# UPML, UPMXL

Installation and operating instructions





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**Original installation and operating instructions**

These installation and operating instructions describe Grundfos UPML and UPMXL pumps.

Sections 1-4 give important information about the product.

Sections 5-9 give the information necessary to be able to install, start up and operate the product in a safe way.

Sections 10-11 give information on fault finding and disposal of the product.

## CONTENTS



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

Children shall not play with the appliance. Cleaning and user maintenance shall not be made by children.



Successful operation depends on careful attention to the procedures described in this manual. Keep this manual for future use.

## 1. Limited warranty

New equipment manufactured by the seller or service supplied by the seller is warranted to be free from defects in material and workmanship under normal use and service for a minimum of twelve (12) months from the date of installation, eighteen (18) months from the date of shipment, unless otherwise stated in the product warranty guide (available upon request). In the case of spare or replacement parts manufactured by the seller, the warranty period shall be twelve months from shipment. The seller's obligation under this warranty is limited to repairing or replacing, at its option, any part found to its satisfaction to be defective, provided that such part is, upon request, returned to the seller's factory from which it was shipped, transportation prepaid. Parts replaced under the warranty shall be warranted for twelve months from the date of the repair, not to exceed the original warranty period. This warranty does not cover damage to parts resulting from decomposition from chemical action or wear caused by abrasive materials, nor does it cover damage resulting from misuse, accident, neglect, or from improper operation, maintenance, installation, modification or adjustment. This warranty does not cover parts repaired outside the seller's factory without prior written approval. The seller makes no warranty as to starting equipment, electrical apparatus or other material not of its manufacture. If the purchaser or any other party repairs, replaces or adjusts equipment or parts without the seller's prior written approval, the seller is relieved of any further obligation to the purchaser under this paragraph with respect to such equipment or parts, unless such repair, replacement or adjustment was made after the seller, within a reasonable time, failed to satisfy his obligations under this paragraph. The seller's liability for breach of these warranties (or for breach of any other warranties found by a competent court to have been given by the seller) shall be limited to: (a) accepting return of such equipment exw plant of manufacture, and (b) refunding any amount paid thereon by the purchaser (less depreciation at a rate of 15 % per year if the purchaser has used the equipment for more than thirty [30] days), and canceling any balance still owing on the equipment, or (c) in the case of service, at the seller's option, redoing the service, or refunding the purchase order amount of the service or a portion thereof upon which such liability is based. These warranties are expressly in lieu of any other warranties, express or implied, and the seller specifically disclaims any implied warranty of merchantability or fitness for a particular purpose, and in lieu of any other obligation or liability on the part of the seller, whether a claim is based upon negligence, breach of warranty or any other theory or cause of action. In no event shall the seller be liable for consequential, incidental, indirect, special or punitive damages of any kind. For the purposes of this paragraph, the equipment warranted shall not include equipment, parts and work not manufactured or performed by the seller. With respect to such equipment, parts or work, the seller's only obligation shall be to assign to the purchaser the warranties provided to the seller by the manufacturer or supplier providing such equipment, parts or work. No equipment furnished by the seller shall be deemed to be defective by reason of normal wear and tear, failure to resist erosive or corrosive action of any fluid or gas, the purchaser's failure to properly store, install, operate or maintain the equipment in accordance with good industry practices or specific recommendations of the seller, including, but not limited to the seller's installation and operation manuals, or the purchaser's failure to provide complete and accurate information to the seller concerning the operational application of the equipment.

## 2. General information

### 2.1 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.

**Example:**

**DANGER**

**Electric shock**

Death or serious personal injury.

- Switch off the power supply before starting any work on the product. Make sure that the power supply cannot be accidentally switched on.

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.

## 3. Product introduction

### 3.1 Product description

#### 3.1.1 UPML, UPMXL

UPML, UPMXL circulator pumps are of the canned-rotor type. Pump and motor form an integral unit without shaft seal, with only one gasket for sealing and four screws for fastening the stator housing to the pump housing. The bearings are lubricated by the pumped medium.

**UPML, UPMXL - internally controlled**

These circulator pumps are designed for systems with variable flows, where the pump is internally controlled via an AUTO user interface. Speed control can reduce the power consumption considerably. In addition, speed control is required to control the performance of a system.

**Fig. 1** UPML AUTO and UPMXL AUTO

**UPML, UPMXL - externally controlled**

These circulator pumps are remote-controlled via a low-voltage PWM or 0-10 VDC signal by a system controller integrated in a boiler or a geothermal heat pump.

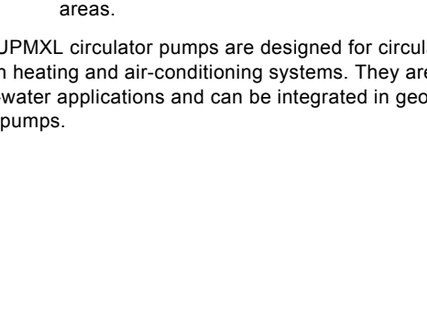


**Fig. 1** UPML, UPMXL

### 3.2 Applications

**DANGER**

**Electric shock**

Death or serious personal injury

- Do not use the pump in swimming pool or marine areas.

UPML, UPMXL circulator pumps are designed for circulating liquids in heating and air-conditioning systems. They are suitable for cold-water applications and can be integrated in geothermal heating pumps.

### 3.3 Pumped liquids

For information about pressures and temperatures, see section *8. Technical data*.

**DANGER**

**Flammable material**

Death or serious personal injury

- Do not use the pump for flammable liquids, such as diesel oil and petrol.

**WARNING**

**Biological hazard**

Death or serious personal injury.

- In domestic hot-water systems, the temperature of the pumped liquid must always be above 122 °F (50 °C) due to the risk of legionella.

**WARNING**

**Biological hazard**

Death or serious personal injury.

- In domestic hot-water systems, the pump is permanently connected to the mains water. Therefore, do not connect the pump by a hose.

**CAUTION**

**Corrosive substance**

Minor or moderate personal injury.

- Do not use the pump for aggressive liquids.

The pump is suitable for the following liquids:

- Clean, thin, non-aggressive and non-explosive liquids without solid particles or fibres.
- If the pump is installed in a heating system, the water should meet the requirements of accepted standards on water quality in heating systems.
- In domestic hot-water systems, the pump should be used only for water with a degree of hardness lower than approx. 15 grain CaCO3/gal (US) (2.5 mmol CaCO3/l). To eliminate the risk of lime precipitation, the medium temperature should not exceed 150 F (65 °C).
- Mixtures of water with anti-freezing media as glycol or ethanol down to 14 F (-10 °C) with a validated temperature profile. Depending on the type of glycol, the mixture and the liquid temperature, the viscosity increases. The viscosity must not exceed 10 cSt (10 $mm/s^2$).

For technical data, see section *8. Technical data*.

## 4. Identification

### 4.1 Nameplate

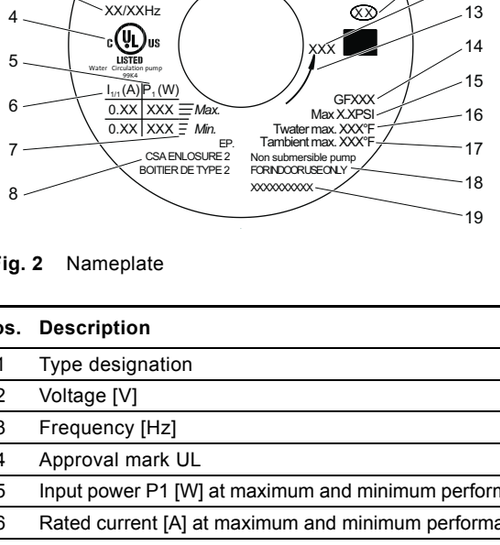



**Fig. 2** Nameplate

| Pos. | Description |
|---|---|
| 1 | Type designation |
| 2 | Voltage [V] |
| 3 | Frequency [Hz] |
| 4 | Approval mark UL |
| 5 | Input power P1 [W] at maximum and minimum performance |
| 6 | Rated current [A] at maximum and minimum performance |
| 7 | Speed |
| 8 | Enclosure class |
| 9 | Product number |
| 10 | Production code (YYMM) |
| 11 | Country of origin |
| 12 | Control signal |
| 13 | Direction of rotation |
| 14 | Code for UL Listed pumps (E96215 vol. 1) |
| 15 | Maximum system pressure [psi] |
| 16 | Maximum water temperature [°F] |
| 17 | Maximum ambient temperature [°F] |
| 18 | Application |
| 19 | Customer type code |

### 4.2 Type key

The type key is designed for the precise identification of the product and not for configuration purposes. It can be found on the product packaging.

| Example | UPM | XL | 25 | -124 | _ | 180 | AUTO |
|---|---|---|---|---|---|---|---|

Pump range:

Pump type:

UPML
UPMXL

Nominal diameter (DN) of inlet and outlet ports [mm]:

Maximum head [dm]:

_ Cast-iron pump housing
N Stainless-steel pump housing
F 2-bolt flanges

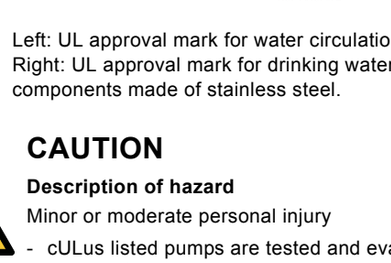
Port-to-port length [mm]:

AUTO Internally controlled
PWM Externally controlled PWM signal
VDC Externally controlled 0-10 VDC signal

### 4.3 Approvals

**cULus approval**

UPML and UPMXL pumps for the North American market are UL approved (E96215 vol. 1 and MH26400). To identify which models are approved, find a list with the codes in section *8.1 Approval codes*.




TM07 0539 0218

**Fig. 3** Left: UL approval mark for water circulation pumps. Right: UL approval mark for drinking water system components made of stainless steel.

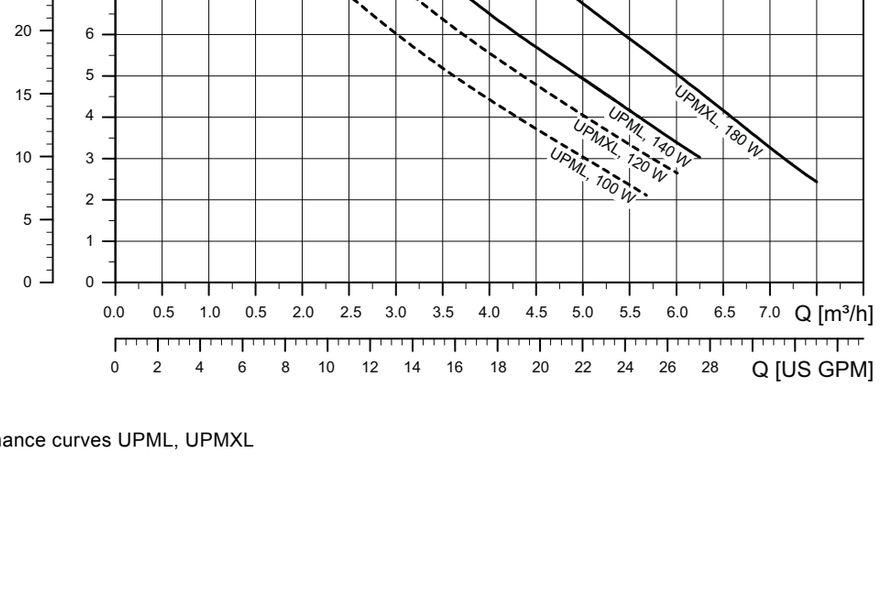
## CAUTION

**Description of hazard**

Minor or moderate personal injury

- cULus listed pumps are tested and evaluated with water only.

### 4.4 Performance curves




TM07 0441 5017

**Fig. 4** Performance curves UPML, UPMXL

## 5. Installation

### WARNING

**Pressurized system**

Death or serious personal injury

- Before dismantling the pump, drain the system or close the isolating valve on either side of the pump before the screws are removed. The pumped liquid may be scalding hot and under high pressure.

### DANGER

**Electric shock**

Death or serious personal injury

- Switch off the power supply before starting any work on the product. Make sure that the power supply cannot be accidentally switched on.

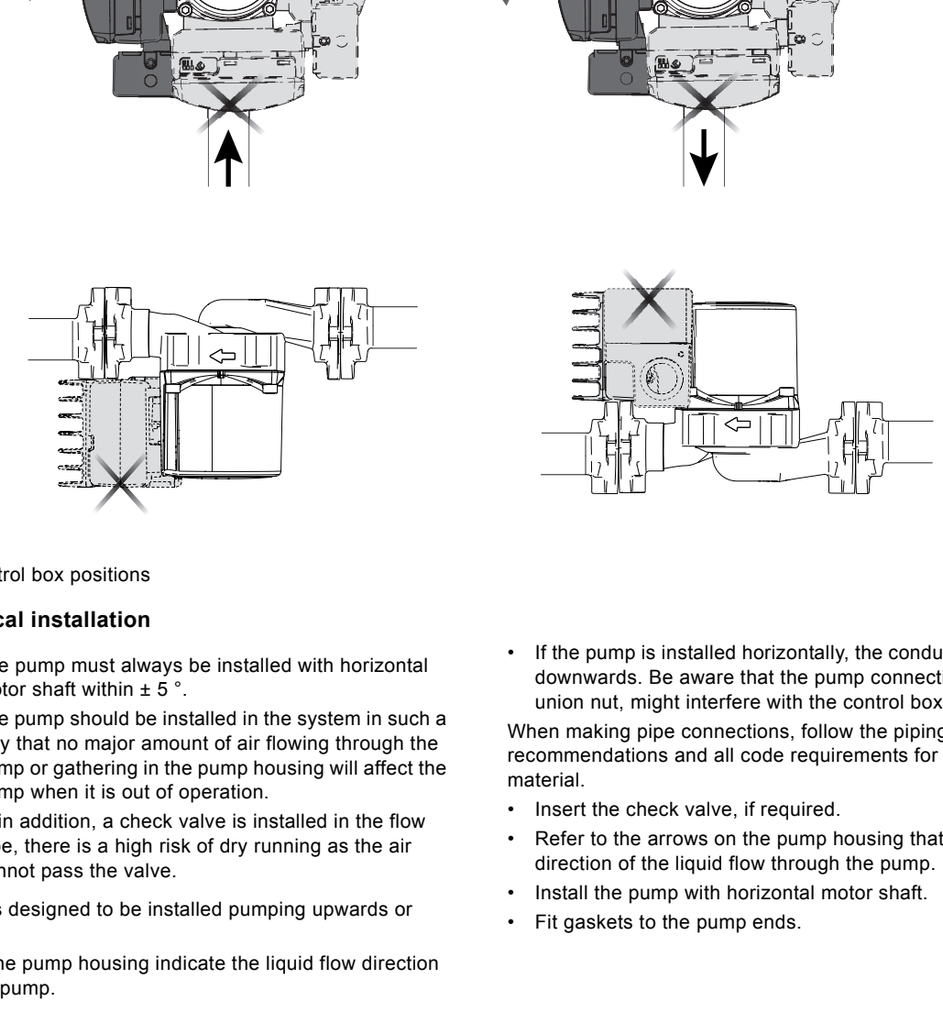
### DANGER

**Electric shock**

Death or serious personal injury

- Do not use the pump in swimming pool or marine areas.

### 5.1 Control box positions



TM07 0265 4617

**Fig. 5** Control box positions

### 5.2 Mechanical installation

The pump must always be installed with horizontal motor shaft within ± 5 °.

The pump should be installed in the system in such a way that no major amount of air flowing through the pump or gathering in the pump housing will affect the pump when it is out of operation.

If, in addition, a check valve is installed in the flow pipe, there is a high risk of dry running as the air cannot pass the valve.

- The pump is designed to be installed pumping upwards or downwards.
- Arrows on the pump housing indicate the liquid flow direction through the pump.
- If the pump is installed horizontally, the conduit box must point downwards. Be aware that the pump connection, flange or union nut, might interfere with the control box.

When making pipe connections, follow the piping manufacturer's recommendations and all code requirements for the piping material.

- Insert the check valve, if required.
- Refer to the arrows on the pump housing that indicate the direction of the liquid flow through the pump.
- Install the pump with horizontal motor shaft.
- Fit gaskets to the pump ends.

### 5.3 Changing the pump head position

**DANGER**

**Electric shock**

Death or serious personal injury

- Switch off the power supply before starting any work on the product. Make sure that the power supply cannot be accidentally switched on.

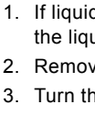
**WARNING**

**Pressurized system**

Death or serious personal injury

- Before dismantling the pump, drain the system or close the isolating valve on either side of the pump before you remove the screws. The pumped liquid may be scalding hot and under high pressure.

**CAUTION**



**Hot surface**

Minor or moderate personal injury

- Position the pump so that persons cannot accidentally come into contact with hot surfaces.

Make any change to the pump head orientation before filling the system with liquid. You can turn the pump head in steps of 90 °.

- See section *5.1 Control box positions* for permissible positions.

**Proceed as follows:**

1. If liquid is present, drain the liquid from the pump or isolate the liquid from the pump.
2. Remove the four socket head cap screws.
3. Turn the pump head to the desired position.
4. Cross-tighten the screws.

### 5.4 Insulating the pump housing



Do not insulate the control box (especially the heat sink) in order to allow cooling by the surrounding air.

Do not cover the pump head with diffusion-tight, cold-water insulation.



Keep the drain holes located in the stator housing free.

If the pump is installed in a cabinet or fitted with insulation shells, the inside air temperature has to be evaluated. If you expect constant ambient air temperatures higher than 130 °F, please contact the Grundfos HVAC OEM Division.

### 5.5 Electrical installation

**DANGER**

**Electric shock**

Death or serious personal injury

- All electrical work must be carried out by a qualified electrician in accordance with the latest edition of the National Electric Code and state, local codes and regulations.

**DANGER**

**Electric shock**

Death or serious personal injury

- Switch off the power supply before starting any work on the product. Make sure that the power supply cannot accidentally switched on.

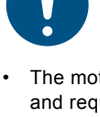
**DANGER**

**Electric shock**

Death or serious personal injury

- Do not use the pump in swimming pool or marine areas.

**WARNING**



**Electric shock**

Death or serious personal injury

- This pump is supplied with a grounding conductor. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded, grounding-type receptacle in accordance with the National Electric Code and any state, local governing codes and regulations.



The pump must not be used with an external speed control which varies the supply voltage, for example phase-cut or pulse-cascade control.



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

- The motor is protected by the electronics in the control box and requires no external motor protection.
- UL-approved UPML and UPMXL circulators are equipped with a conduit box for easy installation of the power supply cable.

**Inrush current**

The inrush current is the charge current to the electrolytic capacitor in the power supply to the electronics. The maximum current amplitude depends on the power supply and the complete wiring from the distributor transformer to the pump. The pump is internally controlled by a small frequency converter running on a DC voltage. Therefore, the supply voltage is rectified to a DC voltage before it reaches the frequency converter. This is done by a rectifier and a capacitor.

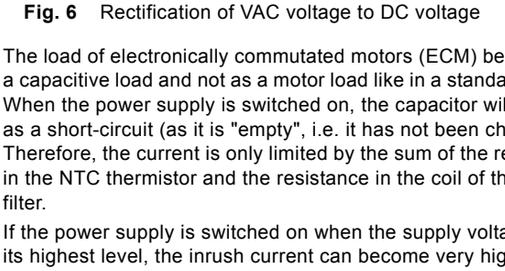



**Fig. 6** Rectification of VAC voltage to DC voltage

The load of electronically commutated motors (ECM) behaves as a capacitive load and not as a motor load like in a standard pump. When the power supply is switched on, the capacitor will behave as a short-circuit (as it is "empty", i.e. it has not been charged). Therefore, the current is only limited by the sum of the resistance in the NTC thermistor and the resistance in the coil of the EMC filter.

If the power supply is switched on when the supply voltage is at its highest level, the inrush current can become very high for a very short period of time. After this period of time, the current will drop to the rated current.

When the power supply to the pump is switched on and off via an external relay, it must be ensured that the contact material of the relay is able to handle higher inrush currents. We recommend to use special inrush relays with silver tin oxide (AgSnO) contacts

**Leakage current**

The pump mains filter causes a leakage current to ground during operation.

**High-voltage test**

The pump incorporates filter components that are connected to ground. The voltage level and the number of tests should be as low as possible, in order to grant the longest lifetime in the market. Additional standard high-voltage tests of the complete pump including filter should be avoided to eliminate the risk of filter damage.

**Ground fault circuit interrupter (GFCI)**

## WARNING



**Electric shock**

Death or serious personal injury

- Use a suitable type of GFCI capable of handling ground fault currents with DC content (pulsating DC).

If the pump is connected to an electrical installation where a ground fault circuit interrupter (GFCI) is used for additional protection, this Ground Fault Circuit Interrupter shall be able to trip when ground fault currents with DC content occur.

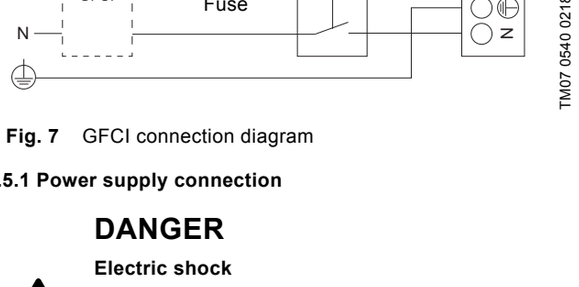



**Fig. 7** GFCI connection diagram

**5.5.1 Power supply connection**

## DANGER



**Electric shock**

Death or serious personal injury

- All electrical work must be carried out by a qualified electrician in accordance with the latest edition of the National Electric Code and state, local codes and regulations.

## DANGER

**Electric shock**

Death or serious personal injury

- Switch off the power supply before starting any work on the product. Make sure that the power supply cannot accidentally switched on.

## WARNING

**Electric shock**

Death or serious personal injury

- This pump is supplied with a grounding conductor. To reduce the risk of electric shock, be certain that it is connected only to a properly grounded, grounding-type receptacle in accordance with the National Electric Code and any state, local governing codes and regulations.

## WARNING

**Electric shock**

Death or serious personal injury

- The connection to the fixed wiring systems must be made using a flexible conduit system only.
- The terminal block is suitable for copper conductors only.



Do not use the pump with an external speed control which varies the supply voltage, for example phase-cut or pulse-cascade control.



Do not connect the pump using rigid conduit connections.



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



All cables and connectors used must be connected in accordance with local regulations.

- UL-approved UPML and UPMXL circulators are equipped with a conduit box for easy installation of the power supply cable.
- The motor is protected by the electronics in the control box and requires no external motor protection.
- The pump can be connected to the power supply by a 3-wire cable with ground connection.

The ground symbol identifies any terminal which is intended for connection to an external conductor for protection against electrical shock in case of a fault, or the terminal of a ground electrode.

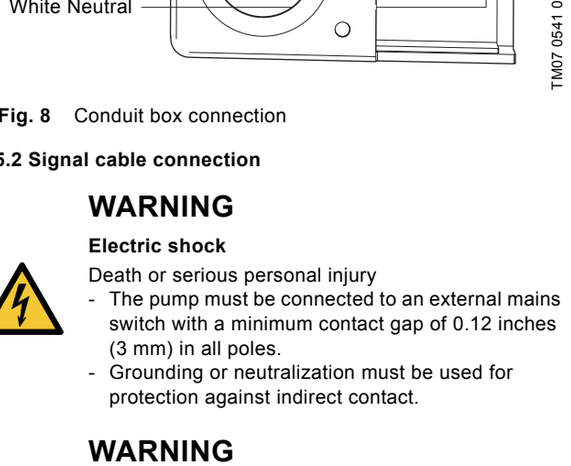



**Fig. 8** Conduit box connection

### 5.5.2 Signal cable connection

## WARNING

**Electric shock**

Death or serious personal injury

- The pump must be connected to an external mains switch with a minimum contact gap of 0.12 inches (3 mm) in all poles.
- Grounding or neutralization must be used for protection against indirect contact.

## WARNING

**Electric shock**

Death or serious personal injury

- External signal cables must be in accordance with chapter 725 of the NEC in order to insulated this circuit from others. The suitable type of signal cable is type CL3, CL3R, CL3P or equivalent.

Do not connect the signal reference wire to the ground.

Connect the signal wires to the correct poles. Otherwise the pump might be damaged.

- The UPML/UPMXL AUTO pumps are internally speed-controlled and have no active signal cable connection. It is covered by a blind plug.

**PWM**

The UPML/UPMXL PWM pumps are externally speed-controlled by a digital low-voltage PWM signal. To enable pump control, a signal cable is required.

- PWM A profile for Heating: Without signal the pump will always run at maximum speed.

The signal cable has two or three leads. The signal cable must be connected to the control box by a dubox housing with an FCI terminal block and terminals.

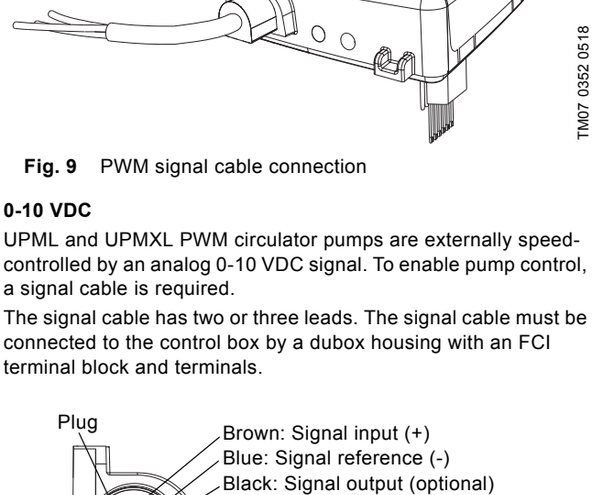



**Fig. 9** PWM signal cable connection

**0-10 VDC**

UPML and UPMXL PWM circulator pumps are externally speed-controlled by an analog 0-10 VDC signal. To enable pump control, a signal cable is required.

The signal cable has two or three leads. The signal cable must be connected to the control box by a dubox housing with an FCI terminal block and terminals.




**Fig. 10** VDC signal cable connection

# 6. Control mode and signals

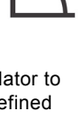
## 6.1 Internal control principles

GRUNDFOS UPML and UPMXL AUTO automatically control the differential pressure by adjusting the pump performance to the actual heat demand, without the use of external components.

Two different control modes are available:

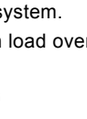
**Proportional Pressure**

The differential pressure increases at increased flow.



**Constant Pressure**

The differential pressure is constant.



### 6.1.1 GRUNDFOS AUTOADAPT

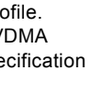
The Grundfos AUTOADAPT function enables the circulator to control the pump performance automatically within a defined performance range.

- Adjusting the pump performance to the size of the system.
- Adjusting the pump performance to the variations in load over time.

Two different control modes are available for Grundfos AUTOADAPT:

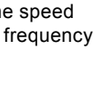
**Proportional Pressure AUTOADAPT**

In proportional pressure AUTOADAPT, the circulator is set to proportional-pressure control.



**Constant Pressure AUTOADAPT**

In constant pressure AUTOADAPT, the circulator is set to constant-pressure control.



## 6.2 External control principles

### 6.2.1 PWM

GRUNDFOS UPML and UPMXL PWM circulators are controlled via a digital low-voltage pulse-width modulation (PWM) signal which means that the speed of rotation depends on the input signal. The speed changes as a function of the input profile. These communication signals are standardized in the VDMA Einheitsblatt 24224 “Wet runner circulating pumps - Specification of PWM control signals”.

**Digital low-voltage PWM signal**

The square-wave PWM signal is designed for a 100 to 4000 Hz frequency range. The PWM signal is used to select the speed (speed command) and as feedback signal. The PWM frequency of the feedback signal is fixed at 75 Hz in the pump.

Duty cycle: d % = 100 x t/T

| Example | Rating |
|---|---|
| T = 2 ms (500 Hz) | $U_{IH}$ = 4-24 V |
| t = 0.6 ms | $U_{IL}$ ≤ 1 V |
| d %= 100 x 0.6 / 2 = 30 % | $I_{IH}$ ≤ 10 mA (depending on $U_{IH}$) |

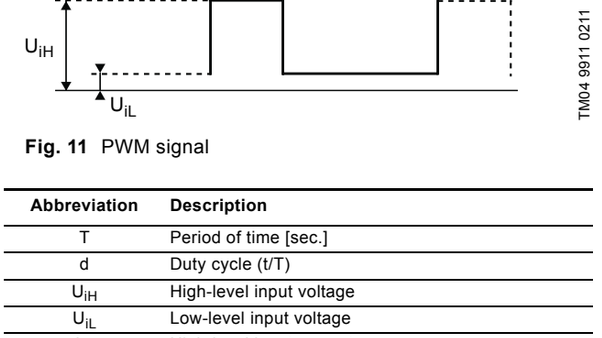
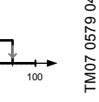



**Fig. 11** PWM signal

| Abbreviation | Description |
|---|---|
| T | Period of time [sec.] |
| d | Duty cycle (t/T) |
| $U_{iH}$ | High-level input voltage |
| $U_{iL}$ | Low-level input voltage |
| $I_{iH}$ | High-level input current |

**PWM input signal profile A (heating)**

At low PWM signal percentages, the circulator speed is high for safety reasons.



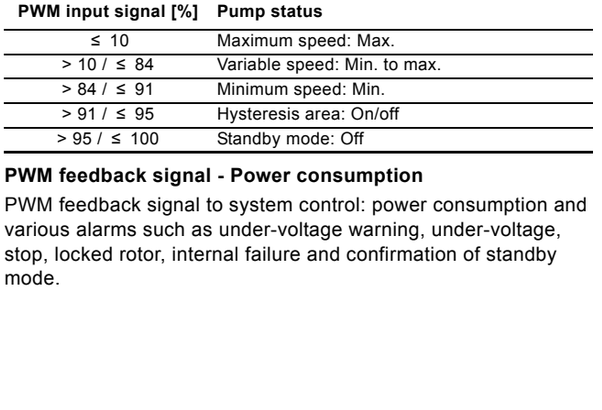



**Fig. 12** PWM input profile A (heating)

| PWM input signal [%] | Pump status |
|---|---|
| ≤ 10 | Maximum speed: Max. |
| > 10 / ≤ 84 | Variable speed: Min. to max. |
| > 84 / ≤ 91 | Minimum speed: Min. |
| > 91 / ≤ 95 | Hysteresis area: On/off |
| > 95 / ≤ 100 | Standby mode: Off |

**PWM feedback signal - Power consumption**

PWM feedback signal to system control: power consumption and various alarms such as under-voltage warning, under-voltage, stop, locked rotor, internal failure and confirmation of standby mode.

**Flow estimation (option)**

The PWM feedback signal can be used to measure the flow of the pump.

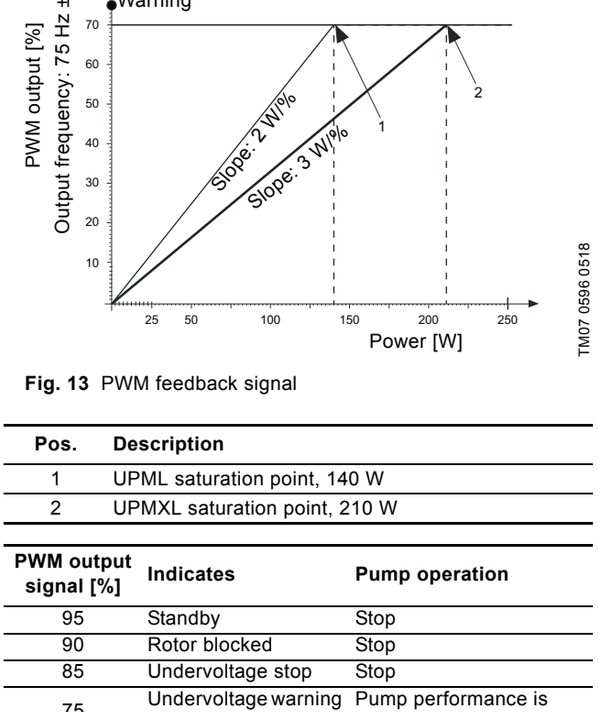



**Fig. 13** PWM feedback signal

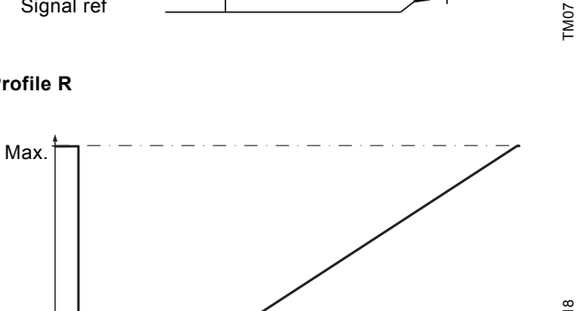
| Pos. | Description |
|---|---|
| 1 | UPML saturation point, 140 W |
| 2 | UPMXL saturation point, 210 W |

| PWM output signal [%] | Indicates | Pump operation |
|---|---|---|
| 95 | Standby | Stop |
| 90 | Rotor blocked | Stop |
| 85 | Undervoltage stop | Stop |
| 75 | Undervoltage warning at Un -15 % | Pump performance is reduced from Un -10 %. |
| 0-70 | Power [W] | Pump is running according to setpoint. |

| Rating | | Value |
|---|---|---|
| Rated input voltage - high level | $U_{IH}$ | 4-24 V |
| Rated input voltage - low level | $U_{IL}$ | < 1 V |
| High-level input current | $I_{IH}$ | < 10 mA |
| Input duty cycle | PWM | 0-100 % |
| PWM frequency output, open collector | f | 75 Hz ± 5 % |
| Accuracy of output signal regarding power consumption | - | ± 2 % of PWM signal |
| Output duty cycle | PWM | 0-100 % |
| Collector-emitter breakdown voltage on output transistor | $U_C$ | < 70 V |
| Collector current on output transistor | $I_C$ | < 50 mA |
| Max. power dissipation on output resistor | $P_R$ | 125 mW |
| Zener diode working voltage | $U_Z$ | 36 V |
| Max. power dissipation in Zener diode | $P_Z$ | 300 mW |

**6.2.2 0-10 VDC**

GRUNDFOS UPML and UPMXL circulators are externally speed-controlled by a analogue 0-10 V DC signal. The pump requires a 0-10 V signal on the signal port to control the speed of the pump. The pump will run at its minimum speed, if the signal fails (cable break).




**Profile R**

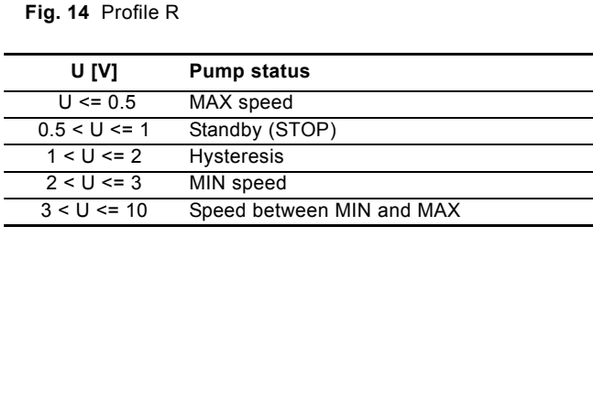



**Fig. 14** Profile R

| U [V] | Pump status |
|---|---|
| U <= 0.5 | MAX speed |
| 0.5 < U <= 1 | Standby (STOP) |
| 1 < U <= 2 | Hysteresis |
| 2 < U <= 3 | MIN speed |
| 3 < U <= 10 | Speed between MIN and MAX |

**Alarm output signal**

An alarm output signal is available.

Output transistor status indicates pump operation

- Activated: Pump is OK Running and input voltage > 0.5V
- Stop (commanded)
- Stop (because of alarm)
- Not activated: Pump fault
- Running and input voltage < 0.5V (interpreted as cable break)

| Rating | | Value |
|---|---|---|
| Rated input voltage - high level | $U_{IH}$ | 4-24 V |
| Rated input voltage - low level | $U_{IL}$ | < 1 V |
| High-level input current | $I_{IH}$ | < 10 mA |
| Input duty cycle | PWM | 0-100 % |
| PWM frequency output, open collector | f | 75 Hz ± 5 % |
| Accuracy of output signal regarding power consumption | - | ± 2 % of PWM signal |
| Output duty cycle | PWM | 0-100 % |
| Collector-emitter breakdown voltage on output transistor | $U_C$ | < 70 V |
| Collector current on output transistor | $I_C$ | < 50 mA |
| Max. power dissipation on output resistor | $P_R$ | 125 mW |
| Zener diode working voltage | $U_Z$ | 36 V |
| Max. power dissipation in Zener diode | $P_Z$ | 300 mW |

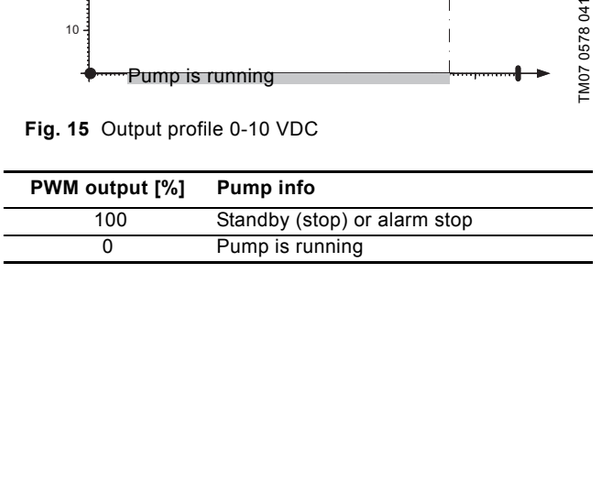



**Fig. 15** Output profile 0-10 VDC

| PWM output [%] | Pump info |
|---|---|
| 100 | Standby (stop) or alarm stop |
| 0 | Pump is running |

## 7. Starting up the product

### CAUTION

**Hot liquid**

Minor or moderate personal injury

- When loosening the inspection screw, be aware of hot, spraying water.

Flush the system of debris before installation.

The pump must not run dry.

The required minimum inlet pressure must be available at the pump inlet.

Do not start the pump until the system has been filled with liquid and vented.

The pump is self-venting, and does not need to manually be vented before start-up.

The system cannot be vented through the pump.

Air in the pump may cause noise. This noise ceases after a few minutes of running.

Air inside the pump will be transported by the medium into the system during the first minutes after pump start-up.

- The pump may stop when the inspection screw is loosened.
- When the pump is connected to power the pump starts automatically either on the pre-set control mode or the last stored setting (AUTO) or with the speed that refers to the externally control signal (PWM/VDC)
- When connected to an external PWM signal, the pump speed is controlled by an external controller which may even stop the pump.
- Without signal, the pump will run at maximum speed (profile heating).
- In special systems (e.g. with check valve at the top of the pump), it might be necessary to check if the system has been vented completely by opening the inspection screw in the middle of the nameplate.

# 8. Technical data

## 8.1 Approval codes

| Code | Voltage | Power | Control mode |
|---|---|---|---|
| GFJNH | 115 V | 100 W | VDC |
| GFJOD | 115 V | 120 W | VDC |
| GFJOF | 115 V | 120 W | AUTO |
| GFJNG | 115 V | 100 W | AUTO |
| GFJOG | 230 V | 180 W | PWM |
| GFJNJ | 230 V | 140 W | PWM |

## 8.2 Operating conditions

**Supply voltage**

- 1 x 208-230 V +10%/-10%, 50/60 Hz
- 1 x 115 V +10%/-10%, 50/60 Hz

**Motor protection**

EP - Electronically Protected

The pump requires no external motor protection.

**Enclosure class**

CSA enclosure type 2. For indoor use only.

**Maximum system pressure**

150 psi (1.0 MPa).

**Inlet pressure**

The minimum inlet pressure must be available at the pump inlet during operation.

| Liquid temperature | Minimum inlet pressure |
|---|---|
| 203 °F (95 °C) | > 7 psi (> 0.05 MPa) |

**Ambient temperature**

Max. 130 °F (55 °C) near the pump surface.

**Storage temperature**

Max. 158 °F (70 °C).

**Liquid temperature**

- Maximum (continuously): 203 °F (95 °C)
- Minimum: 14 °F (-10 °C)

**Inrush current**

Measured on a flicker network according to IEC 61000-3-3:1994 + A1, + A2, Annex B

- 115 V: 25.2 A
- 230 V: 43.1 A

**Leakage current**

< 3.5 mA

# 9. Operation

## 9.1 User interface (AUTO version)

Eight settings are easily available by pushing the button. Three LEDs show the chosen setting.

The user interface allows selection between eight control curves in two control modes:

- three proportional pressure curves (PP) + PP AUTOAdapt
- three constant pressure/power curves (CP) + CP AUTOAdapt.

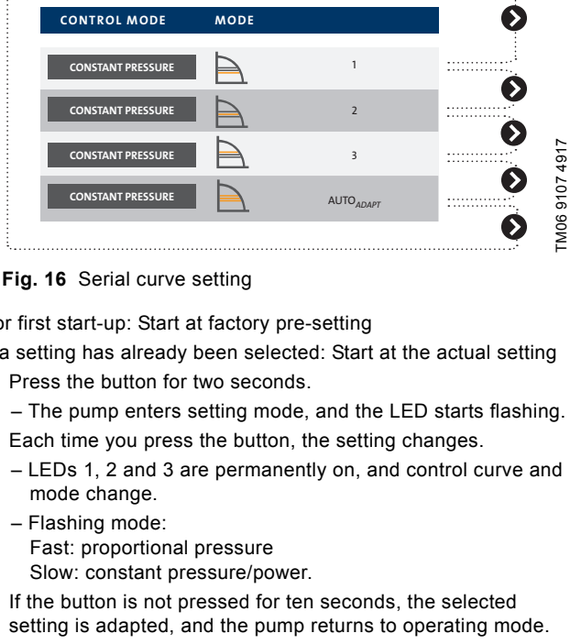



**Fig. 16** Serial curve setting

For first start-up: Start at factory pre-setting

If a setting has already been selected: Start at the actual setting

- Press the button for two seconds.
  - The pump enters setting mode, and the LED starts flashing.
- Each time you press the button, the setting changes.
  - LEDs 1, 2 and 3 are permanently on, and control curve and mode change.
  - Flashing mode:
    Fast: proportional pressure
    Slow: constant pressure/power.
- If the button is not pressed for ten seconds, the selected setting is adapted, and the pump returns to operating mode.
- LED 1, 2 or 3 is permanently on, or all are permanently on: The pump is running with the selected control curve and mode.

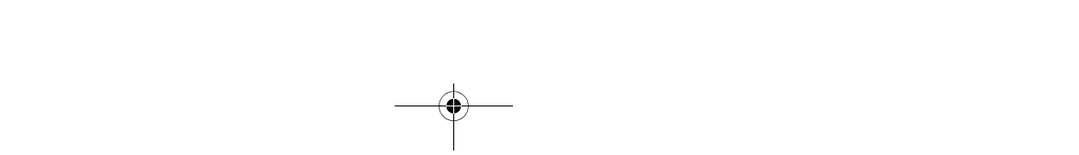



**Fig. 17** LED indication of the curve setting

## 10. Fault finding



**DANGER**

**Electric shock**

Death or serious personal injury

- Before starting any work at the pump, switch off the power supply. Make sure that the power supply cannot be switched on accidentally.
- Be aware that capacitors will be live up to 30 seconds after the power supply has been switched off.



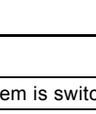
Before dismantling the circulator, drain the system, or close the isolating valves on either side of the circulator.

**CAUTION**

**Hot liquid**

Minor or moderate personal injury

- The pumped liquid may be scalding hot.



**CAUTION**

**Pressurised system**

Minor or moderate personal injury

- The pumped liquid may be under high pressure.

| Fault | Power supply | Cause | Remedy |
|---|---|---|---|
| 1. The pump does not run. | No power supply. | a) The system is switched off. | Check the system controller. |
| | | b) One fuse in the installation is blown. | Replace the fuse. |
| | | c) The current-operated or voltage-operated circuit breaker has tripped. | Cut in the circuit breaker. |
| | | d) Power supply failure. | Check that the power supply falls within the specified range. |
| | Normal power supply. | a) The controller has switched off. | Check the controller and its settings. |
| | | b) The pump is blocked by impurities. | Remove the impurities. |
| | | c) The pump is defective. | Replace the pump. |
| 2. The pump cannot be controlled and only runs at maximum speed. | Normal power supply. | a) No signal through the signal cable. | Check if the cable is connected to the controller. If yes, replace the cable. |
| 3. Noise in the system. | Normal power supply. | a) Air in the system. | Vent the system. |
| | | b) The outlet pressure is too high. | Reduce the setting of the controller or the valve. |
| 4. Noise in the pump. | Normal power supply. | a) Air in the pump. | Let the pump run. The pump vents itself over time. |
| | | b) The inlet pressure is too low. | Increase the inlet pressure or check the air volume in the expansion tank, if installed. |
| 5. Insufficient flow. | Normal power supply. | a) The pump performance is too low. | Check the controller and its settings. |
| | | b) The hydraulic system is closed or the system pressure is insufficient. | Check the check valve and filter. Increase the system pressure. |

## 11. 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.

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