SEG

60 Hz

Installation and operating instructions

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GRUNDFOS

Original installation and operating instructions.

CONTENTS

Warning

Prior to installation, read these installation and operating instructions. Installation and operation must comply with local regulations and accepted codes of good practice.

Warning

The use of this product requires experience with and knowledge of the product.
Persons with reduced physical, sensory or mental capabilities must not use this product, unless they are under supervision or have been instructed in the use of the product by a person responsible for their safety.
Children must not use or play with this product.

1. Symbols used in this document

Warning

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

Warning

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

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

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

2. General description

Grundfos 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.

The pumps can be controlled via the Grundfos LC, LCD 107, LC, LCD 108, LC, LCD 100 pump controllers or the Grundfos CU 100 control box.

See installation and operating instructions for the selected unit.

2.1 Product drawing

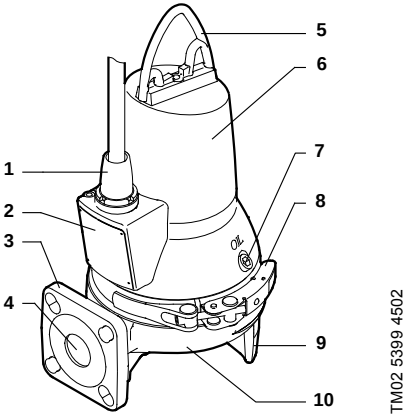

Fig. 1 SEG pump

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

2.2 Applications

- Pumping of wastewater with discharge from water closets
- pumping of sewage from restaurants, hotels, camping sites, etc.

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 tank.

2.3 Operating conditions

The Grundfos SEG range are designed for intermittent operation (S3). When completely submerged, the pumps can also run continuously (S1). See section *9.2 Operating modes*.

Installation depth

Maximum 10 metres below liquid level.

Operating pressure

Maximum 6 bar.

Number of starts per hour

Maximum 30.

pH value

Pumps in permanent installations can cope with pH values ranging from 4 to 10.

Liquid temperature

0 °C to +40 °C.

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

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.

3. Delivery and handling

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

3.1 Transportation

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

Always lift the pump by its lifting bracket or by means of a fork-lift truck if the pump is fixed on a pallet.
Never lift the pump by means of the motor cable or the hose/pipe.

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

3.2 Storage

For long periods of storage, the pump must be protected against moisture and heat.

After a long period of storage, the pump should be inspected before it is put into operation. Make sure that the impeller can rotate freely. Pay special attention to the shaft seals and the cable entry.

3.3 Lifting points

When lifting the pump, use the right lifting point in order 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. 2.

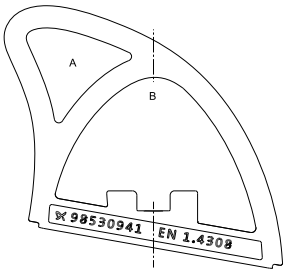

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Fig. 2 Lifting points

4. Identification

4.1 Nameplate

The nameplate states the operating data and approvals applying to the pump.

The nameplate is fixed with rivets to the side of the stator housing near the cable input to the motor.

Fix the additional nameplate supplied with the pump close to the tank.

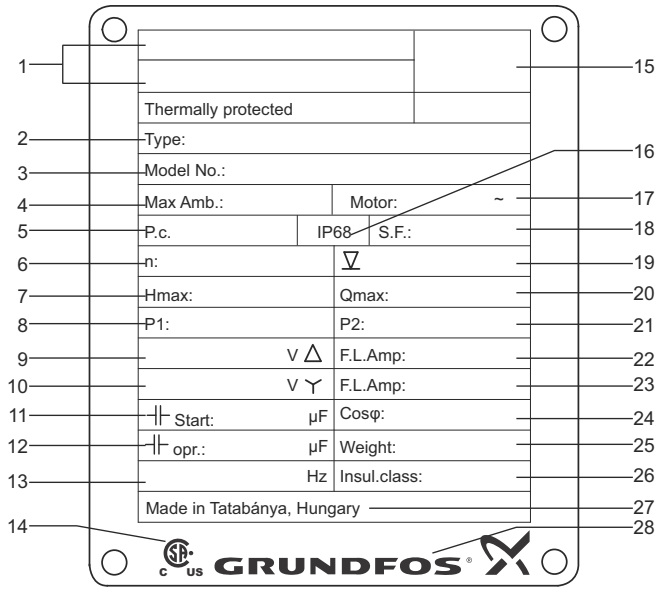

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Fig. 3 SEG nameplate

Pos.	Description	Pos.	Description
1	FM-description	14	Electrical safety*
2	Type designation	15	Approval
3	Product number + serial number	16	Phases
4	Max. liquid temperature	17	Motor safety factor
5	Production code (YYWW)	18	Max installation depth (m)
6	Speed (rpm)	19	Max flow rate (m^3/h)
7	Max head (m)	20	Nominal power output P2
8	Nominal power input (kW)	21	Combines amp. expression 1
9	Combined voltage expression 1	22	Combines amp. expression 2
10	Combined voltage expression 2	23	Cos φ, 1/1 load
11	Start capacitor	24	Net weight (kg)
12	Run capacitor	25	Insulation class / temp. rise
13	Frequency	26	Grundfos logo

* For USA and Canada

4.2 Type key

The type key covers the entire Grundfos SEG range of wastewater pumps. This is why the type key has a number of empty fields for the grinder pumps. Each SEG grinder pump is identified by means of the type key below. Please note that not all combination options are available.

Code	Example	SE	G		.40	.09			.2	.1	.6	03	
	Type range												
SE	Grundfos sewage pumps												
	Impeller type												
G	Grinder system in the pump inlet												
	Material												
	Standard, cast iron												
	Max. spherical impeller clearance [mm]												
	Not relevant for SEG pumps												
	Pump discharge												
40	Nominal diameter of discharge port [mm], DIN PN-10 flange												
K40	Nominal diameter of discharge port [mm], JIS B 2239 10K / KS B 2332 10K / KS B 1511 10K flange												
	Output power, P2												
	P2 [100 W]												
	Equipment in pump												
[ ]	Standard												
	Installation type												
[ ]	Submerged without cooling jacket												
	Pump version												
[ ]	Non-explosion-proof pump, CSA-approved												
	Number of poles												
2	2-pole motor												
	Number of phases												
1	Single-phase motor												
[ ]	Three-phase motor												
	Frequency												
6	60 Hz												
	Voltage												
03	208-230 V												
0G	380 V												
0H	460 V												
0M	200-230 V												
Z	**Custom-built pump**												

5. Approvals

The standard versions of SEG 60 Hz pumps have been approved by SCA.

5.1 Approval standards

CSA approval according to UL778 and C22.2 No 108, No 0.4, No 30, No 145 and No 60529.

6. Safety

Warning

Pump installation in tanks must be carried out by specially trained persons.

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

Warning

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

Warning

It must be possible to lock the mains switch in position 0.

Type and requirements as specified in local regulations.

Warning

The use of this product requires experience with and knowledge of the product.

Persons with reduced physical, sensory or mental capabilities must not use this product, unless they are under supervision or have been instructed in the use of the product by a person responsible for their safety.

Children must not use or play with this product.

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

Note ***It is advisable to make all maintenance and service work when the pump is placed outside the tank.***

Tanks for submersible wastewater pumps contain 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 the hygiene regulations in force.

Warning

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 to personnel or damage to the pump.

The following warnings and notes also appear in a label (delivered with the pump). Place the label near the control panel.

Warning

Risk of electric shock. Do not remove cord and strain relief. Do not connect conduit to pump.

Warning

Risk of electric shock.

This pump has not been approved for use in swimming pools or marine areas.

Warning

To reduce risk of electric shock, see installation and operating instructions for guidance in proper installation.

Warning

To reduce risk of electric shock, install only on a circuit protected by a ground-fault circuit interrupter (GFCI).

Note ***Acceptable for indoor and outdoor use.***

Note ***Submersible pump.***

Caution ***Provide suitable motor protection based on the electric ratings.***

Caution ***This pump has been tested with water only.***

Caution ***Use with approved motor protective circuit breaker matching motor input in full-load amperes with overload element(s) selected or adjusted in accordance with control instructions.***

7. Installation

Caution ***Prior to installation, make sure the tank bottom is even.***

Warning

Before beginning the installation, switch off the power supply and lock the mains switch in position 0.

Any external voltage connected to the pump must be switched off before working on the pump.

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

All safety regulations must be observed at the installation site, e.g. the use of blowers for fresh-air supply to the tank.

Prior to installation, check the oil level in the oil chamber. See section *10. Maintenance and service*.

The SEG pumps are suitable for different installation types which are described in sections *7.1 Submerged installation on auto coupling* and *7.2 Free-standing submerged installation*.

All pump housings have a cast DN 40, PN 10 discharge flange which can also be connected to a DN 50, PN 10 flange.

Note ***The pumps are designed for intermittent operation. When completely submerged in the pumped liquid, the pumps can also run continuously. See section 12. Technical data.***

Warning

Do not put your hands or any tool into the pump suction or discharge 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 mains switch. Make sure that the power supply cannot be accidentally switched on.

Caution ***We recommend to always use Grundfos accessories to avoid malfunctions due to incorrect installation.***

Warning

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

7.1 Submerged 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 tank.

Warning

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

Note ***Make sure that the pipework is installed without the use of undue force. No loads from the pipework weight must be carried by the pump. We recommend the use of loose flanges to ease the installation and to avoid pipe tension at flanges and bolts.***

Note ***Do not use elastic elements or bellows in the pipework; these elements should never be used as a means to align the pipework.***

Auto-coupling guide rail system

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

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

6. Clean out debris from the tank before lowering the pump into the tank.
7. Fit the guide claw to the discharge port of the pump.
8. Slide the guide claw down the guide rails and lower the pump into the tank by means of a chain fastened to the lifting bracket. When the pump reaches the auto-coupling base unit, the pump will automatically connect tightly.

Grease the gasket of the guide claw before lowering the pump into the tank.

Note ***When the pump has reached the base stand, 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 tank and in such a way that the chain cannot come into contact with the pump housing.
10. Adjust the length of the motor 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 tank. Make sure that the cables are not sharply bent or pinched.
11. Connect the motor cable and the monitoring cable, if any.

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

Hookup auto coupling

1. Fit a crossbar in the tank.
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 discharge port.
4. Fasten a shackle and a chain to the movable part of the hookup auto coupling.
5. Clean out debris from the tank before lowering the pump.
6. Lower the pump into the tank by means of the chain secured to the lifting bracket. When the movable part of the auto coupling reaches the stationary part, the two will automatically connect tightly.
7. Hang up the end of the chain on a suitable hook at the top of the tank and in such a way that the chain cannot come into contact with the pump housing.
8. Adjust the length of the motor 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 tank. Make sure that the cables are not sharply bent or pinched.
9. Connect the motor cable and the monitoring cable, if any.

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

7.2 Free-standing submerged installation

Pumps for free-standing submerged installation can stand freely on the bottom of the tank or the like.

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 discharge pipe for easy separation.

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

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

If the pump is installed in muddy conditions or on uneven ground, it is recommended to support the pump on bricks or a similar support.

1. Fit a 90 ° elbow to the pump discharge port and connect the discharge pipe/hose.
2. Lower the pump into the liquid by means of a chain secured to the lifting bracket of the pump. It is recommended to place the pump on a plane, solid foundation. Make sure that the pump is hanging from the chain and not the cable.
3. Hang up the end of the chain on a suitable hook at the top of the tank and in such a way that the chain cannot come into contact with the pump housing.
4. Adjust the length of the motor 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. Make sure that the cables are not sharply bent or pinched.
5. Connect the motor cable and the monitoring cable, if any.

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

8. Electrical connection

Warning

Connect the pump to an external mains 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 mains switch in position 0.

Type and requirements as specified in EN 60204-1, 5.3.2.

The electrical connection must be carried out in accordance with local regulations.

Warning

The pumps must be connected to a control box with a motor protection relay with an IEC trip class 10 or 15.

Warning

The permanent installation must be fitted with earth leakage circuit breaker (ELCB) with a tripping current < 30 mA.

Warning

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

Warning

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

Make sure that the earth connection is protected from corrosion.

Make sure that all protective equipment has been connected correctly.

Note

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

The supply voltage and frequency are marked on the pump nameplate. The permissible voltage tolerance is - 10 %/+ 6 % of the rated voltage. Make sure that the motor is suitable for the power supply available at the installation site.

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

All pumps are supplied without a control box.

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

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

See fig. 4 or 5 and the installation and operating instructions for the selected control box or pump controller.

For more information about the function of the thermal switches, see section *8.4 Thermal switches*.

8.1 Wiring diagrams

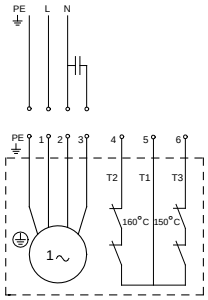

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Fig. 4 Wiring diagram for single-phase pumps

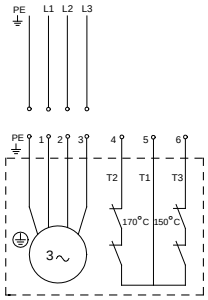

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Fig. 5 Wiring diagram for three-phase pumps

8.2 CU 100 control box

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

Single-phase pumps

A run capacitor must be connected to the control box.

For capacitor sizes, see the table below.

Pump type	Cs, starting capacitor		Cd, run capacitor	
	[µF]	[V]	[µF]	[V]
SEG	150	230	30	450

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.

Note ***Both the two following points must be observed.***

- 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 tank.

Warning

The CU 100 control box must not be used for explosion-proof applications. See section 8.3 Pump controllers.

Warning

The pump must not run dry.

An additional level switch must be installed to ensure that the pump is stopped in case the stop level switch is not operating. See fig. 6.

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 108 pump controller via an intrinsically safe barrier to ensure a safe circuit.

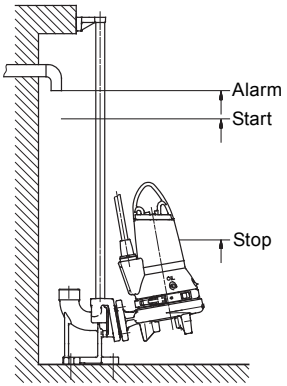

Fig. 6 Start and stop levels

8.3 Pump controllers

The following LC and LCD pump controllers are available:

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

- 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 pump controller selected.

Controllers for single-phase pumps incorporate capacitors.

LC: The controller is fitted with 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.

LCD: The controller is fitted with 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, the following points should be observed:

- 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.
- The start level switch should be installed 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 tank.
- The high-level alarm switch, if installed, should always be installed 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 tank.

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

The pump must not run dry.

An additional level switch must be installed to ensure that the pump is stopped in case the stop level switch is not operating.

Caution

Stop the pump when the liquid level reaches the upper edge of the clamp on the pump.

8.4 Thermal switches

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

Thermal switch, circuit 1 (T1-T3), breaks the circuit at a winding temperature of approx. 150 °C.

Note ***This thermal switch must be connected for all pumps.***

Thermal switch, circuit 2 (T1-T2), breaks the circuit at a winding temperature of approx. 170 °C (three-phase pumps) or 160 °C (single-phase 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.

In the case of standard pumps, both thermal switches can (when closing the circuit after cooling) generate automatic restarting of the pump via the controller.

9. Startup

Warning

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

Make sure that all protective equipment has been connected correctly.

The pump must not run dry.

Warning

The pump must not be started if the atmosphere in the tank is potentially explosive.

Warning

It may lead to personal injuries or death to open the clamp while the pump is operating.

9.1 General startup procedure

1. Remove the fuses, and check whether 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 *10.2 Change of motor oil*.
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.
6. Lower the pump into the liquid and insert the fuses.
7. Check whether the system has been filled with liquid and vented. The pump is self-venting.
8. Start the pump.

Caution ***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 the fault corrected.***

After one week of operation after replacement of the shaft seal, the condition of the oil in the chamber should be checked. See section *10. Maintenance and service*.

9.2 Operating modes

The pumps are designed for intermittent operation (S3). When completely submerged, the pumps can also run continuously (S1).

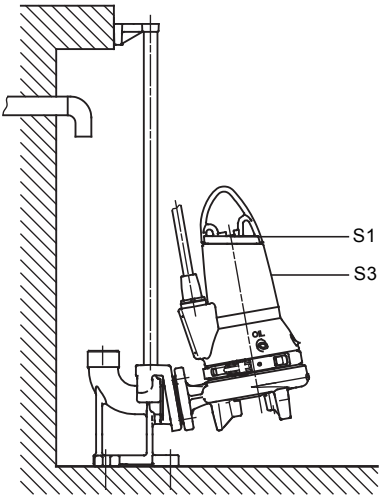

Fig. 7 Operating levels

S3, intermittent operation

S3 operation is a series of identical duty cycles (TC) each with a constant load for a period, followed by a rest period. Thermal equilibrium is not reached during the cycle. See fig. 7.

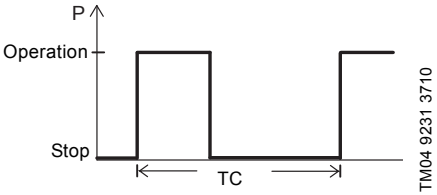

Fig. 8 S3 operation

S1, continuous operation

In this operating mode, the pump can run continuously without having to be stopped for cooling. Being completely submerged, the pump is sufficiently cooled by the surrounding liquid. See fig. 9.

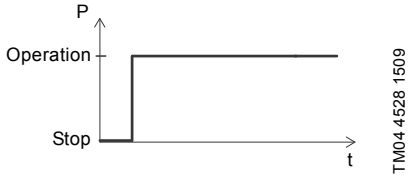

Fig. 9 S1 operation

9.3 Direction of rotation

Note

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 and an arrow at the pump inlet indicate the correct direction of rotation.

Correct direction of rotation is clockwise when 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. See fig. 4 or 5.

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 discharge pressure.
2. Stop the pump and interchange two phases.
3. Restart the pump and measure the quantity of liquid or the discharge 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, e.g. the hoist used for lowering the pump into the tank.
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. 10.
4. If the direction of rotation is wrong, interchange two phases. See fig. 4 or 5.

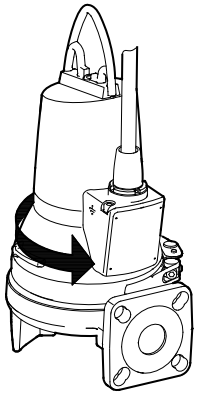

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Fig. 10 Jerk direction

10. Maintenance and service

Warning

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

All rotating parts must have stopped moving.

Warning

Except for service on the pump parts, all other service work must be carried out by Grundfos or a service workshop authorised by Grundfos.

Flush the pump thoroughly with clean water before maintenance and service. Rinse the pump parts in water after dismantling.

Warning

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

10.1 Yearly maintenance

Pumps running normal operation should be checked every 3000 operating hours or at least once a year. If he 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 *4.1 Nameplate*.
- **Motor 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 sections *10.2 Change of motor oil*.

Note ***Used oil must be disposed of in accordance with local regulations.***

- **Cable entry**
  Make sure that the cable entry is watertight and that the cables are not sharply bent and/or pinched. See section *10.5 Service kits*.

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

- **Pump parts**
  Check the impeller, pump housing, etc. for possible wear. Replace defective parts.
  See section *10.5 Service kits*.
- **Ball bearings**
  Check the shaft for noisy or heavy operation (turn 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/parts**
  In case of frequent choke-ups, check the grinder system for wear. When worn, the edges of the grinding parts are round and worn. Compare with a new grinder system.

10.2 Change of motor oil

Warning

When slackening the screws of the oil chamber, note that pressure may have built up in the chamber. Do not remove the screws until the pressure has been fully relieved.

Motor oil quantities

The table states how much oil the SEG pumps must have in the oil chamber:

Pump type	Oil in oil chamber [l]
0.9 to 1.5 kW	0.17
2.2 to 4.0 kW	0.42

Draining the motor oil

1. Slacken 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.

Note ***Used oil must be disposed of in accordance with local regulations.***

Filling with motor oil

Pump on horizontal position

1. Place the pump in such a position that it is lying on the stator housing and the discharge flange and that the oil screws are pointing upwards. See fig. 11.
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.
3. Fit both oil screws using the packing material included in the kit. See section *10.5 Service kits*.

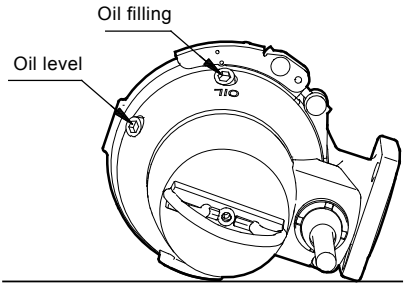

Fig. 11 Oil filling holes

Filling with motor oil

Pump on vertical position

1. Place the pump upright position 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 quality, see the table above.
3. Fit both oil screws using the packing material included in the kit. See section *10.5 Service kits*.

10.3 Checking the shaft seal

To make sure that the shaft seal is intact, the oil should be checked.

If the oil is greyish white like milk or contains a large quantity of water, the shaft seal should be replaced as the primary part of the seal is worn. If the seal is still used, the motor will be damaged within a short time.

If the oil is clean, it can be reused.

10.4 Adjustment of impeller clearance

Warning

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

To adjust impeller you need to dismantle the grinder system first:

1. See section *10.2 Change of motor oil*.
2. Set the pump on horizontal position on the table.
3. Remove the screw (188a) from the pump feet (M).
4. Loosen the grinder ring (44) by knocking it clockwise with punch (F and L). See fig. 12.

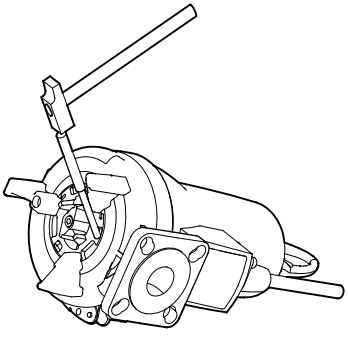

Fig. 12 Dismantling the grinder ring

5. Remove the grinder ring (44).
6. Insert the punch (F) into the hole to hold the impeller to prevent it movement during dismantling.
7. Remove the screw (188a) including washer (66) from the shaft end. See fig. 13.
8. Remove the grinder head (45).

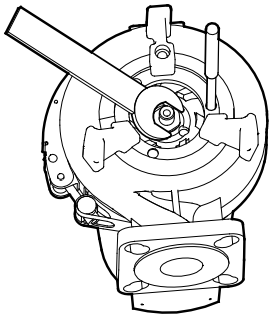

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Fig. 13 Dismantling the screw and grinder head

9. Tighten the adjusting nut (68) until the impeller (49) cannot rotate any more.
10. Slacken the adjusting nut (68) by 1/4 turn.

Assembly of grinder system:

1. Fit grinder head (45). The dogs on the back of the grinder head must engage with the impeller holes (49).
2. Tighten screw (188a) in the shaft end to a torque of 20 Nm ± 2. Do not forget the lock washer.
3. Fit grinder ring (44) and turn grinder ring (44) 15 to 20 ° anti-clockwise until it is tightened.
4. Check that the grinder ring does not touch the grinder head.
5. Tighten screw (188a) to a torque of 16 Nm ± 2.
6. Check that the grinder head rotates freely and noiselessly.

10.5 Service kits

Warning

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

All rotating parts must have stopped moving.

The following service kits are available for all SEG pumps and can be ordered as required:

Service kit	Description	Pump type	Material	Product number
Shaft seal kit	Shaft seal complete	SEG.40.09 - 15	BQQP	96076122
			FKM	96645160
		SEG.40.26 - 40	BQQP	96076123
			FKM	96645275
O-ring kit	O-rings and gaskets for oil screws	SEG.40.09 - 15	BQQP	96076124
			FKM	96646061
		SEG.40.26 - 40	BQQP	96076125
			FKM	96646062
Grinder system	Grinder head, grinder ring, shaft screw and locking screw	DN 40	Standard	96076121
			Heavy duty	96903344
		DN 50 high flow	-	98453210
Impeller	Impeller complete with adjusting nut, shaft screw and key	SEG.40.09	-	98453205
		SEG.40.12	-	98453203
		SEG.40.15	-	98453192
		SEG.40.26	-	98453178
		SEG.40.31	-	98453177
		SEG.40.40	-	98453172
Oil	1 litre of oil, type Shell Ondina X420. See section *10. Maintenance and service* for required quantity in oil chamber.	All types	-	96586753

10.6 Contaminated pumps

Warning

If a pump has been used for a liquid which is injurious to health or toxic, the pump will be classified as contaminated.

If Grundfos is requested to service the pump, Grundfos must be contacted with details about the pumped liquid, etc. before the pump is returned for service. Otherwise Grundfos can refuse to accept the pump for service.

Possible costs of returning the pump are paid by the customer.

However, any application for service (no matter to whom it may be made) must include details about the pumped liquid if the pump has been used for liquids which are injurious to health or toxic.

Before a pump is returned, it must be cleaned in the best possible way.

11. Fault finding

Warning

Before attempting to diagnose any fault, make sure that the fuses have been removed or the mains switch has been switched off. Make sure that the power supply cannot be accidentally switched on.

All rotating parts must have stopped moving.

Fault	Cause	Remedy
1. Motor does not start. Fuses blow, or motor-protective circuit breaker trips immediately. **Caution:** Do not start again!	a) Supply failure; short-circuit; earth-leakage fault in cable or motor winding.	Have the cable and motor checked and repaired by a qualified electrician.
	b) Wrong type of fuse.	Install fuses of the correct type.
	c) Impeller blocked by impurities.	Clean the impeller.
	d) Air bell, float switch or electrode out of adjustment or defective.	Check the air bells, float switches or electrodes.
2. Pump runs, but the motor-protective circuit breaker trips after a short while.	a) Low setting of thermal relay in motor-protective circuit breaker.	Set the relay in accordance with the specifications on the nameplate.
	b) Increased current consumption due to large voltage drop.	Measure the voltage between two motor phases. Tolerance: - 10 %/+ 6 %.
	c) Impeller blocked by impurities. Increased current consumption in all three phases.	Clean the impeller.
	d) Adjustment of impeller clearance incorrect.	Readjust the impeller. See fig. 12 in section *10.4 Adjustment of impeller clearance*.
3. The pump's thermal switch trips when the pump has been operating for some time.	a) Too high liquid temperature.	Reduce the liquid temperature.
	b) Too high liquid viscosity.	Dilute the liquid.
	c) Wrong electrical connection. (If the pump is star-connected to a delta connection, the result will be very low under voltage).	Check and correct the electrical installation.
4. Pump operates at below-standard performance and increased power consumption.	a) Impeller blocked by impurities.	Clean the impeller.
	b) Wrong direction of rotation.	Check the direction of rotation. If is not correct, interchange two phases. See section *9.3 Direction of rotation*.
5. Pump runs but gives no liquid.	a) Discharge valve closed or blocked.	Check the discharge valve and open/clean it.
	b) Non-return valve blocked.	Clean the non-return valve.
	c) Air in pump.	Vent the pump.
6. Pump is blocked.	a) Grinder system is worn.	Replace the grinder system.

12. Technical data

Supply voltage

- 1 x 208-230 V - 10 %/+ 6 %, 60 Hz
- 3 x 200-230 V - 10 %/+ 6 %, 60 Hz
- 3 x 380 V - 10 %/+ 6 %, 60 Hz
- 3 x 460 V - 10 %/+ 6 %, 60 Hz
- 3 x 575 V - 10 %/+ 6 %, 60 Hz

Enclosure class

IP68. According to IEC 60529.

Explosion protection classification

Class 1, division 1, group C and D, T4, T3, IP68.

Insulation class

F (155 °C).

Pump curves

Pump curves are available at 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.

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.

13. Disposal

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.

Subject to alterations.

Dimensional drawings

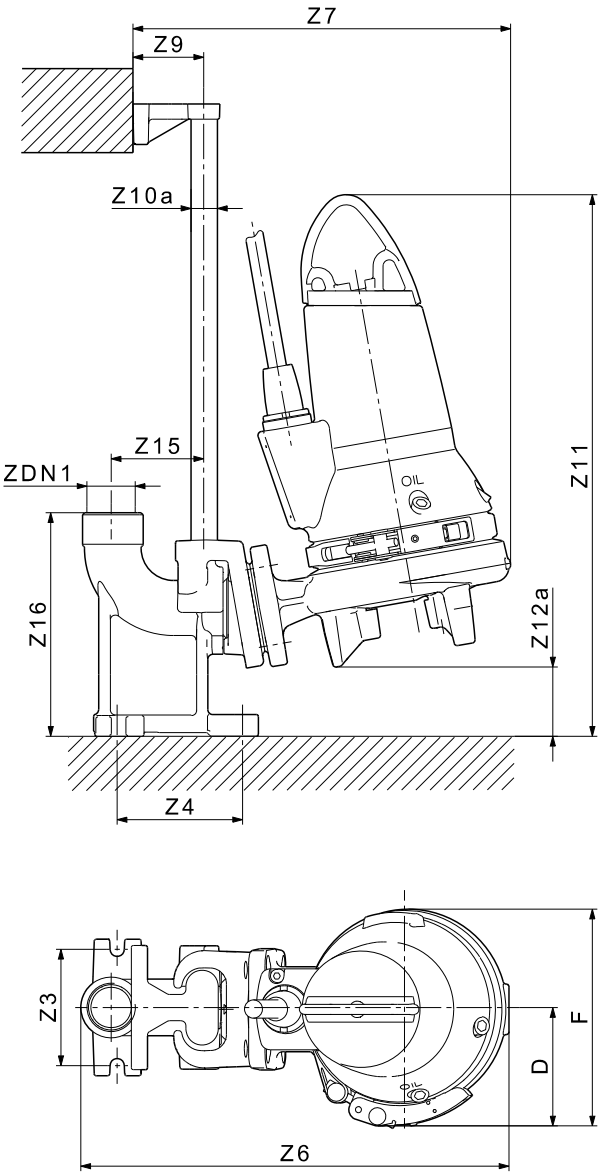

Fig. 1 One-pump installation on auto-coupling