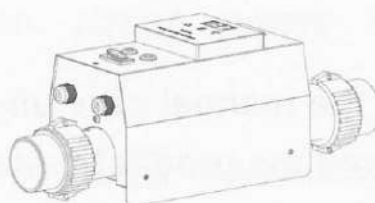
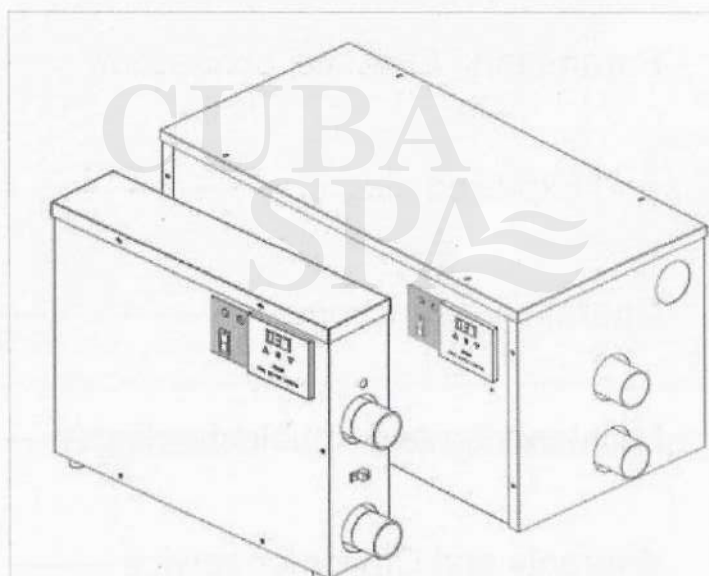


ST and PHS series

CT, CST and CPHS series

POOL Heater

User Manual



- Multiple models
- Multi-functions
- Easy to operate
- Perfect for large swimming pool and small SPA hot tubs.

Thank you for purchasing ST, PHS, CT, CST and CPHS series Pool heater which is reliable, efficient and easy to operate. This product is perfect as part of a circulation system of hot spring bathing or hot tubs with pumps, and is used to heat up water or maintain water temperature.

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Please read through the manual carefully before installation and operation to understand the product better. Keep this manual well for further reference.

NOTICE:

- CT,CST,CPHS series are with circulation pump control system;
- ST, PHS series DO NOT have circulation pump control system;
- Please notice the difference before install the product.

Chapter 2 Installation Instructions

1. Installation site

This product can be installed indoors or outdoors, fixed on a smooth and flat surface. Refer to diagram 1 for correct installation and connection with the filtration system. Leave at least 200-300 mm space above and around the heater for maintenance and repair.

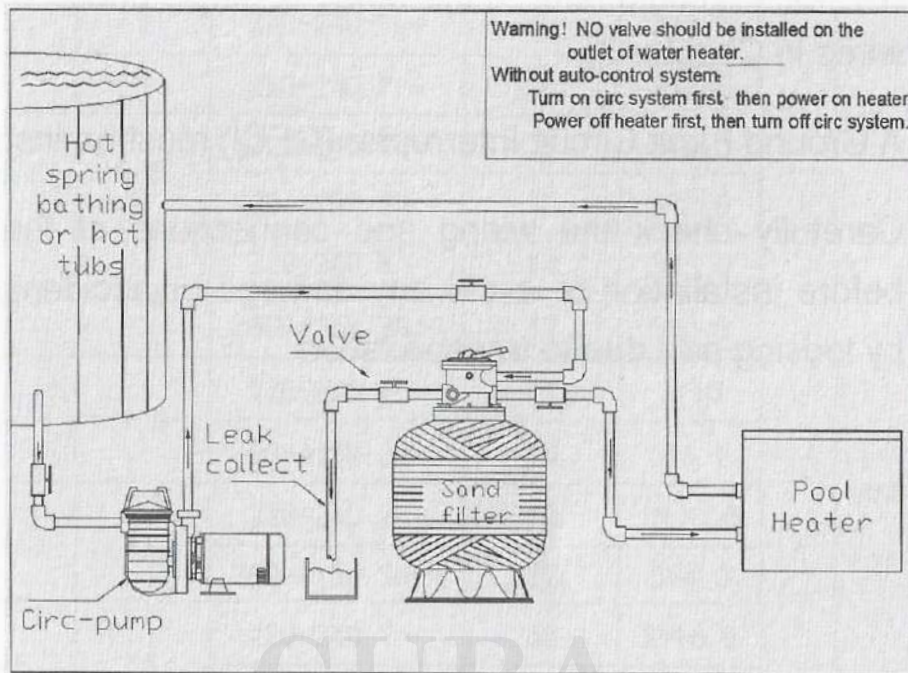


Diagram 1: Plumbing connection

2. Important:

- SHUT OFF the power supply before installation or maintenance.
- The power supply must be in accordance with the parameters on the nameplate.
- Inlet water pressure should be less than 0.2MPa.
- Proper grounding is important. Make sure to connect the ground wire to the terminal labeled as $\perp$.
- The product can only be installed and repaired by licensed professionals, complied with local electrical codes and

instructions in this manual.

- The power supply must be single phase with three wires (L,N, ) or three-phase with five wires (L1,L2,L3,N, ). The heater can be connected to 220 - 240 VAC 50/60Hz or 380 - 415V 3N~ 50/60Hz power supply. Connection of 220 - 240V (L1, L2, ) could refer to the wiring of single phase with three wires in Chapter 3.
- A Ground Fault Circuit Interrupter (GFCI) must be installed.
- Carefully check the wiring and connections of the heater before installation to avoid any damage or accident caused by loosening part due to transportation.

Chapter 3 Parameter, Electrical wiring and Exploited diagram

Model	POWER kW	Voltage V (50/60Hz)	Current A	Wire N*mm ²	Pi pe	Dimension mm	
CT-2	2	220-240 V~	2	3*2.5	1" /2" "	398*120*152	
CT-3	3	220-240 V~	3	3*2.5			
(C) ST-5.5	5.5	220-240 V~	25	3*6.0		450*105*355	
		380-415V 3N~	9	5*2.5			
(C) ST-7.5	7.5	220-240 V~	34	3*6.0			
		380-415V 3N~	12	5*2.5			
(C) ST-9	9.0	220-240 V~	41	3*10			
		380-415V 3N~	14	5*6.0			
(C) ST-11	11	220-240 V~	50	3*10.0			
		380-415V 3N~	17	5*4.0			
(C) ST-15	15	220-240 V~	68	3*16.0			
		380-415V 3N~	23	5*6.0			
(C) ST-18	18	220-240 V~	82	5*6.0			
		380-415V 3N~	28	5*6.0			
(C) PHS-18	18	380-415V 3N~	28	5*6.0		606*330*330	
(C) PHS-21	21	380-415V 3N~	32	5*6.0			
(C) PHS-24	24	380-415V 3N~	37	5*10.0			
(C) PHS-30	30	380-415V 3N~	46	5*10.0			
(C) PHS-36	36	380-415V 3N~	55	5*16.0	2"		
(C) PHS-42	42	380-415V 3N~	64	5*16.0			
(C) PHS-45	45	380-415V 3N~	68	5*16.0			
(C) PHS-48	48	380-415V 3N~	73	5*25.0			
(C) PHS-54	54	380-415V 3N~	82	5*25.0			

Table 1 Parameters

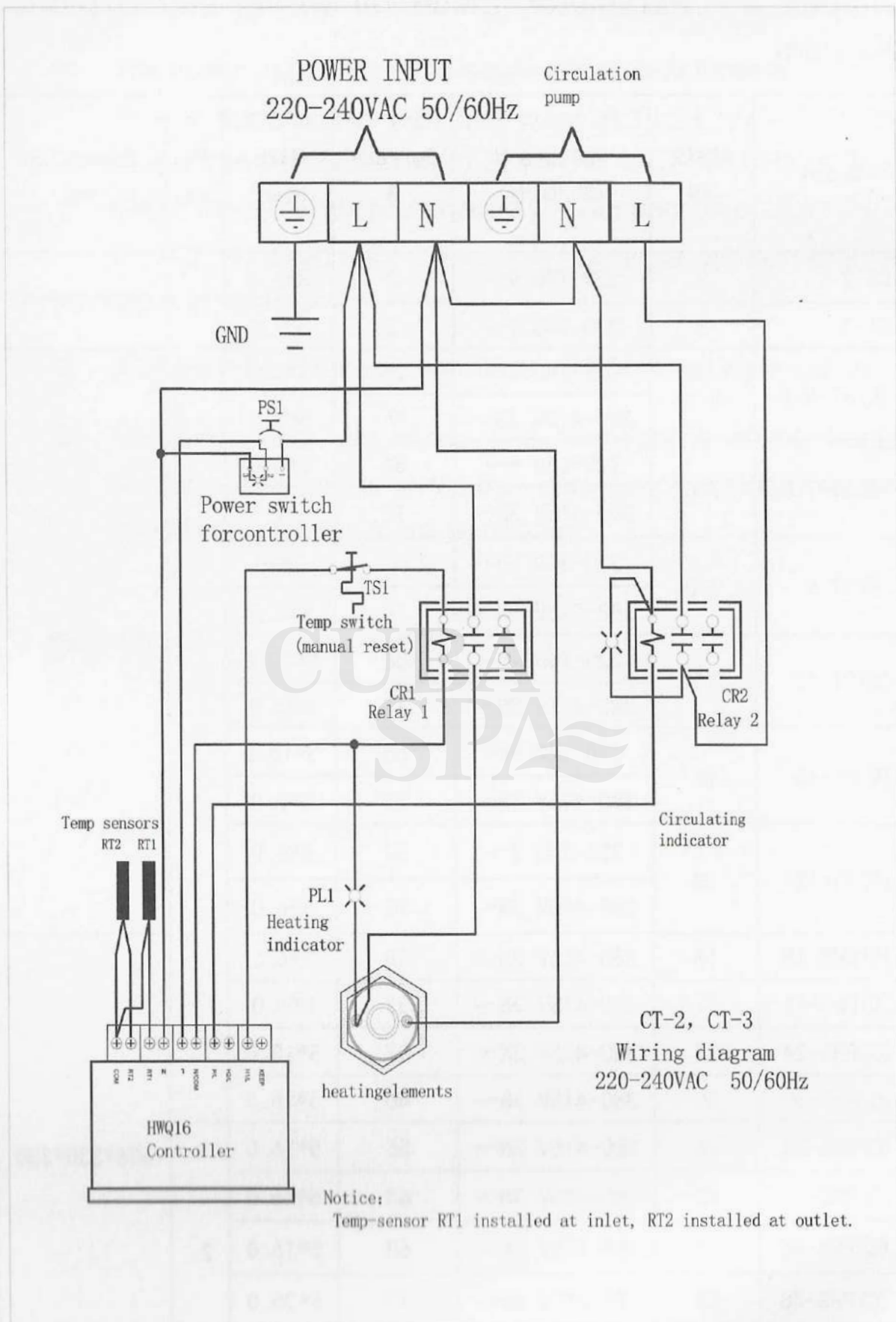
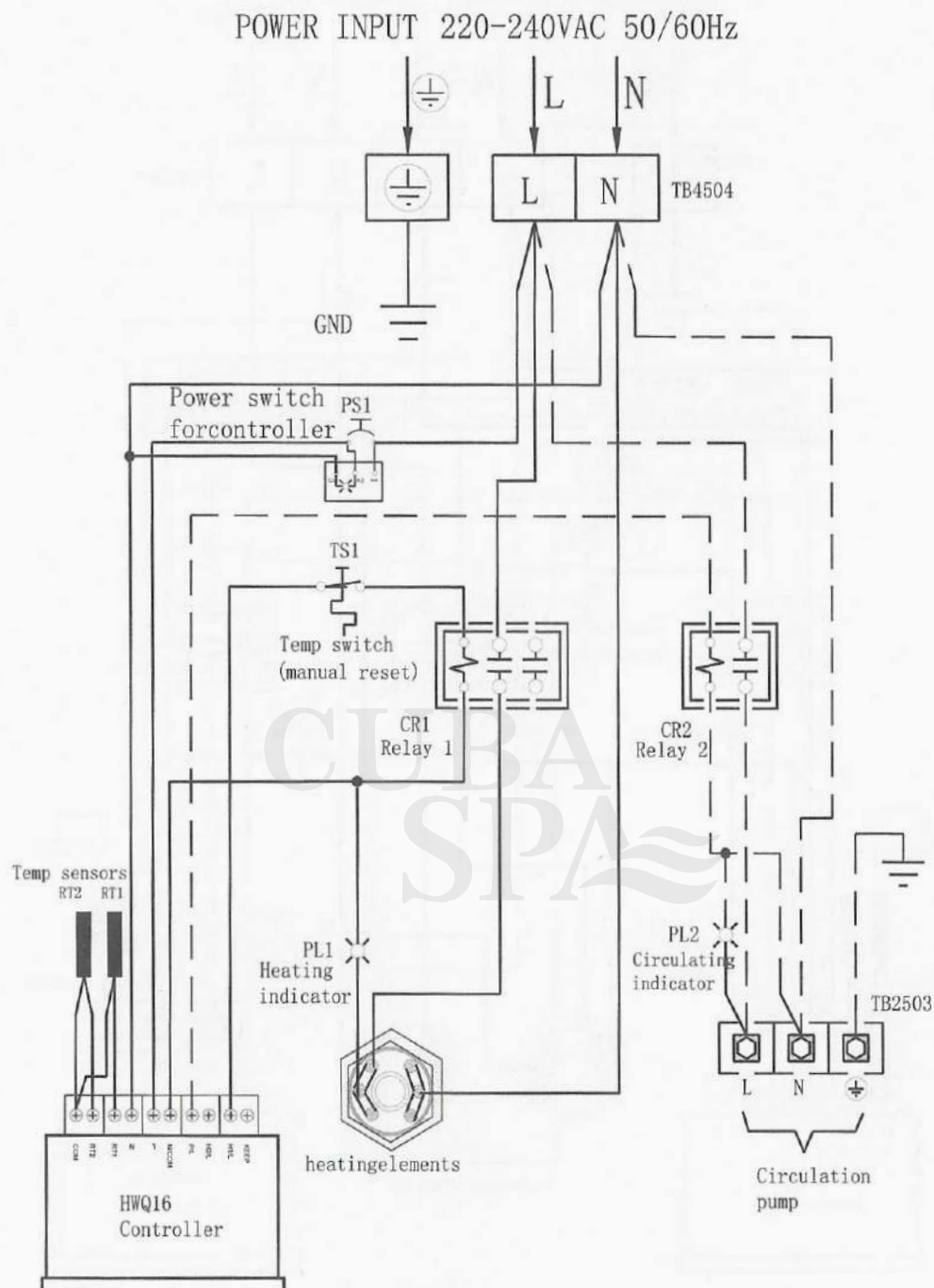


Diagram 2 CT-2, CT-3 Wiring

(220-240VAC 50/60Hz)



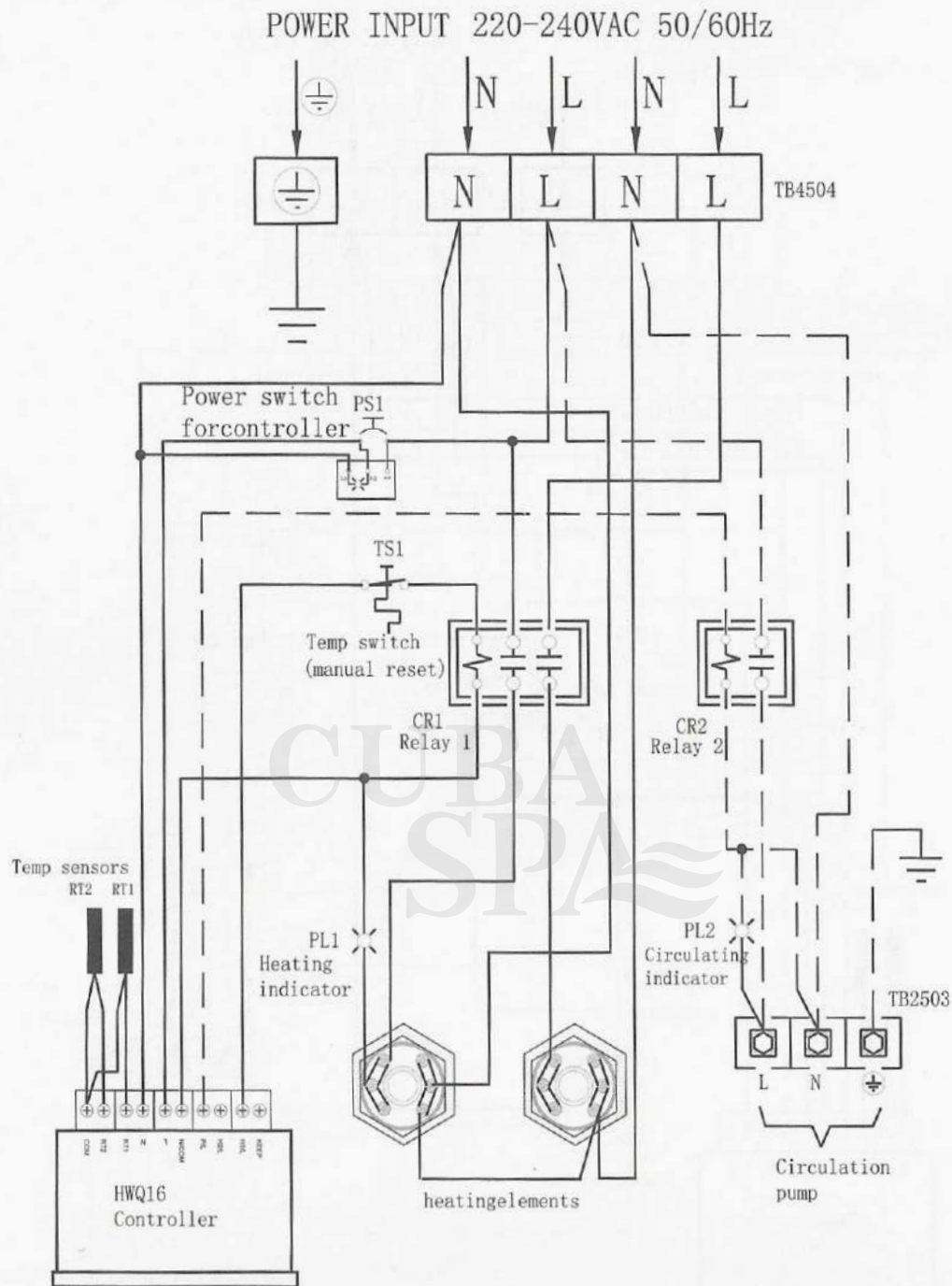
Notice:

1. Temp-sensor RT1 installed at inlet, RT2 installed at outlet. CST-5.5, CST-7.5, CST-9.0
2. For ST, PHS series heater, clients have to install a separate control system for circulation pump control. ST-5.5, ST-7.5, ST-9.0
3. CT, CST and CPHS series heater includes the circulation pump control system (Dashed line part in the diagram), client just need to connect their circulation pump to the terminal TB2503.

Wiring diagram
220-240V 50/60Hz

Diagram 3 (C)ST-5.5, (C)ST-7.5, (C)ST9.0, Wiring

(220-240VAC 50/60Hz)



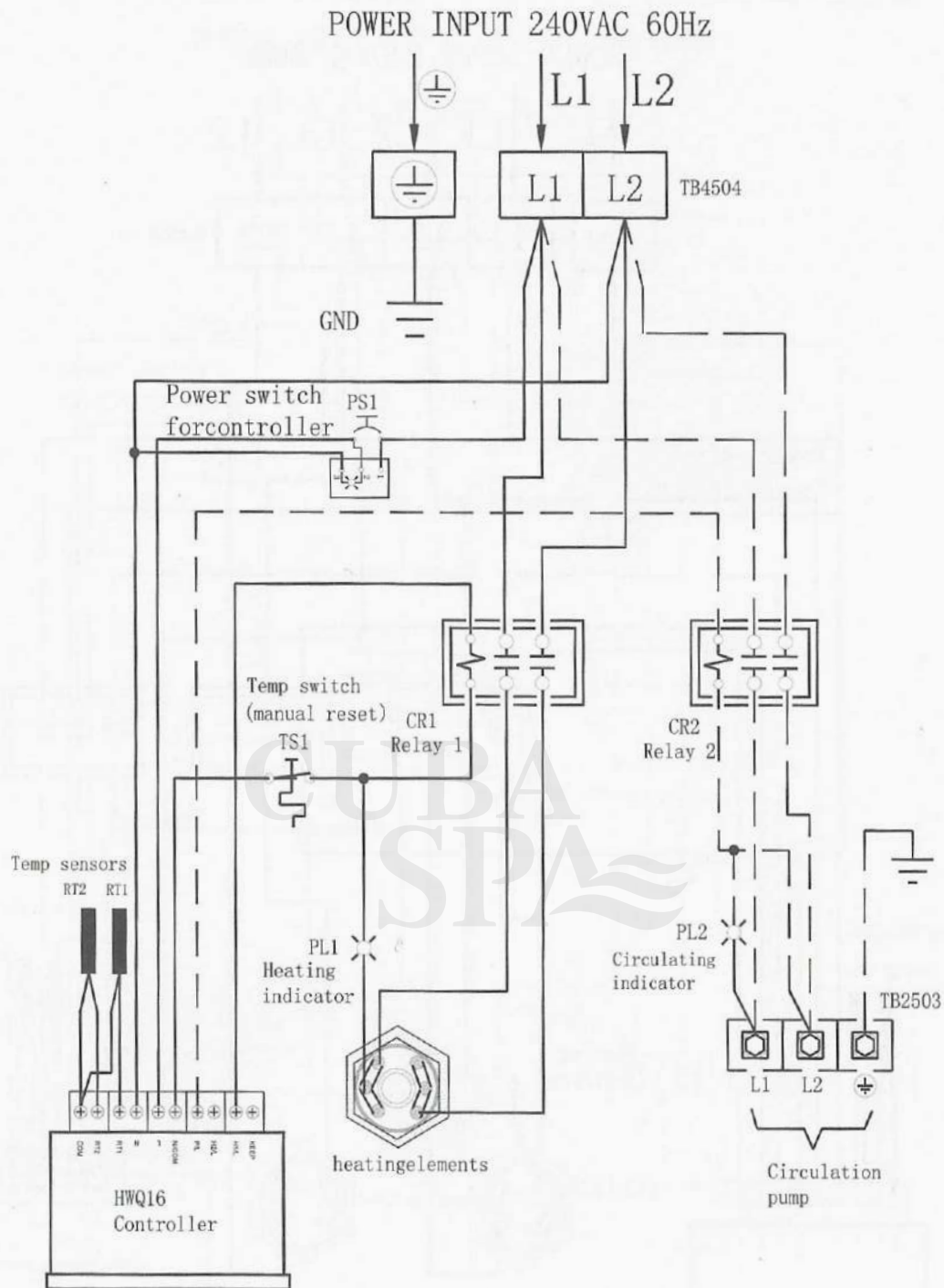
Notice:

1. Temp-sensor RT1 installed at inlet, RT2 installed at outlet.
2. For ST, PHS series heater, clients have to install a separate control system for circulation pump control.
3. CT, CST and CPHS series heater includes the circulation pump control system (Dashed line part in the diagram), client just to need to connect their circulation pump to the terminal TB2503.

CST-11, CST-15, CST-18
ST-11, ST-15, ST-18
Wiring diagram
220-240V 50/60Hz

Diagram 4 (C)ST-11, (C)ST-15, (C)ST-18 Wiring

(220-240VAC50/60Hz)



Notice:

1. Temp-sensor RT1 installed at inlet, RT2 installed at outlet.
2. For ST, PHS series heater, clients have to install a separate control system for circulation pump control.
3. CT, CST and CPHS series heater includes the circulation pump control system (Dashed line part in the diagram), client just to need to connect their circulation pump to the terminal TB2503.

CST-5.5, CST-7.5, CST-9.0
ST-5.5, ST-7.5, ST-9.0

Wiring diagram
240V 60Hz

Diagram 5 (C)ST-5.5, (C)ST-7.5, (C)ST-9.0 Wiring

(240VAC 60Hz)

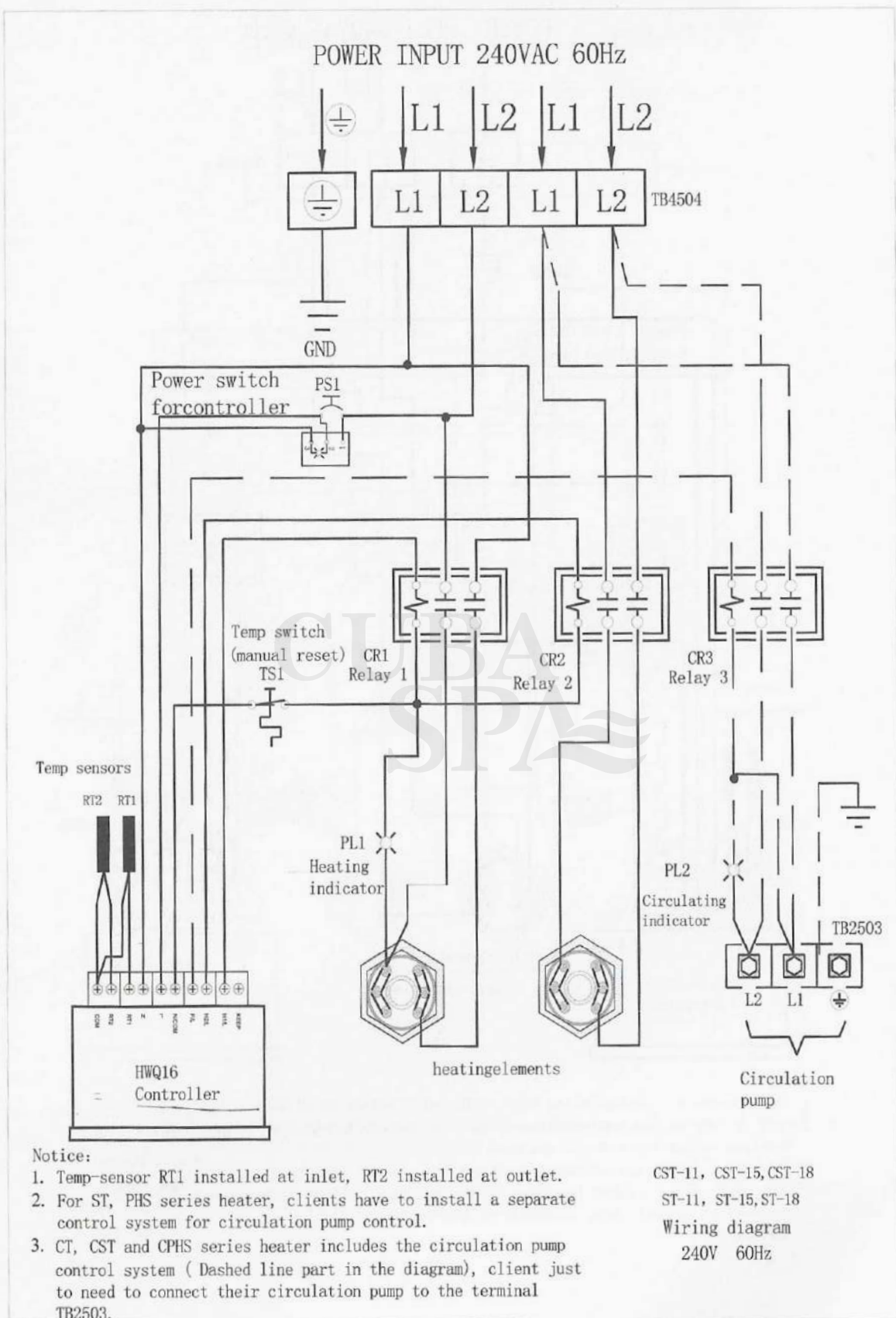
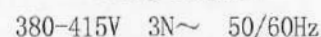
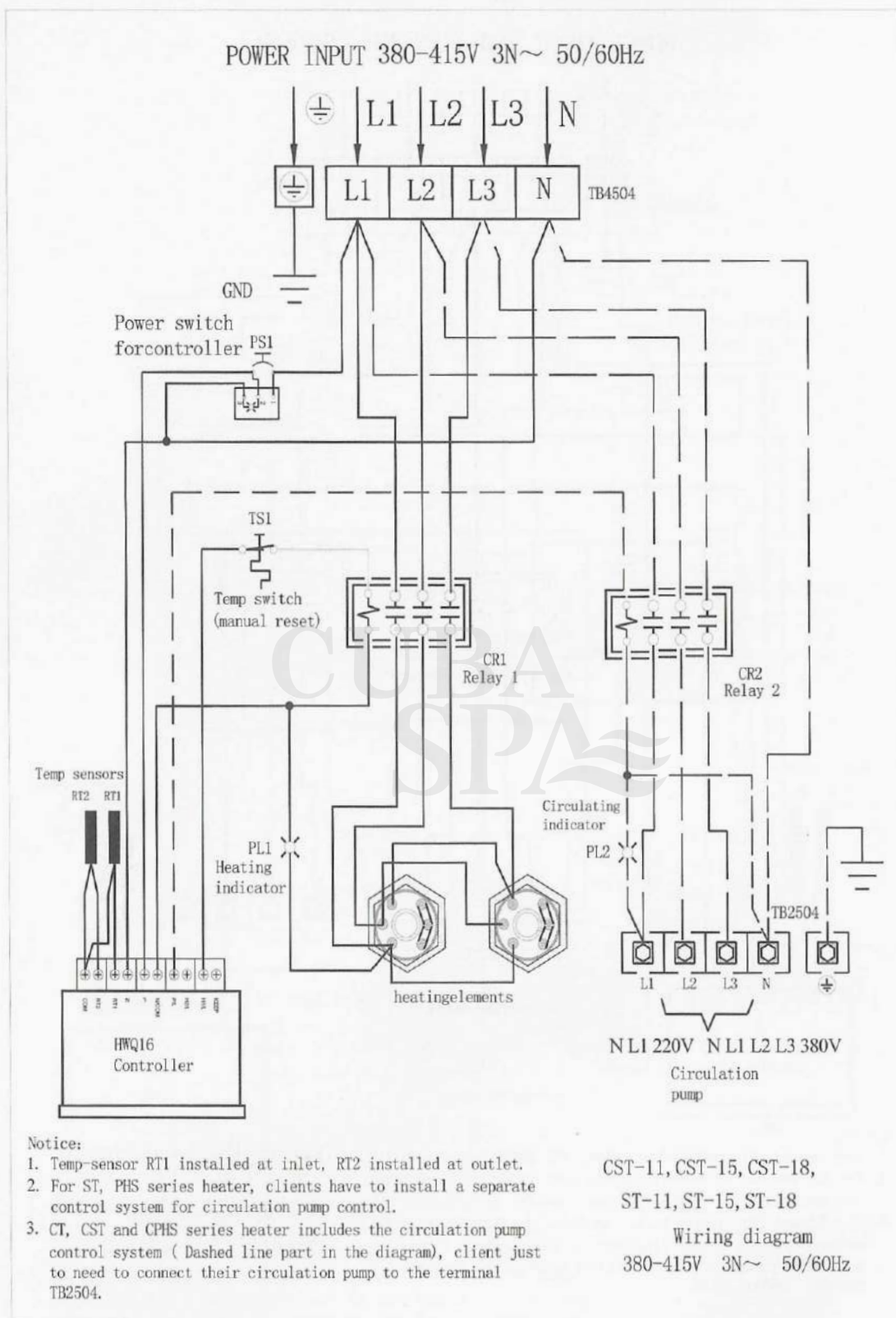


Diagram 6 (C)ST-11, (C)ST-15, (C)ST-18 Wiring

(240VAC 60Hz)



(380-415V 3N~ 50/60Hz)



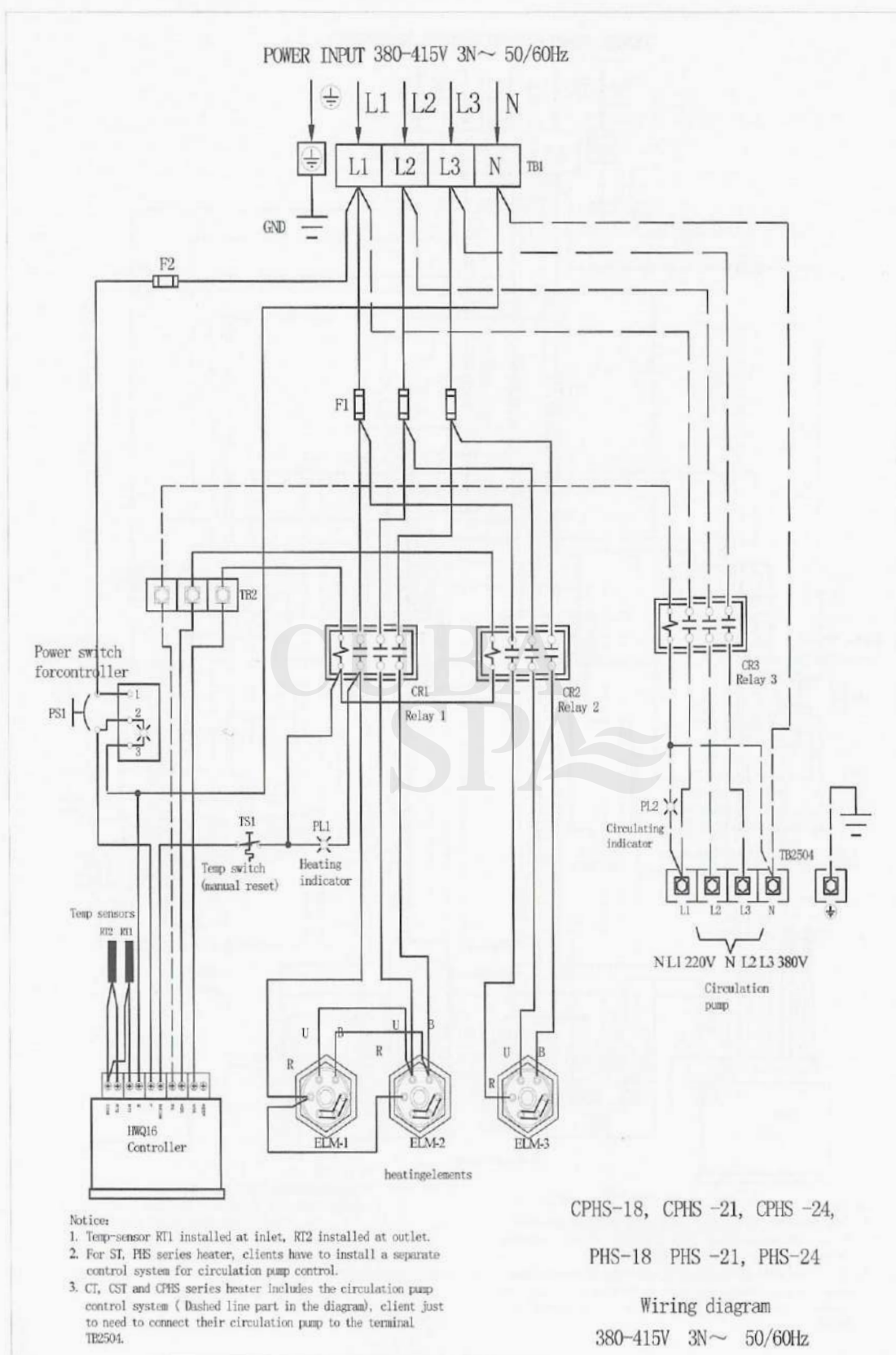


Diagram 9 (C)PHS-18,(C)PHS-21, (C)PHS-24

(380-415V 3N~ 50/60Hz)

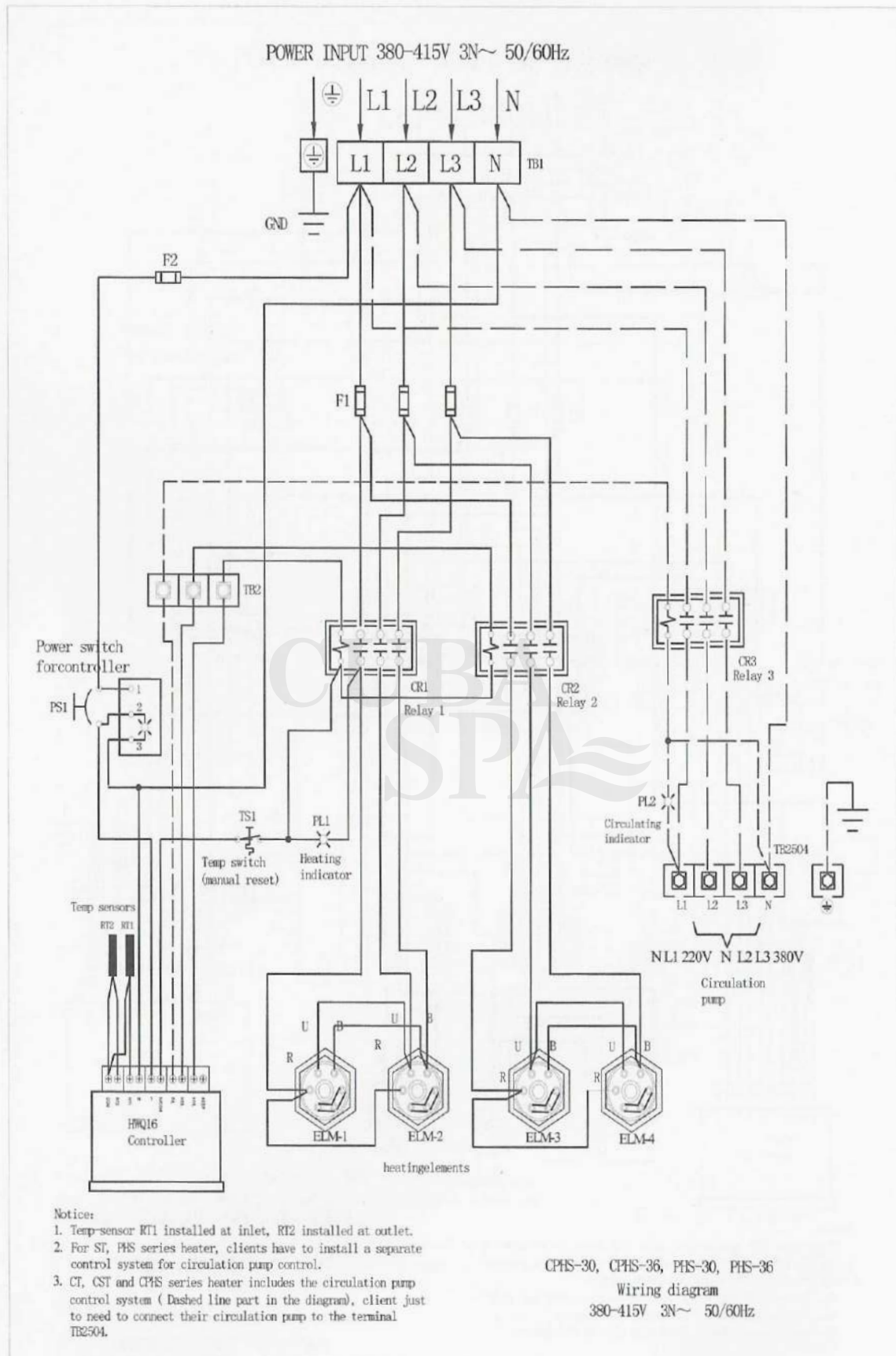


Diagram 10 (C)PHS-30, (C)PHS-36 Wiring (380-415V 3N~ 50/60Hz)

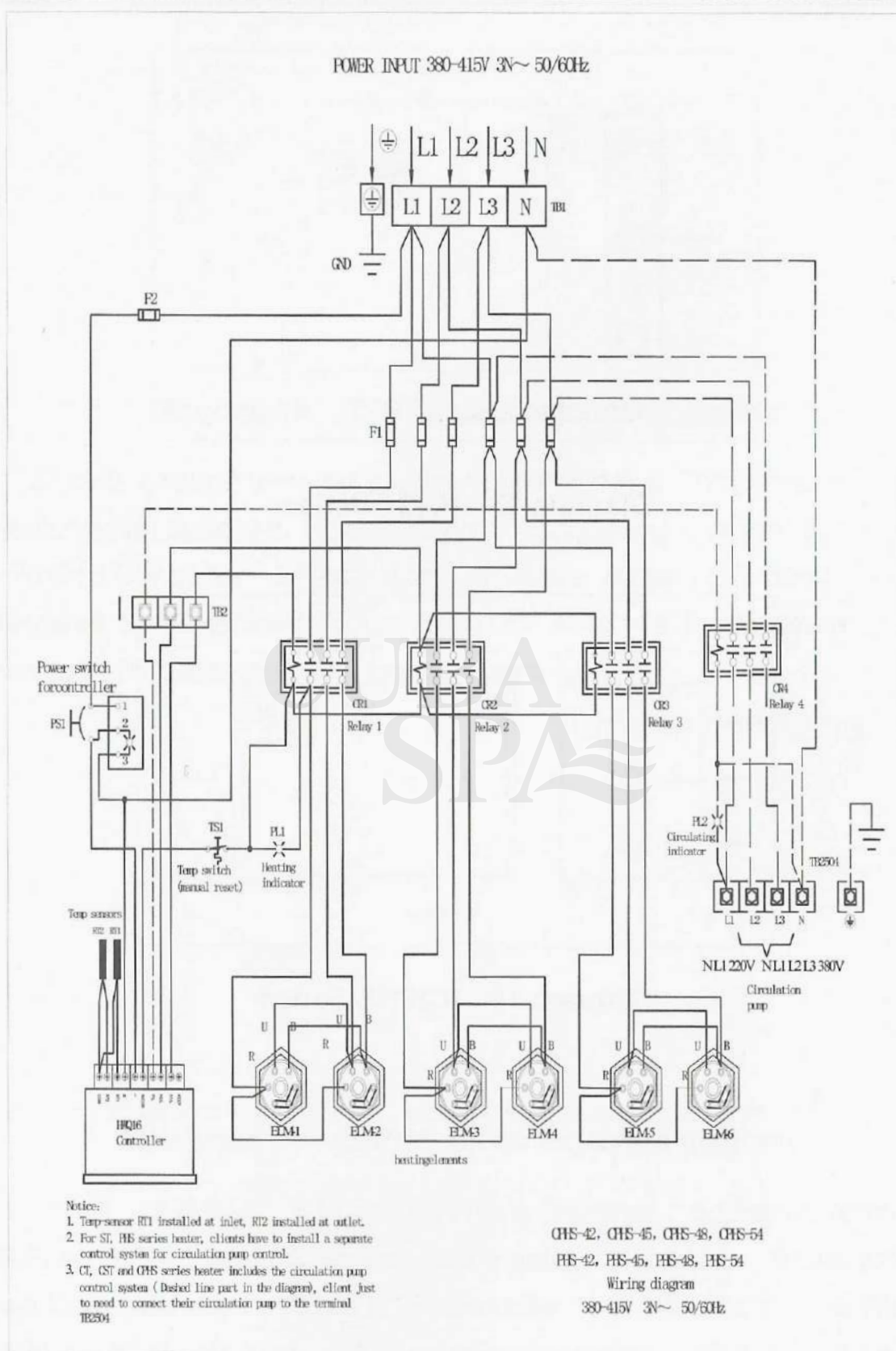
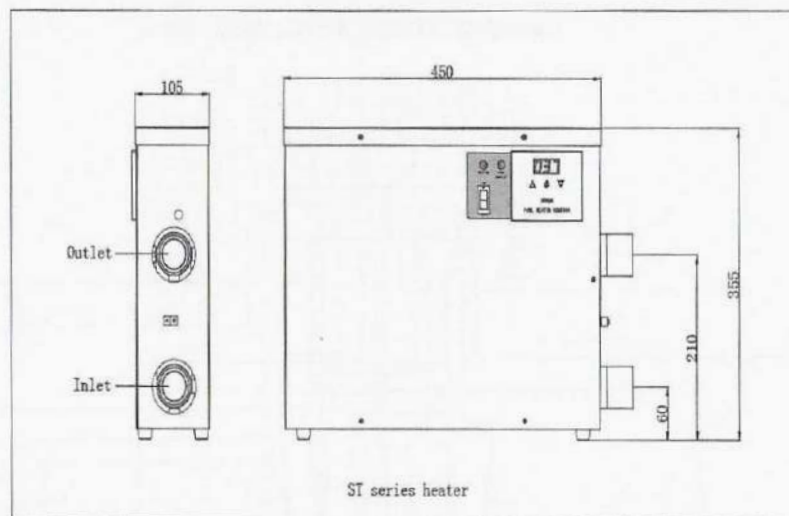
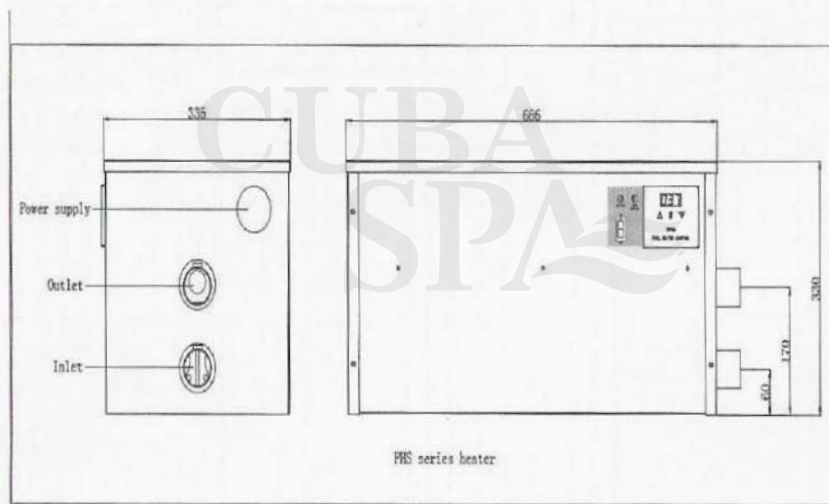
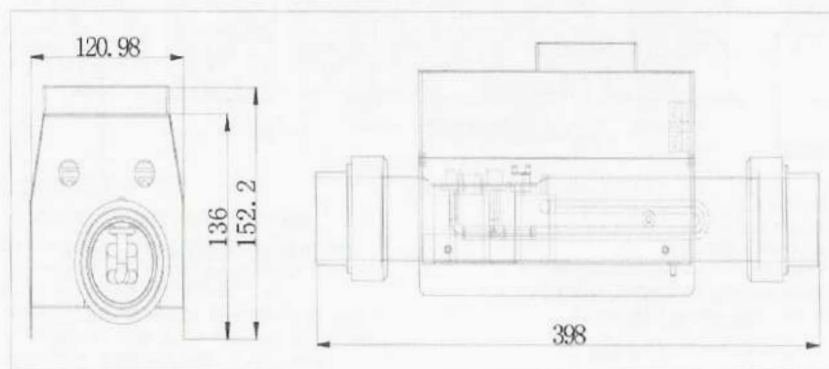


Diagram 11 (C)PHS-42, (C)PHS-45, (C)PHS-48, (C)PHS-54, Wiring
(380-415V 3N~ 50/60Hz)

**Diagram 13 (C)ST Series****Diagram 14 (C)PHS Series****Diagram 15 CT Series**

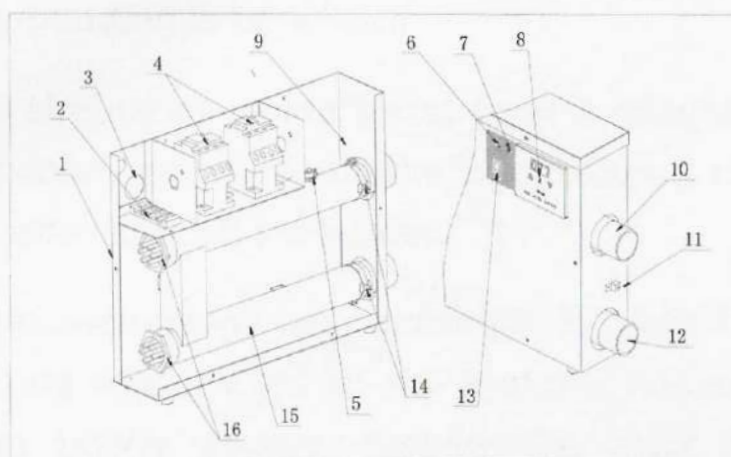


Diagram 16 (C)ST series exploited diagram

1. Shell 2. Ground terminal 3. Wire hole 4. Relay 5. Temperature switch(reset button) 6. Heat indicator 7. Circulating indicator 8. HWQ16 Controller 9. Hose clamp 10. Water outlet 11. Ground terminal 12. Water inlet 13. Controller for switch 14. Temperature sensors 15. Inner tank 16. Heating elements

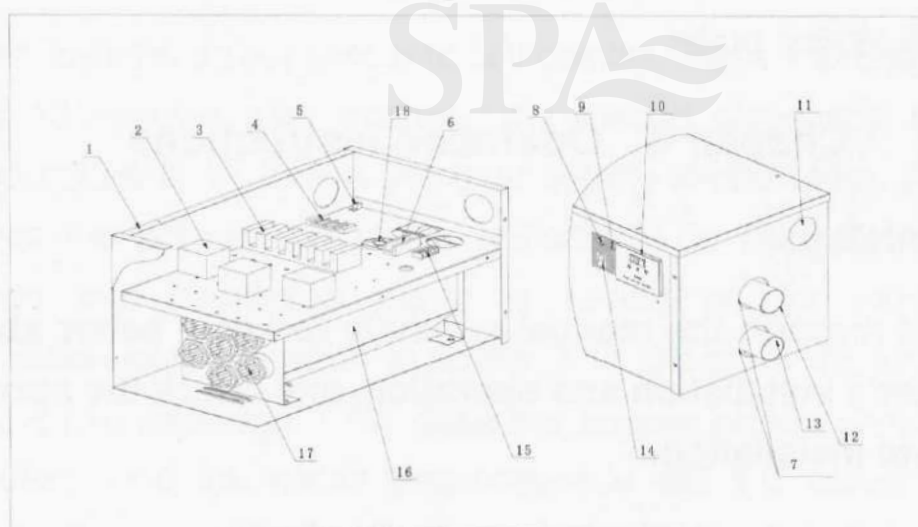


Diagram 17 (C)PHS series exploited diagram

1. Shell 2. Relay 3. Fuse 4. Wiring terminal 5. Ground terminal 6. Fuse 7. Temperature sensor 8. Heating indicator 9. Circulating working indicator 10. HWQ16 controller 11. Wire hole 12. Water outlet 13. Water inlet 14. Controller for switch 15. Wiring terminal 16. Inner tank 17. Heating elements 18. Temperature switch

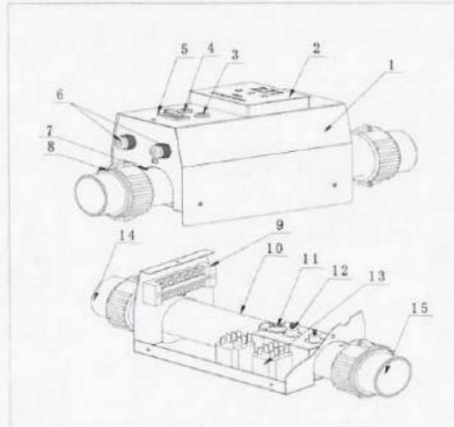


Diagram 18 CT series exploited diagram

1. Shell 2. HWQ16 controller 3. Heating indicator 4. Circulating working indicator 5. Controller for switch 6. Wire hole 7. Temperature sensor 8. Union joint 9. Wiring terminal 10. Inner tank 11. Temperature switch 12. Heating elements 13. Relay 14. Water inlet 15. Water outlet

Chapter 4 Operation instructions

IMPORTANT:

- Read through the manual carefully to know better about the heater's installation and operation, and check the parameters before installation.
- Check the circulation system first before turn on the heater.
- Never disassemble the heater when connecting to power supply.
- Never turn on the heater without water
- No power switch is designed for the heater. The front panel switch can only turn off the controller, thus you should cut off the main power supply before performing maintenance or repair.

- **Proper grounding is important.**
- **start the circulation pump for at least 2 minutes before turn on the heater, and turn off the circulation pump at least 2 minutes after turn off the heater.**
- **Once unexpected high temperature 60°C (140°F) occurs, the temperature switch cuts off the system. You need to cut off the main power supply, resolve the fault and wait the temperature to fall below normal temperature, then press the 'Reset' button to restart the heater.**

The procedure of how the system automatically heats-up.

1. Preparation stage

When turn the power switch to ON position (item 1 in Diagram 20), or if 10 minutes after entering the waiting stage and the water temperature is 1°C below the user setting temperature, the heater enters the preparation stage. Indicator 1 in **Diagram 19** blinks shows that circulation pump is turned on for models with circulation pump control. Indicator 3 in **Diagram 20** turns on as well. If hint message 'PPC' does not appear on the panel within 2 minutes., and the water temperature is still 1°C below the user setting temperature after 2 minutes, the heater enters next stage: pre-heat stage.

2. Pre-heat stage

In this stage, heater heats up for 10 seconds and waits for 90 seconds. Indicator 1 in **Diagram 19** turns on for 10 seconds then blinks. Indicator 2 in **Diagram 20** turn on for 10 seconds and then turns off. If hint message 'HFL' does not appear on the panel after 100 seconds and the water temperature is 1°C below the user setting

temperature, heater enters next stage heat-up stage. Otherwise, system proceeds to waiting stage.

3. Heat-up stage

In this stage, all heating elements turn on, and heating indicator turns on as well. If hint message 'F L' does not appear, heater will heat up to 1°C above the user setting temperature, then heating indicator blinks for 2 minutes. After that, circulation pump turns off for models with circulation pump control. Heater enters next stage waiting stage.

4. Waiting stage

Waiting stage lasts for at least 10 minutes. 10 minutes later, if the water temperature is 1°C below the user setting temperature, the heater jumps to preparation stage, otherwise, it remains in the waiting stage.

The automatically heat-up process is non-stopping and will continue to circulating through all stages until the control system or heater is power off. You could ask for models with separated circulation pump control function.

Control panel functions

▲ Increase the user setting temperature by 1°C or 2°F.

▼ Decrease the user setting temperature by 1°C or 2°F.

Switching button

1. Switch between temperature unit: Press # button for more than 3 seconds, panel displays °C and °F in turns. Release the button once the unit you wish to choose appears, 5 seconds later, panel restore to display the current water temperature.
2. Switch between temperature sensors: Press # button, the panel

will blink and display temperature measured by temperature sensor 2. After 5 seconds or press the # button again, panel will restore to display current water temperature which is measured by temperature sensor 1.

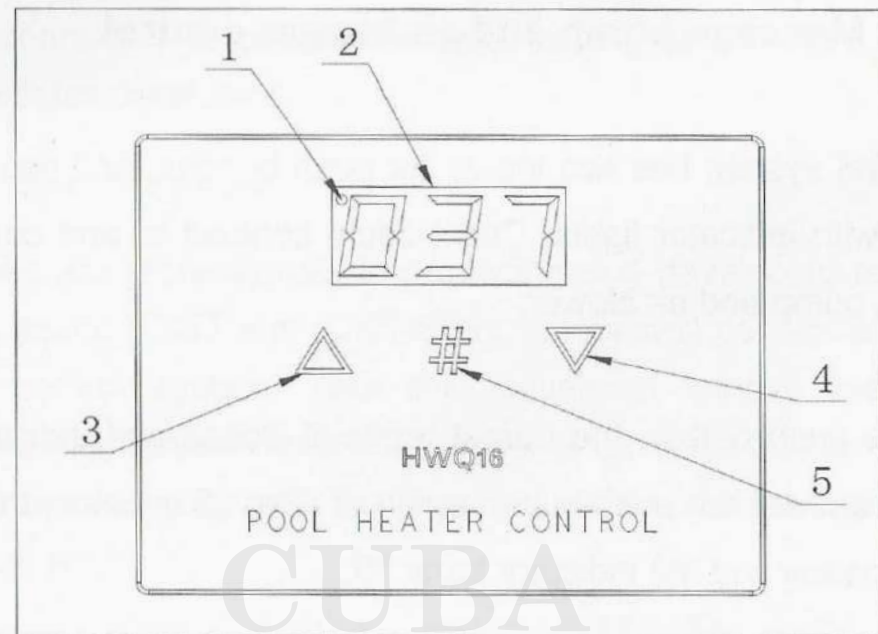


Diagram 19 HWQ16 controller

- 1.indicator 2.display 3. Up button
4. Down button 5.transfer switch

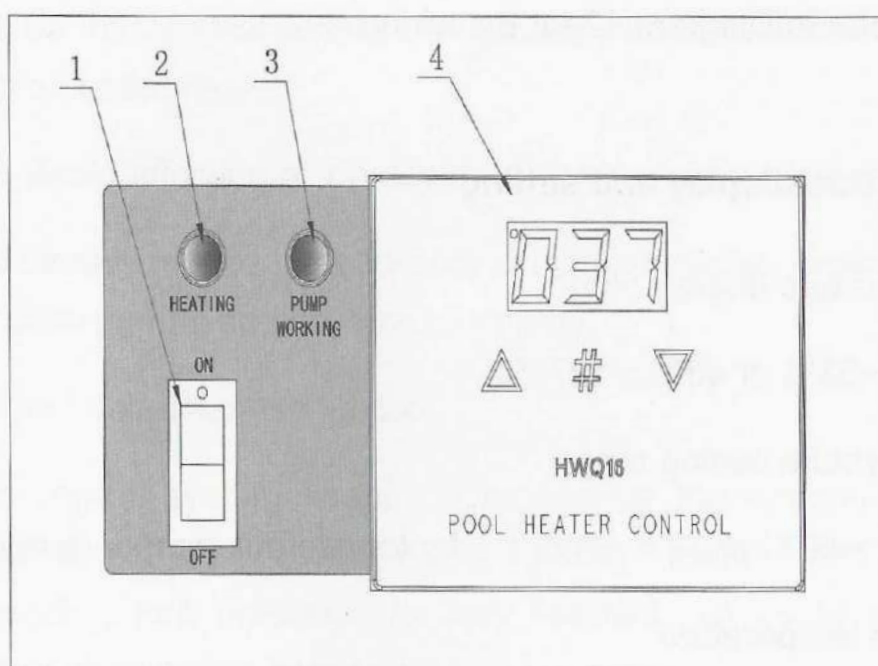


Diagram 20 (C)ST,(C)PHS series control panel

1. Controller power switch
2. Heating indicator
3. Circulation indicator
4. HWQ16 controller

Massage pump and air blower control

The control system has two inputs for push buttons, and two outputs terminal with indicator lights. Client could connect to and control the massage pump and air blower.

Press the push button, the output terminal closes and indicator light turns on; if press the push button again or after 15 minutes, the output terminal opens and the indicator turns off.

NOTICE: It could be used to control the air blower or massage pump in massage tub or SPA.

Please refer to Diagram 12 for the wiring.

Temperature display and setting

1. Temperature display range

6°C~53°C or 43°F~127°F。

2. Temperature setting range

22°C~50°C or 72°F~122°F, factory default temperature is 42°C。

3. Set the temperature

Press▲ or ▼ button to increase or decrease the setting

temperature by $1^{\circ}\text{C}(2^{\circ}\text{F})$, and the panel blinks and display the setting temperature. 5 seconds later, the panel stops blinking, confirm the setting change and restore the current temperature display.

4. If reconnected to power, the user setting temperature is set to default temperature 42°C .

Unique control system

We are professionals in producing and developing heaters for over 10 years. (C)ST and (C)PHS are the newest generation with our unique control system. With this advanced control system, the traditional mechanical water flow sensor is replaced by modern digital temperature sensor, and the features of the temperature sensor technique are:

1. (1) The flow-temperature sensor is always under the control of software, accurately monitoring the temperature status of the whole system, and then adjust the settings to maintain the water temperature and protect the heater from unexpected situations.

(2) No mechanical sensors, avoid any mechanical failure to affect the function of the heater.

(3) Avoid affection of ion accumulation to mechanical sensors.

(4) Greatly reduce unnecessary circulation cycles, prolong the life of circulation pumps and save more energy.

2. Intelligent self-diagnose function

The control system keeps on monitoring the running status of every parts of the heater, and quickly reacts and displays corresponding hint message for any incident, so as to avoid any damage or malfunction happens.

If any fault happens, the heater is stopped immediately, and corresponding hint message will display on the panel for user or technician to decide where the fault is. The safety of customer is the top priority.

Chapter 5 Maintenance and Troubleshooting

IMPORTANT

1. If unexpected high temperature occurs and the temperature switch cuts off the system, please cut off the power supply immediately; and do not restart system until the fault has been resolved. Only press the 'RESET' button after water temperature falls to normal range.
2. If any leakage occurs, repair first before any operation.
3. The temperature switch will cut off the system if temperature is higher than 60°C (140°F) .
4. If hint message appears, please refer to the list below for solution.

Explanation of hint message:

H₁ Temperature is higher than **53°C (127°F)**, (C)Stop heating up and force to start circulating. Remind user to check the system. System will automatically restart after temperature falls below **51°C (124°F)** .

H₁ **blinking** Temperature is higher than **55°C (131°F)**, (C)Stop heating up and force to start circulation. Remind user to check the system. Press any key to restart the system after temperature falls below **51°C (124°F)** .

L₁ Temperature is lower than **6°C (43°F)** . Force to start circulation. Remind user to check the heating elements and relays. 1 minutes after temperature

rising above to **8°C (46°F)** , system automatically prepare to heat up.

L_C blinking Temperature is extremely low. If message 'L_C' appears for more than 10 minutes, 'L_C' start to blink. Force to start circulating. Remind user to check temperature sensor, heating elements, relays and pumps. 1 minutes after temperature rising above to **8°C (46°F)** , press any button to restart the heater.

PP_C In the preparation stage, the temperature sensors must be balanced to start heating up. If the temperature sensors are balanced within 10 minutes, PP_C message disappears and heater will circulation for 2 minutes then enter to next stage.

PP_C blinking PP_C lasts for more than 10 minutes, shows that sensors cannot be balanced. Remind user to check the temperature sensors and circulation pump. Press any button to restart the preparation stage after the sensors are balanced.

HFL Possibility of plumbing blockage or lack of water in pre-heat stage. Remind user to check the water supply, water pump and valves. Press any button to restart the system or system automatically restarts after 10 minutes.

HFL blinking HFL message continues to appear for three times (can not enter heating-up stage from pre-heat stage). Remind user to cut off power and check water supply, water pump and valves. Then reconnect to power and restart the system.

FL Water flow is too low in heating-upstage, heater stop

heating up. Remind user to check water supply, water pump and valve. System restarts automatically after 1 minute.

FL blinking If FL message appears for 5 times in heating-up (C)STage, FL starts to blink. Remind user to cut off power and check water supply, water pump and valves. Then reconnect to power and restart the system.

Ac1 Temperature sensor Rt1 fault, Remind user to cut off power and replace temperature sensor Rt1. Then reconnect to power and restart the system.

Ac2 Temperature sensor Rt2 fault, Remind user to cut off power and replace temperature sensor Rt2. Then reconnect to power and restart the system.

Maintenance of heater

1. Maintenance

- 1) Keeps the heater clean.
- 2) Chemicals usage under normal water quality:
 - A balanced water condition is important to prolong the life of heater. If
 - Reduce scale to protect heater been corroded.
 - Chemicals can be used to keep water clean, maintain a balanced PH value and control the concentration of Ca, Mg irons.

2. Warning :

- 1) Heater can not be installed in a circulation system with water flow larger than 120 gal/min or water pressure larger than 1.2kg/cm².
- 2) Never block the outlet otherwise will damage the heater.
- 3) Heater can not be installed in a massage system.

WARNING:

- Heater can only be reset when temperature falls below normal temperature.
- Maintenance or repair can only been performed by licensed professionals to avoid hazards.
- Checking, maintenance and repair can only be performed with the main power supply been cut off.
- Only original heating elements and other accessories are recommended. Any damages caused by not using original accessories are not covered by the warranty.

Chapter 6 Warranty and Customer Service

Dealers are eligible for Limited warranty.

Any quality problem caused by material or manufacture faults will be covered by one year (from the purchasing date) under free warranty. Damaged accessories, parts, and knobs are not under warranty.

- Heating elements are under 90 days (from installation) or half year from the factory producing date) free warranty (base on the earlier one).
- Our company has the right to decide whether to repair or to

change the faulty parts. Approval must be obtained from our company before shipping back the product. The customer has to pay for the transportation fee and any parts fee first

- Any clause mentioned in the manual is not covered by the warranty.
- This warranty does not cover any defect, malfunction or failure caused by, or resulting from unauthorized installation, maintenance and repair; improper power supply; and any action which violates the manual.
- Damage caused by accident, misusing of chemical products, or any other reason which are beyond our company's responsibilities will not be covered. Any product whose label, nameplate has been removed, altered, damaged is not covered either.
- Using in a salty environment or any other extreme, corrosive condition is not covered by the warranty.
- After the free warranty period, services are still available with good price.
- The warranty only covers our own products.
- Our company is not responsible for any direct or indirect damage caused by the generator.
- Please contact our company for further information and more details.

Thank you for purchasing our products.

IMPORTANT NOTICE

You must have the following conditions to use this product! !!

1、 Circulating pumps with power of about 1.1 KW must be equipped

2、 ST-5.5: Pool less than 123 cuft (3.5CBM)

ST-11: Pool less than 250 cuft (7CBM)

ST-90: Pool less than 210 cuft (6CBM)

ST-15: Pool less than 350 cuft (10CBM)

ST-18: Pool less than 423 cuft (12CBM)

Note :1. The self-test time of the machine is 3 minutes and a half, and it starts to work after normal

2. this product is thermostatic equipment, it takes about 10 hours for the first heating

3. the product reset button is machine high temperature protection, machine high temperature will pop up, must machine cooling before reset

Correct installation sequence as follows

