Technical Specification

SPM High efficiency circulator serials

SPM25-9-130S

SPM25-9-180S

1 Product overview

1.1 Model Illustration

SPM25-9-130E	
SPM	intelligent frequency conversion circulating pump circulating pump
25	Inlet and outlet diameter 25mm
9	Max head：9m（head in 0 m³/h flow）
130	Distance between inlet and outlet 130mm
S	With external pwm control signal & With single speed

1.2 Main features

- EEI≤0.21
- Permanent magnet motor, intelligent frequency conversion control
- The controller and motor are designed as a whole. The compact structure means small installation size
- The cable is quick plug structure, convenient for installation and maintenance
- External PWM speed control
- Low noise、no leakage

1.3 Working condition

- Medium temperature：0℃～+110℃
- ambient temperature：-25℃～+53℃
- Maximum system pressure：1.0MPa（10bar）
- Degree of protection：IP44

- Rated voltage / frequency：230V、50/60Hz
- Insulation class：F
- Pumped liquid characteristics: clean liquid, free from solids and mineral oils, non-toxic, chemically neutral, close to the characteristics of water

1.4 Pumped liquid

- Heating water
- Ethylene glycol solution with solubility ≤ 50%
- Liquid PH between 6.5 to 8.5
- The medium does not contain solid impurities with a volume ratio of more than
- 0.01% and a particle size not more than 0.1mm
- The number of filter meshes shall not be less than 55 meshes

1.5 Technical data

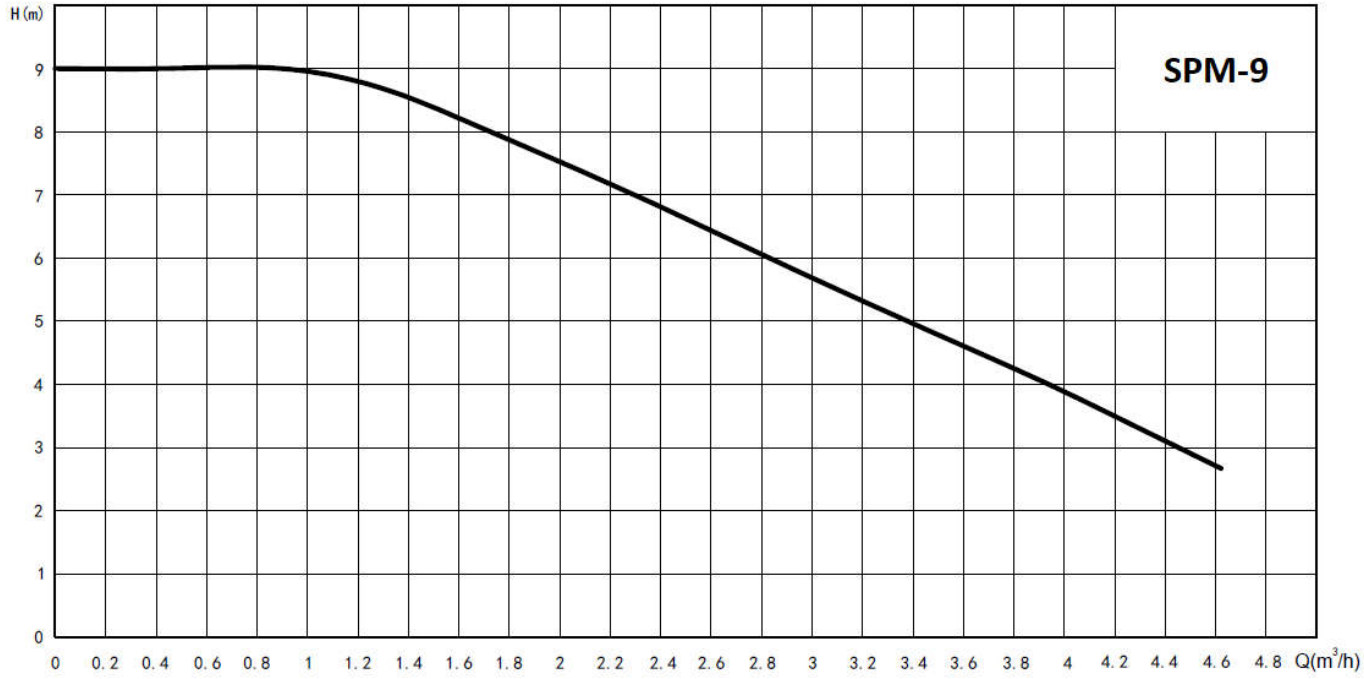
Data	description
Electric pump type	Centrifugal circulating pump (non-self-priming)
Power Supply（AC/DC）	AC
Voltage	230V
Frequency	50/60Hz
Input power	4～95W
current	0.04～0.75A
Rotation speed range	1000～4500r/m
IP Protection	IP44

Insulation class	Class F
EEI	≤0.21-Part3
Max head	9m
Max flow	4.5m³/h
Pipe size	DN25
Inlet and outlet adapter thread	G1.5
Rotation direction	The direction from the control box to the pump body is clockwise

2 Product function

No	Item	Description
1	Running、control mode	Internal maximum constant power operation + PWM external speed regulation control
2	Start	Under Maximum torque
3	PWM external speed regulation control	PWM signal automatically recognizes entering and exiting speed control mode
4	Display	LED digital tube, speed control mode display, fault code display
5	Protection	Overcurrent protection, over/under voltage protection, phase loss protection, locked rotor protection、Dry turn protection
6	PWM feedback	0—4.5m³/h，feedback pump flow, fault feedback

2.1 Hydraulic Performance curve



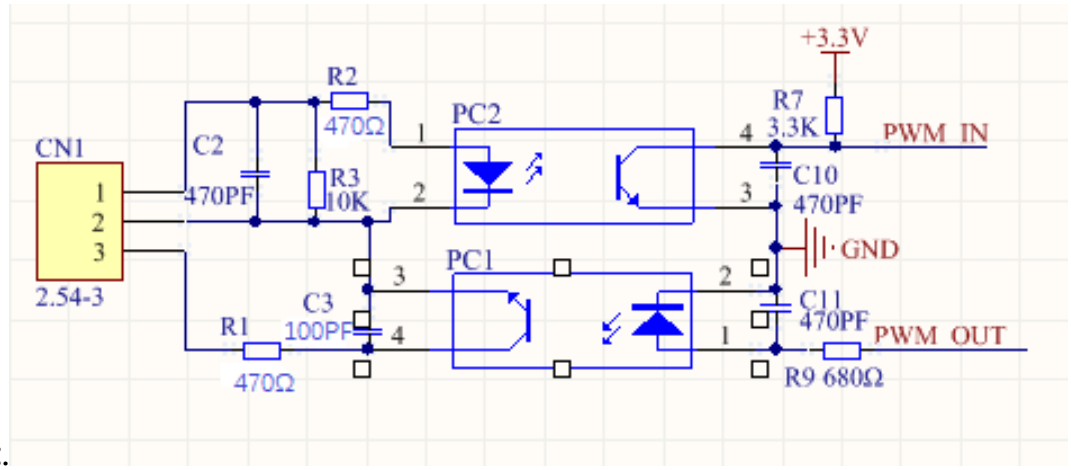
Model	Pipe size	Adapter thread	Max head	Max flow	Rated flow	Rated head	Maximum input power	Electric pump efficiency
	(mm)	/	(m)	(m³/h)	(m³/h)	(m)	(W)	(%)
SPM25-9-130S	DN25	G1.5	9	4.5	3	5	95	48
SPM25-9-180S								

2.2 PWM

2.2.1 Basic control logic

When the PWM signal is connected, the operation of the water pump is controlled by the PWM signal.

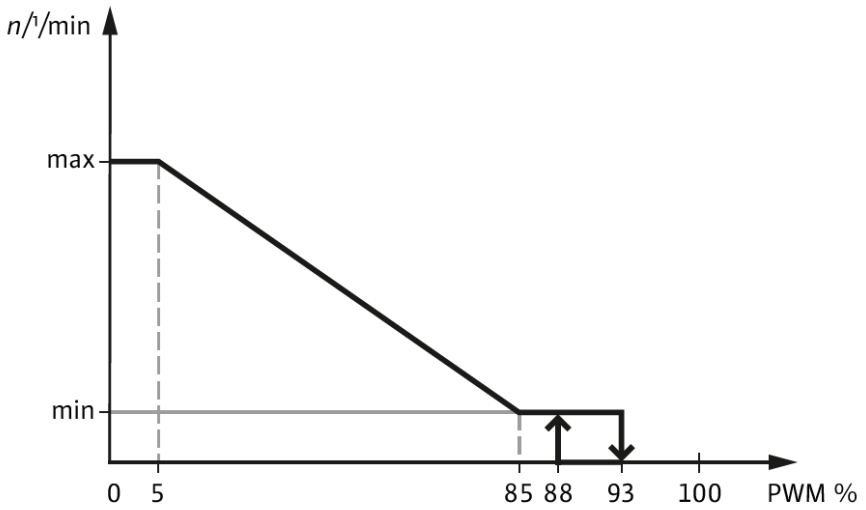
When there is no PWM signal, the operation of the water pump is controlled according to the internal control



logic.

2.2.2 PWM input signal (PWM1 for 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 around the transition point. When the PWM signal percentage is low, the speed of the circulation pump is high for safety reasons. If the cables in the gas boiler system are damaged, the pump will continue to run at maximum speed to transfer heat from the primary heat exchanger. This is also suitable for the heating circulation pump to ensure that the pump can transfer heat in the event of a cable damage.



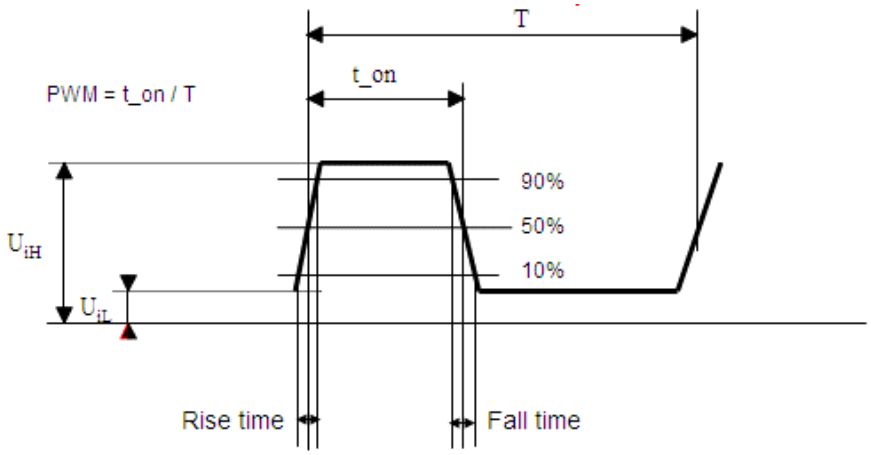
PWM input signal (%)

PWM input signal (%)	Pump status
0	the pump enter into Non-PWM mode (internal control) operation
0 < PWM≤5	The electric pump operates at the maximum speed
5 < PWM≤85	Variable speed: max. to min.
85 < PWM≤88	The electric pump operates at the minimum speed
88 < PWM≤93	If the input signal fluctuates near the speed change point, it will prevent start and stop of the pump according to hysteresis principle
93 < PWM≤100	Standby mode: off

2.2.3 PWM Signal Characteristic Definition

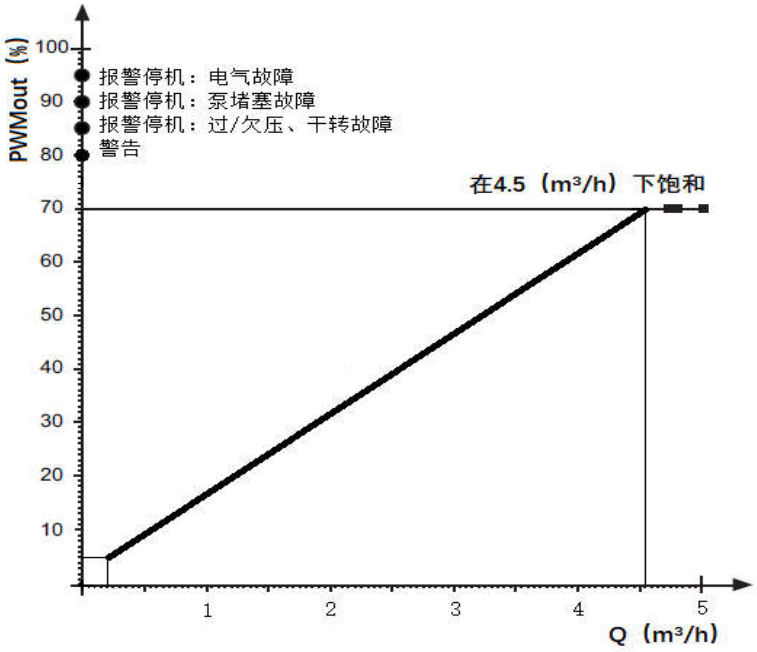
Signal Characteristic Definition	
Optocoupler isolation	YES
PWM Input frequency	1000—2500Hz（1000Hz for routine use）
High-level input Voltage U_{iH}	1.2—4.5V
Low-level input voltage U_{iL}	< 0.7V
High-level input current I_H	3.5mA—10mA
PWM Adjustable range	0—100%
Signal polarity	fix
Length of signal line	< 3m

Rising and falling edge time	< T/1000



PWM wave shape

2.2.4 PWM output



Feedback logic diagram

PWM output signal (%)	Pump status	Reason

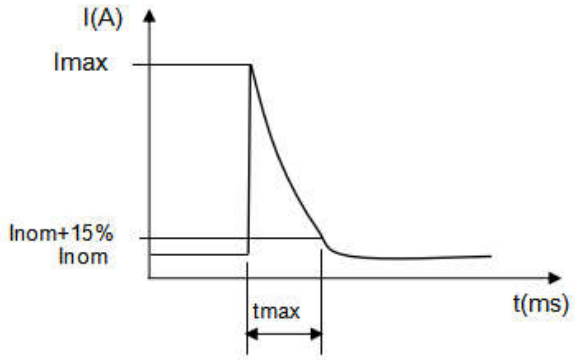
0	PWM output signal missing	PWM signal feedback line connection problem, or the water pump is powered off and shut down
2	Stand-by，prepare to run	/
5-70	Pump is running，feedback 0.3—4.5m³/h flow information	/
80	Warning（low voltage 170-194V）	The power input voltage is at low
85	Alarm/stop/(undervoltage < 170/overvoltage > 270 fault, dry running fault of pump)	The power input voltage is lower or higher than the pump operating voltage (170V-270V)or pump operates without water
90	Alarm/stop/block error (stall/dry-running fault)	Rotor stuck, pump blocked
95	Alarm/shutdown/electrical error (phase loss/overcurrent fault)	Motor UVW phase loss and UVW short circuit cause hardware overcurrent
remark	output signal frequency 75Hz（±3%）	

Under/Over Voltage Protection Description：

- Under/overvoltage protection voltage value accuracy range ±5V
  - Under-voltage reset: When the voltage is lower than 170V, the low-voltage protection of the electric pump stops running, and the voltage needs to be reset to 185V to start the electric pump normally (when the voltage changes dynamically)
- Overvoltage reset: When the voltage is higher than 270V, the high-voltage protection of the electric pump stops running, and the voltage needs to be reset to 265V to start the electric pump normally (when the voltage changes dynamically)
- 2.3 Start-up peak current

Pump model	Input voltage	Imax	Tmax
SPM25-9-130S	180V	< 1.3A	< 6ms
	230V	< 1.6A	< 6ms
	265V	< 2.1A	< 6ms

remark	In order to avoid the effect of self-heating, the interval between two measurements should not be less than 2Min



Peak current graph

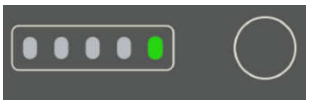
2.4 Panel display

2.4.1 Panel display

When there is no PWM signal input, the pump runs according to the maximum constant power curve. When there is a PWM signal input, it runs according to the PWM speed regulation logic. The right picture is an overview of the panel.

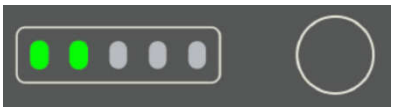
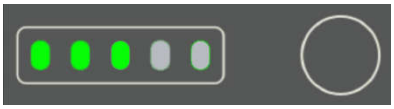
2.4.2 Mode display

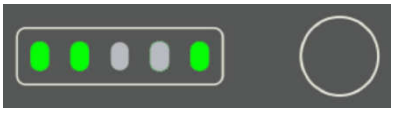
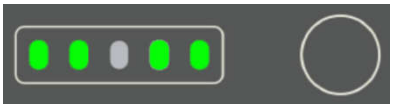
After the power is turned on, all green LED lights flash 3 times, and the speed control mode is displayed as follows:

Pump status	Display	Pump status	Display
No PWM		PWM signal	

signal		enter in to adjust speed	

2.4.3 Fault display

Fault protection description		
Protection	**Description**	**Display**
Locked rotor protection	When the rotor shaft of the electric pump is stuck, the electric pump tries to restart, and restarts every 5S. When trying to restart, the electric pump reports a blocking error and the panel displays a fault code. The pump restarts in this cycle for 5 times and then stops.	
Over/Under Voltage Protection	In abnormal conditions, when the input voltage is less than 170V or higher than 270V, the electric pump will enter the protection state and stop, and report an electrical fault and the panel will display a fault code, so as not to exceed the range and cause damage. When the voltage return to 170V-270V, the electric pump will resume running.	
Phase loss protection	When the phase failure of the electric pump occurs, the electric pump tries to restart, and restarts every 1S. When trying to restart, the	

	electric pump reports an electrical error and the panel displays a fault code. The pump restarts in this cycle for 5 times and then stops.	
Overcurrent (Short Circuit) Protection	When the electric pump is short-circuited, overheated and other faults, the electric pump tries to restart, and restarts every 1S. When trying to restart, the electric pump reports an electrical error and the panel displays a fault code.	
Dry turn protection	When the pump runs dry for 1 min, the pump stops and reports fault, and restarts after 10 min. In this way, it stops after 5 times of cycle restart	
Over temperature protection	When the power module is overheated, the pump stops and reports the fault code	

3 Quality and safety requirements

3.1 Applied standards

- Q/SG 602 Intelligent frequency conversion circulating pump
- GB 4706.1-2005 Safety of household and similar electrical appliances - Part 1: General requirements

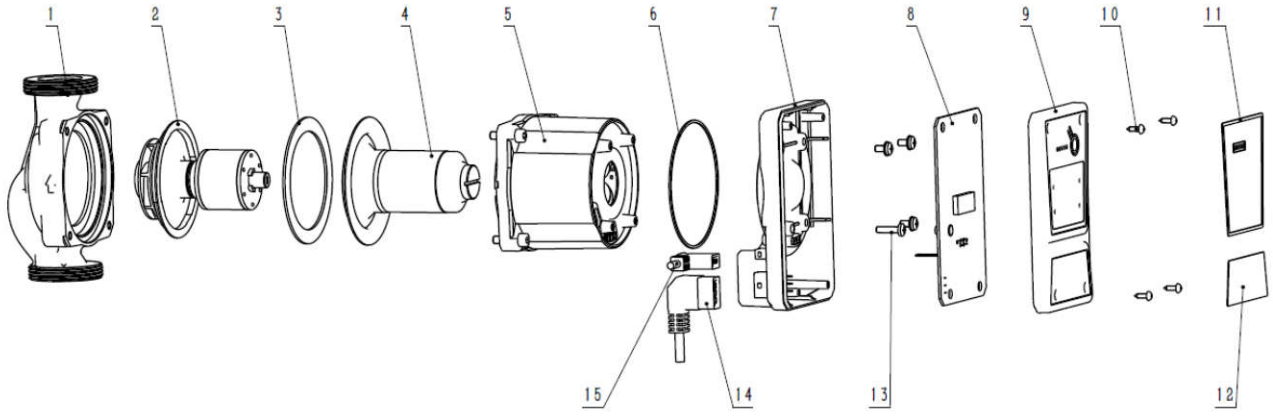
- GB 4706.71-2008 Safety of household and similar electrical appliances Particular requirements for stationary circulating pumps for heating and water supply installations
- EMC Directive (2004/108/EC)
- ErP Directive (2009/125/EC)
- RoHS II Directive (2011/65/EU)

3.2 Pump Mark

Functional requirements	Description
Brand	SEADONA
Protection Class	IP44
Insulation class	Class F
CE Certification	CE
Erp Certification	EEI≤0.21-Part3

4 pump structure

Exploded view

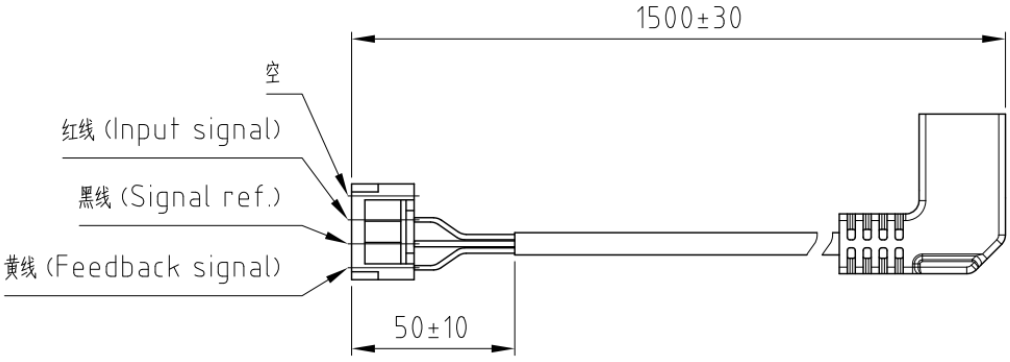


Part Description

No.	Name
1	Pump body
2	Rotor assembly
3	Flat gasket
4	Rotor can assembly
5	Motor
6	Control box sealing
7	Lower cover of control box
8	Control board cover
9	Upper cover of control box
10	Self tapping screw
11	Display panel
12	Film
13	Cross recessed screw
14	power cord
15	signal line

5 Wiring diagram

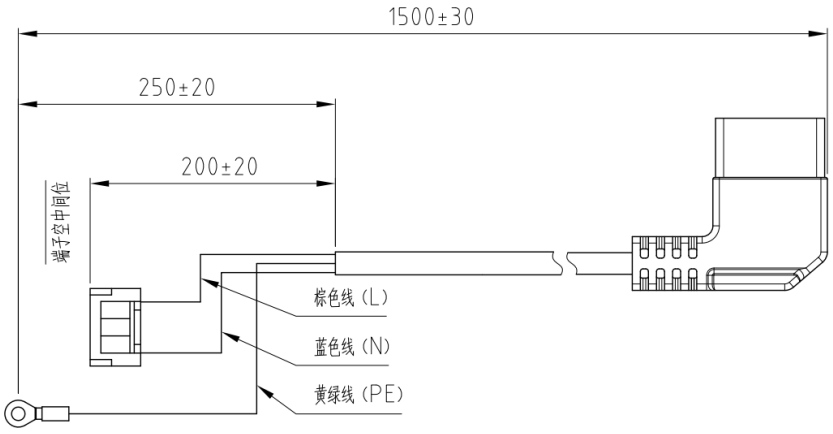
5.1 Signal line (line length and terminal can be changed to requirements)

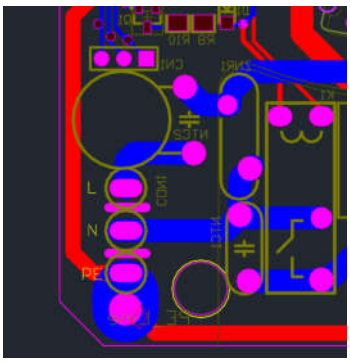


The black wire of the PWM signal line is connected to the GND mark (ground) of the control board, the red wire is connected to the Input mark (input), and the yellow wire is connected to the Output mark (output).

End terminal: VHR-4N (white)

5.2 Power cord (line length and terminal can be changed to requirements)





The brown wire of the power cord is connected to the L mark (live wire) of the control board, the blue wire is connected to the N mark (neutral wire), and the yellow-green wire is connected to the PE mark (ground).

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