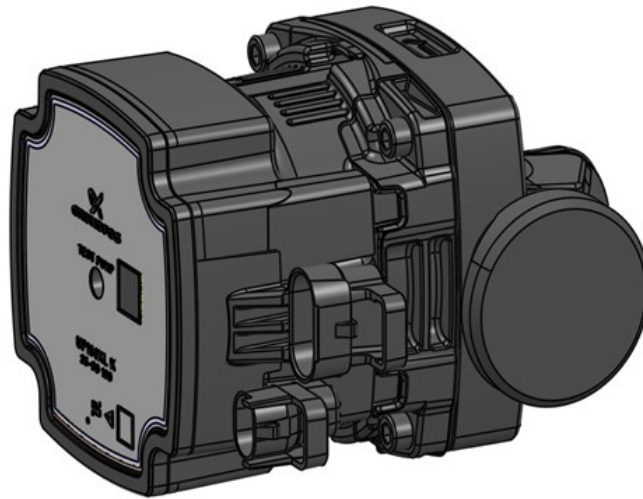


GRUNDFOS UPM4



Type: UPM4XL K 25-90 130

PN: 92769937

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Application

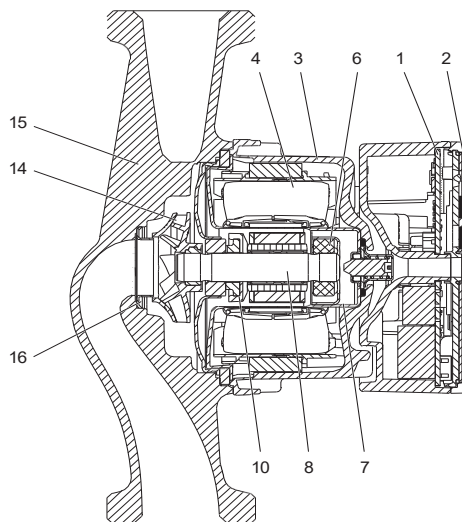
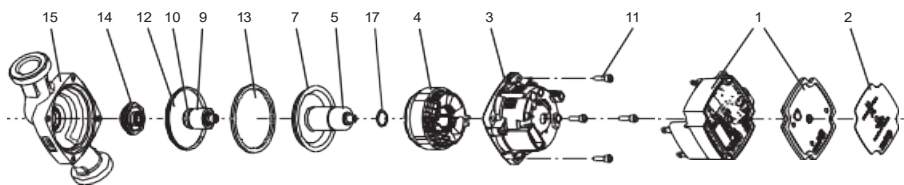
The UPM4 series pumps are high-efficiency canned rotor pumps equipped with permanent magnet rotors and frequency converters. These are primarily employed in heating or cooling units such as heat pumps and wall-hung boilers, where they facilitate the heating and cooling cycles through digital signal control.

Type Key

Example: UPM4XL 25-90 130

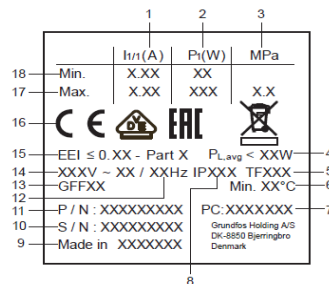
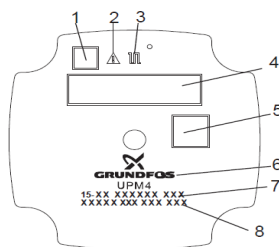
Code	Explanation	Designation
UPM4/L/XL	Standard	Pump Type
K	Condensing	For condensing environments
15 / 25	R 1" / G 1 1/2"	Nominal diameter
75/90	7.0 / 9.0 m	Maximum head
130/180	Cast iron CED, 130/180mm	Pump housing

Material specification



Pos.	Component	Material	EN/DIN
1	Control box	Composite PC-GF10 FR	
	Control electronics	Composite PC-GF10 FR	
2	Front foil	LEXAN 8A13F	
3	Stator housing	Aluminium, silumin	
4	Stator	Copper wire	
	Stator lamination	Laminated iron	
5	Push deblocking device	Stainless steel	1.4404
6	Radial bearing	Ceramics	
7	Rotor can	Stainless steel	1.4401
8	Shaft	Ceramics	
9	Rotor	NdFeB	
10	Thrust bearing	Carbon	
	Thrust bearing retainer	EPDM	
11	Screws	Stainless steel / Steel	
12	Bearing plate	Stainless steel	
13	Gasket	EPDM	
14	Impeller	Composite/PES 30 % GF	
15	Pump housing	Cast iron	EN-GJL-150
16	Neck ring	Stainless steel	
17	O-ring	EPDM	

Nameplate Specification



Pos.	Description
1	Quick Guide QR Code
2	Alarm Status On: Blocked / Electrical Error
3	PWM signal off: No signal Blink: PWM communication
5	Data Matrix
7	Type

Pos.	Description	Pos.	Description
1	Max/Min rated operating current	15	EEL
2	Minimum/Maximum input power	16	CE Marking
3	Maximum pressure	17	Maximum
4	Average input power PL_{avg} (Ecodesign regulation)	18	Minimum
5	Temperature class		
6	Minimum liquid temperature (only K Version)		
7	Production date (YYWW) Customer ID		
8	IP Class		
9	Place of origin		
11	Product part number PN		
12	Power supply frequency		
13	VDE code		
14	Voltage		

Pumped Liquid

Depending on the pump type, the circulating pump is mainly used for the following liquids:

Clear water, in heating systems, the water quality should meet the recognized water quality requirements for heating systems, such as German standard: VDI2035-1.

Softened water: In domestic hot water systems, circulating pumps are suitable for clear water with a hardness of less than about 3 mmol/l CaCO₃ (16.8°Dh).

Antifreeze with ethylene glycol (≤50%): The viscosity of ethylene glycol is greater than water. As the concentration of ethylene glycol increases, the pump's head will decrease accordingly, depending on the type and concentration of ethylene glycol and the temperature of the medium.

Water quality used for testing the complete system and pump in the factory must be controlled to avoid the formation of scale and bacterial biofilms caused by the evaporation of residual water during long-term storage after testing.

Flammable Refrigerant Support

The circulation pumps in this VDE-Mark license has been tested and validated for use in heatpumps according to the conditions in IEC 60335-2-40:2018, cl. §22.116 and §22.117. The maximum surface temperature has been tested according to IEC 60335-2-40:2018, cl. §22.117 and meets the requirements for heatpumps using propane or other A3 refrigerants with similar ignition levels according to IEC 60335-2-40:2018 Annex BB. The final evaluation must take place in the application where the product is used. During the tests according to clause 19.11, various exceedances of the max. surface temperature were found. The critical temperatures (see next table) must be evaluated in the final appliance.

Ambient Temperature & Liquid Temperature

Maximum ambient temperature: -20~55/70 °C

Liquid temperature range: -20 ~ 95 °C

Adapt from 90 W to 75W when ambient and liquid temp over limit

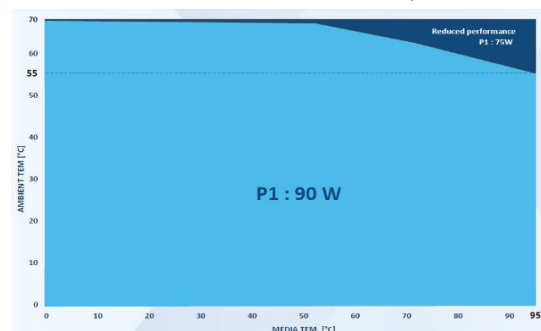
Relative humidity: ≤ 95% IPX4D: in condensing environment

Maximum system pressure: 10Bar

Inlet pressure

To prevent cavitation noise and damage to the pump bearings, the pump inlet must maintain a minimum inlet pressure:

Liquid temperature	75 °C	95 °C	110 °C
Pressure	0.005 MPa 0.05 bar	0.05 MPa 0.5 bar	0.108 MPa 1.08 bar



Electrical Parameters

Rated voltage	230V
Power supply frequency	50/60Hz
Maximum power consumption	90W
Minimum power consumption	2W
Maximum current	0.77A
Minimum current	0.04A
Product's protection level	IPX4D
Motor overload protection	Comes with electronic overload protection
Surge current scheme	Relay
Energy efficiency index(EEI)	< 0.20

External Control Mode and Signal

The PWM signal is a type of digital low-voltage pulse signal.

Control Signal

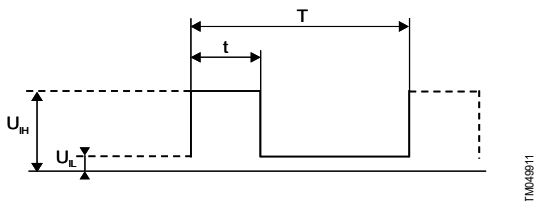
The PWM signal as the speed selection (speed command) signal is suitable for the frequency range of 100 to 4000 Hz. The PWM frequency as the feedback signal (flow signal, etc.) is fixed at 75 Hz.

Duty Cycle

$$d \% = 100 \times t/T$$

Example	Rating
T = 2 ms (500 Hz)	$U_{iH} = 4-24 \text{ V}$
t = 0.6 ms	$U_{iL} \leq 1 \text{ V}$
d % = $100 \times 0.6 / 2 = 30 \%$	$I_{iH} \leq 10 \text{ mA}$ (depending on U_{iH})

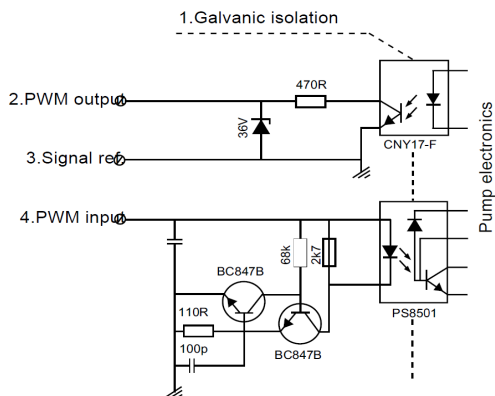
Example



PWM signal

Abb.	Description
T	Time period [sec.]
d	Duty Cycle [t/T]
U_{iH}	Input voltage at high level
U_{iL}	Input voltage at low level
I_{iH}	Input current at high level

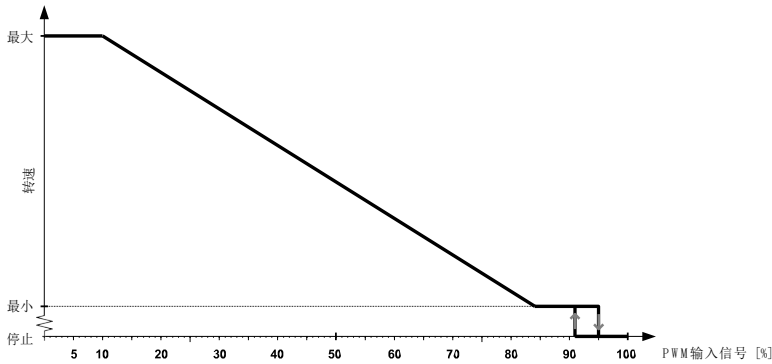
PWM Interface



#	Description
1	Isolation
2	PWM Flow Feedback
3	Signal Reference
4	PWM Input

PWM Signal Input Curve

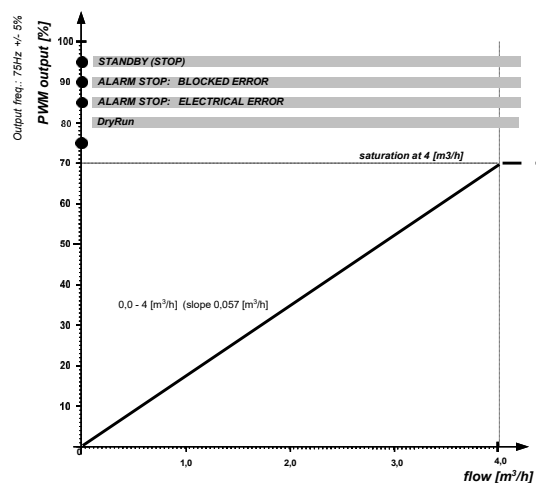
At high PWM signal duty cycles (low speeds), if the input signal fluctuates near the shift point, hysteresis will prevent the pump from starting and stopping. At low PWM signal percentages, the pump speed is higher for safety reasons. If the cable in a gas boiler system breaks, the pump will continue to operate at maximum speed to transfer heat from the main heat exchanger. This also applies to heat pumps, ensuring that the pump transfers heat in case of a cable break.



PWM Input Signal [Pump Status	
≤ 10	Maximum Speed: Maximum
> 10 / ≤ 84	Variable Speed: Minimum to Maximum
> 84 / ≤ 91	Minimum Speed: Minimum
> 91 / ≤ 95	Hysteresis Zone: On/Off
> 95 ≤ 100	Standby Mode: Pump Stops

PWM Signal Feedback

PWM Output [%]	QT[s]	Information	DT[s]	Priority
95	0	Standby (when PWM input is a standby signal)	0	1
90	30	Warning! The pump is blocked and stops. When the fault disappears, it resumes operation.	12	2
85	5-30	Warning! Input voltage is below ~150V, the pump stops due to electrical error. It restarts when the voltage recovers to ~160V.	1-12	3
80	20	Warning, pump is dry running, pump continues operation	1	5
0-70		0,0 - 4 [m ³ /h] (ratio 0,057 [m ³ /h] / % PWM)		6



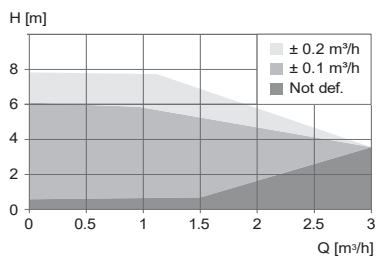
Output Frequency: 75 Hz ± 5 %

QT: Establishment Time, DT: Revocation Time

Control Signal Electrical Data

Maximum Rated Values	Symbol	Range
Input Photocoupler for PWM Frequency	f	100-4000 Hz
Rated Input - High Level	UiH	4-24 V
Rated Input - Low Level	UiL	< 1 V
High Level Input Current	IiH	< 10 mA
Input Duty Cycle	PWM	0-100 %
Output PWM Frequency, Collector Open Circuit	f	75 Hz \pm 5 %
Output Signal Accuracy		\pm 2 % (PWMSignal)
Output Duty Cycle	PWM	0-100 %
Breakdown Voltage on Output Transistor Collector	Uc	< 70 V
Collector Current on Output Transistor	Ic	< 50 mA
Maximum Power Dissipation on Output Resistor	PR	60 mW
Working Voltage of Zener Diode	Uz	36 V
Maximum Power Dissipation of Zener Diode	Pz	300 mW

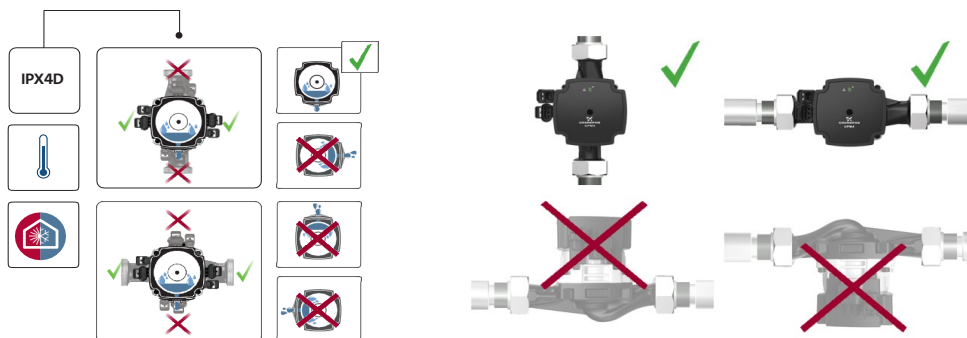
Flow Estimation Accuracy



Flow estimation accuracy is influenced by various factors such as the type of liquid, temperature, and operating point of the pump. The diagram above illustrates the accuracy of pump flow feedback at various typical operating points (water temperature of 40 °C).

Mechanical Installation

The arrow on the pump housing indicates the direction of liquid flow through the pump. The pump can be installed so that the inlets and outlets are oriented upwards, downwards, or horizontally. When installing the pump, it is essential to ensure that the angle of the horizontal motor shaft is within $\pm 5^\circ$. The way the pump is installed in the system should prevent large amounts of air from flowing over the circulation pump when it's not operating or a large amount of gas from accumulating in the pump housing, affecting pump operation. The UPM4 has a condensate drain hole. When the pump operates in a condensing environment, it must be installed with the drain hole facing downward to ensure the proper

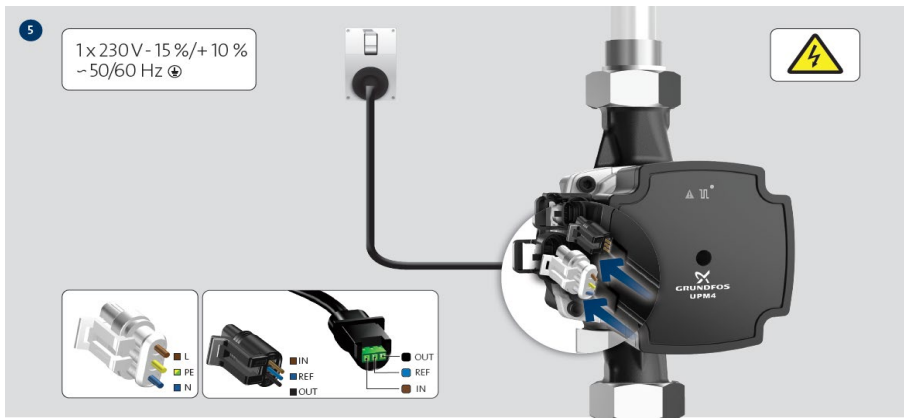


Note: During operation, the pump should always be protected from water dripping from above

Insulation

When insulating the pump, the front panel of the control box should not be covered, allowing it to be cooled by the surrounding air. The ambient temperature must not exceed 70 °C (measured not more than 5 cm in front of the lower edge of the nameplate underneath it). Ensure that the condensate drain hole is unobstructed.

Electrical Installation



The pump does not require additional electrical protection.
Power supply voltage: 1 x 230 V + 10 % / - 15 %, 50/60 Hz.

Leakage Current

When the pump is running, the power filter will generate a leakage current to the ground wire.
Leakage current: < 3.5 mA.

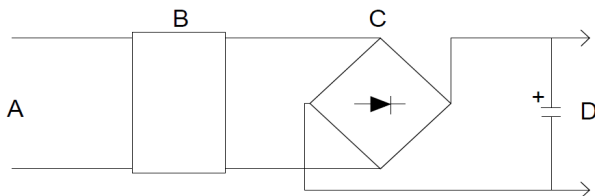
High Voltage Test

All Grundfos pumps are tested according to EN60335-1 Annex A with a high voltage test of 1000 VAC for 1 second. Therefore, additional high voltage testing should be avoided.

Surge Current

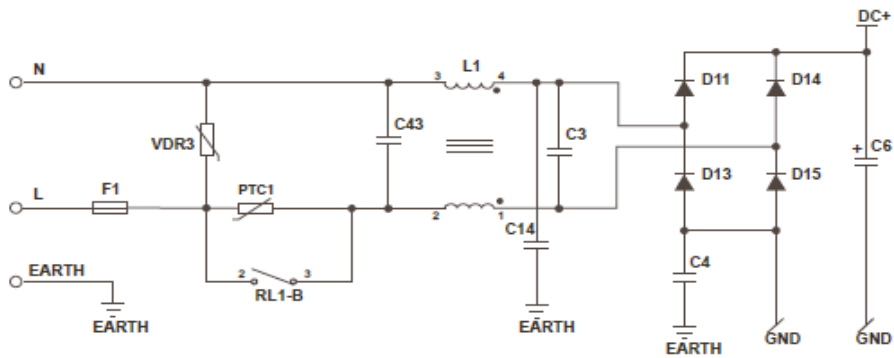
The surge current is the charging current of electronic equipment from the power source to the electrolytic capacitor. The maximum current amplitude depends on the power source and the overall wiring from the distribution transformer to the pump. The pump is internally controlled by a DC voltage mini inverter.

Therefore, the 230 VAC voltage is rectified to DC voltage before entering the inverter. This work is completed by a rectifier and a capacitor. As shown in the figure:

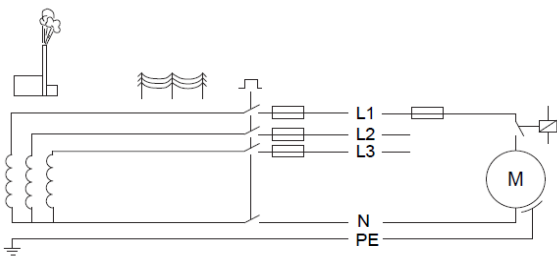


Pos.	Description
A	Description
B	EMC filter
C	Bridge stack
D	DC capacitor

The load of the electronic commutated motor (ECM) is capacitive, and when the power supply is turned on, the capacitor will be short-circuited (the capacitor is "empty", meaning it is not charged). Therefore, when the pump is powered on, a PTC resistor is connected to the power supply circuit to limit the surge current to about 4A, then the relay on the pump controller will bypass this PTC resistor.



Surge Current is measured according to IEC 61000-3-3:1994 + A1 + A2 Appendix B on a flicker network.



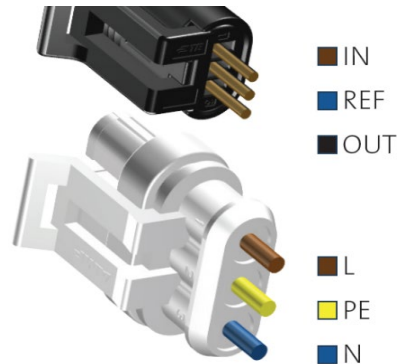
If the power supply to the pump is switched on and off via an external relay, it must be ensured that the contact material of the relay is suitable for higher surge currents.

External application solution recommendation:

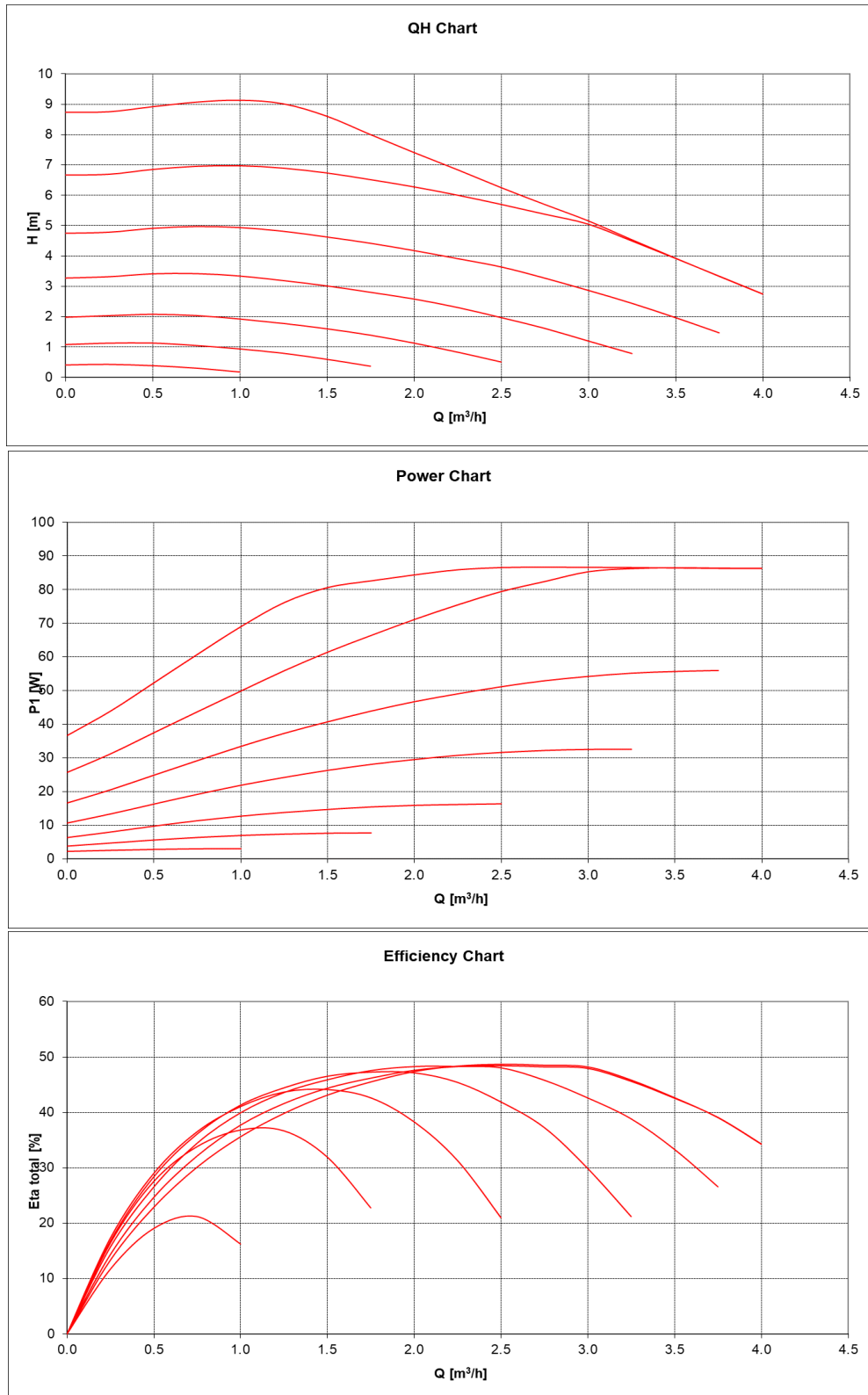
Use a special surge relay with silver tin oxide (AgSnO) contacts.
It is recommended to start (PWM=0%) and stop the pump (PWM=100%) via PWM signal.

Control signal wiring:

Contact	PWM	Cable
1	PWM Input	Brown
2	Signal reference ground	Blue
3	PWM Feedback	Black

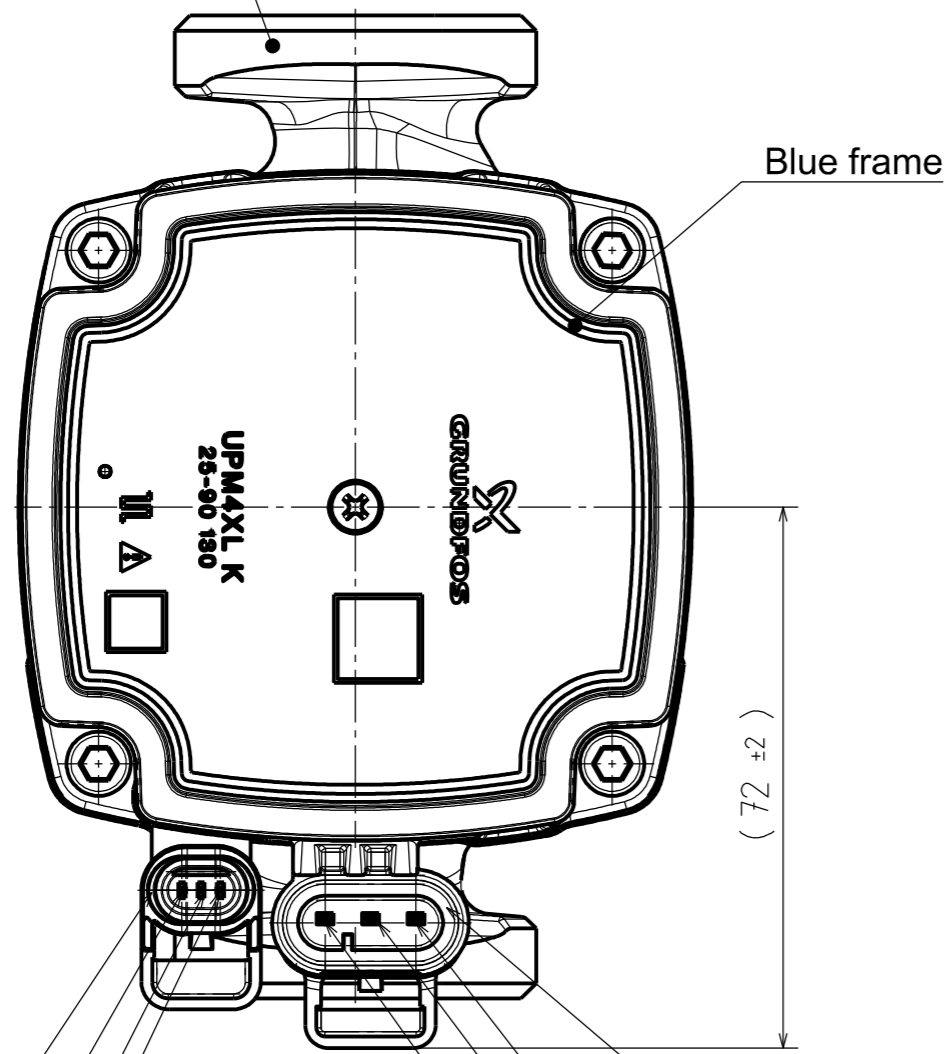


QH Performance



The performance of a PWM controlled pump is measured on 8 PWM values, namely: 5% (max), 20%, 31%, 41%, 52%, 62%, 73%, and 88% (min), under heating conditions. This is done in accordance with ISO 9906, under system conditions of 2.0 bar, and a water temperature of 20°C.

2x Pipe thread ISO 228- G 1 1/2 B



Blue frame

(72 ±2)

Mini Superseal Connector

Input

Signal reference

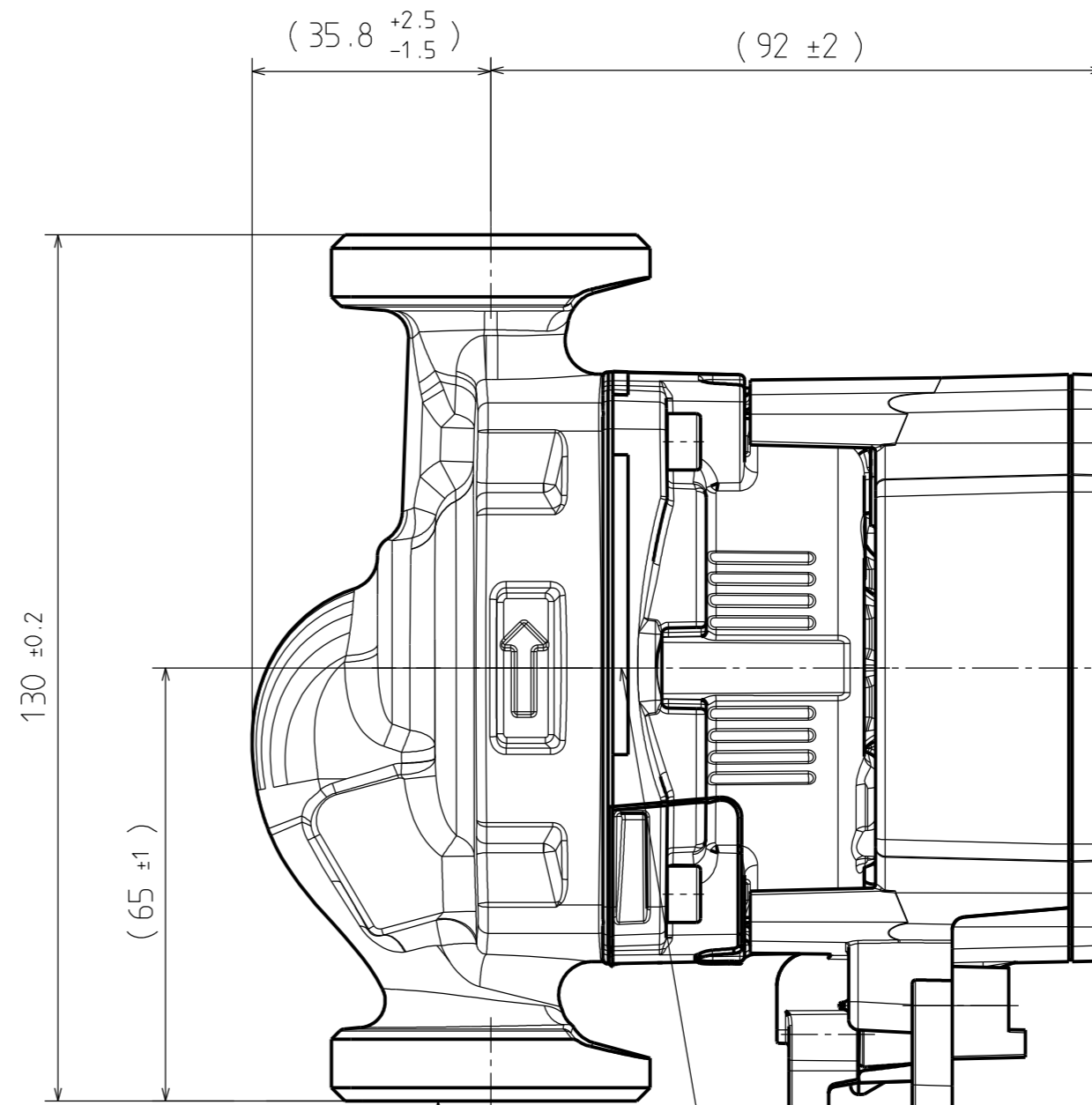
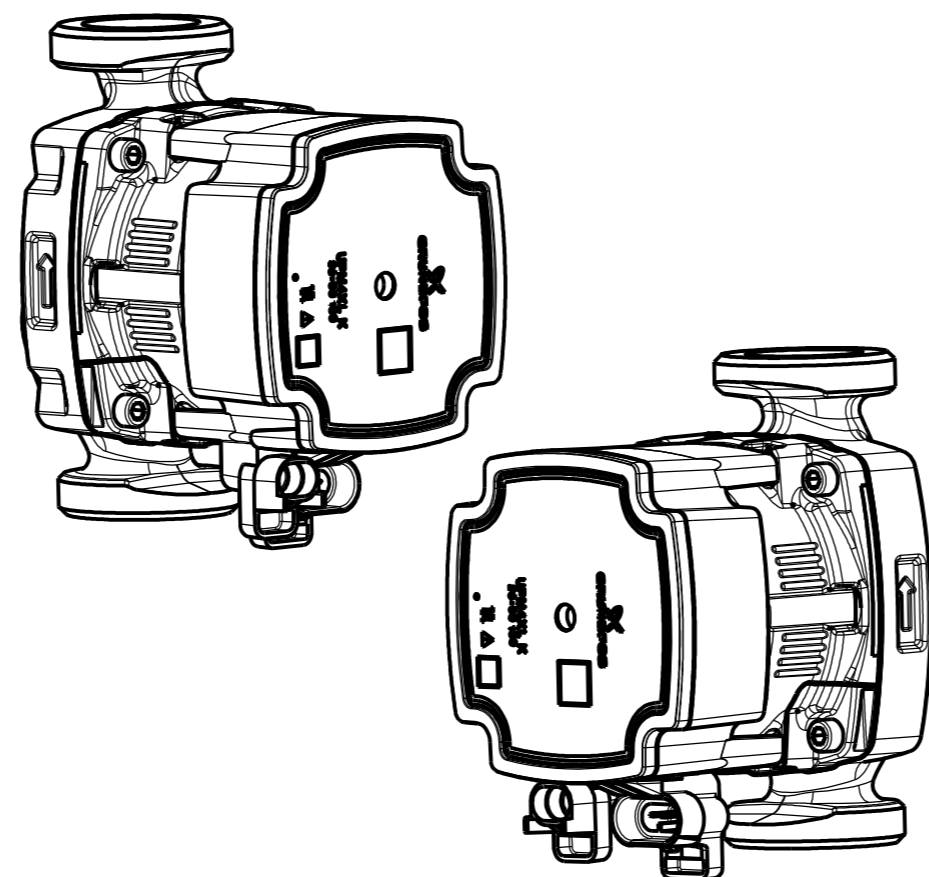
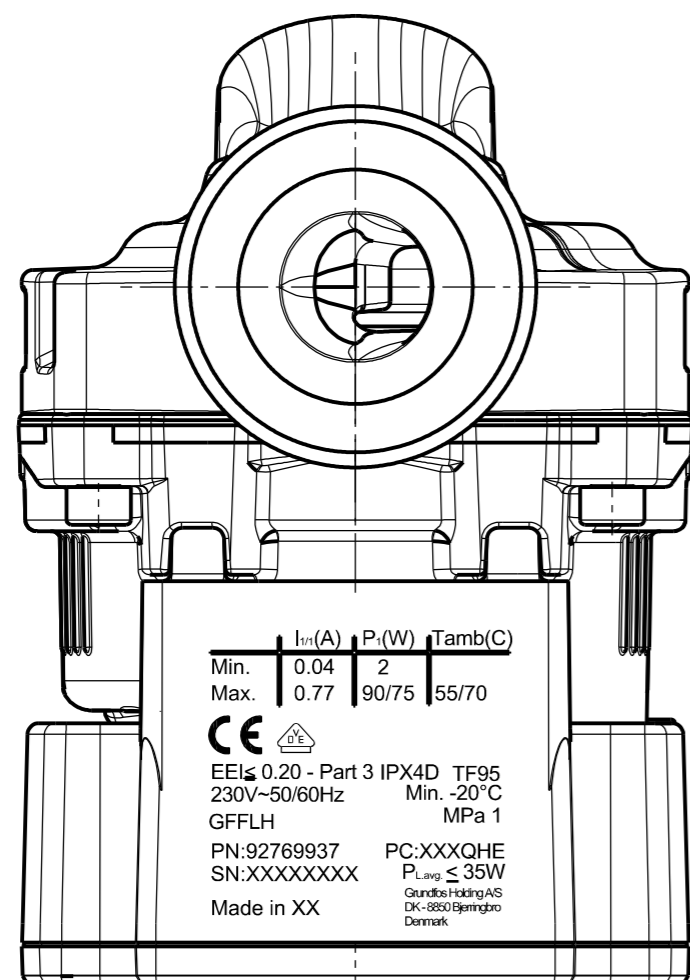
Output

N

PE

L

AMP Superseal 1.5 series Connector



Drain hole

Turned
-2.5/Rz max .36

0.1
2x Sealing Surface

Stamping	:	Production code:	PC:XXXXQHE
		XX	: Year code
		XX	: Week code
		QHE	: Customer code
Made in		xx	: Grundfos production site
Cable	:	Power Cable cpl. Superseal UPM3 2000mm	Grundfos no. 98373382
	:	Signal cable mini superseal UPM3 2000mm	Grundfos no. 98347385

Basic Material No.		 www.GRUNDFOS.com As this is CONFIDENTIAL property of GRUNDFOS Holding A/S it must not be passed on to any person not authorized by GRUNDFOS or be copied or otherwise utilized by anybody without GRUNDFOS' expressed written permission.
Dimension of basic material:		
Type of basic material:		Scale: 1:1 Drawer: 68850 Date: 2022-04-06 Approver: 68850 Date: 2022-09-19 Master No.: Drawing No.: 92769937 Page: 1 of 1 Part Version: --C Doc. Revision: --C
1351390	2022-09-19 AYH	Drawing type: Assembly Drawing
1346752	2022-07-13 LHJ	Nominal net mass: kg
1345810	2022-06-28 AYH	Projection:
ECM No.	Date - Init	ISO FPS. All dimensions are in mm

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Description: UPM4XL K 25-90 130	

Approvals and Certificate

VDE number: 40052747

Code: GFFLH

EC Conformity Declaration

–EU declaration of conformity

We, Grundfos, declare under our sole responsibility that the products marked with GFFHC, GFFKD, GFFKF, GFFLH to which the declaration below relates, are in conformity with the Council Directives listed below on the approximation of the laws of the EU member states:

Low Voltage Directive (2014/35/EU)

Standards used:

EN 60335-1:2012+AC:2014+A11:2014+A13:2017+A1:2019+A14:2019+A2:2019+A15:2021

EN 60335-2-51:2003+A1:2008+A2:2012

EMC Directive (2014/30/EU)

Standards used:

EN 55014-1:2017+A11:2020

EN 55014-2:1997+A1:2001+A2:2008

EN 61000-3-2:2014

EN 61000-3-3:2013

RoHS Directive (2011/65/EU) and (2015/863/EU)

Standards used:

EN 63000:2018

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

Bjerringbro, 8. June 2022



Jannek Uldal-Christesen
Senior Director
GRUNDFOS Holding A/S
Poul Due Jensens Vej 7
DK-8850 Bjerringbro, Denmark

Manufacturer & person authorised to compile technical file and empowered to sign the EU declaration of conformity.