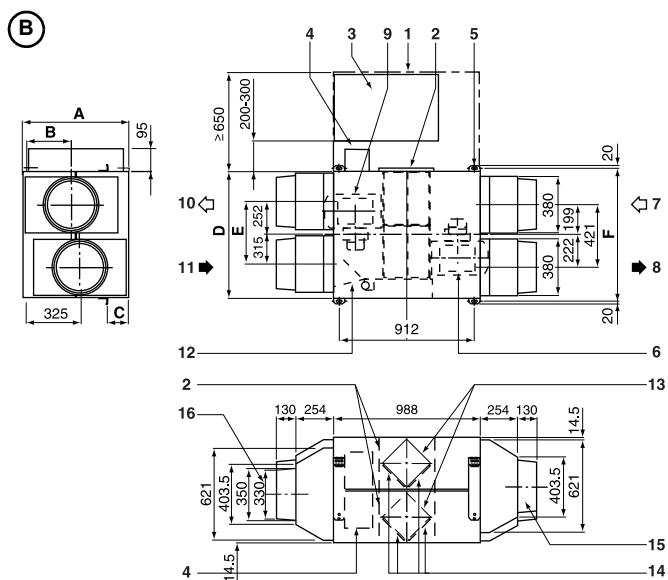




INSTALLATION MANUAL

Total Heat Exchanger HRV (Heat Reclaim Ventilation) (Ceiling mounted duct type)

VAM350FB
VAM500FB
VAM650FB
VAM800FB
VAM1000FB
VAM1500FB
VAM2000FB



	A	B	C	D	E	F	G	H	J	K	L
VAM350F	285	164	112	800	416	850	758	132	812	146	200
VAM500F								84		197	
VAM650F	348	204	145	852	421	902	912	137	988	196	250
VAM800F											
VAM1000F											
VAM1500F	710	383	140	852	421	898				130	
VAM2000F											

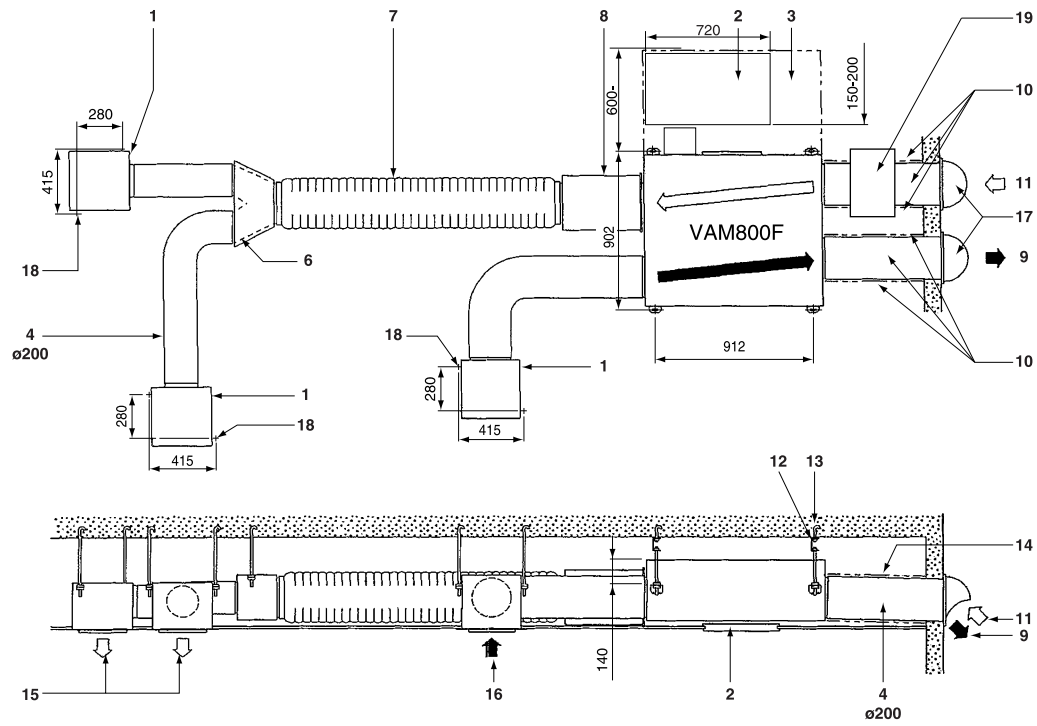
The technical drawing illustrates the VAM500F ventilation unit from three perspectives:

- Front View (Top):** Shows the main rectangular body with a width of 758 mm and a height of 600 mm. The internal filter area measures 620 mm by 150-250 mm. Two circular air outlets are positioned on the right side, each with a diameter of 280 mm. Callouts 9, 10, 11, and 17 indicate specific components related to the airflow and mounting.
- Side View (Middle):** Displays the profile of the unit, highlighting its depth of 415 mm and a total height of 850 mm. It shows the connection points for ductwork at the top and bottom.
- Top View (Bottom):** Provides a plan view of the unit's footprint, which is 758 mm wide and 415 mm deep. It details the base mounting flange and the location of the two Ø200mm mounting holes. Callouts 15 and 16 point to the base support structure.

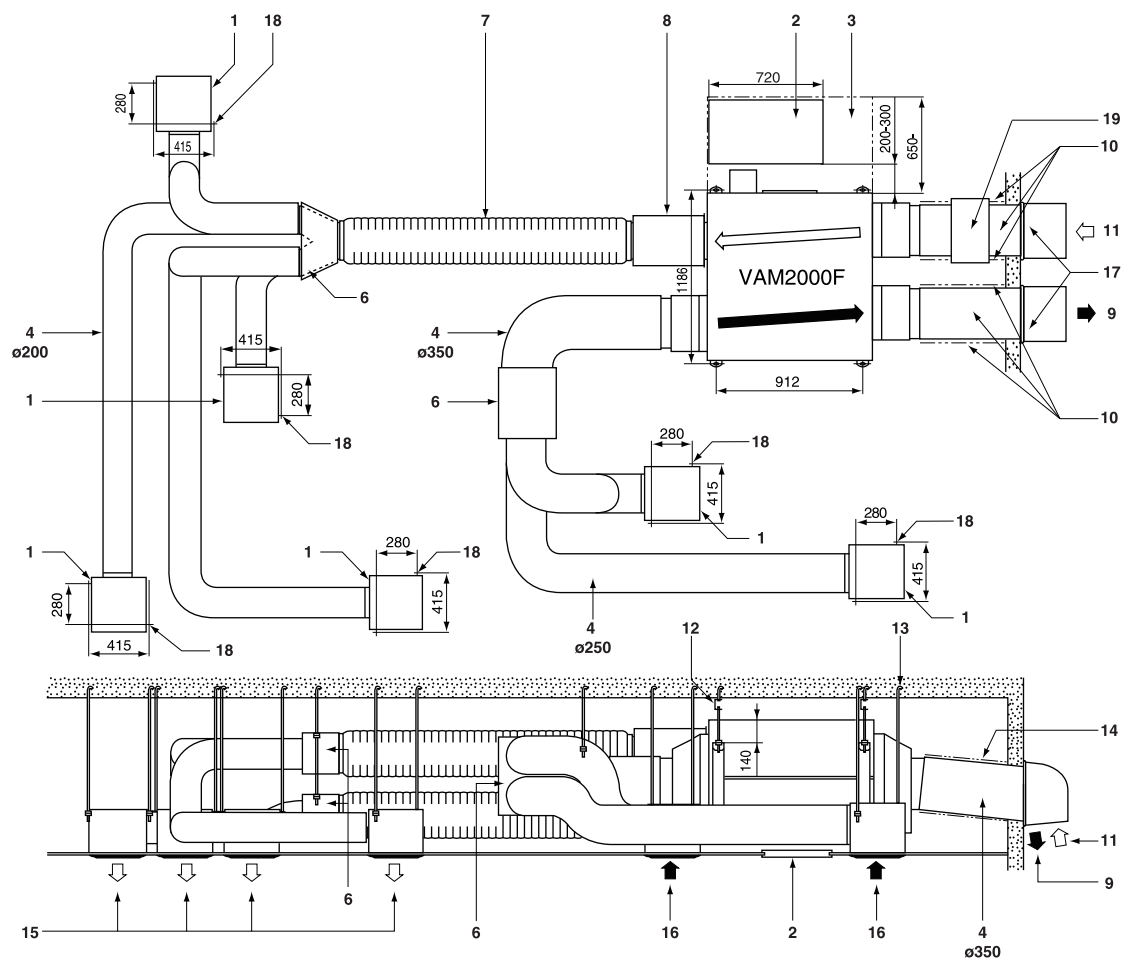
Key features and dimensions include:

- VAM500F:** The model name prominently displayed on the front panel.
- Dimensions:** 758 mm (width), 600 mm (height), 415 mm (depth), 850 mm (total height), 620 mm (filter width), 150-250 mm (filter height), 280 mm (outlet diameter).
- Callouts:** Numbers 1 through 19 identify various parts such as filters, mounting brackets, and electrical connections.
- Arrows:** Indicate the direction of airflow through the unit and the orientation of the mounting flange.

2



3



4

Contents

	Page
Safety considerations	1
Dimensions	2
Installation	2
System configuration	5
Electric wiring	7
Test run	21
Wiring diagram	22

Thank you for purchasing this Daikin HRV.

The original instructions are written in English. All other languages are translations of the original instructions.



HRV – Heat Reclaim Ventilation

Please read this installation manual carefully and install the unit properly to keep it at full capacity for a long time.

Please prepare some necessary parts, for example round hoods, air suction/discharge grilles etc., before the installation of the unit.

Safety considerations

Please read these "Safety considerations" carefully before installing air conditioning equipment and be sure to install it correctly. After completing the installation, make sure that the unit operates properly during the start-up operation. Please instruct the customer on how to operate the unit and keep it maintained.

Also, inform customers that they should store this installation manual along with the operation manual for future reference.

This air conditioner comes under the term "appliances not accessible to the general public".

Meaning of warning and caution symbols



WARNING

Failure to follow these instructions properly may result in personal injury or loss of life.



CAUTION

Failure to observe these instructions properly may result in property damage or personal injury, which may be serious depending on the circumstances.



WARNING

- Never inspect or service the unit by yourself.
Ask a qualified service person to perform this work.
- Electric shock may result. Before servicing the unit, always shut off power.
- Persons servicing the unit are required to wear gloves.
- All wiring must be performed by an authorized electrician and must comply with the applicable legislation.
- Always use the air filter.
If the air filter is not used, heat exchange elements will be clogged, possibly causing poor performance and subsequent failure.
- Do not change operations suddenly.
It can result not only in malfunction but also failure of switches or relays in the body.
- This appliance is intended to be used by expert or trained users in shops, in light industry and on farms, or for commercial use by lay persons.
- This appliance is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the appliance by a person responsible for their safety.
Children should be supervised to ensure that they do not play with the appliance.
- Do not use an HRV or an air suction/discharge grille in the following places:
 - Places such as machinery plants and chemical plants where gas, which contains noxious gas or corrosive components of materials such as acid, alkali, organic solvent and paint, is generated.
 - Places such as bathrooms subjected to moisture.
Electric leak or electric shock and other failure can be caused.

- Places subjected to high temperature or direct flame. Avoid a place where the temperature near the HRV unit and the air suction/discharge air grille exceeds 50°C. If the unit is used at high temperature, deformed air filter and heat exchange element or burned motor result. Unit ambient temperature conditions should be between -15°C and 50°C (80% relative humidity or less)
 - Places subjected to much carbon black. Carbon black attaches to air filter and heat exchange element, disabling them.
 - The equipment is not intended for use in a potentially explosive atmosphere.
- Improper installation or attachment of equipment or accessories could result in electric shock, short-circuit, leaks, fire or other damage to the equipment. Be sure only to use accessories, optional equipment and spare parts made by Daikin which are specially designed for use with the products as of subject in this manual and have them installed by an installer.

Dimensions

(See figure 1 (A = Models 350F~1000F, B = Models 1500F~2000F))

- 1 Maintenance space for the heat exchange elements, air filters and fans
- 2 Maintenance cover
- 3 Inspection hole Ø450 mm
- 4 Switch box
- 5 4x 14x40 mm Ceiling hook (Oval hole)
- 6 Exhaust air fan
- 7 OA (Outdoor air) Fresh air from outdoors
- 8 EA (Exhaust air) Exhaust air to outdoors
- 9 Supply air fan
- 10 SA (Supply air) Supply air to room
- 11 RA (Return air) Return air from room
- 12 Damper plate
- 13 Heat exchange elements
- 14 Air filters
- 15 Applicable duct
- 16 Nominal diameter

Installation

Installation position



CAUTION

- The appliance is designed to be a built-in appliance. It shall not be accessible to the general public. Adequate measures have to be taken to prevent access by other than qualified persons.
- Install the unit in a place strong enough to support its weight.
Poor installation is hazardous. It also causes vibrations and unusual operating noise.
- Provide the service space and the inspection holes.
(Be sure to provide the inspection holes to inspect the air filters, the heat exchange elements and fans.)
- Do not install the unit directly against a ceiling or wall.
(If the unit is in contact with the ceiling or wall, it can cause vibration.)
- This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

- Example of Installation, VAM500F (See figure 2), VAM800F (See figure 3), VAM2000F (See figure 4)

- 1 Air suction/discharge grille (option)
- 2 Inspection hole Ø 450 mm (field supply)
- 3 Maintenance space for the heat exchange elements, air filters and fans
- 4 Duct (field supply)
- 5 Duct (Ø200) (field supply) or (*) Flexible duct (option)
- 6 Branch duct (field supply)
- 7 (*) Flexible duct (field supply)
- 8 (*) Silencer (option) (only for VAM500 till 2000)
- 9 EA (Exhaust air to outdoors)
- 10 Heat Insulator (field supply)
- 11 OA (Outdoor air) Fresh air from outdoors
- 12 Metal suspension bracket for absorbing vibration (field supply)
- 13 Suspension bolt (field supply)
- 14 Gradient of down to outdoor ≥1/50
- 15 SA (Supply air to room)
- 16 RA (Return air from room)
- 17 Round hood (field supply)
- 18 Suspension bolt position
- 19 Additional external damper (field supply)



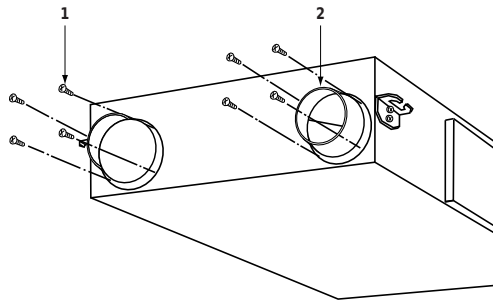
CAUTION

on installing the ducts

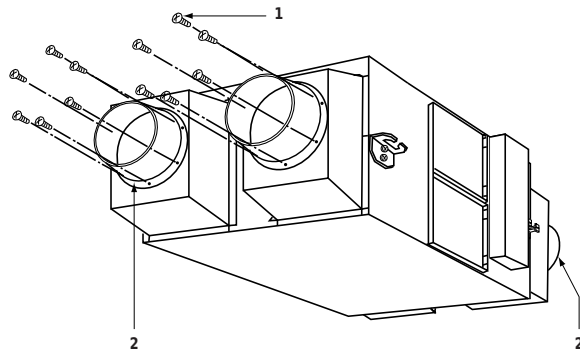
- The parts marked with (*) are effective in reducing blowing noise.
- When using the unit at a quiet place, use the optional silencer box and flexible duct at the part of the air discharge outlet on the indoor side "SA" (supply air to room) of the unit, to counter the noise.
- When selecting installation materials, consider the required volume of air flow and noise level in that particular installation.
- When the outdoor air infiltrates into the ceiling and the temperature and humidity in the ceiling become high, insulate the metal portions of the unit.
- Access inside the unit is only allowed through the service hole. Install grilles in case no ducts are installed.
- Unit sound pressure level is less than 70dB (A).

Preparations

■ VAM350F, VAM500F



■ VAM650F, VAM800F, VAM1000F, VAM1500F, VAM2000F



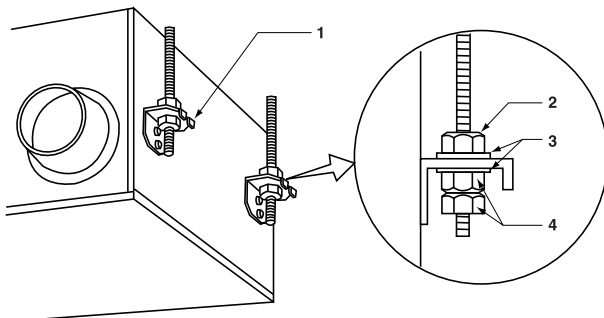
- 1 Screw (accessories)
- 2 Duct connecting flange (accessories)

- Installation of duct connecting flanges
Attach the provided duct connecting flanges using screws (accessories).

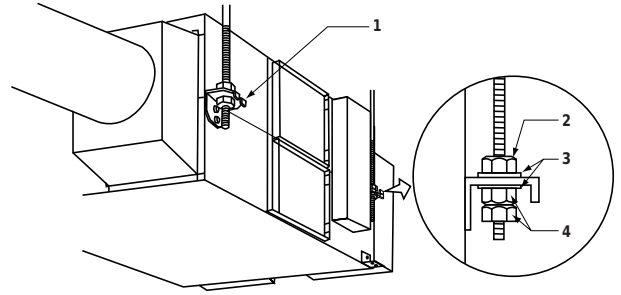
screws provided	
VAM350	16
VAM500	16

screws provided	
VAM650	24
VAM800	24
VAM1000	24
VAM1500	24
VAM2000	24

■ VAM350F, VAM500F, VAM650F, VAM800F, VAM1000F



■ VAM1500F, VAM2000F



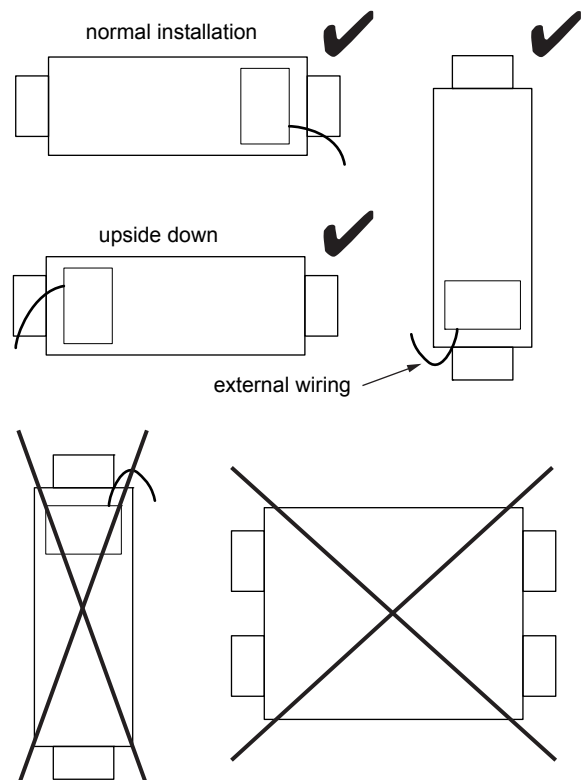
- 1 Ceiling hook
- 2 Nut
- 3 Washer
- 4 Double nuts

Installation of HRV

- Install the anchor bolt (M10 to 12) in advance.
Pass the metal suspension bracket through the anchor bolt and secure the anchor bolt with washer and nut.
(Before installation, check for foreign objects such as vinyl and paper remaining inside the fan housing.)
- Attach the indoor (SA, RA) and outdoor (EA, OA) ducts by referring to the duct diagram on the switchbox.

NOTE Remove the two fixing metals for transportation if it prevents installation work. (Be sure to screw in the removed mounting screw on the body side to prevent air leakage.)

Unit orientation

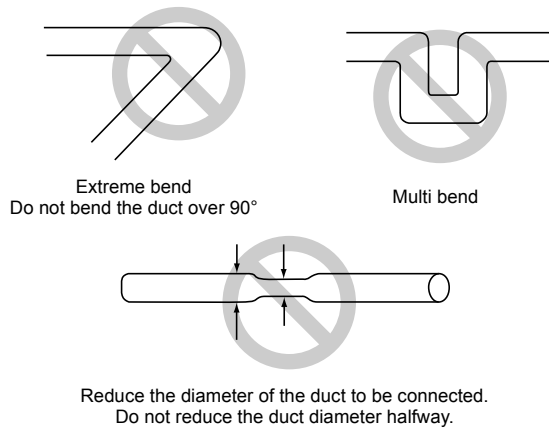


Installation in positions other than horizontal are allowed under the following conditions:

- There shall be no danger of water entering the control box (condensation, nearby piping, etc.).
- The unit shall be sufficiently fixated.
- External switchbox wiring shall point downwards.
- Fan shaft has to remain horizontally.

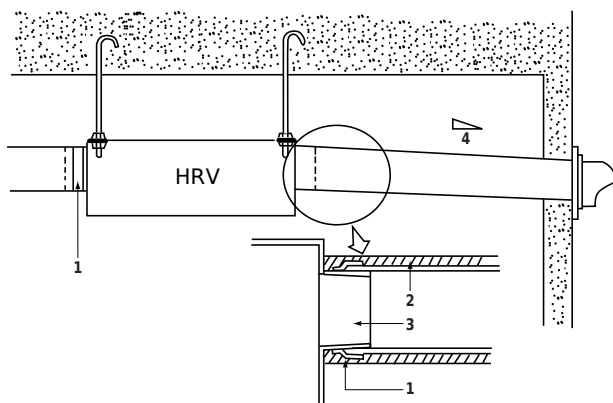
Duct connection

Do not connect the ducts as follows

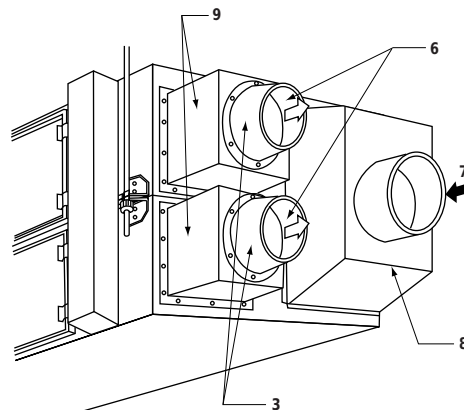
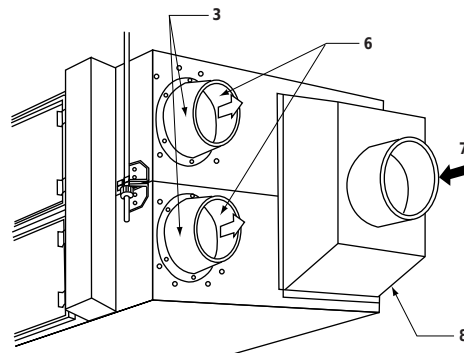
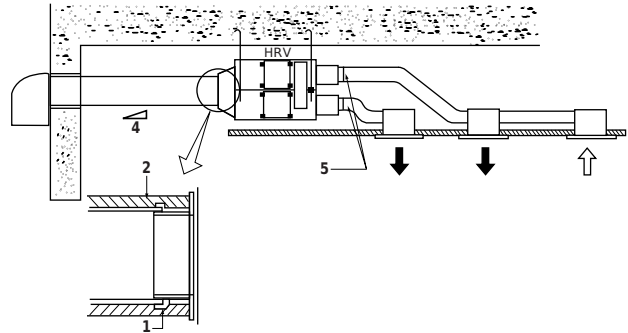


- 1 The minimal radius of bends for flexible ducts are as follows:
300 mm duct: 200 mm diameter
375 mm duct: 250 mm diameter
- 2 To prevent air leakage, wind aluminum tape round the section after the duct connecting flange and the duct are connected.
- 3 Install the opening of the indoor air intake (SA) as far as possible from the opening of the exhaust suction (RA).
- 4 Use the duct applicable to the model of unit used (Refer to the outline drawing).
- 5 Install the two outdoor ducts with down slope (slope of 1/50 or more) to prevent entry of rain water. Also, provide insulation for both ducts to prevent dew formation. (Material: Glass wool of 25 mm thick)
- 6 If the level of temperature and humidity inside the ceiling is always high, install a ventilation equipment inside the ceiling.
- 7 Insulate the duct and the wall electrically when a metal duct is to be penetrated through the metal lattice and wire lattice or metal lining of a wooden structure wall.

■ VAM350F, VAM500F, VAM650F, VAM800F, VAM1000F



■ VAM1500F, VAM2000F



- 1 Aluminium tape (field supply)
- 2 Insulation material (field supply)
- 3 Duct connecting flange (option)
- 4 Slope over 1/50
- 5 Duct connecting flange (option)
- 6 SA (Supply air)
- 7 RA (Return air)
- 8 Connecting chamber
- 9 Silencer (option)

■ Use Ø250 mm round ducts for the SA (supply air) and RA (return air) sides

1. Loosen the 12 screws off the SA (supply air) side and remove the connection chamber. Be sure to tighten up these screws back in position in order not to allow any air leak from the unit.
2. Fix the duct connecting flanges (option) with their accompanying 12 screws.

■ Introducing the silencers and other options.

This model handles a high air flow rate.

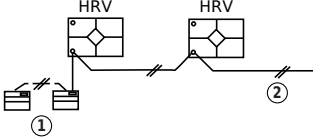
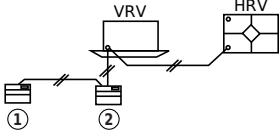
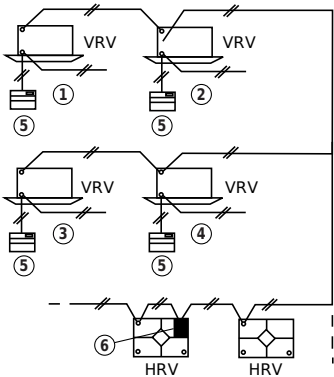
To reduce the blow-out noise, some optional attachments are available: silencer, flexible duct, thin air intake/exhaust grille, etc.

1. Remove the connection chamber off the SA (supply air) side and attach the upper and lower silencers.
2. Now fix the duct connecting flanges (option) and connect the Ø250 mm flexible ducts.

System configuration

Independent system

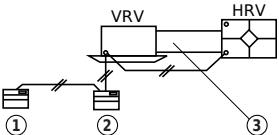
Air conditioner linked operation system

		System	Standard method	Related items in Electric wiring
Independent system		 1 Remote controller for HRV 2 2-wire cord (produced locally)	- Up to 16 units can be controlled with the remote controller for HRV. (A system with two remote controls can be created in the master/slave switching.) - All HRV operations can be used and indicated. - Operation monitor output and humidifier operation are possible using Adapter PCB. - Remote control cord should be procured locally. (Maximum cord length: 500 m)	"When connecting to Remote controller for HRV" on page 16
Combined operation system with VRV systems and Sky-air series	1-group linked operation system	 1 Remote controller for air conditioner 2 Remote controller for air conditioner	- A combined total of up to 16 air conditioners and the HRV can be controlled. - The HRV ventilation mode can be operated independently when air conditioners are not being used. - Using the local setting of the remote controller for air conditioners, various settings such as precool/pre-heat reservation on/off, ventilation flow rate, ventilation mode, etc.	"Standard 1-group linked-control system" on page 16
	Multi-group (2 or more) linked operation system	 1 Group 1 4 Group 4 2 Group 2 5 Remote controller for VRV 3 Group 3 6 Distant control adapter	- Since all VRV units are connected to a single line in view of installation, all VRV units are subjects for operation. - If there are problems operating all VRV units, do not use this system.	"Linked control with more than two groups" on page 17

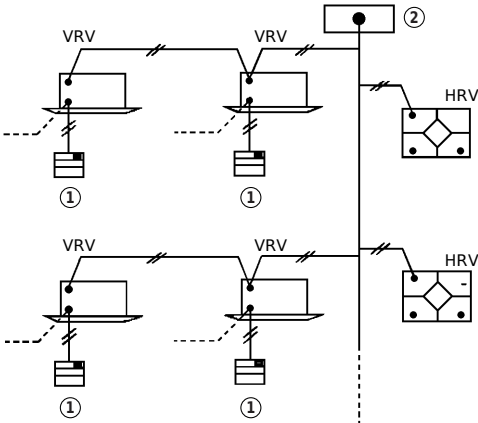
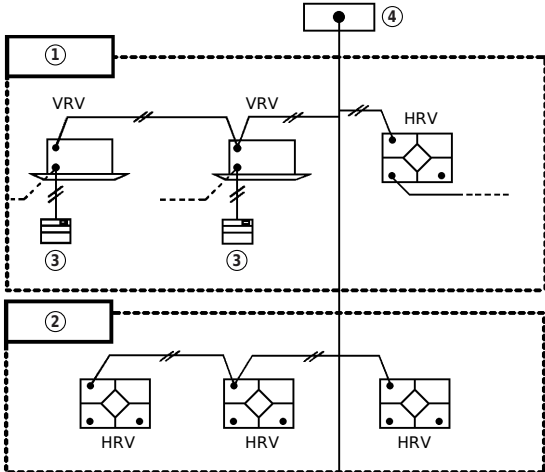
NOTE



- Adapter PCB for external input/output: BRP4A50A; Distant control adapter: KRP2A51 (installation box: KRP1B101).
- Operation of two or more groups is not possible with direct duct connection.
- With VAM types, the direct duct connection shown can also be selected for 1-group operation systems.

		System	Standard method	Related items in Electric wiring
Direct duct connection system		 1 Remote controller for air conditioner 2 Remote controller for air conditioner 3 Duct	- The HRV will operate only when the air conditioner fan is on. - Other specifications are the same as those of the standard system.	"Direct duct connection system for 1-group operation system" on page 17

Centralized control system (VRV system).

System		Standard method	Related items in Electric wiring	
Centralized control system	"All"/individual control system	 1 Remote controller for air conditioner 2 Adapter PCB for remote controller, Schedule timer, On/Off controller	• Use of the on/off controller, Adapter PCB for remote control or schedule timer enables centralized control of the entire system. (maximum of 64 groups) • The on/off controller can turn on or off the individual units. • The schedule timer and on/off controller can be used together. However, the Adapter PCB for remote control cannot be used with another centralized control device.	"All"/individual control" on page 18
	Zone control system	 1 Zone 1 2 Zone 2 3 Remote controller for air conditioner 4 Central controller	• Use of the centralized controller enables zone control via the centralized control line. (maximum of 64 zones) • The central controller displays the "Filter" indication and abnormality warnings, and enables resetting. • The centralized controller allows ventilation operation for each zone independently.	"Zone control system" on page 19

NOTE



Wiring adapter for remote contact: BRP4A50A, Adapter PCB for remote control: KRP2A51, schedule timer: DST301B51, on/off controller: DCS301B51, central remote controller: DCS302C51

Electric wiring



Before obtaining access to terminal devices, all power supply circuits must be interrupted.

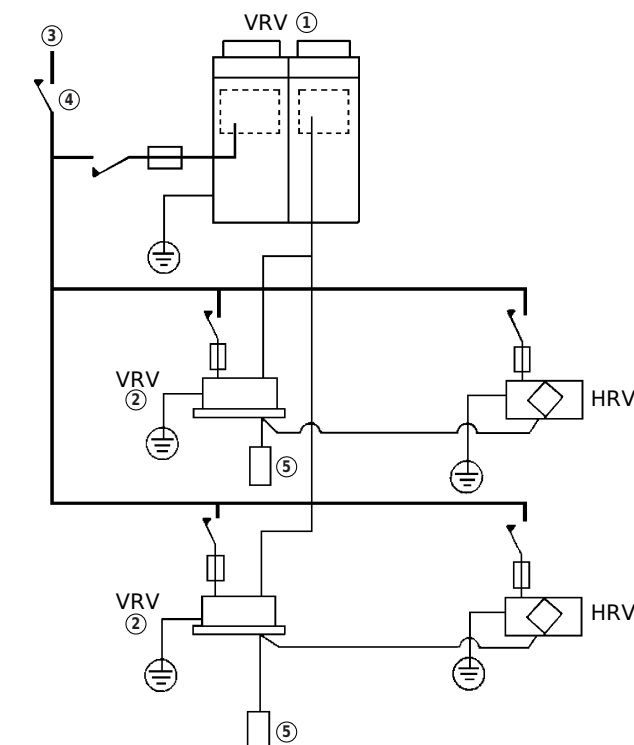
Connection of wiring

- Connect the wires in accordance with the diagram of each system.
- All wiring must be performed by an authorized electrician.
- All field supplied parts and materials and electric works must conform to local regulations.
- Use copper wire only

Connection of wiring

- A main switch or other means for disconnection, having a contact separation in all poles, must be incorporated in the fixed wiring in accordance with applicable legislation. Do not turn on the main switch until all the wiring is completed.
- A single switch can be used to supply power to units on the same system. However, branch switches and branch circuit breakers must be selected carefully.
- Fit the power supply wiring of each unit with a switch and fuse as shown in the drawing.
- Be sure to make the electric grounding (earth) connection.

Complete system example



- Power supply wiring
 — Transmission wiring
 — Switch
 — Fuse
- 1 Outdoor unit
 2 Indoor unit
 3 Power supply
 4 Main switch
 5 Remote controller

Component electrical specifications

VAM	350FB	500FB	650FB	800FB	1000FB	1500FB	2000FB
Power supply (*)							
50 Hz	Power supply Max. 264 V/Min. 198 V						
MCA	(A)	0.9	1.3	1.6	2.5	3.0	5.0
MFA	(A)	16	16	16	16	16	16
Fan motor (*)							
P	(kW)	0.08x2	0.08x2	0.106x2	0.21x2	0.21x2	0.21x4
FLA	(A)	0.4	0.6	0.7	1.1	1.3	2.2

(*) MCA: Min. Circuit Amps
 MFA: Max. Fuse Amps
 P: Motor Rated Output
 FLA: Full Load Amps

NOTE

For details, refer to ELECTRICAL DATA.



Specifications for field supplied fuses and wire

VAM	350F	500F	650F	800F	1000F	1500F	2000F
Type	JVE, 5VE		JVE, 5VE, 7VE				
Power supply wiring							
Field supplied fuses	16 A ^(*)						
Wire	H05VV-U3G						
Size	Wire size must comply with local regulations						
Transmission wiring							
Wire	Shield wire (2 wire)						
Size	0.75-1.25 mm ²						

(*) VAM 1500/2000 requires 2 electrical supplies and fuses.

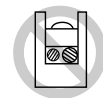
Precautions

- 1 Do not connect wires of different gauge to the same power supply terminal. Looseness in the connection may cause overheating or electric malfunction.

When connecting more than one wire to the power supply wiring, use a 2 mm² (Ø1.6) gauge wire.



Same gauge wires



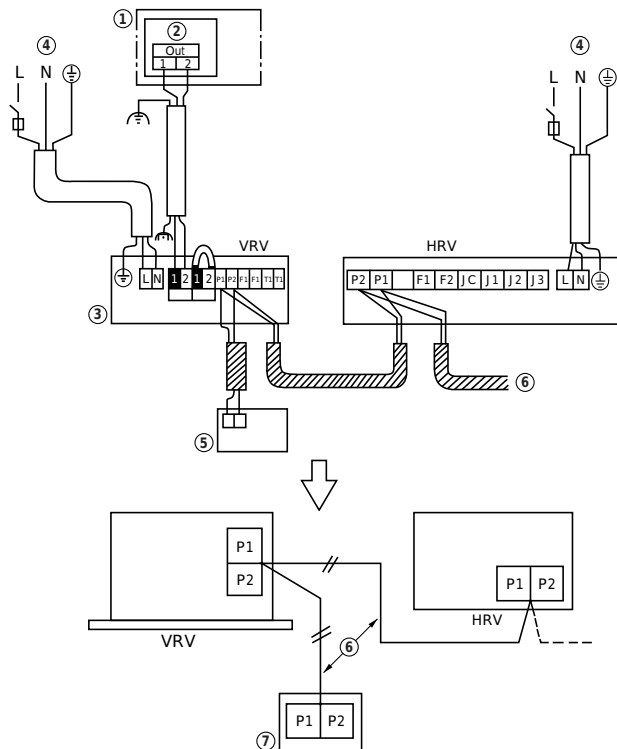
Different gauge wires

When using two power wires of a gauge greater than 2 mm² (Ø1.6), branch the line outside the terminal board of the unit in accordance with electrical equipment standards.

The branch must be sheathed, so as to provide a degree of insulation equal to or greater than the power supply wiring itself.

- 2 Keep total current of crossover wiring between indoor units less than 12 A.
- 3 Do not connect wires of different gauge to the same grounding terminal. Looseness in the connection may deteriorate protection.
- 4 Keep the power supply wiring distant from other wires to prevent noise.
- 5 For remote controller wiring, refer to the Installation manual of the remote controller.

Wiring example



- 1 Outdoor unit/BS unit
- 2 Switch box
- 3 Indoor unit
- 4 Power supply 220-240 V~50 Hz
- 5 Remote controller (VRV)
- 6 Transmission wiring
- 7 Remote controller (HRV)

- All transmission wiring except for the remote controller wires is polarized and must match the terminal symbol.
- Use shield wire in transmission wiring. Ground the shield of the shield wire to "⏏", at the grounding screw, with the C-cup washer.

Opening the switch box

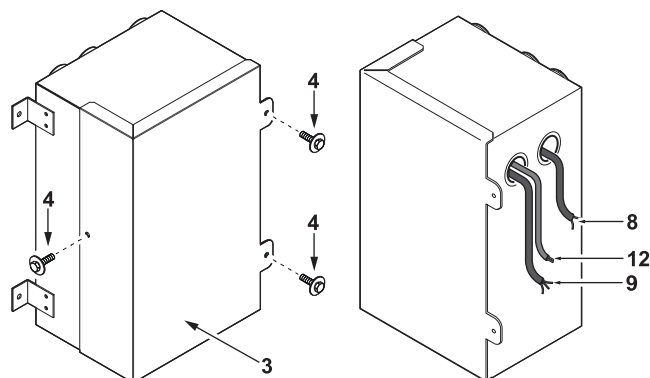
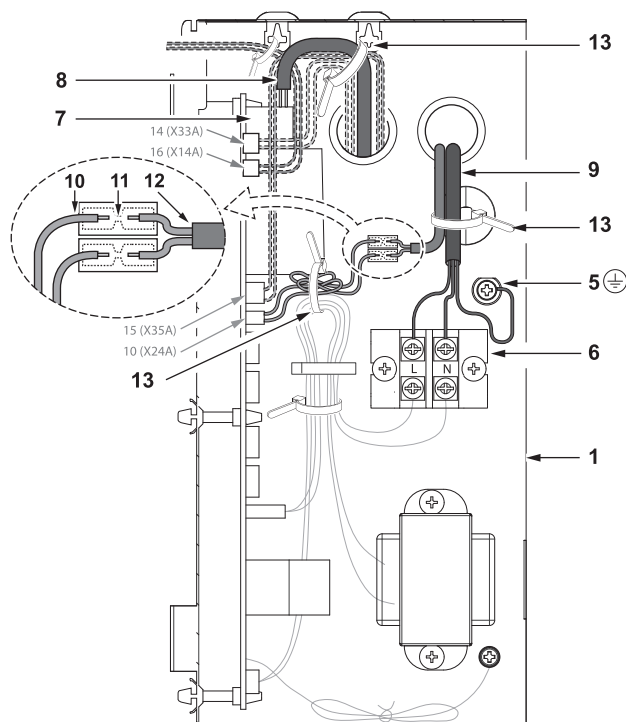


CAUTION

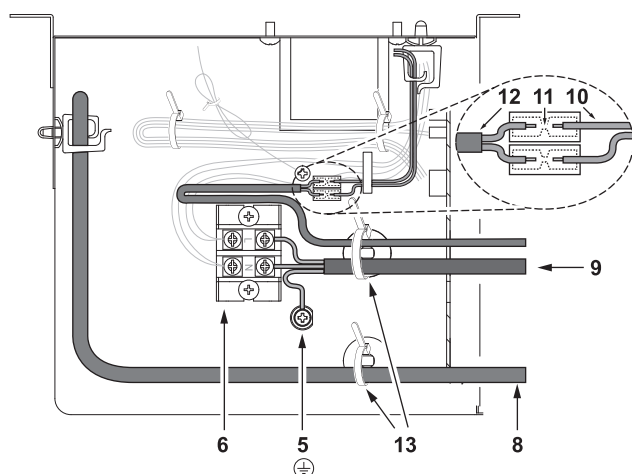
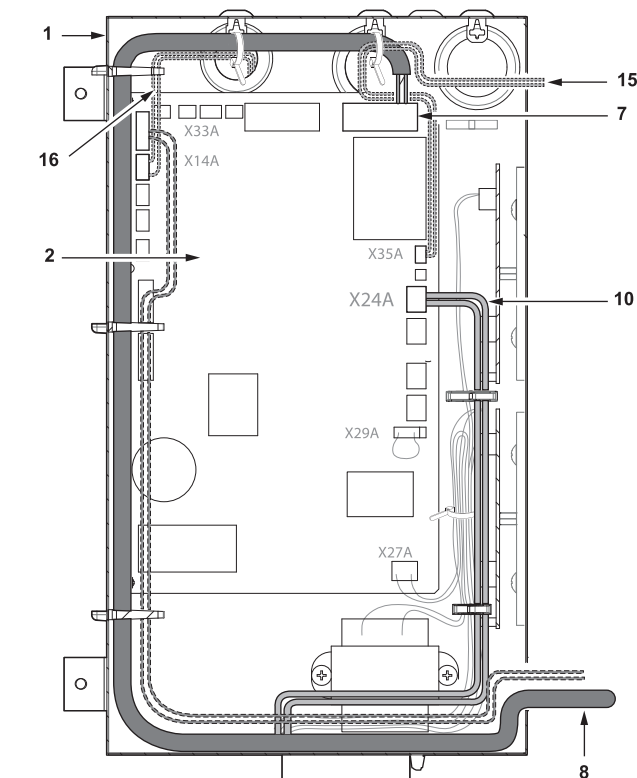
Before opening the cover, be sure to turn off the power switches of the main units and other devices connected with the main units.

- Remove the screw securing the cover and open the switch box.
- Secure the power cord control wires with the clamp, as shown in the next figures.

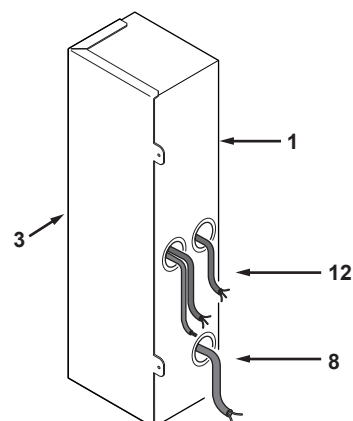
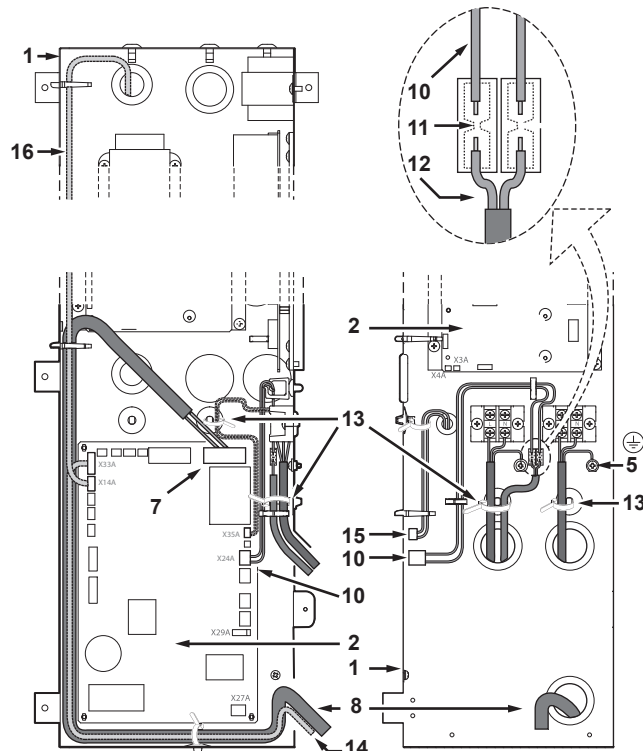
■ VAM350F, VAM500F, VAM650F



■ VAM800F, VAM1000F



■ VAM1500F, VAM2000F

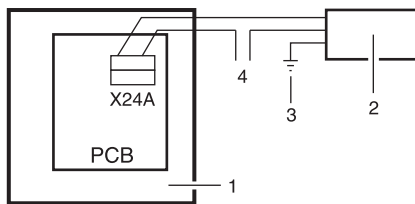


- 1 Electric component box
- 2 Printed circuit board
- 3 Electrical compartment cover
- 4 Securing screw and washer
- 5 Grounding terminal
- 6 Terminal board
- 7 Transmission wiring terminal board (P1, P2)
- 8 Transmission wiring (to optional remote controller)
- 9 Power supply cable
- 10 Wires for connection of additional external damper (supplied accessory)
- 11 Insulated splices-closed barrel connector (0.75 mm²) (field supply)
- 12 Double or reinforced insulated flexible cable (0.75 mm²) to external damper (field supply)
- 13 Tie wrap (field supply)
- 14 BRP4A50A (optional accessory)
- 15 KRP2A51 (optional accessory)
- 16 CO₂ sensor (optional accessory)

Required electrical connections for possible additional field supplied external damper

The external damper prevents the intake of outdoor air if the HRV is switched off. (Refer to figures 2, 3, and 4, item 19).

1. The HRV's main unit PCB operates the HRV and provides a contact for the external damper.



- 1 HRV main unit
- 2 External damper
- 3 Earth to external damper
- 4 Power source



CAUTION

Make sure you follow the instructions below in detail.

2. Required electrical connections

Connect one end of the accessory harness to the X24A connector on the PCB and the other end to the harness leading to the external damper via an insulated splices-closed barrel connector (0.75 mm²).

Make sure that the wire is released from strain. The electrical circuit should have a current protection of 3 A and a maximum voltage of 250 V.

X24A will make contact when the HRV fan starts operating. The contact will be opened when the fan is stopped.

How to install the optional adapter circuit board (KRP2A51, BRP4A50A)



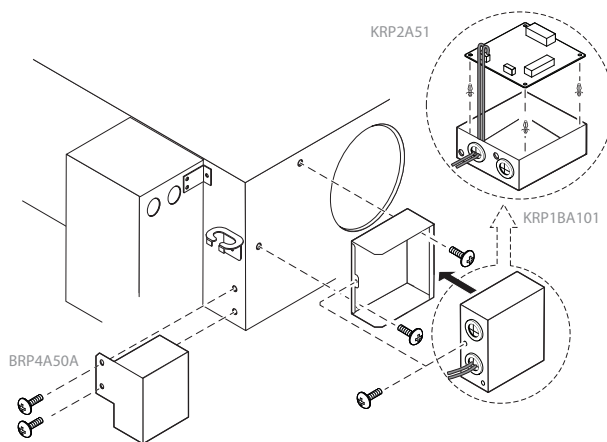
WARNING In case an electrical heater is installed, use nonflammable duct. Be sure to keep 2 m or more between the heater and HRV unit for safety.

When installing any of these options on the VAM1500/2000, it is necessary to prepare the fixing plate (EKMPVAM).

When installing KRP2A51, it is necessary to prepare the fixing box (KRP1BA101).

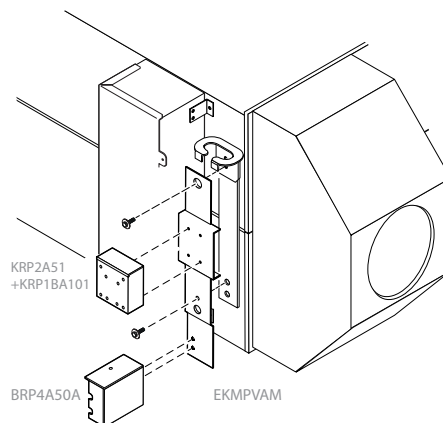
For VAM350/500/650/800/1000

- 1 Loosen the screws from the unit.
- 2 Attach optional PCB in box.
- 3 Guide the PCB wire through the dedicated holes and attach as instructed in "Opening the switch box".
- 4 Attach the box to the unit.
- 5 After the wires are connected, fasten the switch box cover.



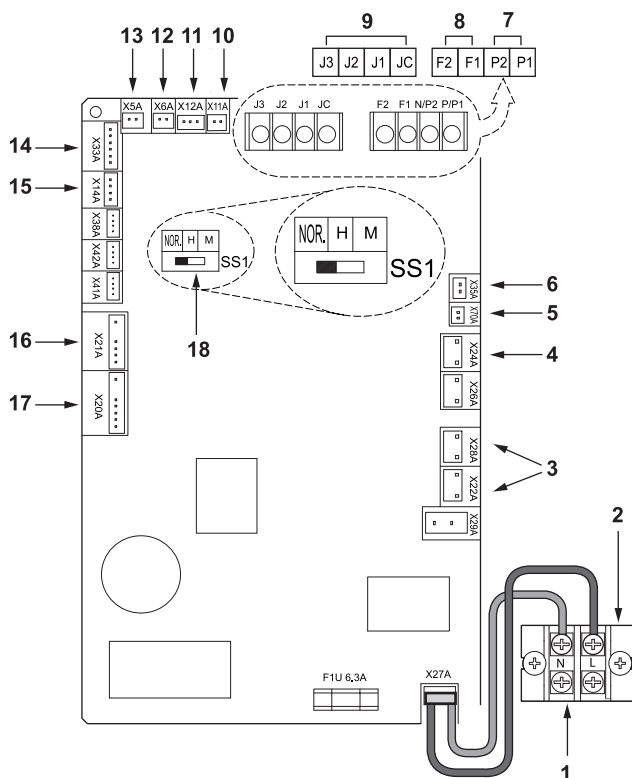
For VAM1500/2000

- 1 Remove the middle screws of the standard fixing plate.
- 2 Attach the optional fixing plate (EKMPVAM) on top of the standard one.
- 3 Attach optional PCB in box.
- 4 Guide the PCB wire through the dedicated holes and attach as instructed in "Opening the switch box".
- 5 Attach the box to the fixing plate.
- 6 After the wires are connected, fasten the switch box cover.



Power cord connection, control wire terminals and switches on the electronic control unit (printed circuit board)

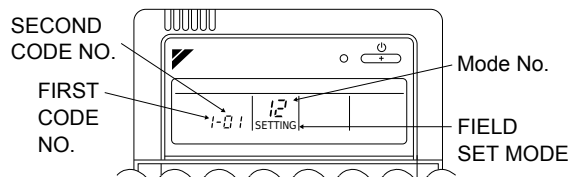
- Connect the power cord to the L and N terminals.
- Secure the power cord with the power cord clamp, as shown in "Opening the switch box" on page 8
- Be sure to connect the electric grounding (earth) wire.



- | | |
|----------------------------------|--|
| 1 Power supply | 10 Outdoor air thermistor |
| 2 Terminals | 11 Indoor air thermistor |
| 3 Damper | 12 Damper |
| 4 External damper (field supply) | 13 Damper (upper part of VAM1500/2000) |
| 5 Fan communications | 14 BRP4A50A (option) |
| 6 KRP2A51 (option) | 15 CO ₂ sensor |
| 7 Remote controller | 16 Exhaust air fan (only VAM350/500/650) |
| 8 Centralized control | 17 Supply air fan (only VAM350/500/650) |
| 9 External input | 18 Factory setting
No operation if setting is changed |

Field setting and test run

- Make sure the switch box lids are closed on the indoor and outdoor units.
- Depending on the type of installation, make the field settings from the remote controller after the power is turned on, following the "Field Settings" manual which came with the remote controller. Lastly, make sure the customer keeps the "Field Settings" manual, along with the operating manual, in a safe place.



Local settings

Using the remote controller of the VRV-system air conditioner to make HRV unit settings

Initial settings

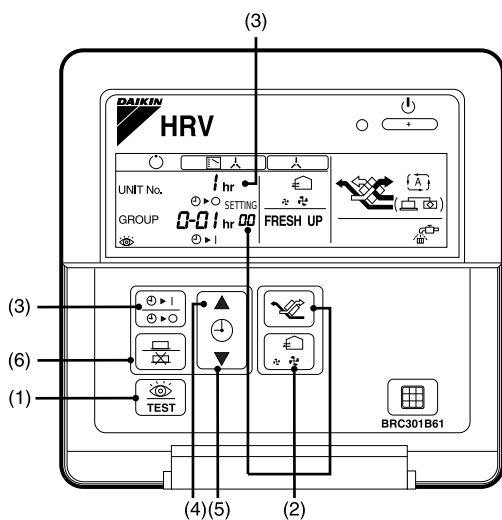
- 1 Mode nos. 17, 18 and 19: Group control of HRV units.
- 2 Mode nos. 27, 28 and 29: Individual control

Operating procedure

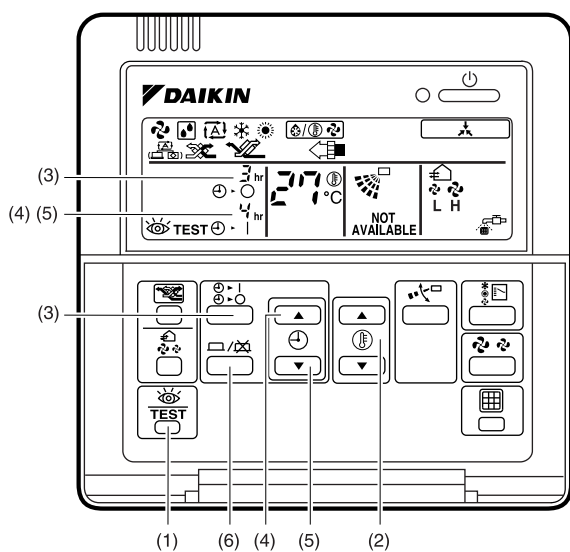
The following describes the operating procedure and settings.

- 1 Press the INSPECTION/TRIAL button (1) for more than four seconds with the unit in the normal mode to enter the local setting mode.
- 2 For BRC301B51: use the VENTILATION MODE button (up) and AIRFLOW RATE button (down) to select the desired "mode number". The code display will blink.
For BRC1D52: use the TEMPERATURE ADJUSTMENT button (2) to select the desired "mode number".
- 3 To make settings for individual units under group control (when mode No. 27, 28 or 29 is selected), press the TIMER SETTING ON/OFF button (3) to select the "unit No." for which the settings are to be made. (This process is not necessary when settings are made for the entire group.)
- 4 Press the top section of the TIMER button (4) to select the "setting switch No."
- 5 Press the lower section of the TIMER button (5) to select "setting position No."

- 6 Press the PROGRAM/CANCEL button (6) once to enter the settings. (The code display will stop blinking and light up.)
- 7 Press the INSPECTION/TRIAL button (1) to return to normal mode.



Remote controller for HRV BRC301B61



Remote controller for air conditioners BRC1D52

List of Settings

Setting mode	Setting switch No.	Description of Setting	Setting position No.														
			01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
17 (27)	0	Filter cleaning time setting	Approx. 2500 hours	Approx. 1250 hours	No counting	-	-	-	-	-	-	-	-	-	-	-	-
	1	Night purge timer (after stop)	Off	On After 2h	On After 4h	On After 6h	On After 8h	-	-	-	-	-	-	-	-	-	-
	2	Pre-cool/pre-heat	Off	On	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	Pre-cool/pre-heat time(min)	30min	45min	60min	-	-	-	-	-	-	-	-	-	-	-	-
	4	Initial fan speed	Normal	Ultra-High	-	-	-	-	-	-	-	-	-	-	-	-	-
	5	Yes/No setting for direct duct connection with VRV system	No duct (Air flow setting)	With duct (fan off)	No duct (Air flow setting)	No duct (Air flow setting)	With duct (fan off)	With duct (fan off)	No duct (Air flow setting)	No duct (Air flow setting)	With duct (fan off)	-	-	-	-	-	-
		Setting for cold areas (Fan operation when heater thermostat off)	-	-	T off: stop	T off: L	T off: stop	T off: L	-	-	-	-	-	-	-	-	-
	6	Night purge fan setting	High	Ultra-High	-	-	-	-	-	-	-	-	-	-	-	-	-
	7	Target temperature for independent night purge	18°C	19°C	20°C	21°C	22°C	23°C	24°C	25°C	26°C	27°C	28°C	29°C	30°C	-	-
18 (28)	8	Centralized zone interlock setting	No	Yes	-	-	-	-	-	-	-	-	-	-	-	-	-
	9	Pre-heat time extension setting	0min	30min	60min	90min	-	-	-	-	-	-	-	-	-	-	-
	0	External signal JC/J2	Last command	Priority on external input	Priority on operation	Disable night purge forced stop	-	24 hours ventilation On/Off	-	-	-	-	-	-	-	-	-
	1	Setting for direct Power ON	Off	On	-	-	-	-	-	-	-	-	-	-	-	-	-
/..	2	Auto restart setting	Off	On	-	-	-	-	-	-	-	-	-	-	-	-	-
	3	Output signal to external damper (X24A)	-	-	Only in heating mode	Operation signal	-	-	-	-	-	-	-	-	-	-	-
	4	Indication of ventilation mode	On	Off	-	-	-	-	-	-	-	-	-	-	-	-	-
	6	Automatic ventilation air flow table	Linear	-	Fixed A	Fixed B	-	-	-	-	-	-	-	-	-	-	-

NOTE



1. Factory settings are marked in grey backgrounds.

2. (*) Refer to technical data book for pressure drop curves and selection of fan curves (step 1 to 15).

3. The setting modes are mentioned as group settings. Between parentheses are the setting modes for individual unit control.

4. Group number setting for centralized controller

Mode No. 00: Group controller

Mode No. 30: Individual controller

Regarding the setting procedure, refer to the section "Group number setting for centralized control" in the operating manual of either the on/off controller or the central controller.

Setting mode	Setting switch No.	Description of Setting	Setting position No.														
			01	02	03	04	05	06	07	08	09	10	11	12	13	14	15
18 (28)	7	Fresh-up mode	No Indication Supply	No Indication Exhaust	Indication Supply	Indication Exhaust	-	-	-	-	-	-	-	-	-	-	-
	8	External input terminal function selection (between J1 and JC)	Fresh-up	Error output	Error output stop operation	Forced off	Fan forced off	Air flow up	Humidity drain error	-	-	-	-	-	-	-	-
	9	BRP4A50A output switching selection (between X3 and X4) (between X1 and X2)	Humidifier/heater output	Error output	Fan output (L/H/UH)	Fan output (H/UH)	Fan output (UH)	Fan output	Fan output	Drain valve output 30min/12hour	Drain valve output 30min/8hour	Drain valve output 30min/6hour	Drain valve output 30min/4hour	-	-	-	-
19 (29)	1	Low tap setting	Off	Run 1/15 (28min off/2 min on)	Run 1/10 (27min off/3 min on)	Run 1/6 (25min off/5 min on)	Run 1/4 (22.5min off/7.5 min on)	Run 1/3 (20min off/10 min on)	Run 1/2 (15min off/15 min on)	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
	2	SA fan step setting*	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8	Step9	Step10	Step11	Step12	Step13	Step14	Step15
	3	EA fan step setting*	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8	Step9	Step10	Step11	Step12	Step13	Step14	Step15
	4	24hour ventilation setting	Off	Run 1/15 (28min off/2 min on)	Run 1/10 (27min off/3 min on)	Run 1/6 (25min off/5 min on)	Run 1/4 (22.5min off/7.5 min on)	Run 1/3 (20min off/10 min on)	Run 1/2 (15min off/15 min on)	Step1	Step2	Step3	Step4	Step5	Step6	Step7	Step8
	7	Reference concentration shift for ventilation air flow control (ppm)	0	+200	+400	+600	-200	-400	-600	-	-	-	-	-	-	-	-
1A	8	Stop ventilation by automatic ventilation air flow control Fan residual operation	Allowed	Not allowed	Allowed	Not allowed	-	-	-	-	-	-	-	-	-	-	-
	9	Normal ventilation tap on automatic ventilation air flow control	Independent UH	Independent H	VRV control UH	VRV control H	Control by CO ₂ sensor	-	-	-	-	-	-	-	-	-	-
	0	Fresh up operation On/Off	Off	On	-	-	-	-	-	-	-	-	-	-	-	-	-

NOTE 1. Factory settings are marked in grey backgrounds.



2. (*) Refer to technical data book for pressure drop curves and selection of fan curves (step 1 to 15).

3. The setting modes are mentioned as group settings. Between parentheses are the setting modes for individual unit control.

4. Group number setting for centralized controller

Mode No. 00: Group controller

Mode No. 30: Individual controller

Regarding the setting procedure, refer to the section "Group number setting for centralized control" in the operating manual of either the on/off controller or the central controller.

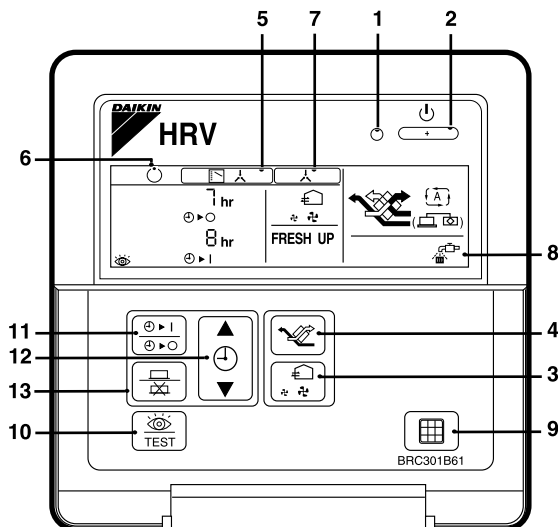
Example

When adjusting the auto restart setting to on in the group setting mode, enter the mode No. "18" setting switch No. "2" and setting position No. "02".

Operation with the remote control exclusively for Air conditioning operation HRV units (BRC301B61)

For non-independent systems, starting/stopping operation and timer operation may not be possible.

Use the air conditioner remote control or the Centralized controller in such cases.



BRC301B61: Remote controller for HRV

1. Operation lamp
This pilot lamp (red) lights up while the unit is in operation.
2. Operation/Stop button
When pushed once, the unit starts operating.
When pushed again, the unit stops.
3. Air flow rate changeover button
Air flow rate can be changed over to " " Low mode or " " High mode,
" " FRESH UP" Low FRESH UP mode,
" " FRESH UP" High FRESH UP mode.
For "FRESH UP" operation
When this indication does not show: The volume of outdoor air supplied into the room and that of the room air exhausted outdoors is equivalent.
For "FRESH UP" operation
 - If it is set to "Fresh up air supply": The volume of outdoor air supplied into the room is larger than that of room air exhausted outdoors.
(This operation prevents the odor and moisture from kitchens and toilets from flowing into the rooms.)
This is the factory setting.
 - If it is set to "Fresh up air exhaust": The volume of room air exhausted outdoors is larger than that of outdoor air supplied into the room.
(This operation prevents the hospital odor and floating bacteria from flowing out to the corridors.)
To change the setting, refer to chapter "List of Settings" in the installation manual.



4. Ventilation mode changeover button

" " Automatic mode.

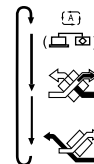
The temperature sensor of the unit automatically changes the ventilation of the unit in Bypass mode and Heat Exchange mode.

" " Heat Exchange mode.

In this mode, the air passes through the heat exchanger element to effect Total Heat Exchanging ventilation.

" " Bypass mode.

In this mode, the air does not pass through the heat exchange element but by passes it to effect Bypass ventilation.



5. Indication of operation control method:

When the operation of HRVs are linked with the air conditioners, this indication may be shown.

While the indication is shown, the ON/OFF of HRVs cannot be operated by the HRV remote controller.

6. Indication of operation standby:

It indicates the precooling/preheating operation. This unit is at stop and will start operation after the precooling/preheating operation is over.

Precooling/preheating operation means the operation of HRVs is delayed during the startup operation of linked air conditioners, for example before the office hours.

During this period the cooling or heating load is reduced to bring the room temperature to the set temperature in a short time.

7. Indication of centralized control:

When a remote controller for air conditioners or devices for centralized control are connected to the HRVs, this indication may show.

When this indication appears on the display, the ON/OFF and timer operation may not be possible with the HRV remote controllers.

8. Indication of air filter cleaning

When the indication " " appears on the display, clean the filter.

9. Filter signal reset button

10. Inspection button

This button is to be used only for service. It is not to be used normally.

How to operate with timer

11. Schedule timer button " / ".

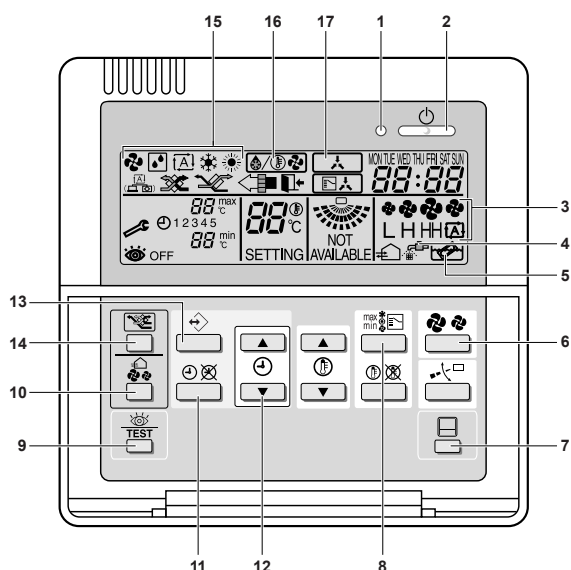
This button enables or disables the schedule timer.

12. Push the time adjust button " " to set the time.

13. Push the programming button " " / " " Then, the reservation is finished.

Operating the HRV unit using the remote controller of the VRV-system air conditioner

Please read the manual supplied with the remote controller for more detailed instructions (optional controllers: BRC1D52 or BRC1E52).



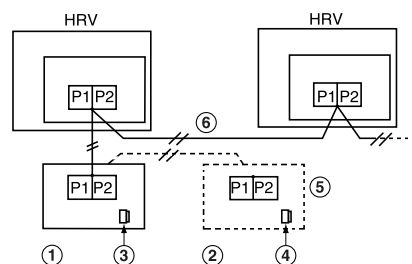
BRC1D52: Remote controller for VRV

- 1 Operation lamp
- 2 Operation/stop button
- 3 Fan speed icon
- 4 Air filter cleaning time icon
- 5 Element cleaning time icon
- 6 Air conditioner fan speed button
- 7 Air filter cleaning time icon reset button
- 8 Air conditioner operation mode
- 9 Inspection button
- 10 Air flow rate changeover button
- 11 } See "How to operate with timer" on page 15
- 12 }
- 13 }
- 14 Ventilation mode button
- 15 Operation mode display
- 16 Defrost/hotstart mode icon
- 17 Indication of centralized control

When the VRV-system air conditioner is connected with the HRV unit with a direct duct, the remote controller of the air conditioner cannot be used to select the VENTILATION mode. To use the HRV unit without operating the air conditioner, set the air conditioner in the FAN VENTILATION mode and select the low fan speed.

Independent system

When connecting to Remote controller for HRV



- 1 Master remote controller
- 2 Slave remote controller
- 3 Switch position: Master
- 4 Switch position: Slave
- 5 Remote controller for HRV
- 6 Maximum connection line length: 500 m



Factory settings: Do NOT change the switch settings. SS1 is a setting switch for special purposes. Changing the settings will stop the unit from operating normally.

For raising the remote-controlled ventilation air flow rate from "High" to "Ultra-High", connect the remote controller for the air-conditioner to HRV and make settings on site.

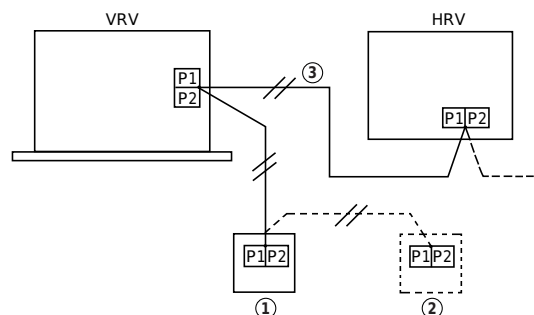
(Refer to "List of Settings" on page 13.)

Keep the switch on the printed circuit board at the factory setting.

Wiring and connections in combination with "VRV-SYSTEM"

Standard 1-group linked-control system

- The remote control of the air conditioner can be used to control up to 16 air conditioner indoor units and HRV units.
- Initial settings can be made for the functions of the HRV units (pre-cool/pre-heat, ventilation air flow, ventilation mode and "Fresh-Up"). Use the remote controller of the air conditioner to make the initial settings for the HRV units. Refer to "Initial setting" under Item "List of Settings" on page 13



- 1 Remote controller for air conditioner
- 2 Remote controller for air conditioner
- 3 Maximum connection line length: 500 m

Pre-cool/pre-heat function

When the pre-cool/pre-heat function is set, the HRV unit switches on at the preset time (30, 45 or 60 minutes) after the VRV-system air conditioner begins cooling or heating operation. The function is set OFF at the factory. Therefore, to use this function, the initial setting must be made using the remote controller of the air conditioner.

If the air conditioner is re-started within two hours after the operation was stopped, this function does not operate.

Example 1:

To switch on the pre-cool/pre-heat function, and turn on the HRV unit 60 minutes after the air conditioner is turned on.

- Set the mode No. to "17" for group control, or "27" for individual control, the setting switch No. to "2" and the setting position No. to "02"
- Set the mode No. to "17" for group control, or "27" for individual control, the setting switch No. to "3" and the setting position No. to "03"

Example 2:

To switch the ventilation air flow to ultra high setting. (The units are set at the high air flow setting at the factory)

- Set the mode No. to "17" for group control, or "27" for individual control, the setting switch No. to "4" and the setting position No. to "02"

In case of several remote controllers, perform master/slave setting.

Refer to "performing initial settings" in the remote control instruction manual.

Example 3:

Air ventilation rate setting using remote control	Default factory settings	When set as in example 2
Low	Low (L) air flow rate	Low (L) air flow rate
High	High (H) air flow rate	Ultra-High (UH) air flow rate

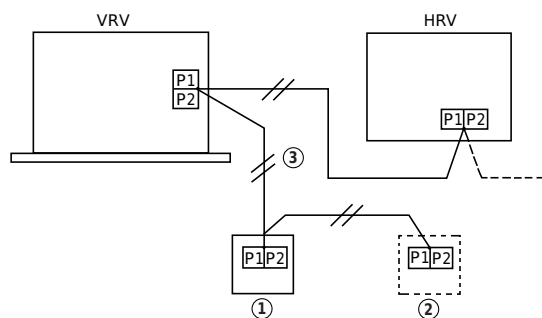
When the remote controller is connected, keep the switches on the HRV unit PCB at the default factory settings.



Factory settings: Do NOT change the switch settings.
SS1 is a setting switch for special purposes. Changing the settings will stop the unit from operating normally.

Direct duct connection system for 1-group operation system

Line connections and the settings of the switches on the HRV unit PCB should be the same as for "Standard system for 1-group system".



- Remote controller for air conditioner
- Remote controller for air conditioner

3 Maximum total cable length: 500 m

Set the switch of the HRV unit PCB to the default factory settings.

- Be sure to set the initial settings to Direct duct connection: Enabled.

■ When the remote controller for HRV is not yet connected, initial settings can be performed using the air conditioner remote control. Set the mode number to "17", the setting switch number to "5", and the setting position number to "02" according to the procedure in "List of Settings" on page 13.

■ When the remote controller for HRV is connected, initial settings should be performed using the remote controller for HRV. Set the same numbers as described above when using the remote controller for air conditioner according to the procedure "Making initial settings" in the remote control instruction manual.

- Settings for other HRV functions should be made using the same method as in "Standard system for 1-group system".

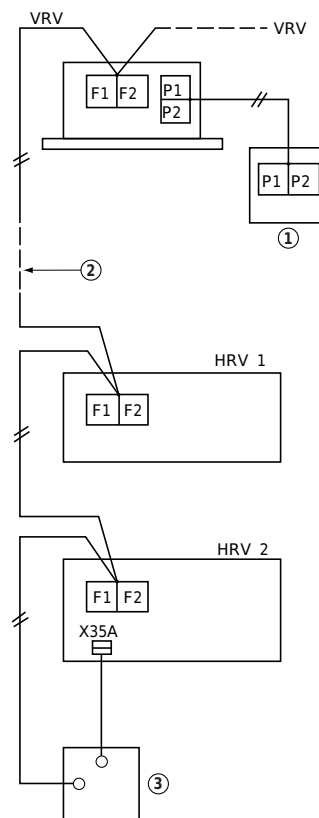
Linked control with more than two groups

■ Mount the optional KRP2A51 Adapter PCB for remote control to one HRV unit.

■ A maximum of 64 air conditioners and HRV units can be connected to the F1 and F2 terminals.

■ Use the remote controller of the air conditioner to make the initial settings.

- Remote controller for air conditioner
- Total cable length is maximum 1000 m.
- Optional distant control adapter KRP2A51



Procedure

Make the remote controller settings on site; set the collective zone interlock to ON. Mode number "17", setting switch number "8" and setting position number "02".

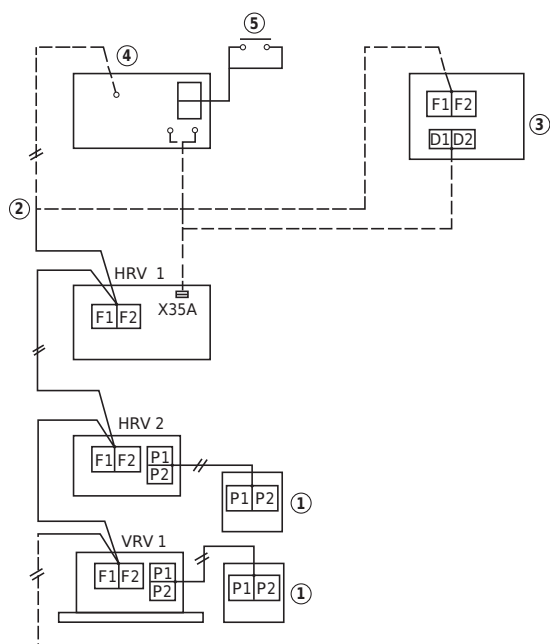
Now the on-site settings are complete.

For raising the remote-controlled ventilation air flow rate "High" to "Ultra-High", connect the remote controller for the air conditioner to HRV and make settings on site. (Refer to "Initial setting" under item "List of Settings" on page 13.)

Centralized control system

"All" control

When using Adapter PCB for remote control (KRP2A51) or schedule timer (DST301B61)

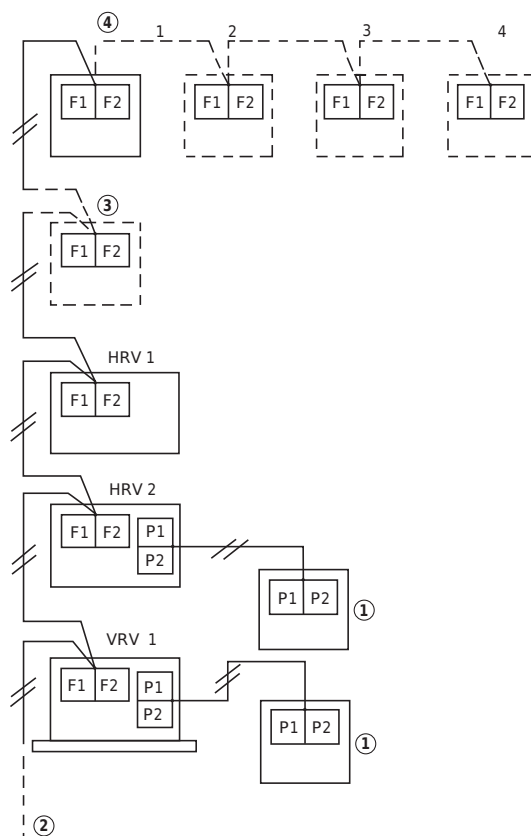


- 1 Remote controller for air conditioner
- 2 Total cable length is maximum 1000 m
- 3 Schedule timer (DST301B61)
- 4 Adapter PCB for remote control (KRP2A51)
- 5 On/Off signal

- A maximum of 64 air conditioners and HRV units can be connected to the F1 and F2 terminals.
- This system does not require group number setting for centralized control. (auto-address system)
- The Adapter PCB for remote control and schedule timer cannot be used together.
- The Adapter PCB for remote control can be mounted on the electric component mounting base of either the HRV unit or air conditioner. (The HRV unit can accept only the KRP2A51)
- For raising the remote-controlled ventilation air flow rate from "High" to "Ultra-High", connect the remote controller for the air conditioner to HRV and make settings on site. (Refer to "Initial setting" under item "List of Settings" on page 13.)

"All"/"individual" control

When using the on/off controller (DCS301B61)



- 1 Remote controller for air conditioner
- 2 Connecting line can be extended up to 1000 m maximum
- 3 Schedule timer
- 4 On/Off controller

- A maximum of 64 air conditioners and HRV units can be connected to the F1 and F2 terminals.
- This system allows connection of four on/off controllers.
- It is necessary to assign a central control group number to each HRV unit and air conditioner. Regarding the setting of the group number, refer to the section on "the centralized control group number setting" in the operating instructions of the On/off controller.
- Use the remote controller of the air conditioner to make the initial settings.

Example:

Follow the procedure below to set the centralized group No. 2-05 to HRV 1.

Procedure

Set the central control group number using the local setting on the remote controller.

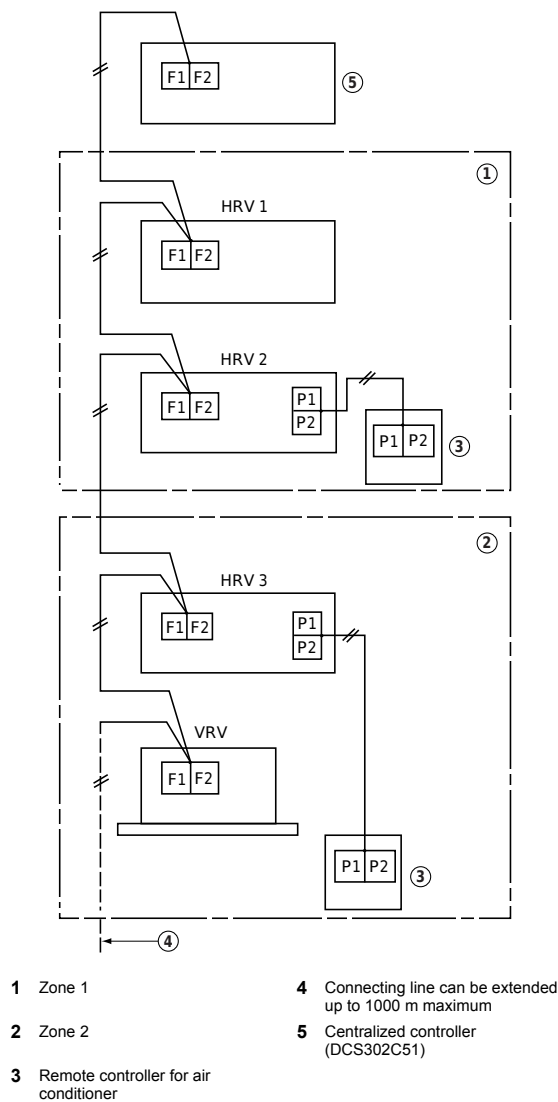
Mode No.: "00"

Central control group No.: "2-05"

The setting is now complete.

For the ventilation air flow setting, follow the procedure described in the section "All control" on page 18.

Zone control system



- A maximum of 64 air conditioners and HRV units can be connected to the F1 and F2 terminals.
- The HRV units will turn on and off in along with the zone operation command from the centralized controller.

Zone 2

The HRV units operate in the zone-linked mode, as described in the section, ["Linked control with more than two groups" on page 17](#). For the initial setting, follow the procedure described in that section.

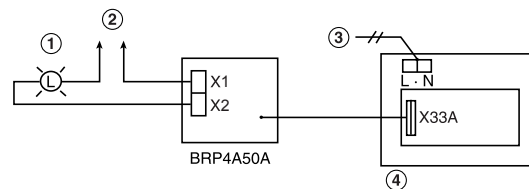
- It is necessary to assign a central control group number to each HRV unit and air conditioner.
Regarding the setting of the group number, refer to the section on "the centralized control group number setting" in the operating instructions of the Centralized controller. Refer to the section ["All"/"individual" control" on page 18](#) for the setting procedure.
- For the ventilation air flow setting, follow the procedure described in the section ["All" control" on page 18](#).
- For the zone setting from the centralized controller, refer to the operating instructions of the centralized controller.
- The centralized controller can be used to control the individual units in the zone for ventilation operation.

Remote control

Monitor of operation

The operation of the HRV can be monitored from the outside by the connection of the adaptor PCB for remote control BRP4A50A (option).

Be sure to connect the terminal strip on the adaptor PCB for remote control BRP4A50A (option).



- 1 Operation lamp
- 2 Power source
- 3 Power source
- 4 HRV printed circuit board

Wiring adapter for remote contact BRP4A50A (option)

Fresh-up operation

Purposes

When Combined with a local ventilating fan (such as the one in toilet and kitchen), the air flow rate of HRV is balanced by either fan operation or exhaust operation.

However, a circuit with voltaged and low current (16 V, 10 mA) is formed between the JC and J1, so a relay with low-load contact point must be used.

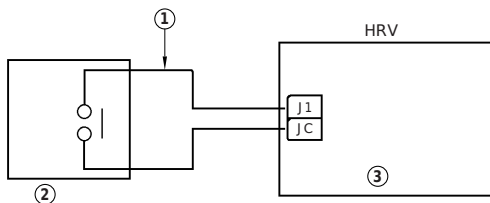
Functions

The unit performs overcharged operation to prevent back flow of odor.

Necessary parts

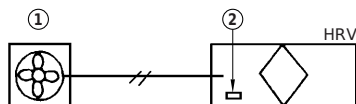
Operation contact of exhaust ventilating fan (Field supply)

Example of control wiring



- 1 Connecting line can be extended up to 50 m maximum
2 Fan (Field supply)
3 Printed circuit board

System description



- 1 Local ventilating fan
2 Power supply

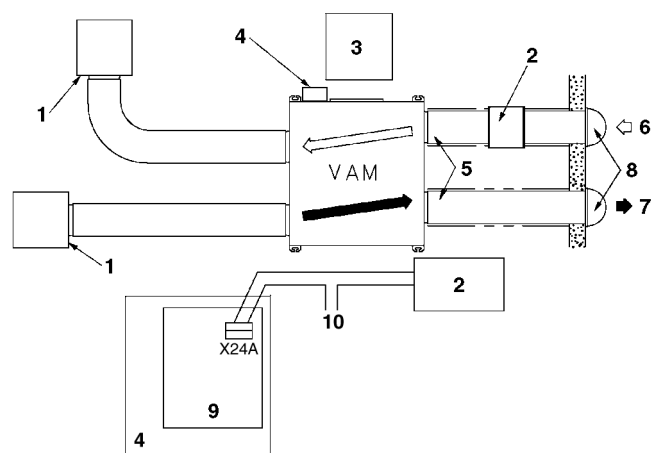
The local setting by the remote controller for the air conditioner (Refer to "List of Settings" on page 13)	"J1", "JC" normal open	"J1", "JC" normal close
Fresh-up "OFF" (Factory setting)	Normal	Fresh-up
Fresh-up "ON"	Fresh-up	Fresh-up

External Damper Operation (Field supply)

Explanation of Functions

Intake of outdoor air can be prevented when HRV is switched OFF if this damper is incorporated in the system.

- The HRV's main unit PCB operates the HRV and provides a signal for the external damper.



- 1 Air suction/discharge grille
2 External damper (field supply)
3 Inspection hole
4 Switch box
5 Heat insulator
6 OA (Fresh air from outdoors)
7 EA (Exhaust air to outdoors)
8 Round shape hood
9 Print circuit board
10 Power source

- Required setting changes for switchover to X24A output (see below for details)

Essential Wiring

Refer to "Opening the switch box" on page 8.

CO₂ sensor

With the CO₂ sensor installed the ventilation volume can be adjusted in function of measured CO₂ concentration. The measured concentration value is compared to programmed trigger values. Make sure to have ventilation mode and air flow rate set to automatic.

Refer to "List of Settings" on page 13 for the field setting overview.

- Use setting 19(29)-9-05 to give control to the CO₂ sensor.
- Use setting 19(29)-7 to shift the trigger values.
- Use setting 18(28)-6 to switch between linear & fixed control.

	Linear control	Fixed control
Initialising	20 minutes in H	20 minutes in H
Measuring	every 5 minutes	every 20 minutes
Judgement	every 30 minutes (average of 6 measurements)	every 20 minutes

Trigger value	Linear control (minutes)			Fixed control	
CO ₂ ppm	UH	H	L	mode A	mode B
1450	30			UH	UH
1300	20	10		UH	UH
1150	10	20		H	H
1000		30		H	H
850		20	10	H	L
700		10	20	L	L
550			30	L	L
400			30	L	stop

Example

When measured 900 ppm in linear control, the unit runs 20 minutes in H, next 10 minutes in L and after elapse judges again.

Essential wiring

Refer to "Opening the switch box" on page 8 and to the installation manual delivered with the optional CO₂ sensor.

Balancing supply and air exhaust

With the VAM FB, it is possible to balance the pressure of the supply and exhaust air via settings. This ensures an optimal heat exchange efficiency.

Refer to the technical data book for pressure drop curves and selection of fan curves (step "1" to "15" refer to ["List of Settings" on page 13](#)).

Set the mode to "19" for group control, or "29" for individual control. Use settings switches "2" and "3" to adjust.

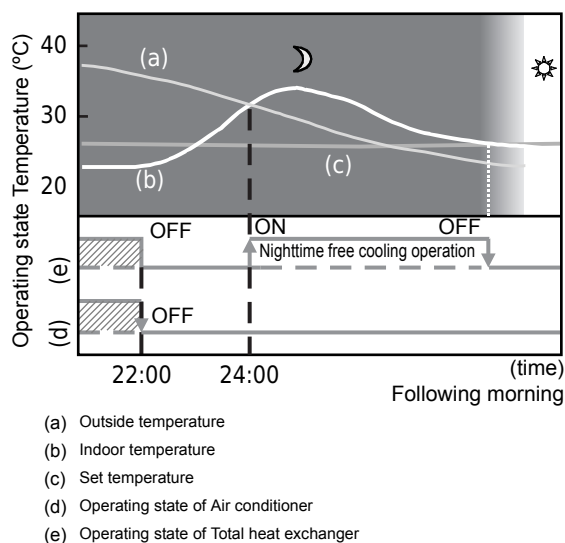
Nighttime free cooling operation

Automatic heat purge function at night

The nighttime free cooling is an energy-conserving function which works at night when the air conditioners is off, reducing the cooling load in the morning when the air conditioner is turned on. This is mainly for rooms that contain office equipment, which raises the room temperature.

- Nighttime free cooling is set to "off" in the factory settings; so request your dealer to turn it on if you intend to use it.

Operation image



Explanation of nighttime free cooling operation image

The unit compares the indoor and outdoor temperatures after the air conditioning operation stops for the night. If the following conditions are satisfied, the operation starts, and when the indoor temperature reaches the air conditioning setting, the operation stops.

Conditions

1. the indoor temperature is higher than the air conditioning setting and
2. the outdoor temperature is lower than the indoor temperature.

If the above conditions are not satisfied, reevaluation is made every 60 minutes.

NOTES



The Nighttime free cooling operation works when the HRV unit is off. Therefore, it is not possible to stop the night purge operation, though the forced off is input from the optional controllers for centralized control.

Test run

After completing the installation of the system, check again to make sure that no error was made in wiring or switch setting on the printed circuit boards of the HRV units.

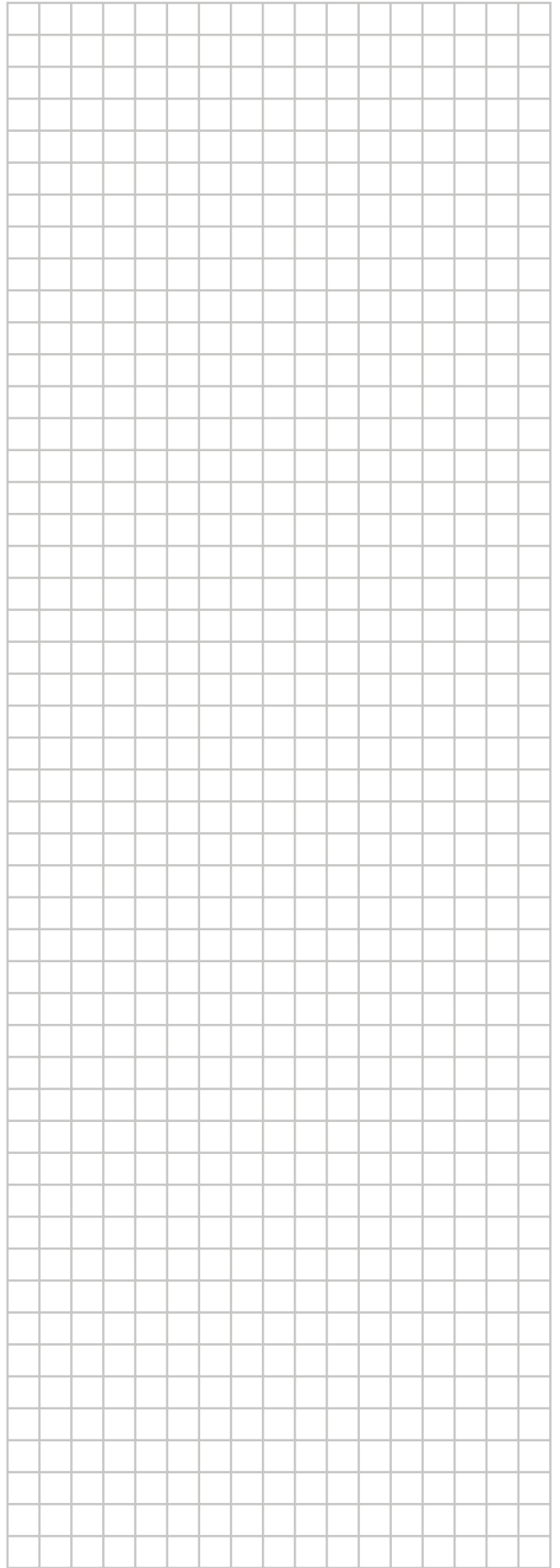
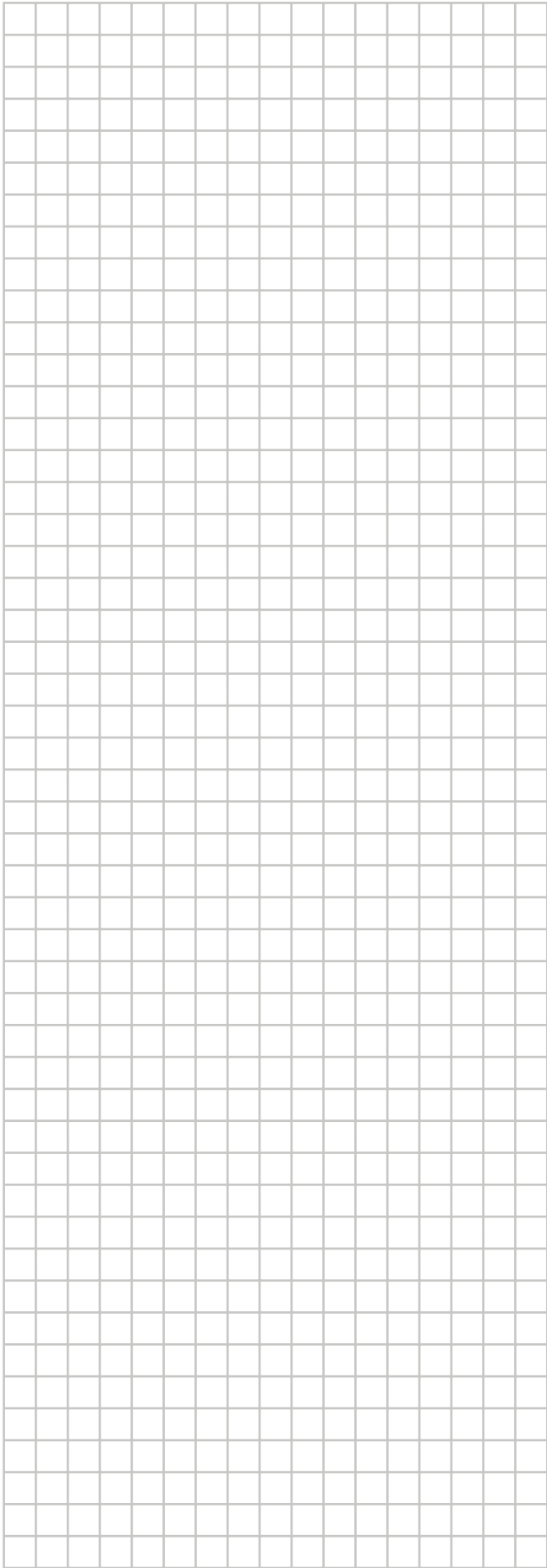
Then, turn on the power of the HRV units. Refer to the manual of the remote controller of each unit (remote controller for air conditioner, central control unit, etc.) for conducting a trial operation.

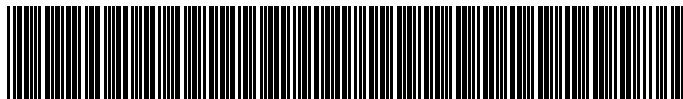
Wiring diagram

The wiring diagram can be found on the service cover.

	: TERMINALS	BLK	: Black	ORG	: Orange
	: CONNECTORS	BLU	: Blue	RED	: Red
	: FIELD WIRING	BRN	: Brown	WHT	: White
	: PROTECTIVE EARTH	GRN	: Green	YLW	: Yellow
	: NOISELESS EARTH				

A1P	PRINTED CIRCUIT BOARD
A2P~A4P	PRINTED CIRCUIT BOARD ASSY (FAN)
A5P	PRINTED CIRCUIT BOARD ASSY (FAN)
C1	CAPACITATOR (M1F)
F1U	FUSE T, 5A, 250V (A1P)
F3U	FUSE T, 6.3A, 250V (A2P, A3P, A4P, A5P)
HAP	PILOT LAMP (SERVICE MONITOR-GREEN)
K1R	MAGNETIC RELAY
K2R, K5R	MAGNETIC RELAY
L1R~L4R	REACTOR
M1D, M2D	MOTOR (DAMPER)
PS	SWITCHING POWER SUPPLY
Q1DI, Q2DI	FIELD EARTH LEAK DETECTOR (MAX. 300mA)
R1T	THERMISTOR (INDOOR AIR)
R2T	THERMISTOR (OUTDOOR AIR)
R3T	THERMISTOR (PTC)
S1C, S2C	LIMIT SWITCH DAMPER MOTOR
X1M	TERMINAL (A1P)
X2M	TERMINAL (OUTSIDE INPUT) (A1P)
X3M	TERMINAL (POWER SUPPLY)
V1R	DIODE
Z1F	NOISE FILTER
REMOTE CONTROLLER	
SS1	SELECTOR SWITCH
OPTIONAL ACCESSORIES	
TES10	ADAPTER PC BOARD
CONNECTOR FOR OPTION	
X14A	CONNECTOR (CO ₂ SENSOR)
X24A	CONNECTOR (OUTSIDE DAMPER)
X26A	CONNECTOR (FILTER SIGN)
X33A	CONNECTOR (ADAPTER PCB)
X35A	CONNECTOR (POWER SUPPLY)
X41A	CONNECTOR (HUMIDITY SENSOR 1)
X42A	CONNECTOR (HUMIDITY SENSOR 2)
For VAM350-650	
M1F	MOTOR (SUPPLY AIR FAN)
M2F	MOTOR (EXHAUST AIR FAN)
For VAM800-2000	
M1F	MOTOR (EXHAUST AIR FAN) (BOTTOM)
M2F	MOTOR (SUPPLY AIR FAN) (BOTTOM)
M3F	MOTOR (EXHAUST AIR FAN) (TOP)
M4F	MOTOR (SUPPLY AIR FAN) (TOP)





4P333249-1 C 0000000\$

Copyright 2013 Daikin

DAIKIN EUROPE N.V.

Zandvoordestraat 300, B-8400 Oostende, Belgium

4P333249-1C 2014.10