

RSV SVAD

Smart Variable Air Diffusers  
Installation, Operation  
& Maintenance Manual Ver.2.1



Royal Service Air-Conditioning CORP.

## 1.General

Royal Service Smart Variable Air Diffuser is equipped with main control board, actuator, thermostat/ thermostat board +remote controller (optional). The control board compares the set temperature of the thermostat with the indoor temperature, and PID adjusts the damper position to keep the room temperature constant at the set value. The control board will correct the damper position every three minutes according to the room temperature to adapt to the change of indoor load.

Royal Service Smart Variable Air Diffuser is suitable for air-conditioning projects of various types of buildings such as offices, libraries, conference rooms, exhibition halls, shopping malls, lounges, banquet halls, etc.

**Table 1 Configurations of RS Smart Variable Air Diffuser**

Item NO.	Item	Configurations	Standard	Optional
1	Casing	Galvanized steel Casing	✓	
2		Galvanized steel Cover	✓	
3		Control Box	✓	
4		Hanger	✓	
5		Damper	✓	
6		Actuator	✓	
7	Control	Main Control Board	✓	
8		Power Board	✓	
9		Wall Mounted Thermostat	✓	
10		Thermostat Board		✓
11		Remote Controller		✓
12		Remote sensor-(RA)	✓	

### RS Smart Variable Air Diffusers have the following series:

RS Smart Variable Air Diffusers have the following series:

RSV-SVAD-ST RSV Smart Square VAV Diffusers;

RSV-SVAD-STS RSV Smart Square VAV Diffusers;

RSV-SVAD-SR RSV Smart Square VAV Diffusers;

RSV-SVAD-RR RSV Smart Round VAV Diffusers;

RSV-SVAD-SW RSV Smart Square Swirl VAV Diffusers;

RSV-SVAD-RW RSV Smart Square Swirl VAV Diffusers;

RSV-SVAD-WL RSV Smart Linear VAV Diffusers;

RSV-SVAD-LL RSV Smart Linear VAV Diffusers;

For their appearance, installation dimensions and performance parameters, please refer to the product information of RS Smart Variable Air Diffuser or contact Royal Service Air Conditioning Corp branches, agents or service organizations.

## 2.Delivery

Royal Service Smart Variable Air Diffusers need to be assembled and tested in the factory before delivery. Delivery configuration includes diffuser casing, control board, actuator, thermostat/ thermostat board +remote controller (optional), installation manual and other necessary materials.

## 3.Storage and Working conditions

- Storage environment temperature/humidity range - 25 ~ 70 ° C(28.4~158°F), 5 ~ 95% rh
- Working environment temperature/humidity range 18 ~ 50 ° C(96.4~122°F), 5 ~ 95% rh
- The unit must be stored in a ventilated, dry storehouse or a grid, and prevent the product from being affected by the collision and corrosion of the gases.
- Please be noted that the unit should not be stored and used in a flammable gas environment.
- During storage and transportation, the goods must be stacked according to the packaging, storage and transportation diagrams on the packaging boxes.
- The unit should be cleaned and inspected before use if the storage period exceeds one year.

## 4.Transport and Installation

During transportation and handling, the variable air diffusers should be stacked in strict accordance with the placement direction indicated by the packaging and storage diagrams on the packaging boxes. When transporting together with the outer packaging, please use both hands to support the entire packaging box. **Throwing is prohibited!**

When transporting with no outer packaging, please use both hands to hold the diffuser's casing edge position; or, carry the air inlet with one hand and the other hand hold the diffuser's casing edge position. **It is forbidden to lift the variable air diffuser frame assembly or other parts, such as: actuator or board, etc.!**

## 5.Check before Installation

1. Check if the packaging, necessary accessories and materials are complete;
2. Check if any scratches on the surface of the unit;
3. Check if the diffuser board, damper, actuator or other parts are loose, falling off or abnormal noise;
4. Check if all parts in the control box are loose, if all plug-in terminals are firmly connected, and if all wiring is loose or disconnected.
5. Check if there are water stains or moisture inside the control box and the diffuser;
6. Check if the nameplate pasted on the diffuser is consistent with the required model;
7. Check if it is a specific air supply mode (one side or two sides or three sides), and the air outlet direction has been set before delivery. Please pay attention to identify and find a suitable air outlet direction for installation;
8. If find any abnormalities, please take photos and contact Royal Service Air-Conditioning Corp branches, agents or service organizations for after-sales service.

## 6.Installation

**Note: There are signs on the diffuser stating that screwing or lifting is not allowed!**

The installation of RS Smart Variable Air Diffuser is simple and convenient. The diffuser is connected to the lifting rod through four matching hangers. It should be fixed tightly after adjusting the hoisting height and keeping the unit level.

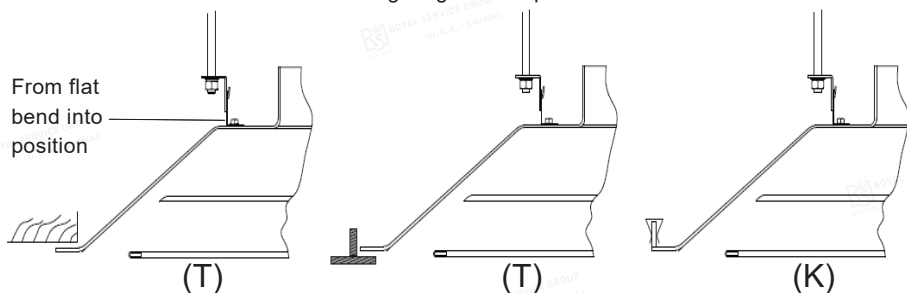
RS Smart Variable Air Diffuser should be checked before installation.

After completing the pre-installation inspection, the installation can be carried out.

The diffuser can be installed on different types of ceilings.

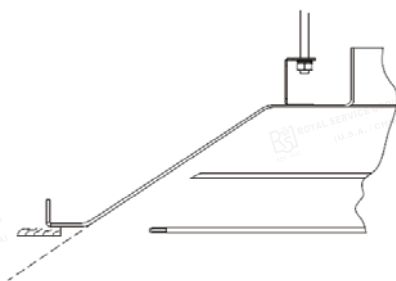
For different ceiling types, please select the corresponding diffuser frame form and installation form.

After determining the hoisting position of the diffuser and the installation of the lifting rod, fix the 90 ° hoisting hook to the lifting rod with a screw nut. Then, turn the four hanger lugs by 90 ° to hang the mounting hole with the hoisting hook, and then hoist the diffuser. Adjust the position of the screw nut and the hoisting height to keep the unit level.



**Installation diagram 1 of RS Smart Variable Air Diffuser**

Certainly, you can also directly pass the lifting rod through the mounting hole without the hoisting hook, and then fix it with a screw nut, adjust the hoisting height and keep the unit level, as shown below.



**Installation diagram 2 of RS Smart Variable Air Diffuser**

The outer frame of the diffuser board of RSV-SVAD-LL Smart Variable Air Diffuser and RSV-SVAD-WL Smart Variable Air Diffuser can be removed separately. If they need to be installed on a hard ceiling (Figure 3-1), the outer frame can be disassembled first. One installer extends the unit from the reserve hole of the ceiling, and another installer inserts it into the outer frame from below, and then fixes the screws or lets the spring hooks hang on each other to firmly connect the outer frame to the diffuser casing. Finally, adjusting the hoisting height and keeping the unit level. If RSV-SVAD-LL Smart Variable Air Diffuser is hoisted on the T-shaped keel ceiling (Figure 3-2) or gusset ceiling (Figure 3-3), please directly hoist the unit from top to bottom on the ceiling, and then adjust the hoisting height and keep the unit level.

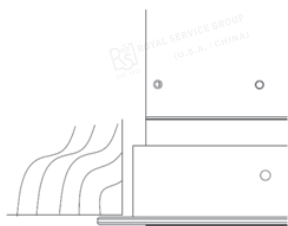


Figure 3-1

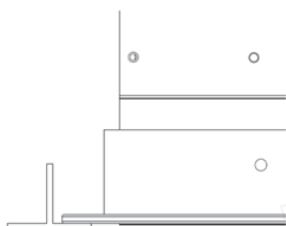


Figure 3-2

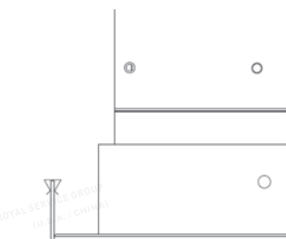
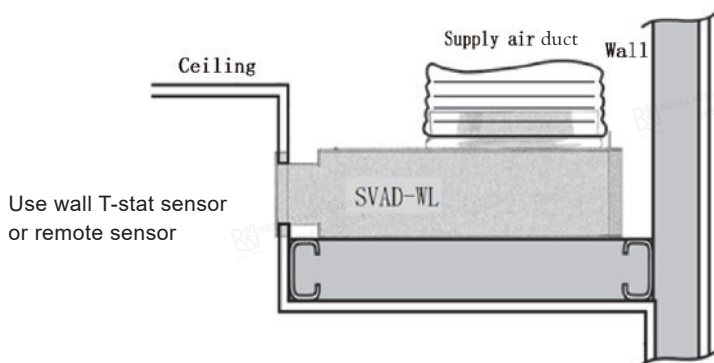


Figure 3-3

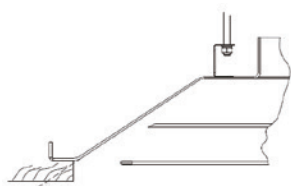
### Installation diagram 3 of RSV-SVAD-LL Smart Variable Air Diffuser



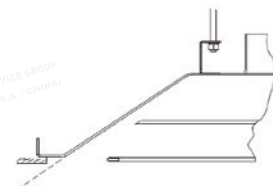
### Installation diagram 4 of RSV-SVAD-WL Smart Variable Air Diffuser

**Note:** To ensure that construction debris does not enter the equipment or duct system during installation.

The lower plane of the diffuser should be flush with the ceiling after hoisting, and there should be no obstacles in the extension line of the casing edge of the diffuser, so as not to damage the air flow back and affect the attachment performance of the air supply, especially the remote-controlled RS Smart Variable Air Diffuser, such rebound airflow will seriously affect the induction of the secondary return air and interfere with the accurate perception of indoor temperature by the diffuser.



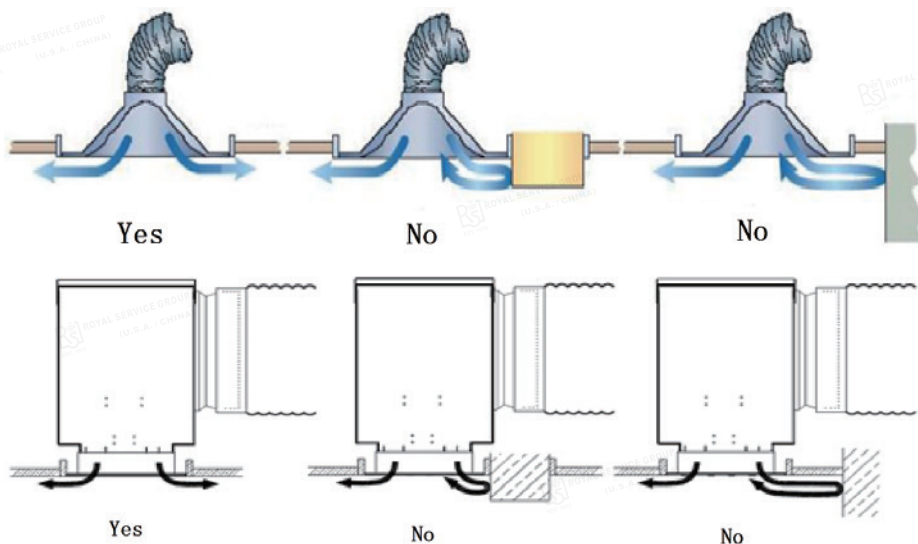
NO



YES

### Installation diagram 5 of RS Smart Variable Air Diffuser

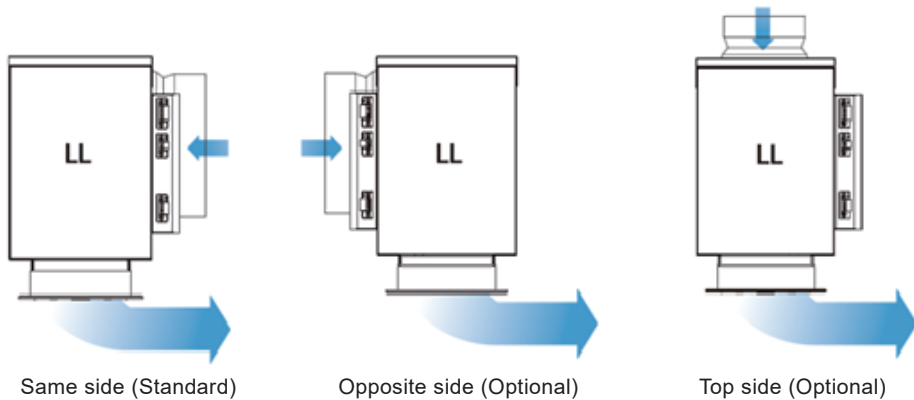
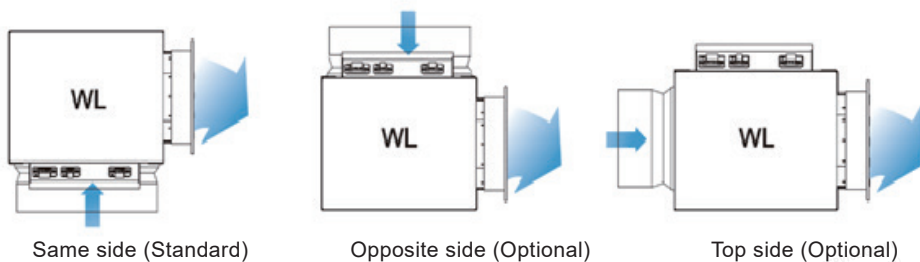
All types of RS Smart Variable Air Diffusers have good air supply adhesion. Therefore, if there are protruding obstacles in the direction of air supply during installation, it will interfere with the air distribution state, affect the perception and control effect of indoor air temperature, and affect the indoor comfort. In particular, the remote control RS Smart Variable Air Diffuser. The edge of the diffuser should not be too close to the wall, beams that are protruding from the ceiling plane, lamps and other obstacles, lest the airflow bounces back and interfere with the sense of the indoor air temperature by Induced airflow. It is suggested that the distance in the outlet direction of the primary air outlet should exceed the air distance of the air outlet under the condition of lowest air speed of 0.75m/s under the designed air flow (please refer to the relevant content of RS Smart Variable Air Diffuser product information), and the minimum distance should not be less than 600 mm. Otherwise, the RS Smart Variable Air Diffuser with 3 sides, 2 sides, or 1 side should be selected.



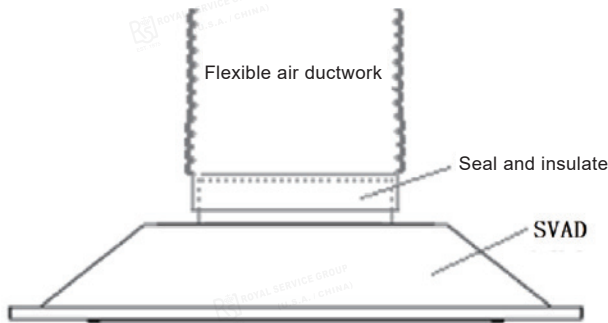
**Installation diagram 6 of RS Smart Variable Air Diffuser**

When the remote-controlled SVAD Smart Variable Air Diffuser is installed in the same space with other diffuser or remote-controlled SVAD Smart Variable Air Diffuser, the distance between the induced inlet position of the remote-controlled SVAD Smart Variable Air Diffuser and other general diffuser must exceed the air distance of the air outlet under the condition of lowest air speed of 0.75m/s under the designed air flow (please refer to the relevant content of remote-controlled SVAD Smart Variable Air Diffuser product information).

If it is a remote-controlled smart variable air diffuser, the remote-controlled SVAD Smart Variable Air Diffuser with 3 sides, 2 sides, or 1 side air supply should be selected. If it is a general diffuser, the distance between the two diffusers should be increased as much as possible, and the induction inlet position of the remote-controlled smart variable air diffuser should be arranged on the side away from the general diffuser.

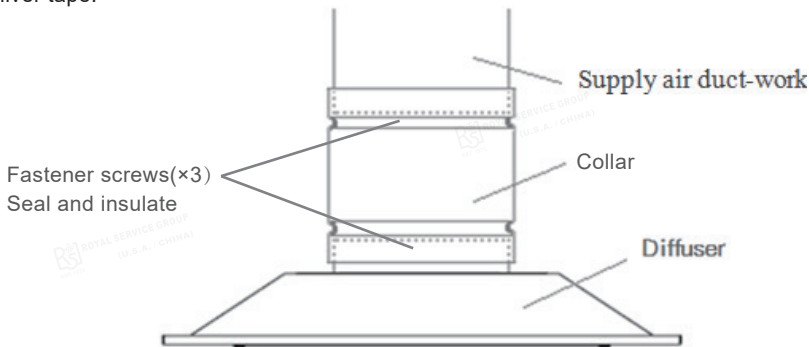

**Diagram 7 of different interface directions of RSV-SVAD-LL**

**Diagram 8 of different interface directions of RSV-SVAD-WL**

Both the SAVD-LL diffuser and the SAVD-WL diffuser have interfaces in 3 different directions to match different installation methods on site. According to the installation situation on site, customers can indicate the product model of the corresponding interface direction when purchasing and placing an order.



**Installation diagram 9 of RS Smart Variable Air Diffuser**

Flex connection: Use six feet / two meters of (silence-Flex) Flexible duct. Use either a metal collar, or connect direct to the diffuser. Seal with sealant tape or sealant and approved silver tape.



**Installation diagram 10 of RS Smart Variable Air Diffuser**

Hard duct-work connection:

(a) Install duct directly to the diffuser and then tape and screw three ¼" (10mm) sheet metal screws to secure the connection. Seal with approved duct-work sealant or approved sealant silver tape. Insulated with approved insulation.

(b) Install with a collar, install the collar as intermediate connection between the diffuser and duct-work. Both (a) and (b) Seal with approved duct-work sealant or approved sealant silver tape.

Do not install duct into the neck of the diffuser, which may affect the operation of the diffuser. The air duct and any other mounting piece touch, touch or bump any part other than the air outlet housing such as the actuator of diffuser, so as not to cause damage to diffuser.

All connection requires smooth elbow, or a straight duct section of more than 12" / 300mm.

Determine your ceiling type, Lay in (T)-Bar, (K) type snap in T-bar, or (HSF) Hard ceiling.

(T) Standard Diffusers installed on the T – bar ceiling with (housing 603mm\*603mm, 595mm\*595mm).

(K) Diffusers installed into the T – bar ceiling with (housing 603mm\*603mm).

(HSF) Standard diffuser size and installed into a hard ceiling frame 655.5mm\*655.5mm, 647.5mm\*647mm).



Hanging (T) optional 1. ST have a beveled edge, and used to set below the frame of the ceiling. The Beveled edge sets onto the ceiling. Hangers support the diffusers.

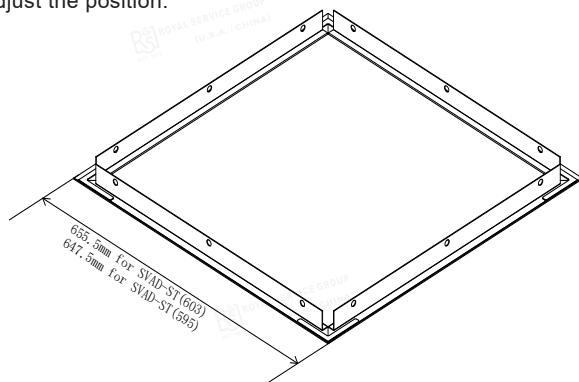
Hanging (K) optional 2. Have a gusset ceiling type edge, allowing the ceiling to snap into place the diffuser. The diffuser finish is flush with the ceiling.

Both T-W/WO (HSF)3.frame, K use Hangers set to hold wires, ceiling rod adjust the hangers bending up and at a 90 degree to hold rod hanger lugs; Adjust fixing nut on screw rods and adjust the height of each side of the diffuser to ensure the level of diffuser and ceiling.

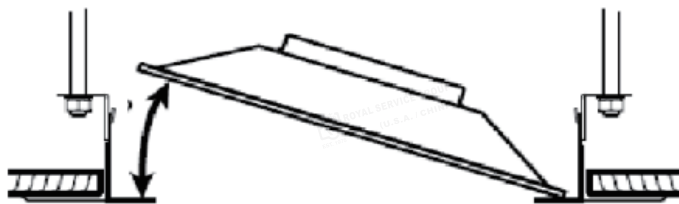
The ((HSF)-frame) attaches to the ceiling. The standard Diffuser lays inside the frame. Secure the diffuser housing with steel wire.

((HSF)-frame) When installing SVAD-ST, Smart Variable Air Diffusers on rigid ceilings such as gypsum board ceilings, it is recommended to use the "Installation hanging frame" shown in the "Installation hanging frame diagram Fig 11" .

Firstly,3.1 Alien the frame inside the ceiling. Choice of hanging rods, or direct screw into the metal ceiling support. Alien Hanging rods to the frame as required. Hanging rod supports secure into the ceiling frame. Screw rods are recommended, properly alien and adjust; 3.2 Use the adjusting nuts, to level the frame. Installation hanging frame" to ensure that each side of "Installation hanging frame" fits well with ceiling surface; 3.3 Finally, place diffuser side of connected cable and silencing flex obliquely into the "Installation hanging frame" from the middle of the "Installation hanging frame", place it in fixed frame in the middle of "Installation hanging frame", and adjust the position.



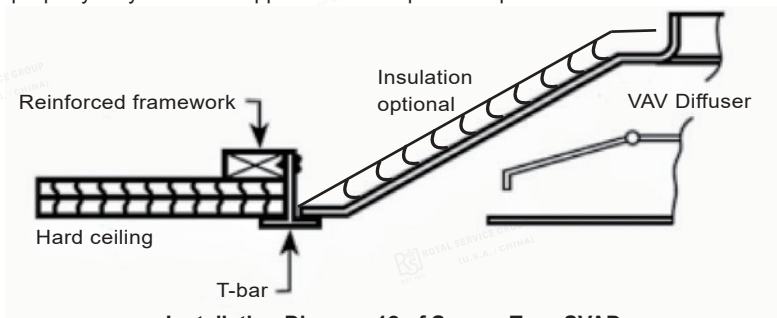
Installing hanging frame diagram 11 Hard ceiling (HSF)



HSF Installation Diagram 11.1 of Squar D

When installing SVAD-RR, SVAD-RW or other circular casing of Smart Variable Air Diffusers on rigid ceiling, also have a circular installation similar to a square frame for hanging frames, please refer to the installation method above and install them with circular installation hanging frames.

Of course, SVAD-ST, SVAD-SR and SVAD-SW Smart Variable Air Diffusers can be installed on hard ceilings the diffuser can also be installed by directly hanging hole on the upper lug of diffuser by 90 degrees hanging hook fixed on lifting screw rod, just like other ceiling forms. However, due to the characteristics of rigid ceiling, this installation method requires not only additional access ports, but also more than two installers, and it is difficult to install diffuser properly only when the upper and lower parts cooperate.

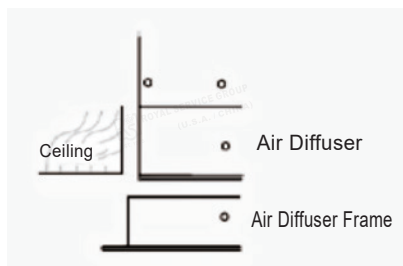
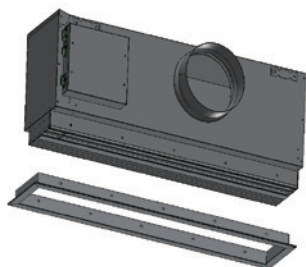


**Installation Diagram 12 of Square Type SVAD**

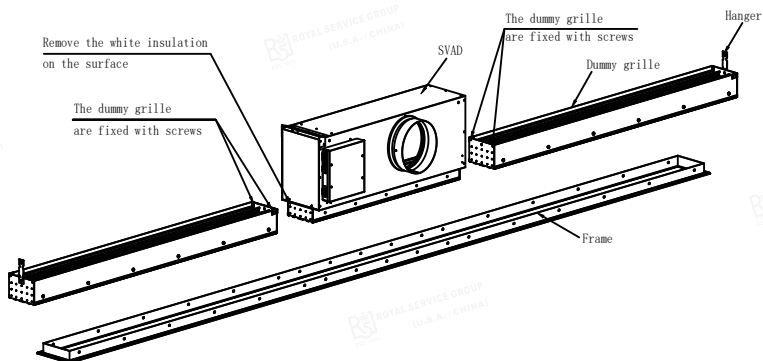
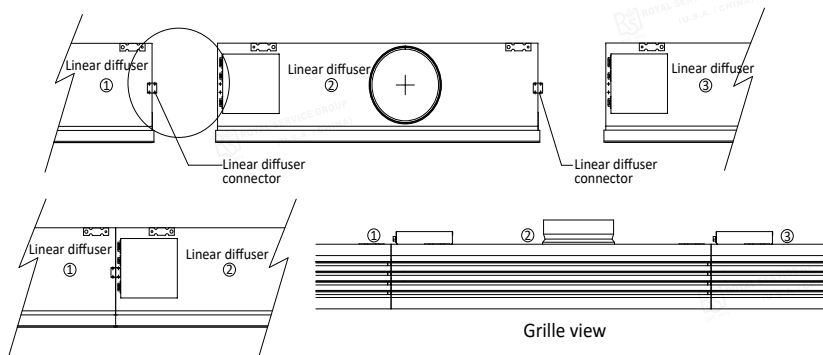
T-bar can also be installed on the hard ceiling as shown in Figure 12 , and made into a frame form to install SVAD-ST/SR/SW/STS without folded edges and flat edges square diffuser, and the SVAD-LL /WL can also be installed in a similar way.

This installation method is similar to the installation method of the hanging frame. After the installation frame is completed, the SVAD has been connected with cables and noise reduction flex can be placed obliquely from the middle of the "installation hanging frame". Insert it into the "installation hanging frame", and put it in the frame, just adjust the position. This installation method also eliminates the need to set up an additional inspection port, and can also solve the problem that the hard ceiling is inconvenient for another person to go up to the ceiling to cooperate with the installation.

The frame of the SVAD-LL and SVAD-WL can be disassembled. When they are installed on the ceiling, if the position is installed on the ceiling has already been made with keels or side strips and the outer frame is just right for their frame size, then only need to put the diffuser vent into the frame, the SVAD-LL diffuser is fixed with a boom, and the position is adjusted , and the SVAD-WL is fixed with a support frame or a backing plate. If there is no suitable size installation frame on the ceiling, a variable air volume ratio of SVAD-LL/WL can be opened on the ceiling (whether it is a hard plasterboard ceiling or an aluminum gusset ceiling or other ceiling types) Install the frame of the air outlet to the square hole about 10mm larger than the frame size of the air outlet; then, the SVAD-LL is fixed with a boom, and the position is adjusted so that the surface of the diffuser is flush with the ceiling surface , and, For the SVAD-WL ,fix it with a support frame or a backing plate, adjust the position so that the surface of the air outlet is flush with the wall , and then push the frame into the square hole from the the outside of the wall behind the ceiling , and then on the ceiling or inside the wall, fix the frame to the diffuser with screws. See Figure 13.



RSV-SVAD-LL/WL Installation Diagram 13



RSV-SVAD-LL/WL Installation Diagram 14

Models SVAD-LL, WL continuous diffuser requirements for installation. Specify all Continuous Royal SVAD-LL, WL when purchasing—Specify corresponding installation accessories ("Linear diffuser connector", fixing screws and plate, etc.). The frame should also be changed from one for each SVAD to a plurality of continuous SVAD using one or several assembled into a whole frame.

When installing, first hoist each SVAD-LL or SVAD-WL (do not install the frame), and preliminarily fix the position; then use the "linear diffuser connector" to preliminarily connect two adjacent SVAD-LL or SVAD-WL. Initially, do not tighten the fixing screws and fix them firmly; then preliminarily connect all two adjacent SVAD-LL or SVAD-WL. Adjust the hoisting height of each SVAD to make all SVAD panels consistent the horizontal, and ensure there are no gaps between two adjacent SVADs. At this time, tighten the fixing screws on the "linear diffuser connector" on all SVADs to fix the positions of all SVADs; finally, push the frame into the installation opening on the ceiling or wall, and fix it to the Diffuser with screws. See Figure 14.

**Hard Ceiling type installation:** When installing various types of SVAD on hard ceilings, the length size of the opening on the ceiling needs to be determined according to the SVAD installation method. Each Diffuser will use standard size; additional lengths are open, returned, or blocked.

When the SVAD is installed on a hard ceiling using a "hanging frame," the ceiling opening size is the SVAD outer frame size plus 15mm(9/16").

For example, SVAD-ST, with an outer frame size of 595\*595mm(23 7/16"x23 7/16"), has a ceiling opening size of 610\*610mm(24"x24").

The outer frame size is SVAD-RW with a diameter of 595mm(23 7/16"), and the ceiling opening size is a round hole with a diameter of 610mm(24").

If square and linear type SVAD (SVAD-ST, STS, LL, WL, SW) are installed by installing T-bars on the hard ceiling according to the installation diagram 12, the opening size of the ceiling is the outer frame size of the SVAD plus 10mm(3/8").

For example, SVAD-ST has an outer frame size of 595\*595mm(23 7/16"x23 7/16") and ceiling opening size requirements of 605\*605mm(23 13/16"x23 13/16").

**Under-ceiling installation:** Directly hoisted SVAD up under a hard ceiling, the ceiling opening dimensions for square and round SVAD are as follows:

SVAD-ST: 575\*575mm(22 5/8"x22 5/8"); SVAD-STs: 305\*305mm(12"x12")

SVAD-RR: Dia 575mm(22 5/8"); SVAD-SW: Dia 510mm(20 1/16")

Detachable Frame sizes of SVAD-LL and SVAD-WL

Ceiling (or on the side wall ceiling), the opening size of the ceiling is 20mm(13/16") smaller than the outer frame size.

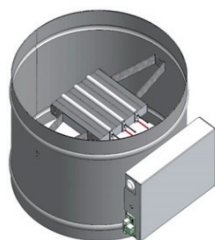
For example, the outer frame size is 1197\*188mm(47 1/8"x7 3/8") SVAD-WL-4841, and its ceiling opening size is 1177\*168mm(46 5/16"x6 5/8").

## 7. Installation of optional electric heating components and airflow measurement components

Royal Service SVAD can be installed with matching electric heating components and airflow measurement components. See Figure 12 and Figure 13 for schematic diagrams.

Install electric heating components for reheating and heating under overcooling conditions; install airflow measurement components to measure the air volume of SVAD to monitor the operation of SVAD; the wheel-type airflow sensor is standard, and the pitot tube-type airflow sensor is optional, it needs to be equipped with other components such as a pressure difference.

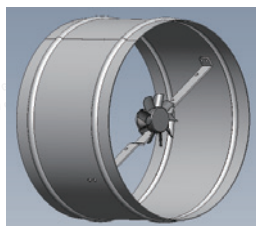
ence sensor. In this case, the appearance and wiring of the airflow measurement component are slightly different. However, compared to the SVAD, its installation is the same, and the electrical wiring is to connect the 0~10V signal line to the SVAD control board. The difference is that the airflow measurement component needs to connect the Pitot tube wind speed sensor connect with the differential pressure sensor in the electric control box.



**Electric Black PTC**

**Heating Element Components**

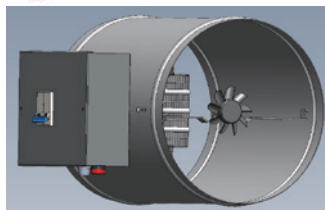
**Diagram 15-1**



**Airflow Measurement**

**Components**

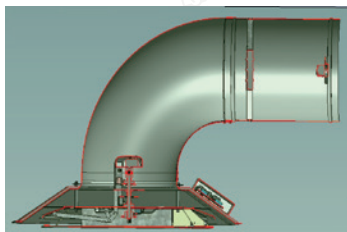
**Diagram 15-2**



**Electric Heating Components**

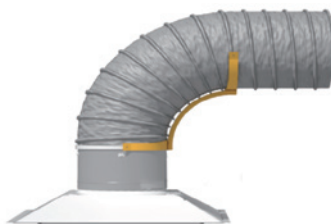
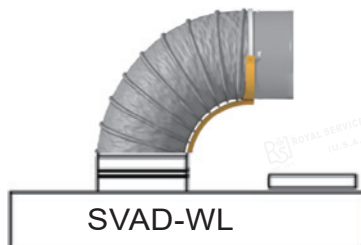
**and Airflow Measurement**

**Components Diagram 16**



**Electric Heating Components and Airflow**

**Measurement Components Installation Diagram 17**



**Electric Heating Components and Airflow Measurement Components**

**Installation Diagram 18**