

GPA 25-10 IV HYDRONIC CIRCULATOR – ECM MOTOR WITH PWM CONTROL



Cast Iron Body, Inlet and Outlet are 1 ¼" Threaded, Inline Pump suitable for Closed Loop Hydronic Heating and Cooling Applications

Compatible with Hydro Solar Innovative Energy Air to Water Heat Pumps, HSS series all models and Nordic Liquid Source Heat Pumps



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Nomenclature

GPA xx – v y zz

LETTER	DESIGNATION
GPA	Circulation Pump Family
XX	Inlet and Outlet diameter in mm (millimeter)
VV	Maximum Pump Head in m (meter)
Y	Material of Pump Body: P (Plastic), N (Stainless Steel), B (Copper), Empty (Cast Iron)
ZZ	Product Sub-Family

Description

Hydro Solar GPA IV circulator pump is the ideal choice for almost any building project – old or new. With its unrivalled energy efficiency, all-encompassing range and built-in communication capabilities, GPA IV is ideal for engineers, contractors and homeowners looking to create high-performance heating and cooling systems. The pump is maintenance-free due to the canned-rotor type design. This also means that pump and motor form an integral unit without shaft seal and with only two gaskets for sealing. The bearings are lubricated by the pumped liquid. GPA IV features PWM external control. GPA IV is the superior choice for a wide range of heating and cooling applications, including:

1. Mixing loops
2. Radiant Heating
3. Radiant Cooling with Dew Point Temperature Reset
4. Ground-source heat pump systems
5. Air to Water Heat Pump.

GPA IV is a single-phase pump and characterized by having the controller integrated in the control box. The pump housing is available in both cast-iron and stainless-steel versions. The composite rotor can is carbon-fiber reinforced, the bearing plate and rotor cladding are made of stainless steel and the stator housing is made of aluminum. The power electronics are air-cooled. The pump speed is controlled by an integrated frequency converter.

Features:

1. Vast communication options, including PWM.
2. The most energy-efficient pump range within the industry.
3. Stainless-steel variant to accommodate domestic hot water applications.
4. Auto Adapt.
5. Proportional-pressure control.
6. Constant-pressure control.
7. Constant-flow control.
8. No external motor protection required.
9. Innovative clamp ring with only one screw enabling easy repositioning of the pump head.
10. Insulating shells supplied with single-head pumps for hydronic heating systems.
11. Large temperature range due to air-cooled electronics.

Parameters:

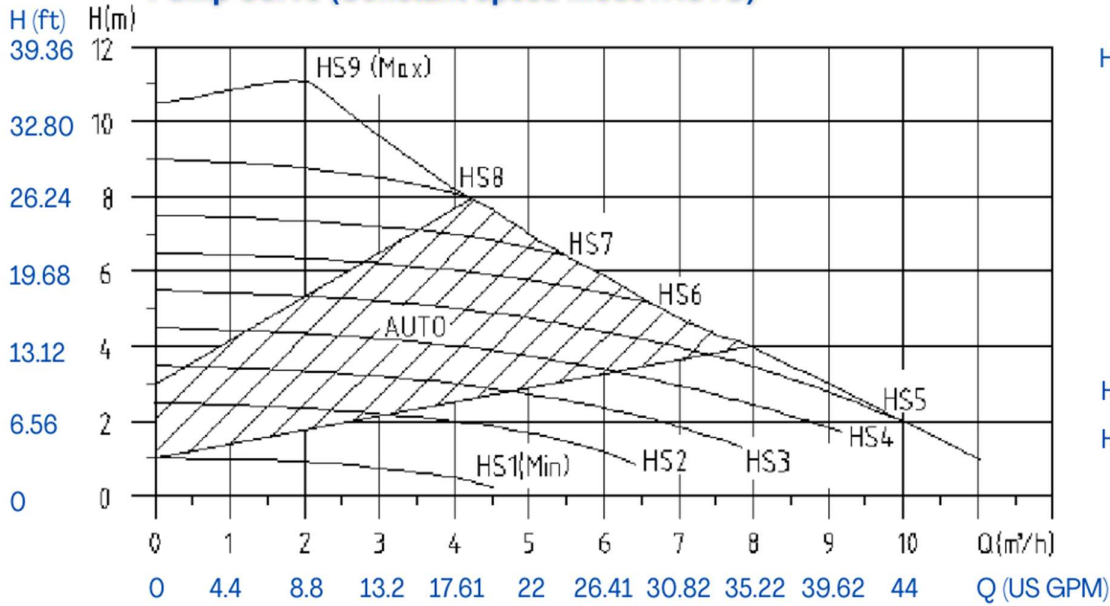
1. Model: GPA25-10 IV
2. Power: 10~185W
3. Max.flow: 7 m³/hr (30.82 US GPM)
4. Max head: 10 m (32.8 ft)
5. Current: 0.10~1.25A
6. Voltage/ Frequency: 230V AC 50HZ/60HZ
7. Pump housing: Cast Iron
8. Pumped liquid: Water or Water/Glycol Mixture
9. Insulation class: H
10. Degree of Protection: IP42



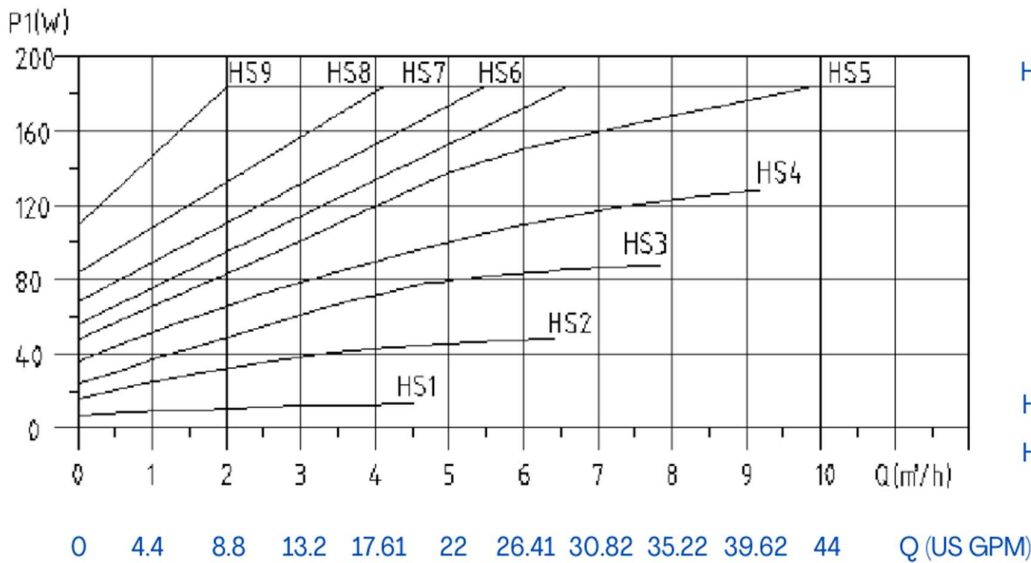
11. Liquid temperature range: -30 to 110°C (-22 to 230°F)
12. Energy (EEI): ≤0.23-Part2
13. Max System Pressure: 1.0MPa (145 PSI)
14. Temperature Grade: TF110

Pump Curves

Pump Curve (Constant speed mode+AUTO)

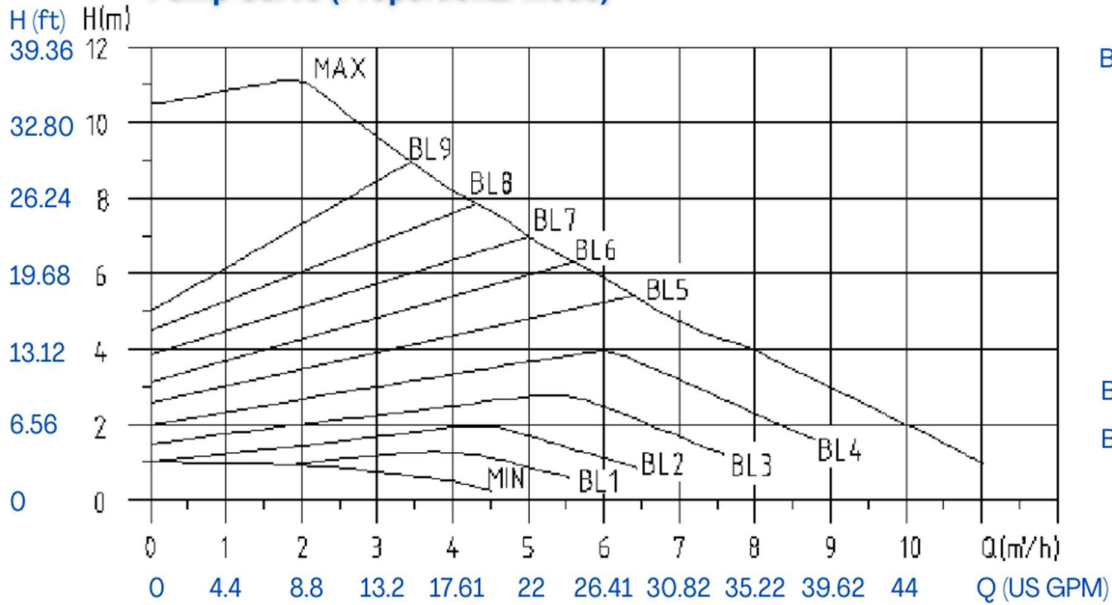


Pump Curve (Constant speed mode+AUTO)

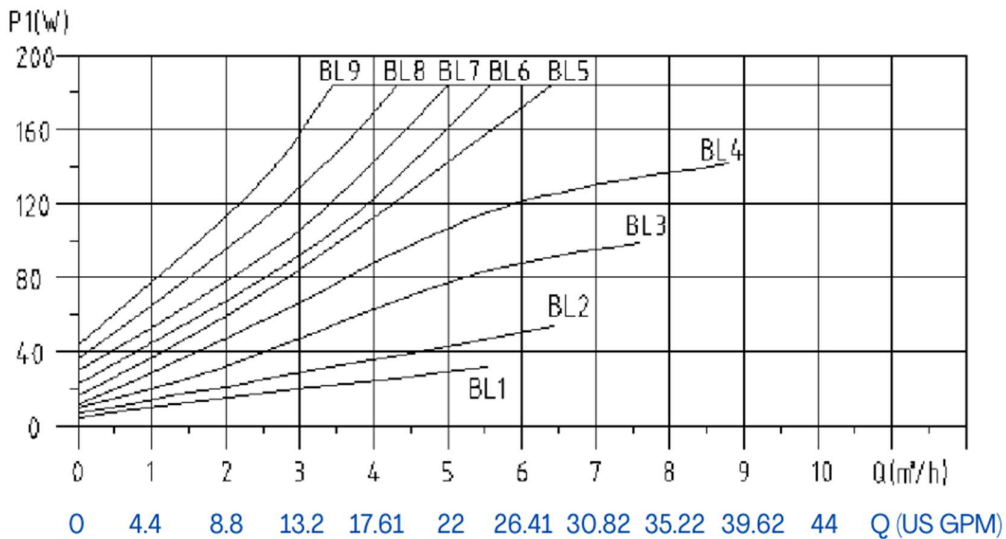




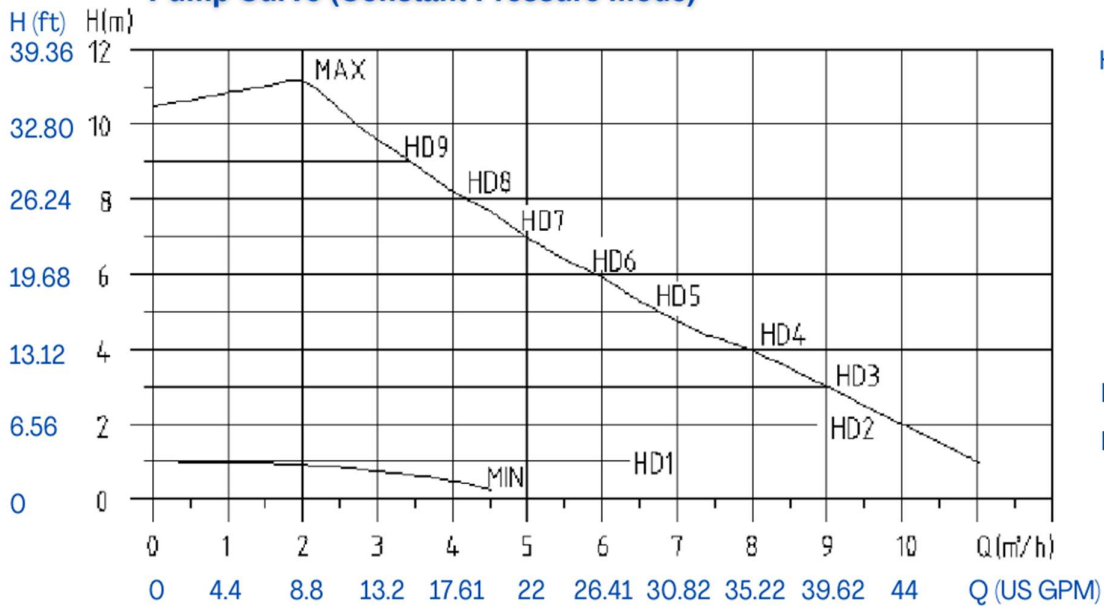
Pump Curve (Proportional mode)



Pump Curve (Proportional mode)



Pump Curve (Constant Pressure mode)

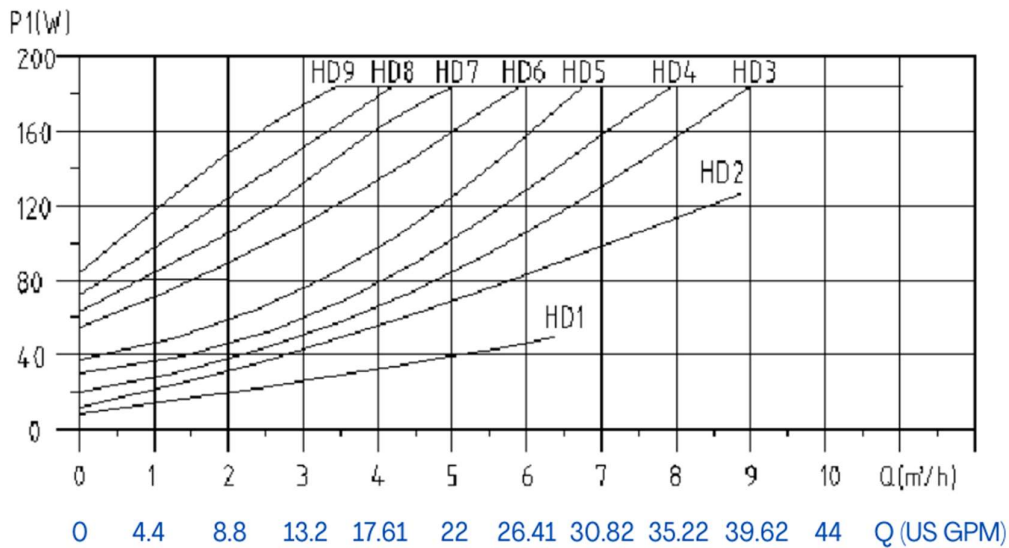


HD9: Speed No 9

HD2: Speed No 2

HD1: Speed No 1

Pump Curve (Constant Pressure mode)



HD9: Speed No 9

HD2: Speed No 2

HD1: Speed No 1

Operating Modes

Circulation pump has different operating modes. Manually press to switch between constant speed mode, AUTO mode, proportional mode, constant pressure mode and PMW control mode.

- 1. Auto Mode (default):** When the pump is in AUTO mode, the AUTO light indicator is on meaning that the pump is adjusting automatically to the set characteristics. The flow indicator displays the flow rate.
- 2. Constant Speed Mode:** When the pump is in constant speed mode, the constant speed light is on meaning that the pump is running at constant speed. The 1-9 position lights display the set speed rate, and the flow indicator displays the flow rate.
- 3. Proportional Mode:** When the pump is in proportional mode, the proportional light indicator is on meaning that the pump's pressure is adjusting proportionally to the speed. The 1-9 position lights display the set speed rate, and the flow indicator displays the flow rate.
- 4. Constant Pressure Mode:** When the pump is in constant pressure mode, the constant pressure light is on meaning that the pump is running at constant pressure. The 1-9 position lights display the set speed rate, and the flow indicator displays the flow rate.
- 5. PMW Control Mode:** When the pump is in PWM control mode, the flow indicator displays the flow rate.

After a power failure, the pump will turn back on automatically on the mode prior to power failure.



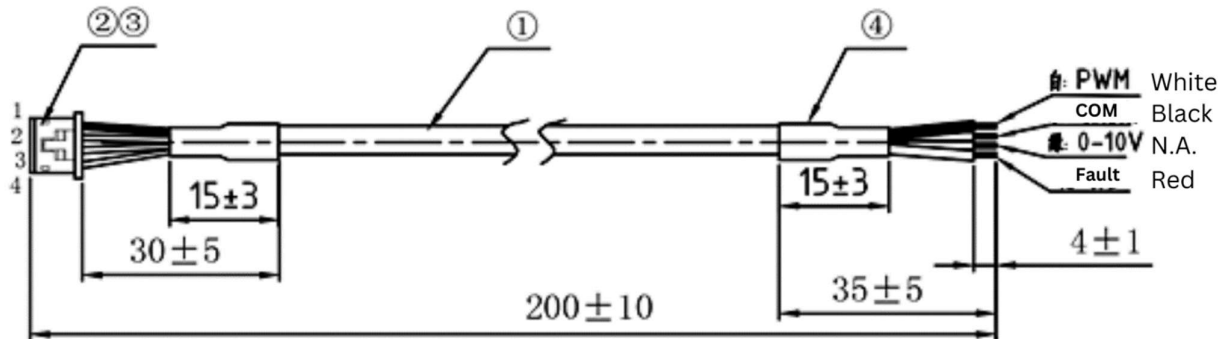
Switching between Operating Modes

- 1. Mode switching button:** When in AUTO mode, press the AUTO button once to switch to constant 9 mode, press it again to switch to proportional 9 mode, and press it again to switch to constant speed 9 mode. If you need to switch speed in constant speed mode, press the increase or decrease button.
- 2.** When the power is turned on, if the PWM signal is not detected, the pump will enter the default mode. If a PWM input signal

is detected, the pump starts in PWM mode. If the signal line gets disconnected, the pump will run at its lowest speed, and the LED flashes at this time.

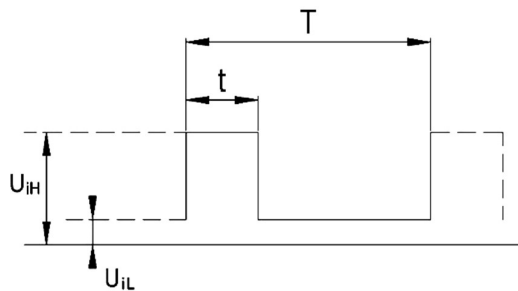
Wiring

Circulation Pump is Supplied with 3 wires control cable with socket. PWM wire (White), COM (Black) and Fault (Red). Cable Length is around 200 mm (8 inches) and need to be extended to reach controller generating PWM Signal. Also, the Fault wire, can be used with the COM wire as a binary input to a Controller for generating fault alarm. Pump is not supplied with a any power supply wiring. It must be wired in compliance with local codes and regulations.



PWM Control

GPA pump is controlled by a PWM (pulse width modulation) digital signal, modulates the speed of the pump. PWM signal must be generated by a third-party controller (Modbus or BACnet Controller, Heat Pump Controller, etc....).



Abbreviation	Description
T	Cycle
d	Duty cycle
U _{iH}	Input high voltage
U _{iL}	Input low voltage
I _{iH}	Input Current

This Pump uses square wave PWM signal with a design frequency of 75 Hz (Normal range: 40Hz ~ 4000Hz). PWM input signal (PWM In - to pump) is used to give modulate pump's motor speed, and speed modulation % is adjusted by adjusting the PWM duty cycle.

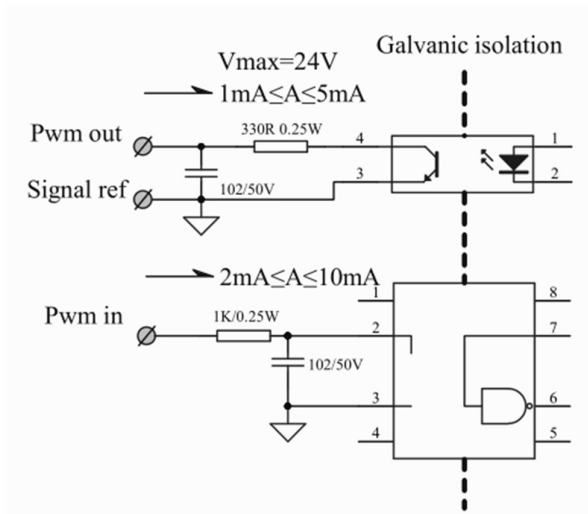
Example:

$$d\% = t/T$$

For Example : T = 2 ms (500Hz), t = 0.6 ms, d% = 100×0.6/2 = 30%, U_{iH} = 4 - 24V, U_{iL} ≤ 1V, I_{iH} ≤ 10mA

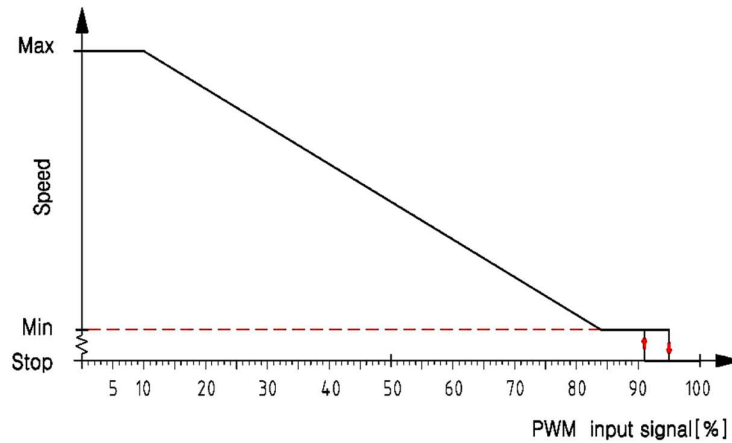
Interface

Circulation pump is controlled via its interface. The interface converts external signals so they can be recognized by the pump's microprocessor. The interface also protects the user from electrocution when touching the signal line while the pump inputs 230V. "Signal ref" acts as a reference ground in the circuit.



PWM Input Signal

- When the duty cycle of the PWM is high, hysteresis switching function prevents the pump from starting and stopping frequently.
- When the duty cycle of the PWM is low, the pump maintains a high speed for system safety. In the event of failure of the signal cable, the pump will continue to run allowing system safety.
- When the PWM input signal is 0% or 100%, the pump goes into normal mode (non-PWM mode).

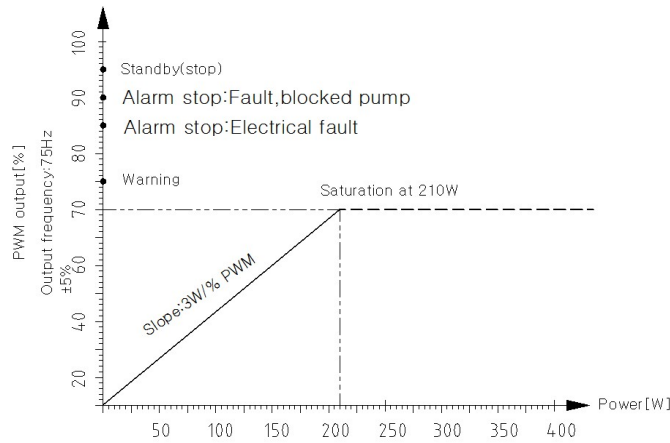


PWM input signal (%)	Pump status
0	The pump switches to normal mode automatically. The system has no PWM signal input by default
< 10	Pump running at maximum speed
10 - 84	The pump linearly drops
85 - 91	Pump running at minimum speed
91 - 95	If the input signal fluctuates around the variable speed point, hysteresis switching function activates
96 - 99	Standby, the pump stops running
100	The pump switches to normal mode automatically. The system has no PWM signal input by default

PWM Feedback Signal



The PWM feedback signals provide the user with the pump's operating status, such as power loss or different alarms/warnings.

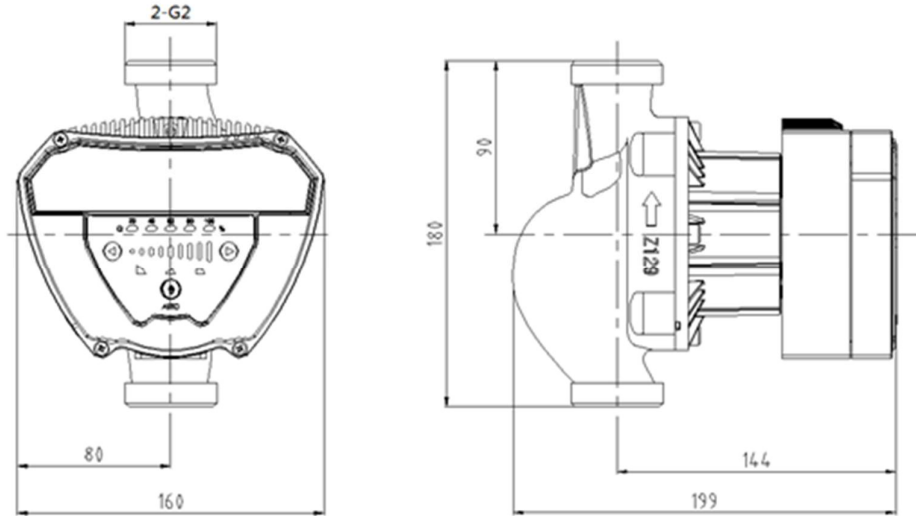


PWM output signal (%)	Pump status	Description
95	Standby	The pump is stopped
90	Pump alarms and stops running, fault (pump stuck)	The pump stops running until the problem is solved
85	Pump alarms and stops running, electrical failure	The pump stops running until the problem is solved
75	Warning	The pump is running, and a problem has been detected. However, the problem is not critical to the pumps function
0 - 70	0-210W (slope 3W/% PWM)	

Failsafe Instructions

- Overvoltage protection:** Light indicator 1 flashes and the pump stops running when the input voltage is higher than $270V \pm 5V$ for 2 seconds under full load condition (input power 185W). Once the voltage returns to normal, the pump runs again.
- Undervoltage protection:** Light indicator 2 flashes and the pump stops running when the input voltage is lower than $165V \pm 5V$ for 2 seconds under full load condition (input power 185W). Once the voltage returns to normal, the pump runs again.
- Overcurrent protection:** If the current is too high and the pump is running under full load condition (input power 185W), the overcurrent protection turns on, meaning that the pump stops running and that the light indicator 3 flashes. The pump restarts after 8 seconds. In the case where the number of protections reaches 5, the pump will not restart and will have to be powered on again.
- Phase loss protection:** When the motor is out of phase, light indicator 4 flashes, the pump stops running and restarts after 8 seconds. In the case where the number of protections reaches 5, the pump will not restart and will have to be powered on again.
- Locked-rotor protection:** If the rotor is locked for 3s, light indicator 5 flashes and the pump stops running. The pump will not restart and will have to be powered on again.
- Light load protection:** When the power on the maximum gear is less than 35W for 8 seconds, the load protection light turns on and the light indicator 6 flashes. The pump restarts after 8 seconds. In the case where the number of protections reaches 5, the pump will not restart and will have to be powered on again.
- Over-temperature protection:** When the surface temperature of the IPM module is higher than $130^{\circ}C \pm 10^{\circ}C$, the pump stops running. Once the surface temperature of the IPM module becomes lower than $100^{\circ}C \pm 10^{\circ}C$, the pump starts running again.
- Overheating treatment:** When the surface temperature of the IPM module is higher than $120^{\circ}C \pm 10^{\circ}C$, the pump's operation rated power is reduced by half. Once the surface temperature of the IPM module becomes lower than $100^{\circ}C \pm 10^{\circ}C$, the pump starts running normally again.

Pump Dimensions



Shipping Dimensions: 480× 370x210mm

General Assembly Drawing

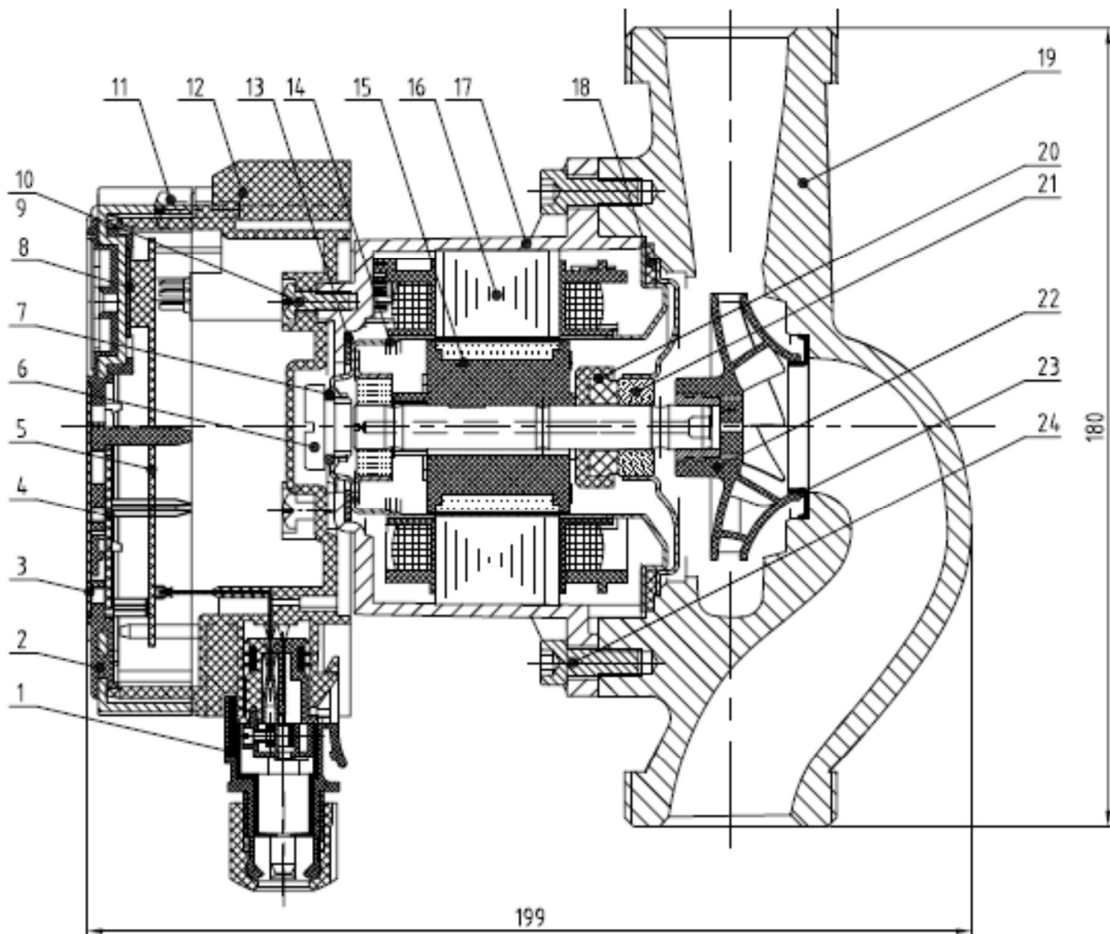
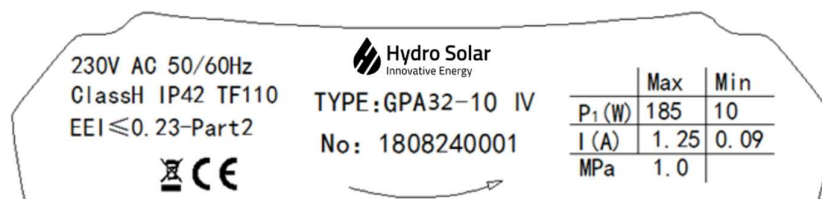




Table of Materials

Series #	Code	Spare parts	Material
1	XK5.946.Z04	Outlet nut	PA66
2	XK5.354.Z41	Junction box cover	/
3	XK8.860.Z92	Myra	PET
4	XK5.064.Z43	PC board B	/
5	XK5.064.Z42	PC board A	/
6	XK8.904.Z01	Screw	Nickel plated copper
7	XK8.370.Z01	O-ring	EPDM
8	XK5.423.Z03	Thermal silica	/
9	GB/T818-85	Screw	Copper
10	GB/TB818-85	Screw	Galvanized
11	GB/TB845-85	Screw	SS 304
12	XK5.354.Z30B	Junction box	PC
13	XK8.371.Z67	O-ring	EPDM
14	XK5.365.Z01	Stator shield	/
15	XK5.365.Z01	Rotor	/
16	XK5.674.Z33	Stator coil	/
17	XK5.671.Z85	Motor base	Aluminum alloy
18	XK8.034.Z71B	O-ring	EPDM
19	XK8.371.Z02	Pump body	HT200
20	XK8.009.Z129B	Thrust bearings	/
21	XK5.262.Z01	Thrust bearing seat	/
22	XK5.436.Z91B	Impeller	PA66
23	XK8.213.Z08B	Oral ring	SS 304
24	GB/T70	Screw	Galvanized

Nameplate



**Limited Residential Warranty:**

Aqua Solanor Inc (Owner of **Hydro Solar Innovative Energy**) warrants that the Pump supplied by it shall be free from defects in materials and workmanship for a period of **(1) One YEAR** after the date of installation or for a period of **(1) One YEAR AND (30) THIRTY DAYS** after the date of shipment, whichever occurs first.

Aqua Solanor Inc shall, at its option repair or replace any part or parts covered by this warranty which shall be returned to **Aqua Solanor Inc**, transportation charges prepaid (by customer), which, upon examination proves to be defective in materials or workmanship.

Replacement or repaired parts and components are warranted only for the remaining portion of the original warranty period.

This warranty is subject to the following conditions:

1. The **Hydro Solar Innovative Energy** GPA Pump must be properly installed and maintained in accordance with this installation and maintenance document and in compliance with Federal, Provincial, Municipal, and local codes and regulations.
2. The installer must be a certified qualified heat pump installer in the province/state where heat pump is installed. Failure to comply with this requirement will void this warranty.
3. It is the responsibility of the building or general contractor to supply temporary heat to the structure prior to occupancy. These pumps are designed to provide heat only to the finished and insulated structure. Start-up of the unit shall not be scheduled prior to completion of construction and final Duct/Pipe installation for validation of this warranty.
4. It is the customer's responsibility to supply the proper quantity and quality of water.

If the pump, supplied by **Aqua Solanor Inc**, fails to conform to this warranty, **Aqua Solanor Inc**'s sole and exclusive liability shall be, at its option, to repair or replace any part or component which is returned by the customer during the applicable warranty period set forth above, provided that (1) **Aqua Solanor Inc** is promptly notified in writing upon discovery by the customer that such part or component fails to conform to this warranty. (2) The customer returns such part or component to **Aqua Solanor Inc**, transportation charges prepaid, within (30) thirty days of failure, and (3) **Aqua Solanor Inc**'s examination of such component shall disclose to its satisfaction that such part or component fails to meet this warranty and the alleged defects were not caused by accident, misuse, neglect, alteration, improper installation, repair, or improper testing.