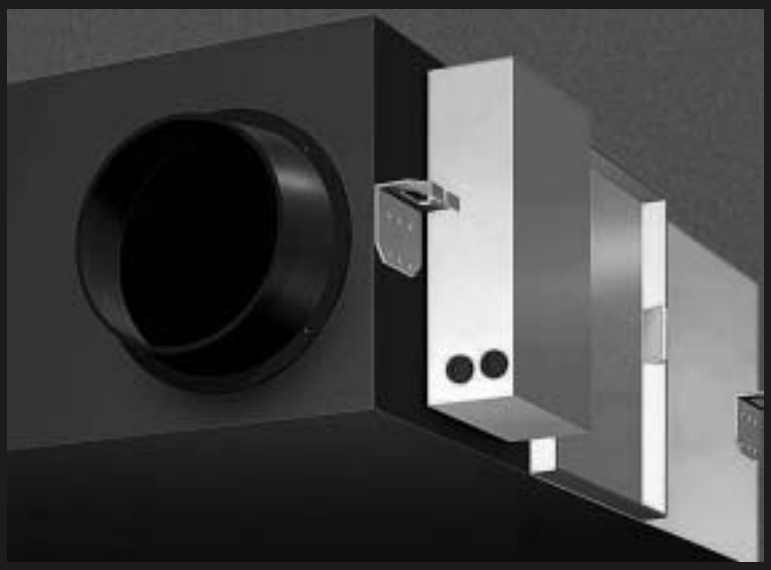
DAIKIN

EEDEN07-201

technical data



heat reclaim ventilation

VAM-FA8VE
VKM-GAMV1
VKM-GAV1

3

TABLE OF CONTENTS

TABLE OF CONTENTS

TABLE OF CONTENTS

Part 1: VAM-FA8VE

TABLE OF CONTENTS
Part 1: VAM-FA8VE

1 External appearance

VAM150FA8VE

VAM250FA8VE

VAM350FA8VE

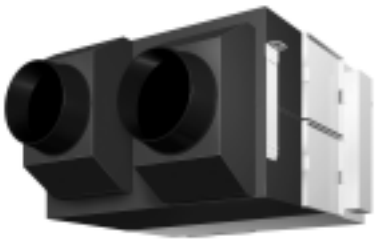
VAM500FA8VE

VAM650FA8VE

VAM800FA8VE

VAM1000FA8VE

VAM1500FA8VE

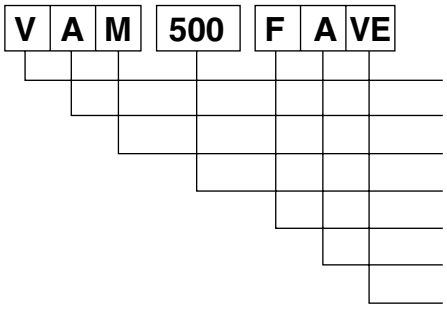


VAM2000FA8VE

2 Model series

VAM150FA8VE
VAM250FA8VE
VAM350FA8VE
VAM500FA8VE
VAM650FA8VE
VAM800FA8VE
VAM1000FA8VE
VAM1500FA8VE
VAM2000FA8VE

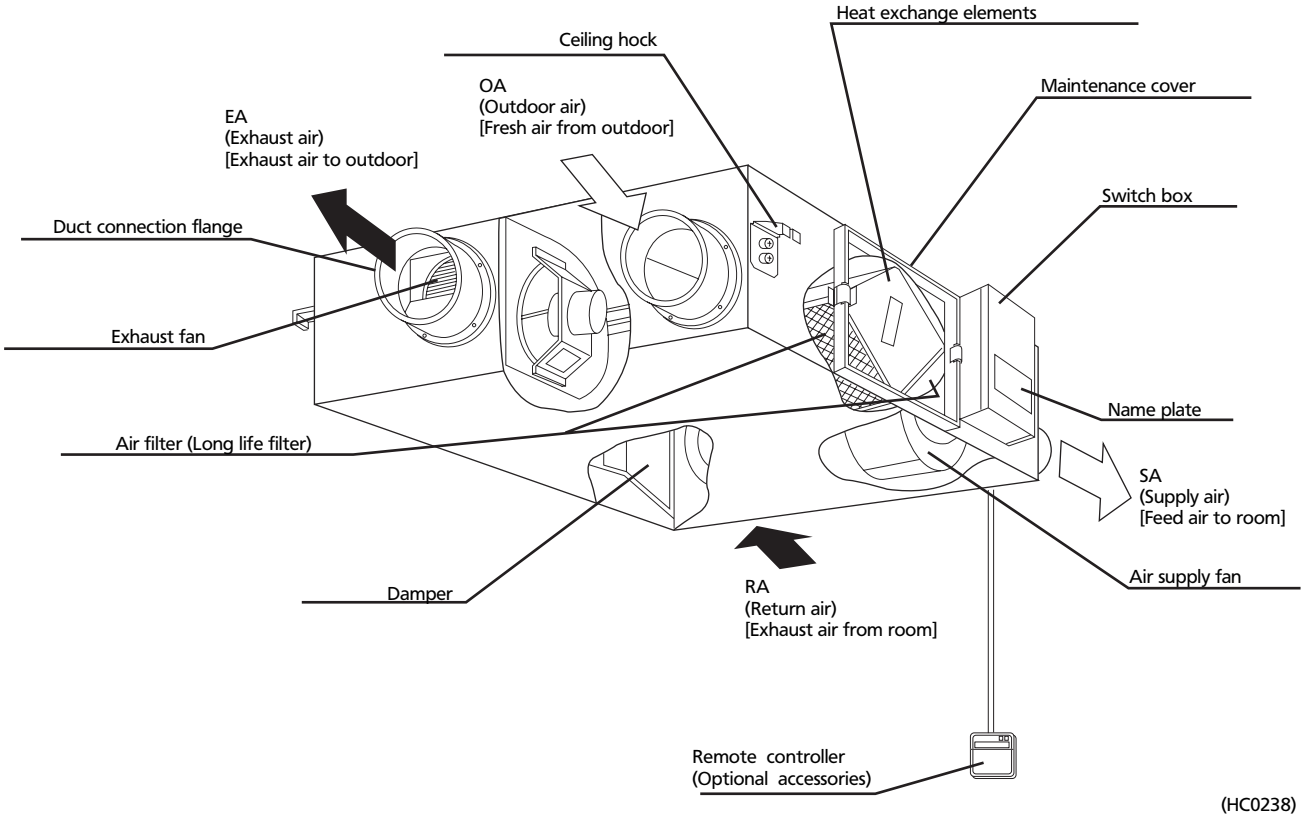
3 Nomenclature



(HC0001)

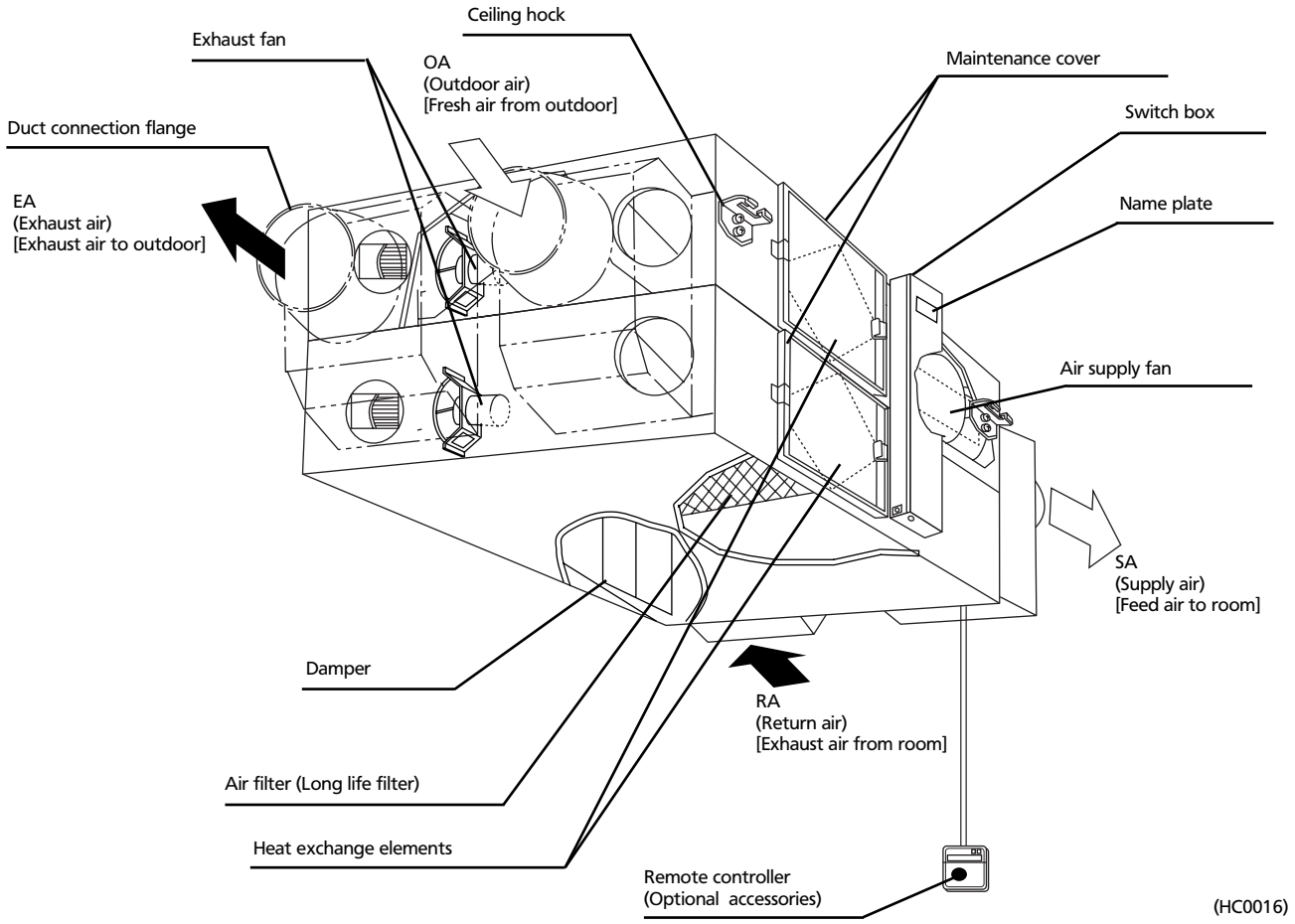
4 Structures

VAM150-1000FA



(HC0238)

VAM1500,2000FA



(HC0016)

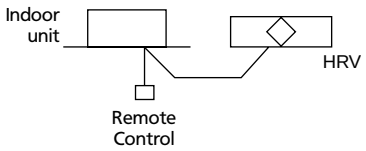
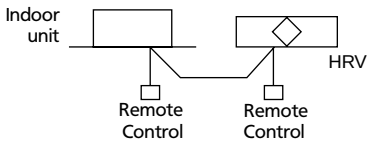
5 Features

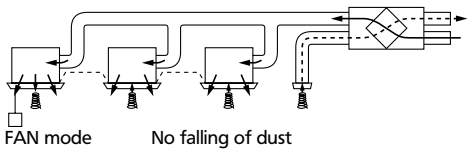
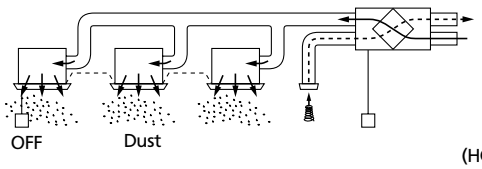
5-1 Interlocked operation with VRV (SkyAir)

1. Simultaneous ON / OFF with the indoor unit by the indoor unit remote control.
2. HRV independent operation during air conditioning off season by the indoor unit remote control.
3. Automatic ventilation mode changeover: Auto / Heat Recovery / Bypass
4. Fan speed changeover by the indoor unit remote control: High / Low, Ultra-High / High, Ultra-High / Low
5. Precooling / heating control function setting to delay the start of ventilation during air conditioner start-up to realize the high energy saving efficiency.
6. FRESH-UP operation setting
7. Filter sign display notifies the time for cleaning the filter
8. No need to purchase or install the HRV exclusive remote control
9. Advantage to IAQ (Internal Air Quality.)

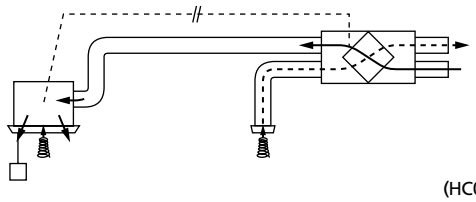
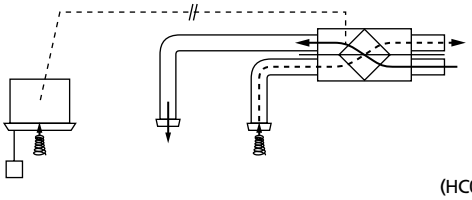
Note:

1. 5-7 can be set at the initial setting only.

Type	Interlocked operation with air conditioner	HRV independent operation
Structure	 (HC0228)	 (HC0229)
Features	• Simultaneous operation by air conditioner's remote control is available • Fan speed can be set at the initial setting.	• Both simultaneous operation by air conditioner's remote control and independent operation by HRV exclusive remote control are available • Fan speed can be changed by switch of HRV (High / Low, High / Ultra-high, Low / Ultra-high)
Connectable Indoor unit	VRV (all indoor unit), SkyAir (Optional connecting PCB is required.)	

Daikin's HRV	Other types
 (HC0006)	 (HC0005)
Dust does not fall off from the air filter because the air supply fan of the interlocked indoor unit remains activated even when the HRV is operated independently.	If conventional HRV, with exclusive remote control, is directly connected to indoor unit of air conditioner, dust may fall off from air filter when air conditioner is OFF.

Installation Examples

Direct duct connection system	Independent duct system
 (HC0007)	 (HC0008)

5 Features

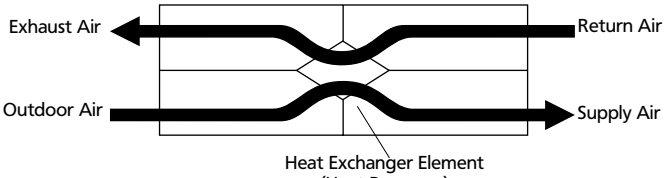
5-2 Energy Saving

By heat recovery operation

Approx. 20% reduction of heating / cooling load

+

HRV unit recovers the thermal energy during cooling / heating operation of air conditioner. HRV reduces the cooling / heating load drastically and enhances the heating / cooling efficiency.



(HC0230)

By setting to automatic ventilation mode

Approx. 6% reduction of heating / cooling load

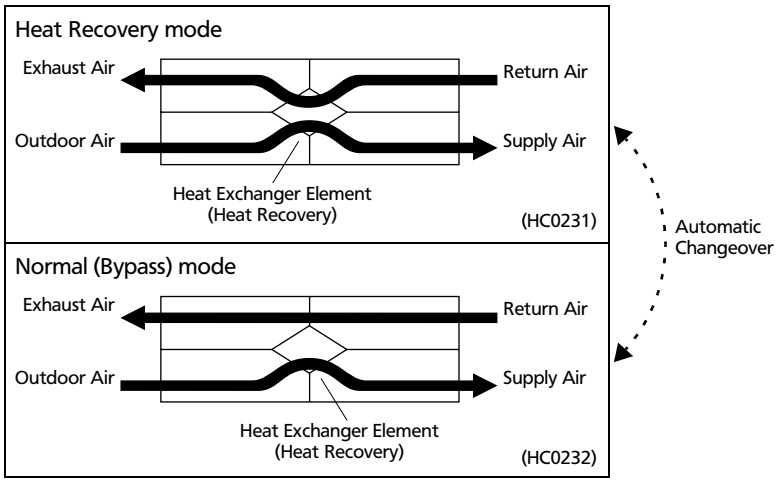
+

Proper use of Heat recovery ventilation and normal ventilation saves energy.
When the cooling operation is required in winter, use of heat recovery ventilation is not efficient because the outdoor air temperature is normally lower than that of the indoor.
Thus, the proper use of ventilation mode enhances the heating / cooling efficiency.

Automatic Ventilation mode changeover

Operation	Sensor of ventilation	Decision of mode (Which is more energy efficient?)
	Difference between indoor / outdoor temp.	
Cooling	Indoor temp. > Outdoor temp Indoor temp. < Outdoor temp.	Normal ventilation (Bypass) Heat recovery ventilation
Heating	Indoor temp. > Outdoor temp. Indoor temp. < Outdoor temp.	Heat recovery ventilation Normal ventilation (Bypass)

Refer to the CONTROL for the mode changeover.

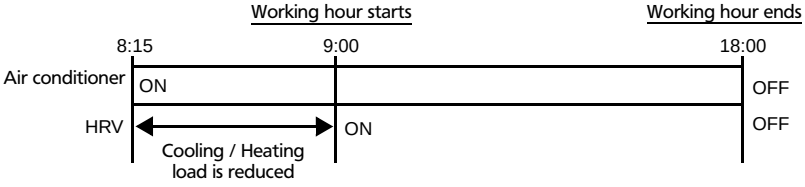


By Precooling / heating operation

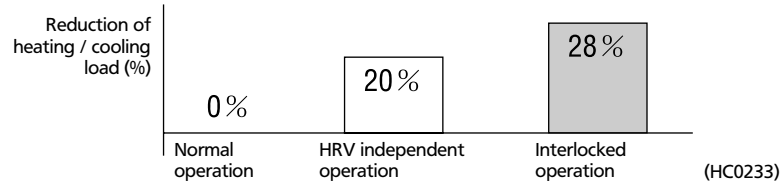
Approx. 2% reduction of heating / cooling load

=

The load is reduced at startup of the air conditioner by the following control.
Before the working hour, the room air is clean.
Therefore, the startup of HRV can be delayed.



Total 28% reduction of heating / cooling load



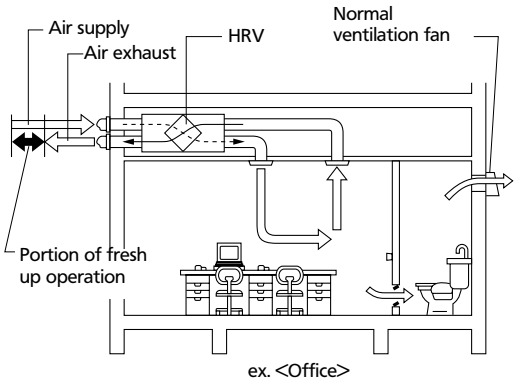
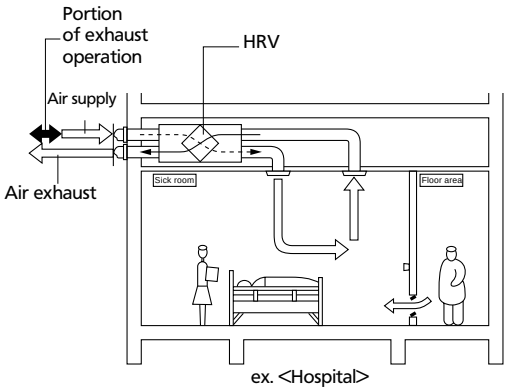
(HC0233)

Note:
1. The total heating / cooling load may vary depending on the climate or the other environmental conditions.

5 Features

5-3 FRESH-UP operation

Both the excessive supply mode and the excessive exhaust mode are selectable.
This function creates a more comfortable air environment.

	Supply Fresh-up (Excessive outdoor air supply)	Exhaust Fresh-up (Excessive Exhaust air supply)
Detail	Supply air volume can be set at a higher level than the exhaust air by the remote control.	Exhaust air volume can be set at a higher level than the supply air by the remote control.
Major effects	• Prevents inflow of toilet odor • Prevents inflow of outdoor air in winter	• Prevents outflow of airborne bacteria from rooms in a hospital • Prevents outflow of odors from rooms in a nursing home
Application	Offices, etc.	Hospitals, Nursing homes, etc.
Example		

5-4 Element (HEP element)

Material

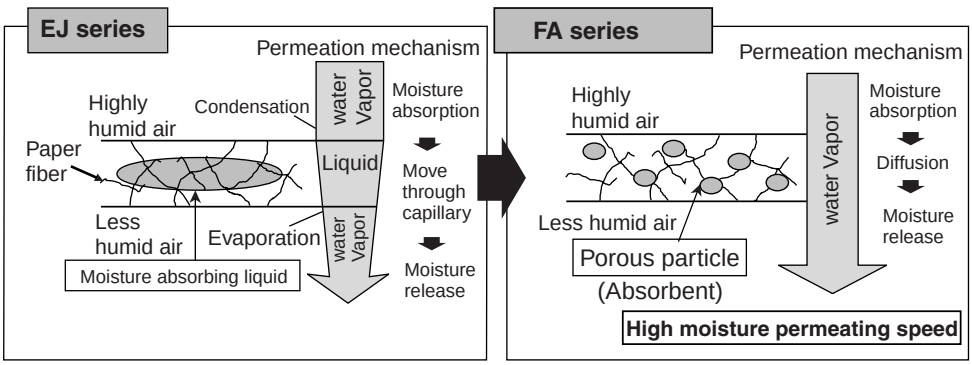
The heat exchanger element adopts a new paper of high permeability. The material recovers exhaust humidity at a speed of 2 times of the previous model.

The material is flame-retardant for safety.
The fungiproof design also keeps the air clean.

Structure

The heat exchanger element is designed without moving parts for higher durability and reliability.
The supply air passage and the exhaust air passage are arranged in right angle to prevent the supply and exhaust air from getting mixed.

(HC0013)



5 Features

5-5 Easy Installation and service maintenance

Downsized

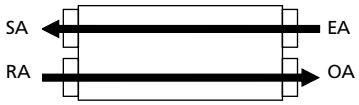
Total volume is reduced to 68% of EJ series and the unit fits into a small space.

(Comparison with FJ and previous EJ series)

Model name	Height			Height Difference (mm)	Volume compared with EJ series
	FJ		EJ		
VAM 500FA	285	←	310	–25	68%
VAM 800FA	348	←	388	–40	70%
VAM1000FA	348	←	388	–40	78%
VAM2000FA	710	←	790	–80	82%

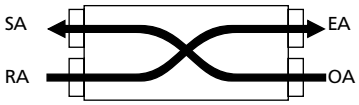
Parallel air flow system (Daikin)

This system prevents misconnection and simplify the installation work.



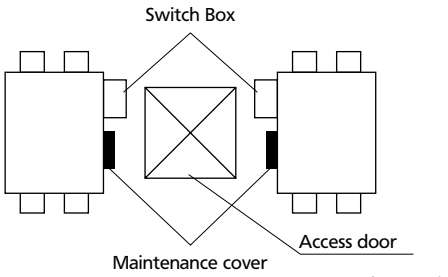
(HC0234)

Cross air flow system



(HC0235)

Service Maintenance



(HC0235)

Upside-down installation is available.
It allows the common use of the access door and reduces the space and installation work.
For 2 units closely installed, only one inspection hole of 450 × 450 mm will do for maintenance or replacement of the heat exchanger element etc.

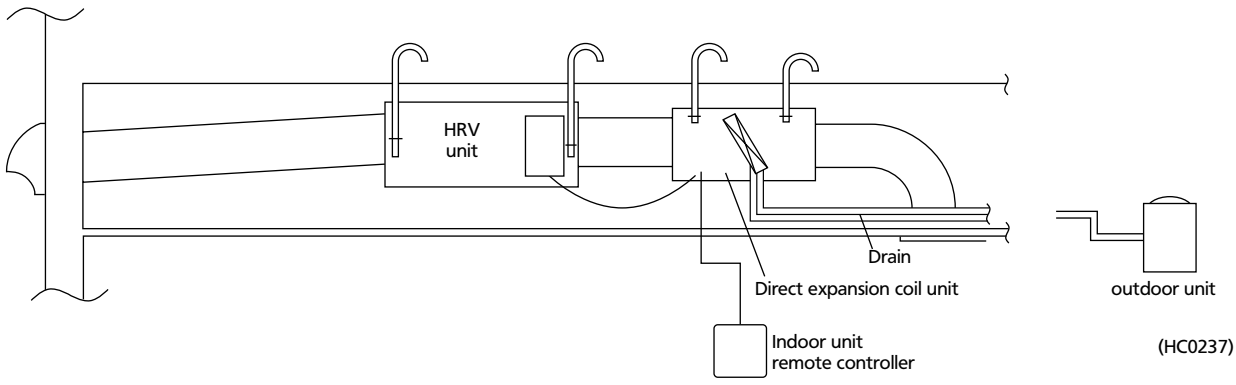
Long life filter is equipped.

5-6 Additional Optional accessories compared with EJ Series

Built-in optional high efficiency filter

It greatly reduces the installation space.
The installation of access doors and the unit can be reduced.

Direct expansion coil



(HC0237)

The direct expansion coil helps to recover approx. 100% of exhaust air heat and prevents unpleasant draft. It can also operate as an air conditioner.
Connectable unit: VRV and HRV.

BRP4A50

Refer to 6.16 Heater control kit (page 145) for the detail.

6 Selection Procedures

Various methods are used to calculate the required ventilating airflow rate according to CO_2 generated by inhabitants in a room, waste gas generated by use of fire, and other conditions of a room.
Here are 2 patterns of calculating methods.

6-1 Based on inhabitants

$$\text{Required ventilating air flow rate } (m^3/h) = \frac{20 \times A}{B}$$

A: 20 × Living room floor space (m^2)
B: Area occupied per person (m^2)

The above equation conforms to article 20, 2 No.2 of the Building Standards Act in Japan.

Note:

1. 20 (in the above equation) means "20(m^3 / h / person)", which is the required ventilating air flow rate based on the CO_2 exhausted by an adult sitting still in a room. If smoking is allowed, other calculation method should be used.
2. Use 10 (m^2) if the area occupied per person exceeds 10 (m^2).

<Table 1>

Type of building	Area occupied per person (N)	Remarks
Eating houses, restaurants, coffee-shops	3 m^2	Floor space of a part used for business purposes.
Cabarets, beer halls	2 m^2	Floor space of a part used for business purposes.
Japanese-style restaurants, hall for hire	3 m^2	Floor space of a part used for business purposes.
Store market	3 m^2	Floor space of a part used for business purposes.
Pool rooms, Ping-pong rooms, dance halls, bowling alleys	2 m^2	Floor space of a part used for business purposes.
Pin-ball parlors, Go club houses, mahjong parlors	2 m^2	Floor space of a part used for business purposes.
Inns, hotels, and motels	10 m^2	Floor space of a part used for business purposes.
Massage parlors	5 m^2	Floor space of a part used for business purposes.
Meeting places, public halls	0.5 – 1 m^2	Persons accommodated simultaneously with the number of persons calculated per unit.
Offices	5 m^2	Floor space of an office.

*: Values set by the Metropolitan Maintenance Bureau in Japan.

Note:

1. Table indicates the required ventilating air flow rate calculated as 20 m^3 / h.
2. The area occupied per person by type of business is calculated in reference to Application Standards for building administration in compliance with Building Standards Act in Japan.

6-2 Based on Room size

$$\text{Required ventilating air flow rate } (m^3/h) = C \times D \times E$$

C: Number of ventilation required per hour (ventilation / h)
D: Area of room (m^2) (See Table 3 of the following page)
E: Height of Ceiling (m) (See table 2)

Calculation is based on the experiences of hygienic laboratory, etc. to find out the number of hourly ventilation of the room air.

(Selection example)
Place: Living room of common household
Required ventilation: 6 times / h (See table 2)
Area of room: Approx. 9.9 (m^2)
Height of ceiling: 2.4 m
Required ventilating air flow rate =

$$6 \times 9.9 \times 2.4 \fallingdotseq \underline{143\ (m^3/h)}$$

Required ventilating air flow rate and the unit size such as 150, 250, 350 .....2000 are almost equal.
So select the close size of the unit.
In this case, select VAM150FJVE.

<Table 2>

Groups	Type of room	Ventilation required
Common household	Living room,	6
	bathroom,	6
	drawing room,	6
	toilet,	10
	kitchen	15
Eating places	Restaurant, sushi restaurant,	6
	banquet hall,	6
	tempura restaurant,	10
	cooking room	20
		20
Inns and hotels	Guest room,	5
	corridor,	5
	dance hall,	8
	large dining hall,	8
	washroom, toilet,	10
	cooking room,	15
	laundry room,	15
	engine room,	20
	boiler room	20
Hospitals	Consultation office,	6
	sick room,	6
	office room,	6
	corridor,	10
	waiting room,	10
	bathroom,	10
	dining room, toilet,	10
	respiratory disease room,	10
	laundry room,	15
	cooking room,	15
	surgery room,	15
	sterilizing room,	15
	engine room,	20
	boiler room	20
Schools	Class room, library,	6
	auditorium,	6
	experimental chemistry room,	6
	gymnasium,	8
	toilet,	12
	cooking room	15

Groups	Type of room	Ventilation required
Playhouses and movie theaters	Audience room,	6
	corridor,	6
	smoking room,	12
	toilet,	12
	projector room	20
Plants	Office room,	6
	general work room,	6
	telephone room,	6
	spinning plant,	10
	printing plant,	10
	battery room,	10
	machinery plant,	10
	generator room,	15
	substation room,	15
	painting shop,	15
	welding plant,	15
	chemical plant,	15
	food plant,	20
	wood working plant,	20
	casting plant	50
General buildings	Office room,	6
	waiting room,	10
	show room, toilet,	10
	conference room	12
Comfort stations		20
Dark rooms	Dark rooms for photo	16
Guest rooms of ship		6
Room of potential noxious gas or combustible gas		20 or more

Note:
Refer to the following pages for the tables.

6 Selection Procedures

6-2 Based on Room size

<Table 3> Criteria for Model Selection

Required ventilating AFR per person (m^3 / h / person)	Area per person (m^2 / person)	Model Name	Frequency	Air Flow Rate		Application area (m^2)
			Hz	L	H	
20	3	VAM 150FA	50	110	150	16.5 – 22.5
			60	110	150	16.5 – 22.5
		VAM 250FA	50	155	250	23.3 – 37.5
			60	145	250	21.8 – 37.5
		VAM 350FA	50	230	350	34.5 – 52.5
			60	210	350	31.5 – 52.5
		VAM 500FA	50	350	500	52.5 – 75.0
			60	300	500	45.0 – 75.0
		VAM 650FA	50	500	650	75.0 – 97.5
			60	440	650	66.0 – 97.5
		VAM 800FA	50	670	800	100.5 – 120.0
			60	660	800	99.0 – 120.0
		VAM1000FA	50	870	1000	130.5 – 150.0
			60	800	1000	120.0 – 150.0
		VAM1500FA	50	1200	1500	180.0 – 225.0
			60	1200	1500	180.0 – 225.0
		VAM2000FA	50	1400	2000	210.0 – 300.0
			60	1400	2000	210.0 – 300.0
	5	VAM 150FA	50	110	150	27.5 – 37.5
			60	110	150	27.5 – 37.5
		VAM 250FA	50	155	250	38.8 – 62.5
			60	145	250	36.3 – 62.5
		VAM 350FA	50	230	350	57.5 – 87.5
			60	210	350	52.5 – 87.5
		VAM 500FA	50	350	500	87.5 – 125.0
			60	300	500	75.0 – 125.0
		VAM 650FA	50	500	650	125.0 – 162.5
			60	440	650	110.0 – 162.5
		VAM 800FA	50	670	800	167.5 – 200.0
			60	660	800	165.0 – 200.0
		VAM1000FA	50	870	1000	217.5 – 250.0
			60	800	1000	200.0 – 250.0
		VAM1500FA	50	1200	1500	300.0 – 375.0
			60	1200	1500	300.0 – 375.0
		VAM2000FA	50	1400	2000	350.0 – 500.0
			60	1400	2000	350.0 – 500.0
	10	VAM 150FA	50	110	150	55.0 – 75.0
			60	110	150	55.0 – 75.0
		VAM 250FA	50	155	250	78.0 – 125.0
			60	145	250	72.0 – 125.0
		VAM 350FA	50	230	350	115.0 – 175.0
			60	210	350	105.0 – 175.0
		VAM 500FA	50	350	500	175.0 – 250.0
			60	300	500	150.0 – 250.0
		VAM 650FA	50	500	650	250.0 – 325.0
			60	440	650	220.0 – 325.0
		VAM 800FA	50	670	800	335.0 – 400.0
			60	660	800	330.0 – 400.0
		VAM1000FA	50	870	1000	435.0 – 500.0
			60	800	1000	400.0 – 500.0
		VAM1500FA	50	1200	1500	600.0 – 750.0
			60	1200	1500	600.0 – 750.0
		VAM2000FA	50	1400	2000	700.0 – 1000.0
			60	1400	2000	700.0 – 1000.0

6 Selection Procedures

6-2 Based on Room size

Required ventilating AFR per person (m^3 / h / person)	Area per person (m^2 / person)	Model Name	Frequency	Air Flow Rate		Application area (m^2)
			Hz	L	H	
40	3	VAM 150FA	50	110	150	8.3 – 11.3
			60	110	150	8.3 – 11.3
		VAM 250FA	50	155	250	11.6 – 18.8
			60	145	250	10.9 – 18.8
		VAM 350FA	50	230	350	17.3 – 26.3
			60	210	350	15.8 – 26.3
		VAM 500FA	50	350	500	26.3 – 37.5
			60	300	500	22.5 – 37.5
		VAM 650FA	50	500	650	37.5 – 48.8
			60	440	650	33.0 – 48.8
		VAM 800FA	50	670	800	50.3 – 60.0
			60	660	800	49.5 – 60.0
		VAM1000FA	50	870	1000	65.3 – 75.0
			60	800	1000	60.0 – 75.0
		VAM1500FA	50	1200	1500	90.0 – 112.5
			60	1200	1500	90.0 – 112.5
		VAM2000FA	50	1400	2000	105.0 – 150.0
			60	1400	2000	105.0 – 150.0
	5	VAM 150FA	50	110	150	13.8 – 18.8
			60	110	150	13.8 – 18.8
		VAM 250FA	50	155	250	19.4 – 31.3
			60	145	250	18.1 – 31.3
		VAM 350FA	50	230	350	28.8 – 43.8
			60	210	350	26.3 – 43.8
		VAM 500FA	50	350	500	43.8 – 62.5
			60	300	500	37.5 – 62.5
		VAM 650FA	50	500	650	62.5 – 81.3
			60	440	650	55.0 – 81.3
		VAM 800FA	50	670	800	83.8 – 100.0
			60	660	800	82.5 – 100.0
		VAM1000FA	50	870	1000	108.8 – 125.0
			60	800	1000	100.0 – 125.0
		VAM1500FA	50	1200	1500	150.0 – 187.5
			60	1200	1500	150.0 – 187.5
		VAM2000FA	50	1400	2000	175.0 – 250.0
			60	1400	2000	175.0 – 250.0
	10	VAM 150FA	50	110	150	27.5 – 37.5
			60	110	150	27.5 – 37.5
		VAM 250FA	50	155	250	38.8 – 62.5
			60	145	250	36.3 – 62.5
		VAM 350FA	50	230	350	57.5 – 87.5
			60	210	350	52.5 – 87.5
		VAM 500FA	50	350	500	87.5 – 125.0
			60	300	500	75.0 – 125.0
		VAM 650FA	50	500	650	125.0 – 162.5
			60	440	650	110.0 – 162.5
		VAM 800FA	50	670	800	167.5 – 200.0
			60	660	800	165.0 – 200.0
		VAM1000FA	50	870	1000	217.5 – 250.0
			60	800	1000	200.0 – 250.0
		VAM1500FA	50	1200	1500	300.0 – 375.0
			60	1200	1500	300.0 – 375.0
		VAM2000FA	50	1400	2000	350.0 – 500.0
			60	1400	2000	350.0 – 500.0

Note:

1. AFR: Air Flow Rate

7 Product Specification

1 7

7-1 Specifications

7-1-1 Technical specifications

(50Hz)

Model name				VAM150FA	VAM250FA	VAM350FA
Power supply				Single phase 220 – 240 V / 50Hz		
Temperature exchanging efficiency		Ultra-High	%	74	72	75
		High	%	74	72	75
		Low	%	79	77	80
Enthalpy exchange efficiency	Cooling	Ultra-High	%	58	58	61
		High	%	58	58	61
		Low	%	64	62	67
	Heating	Ultra-High	%	64	64	65
		High	%	64	64	65
		Low	%	69	68	70
Normal input	Heat exchange mode	Ultra-high	W	116	141	194
		High	W	100	112	175
		Low	W	56	60	111
	Bypass mode	Ultra-high	W	116	141	194
		High	W	100	112	175
		Low	W	56	62	111
Normal Amp.	Heat exchange mode	Ultra-high	A	0.67	0.72	1.00
		High	A	0.57	0.57	0.85
		Low	A	0.33	0.32	0.54
	Bypass mode	Ultra-high	A	0.67	0.72	1.00
		High	A	0.57	0.57	0.85
		Low	A	0.33	0.32	0.54
Casing				Galvanized steel plate		
Insulating material				Self-extinguishable urethane foam		
Dimensions		H × W × D	mm	269 × 760 × 509	269 × 760 × 509	285 × 812 × 800
Heat exchanging system				Air to air cross flow total heat (sensible heat + latent heat) exchange		
Heat exchanging element				Specially processed nonflammable paper		
Air filter				Multidirectional fibrous fleeces		
Fan	Type			Sirroco fan		
	Fan speed	Ultra-High	m^3 / h	150	250	350
		High	m^3 / h	150	250	350
		Low	m^3 / h	110	155	230
	External static pressure	Ultra-High	Pa	69	64	98
		High	Pa	39	39	70
		Low	Pa	20	20	25
Fan motor			Type	Open type capacitor permanent split-phase induction motor, 4 poles × 2		
Motor output			kW	0.030 × 2	0.030 × 2	0.090 × 2
Sound pressure level	Heat exchange mode	Ultra-High	dBA	27 – 28.5	28 – 29	32 – 34
		High	dBA	26 – 27.5	26 – 27	31.5 – 33
		Low	dBA	20.5 – 21.5	21 – 22	23.5 – 26
	Bypass mode	Ultra-High	dBA	27 – 28.5	28 – 29	32 – 34
		High	dBA	26.5 – 27.5	27 – 28	31 – 32.5
		Low	dBA	20.5 – 21.5	21 – 22	24.5 – 26.5
Operation range (Ambient)				–15 °C to 50 °CDB (80% RH or less)		
Connection duct diameter			mm	ϕ 100	ϕ 150	ϕ 150
Weight			kg	24	24	33
Drawing number				4D036749	4D036750	4D036751

(HC0049)

Test conditions are as follows

Condition	Indoor		Outdoor	
	°CDB	R·H (%)	°CDB	R·H (%)
Cooling condition	27	50	35	60
Heating condition	20	40	7	70

Notes:

1. Operation sound is measured at 1.5 m below the center the body.
2. Fan speed can be changed over to Low mode or High mode.
3. Operating sound is measured in an anechoic chamber.
   Operating sound level generally become greater than this value depending on the operating conditions, reflected sound, and peripheral noise.
4. The sound level at the air discharge port is about 8 dB higher than the unit's operating sound.

7 Product Specification

7-1 Specifications

7-1-1 Technical specifications

(50Hz)

Model name					VAM500FA	VAM650FA
Power supply					Single phase 220 – 240 V / 50Hz	
Temperature exchanging efficiency			**Ultra-High**	%	**74**	**74**
			High	%	**74**	**74**
			Low	%	**77**	**77**
Enthalpy exchange efficiency		**Cooling**	**Ultra-High**	%	**58**	**58**
			High	%	**58**	**58**
			Low	%	**63**	**63**
		Heating	**Ultra-High**	%	**62**	**63**
			High	%	**62**	**63**
			Low	%	**67**	**66**
Normal input		Heat exchange mode	Ultra-high	W	212	380
			High	W	189	325
			Low	W	118	227
		Bypass mode	Ultra-high	W	212	380
			High	W	189	325
			Low	W	118	227
Normal Amp.		Heat exchange mode	Ultra-high	A	1.02	1.81
			High	A	0.87	1.55
			Low	A	0.55	1.08
		Bypass mode	Ultra-high	A	1.02	1.81
			High	A	0.87	1.55
			Low	A	0.55	1.08
Casing					Galvanized steel plate	
Insulating material					Self-extinguishable urethane foam	
Dimensions			**H × W × D**	**mm**	**285 × 812 × 800**	**348 × 988 × 852**
Heat exchanging system					Air to air cross flow total heat (sensible heat + latent heat) exchange	
Heat exchanging element					Specially processed nonflammable paper	
Air filter					Multidirectional fibrous fleeces	
Fan	Type				Sirroco fan	
	Fan speed		**Ultra-High**	**m^3 / h**	**500**	**650**
			High	**m^3 / h**	**500**	**650**
			Low	**m^3 / h**	**350**	**500**
	External static pressure		**Ultra-High**	**Pa**	**98**	**93**
			High	**Pa**	**54**	**39**
			Low	**Pa**	**25**	**25**
Fan motor				**Type**	Open type capacitor permanent split-phase induction motor, 4 poles × 2	
Motor output				**kW**	**0.090 × 2**	**0.140 × 2**
Sound pressure level		Heat exchange mode	**Ultra-High**	**dBA**	**33 – 34.5**	**34.5 – 35.5**
			High	**dBA**	**31.5 – 33**	**33 – 34**
			Low	**dBA**	**24.5 – 26.5**	**27 – 28**
		Bypass mode	**Ultra-High**	**dBA**	**33.5 – 34.5**	**34.5 – 35.5**
			High	**dBA**	**32.5 – 33.5**	**34 – 35**
			Low	**dBA**	**25.5 – 27.5**	**27 – 28.5**
Operation range (Ambient)					–15 °C to 50 °CDB (80% RH or less)	
Connection duct diameter				**mm**	**ϕ 200**	**ϕ 200**
Weight				**kg**	**33**	**48**
Drawing number					**4D036752**	**4D036753**

(HC0050)

Test conditions are as follows

Condition	Indoor		Outdoor	
	°CDB	R·H (%)	°CDB	R·H (%)
Cooling condition	**27**	**50**	**35**	**60**
Heating condition	**20**	**40**	**7**	**70**

Notes:

1. Operation sound is measured at 1.5 m below the center the body.
2. Fan speed can be changed over to Low mode or High mode.
3. Operating sound is measured in an anechoic chamber.
   Operating sound level generally become greater than this value depending on the operating conditions, reflected sound, and peripheral noise.
4. The sound level at the air discharge port is about 8 dB higher than the unit's operating sound.

7 Product Specification

7-1 Specifications

7-1-1 Technical specifications

(50Hz)

Model name				VAM800FA	VAM1000FA	VAM1500FA	VAM2000FA
Power supply				Single phase 220 – 240 V / 220 V, 50 / 60 Hz			
Temperature exchanging efficiency		Ultra-High	%	74	75	75	75
		High	%	74	75	75	75
		Low	%	76	76.5	78	78
Enthalpy exchange efficiency	Cooling	Ultra-High	%	60	61	61	61
		High	%	60	61	61	61
		Low	%	62	63	64	66
	Heating	Ultra-High	%	65	66	66	66
		High	%	65	66	66	66
		Low	%	67	68	68	70
Power supply				Single phase 220-240 V, 50Hz / 220V, 60Hz			
Normal Amp.	Heat exchange mode	Ultra-High	A	2.53	2.46	4.97	5.00
		High	A	2.15	2.16	4.12	3.97
		Low	A	1.79	1.74	3.43	3.27
	bypass mode	Ultra-High	A	2.53	2.46	4.97	5.00
		High	A	2.15	2.16	4.12	4.77
		Low	A	1.79	1.74	3.43	3.27
Normal input	Heat exchange mode	Ultra-High	W	451	469	864	953
		High	W	400	432	758	767
		Low	W	346	349	655	653
	bypass mode	Ultra-High	W	451	469	864	953
		High	W	400	432	758	767
		Low	W	346	349	655	653
Casing				Galvanized steel plate			
Insulating material				Self-extinguishable urethane foam			
Dimensions		H × W × D	mm	348 × 988 × 852	348 × 988 × 1140	710 × 1498 × 852	710 × 1498 × 1140
Heat exchanging system				Air to air cross flow total heat (sensible heat + latent heat) exchange			
Heat exchanging element				Specially processed nonflammable paper			
Air filter				Multidirectional fibrous fleeces			
Fan	Type			Sirroco fan			
	Air flow rate	Heat exchange mode	Ultra-High	m^3 / h	800	1000	1500	2000
			High	m^3 / h	800	1000	1500	2000
			Low	m^3 / h	670	870	1200	1400
		Bypass mode	Ultra-High	m^3 / h	800	1000	1500	2000
			High	m^3 / h	800	1000	1500	2000
			Low	m^3 / h	670	870	1200	1400
	External static pressure		Ultra-High	Pa	137	157	137	137
			High	Pa	98	98	98	78
			Low	Pa	49	78	49	59
Motor output				kW	0.230 × 2	0.230 × 2	0.230 × 4	0.230 × 4
Operating sound	Heat exchange mode		Ultra-High	dBA	36 – 37	36 – 37	39.5 – 41.5	40 – 42.5
			High	dBA	34.5 – 36	35 – 36	38 – 39	38 – 41
			Low	dBA	31 – 32	31 – 32	34 – 36	35 – 37
	Byapss mode		Ultra-High	dBA	36 – 37	36 – 37	40.5 – 41.5	40 – 42.5
			High	dBA	34.5 – 36	35.5 – 36	38 – 39	38 – 41
			Low	dBA	31 – 33	31 – 32	33.5 – 36	35 – 37
Operation range (Ambient)				–15 °C to 50 °CDB (80% RH or less)			
Connection duct diameter			mm	ϕ 250	ϕ 250	ϕ 350	ϕ 350
Weight			kg	48	61	132	158
Operation mode				Heat exchange mode, bypass mode, freshup mode			
Accessories				Operation manual, installation manual			
Drawing number				4D036754	4D036755	4D036756	4D036835

(HC0051)

7 Product Specification

7-1 Specifications

7-1-1 Technical specifications

Test conditions are as follows

Condition	Indoor unit		Outdoor unit	
	°CDB	R·H (%)	°CDB	R·H (%)
Cooling condition	27	50	35	60
Heating condition	20	40	7	70

Notes:

1. Operation sound is measured at 1.5 m below the center the body.
2. Air flow rate can be changed over to Low mode or High mode.
3. Normal Amp., input, efficiency depend on the other above conditions.
4. Operating sound is measured in an anechoic chamber.
   Operating sound level generally become greater than this value depending on the operating conditions, reflected sound, and peripheral noise.
5. The noise level at the air discharge port is about 8 dBA higher than the unit's operating sound.
6. The specifications, designs and information here are subject to change without notice.

7 Product Specification

7-1 Specifications

7-1-2 Electrical specifications

Units			Power supply		FM	
Model name	50Hz	60Hz	MCA	MFA	kW	FLA
VAM150FA	Power supply max.264V min.198V	Power supply max. 242V min.138V	0.9	15	0.03 × 2	0.4 × 2
VAM250FA			0.9	15	0.03 × 2	0.4 × 2
VAM350FA			1.35	15	0.03 × 2	0.6 × 2
VAM500FA			1.35	15	0.03 × 2	0.6 × 2
VAM650FA			2.3	15	0.14 × 2	1.0 × 2
VAM800FA			3.4	15	0.23 × 2	1.5 × 2
VAM1000FA			3.4	15	0.23 × 2	1.5 × 2
VAM1500FA			6.75	15	0.23 × 4	1.5 × 4
VAM2000FA			6.75	15	0.23 × 4	1.5 × 4

SYMBOLS:

MCA: min. circuit amps. (A)
MFA: max. fuse amps. (A) (See note 5)
FM: fan motor
FLA: full load amps. (A)
kW: fan motor rated output (kW)

NOTES:

1. Voltage range units are suitable for use on the electrical systems where the voltage supplied to the unit terminals is not below or above the listed range limits.
2. Maximum allowable voltage variation between phases is 2 %.
3. MCA/MFA
   $MCA = 1.25 \times FLA_{(fm1)} + FLA_{(fm2)}$
   $MFA \leq 4 \times FLA$
   (VAM2000FA5/8VE is regarded as 2 × VAM1000FA5/8VE)
4. Select wire size based on the value of MCA.
5. Instead of the fuse, use the circuit breaker.

4D036862

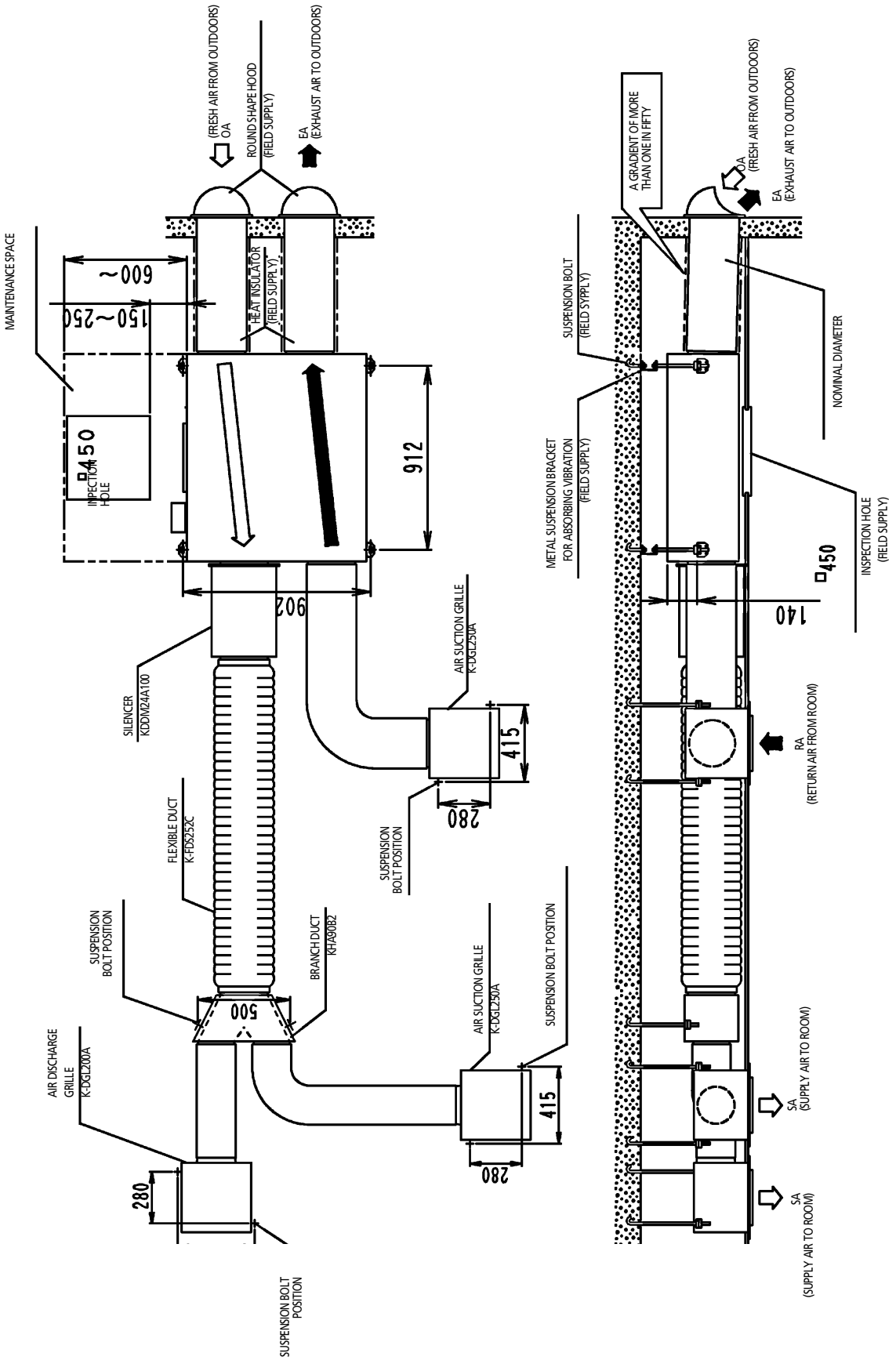
Specifications for field supplied fuses and wire

Model	Type	Power supply wiring			Transmission wiring	
		Field supplied fuses	Wire	Size	Wire	Size
VAM150FA VAM250FA VAM350FA VAM500FA VAM600FA VAM800FA VAM1000FA VAM1500FA VAM2000FA	VE	15A	H05VV-U3G	Wire size must comply with local codes.	Shield wire (2 wire)	0.75 – 1.25 mm^2

7 Product Specification

7-2 Optional accessories

Installation example



7 Product Specification

7-2 Optional accessories

Optional Accesories

Item			Model	VAM150FA	VAM250FA	VAM350FA	VAM500FA	VAM650FA
Controlling device	Remote control			BRC301B61				
	Wired remote controller			BRC1D52				
	Centralized controlling device	Central remote control		DCS302C51 (for general) DCS302C51 (For EC market)				
		Unified On/Off control		DCS301B61 (for general) DCS301B51 (For EC market)				
		schedule timer		DST301B51 (for general) DST301B51 (For EC market)				
	PC board adapter			KRP2A61 (for general) KRP2A51 (for EC market)				
				KRP50-2				
				KRP50-2A90 (Mounted electric component assy of HRV)				
				BRP4A50				

Additional function	Silencer	Model name		-	-	-	**KDDM24A50 Ø 200**	**KDDM24A100 Ø 200**
		Nominal pipe diameter (mm)		-	-	-		
	Air filter for replacement			YAFF323F15	YAFF323F25	YAFF323F35	YAFF323F50	YAFF323F65
	High efficiency filter			YAFF323F15	YAFF323F25	YAFF323F35	YAFF323F150	YAFF323F65
Duct adapter				-	-	-	-	-
		Nominal pipe diameter (mm)		-	-	-	-	-
Duct adapter				-	-	-	VKM50G	VKM80G
Adapter for discharge				-	-	-	KDAJ25K36	KDA25K56

Item			Model	VAM800FA	VAM100FA	VAM1500FA	VAM2000FA
Controlling device	Remote control			BRC301B61			
	Wired remote controller			BRC1D52			
	Centralized controlling device	Central remote control		DCS302C51 (for general) DCS302C51 (For EC market)			
		Unified On/Off control		DCS301B61 (for general) DCS301B51 (For EC market)			
		schedule timer		DST301B51 (for general) DST301B51 (For EC market)			
	PC board adapter	Wiring adapter for electrical appandices		KRP2A61 (for general) KRP2A51 (For EC market)			
		For humidifier		KRP50-2			
		Installation box for adapte PCB		KRP50-2A90 (Mounted electric component assy of HRV)			
		For heater kit		BRP4A50			

Additional function	Silencer	Model name		**KDDM24A100 Ø 250**	**KDDM24A100 Ø 250**	**KDDM24A100x2 Ø 250**	**KDDM24A100x2 Ø 250**
		Nominal pipe diameter (mm)					
	Air filter for replacement			YAFF323F65	YAFF323F100	YAFF323F65x2	YAFF323F100x2
	High efficiency filter			YAFF323F65	YAFF323F100	YAFF323F165x2	YAFF323F100x2
Duct adapter				-	-	YDFA25A1 Ø 250	YDFA25A1 Ø 250
		Nominal pipe diameter (mm)					
Duct adapter				VKM80G	KKM100G	-	-
Adapter for discharge				KDAJ25K56	KDAJ25K56	-	-

Interlock adapter for VRV

Indoor unit	FXYC-K	FXYK-K	FXYF-K	FXYS-K	FXYH-K	FXYA-K	FXYL(M)-KJ	FXYM-K(J)
Adapter for wiring	KRP1B61 *	KRP1B61	KRP1B2 *	KRP1B61		KRP1B3	KRP1B61	
Installation box for adapter PCB **	KRP1B96 Note 2,3	-	KRP1C98 Note 4	-	-	KRP1B93 Note 3	-	-

Notes:

1. Installation box market with ** is required for each adapter marked *.
2. Up to 2 adapters can be fixed for each installation box.
3. Only one installation box can be installed for each indoor unit.
4. Up to 2 adapters can be fixed for each indoor unit.
5. Flexible duct size *** is for the duct from HRV unit to branch duct (or air outlet)

3TW24921-1A

7 Product Specification

7-2 Optional accessories

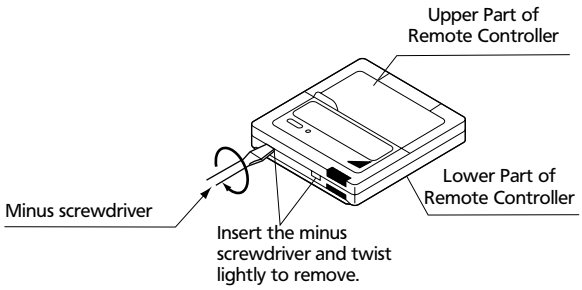
7-2-1 BRC301B61: Remote control

7-2-1-1 Remote control mounting instructions

1. Remove the upper part of remote control.

Insert minus screwdriver into the slots in the lower part of remote controller (2 places), and remove the upper part of remote control.

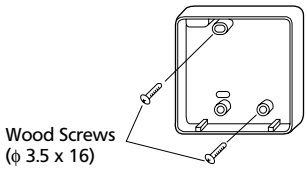
The PC board is mounted in the upper part of remote controller. Be careful not to damage the board with the minus screwdriver.

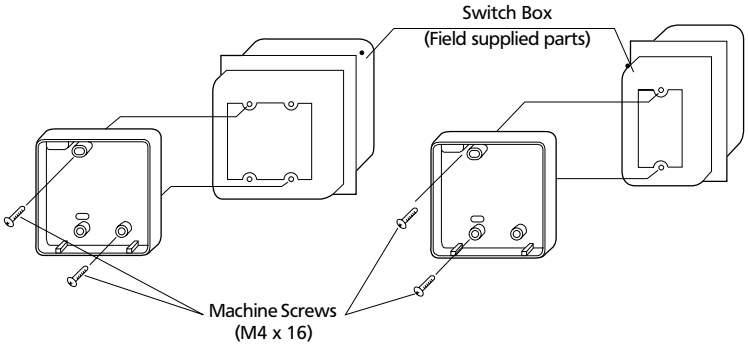


2. Fasten the remote control.

① For exposed mounting, fasten with the included wood screws (2).

② For flush-mounting, fasten with the included machine screws (2).





For the field supplied switch box, use optional accessories KJB111A or KJB211A.

NOTE

Choose the flattest place possible for the mounting surface. Be careful not to damage the shape of the lower part of remote controller by over-tightening the mounting screws.

(HC0111)
2P034150

7 Product Specification

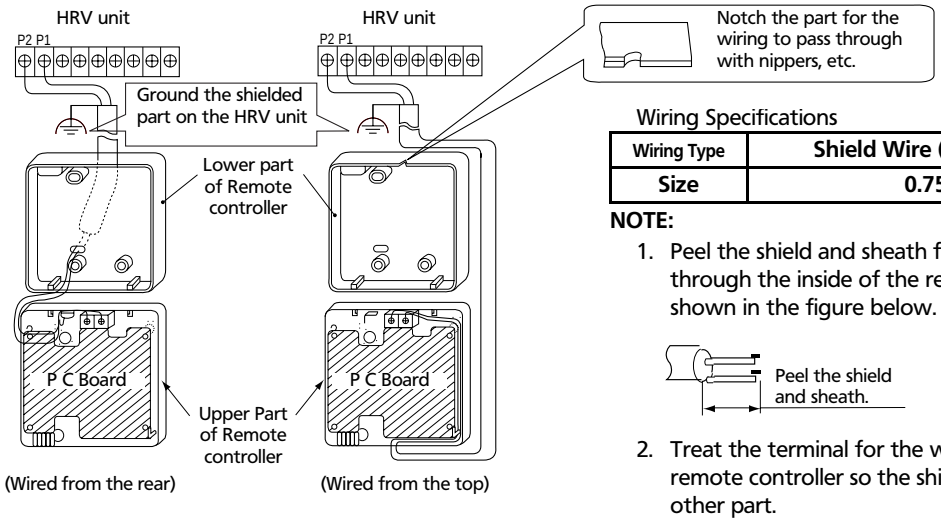
7-2 Optional accessories

7-2-1 BRC301B61: Remote control

7-2-1-1 Remote control mounting instructions

3. Wire the HRV unit.
Connect the terminals on the upper part of the remote
controller (P1, P2) and the terminals of the HRV unit (P1, P2).
(P1 and P2 do not have polarity.)

NOTE
When wiring, run the wiring away the power supply wiring in order to avoid receiving electric noise (external noise).



Wiring Specifications

Wiring Type	Shield Wire (2 wire) (See NOTE 3)
Size	0.75 – 1.25 mm²

NOTE:

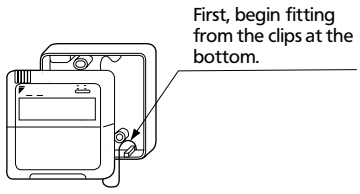
1. Peel the shield and sheath for the part that is to pass through the inside of the remote controller case, as shown in the figure below.

2. Treat the terminal for the wire to be connected to the remote controller so the shielded part doesn't touch any other part.
3. Sheathed wire may be used for transmission wirings, but they do not comply with EMC (Electromagnetic Compatibility) (European Directive). When using sheathed wire. EMC must conform to Japanese standards stipulated in the Electric Appliance Regulatory Act. (If using a sheathed wire, the grounding shown in the figure on the left is unnecessary.)

4. Reattach the upper part of remote controller.
Be careful not to pinch the wiring when attaching.

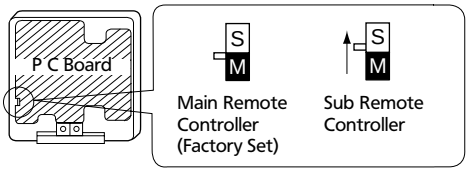
NOTE

1. The switch box and wiring for connection are not included.
2. Do not directly touch the PC board with your hand.



When controlling one HRV unit with two remote controllers

Change the MAIN/SUB changeover switch setting as described below.



Set one remote controller to "main," and the other to "sub."

NOTE

- If controlling with one remote controller, be sure to set it to "main."
- Set the remote controller before turning power supply on.

" 88 " is displayed for about one minute when the power supply is turned on, and the remote controller cannot be operated in some cases.

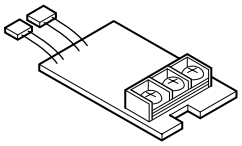
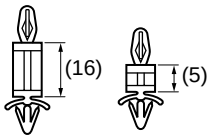
(HC0112)
2P034150

7 Product Specification

7-2 Optional accessories

7-2-2 KRP50-2: Wiring adapter for remote contact / Humidifier KRP50-2A90: Installation box for adapter PCB

Components

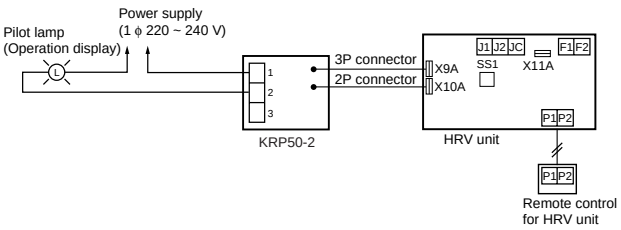
1. KRP50-2 PCB (×1)	2. PCB catches (4 large, 4 small)
 (HC0113)	 Either large or small catches are used, depending on the model (HC0114)
Tie wrap.....(×1)	Manual .....(×1)

Installation guide

1 The KRP50-2 can be connected to HRV units as follows to send the operation signal (pilot lamp etc.) to remote locations.

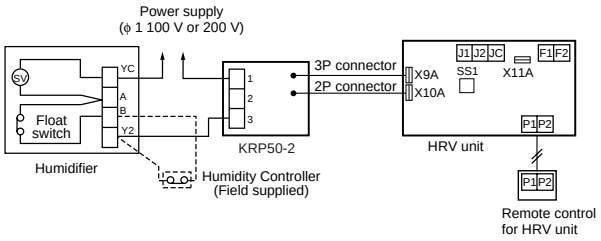
Electric wiring is as follows.

• For Remote contact



(HC0253-1)

• For Humidifier



(HC0115-1)

2 KRP50-2 can also be connected to SkyAir indoor unit for the interlocked operation with HRV units. Or to be connected and used for the adapter for outside air preheater.

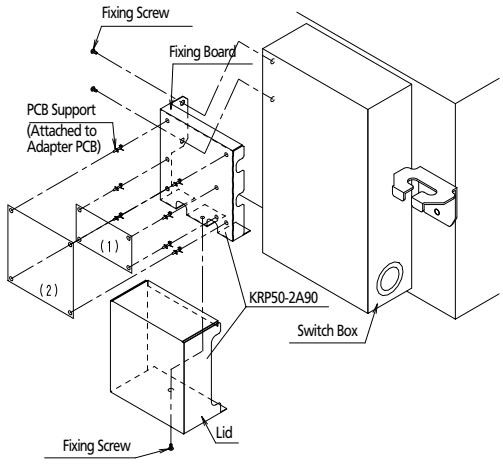
Components

See the right for components.

Fixing Screw	3 PCS.
Clamp	2 PCS.

Installation

Install the Adapter PCB to the outside of switch box. for HRV unit as show below.



Applicable adapter

	Adapter name	Kit name
(1)	Adapter PCB for Humidifier	KRP50-2
(2)	Adapter PCB for Remote control	KRP2A61

4P055444

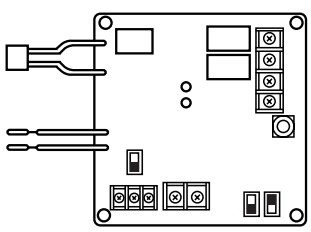
7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

KRP2A51 (For Europe)
KRP2A61 (For General)

Accessories
Check the following accessories are included in the kit before the installation.

Wiring Adapter for Electrical Appendices (1)
 × 1

PCB support	× **4**
Clamp	× **3**
Installation Manual	× **1**

Notes:
- The kit type (KRP2A61 • 51 type, KRP2A62 • 52 type) varies according to air conditioner model.
- The installation plate and box for adapter PCB are required with the following air conditioner models.
  FXYFP .....KRP1A90 or KRP1B94
  FXYFP KRP1C98
  FXH KRP1B93
  FXYCP KRP1B96

General description of system
The KRP2A61 • 62 • 51 • 52 enables operation by remote control (ON/OFF control, temperature setting, operation display, error display). With it, the following system can be built. Note however that the adapter cannot be used with other optional controllers for centralized control.

1. Zone control
   (Unified control of a max. 64 groups of a max. 16 indoor units each.
   But, the max. of indoor units is 128.)

This system requires the following parts.
- Wiring Adapter for Electrical Appendices (1)
  …KRP2A61(62) or KRP2A51(52)
- Remote controller switches (For control)
  …BRC1C517
  BRC2A51
  BRC3A61
  } Per group

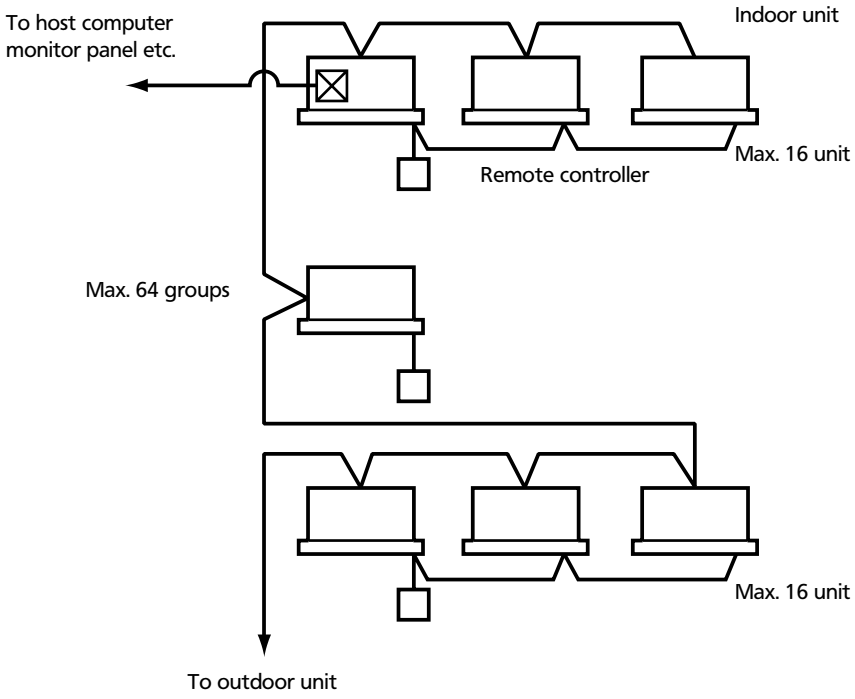
(Ex.) Zone control for 8 FXYC63KVE units (control groups of 4, 3 and 1)
KRP2A51 × 1 kit
BRC1C517 × 3 kits
} (1 set required for each group.)

(HC0116)

7 Product Specification

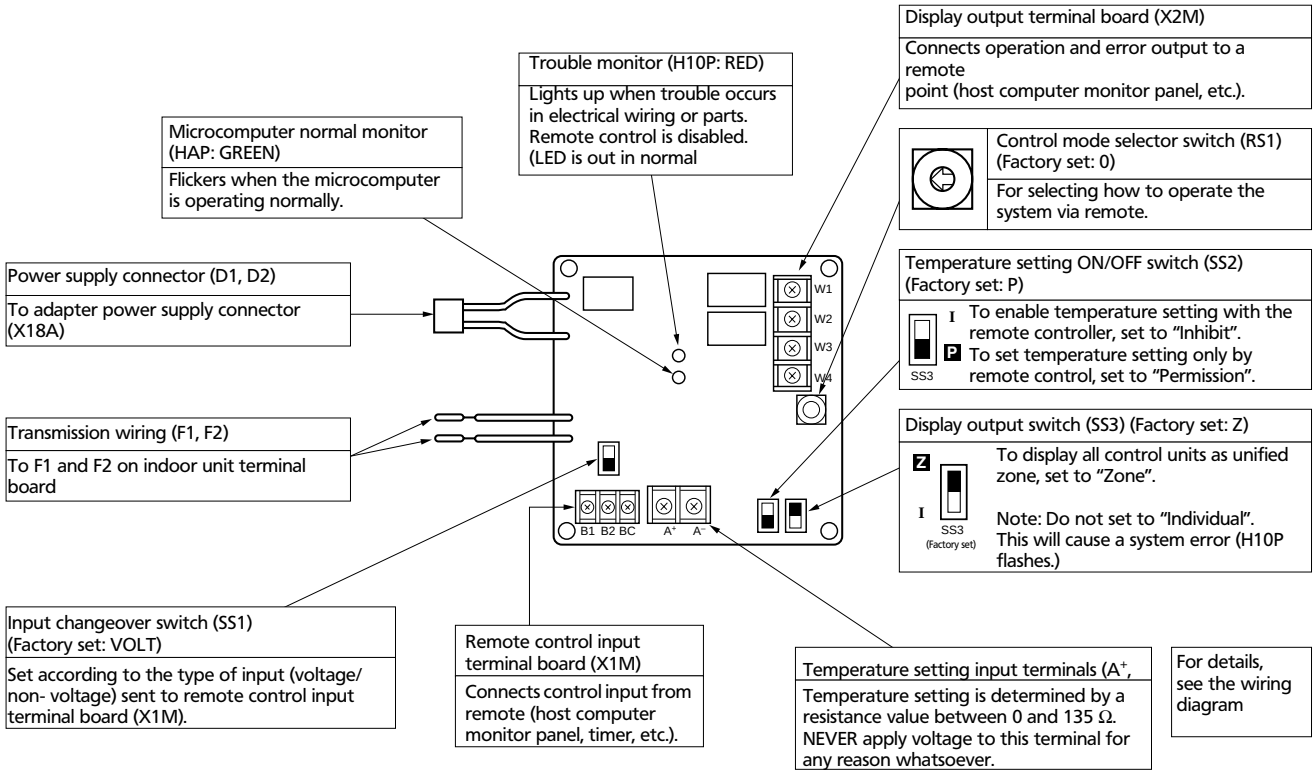
7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices



Notes:
Individual indoor units connected to the centralized line cannot be displayed individually.

Names of parts and functions



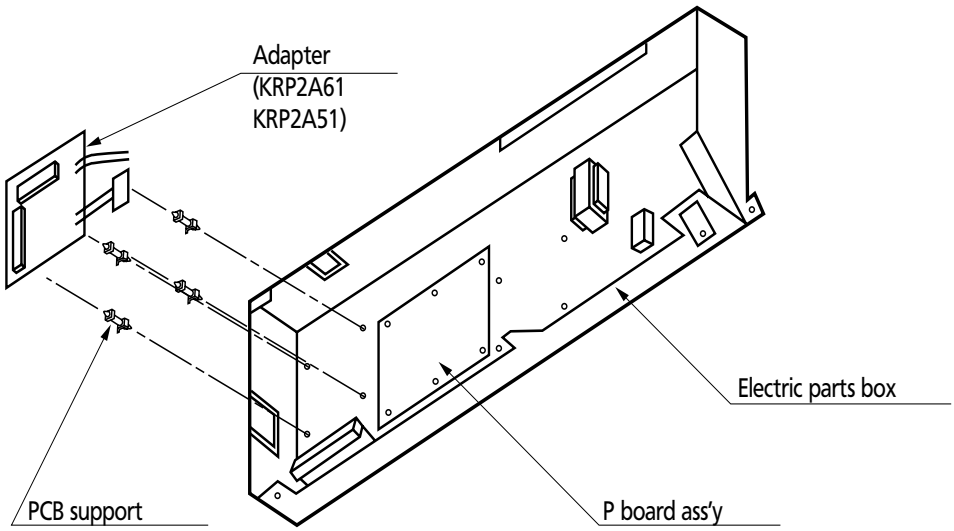
(HC0117)

7 Product Specification

7-2 Optional accessories

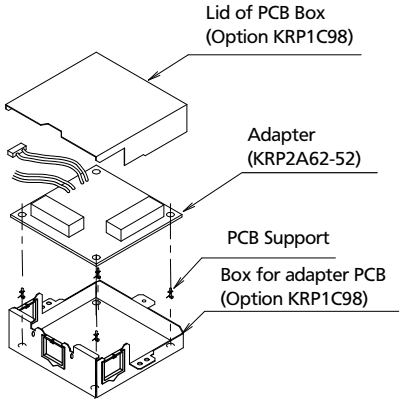
7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

Installation
Ceiling mounted corner cassette



(HC0118)

4-way blow ceiling mounted cassette



Note:

To install the adapter.
Box for adapter PCB (option) is required.

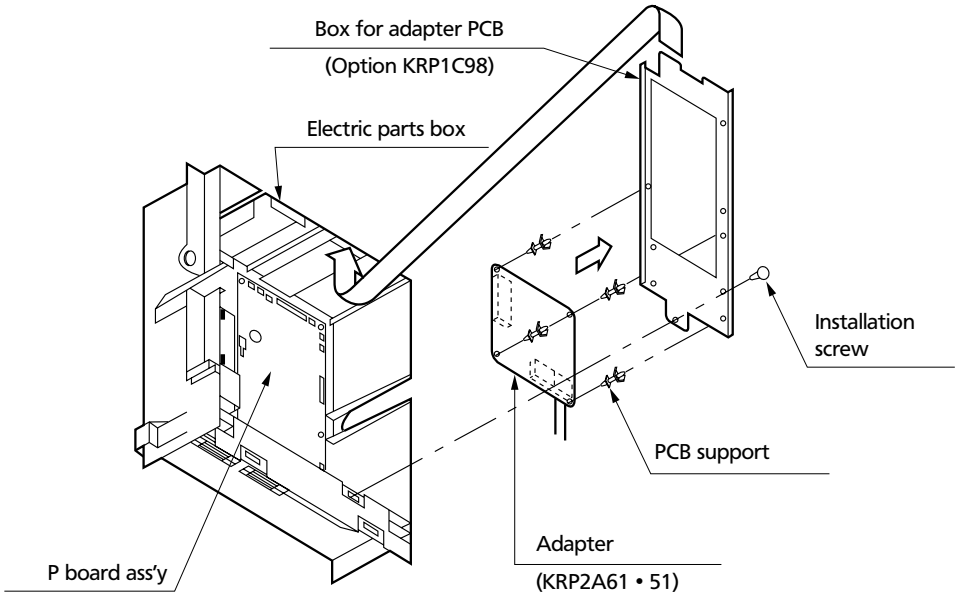
(HC0119)

7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

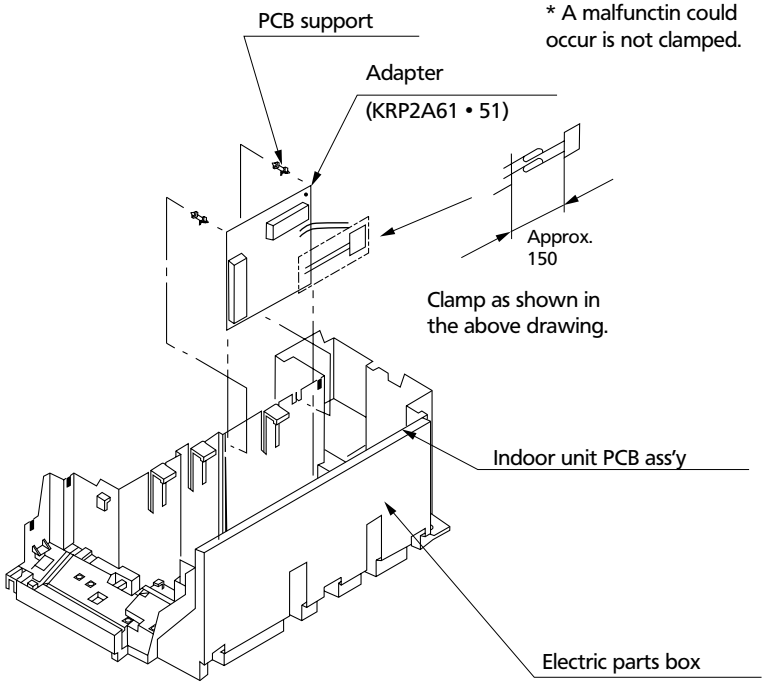
2-way blow ceiling mounted cassette



Note:
A separate plate is needed to install the adapter PCB.

(HC0247)

Wall mounted unit



(HC0120)

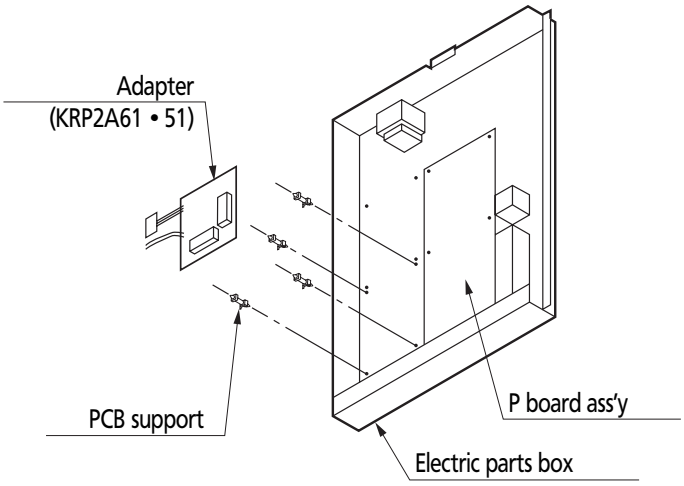
7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

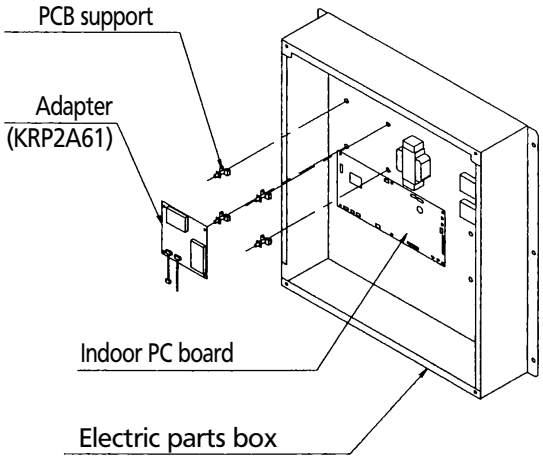
Concealed ceiling unit (large)

40-125



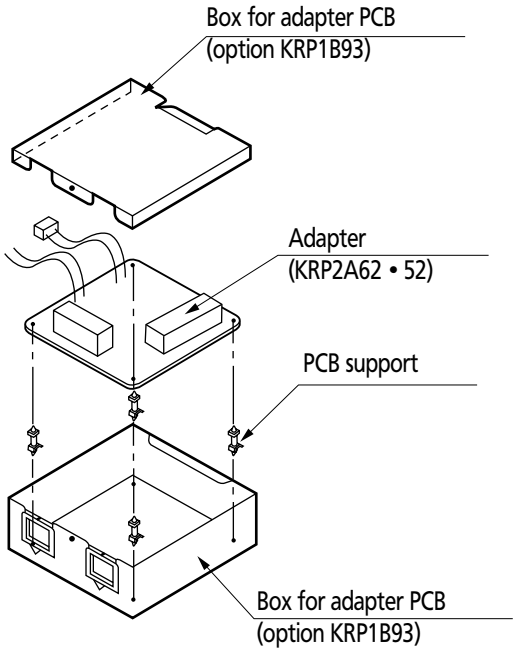
(HC0248)

200 • 250



(V0219)

Ceiling suspended unit

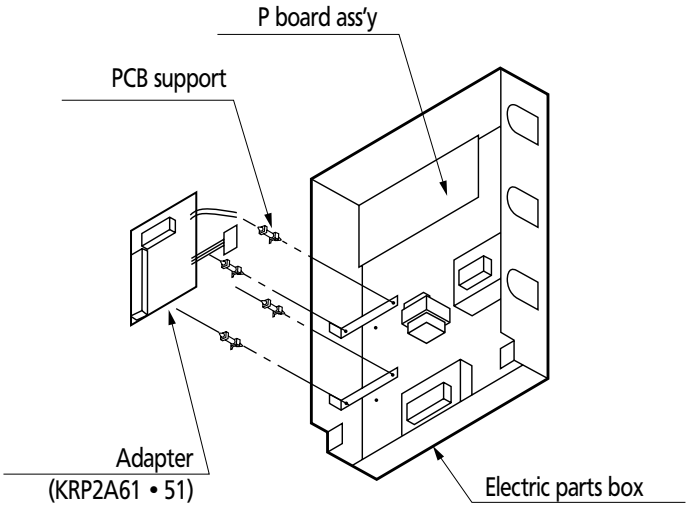


Note:

A separate plate is needed to install the adapter PCB.

(HC0249)

Concealed ceiling unit



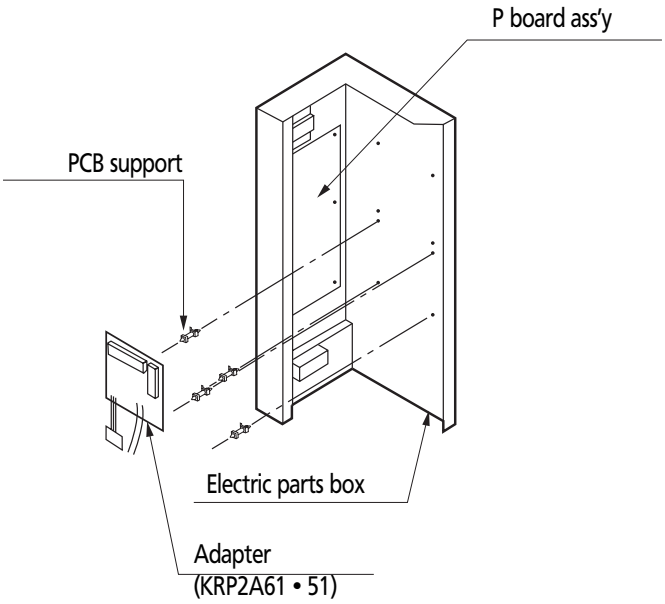
(HC0121)

7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

(Concealed) floor standing unit



(HC0250)

Electrical wiring

1. First, wire between the indoor and outdoor units, then to the separate power sources, and between the indoor units and the remote controllers. Then, check wiring is correct. (If wanting group control by remote controller, check transmission wiring.) For details, see the installation manual of the indoor and outdoor units.

2. Next, wire between the wiring adaptor for electrical appendices (1) and the indoor units. For details, see Wiring to indoor units.

3. Finally, wire between external units such as the host computer monitor panel, and make the necessary settings. For details, see Wiring to external units (host computer monitor panel).

Note:
It is not necessary to set address No. for centralized control. (Setting is automatic.)

(HC0122)

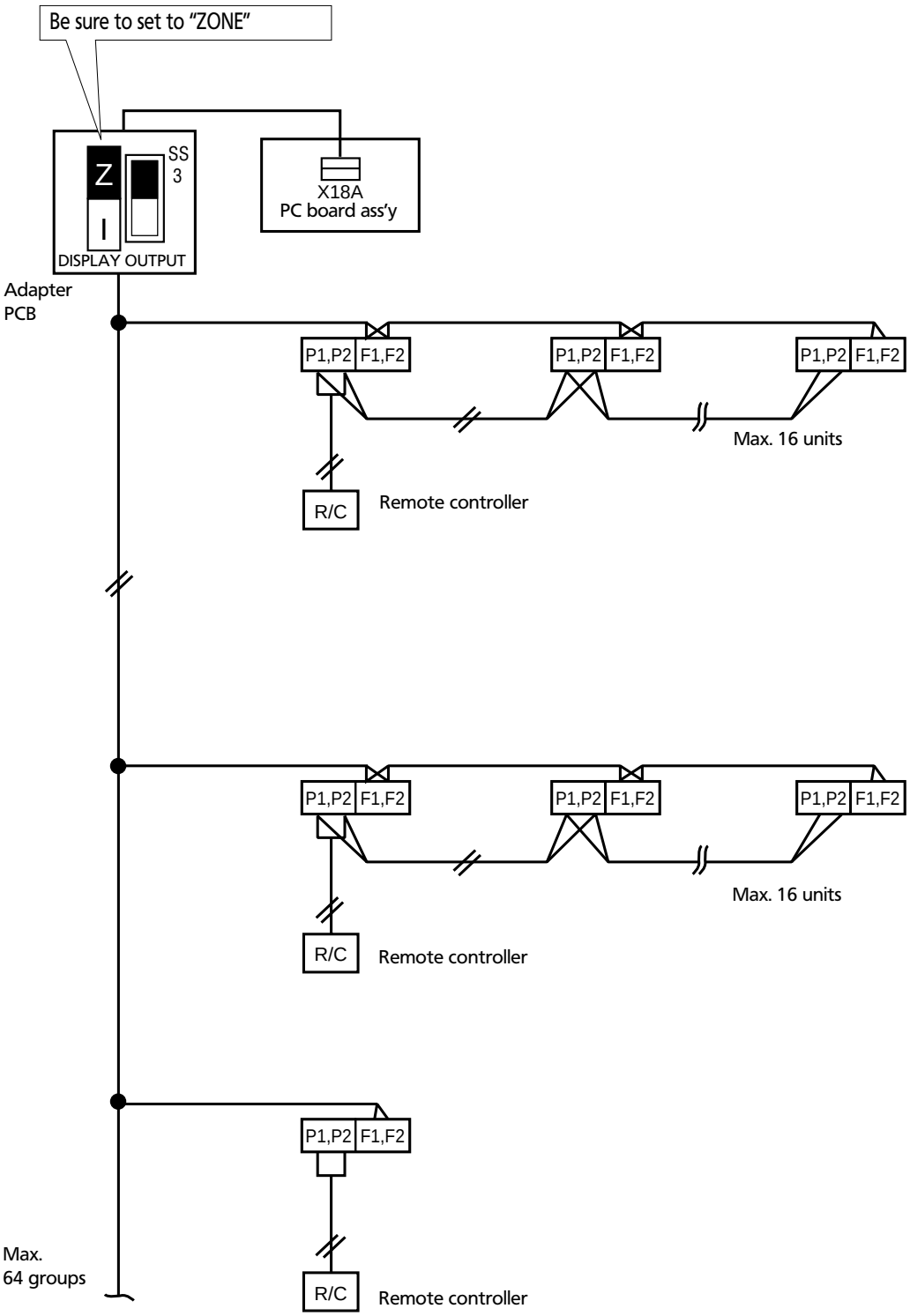
7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

Wiring to indoor units

1. For zone control



(Wiring specifications)
Wiring .... Sheathed wire (2-wire)
Gauge .... 0.75 ~ 1.25 mm^2
Length .... Max. 1000 m

< IMPORTANT >
Keep transmission wiring at least 50 mm away from power supply wiring to avoid malfunctions.

(HC0123)

7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

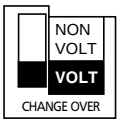
Wiring to external units (host computer monitor panel)

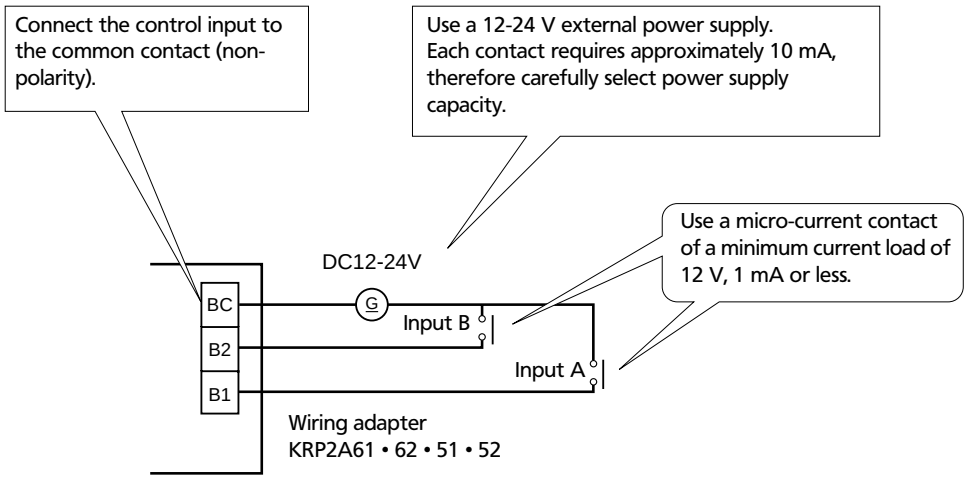
1. Remote control input (operation control)

Wire as described below. Wiring differs depending on whether using a voltage or non-voltage input.

- For voltage input

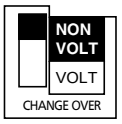
Set input changeover switch (SS1) to "VOLT". (Factory set: VOLT)

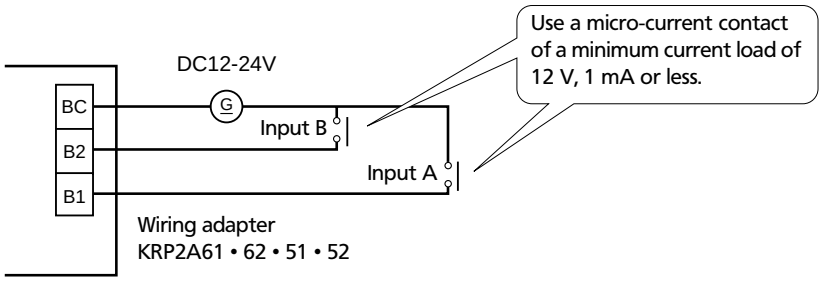




- For non-voltage input

Set input changeover switch (SS1) to "NON VOLT".





(Wiring specifications)
Wiring .... Sheathed wire
Gauge .... 0.18 ~ 1.25 mm^2
Length .... Max. 150 m

< IMPORTANT >
Keep transmission wiring at least 50 mm away from power supply wiring to avoid malfunctions.

(HC0124)

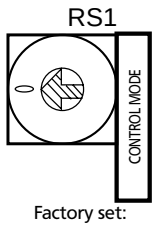
7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

2. Setting control mode selector sitch (RS1)

Using control mode selector switch (RS1), select the control mode as described below.



Factory set: "0" position

1. When operating with only individual display function

Position	Function
0	Individual display (input ignored)

2. When operating with constant input from A

Position	Function	Contents when input A is ON	Contents when input A is OFF
1	Remote controller rejection	Operation (remote controller is normally rejected)	Stop + remote controller rejection
2	Central priority	Operation + remote controller accepted	
3	Stop by remote controller acceptable	Operation + stop by remote controller acceptable (No operation by the remote controller)	
4	Remote controller acceptance/ rejection	Remote controller acceptance only (No operation by the remote location)	

Note:

- Input B is for forced-OFF. When ON, stop + remote controller is rejected, and input A is ignored. When OFF, even if A is ON, the contents of when input A is ON are not achieved. Input A must therefore be re-input.

3. When operating with momentary input from A
(Use a momentary input of ON time 200 mili-sec or longer.)

Position	Function	Contents of Input A	Function of Input B
5	Remote controller rejected	Stop for ON while operating, Operate for ON while stopping	Input B will be forced stop function (When ON, stop + remote controller is rejected, input A is ignored.)
6	Last command priority	Stop for ON while operating, Operate for ON while stopping (Remote controller is normally accepted.)	

(HC0125)

- For demand control from input B

7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

- For demand control from input B

Position	Function when input A is ON	Function when input B is ON
C	Remote controller rejected (Same as position "5")	Forced thermostat OFF command
D		Forced temperature shift command
E	Last command priority (Same as position "6")	Forced thermostat OFF command
F		Forced temperature shift command

- Forced thermostat OFF command
  Forces indoor unit to operate the fan only
- Forced temperature shift command
  The indoor unit operates at 2 C higher (cooling) or 2 C lower (heating) than the set temperature.

Notes:

- In zone control, operation is displayed as long as one indoor unit is running.
  When in the last command priority mode, some units are not operation while ON.
- In such case, even if input A is ON, the unit and all other units in the same zone will stop.

4. When operating with dual momentary inputs from A and B
   (Use a momentary input of 200 mili-sec or longer.)

Position	Function	Contents when input A is ON	Contents when input A is OFF
7	Remote controller rejection	Operation (remote controller is normally rejected)	
8	Central priority	Operation + remote controller accepted	
9	Stop by remote controller acceptable	Operation + stop by remote controller acceptable (No operation by the remote controller)	Stop + remote controller rejection
A	Remote controller acceptance/ rejection	Remote controller acceptance only (No operation by the remote location)	
B	Last command priority	Operation (remote controller is normally accepted)	Stop (remote controller normally accepted)

Note:

- Doing constant input A with position 7 to A, it will be forced OFF function
  (input A is ignored.)
- Constant input cannot use for input B with position B.

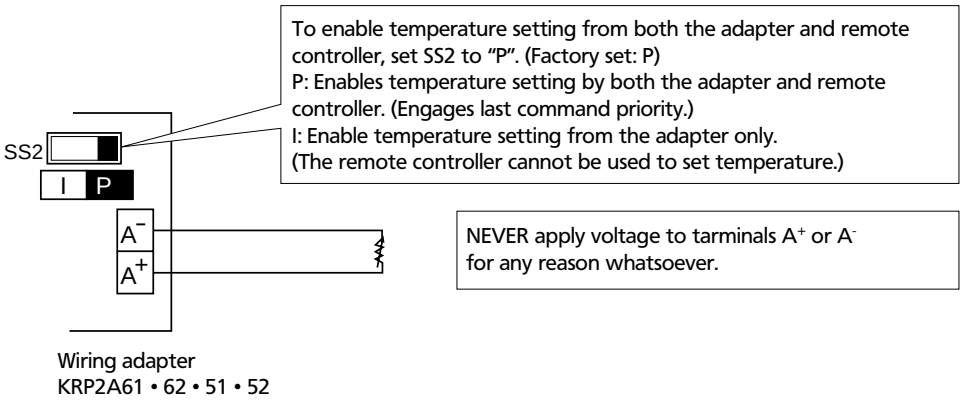
(HC0126)

7 Product Specification

7-2 Optional accessories

7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

3. Temperature setting input



Temperature setting corresponds to resistance values values in the range of 0 to 135 Ω.
Their relationship is as shown below

Temperature setting (C)	16	17	18	19	20	21	22	23	24
Resistance (Ω)	0.0 | 3.4	5.0 | 11.6	13.8 | 20.0	22.4 | 28.4	31.0 | 36.4	39.4 | 44.8	48.2 | 52.8	56.6 | 61.2	65.2 | 69.4

Temperature setting (C)	25	26	27	28	29	30	31	32
Resistance (Ω)	73.8 | 77.8	82.4 | 85.8	91.0 | 94.0	99.4 | 102.2	108.6 | 110.4	117.2 | 119.2	125.8 | 127.4	134.2 | 140.0

Note:
Wiring resistance included in above figures.

(Wiring specifications)
Wiring .... Sheathed wire
Gauge .... 1.25 ~ 2.00 mm^2
Length .... Max. 70m

< IMPORTANT >
Keep transmission wiring at least 50 mm away from power supply wiring to avoid malfunctions.

7 Product Specification

7-2 Optional accessories

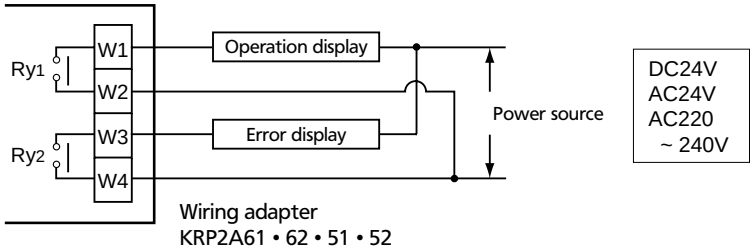
7-2-3 KRP2A51, KRP2A61: Wiring adapter for electrical appendices

4. Cancelling display signals

Operation output terminals (W1 and W2) and malfunction output terminals (W3 and W4) are non-voltage constant contact output. (Allowed electric current per contact is between 10 mA and 3A.)

Normal operation output (Ry1) ON when the unit is operating normally.

Malfunction output (Ry2) ON when the unit stops because of malfunction or when a malfunction of transmission occurs between the adapter



Note:
If using a 220 ~ 240 V power supply, keep transmission wiring at least 50 mm away from incoming power supply wiring.

(HC0127)

Output / System	Both Ry1 and Ry2 OFF	Ry1 only ON	Ry2 only ON
Zone control	All zones OFF	At least one unit running normally, no malfunction	Even 1 unit stopped due to malfunction or malfunction of transmission between adapter and indoor unit

Display output is described by system in the below table.

Note:
If rewiring F1 and F2 after running the system, turn ON power for 5 minutes, then turn it OFF and ON again. Changes to wiring can sometimes disable control from the wiring adapter.

(HC0128)

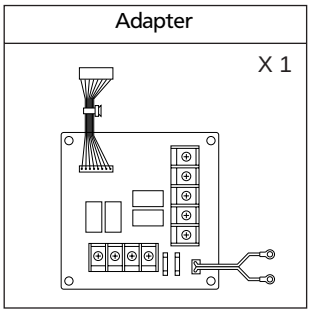
1PA63642B

7 Product Specification

7-2 Optional accessories

7-2-4 KRP1B61: Interlock adapter of VRV

Accessories Check if the following accessories are included in the kit.

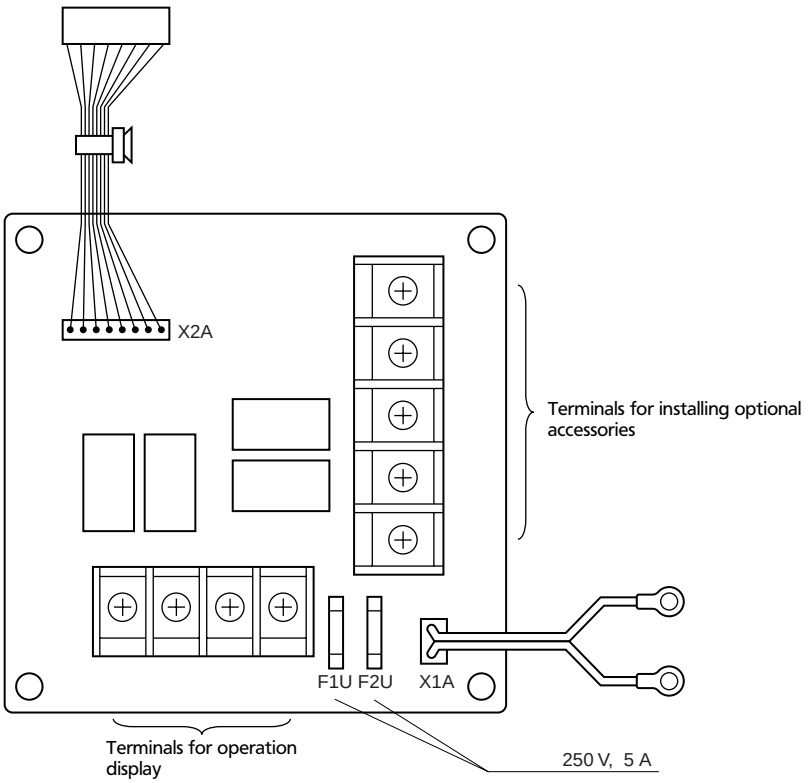


(HC0129)

PC board support	× 4
Clamp	× 3
Installation manual	× 1

Notes
- Kits vary according to applicable models.
- A special adapter fixing plate and box are required for the following models.
  FXYCP.....KRP1B96

Names of parts



(HC0130)

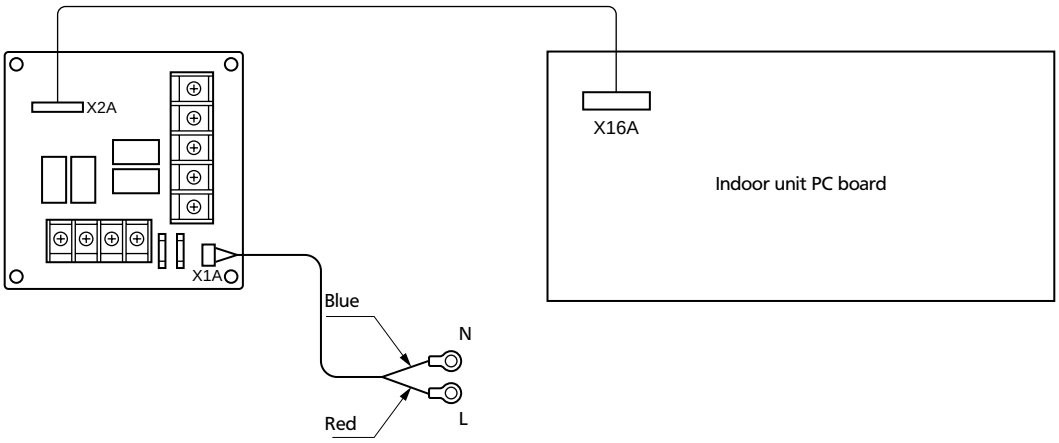
7 Product Specification

7-2 Optional accessories

7-2-4 KRP1B61: Interlock adapter of VRV

Electric Wiring

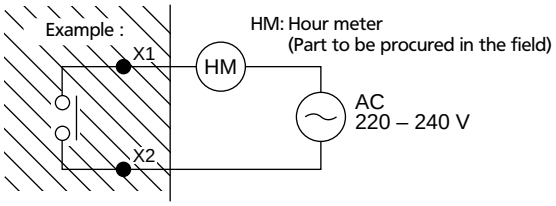
- Refer to the WIRING DIAGRAM attached to the indoor unit before attempting to wire.
  [Make sure wires to units do not pass over the PC board when wiring.]
- Wire the adapter to the indoor unit as shown below,



(HC0131)

1. Fetching the operation display signal
   - Attaching an hour meter

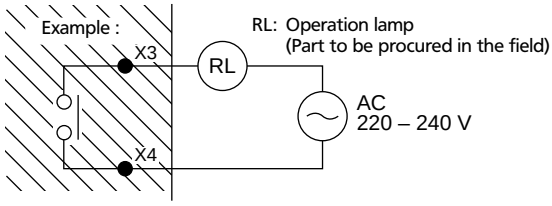
Output is generated at the contact while the compressor is running.



(HC0132)

   - Fan ON display

Output is generated at the contact while the fan is running.



(HC0133)

2. If optional accessories are installed (auxiliary electric heater, humidifier)
   - Wire correctly in accordance with the attached installation manual.
   - Refer to the wiring diagram applied to the indoor unit when running electric wiring.

7 Product Specification

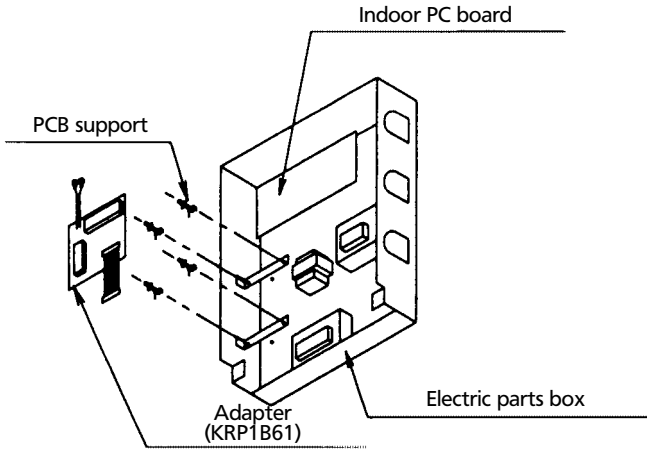
7-2 Optional accessories

7-2-4 KRP1B61: Interlock adapter of VRV

Installation

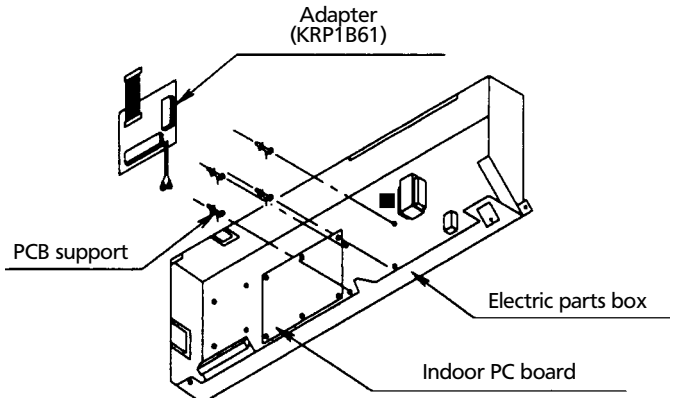
- Installation differs according to models.
- Do not bundle low and high voltage wires together.
- Bundle any access wires with the attached clamps so as to keep loose wirings off the indoor unit PC board.

Concealed ceiling unit



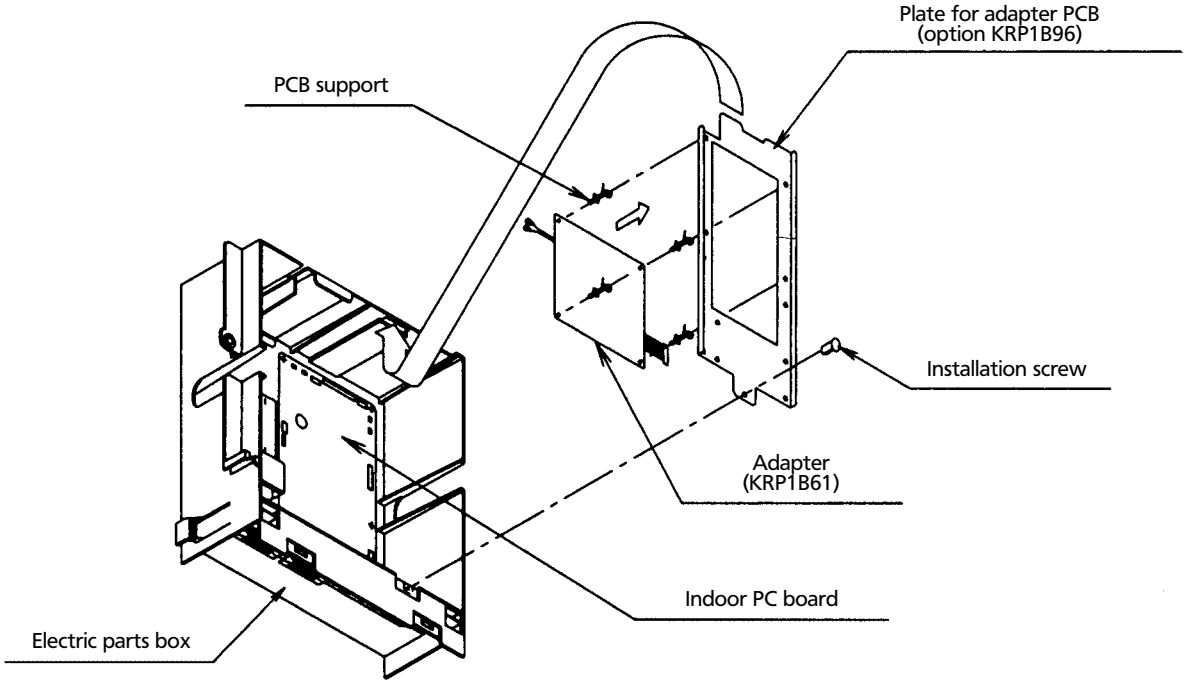
(HC0134)

Ceiling mounted corner cassette



(HC0135)

2-way blow ceiling mounted cassette



(HC0136)

NOTE: A separate plate is needed to install the adapter PCB.

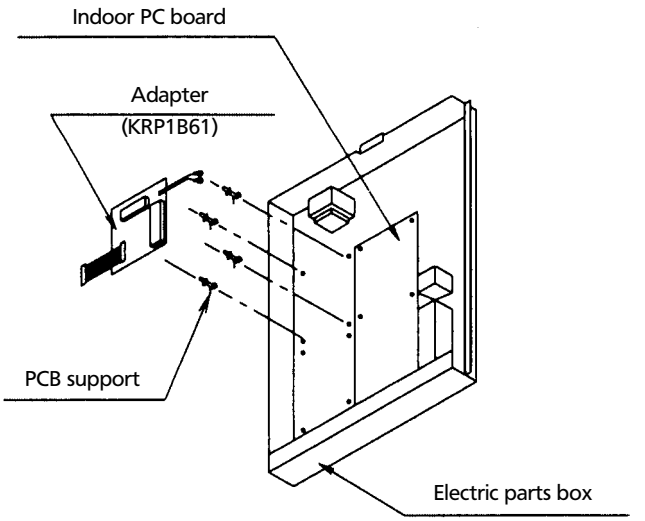
7 Product Specification

7-2 Optional accessories

7-2-4 KRP1B61: Interlock adapter of VRV

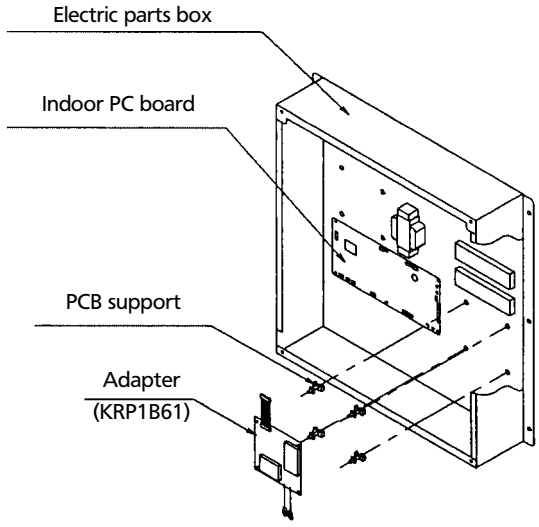
Concealed ceiling unit (large)

40 ~ 125



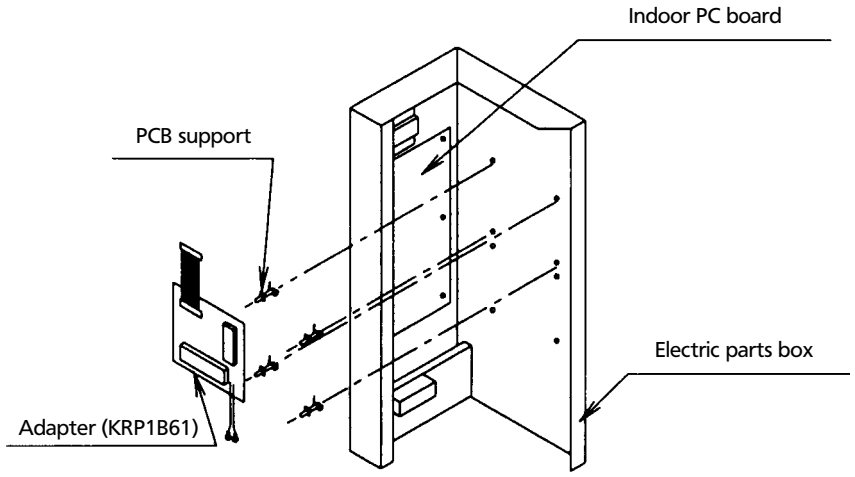
(HC0137)

200 ~ 250



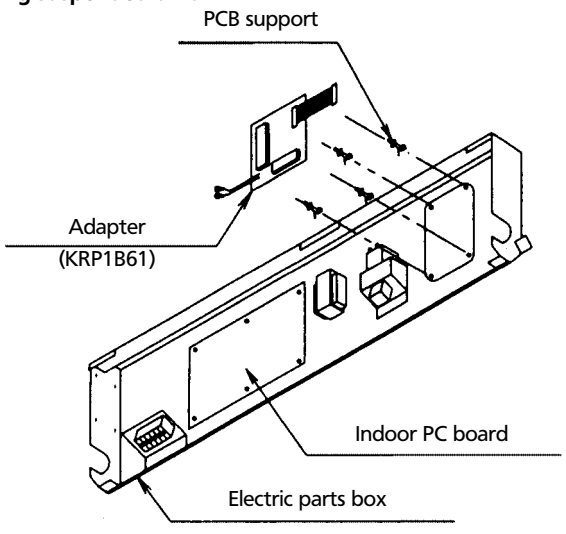
(HC0138)

(Concealed) floor standing unit



(HC0139)

Ceiling suspended unit



(HC0140)

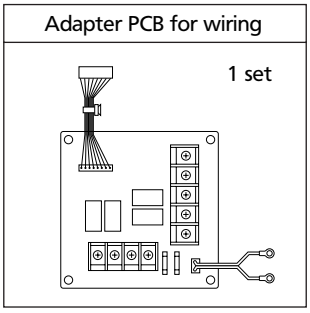
7 Product Specification

7-2 Optional accessories

7-2-5 KRP1B2: Interlock adapter of VRV

Contents of kit

Prior to installation check whether you have the complete kit of parts as shown below including the installation manual.



(HC0142)

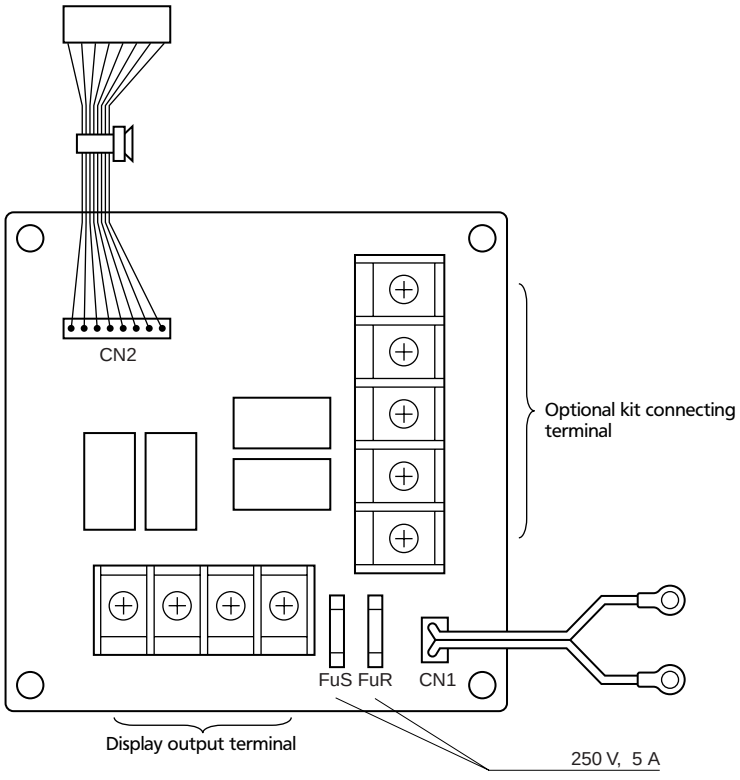
PC board support	4 pieces
Plastic straps	3 pieces
Installation manual	1 piece

Notes:

- Be careful with the selection of the optional kit, which varies depending on the model.
- For the installation of the following optional kit, it also requires the adapter fixing plate and box.

FXYFP KRP1C98

Names of parts



(HC0143)

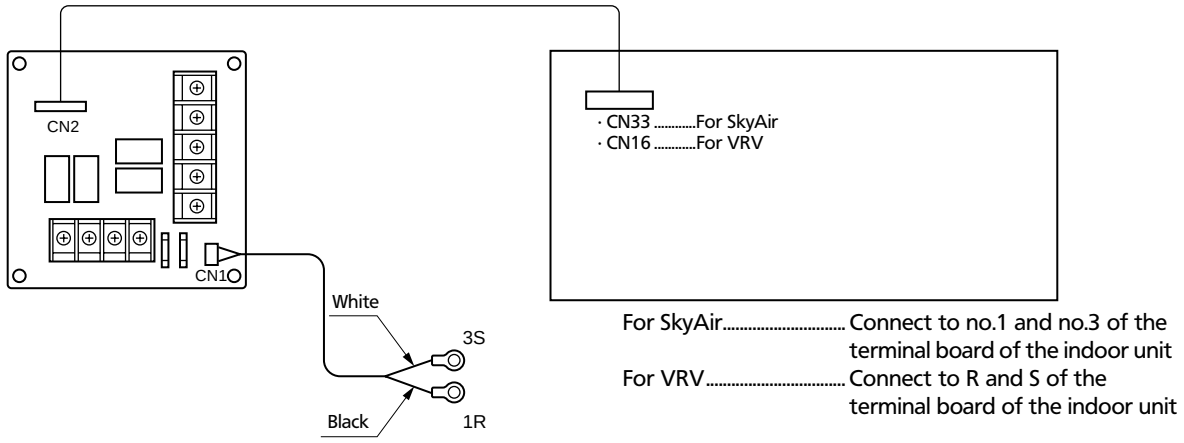
7 Product Specification

7-2 Optional accessories

7-2-5 KRP1B2: Interlock adapter of VRV

Electrical wiring

- Refer to the wiring diagram of the indoor unit for it's wiring connection. (Make sure all the wiring to the unit should not go over the PC board.)
- Connect the wiring to the indoor unit as shown below.

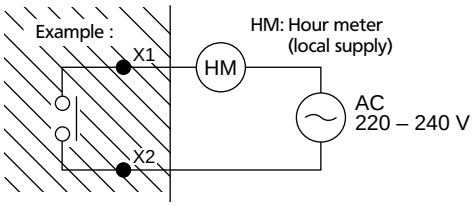


For SkyAir..... Connect to no.1 and no.3 of the terminal board of the indoor unit
For VRV..... Connect to R and S of the terminal board of the indoor unit

(HC0144)

1. To detect the operation display signal
   - Installation of the watt-hour meter

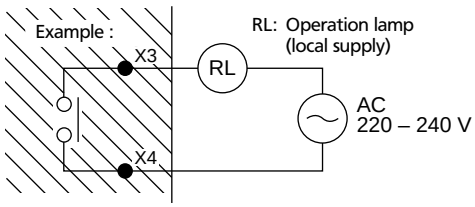
Output signal to detect the operation of the compressor



(HC0132)

- The fan display signal

Output signal to detect the operation of the fan



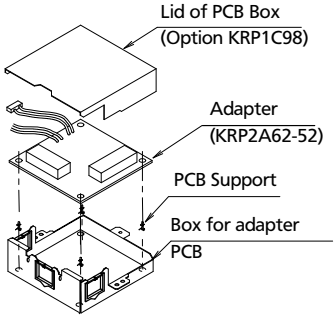
(HC0133)

2. In case other optional kits are installed. (auxiliary electric heater, humidifier and fresh air intake kit)
   - Connect the wiring properly according to the installation manual included in the kit.
   - Refer to the wiring diagram of the indoor unit for it's wiring connection.

Installation

- Never bundle high and low voltage wiring together.
- Be sure to bundle the excess wring with the attached plastic strap so as to keep the loose wiring off the indoor unit PC board.

4-way blow model



Note:
To install the adapter.
Box for adapter PCB (option) is required.

(HC0119)

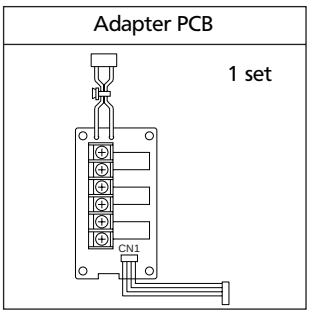
7 Product Specification

7-2 Optional accessories

7-2-6 KRP1B3: Interlock adapter of VRV

Contents of kit

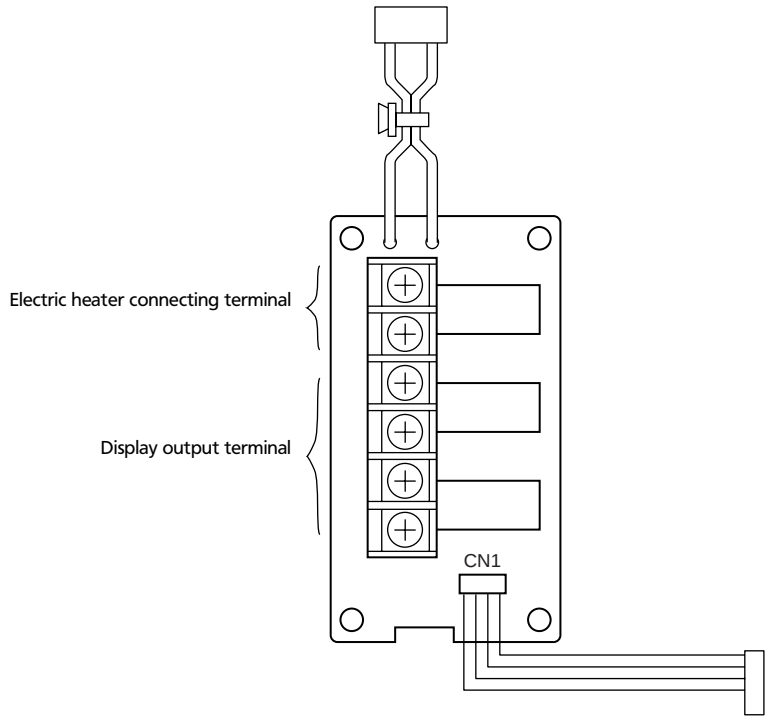
Prior to installation check whether you have the complete kit of parts as shown below including the installation manual.



(HC0217)

Plastic strap	3 pieces
Installation manual	1 piece

Name of parts



(HC0225)

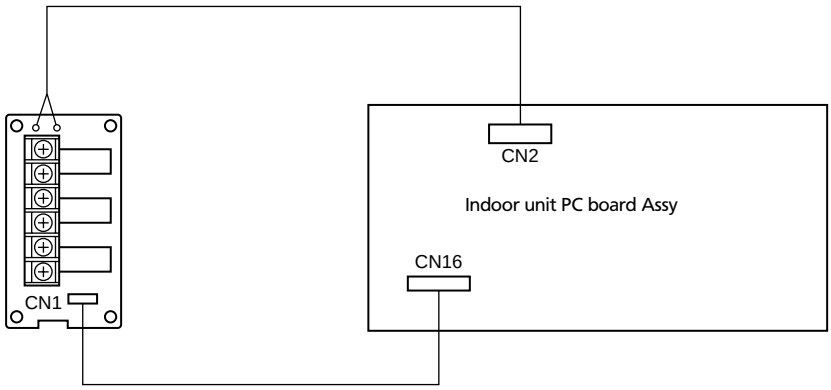
7 Product Specification

7-2 Optional accessories

7-2-6 KRP1B3: Interlock adapter of VRV

Electrical wiring

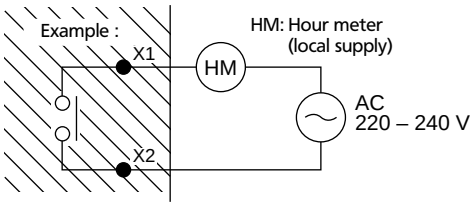
- Refer to the wiring diagram of the indoor unit for its wiring connection. (Make sure all the wiring to the unit should not go over the PC board.)
- Connect the wiring to the indoor unit as shown below.



(HC0211)

1. To detect the operation display signal
   - Installation of the watt-hour meter

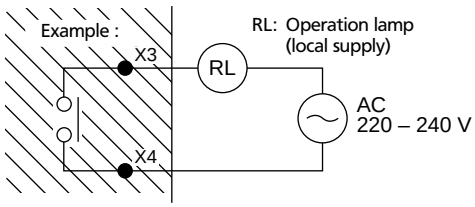
Output signal to detect the operation of the compressor



(HC0132)

   - The fan display signal

Output signal to detect the operation of the fan

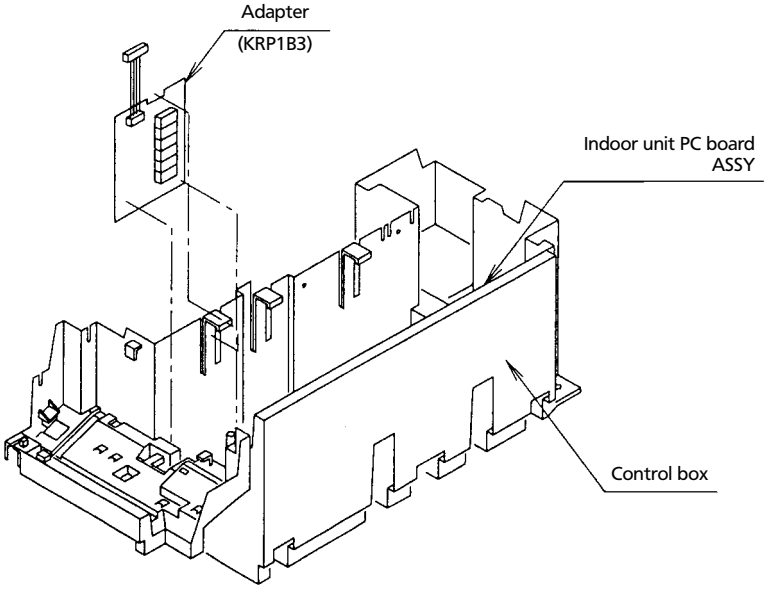


(HC0133)

2. In case the electric heater is installed
   - Connect the wiring properly according to the installation manual included in the kit.
   - Refer to the wiring diagram of the indoor unit for its wiring connection.

Installation

- Never bundle high and low voltage wiring together.
- Be sure to bundle the excess wring with the attached plastic strap so as to keep the loose wiring off the indoor unit PC board.



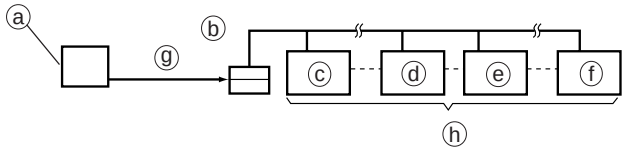
(HC0226)

7 Product Specification

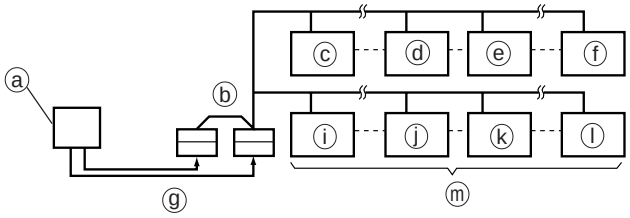
7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

- When using 1 central remote controller



- When using 2 central remote controllers



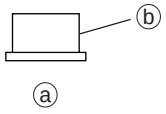
BEFORE USE:

GENERAL DESCRIPTION OF SYSTEM

For a maximum of 64 groups of indoor unit unified operation/stop can be performed. When using 2 central remote controllers, unified operation is possible with up to a maximum of 128 groups of indoor units. It can be used to set operation modes by ZONE: ON/OFF operation, operation controlled by timer ON/OFF control possible/ impossible; as well as, to set operating state: temperature setting,etc.
It can display the operation state such as operation modes and preset temperature by group.
Furthermore, the unit can be connected with an external key system or host computer monitor panel to enable forced ON/OFF input (no-voltage normally open contactor).
(This unit cannot be used concurrently with the adapter for electrical appendieces [optional accessory].)

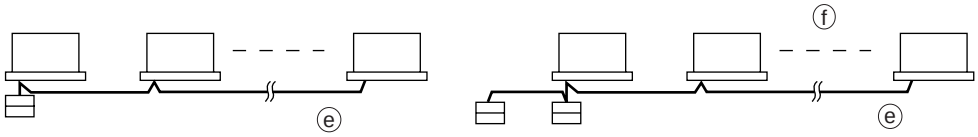
ⓐ Host computer monitor panel, etc. ⓑ Central remote controller ⓒ Group No. 1 – 00
ⓓ Group No. 1 – 15 ⓔ Group No. 2 – 00 ⓕ Group No. 4 – 15 ⓖ Forced ON/OFF command
(Stops with command from either central remote controller) ⓗ A maximum of 64 groups
ⓘ Group No. 5 – 00 ⓙ Group No. 5 – 15 ⓚ Group No. 6 – 00 ⓛ Group No. 8 – 15
ⓜ A maximum of 128 groups

A



B

C



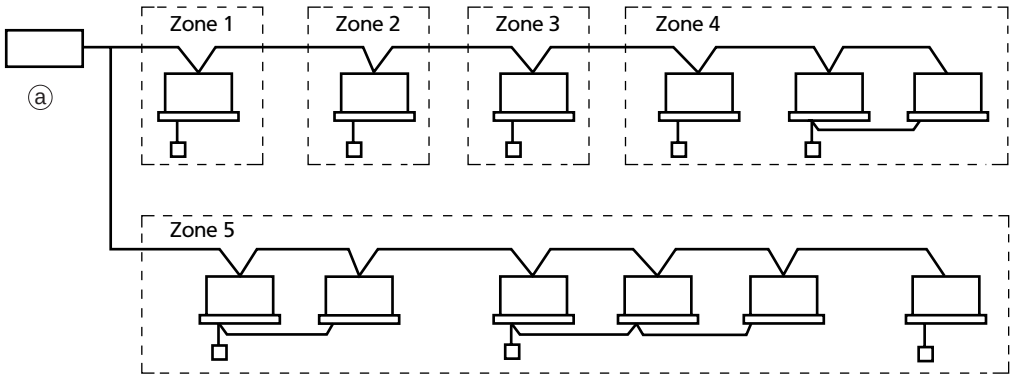
(HC0145)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

❊ GROUP OF INDOOR UNIT refers to the above.
A: A single indoor unit without remote controller B: A single indoor unit controlled by one or two remote controllers C: Maximum of 16 indoor units, group-controlled by one or two remote controllers
ⓐ Remote controller not used ⓑ Indoor unit ⓒ Remote control ⓓ Two remote controllers ⓔ A maximum of 16 units



❊ Zone control from the central remote controller Zone control is available from the central remote controller. With it, it is possible to make unified settings for multiple groups, so setting operations are greatly simplified.
• Any setting you make within a given zone will apply to all groups in the said zone. • A maximum of 64 zones can be set from a single central remote controller. (Each zone contains a um of 64 groups.) • Zones can be set randomly from the central remote controller.
ⓐ Central remote control

CAUTIONS DURING USE

- Do not tamper with the inner machanism.
  Do not remove the front panel. Tampering with the inner mechanism is dangerous and may damage equipment. For inspection and adjustment, contact your DAIKIN dealer.
- Avoid places where the unit may be contacted by water.
  Water penetrating the inner mechanism may cause electrical leakage, or render electric parts defective.
- Do not press the button on the central remote controller with a pointed hard tool.
  This may damage the central remote controller.
- Avoid direct exposure to sunlight.
  Direct sunlight may discolor the LCD and obscure the image.
- Do not wipe the surface of the operation panel with benzene, thinner, chemically treated dust cloth, etc.
  This may cause discoloring or peeling. To clean, moisten a cloth with a neutral cleanser diluted in water, rince and wipe. Blot adhering water with a dry cloth.
- Never pull or twist the electric wire of a remote controller.
  It can cause the unit to malfunction.
- Never inspect or service the central remote controller by yourself.
  Ask a qualified service person to perform this work.

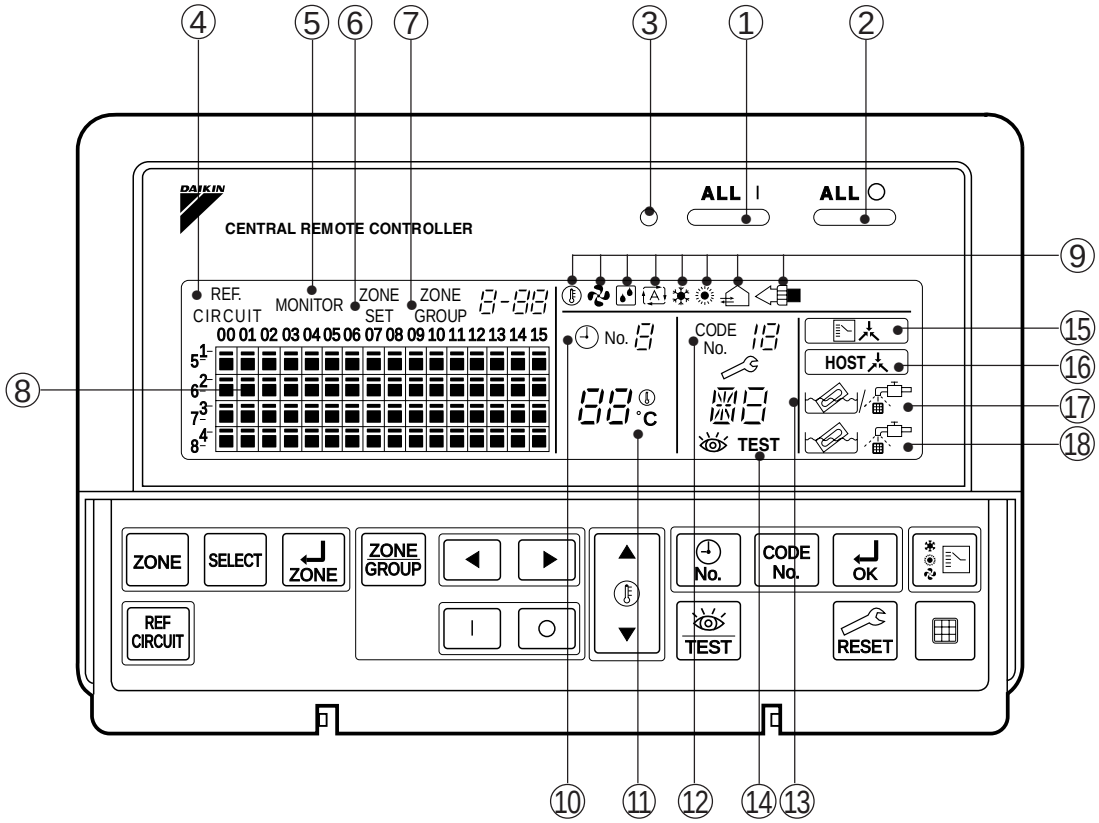
(HC0146)

7 Product Specification

7-2 Optional accessories

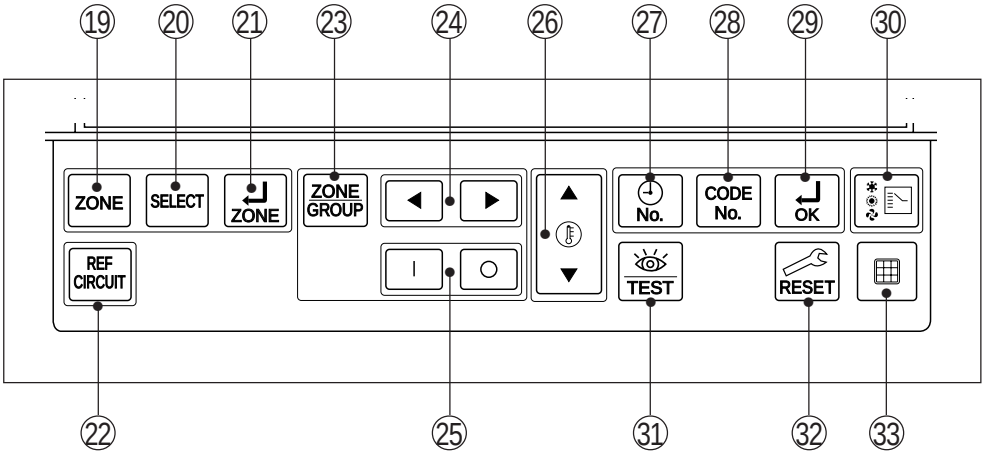
7-2-7 DCS302C51: Centralized control

Fig.1



(HC0147)

Fig.2



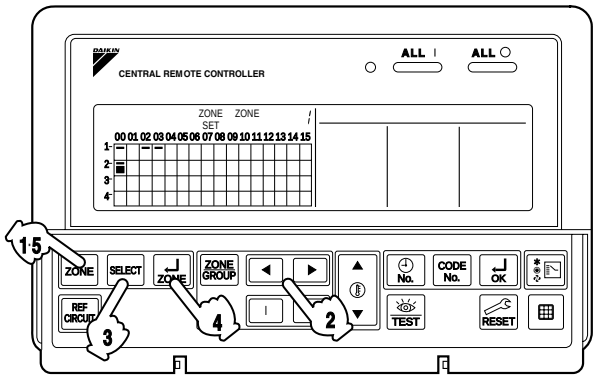
(HC0148)

7 Product Specification

7-2 Optional accessories

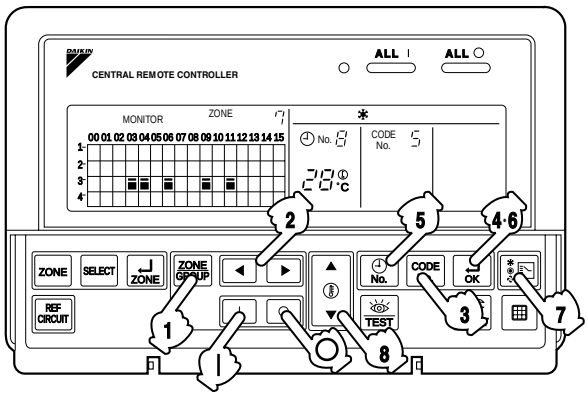
7-2-7 DCS302C51: Centralized control

Fig. 3



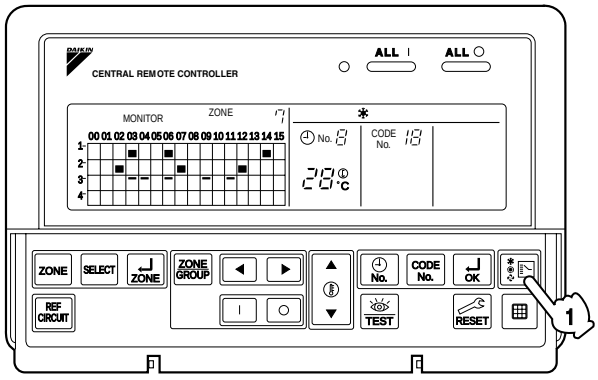
(HC0149)

Fig. 4



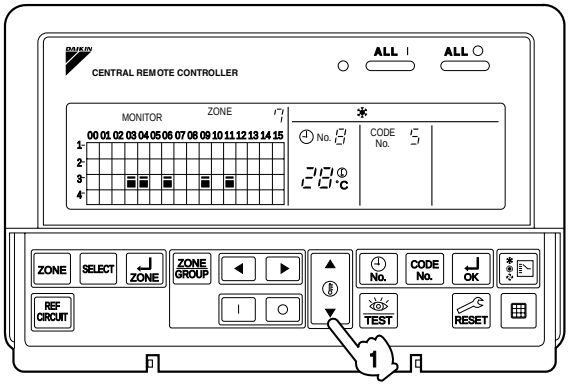
(HC0150)

Fig. 5



(HC0151)

Fig. 6



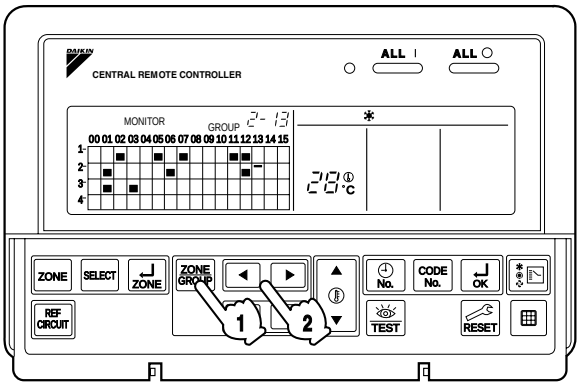
(HC0152)

7 Product Specification

7-2 Optional accessories

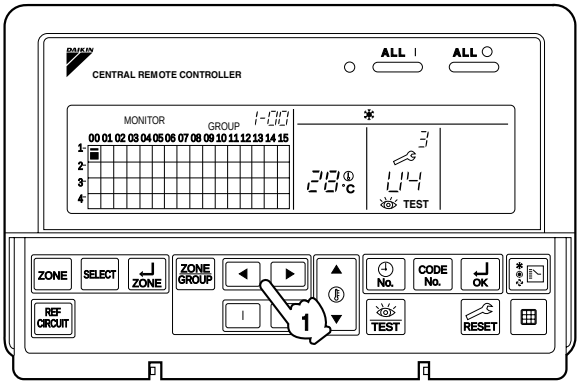
7-2-7 DCS302C51: Centralized control

Fig. 7



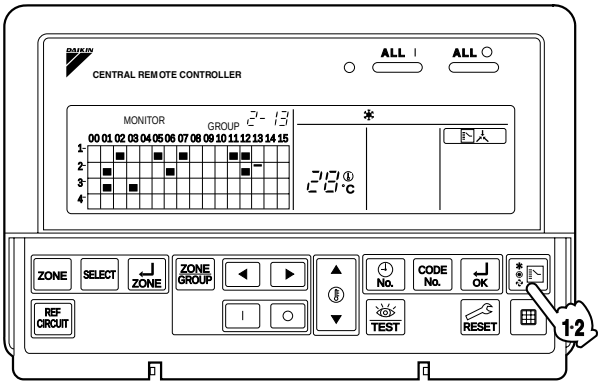
(HC0153)

Fig. 8



(HC0154)

Fig. 9



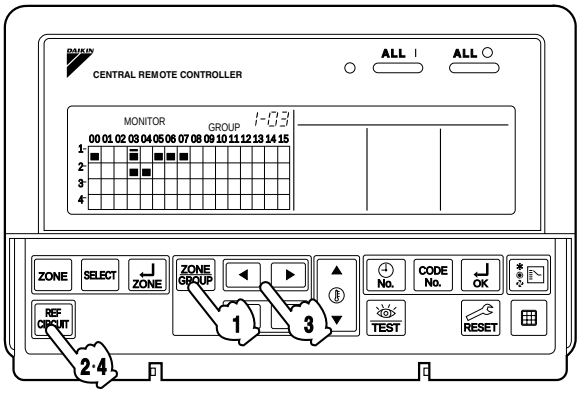
(HC0155)

7 Product Specification

7-2 Optional accessories

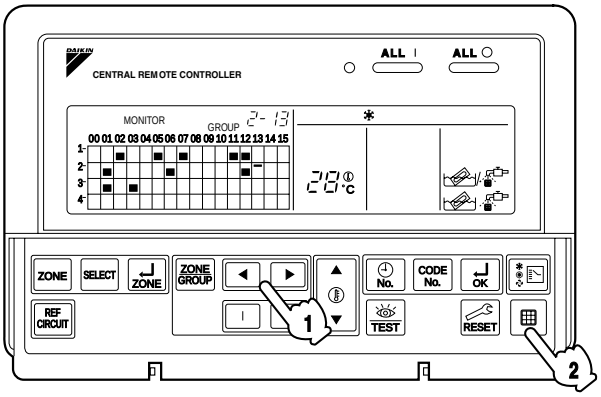
7-2-7 DCS302C51: Centralized control

Fig. 10



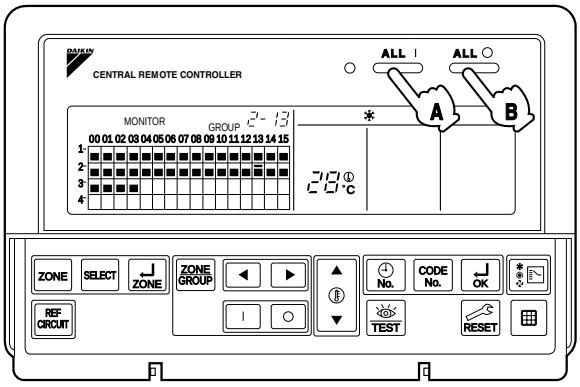
(HC0156)

Fig. 11



(HC0157)

Fig. 12



(HC0158)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

FEATURES AND FUNCTIONS

■ Operation menu
This central remote controller enables the individual operation/stop by zone, and unified operation/stop. ON/OFF operation controlled by timer is possible in conjunction with the schedule timer (optional accessory).

See page 54, 63

■ Various operation modes.
You can operate the system from both this unit and the remote controller, so to enable various operation control patterns. Twenty different operation modes are available including five operation patterns: ON/OFF control impossible by remote controller, only OFF control possible by remote controller, centralized, individual and centralized (ON/OFF control possible by remote controller only withthe timer ON); and temperature setting possible/impossible by remote controller and operation mode selecting possible/impossible by remote controller.

See page 56

■ Zone control for simpler operation
You can control a maximum of 64 groups of indoor units by using this central remote controller. You don't have to repeat the same setting operations by group because you can make each of the following settings by zone.
Also, there is a function which allows you to unify settings in all groups. (When set to Zone No. 0, all the below settings are unified for all groups.)

- ❍ Operation mode
- ❍ Control mode
- ❍ Setting temperature
- ❍ Programming time No. (Used in conjunction with the schedule timer)

See page 53

■ Monitor and display operating conditions of indoor units by group
You can display operating conditions such as operation mode and preset temperature; maintenance information such as time to clean, etc.; and information on trouble such as malfunction codes.

❊ "Time to clean" sign refers to the following functions.

- ❍ Display the time to clean air filter and the air cleaner elementof electric dust collector for each group.
- ❍ Display the time to clean when signaled from any given group.

See page 60

■ Function of refrigerant system display
This display helps you understand, at a glance, the indoor units sharing the same outdoor unit and the particular indoor unit among them that is set as the master remote controller.

See page 62

- Utilizing one of the PC board adapters (optional accessories) will enable you to combine this unit with the split. A/C units and unitary A/C.
  However, be sure to refer to the installation manual attached to each PC board adapter for function limitations..

(HC0159)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

NAMES AND FUNCTIONS OF THE OPERATING SECTION (Fig. 1,2)

①	**UNIFIED OPERATION BUTTON** Press to operate all indoor units.	⑩	**" No." DISPLAY (TIME NO.)** Displays the operation timer No. when used in conjunction with the schedule timer.
②	**UNIFIED STOP BUTTON** Press to stop all indoor units.	⑪	**" " DISPLAY (PRESET TEMPERATURE)** Displays the preset temperature.
③	**OPERATION LAMP (RED)** Lit while any of the indoor units under control is in operation.	⑫	**" CODE No. 18" DISPLAY (CONTROL MODE)** Displays codes on how to control equipment (ON/OFF control impossible by remote controller, centralized, individual etc.). Displays the No. of the particular unit that has stopped due to malfunction.
④	**" REF. CIRCUIT " DISPLAY (REFRIGERANT SYSTEM DISPLAY)** The indicationin the square is lit while the refrigerant system is being displayed.	⑬	**" " DISPLAY (MALFUNCTION CODE)** Displays the contents of a malfunction. The lamp flashes when a malfunction stops operation. The contents of the current malfunction are displayed in the inspection mode.
⑤	**" MONITOR " DISPLAY (OPERATION MONITOR)** The lamp is lit while operation is being monitored.	⑭	**" TEST" DISPLAY (INSPECTION/TEST)** Press the inspection/test operation button. Either the inspection or test lamp lights up.
⑥	**" ZONE SET " DISPLAY (ZONE SETTING)** The lamp is lit while setting zones.	⑮	**" " DISPLAY (CHANGEOVER UNDER CONTROL)** Cool/heat selection is not possible for either the zone or the group where this particular display appears.
⑦	**"ZONE" "GROUP" DISPLAY (ZONES/GROUP)** Indicates the particular zone or group being displayed.	⑯	" HOST " DISPLAY (UNDER HOST COMPUTER INTEGRATED CONTROL) Setting is not possible while this display is being displayed.
⑧	**GROUP NO. IN OPERATION** Each square displays the state corresponding to each group.	⑰	**" " DISPLAY (TIME TO CLEAN)** Displayed to notify the user it is time to clean the air filter or air cleaner element of a particular group.
⑨	**" " " " " " " " " " " " DISPLAY (OPERATION MODE)** Displays operating state.		

(HC0160)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

⑱	**" " " " DISPLAY (TIME TO CLEAN AIR CLEANER ELEMENT/TIME TO CLEAN AIR FILTER)** Displayed to notify the user it is time to clean the air filter or air cleaner element of the group displayed.	㉖	**TEMPERATURE SETTING BUTTON** Press to set temperature.
⑲	**ZONE SETTING BUTTON** Turns zone setting mode ON/OFF.	㉗	**TIME NO. BUTTON** Selects time No. (Use in conjunction with the schedule timer only).
⑳	**SELECTOR BUTTON** Selects the group to be assigned to a zone.	㉘	**CONTROL MODE BUTTON** Selects control mode.
㉑	**ZONE OPERATION ON/OFF BUTTON** Finalizes the zone.	㉙	**TIMER ON BUTTON** Sets control mode and time No.
㉒	**BUTTON FOR REFRIGERANT SYSTEM DISPLAY** See page 62.	㉚	**OPERATION MODE SELECTOR BUTTON** See page 61.
㉓	**ZONE/GROUP CHANGEOVER BUTTON** Switches display "zone" to display "group" or vice versa.	㉛	**INSPECTION/TEST OPERATION BUTTON** Press to run inspection or test run.
㉔	**ADVANCE/BACKWARD BUTTON** See page 53.	㉜	CLEARING BUTTON FOR MALFUNCTION CODE MEMORY Press to clear malfunction code.
㉕	**ON/OFF BUTTON** Starts/stops operation by zone.	㉝	**FILTER SIGN RESET BUTTON** See page 62.

Notes:
1. Please note that all the displays in the figure appear for explanation purposes or when the cover is open.
2. If the unit is used in conjunction with other optional central controllers, the OPERATION LAMP of the unit that is not under operation control may light up and go out a few minutes behind schedule. This shows that the signal is being exchanged, and does not indicate any failure.

(HC0161)

7 Product Specification

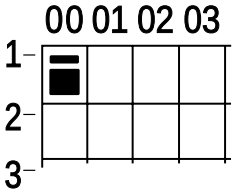
7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

ZONE SETTING (Fig. 3)

You can set multiple groups under a single zone to control them by zone. This equipment is factory set for 64 zones of 1 group per every zone at the time of shipment.

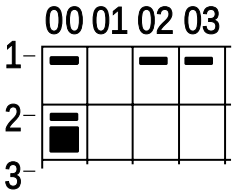
1 Press the ZONE SETTING BUTTON, and " ZONE SET " is displayed.



Zone No. 1 is displayed.Then, operation monitor display " ▬ " of group No. lights up in the displayed zone. The display " ■ " of the lowest group No. lightsup.

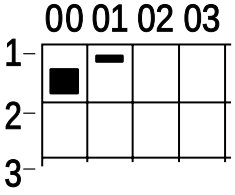
2 Press the ADVANCE/ BACKWARD BUTTON to move the display " ■ " to the group of the desired zone. Holding the button down will quickly move the display.

3 Press the SELECTOR BUTTON to set the above group in the zone. The display " ▬ " of the selected group lights up.



Repeat procedures 2 – 3 to select all desired groups for the zone.
The example in the left, groups 1-00, 1-02, 1-03 and 2-00 are set in the zone No. 1.

4 Press the ZONE OPERATION ON/OFF BUTTON to finalize the zone. This zone becomes finalized, and the next zone No. is displayed.



The zone No. advances one at a time. The display " ▬ " of the group that has already been set is lit in the displayed zone. The display " ■ " of the lowest group No. lights up again. Set the other zones as well following procedures 2 – 4.

In the above example, the zone No. 2 is displayed. Then, the display " ■ " of the lowest group No. that has already been set lights up.

5 Press the ZONE SETTING BUTTON again, to finish zoning.
The current display goes out, and the normal display appears.

NOTES

To clear all registered zones Display " ZONE SET " . Then, hold down both " RESET " and ALL i for about 4 seconds. This will clear all registered zones.

- If you have set a group in the wrong zone, reset it in the correct zone. (The last zone set is judged to be effective .)
- You cannot set the same group in multiple zones.
- When you turn ON the power, the system may display " 88 " for approximately one minute and may not respond to operation until all the liquid crystal display appears.
- Unless operated from within one minute from when the display of zoning appears, the display will automatically revert back to the "group" display.
- A single setting will simultaneously determine the same setting of all the groups in the zone. So, pay attention to the following points in setting the zone.

1. The control mode must be the same for all groups in the zone.
2. The scheduled operation must be the same for all groups in the zone, if the operation is controlled by the timer.
3. The cool/heat operation mode must be the same for all groups in the zone.
4. The preset temperature must be the same for all groups in the zone.

Note:

Be sure to select the " - - " in executing the operation by zone, as well as to set the operation mode and the temperature setting unless the uniform operation is performed in the above 3 and 4. (See page 114.)

(HC0162)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

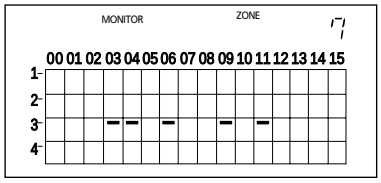
OPERATION

OPERATION BY ZONE (Fig. 4)

Flow of operation by zone

Call up the desired zone.
▼
Set the control mode.
▼
Set time No.
▼
Set operation mode.
▼
Set temperature.
▼
Start operation.
▼
Stop

1 Press the ZONE/GROUP CHANGEOVER BUTTON, to call upthe display of zoning.

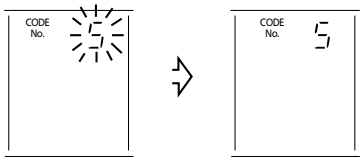


The display " ▬ " of the group set in the display zone lights up.

2 Press the ADVANCE/ BACKWARD BUTTON, to select the zone No. Holding it down will quickly move the display.

3 Press the CONTROL MODE BUTTON, to call up the desired code No. (See page 116.) Following the change, the display flashes.
Setting is not possible when using a data station or parallel interface.

4 Press the TIMER ON BUTTON.
Press the TIMER ON BUTTON within 10 seconds after the code No. is displayed. The display stops flashing and lights up solidly.

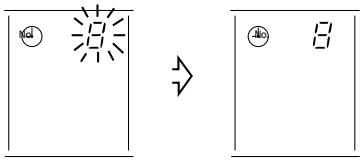


The display returns to its original state after no less than 10 seconds.

(only in conjunction with the schedule timer)

5 Press the TIME No. BUTTON, to select the desired time No.. When you change the setting, the display flashes. If you don't wish to program the to "–".
Check the timer No. of the schedule timer. If the schedule timer is not programmed, set the program in accordance with the instruction manual of schedule timer.

6 Press the TIMER ON BUTTON, to finalize the time No. The display flashes, and then lights up solidly.
Press the TIMER ON BUTTON within 10 seconds after the time No. is displayed.
The display returns to its original state after no less than 10 seconds.



7 Press the OPERATION MODE SELECTOR BUTTON, to call up the desired mode. If you don't wish to execute the unified setting in the zone, set it to " - - ". (See page 121 for further details.)

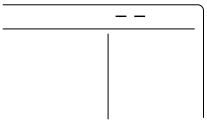
(HC0163)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

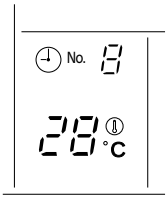
Cooling mode is selected.



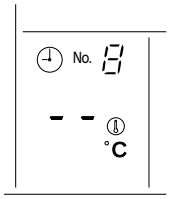
Unified operation is not set within the zone.

8 Press the TEMPERATURE SETTING BUTTON.

Each time you press the " ▲ ", the temperature rises by 1 C.
Each time you press the " ▼ ", the temperature falls by 1 C.
If you don't wish to execute the unified setting in the zone, set it to " - - ".
(See page 122 for further details.)



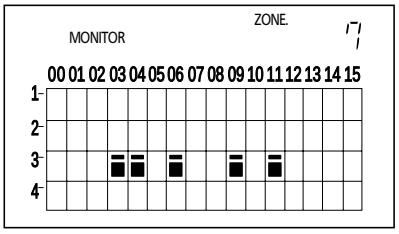
28 C is selected.



Unified operation is not set within the zone.

(When execute operation/stop by zone)

9 Press the ON BUTTON. The operation lamp lights up, and then the display " ■ " of the corresponding group appears.



10 Press the OFF BUTTON.

Unless operated from within one minute from when the display of zoning appears, the display will automatically revert back to the "group" display.

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

OPERATION MODE

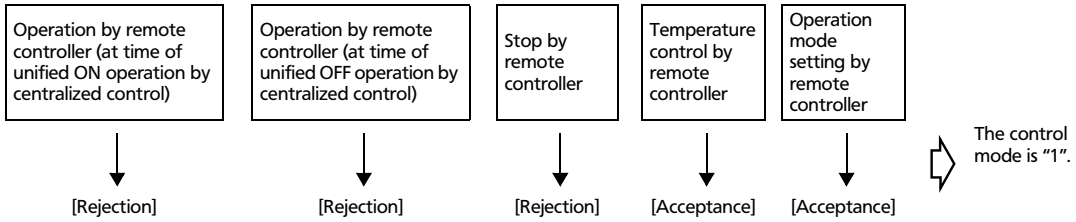
The following five operation control modes can be selected along with the temperature setting and operation mode by remote controller, for a total of twenty different modes. These twenty modes are set and displayed with control modes of 0 to 19. (For further details, see EXAMPLE OF OPERATION SCHEDULE on the next page.)

- ON/OFF control impossible by remote controllerUse this mode when operating and stopping from the central remote controller only. (ON/OFF control by the remote controller is disabled.)
- Only OFF control possible by remote controllerUse this mode when executing the operation only by the central remote controller, and executing only the stop by remote controller.
- CentralizedUse this mode when executing the operation only by the central remote controller, and executing operation/stop freely by remote controller during the preset hours.
- IndividualUse this mode when executing operation/stop both by central remote controller and remote controller.
- Timer operation possible by remote controllerUse this mode when executing operation/stop by remote controller during the preset hours, and not starting operation by the central remote controller at the programmed time of system start.

HOW TO SELECT THE CONTROL MODE

Select whether to accept or to reject the operation from the remote controller regarding the operation, stop,temperature setting and operation mode setting, respectively, and determine the particular control mode from the rightmost column of the table below.

Example



Operation mode	Control by remote controller					Control mode
	Operation					
	Unified operation, individual operation by central remote controller, or operation controlled by timer	Unified stop, individual stop by central remote controller, or timer stop	Stop	Temperature control	Operation mode setting	
ON/OFF control impossible by remote controller	Rejection (Example)	Rejection (Example)	Rejection (Example)	Rejection	Acceptance	0
					Rejection	10
				Acceptance (Example)	Acceptance (Example)	1 (Example)
					Rejection	11
Only OFF control possible by remote controller			Acceptance	Rejection	Acceptance	2
					Rejection	12
				Acceptance	Acceptance	3
					Rejection	13

(HC0165)

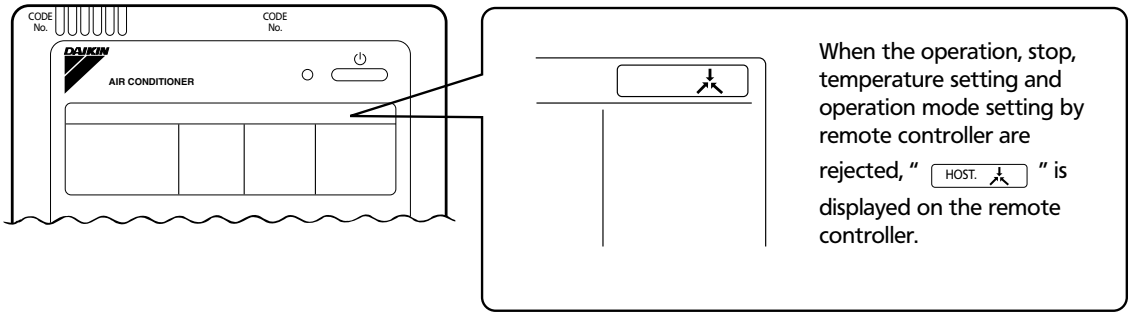
7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

Operation mode	Control by remote controller					Control mode
	Operation					
	Unified operation, individual operation by central remote controller, or operation controlled by timer	Unified stop, individual stop by central remote controller, or timer stop	Stop	Temperature control	Operation mode setting	
Centralized	Acceptance	Rejection (Example)	Acceptance	Rejection	Acceptance	4
					Rejection	14
				Acceptance	Acceptance	5
					Rejection	15
Individual		Acceptance		Rejection	Acceptance	6
					Rejection	16
				Acceptance	Acceptance	7
					Rejection	17
Timer operation possible by remote controller	Acceptance (During timer at ON position only)	Rejection (During timer at OFF position only)		Rejection	Acceptance	8
					Rejection	18
				Acceptance	Acceptance	9
					Rejection	19

Note:
Do not select the timer operation possible without the remote controller. In this case, timer operation is disabled.

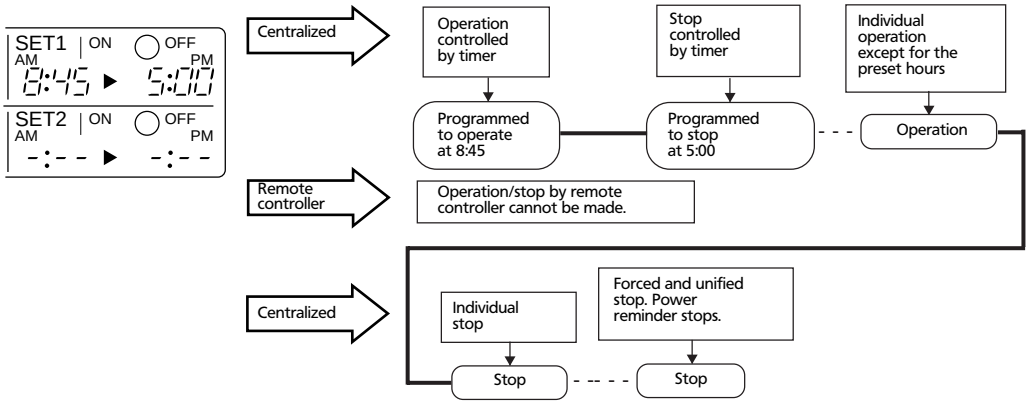


EXAMPLE OF OPERATION SCHEDULE

Operation schedule is possible only in conjunction with the schedule timer (optional accessory).

Liquid crystal display of schedule timer

ON/OFF control impossible by remote controller



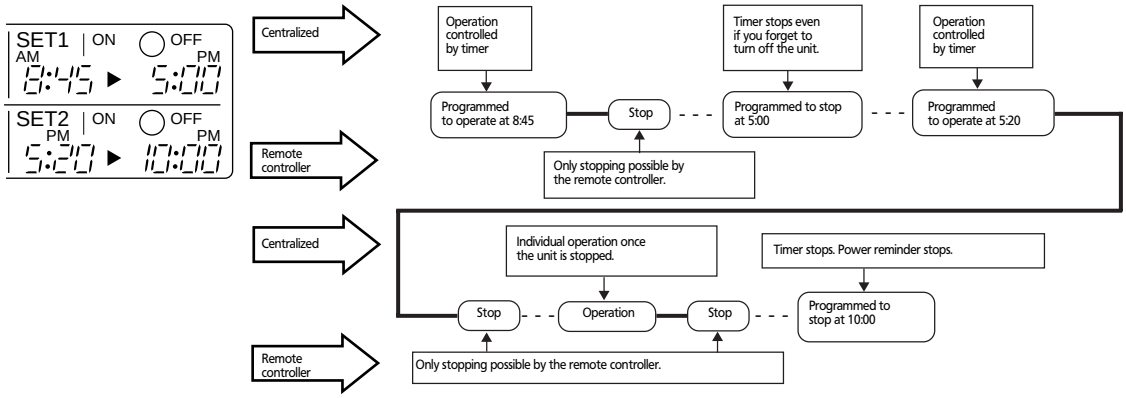
(HC0166)

7 Product Specification

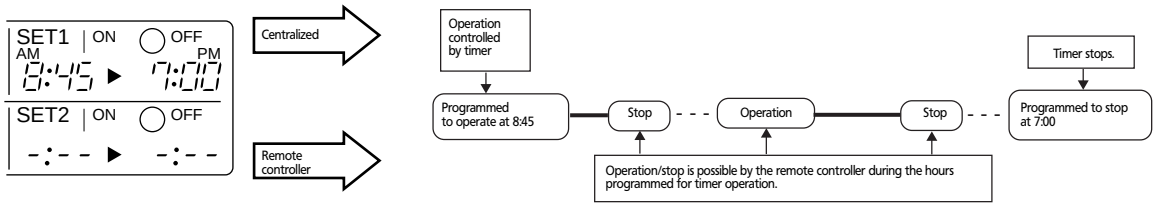
7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

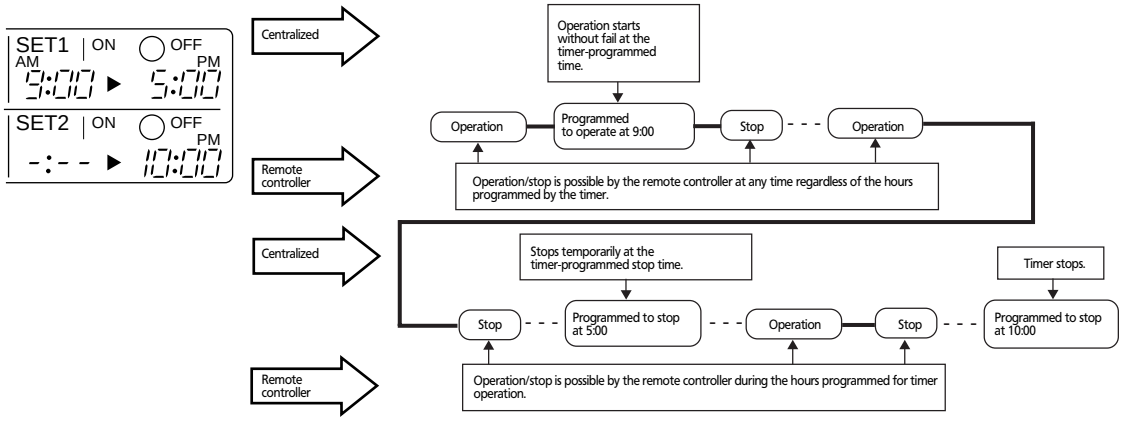
ON/OFF control possible by remote controller



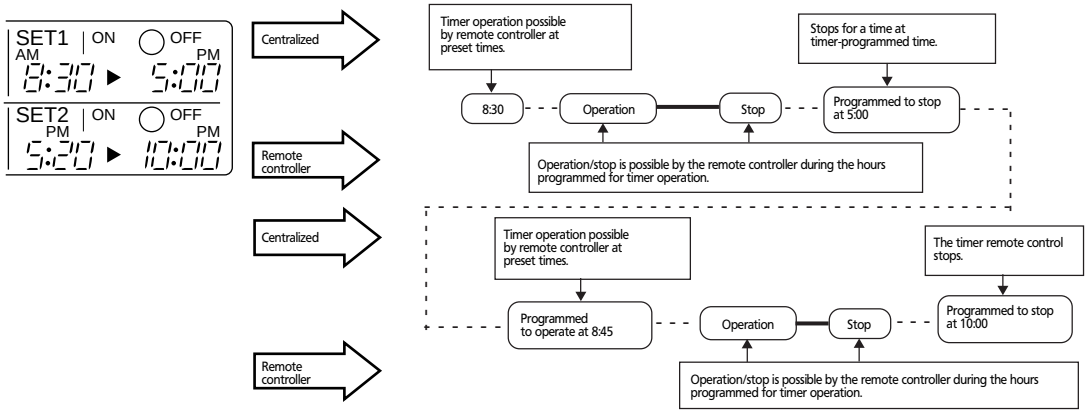
Centralized



Individual



Timer operation possible by remote controller



Air conditioner now OPERATING.
Air conditioner now stopping.
Command by central remote controller.
Command by remote controller.

(HC0167)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

SETTING OPERATION MODE (Fig. 5)

- The Zone consists of the following two cases.

A. Zone without display " [ ] "

The group with master remote controller setting exists in this zone.
Setting the master remote controller enables cool/heat selection.
Operations other than cool/heat operations can also be set for some operations. For further details, see the list on the right.

B. Zone with display " [ ] "

No group with master remote controller setting exists in this zone.
The cool/heat selection is not available because the master remote controller has not been set.
Some operations other than cool/heat operations can be set. For further details, see the list in the right.

See page 121 if the display " [ ] " is flashing.

1 **Press the OPERATION MODE SELECTOR BUTTON. Each time you press this button, the display rotates as shown on the right list.**

NOTES:
- During cool/heat operation, this central remote controller enables FAN operation for each zone even without setting the master remote controller. Meanwhile, ventilation, ventilation/cleaning, etc. are available, if HRV etc. are connected with this unit in the zone. See the operation manual provided with the each unit.
- When the indoor unit is in heat operation, change the setting to FAN operation through the central remote controller; then, you can switch the fan speed to the extremely low fan speed. Warm air may blow if any other indoor unit belonging to the same system is in heat operation.
- The indoor fan stops during defrost/hot start.
- DRY cannot be set from the central remote controller.

- **List of setting operation**

Display	A: Zones not displayed	
	Setting	Contents of setting
	×	
	○	To be set by zone
	○ ❊1	To be set by zone
	○	To be set by zone
	○	To be set by zone
	○ ❊1	To be set by zone
	○ ❊1	To be set by zone
— —	○	Select this display if you don't wish to set by zone.

Display	B: Zones not displayed	
	Setting	Contents of setting
	○	❊2
	○	To be set by zone
	×	
	×	
	×	
	○ ❊1	To be set by zone
	○ ❊1	
— —	○	Select this display if you don't wish to set by zone.

Note:
In the above list, " ○ " refers to the acceptable setting, while " × " refers to the not acceptable setting.
In the meanwhile, ❊ 1 and ❊ 2 refer to the followings.
❊ 1: Setting may not be acceptable depending on the type of indoor unit with which this unit is connected.
❊ 2: The group on FAN operation in the zone performs the temperature control operation (cool/heat) under the outdoor refrigerant system.

(HC0163)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

TEMPERATURE SETTING (Fig. 6)

1 **Press the TEMPERATURE SETTING BUTTON.**

Each time you press the " ▲ ", the temperature rises by 1 C.

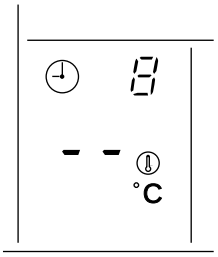
Each time you press the " ▼ ", the temperature falls by 1 C.

If you don't wish to set the temperature in a unified manner in the zone, set the temperature to " – – ".

NOTES:

- The setting temperature refers to that of the temperature sensing part. (It may differ from the room temperature.)
- The proper setting temperature is 26 – 28 C during cooling operation, and 18 – 23 C during heating operation.
- The setting temperature is not displayed in the FAN mode and Ventilation/Cleaning mode. The set temperature is not displayed either if HRV etc. form a zone without an air conditioner.

If you wish to set the temperature to "– –"



(Example)

In case where the range of temperature to be set is – 32 C

Press the " ▼ " when the display shows 16 C. The display " – – " appears.

Press the " ▲ " when the display shows 32 C. The display " – – " appears.

Set the temperature at the point 1 C higher than the upper limit and 1 C lower than the lower limit of the range subject to setting, respectively.

GROUP MONITORING (Fig. 7)

Utilize the group monitor function in each of the following cases:

1. Check the malfunction code. (See the next page.)
2. Check the group that requires cleaning of the air filter and air cleaner element. (See page 125.)
3. Change the setting of the master remote controller. (See page 124.)
4. Check the group(s) sharing the same outdoor unit. Or, check the particular group(s) with the master remote controller setting. (See page 125.)
5. Check the conditions of other individual groups.

1 **Press the ZONE/GROUP CHANGEOVER BUTTON on the display of zoning, and the display "group" appears.**

Unless operated from within one minute from when the display of zoning appears, the display will automatically revert back to the "group" display.

2 **Press the ADVANCE/BACKWARD BUTTON to set the group No. Then, operation monitor display " ▬ " of group No. lights up in the displayed zone; then, the state of the above group(s) is displayed in the liquid crystal display.**

(HC0169)

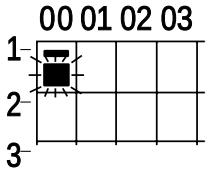
7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

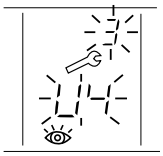
ERROR DIAGNOSING FUNCTION (Fig. 8)

This central remote controller is provided with a diagnosing function, for when an indoor unit stops due to malfunction. In case of actuation of a safety device, disconnection in transmission wiring for control or failure of some parts, the operation lamp, inspection display and unit No. start to flash; then, the malfunction code is displayed. Check the contents of the display, and contact your DAIKIN dealer because the above signs can give you the idea on the trouble area.



The display " ▬ " flashes under the group No. where the indoor unit that has stopped due to malfunction.

1 **Press the RETURN/ADVANCE BUTTON to call up the group that has stopped due to malfunction.**



The unit No. that has stopped due to malfunction and the malfunction code flashes. The display of control mode is replaced by that of the unit No.

SETTING MASTER REMOTE CONTROLLER (Fig. 9)

You must set the master remote controller of the operation mode for one of the indoor units, if two or more such indoor units with the remote controller are connected with the outdoor unit where the operation modes such as cool/heat operation and FAN operation can be set by remote controller and central remote controller.

1 **• Check the particular group with the master remote controller setting for the refrigerant system you wish to reset. (See the right.)**

- Call up the group without the display " [icon] " (See page 136.) Hold the OPERATION MODE SELECTOR BUTTON down for about four seconds while the above group is being called up.

  The display " [icon] " flashes on the liquid crystal display of the remote controller for all the groups sharing the same outdoor unit or BS unit.

  When you turn on the power switch for the first time, the display " [icon] " flashes.

2 Call up the desired group to set the master remote controller, and press the OPERATION MODE SELECTOR BUTTON. The master remote controller is set for this group, and the display " [icon] " goes out. The display " [icon] " appears for the other groups.
Setting is finished now.

- In case of operation switch
  Call up the zone including the group with the setting of master remote controller.

  (Zone without the display " [icon] ")
  Press the OPERATION MODE SELECTOR BUTTON several times, and switch to the desired operation mode. Each time you press it, the display is switched to " [icon] " " [icon] " " [icon] "and " – – " in sequence.

NOTES

- Press the ZONE/GROUP CHANGEOVER BUTTON, and call up the display of zoning.
- However, the displays " [icon] " " [icon] " and " [icon] " may appear in some zones, depending on the type of indoor unit with which they are connected.

(HC0170)

7 Product Specification

7-2 Optional accessories

7-2-7 DCS302C51: Centralized control

FUNCTION OF REFRIGERANT SYSTEM DISPLAY (Fig. 10)

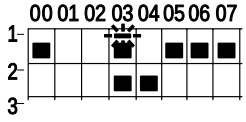
The following information becomes available by utilizing this function.

- Indoor group connected with the same outdoor unit
- Indoor group with the master remote controller setting of the given refrigerant system

1 **Press the ZONE/GROUP CHANGEOVER BUTTON, and call up the display "group" if the display of zoning appears.** Unless operated from within one minute from when the display of zoning appears, the display will automatically revert back to the "group" display.

2 **Press the BUTTON FOR REFRIGERANT SYSTEM DISPLAY. The display " REF. CIRCUIT " appears.**

3 **Press the ADVANCE/ BACKWARD BUTTON to call up the group of which you wish to check the refrigerant system.**



The display " ▬ " of all the groups sharing the same refrigerant system as the group on display flashes. Then, the display " ▬ " of the particular group among them with the master remote controller setting flashes.

Repeat the procedure 3 if you wish to check other refrigerant systems as well.

The above example shows that the groups 1-00, 1-03, 1-05, 1-06, 1-07, 2-03 and 2-04 share the same refrigerant system, and also that the master remote controller is provided with group 1-03.

4 **Press the BUTTON FOR REFRIGERANT SYSTEM DISPLAY again. The display " REF. CIRCUIT " goes out. The refrigerant system display is finished now.**

NOTES

- Unless operated from within one minute from when the refrigerant system display, the display will automatically revert back to the "group" display.
- This function may not be available depending on the type of outdoor unit with which the unit is connected. In this case, the display " REF. CIRCUIT " flashes.

DISPLAY OF TIME TO CLEAN (Fig. 11)

This central remote controller displays the time to clean the air filter or air cleaner element for each group or any given group by utilizing two types of signs.

The display "  " tells the time to clean the air filter or the air cleaner element of some group.

1 **Press the ADVANCE/ BACKWARD BUTTON, and search the groups displaying "  " or "  "**
(Several groups may have this indication.)

> Clean or change the air filter or air cleaner element. For further details, see the operation manual attached to each indoor unit. (Clean or change the air filter or air cleaner element of all the groups displaying " " or " ".)

2 **Press the FILTER SIGN RESET BUTTON, and the display "  " disappears. (Including all the groups where the air filter has been cleaned.)**

NOTE

Be sure to check the display "  " has disappeared at this point. The appearance of the above display is a sign that the air filter or air cleaner element of some group still needs cleaning.

(HC0171)

7 Product Specification

7-2 Optional accessories

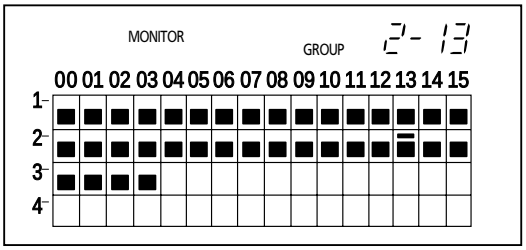
7-2-7 DCS302C51: Centralized control

UNIFIED OPERATION (Fig. 12)

Use this function when executing operation and stop of all the connected indoor units.

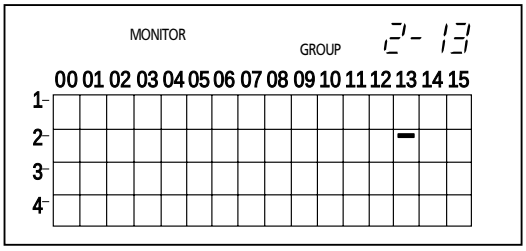
A Unified operation

Press the UNIFIED OPERATION BUTTON. All the displays " ▬ " of the group No. in operation light up at the same time, and all the groups start to operate at the same time.



B Unified stop

Press the UNIFIED STOP BUTTON. The lights of every display " ▬ " of group No. in operation go out at the same time; then, the lights of all the groups stop at the same time.



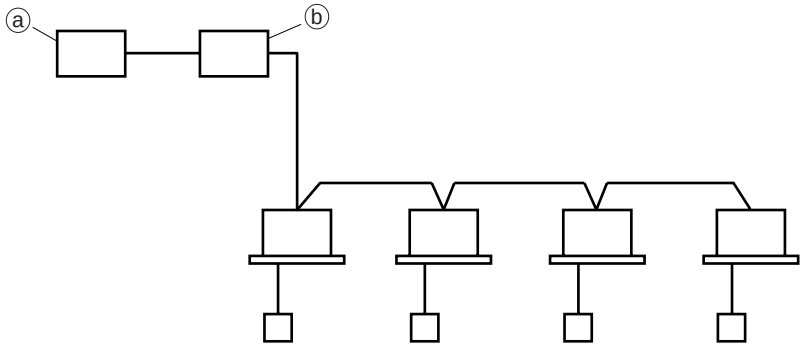
- When using the central remote controller in conjunction with other optional controllers for centralized control, the OPERATION LAMP on controllers which are not being used for operation may delay a few minutes before lighting or going out. There is nothing wrong with the equipment. The delay is due to signal exchange.

7 Product Specification

7-2 Optional accessories

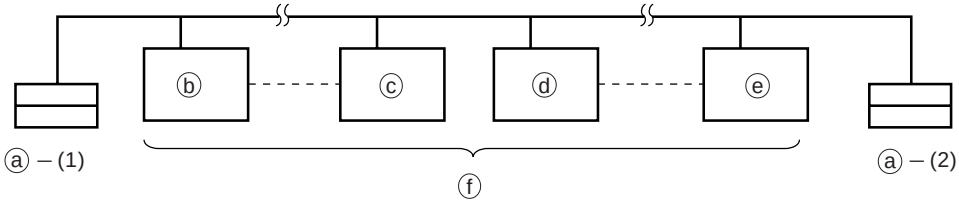
7-2-7 DCS302C51: Centralized control

OPTIONAL ACCESSORIES



You can perform the normal operation, take off the malfunction contact point and unified operation/stop by contact point, all by connecting this unit with the unification adapter for computerized control. For further details, ask your DAIKIN dealer.	
ⓐ Unification adapter for computerized control	ⓑ Central remote controller

DOUBLE CENTRAL REMOTE CONTROLLERS



With two central remote controllers, centralized control (indoor units) is possible from different locations.			
ⓐ Central remote controller	ⓑ Group No. 1–00	ⓒ Group No. 1–15	ⓓ Group No. 2–00
ⓔ Group No. 4–15	ⓕ Maximum 64 groups		

Note:

- For control alignment and settings for double central remote controllers, contact your DAIKIN dealer.

(HC0173)

7 Product Specification

7-2 Optional accessories

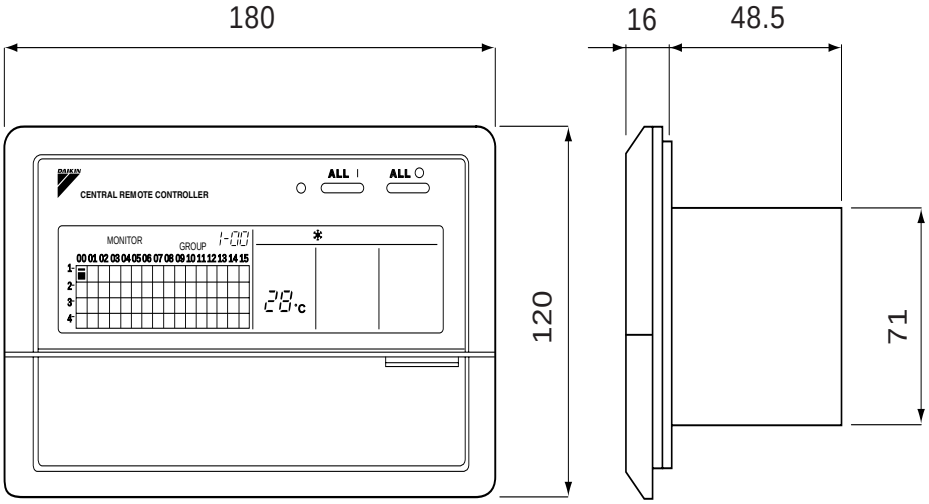
7-2-7 DCS302C51: Centralized control

SPECIFICATIONS

■ Specifications

Power supply	Single phase, 50 / 60 Hz, 220 – 240 V / 220 V
Power consumption	Max. 4.5 W
Forced ON / OFF input	Continuous "a" contact Contact current: approximately 10 mA
Size	180 (W) x 120 (H) x 64.5 (D)
Weight	430 g

■ Outline drawings



Specifications and appearance of this unit subject to change without notice.

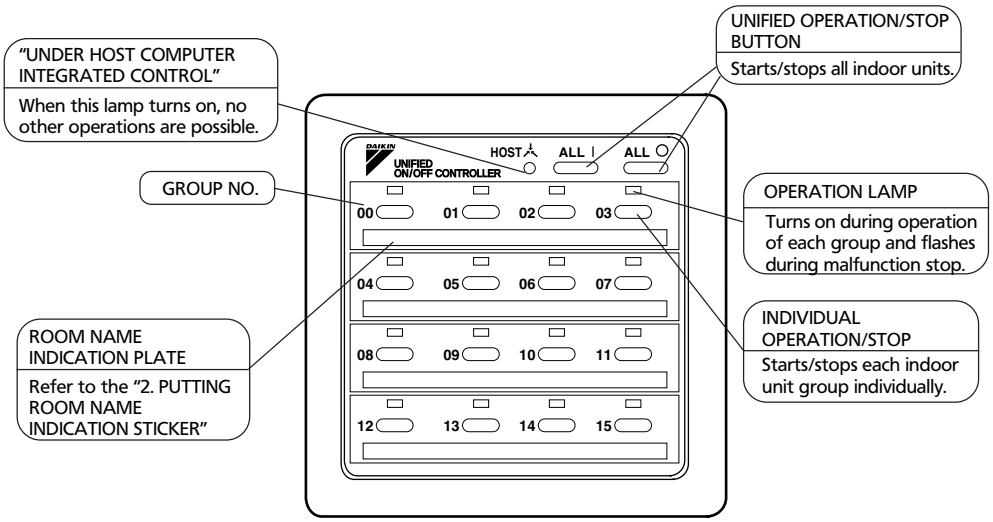
(HC0174)
3PA63363-1
EM96A021

7 Product Specification

7-2 Optional accessories

7-2-8 DCS301B61: Unified ON / OFF control

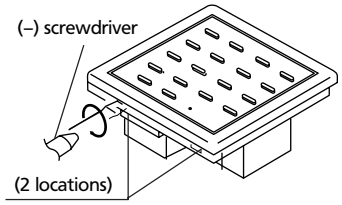
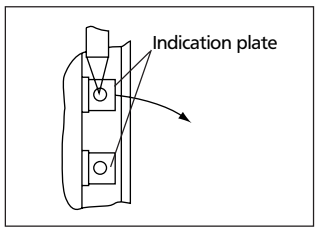
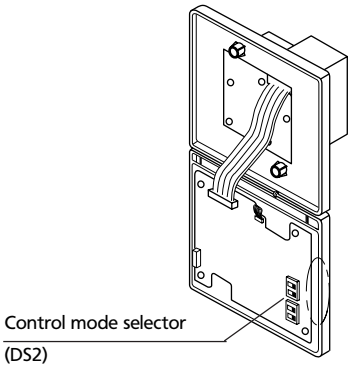
NAMES AND FUNCTIONS



<< NOTE >>

- When using unified ON/OFF controller with other optional controllers for centralized control, "OPERATION LAMP" of the equipment which is not operated may turn on or off after several minutes.
  This state occurs due to signal communications and is not a failure.
- Do not open the upper part of remote controller except when rewriting the indication sticker or selecting control modes.

PUTTING ROOM NAME INDICATION STICKER

① Open the upper part of remote controller. Insert a (–) screwdriver into the recess between the upper and lower part of remote controller (at 2 locations) and twist the screwdriver lightly.	
PC board is attached both the upper and lower part of remote controller. Do not damage the board with the screwdriver.	
② Pull out the room name indication plate. Insert the point of a mechanical pencil etc, into the hole of the indication sticker to pull it out.	 

(HC0190)

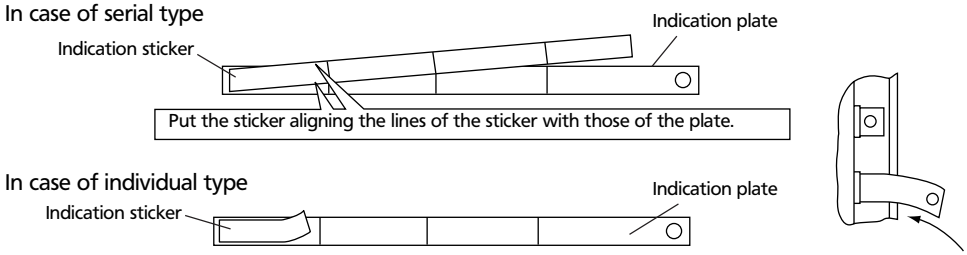
7 Product Specification

7-2 Optional accessories

7-2-8 DCS301B61: Unified ON / OFF control

③ Put the attached indication sticker on the room name indication plate.

In case of serial type



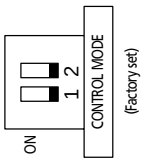
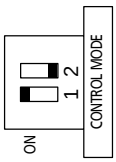
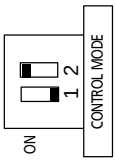
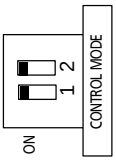
Put the sticker on the center of the frame.
Write the room name in the frame of the sticker with a ball point pen or a felt-tip pen (oil-base).

④ Reinstall the plate as it were, with checking the correct direction.

⑤ Close the upper part of remote controller.

SELECTING CONTROL MODES

The following four patterns of control mode can be set.

Control mode	Individual	Centralized	Timer operation possible by remote controller	ON/OFF control impossible by remote controller
Content	Operation/stop is controlled by both unified ON/OFF controller and remote controller.	After operated by unified ON/OFF controller, operation/ stop is freely controlled by remote controller until stopped by unified ON/OFF controller.	When used in conjunction with schedule timer, operation/stop is controlled freely by remote controller during the set time but operation is not available when schedule timer is ON.	Operation/stop is controlled by unified ON/OFF controller only. Indoor units can not be operated/ stopped by remote controller.
DS2 setting				

NOTE:

- ▬ indicates the position of switches.
- Set control modes before turning power supply on.
- When used in conjunction with central remote controller, the control modes of the central remote controller has the priority.

DISPLAY OF MALFUNCTION

Flashing of lamps indicates malfunctions. Contact your Daikin dealer.

When turning power supply on, all lamps may light and UNDER HOST COMPUTER INTEGRATED CONTROL lamp may flash and not accept the operation for about one minute.

These conditions are not malfunctions.

States of lamps	Contents of malfunctions
Flashing of operation lamp	Indicates malfunctions in the indoor unit in the group where the operation lamp is flashing.
Flashing of UNDER HOST COMPUTER INTEGRATED CONTROL lamp	Indicates malfunctions in optional controllers for centralized control.

(HC0191)

3PA53843

7 Product Specification

7-2 Optional accessories

7-2-9 DST301B61: Schedule timer

CAUTIONS DURING USE

- Do not tamper with the inner mechanism.
  Do not remove the front panel. Tampering with the inner mechanism is dangerous and may damage equipment. For inspection and adjustment, contact your DAIKIN dealer.
- Avoid places where the unit may be contacted by water.
  Water penetrating the inner mechanism may cause electrical leakage, or render electric parts defective.
- Do not press the button on the with a pointed hard tool.
  This may damage the .
- Avoid direct exposure to sunlight.
  Direct sunlight may discolor the LCD and obscure the image.
- Do not wipe the surface of the operation panel with benzene, thinner, chemically treated dust cloth, etc.
  This may cause discoloring or peeling. To clean, moisten a cloth with a neutral cleanser diluted in water, rinse and wipe. Blot adhering water with a dry cloth.
- Never pull or twist the electric wire of the schedule timer.
  It can cause the unit to malfunction.
- Never inspect or service the schedule timer by yourself.
  Ask a qualified service person to perform this work.

FEATURES AND FUNCTIONS

■ Operation controlled by programmed time
Operating time and stopping time can be set to the minute by each day of the week. The operating and stopping patterns can also be set in schedule accord-ing to the time slot given twice a day in tune with the uses.

See page 72

■ Unified Operation/Stop
By using this schedule timer, the unified operation/stop of the indoor unit can be executed manually regardless of the No. of programmed time in operation.

See page 74

■ When used in conjunction with central remote controller (Optional Accessory)
The operation controlled by programmed time can be set for up to eight different patterns (timer No. 1 – 8). Each schedule pattern can be also selected.

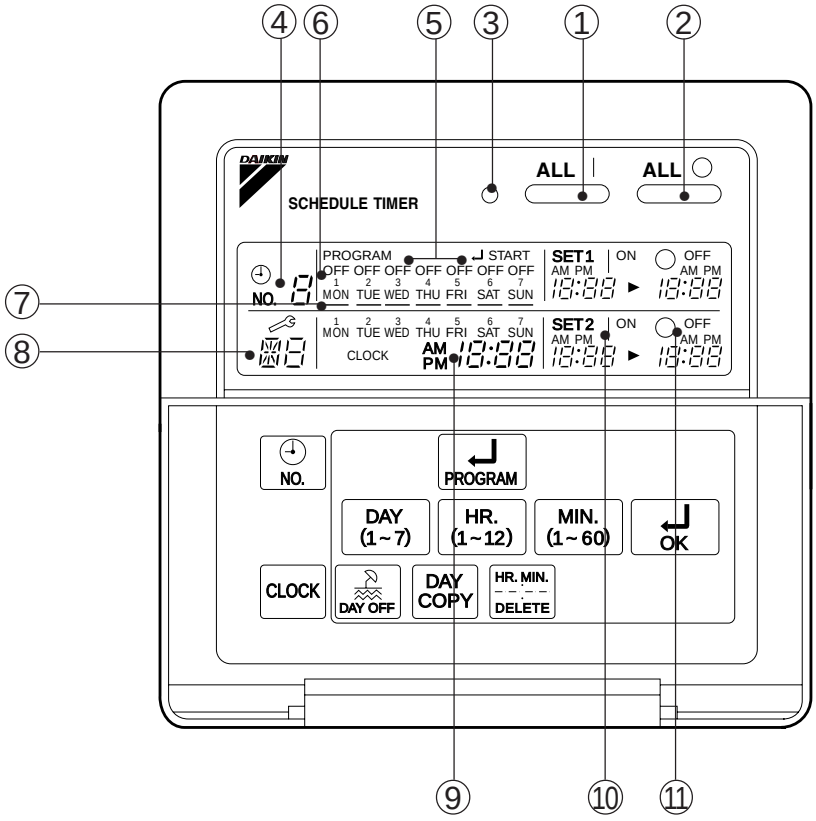
(HC0175)

7 Product Specification

7-2 Optional accessories

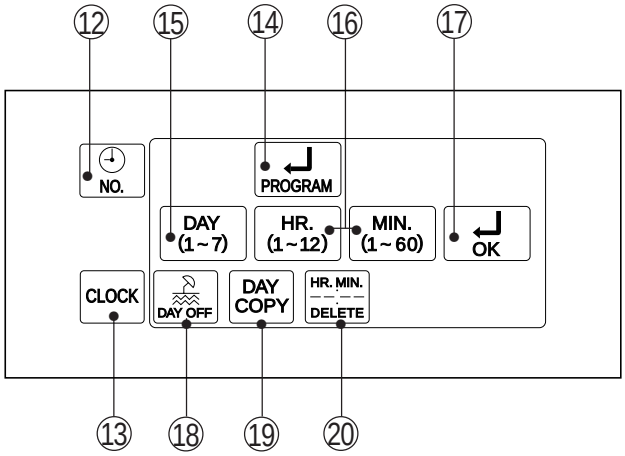
7-2-9 DST301B61: Schedule timer

Fig.1



(HC0176)

Fig.2



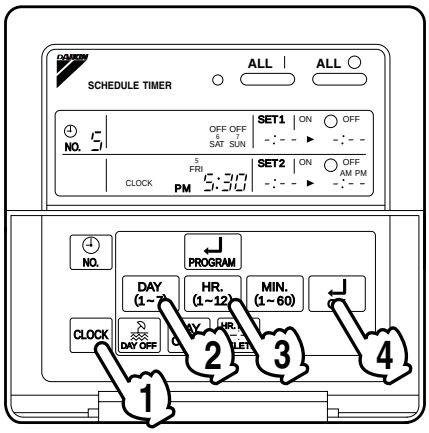
(HC0177)

7 Product Specification

7-2 Optional accessories

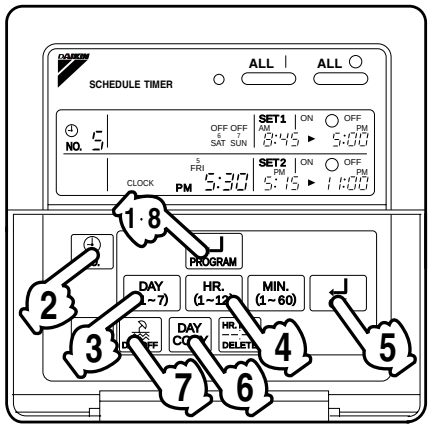
7-2-9 DST301B61: Schedule timer

Fig. 3



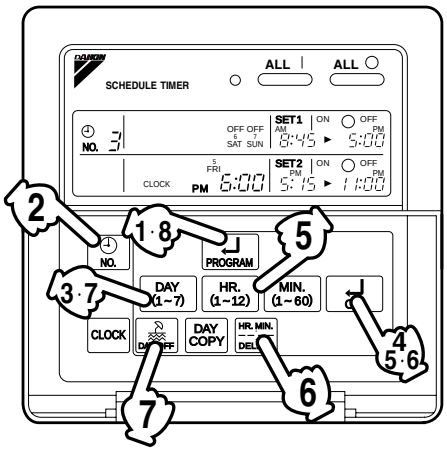
(HC0178)

Fig. 4



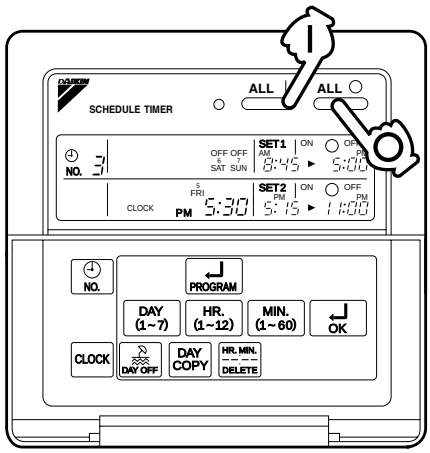
(HC0179)

Fig. 5



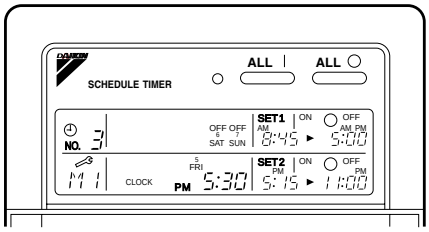
(HC0180)

Fig. 6



(HC0181)

Fig. 7



(HC0182)

7 Product Specification

7-2 Optional accessories

7-2-9 DST301B61: Schedule timer

NAMES AND FUNCTIONS OF THE OPERATING SECTION (Fig. 1,2)

①	**UNIFIED OPERATION BUTTON** Press this button to perform the unified operation regardless of the No. of programmed time.	⑪	**DISPLAY " OFF AM PM 18:88 " (PROGRAMMED TIME OF SYSTEM OFF)** Displays the time programmed to stop.
②	**UNIFIED STOP BUTTON** Press this button to perform the unified stop regardless of the No. of programmed time.	⑫	**TIME NO. BUTTON**
③	**OPERATION LAMP (RED)** The light turns on during the operation of the indoor unit.	⑬	**CLOCK ADJUSTING BUTTON** Press this button to set the present time.
④	**DISPLAY " NO. 8 " (TIME NO.)** Displays the time No. only when used in conjunction with the central remote controller.	⑭	**PROGRAMMING START BUTTON** Press this button to set or check the No. of programmed time. Press it again after you are through with the program.
⑤	**DISPLAY "PROGRAM ↵ START." (PROGRAMMING START)** The light turns on when the timer is programmed.	⑮	**BUTTON FOR SELECTING DAYS OF A WEEK** Press this button to select the day of the week.
⑥	**DISPLAY " OFF " (HOLIDAY SETTING)** Lights above the day of the week set as holiday. The operation controlled by timer is not available on that day.	⑯	**HOUR/MINUTE BUTTON** Press this button to adjust the present time and the programmed time.
⑦	**DISPLAY "–" (SETTING OF DAYS OF A WEEK)** Flashes below the day of the week programmed.	⑰	TIMER ON BUTTON Press this button to set the present time and the programmed time.
⑧	**DISPLAY " MALFUNCTION CODE 10 " (MALFUNCTION CODE)** Displays the contents of malfunction during the stop due to malfunction.	⑱	**HOLIDAY SETTING BUTTON** Press this button to set holidays.
⑨	**DISPLAY " 1 MON 2 TUE 3 WED 4 THU 5 FRI 6 SAT 7 SUN CLOCK AM PM 18:88 " (PRESENT TIME)** Displays the present day of the week and time.	⑲	**BUTTON FOR COPYING PROGRAM OF PREVIOUS DAY** Use this button to set the No. of programmed time same as that of the previous day.
⑩	**DISPLAY " 1 MON 2 TUE 3 WED 4 THU 5 FRI 6 SAT 7 SUN CLOCK AM PM 18:88 " (PROGRAMMED TIME OF SYSTEM START)** Displays the time programmed to start.	⑳	**PROGRAM CANCELING BUTTON** Use this button to set the programmed time to cancel. The display shows "– ; – –".

Note:
Please note that all the displays in the figure appear for explanation purposes or when the cover is open.

(HC0183)

7 Product Specification

7-2 Optional accessories

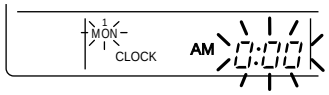
7-2-9 DST301B61: Schedule timer

OPERATION SETTING PRESENT TIME (Fig. 3)

(Example) In case of setting Friday, 5:30 p.m.

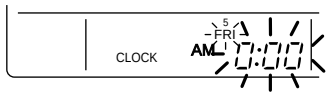
1 Press the CLOCK ADJUSTING BUTTON. The present time display flashes.

Note:
The present time needs adjusting in case of turning power supply on for the first time or the occurrence of power failure over the period of 48 hours or more.



2 Press the BUTTON FOR SELECTING DAYS OF A WEEK. Each time the button is pressed, the day display shifts to the right.

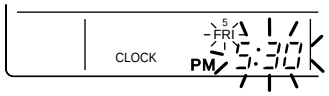
Note:
The display "MON" follows the display "SUN".



Set the day to Friday.

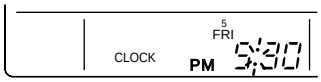
3 Set the time with the HOUR/MINUTE BUTTON. Each time the HOUR/MINUTE BUTTON is pressed, the display is put forward minute by minute and hour by hour.
When the button is kept pressed, the display is put forward continuously.

Notes:
- After becoming "AM 11:00", when the button is pressed, the display becomes "PM 0:00".
- After becoming "59" (minute), when the button is pressed, the display becomes "00" (minute).



Set the time to 5:30 p.m..

4 Press the TIMER ON BUTTON the moment the time signal of TV, radio, telephone, etc. is heard. The mark " : " flashes, and the clock starts.



Press the TIMER ON BUTTON in tune with the time signal at 5:30 p.m.

Notes:
- The clock used is of 12-hour type.
- When you turn power supply on, the system may display "88" for about one minute and not start to operate after all the liquid crystal displays appear at a time.
- If the CLOCK ADJUSTING BUTTON is pressed by mistake, press it again to return to the original state. As the clock does not stop, the time indicated by the clock is kept correct. In case of power failure within 48 hours, the clock keeps operating by utilizing the built-in battery.

(HC0184)

7 Product Specification

7-2 Optional accessories

7-2-9 DST301B61: Schedule timer

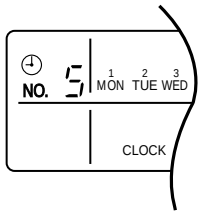
SETTING NO. OF PROGRAMMED TIME (Fig. 4)

(Example)
Time No. 5 (to be programmed only when used in conjunction with the central remote controller)
Monday to Friday:
Operating from 8:45 a.m. till 5:00 p.m.
Operating from 5:15 p.m. till 11:00 p.m.
Saturday and Sunday:
Setting the whole day stop operation (application for holidays) controlled by programmed time.

1 Press the PROGRAMMING START BUTTON. Programming is available.

The display "PROGRAM ↵ START" appears, and the display of days of a week flashes.

2 Press the TIME No. BUTTON, and select the desired number.
Note:
Unless used in conjunction with the central remote controller, The TIME No. is not displayed and can not be selected.
Select the TIME No. 5.



3 Press the BUTTON FOR SELECTING DAYS OF A WEEK, and set the proper day of the week. Each time you press it, the flashing display of days of a week shifts to the right.

Set to Monday.

(1) Setting programmed time

4 Set the programmed time of system start 1 by using the HOUR/MINUTE BUTTON. Each time the HOUR/MINUTE BUTTON is pressed, the display is put forward minute by minute and hour by hour. When the button is kept pressed, the display is put forward continuously.

Set the programmed time of system start 1 at 8:45 a.m.

5 Press the TIMER ON BUTTON,and set the programmed time of system start 1. Each time you press it, the next area to be set flashes.
Note:
Set the other programmed time in the same procedure.

(2) Set the next day of the week.

Set the day of the week to Tuesday, and copy the program of the previous day (Monday). In the same procedure, set the day of the week to Wednesday through Friday in sequence.

6 Press the BUTTON FOR SELECTING DAYS OF A WEEK and set the following day. Press the BUTTON FOR COPYING PROGRAM OF PREVIOUS DAY. The same program as that of the immediately preceding day of the week is set.
Note:
Repeat each procedure 3 – 5 in the above when not copying the contents of the previous day.

(3) Holiday setting

7 Press the BUTTON FOR SELECTING DAYS OF A WEEK and set one or more days of the week as holiday. Press the HOLIDAY SETTING BUTTON, and the display "OFF" is displayed at the top of the day of the week. If you press it again, the display returns to the original state.

Set Saturday and Sunday as holidays.

(HC0185)

7 Product Specification

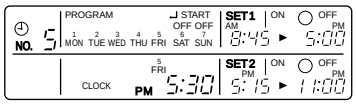
7-2 Optional accessories

7-2-9 DST301B61: Schedule timer

8 Press the PROGRAMMING START BUTTON, and finish the program setting.

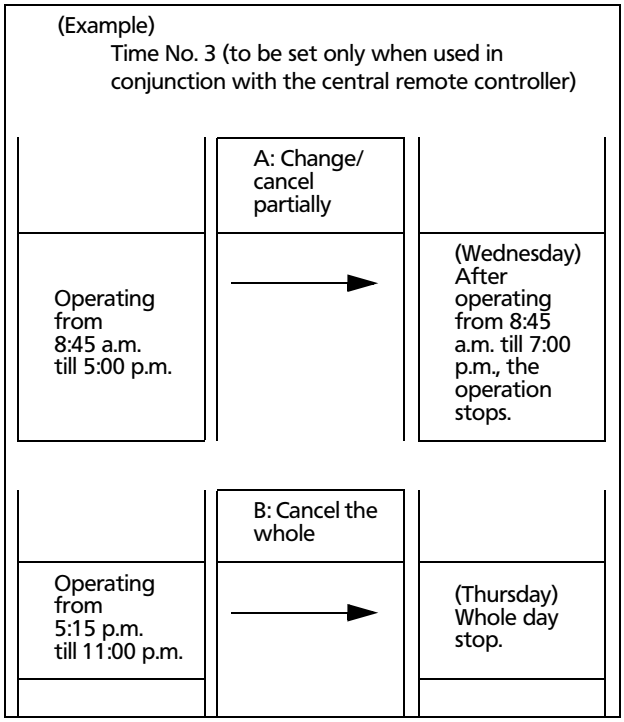
Notes:

- Unless the button is pressed within 20 minutes, the display will automatically revert back to the original state. In this case, setting contents up to the point where the TIMER ON BUTTON (or HOLIDAY SETTING BUTTON or BUTTON FOR COPYING PROGRAM OF PREVIOUS DAY) is pressed will only take effect.
- The display "PROGRAM ↵ START" and the display of days of a week " – " disappears.
- The flashing display goes off, and the No. of programmed time of the present day is displayed. Then the operation controlled by timer starts.
- The operation controlled by timer is executed even while the program is being set.



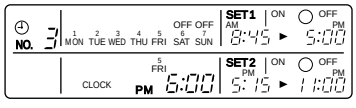
This is the end of the setting example.

CHANGE AND CANCELLATION OF NO. OF PROGRAMMED TIME (Fig. 5)



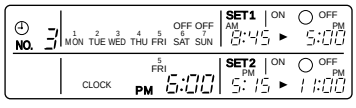
1 Press the PROGRAMMING START BUTTON. The program setting is ready. The display "PROGRAM ↵ START" appears, and the display of days of a week flashes.

2 Press the TIME No. BUTTON, and select the desired No.



Select the time No. 3.

3 Press the BUTTON FOR SELECTING DAYS OF A WEEK, and set the day of the week to be changed. The set No. of programmed time of the day of the week is displayed.



Set the day to Wednesday.

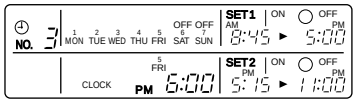
7 Product Specification

7-2 Optional accessories

7-2-9 DST301B61: Schedule timer

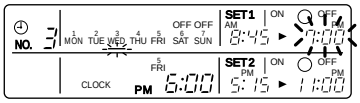
A. Change/cancel partially

4 Press OK button if you do not want to change the timer on. The display of the next programmed time flashes. Each time you press it, the next area to be set flashes.



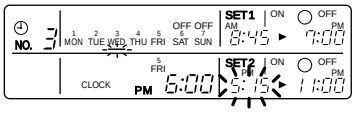
Shift to the display "PROGRAMMED TIME OF SYSTEM OFF".

5 Press the HOUR/MINUTE BUTTON and change the programmed time. Press the OK BUTTON, and finalize the setting of change.

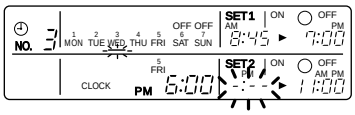


Change the programmed time of system OFF p 1 to 7:00 p.m.

6 Press the PROGRAM CANCELING BUTTON, and cancel the programmed time. If you press it again, display returns to the original state. Press the TIMER ON BUTTON to finalize the cancellation.



Shift to the programmed time of system start 2.



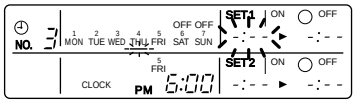
Set the programmed time of system start 2 to program cancellation.

In the same procedure, cancel the programmed time of system off 2.

(HC0186)

B. Cancel the whole

7 Press the BUTTON FOR SELECTING DAYS OF A WEEK, and shift to the day of the week to be canceled. Then, press the HOLIDAY SETTING BUTTON; the display "OFF" appears at the top of the particular day of the week. The programmed time is canceled. If you press the button again, the display returns to the original state.



Shift the day of the week to Thursday to set as a holiday.

8 Press the PROGRAMMING START BUTTON. The program setting is now finished.

Notes:

- Unless the button is pressed within 20 minutes, the display will automatically revert back to the original state. In this case, setting contents to the point where the TIMER ON BUTTON (or HOLIDAY SETTING BUTTON or BUTTON FOR COPYING PROGRAM OF PREVIOUS DAY) is pressed will only take effect.
- To continue the change/cancellation, do not press the PROGRAMMING START BUTTON until all change/ cancellation are completed.
- The operation controlled by timer is executed even while the program is being set.

7 Product Specification

7-2 Optional accessories

7-2-9 DST301B61: Schedule timer

MANUAL OPERATION (Fig. 6)

This schedule timer enables the operation/stop by pressing the UNIFIED OPERATION/STOP BUTTON in addition to the operation controlled by timer (operation/stop according to the programmed time) at any time.

Press the UNIFIED OPERATION BUTTON, and the OPERATION LAMP turns on.

Press the UNIFIED STOP BUTTON, and the OPERATION LAMP is turned off.

Notes:

- The operation automatically stops according to the programmed time of system off even during the manual operation. In the meantime, the operation starts automatically according to the programmed time of system start even during the stop of operation.
- If the unit is used in conjunction with other optional controllers for centralized control, the OPERATION LAMP of the unit that is not under operation control may be turned on or off a few minutes behind schedule. This shows that the signal is being exchanged, and does not indicate any failure.

(HC0187)

Operation lamp
○ Turn on: The light turns on when any of the indoor units is in operation whether the operation is controlled by timer or by hand.
● Turn off: The light turns off when all the indoor units stop.

OPERATION CONTROL CODE

Two different types of operation control codes can be selected when this kit is used independently (when not used in conjunction with the centr al remote controller, unified ON/OFF controller, etc.).

■ Individual

In case where the operation/stop is controlled by both schedule timer and remote controller.

■ Centralized

The operation is controlled by the schedule timer alone, and the operation/stop is controlled freely with the remote controller during the programmed time.

Notes:

- For current settings, contact your DAIKIN dealer.
- To change settings, contact your DAIKIN dealer.
  Do not change settings yourself.

ERROR DIAGNOSING FUNCTION (Fig. 7)

This schedule timer is provided with the malfunction diagnosing function. The malfunction code flashes if there occurs any malfunction in communication, etc. between and among the optional controllers for centralized control. In addition, the operation lamp also flashes if there occurs any malfunction in communication with the indoor unit. Check the contents of the display and contact your DAIKIN dealer because the signals give you the idea of the trouble area.

Operation lamp	Malfunction code	Contents of malfunction
Turn off	M1	Failure of PC board of schedule timer.
Turn on or off	M8	Malfunction of transmission between each optional controllers for centralized control.
Turn on or off	MA	Improper combination of optional controllers for centralized control.
Turn on or off	MC	Address failure of schedule timer.
Flash	UE	Malfunction of transmission between indoor unit and optional controllers for centralized control.
Flash	–	Malfunction in indoor unit (Refer to the malfunction codes of the indoor remote controller, while also read the "CAUTION FOR SERVICING" attached to the indoor unit.)

(HC0188)

7 Product Specification

7-2 Optional accessories

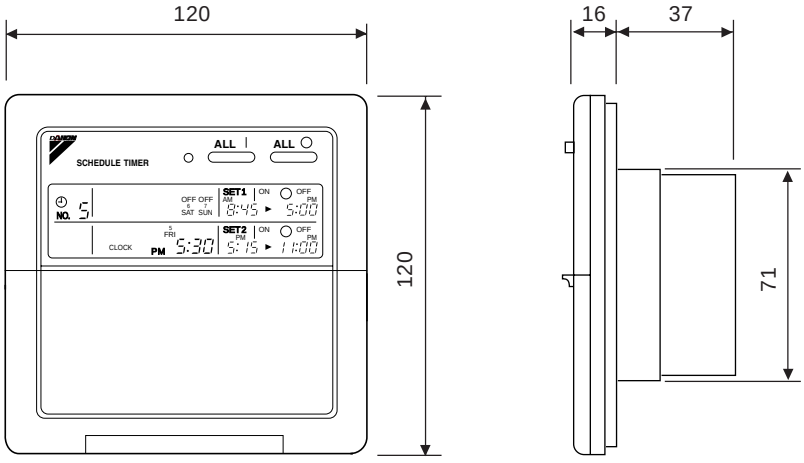
7-2-9 DST301B61: Schedule timer

SPECIFICATION

■ SPECIFICATIONS

Display of time	12-hour digital display
Clock cycle type	Quartz clock type
Clock accuracy	Within • 30 sec. / month (environmental temperature from 15 C to 35 C)
Timer programming	Two pairs of programmed time for both system start and system off can be set in units of minute for each day of the week
Power failure compensation time	Approximately 48 hours for a single occurrence of power failure (clock with No. of programmed time)
Size (Width × Height × Depth)	120(W) × 120(H) × 53(D) mm
Weight	Approximately 210g

■ OUTLINE DRAWINGS



Specifications and appearance subject to change without notice. (HC0189)

7 Product Specification

7-2 Optional accessories

7-2-10 K-DGL100A, K-DGL150A, K-DGL200A, K-DGL250A: Air suction / discharge grill

Model name	K-DGL100A	K-DGL150A	K-DGL200A	K-DGL250A
Applicable model	VAM150FA	VAM250FA VAM350FA	VAM500FA VAM650FA	VAM 800FA VAM1000FA VAM1500FA VAM2000FA
Nominal pipe diameter (mm)	ϕ 100	ϕ 150	ϕ 200	ϕ 250
Noise reducing effect (dB)	approx. 6	approx. 6	approx. 11	approx. 11
Effective opening area (cm^2)	187	257	333	438
Weight (kg)	2.4	3.3	4.5	5.2

Applications and features

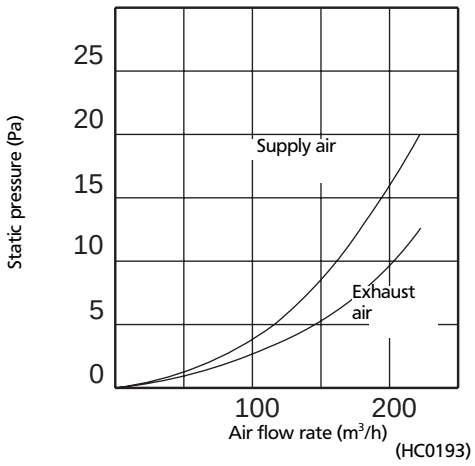
- The grille can be installed at any location, using a duct.
- The grille effectively reduces the total heat exchanger noise transmitted from the duct.

Cautions

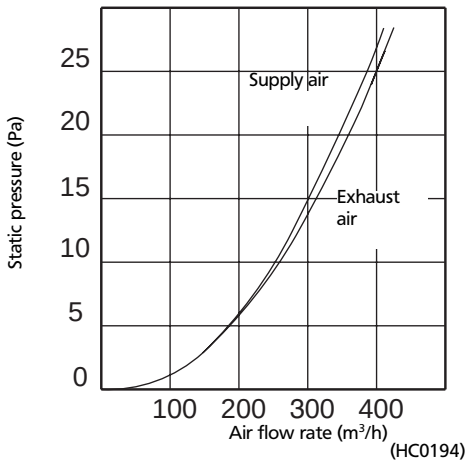
- Do not install the grille in a place of excessive high temperature.
- Do not install the grille in a place of much oil and smoke and of high humidity.

Pressure loss curve

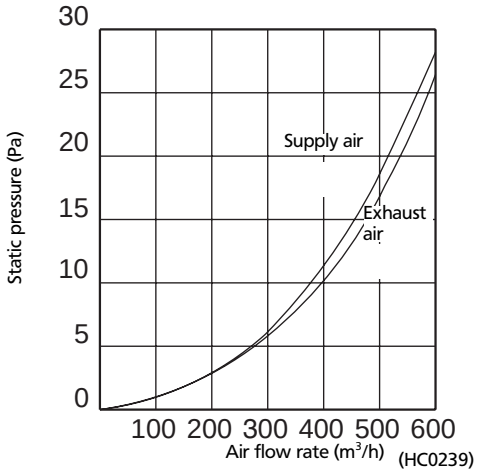
K-DGL100A



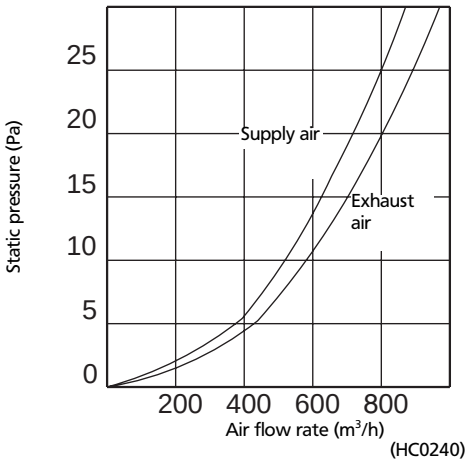
K-DGL150A



K-DGL200A



K-DGL250A



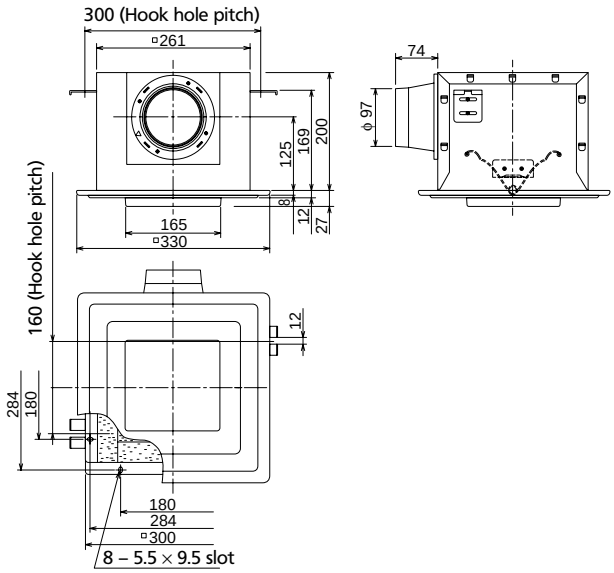
7 Product Specification

7-2 Optional accessories

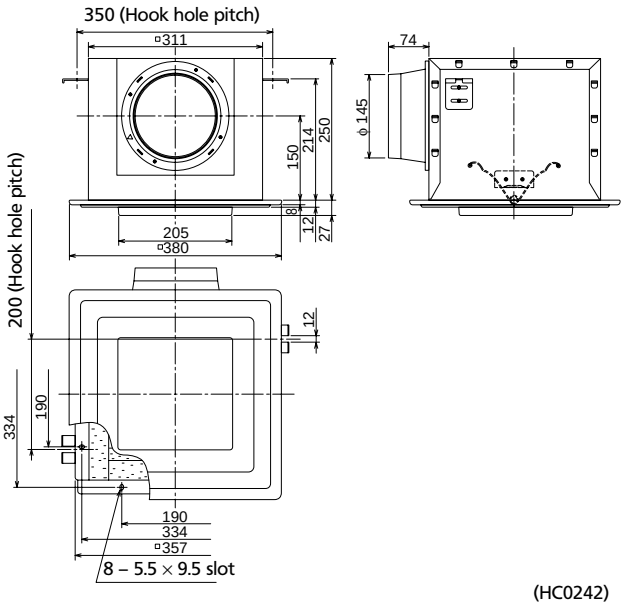
7-2-10 K-DGL100A, K-DGL150A, K-DGL200A, K-DGL250A: Air suction / discharge grill

Dimensions

K-DGL100A

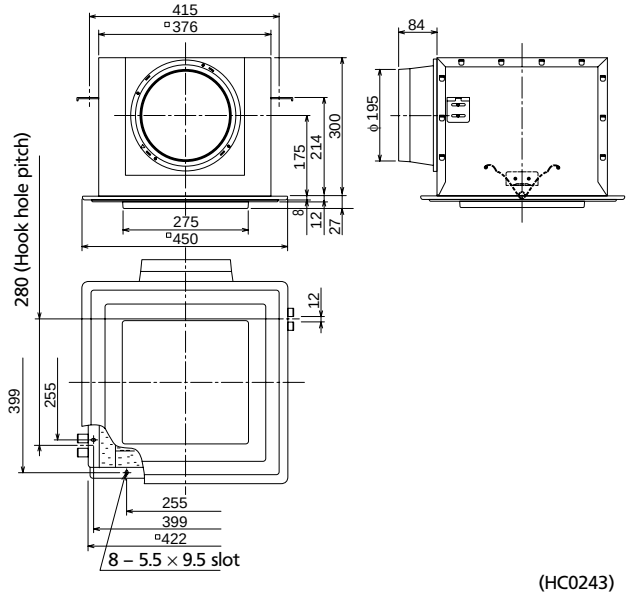


K-DGL150A



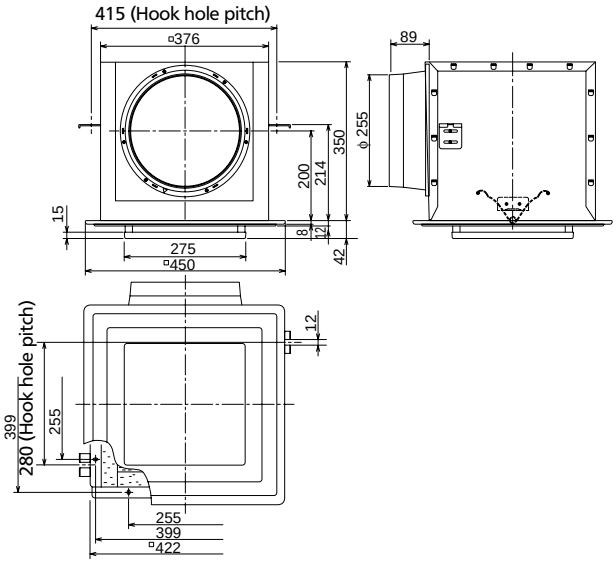
(HC0242)

K-DGL200A



(HC0243)

K-DGL250A



(HC0244)

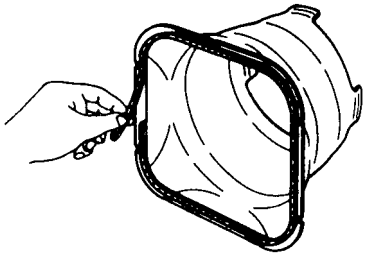
7 Product Specification

7-2 Optional accessories

7-2-10 K-DGL100A, K-DGL150A, K-DGL200A, K-DGL250A: Air suction / discharge grill

Installation procedure

Before starting installation, attach the supplied packing to the adapter provided in the same package. (Attach the packing to the adapter flange so that it will be set within the periphery of the flange.)



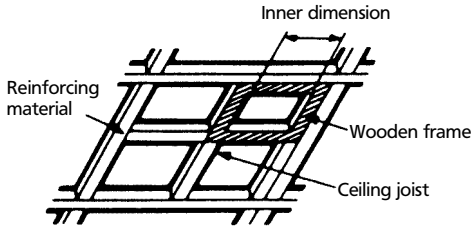
(HC0198)

For installing on a wooden frame (Using ceiling joist)

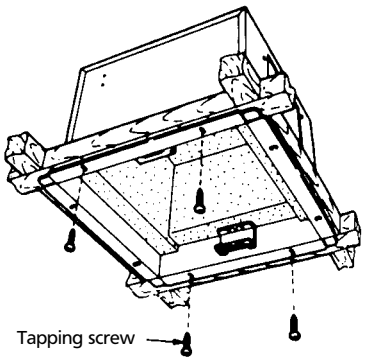
1. Fabricate the wooden frame and attach it to the ceiling joist.
   * If the joist is not strong enough to support the unit, use hanging bolts as well.

	K-DGL100A	K-DGL150A	K-DGL200A K-DGL250A
Inner dimension	□270	□320	□385
Wooden frame	Approx. 30 mm (square)		

2. Put the unit inside the wooden frame and fix the unit using the provided tapping screws (long ones).
3. Attach the adapter to the body using the provided tapping screws (short ones).



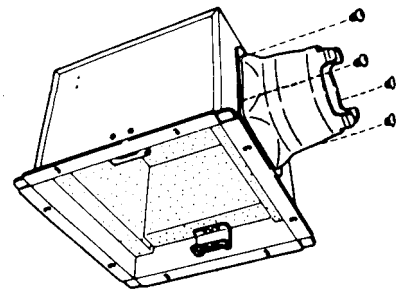
(HC0199)



(HC0200)

For suspending on anchor bolts

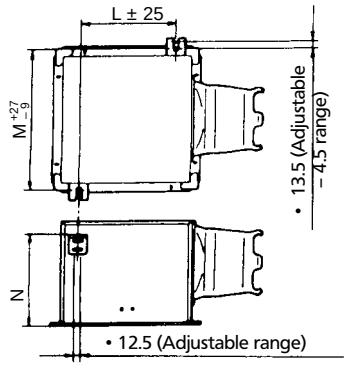
1. Attach the adapter to the body using the provided tapping screws (short ones).



(HC0201)

2. Fix the provided hook metals (2 pcs.) to the body using the four tapping screws (short ones).
3. Fix the body to the anchor bolts so that it stays horizontally level. (M8 or M10)

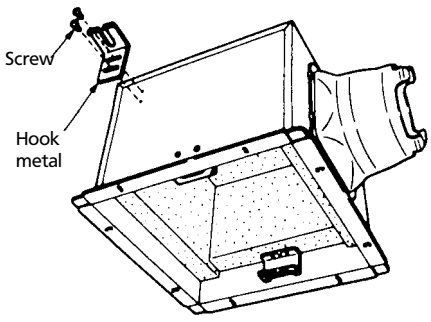
Hook metal fixing position



(HC0197)

Dimension table Unit: mm

Part No.	L	M	N
K-DGL100A	160	300	169
K-DGL150A	200	350	214
K-DGL200A	280	415	214
K-DGL250A	280	415	214



(HC0202)

7 Product Specification

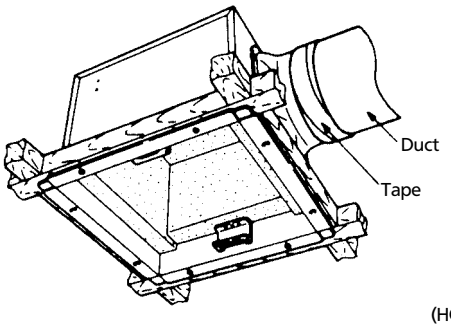
7-2 Optional accessories

7-2-10 K-DGL100A, K-DGL150A, K-DGL200A, K-DGL250A: Air suction / discharge grill

Common works

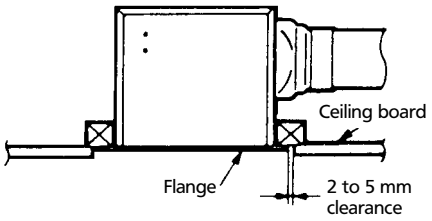
Duct connection and ceiling board installation

1. Put the duct into the adapter and fix them by winding tape around the joint.
   (Suspend the duct from the ceiling to prevent any load from being applied to the body.)



(HC0203)

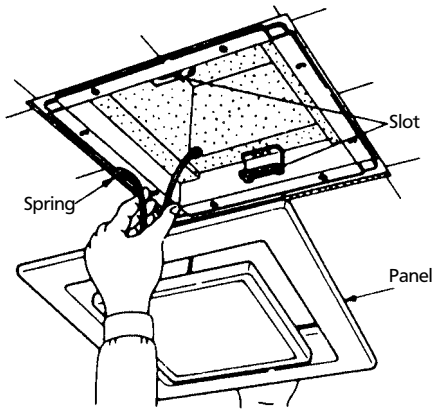
2. Install the ceiling board, providing a clearance of 2 to 5 mm between the flange and the board.
   (If no clearance is provided, maintenance of the unit cannot be performed.)



(HC0204)

Installation of the panel

Contract the panel spring and put it in the panel holder slot to fix the panel.

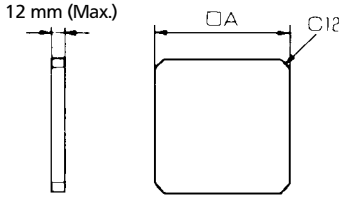


(HC0205)

Installing the ceiling material and gluing the wall paper

For installing the ceiling material

1. Cut the ceiling material to the following dimensions.

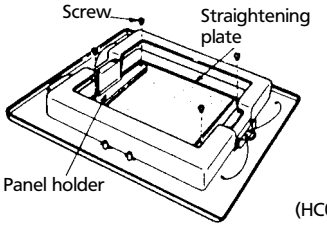


(HC0206)

	K-DGL100A	K-DGL150A	K-DGL200A, 250A
A	157	197	267

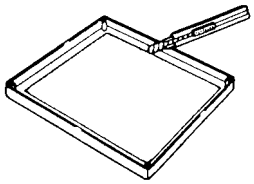
- Avoid using heavy (0.7 kg or more) or fragile material as the ceiling material.

2. Remove the four screws and detach the panel.



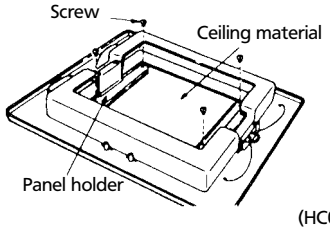
(HC0207)

3. Cut the panel along the groove.



(HC0208)

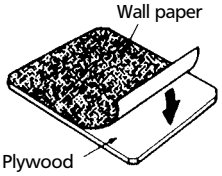
4. Put the cut ceiling material and reassemble the panel.
   (If the ceiling material thickness is not more than 12 mm, attach the provided packing to the rear side of the panel holder.)



(HC0209)

For gluing the wall paper

1. Prepare a piece of plywood of the same size as the ceiling material.
2. Glue the wall paper to the plywood.
   (The thickness after gluing the wall paper should not be more than 12 mm.)



(HC0210)

C: 3K074171-1A

7 Product Specification

7-2 Optional accessories

7-2-11 KDDM24A50, KDDM24A100: Silencer

Part No.	KDDM24A50	KDDM24A100	
Applicable model	VAM500FA	VAM650FA	VAM800FA, VAM1000FA, VAM1500FA, VAM2000FA
Nominal pipe diameter	ϕ 200 mm	ϕ 200 mm	ϕ 250 mm
Noice suppression effect	Approx. 6 dB		

Applications and features

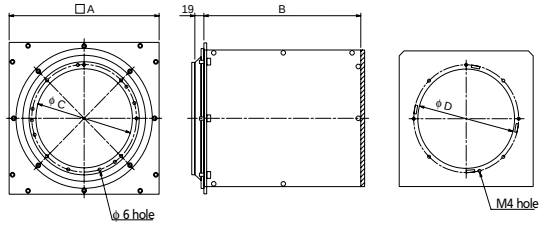
- The silencer effectively reduces the noise of the HRV units.
- Air flow rate should be lower than 600 m^3 / h for the model KDDM24A50 and lower than 1000 m^3 / h for the model KDDM24A100.

Caution

The silencer cannot be used on different model. Confirm the model before installation.

Dimensions

KDDM24A50
KDDM24A100



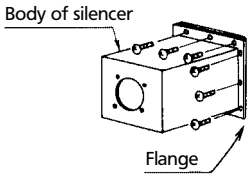
(HC0245)

Dimension table (unit: mm)

Part name	A	B	C	D
KDDM24A50	320	340	206	210
KDDM24A100	380	480	250	260

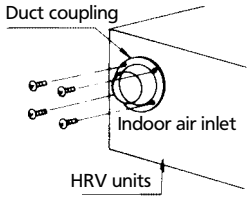
Installation procedure

1. Remove the flange from the silencer.



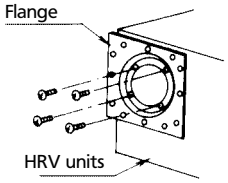
(HC0212)

2. Remove the duct coupling of the air inlet provided on the body of HRV units.



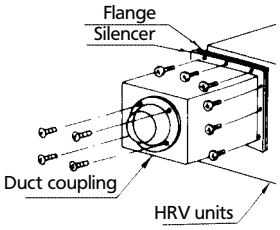
(HC0213)

3. Use the provided screws and install the flange on the HRV units.



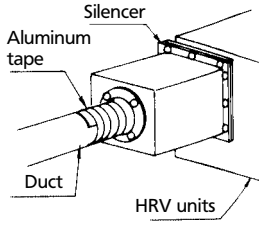
(HC0214)

4. Install the silencer on the flange. Then, install the duct coupling.



(HC0215)

5. Insert the duct into the duct coupling and wind round the commercially available aluminum tape, etc. to prevent the air leakage.



(HC0216)

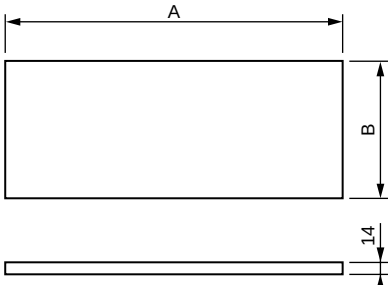
7 Product Specification

7-2 Optional accessories

7-2-12 YAFF323F15, YAFF323F25, YAFF323F35,YAFF323F50, YAFF323F65, YAFF323F100: Air filter replacement

Part No.	Applicable model	Q'ty
YAFF323F15	VAM150FA	2
YAFF323F25	VAM250FA	2
YAFF323F35	VAM350FA	2
YAFF323F50	VAM500FA	2
YAFF323F65	VAM650FA, VAM800FA	2
	VAM1500FA	4
YAFF323F100	VAM1000FA	2
	VAM2000FA	4

Dimension



(HC0219)

Dimension table [mm]

Part No.	A	B
YAFF323F15	362	147
YAFF323F25	435	147
YAFF323F35	621	167
YAFF323F50	725	167
YAFF323F65	757	202
YAFF323F100	1016	202

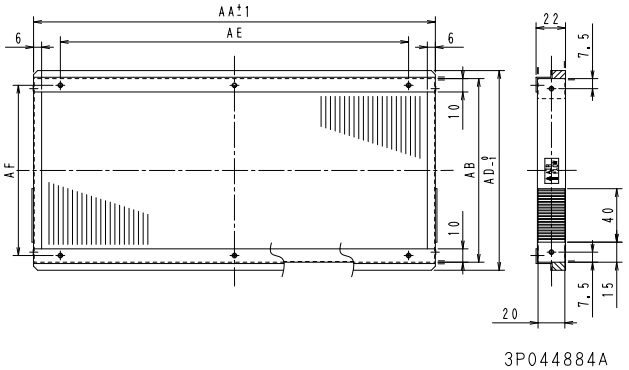
Specification

Working ambient temperature	– 10 to 50 C
Working ambient humidity	Less than 85% RH
Pressure loss	Initialloss: Less than 1.5 mm H_2O Finalloss: 8 mmH_2O
Life	Over 2500 hours (Dust density: 0.10 mg / m^3.h
Average dust collecting efficiency	Over 82% (Gravimetric method)

7-2-13 YAFM323F15, YAFM323F25, YAFM323F35, YAFM323F50, YAFM323F65, YAFM323F100: High efficiency filter

Part No.	Applicable Model	Q'ty / Set	Required set
YAFM323F15	VAM150FA	1	1
YAFM323F25	VAM250FA	1	1
YAFM323F35	VAM350FA	2	1
YAFM323F50	VAM500FA	2	1
YAFM323F65	VAM650FA, VAM800FA	2	1
	VAM1500FA		2
YAFM323F100	VAM1000FA	2	1
	VAM2000FA		2

Dimension



3P044884A

Dimension table [mm]

Part No.	AA	AB
YAFM323F15	362	138
YAFM323F25	435	138
YAFM323F35	311	152
YAFMF323F50	363	152
YAFM323F65	379	193
YAFM323F100	508	193

Specification

Filters material	Non woven cloth
Available conditions	Ambient temperature (0 – 50 C) Relative humidity (40 – 95%)
Initial pressure loss	24.5 Pa (2.5 mmH_2O) or less.
Final pressure loss	78.4 Pa (8 mmH_2O) or less.
Average dust collecting efficiency	65% (Colorimetric method)
Life time	Over 2500 hours (Outdoor dust density: 0.15 mg / m^3)
VAM1500, 2000 need 2 sets per one unit.	

7 Product Specification

7-2 Optional accessories

7-2-14 K-FDS101C, K-FDS151C, K-FDS201C, K-FDS251C, K-FDS102C, K-FDS152C, K-FDS202C, K-FDS252C: Flexible Duct

Part Name: 1 m	K-FDS101C	K-FDS151C	K-FDS201C	K-FDS251C
Part Name: 2 m	K-FDS102C	K-FDS152C	K-FDS202C	K-FDS252C
Applicable model	VAM150FA	VAM250FA VAM350FA	VAM500FA VAM650FA	VAM 800FA VAM1000FA VAM1500FA VAM2000FA
Nominal diameter	ϕ 100	ϕ 150	ϕ 200	ϕ 250
Duct length	1 m (101C, 151C, 201C, 251C)			
	2 m (102C, 152C, 202C, 252C)			

Applications and features

- Flexible duct is used for the outdoor supply air / exhaust air.
- The flexible duct can be bent according to the place of installation and is suitable for installation involving a height difference between the body and the supply air / exhaust air opening. The flexible duct helps simplify installation and construction.
- The flexible duct can be extended by using provided joints.

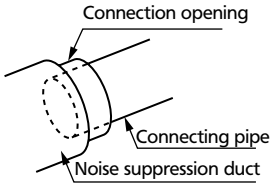
Cautions

- Do not use the flexible duct in a place of mush oil and smoke or high humidity such as bathroom and kitchen.
- Broken flexible duct and surface sheet cause air leakage. Pay particular attention to them.
- Maintain the wind speed at 15 m / sec. inside the flexible duct. Working static pressure must be within –13 mmH_2O to 50 mmH_2O.

Installation procedure

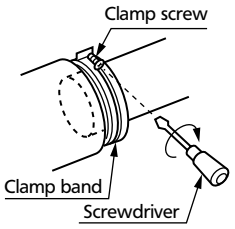
- Use the nominal diameter of the connecting pipe according to the noise suppression duct diameter.
- Use the provided clamp band to secure the noise suppression duct. Insert the connection opening of the noise suppression duct into the connecting pipe and tighten with clamp band.

1. Insert the connection opening of the noise suppression duct into the connecting pipe.



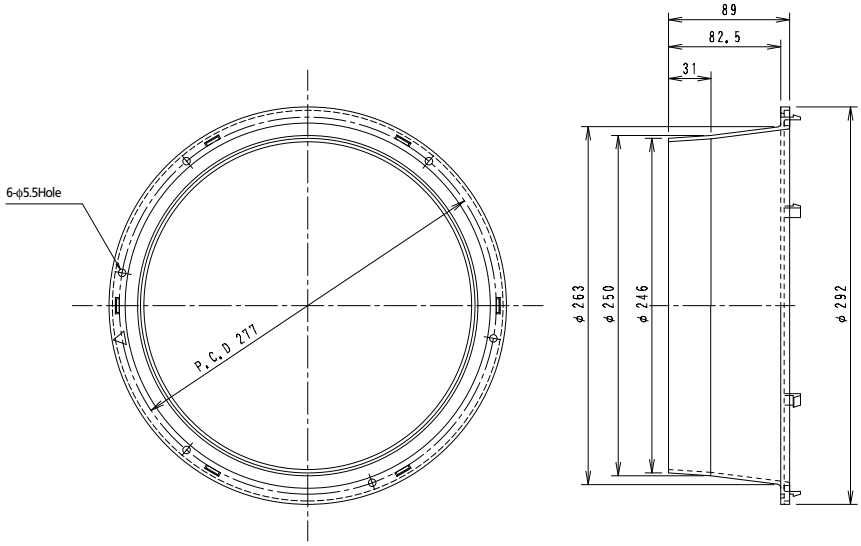
(HC0221)

2. Install the clamp band on the connection opening of the noise suppression duct.
   Use a screwdriver to turn the clamp screw to securely clamp the duct.



(HC0222)

7-2-15 YDFA25A1: Duct adapter



Material: Polystylene (Flammability: UL94V – O)

3D013345

7 Product Specification

7-2 Optional accessories

7-2-16 BRP4A50: Heater control kit

Operation range of the HRV is " –10 C to 50 CDB 80% RH or below."
When operating the HRV units at or below –10 C of the outdoor air temperature, use preheater (field supplied) to preheat outdoor air.
This kit is required to have ON / OFF delay control when preheater is used. (Initial setting is required.)

Cautions

- For electric heater, safety devices and installation location, follow the standards or regulations of each country.
- Use nonflammable duct for the electric heater. Be sure to keep 2 m or more between the heater and HRV unit for safety.
- For the HRV units, use a different power supply from that of the electric heater and install a circuit breaker for each.

Electric heater capacity formula

Heat capacity P (kW) = 0.29 × Air flow rate × Temp. / 860

For VAM500FJVE when Air flow rate = 500m^3 / h (Ultra-high) and preheater so that the outdoor temp. rise from –20 C to –10 C (Temp. = 10 deg)

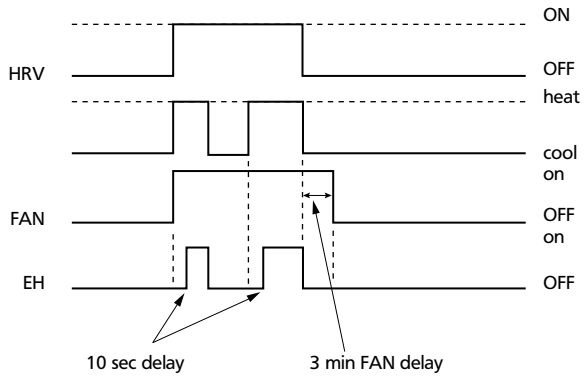
P = (0.29 × 500 × 10) / 860 = 1.68 (kW)

Check the temperature rise at low notch.
For 2kW heater, when 300m^3 / h
T = (860 × P) / (0.29 × Air flow rate)
= (860 × 2) / (0.29 × 300) = 19.7 deg
Therefore – 20 + 19.7 = –0.3 C

Cautions at initial setting

- Make sure to set remote control of HRV at initial setting as follows:
(for ON / OFF delay)

	Setting mode	Setting switch no.	Setting position
Heat setting	19	8	03 or 04



(HC0097)

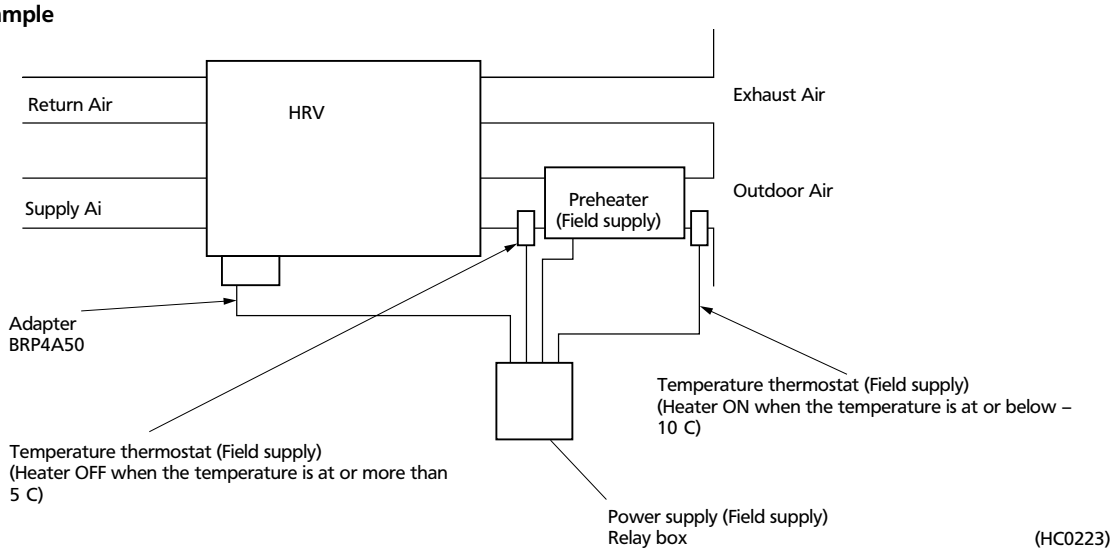
- Heater operating condition
Heater starts operation when it is judged as Heating operation.
(Judged from VRV signal of heating operation or HRV signal of thermostat.)
- ON / OFF delay
Heater starts 10 seconds after HRV starts operation.
Fan stops 3 minutes later after HRV stops operation.

7 Product Specification

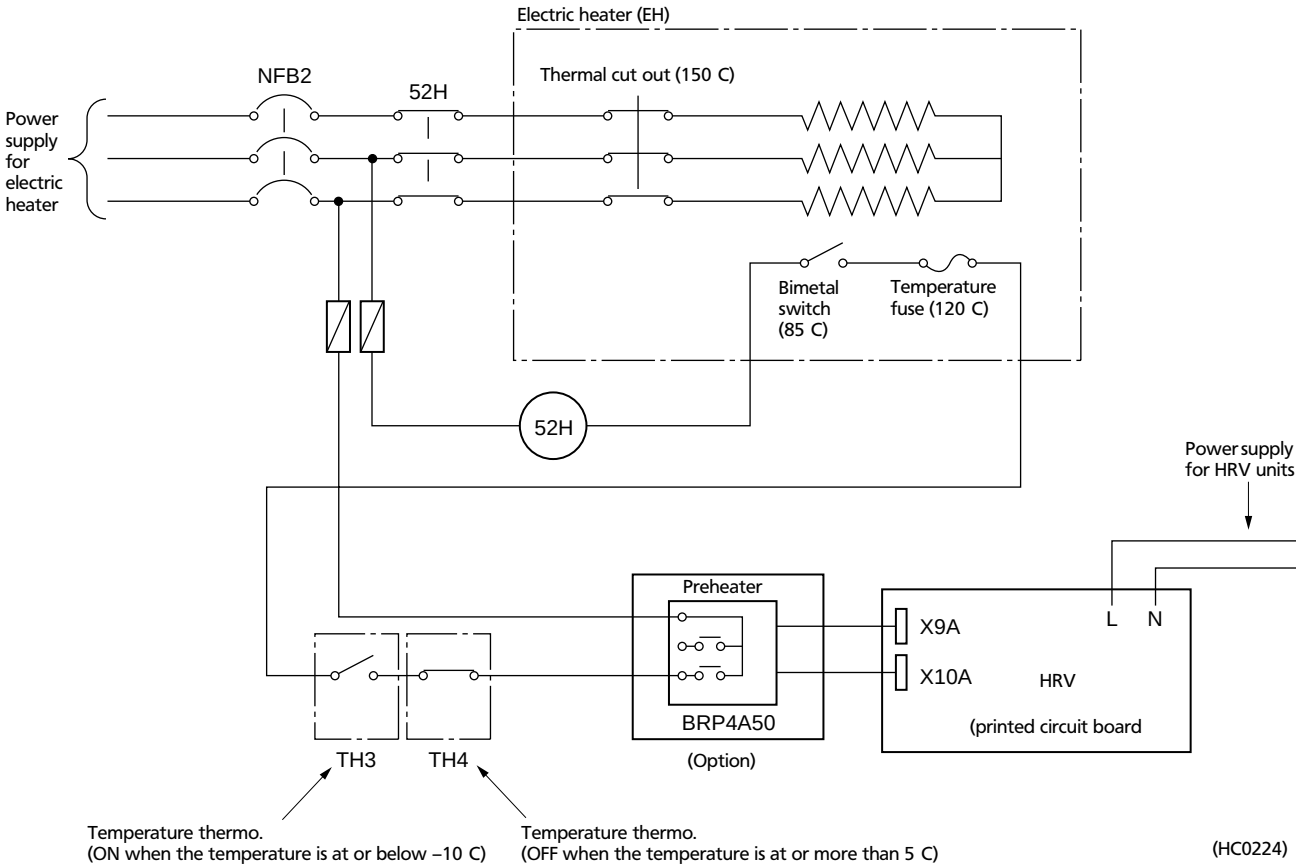
7-2 Optional accessories

7-2-16 BRP4A50: Heater control kit

Installation example



Wiring



Symbol	Part	Installation Place	
52H	Relay	Install a relay box at site	Field supply
EH	Electric heater (Bimetal switch, Temperature fuse, Thermal cut out etc. (built in)	Duct	Field supply
TH3	Temperature thermostat (ON when the temperature is at or below –10 C)	Duct (Front of EH)	Field supply
TH4	Temperature thermostat (OFF when the temperature is at or more than 5 C)	Duct (behind of EH)	Field supply

Note:

Make sure to install TH3 and TH4 for safety.

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 control of each unit (remote control for air conditioner, central control unit, etc.) for conducting a trial operation.

7 Product Specification

7-2 Optional accessories

7-2-16 BRP4A50: Heater control kit

Heater control kit

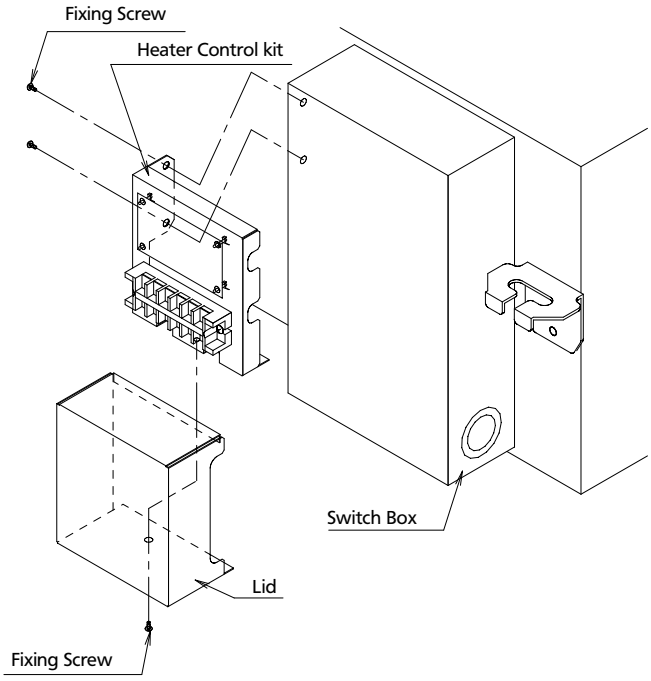
Accessories

See the right for componens.

Fixing Screw	2 pcs.
Clamp	2 pcs.

Installation

Install the Heater control kit to the outside of switch box for HRV unit as shown below.



<< Cautions >>

< Switch setting of the HRV unit >

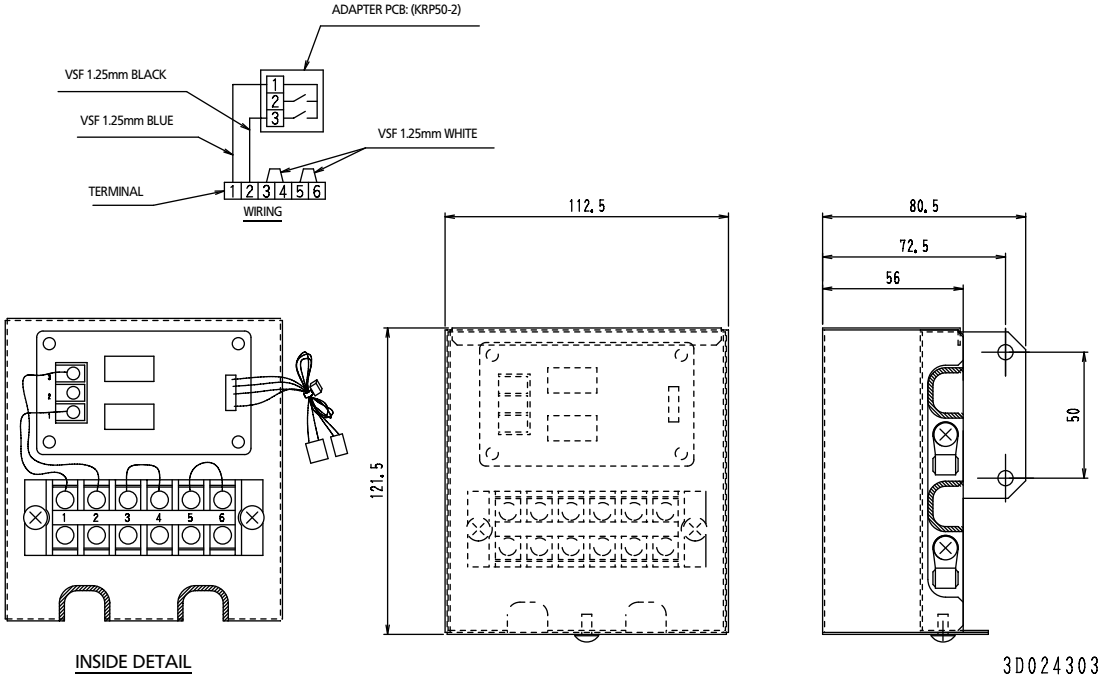
The initial setting is required by remote controller for indoor unit or HRV unit.

See the INSTALLATION MANUAL of HRV (Local setting) Electric heater setting ON, OFF delay [19 (29 • 8 • 03]

❊ The initial setting is necessary for safety.

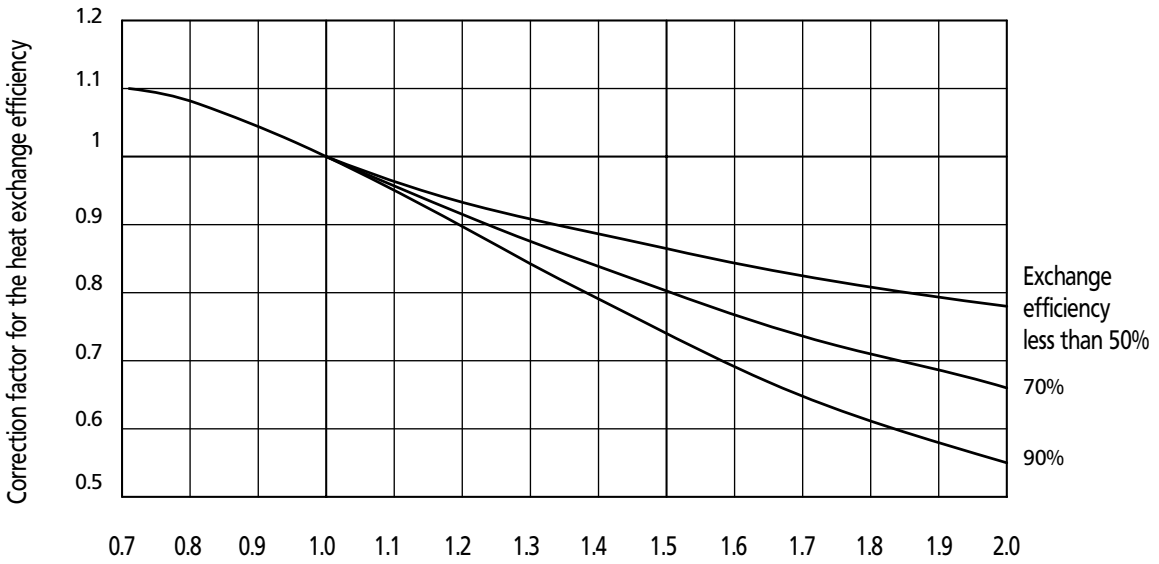
3P055038

Switch box



7 Product Specification

7-3 The correction ratio of exchange efficiency



C: 4D023764 + 4D023764

<Example of correction>

VAM500 (50Hz): Air flow rate at strong notch 500 m^3/h
(Cooling) Enthalpy exchanging efficiency 58%

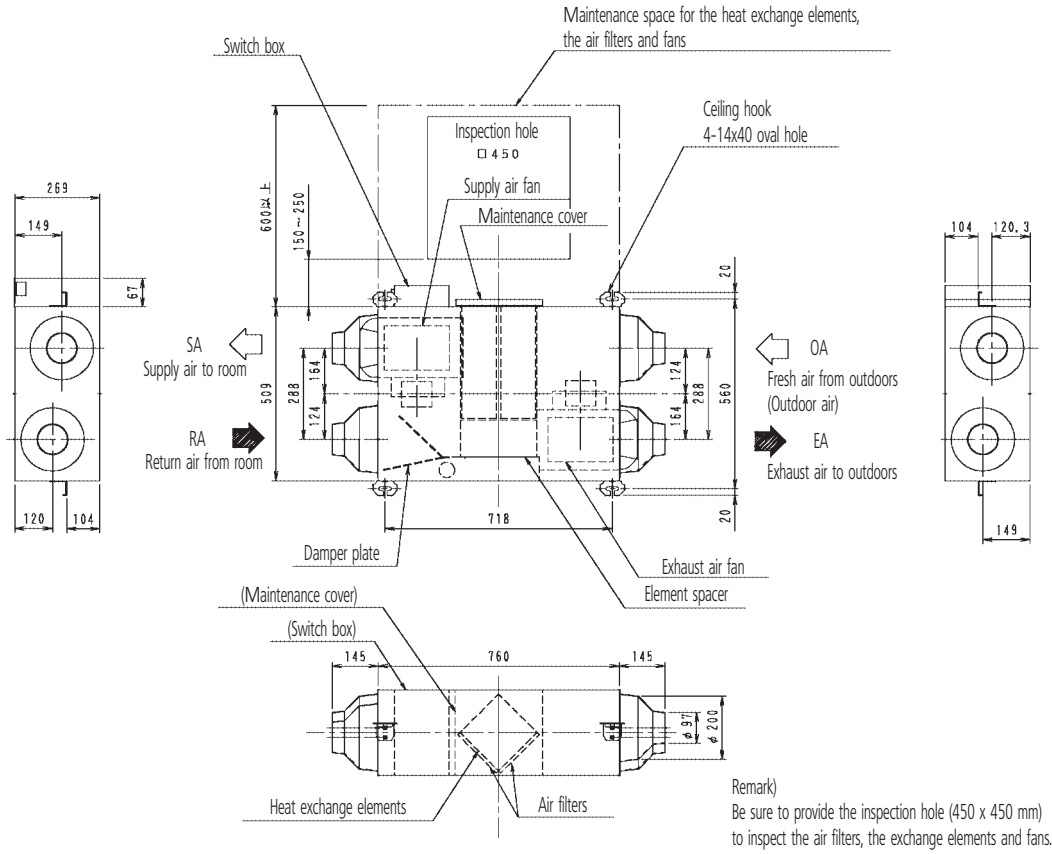
Supply air and exhaust air flow rate for fresh-up mode:
Supply air flow rate / Exhaust air flow rate = 550 / 500 = 1.1
(Cooling) Enthalpy exchange efficiency from above Table

$$58 \times \underbrace{0.96}_{\text{Correction ratio}} = 55.6\%$$

7 Product Specification

7-4 Dimensions

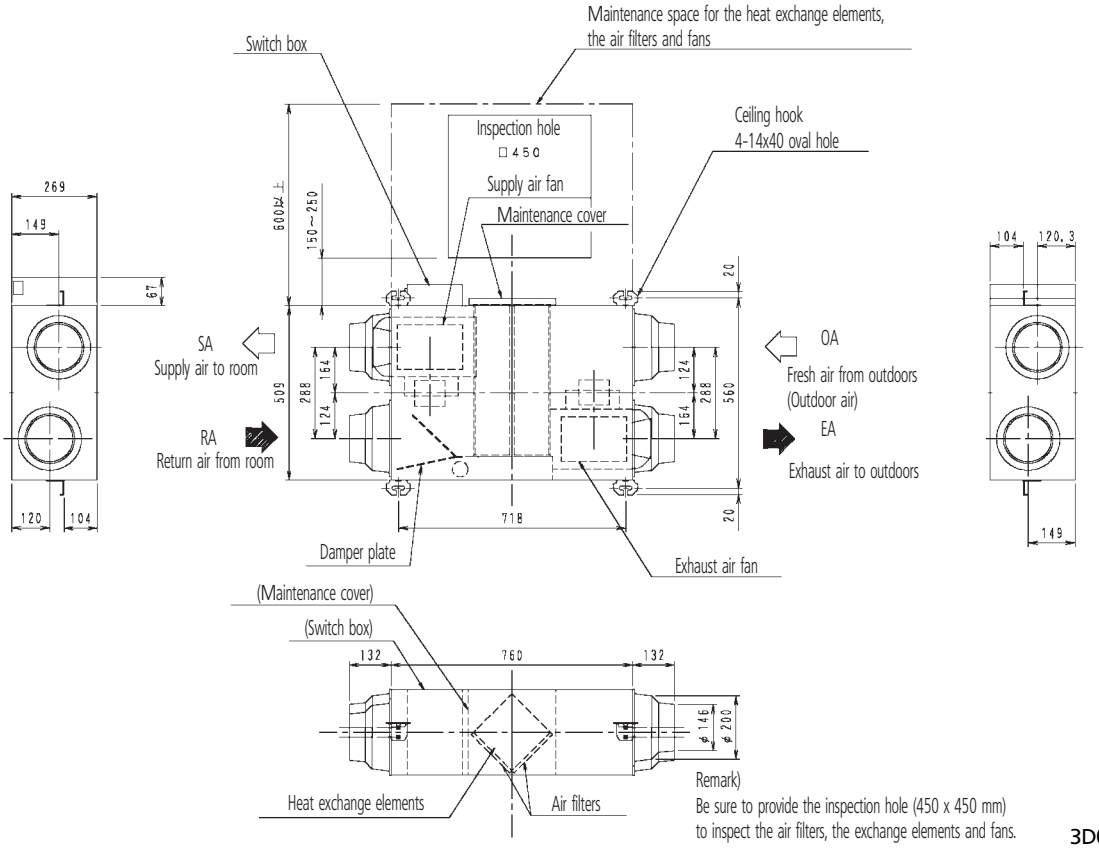
VAM150FA



Remark)
Be sure to provide the inspection hole (450 x 450 mm) to inspect the air filters, the exchange elements and fans.

3D036757

VAM250FA



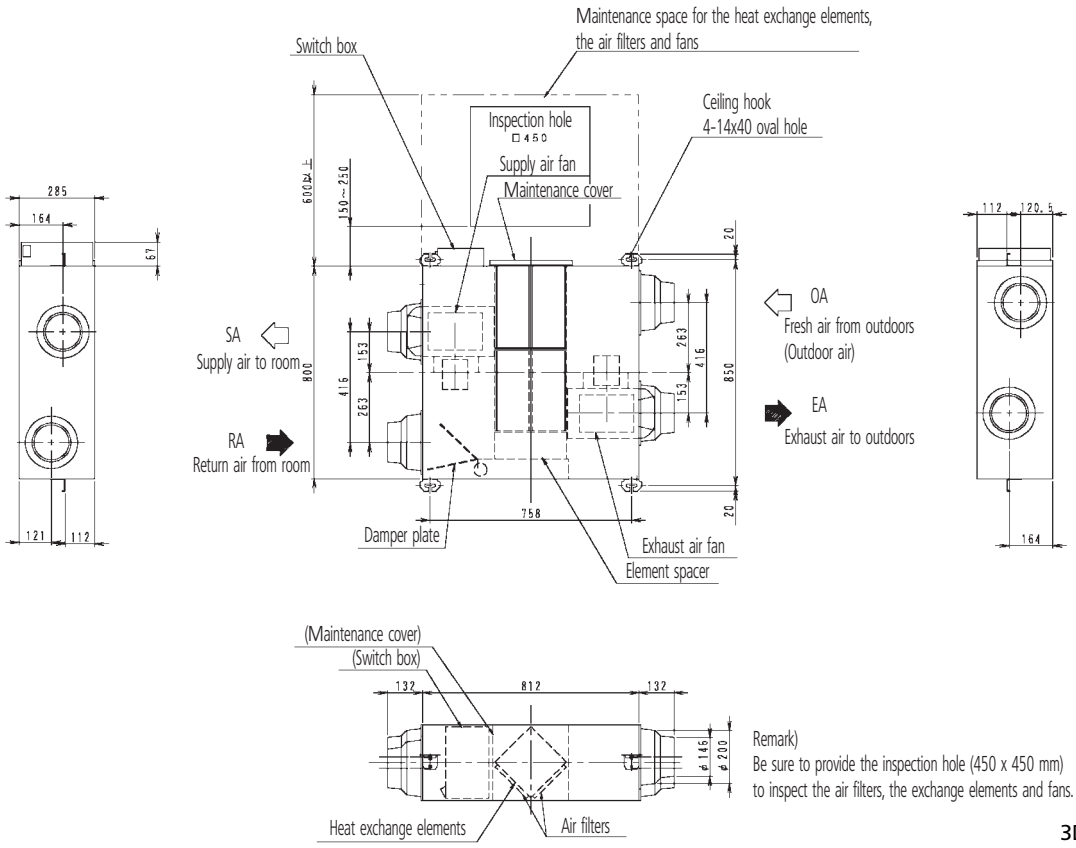
Remark)
Be sure to provide the inspection hole (450 x 450 mm) to inspect the air filters, the exchange elements and fans.

3D036758

7 Product Specification

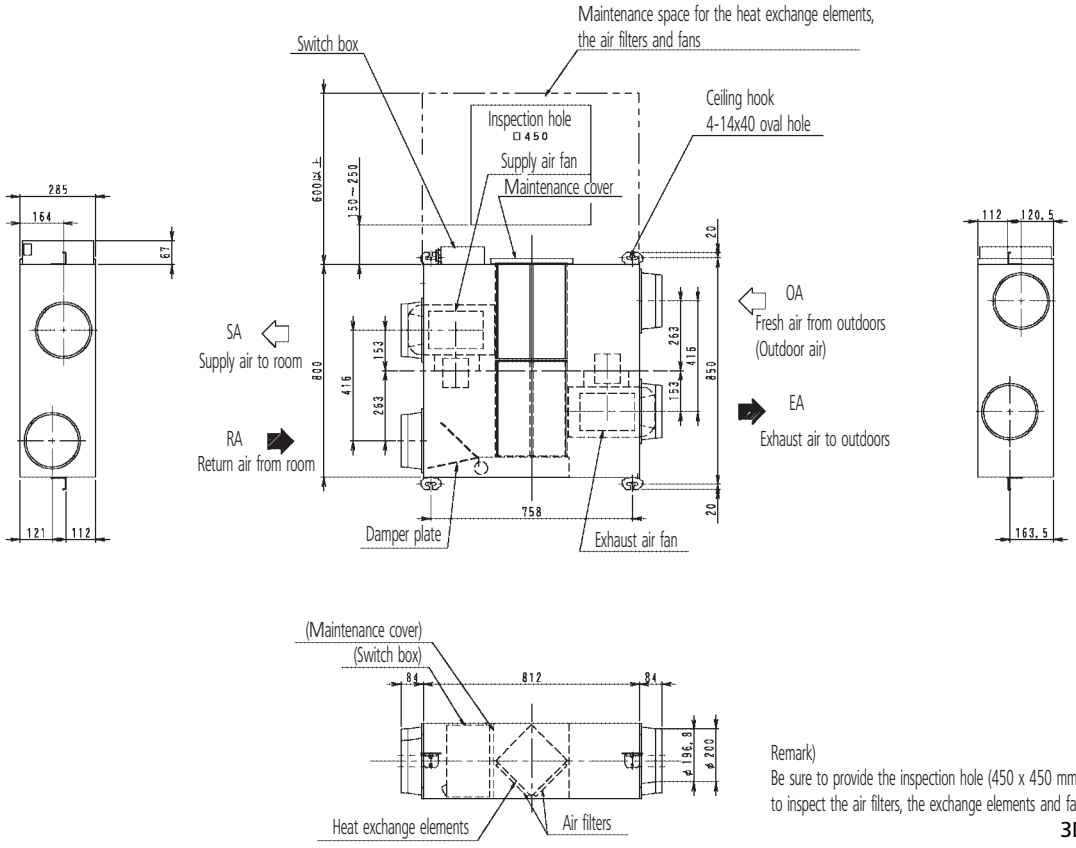
7-4 Dimensions

VAM350FA



3D036759

VAM500FA

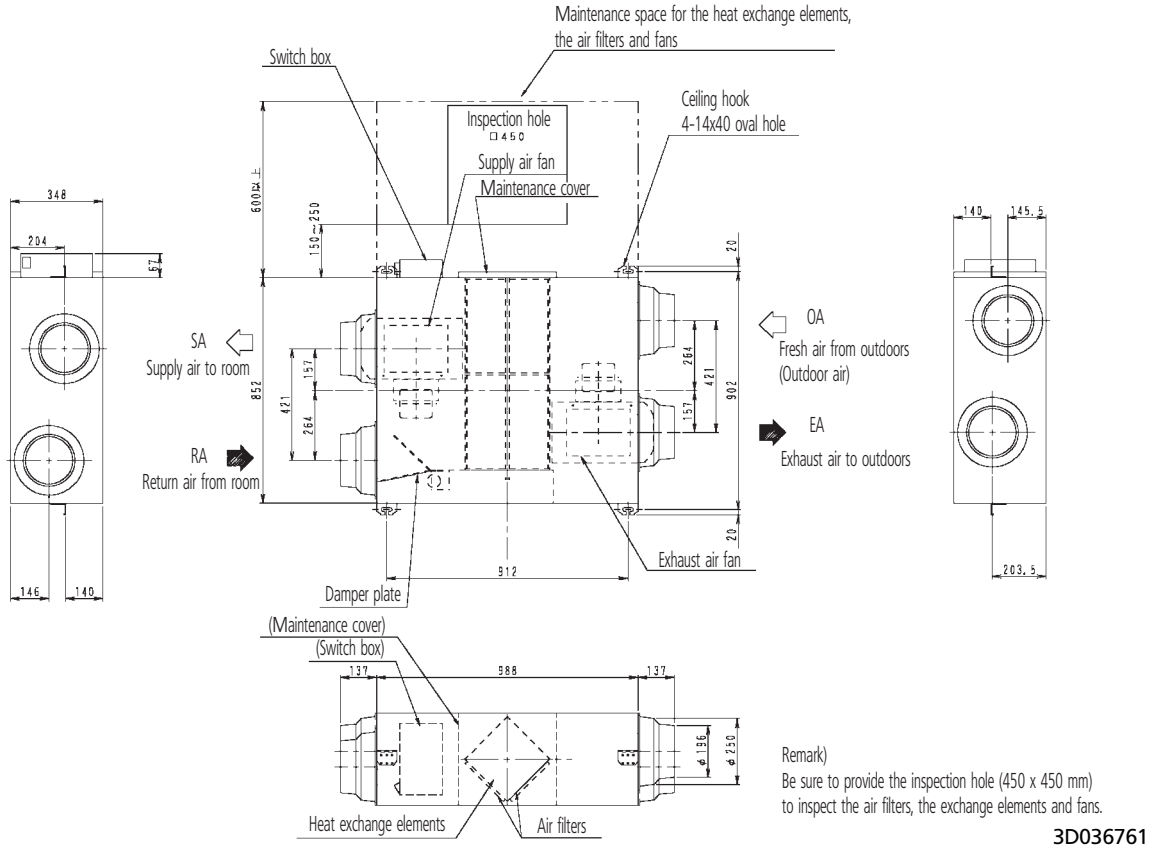


3D036760

7 Product Specification

7-4 Dimensions

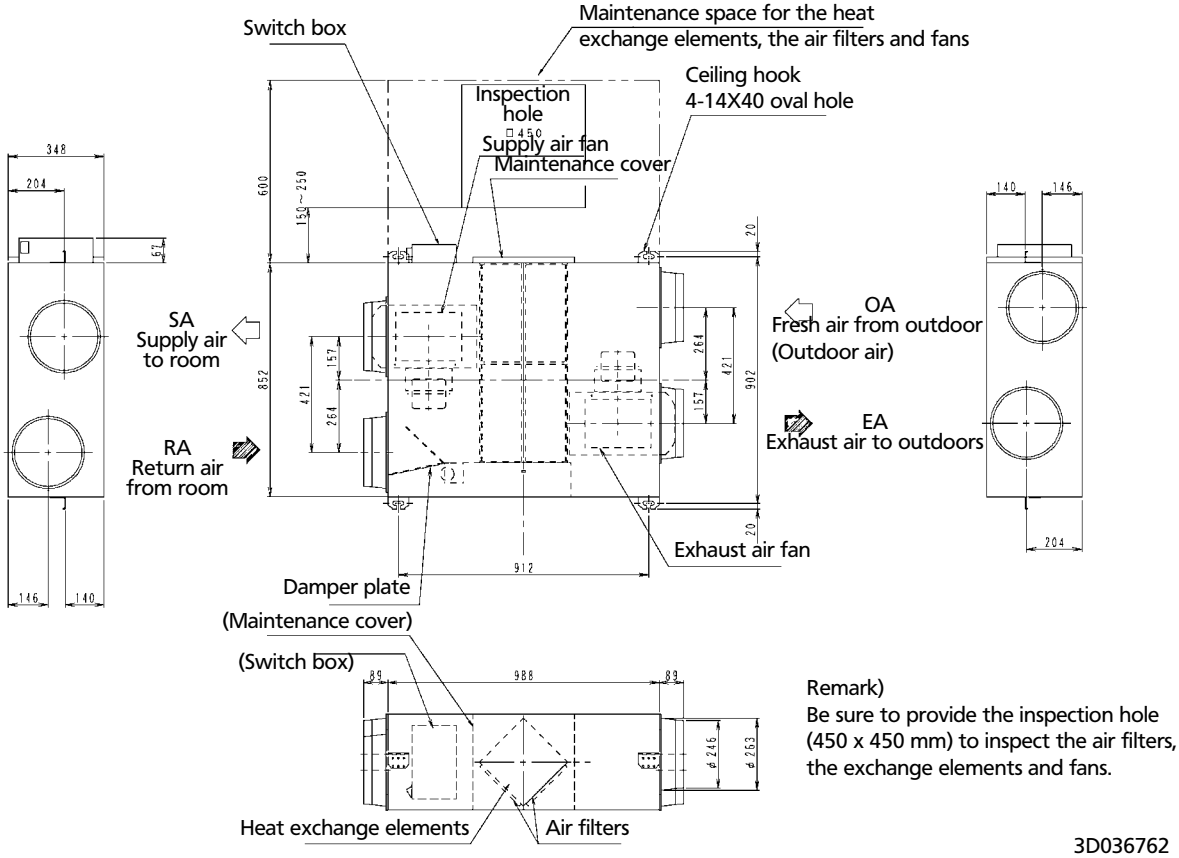
VAM650FA



Remark)
Be sure to provide the inspection hole (450 x 450 mm) to inspect the air filters, the exchange elements and fans.

3D036761

VAM800FA



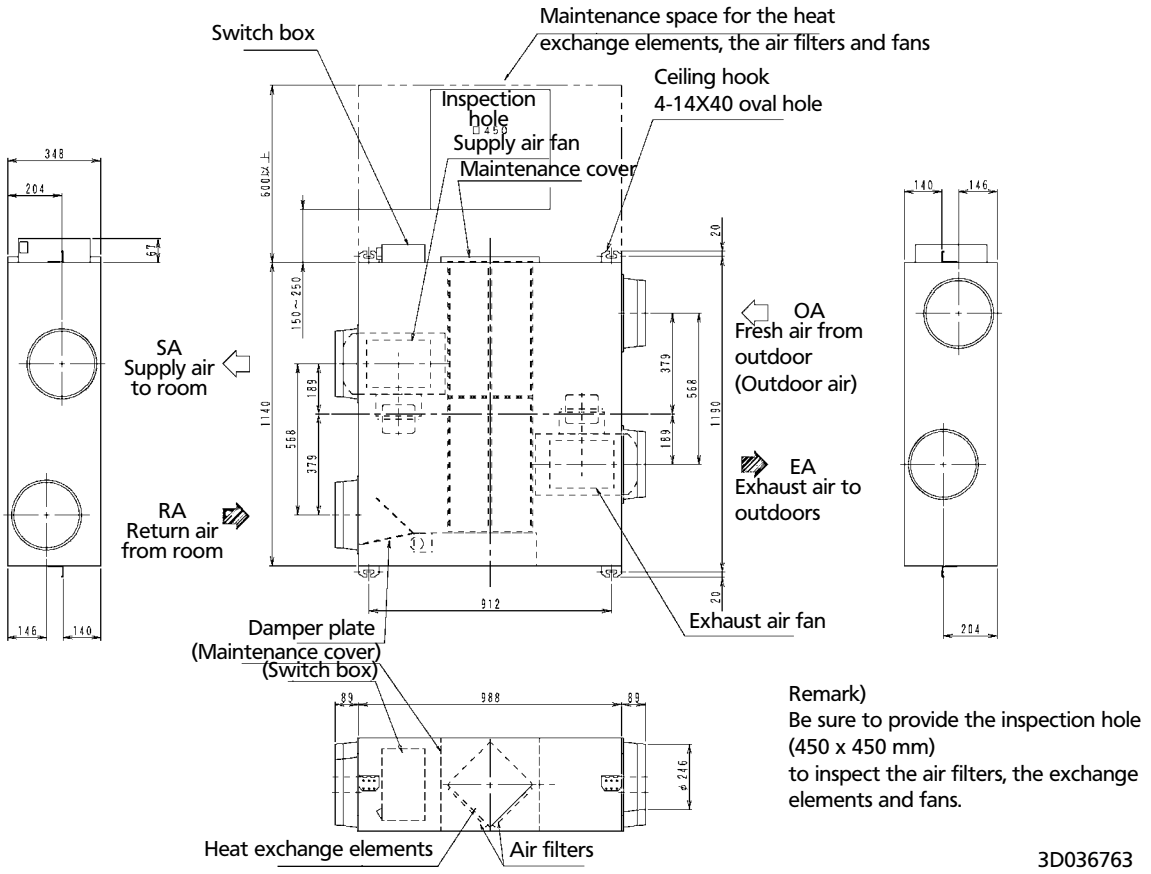
Remark)
Be sure to provide the inspection hole (450 x 450 mm) to inspect the air filters, the exchange elements and fans.

3D036762

7 Product Specification

7-4 Dimensions

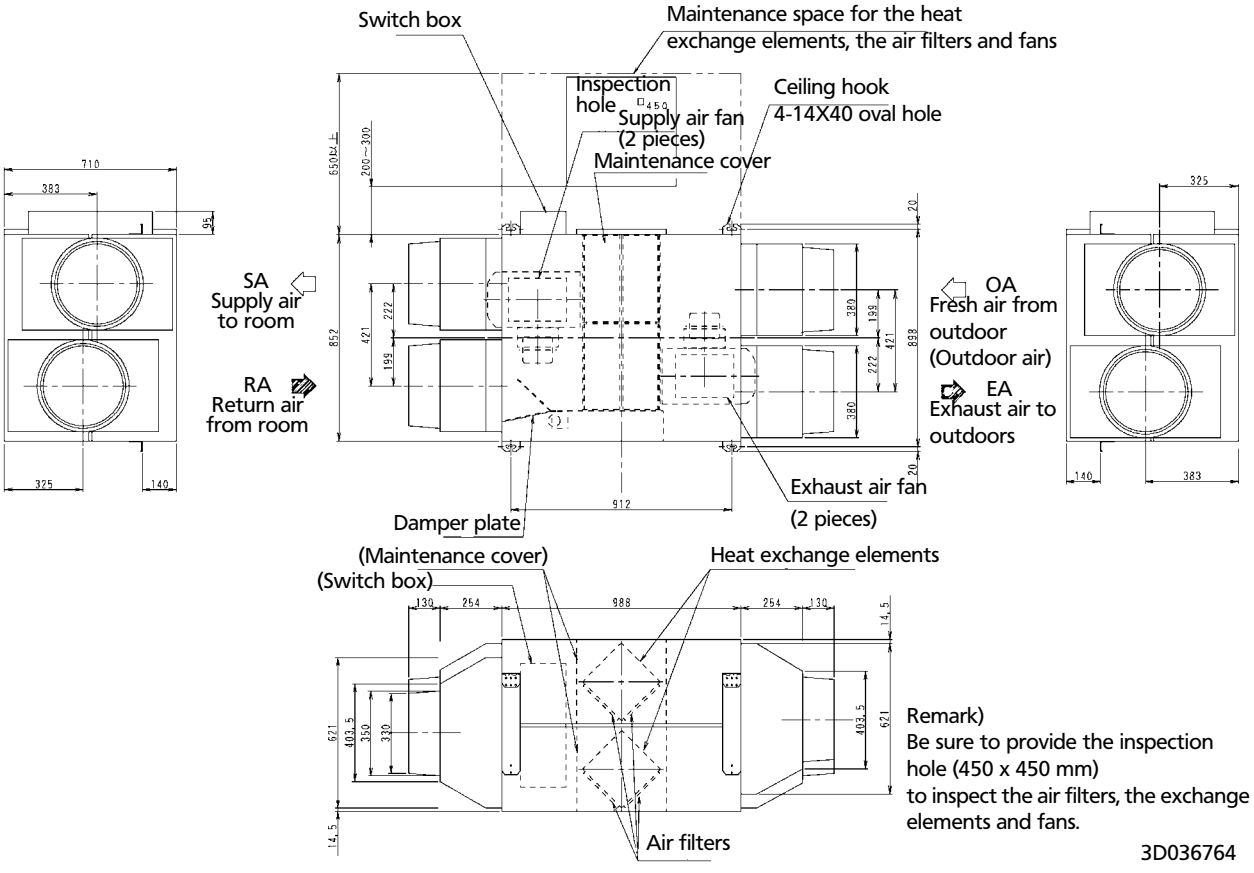
VAM1000FA



Remark)
Be sure to provide the inspection hole (450 x 450 mm)
to inspect the air filters, the exchange elements and fans.

3D036763

VAM1500FA



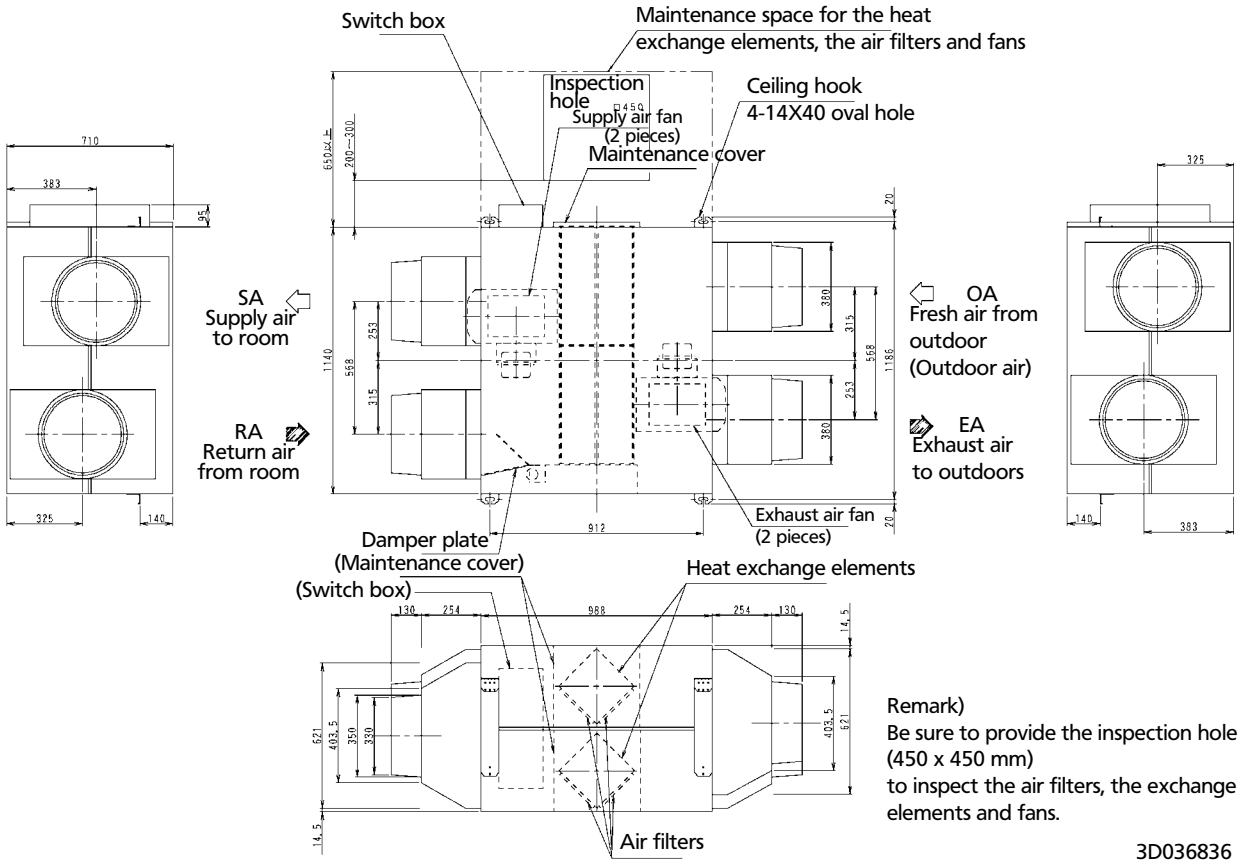
Remark)
Be sure to provide the inspection hole (450 x 450 mm)
to inspect the air filters, the exchange elements and fans.

3D036764

7 Product Specification

7-4 Dimensions

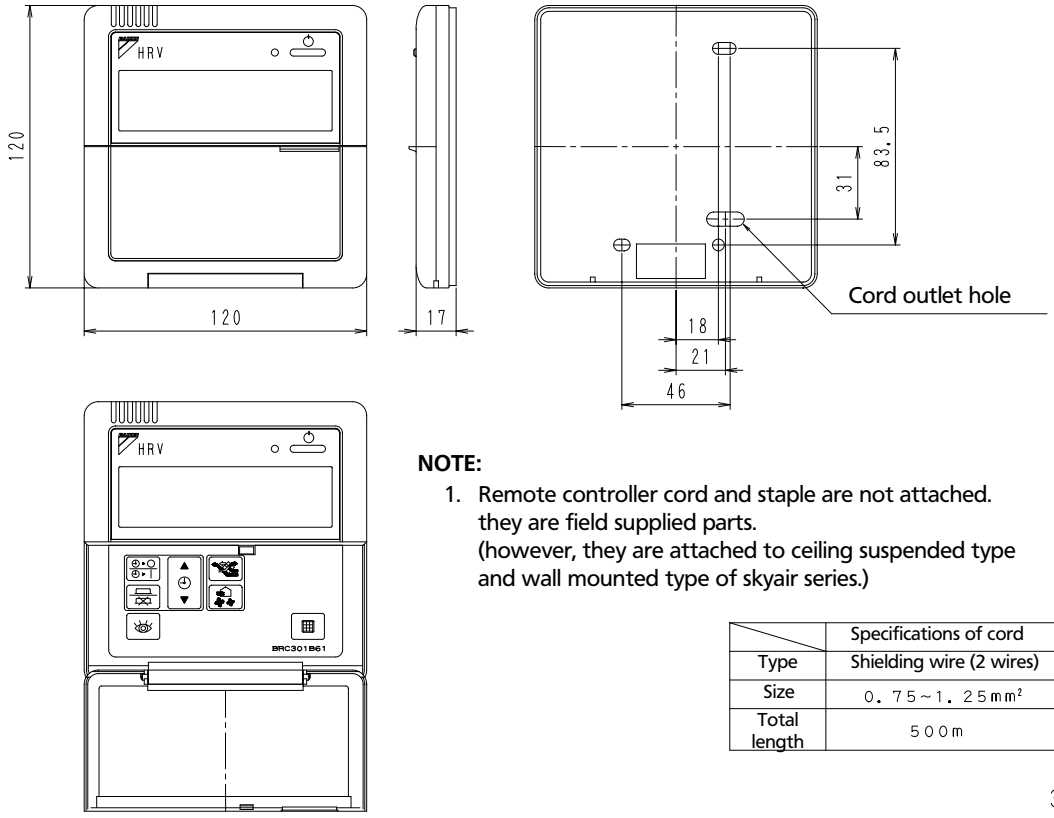
VAM2000FA



Remark)
Be sure to provide the inspection hole (450 x 450 mm)
to inspect the air filters, the exchange elements and fans.

3D036836

Remote control (BRC301B61)



NOTE:

1. Remote controller cord and staple are not attached. they are field supplied parts. (however, they are attached to ceiling suspended type and wall mounted type of skyair series.)

	Specifications of cord
Type	Shielding wire (2 wires)
Size	0.75~1.25mm²
Total length	500m

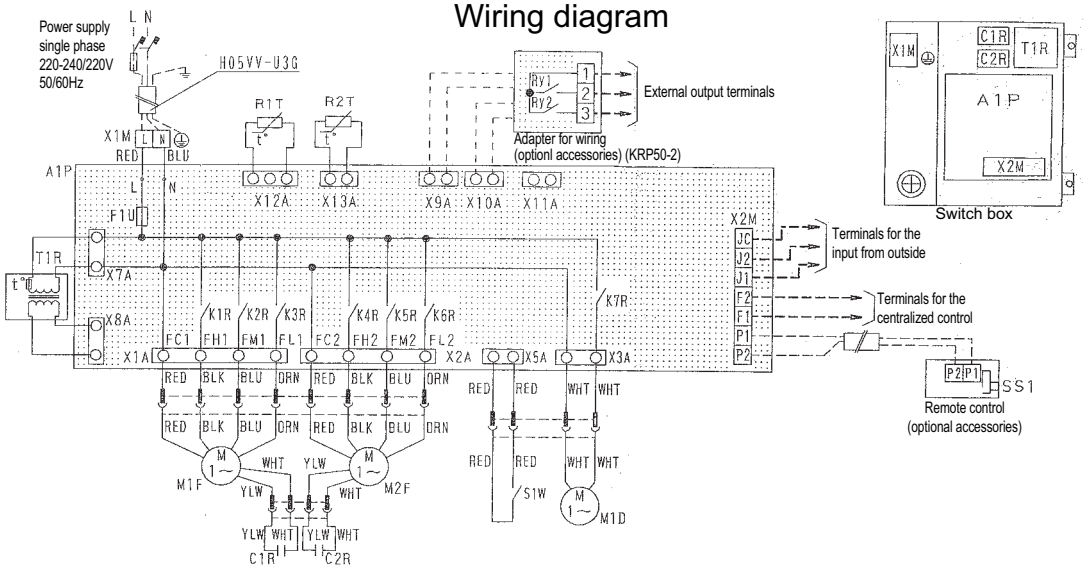
3D013155A

7 Product Specification

7-5 Wiring diagram

VAM150-1000FA

Wiring diagram



L - RED	N - BLU	M2F	Motor (exhaust fan motor)	Optional accessories	
A1P	Printed circuit board	Q1L • Q2L	Thermo switch (MF1 • 2 built-in)	Adapter for wiring (KRP50-2)	
C1R • C2R	Capacitor (M1F • M2F)	R1T	Thermistor (indoor air)	Ry1	Magnetic relay (On/Off)
F1U	Fuse (250V, 10A)	R2T	Thermistor (outdoor air)	Ry2	Magnetic relay (humidifier operation)
K1R ~ K3R	Magnetic relay (M1F)	S1W	Limit switch	X9A • 10A	Connector (KRP50-20)
K4R ~ K6R	Magnetic relay (M2F)	T1R	Transformer (supply 220-240V/22V)	Remote control	
K7R	Magnetic relay (M1D)	X1M	Terminal (power supply)	SS1	Selector switch (main/sub)
M1D	Motor (damper motor)	X2M	Terminal (control)	Optional connector	
M1F	Motor (air supply fan motor)			X11A	Connector (adapter power supply)

: Terminals

: Connector

: Wire clamp

: Field wiring

: Protective earth

Colors: BLK: Black GRN: Green
BLU: Blue RED: Red
BRN: Brown WHT: White
ORN: Orange YLW: Yellow

2TW24836-1C

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

⚠ Clean the heat exchange elements once every two years or more often and the air filter once a year or more often. (Before cleaning, make sure that the unit is not operating.)

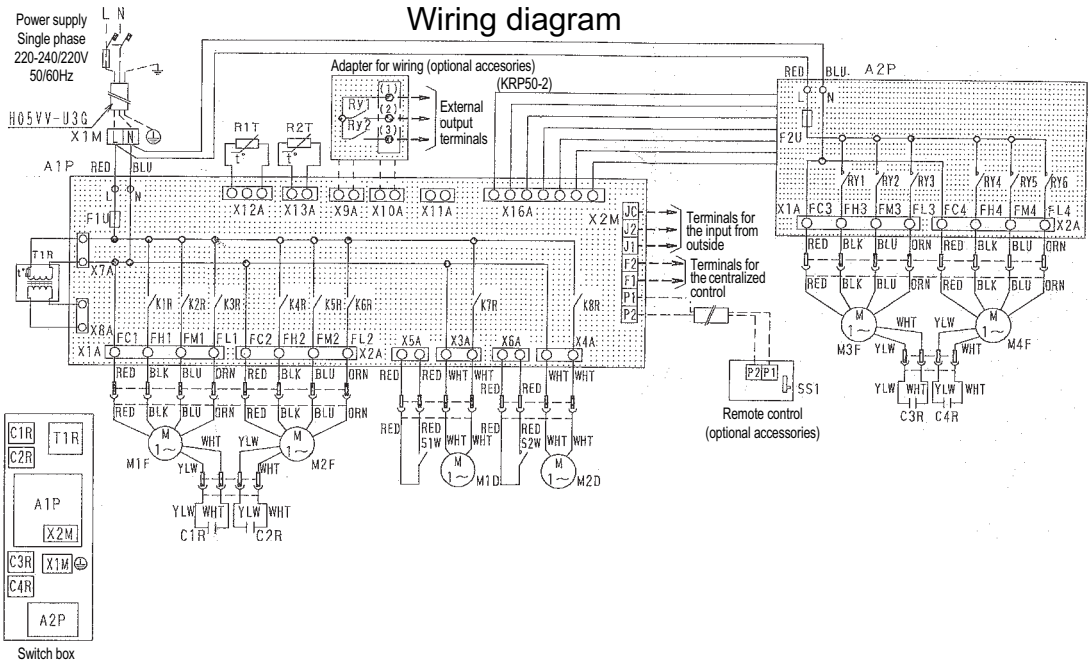
⏚ To prevent electric shock hazards, provide grounding work according to the installation manual.

7 Product Specification

7-5 Wiring diagram

VAM1500,2000FA

Wiring diagram



L - RED	N - BLU	M2F M4F	Motor (exhaust fan motor)	Optional accessories	
A1P	Printed circuit board (control)	Q1L - Q4L	Thermo switch (M1F ~ M4F built-in)	Adapter for wiring (KRP50-2)	
A2P	Printed circuit board (interface)	RY1 ~ RY3	Magnetic relay (M3F)	Ry1	Magnetic relay (On/Off)
C1R-C4R	Capacitor (M1F ~ M4F)	RY4 ~ RY6	Magnetic relay (M4F)	Ry2	Magnetic relay (humidifier operation)
F1U • F2U	Fuse (250V, 10A)	R1T	Thermistor (indoor air)	Remote control	
K1R ~ K3R	Magnetic relay (M1F)	R2T	Terminal (outdoor air)	SS1	Selector switch (main/sub)
K4R ~K6R	Magnetic relay (M2F)	S1W • S2W	Limit switch	Connector for optional parts	
K7R	Magnetic relay (M1D)	T1R	Transformer (220-240V / 22V)	X9A	Connector (for KRP50-2)
K8R	Magnetic relay (M2D)	X1M	Terminal (power supply)	X10A	Connector (for KRP50-2)
M1D • M2D	Motor (damper motor)	X2M	Terminal (control)	X11A	Connector
M1F • M3F	Motor (air supply fan motor)				

: Terminals

: Connector

: Wire clamp

: Field wiring

: Protective earth

Colors: BLK: Black GRN: Green BLU: Blue RED: Red BRN: Brown WHT: White ORN: Orange YLW: Yellow

2TW24906-1C

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

⚠ Clean the heat exchange elements once every two years or more often and the air filter once a year or more often. (Before cleaning, make sure that the unit is not operating.)

⏚ To prevent electric shock hazards, provide grounding work according to the installation manual.

7 Product Specification

7-6 Sound level data

7-6-1 Overall sound pressure levels

Ventilation Mode		220V / 50Hz						230V / 50Hz					
		Total Heat Exchange mode			Bypass mode			Total Heat Exchange mode			Bypass mode		
Fan Speed		U-H	H	L	U-H	H	L	U-H	H	L	U-H	H	L
Model	VAM150FA	27	26	20.5	27	26.5	20.5	28	27	21	28	27	21
	VAM250FA	28	26	21	27.5	27	21	28.5	26.5	21.5	28	27.5	21.5
	VAM350FA	32	31.5	23.5	31.5	31	24.5	33	32	25	32	31.5	25.5
	VAM500FA	33	31.5	24.5	33.5	32.5	24	34	32.5	25.5	34	33	26.5
	VAM650FA	34.5	33	27	34.5	33	27	35	33.5	27.5	35	34.5	27
	VAM800FA	35.5	34.5	31	35.5	34.5	31	36.5	35.5	31.5	36.5	35.5	31.5
	VAM1000FA	36	35	31.5	36	35.5	32	36.5	35.5	31.5	36.5	35.5	32
	VAM1500FA	39.5	38	34	40.5	38	33	41	38.5	35	41	38.5	35
	VAM2000FA	40	38	35	41	38	33	41.5	40	36	41.5	40	35

Ventilation Mode		240V / 50Hz						220V / 60Hz					
		Total Heat Exchange mode			Bypass mode			Total Heat Exchange mode			Bypass mode		
Fan Speed		U-H	H	L	U-H	H	L	U-H	H	L	U-H	H	L
Model	VAM150FA	28.5	27.5	21.5	28.5	27.5	21.5	28.5	26.5	19	28	27	20
	VAM250FA	29	27	22	28.5	28	22	29.5	26	19.5	29	27	20.5
	VAM350FA	34	33	26	33.5	32.5	26.5	34.5	32	22	34.5	33	22
	VAM500FA	34.5	33	27.5	34.5	33.5	27.5	35.5	33.5	24	35	33	24
	VAM650FA	35.5	34	28	35.5	35	28.5	36	33	27	35.5	34	27
	VAM800FA	37	36	32	37	36	32	36	34.5	31	37	35	31
	VAM1000FA	37	36	32	37	36	33	37	35	31	37	35	31
	VAM1500FA	41.5	39	36	41.5	39	36	40.5	38	33	40.5	38	33
	VAM2000FA	41.5	40	38	42.5	41	37	41	38	34	41	38	35

7 Product Specification

7-6 Sound level data

7-6-2 Sound power spectrum

VAM150FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM150FA7VE	50Hz	220V	U-H	50	48	46	40.5	38.5	34	25.5	27
			H	47	47	42	40	37.5	27.5	25	26.5
			L	44	42	38.5	35.5	29.5	21.5	22.5	23.5
		230V	U-H	51	49	47	41.5	39.5	35	27	28.5
			H	47.5	47.5	42.5	39.5	37	28.5	26	27.5
			L	44	42	38.5	36	29.5	21.5	22.5	23.5
		240V	U-H	53	50.5	46.5	42	40	36.5	30	31.5
			H	49.5	49.5	45	42	39.5	31.5	29.5	31.5
			L	44.5	42.5	39.5	36	30	22.5	23.5	25
	60Hz	220V	U-H	52	51	46	42.5	39.5	33.5	24.5	27
			H	49	49	44.5	40.5	37	29.5	26	27.5
			L	41	42	39	35.5	29	21	21.5	23.5

4D036765

VAM250FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM250FA7VE	50Hz	220V	U-H	51.1	51	48	42	38.5	33.5	25.5	25.5
			H	49.5	48.5	46	40	36.5	29	22	23.5
			L	44.5	44	42	34	28	19.5	21	22
		230V	U-H	52	51.5	47	43	39.5	34	27	27
			H	50.5	49.5	47	41	37.5	30	24.5	26
			L	44.5	44.5	42	35	28	19.5	21	22
		240V	U-H	51.5	52.5	48	44.5	41	36	29	29.5
			H	52	52	48.5	40.5	38	32.5	28	30
			L	45	44.5	43	34.5	28.5	21	22.5	23.5
	60Hz	220V	U-H	51.5	52	49	43.5	39.5	34	25.5	25.5
			H	49	50	45.5	40	38	30	24.5	26
			L	44.5	41	39	34.5	30.5	20	20	22

4D036766

VAM350FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM350FA7VE	50Hz	220V	U-H	57.5	53	49.5	45	42.5	39.5	31.5	25.5
			H	58.5	51	46.5	43.5	40.5	35	26	26.5
			L	58.5	45.5	41.5	38	33.5	24	25	27
		230V	U-H	59.5	54	50.5	46	43.5	40.5	32.5	27.5
			H	60	52	49	46	42	36.5	29.5	28.5
			L	59.5	46	42.5	38.5	34.5	25	26	28
		240V	U-H	62	55.5	52	47.5	45	42	34.5	30
			H	64	54.5	49.5	46	44	38.5	31	32
			L	60	46.5	44	39	35	26	26.5	28.5
	60Hz	220V	U-H	59	53.5	52.5	48.5	45	41	32.5	27.5
			H	61.5	52	49.5	46.5	41.5	37	28	30
			L	55.5	44	41	36	32.5	23.5	22.5	24

4D036767

VAM500FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM500FA7VE	50Hz	220V	U-H	57	54	51	48	45	37.5	27.5	25.5
			H	54	51.5	49	46	42.5	36	26.5	26
			L	50.5	47.5	44	39	33.5	25	23	24.5
		230V	U-H	57.5	54.5	51.5	48.5	45.5	38	28.5	26.5
			H	55	52.5	50	47	43.5	37	28	28
			L	51.5	48.5	45	39.5	34.5	26.5	25	26.5
		240V	U-H	58.5	55.5	52.5	49.5	46.5	39	29.5	28.5
			H	56.5	54	51.5	48.5	45.5	38.5	30	30
			L	52	48.5	45.5	40	34.5	27	25.5	27.5
	60Hz	220V	U-H	57.5	54	51	49	46.5	39	29	25.5
			H	55	52	49.5	47	44	36	26.5	26
			L	51	47	44	39.5	33	23.5	22.5	25.5

4D036768

VAM650FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM650FA5/7VE	50Hz	220V	U-H	62	58	52.5	48.5	45.5	41.5	34	26
			H	61	56.5	51	47	44.5	39	30	26
			L	53.5	50.5	46	42	37.5	32	24	25.5
		230V	U-H	62.5	58.5	53	49	46	42	35	27
			H	61.5	57	51.5	47.5	45	39.5	30.5	27
			L	54.5	51.5	47	43	38.5	33	26	27.5
		240V	U-H	63.5	59.5	54	50	47	43	36	28.5
			H	63	58.5	53	49	46.5	41.5	32.5	29.5
			L	56	43	48.5	44.5	40	34.5	28	30
	60Hz	220V	U-H	59.5	58	53.5	48.5	46	43	38	23
			H	61.5	56	51	47	44	40	30	26.5
			L	54	51	46	42	38.5	31	23	25.5

4D036769

Measuring place

Notes:

1. Operation sound is measured in an anechoic chamber.
2. The operating sound level may become greater than this value depending on the operating conditions, reflected sound, and peripheral noise.
3. Operation sound differs with operation and ambient conditions.
4. The power levels have been calculated on the assumption that the measuring point were right under the source of operating sound.
5. U-H: Ultra high
   H: High
   L: Low

7 Product Specification

7-6 Sound level data

7-6-2 Sound power spectrum

VAM800FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM800FA5/7VE	50Hz	220V	U-H	58	58	52.5	49.5	48.5	41.5	33.5	26
			H	58.5	57	51.5	49.5	47	40.5	31	27.5
			L	54.5	54.5	47.5	44.5	43	35.5	24.5	23.5
		220V	U-H	58.5	59.5	53	50	49	42	34	27
			H	59	58.5	52	50	47.5	41	31.5	28.5
			L	55.5	54	49.5	46.5	44	37.5	27.5	28
		240V	U-H	59	58	53	50	49	43.5	34.5	27
			H	59.5	59	52.5	50.5	48	41.5	32	29.5
			L	58	58	51	48	46.5	39	29.5	30.5
	60Hz	220V	U-H	58	57.5	54	50.5	49	43	33.5	26
			H	58.5	57.5	52.5	50	47	39.5	30	27
			L	54	54	48.5	45	43	35	24	23.5

4D036770

VAM1000FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM1000FA5/7VE	50Hz	220V	U-H	62	58.5	54	50.5	49	42	36.5	28
			H	61	57	52	50	48	38.5	31	25.5
			L	58	55	49	45.5	43.5	36.5	27.5	24
		230V	U-H	62.5	57.5	54.5	51	49.5	42.5	37	29
			H	61.5	57.5	52.5	50.5	48.5	39	31.5	26.5
			L	58.5	55	49	47	43.5	37	28	25
		240V	U-H	62.5	59	54.5	51.5	50.5	42.5	37	29
			H	62	58	53	51	49	39.5	32	27.5
			L	59	55.5	49.5	47.5	44	37.5	29	26
	60Hz	220V	U-H	62.5	57.5	53.5	52	49.5	42	36	27
			H	61	57	52	50	48	38	30	24.5
			L	59	54	51	47.5	43	35.5	26	24.5

4D036771

VAM1500FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM1500FA5/7VE	50Hz	220V	U-H	60.5	61	55.5	52.5	50.5	46	39.5	29.5
			H	60.5	60	53.5	51.5	49.5	44.5	37	31
			L	58.5	58	51	49	47	39.5	30.5	31
		230V	U-H	61	61.5	57	54.5	52	48.5	41.5	30.5
			H	61	60.5	54.5	52.5	49.5	43	34	31.5
			L	59.5	59.5	52	49.5	48	40.5	31.5	32
		240V	U-H	61.5	63	59	56	53	46.5	40	32
			H	61	60.5	54	52	49.5	43	34	31.5
			L	60	60	52.5	50	48.5	41	32	32.5
	60Hz	220V	U-H	62	62	57	54.5	52	46	37	31
			H	61	60.5	56	53	50	42.5	33	31.5
			L	59.5	59	51.5	49	45.5	39.5	31.5	32.5

4D036772

VAM2000FA

[dB]

Model	Power supply		Hz/ Notch	63	125	250	500	1000	2000	4000	8000
VAM2000FA5/7VE	50Hz	220V	U-H	65	61.5	57	54	53	45	39.5	32.5
			H	64	60	55	53	51	41.5	34.5	30.5
			L	62	58	51.5	50	48.5	40.5	32.5	30.5
		230V	U-H	65.5	62	58	55.5	53.5	45.5	40	33
			H	65	61	56.5	54	52	42.5	35.5	32
			L	62	59	53	50.5	48.5	40.5	33	31
		240V	U-H	66	62.5	58	55	54	46	40.5	33.5
			H	65	61	56	54	52	42.5	35.5	32
			L	63	60	54.5	52	50	41.5	34	32.5
	60Hz	220V	U-H	66.5	61.5	57.5	56	53.5	46	40.5	33
			H	64	60	55	53	51	41	33.5	30
			L	60.5	57.5	51	48.5	46.5	41	32.5	32.5

4D036837

Measuring place

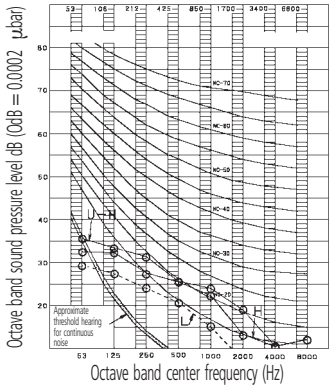
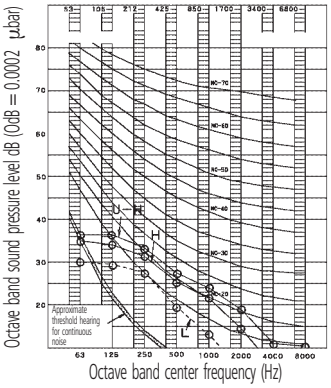
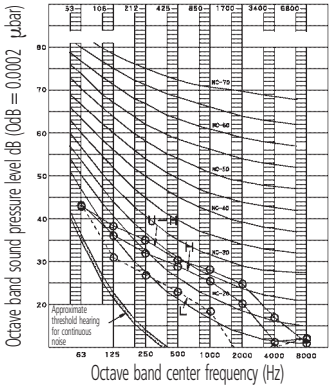
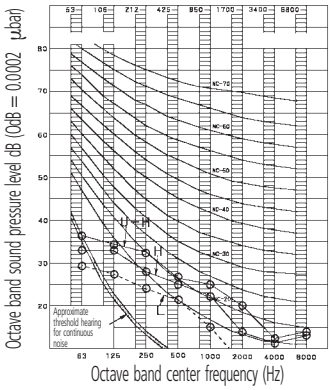
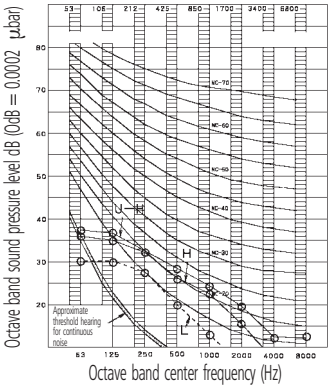
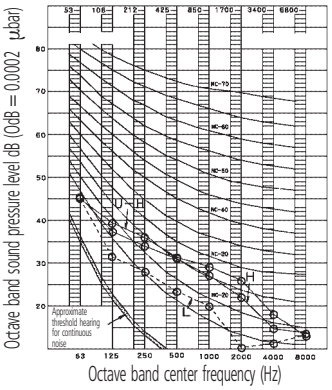
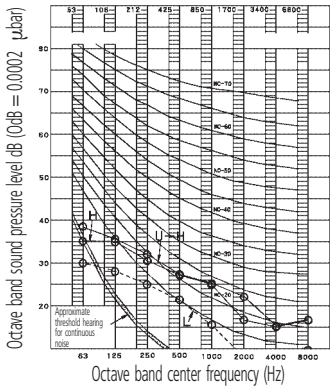
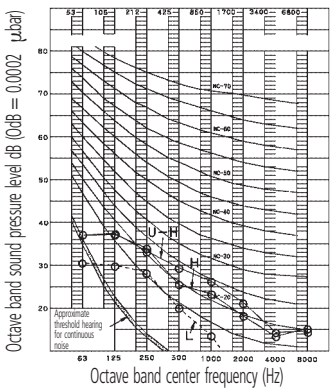
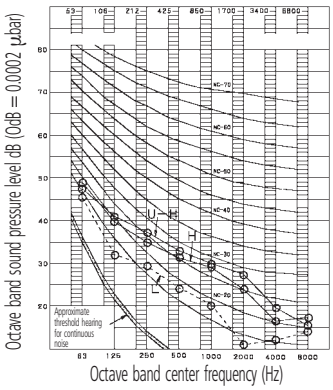
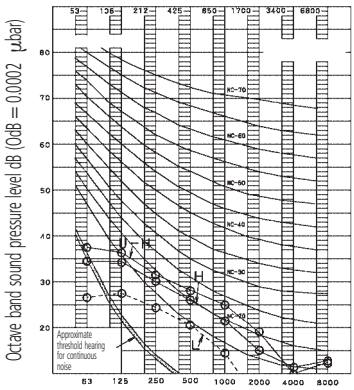
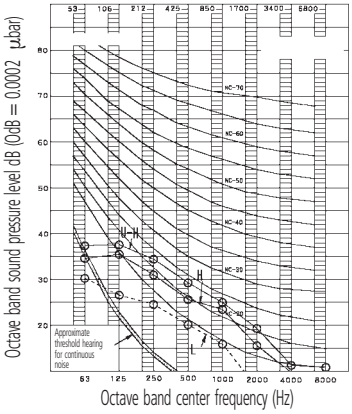
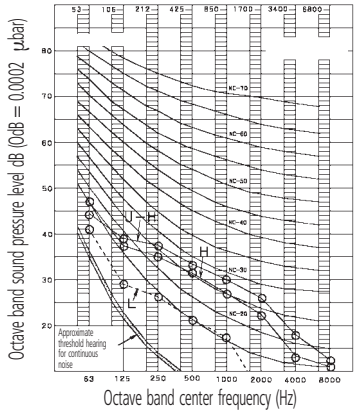
Notes:

1. Operation sound is measured in an anechoic chamber.
2. The operating sound level may become greater than this value depending on the operating conditions, reflected sound, and peripheral noise.
3. Operation sound differs with operation and ambient conditions.
4. The power levels have been calculated on the assumption that the measuring point is right under the source of operating sound.

7 Product Specification

7-6 Sound level data

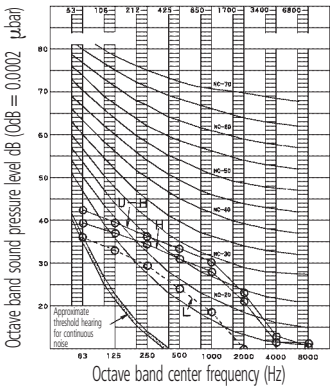
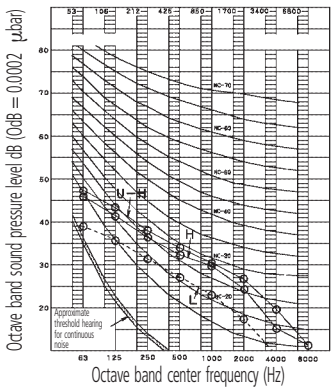
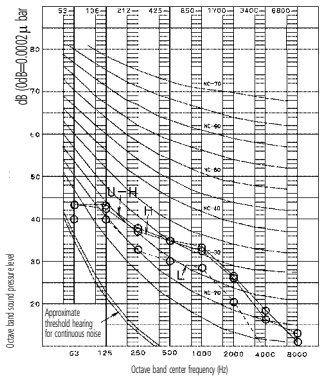
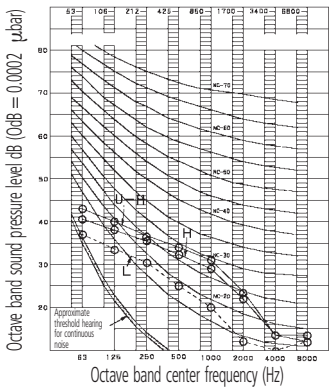
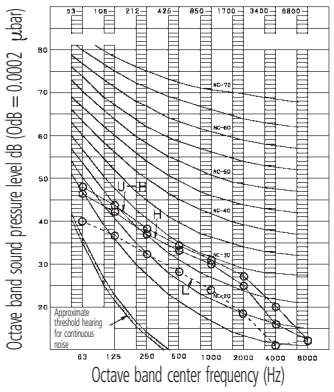
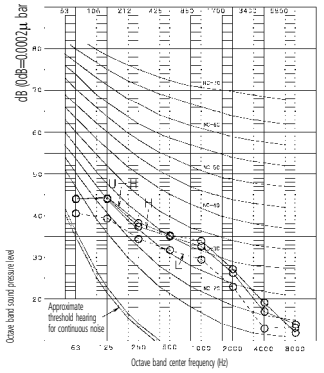
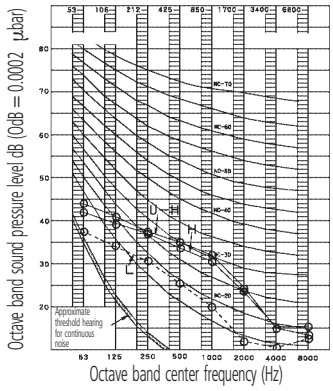
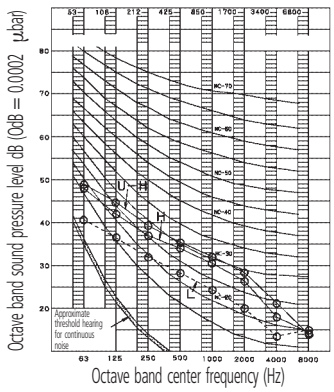
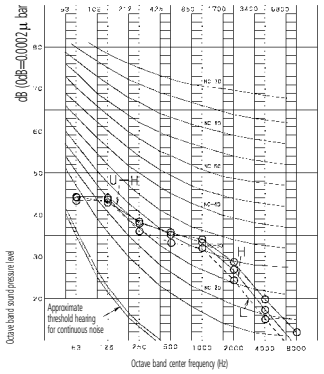
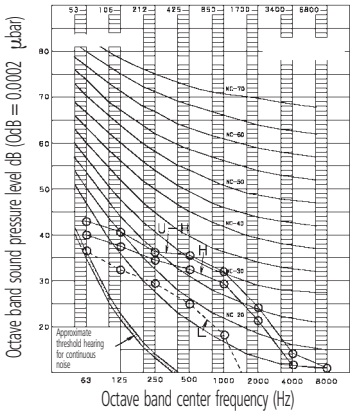
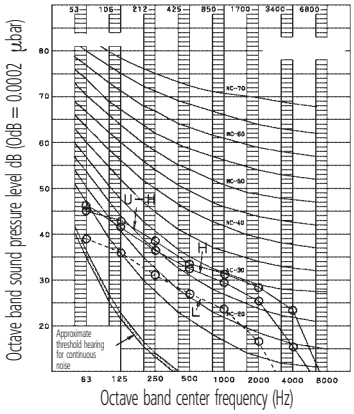
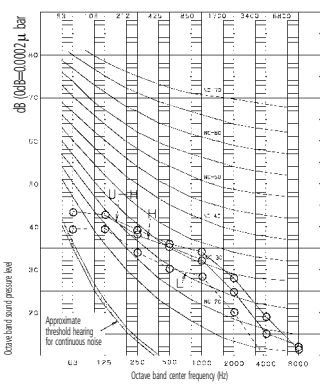
7-6-3 Sound pressure spectrum

	VAM150FA	VAM250FA	VAM350FA
50Hz 220V	 4D036868	 4D036870	 4D036871
50Hz 230V	 4D036878	 4D036879	 4D036880
50Hz 240V	 4D036887	 4D036888	 4D036889
60Hz 220V	 4D036896	 4D036897	 4D036898

7 Product Specification

7-6 Sound level data

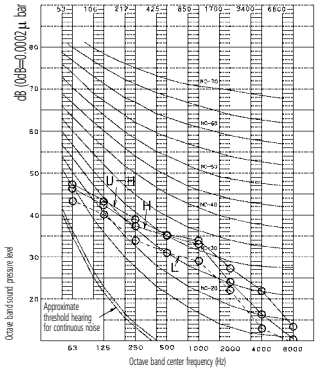
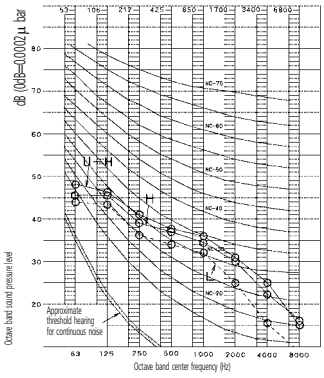
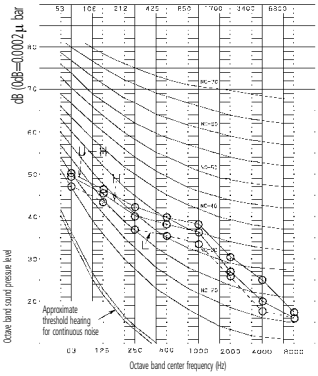
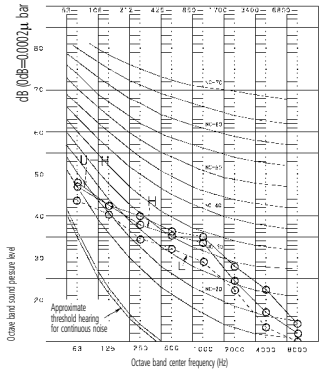
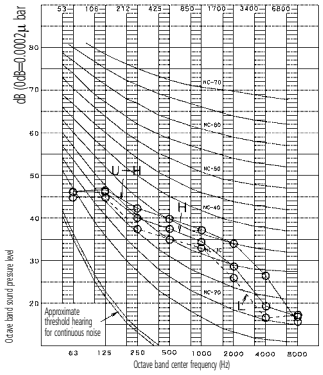
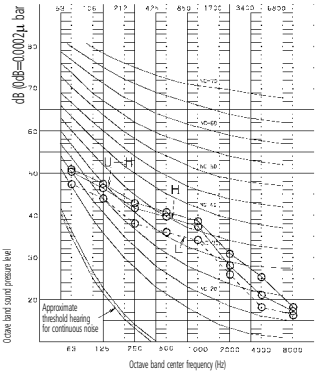
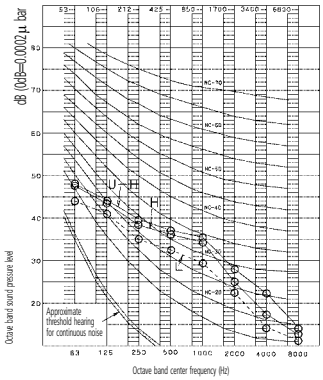
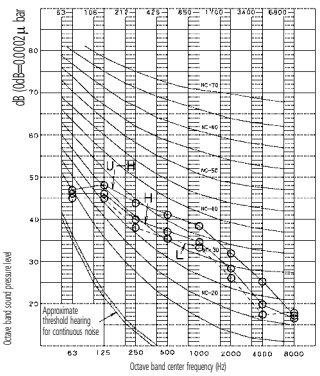
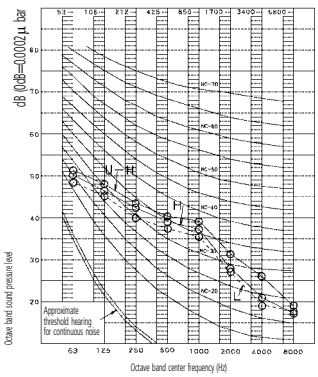
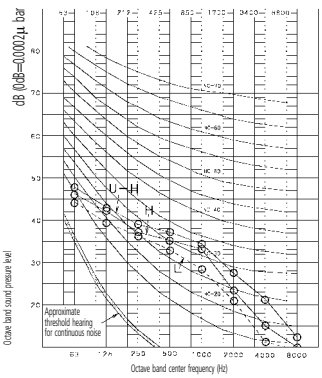
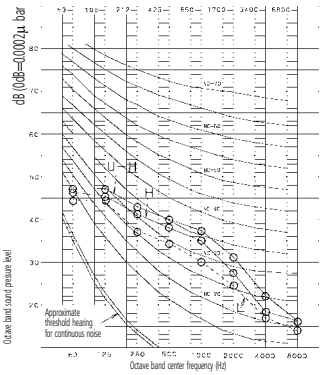
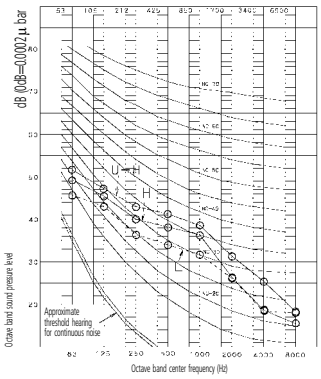
7-6-3 Sound pressure spectrum

	VAM500FA	VAM650FA	VAM800FA
50Hz 220V	 4D036872	 4D036873	 4D036874
50Hz 230V	 4D036881	 4D036882	 4D036883
50Hz 240V	 4D036890	 4D036891	 4D036892
60Hz 220V	 4D036899	 4D0368900	 4D036901

7 Product Specification

7-6 Sound level data

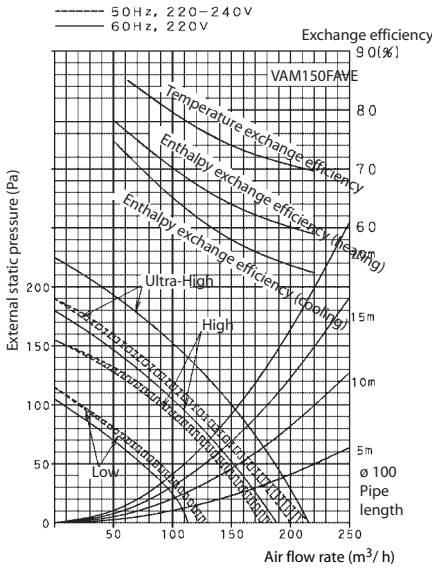
7-6-3 Sound pressure spectrum

	VAM1000FA	VAM1500FA	VAM2000FA
50Hz 220V	 4D036875	 4D036876	 4D036877
50Hz 230V	 4D036884	 4D036885	 4D036886
50Hz 240V	 4D036893	 4D036894	 4D036895
60Hz 220V	 4D036902	 4D036903	 4D036904

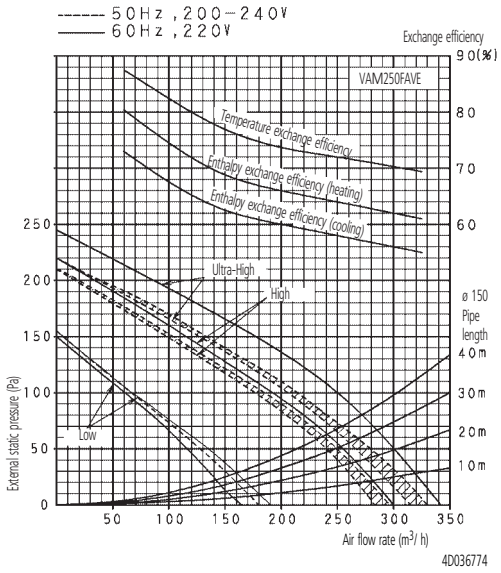
7 Product Specification

7-7 Fan performance

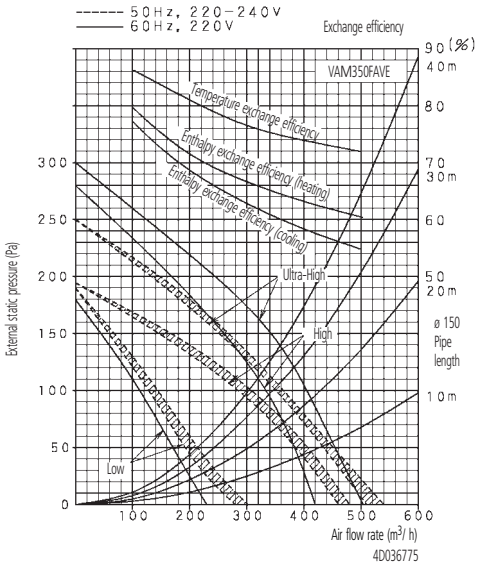
VAM150FA



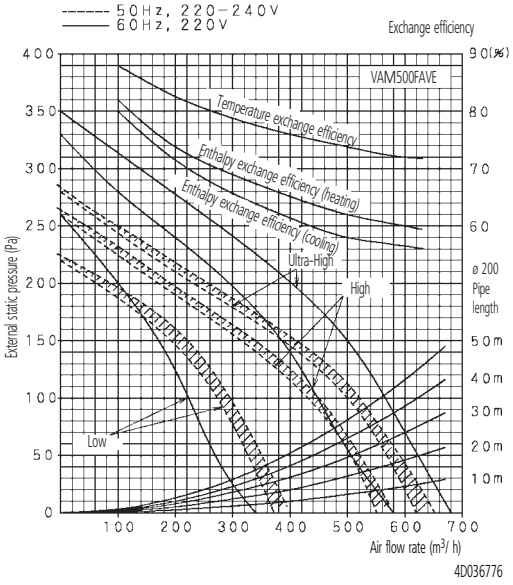
VAM250FA



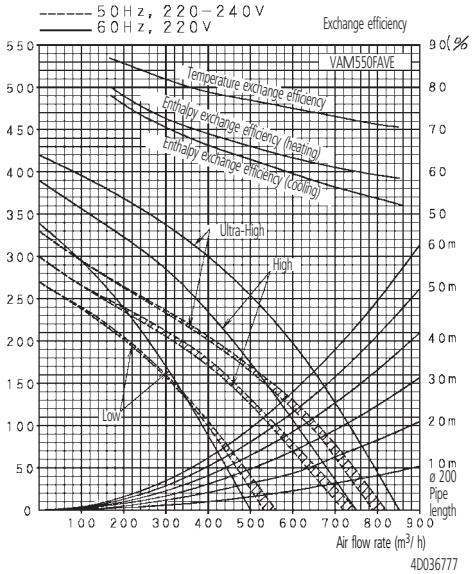
VAM350FA



VAM500FA



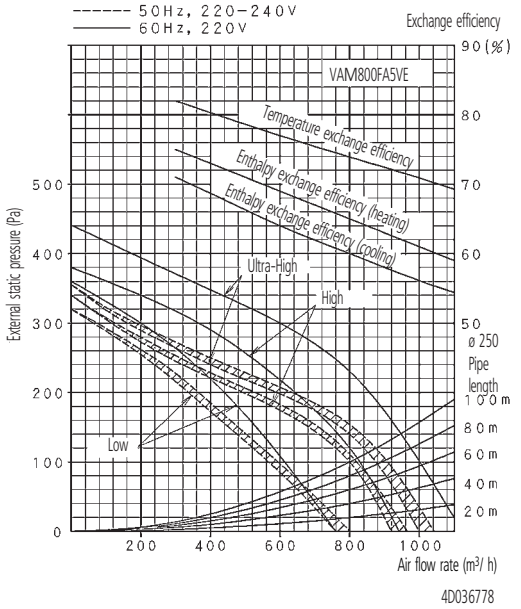
VAM650FA



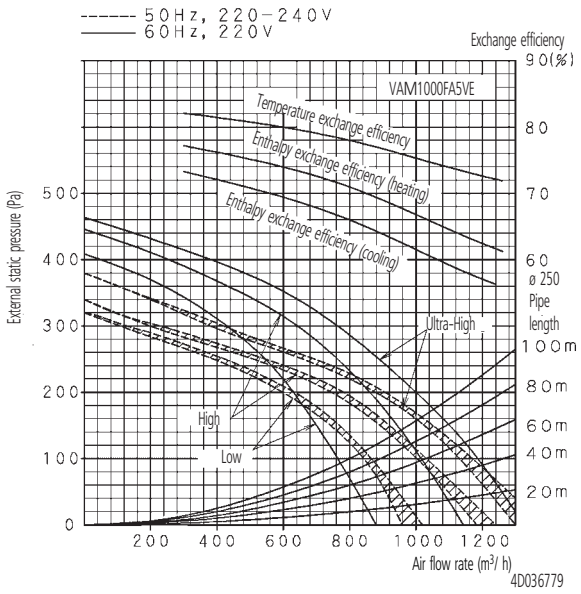
7 Product Specification

7-7 Fan performance

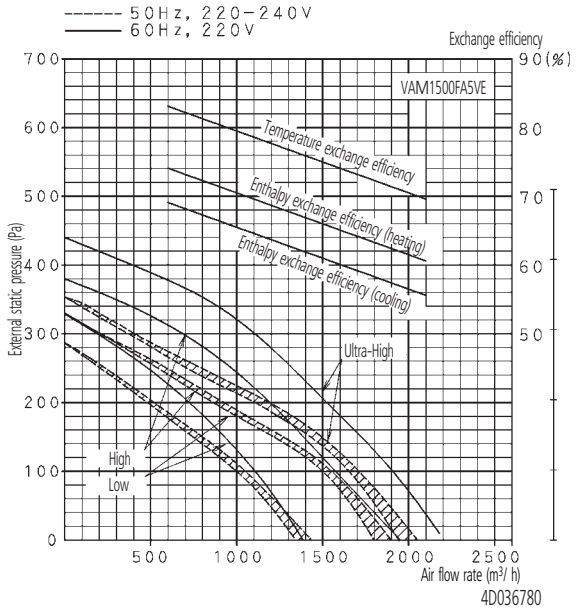
VAM800FA



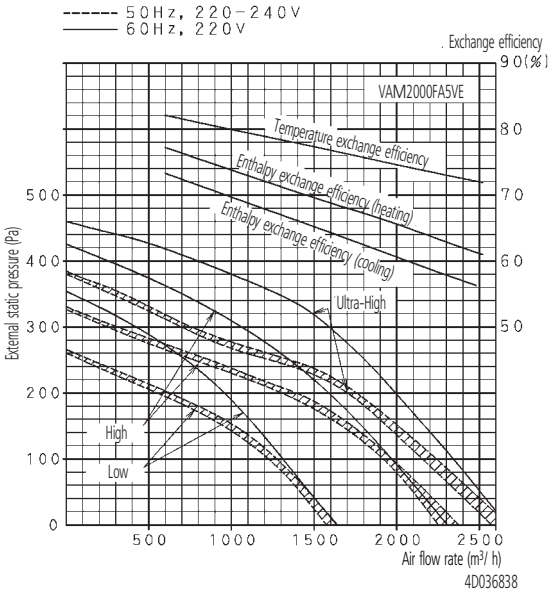
VAM1000FA



VAM1500FA



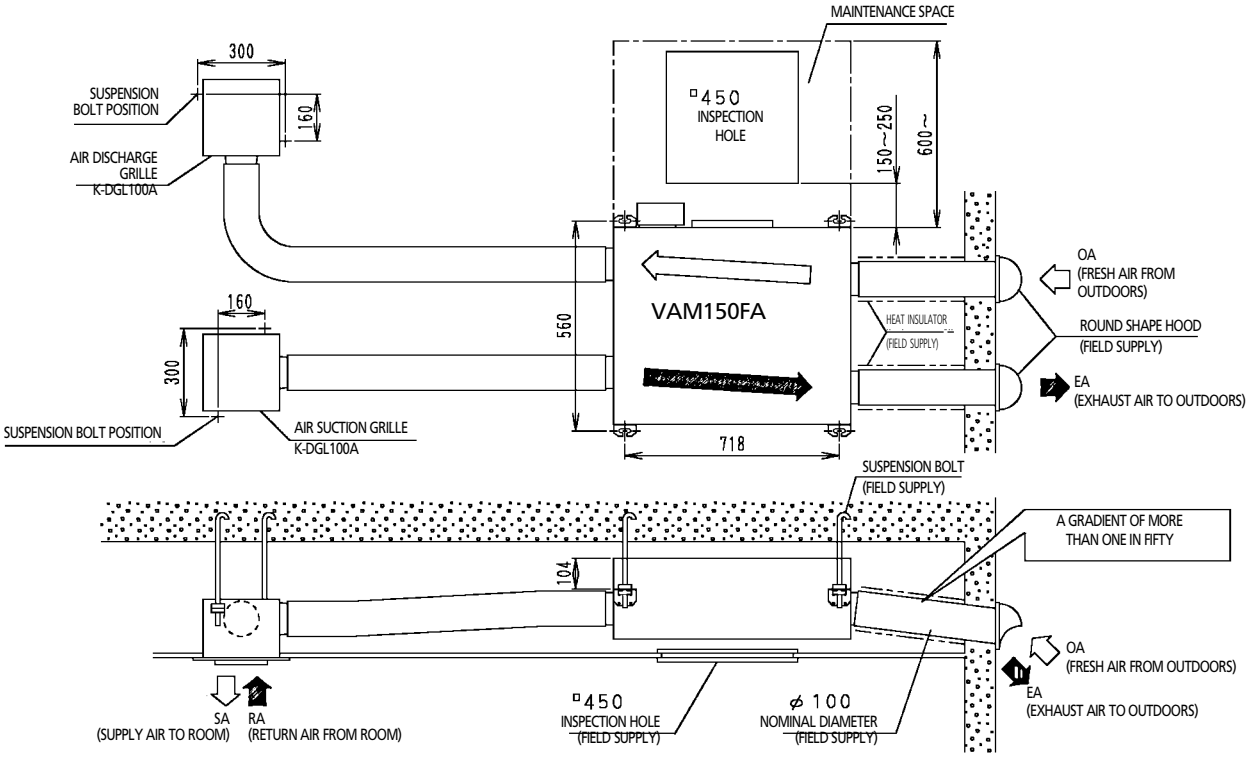
VAM2000FA



7 Product Specification

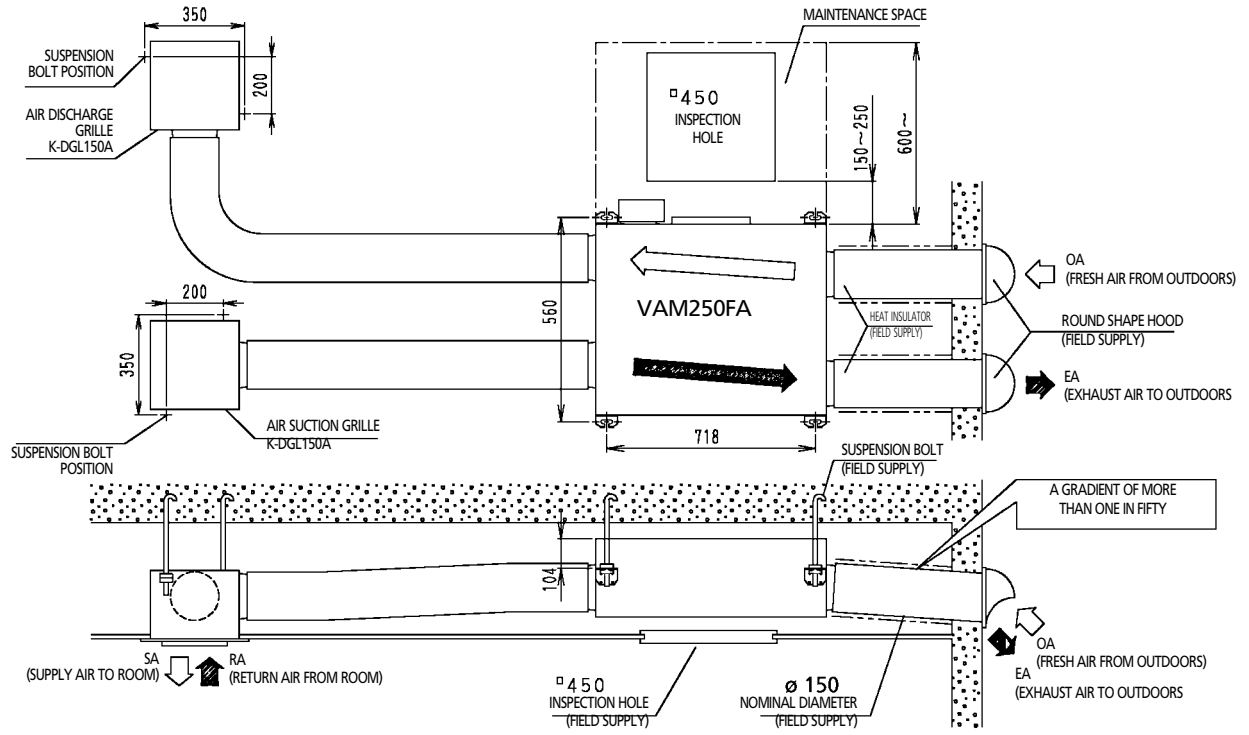
7-8 Installation method

VAM150FA



3D036781

VAM250FA

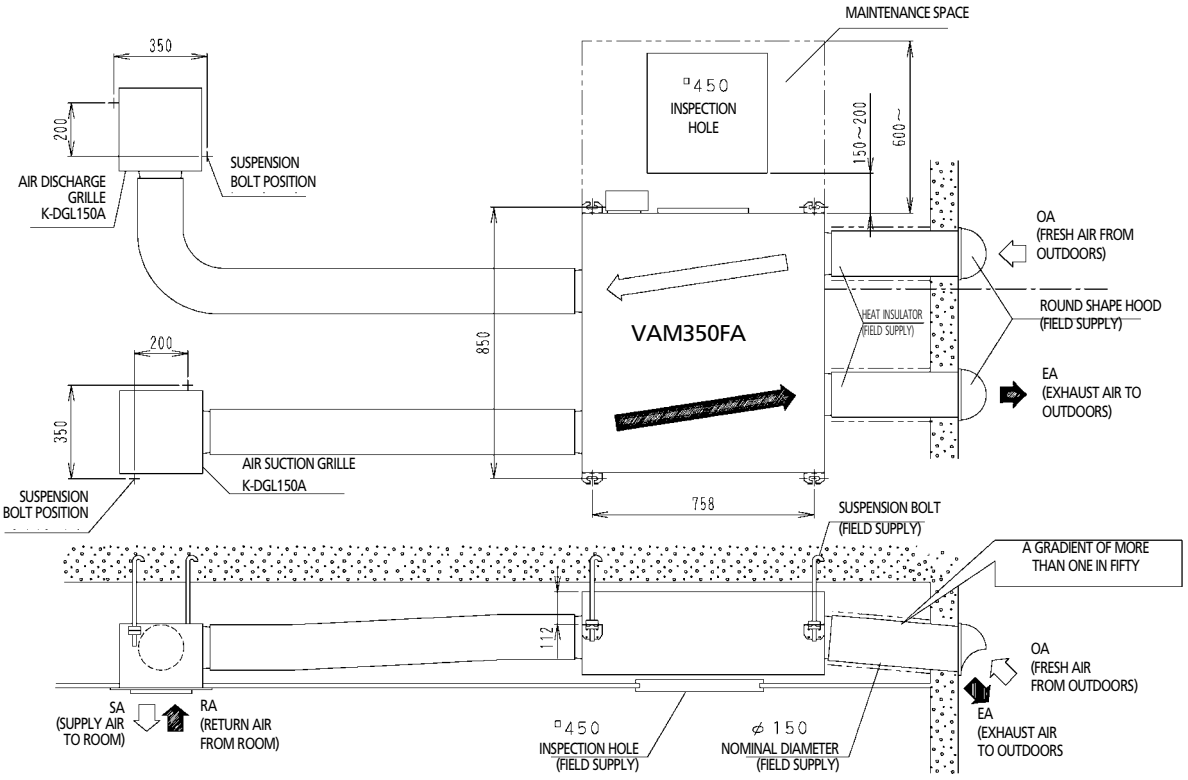


3D036782

7 Product Specification

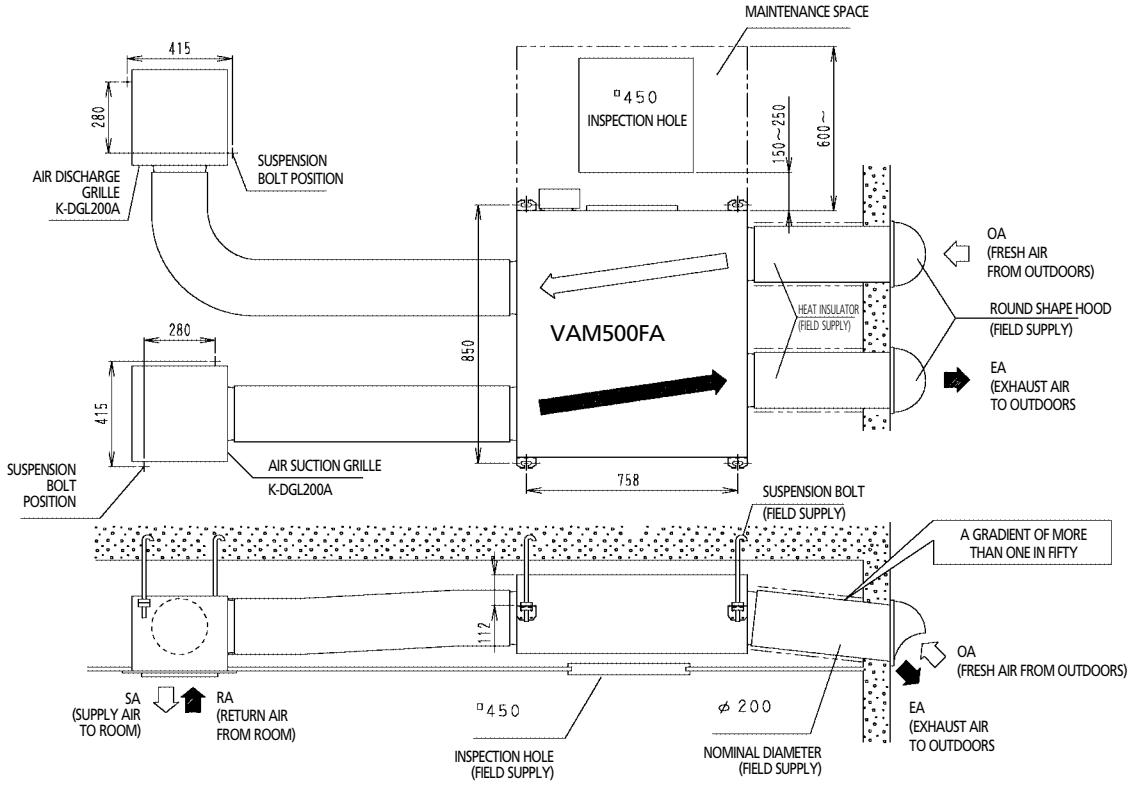
7-8 Installation method

VAM350FA



3D036786

VAM500FA

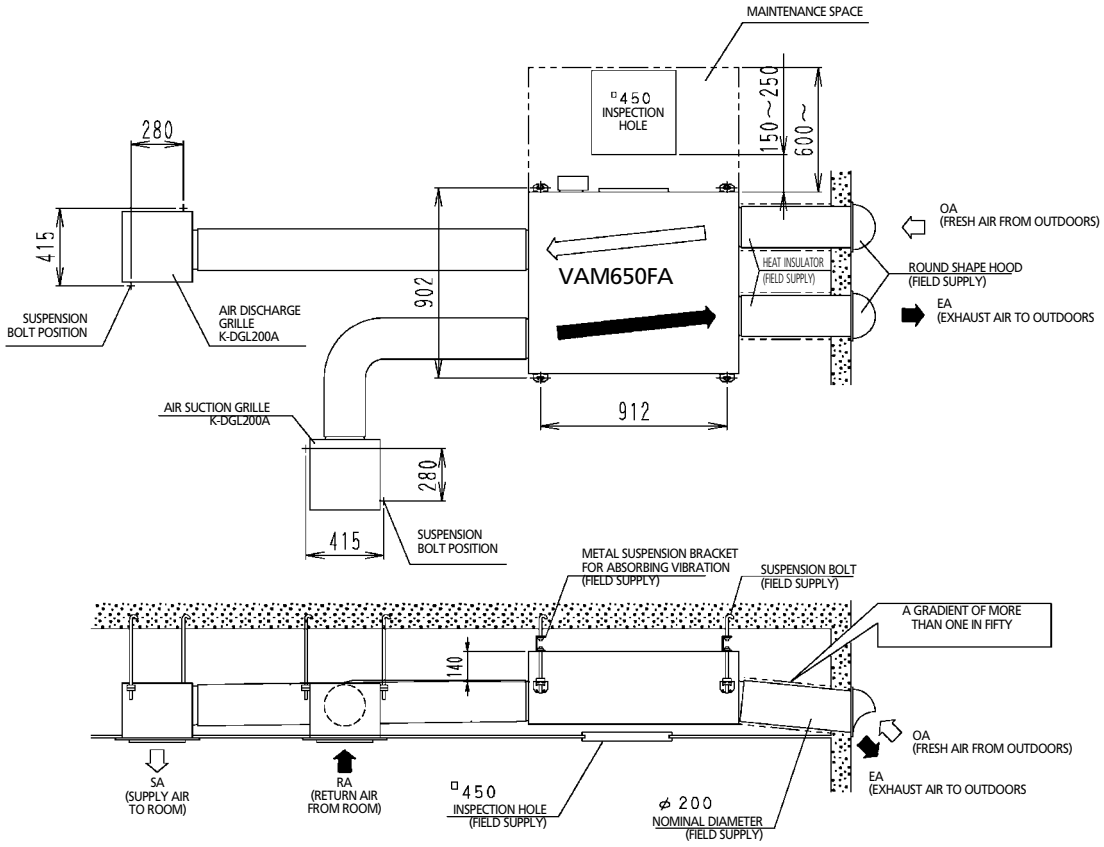


3D036787

7 Product Specification

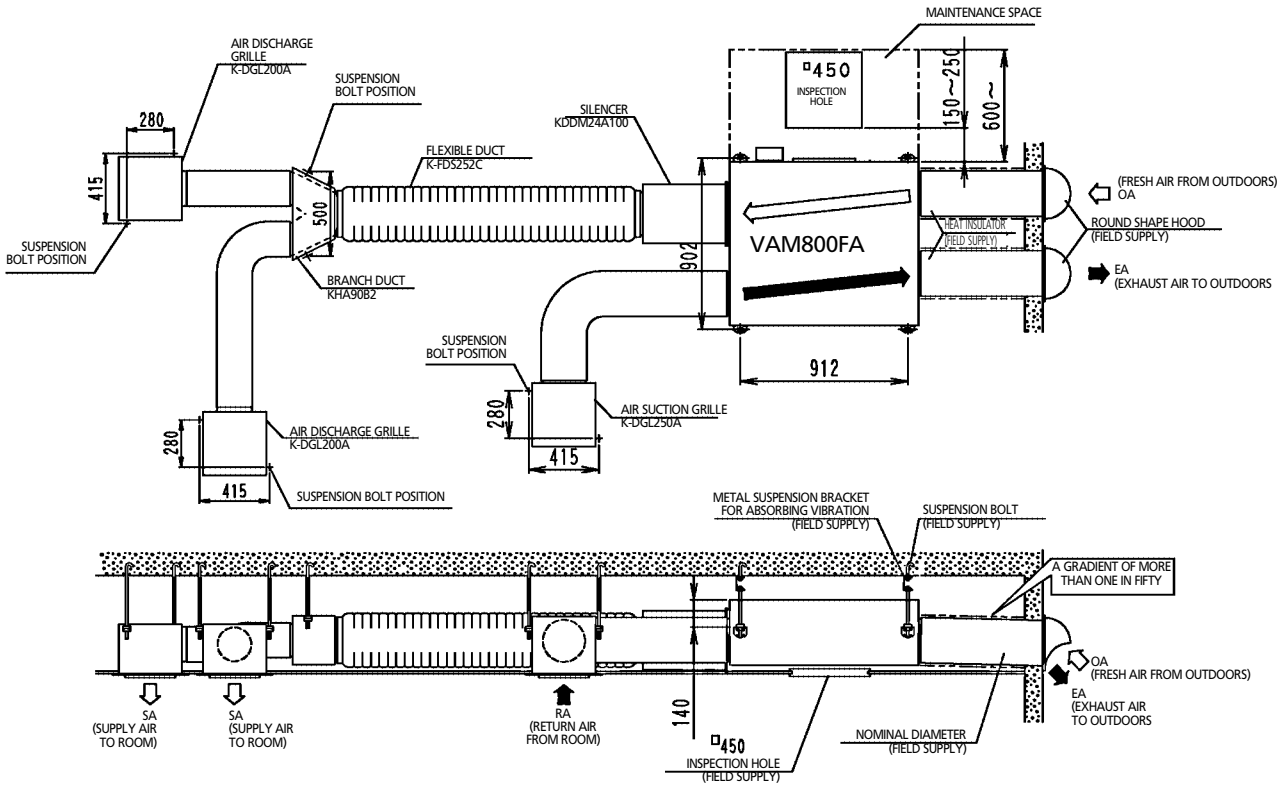
7-8 Installation method

VAM650FA



3D036788

VAM800FA

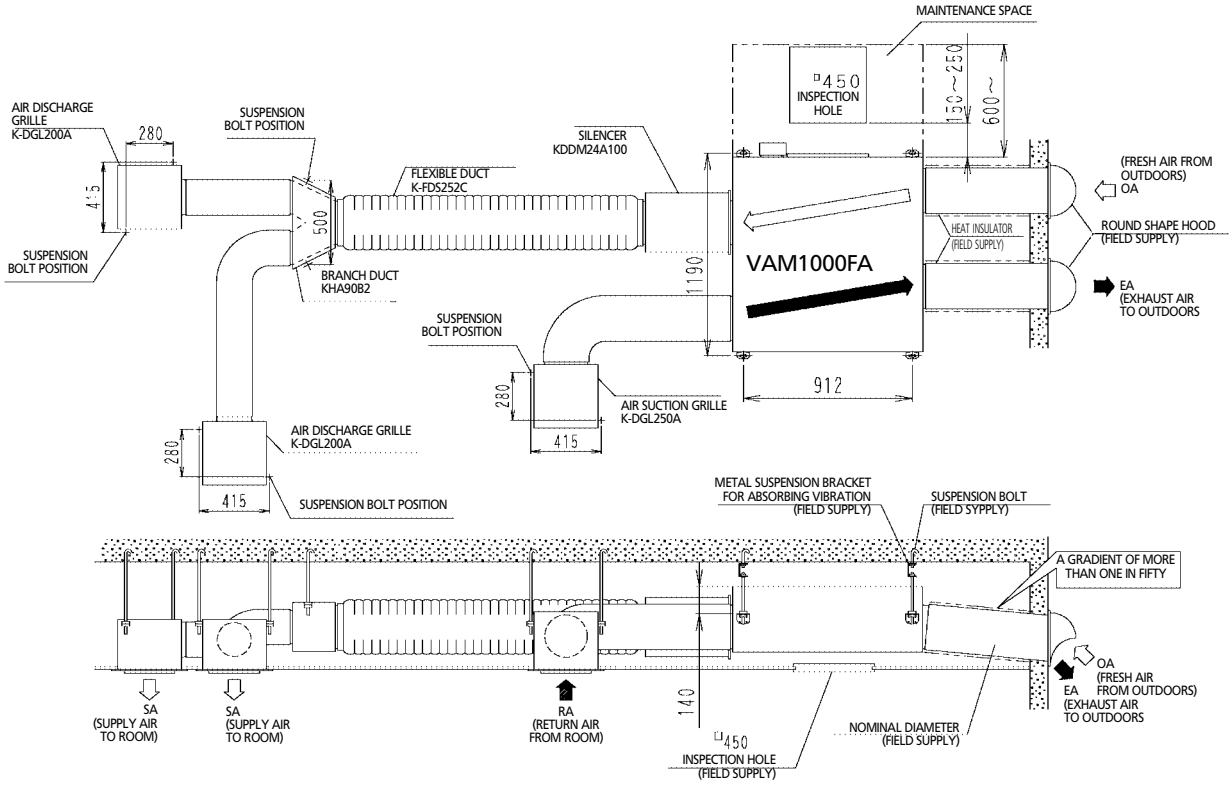


3D036789

7 Product Specification

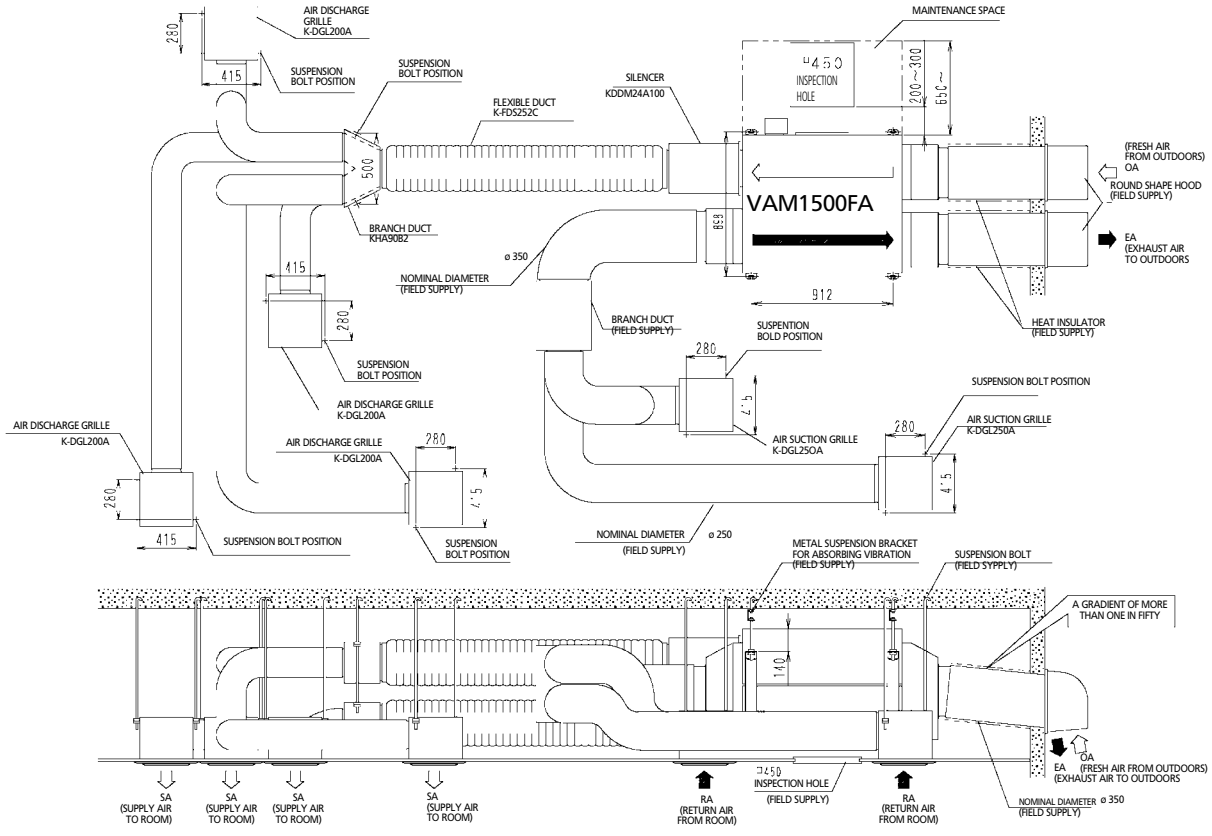
7-8 Installation method

VAM1000FA



3D036790

VAM1500FA

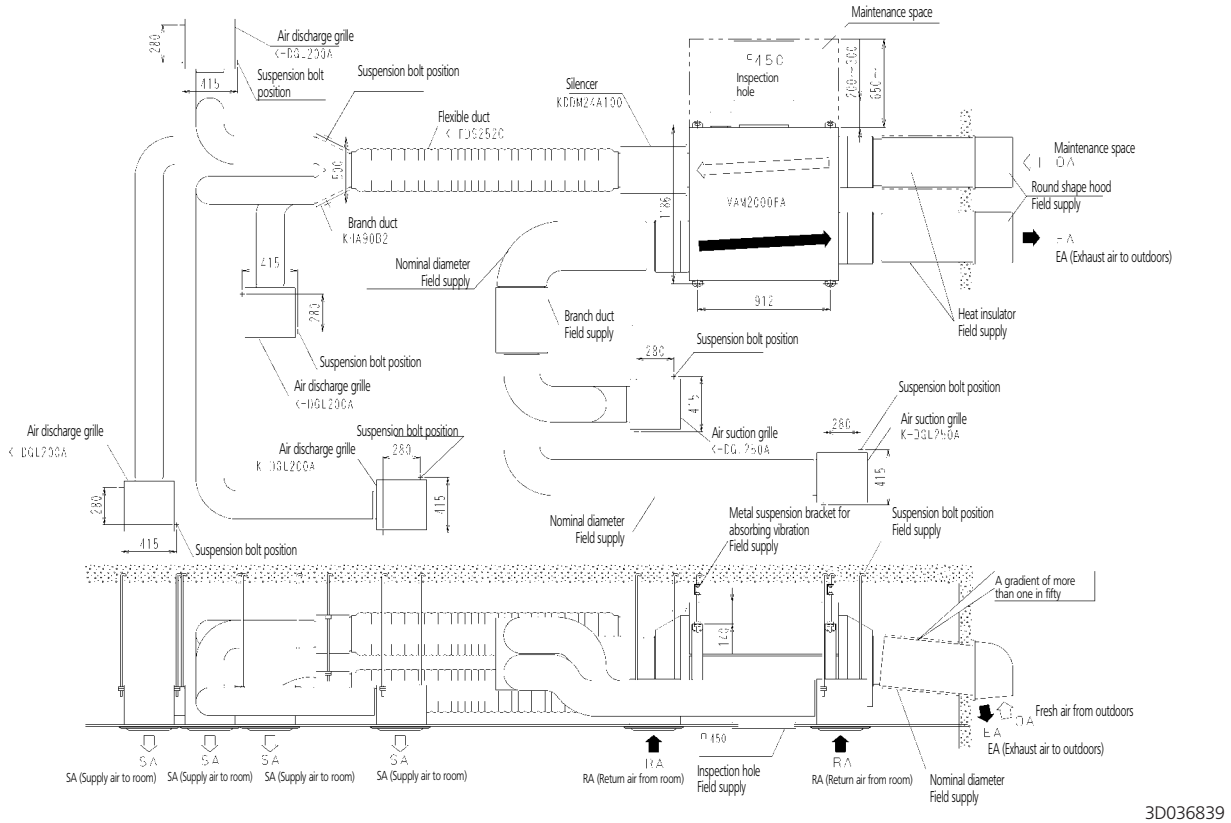


3D036791

7 Product Specification

7-8 Installation method

VAM2000FA



3D036839

8 Operation

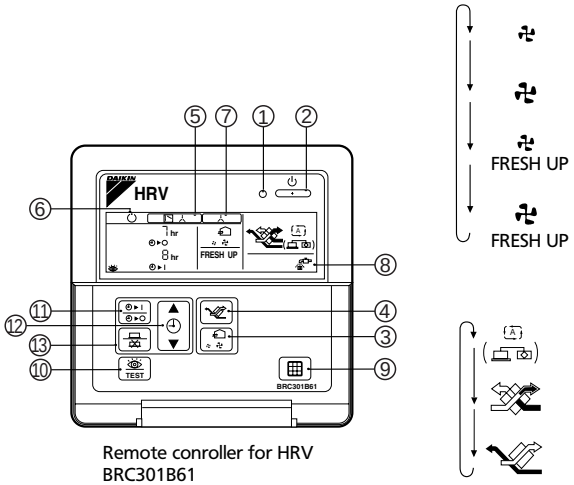
8-1 Method of operation

8-1-1 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 control in such cases.

① Operation lamp
This pilot lamp (red) light up while the unit is in Operation.

② Operation / Stop button
When pushed once, the unit starts operating.
When pushed twice, the unit stops.



Remote conroller for HRV
BRC301B61

(HC0098)

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.)
•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.)

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 exchange 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 interlocked 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 control.

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 interlocked air conditioners such a 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 control for air conditioners or devices for centralized control are connected to the HRVs, this indication may show.
During this indication appears on the display, the ON / OFF and timer operation may not be possible with the HRV remote controls.

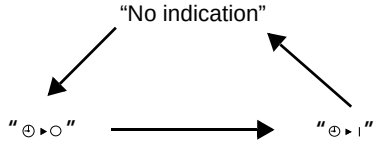
⑧ Indication of air filter cleaning
When the indication " " appears on the display, clean the filter.

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 Push the button " " and select either one of " " or " ".
Each time the button is pushed, the indication changes as shown below.



⑫ Push the button " " and set the time.
Each time when " ▲ " is pushed, the time advances one hour.
Each time when " ▼ " is pushed, the time goes back one hour.

⑬ Push the button " ".
Then, the reservation is finished.
Either " " or " " changes from flashing to lighting. After the reservation is finished, the remaining time is indicated in the display.
For cancelling the timer operation, push the button " " once again.
The indication disappears.

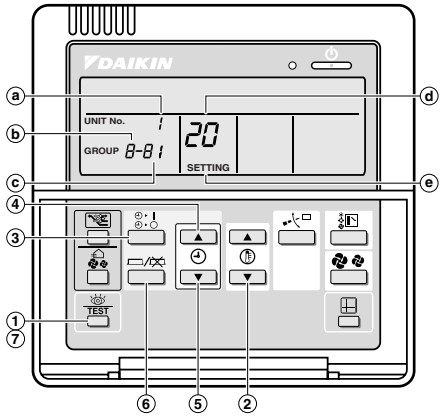
8 Operation

8-1 Method of operation

8-1-2 Operating the HRV unit using the remote control of the VRV- system air conditioner

When the VRV-system air conditioner is connected with the HRV unit with a direct duct, the remote control 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.

① Operation lamp
② Operation / stop button
③ Operation mode display
④ Operation mode selector

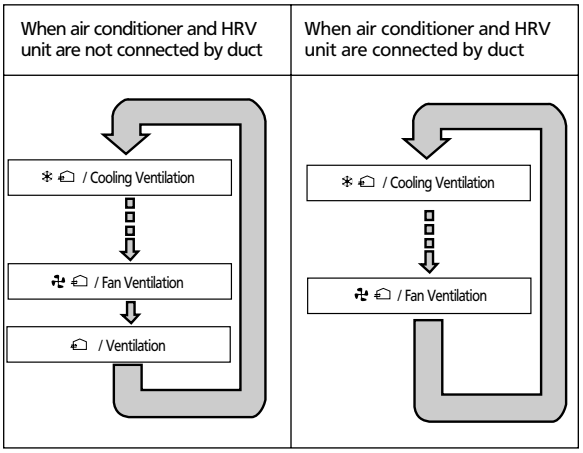


Remote control for indoor unit

(HC0099)

- Every time the operation mode selector is pressed, the operation mode display changes as shown below.

example



(HC0100)

- When the ▦ "FILTER" indication appears on the display, clean the filter of the HRV unit. (Refer to the section 3.)

8-1-3 Independent operation of the HRV unit using the Centralized control (DCS302B61)

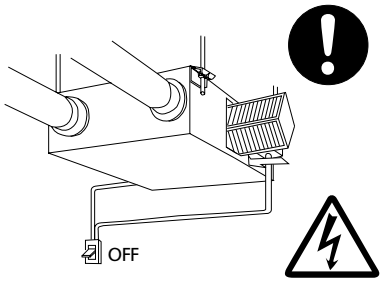
- After selecting the zone where the only the HRV unit operation is desired, press the operation mode selector and select "⌂" VENTILATION. The HRV unit can then be operated independently from the air conditioner.
- When the ▦ "FILTER" indication appears on the display, clean the filter of the HRV unit.(Refer to the section 3.)

8 Operation

8-2 Cautions in use

⚠WARNING
Never inspect or service the unit by yourself.
Ask a qualified service person to perform this work.
(The qualified service person)

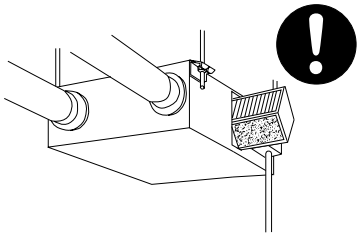
⚠WARNING
Before obtaining access to terminal devices(⚠), all power supply circuit must be interrupted.



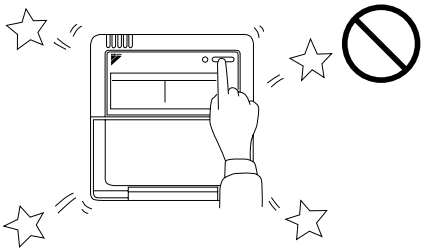
(HC0227)

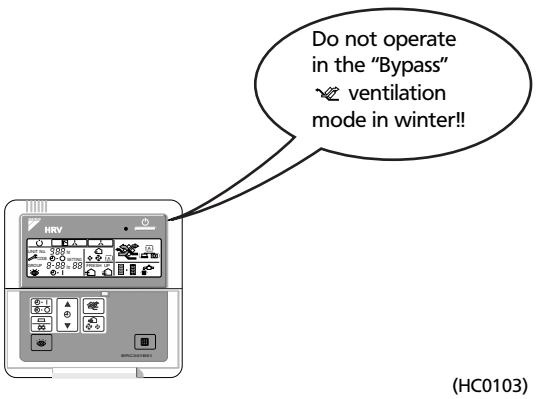
Electric shock may result. Before servicing the unit, always shut off power.

⚠WARNING
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.


(HC0101)

⚠WARNING
Do not change operations suddenly. It can result not only in malfunction but also failure of switches or relays in the body.


(HC0102)



(HC0103)

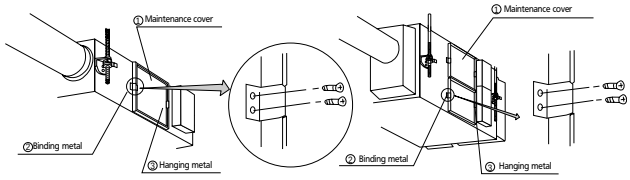
8-3 Maintenance (for a qualified service person only)

⚠CAUTION
Only a qualified service person is allowed to perform maintenance.
During operation, never check or clean the HRV. It may cause electrical shock and it is very dangerous to touch the rotating part.
Be sure to turn off the OPERATION switch and disconnect the power.

—— CLEANING FREQUENCY —— AIR FILTER
AT LEAST ONCE A YEAR
(FOR GENERAL OFFICE USE)
(CLEAN THE ELEMENT MORE FREQUENTLY IF NECESSARY.)

1. Go into the ceiling through the inspection hole, remove the hanging metals of maintenance cover and take it off.

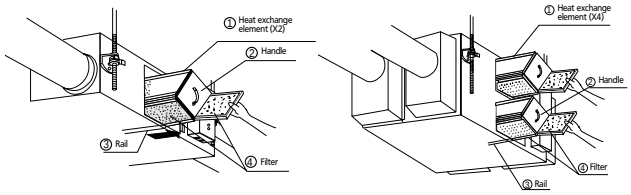
VAM150 - 1000FA VAM1500 - 2000FA



(HC0104)

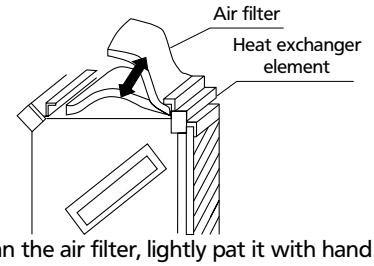
2.

VAM150 - 1000FA VAM1500 - 2000FA



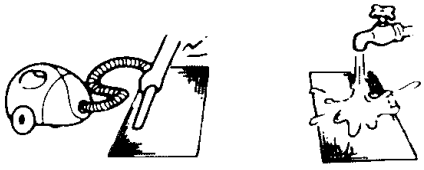
(HC0106) (HC0107)

3. Take out the air filter.



(HC0108)

4. To clean the air filter, lightly pat it with hand or remove dust with a vacuum cleaner. If excessively dirty, wash it with neutral detergent.


(HC0109)

5. If the air filter is washed, remove water completely and allow to dry for 20 to 30 minutes in the shade. When dried completely, install the air filter back in place.
(Direct the indication "INSIDE" of the air filter toward the heat exchange element.)
6. Install the maintenance cover securely in place.

8 Operation

8-3 Maintenance

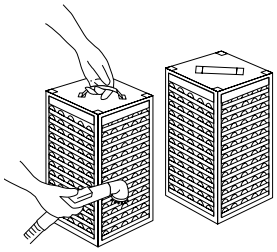
⚠CAUTION

1. Do not wash the air filter in hot water.
2. Do not dry the air filter over a fire.
3. Do not subject the air filter to direct sunlight.
4. Do not use organic solvent such as gasoline and thinner on the air filter.
5. Be sure to install the air filter after servicing.
   (Missing air filter causes clogged heat exchange element.)

The air filter is an optional item and the replacement is available.

—— CLEANING FREQUENCY ——
AT LEAST ONCE EVERY TWO YEARS
(FOR GENERAL OFFICE USE)
(CLEAN THE ELEMENT MORE FREQUENTLY IF NECESSARY.)

1. Use a vacuum cleaner to remove dust and foreign objects on the surface of the heat exchange element.



(HC0218)

   Use the vacuum cleaner equipped with a brush on the tip of the suction nozzle.
   Lightly contact the brush on the surface of the heat exchanging element when cleaning. (Do not crush the heat exchange element while cleaning.)
2. Install the air filter securely in place.
3. Put the heat exchange element on the rail and insert it securely in place.
4. Install the maintenance cover securely in place.

⚠CAUTION
Never wash the heat exchanger element with water.

8-4 Trouble shooting

8-4-1 If your unit does not operate properly, check the following items.

Conditions	Causes	Corrective actions
The unit does not operate at all.	Check if there is a power failure.	After power has been restored, start operation again.
	Check if the fuse has blown or breaker has worked.	Change the fuse or set the breaker.
	Check if the indication of operation control method on remote control (BRC301B61) is shown.	This is normal. Operate the unit using the air conditioner remote control or centralized control. (Refer to "2. OPERATION")
	Check if the indication of operation stand by on remote control (BRC301B61) is shown.	It indicates the precooling / preheating operation. This unit is at stop and will start operation after the precooling / preheating operation is over. (Refer to "2. OPERATION".)
Amount of discharged air is small and the discharging sound is high.	Check if the air filter and heat exchange element are clogged.	Refer to "3. MAINTENANCE".
Amount of discharged air is large and so is the sound.	Check if the air filter and heat exchange element are installed.	Refer to "3. MAINTENANCE".

8-4-2 If the following occurs, consult your dealer where the unit was purchased.

<List of mulfunction codes of Remote control of the HRV-system air conditioner>

Operation lamp	Inspection indicator	Unit No.	Malfunction code	Description
On	Off	Blinking	64	Indoor air thermistor malfunction
On	Off	Blinking	65	Outdoor air thermistor malfunction
On	Off	Blinking	6A	Dumper-related malfunction
Blinking	Blinking	Blinking	6A	Dumper-related malfunction + thermistor
Blinking	Blinking	Blinking	U5	Transmission error between the unit and remote control
Off	Blinking	Off	U5	Printed circuit board error or setting error of remote control
Off	Blinking	Off	U8	Transmission error between main remote control and sub remote control
Off	Blinking	Blinking	UA	Faulty installation setting
On	Blinking	On	UC	Repeated central address
Blinking	Blinking	Blinking	UE	Transmission error between the unit and centralized control

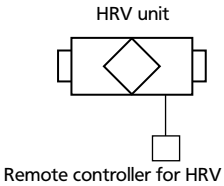
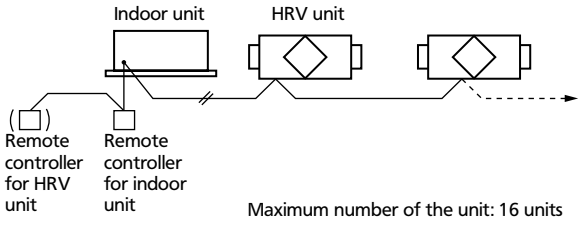
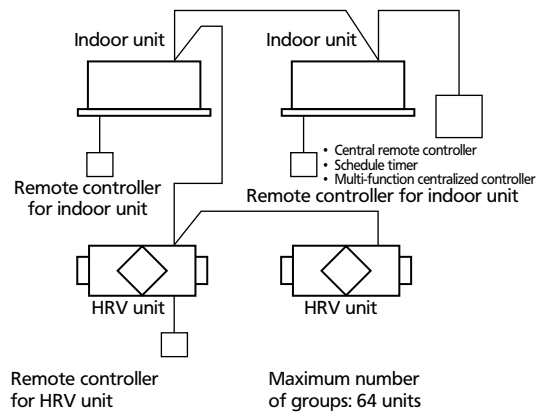
■ In case of the mulfunction with the code in white letters on the black background in the unit still operates. However, be sure to have it inspected and repaired and as soon as possible.

9 Control System

9-1 Introduction of control system

The control systems introduced here is for the HRV unit adopting the high speed and high performance transmission system (DIII-NET), the same as the VRV systems and SkyAir series,

Description of system

Contorl system	Purposes and applications	Description of system	Control system: Controller: Central remote controller	Unified On / Off controller	Schedule timer	Remote controller for HRV unit	Remote controller for indoor unit	Operation / Stop	Function: Ventilation mode changeover: Automatic	Manual	Air flow rate changeover (High / Low)	Air flow rate mode changeover (normal mode / fresh-up mode)	Precool / preheat operation	Malfunction display
Independent	• Basic method to operate HRV unit (Operation by exclusive remote controller for HRV unit)					○		○	○	○	○	○		○
Interlocked operation	• Interlocked operation with indoor unit by remote controller for indoor unit • The HRV unit can also be operated independently by the remote controller for indoor unit, even if indoor unit is not in operation. The HRV unit cannnot be operated independently when the duct is connected directly to the indoor unit.)					○*1	○	○	○	Initial setting required: ○*2				○
Centralized control	[Unified On / Off controller] • A maximum of 16 groups can be controlled of "On / Off" by one unified On / Off controller. (Note) Up to 4 unified ON / OFF controllers can be installed in one system. [Schedule timer] • One schedule timer can control the weekly schedule of up to 128 units. [Central remote controller] • Up to 64 groups of the units can be controlled individually by one central remote controller.		○	○	○	○		○	○	(Only when remote controller for HRV unit is used) ○	(Initial setting required when remote controller for HRV unit is not used) ○			○

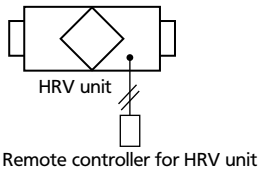
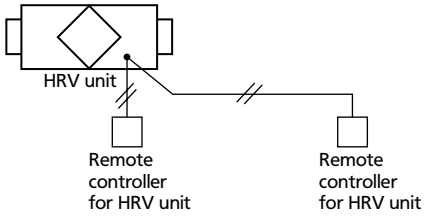
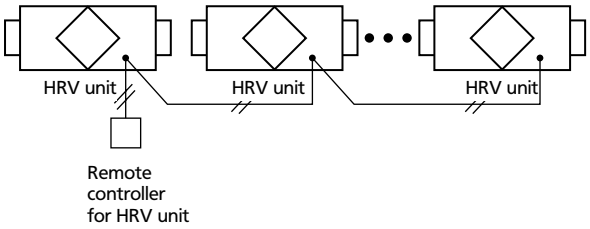
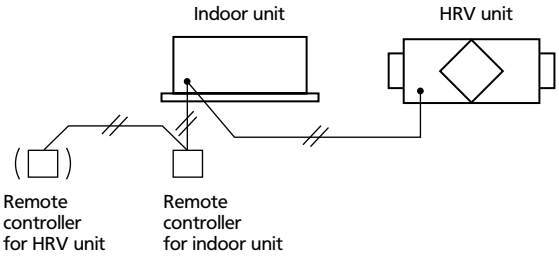
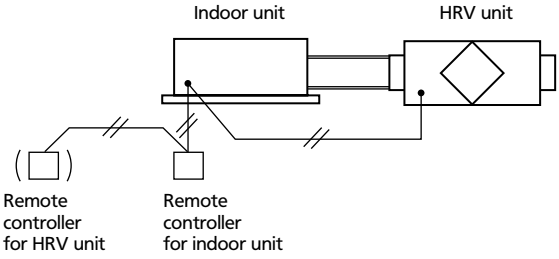
(HC0018)

1. A remote control for HRV unit can be connected as the 2nd remote control. In addition to air volume control, selection of ventilation mode and Fresh up mode is available.
2. In case of installing Indoor unit remote control only, initial setting is required for the setting of above function. However, in case of installing both indoor unit remote control and HRV unit remote control, initial setting is not required.

9 Control System

9-2 Basic patterns

9-2-1 List of control system

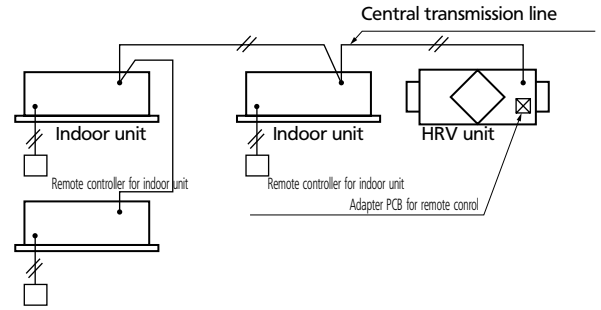
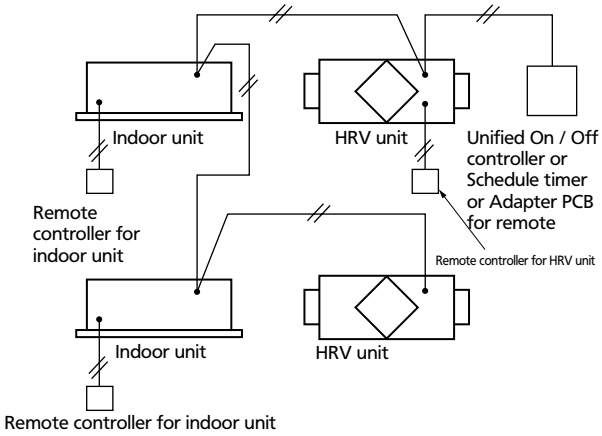
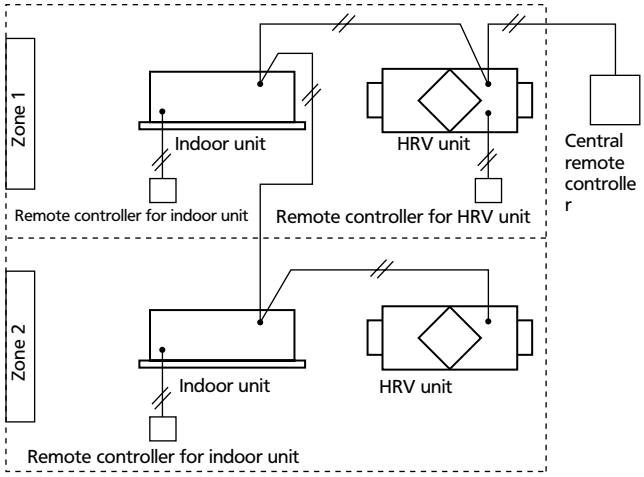
Control system		Purposes and applications	Description of system	Optional accessories required	
Independent system	Operation by main switch	• Basic method to operate HRV unit The remote controller for HRV unit is installed on each HRV unit for its operation.		BRC301B61 Liquid crystal remote controller	
	Control with two remote controllers	• The HRV is operable from a place near the unit or a remote place and the selected control is indicated in the display. (Priority is on the last selection)		BRC301B61 Liquid crystal remote controller	
	Group control	• Simultaneous control of multiple units installed in such as a spacious room is available.		BRC301B61 Liquid crystal remote controller	
Interlocked operation system with VRV systems and SkyAir series	Single-group interlocked operation	• The HRV unit operates whenever the indoor unit is in operation, and can also be operated independently by the remote controller for indoor unit, even if the indoor unit is not in operation.		———	
	Direct duct connection system	• Within the same group, the remote controller for indoor unit can control the operation of both the indoor unit and HRV unit connected by duct.		———	

	Function	Nos. of the unit controlled and length of wiring	Cautions	page
	BRC301B61 • ON / OFF • Ventilation mode (Auto / Heat Exchange / Bypass) • Ventilating rate (High / Low) • Fresh up mode (On / Off)	• One remote controller operates each HRV unit. • Remote control wiring can be extended up to 500 m maximum.	• The wire for remote controller is not included as standard accessories and should be arranged locally. • By connecting the adapter PCB, the operation signal can be taken out remotely. • "Fresh-up operation" is possible by external input. • The group control is not possible by the remote controller for HRV unit.	118
	BRC301B61 • ON / OFF • Ventilation mode (Auto / Heat Exchange / Bypass) • Ventilating rate (High / Low) • Fresh up mode (On / Off) • Timer setting (On / Off) • Indication of filter cleaning signal • Digital indication of malfunction	• Control of one HRV with two remote controllers • The maximum allowable total length of remote controller wiring is 500 m.	• Same as operation from local place. • It is necessary to set the Master / Slave changeover switch in the remote controller. • Two remote controller operation is not available with simple remote controllers.	119
		• Up to 16 HRV units can be controlled with one liquid crystal remote controller. • The maximum total length of remote controller wiring is 500 m. • Control with two remote controllers is available.	• Same as operation from local place. • Group control is not available with a simple remote controller. • All the settings of HRVs in the same group are the same (However, it is possible to fix the individual setting by each unit)	119
	• The HRV unit operates whenever the indoor unit is in operation. • Precool / preheat operation is also possible. • Various settings are available by adding the HRV remote controllers.	• A maiximum of 16 units of indoor unit and HRV unit can be controlled by the remote controller for indoor unit. (If they are in the same group) • Remote control wiring can be extended up to 500 m maximum.	———	120
		• A maximum of 16 units of indoor unit and HRV unit can be controlled the operation by the remote controller for indoor unit. • Remote control wiring can be extended up to 500 m maximum.	• Make sure to set "ON" for direct ducting setting. • The HRV cannot be operated independently to prevent the dust, when the indoor unit is not in operation. However, if the fan of indoor unit is in operation, the HRV unit can be operated independently.	120

(HC0019)

9 Control System

9-2 Basic patterns

Control system		Purposes and applications	Description of system	Optional accessories required	
Interlocked operation system with VRV systems and SkyAir series	Interlocked operation with 2 or more groups	• When the HRV unit is interlocked to 2 or more groups of indoor units, The HRV unit operates if one of indoor unit in the groups is in operation. The HRV unit can also be operated independently by remote controller for indoor unit, even if the indoor unit is not in operation.		KRP2A61 ♦ Adapter PCB for remote control (One adapter PCB should be installed in either the HRV unit or the indoor unit.)	
Centralized control system	Coolective / Individual control	[Unified On / Off Controller] • A maximum of 16 groups can be controlled of "On / Off" by one controller, and up to four controllers can be installed in one system. [Schedule Timer] • One schedule timer can control the weekly schedule of up to 128 units. [Adapter PCB for remote control] • One adapter PCB can control up to 64 groups collectively.		DCS301B61 ♦ Unified On / Off Controller (up to 4 controllers) DST301B61 ♦ Schedule timer KRP2A61 ♦ Adapter PCB for remote control (not possible to use together with other central controller) * One of the above controller should be installed in indoor unit. (However, only KRP2A61 can also be installed in HRV unit.)	
	Zone control system	• The Central remote controller can control the zone operation of the several groups of the units collectively. • Central remote controller can control the independent operation of HRV unit in each zone.		DCS302B61 ♦ Central remote controller	

	Function	Nos. of the unit controlled and length of wiring	Cautions	page
	• The HRV unit operates of one of the indoor units connected to the central control transmission line is in operation. • The various setting for the operation of HRV unit should be set by the remote controller for the indoor unit.	• A maximum of 64 groups of the units can be controlled. • The central control transmission line can be extended up to 1000 m maximum.	• No direct duct connection is possible. • Set "ON" for collective zone interlock setting.	121
	Collective / Individual operation [The unified On / Off controller] • Each group can be controlled of "On / Off" individually. • Each 16 groups can be controlled "On / Off" collectively. • The power supply terminal for the schedule timer is provided. [The schedule timer] • The schedule timer can control collectively the operation "ON / OFF" twice a day by weekly. • Back-up power supply for 48 hours is provided, when the power failure is occurred. [Adapter PCB for remote control] • The HRV units can be controlled "On / Off" collectively by external input.	• A maximum of 64 groups connected by the central transmission line can be controlled. • The central transmission line can be extended up to 1000 m maximum.	• When you use the central controller, no direct duct connection is possible. [The unified On / Off controller] • Each group should be set the group number. (It cannot be set by the remote controller for HRV unit.) • The power must be supplied. [The schedule timer] • When you use the schedule timer alone, it is necessary to supply the power of DC16V, which can be supplied from the printed circuit board of the nuit. (from CN11 in case of HRV unit) [Adapter PCB for remote control] • The adapter PCB for remote control cannot be used with other central controller. (It can be installed in the either indoor unit or HRV unit.) • Only KRP2A61 can be installed in the HRV unit. (KRP2A2.A3 cannot be installed in the HRV unit because of their size.)	122
	The interlocked operation [Multi function centralized controller] • It can control the operation "On / Off" individually or collectively. • The several group of the units can be controlled collectively by zone. • It can control the interlocked operation of the indoor units and the HRV units in the same zone. • The electrical terminal for the schedule timer is provided.	• A maximum of 64 groups connected by the centralized transmission line can be controlled. • The central transmission line can be extended up to 1000 m maximum.	• The initial setting by remote controller for indoor unit is needed. (The collective zone interlock setting should be "On".) However, if there is no indoor unit in the same zone (only HRV units), the initial setting is not required. • When you use the central transmission line, no direct duct connection is possible. [Multi function central controller] • Each group should be set the group number for central control. (It cannot be set by the remote controller for HRV unit.) • The power supply is needed.	123

(HC0020)

9 Control System

9-2 Basic patterns

9-2-2 Independent system

Operation by main switch

Purposes and functions

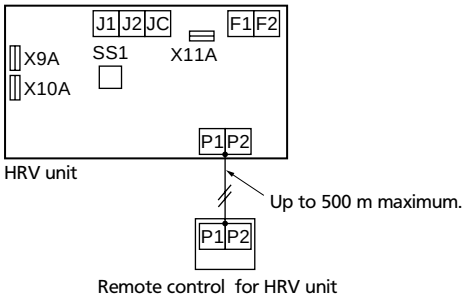
- Basic method to operate HRV unit
  The remote control for HRV unit is installed on each HRV unit for its operation.

[When you use remote control for HRV unit]

Cautions

1. The remote control for HRV unit should be connected to the terminal no. P1 and P2.
2. The remote control wiring should be arranged locally.
3. The operation by two remote controls or the group control is not possible.
4. The initial setting cannot be done by the remote control for HRV unit, which has to be set by the remote control for indoor unit.

Example of control wiring



(HC0021)

Switch setting of HRV unit

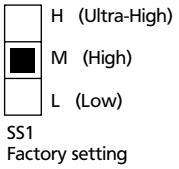
- No change is required. (as per factory setting)

Optional accessories required

- Remote control for HRV unit BRC301B61

Information

1. If you increase the air flow rate from "High" to "Ultra-High" by the remote control for HRV unit, it is necessary to have a initial setting by the remote control for indoor unit or HRV unit.
2. The SS1 on the HRV unit is the selector switch of air flow rate.
   When the remote control is not used, set the SS1 on the PC board to H.



(HC0022)

9 Control System

9-2 Basic patterns

9-2-2 Independent system

Control with two remote controls

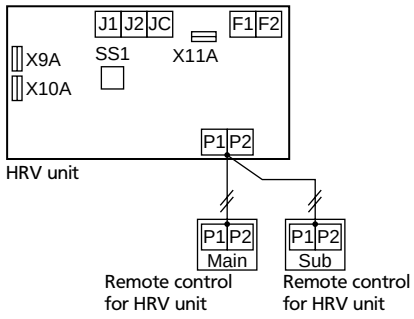
Purpose and functions

- For control of one HRV unit (Also one group control is possible)
  Sophisticated operation and indication output are possible from either local place or remote place by two liquid crystal remote controls.
- Either one of two liquid crystal remote controls can be used for all operations and indications.
  (However, initial setting can only be carried out by the master remote control)

Point

- The wiring to the remote controls must be branched from the unit as shown in the diagram.
  (Though the crossover between the master and slave remote controls is acceptable, the work to put two wires into the remote control takes time.)

Example of wiring for control



(HC0023)

Note

1. The maximum allowable total length of wires to the remote control is 500 m.
2. Simple remote controls cannot be used for control with two remote controls.

The following setting is required

- Either one of two remote controls must be set as a slave remote control.

Required optional accessories

- Liquid crystal remote control × 2
  BRC301B61

Group control

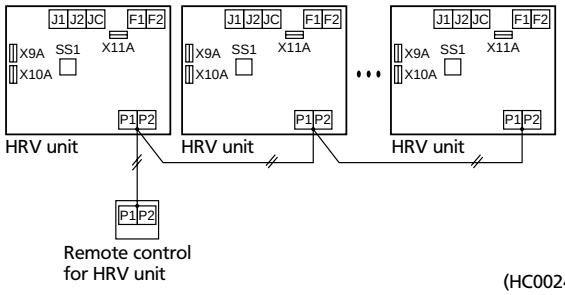
Purpose and functions

- Simultaneous control of multiple HRV units (max. 16 units) is available. (for application to such as a spacious room)
- All operation and individual setting can be carried out from one remote control.
- In case the liquid crystal indicates malfunction, the indication of HRV unit No. shows in the display.
  (If another remote control is additionally installed, control with two remote controls is possible.)

Point

- No address setting is required because address is automatically set.
  (The address is optionally allocated. The address No. can be confirmed by setting to service mode "Forced fan operation" and be checked whether the unit is in operation or not.)

Example of wiring for control



(HC0024)

Note

1. The maximum allowable total length of wires to the remote control is 500 m.
2. One liquid crystal remote control is always required.
3. Simple remote controls cannot be used for control with two remote controls.

The following setting is required

- No setting is required. (product is to be just as it was when shipped from the factory)

Required optional accessories

- One set of liquid crystal remote control
  BRC301B61

9 Control System

9-2 Basic patterns

9-2-3 The interlocked operation system

Single-group interlocked operation (Basic pattern)

Purposes and functions

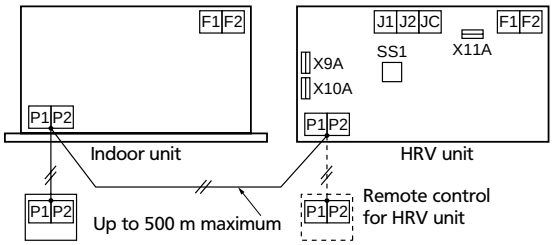
- The remote control for indoor unit can control the interlocked operation with the HRV unit, and it can make an initial setting of the ventilation flow rate, the ventilation mode changeover and fresh-up operation. The HRV unit can independently be operated, even if the indoor unit is not in operation.

Note

1. The remote control should be connected to the terminal no. P1 and P2, the same as the group control wiring of indoor units.
2. Since this is two remote control system (for Indoor unit and HRV unit), the Master / Slave setting is required.

Remote control for	Setting
Indoor unit	Slave
HRV unit	Master

Example of control wiring



(HC0025)

Switch setting for HRV unit

- No change is required. (as per factory setting)

Optional accessories required

- None

Single-group interlocked operation (Direct duct connection)

Purposes and functions

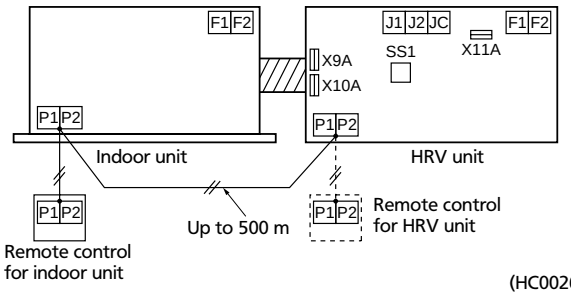
- The operation of HRV unit is interlocked to the indoor unit connected by the duct, which has a fresh air intake.
- It can reduce the number of outlets for supply air.
- The HRV unit cannot be operated independently to prevent a reverse stream of fresh air to the suction side of the indoor unit, unless the fan of indoor is in operation.

Note

1. The amount of fresh air to the indoor unit should be less than 20% of the total air volume of the indoor unit. (If the amount of fresh air is too much, the capacity of the indoor unit may reduce and the operating sound might be higher.)
2. The HRV unit can be operated independently, if the fan of indoor unit is in operation.
3. Since this is two remote control system (for Indoor unit and HRV unit), the Master / Slave setting is required.

Remote control for	Setting
Indoor unit	Slave
HRV unit	Master

Example of control wiring



(HC0026)

Switch setting for HRV unit

The initial setting by the remote control for indoor unit
Direct duct setting ..... "ON" [17(27)·5·02]

Optional accessories required

- None

9 Control System

9-2 Basic patterns

9-2-3 The interlocked operation system

Interlocked operation with 2 or more group of VRV system

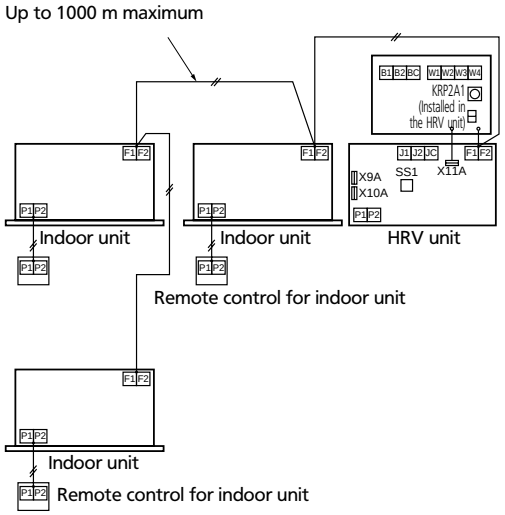
Purposes and functions

- When the HRV unit is interlocked to 2 or more group of indoor units, the HRV unit operates, if one of indoor unit in groups is in operation. The HRV unit can also be operated independently by remote control for indoor unit, even if the indoor unit is not in operation.

Cautions

1. It is not necessary to set the group number for central control.
2. One adapter PCB for remote control should be installed in the one of the unit connected to the central transmission line.
   (When you install an adapter PCB for remote control in the indoor unit, select the applicable model number of Adapter PCB to be installed.)

Example of control wiring



(HC0027)

Note:

The central transmission line can be extended up to 1000 m maximum.

Switch setting for HRV unit

The initial setting by the remote control for indoor unit or HRV unit.

Optional accessories required

- Adapter PCB for remote control: KRP2A61

9 Control System

9-2 Basic patterns

9-2-4 Centralized control system

Collective / individual control [Unified On / Off control DCS301B61]

Purposes and functions

- One control can control the operation of "ON / OFF" of 16 groups of the units collectively or individually.
  Also up to 4 controls can be installed in one centralized transmission line (in one system), which enable to control up to 64 groups. (16 groups × 4 = 64 groups)
- The ventilation mode will be selected automatically.

Cautions

1. It is necessary to assign a central group number to each indoor unit and HRV unit.
2. The operation of HRV unit is not interlocked with the operation of indoor unit under this control system. If you like to have a interlocked operation, please consider other control system.

Switch setting for HRV unit

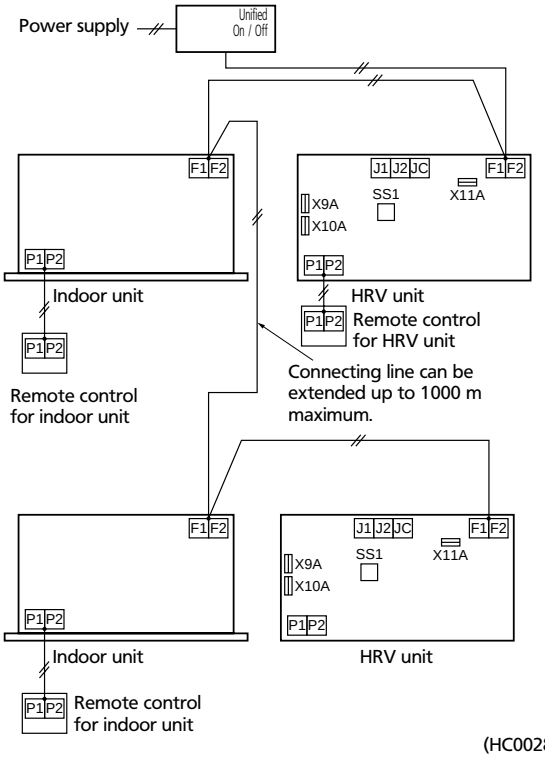
The initial setting is required by the remote control for indoor unit or HRV unit.

- No change is required. (as per factory setting)

Optional accessories required

- Remote control (Only when you use) BRC301B61

Example of control wiring



(HC0028)

9 Control System

9-2 Basic patterns

9-2-4 Centralized control system

Zone control system (Central remote control DCS302B61)

Purposes and functions

- A maximum of 64 groups can be controlled On / Off individually by one control. And also the central remote control can control the On / Oft operation of the units in each zone collectively. (It also can control the interlocked operation as well as the independent operation within the same zone.)
- If the zone setting is not required, or if you like to operate the HRV unit whenever one of indoor unit of any group connected to the central transmission line is in operation, refer to the applied system.

Cautions

1. It is necessary to assign a central control group number.
2. If you operate the HRV unit interlocked to the operation of indoor unit, please set the same zone number. At that time, it is necessary to set the zone operation on the HRV unit.
3. It is not possible to operate On / Off from the remote control for the HRV unit in zone 1.
4. It is not necessary to set the zone operation mode in zone 2, which is already set at the factory.

Switch setting for HRV unit

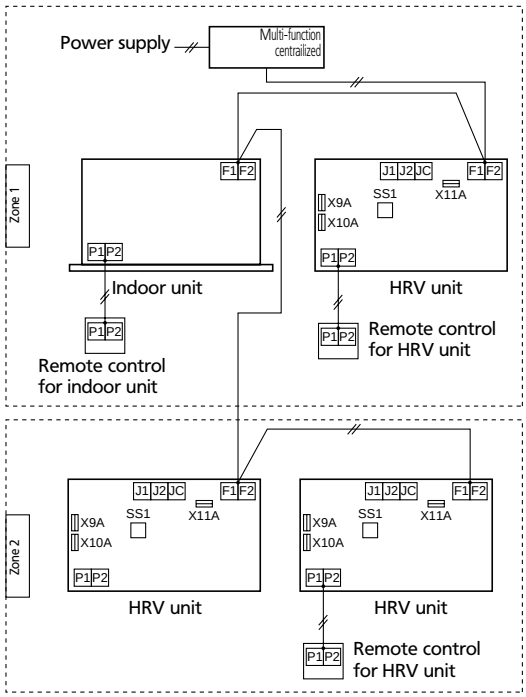
The initial setting is required by the remote control for indoor unit or HRV unit.

- For zone 1.....“ON” [17(27)·8·02]
- For zone 2.....Factory set (No change is required)

Optional accessories required

- Remote control (Only when you use) BRC301B61

Example of control wiring



(HC0029)

9 Control System

9-3 Applicable patterns

9-3-1 Additional functions

Operation by power supply [HRV unit]

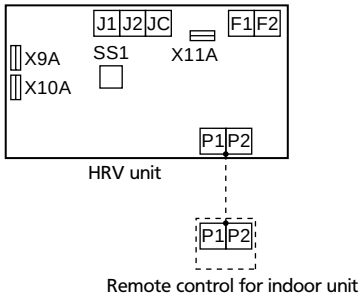
Purposes and functions

- The HRV unit is operated by "On / Off" of the main power breaker. This is possible only for the independent operation system. (When the main power is disconnected, the transmission error will be displayed if the HRV unit is interlocked to the indoor unit or controlled by the centralized control.)

Cautions

1. Install insect control wire net on the air intake and exhaust openings. (If the power is disconnected when the damper is open, the damper remains open and the insects may get into the room.)
2. When you install the remote control, it is possible to have normal operation after the electric power is supplied.

Example of control wiring



(HC0030)

Switch setting for HRV unit

The initial setting is required by the remote control for indoor unit. Power-on setting..... "ON" [18(28)·1·02]

Install the remote control for indoor unit for the initial setting. After completion of the initial setting, remove the remote control.

Optional accessories required

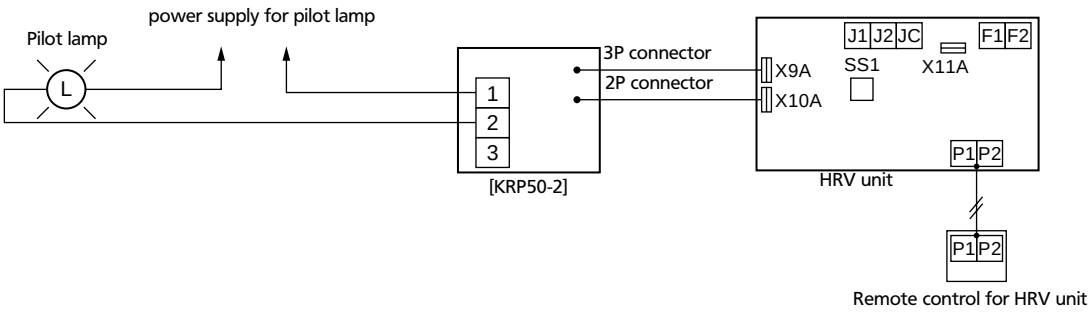
- None

Monitor of operation (KRP50-2) [HRV unit → operating pilot lamp (local supply)]

Purposes and functions

To monitor the operation of one HRV unit.

Example of control wiring



(HC0031)

Switch setting for HRV unit

- No change is required. (as per factory setting)

Optional accessories required

- Adapter PCB: KRP50-2

9 Control System

9-3 Applicable patterns

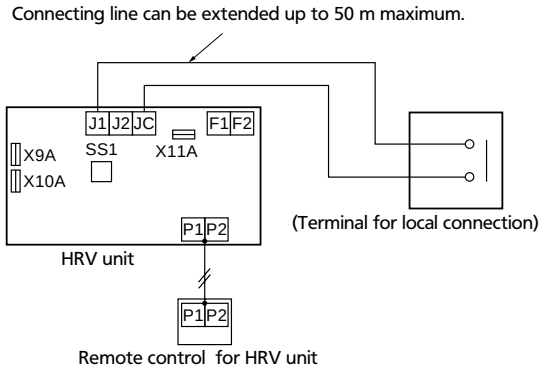
9-3-1 Additional functions

Fresh-up operation by external input [HRV unit]

Purposes and functions

When the operation is interlocked with the local ventilating fan (such as the one for toilet or kitchen), the HRV unit performs the over-supply operation to prevent the reverse flow of the odor.
The flow rate of supply air becomes higher than that of exhaust air.)

Example of control wiring



(HC0032)

- Local wiring

Operation of HRV unit	Terminal for local connection	Capacity of connecting terminal
Fresh-up	Short-circuit	No-voltage normally open contact for micro-current 16 V, 10 mA
Normal	Open circuit	

Note:

The connecting wiring between HRV unit and the terminal for local connection can be extended up to 50 m maximum.

Switch setting of HRV unit

- No change is required. (factory setting)

Optional accessories required

- None

9 Control System

9-3 Applicable patterns

9-3-1 Additional functions

Precool / preheat operation

Purposes and functions

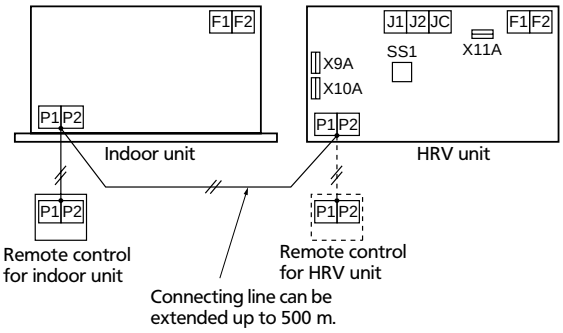
- The operation of HRV unit is delayed when the air conditioner begins operation.

Cautions

1. The precool / preheat function is possible only when the operation of HRV unit is interlocked to one-group or two-group of indoor unit.
   (It will not function when the HRV unit is in independent operation.)
2. You can select the preset time of 30 / 45 / 60 minutes for delayed operation at the time of initial setting.
   If this preset time is not sufficient, you can extend the preset time for further 30 / 60 / 90 minutes only the preheating function.
3. Since this is two remote control system (for Indoor unit and HR unit), the Master / Slave setting is required.

Remote control for	Setting
Indoor unit	Slave
HRV unit	Master

Example of control wiring



(HC0033)

Switch setting of the HRV unit

The initial setting by the remote control for the indoor unit.

- Precool / preheat On / Off setting
  ..... "ON" [17(27)·2·02]
- Precool / preheat time setting
  ..... "Time" [17(27)·3·*1]
- Preheat extra time setting
  ..... "Time" [17(27)·9·*2]

*1 setting01 for 30, 02 for 45 and 03 for 60 minutes.
*2 setting01 for 0 (factory set), 02 for 30, 03 for 60 and 04 for 90 minutes.

Optional accessories required

- None

Remote control operation by input from outside

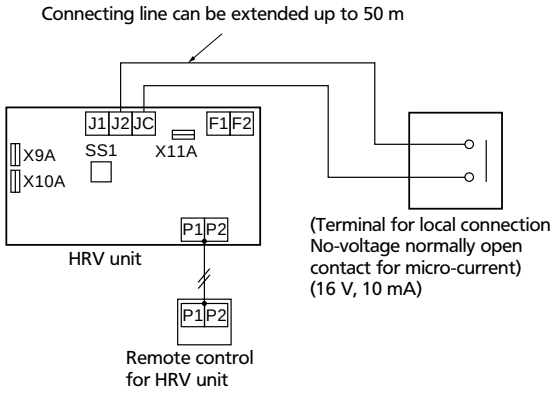
Purposes and functions

- The HRV unit can be controlled the operation of "On / Off" remotely by the signal from no-voltage normally open contact.

Cautions

1. When the system is under group control, the input from outside controls the operation of "ON / OFF" collectively, if it is installed in the one of the unit.

Example of control wiring



(HC0034)

Switch setting of HRV unit

- No change is required.

Optional accessories required

- None

9 Control System

9-3 Applicable patterns

9-3-2 To connect the remote control to the HRV unit

(Part 1) single-group interlocked operation

Purposes and functions

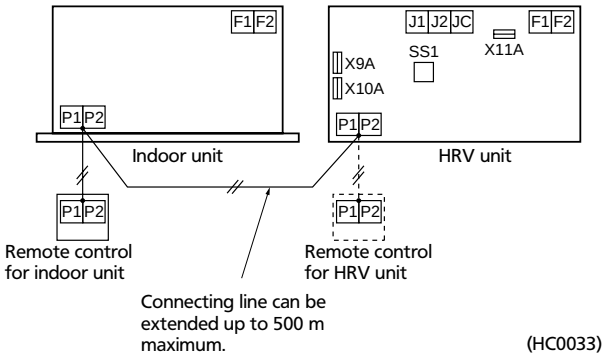
When the HRV unit is interlocked to the single-group control system, the remote control for HRV unit will be connected to change the setting mode at the HRV unit side.

Cautions

1. It is not possible to set the "On / Off" and "timer" setting by the remote control for HRV unit. Also it is not possible to display the filter-sign and malfunction code neither on the remote control for indoor unit nor on the remote control for HRV unit.
2. Since this is two remote control system (for Indoor unit and HR unit), the Master / Slave setting is required.

Remote control for	Setting
Indoor unit	Slave
HRV unit	Master

Example of control wiring



(HC0033)

Switch setting of the HRV unit

- No change is required. (as per factory setting)

Optional accessories required

- Remote control BRC301B61

(Part 2) Centralized control operation

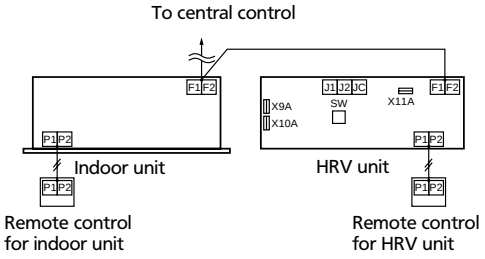
Purposes and functions

- Beside the operation by central remote control, the remote control for HRV unit can change the ventilation mode setting, the ventilation air flow setting and etc.

Cautions

1. In case of Zone control, the operation / stop and the timer setting cannot be done by the remote control for the HRV unit. (The operation lamp blinks twice to indicate that the operation is not possible.)
2. The remote control for the HRV unit cannot set the group no. for centralized control. In this case, the remote control for the indoor unit has to be connected once for this setting.
3. It is not possible to have Precool / preheat time setting function.

Example of control wiring



(HC0035)

Switch setting of the HRV unit

Group no. setting for central control is required.
It is necessary to set the group number for each unit connected to the central transmission line (terminal no. (F1) and (F2)).
Initial setting is required by the remote control for indoor unit.

- In case of collective / individual control
  Collective zone interlock setting
  ..... "OFF" (as per factory set)
- In case of zone control
  Collective zone interlock setting
  ..... "ON" [17(27)·8·02]

Optional accessories required

- Remote control BRC301B61

9 Control System

9-3 Applicable patterns

9-3-3 Central control system (DCS302B61)

Collective / individual operation (Central remote control)

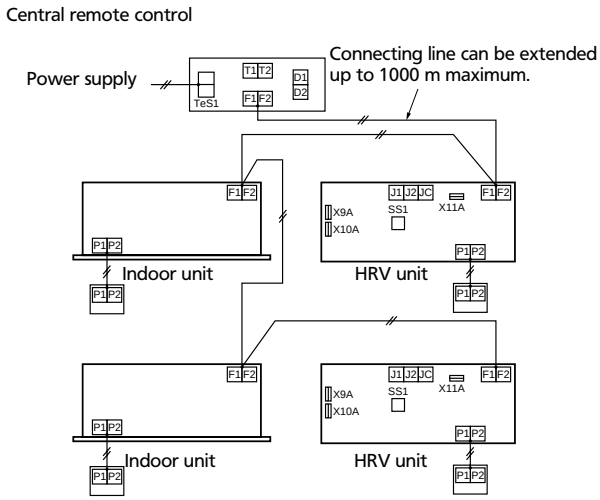
Purposes and functions

It is possible to have collective On / Off or individual On / Off without zone control (while setting the 64 zones).
It is also possible to connect the unified On / Off control and etc.

Cautions

1. It is required the local setting of the group number for central control.
2. The HRV unit judges the ventilation mode, individually.

Example of control wiring



(HC0036)

Switch setting of the HRV unit

The initial setting is required by the remote control for indoor unit.

- Collective zone interlock setting
  ..... "OFF" (as per factory set)

Optional accessories required

- Central remote control DCS302B61

9 Control System

9-3 Applicable patterns

9-3-3 Central control system (DCS302B61)

Collective operation (Schedule timer DST301B61)

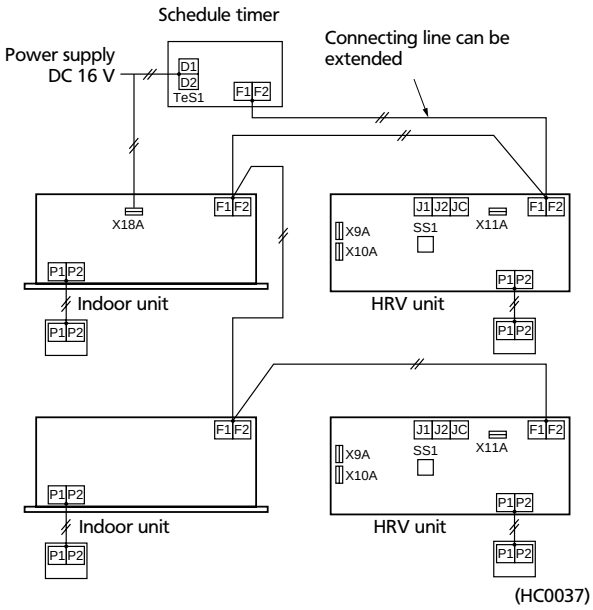
Purposes and functions

- A maximum of 128 units can be controlled the collective operation / stop by weekly schedule.

Cautions

1. The setting of group number for central control is not required.
2. The HRV unit judges the ventilation mode, individually.
3. The power supply for the schedule timer can be supplied from the PCB of the unit. (X18A for the indoor unit and X11A for the HRV unit)

Example of control wiring



Switch setting of the HRV unit

The initial setting is required by the remote control for the indoor unit.

- Collective zone interlock setting
  ..... "OFF" (Factory setting)

Optional accessories required

- Schedule timer DST301B61

9 Control System

9-3 Applicable patterns

9-3-3 Central control system (DCS302B61)

Collective operation [Adapter PCB for remote control KRP2A Series]

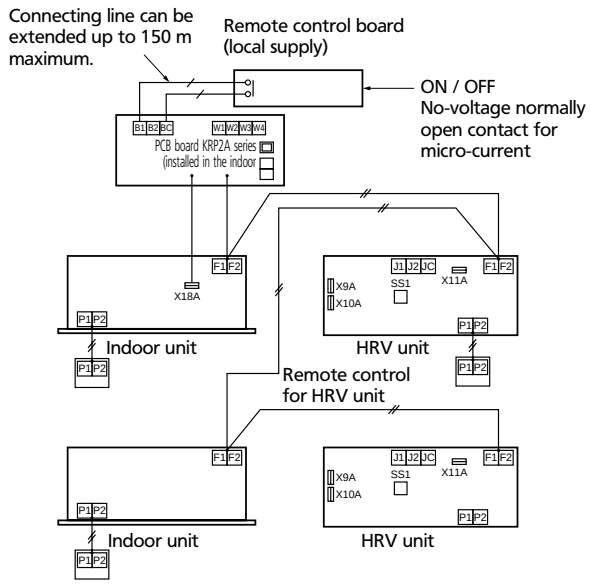
Purposes and functions

A maximum of 64 groups can be controlled the operation of "ON / OFF" collectively. (For the individual control, use the central remote control or the unified On / Off control.)

Cautions

1. Adapter PCB can be installed in any unit connected to the central transmission line.
2. It cannot be used with other central control.
3. The setting of group number is not required.
4. The HRV unit judges the ventilation mode, individually.

Example control wiring



(HC0038)

Switch setting of the HRV unit

The initial setting is required by the remote control for the indoor unit or HRV unit.

- Collective zone interlock setting
  ......"OFF" (as per factory setting)
- The setting of switch on the PCB
- Voltage / no-voltage changeover switch(SS1)
  ..... "no-voltage"

* Remote control mode changeover switch (RS1) should be selected.

Optional accessories required

Adapter PCB for remote control KRP2A61

9 Control System

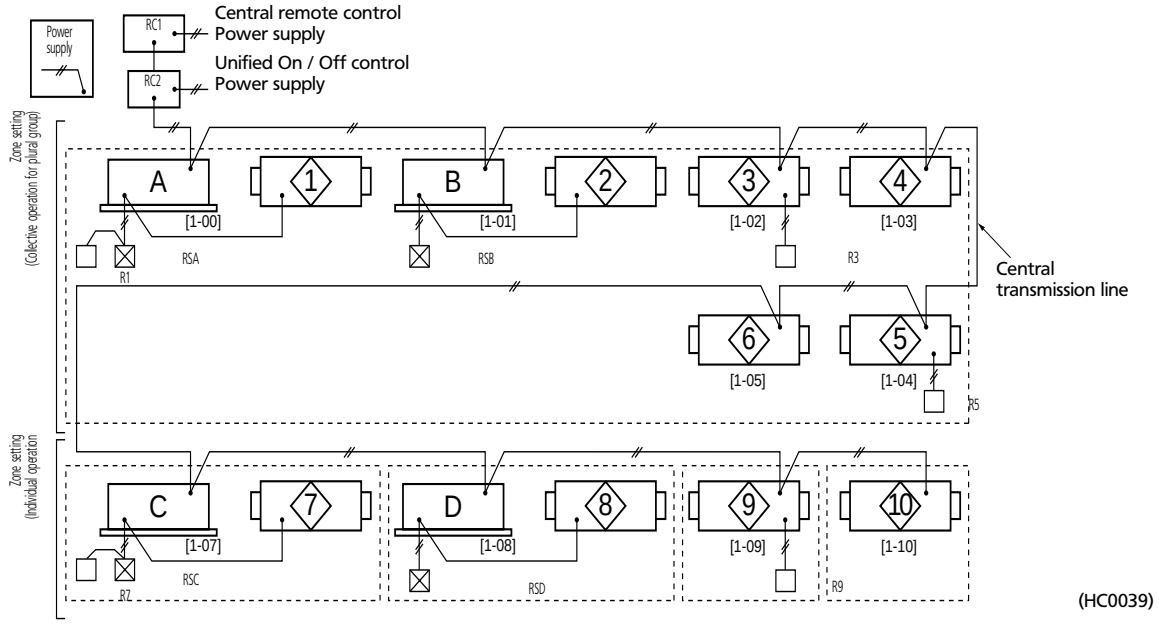
9-3 Applicable patterns

9-3-3 Central control system (DCS302B61)

Multi function central control + Unified On / Off Control

Proper control should be selected according to the functions required.

System description



(HC0039)

Unit No.	Setting					Operation display functions (○ means possible)																Choise condition	
	Zone setting		Interlocked zone contol		Group number setting for central control	Operation / stop				Independent ventilation Operation/stop				Ventilation air flow Ventilation mode Fresh-up				Filter-sign Malfunction code				HRV unit side	
	Collective	Individual	On	Off	Required (●) Not Required	RC1	RC2	RSA - D	R1 - 9	RC1	RC2	RSA - D	R1 - 9	RC1	RC2	RSA - D	R1 - 9	RC1	RC2	RSA - D	R1 - 9	Interlocked operation with Energy saving	*4 Total evaluation
①	●			●	Not required (Setting required only for Ⓐ Ⓑ)	Collective by zone	Linked to A / B	○	–	–	Linked to A / B	○	–	–	–	–	○	–	–	–	○	○	AA
②	●			●				○	–	–		○	–	–	–	*2	–	*3	–	*3	–	○	AA
③	●		●		●		–	○	–	*1	–	○	–	–	–	–	○	○	–	–	○	○	AA
④	●		●		(Connection required, ● when setting)		–	○	–		–	○	–	–	–	–	–	○	–	–	–	○	BB
⑤	●			●	●		○	–	○		○	–	○	–	–	–	○	○	–	–	○	–	CC
⑥	●			●	(Connection required, ● when setting)		○	–	–		○	–	–	–	–	–	–	○	–	–	–	–	DD
⑦		●		●	Not required (Setting required only for Ⓒ Ⓓ)		Linked to C / D	○	–	–	Linked to C / D	○	–	–	–	–	○	–	–	–	○	○	AA
⑧		●		●				○	–	–		○	–	–	–	*2	–	*3	–	*3	–	○	AA
⑨		●		●	●	○	○	–	○	○	○	–	○	–	–	–	○	○	–	–	○	–	*5 CC
⑩		●		●	(Connection required, ● when setting)	○	○	–	–	○	○	–	–	–	–	–	–	○	–	–	–	–	*5 DD

*1. Independent operation for ventilation is possible, if collective zone interlock setting is "ON" with the indoor unit in the same zone.
*2. It is possible by the initial setting.
*3. Display of malfunction code only.
*4. The meaning of total evaluation
AA: Interlocked operation with energy saving and changeable of Ventilation mode / Air flow rate
BB: Interlocked operation with energy saving and no changeable of Ventilation mode / Air flow rate
CC: No interlocked operation with energy saving and changeable of Ventilation mode / Air flow rate
DD: No interlocked operation with energy saving and no changeable of Ventilation mode / Air flow rate
*5. Interlocked operation setting must not be done for individual zone. (Because there is no unit to combine in zone except 1unit.)

9 Control System

9-3 Applicable patterns

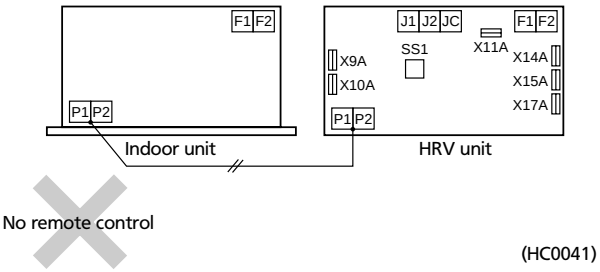
9-3-4 Examples of mistakes in wiring and system designing

It is necessary to install the remote control for the transmission line.

<Part 1>

- When you connect the transmission line for the remote control, the remote control should be installed on the transmission line.

Example of control wiring



(HC0041)

Reason

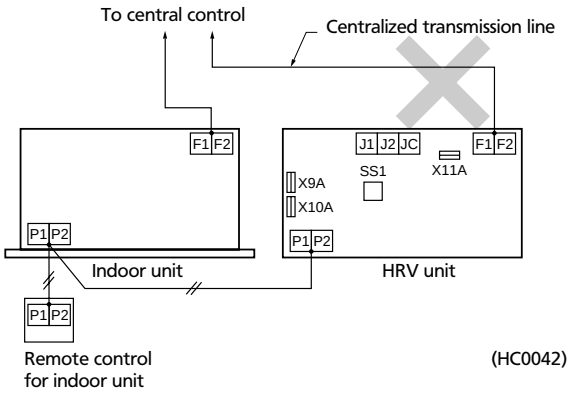
Because the signal through the transmission line is originated from the remote control, there is no transmission signal to operate the units, if the remote control is not installed.

The centralized transmission line should be connected to the indoor unit.

<Part 2>

- If the HRV unit is interlocked to the centralized control, the central transmission line should be connected to the terminal no. F1 and F2 of indoor unit.

Example of control wiring



(HC0042)

Reason

The information from the indoor unit cannot be transmitted to the central control through the HRV unit. And also the information from the central control cannot be transmitted to the indoor unit through the HRV unit.

9 Control System

9-3 Applicable patterns

9-3-4 Examples of mistakes in wiring and system designing

Setting of Remote Control for HRV unit

List of Settings

Mode no.		Setting switch no.	Description of Setting	Setting position no. (Caution *1.)					
Group settings	Individual settings			01	02	03	04	05	06
17	27	0	Filter cleaning time setting	Approx. 2500 hours	Approx. 1250 hours	No counting	–	–	–
		2	Precool / preheat on / off setting	Off	On	–	–	–	–
		3	Precool / preheat time setting	30 min	45 min	60 min	–	–	–
		4	Fan speed initial setting	Normal	Ultra high		–	–	–
		5	Yes / No setting for direct duct Connection with VRV system	No duct (Air flow setting)	With duct (fan off)	–	–	–	–
			Setting for cold areas (Fan operation selection for heater thermo OFF)	–	–	No duct		With duct	
						Fan off	Fan L	Fan off	Fan L
		7	Centralized / individual setting	Centralized	Individual	–	–	–	–
		8	Centralized zone interlock setting	No	Yes	Priority on Operation	–	–	–
		9	Preheat time extension setting	0 min	30 min	60 min	90 min	–	–
18	28	0	External signal JC / J2	Last command	Priority on external input	–	–	–	–
		1	Setting for direct Power ON	Off	On	–	–	–	–
		2	Auto restart setting	Off	On	–	–	–	–
		4	Indication of ventilation mode / Not indication	Indication	No Indication	–	–	–	–
		7	Fresh up air supply / exhaust setting	No Indication	No Indication	Indication	Indication	–	–
				Supply	Exhaust	Supply	Exhaust	–	–
		8	External input terminal function selection (between J1 and JC)	Fresh-up	Overall alarm	Overall malfunction	Forced off	Fan forced off	Air flow Increase
		9	KRP50-2 output switching selection (between 1 and 3)	Humidify	Abnormal	Fan on / off	–	–	–
19	29	0	Ventilation air flow setting	Low	Low	Low	Low	High	High
		2	Ventilation mode setting	Automatic	Exchange	By pass	–	–	–
		3	"Fresh Up" on / off setting	Off	On	–	–	–	–
		8	Electric heater setting	No delay	No delay	On, off delay	On, off delay	–	–

Caution

1. The setting positions are set at "01" at the factory.
   The ventilation air flow, however, is set at "05" (medium) in the HRV unit. When lower or higher setting is desired, change the setting after installation.

Group number setting for centralized control

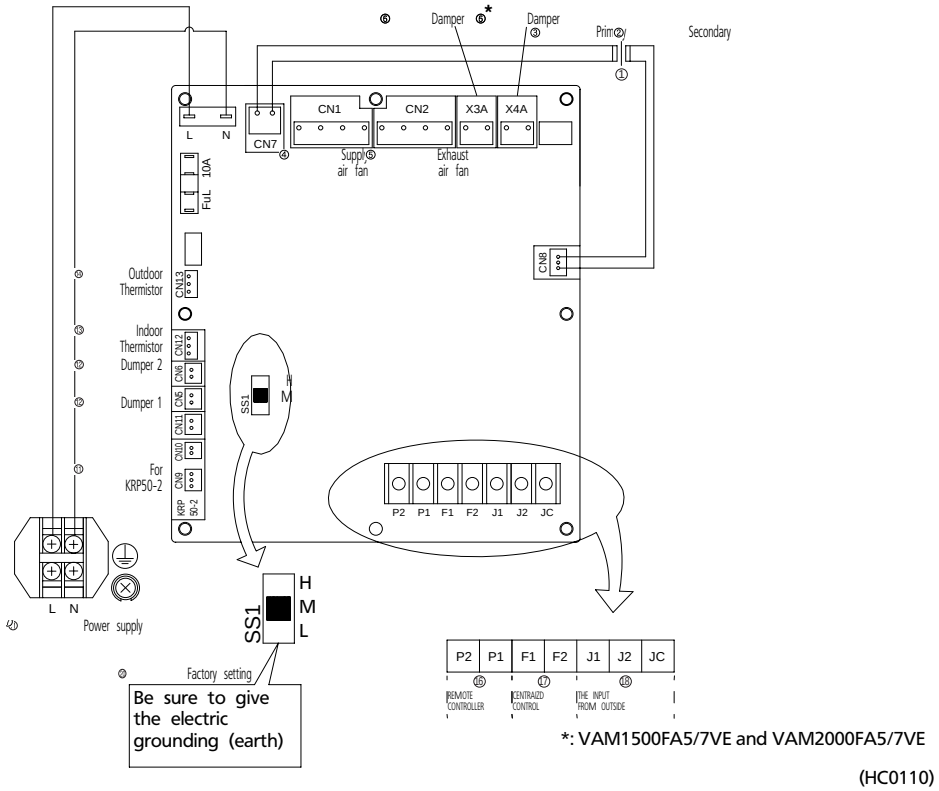
1. Mode no. 00: Group control
2. Mode no. 30: Individual control

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

9 Control System

9-4 Functions of Printed Circuit Board

9-4-1 Layout of switches on Printed Circuit Board



*: VAM1500FA5/7VE and VAM2000FA5/7VE

(HC0110)
3P034928-2B

9-4-2 Function of main connection terminal

Terminal No.		Contents of function
Power supply	L N TeS1	Single phase 220 - 240 V Power supply and earth terminal
Remotecontroller	P1 P2	Connection terminal for remote controller for HRV unit. This terminal is used to receive information of the indoor unit for interlocked operation.
Centralizedcontrol	F1 F2	This terminal is used to receive information when centralized controller is connected.
Inputfromoutside	J1 J2 JC	Between terminal no. (J1) ~ (JC) Used for "fresh up operation" by external input. Between terminal no. (J2) ~ (JC) Used for Operation / Stop by external input.

(HC0043)

9 Control System

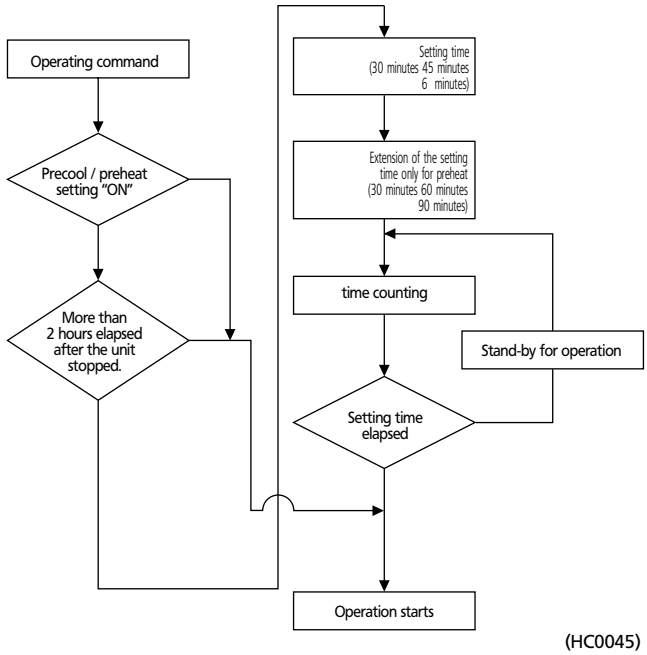
9-5 Fan operation setting

		Initial setting by the remote controller for indoor unit			Fan operation			
		Ventilation air flow setting	Fan speed	Fresh-up operation	Fresh-up Supply air setting		Fresh-up Exhaust air setting	
					Supply side	Exhaust side	Supply side	Exhaust side
Interlocked operation system	With remote controller for indoor unit	Normal	Low	Off	Low	Low	Low	Low
				On	High	Low	Low	High
			High	Off	High	High	High	High
				On	Ultra-high	High	High	Ultra-high
		Ultra-high	Low	Off	Low	Low	Low	Low
				On	High	Low	Low	High
			High	Off	Ultra-high	Ultra-high	Ultra-high	Ultra-high
				On	Ultra-high	High	High	Ultra-high
		Ventilation air flow setting	Fan speed	Terminal between J1 and JC (Fresh-up by external command)	Fan operation			
					Supply side	Exhaust side	Supply side	Exhaust side
Independent system	With remote controller for HRV unit	Normal	Low	Open	Low	Low	Low	Low
				Short-circuit	High	Low	Low	High
			High	Open	High	High	High	High
				Short-circuit	Ultra-high	High	High	Ultra-high
Centralized control system		Ultra-high	Low	Open	Low	Low	Low	Low
				Short-circuit	High	Low	Low	High
			High	Open	Ultra-high	Ultra-high	Ultra-high	Ultra-high
				Short-circuit	Ultra-high	High	High	Ultra-high
Independent system	With remote controller	Switch on the PCB (H / M / L)		Terminal between J1 and JC (Fresh-up by external command)	Fan operation			
					Supply side	Exhaust side	Supply side	Exhaust side
		"L"		Open	Low	Low	Low	Low
				Short-circuit	High	Low	Low	High
		"M"		Open	High	High	High	High
				Short-circuit	Ultra-high	High	High	Ultra-high
Centralized control system		"H"		Open	Ultra-high	Ultra-high	Ultra-high	Ultra-high
				Short-circuit	Ultra-high	High	High	Ultra-high

(HC0044)

9-6 Pre -Operation flowchart

system		Operating command		Operation command
		By the remote control for indoor unit	By the central control	Mode setting by remote control for indoor unit mode setting
Interlocked operation	Interlocked control interlocked to single-group and two-groups	○	–	Only for cooling and heating mode

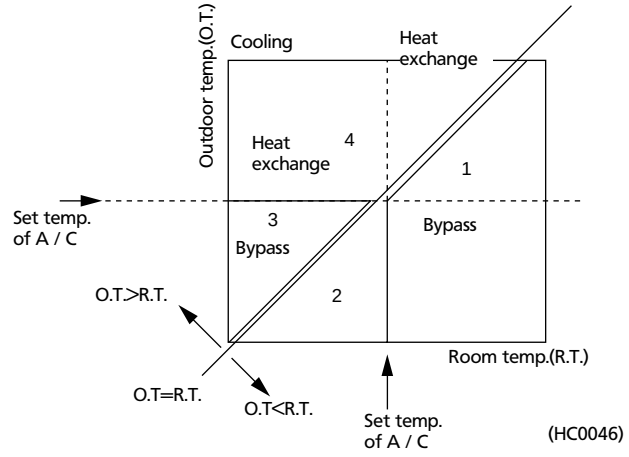


(HC0045)

9 Control System

9-7 Operation mode change over

1. In case of cooling operation



(HC0046)

1 zone: Free cooling (cooling by outdoor air) in bypass mode.*

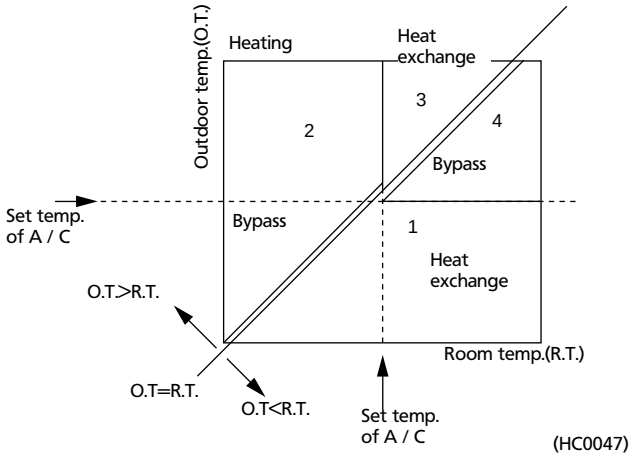
2 zone: Room temperature to be achieved to set temperature by heat exchange mode.

3 zone: Room temperature to be achieved to set temperature in bypass mode. *

4 zone: Fresh air supply is cooled down by indoor air in heat exchange mode (energy saving).

* The air cannot be supplied at the same temperature as the outdoor air because it is partly heat-exchanged.

2. In case of heating operation



(HC0047)

1 zone: Fresh air supply is heated up by indoor air in heat exchange mode (energy saving).

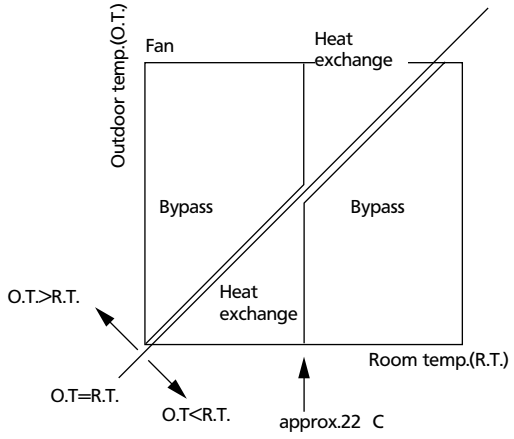
2 zone: Free heating (heating by outdoor air) in bypass mode.*

3 zone: Room temperature to be achieved to set temperature by heat exchange.

4 zone: Room temperature to be achieved to set temperature by bypass mode. *

* The air cannot be supplied at the same temperature as the outdoor air because it is partly heat-exchanged.

3. In case of fan operation only



(HC0048)

Ventilation mode is individually determined by the original formula of HRV with the temperature sensors.

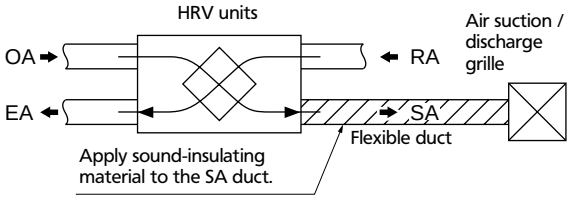
10 Installation

10-1 Reducing operating sound

The air suction and discharge grille may give out operating sound higher by 8 to 11 phons than of the HRV units body. When installing this unit in a quiet place, take measures to reduce operating sound.

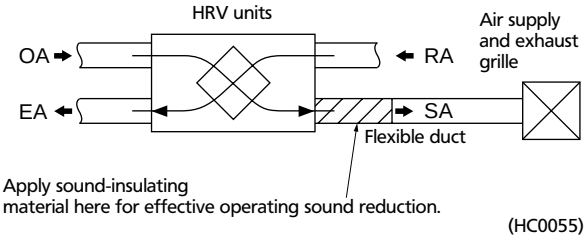
10-1-1 Points for reducing operating sound

1. Operating sound heard from the air discharge outlet can be reduced just by applying sound-insulating material to the SA (indoor air supply) duct.



(HC0054)

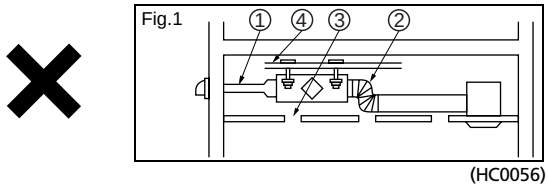
2. Operating sound can be reduced more effectively by applying sound-insulating material to a portion of the SA duct near the unit body than that near the air suction / discharge grille.



(HC0055)

10-1-2 Taking measures to reduce operating sound heard from attic-installed equipment and air ducts.

1. When installing large air volume models (650 m^3 / h or more), avoid the following wherever possible if it is expected to be necessary to apply sound-insulating material to them. (Fig.1)



(HC0056)

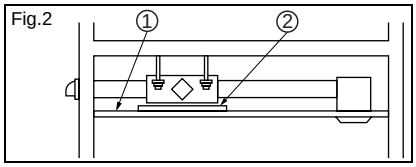
① Making the duct diameter extremely small (Example: ϕ 250 $\rightarrow \phi$ 150, ϕ 200 $\rightarrow \phi$ 100)

② Making the duct extremely bent using bellows (in particular, connecting bellows to the air discharge outlet of the unit body)

③ Making opening holes on the ceiling

④ Hanging the unit on a material which does not have enough hanging strength
See "Precautions for installing and handling the unit" on pages 77 and 87.

2. Take the following sound reduction measures. (Fig.2)



(HC0057)

① Use a sound-insulating (low-permeability-to-sound) ceiling.

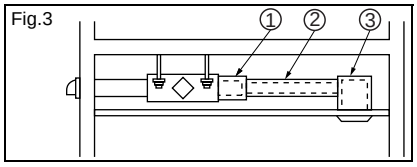
Note:
Some sound-insulating ceilings are not very effective in reducing low-frequency element of the operating sound.

② Place a sound-reducing material under the source of the operating sound.

Note:
When using a sound-insulating sheet, it is necessary to have the entire body of the unit covered with it. Note, however, that some models do not allow the use of a sound-insulating sheet because it may badly affect the ventilation of their radiation heat.

10-1-3 Reducing operating sound heard from the air discharge outlet (suction inlet)

1. Use the following recommended optional accessories to reduce operating sound heard from attic-installed duct type models. (Fig.3)



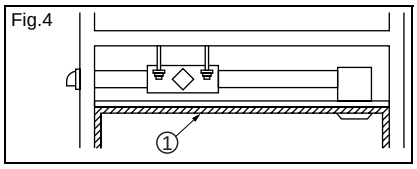
(HC0058)

① Sound-eliminating box (Silencer)

② Flexible duct

③ Sound-eliminating air suction / discharge grille

2. If the above accessories do not give satisfactory effect or when an attic-installed cassette type model is used, take the following measure.

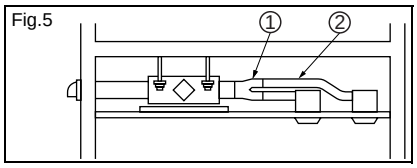


(HC0059)

① Apply a sound-absorbing material to the interior of the room.

3. To reduce the air flow sound heard from the air discharge outlet (suction inlet) of an attic-installed duct type model, use a small diameter flexible duct, which excels in sound absorptivity, for greater sound reduction effect.

① Branched duct (for letting air flow through two ducts to slow down its speed before it reaches the air discharge outlets (sunction inlets))



(HC0060)

② Flexible duct

4. Installation of the unit with the source of its operating sound located at a corner of a room will be a partially effective sound reduction measure; it will keep persons in the center of the room free from the annoying operating sound, with those in the corner of the room kept annoyed by the operating sound. To avoid this, try to find the best installation place from which the operating sound is least heard by everyone in the room.

10 Installation

10-1 Reducing operating sound

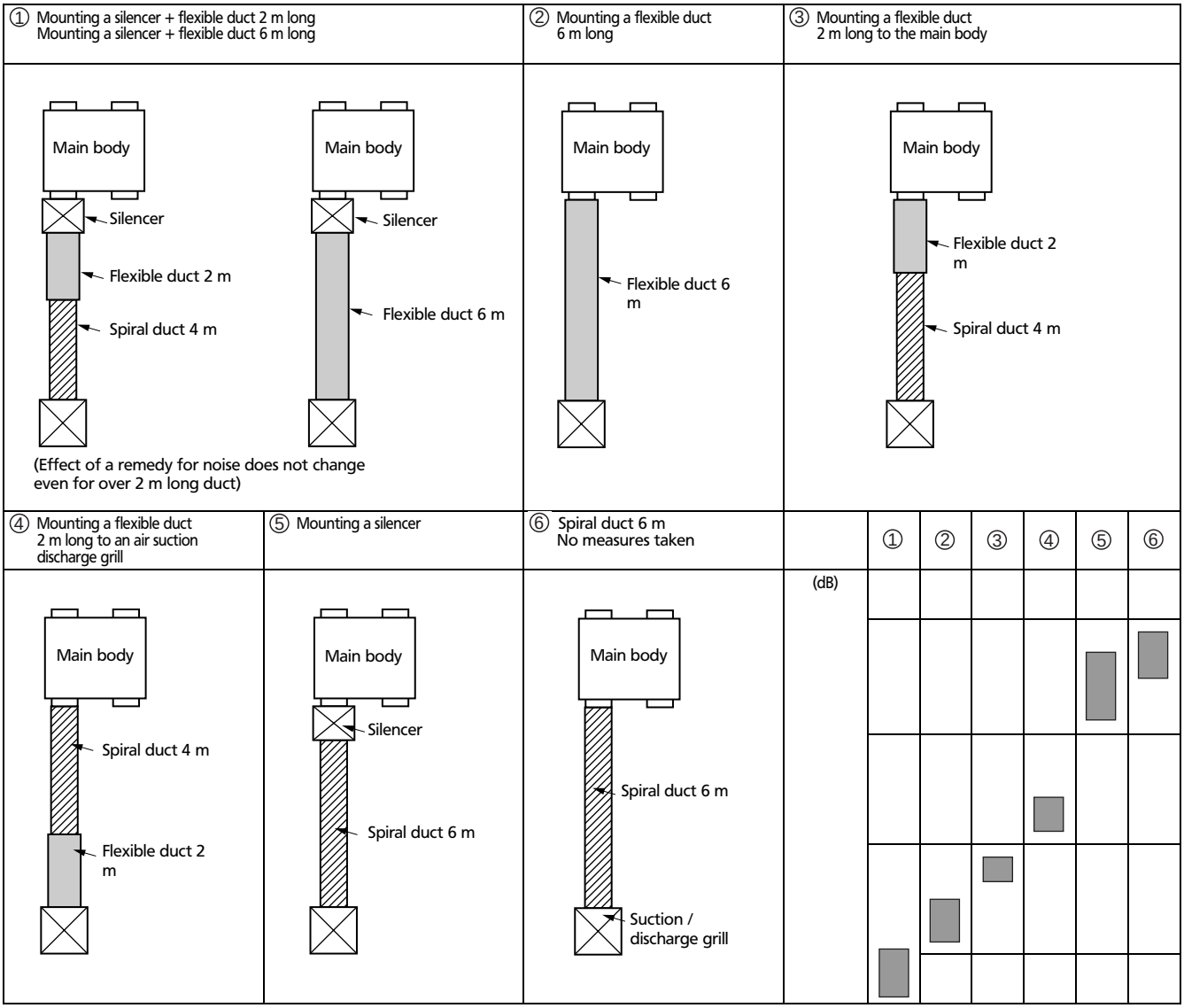
10-1-4 Effect of remedy for sound

Caution

1. Be sure to connect a flexible duct (2 m) to an outlet of the main body in the indoor air supply side.
2. Do not connect a spiral duct and an alminium bellows directly to the outlet of the main body.

*A silencer is effective especially when using theflexible duct at the same time.

10-1-5 General comparison of the effect (① → ⑥ in more effective order)



(HC0061)

Note:

Measure the noise at 1.5 m below the air supply grille. Operating noise conforms to JIS standard and the value is converted in terms of the anechoic chamber.

10-1-6 Nameplate for note

"Notes for duct work" is written on the HRV units as indicated below.

- When connecting a spiral duct or an aluminum bellows, sound at the air discharge outlet is higher by 8~11 phon than the main body operating sound.
- When using this unit in a quiet place, take a remedy for sound by connecting an optional flexible duct at the outlet of the indoor air suction side of the main body.

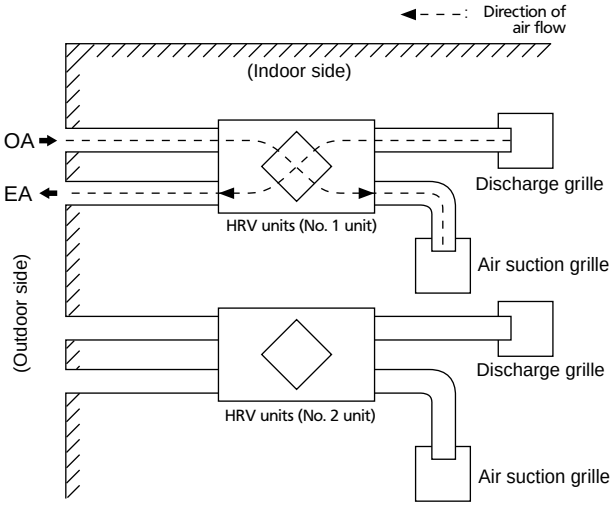
10 Installation

10-2 Centralized piping

Wherever possible, avoid centralized OA and EA pipings for two or more HRV units, and install ducts for each body of the unit. (Fig. 2)

Because the air flow shown in Fig.1 is generated when centralized OA and EA pipings for two or more HRV units normal air flow cannot be maintained. If a back flow prevention damper is installed in the duct on OA and EA side of each HRV units (Fig.3), costs will increase as compared with the case a duct is installed for each body. It is therefore recommended that a duct be in-stalled for each body.
(Before installing the back flow prevention damper, contact our engineering section.)

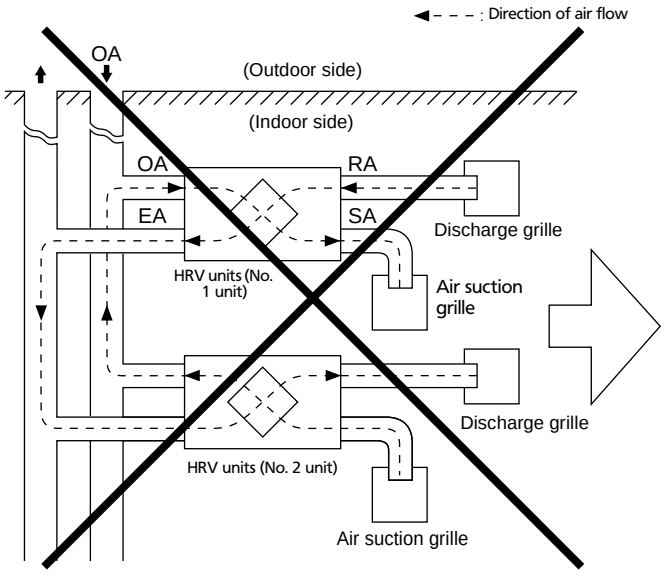
Fig.2: Install a duct for each HRV unit.



(HC0062)

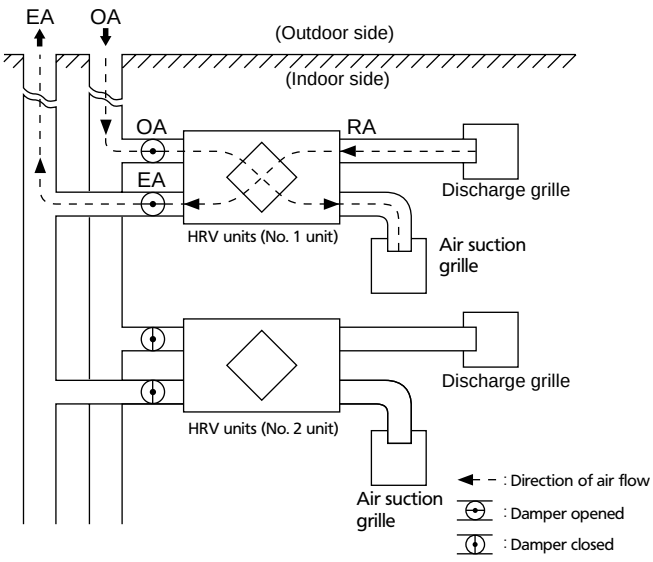
In the above duct system diagram, the air of No.1 unit will flow into normal direction regardless of the operation of No.2 unit when one duct is provided for each unit.

Fig.1: Centralized piping cannot be installed.



(HC0063)

Fig.3: Install a back flow prevention damper on each duct on OA and EA sides. (Field supply)



(HC0064)

In the above duct system diagram, if a damper is not provided and No.1 unit is operated with No.2 unit being stopped, the air flows in the direction indicated by a broken line, the amount of the air supplied from outside to OA side is decreased, and the air is discharged from the discharge grille of EA side.

Therefore, the air will not flow into the normal direction.

In the above duct system diagram, if a back flow prevention damper (field supply) is installed on each duct on OA and EA sides and the damper interlocked to the operation signals of HRV units, faults such as those shown in Fig.1 can be eliminated and the normal air flow maintained.
(Note, however, that the above does not apply to the standard duct system.)

10 Installation

10-3 Cautions

1. Install the unit on a rigid and stable place. Refer to the specification and weight of the unit.

Use suspension bolts for installation. Confirm that the place for installation can stand the weight of the unit. If not, reinforce the place with beams, etc. and install the suspension bolts.
If the strength of the place for installation is not sufficient, the place resonates to the vibration of the unit and abnormal noise may be transmitted.

2. Install a service space and an inspection hole. Refer to the outline drawing for details.

Be sure to provide a service space and an inspection hole for inspection of air filter, heat exchange element and fan. HRV units require one inspection hole.

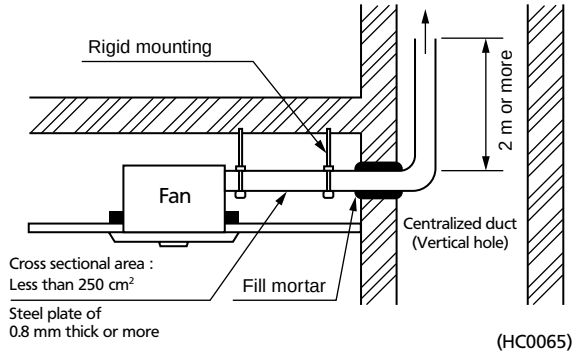
3. Bellows may not be able to use depending on the local regulations. (In the case in Japan)

Some local regulations may not allow the use of bellows in view of the safety for fire prevention. Before using the bellows, contact administrative agencies or fire department in your district. Note that bellows are not allowed in Tokyo in accordance with the Fire Prevention Act of Tokyo.

4. When exhausting air into the centralized duct (vertical hole), install a riser duct of steel plate of over two meters long inside the vertical hole or install an approved smoke back flow prevention damper. (In the case in Japan)

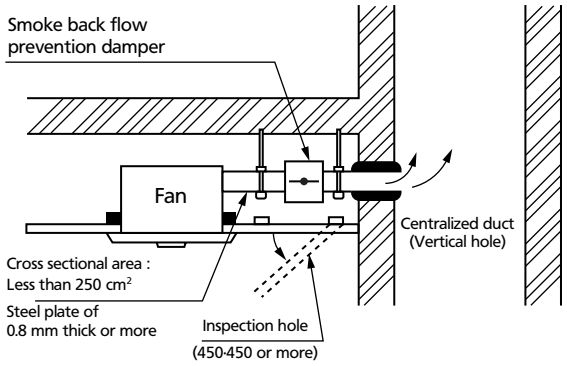
When exhausting air into centralized duct (vertical hole), the Building Standards Act requires that the duct must be capable of preventing fire from expanding through the duct should a fire break out.

When a riser duct of steel plate of 2 m long is installed



(HC0065)

When a smoke back flow prevention damper is installed



(HC0066)

Caution

- Installing a 2 m exhaust duct in a centralized duct involves difficulty in construction and maintenance, and is not practised generally. In actual installation, the approved smoke back flow prevention dam per is used, Use Daikin's optional smoke back flow prevention damper.

5. Air filters are provided on the air intake side and exhaust air side. Be sure to install these filters.

Air filter cleans the air and prevents clogging of the element, and must be installed properly.

6. Confirm the using conditions of HRV units before installation.

Ambient conditions for use: –10 C to 50 CDB at 80% RH or less

Outdoor air temperature condition

When used below –10 C, indoor air temperature varies greatly from outdoor air temperature and frost may form on the heat exchange element depending on conditions of temperature and humidity. Further, the frost formation may be frozen. The frozen frost melts during the day as the temperature rises but the heat exchange efficiency drops before the frozen frost is melted.

As a countermeasure, preheating of the air on low temperature side is considered.

In a place where the temperature exceeds 50 C, deformation of resin parts such as air filter and reduced life of motor and electric parts due to deteriorated insulation are considered.

7. The precise available conditions are shown below.

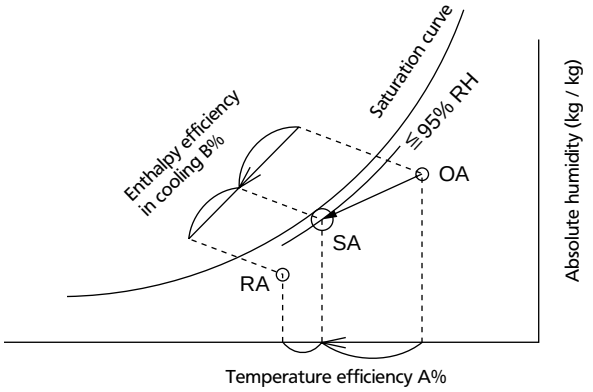
Conditions:

Ambient temperature & humidity for HRV unit	–10 to 50 CDB 80% RH or less
Indoor / Outdoor air	–10 to 43 CDB The relative humidity [% RH] is as described below

10 Installation

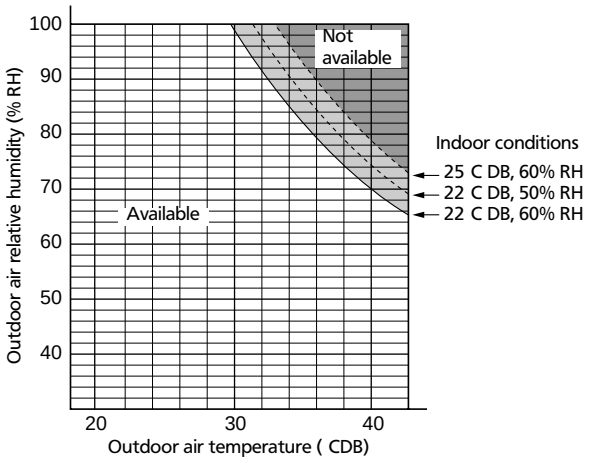
10-3 Cautions

1) Operation in highly humid areas (in cooling mode)
To prevent dew formation, use the unit under the condition that the indoor discharge air is 95% RH or less on the psychrometric chart.



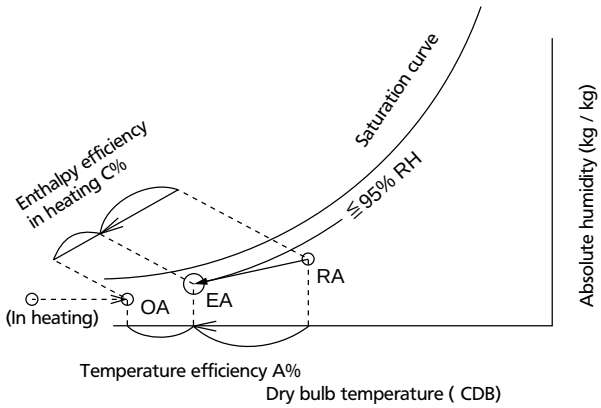
(HC0067)

Fig.1 shows the limit under normal indoor conditions.
Fig.1 Conditions:
Temperature efficiency A = 72%
Enthalpy efficiency B = 56% (In cooling)
This conditions are at the minimum efficiency that are the severest to dew formation.



(HC0068)

2) Operation in cold areas (in heating mode)
To prevent dew formation and freezing, use the unit under the conditions that the outdoor discharge air is 95% RH or less on the psychrometric chart.



(HC0069)

Note:
If the outdoor discharge air exceeds 95% RH, please preheat the outdoor suction air before it goes through the heat exchanger.

8. Do not use HRV units where the air contains noxious gas and corrosive components of materials such as acid, alkali, organic solvent, carbon black and paint. Also, do not use in a place where damage from sea wind and hot spring prevail or where air containing odor is recovered for supply to other locations.

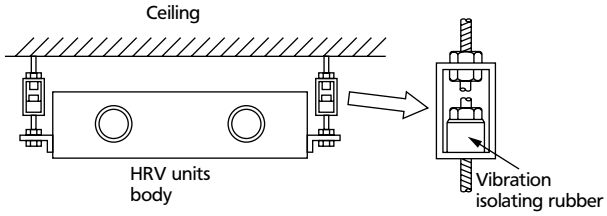
9. Do not operate HRV units in [Bypass] ventilation mode when the indoor is heated during winter.

Such operation may cause frost to form in the body and dirty ceiling may result.

10. When a unit is installed on the ceiling using short suspension bolts, abnormal noise may be generated due to resonance with the ceiling.

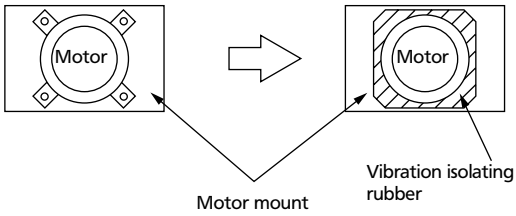
Provide resonance preventive measures for the body suspension bolts.

Example



(HC0070)

If abnormal noise is suspected generating from a spiral duct connection, change the duct to flexible duct. The above preventive measure is considered to eliminate the problem (resonance) but contact our service group and provide means to prevent vibration or necessary changes of the motor of the unit body.



(HC0071)

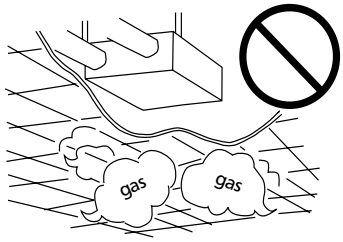
Caution
- When the outdoor air infiltrates into the ceiling and the temperature and humidity in the ceiling become high, insulate the metal part of the unit.

10 Installation

10-4 Cautions in installation

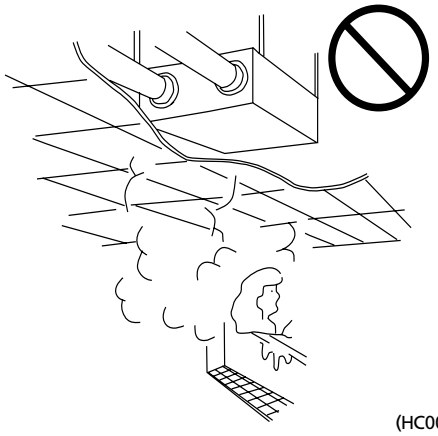
Do not use a HRV or an air suction / discharge grille in the following places.

- Place such as machinery plant and chemical plant where gas, which contains noxious gas or corrosive components of materials such as acid, alkali, organic solvent and paint, is generated. Place where combustible gas leakage is likely.
  Such gas can cause fire.



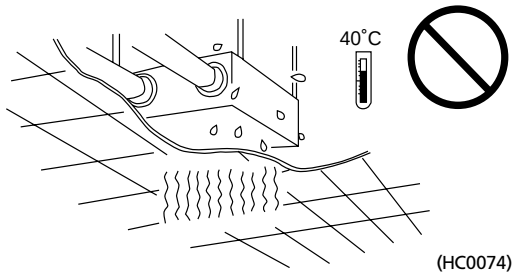
(HC0072)

- Place such as bathroom subjected to moisture.
  Electric leak or electric shock and other failure can be caused.



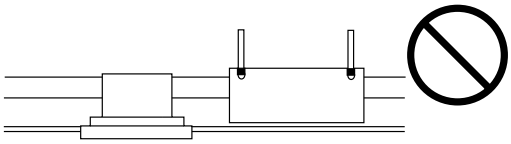
(HC0073)

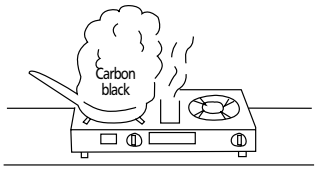
- Place subjected to high temperature or direct flame.
  Avoid a place where the temperature near the HRV unit and the air suction / discharge air grille exceeds 40 C. If the unit is used at high temperature, deformed air filter and heat exchange element or burned motor result.



(HC0074)

- Place subjected to much carbon black.
  Carbon black attaches to air filter and heat exchange element, marking them unable to use.





(HC0075)
3P034927-2B

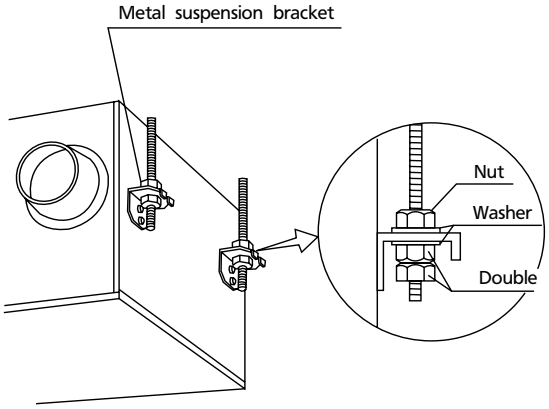
10-5 Installation

10-5-1 Installation of HRV units

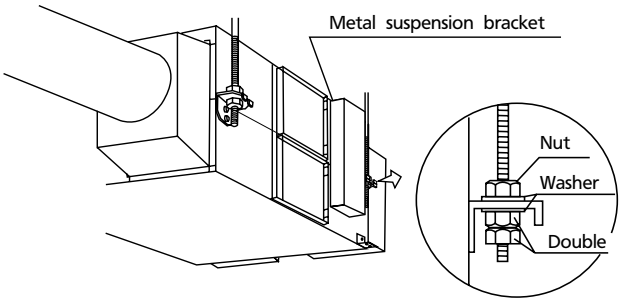
- Install the anchor bolt (M10 to 12) in advance.
  Pass the ceiling suspension fixture through the anchor bolt and secure the anchor bolt with washer and nut. (Before installation, check for foreign objects such as vinyl and paper remaining inside the fan housing.)
- The ceiling suspension fixture is fitted on top of the standard unit. If the anchor bolt is long, install it on the bottom of the unit. (Be sure to screw in the removed mounting screw on top to prevent air leakage.)

Install the duct caution name plate properly on the indoor side (SA·RA) and outdoor side (EA·OA).

VAM150-1000FA



VAM1500,2000FA



(HC0076)

Note:

Remove the clamp (at two locations) for securing the unit in transit, if it prevents installation work. (Be sure to screw in the removed mounting screw on the body side to prevent air leakage.)

10 Installation

10-6 Duct Work

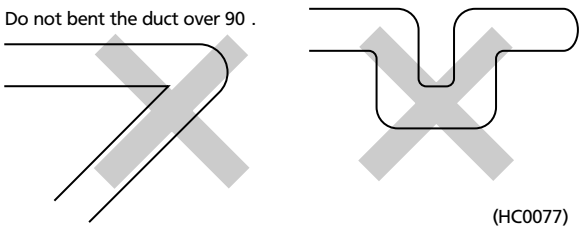
10-6-1 Caution

- Do not install ducts as shown below.

(1) Extreme bend

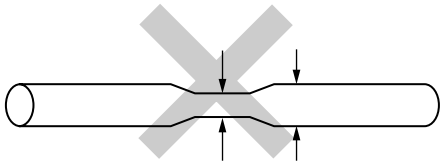
Do not bent the duct over 90 .

(2) Multi bend



(HC0077)

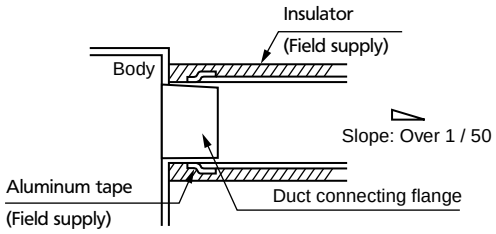
(3) Reduce the diameter of the duct to be connected.



Do not reduce the duct diameter halfway.

(HC0078)

1. To prevent air leakage, wind aluminum tape round the section after the duct connecting flange and the duct are connected.
11. Install the opening of the indoor air intake as far as from the opening of the exhaust suction.
12. Use the duct applicable to the model of unit used (Refer to the outline drawing.)
13. 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)



(HC0079)

14. If the level of temperature and humidity inside the ceiling is always high install a ventilation equipment inside the ceiling.
15. 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.

10-6-2 Going through the external wall

1. Hole diameter

Duct dia. + 50 or 75
(I.D. depends on the core drill specification)

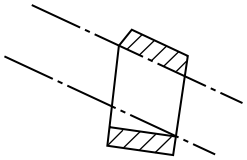
<e.g.>

Duct diameter	Hole diameter
ϕ 100 + 50	ϕ 150
ϕ 150 + 50	ϕ 200

2. Drilling the hole

Ideally it is better to grade in the same procedure as refrigerant piping.

In the case of a square duct
Grade a wood frame of a duct stay.



(HC0080)

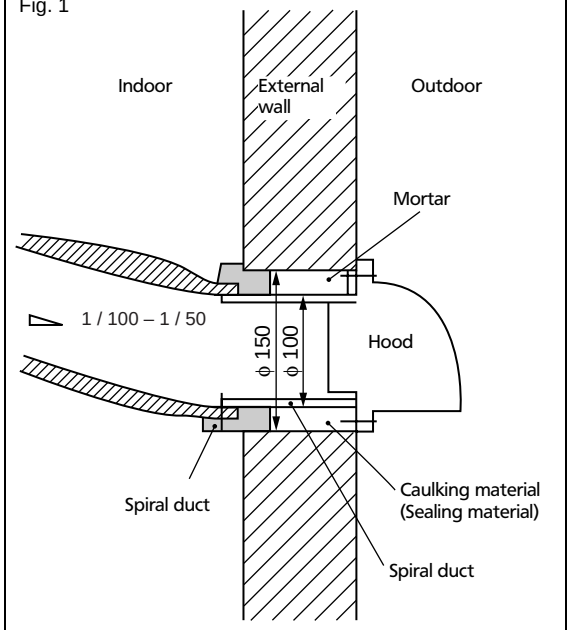
In the case of a round duct
Drill a hole horizontally because the hole cannot be made with the tool graded.

3. Preventing wind and rain from entering

Most of a space between the duct and the external wall is protected by mortar. Coated wall is filled with a caulking material. (See fig. 1)

Image picture

Fig. 1



(HC0081)

4. How about the building which has already been built?

Same as the newly-built building.

- Only hole diameter 100 is instructed in a drawing by a drawing company, so a detailed work is executed by the judgement of an installation company.

10 Installation

10-7 Electrical wiring procedure

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

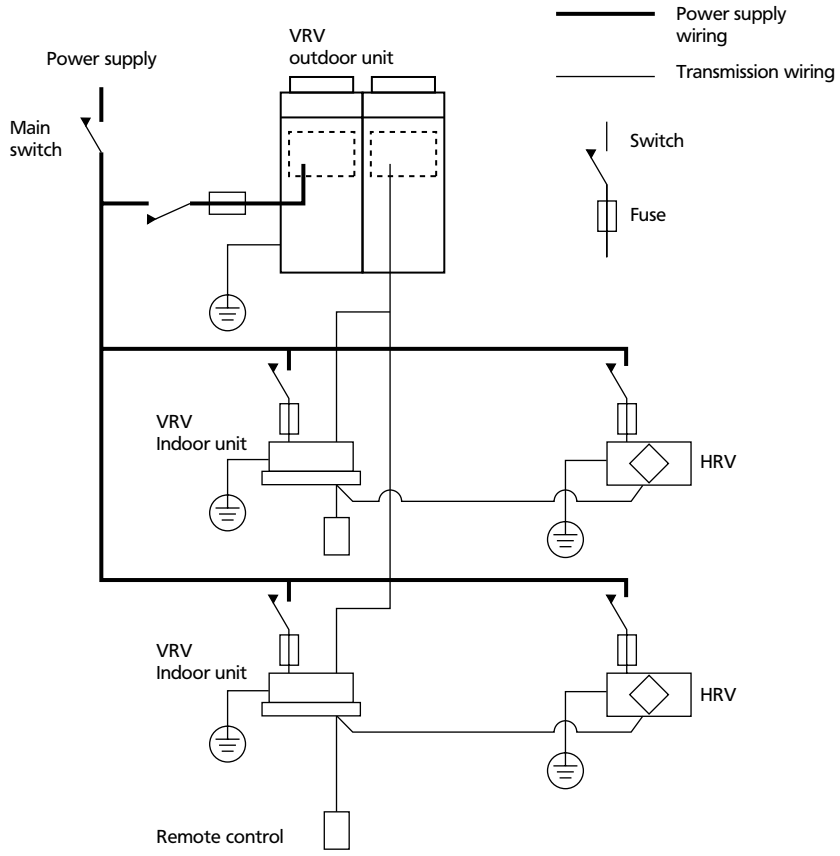
Connection of Wiring

- 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 codes.
- Use copper wire only.

Connection of wiring

- A circuit breaker capable of shutting down supply to the entire system must be installed.
- 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 give the electric grounding (earth) connection.

Complete System Example



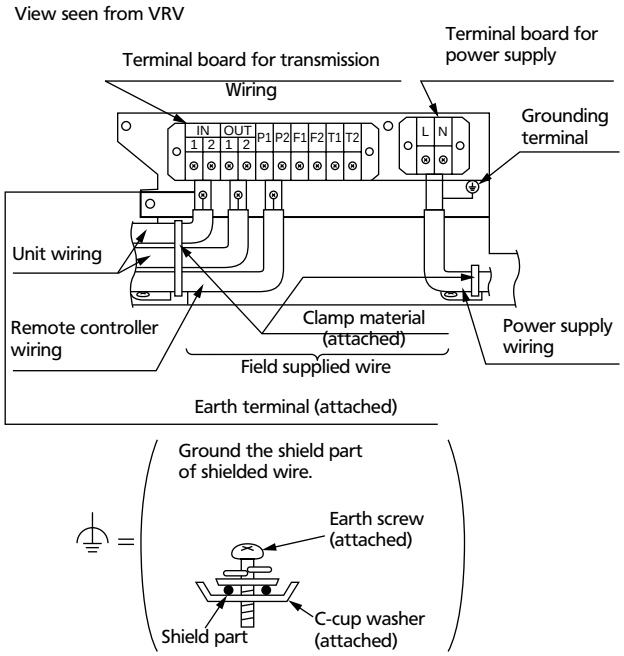
(HC0082)

Model	Type	Power supply wiring			Transmission wiring	
VAM150FA	VE	Field supplied fuses	Wire	Size	Wire	Size
VAM250FA		15A	H05VV-U3G	Wire size must comply with local codes.	Shield wire (2 wire)	0.75 ~ 1.25 mm²
VAM350FA						
VAM500FA						
VAM650FA						
VAM800FA						
VAM1000FA						
VAM1500FA						
VAM2000FA						

(HC0083)

10 Installation

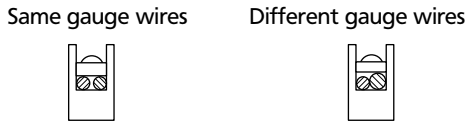
10-7 Electrical wiring procedure



(HC0084)

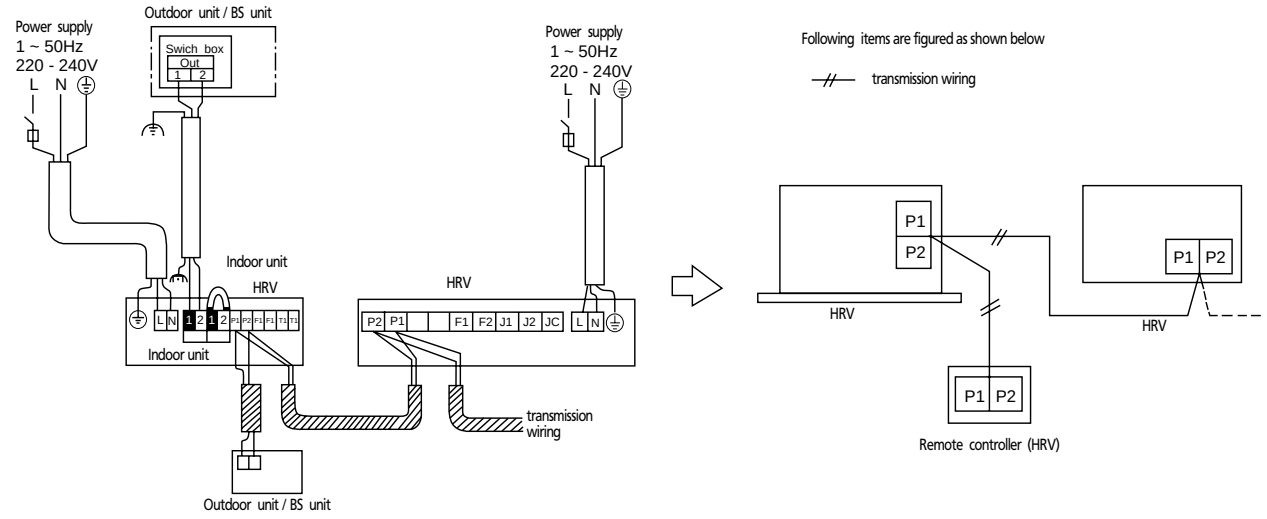
▲PRECAUTIONS

1. Do not connect wires of different gauge to the same power supply terminal. Looseness in the connection may cause overheating. When connecting more than one wire to the power supply wiring, use a 2 mm² (ϕ 1.6) gauge wire.



2. Keep total current of crossover wiring between indoor units less than 12 A. When using two power wiring of gauge greater than 2 mm² (ϕ 1.6), 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 an equal or greater degree of insulation as the power supply wiring itself.
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 control wiring, refer to the "INSTALLATION MANUAL OF REMOTE CONTROL".

Wiring Example



(HC0085)

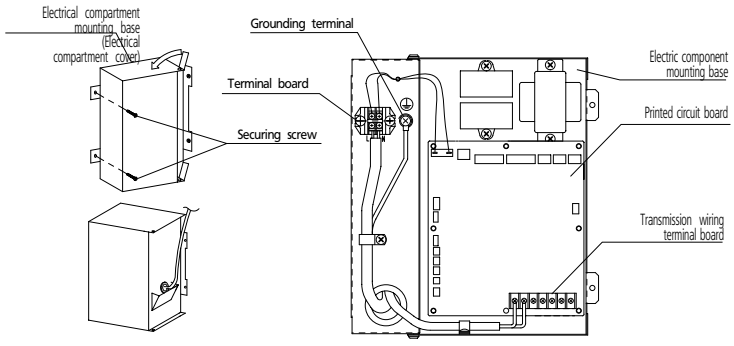
- All transmission wiring except for the remote control wires is polarized and must match the terminal symbol.
- Use screened wire in transmission wiring. Ground the shield of the shield wire to "⏚", at the grounding screw, with the C-cup washer.
- Sheathed wire materials may be used for transmission wiring, but they are not suitable for EMC (Electromagnetic Compatibility) (European Directive).
- When using sheathed wire, electromagnetic compatibility must conform to Japanese standards stipulated in the Electric Appliance Regulatory Act.
  Transmission wiring need not be grounded when using sheathed wire.

10 Installation

10-7 Electrical wiring procedure

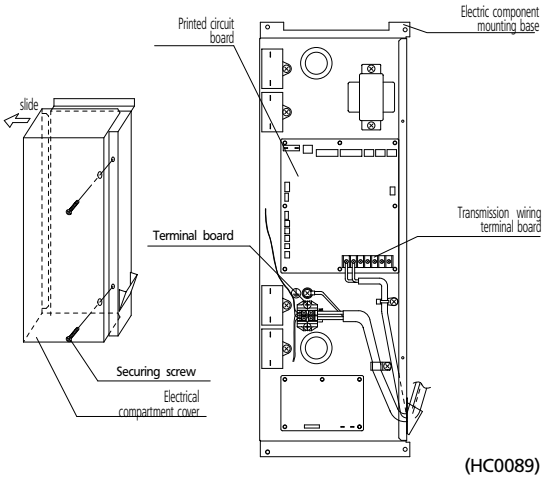
10-7-1 Opening the switch box

VAM150-1000FA



(HC0088)

VAM1500,2000FA



(HC0089)

⚠ 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 above.

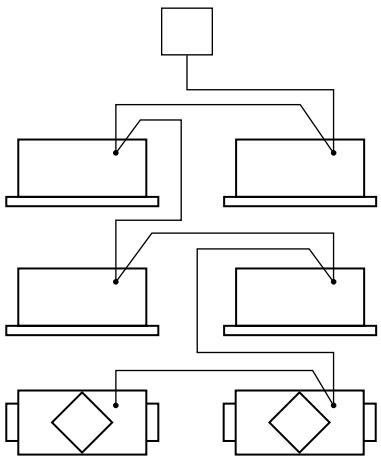
10-7-2 How to install the optional adapter circuit board

1. Open the electrical compartment cover by following the procedure described in the "Opening the switch box" section.
6. Remove the securing screw, and install the adapter circuit board.
7. After the wires are connected, fasten the electrical compartment cover.
   (For detail, refer to 6. Optional accessories.)

10-7-3 Wiring system of centralized transmission control wiring

Total length of wiring should not exceed 1000 m.

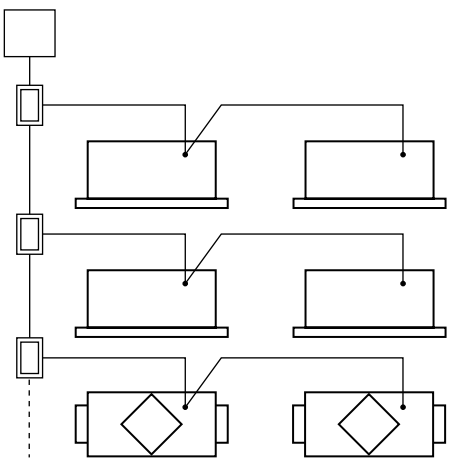
Series wiring



(HC0090)

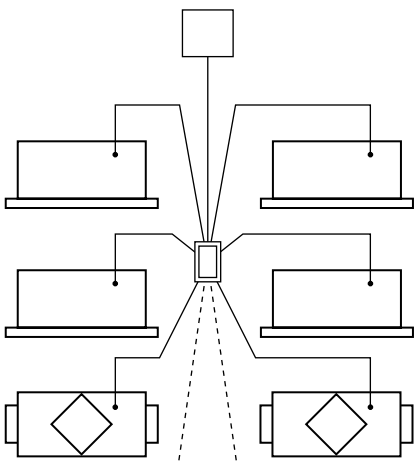
(Can be connected up to 8 branches)

Bus type wiring



(HC0091)

Star type wiring



(HC0092)

(Can be connected up to 8 branches)

Cautions:

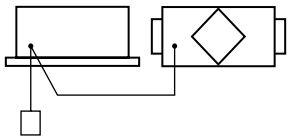
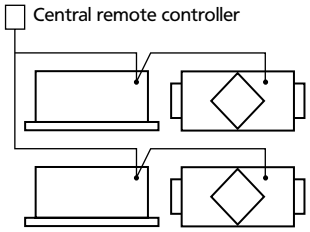
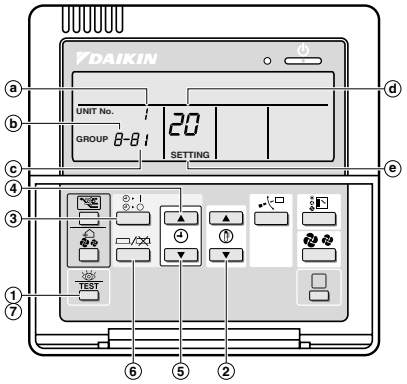
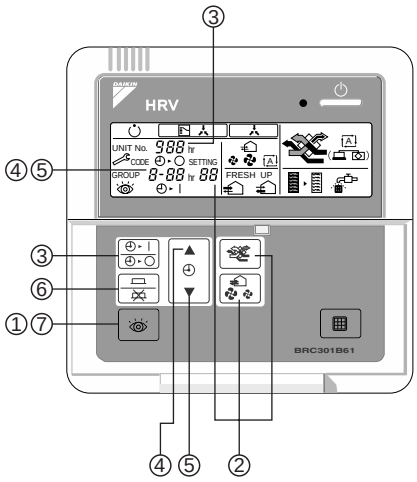
The bus type wiring and the star type wiring cannot be used at the same time.
Do not connect more than 3 wires to the same terminal.
If necessary, use a relay terminal (field supply).

In this technical manual, all the schematic drawings is shown by the series wiring, which do not require relay terminals.

10 Installation

10-8 Initial setting

10-8-1 Initial setting by the remote control for indoor unit

	Purpose	Controller	Operating procedure for initial setting
	• Interlocked operation  Remote controller for indoor unit • When only the centralized controller is used.  Central remote controller	• Remote control for indoor unit  	**The following describes the operating procedure and settings.** ① When in the normal mode, press the "TEST" button for a minimum of four seconds, and the FIELD SET MODE is entered. ② Select the desired MODE NO. with the "▲" button. ③ During group control, when setting by each indoor unit (mode No. 20, 21, 22 and 23 have been selected), push the "▶" button and select the INDOOR UNIT NO. to be set. (This operation is unnecessary when setting by group.) ④ Push the "▲" upper button and select FIRST CODE NO. ⑤ Push the "▼" lower button and select the SECOND CODE NO. ⑥ Push the "▭" button once and the present settings are SET. ⑦ Push the "TEST" button to return to the NORMAL MODE.
		• BRC301B61  	The following describes the operating procedure and settings. ① Press the INSPECTION button for more than four seconds to enter the local setting mode when the unit is in the normal mode. ② Use the VENTILATION MODE, AIR FLOW RATE button to select the desired "mode number". (The code display will blink.) ③ To make setting for individual unit under group control (when mode no. 27, 28 or 29 is selected), press TIMER SETTING ON / OFF button to select the "unit No." for which the settings are to be made. (This process is not necessary when settings are made collectively for the group.) ④ Press the top section of the TIMER button to select the "setting switch No.". ⑤ Press the lower section of the TIMER button to select the "setting position No.". ⑥ Press the PROGRAM / CANCEL button once to enter the settings. (The code display will stop blinking and light up.) ⑦ Press the INSPECTION button to return to normal mode.

Notes:

When you make several field settings to one (or one group of) indoor unit(s), the item ② to ⑥ of the above setting procedure should be repeated and it should be terminated to the "normal display" by the procedure of item ⑦ as last.

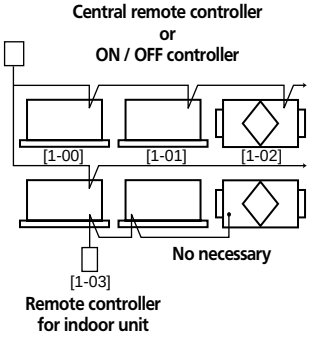
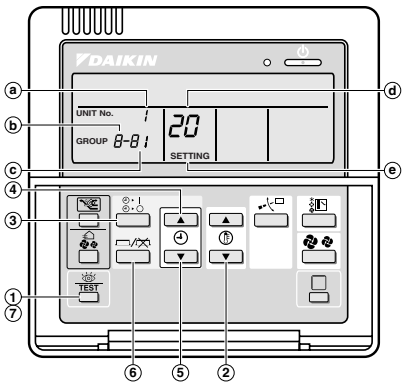
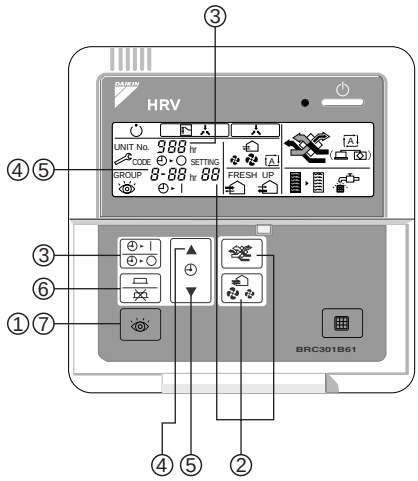
(HC0093)

10 Installation

10-8 Initial setting

10-8-2 Setting procedure of group no. for centralized control

The following shows the procedure how to set the group number for the centralized control by the remote control for indoor unit

	Purpose	Control	Operating procedure
	When you use the central remote controller and the unified On / Off controller, you have to set the each unit connected to the central transmission line. <Example>  	• Remote control for indoor unit  	**The following describes the operating procedure and settings.** ① When in the normal mode, press the "TEST" button for a minimum of four seconds, and the FIELD SET MODE is entered. ② Select the desired MODE NO. with the "▲▼" button. ③ During group control, when setting by each indoor unit (mode No. 20, 21, 22 and 23 have been selected), push the "◁▷" button and select the INDOOR UNIT NO. to be set. (This operation is unnecessary when setting by group.) ④ Push the "▲" upper button and select FIRST CODE NO. ⑤ Push the "▼" lower button and select the SECOND CODE NO. ⑥ Push the "▭" button once and the present settings are SET. ⑦ Push the "TEST" button to return to the NORMAL MODE.
		• BRC301B61  	The units in [ ] do not require the group no. setting for the centralized controller connected to the central transmission line. (Auto-address setting) ① Press the INSPECTION button for more than four seconds. ② Use the VENTILATION MODE, AIR FLOW RATE to select the mode no. "00". ③ Use the top or lower section of the TIMER button to set the group no. for the centralized controller. (When you use the unified ON / OFF controller, it displays only the group no. selected by the setting switch for zone control.) ④ Press the PROGRAM / CANCEL button to enter the setting group no. shown on the display. ⑤ Press INSPECTION button to return to normal mode.

Notes:

Do not duplicate the group number.
Be sure to supply the power to the remote controller side.
(It cannot be set without the power supply.)

(HC0094)

.

10 Installation

10-8 Initial setting

10-8-3 Initial setting for "Central zone control"

When HRV unit is connected to the central transmission line (terminal connector no. (F1) and (F2)), it is necessary to make a initial setting of "collective zone interlock" by the remote control for indoor unit. (Factory set "OFF".)
Make initial setting as follows.

Combination with central control

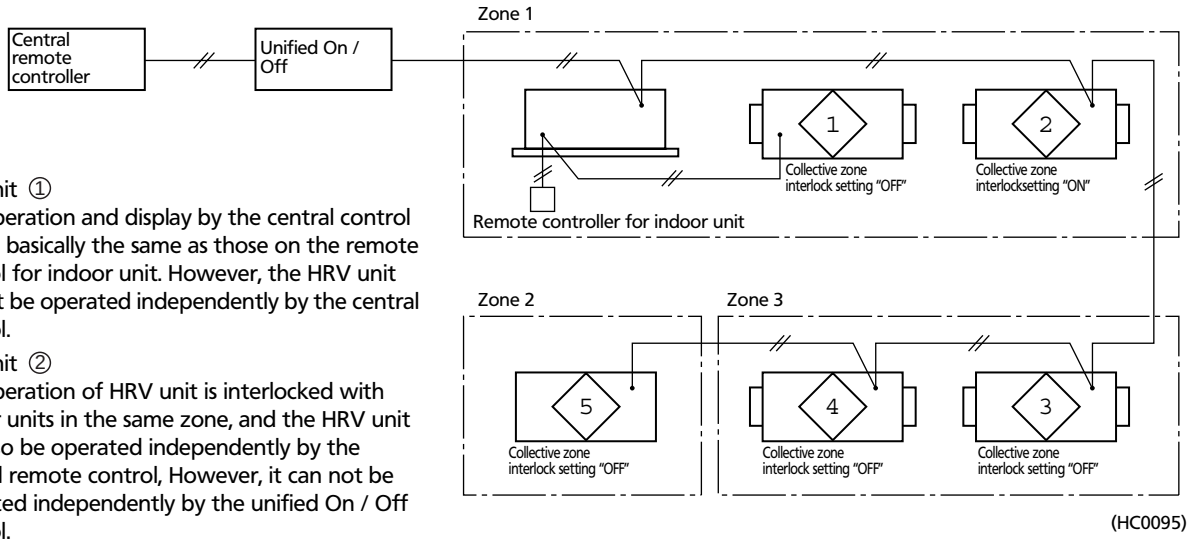
Central control ○: Possible ×: Impossible

Central control				Operation · function		Initial setting for "central zone control"
Multi-function centralized control	Unified ON / OFF control	Schedule timer	Adapter PCB for remote control	Interlocked operation (Automatic selection)	Independent operation / stop (By central control)	
1 unit	—	—	—	○	×	ON
				×	×	OFF
1 unit	1 – 4 units	—	—	○	×	ON
				×	○	OFF
1 unit		1 unit	—	○	×	ON
				×	×	OFF
1 unit	1 – 4 units	1 unit	—	○	×	ON
				×	○	OFF
—	1 – 4 units	—	—	It is impossible to operate.		ON
				×	○	OFF
—	—	1 unit	—	It is impossible to operate.		ON
				×	○	OFF
—	—	1 unit	—	○	×	ON
				×	X (Only collective operation)	OFF
—	—	—	1 unit	○	×	ON
				×	X (Only collective operation)	OFF

Cautions

When you make an initial setting "ON", the interlocked operation has a priority, and it is impossible to operate / stop HRV unit independently by the central remote control or the unified On / Off control. If there is no indoor unit for interlocked operation in the same zone, make an initial setting "OFF".
When you make an initial setting "OFF", the independent operation of HRV unit has a priority, and the interlocked operation is not possible.
When the HRV unit is operated independently by the central control, the HRV unit will not operate until the preset time elapses if the precool / preheat time setting is set. Therefore, please do not set the precool / preheat time setting in normal operation.

Example of system



(HC0095)

The unit ①
The operation and display by the central control will be basically the same as those on the remote control for indoor unit. However, the HRV unit cannot be operated independently by the central control.

The unit ②
The operation of HRV unit is interlocked with indoor units in the same zone, and the HRV unit can also be operated independently by the central remote control, However, it can not be operated independently by the unified On / Off control.

The unit ⑤
When the central remote control is used, each unit will be one zone, unless you set the zone for plural units.

TABLE OF CONTENTS

Part 2: VKM-GA(M)V1

TABLE OF CONTENTS
Part 2: VKM-GA(M)V1

1 External Appearance

VKM50GAMV1
VKM50GAV1

VKM80GAMV1
VKM100GAMV1
VKM80GAV1
VKM100GAV1

2 Model Series

Type	500	800	1000
DX-Coil and Humidifier	VKM50GAMV1	VKM80GAMV1	VKM100GAMV1
DX-Coil	VKM50GAV1	VKM80GAV1	VKM100GAV1

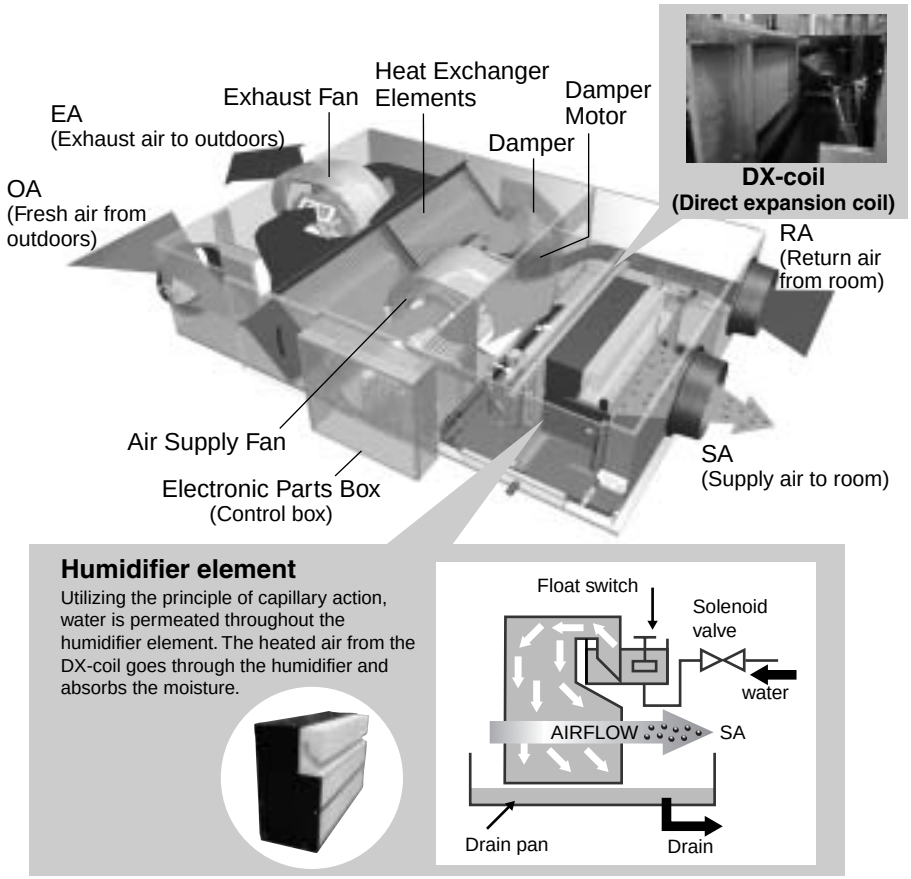
These units are applied only for CE regulation.

3 Nomenclature

V K M 50 GA M V1

- Ventilation
- Outdoor Air Treatment Type
- Mounted Type
- Nominal Air Flow Rate
  50 : 500m^3/h, 80 : 750m^3/h, 100 : 950m^3/h
- Major Design Category
- Moisture (M : With Humidifier Elements, nothing : without Humidifier Elements)
- Power Supply
  V1 : 1 Phase : 220-240V, 50Hz

4 Structures



5 Features

5.1 General

- Interlocked operation with VRV
  (Controls of interlocked operation for energy saving : The remote controller for air conditioner can be used, so special remote controller for HRV is unnecessary.)
- Mounted for direct expansion coil unit for outdoor air treatment
- Changeover function for ventilation mode to Auto/Manual
- Fresh-up operation (Selectable : Supply air rich mode or exhaust air rich mode ; initial setting)
- Mounted for water flow type natural evaporating humidifier
- Possible to attach the high efficiency filter
- Attaching the power supply terminal for easy connection
- Quiet operation
- Changeover function for air flow rate to High/Low (Ultra-high setting is possible.)
- The power supply of HRV is commonly used with the air-conditioner (Single-phase 220-240V, 50Hz)
- Filter sign display and reset
- Timer setting

■ Features of direct expansion coil

- Draftless ventilation in heating
- High humidifying function

■ How to use this unit

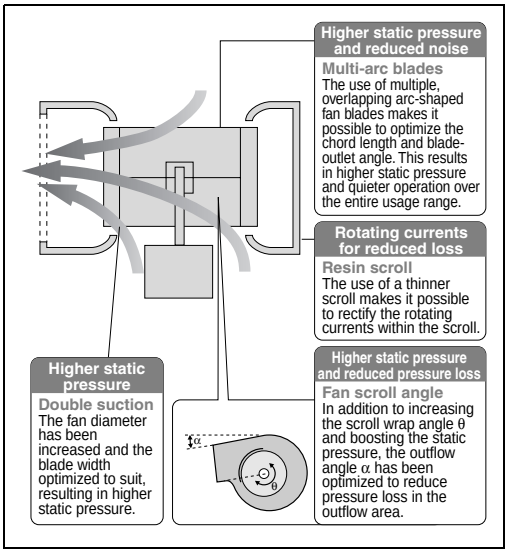
- This unit should be used with air conditioners.
  Air conditioning is impossible only by this unit, because this unit does not have temperature control function. (Its capacity is too small in order to control the room temperature to the whole.)
  And should be operated in combination with standard indoor units. (Interlocked operation)
- Independent operation without taking an interlock with indoor units is possible, however, temperature setting by remote controller is impossible.
  In this ON/OFF operation by thermostat depends on factory setting, however, this value is changeable by setting mode on site.
- Model selection should be done not by cooling capacity but by ventilating air flow rate.

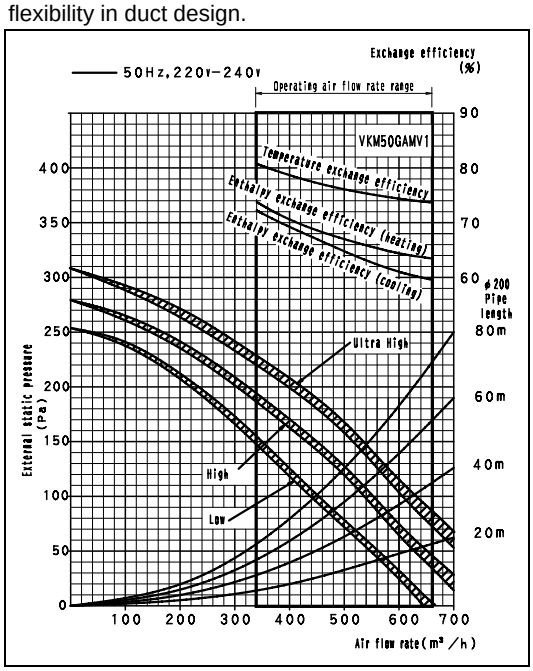
5.2 Design Flexibility

5.2.1 Efficient Fan Performance Produces a High Static Pressure

Improvements to the fan, including the use of multi-arc blades, a thinner scroll and optimized fan scroll angle, help to boost efficiency.

Dramatically higher static pressure is achieved due to improved fan performance. This reduces limitations on unit placement and allows more flexibility in duct design.





5.2.2 Operable Outdoor Temperature Down to –15°C

If the outdoor air temperature falls below –10° C, the unit changes to intermittent operation to prevent freezing of the heat exchanger element and dew condensation within the unit.

Intermittent operation

A thermistor (standard equipment) within the unit detects the outdoor air temperature. Unit operation varies according to the detected temperature.

5.2.3 Indoor Unit Connectable to up to 130% of the Capacity

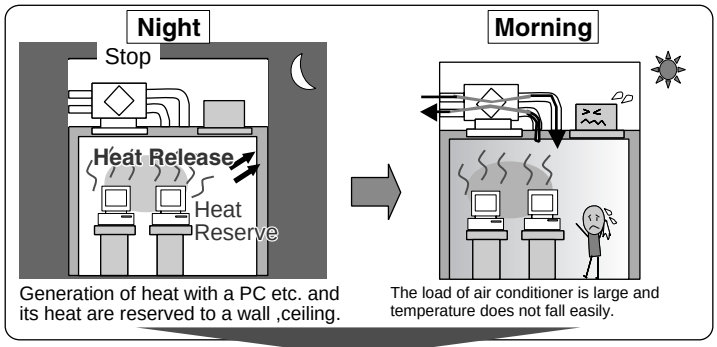
5.2.4 Slim Design

The slim design of only 387 mm in height enables installation inside ceilings with less than 400 mm of clearance.

5.3 Energy Saving

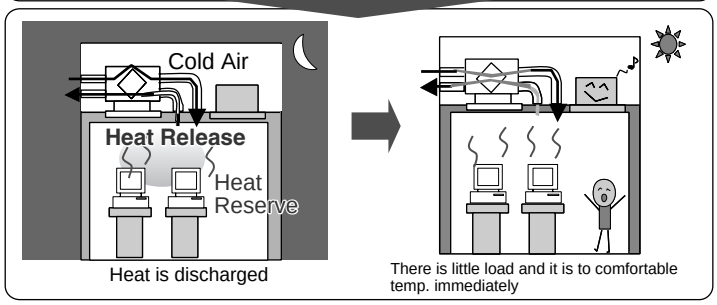
5.3.1 Automatic Heat Purge Function at Night

Not operation



Automatic heat purge control

The heat which accumulated indoors is discharged at night. Air conditioning load of the next day is reduced, and efficiency is increased.

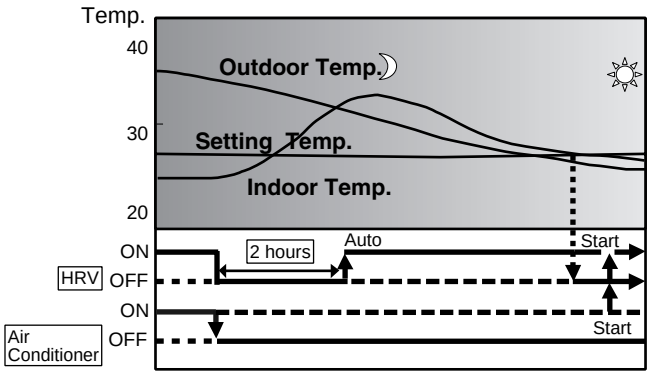


In case of interlocking operation with an air conditioner

■ **Mechanism**

<Operation>

1. Interlocking operation is carried out with the air-conditioning machine, and the time of 2 hours passing after an operation stop is judged to be night. (The same judgment as the present preparatory operation)
2. After 2-hour progress, when indoor temperature is higher than the preset temperature of an air-conditioning machine and higher than outdoor temperature, operation is started.
3. Operation will be stopped if indoor temperature falls to air-conditioning machine preset temperature.

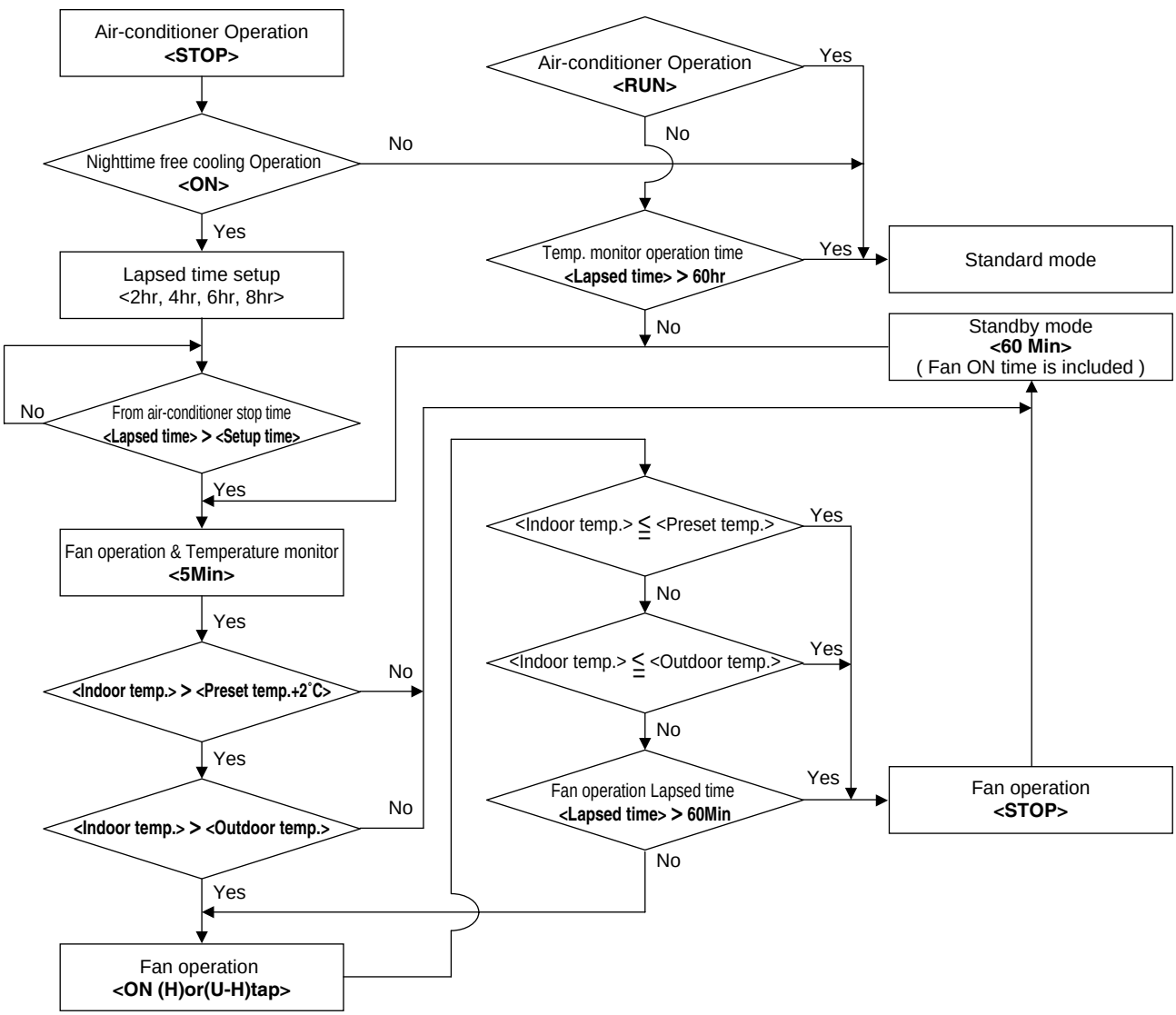


■ **Effect** (Field Setting by remote controller)

It is reduction of about 5% of air-conditioning load at the time of cooling operation.

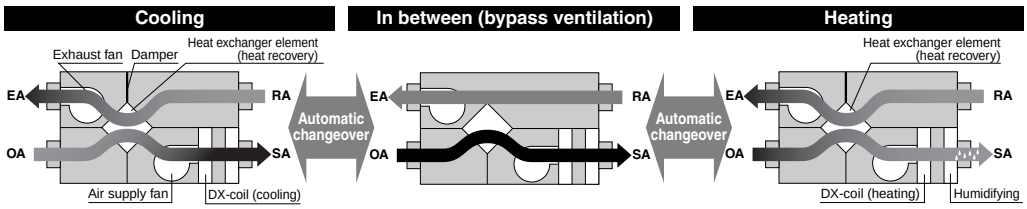
Air conditioning operation carries out to to April to October, and air-conditioning load is calculated only with sensible heat load.

Nighttime Free Cooling Operation <Flow Chart>



5.3.2 Automatic Changeover to Efficient Operation Patterns

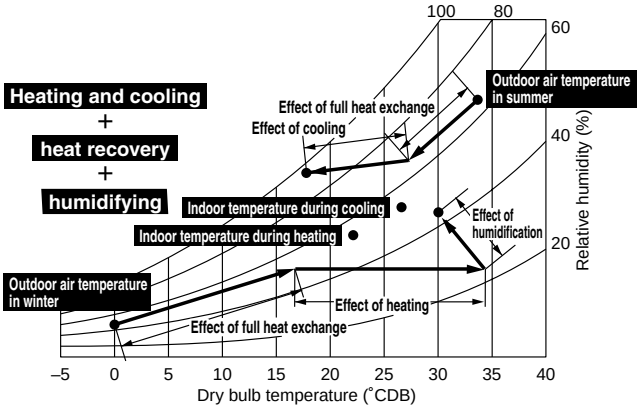
Operation automatically changes to the optimum pattern to suit conditions.



5.3.3 Efficient Outdoor Air Introduction with Heat Exchanger and Cooling / Heating Operation

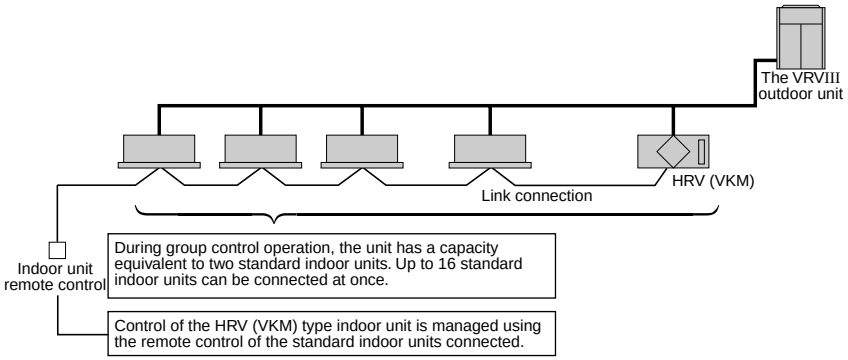
Indoor unit with outdoor air treatment

Using outdoor air, the temperature can be brought near room temperature with minimal cooling capacity through the use of outdoor air.



5.3.4 Operations, Such as Cleaning, Ventilation, Cooling / Heating and Humidifying, are Possible with One Remote Controller.

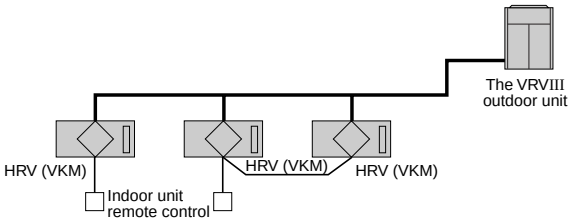
Four air conditioner functions can be managed using a single remote control. This makes it easy to obtain high-quality and energy-efficient outdoor air treatment.



5.4 Unique Control System

5.4.1 Independent Control Possible

Individual outdoor air treatment operation is possible by connecting an optional remote controller.



5.5 Quiet Operation

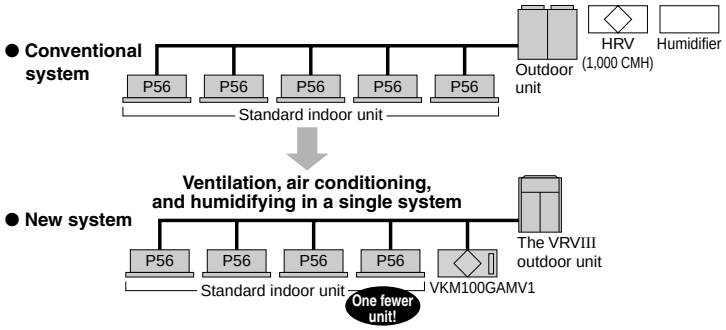
Reduced pressure loss and quieter operation internally lowers the noise output of the 1,000m^3/h type system to 38dB (VKM100GAMV1 at 50Hz 240V, High mode).

5.6 Easy Installation

5.6.1 Integrated System Includes Ventilation, Air Conditioning and Humidifying Operations

Rather than using separate ventilation, air conditioning, and humidifying components, the system incorporating HRV (VKM) integrates all functions, reducing the total number of indoor units and facilitating a far simpler system. The installation space becomes smaller and the labor required for installation and

maintenance is reduced significantly.



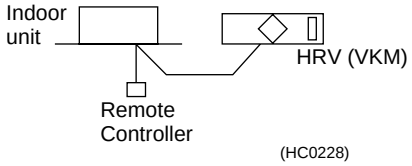
5.7 Other Features

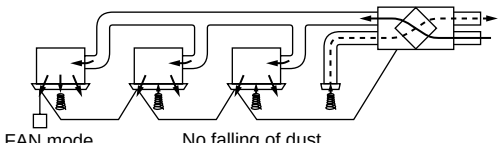
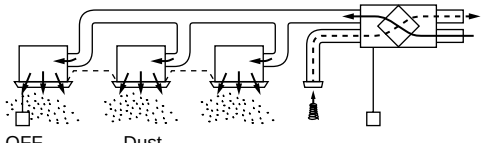
5.7.1 Interlocked Operation with VRV

1. Simultaneous ON / OFF with the indoor unit by the indoor unit remote controller.
2. HRV independent operation during air conditioning off season by the indoor unit remote controller.
3. Automatic ventilation mode changeover : Auto / Heat Recovery / Bypass
4. Fan speed changeover by the indoor unit remote controller : High / Low, Ultra-high / High
5. Fresh-up operation setting
6. Filter sign display notifies the time for cleaning the filter.
7. No need to purchase or install the HRV exclusive remote controller
8. Advantage to IAQ (Internal Air Quality)

Note

4-6 can be set at the initial setting only. (When using the remote controller BRC1A62)

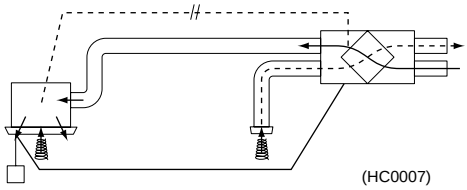
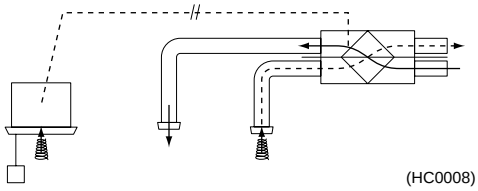
Type	Interlocked operation with air conditioner
Structure	
Features	• Simultaneous operation by air conditioner's remote controller is available. • Fan speed can be set at the initial setting.
Connectable Indoor unit	VRV (all indoor unit)

Daikin's HRV	Other types
	
Dust does not fall off from the air filter because the air supply fan of the interlocked indoor unit remains activated even when the HRV is operated independently.	If conventional HRV, with exclusive remote controller, is directly connected to indoor unit of air conditioner, dust may fall off from air filter when air conditioner is OFF.

Note

1) In case of the direct duct connection system, operate interlocking with indoor units.
2) Do not connect the duct with discharge air side of indoor units.

Installation Examples

Direct duct connection system	Independent duct system
 (HC0007)	 (HC0008)

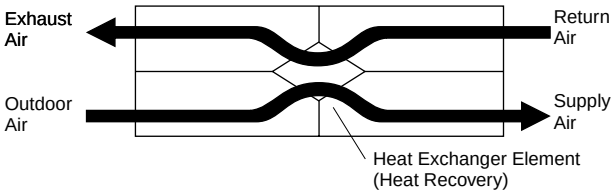
5.7.2 Mechanism of Energy Saving

By heat recovery operation

Approx. **20%** reduction of heating / cooling load

+

HRV unit recovers the thermal energy during cooling / heating operation of air conditioner. HRV reduces the cooling / heating load drastically and enhances the heating / cooling efficiency.



By setting to automatic ventilation mode

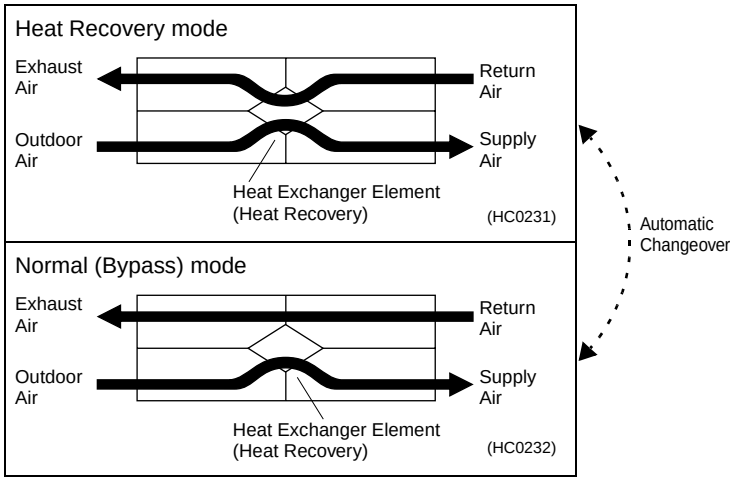
Approx. **6%** reduction of heating / cooling load

+

Proper use of Heat recovery ventilation and normal ventilation saves energy.
When the cooling operation is required in winter, use of heat recovery ventilation is not efficient because the outdoor air temperature is normally lower than that of the indoor.
Thus, the proper use of ventilation mode enhances the heating / cooling efficiency.
Automatic Ventilation mode changeover

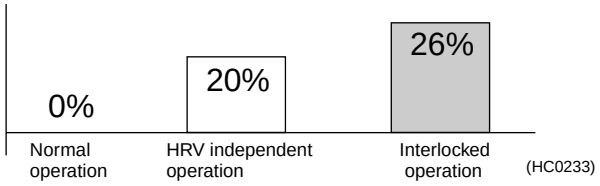
Operation	Sensor of ventilation	Decision of mode (Which is more energy efficient?)
	Difference between indoor / outdoor temp.	
Cooling	Indoor temp. > Outdoor temp. Indoor temp. < Outdoor temp.	Normal ventilation (Bypass) Heat recovery ventilation
Heating	Indoor temp. > Outdoor temp. Indoor temp. < Outdoor temp.	Heat recovery ventilation Normal ventilation (Bypass)

Refer to the CONTROL for the mode changeover.



=

Total **26%** reduction of heating / cooling load

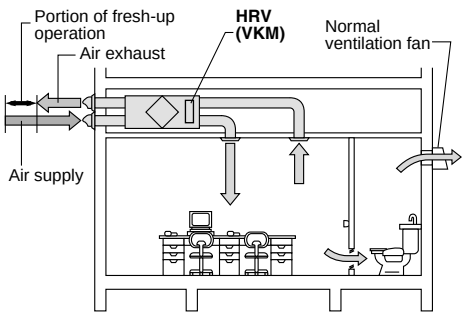
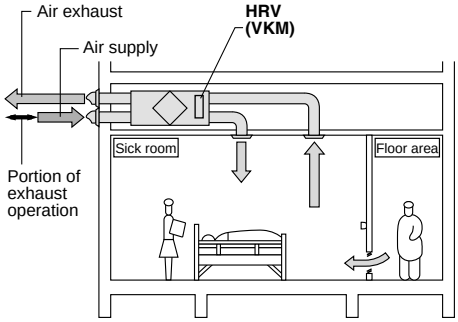


Note :

The total heating / cooling load may vary depending on the climate or the other environmental conditions.

5.7.3 Fresh-up Operation

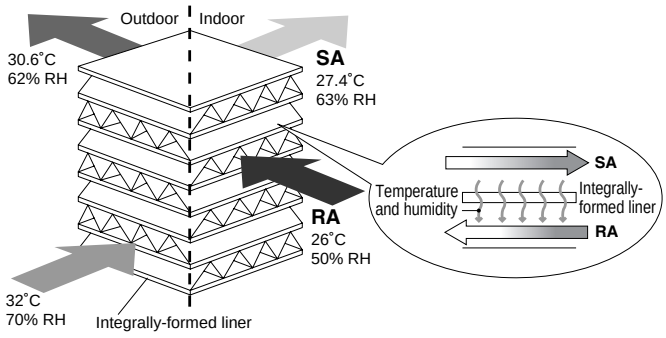
Both the excessive supply mode and the excessive exhaust mode are selectable.
This function creates a more comfortable air environment.

	Supply Fresh-up (Excessive outdoor air supply)	Exhaust Fresh-up (Excessive exhaust air supply)
Detail	Supply air volume can be set at a higher level than the exhaust air by the remote controller.	Exhaust air volume can be set at a higher level than the supply air by the remote controller.
Major effects	• Prevents inflow of toilet odor • Prevents inflow of outdoor air in winter	• Prevents outflow of airborne bacteria from rooms in a hospital • Prevents outflow of odors from rooms in a nursing home
Application	Offices, etc.	Hospitals, Nursing homes, etc.
Example		

5.7.4 Proprietary Developed HEP Element

The heat exchanger element uses a High Efficiency Paper (HEP) that has superior moisture-absorption and humidifying properties and doubles the current efficiency of moisture absorption. The heat exchanger unit speedily recovers heat contained as latent heat (vapor). The element is made of a material with superior flame-resistant properties and is treated with an anti-molding agent.

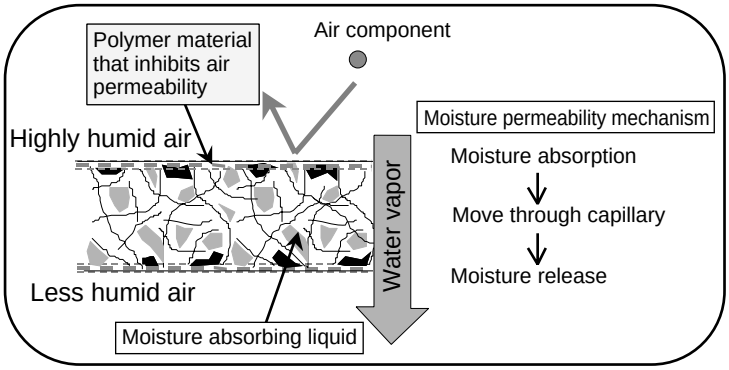
Operation of the heat exchanger element



(HC0013)
HEP anti-molding

Features

- High air shielding
  Even in the conventional less humidity conditions, maintaining the features of the material that can get excellent moisture permeability, we have achieved high air shielding, by special processing in the step of milling paper.



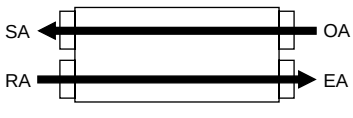
- Polymer material that inhibits air permeability that treated on the surface of the heat exchanger element restrains air permeability.

5.7.5 Easy Installation and Service Maintenance

Downsized

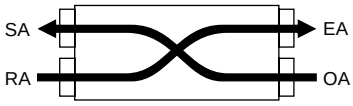
Model name	Height (mm)
VKM50GAMV1	387
VKM50GAV1	
VKM80GAMV1	
VKM80GAV1	
VKM100GAMV1	
VKM100GAV1	

Parallel air flow system (Daikin)
This system prevents misconnection and simplifies the installation work



(HC0234)

Cross air flow system (Others)



(HC0235)

5.7.6 The Operation is Available When the Outdoor Air Temperature is Down to -15°C

(Operation when the outdoor air temperature becomes lower than -10°C)
When the outdoor air suction temperature becomes lower than -10°C, the unit is changed to intermittent operation to prevent freezing of the heat exchanger element and dew condensation within the unit.

Intermittent operation

The outdoor air thermistor (standard equipment) within the unit detects the temperature. According to the detected temperature, the following operation determines.

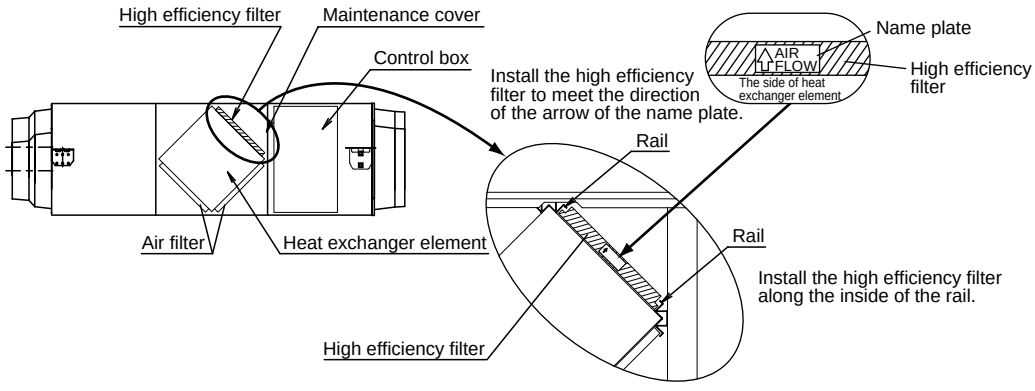
<Step 1>

- The air supply fan is changed to intermittent operation, when the temperature is lower than -10°C.
- The intermittent operation of the air supply fan is changed to an operation of each cycle for 45 minutes' operation after stopping operation for 15 minutes.
- The exhaust fan operates continuously according to setup.

<Step 2>

- When the temperature becomes lower than -15°C, the unit stops operation to prevent any defect, such as dew condensation and freezing. The unit does not ventilate.
  But, to detect the elevation of the outdoor air temperature, the unit operates for 5 minutes per hour.

5.7.7 The High Efficiency Filter (that has 65% of Average Dust Collecting Efficiency) is Suitable



5.7.8 Additional Optional Accessories

Built-in optional high efficiency filter

It greatly reduces the installation space.
The installation of access doors and the unit can be reduced.

6 Selection Procedures (in Japan)

Various methods are used to calculate the required ventilating air flow rate according to CO_2 generated by inhabitants in a room, waste gas generated by use of fire, and other conditions of a room.
Here are 2 patterns of calculating methods.

Based on inhabitants

$$\text{Required ventilating air flow rate } (m^3/h) = \frac{20 \times A}{B}$$

A : 20 × Living room floor space (m^2)
B : Area occupied per person (m^2)
The above equation conforms to article 20, 2 No.2 of the Building Standards Act in Japan.

Note :

1. 20 (in the above equation) means "20(m^3 / h / person)", which is the required ventilating air flow rate based on the CO_2 exhausted by an adult sitting still in a room. If smoking is allowed, other calculation method should be used.
2. Use 10 (m^2) if the area occupied per person exceeds 10 (m^2).

<Table 1>

Type of building	Area occupied per person (N)	Remarks
Dining houses, restaurants, coffee-shops	3 m^2	Floor space of a part used for business purposes
Cabarets, beer halls	2 m^2	Floor space of a part used for business purposes
Japanese-style restaurants, hall for hire	3 m^2	Floor space of a part used for business purposes
Store market	3 m^2	Floor space of a part used for business purposes
Pool rooms, Ping-pong rooms, dance halls, bowling alleys	2 m^2	Floor space of a part used for business purposes
Pin-ball parlors, Go club houses, mahjong parlors	2 m^2	Floor space of a part used for business purposes
Inns, hotels, and motels	10 m^2	Floor space of a part used for business purposes
Massage parlors	5 m^2	Floor space of a part used for business purposes
Meeting places, public halls	0.5 – 1 m^2	Persons accommodated simultaneously with the number of persons calculated per unit
Offices	5 m^2	Floor space of an office

* : Values set by the Metropolitan Maintenance Bureau in Japan.

Note :

1. Table indicates the required ventilating air flow rate calculated as 20 m^3 / h.
2. The area occupied per person by type of business is calculated in reference to Application Standards for building administration in compliance with Building Standards Act in Japan.

Based on Room size

$$\text{Required ventilating air flow rate } (m^3/h) = C \times D \times E$$

C : Number of ventilation required per hour (ventilation / h)
D : Area of room (m^2)
E : Height of Ceiling (m)
Calculation is based on the experiences of hygienic laboratory, etc. to find out the number of hourly ventilation of the room air.
(Selection example)

Place : Living room of common household
Required ventilation : 6 times / h (See Table 2)
Area of room : Approx. 30 (m^2)
Height of ceiling : 2.4 m

Required ventilating air flow rate = $6 \times 30 \times 2.4 \fallingdotseq$ 432 (m^3 / h)

Required ventilating air flow rate 500 is almost equivalent to the unit type 50.
So select the close size of the unit.
In this case, select VKM50GAMV1.

<Table 2>

Groups	Type of room	Ventilation required
Common household	Living room	6
	Bathroom	6
	Drawing room	6
	Toilet	10
	Kitchen	15
Dining places	Restaurant	6
	Sushi restaurant	6
	Banquet hall	10
	Tempura restaurant	20
	Cooking room	20
Inns and hotels	Guest room	5
	Corridor	5
	Dance hall	8
	Large dining hall	8
	Washroom, Toilet	10
	Cooking room	15
	Laundry room	15
	Engine room	20
	Boiler room	20
Hospitals	Consultation office	6
	Sick room	6
	Office room	6
	Corridor	10
	Waiting room	10
	Bathroom	10
	Dining room, Toilet	10
	Respiratory disease room	10
	Laundry room	15
	Cooking room	15
	Surgery room	15
	Sterilizing room	15
	Engine room	20
	Boiler room	20
Schools	Class room, library	6
	Auditorium	6
	Experimental chemistry room	6
	Gymnasium	8
	Toilet	12
	Cooking room	15

Groups	Type of room	Ventilation required
Playhouses and movie theaters	Audience room	6
	Corridor	6
	Smoking room	12
	Toilet	12
	Projector room	20
Plants	Office room	6
	General work room	6
	Telephone room	6
	Spinning plant,	10
	Printing plant	10
	Battery room	10
	Machinery plant	10
	Generator room	15
	Substation room,	15
	Painting shop,	15
	Welding plant	15
	Chemical plant	15
	Food plant	20
	Wood working plant	20
	Casting plant	50
General buildings	Office room	6
	Waiting room	10
	Show room, Toilet	10
	Conference room	12
Comfort stations		20
Dark rooms	Dark rooms for photo	16
Guest rooms of ship		6
Room of potential noxious gas or combustible gas		20 or more

7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 1 Specifications

TECHNICAL SPECIFICATIONS				VKM80GAMV1	VKM100GAMV1	VKM50GAMV1
Fresh air conditioning load	Cooling		kW	7.46	9.12	4.71
	Heating		kW	8.79	10.69	5.58
Power input (nominal)	Heat exchange mode	Ultra-high	kW	0.620	0.670	0.560
		High	kW	0.560	0.570	0.490
		Low	kW	0.470	0.480	0.420
	Bypass mode	Ultra-high	kW	0.620	0.670	0.560
		High	kW	0.560	0.570	0.490
		Low	kW	0.470	0.480	0.420
Casing	Material			Galvanised steel plate		
Dimensions	Height		mm	387	387	387
	Width		mm	1764	1764	1764
	Depth		mm	1214	1214	832
Weight			kg	120	125	102
Heat exchanger	Type			Cross fin coil		
	Rows			2	2	2
	Stages			12	12	12
	Fin pitch		mm	2.2	2.2	2.2
	Face area		m²	0.118	0.165	0.078
Fan	Type			Sirocco fan		
Air Flow Rate	Heat exchange mode	Ultra-high	m	750	950	500
		High	m	750	950	500
		Low	m	640	820	440
	Bypass mode	Ultra-high	m	750	950	500
		High	m	750	950	500
		Low	m	640	820	440
Fan	External static pressure	Ultra-high	Pa	140	110	160
		High	Pa	90	70	120
		Low	Pa	70	60	100
	Motor	Quantity		2	2	2
		Output	W	280	280	280
Temperature exchange efficiency	Ultra-high		%	78	74	76
	High		%	78	74	76
	Low		%	79	76.5	77.5
Enthalpy exchange efficiency	Cooling	Ultra-high	%	66	62	64
		High	%	66	62	64
		Low	%	68	66	67
	Heating	Ultra-high	%	71	65	67
		High	%	71	65	67
		Low	%	73	69	69
Humidifier	System			Natural evaporating type		
	Amount		kg/h	4.0	5.4	2.7
	Feed water pressure		MPa	0.02~0.49		
	N			1	2	1
Operation Range	Outdoor air			-15	-15	-15
Heat exchange mode	Sound Pressure	Ultra-high	dBA	38.5/39/40	39/39.5/40	37/37.5/38
		High	dBA	36/37/37.5	37/37.5/38	35.5/35.5/36
		Low	dBA	33/34/35.5	34/34.5/35.5	32/33/34
Bypass mode	Sound Pressure	Ultra-high	dBA	38.5/39/40	39/39.5/40	37/37.5/38
		High	dBA	36/37/37.5	37/37.5/38	35.5/35.5/36
		Low	dBA	33/34/35.5	34/34.5/35.5	32/33/34

TECHNICAL SPECIFICATIONS				VKM80GAMV1	VKM100GAMV1	VKM50GAMV1
Piping connection	Liquid	Type		flare connection		
		Diameter	mm	6.4	6.4	6.4
	Gas	Type		flare connection		
		Diameter	mm	12.7	12.7	12.7
	Water supply		mm	6.4	6.4	6.4
	Drain			PT3/4 external thread		
Refrigerant control				electronic expansion valve		
Insulation material				Self-extinguishable urethane foam		
Heat exchange system				Air to air cross flow total heat (sensible + latent heat) exchange		
Heat exchange element				Specially processed non-flammable paper		
Air Filter				Multidirectional fibrous fleeces		
Connection duct diameter			mm	250	250	200
Operation mode				Heat exchange mode, bypass mode, fresh-up mode		
Standard Accessories				Installation and operation manual		
				Duct connection flange		
				M4 tapping screw to connect duct		
				water supply piping with strainer		
				half union joint (copper piping joint)		
				flare nut (copper piping joint)		
				refrigerant piping insulation cover		
				water supply piping insulation cover		
				sealing material		
				clamp		
Notes				Cooling and heating capacities are based on the following conditions: Fan is based on High and Ultra High. The figures in parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use 5.6kW.		
				Cooling capacities are based on: indoor temperature: 27		
				Heating capacities are based on: indoor temperature: 20		
				Humidifying capacity is based on		
				Operation sound measured at 1.5m below the center of the unit is converted to that measured in an anechoic chamber, built in accordance with JIS C1502 condition. The actual operation sound varies depending on the surrounding conditions (near running unit		
				The sound level at the air discharge port is about 8-11dB higher than the unit's operating sound. For operation in a quiet room, it is required to take measures to lower the sound, for example install more than 2m soft duct near the air discharge grille		
				Air flow rate can be changed over to Low mode or High mode.		
				Normal amplitude, input, efficiency depend on the other above conditions		
				In case of holding full water in humidifier		
				OA: fresh air from outdoor, RA: return air from the room		
				The specifications, designs and information here are subject to change without notice		
				Temperature Exchange Efficiency is a mean value in cooling and heating		
				Efficiency is measured under following condition: ratio of rated external static pressure has been kept as follows: outdoor side to indoor side = 7 to 1		
				Feed clean water. If the supply water is hard water, use a water softener because of short life. Life of humidifying element is about 3 years (4,000 hours, under the supply water conditions of hardness: 150mg/l). Life of humidifying element is about 1 y		
				During the heating operation the freezing of the outdoor unit coil increases, heating capacity decreases and the system goes into defrost operation. During defrost operation the fans of the units continue driving (factory settings), the purpose of this is to maintain the amount of ventilation and humidification.		
				When connecting with a VRV Heat Recovery outdoor unit, bring the RA (exhaust gas intake) of this unit directly in from the ceiling. Connect to a BS unit identical to the VRV outdoor unit (master unit), and use group-linked operation.		
				When connecting the indoor unit directly to the duct, always take the same system on the indoor unit as with the outdoor unit. Perform group-linked operation and make the direct duct connection settings from the remote controller. (Mode No. '17 (27)' -first code n° '5' - Second Code n° '6') Do not connect to the outlet side of the indoor unit, depending on the fan strength and static pressure the unit might back up.		

ELECTRICAL SPECIFICATIONS				VKM80GAMV1	VKM100GAMV1	VKM50GAMV1
Power Supply	Name			V1		
	Phase			1	1	1
	Frequency		Hz	50	50	50
	Voltage		V	220-240		
Nominal running current (RLA)	Heat exchange mode	Ultra-high	A	3.00	3.00	3.00
		High	A	2.60	2.50	2.50
		Low	A	2.10	2.10	2.10
	Bypass mode	Ultra-high	A	3.00	3.00	3.00
		High	A	2.60	2.50	2.50
		Low	A	2.10	2.10	2.10
Current	Minimum circuit amps (MCA)		A	4.30	4.30	4.30
	Maximum fuse amps (MFA)		A	15	15	15
	Fan motor rated output		kW	0.028 x 2		
	Full load amps (FLA)		A	1.9 x 2		
Voltage range	Minimum		V	198	198	198
	Maximum		V	264	264	264
Notes				Voltage range : Units are suitable for use on the electrical systems where the voltage supplied to the unit terminals is not below or above the listed range limits.		
				Maximum allowable voltage range variation between phases is 2%		
				MCA/MFA : MCA = 1.25 x FLA (FM1) + FLA (FM2) ; MFA <= 4 x FLA ; (Next lower standard fuse rating. Min. 15A		
				Select wire size based on the value of MCA.		
				Instead of the fuse, use the circuit breaker.		

7 Product Specification

7 - 1 VKM-GAMV1

HUMIDIFIER		VKM50GAMV1	VKM80GAMV1	VKM100GAMV1
		VKM50GAMV1	VKM80GAMV1	VKM100GAMV1
Humidifier type		Natural evaporating type humidifier		
Wetted element		Porosity plate 60 pcs.	Porosity plate 90 pcs.	Porosity plate 120 pcs. (60×2 pcs.)
Water inlet port		ϕ6.4 C1220T (Flare Connection)		
Water outlet port		PT3/4		
Supply water pressure	kg/cm^2	0.2 (Min.) ~ 5.0 (Max.)		

NOTES

1 Feed clean water (city water, tap water or equivalent). Dirty water may clog the valve or cause dirt deposits in the water container, resulting in poor humidifier performance. (Never use any cooling tower water and heating - purpose water.
Also, if the supply water is hard water, use a water softener because of short life.
*Life of humidifying element is about 3 years (4,000 hours), under the supply water conditions of hardness: 150 mg/l. (Life of humidifying element is about 1 year (1,500 hours) under the supply water conditions of hardness: 400 mg/l.)
Annual operating hours: 10 hours / day × 26 days / month × 5 month = 1,300 hours

2 Maintain the supply water temperature at 5 ~ 50°C and its pressure at 20 ~ 490 kPa (0.2 ~ 5.0 kg/cm2). If the water pressure is above 490 kPa (5.0 kg/cm2), add pressure reducing valve in between the kit and the supply water shut - off valve.

3 The supply water line cannot be directly connected with a utility water tap. To unavoidably take water from such line, employ a CISTERN (gotten configuration authorization).

4 Be sure to provide thermal insulation around the indoor piping as well as the shut - off valves.

5 In order to prevent harmful bacteria from generating, do maintenance on humidifying unit portion at the beginning and the end of the heating season according to the operation manual.

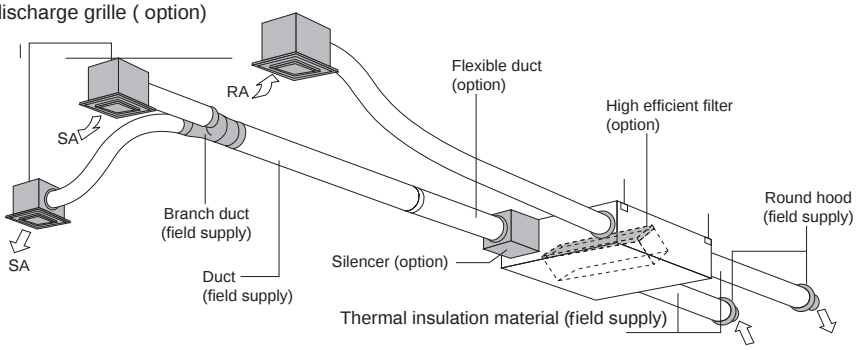
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 2 Options

VKM-GA(M)V1

Air suction/discharge grille (option)



				VKM-GAV1									
Controling device	Remote control			BRC1A62 (General market) BRC1D527 (EC market) (⁜1)									
	Centralized controlling device	Central remote control		DCS302C51									
		Unified ON/OFF control		DCS301B61 (General market) DCS301B51 (EC market)									
		Schedule timer		DST301B51									
	PC board adapter	Wiring adapter for electrical appendices		KRP2A61 (General market) KRP2A51 (EC market)									
		For ON signal output		KRP50-2									
		For heater control kit		BRP4A50									
		For wiring	Type (indoor unit of VRV)	FXCQ-M	FXFQ-P	FXKQ-M	FXSQ-M	FXMQ-M	FXHQ-M	FXAQ-M	FXDQ-N	FXLQ-M FXNQ-M	FXZQ-M
				KRP1B61★	-	KRP1B61			KRPB3	-	KRP1B56	KRP1B61	KRP1B57
		Installation box for adapter PCB ☆		KRP1B96 Notes 2, 3	KRP1D98 Notes 2, 3	-	KRP4A91 Notes 5	-	KRP1C93 Notes 3	KRP4A93 Notes 2, 3	KRP1B101 Notes 4, 6	-	KRP1B101 Notes 4, 6

NOTES

1 Installation box ☆ is necessary for each adapter marked ★.
2 Up to 2 adapters can be fixed for each installation box.
3 Only one installation box can be installed for each indoor unit.
4 Up to 2 installation boxes can be installed for each indoor unit.
5 Installation box ☆ is necessary for second adapter.
6 Installation box ☆ is necessary for each adapter.
7 ⁜1 Necessary when operating HRV (VKM) independently. When operating interlocked with other air conditioners, use the remote control of the air conditioners.

			VKM-GAV1		
			50	80	100
Additional function	Silencer		-	KDDM24B100	
		Nominal pipe diameter (mm)	-	ø250	
	Air suction/ Discharge grill	White	K-DGL200B	K-DGL250B	
		Nominal pipe diameter (mm)	ø200	ø250	
	High efficiency filter		KAF241G80M	KAF241G100M	
	Air filter for replacement		KAF242G80M	KAF242G100M	
Flexible duct (1m)			K-FDS201C	K-FDS251C	
Flexible duct (2m)			K-FDS202C	K-FDS252C	


Remote Control


Centralised remote control


Unified ON/OFF controller


Schedule timer


Silencer


Air suction/discharge grille (Noise suppression type)


Flexible duct (Noise suppression type)

7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 3 Capacity tables

2
7

7 - 1 - 3 - 1 Cooling capacity tables

VKM-GA(M)

TC: Total capacity : kW; SHC : Sensible heat capacity : kW

Class	Capacity DX-Coil Only	Outdoor °CDB	Coil Inlet air temp.°CDB													
			14.0WB 20.0DB		16.0WB 23.0DB		18.0WB 26.0DB		19.0WB 27.0DB		20.0WB 28.0DB		22.0WB 30.0DB		24.0WB 32.0DB	
			TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
50	2.8kW index 25	10.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	—	—	—	—	—	—
		12.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	—	—	—	—	—	—
		14.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		16.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		18.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		20.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		21.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		23.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.3	2.1	—	—
		25.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.3	2.0	—	—
		27.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.2	2.0	—	—
		29.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.2	2.0	—	—
		31.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.1	2.0	—	—
		33.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.1	2.0	3.1	1.8
		35.0	—	—	—	—	2.6	2.0	2.8	2.0	3.0	2.0	3.0	1.9	3.1	1.8
		37.0	—	—	—	—	2.6	2.0	2.8	2.0	2.9	2.0	3.0	1.9	3.0	1.8
		39.0	—	—	—	—	2.6	2.0	2.8	2.0	2.9	2.0	2.9	1.9	3.0	1.8
80	4.5kW index 40	10.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	—	—	—	—	—	—
		12.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	—	—	—	—	—	—
		14.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	3.3	—	—	—	—
		16.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		18.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		20.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		21.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		23.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.3	2.9	—	—
		25.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.2	2.9	—	—
		27.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.1	2.8	—	—
		29.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.1	2.8	—	—
		31.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.0	2.8	—	—
		33.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	4.9	2.7	5.0	2.6
		35.0	—	—	—	—	4.2	2.7	4.5	2.7	4.7	2.8	4.8	2.7	4.9	2.6
		37.0	—	—	—	—	4.2	2.7	4.5	2.7	4.6	2.8	4.8	2.7	4.9	2.6
		39.0	—	—	—	—	4.2	2.7	4.5	2.7	4.6	2.7	4.7	2.6	4.8	2.5
100	5.6kW index 50	10.0	3.8	2.5	4.5	2.9	5.2	3.3	—	—	—	—	—	—	—	—
		12.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	—	—	—	—	—	—
		14.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	—	—	—	—	—	—
		16.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		18.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		20.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		21.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		23.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		25.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.5	3.5	—	—
		27.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.4	3.5	—	—
		29.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.3	3.4	—	—
		31.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.2	3.4	—	—
		33.0	—	—	—	—	5.2	3.3	5.6	3.3	6.0	3.4	6.1	3.3	6.3	3.2
		35.0	—	—	—	—	5.2	3.3	5.6	3.3	5.9	3.3	6.0	3.3	6.2	3.2
		37.0	—	—	—	—	5.2	3.3	5.6	3.3	5.8	3.3	5.9	3.2	6.1	3.1
		39.0	—	—	—	—	5.2	3.3	5.6	3.3	5.7	3.3	5.8	3.2	6.0	3.1

NOTES

1 Cooling and heating capacities are based on the following conditons. Fan is based on High and Ultra-high? The figures in the parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use the following figures:
VKM50GAMV1 : 3.5kW
VKM80GAMV1: 5,6kW
VKM100GAMV1 : 7.0kW

7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 3 Capacity tables

7 - 1 - 3 - 2 Heating capacity tables

VKM-GA(M)

Class	Capacity	Outdoor		Coil Inlet air temp.°CDB					
	DX-Coil Only	°CDB	°CWB	16.0kW	18.0kW	20.0kW	21.0kW	22.0kW	24.0kW
50	2.8kW index 25	-14.7	-15.0	2.2	2.2	—	—	—	—
		-12.6	-13.0	2.3	2.3	—	—	—	—
		-10.5	-11.0	2.4	2.4	—	—	—	—
		-9.5	-10.0	2.5	2.4	—	—	—	—
		-8.5	-9.1	2.5	2.5	—	—	—	—
		-7.0	-7.6	2.6	2.6	2.7	—	—	—
		-5.0	-5.6	2.7	2.7	2.7	—	—	—
		-3.0	-3.7	2.8	2.8	3.0	3.0	—	—
		0.0	-0.7	3.0	3.0	3.1	3.1	—	—
		3.0	2.2	3.1	3.1	3.2	3.1	3.0	—
		5.0	4.1	3.3	3.2	3.2	3.1	3.0	—
		7.0	6.0	3.4	3.4	3.2	3.1	3.0	—
		9.0	7.9	3.5	3.4	3.2	3.1	3.0	—
		11.0	9.8	3.6	3.4	3.2	3.1	3.0	2.8
		13.0	11.8	3.6	3.4	3.2	3.1	3.0	2.8
		15.0	13.7	3.6	3.4	3.2	3.1	3.0	2.8
80	4.5kW index 40	-14.7	-15.0	3.4	3.4	—	—	—	—
		-12.6	-13.0	3.6	3.6	—	—	—	—
		-10.5	-11.0	3.7	3.7	—	—	—	—
		-9.5	-10.0	3.9	3.7	—	—	—	—
		-8.5	-9.1	3.9	3.9	—	—	—	—
		-7.0	-7.6	4.1	4.1	4.2	—	—	—
		-5.0	-5.6	4.2	4.2	4.2	—	—	—
		-3.0	-3.7	4.4	4.4	4.7	4.6	—	—
		0.0	-0.7	4.7	4.7	4.9	4.9	—	—
		3.0	2.2	4.9	4.9	5.0	4.9	4.7	—
		5.0	4.1	5.2	5.0	5.0	4.9	4.7	—
		7.0	6.0	5.3	5.3	5.0	4.9	4.7	—
		9.0	7.9	5.5	5.3	5.0	4.9	4.7	—
		11.0	9.8	5.7	5.3	5.0	4.9	4.7	4.4
		13.0	11.8	5.7	5.3	5.0	4.9	4.7	4.4
		15.0	13.7	5.7	5.3	5.0	4.9	4.7	4.4
100	5.6kW index 50	-14.7	-15.0	4.4	4.4	—	—	—	—
		-12.6	-13.0	4.6	4.6	—	—	—	—
		-10.5	-11.0	4.8	4.8	—	—	—	—
		-9.5	-10.0	5.0	4.8	—	—	—	—
		-8.5	-9.1	5.0	5.0	—	—	—	—
		-7.0	-7.6	5.2	5.3	—	—	—	—
		-5.0	-5.6	5.4	5.4	5.4	—	—	—
		-3.0	-3.7	5.6	5.6	6.0	—	—	—
		0.0	-0.7	6.0	6.0	6.2	6.2	—	—
		3.0	2.2	6.2	6.2	6.4	6.2	6.0	—
		5.0	4.1	6.6	6.4	6.4	6.2	6.0	—
		7.0	6.0	6.8	6.8	6.4	6.2	6.0	—
		9.0	7.9	7.0	6.8	6.4	6.2	6.0	—
		11.0	9.8	7.2	6.8	6.4	6.2	6.0	5.6
		13.0	11.8	7.2	6.8	6.4	6.2	6.0	5.6
		15.0	13.7	7.2	6.8	6.4	6.2	6.0	5.6

NOTES

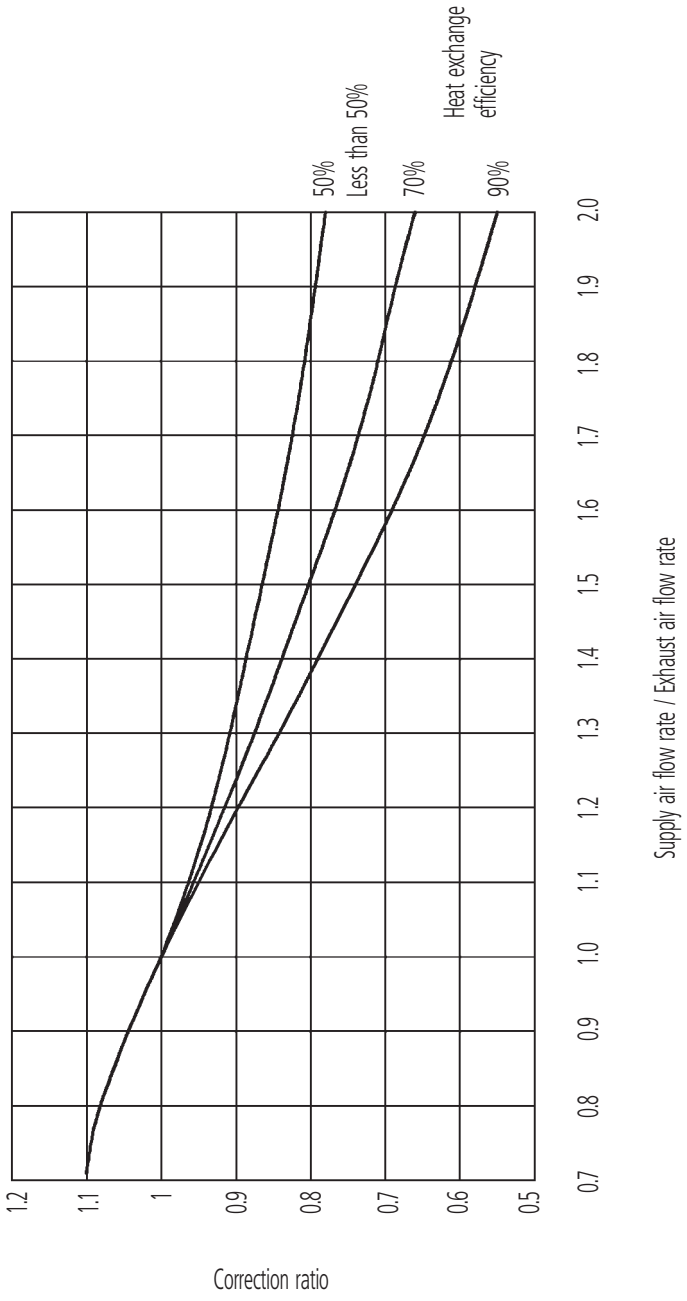
1 Cooling and heating capacities are based on the following conditions. Fan is based on High and Ultra-high. The figures in the parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use the following figures :
VKM50GAMV1 : 3.5kW
VKM80GAMV1 : 5.6kW
VKM100GAMV1 : 7.0kW

7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 3 Capacity tables

7 - 1 - 3 - 3 Capacity correction factor



4D023764

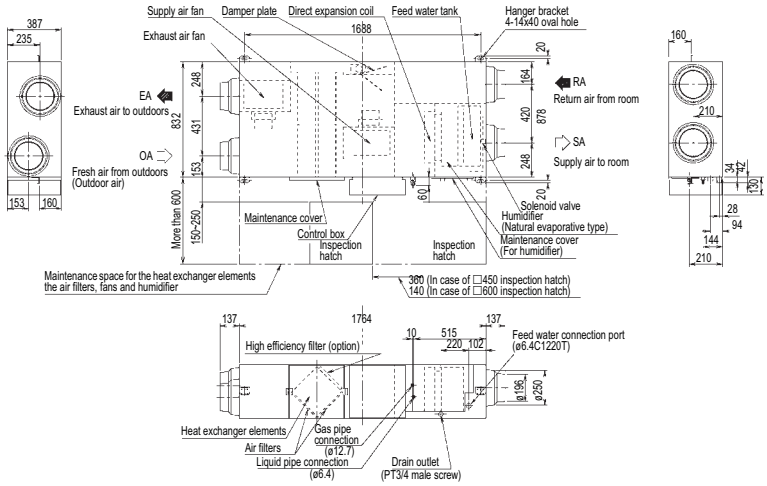
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 4 Dimensional drawing & centre of gravity

7 - 1 - 4 - 1 Dimensional drawing

VKM50GAMV1

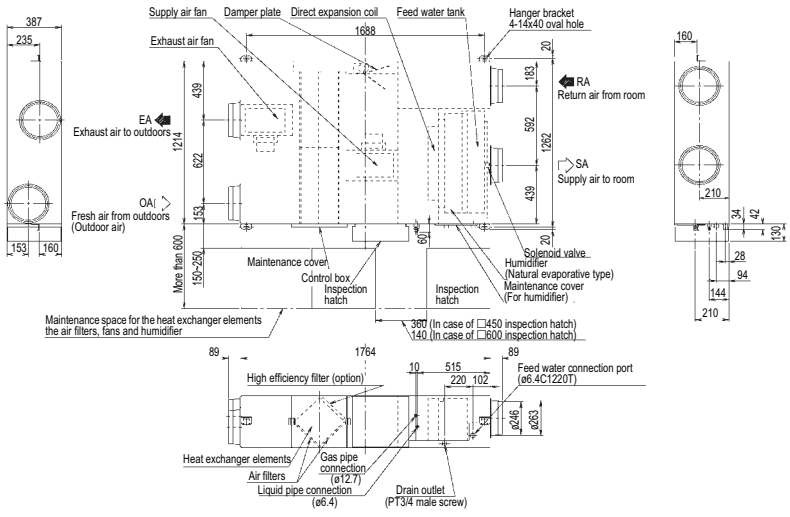


NOTES

1. Specifications are subject to change without notice.
2. Be sure to provide two inspection hatches (□450 or □600) at the service side of filters and elements.
3. The high efficiency filter (option) can be attached to the SA surface of the heat exchanger elements.

3D051285

VKM80GAMV1



NOTES

1. Specifications are subject to change without notice.
2. Be sure to provide two inspection hatches (□450 or □600) at the service side of filters and elements.
3. The high efficiency filter (option) can be attached to the SA surface of the heat exchanger elements.

3D051286

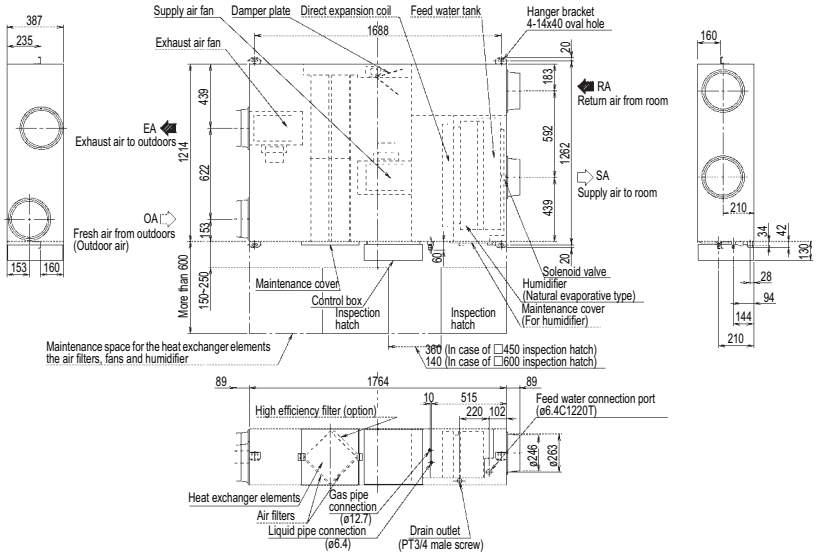
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 4 Dimensional drawing & centre of gravity

7 - 1 - 4 - 1 Dimensional drawing

VKM100GAMV1



NOTES

1 Specifications are subject to change without notice.
2 Be sure to provide two inspection hatches (□450 or □600) at the service side of filters and elements.
3 The high efficiency filter (option) can be attached to the SA surface of the heat exchanger elements.

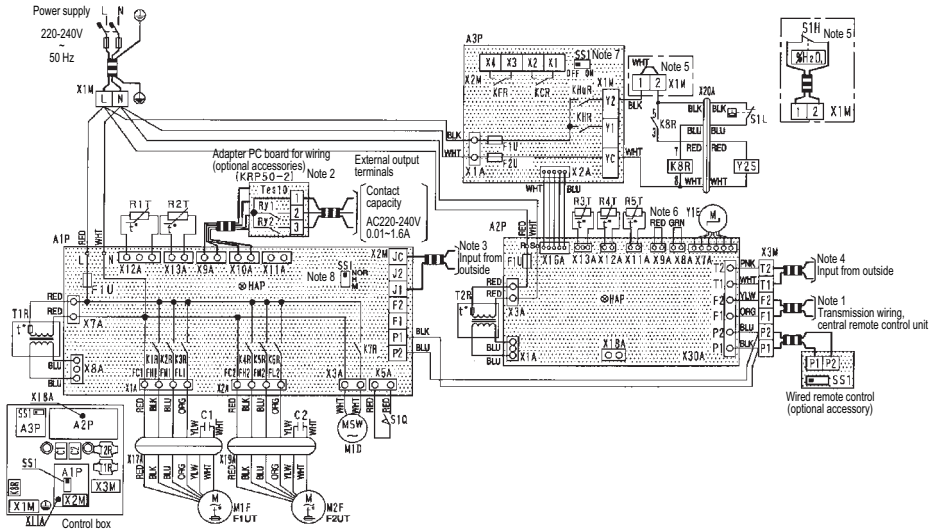
3D051287

7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 5 Wiring diagram

VKM50,80,100GAMV1



Indoor unit		KHR, KHuR	Magnetic relay (A3P)	X20A	Connector (relaying wire)
A1P	Printed circuit board	KSR	Magnetic relay (Y1S)	Y1E	Electronic expansion valve
A2P	Printed circuit board	M1D	Motor (damper motor)	Y2S	Feed water solenoid valve
A3P	Printed circuit board (adapter for wiring)	M1F	Motor (supply air fan)		
C1, C2	Capacitor (M1F)	R1T	Thermistor (indoor air)	Optional accessories	
F1U	Fuse (Ⓑ, 10A, 250V) (A1P)	R2T	Thermistor (outdoor air)	Wired remote control	
F1U	Fuse (Ⓑ, 5A, 250V) (A2P)	R3T	Thermistor (inlet air into coil)	SS1	Select switch (main/sub)
F1U, F2U	Fuse (Ⓑ, 5A, 250V) (A3P)	R4T, R5Y	Thermistor (liquid/gas pipe of coil)		
F1UT-F2UT	Thermo switch (152°C) (M1F, M2F built-in)	S1L	Float switch (humidifier)	Adaptor PC board for wiring (KRP50-2)	
		S1Q	Limit switch (damper motor)	Ry1	Magnetic relay (operation/stop)
HAP	Light emitting diode (service monitor-green) (A1P)	SS1	Selector switch (for especially use) (A1P)	Ry2	Magnetic relay (for humidifier operation)
		SS1	Selector switch (humidistat input) (A3P)	Tes10	Terminal block (for external output)
HAP	Light emitting diode (service monitor-green) (A2P)	T1R	Transformer (220-240V/22V)	Connector for optional parts	
		T2R	Transformer (220-240V/22V)	X11A	Connector (adapter power supply) (A1P)
K1R~K3R	Magnetic relay (M1F) (A1P)	X1M	Terminal block (power supply)	X18A	Connector (wiring adapter for electrical appendices) (A2P)
K4R~K6R	Magnetic relay (M2F) (A1P)	X1M, X2M	Terminal block (control) (A3P)		
K7R	Magnetic relay (M1D) (A1P)	X2M	Terminal block (control) (A1P)		
K8R	Magnetic relay (S1L)	X3M	Terminal block (control)	Local supplied parts	
KCR, KFR	Magnetic relay (A3P)	X17A, X19A	Connector (relaying wire)	S1H	Humidistat

: Terminal block
: Connector
: Short circuit connector
: Terminal
: Field wiring

Colors: BLK: Black, BLU: Blue, GRN: Green, ORG: Orange, PNK: Pink, RED: Red, WHT: White, YLW: Yellow

3D051310

NOTES

1 In case of using central remote control, connect it to the unit in accordance with the attached instruction manual.
2 In case using wiring adapter, connect it to the unit in accordance with the attached installation manual.
3 When connecting the input wires from outside, fresh up control operation can be selected by remot control, in details, refer to the installation manual attached the unit.
4 When connecting the input wires from outside, forced off or on/off control operation can be selected by remot control, in details, refer to the In case of installation manual attached the unit.
5 In case installing a humidistat S1H (locally procured), remove the short circuit wiring between (1) and (2) as shown in the figure right.
6 Do not remove the short circuit connectors of X8A and X9A. The unit will not run if they are removed.
7 SS1 (A3P) has already been set to off at factory set. Humidifying becomes impossible, if the setting are changed.
8 SS1 (A1P) has already been set to 'nor', at factory set. The unit will not run if the setting are changed.
9 Use copper conductors only.

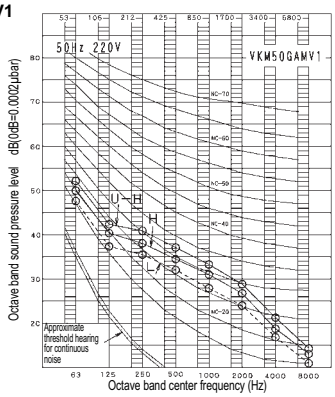
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 6 Sound data

7 - 1 - 6 - 1 Sound pressure spectrum

VKM50GAMV1



4D051291

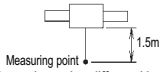
NOTES

Scale	Air flow rate		
	U-H	H	L
A	37	35	32

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 220V
- Model: VKM50GAMV1
- Ventilation mode: total heat exhange

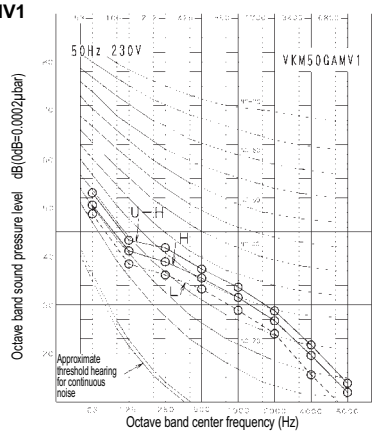
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM50GAMV1



4D051297

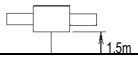
NOTES

Scale	Air flow rate		
	U-H	H	L
A	37.5	35.5	33

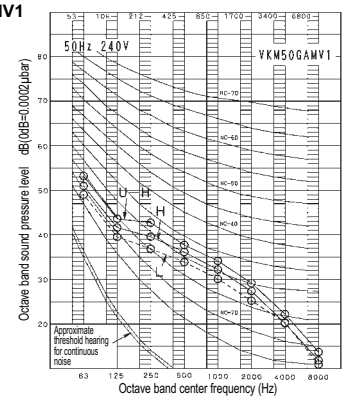
1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 230V
- Model: VKM50GAMV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



VKM50GAMV1



4D051304

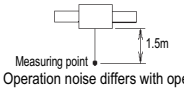
NOTES

Scale	Air flow rate		
	U-H	H	L
A	38	36	34

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 240V
- Model: VKM50GAMV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

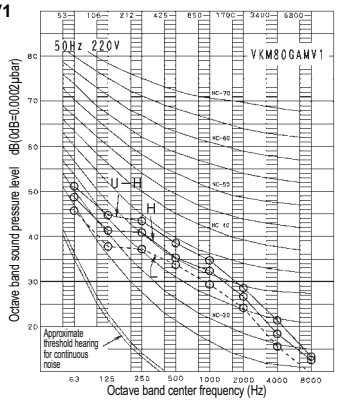
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 6 Sound data

7 - 1 - 6 - 1 Sound pressure spectrum

VKM80GAMV1



4D051292

NOTES

Scale	Air flow rate		
	U-H	H	L
A	38.5	36	33

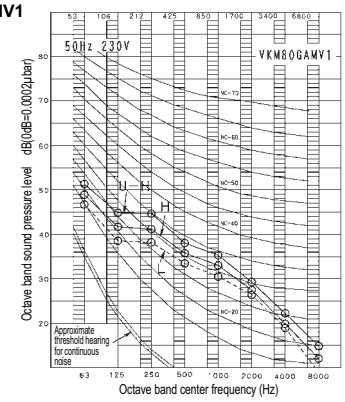
1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 220V
- Model: VKM80GAMV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone

5 Operation noise differs with operation and ambient conditions.

VKM80GAMV1



4D051299

NOTES

Scale	Air flow rate		
	U-H	H	L
A	39	37	34

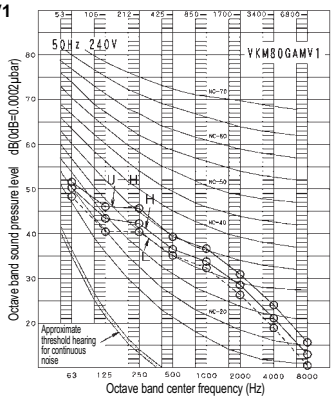
1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 230V
- Model: VKM80GAMV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone

5 Operation noise differs with operation and ambient conditions.

VKM80GAMV1



4D051305

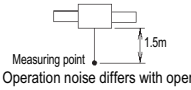
NOTES

Scale	Air flow rate		
	U-H	H	L
A	40	37.5	35.5

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 240V
- Model: VKM80GAMV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

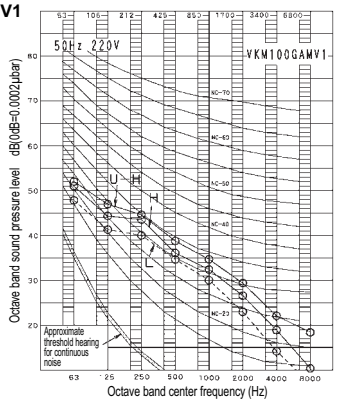
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 6 Sound data

7 - 1 - 6 - 1 Sound pressure spectrum

VKM100GAMV1



4D051293

NOTES

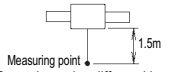
Scale	Air flow rate		
	U-H	H	L
A	39	37	34

1 Over All (dB):
(B, G, N is already rectified)

2 Operating conditons:
- Power source: Single phase 50Hz 220V
- Model: VKM100GAMV1
- Ventilation mode: total heat exhange

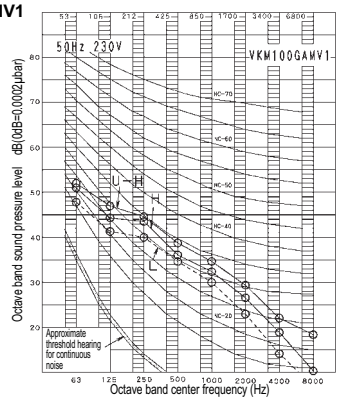
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM100GAMV1



4D051293

NOTES

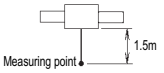
Scale	Air flow rate		
	U-H	H	L
A	39.5	37.5	34.5

1 Over All (dB):
(B, G, N is already rectified)

2 Operating conditons:
- Power source: Single phase 50Hz 230V
- Model: VKM100GAMV1
- Ventilation mode: total heat exhange

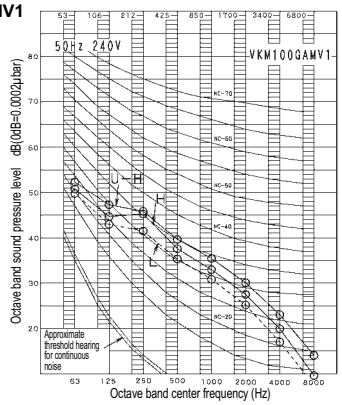
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM100GAMV1



4D051306

NOTES

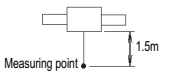
Scale	Air flow rate		
	U-H	H	L
A	40	38	35.5

1 Over All (dB):
(B, G, N is already rectified)

2 Operating conditons:
- Power source: Single phase 50Hz 240V
- Model: VKM100GAMV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

7 Product Specification

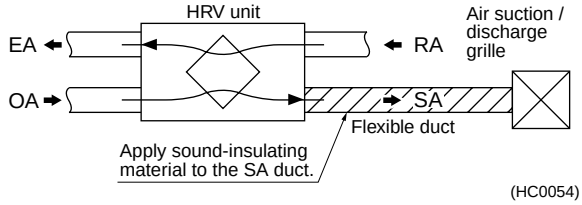
7 - 1 VKM-GAMV1

7 - 1 - 7 Reducing Operating Sound

The air suction and discharge grille may give out operating sound higher by 8 to 11 phons than of the HRV units body.
When installing this unit in a quiet place, take measures to reduce operating sound.

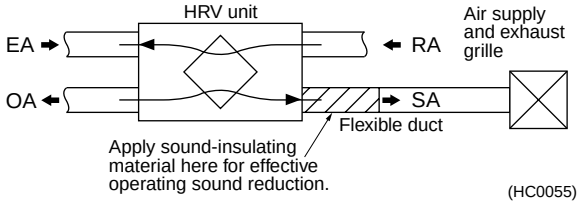
7 - 1 - 7 - 1 Points for Reducing Operating Sound

1. Operating sound heard from the air discharge outlet can be reduced just by applying sound-insulating material to the SA (indoor air supply) duct.



(HC0054)

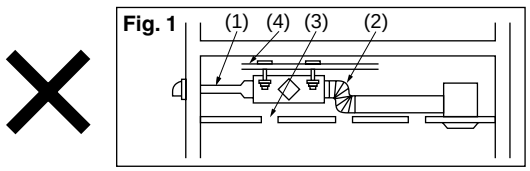
2. Operating sound can be reduced more effectively by applying sound-insulating material to a portion of the SA duct near the unit body than that near the air suction / discharge grille.



(HC0055)

7 - 1 - 7 - 2 Taking Measures to Reduce Operating Sound Heard from Attic-installed Equipment and Air Ducts.

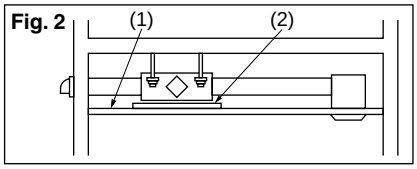
1. When installing large air volume models (650 m^3 / h or more), avoid the following wherever possible if it is expected to be necessary to apply sound-insulating material to them. (Fig.1)



(HC0056)

(1)Making the duct diameter extremely small (Example: ϕ 250 → ϕ 150, ϕ 200 → ϕ 100)
(2)Making the duct extremely bent using bellows (in particular, connecting bellows to the air discharge outlet of the unit body)
(3)Making opening holes on the ceiling
(4)Hanging the unit on a material which does not have enough hanging strength

2. Take the following sound reduction measures. (Fig.2)



(HC0057)

(1)Use a sound-insulating (low-permeability-to-sound) ceiling.

Note :
Some sound-insulating ceilings are not very effective in reducing low-frequency element of the operating sound.

(2)Place a sound-reducing material under the source of the operating sound.

Note :
When using a sound-insulating sheet, it is necessary to have the entire body of the unit covered with it. Note, however, that some models do not allow the use of a sound-insulating sheet because it may badly affect the ventilation of their radiation heat.

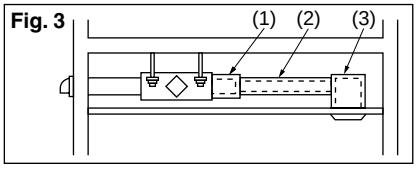
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 7 Reducing Operating Sound

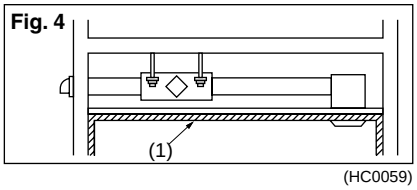
7 - 1 - 7 - 3 Reducing Operating Sound Heard from the Air Discharge Outlet (Suction Inlet)

1. Use the following recommended optional accessories to reduce operating sound heard from attic-installed duct type models. (Fig.3)



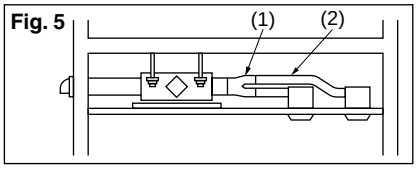
(1)Sound-eliminating box (Silencer)
(2)Flexible duct
(3)Sound-eliminating air suction / discharge grille

2. If the above accessories do not give satisfactory effect or when an attic-installed cassette type model is used, take the following measure.



(1)Apply a sound-absorbing material to the interior of the room.

3. To reduce the air flow sound heard from the air discharge outlet (suction inlet) of an attic-installed duct type model, use a small diameter flexible duct, which excels in sound absorptivity, for greater sound reduction effect.
(1)Branched duct (for letting air flow through two ducts to slow down its speed before it reaches the air discharge outlets (sunction inlets))



(2)Flexible duct

4. Installation of the unit with the source of its operating sound located at a corner of a room will be a partially effective sound reduction measure; it will keep persons in the center of the room free from the annoying operating sound, with those in the corner of the room kept annoyed by the operating sound. To avoid this, try to find the best installation place from which the operating sound is least heard by everyone in the room.

7 - 1 - 7 - 4 Effect of Remedy for Sound

Caution

1. Be sure to connect a flexible duct (2 m) to an outlet of the main body in the indoor air supply side.

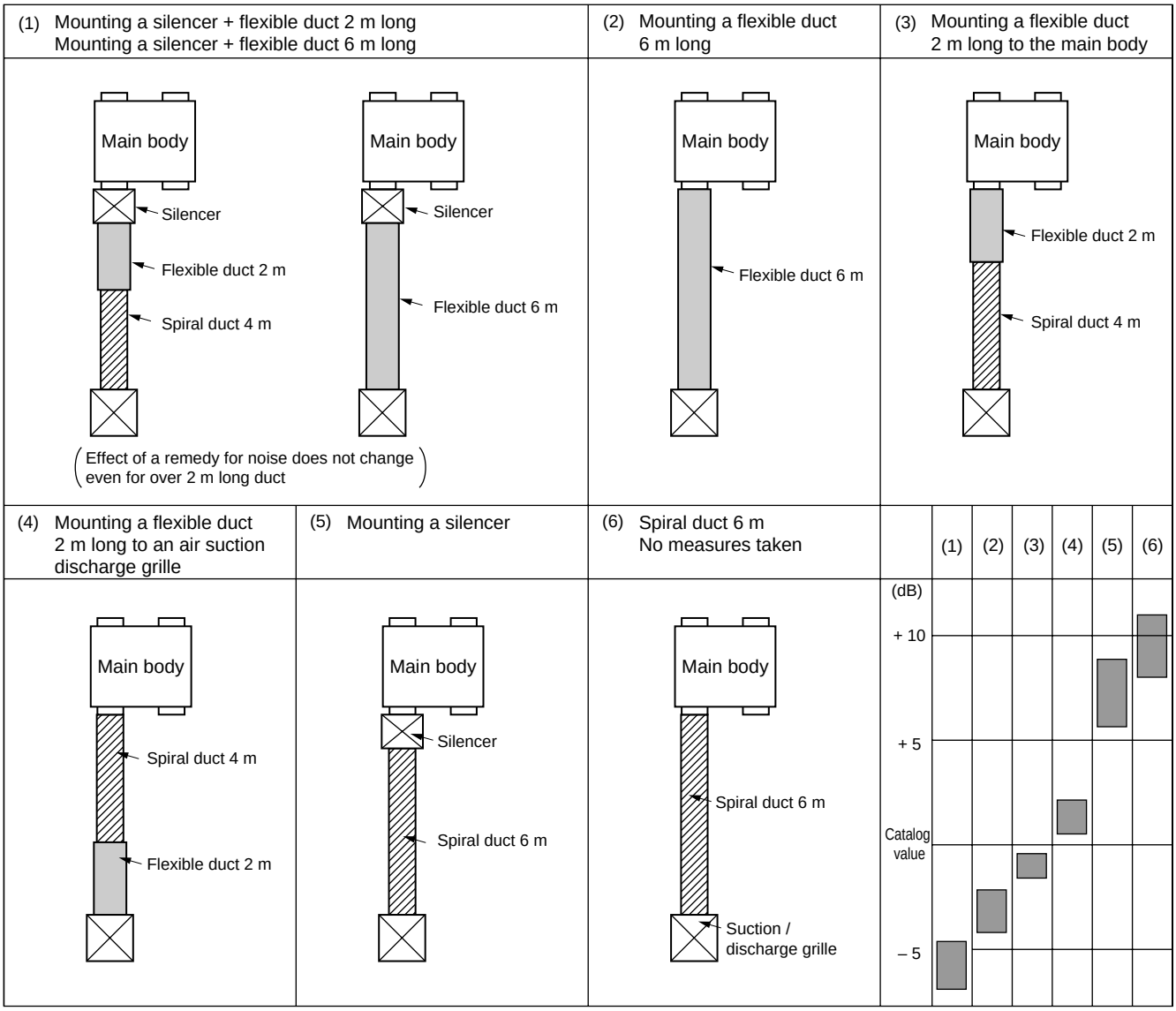
2. Do not connect a spiral duct and an alminium bellows directly to the outlet of the main body.
*A silencer is effective especially when using the flexible duct at the same time.

7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 7 Reducing Operating Sound

7 - 1 - 7 - 5 General Comparison of the Effect ((1) → (6) in more Effective Order)



(HC0061)

Note :

Measure the noise at 1.5 m below the air supply grille. Operating noise conforms to JIS standard and the value is converted in terms of the anechoic chamber.

7 - 1 - 7 - 6 Nameplate for Note

"Notes for duct work" is written on the HRV units as indicated below.

[2] When connecting a spiral duct or an aluminum bellows, sound at the air discharge outlet is higher by 8~11 phon than the main body operating sound.

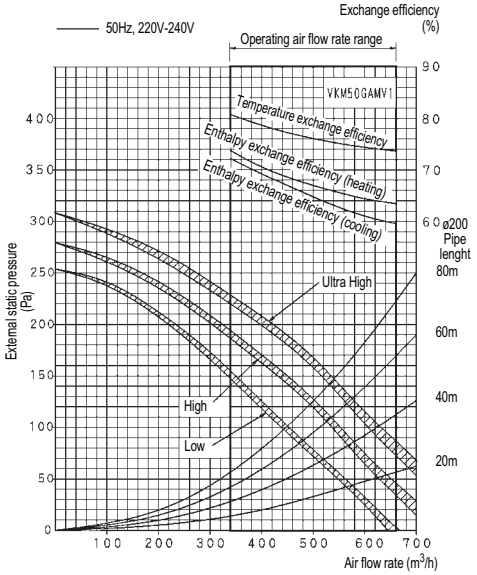
- When using this unit in a quiet place, take a remedy for sound by connecting an optional flexible duct at the outlet of the indoor air suction side of the main body.

7 Product Specification

7 - 1 VKM-GAMV1

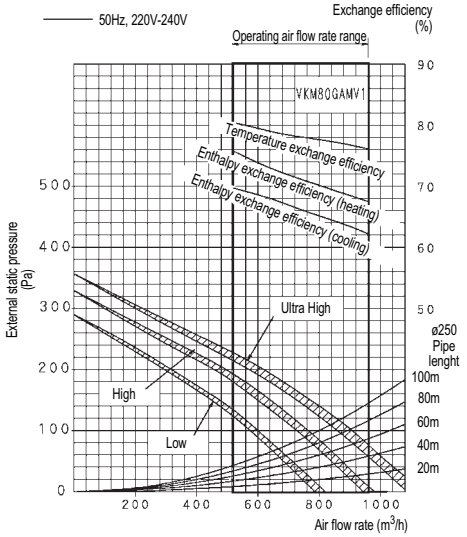
7 - 1 - 8 Fan characteristics

VKM50GAMV1



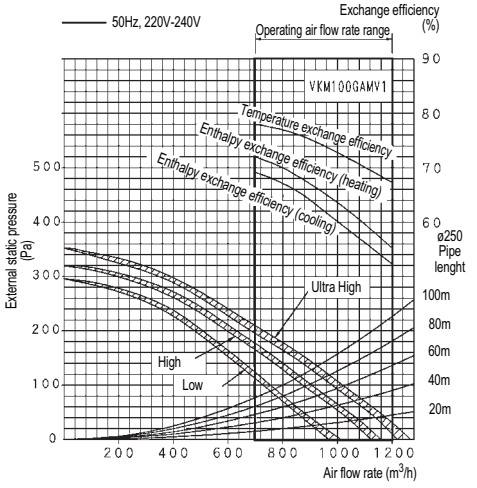
4D051312

VKM80GAMV1



4D051313

VKM100GAMV1



4D051314

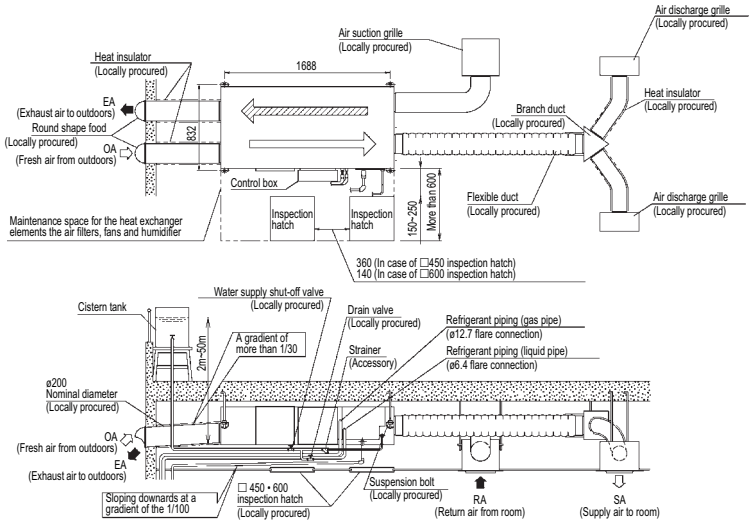
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 9 Installation

7 - 1 - 9 - 1 Installation method

VKM50GAMV1

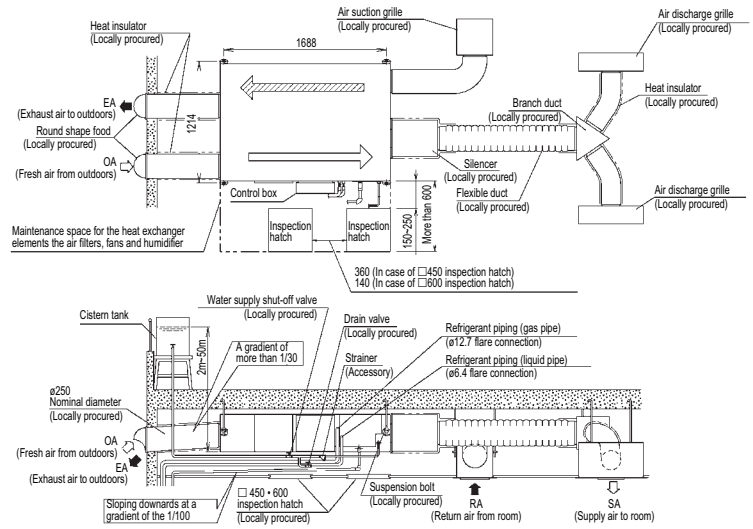


NOTES

1 Leave space for servicing the unit and include inspection hatch. (Always open a hole on the side of the control box so that the air filters, heat exchange elements, fans, and humidifier elements can easily be inspected and serviced.)
2 Install the two outdoor ducts with down slope (slope of 1/30 or more) to prevent entry of rain water, also, provide insulation for three ducts (outdoor ducts and indoor supply air duct) to prevent dew condensation) (material: glass wool of 25mm thick).
3 Do not turn the unit upside down.
4 Use city water of clean water. Include water supply piping with straner, a water supply shut-off valve, and a drain valve (both locally procured) somewhere along the water supply piping that can be reached from the inspection.
5 It is impossible to connect the water supply piping directly to public piping, use a cistern tank (of the approved type), if you need to get your water supply from public piping.
6 Make sure the supply water 0.02MPa to 0.49MPa (0.2kg/cm² to 5kg/cm²)
7 Make sure the supply water is between 5°C and 40°C in temperature.
8 Insulate the water supply piping to prevent condensation from forming.
9 Make sure install drain piping, and insulate drain piping to prevent dew condensation.
10 Keep the drain pipe short and sloping downwards at a gradient of at least 1/100 to prevent air from forming.
11 Install in a location where the air around the unit or taken into the humidifier will not drop below 0°C.
12 Do not use a bent cap or a round hood as the outdoor hood if they might get rained on directly (we recommend using a deep hood) (optional accessory).
13 In areas where freezing may occur, always take steps to prevent the pipes from freezing.
14 Do not place something which shouldn't be get wet at the below of this unit. The dew would fall at following case, where humidity is 80% more, or the exit of drain socket is choked up, or the air filter is very dirty.
15 Feed clean water, the supply water is hard water. Use water softener because of short life. Life of humidifying element is about 3 years 4,000 hours), under the supply water conditions of hardness: 150mg/L. (Life of humidifying element is about 1 year (1500 hours), under the supply water conditions of hardness: 400mg/L.)

3D051319

VKM80GAMV1



NOTES

1 Leave space for servicing the unit and include inspection hatch. (Always open a hole on the side of the control box so that the air filters, heat exchange elements, fans, and humidifier elements can easily be inspected and serviced.)
2 Install the two outdoor ducts with down slope (slope of 1/30 or more) to prevent entry of rain water, also, provide insulation for three ducts (outdoor ducts and indoor supply air duct) to prevent dew condensation) (material: glass wool of 25mm thick).
3 Do not turn the unit upside down.
4 Use city water of clean water. Include water supply piping with straner, a water supply shut-off valve, and a drain valve (both locally procured) somewhere along the water supply piping that can be reached from the inspection.
5 It is impossible to connect the water supply piping directly to public piping, use a cistern tank (of the approved type), if you need to get your water supply from public piping.
6 Make sure the supply water 0.02MPa to 0.49MPa (0.2kg/cm² to 5kg/cm²)
7 Make sure the supply water is between 5°C and 40°C in temperature.
8 Insulate the water supply piping to prevent condensation from forming.
9 Make sure install drain piping, and insulate drain piping to prevent dew condensation.
10 Keep the drain pipe short and sloping downwards at a gradient of at least 1/100 to prevent air from forming.
11 Install in a location where the air around the unit or taken into the humidifier will not drop below 0°C.
12 Do not use a bent cap or a round hood as the outdoor hood if they might get rained on directly (we recommend using a deep hood) (optional accessory).
13 In areas where freezing may occur, always take steps to prevent the pipes from freezing.
14 Do not place something which shouldn't be get wet at the below of this unit. The dew would fall at following case, where humidity is 80% more, or the exit of drain socket is choked up, or the air filter is very dirty.
15 Feed clean water, the supply water is hard water. Use water softener because of short life. Life of humidifying element is about 3 years 4,000 hours), under the supply water conditions of hardness: 150mg/L. (Life of humidifying element is about 1 year (1500 hours), under the supply water conditions of hardness: 400mg/L.)

3D051320

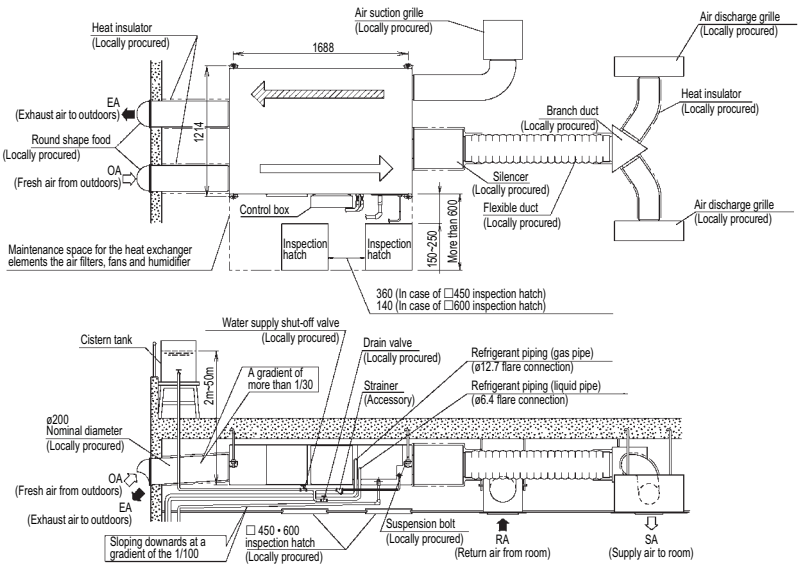
7 Product Specification

7 - 1 VKM-GAMV1

7 - 1 - 9 Installation

7 - 1 - 9 - 1 Installation method

VKM100GAMV1



NOTES

1 Leave space for servicing the unit and include inspection hatch. (Always open a hole on the side of the control box so that the air filters, heat exchange elements, fans, and humidifier elements can easily be inspected and serviced.)
2 Install the two outdoor ducts with down slope (slope of 1/30 or more) to prevent entry of rain water, also, provide insulation for three ducts (outdoor ducts and indoor supply air duct) to prevent dew condensation) (material: glass wool of 25mm thick).
3 Do not turn the unit upside down.
4 Use city water of clean water. Include water supply piping with straner, a water supply shut-off valve, and a drain valve (both locally procured) somewhere along the water supply piping that can be reached from the inspection.
5 It is impossible to connect the water supply piping directly to public piping, use a cistern tank (of the approved type), if you need to get your water supply from public piping.
6 Make sure the supply water 0.02MPa to 0.49MPa (0.2kg/cm² to 5kg/cm²)
7 Make sure the supply water is between 5°C and 40°C in temperature.
8 Insulate the water supply piping to prevent condensation from forming.
9 Make sure install drain piping, and insulate drain piping to prevent dew condensation.
10 Keep the drain pipe short and sloping downwards at a gradient of at least 1/100 to prevent air from forming.
11 Install in a location where the air around the unit or taken into the humidifier will not drop below 0°C.
12 Do not use a bent cap or a round hood as the outdoor hood if they might get rained on directly (we recommend using a deep hood) (optional accessory).
13 In areas where freezing may occur, always take steps to prevent the pipes from freezing.
14 Do not place something which shouldn't be get wet at the below of this unit. The dew would fall at following case, where humidity is 80% more, or the exit of drain socket is choked up, or the air filter is very dirty.
15 Feed clean water, the supply water is hard water. Use water softener because of short life. Life of humidifying element is about 3 years 4,000 hours), under the supply water conditions of hardness: 150mg/L. (Life of humidifying element is about 1 year (1500 hours), under the supply water conditions of hardness: 400mg/L.)

3D051321

7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 1 Specifications

TECHNICAL SPECIFICATIONS				VKM100GAV1	VKM80GAV1	VKM50GAV1
Fresh air conditioning load	Cooling		kW	9.12	7.46	4.71
	Heating		kW	10.69	8.79	5.58
Power input (nominal)	Heat exchange mode	Ultra-high	kW	0.670	0.620	0.560
		High	kW	0.570	0.560	0.490
		Low	kW	0.480	0.470	0.420
	Bypass mode	Ultra-high	kW	0.670	0.620	0.560
		High	kW	0.570	0.560	0.490
		Low	kW	0.480	0.470	0.420
Casing	Material			Galvanised steel plate		
Dimensions	Height		mm	387	387	387
	Width		mm	1764	1764	1764
	Depth		mm	1214	1214	832
Weight			kg	114	109	96
Heat exchanger	Rows			2	2	2
	Stages			12	12	12
	Fin pitch		mm	2.2	2.2	2.2
	Face area		m²	0.165	0.118	0.078
Fan	Type			Sirocco fan		
Air Flow Rate	Heat exchange mode	Ultra-high	m	950	750	500
		High	m	950	750	500
		Low	m	820	640	440
	Bypass mode	Ultra-high	m	950	750	500
		High	m	950	750	500
		Low	m	820	640	440
Fan	External static pressure	Ultra-high	Pa	150	170	180
		High	Pa	100	120	150
		Low	Pa	70	80	110
	Motor	Quantity		2	2	2
		Output	W	280	280	280
Temperature exchange efficiency	Ultra-high		%	74	78	76
	High		%	74	78	76
	Low		%	76.5	79	77.5
Enthalpy exchange efficiency	Cooling	Ultra-high	%	62	66	64
		High	%	62	66	64
		Low	%	66	68	67
	Heating	Ultra-high	%	65	71	67
		High	%	65	71	67
		Low	%	69	73	69
Operation Range	Outdoor air			-15	-15	-15
Heat exchange mode	Sound Pressure	Ultra-high	dBA	40/40.5/41	40/41/41.5	38/38.5/39
		High	dBA	38/38.5/39	37.5/38/39	36/36.5/37
		Low	dBA	35/36/36.5	34.5/36/37	33.5/34.5/35.5
Bypass mode	Sound Pressure	Ultra-high	dBA	40/40.5/41	40/41/41.5	38/38.5/39
		High	dBA	38/38.5/39	37.5/38/39	36/36.5/37
		Low	dBA	35/36/36.5	34.5/36/37	33.5/34.5/35.5
Piping connection	Liquid	Type		flare connection		
		Diameter	mm	6.4	6.4	6.4
	Gas	Type		flare connection		
		Diameter	mm	12.7	12.7	12.7
	Drain			PT3/4 external thread		
Refrigerant control				electronic expansion valve		
Insulation material				Self-extinguishable urethane foam		
Heat exchange system				Air to air cross flow total heat (sensible + latent heat) exchange		
Heat exchange element				Specially processed non-flammable paper		
Air Filter				Multidirectional fibrous fleeces		

TECHNICAL SPECIFICATIONS			VKM100GAV1	VKM80GAV1	VKM50GAV1
Connection duct diameter		mm	250	250	200
Operation mode			Heat exchange mode, bypass mode, fresh-up mode		
Standard Accessories	Item		Installation and operation manual		
			Duct connection flange		
			M4 tapping screw to connect duct		
			refrigerant piping insulation cover		
			clamp		
Notes			Cooling and heating capacities are based on the following conditions: Fan is based on High and Ultra High. The figures in parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use 7.0kW.	Cooling and heating capacities are based on the following conditions: Fan is based on High and Ultra High. The figures in parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use 5.6kW.	Cooling and heating capacities are based on the following conditions: Fan is based on High and Ultra High. The figures in parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use 3.5kW.
			Cooling capacities are based on: indoor temperature: 27		
			Heating capacities are based on: indoor temperature: 20		
			Operation sound measured at 1.5m below the center of the unit is converted to that measured in an anechoic chamber, built in accordance with JIS C1502 condition. The actual operation sound varies depending on the surrounding conditions (near running unit		
			The sound level at the air discharge port is about 8-11dB higher than the unit's operating sound. For operation in a quiet room, it is required to take measures to lower the sound, for example install more than 2m soft duct near the air discharge grille		
			Air flow rate can be changed over to Low mode or High mode.		
			Normal amplitude, input, efficiency depend on the other above conditions		
			OA: fresh air from outdoor, RA: return air from the room		
			The specifications, designs and information here are subject to change without notice		
			Temperature Exchange Efficiency is a mean value in cooling and heating		
			Efficiency is measured under following condition: ratio of rated external static pressure has been kept as follows: outdoor side to indoor side = 7 to 1		
			During the heating operation the freezing of the outdoor unit coil increases, heating capacity decreases and the system goes into defrost operation. During defrost operation the fans of the units continue driving (factory settings), the purpose of this is to maintain the amount of ventilation and humidification.		
			When connecting with a VRV Heat Recovery outdoor unit, bring the RA (exhaust gas intake) of this unit directly in from the ceiling. Connect to a BS unit identical to the VRV outdoor unit (master unit), and use group-linked operation.		
			When connecting the indoor unit directly to the duct, always take the same system on the indoor unit as with the outdoor unit. Perform group-linked operation and make the direct duct connection settings from the remote controller. (Mode No. '17 (27)' -first code n° '5' - Second Code n° '6') Do not connect to the outlet side of the indoor unit, depending on the fan strength and static pressure the unit might back up.		

ELECTRICAL SPECIFICATIONS				VKM100GAV1	VKM80GAV1	VKM50GAV1
Power Supply	Name			V1		
	Phase			1	1	1
	Frequency		Hz	50	50	50
	Voltage		V	220-240		
Nominal running current (RLA)	Heat exchange mode	Ultra-high	A	3.00	3.00	3.00
		High	A	2.50	2.60	2.50
		Low	A	2.10	2.10	2.10
	Bypass mode	Ultra-high	A	3.00	3.00	3.00
		High	A	2.50	2.60	2.50
		Low	A	2.10	2.10	2.10
Current	Minimum circuit amps (MCA)		A	4.30	4.30	4.30
	Maximum fuse amps (MFA)		A	15	15	15
	Fan motor rated output		kW	0.28 x 2		
	Full load amps (FLA)		A	1.9 x 2		
Voltage range	Minimum		V	198	198	198
	Maximum		V	264	264	264
Notes				Voltage range : Units are suitable for use on the electrical systems where the voltage supplied to the unit terminals is not below or above the listed range limits.		
				Maximum allowable voltage range variation between phases is 2%		
				MCA/MFA : MCA = 1.25 x FLA (FM1) + FLA (FM2) ; MFA <= 4 x FLA ; (Next lower standard fuse rating. Min. 15A		
				Select wire size based on the value of MCA.		
				Instead of the fuse, use the circuit breaker.		

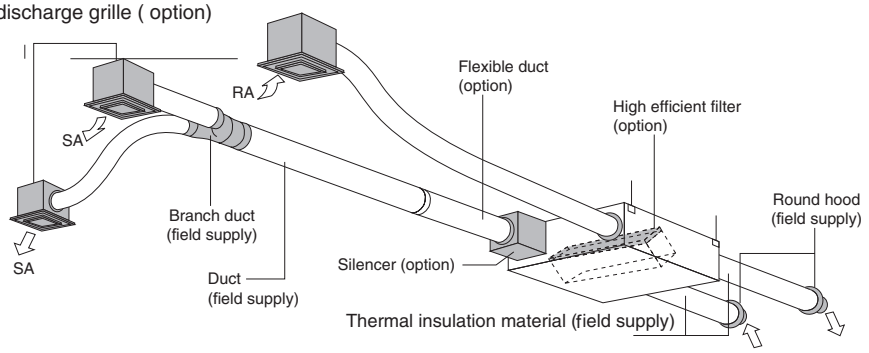
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 2 Options

VKM-GA(M)V1

Air suction/discharge grille (option)



			VKM-GAV1									
Controling device	Remote control		BRC1A62 (General market) BRC1D527 (EC market) (✻1)									
	Centralized controlling device	Central remote control	DCS302C51									
		Unified ON/OFF control	DCS301B61 (General market) DCS301B51 (EC market)									
		Schedule timer	DST301B51									
	PC board adapter	Wiring adapter for electrical appendices	KRP2A61 (General market) KRP2A51 (EC market)									
		For ON signal output	KRP50-2									
		For heater control kit	BRP4A50									
		For wiring — Type (indoor unit of VRV)	FXCQ-M	FXFQ-P	FXKQ-M	FXSQ-M	FXMQ-M	FXHQ-M	FXAQ-M	FXDQ-N	FXLQ-M FXNQ-M	FXZQ-M
			KRP1B61★	-	KRP1B61			KRPB3	-	KRP1B56	KRP1B61	KRP1B57
		Installation box for adapter PCB ☆	KRP1B96 Notes 2, 3	KRP1D98 Notes 2, 3	-	KRP4A91 Notes 5	-	KRP1C93 Notes 3	KRP4A93 Notes 2, 3	KRP1B101 Notes 4, 6	-	KRP1B101 Notes 4, 6

NOTES

1 Installation box ☆ is necessary for each adapter marked ★.
2 Up to 2 adapters can be fixed for each installation box.
3 Only one installation box can be installed for each indoor unit.
4 Up to 2 installation boxes can be installed for each indoor unit.
5 Installation box ☆ is necessary for second adapter.
6 Installation box ☆ is necessary for each adapter.
7 ✻1 Necessary when operating HRV (VKM) independently. When operating interlocked with other air conditioners, use the remote control of the air conditioners.

			VKM-GAV1		
			50	80	100
Additional function	Silencer		-	KDDM24B100	
		Nominal pipe diameter (mm)	-	ø250	
	Air suction/ Discharge grill	White	K-DGL200B	K-DGL250B	
		Nominal pipe diameter (mm)	ø200	ø250	
	High efficiency filter		KAF241G80M	KAF241G100M	
	Air filter for replacement		KAF242G80M	KAF242G100M	
Flexible duct (1m)			K-FDS201C	K-FDS251C	
Flexible duct (2m)			K-FDS202C	K-FDS252C	


Remote Control


Centralised remote control


Unified ON/OFF controller


Schedule timer


Silencer


Air suction/discharge grille (Noise suppression type)


Flexible duct (Noise suppression type)

7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 3 Capacity tables

7 - 2 - 3 - 1 Cooling capacity tables

VKM-GA(M)

TC: Total capacity : kW; SHC : Sensible heat capacity : kW

Class	Capacity	Outdoor	Coil Inlet air temp.°CDB													
			14.0WB		16.0WB		18.0WB		19.0WB		20.0WB		22.0WB		24.0WB	
	DX-Coil Only	°CDB	20.0DB		23.0DB		26.0DB		27.0DB		28.0DB		30.0DB		32.0DB	
			TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
50	2.8kW index 25	10.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	—	—	—	—	—	—
		12.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	—	—	—	—	—	—
		14.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		16.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		18.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		20.0	1.9	1.5	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		21.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	—	—	—	—
		23.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.3	2.1	—	—
		25.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.3	2.0	—	—
		27.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.2	2.0	—	—
		29.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.2	2.0	—	—
		31.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.1	2.0	—	—
		33.0	—	—	2.3	1.8	2.6	2.0	2.8	2.0	3.0	2.0	3.1	2.0	3.1	1.8
		35.0	—	—	—	—	2.6	2.0	2.8	2.0	3.0	2.0	3.0	1.9	3.1	1.8
		37.0	—	—	—	—	2.6	2.0	2.8	2.0	2.9	2.0	3.0	1.9	3.0	1.8
		39.0	—	—	—	—	2.6	2.0	2.8	2.0	2.9	2.0	2.9	1.9	3.0	1.8
80	4.5kW index 40	10.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	—	—	—	—	—	—
		12.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	—	—	—	—	—	—
		14.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	3.3	—	—	—	—
		16.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		18.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		20.0	3.0	2.1	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		21.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	—	—	—	—
		23.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.3	2.9	—	—
		25.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.2	2.9	—	—
		27.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.1	2.8	—	—
		29.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.1	2.8	—	—
		31.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	5.0	2.8	—	—
		33.0	—	—	3.6	2.4	4.2	2.7	4.5	2.7	4.8	2.8	4.9	2.7	5.0	2.6
		35.0	—	—	—	—	4.2	2.7	4.5	2.7	4.7	2.8	4.8	2.7	4.9	2.6
		37.0	—	—	—	—	4.2	2.7	4.5	2.7	4.6	2.8	4.8	2.7	4.9	2.6
		39.0	—	—	—	—	4.2	2.7	4.5	2.7	4.6	2.7	4.7	2.6	4.8	2.5
100	5.6kW index 50	10.0	3.8	2.5	4.5	2.9	5.2	3.3	—	—	—	—	—	—	—	—
		12.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	—	—	—	—	—	—
		14.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	—	—	—	—	—	—
		16.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		18.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		20.0	3.8	2.5	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		21.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		23.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	—	—	—	—
		25.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.5	3.5	—	—
		27.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.4	3.5	—	—
		29.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.3	3.4	—	—
		31.0	—	—	4.5	2.9	5.2	3.3	5.6	3.3	6.0	3.4	6.2	3.4	—	—
		33.0	—	—	—	—	5.2	3.3	5.6	3.3	6.0	3.4	6.1	3.3	6.3	3.2
		35.0	—	—	—	—	5.2	3.3	5.6	3.3	5.9	3.3	6.0	3.3	6.2	3.2
		37.0	—	—	—	—	5.2	3.3	5.6	3.3	5.8	3.3	5.9	3.2	6.1	3.1
		39.0	—	—	—	—	5.2	3.3	5.6	3.3	5.7	3.3	5.8	3.2	6.0	3.1

NOTES

1 Cooling and heating capacities are based on the following conditons. Fan is based on High and Ultra-high? The figures in the parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use the following figures:
VKM50GAV1 : 3.5kW
VKM80GAV1: 5,6kW
VKM100GAV1 : 7.0kW

7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 3 Capacity tables

7 - 2 - 3 - 2 Heating capacity tables

VKM-GA(M)

Class	Capacity	Outdoor		Coil Inlet air temp.°CDB					
	DX-Coil Only	°CDB	°CWB	16.0kW	18.0kW	20.0kW	21.0kW	22.0kW	24.0kW
50	2.8kW index 25	-14.7	-15.0	2.2	2.2	—	—	—	—
		-12.6	-13.0	2.3	2.3	—	—	—	—
		-10.5	-11.0	2.4	2.4	—	—	—	—
		-9.5	-10.0	2.5	2.4	—	—	—	—
		-8.5	-9.1	2.5	2.5	—	—	—	—
		-7.0	-7.6	2.6	2.6	2.7	—	—	—
		-5.0	-5.6	2.7	2.7	2.7	—	—	—
		-3.0	-3.7	2.8	2.8	3.0	3.0	—	—
		0.0	-0.7	3.0	3.0	3.1	3.1	—	—
		3.0	2.2	3.1	3.1	3.2	3.1	3.0	—
		5.0	4.1	3.3	3.2	3.2	3.1	3.0	—
		7.0	6.0	3.4	3.4	3.2	3.1	3.0	—
		9.0	7.9	3.5	3.4	3.2	3.1	3.0	—
		11.0	9.8	3.6	3.4	3.2	3.1	3.0	2.8
		13.0	11.8	3.6	3.4	3.2	3.1	3.0	2.8
		15.0	13.7	3.6	3.4	3.2	3.1	3.0	2.8
80	4.5kW index 40	-14.7	-15.0	3.4	3.4	—	—	—	—
		-12.6	-13.0	3.6	3.6	—	—	—	—
		-10.5	-11.0	3.7	3.7	—	—	—	—
		-9.5	-10.0	3.9	3.7	—	—	—	—
		-8.5	-9.1	3.9	3.9	—	—	—	—
		-7.0	-7.6	4.1	4.1	4.2	—	—	—
		-5.0	-5.6	4.2	4.2	4.2	—	—	—
		-3.0	-3.7	4.4	4.4	4.7	4.6	—	—
		0.0	-0.7	4.7	4.7	4.9	4.9	—	—
		3.0	2.2	4.9	4.9	5.0	4.9	4.7	—
		5.0	4.1	5.2	5.0	5.0	4.9	4.7	—
		7.0	6.0	5.3	5.3	5.0	4.9	4.7	—
		9.0	7.9	5.5	5.3	5.0	4.9	4.7	—
		11.0	9.8	5.7	5.3	5.0	4.9	4.7	4.4
		13.0	11.8	5.7	5.3	5.0	4.9	4.7	4.4
		15.0	13.7	5.7	5.3	5.0	4.9	4.7	4.4
100	5.6kW index 50	-14.7	-15.0	4.4	4.4	—	—	—	—
		-12.6	-13.0	4.6	4.6	—	—	—	—
		-10.5	-11.0	4.8	4.8	—	—	—	—
		-9.5	-10.0	5.0	4.8	—	—	—	—
		-8.5	-9.1	5.0	5.0	—	—	—	—
		-7.0	-7.6	5.2	5.3	—	—	—	—
		-5.0	-5.6	5.4	5.4	5.4	—	—	—
		-3.0	-3.7	5.6	5.6	6.0	—	—	—
		0.0	-0.7	6.0	6.0	6.2	6.2	—	—
		3.0	2.2	6.2	6.2	6.4	6.2	6.0	—
		5.0	4.1	6.6	6.4	6.4	6.2	6.0	—
		7.0	6.0	6.8	6.8	6.4	6.2	6.0	—
		9.0	7.9	7.0	6.8	6.4	6.2	6.0	—
		11.0	9.8	7.2	6.8	6.4	6.2	6.0	5.6
		13.0	11.8	7.2	6.8	6.4	6.2	6.0	5.6
		15.0	13.7	7.2	6.8	6.4	6.2	6.0	5.6

NOTES

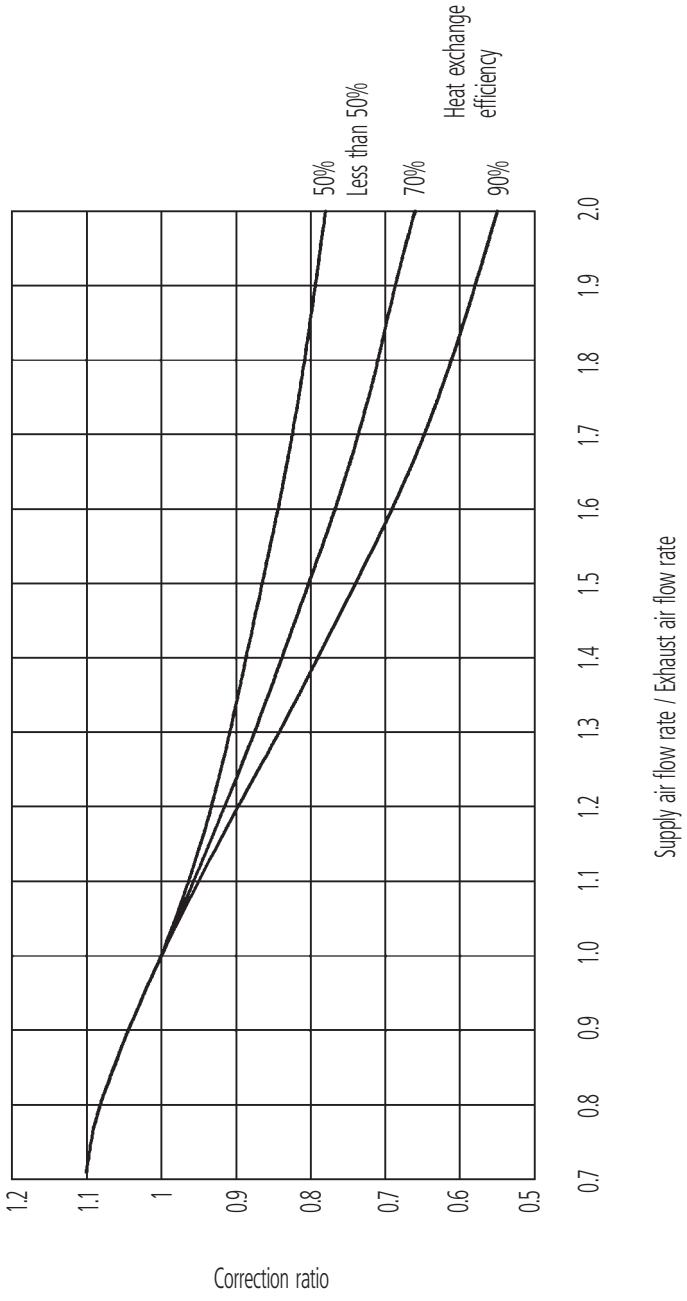
Cooling and heating capacities are based on the following conditions. Fan is based on High and Ultra-high. The figures in the parenthesis indicate the heat reclaimed from the heat recovery ventilator. When calculating the capacity as indoor units, use the following figures :
VKM50GAV1 : 3.5kW
VKM80GAV1 : 5.6kW
VKM100GAV1 : 7.0kW

7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 3 Capacity tables

7 - 2 - 3 - 3 Capacity correction factor



4D023764

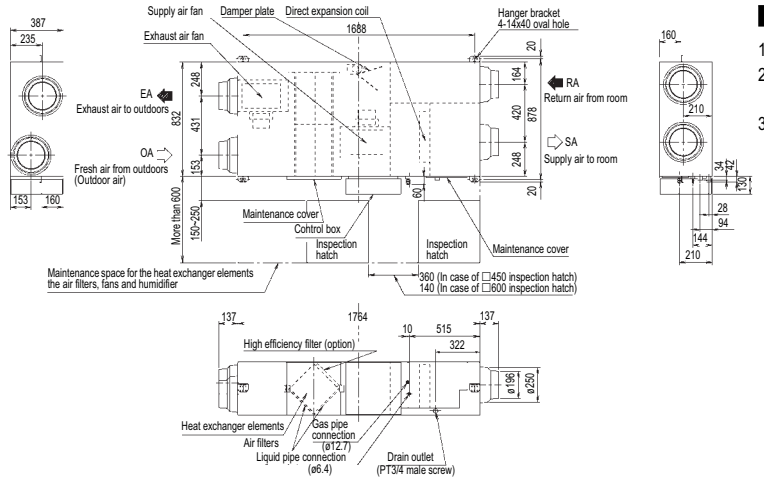
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 4 Dimensional drawing & centre of gravity

7 - 2 - 4 - 1 Dimensional drawing

VKM50GAV1

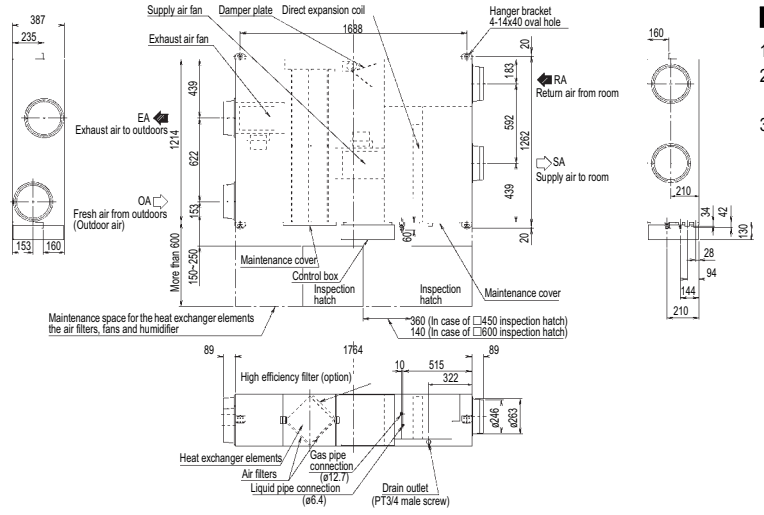


NOTES

1 Specifications are subject to change without notice.
2 Be sure to provide two inspection hatches (☐450 or ☐600) at the service side of filters and elements.
3 The high efficiency filter (option) can be attached to the SA surface of the heat exchanger elements.

3D051288

VKM80GAV1



NOTES

1 Specifications are subject to change without notice.
2 Be sure to provide two inspection hatches (☐450 or ☐600) at the service side of filters and elements.
3 The high efficiency filter (option) can be attached to the SA surface of the heat exchanger elements.

3D051289

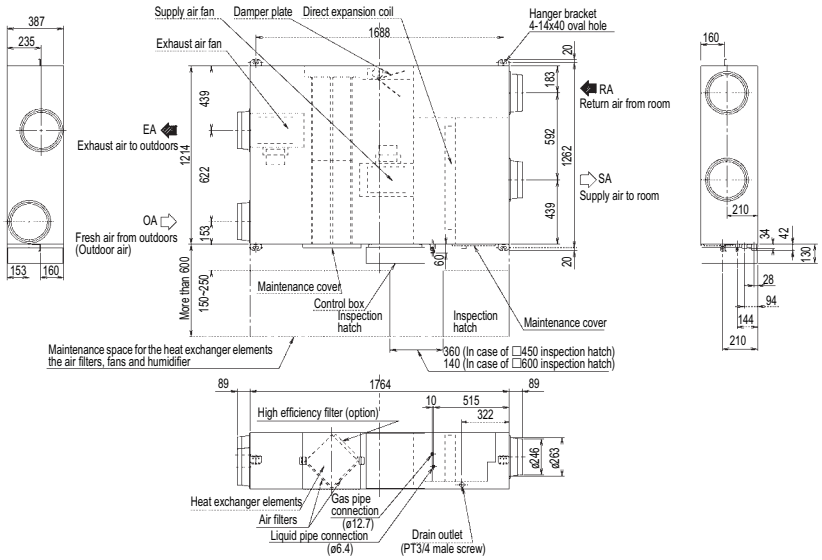
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 4 Dimensional drawing & centre of gravity

7 - 2 - 4 - 1 Dimensional drawing

VKM100GAV1



NOTES

1 Specifications are subject to change without notice.
2 Be sure to provide two inspection hatches (□450 or □600) at the service side of filters and elements.
3 The high efficiency filter (option) can be attached to the SA surface of the heat exchanger elements.

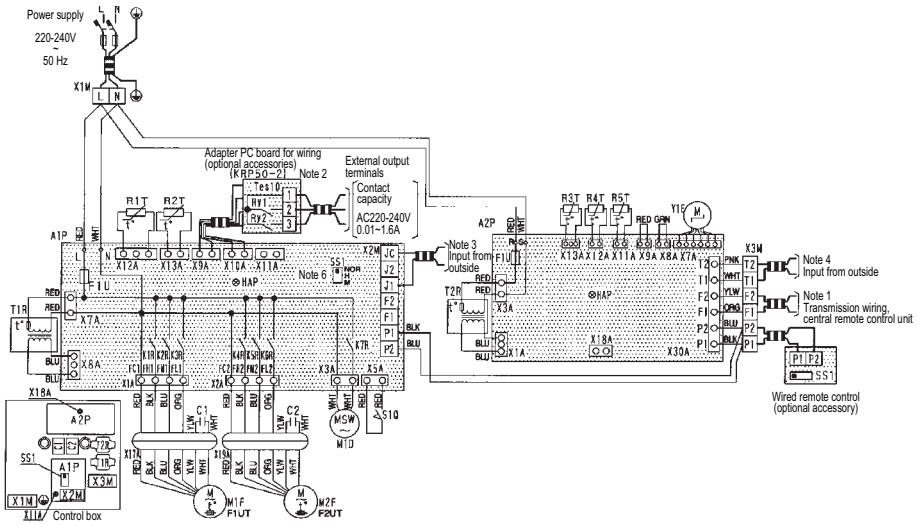
3D051290

7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 5 Wiring diagram

VKM50,80,100GAV1



Indoor unit		M1F	Motor (supply air fan)	Optional accessories	
A1P	Printed circuit board	M2F	Motor (exhaust air fan)	Wired remote control	
A2P	Printed circuit board	R1T	Thermistor (indoor air)	SS1	Select switch (main/sub)
C1•C2	Capacitor (M1F)	R2T	Thermistor (outdoor air)		
F1U	Fuse (Ⓑ, 10A, 250V) (A1P)	R3T	Thermistor (inlet air into coil)		
F1U	Fuse (Ⓑ, 5A, 250V) (A2P)	R4T, R5T	Thermistor (liquid/gas pipe of coil)	Adaptor PC board for wiring (KRP50-2)	
F1UT•F2UT	Thermo switch (152°C) (M1F, M2F built-in)	S1Q	Limit switch (damper motor)	Ry1	Magnetic relay (operation/stop)
		SS1	Selector switch (for especially use) (A1P)	Ry2	Magnetic relay (for humidifier operation)
HAP	Light emitting diode (service monitor-green) (A1P)	T1R	Transformer (220-240V/22V)	Tes10	Terminal block (for external output)
		T2R	Transformer (220-240V/22V)		
HAP	Light emitting diode (service monitor-green) (A2P)	X1M	Terminal block (power supply)		
		X2M	Terminal block (control) (A1P)	Connector for optional parts	
K1R~K3R	Magnetic relay (M1F) (A1P)	X3M	Terminal block (control)	X11A	Connector (adapter power supply) (A1P)
K4R~K6R	Magnetic relay (M2F) (A1P)	X17A, X19A	Connector (relaying wire)	X18A	Connector (wiring adapter for electrical appendices) (A2P)
K7R	Magnetic relay (M1D) (A1P)	X20A	Connector (relaying wire)		
M1D	Motor (damper motor)	Y1E	Electronic expansion valve		

□□□□	: Terminal block	Colors:	BLK: Black	PNK:	Pink
⊡⊡, ⊡–	: Connector		BLU: Blue	RED:	Red
⊡□	: Short circuit connector		GRN: Green	WHT:	White
—○—	: Terminal		ORG: Orange	YLW:	Yellow
=▮▮▮=	: Field wiring				

3D051311

NOTES

1 In case of using central remote control, connect it to the unit in accordance with the attached instruction manual.
2 In case using wiring adapter, connect it to the unit in accordance with the attached installation manual.
3 When connecting the input wires from outside, fresh up control operation can be selected by remot control, in details, refer to the installation manual attached the unit.
4 When connecting the input wires from outside, forced off or on/off control operation can be selected by remot control, in details, refer to the In case of installation manual attached the unit.
5 Do not remove the short circuit connectors of X8A and X9A. The unit will not run if they are removed.
6 SS1 (A1P) has already been set to 'nor', at factory set. The unit will not run if the setting are changed.
7 Use copper conductors only.

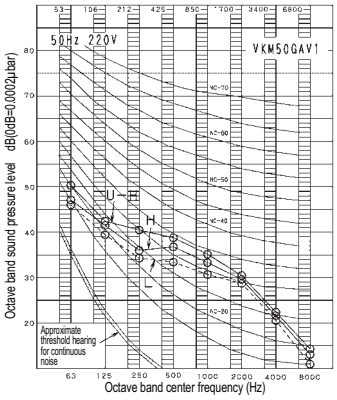
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 6 Sound data

7 - 2 - 6 - 1 Sound pressure spectrum

VKM50GAV1



4D051294

NOTES

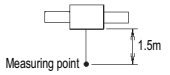
Scale	Air flow rate		
	U-H	H	L
A	38	36	33.5

1 Over All (dB):
(B, G, N is already rectified)

2 Operating conditons:
- Power source: Single phase 50Hz 220V
- Model: VKM50GAV1
- Ventilation mode: total heat exhange

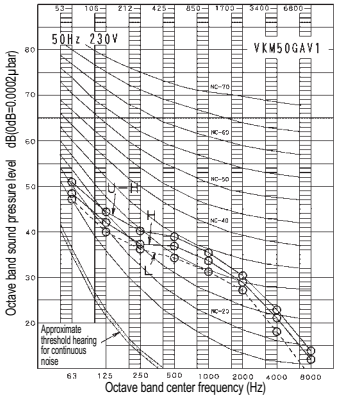
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM50GAV1



4D051301

NOTES

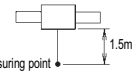
Scale	Air flow rate		
	U-H	H	L
A	38.5	36.5	34.5

1 Over All (dB):
(B, G, N is already rectified)

2 Operating conditons:
- Power source: Single phase 50Hz 230V
- Model: VKM50GAV1
- Ventilation mode: total heat exhange

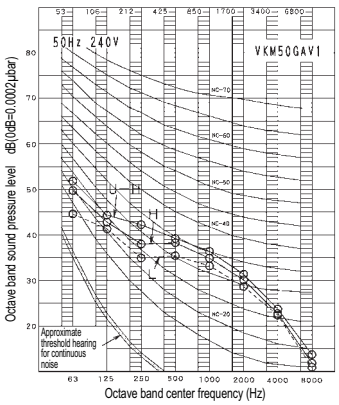
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM50GAV1



4D051307

NOTES

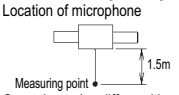
Scale	Air flow rate		
	U-H	H	L
A	39	37	35.5

1 Over All (dB):
(B, G, N is already rectified)

2 Operating conditons:
- Power source: Single phase 50Hz 240V
- Model: VKM50GAV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

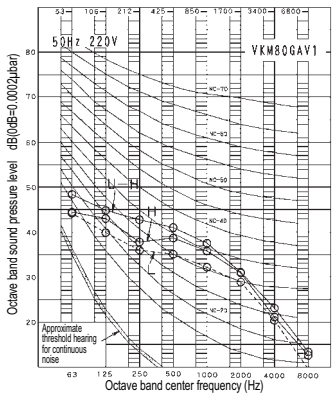
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 6 Sound data

7 - 2 - 6 - 1 Sound pressure spectrum

VKM80GAV1



4D051295

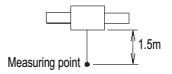
NOTES

Scale	Air flow rate		
	U-H	H	L
A	40	37.5	34.5

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 220V
- Model: VKM80GAV1
- Ventilation mode: total heat exhange

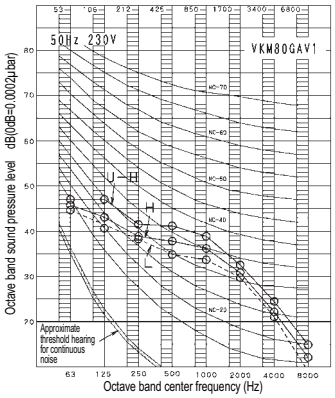
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM80GAV1



4D051302

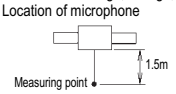
NOTES

Scale	Air flow rate		
	U-H	H	L
A	41	38	36

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 230V
- Model: VKM80GAV1
- Ventilation mode: total heat exhange

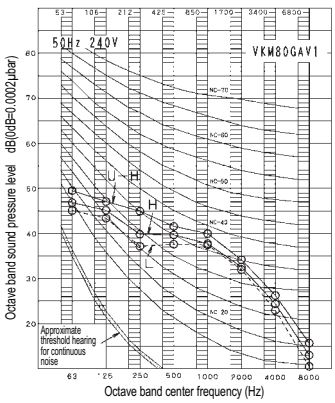
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM80GAV1



4D051308

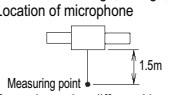
NOTES

Scale	Air flow rate		
	U-H	H	L
A	41.5	39	37

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 240V
- Model: VKM80GAV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

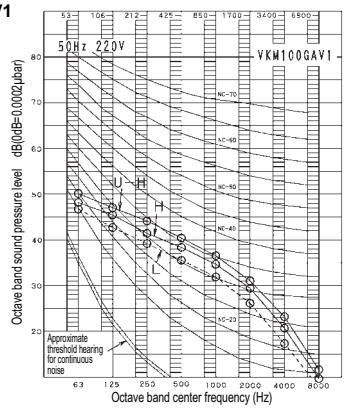
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 6 Sound data

7 - 2 - 6 - 1 Sound pressure spectrum

VKM100GAV1



4D051296

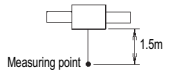
NOTES

Scale	Air flow rate		
	U-H	H	L
A	40	38	35

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 220V
- Model: VKM100GAV1
- Ventilation mode: total heat exhange

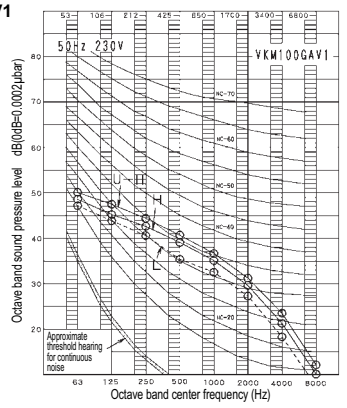
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM100GAV1



4D051303

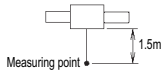
NOTES

Scale	Air flow rate		
	U-H	H	L
A	40.5	38.5	36

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 230V
- Model: VKM100GAV1
- Ventilation mode: total heat exhange

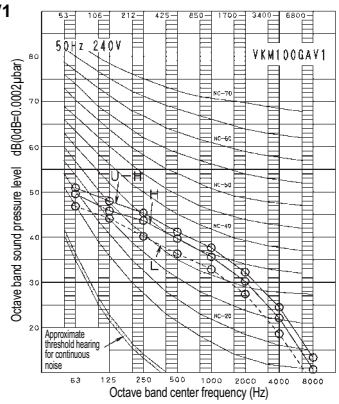
3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

VKM100GAV1



4D051309

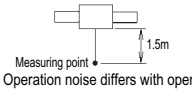
NOTES

Scale	Air flow rate		
	U-H	H	L
A	41	39	36.5

1 Over All (dB):
(B, G, N is already rectified)
2 Operating conditons:
- Power source: Single phase 50Hz 240V
- Model: VKM100GAV1
- Ventilation mode: total heat exhange

3 Measuring place:
Remark:
- Operation noise is measured in an anechoic chamber.
- The operation noise level becomes greater than this value depending on the operation conditions, reflected sound, and peripheral noise.
- Operation noise differs with operation and ambient conditions.
- U-H: ultra-high, H: high, L: low

4 Location of microphone



5 Operation noise differs with operation and ambient conditions.

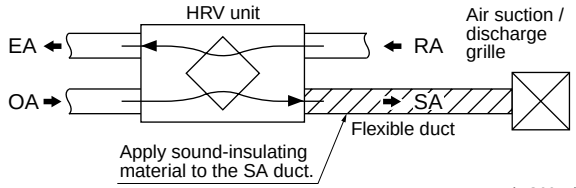
7 Product Specification

7 - 2 VKM-GAV1

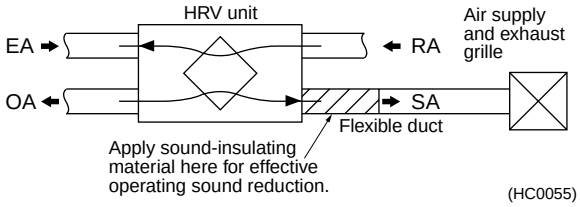
7 - 2 - 7 Reducing Operating Sound

The air suction and discharge grille may give out operating sound higher by 8 to 11 phons than of the HRV units body.
When installing this unit in a quiet place, take measures to reduce operating sound.

1. Operating sound heard from the air discharge outlet can be reduced just by applying sound-insulating material to the SA (indoor air supply) duct.

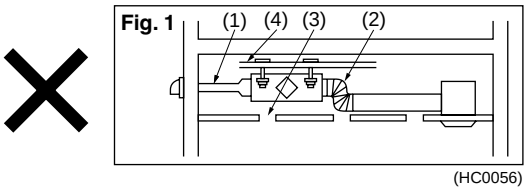


2. Operating sound can be reduced more effectively by applying sound-insulating material to a portion of the SA duct near the unit body than that near the air suction / discharge grille.



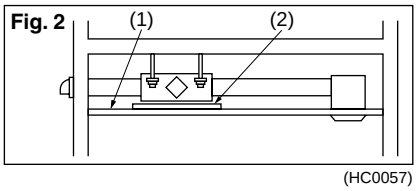
7 - 2 - 7 - 1 Taking Measures to Reduce Operating Sound Heard from Attic-installed Equipment and Air Ducts.

1. When installing large air volume models (650 m^3 / h or more), avoid the following wherever possible if it is expected to be necessary to apply sound-insulating material to them. (Fig.1)



(1)Making the duct diameter extremely small (Example: ϕ 250 → ϕ 150, ϕ 200 → ϕ 100)
(2)Making the duct extremely bent using bellows (in particular, connecting bellows to the air discharge outlet of the unit body)
(3)Making opening holes on the ceiling
(4)Hanging the unit on a material which does not have enough hanging strength

2. Take the following sound reduction measures. (Fig.2)



(1)Use a sound-insulating (low-permeability-to-sound) ceiling.

Note :

Some sound-insulating ceilings are not very effective in reducing low-frequency element of the operating sound.

(2)Place a sound-reducing material under the source of the operating sound.

Note :

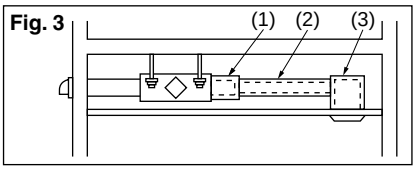
1 When using a sound-insulating sheet, it is necessary to have the entire body of the unit covered with it. Note, however, that some models do not allow the use of a sound-insulating sheet because it may badly affect the ventilation of their radiation heat.

7 Product Specification

7 - 2 VKM-GAV1

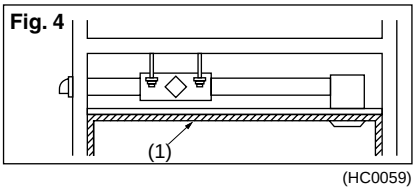
7 - 2 - 7 - 2 Reducing Operating Sound Heard from the Air Discharge Outlet (Suction Inlet)

1. Use the following recommended optional accessories to reduce operating sound heard from attic-installed duct type models. (Fig.3)



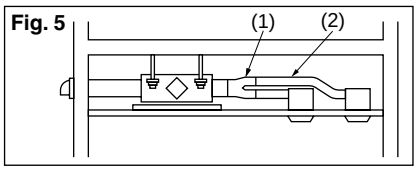
(1)Sound-eliminating box (Silencer)
(2)Flexible duct
(3)Sound-eliminating air suction / discharge grille

2. If the above accessories do not give satisfactory effect or when an attic-installed cassette type model is used, take the following measure.



(1)Apply a sound-absorbing material to the interior of the room.

3. To reduce the air flow sound heard from the air discharge outlet (suction inlet) of an attic-installed duct type model, use a small diameter flexible duct, which excels in sound absorptivity, for greater sound reduction effect.
(1)Branched duct (for letting air flow through two ducts to slow down its speed before it reaches the air discharge outlets (sunction inlets))



(2)Flexible duct

4. Installation of the unit with the source of its operating sound located at a corner of a room will be a partially effective sound reduction measure; it will keep persons in the center of the room free from the annoying operating sound, with those in the corner of the room kept annoyed by the operating sound. To avoid this, try to find the best installation place from which the operating sound is least heard by everyone in the room.

7 - 2 - 7 - 3 Effect of Remedy for Sound

Caution

1. Be sure to connect a flexible duct (2 m) to an outlet of the main body in the indoor air supply side.
2. Do not connect a spiral duct and an alminium bellows directly to the outlet of the main body.

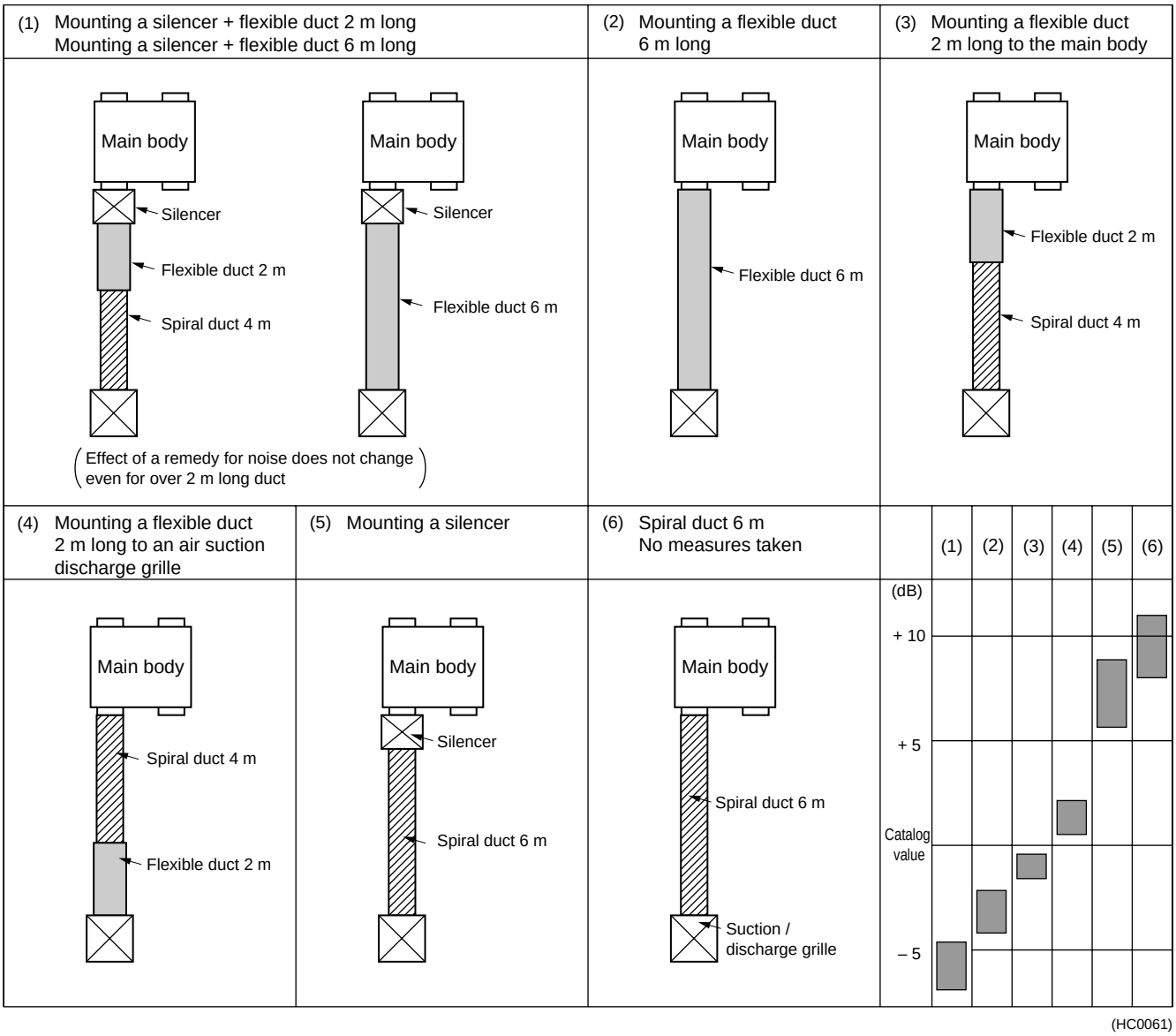
* A silencer is effective especially when using the flexible duct at the same time.

7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 7 Reducing Operating Sound

7 - 2 - 7 - 4 General Comparison of the Effect ((1) → (6) in more Effective Order)



(HC0061)

Note :

Measure the noise at 1.5 m below the air supply grille. Operating noise conforms to JIS standard and the value is converted in terms of the anechoic chamber.

7 - 2 - 7 - 5 Nameplate for Note

"Notes for duct work" is written on the HRV units as indicated below.

[2] When connecting a spiral duct or an aluminum bellows, sound at the air discharge outlet is higher by 8~11 phon than the main body operating sound.

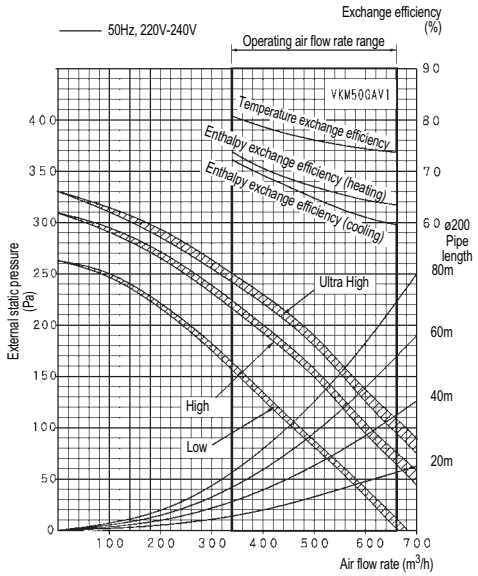
- When using this unit in a quiet place, take a remedy for sound by connecting an optional flexible duct at the outlet of the indoor air suction side of the main body.

7 Product Specification

7 - 2 VKM-GAV1

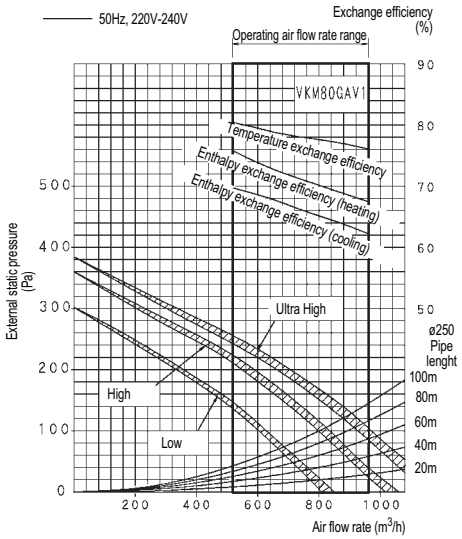
7 - 2 - 8 Fan characteristics

VKM50GAV1



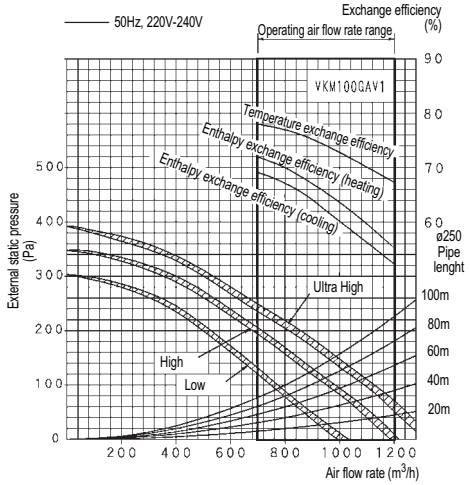
4D051315

VKM80GAV1



4D051316

VKM100GAV1



4D051317

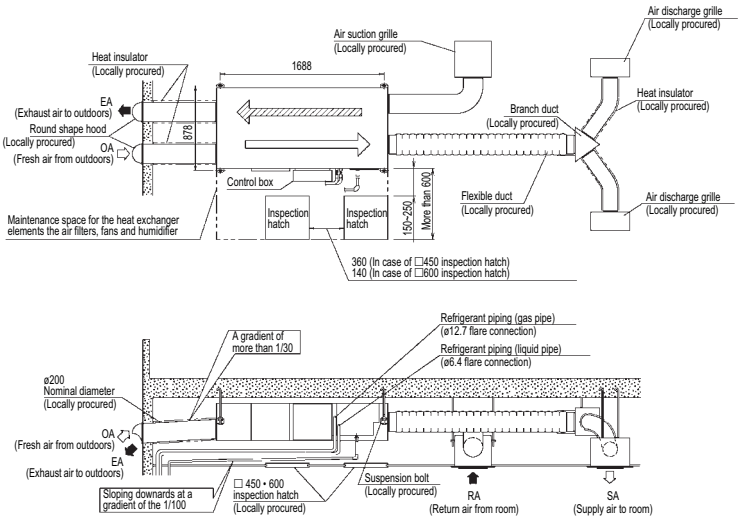
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 9 Installation

7 - 2 - 9 - 1 Installation method

VKM50GAV1

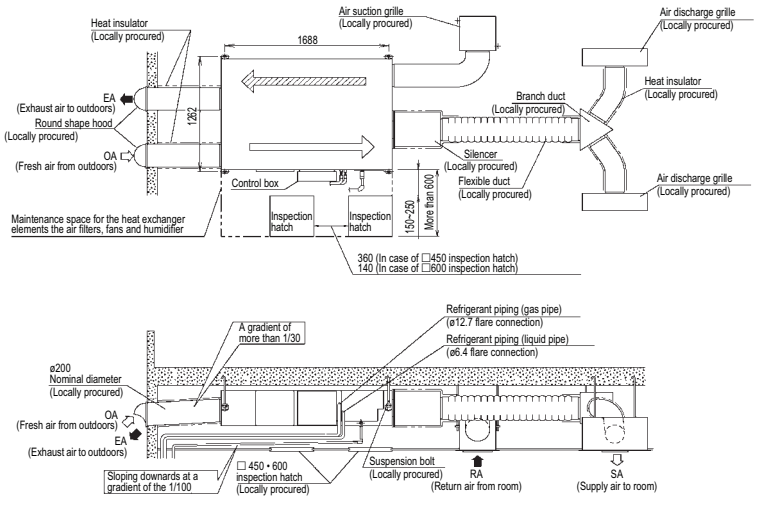


NOTES

1. Leave space for servicing the unit and include inspection hatch. (Always open a hole on the side of the control box so that the air filters, heat exchange elements, and fans can easily be inspected and serviced.)
2. Install the two outdoor ducts with down slope (slope of 1/30 or more) to prevent entry of rain water, also, provide insulation for three ducts (outdoor ducts and indoor supply air duct) to prevent dew condensation) (material: glass wool of 25mm thick).
3. Do not turn the unit upside down.
4. Make sure install drain piping, and insulate drain piping to prevent dew condensation.
5. Keep the drain pipe short and sloping downwards at a gradient of at least 1/100 to prevent air from forming.
6. Do not use a bent cap or a round hood as the outdoor hood if they might get rained on directly (we recommend using a deep hood) (optional accessory).
7. In areas where freezing may occur, always take steps to prevent the pipes from freezing.
8. Do not place something which shouldn't be get wet at the below of this unit. The dew would fall at following case, where humidity is 80% more, or the exit of drain socket is choked up, or the air filter is very dirty.

3D051322

VKM80GAV1



NOTES

1. Leave space for servicing the unit and include inspection hatch. (Always open a hole on the side of the control box so that the air filters, heat exchange elements, and fans can easily be inspected and serviced.)
2. Install the two outdoor ducts with down slope (slope of 1/30 or more) to prevent entry of rain water, also, provide insulation for three ducts (outdoor ducts and indoor supply air duct) to prevent dew condensation) (material: glass wool of 25mm thick).
3. Do not turn the unit upside down.
4. Make sure install drain piping, and insulate drain piping to prevent dew condensation.
5. Keep the drain pipe short and sloping downwards at a gradient of at least 1/100 to prevent air from forming.
6. Do not use a bent cap or a round hood as the outdoor hood if they might get rained on directly (we recommend using a deep hood) (optional accessory).
7. In areas where freezing may occur, always take steps to prevent the pipes from freezing.
8. Do not place something which shouldn't be get wet at the below of this unit. The dew would fall at following case, where humidity is 80% more, or the exit of drain socket is choked up, or the air filter is very dirty.

3D051323

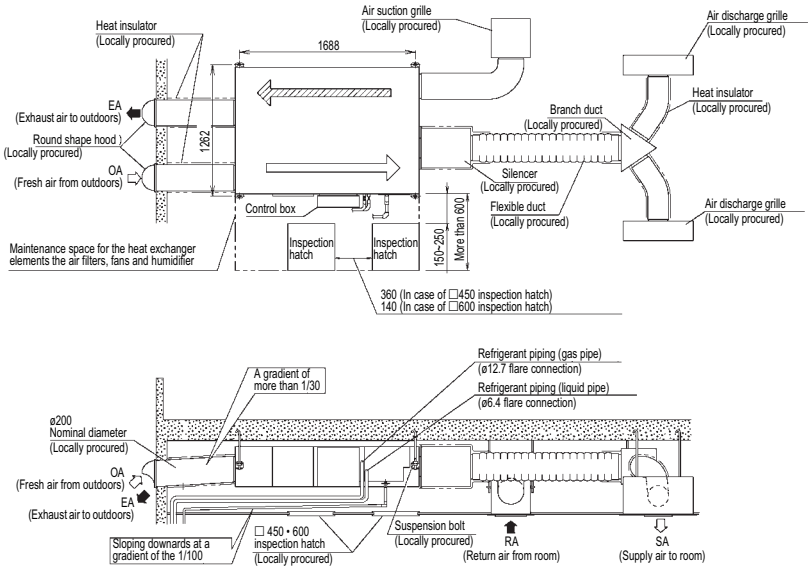
7 Product Specification

7 - 2 VKM-GAV1

7 - 2 - 9 Installation

7 - 2 - 9 - 1 Installation method

VKM100GAV1



NOTES

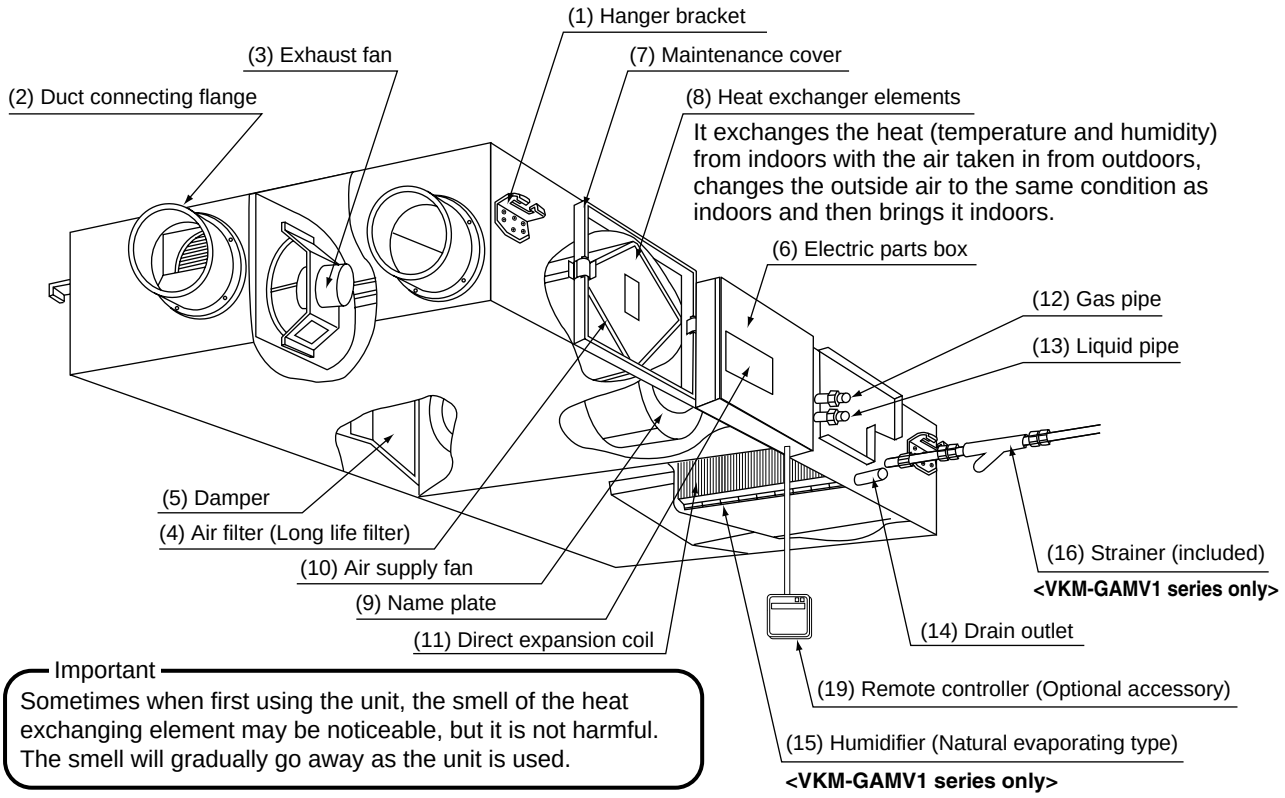
1. Leave space for servicing the unit and include inspection hatch. (Always open a hole on the side of the control box so that the air filters, heat exchange elements, and fans can easily be inspected and serviced.)
2. Install the two outdoor ducts with down slope (slope of 1/30 or more) to prevent entry of rain water, also, provide insulation for three ducts (outdoor ducts and indoor supply air duct) to prevent dew condensation) (material: glass wool of 25mm thick).
3. Do not turn the unit upside down.
4. Make sure install drain piping, and insulate drain piping to prevent dew condensation.
5. Keep the drain pipe short and sloping downwards at a gradient of at least 1/100 to prevent air from forming.
6. Do not use a bent cap or a round hood as the outdoor hood if they might get rained on directly (we recommend using a deep hood) (optional accessory).
7. In areas where freezing may occur, always take steps to prevent the pipes from freezing.
8. Do not place something which shouldn't be get wet at the below of this unit. The dew would fall at following case, where humidity is 80% more, or the exit of drain socket is choked up, or the air filter is very dirty.

3D051324

8 Operation

HRV; Heat Reclaim Ventilation

- Carefully read this operation manual before using the total heat exchanger. It will tell you how to use the unit properly and help you if any trouble occurs. This manual explains about the indoor unit only. Use it along with the operation manual for the outdoor unit. After reading the manual, file it away for future reference.
- This unit is an option type for the VRVIII system air conditioner.
  It should normally be used in combination with the P-type VRVIII system indoor air conditioner. (RXYQ, REYQ, RXQ)
  It is also possible to use this unit as an independent system.
- This unit cannot control room temperature. If this is needed, do not install the HRV unit alone, but rather install another indoor unit.
- Use the remote controller of the VRVIII-system indoor air conditioner to control the unit.



Important

Sometimes when first using the unit, the smell of the heat exchanging element may be noticeable, but it is not harmful. The smell will gradually go away as the unit is used.

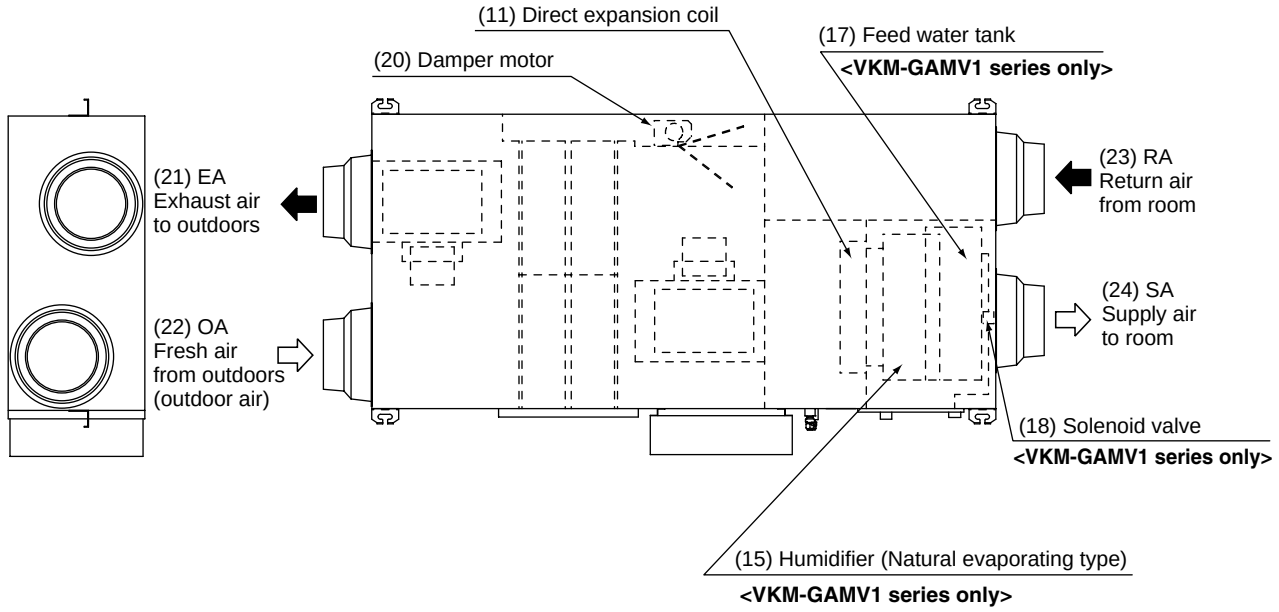


Figure 1

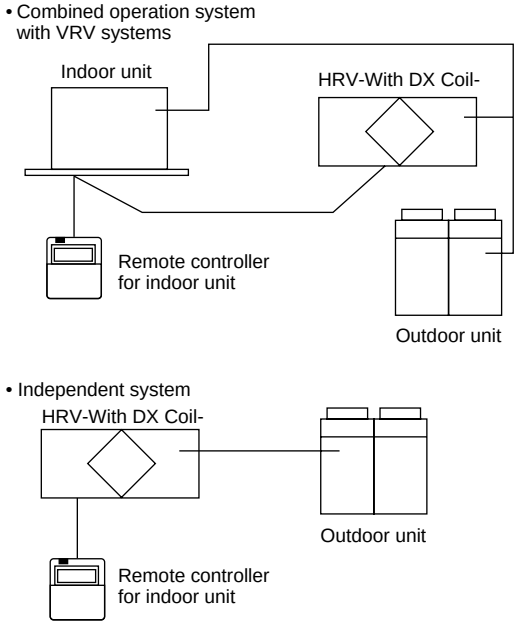
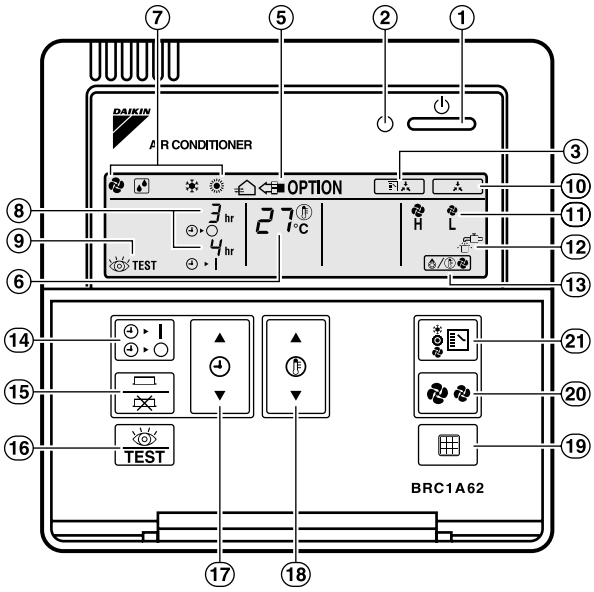


Figure 2



Remote controller for VRV BRC1A62

Figure 3

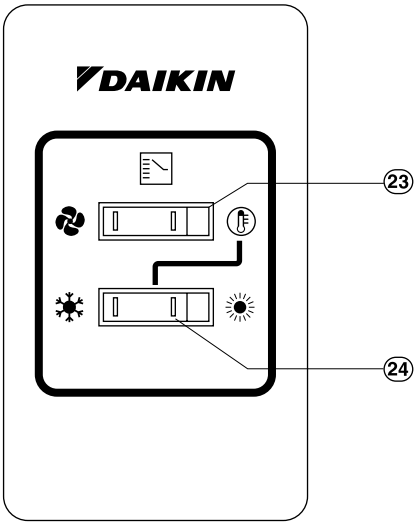
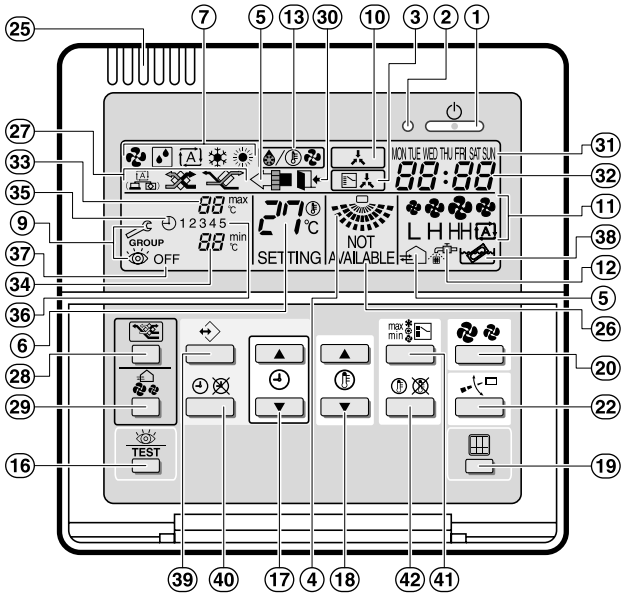
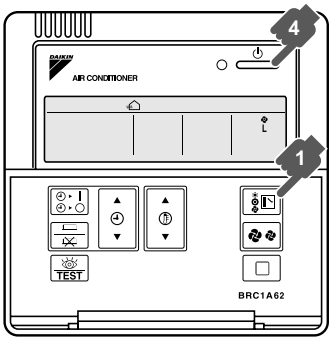


Figure 4



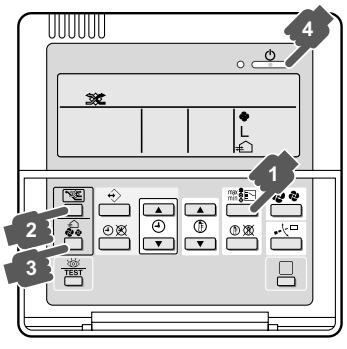
Remote controller for VKM BRC1D527 (EU only)

Figure 3



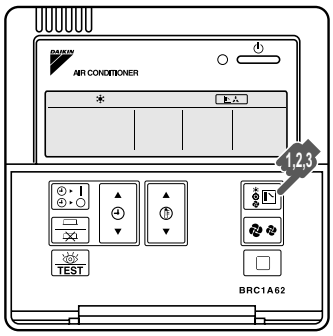
Remote controller for VRV BRC1A62

Figure 5



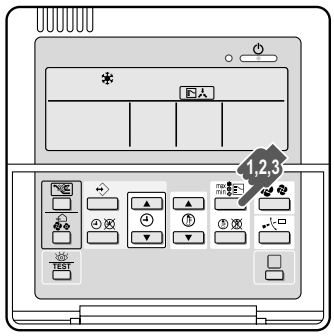
Remote controller for VKM BRC1D527 (EU only)

Figure 5



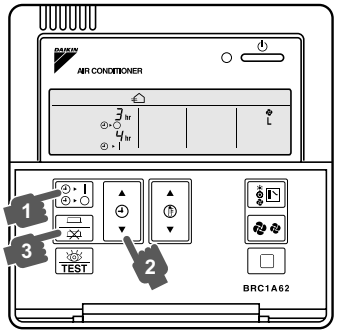
Remote controller for VRV BRC1A62

Figure 6



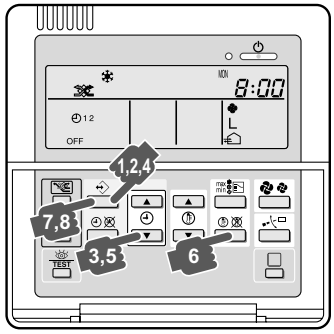
Remote controller for VKM BRC1D527 (EU only)

Figure 6



Remote controller for VRV BRC1A62

Figure 7



Remote controller for VKM BRC1D527 (EU only)

Figure 7

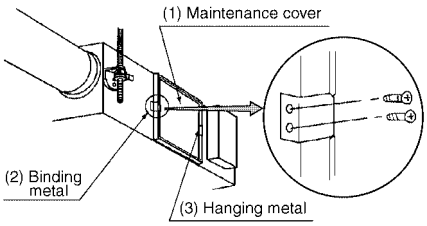


Figure 8-1

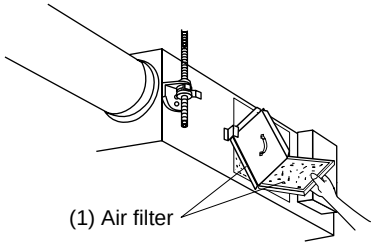


Figure 8-2

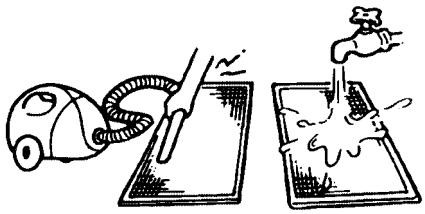


Figure 9

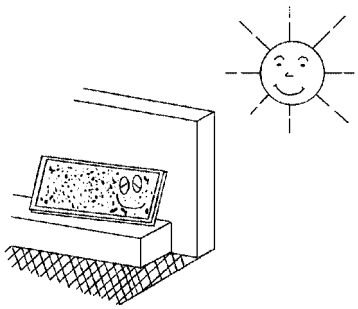


Figure 10

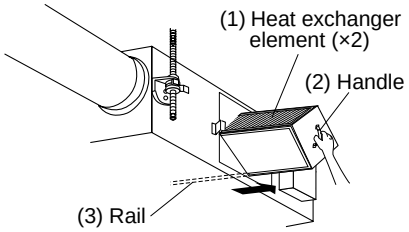


Figure 11

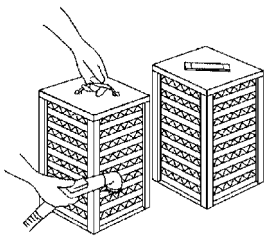


Figure 12

8.1 Safety Cautions

Read the following cautions carefully and use your equipment properly.
This unit comes under the term “appliances not accessible to the genetic public.”
There are two kinds of safety cautions and tips listed here as follows:

⚠ **WARNING**.....Improper handling can lead to such serious consequences as death or severe injury.

⚠ **CAUTION**.....Improper handling can lead to injury or damage. It could also have serious consequences under certain conditions.

Note

- These instructions will ensure proper use of the equipment.

Be sure to follow these important safety cautions.

Keep these warning sheets handy so that you can refer to them if needed.

Also, if this equipment is transferred to a new user, make sure to hand over this user's manual to the new user.

⚠ WARNING (During Operation)

- **When the unit is in abnormal conditions (smell of something burning, etc.), cut off the power, and contact your dealer.**
  Continued operation under such circumstances may result in a failure, electric shock, and fire.
- **It is not good for your health to expose your body to the air flow for a long time.**
- **Do not operate the unit with a wet hand.**
  An electric shock may result.
- **Open the windows and ventilate the room if flammable gas is leaked.**
  Insufficient ventilation when the unit is turned on or off may cause an explosion from sparks at the electrical connection.
- **Do not wash the HRV unit with water.**
  Electric shock or fire may result. (Not including air filters, etc.)
- **Be sure to stop the unit and turn off the power when cleaning or inspecting it.**
  As the fan is rotating at high speed, it will cause injury.
- **Never inspect or service the unit by yourself.**
  Ask a qualified service person to perform this work. (The qualified service person)
- **Keep all flames away if the refrigerant leaks.**
  The refrigerant in the air conditioner is safe and normally does not leak. If the refrigerant leaks inside the room, the contact with a fire of a burner, a heater or a cooker may result in a harmful gas. Extinguish all flames from burning appliances (such as stoves, heaters, etc.) ventilate the room, and contact your dealer. Do not use the air conditioner until when a service person confirms to finish repairing the portion where the refrigerant leaks.

⚠ CAUTION (During Operation)

- **Do not use the HRV unit for other purposes.**
  In order to avoid any quality deterioration, do not use the unit for cooling precision instruments, food, plants, animals or works of art.
- **Do not use burning appliances directly in the path of the air from the unit.**
  Incomplete combustion of the burning appliances may occur.
- **Never expose little children, plants or animals directly to the air flow.**
  Adverse influence to little children, animals and plants may result.
- **Neither place a flammable spray bottle near the HRV unit or indoor intake and outlet grills nor perform spraying.**
  Doing so may result in a fire.
- **Turn off the power when the unit is not to be used for long periods of time.**
  Otherwise, the unit may get hot or catch on fire due to dust accumulation.
- **Do not block the intake or outlet grills.**
  If the fan does not blow air throughout the entire room, it may cause oxygen deficiency leading to bad health condition or long-term health problems.
- **Use gloves when cleaning.**
  Cleaning without gloves may cause injury.
- **Do not operate the remote controller with wet hands.**
  This may cause electric shock.
- **Never touch the internal parts of the controller.**
  An electric shock or a machine trouble may happen. For checking and adjusting the internal parts, contact your dealer.
- **Do not place objects in direct proximity of the outdoor unit and do not let leaves and other debris accumulate around the unit.**
  Leaves are a hotbed for small animals which can enter the unit. Once in the unit, such animals can cause malfunctions, smoke or fire when making contact with electrical parts.

⚠ WARNING (For installation)

- **Do not attempt to install the unit yourself.**
  Ask your dealer for installation of the unit.
  Incomplete installation performed by yourself may result in a water leakage, electric shock, and fire.
- **Installation should be done following the installation manual.**
  Incorrect installation may cause leaking, electric shock, or fire. Injuries may result if the unit falls.
- **Do not install the unit in locations where the temperature in the areas around the unit or indoor intake and outlet grills may fall below freezing. <VKM-GAMV1 series only>**
  The water of the water pipes, humidifier element, solenoid valves, and other components may freeze, causing breakage and leaks.
- **Do not allow exhaust air to enter the outside air intake vent.**
  This may cause the interior of the room to become contaminated and harming the health
- **Locate the outside air intake vent so that it does not take in exhaust air which contains combustion air, etc.**
  Incorrect installation may cause a loss of oxygen in the room, leading to serious accidents.
- **All wiring must be performed by an authorized electrician.**
  To do wiring, ask your dealer. Never do it yourself.
- **Make sure that a separate power supply circuit is provided for this unit and that all electrical work is carried out by qualified personnel according to local lows and regulations.**
  Insufficient power circuit capacity or incorrect work may cause electric shock or fires.
- **Be sure to establish an earth.**
  Do not earth the unit to a utility pipe, arrester, or telephone earth.
  Incomplete earth may cause electrical shock, or fire.
  A high surge current from lightning or other sources may cause damage to the air conditioner.
- **Install the unit on a foundation strong enough to withstand the weight of the unit.**
  A foundation of insufficient strength may result in the unit falling and causing injuries.
- **Connect the remote controller to the correct model.**
  This may cause electric shock or fire.
- **Do not connect additional electric wirings.**
  This may cause fire.
- **For refrigerant leakage, consult your dealer.**
  When the HRV unit is to be installed in a small room, it is necessary to take proper measures so that the amount of any leaked refrigerant does not exceed the limiting concentration even when it leaks. If the refrigerant leaks exceeding the level of limiting concentration, an oxygen deficiency accident may happen.
- **Do not install the HRV unit at any place where flammable gas may leak out.**
  If the gas leaks out and stays around the unit, a fire may break out.
- **Be sure to install an earth leakage breaker.**
  Failure to install an earth leakage breaker may result in electric shocks, or fire.

⚠ CAUTION (For installation)

- **Do not use the HRV unit or an air suction/discharge grille in the following places.**
  a. **Place 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 40°C. If the unit is used at high temperature, deformed air filter and heat exchange element or burned motor result.
  b. **Place such as kitchens or other places where oil fumes are present.**
  This may cause fire.
  c. **Place such as machinery plant and chemical plant where gas, which contains noxius gas or corrosive components of materials such as acid, alkali, organic solvent and paint, is generated. Place where combustible gas leakage is likely.**
  This may cause gas poisoning or fires.
  d. **Place such as bathroom subjected to moisture.**
  Electric leak or electric shock and other failure can be caused.
  e. **Locations below freezing point. <VKM-GAMV1 series only>**
  Using the unit at temperatures below 0°C may cause the drain pan the supply and discharge piping, the humidifying element, the solenoid valves, and other parts to freeze, which can cause accidents.
  f. **Near machinery emitting electromagnetic waves.**
  Electromagnetic waves may disturb the operation of the control system and result in a malfunction of the equipment.
  g. **Place subjected to much carbon black.**
  Carbon black attaches to air filter and heat exchange element, marking them unable to use.
- **Is a snow protection measure taken?**
  For detail, consult your dealer.
- **Make sure the temperature and the humidity of the installation location is within the usage range, not exceed the limit.**
  Do not install in cold storage or other locations with low temperatures or near heated pools. This may cause electrical shock and fire.

- **Install the two outdoor ducts with down slope to prevent rainwater from entering the unit.**
  If this is not done completely, water may enter the building, damaging furniture, and cause electric shock and fire.
- **Insulate the two outdoor ducts to prevent dew condensation (and the indoor duct as well if needed).**
  If this is not done completely, water may enter the building, damaging furniture, etc.
- **Use electric insulation between the duct and the wall when using metal ducts to pass metal or wire laths or metal plating into wooden buildings.**
  This may cause electric shock and fire.
- **Arrange the drain hose to ensure smooth drainage.**
  Incomplete drainage may cause wetting of the building, furniture etc.
- **Avoid placing the controller in a spot splashed with water.**
  Water coming inside the controller may cause an electric leak or may damage the internal electronic parts.

⚠ WARNING (For moving and reinstalling/repairing)

- **Do not modify the unit.**
  This may cause electric shock or fire.
- **Ask your dealer to move and reinstall the unit.**
  Incomplete installation may result in a water leakage, electric shock, and fire.
- **Do not disassemble or repair the unit yourself.**
  This may cause electric shock or fire.
  Contact your dealer to have such work done.
- **When removing the unit, be sure not to tip it.**
  The water inside the unit may drip or leak out, and get on furniture, etc.
- **Do not move or attempt to reinstall the remote controller yourself.**
  Incorrect installation, may cause electric shock or fire. Contact your dealer to have such work done.

CHECK LIST EXCEPT SAFETY CAUTION

The items described below should be checked and ask your dealer when you feel uncertain or you can't check by yourself.

■ **CHECK LIST ABOUT SELECTING INSTALLATION SITE**

- **Is the outdoor unit installed in a well-ventilated location with no obstructions in its vicinity?**
- **Do not use in the locations described below.**
  a. Locations with mineral oil such as cutting oil in the atmosphere.
  b. Locations with salt in the air, such as coastal areas.
  c. Locations with sulfide gas in the air, such as hot springs.
  d. Locations where voltage fluctuates, such as factory.
  e. In automobiles or marine vessels.
  f. Locations containing steam in the atmosphere or splattered oil, such as kitchen.
  g. Locations with mechanical equipment generating electromagnetic wave.
  h. Locations enveloped in acidic or alkaline steam.
- **Has any action for snow protection been taken?**
  Contact your Daikin dealer for details.

■ **CHECK LIST ABOUT ELECTRIC WIRING WORK**

- **All wiring must be performed by an authorized electrician.**
  Do not conduct the work yourself. Contact your dealer.
- **Electrical wiring must be done according to the local standards.**
- **Is the circuit specific to air conditioner?**

■ **CHECK LIST CORRESPONDING TO OPERATING NOISE**

- **Is the unit installed at the following locations?**
  a. Location strong enough to support the weight of the unit, and which will not amplify noise or vibration.
  b. Location where the warm air and the noise from the outlet vent of the outdoor unit will not bother neighbors.
- **Are any obstructions near the outlet vent of the outdoor unit?**
  They may reduce the function and increase the operating noise.
- **If any abnormal noise is heard during the operation, contact your dealer.**

■ **CHECK LIST ABOUT DRAIN PIPING AND WATER SUPPLY WORK**

- **Make sure the drain works properly.**
  During cooling operation, no drainage from the outdoor drain piping may clog the drain piping with dirt or dust, causing water leakage from the indoor unit.
  Stop the unit operation, and contact your dealer.

8.2 What to do before Operation

This operation manual is for the following systems with standard control. Before initiating operation, contact your Daikin dealer for the operation that corresponds to your system type and mark.
If your installation has a customized control system, ask your dealer for the operation that corresponds to your system.

8.2.1 Name of Parts
(Refer to Figure 1)

8.2.2 Remote Controller and Changeover Switch : Name and Function of Each Switch and Display (Refer to Figure 3 and 4)

■ Only the items marked with an asterisk (∗ mark) are explanation relating to the functions and display of the unit. Unmarked items are functions of the combined air conditioners. When using buttons for functions which are not available (buttons which are not described in the text) will cause “NOT AVAILABLE” to be displayed.
Contact your dealer for more detailed descriptions of those functions (buttons).

1. ∗**On/off button**
   Press the button and the system will start. Press the button again and the system will stop.
2. ∗**Operation lamp (red)**
   The lamp lights up during operation or blinks if a malfunction occurs.
3. ∗**Display “ ” (changeover under control)**
   May be displayed when combined with a VRV-system air conditioner.
   It is impossible to changeover heat/cool with the remote controller when this icon is displayed.
4. **Display “ ” (air flow flap)**
   This displays the direction and mode of the air flow flap of the combined air conditioner.
5. **Display “ OPTION ” (ventilation/air cleaning)**
   This display shows that the total heat exchange and the air cleaning unit are in operation.
   (these are optional accessories)
6. **Display “ ” (set temperature)**
   This displays the set temperature of the combined air conditioner.
   It is not displayed when the unit is used as an independent system.
7. **Display “ ” “ ” “ ” “ ” “ ” (operation mode: “FAN, DRY, AUTOMATIC, COOLING, HEATING”)**
   This displays the operating status of the combined air conditioner.
   - There is no “heating” for the VRV III system (Cooling only type).
   - “ ” is only available for systems operating in cooling and heating at the same time.
8. ∗**Display “ ” (programmed time)**
   This display shows the programmed time of the system start or stop.
9. **Display “ TEST ” (inspection/test operation)**
   When the inspection/test operation button is pressed, the display shows the mode in which the system actually is.
   - Do not use under usual use (service person/installer only).
10. **Display “ ” (under centralized control)**
    When this display shows, the system is under centralized control. (This is not a standard specification.)
11. ∗**Display “ ” (fan speed)**
    This display shows the fan speed you have selected.
    ∗ This is only displayed when the fan speed selection button is pressed. It normally displays the set fan strength of the combined air conditioner.
12. ∗**Display “ ” (time to clean air filter)**
    Refer to **“8.4.1 How to clean the Air Filter”**.
13. ∗**Display “ ” (defrost/hot start)**
    It may be displayed when freezing of outdoor unit’s coil increases in heating mode.
14. ∗**Timer mode start/stop button**
    Refer to the chapter “Operation procedure - Programming start and stop of the system with timer.” **(Refer to 8.3.3)**
15. ∗**Timer on/off button**
    Refer to the chapter “Operation procedure - Programming start and stop of the system with timer.” **(Refer to 8.3.3)**
16. ∗**Inspection/test operation button**
    Pressed during inspection or “test run.”
    - Do not use under usual use. (service person/installer only)
17. ∗**Programming time button**
    Use this button for programming start and/or stop time.

18. Temperature setting button

Use this button for setting the desired temperature of air conditioner combined with this unit.
This button can't use for this unit.
This unit can't change temperature setting.

19. ∗Filter sign reset button

Refer to **"8.4.1 How to clean the Air Filter"**.

20. Fan speed control button

Press this button to select the fan speed of air conditioner combined with this unit.

21. ∗Operation mode selector button

Press this button to select the operation mode of air conditioner combined with this unit.

22. Air flow direction adjust button

Press this button to select the air flow direction of air conditioner combined with this unit.

23. Fan only/air conditioning selector switch

Set the switch to " " for fan only operation or to " " for heating or cooling operation.

24. Cool/heat changeover switch

Set the switch to " " for cooling or to " " for heating operation.

25. Remote controller thermo

This detects the temperature around the remote controller. This is not the same as the temperature of return air from room (RA) by heat exchanger unit.

26. ∗Display "NOT AVAILABLE"

- "NOT AVAILABLE" may be displayed for a few seconds if the function for the button pressed is not available for the unit or the air conditioner.
- "NOT AVAILABLE" is only displayed when none of the indoor units is equipped with the function in question when running several units simultaneously. It is not displayed if the function is available on even one of the units.

27. ∗Display " " " " " "

This displays the ventilation mode. (BRC1D527 and so on.) (This is not displayed on the controller BRC1A62)

28. ∗Ventilation mode selector button (available only connecting the HRV unit)

This is pressed to switch the ventilation mode of the HRV unit.

29. ∗Ventilation fan speed control button (available only connecting the HRV unit)

This is pressed to control the fan speed of the HRV unit.
(Refer to item 11)

30. LEAVE HOME ICON " "

The leave home icon shows the status of the leave home function.

ON	Leave home is enabled
FLASHING	Leave home is active
OFF	Leave home is disabled

31. ∗DAY OF THE WEEK INDICATOR " MON TUE WED THU FRI SAT SUN **"**

The day of the week indicator shows the current week day (or the set day when reading or programming the schedule timer).

32. ∗CLOCK DISPLAY " 88:88 **"**

The clock display indicates the current time (or the action time when reading or programming the schedule timer).

33. MAXIMUM SET TEMPERATURE " 88 max ℃ **"**

The maximum set temperature indicates the maximum set temperature when in limit operation.

34. MINIMUM SET TEMPERATURE " 88 min ℃ **"**

The minimum set temperature indicates the minimum set temperature when in limit operation.

35. ∗SCHEDULE TIMER ICON " **"**

This icon indicates that the schedule timer is enabled.

36. ∗ACTION ICONS " 1 2 3 4 5 **"**

These icons indicate the actions for each day of the schedule timer.

37. ∗OFF ICON " OFF **"**

This icon indicates that the OFF action is selected when programming the schedule timer.

38. ∗ELEMENT CLEANING TIME ICON " **"**

This icon indicates the element must be cleaned ("HRV" only).

39. ∗PROGRAMMING BUTTON " **"**

This button is a multi-purpose button.
Depending on the previous manipulations of the user, the programming button can have various functions.

40. ∗SCHEDULE TIMER BUTTON " **"**

This button enables or disables the schedule timer.

41. OPERATION CHANGE/MIN-MAX **BUTTON "max min"**

This button is a multi-purpose button. Depending on the previous manipulations of the user, it can have following functions:

1. select the operation mode of the installation (FAN, DRY, AUTOMATIC, COOLING, HEATING)
2. toggle between minimum temperature and maximum temperature when in limit operation

42. SETPOINT/LIMIT BUTTON "⏻⊗"

This button toggles between setpoint, limit operation or OFF (programming mode only).

Note

- In contradistinction to actual operating situations, the display on figure 3 shows all possible indications.
- If the filter sign lamp lights up, clean the air filter as explained in the chapter "MAINTENANCE". After cleaning and reinstalling the air filter: press the filter sign reset button on the remote controller. The filter sign lamp on the display will go out.
- Item 27~ Item 42 can be used with BRC1D527.
  In detail, refer to operation manual of the remote controller.
- Only the items marked with an asterisk (∗ mark) are explanation relating to the functions and display of the unit.
  Unmarked items are functions of the combined air conditioners.

8.2.3 Explanation for Systems

This unit can be made a part of two different systems: as part of the combined operation system used together with VRVIII SYSTEM Air Conditioners and as the independent system using only the HRV. An operating remote controller is required when using the unit as an independent system. Ask your dealer what kind of system your system is set up for before operation.
For the operation of the remote controller for indoor unit and centralized controller, refer to the instruction manual provided with each unit.
See the included operating manuals for details on how to operate each remote control.

■ **OPERATION for EACH SYSTEM**

Sample system (Refer to figure 2)
Combined operation system with VRVIII systems

[Operation]
The air conditioner remote controller starts and stops the air conditioner and the HRV unit.
You can also select the ventilation amount and the ventilation mode **(Refer to "8.3 Operation Procedure")**
During intermediate periods when only the HRV unit is used without the air conditioner, select "ventilation" with the operation selection button. **(Refer to 8.2.4)**

Sample system (Refer to Figure 2)
Independent system

[Operation]
The HRV unit can be started and stopped using the remote controller.
You can also select the ventilation amount and the ventilation mode.
(Refer to "8.3 Operation Procedure")

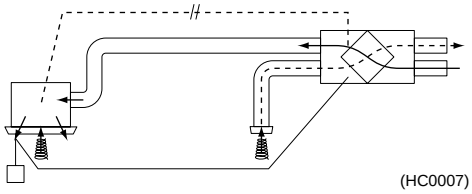
Note

- This unit cannot control room temperature. If this is needed, do not install the HRV unit alone, but rather install another indoor unit.

8.2.4 About Direct Duct Connection System

Installation Examples

Direct duct connection system

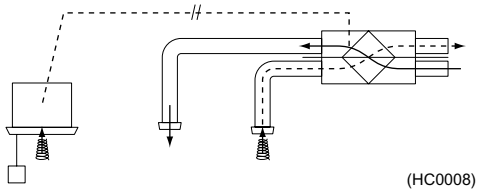


(HC0007)

Note

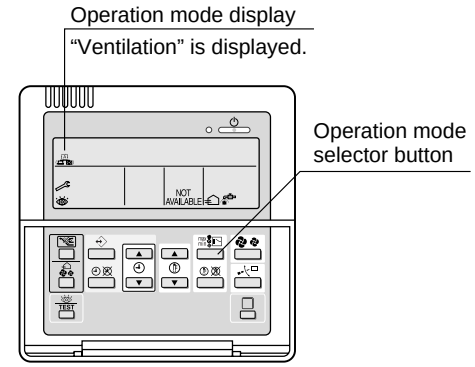
- The system must be operated interlocking with the air conditioner.
- Do not connect to the outlet side of the indoor unit.

Independent duct system



(HC0008)

The HRV unit cannot be operated independently when the air conditioner is connected to the HRV unit via a duct. When using the HRV unit, set the air conditioner to "fan" mode on weak fan strength.

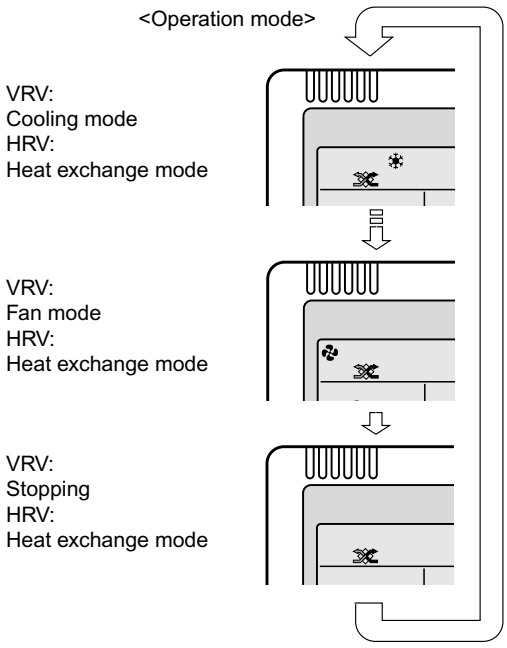


Remote controller for indoor unit

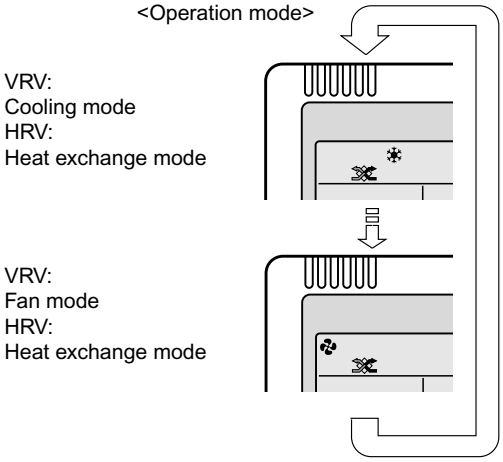
- Each time you press the operation selection button, the operation mode display will change as shown in the figure below.

Example 1 :
In case of the remote controller "BRC1D527" and as equivalent.
Display changes as below.

When air conditioner and HRV unit are not connected via duct



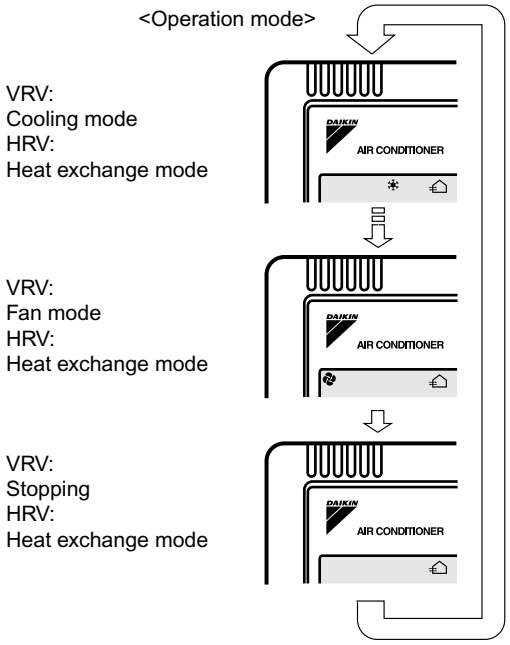
When air conditioner and HRV unit are connected via duct



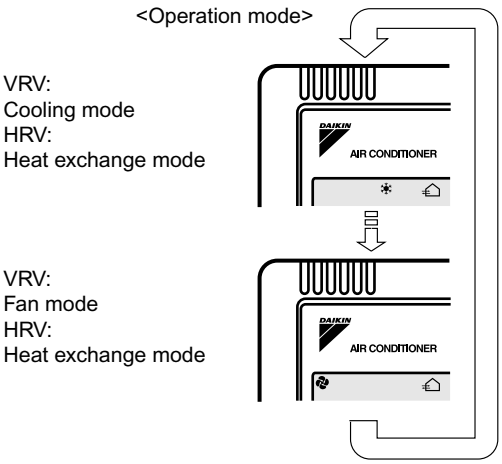
Note
Current Ventilation mode can be visible and selected on the remote controller.

Example 2 :
In case of the remote controller "BRC1A62"
Display changes as below.

When air conditioner and HRV unit are not connected via duct



When air conditioner and HRV unit are connected via duct



Note
Current Ventilation mode doesn't be displayed.

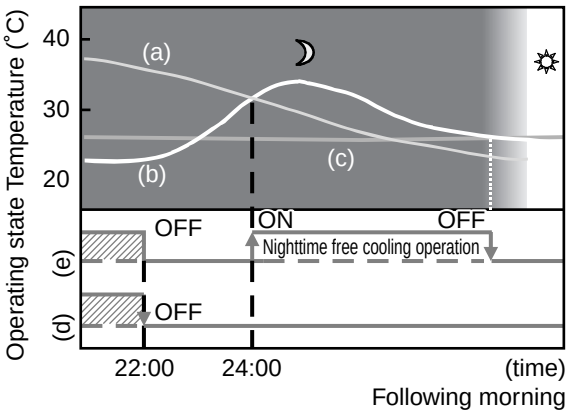
- When the display shows " " (time to clean air filter), ask a qualified service person to clean the filters **(Refer to the chapter "MAINTENANCE")**.

8.2.5 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 by ventilating rooms which contain office equipment which raises the room temperature.

- Nighttime free cooling only works during cooling and when connected to Building Multi or VRV systems.
- 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



(a) Outside temperature
(b) Indoor temperature
(c) Set temperature
(d) Operating state of Air conditioner
(e) Operating state of Total heat exchanger

■ **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.

8.3 Operation Procedure

8.3.1 Cooling, Heating and Fan Only Operation (Refer to Figure 5)

[PREPARATIONS]

- To protect the unit, turn on the main power switch 6 hours before operation.
  Do not turn off the power during the heating or cooling season. This is to ensure smooth start-up.

1 Press the operation mode selector button several times and select the operation mode of your choice;
" ☀ " Cooling operation
" ☀ " Heating operation
" ✣ " Fan only operation

Note

- " Ⓐ " can only be set for systems operating in cooling and heating at the same time.
  " ⊡✣ " is displayed on all remote controllers when using the VRVIII system cooling only type, but only " ☀ " and " ✣ " can be set.
- Select the operating mode on a remote controller on which " ⊡✣ " is not displayed.
  " ☀ " " ☀ " and " Ⓐ " (only for simultaneous cooling/heating systems) cannot be selected on remote controllers on which it is displayed.
  See **8.3.2** if " ⊡✣ " is displayed.

2 Press ventilation mode selector button if you wish to change the mode.
The display rotates through the following selections every time the button is pressed.

Note

- Above is available only if the remote controller BRC1D527 is connected with this unit.
  It is unnecessary to change ventilation mode because the mode is already set to "automatic mode".
- If you change this mode with BRC1A62, consult your dealer.

3 Press ventilation fan speed button if you wish to change the fan speed.
The display rotates through the following selections every time the button is pressed.

Low ✣ L ⇨ High ✣ H

After the selection, the ventilation fan speed display disappears.
And the fan speed of the combined air conditioner regularly displays.

Note

- Above is available only if the remote controller BRC1D527 is connected with this unit.
- It is unnecessary to change four speed mode because the mode is already set to "Low" or "High" mode by the installer.
- If you want to know or change this mode with BRC1A62 consult your dealer.

4 Press the on/off button.
The operation lamp lights up and the system starts operation.

Stopping the system

Press start/stop one more time. The operation lamp will go off. The unit will stop.

- After stopping operation, the fan may continue operating for up to a minute.
- The fan may stop, but this is not a malfunction.

Note

- Do not turn off the power immediately after operation stops. Wait at least 5 minutes.
  Not waiting may cause leaking or malfunction.
- Do not change operations suddenly.
  It can result not only in malfunction but also failure of switches or relays in the remote controller.
- Never press the button of the remote controller with a hard, pointed object.
  The remote controller may be damaged.

■ **EXPLANATION OF OPERATION MODE**

Cooling mode	Heating mode	Automatic mode
While operating in ventilation mode, the unit adjusts the outside air to the indoor temperature and then brings it into the room.		It automatically selects " " or " ." **Fan mode** It only operates in ventilation mode. The unit processes outside air using the heat exchanger element, but not the DX expantion coil.

Note

- This unit cannot control room temperature. If this is needed, do not install the HRV unit alone, but rather install another indoor unit.

■ **EXPLANATION OF VENTILATION MODE**

Note

- These icons below are displayed on the remote controller BRC1D527.

Automatic mode : When combined with a VRVIII-system air conditioner
The unit automatically switches between " " and " " based on information from the VRVIII system air conditioner (heating, cooling, fan, and set temperature) and information from the HRV unit (indoor and outdoor temperatures).
The unit automatically switches between " " and " " when it is combined with an air conditioner (Not producted by Daikin) and based on only the information from the HRV unit (indoor and outdoor temperatures) when the HRV unit is operating alone.

Total heat exchange mode : Outdoor air passes through the heat exchange element and heat exchanged air is sent into the room.

Bypass mode : In this mode outdoor air does not through the heat exchange element, but rather sent into the room as is.

■ **EXPLANATION OF HEATING OPERATION**

Defrost operation

- In heating operation, freezing of the outdoor unit's coil increases.
  Heating capability decreases and the system goes into defrost operation.
- The remote controller will read " " until the hot air starts blowing.
- It returns to the heating operation again after 6 to 8 minutes (10 at the longest).
- During defrost operation, the fans of the unit continues driving (factory setting).
  The purpose of this is to maintain the amount of ventilation and humidifying.
- The change of the layout in the room should be examined when the cold draft from air supplying opening is feared.
- Though the fan can be stopped by the setting of remote controller.
  Do not stop the fan in the place where no ventilation by stopping the fan may cause the influence of diffusion of air which it is dirty and moisture into another room, or the inflow from outside the room. (outflow such as viruses from the sickroom, or smell leakage from the rest room, etc.)
  Contact your dealer for details.

Hot start

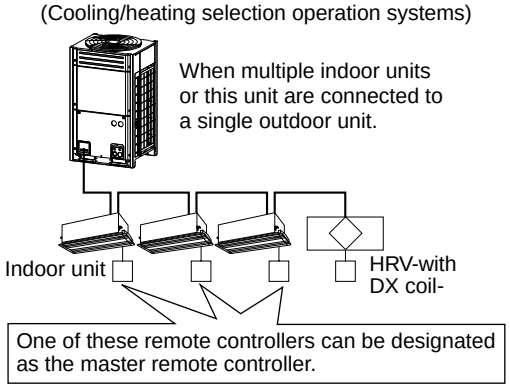
- The remote controller will read " " until the hot air starts blowing, e.g. at the start of heating operation.

8.3.2 Setting the Master Remote Controller (Refer to Figure 6)

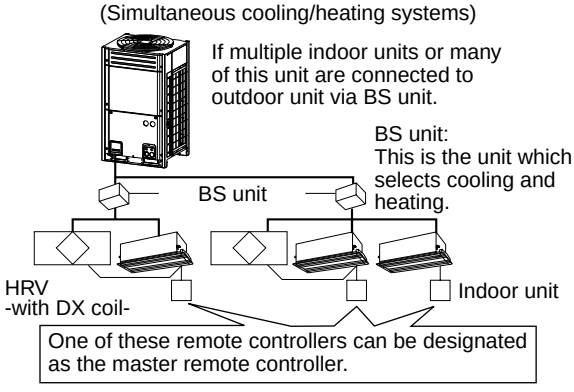
- When the system is installed as shown bellow it is necessary to designate one of the remote controllers as the master remote controller.
- Only the master remote controller can select cooling, heating, or automatic operation (the last only on simultaneous cooling/heating systems).
- The displays of slave remote controllers show " " (changeover under control) and they automatically follow the operation mode directed by the master remote controller.

However, it is possible to changeover to program dry with slave remote controllers if the system is in cooling operation set by the master remote controller.

(Cooling/heating selection operation systems)



(Simultaneous cooling/heating systems)



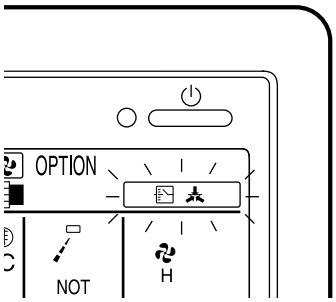
■ **HOW TO DESIGNATE THE MASTER REMOTE CONTROLLER**

1 Press the operation mode selector button of the current master remote controller for 4 seconds.
The display showing" [ ] " (changeover under controll) of all slave remote controllers connected to the same outdoor unit or BS unit flashes on.

- " [ ] " flashes when the power is first turned on.
- The ventilation mode can be changed regardless of the setting (main or slave).

Note

- This unit cannot control room temperature. If the unit is connected to the same system with other indoor units, set the master remote controller on the other indoor units.



2 Press the operation mode selector button of the controller that you wish to designate as the master remote controller. Then designation is completed. This remote controller is designated as the master remote controller and the display showing " [ ] " (changeover under control) vanishes.
The displays of other remote controller show " [ ] " (changeover under control).

3 Press the operation mode selector button on the master remote controller (i.e. a remote controller which does not display " [ ] ") to scroll through the modes.The display will scroll through " " – " " (only for simultaneous cooling/heating systems) – " " – " ".
The display on slave remote controllers will also change automatically.

■ **Details and activity of operation**

- Setting the master remote controller (without the " [ ] " display) to cooling/heating mode will make slave remote controllers (with the " [ ] " display) to follow to the mode of the master remote controller.
  Selection of fan mode is possible, however.
- Setting the master remote controller (without the " [ ] " display) to fan mode will make slave remote controllers (with the " [ ] " display) any setting other than fan mode impossible.

8.3.3 Programming Start and Stop of the System with Timer

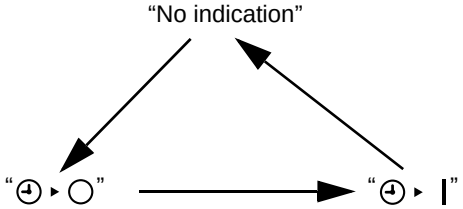
How to Program and Set the Timer with the Remote Controller "BRC1A62" (Refer to Figure 7)

- The timer is operated in the following two ways.
  Programming the stop time " ▸ ◯ ". The system stops operating after the set time has elapsed.
  Programming the start time " ▸ | ". The system starts operating after the set time has elapsed.
- The start and the stop time can be simultaneously programmed.

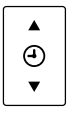
1 Press the timer mode start/stop button " " several times and select the mode on the display.

- For setting the timer stop " ▸ ◯ "
- For setting the timer start " ▸ | "

Each time the button is pushed, the indication changes as shown below.



2 Press the programming time button and set the time for stopping or starting the system.



Each time this button is pressed, the time advances or goes backward by 1 hour.

- The timer can be programmed for a maximum of 72 hours.
- Each time when " ▲ " is pushed, the time advances one hour.
  Each time when " ▼ " is pushed, the time goes back one hour.

3 Press the timer on/off button.
The timer setting procedure ends. The display " ▸ " or " ▸ " changes from flashing light to constant light.
- After the timer is programmed, the display shows the remaining time.

For cancelling the timer operation, push the timer on/off button " " once again.
The indication disappears.
Note
- When setting the timer off and on at the same time, repeat the above procedure (from " 1 " to " 3 ") once again.

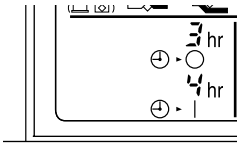
■ **DETAIL EXPLANATION**
When you want to stop operation after a desired time,
Example :
Set the time to "8".
↓
8hr
" ▸ " will display.
Stops operation 8 hours after the reservation is complete.
The program will be cleared after the operation stops.
- Set the stop time during operation.

When you want to start operation after a desired time has elapsed
Example :
Set the time to "8".
↓
8hr
" ▸ " will display.

Starts operation 8 hours after the reservation is complete.
The reservation is cancelled after operation starts.
- Set the start time while the unit is stopped.
- The remaining time will count at the same time after reservation is complete.

See the example below if you want to reserve "off after time" and "on after time" at the same time.

For example : (Refer to Fig. below)
When the timer is programmed to stop the system after 3 hours and start the system after 4 hours, the system will stop after 3 hours and start 1 hour later.
Example :



- Setting "off after 3 hours" and "on after 4 hours" will
↓
- Operation will stop after 3 hours.
Operation will then start in 1 hour from the time it stopped.

How to Program and Set the Timer with the Remote Controller "BRC1D527" (Refer to Figure 7)

- The controller is equipped with a schedule timer that enables the user to operate the installation automatically; setting the clock and day of the week is required to be able to use the schedule timer.
- To set up clock, refer to the operation manual of the remote controller.

1 Browse to Monday by pressing the " " button.
The " " icon appears, "MON" will blink and one of the " " icons, one of the " " icons might be displayed but all other fields remain blank, indicating that no actions are programmed for Monday.

2 Enter the program mode by holding down the " " button for 5 seconds, the " " icon will now blink too.

3 Press the " " button to activate the first programmed action.
A blinking "1" is displayed indicating that the first programmed action for Monday is being programmed; The set temperature and clock display are blinking.

3 Enter the time when the action must start using the " ▲ " & " ▼ " buttons (min. step = 10 minutes).

4 Press the "⇔" button to display the next programmed action. If a second action is programmed for Monday, "MON" will still be blinking and "1 2" will appear.
Assuming that 5 actions were programmed for Monday, a total of 5 presses will be required to display all programmed actions.

5 Enter the time when the action must stop using the "🕘▲" & "🕘▼" buttons (min. step = 10 minutes).

6 Press the "⏻⊗" button. "OFF" icon displays.
This icon means the unit will stop at the set time.
When all data for the schedule timer actions for Monday are entered, you must confirm the programmed actions.
Make sure the last schedule timer action you want to keep is selected (schedule timer actions with a higher number will be deleted).

Now you must choose between 2 options:

1. CONFIRM AND COPY TO NEXT DAY

7 The schedule timer action programmed for the current day are also valid for the next day: use the "confirm last action and copy actions to next day" function by pressing the "⇔" and "⏻⊗" buttons simultaneously for 5 seconds. "DAY OF THE WEEK INDICATOR" will change blinking from "MON" to "SUN".

2. CONFIRM ONLY

8 The schedule timer action programmed for the current day are only valid for the selected day: use the "confirm last action and go to next day" function by pressing the "⇔" button for 5 seconds. Program mode is quit and depending on the choice made, the programmed actions are saved for Monday (and possibly Tuesday).

PROGRAMMING THE OTHER DAYS OF THE WEEK

Programming the other days of the week is identical to programming the first day of the week. "TUE" is blinking to indicate the selected day, "🕘" and "1" are steady if actions were copied from Monday to Tuesday, only "🕘" is displayed if no actions were copied from Monday to Tuesday.

Note

The schedule timer will not:

- control fan speed,
- control air flow direction,
- control ventilation mode,
- control ventilation amount,
- change the operation mode for a scheduled setpoint.

The parameters listed above can be set manually, without interfering with the schedule timer.

8.3.4 Optimum Operation

Observe the following precautions to ensure the system operates.

- **When the display shows "🧹", ask a qualified service person to clean the filters (Refer to MAINTENANCE).**
- **Do not operate the HRV unit in Bypass mode when the room air is under heating in winter or when the outside temperature is 30°C or higher.**
  This may cause condensation to form on the main unit or on discharge grill, or around air supply opening.
- **Keep the indoor unit and the remote controller at least 1 m away from televisions, radios, stereos, and other similar equipments.**
  This may cause distorted picture or noise.
- **Turn off the main power supply switch when it is not used for long periods of time. When the main power switch is turned on, some watts of electricity is being used even if the system is not operating.**
  Turn off the main power supply switch for saving energy. When reoperating, turn on the main power supply switch 6 hours before operation for smooth running.
- **Use city water or clean water and take steps to prevent condensation from forming. (VKM-GAMV1 series only)**
- **The life of humidifier become shorter when the supply water is hard water. (VKM-GAMV1 series only)**
  Use a water softener.
- **Do not install the remote controller where the indoor temperature and humidity, respectively, are out of the range of 0-35°C and RH 40-80%.**
  This may cause malfunction.
- **Do not install the remote controller where direct sunlight may fall on it.**
  This may cause discoloration or deformation.

Note

- When the fan motor fails, the remote controller does not display any error code.
  Usage under that status will lead to insufficient ventilation.
  The air supply and exhaust fans should be checked once every one or two months.
  You can make a simple check such as below way.
  To check the wind flow, hold a bar of which the end has a string or other similar lightweight item over the supply grille and exhaust grille.
- When the solenoid valve fails, the remote controller does not display any error code.
  Usage under that status will lead to insufficient humidification and increased tap water consumption.
  The solenoid valve should be checked at the beginning of the heating season.
  <VKM-GAMV1 series only>

8.4 Maintenance (for a Qualified Service Person only)

ONLY A QUALIFIED SERVICE PERSON IS ALLOWED TO PERFORM MAINTENANCE
DO NOT CHECK OPENING INSIDE THE UNIT BY YOURSELF.

⚠ WARNING

- **BEFORE OBTAINING ACCESS TO TERMINAL DEVICES, ALL POWER SUPPLY CIRCUITS MUST BE INTERRUPTED.**
- To clean the HRV, or maintenance be sure to stop operation, and turn the power switch off.
  It may cause electrical shock and it is very dangerous to touch the rotating part.
- Do not wash the HRV with water.
  Doing so may result in an electric shock.

⚠ CAUTION

- Use gloves when cleaning.
  Cleaning without gloves may cause injury.
- Watch your step.
  Use caution, as this requires working in high places.
- Do not use benzene or thinner to clean the outside surfaces of the air conditioner.
  This may cause cracks, discoloration, or machine trouble.

8.4.1 How to clean the Air Filter

Clean the air filter when the display shows " " (TIME TO CLEAN AIR FILTER).
It will display that it will operate for a set amount of time.
AT LEAST ONCE EVERY YEARS (FOR GENERAL OFFICE USE)
(CLEAN THE MORE FREQUENTLY IF NECESSARY.)

- Increase the frequency of cleaning if the unit is installed in a room where the air is etermely contaminated.
- If the dirt becomes impossible to clean, change the air filter (Air filter for exchange is optional).

(1) Detach the maintenance cover.
Go into ceiling through the inspection hatch, remove binding metal of maintenance cover and take it off. **(Refer to figure 8-1)**

(2) Detach the air filter.
Take out from the heat exchange elements.
(Refer to figure 8-2)

(3) Clean the air filter. **(Refer to figure 9)**
Use vacuum cleaner A) or wash the air filter with water B).
A) Using a vacuum cleaner
B) Washing with water
When the air filter is very dirty, use soft brush and neutral detergent.
After cleaning, remove water and dry in the shade.

Note

- Do not wash the air filter with hot water of more than 50°C, as doing so may result in discoloration and/or deformation.
- Do not expose the air filter to fire, as doing so may result in burning.
- Do not use gasoline, thinner, or other organic solvents.
  This may cause discoloration or deformation.

(4) Fix the air filter.
If the air filter is washed, remove water completely and allow to dry for 20 to 30 minutes in the shade.
When dried completely, install the air filter back in place. **(Refer to figure 10)**

Note

- Be sure to install the air filter after servicing.
  (Missing air filter causes clogged heat exchange element.)
  The air filter is an optional item and the replacement is available.

(5) Install the maintenance cover. **(Refer to 8.4.1, (1))**.

For remote controllers which display the filter sign, turn on the power after maintenance, and press the filter sign reset button.

* Consult your dealer if you want to change the time setting for when the filter sign goes on.

CAUTION

- **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.

8.4.2 How to clean the Heat Exchange Element

AT LEAST ONCE EVERY TWO YEARS (FOR GENERAL OFFICE USE)
(CLEAN THE ELEMENT MORE FREQUENTLY IF NECESSARY.)

WARNING

- **Please exchange the heat exchange element if you find that the knob of the heat exchange element is damaged or is deteriorated when cleaning it.**
  There is falling danger.

(1) Detach the maintenance cover. **(Refer to 8.4.1, (1))**.

(2) Detach the air filter. **(Refer to 8.4.1, (2))**.

(3) Take out the heat exchange elements.
Pull out the air filter and then pull out the two heat exchanger elements. **(Refer to figure 11)**

(4) Use a vacuum cleaner to remove dust and foreign objects on the surface of the heat exchange element. **(Refer to figure 12)**
- Use the vacuum cleaner equipped with a brush on the tip of the suction nozzle.
- Lightly contact the brush on the surface of the heat exchange element when cleaning. (Do not crush the heat exchange element while cleaning.)

CAUTION

- Do not clean touching strongly with a vacuum cleaner. This may crush the mesh of the heat exchange elements.
- Never wash the heat exchange element with water.
- Have your dealer professionally clean the filter if it is very dirty.

(5) Put the heat exchange element on the rail and insert it securely in place.

(6) Install the air filter securely in place. **(Refer to 8.4.1, (4))**

(7) Install the maintenance cover securely in place. **(Refer to 8.4.1 (5))**

8.4.3 Seasonal Maintenance <VKM-GAMV1 series only>

At the Beginning of the Season

(1) Check below
- Are the indoor and outdoor unit intake and outlet vents blocked?
  Remove anything that might be blocking them.

(2) Turn the power on
- When the power comes on, the characters in the remote controller display appear.
  (To protect the unit, turn the power on at least 6 hours before operating it. This makes operation smoother.)

(3) Supply water (Start of heating season)

At the end of the Season

(1) On a clear day, use fan only operation for around half a day to thoroughly dry out the interior of the unit.
- Refer to **8.3.1** for details on fan operation.

(2) Turn off the power
- When the power is shut off, the characters in the remote controller display disappear.
- When the power is on, the unit consumes up to several dozen Watts of power.
  Turn off the power to conserve energy.

(3) Stop water supply (End of heating season)

8.4.4 Inspection and Maintenance of the Humidifier <VKM-GAMV1 series only>

- **Have your dealer do the following inspections in order to get the longest use.**
- In order to prevent harmful bacteria from generating, ask your dealer to do maintenance on humidifying unit portion at the beginning or the end of the heating season.

Note
- When the solenoid valve fails, the remote controller does not display any error code.
  Usage under that status will lead to insufficient humidification and increased tap water consumption.
  The solenoid valve should be checked at the beginning of the heating season.

For dealers

Inspected part	Content of maintenance		Problems if maintenance is not carried out
	Items to be inspected	Solution	
Strainer (80-mesh)	Check for clogging	Clean if clogged.	Insufficient humidifying.
	Check o-ring for cracks	Replace if cracked.	Leaking.
Feed water tank	Check for operation of float switch	Clean if it does not work properly due to build-up.	Insufficient humidifying. Overflowed feed water tank.
	Check for dirt	Clean if very dirty.	Weak fan strength. Reduced humidifying capacity.
Solenoid valve	Check for shutting and opening. Check in a similar fashion when checking the float switch operation.	Replace if it doesn't work.	Insufficient humidifying. Overflowed feed water tank. (Increased tap water consumption)

8.4.5 Inspection of the Fan Motor

Note

- When the fan motor fails, the remote controller does not display any error code.
  Usage under that status will lead to insufficient ventilation.
  The air supply and exhaust fans should be checked once every one or two months.
  You can make a simple check such as below way.
  To check the wind flow, hold a bar of which the end has a string or other similar lightweight item over the supply grille and exhaust grille.

8.4.6 Replacing the Humidifier Element <VKM-GAMV1 series only>

- The humidifier element needs to be replaced regularly.
  The humidifier element should in general be replaced once every three years when supply water is soft water, but outside factors (If the water quality is hard water, etc.) as well as operating conditions (24-hour-a-day air conditioning, etc.) may shorten its productive life.
- Contact your dealer if you have any questions.

8.5 Trouble Shooting

8.5.1 The Following Situations are not Malfunctions.

- **Operation does not start.**

<Symptom>

The icon " [ ] " (under centralized control) is displayed on the remote controller and pressing the on/off button causes the display to blink for a few seconds.

<Cause>

This indicates that the central device is controlling the unit.
The blinking display indicates that the remote controller cannot be used.

<Symptom>

The fans rotates after 1 minutes when pressing on on/off button.

<Cause>

This indicates that the operation is in preparation.
Wait for about 1 minute.

- **Operation stops sometimes.**

<Symptom>

"U5" is displayed on the remote controller and the operation stops but then restarts after a few minutes.

<Cause>

This indicates that the remote controller is intercepting noise from electrical appliances other than the HRV unit, and this prevents communication between the units, causing them to stop.
Operation automatically restarts when the noise goes away.

- **"88" is displayed on the remote controller.**

<Symptom>

It displays immediately after the power is turned on, and disappears after several seconds.

<Cause>

This indicates that the unit is checking whether or not the remote controller is normal.
It is only displayed temporarily.

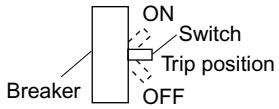
8.5.2 If One of the Following Malfunctions Occurs, take the Measures Shown below and Contact Your Daikin Dealer.

The system must be repaired by a qualified service person.
DO NOT CHECK AND REPAIR OPENING INSIDE THE UNIT BY YOURSELF.

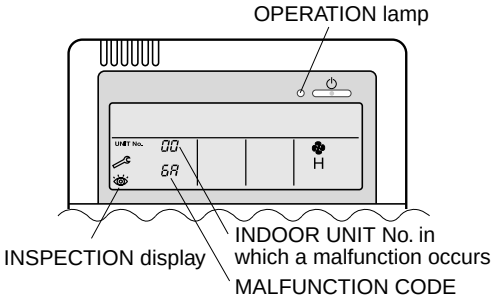
⚠ WARNING

When the HRV is in abnormal conditions (smell of something burning, etc), cut off the power, and contact your dealer.
Continued operation under such circumstances may result in a failure, electric shock, and fire.

- **The unit does not operate at all.**
  a. Check if there is a power failure.
  Measure: After power has been restored, start operation again.
  b. Check if the fuse has blown.
  Measure: Turn the power off.
  c. Check if breaker has worked.
  Measure: Turn the power on with the breaker switch in the off position. Do not turn the power on with the breaker switch in the trip position. (Contact your dealer.)



- **If a safety device such as a fuse, a breaker, or an earth leakage breaker frequency actuates, or ON/ON/OFF switch does not properly work.**
  Measure: Do not turn the power on.
- **The remote control buttons do not work well.**
  Measure: Turn off the main power switch.
- **If the display "⊙" (INSPECTION), "UNIT No." and the OPERATION lamp flash and the "MALFUNCTION CODE" appears.**
  Measure: Notify and inform the model name and what the malfunction code indicates to your Daikin dealer.



- **There are other malfunctions.**
  Measure: Stop the unit.

List of malfunction codes of Remote controller of the HRV-system

Operation lamp	Inspection indicator	Unit No.	Malfunction code	Description
On	Off	Blinking	64	Indoor air thermistor malfunction
On	Off	Blinking	65	Outdoor air thermistor malfunction
On	Off	Blinking	6A	Dumper-related malfunction
Blinking	Blinking	Blinking	6A	Dumper-related malfunction + thermistor malfunction
Blinking	Blinking	Blinking	A1	Printed circuit board fault
On	Off	Blinking	A1	Printed circuit board fault
Blinking	Blinking	Blinking	A9	Electric expansion valve drive error
Blinking	Blinking	Blinking	C4	Liquid piping thermistor error (faulty connection, disconnection short circuit, fault)
Blinking	Blinking	Blinking	C5	Gas piping thermistor error (faulty connection, cut wire, short circuit, fault)
Blinking	Blinking	Blinking	C9	Intake air into coil thermistor error (faulty connection, disconnection, short circuit, fault)
Blinking	Blinking	Blinking	U3	Test run not performed
Blinking	Blinking	Blinking	U5	Transmission error between the unit and remote controller
Off	Blinking	Off	U5	Setting error of remote controller
Off	Blinking	Off	U8	Transmission error between main remote controller and sub remote controller
Off	Blinking	Blinking	UA	Incorrect combination with indoor unit and remote controller.
On	Blinking	On	UC	Central control address over lapping
Blinking	Blinking	Blinking	UE	Transmission error between the unit and centralized controller

■ In case of the malfunction with the code in white letters on the black background in the unit still operates. However, be sure to have it inspected and repaired and as soon as possible.
If other than the above error codes are displayed, there is a possibility that the problem in question has occurred with a combined air conditioner or outdoor unit. See the operation manuals included with the air conditioners or outdoor units for details.

8.5.3 If the System does Not Properly Operate Except for the Above Mentioned Case, and None of the Above Mentioned Malfunctions is Evident, Contact your Dealer, and Request for Investigation the System According to the Following Procedures by a Qualified Service Person.

The following malfunctions must be checked by a qualified service person. Do not check by yourself.

- **The unit does not operate at all.**
  a. Check if there is a power failure.
  After power has been restored, start operation again.
  b. Check if the fuse has blown.
  Change the fuse.
  c. Check if breaker has worked.
  Contact your dealer.
  d. Are there any problems with the power or wiring?
  Inspect the power and wiring.
  e. Are there any problems with the fan unit?
  Inspect the fan motor and fan.
- **Amount of discharged air is small and the discharging sound is high.**
  a. Check if the air filter and heat exchange element are clogged.
  (Check both SA and RA air filter. Check both sides of elements.)
  Clean the air filter and heat exchange element.
- **Amount of discharged air is large and so is the sound.**
  a. Check if the air filter and heat exchange element are not installed.
  Install the air filter and heat exchange element.
- **It dries usually in winter. <VKM-GAMV1 series only>**
  a. Is the water supply service valve open?
  Open the water supply service valve.
  b. Have you lowered setting on the humidistat (locally procured) too far?
  Correct the setting.
- **Humidifies very little or not at all. <VKM-GAMV1 series only>**
  a. Is there water in the water supply tank?
  b. Is water being supplied?
  Inspect the water supply pipes and supply the water.
  c. Is the strainer clogged?
  Clean the strainer.
  d. Is the solenoid valve broken (i.e. won't open)?
  Replace the solenoid valve.
  e. Is the humidifier element torn?
  Replace.
  f. Has the water resistance of the humidifier element dropped?
  Replace the humidifier element.
  g. Are the control circuits broken?
  Replace the printed circuit board and other electric parts.
  h. Is the float switch broken?
  Replace the float switch.
  i. Is the water supply pressure sufficient?
  Re-set it so that there is sufficient pressure.
  j. Is there foreign matter in the feed water tank?
  Clean the feed water tank.

8.6 After-sales Service and Warranty

After-sales service:

⚠ WARNING

- **Do not modify the unit.**
  This may cause electric shock or fire.
- **Do not disassemble or repair the unit.**
  This may cause electric shock or fire.
  Contact your dealer.
- **If the refrigerant leaks, keep out of fire.**
  The refrigerant used in this unit is safe.
  Although the refrigerant does not usually leak, if the refrigerant leaks out into a room and comes in contact with the combustible air in the equipment such as fan heater, stove, oil (gas) cooker, etc., it will cause toxic gas to be generated.
  When a refrigerant leakage failure has been repaired, confirm a service person that the leakage point has been corrected surely before restarting operation.
- **Do not remove or reinstall the unit by yourself.**
  Incomplete installation may cause a water leakage electric shock and fire.
  Contact your dealer.

■ **When asking your dealer to repair, inform related staff of the details as follows:**
- Shipping date and installation date:
- Malfunction:
  Inform the staff of the defective details.
  (Malfunction code being displayed on the remote controller.)
- Name, address, telephone number

■ **Repair where the warranty term is expired**
Contact your dealer. If necessary to repair, pay service is available.

■ **Minimum storage period of important parts**
Even after a certain type of air conditioner is discontinued, we have the related important parts in stock for 6 years at least.
The important parts indicate parts essential to operate the air conditioner.

■ **Recommendations for maintenance and inspection**
Since dust collects after using the unit for several years, the performance will be deteriorated to some extent.
Taking apart and cleaning inside require technical expertise, so we recommend entering a maintenance and inspection contract (at a cost) separate from normal maintenance.

■ **Recommended inspection and maintenance cycles**
[Note: The maintenance cycle is not the same as the warranty period.]
Table 1 assumes the following usage conditions.
- Normal use without frequent starting and stopping of the machine.
  (Although it varies with the model, we recommend not starting and stopping the machine more than 6 times/hour for normal use.)
- Operation of the product is assumed to be 10 hours/day, 2500 hours/year.

• Table 1 “Inspection Cycle” and “Maintenance Cycle” Lists

Name of Main Part	Inspection Cycle	Maintenance Cycle [replacements and/or repairs]
Electric motor (fan, damper, etc.)	1~2 months recommended *1	20,000 hours
PC boards	1 year	25,000 hours
Heat exchanger element		10 years
Heat exchanger		5 years
Sensor (thermistor)		5 years
Remote controller and switches		25,000 hours
Drain pan		8 years
Expansion valve	1 year *2	20,000 hours
Electromagnetic valve	1 year	20,000 hours

*1 :
- When the fan motor fails, the remote controller does not display any error code.
  Usage under that status will lead to insufficient ventilation.
  The air supply and exhaust fans should be checked once every one or two months.
- You can make a simple check such as below way.
  To check the wind flow, hold a bar of which the end has a string or other similar lightweight item over the supply grille and exhaust grille.

*2 :
- When the solenoid valve fails, the remote controller does not display any error code.
  Usage under that status will lead to insufficient humidification and increased tap water consumption.
  The solenoid valve should be checked at the biginning of the heating season.

Note 1
This table indicates main parts.
See the maintenance and inspection contract for details.

Note 2
This maintenance cycle indicates recommended lengths of time until the need arises for maintenance work, in order to ensure the product is operational as long as possible.
Use for appropriate maintenance design (budgeting maintenance and inspection fees, etc.).
Depending on the content of the maintenance and inspection contract, the inspection and maintenance cycles may in reality be shorter than those listed here.

Shortening of “maintenance cycle” and “replacement cycle” needs to be considered in the following cases.
- When used in hot, humid locations or locations where temperature and humidity fluctuate greatly.
- When used in locations where power fluctuation (voltage, frequency, wave distortion, etc.) is high. (Cannot be used if it is outside the allowable range.)
- When installed and used in locations where bumps and vibrations are frequent.
- When used in bad locations where dust, salt, harmful gas or oil mist such as sulfurous acid and hydrogen sulfide may be present in the air.
- When used in locations where the machine is started and stopped frequently or operation time is long. (Example: 24 hour air-conditioning)
- When the supply water is hard water the humidifier’s life become shorter.

■ **Recommended replacement cycle of wear-out parts**
[The cycle is not the same as the warranty period.]

- Table 2 “Replacement Cycle” Lists

Name of Main Part	Inspection Cycle	Replacement Cycle
Air filter	1 year	3 years
High efficiency filter (Optional accessory)		1 year
Heat exchanger element	2 years	10 years
Humidifier element	1 year	3 years (Note 3)

Note 1
This table indicates main parts.
See the maintenance and inspection contract for details.
Note 2
This maintenance cycle indicates recommended lengths of time until the need arises for maintenance work, in order to ensure the product is operational as long as possible.
Use for appropriate maintenance design (budgeting maintenance and inspection fees, etc.).
Note 3
Life of humidifying element is about 3 years (4,000 hours), under the supply water conditions of hardness: 150mg/l.
(Life of humidifying element is about 1 year (1,500 hours), under the supply water conditions of hardness: 400mg/l.)
Annual operating hours: 10 hours/day × 26 days / month × 5 month = 1,300 hours.

Contact your dealer for details.
Note: Breakage due to taking apart or cleaning inside by anyone other than our authorized dealers may not be included in the warranty.

■ **Moving and discarding the unit**

- Contact your dealer for removing and reinstalling the total enthalpy heat exchanger when moving house since they require technical expertise.
- This unit contains chlorofluorocarbon in the refrigent.
  When discarding, removing linstalling and maintaining the unit, collect the refrigent in accordance with the local law for the global environmental destruction prevention.
  In detail contact your dealer.

■ **Where to call**

For after-sales service, etc., consult with your dealer.

■ **Warranty period:**
Warranty period: Within one year after installation.

- If it is necessary to repair the air conditioner within the warranty period, contact your dealer.

C : 3P130767-3F

9 Installation

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

9.1 Before Installation

The accessories needed for installation must be retained in your custody until the installation work is completed. Do not discard them!

After carrying in the unit, protect it with packing materials to prevent it from scratching until installation work is done.

[1] Decide upon a line of transport.

[2] Leave the unit inside its packaging while moving, until reaching the installation site. Where unpacking is unavoidable, use a sling of soft material or protective plates together with a rope when lifting, to avoid damage or scratches to the unit.

Hold the unit by the hanger brackets (4) when opening the crate and moving it, and do not lift it holding on to any other part (especially the refrigerant piping, the drain piping, the water supply piping, and the duct connecting flange).

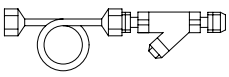
- Be sure to check the type of R-410A refrigerant to be used before installing the unit. (Using an incorrect refrigerant will prevent normal operation of the unit.)
- For the installation of an outdoor unit, refer to the installation manual attached to the outdoor unit.

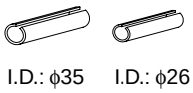
9.1.1 Precautions

- Be sure to instruct customers how to properly operate the unit (especially maintenance of air filter, and operation procedure) by having them carry out operations themselves while looking at the manual.
- Where the air contains high levels of salt such as that near the ocean and where voltage fluctuates greatly such as that in factories. Also in vehicles or vessels.

9.1.2 Accessories

Check the following accessories are included with your unit.

Name	Duct connecting flange	M4 tapping screw (For connecting duct)	Water supply piping with strainer	Half-union joint (Copper piping joint)	Flare nut (Copper piping joint)
Quantity	4 pcs.	24 pcs.	VKM-GAMV1:1 pc. VKM-GAV1: 0 pc.	VKM-GAMV1:1 pc. VKM-GAV1: 0 pc.	VKM-GAMV1:1 pc. VKM-GAV1: 0 pc.
Shape		 50 type M4×12 80, 100 type M4×16			

Name	Refrigerant piping insulation cover	Water supply piping insulation cover	Sealing material	Clamp	
Quantity	1 set	VKM-GAMV1:1 pc. VKM-GAV1: 0 pc.	1 pc.	VKM-GAMV1: 8 pcs. VKM-GAV1: 6 pcs.	(Other) • Installation manual • Operation manual
Shape	 I.D.: ϕ35 I.D.: ϕ26	 I.D.: ϕ15			

9.1.3 Optional Accessories

- This unit can be made a part of two different systems: as part of the combined operation system used together with VRVIII SYSTEM Air Conditioners, and as the independent system using only the HRV. An operating remote controller is required for this unit when using the unit as an independent system. Select a suitable remote controller from below table according to customer request and technical materials.

Table

Remote controller type	BRC1A62, BRC1D527

NOTE) 1

If you use the remote controller which is not listed in above table, please consult your dealer.

NOTE) 2

We recommend the remote controller “BRC1D527” especially when the unit is used as independent system. Because it displays the ventilation mode and can be selected ventilation fan mode with the button.

- When installing the unit, have ready the round shape hood, the air discharge grille and the air suction grille, and other parts needed for the installation.
  Consult your Daikin dealer when selecting optional accessories.

FOR THE FOLLOWING ITEMS, TAKE SPECIAL CARE DURING CONSTRUCTION AND CHECK AFTER INSTALLATION IS FINISHED.

a. Items to be checked after completion of work

Items to be checked	If not properly done, what is likely to occur	Check
Are the indoor and outdoor unit fixed firmly?	The units may drop, vibrate or make noise.	
Is the outdoor duct installed to outside with down slope? **(Refer to Fig. 16)**	Condensate water may drip.	
Is the gas leak test finished?	It may result in insufficient cooling.	
Is the unit fully insulated?	Condensate water may drip.	
Does drainage flow smoothly?	Condensate water may drip.	
Does the power supply voltage correspond to that shown on the name plate?	The unit may malfunction or the components burn out.	
Are wiring and piping correct?	The unit may malfunction or the components burn out.	
Is the unit safely grounded?	Dangerous at electric leakage.	
Is wiring size according to specifications?	The unit may malfunction or the components burn out.	
Is something blocking the air outlet or inlet of either the indoor or outdoor units?	It may result in insufficient cooling.	
Are refrigerant piping length and additional refrigerant charge noted down?	The refrigerant charge in the system is not clear.	
Is water supplied with the water supply piping connected?	Not humidified.	

Please check all items listed in the “SAFETY CONSIDERATIONS” above once again.

b. Items to be checked at time of delivery

Items to be checked	Check
Did you explain about operations while showing the operation manual to your customer?	
Did you hand the operation manual and warranty over to your customer?	

C. Points for explanation about operations

The items with ⚠ **WARNING** and ⚠ **CAUTION** marks in the operation manual are the items pertaining to possibilities for bodily injury and material damage in addition to the general usage of the product. Accordingly, it is necessary that you make a full explanation about the described contents and also ask your customers to read the operation manual.

9.2 Selecting Installation Site

⚠ CAUTION

- When moving the unit during or after unpacking, make sure to lift it by holding its hanger brackets. Do not exert any pressure on other parts, especially the refrigerant piping, drain piping, water supply piping and duct connecting flange.
- If you think the humidity inside the ceiling might exceed 30°C and RH80%, reinforce the insulation on the inter-unit piping.
  Use glass wool or polyethylene foam as insulation so that it is no thicker than 10mm and fits inside the ceiling opening.
- Use glass wool or polyethylene form of 10mm or more thick which fit into ceiling opening as insulation material.

1. Select an installation site where the following conditions are fulfilled and that meets with your customer’s approval.

- Install in a place which has sufficient strength and stability.
  (Beams, ceiling, and other locations capable of fully supporting the weight of the unit.)
  Insufficient strength is dangerous. It may also cause vibration and unusual operating noise.
- Where piping between indoor and outdoor units is possible within the allowable limit.
  (Refer to the installation manual for the outdoor unit.)
- Where nothing blocks air passage.
- Where condensate can be properly drained.
- Install in a location where the air around the unit or taken into the humidifier will not drop below 0°C.
- 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.)

- Where sufficient clearance for maintenance and service can be ensured. **(Refer to Fig. 1)**

Unit (mm)

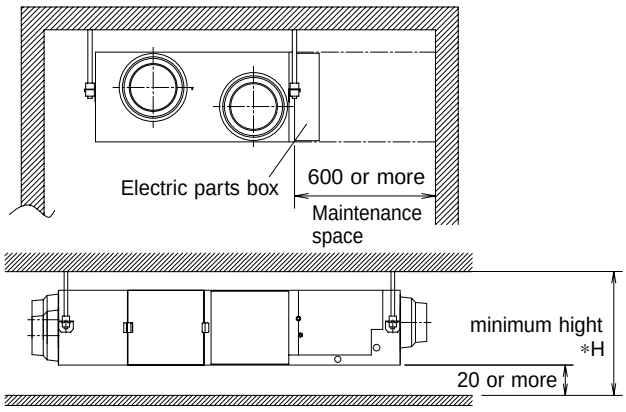


Fig. 1

- Select the *H dimension such that a downward slope of at least 1/100 is ensured as indicated in **"9.5 Drain Piping and Water Supply Work"**.

[PRECAUTION]

- Install the indoor and outdoor units, power supply wiring and connecting wires at least 1 meter away from televisions or radios in order to prevent image interference or noise. Depending on the radio waves, a distance of 1 meter may not be sufficient enough to eliminate the electric noise.
- The bellows may not be able to be used in some disctricts, so exercise caution. (Contact your local government office or fire department for details.)
- When discharging exhaust air to a common duct, the Building Standard Law requires the use of fire-proof materials, so attach a 2 m copper plate standing duct or smoke back flow prevention damper.

2. **Use suspension bolts for installation. Check whether the ceiling is strong enough to support the weight of the unit or not. If there is a risk, reinforce the ceiling before installing the unit.**
   (Installation pitch is mentioned as follow. Refer to it to check for points requiring reinforcing.)

9.3 Preparations before Installation

1. **Confirm the positional relationship between the unit and suspension bolts. (Refer to Fig. 2)**
   Leave space for servicing the unit and include inspection hatches. (Always open a hole on the side of the electric parts box so that the air filters, heat exchange elements, fans, and humidifier elements can easily be inspected and serviced.)

Unit (mm)

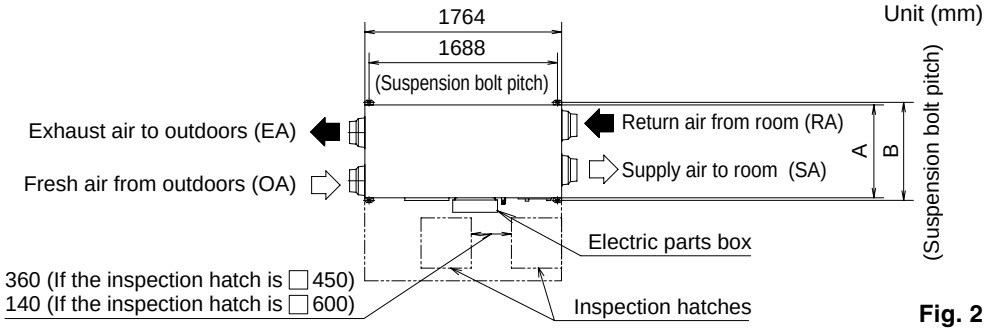


Fig. 2

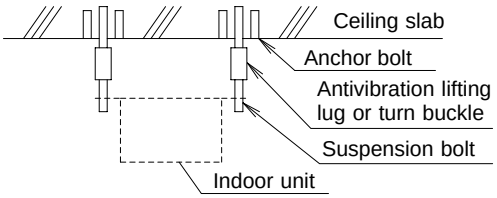
(mm)

Model	A	B
VKM50GAMV1, VKM50GAV1	832	878
VKM80GAMV1, VKM80GAV1 VKM100GAMV1, VKM100GAV1	1214	1262

2. **Make sure the range of the unit's external static pressure is not exceeded.**
   (See the fan-strength and static performance characteristic drawings as well as the general catalog for the range of the external static pressure setting.)
3. **Open the installation hole. (Pre-set ceilings)**
   - Once the installation hole is opened in the ceiling where the unit is to be installed, pass refrigerant, drain piping, transmission wiring, and remote controller wiring to the unit's piping and wiring holes.
     See **"9.5 Drain Piping and Water Supply Work"**, **"9.6 Refrigerant Piping Work"**, and **"9.9 Wiring Example and how to set the Remote Controller"**.
   - After opening the ceiling hole, make sure ceiling is level if needed. It might be necessary to reinforce the ceiling frame to prevent shaking.
     Consult an architect or carpenter for details.

4. Install the suspension bolts.

(Use M10 to M12 suspension bolts.) Use a hole-in-anchor, sunken insert, sunken anchor for existing ceilings, or other part to be procured in the field to reinforce the ceiling to bearing the weight of the unit. **(Refer to Fig. 3)**



Note: All the above parts are locally procured. **Fig. 3**

9.4 The Method of Installation

CAUTION

〈〈**Hold underside of the unit or hanger bracket without putting force on other parts when unpacking or moving the unit.**〉〉

〈〈**As for the parts to be used for installation work, be sure to use the provided accessories and specified parts designated by our company.**〉〉

(1) Install the unit temporarily.

- Attach the hanger bracket to the suspension bolt. Be sure to fix it securely by using nuts (M10, M12) and washers (M10 with external dia. 30 to 34 mm, M12 with external dia. 36 to 38 mm) (locally procured) from the upper and lower sides of the hanger bracket. **(Refer to Fig. 4)**

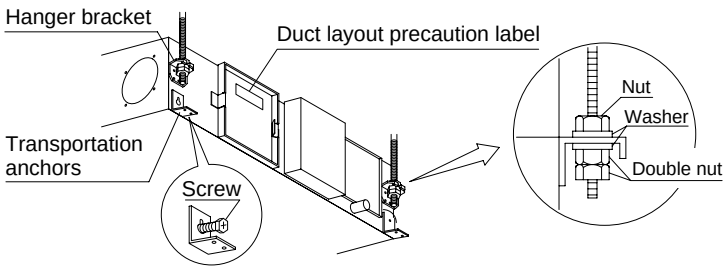


Fig. 4

(2) If unnecessary, remove the four transportation anchors.

- Loosen the screws.
- Slide upward and remove the transportation anchors.
- Securely tighten the screws as before.

CAUTION

- The screws shouldn't be removed from the unit and should be tightened in order to prevent air from escaping.
- Check that foreign objects such as plastic or paper are not contained in the unit when installing.

- Install the unit after checking the indoor (SA/RA) and outdoor (EA/OA) in accordance with the figure duct layout precaution label.
- Do not turn the unit upside down.

(3) Adjust the height of the unit. (Tighten the double nuts securely.)

(4) Check the unit is horizontally level.

CAUTION

Use a level to make sure that the unit is level and that the tilt (downward slope) to the drain piping connection is within 1°. (Refer to Fig. 5)
(One thing to watch out for in particular is if it is installed so that the slope is not in the direction of the drain piping, as this might cause leaking.)

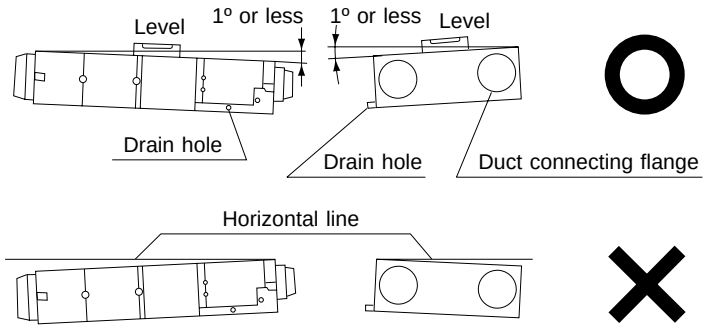


Fig. 5

(5) Tighten the upper nut.

(6) Attach the accessory duct connecting flanges using the included screws to the outlet and intake holes (a total of four).
When attaching, make sure the alignment markings on the unit match up with the triangle on the each duct connecting flange. **(Refer to Fig. 6)**

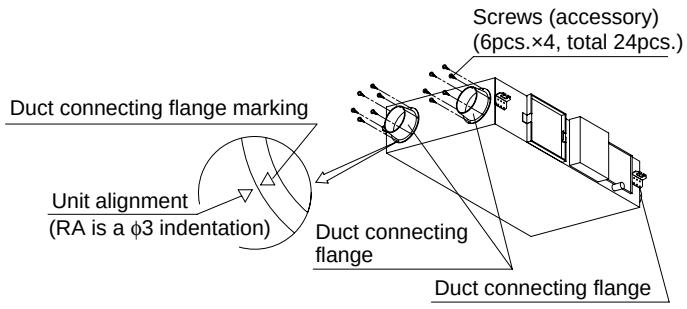


Fig. 6

9.5 Drain Piping and Water Supply Work

(1) Install the drain piping.
- Make sure the drain works properly.
- In case of the direct duct connection system, there is negative pressure inside the unit relative to atmospheric pressure when the unit is running, so be sure to provide drain frap on the drain outlet. **(See Fig. 7-1)**

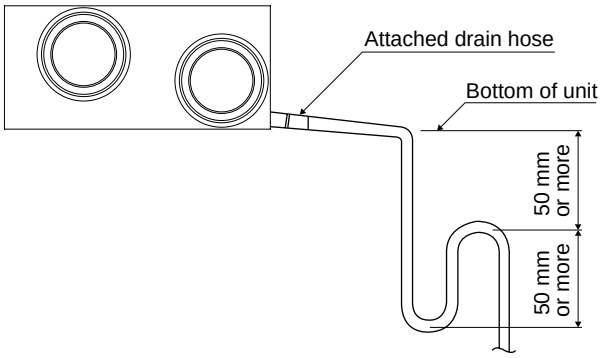


Fig. 7-1

⚠ CAUTION

Do not connect the drain piping directly to sewage pipes that smell of ammonia. The ammonia in the sewage might enter the indoor unit through the drain pipes and corrode the heat exchanger (Direct expantion coil).

- Keep the drain pipe short and sloping downwards at a gradient of at least 1/100 to prevent air pockets from forming. **(Refer to Fig. 7-2)**
- If converging multiple drain pipes, install according to the procedure shown below. (Install a drain trap for each indoor unit.)

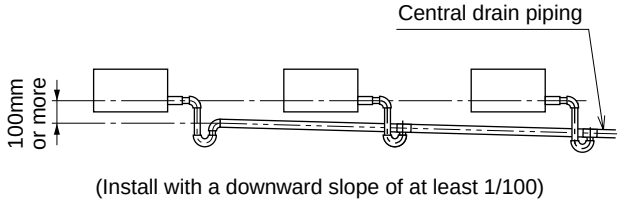


Fig. 7-2

⚠ CAUTION

Water accumulating in the drain piping can cause the drain to clog.

- The diameter of the drain pipe should be greater than or equal to the diameter of the connecting pipe. (pipe size: PT3/4B)
- When piping passes indoors, always insulate it all the way to the base of the drain socket.
- In areas where freezing may occur, always take steps to prevent the pipes from freezing.
- Make sure water doesn't leak from the drain pipes.
- Avoid bends and curves in the pipes to prevent them getting clogged.
- If you are using central drain piping, follow the procedure outlined in the figure 7-2.
- Select central drain pipes of proper size according to the capacity of the connected unit.
- Make sure the tip of the drain pipes opens out into a location where the drainage can be safely processed.

(2) After piping work is finished, check drainage flows smoothly.

- Test the drainage by pouring around 1000cc of water into the drain pan through the inspection hole by removing the maintenance cover (10 screws) or through the outlet duct joint of supply air to room (SA). **(Refer to Fig. 8)**

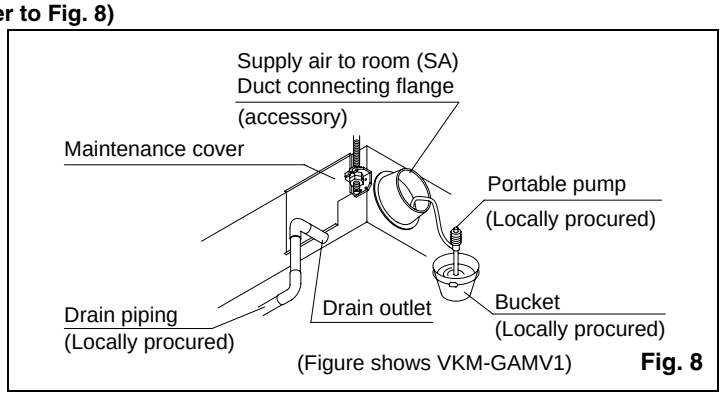


Fig. 8

(3) Make sure that heat insulation work is executed on the following 2 spots to prevent any possibility water leakage due to dew condensation.

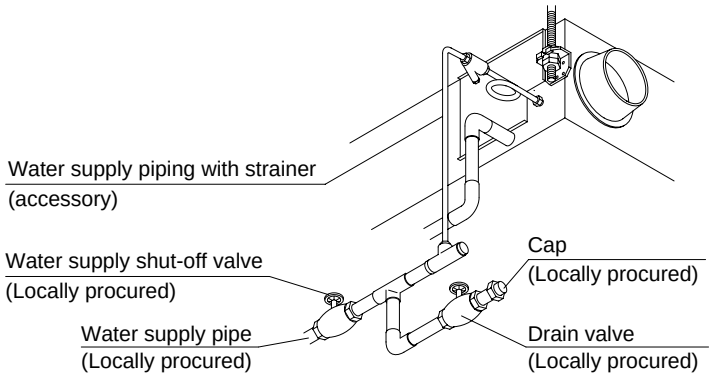
- Indoor drain piping
- Drain outlet

(4) Install the water supply piping. 〈**VKM-GAMV1 series only**〉

⚠ CAUTION

When installing the water supply piping, wash the pipes with tap water so that all dirt is removed from them or install a drain valve somewhere along the piping and drain the pipes thoroughly until the water flowing through them is clear. Make sure no cutting oils or detergents get into the pipes.

- Connect the water supply piping with strainer (accessory), other pipings and valves (locally procured) to the indoor unit as shown in the figure at below.



[PRECAUTION]

- When installing the water supply piping, do not pass piping in front of the maintenance cover, as this will make it impossible to remove the humidifier element.
- Include the water supply piping with strainer (included), a water supply shut-off valve, and a drain valve (both locally procured) somewhere along the water supply piping that can be reached from the inspection hole.
- It is impossible to connect the water supply piping directly to public piping. Use a cistern tank (of the approved type) if you need to get your water supply from public piping.
- When using copper piping for the water supply connections, replace the included half-union joints. **(Refer to Fig. 9)**

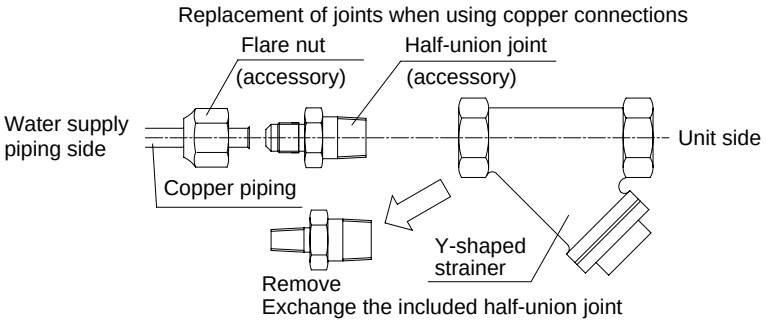


Fig. 9

- Use two spanners when attaching or removing pipes to the half-union joints.
- Secure the water supply piping without applying pressure.

[PRECAUTIONS]

- Use pure water (city water, tap water or equivalent) that satisfies the standard regulated by the law of each country for water supply to the humidifier when performing anti-sweat work.
- Dirty water may cause valves to clog, dirt to accumulate in water tanks, and resulting in poor humidifier performance. (Never use water from a cooling tower or warm water for heating.)
- Make sure the supply water is between 5°C and 40°C in temperature and 0.02MPa to 0.49MPa (0.2kg/cm^2 to 5kg/cm^2) in pressure. Include a pressure release valve between the humidifier and the strainer if the water pressure will be higher than this range.
- Use city water or clean water and take steps to prevent condensation from forming.
- Also, if the supply water is hard water, use a water softener because of short life.
  * Life of humidifying element is about 3 years (4,000 hours), under the supply water conditions of hardness: 150mg/l. (Life of humidifying element is about 1 year (1,500 hours), under the supply water conditions of hardness: 400mg/l.)
  Annual operating hours: 10 hours / day × 26 days / month × 5 month = 1,300 hours

(5) Insulate all piping that passes indoors.

After checking that the water supply piping connections do no leak, insulate them using the included insulation as shown in Fig. 10. (Tighten both edges with clamping material.) **(Refer to Fig. 10)**

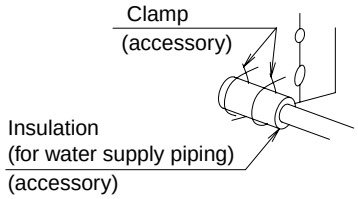


Fig. 10

- Wrap the water supply piping with insulation to prevent condensation from forming.
- In areas where freezing may occur, always take steps to prevent the pipes from freezing.

9.6 Refrigerant Piping Work

〈For refrigerant piping of outdoor units, see the installation manual attached to the outdoor unit.〉
〈Execute heat insulation work completely on both sides of the gas piping and the liquid piping. Otherwise, a water leakage can result sometimes.
Use insulation that can withstand temperatures of at least 120°C. Improve insulation of refrigerant piping according to the installation environment.
Refer to the following information as a guide.

- **The ambient temperature is 30°C and humidity is 75% to 80%: 15 mm min. in thickness.**
- **The ambient temperature exceeds 30°C and the humidity exceeds 80%: 20 mm min. in thickness.**

Without reinforcement, condensation may form on the surface of the insulation.〉
〈Before refrigerant piping work, check the type of R-410A refrigerant is used. (Proper operation is not possible if the types of refrigerant are not the same.)〉

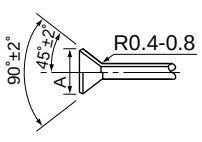
⚠ CAUTION

This product must use a new refrigerant (R-410A). Obey the following items.

- **Use a pipe cutter and flare suitable for the type of refrigerant (R-410A).**
- **Apply ester oil or ether oil around the flare portions before connectioning.**
- **Only use the flare nuts included with the unit. Using different flare nuts may cause the refrigerant to leak.**
- **To prevent dust, moisture or other foreign matter from infiltrating the tube, either pinch the end or cover it with tape.**
- **Do not allow anything other than the designated refrigerant to get mixed into the refrigerant circuit, such as air, etc. If any refrigerant gas leaks while working on the unit, ventilate the room thoroughly right away.**

- The outdoor unit is charged with refrigerant.
- Be sure to use both a spanner and torque wrench together, as shown in the drawing, when connecting or disconnecting pipes to the unit. **(Refer to Fig. 11)**
- Refer to the “Table 1” for the dimensions of flare nut spaces.

Table 1

Pipe gauge	Tightening torque	Flare dimension A (mm)	Flare shape
ϕ 6.4	14.2–17.2N·m	8.7 – 9.1	
ϕ12.7	49.5–60.3N·m	16.2 – 16.6	

- When connecting the flare nut, coat the flare section (both inside and outside) with ester oil or ether oil, rotate three or four times first, then screw in. **(Refer to Fig. 12)**

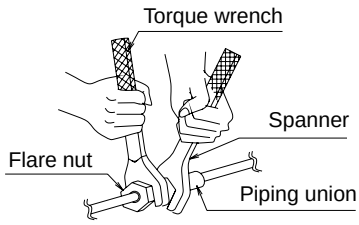


Fig. 11

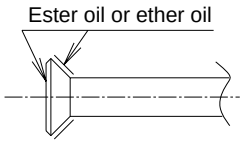


Fig. 12

- Refer to the “Table 1” for tightening torque.

CAUTION

Over-tightening may damage the flare and cause a refrigerant leakage.

- If a torque wrench is not available, tighten the nut in the following manner. Once work is complete, make sure there is no gas leaking. As the flare nut is tightened with the wrench, the torque will suddenly increase. From that position, tighten the nut to the angle shown on “ Table 2 ”.

Table 2

Pipe size	Further tightening angle	Recommended arm length of tool
ϕ 6.4 (1/4”)	60 to 90 degrees	Approx. 150mm
ϕ 12.7 (1/2”)	30 to 60 degrees	Approx. 250mm

- After the work is finished, make sure to check that there is no gas leak.
- After checking the pipe-connection for gas leakage, be sure to insulate the liquid and gas piping. **(Refer to Fig. 13)**

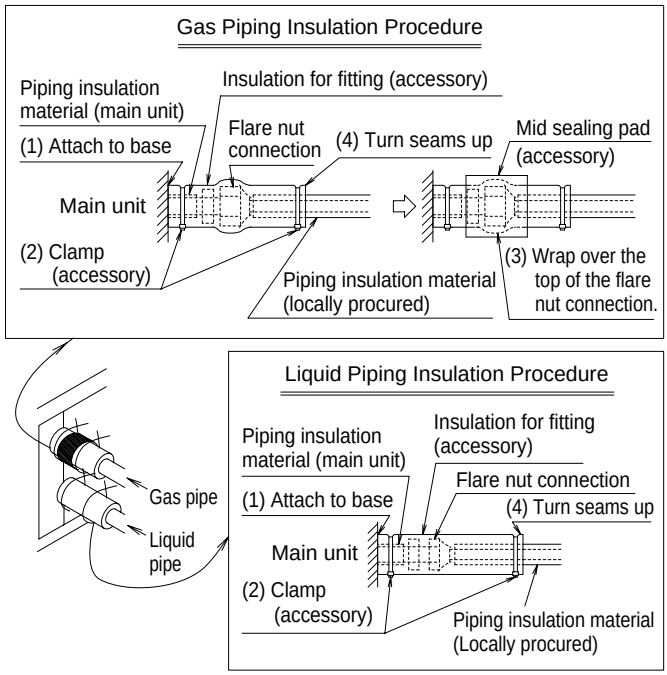


Fig. 13

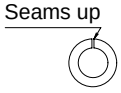
Precautions for insulation material installation on flare nut connection

(1) Make sure that the piping insulation material comes in close contact with the base so that there will be no air passage at the edges of the piping insulation material.

(2) Do not tighten the clamp excessively so as to maintain the appropriate thickness of the insulator.

(3) Wrap the sealing material around the upper part of the flare nut connection.

(4) Turn the seams up (see the figure on the right-hand side).



CAUTION

Be sure to insulate any field piping all the way to the piping connection inside the unit. Any exposed piping may cause condensation or burns if touched.

- Connect refrigerant piping and branching according to the attached installation manuals that come with the outdoor unit.

Model	Gas piping diameter	Liquid piping diameter
VKM50GAMV1, VKM50GAV1 VKM80GAMV1, VKM80GAV1 VKM100GAMV1, VKM100GAV1	ϕ 12.7	ϕ 6.4

- When brazing the refrigerant piping, perform nitrogen replacement first, or perform the brazing (note 2) while feeding nitrogen into the refrigerant piping (note 1), and finally connect the indoor unit using the flare connections. **(Refer to Fig. 14)**

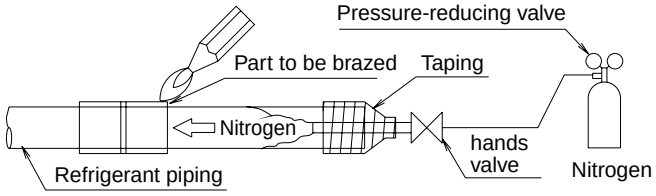


Fig. 14

⚠ CAUTION

- When brazing a pipe while feeding nitrogen inside the pipe, make sure to set the nitrogen pressure to 0.02MPa (0.2kg/cm^2) or less using the pressure reducing valve. (This pressure is such that breeze is blown to your cheek.)
- Do not use a flux when brazing the refrigerant pipe joints. Use phosphor copper brazer (BCuP-2: JIS Z 3264/B-Cu93P-710/795: ISO 3677) which does not require flux. (Using a flux containing chlorine may cause the piping to corrode. Using a welding flux containing fluorine may cause the refrigerant lubricant to deteriorate, and affect adversely the refrigerant piping system.)
- Do not use anti-oxidants or other similar agent when brazing the pipe joints. Residue can clog the pipes and may cause breakdown of parts.

9.7 Duct Connection

〈**Perform duct work keeping the following things in mind**〉

- Do not connect the ducts as shown in Fig. 15.

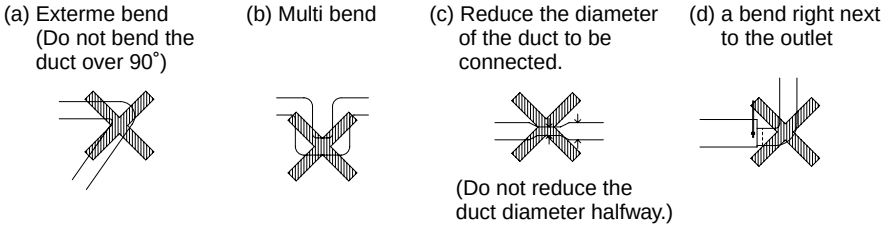


Fig. 15

- The minimal radius of bends for flexible ducts are as follows.
  200-mm duct : 300mm diameter
  250-mm duct : 375mm diameter
- To prevent air leakage, wind aluminum tape round the section after the duct connecting flange and the duct are connected. **(Refer to Fig. 16)**
- To prevent short circuit, install the opening of the indoor air intake as far as from the opening of the exhaust suction.
- Use the duct applicable to the model of unit used. (Refer to the installation drawing.)
- Install the two outdoor ducts with down slope (slope of 1/30 or more) to prevent entry of rain water. Also, provide insulation for three ducts (Outdoor ducts and Indoor supply air duct) to prevent dew condensation. (Material : Glass wool of 25mm thick) **(Refer to Fig. 16)**
- If the level of temperature and humidity inside the ceiling is always high, install a ventilation equipment inside the ceiling.
- 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.
- Using flexible or silent ducts can be effective in reducing the air discharge sound of the supply air to room (SA). Select materials keeping in mind the fan strength and operating sound of the unit. Consult your Daikin dealer for selection.
- Set the pitch between the exhaust air outlet (EA) and the outside air intake (OA) to 3 times the duct diameter.
- Do not use a bent cap or a round hood as the outdoor hood if they might get rained on directly. (We recommend using a deep hood (optional accessory).)

- When using a deep hood, make sure the duct from the deep hood (outer wall) to the unit is at least 1m long.

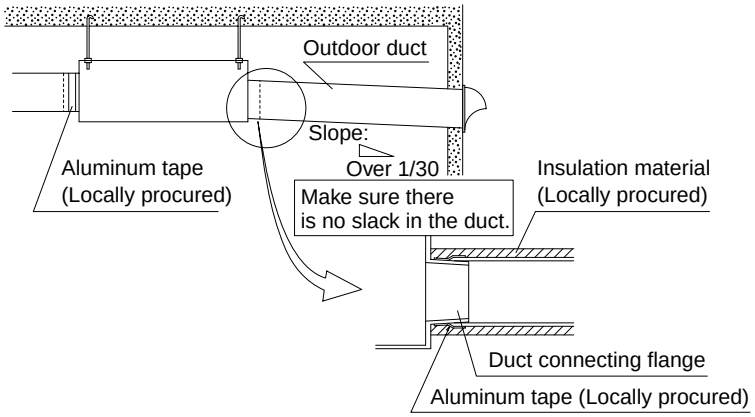


Fig. 16

- The change of air discharge grill's location should be examined when the cold draft from air discharge grill is feared.
  The fan is driving while defrost operation, and the cold air is often blowing.
- When connecting the indoor unit directly to the duct, always use the same system on the indoor unit as with the outdoor unit, perform group-linked operation, and make the direct duct connection settings from the remote controller (Mode No. “17 (27)” – FIRST CODE NO. “5” – SECOND CODE NO. “06”) Also, do not connect to the outlet side of the indoor unit. Depending on the fan strength and static pressure, the unit might back up.
- In the case of suburban buildings where windows and road lighting equipment are close to the air supply opening and insects tends to swarm around the light, minute insects may intrude indoors through the air supply opening and air filter. In such cases, the use of a high-performance filter (sold separately) is recommended. However, it may be still difficult to prevent the intrusion of very minute insects. In that case, consider ultimate countermeasures, such as a filter box (arranged on site).

9.8 Electric Wiring Work

- Shut off the power before doing any work.
- All field supplied parts and materials, electric works must conform to local codes.
- Use copper wire only.
- All wiring must be performed by an authorized electrician.
- See also the “Electrical Wiring Diagram label” attached to the electric parts box lid when laying electrical wiring.
- Wire the outdoor unit and remote controller as shown in the electric wiring diagram label. See the “Remote Controller Installation Manual” for details on how to install and lay the wiring for the remote controller.
- This system consists of multiple indoor units. Mark each indoor unit as unit A, unit B..., and be sure the terminal board wiring to the outdoor unit and BS unit are properly matched. If wiring and piping between the outdoor unit and an indoor unit are mismatched, the system may cause a malfunction.
- Install a wiring interrupter or ground-fault circuit interrupter for the power wiring.
- Make sure the ground resistance is no greater than 100Ω . This value can be as high as 500Ω when using a ground fault circuit interrupter since the protective ground resistance can be applied.
- Do not let the ground wire should come in contact with gas pipes, water pipes, lighting rods, or telephone ground wires.
  - Gas pipes: gas leaks can cause explosions and fire.
  - Water pipes: cannot be grounded if hard vinyl pipes are used.
  - Telephone ground and lightning rods: the ground potential when struck by lightning gets extremely high.
- Do not turn on the power supply (switch, wiring interrupter or ground fault circuit interrupter) until all other works are done.

SPECIFICATIONS FOR FIELD SUPPLIED FUSES AND WIRE

Model	Power supply wiring			Remote controller wiring Transmission wiring	
	Field fuses	Wire	Size	Wire	Size
VKM50GAMV1, VKM50GAV1	15A	H05VV-U3G	Follow local standards	Sheathed wire (2 wire)	0.75-1.25 mm^2
VKM80GAMV1, VKM80GAV1					
VKM100GAMV1, VKM100GAV1					

Note

- If the wiring is in a place where people it can be easily touched by people, install a leak interrupter to prevent electric shock.
- When using a ground-fault circuit interrupter, make sure to select one useful also to protection against overcurrent and short-circuit.
  If you use a leak interrupter which is designed for protecting again ground faults, be sure to combine it with a wiring interrupter or an load switch that has a fuse.
- The length of the transmission wiring and remote controller wiring are as follows.

Length of outdoor-indoor transmission wiring … max 1000m (total wiring length 2000m)
Length of remote controller wiring between indoor unit and remote controller … max 500m

ELECTRICAL CHARACTERISTICS

Units				Power supply		Fan motor	
Model	Hz	Volts	Voltage range	MCA	MFA	kW	FLA
VKM50GAMV1, VKM50GAV1	50	220-240V	Max. 264V Min. 198V	4.3	15	0.28×2	1.9×2
VKM80GAMV1, VKM80GAV1				4.3	15	0.28×2	1.9×2
VKM100GAMV1, VKM100GAV1				4.3	15	0.28×2	1.9×2

MCA: Min. Circuit Amps (A); MFA: Max. Fuse Amps (A)
kW: Fan Motor Rated Output (kW); FLA: Full Load Amps (A)

9.9 Wiring Example and how to set the Remote Controller

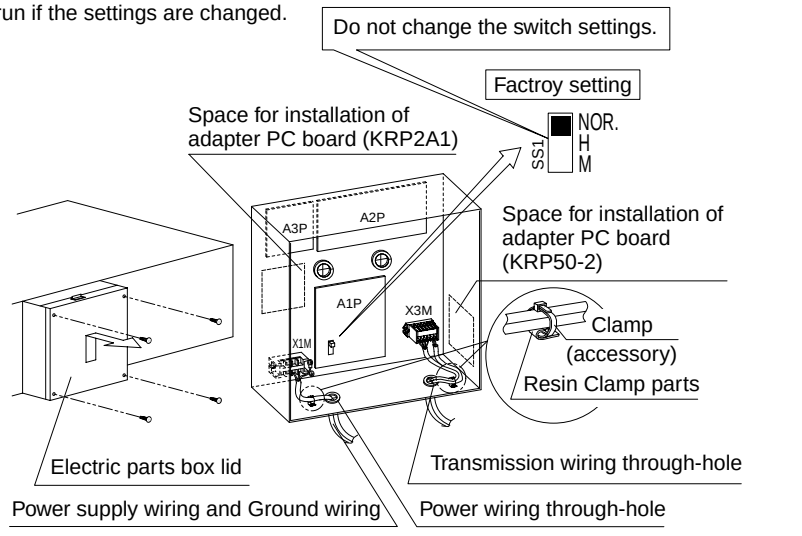
9.9.1 Opening and Shutting the Electric Parts Box and Connecting the Wiring

CAUTION

Be sure to power off before opening the electric parts box.

- Remove the electric parts box lid and wire as shown in the figure below.

SS1 is the switch for setting the remote controller.
The unit will not run if the settings are changed.



NOTE) A3P: VKM-GAMV1 series only

CAUTION

- See “Electrical Wiring Diagram label” on the backside of the lid of the electric parts box for electric wiring work.
- Be sure to attach the sealing material or putty (locally procured) to hole of wiring to prevent the infiltration of water as well as any insects and other small creatures from outside. Otherwise a short-circuit may occur inside the electric parts box.
- When clamping the wires, be sure no pressure is applied to the wire connections by using the included clamping material to make appropriate clamps. Also, when wiring, make sure the lid on the electric parts box fits snugly by arranging the wires neatly and attaching the electric parts box lid firmly.
  When attaching the electric parts box lid, make sure no wires get caught in the edges. Pass wiring through the wiring through holes to prevent damage to them.
- Make sure the remote controller wiring, the wiring between the units, and other electrical wiring do not pass through the same locations outside of the unit, separating them by at least 50mm, otherwise electrical noise (external static) could cause mistaken operation or breakage.

9.9.2 Connecting Power Supply Wiring and Ground Wiring

- Pass the power supply wiring and the ground wiring through the wiring through-hole into the electrical parts box and secure with the included clamping material after connecting the wires to terminal blocks. **(Refer to Fig. 17-1, 17-2)**

〈 **VKM-GAMV1 series** 〉
Terminal block (X1M) details

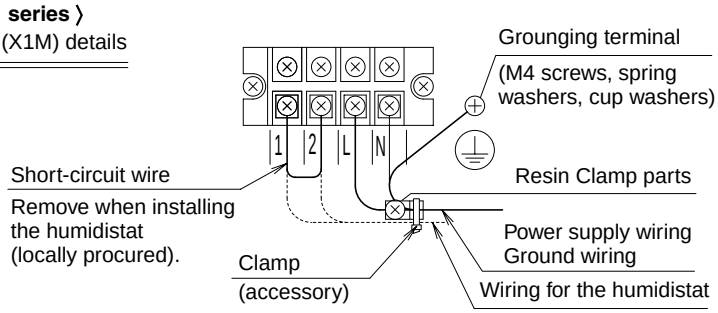


Fig. 17-1

〈 **VKM-GAV1 series** 〉
Terminal block (X1M) details

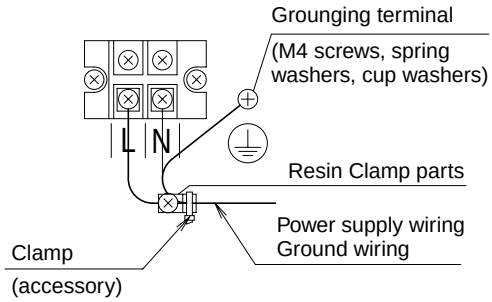
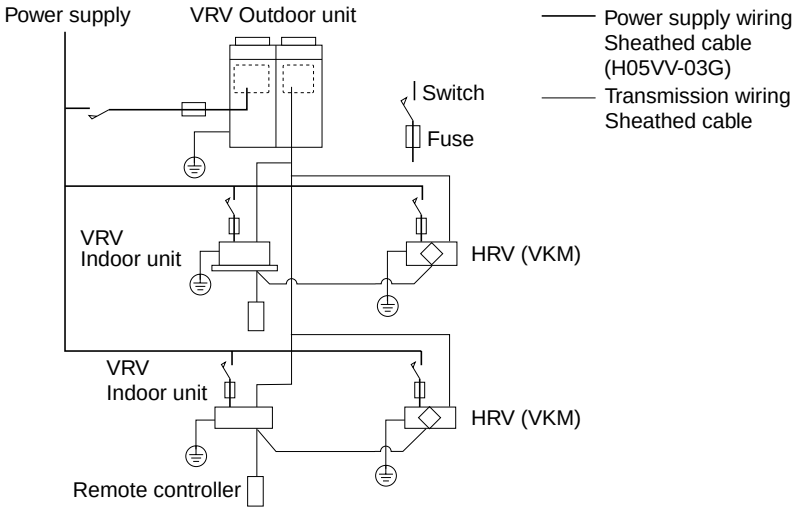


Fig. 17-2

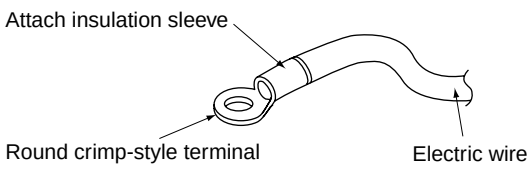
〈**Precautions when laying power supply wiring**〉
[PRECAUTIONS]

[1] A circuit breaker capable of shutting down power supply to the entire system must be installed.
[2] A single switch can be used to supply power to units on the same system.
However branch switches, branch overload circuit interrupter must be selected carefully.
[3] Fit the power supply wiring of each unit with a switch and fuse as shown in the drawing.

COMPLETE SYSTEM EXAMPLE



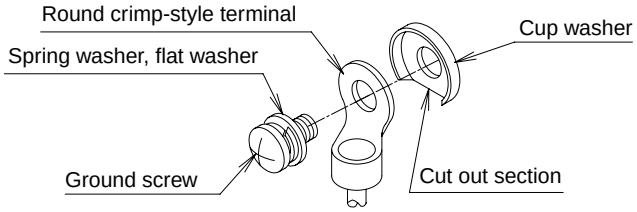
[4] Use round crimp-style terminals for connecting wires to the power supply terminal block.
If unavailable, observe the following points when wiring.
- Do not connect wires of different gauge to the same power supply terminal. (Looseness in the connection may cause overheating.)
- Use the specified electric wire. Connect the wire securely to the terminal. Lock the wire down without applying excessive force to the terminal. (Tightening torque: 131N·cm ±10%)



[5] Tightening torque for the terminal screws.
- Use the correct screwdriver for tightening the terminal screws. If the blade of screwdriver is too small, the head of the screw might be damaged, and the screw will not be properly tightened.
- If the terminal screws are tightened too hard, screws might be damaged.
- Refer to the table below for the tightening torque of the terminal screws.

	Tightening torque (N·m)
Treminal block for remote controller/Transmission wiring (X3M)	0.79 – 0.97
Power supply terminal block (X1M)	1.18 – 1.44
Ground terminal (M4)	1.44 – 1.94

〈**Precautions when connecting the ground**〉
When pulling the ground wire out, wire it so that it comes through the cut out section of the cup washer. (An improper ground connection may prevent a good ground from being achieved.)



9.9.3 Remote Power Supply Wiring, Transmission Wiring, Computerised Control Wire

- Pass the remote control wiring, the transmission wiring, and the computerised control wire into the electric parts box through the through-hole and connect to the terminals on the X3M terminal block. After connection, secure with the included cramping material. **(Refer to Fig. 18)**

Detail of terminal block (X3M)

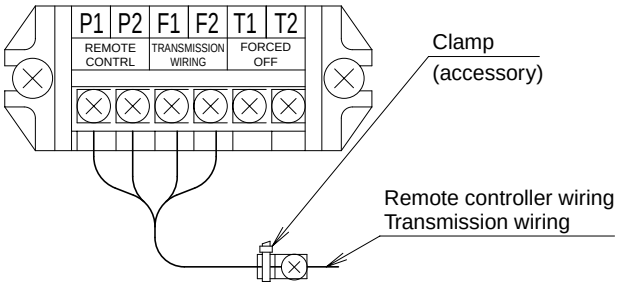


Fig. 18

[PRECAUTIONS]
- Refer to the “Remote Controller Installation Manual” on how to install and lay the wiring for the remote controller.
- Do not, under any circumstances, connect the power wiring to the remote controller or transmission wiring terminal block.
  Doing so can destroy the entire system.
- Connect the remote controller and transmission wiring their respective terminal blocks.

9.9.4 Wiring for the Humidity Regulator (Locally Procured)

<VKM-GAMV1 series only>
- Pass into the electric parts box together with the power wire through the power wiring through-hole.
- Remove the short-circuit wires (1 and 2) on the X1M terminal block and connect the wiring for the humidity regulator.
- Secure with cramping material together with the power wire. **(Refer to Fig. 17-1)**

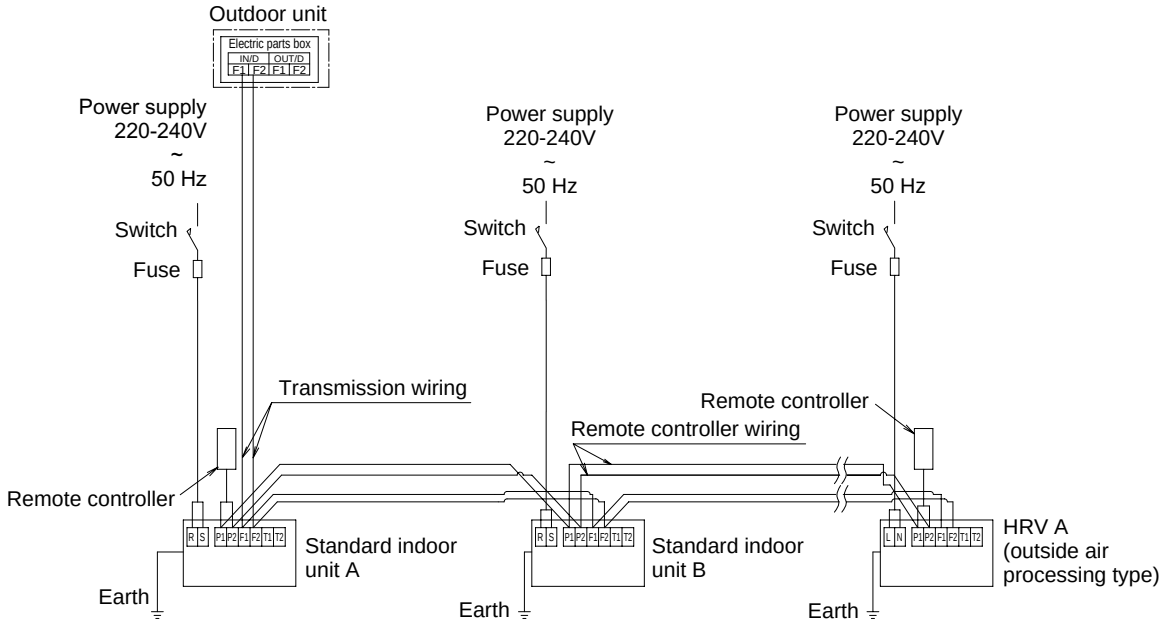
Wiring specifications	Sheathed wire (2 wire)
Size	0.75 - 1.25mm^2
Length	MAX. 100m
External contact specifications	Normally closed contact (Current tolerance 10mA – 0.5A)

CAUTION
〈**VKM-GAMV1 series only**〉
- If using humidistat, install one per HRV unit.
  Controlling more than one HRV unit with a single humidity controller may prevent normal humidity operation and cause water leakage, etc.

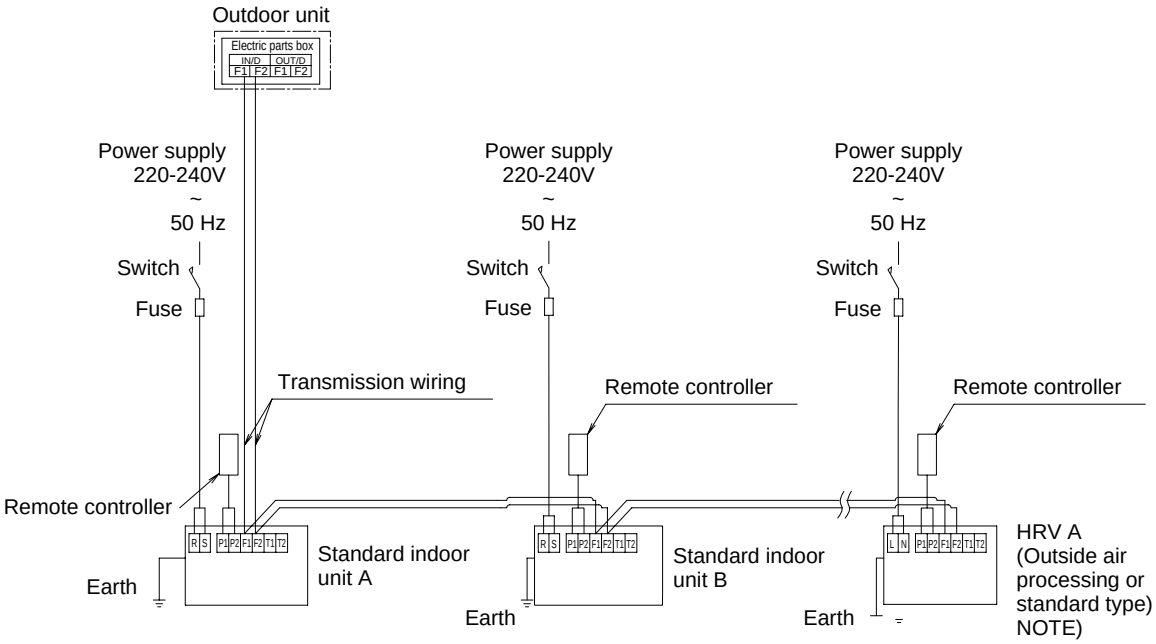
9.9.5 Wiring Example

- This unit can be used as part of the combined operation system used together with indoor units (VRVIII system air conditioners), or as an independent system for processing outside air.
- When connecting with a cooling free building multi type and bringing the RA (exhaust gas intake) of this unit directly in from the ceiling, connect to a BS unit identical to the building multi indoor unit (master unit), and use group-linked operation. (See the Engineering Data for details.)

〈**Combined operation system with VRVIII system (connected with HRV units and standard indoor units in a single refrigerant circuit)**〉

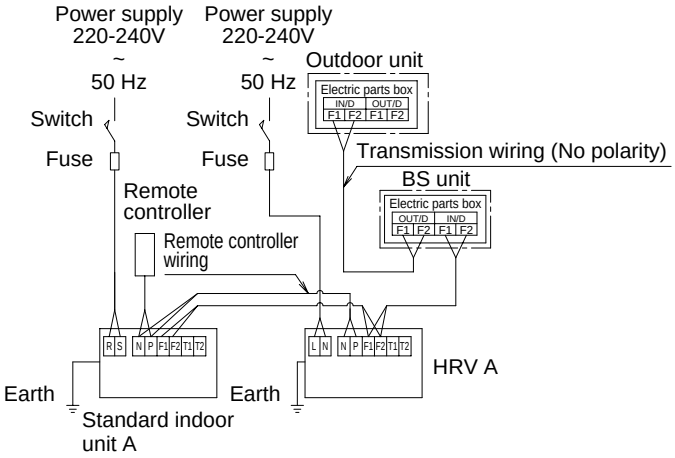


〈**Independent system (connected only with a HRV unit in a single refrigerant circuit)**〉



NOTE) Standard type ..... VAM series

〈**When including a BS unit**〉



[PRECAUTIONS]

There is not need to set the indoor unit address when using group control. (It is automatically set when the power is turned on.) However, since the HRV (outside air processing type) uses two remote control addresses per unit, the number of units which can be group controlled is as follows.

No. of indoor air conditioner units	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14
No. of HRV units	8	7	7	6	6	5	5	4	4	3	3	2	2	1	1

Note

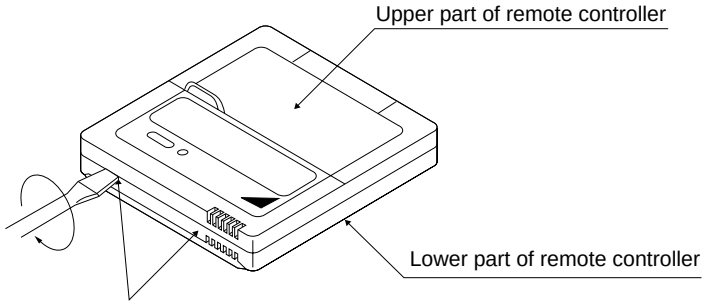
If a simultaneous cooling system is used, a single BS unit should connect to HRV (outdoor air-processing type) and indoor units under group control. If a single BS unit connects to the HRV unit only, fix the operating mode of the HRV unit to cooling, heating, or ventilation.

9.9.6 Control by 2 Remote Controllers (Controlling 1 Indoor Unit by 2 Remote Controllers)

- When using 2 remote controllers, one must be set to “MAIN” and the other to “SUB”.

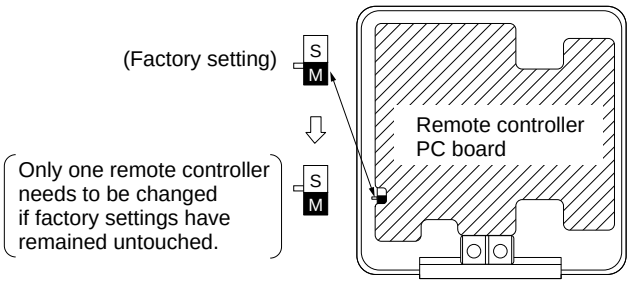
MAIN / SUB CHANGEOVER

1. **Insert a ⊖ screw driver into the recess between the upper and lower part of remote controller and, working from the 2 positions, pry off the upper part.**
   (The remote controller PC board is attached to the upper part of remote controller.)



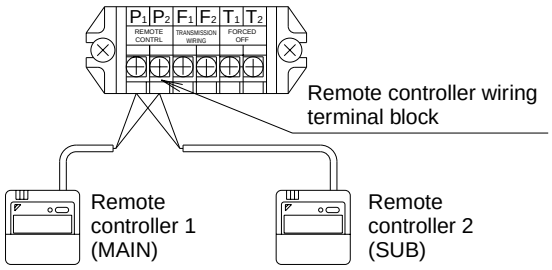
Insert the screwdriver here and gently work off the upper part of remote controller.

2. **Turn the MAIN/SUB changeover switch on one of the two remote controller PC boards to “S”.**
   (Leave the switch of the other remote controller set to “M”.)



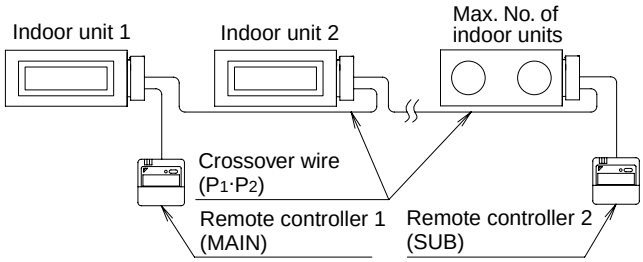
〈**Wiring Method**〉 (See **"9.8 Electric Wiring Work**".)

1. Remove the electric parts box lid.
2. Add remote controller 2 (slave) to the terminal block for remote controller (P_1, P_2) in the electric parts box. (There is no polarity.)



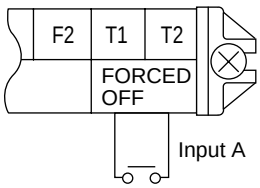
[PRECAUTIONS]

- Crossover wiring is needed when using group control and 2 remote controllers at the same time.
- Connect the indoor unit at the end of the crossover wire (P_1, P_2) to remote controller 2 (slave).



9.9.7 Computerised Control (Forced OFF and ON/OFF Operation)

- Wire specifications and how to perform wiring
  Connect the input from outside to terminals T1 and T2 of the terminal block for remote controller.



∗ The equipment in Nighttime free cooling operation cannot be stopped forcibly with T1 or T2.

Wire specification	Sheathed wire (2 wire)
Gauge	0.75 - 1.25mm^2
Length	Max. 100m
External terminal	Contact that can ensure the minimum applicable load of 15V DC, 1mA.

- Actuation
  The following table explains FORCED OFF and ON/OFF OPERATIONS in response to Input A.

FORCED OFF	ON/OFF OPERATION
Input "ON" stops operation (impossible by remote controllers.)	Input OFF → ON turns ON unit.
Input OFF enables control by remote controller.	Input ON → OFF turns OFF unit.

- How to select FORCED OFF and ON/OFF OPERATION
  Enter the FORCED OFF and ON/OFF OPERATION selection using the local "external start/stop input" settings based on **"9.10 Field Setting and Test Run"**.

9.9.8 Central Control

If control is performed with a central device (central management controller, etc.), group number needs to be set with the remote controller. See the manual of each central device for detail.

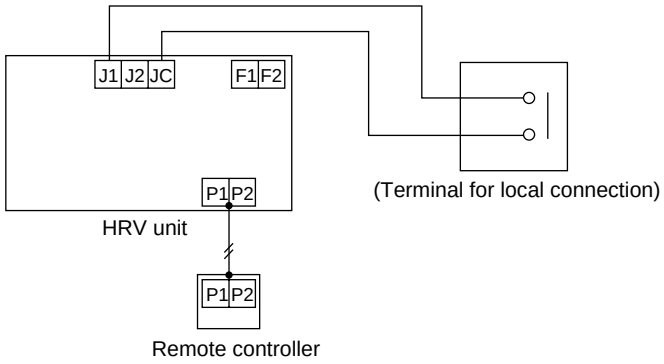
9.9.9 Fresh-up Operation by External Input (HRV Unit)

PURPOSES AND FUNCTIONS

When the operation is interlocked with the local ventilating fan(such as the one for toilet or kitchen), the HRV unit performs the over-supply operation to prevent inflow of the odor from outside.
The flow rate of supply air becomes higher than that of exhaust air.
Both the excessive supply mode (Supply Fresh-up) and the excessive exhaust mode (Exhaust Fresh-up) are selectable.
In details, contact your dealer.

EXAMPLE OF CONTROL WIRING

Connecting line can be extended up to 50m maximum.



- Local wiring

Operation of HRV unit	Terminal for local connection	Capacity of connecting terminal
Fresh-up	Short-circuit	No-voltage normally open contact for micro-current 12V, 1mA
Normal	Open circuit	

Note

The connecting wiring between HRV unit and the terminal for local connection can be extended up to 50m maximum.

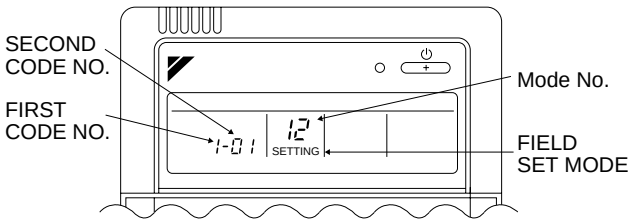
9.10 Field Setting and Test Run

9.10.1 Perform Field Settings with the Remote Controller

(1) Make sure the electric parts box lids are closed on the indoor and outdoor units.

(2) 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.



■ **Field setting**

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

〈**Initial setting**〉

- "Mode No." 17,18 and 19: Group control of HRV units.
- "Mode No." 27, 28 and 29: individual control

〈**Operating procedure**〉

The following describes the operating procedure and settings.

(1) Press the INSPECTION/TRIAL button for more than four seconds with the unit in the normal mode to enter the local setting mode.

(2) Use the TEMPERATURE ADJUSTMENT button to select the desired "**Mode No.**" (The code display will blink.)

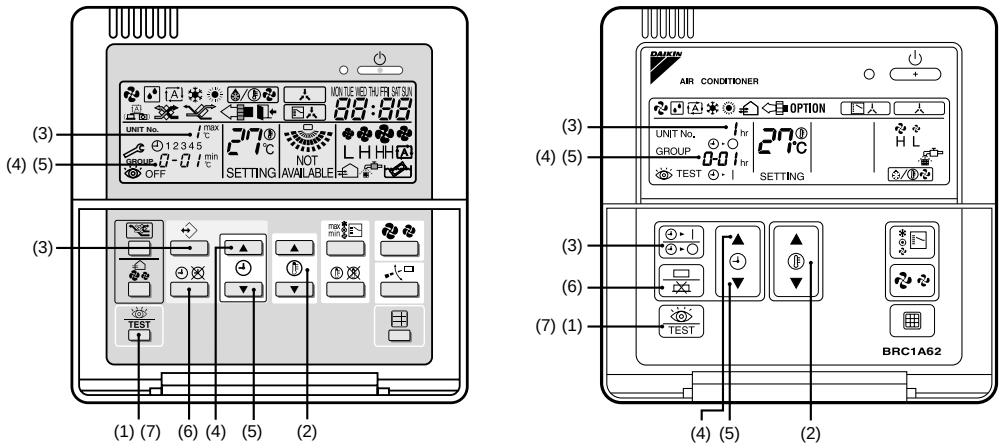
(3) To make settings for individual units under group control (when mode No. 27, 28 or 29 is selected), press the TIMER SETTING ON/OFF button to select the "**unit No.**" for which the settings are to be made. (This process is not necessary when settings are made for the entire group.)

(4) Press the top section of the TIMER button to select the "**FIRST CODE NO.**"

(5) Press the lower section of the TIMER button to select "**SECOND CODE NO.**"

(6) Press the PROGRAM/CANCEL button once to enter the settings. (The code display will stop blinking and light up.)

(7) Press the INSPECTION/TRIAL button to return to normal mode.



〈**Example**〉

When adjusting the ventilation air flow to low setting in the group setting mode, enter the Mode No., "19" FIRST CODE NO., "0" and SECOND CODE NO., "01".

■ **Settings and setting numbers**

Description of setting	Mode No. *1	FIRST CODE NO.	SECOND CODE NO.						
			01	02	03	04	05	06	07
Filter cleaning time setting NOTE) 5	17 (27)	0	Approx. 2500 hours	Approx. 1250 hours	No counting	–	–	–	–
Nighttime free cooling operation setting (Time after air conditioning is stopped.) NOTE) 5		1	OFF	2 hours later	4 hours later	6 hours later	8 hours later	–	–
Fan speed initial setting		4	Normal	Ultra high	–	–	–	–	–
Direct duct connection with VRV setting		5	Not direct duct (Air flow setting)	With direct duct (fan off)	–	Not direct duct (Air flow setting)	–	With direct duct (fan off)	–
Setting for cold areas (Fan operation selection for heater thermo OFF) NOTE) 6		5	Air flow setting	Air flow setting	–	Fan L	–	Fan L	–
Ventilation air flow setting when Nighttime free cooling setting	17 (27)	6	High	Ultra-High	–	–	–	–	–
ON/OFF input from Outside (Set when ON/OFF is to be controlled from outside)	12 (22)	1	Forced off	ON/OFF control	–	–	–	–	–
Power faillure automatic reset (Auto Restart)	12 (22)	5	No equipped	Equipped	–	–	–	–	–
Humidification on/off when heating thermo is off	15 (25)	1	No	Yes	–	–	–	–	–
Indication of ventilation mode/ Not indication	18 (28)	4	Indication	No Indication	–	–	–	–	–
Fresh up air supply/exhaust setting		7	No Indication		Indication		–	–	–
			Supply	Exhaust	Supply	Exhaust			
External input terminal function selection (between J1 and JC) NOTE) 7		8	Fresh-up	Overall alarm	–	–	–	Air flow increase	–
KRP50-2 output switching selection (between 1 and 3)		9	Fan on/off	Abnormal	–	–	–	–	–
Ventilation air flow setting	19 (29)	0	Low	Low	Low	Low	High	High	
Ventilation mode setting		2	Automatic	Exchange	Bypass				
Fresh-up operation	1A		Off	On	–	–	–	–	–
Forced fan on	43								
Unit no. allocation	45								

NOTE

1. The ☐ inside the frame indicates the second code no. set when shipped from factory.
2. The settings are applied to the entire group, but if the mode no. inside the parentheses is selected, the settings can be applied to individual indoor units.
   However, it is only possible to check any changes made to the settings inside the parentheses in individual mode. (For group batch operation, the changes are made but the display remains as it was when shipped from the factory.)
3. Do not set anything not shown above. If the applicable functions are not available, they will not be displayed.
4. When returning to normal mode, the remote controller is initialized, so the display might show "88."
5. When "Filter cleaning time setting" or "Nighttime free cooling operation setting" is changed, explain set contents to the customer.

6. See below for details on the settings for cold areas.
– : operate at the set fan strength

	Air conditioner fan	01	02	04	06
Heating thermo off	Operation	–	–	L	L
Defrost	Stop	–	Stop	Stop	Stop
Oil return	Stop	–	Stop	Stop	Stop

In case of Independent operation

	Air conditioner fan	01	02	04	06
Heating thermo off	Operation	–	–	L	L
Defrost	Stop	–	–	Stop	Stop
Oil return	Stop	–	–	Stop	Stop

– : operate at the set fan strength
L : operate at the weak fan strength
S : Stop

Defrost operation

- In heating operation, freezing of the outdoor unit's coil increases.
  Heating capability decreases and the system goes into defrost operation.
- The remote controller will read "" until the hot air starts blowing.
- It returns to the heating operation again after 6 to 8 minutes (10 at the longest).
- During defrost operation, the fans of the unit continues driving (factory setting).
  The purpose of this is to maintain the amount of ventilation and humidifying.
- The change of air discharge grill's location should be examined when the cold draft from air discharge grill is feared.
- Though the fan can be stopped by the setting of remote controller.
  Do not stop the fan in the place where no ventilation by stopping the fan may cause the influence of diffusion of air which it is dirty and moisture into another room, or the inflow from outside the room. (outflow such as viruses from the sickroom, or smell leakage from the rest room, etc.)

7. See below for details on the external input terminal function.

SECOND CODE NO.	Input contact	Fan operation	Operation lamp	
01	a	Operation	On	Fresh-up operation
02	a	Operation	On	Malfunction code "60" is displayed
06	a	Operation	On	Fan strength up (Low to High, High to Ultra-High)

∗SECOND CODE NO. "04" does not function when in air conditioner linked mode.

9.10.2 Perform a Test Run according to the Outdoor Unit's Installation Manual.

(1) Make sure the electric parts box of the unit is closed before turning on power.

(2) Make a test run following the operation manual of the outdoor unit.

- The operation lamp of the remote controller will flash when an malfunction occurs. Check the malfunction code on the liquid crystal display to identify the point of trouble. An explanation of malfunction codes and the corresponding trouble is provided in "CAUTION FOR SERVICING" of the outdoor unit.
  If the display shows any of the following, there is a possibility that the wiring was done incorrectly or that the power is not on, so check again.

Remote controller display	Content
"" is display	• There is a short circuit at the FORCED OFF terminals (T1, T2)
"U3" is display	• The test-run has not be performed.
"U4" is display "UH" is display	• The power on the outdoor unit is off. • The outdoor unit has not been wired for power supply. • Incorrect wiring for the transmission wiring and the wiring 〈the remote controller wiring or FORCED OFF wiring.〉 • The transmission wiring is cut.
"UP" is display	• "MAIN/SUB" setting of the remote controller is wrong.
No display	• The power on the indoor unit and HRV is off. • The indoor unit and HRV has not been wired for power supply. • Incorrect wiring for the remote controller wiring and the wiring 〈the transmission wiring or the FORCED OFF wiring.〉 • The remote controller wiring is cut.

9.10.3 Next, run the Humidifier.

〈**VKM-GAMV1 series only**〉

(1) Check that the water supply piping is connected securely.

(2) Open the water supply shut-off valve. (No water will be supplied at this time.)

(3) Run the HRV unit in heating mode.
(See the operating manual included with the indoor unit for details on how to run the unit in heating mode.)
The water supply will start and the humidifier will begin operation.

(4) After starting heating (humidifying), the sound of the water supply solenoid valve will be heard every 3 or 4 minutes (a clicking sound), so listening for that clicking sound let the unit run for 30 minutes to make sure that humidifying operation is normal.

⚠ CAUTION

- If carpentry work is not completed when a test run is finished, tell the customer not to run the humidifier for the protection of indoor unit and HRV until it is completed.
- If the humidifier is run, paint, particles generated from adhesive and other materials used for carpentry work may cause HRV to get dirty, causing splash or leakage of water.

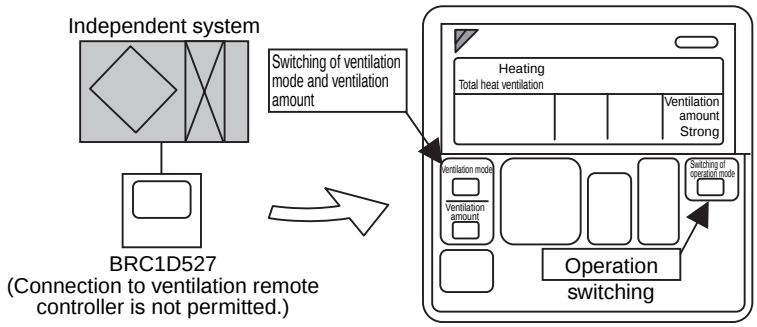
C : 3P130768-2E

10 Outdoor Air Processing of Ceiling Mounted Duct Connection Type

The structure of VKM-GAMV1 model is different from other ventilation models. Points you need to note are summarized below, which please use for your reference when selecting the model.

10.1 Stand-alone Operation is Possible as an Independent System

Because no function to control the room temperature is equipped, only the operation mode (cooling, heating, automatic, ventilation) is displayed on the remote controller. Set temperature is not displayed. (Automatic mode is displayed only when connected with outdoor unit of cooling/heating free type.)
In addition, you cannot change the set temperature or set direction of air flow.
Even if you attempt to operate by changing the temperature or air flow direction, only [This function is not available] will be displayed.
You can select the ventilation mode, ventilation amount and operation switching (if a function to select either cooling or heating has been provided) only.



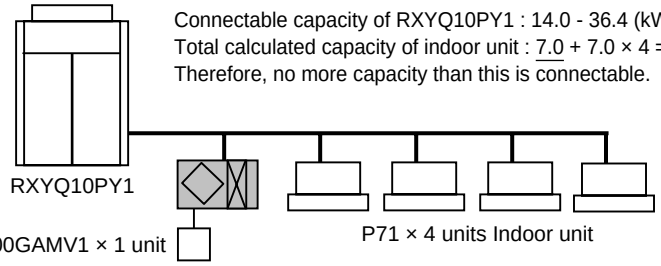
10.2 Ability to Calculate Connectable Capacity

Because of an outdoor air processor, the load may increase depending on the outdoor air condition. So, use the values in the table below when calculating the connectable capacity to an outdoor unit.

Ceiling mounted duct connection type	Corresponding HP	Ability to process outdoor air (kW)		Ability to calculate connectable capacity (kW)	Diameter of connection pipe
		Cooling	Heating		
VKM50GA(M)V1	1.0	4.71 (1.91)	5.58 (2.38)	3.5	ϕ6.4 for liquid ϕ12.7 for gas
VKM80GA(M)V1	1.6	7.46 (2.96)	8.79 (3.79)	5.6	
VKM100GA(M)V1	2.0	9.12 (3.52)	10.69 (4.39)	7.0	

( ) indicates a heat amount recovered by a total heat exchanger.

Example of a system

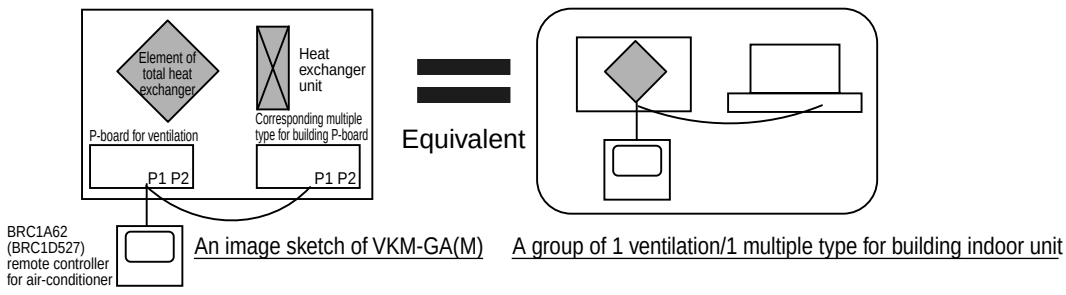


Connectable capacity of RXYQ10PY1 : 14.0 - 36.4 (kW)
Total calculated capacity of indoor unit : 7.0 + 7.0 × 4 = 35.0 (kW)
Therefore, no more capacity than this is connectable.

■ **Similar to R-407C Model, but following points are to be noted ;**

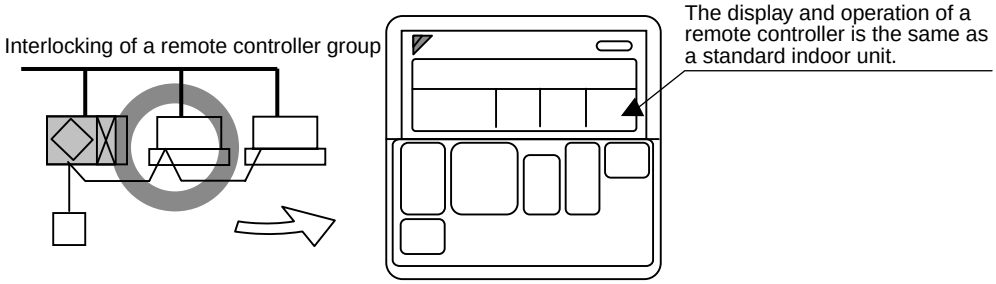
[Features of VKM-GA(M)]

Because VKM-GA(M) model is equipped with a heat exchanger unit, a PC-board (corresponding multiple type for building PC-board) for controlling the heat exchanger has been built-in in addition to a P-board for ventilation. These two PC-boards are connected via remote controller line (P1 P2) to perform an interlocked control. Its control system provides the same condition when 1 ventilation and 1 multiple type for building have been remotely controlled. No air-conditioning (temperature controlling) function has been equipped. Therefore, it is necessary to prepare separately an indoor unit for air-conditioning purpose.



[Points to be noted for VKM-GA(M)]
There are following restrictions with VKM-GA(M) model due to its own controlling structure.

1. Stand alone system: No address setting is required because of its automatic addressing function (corresponding multiple type for building P-board : Master).
   Because it is under a group control, it is always required to connect to a remote controller. The structure does not permit if no remote controller is connected. A direct connection to a duct is also prohibited.
2. Interlock system : No address setting is required because of its automatic addressing function (Indoor unit : Master).
   - Basically, the interlocking with an air-conditioner is only made via connection to a remote controller line (NP).



   - Number of units connectable in case of a remote controller group
     Because 2 pieces of controlling P-board have been built in a VKM-GAM model, count the remote controller group as : 1 set = 2 units. The maximum number of units connectable to a remote controller group is 16.

<Example>
How many units of VKM-GAM model can be connected within a single group?
In case of a group composed of (10 × indoor units + VKM-GAM), the maximum number of VKM-GAM is 3.
10 + 3 × 2 = 16 units OK
In case of 4 units ;
10 + 4 × 2 = 18 units NG (2 units are in excess)

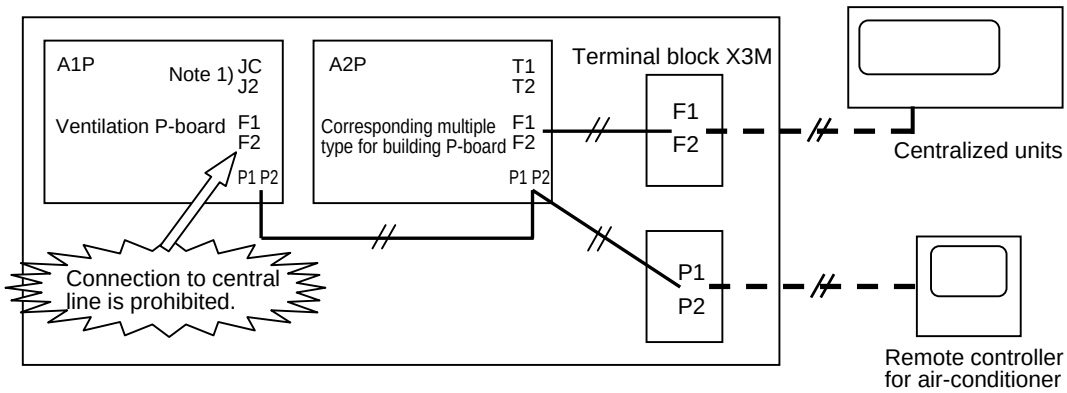
   - External contact point
     If you want to start/stop through an external contact point, use external input terminals (T1 and T2).
     * If you start/stop using T1 and T2 terminals, the entire remote controller group makes a start/stop.

Note 1) JC/J2 of ventilation P-board cannot be used. (Because only the ventilation P-board makes a start/stop, no synchronized movement with the corresponding multiple type for building P-board is assured.)

10.3 Central Control System

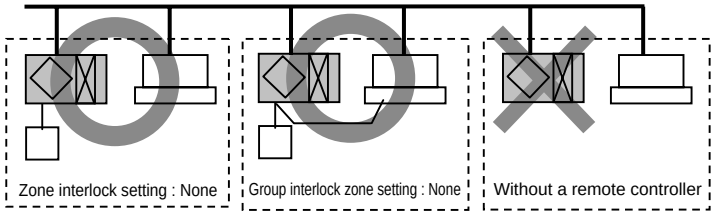
- When carrying out a central connection, connect the central line to F1 and F2 only on the corresponding multiple type for building P-board. Do not connect to F1 and F2 on the ventilation side. (= Connect to the terminal block X3M.)

An image sketch of internal wiring on the ventilation side



- In case of a central control, operation ON/OFF can be done separately by each zone. (In this case, zone interlocked setting must be kept as the factory setting (17. 08. 01).)

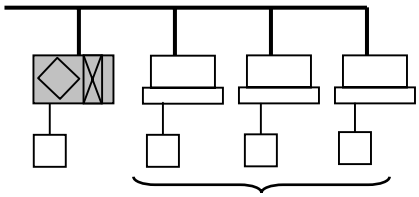
- Structure without a remote controller cannot be accepted because the remote controller group is controlled within a VKM-GA(M) model. (intelligent Touch Controller, central control controller)



* Alteration of set temperature and independent ventilation operation cannot be performed from a central device.

10.4 Restrictions to Control System

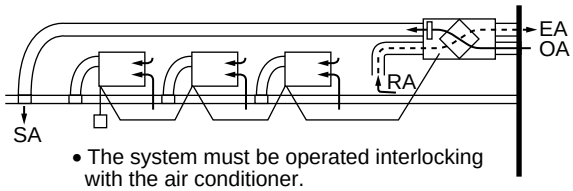
10.4.1 Do not Give VKM-GA(M) Model a Function to Select Cooling/Heating. (This is because the operation mode switches automatically depending on the outdoor conditions regardless of the indoor temperature when set to "Automatic".)



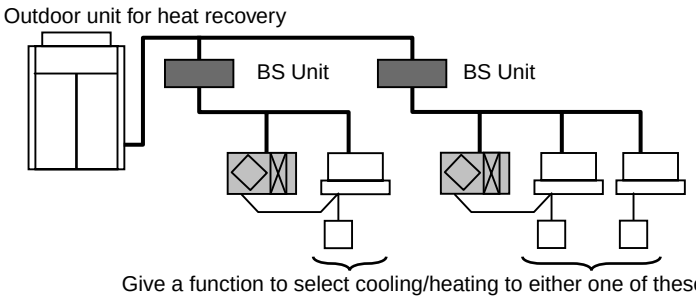
Give a function to select cooling/heating to either one of these.

10.4.2 Caution When Connecting with a VRVIII System, Heat Recovery Type

When bringing the RA (exhaust gas intake) of this unit directly in from the ceiling, connect to a BS unit identical to the VRV indoor unit (master unit), and use group-linked operation.



• The system must be operated interlocking with the air conditioner.



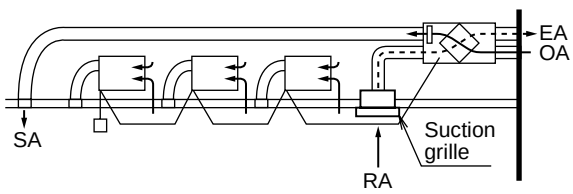
Give a function to select cooling/heating to either one of these.

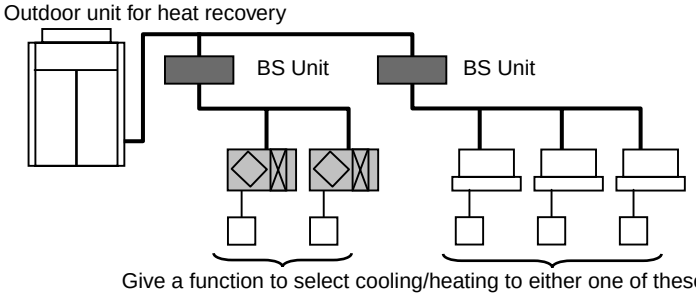
CAUTION

If above setting is not made, the detection of correct temperature is not available and automatic judgment on proper cooling or heating cannot be made when the temperature in the ceiling gets higher than indoor temperature.
Poor heating or shortage of the amount of humidification may result.

If the indoor unit and this unit are installed with different BS system inevitably, always take following remedies (1) and (2).

(1) RA (Exhaust and suction) of this unit is not taken directly from inside of the ceiling, connect the suction duct and suction grille to the fitting port of RA duct to suck the indoor air.





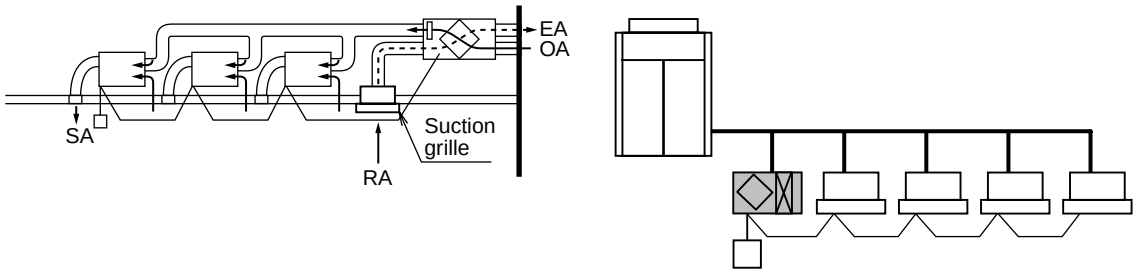
Give a function to select cooling/heating to either one of these.

(2) Do not make the selection of heating or cooling in automatic mode and it shall be made by manual selection from remote controller or centralized controller.

10.4.3 Caution when Connecting the Indoor Unit Directly to the Duct

Follow the indications described below

a) When connecting the indoor unit directly to the duct, always use the same system on the indoor unit as with the outdoor unit, perform group-linked operation, and make the direct duct connection settings from the remote controller. (Mode No. “17 (27)” – First code No. “5” – Second code No. “6”.) Refer to 15.10.1 concerning setting method.



b) Do not connect to the outlet side of the indoor unit. Depending on the fan strength and static pressure, the unit might back up.

c) When it is connected to the suction side of indoor unit as a direct duct connection system, etc., since there is a possibility that the body thermo of the indoor unit detects erroneously SA discharge from this unit as indoor air, use the remote sensor (Optional).

10.5 About the basic control of VKM

10.5.1 Basic control of VKM

VKM sucks the air after OA has subjected to total heat exchange with RA, detects the air temperature by means of the thermistor for inlet air into DX-coil (R3T) to make a judgment on operation mode, cooling or heating and exercises the control on the capacity of air heat exchanger.

■ **Sensor position and its function**

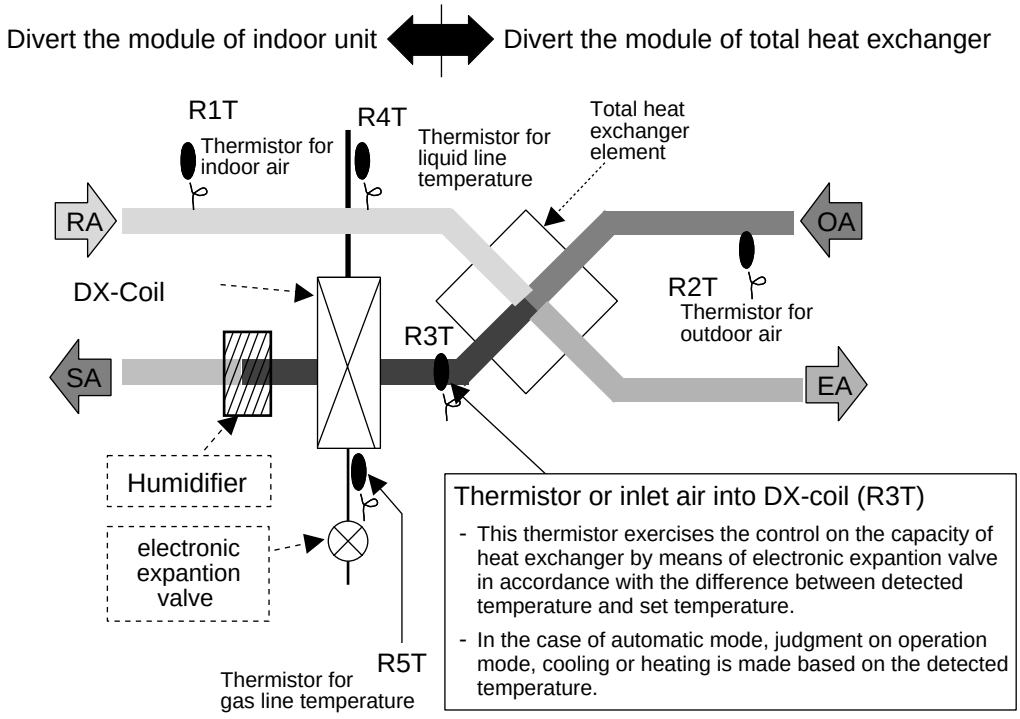
VKM consists of indoor unit + total heat exchanger portion.

Dissimilarities with normal indoor unit are :

- Position of thermostat in the normal indoor unit : Position to detect RA temperature
- Position of thermostat in VKM : Position to detect the air subjected to total heat exchange between OA and RA.

Therefore, the temperature detected by VKM gets lower than that of the indoor unit thermostat.

Doing so allows VKM to perform treatment of outside air with stability even as the indoor unit stays thermo-OFF state because of big difference between the set temperature and suction temperature even though the set temperature of VKM and indoor unit are the same.



11 Appendix

11.1 Purpose of Ventilation

Living environment, and working environment as well, can be polluted for various reasons, which in turn will lead to hygienic problems and/or lower productivity. To avoid this, the polluted air must be replaced with fresh air. This operation is called ventilation.
To apply ventilation for removing pollution, it is necessary to identify the causes of air pollution before studying corrective measures.

11.1.1 Air Pollution

■ **Dust**

There are about 7,500 ~ 22,000 dust particles in the air of one liter. However, if you feel dusty, the number may have reached as many as 100 ~ 200 thousand. We are unknowingly inhaling such polluted air, which enters into our trachea and lungs, leading to coughs and difficulty in breathing, some malignant disease and/or nausea, and in worse cases, other serious chronic diseases such as bronchitis and pneumoconiosis.

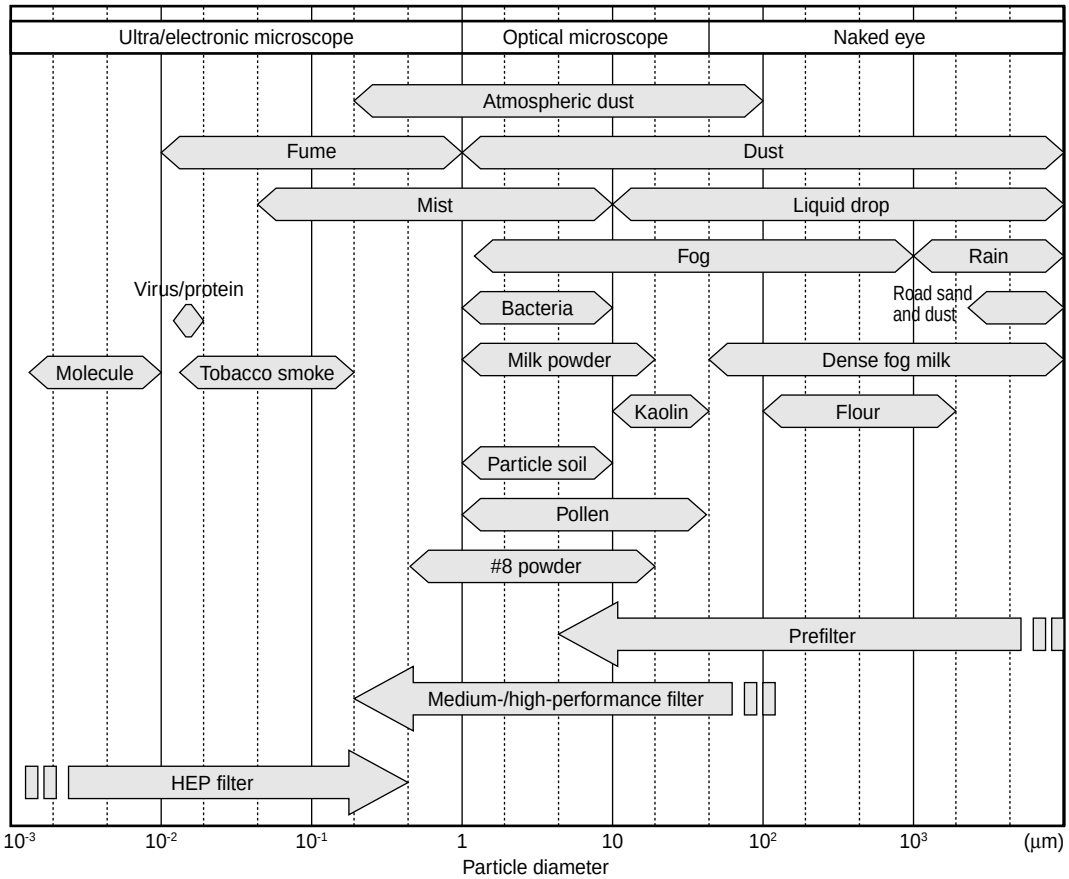
Table 1 Suspended Dust in the Air

Type of dust	Content (weight %)
Smoke, pollen, fly ash	0~20%
Ore chips, cinders	10~90%
Rotten plant	0~10%
Vegetable fiber	5~40%
Carbon, fume	0 ~ 40%

■ **Bacteria**

Suspended particles of bacteria of 0.2~5μ in diameter are likely being adhered with dust in the air, not independently suspended. According to NASA (the National Aeronautics and Space Administration), the more number of dust particles may allow the more number of bacteria to exist, which may justify the abovementioned theory of bacteria's presence in the form of adherence to dust. Therefore, it is possible to remove bacteria using an electrostatic precipitator, though the result of cleaning cannot be easily measured. It takes time to demonstrate how effectively bacteria could be removed. According to our experiments that measured the number of bacteria using the settle plate microbe count method, the number of bacteria in the space above the dust collector electrode is smaller than that collected on a plate of the same area being left in the air. This indicates that electrostatic precipitators can, to some extent, kill bacteria collected on the electrode.

Table 2 Particle diameter of dust



■ **Tobacco**

Only one cigarette can soon pollute the air in the enclosed room. And both the smoker and other non-smokers staying here are affected. Especially the “secondhand” smoke from the tip of cigarette contains 2~3 times larger amount of harmful substances (nicotine and tar) than the “main smoke” exhaled by the smoker, so that the non-smokers around the smoker can be affected by tobacco smoke.

So, tobacco smoke is one of the serious causes of interior air pollution. Tobacco smoke consists mainly of mists such as tar and nicotine, gases such as carbon monoxide (CO), carbon dioxide (CO_2), hydrogen and various hydrocarbons including methane, and traces of hydrogen cyanide, formaldehyde, acrolein, ammonia and nitrogen oxides (NOx), so that various human health problems including lung cancer, chronic CO toxication and bronchitis can occur.

New ceilings, walls, furniture and decorations in white will turn into yellow in one or two years. This is due to the nicotine and tar contained in tobacco smoke, and/or dust in the air.

To allow smoking, proper ventilation is inevitable. A ventilation system consisting of an air cleaner and ventilator that operates automatically detecting the level of pollution is recommendable. This system can be associated with an air conditioning system, so that power consumption for these systems can be reduced, and so that they can enjoy comfortable smoking without feeling hot or cold.

Table 3 Sensation for Tobacco Smoke

Smoke concentration (mg/m^3)	Status of the air in the room	Sensation
0.15	Smoke diffuses in 6 to 30 seconds.	Slight odor
0.44	Slightly smoky	Odor
0.78	Slightly smoky	Feel strange in the nose and/or throat
0.95	Blurred sight	Strong odor
1.13	Blurred sight	Slight eye irritation
1.26	Heavily smoky	Nose and throat irritation
1.48	Heavily smoky	Slight pain of eyes
1.73	Heavily smoky	Pain of nose and throat
1.95	Heavily smoky	Slight tears

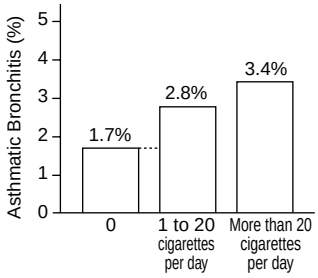
Table 4 Air Pollutants per Cigarette (when smoking)

Type	NOx (cc)	CO (cc)	DUST (mg)
Seven Stars	0.90	72	12.6
	0.57	38	7.7
	0.77	68	11.3

Table 5 Air Pollutants per Cigarette (when a lit cigarette is left)

Type	NOx (cc)	CO (cc)	DUST (mg)
Seven Stars	1.26	45	6.3

Fig 1 Three-Year-Old Child Asthmatic Bronchitis Due to Passive Smoking



■ **Carbon monoxide (CO)**

Carbon monoxide is colorless, odorless and very toxic gas. Imperfect combustion of briquette, charcoal or oil produces CO gases. Tobacco smoke and automobile exhaust gases also contain CO gases.

CO gases inhaled into the lung join together with hemoglobin in the blood, which result in preventing the bonding between oxygen and hemoglobin, leading to inability to convey oxygen to the tissues of the human body. The bonding force between CO and hemoglobin is 200 ~ 300 times larger than that between oxygen and hemoglobin.

A typical symptom is headache. The motor of their limbs is anaesthetized before losing consciousness, so that they cannot escape away from the place, which may, in the worst case, lead to fatal accident. Inhaling CO gases repeatedly may lead to chronic poisoning, with short memory, or in the worst case, he (she) is crippled for life.

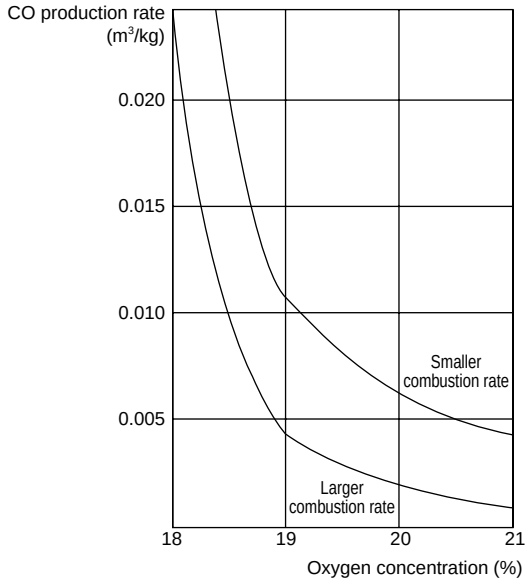
The normal atmosphere contains about 21% of oxygen. Combusting the air will reduce the oxygen concentration. When it reduces to 19%, CO concentration starts to increase quickly. This quick increase in CO concentration occurs earlier with the lower combustion rate. This is a reason for larger number of CO poisoning accidents due to imperfect combustion. During combustion, using both exhaust ventilation and supply of fresh air is preferable.

Table 6 Effect of Carbon Monoxide (CO)

Concentration (ppm)	Effect of change in concentration	
0.01~0.2	Standard atmosphere	
5	Long-term based allowable value	About 5 ppm in annual average for urban roads; over 100 ppm possible for motor highways, tunnels and parking areas
10	Building Standard Act and Building Control Act use this value as the 24-hour average environmental standard.	
20	Short-term based allowable value: 8-hour average environmental standard	
50	Vocational environment allowable concentration (Japan Industrial Safety and Health Association)	
100	No effect up to 3 hours, effect after 5 hours, headache after 8 hours, malignant disease, long-term harmful, non-lethal	
200	Slight pain in the forehead within 2~3 hours	
400	Pain in the forehead within 1~2 hours, and occipital part within 2~3 hours	
800	Headache, giddiness, nausea and convulsion in 45 minutes, and swoon in 2 hours	
1,600	Headache and giddiness in 20 minutes, and death in 2 hours	
3,200	Headache and giddiness in 5~10 minutes, and death in 30 minutes	
6,400	Death in 10~15 minutes	
11,800	Death in 1~3 minutes	
Scores of thousands ppm (several %)	Possible for automobile exhaust emissions	

Source: Facility Check List published by Eikoku-Sha

Fig 2 Relationship in Concentration between Oxygen and CO



<CO safety limit is 10 ppm with max. 5 ppm recommended>

■ **Carbon Dioxide (CO_2)**

Carbon dioxide gas is a normal component of the air, normal concentration of about 0.04%.
Physiologically, CO_2 gas is requisite for human life: the gas stimulates the respiratory center for unconscious, automatic breathing. CO_2 gases dissolve into blood to maintain the oxygen concentration at the proper level for the purpose of sustaining normal functions of human body. Hygienically, CO_2 gases are used as an indicator of the atmospheric condition in the room, not treated as a toxic gas.
Higher concentration of CO_2 gas will adversely affect the human body, though the effect closely depends on the oxygen concentration.

Table 7 Effect of Carbon Dioxide (CO_2)

Concentration (%)	Effect of change in concentration	
0.03(0.04)	Standard atmosphere	
0.04~0.06	Urban atmosphere	
0.07	Allowable concentration for many persons staying in a room	These concentration limits are defined as a pollution indicator within a hypothesis that the physical and scientific properties of the air will become worse with the increase in the concentration of CO_2, not based on its own harmfulness.
0.10	Allowable concentration for general cases: adopted by the Building Standard Act and Building Control Act	
0.15	Allowable concentration for ventilation calculation	
0.2~0.5	Worse result	
0.5 or larger	Worst result	
0.5	Long-term safety limit (US Labor Health) ACGIH, Labor Office Rule	
2	30% increase in breathing depth and air amount inhaled	
3	Lower working performance, change in physiological functions, and twice larger number of breaths	
4	Concentration for normal breathing	
4~5	Stimulates the respiratory center for taking a deeper breath and increasing the number of breaths ; longer breathing time is a sign of danger ; O_2 starvation will raise the possibility of physical disorder outbreak earlier than usual	
8	10-minute breathing will result in serious difficulty in breathing, hectic cheeks and headache ; O_2 starvation will enhance the possibility of this disorder	
18 and larger	Lethal	

■ **Sulfurous acid gas**

Volcano exhaust, automobile exhaust or oil fuel-combusted gas and mist contain sulfurous acid gases in the form of being adhered or absorbed onto suspended dust particles. These gases are a possible cause of chronic bronchitis or other respiratory diseases.

■ **Nitrogen oxides**

Nitrogen oxides (NOx) include NO, NO_2, NO_3, N_2O, N_2O_3 and N_2O_4. Of these, NO and NO_2 are harmful and account for large portions of NOx compounds. NO_2 (nitrogen dioxide) can easily reach the deepest part of the lung, and adversely affect it and other organs. In terms of long-term adverse effect, NOx is stronger than sulfurous acid gases. Dusts can enhance the adverse effect of NOx gases.
NO (nitrogen monoxide) is also harmful, though its chronic effect is yet to be clarified.

- NO_2 produced by other than combustion

Oil heaters and gas ovens for oxygen-based combustion produce a large amount of NO_2 gases. Electric ovens also produce NO_2 gases though their amount is smaller, and this is not well-known. That is, high temperatures, regardless of combustion, facilitate bonding between N and O atoms in the air, which results in the increase in the amount of NO_2. Continual generation of high temperatures in an enclosed space thus requires ventilation.
<NO_2 safety limit = 0.04 ppm~0.06 ppm>

Table 8 Effect of SO_2 on Human Body

Concentration (%)	Effect of change in concentration
1	Feel of slight oppression in the chest
3~5	Feel odor
7~12	Stimulant odor
20~40	Significant stimulation, eye irritation and coughing
100~200	Bronchitis and significant stimulation in the chest; and lung disorder
300	Impossible to breath
400	Difficulty in breathing
500	Impossible to breath

■ **Oxygen starvation**

About 21% of O_2 concentration is normal for human body. Lower O_2 concentration will cause difficulty in breathing with other various symptoms. O_2 concentration of 8% or lower will have a fatal effect. Higher O_2 concentration will cause our pulse rate to increase, which leads to larger burdens on the heart. Abnormally higher O_2 concentrations invite another danger : higher ignition possibilities. Therefore, artificial oxygen supplies should be avoided. The most effective way for avoiding oxygen starvation is to supply natural air that contains oxygen concentrations appropriate for human life.

- Yawning is a sign of insufficient oxygen

You may think that persons who frequently yawn have no concentration. However, this is not the case depending on the situation. Yawning is a physiological phenomenon that can occur when the brain is suffering from the shortage of oxygen. Concentration can be reduced by the shortage of oxygen. Yawning is an action to try to keep himself (herself) concentrated. Fresh air required for human body is min. 30 mg per hour. This corresponds to the oxygen amount contained in a room of normal size (about 10 m^2), which suggests that four persons of a family cannot stay for more than one hour in an enclosed, non-ventilated living room about four times larger than a normal size bed room or private room. Yawning should be considered a sign of oxygen shortage. In such cases, immediately take fresh air into the room.

Table 9 Effect of Oxygen (O_2) Concentration

Concentration (%)	Standard, and effect of change in concentration
About 21	Standard air
20.5	Ventilation shall have a target of not decreasing the O_2 concentration by 0.5% or larger from the normal value (Building Standard Act)
20~19	In the normal atmospheric pressure, this small reduction in O_2 concentration unlikely affects our lives, though in the case of using a combustion apparatus, possible imperfect combustion may cause the CO concentration to increase quickly.
18	Standard of Labor Safety and Health Law (Oxygen Starvation Preventive Regulation)
16	Concentration during breathing in normal cases
16~12	Increase number of pulses and breaths, giddiness, and headache
15	Combustion apparatuses will be put off
12	Possibility of death within a short time
7	Death

■ **Humidity**

Humidity has a close relationship with our living environment. Humidity is an additional parameter to be controlled by air conditioning systems. It may give persons a feel of mild air, if the temperature is relevant for the humidity. Imbalance between the temperature and humidity (especially higher humidity) leads to discomfort. A term that is frequently used in summer, “discomfort index,” indicates this imbalance between temperature and humidity. Higher humidity causes buildings and furniture to rot. Lower humidity causes our skins to dry and buildings and furniture to crack or warp. Another point for controlling humidity is to avoid mold, ticks and termites. To satisfy all of these requirements, two types of ventilation must be used in a well controlled, combined manner. One is to maintain the humidity for our living comfort, and the other one is to remove humidity where dryness is required to prevent such mold and small animals.
<Relative humidity recommended = 30~70%>

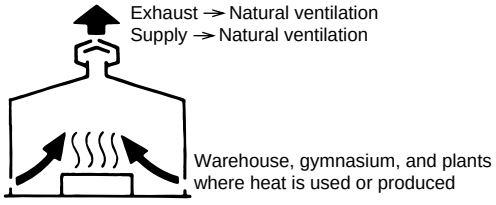
11.2 Kinds of Ventilation

11.2.1 Methods of Ventilation

Natural ventilation based on the natural conditions and mechanical ventilation using mechanical power

■ **Natural ventilation**

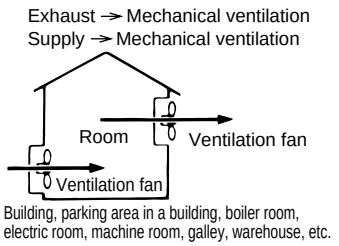
Uses external wind pressures and/or buoyancy force produced by the difference in temperature between the inside and outside of the room: subject to natural conditions, so the benefits are unforeseeable, or smaller than expected.

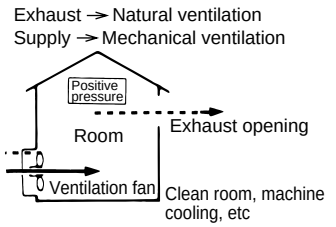


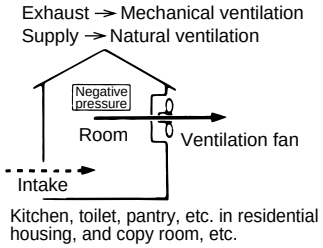
■ **Mechanical ventilation**

Forced ventilation using a power-driven fan or blower produces larger flow in a more stable and timely manner than natural ventilation.

* To ventilate a more heavily polluted room, it is necessary to keep the room air pressure lower than the surroundings to avoid the dirty air flowing into the adjacent rooms or passages; for clean rooms, it is necessary to keep the room air pressure higher than the surroundings to avoid the dirty air coming into the room.



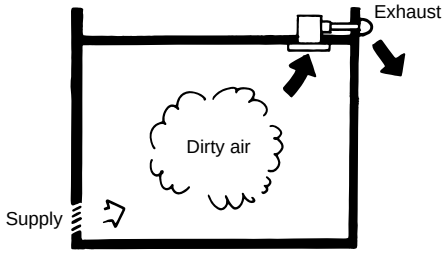




<Mechanical ventilation>

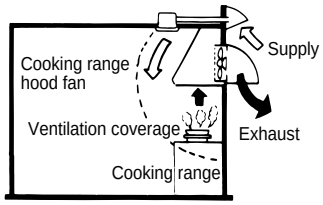
■ Whole ventilation

This is to replace all air in the room with fresh air. This system is effective for rooms in which there is a source of smoke, steam or odor.



■ **Local ventilation**

This is to replace air in a limited area where the air is polluted. This is effective for cases where the source of pollution is stationary and concentrated. Combined use with a hood is effective for removing highly contaminated air.

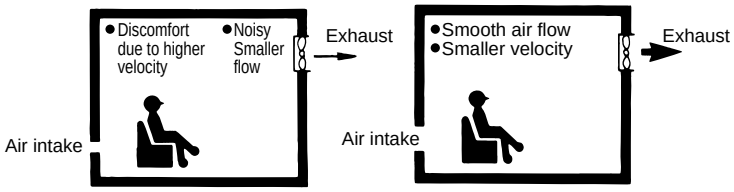


<Important supply flow>

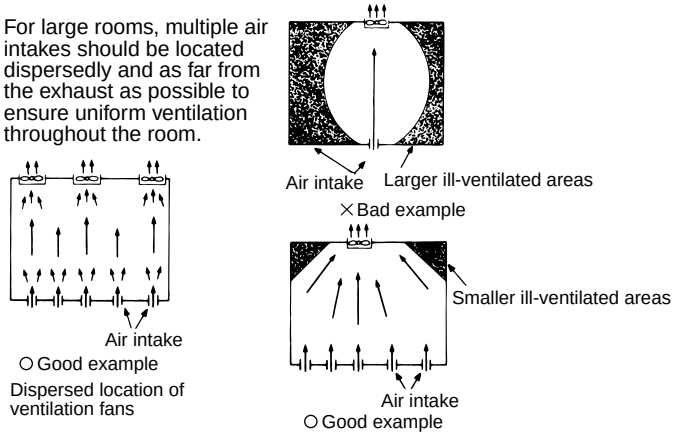
To ensure effective ventilation, sufficient air intakes should be provided.
To ensure stable ventilation, the same amount of fresh air as exhausted should be supplied.

■ **Size and location of air intakes**

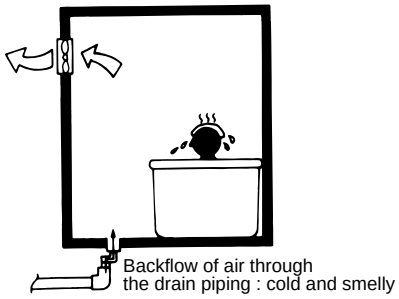
1. Size
   Mechanical ventilation fan rated capacities indicated on a catalogue can be used on condition that the same amount of air is fed into the room through the air intakes. Smaller air intakes will reduce the capability of the ventilation fan. Generally, the air intakes should be larger than the ventilation fan opening. Larger air intakes can reduce the air velocity from the intake, so that persons, when standing near the intake, do not feel discomfort.



2. Location of exhaust (fans) and intakes
   For whole ventilation, air intakes should be located as far from the fans as possible. For local ventilation intended for narrower, limited space, air intake(s) should be located as close to the fan as possible so that the surrounding areas can be less affected.



3. For confined rooms
   Ventilating a bathroom with the door tightly closed may cause the water trap of the drainage to break, which results in the backflow of odor into the bathroom. In cold weather areas, ventilating a confined room using a stove with a natural exhaust ventilation duct may invite backflow of air into the stove through the exhaust duct, leading to dangerous combustion condition.



11.2.2 Air Flow (Quantity), and Dynamic and Static Pressure

Ventilation fan performance parameters include air flow (quantity) and static pressure. These two parameters relate closely to each other. Ventilation cannot be designed without these two parameters. The first step of “designing a ventilation system” is to understand these two parameters.

■ Quantity

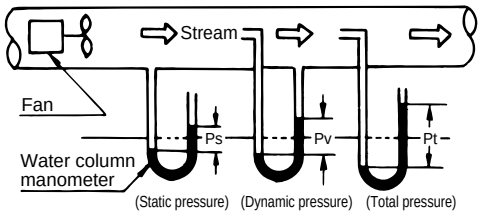
Air flow is the amount of air that a ventilation fan exhausts (or supplies) per unit time, generally expressed in m^3/h or m^3/min.

■ Pressure

This is a wind pressure expressed in the unit of Pa. Three types of wind pressure are used.

- Dynamic pressure
  This is a pressure produced by wind velocity, also called “velocity pressure.” Deflection of a window glass by strong wind during typhoon is due to this dynamic pressure.
- Static pressure
  When a balloon has been inflated, there is a pressure in the balloon that presses against the membrane of the balloon. Static pressure is produced also when the air is still.
- Total pressure
  This is the sum of wind’s dynamic pressure and static pressure.

■ Relationship between pressure types



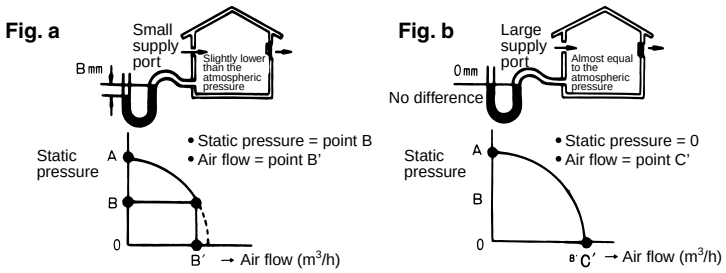
“Static pressure (Ps)” is a pressure needed for overcoming the resistance of the duct when conveying air. “Dynamic pressure (Pv)”, on the contrary, is a pressure due to air stream. To determine air velocity, measure the dynamic pressure of the air.
The “total pressure (Pt)” is the sum of static pressure and dynamic pressure.

$$Pt = Ps + Pv = Ps + \frac{V^2}{2g}\gamma$$

V : velocity (m/sec)
g : Acceleration of gravity (m/sec^2)
γ : Air density (kg/m^3)

■ P-Q Curve (static pressure - flow characteristic curve)

“P-Q Curve” shows the performance of a ventilation fan by indicating the relationship between air flow and static pressure.
Fig. a shows a case with a wall-mount supply opening that is so small that the internal pressure becomes slightly lower than the atmospheric pressure. The static pressure is B mm.
Fig. b shows a case with a wall-mount supply opening that is so large that the internal pressure becomes almost equal to the atmospheric pressure. The static pressure is 0 Pa.



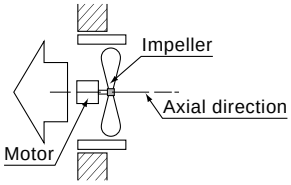
11.2.3 Mechanical Fan Types and their Characteristics

■ **Axial fan and centrifugal fan**

Ventilation fan are roughly classified into two types: axial fans and centrifugal fans. These two types of ventilation fans are selected depending on the operating conditions and/or application. Axial fan is normally a propeller fan available for applications for larger flow but at smaller pressure rating ranging between 0 and 30 Pa. Centrifugal fan is either a sirocco or turbo fan available for applications that need large pressure, and available for ducted ventilation systems.

<Propeller fan>

- The simplest axial flow fan available for small capacity applications ; larger air flow can be obtained but at small pressure up to about 30 Pa, so that large reduction in flow can occur due to resistance (e.g. frictional resistance) when flowing in a ducted system.



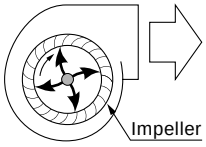
<Features>
- Air flow is larger than sirocco or turbo fans, but the static pressure is lower.

<Installation>
- Residential housing, external wall mount

<Applications>
- General ventilator
- Window-mount ventilator
- Living room ventilator

<Sirocco fan>

- Uses the same theory as water wheel; the impeller consists of many small fins facing forward as shown in the figure below ; higher static pressure can be obtained; available for various applications.



<Features>
- Static pressure is higher but the air flow is smaller than propeller fans.

<Installation>
- Housing complex
- Ducted ventilation system

<Applications>
- Air conditioning system ventilator
- Cooking range hood, deep
- Intermediate ventilator, ducted system
- Sirocco fan

■ **Impeller characteristics as an essential parameter for type selection**

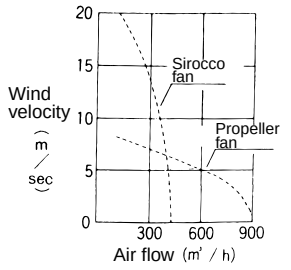
Propeller fans have a smaller pressure rating, which means that the air flow is reduced significantly by adverse wind. The next table shows the airflow vs. pressure characteristics that differ between propeller and sirocco fans. Depending on the topography, altitude and/or other conditions, as a general guide, propeller fans can be used at a height corresponding to the second floor of the building, and other types of fans having a higher pressure rating should be used at higher locations.

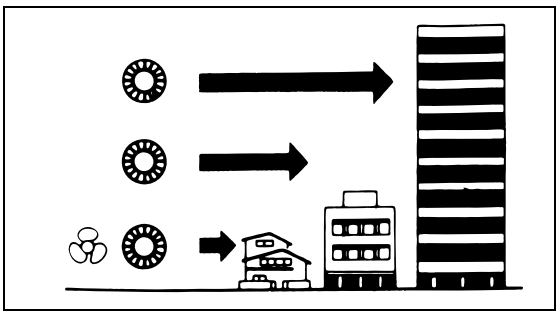
* Even for independent houses, to ventilate a room that does not share any external walls, or if the house is located in a windy place, use a pressure type fan.

Wind velocity vs. wind pressure, and ventilator capacity reduction due to wind pressures (air flow : for 50 Hz only)

External air velocity (Vm/sec)	Wind pressure (PPa)	Propeller fan	Sirocco fan
0	0	924m^3/h	432m^3/h
3	3.9	810	420
5	10.8	612	408
7	20.6	294 Reverse flow	390
10	43.1	Reverse flow	360
15	96.0	Reverse flow	264
20	171.5	Reverse flow	210

Change in fan capacity due to wind pressures





11.2.4 Operating Sound

As well as the required airflow and static pressure, the operating sound (noise level) is an important factor for determining the type of ventilating fans. The noise level allowable limit may have been defined depending on the use of the room to be ventilated. Select an appropriate type of ventilating fans according to the noise requirements.

■ Operating sound unit : dB

A-weighted sound pressure level measured using a sound level meter is the measure of sound produced by an operating ventilator fan. There has been many units used : phon(A), phon, dB(A) and dB. This catalogue uses the internationally unified unit “dB.” Note that the sound pressure level in “phon” can be directly converted into “dB” without changing the numerical value. Use sound level meters in the A-weighted mode.

■ Allowable noise level

Building codes specify the allowable noise level for each type of room. See Table 1 for selecting.

Table 1 Allowable noise level depending on the type of room

Use of room	dB	Use of room	dB
Broadcasting studio	25	Cinema	40
Music hall	30	Hospital	35
Theater (about 500 seats)	35	Library	40
School room	40	Small office room	45
Meeting room	40	Restaurant	50
Apartment	40	Gymnasium	55
Hotel	40	Large office room	50
Residential housing (living room, etc.)	40	Factory	70

■ Notes for noise level

The noise ratings shown on the nameplate of a product are those measured in an anechoic room per the relevant JIS standard that specifies measuring procedures including the distance between the noise source under test and the sound level meter. To select types of ventilating fans, observe the following three notes.

1. The environment affects the noise level.
   The nameplate values are those measured in an anechoic room. Actual buildings have echoes from the walls, floors and ceilings, so that the noise level depends on the building materials used and how wide the room is. Use appropriate echo coefficients to determine the actual noise level and available fan types.
2. Vibration
   Motor driven fans, a type of rotating machine, inevitably produce vibration, though our largest efforts to reduce such vibration have been made. To minimize vibration (propagation and resonance), the product should be firmly mounted on the wall.
3. Synthesis of sounds
   When using two or more ventilating fans in a room, consider the synthesized effect of sounds.

■ Other noise

- Echoes
  Depending on the type or material of the wall and ceilings of the room, and in small room, echoes occur.
- Vibration
  Vibrating objects produce vibrating sound by moving their surrounding air. 20Hz or higher frequency sounds are audible.
- Noise due to duct’s resistance
  Higher static pressures acting on the fan will produce larger sounds.

11.2.5 Required Air Flow

When calculating the required air flow (ventilating capacity), various factors, including CO_2 production by the persons staying therein and production of combustion gases, should be considered. Calculations should consider all of the requirements that the room should meet.

■ **Calculate air flow based on the occupied area per person**

$$\text{Required air flow } (m^3/h) = \frac{20 \times \text{room floor area } (m^2)}{\text{Occupied area per person } (m^2)}$$

Note 1) The number 20 contained in the above equation means 20 $m^3/h \cdot$ person. This value (required fresh air) has been determined based on the CO_2 production of a male adult when he is sitting quietly. If he is smoking, additional air flow is required.

Note 2) In the case that the actual occupied area per person exceeds 10 m^2, use 10 as the value of the denominator of the equation.

Occupied area per person for ventilation requirements for commercial facilities

Building type	Occupied area per person (N)	Remarks
Restaurant, coffee shop	$3m^2$	Floor area for business use
Cabaret, beer hall	$2m^2$	Floor area for business use
Japanese restaurant, assembly room on hire	$3m^2$	Floor area for business use
Shop, supermarket	$3m^2$	Floor area for business use
Billiard room, table tennis room, dance hall, bowling alley	$2m^2$	Floor area for business use
Pachinko parlor, go club, mah-jongg saloon	$2m^2$	Floor area for business use
Japanese style hotel, Hotel, motel	$10m^2$	Floor area for business use
Special bath house	$5m^2$	Floor area for business use
Meeting room, city hall	$0.5\sim1m^2$	Per area number of person
Office	$5m^2$	Floor area of the office room

Calculate air flow based on the required number of air changes

Required air flow (m^3/h)
= Required number of air changes (times/h) × Room volume (m^3)

- The required number of air changes shown below has been determined based on the prior knowledge and experiments by sanitary testing laboratories etc.
  (Example) Place : ordinary living room
  Required number of air changes : 6 (times/h) (see the table below)
  Area of the room : about 9.9 m^2
  Ceiling height : 2.4 m
  Required air flow = 6 × 9.9 × 2.4 = 143 (m^3/h)
  Select ventilating fans that can satisfy the above mentioned airflow requirement.

Guideline for the number of air changes

Room	Number of air changes (times/h)
Toilet, washroom	5~15
Locker room, changing room	5
Library, warehouse, store	5
Darkroom	10
Copy room, print room	10
Projection room	10
Pantry	8
Shower room	5
Bathroom	5
Changing room	5
Food locker	5
Garbage locker	15

■ **Calculate air flow based on the room capacity (number of persons to be admitted)**

Required air flow (m^3/h) = Required air flow per person (m^3/h) × Number of persons

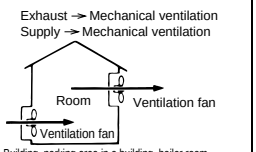
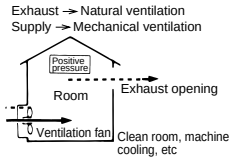
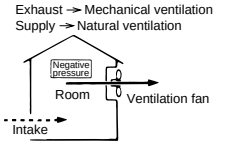
Required air flow per person

Room	Required air flow	
	Recommendation	Minimum
Bar, cabaret	$51m^3$/person · h	$42.5m^3$/person · h
Office, restaurant	$25.5m^3$/person · h	$17\sim20m^3$/person · h
Shop, department store	$25.5m^3$/person · h	$17m^3$/person · h

■ **Calculate air flow based on the required air flow per floor area**

Required air flow (m^3/h)
= Required air flow per floor area ($m^3/m^2 \cdot h$) × Floor area (m^2)

Required air flow per floor area ($1m^2$)

Room	Air flow rate	
Office	$10m^3/h$	$10m^3/h$
Shop	$15m^3/h$	$15m^3/h$
Beauty salon	$12m^3/h$	$12m^3/h$
Amusement room	$15m^3/h$	$15m^3/h$
Smoking room	$20m^3/h$	$20m^3/h$
Small meeting room	$25m^3/h$	$25m^3/h$
Dining room (commercial)	$25m^3/h$	$25m^3/h$
Kinds of ventilation	 Building, parking area in a building, boiler room, electric room, machine room, galley, warehouse, etc.		 Kitchen, toilet, pantry, etc. in residential housing, and copy room, etc.

■ **Required air flow based on CO_2 production**

CO_2 is produced by human being's breathing, which means that the required air flow depends on the number of persons staying therein and/or labor loads. To calculate air flow based on CO_2 production, use the following equation.

$$Q = \frac{100M}{K\text{-}Ko}$$

Q : Required air flow [$m^3/h \cdot person$]
M : CO_2 production [$m^3/h \cdot person$] → see Table A
K : CO_2 concentration limit in normal status [%] see Table B
Ko : CO_2 concentration in the atmosphere [%] (normally 0.03%)

Table A CO_2 Production Depending on Labor Burdens

Energy metabolic rate : RMR	Labor burden	CO_2 production ($m^3/h \cdot person$)	CO_2 production for calculation ($m^3/h \cdot person$)
0	Sitting quietly	0.0132	0.013
0~1	Very light work	0.0132~0.0242	0.022
1~2	Light work	0.0242~0.0352	0.030
2~4	Medium work	0.0352~0.0572	0.046
4~7	Heavy work	0.0572~0.0902	0.074

Table B Required Air Flow Based on Labor Burdens

CO_2 production for calculation ($m^3/h \cdot person$)	Energy metabolic rate for calculation	Labor burden	Required air flow ($m^3/h \cdot person$)		
			CO_2 limit = 0.10%	CO_2 limit = 0.15%	CO_2 limit = 0.20%
0.013	0	Sitting quietly	18.6	10.8	7.6
0.022	0.8	Very light work	31.4	18.3	12.9
0.030	1.5	Light work	43.0	25.0	17.6
0.046	3.0	Medium work	65.7	38.3	27.1
0.076	0.8	Heavy work	106.0	61.7	43.7

<Example>

Assumptions : CO_2 production 0.03 $m^3/h \cdot person$ (light work)
CO_2 concentration limit 0.15 vol%

$$Q = \frac{100 \times 0.030}{0.15 - 0.03} = 25 m^3/h \cdot person$$

Therefore, air flow of 25 $m^3/h \cdot person$ is required.

■ **Required air flow based on tobacco smoking and odor**

6-class odor level presentation (this classification is linked with an approximate, intuitive estimation of gas concentration)

Odor intensity	Description
0	Odorless
1	Manages to detect the presence of odor (threshold concentration)
2	Manages to detect what is producing the odor (threshold concentration)
3	Easily detects the odor
4	Strong odor
5	Very strong odor

For example, to keep the odor level not greater than 2, the contamination concentration (tobacco combustion amount (mg)/ventilation amount (m^3)) should be reduced to 35.3 mg/m^3 or smaller. To keep the odor level not greater than 1, the contamination concentration should be reduced to 17.7 mg/m^3 or smaller. To calculate required air flow based on smoking concentration, use the following equation.

$$Q = \frac{\text{Tobacco combustion (mg/h · person)}}{\text{Allowable contamination (mg/m}^3\text{)}} \ (\text{m}^3\text{/h})$$

<Example>

Assumptions : Combustion per cigarette 1,000 mg
Combustion rate 70%
Number of cigarettes per person 4/h · person
Odor intensity level 2 (=35.5 mg/m^3)

$$Q = \frac{1{,}000 \times 0.7 \times 4}{35.3} \fallingdotseq 79.3\text{m}^3\text{/h} \cdot \text{person}$$

Therefore, under the conditions given above, in the case of cleaning air using ventilation only, about 80 m^3/h/person of air flow is required. By using air cleaners and/or deodorizers in conjunction with the ventilation system, its capacity can be reduced significantly.

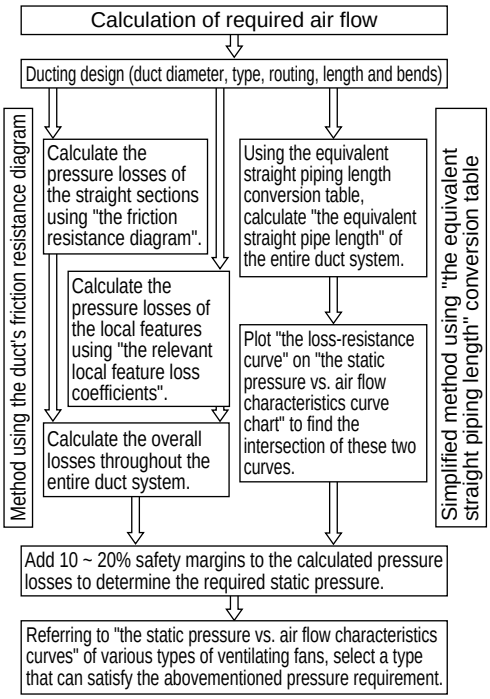
Required air flow depending on the degree of smoking (estimated)

Degree of smoking	Locations	Required air flow (m^3/h/person), minimum to recommended value	Smoking amount (number of cigarettes/hour/person)
Very high	Dealer office, newspaper editing room, meeting room	51~85	3~5.1 (1.5~2.5)
High	Bar, office, hotel (guest room)	42~51	2.5~3 (1.3~1.5)
Medium (to high)	Restaurant, office	20~26	1.2~1.6 (0.6~0.8)
Low (sometimes)	Sales room in a bank, office, shop	13~17	0.8~1.0 (0.4~0.5)

11.3 Calculation of Duct Pressure Loss

Some types of ventilating fans, including those (pressure types) installed in a cooking range hood, are installed in a ducted system. The air flow depends on the pressure losses determined according to the length of the ducted system and the number of bends, and other accessories contained in the system. Air flow calculations should consider these pressure drops to estimate the air flow as accurately as possible.

11.3.1 Procedure for Calculating Pressure Drops and Finally Determining the Type of Ventilators



11.3.2 Pressure Loss Calculation for Straight Duct

■ **For round ducts**

1. The resistance of a duct can be calculated using the following equation.
   Pressure drop ΔP due to the frictional resistance of a straight duct can be calculated using the following equation.

$$\text{Resistance of duct } \Delta P \text{ (Pa)} = \lambda \times \frac{\gamma}{2} \times \frac{L}{d} \times V^2 \times 9.80665$$

λ : Duct friction coefficient (0.01~0.25)

γ : Air specific gravity (kg/m³) = 1.20 kg/m³

L : Duct length (m)

d : Duct diameter (m)

V : Duct air velocity (m/sec)

$$V = \frac{Q}{d^2} \times \frac{4}{3{,}600\pi}$$

Q : Air flow (m³/h)

Where, λ = 0.01 (very smooth pipe), and γ = 1.2

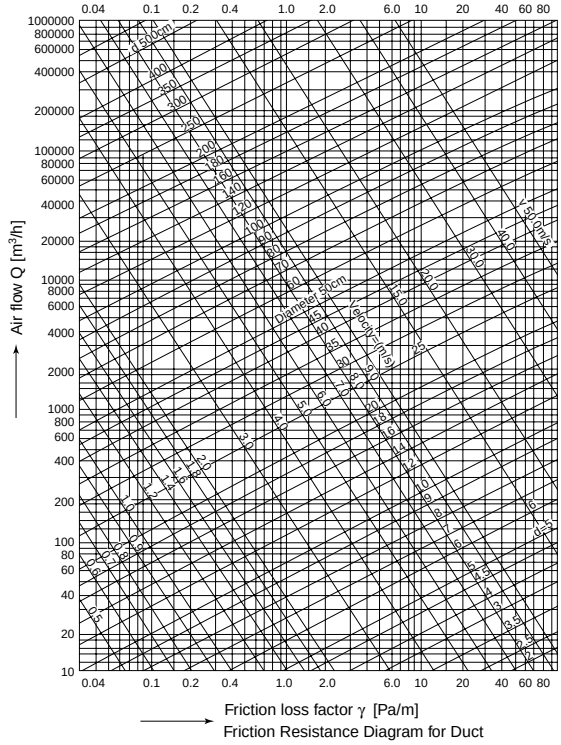
$$P = 0.01 \times \frac{1.2}{2} \times \frac{L}{d} \times \left\{ \frac{Q}{d^2} \times \frac{4}{3{,}600\pi} \right\}^2 \times 9.80665$$

Friction coefficient of major duct types

Duct material	λ
Aluminum flexible duct	0.03~0.04
Vinyl chloride pipe	0.01~0.02
Galvanized steel pipe	0.016~0.025

2. Using the duct's friction resistance diagram

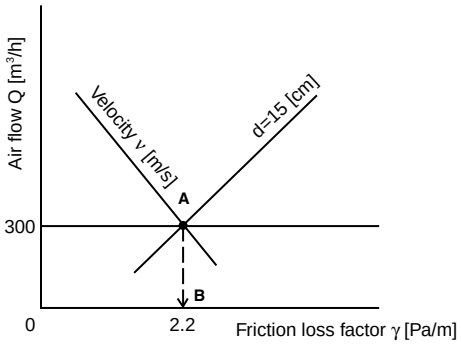
Friction resistance diagram for round duct (galvanized steel pipe)



<How to use the diagram>

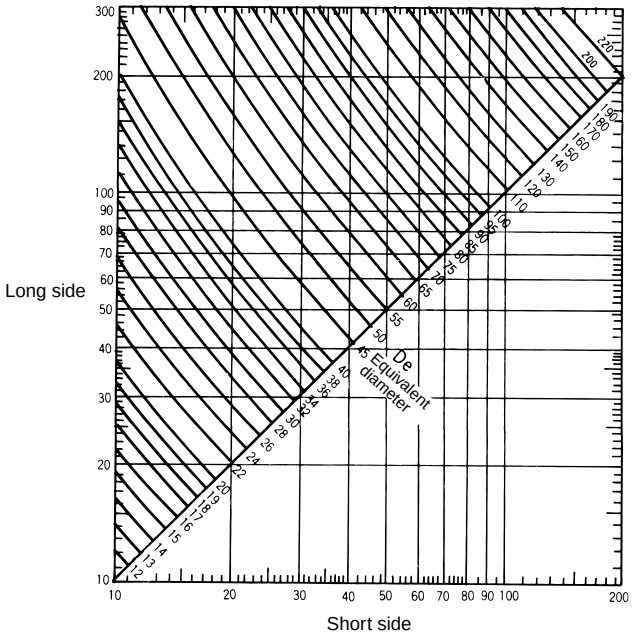
(Conditions)

- A ventilating fan intended for use with a ducted system should be chosen.
- Required air flow : 300 m^3/h
- Duct diameter : ϕ15 cm
- Duct length : 5 m



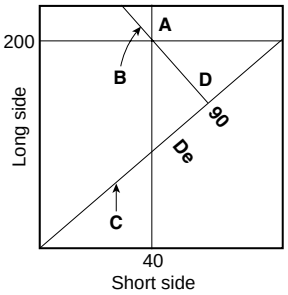
1. Find the intersection of the duct diameter d (15 cm) and air flow Q (300 m^3/h) => Point **A**
2. Draw a vertical line through Point **A** until it intersects with the abscissa => Point **B**
3. Read the Point **B** (2.2 Pa/m for this case). Multiply the value by the duct length. The answer is 11 Pa.

■ Conversion from rectangular to round duct



<How to use the chart>

Example) A rectangular duct of 40×200 is equivalent to a round duct of 90 in diameter.



I) Find the intersection of the short side 40 and long side 200 : Point **A**.
II) Draw the line **B** passing through Point **A** until it intersects with the slant line **C** : Point **D**.
This is the equivalent diameter. In this case, the diameter is 90.

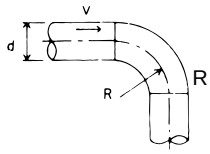
11.3.3 Pressure Loss Due to Local Features

1. Local feature loss coefficient (local feature resistance coefficient)
   Bends, and sections where the sectional area is suddenly changed, have, unlike straight sections, particular types of pressure losses due to eddy current and other factors. The pressure loss of these non-straight parts is given by the following equation.

$$\Delta P\ (Pa) = \zeta \cdot \gamma \frac{V^2}{2g} = \zeta \cdot Pv$$

Where ζ : Local loss coefficient
v : Air velocity.....[m/s]
* This is the velocity measured at the upstream side of the feature except junctions.
Pv : Dynamic pressure.....[Pa]

2. Calculation of pressure loss due to local features
   (Example) Bend as shown in the figure



R bend, round duct

[Conditions] $\frac{R}{d} = 1.5$ v = 5.0 [m/s]

$\zeta = 24$

$Pv = \frac{V^2}{2g}\gamma = \frac{25}{2} \times 1.2$

Pv = 1.53 [Pa]

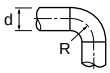
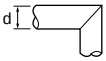
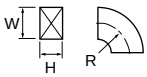
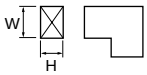
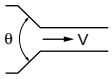
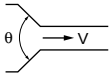
ΔP = ζ (Local loss coefficient) × Pv (Dynamic pressure)
= 0.24 × 1.5326 ≒ 0.37 Pa

The right column of Table A shows the duct diameter equivalent to this pressure loss of the local feature. Note that the values shown in the table are for λ = 0.018. For other values of the friction resistance coefficient (λ) to be used, use the following equation to find appropriate conversion.

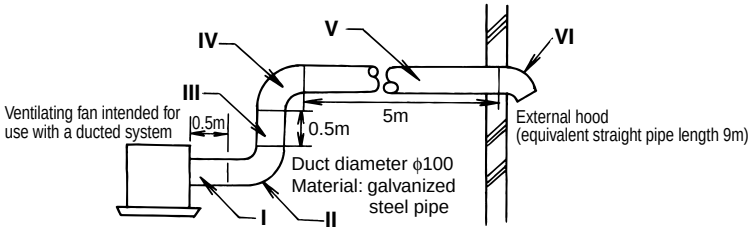
$$le = \frac{\zeta}{\lambda} d$$

le : equivalent straight pipe length of partial resistance...[m]
d : straight pipe diameter.....[m]
ζ : Local loss coefficient

Table A

No.	Name	Sketch	Status		Loss coefficient ζ
			H/W	R/dR/W	
1	R bend, round duct		–	0.5	0.90
				0.75	0.45
				1.0	0.33
				1.5	0.24
				2.0	0.19
2	Straight bend, round duct		–	–	1.30
3	R bend, rectangular duct		0.25	0.5	1.25
				0.75	0.60
				1.0	0.37
				1.5	0.19
				0.5	1.10
			0.5	0.75	0.50
				1.0	0.28
				1.5	0.13
			1.0	0.5	1.00
				0.75	0.41
				1.0	0.22
				1.5	0.09
			4.0	0.5	0.96
				0.75	0.37
				1.0	0.19
				1.5	0.07
4	Straight bend, rectangular duct		0.25	–	1.25
			0.5		1.47
			1.0		1.50
			4.0		1.38
5	Pipe inlet (with round hood)		θ	20°	0.02
				40°	0.03
				60°	0.05
				90°	0.11
				120°	0.20
6	Pipe inlet (with rectangular hood)		θ	20°	0.13
				40°	0.08
				60°	0.12
				90°	0.19
				120°	0.27

(Example)



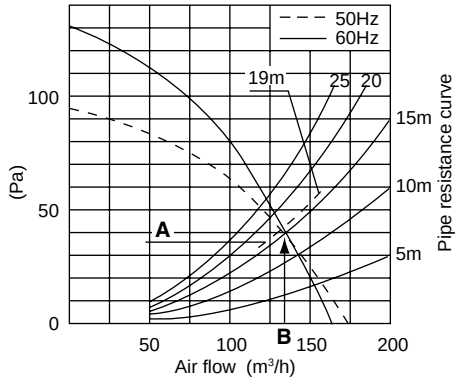
(For galvanized steel pipe with λ = 0.02, approximate value)

- To convert a local resistance to the equivalent straight pipe length, use the Table A shown in the previous page.
- For this example, the equivalent length can be calculated as follows.

Piping part	Equivalent straight pipe length (pipe diameter 100)
I	0.5m
II	2m
III	0.5m
IV	2m
V	5m
VI	9m
Total	19m

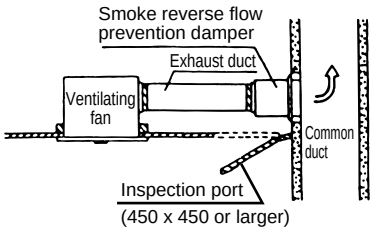
<Calculate from the equivalent straight pipe length (le) and air flow (Q)>
Example)
Equivalent straight pipe length : 19 m, Air flow : 120 [m^3/h]
To find a ventilating fan that can satisfy these requirements, find the intersection of the pipe resistance curve for le : 19 [m] and the static pressure / air flow characteristics curve, and then draw a vertical line through the intersection **A** until it each the abscissa. The intersection **B** of the vertical line and abscissa shows the required air flow capacity of the fan. In this case, the fan rating capacity should be greater than 120 m^3/h.

Static pressure - air flow characteristics curve

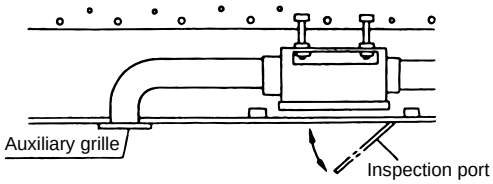


11.4 Notes for Ducted Systems

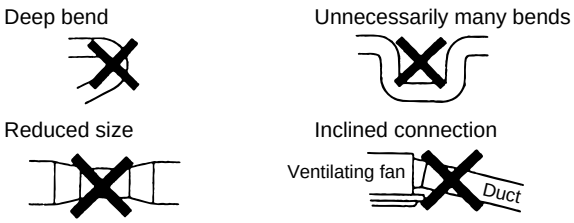
- To connect the ventilation duct to a common (multipurpose) duct, use a 2 m-long steel leading duct or smoke reverse flow prevention damper per the regulations for the Building Standard Act. In the latter case, an inspection port should be installed on the ceiling so that the damper can be accessed through the port.



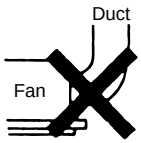
- If an intermediate fan is installed midway in the duct, an inspection port should be installed on the ceiling so that the fan can be accessed through the port.



- The ducting examples shown in figures should be avoided. These invite larger noise and smaller air flow, and adversely affect the motor.

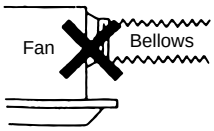


Bend located too close to the fan



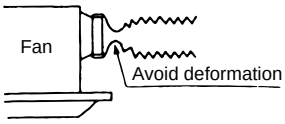
Bending the duct near the shutter frame may not permit the shutter to open completely. To avoid this, there should be a distance of minimum 150 mm between the bend and shutter.

To install a bellows, it should not be expanded near the connection



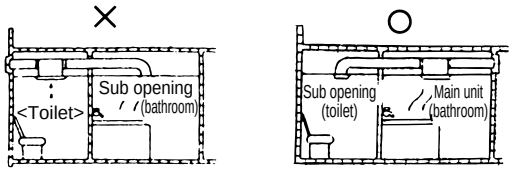
Each local rule or regulation may have different requirements for bellows. For details, consult the authorities.
Connection to an aluminum flexible duct.

Bend located too close to the fan



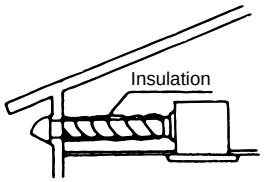
Deformed flexible duct may not permit the shutter to open completely.

- Depending on the room structure, the noise may increase by 8 to 10 phons due to echoes and/or other factors.
- To avoid entry of rainwater, exhaust ducts extending outside should be inclined down by 1/100 or larger.
- To use a two-room ventilating fan for a bathroom and other room, install the fan in the bathroom. Two-room ventilating fans are designed so that the air flow through the main opening on the fan is about twice larger than that through the sub opening (for cases where the distance between the main and sub openings is about 1 m). However, this air flow proportion can be adjusted by moving the air flow adjusting plate located on the grille of the main unit.



- Components that constitute the ceiling should be strong enough to prevent vibration and sympathetic sounds.
  Recommended material : gypsum board, cement excelsior board, fiber board
- Exhaust duct ends should be fitted with a vent cap or weather cover to prevent rainwater entry and bird nesting.
- In cold weather areas, the ducts should be thermal-insulated.

In cold weather areas, or in winter, condensation may occur due to the difference in temperature between the duct surroundings and living room. To avoid condensation, the ducting and their connections should be thermal-insulated.



- Local rules and regulations may have special requirements for fire dampers and bellows. For details, consult the authorities.
- For bathrooms, use ventilating fans specially designed for bathroom use. Never fail to earth the fan.
- Electric wiring should be done by a qualified electrician (electric engineering firm). High-voltage connections are dangerous.

11.5 How to use Psychrometric Chart

11.5.1 Unit conversion tables

- Btu/h =kcal/h×3.97
- kW =kcal/h×1/860
- Inches =mm×0.0394
- Pounds =kg×2.205
- Psi =kgf/cm^2×14.22
- KPa =kgf/cm^2×98.07
- Cfm =m^3/min×35.3
- US Gallons =Liter×0.264
- UK Gallons =Liter×0.220

■ General conversion tables

Pressure

bar	kgf/cm^2	lb/in^2	OZ/in^2	British atm	Mercury (0°C)	
					mm	in
1	1.0197	14.50	2320	0.9869	750.0	29.53
0.980667	1	14.223	2275.66	0.9678	735.5	28.96
0.06895	0.07031	1	16	0.06804	51.71	0.0355
0.0$_2$4309	0.0$_2$4394	0.0625	1	0.0$_2$4252	3.232	0.1276
1.0113	1.0333	14.70	235.2	1	760	29.921
1.3333	1.3596	19.34	309.4	1.316	1000	39.37
0.03386	0.0$_2$453	0.4912	7.859	0.03342	25.4	1

Velocity

m/sec	m/min	km/hr	ft/sec	ft/min	mile/hr	Knot
1	60	3.6	3.28091	196.854	2.23698	1.9426
0.016667	1	0.06	0.05468	3.28091	0.03728	0.03237
0.27778	16.66667	1	0.91136	54.6815	0.62138	0.53962
0.30479	18.2874	1.09725	1	60	0.68182	0.59211
0.0$_2$50798	0.30479	0.018287	0.016667	1	0.011364	0.0$_3$98684
0.44703	26.8215	1.60931	1.46667	88	1	0.86842
0.51478	30.8867	1.8532	1.68889	101.337	1.15152	1

Area

mm^2	cm^2	m^2	In^2	It^2	yd^2
1	0.01	0.000001	0.00155	——	——
100	1	0.0001	0.15501	0.0010764	0.0$_3$1196
10×10^5	10×10^3	1	1550.1	10.7643	1.196
645.14	6.4514	0.0$_3$64514	1	0.006944	0.0$_3$7716
92900	92.9	0.0929	144	1	0.11111
836090	8360.9	0.83609	1296	9	1

Weight

mg	g	kg	grain	oz	lb
1	0.001	0.0$_5$1	0.015432	0.0435274	0.0$_5$22046
1000	1	0.001	15.4324	0.035274	0.0$_2$22046
10×10^5	1000	1	15432.4	35.27394	2.20462
64.799	0.064799	0.0$_4$64799	1	0.0$_7$22857	0.0$_3$14286
28349.5	28.34954	0.028349	437.5	1	0.0625
453592	453.592	0.45359	7000	16	1

Length

m	km	ft	yd	mile
1	0.001	3.2809	1.09363	0.00062
1000	1	3280.9	1093.63	0.62138
0.30479	0.033048	1	0.33333	$0.0_3$1894
0.91438	$0.0_3$9144	3	1	$0.0_3$5682
1609.31	1.60931	5280	1760	1

Flow rate

l/sec	l/min	m^3/hr	m^3/min	m^3/sec	British gal/min	U.S gal/min	ft^3/hr	ft^3/min	ft^3/sec
1	60	3.6	0.06	0.001	13.197	15.8514	127.14	2.119	0.035317
0.01666	1	0.06	0.001	$0.0_4$16666	0.21995	0.26419	2.119	0.035317	$0.0_3$5886
0.27777	16.666	1	0.016666	$0.0_3$27777	3.66583	4.40316	35.3165	0.58861	$0.0_2$9801
16.666	1000	60	1	0.016666	219.95	264.19	2119	35.3165	0.058861
1000	60×10^3	3600	60	1	13198	15851	127150	2119	35.3165
0.075775	4.5465	0.27279	$0.0_2$45465	$0.0_4$75775	1	1.20114	9.6342	0.16057	$0.0_2$2676
0.063086	3.7852	0.22711	$0.0_2$37852	0.063086	0.83254	1	8.0208	0.13368	$0.0_2$2228
$0.0_2$7865	0.47188	0.028315	$0.0_3$47188	$0.0_5$78647	0.103798	0.12467	1	0.016666	$0.0_3$27777
0.47188	28.3153	1.6989	0.028315	$0.0_3$47188	6.22786	7.48055	60	1	0.016666
28.3153	1698.9	101.935	1.6989	0.028315	373.6716	448.833	3600	60	1

Note: $0.0_4$1=0.00001

■ **SI unit used for refrigeration / air conditioning and conversion table**

Amount	SI unit		JIS unit Other units		Units mainly used in integral multiple of 10 of SI unit	Units mainly used in integral multiple of 10 of unit used in combination with SI unit or of unit allowed use in combination	Remarks
Length	m	m	in	ft	km dm cm mm μm		
		1 0.0254 0.3048	39.37 1 12.00	3.281 0.0833 1			
Area	m^2	m^2	in^2	ft^2	km^2 dm^2 cm^2 mm^2		
		1 0.000652 0.09290	1550.0 1 144.0	10.76 0.006944 1			
Volume	m^3	m^3	in^3	ft^3	dm^3 cm^3 mm^3	kℓ=m^3 ℓ =$10^{-3}m^3$ 1dℓ=$10^{-4}m^3$ 1cℓ=$10^{-5}m^3$	
		1 1.639×10^{-5} 0.02832	61020 1 1728	35.31 5.787×10^{-4} 1			
Mass	kg	kg	lb		Mg g mg		
		1 0.4536	2.205 1				
Density	kg/m^3	kg/m^3	g/cm^3	lb/ft^3			
		1000 1 16.02	1 0.001 0.01602	62.43 0.06243 1			
Speed	m/s	m/s	ft/s			km/h 1km/h=$\frac{1}{3.6}$ m/s	
		1 0.3048	3.281 1				
Temperature	K (℃) (Kelvin) (Celsius)	K	°F				
		1 1.8	0.5555 1				
Force (weight)	N (Newton)	N	kgf	lb	MN kN mN μN		IN=1kg×1m/s^2
		1 9.807 4.448	0.102 1 0.4536	0.245 2.205 1			
Pressure	Pa (Pascal)	Pa	kgf/cm^2	lb/in^2 (psi)	GPa MPa kPa hPa mPA μPa		Pa=N/m^2 hPa=mmbar
		1 9.807×10^{4} 6.895×10^{3}	1.02×10^{-5} 1 0.07031	1.45×10^{-4} 14.22 1			
Work	J (Joule)	J	kcal	BTU	TJ GJ MJ kJ		
		1 4186.05 1055.1	2.39×10^{-4} 1 0.252	9.478×10^{-4} 3.968 1			

■ Pressure conversion table

kgf/cm^{2}G	MPaG	p.s.i.G	kgf/cm^{2}G	MPaG	p.s.i.G
0.0	0.00	0.0	12.0	1.18	170.6
0.2	0.02	2.8	12.2	1.20	173.5
0.4	0.04	5.7	12.4	1.22	176.3
0.6	0.06	8.5	12.6	1.23	179.2
0.8	0.08	11.4	12.8	1.25	182.0
1.0	0.10	14.2	13.0	1.27	184.9
1.2	0.12	17.1	13.2	1.29	187.7
1.4	0.14	19.9	13.4	1.31	190.5
1.6	0.16	22.8	13.6	1.33	193.4
1.8	0.18	25.6	13.8	1.35	196.2
2.0	0.20	28.4	14.0	1.37	199.1
2.2	0.22	31.3	14.2	1.39	201.9
2.4	0.23	34.1	14.4	1.41	204.8
2.6	0.25	37.0	14.6	1.43	207.6
2.8	0.27	39.8	14.8	1.45	210.5
3.0	0.29	42.7	15.0	1.47	213.3
3.2	0.31	45.5	15.2	1.49	216.1
3.4	0.33	48.3	15.4	1.50	219.0
3.6	0.35	51.2	15.6	1.53	221.8
3.8	0.37	54.0	15.8	1.55	224.7
4.0	0.39	56.9	16.0	1.57	227.5
4.2	0.41	59.7	16.2	1.58	230.4
4.4	0.43	62.6	16.4	1.61	233.2
4.6	0.45	65.4	16.6	1.63	236.1
4.8	0.47	68.3	16.8	1.65	238.9
5.0	0.49	71.1	17.0	1.67	241.7
5.2	0.51	73.9	17.2	1.69	244.6
5.4	0.53	76.8	17.4	1.71	247.4
5.6	0.55	79.6	17.6	1.72	250.3
5.8	0.57	82.5	17.8	1.74	253.1
6.0	0.59	85.3	18.0	1.76	256.0
6.2	0.61	88.2	18.2	1.78	258.8
6.4	0.63	91.0	18.4	1.80	261.6
6.6	0.65	93.9	18.6	1.82	264.5
6.8	0.67	96.7	18.8	1.84	267.3
7.0	0.69	99.5	19.0	1.86	270.2
7.2	0.71	102.4	19.2	1.88	273.0
7.4	0.73	105.2	19.4	1.90	275.9
7.6	0.74	108.1	19.6	1.92	278.7
7.8	0.76	110.9	19.8	1.94	281.6
8.0	0.78	113.8	20.0	1.96	284.4
8.2	0.80	116.6	20.2	1.98	287.2
8.4	0.82	119.4	20.4	2.00	290.1
8.6	0.84	122.3	20.6	2.02	292.9
8.8	0.86	125.1	20.8	2.04	295.8
9.0	0.88	128.0	21.0	2.06	298.6
9.2	0.90	130.8	21.2	2.08	301.5
9.4	0.92	133.7	21.4	2.10	304.3
9.6	0.94	136.5	21.6	2.12	307.2
9.8	0.96	139.4	21.8	2.14	310.0
10.0	0.98	142.2	22.0	2.16	312.8
10.2	1.00	145.0	22.2	2.18	315.7
10.4	1.02	147.9	22.4	2.19	318.5
10.6	1.04	150.7	22.6	2.21	321.4
10.8	1.06	153.6	22.8	2.23	324.2
11.0	1.08	156.4	23.0	2.25	327.1
11.2	1.09	159.3	23.2	2.27	329.9
11.4	1.12	162.1	23.4	2.29	332.7
11.6	1.14	165.0	23.6	2.31	335.6
11.8	1.16	167.8	23.8	2.33	338.4

p.s.i.=14.22×kgf/cm^2
kgf/cm^2=10.2×Mpa

kgf/cm^2=0.0703×p.s.i.
MPa=0.098×kgf/cm^2

p.s.i=145.0×MPa

MPa=0.006896×p.s.i

Note : This conversion system is based on GAUGE pressure.

p.s.i.G	MPaG	kgf/cm^{2}G	p.s.i.G	MpaG	kgf/cm^{2}G
0	0.00	0.0	350	2.41	24.6
5	0.03	0.4	355	2.45	25.0
10	0.07	0.7	360	2.48	25.3
15	0.10	1.1	365	2.52	25.7
20	0.14	1.4	370	2.55	26.0
25	0.17	1.8	375	2.58	26.4
30	0.21	2.1	380	2.62	26.7
35	0.24	2.5	385	2.65	27.1
40	0.27	2.8	390	2.68	27.4
45	0.31	3.2	395	2.72	27.8
50	0.34	3.5	400	2.76	28.1
55	0.38	3.9	405	2.79	28.5
60	0.41	4.2	410	2.83	28.8
65	0.45	4.6	415	2.86	29.2
70	0.48	4.9	420	2.90	29.5
75	0.51	5.3	425	2.93	30.0
80	0.55	5.6	430	2.97	30.2
85	0.59	6.0	435	3.00	30.6
90	0.62	6.3	440	3.03	30.9
95	0.66	6.7	445	3.07	31.3
100	0.69	7.0	450	3.10	31.6
105	0.72	7.4	455	3.14	32.0
110	0.76	7.7	460	3.17	32.3
115	0.79	8.1	465	3.20	32.7
120	0.83	8.4	470	3.24	33.0
125	0.86	8.8	475	3.28	33.4
130	0.89	9.1	480	3.31	33.7
135	0.93	9.5	485	3.34	34.1
140	0.97	9.8	490	3.38	34.5
145	1.00	10.2	495	3.41	34.8
150	1.03	10.5	500	3.45	35.2
155	1.07	10.9	505	3.48	35.5
160	1.10	11.2	510	3.52	35.9
165	1.13	11.6	515	3.55	36.2
170	1.17	12.0	520	3.59	36.6
175	1.21	12.3	525	3.62	36.9
180	1.25	12.7	530	3.65	37.3
185	1.28	13.0	535	3.69	37.6
190	1.31	13.4	540	3.72	38.0
195	1.34	13.7	545	3.76	38.3
200	1.38	14.1	550	3.79	38.7
205	1.41	14.4	555	3.83	39.0
210	1.45	14.8	560	3.86	39.4
215	1.48	15.1	565	3.90	39.7
220	1.52	15.5	570	3.93	40.0
225	1.55	15.8	575	3.97	40.4
230	1.59	16.2	580	4.00	40.8
235	1.62	16.5	585	4.03	41.1
240	1.66	16.9	590	4.07	41.5
245	1.69	17.2	595	4.10	41.8
250	1.72	17.6	600	4.14	42.2
255	1.76	17.9	605	4.17	42.5
260	1.79	18.3	610	4.21	42.9
265	1.83	18.6	615	4.24	43.2
270	1.86	19.0	620	4.28	43.6
275	1.90	19.3	625	4.31	43.9
280	1.93	19.7	630	4.34	44.3
285	1.96	20.0	635	4.38	44.6
290	2.00	20.4	640	4.41	45.0
295	2.03	20.7	645	4.45	45.3
300	2.07	21.1	650	4.48	45.7
305	2.10	21.4	655	4.52	46.0
310	2.13	21.8	660	4.55	46.4
315	2.17	22.1	665	4.58	46.7
320	2.20	22.5	670	4.62	47.1
325	2.24	22.8	675	4.65	47.5
330	2.27	23.2	680	4.68	47.8
335	2.31	23.6	685	4.72	48.2
340	2.34	23.9	690	4.75	48.5
345	2.37	24.3	695	4.79	48.9

■ Temperature conversion table

°C →	°F	°C →	°F
−10	14.0	50	122.0
−9	15.8	51	123.8
−8	17.6	52	125.6
−7	19.4	53	127.4
−6	21.2	54	129.2
−5	23.0	55	131.0
−4	24.8	56	132.8
−3	26.6	57	134.6
−2	28.4	58	136.4
−1	30.2	59	138.2
0	32.0	60	140.0
1	33.8	61	141.8
2	35.6	62	143.6
3	37.4	63	145.4
4	39.2	64	147.2
5	41.0	65	149.0
6	42.8	66	150.8
7	44.6	67	152.6
8	46.4	68	154.4
9	48.2	69	156.2
10	50.0	70	158.0
11	51.8	71	159.8
12	53.6	72	161.6
13	55.4	73	163.4
14	57.2	74	165.2
15	59.0	75	167.0
16	60.8	76	168.8
17	62.6	77	170.6
18	64.4	78	172.4
19	66.2	79	174.2
20	68.0	80	176.0
21	69.8	81	177.8
22	71.6	82	179.6
23	73.4	83	181.4
24	75.2	84	183.2
25	77.0	85	185.0
26	78.8	86	186.8
27	80.6	87	188.6
28	82.4	88	190.4
29	84.2	89	192.2
30	86.0	90	194.0
31	87.8	91	195.8
32	89.6	92	197.6
33	91.4	93	199.4
34	93.2	94	201.2
35	95.0	95	203.0
36	96.8	96	204.8
37	98.6	97	206.6
38	100.4	98	208.4
39	102.2	99	210.2
40	104.0	100	212.0
41	105.8	101	213.8
42	107.6	102	215.6
43	109.4	103	217.4
44	111.2	104	219.2
45	113.0	105	221.0
46	114.8	106	222.8
47	116.6	107	224.6
48	118.4	108	226.4
49	120.2	109	228.2

°F=9/5×°C+32

°F →	°C	°F →	°C
0	−17.8	120	48.9
2	−16.7	122	50.0
4	−15.6	124	51.1
6	−14.4	126	52.2
8	−13.3	128	53.3
10	−12.2	130	54.4
12	−11.1	132	55.6
14	−10.0	134	56.7
16	−8.9	136	57.8
18	−7.8	138	58.9
20	−6.7	140	60.0
22	−5.6	142	61.1
24	−4.4	144	62.2
26	−3.3	146	63.3
28	−2.2	148	64.4
30	−1.1	150	65.6
32	0.0	152	66.7
34	1.1	154	67.8
36	2.2	156	68.9
38	3.3	158	70.0
40	4.4	160	71.1
42	5.6	162	72.2
44	6.7	164	73.3
46	7.8	166	74.4
48	8.9	168	75.6
50	10.0	170	76.7
52	11.1	172	77.8
54	12.2	174	78.9
56	13.3	176	80.0
58	14.4	178	81.1
60	15.6	180	82.2
62	16.7	182	83.3
64	17.8	184	84.4
66	18.9	186	85.6
68	20.0	188	86.7
70	21.1	190	87.8
72	22.2	192	88.9
74	23.3	194	90.0
76	24.4	196	91.1
78	25.6	198	92.2
80	26.7	200	93.3
82	27.8	202	94.4
84	28.9	204	95.6
86	30.0	206	96.7
88	31.1	208	97.8
90	32.2	210	98.9
92	33.3	212	100.0
94	34.4	214	101.1
96	35.6	216	102.2
98	36.7	218	103.3
100	37.8	220	104.4
102	38.9	222	105.6
104	40.0	224	106.7
106	41.1	226	107.8
108	42.2	228	108.9
110	43.3	230	110.0
112	44.4	232	111.1
114	45.6	234	112.2
116	46.7	236	113.3
118	47.8	238	114.4

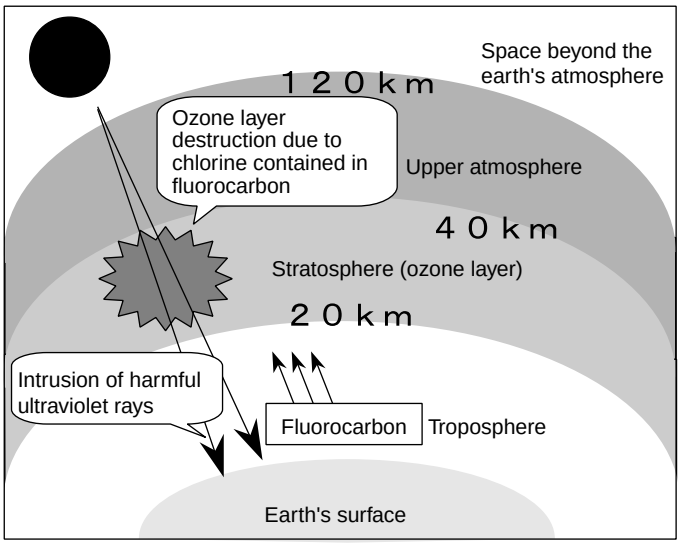
°C=(°F−32)×5/9

11.5.2 Refrigerant

■ **Fluorocarbon and global environment**

Influence of refrigerant given on global environment

1. Ozone layer destruction



Refrigerants discharged reach the stratosphere without being decomposed.

↓

Refrigerants are decomposed by strong ultraviolet rays radiated from the sun.

↓

Chlorine is discharged.

↓

Ozone (O^3) reaction caused by chlorine discharged.

↓

Resulting in ozone layer destruction.

↓

The strong ultraviolet rays radiated from the sun directly reach Earth's surface.

↓

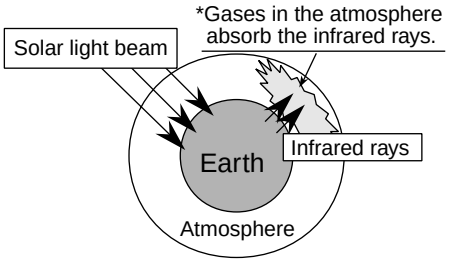
Resulting in the increase of harmful ultraviolet rays.

↓

Cause of skin cancer and others

2. Global warming

(Principle)
Due to the results of human activities such as a large quantity of consumption of petrochemical fuels (e.g. petroleum, coal, and natural gas) and forest destruction, carbon dioxide, chlorofluorocarbon, methane, and others in the atmosphere have been increasing beyond the limit that natural force can remove them.
As a result, the dissipation of heat from Earth's surface is interrupted (greenhouse effect), thus resulting in global warming.



Carbon dioxide, fluorocarbon, methane, nitride, and others are released from Earth's surface.

↓

Infrared rays (heat rays) from Earth's surface are absorbed.

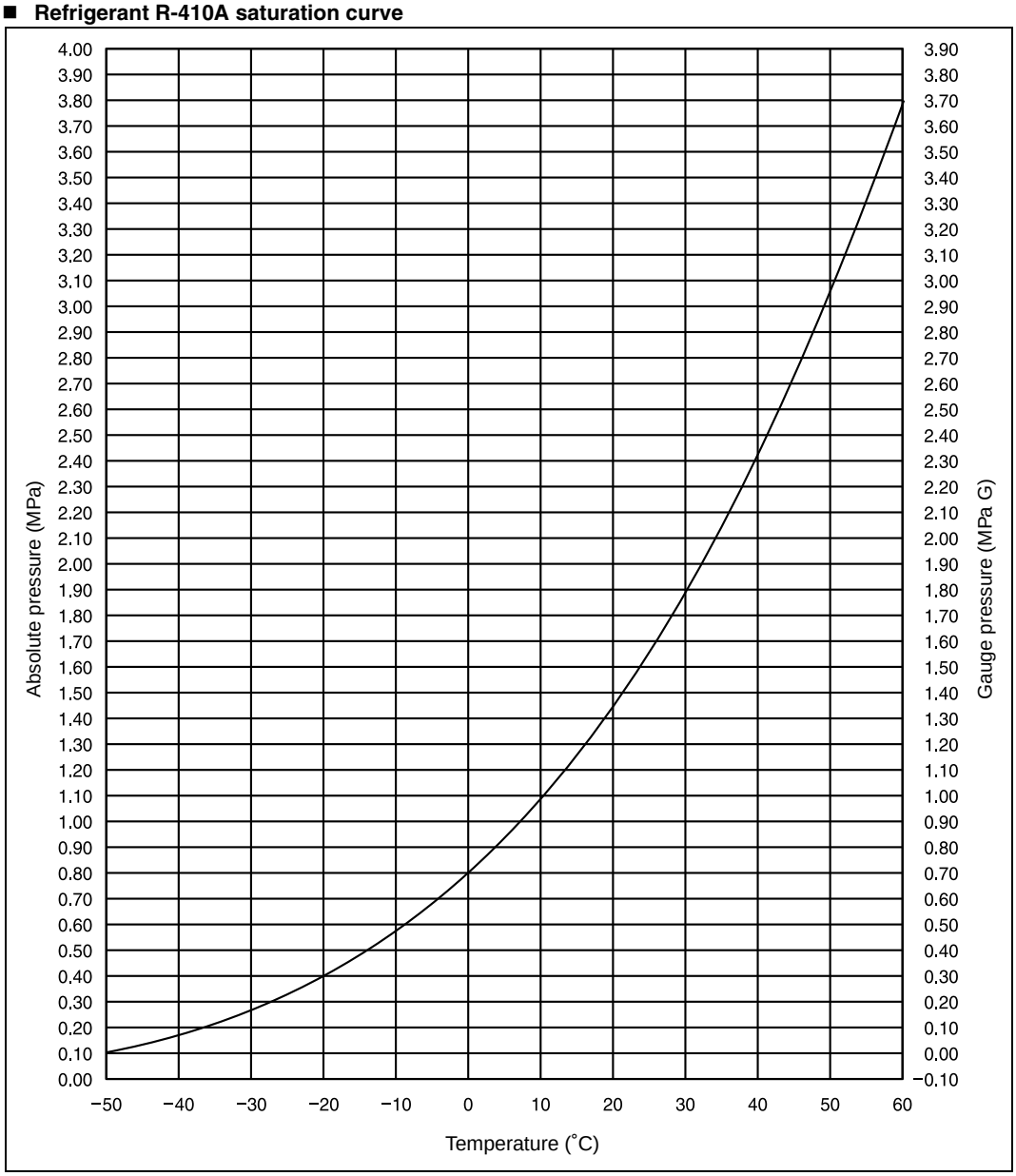
↓

Heat (temperature) cannot be dissipated from Earth's surface.

↓

Resulting in temperature rise and sea level rise.

■ **Refrigerant R-410A saturation curve**



■ **R-410A Saturation pressure (gauge pressure) chart**

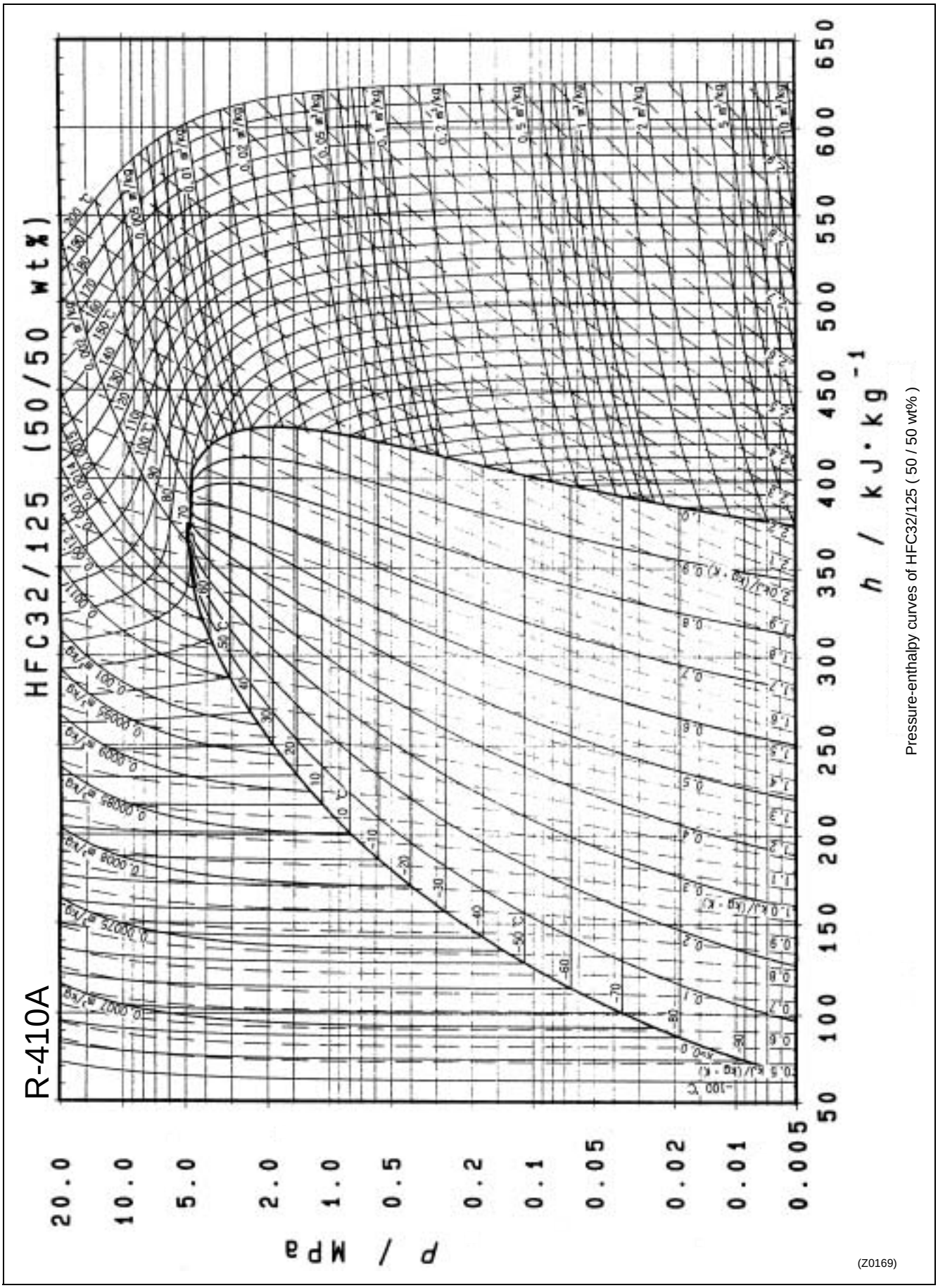
Press. MpaG	Temp ℃	Press. MpaG	Temp ℃	Press. MpaG	Temp ℃
0	-51.58	0.9	7	3.49	57
0.06	-42	0.93	8	3.57	58
0.07	-41	0.97	9	3.65	59
0.08	-40	1	10	3.73	60
0.085	-39	1.03	11	3.82	61
0.09	-38	1.06	12	3.9	62
0.1	-37	1.09	13	3.99	63
0.11	-36	1.12	14	4.08	64
0.12	-35	1.16	15		
0.13	-34	1.2	16		
0.14	-33	1.24	17		
0.15	-32	1.27	18		
0.16	-31	1.31	19		
0.17	-30	1.35	20		
0.18	-29	1.39	21		
0.19	-28	1.43	22		
0.21	-27	1.48	23		
0.22	-26	1.52	24		
0.23	-25	1.56	25		
0.24	-24	1.6	26		
0.26	-23	1.65	27		
0.27	-22	1.7	28		
0.29	-21	1.75	29		
0.3	-20	1.79	30		
0.32	-19	1.84	31		
0.33	-18	1.89	32		
0.35	-17	1.92	33		
0.36	-16	1.94	34		
0.38	-15	2.02	35		
0.4	-14	2.1	36		
0.42	-13	2.16	37		
0.43	-12	2.21	38		
0.45	-11	2.27	39		
0.47	-10	2.33	40		
0.49	-9	2.39	41		
0.51	-8	2.45	42		
0.54	-7	2.51	43		
0.56	-6	2.57	44		
0.58	-5	2.64	45		
0.6	-4	2.7	46		
0.63	-3	2.77	47		
0.65	-2	2.83	48		
0.68	-1	2.9	49		
0.7	0	2.97	50		
0.73	1	3.04	51		
0.75	2	3.11	52		
0.78	3	3.19	53		
0.81	4	3.26	54		
0.84	5	3.34	55		
0.87	6	3.41	56		

■ Thermodynamic characteristics of R-410A

DAIREP ver2.0

Temperature (°C)	Steam pressure (kPa)		Density (kg/m³)		Specific heat at constant pressure (kj/kgK)		Specific enthalpy (kj/kg)		Specific entropy (kj/kgK)	
	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor	Liquid	Vapor
-70	36.13	36.11	1410.7	1.582	1.372	0.695	100.8	390.6	0.649	2.074
-68	40.83	40.80	1404.7	1.774	1.374	0.700	103.6	391.8	0.663	2.066
-66	46.02	45.98	1398.6	1.984	1.375	0.705	106.3	393.0	0.676	2.058
-64	51.73	51.68	1392.5	2.213	1.377	0.710	109.1	394.1	0.689	2.051
-62	58.00	57.94	1386.4	2.463	1.378	0.715	111.9	395.3	0.702	2.044
-60	64.87	64.80	1380.2	2.734	1.379	0.720	114.6	396.4	0.715	2.037
-58	72.38	72.29	1374.0	3.030	1.380	0.726	117.4	397.6	0.728	2.030
-56	80.57	80.46	1367.8	3.350	1.382	0.732	120.1	398.7	0.741	2.023
-54	89.49	89.36	1361.6	3.696	1.384	0.737	122.9	399.8	0.754	2.017
-52	99.18	99.03	1355.3	4.071	1.386	0.744	125.7	400.9	0.766	2.010
-51.58	101.32	101.17	1354.0	4.153	1.386	0.745	126.3	401.1	0.769	2.009
-50	109.69	109.51	1349.0	4.474	1.388	0.750	128.5	402.0	0.779	2.004
-48	121.07	120.85	1342.7	4.909	1.391	0.756	131.2	403.1	0.791	1.998
-46	133.36	133.11	1336.3	5.377	1.394	0.763	134.0	404.1	0.803	1.992
-44	146.61	146.32	1330.0	5.880	1.397	0.770	136.8	405.2	0.816	1.987
-42	160.89	160.55	1323.5	6.419	1.401	0.777	139.6	406.2	0.828	1.981
-40	176.24	175.85	1317.0	6.996	1.405	0.785	142.4	407.3	0.840	1.976
-38	192.71	192.27	1310.5	7.614	1.409	0.792	145.3	408.3	0.852	1.970
-36	210.37	209.86	1304.0	8.275	1.414	0.800	148.1	409.3	0.864	1.965
-34	229.26	228.69	1297.3	8.980	1.419	0.809	150.9	410.2	0.875	1.960
-32	249.46	248.81	1290.6	9.732	1.424	0.817	153.8	411.2	0.887	1.955
-30	271.01	270.28	1283.9	10.53	1.430	0.826	156.6	412.1	0.899	1.950
-28	293.99	293.16	1277.1	11.39	1.436	0.835	159.5	413.1	0.911	1.946
-26	318.44	317.52	1270.2	12.29	1.442	0.844	162.4	414.0	0.922	1.941
-24	344.44	343.41	1263.3	13.26	1.448	0.854	165.3	414.9	0.934	1.936
-22	372.05	370.90	1256.3	14.28	1.455	0.864	168.2	415.7	0.945	1.932
-20	401.34	400.06	1249.2	15.37	1.461	0.875	171.1	416.6	0.957	1.927
-18	432.36	430.95	1242.0	16.52	1.468	0.886	174.1	417.4	0.968	1.923
-16	465.20	463.64	1234.8	17.74	1.476	0.897	177.0	418.2	0.980	1.919
-14	499.91	498.20	1227.5	19.04	1.483	0.909	180.0	419.0	0.991	1.914
-12	536.58	534.69	1220.0	20.41	1.491	0.921	182.9	419.8	1.003	1.910
-10	575.26	573.20	1212.5	21.86	1.499	0.933	185.9	420.5	1.014	1.906
-8	616.03	613.78	1204.9	23.39	1.507	0.947	189.0	421.2	1.025	1.902
-6	658.97	656.52	1197.2	25.01	1.516	0.960	192.0	421.9	1.036	1.898
-4	704.15	701.49	1189.4	26.72	1.524	0.975	195.0	422.6	1.048	1.894
-2	751.64	748.76	1181.4	28.53	1.533	0.990	198.1	423.2	1.059	1.890
0	801.52	798.41	1173.4	30.44	1.543	1.005	201.2	423.8	1.070	1.886
2	853.87	850.52	1165.3	32.46	1.552	1.022	204.3	424.4	1.081	1.882
4	908.77	905.16	1157.0	34.59	1.563	1.039	207.4	424.9	1.092	1.878
6	966.29	962.42	1148.6	36.83	1.573	1.057	210.5	425.5	1.103	1.874
8	1026.5	1022.4	1140.0	39.21	1.584	1.076	213.7	425.9	1.114	1.870
10	1089.5	1085.1	1131.3	41.71	1.596	1.096	216.8	426.4	1.125	1.866
12	1155.4	1150.7	1122.5	44.35	1.608	1.117	220.0	426.8	1.136	1.862
14	1224.3	1219.2	1113.5	47.14	1.621	1.139	223.2	427.2	1.147	1.859
16	1296.2	1290.8	1104.4	50.09	1.635	1.163	226.5	427.5	1.158	1.855
18	1371.2	1365.5	1095.1	53.20	1.650	1.188	229.7	427.8	1.169	1.851
20	1449.4	1443.4	1085.6	56.48	1.666	1.215	233.0	428.1	1.180	1.847
22	1530.9	1524.6	1075.9	59.96	1.683	1.243	236.4	428.3	1.191	1.843
24	1615.8	1609.2	1066.0	63.63	1.701	1.273	239.7	428.4	1.202	1.839
26	1704.2	1697.2	1055.9	67.51	1.721	1.306	243.1	428.6	1.214	1.834
28	1796.2	1788.9	1045.5	71.62	1.743	1.341	246.5	428.6	1.225	1.830
30	1891.9	1884.2	1034.9	75.97	1.767	1.379	249.9	428.6	1.236	1.826
32	1991.3	1983.2	1024.1	80.58	1.793	1.420	253.4	428.6	1.247	1.822
34	2094.5	2086.2	1012.9	85.48	1.822	1.465	256.9	428.4	1.258	1.817
36	2201.7	2193.1	1001.4	90.68	1.855	1.514	260.5	428.3	1.269	1.813
38	2313.0	2304.0	989.5	96.22	1.891	1.569	264.1	428.0	1.281	1.808
40	2428.4	2419.2	977.3	102.1	1.932	1.629	267.8	427.7	1.292	1.803
42	2548.1	2538.6	964.6	108.4	1.979	1.696	271.5	427.2	1.303	1.798
44	2672.2	2662.4	951.4	115.2	2.033	1.771	275.3	426.7	1.315	1.793
46	2800.7	2790.7	937.7	122.4	2.095	1.857	279.2	426.1	1.327	1.788
48	2933.7	2923.6	923.3	130.2	2.168	1.955	283.2	425.4	1.339	1.782
50	3071.5	3061.2	908.2	138.6	2.256	2.069	287.3	424.5	1.351	1.776
52	3214.0	3203.6	892.2	147.7	2.362	2.203	291.5	423.5	1.363	1.770
54	3361.4	3351.0	875.1	157.6	2.493	2.363	295.8	422.4	1.376	1.764
56	3513.8	3503.5	856.8	168.4	2.661	2.557	300.3	421.0	1.389	1.757
58	3671.3	3661.2	836.9	180.4	2.883	2.799	305.0	419.4	1.403	1.749
60	3834.1	3824.2	814.9	193.7	3.191	3.106	310.0	417.6	1.417	1.741
62	4002.1	3992.7	790.1	208.6	3.650	3.511	315.3	415.5	1.433	1.732
64	4175.7	4166.8	761.0	225.6	4.415	4.064	321.2	413.0	1.450	1.722

(Z0168)



Pressure-enthalpy curves of HFC32/125 (50 / 50 wt%)

11.5.3 Psychrometric Chart