Electric heating elements or airflow measurement components may be independently installed on the SVAD diffuser. In such cases, the electric heating element or airflow measurement component should be installed on a straight section of the air supply branch ductwork, followed by connecting it to the SVAD using a rigid elbow or an acoustically insulated flexible duct elbow.

When using a flexible duct elbow, a supporting bracket (provided by Royal Air Conditioner) should be fitted to prevent deformation of the duct, which could impede the normal operation of the SVAD.

When both the electric heating and airflow measurement components are being installed simultaneously, utilize the integrated component designed for combined measurement and heating. Install this combined component onto the straight section of the air supply branch ductwork, and then connect it to the SVAD using either a rigid elbow or a noise-absorbing flexible duct elbow.

When using a flexible duct elbow for connection, a support bracket (provided by Royal) should be fitted to the duct. This step prevents the duct from deforming, which could hinder the regular operation of the SVAD. For additional guidance, please refer to installation diagram 15~Figure 18.

Thermostat installation

Thermostat Technical Parameters
- Power：DC12V
- Control mode: 485 communication;
- Room temperature display range: -9℃ ~ 50℃;
- Temperature control accuracy: ±0.1℃;
- Working temperature range: 0 ~ 50℃, humidity range: 5 ~ 95%RH (no condensation);
- Transport temperature range: -20 ~ 65℃;
- Installation method: installed in 86 junction box;
  Installation instructions
- Before installing the thermostat, read the instructions carefully and operate the thermostat strictly according to the instructions.
- Cut off the power before installing, moving, cleaning or repairing the thermostat.
- Only the company with the safety knowledge of the engineering to install thermostat.
- All wiring must be in accordance with national standards.
- Operate the thermostat strictly according to the instructions.

Application

Wall controller or wall controller and remote sensor
Required materials
Screw driver, cable.
Cable with Sheild and twisted pair. Use Plenum cable if local code requires.
Cable 24-18 AWG / 4 conductor twisted pair. 0.24mm2~1.0mm2/ 4 conductor.
(0-100 meters 24~20 AWG / 0.25~0.5mm2, 0-300meters 22~20AWG 0.34~0.5mm2, longer 20~18AWG 0.5~1.0mm2).
Recommend Wall thermostat is connected close to the diffusers controlling the air temperature in the zone. Using remote sensor requires connection to the board and config remote sensor jumper.

Installation Instructions:
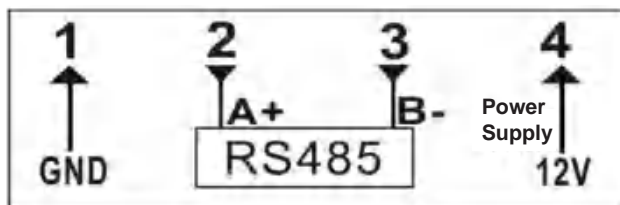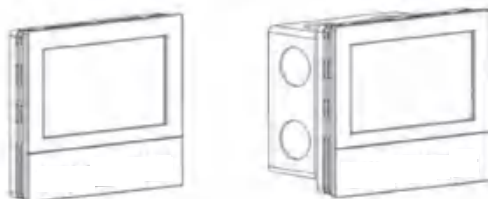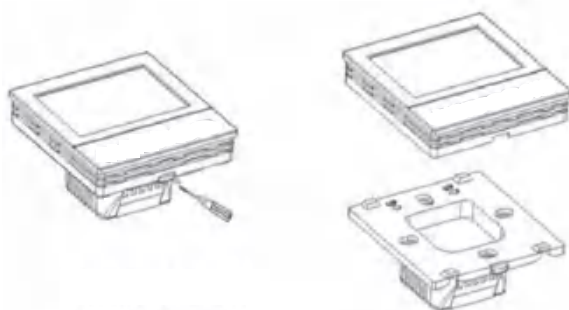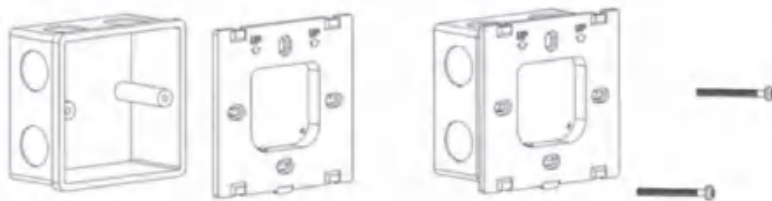
Thermostat Wiring principle diagram20

(If not connect correctly ER3)

SVAD standard is diffuser and APP only.

Optional: SVAD smart variable air diffusers have two control models; One is (W) wall-mounted thermostat control. The other is Model (R) remote control, equipped with optional desktop remote control.

Each Model is different and cannot have both R and W in one unit. Users can freely choose which control model is according to personal preferences and site conditions.

1. Model (W) Version 2.1 Thermostat:
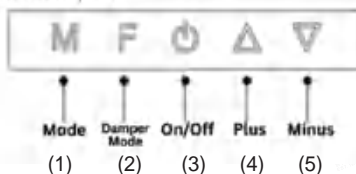

Wall-mounted Thermostat Screen Fig.21

(W) Version 2 8918Q Thermostat panel Fig.22


The icons displayed on the Version 2 8918Q thermostat display with content description Fig.23

Button Description:

M	F	⏻	△	▽
Mode	Damper Mode	On/Off	Plus	Minus
(1)	(2)	(3)	(4)	(5)

Button Description Fig.24

(W) Version 2.1 8918Q Thermostat Panel Operating Instructions

(1) Mode operation "M" button: In the power-on state, short press the mode button to select cooling, heating, or automatic mode. When switching between modes, the time is 10 seconds before the data is sent to the diffuser control.

(2) Diffuser damper mode "F" button: AUTO (automatic), ON (fully open), OFF (full close). In operating on state, Press the "F" mode button, select AUTO (automatic), ON (fully open), OFF (full close). When switching between modes, the time is 10 seconds before the data is sent to the diffuser control.

(3) Power button ⏻ : Power on/ off button and used to set parameter setting confirmation button

(4) Plus button +: △ Increase set points

(5) Minus button -: ▽ Decrease set points

Version 2.1 8918Q Thermostat operating instructions:

(3) **Power on/off:** ⏻

Short press the on /off button ⏻ to turn on /off the SVAD, in off mode, the damper blades closes.

The second function of this button is to confirm engineering settings. In the engineer mode, after setting the parameters, short press the on /off button ⏻ to approve the modified parameters and exit the setting state.

(1) **Operating mode selection:**

In the power-on state, short press the M button, and the operating mode will switch between modes: cooling ❄ , heating ☀ , and automatic modes ☀.

(2) **Damper operating mode selection:**

When the thermostat is 'on' state, short press the air damper operation mode "F" button , the operating mode of the damper will switch between the following types: AUTO (air damper automatic control) ✿ ON , (the air damper is forced to open fully) ✿ OFF , (the air damper is forced to fully close) ✿ .

Damper AUTO (automatic) operates according to the heating and cooling mode demand. The damper drives the min position to open fully.

Setting Min position is set at the engineering settings.

Damper ON (fully open). The damper is driven open and remains open. (Use this mode for ventilation, commissioning, and checking damper operation)

Damper OFF (full close), damper is driven closed and remains closed.

(Use off mode for vacations, commissioning testing, and checking damper operation.)

(See engineer settings for % min.)

(4)(5)**Modifying the zone temperature set point:**

In power-on state, short press the plus△(4) and minus buttons▽(5) to modify the desired temperature set point; The temperature will blink and after completing the modification after 10 seconds, the setting is confirmed. The thermostat does not need to be unlocked.

Indoor and primary supply air temperature values display:

In power-on state, long press the minus button▽(5). The temperature value will be displayed on the thermostat and switch between the indoor and primary supply air temperature values. After 10 seconds, it will automatically return to the indoor temperature value.

- **Switching from Master thermostat to Drone thermostat. Each diffuser has an address or control "ALL" diffusers. Switching from address to address can change the states.**

    In the power-on state, long press the M button to enter the address code upper right. You can then select either "ALL" or the specific address code of the diffuser. In the Address code setting state, the digital display in the upper right corner **8888** will flash, press the plus button △ or minus button ▽, you can adjust and change diffusers by modify the address code corresponding to the diffuser. After the modification, press and hold the M button again or wait 10 seconds to confirm the modification. Exiting is automatically after 10 seconds.

    Master-Drone, one-control-multiple, icon displays " ALL "; Standalone when one-control-one, icon display address from the 485 Modbus address "1~255" of the controlled drone diffuser to be controlled;

- **One (thermostat) control address multiple (diffusers) one by one / One (thermostat) control one(diffuser) address code displays, damper position, flow rate (CMH/CFM), CO2 concentration, humidity, air flow rate (l/s) display switching:**

    When displaying one-control-multiple/one-control-one address codes, only the numerical value is displayed, and the following units are not displayed. When one-controls-multiple, it will display " ALL "; when one-control-one, it will display the 485 address "1~255" of the drone diffuser to be controlled;

    In the power-on state, press and hold the plus button for about 10 seconds until the address code in the upper right corner flashes, and then press the plus button, the data in the upper right corner will switch cyclically display the address code, damper position, flow rate (CMH/CFM), CO2 concentration, humidity, flow rate (L/s).

    When displaying the damper opening percentage, the numerical value represents the damper opening percentage, followed by the display unit " % ".

    When using Version 2.1 displaying the air volume value, the numerical value indicates the flow rate and displayed unit either " CMH " or "CFM" (In the engineering setting, when the temperature unit is switched to ℃, the air volume unit displayed is " CMH "; when the temperature unit is ℉, the air volume unit displayed is " CFM " .)

    When displaying the CO2 concentration value, the numerical value represents the CO2 concentration value, and the unit will not be displayed later.

    When displaying the humidity value, the numerical value represents the relative humidity value, and the unit " % " will be displayed later.

    When displaying the flow rate(l/s) value, the numerical value represents the flow rate (l/s) value, and the unit will not be displayed later.

- **Locking and unlocking the screen:**

    When you see this symbol is and displayed, 🔒 the thermostat is locked.

    The thermostat automatically enters the lock screen state 🔒 after (30 seconds) if no button is pusded.

    In the locked state: (i) operating mode locked, (ii) damper setting locked.

    In the locked state: Temperature can be set Fig.24 (4)(5).

    In the locked state, press and hold the F button to configure the network settings. Press and hold the M button to enter address code setting state, you can then select either "ALL" or the specific address code of the diffuser.

Unlocking the thermostat: Press and hold the on /off button(3) (5 seconds) to unlock, once unlocked you can normally set the operating modes of the thermostat, damper operating mode, and on/off control of the thermostat.

- **Light control:**

Press and hold the plus button △ & minus button ▽ at the same time (5 seconds) to switch the light control instructions in sequence : off, on, and automatic. 🔆 This icon goes out when the light is off, stays on when it is on, and flashes when it is on auto.

- **Thermostat and diffuser four wired connection status display:**

When the thermostat and SVAD control board are connected correctly and the 485 communication is successful, the thermostat will display ∞ .

ER3: Unsuccessful connection, the icon ∞ on the thermostat will not be displayed, and the "ER3" code will indicate a communication error alarm. Check 1,2,3,4 connection for 1-GND, RS485 2-A+,3- B-, 4-12V Connections both the thermostat and the controller at each diffuser.

- **Wi-Fi networking Common status display:**

There are three states of Wi-Fi networking status display: Off, flashing, and on.

Icon📶 Off: The WiFi has been connected, but the Tuya server cannot be connected, and the icon display is always off at this time.

Icon📶 flashing: Normal when the network is connection waiting for the distribution network status,📶 the icon will flash;

Icon📶 on: Wi-Fi and Tuya server has been successfully connected, during operation the icon is always displayed.

- **Smartphone Android, and Apple connection. To make a connection both Wi-Fi, and Bluetooth required network and provide distribution, connection simple and is made with a code matching method, and mobile phone APP:**
For the SVAD to perform Wi-Fi pairing and coding:

(i) First set the thermostat/remote controller to one-control-one mode and set the address code of the one-control-one to the address code of the SVAD to be paired with;

(ii) Then, long press the M+F button at the same time, the icon on the thermostat 📶 will flash, and enter or reset the Wi-Fi distribution network and code pairing state.

(iii) Setting your add device diffusers into a smart phone: When the icon 📶 on the thermostat is flashing, open the "Royal Service" APP.

(iv) Welcome home will appear and add a device will appear. Push Add device. With add device on top the app will try to discover devices. The new diffuser should be seen under Discovering device. To the right add, push add. You will then be asked to enter the Wi-Fi information. Wi-Fi and password from your Wi-Fi. Then Push next. SVAD in this case will be added. Loading should take one minute. Once added Push done. Now your diffuser is displayed.

Manually setting:

(i) Opening the App and adding a device.

(ii) Press add device, and a list of devices will appear. Then add Manually an Icon photo of the device you would like to add. Air purifier, 2000,600,20B,50A or diffuser.

(iii) Open the App and select 'Add Device' to view the list of devices. Choose the appropriate icon photo (e.g., Air purifier: 2000, 600, 20B, 50A, or diffuser) from Royal Service Company. Click on the corresponding product icon for the SVAD to pair. Enter the 2.4G Wi-Fi name and password with a strong signal in the area. Proceed with pairing and coding. Upon success, the icon will remain lit, indicating a successful connection to the Tuya server.

When is the SVAD ready for pairing:

The SVAD is always in the state of waiting for network distribution. Condition one is before it has not been networked, or removed condition, it has been successfully networked but has been "removed" by the networked mobile phone and has not been networked again. When either condition is met, you can directly network (pair) using the smart mobile phone and code matching operations, regardless of whether it is connected to a thermostat or remote control.

Pairing-ready status: Before leaving the factory, Royal Service Air Conditioning Company restores each SVAD to its pairing-ready status. Onsite at the project, Wi-Fi pairing and coding can be performed directly from a smart mobile phone.

Removing commissioning pairing:

If an SVAD is successfully paired during project debugging but not removed afterward, SVAD remains paired state.

In this case, If the SVAD is configured with a thermostat or remote control, the user can press and hold the F key to force it into pairing-ready status in one-control-one mode. Then, the user can pair it with their own smart mobile phone.

If the SVAD has no thermostat or remote control, the on-site debugging engineer can be contacted to "remove" the device's pairing from the original phone, restoring it to the pairing-ready state. If there are still App connection issues, please contact the local dealer or relevant service department of Royal Service Air Conditioning Company.

Multiply additional smart phone use:

If there are other mobile phones that need to use the mobile APP to monitor the SVAD that have been successfully networked.

Install the "Royal Service" APP on the additional mobile phone.

The owner of the SVAD must share the APP device with the new mobile phone. After successful sharing, the new mobile phone can monitor the SVAD through the mobile APP.

A SVAD smart variable air diffuser, whose network is successfully dis-tributed by a mobile phone, can be shared with any mobile phone that has installed the "Royal Service" APP.

A mobile phone can configure any SVAD that has not been configured.

Through "Royal Service" APP, the mobile phone can group its own SVADs that have successfully distributed their network (not shared) by "adding rooms", and then, through the "Scene" create a "smart scene" and "one-click execution" in the bar to perform group control on these groups.

When SVAD and mobile phone are paired with the network, it is best to turn on the Bluetooth function of the mobile phone, which is helpful for successful code pairing and network configuration with SVAD!

● **Delayed execution of action commands:**

All commands will be executed after the operation is completed and no similar operations are performed for 10 seconds;

In the engineer mode, after the parameters are modified, the modified data will be issued at the moment of exit.

● **For engineering department only: Enter the engineer mode and reset the internal operating parameters:**

Special attention: Many parameters in the engineer mode are used to set the basic parameters for the operation of the SVAD. They are all set at the factory. Changing the parameters will affect the operation of the SVAD. Therefore, unless you are a professional engineer, generally do not allowed to enter this mode to modify any parameters!

How to enter the engineer mode, please contact the relevant departments of Royal Service Air Conditioning Company or the distributors of Royal Service Air Conditioning Company.

Enter the engineer mode setting state:

(i) The first item of the parameter setting of the engineer mode will be displayed.

(ii) Press the M button to display the next item, short press the F button to display the previous engineering item, and so on for 16 possible values.

(iii) A digital display in the upper right corner **8888** displays the parameter item number one by one , the digital display in the middle **888.8**℃ displays the set v alue.

(iv) Short press the plus button △ and minus button ▽ to reset middle set values, the parameters corresponding to the item being displayed; after the resetting is completed, short press the plus button △ and minus button ▽ , you can re-set the next parameter.

(v) After all the corresponding re-set parameters are re-set, short press the on /off button or wait for 10 seconds, it will confirm the re-setting of all modified parameters and exit set state; M-forward F reverse change items 1-16. ⏻ short press the on /off button ⏻.

Under both one-control-multiple and one-control-one modes, the thermostat can perform engineer mode parameter reset for the SVAD which is connected to. In one-control-multiple mode, the thermostat performs engineer mode parameter reset for all the SVAD which are connected to. In one-control-one mode, the thermostat performs engineer mode parameter reset only for the corresponding SVAD with the one-control-one address code it has set.

Regardless of whether it is in the state of one control for multiple or one control for one state, in the thermostat engineer mode, each time the parameters are re-set, only the parameter items whose parameter values have been modified during this parameter re-setting process will be modified. For parameter items that have not been changed, their existing parameter values will not be modified in this resetting and will remain unchanged! For example, the temperature controller adopts a one-control-multiple mode, and the parameters of SVAD 1 and SVAD 2 are set in the "engineer mode". Currently, the travel of the temperature controller in "engineer mode" is the default 40mm, the travel of SVAD 1 is 22mm, and the travel of SVAD 2 is 33mm. In this parameter adjustment, only the minimum opening value of the damper is changed from the default 0 to 30. After the modification is completed, exit the modification, exit the "engineer mode", and confirm the parameters. Regardless of the previous minimum opening value of the

Damper for SVAD 1 and SVAD 2, it will be modified to 30. However, the numerical values of other parameter items that have not been modified remain unchanged. The travel of SVAD 1 remains at 22mm, and the travel of SVAD 2 remains at 33mm.

● **Reheat devise start /shutdown conditions and restart delay:**

When the "reheat force" item in the engineer mode is set to "off", the reheat device will not operate or start.

Reheating equipment startup conditions: the "reheating force" item in the engineer mode is set to "recovery" state, and when the indoor temperature < set temperature - reheating temperature difference, the reheating equipment control will close the heat relay give a startup command.

Reheating equipment stop conditions: the "reheating force" item in the engineer mode is set to "recovery" state, and when the indoor temperature > set temperature - reheating temperature difference, the reheating equipment control will give a stop command.

The forced "off" function of the reheat function can be set in the engineer mode of the thermostat, the engineer mode of the mobile APP, and the BA/BMS.

Regardless of whether the reheating device automatically runs and then stops, or the reheating function is forced to "turn off", after each shutdown, there must be a delay of 30 seconds before the reheating device can be turned on again.

When the reheating device is in the starting state, the icon $\underline{\mathcal{SSS}}$ will be displayed on the thermostat; when the reheating device is not in the starting state (stopped state or forced "off" state), the icon $\underline{\mathcal{SSS}}$ will not be displayed on the thermostat.

● **Data display and command delivery in one control multiple /one control one mode:**

When the temperature controller is in the one control multiple mode, the indoor air temperature displayed on it is the indoor air temperature detected by the temperature sensor built into the temperature controller itself. It will not read the working state and indoor air temperature value of any connected SVAD; however, when operating it to operate a certain function, the operation command of the function will be issued, and the function that has not been modified by the operation will not issue the operation command. For example: just modify the temperature setting value on the thermostat. After confirmation, all SVAD connected to the thermostat will receive the modification command of the temperature setting value and will change to the same value. At the same time, since the thermostat has not modified the operation mode and damper operation mode, the operation mode and damper operation mode of all SVAD connected to the thermostat will still be executed. The operating mode being executed will not be changed, even if the operating mode may be different between them, it will not be affected and will not be changed.

When the thermostat is in one-control-one mode, the thermostat will fully display the working status and operating parameters of the SVAD corresponding to its one-control-one address code: operating mode, damper operating mode, setting fixed temperature value, indoor air temperature value, air damper opening value, reheating equipment status, manned/unmanned mode status, networking status, WIFI connection status, etc.; at this time, when setting a certain function on the thermostat, the corresponding SVAD will execute the command accordingly. At the same time, the thermostat will display the functional changes and operation changes of each parameter caused by the command. The other SVAD connected to the temperature controller are not affected.

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● **Error Alarm Codes:**

Royal Service SVAD features an error alarm that issues a failure code on the thermostat, remote control, mobile app, and BA/BMS when there is an operation failure. The main alarms on the thermostat include:

Alarm Information:

ER1: Indoor temperature sensor connection failure alarm.

The SVAD control board has a jumper that allows you to choose whether to use the temperature sensor on the thermostat or the indoor temperature sensor on the control board to sense the indoor temperature. When this alarm occurs, it indicates that the currently selected indoor temperature sensor has a connection failure.

ER2: Supply air temperature sensor connection failure alarm in automatic operation mode.

This alarm only occurs in the automatic operation mode of the SVAD when there is a connection failure of the supply air temperature sensor.

In cooling or heating mode, this alarm will not occur even if the connection of the supply air temperature sensor is faulty.

ER3: Thermostat to SVAD-Master Drone Network Connection Failure Alarm.

Wire connect to thermostat.Jumper for the thermostst at the control board must set to thermostst mode. Other is multiple diffusres connected to each other. If a wire connection fails, then ER3 is displayed.

The SVAD control board offers a selectable jumper for whether the thermostat is enabled. When the jumper is in the "enable" position, any connection or communication failure between the thermostat and the BA/BMS will trigger an ER3 alarm on the controller, mobile app, and BA/BMS.

When the jumper is set to the "disabled" position, any connection or communication failure between the thermostat/remote control and the BA/BMS will not trigger an ER3 alarm on the mobile app or BA/BMS. However, if a thermostat is connected to the SVAD control board at this time, the ER3 alarm will be displayed on the thermostat.

ER9 CO2 alarm concentration exceeds the limit standard.

When the SVAD senses that the indoor CO_2 concentration exceeds 1000 ppm, it will issue an ER9 alarm.

ER10: Motor stall alarm.

● Description of thermostat engineering mode parameters:

Encoding (panel display)	Description	initial value	range unit	Remark
P0	Damper travel	40	10~100mm	
P1	Primary air Cooling mode switching temperature TL	18	10~22℃	In automatic operation mode, when the supply air temperature is lower than TL, SVAD executes cooling mode. In the automatic operation mode, when the supply air temperature is greater than (P1) TH, SVAD executes the heating mode.
P2	Primary air Heating mode switching temperature TH	24	20~30℃	In the automatic operation mode, when the supply air temperature is between (P1) TL and (P2) TH, SVAD executes the transition season operation mode. In any case, TL≤TH;
P3	Primary air Heating mode switching temperature TH	30%	10~100%	In the transition season operation mode, the air damper opening remains unchanged and is always at the (P3) set value;
P4	Reheat start temperature differential	3	0~5℃	
P5	temperature calibration	0	-4~4℃	Temperature calibration is only valid for the indoor temperature value being displayed on the thermostat. The temperature calibration interval is 0.1°C;
P6	Minimum damper position in cooling mode	0	0~100%	Default is 30%
P7	Temperature unit	0	0~1, 0: ℃ 1: ℉	0: ℃ 1: ℉
P8	Inlet size	6	6, 7, 8, 10, 12	0: ℃ 1: ℉

Encoding (panel display)	Description	initial value	range unit	Remark
P9	Address code setting	1	1~255	0: broadcast
P10	Upper limit of temperature regulation	3	0~4℃	Indoor air temperature - When the set temperature value is greater than this value (overheating), in cooling mode, the air damper opening is 100%; in heating mode, the air damper opening is 0%;
P11	Lower limit of temperature regulation	3	0~4℃	When the indoor air temperature falls below the set temperature value (too cold), the damper opening is set to 0% in cooling mode while it is set to 100% in heating mode, following the instructions in the HVAC air conditioning installation manual
P12	Manual switching occupied/ unoccupied mode forced switching;	someone mode, 0	0、1、2	0: Automatic 1: Occupied 2: Unoccupied
P13	air damper control	101 (automatic)	0~100%，101 (Drive) (Auto)	101: Automatic, 0~100%: according to the air damper opening 0~100%
P14	Select whether to enable reheat function	0	0: off 1: normal	0: force open contacts 1: restore (Auto)
P15	baud rate	0	9600~38400 0：9600 1：14400 2：19200 3：38400	Standard is 0：9600
P16	reset	0	1: Factory reset	

P17	Minimum damper position in heating mode	30	0 ~100%	
P18	CO_2 concentration control damper function selection	0	0: Off 1: Enable	The CO_2 concentration control damper function is selected as "Off"; the CO_2 concentration is not in control of the damper. When the CO_2 concentration control damper function is selected as "Enable", CO_2 concentration exceeds its set (P19) value, overrides damper control.
P19	CO_2 concentration set value	600	0 ~2000ppm	

2. Control panel:
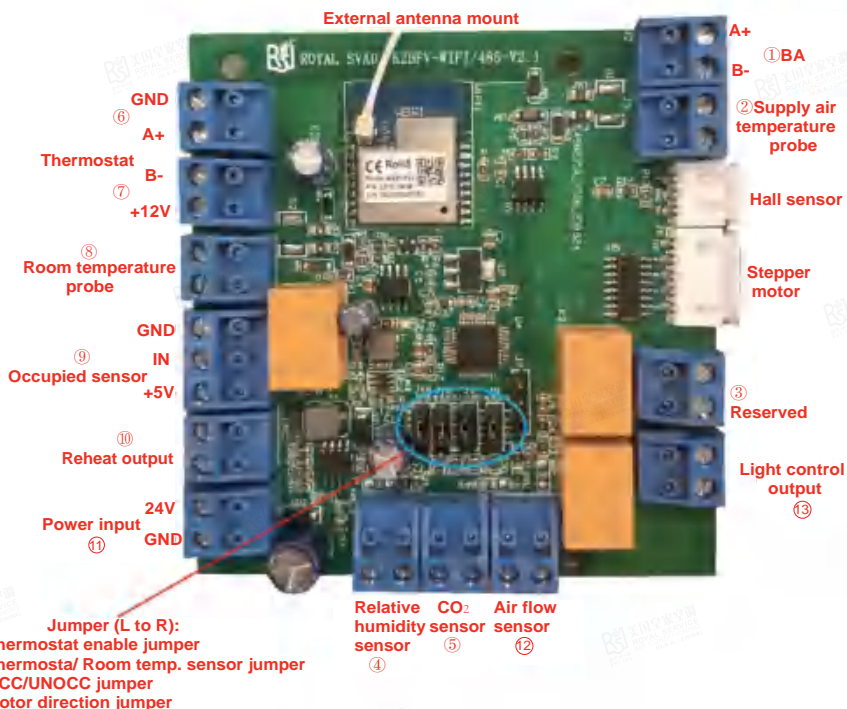
SVAD smart variable air diffuser control panel true view Fig.25