## Ⅰ. Overview of the Panel


Fig. 1.The panel plan of 9 buttons

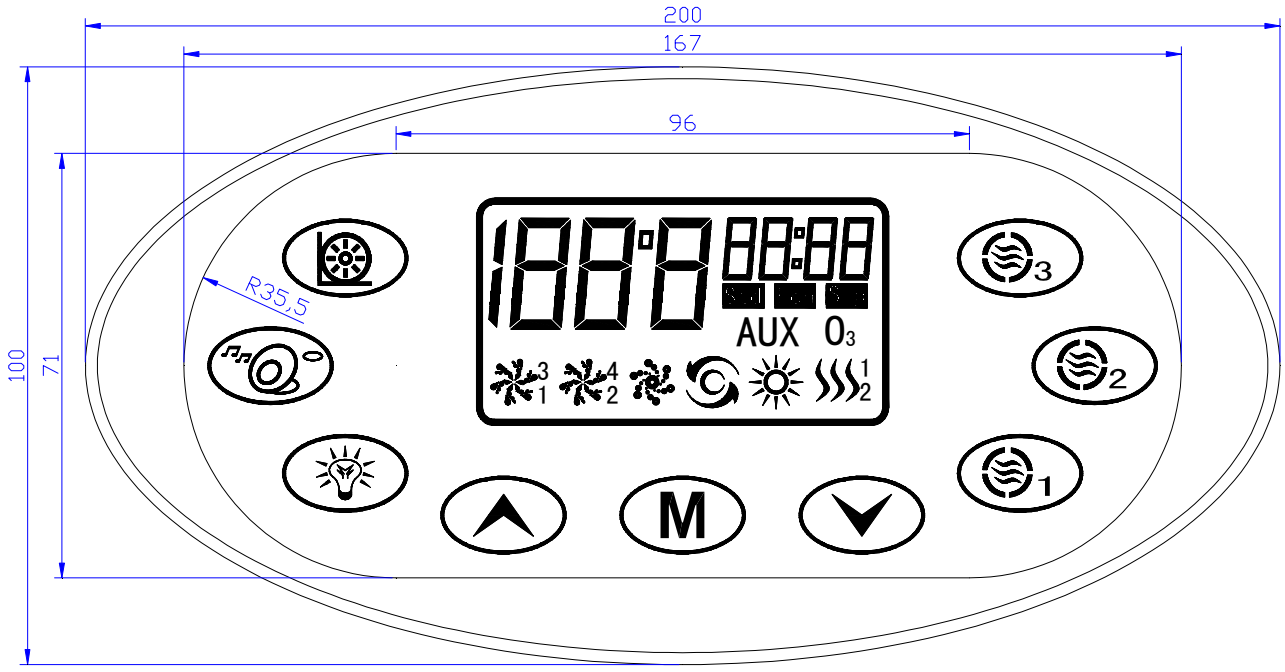



Fig. 2.The installation plan of 9 buttons (200*100mm)

## Ⅱ.The function summary

1. Plug-and-play mode is to get the easy operating and easy setting up.
2. Three working modes: Normal/Standard Mode, Energy saving/Economy Mode and Filtering /Sleep Mode.
3. The clock display and function about the setup of circulation-cleaning for 24 hours
4. Max 6 KW thermostat function, water temperature display and the setting function.
5. Max 4 surfing pumps and 1 circulating pump (or 3 surfing pump and 1double speed

pump) and an air pump
6. Functions of synchronous changing color with multiple lights and fixed color bottom lamp and ozone antivirus system.
7. The function of automatic water frozen preventing
8. The function of double color buttons backlighting
9. Optional inputting about one-phase, three-phase or dual 110V, optional outputting about 110-120VAC or 220-240VAC
10. A group of additional power output, it can be used for DVD/TV or others.
11. Switchbank selecting the different functions.
12. The protection of overvoltage or undervoltage
13. Low-pressure part (bottom lamp and ozone) overcurrent protection
14. overcurrent protection of circulating pump
15. The function of moisturizing and forced drainage
16. Error code hinting

## Ⅲ. Function Description

### Ⅰ).Initial electrical testing

During the whole process of the initial electrical testing, LED shows "PrAE"

1. Overvoltage testing

When it is initial to power on, the system is working under a protecting status.

The system is testing the voltage from the input transformer, when the input voltage is beyond 280VAC, LED shows "EUH", then the system stops working.

If the input voltage is below 280VAC, the system will go into normal power supply.

In a normal power supply, turn off all the load, and then test the input voltage again. It is normal working voltage if the voltage shows below 260VAC.It is the over-voltage if it is beyond 260VAC, then LED shows "EUo"".

In these two kinds of situation, the system will not go into normal operation.

### Ⅱ).Temperature Settings (77-104℉/25-40℃)

In the status of being without any settings, the first time to press "  "or"  " button, it can enter to the setting status of temperature. At this time, the setting temperature is flashing in the screen. Before the temperature stop flashing, press the "  "or"  " button again, it can change settings temperature. Within 6 seconds without any pressing button, it will exit and save settings temperature, and begin to show the current SPA temperature.

## Ⅲ）.The Operation of “M” Button

1. Keep pressing “M” button for more than 5 seconds until it appears a flashing“rtC”on the screen, it means that the system is entering to the setting pattern, and at the same time, it also enters to a “real-time clock” setting.

2. Under the setting mode, click on “M” to set “open time of filter cycle”, the screen shows “FSt”.

3. The 3rd time to click on “M” to set “timer of filter”, the screen shows “Ft1 ”.

4. The 4th time to click on “M” to set “tuning temperature”, the screen shows “Adj”

5. The 5th time to click on “M” back to “forced drainage” setting the screen shows “out”

6. The 6th time to click on “M” back to “real-time clock” setting, and the screen shows flashing “rtC”

When finish the setting, (or being without pressing any setting button within 6 seconds) the data will be saved, and then it exits the setting pattern. Any modification must be operated within 6 seconds.

***Note***

1. When A1=ON or A2=ON, then it skips the 2nd and 3rd steps
2. When B4=OFF, it skips the fifth steps
3. Only “M” button has the operation of “keep pressing” and “click pressing”, the other buttons are “click pressing”
4. “Keep pressing” means to click the button and hold until it appears some icons or enters to a certain status.
5. “Click pressing” means to click the button and let go right now, within 1 second.

## Ⅳ).Working Mode

1. Three kinds of working modes: Normal/Standard Mode, Energy saving /Economy Mode and Filtering /Sleep Mode .The work of the mode is just effective for circulation pump, circulation filter of heater and antivirus function.

2. When A1=ON, it just has Normal /Standard Mode, and “M” button cannot switch the working modes

3. The switching of the modes

1）When it is power up, the system is working at the “Normal/Standard Mode”, and the screen shows “Std”.The system is keeping setting temperature in all-weather. At the moment, the button backlighting is double-color backlighting.

2) The 1st time to press “M” button, then the system enters into “standard mode turning into economic mode” and “Std” is normally on the screen, “Ecn” is flashing. The system will turn into economic mode after going standard mode for an hour. At the moment, the button backlighting is double-color backlighting.

3) The 2nd time to press “M” button, then the system enters to “economic mode”, the screen shows “Ecn”The system is just working during the filter cycle, and it will heat the SPA to the setting temperature. At the moment, the button backlighting is green

4) The 3rd time to press “M” button, then the system goes into “sleep mode”, the screen shows“Slp”, The system is just working during the filter cycle, in this mode, the heater doesn’t work. At the moment, the button backlighting is blue.

5) The 4th time to press “M” button, then the system goes into “standard mode”, the screen shows “Std”. The button backlighting is double-color.

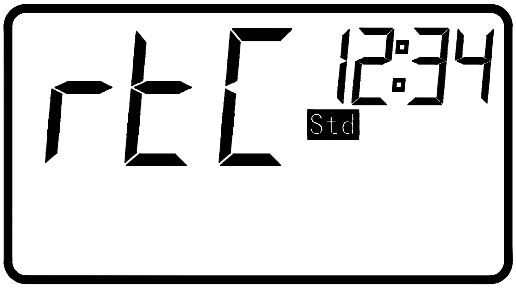
4. Automatic frozen-preventing function:

When the water temperature is below 44℉/6.7℃ or much lower, the function of anti-freeze is automatic starting, all the pumps and air pumps work for 30 seconds and then turn off. All the heaters and circulating pumps turn on. The panel shows “ICE”

When the water temperature is reaching 44℉/6.7℃ or above, all the heaters and circulating pumps stop working.

Ⅴ).Clock setting

At clock setting status, (show as Fig. 3), to press the “▼” button to set the hour (down button), the adjusting range is from “0 to 23”.And to press the “▲” button to set the minute (up button), the adjusting range is from “0 to 59”



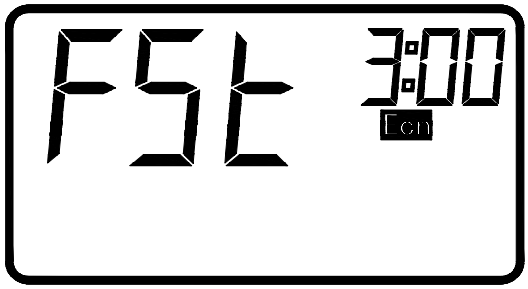



Fig. 3: It is 12:34 now.

Fig.4: The starting time for filtering is 3:00.

## Ⅵ).Pre-settings filtering antivirus cycle (Valid of A1=off)

1. When A2=ON, the time for filtering antivirus is fixed. It starts to work at 14:00 every day, and it will last for 3 hours.
2. It is only able to set the starting time for the first filtering antivirus cycle. The setting of the filtering time can be1-11hours.The default time is 3 hours.
3. When A3=OFF, it has twice filtering antivirus cycle every day. And the second filtering cycle is automatic added, it will start after 12 hours later. (For example, it starts at 14:00 and the second filtering time is at 2:00)
4. In the setting status of “starting time of filtering cycle” (show as Fig.4).Press the “▼” button to change starting time, and both hour and minute are 00.
5. In the setting status of “continuous working time of filtering cycle”, press “▼” button to change the time, the settings are1-11 hours, and the default time is 3 hours (show as Fig.5).
6. At the initial stage of each filtering cycle, all the devices will run for 15 seconds to purify the pipeline equipment. Ozone will start to work 15 seconds later.

In order to prolong the service life of anti-virus system, every 15 minutes ozone stops working for 15 minutes.

When any surfing pump (or high speed pump) and air pump is power on, the anti-virus system will stop working at once.

## Ⅶ).Temperature Adjust:

Keep pressing “M” button to enter to the setting mode, and continuous press “M” button to enter to temperature adjust mode (show as Fig.6).At this moment, to press “▼” button and“▲” button can change the fine-tune number, adjusting range is -7～7℉.

If the current water temperature shows 98℉, but the real water temperature is 100℉.At the moment, as long as to adjust the fine-tuning number for 2 ℉, then the showing temperature will turn into 100℉.

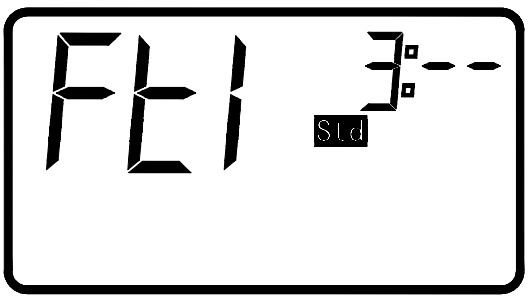



Fig.5: filtering lasts for 3 hours

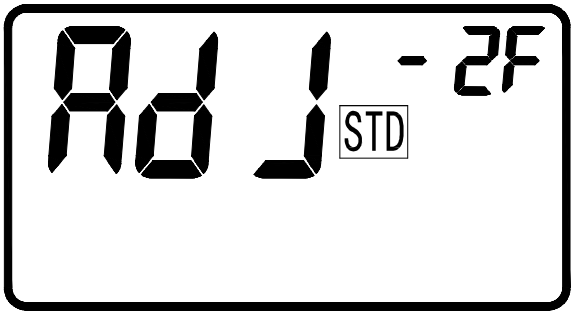



Fig.6: Temperature Adjust

## Ⅷ).The Main Board Specifications and DIP jumpers settings (show as Fig.7)

A1: OFF: Three working modes
ON: Just having standard mode and the antivirus function is of no avail

A2: OFF: It is able to set filtering antivirus cycle artificially.
ON: Filtering antivirus cycle built-in is unchanged. It starts to work at 14:00, and it works for 3 hours.

A3: OFF: There is twice to filter antivirus cycle every day. And the second starting time to start is 12 hours later
ON: There is once to filter antivirus cycle every day

A4: OFF: Display the Fahrenheit temperature.
ON: Display Celsius temperature.

A5: OFF: Surfing pump1 is a single-speed pump.
ON: Surfing pump 1 is a double-speed pump.

A6: OFF: When the temperature appears abnormal, all high pressure loads will stop working.
ON: All high-pressure load (without heater and heat pump) are not affected by temperature sensor control

A7: OFF: There is a flowing induction sensor, when it is detected there is no flowing, the heater will not work.
ON: There is no flowing induction sensor.

A8: OFF: There is a water level probe, which controls the water pump and heater.
ON: There is no water level probe.

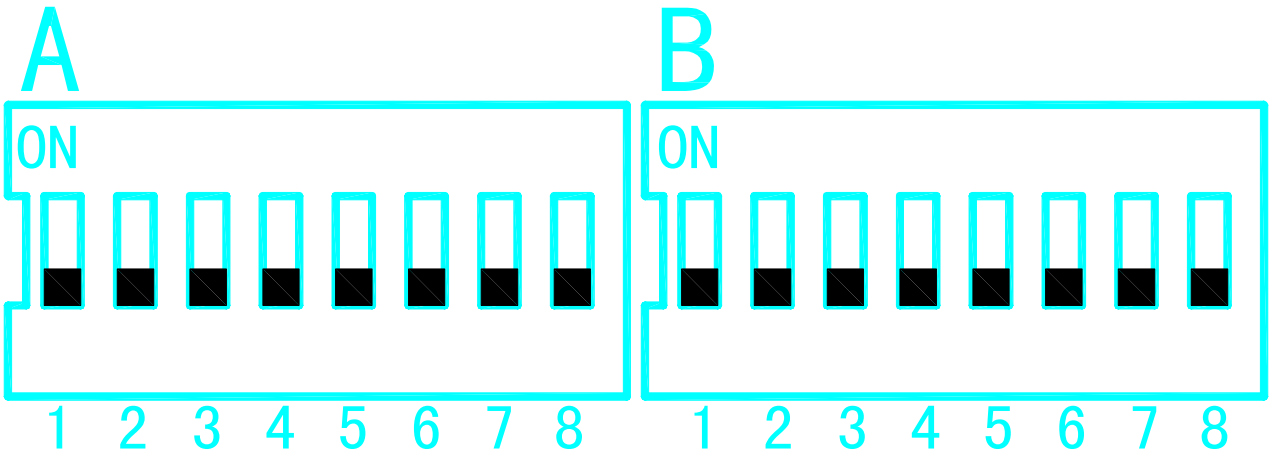



Fig.7 Switchbank A/B

B1: OFF: When it is initial power on, there is detection about inputting power supply voltage.
ON: Without power supply voltage detection

B2: OFF: The air pump is not controlled by water level probe.
ON: The air pump is controlled by water level probe, air pump loading place can be the third surfing pump.

B3：OFF：No moisturizing function.
ON：Auto moisturizing function

B4：OFF：No forced drainage
ON：Forced drainage

B5：OFF：3 surfing pumps
ON：4 surfing pumps.
B6：OFF: Heater: ETHINK heater
ON：Heater: hot pump
B7： OFF：。
ON：。
B8：OFF: Normal working mode.
ON: Testing mode.

***note***

1. The setting of all the jumpers is effective only when it is re-power on. And the spacing interval for re-power on is more than 60 seconds.
2. All the jumpers have been set in the factory. The user had better not change the product setting.
3., When any surfing pump is turned on, the heater stops working.

## Ⅳ.The operating instructions of output load part

### Ⅰ).The operating of surfing pump

"  ", "  " and "  " buttons are to control surfing pump1/2/3 to be ON/OFF.

When there is no water in the bathtub or it is below the water level, the system will display flashing after all the pumps are turning on.

When B5=ON and B2=ON, "  " button is to control the fourth surfing pump (the position of the heater 2)

When B5=ON and B2=OFF, the 1st time to press "  " button to turn on pump2, and the 2nd time to press "  "button to turn on pump2 and pump 4, and the 3rd time to press"  "button to turn off the pump2/ pump 4.

The surfing pump will automatically turn off when it works for 25 minutes.

### Ⅱ).The operating of the air pump

There is a button "  " to control the air pump to be ON/OFF. The air pump will automatically turn off when it works for 25 minutes.

Ⅲ).“  ”Power supply function button

“  ”is the button about the sound of the system or the other power supply function.

Ⅳ).The operating of the lamp

There is a button “  ” to control the lamp for turning on /off. The lamp will automatically turn off when it works for 120 minutes.

Ⅴ）The operation of automatic moisturizing（when A8 = ON，it is invalid) :

When B3 = ON and the A8 = OFF, the function of automatically moisturizing is effective.

When the water probes detect that there is no water, automatic moisturizing function will start (12 VDC moisturizing solenoid valves will turn on). And LCD shows " InF " at this time.

After filling water to water level probes, the moisturizing solenoid valves will delay 1 minute to work, then it will turn off the solenoid valves.

During moisturizing, if it has not reached the water level probe in an hour (maybe without tap water), moisturizing solenoid valve will also turn off, and it shows "EI n". Then it won't turn on the automatic moisturizing. At the moment, it can work regularly unless manual moisturizing to water level moisturizing.

When filling water is finished, " InF " mark will disappear. It will start moisturizing function when the next water shortages.

Ⅵ).Operation of Compulsive Drainage:

When B4 = ON, in the fifth step of the Settings mode, to press "  " button to ON/OFF compulsive drainage, at this time the LCD shows " ON "or" OFF ". After finishing the setting, according to the ON/OFF instructions, turn on or turn off compulsive drainage. At this time, all surfing pumps and air pumps will start to work to stir the water in the SPA. After 15 seconds, all pumps and heater will stop working and drainage solenoid valves will start.

When the water is below the water level probe, drainage solenoid valves will delay 1 hour to work, and then turn off.

## Ⅴ. The structure chart of PCB

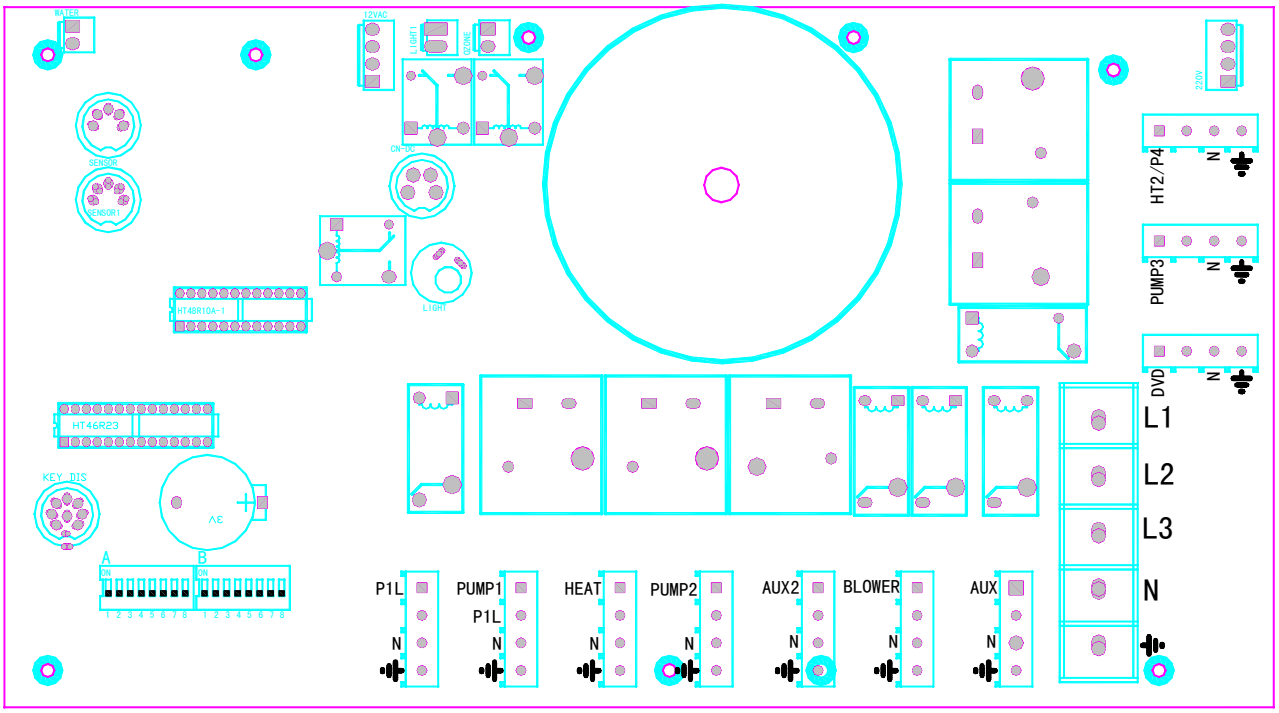



Fig.8. Control box structure

1. Single-phase (3 line) input : A1=A2=A3=ACL(phase line) , A4=ACN(zero line)
2. Three-phase (5 line) input : A1=L1 (phase line 1), A2=L2 (phase line 2), A3=L3(phase line 3,) N=ACN (zero line)

## Ⅵ. System malfunction warning

| Fault indication | Failure cause | Solutions |
|---|---|---|
| "E5A" | Temperature sensor open circuit or short circuit | 1. Check whether the plug loose or not and whether cable is damaged or not.<br>2. If plug and cable are intact, please replace the mainboard.<br>3. If changing the mainboard is still invalid, please replace heaters. |
| "E5b" | Water flow sensor open circuit /short circuit | |
| "Eob" | It is detected that water flow sensor is over limit | |
| "EHH" | It is detected that inside the heater, the temperature reaches 118 ℉ / 48 ℃ or more than. | 1. Check whether environmental temperature is over high.<br>2. Check whether filter is blocking or just replaced.<br>3. Check whether the metering valves and circulating pump are normal or not. |
| "EoH" | It is detected that inside the heater, the temperature reaches 110℉/43.5℃ or more than. | |
| "EPL" | The water flow inside the heater is possibly too low. | 1. Check whether filter is blocking or is just replaced<br>2. Check whether the metering valves and circulating pump are normal or not.<br>3. If the above is normal, please turn off the power supply for 15 seconds, then turn on the power and reset the system. |
| "ECP" | It is sure that the water flow inside the heater is not enough. | |
| "LLL" | It lacks of water or water level is not reaching. | 1. Please check whether the water level is reaching the normal level or not.<br>2. Please check whether all the cables about the water probe are normal or not. |
| "EUH" | Input voltage is more than 280±10V | Whether Power input line is wrong to connect. |
| "EUo" | Input voltage is more than 260±5V | Check input power supply voltage |
| "EI o" | The working current of underwater lamp is over limit. | Whether underwater light interface is short-circuit or not. |
| "CPo" | The current of circulating pump is oversize. | Check whether the circulation pump is jammed to cause the flow stream |
| "EI n" | Automatic moisturizing overtime | 1. If there is without tap water<br>2. Please manual filling water to the water level probe. |

Other operation information

1、"ICE"：It detected that it is going to freeze and it is operating the protection about anti-freeze.

2、“ InF ”：The system is moisturizing and the other function can be operated normally.

3、“ out ” : Compulsory drainage is running.

## Ⅶ.Electrical parameters

### 1. Performance index

Working voltage: AC220-240V / 50Hz
Maximum working current: 48 A / 220V
Compression strength: 1250V / 1 minute　　Not being punctured.
Insulation resistance: 》200MΩ
Waterproof level: IPX5
Electric shock preventing: 1 class

### 2. Maximum output load index

Thermostatic furnace：AC220V/3KW ×2
Surfing pump：AC220V/3HP×4
Circulating pump：AC220V/1HP
Air pump：AC220V/800W
Bottom lamp：AC12V/20W or DC12V/20W
Ozone：AC12V/8W