

High Flow Heated Respiratory Humidifiers

Service Manual

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1. Precautions

1.1 The malfunctioning machine should be repaired by a professionally trained maintenance engineer. Non-professionals are strictly prohibited from performing maintenance work.

1.2 Maintenance engineers should clean up the work table before maintenance to prevent foreign bodies scratching machine housing.

1.3 During maintenance, attention that operators should operate carefully according to specifications to avoid damage to the machine, causing new faults or expanding the faults.

1.4 After the service is completed, conduct a comprehensive inspection of the machine and cleaning work, ensure that the machine can operate normally.

1.5 Write down the serial number of the machine and make maintenance records for traceability.

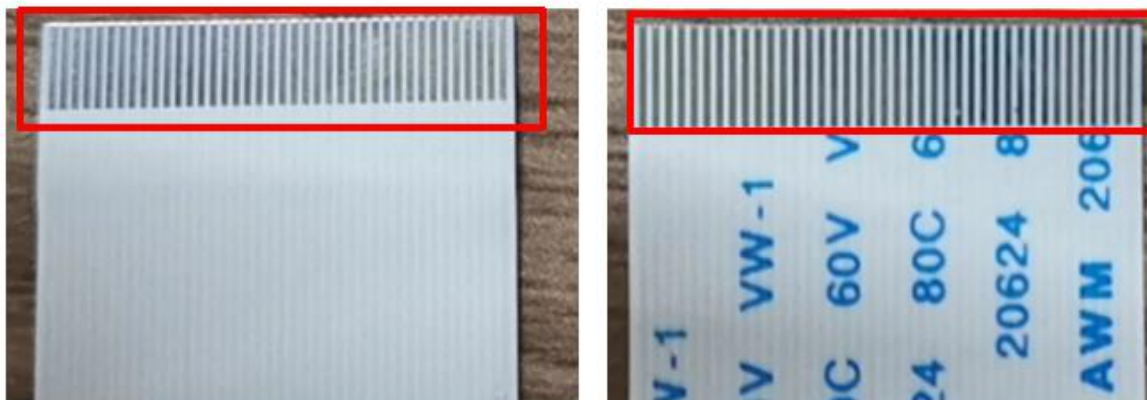
2. Fault analysis and troubleshooting

Please note: part of the troubleshooting requires disassembly and repair operations. If the user or dealer has sufficient repair capabilities, you can refer to the maintenance manual for testing and replacement parts. If you do not have the repair capability, please return the machine to the factory for repairing.

2.1 Poor display (display incomplete / backlight only / backlight not bright/fuzzy screen/jitter/blank screen)

- ① Visually inspect whether there is any breakage or drugs immersion on LCD display.
- ② Reboot "restore factory settings" then watching whether this fault persists. If the fault persists, you need to disassemble the machine to check or replace parts.
- ③ Disassemble the upper shell of the machine to check:

Whether the screen adapter cable and the screen cable are firmly connected, or whether the golden finger pin on the screen adapter cable connector is damaged, if the connection is not strong enough, please reconnect the adapter; if the gold finger pin on the screen adapter cable connector is damaged, you need to replace the adapter wiring.



- ④ If the screen adapter cable and the screen connection are normal, the connection is

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firm, and the screen still cannot return to normal, the screen may be damaged or there may be a problem with the connector seat, the key board, or the main board. You need to refer to Chapter 3 of the Maintenance Manual to replace the screen, key board or main board.

⑤ Take out the display to check for damage. Replace the screen if damaged.

⑥ Check to see if components are damaged between the screen connector seat and the main control chip, and whether there is any false welding, leakage welding, or tin connection between the connector, the chip and the components.

⑦ Provide videos or photos taken during a failure. Visually detect the immersion corrosion of the main board.

2.2 Touch screen failure

① Disassemble the machine and check: Whether the touch screen cable is connected properly or damaged.

② Provide video or photos taken during the alarm.

2.3 Key & Knob failure (knob, start/stop button, mute button failure)

① Power on again to see if this phenomenon exists;

② Disassemble the machine and inspect: Visually inspect if the main board and key board have the phenomenon of immersion and corrosion;

③ Check whether the connection line between the main board and the key board is loose or damaged. Replace or reconnect the key board adapter cable, operate the buttons and knob again to see if it returns to normal.

④ Check to see if there are false welding, leakage welding, tin connection and other phenomena in the welding point of the faulty buttons on the keyboard.

⑤ Check to see if components are damaged between the key board connector seat and the main control chip, and whether there is any false welding, leakage welding, or tin connection between the connector, the chip and the components.

⑥ Provide videos or photos taken during a failure.

2.4 The machine cannot boot (power on, screen not bright)

① Check whether the power supply voltage is normal, the power cable and power interface are damaged, and check whether the power cable is firmly connected.

② Check whether the water tank is leaking. If there is water leakage, please turn off the power and stop using it. Replace the water tank and observe whether there is water seeping from the bottom of the machine. If there is water seeping, wait for a period of time (2-3 hours) after there is no water seeping out of the machine, and then power it on for use.

③ Power on again to see if the screen lights up.

④ Disassemble the machine and inspect: Plug in the power supply and observe whether the 4 indicators on the main board are illuminated. If there is no light, it means that the main board is not powered, as shown below:

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- ⑤ If the 4 indicators are on normally, check whether the screen adaptors and screen connector are connected and the screen is normal
- ⑥ Disconnect the power supply, check the power supply module, control board, main board and their power supply connections.
- ⑦ Provide videos or photos taken during a failure.

2.5 The time can not be saved

① Enter the time setting interface by operating the knob to reset the time. The specific operation method is: Rotate the knob to left 2 times, to right 2 times, to left 2 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. As shown below:



② After resetting the time, turn on the power again to check whether the time is normal. If the set time still cannot be saved, you need to disassemble the machine and check.

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③ Disassemble the upper shell of the machine and inspect: Whether the battery is leaking and installed correctly, whether the battery voltage is 3.8V, and whether the U13 chip next to the battery is damaged.

④ Provide videos or photos taken during a failure.

2.6 Heating plate can not be heated

① Disassemble the machine and inspect: Check whether the heating plate power cable, temperature sensor cable, and heating control cable are properly connected.

② Measure whether the resistance at the 2 end of the heating plate's power cord is less than 200Ω. If the measured resistance is very large, the ceramic heater is damaged.

③ Check whether the power supply of the heating plate power cord interface on the heating control board is 220V.

④ Check whether other components on the main board are damaged.

⑤ Provide videos or photos taken during a failure.

2.7 Abnormal alarm sound (no alarm sound when alarm occurs)

① Disassemble the machine and inspect: Whether the speaker is connected well or damaged.

② Check whether the C115 capacitor on the main board is damaged.

③ Check whether the chips U4 and U18 on the main board are damaged.

④ Provide videos or photos taken during a failure.

2.8 Press the start button, the machine does not blow out

① Power on again to see if this phenomenon exists, listen to the fan rotation inside the machine.

② Disassemble the machine and inspect: Check whether the fan power cord, control and main board interface are loose, whether there are false welding or missing welding on the main board interface.

③ Open the silencer to see if the fan is damaged.

④ Check whether other components of the main board are damaged.

⑤ Provide videos or photos taken during a failure.

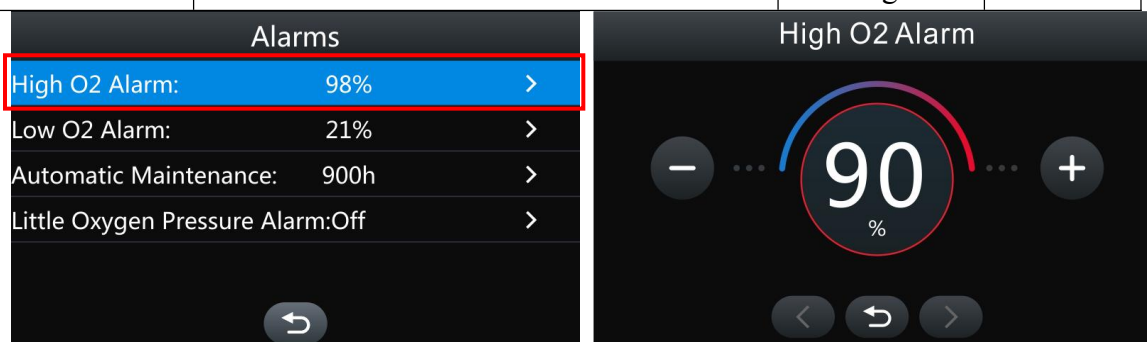
2.9 High O2 Concentration Alarm (text prompt: Oxygen is too high , please check!)

Do not power off or shut down to stop the operation, please do the following and record the relevant information:

① Check the oxygen concentration setting value in the parameter menu

② Check whether the high oxygen concentration alarm value in the alarm menu is smaller than the oxygen concentration setting value. If it is smaller, adjust the high oxygen concentration alarm value to be greater than the oxygen concentration setting value.

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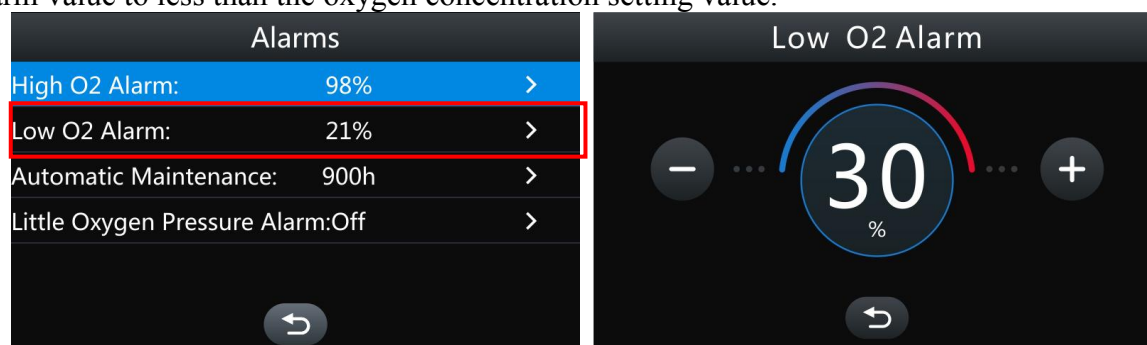


- ③ The oxygen concentration display value and the color of the oxygen concentration display font when the machine interface alarms.
- ④ Provide the videos or photos taken during the alarm.

2.10 Low oxygen concentration alarm (text prompt: Oxygen is too low, please check!)

Do not power off or shut down to stop the operation, please do the following and record the relevant information:

- ① Check the oxygen concentration setting value in the parameter menu
- ② Check whether the low oxygen concentration alarm value in the alarm menu is greater than the oxygen concentration setting value. If it is larger, adjust the high oxygen concentration alarm value to less than the oxygen concentration setting value.



- ③ The oxygen concentration display value and the color of the oxygen concentration display font when the machine interface alarms.
- ④ Provide the video or photos taken during the alarm.

2.11 Treatment time alarm (text prompt: Therapy has finished, please set again!)

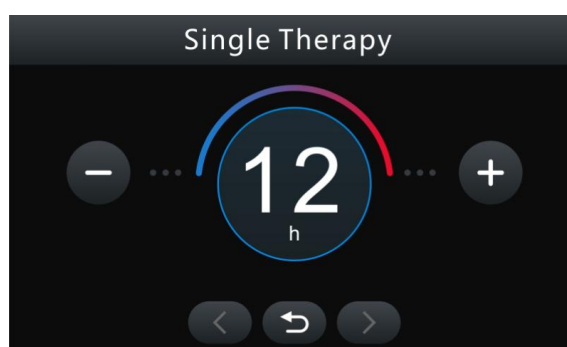
Do not power off or shut down to stop the operation, please do the following and record the relevant information:

- ① Treatment time count in the upper left corner of the screen

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- ② The setting value of the preset treatment time in the system menu, as shown below:



- ③ Provide the video or photos taken during the alarm

2.12 High O2 alarm (Text prompt: The oxygen source pressure is too high, please check the oxygen supply pipeline)

Do not cut off the power or shut down to stop the operation, please do the following and record the relevant information:

① Please confirm the actual value of the oxygen source pressure: please ask the hospital for the oxygen source pressure if it is central oxygen supply, and check the oxygen source pressure gauge. Please check the pressure gauge on the oxygen cylinder if it is oxygen supply.

② If the oxygen source pressure is confirmed to be normal, enter the engineering interface through the operation knob without shutting down the machine. The specific operation method is: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. Enter the engineering interface to check whether the value of the oxygen source pressure above 2318. As shown below:

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The screenshot displays the HFNC control interface. The 'Oxygen Pres' field is highlighted with a red box, showing a value of 378. Other fields include Pipe Temp (0), Adapter Temp (0), ASbsolHumi (22.4), Pipe Target (31.5), Adapter Tarc (23.1), Absol Humi (0), Plate Temp (25.2), Adapter Hum (0), Flow (0), Pres (0), Oxygen (21), Ambient Temp (27.4), Set Temp (31), Set Flow (60), Set Oxygen (21), Work Status (Standby), Set Humidity (0), Proportional valve Ca (0), Cali time (2021-04-29 11:16:38), and Current Power T (200-240V).

- ③ If the pressure of the oxygen source exceeds 0.6 MPa, reduce the pressure of the oxygen source to below 0.6 MPa, and then observe whether the machine continues to give alarm that the oxygen source pressure is too high.
- ④ If the oxygen source pressure cannot be adjusted in real time, please disconnect the high-pressure oxygen connecting pipe and observe whether the machine continues to give alarm that the oxygen source pressure is too high.
- ⑤ The oxygen concentration setting value in the parameter menu.
- ⑥ Provide the video or photos taken during the alarm

2.13 Low O2 alarm (Text prompt: The oxygen source pressure is too low, please check the oxygen supply pipeline)

Do not cut off the power or shut down to stop the operation, please do the following and record the relevant information:

- ① Please check the 2 ends of the high-pressure oxygen connecting pipe (oxygen source end and machine threaded interface end) to see if there is air leakage.
- ② Please confirm the actual value of the oxygen source pressure: please ask the hospital for the oxygen source pressure if it is central oxygen supply , and check the oxygen source pressure gauge. Please check the pressure gauge on the oxygen cylinder if it is oxygen supply.
- ③ If the oxygen source pressure is confirmed to be normal, enter the engineering interface without shutting down machine by rotating knob: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. Enter the engineering interface to check whether the value of the oxygen source pressure less than 900. As shown below:

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The screenshot shows a control interface with the following fields and values:

- Pipe Temp: 0, Adapter Tem: 0, ASbsolHumi: 22.4
- Pipe Target: 31.5, Adapter Tarc: 23.1, Absol Humi: 0
- Plate Temp: 25.2, Adapter Hum: 0
- Flow: 0, Pres: 0, Oxygen: 21, **Oxygen Pres: 378** (highlighted)
- Ambient Temp: 27.4
- Set Temp: 31, Set Flow: 60, Set Oxygen: 21
- Work Status: Standby, Set Humidity: 0
- Proportional valve Ca: 0, Proportional Valve Cali: 2021-04-29 11:16:38
- Current Power T: 200-240V, 100-120V, 200-240V

④ If the oxygen source pressure value is less than 0.2 MPa, increase the oxygen source pressure by more than 0.2 MPa, and then observe whether the machine continues to give alarm that the oxygen source pressure is too low.

⑤ The oxygen concentration setting value in the parameter menu.

⑥ If the oxygen concentration of the machine can reach the set value, select the oxygen source pressure is too low alarm in the alarm menu, select Off, and then observe whether the machine continues to give alarm that the oxygen source pressure is too low. Otherwise, perform ①②③④⑤.

The screenshot shows the 'Alarms' menu with the following items:

- High O2 Alarm: 98% >
- Low O2 Alarm: 21% >
- Automatic Maintenance: 900h >
- Little Oxygen Pressure Alarm:Off >** (highlighted)

⑦ Provide videos or photos taken during the alarm.

2.14 The elbow is not connected alarm (text prompt:the elbow is not connected, please check)

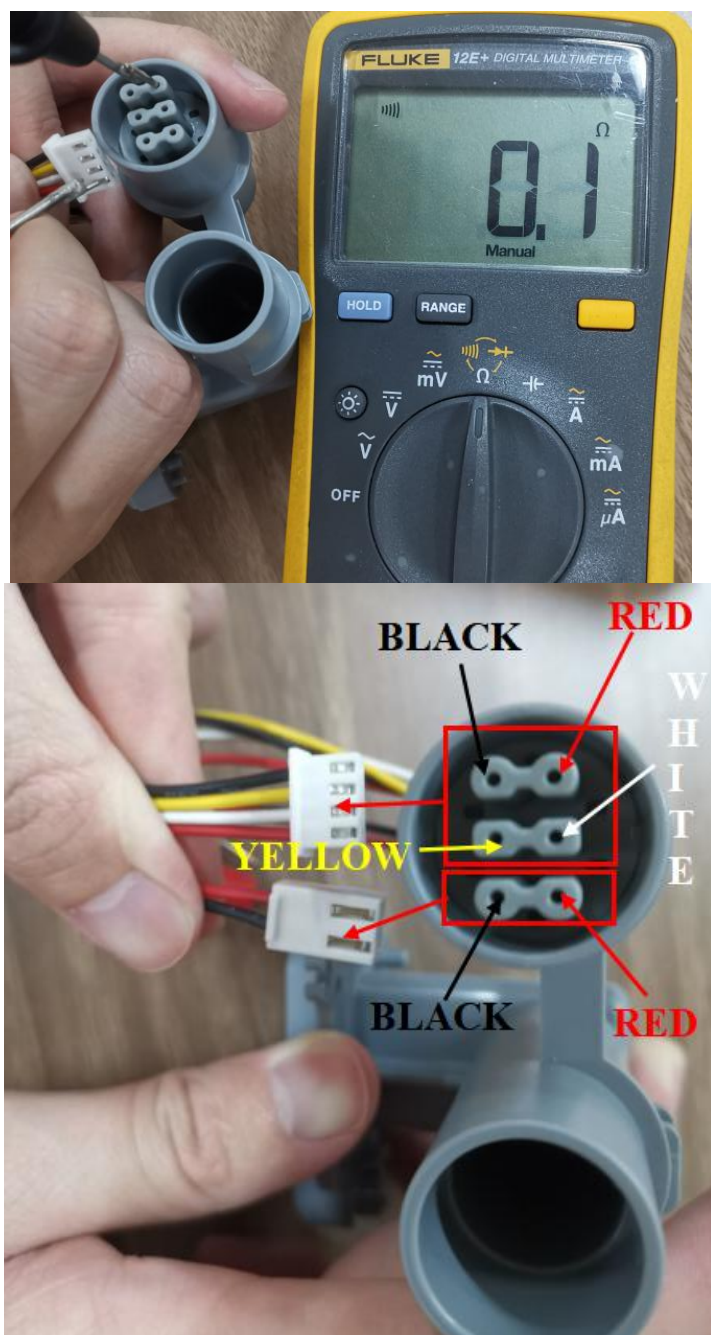
① Check whether the elbow connector pin is damaged (needle break, needle crook, needle retreat too much, needle attrit, oxide or other stains on the needle), if it is normal, please reinstall the elbow to ensure that the installation is correct.

② If the elbow connector pin is not damaged and the alarm still remains after re-installation, please replace it with a new elbow.

③ If you have replaced elbow and still give an alarm, you need to check whether the elbow of the silencer box on the machine (the joint of the machine that the elbow joint is connected to) is damaged. Inspection method: Open the upper shell of the machine, check whether the connecting wire is firmly connected, and whether the 2 ends of the connecting wire are unpinning, and then use a multi-meter to measure whether the resistance value of the 6 wires of the silencer box elbow is bigger than 1 Ω . Please refer to the Maintenance Manual for specific

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detection methods.



⑧ If the function of the silencer box elbow is normal, you need to replace the main board and then observe whether there is an alarm. For the method of replacing the main board, please refer to Chapter 3 of the Maintenance Manual.

⑨ Provide the videos or photos taken during the alarm.

2.15 The heated tube is not connected alarm(text prompt: the heated tube is not connected, please check)

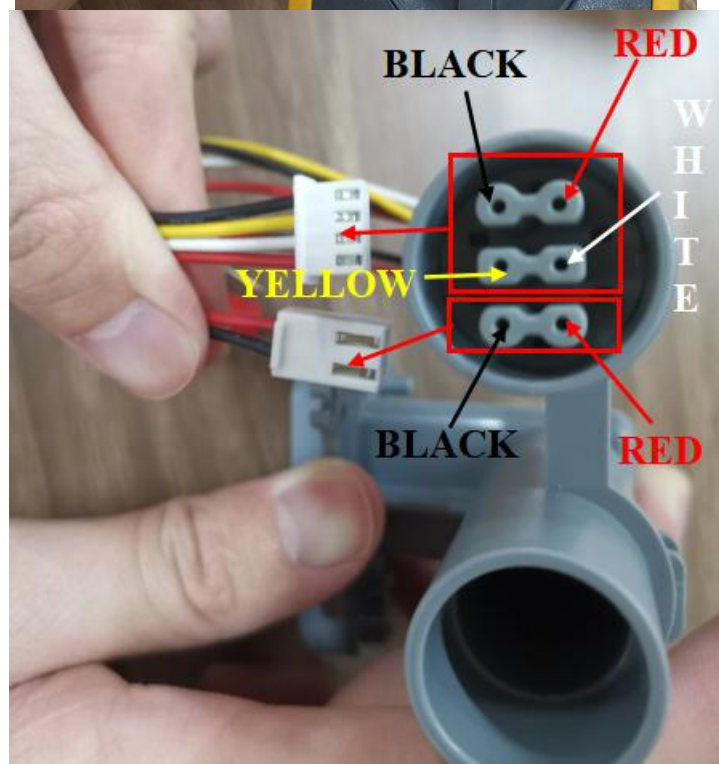
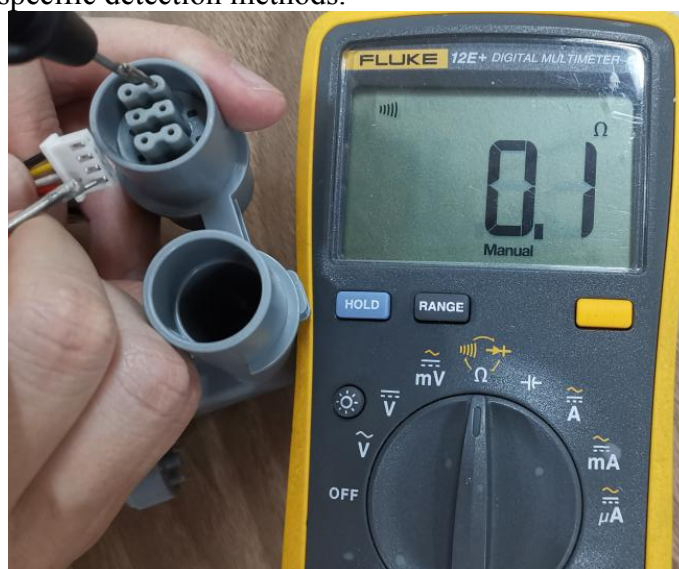
① Check whether the pins of the heating tube are damaged. If it is normal, please reinstall the heating tube to ensure that the installation is correct.

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② If the heating tube pin is not damaged and the alarm still remains after re-installation, please replace it with a new heating tube.

③ If you have replaced heating tubes and still alarm, you need to check whether the corresponding ports and pins on the elbow joint are damaged.

④ If the elbow joint is normal, check whether the silencer box elbow on the machine (the joint of the machine with the elbow joint) is damaged. Inspection method: Open the upper shell of the machine, check whether the connecting wire is firmly connected, and whether the 2 ends of the connecting wire are unpinched, and then use a multi-meter to measure whether the resistance value of the 6 wires of the silencer box elbow is bigger than $1\ \Omega$. Please refer to the Maintenance Manual for specific detection methods.



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⑤ If the function of the silencer box elbow is normal, you need to replace the main board and then observe whether there is an alarm. Please refer to Chapter 3 of the Maintenance Manual for the method of replacing the motherboard.

⑥ Provide the videos or photos taken during the alarm.

2.16 Leakage alarm (text prompt: pipeline is leaking, please check)

① Please check whether the nasal oxygen tube is connected.
 ② Please check whether the pipeline is broken
 ③ Please check whether the pipeline and elbow joints are well connected
 ④ Please check whether the sealing ring on the elbow joint is installed correctly, whether it is deformed or lost

⑤ Check whether the elbow joint and the machine end are tightly connected, and there is no air leakage

⑥ View the flow setting value in the parameter menu and the flow value displayed on the main interface

⑦ Enter the engineering interface without shutting down machine by rotating knob: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. Enter the engineering interface to view the pressure value. As shown below:

The screenshot displays the engineering interface of the HFNC device. It features several input fields for monitoring and setting parameters. The 'Pres' field, representing pressure, is highlighted with a red rectangular box. Other visible fields include Pipe Temp, Adapter Temp, ASbsolHumi, Pipe Target, Adapter Tarc, Absol Humi, Plate Temp, Adapter Hum, Flow, Oxygen, Oxygen Pres, Ambient Temp, Set Temp, Set Flow, Set Oxygen, Work Status, Set Humidity, Proportional valve Ca, and Cali time. At the bottom, there are buttons for '100-120V' and '200-240V'.

⑧ Provide videos or photos taken during the alarm.

2.17 Blocking alarm (text prompt: the pipeline is blocked, please check)

① Check whether the nasal oxygen tube is blocked
 ② Check whether the pipeline is bent
 ③ Check if there is any blockage in the pipeline
 ④ Check whether there is any foreign matter blocked in the elbow joint
 ⑤ Check whether the water level in the water tank is too high to block the airflow, or there are other foreign objects blocking it

⑥ View the flow setting value in the parameter menu and the flow value displayed on the main interface

⑦ Enter the engineering interface without shutting down machine by rotating knob: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can

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consider it be effectively operated. Enter the engineering interface to view the pressure value. As shown below:

The screenshot shows an engineering interface with the following fields and values:

- Pipe Temp: 0
- Pipe Target: 31.5
- Plate Temp: 25.2
- Flow: 0
- Ambient Temp: 27.4
- Adapter Temp: 0
- Adapter Target: 23.1
- Adapter Hum: 0
- ASbsolHumi: 22.4
- Absol Humi: 0
- Oxygen: 21
- Oxygen Pres: 378
- Set Temp: 31
- Set Flow: 60
- Set Oxygen: 21
- Work Status: Standby
- Set Humidity: 0
- Proportional valve Ca: 0
- Proportional Valve Cali (button)
- Cali time: 2021-04-29 11:16:38
- Current Power T: 200-240V
- 100-120V (button)
- 200-240V (button)

A red box highlights the 'Pres' field with a value of 0.

- ⑧ Provide videos or photos taken during the alarm.

2.18 Unable to reach the set temperature alarm (text prompt: the temperature does not reach the set value , please check)

① Make sure if the working temperature is at normal working temperature range (18~30℃)

② Check if heating plate is working: touch the shell of water box without shutting down and removing the water box, the heating plate is working if hot. Be careful to prevent scald

③ Enter the engineering interface without shutting down machine by rotating knob: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. Enter the engineering interface to view the temperature changes of the heating plate and heating tube. The temperature value of the heating plate near room temperature indicates that the heating plate is not heated, and if it is higher, the heating plate is heated. The temperature value of the heating tube is less than the tube target temperature and the bending temperature indicates that the heating tube is not heated. If it is near the tube target temperature, it indicates that the heating tube is heated. As shown below:

The screenshot shows the same engineering interface as before, but with red boxes highlighting the 'Pipe Temp', 'Adapter Temp', and 'Plate Temp' fields, which all have a value of 0.

④ If the heating plate can be heated and the temperature value of the heating tube is normal, Check whether the voltage of the power supply in use is within the voltage range of the

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"current power supply type", and if not, please click the blue option box of "100-120V" or "200-240V" to select the appropriate voltage range. As shown below:

The screenshot shows a control interface for an HFNC device. It includes fields for Pipe Temp, Adapter Temp, ASbsolHumi, Pipe Target, Adapter Tarc, Absol Humi, Plate Temp, Adapter Hur, Flow, Pres, Oxygen, Oxygen Pres, and Ambient Temp. Below these are Set Temp, Set Flow, Set Oxygen, Work Status (Standby), Set Humidity, Proportional valve Ca, and a button for Proportional Valve Cali. At the bottom, there are three buttons: 'Current Power T 200-240V', '100-120V', and '200-240V'. The 'Current Power T 200-240V' button is highlighted with a red box, and the '100-120V' and '200-240V' buttons are also highlighted with red boxes.

- ⑤ Provide videos or photos taken during the alarm.

2.19 Unable to reach the set flow alarm (text prompt: the flow does not reach the set value, please check)

- ① View the real-time display value of the main interface and the flow setting value of the parameter menu
- ② Check whether the entire airway circuit is blocked (check the nasal oxygen tube, heating pipe, water box, elbow joint)
- ③ Check whether the fan is windy and listen to the sound of fan rotation inside the machine. If there is the sound of fan rotation, the internal assembly is wrong and the disassembly inspection is required.
- ④ If there is no wind, it means that there is a problem with the fan or the main board. Please refer to Chapter 3 of the Maintenance Manual for disassembly inspection and replacement parts.
- ⑤ Provide videos or photos taken during the alarm.

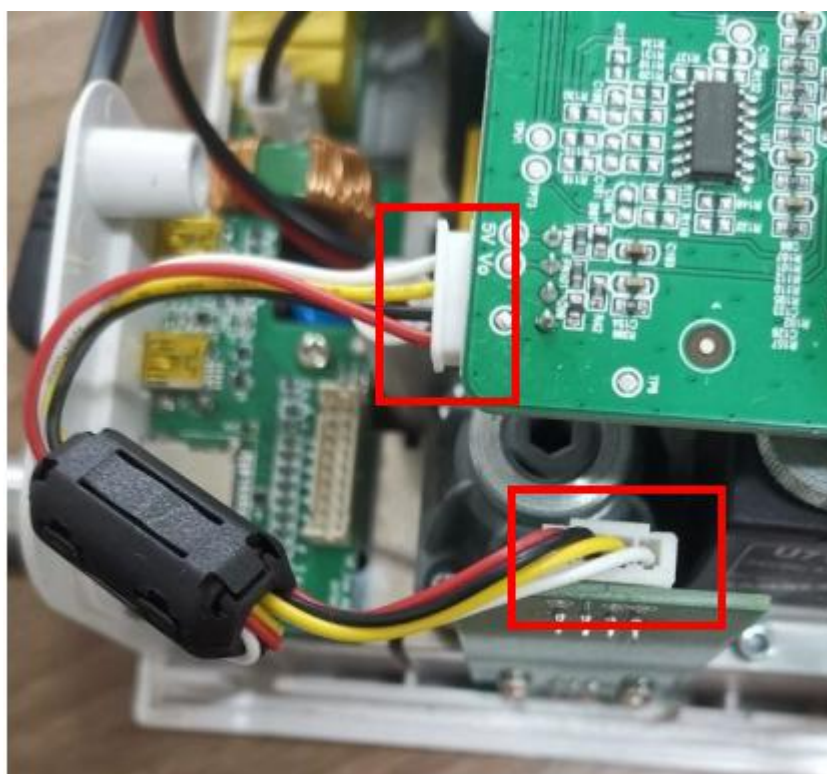
2.20 Alarm of unable to reach the set oxygen concentration value (text prompt: the oxygen concentration does not reach the set value, please check)

- ① Check whether there is any leakage of the two ends of the high-pressure oxygen connecting pipe.
- ② Please confirm whether the actual value of the oxygen source pressure is within the range of 0.2-0.6MPa: Ask hospital for the oxygen source pressure if central oxygen supply, Check the pressure gauge on the oxygen cylinder if oxygen supply.
- ③ If the pressure of the oxygen source is within the normal range, enter the engineering interface to check whether the oxygen source pressure value is around 374. The specific operation method is: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. As shown below:

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Pipe Temp	0	Adapter Tem	0	ASbsolHumi	22.4
Pipe Target	31.5	Adapter Tarc	23.1	Absol Humi	0
Plate Temp	25.2	Adapter Hur	0		
Flow	0	Pres	0	Oxygen	21
Ambient Temp	27.4			Oxygen Pres	378
Set Temp	31	Set Flow	60	Set Oxygen	21
Work Status	Standby			Set Humidity	0
Proportional valve Ca	0	Proportional Valve Cali		Cali time	2021-04-29 11:16:38
Current Power T	200-240V				

④ If the oxygen source pressure value is around 370 (the deviation is within 20), it indicates that the oxygen source pressure sampling has failed, disassemble the upper shell to check whether the connection line of the high pressure sampling board is connected properly. Please refer to Chapter 3 of the Maintenance Manual for disassembly operation and inspection.



2.21 Water tank shortage alarm (text prompt: water tank shortage, please add water)

① Check whether there is water in the water chamber , If there is no water, please add the water and press the power button again ,to check whether the heating plate is heated: touch the water chamber with your hand without turning off the power or removing water chamber. If the plastic shell is very hot, it means the heating plate is heating up. Please be careful to prevent burns. If the heating plate does not heat, the heating plate may be damaged. Please refer to Chapter 3 of the Maintenance Manual to disassemble and inspect the heating plate.

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② Check the system menu to confirm whether the software version is the latest version. Update the software to the latest version.

③ If there is water in the water chamber and press the power button again, the heating plate can also be heated and an alarm appears. Enter into the engineering interface to view the information by operating the knob. The specific operation method is: turn the knob right 3 left 2 right 3 and then press the knob to operate continuously. It is necessary to ensure that the frustration of each step is clear to be effective. Enter the engineering interface to check the temperature of the heating plate and the humidity of the elbow: whether the temperature of the heating plate is continuously rising, and whether the humidity of the elbow is greater than 40%. As shown below:

The screenshot displays the engineering interface with the following data:

Pipe Temp	0	Adapter Tem	0	ASbsolHumi	22.4
Pipe Target	31.5	Adapter Tarc	23.1	Absol Humi	0
Plate Temp	25.2	Adapter Hur	0		
Flow	0	Pres	0	Oxygen	21
Ambient Temp	27.4	Oxygen Pres	378		
Set Temp	31	Set Flow	60	Set Oxygen	21
Work Status	Standby	Set Humidity	0		
Proportional valve Ca	0	Optional Valh Cali	Cali time:2021-04-29 11:16:38		
Current Power T	200-240V	100-120V	200-240V		

④ Check the value of ambient temperature and humidity, flow rate, oxygen concentration, and setting value of temperature. Check whether the voltage of the power supply in use is within the voltage range of the "current power supply type", and if not, please click the blue option box of "100-120V" or "200-240V" to select the appropriate voltage range. As shown below:

The screenshot displays the engineering interface with the following data:

Pipe Temp	0	Adapter Tem	0	ASbsolHumi	22.4
Pipe Target	31.5	Adapter Tarc	23.1	Absol Humi	0
Plate Temp	25.2	Adapter Hur	0		
Flow	0	Pres	0	Oxygen	21
Ambient Temp	27.4	Oxygen Pres	378		
Set Temp	31	Set Flow	60	Set Oxygen	21
Work Status	Standby	Set Humidity	0		
Proportional valve Ca	0	Optional Valh Cali	Cali time:2021-04-29 11:16:38		
Current Power T	200-240V	100-120V	200-240V		

⑤ Provide videos or photos taken during the alarm.

2.22 Communication failure alarm (text prompt: communication failure, please check)

① Enter the engineering interface to view by operating the knob. The operation method is: rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. Enter the engineering interface to check whether all the values in all monitoring items have not changed. As shown below:

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The screenshot shows the engineering interface of the HFNC device. A red rectangular box highlights the top section of the interface, which contains the following parameters and their values:

- Pipe Temp: 0
- Adapter Ten: 0
- ASbsolHumi 1: 22.4
- Pipe Target: 31.5
- Adapter Tarc: 23.1
- Absol Humi: 0
- Plate Temp: 25.2
- Adapter Hur: 0
- Flow: 0
- Pres: 0
- Oxygen: 21
- Oxygen Pres: 378
- Ambient Temp: 27.4

Below the highlighted section, there are settings for Set Temp (31), Set Flow (60), Set Oxygen (21), Work Status (Standby), Set Humidity (0), Proportional valve Ca (0), and a button for 'Proportional Valve Cali'. At the bottom, there is a 'Current Power T' section with '200-240V' and two buttons: '100-120V' and '200-240V'. A 'Cali time' stamp shows '2021-04-29 11:16:38'.

- ② Check if there will be an alarm after re-powering on.
- ③ Check the device information in the system menu to confirm whether the software version is the latest.
- ④ Update to the latest version for the software.
- ⑤ If the software cannot be upgraded, the motherboard is damaged and it needs to be disassembled and replaced. Please refer to Chapter 3 of the service manual for operation.
- ⑥ Provide videos and photos taken during the alarm.

2.23 Power failure alarm (no text prompt, only alarm)

- ① Check if the power cord is plugged in
- ② Check whether the grid has electricity

2.24 Abnormal ambient temperature alarm (text prompt: abnormal ambient temperature)

- ① Check whether the room temperature is below 10 degrees Celsius
- ② If the room temperature is not lower than 10 degrees Celsius, enter the project interface and check the display value of the ambient temperature. Enter the engineering interface by operating the knob. The operation method is: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. As shown below:

This screenshot is similar to the one above, but with a red rectangular box highlighting the 'Ambient Temp' field, which displays the value '27.4'. The rest of the interface, including the other parameters and the bottom section, remains the same.

- ③ If the display value of the ambient temperature on the engineering interface is lower than 10 degrees Celsius, shut down quickly, wait for the heating plate to cool down, then

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checking the pipeline temperature, elbow temperature, and heating plate temperature on the engineering interface, compare these 3 temperature values with the room temperature, if it deviates from the room temperature very large (the deviation is much greater than 3°C), it means that there is a problem with the sampling temperature in this part, and the parts need to be replaced. If you need to disassemble and replace parts, please refer to the service manual for operation.

- ④ Restart the machine after replacing the parts and check whether the alarm still occurs.
- ⑤ Provide video or photos taken during the alarm.

2.25 Maintenance prompt (text prompt: please perform maintenance)

- ① Replace the filter and PM2.5 filter, and click "maintenance" in the dialog box after completion.
- ② Or do not replace the filter and PM2.5 filter, click "Cancel" in the dialog box, select the automatic maintenance prompt in the alarm menu, and select "0 h".

2.26 Abnormal heating function alarm (text prompt: abnormal heating function)

- ① Check whether the temperature value displayed on the main interface is normal (large fluctuation, very low or very high temperature, the temperature is displayed — —), check whether the heating plate is heated, and whether the heating tube is heated.
- ② When alarming, enter the engineering interface, check the heating tube and the heating plate temperature display value, and shoot the video. Enter the engineering interface by operating the knob. The specific operation method is: Rotate the knob to right 3 times, to left 2 times, to right 3 times and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated.
- ③ Provide videos or photos taken during the alarm.

2.27 Standard time adjustment (the time displayed in the upper right corner of the screen)

- ① If the standard time displayed in the upper right corner of the screen is inconsistent with the local time, you can enter the time setting interface to adjust and set it. The specific operation method is: Rotate the knob to **right 2 times, to left 2 times, to right 2 times** and then press the knob, has to be continuous operation. Only when each rotation step has a clear sense of frustration can consider it be effectively operated. Time setting interface, as shown below:



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② Adjust the year, month, day, hour, minute, and second by clicking "+" and "-", and click "OK" to save the set time.

3. Disassemble the host

3.1 Replace air filter



Figure 3-1-1



Figure 3-1-2

According to the direction of the red arrow in Figure 3-1-1, push and pull the cover on the left side, open the cover and take out 2 filters. From the outside to the inside, they are black filter and white PM2.5 filter (shown as Figure 3-1-2).

3.2 Disassemble the upper shell

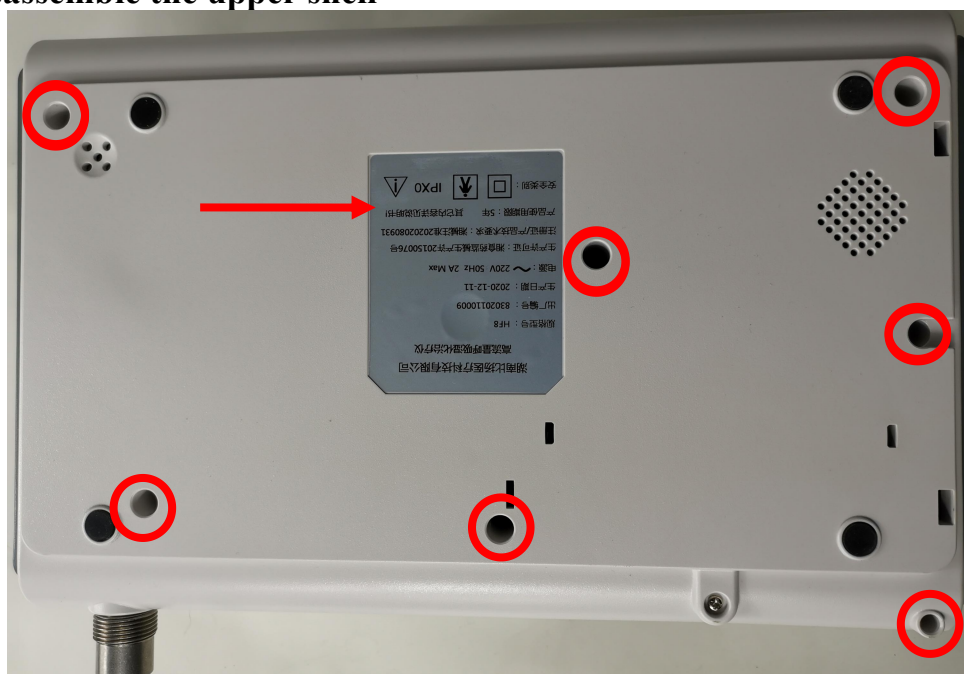


Figure3-2-1

① Use a Phillips screwdriver to remove the 7 screws at the bottom of the machine. The red circle in Figure 3-2-1 is the screw location.

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Figure3-2-2

② On the back of the machine, gently push the upper shell upwards in the direction as red arrow, please push several times, slowly and carefully open the upper shell. Note: When pushing the upper shell upward, be careful not to use excessive force.

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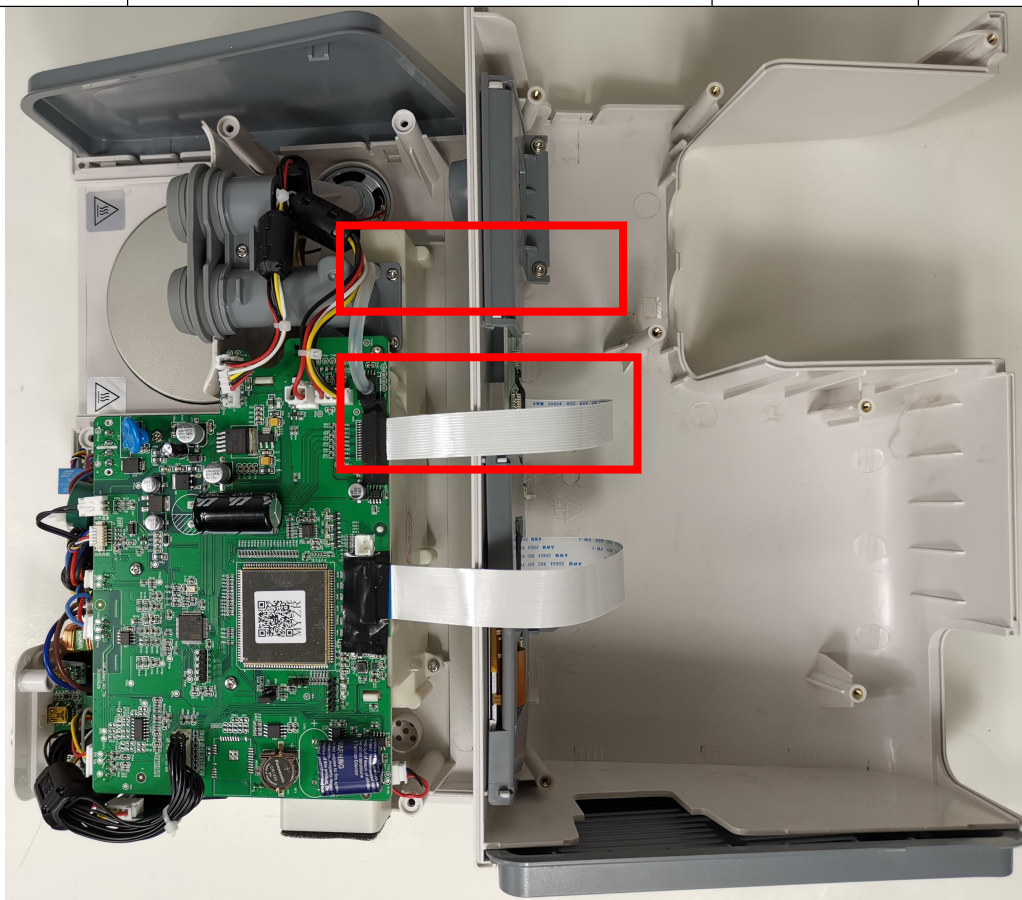


Figure3-2-3

③ After pushing up the upper case, carefully put it on the desktop and pay attention to the connection line between the upper case and the motherboard (shown in Figure 3-2-3).

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Figure3-2-4

④ Disconnect the screen cable and button cable between the upper shell and the motherboard as shown in Figure 3-2-4.

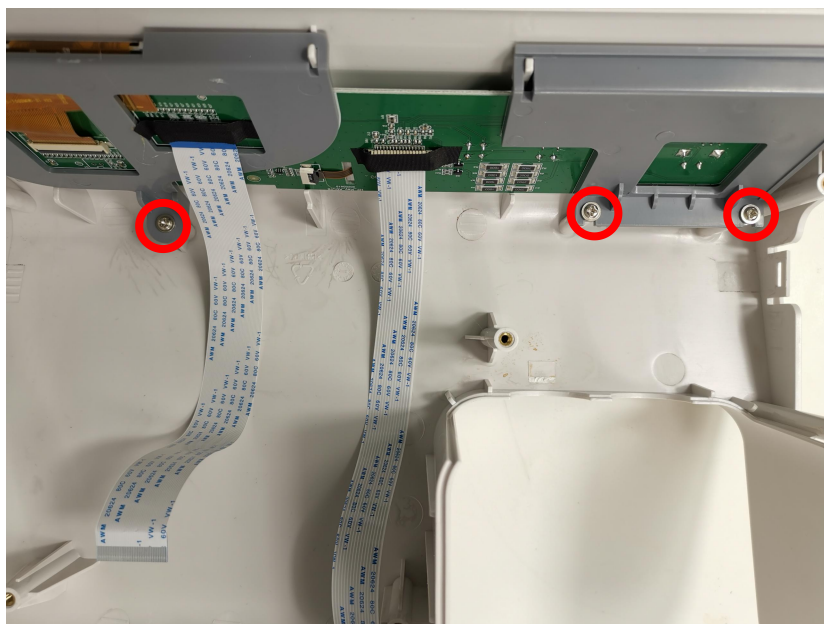


Figure3-2-5

⑤ Use a Phillips screwdriver to remove the 3 screws marked in the red circle in Figure 3-2-5, and remove the two brackets that fix the key board (as shown in Figure 3-2-6).

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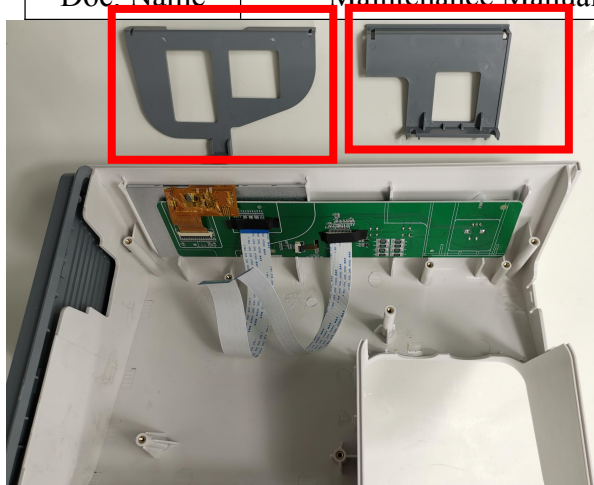


Figure3-2-6

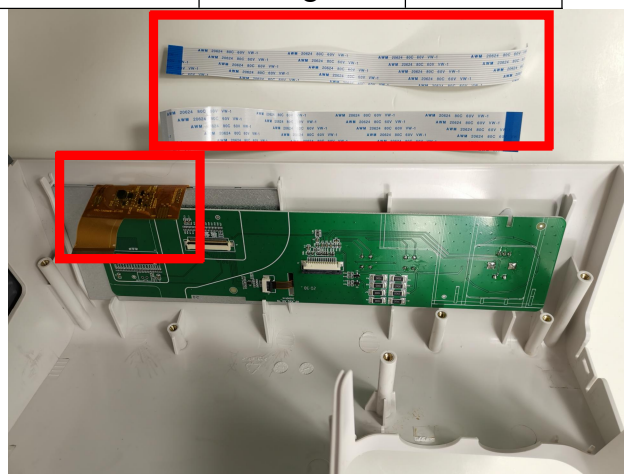


Figure3-2-7

⑥ Use a Phillips screwdriver to remove the 3 screws marked in the red circle in Figure 3-2-5, and remove the two brackets that fix the key board (as shown in Figure 3-2-6).

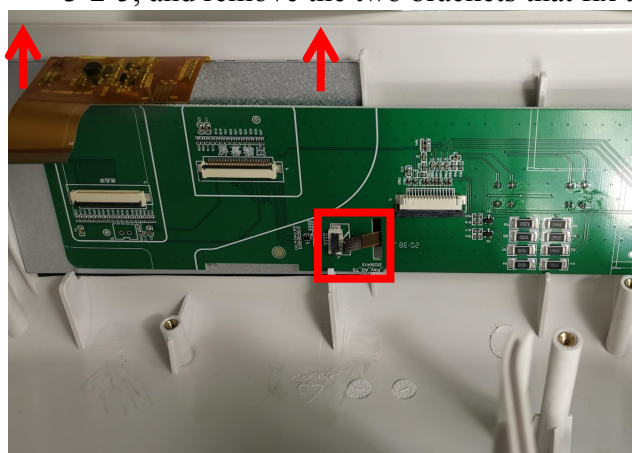


Figure3-2-8



Figure3-2-9

⑦ Take out the display in the direction of the red arrow shown in Figure 3-2-8, and disconnect the connection line of the touch screen.



Figure3-2-10

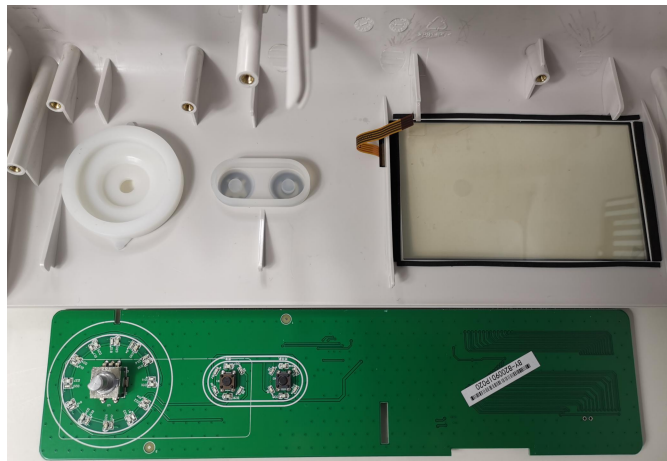


Figure3-2-11

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⑧ Remove the knob cap from the front of the upper shell, and then carefully remove the keyboard PCBA. Note: Do not damage the touch screen display connection cable when removing the keyboard PCBA.

3.3 Disassemble the main PCBA

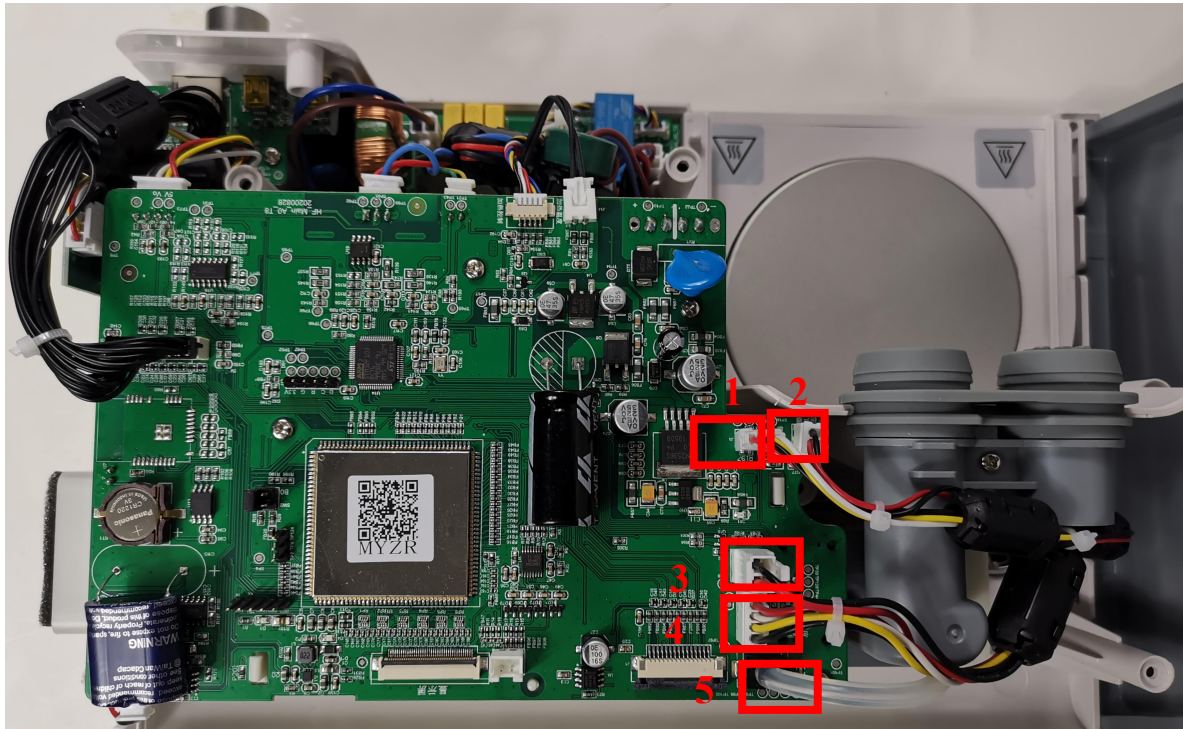


Figure3-3-1

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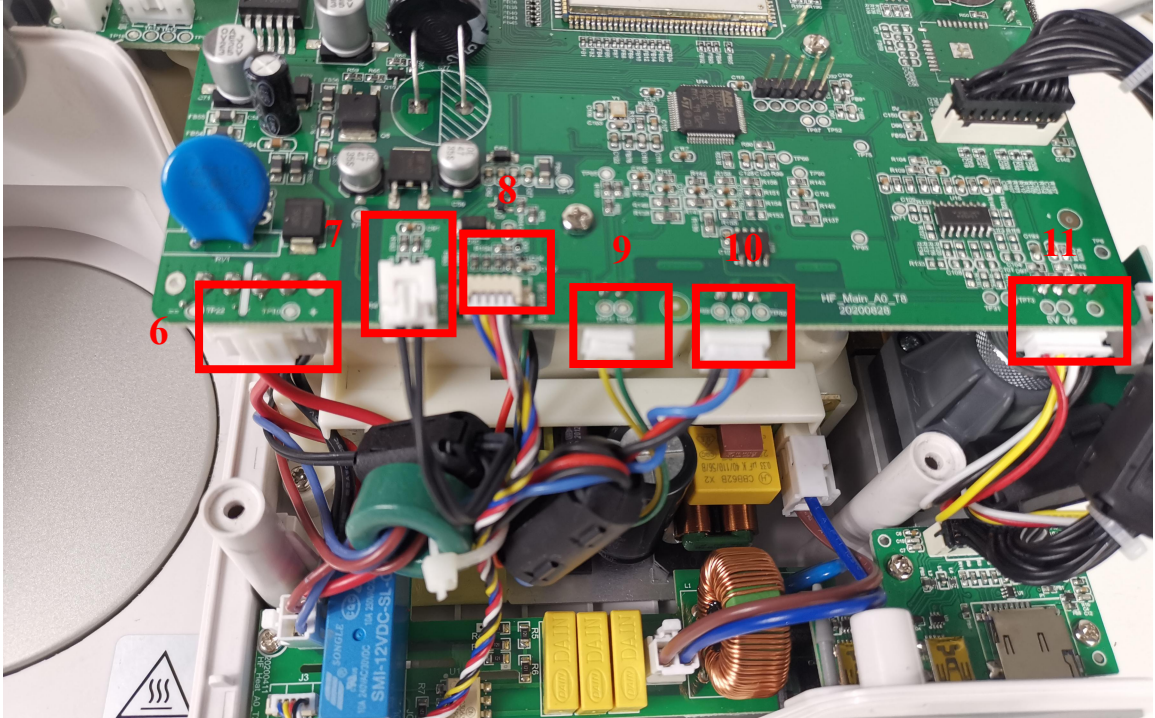


Figure3-3-2

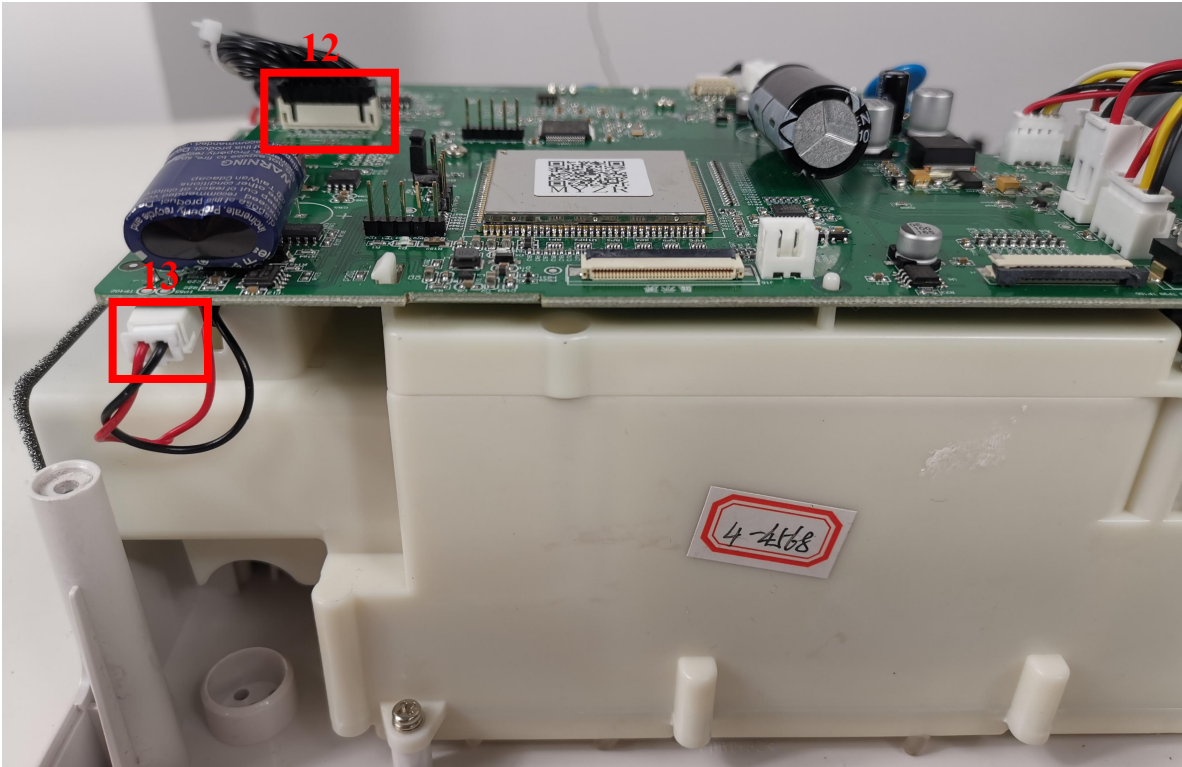


Figure3-3-3

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① Unplug the connecting wire and sampling tube on the main PCBA according to the order of 1-13 shown in Figure 3-3-1, 3-3-2, and 3-3-3.

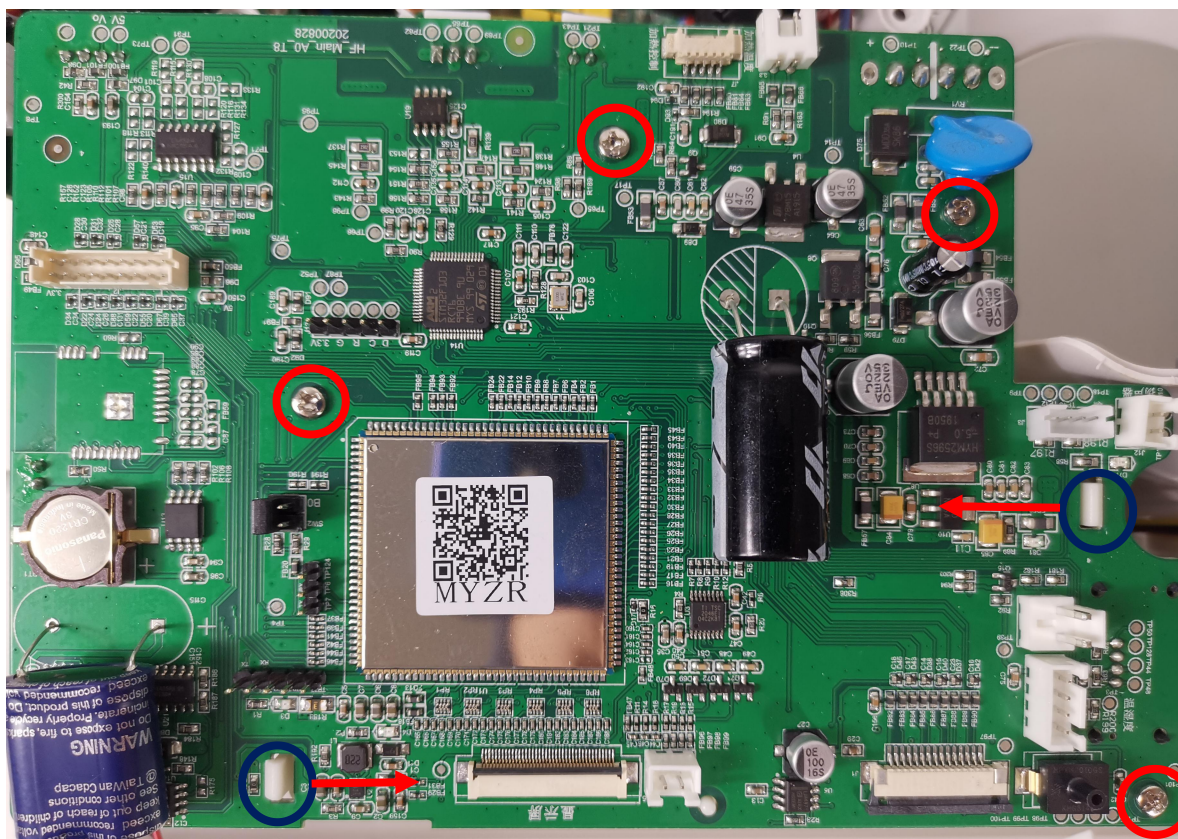


Figure3-3-4

② Use a Phillips screwdriver to remove the 4 screws in the red circle in Figure 3-3-4; push the buckle in the blue circle in the direction of the arrow shown, and carefully remove the main PCBA from the silencer.

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Figure 3-3-5



Figure 3-3-6

③ Turn the main PCBA over and remove the sampling rubber plug in the red circle as Figure 3-3-5.

3.4 Disassemble the silencer

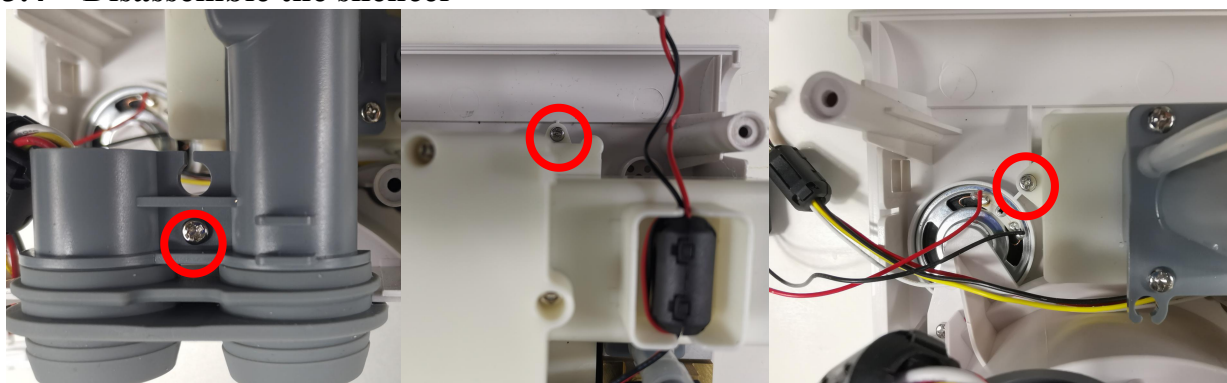


Figure 3-4-1

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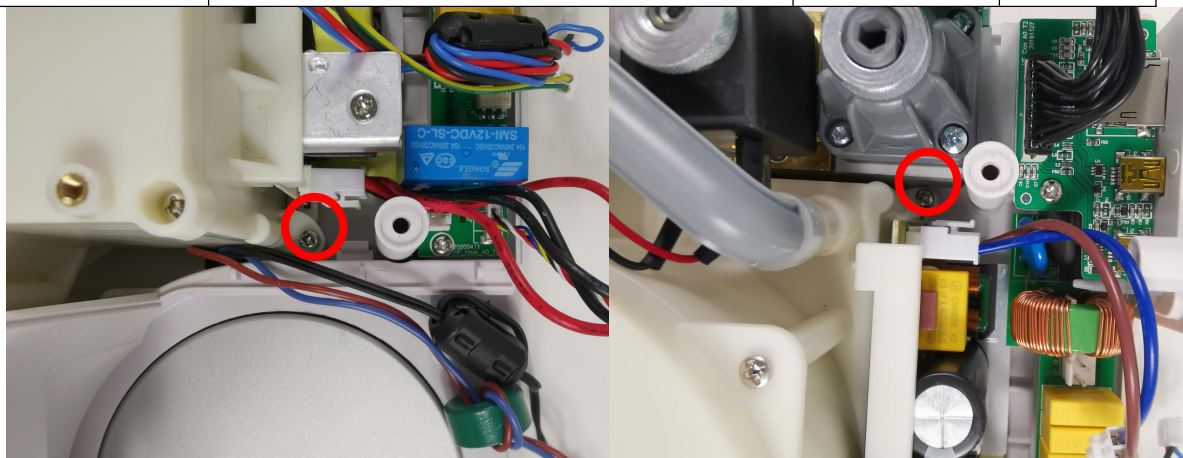


Figure 3-4-2

① Use a Phillips screwdriver to remove the 5 screws in the red circles as Figure 3-4-1 and 3-4-2. Then pull out the oxygen elbow in Figure 3-4-3 in the direction as red arrow to take out the entire silencer. After taking out the silence, you can directly take out the power module as shown in Figure 3-4-4

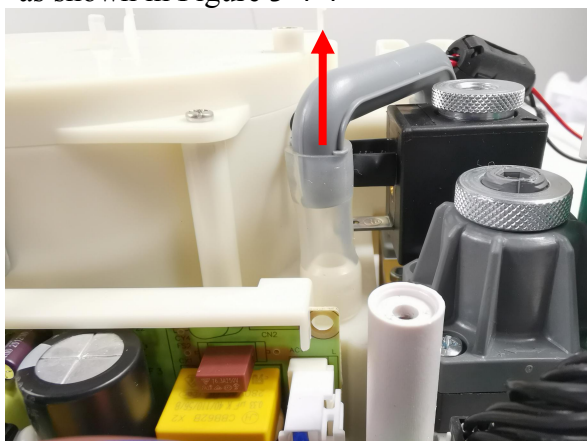


Figure 3-4-3



Figure 3-4-4



Figure 3-4-5

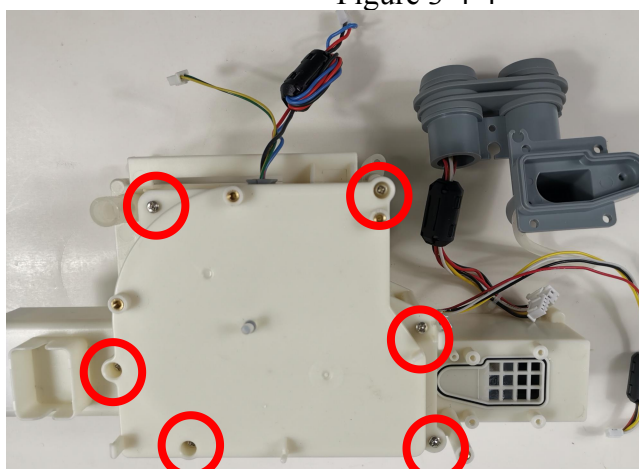


Figure 3-4-6

② Use a Phillips screwdriver to remove the 4 screws in the red circle in Figure 3-4-5, and remove the exhaust connector of the silencer.

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Figure 3-4-7

③ Use a Phillips screwdriver to remove the 6 screws in the red circle as Figure 3-4-6, and remove the upper shell of the muffler to check the fan status as shown in Figure 3-4-7.

3.5 Remove the adapter plate, rear cover plate and proportional valve

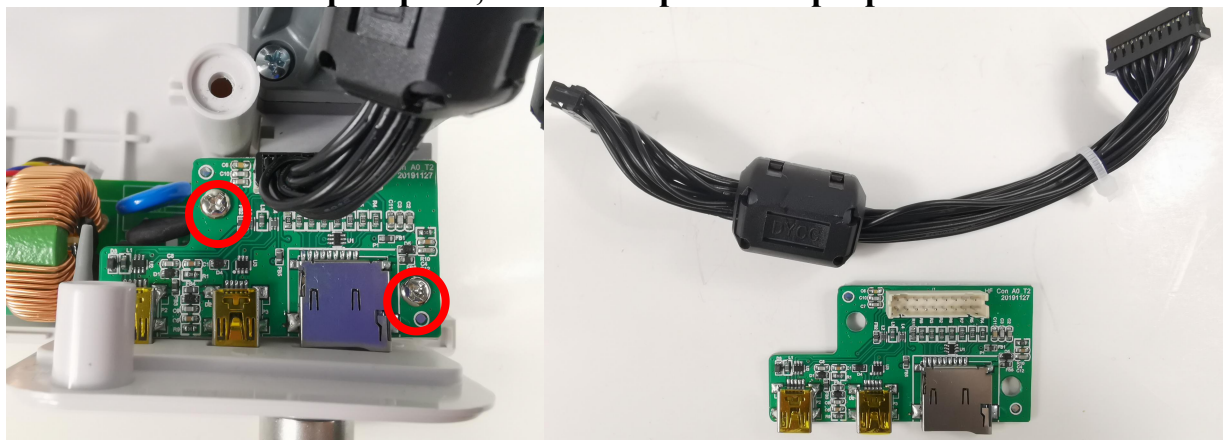


Figure 3-5-1

① Use a Phillips screwdriver to remove the 2 screws in the red circle in Figure 3-5-1. carefully take out the adapter board and unplug the adapter board cable.

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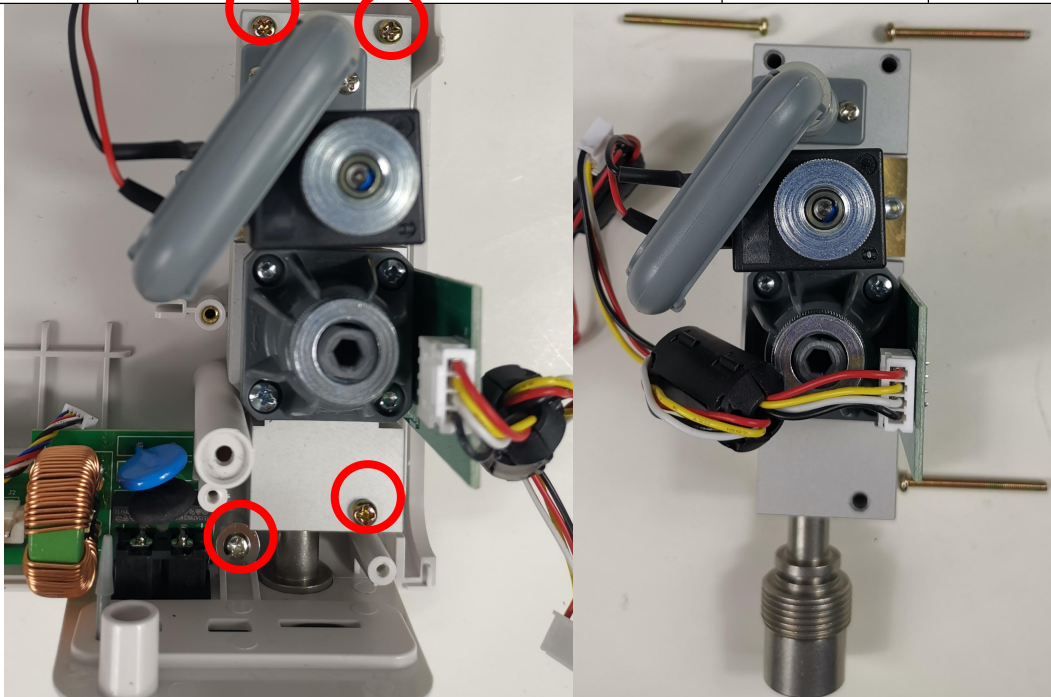


Figure 3-5-2

② Use a Phillips screwdriver to remove the 4 screws in the red circle in Figure 3-5-2, and take out the back cover and proportional valve.

3.6 Disassemble the heating control board, heating plate and horn

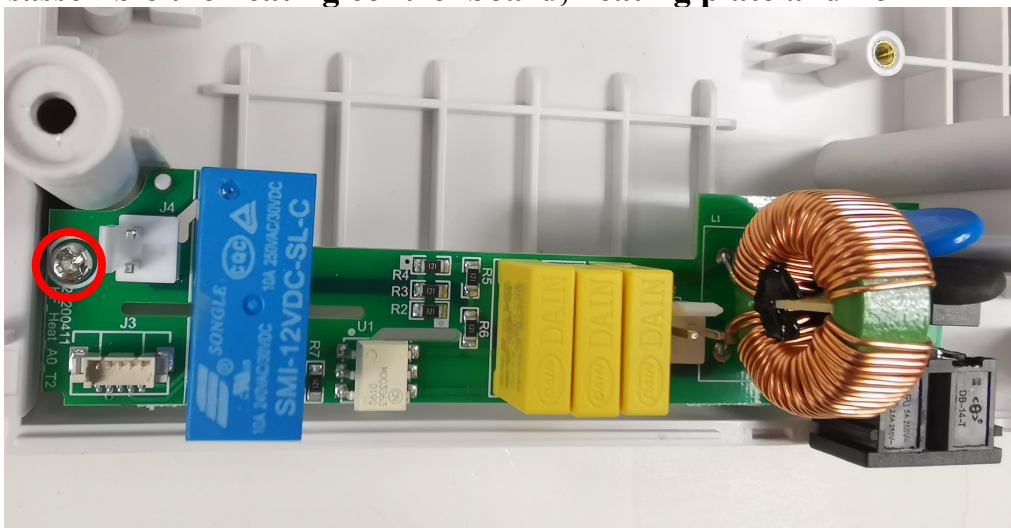


Figure 3-6-1

① Use a Phillips screwdriver to remove the screw in the red circle in Figure 3-6-1, carefully take out the heating control board.

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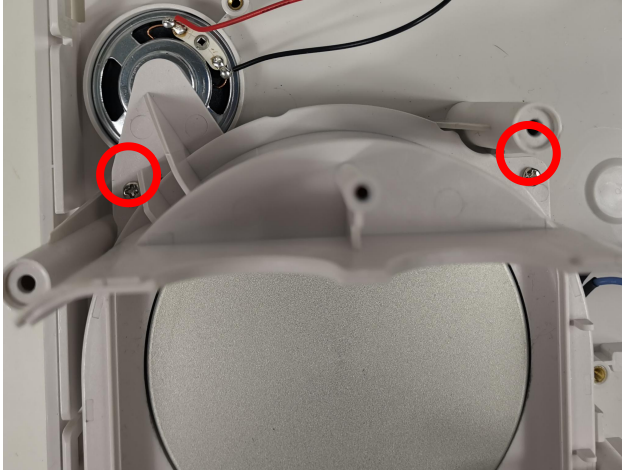


Figure 3-6-2



Figure 3-6-3

② Use a Phillips screwdriver to remove the 3 screws in the red circles as Figures 3-6-2 and 3-6-3, remove the bottom shell of the water tank as shown in Figure 3-6-4.

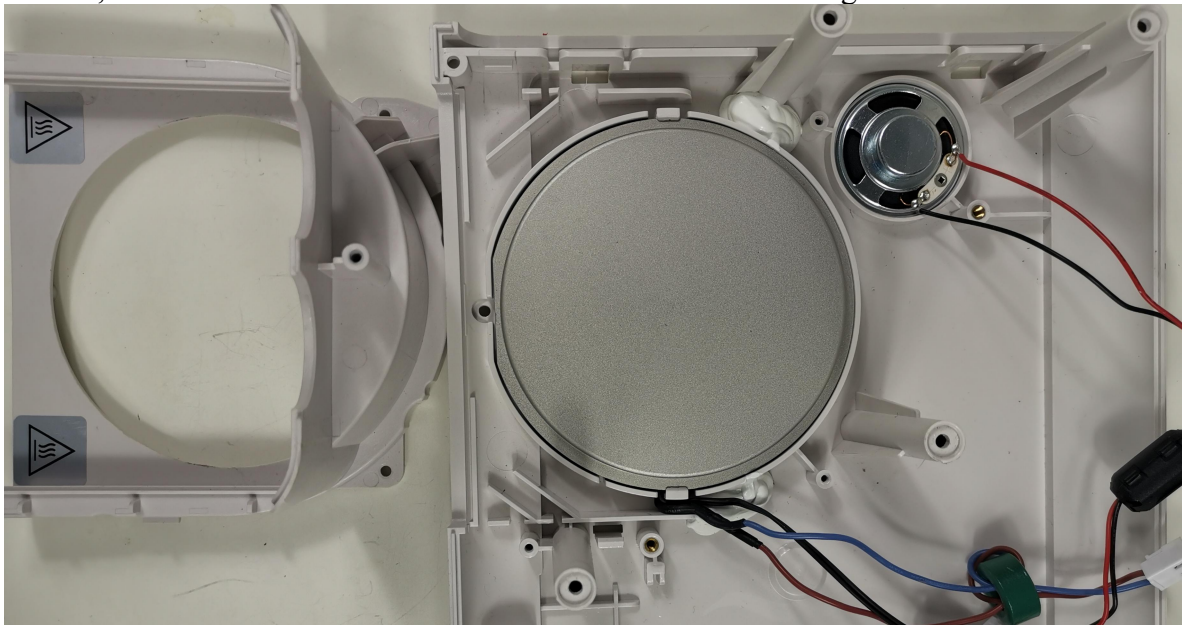


Figure 3-6-4

③ Very carefully take out the heating plate and the horn, keep the 3 springs well in the red circle in Figure 3-6-5.

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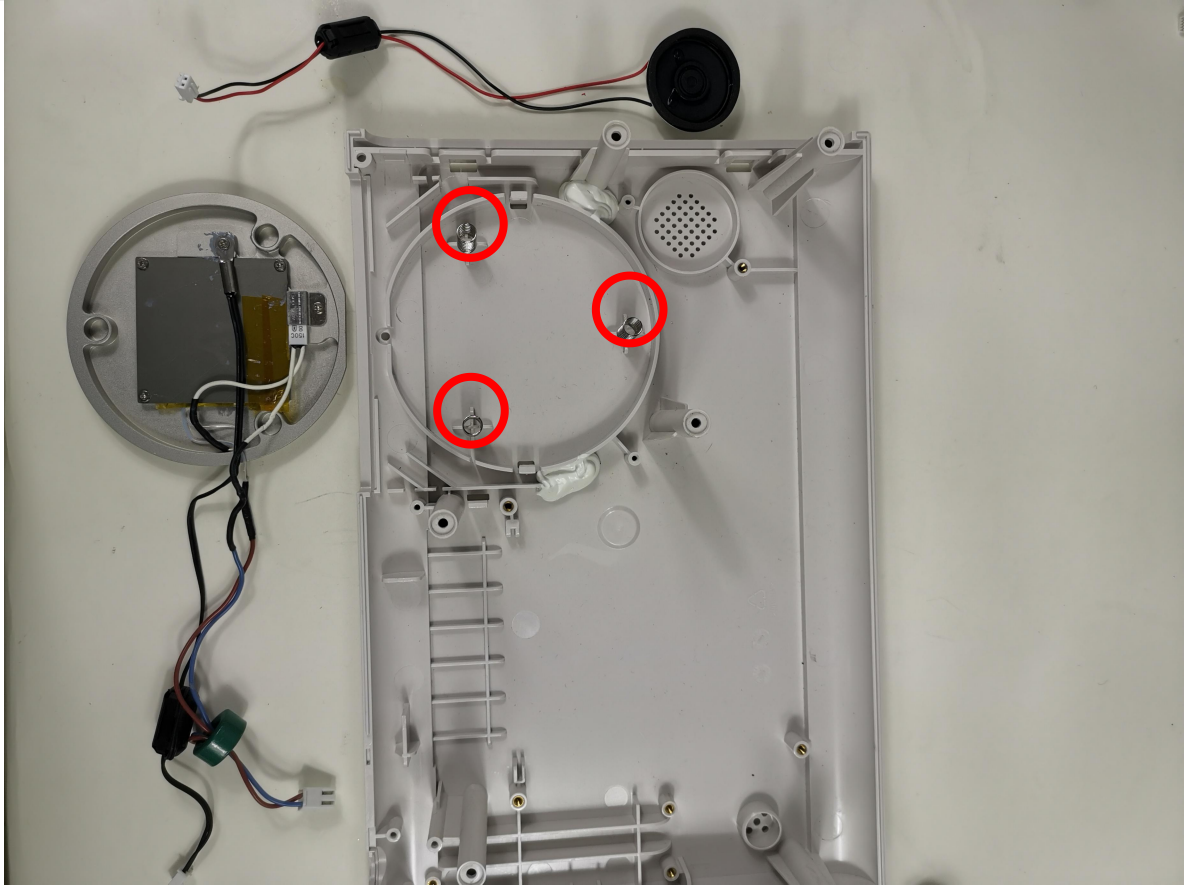


Figure 3-6-5

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4. Interface description

4.1 Main board interface

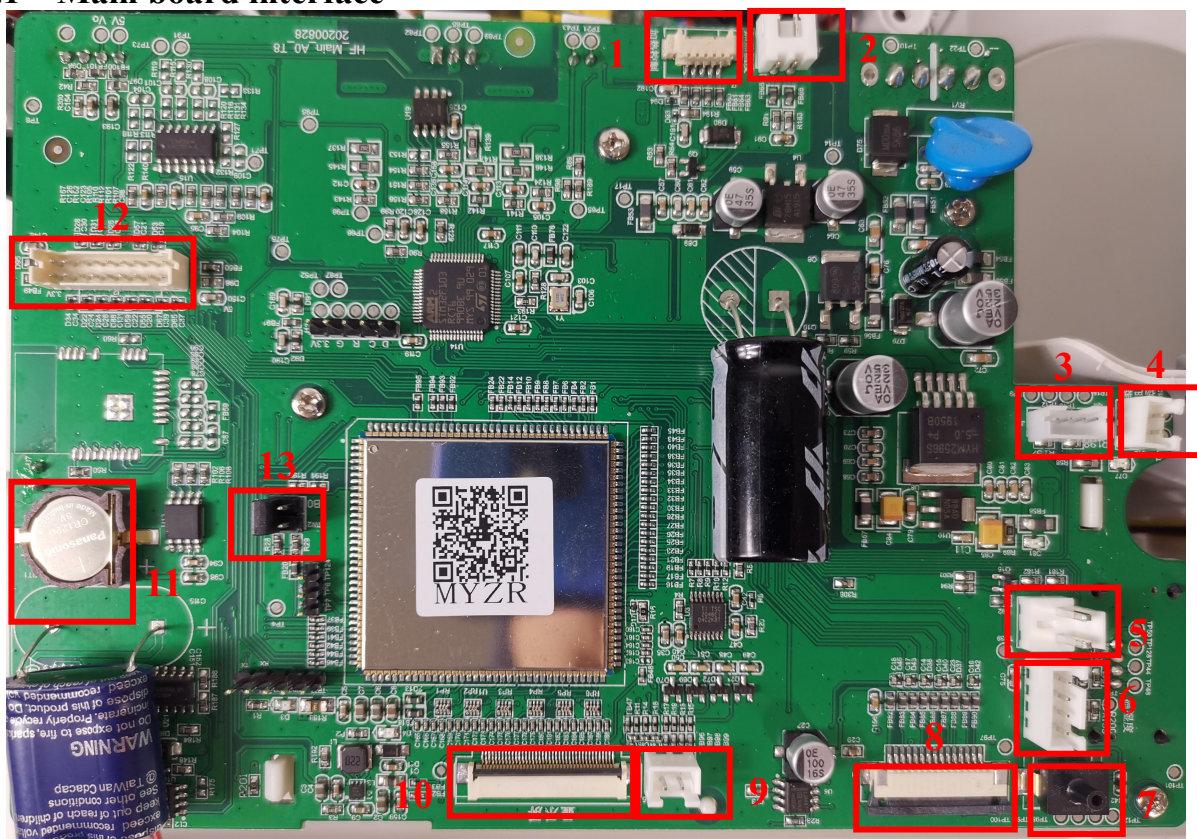


Figure 4-1-1 Main-board front view

Interfaces in Figure 4-1-1:

No.	Interface description	No.	Interface description
1	Heating plate control interface	7	Pressure sensor sampling tube interface
2	Heating plate temperature sensor interface	8	Keyboard interface
3	O2 concentration sensor interface	9	Display timer interface (reserved port)
4	Speaker interface	10	Display interface
5	Heating tube connector	11	Timer battery mounting seat
6	Elbow connector interface	12	Transfer board interface
		13	Jumper cap interface

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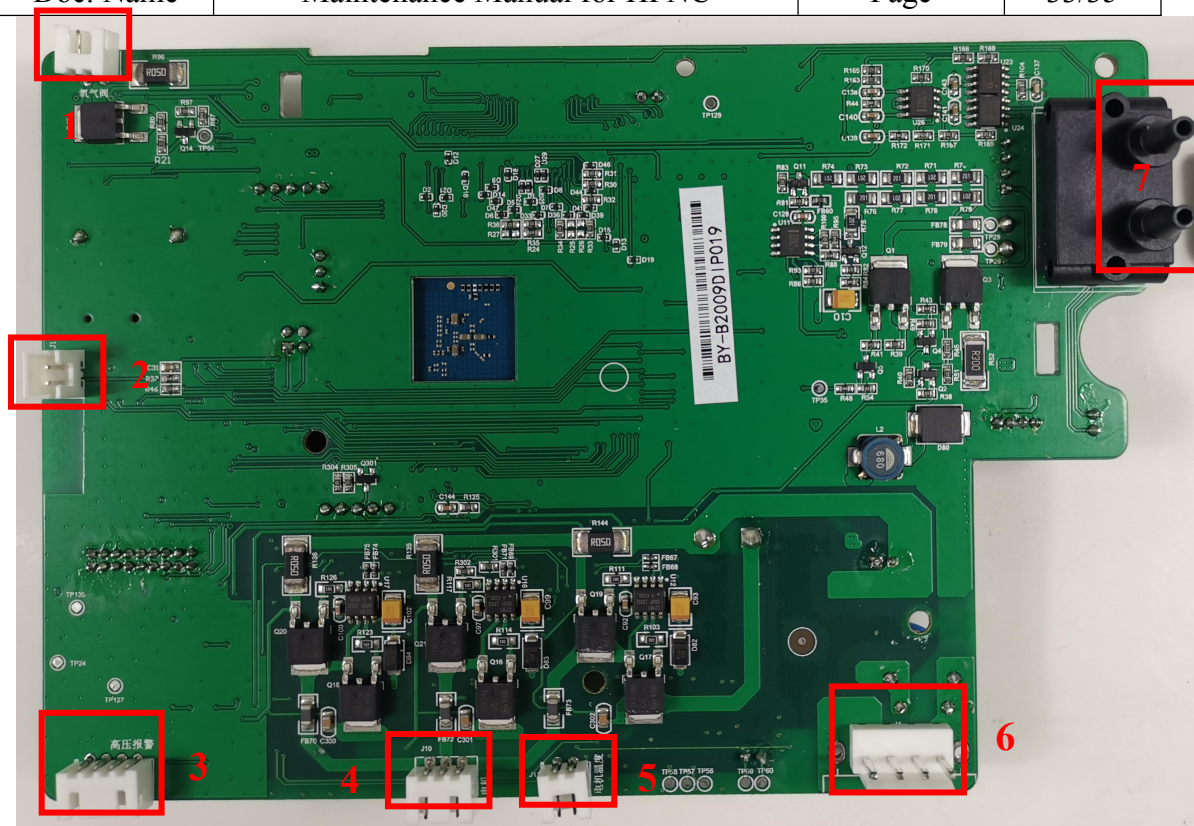


Figure 4-1-2 Main-board back view
Interfaces in Figure 4-1-2:

No.	Interface description	No.	Interface description
1	Proportional valve interface	5	Fan control interface
2	Ambient temperature sensor interface (reserved interface)	6	Main-board 24V power interface
3	High pressure detection board interface	7	Flow sensor
4	Fan power interface		

4.2 Keyboard interface

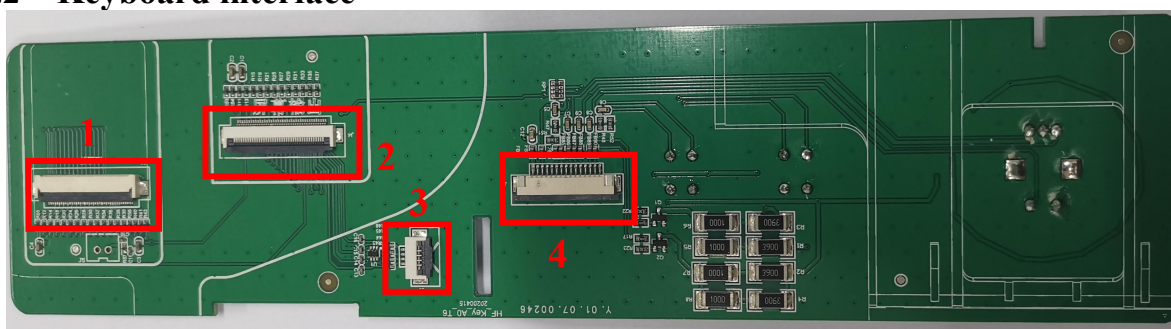


Figure 4-2-1 Keyboard back view

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Interfaces in Figure 4-2-1:

No.	Interface description	No.	Interface description
1	Display interface	3	Touchscreen interface
2	Screen adapter interface	4	Keys interface

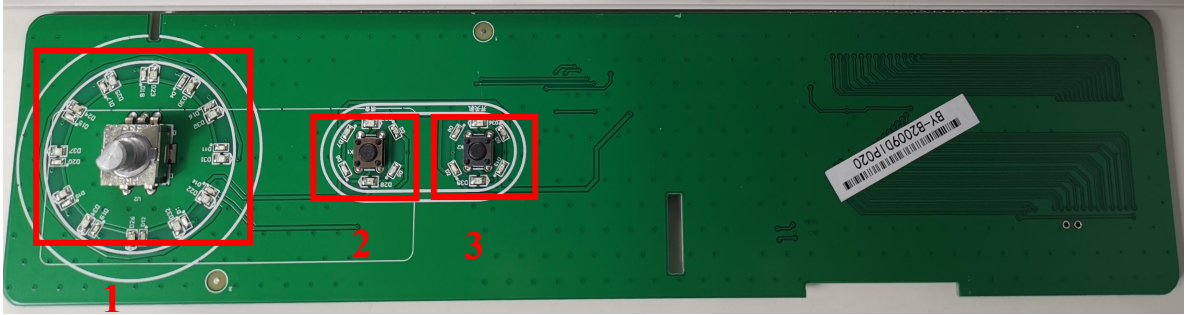


Figure 4-2-2 Keyboard front view

Interfaces in Figure 4-2-2:

No.	Interface description	No.	Interface description
1	Knob and light strip	3	Start/Stop key and light strip
2	Muse key and strip		

4.3 Adapter board, power module, heating plate control board interface

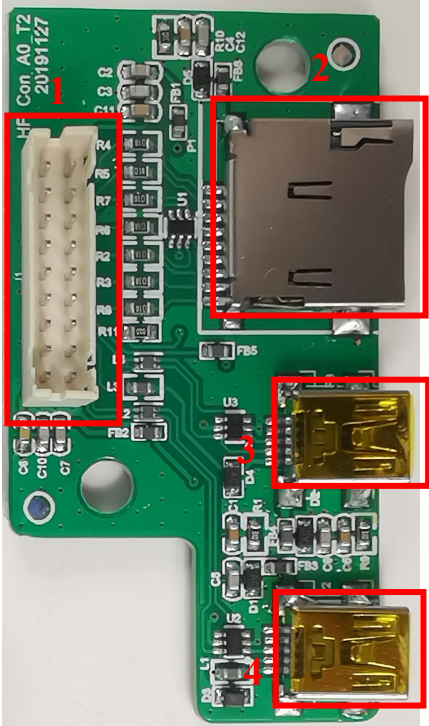


Figure 4-3-1 Adapter board



Figure 4-3-2 Power module

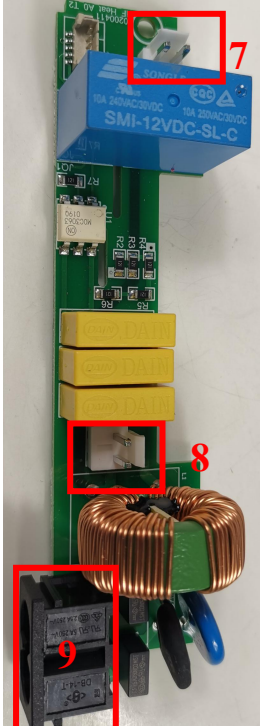


Figure 4-3-3 Heating plate control interface

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Interfaces in Figure 4-3-1,4-3-2 and 4-3-3:

No.	Interface description	No.	Interface description
1	Adapter board interface	5	24V DC output interface
2	TF card port	6	220V AC input interface
3	USB debug interface	7	Heating Plate 220VAC input interface
4	SpO2 port	8	220V AC output interface
		9	External power output interface

5. Accuracy Test

5.1 Flow accuracy test

Test parameter requirements: oxygen concentration set to 21%, long press the mute button for 3 seconds to the Transfer Mode, no water in the water tank and then connect to the flow-meter.

5.2 Oxygen concentration accuracy test

Long press the mute button for 3 seconds to the Transfer Mode, no water in the water tank and then connect to the oxygen concentration test instrument.

Note: All the steps mentioned above in this file will be omitted when they appear again below, please refer to the steps shown above by yourself.

After the removal is complete, follow the removal method to reverse the operation to complete the assembling.

When the operator encounters matters not covered in this document, please call our after-sales service and after-sales service telephone: 0731-88862455