

# MHI

## TECHNICAL MANUAL

Manual No.'13•SAF-T-182

updated December 02 ,2013

## AIR TO AIR HEAT EXCHANGE UNIT

**SAF150E6**  
250E6  
350E6  
500E6  
650E6  
800E6  
1000E6

## CONTENTS

<b>1. SELECTION DATA .....</b>	<b>2</b>
<b>1.1 Specifications .....</b>	<b>2</b>
<b>1.2 Environmental Conditions During Use .....</b>	<b>3</b>
<b>1.3 Exterior dimensions .....</b>	<b>4</b>
<b>1.4 Characteristic of fan .....</b>	<b>12</b>
<b>1.5 Noise level .....</b>	<b>16</b>
<b>2. ELECTRICAL DATA .....</b>	<b>20</b>
<b>2.1 Electrical wiring .....</b>	<b>20</b>
<b>3. APPLICATION DATA .....</b>	<b>24</b>
<b>4. TECHNICAL INFORMATION .....</b>	<b>32</b>

# 1. SELECTION DATA

## 1.1 Specifications

Item		Model	SAF150E6	SAF250E6	SAF350E6	SAF500E6	SAF650E6	SAF800E6	SAF1000E6		
Power source			1 Phase, 220-240V 50Hz								
Exterior dimensions Height × Width × Depth		mm	270×970×467	270×882×599	317×1050×804	317×1090×904	388×1204×884	388×1322×884	388×1322×1134		
Exterior appearance			Galvanized steel sheet								
Operation date	Power input		W	92-107	108-123	178-185	204-225	269-295	360-378	416-432	
	Running current		A	0.42-0.45	0.49-0.51	0.81-0.77	0.93-0.94	1.22-1.23	1.64-1.58	1.89-1.80	
Capacity	UHi	Enthalpy exchange efficiency	%	Cooling	63	63	66	62	62	65	65
		Heating		70	70	69	67	68	71	71	
	Temperature exchange efficiency			75	75	75	75	75	75	75	
	Hi	Enthalpy exchange efficiency		Cooling	63	63	66	62	62	65	65
		Heating		70	70	69	67	68	71	71	
	Temperature exchange efficiency			75	75	75	75	75	75	75	
Lo	Enthalpy exchange efficiency	Cooling	66	65	71	64	66	68	70		
	Heating	73	72	73	69	73	74	76			
Temperature exchange efficiency		77	77	78	76	79	76	79			
Motor & Q'ty		W	10 × 2	20 × 2	40 × 2	70 × 2	100 × 2	180 × 2	180 × 2		
Air handling equipment Fan type & Q'ty			Sirroco fan × 2								
Air flow		UHi	m <sup>3</sup> /h	150	250	350	500	650	800	1000	
		Hi		150	250	350	500	650	800	1000	
		Lo		120	190	240	440	460	630	700	
External static pressure		UHi	Pa	80	105	140	120	65	140	105	
		Hi		70	95	60	60	40	110	80	
		Lo		25	45	45	35	40	55	75	
Air filter	Outside intake air			Protection for element (Washable) PS400							
	Exhaust air										
Operation time for air filter		h	3000								
Noise level		UHi	dB(A)	28.5-29.0	30.0-31.5	32.5-33.0	36.5-37.5	36.5-37.5	37.0-37.5	37.5-38.5	
		Hi		28.0-29.0	29.5-30.5	30.5-31.0	34.5-35.5	34.5-35.0	36.5-37.0	37.0-37.5	
		Lo		19.5-21.5	23.5-26.5	22.5-25.5	31.0-32.5	30.0-32.0	33.5-34.5	33.5-34.5	
Net weight		kg	25	29	49	57	68	71	83		
Operation control	Operation switch			Control switch (Accessory)							
	Operation			Ventilation (ON / OFF)							
	Fan speed			Hi / Lo							
	Function			Heat exchange / Normal Ventilation							
Safety equipment			Internal thermostat for fan motor								

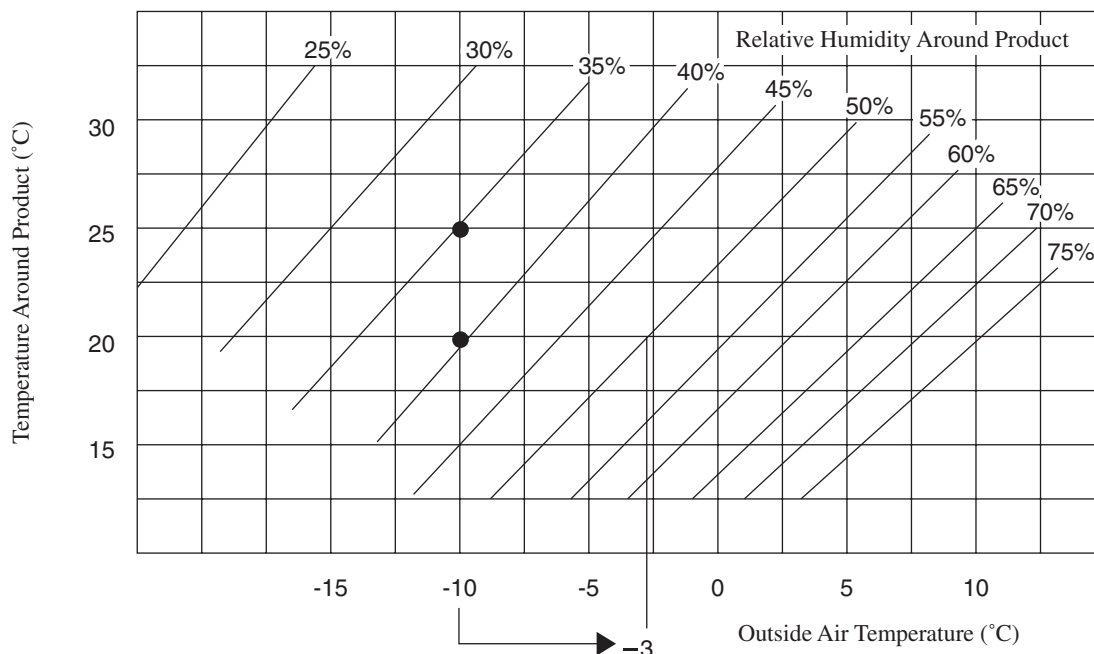
Notes (1) The data are mesured at the following conditions.

		Summer	Winter
Indoor side (Supply air)	DB	27°C	20°C
	WB	20°C	14°C
Outdoor side (Outside air)	DB	35°C	5°C
	WB	29°C	2°C
Unit around	DB	27°C	20°C

## 1.2 Environmental Conditions During Use

### • Condensation on the product's surface

If the temperature and humidity in the air around the product are high and the outside temperature is low, condensation may form on the outside surface of the product. The following graph shows the limit conditions for occurrence of condensation on the product's surface relative to the temperature and humidity surrounding the product and the outside air temperature.



Use the humidity around the product determined from this graph as shown below.

[Example 1]

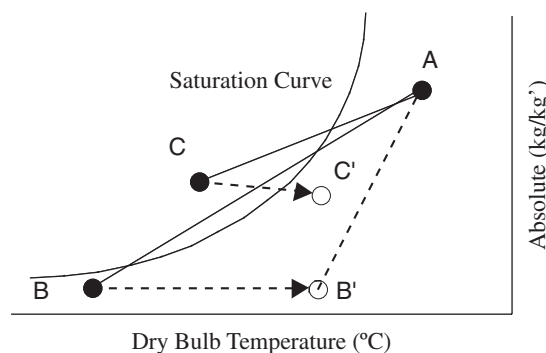
If the outside air temperature is  $-10^{\circ}\text{C}$  and the temperature of the air around the product is  $20^{\circ}\text{C}$ , condensation will not form on the product's surface if the relative humidity around the product is below 40%. However, if the temperature of the air around the product is  $25^{\circ}\text{C}$ , it is necessary for the relative humidity around the product to be below approximately 35%.

[Example 2]

In places where the outside air temperature is  $-10^{\circ}\text{C}$  and the temperature of the air around the product is  $20^{\circ}\text{C}$ , and there is danger of the relative humidity around the product changing to 40~50%, condensation may form on the surface of the product, so countermeasures to preheat the outside air from  $-10^{\circ}\text{C}$  to  $-3^{\circ}\text{C}$  are necessary.

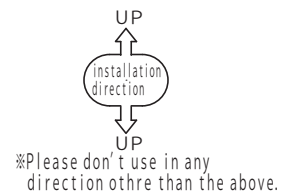
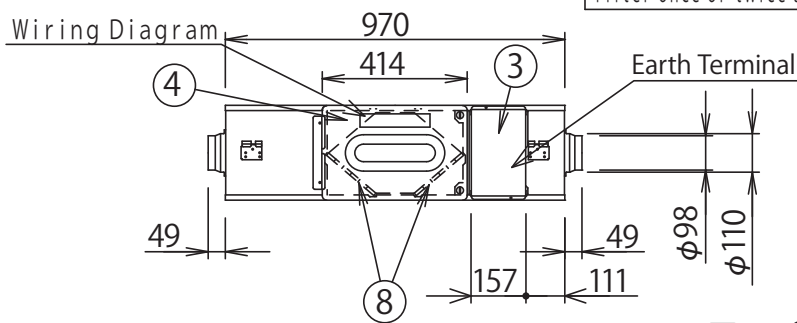
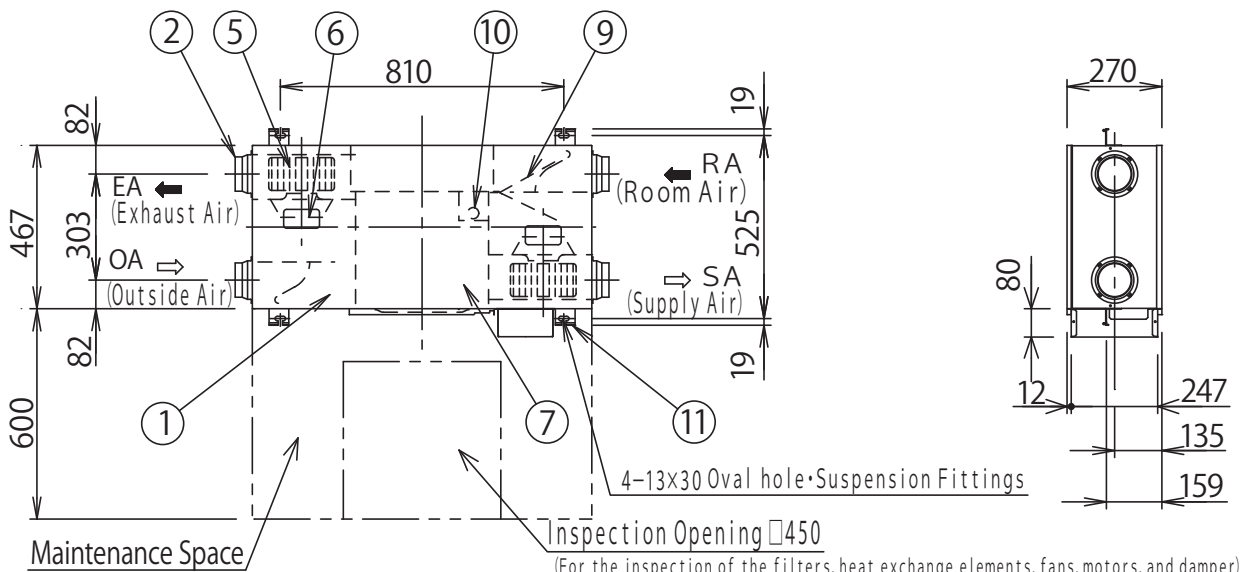
### • Condensation on the Heat Exchanger Element

As shown in the graph at right, points are plotted along the line between condition A, with high temperature air being drawn in, and condition B, with low temperature air being drawn in. Heat is obtained by the heat in the air from high temperature side A being exchanged at the heat exchanger unit, and in the case where the air conditions exceed the saturation curve, as in the case of point C, condensation forms on the heat exchanger element or frost forms. In such a case, Use low temperature side air B by heating it to point B' so that point C does not exceed the saturation curve but remains inside it at point C'.



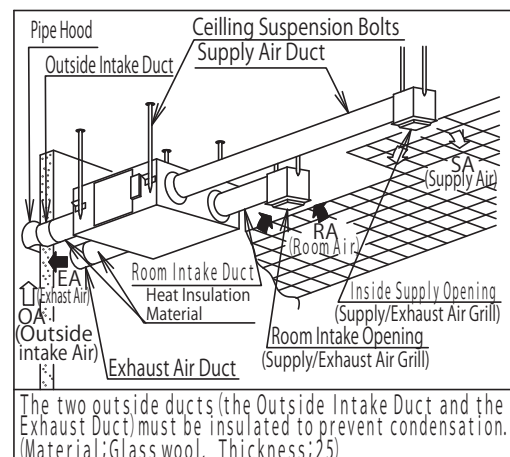
### 1.3 Exterior dimensions

Model SAF150E6



NO.	Parts Name	Qty.	Material	Remarks
1	Frame	1	Galvanized sheets	
2	Adapter	4	ABS	
3	Electrical Equipment Box	1		
4	Inspection Cover	1	Galvanized sheets	
5	Fan	2	ABS	
6	Motor	2		
7	Heat Exchange Element	1	Special paper + Resin	
8	Filter	2	Nylon-Polyester Fiber	Collection Efficiency AFI 82%
9	Damper	1		
10	Damper Motor	1		
11	Ceiling Suspension Fixture	4	Galvanized sheets	

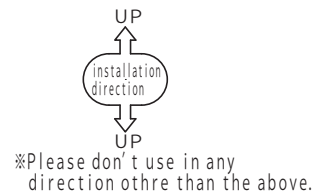
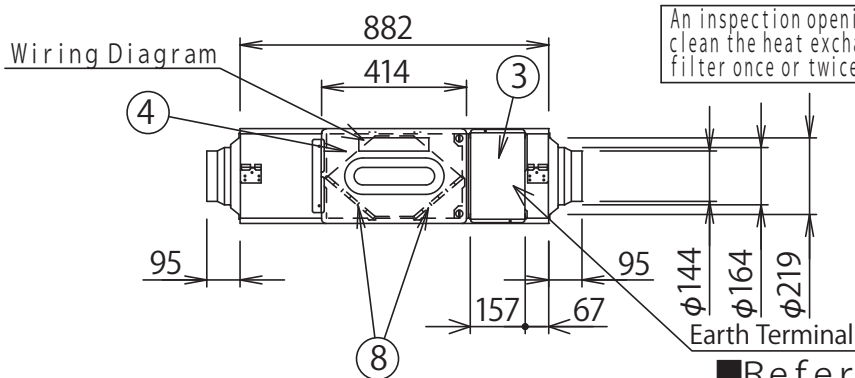
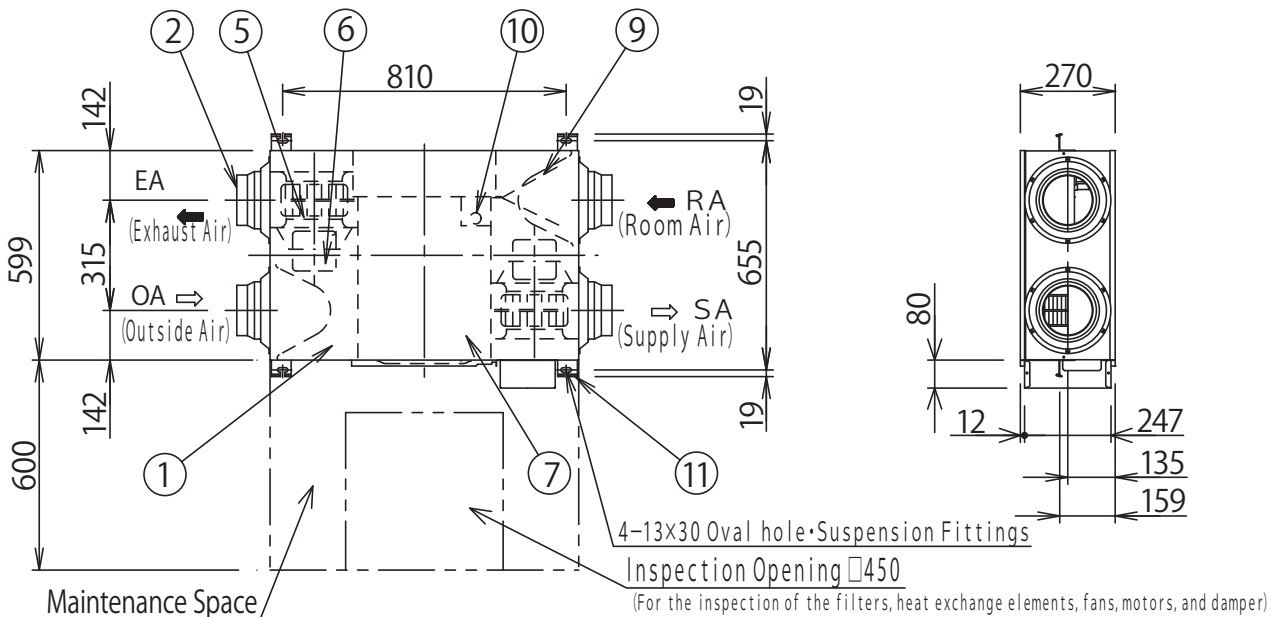
#### Reference Sketch



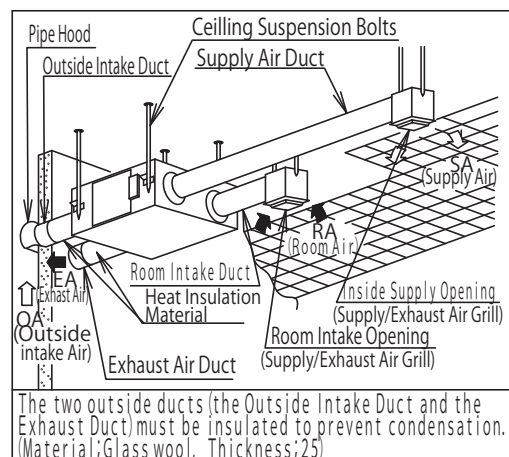
\*Duct size (Nominal Diameter) :  $\phi 100$

\*\* The above dimensions do not include the thickness of the insulation material on the unit body.

Model SAF250E6



Reference Sketch

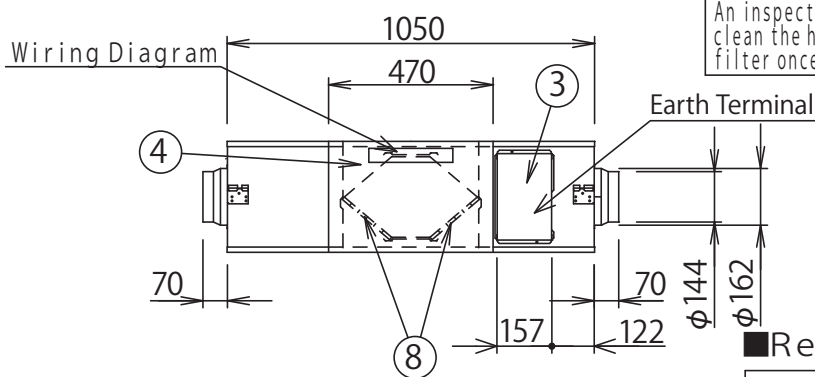
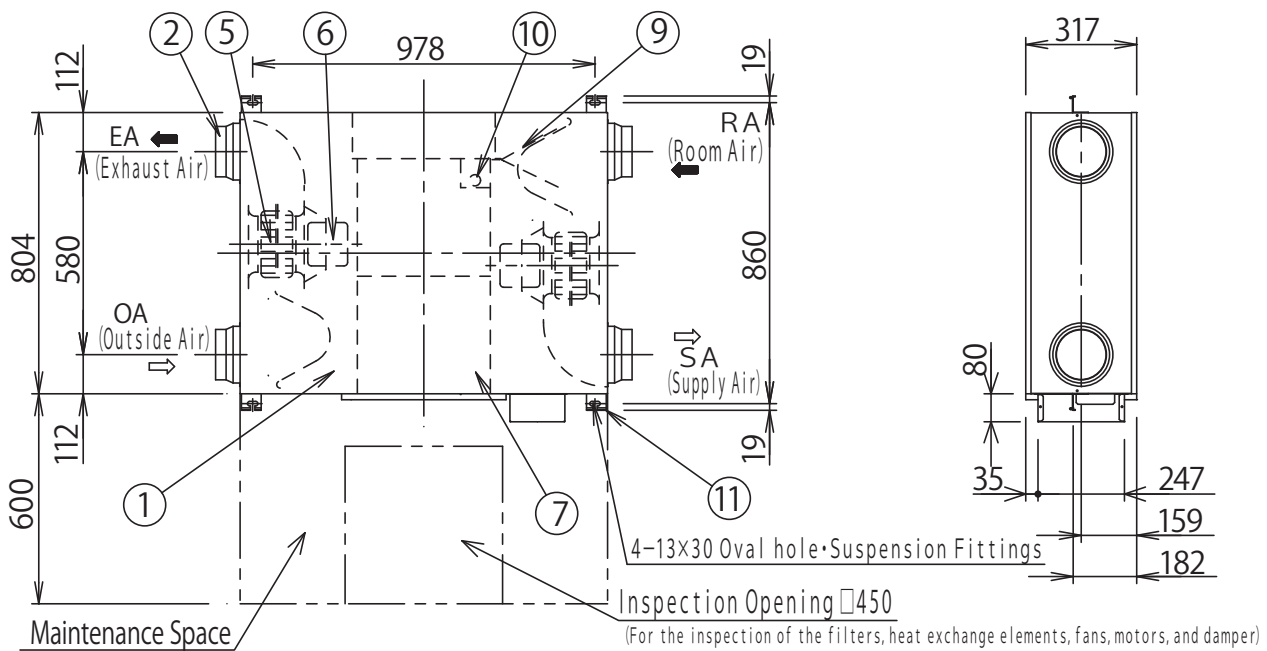


\* Duct size (Nominal Diameter): φ150

\*\* The above dimensions do not include the thickness of the insulation material on the unit body.

NO.	Parts Name	Qty.	Material	Remarks
1	Frame	1	Galvanized sheets	
2	Adapter	4	ABS	
3	Electrical Equipment Box	1		
4	Inspection Cover	1	Galvanized sheets	
5	Fan	2	ABS	
6	Motor	2		
7	Heat Exchange Element	1	Special paper + Resin	
8	Filter	2		
9	Damper	1	Nylon-Polyester Fiber	Collection Efficiency AFI 82%
10	Damper Motor	1		
11	Ceiling Suspension Fixture	4	Galvanized sheets	

Model SAF350E6



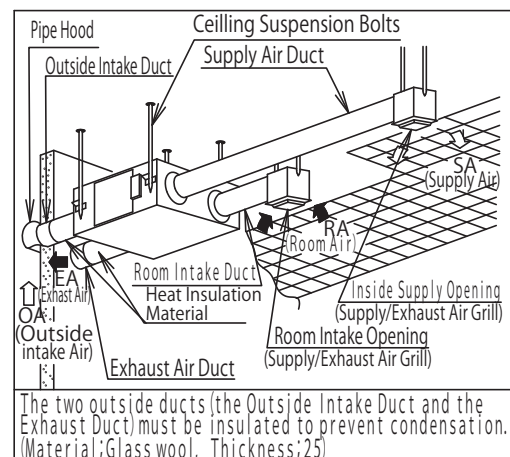
An inspection opening is necessary to clean the heat exchange element and filter once or twice a year.



※Please don't use in any direction other than the above.

NO.	Parts Name	Qty.	Material	Remarks
1	Frame	1	Galvanized sheets	
2	Adapter	4	ABS	
3	Electrical Equipment Box	1		
4	Inspection Cover	1	Galvanized sheets	
5	Fan	2	ABS	
6	Motor	2		
7	Heat Exchange Element	2	Special paper + Resin	
8	Filter	2	Nylon-Polyester Fiber	Collection Efficiency AFI 82%
9	Damper	1		
10	Damper Motor	1		
11	Ceiling Suspension Fixture	4	Galvanized sheets	

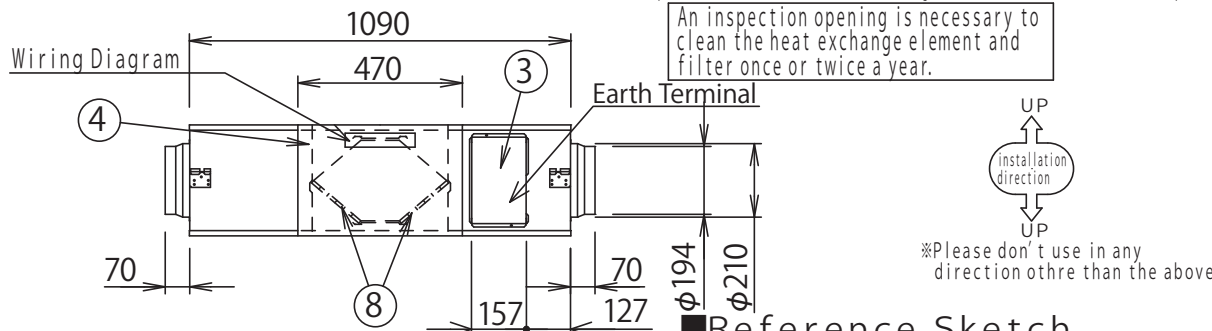
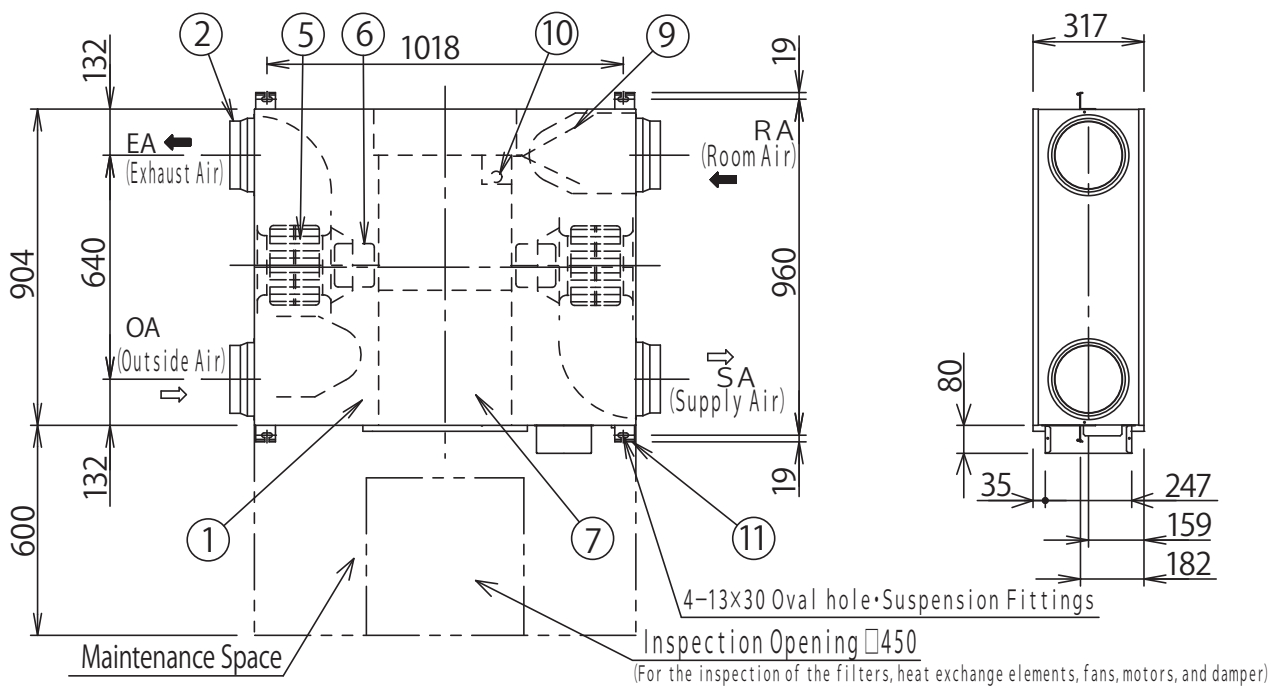
Reference Sketch



\* Duct size (Nominal Diameter): φ150

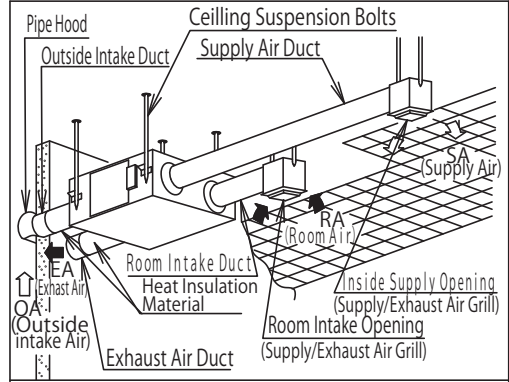
\*\* The above dimensions do not include the thickness of the insulation material on the unit body.

Model SAF500E6



Reference Sketch

NO.	Parts Name	Qty.	Material	Remarks
1	Frame	1	Galvanized sheets	
2	Adapter	4	ABS	
3	Electrical Equipment Box	1		
4	Inspection Cover	1	Galvanized sheets	
5	Fan	2	ABS	
6	Motor	2		
7	Heat Exchange Element	2	Special paper + Resin	
8	Filter	2	Nylon-Polyester Fiber	Collection Efficiency AFI 82%
9	Damper	1		
10	Damper Motor	1		
11	Ceiling Suspension Fixture	4	Galvanized sheets	

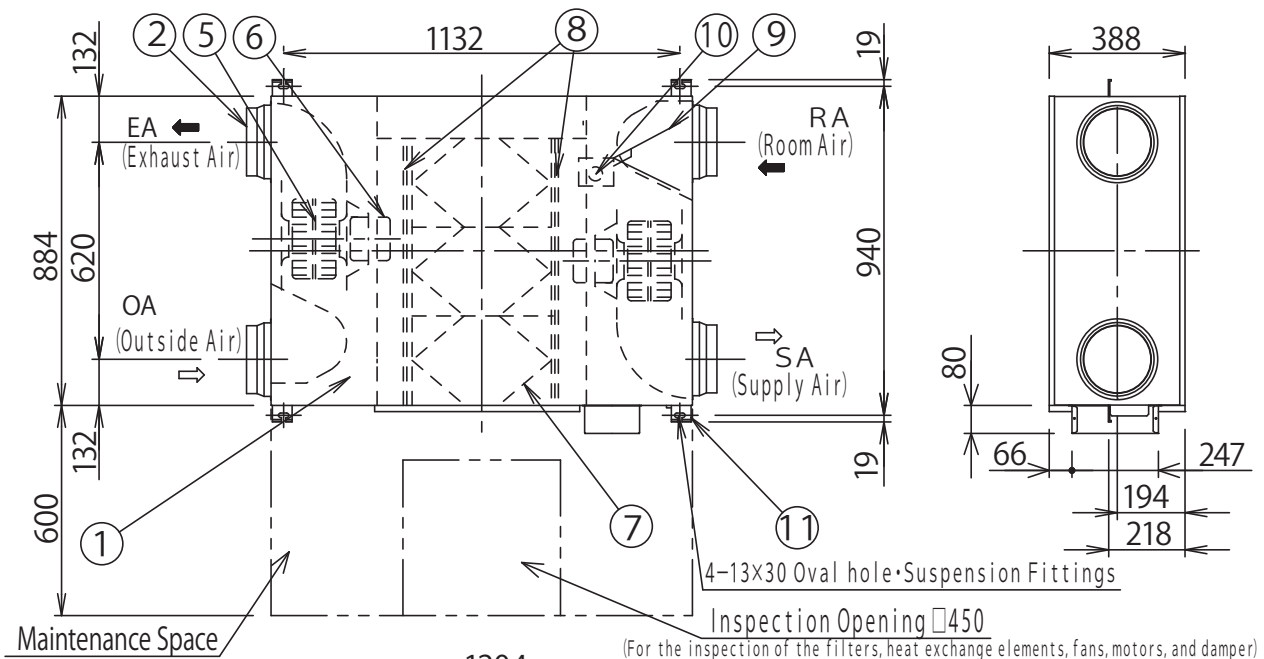


The two outside ducts (the Outside Intake Duct and the Exhaust Duct) must be insulated to prevent condensation. (Material: Glass wool, Thickness: 25)

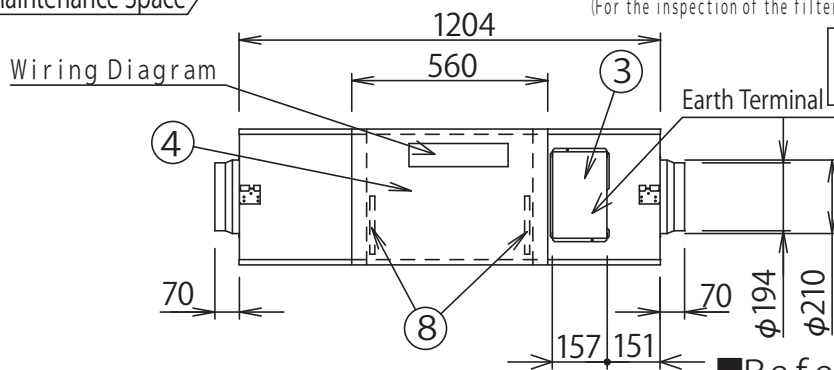
- \* Duct size (Nominal Diameter):  $\phi 200$
- \*\* The above dimensions do not include the thickness of the insulation material on the unit body.



Model SAF650E6



(For the inspection of the filters, heat exchange elements, fans, motors, and damper)



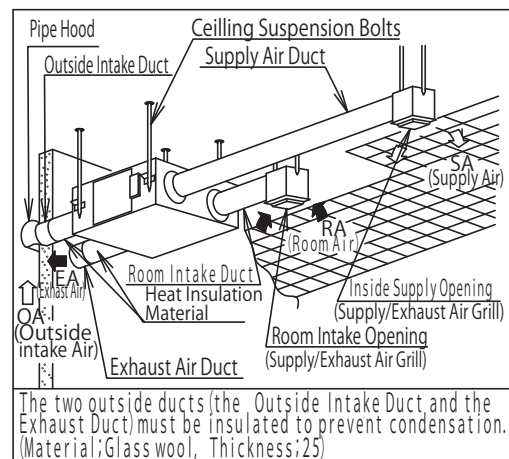
An inspection opening is necessary to clean the heat exchange element and filter once or twice a year.



※Please don't use in any direction other than the above.

■Reference Sketch

NO.	Parts Name	Qty.	Material	Remarks
1	Frame	1	Galvanized sheets	
2	Adapter	4	ABS	
3	Electrical Equipment Box	1		
4	Inspection Cover	1	Galvanized sheets	
5	Fan	2	ABS	
6	Motor	2		
7	Heat Exchange Element	3	Special paper + Resin	
8	Filter	2	Nylon-Polyester Fiber	Collection Efficiency AFI 82%
9	Damper	1		
10	Damper Motor	1		
11	Ceiling Suspension Fixture	4	Galvanized sheets	

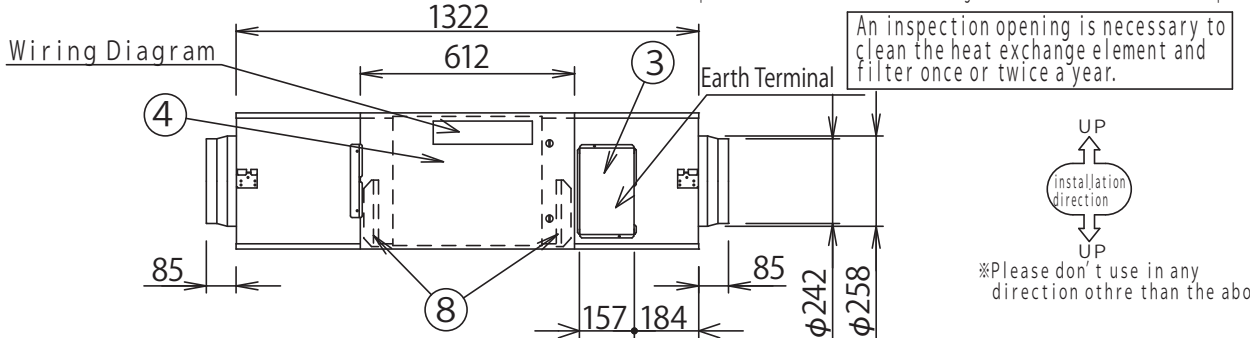
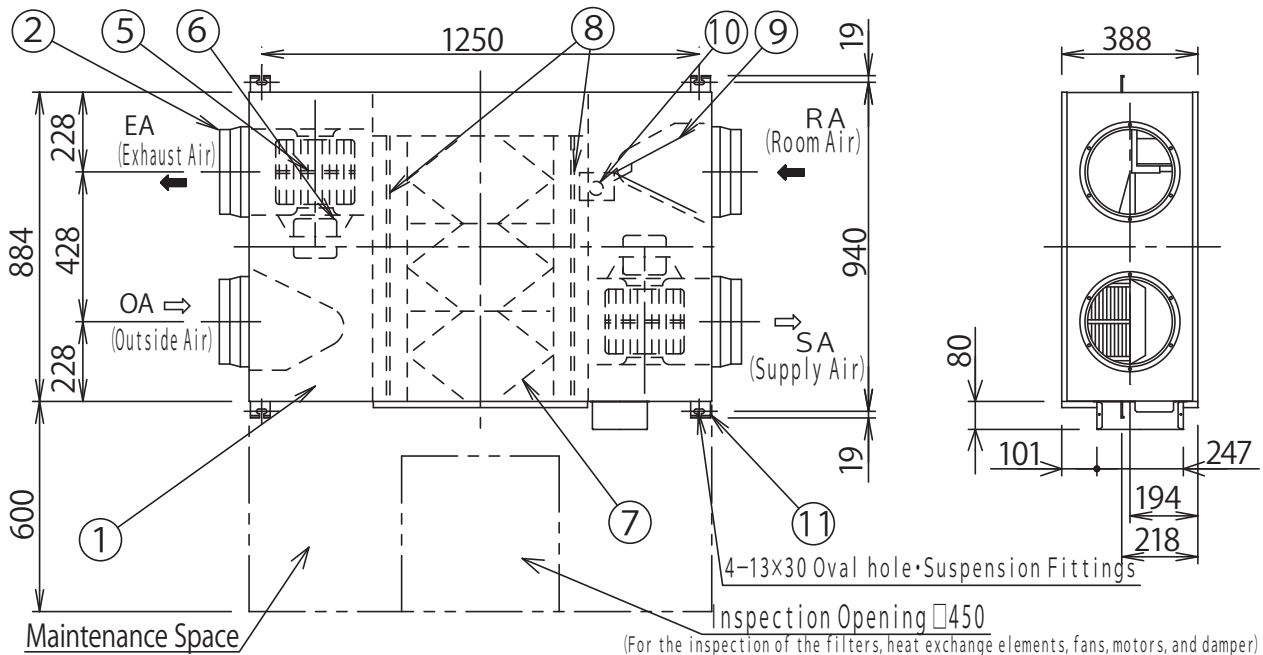


The two outside ducts (the Outside Intake Duct and the Exhaust Duct) must be insulated to prevent condensation. (Material: Glass wool, Thickness: 25)

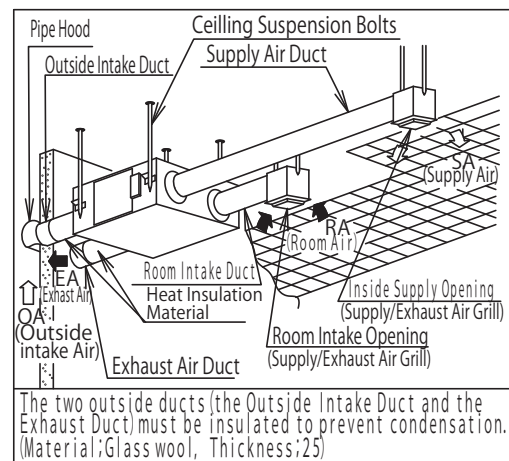
\*Duct size (Nominal Diameter):  $\phi 200$

\*\* The above dimensions do not include the thickness of the insulation material on the unit body.

Model SAF800E6



Reference Sketch



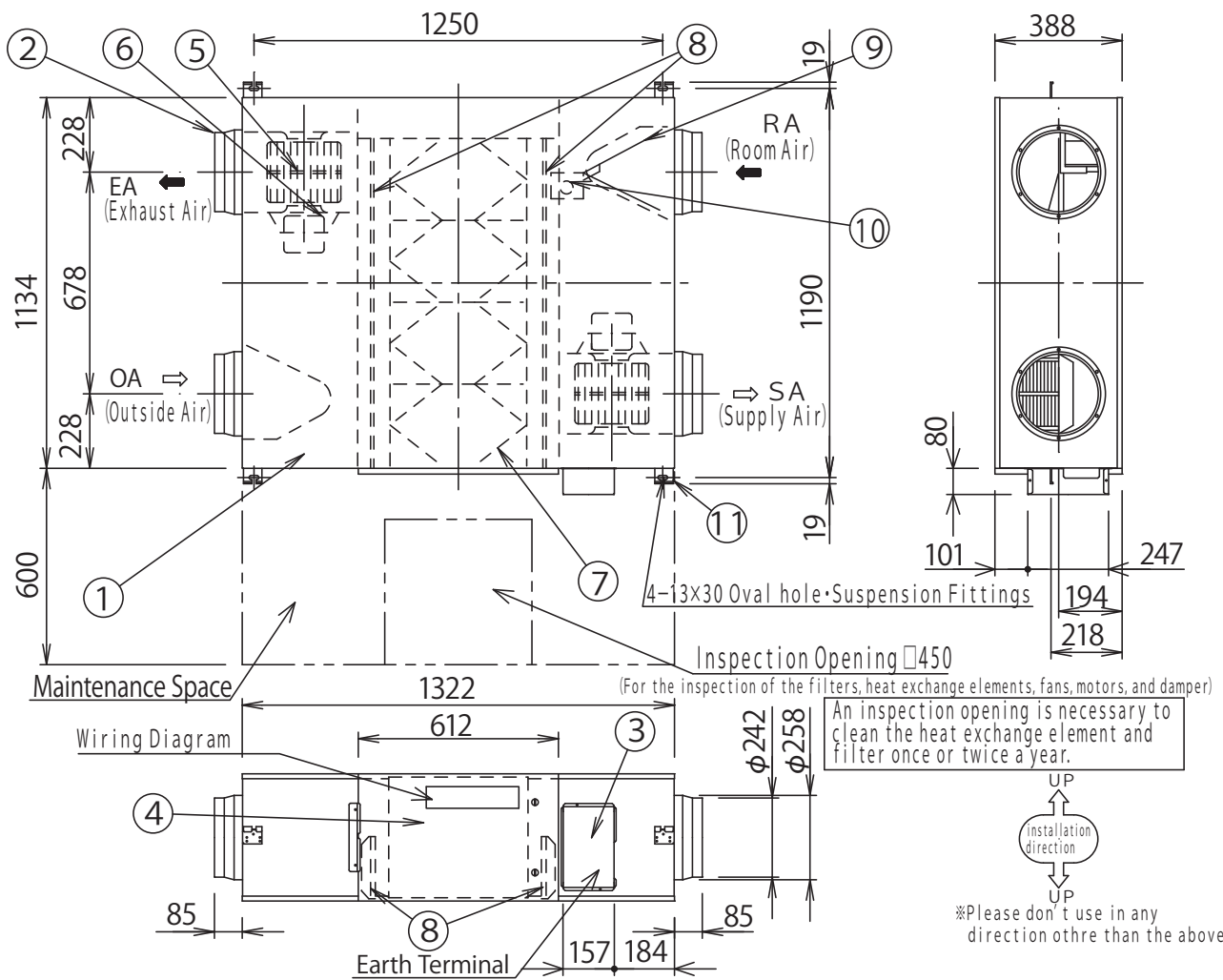
The two outside ducts (the Outside Intake Duct and the Exhaust Duct) must be insulated to prevent condensation. (Material: Glass wool, Thickness: 25)

\* Duct size (Nominal Diameter):  $\phi 250$

\*\* The above dimensions do not include the thickness of the insulation material on the unit body.

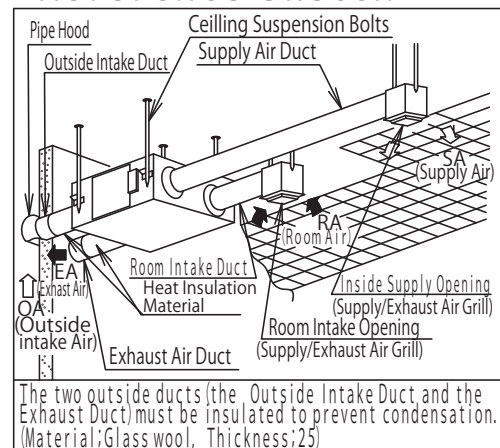
NO.	Parts Name	Qty.	Material	Remarks
1	Frame	1	Galvanized sheets	
2	Adapter	4	ABS	
3	Electrical Equipment Box	1		
4	Inspection Cover	1	Galvanized sheets	
5	Fan	2	ABS	
6	Motor	2		
7	Heat Exchange Element	3	Special paper + Resin	
8	Filter	2	Nylon-Polyester Fiber	Collection Efficiency AFI 82%
9	Damper	1		
10	Damper Motor	1		
11	Ceiling Suspension Fixture	4	Galvanized sheets	

Model SAF1000E6



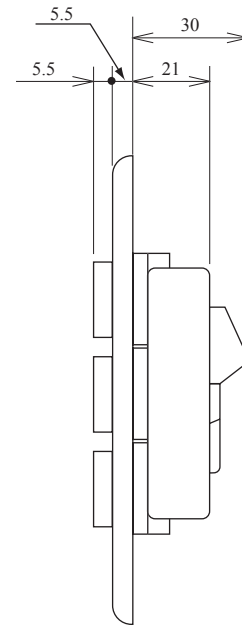
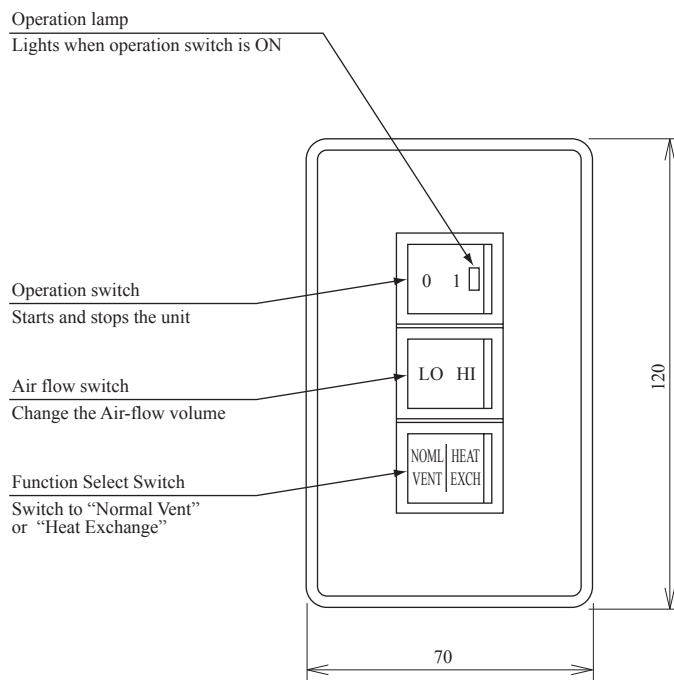
NO.	Parts Name	Qty.	Material	Remarks
1	Frame	1	Galvanized sheets	
2	Adapter	4	ABS	
3	Electrical Equipment Box	1		
4	Inspection Cover	1	Galvanized sheets	
5	Fan	2	ABS	
6	Motor	2		
7	Heat Exchange Element	4	Special paper + Resin	
8	Filter	2	Nylon-Polyester Fiber	Collection Efficiency AFI 82%
9	Damper	1		
10	Damper Motor	1		
11	Ceiling Suspension Fixture	4	Galvanized sheets	

Reference Sketch



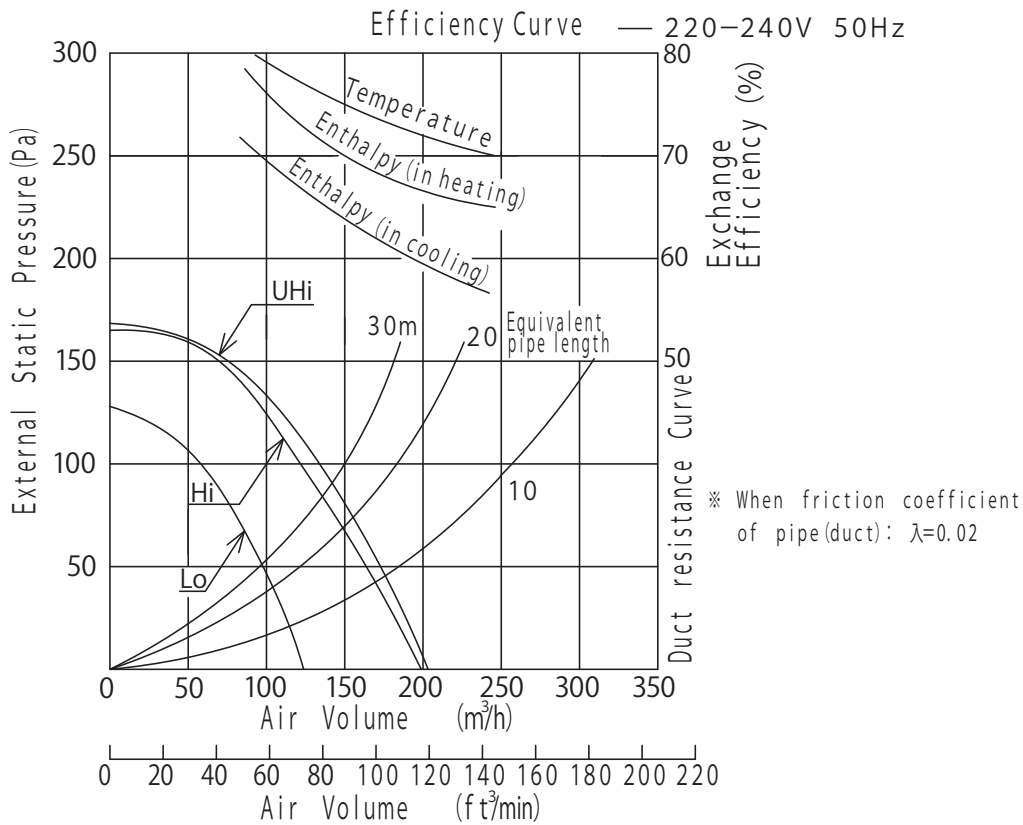
**Control switch (Accessory)**  
**Model SAF-REMOC-E**

Unit: mm

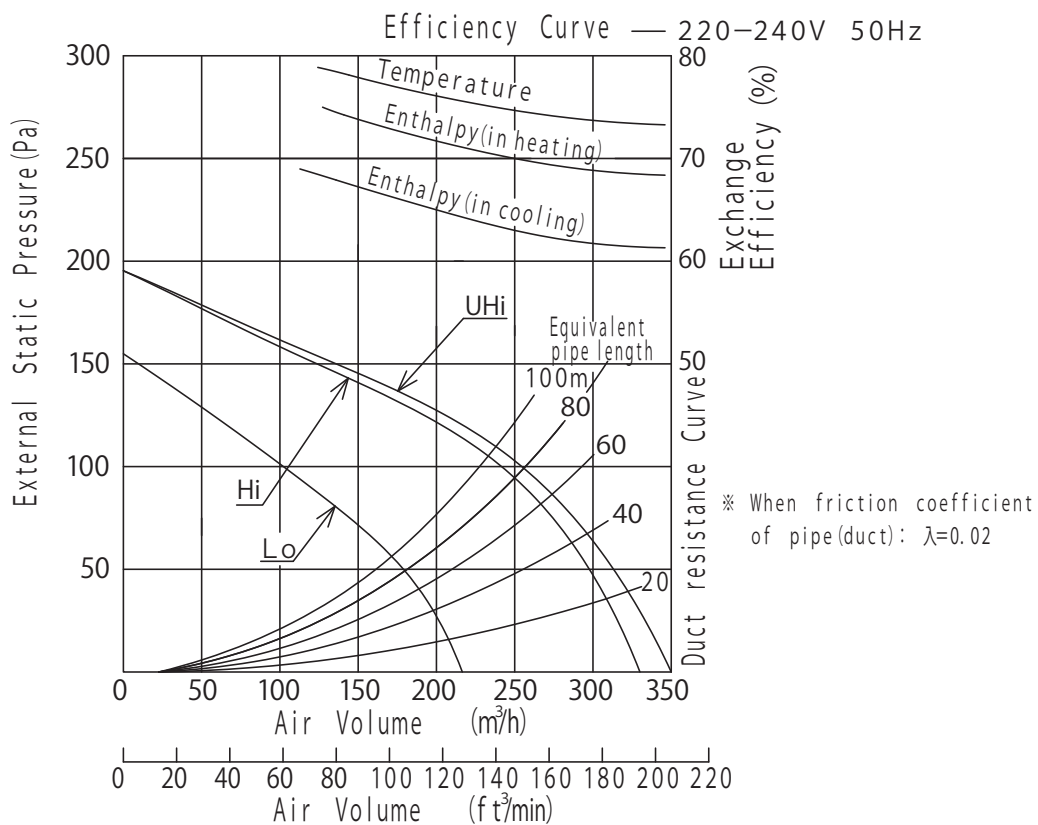


### 1.4 Characteristics of fan

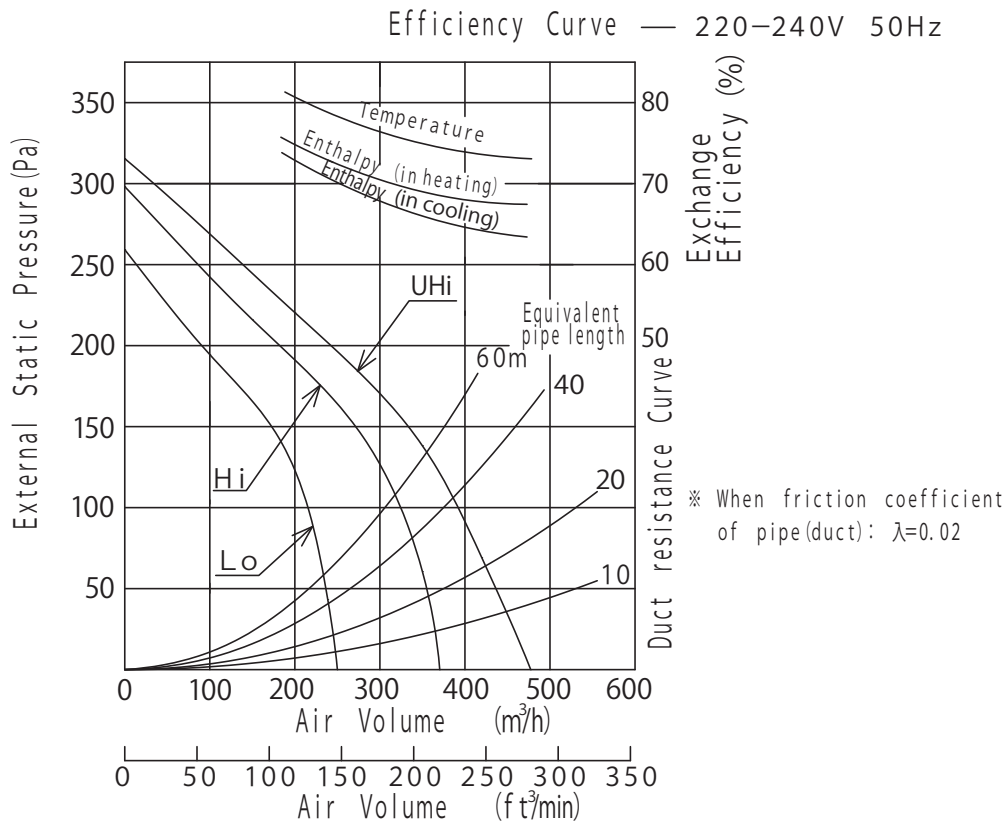
Model SAF150E6



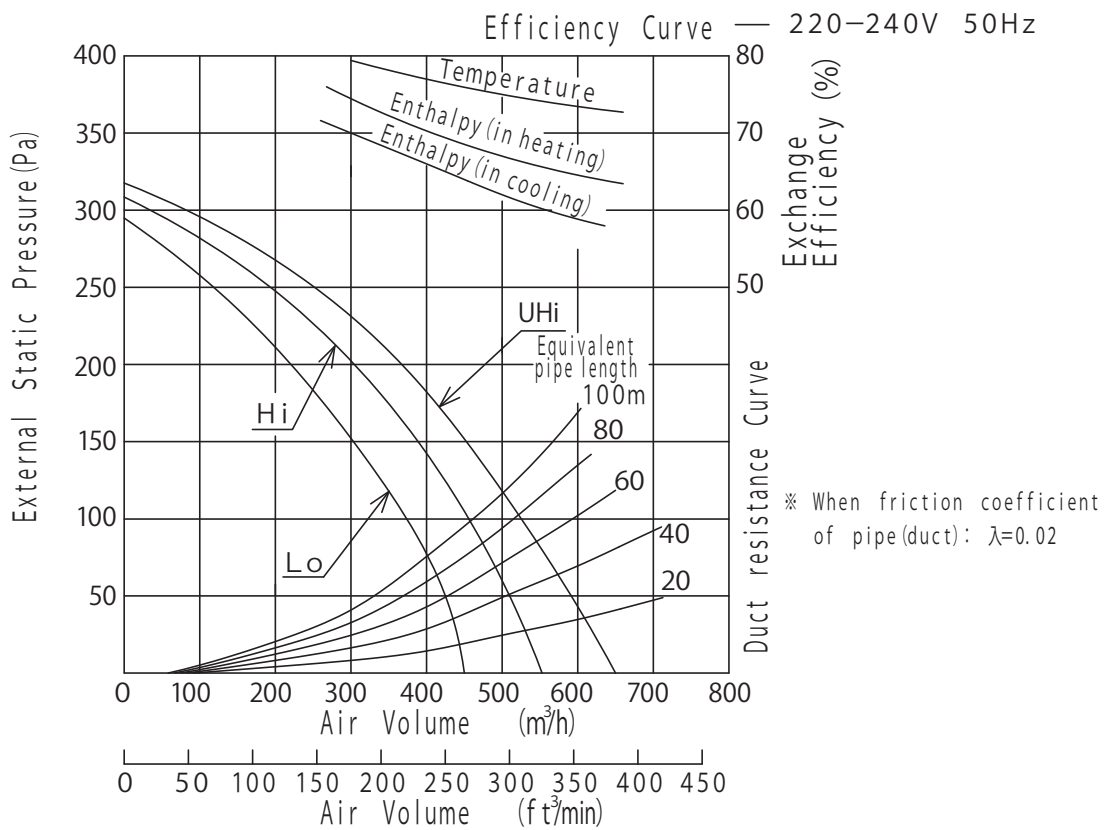
Model SAF250E6



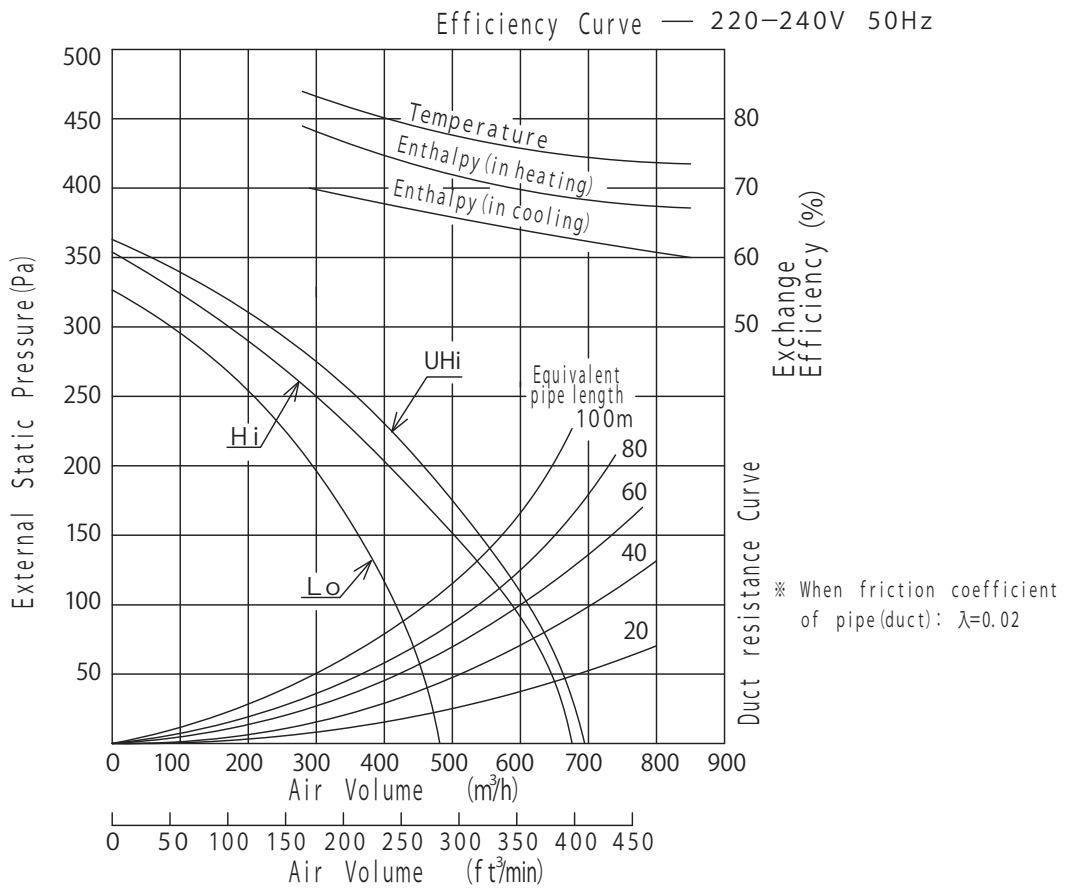
Model SAF350E6



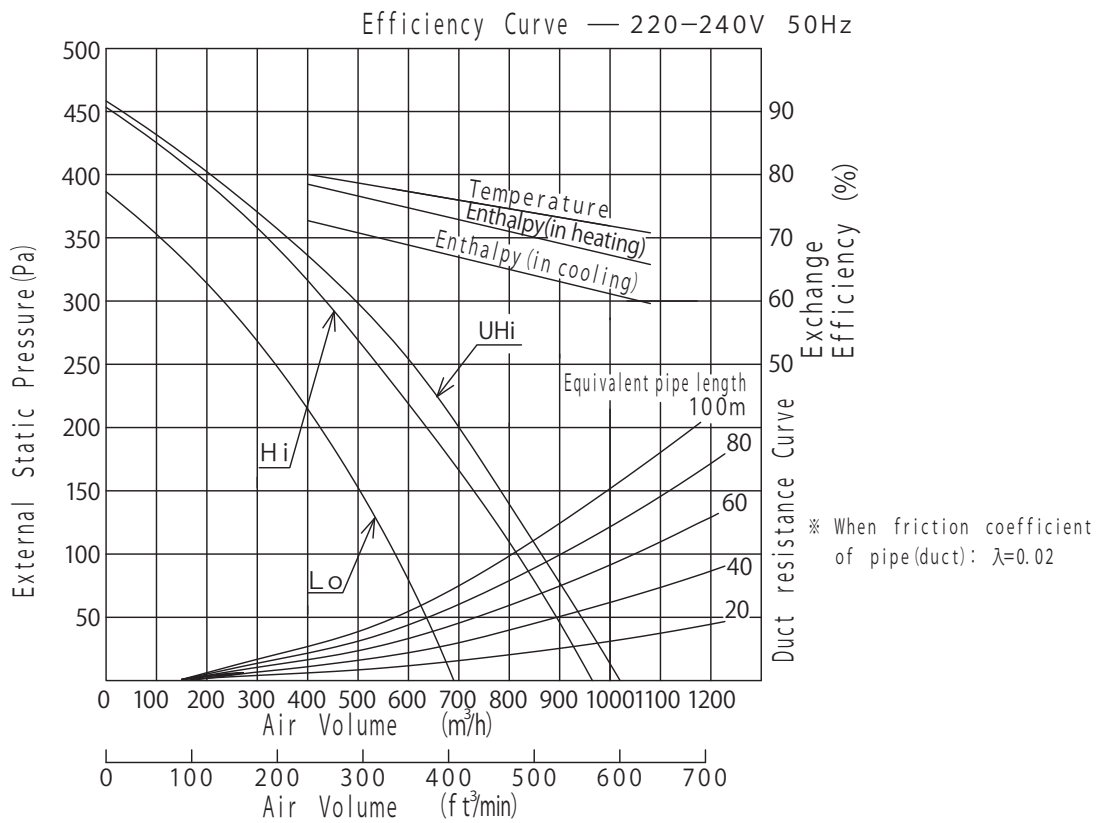
Model SAF500E6



**Model SAF650E6**

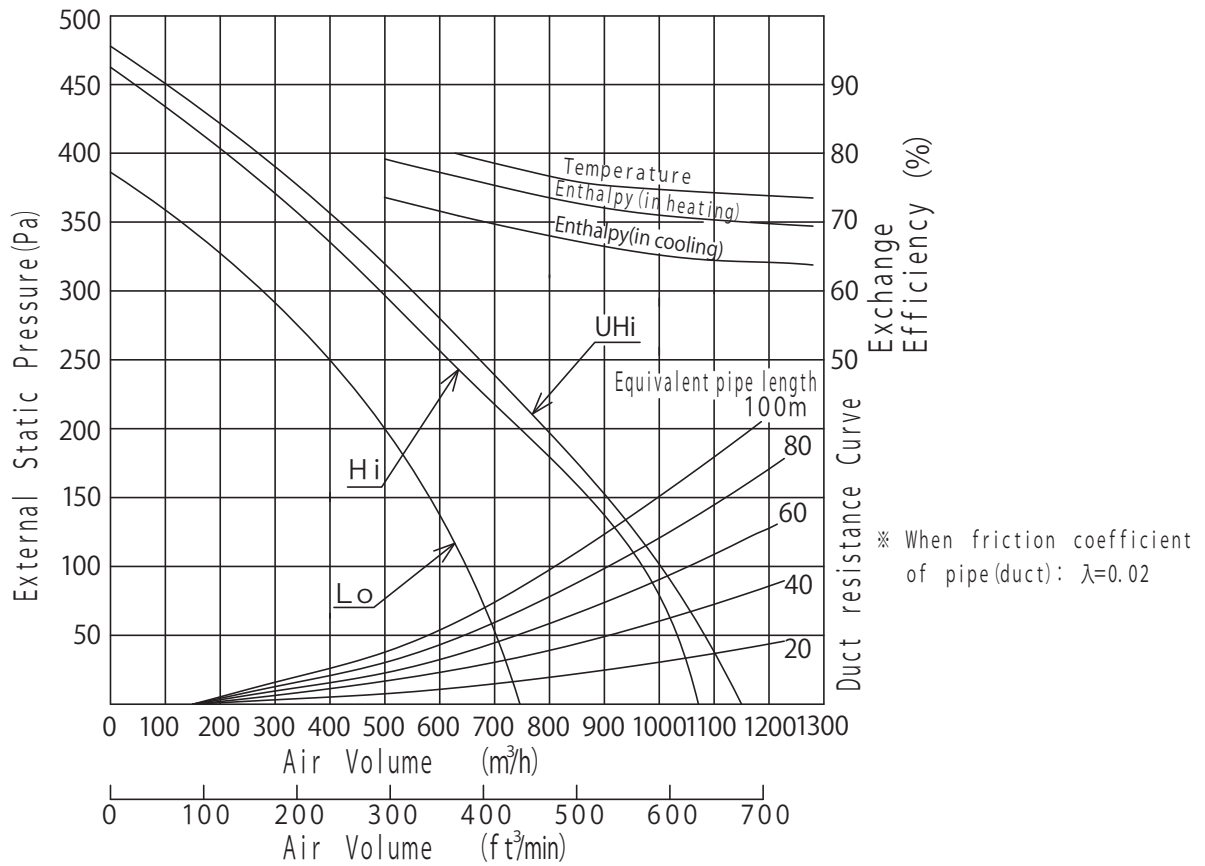


**Model SAF800E6**



Model SAF1000E6

Efficiency Curve — 220V-240V 50Hz



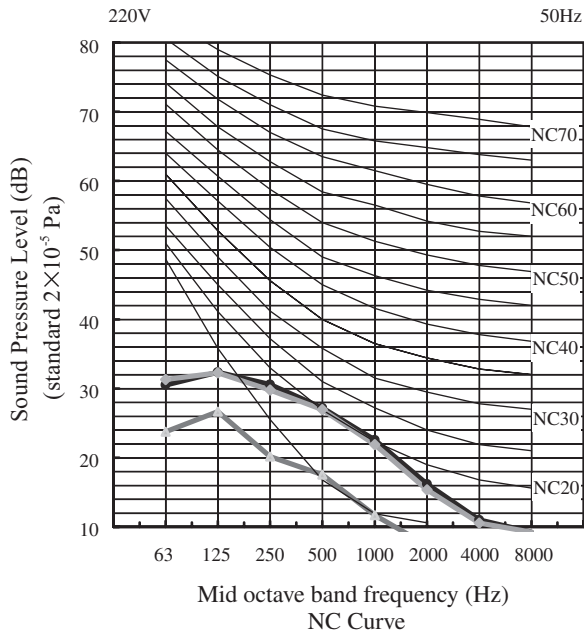


## 1.5 Noise level

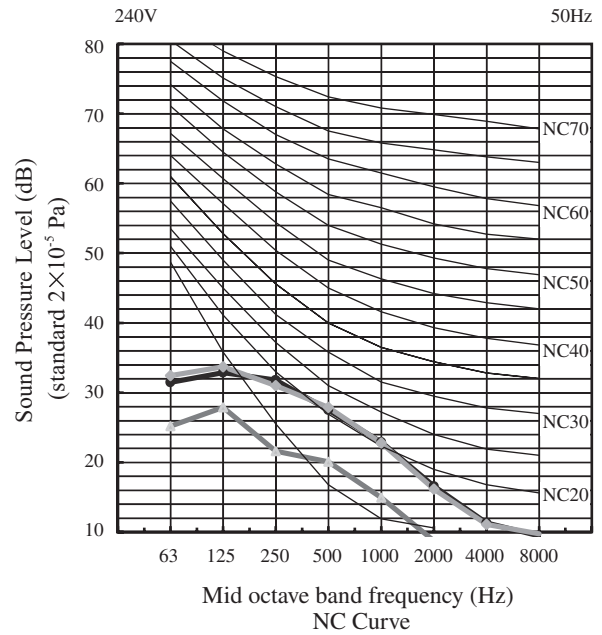
- Notes (1) The data are based on the following condition.  
 Distance center & low point: 1.5 m.  
 (2) The data in the chart are measured in an unechonic room.  
 (3) The noise levels measured in the field are usually higher than data because of reflection.

### Model SAF150E6

**Noise level** 28.5 dB (A) at UHi  
 28 dB (A) at Hi  
 19.5 dB (A) at Lo

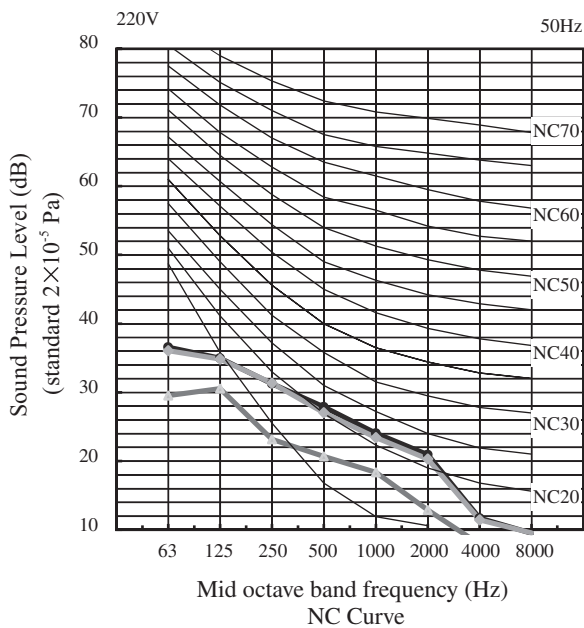


**Noise level** 29 dB (A) at UHi  
 29 dB (A) at Hi  
 21.5 dB (A) at Lo

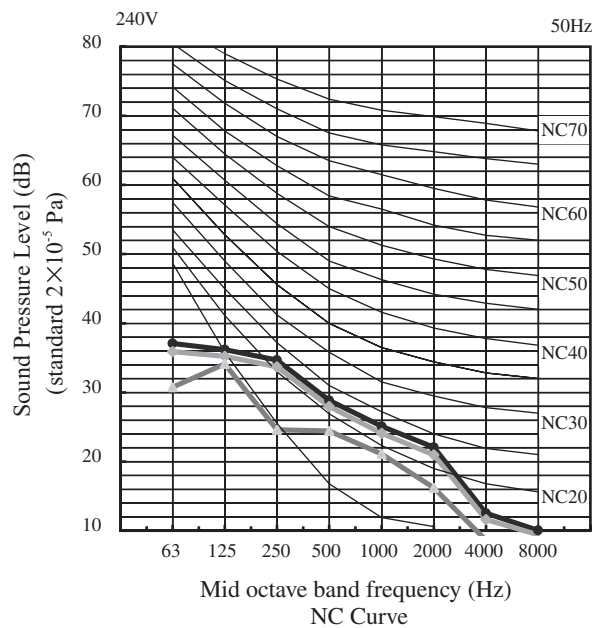


### Model SAF250E6

**Noise level** 30 dB (A) at UHi  
 29.5 dB (A) at Hi  
 23.5 dB (A) at Lo

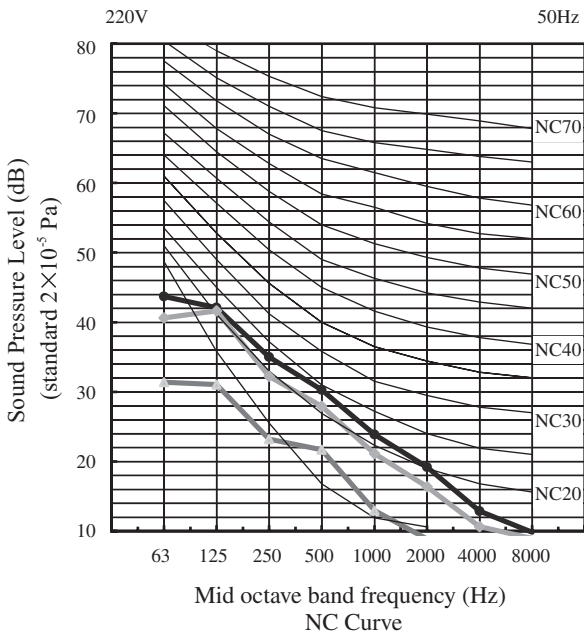


**Noise level** 31.5 dB (A) at UHi  
 30.5 dB (A) at Hi  
 26.5 dB (A) at Lo

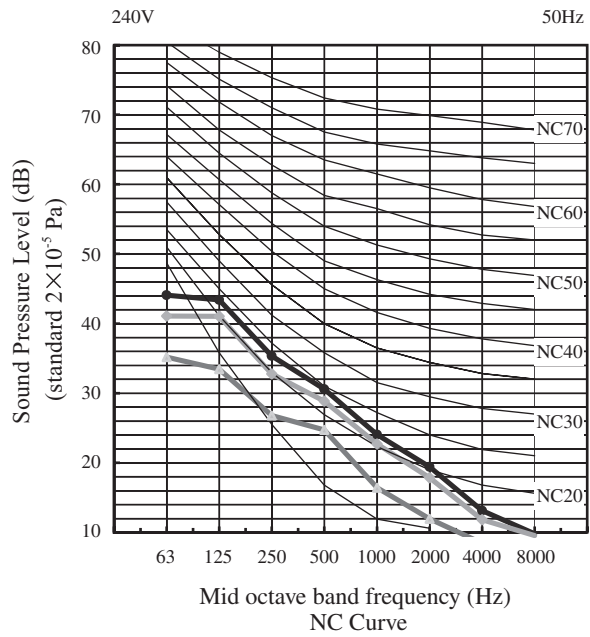


**Model SAF350E6**

**Noise level** 32.5 dB (A) at UHi —●—  
 30.5 dB (A) at Hi —◆—  
 22.5 dB (A) at Lo —△—

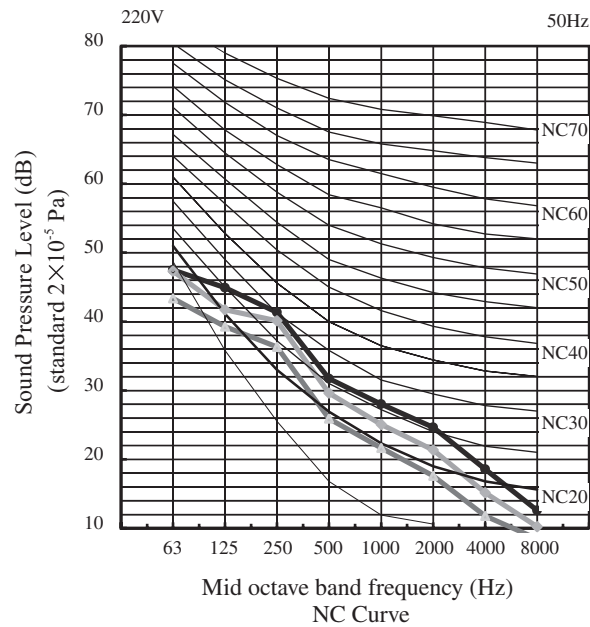


**Noise level** 33 dB (A) at UHi —●—  
 31 dB (A) at Hi —◆—  
 25.5 dB (A) at Lo —△—

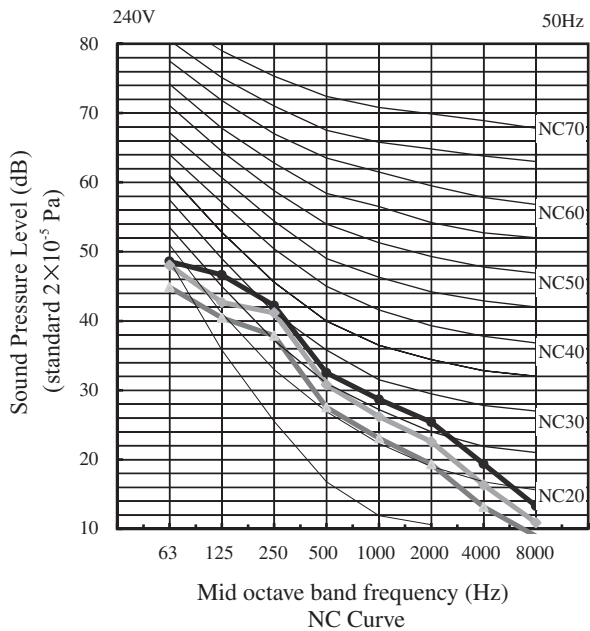


**Model SAF500E6**

**Noise level** 36.5 dB (A) at UHi —●—  
 34.5 dB (A) at Hi —◆—  
 31 dB (A) at Lo —△—

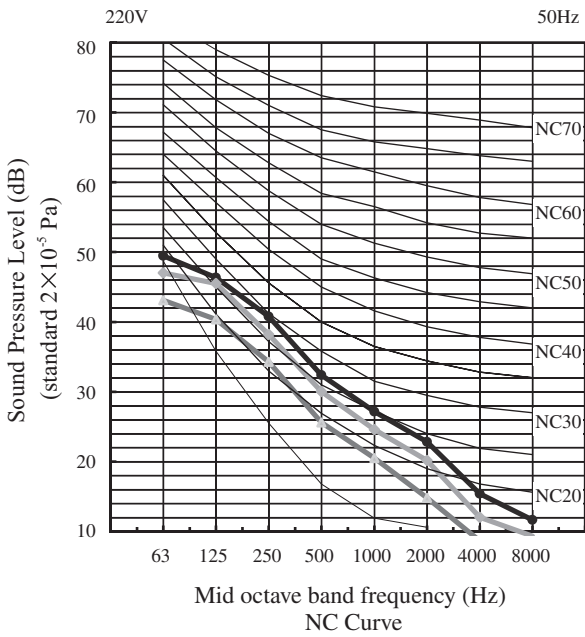


**Noise level** 37.5 dB (A) at UHi —●—  
 35.5 dB (A) at Hi —◆—  
 32.5 dB (A) at Lo —△—

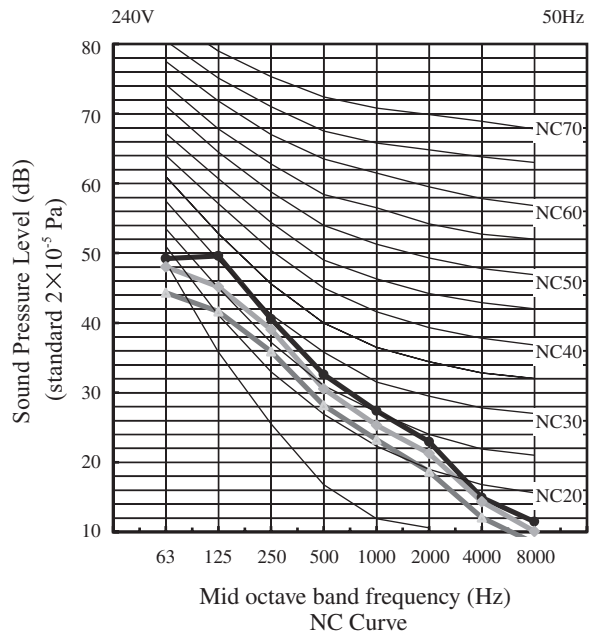


**Model SAF650E6**

**Noise level** 36.5 dB (A) at UHi —●—  
 34.5 dB (A) at Hi —◆—  
 30 dB (A) at Lo —▲—

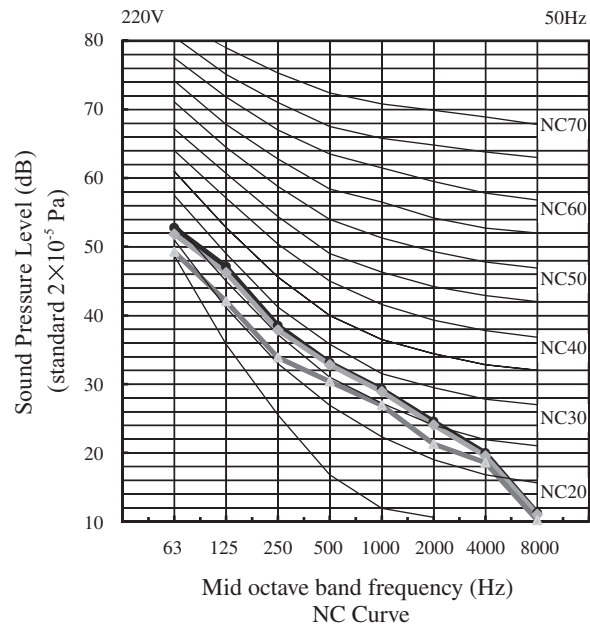


**Noise level** 37.5 dB (A) at UHi —●—  
 35 dB (A) at Hi —◆—  
 32 dB (A) at Lo —▲—

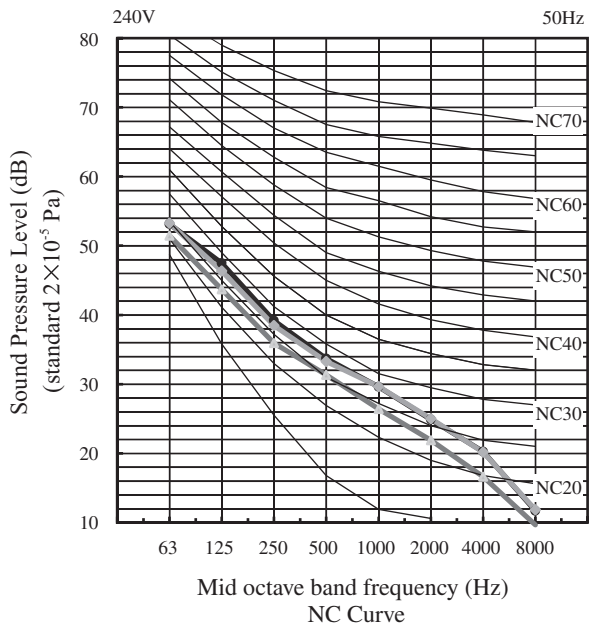


**Model SAF800E6**

**Noise level** 37 dB (A) at UHi —●—  
 36.5 dB (A) at Hi —◆—  
 33.5 dB (A) at Lo —▲—

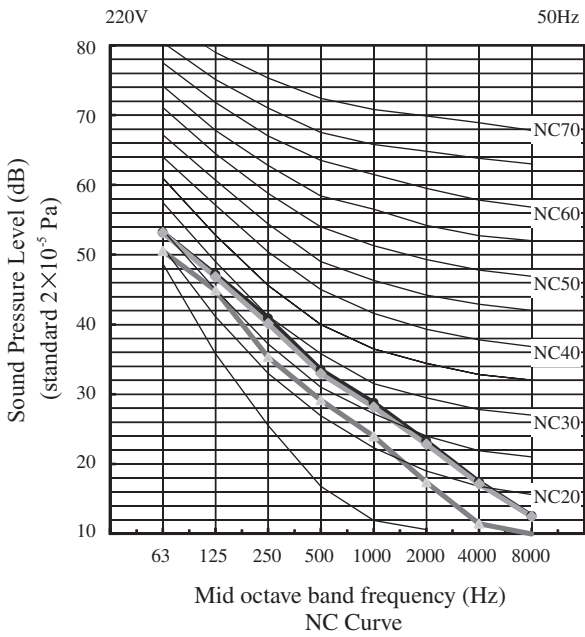


**Noise level** 37.5 dB (A) at UHi —●—  
 37 dB (A) at Hi —◆—  
 34.5 dB (A) at Lo —▲—

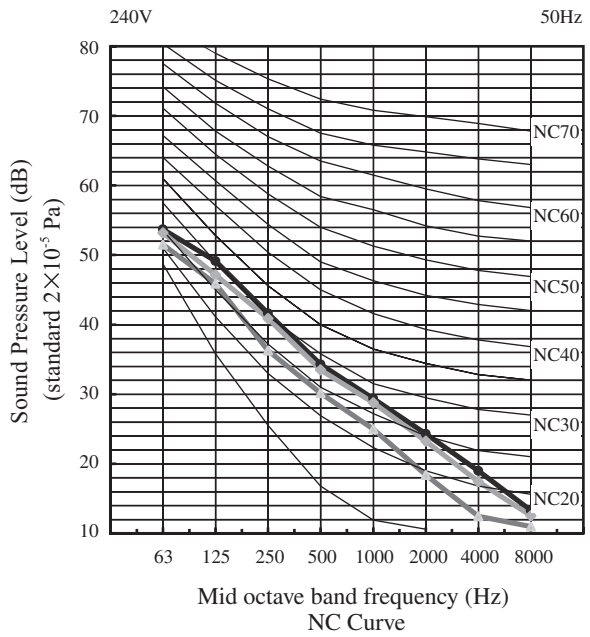


**Model SAF1000E6**

**Noise level** 37.5 dB (A) at UHi —●—  
 37 dB (A) at Hi —●—  
 33.5 dB (A) at Lo —△—



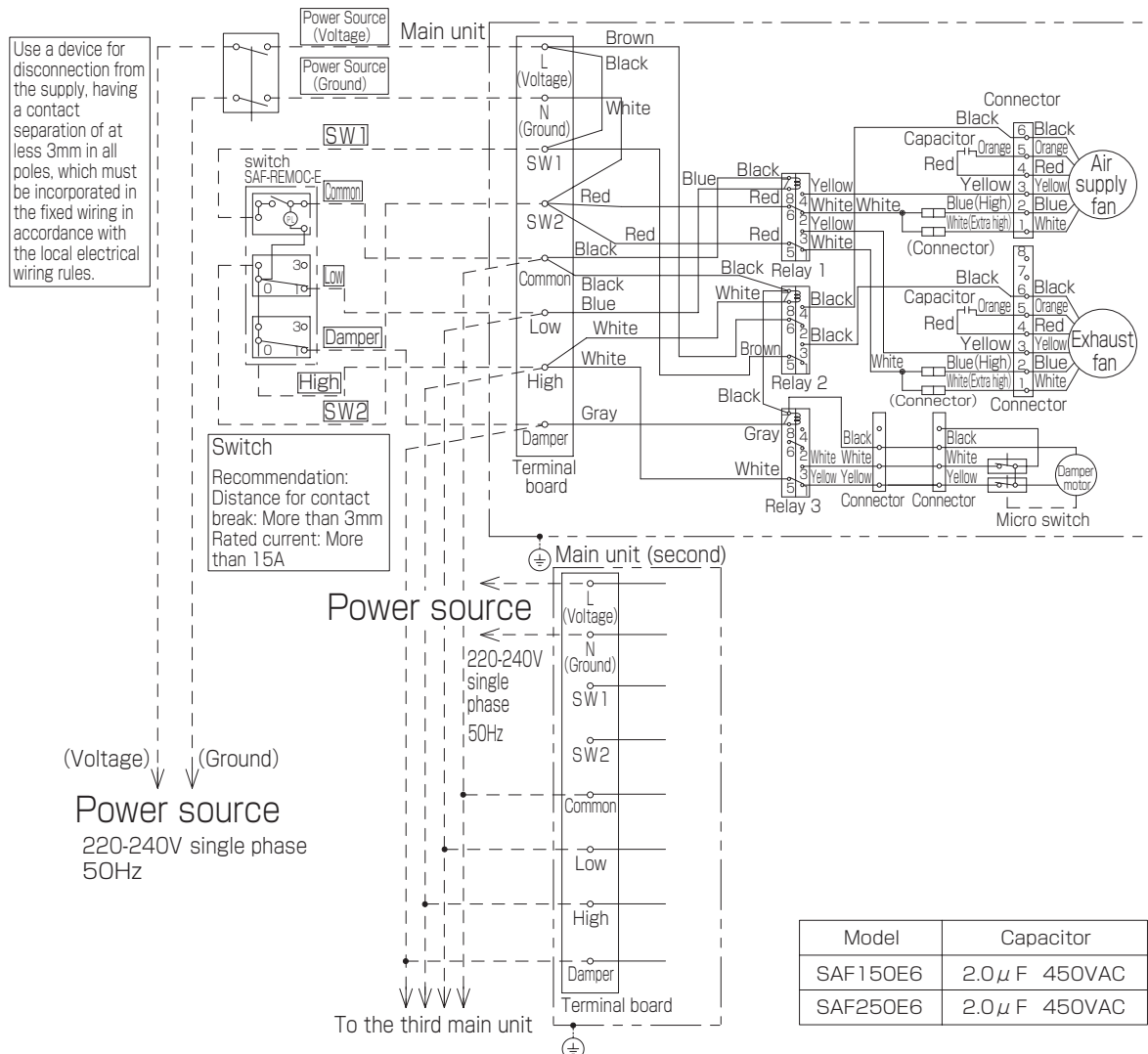
**Noise level** 38.5 dB (A) at UHi —●—  
 37.5 dB (A) at Hi —●—  
 34.5 dB (A) at Lo —△—



## 2. ELECTRICAL DATA

### 2.1 Electrical wiring

Models SAF150E6, 250E6



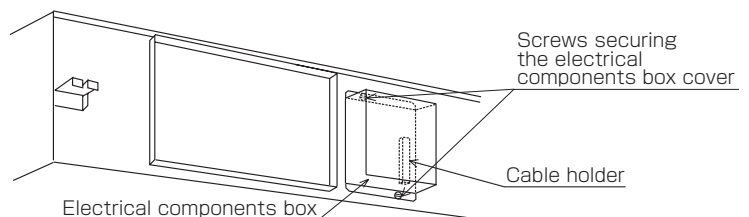
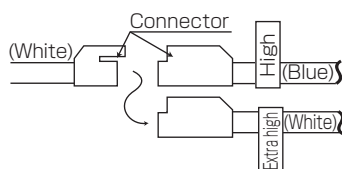
Notes (1) Connect wires/cables indicated by broken lines.

For power source, use a VVF cable with  $\phi$  1.6 or  $\phi$  2.

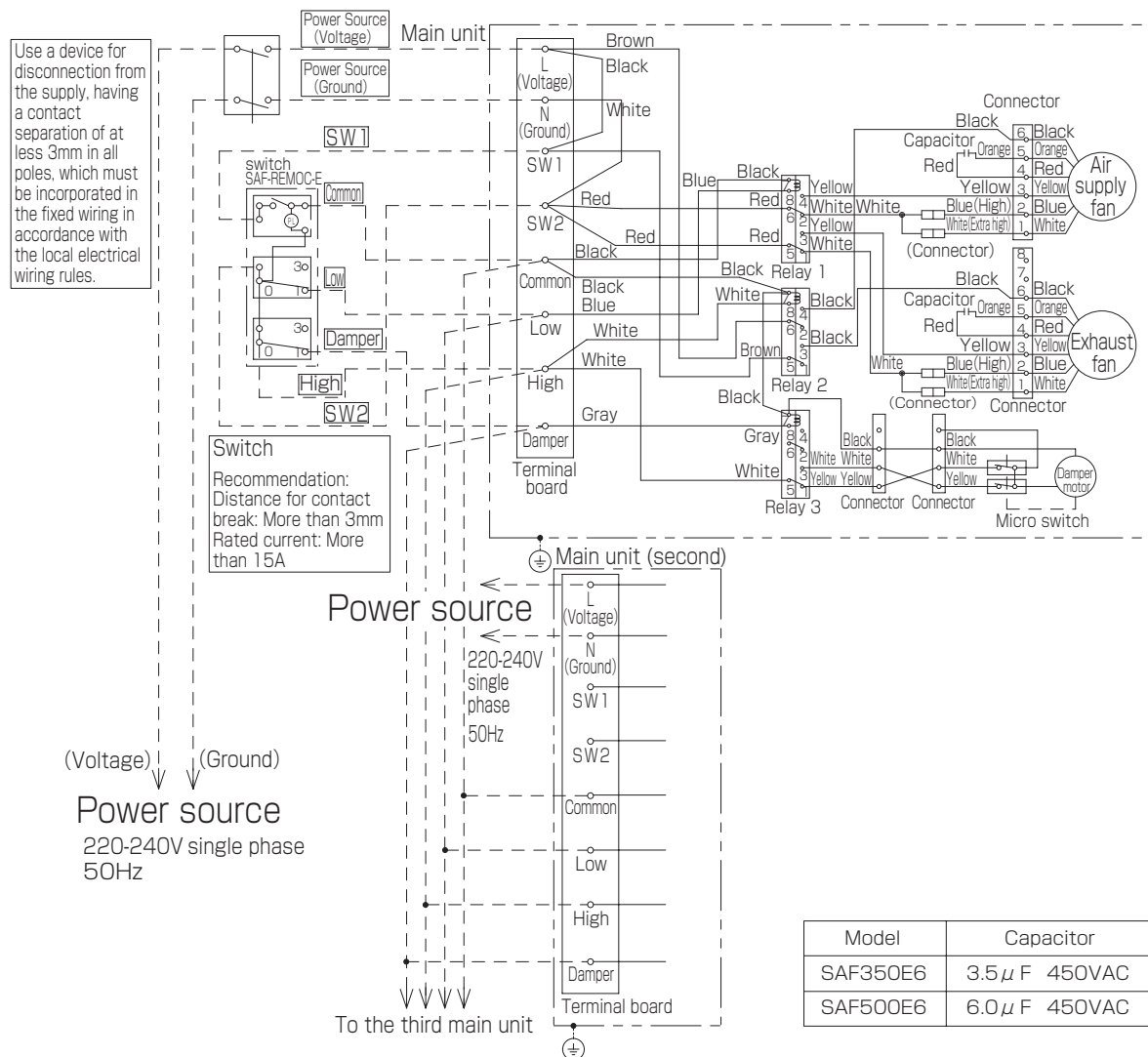
(2) It is set on the "High" or "Low" notch when shipped from the factory.

(3) If a large volume of air is required or a long duct is used, switch the wire connection from Lo to Extra high according to the following steps:

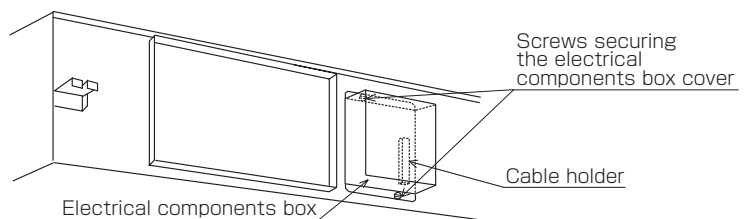
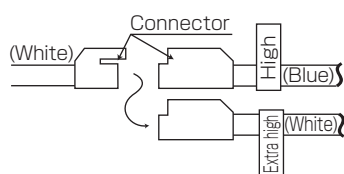
- Remove two screws securing the cover of the electrical components box, and open the cover.
- In the electrical components box, change the connection of fan motor leads from High to Extra high.



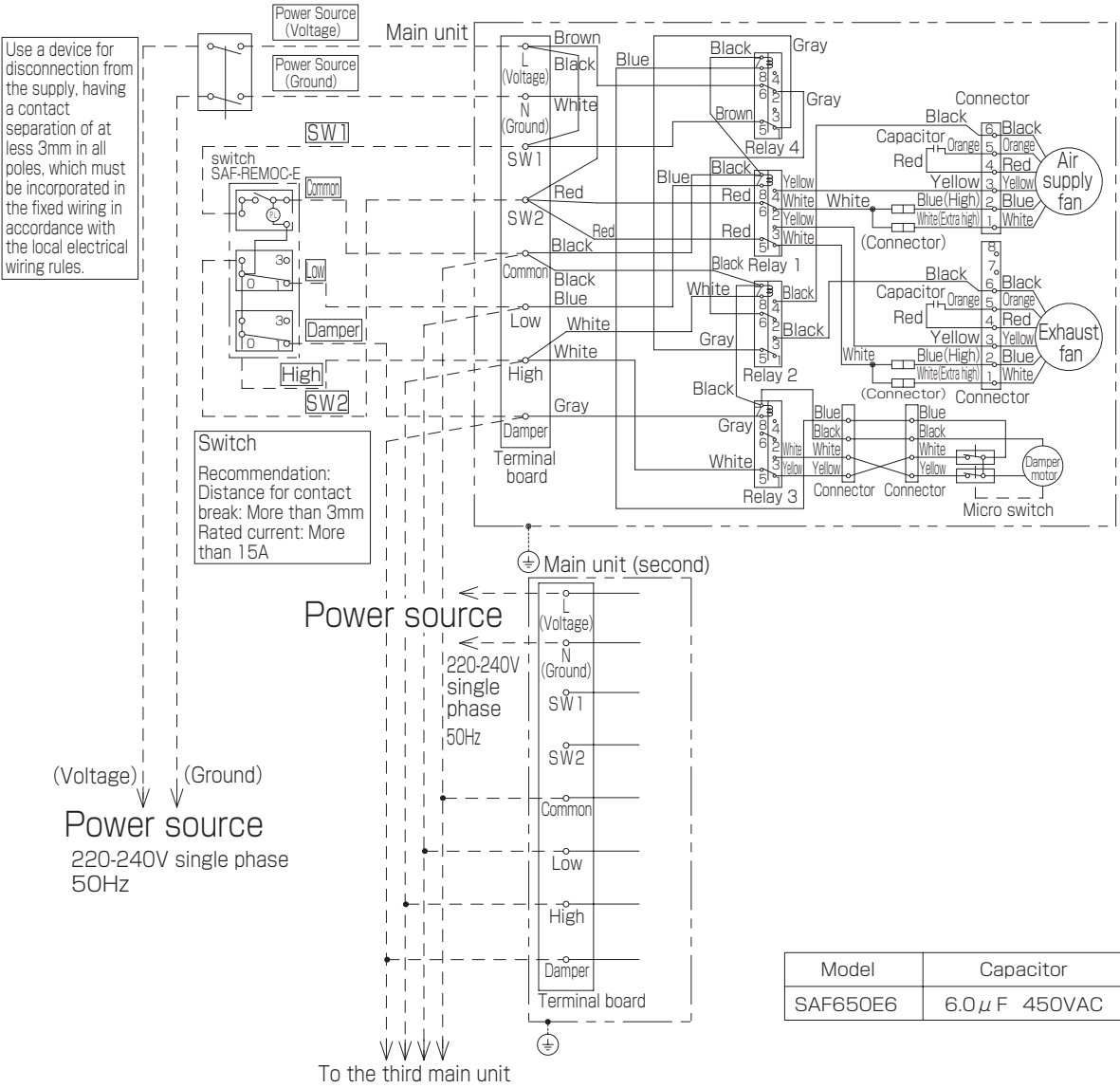
Models SAF350E6, 500E6



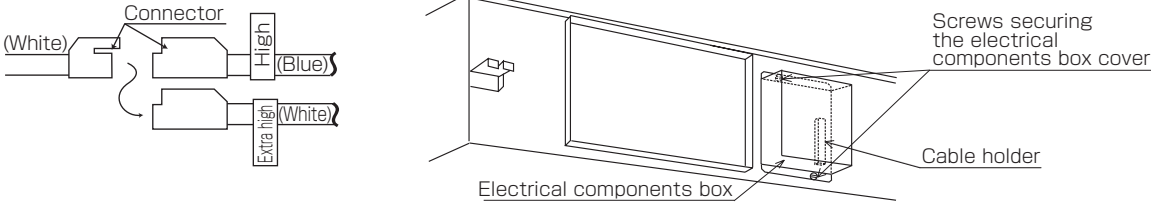
- Notes (1) Connect wires/cables indicated by broken lines.  
For power source, use a VVF cable with  $\phi$  1.6 or  $\phi$  2.
- (2) It is set on the "High" or "Low" notch when shipped from the factory.
- (3) If a large volume of air is required or a long duct is used, switch the wire connection from Lo to Extra high according to the following steps:
- Remove two screws securing the cover of the electrical components box, and open the cover.
  - In the electrical components box, change the connection of fan motor leads from High to Extra high.



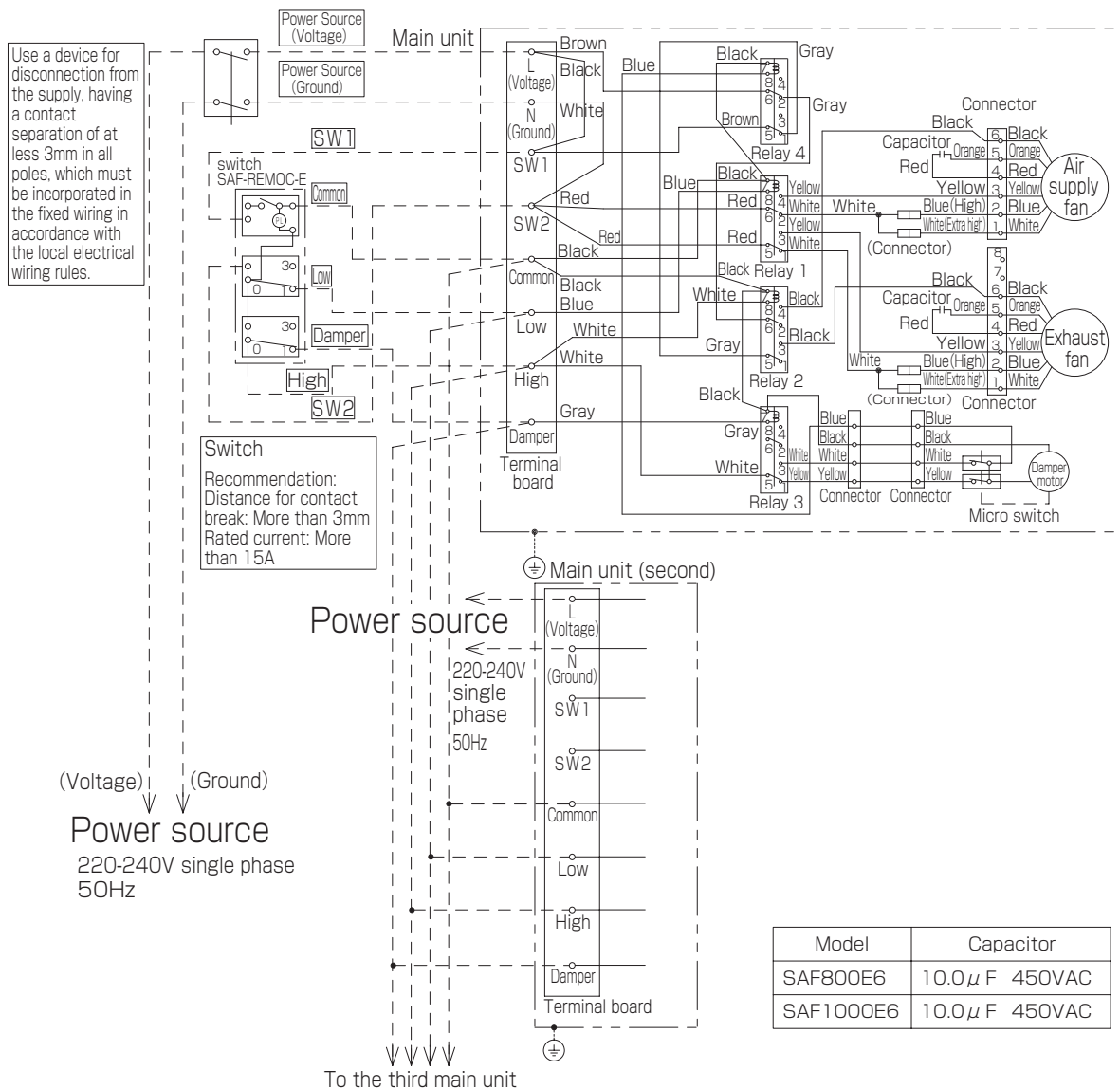
Model SAF650E6



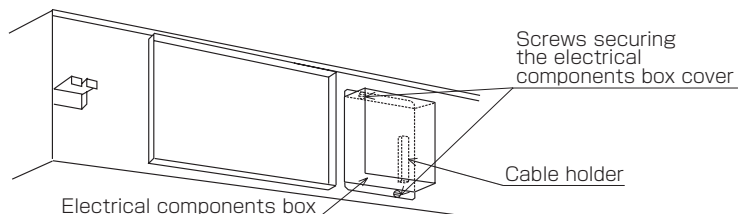
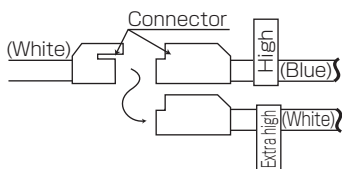
- Notes
- (1) Connect wires/cables indicated by broken lines.  
For power source, use a VVF cable with  $\phi 1.6$  or  $\phi 2$ .
  - (2) It is set on the "High" or "Low" notch when shipped from the factory.
  - (3) If a large volume of air is required or a long duct is used, switch the wire connection from Lo to Extra high according to the following steps:
    - Remove two screws securing the cover of the electrical components box, and open the cover.
    - In the electrical components box, change the connection of fan motor leads from High to Extra high.



Models SAF800E6, SAF1000E6



- Notes (1) Connect wires/cables indicated by broken lines.  
For power source, use a VVF cable with  $\phi 1.6$  or  $\phi 2$ .
- (2) It is set on the "High" or "Low" notch when shipped from the factory.
- (3) If a large volume of air is required or a long duct is used, switch the wire connection from Lo to Extra high according to the following steps:
- Remove two screws securing the cover of the electrical components box, and open the cover.
  - In the electrical components box, change the connection of fan motor leads from High to Extra high.





### 3. APPLICATION DATA

## Installation Manual

PCH012D014





< SAF150E6, SAF250E6, SAF350E6, SAF500E6, SAF650E6, SAF800E6, SAF1000E6 >











- Read through this "Cautions on Safety" with care before installing the unit.
- Described below are the way we are stimulating your attention to what you are supposed to observe to prevent dangers to the users or other people as well as loss to the property.












## SAFETY PRECAUTIONS

Never fail to observe the caution items described hereinafter because all of them refer to the critical matters on safety. The meanings of the marks or indications are described below.

- The degrees of danger or damage that is likely to occur due to the wrong use ignoring the indications are categorized for explanation as marked below.
- Kinds of the items to be observed are categorized for clarification with the following pictorial symbols.

 <b>DANGER</b> Indicates "Impending risk of death or serious injury."	 This pictorial indication shows "Prohibited".
 <b>CAUTION</b> Indicates "Risk of minor injury or property damage."	 This pictorial indication shows "Forced Execution".

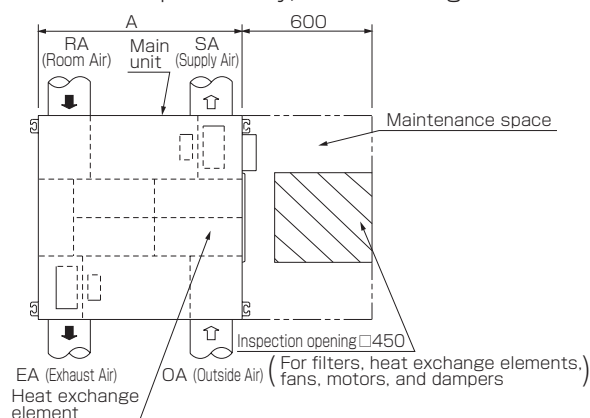
 <b>DANGER</b>	
 Never change product specifications, and never modify the product. Doing so may result in fire, electric shock, or personal injury.	 Carry out electrical work in accordance with the laws and regulations prevailing in the country concerned, technical standard and explanation for work, and make absolutely sure that an exclusive circuit is used. Any insufficient capacity of power circuit and improper work can result in electric shock and fire hazard.
 Do not install the room air intake opening at a position where it may suck in hot or humid air. Doing so may affect the inside of the product, resulting in failure of the product, electric shock or fire.	 The external air intake opening should be positioned away from the exhaust openings of combustible gases etc. The intake of such gases could cause a lack of oxygen in the room.
 Never fail to ask the sales office from which you bought the unit or the installing service shop to install the unit. If you install it by yourself, any inappropriate installing works would cause an electric shock or a fire.	 Netting or something similar should be provided at the external air intake opening to prevent birds etc. interfering with the unit. Nests or other foreign objects should be removed. That could cause a lack of oxygen in the room.
 Carry out the installation works accurately in line with this installation work manual. Improper practice of installation could cause an electric shock or a fire.	 Carry out the ground work. Never connect the ground wire to a gas pipe, a water supply pipe, a lightning conductor, a ground line of a telephone, etc. An incomplete ground wire is likely to cause an electric shock.
 Choose the installation place where is endurable in quality as well as in weight, then install the unit accurately with adequate strength and completeness of installation in accordance with the installation work manual. otherwise, it is likely to cause an electric shock, a fire, a drop of the unit, thus causing the injury on the human body.	

 <b>CAUTION</b>	
 Install a breaker dedicated to the product. (An earth leakage breaker may be required for some installation locations.) If the earth leakage breaker is not installed, electric shock may result.	 When the system is checked and the power cable undergoes maintenance, stop the operation, and switch the exclusive circuit breaker "OFF". It could cause an electric shock.
When you want to pierce the metal duct through the metal lath or the wire lath or the metal plate of the wooden facility, do not forget to insulate electrically between the duct and the wall. Otherwise, it would cause an electric shock or an electric leakage.	 Install the power line and the connecting line with accuracy so the power source cover may not float. If the installation of the power source cover is inappropriate, the pin connection area is likely to cause a heat generation, a fire and an electric shock due to dust or powder.
Do not use other parts than specified (including the auxiliary parts) for installation works. If you do not use the specified parts, it is likely to cause a drop of the unit, a fire, an electric shock, etc.	 Never install the unit near the place where there is a fear of leakage of an inflammable gas. If gas happens to leak and stays around the unit, it is likely to cause a fire.
Install the outdoor duct in a falling gradient toward the outside so as to prevent water from coming in. If it is not installed so, the building is likely to be flooded, wetting the household effects.	 Do not use the unit at the other voltages than the rated one. It could cause a fire or an electric shock.
Heat-insulate the outdoor duct (including the indoor side, if necessary) to prevent dewing. If heat insulation is not adequate, water likely goes indoor and wets the household properties.	 Do not install the unit in locations with large amounts of oily smoke, such as food preparation areas. It could cause a fire.
When it is high humid and high temperature inside the ceiling, a ventilation system must be installed inside the ceiling. Otherwise it could cause a fire or an electric leakage.	 Do not install the unit at the place of a high temperature or a flame. It could cause a heat generation or a fire.
Connect the power line and the connecting line with accuracy using the specified cables and fix them firmly so as not to put the outer stress of the cables on the pin connecting area. Incomplete connection or fixing is likely to cause a heat generation or a fire.	 Do not install in locations where harmful or corrosive gases may be present (i.e. acidic, alkali, organic solvent, paint gases etc. from machinery or factories) Installation in such a location could cause a gas-poisoning and a fire.
Install the product inside the heat insulation barrier. If the product is installed outside the heat insulation barrier (in a space where the air condition is close to outer air), dew will form during winter, resulting in electric shock or fire.	 Do not install in locations with high humidity, such as close to bathroom etc. It could cause an electric shock or an electric leakage etc.
	 Do not install the product in an environment where the room temperature may be significantly lower than the outside temperature. Doing so may result in electric shock or fire.

# Request

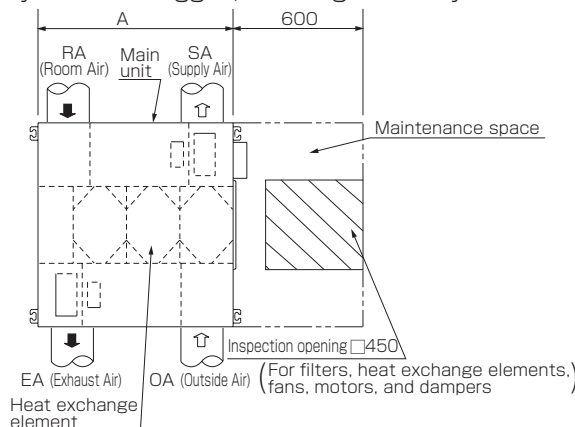
- To enable product inspections and daily cleaning of filters and heat exchange elements, be sure to arrange an inspection opening at the specified position on the ceiling.
- Do not drag the product on the floor. Doing so may scratch the floor, or damage the heat insulation material, resulting in dew formation.

■ An inspection opening as shown in the following figure is required to replace heat exchange elements and to clean the filter, which is to be conducted once or twice per year. If not cleaned periodically, heat exchange elements may become clogged, reducing efficiency.



Note) Model SAF150E6 and SAF250E6 have one heat exchange element.

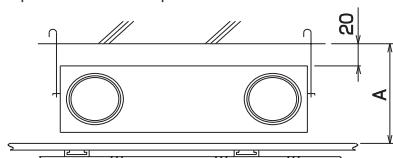
Model No.	A
SAF150E6	467
SAF250E6	599
SAF350E6	804
SAF500E6	904



Note) Model SAF1000E6 has four heat exchange elements.

Model No.	A
SAF650E6	884
SAF800E6	
SAF1000E6	1134

■ This air to air heat exchange unit must be installed in a location containing the minimum required roof space as shown in the following table.



Model No.	Roof space height A	Model No.	Roof space height A
SAF150E6	320	SAF650E6	440
SAF250E6		SAF800E6	
SAF350E6	367	SAF1000E6	
SAF500E6			

■ Do not install the product in the vicinity of a water boiler.

■ Do not install the following shapes of ducts:

(1) Bent extremely



(2) Bent several times



(3) Shrunken diameter of connection duct



■ Do not use the product in a bathroom or an area used to prepare food.

Using the product in a location containing thick, greasy fumes may cause filters and heat exchange elements to become clogged and unusable. Also, using the product in a bathroom or other humid location may cause dew to form inside the main unit, resulting in dew dripping, electric shock or short-circuiting.

■ Note that some regions prohibit the use of bellows.

(Contact your administrative authority or fire department for more information.)

■ When exhausting air through a shared duct, you must use specified fire prevention material to comply with a requirement of the Order for Enforcement of the Building Standards Act.

In that case, use 2 m sheet steel riser duct.

■ Use the air to air heat exchange unit at an ambient temperature of 40°C or lower.

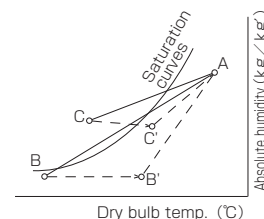
Never install the air to air heat exchange unit in a location where it could be exposed to direct flame. Using the unit in an environment with a temperature of 40°C or higher over a long period of time may cause alteration or deformation of resin parts, or failure of the unit.

■ About prevention entry of outside air

If you assume inverse rotation caused by adverse wind, we recommend you install an "Electric dumper" (to be procured separately) to prevent outside air from entering.

■ Watch formation of dew and frost.

In the air line graph shown at right, line A indicates a high-temperature intake air condition and line B indicates a low-temperature intake air condition. When high-temperature air A is heat exchanged by the air to air heat exchange unit, and if the A line goes out of the saturation curve as point C, then dew or frost may appear in the unit. If this occurs, heat low-temperature air B up to the B' point so that point C moves to point C' below the saturation line, and then use the unit again.



We have confirmed that dew does not drop from this air to air heat exchange unit in the conditions shown at right based on JIS. If the unit is used under more severe conditions, dew may form and drip out.

JIS B 8628 Total heat exchanger Attachment 5 (Regulation)  
Dew condensation test procedure

Classification	Indoor conditions		Outdoor conditions		Operating status	Duration (h)
	Dry bulb temp.	Wet bulb temp.	Dry bulb temp.	Wet bulb temp.		
Cooling in summer	22±1	17±2	35±1	29±2	Operating	6hours
Heating in winter	20±1	14±2	-5±2	-	Operating	6hours
Heating in winter	20±1	14±2	-15±2	-	Stop	6hours

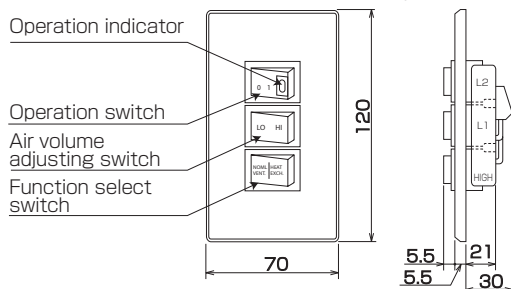
Unit :°C

■ Intrusion of bugs, etc.

- If you want to stop the unit to prevent bugs, insects, etc. entering, be sure to switch the mode to "Energy recovery" first, and then turn off the operation switch to stop the unit. Even when you use the unit in "Normal ventilation" mode, switch the mode to "Energy recovery" first, wait for at least 30 seconds, and then turn off the operation switch to stop the unit. If you stop the unit in "Normal ventilation" mode, the dampers will not be switched and bugs and insects, etc. may be able to enter the room.
- In order to intake fresh air into the room, this product is equipped with a rough filter in the air supply part. However, in an environment containing many bugs or with a light near the outside openings that attracts bugs, the rough filter will not block the entry of bugs, insects, etc., and they may enter through gaps around the filter and gaps in the main unit. Be careful of the installation place of the unit.

# Accessory

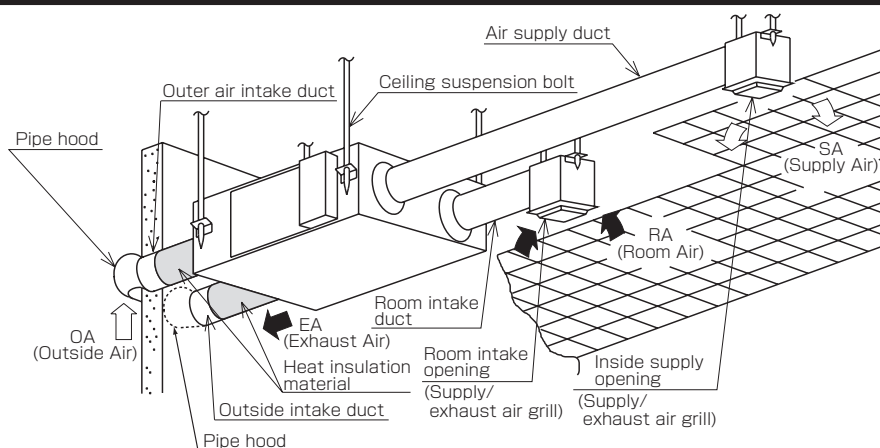
■ Switches...SAF-REMOE-E (Metal plate)



■ Switch box(Local arrangement)

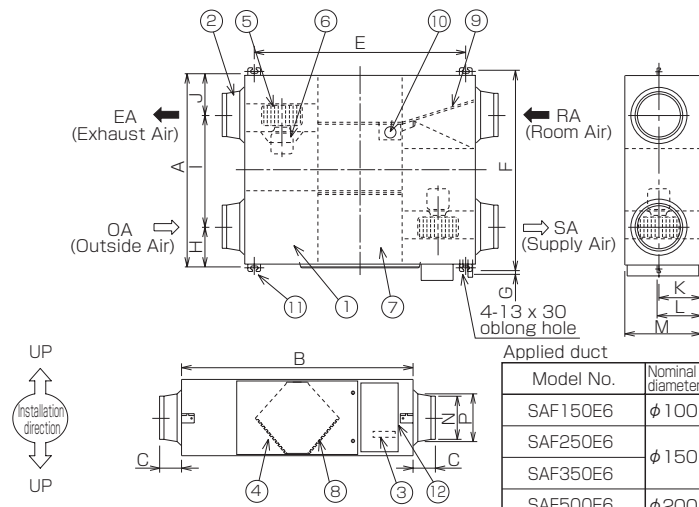
If necessary, please arrange switch box. Use switch box JIS C 8340 for 1 outlet (with cover).

# Reference sketch



# Part Names and Dimensions

Model No.  
SAF150E6  
SAF250E6  
SAF350E6  
SAF500E6



No	Name	Qt'y	Remarks
1	Frame	1	
2	Adapter	4	
3	Terminal board	1	
4	Inspection cover	1	
5	Fan	2	Note 2
6	Motor	2	Note 2
7	Heat exchange element	2	Note 1
8	Filter	2	
9	Damper	1	
10	Damper motor	1	
11	Suspension fitting	4	
12	Electrical components box	1	

Note 1) Model SAF150E6 and SAF250E6 have one heat exchange element.

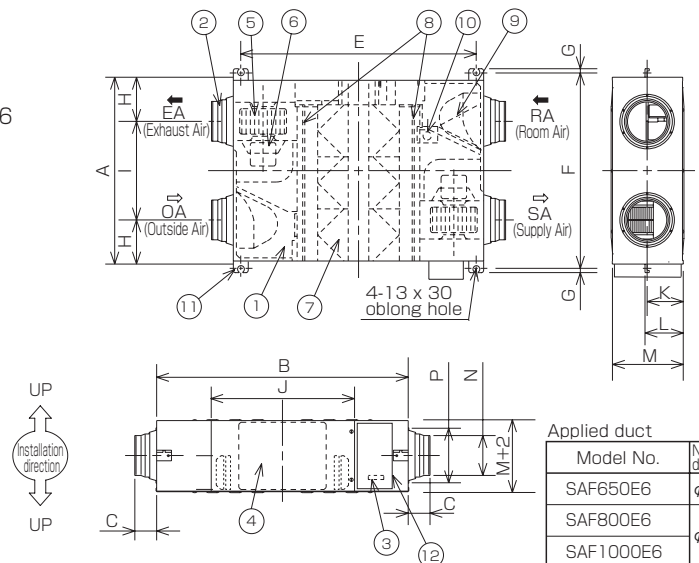
Note 2) Model SAF350E6 and SAF500E6 have different fan and motor locations.

※Please don't use in any direction other than the above.

Unit : mm

Model No.	A	B	C	E	F	G	H	I	J	K	L	M	N	P
SAF150E6	467	970	49	810	525	19	82	303	82	135	159	270	φ98	φ110
SAF250E6	599	882	95		655		142	315	142				φ144	φ164
SAF350E6	804	1050	70	978	860		112	580	112	159	182	317	φ162	
SAF500E6	904	1090		1018	960		132	640	132				φ194	φ210

Model No.  
SAF650E6  
SAF800E6  
SAF1000E6



No	Name	Qt'y	Remarks
1	Frame	1	
2	Adapter	4	
3	Terminal board	1	
4	Inspection cover	1	
5	Fan	2	Note 2
6	Motor	2	Note 2
7	Heat exchange element	3	Note 1
8	Filter	2	
9	Damper	1	
10	Damper motor	1	
11	Suspension fitting	4	
12	Electrical components box	1	

Note 1) Model SAF1000E6 has four heat exchange elements.

Note 2) Model SAF650E6 has different fan and motor locations.

※Please don't use in any direction other than the above.

Unit : mm

Model No.	A	B	C	E	F	G	H	I	J	K	L	M	N	P
SAF650E6	884	1204	70	1132	940	19	132	620	560	194	218	388	φ194	φ210
SAF800E6		1322	85	1250			228	428	612				φ242	φ258
SAF1000E6	1134			1190			678							

# Installation Procedure

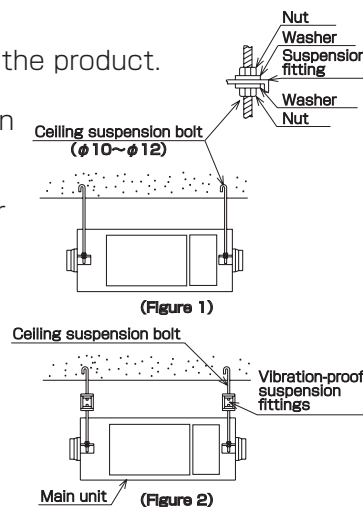
## 1. Installation of the main unit

- Ceiling suspension bolts, nuts, and washers are not included in the product. Procure them separately.
- Install the main unit firmly and horizontally so that its weight can fully be supported. (Figure 1)
- Note that insufficient installation causes hazards as well as vibration. If the main unit is not secured horizontally, the damper unit may eventually malfunction.

### Request

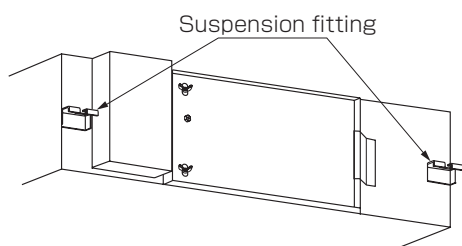
- If prevention of vibration is of particularly importance to you, we recommend you use vibration-proof suspension fittings as shown in the following table. (Figure 2)
- For the purpose of inspecting filters, heat exchange elements, power supply, and motors, be sure to arrange an inspection opening with at least 450 mm square at the position shown in the "Cautions on Installation" section.

Model No.	Mass(kg)
SAF150E6	25
SAF250E6	29
SAF350E6	49
SAF500E6	57
SAF650E6	68
SAF800E6	71
SAF1000E6	83

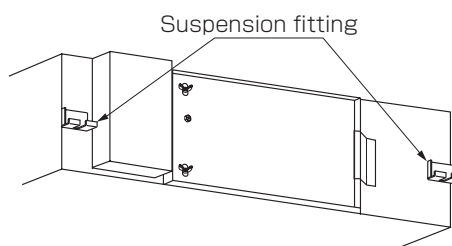


### When the main unit is installed upside down.

- If you use model SAF650E6, SAF800E6 or SAF1000E6, reinstall the suspension fittings upside down as shown in the following figure. (The suspension fittings at their original positions cannot hold the ceiling suspension bolts correctly. The bolts may come off and an accident may occur.)



Suspension fittings were reinstalled



Suspension fittings are not reinstalled



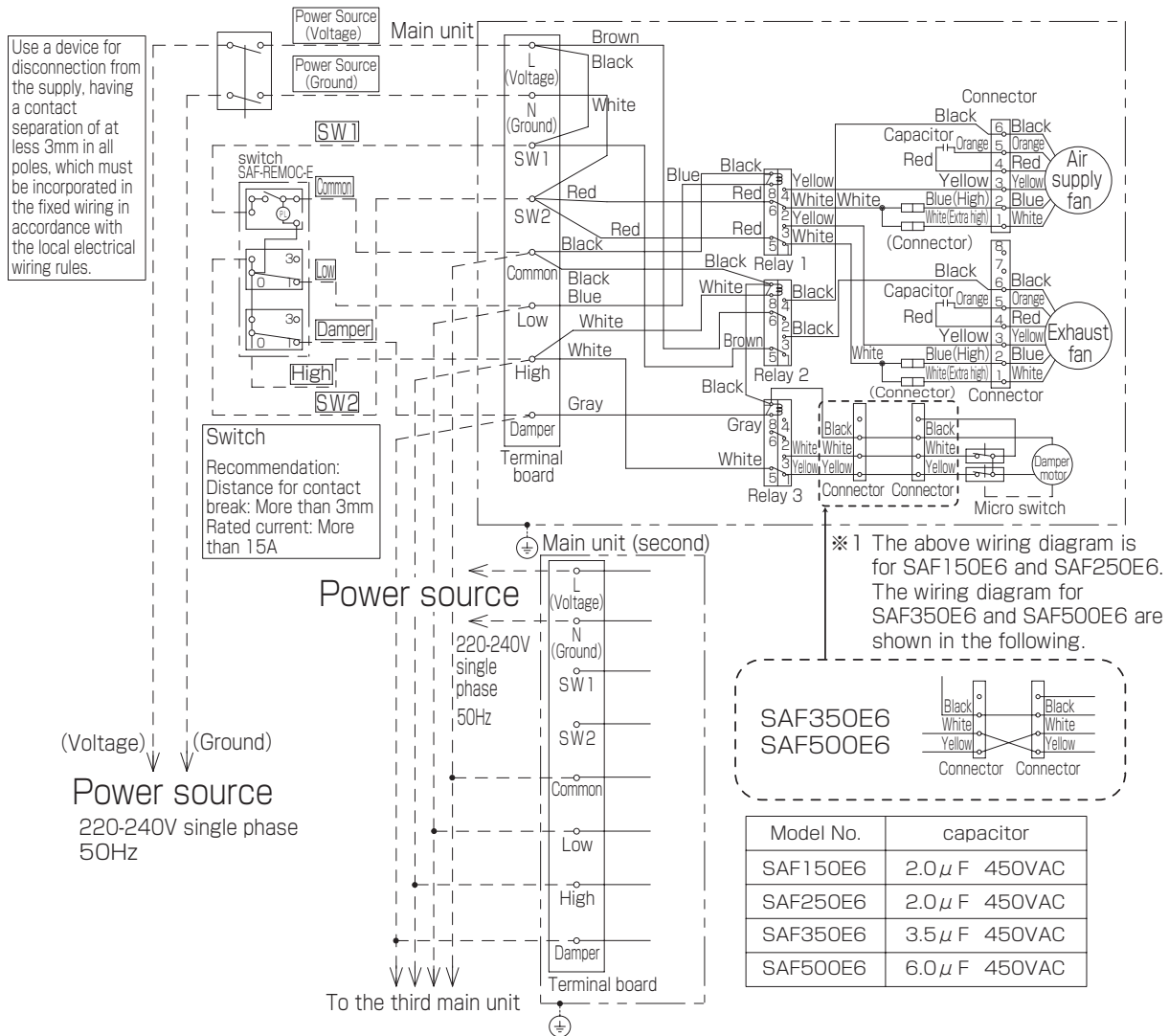
- Displays are shown upside down. In particular, watch the direction "↑" of inserting the heat exchange element.

## 2. Electrical work

Ask a specialized electrical construction operator for advice regarding wiring in accordance with "Technical Standards for Electrical Equipment" and "Interior Wiring Regulation."

■ Connect wires/cables indicated by broken lines.

Model No. SAF150E6 SAF250E6 SAF350E6 SAF500E6



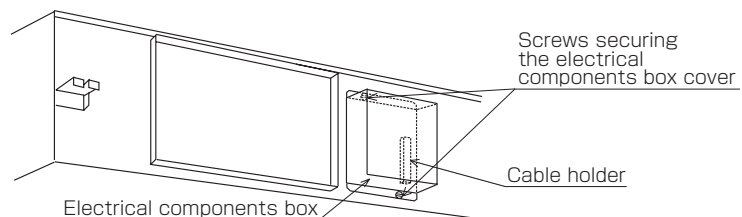
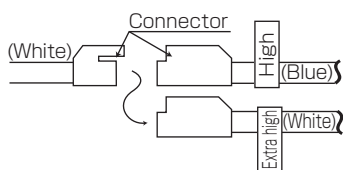
■ For power source, use a VVF cable with  $\phi$  1.6 or  $\phi$  2.

■ Take the following steps to connect wires/cables:

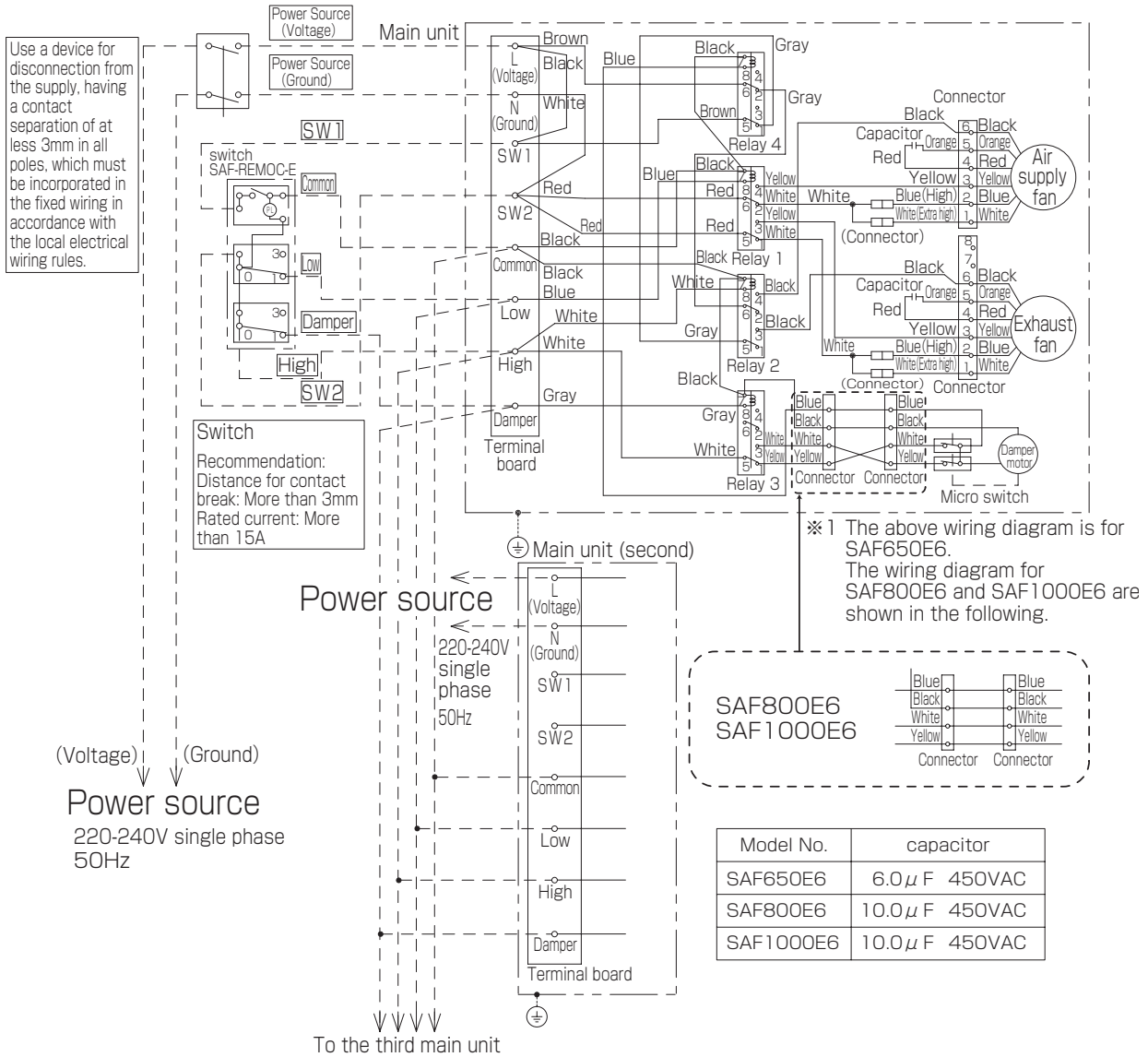
- Remove two screws fixing the cover of the electrical components box, open the cover, and connect wires/cables correctly.
- Secure the cable drawn from the terminal board firmly with the cable holder.

■ If a large volume of air is required or a long duct is used, switch the wire connection from Lo to Extra high according to the following steps:

- Remove two screws securing the cover of the electrical components box, and open the cover.
- In the electrical components box, change the connection of fan motor leads from Hi to Extra high.



Model No. SAF650E6 SAF800E6 SAF1000E6



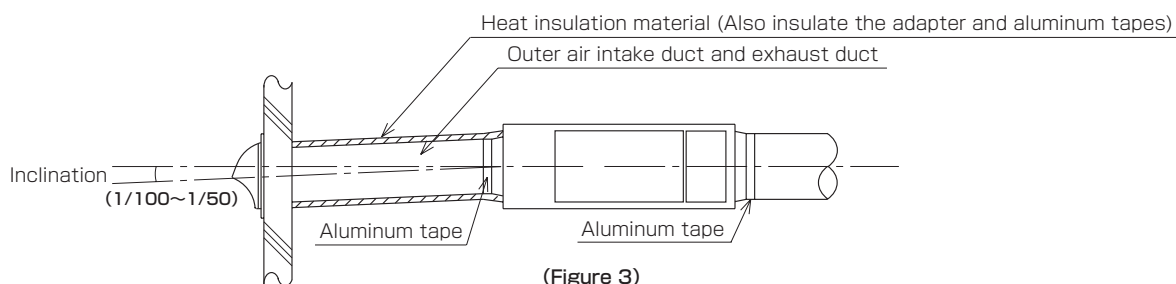
Request

- When operating multiple air to air heat exchange units using a single switch, the maximum number of units able to be operated is 10.
- Be sure to use the appropriate power source corresponding to each model number. Using an inappropriate power supply may cause the motor to burn out.
- Grounding work must be based on Class D as defined in "Technical Standards for Electrical Equipment."
- After wire connections are completed, check the connection again before turning the power on.



### 3. Installation of duct

- Completely seal the joint between the adapter and duct using aluminum tape to prevent air leakage.
- Keep as much distance as possible between the room air intake opening and room air supply opening.
- Use only applied ducts (See Page 27 "Part Names and Dimensions").
- Install two outdoor ducts angled downwards toward the outside to prevent water from entering. (Inclination: 1/100 to 1/50) (Figure 3)
- Be sure to apply heat insulation to two outdoor ducts (outer air intake and exhaust ducts) to prevent dew from forming. (Material: Glass wool, Thickness: 25 mm) (Figure 3)
- If you use a metal duct to penetrate metal lath, wire lath, or the metal plate of the wooden facility, insert insulation between the duct and the wall electrically. (See "Technical Standards for Electrical Equipment and "Interior Wiring Regulation.").



### 4. Trial Run

- After installation is completed, check wire connections and be sure to conduct a trial run.
- After checking wire connections, turn on the power of the product, and conduct a trial run in the order shown in the following table to confirm air flows and damper operation.
- To confirm damper operation, open the inspection cover on the side of the main unit, and check the open and shutting movements of the damper

· Model SAF650E6, SAF800E6, or SAF1000E6 stops the fan motor during damper operation.

	Switch settings		Check items	
	Function select switch	Air flow switch	Air flow status	Damper status
1	Energy recovery	Hi (Extra High)	Check Hi (Extra High) air flow from the room air supply opening and into the room air intake opening if the air flow switch is set to "Hi," and Lo air from/into the openings if the air flow select switch is set to "Lo."	Open (Damper is in the rear)
		Lo		
2	Normal ventilation	Hi (Extra High)		Close (Damper is in the front)
		Lo		

- If an abnormality occurs during the test run, an incorrectly connected wire may be the cause. As an incorrectly connected wire may result in electric shock, immediately turn the dedicated breaker to the "Off" position, and check and reconnect the wire correctly.



#### 4. TECHNICAL INFORMATION

**Product information based on the Regulation (EU) No.327/2011 of March 30 2011: ecodesign requirement for fans driven by motors with an electric input power between 125W and 500kW**

	SAF650E6	SAF800E6	SAF1000E6
(1) overall efficiency $\eta$	30.4%	31.8%	31.6%
(2) measurement category	B	B	B
(3) efficiency category	TOTAL	TOTAL	TOTAL
(4) efficiency grade	42 (Tier 1 (2013~))	42 (Tier 1 (2013~))	42 (Tier 1 (2013~))
(5) VSD is integrated or not.	Not Applicable		
(6) year of manufacturing	Refer to the model name label.		
(7) manufacturer's name, address	MITSUBISHI HEAVY INDUSTRIES, LTD. 3-1, ASahi, NISHIBIWAJIMA-CHO, KIYOSU, AICHI, 452-8561 JAPAN		
(8) product's model number	SAF650E6	SAF800E6	SAF1000E6
(9) input / flow rate / pressure	0.145kW / 9.4m <sup>3</sup> /min / 287Pa	0.243kW / 17.0m <sup>3</sup> /min / 318Pa	0.229kW / 15.3m <sup>3</sup> /min / 343Pa
(10) rotations per minute	1329rpm	1381rpm	1388rpm
(11) specific ratio	1.0		
(12) information for disassembly, recycling, disposal	Frame:Fe, Adapter:ABS, Element:Composite materials (ABS, paper, polystyrene) Fan:ABS, Casing:polystyrene Motor:Composite materials (Frame:Fe, Copper wire:Cu, Connector:Resin, Protective tube:PVC)		
(13) information for installation, use, maintenance	Refer to the installation manual, user's manual and service manual.		
(14) description of additional items used when determining the fan energy efficiency, such as ducts, that are not described in the measurement category and not supplied with the fan	1)Remove the fan casing of the product 2)Remove the adapter of the product 3)Attach the adapter to the outlet of the casing 4)Connect the adapter to the chamber at a duct of 300mm		

ISDZ12020a

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# **AIR TO AIR HEAT EXCHANGE UNIT**

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Air-Conditioning & Refrigeration Systems

16-5, Konan 2-chome, Minato-ku, Tokyo, 108-8215 Japan

<http://www.mhi.co.jp>

Because of our policy of continuous improvement, we reserve the right to make changes in all specifications without notice.

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