SmartGen

MAKING CONTROL SMARTER

HWP SERIES
(HWP40/HWP60/HWP90/HWP120)
FORCED CIRCULATION HEATER
USER MANUAL

郑州众智科技股份有限公司

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Table 1 – Software Version

Date	Version	Note
2014-07-08	1.0	Original release.
2015-04-10	1.1	Add types HWP60, HWP90, HWP120, remove type HWP30.
2016-01-22	1.2	DC pump has been updated to AC pump.
2016-07-12	1.3	Modify relay expansion board type.
2017-11-11	1.4	Modify relay expansion board & wiring connection diagram, and add AC contactor.
2018-03-22	1.5	Modify wire connection diagram.
2022-05-09	1.6	Add the description of precautions for pipeline installation.
2022-07-20	1.7	Modify the drain screw.
2024-01-19	1.8	Modify the contents of common faults and solutions.
2025-01-10	1.9	Add the description of heater installation.

Table 2 – Notation Clarification

Sign	Instruction
 NOTE	Highlights an essential element of a procedure to ensure correctness.
 CAUTION!	Indicates a procedure or practice, which, if not strictly observed, could result in damage or destruction of equipment.
 WARNING!	Indicates a procedure or practice, which could result in injury to personnel or loss of life if not followed correctly.

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1 OVERVIEW

HWP series forced circulation water engine heater is composed of 3 parts (controller, water pump and water heater).

If during cranking the outside temperature is lower than 4°C, engine coolant and lubricant may condense into solid state and lose their lubricating and cooling properties, which can damage the engine. Thus, engine heater should be installed to ensure normal starting and running of the engine when the outside temperature is lower than 4°C.

HWP series forced circulation water engine heater combines the following features: cast stainless steel inner pipes and end closure with high corrosion resistance; heating and overheat light indicators; user-defined thermostat set point; overheat protection.

This product is suitable for various engine with (15~100)L displacement.

Please login our company's official website (www.smartgen.com.cn) to select heaters.

2 PERFORMANCE AND CHARACTERISTICS

- The circulating water pump adopts special customized pump with stainless steel pump head.
- Control section: microprocessor design; PT100 temperature sampling. Coolant temperature can be set via the control panel. Four digital LED display, current coolant temperature and all kinds of set point temperature can be displayed clearly.
- Overheat protection due to the inner overheating thermostat.
- Separately control of water pump and water heater: power on the water pump and water heater synchronously, once the set temperature has reached, water heater will be powered off firstly, after 60s, following is water pump. The goal is to prevent heat concentration and significantly prolong water pump lifetime.
- Manual test: test the water heater and water pump are normal or not via panel button.
- Fine cast aluminum enclosure;
- Stainless steel inner pipes and sealed end closure;
- There is a water drain valve with seal ring on the bottom of the heater so as to be used when needed;
- There is one-way inlet valve on the water inlet.
- This product can work normally at -25°C temperature.

3 SPECIFICATION

Table 3 – Parameters Specification

Type	HWP40	HWP60	HWP90	HWP120
Rated Power	4000W	6000W	9000W	12000W
Rated Voltage	AC 240V	AC 420V		
Rated Current	16.7A	8.3A	12.5A	16.7A
Phase	Single phase	Three phase		
Engine Displacement (L)	15~30	25~50	50~75	75~100
Thermostat Range	Off: (5~99)°C On: (0~94)°C			
Default Thermostat Range	Off: (40±2)°C On: (25±2)°C			
Overheating Thermostat Range	Off: (95±3)°C On: (80±6)°C			
Insulating Resistance	≥50MΩ			
Electrical Strength	AC 1.5kV 1min			
Inlet/Outlet Size	3/4”(Φ19.5mm)			
Max. Water Pressure	0.5MPa			
Pump Flow Velocity	40L/min (1.5m of lift)			
Protection Level	IP44			
Vibration Resistance	(5~8)Hz Amplitude=±7.5mm Triaxial (8~500)Hz a=2g Triaxial			
Shock Resistance	Half-sine Wave; a_{peak}=50g; Triaxial			
Working Temperature	-25°C ~ +70°C			
Storage Temperature	-30°C ~ +70°C			
Case Dimensions	444mm × 270mm × 380mm			
Weight	14kg			

4 HEATER INSTALLATION

1. The power supply voltage of the engine must match the rated working voltage of the heater. It is strictly prohibited to use the heater under overvoltage condition.

2. The size of power cable should match the power required. Otherwise, it may easily lead to insufficient power, cable overheating, electrical fire and other dangerous situations.

3. The antifreeze/coolant used should be clean and free of sand or other impurities to reduce wear on the heater.

4. The heater should be isolated from the engine vibrations, because the engine vibrations may damage the heater. Do not directly install the heater on the engine. If the heater is installed with rigid fittings, a flexible hose is required to connect the water inlet and outlet of the engine to isolate the heater from the vibrations.

5. The height difference between water inlet and outlet of the engine should be more than 20 cm.

6. Before wiring, repairing, venting or cleaning the heater, the power supply must be turned off. Otherwise, it may cause harmful or fatal electric shock.

7. Users should select a suitable main power circuit breaker according to the power of the heater to ensure effective overcurrent protection for the heater. It is recommended to connect this heater to a circuit breaker with a rated load of 125% of the system's maximum load.

8. When using the heater, safety operation procedures must be followed. Any modification to the heater is not allowed. If the customer needs extra modification and the modification does not affect the safety of the heater, they can send application to SmartGen. With SmartGen's approval, professional technicians will be assigned to guide the modification.

9. Please install the heater vertically according to the diagram before use. Pay attention to the direction of the water inlet and outlet of the heater, connect the pipes/hoses correctly, open the valves of the water inlet and outlet of the heater, and manually vent the excess air through the vent valve of the water pump. When the heater is running, the heating chamber and pipes must be filled with antifreeze/coolant. Do not operate the heater without water or without water fully filled, otherwise it will cause damage to the heater.

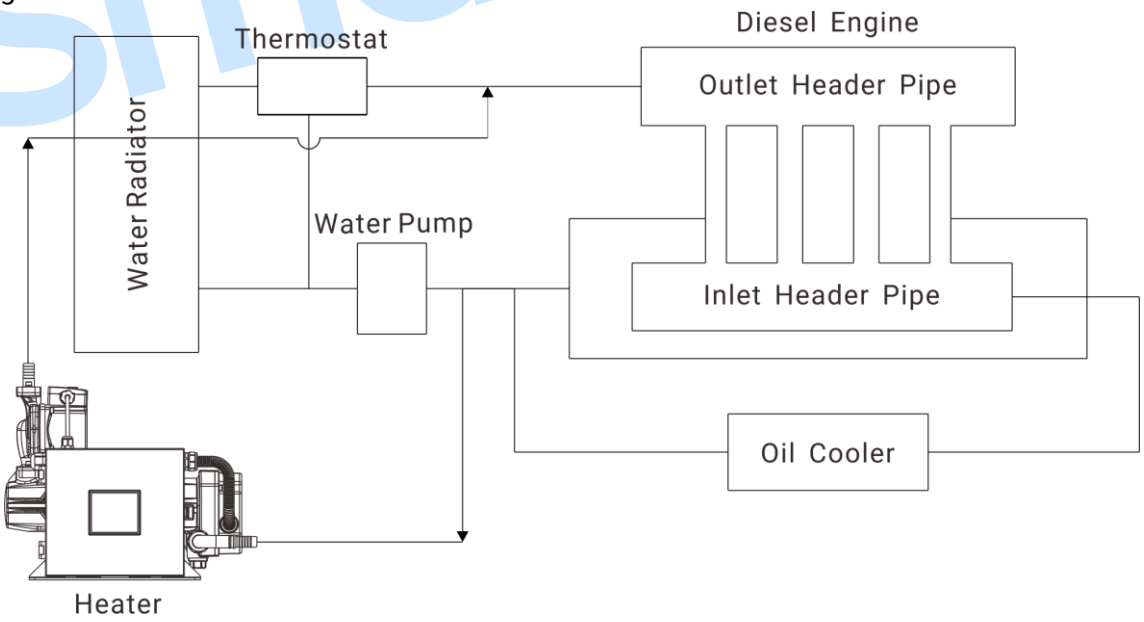


Fig.1 - Installation Plane Schematic

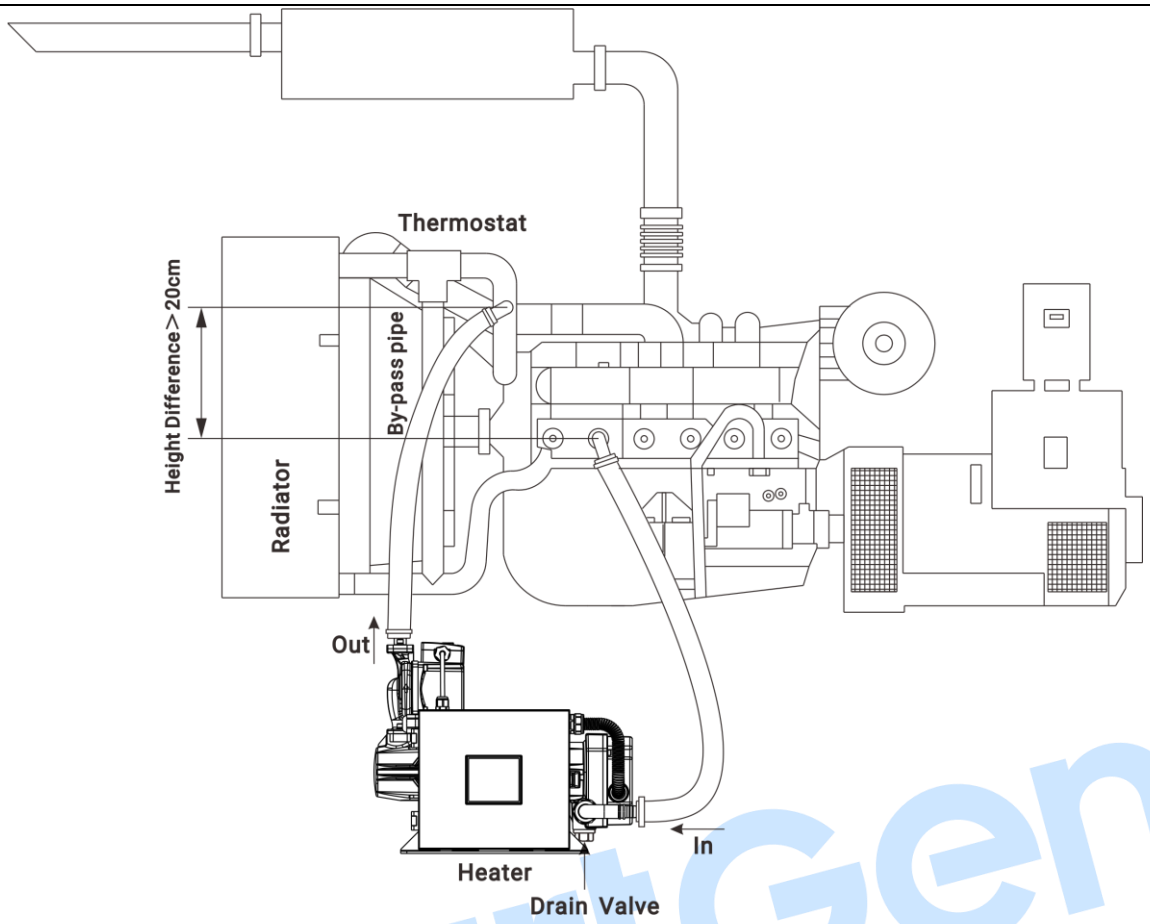


Fig.2 – Installation Side Schematic

Fig. 3 – Incorrect Pipe Connection Methods

NOTE: If there is a W-shaped bend or reverse U-shaped bend during pipe connection, the air accumulated in the pipe cannot be discharged normally, resulting in the liquid cannot be circulated properly. The air dissolved in the liquid will be precipitated during heating and retained in the bend, so on the condition of unsmoothed pipeline, even if by the manual exhaust, it will repeat in the next heating process of air collection. To ensure that the smooth liquid circulation, the hosepipe with an inner diameter of more than 20mm and pipe joints with an inner diameter of more than 15mm should be selected.

10. Check if there is any leakage in the connecting pipes/hoses. If necessary, tighten the pipe connection. Untight pipe connection will cause loss of antifreeze and cavitation in the water pump, and may also allow air to enter the heating chamber, which will lead to heater fault.

11. Power on the heater and monitor its operation. Place your hand on the heater shell and the outlet pipe to check for hot spots. If the temperature is more than or equal to 60°C, it may be due to remaining air in the heating chamber. It needs to stop the heater immediately and vent the remaining air from the pipes and the heater.

12. Turn on the power and observe if the temperature of the heater displayed increases steadily. If

there is a large temperature change, please stop the heater and check if the antifreeze valve in the pipe is open or if there is excess air in the pipe.

13. Use a clamp meter to test if the current matches the power of the heater being used. If the power is too low, it may be due to excessive voltage drop caused by a long cable, which affects the heater's power. Users can solve this problem by replacing the power cable with a larger conductor size.

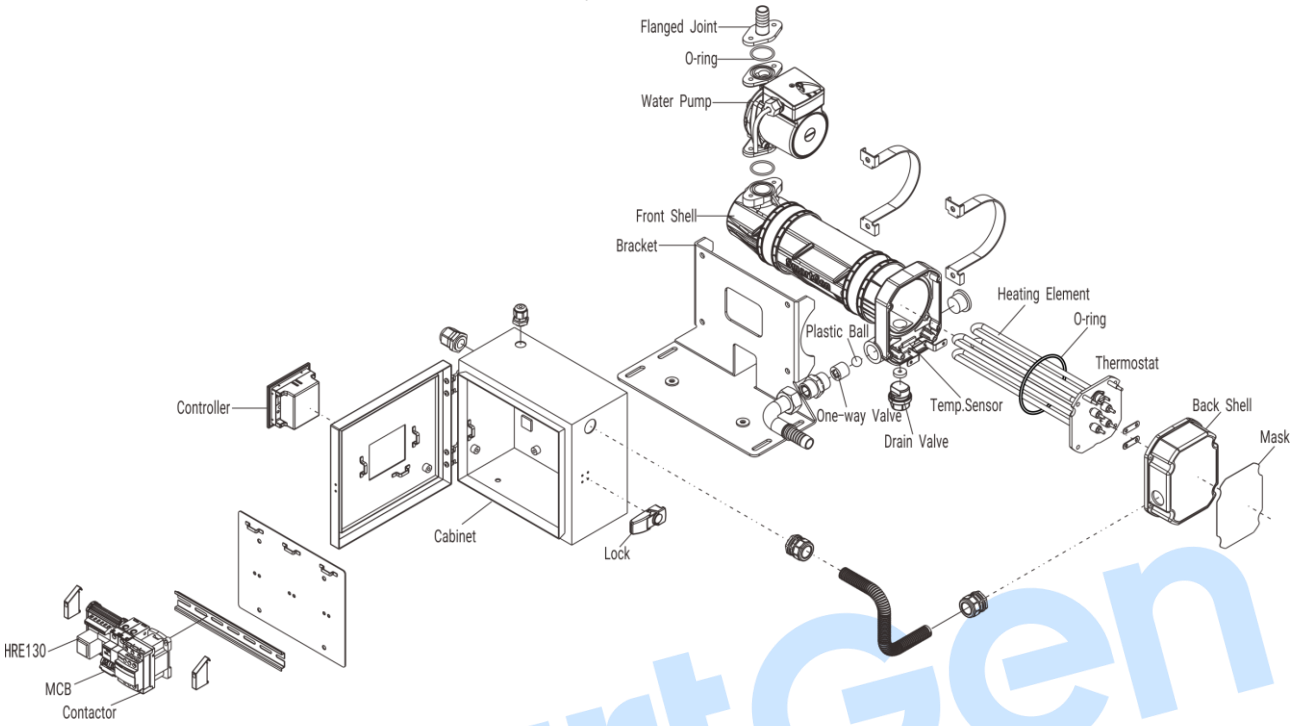


Fig. 4 – Assembly Structure

5 OPERATING INSTRUCTIONS

5.1 PANEL AND BUTTON

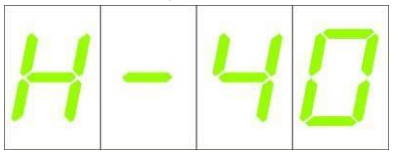
Table 4 – Panel Display and Buttons

Button	Definition	Description
	Test	Pressing this button will test-run the machine.
	Lamp Test	All indicators will be illuminated when the button is pressed.
	Set	Using this button you can set the temperature value.
	Turn Page	Using this button you can scroll pages of the LED Nixie Tube; and adjust the value.

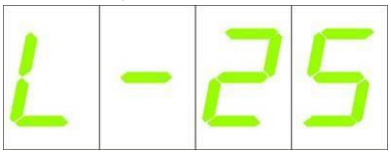
5.2 DISPLAY DESCRIPTION

The heater is heating on when the "Heating" indicator is illuminated while the thermostat is off and the heater stops heating when the "Overheat" indicator is flashing.

Temp. Display: OFF

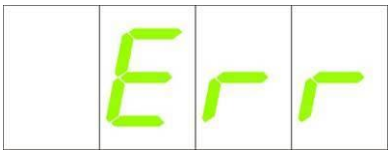


Temp. Display: ON



Temp. Display: Current Temp.

Alarm: Sensor Abnormal



5.3 PANEL DESCRIPTION

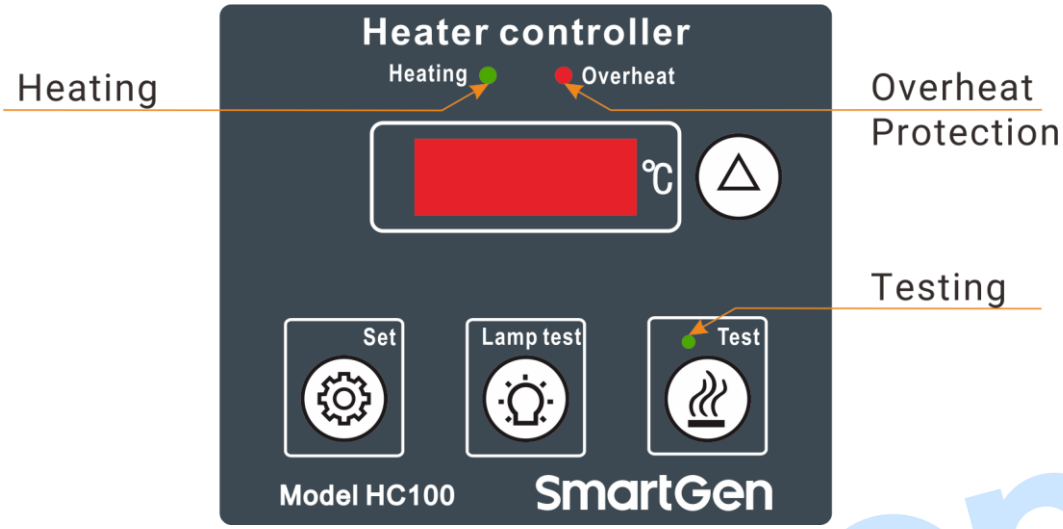


Fig.5 – Operation Panel Drawing

5.4 OPERATION DESCRIPTION

★Page Scroll (△)

Using this button you can scroll pages of the LED Nixie Tube and adjust the value.

★Test(♨)

If the water temperature has exceeded the preset “ON” temperature, pressing this button will test-run the heater, after 3s, it turns into Auto mode automatically.

★Lamp Test(☼)

All indicators will be illuminated when the button is pressed.

★Set(⚙)

Pressing this button will enter into setting interface, as shown: 

(Letter “H” means that it is the preset “OFF” temperature, here we take 40°C as example)，the first digital is flashing and you can adjust it by pressing △ button. Then press ⚙ button, the second digital will flash and the adjust way is same as the first digital. Press ⚙, as shown: 

(Letter “L” means that it is the preset “ON” temperature, here we take 25°C as example)，the first digital is flashing and you can adjust it by pressing △ button. Then press ⚙ button, the second digital will flash and the adjusting way is same as the first digital. After doing these, press ⚙ button, the LED will back the current temperature. All the adjustment should be saved and not lost even when power is off.

6 USE AND MAINTENANCE

Before starting the machine, ensure that all the air is exhausted out of the heater and it is topped off with coolant, and make sure that the pump is full of coolant by using vent valve.

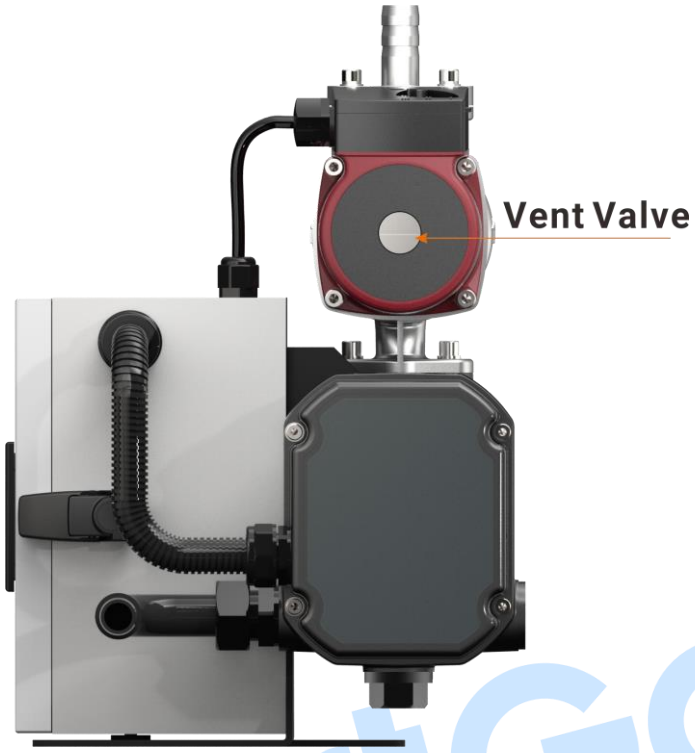


Fig.6 – Vent Valve Indicating Diagram

NOTE: If water is used, please drain it off when the ambient temperature is below 0°C. The heater will be damaged if the water in the heater is frozen.

It is highly recommended to use corresponding antifreeze with the correct specification. If tap water or river water is used, it will cause scaling on the surface of the heating element and shorten the life of the heater.

Drain valve: Can be opened or closed using hexagonal tools.

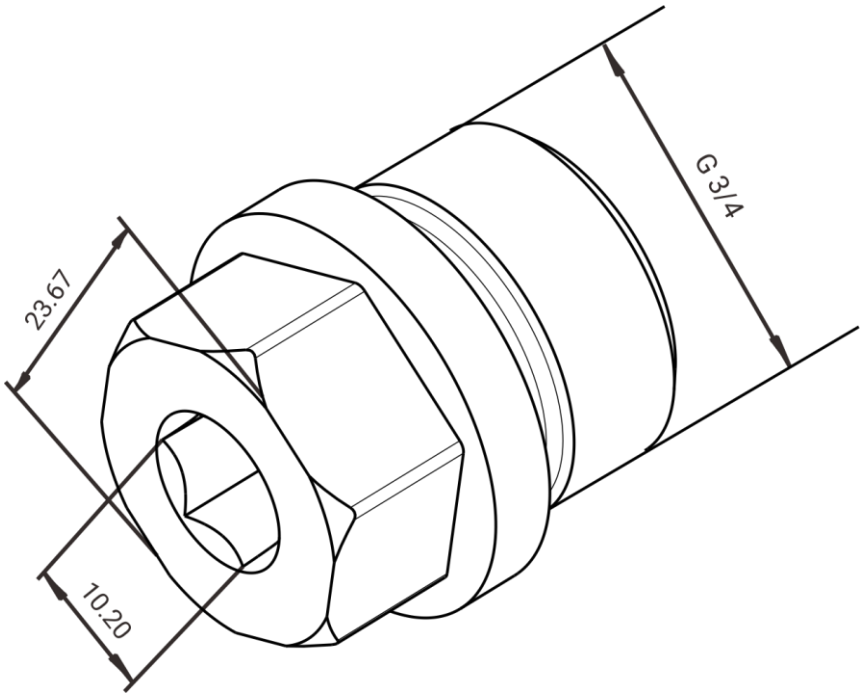


Fig.7 – Water Drain Valve (Unit: mm)

Table 5 – Common Faults and Solutions

No.	Faults	Analysis	Solutions
1	Overheat protection	Check the valve to assure whether it is opened and whether the heater is full of water.	Shorten the hosepipe length and optimize the hosepipe trend.
		Check whether the hosepipe has an obvious W-shaped or reverse U-shaped trend, and whether there is an obvious hot and cold alternating area.	
2	High water outlet temperature	It occurs when the hosepipe is too long, both the inner diameter of the hosepipe and the inner diameter of the fitting joints are too small, as well as the water flow is not smooth so that the heat cannot be transferred properly.	Shorten the hosepipe length, using the hose with an inner diameter of more than 20mm, and the connectors with an inner diameter of more than 15mm.
3	Unable to reach the preheating temperature	The heater power is not enough	Replace the heater whose power matches the engine.
		The cable of the power supply is too long and result in dividing resistance of the cable.	Shorten the power cable as possible and using the cables that match the heater power.

7 CONNECTIONS

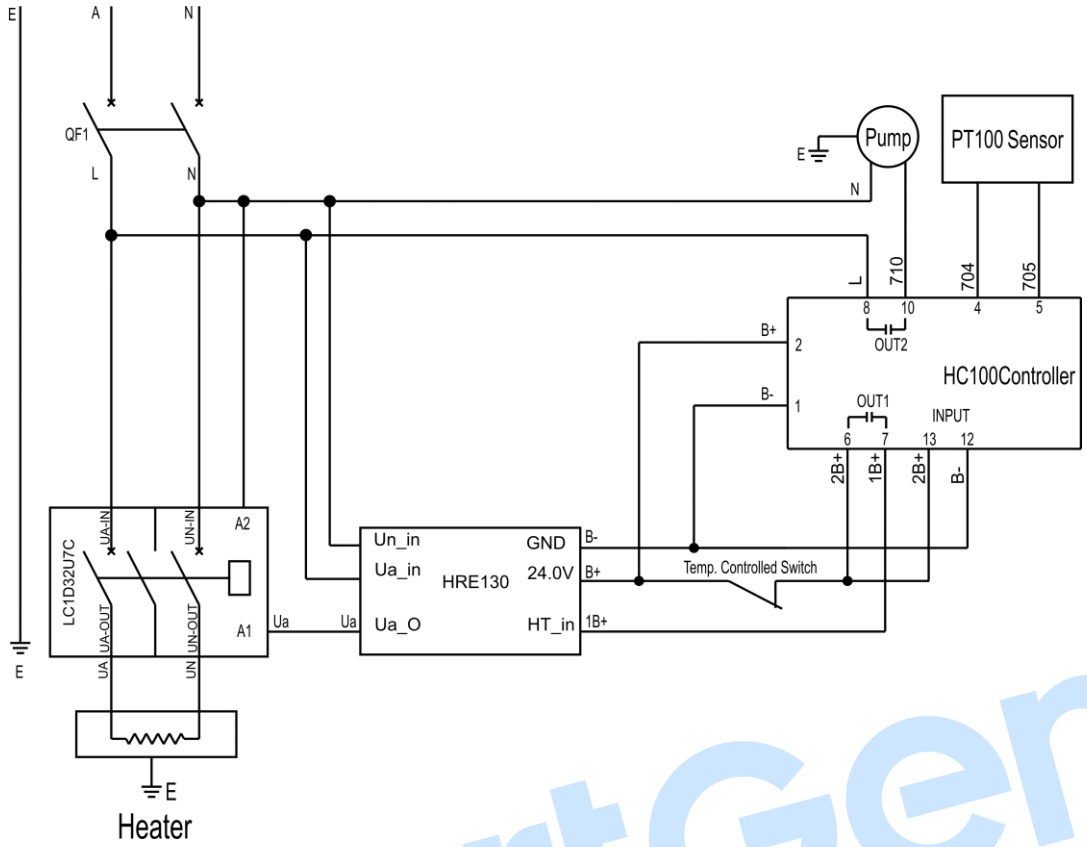


Fig.8 – HWP40 Wiring Diagram

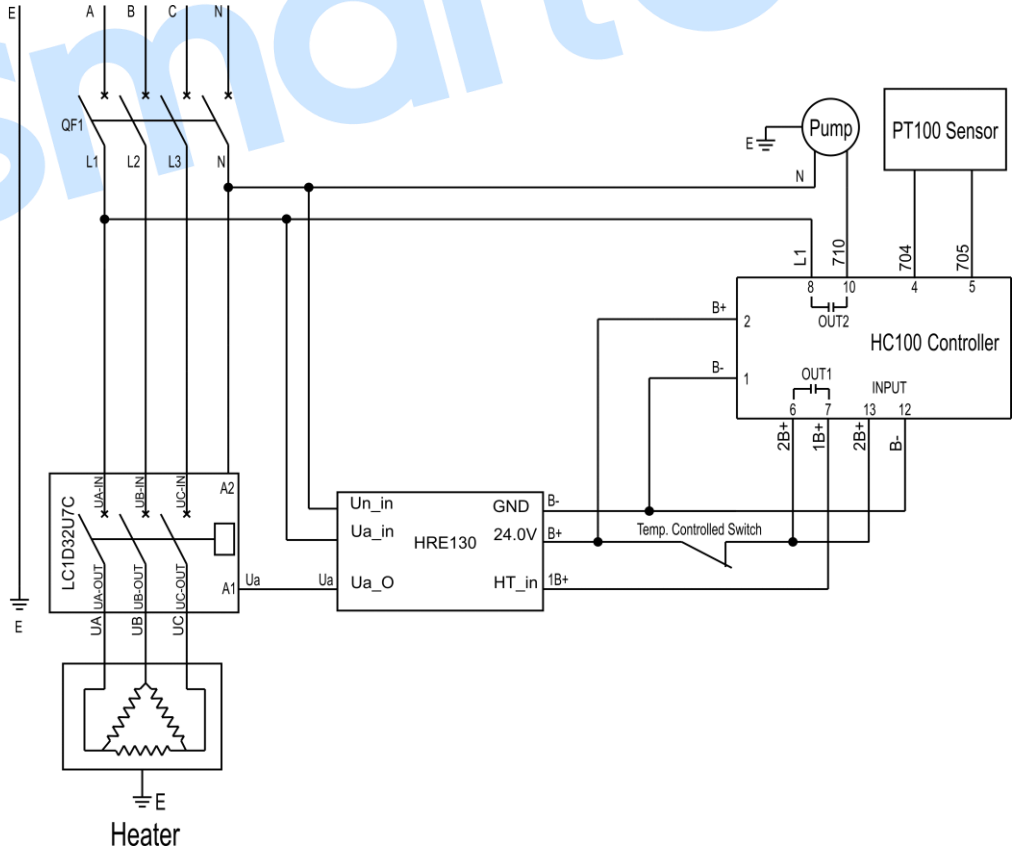


Fig.9 – HWP60/HWP90/HWP120 Wiring Diagram

Using 4mm^2 power line for tie-in. Earth line must be soundly connected to earth.

8 CASE AND DIMENSIONS

Unit: mm

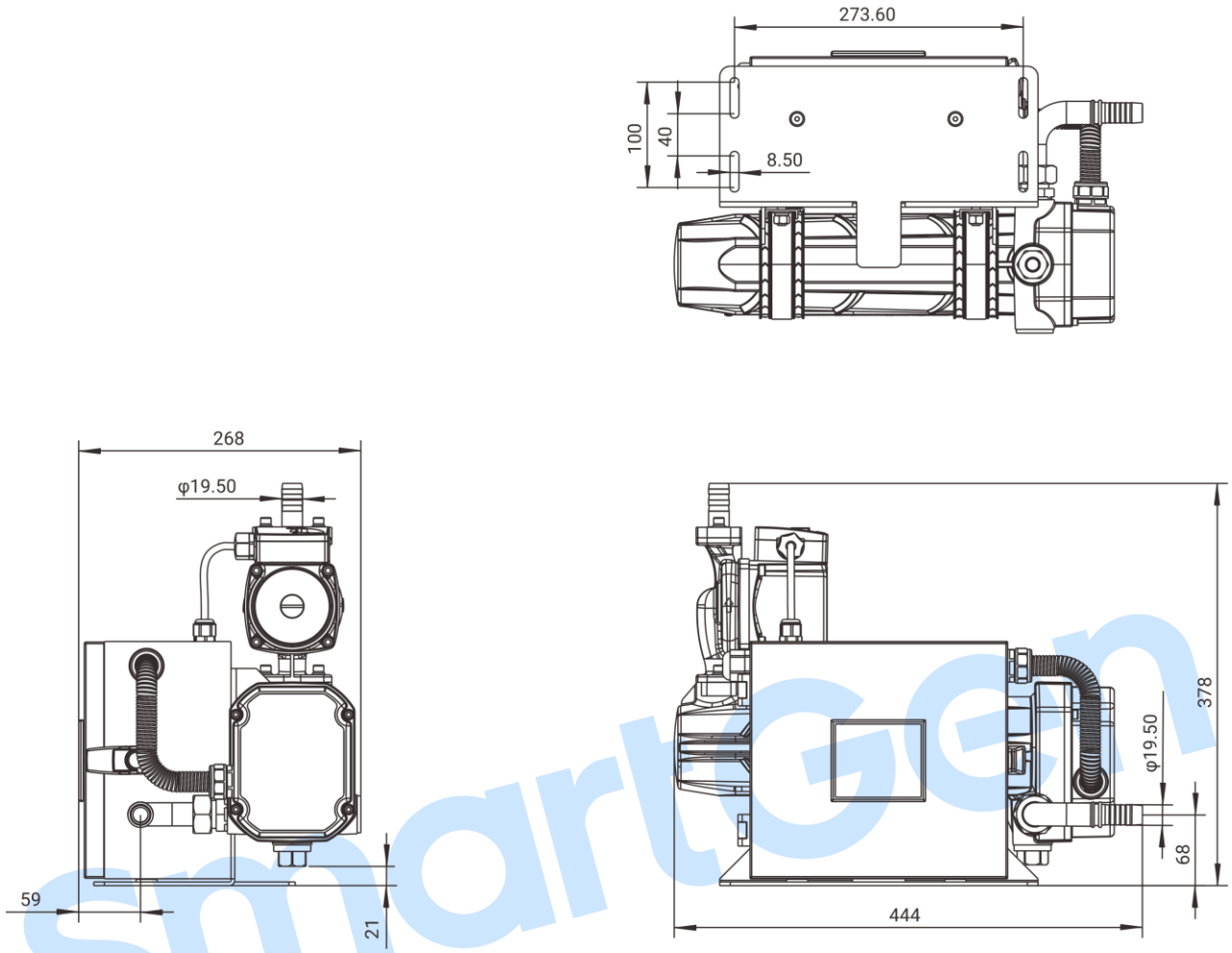


Fig.10 – Overall Dimensions

NOTE: all the inlets/outlets connectors are Pagoda-shape (barb type).

9 DISCLAIMER

The manufacturer shall not be responsible for the damage to the heater and other related problems caused by the following reasons during the user's operation:

1. Add antifreeze that is not suitable for the ambient temperature as the circulation medium, which results in the freezing and damage of the heater.
2. Unauthorized disassembly, repair or modification of the heater, which causes heater damage or fault.
3. Improper installation during use, which results in heating without water, and causes damage to the pump impeller and the heater.
4. Failure to open the inlet and outlet water valves or pipeline blockage, which results in poor water flow and heater damage or fault.
5. Damage to the pump and the heater caused by not qualified antifreeze which contains sand or other impurities.
6. Irreversible damage to the product caused by overvoltage use.