Shimge Pump Industry (Jiangsu) Co., Ltd.

Technical Specification

Product name： High Efficiency Circulation Pump

Product model： APM25-12-180H PWM1

Version： A 1.0

Date： 2024.05.30

Standards applicable to customers: Shimge Standards

Contents

1 Product Overview

APM series intelligent variable frequency circulation pump (hereinafter referred to as the “Electric Pump”) is subject to the Q/SG 602 standard. The stator of the motor is completely shielded, and the rotating parts are immersed in clean water, which plays a role of cooling and lubrication during operation. The shielding sleeve of the Electric Pump adopts a thin-walled structure, which completely shields and isolates the inner iron core of the motor from the water, and replaces the traditional mechanical seal structure, thus solving the seal leakage problem of conventional water pumps. The rotating parts adopt ceramic bearings and ceramic shafts, which are wear-resistant and lubricated with clean water, achieving the cooled motor and reduced noise. The Electric Pump is not overloaded when working at the full lift, and is generally free of maintenance as long as it is used correctly.

1.1 Model Description

APM25-12-180H PWM1	
APM	High Efficiency Circulation Pump
25	The nominal diameter of suction inlet and discharge
12	Maximum lift: 12m (lift at the flow of 0 m^3/h)
180	The length of the pump body from inlet to outlet is
H	High flow rate
PWM1	The external speed control logic is PWM1

1.2 Product Application

This series of products are designed for heating systems and can be used in domestic hot water circulation systems, heating, ventilation and air conditioning (HVAC) systems and other systems such as:

·Floor heating water mixing system
·Air energy hot water circulating system
·HVAC
·Boiler system
·Heat pump
·Micro combined heat and power (CHP)

1.3 Main Features

- Energy Efficiency Index (EEI)≤0.23-Part3
- Permanent magnet motor, and intelligent variable frequency control
- The controller and the motor are designed as a whole, and the whole pump has a compact structure and a small installation size
- The cable is of a quick-plug structure, which is convenient for installation and maintenance
- External PWM speed control
- Low noise, and no leakage

1.4 Service Conditions

- Medium temperature: -20℃ to 95℃
- Ambient temperature: -20℃ to 50 ℃

Medium and ambient temperature comparison list

Maximum ambient temperature（℃）	Maximum liquid temperature（℃）
30	95
50	70

- Maximum system pressure: 1.0MPa (10bar)
- Protection class: IPX4
- Rated voltage/frequency: 230V、50/60Hz
- Temperature resistance class: F
- Pumped liquid properties: Clean, free of solids and mineral oils, non-toxic, chemically neutral, and close to the properties of water.
- In order to avoid cavitation noise and damage to pump bearings, the following pressure should be maintained at the pump inlet.

Liquid temperature（℃）	85	95
Intake pressure	≥0.5m	≥2.8m
	≥0.05bar	≥0.27bar

1.5 Conveyed Liquid

- Water for heating or cooling
- Ethylene glycol solution with solubility ≤50%
- The pH of the liquid is between 6.5 and 8.5

- The volume content of solid particles should not exceed 0.1 per unit volume, and the particle size should not exceed 0.2mm
- The number of filter meshes shall not be less than 55

1.6 Pump Installation Requirements

- When the pump is installed, the motor shaft must be parallel to the horizontal plane

- Do not run the pump without water
- Before installing the pump, it is required to ensure that the piping system is in good condition and clean, for impurities such as welding slag and dirt may damage the pump
- The water pump shall be installed in a place convenient for maintenance and replacement

1.7 Technical Parameters

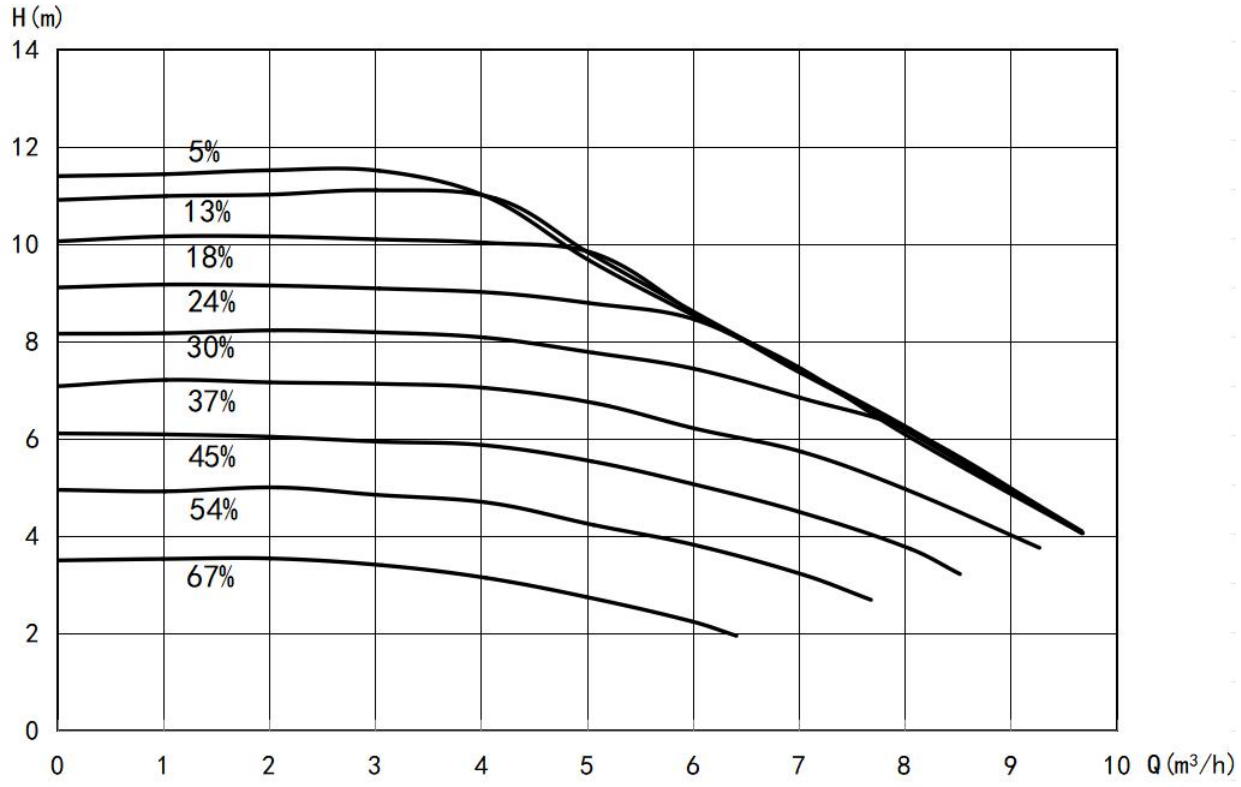
Parameters	Specification description
Electric pump form	High Efficiency circulation pump (non-self-priming)
Power supply (AC/DC)	AC
Voltage	230V（-10%～+10%）
Frequency	50/60Hz
Input power	20～320W
Current	0.2～1.6A
Range of speed	1000～4700r/m
IP protection class	IPX4
Insulation grade	Class F
EEI	≤0.23
Noise	≤50dB
Maximum lift	12m
Maximum flow	8m³/h（6m）
Matching pipe diameter	DN25（G1.5）

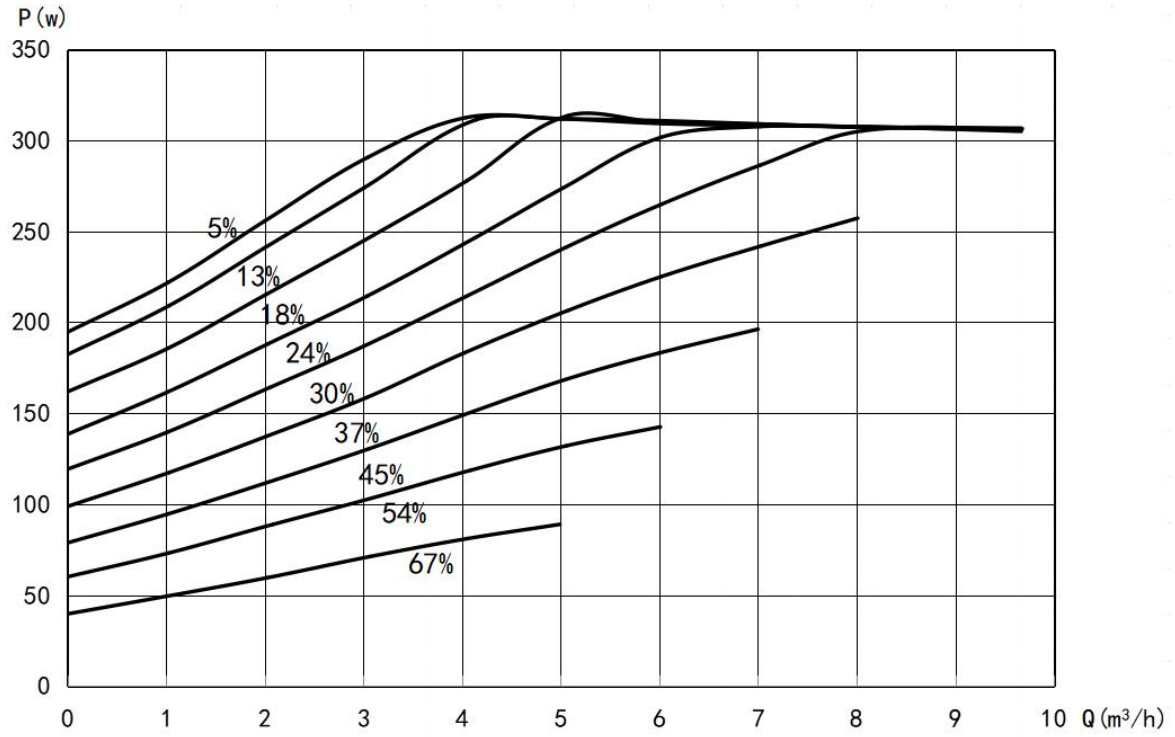
Rotating direction of the rotor	Clockwise from the control box to the pump body
Pressure test requirements	The leakage at 1500V is less than 15mA

2 Product Functions

No.	Items	Function description
1	Operation mode	Constant speed curve + PWM control
2	Display	LED digital tube, operation mode display, fault code display, real-time power display
3	Operation	PWM signal identification in and out speed regulation
4	Protection function	Over current protection, over/under voltage protection, phase loss protection, locked rotor protection, over temperature protection
5	Start	Maximum torque start

2.1 Hydraulic Performance Curve

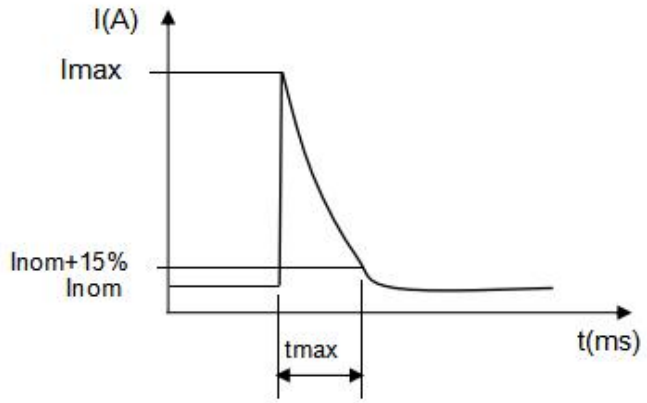




Model	Mode	Maximum lift	Rated flow	Rated lift	Rated flow	Maximum input power	Electric pump efficiency
	(mm)	(m)	(m³/h)	(m)	(m³/h)	(W)	(%)
APM25-12-180H PWM1	DN25	12	6	9	8（6m）	320	50
APM32-12-180H PWM1	DN32						

2.2 Start-up Peak Current

Pump model	Input voltage	Imax	Tmax
APM25-12-180H	178、230、264V	＜20A	＜25ms
Remarks	In order to avoid the effect of self-heating, the interval between two measurements shall not be less than 2 minutes		

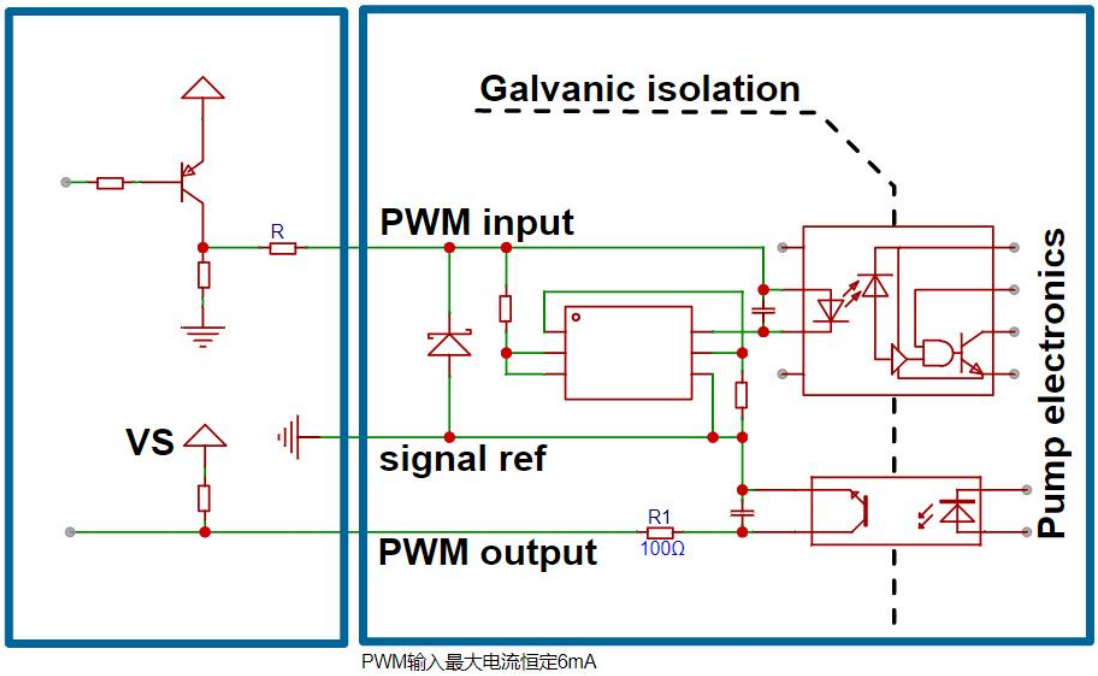


Peak current graph

2.3. PWM control

2.3.1 Basic control logic & Interface schematic diagram

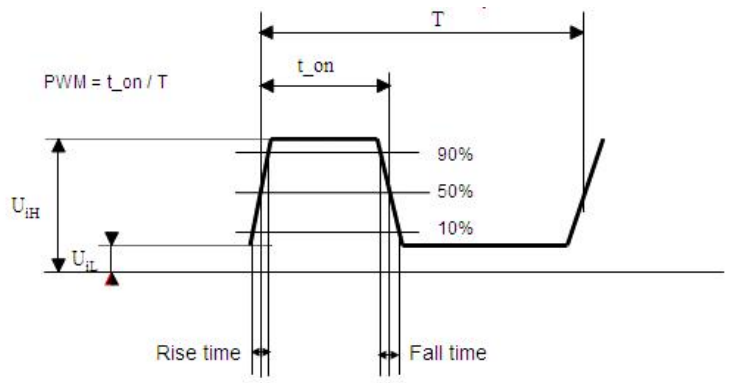
When the PWM signal is connected, the pump runs through the PWM signal control, and when there is no PWM signal, the pump runs according to max speed.



PWM输入最大电流恒定6mA

2.3.2 **PWM Signal characteristic definition**

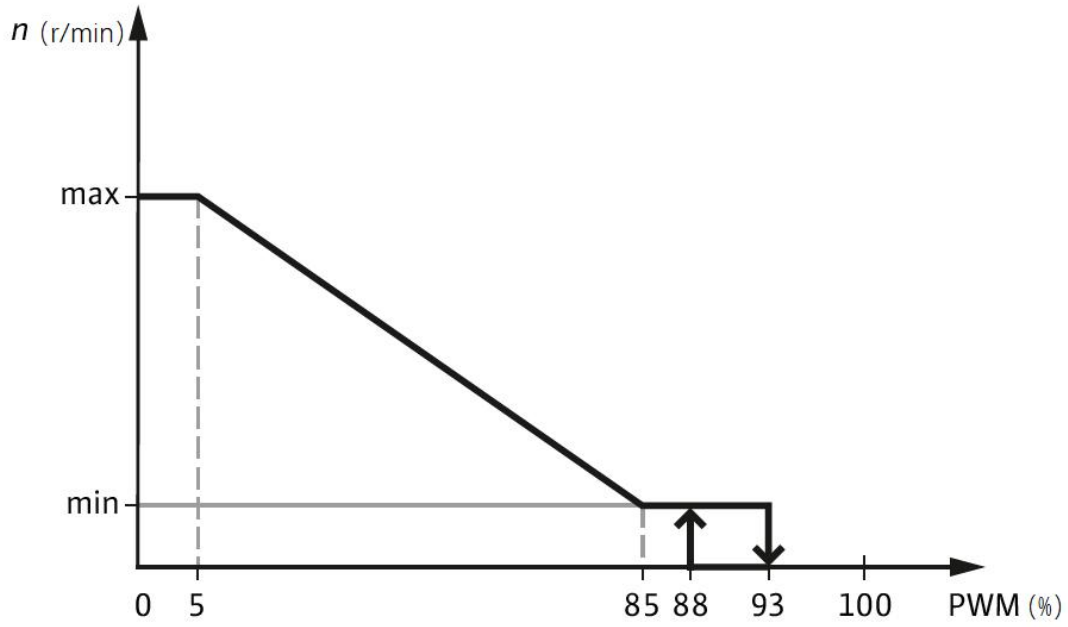
Input signal characteristic definition	Optocoupler isolation	YES
	PWM output frequency	100—4000Hz（2000Hz is conventionally used）
	High level input voltage U_{iH}	4—24V
	Low level input voltage U_{iL}	＜1V
	High level input current I_H	3mA—30mA
	Adjustable range of PWM	0—100%
	Length of signal cable	＜3m
	Rising edge or falling edge time	＜T/500
Feedback signal characteristic definition	Optocoupler isolation	YES
	PWM output frequency	75（±3）Hz
	PWM output signal accuracy	±5W
	Output maximum pull-up voltage VS	3V—24V
	Output pole current drive capability Iout	1mA—10mA
	Feedback range of PWM	0—100%
	Length of signal cable	＜3m
	Rising edge or falling edge time	＜T/500
	PWM output pull-up resistor R2	(VS-0.2)/Iout-R1



PWM waveform

2.3.3 PWM input Signal (PWM1 heating)

When the PWM signal percentage (duty cycle) is high, the hysteresis can prevent the circulating pump from starting and stopping if the input signal fluctuates up and down the transition point. When the percentage of PWM signal is low, the circulating pump speed is high for safety reasons. If the cable in the gas boiler system is damaged, the pump will continue to operate at maximum speed to transfer heat from the primary heat exchanger. This is also suitable for heating circulating pumps to ensure that the pump is able to transfer heat in the event of cable damage.

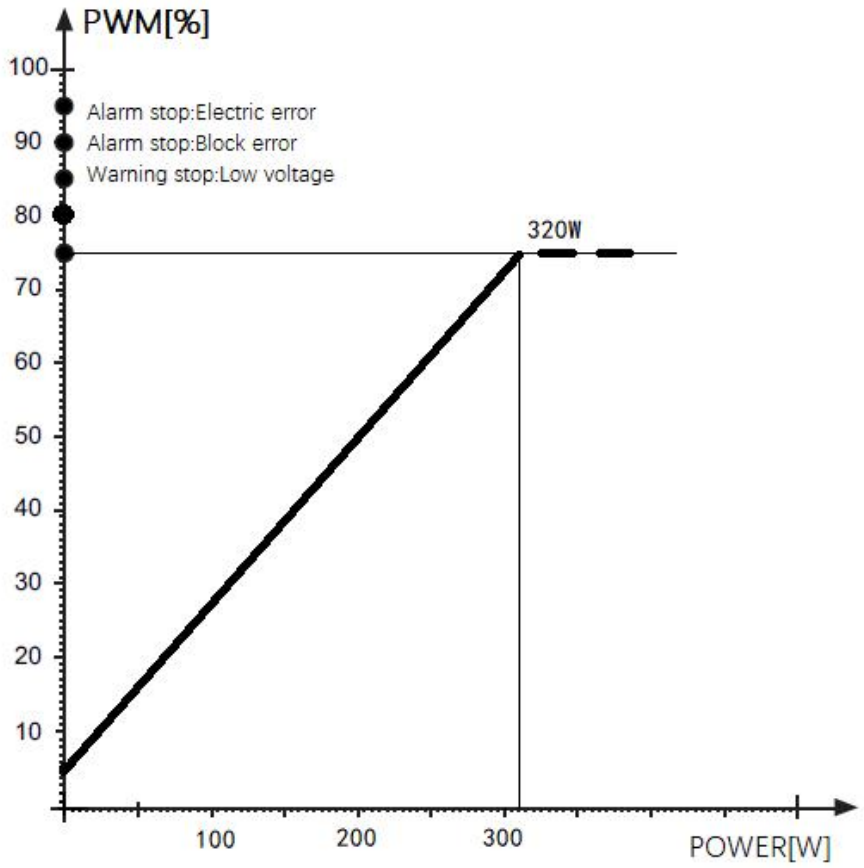


PWM input signal (%)

PWM input signal (%)	Pump status
PWM≤5	The electric pump operates at maximum speed
5＜PWM≤85	Electric pump linear from the highest speed to the lowest speed
85＜PWM≤88	The electric pump operates at the lowest speed
88＜PWM≤93	If the input signal fluctuates near the speed change point, it will prevent the pump from starting and stopping according to the principle of hysteresis

93＜PWM≤100	Standby, water pump stopped running

2.3.4 PWM output (power)



PWM output signal (%)	Pump information	Causes
5-75	Pump normal operation, feedback 5-320W power information P=4.5*PWMout-17.5(P:W,PWMout:%)	/
85	Warning /stop(Low voltage ＜120V, IPM over temperature protection)	The power input voltage is too low(less than 120V), IPM temperature is too high
90	Alarm/Stop/Block error(block error)	The rotor is stuck, the pump is blocked
95	Alarm/stop/electric error(phase loss, over-current error)	Motor UVW phase missing, UVW short circuit leads to hardware overcurrent
2	Pump standby(stop), pump ready to start(Highest priority)	/

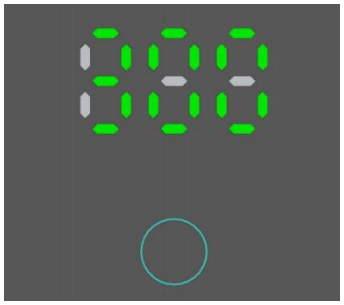
Notes for under/overvoltage protection:

- The accuracy range of under/overvoltage protection voltage value is ±5V
- Undervoltage reset: When the voltage is lower than 120V, the electric pump stops running under the action of undervoltage protection, and the voltage needs to be reset to 135V to start the electric pump normally (when the voltage changes dynamically)

2.4 Operation and Panel Display

2.4.1 Overview of operation and panel

The panel diagram is as follows:

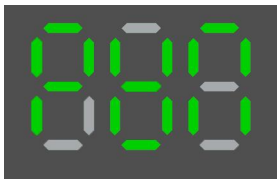
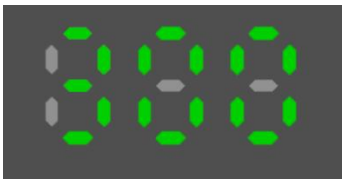
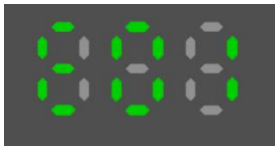


2.4.2 Operating Instructions

When there is no signal, the panel displays real-time power, when there is a signal, the panel displays PWM letters, and enters speed control mode.

2.4.3 Panel status display

After the power is turned on, all green LED lights in zone A blink 4 times, and each state is shown in the following table:

Mode display			
Description	**Display light status**	**Description**	**Display light status**
PWM control		Power	
Fault display			

2.4.4 Fault display

When the pump detects a fault, the LED displays the fault protection types in the table below.

Function name	Panel display code	Pump status	Solution
Over-temperature protection	E18	Warning, pump shut down. Start when temperature returns	Remove overtemperature or replace pump

Locked-rotor protection	E07	Try to restart, warning if failure to start, pump stop	External force to solve the blockage or replace
Undervoltage protection	E05	Warning, pump shut down. Start when voltage is restored	Adjust the water pump power supply
Phase loss protection	E06	Try to restart, warning if failure to start, pump stop	Pump replacement
Software overcurrent	E02	Try to restart, warning if failure to start, pump stop	Pump replacement
Hardware overcurrent	E01	Try to restart, warning if failure to start, pump stop	Pump replacement

If the fault is displayed, the power supply must be disconnected for troubleshooting, after troubleshooting, re-connect the power supply and start the pump; In case of abnormal power failure, the electric pump has a memory function, and automatically enters the operation mode before power failure when the power is restored.

3 Quality and Safety Requirements

3.1 Executive standards

3.1.1 Q/SG 602 Intelligent Variable Frequency Circulation Pump

3.1.2 GB 4706.1 Household and Similar Electrical Appliances - Safety - Part 1: General Requirements

3.1.3 GB 4706.71 Household and Similar Electrical Appliances - Safety - Particular Requirements for Stationary Circulation Pumps for Heating and Service Water Installations

3.2 Pump Identification

Functional requirements	Description
Product brand	SHIMGE
Protection class	IPX4
Temperature resistance class	Class F
CE certification	CE
Erp certification	EEI ≤ 0.23

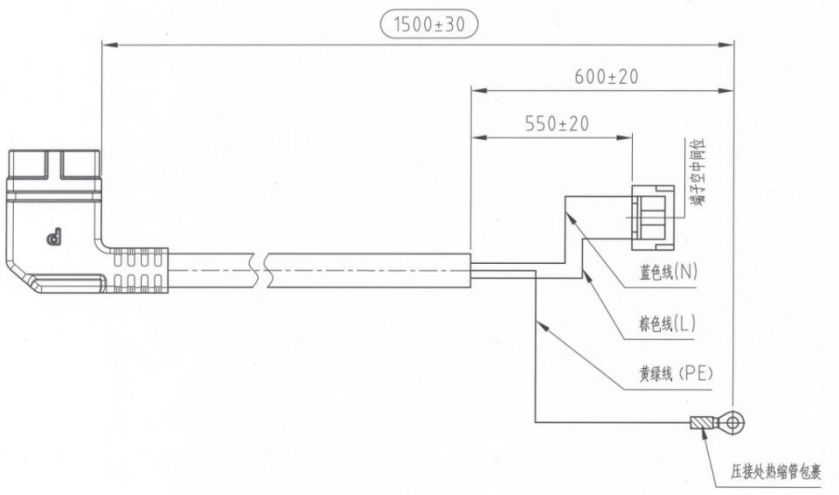
4 Pump Structure

No.	Name	Component	Material
1	Pump body assembly	/	HT200 & 304
2	Rubber ring	/	EPDM
3	Rotor parts	Rotor sleeve	304
		Pump cover assembly	304 & Ceramic
		Magnetic steel	Ferrite
		Thrust assembly	Carbon graphite & EPDM
		Impeller	PA66&H59
4	Flat gasket	/	EPDM
5	Shielding sleeve	/	304 & Ceramic
6	Cyclone release plug	/	H59
7	O ring	/	EPDM
8	Motor	Casing	YL102
		Stator core	50W800
		Enameled wire	QZY-2/180
		Skeleton	PET
9	Bolt	/	304
10	Wiring base I	/	PA6&PET&H59
11	Lower cover of control box	/	YL102
12	Wiring base II	/	PA6&H59
13	Control panel assembly	/	Assembly
14	Display board assembly	/	Assembly
15	Control box inner cover assembly	/	PC&PET
16	Cross recessed screw	/	304

17	Display panel film	/	PVC
18	Upper cover of control box	/	PC

5 Wiring Diagram

Power cable

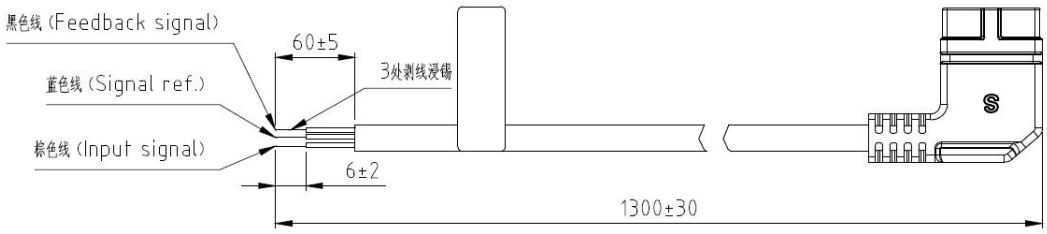


blue wire is connected to the N mark (neutral wire), and the yellow-green wire is connected to the PE mark (grounding).

Cable harness specification: H05VV-F3-0.75mm².

End terminal: VH-3N (yellow) + ground wire OT1-4 ring terminal.

PWM cable



The blue line of the PWM signal cable connects to the GND label (ground) on the control board, the brown line connects to the Input label (input), and the black line connects to the Output label (output).

End: bare wire

6 Product Packaging

- **Inner/outer box**

7 Instructions for Use

7.1 Before installing the electric pump, check whether the piping system is connected reliably, and ensure that impurities, welding slag, dirt, etc. in the pipeline have been removed;

7.2 The electric pump shall be installed in a dry and ventilated place to avoid short circuit due to damp or water splashing, and the installation shall be convenient for future maintenance and replacement;

7.3 When the electric pump is installed in the open air, a protective cover shall be added, and when it is installed indoors, it shall be prevented from being splashed by water to avoid electric shock; do not install it in the bathroom, so as to prevent water vapor or water from entering the junction box and causing electric leakage;

7.4 In order to facilitate the maintenance of the electric pump in the future, it is recommended to install an independent shut-off valve at the water inlet and outlet of the electric pump;

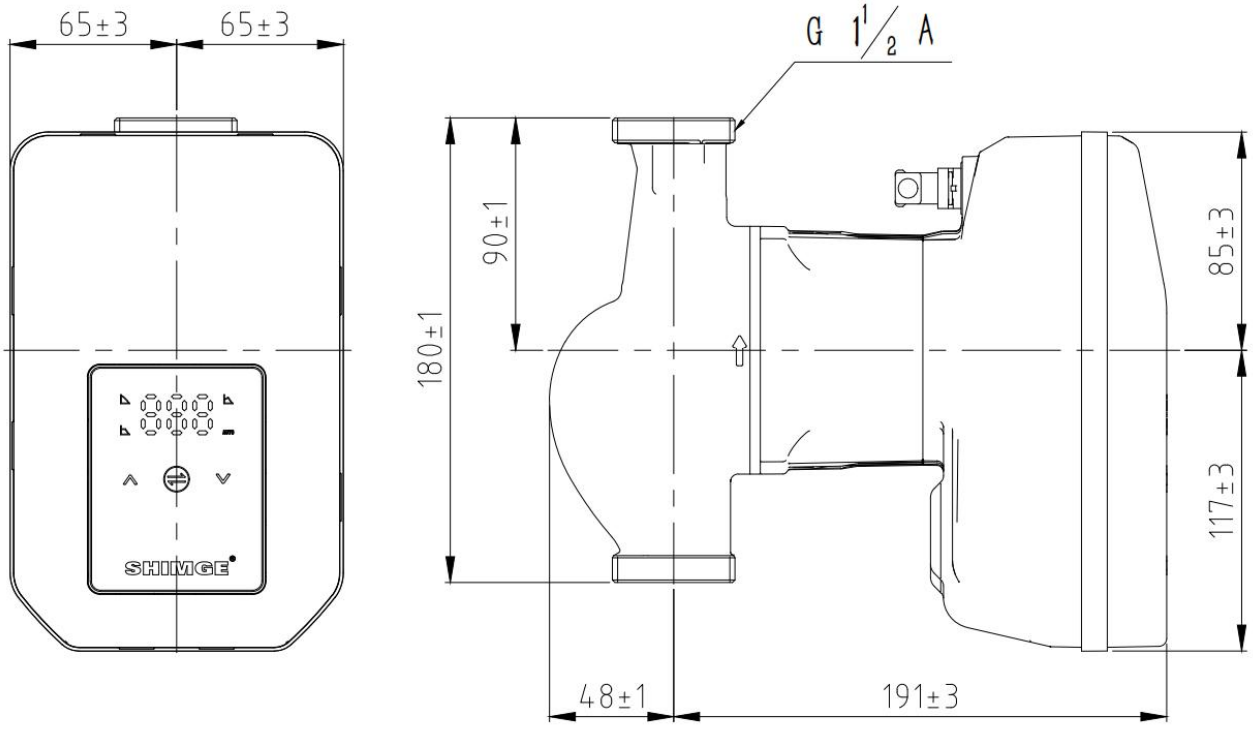
7.5 When the electric pump supplies water for the supporting heating system, do not touch the electric pump and its pipes with your hands for the avoidance of scalding;

7.6 The power plug shall be grounded strictly, and the grounding pin of the plug shall be reliably connected to the grounding hole of the power socket, and the power grounding plug must not be changed without authorization;

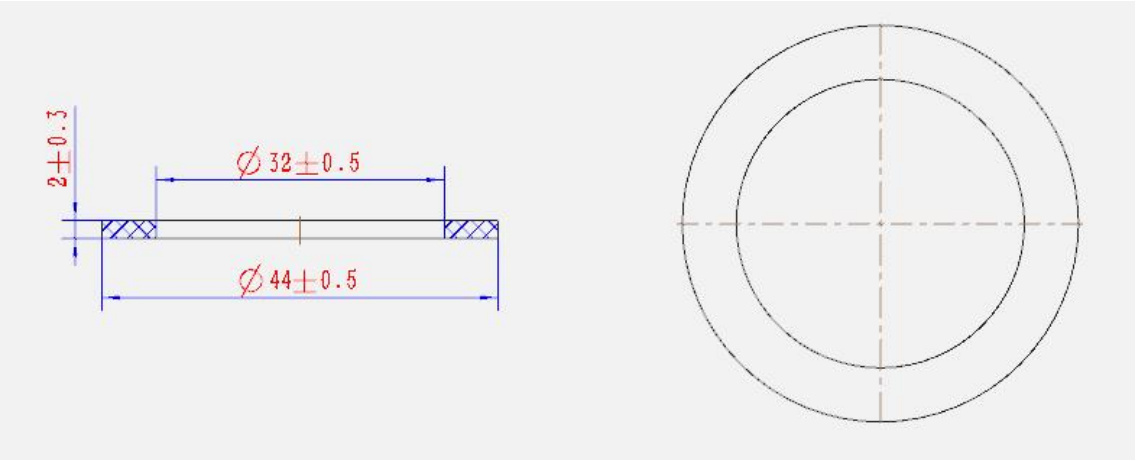
7.7 When the electric pump is working, you must cut off the power first to prevent accidents if you want to adjust the position of the electric pump or touch the electric pump;

7.8 When the ambient temperature is lower than 0℃ in winter, the water in the piping system shall be drained to avoid the cracking of the pump body if the electric pump stops running;

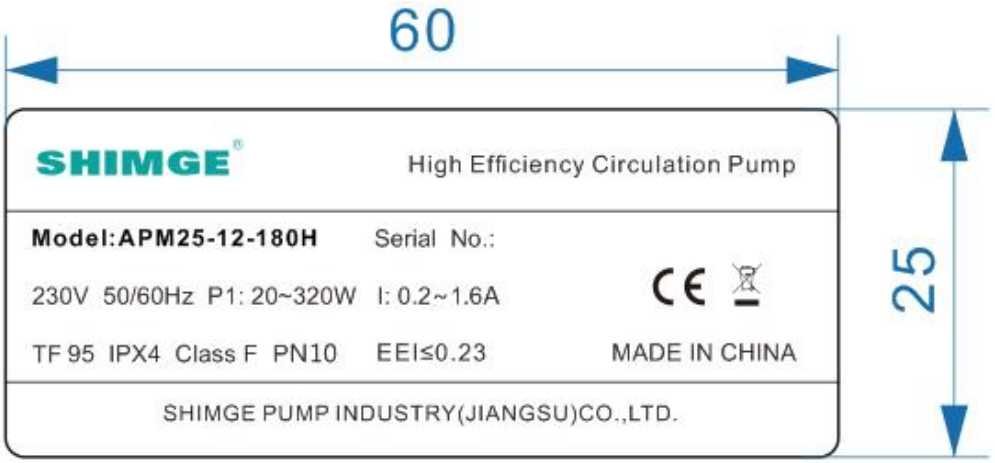
Annex A: Dimensional Drawing of Water Pump



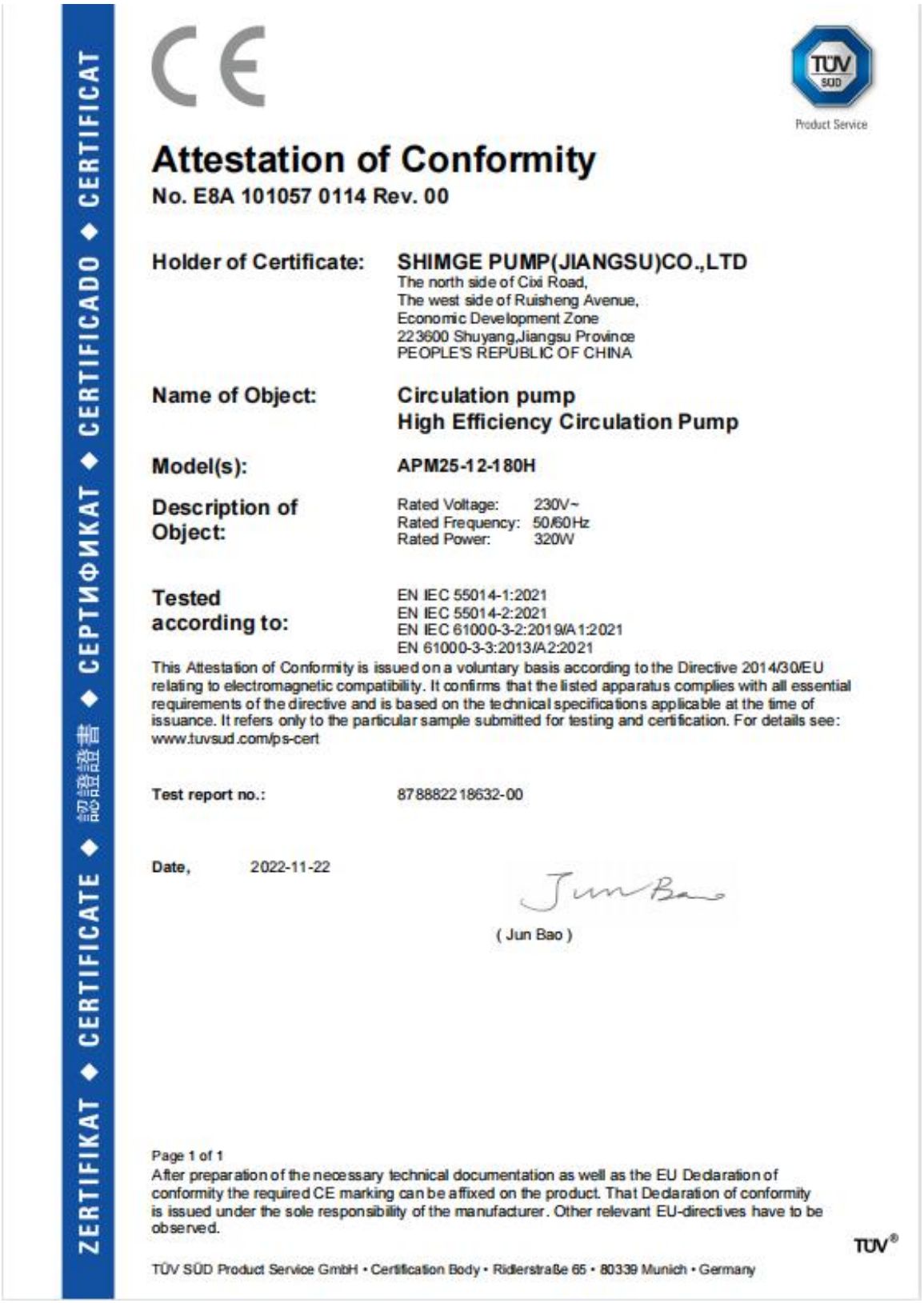
Accessories (flexible sealing gasket)



Annex B: Nameplate



Annex C: Certificates



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CE

TÜV SÜD Product Service

Attestation of Conformity

No. E8A 101057 0114 Rev. 00

Holder of Certificate: SHIMGE PUMP(JIANGSU)CO.,LTD
The north side of Cixi Road,
The west side of Ruisheng Avenue,
Economic Development Zone
223600 Shuyang,Jiangsu Province
PEOPLE'S REPUBLIC OF CHINA

Name of Object: Circulation pump
High Efficiency Circulation Pump

Model(s): APM25-12-180H

Description of Object:
Rated Voltage: 230V~
Rated Frequency: 50/60Hz
Rated Power: 320W

Tested according to:
EN IEC 55014-1:2021
EN IEC 55014-2:2021
EN IEC 61000-3-2:2019/A1:2021
EN 61000-3-3:2013/A2:2021

This Attestation of Conformity is issued on a voluntary basis according to the Directive 2014/30/EU relating to electromagnetic compatibility. It confirms that the listed apparatus complies with all essential requirements of the directive and is based on the technical specifications applicable at the time of issuance. It refers only to the particular sample submitted for testing and certification. For details see: www.tuvsud.com/ps-cert

Test report no.: 87888221863 2-00

Date, 2022-11-22

(Jun Bao)

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After preparation of the necessary technical documentation as well as the EU Declaration of conformity the required CE marking can be affixed on the product. That Declaration of conformity is issued under the sole responsibility of the manufacturer. Other relevant EU-directives have to be observed.

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