

English (GB) Installation and operating instructions

Original installation and operating instructions

These installation and operating instructions describe UPS, UPSD Series 200.

Sections 1-6 give the information necessary to be able to unpack, install and start up the product in a safe way.

Sections 7-11 give important information about the product, as well as information on service, fault finding and disposal of the product.

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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 Symbols used in this document

DANGER



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

WARNING



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

CAUTION



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

The text accompanying the three hazard symbols DANGER, WARNING and CAUTION is structured in the following way:

SIGNAL WORD



Description of hazard

Consequence of ignoring the warning.
- Action to avoid the hazard.



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

1.2 Other important notes



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.

2. Receiving the product

2.1 Inspecting the product

Check that the product received is in accordance with the order.

Check that the voltage and frequency of the product match voltage and frequency of the installation site. See section [6.4.1 Nameplate](#).

2.2 Scope of delivery

The box contains the following items:

- UPS Series 200 pump
- installation and operating instructions in four languages
- safety instructions booklet.

3. Installing the product

3.1 Location

The pump is designed for indoor installation.

3.2 Tools

3.2.1 Torque

We recommend these tightening torques for bolts used in flanged connections:

Dimensions	Torque [Nm]
M12	27
M16	66

Install the pump with the motor shaft in horizontal position. See fig. 1.

3.2.2 Flange forces and torques

For maximum permissible forces and torques from the pipe connections acting on the pump flanges, see fig. 10, in appendix.

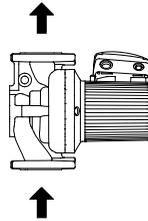


Fig. 1 Horizontal motor shaft

Arrows on the pump housing indicate the liquid flow direction through the pump.



Fit twin-head pumps mounted in horizontal pipes with an automatic air vent in the upper part of the pump housing. See fig. 5.

The automatic air vent is not supplied with the pump.



Observe the technical data in section [9. Technical data](#)

3.3 Terminal box positions

At the bottom close to the pump housing, the stator housing has two drain holes, 5 x 10 mm, to enable condensed water to escape. The drain holes must point downwards. See the arrows in fig. 2. Do not consider the air vent holes in the stator housing as drain holes.

The possible terminal box positions for single-head pumps are shown in fig. 2. The positions apply to mounting in both vertical and horizontal pipes.



Fig. 2 Terminal box positions, single-head pumps



Only turn the terminal box to the positions in fig. 2.

Standard terminal box positions.

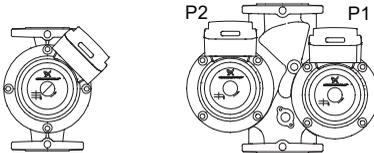


Fig. 3 Standard positions

3.4 Flow directions

Possible flow directions for single-head pumps.

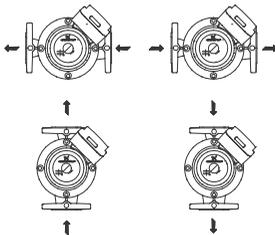


Fig. 4 Flow directions, single-head pumps

Possible flow directions for twin-head pumps.

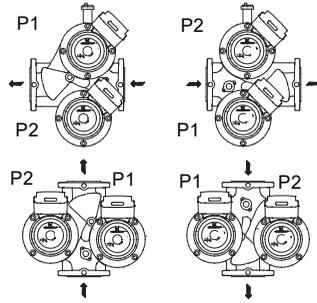


Fig. 5 Flow directions, twin-head pumps

TM05 1965 4111

TM02 1400 2701

TM04 5891 4409

TM02 1399 2701

WARNING

Pressurised system



Death or serious personal injury
- Before dismantling the pump, drain the system or close the isolating valve on either side of the pump. The pumped liquid may be scalding hot and under high pressure.

Change the terminal box position as follows:

1. Remove the four screws holding the pump head.
2. Turn the pump head to the desired position.
3. Refit the four screws.

When changing the terminal box position of twin-head pumps, you may have to remove the cable connecting the two terminal boxes. We recommend that you disconnect the cable from pump 1.

DANGER

Electric shock



Death or serious personal injury
Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Do not start the pump until the system has been filled with liquid and vented. Furthermore, the required minimum inlet pressure must be available at the pump inlet. See table in appendix.



When the terminal box position has been changed, turn the pump nameplate so that the cutout points downwards. This allows water from a possible venting to escape.

To change the nameplate position, ease the outer edge of the nameplate at the cutout with a screwdriver, turn the nameplate to the new position, and push it into place.

3.5 Electrical connections

The electrical connection must be carried out according to local regulations.

DANGER

Electric shock

Death or serious personal injury
Do not make any connections in the terminal box unless you have switched off the power supply.
Connect the pump to earth.
Connect the pump to an external mains switch with a minimum contact gap of 3 mm in all poles.



DANGER

Electric shock

Death or serious personal injury
It must be possible to lock the main switch in the off position. Type and requirements as specified in EN 60204-1, 5.3.2.



Check that the supply voltage and frequency correspond to the values stated on the nameplate.

Set the thermal switch to the pump full-load current according to the speed selected. The pump full-load current is stated on the pump nameplate. See fig. 10.

You can use earthing or neutralisation for protection against indirect contact. You can use a current- or voltage-operated earth-leakage circuit breaker as extra protection.

3.6 Single-head and twin-head pumps with standard module

Connect the pump to the power supply via an external contactor.

Connect the contactor to the thermal switch which is incorporated in the pump, terminals T1 and T2, to protect the pump against overloading at all three speeds.

CAUTION

Hot surface

Minor or moderate personal injury
- If the pump is also protected by a motor-protective circuit breaker, set this circuit breaker to the current consumption of the pump at the selected speed.
Change the motor-protective circuit breaker setting every time the pump speed is changed. The current consumption at the individual speeds is stated on the pump nameplate.



Figures 1 and 2 in the appendix show the possible connections:

- Figure 1 shows the electrical connections when using external pulse contacts for start or stop.
- Figure 2 shows the electrical connections when using an external changeover contact for start or stop.

3.7 Twin-head pumps with relay module

The pump is connected directly to the mains as it incorporates overload protection at all three speeds. The pumps are factory-set to alternating operation as duty and standby pump. Pump change takes place every 24 hours.

Figures 3 to 5 in the appendix show the possible connections and the setting of the selector switch for the various operating modes:

- Figure 3: Alternating operation.
- Figure 4: Standby operation with pump 1 as duty pump and pump 2 as standby pump.



Set the selector switch of pump 2 to either fault or operating indication in this operating mode.

- Figure 5: Standby operation with pump 2 as duty pump and pump 1 as standby pump.



Set the selector switch of pump 1 to either fault or operating indication in this operating mode.

In the case of single-pump operation, the cable between the pumps is to be removed. Set the pumps individually and connected them separately to the mains. See figures 6 and 7 in the appendix:

- Figure 6: Electrical connection and setting of the selector switch when using the signal output for operating indication.
- Figure 7: Electrical connection and setting of the selector switch when using the signal output for fault indication.



In the case of single-pump operation, set the selector switch to either fault or operating indication.

Fault or operating indication for twin-head pumps in alternating operation

If the signal output is to be used for fault or operating indication, use an intermediate relay.

Figure 8 shows a single-phase pump in alternating operation with external fault indication if pump 2 or both pumps are faulty.

Fault or operating indication for twin-head pumps in standby operation

If the signal output of the duty pump is to be used for fault or operating indication, use an intermediate relay.

If the signal output of the standby pump is to be used for fault or operating indication, proceed as shown in figures 6 and 7 in appendix.

3.8 Frequency converter operation

We do not recommend the pumps for frequency converter operation for the following reasons:

- The noise level will increase.
- The life of the motor insulation system will be reduced due to voltage peaks caused by the frequency converter.
- On three-phase pumps, the indication of the indicator light will be wrong. It will always be red.
- Pumps fitted with protection or relay module must not be connected to a frequency converter.

We recommend that you use Grundfos MAGNA and UPE Series 2000 which have built-in frequency converter.

4. Starting up the product

Do not start the pump until you have filled the system with liquid and vented it. Furthermore, the required minimum inlet pressure must be available at the pump inlet. See table in appendix.

CAUTION

Pressurised system

Minor or moderate personal injury
If the inspection screw is to be loosened, make sure that the escaping, scalding hot liquid does not cause personal injury or damage to components

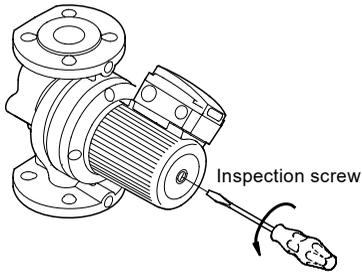


Fig. 6 Venting the pump

TM02 1405 1101

5. Storing and handling the product

5.1 Lifting the product

CAUTION

Crushing of feet

Minor or moderate personal injury
- Use safety shoes when handling the pump.



Observe local regulations setting limits for manual lifting or handling.

Always lift directly on the pump head or the cooling fins. See fig. 7.

For large pumps, you may have to use lifting equipment. Position the lifting straps as illustrated in fig. 7.



Fig. 7 Correct lifting of pump



Do not lift the pump head by the control box. See fig. 8.



Fig. 8 Incorrect lifting of pump

TM06 5352 4415

TM06 5353 4415

5.2 Positioning the product

CAUTION

Hot surface

- Minor or moderate personal injury
- Position the pump so that persons cannot accidentally come into contact with the hot surfaces.



When installing pumps, types UPS, UPS D 32-xx, 40-xx, 50-xx and 65-xx, with oval bolt holes in the pump flange, use washers as shown in fig. 9.

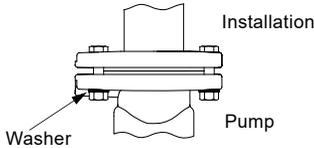


Fig. 9 Position of washers for oval bolt holes

TM01 0683 1997

5.3 Frost protection

If the pump is used during periods of frost, necessary steps must be taken to prevent frost bursts.

6. Product introduction

UPS, UPS D multispeed circulator pumps can run at three different speeds.

The pumps are available as single-head or twin-head pumps. All pumps incorporate a thermal switch in the stator.

The pumps are available as:

- cast-iron pumps with black nameplate
- bronze with bronze nameplate and a B in the type designation.

Terminal box modules

Single-head pumps are fitted with a standard module in the terminal box.

Twin-head pumps are fitted with a standard module or a relay module in the terminal box.

The relay module is available as an optional extra for single-head pumps.

6.1 Applications

The pumps are designed for circulation of liquids in heating and air-conditioning systems. The pumps can also be used in domestic hot-water systems.

6.2 Pumped liquids

Clean, thin, non-aggressive and non-explosive liquids, not containing solid particles, fibres or mineral oil.

If the pump is installed in a heating system, the water must meet the requirements of accepted standards on water quality in heating systems, for example the German standard VDI 2035.

In domestic hot-water systems, we recommend that you use the pumps only for water with a degree of hardness lower than approx. 14 °dH. For water with a higher degree of hardness, we recommend a direct-coupled TP pump.

Liquid temperature, see section 9. *Technical data*.

WARNING



Flammable material

Death or serious personal injury
Do not use the pump for flammable liquids, such as diesel oil and petrol.

6.3 Glycol

The pumps can be used for pumping water-glycol mixtures up to 50 %.

The maximum viscosity of a 50 % glycol mixture at 10 °C is approx. 32 cSt.



When pumping glycol mixtures, the pump performance will be reduced.

Consult Grundfos Product Center on www.grundfos.com for further details.

To prevent the glycol mixture from degrading, avoid temperatures exceeding the rated liquid temperature and minimise the operating time at high temperatures.

It is important to clean and flush the system before adding the glycol mixture.

To prevent corrosion or precipitation, check the glycol mixture and maintain it regularly. If further dilution of the supplied glycol is required, follow the glycol supplier's instructions.



DEX-COOL[®] glycol may damage the pump.

6.4 Identification

6.4.1 Nameplate



Fig. 10 Nameplate

TM06 5497 4715

Pos.	Description
1	Pump name
2	Type designation (UPS 50-30 FB)
3	Port-to-port length
4	Product number
5	Model designation
6	Production code (year and week)
7	Country of origin
8	Number of phases and rated voltage
9	Current, speeds 1, 2, 3
10	Power, speeds 1, 2, 3
11	Approvals
12	Direction of rotation
13	Rated frequency
14	Capacitor size
15	Enclosure class
16	Maximum system pressure
17	Temperature class

6.4.2 Type key

Example	UPS (D) 65 -60 (/2) (F) 280
Type range	
Twin-head pump	
Nominal flange diameter [mm]	
Max. head [dm]	
Number of motor poles. Stated if available both as 2- and 4-pole motor.	
F - Pump with flanges	
B - Pump with bronze pump housing. EuP: This circulator pump is suitable for drinking water only.	
Port-to-port length [mm]	

7. Control functions

7.1 Single-head and twin-head pumps with standard module

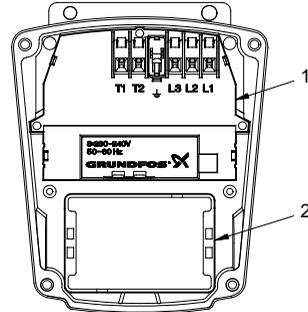


Fig. 11 Standard module and speed switch

TM00 9237 0602

Pos.	Description
1	Standard module
2	Speed switch

The function of the indicator lights is as shown in the following tables.

Single-phase pumps

Single-phase pumps incorporate a green indicator light only.

Indicator light	Description
On	The power supply has been switched on.
Off	The power supply has been switched off, or the pump has been cut out by the thermal switch.

Three-phase pumps

Three-phase pumps incorporate a green and a red indicator light.

Indicator lights		Description
Green	Red	
Off	Off	The power supply has been switched off, or the pump has been cut out by the thermal switch.
On	Off	The power supply has been switched on.
On	On	The power supply has been switched on. The direction of rotation is incorrect.

7.2 Twin-head pumps with relay module

The two terminal boxes are connected via a four-core cable.

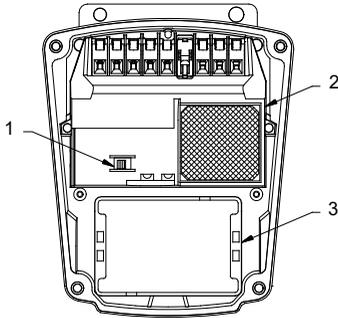


Fig. 12 Terminal box with relay module

TM02 6328 0203

Pos.	Description
1	Switch for signal output
2	Relay module
3	Speed switch

The relay module has a signal output for the connection of a transmitter for external operating or fault indication or for the control of the alternating operation of pump 1 and 2.

By means of a selector switch, the signal output can be set to activation:



Operation: The signal output is activated when the pump is operating.



Fault: The signal output is activated in case of fault.



Alternating operation: Use this setting when the pumps are to run alternately as duty and standby pump.

All pumps with relay module incorporate a green and a red indicator light. The function of the two indicator lights and the signal output is shown in the following table.

Indicator lights		Signal output activated		Description
Green	Red	Operation	Fault	
Off	Off			The pump has been stopped. The power supply has been switched off or a phase is missing.
On	Off			The pump is operating.
On	On			Three-phase pumps only: The pump is operating, but the direction of rotation is wrong.
Off	On			The thermal switch has cut out the pump.
Flashes	Off			The pump has been stopped by an mains switch.
Flashes	On			The thermal switch has cut out the pump and the mains switch is switched off.

Three operating modes are available.

- Alternating operation (factory setting): The pumps run alternately as duty and standby pump.
- Standby operation: One pump runs constantly as duty pump and the other runs constantly as standby pump.
- Single-pump operation: The pumps run independently of each other.

Note: If the pumps are to run simultaneously, set them to the same speed. Otherwise the non-return flap will close off the pump running at the lowest speed.

7.3 Speed selection



This section does not apply to pump version for Korea.

The speed switch in the terminal box can be turned to three positions. The speed in the three positions appears from the table below:

Switch position	Speed in % of maximum speed	
	Single-phase pumps	Three-phase pumps
1	approx. 60 %	approx. 70 %
2	approx. 80 %	approx. 85 %
3	100 %	100 %

Change to lower speed settings offers considerable reduction in energy consumption and less noise in the system.

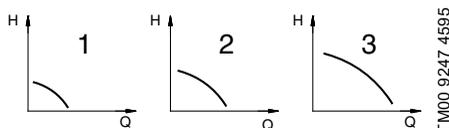


Fig. 13 Pump performance, speeds 1, 2 and 3

TM00 9247 4595



Do not vent the system through the pump.

DANGER

Electric shock



Death or serious personal injury
Before starting any work on the product, make sure that the power supply has been switched off and that it cannot be accidentally switched on.

Change the pump performance as follows:

1. Switch off the power supply to the pump with the external mains switch. The green indicator light in the terminal box must be off.
2. Remove the terminal box cover.
3. Pull out the speed switch module, and insert it so that the number of the required speed is visible through the window in the terminal box. See fig. 14.



When changing to or from speed 1, remove the cover of the speed switch and fit it on the other side of the switch.

4. Fit the terminal box cover.
5. Switch on the power supply. Check that the green indicator light is permanently on or flashing.



Do not use the speed switch module as an on/off switch.

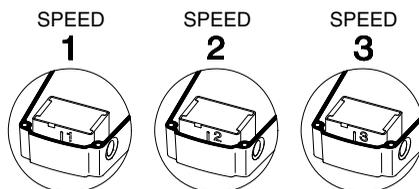


Fig. 14 Speed selection

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8. Fault finding the product

This section consists of two subsections, i.e. for pumps with terminal box with standard module and for twin-head pumps with terminal box with relay module.

WARNING

Pressurised system



Death or serious personal injury
Before dismantling the pump, drain the system or close the isolating valve on either side of the pump. The pumped liquid may be scalding hot and under high pressure

DANGER

Electric shock



Death or serious personal injury
It must be possible to lock the main switch in the off position. Type and requirements as specified in EN 60204-1, 5.3.2.

8.1 Single-head and twin-head pumps with standard module

Fault	Cause	Remedy
1. The pump does not run. None of the indicator lights are on.	a) One fuse in the installation is blown.	Replace the fuse.
	b) External mains switch switched off.	Switch on the mains switch.
	c) Current-/voltage-operated earth-leakage circuit breaker has tripped.	Repair insulation defects, and cut in the circuit breaker.
	d) The pump has been cut out by the thermal switch.	Check that the liquid temperature falls within the specified range. With external on/off changeover contact: The pump will restart automatically when it has cooled to normal temperature. With external on/off pulse contacts: The pump will restart when it has cooled to normal temperature.
2. The pump does not run. The green indicator light is on.	a) The rotor is blocked, but the pump has not been cut out by the thermal switch.	Switch off the power supply, and clean or repair the pump.
	b) The speed switch module has not been fitted.	Switch off the power supply with the external mains switch, and fit the speed switch module.
3. Three-phase pumps only: The pump is running. The red and green indicator lights are on.	a) The pump is running, but the direction of rotation is wrong.	Switch off the power supply with the external mains switch, and interchange two phases in the pump terminal box.
4. Noise in the system. The green indicator light is on.	a) Air in the system.	Vent the system.
	b) The flow rate is too high.	Reduce the pump performance. Change to lower speed.
	c) The pressure is too high.	Reduce the pump performance. Change to lower speed.
5. Noise in the pump. The green indicator light is on.	a) Air in the pump.	Vent the pump.
	b) The inlet pressure is too low.	Increase the inlet pressure, and/or check the air volume in the expansion tank, if installed.
6. Insufficient heat in some places in the heating system.	a) The pump performance is too low.	Increase the pump performance. Change to higher speed, if possible, or replace the pump with a pump with a higher flow.

8.2 Twin-head pumps with relay module

Fault	Cause	Remedy
1. The pump does not run. None of the indicator lights are on.	a) One fuse in the installation is blown.	Replace the fuse.
	b) The external mains switch switched off.	Switch on the mains switch.
	c) The current-/voltage-operated earth-leakage circuit breaker has tripped.	Repair insulation defects, and cut in the circuit breaker.
	d) Missing phase (only three-phase pumps).	Check fuses and connections.
2. The pump does not run. The green indicator light flashes.	a) The pump has been stopped by the mains switch.	Switch on the mains switch.
3. The pump does not run. The green indicator light is on.	a) The rotor is blocked, but the pump has not been cut out by the thermal switch.	Switch off the power supply, and clean or repair the pump.
4. The pump does not run. The red indicator light is on. The green indicator light is off.	a) The pump has been cut out by the thermal switch due to high liquid temperature or blocked rotor.	Check that the liquid temperature falls within the specified range. The pump will restart automatically when it has cooled to normal temperature. Note: If the thermal switch has cut out the pump three times within a short period, restart the pump manually by switching off the power supply.
	b) The speed switch module has not been fitted.	Switch off the power supply with the external mains switch, and fit the speed switch module.
5. The pump does not run. The green indicator light flashes. The red indicator light is on.	a) The pump is or has been cut out by the thermal switch and the mains switch is switched off.	Check that the liquid temperature falls within the specified range. Note: If the thermal switch has cut out the pump three times within a short period, restart the pump manually by switching off the power supply.
	b) The pump has been stopped by the external mains switch.	Switch off the power supply with the external mains switch, and interchange two phases in the terminal box.
	c) The pump will be running with wrong direction of rotation, if started.	
6. The pump is running. The red and green indicator lights are on.	a) The pump is running with wrong direction of rotation. Only three-phase pumps.	
7. Noise in the system. The green indicator light is on.	a) Air in the system.	Vent the system.
	b) The flow rate is too high.	Reduce the pump performance. Change to lower speed.
	c) The pressure is too high.	Reduce the pump performance. Change to lower speed.
8. Noise in the pump. The green indicator light is on.	a) Air in the pump.	Vent the pump.
	b) The inlet pressure is too low.	Increase the inlet pressure, and/or check the air volume in the expansion tank, if installed.
9. Insufficient heat in some places in the heating system.	a) The pump performance is too low.	Increase the pump performance. Change to higher speed, if possible, or replace the pump with a pump with a higher flow.

9. Technical data

Supply voltage

	Single-phase pumps	Three-phase pumps
Europe	1 x 230-240 V 50 Hz	3 x 400-415 V 50 Hz
Japan	1 x 100-110 V 50 Hz 1 x 100-110 V 60 Hz	3 x 200-230 V 50 Hz 3 x 200-230 V 60 Hz

Supply voltage tolerances

The motors meet the requirements to temperature rise at $\pm 6\%$. Furthermore, the motors have been tested at $\pm 10\%$ of the voltage range. During these tests, the motors operate without problems and without being thermally cut out. The voltage tolerances are intended for mains voltage variations. They must not be used for running motors at other voltages than those stated on the nameplates.

Enclosure class

IPX4D.

Ambient temperature

0 to 40 °C.

Relative air humidity

Maximum 95 %.

Liquid temperature

Water in heating systems:

Continuously: -10 to +120 °C.

For short periods: Up to 140 °C.

Domestic hot water: Up to 60 °C.

Special version with FKM seals: Up to 80 °C.

Insulation of pump head

Do not insulate the pump head. If the liquid temperature is lower than the ambient temperature, do not cover the drain holes in the stator housing if you insulate the pump display.

System pressure

The flange pressure number (PN) is indicated on the pump flanges. The table below shows the maximum permissible system pressure for the various pressure numbers at different temperatures:

Pressure	Cast-iron pumps			Bronze pumps
	$\leq 120\text{ °C}$	130 °C	140 °C	$\leq 140\text{ °C}$
	[[bar/MPa]]			
PN 6	6 / 0.6	5.8 / 0.58	5.6 / 0.56	10 / 1.0
PN 10	10 / 1.0	9.7 / 0.97	9.4 / 0.94	10 / 1.0
PN 6/10	10 / 1.0	9.7 / 0.97	9.4 / 0.94	10 / 1.0
PN 16	16 / 1.6	15.6 / 1.56	15 / 1.5	16 / 1.6

Flange connection

Pump type	PN 6	PN 10	PN 6/10	PN 16	Bolt holes
UPS, UPSD 32-xx			•	•	4
UPS, UPSD 40-xx			•	•	4
UPS, UPSD 50-xx			•	•	4
UPS, UPSD 65-xx			•	•	4
UPS, UPS D 80-xx	•				4
		•		•	8
UPS, UPSD 100-xx	•				4
		•		•	8

Pressure test

PN 6: 10 bar - 1.0 MPa.

PN 10: 15 bar - 1.5 MPa.

PN 6 / PN 10: 15 bar - 1.5 MPa.

PN 16: 20.8 bar - 2.08 MPa.

The pressure test has been made with water containing anti-corrosive additives at a temperature of 20 °C.

Inlet pressure

For the minimum pressures required for water at the pump inlet during operation, see table in appendix.

Sound pressure level

The sound pressure level of the pump is lower than 70 dB(A).

Thermal switch

The pump has a built-in thermal switch with the following data: 250 VAC / 1.6 A, $\cos \varphi$ 0.6.

The switch is a potential-free normally closed contact which opens when the pump temperature becomes too high and closes again when the pump has cooled to normal temperature.

To provide overload protection, connect the switch to an external thermal switch or fit a Grundfos protection or relay module. See figures 1 and 2.

If the pump is protected via an overload relay, i.e. motor current only, and not using the built-in switch, adjust the relay to the pump full-load current, stated on the pump nameplate, according to the selected speed. See fig. 9.

Start/stop input, basic module/relay module

External potential-free contact.

Maximum load: 250 V, 1.5 mA.

Minimum load: 100 V, 0.5 mA.

Operating/fault signal output, relay module

Internal potential-free changeover contact.

Maximum load: 250 V, 2 A, AC.

Minimum load: 5 V, 100 mA, DC.

10. 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 wheeled 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.

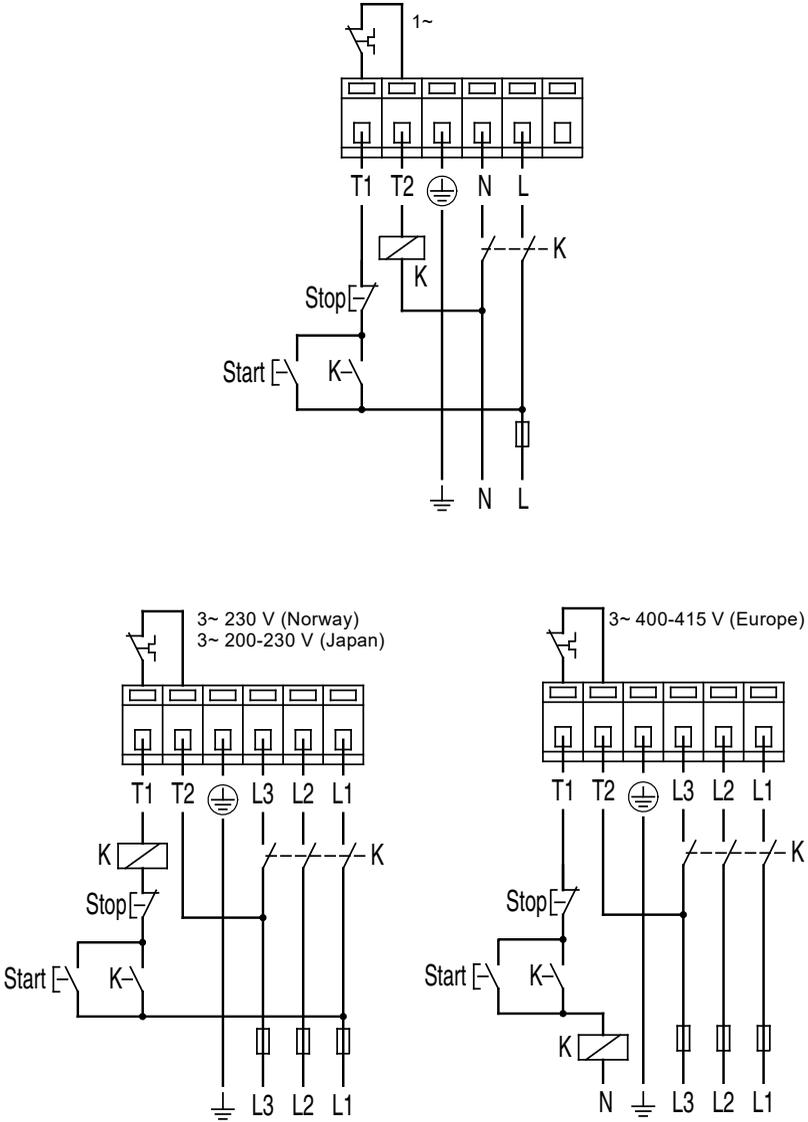


Fig. 1

TM00 9173 0305

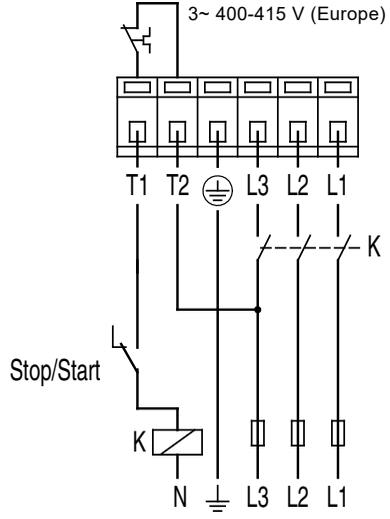
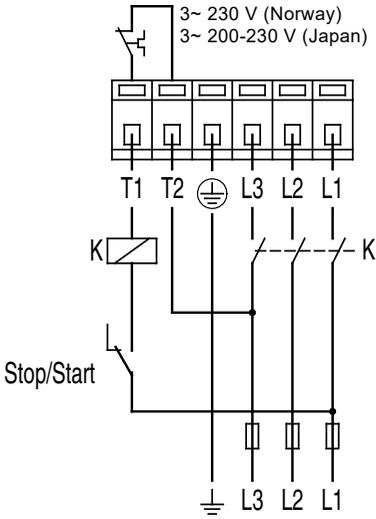
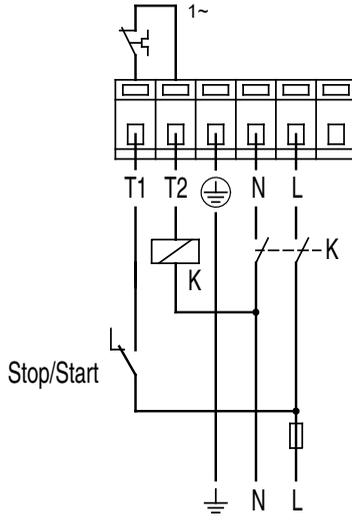


Fig. 2

TM00 9172 0305

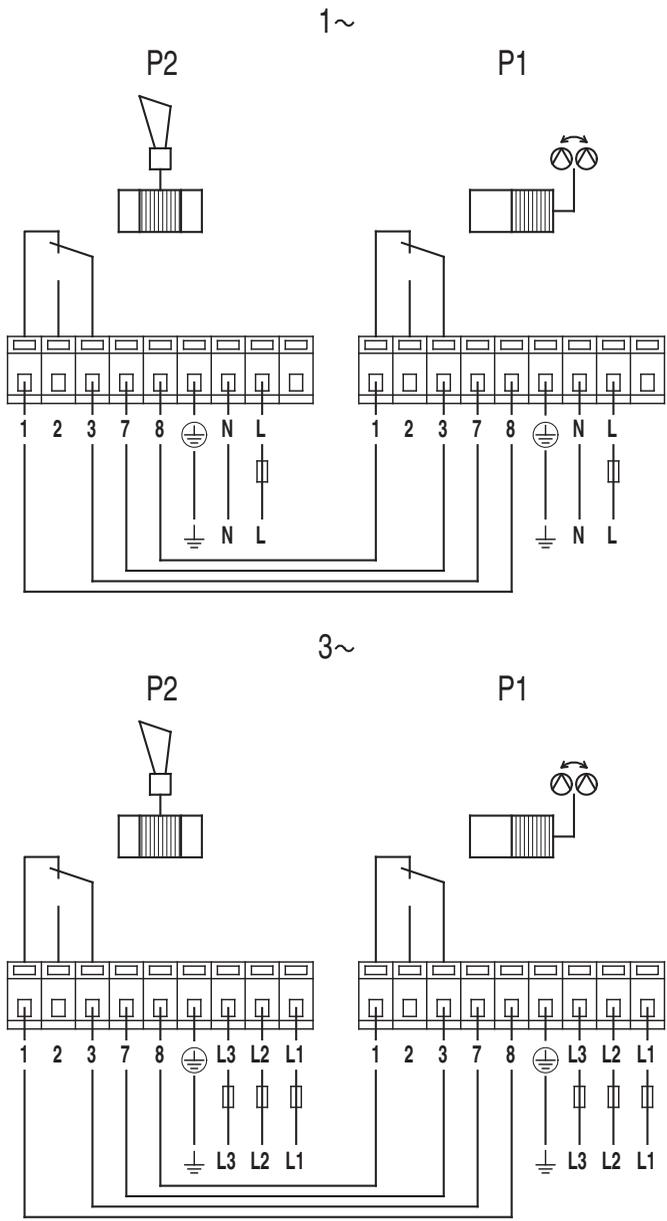


Fig. 3

TM00 9176 2407

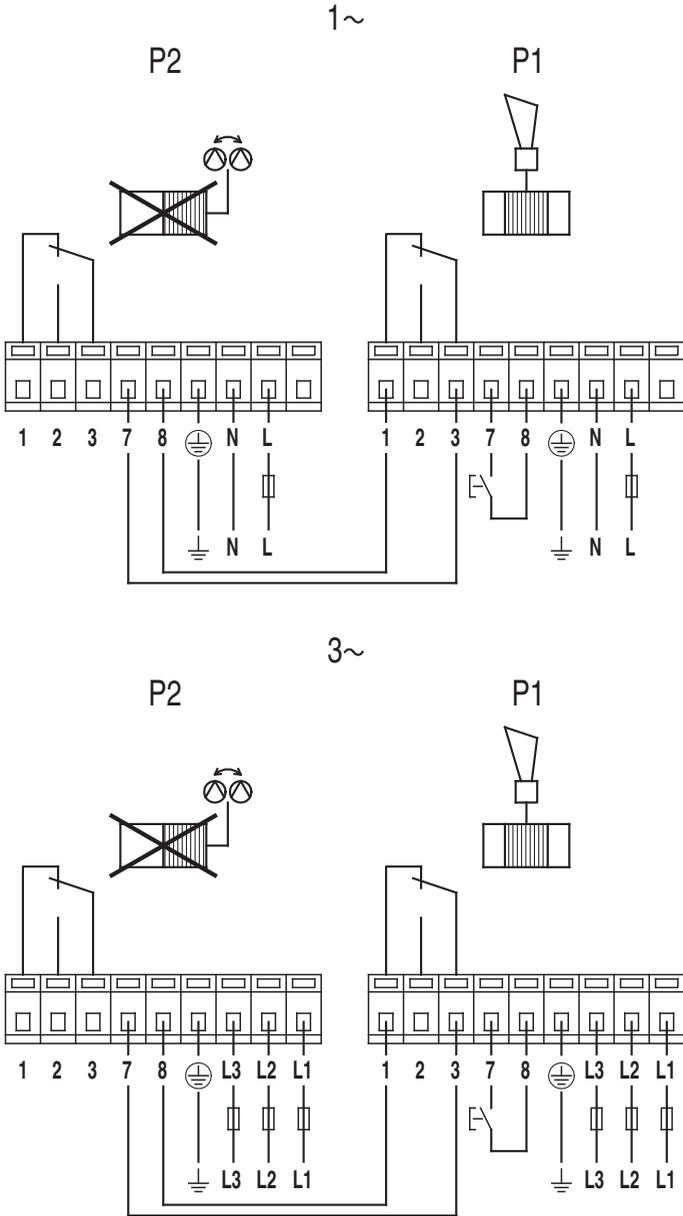


Fig. 4

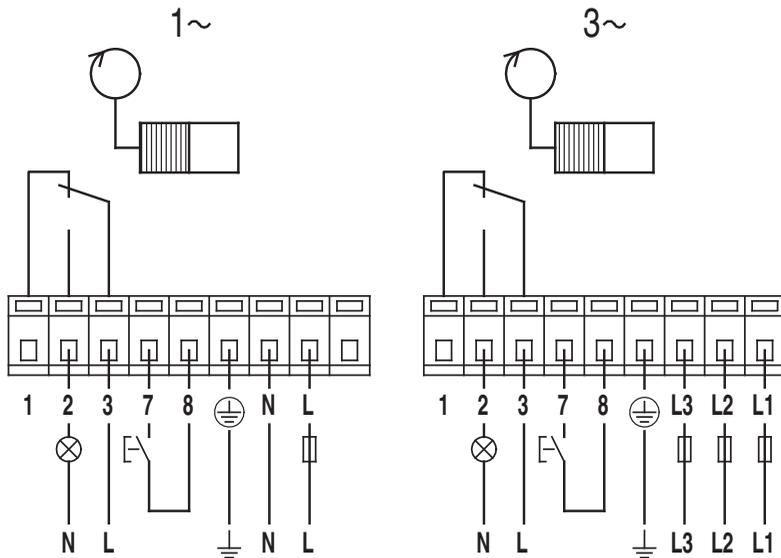


Fig. 6

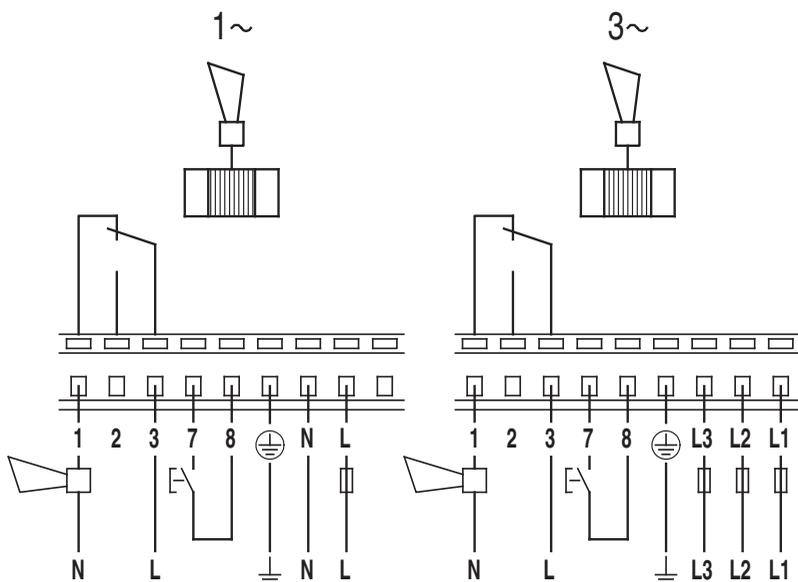


Fig. 7

TM00 9174 2407

TM00 9175 2407

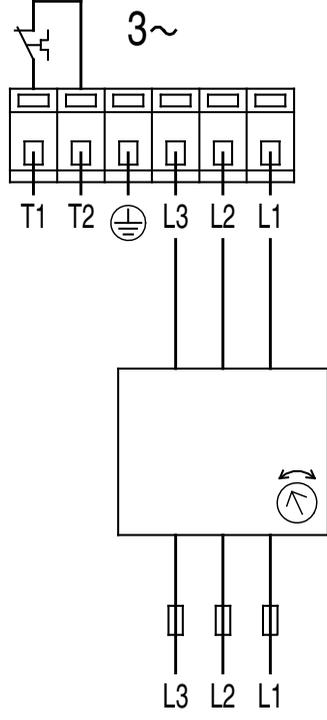
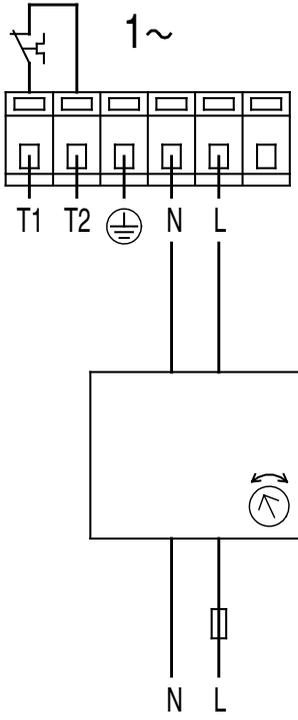


Fig. 9

TM02 4334 0305

50 Hz

Minimum inlet pressure for hot water						
Pump type	Liquid temperature					
	75 °C		90 °C		120 °C	
	[bar]	[MPa]	[bar]	[MPa]	[bar]	[MPa]
32-60	0.05	0.005	0.2	0.02	1.5	0.15
32-120	0.4	0.04	0.7	0.07	1.95	0.195
40-60/2	0.15	0.015	0.45	0.045	1.75	0.175
40-120	0.1	0.01	0.4	0.04	1.7	0.17
40-180	0.4	0.04	0.7	0.07	1.95	0.195
40-185	0.55	0.055	0.9	0.09	1.8	0.18
50-60/2	0.05	0.005	0.35	0.035	1.65	0.165
50-120	0.4	0.04	0.7	0.07	1.95	0.195
50-180	0.35	0.035	0.65	0.065	1.9	0.19
50-185	0.85	0.085	1.0	0.1	2.15	0.215
65-60/2	0.45	0.045	0.75	0.075	2.0	0.2
65-120	0.9	0.09	1.2	0.12	2.45	0.245
65-180	0.7	0.07	1.0	0.1	2.25	0.225
65-185	0.9	0.09	1.3	0.13	2.35	0.235
80-60	1.2	0.12	1.5	0.15	2.75	0.275
80-120	1.6	0.16	1.9	0.19	3.15	0.315
100-30	1.05	0.105	1.35	0.135	2.6	0.26

The pressure indicated in the table is the relative minimum pressure required at sea level, 1 bar (0.1 MPa).

Flange forces and moments

For maximum permissible forces and moments from the pipe connections acting on the pump flanges or thread connections, see fig. 10.

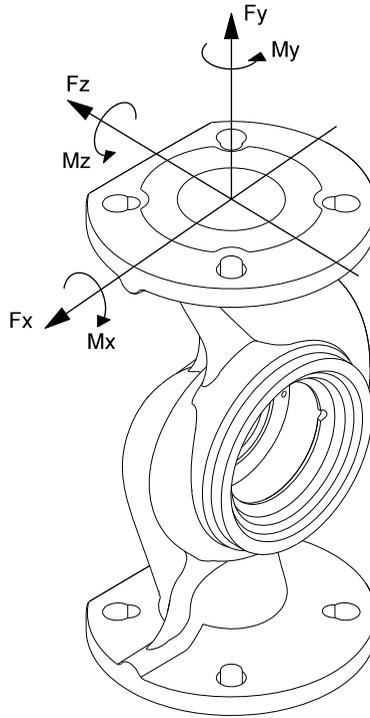


Fig. 10 Flange forces and moments

Diameter, DN	Force [N]			Moment [Nm]				
	Fy	Fz	Fx	ΣF_b	My	Mz	Mx	ΣM_b
32	425	525	450	825	375	425	550	800
40	500	625	550	975	450	525	650	950
50	675	825	750	1300	500	575	700	1025
65	850	1050	925	1650	550	600	750	1100
80	1025	1250	1125	1975	575	650	800	1175
100	1350	1675	1500	2625	625	725	875	1300

Above values apply to cast iron and brass versions. See ISO 5199, tables B.2 (16A and 16B), B.3 and B.6.

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