HLN

THERMOSTAT

User Manual

Color HD LCD Screen
HLN ComfortStart Digital Controller(Air Heater)

AE-8S-QC | AE-8S-QC-WIFI&Bluetooth

Technical Specifications

◆ Temperature Sensor: Thermistor	◆ Operating Environment: -20~45℃	◆ Temperature Control Accuracy: ±1℃
◆ Temperature Control Accuracy: ±1℃	◆ Mounting Hole Spacing: 60mm (Standard)	◆ Casing: PC + ABS Flame Retardant

Button Instructions

WIFI Controller (Applicable to WIFI Controller)

AUTO	MANU				ERR
Auto Mode	Manual Mode	Ventilation Mode	Quick Fuel Pumping	Voltage Check	Error Code
Time Setting	Alarm Clock Setting	Timer Function	System Setting	WiFi Reset	

Bluetooth Controller (Applicable to Bluetooth Controller)

AUTO	MANU				ERR
Auto Mode	Manual Mode	Ventilation Mode	Quick Fuel Pumping	Voltage Check	Error Code
Time Setting	Alarm Clock Setting	Timer Function	System Setting	Bluetooth Reset	

Basic Function Operation Instructions

1.Manual Mode Start: The heater defaults to manual mode when powered on. In manual mode, press and hold the "" button to start the heater. The heating symbol will appear on the screen with "on" displayed above it, indicating that the heater is starting. Once the heater has started and entered the heating state, the operation indicator light will illuminate. After 5 seconds, the "on" will disappear, indicating that the heater is in the heating state.

Starting

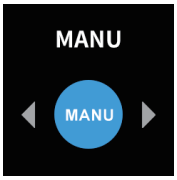
Heating State

2.Manual Mode Stop: In the manual mode and while the heater is in the heating state, press and hold the "" button to turn off the heater. The heating symbol will appear on the screen with "off" displayed above it, indicating that the heater is stopping. Once the heater has stopped, the operation indicator light will turn off, and both the heating symbol and "off"will disappear, indicating that the heater has stopped.

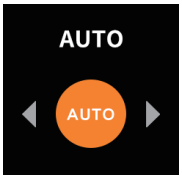
Stopping

Stopped State

3.Mode Switching: Press the "Confirm" button to enter the mode switching. Use the rotary knob to switch between Manual,Auto, and Ventilation modes . Press the "Confirm" button to enter the selected mode. If the "Confirm" button is not pressed within 3 seconds, it will return to the original mode.



User Manual



Automatic

Ventilation

4.Auto Mode Operation: In auto mode, the heater starts and stops automatically based on the comparison between the current temperature and the set temperature. It also automatically adjusts the wind level. When the set temperature is higher than the current temperature by a certain value (default 2 degrees, adjustable in advanced settings), the heater starts. The heating symbol will appear on the screen with "on" displayed above it, indicating that the heater is starting. Once the heater has started and entered the heating state, the operation indicator light will illuminate. After 5 seconds, the "on" will disappear, in dicating that the heater is in the heating state. When the set temperature is lower than the current temperature by a certain value (default 5 degrees, adjustable in advanced settings), the heater turns off. The heating symbol will appear on the screen with "off" displayed above it, indicating that the heater is stopping. Once the heater has stopped, the operation indicator light will turn off, and both the heating symbol and "off" will disappear, indicating that the heater has stopped.

Starting

Heating State

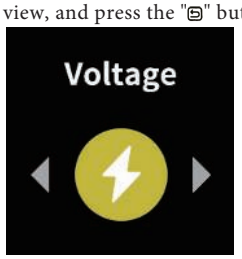
Stopping

Stopped State

5.Ventilation Mode Operation: In ventilation mode, press the "Confirm" button to enter the ventilation mode and start operation. The heating symbol will appear on the screen with "on" displayed above it, indicating that ventilation is starting. Once ventilation has started and entered the ventilation state, the operation indicator light will illuminate, and the "on" will disappear. The heater is now in the ventilation state. In the ventilation state, use the rotary knob to adjust the ventilation level. To end the ventilation mode, switch to another mode using the mode selection.

Viewing Function Operation Instructions

Press and hold the "Confirm" button to enter the viewing function interface. The screen will display the voltage interface. Rotate the rotary knob to cycle between error codes and voltage. Press the "Confirm" button to view, and press the "" button to exit.

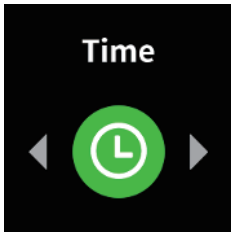


Check voltage

View fault code

Other Function Operation Instructions

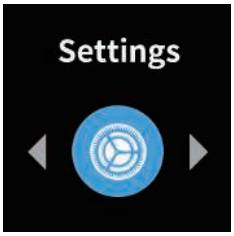
Press and hold the "⊜" button to enter the other function interface. The screen will display the Time interface. Rotate the rotary knob to cycle between Time, Alarm Clock, Timer, Settings, Fast, and WiFi. Press the "Confirm" button to enter.



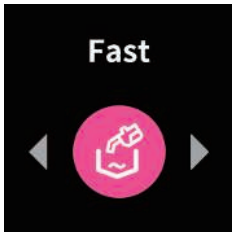
Time Setting

Alarm Clock Setting

Timer Function



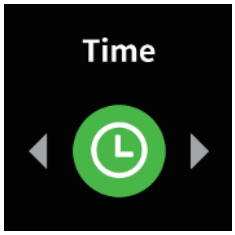
System Setting

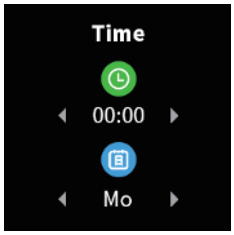


Fast Fuel Pumping

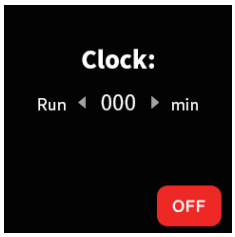
WiFi Reset

1.Time Setting: The Time function is used to set the current time and day of the week. Press the "Confirm" button to switch between minutes, hours, and day of the week. The corresponding value will turn green. Use the rotary knob to set the values. Press the "⊜" button to save and exit when all settings are done.





2.Alarm Clock Setting: The Alarm Clock function is used to set the shutdown time after a certain period of operation. When entering the Alarm Clock setting interface, rotate the rotary knob to set the shutdown time (in minutes). Press the "Confirm" button to save and exit. To cancel this setting, set the time to "- -: - -".

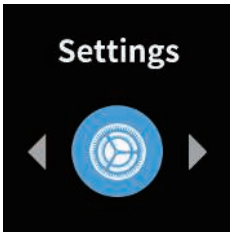


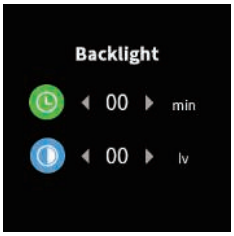
3.Timer Function: Enter the Timer function interface, where there are 6 timer options available for setting. Use the rotary knob to select Timer 1-6, and then press the "Confirm" button to switch between execution (on/off), temperature, day of the week, minutes, hours, and duration. The selected variable will turn green. Use the rotary knob to set the values. Press the "⊜" button to save and exit when all settings are done.

Note:

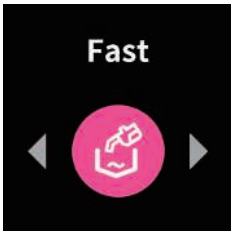
*When Timer 1-6 is set to "off", the corresponding color will be dim. When Timer 1-6 is set to "on", the corresponding color will be bright.
*If there is a logical conflict in the timer settings, the variable setting with the rotary knob will not be successful. In such cases, it is necessary to check the timer logic.
*After completing the timer function settings, press the "⊜" button briefly to execute the function. The screen will display "". Press the "⊜" button again to turn off the function.

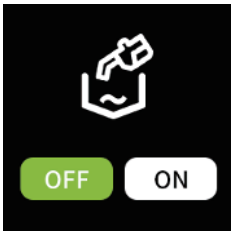
4.Setting Function(Setting): Settings is the function for configuring the thermostat. Currently, it includes backlight auto-off time (1-30 minutes) and backlight brightness (1-10 levels) settings. Press the "Confirm" button in the interface to switch and select the backlight auto-off time. The selected number will turn green, and then use the rotary knob to adjust the setting. After completing all the settings, press the "⊜" button to save and exit.





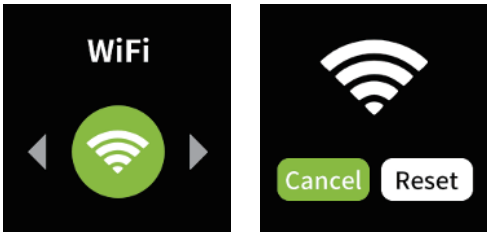
5.Quick Fuel Pump Function (Fast): Enter the Quick Fuel Pump Function, and use the rotary knob to select "on" or "off". After making the selection, press the "Confirm" button to execute the function and exit.





6. WIFI reset (Applicable to WIFI Controller)

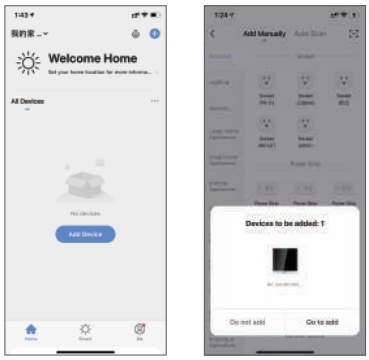
Long press the "⊜" key to enter other function interfaces, and the Time interface will appear. Rotate the knob to switch to WiFi settings, press the confirm key to enter, rotate the knob to switch to Reset, and press the "Confirm" key to reset.



WiFi connection: Scan the QR code in the lower left corner to download the APP, then connect to the APP.

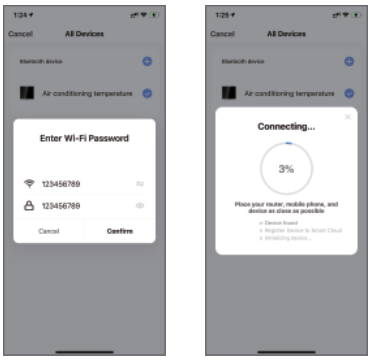
1、Bluetooth connection

Turn on the Bluetooth function of the phone, and then open the downloaded APP.
Wait a few seconds for the following picture to appear, click "Go to add".



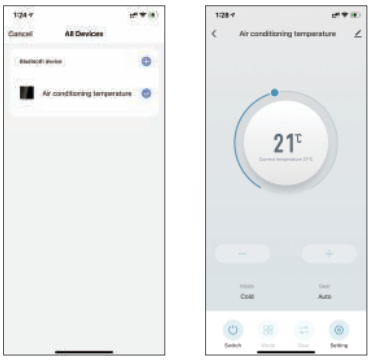
2、Search for device

The password appears automatically or manually enter the password.
Click "Confirm" to show the percentage connection progress.



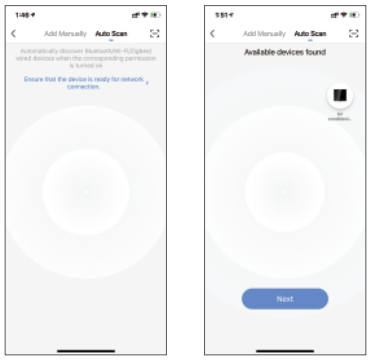
3、Connection complete

Click on the "+" sign.
Connection complete.



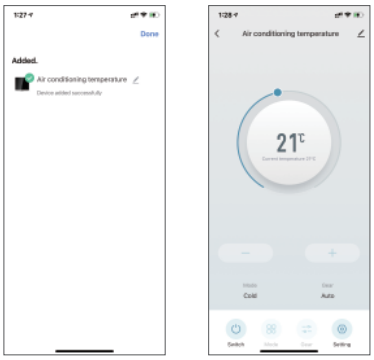
4、Auto connect

Or choose automatic connection.
Wait for the following picture to appear, click "Next".



5、Connection complete

Click "Done" to complete the connection.



QR code of APP

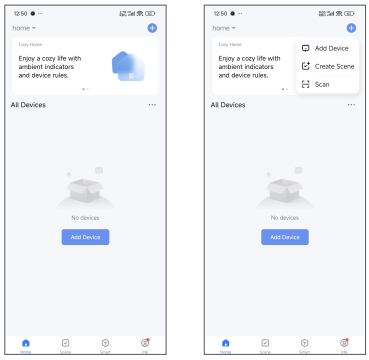
6. Bluetooth reset (Applicable to Bluetooth Controller)

Long press the "⧉" key to enter other function interfaces, and the Time interface will appear. Rotate the knob to switch to Bluetooth settings, press the confirm key to enter, rotate the knob to switch to Reset, and press the "Confirm" key to reset.

Connect the device to the APP (please scan the QR code to download the APP, complete the registration, and then follow the steps below to configure Bluetooth).

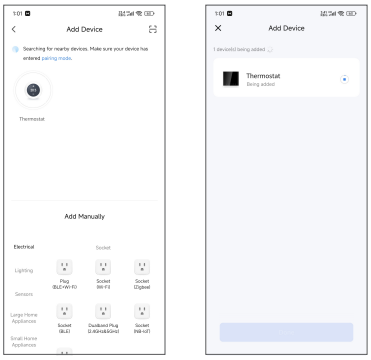
1. Bluetooth connect

Turn on Bluetooth on your phone and open the downloaded APP. Click "+" in the upper right corner and click "Add Device".



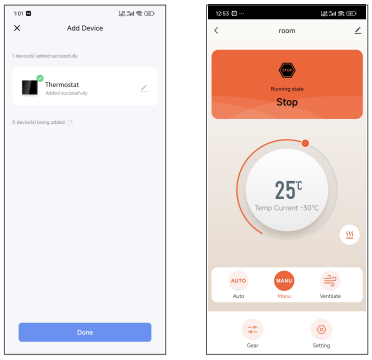
2. Add devices

Click on the new device that appears and wait for the connection.



3.Connection complete

Click "Done" to complete the connection.



Apple

Android

QR code of APP

Advanced Settings

Simultaneously long press the "♨" key and the "⊜" key to enter advanced settings. Once entered, rotate the knob to adjust the numerical values, press the "Confirm" key to proceed to the next parameter setting, and press the "⊜" key to return after completing the settings.

00: Temperature Adjustment - Calibrate the temperature by using the knob adjustment function on the product based on the difference between the actual temperature and the temperature displayed on the screen. If the displayed temperature is higher than the actual temperature, rotate the knob counter clockwise to decrease the calibration value. If the displayed temperature is lower than the actual temperature, rotate the knob clockwise to increase the calibration value. The default value is 0.

01: Set The Upper Uimit Of The Target Temperature - Default: 35 degrees (Selectable from 40 degrees to the lower limit).

02: Set The Lower Limit Of The Target Temperature - Default: 5 degrees (Selectable from 5 degrees to the upper limit).

03: Negative Difference - In constant temperature mode, if the set temperature is lower than the actual temperature by a value greater than the negative difference, the heater will automatically turn on. The default value is 2 degrees, and it can be adjusted from 1 to 10 degrees.

04: Positive Difference - In constant temperature mode, if the set temperature is higher than the actual temperature by a value greater than the positive difference, the heater will automatically turn off. The default value for the positive difference is 5 degrees, and it can be adjusted from 1 degree to 10 degrees.

05: Wind Speed Settings Based On Temperature Differential - Set temperature differential as x. When the difference between the set temperature and ambient temperature is less than x, the wind speed of the heater is set to level 1. When the difference is greater than x but less than 2x, the wind speed is set to level 2. When the difference is greater than 2x but less than 3x, the wind speed is set to level 3. When the difference is greater than 3x, the wind speed is set to level 4. The default temperature differential is 1.5 degrees (Selectable between 1 to 5 degrees with an adjustment increment of 0.5 degrees).

06: Force Start - Automatically forces the system to turn on when the temperature drops below a fixed temperature in constant temperature mode. Default: 5 degrees (Selectable from 5 to 25 degrees).

07: Force Shutdown - Automatically forces the system to turn off when the temperature rises above a fixed temperature in constant temperature mode. Default: 35 degrees (Selectable from 26 to 40 degrees).

08: Voltage Setting - When the voltage acted on the controller is lower than the set voltage value, the heater will be turned off. The default voltage is 8V (selectable from 7V to 12V) for the 12V version, and 20V (selectable from 18V to 24V) for the 24V version.

09: Voltage Deadband - Default: 0.5V (selectable from 0.1 to 1V). Only for Voltage Setting function.

10: Voltage Setting - 0 voltage set 12v; 1 Voltage set 24V.

11: Temperature Sensor Selection - 0 for Internal Temperature Sensor, 1 for External Temperature Sensor.

12: Ventilation Wind Speed Selection - 0 for Ventilation wind speed Not Adjustable, 1 for Ventilation wind speed Adjustable.

13: Restore Factory Settings - Change from 00 to 01 to restore factory settings.

Fault code	Fault Description	Causes / Repair
---	Diagnosis not possible	• Check the electrical connections and fuses. • Check the switch. • Test the ECU and replace it if necessary.
E00 (00000)	Open circuit – flame sensor	• Disconnect the flame sensor and check if the resistance is within specification (green connector, Pg.8). • Open circuit detected. • If the resistance is OK, test the ECU and replace it if necessary.
E01 (00001)	Short circuit (Blower motor, Pump, ECU).	• Check if the blower motor has a short circuit. • Check if the pump or wiring has a short circuit. • Test the ECU and replace it if necessary.
E02 (00010)	Overvoltage	• Voltage here should be the same as the battery. • Voltage must be less than 16 volts for a 12-volt heater. • Voltage must be less than 32 volts for a 24-volt heater. • Check if the battery charger is connected. If so, disconnect the charger. • Check the vehicle charging system. If there is a problem, correct it as necessary.
E03 (00011)	Undervoltage	• Undervoltage detected for at least 20 seconds without interruption. • Check the voltage of the heater control unit: If the fault happens at the heater start-up stage, the voltage here should be the same as the battery; if the fault happens after the heater enters a normal state, the voltage should be close to the battery (the wiring harness voltage drop should not exceed 1V). • If the voltage is lower, check fuses and wiring for damage. Check battery connections for corrosion and proper contact. • Voltage must be more than 10 volts for a 12-volt heater. • Voltage must be more than 21 volts for a 24-volt heater. • Check the voltage before and after the heater is started. • Check if fuses, connections, and wiring are in good condition. • Check the vehicle charging system. If there is a problem, correct it as necessary.
E04 (00100)	Short circuit – flame sensor	• Disconnect the flame sensor (green connector) and scan for fault codes again. • If E00 comes up, replace the combo sensor. • If E04 comes up, test the ECU and replace it if necessary. • Short circuit resistance is less than 500 ohms (486 ohms·).
E05 (00101)	Open circuit – overheat sensor	• Disconnect both the flame and overheat sensors from the ECU. • Measure the resistance between the blue and brown/white wires. • Check the correct resistance value according to the temperature-resistance indexing table. If the resistance is within the allowable range, test the ECU and replace it if necessary. • The ECU will record an open circuit if the resistance is greater than 2000k ohms.
E06 (00110)	Short circuit- overheat sensor	• Disconnect both the flame and overheat sensors from the ECU and scan for fault codes again. • If 05 comes up, replace the combo sensor. • If fault 06 is still displayed, test the ECU and replace it if necessary. • If the overheat sensor resistance is less than 500 ohms (without combustion), replace the sensor.
E08 (01000)	Short circuit – Fuel metering pump	• Disconnect the connector from the FMP, restart the heater. If E08 is displayed, the FMP is defective. • If E08 is still displayed, disconnect the harness from the heater and look for a short circuit in the fuel metering pump. • If there is no short circuit, test the ECU and replace it if necessary.
E11 (01011)	Short circuit - Inlet air temperature sensor	• Test the ECU and replace it if necessary.

E13 (01101)	No flame detected – Start phase	• If there is actually a flame but it is not detected, check the resistance of the flame sensor (Pg.8). • If there is no flame: • Check the combustion air intake and exhaust lines for interference. • Check if the fuel grade matches the local ambient temperature. • Check the glow pin screen (should be replaced yearly) and ventilation hole (should be inspected when the screen is replaced). • Check whether the fuel metering pump is working with a pulse. If not, check whether the wiring harness is open and replace the fuel pump if necessary. • Perform the Fuel Quantity Test. • Check if there is carbon deposit on the glow pin. Clean it up if necessary.
E18 (10010)	Open circuit – Glow pin	• Check glow pin resistance at 20 deg C • 12 volt heater: 0.42ohms - 0.7ohms • 24 volt heater: 1.2 ohms - 2.0 ohms
E19 (10011)	Short circuit – Glow pin	• Check the glow pin harness for damage and ensure it is properly routed and connected. • Check the harness for continuity. • Test the ECU and replace it if necessary.
E21 (10101)	Short circuit – Blower motor	• Check the wiring for a short circuit. • Apply the appropriate voltage to the blower and check the current draw (8V for a 12V heater, 18V for a 24V heater). Ensure that the power supply has at least a 20-amp short circuit resistance. • If the current is less than 6.5 amps, test the ECU and replace it if necessary. • If the current is more than 6.5 amps, replace the blower.
E25 (11001)	Altitude sensor fault	• Test the ECU and replace it if necessary.
E27 (11011)	Overheat at overheat sensor	• Check the air ducting for excessive restriction or blockage. • Check if the ducting length is within specifications (refer to the product catalogue). • Measure the resistance of both the overheat sensor and flame sensor to see if they are within specifications (Pg.8). • Perform the Fuel Quantity test (Pg.8).
E29 (11101)	Speed differential, no rotation, short circuit after negative.	**Motor speed below 300 rpm.** • Use a non-contact RPM meter to measure the speed of the blower (Pg.9). • If the RPM is too low, check for restrictions or blockage. If there are no restrictions, check the remedies for fault code 021. • Check if the floor is uneven and causing the motor to get stuck when tightening the heater body to the floor. • Test the ECU and replace it if necessary.
E32	Digital controller cannot detect feedback signal.	• Check if the wire harness is connected to the digital controller correctly and if the connectors are properly inserted. • Replace the digital controller. • Test the ECU and replace it if necessary.

The fuel quantity should be tested if the heater has difficulty starting or maintaining a flame.

Preparation:

• Detach the fuel line from the air heater.
• Insert the fuel line into a graduated cylinder 100ml.
• Switch the air heater to rapid pumping mode to bleed the air out of the fuel system.
• Switch the air heater off and empty the graduated cylinder.

Measurement:

• Switch the air heater to rapid pumping mode.
• The fuel pump starts to pump fuel.
• The fuel pump will stop automatically after 228 seconds.
• Once fuel pump stops, switch off the heater.

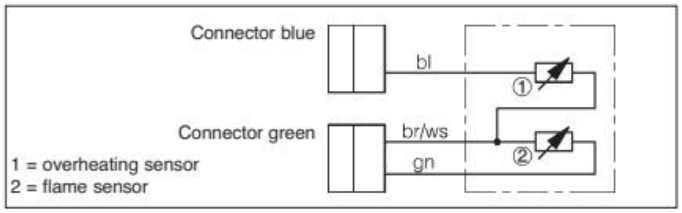
Evaluation:

• Read out the quantity of fuel in measuring glass.
• Fuel quantity should be：48ml±10%

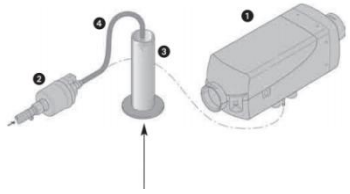
Replace the fuel metering pump if the fuel quantity is above specified value.

If measured fuel quantity is insufficient:

– Check the filter in the fuel pump.
– Check that the fuel lines are correctly routed.
– Check that the fuel lines don’t leak.
– Check and tighten hose connections.
– Does fuel withdrawal comply with the data in the technical description.



Note: The fuel quantity is not affected by voltage ariances.



Graduated Cylinder 100ml

Values for overheat/flame sensor

Temperature °C(F°)	Resistance kΩ (min)	Resistance kΩ (max)
-40 (-40)	1480	2008
-20 (-4)	429.7	552.5
0 (32)	146.3	179.7
20 (68)	56.56	66.76
40 (104)	24.40	27.82
60 (140)	11.54	12.76
80 (176)	5.896	6.348
100 (212)	3.218	3.382
120 (248)	1.819	1.953
140 (284)	1.082	1.185
160 (320)	0.6731	0.7504
180 (356)	0.4355	0.4934
200 (392)	0.2917	0.3354

Control values Motor speed Test speed for the blower heater FJH-2.5A 12V air heater 5000 rpm ±25% at U = 9.0V 24V air heater 5000 rpm ±25% at U = 18.0V FJH-4A 12V air heater 4400 rpm ±25% at U = 9.0V 24V air heater 4400 rpm ±25% at U = 18.0V			
Control stage		FJH-2.5A（Speed Tolerance ±5%）	FJH-4A（Speed Tolerance ±5%）
Power		4800 rpm	4400 rpm
Fast		4000 rpm	3500 rpm
Medium		2800 rpm	2800 rpm
Slow		2000 rpm	2600 rpm
Ventilation		600 rpm	600 rpm
Resistance Values			
Components Glow pin Fuel metering pump（20℃）	12V 0.42 - 0.7 Ω 8.9 ± 0.6Ω	24V 1.2 - 2.0 Ω 35.1 ± 1.35 Ω	overheat/flame sensor ~50KOhm at room temp
When overheat protection is triggered		FJH-2.5A/4A 140℃- 170℃ (284°F - 338°F) measured in the control stage “power” and at a clearance of 300 mm from the hot air outlet