

# AP40-70

50 Hz DIN

Installation and operating instructions



**QR99912799**

Installation and operating instructions  
(all available languages)  
<http://net.grundfos.com/qr/99912799>



## AP40-70

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### English (GB)

Installation and operating instructions . . . . . 4

**Appendix A** . . . . . **20**

# English (GB) Installation and operating instructions

## Original installation and operating instructions

### Table of contents

<b>1. General information</b>	<b>4</b>
1.1 Hazard statements	4
1.2 Notes	4
1.3 Target group	5
<b>2. Product introduction</b>	<b>5</b>
2.1 Product description	5
<b>3. Receiving the product</b>	<b>7</b>
3.1 Transporting the product	7
3.2 Handling and lifting the product	7
<b>4. Mechanical installation</b>	<b>7</b>
4.1 Installation requirements	7
4.2 Installation on auto-coupling	7
4.3 Installation on ring stand	9
<b>5. Electrical connection</b>	<b>9</b>
5.1 CU 100 control unit	10
5.2 Level controllers	10
5.3 Sensors	11
<b>6. Startup</b>	<b>11</b>
6.1 Operating modes	12
6.2 Start and stop levels	12
6.3 Direction of rotation	13
6.4 Resetting the pump	13
<b>7. Storing the product</b>	<b>13</b>
<b>8. Maintenance and service</b>	<b>14</b>
8.1 Maintenance schedule	14
8.2 Test insulation resistance	14
8.3 Replacing the impeller	14
8.4 Ball bearing maintenance	15
8.5 Oil check and change	15
8.6 Service kits	16
8.7 Contaminated pumps	16
<b>9. Fault finding</b>	<b>16</b>
9.1 The pump does not start	16
9.2 The pump runs, but delivers no liquid	16
9.3 The pump starts, but the motor-protective circuit breaker trips after a short time	16
9.4 The pump runs at below standard performance and power consumption	16
9.5 Mechanical shaft seal leaks, sealing chamber monitor reports fault and switches the pump off	17
<b>10. Technical data</b>	<b>18</b>
10.1 Operating conditions	18
10.2 Weights	18

10.3 Electrical data	18
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<b>11. Disposing of the product</b>	<b>18</b>
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## 1. General information



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

### 1.1 Hazard statements

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



#### DANGER

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



#### WARNING

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



#### CAUTION

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

The hazard statements are structured in the following way:



#### SIGNAL WORD

##### Description of the hazard

Consequence of ignoring the warning

- Action to avoid the hazard.

### 1.2 Notes

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



Observe these instructions for explosion-proof products.



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



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



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



Tips and advice that make the work easier.

### 1.3 Target group

These installation and operating instructions are intended for professional installers.

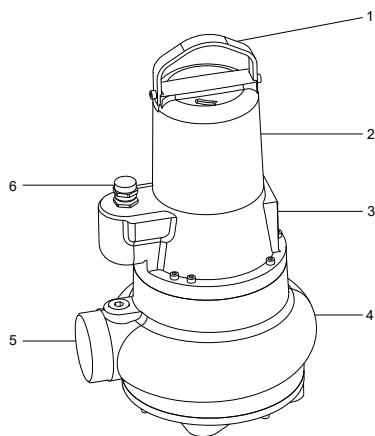
## 2. Product introduction

### 2.1 Product description

The AP40-70 pumps are a range of Vortex and Single-channel (1-channel) impeller pumps designed for transferring sewage, effluents, sludge and surface water.

Impeller types:

- 1-channel: enclosed single-channel impeller for liquids containing impurities and sludge with solid particles or long fibres.
- Vortex impeller: for liquids containing a high level of impurities or fibrous matter and gas.



TM076786

AP70 pump

Position	Description
1	Lifting bracket
2	Stator housing
3	Nameplate
4	Pump housing
5	Outlet
6	Cable plug

#### 2.1.1 Intended use

These pumps are designed for pumping sewage and wastewater in a wide range of private and industrial applications.

#### 2.1.2 Pumped liquids



The pumps must not be used for pumping combustible, flammable or corrosive liquids.

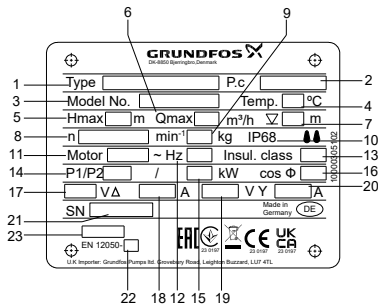
The pumps are designed for transferring the following liquids:

- sewage
- drainage and surface water
- sludge with minimal dry-solids content
- effluent.

### 2.1.3 Identification

#### 2.1.3.1 Nameplate

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



TM076788

Position	Description
1	Type designation
2	Production code, year and week
3	Product number
4	Maximum liquid temperature [°C]
5	Maximum head [m]
6	Maximum flow rate [m³/h]
7	Maximum installation depth [m]
8	Speed [rpm]
9	Net weight [kg]
10	Enclosure class
11	Phase
12	Frequency [Hz]
13	Insulation class
14	Motor input power P1 [kW]
15	Motor input power P2 [kW]
16	Cos φ, 1/1 load
17	Rated voltage [V], delta connection
18	Rated current [A], delta connection
19	Rated voltage [V], star connection
20	Rated current [A], star connection
21	Serial number
22	Standard number
23	Instruction manual publication number

#### 2.1.3.2 Type key

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

Example: AP40.50.07.A.3.V

Code	Description	Explanation
AP	Wastewater/sewage pump	Pump type
40	Maximum solids size 40 = 40 mm	Pump passage
50	Nominal outlet diameter 50 = 50 mm	Pump outlet
07	Output power P2 / 10	Power [kW]
A	Level switch	Control
1	Single-phase motor	Number of phases
3	Three-phase motor	
1	Single-channel impeller	Impeller type
V	Vortex impeller	
Z	Custom-built products	Customisation

## 3. Receiving the product

### 3.1 Transporting the product

The pump can be transported and stored in vertical or horizontal position. Make sure it cannot roll or fall over. Make sure that the received product corresponds to the order. In case of damage or missing parts, inform the transport company or the manufacturer immediately.

### 3.2 Handling and lifting the product

All lifting equipment must be rated for the purpose and checked for damage before lifting the pump. The lifting equipment rating must not 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 the top of each other when lifting or moving them.
- Always lift the pump by its lifting bracket or by a forklift truck, if the pump is fixed on a pallet. Never lift the pump by the power cable, hose or pipe.



#### CAUTION

##### Sharp element

Minor or moderate personal injury

- Wear protective gloves when opening the pump package.



Keep the cable end protectors in storage for later use.

#### WARNING

##### Crushing hazard

Death or serious personal injury

- Make sure your hand cannot get caught between the lifting bracket and the hook.



#### WARNING

##### Crushing hazard

Death or serious personal injury

- Make sure the hook is fixed to the lifting bracket properly.
- Always lift the pump by its lifting bracket or by a forklift truck, if the pump is fixed on a pallet.
- Make sure that the lifting bracket is tightened before lifting the pump.



## 4. Mechanical installation

The compact design makes the pumps suitable for both temporary and permanent installation. The pumps can be installed on an auto-coupling system or on a ring stand to the bottom of the pit.

### 4.1 Installation requirements



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

#### DANGER

##### Electric shock

Death or serious personal injury

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



#### DANGER

##### Electric shock

Death or serious personal injury

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



Maintenance and service work must be carried out when the pump is outside the pit. For safety reasons, all work inside pits must be supervised by a person outside the pit.

#### WARNING

##### Crushing hazard

Death or serious personal injury

- Make sure the lifting bracket is tightened before lifting the pump.



### 4.2 Installation on auto-coupling

Pumps for permanent, vertical installation in a pit can be installed on a stationary auto-coupling unit.



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. Use loose flanges to ease the installation and to avoid pipe tension at the flanges.



Do not use elastic elements or bellows to connect the pipes.



In some installations, a plinth is required beneath the auto coupling to ensure the correct installation of the pump.

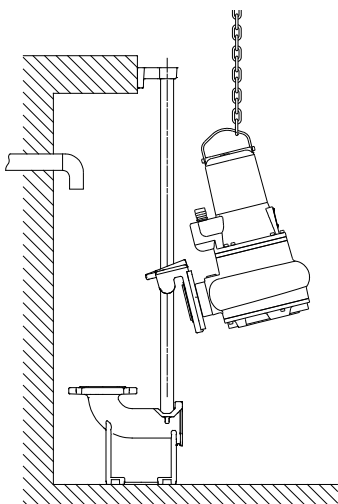


The free end of the cable must not be submerged as water may penetrate into the motor.

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

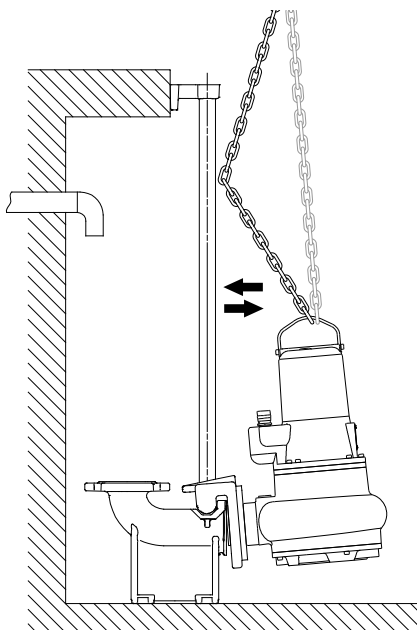
Proceed as follows:

1. Drill mounting holes for the guide-rail bracket on the inside of the pit and fasten the guide-rail bracket with two screws.
2. Place the auto-coupling base unit on the bottom of the pit. If the bottom is uneven, the auto-coupling base unit must be supported. Use a plumb line to establish the correct positioning. Fasten the auto coupling with expansion bolts.
3. Connect the outlet pipe in accordance with the generally accepted procedures. Avoid exposing the pipe to distortion or tension.
4. Place the guide rails on the auto-coupling base unit and adjust the length of the rails to the guide-rail bracket at the top of the pit.
5. Unscrew the guide-rail bracket. Insert the expansion dowels into the holes. Fasten the guide-rail bracket on the inside of the pit. Tighten the bolts in the expansion dowels.
6. Clean out debris from the pit before lowering the pump.
7. Fit the guide shoe to the pump outlet. Grease the gasket of the guide shoe before lowering the pump into the pit.
8. Slide the guide shoe along the guide rails and lower the pump into the pit using the chain secured to the lifting bracket. When the pump reaches the auto-coupling base unit, pull the lifting chain towards the guide rail several times to shake off any substances. When the chain is unstrained, the pump automatically connects to the auto-coupling unit.
9. Hang up the end of the chain on a suitable hook at the top of the pit. Make sure that the chain is straight but not strained.
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. Ensure that the coiled cable cannot fall into the pit. Make sure that the cables are not sharply bent or pinched.
11. Connect the power cable and the control cable, if any.



TM076790

*Lowering the pump to the auto-coupling base*



TM076792

*Connecting the pump to the auto-coupling base*

### 4.3 Installation on ring stand



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



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

Pumps for submerged ring stand installation can stand freely on the bottom of the pit or similar location.

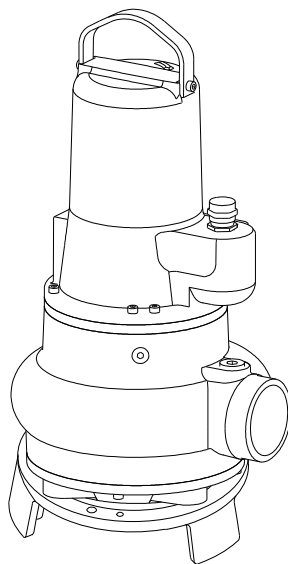
If a hose is used, make sure it does not buckle and that the inside diameter of the hose matches the outlet.

If a rigid pipe is used, fit the parts in the following order:

1. union or coupling
2. non-return valve
3. isolating valve.

If the pump is installed in muddy conditions or on uneven ground, place it on a solid support.

1. Fit a 90° elbow to the pump outlet and connect the outlet pipe or hose.
2. Lower the pump into the liquid by a chain secured to the lifting bracket. Place the pump on a plain, solid foundation.
3. Hang up the end of the chain on a suitable hook at the top of the pit, so 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 cables are not sharply bent or pinched.
5. Connect the power cable and the control cable, if any.



TM076794

*Installation on ring stand*

### 5. Electrical connection



Pumps cannot be operated with frequency converter.

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



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.

**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 nameplate.



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

The supply voltage and frequency are marked on the pump nameplate. Make sure the power supply at the installation site is suitable for the pump motor.

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, check the cable for visible defects to avoid short circuits.

The pumps must be connected to one of the following:

- a control unit with motor-protective circuit breaker, such as Grundfos CU 100
- Grundfos LC 231 or 241 pump controller.



Pumps cannot be operated with frequency converter.

**5.1 CU 100 control unit**

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

**5.2 Level controllers**

The liquid level can be controlled by the Grundfos LC level controllers.

Suitable level controllers:

- LC 231: compact solution with certified motor protection for single- and dual-pump versions.
- LC 241: cabinet solution offering modularity and customisation for single- and dual-pump versions.

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

Depending on the security levels and the number of pumps, level switches can be used in the following setups:

- Dry run (optional)
- Stop
- Start pump 1 (single-pump version)
- Start pump 2 (dual-pump version)
- High level (optional)

Analogue level transmitters can be used, and all levels can be customised. Level switches can be used with level transmitters, for dry-run protection and high level alarm.



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.

**5.2.1 Installing level switches**

When installing the level switches, observe the following points:

- To prevent air intake and vibrations, install the stop level switch, so the pump is stopped before the liquid level is lowered to the middle of the motor housing.
- Install the start level switch, so the pump is started at the required level. The pump must always start before the liquid level reaches the bottom inlet pipe.
- 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.

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

### 5.3 Sensors

The thermal switch in circuit 1 (T1-T3) and in circuit 2 (T1-T2) breaks the circuit at an approximate 140 °C winding temperature. Thermal protection must always be connected.

	AP40 (1-phase)	AP40-60	AP70
Thermal protection	Thermistor enclosed in motor winding. It has an automatic reset after cooling down, does not require outside control.	External thermal switch must be connected (contact Grundfos).	Enclosed in motor winding, requires outside control through the signal wires of the power cable.
Oil chamber seal probe		-	Requires outside control through the signal wires of the power cable.

## 6. Startup

Before starting the product:

- Make sure that the fuses have been removed.
- Make sure that all protective equipment has been connected correctly.
- Check the oil level.
- Test the insulation resistance.



### CAUTION Hot surface

Minor or moderate personal injury

- If the float switches cannot work properly, dry running of the pump may cause overheating. Ensure that the float switches can move freely.



### CAUTION Crushing of hands

Minor or moderate personal injury

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



### 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.



### WARNING

#### Crushing of hands

Death or serious personal injury

- When lifting the pump, make sure your hand cannot get 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 a forklift truck, if the pump is fixed on a pallet.
- Never lift the pump by the power cable, hose or pipe.
- Make sure that the lifting bracket is tightened before lifting the pump.



### 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 after dismantling.
- Wear appropriate personal protective equipment and clothing.

**CAUTION**  
**Hot surface**

Minor or moderate personal injury



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

**6.1 Operating modes**

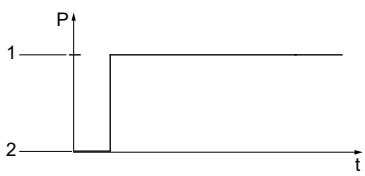


Never use these pumps for siphoning operation. The pumps must always be completely submerged in the pumped liquid.

The pumps are designed for continuous (S1) 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. During S1 operation, the maximum number of starts per hour is 15.



The pumps must be completely submerged for continuous operation.



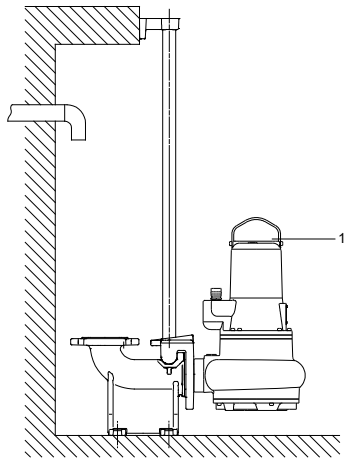
TM076798

*S1 operation*

Position	Description
1	Operation
2	Stop

The minimum liquid level is at the top of the pump housing.

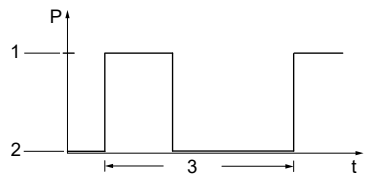
For AP40 and AP50 pumps, intermittent (S3) operation between 40 °C and 60 °C liquid temperature is permitted up to 30%. S3 operation is a series of 10-minute duty cycles. Each cycle has a 3-minute period of constant load followed by a 7-minute period of rest. Thermal equilibrium is not reached during the cycle.



TM076796

*Minimum liquid level*

Position	Description
1	Minimum liquid level



TM076800

*S3 operation*

Position	Description
1	Operation
2	Stop
3	Duty cycle

**6.2 Start and stop levels**

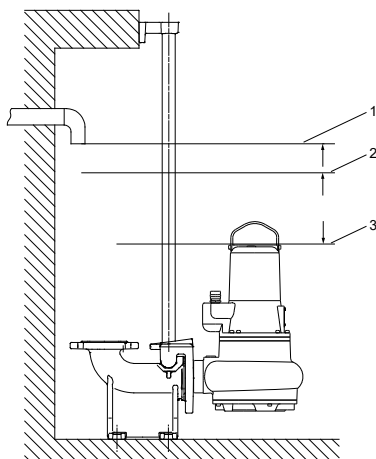
Start and stop levels can be adjusted by changing the free cable length of the float switch.

Long free cable = large difference in level.

Short free cable = small difference in level.

- To prevent air intake and vibrations, install the stop level switch, so the pump is stopped before the liquid level reaches the upper edge of the clamp.

- Install the start level switch, so the pump is started at the required level. The pump must always be started before the liquid level reaches the bottom of the inlet pipe.



TM076802

Start and stop levels

Position	Description
1	Alarm
2	Start
3	Stop

### 6.3 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 indicates the correct direction of rotation.



The impeller rotates clockwise. When started, the pump jerks counterclockwise.

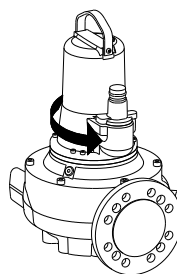
Procedure 1:

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 of steps 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 chain 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 jerks counterclockwise.
4. If the direction of rotation is wrong, interchange two phases in the power cable.



TM076805

*Jerk direction*

### 6.4 Resetting the pump

To reset the pump, switch off the power supply for a minute, then switch it on again.

### 7. Storing the product

Newly delivered products can be stored for 1 year without opening the original package.

#### **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.

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

After a period of storage, inspect the pump before putting it into operation. Make sure that the impeller can rotate freely. Pay attention to the condition of the shaft seals, O-rings and the cable entries.



Leave the cable-end protectors on the power and control cables until starting the electrical connection. Whether insulated or not, the free cable end must never be exposed to moisture or water. Non-compliance with this may cause damage to the motor.



If the pump is being stored for more than one month, turn the impeller at least every month to prevent the seal faces of the lower mechanical shaft seal from seizing up.

If you do not do this, the shaft seal may be damaged when the pump is started.

If the impeller cannot be turned, contact Grundfos or an authorised service workshop.

### WARNING

#### Crushing of hands

Death or serious personal injury

- Do not turn the impeller by hand. Always use an appropriate tool.



## 8. Maintenance and service

### 8.1 Maintenance schedule

Before initial startup or after a longer period of storage:

- Check the insulation resistance.
- Check the fill level in the sealing chamber.
- Check possible damage on the axial face seal.

Monthly:

- Monitor the power input and voltage.
- Check the used switchgears for resistance and sealed space control.

Every six months:

- Inspect the power supply cable.
- Inspect the cable holder and wiring.
- Inspect the accessories, such as the suspension device and hoisting gears.

After 1000 operating hours or after six months, whichever is earlier:

- Monitor current consumption and voltage
- Check the relays for posistors, sealing room, etc.
- Inspect power supply cable
- Inspect cable holder and cable bracing
- Inspect accessories, e.g. suspension device and hoisting gears

After 3000 operating hours:

- Perform visual check of the pump and inspect the wear ring.

- Check the oil level and condition. Change the oil. Change the shaft seal in case of water ingress or oil leakage.
- Check the hydraulic components and wear ring for wear. Replace if necessary.

After 8000 operating hours or two years:

- Check the insulation resistance
- Empty the leakage chamber. Not available for all models. For more information, contact Grundfos.
- Inspect all safety and control devices.
- Check the coating and touch-up as required.

After 15 000 operating hours or five years:

- General overhaul.



If the pump is used in highly abrasive or corrosive matter, the maintenance intervals should be reduced.

### Tightening torques

	A2/A4, Hardness class 70	A2/A4, Hardness class 80
DIN912 / DIN933		
M6	7 Nm	11.8 Nm
M8	17 Nm	28.7 Nm
M10	33 Nm	58 Nm
M12	57 Nm	100 Nm
M16	140 Nm	245 Nm
M20	273 Nm	494 Nm

### 8.2 Test insulation resistance

To check the insulation resistance, proceed as follows:

1. Disconnect the power supply cable.
2. Measure the resistance with an insulation tester. Measuring DC voltage is 1000 V.

During commissioning, the insulation resistance of 20 MΩ must be met or exceeded. For additional measurements, the value must be larger than 2 MΩ.

Low insulation resistance indicates that moisture may have penetrated to the cable and/or the motor insulation. Do not connect the pump, contact Grundfos.

### 8.3 Replacing the impeller

The stationary wear ring determines the gap between the impeller and the inlet. If this gap is too big, the pump performance decreases and may lead to impeller jams. The wear ring can be replaced, which reduces the wear on the inlet and the impeller, and consequently the expense for spare parts.

1. Loosen and remove the screws on the seal housing.
2. Remove the pump housing from the seal housing.
3. Place the pump housing on a secure base.
4. Hold the impeller steady with a suitable tool, and remove the impeller fastener.
5. Remove the impeller from the shaft.
6. Clean the shaft.
7. Attach a new impeller to the shaft. Make sure the sliding surfaces remain undamaged.
8. Hold the impeller steady with a suitable tool, then insert a new impeller fastener and tighten it.
9. Assemble the pump housing with the seal housing.
10. After the assembly is finished, check that the impeller can be turned by hand.

## 8.4 Ball bearing maintenance

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 an authorised service workshop.

## 8.5 Oil check and change



Use original parts only.



Use Shell Ondina X420 oil or equivalent type.



Dispose of used oil must comply with local regulations

### CAUTION

#### Pressurised system

Minor or moderate personal injury

- The oil chamber may be under pressure. Loosen the screws carefully and do not remove them until the pressure has been completely relieved.



After 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, the oil must be changed as well.

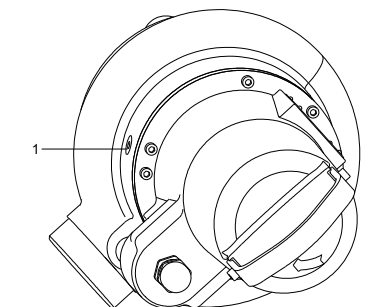
When the pump is new or the shaft seal is replaced, check the oil level and water content after one week of operation. If there is more than 20 % extra liquid (water) in the oil chamber, the shaft seal is defective. The table below states the quantity of oil in the oil chamber:

Pump type	Quantity [l]
AP40	0.01
AP50	0.8
AP50 (1.2 kW)	0.01
AP60 (0.8 kW)	0.8
AP60 (1.8 kW)	0.5
AP70	0.5

### 8.5.1 Draining of oil

1. Place the pump on a level surface with one oil screw pointing downwards.
2. Place a 1 litre capacity transparent container under the oil screw.
3. Remove the lower oil screw.
4. Remove the upper oil screw. Inspect the oil. If the colour is greyish white, the oil may contain water. If the oil contains water, the shaft seal is defective and must be replaced. If the oil quantity is less than the specified, the shaft seal is defective. If the shaft seal is not replaced, it can cause motor damage.
5. Clean the surfaces for gaskets and oil screws.

### 8.5.2 Filling with oil



Oil filling

TM076806

Proceed as follows:

1. Place the pump horizontally, on a level surface.
2. Fill new oil into the chamber through the oil filling position (1). The correct oil volume is prescribed in the Table above. Use Shell Ondina X420 or equivalent.
3. Remove the old seal (gasket) for the oil plug, and replace it with a new seal, which can be found in Kit Oil Plug Seals.
4. Fit both oil screws

## 8.6 Service kits

For details on available service kits, see the Grundfos Product Center (GPC) at product-selection.grundfos.com.

## 8.7 Contaminated pumps

The product is classified as contaminated if it is used with contagious or toxic liquid.

### CAUTION

#### Biological hazard

Minor or moderate personal injury



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

## 9. Fault finding

### 9.1 The pump does not start

Cause	Remedy
<b>Electricity supply interrupted – short circuit or earth connection in the cable or motor windings.</b>	<ul style="list-style-type: none"> <li>• Have the motor and wires checked by a specialist and replaced, if necessary.</li> </ul>
<b>Fuses, motor protection switch and/or monitoring devices are triggered.</b>	<ul style="list-style-type: none"> <li>• Have a specialist inspect the connection and correct them as necessary.</li> <li>• Have the motor protection switch adjusted according to the technical specifications and reset monitoring equipment.</li> <li>• Check that the impeller/propeller runs smoothly.</li> <li>• Clean it or free it as necessary.</li> </ul>

Cause	Remedy
<b>The oil chamber seal probe (optional) has interrupted the power circuit</b>	<ul style="list-style-type: none"> <li>• See fault: Mechanical shaft seal leaks, sealing chamber monitor reports fault and switches the pump off.</li> </ul>

### 9.2 The pump runs, but delivers no liquid

Cause	Remedy
<b>Outlet valve is closed or blocked.</b>	<ul style="list-style-type: none"> <li>• Check the outlet valve and open and/or clean it, if necessary.</li> </ul>
<b>Non-return valve is blocked.</b>	<ul style="list-style-type: none"> <li>• Clean the non-return valve.</li> </ul>
<b>There is air in the pump.</b>	<ul style="list-style-type: none"> <li>• Vent the pump.</li> </ul>

### 9.3 The pump starts, but the motor-protective circuit breaker trips after a short time

Cause	Remedy
<b>Low setting of the thermal relay in the motor-protective circuit breaker.</b>	<ul style="list-style-type: none"> <li>• Set the relay in accordance with the specifications on the nameplate.</li> </ul>
<b>Increased power consumption due to large voltage drop.</b>	<ul style="list-style-type: none"> <li>• Measure the voltage between two motor phases. Tolerance: - 10 %/+ 6 %. Re-establish correct voltage supply.</li> </ul>
<b>The impeller is blocked by impurities. Increased power consumption in all three phases.</b>	<ul style="list-style-type: none"> <li>• Clean the impeller.</li> </ul>
<b>The impeller clearance is incorrect.</b>	<ul style="list-style-type: none"> <li>• Dismantle and inspect hydraulic components for wear, replace worn components if necessary. The impeller clearance is not adjustable.</li> </ul>

### 9.4 The pump runs at below standard performance and power consumption

Cause	Remedy
<b>The impeller is blocked by impurities.</b>	<ul style="list-style-type: none"> <li>• Clean the impeller.</li> </ul>

Cause	Remedy
<b>The direction of rotation is wrong.</b>	<ul style="list-style-type: none"> <li>• Check the direction of rotation. If it is not correct, interchange two phases in the power cable.</li> </ul>

### 9.5 Mechanical shaft seal leaks, sealing chamber monitor reports fault and switches the pump off

Cause	Remedy
<b>Increased leakage when running in new mechanical shaft seals.</b>	<ul style="list-style-type: none"> <li>• Change the oil.</li> </ul>
<b>Defective oil chamber seal probe.</b>	<ul style="list-style-type: none"> <li>• Replace the oil chamber seal probe.</li> </ul>
<b>Mechanical shaft seal is defective.</b>	<ul style="list-style-type: none"> <li>• Replace the mechanical shaft seal</li> <li>• After a shaft seal has been removed from the shaft, always replace with a new shaft seal.</li> </ul>

## 10. Technical data

	Maximum solids size [mm]	Impeller type	Shaft seal		Ball bearing types	
			Motor side	Medium side	Upper	Lower
AP40	42	Vortex	Nitrile rubber	SIC / SIC	Deep groove	Deep groove
AP50	50		Nitrile rubber	SIC / SIC	Double row angular	Deep groove
AP50	50	1-channel	Nitrile rubber (1.2 kW)	SIC / SIC	Deep groove	Deep groove (1.2 kW)
			SIC / SIC (1.7 kW)			Double row angular (1.7 kW)
AP60	62	Vortex	SIC / SIC	SIC / SIC	Double row angular	Deep groove
AP70	70	1-channel	SIC / SIC	SIC / SIC	Double row angular	Deep groove

### 10.1 Operating conditions

Operating mode	S1, S3 30% (for AP40 and AP50)
Liquid temperature	0–40 °C. For short periods, a temperature of up to 60 °C is allowed.
Maximum density of the medium	1040 kg/m <sup>3</sup>
pH	6 – 11
Maximum installation depth	20 m
Operating pressure	6 bar
Regular cable length	10 m
Maximum starts per hour	15



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 Weights

Type (kW)	Weight (kg)
AP40 (0.7)	27
AP50 (1.0)	40
AP50 (1.2 and 1.7)	27 and 40
AP60 (0.8 and 1.8)	40 and 45
AP70 (0.9 and 1.3)	40

### 10.3 Electrical data

Power supply	3 x 400 V 50 Hz
	1 x 230 V 50 Hz
Enclosure class	IP68
Insulation class	H (180°C)

## 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 wheellie 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.

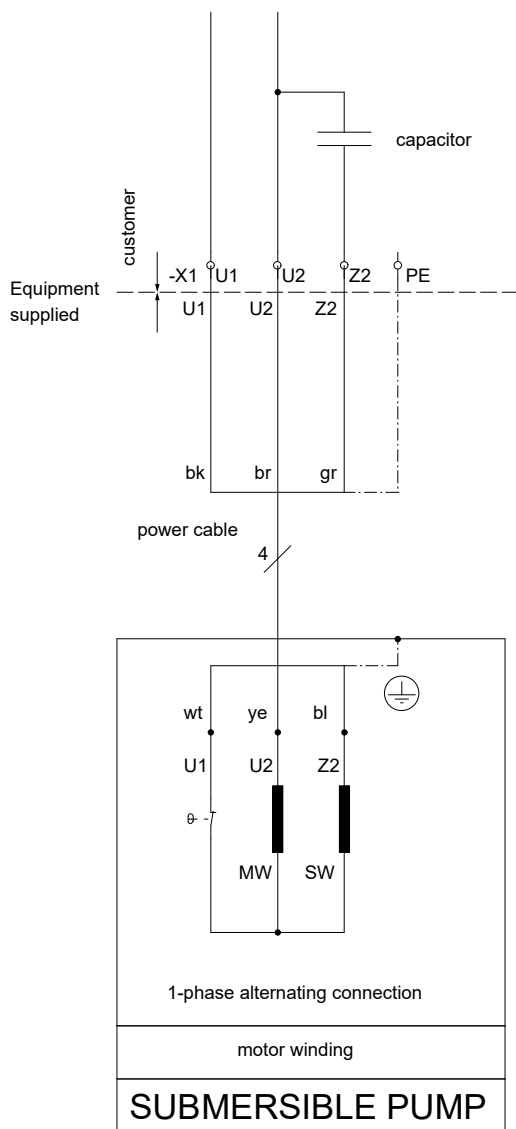
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See also end-of-life information at  
[www.grundfos.com/product-recycling](http://www.grundfos.com/product-recycling).

Appendix A

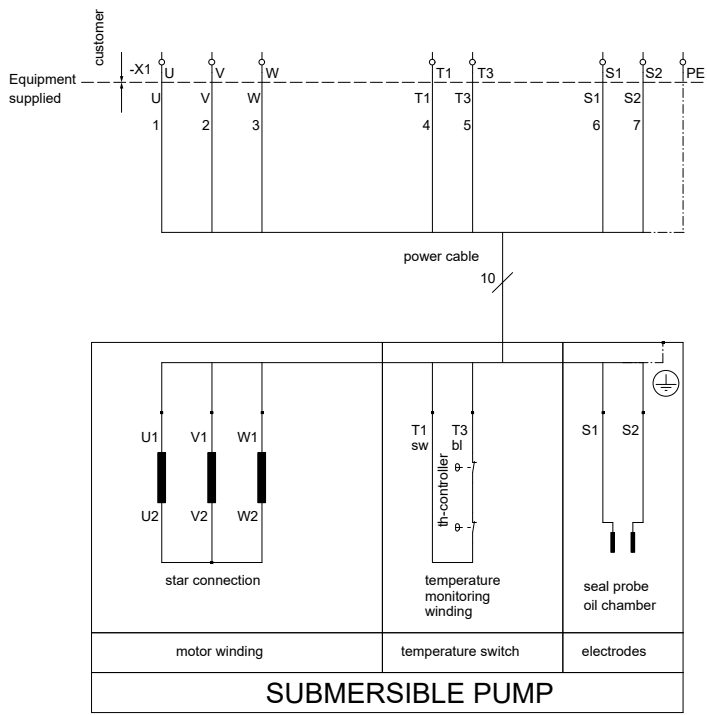
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## A.1. Wiring diagrams



MW = main winding  
SW = start winding

1-phase wiring diagram



3-phase wiring diagram



**WARNING**  
**Electric shock**  
Death or serious personal injury

- Make sure the earth and phase conductors are not mixed up, and the earth conductor is connected first.

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