionally fastened guide rail bracket, fit it on top of the guide rails, and finally fasten it firmly to the pit wall.



The guide rails must not have any axial play as this would cause noise during pump operation.

6. Clean out debris from the pit before lowering the pump into the pit.
7. Fit the guide claw to the pump outlet. Grease the gasket of the guide claw before lowering the pump into the pit.
8. Slide the guide claw between the guide rails and lower the pump into the pit by means of a chain secured to the lifting bracket of the pump. When the pump reaches the auto-coupling base unit, the pump will automatically connect tightly.



When the pump has reached the auto-coupling base unit, shake the pump by means of the chain to make sure that it is placed in the correct position.

9. Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
10. Adjust the length of the power cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook at the top of the pit. Make sure that the cable is not sharply bent or pinched.
11. Connect the power cable and the control cable, if any.



The free end of the cable must not be submerged as water may penetrate through the cable into the motor.

## Hookup auto-coupling system

See fig. 2 in [Appendix](#).

Proceed as follows:

1. Fit a crossbar in the pit.
2. Fit the stationary part of the auto coupling on top of the crossbar.
3. Fit the adapted piece of pipe for the movable part of the hookup auto coupling to the pump outlet.
4. Fasten a shackle and a chain to the movable part of the hookup auto coupling.
5. Clean out debris from the pit before lowering the pump.
6. Lower the pump into the pit by means of the chain secured to the lifting bracket of the pump. When the movable part of the auto coupling reaches the stationary part, the two will normally, automatically connect tightly.



When the pump has reached the auto-coupling base unit, shake the pump by means of the chain to make sure that it is placed in the correct position.

7. Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
8. Adjust the length of the power cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook at the top of the pit. Make sure that the cable is not sharply bent or pinched.
9. Connect the power cable and the control cable, if any.



The free end of the cable must not be submerged as water may penetrate through the cable into the motor.

## 3.1.3 Free-standing submerged installation

Pumps for free-standing submerged installation can stand freely on the bottom of the pit or similar location. See fig. 3 in [Appendix](#).

The pump must be mounted on separate feet (accessory).

In order to facilitate service on the pump, fit a flexible union or coupling to the outlet line for easy separation.

If a hose is used, make sure that the hose does not buckle and that the inside diameter of the hose matches that of the outlet port.

If a rigid pipe is used, fit the union or coupling, non-return valve and isolating valve in the order mentioned, when viewed from the pump.

If the pump is installed in muddy conditions or on uneven ground, we recommend that you support the pump on bricks or a similar support.

Proceed as follows:

1. Fit a 90 ° elbow to the pump outlet port and connect the outlet pipe or hose.
2. Lower the pump into the liquid by means of a chain secured to the lifting bracket of the pump. We recommend that you place the pump on a plane, solid foundation. Make sure that the pump is hanging from the chain and not the power cable.
3. Hang up the end of the chain on a suitable hook at the top of the pit and in such a way that the chain cannot come into contact with the pump housing.
4. Adjust the length of the power cable by coiling it up on a relief fitting to ensure that the cable is not damaged during operation. Fasten the relief fitting to a suitable hook at the top of the pit. Make sure that the cable is not sharply bent or pinched.
5. Connect the power cable and the control cable, if any.



The free end of the cable must not be submerged as water may penetrate through the cable into the motor.



If several pumps are installed in the same pit, the pumps must be installed at the same level in order to allow optimum pump alternation.

### 3.2 Electrical connection

Carry out the electrical connection according to local regulations.

#### DANGER

##### Electric shock

Death or serious personal injury

- Connect the pump to an external main switch which ensures all-pole disconnection with a contact separation according to EN 60204-1, 5.3.2.
- It must be possible to lock the main switch in position 0. Type and requirements as specified in EN 60204-1, 5.3.2.



Connect the pumps to a control unit with a motor protection relay with IEC trip class 10 or 15.

Pumps to be installed in potentially explosive locations must be connected to a control box with a motor protection relay with IEC trip class 10.

The permanent installation must be fitted with an earth-leakage circuit breaker.

Make sure there are at least 3 m free cable above the maximum liquid level.



Do not install Grundfos control boxes, pump controllers, Ex barriers and the free end of the power cable in potentially explosive environments.

The classification of the installation site must be approved according to local rules in each individual case.

On explosion-proof pumps, make sure that an external earth conductor is connected to the external earth terminal of the pump using a conductor with a secure cable clamp. Clean the surface of the external earth connection and fit the cable clamp.



The cross-section of the earth conductor must be at least 4 mm<sup>2</sup>, e.g. type H07 V2-K (PVT 90 °) yellow and green.

Make sure that the earth connection is protected against corrosion.

Make sure that all protective equipment has been connected correctly.

Float switches used in potentially explosive environments must be approved for this application. They must be connected to the Grundfos LC, LCD 108 pump controller via the intrinsically safe LC-Ex4 barrier to ensure a safe circuit.

#### DANGER

##### Electric shock

Death or serious personal injury



- If the power cable is damaged, it must be replaced by the manufacturer, his service agent or a similarly qualified person.



Set the motor-protective circuit breaker to the rated current of the pump. The rated current is stated on the pump nameplate.



Make sure that the pump is connected in accordance with the instructions given in this booklet.

The supply voltage and frequency are marked on the pump nameplate. For voltage tolerance, see section [10. Technical data](#). Make sure that the motor is suitable for the power supply available at the installation site.

All pumps are supplied with 10 m cable and a free cable end.

## DANGER

### Electric shock



Death or serious personal injury

- Before the first startup of the pump, check the power cable for visible defects to avoid short circuits.



A possible replacement of the power cable must be carried out by Grundfos or a service workshop authorised by Grundfos.

The pump must be connected to one of these two controller types:

- a control unit with motor-protective circuit breaker, such as a Grundfos CU 100
- a Grundfos LC, LCD 107, LC, LCD 108 or LC, LCD 110 pump controller.

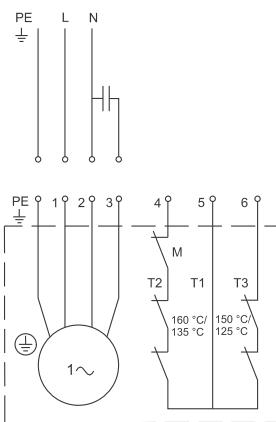
See fig. 2 or 3 and the installation and operating instructions for the selected control unit or pump controller.

In potentially explosive environments you have two options:

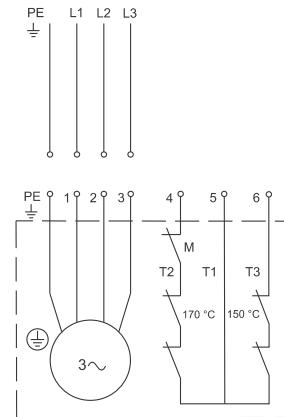
- Use float switches made for an Ex environment and a safety barrier in combination with either DC, DCD or LC, LCD 108.
- Use air bells in combination with LC, LCD 107.

For more information about the function of the thermal switches, see section [7.2 Thermal switches](#).

### 3.2.1 Wiring diagrams



**Fig. 2** Wiring diagram for single-phase pumps



**Fig. 3** Wiring diagram for three-phase pumps

## 4. Starting up the product

### CAUTION

#### Crushing of hands

Minor or moderate personal injury

- Do not put your hands or any tool into the pump inlet or outlet port after the pump has been connected to the power supply, unless the pump has been switched off by removing the fuses or switching off the main switch.
- Make sure that the power supply cannot be accidentally switched on.



Before starting the product:

- Make sure that the fuses have been removed.
- Make sure that all protective equipment has been connected correctly.



### CAUTION

#### Biological hazard

Minor or moderate personal injury

- Make sure to seal the pump outlet properly when fitting the outlet pipe otherwise water might spray out of the sealing.



### WARNING

#### Crushing of hands

Death or serious personal injury

- When lifting the pump, make sure your hand is not caught between the lifting bracket and the hook.



### DANGER

#### Crushing hazard

Death or serious personal injury

- Make sure that the hook is fixed properly to the lifting bracket.
- Always lift the pump by its lifting bracket or by means of a forklift truck if the pump is fixed on a pallet.
- Never lift the pump by means of the power cable, hose or pipe.
- Make sure that the lifting bracket is tightened before attempting to lift the pump. Tighten if necessary.



### DANGER

#### Electric shock

Death or serious personal injury

- Before starting up the product for the first time, check the power cable for visible defects to avoid short circuits.
- If the power cable is damaged, it must be replaced by the manufacturer, his service agent or a similarly qualified person.
- Make sure that the product is earthed properly.
- Switch off the power supply and lock the main switch in position 0.
- Switch off any external voltage connected to the product before working on it.



### CAUTION

#### Biological hazard

Minor or moderate personal injury

- Flush the pump thoroughly with clean water and rinse the pump parts in water after dismantling.
- Pits for submersible sewage and wastewater pumps may contain sewage or wastewater with toxic and/or disease-causing substances.
- Wear appropriate personal protective equipment and clothing.
- Observe the local hygiene regulations in force.



### CAUTION

#### Hot surface

Minor or moderate personal injury

- Do not touch the surface of the pump while the pump is running.



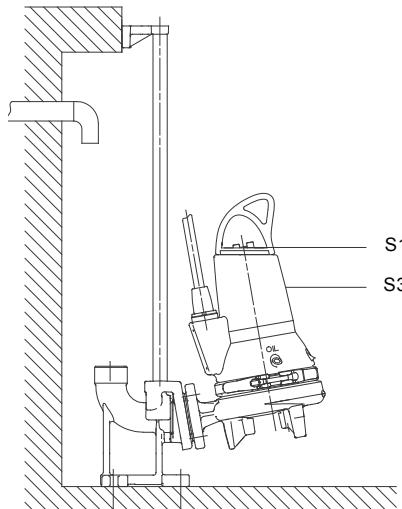
Do not open the clamp while the pump is running.

## 4.1 Operating modes



Do not start the pump if the atmosphere in the pit is potentially explosive.

The pumps are designed for intermittent operation (S3). When completely submerged in the pumped liquid, the pumps can also operate continuously (S1). See fig. 4.



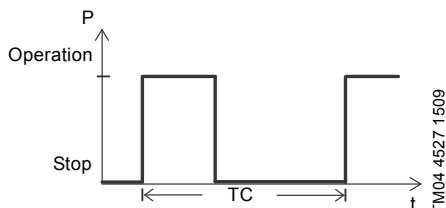
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**Fig. 4** Operating levels

## S3, intermittent operation

S3 operation is a series of 10-minute duty cycles (TC). Each cycle has a 4-minute period of constant load followed by a 6-minute period of rest. Thermal equilibrium is not reached during the cycle. See fig. 5.

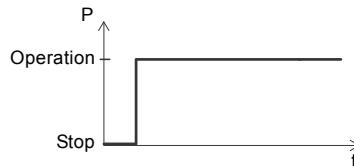
In this operating mode, the pump is partly submerged in the surrounding liquid. The minimum liquid level is at the top of the cable entry.



**Fig. 5** S3 operation

## S1, continuous operation

In this operating mode, the pump can operate continuously without being stopped for cooling. Being completely submerged, the pump is sufficiently cooled by the surrounding liquid. See fig. 6.



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**Fig. 6** S1 operation

## 4.2 Start and stop levels

The difference in level between start and stop can be adjusted by changing the free cable length.

Long free cable = large difference in level.

Short free cable = small difference in level.

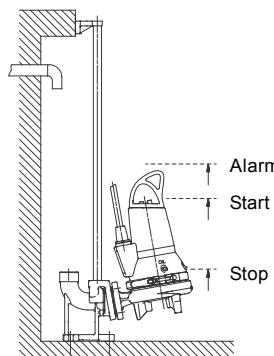


Observe the two following points.

- To prevent air intake and vibrations, install the stop level switch in such a way that the pump is stopped before the liquid level is lowered below the upper edge of the clamp on the pump.
- Install the start level switch in such a way that the pump is started at the required level; however, the pump must always be started before the liquid level reaches the bottom inlet pipe to the pit.



CU 100 must not be used for Ex applications.



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**Fig. 7** Start and stop levels

### 4.3 Direction of rotation



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

All single-phase pumps are factory-wired for the correct direction of rotation.

Before starting up three-phase pumps, check the direction of rotation.

An arrow on the stator housing indicate the correct direction of rotation.



The impeller rotates clockwise when the pump is viewed from above. When started, the pump will jerk in the opposite direction of the direction of rotation.

If the direction of rotation is wrong, interchange two phases in the power cable. See fig. 2 or 3.

#### Checking the direction of rotation

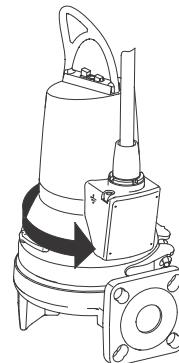
Check the direction of rotation in one of the following ways every time the pump is connected to a new installation.

Procedure 1:

1. Start the pump and measure the quantity of liquid or the outlet pressure.
2. Stop the pump and interchange two phases in the power cable.
3. Restart the pump and measure the quantity of liquid or the outlet pressure.
4. Stop the pump.
5. Compare the results taken under points 1 and 3. The connection which gives the larger quantity of liquid or the higher pressure is the correct direction of rotation.

Procedure 2:

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.
3. If connected correctly, the pump will jerk in the opposite direction of the direction of rotation. See fig. 8.
4. If the direction of rotation is wrong, interchange two phases in the power cable. See fig. 2 or 3.



**Fig. 8 Jerk direction**

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### 4.4 Startup



The pump must not run dry.



If the atmosphere in the pit is potentially explosive, use only pumps with Ex approval.



In case of abnormal noise or vibrations from the pump, other pump failure or power supply failure, stop the pump immediately.

Do not attempt to restart the pump until the cause of the fault has been found and corrected.

Proceed as follows:

1. Remove the fuses, and check that the impeller can rotate freely. Turn the grinder head by hand.
2. Check the condition of the oil in the oil chamber. See also section [8.4 Oil check and oil change](#).
3. Check whether the monitoring units, if used, are operating satisfactorily.
4. Check the setting of the air bells, float switches or electrodes.
5. Open the isolating valves, if fitted.  
**Auto coupling:** It is important to grease the gasket of the guide claw before lowering the pump into the pit.
6. Lower the pump into the liquid and insert the fuses.  
**Auto coupling:** Check that the pump is in the right position on the auto-coupling base unit.
7. Check that the system has been filled with liquid and vented. The pump is self-venting.
8. Switch on the power supply to the pump. When power is on, the pump will start and pump down to the dry-running level. This process can be used to check that the pump functions correctly.

After one week of operation or after replacement of the shaft seal, check the condition of the oil in the chamber. See section [8. Servicing and maintaining the product](#).

#### 4.5 Resetting the pump

To reset the pump, switch off the power supply to the pump for one minute, and switch it on again.

### 5. Handling and storing the product

#### 5.1 Handling the product

Before handling the product, see section [3.1.1 Lifting the product](#).

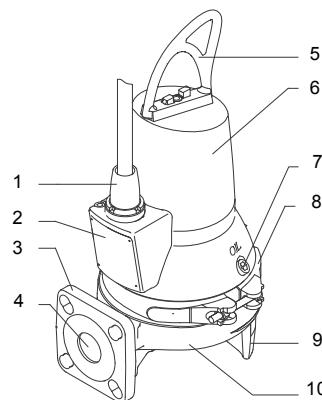
#### 5.2 Storing the product

During long periods of storage, protect the pump against moisture and heat.

After a long period of storage, inspect the pump before putting it into operation. Make sure that the impeller can rotate freely. Pay special attention to the condition of the shaft seal and the cable entry.

## 6. Product introduction

### 6.1 Product description



**Fig. 9** SEG pump

Pos.	Designation
1	Cable plug
2	Nameplate
3	Outlet flange DN 40 and 50
4	Outlet port
5	Lifting bracket
6	Stator housing
7	Oil screw
8	Clamp
9	Pump foot
10	Pump housing

## 6.2 Applications

The compact design makes the pumps suitable for both temporary and permanent installation.

The pumps can be installed on an auto-coupling system or stand freely on the bottom of the pit.

SEG pumps are designed with a grinder system which grinds solid particles into small pieces so that they can be led away through pipes of a relatively small diameter.

SEG pumps are used in pressurised systems, e.g. in hilly areas.

## 6.3 Pumped liquids

SEG pumps are designed for pumping these liquids:

- domestic wastewater with discharge from toilets
- sewage from restaurants, hotels, camping sites, etc.

## 6.4 Potentially explosive environments

Use explosion-proof pumps for applications in potentially explosive environments.



The pumps must under no circumstances pump combustible or flammable liquids.



The classification of the installation site must be approved according to local rules in each individual case.

The letter X in the certificate number indicates that the equipment is subject to special conditions for safe use. The conditions are mentioned in the certificate and in these installation and operating instructions.

Special conditions for safe use of explosion-proof pumps:

1. Bolts used for replacement must be class A2-70 or better according to EN/ ISO 3506-1.
2. The pump must not run dry. The level of pumped liquid must be controlled by two stop level switches connected to the motor control circuit. The minimum level depends on the installation type and is specified in these installation and operating instructions. The pumps can be used in duty cycles S3, halfway submerged, or S1, fully submerged.
3. Make sure the permanently attached cable is suitably mechanically protected and terminated in a suitable terminal board placed outside the potentially explosive area. The power cable plug may only be disconnected by the manufacturer or his representative.
4. The thermal protector in the stator windings has a rated cut-out temperature of 150 °C guaranteeing the disconnection of the power supply. The power supply must be reset manually.
5. The IP68 rating is limited to maximum 10 m submersion depth.
6. The temperature range is limited to -20 to +40 °C for ambient temperature and 0-40 °C for liquids.
7. Contact the manufacturer regarding the "d" protection type for pumps and for information on the dimensions of the flameproof joints.
8. The lock nut of the cable connector must only be replaced with an identical one.

## 6.5 Approvals

The standard version of SEG pumps has been tested by VDE. The explosion-proof version of SEG has been approved by DEKRA according to the ATEX directive.

### 6.5.1 Approval standards

The standard version of SEG pumps has been approved by TÜV Rheinland LGA according to EN 12050-1.

The explosion protection classification of the pumps is Europe CE 0344 Ex II 2 G Ex db IIB T4 Gb.

Directive or standard	Code	Description
	CE 0344	CE marking of conformity according to the ATEX directive 2014/34/EU. 0344 = 0344 is the number of the notified body which has certified the quality system for ATEX.
ATEX	Ex	= Explosion protection marking.
	II	= Equipment group according to the ATEX directive, defining the requirements applicable to the equipment in this group.
	2	= Equipment category according to the ATEX directive, defining the requirements applicable to the equipment in this category.
	G	= Explosive atmosphere caused by gases, vapours or mists.
	Ex	= The equipment conforms to harmonised European standard.
	db	= Flameproof enclosure according to EN 60079-1.
Harmonised European standard	IIB	= Classification of gases, see EN 60079-0. Gas group B includes gas group A.
	T4	= Maximum surface temperature is 135 °C.
	Gb	= Equipment for explosive gas atmospheres with "high" level of protection.

### 6.5.2 Australia

For IEC countries, such as Australia and others, the explosion-proof versions have been approved by DEKRA, certificate no IECEx DEK 18.0038X, as Ex db IIB T4 Gb according to IEC 60079-0:2017 and IEC 60079-1:2014 or certificate no IECEx KEM 06.0127X, as Ex nC II T3 according to IEC 60079-15:1987 (corresponding to AS 2380.9).

Standard	Code	Description
IEC 60079-15	Ex	= Area classification according to AS 2430.1.
	n	= Non-sparking according to AS 2380.9:1991, section 3 (IEC 60079-15).
	C	= The environment is adequately protected against sparking components.
	II	= Suitable for use in explosive atmospheres (not mines).
	T3	= Maximum surface temperature is 200 °C.

## 6.6 Identification

### 6.6.1 Nameplate

Fix the extra nameplate supplied with the pump at the installation site or keep it in the cover of this booklet.

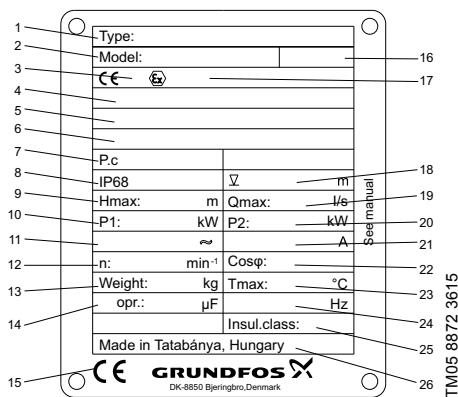


Fig. 10 Nameplate

Pos.	Description
1	Type designation
2	Product number
3	Approval
4	ATEX certificate number
5	IEC Ex description
6	IEC Ex certificate number
7	Production code, year and week
8	Enclosure class according to IEC 60529
9	Maximum head [m]
10	Rated input power [kW]
11	Rated voltage
12	Speed [rpm]
13	Net weight [kg]
14	Run capacitor [ $\mu$ F]
15	CE mark
16	Safety instructions, publication number
17	Ex description
18	Maximum installation depth [m]
19	Maximum flow rate [l/s]
20	Rated power output [kW]
21	Maximum current [A]
22	Cos $\varphi$ , 1/1 load
23	Maximum liquid temperature [ $^{\circ}$ C]
24	Frequency [Hz]
25	Insulation class
26	Production country

### 6.6.2 Type key

Example: SEG.40.12.Ex.2.1.502

Code	Description	Designation
SE	Grundfos sewage pumps	Type range
G	Grinder system in the pump inlet	Impeller type
40	Nominal diameter of outlet port	
50	Nominal diameter of the outlet port for high-flow variants	Pump outlet [mm]
12	P2 = code number from type designation / 10	Output power [kW]
[ ]	Standard, without equipment	Equipment
[ ]	Standard version of submersible wastewater pumps	
Ex	Pump designed according to the ATEX standard indicated or Australian standard, AS 2430.1	Pump version
2	2-pole	Number of poles
1	Single-phase motor	Number of phases
[ ]	Three-phase motor	
5	50 Hz	Frequency [Hz] <sup>1)</sup>
02	230 V, DOL	
0B	400-415 V, DOL	Voltage and starting method
0C	230-240 V, DOL	
[ ]	1st generation	
A	2nd generation	Generation <sup>2)</sup>
B	3rd generation	
[ ]	Standard material (EN-GJL-200)	Pump material
Z	Custom-built pump	Customisation

1) Maximum frequency in case of frequency converter operation.

2) The pumps in the individual generations differ in design but are similar in terms of power rating.

## 7. Protection and control functions

The liquid level can be controlled via the Grundfos LC, LCD 107, LC, LCD 108, LC, CLD 110 level controllers, and the pumps can be protected via thermal switches or the Grundfos CU 100 control unit.

### 7.1 LC and LCD level controllers

LC controllers are for one-pump installations and LCD controllers are for two-pump installations.

The following LC and LCD level controllers are available:

- LC 107 and LCD 107 with air bells
- LC 108 and LCD 108 with float switches
- LC 110 and LCD 110 with electrodes.

In the following description, "level switches" can be air bells, float switches or electrodes, depending on the level controller selected.

#### 7.1.1 LC, LCD

Controllers for single-phase pumps incorporate capacitors.

The LC controller has two or three level switches: One for start and the other for stop of pump. The third level switch, which is optional, is for high-level alarm.

The LCD controller has three or four level switches: One for common stop and two for start of the pumps. The fourth level switch, which is optional, is for high-level alarm.

When installing the level switches, observe the following points:

- To prevent air intake and vibrations, install the stop level switch in such a way that the pump is stopped before the liquid level is lowered below the middle of the motor housing.
- Install the start level switch in such a way that the pump is started at the required level; however, the pump must always be started before the liquid level reaches the bottom inlet pipe to the pit.
- If installed, always install the high-level alarm switch about 10 cm above the start level switch. However, the alarm must always be given before the liquid level reaches the inlet pipe to the pit.

For further settings, see the installation and operating instructions for the level controller selected.

The pump must not run dry.

Install an additional level switch to ensure that the pump is stopped in case the stop level switch is not operating.

The pump must be stopped when the liquid level reaches the upper edge of the clamp on the pump.

 Float switches used in potentially explosive environments must be approved for this application. They must be connected to the Grundfos DC, DCD and LC, LCD 107, LC, LCD 108 and LC, LCD 110 level controller via an intrinsically safe barrier to ensure a safe circuit.

## 7.2 Thermal switches

All pumps have two sets of thermal switches incorporated in the stator windings.

The thermal switch in circuit 1 (T1-T3) will break the circuit at the following approximate winding temperatures:

- 150 °C
- 125 °C for 1.5 kW, single-phase pumps.

This thermal switch must always be connected.

The thermal switch in circuit 2 (T1-T2) will break the circuit at the following approximate winding temperatures:

- 170 °C for three-phase pumps
- 160 °C for single-phase pumps
- 135 °C for 1.5 kW, single-phase pumps.

After thermal cutout, explosion-proof



pumps must be restarted manually. The thermal switch in circuit 2 must be connected for manual restarting of these pumps.

The maximum operating current of the thermal switches is 0.5 A at 500 VAC and cos φ 0.6. The switches must be able to break a coil in the supply circuit.

When the thermal switches in standard pumps close the circuit after cooling, the pump will be restarted automatically by the controller.

## DANGER

### Explosive environment

Death or serious personal injury



- Do not install the separate motor-protective circuit breaker or control unit in potentially explosive environments.

### 7.3 CU 100 control unit

CU 100 incorporates a motor-protective circuit breaker and is available with level switch and cable.

#### Single-phase pumps

Connect a run capacitor to the control unit.

For capacitor sizes, see the table below:

Pump type	CS, starting capacitor	CR, run capacitor		
[kW]	[ $\mu$ F]	[V]	[ $\mu$ F]	[V]
0.9 and 1.2	150	230	30	450
1.5	150	230	40	450

### 7.4 Frequency converter operation



Frequency converter operation will influence the efficiency of the grinder system.

For frequency converter operation please observe the following information.

Requirements must be fulfilled.

Recommendations ought to be followed.

Consequences must be considered.

#### 7.4.1 Requirements

- The thermal protection of the motor must be connected.
- Peak voltage and dU/dt must be in accordance with the table below. The values stated are maximum values supplied to motor terminals. The cable influence has not been taken into account. See data sheet for the frequency converter used regarding the actual values and cable influence on the peak voltage and dU/dt.

Max. repetitive peak voltage [V]	Max. dU/dt U <sub>N</sub> 400 V [V/ $\mu$ sec.]
650	2000

- If the pump is an Ex-approved pump, check if the Ex certificate of the specific pump allows the use of a frequency converter.
- Set the frequency converter U/f ratio according to the motor data.
- Local regulations and standards must be fulfilled.

#### 7.4.2 Recommendations

Before installing a frequency converter, calculate the lowest allowable frequency in the installation in order to avoid zero flow.

- Do not reduce the motor speed to less than 30 % of rated speed.
- Keep the flow velocity above 1 m/sec.
- Let the pump run at rated speed at least once a day in order to prevent sedimentation in the pipe system.
- Do not exceed the frequency indicated on the nameplate. In this case there is risk of motor overload.
- Keep the power cable as short as possible. The peak voltage will increase with the length of the power cable. See data sheet for the frequency converter used.
- Use input and output filters on the frequency converter. See data sheet for the frequency converter used.
- Use a screened power cable if there is a risk that electrical noise can disturb other electrical equipment. See data sheet for the frequency converter used.

#### 7.4.3 Consequences

When operating the pump via a frequency converter, please be aware of these possible consequences:

- The locked-rotor torque will be lower. How much lower will depend on the frequency converter type. See the installation and operating instructions for the frequency converter used for information on the locked-rotor torque available.
- The working condition of bearings and shaft seal may be affected. The possible effect will depend on the application. The actual effect cannot be predicted.
- The acoustic noise level may increase. See the installation and operating instructions for the frequency converter used for advice as to how to reduce the acoustic noise.

## 8. Servicing and maintaining the product

### 8.1 Safety instructions and requirements

#### DANGER

##### Electric shock

Death or serious personal injury

- Before starting work on the pump, 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.



#### CAUTION

##### Crushing of hands

Minor or moderate personal injury

- Do not put your hands or any tool into the pump inlet or outlet port after the pump has been connected to the power supply, unless the pump has been switched off by removing the fuses or switching off the main switch.
- Make sure that all the rotating parts have stopped moving.



#### CAUTION

##### Sharp element

Minor or moderate personal injury

- Avoid touching the sharp edges of the impeller, grinder head and grinder ring without gloves.



#### CAUTION

##### Biological hazard

Minor or moderate personal injury

- Make sure to seal the pump outlet properly when fitting the outlet pipe, otherwise water might spray out of the sealing.



#### CAUTION

##### Hot surface

Minor or moderate personal injury

- Do not touch the surface while the pump is running.



#### WARNING

##### Crushing of hands

Death or serious personal injury

- When lifting the pump, make sure your hand is not caught between the lifting bracket and the hook.



#### DANGER

##### Crushing hazard

Death or serious personal injury

- Make sure that the hook is fixed properly to the lifting bracket.
- Always lift the pump by its lifting bracket or by means of a forklift truck if the pump is fixed on a pallet.
- Never lift the pump by means of the power cable, hose or pipe.
- Make sure that the lifting bracket is tightened before attempting to lift the pump. Tighten if necessary.



#### DANGER

##### Electric shock

Death or serious personal injury

- Before installing the pump and starting it up for the first time, check the power cable for visible defects to avoid short circuits.
- If the power cable is damaged, it must be replaced by the manufacturer, his service agent or a similarly qualified person.
- Make sure that the product is earthed properly.
- Switch off the power supply and lock the main switch in position 0.
- Switch off any external voltage connected to the pump before working on it.



#### CAUTION

##### Biological hazard

Minor or moderate personal injury

- Flush the pump thoroughly with clean water and rinse the pump parts in water after dismantling.
- Pits for submersible sewage and wastewater pumps may contain sewage or wastewater with toxic and/or disease-causing substances.
- Wear appropriate personal protective equipment and clothing.
- Observe the local hygiene regulations in force.



#### CAUTION

##### Pressurised system

Minor or moderate personal injury

- As pressure may have built up in the oil chamber, do not remove the screws until the pressure has been fully relieved.





Except for service on the pump parts, all other service work must be carried out by Grundfos or a service workshop authorised by Grundfos and approved for servicing explosion-proof products.

Before carrying out maintenance and service, flush the pump thoroughly with clean water. Rinse the pump parts in water after dismantling.



If the pump is inactive for long periods of time, we recommend that you check the function of the pump.



Service videos can be found in Grundfos Product Center at [www.grundfos.com](http://www.grundfos.com).



A possible replacement of the power cable must be carried out by Grundfos or a service workshop authorised by Grundfos.

## 8.2 Contaminated pumps

### 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.

## 8.3 Maintenance schedule

Inspect pumps running normal operation every 3000 operating hours or at least once a year. If the dry-solids content of the pumped liquid is very high or sandy, check the pump at shorter intervals.

Check the following points:

- **Power consumption**  
See section [6.6.1 Nameplate](#).
- **Oil level and oil condition**  
When the pump is new or after replacement of the shaft seal, check the oil level after one week of operation.  
Use Shell Ondina X420 oil or similar type.  
See section [8.4 Oil check and oil change](#).
- **Cable entry**



Make sure that the cable entry is watertight and that the cables are not sharply bent and/or pinched.

- **Pump parts**  
Check the impeller, the pump housing, etc. for possible wear. Replace defective parts.  
See section [8.9 Service kits](#).
- **Ball bearings**  
Check the shaft for noisy or heavy operation by turning the shaft by hand. Replace defective ball bearings.  
A general overhaul of the pump is usually required in case of defective ball bearings or poor motor function. This work must be carried out by Grundfos or a service workshop authorised by Grundfos.
- **Grinder system and parts**  
In case of frequent choke-ups, check the grinder system for visible wear. When worn, the edges of the grinding parts are round. Compare with a new grinder system.

## 8.4 Oil check and oil change

Every 3000 operating hours or at least once a year, change the oil in the oil chamber as described below. If the shaft seal has been changed, change the oil as well.

The table below states the quantity of oil in the oil chamber.

Pump type	Quantity of oil in the oil chamber [l]
SEG up to 1.5 kW	0.17
SEG 2.6 to 4.0 kW	0.42

### Draining of oil

#### CAUTION

##### Pressurised system



Minor or moderate personal injury

- As pressure may have built up in the oil chamber, do not remove the screws until the pressure has been fully relieved.

1. Loosen and remove both oil screws to allow all the oil to drain from the chamber.
2. Check the oil for water and impurities. If the shaft seal has been removed, the oil will give a good indication of the condition of the shaft seal.



Dispose of used oil in accordance with local regulations.

### Oil filling, pump lying down

See fig. 11.

1. Place the pump in such a position that it is lying on the stator housing and the outlet flange and that the oil screws are pointing upwards.
2. Fill oil into the oil chamber through the upper hole until it starts running out of the lower hole. The oil level is now correct.  
For oil quantity, see section [8.4 Oil check and oil change](#).
3. Fit both oil screws using the gaskets included in the O-ring service kit. See section [8.9 Service kits](#).

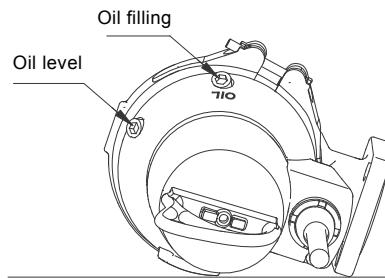


Fig. 11 Oil filling holes

### Oil filling, pump in upright position

1. Place the pump on a plane, horizontal surface.
2. Fill oil into the oil chamber through one of the holes until it starts running out of the other hole. For oil quantity, see section [8.4 Oil check and oil change](#).
3. Fit both oil screws using the gaskets included in O-ring service the kit. See section [8.9 Service kits](#).

### 8.5 Adjusting the impeller clearance

For position numbers in brackets, see fig. D in [Appendix](#).

Proceed as follows:

1. Gently tighten the adjusting nut (68) until the impeller (49) cannot rotate any more. Use a spanner size 24.
2. Loosen the adjusting nut by 1/4 turn.

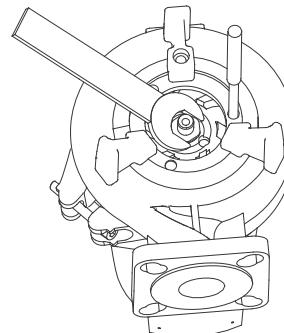


Fig. 12 Adjusting the impeller clearance

## 8.6 Replacing the grinder system

### CAUTION

#### Sharp element

Minor or moderate personal injury

- Beware of the sharp edges on the impeller, grinder head and grinder ring.

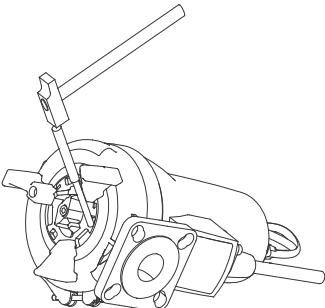
 During service the painted surface may be damaged. Remember to restore the painted surface by applying new paint.

For position numbers in brackets, see fig. D in [Appendix](#).

Proceed as follows:

### Dismantling

1. Loosen the screw (188a) in one of the pump feet.
2. Loosen the grinder ring (44), and open the bayonet socket by knocking or turning the grinder ring 15 to 20 ° clockwise. See fig. 13.



TM06 5746 0116

Fig. 13 Removing the grinder ring

3. Gently prise the grinder ring (44) out of the pump housing with a screwdriver.



Make sure that the grinder ring does not get stuck against the grinder head.

4. Insert a punch into the hole in the pump housing to hold the impeller.
5. Remove the screw (188a) in the shaft end and the locking ring (66).
6. Remove the grinder head (45).

### Assembly

1. When fitting the grinder head (45), the projections on the back of the grinder head must engage with the holes in the impeller (49).
2. Tighten the screw (188a) for the grinder head to 20 Nm. Do not forget the lock washer.
3. Fit the grinder ring (44).
4. Turn the grinder ring (44) 15 to 20 ° counter-clockwise until it is tightened.
5. Check that the grinder ring does not touch the grinder head.
6. Tighten the screw (188a) to 16 Nm.

## 8.7 Cleaning the pump housing

For position numbers in brackets, see fig. D in [Appendix](#).

Proceed as follows:

### Dismantling

1. Stand the pump upright.
2. Loosen and remove the clamp (92) joining the pump housing and the motor.
3. Lift the motor out of the pump housing (50). As the impeller and grinder head are fastened to the shaft end, the impeller and the grinder head will be removed together with the motor.
4. Clean the pump housing and the impeller.

### Assembly

1. Place the motor with the impeller and the grinder head in the pump housing.
2. Fit and tighten the clamp (92).

See also section [8.8 Checking or replacing the shaft seal](#).

## 8.8 Checking or replacing the shaft seal

To make sure that the shaft seal is intact, check the oil.

If the oil contains more than 20 % water, the shaft seal is defective and must be replaced. If the shaft seal is still used, the motor will be damaged.

If the oil is clean, it can be reused. See also section [8. Servicing and maintaining the product](#).

For position numbers in brackets, see fig. D in [Appendix](#).

Proceed as follows:

1. Remove the grinder ring (44).  
See section [8.6 Replacing the grinder system](#).
2. Remove the screw (188a) from the shaft end.
3. Loosen and remove the clamp (92) fastening the pump housing to the motor.
4. Lift the motor out of the pump housing (50). As the impeller and grinder head are fastened to the shaft end, the impeller and the grinder head will be removed together with the motor.
5. Remove the screw (188a) from the shaft end.
6. Remove the grinder head (45).
7. Remove the impeller (49) from the shaft.
8. Drain the oil from the oil chamber. See section [8.4 Oil check and oil change](#). The shaft seal is a complete unit for all pumps.
9. Remove the screws (188a) securing the shaft seal (105).
10. Lift the shaft seal (105) out of the oil chamber using the lever principle using the two dismounting holes in shaft seal carrier (58) and two screwdrivers.
11. Check the condition of the bush (103) where the secondary seal of the shaft seal touches the bush. The bush must be intact.  
If the bush is worn and must be replaced, the pump must be checked by Grundfos or a service workshop authorised by Grundfos.  
If the bush is intact, proceed as follows:
  1. Check and clean the oil chamber.
  2. Lubricate the faces in contact with the shaft seal with oil.
  3. Insert the new shaft seal (105) using the plastic bush included in the kit.
  4. Tighten the screws (188a) securing the shaft seal to 16 Nm.
  5. Fit the impeller and the grinder head. Make sure that the key (9a) is fitted correctly.
  6. Place the motor with impeller and grinder head in the pump housing (50).
  7. Fit and tighten the clamp (92).
  8. Fill the oil chamber with oil. See section [8.4 Oil check and oil change](#).

For adjustment of the impeller clearance, see section [8.5 Adjusting the impeller clearance](#).

## 8.9 Service kits

The following service kits are available for all pumps.

Service kit	Contents	Pump type	Material	Product number
Shaft seal kit	Shaft seal complete	SEG.40	09-15	NBR 96076122
		SEG.50		NBR 96076123
		SEG.40	26-40	FKM 96645160
		SEG.50		FKM 96645275
Shaft seal carrier	Shaft seal carrier	SEG.50		99346051
Shaft with rotor	Shaft with rotor complete	SEG.50	26	99346054
			26...Ex	99346055
			31-40	99346058
			31-40...Ex	99346091
O-ring kit	O-rings and gaskets for oil screws	SEG40/50	09-15	NBR 96076124
				98682327*
			09-15	FKM 96646061
				98682329*
Grinder system	Grinder head, grinder ring, locking screw, and washer	SEG.40	26-40	NBR 96076125
			26-40	FKM 96646062
		SEG.50	Standard	96076121
			Heavy duty	96903344
Impeller	Impeller complete with adjusting nut, shaft screw and key	SEG.40	High flow	98453210
			09	96076115
			12	96076116
			15	96076117
			26	96076118
			31	96076119
		SEG.50	40	96076120
			26	99346032
			31	99346046
			40	99346048
Oil	1 litre of oil, type Shell Ondina X420. See section <a href="#">8.4 Oil check and oil change</a> for required quantity in oil chamber.	All types		96586753
Lifting bracket	Lifting bracket and screw	SEG.40/50	09-15	96690420
			26-40	96690428

\* For pumps produced in week 19, 2014: P.C. code 1419.

## 9. Fault finding the product

Before attempting to diagnose any fault, read and observe the safety instructions in section [8.1 Safety instructions and requirements](#).



Observe all regulations applying to pumps installed in potentially explosive environments.

Make sure that no work is carried out in potentially explosive atmosphere.



Before attempting to diagnose any fault,

- 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
- make sure all rotating parts have stopped moving.

Fault	Cause	Remedy
1. The pump does not start. The fuses blow, or the motor-protective circuit breaker trips immediately. <b>Caution:</b> Do not start again!	a) Power supply failure, short circuit or earth leakage in the power cable or the motor windings.  b) Wrong type of fuse.  c) The impeller is blocked by impurities.  d) The air bells, the float switches or the electrodes are out of adjustment or defective.	Have the power cable and motor checked and repaired by a qualified electrician.  Install fuses of the correct type.  Clean the impeller.  Readjust or replace the air bells, float switches or electrodes.
2. The pump starts, but the motor-protective circuit breaker trips after a short while.	a) Low setting of the thermal relay in the motor-protective circuit breaker.  b) Increased current consumption due to large voltage drop.  c) The impeller is blocked by impurities. Increased current consumption in all three phases.  d) The impeller clearance is incorrect.	Set the relay in accordance with the specifications on the nameplate.  Measure the voltage between two motor phases. Tolerance: - 10 %/+ 6 %. Reestablish correct voltage supply.  Clean the impeller.  Readjust the impeller. See section <a href="#">8.5 Adjusting the impeller clearance</a> , fig. 12.
3. The pump's thermal switch trips when the pump has been running for some time.	a) The liquid temperature is too high.  b) The liquid viscosity is too high.  c) Wrong electrical connection. (If the pump is star-connected to a delta connection, the result will be very low undervoltage).	Reduce the liquid temperature.  Dilute the liquid.  Check and correct the electrical installation.
4. The pump operates at below-standard performance and increased power consumption.	a) The impeller is blocked by impurities.  b) The direction of rotation is wrong.	Clean the impeller.  Check the direction of rotation. If it is not correct, interchange two phases in the power cable. See section <a href="#">4.3 Direction of rotation</a> .
5. The pump operates but delivers no liquid.	a) The outlet valve is closed or blocked.  b) The non-return valve is blocked.  c) There is air in the pump.	Check the outlet valve and open and/or clean it, if necessary.  Clean the non-return valve.  Vent the pump.
6. The pump is blocked.	a) The grinder system is worn.	Replace the grinder system.

## 10. Technical data

### 10.1 Operating conditions

The Grundfos SEG pumps are designed for intermittent operation (S3). When completely submerged in the pumped liquid, the pumps can also operate continuously (S1). See section [4.1 Operating modes](#).

#### 10.1.1 Installation depth

Maximum 10 m below liquid level.

#### 10.1.2 Operating pressure

Maximum 6 bar.

#### 10.1.3 Number of starts per hour

Maximum 30.

#### 10.1.4 pH value

Pumps in permanent installations can be used for pumping liquids with pH values between 4 and 10.

#### 10.1.5 Liquid temperature

0-40 °C.

For short periods (maximum 15 minutes), a temperature of up to 60 °C is permissible (non-Ex versions only).



Explosion-proof pumps must never pump liquids at a temperature higher than 40 °C.

#### 10.1.6 Density and viscosity of pumped liquid

When pumping liquids with a density and/or a kinematic viscosity higher than that of water, use motors with correspondingly higher outputs.

#### 10.1.7 Sound pressure level

The sound pressure level of the pumps is lower than the limiting values stated in the EC Council Directive 2006/42/EC relating to machinery.

## 10.2 Electrical data

### 10.2.1 Supply voltage

- 1 x 230 V - 10 %/+ 6 %, 50 Hz.
- 3 x 230 V - 10 %/+ 6 %, 50 Hz.
- 3 x 400 V - 10 %/+ 6 %, 50 Hz.

### 10.2.2 Enclosure class

IP68, according to IEC 60529.

### 10.2.3 Insulation class

F (155 °C).

### 10.2.4 Winding resistances

Motor size [kW]	Single-phase motor	
	Starting winding	Main winding
0.9 - 1.2	4.5 Ω	2.75 Ω
1.5	4.1 Ω	2.9 Ω
Three-phase motor		
	3 x 230 V	3 x 400 V
0.9 - 1.5	6.8 Ω	9.1 Ω
2.6	3.4 Ω	4.56 Ω
3.1 - 4.0	2.52 Ω	3.36 Ω

The table values do not include the cable.  
Resistance in cable: 2 x 10 m, approx. 0.28 Ω.

### 10.2.5 Pump curves

Pump curves are available via [www.grundfos.com](http://www.grundfos.com).

The curves are to be considered as a guide. They must not be used as guarantee curves.

Test curves for the supplied pump are available on request.

## 10.3 Dimensions and weights

### 10.3.1 Dimensions

See figs A to C in [Appendix](#).

### 10.3.2 Weights

Pump type	Weight [kg]
SEG.40.09.2.1.502	40
SEG.40.09.2.50B/C	39
SEG.40.12.2.1.502	40
SEG.40.12.2.50B	40
SEG.40.12.2.50C	39
SEG.40.15.2.1.502	53
SEG.40.15.2.50B	40
SEG.40.15.2.50C	39
SEG.40.26.2.50B/C	62
SEG.40.31.2.50B/C	70
SEG.40.40.2.50B/C	40
SEG.50.26...	64
SEG.50.31...	72
SEG.50.40...	72

## 11. Disposing of the product

This product or parts of it must be disposed of in an environmentally sound way:

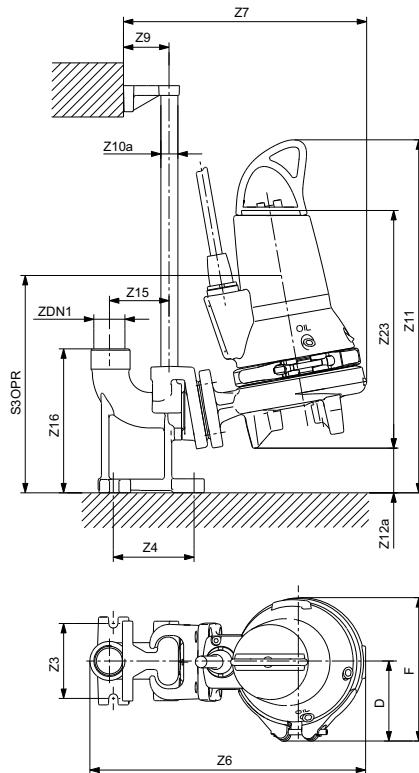
1. Use the public or private waste collection service.
2. If this is not possible, contact the nearest Grundfos company or service workshop.



The crossed-out wheelie bin symbol on a product means that it must be disposed of separately from household waste. When a product marked with this symbol reaches its end of life, take it to a collection point designated by the local waste disposal authorities. The separate collection and recycling of such products will help protect the environment and human health.

See also end-of-life information at  
[www.grundfos.com/product-recycling](http://www.grundfos.com/product-recycling).

## Appendix

**One-pump installation on auto coupling**

TM06 5743 0116

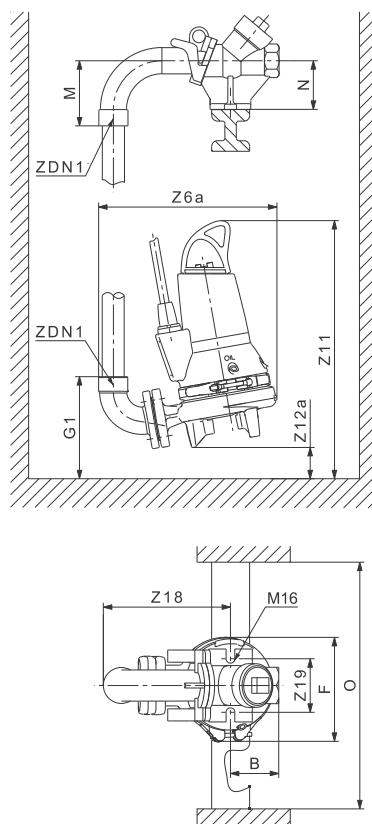
**Fig. 1****SEG.40**

Power [kW]	D	F	ZDN1	Z3	Z4	Z6	Z7	Z9	Z10a	Z11	Z12a	Z15	Z16	Z23	S3OPR
0.9 and 1.2	99	216	Rp 1 1/2	115	118	424	374	70	3/4"-1"	546	68	90	221	363	346
1.5 (3 phase)	99	216	Rp 1 1/2	115	118	424	374	70	3/4"-1"	546	68	90	221	363	361
1.5 (1 phase)	99	216	Rp 1 1/2	115	118	424	374	70	3/4"-1"	551	68	90	221	368	346
2.6	119	256	Rp 1 1/2	115	118	460	410	70	-	614	80	90	221	394	371
3.1 and 4.0	119	256	Rp 1 1/2	115	118	460	410	70	-	652	80	90	221	432	371

**SEG.50**

Power [kW]	D	F	ZDN1	Z3	Z4	Z6	Z7	Z9	Z10a	Z11	Z12a	Z15	Z16	Z23	S3OPR
2.6	119	256	Rp 1 1/2	115	118	460	410	70	3/4"-1"	646	67	90	221	442	384
3.1 and 4.0	119	256	Rp 1 1/2	115	118	460	410	70	3/4"-1"	686	67	90	221	481	384

### One-pump installation on hookup auto coupling



**Fig. 2**

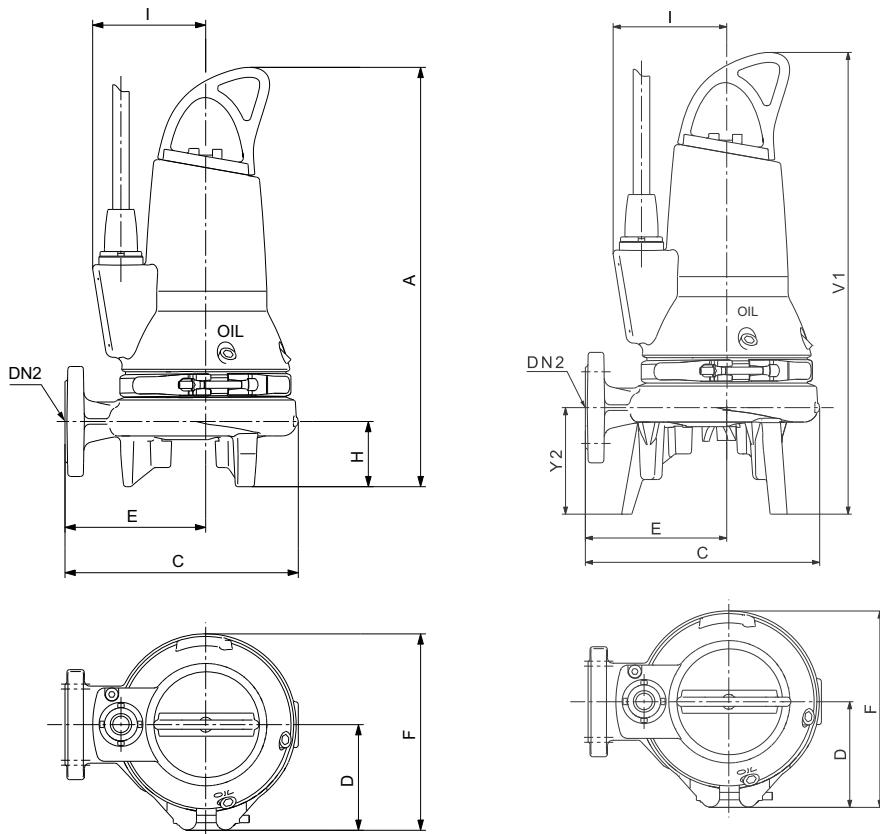
### SEG.40

Power [kW]	B	F	G1	M	N	O	ZDN1	Z6a	Z11	Z12a	Z18	Z19
0.9 and 1.2	100	216	214	134	100		Rp 1 1/2	365	546	68	271	120
1.5 (3 phase)	100	216	214	134	100		Rp 1 1/2	365	546	68	271	120
1.5 (1 phase)	100	216	214	134	100	min. 600	Rp 1 1/2	365	551	68	271	120
2.6	100	256	215	134	100		Rp 1 1/2	365	614	80	271	120
3.1 and 4.0	100	256	214	134	100		Rp 1 1/2	365	652	80	271	120

### SEG.50

Power [kW]	B	F	G1	M	N	O	ZDN1	Z6a	Z11	Z12a	Z18	Z19
2.6	554	256	215	134	100	min. 600	Rp 1 1/2,	365	646	67	271	120
3.1 and 4.0	594	256	215	134	100		Rp 1 1/2,	365	686	67	271	120

## Free-standing installation



TM06 5742 0116 - TM06 5745 0116

Fig. 3

## SEG.40

Power [kW]	A	C	D	DN2	E	F	H	I	V1	Y2
0.9 and 1.2	466	255	99	DN 40	154	216	71	123	510	116
1.5 (3 phase)	466	255	99	DN 40	154	216	71	123	510	116
1.5 (1 phase)	471	255	99	DN 40	154	216	71	123	515	116
2.6	522	292	119	DN 40	173	256	60	143	582	115
3.1 and 4.0	562	292	119	DN 40	173	256	60	144	622	115

## SEG.50

Power [kW]	A	C	D	DN2	E	F	H	I	V1	Y2
2.6	554	294	119	50	173	256	73	143	614	128
3.1 and 4.0	594	294	119	50	173	256	73	143	654	128

TM06 5813 0116

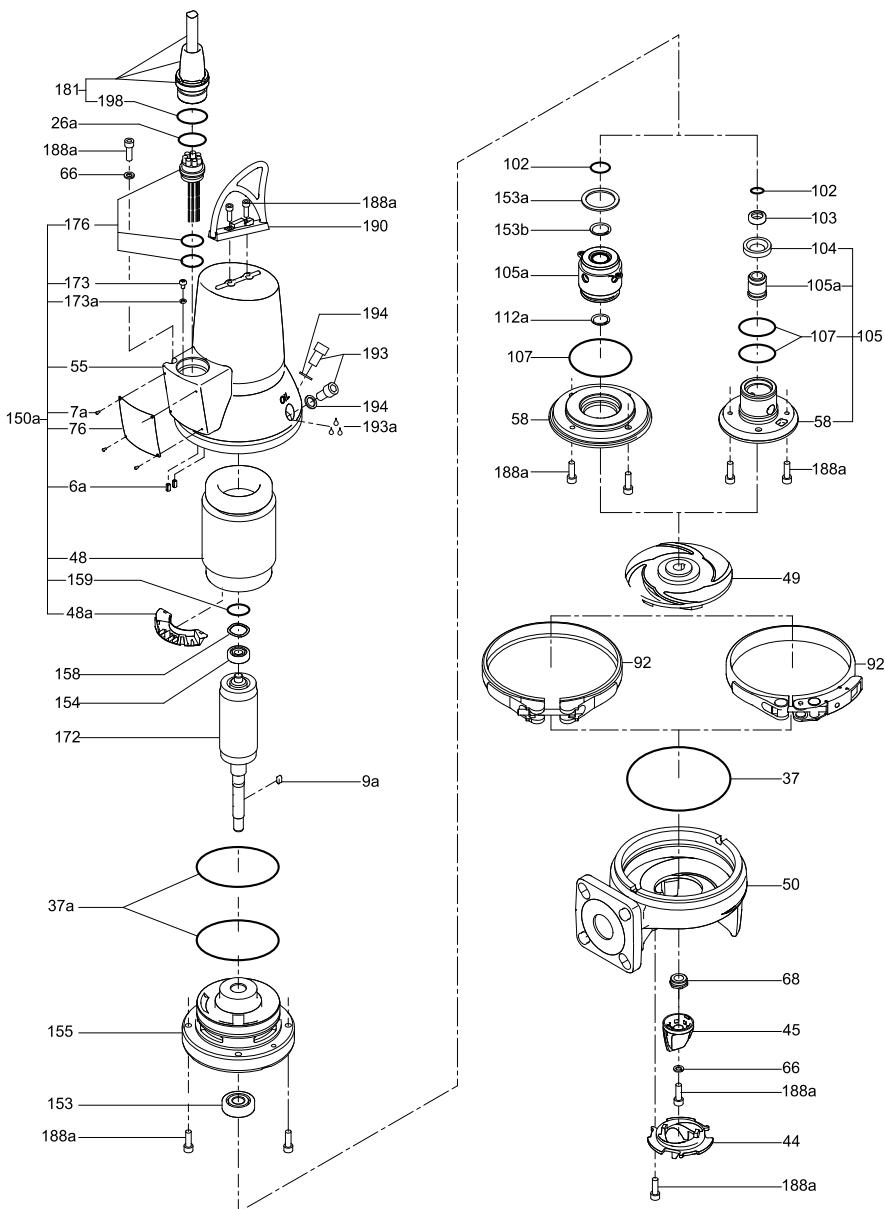


Fig. 4

Pos.	Designation GB	Описание BG	Popis CZ	Bezeichnung DE
6a	Pin	Щифт	Kolík	Stift
7a	Rivet	Нит	Nýt	Kerbnagel
9a	Key	Фиксатор	Pero	Keil
37a	O-rings	О-пръстени	O-kroužky	O-Ringe
44	Grinder ring	Пръстен	Řezací kolo	Schneidring
45	Grinder head	Режеща глава	Hlava mělnicího zařízení	Schneidkopf
48	Stator	Статор	Stator	Stator
48a	Terminal board	Клеморед	Svorkovnice	Klemmbrett
49	Impeller	Работно колело	Oběžné kolo	Laufrad
50	Pump housing	Помпен корпус	Těleso čerpadla	Pumpengehäuse
55	Stator housing	Корпус на статора	Těleso statoru	Statorgehäuse
58	Shaft seal carrier	Носач на уплътнението при вала	Unašeč ucprávky	Dichtungshalter
66	Locking ring	Фиксиращ пръстен	Pojistný kroužek	Sicherungsring
68	Adjusting nut	Регулираща гайка	Stavěcí matice	Justiermutter
76	Nameplate	Табела	Typový štítek	Leistungsschild
92	Clamp	Скоба	Fixační objímka	Spannband
102	O-ring	О-пръстени	O-kroužek	O-Ring
103	Bush	Втулка	Pouzdro	Buchse
104	Seal ring	Уплътняващ пръстен	Těsnící kroužek	Dichtungsring
105 105a	Shaft seal	Уплътнение при вала	Hřídelová ucprávka	Wellenabdichtung
107	O-rings	О-пръстени	O-kroužky	O-Ringe
112a	Locking ring	Фиксиращ пръстен	Pojistný kroužek	Sicherungsring
153	Bearing	Лагер	Ložisko	Lager
154	Bearing	Лагер	Ložisko	Lager
155	Oil chamber	Маслото в камерата	Olejové komoře	Ölsperrkammer
158	Corrugated spring	Гофрирана пружина	Tlačná pružina	Gewellte Feder
159	Washer	Шайба	Podložka	Unterlegscheibe
172	Rotor/shaft	Ротор/вал	Rotor/hřídel	Rotor/Welle
173	Screw	Винт	Šroub	Schraube
173a	Washer	Шайба	Podložka	Unterlegscheibe
176	Inner plug part	Вътрешна част на щепсела	Vnitřní část kabelové průchody	Kabelanschluss, innerer Teil
181	Outer plug part	Външна част на щепсела	Vnější část kabelové průchody	Kabelanschluss, äußerer Teil
188a	Screw	Винт	Šroub	Schraube
190	Lifting bracket	Ръкохватка	Zvedací rukojet'	Transportbügel
193	Oil screw	Винт при камерата за масло	Olejová zátka	Ölschraube
193a	Oil	Масло	Olej	Öl
194	Gasket	Гарнитура	Těsnící kroužek	Dichtung
198	O-ring	О-пръстен	O-kroužek	O-Ring

<b>Pos.</b>	<b>Betegnelse DK</b>	<b>Seletus EE</b>	<b>Descripción ES</b>	<b>Kuvaus FI</b>
6a	Stift	Tihvt	Pasador	Tappi
7a	Nitte	Neet	Remache	Niitti
9a	Feder	Kiil	Chaveta	Kiila
37a	O-ring	O-ringid	Juntas tóricas	O-rengas
44	Snittering	Purusti plaat	Anillo de corte	Repijärengas
45	Snitrehoved	Purusti pea	Cabezal de corte	Repijä
48	Stator	Staator	Estator	Staattori
48a	Klembræt	Klemmiliist	Caja de conexiones	Kytkentälevy
49	Løber	Tööratas	Impulsor	Juoksupyörä
50	Pumpehus	Pumbapesa	Cuerpo de bomba	Pumppupesä
55	Statorhus	Staatori korpus	Alojamiento de estator	Staattoripesä
58	Akseltætningsholder	Völlitihendi alusplaat	Soporte de cierre	Akselitiiivistekannatin
66	Låsering	Lukustusröngas	Anillo de cierre	Lukkorengas
68	Justermøtrik	Seademutter	Tuerca de ajuste	Säätmutteri
76	Typeskilt	Andmeplaat	Placa de identificación	Arvokilpi
92	Spændebånd	Klamber	Abrazadera	Kiinnityspanta
102	O-ring	O-ring	Junta tórica	O-rengas
103	Bøsning	Puks	Casquillo	Holkki
104	Simmerring	Tihend	Anillo de cierre	Tiivisterengas
105 105a	Akseltætning	Völlitihend	Cierre	Akselitiviste
107	O-ring	O-ringid	Juntas tóricas	O-renkaat
112a	Låsering	Lukustusröngas	Anillo de cierre	Lukkorengas
153	Leje	Laager	Cojinete	Laakeri
154	Leje	Laager	Cojinete	Laakeri
155	Oliekammer	Ölikamber	Cámara de aceite	Öljytila
158	Bølgefjeder	Vedruseib	Muelle ondulado	Aaltojousi
159	Skive	Seib	Arandela	Aluslevy
172	Rotor/aksel	Rootor/völl	Rotor/eje	Roottori/akseli
173	Skrue	Polt	Tornillo	Ruuvi
173a	Skive	Seib	Arandela	Aluslevy
176	Indvendig stikdel	Pistiku sisemine pool	Parte de clavija interior	Sisäpuolinen tulppaosa
181	Udvendig stikdel	Pistiku välimine pool	Parte de clavija exterior	Ulkopuolinen tulppaosa
188a	Skrue	Polt	Tornillo	Ruuvi
190	Løftebøjle	Tõsteaas	Asa	Nostosanka
193	Olieskrue	Ölikambri kork	Tornillo de aceite	Öljytulppa
193a	Olie	Öli	Aceite	Öljy
194	Pakning	Tihend	Junta	Tiiviste
198	O-ring	O-ring	Junta tórica	O-rengas

Pos.	Description FR	Περιγραφή GR	Opis HR	Megnevezés HU
6a	Broche	Πείρος	nožica	Csap
7a	Rivet	Πριτσίνι	zarezani čavao	Szegecs
9a	Clavette	Κλειδί	opruga	Rögzítőék
37a	Joints toriques	Δακτύλιος-Ο	O-prsten	O-gyűrűk
44	Anneau broyeur	Δακτύλιος άλεσης	prsten za rezanje	Őrlögyűrű
45	Tête de broyeur	Κεφαλή άλεσης	glava za rezanje	Őrlőfej
48	Stator	Στάτης	stator	Állandó rész
48a	Bornier	Κλέμες σύνδεσης	priklučna letvica	Kapcsoló tábla
49	Roue	Πτερωτή	rotor	Járókerék
50	Corps de pompe	Περιβλήμα αντλίας	kućište crpke	Szivattyúház
55	Logement de stator	Περιβλήμα στάτη	kućište statora	Állandó részház
58	Support de garniture mécanique	Φορέας στυπιοθίπη άξονα	držač brtve	Tengelytömítés-keret
66	Anneau de serrage	Ασφαλιστικός δακτύλιος	sigurnosni prsten	Rögzítőgyűrű
68	Ecrou de réglage	Ρυθμιστικό περικόχλιο	matica za justiranje	Beállítóanya
76	Plaque signalétique	Πινακίδα	natpisna pločica	Adattábla
92	Collier de serrage	Σφιγκτήρας	zatezna traka	Bilincs
102	Joint torique	Δακτύλιος-Ο	O-prsten	O-gyűrű
103	Douille	Αντιτριβικός δακτύλιος	brtvenica	Tömitőgyűrű
104	Anneau d'étanchéité	Στεγανοποιητικός δακτύλιος	brtveni prsten	Tömitőgyűrű
105 105a	Garniture mécanique	Στυπιοθίπης άξονα	brtva vratila	Tengelytömítés
107	Joints toriques	Δακτύλιος-Ο	O-prsten	O-gyűrűk
112a	Anneau de serrage	Ασφαλιστικός δακτύλιος	sigurnosni prsten	Rögzítőgyűrű
153	Roulement	Έδρανο	ležaj	Csapágy
154	Roulement	Έδρανο	ležaj	Csapágy
155	Chambre à huile	Θάλαμος λαδιού	komora za ulje	Olajkamra
158	Ressort ondulé	Αυλακωτό ελατήριο	valovita opruga	Hullámrugó
159	Rondelle	Ροδέλα	podložna pločica	Alátét
172	Rotor/arbre	Ρότορας/άξονας	rotor/vratilo	Forgóréssz/tengely
173	Vis	Βίδα	vijak	Csavar
173a	Rondelle	Ροδέλα	podložna pločica	Alátét
176	Partie intérieure de la fiche	Εσωτερικό τμήμα φις	kabel. priključak, nutarnji dio	Belső kábelbevezetés
181	Partie extérieure de la fiche	Εξωτερικό τμήμα φις	kabel. priključak, vanjski dio	Külső kábelbevezetés
188a	Vis	Βίδα	vijak	Csavar
190	Poignée de levage	Χειρολαβή	transportni stremen	Emelőfűl
193	Bouchon d'huile	Βίδα λαδιού	vijak za ulje	Olajtöltőnyílás zárócsavarja
193a	Huile	Λάδι	ulje	Olaj
194	Joint d'étanchéité	Τσιμούχα	brtva	Tömités
198	Joint torique	Δακτύλιος-Ο	O-prsten	O-gyűrű

<b>Pos.</b>	<b>Descrizione IT</b>	<b>Aprašymas LT</b>	<b>Apraksts LV</b>	<b>Omschrijving NL</b>
6a	Perno	Vielokaištis	Tapa	Paspen
7a	Rivetto	Kniedė	Kniede	Klinknagel
9a	Chiavetta	Kaištis	Atslēga	Spie
37a	O-ring	O žiedai	Apaļa šķērsgriezuma blīvgredzeni	O-ring
44	Anello trituratore	Smulkintuvu žiedas	Griezējgredzens	Snijring
45	Trituratore	Smulkintuvu galvutē	Griezējgalva	Snijkop
48	Statore	Statorius	Stators	Stator
48a	Morsettiera	Kontaktų plokštė	Spaiļu plate	Aansluitblok
49	Girante	Darbaratis	Darbrats	Waaier
50	Corpo pompa	Siurblio korpusas	Sūkņa korpuiss	Pomphuis
55	Cassa statore	Statorius korpusas	Statora korpuiss	Motorhuis
58	Supporto tenuta meccanica	Riebokšlio lizdas	Vārpstas blīvējuma turētājs	Dichtingsplaat
66	Anello di arresto	Fiksavimo žiedas	Sprostgredzens	Borgring
68	Dado di regolazione	Regulavimo veržlē	Regulēšanas uzgrieznis	Afstellmoer
76	Targhetta di identificazione	Vardinė plokštélė	Pases datu plāksnīte	Typeplaat
92	Fascetta	Apkaba	Apskava	Span ring
102	O-ring	O žiedas	Apaļa šķērsgriezuma blīvgredzens	O-ring
103	Bussola	Ivoré	Ieliktnis	Bus
104	Anello di tenuta	Sandarinimo žiedas	Blīvējošais gredzens	Oliekeerring
105 105a	Tenuta meccanica	Riebokšlis	Vārpstas blīvējums	As afdichting
107	O-ring	O žiedai	Apaļa šķērsgriezuma blīvgredzeni	O-ringen
112a	Anello di arresto	Fiksavimo žiedas	Sprostgredzens	Borgring
153	Cuscinetto	Guolis	Gultnis	Kogellager
154	Cuscinetto	Guolis	Gultnis	Kogellager
155	Camera dell'olio	Alyvos kamera	Ellas kamera	Oliekamer
158	Molla ondulata	Rifluota spyruoklē	Vijnotā atspere	Drukring
159	Rondella	Poveržlē	Paplāksne	Ring
172	Gruppo rotore/albero	Rotorius/velenas	Rotors/vārpsta	Rotor/as
173	Vite	Varžtas	Skrūve	Schroef
173a	Rondella	Poveržlē	Paplāksne	Ring
176	Parte interna del connettore	Vidinė elektros jungties dalis	Spraudņa iekšējā daļa	Kabelconnector inwendig
181	Parte esterna del connettore	Išorinė elektros jungties dalis	Spraudņa ārējā daļa	Kabelconnector uitwendig
188a	Vite	Varžtas	Skrūve	Inbusbout
190	Maniglia	Kėlimo rankena	Rokturis	Ophangbeugel
193	Tappo dell'olio	Alyvos sraigtas	Ellas aizgrieznis	Inbusbout
193a	Olio	Alyva	Ellja	Olie
194	Guarnizione	Tarpiklis	Blīvslēgs	Pakkeringring
198	O-ring	O žiedas	Apaļa šķērsgriezuma blīvgredzens	O-ring

Pos.	Opis PL	Descrição PT	Instalație fixă RO	Naziv RS
6a	Kolek	Pino	Pin	Klin
7a	Nit	Rebite	Nit	Zakovica
9a	Klin	Chaveta	Cheie	Klin
37a	Pierścień O-ring	O-rings	Inel tip O	O-prsten
44	Pierścień tnący	Anilha da trituradora	Inel tocător	Prsten seckalice
45	Głowica tnąca	Cabeça da trituradora	Cap tocător	Glava seckalice
48	Stator	Estator	Stator	Stator
48a	Listwa przyłączeniowa	Caixa terminal	Înveliș stator	Priklučna letva
49	Wirnik	Impulsor	Rotor	Propeler
50	Korpus pompy	Voluta da bomba	Carcasă pompa	Kućište pumpe
55	Obudowa statora	Carcaça do estator	Carcasă stator	Stator kućišta
58	Mocowanie uszczelnienia wału	Suporte do empanque	Etanșare	Nosač zaptivanja osovine
66	Pierścień mocujący	Anilha de fixação	Inel închidere	Prsten pričvršćivanja
68	Nakrętka dopasowująca	Porca de ajuste	Cap reglaj	Matica za podešavanje
76	Tabliczka znamionowa	Placa de características	Etichetă	Pločica za obeležavanje
92	Zacisk	Gancho	Şurub	Obujmica spajanja
102	Pierścień O-ring	O-ring	Inel tip O	O-prsten
103	Tulejka	Anilha	Bucșă	Čaura
104	Pierścień uszczelniający	Anilha de empanque	Inel etanșare	Zaptivni prsten
105 105a	Uszczelnienie wału	Empanque	Etanșare	Zaptivka osovine
107	Pierścień O-ring	O-rings	Inel tip O	O-prsten
112a	Pierścień mocujący	Anilha de fixação	Inel închidere	Prsten pričvršćivanja
153	Łożysko	Rolamento	Rulment	Kuglični ležaj
154	Łożysko	Rolamento	Rulment	Kuglični ležaj
155	Komorze olejowej	Compartimento do óleo	Camera de ulei	Ulijnoj komori
158	Sprzęzyna falista	Mola	Arc canelat	Sigurnosni prste
159	Podkładka	Anilha	Spālātor	Podloška
172	Rotor/wał	Rotor/veio	Rotor/ax	Rotor/osovina
173	Śruba	Parafuso	Filet	Zavrtanj
173a	Podkładka	Anilha	Spālātor	Prsten podloške
176	Część zewn. wtyczki	Parte interna do bujão	Cablu conector intrare	Unutrašnji deo konektora
181	Część wewn. wtyczki	Parte externa do bujão	Cablu conector ieșire	Spoljni deo konektora
188a	Śruba	Parafuso	Filet	Zavrtanj
190	Uchwyt	Suporte de elevação	Mâner	Ručica
193	Śruba olejowa	Parafuso do óleo	Şurub ulei	Zavrtanj za ulje
193a	Olej	Óleo	Ulei	Ulje
194	Uszczelka	Junta	Spālātor	Podloška
198	Pierścień O-ring	O-ring	Inel tip O	O-prsten

Pos.	Beskrivning SE	Opis SI	Popis SK	Tanım TR	التسمية AR
6a	Stift	Zatič	Kolík	Pim	مسمار محور
7a	Nit	Zakovica	Nýt	Perçin	مسمار برسام
9a	Kil	Kluč	Pero	Anahtar	مفتاح
37a	O-ringar	O-obroči	O-kružky	O-ringler	حفلات منع تسرب
44	Skärring	Drobilni obroč	Rezacie koleso	Parçalayıcı halka	حلقة مطحنة
45	Skärhuvud	Drobilna glava	Hlava rezacieho zariadenia	Parçalayıcı başlık	رأس مطحنة
48	Stator	Stator	Stator	Stator	ساکن
48a	Kopplingsplint	Priključna letvica	Svorkovnica	Klemens bağlantısı	لوحة التوصيلات الكهربائية
49	Pumphjul	Tekalno kolo	Obežné koleso	Çark	الرافعة
50	Pumphus	Ohišje črpalka	Teleso čerpadla	Pompa gövdesi	غلاف المصخة
55	Statorhus	Ohišje statorja	Teleso statora	Stator muhafazası	غلاف الساكن
58	Axeltätningshållare	Nosilec tesnila osi	Unášač upchávky	Salmastra taşıyıcı	حامل مانع تسرب عمود الادارة
66	Låsring	Zaklepni obroček	Poistný krúžok	Kilitleme halkası	حفلة زنق
68	Justermutter	Prilagoditvena matica	Stavacie matice	Ayar somunu	صسلولة ضبط
76	Typskylt	Tipska ploščica	Typový štítok	Bilgi etiketi	لوحة اسم الموزيل
92	Spännband	Sponka	Fixačná objímka	Kelepçe	المشبك
102	O-ring	O-obroč	O-kružok	O-ring	حفلة منع تسرب
103	Bussning	Podloga ležaja	Púzdro	Burç	جلبة
104	Simmerring	Tesnilni obroč	Tesniaci krúžok	Sızdırmazlık halkası	حفلة سد
105	Axeltätning	Tesnilo osi	Hriadeľová upchávka	Salmastra	مانع تسرب عمود الادارة
105a					
107	O-ringar	O-obroči	O-kružky	O-ringler	حفلات منع تسرب
112a	Låsring	Zaklepni obroček	Poistný krúžok	Kilitleme halkası	حفلة زنق
153	Lager	Ležaj	Ložisko	Rulman	كرسي تحويل
154	Lager	Ležaj	Ložisko	Rulman	كرسي تحويل
155	Oljekammare	Oljni komori	Olejovej komore	Yağ miktarı	حجرة الزيت
158	Fjäder	Vzmet	Tlačná pružina	Oluklu yay	نابض مسحوق
159	Bricka	Tesnilni obroč	Podložka	Pul	حفلة احكام المرطب
172	Rotor/axel	Rotor/os	Rotor/hriadeľ	Rotor/mil	العصو السواري/عمود الادارة
173	Skruv	Vijak	Skrutka	Vida	مسمار ملولب
173a	Bricka	Tesnilni obroč	Podložka	Pul	حفلة احكام المرطب
176	Kontakt, inre del	Notranji vtični del	Vnútorná časť káblevej priechodky	İç fiş kısmı	الجزء الداخلي للقبس
181	Kontakt, yttrre del	Zunanji vtični del	Vonkajšia časť káblevej priechodky	Dış fiş kısmı	الجزء الخارجي للقبس
188a	Skruv	Vijak	Skrutka	Vida	مسمار ملولب
190	Lyftbygel	Ročaj	Dvihacia rukoväť	Kaldırma kolu	كتفنة السرفاع
193	Oljeskruv	Oljni vijak	Olejová zátka	Yağ vidası	مسمار الزيت
193a	Olja	Olie	Olej	Yağ	الزيت
194	Packning	Tesnilni obroč	Tesniaci krúžok	Conta	حشية
198	O-ring	O-obroč	O-kružok	O-ring	حفلة منع تسرب

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