Medium UPM

UPMM, UPML, UPMXL, UPMXXL, SOLAR PML

EU range

1 x 230 V, 50/60 Hz

be
think
innovate

GRUNDFOS

1. Introduction

Medium UPM - EU range

This data booklet applies to the Grundfos Medium UPM pump range.

Type	P1 max.	Control	R 1 1/2" x 130 mm CED	R 1 1/2" x 180 mm CED	R 2" x 180 mm CED	R 1" x 130 mm CED	R 1 1/2" x 180 mm N
UPMM xx-95	100 W	PWM A	●	●	●	●	●
UPMM xx-95 AUTO		AUTO	●	●	●	●	●
UPML xx-105	140 W	PWM A	●	●	●	●	●
UPML xx-105 LIN		LIN bus	●	●	●	●	●
UPML xx-105 AUTO		AUTO	●	●	●	●	●
SOLAR PML xx-145	140 W	PWM C	●	●	●	●	●
UPMXL xx-125	180 W	PWM A	●	●	●	●	●
UPMXL xx-125 LIN		LIN bus	●	●	●	●	●
UPMXL xx-125 AUTO		AUTO	●	●	●	●	●
UPMXXL xx-120	180 W	PWM A		●	●		
UPMXXL xx-120 AUTO		AUTO		●	●		

Applications

In a modern heating, cooling and domestic hot water supply system there are different circuits in which Medium UPM pumps in different versions can be placed. A differentiation must be made between the heating (or cooling) production and the distribution.

On the production side there are some applications where pumps are used in primary or internal circuits e.g. for geothermal or solar thermal brine circuits.

The distribution side is often split into two circuits - a primary and a secondary circuit - in order to keep the flow and temperature independent from each other. A heat exchanger, a hydraulic separator or a buffer tank can be used for this separation.

For some heating generators (e.g. condensing boilers, heat pumps or district heating) it is important to keep the return temperature as low as possible. Therefore it is necessary to keep the right balance between flow in primary and secondary circuits. Without separator, the primary pump creates a differential pressure in the secondary circuits. A generator effect can happen in the secondary pump, from which Medium UPM pumps are protected.

The primary pump is mostly integrated into the heating appliance and controlled via a control signal (e.g. PWM or BUS) to ensure the optimum operation of the boiler, for instance.

	Application	Recommended pump type
Heat production or heat transmission side	Gas or oil-fired space and combination heaters	UPMM/UPML/UPMXL/UPMXXL PWM/LIN
	Solid fuel heaters	UPMM/UPML/UPMXL/UPMXXL AUTO
	Heat pumps (brine side)	UPMM/UPML/UPMXL/UPMXXL PWM/LIN
	Heat pumps (heating side)	UPMM/UPML/UPMXL/UPMXXL PWM/LIN
	Mini combined heat and power cogeneration	UPMM/UPML/UPMXL/UPMXXL PWM/LIN
	Thermal solar system (collector side)	SOLAR PML
	District heating systems with heat exchanger	UPMM/UPML/UPMXL/UPMXXL PWM/LIN
Heat distribution side	Space heating systems	UPMM/UPML/UPMXL/UPMXXL AUTO
	Space heating and cooling systems	UPMM/UPML/UPMXL/UPMXXL AUTO
	Domestic hot water generation (heating side)	UPMM/UPML/UPMXL/UPMXXL PWM/LIN
	Domestic hot water generation (DW side)	UPMM/UPML/UPMXL AUTO N
	Domestic hot water recirculation	UPMM/UPML/UPMXL AUTO N

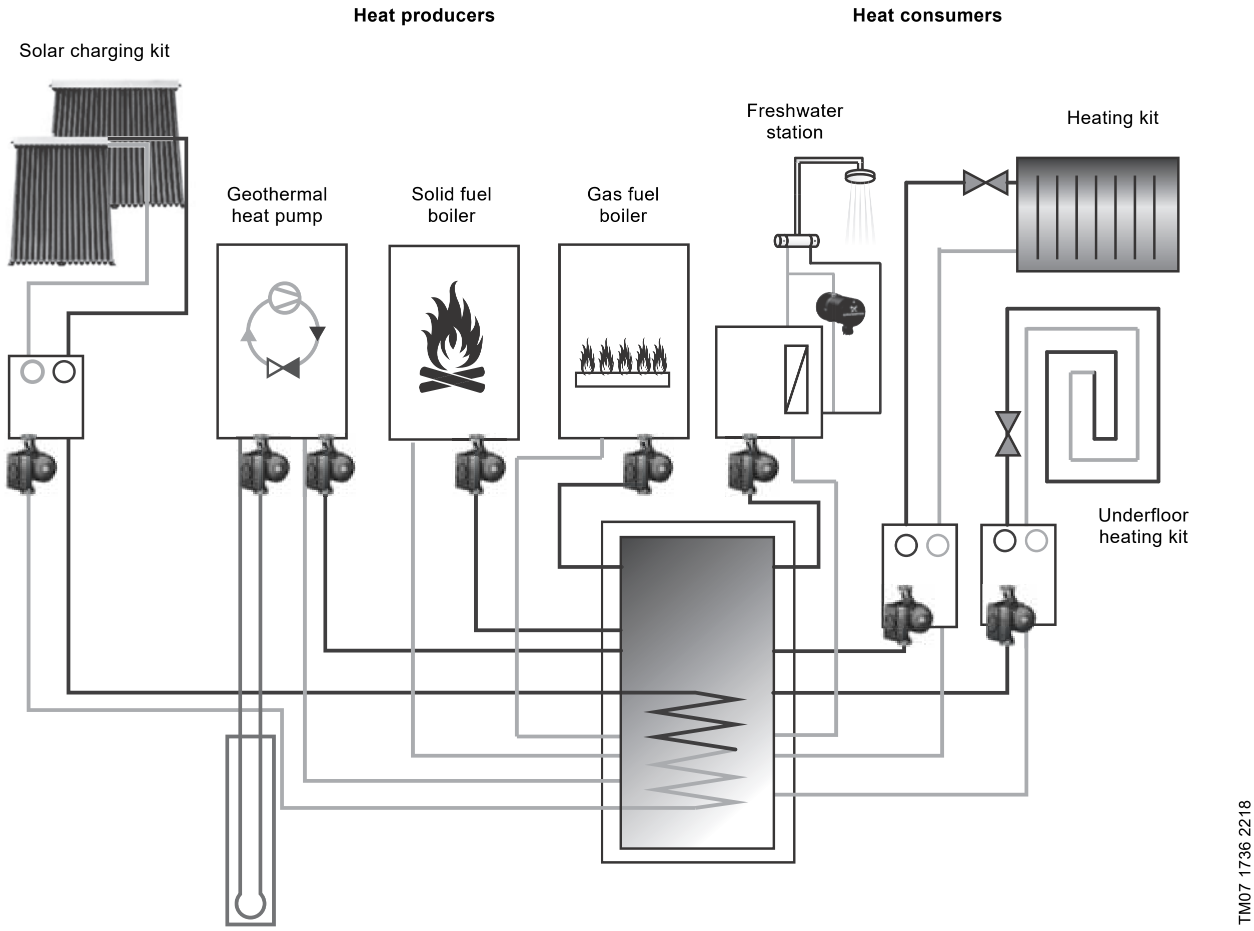


Fig. 1 Complete domestic heating system combined with renewable energy sources

On the generation side, most pumps are externally controlled via control signal (PWM, LIN bus) by the appliance control. The pumps on the distribution side are often stand-alone pumps and mainly internally controlled (AUTO version). The pumps in circuits with variable flow are differential-pressure controlled either as constant pressure (CP) or proportional pressure (PP) control. In addition to 3 different control curves each, there is the option to select the AUTOADAPT CP or PP mode. With AUTOADAPT, the control curve is automatically adapted to the actual requirements of the respective application.

For domestic hot water systems, we must offer pumps with stainless-steel housings that have the necessary drinking water approvals like UBA, KTW, DVGW, ACS, KIWA or WRAS.

For solar thermal systems, SOLAR PML pumps are available, which are suitable for solar media containing glycol up to 110 °C (peak). They use the PWM-C signal profile, which is inverse of the PWM-A signal profile. The PWM-C signal profile stops the pump and avoids that the pump runs and overheats or unloads the storage tank, if the signal is missing.

All medium UPM pumps are equipped with spacers to decouple the terminal box from the motor. The motor is protected against condensate in the stator with drain holes. Therefore, all pumps can run down to minus 10 °C with antifreeze media mixtures.

Safety instructions

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

General information

Target group

Qualification and training

The persons responsible for installation, startup, operation and maintenance must be appropriately qualified for these tasks. Areas of responsibility, levels of authority and the supervision of the persons must be precisely defined by the operating company. If necessary, the persons must be trained.

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.

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

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

Tips and advice that make the work easier.

Storage and transport

- Observe the permissible ambient conditions.
- The storage location must be protected from rain, humidity, condensation, direct sunlight and dust.
- Maximum storage time: 2 years from delivery.
- Use appropriate lifting and transporting devices.
- Observe the maximum stacking height of pallets.

Non-observance of the safety instructions may have dangerous consequences for persons, the environment and the product.

2. Features and benefits

Features

The Medium UPM range offers a number of important features and benefits for the customer:

- Suitable for heating, solar-thermal systems, geothermal heat pumps and cooling
- Internally or externally speed-controlled, high-efficiency pumps with electronically commutated motor (ECM) with permanent-magnet rotor and frequency converter
- Proven components based on the second UPM generation
- Improved motor technology and hydraulics for high pump efficiency
- Meets all Ecodesign requirements of the ErP regulation EU/622/2012
- Functional design concentrating on the essentials, fitting in the smallest space
- Easy operation and convenient setting via external control signals or button
- Electronics separated from the motor for operation in condensing environments
- Motor protected against condensed water by means of drain holes and double-coated wiring
- Fits into the confined space inside boilers and heat pumps
- Electrical compatibility with existing PWM controllers
- Low ambient temperature constraints (EN 60335)
- Electrocoated cast-iron housing for the prevention of inside and outside corrosion
- Low flow noise
- High starting torque for reliable starting
- Suitable for cold antifreeze media containing glycol or ethanol
- Standard delivery with plug for easy electrical connection and quick and safe installation

Benefits

- Use up to 80 % less electrical power than conventional constant-speed pumps.
- Use up to 60 % less electrical power than conventional speed-controlled pumps.
- Highly reliable, based on a range with more than 1 million units installed with success since 2006.
- Cost-optimised and highly available thanks to the use of existing mass production facilities.

ErP, Ecodesign regulation in brief

The EU has addressed the climate challenge in a EuP/ErP directive: Since August 2015, all stand-alone pumps as well as pumps integrated in boiler systems, solar systems and heat pump systems must fulfil Ecodesign requirements, defined in regulation 641/2009/EC on glandless pumps, which was amended by 622/2012/EC. The regulation has set radically new standards for energy efficiency.

The essentials

- Glandless pumps integrated in products must have an energy efficiency index (EEI) of not more than 0.23. The benchmark level is 0.20.
- Stand-alone pumps are measured according to EN 16297-2.
- Integrated pumps are measured according to EN 16297-3, due to their various functions integrated in many customised hydraulic solutions on the market.
- All pumps integrated in products which generate and/or transfer heat and all types of media are included. This means that not only heating systems, but also solar-thermal and heat pump systems are affected by the Ecodesign regulation.
- Non-compliant spare pumps for integrated pumps sold before August 2015 are allowed until January 1st, 2022.
- Pumps designed for recirculation of drinking water are out of the scope of this regulation.
- Conformity with EU regulations is governed through mandatory CE marking.

All Grundfos Medium UPM pumps meet the Ecodesign requirements measured by EN 16297-2 and EN 16297-3:2012.

Identification

Type key

Example:		UPM XL 25 -105 180 AUTO
Type		
UPM	Standard	
SOLAR PM	For thermal solar systems	
Power variant		
M	100 W	
L	140 W	
XL	180 W	
XXL	180 W	
Nominal diameter		
15	R 1/2" / G 1"	
25	R 1" / G 1 1/2"	
32	R 1 1/4" / G 2"	
Nominal head		
95	9.5 m	
105	10.5 m	
120	12.0 m	
125	12.5 m	
145	14.5 m	
Pump housing, port-to-port length		
130	Cast iron CED, 130 mm	
180	Cast iron CED, 180 mm	
N 180	Stainless steel, 180 mm	
Control variant		
AUTO	Internally controlled	
	Externally controlled via PWM	
LIN	Externally controlled via LIN bus	

Nameplate

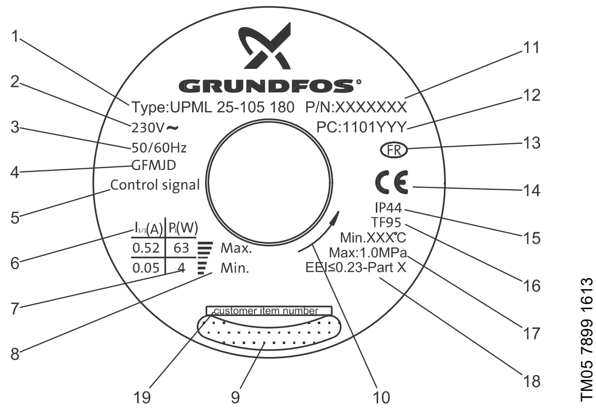


Fig. 2 Nameplate

Pos.	Description
1	Product type
2	Voltage [V]
3	Frequency [Hz]
4	Legal product code
5	Control signal
6	Rated current [A] at maximum and minimum performance
7	Input power P_1 [W] at maximum and minimum performance
8	Speed
9	Approval marks
10	Direction of rotation, direction of deblocking
11	Product number
12	Production code, year, week and customer ID
13	Country of origin
14	CE mark
15	Enclosure class
16	Temperature class
17	Maximum system pressure [MPa]
18	Energy index
19	Customer item number

3. Performance overview

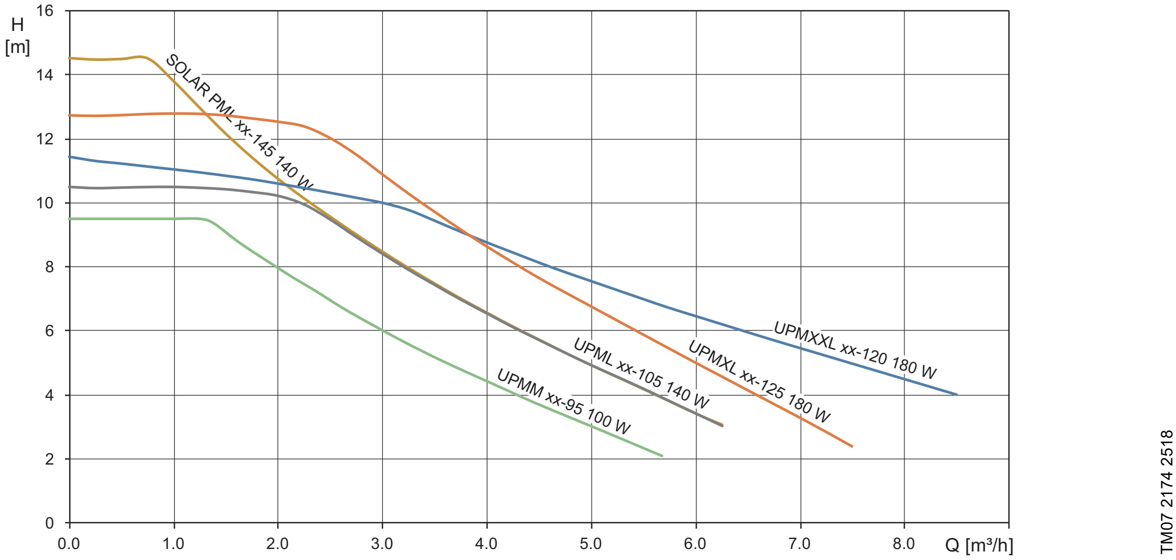


Fig. 3 Medium UPM performance overview

4. Product range

Pump type	P1 max.	Control	Housing	Page
UPMM 15-95 130	100 W	PWM A	R 1" x 130 mm CED	36
UPMM 25-95 130			R 1 1/2" x 130 mm CED	
UPMM 25-95 180			R 1 1/2" x 180 mm CED	
UPMM 25-95 180 N			R 1 1/2" x 180 mm N	
UPMM 32-95 180			R 2" x 180 mm CED	
UPMM 15-95 130 AUTO	100 W	AUTO	R 1" x 130 mm CED	37
UPMM 25-95 130 AUTO			R 1 1/2" x 130 mm CED	
UPMM 25-95 180 AUTO			R 1 1/2" x 180 mm CED	
UPMM 25-95 180 N AUTO			R 1 1/2" x 180 mm N	
UPMM 32-95 180 AUTO			R 2" x 180 mm CED	
UPML 15-105 130	140 W	PWM A	R 1" x 130 mm CED	38
UPML 25-105 130			R 1 1/2" x 130 mm CED	
UPML 25-105 180			R 1 1/2" x 180 mm CED	
UPML 25-105 180 N			R 1 1/2" x 180 mm N	
UPML 32-105 180			R 2" x 180 mm CED	
UPML 15-105 130 LIN	140 W	LIN bus	R 1" x 130 mm CED	38
UPML 25-105 130 LIN			R 1 1/2" x 130 mm CED	
UPML 25-105 180 LIN			R 1 1/2" x 180 mm CED	
UPML 25-105 180 N LIN			R 1 1/2" x 180 mm N	
UPML 32-105 180 LIN			R 2" x 180 mm CED	
UPML 15-105 130 AUTO	140 W	AUTO	R 1" x 130 mm CED	39
UPML 25-105 130 AUTO			R 1 1/2" x 130 mm CED	
UPML 25-105 180 AUTO			R 1 1/2" x 180 mm CED	
UPML 25-105 180 N AUTO			R 1 1/2" x 180 mm N	
UPML 32-105 180 AUTO			R 2" x 180 mm CED	
SOLAR PML 15-145 130	140 W	PWM C	R 1" x 130 mm CED	40
SOLAR PML 25-145 130			R 1 1/2" x 130 mm CED	
SOLAR PML 25-145 180			R 1 1/2" x 180 mm CED	
SOLAR PML 25-145 180 N			R 1 1/2" x 180 mm N	
SOLAR PML 32-145 180			R 2" x 180 mm CED	
UPMXL 15-125 130	180 W	PWM A	R 1" x 130 mm CED	41
UPMXL 25-125 130			R 1 1/2" x 130 mm CED	
UPMXL 25-125 180			R 1 1/2" x 180 mm CED	
UPMXL 25-125 180 N			R 1 1/2" x 180 mm N	
UPMXL 32-125 180			R 2" x 180 mm CED	
UPMXL 15-125 130 LIN	180 W	LIN bus	R 1" x 130 mm CED	41
UPMXL 25-125 130 LIN			R 1 1/2" x 130 mm CED	
UPMXL 25-125 180 LIN			R 1 1/2" x 180 mm CED	
UPMXL 25-125 180 N LIN			R 1 1/2" x 180 mm N	
UPMXL 32-125 180 LIN			R 2" x 180 mm CED	
UPMXL 15-125 130 AUTO	180 W	AUTO	R 1" x 130 mm CED	42
UPMXL 25-125 130 AUTO			R 1 1/2" x 130 mm CED	
UPMXL 25-125 180 AUTO			R 1 1/2" x 180 mm CED	
UPMXL 25-125 180 N AUTO			R 1 1/2" x 180 mm N	
UPMXL 32-125 180 AUTO			R 2" x 180 mm CED	
UPMXXL 25-120 180	180 W	PWM A	R 1 1/2" x 180 mm CED	43
UPMXXL 32-120 180			R 2" x 180 mm CED	
UPMXXL 25-120 180 AUTO	180 W	AUTO	R 1 1/2" x 180 mm CED	44
UPMXXL 32-120 180 AUTO			R 2" x 180 mm CED	

5. Control mode and signals

Control principles

Some medium UPM pumps 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 standardised in the VDMA Einheitsblatt 24244 "Wet runner circulating pumps - Specification of PWM control signals".

Control signals

Digital low-voltage PWM signal

The square-wave PWM signal is designed for a 100 to 4,000 Hz frequency range. The PWM signal is used to select the speed (speed command) and as feedback signal. The PWM frequency on 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

Example

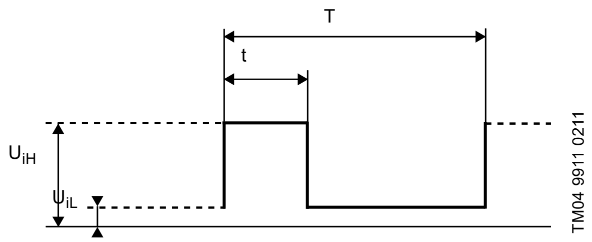


Fig. 4 PWM signal

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

Interface

The Medium UPM PWM interface consists of an electronic part connecting the external control signal to the pump. The interface translates the external signal into a signal type that the microprocessor can understand.

In addition, the interface ensures that the user cannot get into contact with dangerous voltage if touching the signal wires when power is connected to the pump.

Note: "Signal ref." is a signal reference with no connection to protective earth.

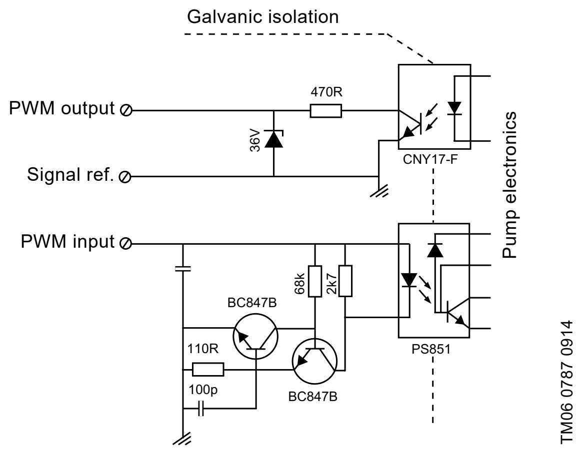


Fig. 5 Schematic drawing, interface

PWM input signal profile A (heating)

At high PWM signal percentages (duty cycles), a hysteresis prevents the pump from starting and stopping if the input signal fluctuates around the shifting point. At low PWM signal percentages, the pump speed is high for safety reasons. In case of a cable breakage in a gas boiler system, the pump continues to run at maximum speed to transfer heat from the primary heat exchanger. This is also suitable for heating pumps to ensure that the pumps transfer heat in case of a cable breakage.

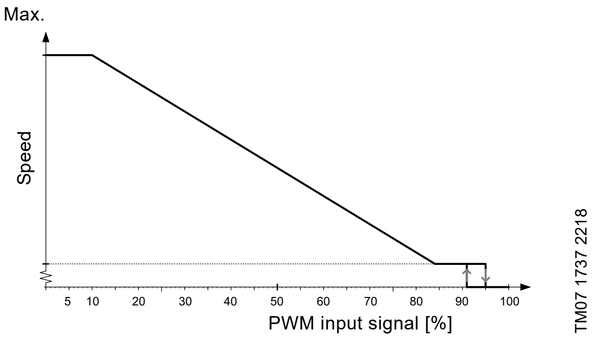


Fig. 6 PWM input profile A (heating)

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 input signal profile C (solar)

At low PWM signal percentages (duty cycles), a hysteresis prevents the pump from starting and stopping if the input signal fluctuates around the shifting point. Without PWM signal percentages, the pump will stop for safety reasons. If a signal is missing, for example due to a cable breakage, the pump will stop to avoid overheating of the solar thermal system.

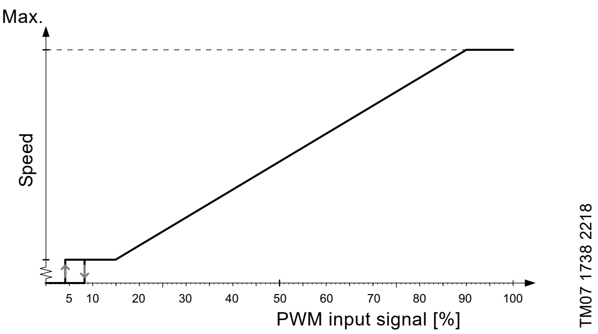


Fig. 7 PWM input profile C (solar)

PWM input signal [%]	Pump status
≤ 5	Standby mode: off
> 5 / ≤ 8	Hysteresis area: on/off
> 8 / ≤ 15	Minimum speed: min.
> 15 / ≤ 90	Variable speed: min. to max.
> 90 / ≤ 100	Maximum speed: max.

PWM feedback signal - power consumption (standard)

The PWM feedback signal offers pump information like in bus systems:

- current power consumption (accuracy ± 2 % of PWM signal)
- warning
- alarm
- operation status.

Alarms

Alarm output signals are available because some PWM output signals are dedicated to alarm information. If a supply voltage is measured below the specified supply voltage range, the output signal is set to 75 %. If the rotor is blocked due to deposits in the hydraulics, the output signal is set to 90 %, because this alarm has a higher priority.

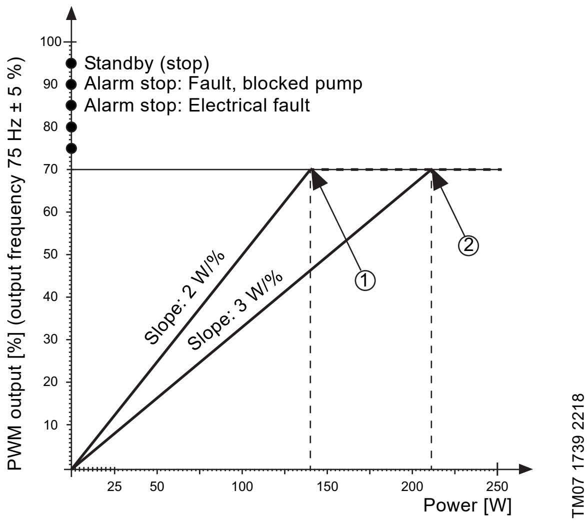


Fig. 8 PWM feedback signal, power consumption

Pos.	Type	Description
1	UPMM, UPML, SOLAR PML	slope 2 W/%, saturation point, 140 W
2	UPMXL, UPMXXL	slope 3 W/%, saturation point, 210 W

PWM output signal [%]	QT [s]	Pump info	DT [s]	Priority
95	0	Standby (STOP) by PWM signal	0	1
90	30	Alarm, stop, blocked error	12	2
85	0-30	Alarm, stop, electrical error	1-12	3
75	0	WARNING	0	5
0-70		0-140 W (slope 2 W/% PWM)		6
Output frequency: 75 Hz ± 5 %				

QT = qualification time, DT = disqualification time

PWM feedback signal - flow estimation (on request)

On request, there is an option where the PWM feedback signal can also be used to indicate the flow of the pump on defined pump housings (e.g. cast iron inline) above a head of 1 m. The accuracy of the feedback signal is depending on the media, media temperature and operation point, but it gives an indication on the actual flow.

Example: The PWM output range between 0-70 % shows the flow between 0 and 4 m^3/h with a slope of 0.057 m^3/h / % PWM.

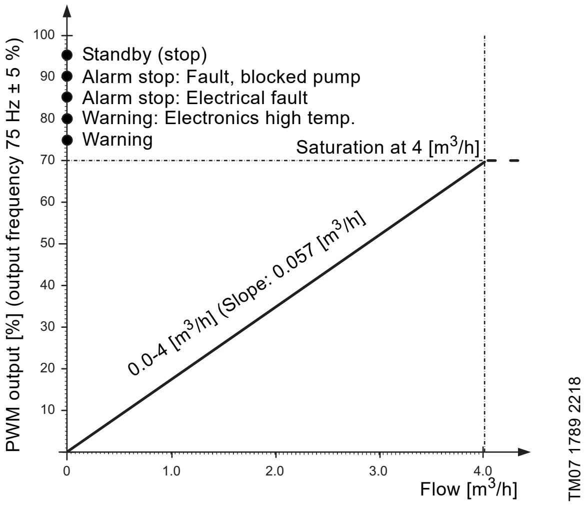


Fig. 9 PWM feedback signal - flow estimation

Data

Maximum rating	Symbol	Value
PWM frequency input with high-speed optocoupler	f	100-4000 Hz
Guaranteed standby power consumption		< 3 W
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 Note: A PWM output signal below 5 % is too inaccurate for the calculation of the flow.		± 2 % (of PWM signal)
Accuracy of output signal regarding flow: < 1 m^3/h > 1 m^3/h		 ± 0.1 m^3/h ± 0.2 m^3/h
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
Maximum power dissipation on output resistor	P_R	60 mW
Zener diode working voltage	U_z	36 V
Maximum power dissipation in Zener diode	P_z	500 mW

LIN bus (on request)

On request, there is an option of Medium UPM pumps with LIN bus communication. This data bus has been developed as a Local Interconnect Network (LIN) in the automotive sector and is used in vehicles.

"VDMA Einheitsblatt 24226" defines the specification of an appliance-integrated fieldbus system based on the LIN bus. With the LIN bus, serial data can be transmitted for control, monitoring and analysis.

Data transmitted from the LIN bus can be defined by Grundfos.

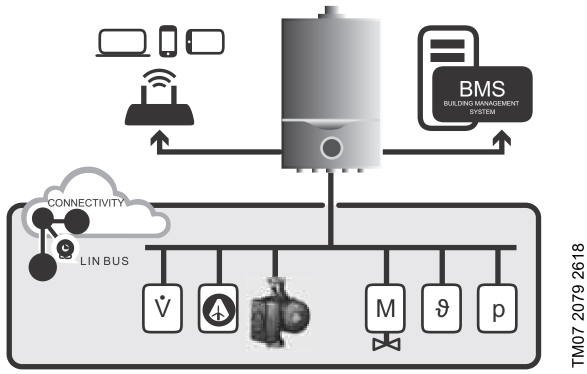


Fig. 10 LIN bus on fieldbus of heating control systems

6. Control modes, user interface and settings

Pump control in heating systems

The heating required in a building varies greatly during the day due to changing outdoor temperatures, solar radiation and heat emanating from people, electric appliances, and others. In addition, the need for heating may vary from one section of the building to another and the thermostatic valves of some radiators may have been turned down by the users. An uncontrolled pump will produce a too high differential pressure when the heat demand and flow are low.

Possible consequences:

- too high energy consumption
- irregular control of the system
- noise in thermostatic radiator valves and similar fittings.

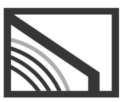
Grundfos Medium UPM AUTO pumps automatically control the differential pressure by adjusting the performance to the actual heat demand, without the use of external components.

Control mode explanation

Medium UPM - externally controlled by a control signal from the system controller

Some Medium UPM pumps are available with external digital PWM control signal.

PWM A profile (heating) (externally controlled)

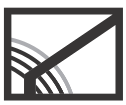


TM06 0706-4 1918

The pump runs on constant-speed curves depending on the current PWM value (regarding VDMA 24244).

The speed decreases when the PWM value increases. If PWM equals 0, the pump runs at maximum speed.

PWM C profile (solar) (externally controlled)



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The pump runs on constant-speed curves depending on the current PWM value.

The speed increases when the PWM value increases. If PWM equals 0, the pump stops.

Other external communication signals

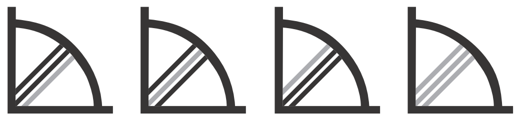
Some Medium UPM pumps are available with LIN bus signal.

Medium UPM AUTO - internally controlled by the integrated pump controller

Proportional Pressure (internally controlled)

The head (pressure) is reduced with falling heat demand and increased with rising heat demand.

The duty point of the pump will move up or down on the selected proportional-pressure curve, depending on the heat demand in the system.



TM06 0704 0814

- PP1: lowest proportional-pressure curve
- PP2: intermediate proportional-pressure curve
- PP3: highest proportional-pressure curve
- AUTO$_{ADAPT}$: highest to lowest proportional-pressure curve.

In Proportional Pressure AUTO$_{ADAPT}$, the pump is set to proportional-pressure control.

The AUTO$_{ADAPT}$ function enables the pump 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.

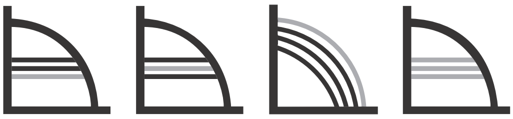
Constant Pressure

The head (pressure) is kept constant, irrespective of the heat demand.

The duty point of the pump moves out or in on the selected constant-pressure curve, depending on the heat demand in the system.

The Constant Pressure/power mode limits the maximum power consumption, like formerly the performance of standard pumps with speed selector.

At reduced flow, the head increases. When the maximum head selected is reached, the speed of the pump is reduced to keep this head (differential pressure) down to zero flow.



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- CP1: lowest constant-pressure curve
- CP2: intermediate constant-pressure curve
- CP3: MAX curve
- AUTO*ADAPT*: highest to lowest constant-pressure curve.

In Constant Pressure AUTO*ADAPT*, the pump is set to constant-pressure control.

The AUTO*ADAPT* function enables the pump to control the 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.

Advantages of pump control

In Grundfos Medium UPM AUTO, pump control is effected by adapting the differential pressure to the flow (proportional-pressure and constant-pressure control). Unlike an uncontrolled pump, a constant-pressure-controlled pump keeps the differential pressure constant. A proportional-pressure-controlled pump reduces the differential pressure as a result of falling heat demand.

For example:

If the heat demand falls, for instance due to solar radiation, the thermostatic radiator valves close, and, for the uncontrolled pump, the flow resistance of the system rises, for instance from A1 to A2.

In a heating system with an uncontrolled pump, this situation causes a pressure rise in the system by ΔH_1.

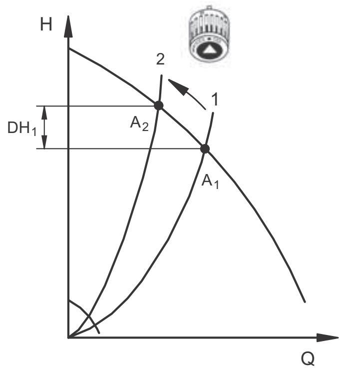

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Fig. 11 Uncontrolled pump

In a system with a proportional-pressure-controlled pump operated in the proportional pressure mode, the pressure is reduced by ΔH_2 and results in reduced energy consumption.

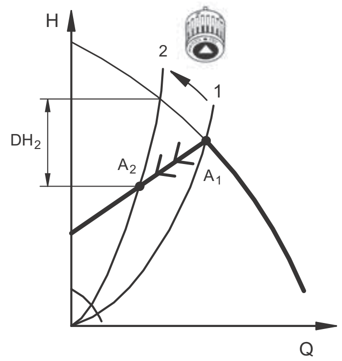

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Fig. 12 Pump operated in proportional-pressure control mode

In a system with an uncontrolled pump, a pressure rise often causes flow-generated noise in the thermostatic radiator valves. With proportional pressure control, this noise is reduced considerably.

AUTO*ADAPT*

Grundfos holds a patent for AUTO*ADAPT* since 1995. With AUTO*ADAPT*, the control curve is automatically adapted to the actual requirements of the respective application.

If you select AUTO*ADAPT*, the pump starts with the medium proportional or constant control curve and runs on this curve as long as a new curve will be adapted.

The AUTO*ADAPT* proportional pressure functionality is well known from millions of installed Grundfos trade pumps as ALPHA2 or MAGNA. The AUTO*ADAPT* setting continually analyses and finds the setting where optimal comfort meets minimal energy consumption. It automatically delivers perfect comfort at the lowest possible energy level. It adapts to the requirements of the heating system before reaching the maximum pump curve and allows the pump to adjust the proportional pressure or constant pressure curve both up and down.

Advantages of AUTO*ADAPT*

- Easy installation
- Automatic setting
- Demand-controlled operations
- Optimum comfort
- Energy savings
- Reduced CO_2 emissions.

Constant pressure at all load conditions is essential for how well the thermostatic valves can control the heat emission from the radiators. It is a well-known fact that optimum pump control in a two-pipe heating system with thermostatic radiator valves is best obtained by controlling pump pressure on a proportional pressure curve. In systems as underfloor heating or one-pipe systems it might be better to use Constant Pressure control. However, predicting the best position in real-life applications is rather difficult, because the optimum position depends on correlated factors such as the size of the heating system, the boiler type, the load condition, etc. This is where AUTO*ADAPT* steps in to ensure that the pump is controlled in an optimum manner.

The AUTO*ADAPT* algorithm

The objective of the AUTO*ADAPT* algorithm is to measure and analyse the heating system during operation and adapt to the current heating pattern. The system adapts to night vs. day operations, summer vs. winter season, and heat losses or gains affecting room temperature, for example, from radiators, walls and windows, sun radiation, electrical equipment, and people.

AUTO*ADAPT* three-step task

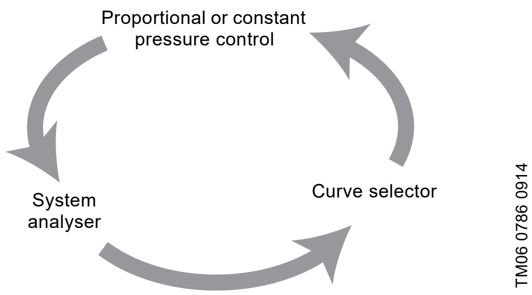

Fig. 13 The AUTO*ADAPT* three-step task

Basically, AUTO*ADAPT* optimises the position of the proportional or constant pressure curve via a three-step task.

The "system analyser" analyses the heating system of which the pump is a part. On the basis of the analysis, AUTO*ADAPT* verifies whether the pump pressure is too high or too low or correct. The "curve selector" uses this knowledge to select the optimum proportional-pressure or constant-pressure curve for the pump. The pump is controlled according to the selected proportional-pressure or constant-pressure curve by means of the "Proportional Pressure or Constant Pressure control". The pump continues this cycle as long as it is running.

Example

This example shows proportional pressure AUTO*ADAPT*.

Note: The Constant Pressure AUTO*ADAPT* function acts accordingly just by utilising Constant Pressure control, and not Proportional Pressure control as shown in the example below.

The AUTO*ADAPT* function can operate and adjust pump speed according to duty point within a specific area.

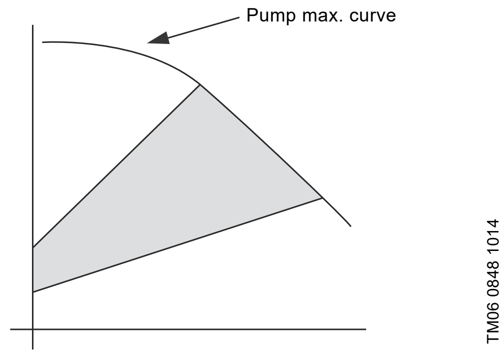

Fig. 14 Proportional pressure AUTO*ADAPT* operation area

As default the AUTO*ADAPT* is preset to operate the pump on the middle proportional pressure curve. By use of an immediate acting PI-controlling function the pump will adapt to the system on this proportional pressure curve.

Note: The PI controller is set to eliminate any offset within a time frame of 120 seconds.

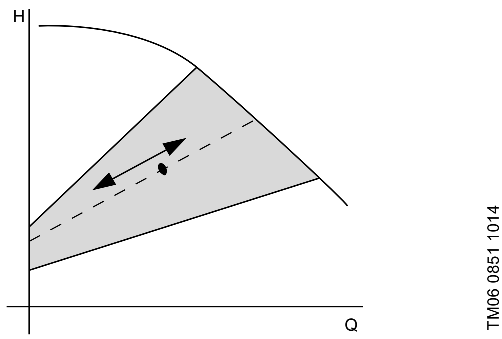

Fig. 15 Proportional pressure control

Control modes, user interface and settings

System analyser

From the preset reference duty point, the pump will immediately start to analyse the heating pattern.

The system resistance (K_{sys}) is logged and based on this data, a more optimal curve for operation is selected.

Note: K_{sys} = m^3/h to create a system pressure loss of 1 bar.

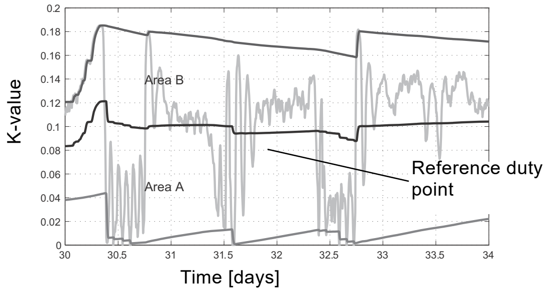

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Fig. 16 K_{sys}-values logged for the system analyser

If the actual duty point deviates from the reference duty point over time, the pump will automatically adjust its performance accordingly. If a tendency of operation in area A is shown, the performance of the pumps is too high. The pump will then select a lower proportional curve. In other words, if the requirement of the heating system exceeds the reference duty point, the pump will choose a higher proportional pressure curve. Should the requirement be lower, a lower curve will be chosen.

Curve selector

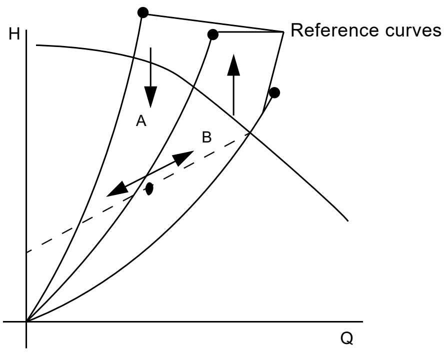

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Fig. 17 Duty point on selected proportional pressure curve

Note: The arrows symbolise the change of the proportional pressure curve.

New reference setting

When changing the proportional pressure curve setting to adapt to the requirements of the heating system, $AUTO_{ADAPT}$ automatically sets a new reference duty point. From the new setting, the process starts over again: $AUTO_{ADAPT}$ will continuously adapt to changes in the heating pattern.

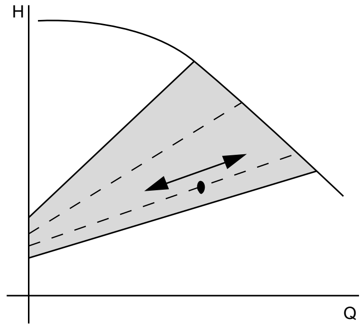

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Fig. 18 New lower proportional pressure curve

Selection of control mode

The selection of the control mode depends on the system type and the allocation of pressure losses defined by the valve or consumer authority.

<table>
<tr><th colspan="3">System type</th><th>Recommended control mode</th></tr>
<tr><td colspan="3">Heating system with PWM control of the pump.</td><td>PWM A profile
</td></tr>
<tr><td colspan="3">Solar system with PWM control of the pump.</td><td>PWM C profile
</td></tr>
<tr><td colspan="3">System without PWM control of the pump (stand-alone).</td><td>Internally controlled</td></tr>
<tr><td rowspan="5">Variable-flow system with relatively high pressure losses inside heating appliance and pipes (> 50 % of pump head).</td><td rowspan="4">Two-pipe systems with thermostatic radiator valve with low valve authority.</td><td>H_N > 2 m for noise reduction.</td><td rowspan="5">Proportional pressure / AUTOADAPT proportional pressure
</td></tr>
<tr><td>Long distribution pipes.</td></tr>
<tr><td>High pressure losses in system parts with total flow.</td></tr>
<tr><td>Heat consumers with low pressure losses.</td></tr>
<tr><td>Primary pump.</td><td>Primary circuit with high pressure losses.</td></tr>
<tr><td rowspan="8">Variable-flow system with relatively low pressure losses inside heating appliance and pipes (< 50 % of pump head).</td><td rowspan="4">Two-pipe systems with thermostatic radiator valve with high valve authority.</td><td>$H_N \leq 2$ m for noise reduction.</td><td rowspan="8">Constant Pressure / AUTOADAPT Constant Pressure
</td></tr>
<tr><td>Former gravity systems.</td></tr>
<tr><td>Low pressure losses in system parts with total flow.</td></tr>
<tr><td>Heat consumers with high pressure losses.</td></tr>
<tr><td>Floor heating system with variable flow.</td><td>System with thermostatic zone valves.</td></tr>
<tr><td>One-pipe system with variable flow.</td><td>System with thermostatic radiator valves.</td></tr>
<tr><td>Primary pump.</td><td>Primary circuit with low pressure losses.</td></tr>
<tr><td>Systems with low flow variation.</td><td>Systems with minimum flow ensured by an automatic bypass valve.</td></tr>
</table>

User interface

Externally controlled versions

Externally PWM controlled Medium UPM pumps have no user interface. LIN versions have a red and green LED for indication of fault and communication.

AUTO versions

Internally controlled Medium UPM AUTO pumps have a user interface with one button and three LEDs.

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Fig. 19 UPM AUTO user interface

The user interface allows to select between 8 control curves in two control modes:

- 3 proportional pressure curves (PP) plus AUTO$_{ADAPT}$ PP
- 3 constant pressure/power curves (CP) plus AUTO$_{ADAPT}$ CP

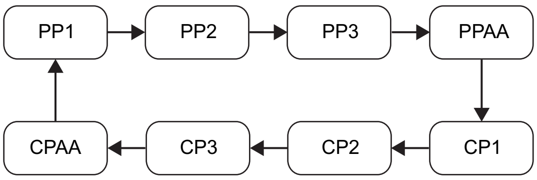

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Fig. 20 Manual curve setting

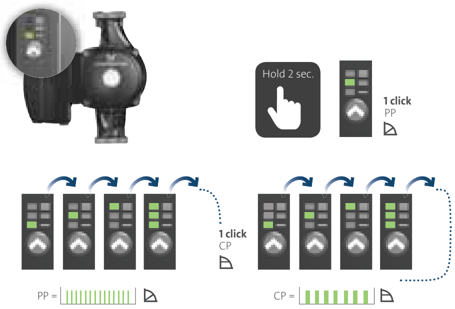

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Fig. 21 Serial curve setting

The first time, the pump starts with the factory presetting: Proportional pressure curve, PP2.

- Push the button for 2 seconds:
  – the pump goes to setting mode - LED starts flashing.
- With each push, the setting changes:
  – LEDs 1-2-3 are permanently on, the control curve and mode are changed.
- Flashing mode:
  – Fast: Proportional pressure
  – Slow: Constant pressure/power
- If the button is not pushed for ten seconds:
  – the setting is adapted.
  – the pump returns into operating mode

During operation, the display shows the selected setting.

- LED 1 or 2 or 3 is permanently on.
  – Pump is running with the selected curve and mode.

7. Technical description

Exploded view

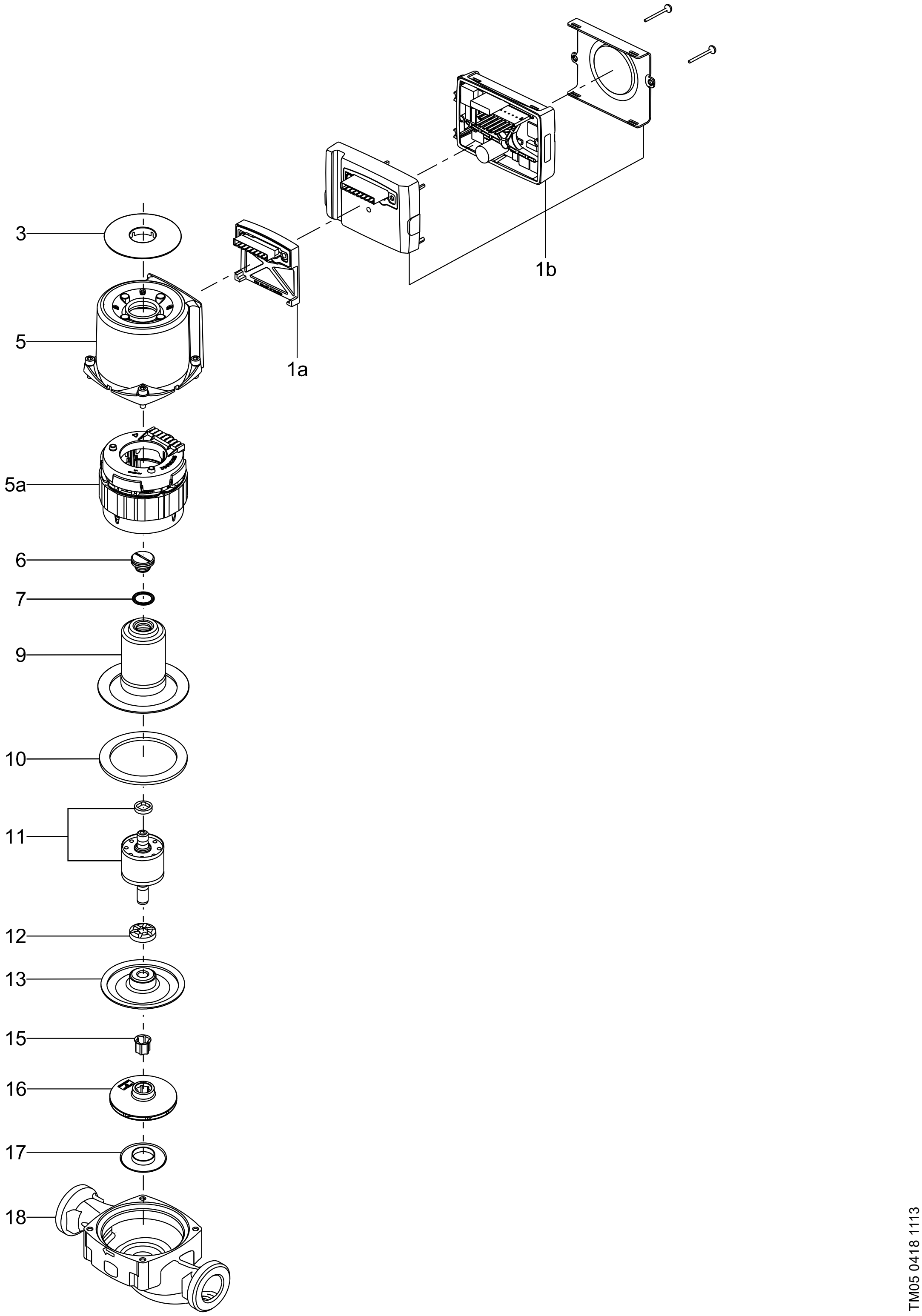

Fig. 22 UPML exploded view

Sectional view

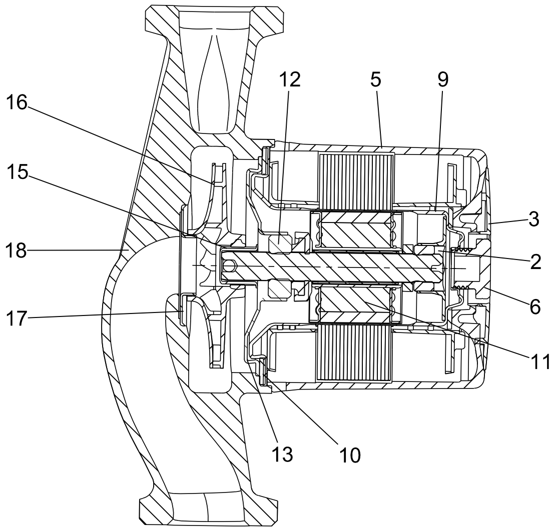

Fig. 23 UPML, UPMXL and SOLAR PML sectional view

Material specification

Pos.	Component	Material	EN/DIN	AISI/ASTM
1a	Spacer	Composite PET 30 % GF		
1b	Control box housing	Composite PET 30 % GF		
	Control box bottom	Composite PPE/PS 20 % GF		
	Control electronics	PCB with SMD components		
	Control box cooling cover	Aluminium		
1c	Heat sink with cooling pad (only UPMXL)	Aluminium, AlSi11Cu2	EN 46100	
2	Radial bearing	Ceramics		
3	Nameplate	Composite, PA 66		
5	Stator housing	Aluminium, AlSi10Cu2		
5a	Stator windings	Copper wire		
	Stator lamination	Laminated iron		
6	Vent and deblocking screw	Brass, nickelled, Ms58	2.0401.30	
7	O-ring	EPDM	ID2034	
9	Rotor can	Stainless steel	1.4301/1.4521	304
9a	Radial bearing	Ceramics		
10	Gasket	EPDM rubber		
11	Shaft	Ceramics		
	Rotor stack	Laminated iron		
	Rotor magnet	NdFeB		
	Rotor cladding	Stainless steel	1.4301/1.4521	304
12	Thrust bearing	Carbon		
	Thrust bearing retainer	EPDM rubber		
13	Bearing plate	Stainless steel	1.4301	304
15	Split cone	Stainless steel	1.4301	304
16	Impeller	Composite/PES 30 % GF		
17	Neck ring	Stainless steel	1.4301	304
18	Pump housing	Cast iron	EN-GJL-150	
		Stainless steel	1.4308	CF8

Description of components

Medium UPM pumps are of the canned-rotor type, that is pump and motor form an integral unit without shaft seal and 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. The focus has been on using eco-friendly materials as well as on limiting the number of materials.

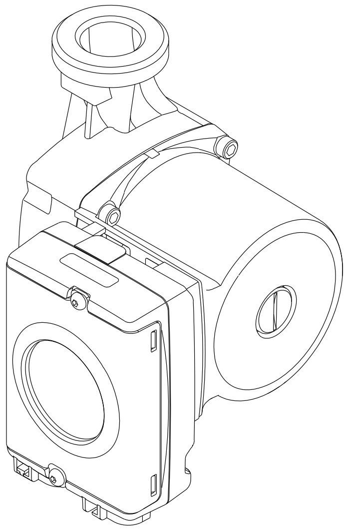

Fig. 24 Example, UPML

Motor

The efficiency of the 4-pole, synchronous, electronically commutated permanent-magnet (ECM/PM) motor type is considerably higher compared to a conventional asynchronous squirrel-cage motor.

The PM motor is designed according to the canned-rotor principle. The design of the mechanical motor components has mainly focused on these features:

- robustness achieved through efficient protection of loaded components
- simple design meaning as few components as possible, each with several functions
- high efficiency due to permanent magnets and low-friction bearings.

The motor is cooled by the pumped medium which reduces the sound pressure level to a minimum. Being software-protected, the pump requires no further motor protection. The motor/pump and control box have been tested according to VDE 0700 and meet the requirements of EN 61800-3 concerning electromagnetic compatibility.

Stator housing

The die-cast stator housing with four fixing holes enables condensed water to escape from the pump through three drain holes, close to the pump housing. Consequently, one of the drain holes must always point downwards. See fig. 25.

The housings are electrocoated.

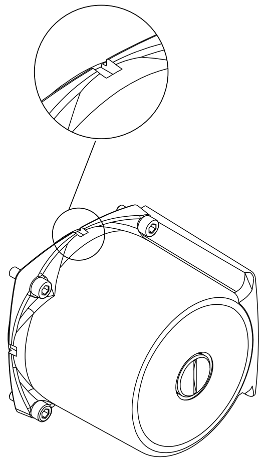

Fig. 25 Drain hole in stator housing

Stator and windings

The UPML, UPMXL pumps have a three-phase stator.

These pumps are designed for pumping very cold liquids (down to -10 °C). In such applications, condensation may occur in the stator housing. To protect the stator, the copper wires are provided with reinforced insulation.

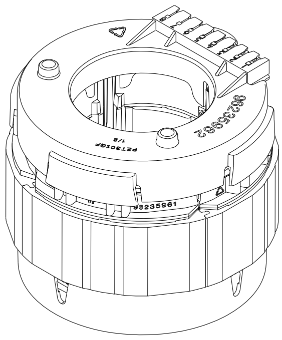

Fig. 26 Stator

Shaft with rotor

The shaft is made of ceramics. The rotor core is made of iron lamination and fitted with neodymium permanent magnets. The rotor is fitted to the shaft with a pipe and an elastic sleeve. The rotor is encapsulated in a thin stainless-steel cladding welded to the end covers and shaft pipe. To avoid precipitation of calcium in the radial bearings, the shaft has been plunge-ground at the journals. It has a through-going hole to ensure good lubrication and cooling of the upper bearing. Air in the rotor chamber escapes into the system through the through-going holes of the shaft.

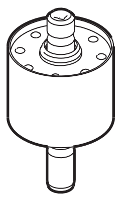

Fig. 27 Shaft with rotor

Rotor can

The drawn stainless-steel rotor holds the ground and honed upper radial bearing at the top. The rotor can has a vent and deblocking screw.

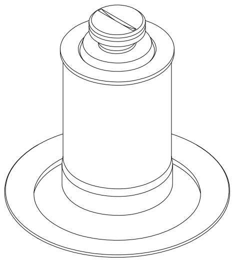

Fig. 28 Rotor can

Bearing plate

The bearing plate is made of stainless steel. The ground and honed inner radial bearing is pressed into the bearing plate. Thanks to the relatively large bearing plate surface, the motor heat is effectively carried away by the pumped medium. The four tiny laser holes of the bearing plate ensure optimum venting and minimise the gradual replacement of rotor liquid with the pumped medium.

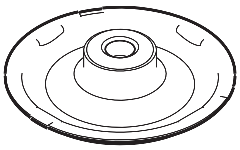

Fig. 29 Bearing plate

Thrust bearing

The thrust bearing is fitted to the shaft in a flexible suspension. In combination with the bearing plate, the thrust bearing prevents forces from being transmitted axially to rotor and rotor can.

Fig. 30 Thrust bearing

Impeller

The composite impeller is of the radial type with curved blades. The impeller is secured to the shaft with a split cone. The impeller, shaft with rotor and bearing plate are assembled in one unit to eliminate possible misalignment in the bearings.

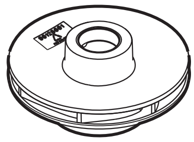

Fig. 31 Impeller

Pump housing

As standard, the pump housing is available in electrocoated cast iron with threaded inlet and outlet ports. The pump housing is of the in-line type. The stainless-steel neck ring is pressed into the pump housing to minimise the amount of liquid running from the outlet side of the impeller to the inlet side.

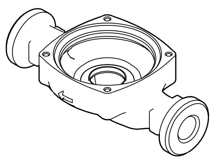

Fig. 32 Pump housing

Control box

The control box is made of black composite material with an aluminium heat sink. It contains the PCBs for internal power supply and communication.

The spacer fitted between stator and control box decreases the temperature influence of the pumped medium/motor temperature. The XL versions have an additional extended heat sink. The height will be extended by approx. 21 mm.

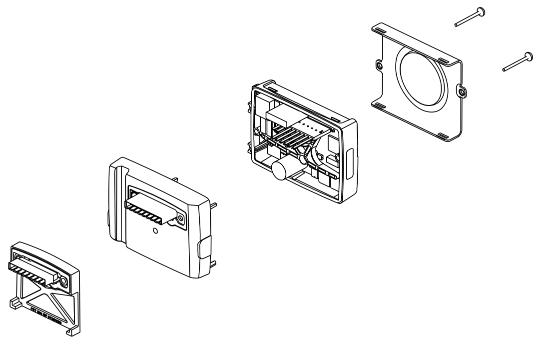

Fig. 33 Control box for UPML

8. Installation

Installation must be carried out by trained persons in accordance with local regulations.

Pumped liquids

The pump must not be used for circulation of flammable liquids such as diesel oil and petrol.

Risk of malfunction or damage when inhibitors or additives are added to the pumped liquids.

Medium UPM pumps are suitable for the following liquids:

- Clean, thin, non-aggressive and non-explosive liquids, not containing solid particles or fibres.
- In heating systems, the water must meet the requirements of accepted standards on water quality in heating systems, for example the German standard VDI 2035.
- The pH must be between 8.2 and 9.5. The minimum value depends on the water hardness and must not be below 7.4 at 4 °dH (0.712 mmol/l).
- The electrical conductivity at 25 °C must be ≥ 10 microS/cm.
- For drinking water systems, approved housings must be used, such as stainless steel N. These pumps and their components in contact with water are approved by WRAS (GB), ACS (FR), KTW (DE) and DIN DVGW W270 (DE).
- In domestic hot-water systems, the pump must be used only for water with a degree of temporary hardness of less than 3 mmol/l $CaCO_3$ (16.8 ° dH). To avoid lime problems in hard waters, the medium temperature must not exceed 65 °C.
- The water quality of test beds for the final production tests of complete heating appliances including pump must be observed to avoid calcification or biofilm formation during a longer storage period.
- Solar media as used in typical solar thermal systems containing up to 50 Vol % of antifreeze media.
- Mixtures of water with antifreeze media such as glycol or ethanol (down to -10 °C with a validated temperature profile) with a kinematic viscosity lower than 15 mm^2/s (15 cSt).

Antifreeze media containing glycol

When selecting a pump, the viscosity of the pumped liquid must be taken into consideration. Depending on the type of glycol, the mixture and the liquid temperature, the viscosity increases differently compared to water as a medium. This will influence the pressure loss of the system as well as the efficiency, performance and load of the pump. As the pump is controlled by a power limitation function that protects against overload, the maximum curve might be lower.

Example:

If the water-glycol mixture is 50 %, and the liquid temperature is +2 °C, the viscosity is 15 cSt:

The maximum head falls 1.0 to 1.5 m compared to 100 % water at 60 °C (at the same flow).

Performance curves measured with a medium containing glycol at higher viscosity than water are different from the water curves in this data booklet and can be taken into account by adding these mark-up factors to the required duty point:

Pumped liquid at -7 °C	Viscosity [mm^2/s]	Density [kg/m^3]	$H_{mark\ up}$ [%]	$Q_{mark\ up}$ [%]	$P_{mark\ up}$ [%]
Ethylene glycol					
50 %	10.20	1083	7	10	18
30 %	5.18	1054	3	7	9
25 %	4.37	1046	2	5	8
Propylene glycol					
50 %	26.90	1056	14	15	19
30 %	9.71	1038	7	8	8
25 %	7.34	1033	4	5	7
Ethanol					
50 %	10.20	932	4	10	2
30 %	11.00	972	4	8	3
25 %	9.61	980	4	7	4

Mechanical installation

Mechanical installation must be carried out by trained persons in accordance with local regulations.

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

Arrows on the pump housing indicate the liquid flow direction through the pump. The pump is designed to be installed with horizontal shaft pumping upwards, downwards or horizontally.

For mounting dimensions see the data sheets.

- The pump must be installed in the system in such a way that no major amount of air flowing through or gathering in the pump housing affects the pump when it is out of operation.
- If an additional non-return valve is installed in the flow pipe, there is a high risk of dry-running, because the air cannot pass the valve.
- It must be possible to vent the system at the highest part of each system segment.
- Permanent venting is recommended.

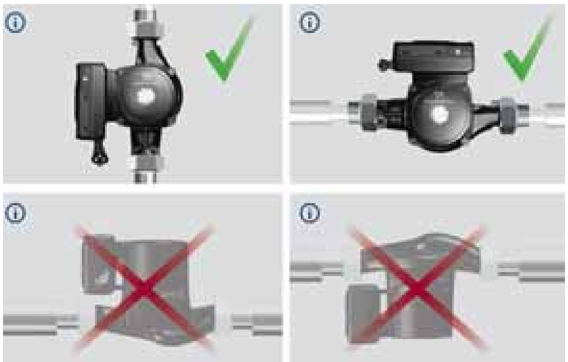

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Fig. 34 Control box positions

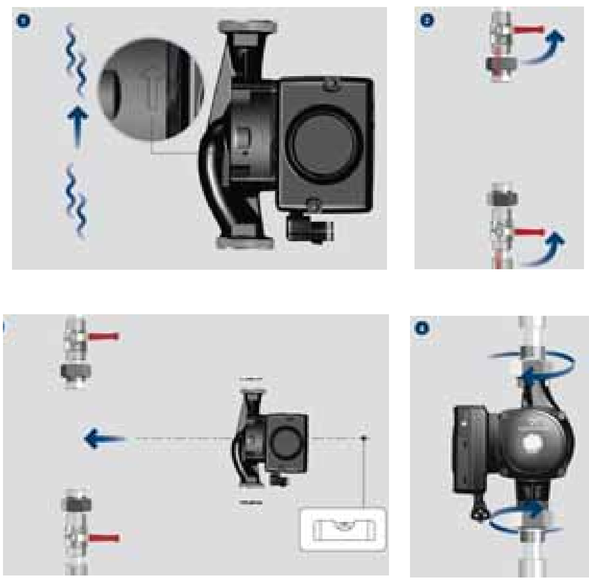

Fig. 35 Mechanical installation

Control box positions

Control box positions in a non-condensing environment

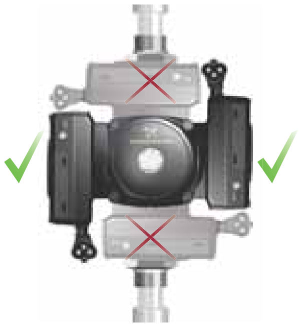

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Fig. 36 Allowed control box positions

Control box positions in a condensing environment

In condensing environments the cables on the control box must point downwards.

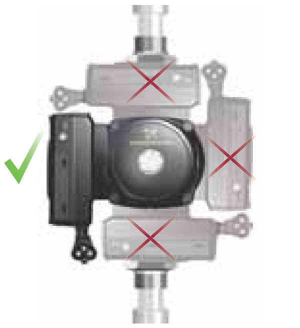

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Fig. 37 Allowed control box positions

Changing the control box position

1. Remove the screws that hold the pump head.
2. Turn the control box into the desired position.
3. Fit the screws.
4. Tighten the new screws securely.
   – The nameplate position cannot be changed.

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

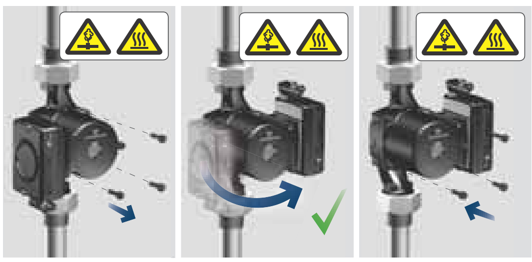

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Fig. 38 Changing the control box position

Insulation

When insulating the pump, the control box (especially the cooling cover) must not be covered to allow cooling by the surrounding air.

If the pump is installed in a cabinet or fitted with insulation shells, the inside air temperature must not be higher than 55 °C during operation.

Diffusion-tight, cold-water insulation cannot be supplied by Grundfos. It must not cover the pump head. The drain holes located in the stator housing must always be free and one must point downwards.

Mechanical specifications

Ambient temperature

The ambient temperature must not exceed 55 °C (near the pump surface).

Relative humidity

The relative humidity inside control box must not exceed 95 %. Condensation is acceptable if the cables on the control box point downwards. See *Control box positions in a condensing environment*, page 25.

Liquid temperature

- Max. 95 °C at 55 °C ambient temperature (continuously)
- Max. 110 °C for short periods or at low load
- Min. -10 °C (see validated temperature profile)

Note: For further lifetime evaluation, the temperature profile must be defined.

System pressure

Max. 1.0 MPa (10 bar) with cast iron or stainless steel housings.

Minimum inlet pressure

To avoid cavitation noise and damage to the pump bearings, the following minimum pressures are required at the inlet port.

Liquid temperature	75 °C	95 °C	110 °C
Minimum inlet pressure	0.01 MPa	0.05 MPa	0.10 MPa
	0.10 bar	0.50 bar	1.00 bar

For further specifications, see *Technical data* and *13. Data sheets*.

Electrical installation

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.

All electrical connections must be carried out by a qualified electrician in accordance with local regulations.

The pump is not a safety component and cannot be used to ensure functional safety in the final appliance.

- The pump requires no external motor protection.
- Check that the supply voltage and frequency correspond to the values stated on the nameplate.
- The pump must not be used with an external speed control which varies the supply voltage.
- If an earth leakage circuit breaker is used, check which type it is.
- If an external relay is used, check if it can stand the inrush current.

Supply voltage

EU version: 1 x 230 V + 10 %/- 15 %, 50/60 Hz.

The Medium UPM pumps are externally controlled via PWM signal or internally speed-controlled by a frequency converter. Therefore, the pumps must not be used with an external speed control which varies the supply voltage, for example phase-cut or pulse-cascade control.

Reduced supply voltage

Medium UPM with PWM control: If the voltage falls below the specified voltage range (< 195 V), a low voltage warning is sent via PWM return signal.

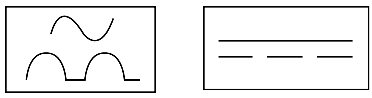
The signal is disabled on variants with FlowEstimation. In case of low voltage, the reduced performance is visible via the FlowEstimation signal.

Earth leakage circuit breaker (ELCB)

DANGER
Electric shock
▲ Death or serious personal injury
► If national legislation requires a Residual Current Device (RCD) or equivalent in the electrical installation, this must be type A or better, according to the nature of the pulsating DC leakage current.

If the pump is connected to an electric installation that uses an earth leakage circuit breaker (ELCB) as additional protection, this circuit breaker must trip when earth fault currents with DC content (pulsating DC) occur.

The earth leakage circuit breaker must be marked with the first (type A) or both (type B) of the symbols shown below:



TM05 5404 3712

Fig. 39 Symbol on earth leakage circuit breaker

Leakage current

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

Leakage current: < 3.5 mA.

High-voltage test

All Grundfos pumps are tested with 1000 VAC for 1 second according to EN 60335-1 Annex A.

ECM pumps incorporate filter components (including Y capacitors) that are connected to protective earth. The capacitors are class Y2 film capacitors with normal requirements. Every high-voltage test exposes the Y capacitors to high voltage.

The voltage level and the amount of tests should be as low as possible, in order to grant 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.

Inrush current

All electronic pumps contain electronic units that must be protected by filters including capacitors and ECM pumps frequency converters with AC/DC rectifiers containing capacitors to equalize the waves. This is not the case in most asynchronous pumps.

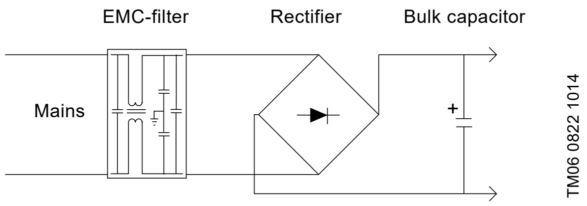


Fig. 40 Rectification of VAC voltage to DC voltage

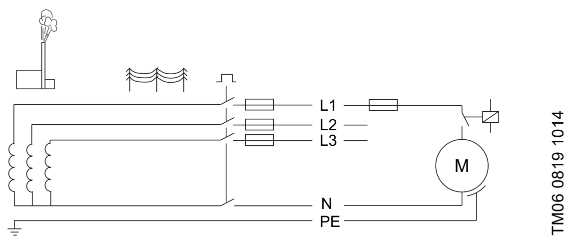
The load of electronically commutated motors (ECM) behaves as a capacitive load and not as a motor load like in a standard pump. At start, the capacitor is unloaded. Hereby the amplitude of the current peak depends on the grid impedance, until the capacitor is charged. The faster the capacitor is charged, the higher amplitude, and the faster the pump can be started. After this period of time, the current will drop to the rated current.

Definition: Inrush current is the current peak charging the capacitors in the electronics when the supply voltage is connected.

Note: When discussing measurements, it is important to refer to the same method. Since 2007, Grundfos uses the IEC 61000-3-3 Annex B method for measuring inrush current.

The inrush current peak charges the bulk capacitor to 325 VDC as fast as the power grid allows. That shows that inrush current is not only depending on the integrated electronics but as well on the impedance of the grid.

There is a "VDMA Einheitsblatt 24225" - "Wet runner circulating pumps - Specification for the measurement of the inrush current".



If you use a relay to switch the power supply of the pump, you risk excessive wear on the relay contact surface.

To avoid such problems there are different external and internal solutions.

External solutions in the controller of the appliance unit

- Specific relays with silver tin oxide ($AgSnO_2$) inrush relay contacts.
- Switching at ZERO crossing.
- Standby operation - pump only switches via the PWM signal.

Internal solutions in the pump

- NTC resistor in the power input circuit or power cable (passive)

Inrush current limitation by NTC resistor

At startup the operating temperature of the pump including the NTC resistor is cold. In this situation the NTC resistor has a high resistance and is able to limit the inrush current to the specified inrush level of the chosen variant. During operation the operating temperature of the pump including NTC resistor is hot. There is no inrush current but the NTC resistance decreases so that the loss is limited.

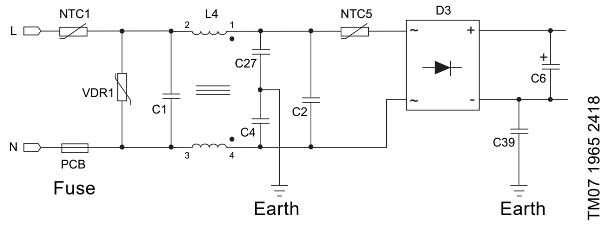


Fig. 41 Inrush current limitation

At restart, the operator must ensure that the NTC resistor has been cooled down so that efficient operation is guaranteed. Normally, it takes 1 minute to cool down the resistor.

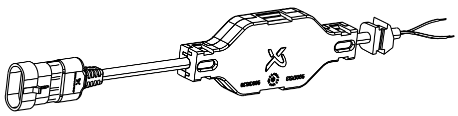
When the power supply to the pump is switched on and off via an external relay, you must ensure that the contact material of the relay is able to handle higher inrush currents.

The inrush current is measured on a flicker network according to IEC 61000-3-3:1994 + A1, + A2, Annex B. See also "VDMA Einheitsblatt 24225".

Power supply connection

The pump can be connected to the power supply in different ways, depending on the model.

Pumps above 140 W power consumption (UPMXL, UPMXXL) are supplied with mounted short high-temperature resistant cables with external NTC box plus different adapters for MOLEX, VOLEX or TE Superseal supply cables to reduce the inrush level to the specified one.



TM07 1964 2418

Fig. 42 Superseal NTC cable with plug

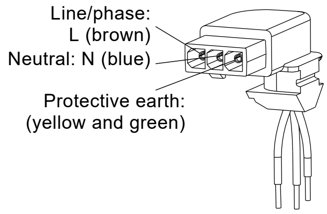
Alternative pumps are available with mounted power cables (1 m and 2 m) with NTC but without connector.

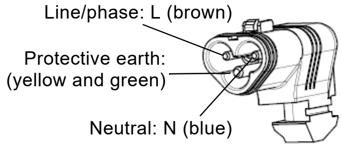
Product number	UPMXL connector cable with external NTC box
98937821	UPMXL cable with NTC 280 mm + Molex plug
98937822	UPMXL cable with NTC 245 mm + Volex plug
99064400	UPMXL cable with NTC 315 mm + Super seal
98937820	UPMXL NTC cable 1000 mm 3G 0.75 moulded
98937819	UPMXL NTC cable 2000 mm 3G 0.75 moulded

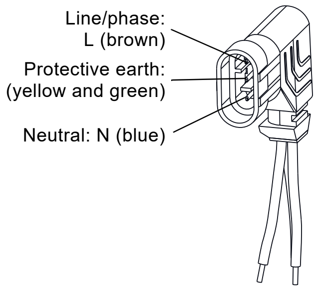
Pumps up to 140 W power consumption have integrated NTC to reduce to the specified inrush level of the chosen variant. These pumps can be delivered with mounted plug connector like MOLEX, VOLEX or TE Superseal. An additional NTC adapter cable can reduce the inrush level additional by approx. 4 A.

Product number	UPML plug connector mounted at the control box
98428087	UPML Molex 90 ° connector vertical towards name plate
98431661	UPML Molex 270 ° connector vertical towards pump housing
98428090	UPML Volex 90 ° connector towards name plate
98492211	UPML Volex 270 ° connector towards pump housing
98585906	UPML Superseal 90 ° connector towards name plate

Note: All cables and connectors used must comply with EN 60335-1.

<table>
<tr><th>Description</th><th>Plug connection</th></tr>
<tr><td>Molex 3-pin plug</td><td>

TM05 8412 2313</td></tr>
<tr><td>Volex plug</td><td>

TM05 0419 1011</td></tr>
<tr><td>Superseal plug</td><td>

TM06 0969 1314</td></tr>
</table>

Signal cable

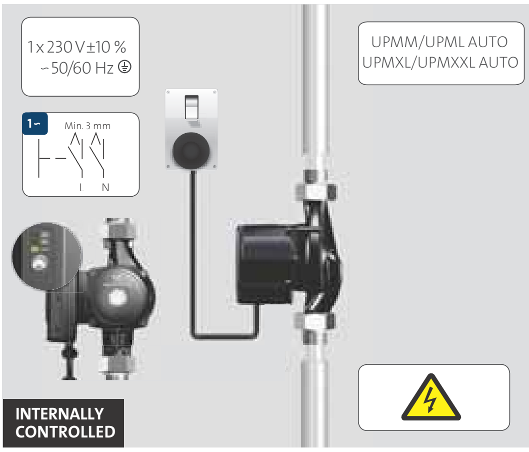
Medium UPM AUTO pumps are internally speed-controlled and have no signal cable connection. We recommend to order these pump types with signal blind plug. Medium UPM PWM/LIN pumps are externally speed-controlled. To enable pump control, a signal cable is required, otherwise the pump always runs at maximum speed (profile A for heating).

SOLAR PML pumps do not run without signal (PWM profile C for solar).

The signal cable has three leads, signal input, signal output and signal reference. The cable must be connected to the control box by a Dubox housing with a FCI terminal block and terminals. The optional signal cable can be supplied with the pump as an accessory. The cable length is customised to specific requirements (maximum 3 metres).

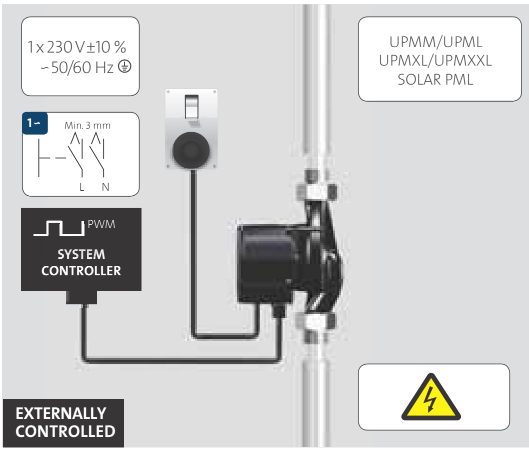
The installation of a ferrite core around the cable is not necessary.

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



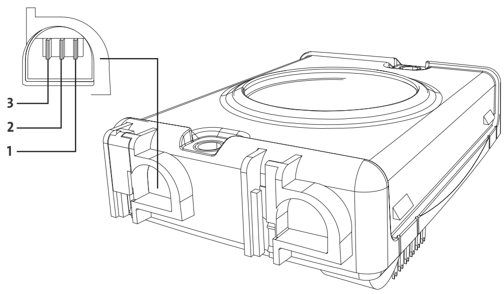
TM07 2011 2518

Fig. 43 Internally controlled



TM07 2012 2518

Fig. 44 Externally controlled



TM07 1425 2918

Fig. 45 FCI signal cable connection

Contact	PWM	LIN	Cable colour
1	PWM input	VBAT	Brown
2	Signal ref	Signal ref	Blue
3	PWM output	LIN signal	Black

Technical data

Feature	Specification
Nominal supply voltage	EU: 1 x 230 V + 10 %/- 15 %, 50/60 Hz
Minimum supply voltage	160 VAC (runs with reduced performance)
Motor protection	The motor is protected by the electronics in the control box and requires no external motor protection.
Enclosure class	IPX2D (with drain holes)
Equipment class	I (EN 60335-1)
Insulation class	F (EN 60335-1)
Temperature class	TF95 (EN 60335-2-51)
High voltage protection	EN 60335-1 1000 VAC / 2500 VAC
Maximum ambient temperature	55 °C (near pump surface)
Maximum media temperature	95 °C
Minimum media temperature	-10 °C (see validated temperature profile
Storage temperature	-40 to +70 °C
Maximum system pressure	1 MPa (10 bar) (depending on the housing material)
Minimum inlet pressure	0.01 MPa (0.10 bar) at 75 °C liquid temperature 0.05 MPa (0.50 bar) at 95 °C liquid temperature
Flow estimation	Available on demand, based on cast-iron inline housing (25 x 180 mm), accuracy: see PWM and LIN specification
Drinking water approvals (ACS, WRAS, UPBA, KTW, DVGW W270)	All pump head components are compliant. Specific compliant N pump housing is available.
Deblocking device	Manual deblocking device, access from front side
Dry run ability - first start	3 x 20 seconds (5 minutes interval), all pumps are lubricated with glycerine
Dry run ability - during operation	Rotor can must be filled with water: fulfils EN 60335-2-51
Expected lifetime	> 80,000 h (with specified load profile)
Minimum switching time power on/off	1 minute.
Inrush current	7.5...11.5 A (reg. VDMA Einheitsblatt 24225) (depending on the variant)
Maximum leakage current	≤ 3.5 mA (EN 60335-1)
Relative humidity	Condensation at the motor surface is acceptable, if the drain holes are free.
Standby power consumption	< 3 W
Acoustic sound pressure level	≤ 38 dB(A)
Maximum altitude of installation	2000 m above sea level

9. Startup

Before you start the Medium UPM pump:

1. Mount the pump in the right way (see *8. Installation*).
2. Check that the unions are tightened.
3. Check that the valves are opened.
4. Fill the system and vent it above the pump.
5. Check if the required minimum inlet pressure is available at the pump inlet.
6. Switch on the power supply.
7. If the pump is externally controlled: Check if the external controller sends a signal that controls the speed or that might have stopped the pump.
8. If the pump is internally controlled: The pump starts with factory pre-setting (e.g. proportional pressure curve 2). Change the setting if necessary (see *User interface*).

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

Medium UPM pumps are self-venting and do not have to be vented before startup. Air inside the pump is transported by the liquid into the system shortly after startup.

Hint for installers:

- Heating systems must be flushed according to local standards, such as DIN EN 14336 or VOB ATV C DIN 18380, before startup. After filling the system for the first time, the pump must run for approx. 1 hour before a long-term stop.
- Inhibitors and additives increase the risk of malfunction of the pump.
- If filters are installed, they must be monitored and maintained thoroughly.

Warning: 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.

Hint for OEM customers: This warning must be available in the local language when placing the product on the market. It is part of the Quick Guides.

10. Service

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.

DANGER

Electric shock

▲ Death or serious personal injury

▶ Before dismantling the complete pump set, switch off the power supply at least 5 minutes prior to commencing work and ensure that it cannot be switched on again unintentionally.

DANGER

Electric shock

▲ Death or serious personal injury

▶ When running in reverse, the pump acts as a generator and creates hazardous induction voltage at the motor terminals.

▶ Prevent the fluid from flowing back by closing the shut-off valves.

WARNING

Strong magnetic field in the rotor area

▲ Danger of death for persons with pacemaker.

▶ Keep a safety distance of at least 0.3 m during disassembly.

WARNING

Toxic material

▲ Death or serious personal injury

▶ Decontaminate pumps which handle fluids posing a health hazard.

CAUTION

Hot surface

▲ Minor or moderate personal injury

▶ Before starting to work on the pump, let the pump casing cool down to ambient temperature.

All service work must be carried out by an instructed service technician.

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

Maintenance

Medium UPM pumps are maintenance-free. However, it might be necessary to deblock or to open the pump, for example if it is blocked by impurities.

Deblocking is possible by opening the deblocking screw at the front.

1. Unscrew the deblocking screw at the front of the pump head.
   – Be aware of splashing hot water.
2. Deblock the pump with a screwdriver.

Cleaning

If the impeller or pump housing has to be cleaned from impurities, proceed as follows:

1. Drain the system or close the isolating valves.
   – Be aware of hot water.
2. Remove the screws that hold the pump head.
3. Check impeller and pump housing and remove the impurities.
4. Place the pump head in the desired position, fit the screws and tighten the screws securely.

Fault finding

Fault	Cause	Remedy
1. Pump is not running. No power supply.	• System is switched off.	Check the system controller.
	• A fuse in the installation is blown.	Replace the fuse.
	• The circuit breaker has tripped.	Check the power connection and switch on the circuit breaker.
	• Power supply failure.	Check the power supply.
2. Pump is not running. Normal power supply.	• Controller is switched off.	Check the controller and its settings.
	• Pump is blocked by impurities.	Remove impurities. Unscrew the deblocking screw at the front of the pump. Deblock the pump from the front of the control box with a screwdriver. Be aware of splashing hot water.
	• Pump is defective.	Replace the pump.
3. Pump runs at maximum speed and cannot be controlled.	• No signal from signal cable.	Check if the cable is connected to the controller. If it is, replace the cable.
4. Noise in the system.	• There is air in the system.	Vent the system.
	• Differential pressure is too high.	Reduce the pump performance at the pump or external controller.
5. Noise in the pump.	• There is air in the pump.	Let the pump run. The pump vents itself over time.
	• Inlet pressure is too low.	Increase the system pressure or check the air volume in the expansion tank, if installed.
6. Insufficient flow.	• Pump performance is too low.	Check the external controller and the pump settings.
	• Hydraulic system is closed or system pressure is insufficient.	Check the non-return valve and filter. Increase the system pressure.

11. Disposing of the product

WARNING

Toxic material

▲ Death or serious personal injury

► Decontaminate pumps which handle fluids posing a health hazard.

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

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.

For information regarding materials used in the product and disassembly considerations, please see the product recycling section on the Grundfos website:

http://www.grundfos.com/products/product-sustainability/product-recycling.html

12. Performance curves

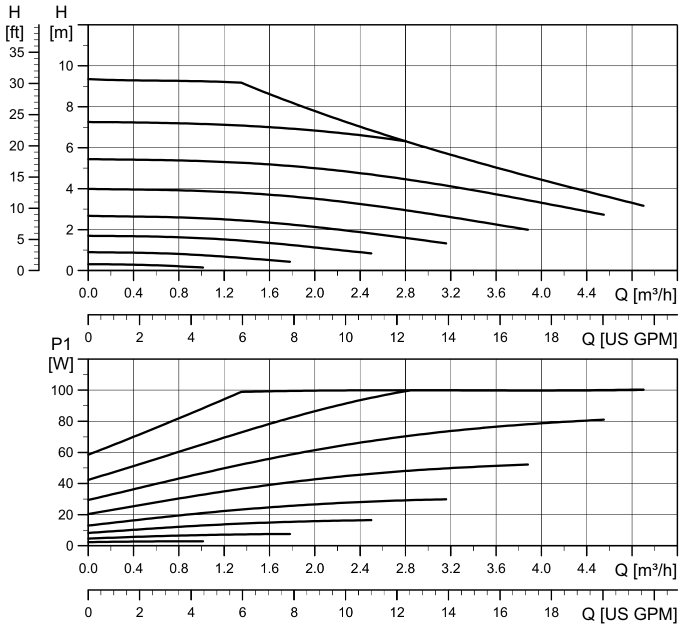
Curve conditions

The guidelines below apply to the performance curves on the following pages:

- Test liquid: airless water.
- The curves apply to a density of 998.21 kg/m^3 and a liquid temperature of +20 °C.
- All curves show average values and should not be used as guarantee curves. If a specific minimum performance is required, individual measurements must be made.
- The curves apply to a kinematic viscosity of 1.004 mm^2/s (1.004 cSt).
- The conversion between head H [m] and pressure p [kPa] has been made for water with a density of 1000 kg/m^3. For liquids with other densities, e.g. hot water, the outlet pressure is proportional to the density.
- Curves obtained according to EN 16297.
- Medium UPM with PWM signal connection are designed to be speed controlled by an external system controller. Therefore, EEI and $P_{L,Avg}$ of the different pump heads (pumps without pump housings) are measured to be in compliance with the Ecodesign requirements of regulation EC/622/2012 with a reference housing in accordance with EN 16297-3.
- It is not obligatory to show $P_{L,Avg}$ but it gives an indication on the yearly expectable average power consumption.
- The performance of PWM controlled pumps is measured with A profile (heating) at eight PWM values: 5 % (max.), 20 %, 31 %, 41 %, 52 %, 62 %, 73 %, 88 % (min.).
- C profile curves are measured mirrored with 95 % (max.), 80 %, 69 %, 59 %, 48 %, 38 %, 27 %, 12 % (min.)
- Maximum curves are limited by speed and power
- Other curves for different control signals or OEM housings are available on request.

13. Data sheets

UPMM 15-95 130, 25-95 130, 25-95 180 (N), 32-95 180 (GFJNB)



High Efficiency

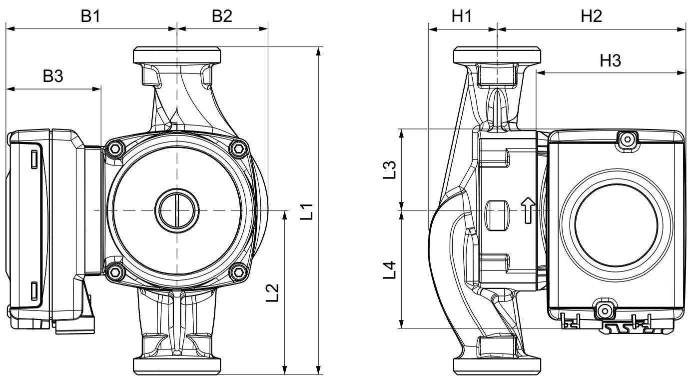
EEI ≤ 0.23 Part 3

$P_{L,\ avg}$ ≤ 43 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	3	0.03
Max.	100	0.8

Dimensions

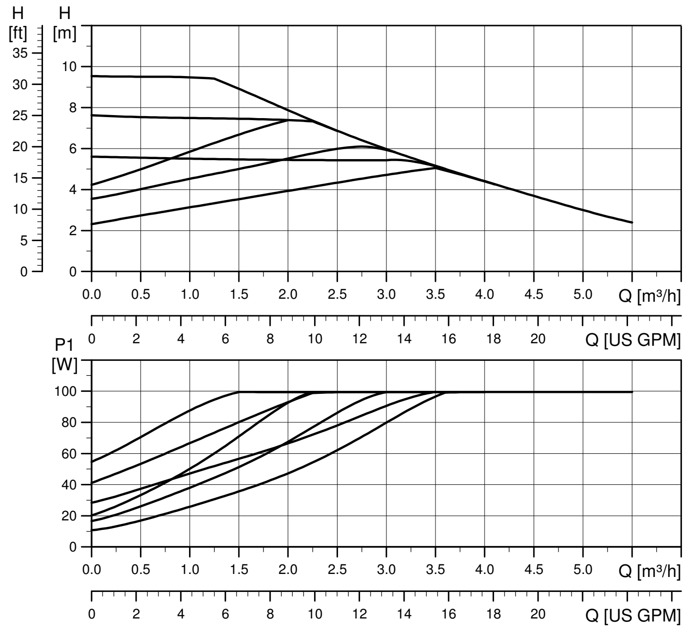


Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPMM 15-95 130	130	65	45	65	94	50	52	38	104	82	G 1	2.3
UPMM 25-95 130	130	65	45	65	94	50	52	38	104	82	G 1 1/2	2.4
UPMM 25-95 (N) 180	180	90	45	65	94	50	52	38	104	82	G 1 1/2	2.5
UPMM 32-95 180	180	90	45	65	94	50	52	38	104	82	G 2	2.7

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

UPMM 15-95 130, 25-95 130, 25-95 180 (N), 32-95 180 AUTO (GFJNC)



High Efficiency

Setting	Max. H_{nom}
CP1	5.5
CP2	7.5
CC3	9.5
PP1	5.0
PP2	6.0
PP3	7.5

Setting	Max. $P1_{nom}$
All curves	100 W

EEI ≤ 0.23 Part 2

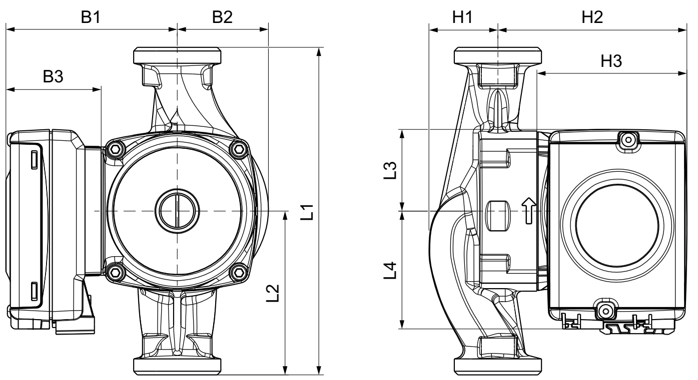
$P_{L,\ avg}$ ≤ 43 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	10	0.04
Max.	100	0.8

Settings		
PP	CP	CC
3/AA	2/AA	MAX

Dimensions

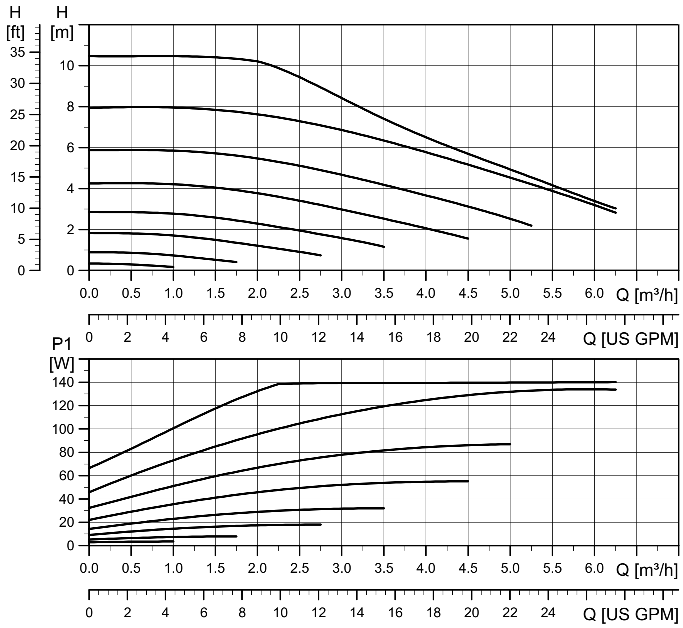


Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPMM 15-95 130 AUTO	130	65	45	65	94	50	52	38	104	82	G 1	2.3
UPMM 25-95 130 AUTO	130	65	45	65	94	50	52	38	104	82	G 1 1/2	2.4
UPMM 25-95 (N) 180 AUTO	180	90	45	65	94	50	52	38	104	82	G 1 1/2	2.5
UPMM 32-95 180 AUTO	180	90	45	65	94	50	52	38	104	82	G 2	2.7

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

UPML 15-105 130, 25-105 130, 25-105 180 (N), 32-105 180 (GFJNB)



High Efficiency

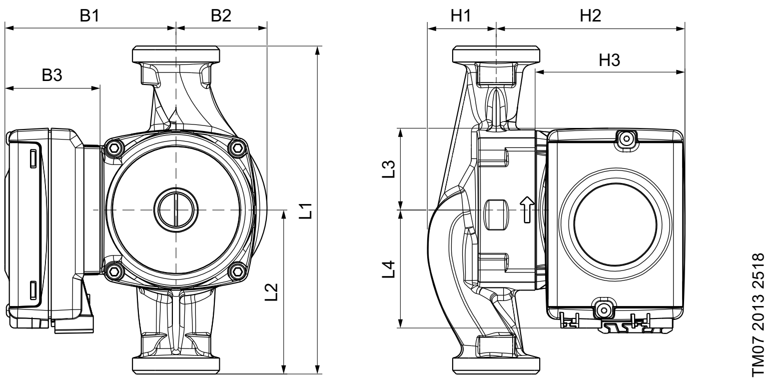
EEI ≤ 0.23 Part 3

$P_{L,\ avg}$ ≤ 58 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	3	0.04
Max.	140	1.1

Dimensions

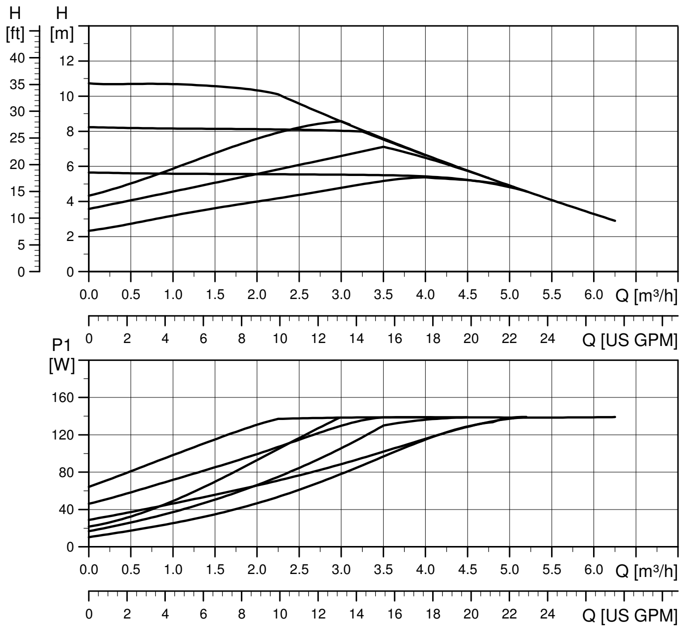


Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPML 15-105 130	130	65	45	65	94	50	52	38	104	82	G 1	2.3
UPML 25-105 130	130	65	45	65	94	50	52	38	104	82	G 1 1/2	2.4
UPML 25-105 (N) 180	180	90	45	65	94	50	52	38	104	82	G 1 1/2	2.5
UPML 32-105 180	180	90	45	65	94	50	52	38	104	82	G 2	2.7

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

UPML 15-105 130, 25-105 130, 25-105 180 (N), 32-105 180 AUTO (GFJNC)



High Efficiency

Setting	Max. H_{nom}
CP1	5.5 m
CP2	8 m
CC3	10.5 m
PP1	5.5 m
PP2	7 m
PP3	9 m

Setting	Max. $P1_{nom}$
All curves	140 W

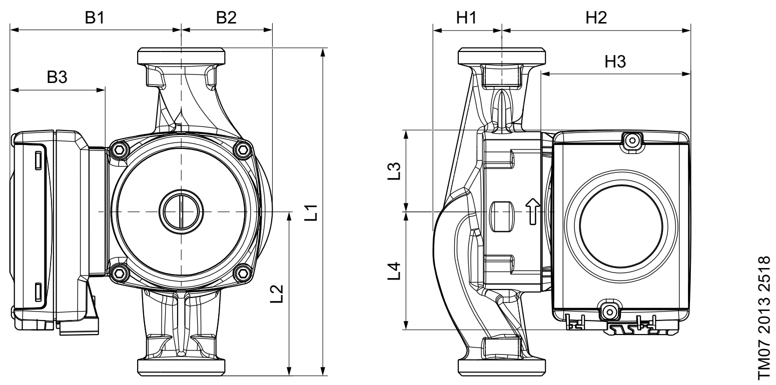
EEI ≤ 0.23 Part 2
$P_{L, avg}$ ≤ 58 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	12	0.1
Max.	140	1.1

Settings		
PP	CP	CC
3/AA	2/AA	MAX

Dimensions

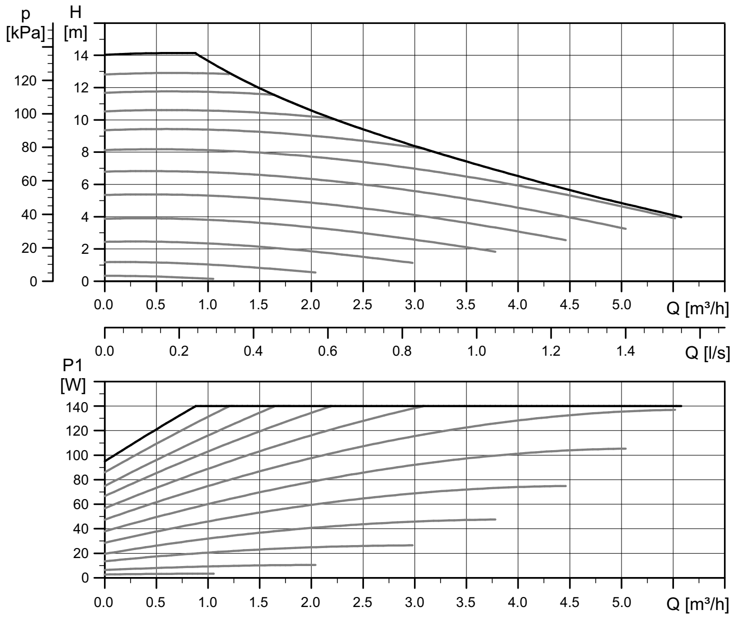


Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPML 15-105 130 AUTO	130	65	45	65	94	50	52	38	104	82	G 1	2.3
UPML 25-105 130 AUTO	130	65	45	65	94	50	52	38	104	82	G 1 1/2	2.4
UPML 25-105 (N) 180 AUTO	180	90	45	65	94	50	52	38	104	82	G 1 1/2	2.5
UPML 32-105 180 AUTO	180	90	45	65	94	50	52	38	104	82	G 2	2.7

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

SOLAR PML 15-145 130, 25-145 130, 25-145 180 (N), 32-145 180 (GFJNB)



High Efficiency

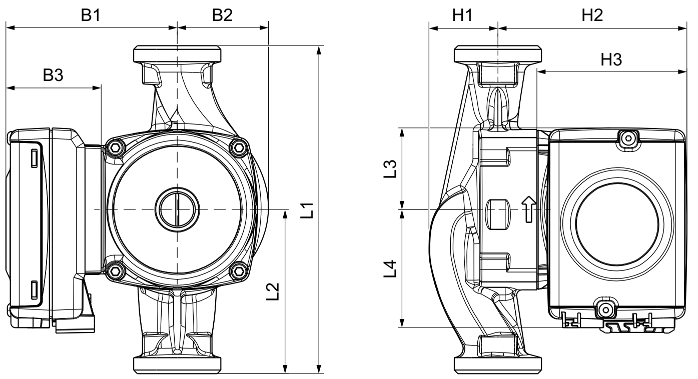
EEI ≤ 0.23 Part 3

$P_{L,\ avg}$ ≤ 65 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	3	0.04
Max.	140	1.1

Dimensions

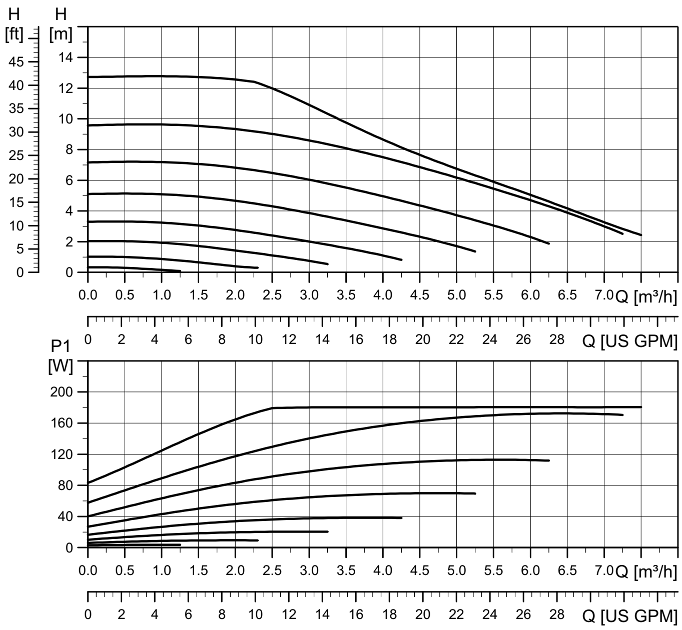


Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
SOLAR PML 15-145 130	130	65	45	65	94	50	52	38	104	82	G 1	2.3
SOLAR PML 25-145 130	130	65	45	65	94	50	52	38	104	82	G 1 1/2	2.4
SOLAR PML 25-145 (N) 180	180	90	45	65	94	50	52	38	104	82	G 1 1/2	2.5
SOLAR PML 32-145 180	180	90	45	65	94	50	52	38	104	82	G 2	2.7

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

UPMXL 15-125 130, 25-125 130, 25-125 180 (N), 32-125 180 (GFJOB)



High Efficiency

EEI ≤ 0.23 Part 3

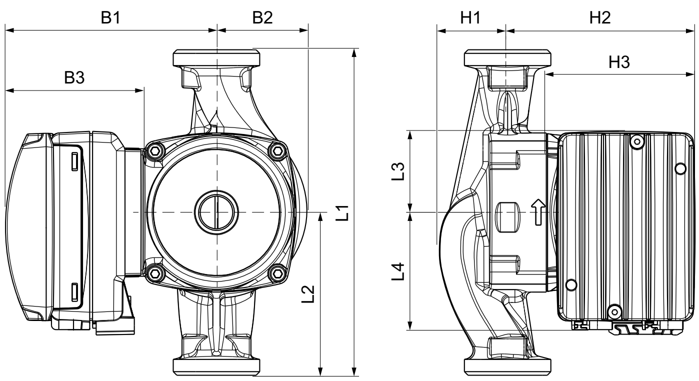
$P_{L, avg}$ ≤ 77 W

TM06 8328 0817

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	3	0.06
Max.	180	1.42

Dimensions



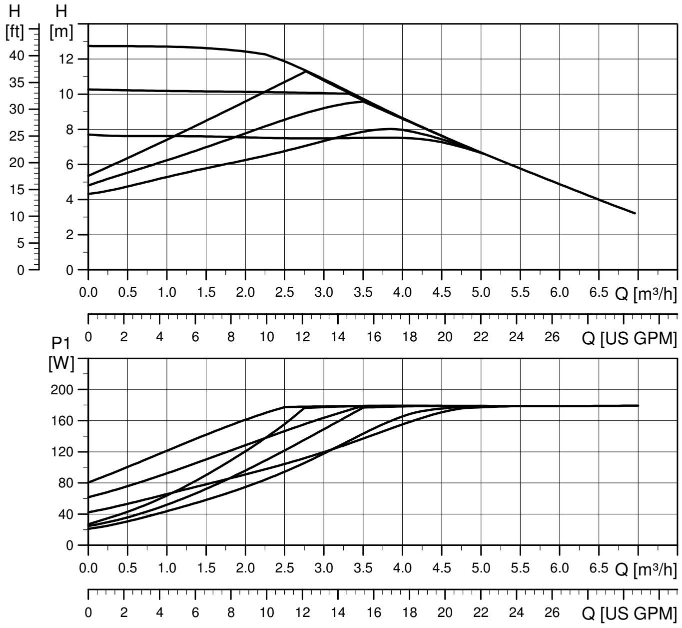
TM07 2014 2518

Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPMXL 15-125 130	130	65	45	65	117	50	75	38	104	82	G 1	2.3
UPMXL 25-125 130	130	65	45	65	117	50	75	38	104	82	G 1 1/2	2.4
UPMXL 25-125 (N) 180	180	90	45	65	117	50	75	38	104	82	G 1 1/2	2.5
UPMXL 32-125 180	180	90	45	65	117	50	75	38	104	82	G 2	2.7

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

UPMXL 15-125 130, 25-125 130, 25-125 180 (N), 32-125 180 AUTO (GFJOC)



High Efficiency

Setting	Max. H_{nom}
CP1	7.5 m
CP2	10 m
CC3	12.5 m
PP1	8 m
PP2	9.5 m
PP3	11 m

Setting	Max. $P1_{nom}$
All curves	180 W

EEI ≤ 0.23 Part 2

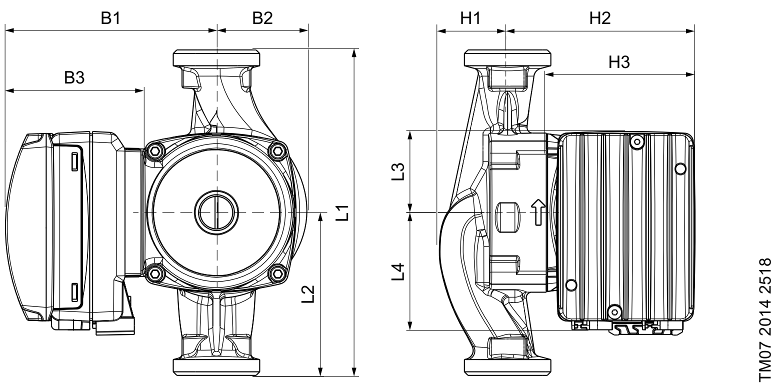
$P_{L,\ avg}$ ≤ 77 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	20	0.2
Max.	180	1.4

Settings		
PP	CP	CC
3/AA	2/AA	MAX

Dimensions

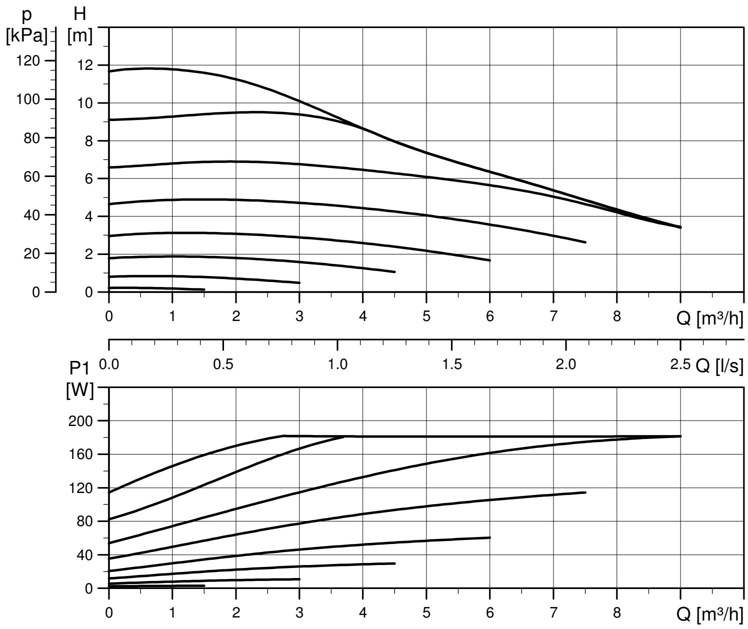


Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPMXL 15-125 130 AUTO	130	65	45	65	117	50	75	38	104	82	G 1	2.5
UPMXL 25-125 130 AUTO	130	65	45	65	117	50	75	38	104	82	G 1 1/2	2.6
UPMXL 25-125 (N) 180 AUTO	180	90	45	65	117	50	75	38	104	82	G 1 1/2	2.7
UPMXL 32-125 180 AUTO	180	90	45	65	117	50	75	38	104	82	G 2	2.9

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

UPMXXL 25-120 180, 32-120 180 (GFJOB)



High Efficiency

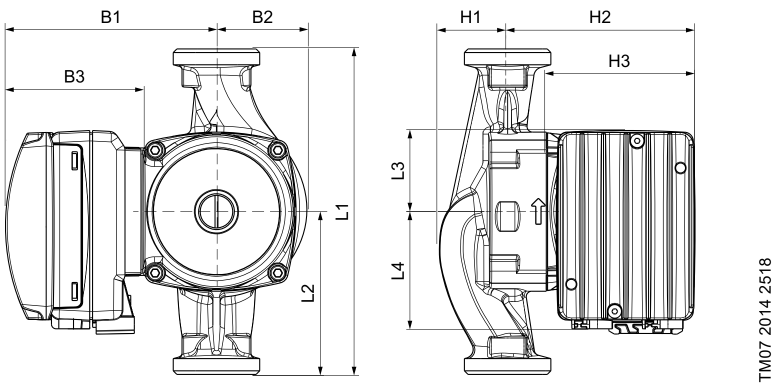
EEI ≤ 0.23 Part 2

$P_{L, avg}$ ≤ 94 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	3	0.04
Max.	180	1.42

Dimensions

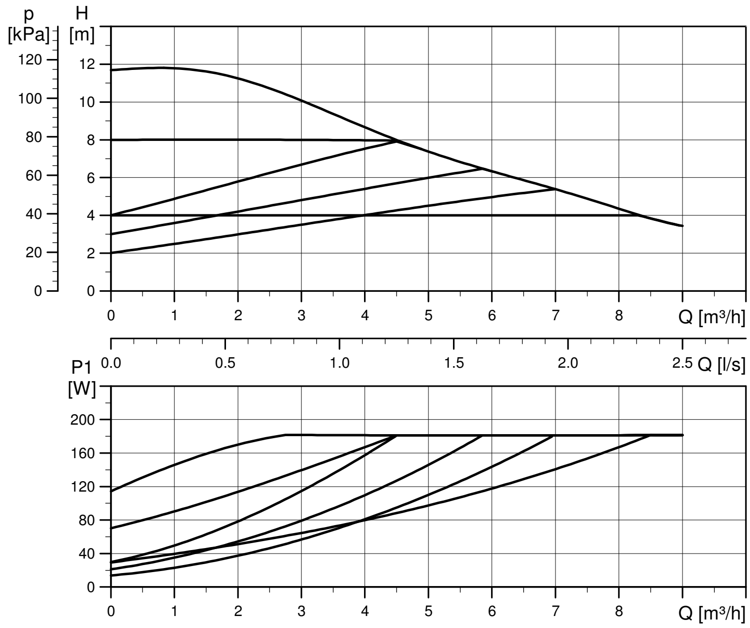


Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPMXXL 25-120 180	180	90	45	65	117	50	75	55	104	82	G 1 1/2	3.2
UPMXXL 32-120 180	180	90	45	65	117	50	75	55	104	82	G 2	3.4

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

UPMXXL 25-120 180, 32-120 180 AUTO (GFJOC)



High Efficiency

Setting	Max. H_{nom}
CP1	4 m
CP2	8 m
CC3	12 m
PP1	5 m
PP2	6.5 m
PP3	8 m

Setting	Max. $P1_{nom}$
All curves	180 W

EEI ≤ 0.23 Part 2

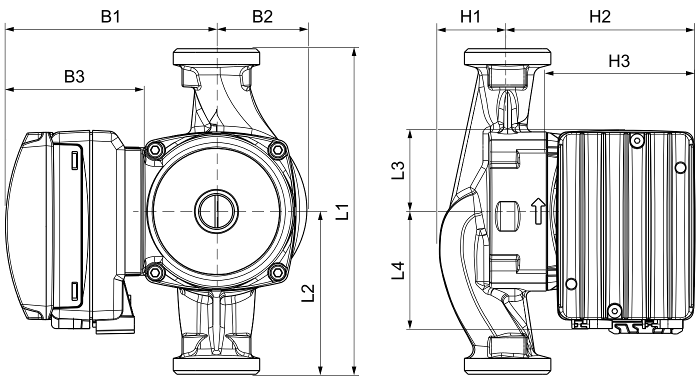
$P_{L, avg}$ ≤ 94 W

Electrical data, 1 x 230 V, 50/60 Hz

Speed	P_1 [W]	$I_{1/1}$ [A]
Min.	18	0.1
Max.	180	0.4

Settings		
PP	CP	CC
3/AA	2/AA	MAX

Dimensions



TM07 2014 2518

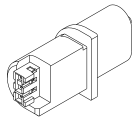
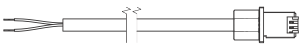
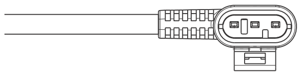
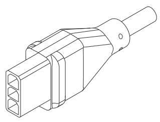
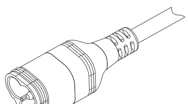
Pump type	Dimensions [mm]										Connections	Net weight [kg]
	L1	L2	L3	L4	B1	B2	B3	H1	H2	H3		
UPMXXL 25-120 180 AUTO	180	90	45	65	117	50	75	55	104	82	G 1 1/2	3.2
UPMXXL 32-120 180 AUTO	180	90	45	65	117	50	75	55	104	82	G 2	3.4

Technical data

System pressure:	Max. 1.0 MPa (10 bar)	Enclosure class:	IPX2D
Minimum inlet pressure:	0.01 MPa (0.10 bar) at 95 °C liquid temperature	Insulation class:	H
Liquid temperature:	-10 °C to +95 °C (TF 95)	Equipment class:	I
Motor protection:	Overload protection	Approval and marking:	VDE, CE

14. Accessories

Different accessories, such as cables, gaskets, insulation shells, quick guides or specific mounting parts are available for Medium UPM. They can be delivered together with the pump, or separately.

Product	Description	Product number	Pcs/ box	Product number (box)
 TM05 1106 2111	Blind plug for PWM signal plug-in	97823485	100	59200643
 TM07 1981 2518	2W PWM signal cable, 1000 mm, no end plug	96645398	100	59200576
	2W PWM signal cable, 2000 mm, no end plug	97940991	100	59200578
	1W PWM signal cable, 1000 mm, no end plug	98386202	200	59200575
	1W PWM signal cable, 2000 mm, no end plug	97698929	200	59200577
 TM07 1982 2518	Superseal counter cable, overmoulded, angled 90 °, 2000 mm	98616051	100	59200535
 TM05 1103 5119	Molex counter cable, 2000 mm, 3 x 0.75 mm^2	98937821	30	98100613
 TM05 1102 5119	Volex counter cable, 2000 mm, 3 x 0.75 mm^2	98937822	30	98100618

Insulation kits

Insulation kits for warm water applications are available on request. Insulation kits for warm water applications contain two insulation shells. The thickness of the insulation shells corresponds to the nominal diameter of the pump. Diffusion-tight insulation shells for cold water applications are not available.

Quick guides

Quick guides for Medium UPM variants are available on request.

Gaskets

Gasket material	Pump connection	External diameter (D) [mm]	Internal diameter (d) [mm]	Thickness (s) [mm]	Product number
EPDM	G 1	29.5	21	2	504023
EPDM	G 1 1/2	44	32	2	520046
K for drinking water	G 1 1/2	44	32	2	520226
EPDM	G 2	56	40	2	530243
K for drinking water	G 2	56	40	2	530086

15. Approvals and certificates

EC declaration of conformity

We, Grundfos, declare under our sole responsibility that the products marked with **GFJNC** (UPML variants with user interface), **GFJNB** (UPML variants without user interface), **GFJOC** (UPMXL variants with user interface) and **GFJOB** (UPMXL variants without user interface), to which this declaration relates, are in conformity with these Council directives on the approximation of the laws of the EC member states:

Low Voltage Directive (2014/35/EU)

Standards used:

- EN 60335-1:2012/AC:2014/A11:2014
- EN 60335-2-51:2003/A1:2008/A2:2012
- EN 62233:2008

EMC Directive (2014/30/EU)

Standards used:

- EN 55014-1:2006/A1:2009/A2:2011
- EN 55014-2:2015
- EN 61000-3-2:2014
- EN 61000-3-3:2013

RoHS Directives: 2011/65/EU and 2015/863/EU

- Standard: EN 50581:2012

Ecodesign Directive (2009/125/EC)

Commission Regulation (EC) No 641/2009

Commission Regulation (EC) No 622/2012

Standards used:

- EN 16297-1:2012
- EN 16297-2:2012
- EN 16297-3:2012

EEI ≤ 0.23 (see individual data sheet or name plate).

The benchmark for the most efficient circulators is EEI ≤ 0.20.

Warning

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.

Bjerringbro, 15th of August 2019

Steen Tøffner-Clausen
Senior Director, Products & Projects
HVAC OEM
GRUNDFOS Holding A/S
Poul Due Jensens Vej 7
DK-8850 Bjerringbro, Denmark

Person authorised to compile technical file and
empowered to sign the EC declaration of conformity.

VDE certificate

These pumps are certified by VDE certificate No. 40037291.

Product code: GFJNC, GFJNB, GFJOC, GFJOB

This approval forms the basis of the EC declaration of conformity and the CE marking by the manufacturer or his agent and proves the conformity with the essential safety requirements of the EC Low Voltage Directive (2014/35/EU).

Grundfos Product Chemical Compliance declaration concerning the non-use of certain chemical substances

GRUNDFOS Holding A/S and its subsidiaries are aware of their responsibilities and are committed not to use hazardous substances in their products.

Grundfos products manufactured and placed on the market within the European Union (EU) and the European Economic Area (EEA) comply with the following EU chemical legislation:

- REACH Regulation (EC 1907/2006)
  - Candidate List of SVHC
  - REACH Annex XIV - Authorization List
  - REACH Annex XVII - Restriction List
- RoHS directives (RoHS2: 2011/65/EU and RoHS3: 2015/863/EU)
- Battery directives (2006/66/EC and 493/2012)
- Packaging and Packaging Waste directives (94/62/EC and 2004/12/EC)
- Ozone Depleting Substances directives (EC 1005/2009 and 2037/2000)
- Persistent Organic Pollutants directive (EC 850/2004)
- IMO (International Maritime Organization/Hong Kong Convention)

Today, Grundfos products are not fully covered by the RoHS directives.

The RoHS directives on the restriction of the use of certain hazardous substances in electrical and electronic equipment (EEE) will in 2019 apply to all EEE except for the ones explicitly excluded.

Grundfos strives on a voluntary basis to be RoHS-compliant regarding the non-use of certain hazardous substances in Grundfos products.

All suppliers of raw materials and components to Grundfos Holding A/S and its subsidiaries are under contractual obligation to comply with the European chemical legislation.

To ensure that Grundfos is compliant, we have taken the following initiatives:

- Grundfos has launched the Grundfos Focus List in order to give our suppliers, contractors and other relevant stakeholders worldwide a tool to help comply with chemical legislation. The Grundfos Focus List, which bans or restricts the use of certain chemical substances in Grundfos products, Grundfos production processes and at Grundfos facilities (www.grundfos.com/focus-list).
- Grundfos has implemented an IT-platform to support the work of securing compliance with the Focus List and a better supplier collaboration to secure a high data quality and reliability.
- Grundfos continuously performs audits of their suppliers to ensure compliance with their contractual obligation to comply with the chemical legislation.
- Grundfos does not accept banned or restricted hazardous substances in their products. It is a standard task in product development projects to ensure that banned or restricted hazardous substances are not used.

REACH Regulation (EC 1907/2006)

Information regarding REACH Candidate List of substances of very high concern for Authorisation

At Grundfos, we run our business in a responsible and ever more sustainable way. We are committed to creating products and solutions that help our customers and the surrounding world conserve natural resources and reduce climate impacts.

To give our suppliers, contractors and other relevant stakeholders worldwide a tool to help comply with this, we have devised the Grundfos Focus List, which bans or restricts the use of certain chemical substances in Grundfos products, Grundfos production processes and at Grundfos facilities.

The process set-out in Grundfos is to phase out the use of the substances of very high concern (SVHC) from the REACH Candidate List (www.echa.europa.eu/web/guest/candidate-list-table).

With the recent update of the REACH Candidate List of substances of very high concern for Authorisation as of 27.06.2018 where Lead; CAS No. 7439-92-1 has been added, we are making an exemption from our internal procedures, since a timely phase out is not possible.

Lead is only used in applications that are declared as exemptions in the EU RoHS Directive and the purpose of the RoHS Directive is to eliminate risk of harm:

- Copper alloy containing up to 4 % lead by weight (used in fittings, unions etc.)
- Lead as an alloying element in aluminum containing up to 0.4 % by weight (used in very few parts)
- Lead as an alloying element in steel for machining purposes and in galvanised steel containing up to 0.35 % lead by weight (used in very few parts)
- Lead in high melting temperature type solders (used electronic components)

At Grundfos we are working closely together with our suppliers, and all our suppliers are contractually obliged to comply with the Grundfos Focus List, which is our Restricted Substance List: www.grundfos.com/focus-list.

Customer information regarding REACH, RoHS and other relevant chemical legislation and Grundfos' Product Chemical Compliance initiatives

GRUNDFOS Holding A/S and its subsidiaries are aware of their responsibilities and are committed not to use hazardous substances in their products.

We have introduced our Restricted Substance List - the Grundfos Focus List - as the backbone in our product chemical compliance work.

All our suppliers are contractually obliged to comply with the Focus List - no matter the placing of the goods.

To improve the compliance work and to improve the quality process linked to this work, we have also implemented a digital platform to not only secure a far better data quality in our work, but also secure a faster response to our customers in this regard.

The digital platform supports our ISO Management System and secures a robust process with a solid quality performance. All our suppliers are also contractually obliged to sign up to the system and provide compliance data within the system.

We comply with the standard EN 50581:2012 and technically document that we comply with the RoHS directives. This standard is also used in regards of all other legislations listed in the Focus List.

Grundfos continuously performs audits of their suppliers to ensure compliance with their contractual obligation to comply with the chemical legislation.

WEEE Directive 2012/19/EU

Statement regarding compliance of HVAC OEM pumps with WEEE Directive 2012/19/EU

GRUNDFOS Holding A/S and its subsidiaries does not mark HVAC OEM pumps with the symbol for marking of electrical and electronic equipment (EEE).

Grundfos HVAC OEM pumps are delivered to OEM customers exclusively as components for integration into heating and cooling units (e.g. boilers) to be used to manufacture the final equipment.

As Grundfos HVAC OEM pumps are designed and placed on the market as a component to be integrated into other EEE, the manufacturer of the full/combined product will be responsible for marking, any weight declaring, and takeback obligations for the full combined EEE under directive 2012/19/EU.

Any WEEE obligations will depend on the OEM customer's use of the component. It is the responsibility of the OEM customer to assess whether the use of the component is within the scope of directive 2012/19/EU and if this equipment may or may not be affected by WEEE regulation and it is the responsibility of the OEM to report these volumes if affected.

16. Abbreviations

Abbreviation	Explanation
°dH	Degree of German water hardness, replaced by the SI unit mmol/l. Conversion: 1 °dh = 0.1783 mmol/l
AC	Alternating current
ACS	Material safety approval required for materials and products in contact with drinking water in France (Attestation de Conformité Sanitaire)
AUTO	Internally self-controlled pump mode
AUTOADAPT	The control curve is automatically adapted to the actual requirements of the respective application.
CSA	Canadian Standards Association
CC	Constant Curve, control mode limited by speed and power
CE	CE marking is a certification mark that indicates conformity with health, safety, and environmental protection standards for products sold within the European Economic Area (EEA).
CED	Cataphoretic coating (electrophoretically deposited paint, EDP); paintwork with hight adhesive strength for long-lasting corrosion protection
CP	Constant Pressure, control mode for constant differential pressure
DC	Direct current
DIN	German institute for standardisation (Deutsches Institut für Normung e.v.)
DVGW	German association for gas and water (Deutscher Verein des Gas- und Wasserfaches)
ECM technology	Electronically commutated motor with wet rotor encapsulation and glandless drive for high-efficiency pumps
EEI	Energy Efficiency Index for pumps, defined by EN 16297
EN	European standard adopted by CEN, CENELEC or ETSI
ErP	Directive 2009/125/EC (formerly EuP, Ecodesign Directive 2005/32/EC) establishing a framework for the setting of environmentally-responsible requirements for energy-driven products
ETL	Electrical Testing Laboratory by Intertek Group plc, certification institute for compliance with North American safety standards
H	Delivery head of pumps, related to the differential pressure
IEC	International Electrotechnical Commission for all electrical, electronic and related technologies
IP	International Protection marking (IEC) or Ingress Protection marking, classifies and rates the degree of protection against intrusion, dust, accidental contact and water provided by mechanical casings and electrical enclosures
KIWA	European institution for testing, inspection and certification, setting drinking water rules for the Netherlands
KTW	German quality standard for rubber and plastic components in contact with drinking water (Kunststoffe in Kontakt mit Trinkwasser)
LIN	Serial communications (BUS) protocol (Local Interconnect Network reg. ISO 17987-3) (VDMA 24226 defines protocol for pumps)
N	Stainless-steel housing (NIRO)
NTC	Thermistor with negative temperature coefficient, used as inrush current limiter
P L, avg	Weighted average power input of a pump on a reference profile reg. EN 16297
P1	Power consumption (power supply input)
PN	Pressure class in bar (PN10 = suitable up to 10 bar)
PP	Proportional Pressure, control mode for variable differential pressure
PWM	Digital low-voltage control signal with pulse-width modulation for external control (VDMA 24244 defines control signals for wet-runner circulating pumps)
Q	Volume flow in hydronic systems
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals (EC 1907/2006)
RoHS	Restriction of Hazardous Substances Directive 2002/95/EC (RoHS1) (European directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment)
TF	Temperature classification of circulation pumps reg. EN 60335-2-51
UL	Certification institute for compliance to North American safety standards (Underwriters Laboratories)
UBA	German Environment Agency (Umweltbundesamt), defines mandatory evaluation criteria for materials and substances that come into contact with drinking water
VBAT	Supply voltage of BUS signal (Voltage of Battery)
VDE	German association of electrotechnology, electronics and information technology (Verband der Elektrotechnik, Elektronik und Informationstechnik)
VDI	Association of German engineers (Verein Deutscher Ingenieure)
VDMA	Mechanical engineering industry association in Germany (Verband Deutscher Maschinen- und Anlagenbau)
VOB	German regulation on conditions for the award and conclusion of works contracts (Vergabe- und Vertragsordnung für Bauleistungen)
WEEE	European Community Directive 2012/19/EU on Waste Electrical and Electronic Equipment
WRAS	Water Regulation Advisory Scheme for drinking water treatment devices in the UK and Northern Ireland

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