

TECHNICAL MANUAL

Collection data

PACKAGED AIR-CONDITIONER

(Split system, Air to air heat pump type)

FDUMVA201HEN2R
251HEN2R
302HEN2R
402HEN2R
502HEN2R
602HEN2R

MULTI-TYPE (V-MULTI)

PACKAGED AIR-CONDITIONER

(OUTDOOR UNIT)

FDCVA402HENR
502HENR
602HENR
802HESR
1002HESR

(INDOOR UNIT)

FDUMA202R
252R
302R
402R
502R

INVERTER DRIVEN MULTI-INDOOR UNIT CLIMATE CONTROL SYSTEM

FDUMA22KXE5R
28KXE5R
36KXE5R
45KXE5R
56KXE5R
71KXE5R
90KXE5R
112KXE5R
140KXE5R

TABLE OF CONTENTS

1. PACKAGED AIR-CONDITIONER.....	2
2. MULTI-TYPE (V MULTI) PACKAGED AIR-CONDITIONER	142
3. INVERTER DRIVEN MULTI-INDOOR UNIT CLIMATE CONTROL SYSTEM	195
4. WIRELESS KIT (OPTIONAL PARTS)	220

1. PACKAGED AIR-CONDITIONER

CONTENTS

1.1 GENERAL INFORMATION	4
1.1.1 Specific features	4
1.1.2 How to read the model name	4
1.2 SELECTION DATA	5
1.2.1 Specifications	5
1.2.2 Range of usage & limitations	11
1.2.3 Exterior dimensions	12
(1) Indoor unit	12
(2) Remote controller (Optional parts)	15
(3) Outdoor unit	16
1.2.4 Inside view	20
1.2.5 Exterior appearance	22
1.2.6 Piping system	23
1.2.7 Selection chart	25
1.2.8 Characteristics of fan	36
1.2.9 Noise level	38
(1) Indoor unit	38
(2) Outdoor unit	39
1.3 ELECTRICAL DATA	40
1.3.1 Electrical wiring	40
(1) Indoor unit	40
(2) Outdoor unit	41
1.4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER	44
(1) Remote controller	44
(2) Operation control function by the indoor controller	45
(3) Operation control function by the wired remote controller	51
(4) Operation control function by the outdoor controller	52

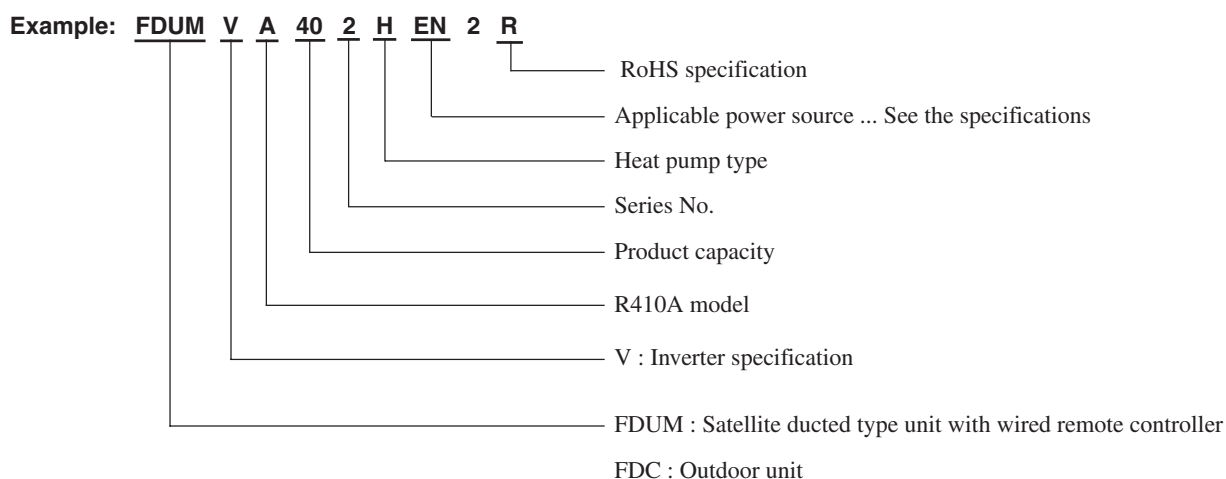
1.5 APPLICATION DATA	70
1.5.1 Installation of indoor unit	71
1.5.2 Installation of wired remote controller	78
1.5.3 Installation of outdoor unit	79
(1) Haulage and installation	79
(2) Refrigerant piping work	81
(3) Air tightness test and air purge	83
(4) Additional refrigerant charge	83
(5) Drain piping work	84
(6) Electrical wiring	85
(7) Setting functions using the wired remote controller	87
(8) Checking operation data	91
(9) Test run	92
1.6 MAINTENANCE DATA	95
1.6.1 Servicing	95
1.6.2 Trouble shooting for refrigerant circuit	96
1.6.3 Diagnosing of microcomputer circuit	97
(1) Selfdiagnosis function	97
(2) Procedures of trouble diagnosis	100
(3) Error diagnosis procedures at the indoor unit side	100
(4) Error diagnosis procedures at the outdoor unit side	112
(5) Check method in the case of the failure display in the wired remote controller	140
(6) Check abnormal operation data with the wired remote controller	140

1.1 GENERAL INFORMATION

1.1.1 Specific features

- (1) A new refrigerant, R410A, which causes no damage to the earth's ozone layer, is used. R410A is a pseudoazeotropic refrigerant, so there is little formation of separate vapor and liquid layers, and it is possible to add refrigerant on-site.
- (2) Less refrigerant charge amount due to use of double phase refrigerant flow system. The total refrigerant charge amount has been reduced by more than 50%.
- (3) The microcomputer chip is installed in the indoor unit and outdoor unit. There is no need for the unit to communicate between the outdoor and indoor units so the unit is more resistant to electromagnetic noise thus the incidence of microcomputer malfunction has been reduced. The compressor in the outdoor unit has its own self protection function, that reacts according to abnormal high pressure and excessive high temperature.
- (4) There are only three power lines between the outdoor and indoor unit. One cable with 3 wires encased in one sheath is enough for conducting the wiring work between the outdoor unit and the indoor unit. This contributes to simpler wiring work in the field.
- (5) The model have service valves protruding from the outdoor unit for faster flare connection work in the field.

1.1.2 How to read the model name



1.2 SELECTION DATA

1.2.1 Specifications

Satellite ducted type (FDUM)

Model FDUMVA201HEN2R

Item		Model	FDUMVA201HEN2R	
			FDUMA202R	FDCVA201HENR
Nominal cooling capacity ⁽¹⁾		kW	5.0 [2.2~5.6]	
Nominal heating capacity ⁽¹⁾		kW	5.4 [2.5~6.3]	
Power source			1 Phase, 220-240V, 50Hz	
Operation data ⁽³⁾	Cooling power consumption	kW	1.53	
	Running current (Cooling)	A	6.8	
	Power factor (Cooling)	%	98	
	Heating power consumption	kW	1.58	
	Running current (Heating)	A	7.0	
	Power factor (Heating)	%	98	
	Inrush current (L.R.A)	A	5	
Noise level		dB(A)	Hi:34 Me:31 Lo:28	48
Exterior dimensions				
Height × Width × Depth		mm	299 × 750 × 635	595 × 780 (+67) × 290
Net weight		kg	34	40
Refrigerant equipment				
Compressor type & Q'ty			–	5CS102XFD × 1
Starting method			–	Direct line start
Heat exchanger			Louver fin & inner grooved tubing	Straight fin & inner grooved tubing
Refrigerant control			–	Electronic expansion valve
Refrigerant			R410A	
Quantity		kg	–	1.55 [Pre-charged up to the piping length of 30m]
Refrigerant oil		ℓ	–	0.48 (RB68A)
Defrost control			Microcomputer controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Centrifugal fan × 2	Propeller fan × 1
Motor		W	55 × 1	34 × 1
Starting method			Direct line start	Direct line start
Air flow (Standard)		CMM	Hi:14 Me:12 Lo:11	41
Available static pressure		Pa	Standard: 50, Max: 85	–
Outside air intake			–	–
Air filter, Q'ty			–	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
Operation control			Wired remote control switch (Optional : RC-E1R)	– (Indoor unit side)
Operation switch			Wireless kit (Optional : RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
Installation data		mm	Liquid line: φ6.35 (1/4") Gas line: φ12.7 (1/2")	
Refrigerant piping size		(in)		
Connecting method			Flare piping	
Drain hose			Connectable with VP25 (I.D.25mm, O.D.32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Filter kit (UM-FL1E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1
Heating	20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard. ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 230V 50Hz.

(4) Values in [~] show the minimum to maximum range.

Model FDUMVA251HEN2R

Item		Model	FDUMVA251HEN2R	
			FDUMA252R	FDCVA251HENR
Nominal cooling capacity⁽¹⁾		kW	5.6 [2.8~6.3]	
Nominal heating capacity⁽¹⁾		kW	6.4 [3.1~7.1]	
Power source			1 Phase, 220-240V, 50Hz	
Operation data⁽³⁾	Cooling power consumption	kW	1.66	
	Running current (Cooling)	A	7.3	
	Power factor (Cooling)	%	99	
	Heating power consumption	kW	1.82	
	Running current (Heating)	A	8.3	
	Power factor (Heating)	%	95	
	Inrush current (L.R.A)	A	5	
Noise level		dB(A)	Hi:34 Me:31 Lo:28	48
Exterior dimensions				
Height × Width × Depth		mm	299 × 950 × 635	595 × 780 (+67) × 290
Net weight		kg	40	40
Refrigerant equipment				
Compressor type & Q'ty			–	5CS102XFD × 1
Starting method			–	Direct line start
Heat exchanger			Louver fin & inner grooved tubing	Straight fin & inner grooved tubing
Refrigerant control			–	Electronic expansion valve
Refrigerant			R410A	
Quantity		kg	–	1.75 [Pre-charged up to the piping length of 30m]
Refrigerant oil		ℓ	–	0.48 (RB68A)
Defrost control			Microcomputer controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Centrifugal fan × 2	Propeller fan × 1
Motor		W	90 × 1	34 × 1
Starting method			Direct line start	Direct line start
Air flow (Standard)		CMM	Hi:18 Me:16 Lo:14	41
Available static pressure		Pa	Standard: 50, Max: 85	–
Outside air intake			–	–
Air filter, Q'ty			–	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
Operation control			Wired remote control switch (Optional : RC-E1R)	– (Indoor unit side)
Operation switch			Wireless kit (Optional : RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
Installation data		mm	Liquid line: φ6.35 (1/4") Gas line: φ15.88 (5/8")	
Refrigerant piping size		(in)		
Connecting method			Flare piping	
Drain hose			Connectable with VP25 (I.D.25mm, O.D.32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Filter kit (UM-FL2E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1
Heating	20°C	12°C	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard. ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 230V 50Hz.

(4) Values in [~] show the minimum to maximum range.

Model FDUMA302HEN2R

Item		Model	FDUMA302HEN2R	
			FDUMA302R	FDCVA302HENR
Nominal cooling capacity⁽¹⁾		kW	7.1 [3.5~8.0]	
Nominal heating capacity⁽¹⁾		kW	8.0 [4.0~9.0]	
Power source			1 Phase, 220-240V, 50Hz/220V 60Hz	
Operation data⁽³⁾	Cooling power consumption	kW	2.08/2.08	
	Running current (Cooling)	A	9.2/9.2	
	Power factor (Cooling)	%	98/98	
	Heating power consumption	kW	2.21/2.21	
	Running current (Heating)	A	10.2/10.2	
	Power factor (Heating)	%	94/94	
	Inrush current (L.R.A)	A	5	
	Noise level	dB(A)	Hi:35 Me:32 Lo:29	48
Exterior dimensions		mm	299 × 950 × 635	
Height × Width × Depth			750 × 880 (+88) × 340	
Net weight		kg	40	
Refrigerant equipment			–	
Compressor type & Q'ty			2YC45DXD × 1	
Starting method			Direct line start	
Heat exchanger			Louver fine & inner grooved tubing	Straight fin & inner grooved tubing
Refrigerant control			–	Electronic expansion valve
Refrigerant			R410A	
Quantity		kg	–	2.95 [Pre-charged up to the piping length of 30m]
Refrigerant oil		ℓ	–	0.65 (FVC50K)
Defrost control			Microcomputer controlled de-icer	
Air handling equipment			Centrifugal fan × 2	Propeller fan × 1
Fan type & Q'ty				
Motor		W	100 × 1	120 × 1
Starting method			Direct line start	Direct line start
Air flow (Standard)		CMM	Hi:20 Me:18 Lo:15	Cooling type:60, Heating type:48.5
Available static pressure		Pa	Standard: 50, Max: 85	–
Outside air intake			–	–
Air filter, Q'ty			–	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
Operation control			Wired remote control switch (Optional: RC-E1R)	– (Indoor unit side)
Operation switch			Wireless kit (Optional: RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
Installation data		mm	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
Refrigerant piping size		(in)		
Connecting method			Flare piping	
Drain hose			Connectable with VP25 (I.D.25mm, O.D.32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Filter kit (UM-FL2E)	

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

Operation	Item	Indoor air temperature		Outdoor air temperature		Standards
		DB	WB	DB	WB	
Cooling		27°C	19°C	35°C	24°C	ISO-T1
Heating		20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 230V 50Hz or 220V 60Hz.

(4) Values in [~] show the minimum to maximum range.

Model FDUMVA402HEN2R

Item		Model	FDUMVA402HEN2R	
			FDUMA402R	FDCVA402HENR
Nominal cooling capacity⁽¹⁾		kW	10.0 [6.1~11.2]	
Nominal heating capacity⁽¹⁾		kW	11.2 [6.0~12.5]	
Power source			1 Phase, 220-240V 50Hz/220V 60Hz	
Operation data⁽³⁾	Cooling power consumption	kW	2.80/2.80	
	Running current (Cooling)	A	12.5/12.5	
	Power factor (Cooling)	%	97/97	
	Heating power consumption	kW	2.77/2.80	
	Running current (Heating)	A	12.6/13.0	
	Power factor (Heating)	%	96/98	
	Inrush current (L.R.A)	A	5	
Noise level		dB(A)	Hi:37 Me:35 Lo:32	50
Exterior dimensions				
Height × Width × Depth		mm	350 × 1370 × 635	845 × 970 × 370
Net weight		kg	59	63
Refrigerant equipment				
Compressor type & Q'ty			–	RM-B5125MD11× 1
Starting method			–	Direct line start
Heat exchanger			Louver fin & inner grooved tubing	Straight fin & inner grooved tubing
Refrigerant control			–	Electronic expansion valve
Refrigerant			R410A	
Quantity		kg	–	3.8 [Pre-charged up to the piping length of 30m]
Refrigerant oil		ℓ	–	0.7 (M-MA68)
Defrost control			Microcomputer controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Centrifugal fan × 3	Propeller fan × 1
Motor		W	45 × 1, 90 × 1	120 × 1
Starting method			Direct line start	Direct line start
Air flow (Standard)		CMM	Hi: 28 Me: 25 Lo: 22	Cooling type: 75, Heating type: 73
Available static pressure		Pa	Standard: 60, Max 90	–
Outside air intake			–	–
Air filter, Q'ty			–	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
Operation control			Wired remote control switch (Optional: RC-E1R)	– (Indoor unit side)
Operation switch			Wireless kit (Optional: RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
Installation data				
Refrigerant piping size		mm (in)	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
Connecting method			Flare piping	
Drain hose			Connectable with VP25 (I.D.25mm, O.D.32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Filter kit (UM-FL3E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1
Heating	20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 230V 50Hz or 220V 60Hz.

(4) Values in [~] show the minimum to maximum range.

Model FDUMVA502HEN2R

Item		Model	FDUMVA502HEN2R	
			FDUMA502R	FDCVA502HENR
Nominal cooling capacity⁽¹⁾		kW	12.5 [6.7~14.0]	
Nominal heating capacity⁽¹⁾		kW	14.0 [6.2~16.0]	
Power source			1 Phase, 220-240V 50Hz/220V 60Hz	
Operation data⁽³⁾	Cooling power consumption	kW	4.03/4.03	
	Running current (Cooling)	A	18.3/18.3	
	Power factor (Cooling)	%	96/96	
	Heating power consumption	kW	3.80/3.85	
	Running current (Heating)	A	17.0/18.1	
	Power factor (Heating)	%	97/97	
	Inrush current (L.R.A)	A	5	
Noise level		dB(A)	Hi:38 Me:36 Lo:33	52
Exterior dimensions				
Height × Width × Depth		mm	350 × 1370 × 635	845 × 970 × 370
Net weight		kg	59	63
Refrigerant equipment				
Compressor type & Q'ty			–	RM-B5125MD11
Starting method			–	Direct line start
Heat exchanger			Louver fin & inner grooved tubing	Straight fin & inner grooved tubing
Refrigerant control			–	Electronic expansion valve
Refrigerant			R410A	
Quantity		kg	–	3.8 [Pre-charged up to the piping length of 30m]
Refrigerant oil		ℓ	–	0.7 (M-MA68)
Defrost control			Microcomputer controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Centrifugal fan × 3	Propeller fan × 1
Motor		W	50 × 1, 100 × 1	120 × 1
Starting method			Direct line start	Direct line start
Air flow (Standard)		CMM	Hi: 34 Me: 31 Lo: 27	Cooling: 75, Heating: 73
Available static pressure		Pa	Standard: 60, Max 85	–
Outside air intake			–	–
Air filter, Q'ty			–	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
Operation control			Wired remote control switch (Optional: RC-E1R)	– (Indoor unit side)
Operation switch			Wireless kit (Optional: RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor. Abnormal discharge temperature protection.
Installation data				
Refrigerant piping size		mm (in)	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
Connecting method			Flare piping	
Drain hose			Connectable with VP25 (I.D.25mm, O.D.32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit. Drain hose	
Optional parts			Filter kit (UM-FL3E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1
Heating	20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 230V 50Hz or 220V 60Hz.

(4) Values in [~] show the minimum to maximum range.

Model FDUMVA602HEN2R

Item		Model	FDUMVA602HEN2R	
			FDUMA602R	FDCVA602HENR
Nominal cooling capacity⁽¹⁾		kW	14.0 [6.7~14.5]	
Nominal heating capacity⁽¹⁾		kW	16.0 [6.3~16.5]	
Power source			1 Phase, 220-240V 50Hz/220V 60Hz	
Operation data⁽³⁾	Cooling power consumption	kW	4.95/4.95	
	Running current (Cooling)	A	22.3/22.3	
	Power factor (Cooling)	%	97/97	
	Heating power consumption	kW	4.75/4.91	
	Running current (Heating)	A	21.7/22.5	
	Power factor (Heating)	%	95/99	
	Inrush current (L.R.A)	A	5	
Noise level		dB(A)	Hi:38 Me:36 Lo:33	53
Exterior dimensions				
Height × Width × Depth		mm	350 × 1370 × 635	845 × 970 × 370
Net weight		kg	59	63
Refrigerant equipment				
Compressor type & Q'ty			–	RM-B5125MD11
Starting method			–	Direct line start
Heat exchanger			Louver fin & inner grooved tubing	Straight fin & inner grooved tubing
Refrigerant control			–	Electronic expansion valve
Refrigerant			R410A	
Quantity		kg	–	3.8 [Pre-charged up to the piping length of 30m]
Refrigerant oil		ℓ	–	0.7 (M-MA68)
Defrost control			Microcomputer controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Centrifugal fan × 3	Propeller fan × 1
Motor		W	50 × 1, 100 × 1	120 × 1
Starting method			Direct line start	Direct line start
Air flow (Standard)		CMM	Hi: 34 Me: 31 Lo: 27	Cooling: 75, Heating: 73
Available static pressure		Pa	Standard: 60, Max 85	–
Outside air intake			–	–
Air filter, Q'ty			–	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
Operation control			Wired remote control switch (Optional: RC-E1R)	– (Indoor unit side)
Operation switch			Wireless kit (Optional: RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor.	Internal thermostat for fan motor.
			Frost protection thermostat.	Abnormal discharge temperature protection.
Installation data				
Refrigerant piping size		mm	Liquid line: φ9.52 (3/8") Gas line: φ15.88 (5/8")	
Connecting method		(in)	Flare piping	
Drain hose			Connectable with VP25 (I.D.25mm, O.D.32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Filter kit (UM-FL3E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27°C	19°C	35°C	24°C	ISO-T1
Heating	20°C	–	7°C	6°C	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.

ISO-T1 "UNITARY AIR-CONDITIONERS"

(3) The operation data indicate when the air-conditioner is operated at 230V 50Hz or 220V 60Hz.

(4) Values in [~] show the minimum to maximum range.

1.2.2 Range of usage & limitations

Models		201, 251	302~602
Item			
Limitations Return air temp.	Cooling	Refer to the selection chart (see page 25)	Indoor unit: 18 ~ 32°C.D.B Outdoor unit: -15 ~ 43°C.D.B
	Heating		Indoor unit: 10 ~ 30°C.D.B Outdoor unit: -10 ~ 24°C.D.B
Indoor unit atmosphere (behind ceiling) temperature and humidity		Dew point temperature: 28°C or less, relative humidity: 80% or less	
Refrigerant line (one way) length		Max. 40m	Max. 50m
Vertical height difference between outdoor unit and indoor unit		Max. 30m (Outdoor unit is higher) Max. 15m (Outdoor unit is lower)	
Power source voltage		Rating ± 10%	
Voltage at starting		Min. 85% of rating	
Compressor stop/start Frequency	Cycle Time	7 minutes or more (4 minutes or more from start to stop) or (3 minutes or more from stop to start)	
	Stop Time	3 minutes or more	

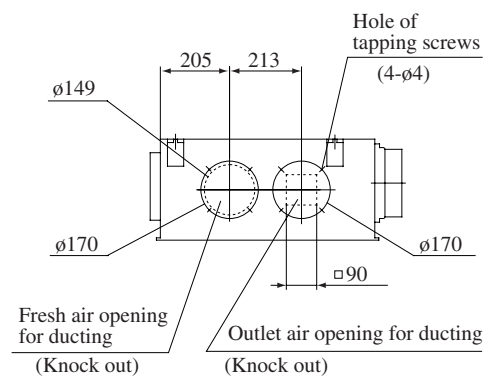
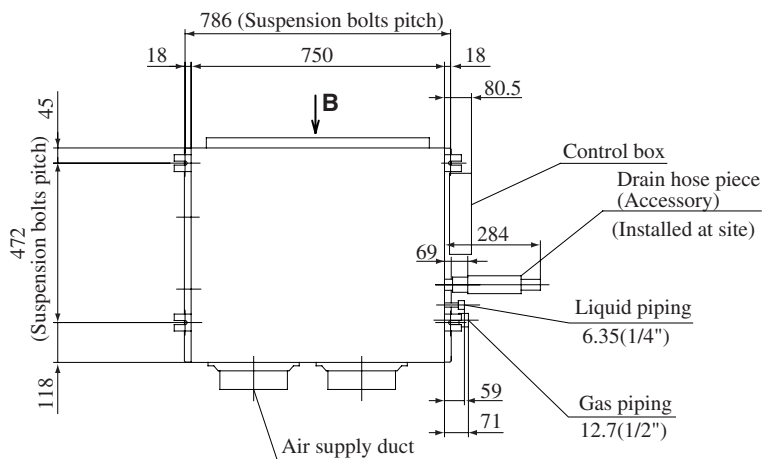
1.2.3 Exterior dimensions

(1) Indoor unit

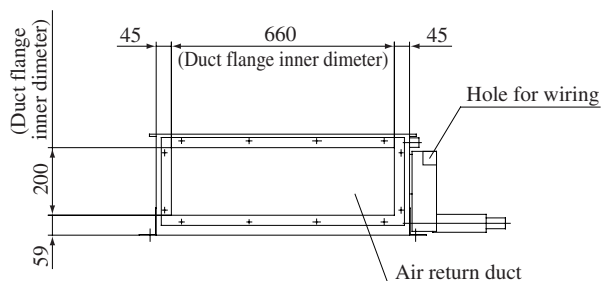
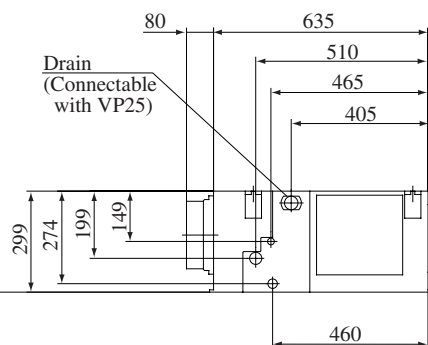
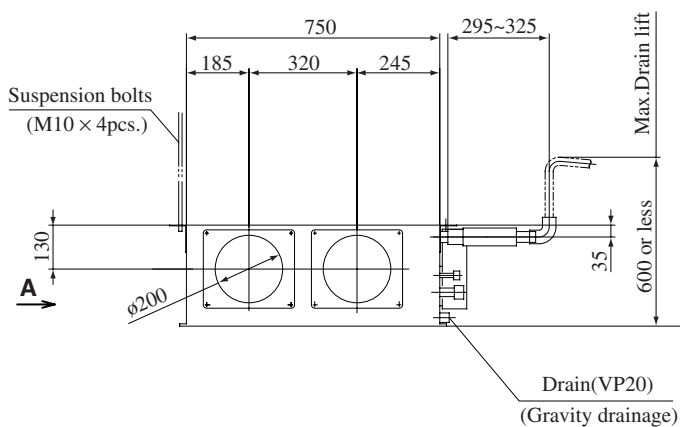
Satellite ducted type (FDUM)

Model FDUMA202R

Unit : mm

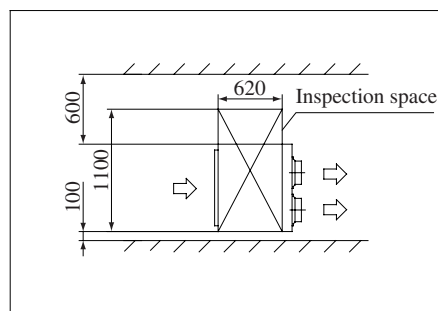


VIEW A



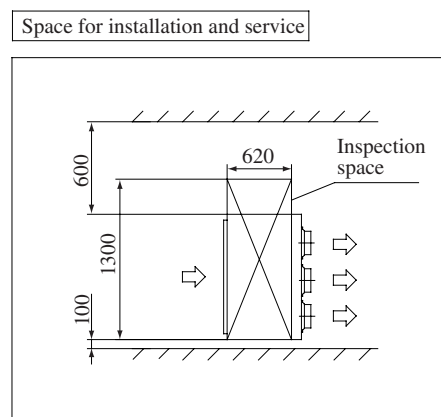
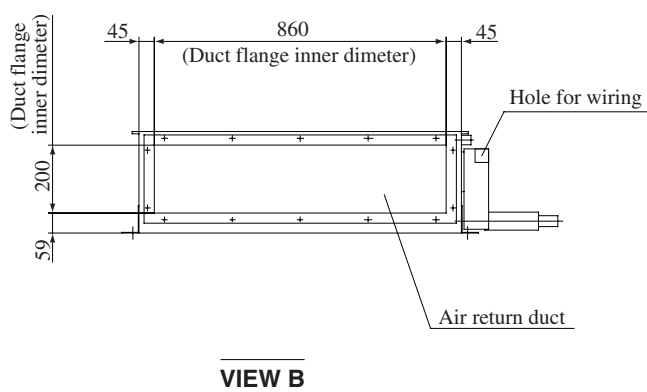
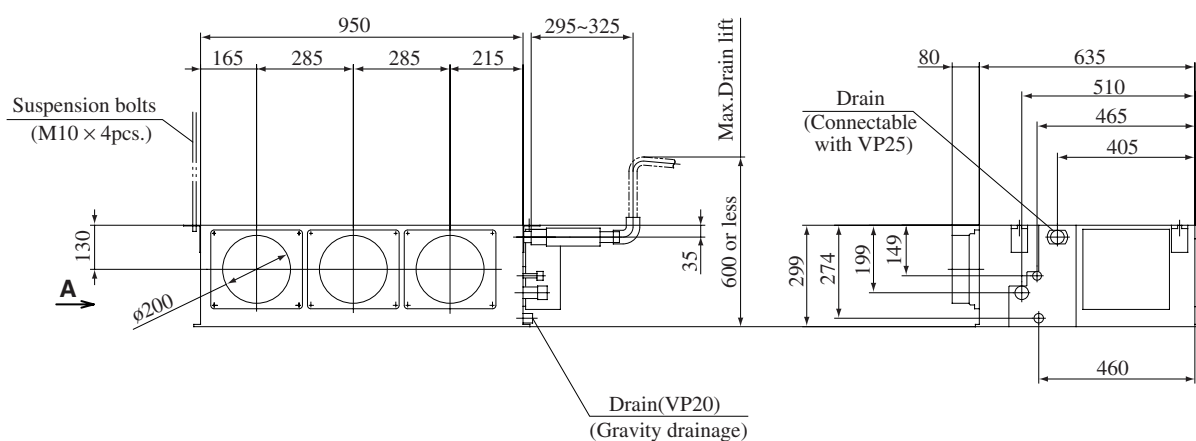
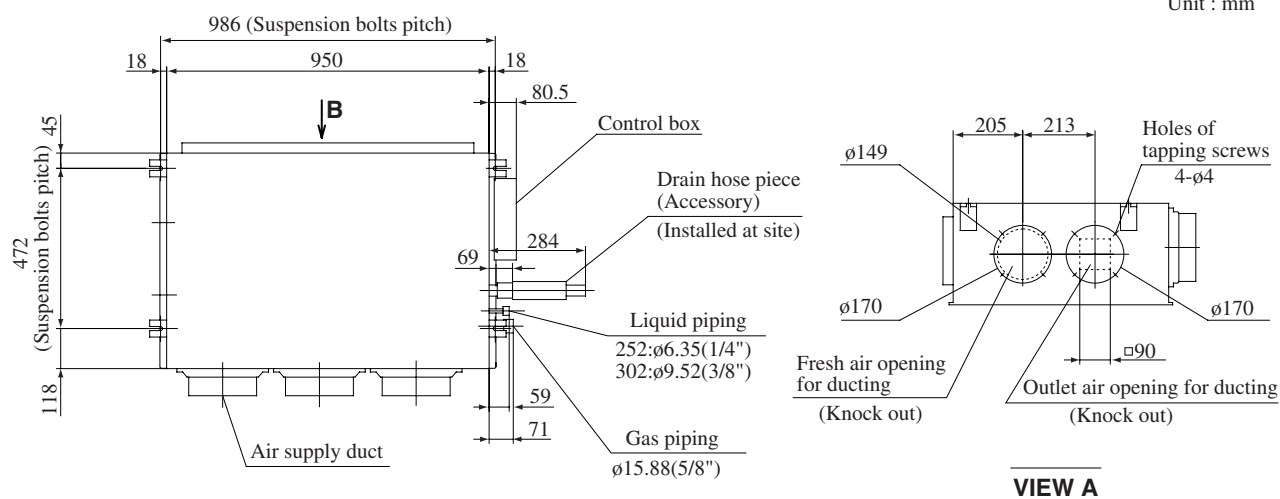
VIEW B

Space for installation and service



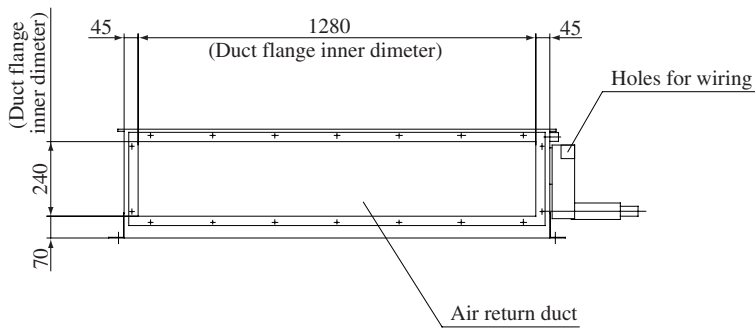
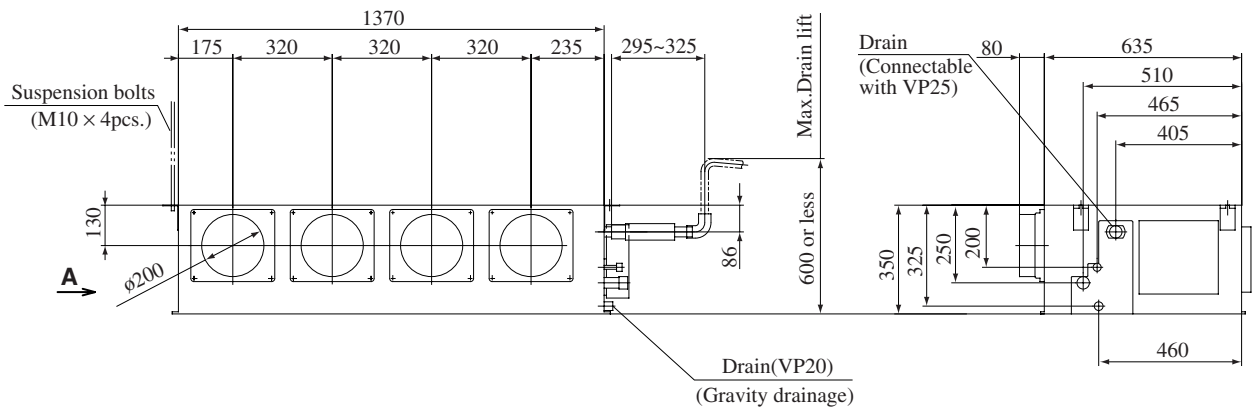
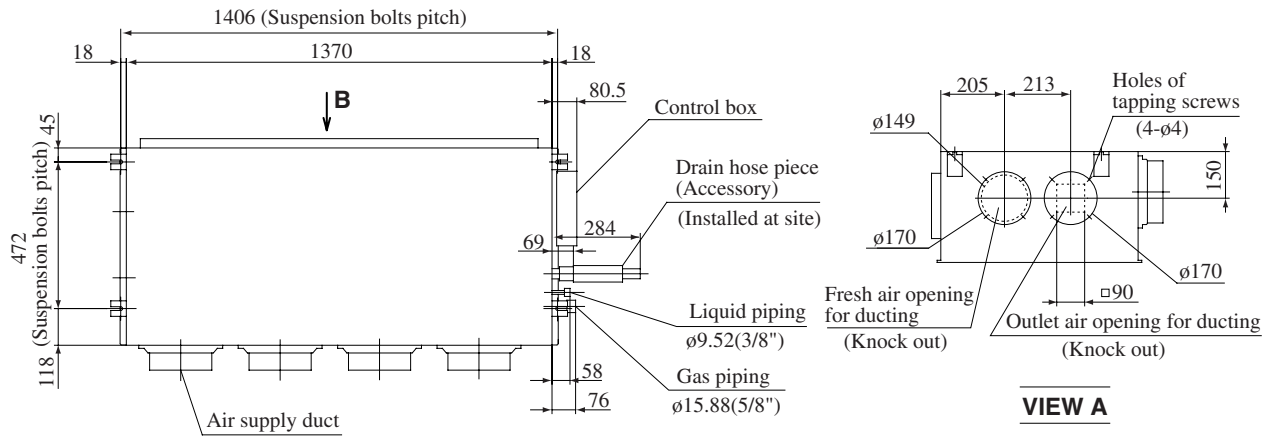
Models FDUMA252R, 302R

Unit : mm

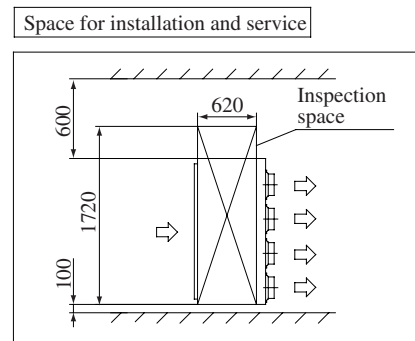


Models FDUMA402R, 502R, 602R

unit : mm



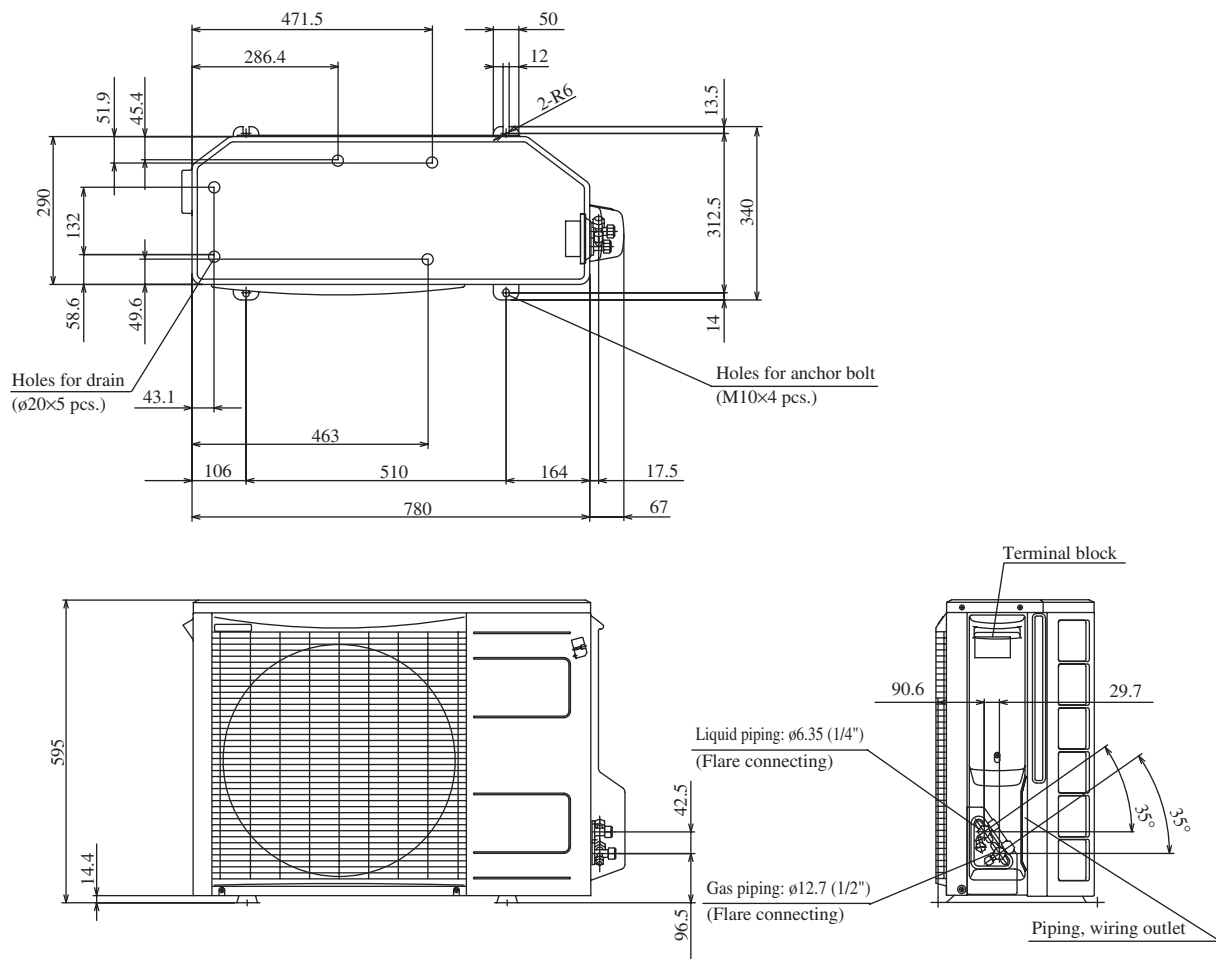
VIEW B



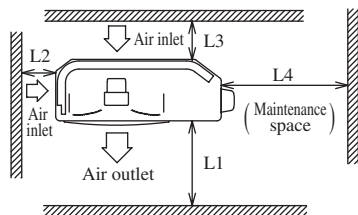
(3) Outdoor unit

Model FDCVA201HENR

Unit: mm



Required space for maintenance and air flow



Minimum allowable space to the obstacles

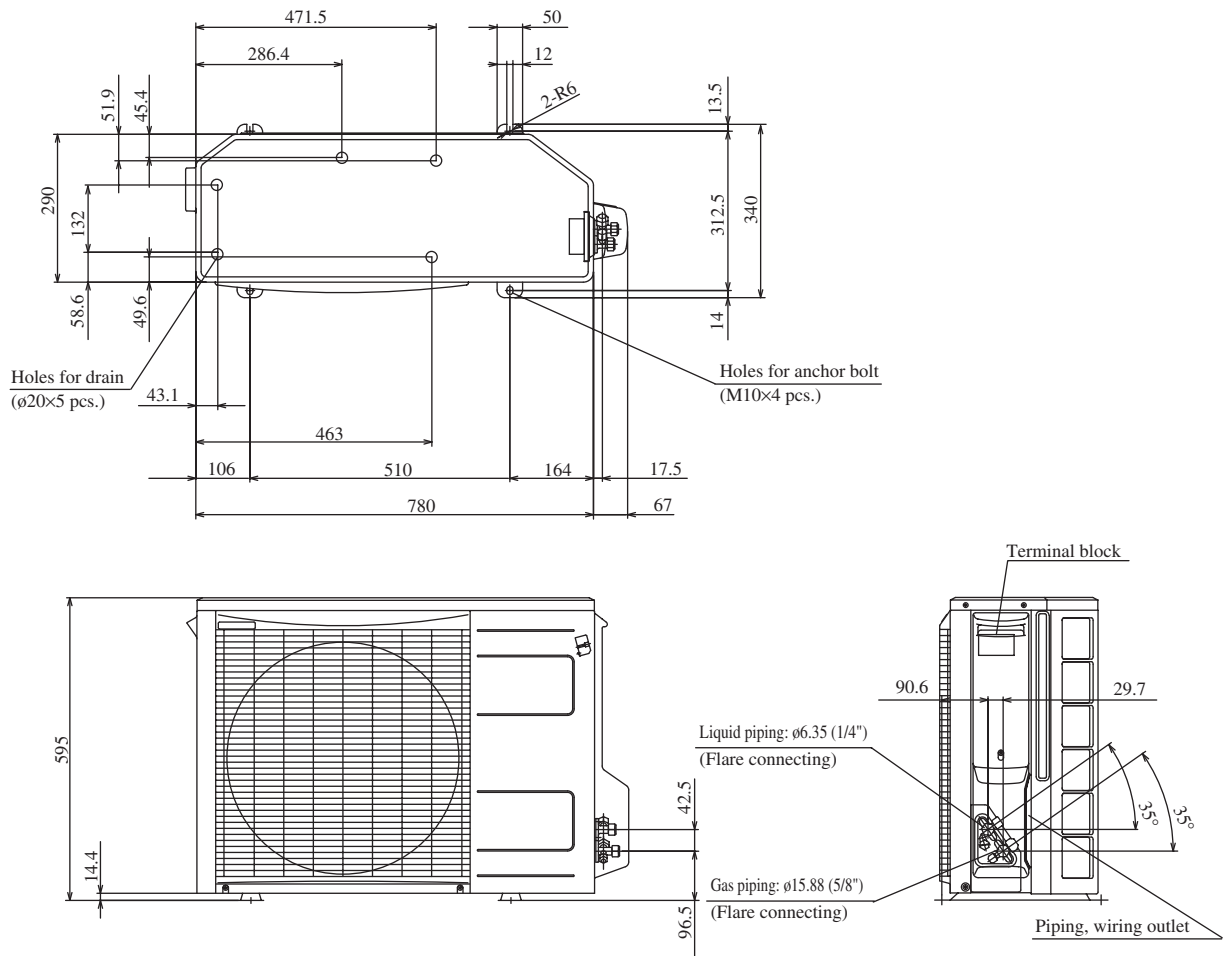
Unit:mm			
Installation type	I	II	III
Mark			
L1	Open	280	280
L2	100	75	Open
L3	100	80	80
L4	250	Open	250

Notes

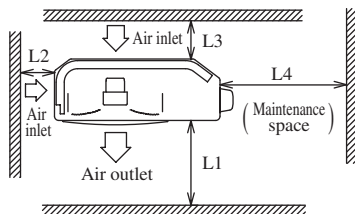
- (1) It is prohibited to install in a space enclosed with walls at four sides.
- (2) Unit must be secured with anchor bolts. Anchor bolt should not protrude more than 15 mm above the surface.
- (3) Where strong winds blow, the blow outlet must be oriented at right angle against the wind direction.
- (4) Secure a space of 1 m or more above the unit.
- (5) Barrier standing in front of the blow outlet must be lower than the height of unit.

Model FDCVA251HENR

Unit: mm



Required space for maintenance and air flow



Minimum allowable space to the obstacles

Unit:mm

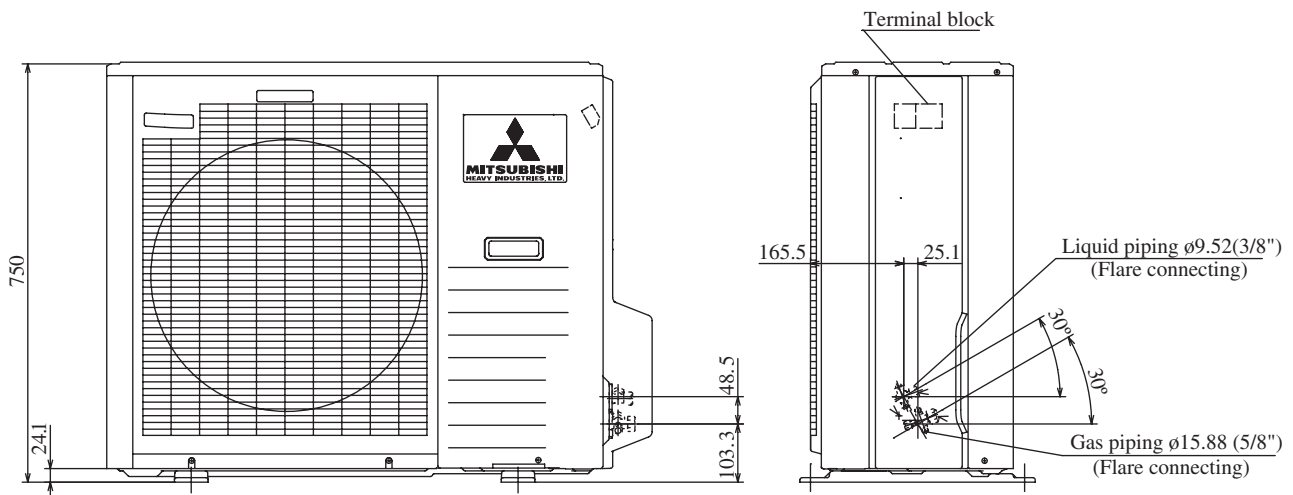
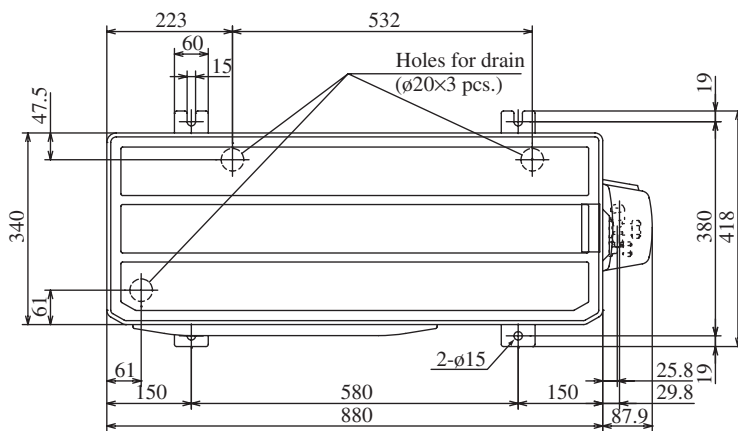
Mark	Installation type		
	I	II	III
L1	Open	280	280
L2	100	75	Open
L3	100	80	80
L4	250	Open	250

Notes

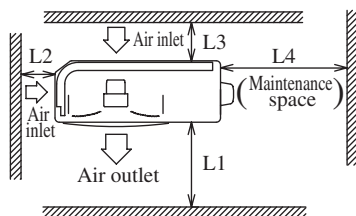
- (1) It is prohibited to install in a space enclosed with walls at four sides.
- (2) Unit must be secured with anchor bolts. Anchor bolt should not protrude more than 15 mm above the surface.
- (3) Where strong winds blow, the blow outlet must be oriented at right angle against the wind direction.
- (4) Secure a space of 1 m or more above the unit.
- (5) Barrier standing in front of the blow outlet must be lower than the height of unit.

Model FDCVA302HENR

Unit: mm



Required space for maintenance and air flow



Minimum allowable space to the obstacles

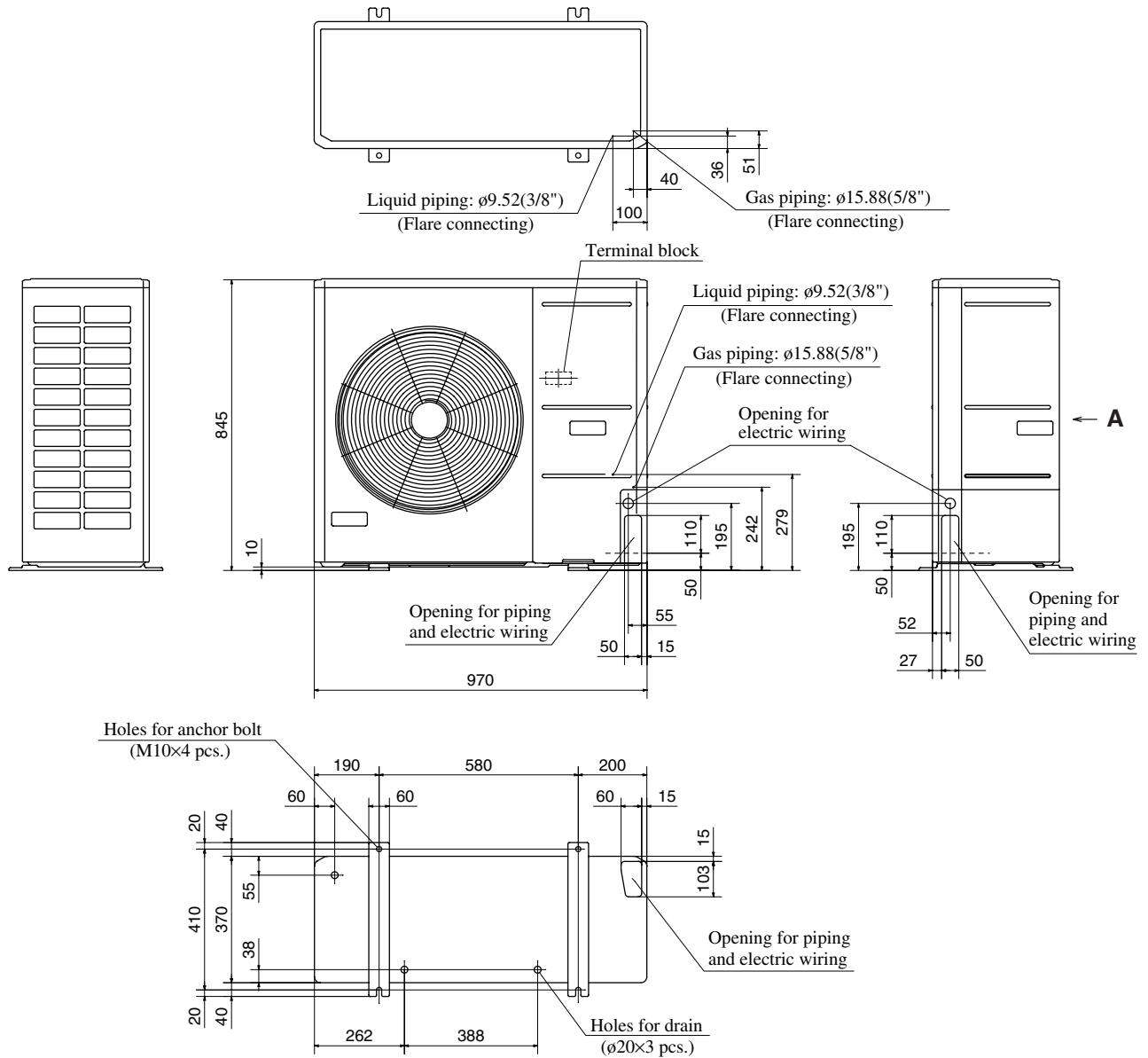
			Unit:mm	
Mark	Installation type	1	2	3
	L1	Open	Open	500
	L2	300	250	Open
	L3	100	150	100
	L4	250	250	250

Notes

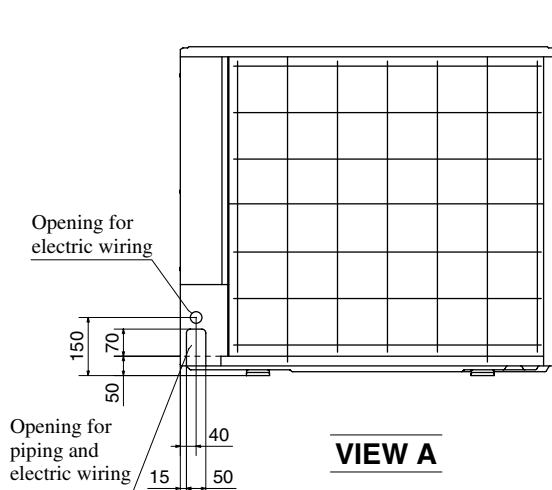
- (1) It is prohibited to install in a space enclosed with walls at four sides.
- (2) Unit must be secured with anchor bolts. Anchor bolt should not protrude more than 15 mm above the surface.
- (3) Where strong winds blow, the blow outlet must be oriented at right angle against the wind direction.
- (4) Secure a space of 1 m or more above the unit.
- (5) Barrier standing in front of the blow outlet must be lower than the height of unit.

Models FDCVA402HENR, 502HENR, 602HENR

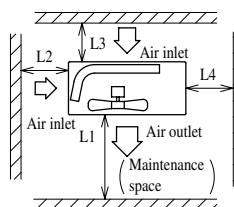
Unit: mm



Minimum allowable space to the obstacles



VIEW A



Unit : mm

Installation type	I	II	III
Mark			
L1	Open	Open	500
L2	300	5	Open
L3	150	300	150
L4	5	5	5

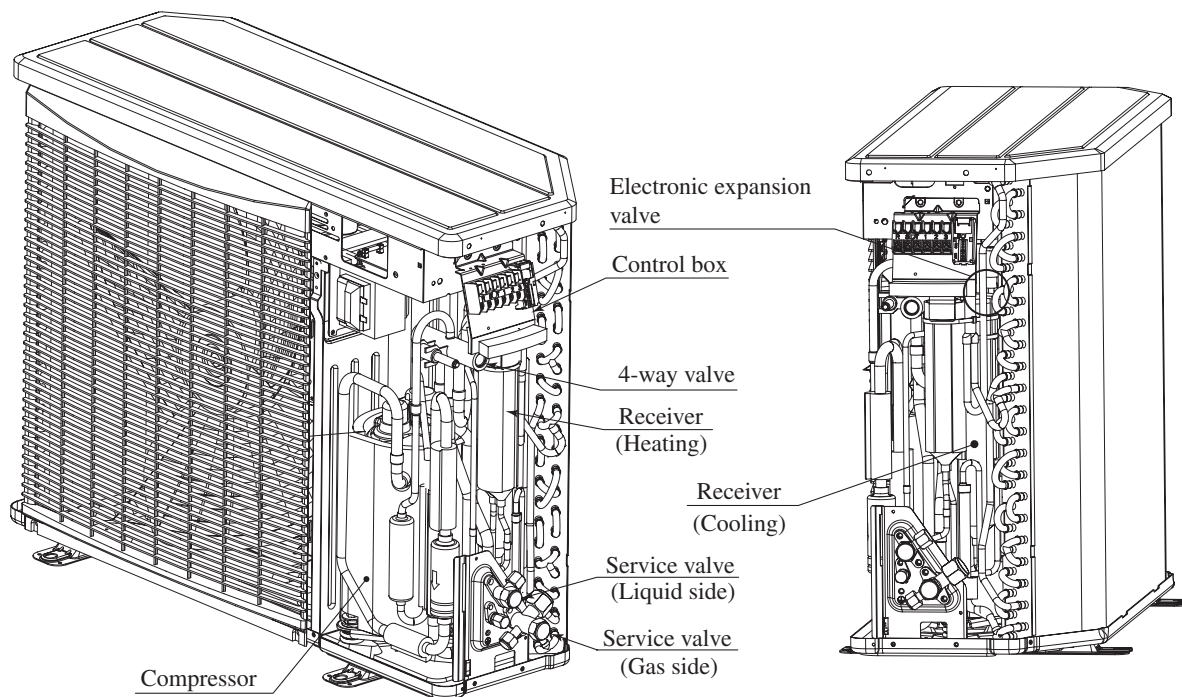
Notes

- (1) It is prohibited to install in a space enclosed with walls at four sides.
- (2) Unit must be secured with anchor bolts.
Anchor bolt should not protrude more than 15 mm above the surface.
- (3) Where strong winds blow, the blow outlet must be oriented at right angle against the wind direction.
- (4) Secure a space of 1 m or more above the unit.
- (5) Barrier standing in front of the blow outlet must be lower than the height of unit.

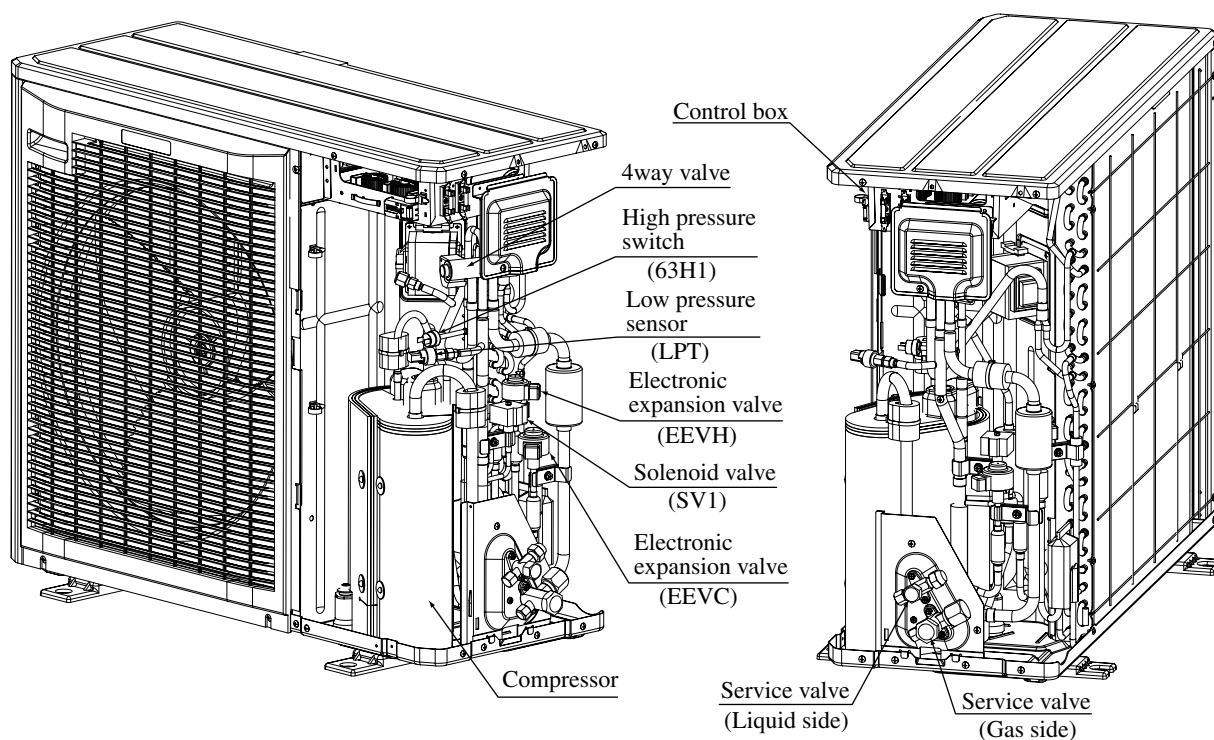
1.2.4 Inside view

(1) Outdoor unit

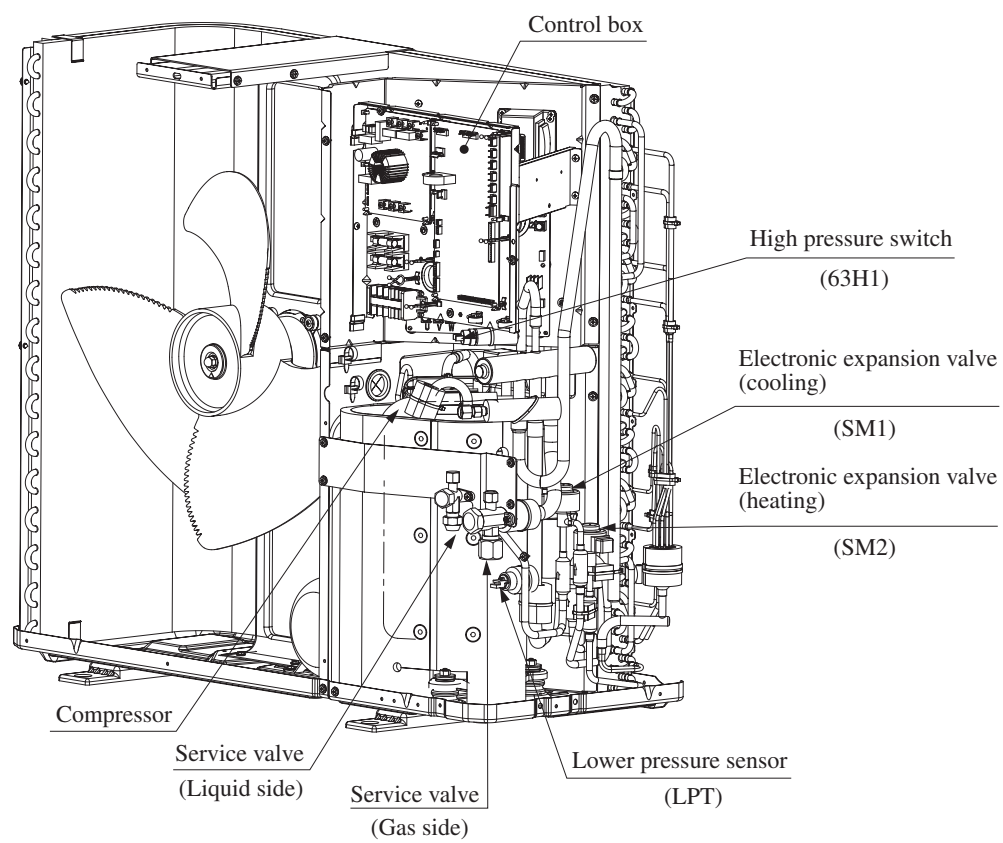
Models FDCVA201HENR, 251HENR



Model FDCVA302HENR



Models FDCVA402HENR, 502HENR, 602HENR



1.2.5 Exterior appearance

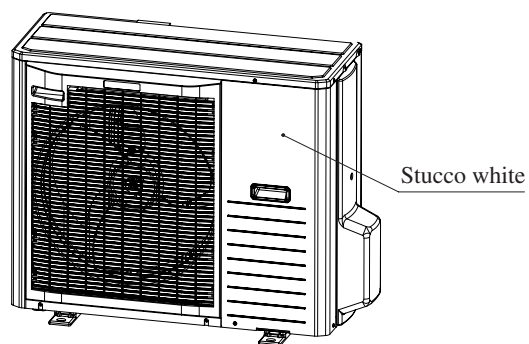
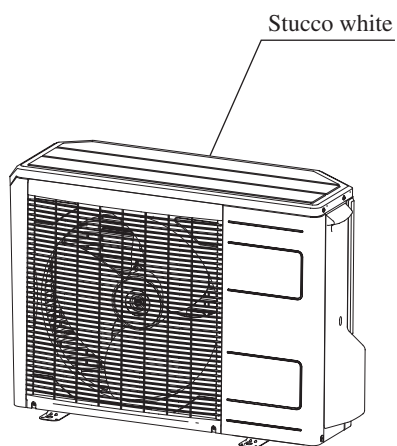
(1) Indoor unit

Satellite ducted type (FDUM) Zinc steel plate

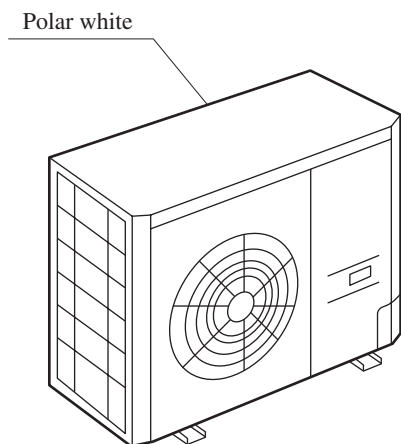
(2) Outdoor unit

Models FDCVA201, 251HENR

Model FDCVA302HENR

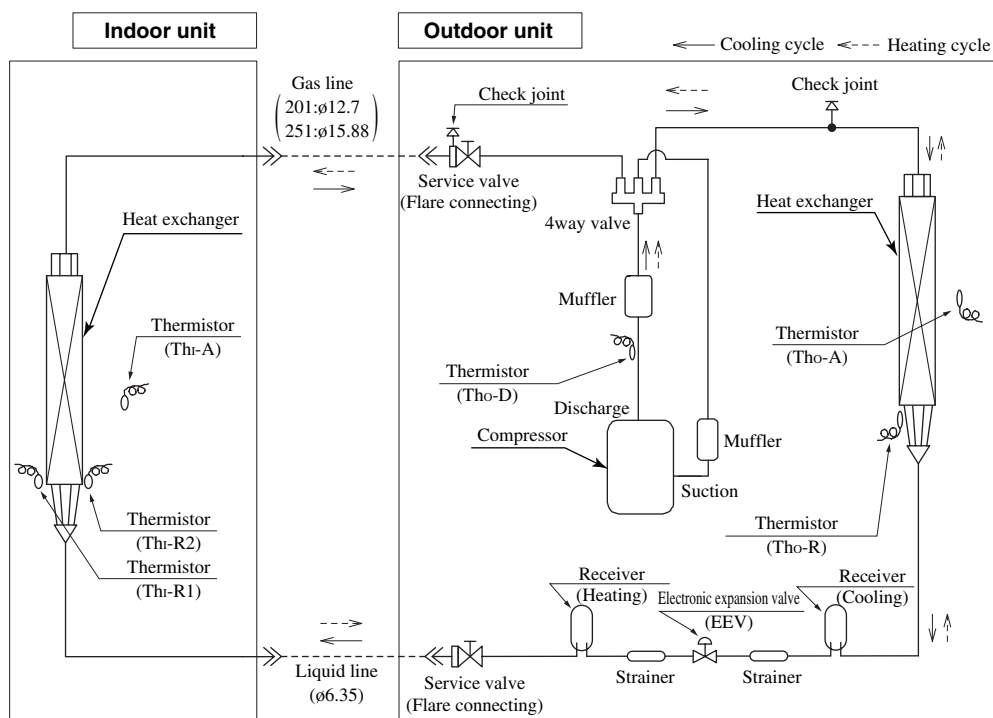


Models FDCVA402, 502, 602HENR

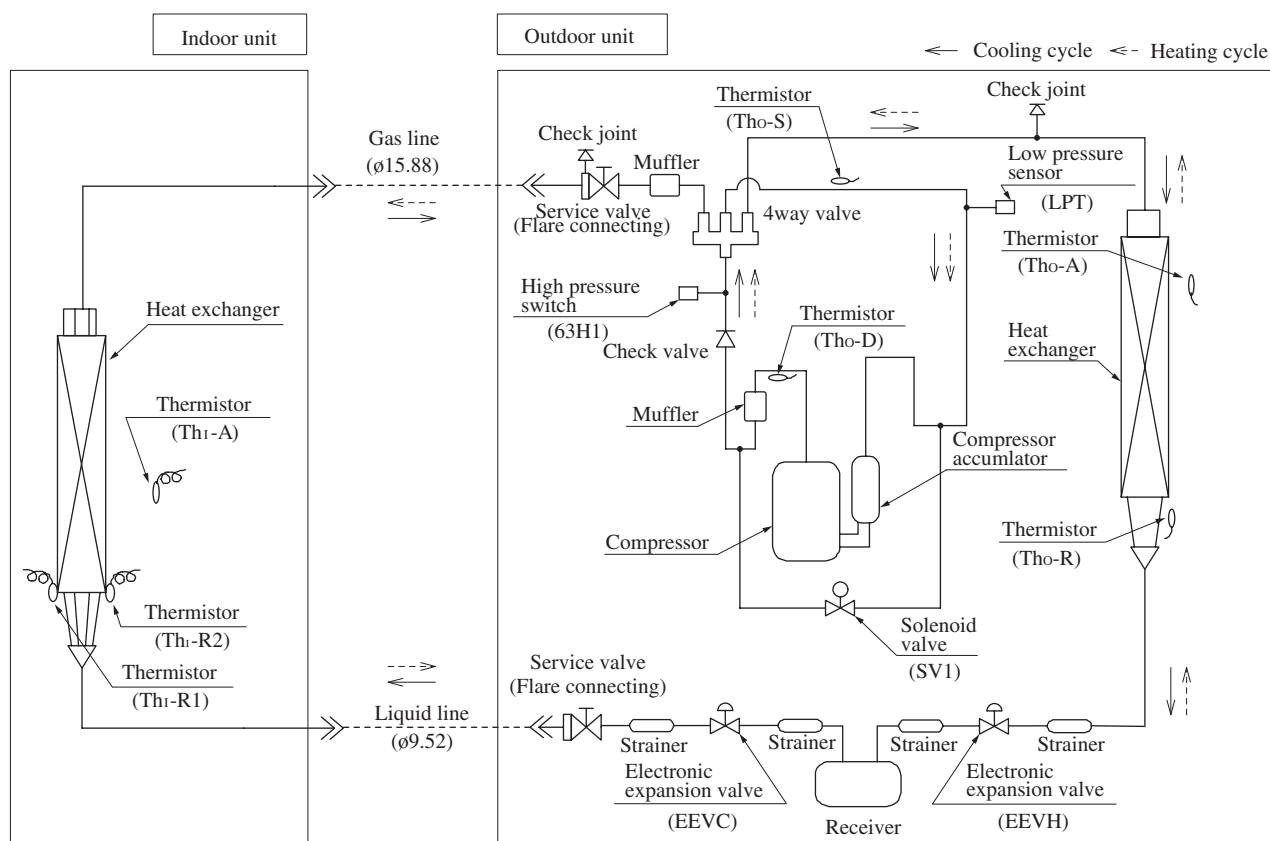


1.2.6 Piping system

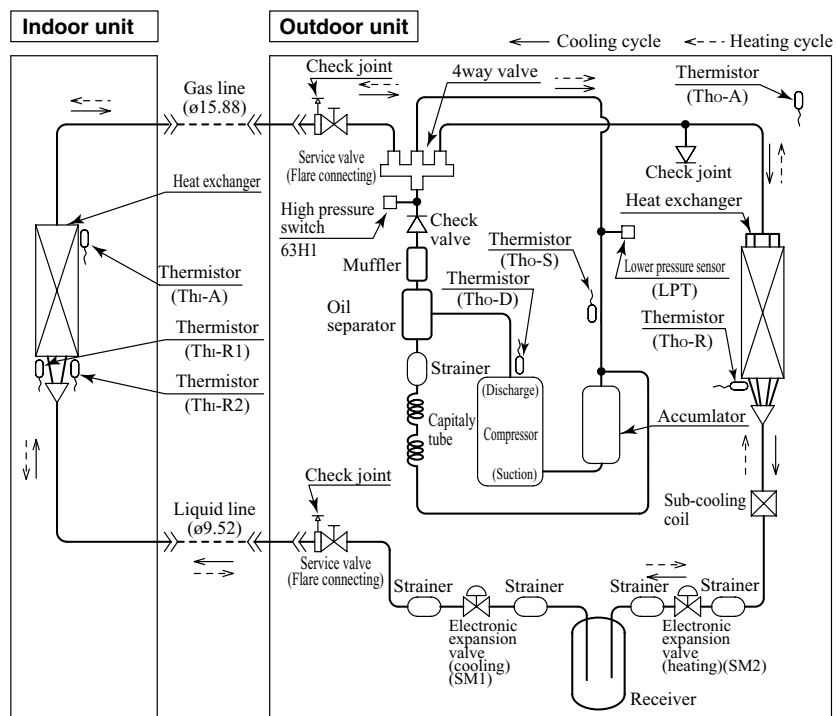
Models 201, 251



Model 302



Models 402, 502, 602



Preset point of the protective devices

Parts name	Mark	Equipped unit	201, 251 model	302, 402, 502, 602 model
Thermistor (for protection over-loading in heating)	Thi-R	Indoor unit	OFF 63 ON 56	
Thermistor (for frost prevention)			OFF 1.0 ON 10	
Thermistor (for detecting discharge pipe temp.)	Tho-D	Outdoor unit	OFF 115 ON 85	OFF 115 ON 85
High pressure switch (for protection)	63H1	Outdoor unit	—	OFF 4.15MPa ON 3.15MPa
Low pressure sensor (for protection)	LPT	Outdoor unit	—	OFF 0.227MPa ON 0.079MPa

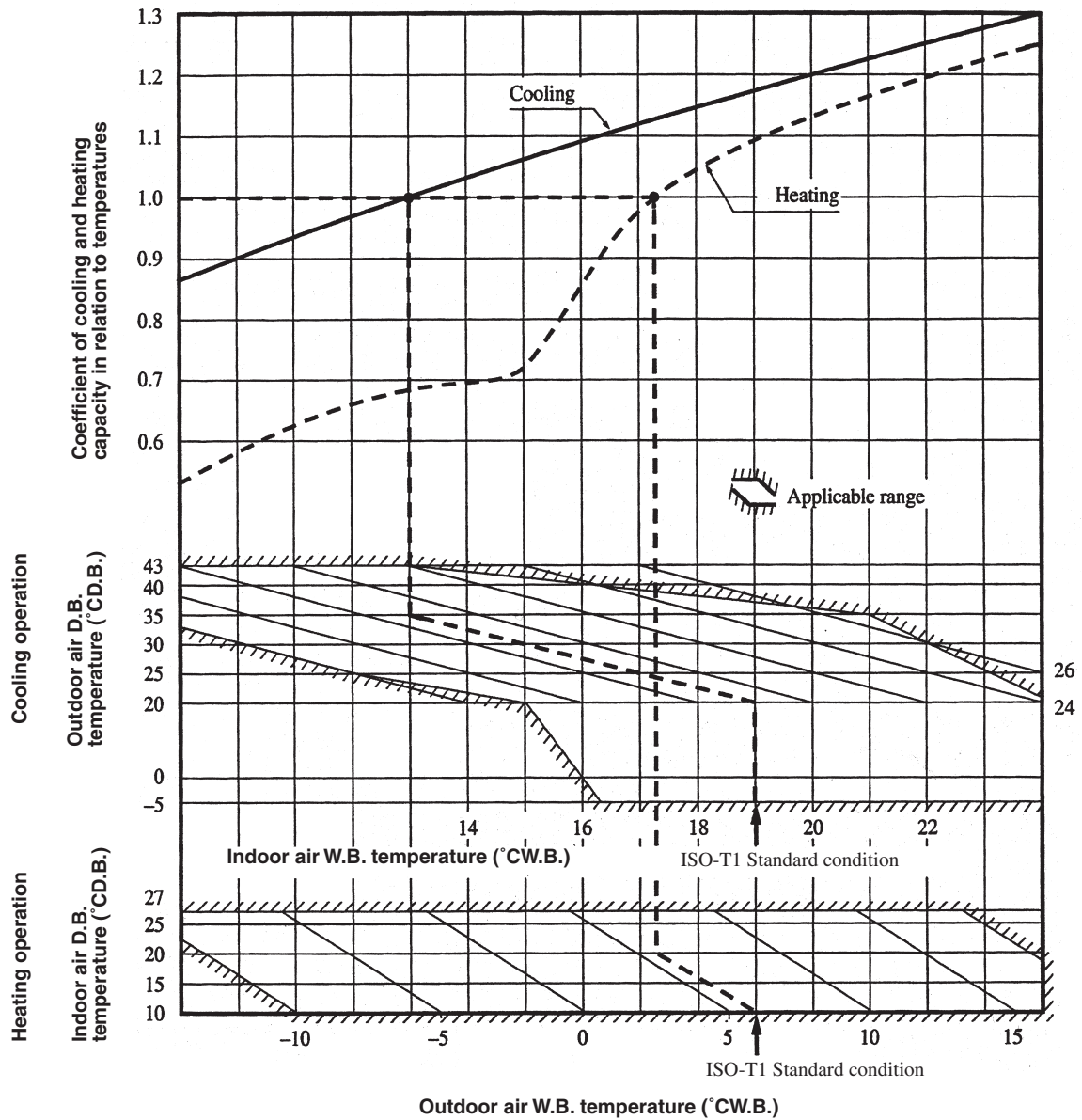
1.2.7 Selection chart

Correct the cooling and heating capacity in accordance with the conditions as follows. The net cooling and heating capacity can be obtained in the following way.

Net capacity = Capacity shown on specification × Correction factors as follows.

(1) Models 201, 251

(a) Coefficient of cooling and heating capacity in relation to temperatures

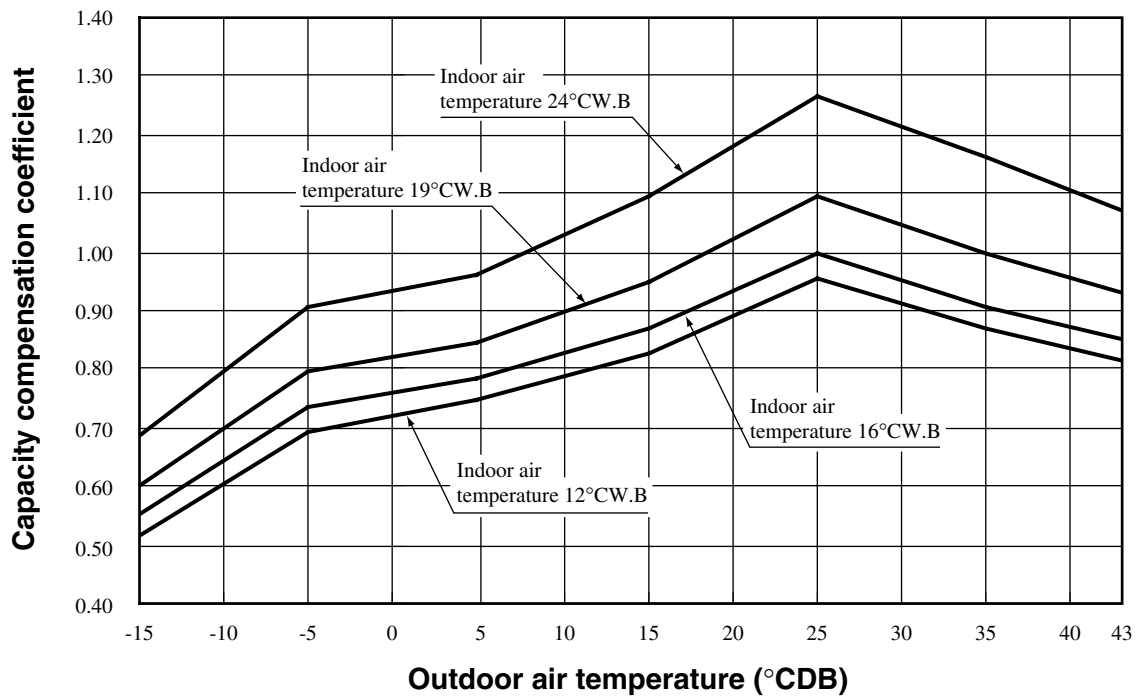


(2) Models 302 ~ 1002

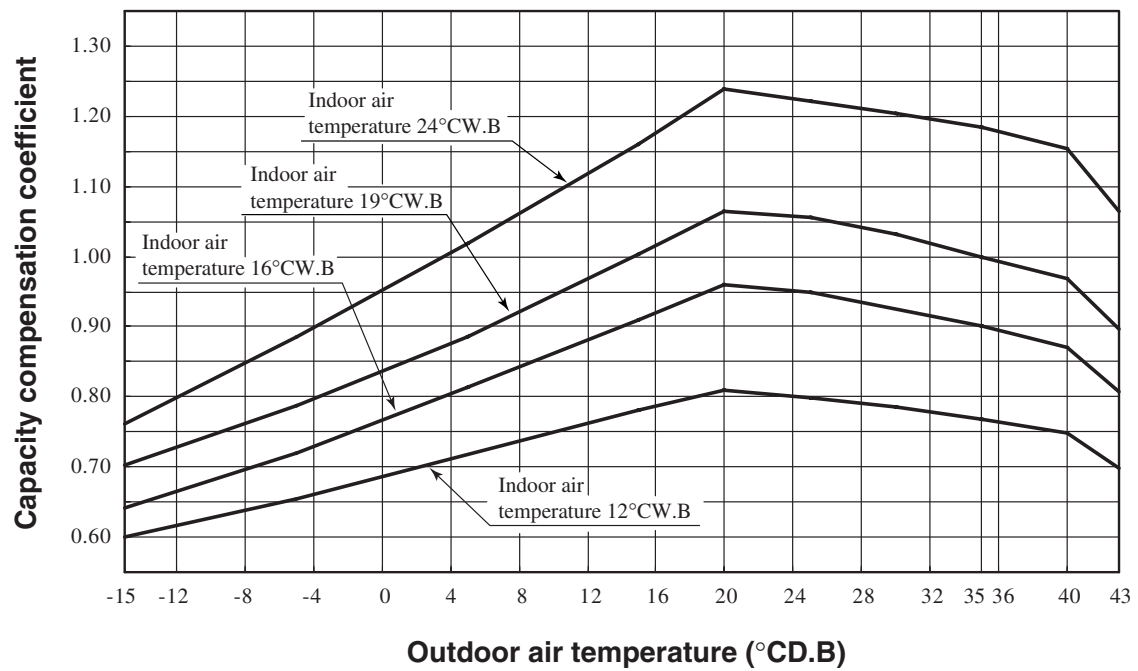
(a) Capacity compensation coefficient

1) Cooling

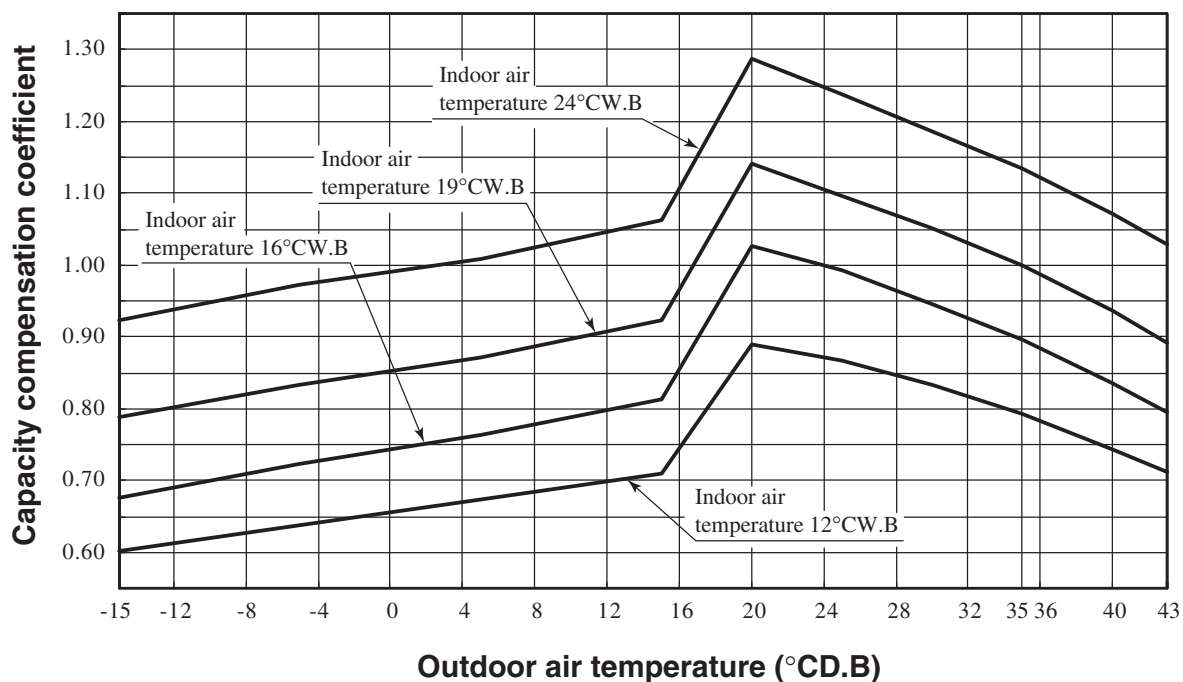
a) Model 302



b) Models 402 ~ 602



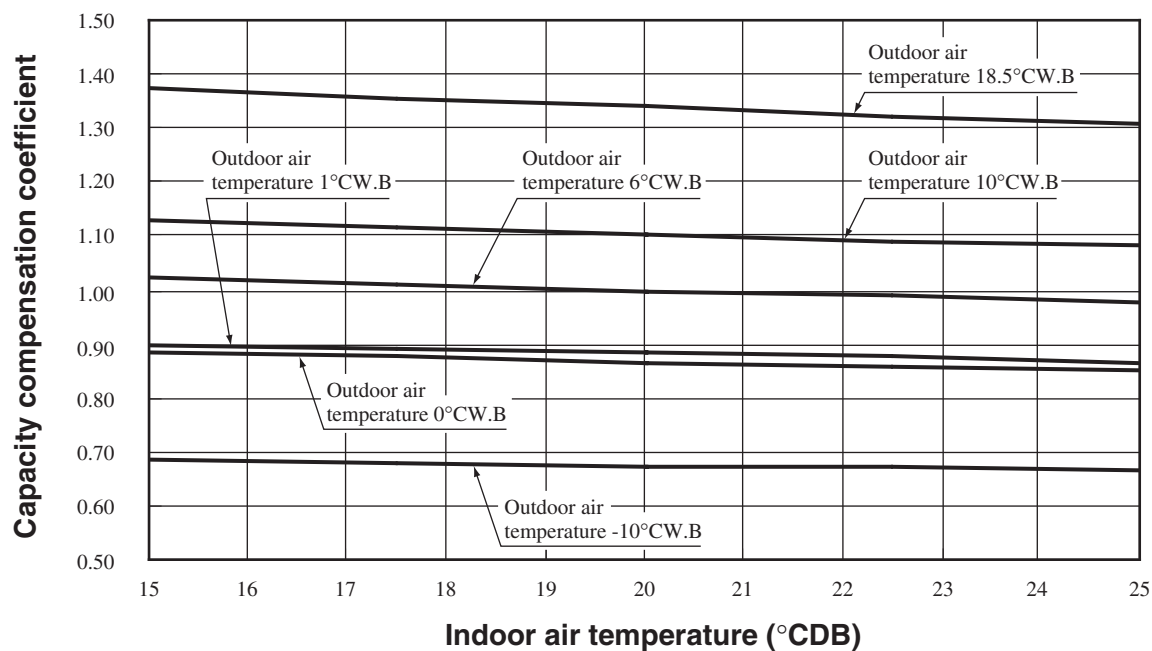
c) Models 802, 1002



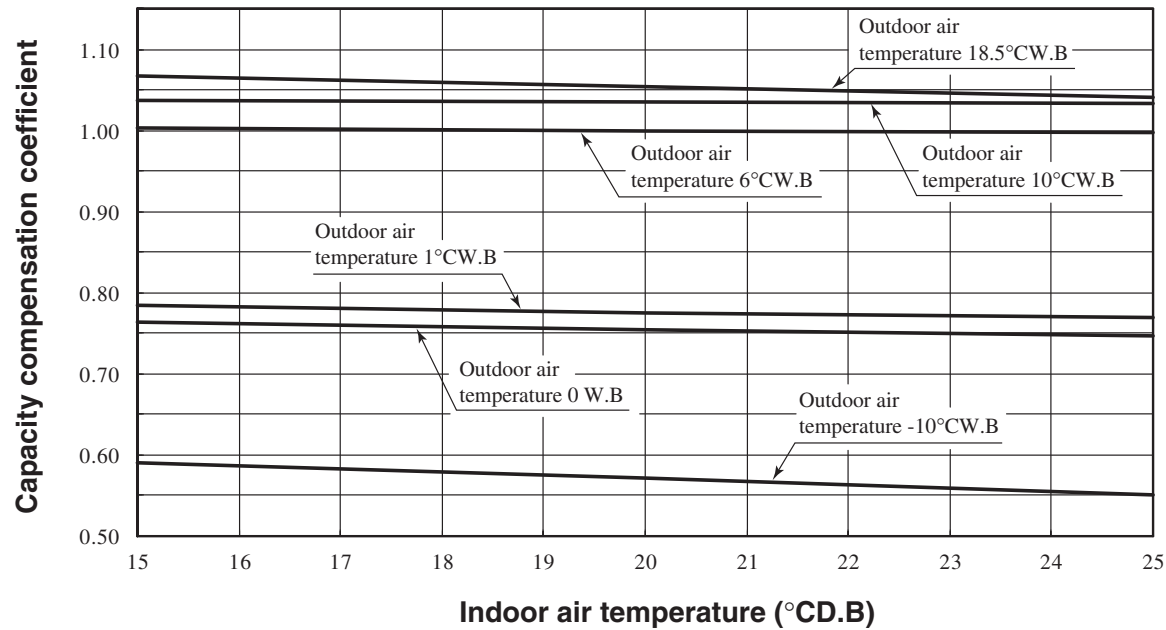
Caution: If a cooling operation is done when the outdoor air temperature is -5°C or lower, as much as possible, the outdoor unit should be installed in a condition where it is not going to be influenced by natural wind. If it is hit by the wind, the compressor stop frequency will be high because of the drop in the low pressure, the capacity will drop even further and it could cause the unit to break down.

2) Heating

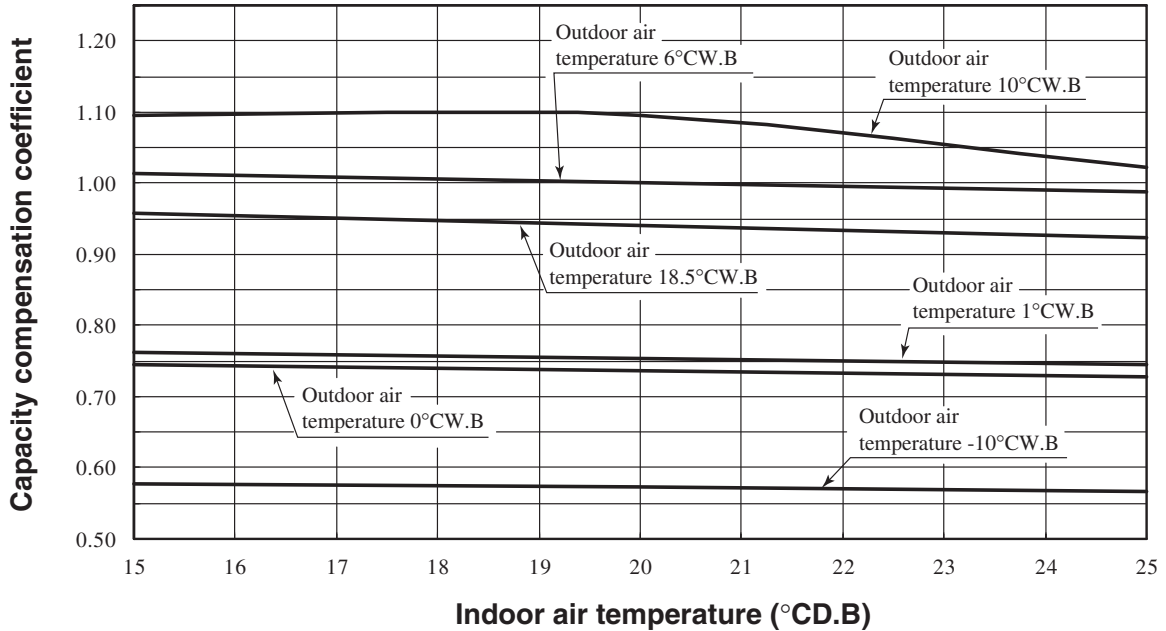
a) Model 302



b) Models 402 ~ 602



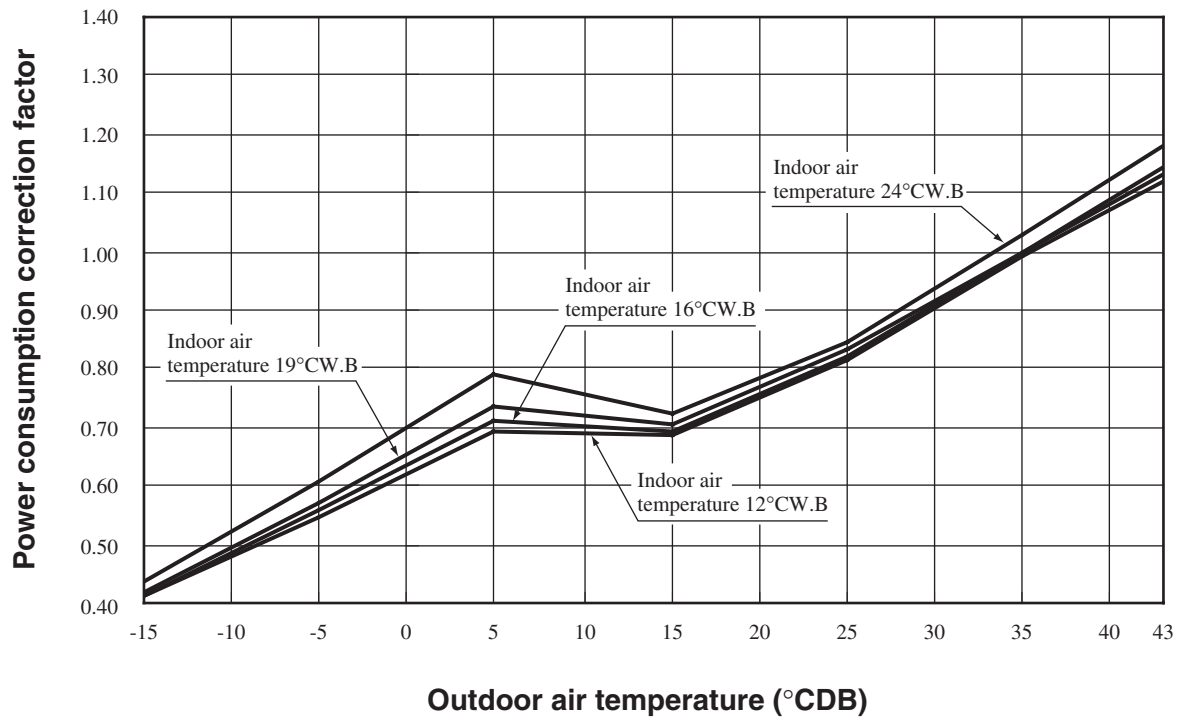
c) Models 802, 1002



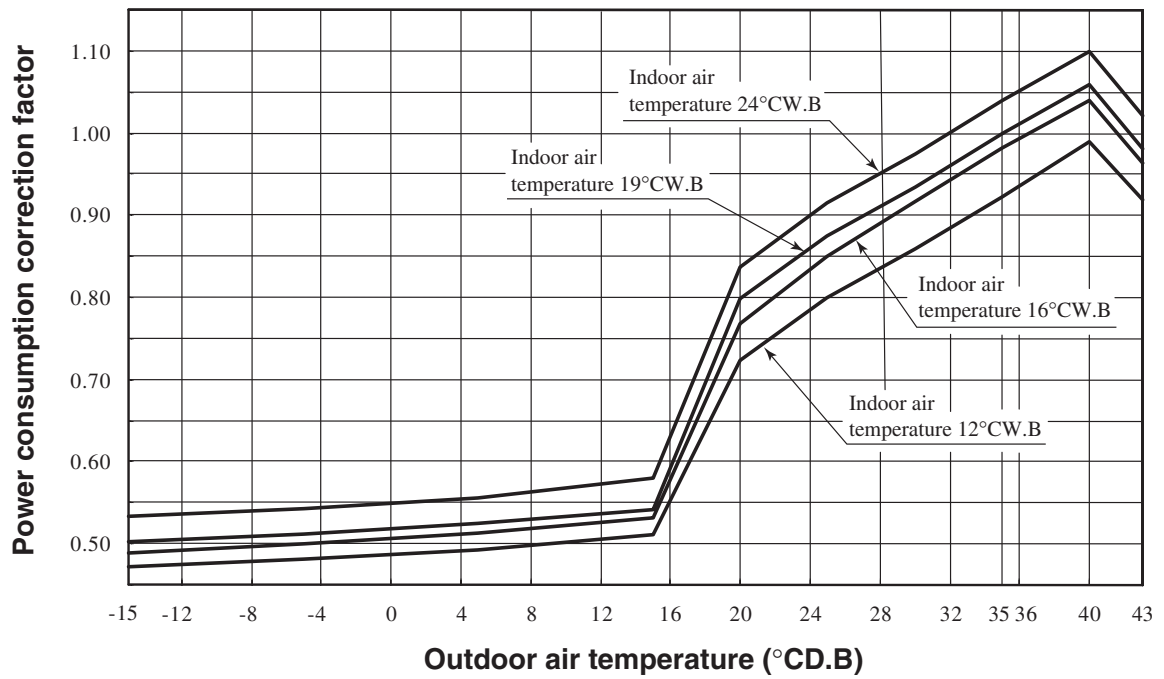
(b) Power consumption correction factor

1) Cooling

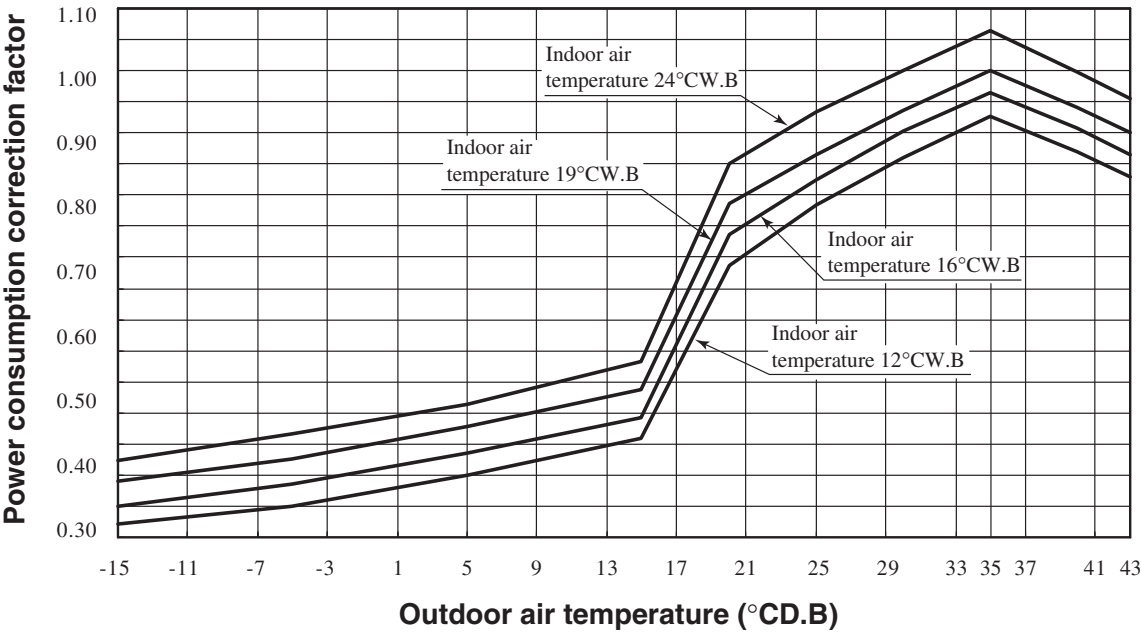
a) Model 302



b) Models 402 ~ 602

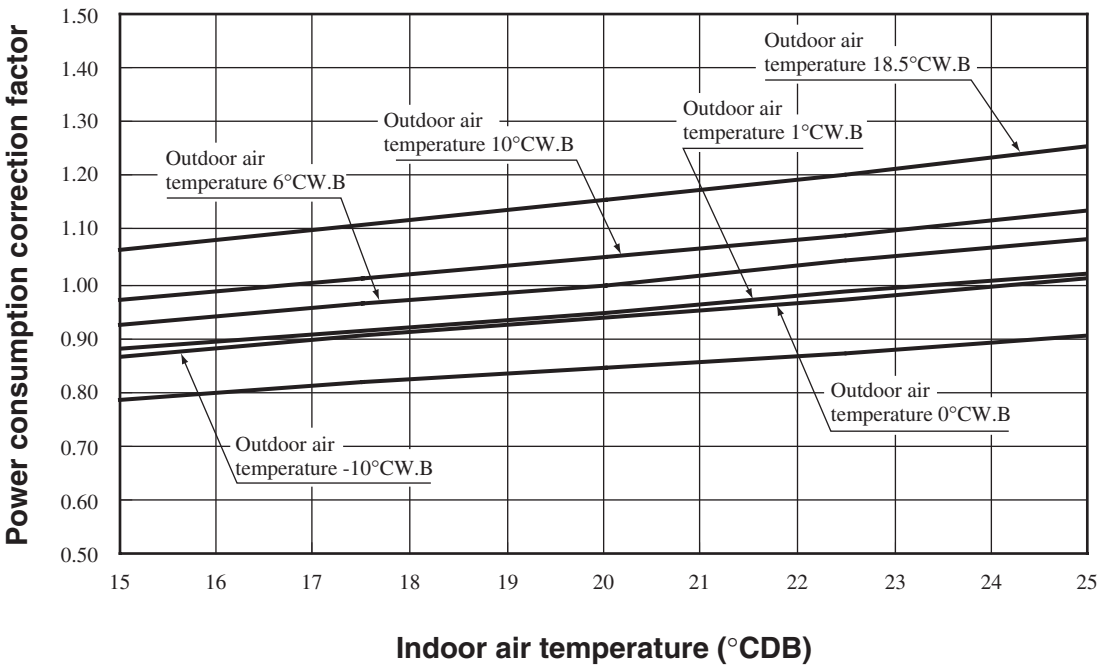


c) Models 802, 1002

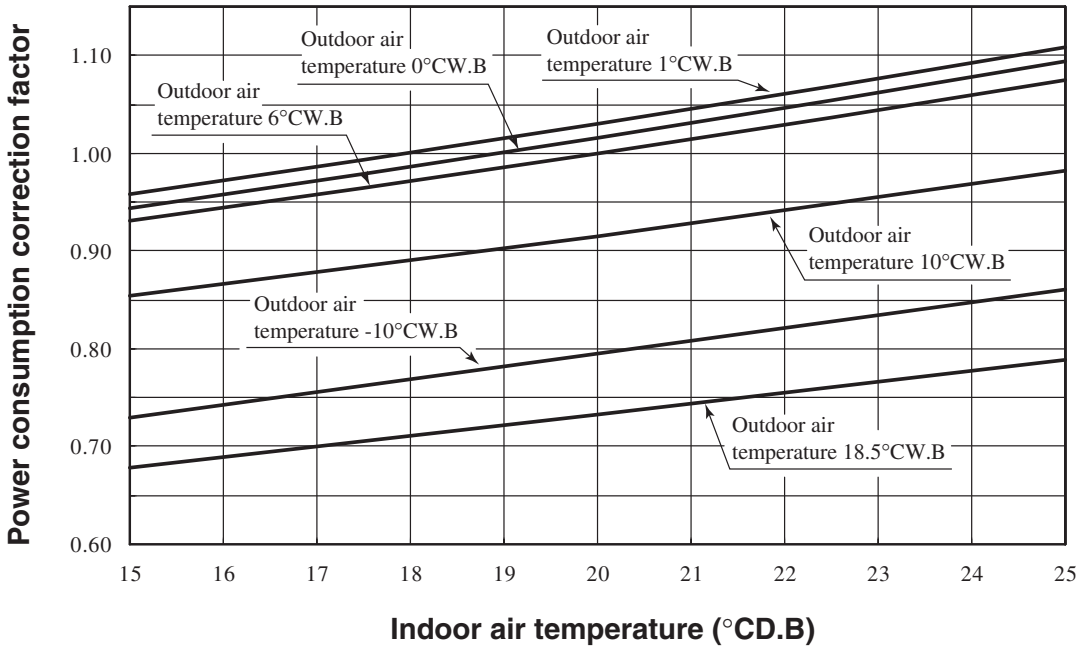


2) Heating

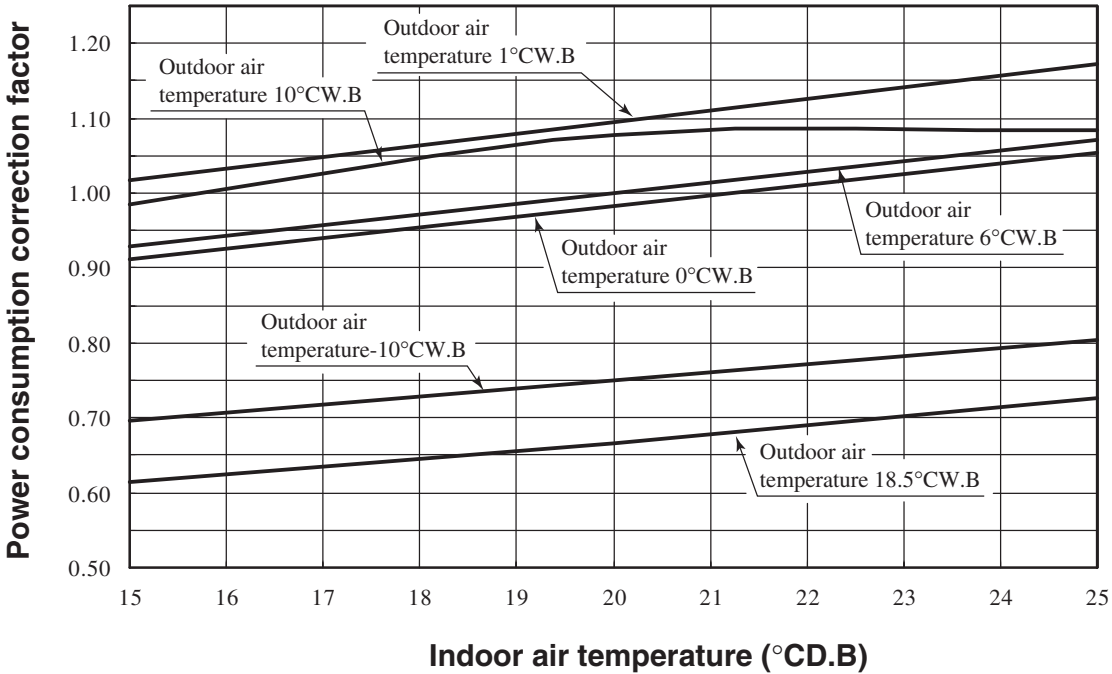
a) Model 302



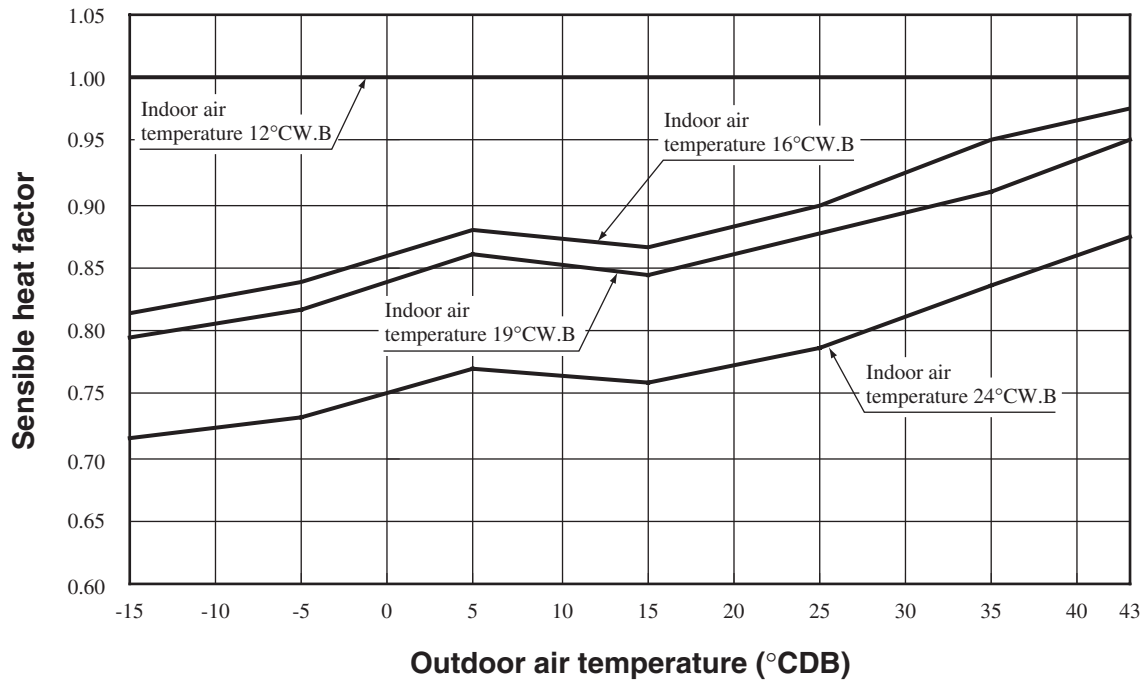
b) Models 402 ~ 602



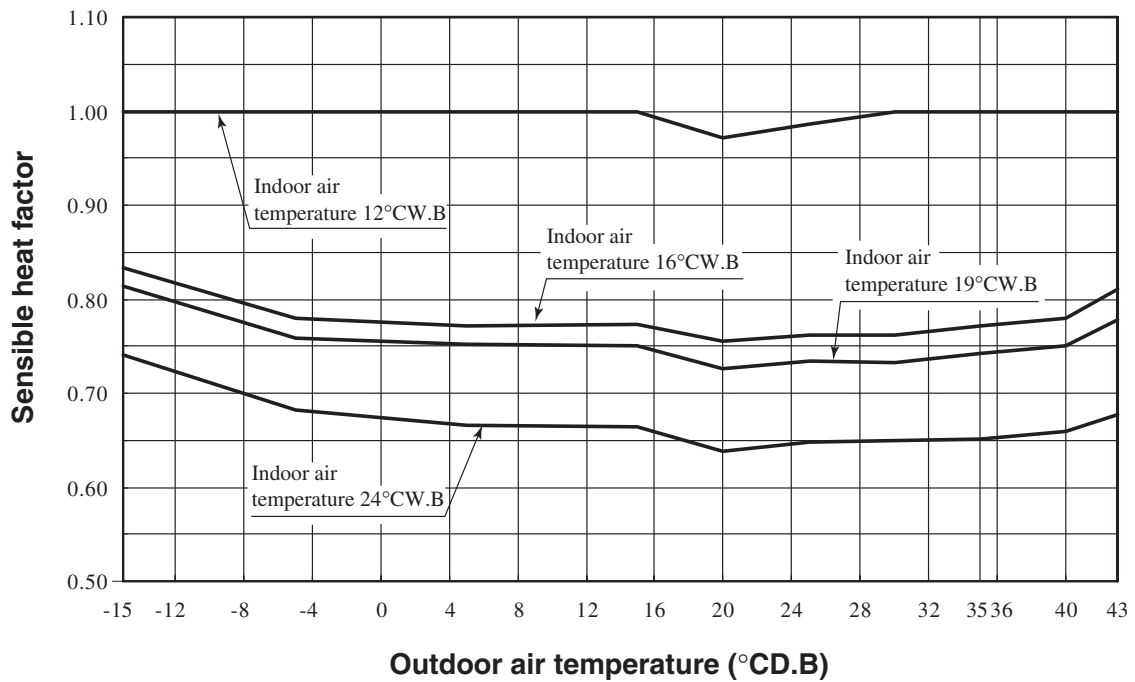
c) Models 802, 1002



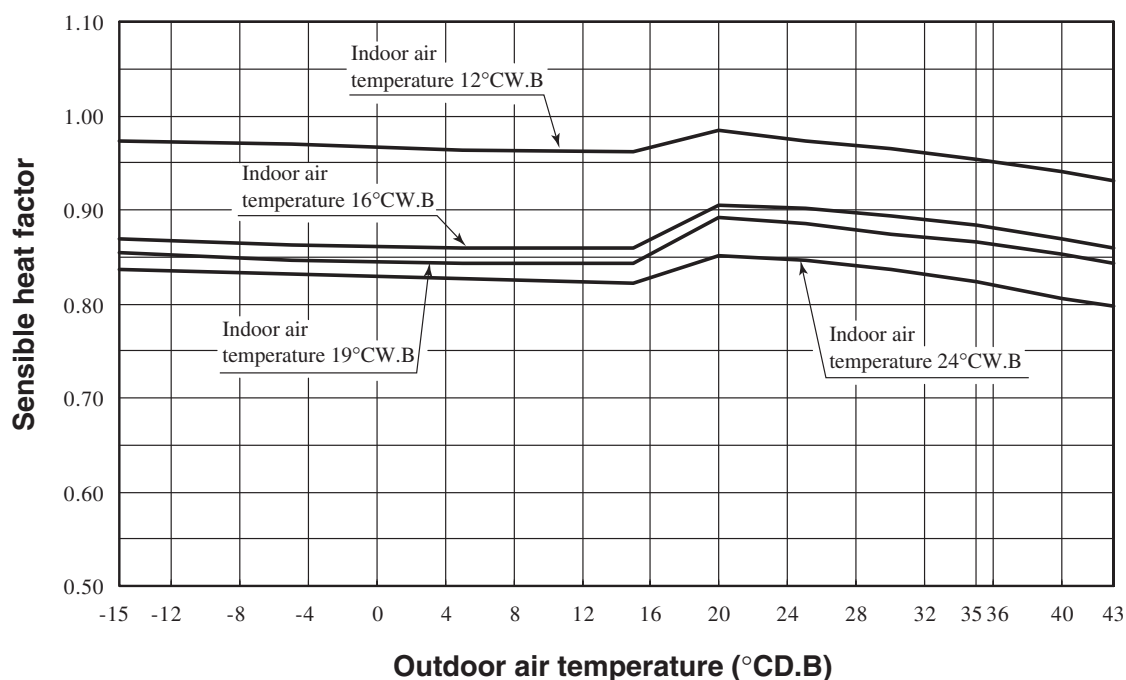
(c) **Sensible heat factor**
1) Model 302



2) Models 402 ~ 602



3) Models 802, 1002



(3) Correction of cooling and heating capacity in relation to air flow rate control (fan speed)

Coefficient: 1.00 at High, 0.97 at Middle, 0.95 at Low

(4) Correction of cooling and heating capacity in relation to one way length of refrigerant piping

It is necessary to correct the cooling and heating capacity in relation to the one way equivalent piping length between the indoor and outdoor units.

(i) Models 201, 251

Equivalent piping length ⁽¹⁾ m		7.5	10	15	20	25	30	35	40	45
Heating		1.0	0.995	0.992	0.990	0.987	0.984	0.981	0.978	0.975
Cooling	201 model	1.0	0.996	0.989	0.981	0.973	0.966	0.958	0.951	0.943
	251 model	1.0	0.995	0.986	0.977	0.967	0.958	0.948	0.939	0.930

(ii) Models 302 ~ 602

• Outdoor air temperature degree 5°C or more

Equivalent piping length ⁽¹⁾ (m)		7.5	10	15	20	25	30	35	40	45	50	55
Heating		1	1	1	1	1	0.998	0.998	0.993	0.993	0.988	0.988
Cooling	302 model	ø15.88	1	0.996	0.989	0.982	0.975	0.968	0.961	0.954	0.947	0.940
	402 model		1	0.991	0.978	0.964	0.951	0.937	0.924	0.910	0.897	0.883
	502 model		1	0.986	0.968	0.950	0.932	0.914	0.896	0.878	0.860	0.842
	602 model		1	0.985	0.966	0.946	0.927	0.907	0.888	0.868	0.849	0.829
	302 model	ø19.05	1.008	1.006	1.003	1	0.997	0.994	0.991	0.988	0.985	0.982
	402 model		1.016	1.013	1.007	1.002	0.996	0.991	0.985	0.980	0.974	0.969
	502 model		1.022	1.018	1.009	1.001	0.992	0.984	0.975	0.967	0.958	0.950
	602 model		1.026	1.021	1.011	1.002	0.992	0.983	0.973	0.964	0.954	0.945

● Outdoor air temperature degree -5°C

Equivalent piping length ⁽¹⁾ (m)			7.5	10	15	20	25	30	35	40	45	50	55
Heating			1	1	1	1	1	0.998	0.998	0.993	0.993	0.988	0.988
Cooling	302 model	ø15.88	0.800	0.793	0.779	0.765	0.751	0.738	0.724	0.710	0.696	0.682	0.669
	402 model		1	0.987	0.963	0.938	0.914	0.890	0.866	0.841	0.817	0.793	0.769
	502 model		1	0.983	0.954	0.926	0.897	0.868	0.839	0.810	0.781	0.752	0.724
	602 model		1	0.982	0.952	0.921	0.891	0.861	0.830	0.800	0.769	0.739	0.709
	302 model	ø19.05	0.806	0.798	0.786	0.774	0.762	0.750	0.738	0.727	0.715	0.703	0.691
	402 model		1.016	1.008	0.992	0.975	0.959	0.943	0.927	0.911	0.895	0.879	0.863
	502 model		1.022	1.013	0.994	0.974	0.955	0.936	0.917	0.898	0.879	0.860	0.841
	602 model		1.026	1.016	0.996	0.975	0.955	0.935	0.915	0.895	0.875	0.855	0.835

● Outdoor air temperature degree -15°C

Equivalent piping length ⁽¹⁾ (m)			7.5	10	15	20	25	30	35	40	45	50	55
Heating			1	1	1	1	1	0.998	0.998	0.933	0.993	0.988	0.988
Cooling	302 model	ø15.88	0.600	0.590	0.569	0.549	0.528	0.507	0.487	0.466	0.446	0.425	0.404
	402 model		1	0.983	0.948	0.913	0.878	0.843	0.808	0.773	0.738	0.703	0.668
	502 model		1	0.980	0.940	0.901	0.861	0.821	0.782	0.742	0.702	0.662	0.623
	602 model		1	0.979	0.938	0.897	0.856	0.814	0.773	0.732	0.690	0.649	0.608
	302 model	ø19.05	0.605	0.590	0.569	0.548	0.527	0.507	0.486	0.465	0.444	0.424	0.403
	402 model		1.016	1.002	0.976	0.949	0.922	0.896	0.869	0.842	0.816	0.789	0.762
	502 model		1.022	1.007	0.978	0.948	0.918	0.889	0.859	0.829	0.800	0.770	0.740
	602 model		1.026	1.010	0.980	0.949	0.918	0.888	0.857	0.826	0.796	0.765	0.734

(iii) Models 802, 1002

● Outdoor air temperature degree 5°C or more

Equivalent piping length ⁽¹⁾ (m)			7.5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
Heating			1	0.998	0.995	0.991	0.988	0.984	0.981	0.977	0.974	0.970	0.967	0.963	0.960	0.956	0.953
Cooling	802 model	ø25.4	1	0.998	0.995	0.991	0.988	0.984	0.981	0.977	0.974	0.970	0.967	0.963	0.960	0.956	0.953
	1002 model		1	0.996	0.990	0.984	0.978	0.972	0.966	0.960	0.954	0.948	0.942	0.936	0.930	0.924	0.918
	802 model	ø22.22	0.993	0.990	0.984	0.977	0.971	0.964	0.958	—	—	—	—	—	—	—	—
	1002 model		0.988	0.983	0.973	0.963	0.953	0.943	0.933	—	—	—	—	—	—	—	—
	802 model	ø28.58	1.003	1.002	1	0.998	0.996	0.994	0.992	0.990	0.988	0.986	0.984	0.982	0.980	0.978	0.976
	1002 model		1.004	1.003	0.999	0.996	0.992	0.989	0.985	0.982	0.978	0.975	0.971	0.968	0.964	0.961	0.957

● Outdoor air temperature degree -5°C

Equivalent piping length ⁽¹⁾ (m)			7.5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
Heating			1	0.998	0.995	0.991	0.988	0.984	0.981	0.977	0.974	0.970	0.967	0.963	0.960	0.956	0.953
Cooling	802 model	ø25.4	1	0.993	0.979	0.965	0.950	0.936	0.922	0.908	0.894	0.880	0.866	0.852	0.838	0.824	0.810
	1002 model		1	0.991	0.974	0.958	0.941	0.925	0.908	0.891	0.875	0.858	0.841	0.825	0.808	0.791	0.775
	802 model	ø22.22	0.993	0.985	0.968	0.951	0.934	0.917	0.899	—	—	—	—	—	—	—	—
	1002 model		0.988	0.978	0.957	0.937	0.916	0.895	0.875	—	—	—	—	—	—	—	—
	802 model	ø28.58	1.003	0.996	0.984	0.971	0.958	0.946	0.933	0.921	0.908	0.896	0.883	0.870	0.858	0.845	0.833
	1002 model		1.004	0.997	0.983	0.969	0.955	0.941	0.927	0.913	0.899	0.885	0.870	0.856	0.842	0.828	0.814

● Outdoor air temperature degree -15°C

Equivalent piping length ⁽¹⁾ (m)			7.5	10	15	20	25	30	35	40	45	50	55	60	65	70	75
Heating			1	0.998	0.995	0.991	0.988	0.984	0.981	0.977	0.974	0.970	0.967	0.963	0.960	0.956	0.953
Cooling	802 model	ø25.4	1	0.987	0.963	0.938	0.913	0.889	0.864	0.839	0.815	0.790	0.765	0.741	0.716	0.691	0.667
	1002 model		1	0.986	0.959	0.932	0.904	0.877	0.850	0.823	0.795	0.768	0.741	0.713	0.686	0.659	0.631
	802 model	ø22.22	0.993	0.980	0.952	0.924	0.897	0.869	0.841	—	—	—	—	—	—	—	—
	1002 model		0.988	0.973	0.941	0.910	0.879	0.848	0.817	—	—	—	—	—	—	—	—
	802 model	ø28.58	1.003	0.991	0.968	0.945	0.921	0.898	0.875	0.852	0.829	0.806	0.782	0.759	0.736	0.713	0.690
	1002 model		1.004	0.992	0.967	0.943	0.918	0.893	0.869	0.844	0.819	0.795	0.770	0.745	0.720	0.696	0.671

Note (1) Calculate the relevant length using the following formula.

However, install the piping so that the piping length is within +5 m of the limit length (actual length) for the respective types.

• Relevant Length = Actual Length + (Relevant bend length x number of bends in the piping.)

Relevant length per bend.

Gas Pipe Diameter (mm)	ø9.52	ø12.7	ø15.88	ø19.05	ø22.22	ø25.4	ø28.58
Relevant Bend Length	0.15	0.20	0.25	0.30	0.35	0.40	0.45

- (5) When the outdoor unit is located at a lower height than the indoor unit in cooling operation and when the outdoor unit is located at a higher height than the indoor unit in heating operation, the following values should be subtracted from the values in the above table.

Height difference between the indoor unit and outdoor unit in the vertical height difference	5m	10m	15m	20m	25m	30m
Adjustment coefficient	0.01	0.02	0.03	0.04	0.05	0.06

Piping length limitations

Item \ Model	201, 251	302, 402, 502, 602	802, 1002
Max. one way piping length	40m	50m	70m*
Max. vertical height difference	Outdoor unit is higher 30m Outdoor unit is lower 15m		

Notes (1) Values in the table indicate the one way piping length between the indoor and outdoor units.

(2) When ø22, 22 gas pipe is used for piping lengths with the * mark, let the maximum one-way length be 30 m.

How to obtain the cooling and heating capacity

Example : The net cooling capacity of the model FDUMVA402HEN2R with the air flow “High”, the piping length of 15m, the outdoor unit located 5m lower than the indoor unit, indoor wet-bulb temperature at 19.0 °C and outdoor dry-bulb temperature 35 °C is

$$\text{Net cooling capacity} = \underset{\substack{\uparrow \\ \text{FDUMVA402HEN2R}}}{10.0} \times \underset{\substack{\uparrow \\ \text{Air flow} \\ \text{“High”}}}{1.00} \times \underset{\substack{\uparrow \\ \text{Length 15m.} \\ \text{Height difference 5 m}}}{(0.978^{(1)} - 0.01)} \times \underset{\substack{\uparrow \\ \text{Factor by air} \\ \text{temperatures}}}{1.0} \div 9.7 \text{ w}$$

Note (1) The above conditions show calculations for when the outside air temperature is 5°C or higher and the gas pipe size is ø15.88.

The capacity correction coefficient will differ depending on the proportions between the outside air temperature and the gas pipe size.

1.2.8 Characteristics of fan

Satellite ducted type (FDUM)

- External static pressure table

Unit : Pa

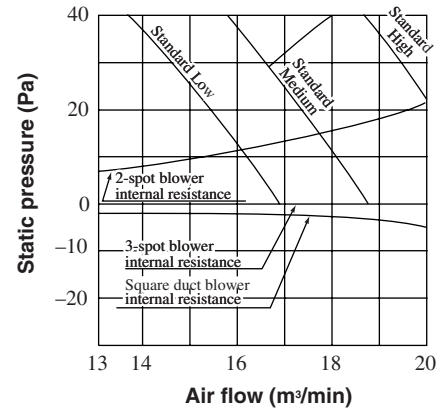
Model	Duct specs. Air flow (m ³ /min)	1 spot closing		Standard		Square duct	
		Stan- dard	High ⁽⁴⁾ speed	Stan- dard	High ⁽⁴⁾ speed	Stan- dard	High ⁽¹⁾ speed
FDUMA202	14	-	-	50	85	50	90
FDUMA252	18	35	70	50	85	55	90
FDUMA302	20	30	65	50	85	55	90
FDUMA402	28	50	80	60	90	65	95
FDUMA502,602	34	50	75	60	85	65	95

Notes(1) 1 spot closing: Round duct flange at center is removed and shield with a special panel (option).

- (2) Standard: ø200 duct are installed at all blowout holes.
 (3) Square duct: All round ducts are removed and replaced with special square duct flanges (option).
 (4) When using the high speed setting, turn the dip switch SW9-4 on the indoor PCB to the ON position.
 (When setting from the remote controller, select "Hi CEILING 1")

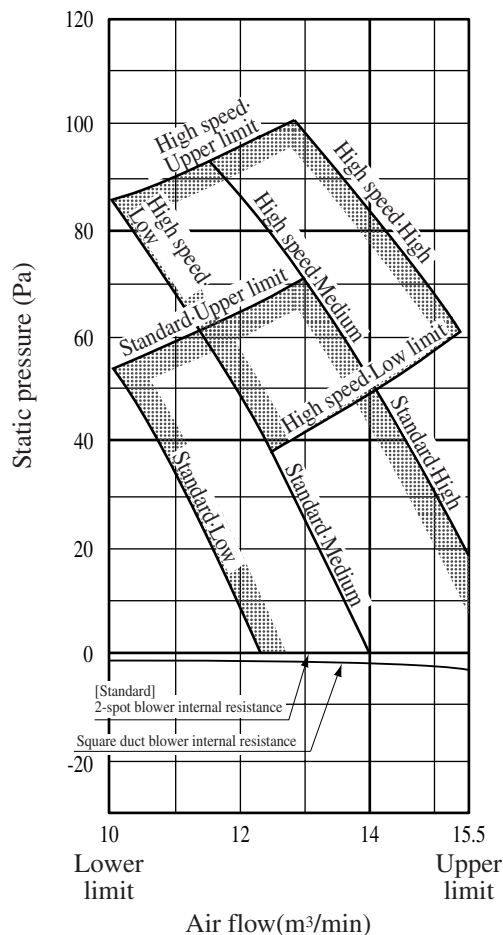
How to interpret the blower characteristics table

Example : Case of FDUMA252R

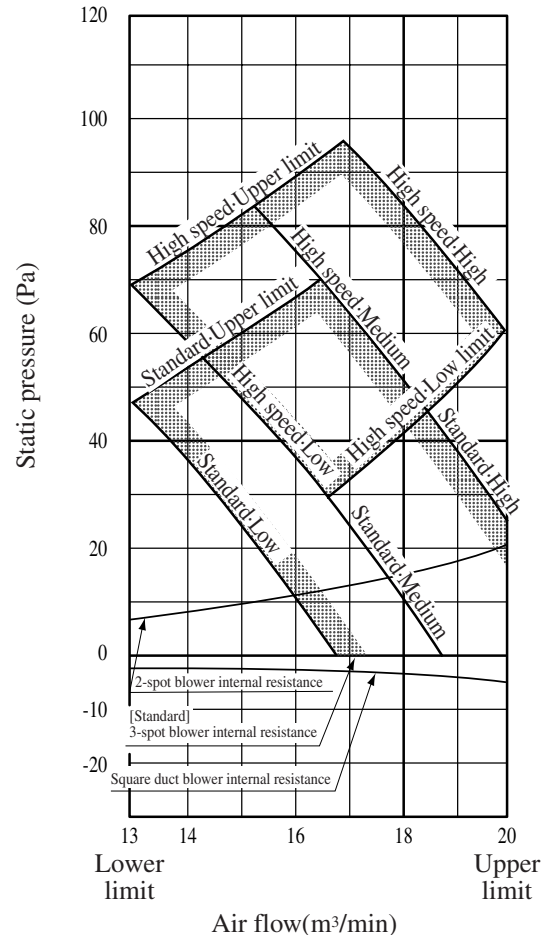


- ① 2-spot blowout.....
 Internal resistance increases more than the standard 3-spot blowout. Approx. 14Pa at 17m³/min
 ② Square duct blowout.....
 Internal resistance decreases more than the standard round duct (ø200 3-spot). 3Pa at 17m³/min. (External static pressure increases in reverse.)

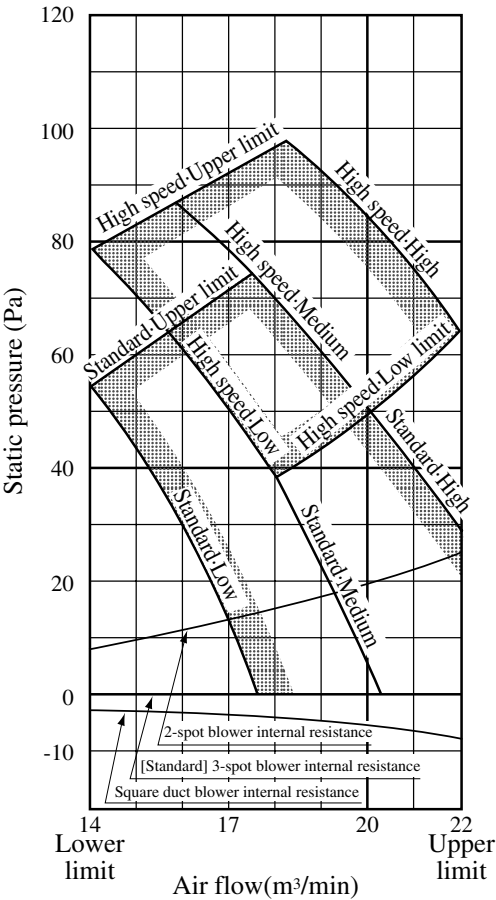
FDUMA202R



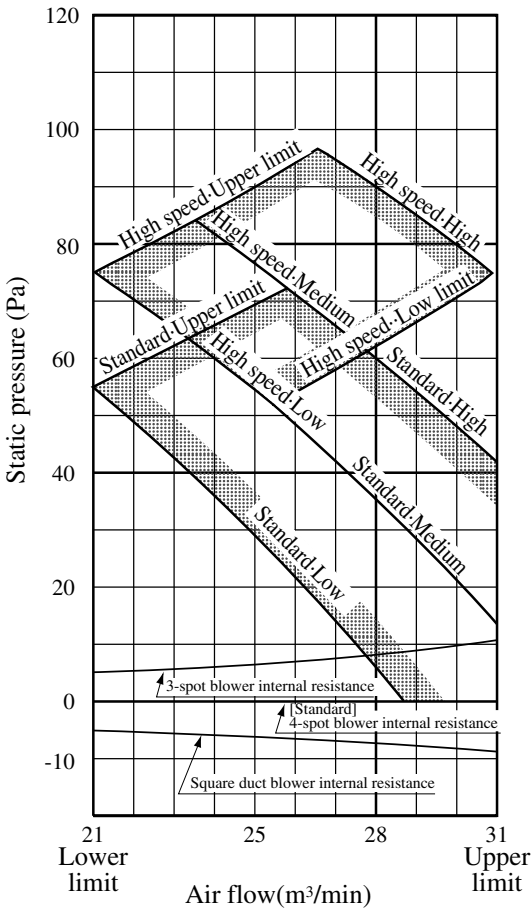
FDUMA252R



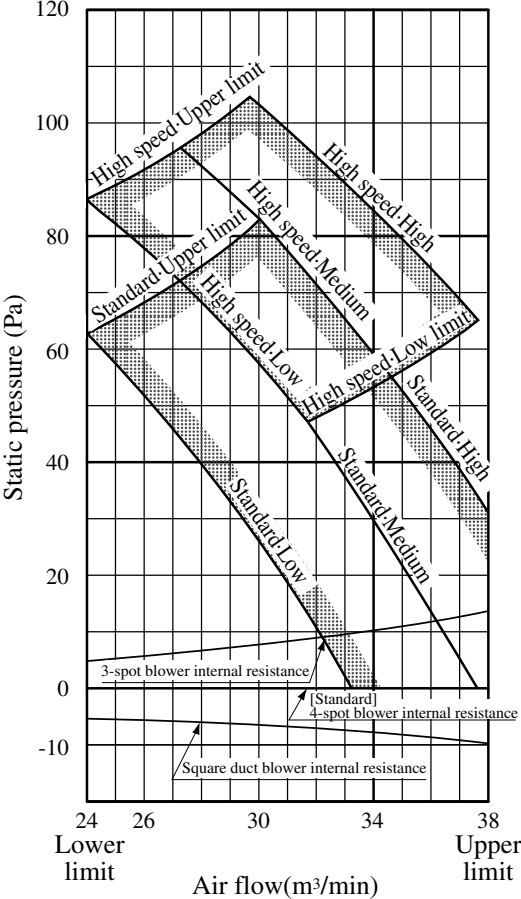
FDUMA302R



FDUMA402R



FDUMA502R, 602R



1.2.9 Noise level

Notes (1) The data are based on the following conditions.

Ambient air temperature: Indoor unit 27°C DB, 19°C WB. Outdoor unit 35°C DB.

(2) The data in the chart are measured in an unechonic room.

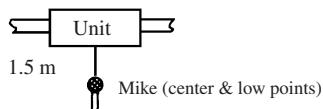
(3) The noise levels measured in the field are usually higher than the data because of reflection.

(1) Indoor unit

Satellite ducted type (FDUM)

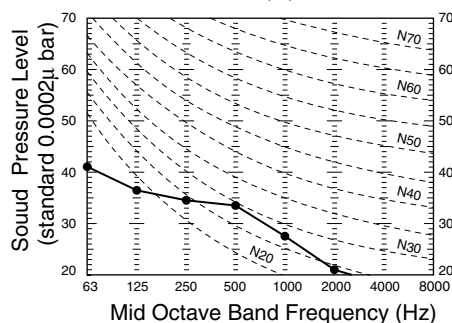
Measured based on JIS B 8616

Mike position as right



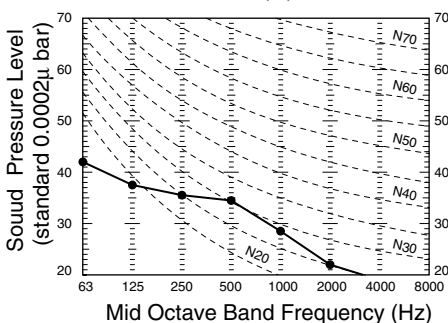
Models FDUMA202, 252R

Noise level 34 dB (A) at HIGH
31 dB (A) at MEDIUM
28 dB (A) at LOW



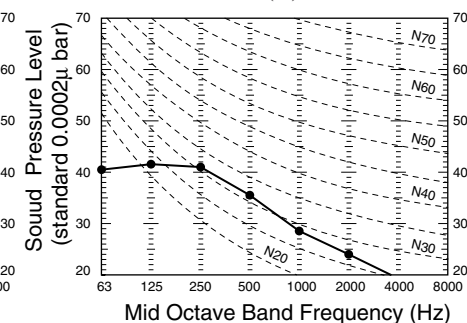
Model FDUMA302R

Noise level 35 dB (A) at HIGH
32 dB (A) at MEDIUM
29 dB (A) at LOW



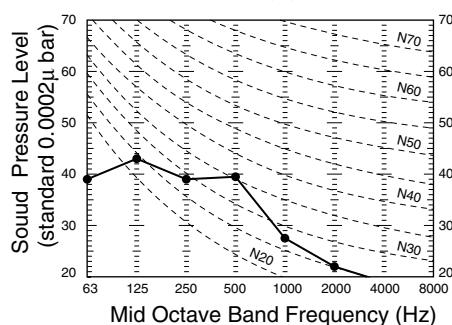
Model FDUMA402R

Noise level 37 dB (A) at HIGH
35 dB (A) at MEDIUM
32 dB (A) at LOW



Models FDUMA502R, 602R

Noise level 38 dB (A) at HIGH
36 dB (A) at MEDIUM
33 dB (A) at LOW



(2) Outdoor unit

Measured based on JIS B 8616

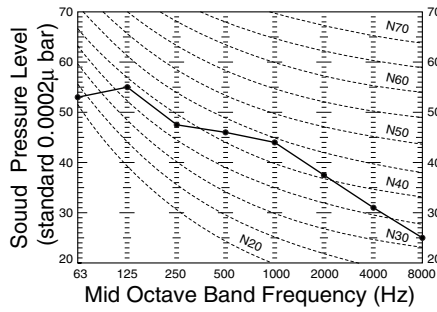
Mike position: at highest noise level in position as below

Distance from front side 1m

Height 1m

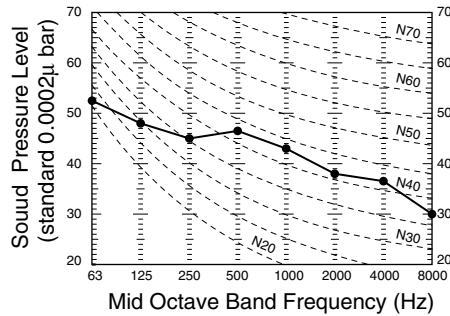
Models FDCVA201, 251HENR

Noise level 48 dB (A)



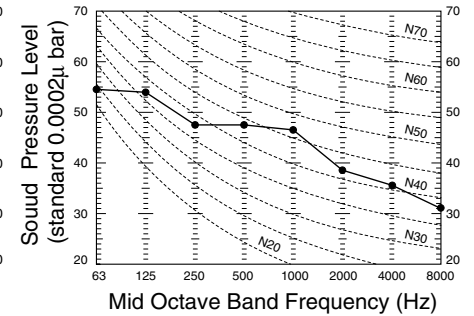
Model FDCVA302HENR

Noise level 48 dB (A)



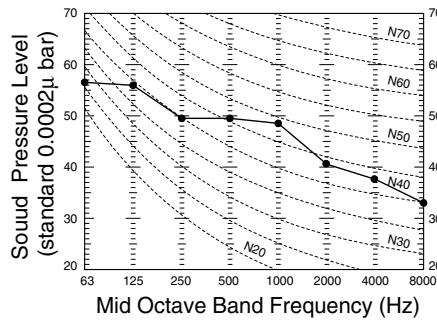
Model FDCVA402HENR

Noise level 50 dB (A)



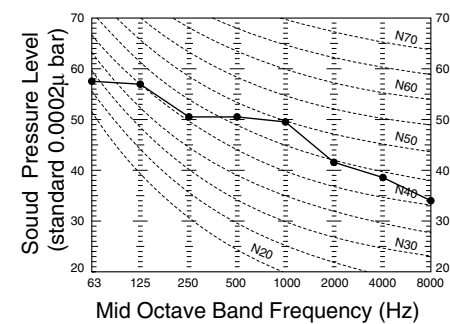
Model FDCVA502HENR

Noise level 52 dB (A)



Model FDCVA602HENR

Noise level 53 dB (A)



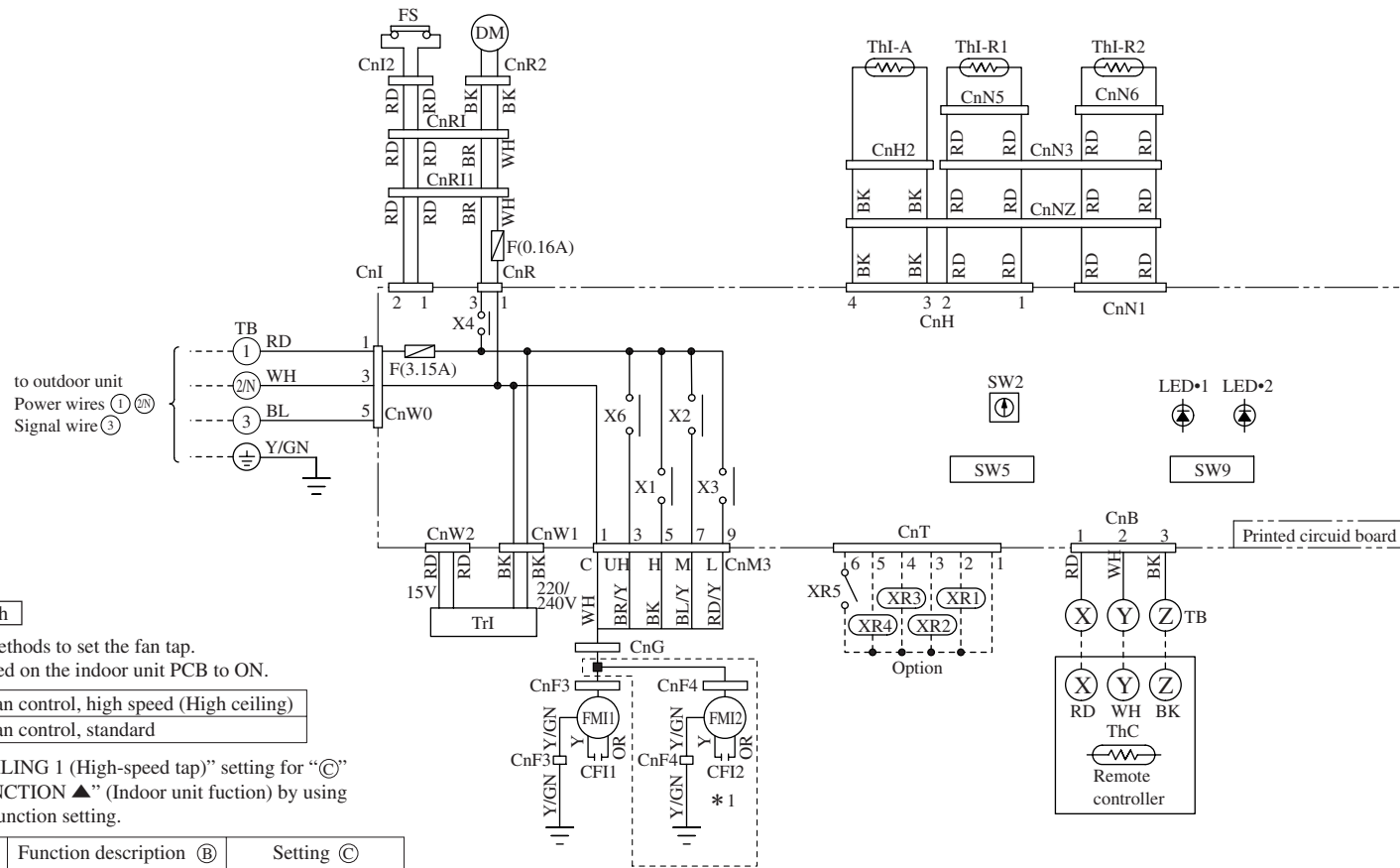
1.3 ELECTRICAL DATA

1.3.1 Electrical wiring

(1) Indoor unit

Satellite ducted type (FDUM)

Model All models



Blower fan tap switch

Use one of the two methods to set the fan tap.

① Set SW9-4 provided on the indoor unit PCB to ON.

SW9-4	ON	Fan control, high speed (High ceiling)
	OFF	Fan control, standard

② Select the “Hi CEILING 1 (High-speed tap)” setting for “©” in #01 of “I/U FUNCTION ▲” (Indoor unit function) by using remote controller function setting.

Function number ①	Function description ②	Setting ③
01	Hi CEILING SET	Hi CEILING 1

Note (1) * 1 FMI2 is equipped only for FDUMA402, 502, 602R.

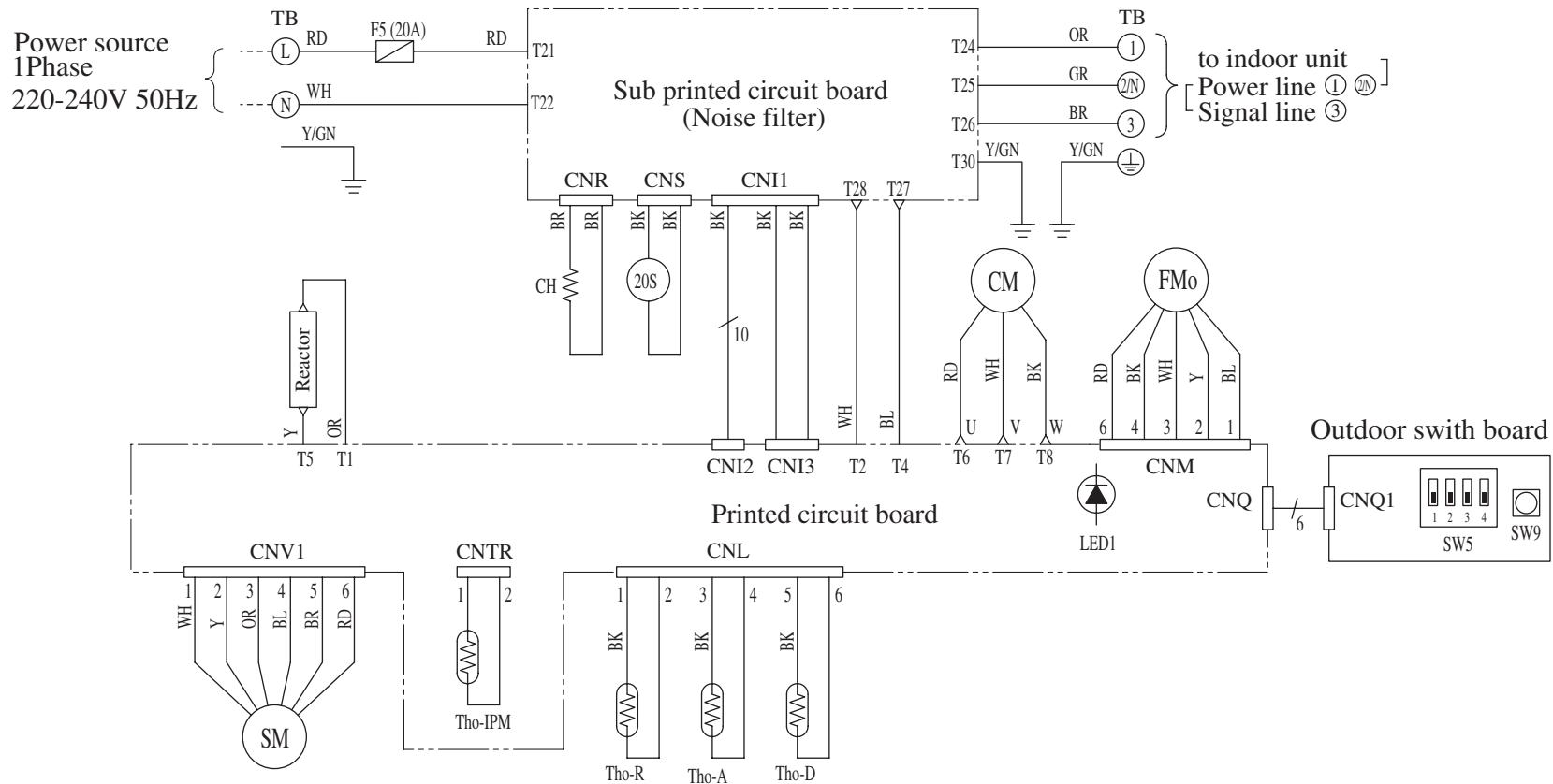
Meaning of marks

Mark	Parts name	Mark	Parts name	Mark	Parts name
FMI1,2	Fan motor	SW5-3,4	Filter sign	XR4	Inspection output (DC12V output)
CFI1,2	Capacitor for FMI	SW9-3	Emergency operation	XR5	Remote operation input (volt-free contact)
DM	Drain motor	TrI	Transformer	X1,2,3,6	Auxiliary relay (For FM)
FS	Float switch	F	Fuse	X4	Auxiliary relay (For DM)
ThI-A	Thermistor	LED-1	Indication lamp (Red:inspection)	TB	Terminal block (○ mark)
ThI-R1	Thermistor	LED-2	Indication lamp (Green:normal operation)	CnA~Z	Connector (□ mark)
ThI-R2	Thermistor	XR1	Operation output (DC12V output)	■mark	Closed-end connector
ThC	Thermistor	XR2	Heating output (DC12V output)		
SW2	Remote control communications address	XR3	Thermo ON output (DC12V output)		

Color marks

Mark	Color	Mark	Color
BK	Black	RD	Red
BL	Blue	RD/Y	Red/Yellow
BL/Y	Blue/Yellow	WH	White
BR	Brown	Y	Yellow
BR/Y	Brown/Yellow	Y/GN	Yellow/Green
OR	Orange		

(2) Outdoor unit
Models FDCVA201HENR, 251HENR

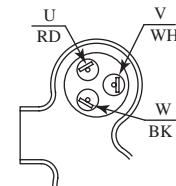


Meaning of marks

Mark	Parts name	Mark	Parts name
CH	Crankcase heater	SW9	Pump down switch
CM	Compressor motor	TB	Terminal block(◯ mark)
CNA~Z	Connector(◻ mark)	Tho-A	Thermistor(outdoor air temp.)
F	Fuse	Tho-D	Thermistor(discharge temp.)
FMo	Fan motor	Tho-IPM	Thermistor(Power transistor temp.)
LED1	Indication lamp(Red)	Tho-R	Thermistor(outdoor H.EX. temp.)
SM	Stepping motor(for EEV)	20S	4 way valve(coil)
SW5-1	Defrost control switch	◁ mark	Fasuton terminal
SW5-2	Snow prevented fan control switch		
SW5-4	Operate test run switch(Cooling/Heating)		

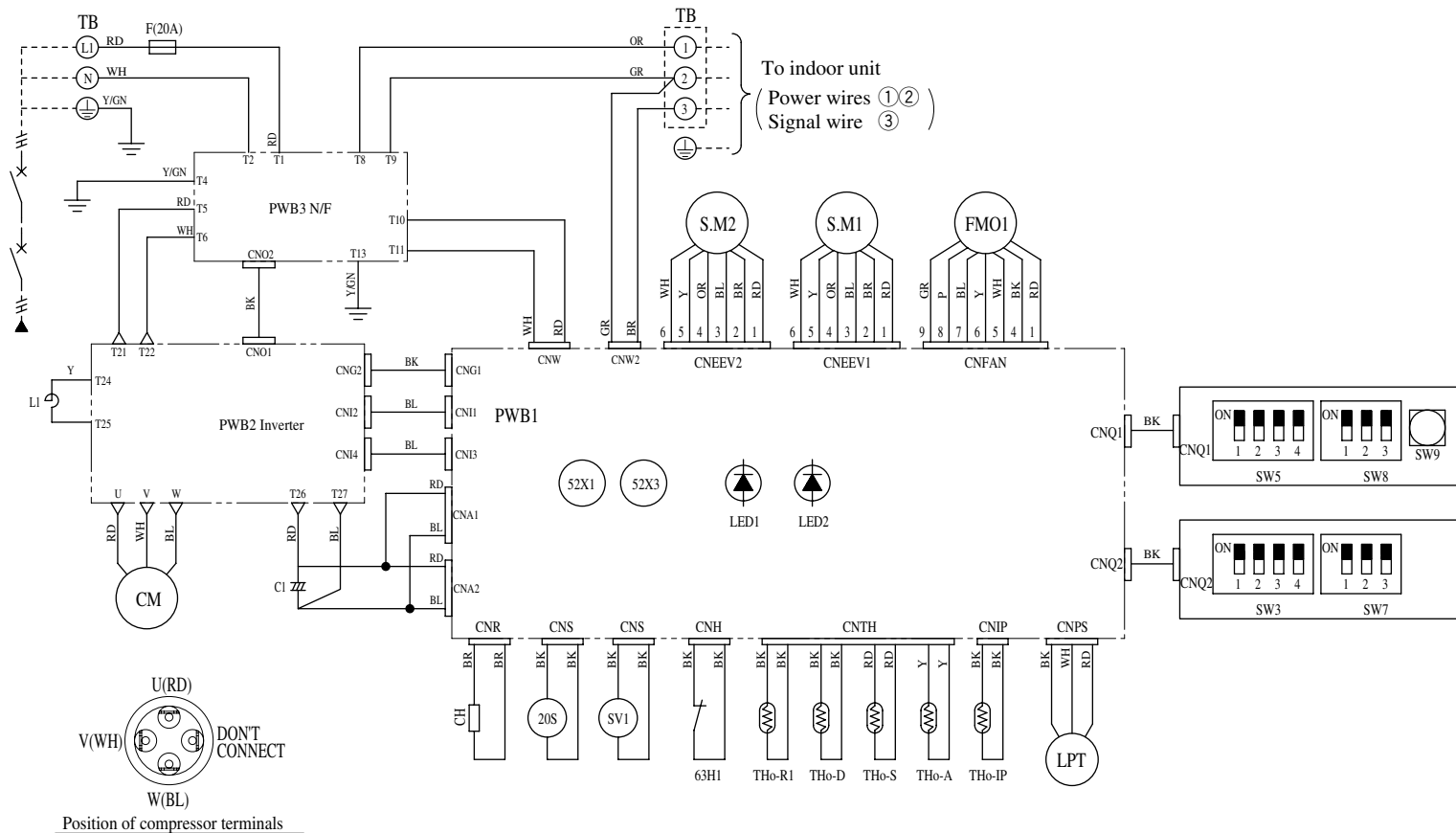
Color mark

Mark	Color
BK	Black
BL	Blue
BR	Brown
GR	Gray
OR	Orange
RD	Red
WH	White
Y	Yellow
Y/GN	Yellow/Green



Compressor terminal arrangement

Power source
1Phase 220-240V 50Hz/220V 60Hz

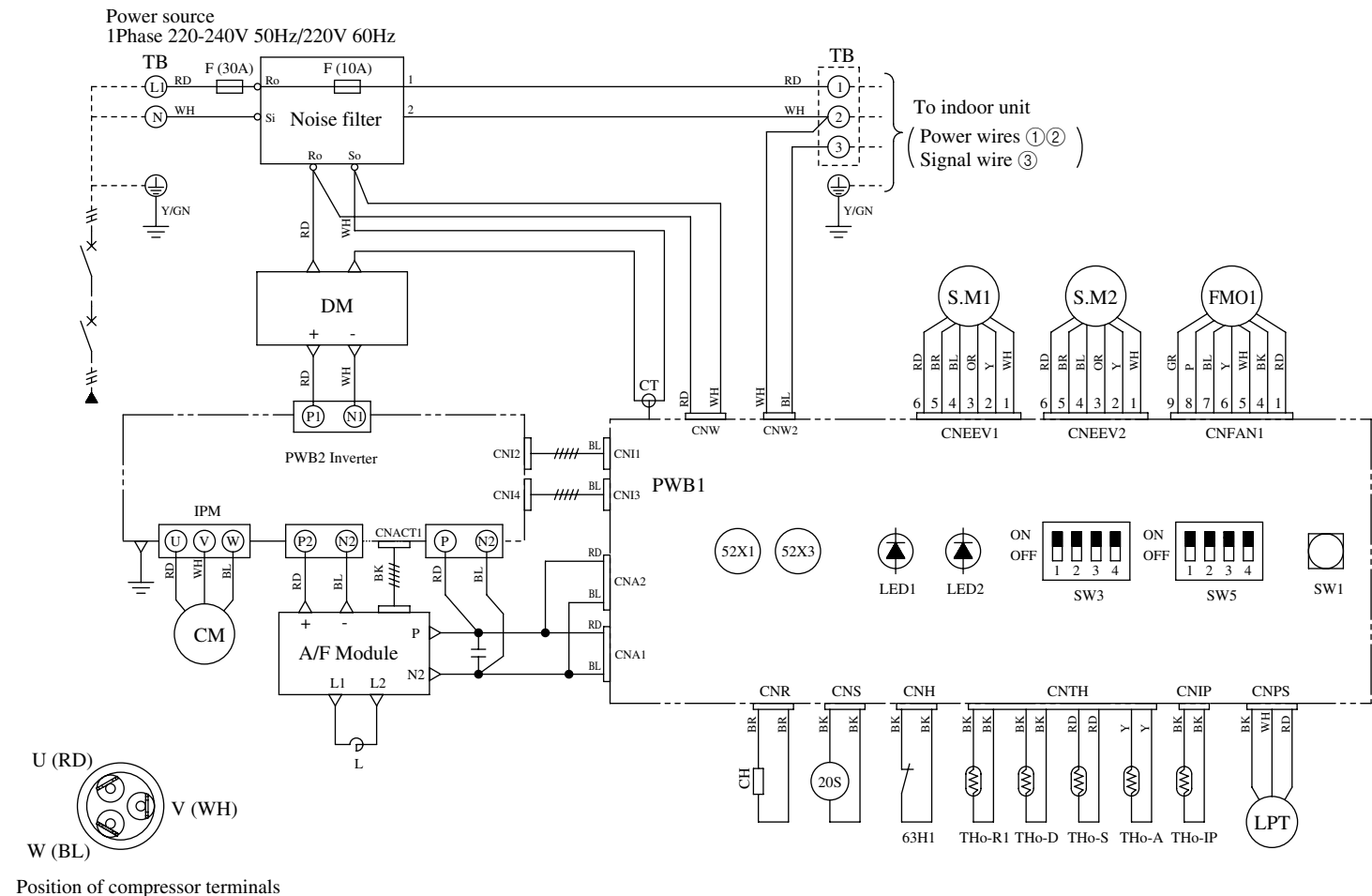


Meaning of marks

Mark	Parts name	Mark	Parts name	Mark	Parts name
CM	Compressor motor	Tho-A	Thermistor (Outdoor air temp.)	CnA~Z	Connector
FMO1	Fan motor	Tho-D	Thermistor (discharge temp.)	SW9	Pump down switch
CH	Crankcase heater	Tho-R1	Thermistor (H.X. temp.)	SW3,5,7,8	Local setting switch
52X1	Auxillary relay (for CH)	Tho-S	Thermistor (suction temp.)	LED1	Indication lamp (GREEN)
52X3	Auxillary relay (for 20S)	Tho-IP	Thermistor (IPM)	LED2	Indication lamp (RED)
20S	Solenoid valve for 4 way valve	LPT	Low pressure sensor	DM	Diode module
SM1	Expansion valve for cooling	SV1	Solenoid valve	L1	Reactor
SM2	Expansion valve for heating	TB	Terminal block	◁ mark	Faston terminal
63H1	High pressure switch	F	Fuse		

Color marks

Mark	Color
BK	Black
BL	Blue
BR	Brown
OR	Orange
RD	Red
WH	White
Y	Yellow
Y/GN	Yellow/Green
GR	Gray
P	Pink



Meaning of marks

Mark	Parts name	Mark	Parts name	Mark	Parts name
CM	Compressor motor	SM2	Expansion valve for heating	TB	Terminal block
FMO1	Fan motor	63H1	High pressure switch	F	Fuse
52C	Magnetic contactor for CM	Tho-A	Thermistor (Outdoor air temp.)	CnA~Z	Connector
CH	Crankcase heater	Tho-H	Thermistor (dome temp.)	SW1	Pump down switch
52X1	Auxillary relay (for CH)	Tho-D	Thermistor (discharge temp.)	SW3,5	Local setting switch
52X3	Auxillary relay (for 20S)	Tho-R1,2	Thermistor (H.X. temp.)	LED1	Indication lamp (RED)
52X5	Auxillary relay (for SV2)	Tho-S	Thermistor (suction temp.)	LED2	Indication lamp (GREEN)
52X6	Auxillary relay (for 52C)	Tho-IP	Thermistor (IPM)	DM	Diode module
20S	Solenoid valve for 4 way valve	LPT	Low pressure sensor	L	Reactor
SM1	Expansion valve for cooling	CT	Current sensor		

Color marks

Mark	Color
BK	Black
BL	Blue
BR	Brown
OR	Orange
RD	Red
WH	White
Y	Yellow
Y/GN	Yellow/Green
GR	Gray
P	Pink

1.4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

(1) Remote controller

(a) Wired remote controller

The figure below shows the remote controller with the cover opened. Note that all the items that may be displayed in the liquid crystal display area are shown in the figure for the sake of explanation.

Characters displayed with dots in the liquid crystal display area are abbreviated.

Pull the cover downward to open it.

Central control display

Displayed when the air conditioning system is controlled by the option controller.

Timer operation display

Displays the settings related to timer operation.

Temperature setting switches

These switches are used to set the temperature of the room.

TIMER switch

This switch is used to select a timer mode.

Timer setting switches

These switches are used to set the timer mode and time.

GRILL switch

This switch has no function.
When this switch is pressed, "INVALID OPER (Invalid Operation)" is displayed, but it does not mean a failure.

AIR CON No. (Air conditioning system No.) switch

Displays the number of the connected air conditioning system.

CHECK switch

This switch is used at servicing.

TEST switch

This switch is used during test operation.

Vent Indicator

Indicates operation in the Ventilation mode.

Weekly timer display

Displays the settings of the weekly timer.

Operation setting display area

Displays setting temperature, airflow volume, operation mode and operation message.

Operation/Check indicator light

During operation: Lit in green
In case of error: Flashing in red

ON/OFF switch

This switch is used to operate and stop the air conditioning system.
Press the switch once to operate the system and press it once again to stop the system.

MODE switch

This switch is used to switch between operation modes.

FAN SPEED switch

This switch is used to set the airflow volume.

VENT switch

Switch that operates the connected ventilator.

LOUVER switch

This switch is used to operate/stop the swing louver.

SET switch

This switch is used to apply the timer operation setting.
This switch is also used to make silent mode operation settings.

RESET switch

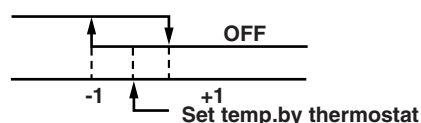
The switch which returns to a previous step.

*If you press any of the switches above and "INVALID OPER" is display, the switch has no function.
But it does not mean a failure.

(2) Operation control function by the indoor controller

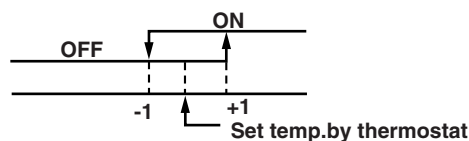
(a) Room temperature control (Differential of thermostat)

Heating operation



Temperature difference between thermostat set temp. and return air temp. (Detected by Th₁-A)

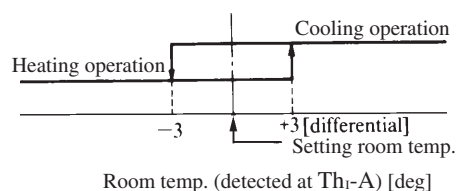
Cooling operation



Temperature difference between thermostat set temp. and return air temp. (Detected by Th₁-A)

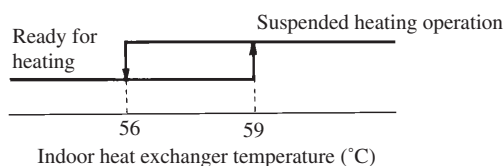
(b) Automatic operation

If the Auto mode is selected on the remote control device, the selection of cooling or heating can be made automatically depending on the room temperature (and the temperature of indoor heat exchanger). (When the switching between the cooling and the heating is made within 3 minutes, the compressor will not operate for 3 minutes.) This will make much easier the switching of cooling/heating at the change of season and can be adapted to the unmanned operation at bank cash dispenser.



Notes (1) During the automatic switching of cooling/heating the room temperature is controlled based on the setting of room temperature.

(2) If the temperature of indoor heat exchanger rises beyond 59°C during the heating operation, it is switched automatically to the cooling operation. For an hour after this switching, the heating operation is suspended regardless of the temperature as shown at left.



(c) Control parts operation during cooling and heating

Function	Cooling		Fan	Heating			Dry	
	Thermostat ON	Thermostat OFF		Thermostat ON	Thermostat OFF	Hot start (Defrost)	Thermostat ON	Thermostat OFF
Control part								
Compressor	○	×	×	○	×	○	○	×
4-way valve	×	×	×	○	○	○	×	×
Outdoor fan	○	×	×	○	×	○	○	×
Indoor fan	○		○	○	○	○ / ×	○ / ×	
Condensate motor	○	× (5min. ON)	× (5min. ON)	× (5min. ON)			○	× (5min. ON)

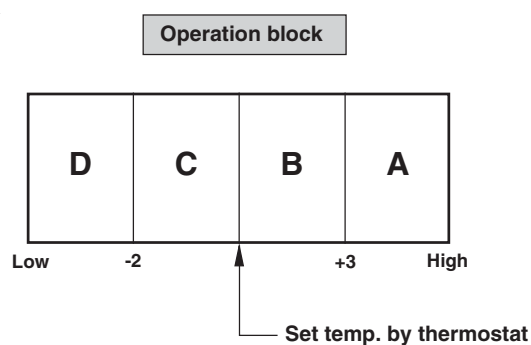
Note (1) ○ :ON

× :OFF

○ / × :According to control other than temperature control.

(d) Dehumidifying operation (“THERMAL DRY”)

The compressor, the indoor fan motor and the outdoor fan motor are operated intermittently under thermistor (Thi-A) control according to the appropriate operation block, to provide cooling operation for the dehumidifying.



Pattern of operation		
<div style="display: inline-block; width: 15px; height: 10px; background-color: #cccccc; border: 1px solid black; margin-right: 5px;"></div> CM, FM _o : ON <div style="display: inline-block; width: 15px; height: 10px; background: repeating-linear-gradient(45deg, transparent, transparent 2px, #cccccc 2px, #cccccc 4px); border: 1px solid black; margin-left: 10px; margin-right: 5px;"></div> FM _i : ON		
Operation block	Thermal drying starting (for 8 or 16 minutes after operation started)	Normal thermal dry operation (after completion of thermal drying)
A	(16 minutes) Normal cooling operation • The air flow is set at 1 speed lower than the set air flow.	(8 minutes) Continuous cooling operation (FM _i :Lo)
B		(8 minutes)
C	(8 minutes) 	(8 minutes)
D		(8 minutes) All stoppage

- Notes (1) Blocks (A) and (B): Normal cooling operation for 16 minutes after operation starts, then when the set temperature is reached, the thermostat stops. 16 minutes later, it switches to normal operation.
 Blocks (C) and (D): The operation mode shown in the table above is performed for 8 minutes. After 8 minutes, it switches to normal operation.
- (2) Under normal operation, the temperature is checked every 8 minutes after normal operation starts to determine which block is operating, then the operation mode is decided.

(e) Timer Operation

1) Simple Timer

This sets the amount of time from the current time that the air conditioner goes OFF.

The off time can be selected in 10 steps, from “Off 1 hour from now” to “Off 10 hours from now.” After the simple timer is set, the number of hours until the air conditioning goes off is displayed in one hour units from the current time.

2) Time Off Timer

The time the air conditioner goes OFF can be set in 10-minute increments.

3) Time On Timer

The time the air conditioner goes ON can be set in 10-minute increments. The set temperature can also be set at the same time.

4) Weekly timer

Each day, it is possible to set this timer's operation up to 4 times (on time, or off timer).

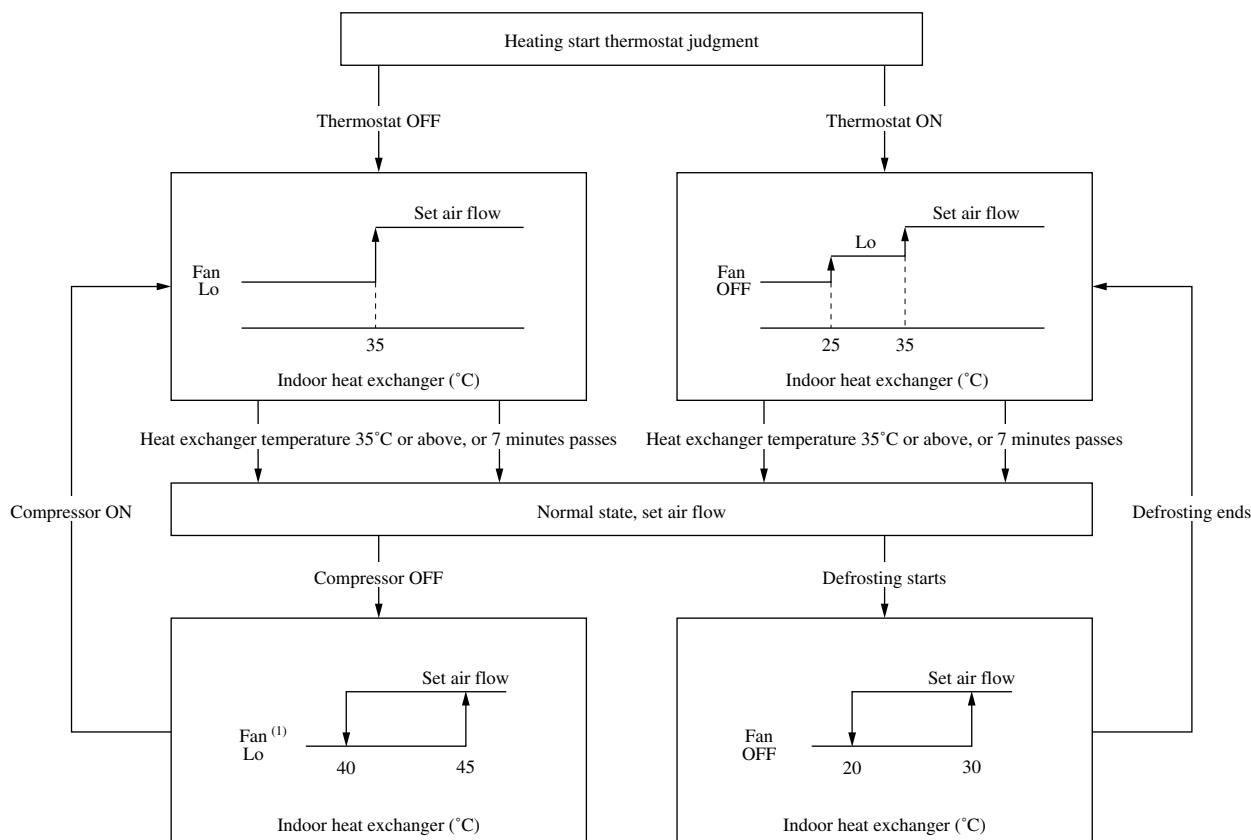
5) Possible joint use timer operation setting combinations

	Simple timer	Time off timer	Time on timer	Weekly timer
Simple timer		×	○	×
Time off timer	×		○	×
Time on timer	○	○		×
Weekly timer	×	×	×	

Note (1) ○: Possible, ×: Impossible

(f) Hot start (Cold draft prevention during heating)

When heating operation starts, when the thermostat is reset, during a defrosting operation or when resetting a heating operation, in order to prevent a cold draft, the indoor heat exchanger (sensed by Th1-R1 and R2) control the indoor fan.

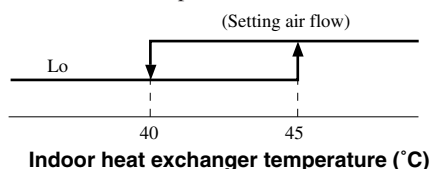


Notes (1) If J2 starts, it changes from OFF to Lo for 5 minutes.

(2) During Hot Start (the compressor is operating and the indoor fan is not operating at the set air flow), Heating preparation is displayed.

(g) FM control with the heating thermostat turned off (For cold draft prevention)

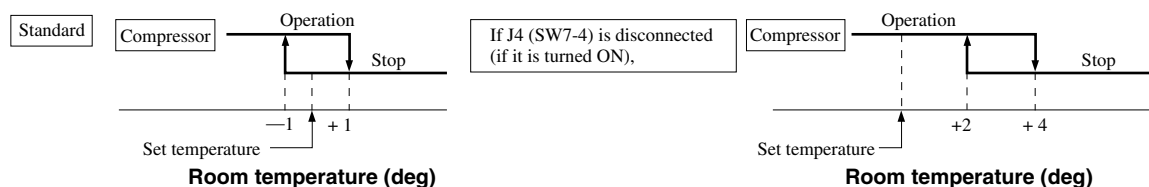
In order to prevent a cold draft while the heating thermostat is turned off, the indoor blower is controlled in response to the temperature of the indoor heat exchanger as illustrated below. It should be noted that if jumper wire J2 (SW7-2) on the indoor PCB is turned off, the indoor blower will stop so far as the temperature of the indoor heat exchanger is lower than 40°C. It will be turned to the Lo operation 5 minutes later.



Note (1) After the thermostat is reset, it returns to the hot start control.

(h) Room temperature sensing temperature compensation during heating

In the standard specifications, the temperature set on the thermostat is used to turn the compressor on and off, but in cases where the warm air easily escapes to the ceiling and the thermostat ends up turning off too soon, Jumper wire J4 (SW7-4) on the indoor PCB can be disconnected. When this is done, the compressor can be turned ON and OFF at the set temperature +3 degrees, and the feeling that the room is heated can be improved. However, the upper limit for the set temperature is 30°C.



(i) Filter sign

If operating time (the length of time the ON/OFF switch is ON) totals 180 hours⁽¹⁾, "FILTER CLEANING" is displayed on the remote control unit. (This is displayed whether the system is running or not, when the unit is broken down, and when there is central control.)

Notes (1) The following controls are enabled by the combination of the ON/OFF settings of 2 switches on the indoor unit PCB, SW5-3 and SW5-4. (They are switched OFF when the unit is shipped from the factory. The setting time is 180 hours.)

Switch	Function
SW5-3 OFF	Setting time: 180 hrs. (when shipped from factory)
SW5-4 OFF	
SW5-3 OFF	Setting time: 600 hrs. (Display)
SW5-4 ON	
SW5-3 ON	Setting time: 1000 hrs. (Display)
SW5-4 OFF	
SW5-3 ON	Setting time: 1000 hrs. (Unit stop)
SW5-4 ON	

(2) When SW5-3, SW5-4 is switched ON, the message "FILTER CLEANING" is displayed after the setting time has passed, then the unit stops after another 24 hours have passed (including stop time).

(j) Condensate pump motor (DM) Control

- Drain motor is started no sooner than the compressor is turned ON during cooling or dehumidifying operation. The drain motor continues to operate for 5 minutes after the stop of unit operation, stop with the error stop, thermostat stop and at switching from cooling or dehumidifying operation to blowing or heating operation. When there is any unit subjected to oil return control, the drain motor is operated for 5 minutes at such occasion.
- Overflow detection is performed by the float switch at all times regardless of the operating mode. If the float switch circuit is detected to be open continuously for 3 seconds (or when the float switch is disconnected or a wire is broken), an abnormal stop (E9) is performed and the condensate pump motor runs until the float switch recovers.

(k) Air flow mode control

Air flow mode control can be changed using DIP switch SW9-4 on the indoor PCB.

DIP SW Item	SW9-4 OFF (Standard)	SW9-4 ON (High speed)
Air flow mode	Hi, Me, Lo	UHi, Hi, Me

Notes (1) When the unit is shipped, SW9-4 is turned OFF.

(2) If SW9-4 is ON, the fan operates in Hi even during hot start and when the heating thermostat is OFF.

(l) Compressor inching prevention control

1) 3-minute timer

If the compressor stops due to operation of the thermostat, the Run switch on the remote controller or some trouble, it is not restarted after 3 minutes. However, when the power is turned ON, the 3-minute timer becomes inactive.

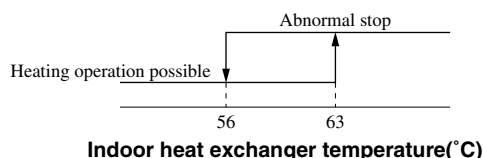
2) 3-minute forced operation timer

- For 3 minutes after the compressor goes ON, it does not stop. However, it will stop if the Run/Stop button is pressed and through a change in the operation mode, it still stop immediately when the thermostat goes OFF.
- During 3-minute forced operation timer control in heating operation, if the thermostat goes OFF, the louver position is set in the horizontal position.

Note (1) The compressor stops when protection control starts.

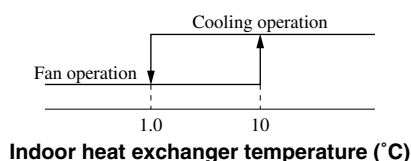
(m) Heating overload protection

If an overload condition is sensed continuously for 2 seconds by the indoor heat exchanger temperature during heating (sensed by Thi-R1 or R2), the compressor is stopped. After a 3-minute delay, the compressor is restarted. If the overload is sensed 5 times within 60 minutes of the first time it was detected, an abnormal stop is performed (E8). Also, if the overload state is sensed continuously for 6 minutes, it results in an abnormal stop.



(n) Frost prevention during cooling, dehumidification

In order to prevent frost during cooling and dehumidification, 3 minutes after compressor operation starts, if the indoor heat exchanger temperature (sensed by Thi-R1 or R2) is 3.5°C or lower for 30 seconds, the compressor's speed is lowered. 30 seconds later, if the indoor heat exchanger temperature is 3.5°C or lower, the speed is reduced still more. If the temperature becomes lower than 3.5°C continuously, this control is terminated. Furthermore, even if the compressor's speed is lowered, if the indoor heat exchanger becomes as shown in the diagram below, the unit switches to fan operation.



(o) Thermistor (Air return, heat exchanger) disconnected wire detection.

If the temperature sensed by the thermistor is -50°C or lower continuously for 5 seconds, the compressor stops. After a 3-minute delay, the compressor is restarted, but if a recurrence is detected within 60 minutes of the 1st time, or if it is sensed continuously for 6 minutes, it results in an abnormal stop (E6, E7).

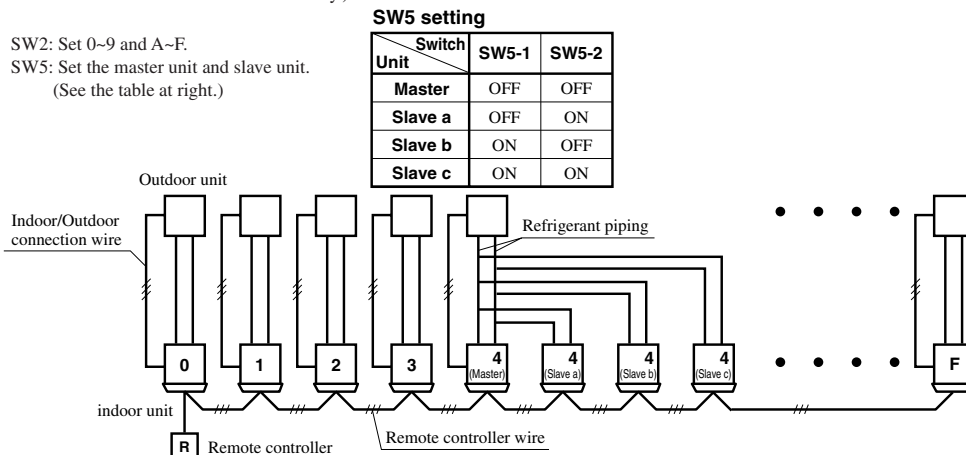
(p) Using 1 remote controller to control multiple units (indoor units - up to 16 units)

1) Function

A single remote control switch can be used for group control of multiple units (indoor units - up to 16 units). All units in the group that have had the remote control switch set at [Operating Mode] can be turned on and off in order of the unit number.

This functions independently of the thermostat and protection functions of each unit.

Notes (1) The unit No. is set using SW2 on the indoor unit control PCB. The SW2 unit No. setting only needs to be performed at the indoor units. For twin, triple or double twin specifications, setting of the master unit and slave units is necessary. This can be done using SW5. (All the units are set as the master unit at the factory.)



(2) If unit number is not important, random can be used. However, setting in order from 0, 1, 2, to F will ensure setting without error.

2) Display to remote controller

- a) **Remote or center and heating preparation:** Displays for the youngest unit for the remote mode (center mode if there is no remote mode) of the units in operation.
- b) **Inspection and filter sign:** Displays either to the first corresponding unit.

3) Confirmation of connected units

Pressing the "AIR CON No." switch on the remote control unit displays the indoor unit address. Pressing the ▲ or ▼ button displays the indoor units in the order of lowest to highest assigned No.

4) Error

- a) If an error occurs (protection device activation) with some of the units in the group, those units will have an error stop, but the properly operating units will continue operation.

b) Wiring outline

Route the wire connecting each of the indoor and outdoor units as it would be for each unit. Use the terminal block (X, Y, Z) for the remote control for the group controller and use a jumper wire among each of the rooms.

(q) External control (remote display) /control of input signal

1) External control (remote display) output

Following output connectors (CnT) are provided on the control PCB of indoor unit.

- Operation output: Power to engage DC 12V relay (provided by the customer) is outputted during operation.
- Heating output: Power to engage DC 12V relay (provided by the customer) is outputted during the heating operation.
- Compressor ON output: Power to engage DC 12V relay (provided by the customer) is outputted while the compressor is operating.
- Error output: When any error occurs, the power to engage DC 12V relay (provided by the customer) is outputted.

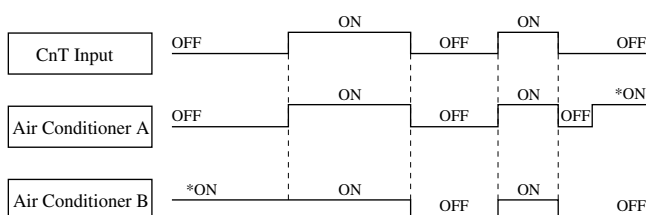
2) Control of input signal

(Make sure to connect the standard remote control unit. Control of input signal is not available without the standard remote controller.)

Control of input signal (switch input, timer input) connectors (CnT) are provided on the control PCB of the indoor unit. However, when the operation of air conditioner is under the Center Mode, the remote control by CnT is invalid.

- a) At shipping from factory J1 on PCB OFF

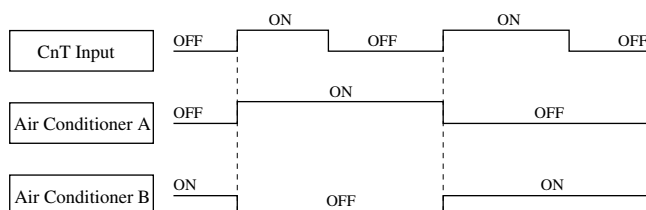
- Input signal to CnT OFF → ON [Edge input] ... Air conditioner ON
- Input signal to CnT ON → OFF [Edge input] ... Air conditioner OFF



Note (1) The ON at the * mark indicates ON using the remote control switch, etc.

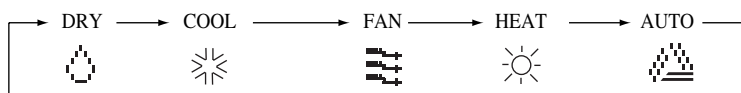
- b) When J1 on the PCB of indoor unit is turned on at the field.

Input signal to CnT becomes Valid at OFF → ON only and the motion of air conditioner [ON/OFF] is inverted.



(3) Operation control function by the wired remote controller

(a) Remote controller operation mode switching sequence



(b) CPU reset

If the “GRILL” switch and “CHECK” switch on the remote controller are pressed at the same time, this function is activated. Power supply reset and run are the same.

(c) Power failure compensation function

- By setting the remote control functions, setting of the “POWER FAILURE COMPENSATION SETTING” is enabled.
- The remote controller’s status is always stored in memory, and after the unit is reset following a power failure, operation is resumed using the memory contents. However, the auto swing stop position and timer mode are cancelled, but the weekly timer setting is reset on both friday and holidays.

After power is restored, by resetting the clock, then canceling each day’s holiday setting, the weekly timer’s setting is enabled.

- Contents stored in memory for power failure compensation are as follows.

Note (1) Items ⑥, ⑦ and ⑧ are stored in memory regardless of whether power failure compensation is enabled or disabled, and the quiet mode setting is cancelled regardless of whether power failure compensation is enabled or disabled.

① When there is a power failure running/Stopped

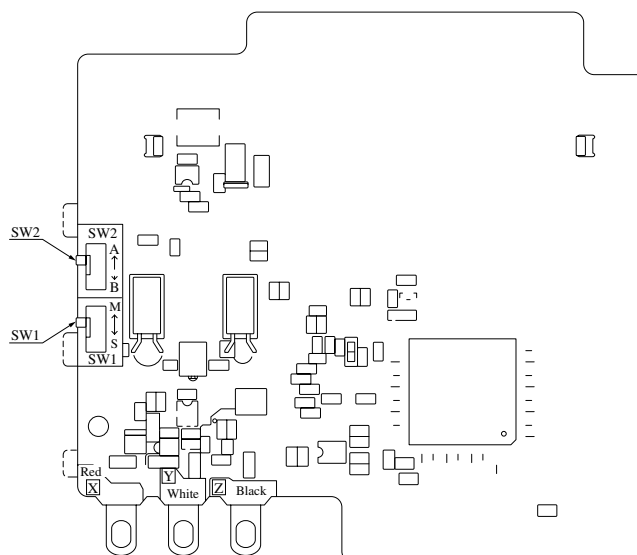
During operation in the off time timer mode and simple timer mode, the setting changes to stopped. (The timer mode is cancelled when power is restored, but the weekly timer setting for all days is changed to the holiday setting.)

- ② Operation mode
- ③ Fan speed mode
- ④ Room temperature setting
- ⑤ Louver auto swing/stop

However, the stop position (position 4) is cancelled and it becomes the horizontal position (1).

- ⑥ The remote control function item, set in accordance with the remote control setting (“Indoor unit function items” are stored in the indoor unit’s memory.)
- ⑦ Upper limit and lower limit values set by temperature setting control.
- ⑧ Weekly timer settings (other timer settings are not stored in memory).

Remote controller PCB parts arrangement



Control select switch (SW1)

Switch		Function
SW1	M	Master remote controller
	S	Slave remote controller

Note (1) SW2 is not normally used, so do not change the selection.

(4) Operation control function by the outdoor controller

◆ Models FDCVA201, 251

(a) Deciding the compressor speed

The indoor unit's return air temperature and the set temperature are used to carry out fuzzy calculations, then the required speed is decided. Speed control compensation is then activated to decide the speed.

Unit required speed

1) Dehumidify and cooling operation

Units: rps

Model \ Item	Outdoor unit	
	201	251
Maximum required speed	95	125
Minimum required speed	30	40

2) Heating operation

Units: rps

Model \ Item	Outdoor unit	
	201	251
Maximum required speed	95	125
Minimum required speed	30	40

(b) Compressor soft start control

1) Compressor protective start I

When conditions are as shown below, carry out compressor start I.

- The time since the previous stop is less than 6 hours, and this start is the 2nd or subsequent cumulative start since the power was turned ON.
 - The compressor begins synchronous operation 5 seconds after the thermostat ON conditions have been established.
 - The bottom limit compressor speed is 30 (40) rps, and the upper limit is 64 rps. If the compressor's speed is increased, it is increased by 6 rps/30 (40) seconds.
 - This control is terminated 3 minutes after the compressor has started.

Note (1) Values in () show for the 251 model.

2) Compressor protective start II

If any of the following conditions is satisfied, compressor start II is implemented.

- It has been 6 hours or longer since the power was turned on, and this is the first cumulative compressor start since the power was turned ON.
- If the compressor is stopped for 6 hours or longer, and this is the second or subsequent cumulative start since the power was turned ON.
 - The compressor begins synchronous operation 5 seconds after the thermostat ON conditions have been established.
 - 30 seconds after the compressor started, the compressor speed is increased by 2 rps/sec. from the lower limit value to the upper limit value.
 - After item ② is terminated, the compressor's speed is retained at the lower limit value for 3 minutes after the compressor starts.
 - After item ③ is terminated, if the compressor's speed becomes greater than the lower limit speed, the compressor's speed is increased by 6 rps/30 sec. for 6 minutes after the compressor is started.

Units: rps

Model \ Item	Lower limit value	Upper limit value
FDCVA201	30	64
FDCVA251	40	64

3) Compressor protective start III

When the following conditions are satisfied, compressor start III is implemented.

- a) Less than 6 hours have passed since the power was turned ON, and this is the 1st time the compressor has been started since the power was turned ON.
 - ① The compressor begins synchronous operation 5 seconds after the thermostat ON conditions have been established.
 - ② 30 seconds after the compressor started, the compressor speed is increased by 2 rps/sec. from the lower limit value to the upper limit value.
 - ③ After item ② is terminated, the compressor's speed is retained at the lower limit value for 3 minutes after the compressor starts.
 - ④ After item ③ is terminated, if the compressor's speed becomes greater than the lower limit speed, the compressor's speed is increased by 6 rps/2 minutes for 11 minutes after the compressor is started.

Units: rps

Model \ Item	Lower limit value	Upper limit value
FDCVA201	30	64
FDCVA251	40	64

Compressor soft start control

		Initial start remotecontrol unit ON, Trouble solved	Thermostat ON start	
			When the thermostat is OFF, there is an operating mode change.	When the thermostat is OFF, there is no operating mode change.
First time since the compressor was turned ON	Less than 6 hours since the power was turned ON	In accordance with the following [conditions]		
	6 hours or longer since the power was turned ON	Protective start II	Protective start II	Protective start II
2nd or subsequent time since the compressor was turned ON	Less than 6 hours since stop	Protective start I	Protective start I	Protective start I
	6 hours or longer since stop	Protective start II	Protective start II	Protective start II

[Conditions]

The discharge pipe temperature (Tho-D) and outdoor air temperature (Tho-A) are detected.

- If the discharge pipe temperature (Tho-D) minus the outdoor air temperature (Tho-A) is ≥ 15 degrees, protective start II is implemented.
- If the discharge pipe temperature (Tho-D) minus the outdoor air temperature (Tho-A) is < 15 degrees, protective start III is implemented.

(c) Compressor protective control according to operating speed

1) Compressor protection during high speed operation

When the compressor is operated at speeds exceeding 100 rps for 30 minutes, the upper limit for the compressor's speed is made 100 rps for 3 minutes.

2) Compressor protection during low speed operation

When the compressor is operated at speeds below 26 rps for 60 minutes, the lower limit for the compressor's speed is made 30 rps for 15 seconds.

(d) Outdoor fan control

(i) Outdoor fan tap and fan motor control contents during control

FDCVA201

Cooling	Compressor speed (rps)	less than 46	46 to less than 66	66 to less than 80	80 or more
	Outdoor unit fan tap	4th speed (520 rpm)	5th speed (570 rpm)	6th speed (685 rpm)	7th speed (740 rpm)
Heating	Compressor speed (rps)	less than 62	62 to less than 82	82 to less than 92	92 or more
	Outdoor unit fan tap	4th speed (520 rpm)	5th speed (570 rpm)	6th speed (685 rpm)	7th speed (740 rpm)

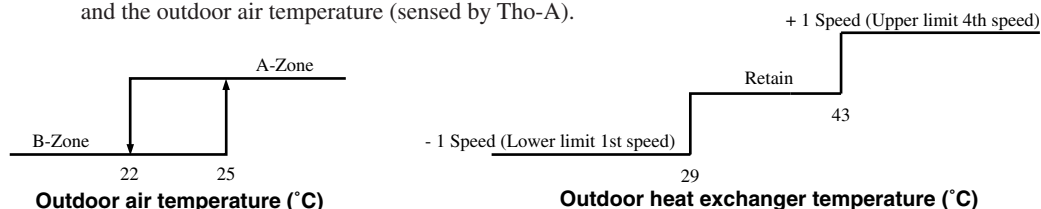
FDCVA251

Cooling	Compressor speed (rps)	less than 46	46 to less than 66	66 to less than 80	80 or more
	Outdoor unit fan tap	4th speed (520 rpm)	5th speed (570 rpm)	6th speed (685 rpm)	7th speed (740 rpm)
Heating	Compressor speed (rps)	less than 62	62 to less than 82	82 to less than 104	104 or more
	Outdoor unit fan tap	4th speed (520 rpm)	5th speed (570 rpm)	6th speed (685 rpm)	7th speed (740 rpm)

(ii) Outdoor unit fan tap control

1) Fan tap control during low outdoor temperature cooling

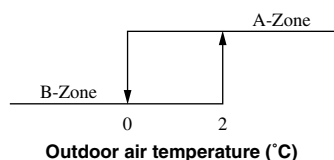
The outdoor unit's fan is controlled in accordance with the outdoor heat exchanger temperature (sensed by Tho-R) and the outdoor air temperature (sensed by Tho-A).



- After detecting the B-zone temperature, the outdoor fan tap speed is immediately raised to 4th speed and this speed is retained for 20 seconds. 4th speed is made the upper limit and 1st speed is made the lower limit. Also, sampling of the outdoor heat exchanger temperature is done at 20-second intervals and the outdoor unit fan tap's speed transitions are made immediately.
- Control is cancelled when it is judged that the outdoor temperature is in the A-Zone and the outdoor fan tap is running in 3rd speed or higher. Also, if it is running at 2nd speed and ends up in the A-Zone, if the outdoor heat exchanger temperature is 43°C or higher, this control is cancelled.

2) Outdoor unit fan tap control during heating

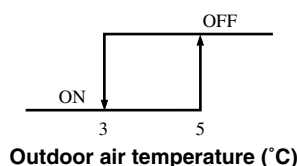
If the outdoor air temperature (sensed by Tho-A) is detected in the B-Zone for 5 minutes continuously, the outdoor fan tap speed is increased by 2 speeds and thereafter, this may be repeated, but the upper limit is made 7th speed.



- When the compressor is ON and the outdoor unit fan motor's outputting, if the outdoor fan motor's speed is 75 rpm or lower for 30 seconds or longer, the compressor is stopped immediately. 3 minutes after the compressor is stopped, if the thermostat ON conditions are satisfied, the compressor is started.
- If the condition in item 3) is detected 5 times within 60 minutes after the first detection, an abnormal stop occurs and an error message (E48) is displayed.

(e) Snow protection fan control

If SW5-2 on the outdoor unit PCB is turned ON, a full stop results. Then in the abnormal stop mode and with the thermostat OFF unit's outdoor fan outdoor temperature at 3°C or lower, the fan is run for 10 seconds at 6th speed once every 10 minutes.



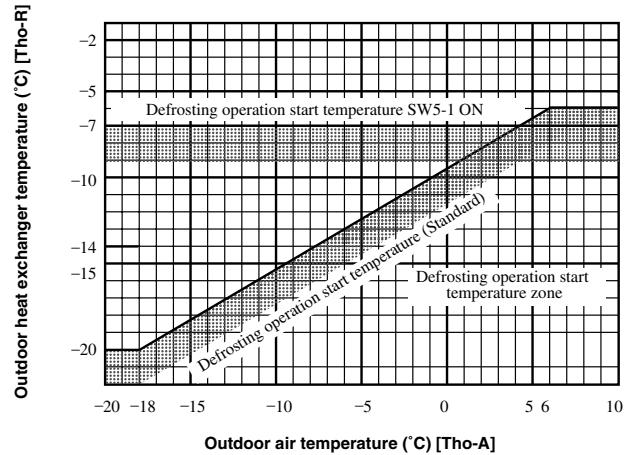
(f) Defrosting

1) Defrosting start conditions

Defrosting operation starts when all the following conditions are satisfied.

- If 45 minutes (35)⁽¹⁾ of cumulative compressor operating time have passed since defrosting ended and cumulative compressor operating time of 30 minutes have passed since heating operation started (Remote controller: ON)
- If 5 minutes have passed since the compressor went ON.
- 5 minutes of outdoor fan operation have passed.
- After all the above conditions have been met, when the temperature sensed by the outdoor heat exchanger temperature thermistor (Tho-R) and outdoor temperature thermistor (Tho-A) continues for 30 seconds and drops below the dehumidifying operation start temperature shown in the figure at right.

Note (1) Values in () show in the case of the 251 model.



2) Defrosting start temperature change procedure

Turn SW5-1 on the outdoor unit PCB ON.

- A cumulative total of 30 minutes of compressor operating time has passed since defrosting ended.
- When the temperature at the outdoor heat exchanger thermistor (Tho-R) and the temperature at the outdoor air temperature thermistor (Tho-A) is below the defrost operation start temperature continuously for 30 seconds.
- Other than items a) and b), the same as standard conditions.

3) Defrosting end conditions

If any of the following conditions is satisfied, the defrosting end operation starts.

- If 10 minutes⁽¹⁾ have passed since defrosting started.

Note (1) This setting can be changed to 13minutes by turning SW5-1 on the outdoor unit PCB ON.

- If the temperature at the outdoor heat exchanger thermistor (Tho-R) is 12°C or higher continuously for 2 seconds.

(g) Compressor protection control

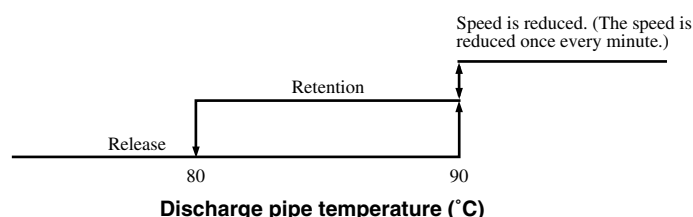
(i) Compressor overcurrent protection

- If a value at or higher than the set value is detected continuously for approximately 0.5 second in the L1 and L3 phases (1 phase model: L phase) on the secondary side of the 52C (sensed by the current sensor (CT)), the compressor stops. After a 3-minute delay, the compressor restarts if the detected current is 1.5 ~ 2 A or lower, but if this condition is repeated 5 times within 60 minutes of the first detection, the unit is subjected to an abnormal stop (E33).
- After the compressor stops the first time, if 60 seconds pass with the detected current not dropping to 1.5~2 A or lower for 60 minutes, An abnormal stop is performed after the first time.

(ii) Discharge pipe temperature control

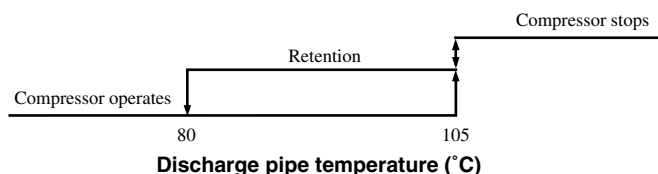
If the discharge pipe temperature (sensed by Tho-D) exceeds the set value, the compressor speed is controlled to prevent the discharge pipe temperature from rising. If it continues to rise anyway, the compressor is stopped.

1) Compressor speed (Expansion valve) control



2) Abnormal discharge pipe temperature

- a) If the discharge pipe temperature rises to 105°C or higher, the compressor is stopped [the outdoor unit's fan motor stops 1 minute later. If the temperature drops to 80°C or lower, the compressor recovers automatically.



- b) If the abnormal discharge pipe temperature occurs 2 times in 60 minutes, or continues at 105° or higher for 60 minutes, including when the compressor is stopped, the unit performs an abnormal stop (E36).

Note (1) If the abnormal discharge pipe temperature continues for 45 minutes from the time it first occurs and does not drop below 80°C, the compressor cannot be operated again.. (It can be reset using the remote control unit.)

(iii) Current safe control

- 1) If the current value input at the inverter inlet becomes higher than the set value, the compressor's speed is reduced. If the value continues to be higher than the set value even when the compressor speed is reduced, the speed is reduced again.
- 2) If the problem continues for 3 minutes and the temperature drops below the cancellation value, this control ends and the compressor begins speed protection release operation.

(iv) High pressure control

1) Heating

- a) The compressor speed is reduced to control high pressure in accordance with the indoor heat exchanger temperature (sensed by Thi-R) after the compressor starts.

Model \ Item	Compressor speed (rps)	Indoor heat exchanger temperature (°C)
FDCVA201, 251	less than 88	57 or more
	88 to less than 108	52 or more
	108 or more	47 or more

- b) When the outdoor air temperature (sensed by Tho-A) is 17°C or higher, the compressor's speed is reduced and the outdoor unit's fan motor tap is changed to 2nd speed, in order to raise the high pressure under the heating overload conditions. Furthermore, the upper limit of the compressor's speed during control is 60 rps.

2) Cooling

- a) When the temperature at the outdoor heat exchanger (sensed by Tho-R) and the outdoor air temperature (sensed by Tho-A) is 41°C or higher after the compressor starts, the compressor's speed is reduced and the outdoor unit's fan motor tap is changed to high speed operation at 7th speed.

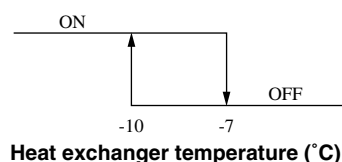
Model \ Item	Compressor speed (rps)	Indoor heat exchanger temperature (°C)
FDCVA201, 251	less than 88	58.5 or more
	88 to less than 108	53.5 or more
	108 or higher	48.5 or more

- b) If the outdoor heat exchanger temperature (sensed by Tho-R) is sensed 5 times in 60 minutes during compressor operation, or sensed continuously for 10 minutes, including when the compressor is stopped, an abnormal stop is performed.

Model \ Item	Compressor speed (rps)	Indoor heat exchanger temperature (°C)
FDCVA201, 251	less than 88	65 or more
	88 to less than 108	60 or more
	108 or more	55 or more

(v) Heating low outdoor temperature protection control

If a temperature of -10°C is sensed at the heat exchanger (sensed by Tho-R) continuously for 1 minute during operation, the upper limit of the compressor speed is changed to 100 rps.



(h) Inverter protection control

1) Current cut control

This prevents overcurrent in the inverter unit. If the current exceeds the set value, the compressor is stopped. It restarts automatically after 3 minutes, but if current cut operates 3 times in a period of 20 minutes, an abnormal stop (E42) is performed.

2) Power transistor temperature control

The power transistor's temperature is detected from the time when the compressor starts operation. When the temperature at speeds that are higher than the set speed is 82°C or higher, the compressor's speed is controlled. If the power transistor's temperature drops to 77°C or lower, protection control is cancelled.

3) Excessive voltage protection control

The converter's voltage is detected, and if it exceeds approximately 340V, abnormal detection control is exercised. If the same trouble occurs 3 times in 20 minutes after the compressor starts, or if it continues unchanged for 15 minutes, an abnormal stop (E47) is performed.

(i) Thermistor disconnection (discharge pipe, outdoor heat exchanger and outdoor temperature thermistor)

1) Outdoor heat exchanger temperature, outdoor air temperature thermistor

If the detected temperature is -30°C or lower at the outdoor heat exchanger temperature thermistor and outdoor air temperature thermistor continuously for 5 seconds during the interval from 2 minutes to 2 minutes 20 seconds after the compressor goes ON, the compressor is stopped. After a 3-minute delay, the compressor is restarted, but if this condition is detected 3 times in a 40-minute period an abnormal stop is performed.

Note (1) The temperature is not detected during defrosting or for 3 minutes after defrosting is ended.

2) Discharge pipe temperature thermistor

If the detected temperature is -10°C or lower continuously for 5 seconds during the interval from 10 minutes to 10 minutes 20 seconds after the compressor goes ON, the compressor is stopped. After a 3-minute delay, the compressor is restarted, but if this condition is detected 3 times in a 40-minute period an abnormal stop is performed.

Note (1) The temperature is not detected during defrosting or for 3 minutes after defrosting is ended.

3) Power transistor temperature thermistor

If the detected temperature is -10°C or lower continuously for 5 seconds during the interval from 10 minutes to 10 minutes 20 seconds after the compressor goes ON, the compressor is stopped. After a 3-minute delay, the compressor is restarted, but if this condition is detected 3 times in a 40-minute period, an abnormal stop is performed.

(j) Silent mode control

If the "Silent Mode Start" signal is received from the remote control unit, silent mode operation is started.

- 1) The fan is run at speed 5 when the outdoor unit fan control speed in item (d) is 6 or 7.

(Speed 5 is made the maximum speed.)

(k) Abnormal stop due to starting of the compressor

- (a) If the compressor's DC motor's rotor position detection operation cannot be executed 5 seconds after compressor starting conditions are established, it is switched to the stop state temporarily, then after 3 minutes the detection operation is executed.
- (b) If the position detection operation cannot be executed the second time, compressor start is judged to be abnormal, and an abnormal stop (E59) is performed.

(l) Compressor rotor lock trouble

If, within 4 seconds after changing to compressor rotor position detection operation, the rotor's position cannot be detected a second time, the compressor is stopped. After 3 minutes, the compressor recovers automatically, but if this condition recurs 4 times in a 15-minute period, an abnormal stop (E60) is performed.

(m) Insufficient refrigerant protection control

1 minute after the compressor is started in the case of cooling and dehumidification, and 9 minutes after in the case of heating, the indoor heat exchanger temperature (sensed by Thi-R) and indoor return air temperature (sensed by Thi-A) are detected and the compressor is stopped.

- 1) If the following conditions continue uninterrupted for 1 minute or longer

• During cooling and dehumidification: The indoor heat exchanger temperature (Thi-R) is 4 degrees higher than the indoor return air temperature (Thi-A).

• During heating: The indoor heat exchanger temperature (Thi-R) is 4 degrees lower than the indoor return air temperature (Thi-A).

- 2) If the controls in item 1) are implemented 3 times within 30 minutes, an abnormal stop is performed and an error message is displayed (E57).

(n) Low voltage protection control

If a power supply voltage of 176 V or lower is detected while the compressor is stopped, or if a power supply voltage of 176 V or lower is detected for 3 minutes during compressor operation, the compressor is stopped.

(o) Test operation

- 1) It is possible to operate the outdoor unit using SW9 and SW5-4 on the outdoor unit PCB.

SW9	After pressing continuously for 1 second	SW5-4	ON	Cooling test operation
			OFF	Heating test operation
		Test operation is ended by pressing SW9 (SW2) during test operation.		

- 2) Test operation control

- Operates the air conditioner at the predetermined maximum speed for each model.
- Each protective control and abnormal sensing control is activated.
- If SW5-4 is switched back during test operation, stop control is implemented and the cooling and heating operations are toggled.
- Remote control unit settings and displays during test operation

Capacity Mode	Remote control unit settings, display contents
Cooling operation	The initial setting temperature is 5°C.
Heating operation	The initial setting temperature is 30°C.

◆ **Models FDCVA302 ~ 1002**

(a) Deciding the compressor speed

The indoor unit's return air temperature and the set temperature are used to carry out fuzzy calculations, then the required speed is decided. Speed control compensation is then activated to decide the speed.

Unit required speed

(i) Dehumidify and cooling operation

Units: rps

Model Item	Outdoor unit					
	302	402	502	602	802	1002
Maximum required speed	88	90	105	105	100	120
Minimum required speed	20	40	40	40	30	30

(ii) Heating operation

Units: rps

Model Item	Outdoor unit					
	302	402	502	602	802	1002
Maximum required speed	95	90	105	115	100	120
Minimum required speed	20	40	40	40	30	30

(b) Compressor start control

At the point when compressor operating conditions are established, the control in either item (i) or item (ii) is executed.

- The first time the compressor starts after the power is turned ON, or when the operating mode is the same as the operating mode the previous time the compressor ran, the compressor starts 5 seconds after the compressor ON conditions are established. However, in the case of models 802 and 1002, the bypass solenoid valve (SV2) goes ON, then the compressor starts 5 seconds later.
- If the mode reverses from the previous operating mode, the 4-way valve is switched 10 seconds after the compressor's ON conditions are established, then 10 seconds after that, the compressor starts. However, in the case of models 802 and 1002, after the 4-way valve switches, the bypass solenoid valve (SV2) goes ON, then 10 seconds after that, the compressor starts.

(c) Compressor soft start control

(i) Compressor protective start I

- Compressor protective start I is executed when the compressor starts.
- Control contents
 - The commanded speed is set at 55 (Cooling: 42, Heating: 62) rps 30 seconds after the compressor starts, and the increase in speed at this time is 6 rps/30 seconds.

Note (1) Values in () show in the case of the 302 model.

- 4 (Heating:2) minutes after the compressor starts, the speed is set at the target speed.

(ii) Compressor protective start III

- 1) The first additional time the compressor starts after the power is turned ON, compressor protective start III is executed.

2) Control content

a) Momentary stop judgment control

When 3 minutes have passed since the power was turned ON, the following judgment is implemented.

- i) When the discharge pipe temperature (Tho-D) is 15°C or more higher than the outdoor air temperature (Tho-A), it is judged that an instantaneous stop is required. This control is stopped and the compressor is started under compressor protective start I.
- ii) When the discharge pipe temperature (Tho-D) is less than 15°C above the outdoor air temperature (Tho-A), control changes to the operation mode judgment control in item b).

Note (1) The compressor is not started for 3 minutes after the power supply is ON.

b) Operation mode judgment control

Control changes to the following control required from the indoor units or in accordance with the SW3-4 (SW5-4) setting (switching between cooling/heating) in test run control.

Note (1) Values in () show in the case of the 302 model.

■ Model FDCVA302

- When in the cooling and dehumidifying mode, control is switched to cooling start conditions judgment control in item i).
- When in the heating mode, control is switched to high dilution operation prevention control in item v).

■ Models FDCVA402 ~ 1002

- When in the cooling and dehumidifying mode, control changes to low speed operation control in item v).
- When in the heating mode, control changes to high dilution operation prohibited control in item vi).

i) Cooling start conditions judgment

If any of the following conditions is established, control is switched to low speed operation control in item vi). Also, if none of these conditions is established, control is switched to high dilution operation prevention control in item ii).

Conditions

- ① 6 hours have passed since the power was turned ON.
- ② The outside temperature (Tho-A) is 5°C or higher.

ii) High dilution operation prevention control

If any of the following conditions is established, operation changes to forced heating operation in item iii).

Conditions

- ① 30 minutes have passed since the power was turned ON.
- ② SW8-2 (Compressor dilution timer cancel) is ON.

iii) Forced heating operation

- ① In the heating mode, the speed is set at the starting speed in compressor protective start I, 42 rps, and at this time, the speed is increased by 6 rps every 30 seconds.
- ② 2 minutes after starting, operation is in accordance with the target speed, but if the compressor stops during this control (including when the remote control is used to turn it OFF), this control is repeated.
- ③ After 10 minutes, control is switched to low speed operation control in item vi).

iv) Low speed operation control (Cooling, Dehumidifying mode)

- ① Compressor protective start I is implemented at the following compressor speeds and times.
 - Model 302: Specified speed: 20 rps, Time: 10 min.
 - Models 402~602: Specified speed: 55 rps, Time: 10 min.
 - Models 802~1002: Specified speed: 30 rps, Time: 10 min.

Note (1) During this control, if the compressor is stopped using a remote controller, etc., this control is repeated.

- ② This control ends after 10 minutes of operation.

③ If the conditions of the following are established, it is judged that the service valve is closed and abnormal stop occurs (E49).

- When the low pressure sensor (LPT) measures 0.079 MPa or lower continuously for 15 seconds.
- When the indoor unit's heat exchanger temperature (ThI-R) after 1 minutes has passed since the compressor started is 4°C lower than the indoor unit air return temperature (ThI-A) continuously for 1 minute or longer. (Only FDCVA402 ~ 1002 models)

Note (1) This can be canceled using the check reset from the remote controller. However, when the low pressure sensor (LPT) is 0.227 MPa or higher.

v) High dilution operation prohibition control (Heating mode)

If any of the following conditions is established, control changes to the low speed operation control in item vi).

- 30 min. has passed since the power was turned ON.
- SW5-2 (SW8-2) is ON (for emergency measures)
- If the outside air temperature (Tho-A) and under-dome temperature (Tho-C) is outside the shaded region shown in the following diagram. (Models 802~1002 only)

Note (1) Values in () show in the case of the 302 model.

vi) Low speed operation control (Heating mode)

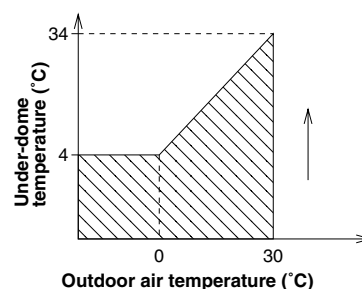
① Compressor protective start I is implemented at the following compressor speeds and times.

- Model 302: Specified speed: 42 rps, Time: 10 min.
- Models 402~602: Specified speed: 55 rps, Time: 10 min.
- Models 802, 1002: Specified speed: 30 rps, Time: 10 min.

Note (1) During this control, if the compressor is stopped by the remote controller, etc., this control is repeated.

② This control is stopped after 10 minutes of operation.

③ If the high pressure switch (63H1) is turned OFF, it is judged that the operation valve is closed and an abnormal stop (E40) occurs.



(d) Outdoor unit fan control

(i) Contents of fan tap and fan motor control during control

Unit: min⁻¹

Model	302		402		502, 602		802, 1002			
	Cooling	Heating	Cooling	Heating	Cooling	Heating	Cooling		Heating	
	FM01	FM01	FM01	FM01	FM01	FM01	FM01	FM02	FM01	FM02
Fan tap										
6th speed	850	870	870	870	870	870	910	910	910	910
5th speed	810	760	790	790	790	790	850	850	850	850
4th speed	740	650	740	740	740	740	800	800	800	800
3th speed	600	500	600	600	600	600	540	540	540	540
2th speed	400	350	400	400	400	400	350	350	350	350
1th speed	200	200	200	200	200	200	200	200	200	200

(ii) Fan tap control when started

- 1) During heating and defrosting fan control
 - a) The outdoor unit's fan is started in 4th speed simultaneously with the start of compressor operation.
 - b) After 20 seconds of operation in 4th speed, outdoor fan control in item (iii) is executed.
- 2) During cooling, dehumidifying
 - a) When the outdoor air temperature (Tho-A) is 20°C or higher, the outdoor unit fan starts simultaneously with the compressor. The fan tap runs in 4th speed when starting and after 20 seconds, outdoor unit fan control in item (iii) is executed. (Normal control)
 - b) When the outdoor air temperature (Tho-A) is lower than 20°C, the outdoor unit fan starts 10 seconds after the compressor starts. The fan tap runs in 3rd speed when starting and after 20 seconds, outdoor unit fan control in item (iii) is executed.
 - c) When the outdoor air temperature (Tho-A) is lower than 10°C, the outdoor unit fan starts 10 seconds after the compressor starts. The fan tap runs in 2nd speed when starting and after 20 seconds, outdoor unit fan control in item (iii) is executed. (only case of 302 model)
 - d) When the outdoor air temperature (Tho-A) is less than -5°C, the outdoor unit fan starts 10 seconds after the compressor starts. The fan tap runs in 1st speed when starting and after 20 seconds, outdoor unit fan control in items (iii) and (iv) is executed.

(iii) Outdoor unit fan control

- 1) Fan tap control during cooling and dehumidifying

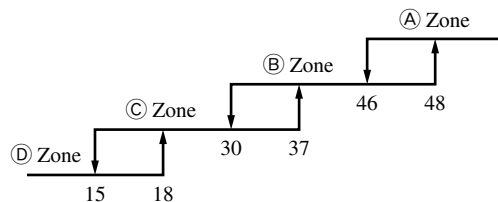
The fan tap's speed is changed in accordance with the outdoor unit heat exchanger temperature (Tho-R1, R2) and outdoor air temperature (Tho-A).

Note (1) Either the Tho-R1 or R2 temperature, whichever temperature is sensed to be higher (Tho-R2 in models 802 and 1002 only).

• 302 ~ 602 models

	(A) Zone	(B) Zone	(C) Zone	(D) Zone
(a) Zone	5(6)th Speed	6th Speed	5th Speed	4th Speed
(b) Zone	5th Speed	5th Speed	4th Speed	3th Speed
(c) Zone	4th Speed	4th Speed	3th Speed	2th Speed
(d) Zone	3th Speed	3th Speed	2th Speed	1th Speed

Note (1) Values in () show in the case of the 302 model.

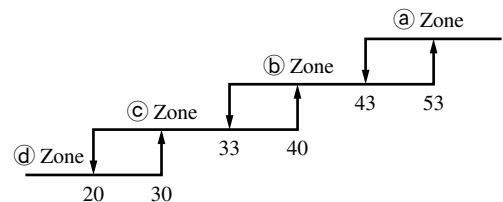


Outdoor air temperature (°C)

• 802 ~ 1002 models

	(A) Zone	(B) Zone	(C) Zone	(D) Zone
(a) Zone	5th Speed	6th Speed ⁽¹⁾	5th Speed	4th Speed
(b) Zone	5th Speed	5th Speed	4th Speed	3th Speed
(c) Zone	4th Speed	4th Speed	3th Speed	2th Speed
(d) Zone	3th Speed	3th Speed	2th Speed	1th Speed

Note (1) If jumper J7 on the outdoor unit's control PCB is disconnected (open), the fan tap speed changes from 6th speed to 5th speed.



Outdoor heat exchanger temperature (°C)

- 2) Fan tap control during heating

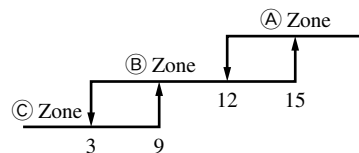
The fan tap's speed is changed in accordance with the outdoor unit heat exchanger temperature (Tho-R1, R2) and outdoor air temperature (Tho-A).

Note (1) Either the Tho-R1 or R2 temperature, whichever temperature is sensed to be higher (Tho-R2 in models 802 and 1002 only).

• 302 ~ 602 models

	(A) Zone	(B) Zone	(C) Zone
(a) Zone	3(2)th Speed	3th Speed	4th Speed
(b) Zone	3th Speed	4th Speed	5th Speed
(c) Zone	4th Speed	5th Speed	6th Speed

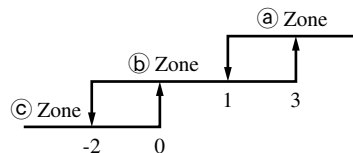
Note (1) Values in () show in the case of the 302 model.



Outdoor air temperature (°C)

• 802 ~ 1002 models

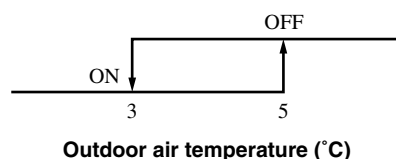
	(A) Zone	(B) Zone	(C) Zone
(a) Zone	3th Speed	3th Speed	4th Speed
(b) Zone	3th Speed	4th Speed	5th Speed
(c) Zone	4th Speed	5th Speed	6th Speed



Outdoor heat exchanger temperature (°C)

3) Snow protection fan control

When DIP switch (SW3-2) on the outdoor unit's control PCB is ON or when in the stop mode or the abnormal stop mode, the outdoor unit's fan runs at 4th speed for 1 minute and 30 seconds every ten minutes in accordance with the outdoor air temperature (sensed by Tho-A).



4) Cautions concerning outdoor unit fan start control

Before the compressor starts, if the outdoor unit's fan runs for 400 min⁻¹ or longer (including in reverse), the compressor may run by itself without the outdoor unit fan starting. This is not a breakdown.

5) If the outdoor unit's fan motor is sensed to be abnormal

- If the compressor is ON and the outdoor unit fan motor is turning at 100 min⁻¹ or less or is turning in reverse for 30 seconds or longer, the compressor stops instantly. After the compressor is stopped for 3 minutes, if the thermostat's ON conditions are established, the compressor starts.
- If it is detected 5 times within 60 minutes after the first detection, an abnormal stop (E48) occurs.

6) Outdoor unit fan control by power transistor cooling fan temperature

If all the following conditions are established 3 minutes after the compressor starts, the following control is implemented.

a) Cooling, Dehumidifying

- Outdoor air temperature Tho-A $\geq 33^{\circ}\text{C}$
- Actual compressor speed $\geq \text{A rps}$
- Power transistor cooling fan temperature $\geq \text{C}^{\circ}\text{C}$

b) Heating

- Outdoor air temperature Tho-A $\geq 16^{\circ}\text{C}$
- Actual compressor speed $\geq \text{B rps}$
- Power transistor cooling fan temperature $\geq \text{C}^{\circ}\text{C}$

c) Control contents

- The outdoor unit fan tap speed is increased by 1 speed.
- When sampling is done once every 60 seconds and the power transistor cooling fan temperature (Tho-P) value is as follows.
 - If the power transistor cooling fan temperature (Tho-P) is $\geq \text{C}^{\circ}\text{C}$, the outdoor unit fan tap's speed increases by 1 speed.
 - If $\text{C}^{\circ}\text{C} > \text{Tho-P} \geq \text{D}^{\circ}\text{C}$, the current outdoor unit fan tap speed is maintained.
 - If the power transistor cooling fan temperature (Tho-P) is $\leq \text{D}^{\circ}\text{C}$, the outdoor unit fan tap speed is lowered by 1 speed.

d) End conditions

When the conditions in item ③ above and the outdoor unit fan tap speed determined in item (i) are sensed 2 times in succession.

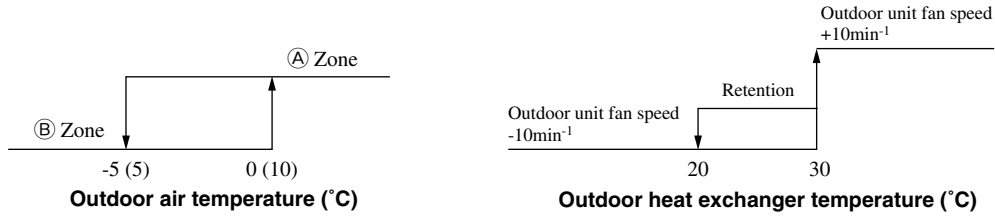
- Compressor speed and power transistor cooling fan temperature

Model \ Item	A	B	C	D
302	60	70	80	75
402	70	70	72	68
502	85	85	72	68
602	90	90	80	75
802	70	70	80	75
1002	90	90	80	75

(e) Outdoor unit fan control during cooling when the outdoor air temperature is low

- (i) When cooling or defrosting, if the outdoor air temperature (Tho-A) is in Zone B and when the outdoor unit's fan has run for 20 seconds since starting and is running at 1 speed, the outdoor unit's fan speed is controlled in accordance with the outdoor heat exchanger temperature (Tho-R1, R2).

Note (1) Whichever of the two readings, Tho-R1 or R2, is highest (Tho-R2 is used in models 802 and 1002 only).



Note (1) Values in () show in the case of the 302 model.

- (ii) If the rotational speed drops, the speed is held constant for 20 seconds, then if the conditions in (i) exist after 20 seconds, the speed is lowered further. The same is true in the case that the speed is increased. The speed is held constant for 20 seconds, then if the conditions in (i) exist 20 seconds later, the speed is increased further.

- Speed lower limit: 130 rpm
- Speed upper limit: 400 (500) rpm

Note (1) Values in () show in the case of the 302 model.

- (iii) If any of the following conditions is established, this control ends and the fan runs at the fan tap set in item (d). (iii).
- 1) The outdoor air temperature (Tho-A) is in Zone A and the outdoor heat exchanger temperature (Tho-R1, R2) is sensed to be 30°C or higher continuously for 40 seconds or longer.
 - 2) The outdoor unit's fan speed is 400 (500) min⁻¹, and the outdoor heat exchanger temperature (Tho-R1, R2) is sensed to be 30°C or higher continuously for 40 seconds or longer.

Note (1) Values in () show in the case of the 302 model.

- 3) The outdoor heat exchanger temperature (Tho-R1, R2) is sensed to be 45°C or higher continuously for 40 seconds or longer.

(f) Defrosting

(i) Defrosting start conditions

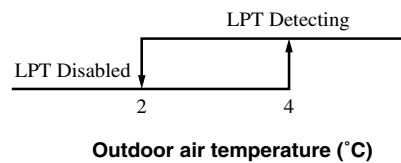
If all the following defrosting conditions A and B are satisfied, defrosting operation starts.

1) Defrosting conditions A

- If 45 (30) minutes of cumulative compressor operation passes and after defrosting ends and if there is 30 (37) minutes of cumulative compressor operating time after heating begins (with the remote control ON).

Note (1) Values in () show in the case of the 302 model.

- 5 minutes passes after the compressor goes ON.
- 5 minutes passes after the outdoor unit fan runs.
- After all the above conditions are satisfied, if the temperature sensed by the outdoor heat exchanger thermistor (Tho-R1, R2) and outdoor air temperature thermistor (Tho-A) remains at the defrosting start temperature or lower as shown in the figure at right for 15 seconds continuously, or the intake gas saturation temperature (SST), obtained from the low pressure sensor's (LPT) detected value and outdoor air temperature (Tho-A) are within a range that is below the defrosting start temperature range shown in the figure at right for 3 minutes. However, when 10 minutes have passed since the compressor started and the outdoor air temperature is as shown in the following figure.



2) Defrosting conditions B

- The conditions for ending the previous defrosting operation are a defrosting operation time up and a heating operation after a compressor running time of 30 minutes after defrosting ends.
- 5 minutes have passed since the compressor started.
- 5 minutes have passed since the outdoor unit's fan started running.

(ii) Changing the defrosting start temperature

Turn the DIP switch (SW3-1) on the outdoor unit's control PCB ON.

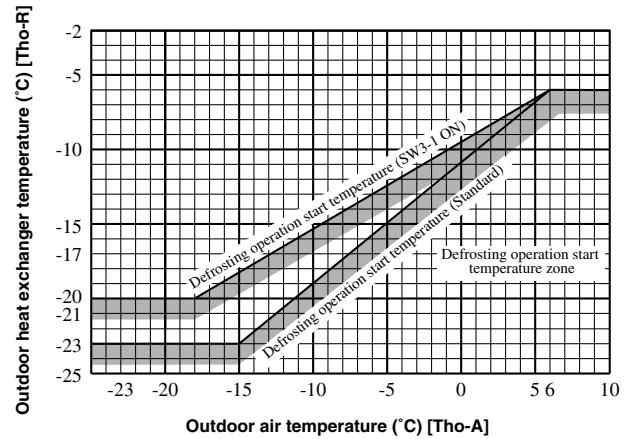
1) Defrosting condition A

After defrosting ends, 30 minutes passes cumulatively of the compressor running in a heating operation.

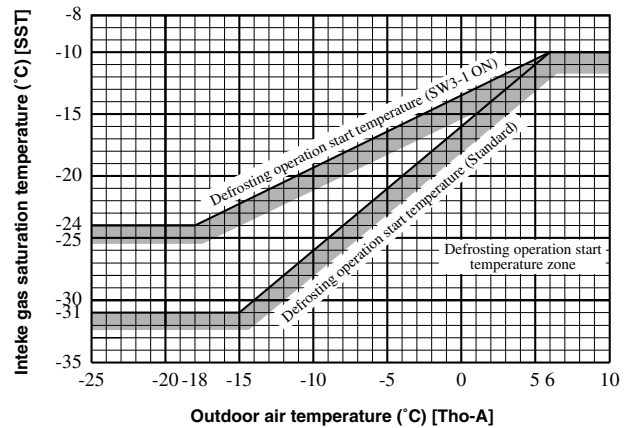
2) Defrosting condition B

After defrosting ends, 25 minutes passes cumulatively of the compressor running in a heating operation.

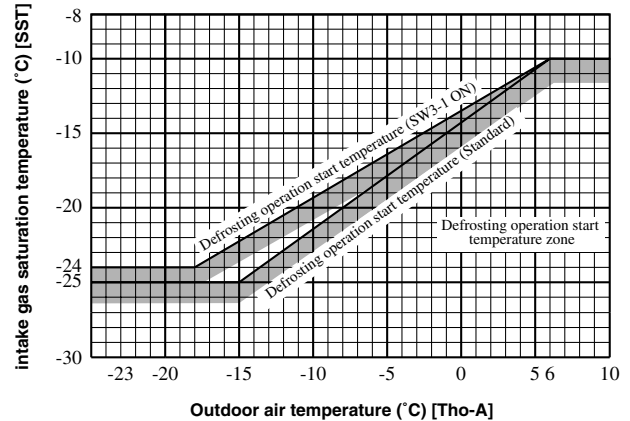
3) Other than items 1) and 2) above, other conditions are the same as the standard conditions.



Model FDCVA 302



Models FDCVA 402~1002



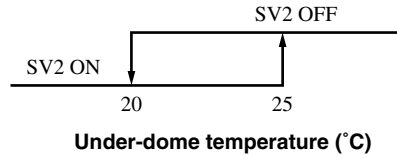
(iii) Defrosting end conditions

If any of the following conditions is satisfied, the defrosting end operation starts.

- 1) 8 minutes and 20 seconds have passed since defrosting started. (In models 302, 802 and 1002, 10 minutes and 20 seconds have passed.)
- 2) When the outdoor heat exchanger temperature (sensed by Tho-R1, R2, whichever one senses the lower temperature) is 12°C or higher continuously for 10 seconds.

(g) Oil bypass solenoid valve (SV2) control (models 802, 1002 only)

During compressor operation, SV2 controls as shown below.

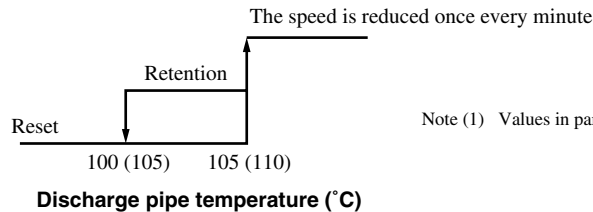


(h) Compressor protective control

(i) Discharge pipe temperature control

If the discharge pipe temperature (Tho-D) after the compressor starts becomes higher than the set temperature, the compressor's speed is controlled to suppress the rise in the discharge pipe temperature. If it rises still higher, the compressor is stopped.

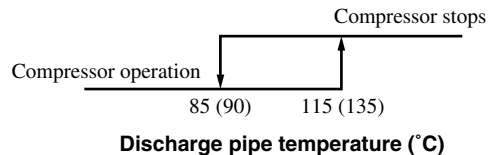
1) Compressor speed control



Note (1) Values in parenthesis show for 802 or 1002 models.

2) Discharge pipe temperature abnormal

- a) If the discharge pipe temperature has risen to 115 (135) °C or higher, the compressor is stopped. If it drops to 85 (90) °C or lower, the compressor restarts automatically.



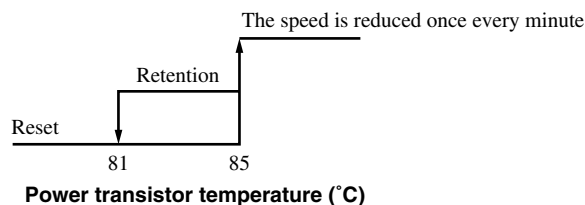
Note (1) Values in parenthesis show for 802 or 1002 models.

- b) If the discharge pipe temperature is sensed to be 115 (135) °C or higher 2 times within a period of 60 minutes, or for 60 minutes continuously while the compressor is stopped, an abnormal stop (E36) is carried out.

Note (1) If the temperature does not drop to 85 (90) °C or lower continuously for 45 minutes after a discharge pipe temperature error occurs, operation cannot be restarted. (This can be set using the remote controller.)

(ii) Power transistor temperature control

If the power transistor temperature (Tho-TR) rises to 85°C or higher, the compressor speed is controlled. If the power transistor temperature drops to 81°C or lower, this control ends and the speed protection cancel operation starts.



(iii) Current safe control

- 1) If the inverter inflow current (CT current) becomes higher than the following set value, the compressor's speed is lowered. If the current is still above the set value after the speed is lowered, the speed is lowered still further.

Model	Set valve (A)
302	15
402, 502, 602	23
802	17
1002	20

- 2) If the current value drops to or below the cancellation value continuously for 3 minutes, this control is ended and the speed protection cancel operation is started.

(iv) High pressure control

- 1) Compressor speed control during heating

If the compressor's speed exceeds the speed in the following table, the compressor's speed is controlled at the upper limit value in accordance with the indoor heat exchanger temperature (ThI-R1, R2) during operation.

Item \ Model	302	402 ~ 602	802, 1002
Compressor rotational speed (rps)	20	40	30
Indoor heat exchanger temp (°C)	52 ~ 58	52 ~ 58	52 ~ 58

- 2) Compressor speed control during cooling

If the compressor's speed exceeds the speed in the following table, the compressor's speed is controlled at the upper limit value in accordance with the outdoor heat exchanger temperature (Tho-R1, R2) during operation.

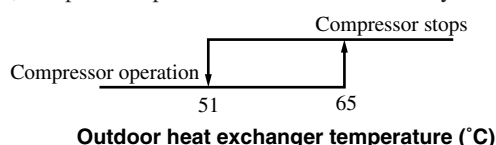
Item \ Model	302	402 ~ 602	802, 1002
Compressor rotational speed (rps)	20	40	30
Outdoor heat exchanger temp (°C)	52 ~ 58	52 ~ 58	54 ~ 60

- 3) Operation stop control according to indoor heat exchanger temperature

If an indoor heat exchanger temperature (sensed by ThI-R1, R2) of 65°C or higher is detected continuously for 2 seconds during compressor operation in the heating mode, the compressor's speed is controlled. If the indoor heat exchanger's temperature drops to 47°C or lower, this control ends and the speed protection cancellation operation starts.

- 4) Control according to the outdoor heat exchanger temperature

- a) If an outdoor heat exchanger temperature (sensed by Tho-R1, R2) that is higher than the set value is detected, during compressor operation in the cooling mode, the compressor is stopped. When the temperature drops to or below the set value, compressor operation resumes automatically.



- b) If the outdoor heat exchanger temperature exceeds the set value 5 times within a period of 60 minutes or continuously for 60 minutes even when the compressor is stopped, the unit is subjected to an abnormal stop (E35).

Note (1) If an outdoor heat exchanger abnormal stop occurs and the temperature does not drop to 51°C or lower for 3 minutes continuously, operation cannot be resumed.

- 5) Abnormality detected by the high pressure switch (63H1)

If the pressure rises and the high pressure switch (4.15 open/3.15 closed MPa) operates (opens) 5 times within 60 minutes or operates (remains open) continuously for 60 minutes even when the compressor is stopped, the compressor performs an abnormal stop (E40).

(v) Low pressure control [LPT]

- 1) Compressor speed protective control

- a) If all the following conditions are satisfied 5 minutes or more after the compressor starts or after a defrost reset, the compressor's speed is lowered.
 - ① If the low pressure is 0.15 MPa or lower continuously for 10 seconds.
 - ② If the compressor speed is 20 rps or higher (for model 302), 40 rps or higher (for models 402 ~ 602) or 30 rps or higher (for models 802, 1002).
- b) The low pressure is detected again 30 seconds later, and if it is lower than 0.15 MPa, the compressor speed is lowered again.
- c) If the low pressure becomes 0.189 MPa or higher, this control ends and the speed protection cancel operation begins.

2) Low pressure error detection

a) If either of the following conditions is satisfied, the compressor is stopped.

- ① If the low pressure is 0.079 MPa or lower continuously for 15 seconds after the compressor starts.
- ② If the low pressure is 0.15 MPa after 10 minutes have passed since the compressor started and superheating at 30°C continues for 60 seconds.

b) Operation resumes automatically when the low pressure becomes 0.227 MPa or higher.

c) If the conditions in ① or ② of item a) above occur 3 times within 60 minutes or if the low pressure drops to 0.079 MPa or lower for 6 minutes or longer continuously, including when the compressor is stopped, the unit is subjected to an abnormal stop (E49).

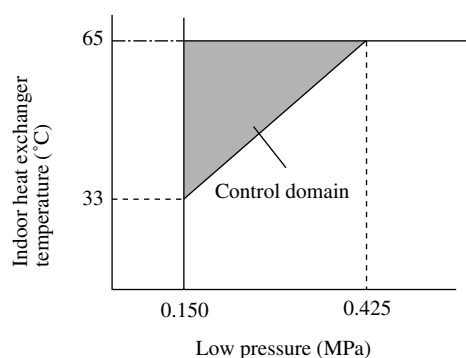
(iv) High pressure ratio protection control

During a heating operation, the compressor's speed is controlled in accordance with the low pressure (PSL) and indoor heat exchanger temperature (ThI-R1, R2).

1) Start conditions

When all the following conditions are satisfied

- a) 10 minutes have passed since the compressor started.
- b) The outdoor unit fan is ON and 10 minutes have passed since the outdoor unit fan started.
- c) 10 minutes have passed since defrosting ended.
- d) When the low pressure and indoor heat exchanger temperature detected values are within the control region shown in the following figure for 30 seconds.



2) Control contents

The compressor's speed is lowered. 1 minute later, detection is repeated and if the conditions in item d) continue to exist, the speed is lowered still further.

3) End conditions

When operation is outside the control region shown in item d) above for 6 minutes continuously.

(i) Inverter protection control

(i) Current cut control

This prevents overcurrent at the inverter. If the current exceeds the set value, the compressor stops. It restarts automatically 3 minutes later, but if the current is cut 4 times within a period of 30 seconds, an abnormal stop (E42) occurs.

(ii) Power transistor overheating protection

- 1) If the power transistor's temperature rises to 110°C or higher, the compressor stops. If the temperature drops to 90°C or lower after 3 minutes, the compressor restarts automatically.
- 2) If this operation is repeated 5 times within 60 minutes, or the temperature rises to 110°C or higher for 15 minutes continuously, an abnormal stop (E41) occurs.

Note (1) The abnormal stop (E41) occurs in models 802 and 1002 only.

(j) Open phase protection

If the voltage of either the L1, L2 or L3 phase is 0 V for 5 seconds continuously after the power is turned ON, it is judged that there is an open phase state in the power supply, and 1 second later, an abnormal stop (E34) occurs.

(k) Temperature thermistor (outdoor heat exchanger, outdoor air, discharge pipe, suction pipe, under-dome) and low pressure sensor disconnection sensing

(i) Outdoor heat exchanger temperature thermistor, outdoor air temperature thermistor, low pressure sensor

If the conditions on the following page are detected for 5 seconds continuously between 2 minutes to 2 minutes 20 seconds after the compressor goes ON, the compressor goes off. After a 3-minute delay, the compressor is restarted, but if this state is detected 3 times within a 40-minute period, an abnormal stop occurs.

Note (1) This is not detected during defrosting and for 3 minutes after defrosting.

- Outdoor heat exchanger thermistor: -50°C or lower
 - Outdoor temperature thermistor: -30°C or lower
 - Low pressure sensor: 0 V or lower, or 3.49 V or higher.
- (ii) Discharge pipe temperature thermistor, suction pipe temperature thermistor, under-dome temperature thermistor, (models 802, 1002 only)

After the compressor goes ON, if the following is detected for 5 seconds continuously between 10 minutes and 10 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3-minute delay, the compressor is restarted, but if this state is detected 3 times within a 40-minute period, an abnormal stop occurs.

Note (1) This is not detected during defrosting and for 3 minutes after defrosting.

- Discharge pipe temperature thermistor: -10°C or lower
- Suction pipe temperature thermistor: -50°C or lower
- Under-dome temperature thermistor: -50°C or lower

(I) Test operation

- (i) It is possible to operate the outdoor unit using SW3-3 (SW5-3) and SW3-4 (SW5-4) on the outdoor unit PCB.

SW3-3 (SW5-3)	ON	SW3-4 (SW5-4)	OFF	Cooling test operation
			ON	Heating test operation
	OFF	Normal or test operation end		

Be sure to turn SW3-3 (SW5-3) OFF when operation ends.

- (ii) Test operation control
- 1) Operates the air conditioner at the predetermined maximum speed for each model.
 - 2) Each protective control and abnormal sensing control is activated.
 - 3) If the setting of SW3-4 (SW5-4) is changed during trial operation, stop control is performed, and the compressor is stopped temporarily, and operation is switched between cooling and heating.
 - 4) Remote control settings and display during trial operation.

Mode \ Capacity	Remote controller settings, display contents
Cooling test operation	The set temperature is 5°C.
Heating test operation	The set temperature is 30°C.

Note (1) Values in () show in the case of the 302 model.

(m) Silent mode control

Silent operation according to the remote control function setting.

- (i) It runs at a speed that is lower than the outdoor fan control speed in item (d).
- 1) Fan tap during cooling and dehumidifying operation

● 302 ~ 602 models

	(A) Zone	(B) Zone	(C) Zone	(D) Zone
(a) Zone	5(6)th Speed	5th Speed	5th Speed	4th Speed
(b) Zone	5th Speed	5th Speed	3th Speed	3th Speed
(c) Zone	4th Speed	3th Speed	3th Speed	2th Speed
(d) Zone	3th Speed	3th Speed	2th Speed	1th Speed

Note (1) Values in () show in the case of the 302 model.

● 802 ~ 1002 models

	(A) Zone	(B) Zone	(C) Zone	(D) Zone
(a) Zone	5th Speed	5th Speed	5th Speed	4th Speed
(b) Zone	5th Speed	5th Speed	3th Speed	3th Speed
(c) Zone	4th Speed	3th Speed	3th Speed	2th Speed
(d) Zone	3th Speed	3th Speed	2th Speed	1th Speed

- 2) Fan tap during heating

● 302 ~ 602 models

	(A) Zone	(B) Zone	(C) Zone
(a) Zone	3th Speed	3th Speed	3th Speed
(b) Zone	3th Speed	3th Speed	5th Speed
(c) Zone	4th Speed	5th Speed	6th Speed

● 802 ~ 1002 models

	(A) Zone	(B) Zone	(C) Zone
(a) Zone	3th Speed	3th Speed	3th Speed
(b) Zone	3th Speed	3th Speed	5th Speed
(c) Zone	4th Speed	5th Speed	6th Speed

(n) Pump down control

If the pump down switch SW1 (SW9) is turned on for 2 seconds during an operation stop and abnormal stop (not including when the thermostat is OFF), pump down operation starts. (It is disabled during indoor unit operation. It is enabled during an abnormal stop of the indoor unit and during power OFF.)

(i) Control contents

- 1) Close the liquid side service valve. (Leave the gas side fully open.)
- 2) In the cooling mode, set the target speed at 55 (62) rps and start the compressor.
- 3) The red and green indicators (LED) on the outdoor unit's control PCB keeps flashing.
- 4) Except for low pressure control, each protective and abnormal sensing control is enabled.
- 5) The outdoor fan is controlled the same as normal.
- 6) The electronic expansion valve (cooling, heating) is fully opened.
- 7) The oil bypass valve (SV2) or solenoid valve (SV1: Model 302) goes on for 2 minutes after the pump down operation starts and after that, it goes OFF.

(ii) Control end conditions

Stop control is executed according to any of the following conditions.

- 1) A low pressure of 0.087 MPa or lower is detected continuously for 5 seconds.
 - Ⓐ Red LED: On, Green LED: flashing, Remote controller: displays stopped.
 - Ⓑ Restarting is possible when low pressure exceeds 0.087 MPa.
 - Ⓒ The electronic expansion valves (cooling, heating) remain fully open.
- 2) Stop according to error detection control
 - Ⓐ Red LED: On, Green LED: flashing is displayed.
 - Ⓑ Restarting is not possible. ordinary operation is restored by resetting the power supply.
 - Ⓒ The electronic expansion valves (cooling, heating) remain fully open.
- 3) When the cumulative compressor operating time by pump down control is 5 minutes.
 - Ⓐ Red LED: Off, Green LED: flashing, Remote controller: Stop.
 - Ⓑ Pump down repeat is possible.
 - Ⓒ The electronic expansion valves (cooling, heating) remain fully open.

Notes (1) Close the gas side operating valve after the compressor stops.

(2) Values in () show in the case of the 302 model.

Caution: If the pump down switch is pressed, communications with the indoor units is cancelled, so the message "communications error – E5" is displayed on the indoor unit and the remote controller, but there is no error.

(o) Abnormal stop by stopping compressor stop (Models 402 ~ 1002 only)

- (i) If the unit cannot switch to compressor DC motor rotor position detection operation 5 seconds after compressor start conditions are established, it enters a pause state, then after 3 minutes, the compressor is started again.
- (ii) If switching to position detection operation cannot be done a second time, an abnormal stop (E59) occurs due to a compressor start error.

(p) Compressor rotor lock error (Models 802, 1002 only)

Auto restart occurs 3 minutes later, but if this occurs 4 times in 15 minutes, an abnormal stop (E60) occurs.

1.5 APPLICATION DATA

SAFETY PRECAUTIONS

- Please read these “Safety Precautions” first then accurately execute the installation work.
 - Though the precautionary points indicated herein are divided under two headings, **⚠ WARNING** and **⚠ CAUTION**, those points which are related to the strong possibility of an installation done in error resulting in death or serious injury are listed in the **⚠ WARNING** section. However, there is also a possibility of serious consequences in relationship to the points listed in the **⚠ CAUTION** section as well.
- In either case, important safety related information is indicated, so by all means, properly observe all that is mentioned.
- After completing the installation, along with confirming that no abnormalities were seen from the operation tests, please explain operating methods as well as maintenance methods to the user (customer) of this equipment, based on the owner’s manual. Moreover, ask the customer to keep this sheet together with the owner’s manual.



WARNING

- Installation should be performed by the dealer or a company specializing in this type of installation. If you install the equipment yourself, installation errors could result in water leaks, electric shock, and/or a fire, as well as other hazards.
- Conduct installation work in accordance with the instructions in this installation manual. Installation errors could result in water leaks, electric shock, or fire.
- Sling the unit at the specified points with ropes properly rated for the weight in lifting it for portage. An improper manner of portage can result in a fail of the unit resulting in an accident involving personal death or injury.
- When installing a unit in a small rooms, take measure so that if the refrigerant leaks, it does not exceed the concentration limit. For information regarding measures to prevent the concentration limit from being exceed, please contact the dealer.
- If refrigerant leaks and the concentration limit is exceeded, suffocation could occur.
- Install the equipment in a location that can sufficiently support the weight of the equipment. If the area is not strong enough, an accident could result from the unit falling.
- Install the equipment in a location that can withstand strong winds, such as typhoons, and earthquakes. If the installation is not secure, an accident could result from the unit falling.
- Always turn off power before work is performed inside the unit such as for installation or servicing. A failure to observe this instruction can cause a danger or electric shock.
- Electrical work should be done by a licensed electrician who shall do the work in accordance with the Technical Standards Regarding Electrical Equipment. Indoor Wiring Provisions, and this installation manual. The electrician shall use specified circuits for the equipment. If the power supply circuit capacity is insufficient or the work is not done correctly, it could result in electric shock or a fire.
- For wiring, the specified cable should be used, the connections should be secure, and the fixtures shall be strong enough to prevent cables from being pulled out from the terminal connections. Incorrect connections or work fixtures could result in heat generation or a fire.
- In cabling, arrange cables suitably so that they may not get off their support and then fix the service panel securely. Improper installation can cause heat generation and a resultant fire. Please prevent any substance other than the specified refrigerant (R410A) such as air from entering the refrigerant cycle in installing or moving the air conditioning system. Contamination by air or a foreign substance can cause an abnormal pressure build-up inside the refrigerant cycle and a resultant explosion and personally injury.
- Use only parts supplied with the unit and specified supply parts for installation. The use of unauthorized parts may cause the leaking of water or electricly causing a danger of electric shock or a fire, a refrigerant leak, performance degradation, and control failures.
- Do not open operation valves (either liquid or gas or both) until refrigerant piping, an air-tightness test and an air purge are completed. When a leak of refrigerant gas occurs during piping work, stop brazing pipes and ventilate the room. Refrigerant gas, when it comes into contact with bare fire, can generate a toxic gas.
- When installation is completed, check for refrigerant gas leaks. If the refrigerant gas leaks indoors, it could come in contact with a fan heater, burner, or hot plate, which could generate a poisonous gas.



CAUTION

- Ground the equipment. Do not connect the ground wire to gas piping, water piping, a lightning rod, or telephone ground wires. If grounding is not performed correctly electric shock could occur.
- Depending on the installation location, a circuit breaker may need to be installed. If a circuit breaker is not installed, electric shock may occur.
- Please follow this manual faithfully in performing installation work. Improper installation work can cause abnormal vibrations and noise generation.
- Do not install the equipment in areas where there is danger of flammable gas leaks. If such gas does leak it could collect around the units and cause a fire.
- Install the drain piping in accordance with the installation manual so that it properly discharges waste water and is maintained at a temperature that prevents condensation.
- Do not install the outdoor unit where winds from its fan blow directly onto a plant, etc. Winds can affect adversely to the plant, etc.
- Secure a space for inspection and maintenance as specified in the manual. An insufficient space can result in an accident such as a fall from the installation point and a resultant personal injury.
- When the outdoor unit is installed on a roof or at an elevated point, provide permanent ladders and handrails along the access route and fences and handrails around the outdoor unit.
- In tightening a flare nut, use a double spanner and observe the specified tightening torque. Care must be taken so as not to over-tighten a nut and damage the flare part. (Please refer to the tightening torque) The loosening or damage of the flare part can cause a refrigerant gas leak and a resultant lack-of-oxygen accident.
- Please dress the refrigerant piping with a heat insulation material for prevention of dew condensation. Improper heat insulation for prevention of dew condensation can cause the leaking or dripping of water and a resultant soaking of household effects.
- When refrigerant piping is completed, check its air-tightness with nitrogen gas to make sure it does not have a leak. A leak of refrigerant gas in a narrow room beyond the safety limit concentration can cause a lack-of oxygen accident.
- If the humidity exceeds 80% or the drain or piping become clogged, condensation from the indoor unit could drip and cause damage. Please do not install the indoor units above items of furniture, etc. that you do not want to get wet. Also, do not place items that you do not want to get wet underneath the indoor units.



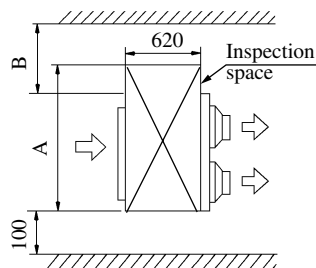
1.5.1 Installation of indoor unit

Satellite ducted type (FDUM)

(i) Selection of installation location

- 1) Avoid installation and use at those places listed below.
 - a) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).
Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.
 - b) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains. Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.
 - c) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.
- 2) Select places for installation satisfying the following conditions and, at the same time, obtain the consent on the part of your client user,
 - a) Places where chilled or heated air circulates freely. When the installation height exceeds 3m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.
 - b) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
 - c) Places free from air disturbances to the return air port and supply hole of the indoor unit, places where the fire alarm may not malfunction to short circuit.
 - d) Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%.

(This unit is tested under ISO installation conditions to make sure that there are no defects. However, if it is operated under conditions of high humidity that exceed the conditions above, there is danger of condensate falling from the unit. If there is a possibility that the unit will be used under such conditions, dress 10~20 mm of insulation on the entire unit body, the piping and drain pipe.)
- 3) Check if the selected place for installation is rigid enough to stand the weight of the unit.
Otherwise, apply reinforcement using boards and beams before starting the installation work.



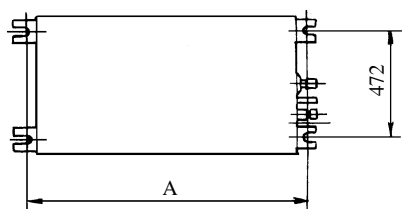
Unit : mm

Models	Mark	A	B
FDUMA202R		1100	600
FDUMA252, 302R		1300	600
FDUMA402 ~ 602R		1720	600

(ii) Suspension

Be sure to observe the finished length of the suspension bolts given below.

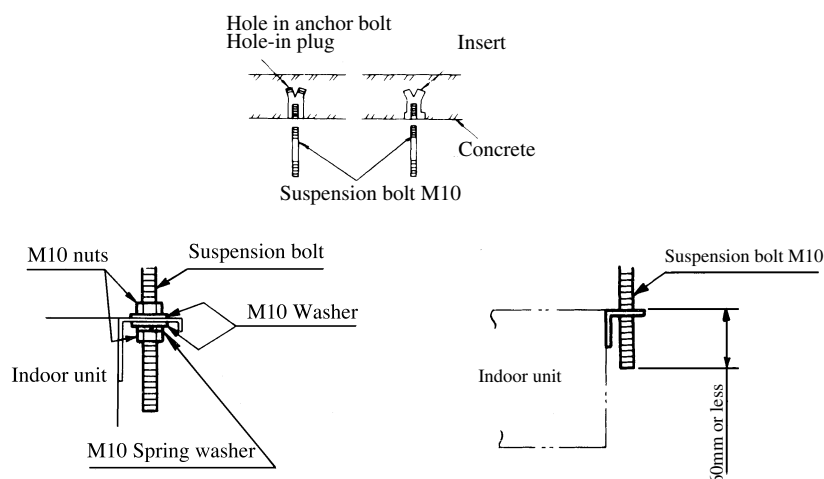
Unit : mm



Models	Mark	A
FDUMA202R		786
FDUMA252, 302R		986
FDUMA402 ~ 602R		1406

1) Fixing the suspension bolt (customer ordered parts M10)

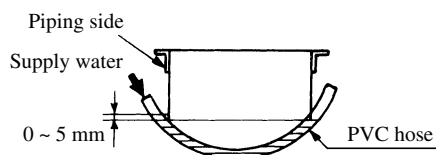
Securely fix the suspension bolt as illustrated below or in another way.



2) Adjusting the unit's levelness

a) Adjust the out-levelness using a level vial or by the following method.

- Make adjustment so that the relation between the lower surface of the indoor unit proper and water level in the hose becomes given below.



Bring the piping side slightly lower

b) Unless the levelness is adjusted properly, the malfunction of the float switch will occur.

3) Blower fan tap switch

The following two methods are available in switching the blower fan tap. Switch to the high-speed tap with one of these methods.

SW9-4	ON	Fan control,high speed (High ceiling)
	OFF	Fan control,standard

- ① Set SW9-4 provided on the indoor unit PCB to ON.
- ② By means of function setting from the remote control unit, set the setting ③ of "I/U FUNCTION ▲" (indoor unit function) to "Hi CEILING 1" (high-speed tap) as shown right.

Function number ①	Function description ②	Setting ③
01	Hi CEILING SET	Hi CEILING 1

For the details of operating procedures, please refer to the installation manual of your remote control unit.

(iii) Duct work

① Supply air duct

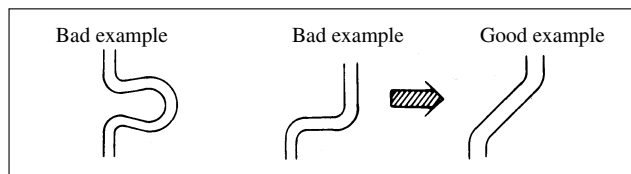
- 2-spot, 3-spot and 4-spot with $\phi 200$ type duct are the standard specifications. Determine the number of spots based on following table.

FDUMA202R	FDUMA252, 302R	FDUMA402 ~ 602R
2-spot	2 ~ 3-spot ⁽¹⁾	3 ~ 4-spot ⁽²⁾

Notes (1) Shield the central supply air port for 2-spot.

(2) Shield the supply air port around the center for 3-spot.

- Limit the difference in length between spots at less than 2:1.
- Reduce the length of duct as much as possible.
- Reduce the number of bends as much as possible. (Corner R should be as larger as possible.)



② Access door

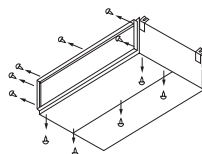
Access door must be provided without fail.

• Dimensions of access door and service space

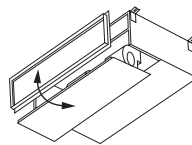
(See exterior dimensions in page 12 to 14.)

③ Return air port

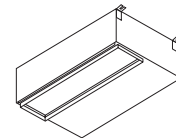
- When shipped, the return air port lies on the back.
- When connecting the duct to the return air port, remove the air filter if it is fitted to return air port.
- When placing the return air port to carry out suction from the bottom side, use the following procedure to replace the return air duct joint and the bottom plate.



- Remove the screws which fasten the bottom plate and the duct joint on the return air port of the unit.



- Replace the removed bottom plate and duct joint.

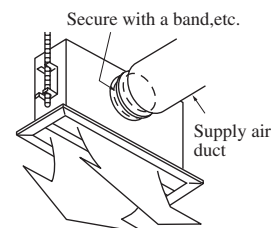


- Fit the duct joint with a screw, fit the bottom plate.

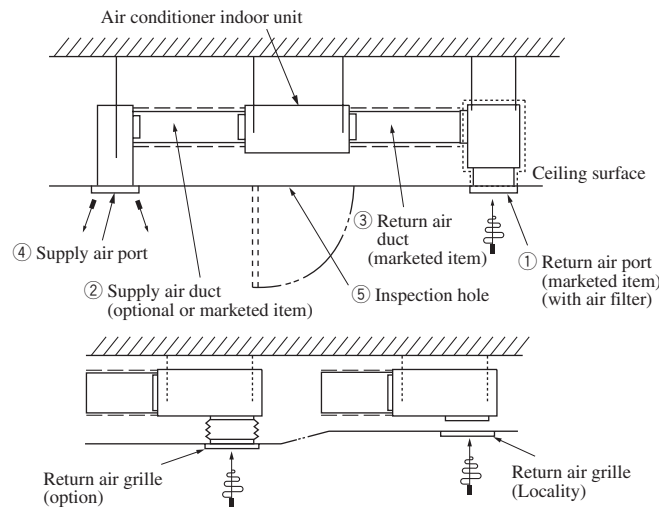
- Make sure to insulate the duct to prevent dewing on it.

④ Install the specific supply air duct in a location where the air will circulate to the entire room.

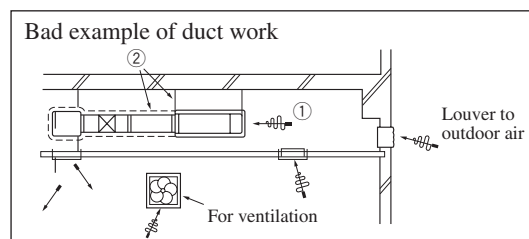
- The duct connection is specific to the 200 circular duct.
- Conduct the installation of the specific supply air hole and the connection of the duct before attaching them to the ceiling.
- Insulate the area where the duct is secured by a band for dew condensation prevention.



- ⑤ Make sure provide an inspection hole on the ceiling. It is indispensable to service electric equipment, motor, functional components and cleaning of heat exchanger.



- ⑥ If a duct is not provided at the return air side but it is substituted with the space over the ceiling, humidity in the space will increase by the influence of capacity of ventilation fan, strength of wind blowing against the outdoor air louver, weather (rainy day) and others.
- Moisture in air is likely to condense over the external plates of the unit and to drip on the ceiling. Unit should be operated under the conditions as listed in the above table and within the limitation of wind volume. When the building is a concrete strucially immediately after the construction, humidity tends to rise if the space over the ceiling is not substituted in place of a duct. In such occasion, it is necessary to insulate the entire unit with glass wool (25mm). (Use a wire net or equivalent to hold glass wool in place.)
 - It may run out the allowable limit of unit operation (Example: When outdoor air temperature is 35°C D.B, return air temperature is 27°C W.B) and it could result in such troubles as compressor overload, etc..
 - There is a possibility that the supply air volume may exceed the allowable range of operation due to the capacity of ventilation fan or strength of wind blowing against external air louver so that drainage from be heat exchanger may fail to reach the drain pan leak outside (e.g. drip on to the with consequential water leakage in the room.)



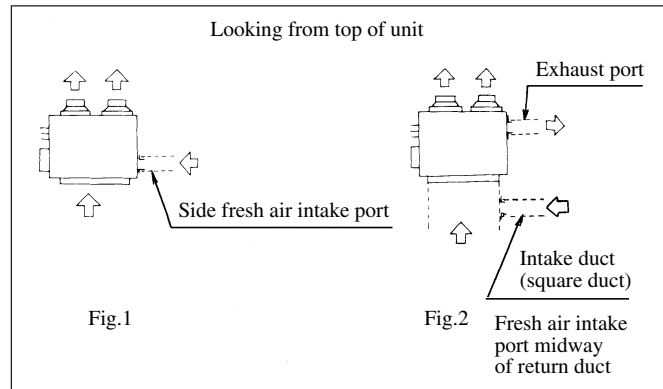
Notice: Aspecific cover plate is available when changing the 4 spot to the 3 spot, or when changing the 3 spot to the 2 spot.

Note (1) Do not change from 2 spot to 1 spot.

⑦ **Return air duct: Use square duct.**

⑧ **Return air port with canvas duct**

1) Connection of intake and exhaust ducts.



2) Duct connecting position.

< Fresh air intake >

- Use side air intake port.
- In case of simultaneous intake and exhaust, the side air intake port cannot be used, therefore, take air from the midway air intake port along the intake duct.

< Exhaust > Make sure to use suction as well.

- Use a side exhaust port.

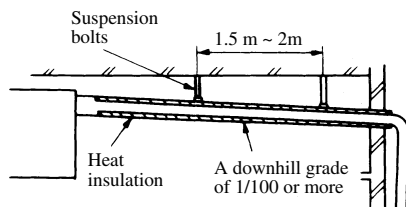
3) Duct connection

Use intake and exhaust duct flange of separately sold (for connection of $\phi 125$ mm round duct) to connect $\phi 125$ mm round duct. The duct clamped by bands must be thermally insulated to prevent dew condensation.

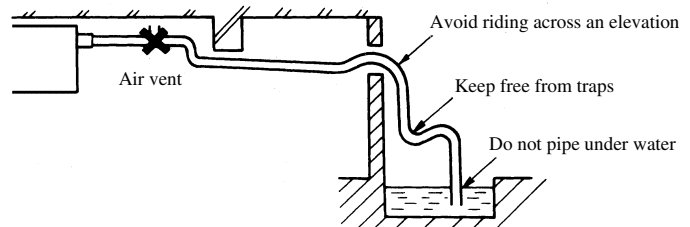
(iv) Drain piping

- Drain piping should always be in a downhill grade (1/50-1/100) and avoid riding across an elevation or making traps.

• Good piping

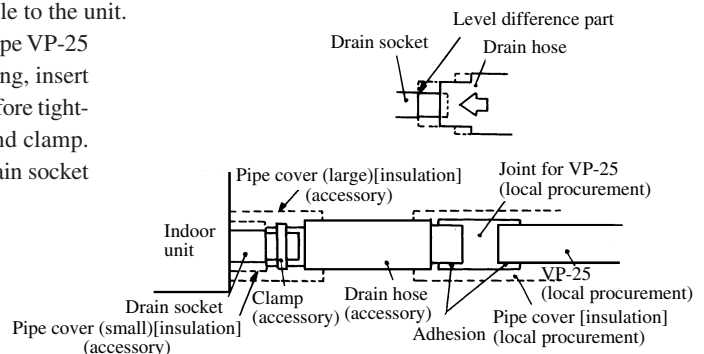


• Improper piping

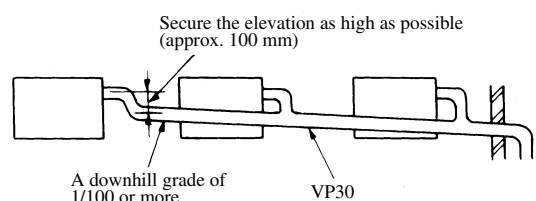


- When connecting the drain pipe to the unit, pay sufficient attention not to apply excess force to the piping on the unit side. Also, fix the piping at a point as close as possible to the unit.

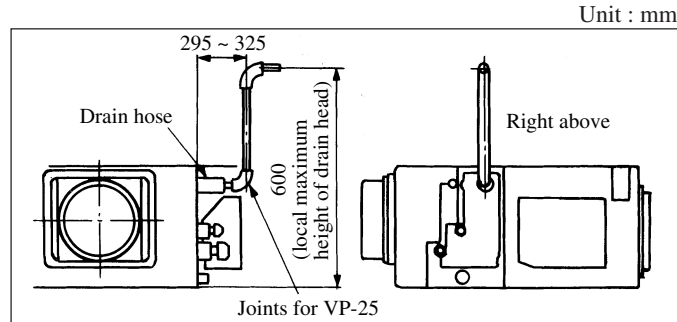
- For drain pipe, use hard PVC general purpose pipe VP-25 which can be purchased locally. When connecting, insert a PVC pipe end securely into the drain socket before tightening securely using the attached drain hose and clamp. Adhesive must not be used connection of the drain socket and drain hose (accessory).



- When constructing drain piping for several units, position the common pipe about 100 mm below the drain outlet of each unit as shown in the sketch below. Use VP-30 or thicker pipe for this purpose.



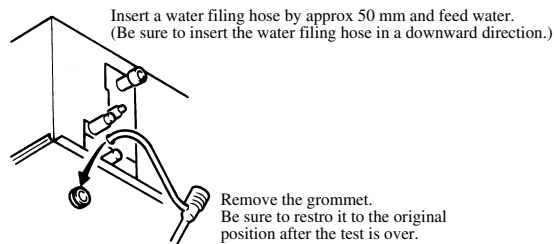
- 5) Be sure to provide heat insulation to hard PVC pipes of indoor placement.
- 6) Do not ever provide an air vent.
- 7) The height of the drain head may be elevated up to a point 600 mm from the bottom of unit and, when an obstacle exists in the ceiling space, elevate the piping to avoid the obstacle using an elbow or corresponding gadget. When doing this, if the stretch for the needed height is too high, the back-flow quantity of drain at the time of interruption of the operation gets too much and it may cause overflow at the drain pan. Therefore, make the height of the drain pipe withing the distance given in the drawing below.



- 8) Avoid positioning the drain piping outlet at a place where generation of odor may be stimulated. Do not lead the drain piping direct into a sewer from where sulfur gas may generate.

9) Drainage test

- a) During trial operation, make sure that drainage is properly executed and check that leakage is not found at connections.
- b) Be sure to carry out a drainage test when installing the system during a heating season.
- c) When installing the system in a building under construction, carry out the drainage test before ceiling tiles are installed.



- ① Supply approx 1000cc of water through the outlet of the unit using a feed water pump.
- ② Make sure that drainage is proceeding properly at the see-through outlet of the unit.
* Also confirm the revolving sound of the condensate motor when checking the drainage.
- ③ Then remove the drain plug at lower section of the unit to drain water off. After making sure water is not left, restore the drain plug to the original position.

Forced drain pump operation

◆ Setup from a unit side.

- ① Turn power on after selecting the emergency operation mode with a setting on the indoor unit control PCB (SW9-3 ON) and disconnecting the CnB connector on the board. Then, the drain pump will start a continuous operation 15 seconds later.
(Note: The blower will also start operation in tandem)
- ② When a drain test is completed, reinstate the setting to cancel the emergency operation mode (SW9-3 OFF) and plug in the CnB connector on the board.
(When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain conditions of the pipe.)



◆ Setup from a remote controller side.

Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.

1. To start a forced drain pump operation

- ① Press the TEST button for three seconds or longer.

The display will change from “ SELECT ITEM” → “ SET” → “ TEST RUN ▼”

- ② Press the  button once while “ TEST RUN ▼” is displayed, and cause “DRAIN PUMP ◆” to be displayed.

- ③ When the SET button is pressed, a drain pump operation will start.

Display: “DRAIN PUMP RUN” → “ → STOP”

2. To cancel a drain pump operation.

- ① If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.

The air conditioning system will become OFF.

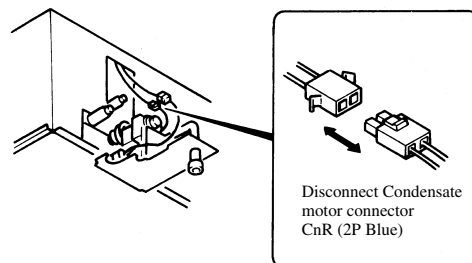
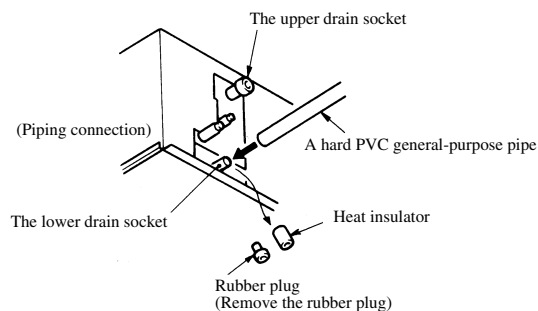
10) Drainage from the lower drain socket

Only if the drain pipe can be installed in a downhill grade (1/50-1/100), the lower drain socket can be used for connecting to the drain pipe as illustrated.

(Disconnect the connector for the drain motor)

As shown in the sketch to the right, disconnect the drain motor connector CnR (blue color coding).

If the system is started with this connector connected as is, drain water is discharged out of the upper drain socket causing a heavy water leakage.



1.5.2 Installation of wired remote controller

(1) Selection of installation location

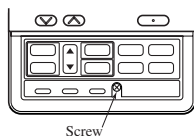
Avoid the following locations

- Direct sunlight.
- Close to heating device.
- Highly humid or water splashing area.
- Uneven surface.

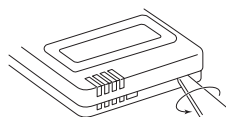
(2) Installation procedure

(a) Exposed fitting

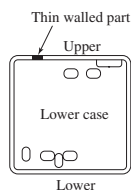
- Open the remote controller cover and unscrew the screw located beneath the switch.



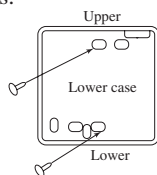
- Open the remote controller case.



- Put a screw driver (flat-head) into the concavity made on the upper part of a remote controller and twist it lightly to open the casing.
- The cord of a remote controller can only be pulled out in the upward direction.

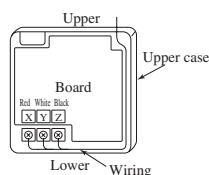


- Cut off with nippers or a knife a thin walled part made on the upper end of the remote controller bottom casing, and then remove burrs with a file or the like.
- Fix the remote controller bottom casing onto a wall with two wood screws supplied as accessories.



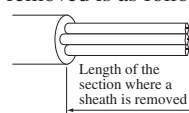
- Connect the remote controller to the terminal block. Connect the terminals of the remote controller to the indoor unit with the same numbers. Because the terminal block has polarity, the device becomes inoperative if there are wrong connections.

Terminals: ⓧ Red wire, Ⓨ White wire, Ⓩ Black wire



- Use a cord of 0.3mm² (recommended) - 0.5mm² (maximum) for a remote controller cord. Remove a sheath of the remote controller cord for the section laid within the remote controller casing.

The length of each wire that should be left after a sheath is removed is as follows:

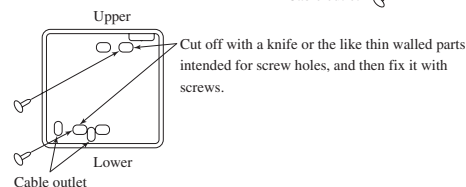
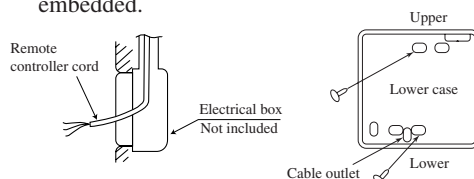


Black: 195mm, White: 205mm, Red: 125mm

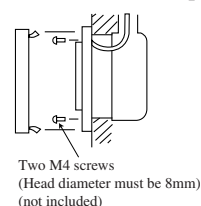
- Replace the top casing as before.
- Use a cord clamp to attach the remote controller cord to the wall.
- Set the functions according to the types of indoor unit. See Section "Function Setting".

(b) Recessed fitting

- The Electrical box and remote controller (shield wire must be use in case of extension) are first embedded.



- Remote the upper case to the remote controller.
- Attach the lower case to the Electrical box with two M4 screws. (Head diameter must be 8 mm). Choose either of the following two positions in fixing it with screws.
- Connect the remote controller cord to the remote controller. Refer to [Exposed fitting].
- Installation work is completed by replacing the top casing onto the bottom casing as before.
- Set the function switch according to the type of the indoor unit. (Refer to 87 page)



Precation in extending the remote controller cord

- Maximum total extension 600m.

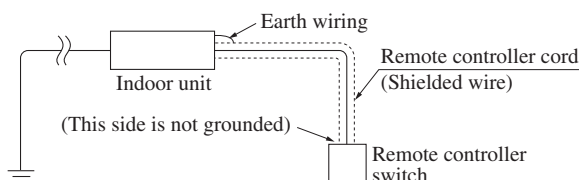
The cord should be a shielded wire.

- For all types : 0.3mm² × 3 cores

Note (1) Use cables up to 0.5mm² (maximum) for those laid inside the remote controller unit casing and connect to a different size cable at a vicinity point outside the remote controller unit, if necessary.

Within 100-200m.....	0.55 mm ² × 3 cores
Within 300m.....	0.75 mm ² × 3 cores
Within 400m.....	1.25 mm ² × 3 cores
Within 600m.....	2.05 mm ² × 3 cores

- The shielded wire should be grounded at one side only.



1.5.3 Installation of outdoor unit

Notabilia as a unit designed for R410A

- Do not use any refrigerant other than R410A. R410A will rise to pressure about 1.6 times higher than that of a conventional refrigerant.
- A unit designed for R410A has adopted a different size indoor unit operation valve charge port and a different size check joint provided in the unit to prevent the charging of a wrong refrigerant by mistake. The processed dimension of the flared part of a refrigerant pipe and a flare nut's parallel side measurement have also been altered to raise strength against pressure. Accordingly, you are required to arrange dedicated R410A tools listed in the table on the right before installing or servicing this unit.
- Do not use a charge cylinder. The use of a charge cylinder will cause the refrigerant composition to change, which results in performance degradation.
- In charging refrigerant, always take it out from a cylinder in the liquid phase.
- All indoor units must be models designed exclusively for R410A. Please check connectable indoor unit models in a catalog, etc. (A wrong indoor unit, if connected into the system, will impair proper system operation)

	Dedicated R410A tools
a)	Gauge manifold
b)	Charge hose
c)	Electric scale for refrigerant charging
d)	Torque wrench
e)	Flare tool
f)	Protrusion control copper pipe gauge
g)	Vacuum pump adapter
h)	Gas leak detector

- (1) **Haulage and installation (Take particular care in carrying in or moving the unit, and always perform such an operation with two or more persons.)**

CAUTION

When a units hoisted with slings for haulage, take into consideration the offset of its gravity center position. If not properly balanced, the unit can be thrown off-balance and fall.

(a) Delivery

- 1) Deliver the unit as close as possible to the installation site before removing it from the package.
- 2) When some compelling reason necessitates the unpacking of the unit before it is carried in, use nylon slings or protective wood pieces so as not to damage the unit by ropes lifting it.

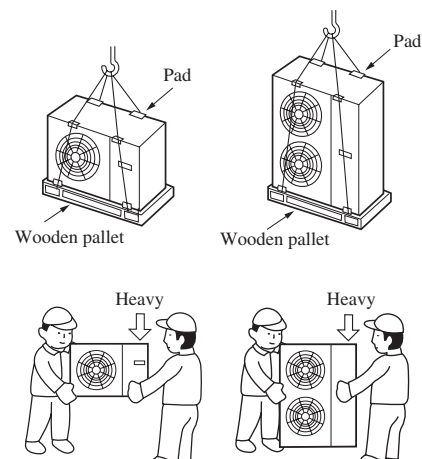
(b) Portage

The right hand side of the unit as viewed from the front (diffuser side) is heavier. A person carrying the right hand side must take heed of this fact. A person carrying the left hand side must hold with his right hand the handle provided on the front panel of the unit and with his left hand the corner column section.

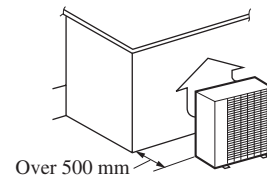
(c) Selecting the installation location

Be careful of the following conditions and choose an installation place.

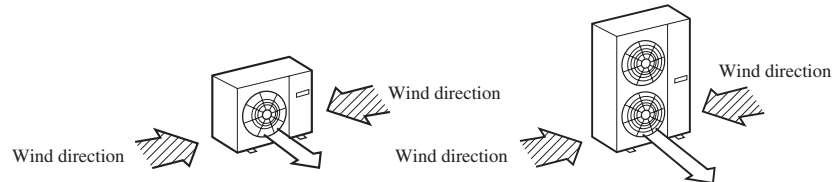
- Where air is not trapped.
- Where the installation fittings can be firmly installed.
- Where wind does not hinder the intake and outlet pipes.
- Out of the heat range of other heat sources.
- A place where stringent regulation of electric noises is applicable.
- Where it is safe for the drain water to be discharged.
- Where noise and hot air will not bother neighboring residents.
- Where snow will not accumulate.
- Where strong winds will not blow against the outlet pipe.
- A place where no TV set or radio receiver is placed within 5 m.
(If electrical interference is caused, seek a place less likely to cause the problem)
- Where it is likely that the unit is subjected to strong winds, provide wind guards according to the following guidelines.
Strong winds can cause performance degradation, an accidental stop due to a rise of high pressure and broken fan.



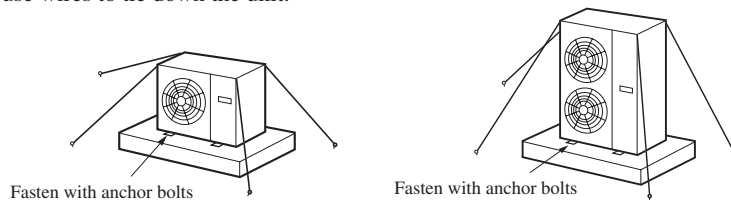
- 1) Place the unit outlet pipe perpendicular to the wind direction.



- 2) Please install so the direction of the air from the blowing outlet will be perpendicular to the direction of the wind.



- 3) When the foundation is not level, use wires to tie down the unit.

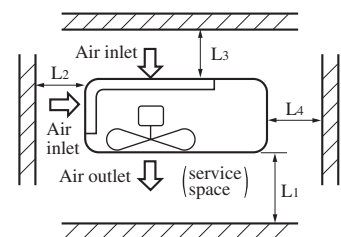


(d) Installation space

- Walls surrounding the unit in the four sides are not acceptable.
- There must be a 1-meter or larger space in the above.
- Where a danger of short-circuiting exists, install guide louvers.
- When more than one unit are installed, provide sufficient intake space consciously so that short-circuiting may not occur.
- Where piling snow can bury the outdoor unit, provide proper snow guards.

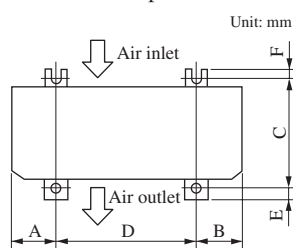
Unit: mm

Installation example Distance	FDCVA201, 251			FDCVA302			FDCVA402, 502, 601		
	I	II	III	I	II	III	I	II	III
L1	Open space	280	280	Open space	Open space	500	Open space	Open space	500
L2	100	75	Open space	300	250	Open space	300	5	Open space
L3	100	80	80	100	150	100	150	300	150
L4	250	Open space	250	250	250	250	5	5	5

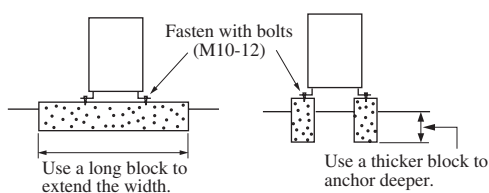


(e) Installation

- ① Anchor bolt fixed position



- ② Notabilia for installation



Unit: mm

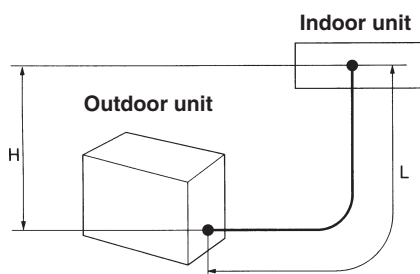
Model	Item	A	B	C	D	E	F
FDCVA201, 251		106	164	312.5	510	14	13.5
FDCVA302		150	150	380	580	19	19
FDCVA402 ~ 602		190	200	410	580	20	20

- In installing the unit, fix the unit's legs with bolts specified on the left.
- The protrusion of an anchor bolt on the front side must be kept within 15 mm.
- Securely install the unit so that it does not fall over during earthquakes or strong winds, etc.
- Refer to the left illustrations for information regarding concrete foundations.
- Install the unit in a level area. (With a gradient of 5 mm or less.)
- Improper installation can result in a compressor failure, broken piping within the unit and abnormal noise generation.

(2) Refrigerant piping work

Select the piping specification to fit the specification of indoor unit and installation location.

(a) Decision of piping specification



Tightening torque

ø6.35 Flare nut	14~18 N·m (1.4~1.8 kg·m)
ø9.52 Flare nut	34~42 N·m (3.4~4.2 kg·m)
ø12.7 Flare nut	49~61 N·m (4.9~6.1 kg·m)
ø15.88 Flare nut	68~82 N·m (6.8~8.2 kg·m)

Piping specification

Unit : mm

Outdoor unit model	Gas pipe	Liquid pipe
FDCVA201	ø 12.7 × t0.8	ø 6.35 × t0.8
FDCVA251	ø 15.88 × t1.0	ø 6.35 × t0.8
FDCVA302 ~ 602	ø 15.88 × t1.0	ø 9.52 × t0.8

Maximum one way length

FDCVA201, 251 : L=40 m or less

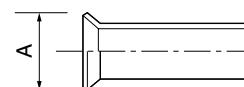
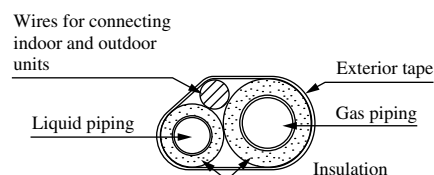
FDCVA302~602 : L=50 m or less

Height difference

- When the position of outdoor unit is higher than that of the indoor unit, keep the difference H=30 m or less.
- When the position of outdoor unit is lower than that of the indoor unit, keep the difference H=15 m or less.

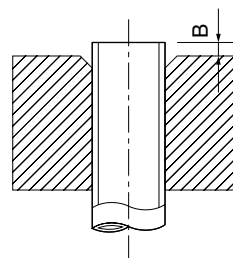
(b) Points for attention in installing refrigerant piping

- Use pipes made of the following material
Material: Phosphorus deoxidized copper seamless pipes (C1220T, JIS H3300)
- Please dress the refrigerant piping (both gas and liquid pipes) with a heat insulating material for prevention of dew condensation. Improper heat insulation incapable of preventing dew condensation can cause the leaking or dripping of water and a resultant soaking of household effects.
- Use only a good heat insulating material (120°C or higher) for heat insulation. A poor heat insulating material offers only poor heat insulation and can cause cable deterioration.
 - The gas pipes can cause dew condensation during a cooling operation, which may become drain water causing a water-leak accident, or a risk of burns during a heating operation, if touched accidentally, with its surface reaching a high temperature because of discharged gas flowing inside. So, do not fail to dress it with a heat insulating material to prevent such mishap.
 - Dress the flare joints of the indoor units with a heat insulating material (pipe covers) (for both gas and liquid pipes).
 - Dress both gas and liquid pipes with a heat insulating material. In doing so, leave no gaps between the pipe and the heat insulating material and wrap them, together with the connecting cable, with a dressing tape.
 - If the unit is used in a place where dew point in the ambient atmosphere is 28°C or higher, and the relative humidity is 80% or higher, dress 20 mm or more of insulation.
- When you need to bend a pipe, bend it to the largest possible radius (R100-R150) permitted. Do not bend a pipe repeatedly in an effort to shape it appropriately.
- In laying pipes, take care to avoid debris, chips or water from entering the piping system.
- A unit and a refrigerant pipe are to be flare connected. Flare a pipe after you have attached a flare nut to the pipe. The dimensions of flaring for R410A are different from those for the conventional R407C refrigerant. Although we recommend the use of flare tools developed specifically for R410A, conventional flare tools can also be used, if the measurement of protrusion B is adjusted with a protrusion control copper pipe gauge.
- Tighten a flare joint securely with double spanners. Observe the following tightening torque values for flare nuts:



Flared pipe end: A (mm)

Copper pipe outer diameter	A
ø6.35	9.1
ø9.52	13.2
ø12.7	16.6
ø15.88	19.7

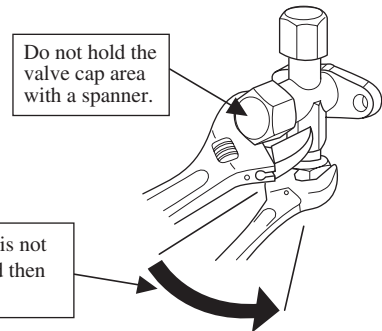


Copper pipe protrusion for flaring: B (mm)

Copper pipe outer diameter	In the case of a rigid (clutch) type	
	With an R410A tool	With a conventional tool
ø6.35	0~0.5	0.7~1.3
ø9.52		
ø12.7		
ø15.88		

- 8) A branching pipe set (option part supplied separately) and refrigerant piping should be connected by brazing.
- 9) In brazing pipes, keep nitrogen gas flowing inside the pipes so that an oxide film may not form on the inner surfaces of the pipes.
- 10) Tighten a flare joint securely with a double spanner.
 - a) Do not apply force beyond proper fastening torque in tightening the flare nut.
 - b) Fix both liquid and gas service valves at the valve main bodies as illustrated on the lower, and then fasten them, applying appropriate fastening torque.

Operation valve size (mm)	Tightening torque (N·m)	Tightening angle (°)	Recommended length of a tool handle (mm)
ø6.35 (1/4")	14~18	45~60	150
ø9.52 (3/8")	34~42	30~45	200
ø12.7 (1/2")	49~61	30~45	250
ø15.88 (5/8")	68~82	15~20	300

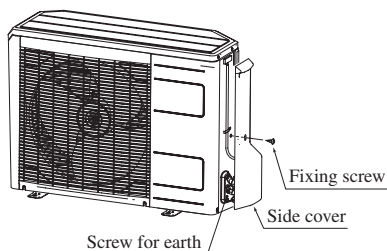


(c) How to remove the side cover

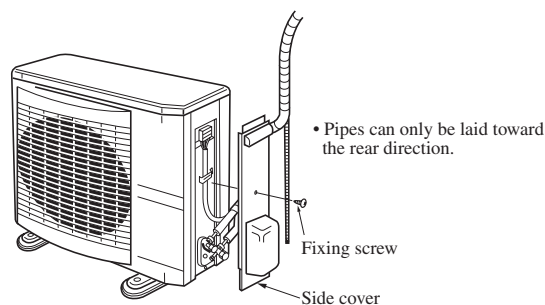
• Models FDCVA201 ~ 302

First unscrew four screws holding the side cover in place, pull down the cover toward the direction indicated by the arrow, and then pull it toward you to remove it from the casing.

Models FDCVA201, 251

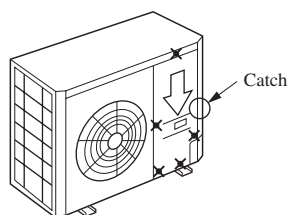


Model FDCVA302



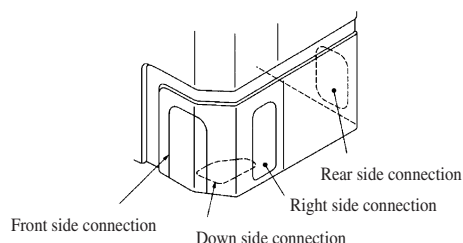
• Models FDCVA402 ~ 602

First remove the five screws (× mark) of the service panel and push it down into the direction of the arrow mark and then remove it by pulling it toward you.



(d) Refrigerant pipe connection (Models FDCVA402 ~ 602 only)

- 1) The pipe can be laid in any of the following directions: side right, front, rear and downward.
- 2) Remove a knock-out plate provided on the pipe penetration to open a minimum necessary area and attach an edging material supplied as an accessory by cutting it to an appropriate length before laying a pipe.



(3) Air tightness test and air purge

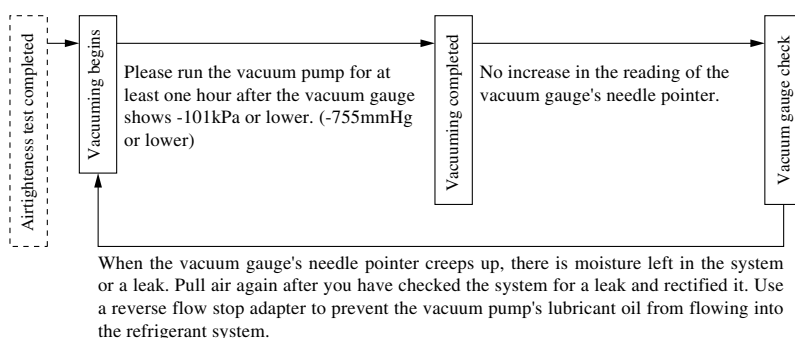
- Always use a vacuum pump to purge air trapped within an indoor and the refrigerant piping.

(a) Air tightness test

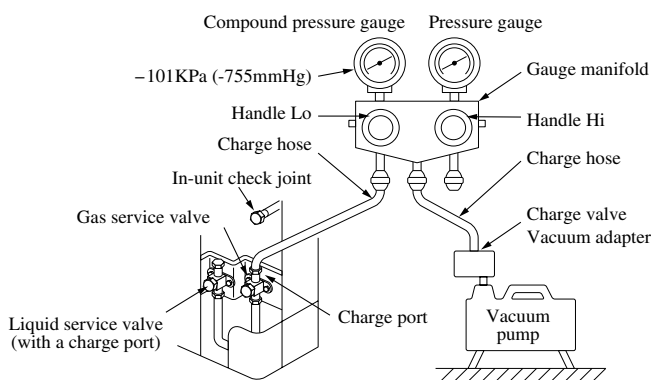
- When all the flare nuts on both indoor and outdoor unit sides are fastened. Conduct an air-tightness test from the service valves (on both liquid and gas sides) closed tightly to check whether the system has no leaks.
- Use nitrogen gas in the air-tightness test. Do not use gas other than nitrogen gas under any circumstances. Conduct the air-tightness test by applying 4.15MPa of pressure.
- Do not apply the specified pressure at once, but increase pressure gradually.
 - Raise the pressure to 0.5 MPa, and then stop. Leave it for five minutes to see if the pressure drops.
 - Then raise the pressure to 1.5 MPa, and stop. Leave it for five more minutes to see if the pressure drops.
 - Then raise the pressure to the specified level (4.15 MPa), and record the ambient temperature and the pressure.
 - If the pressure does not drop after the units is left for approximately one day, the airtightness is acceptable.

When the ambient temperature changes 1°C, the pressure also changes approximately 0.01 MPa. The pressure, if changed, should be compensated for.

(b) Air purge

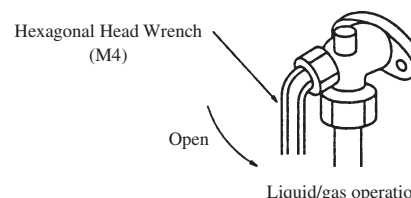


When a vacuum air purge is completed, remove the valve rod cap nuts and open the service valves (both liquid and gas sides) as illustrated below. After you have made sure that the valves are in the full-open position, lighten the cap nuts (for the valve rods and charge ports).



- You can purge air with either liquid service valve or gas service valve.

► Hexagonal wrench type



- Open the valve rod until it touches the stopper. You need not apply force to push it further.
- When an operation is completed, replace the cap nut and tighten it as before.

(4) Additional refrigerant charge

(a) Please calculate a required refrigerant charge volume from the following table.

- Models FDCVA201, 251

Item	Model	FDCVA201	FDCVA251
Factory Charge Amount (for 30 m of pipe) (kg)		1.55	1.75
Standard Charge Amount (for 15 m of pipe) (kg)		1.25	1.45
Additional Charge Amount (for each 1 m of piping) (kg/m)		0.020	

(Example) If the FDCVA201 model is newly installed and the piping length is 40 m.

Additional Charge Amount: $0.2 \text{ kg} = (40 - 30) \text{ m} \times 0.020 \text{ kg/m}$

● **If the system is recharged during servicing, etc., recharge in accordance with the following.**

If the piping length is 15 m or less, recharge the system with the standard charge in the above table. If the piping length is greater than 15 m, charge with the standard charge plus an additional charge amount corresponding to the length of piping that exceeds 15 m.

(Example) If the model FDCVA201, with a piping length of 40 m is being recharged:

$$\text{Recharge Amount: } 1.75 \text{ kg} = 1.25 \text{ kg} + (40 - 15) \text{ m} \times 0.020 \text{ kg/m}$$

● **Models FDCVA301 ~ 602**

Item Model	Standard refrigerant charge volume (kg)	Additional charge volume (kg) per meter of refrigerant piping (liquid pipe)	Refrigerant volume charged for shipment at the factory (kg)	Installation's pipe length (m) covered without additional refrigerant charge
FDCVA302	1.15	0.06	2.95	30
FDCVA402	2.0		3.8	
FDCVA502				
FDCVA602				

- A standard refrigerant charge volume means a refrigerant charge volume for an installation with 0 m long refrigerant piping.
- This unit contains factory charged refrigerant covering 30 m of refrigerant piping and additional refrigerant charge on the installation site is not required for an installation with up to 30 m refrigerant piping. When refrigerant piping exceeds 30 m, please additionally charge an amount calculated from the pipe length and the above table for the portion in excess of 30 m.

Formula to calculate the volume of additional refrigerant required

Model FDCVA302~602	Additional charge volume (kg) = [Main length (m) - Factory charged volume 30 (m)] × 0.06 (kg/m) + Total length of branch pipes (m) × 0.06 (kg/m)
--------------------	---

(b) Charging refrigerant

- 1) Since R410A refrigerant must be charged in the liquid phase, you should charge it, keeping the container cylinder upside down or using a refrigerant cylinder equipped with a siphon tube.
- 2) Charge refrigerant always from the liquid side service port with the service valve shut. When you find it difficult to charge a required amount, fully open the outdoor unit valves on both liquid and gas sides and charge refrigerant from the gas (suction) side service port, while running the unit in the cooling mode. In doing so, care must be taken so that refrigerant may be discharged from the cylinder in the liquid phase all the time. When the cylinder valve is throttled down or a dedicated conversion tool to change liquid-phase refrigerant into mist is used to protect the compressor, however, adjust charge conditions so that refrigerant will gasify upon entering the unit.
- 3) In charging refrigerant, always charge a calculated volume by using a scale to measure the charge volume.
- 4) When refrigerant is charged with the unit being run, complete a charge operation within 30 minutes. Running the unit with an insufficient quantity of refrigerant for a long time can cause a compressor failure.

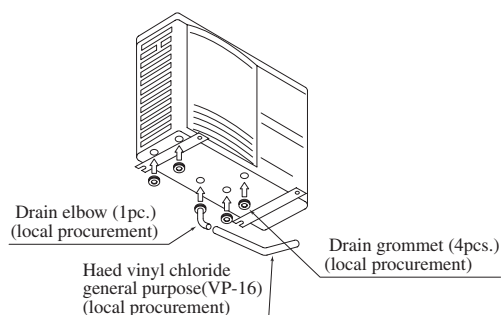
PLEASE NOTE

Please put down the refrigerant volume calculated from the pipe length onto the caution label attached on the back side of the service panel (Models 201 ~ 302 only; side cover).

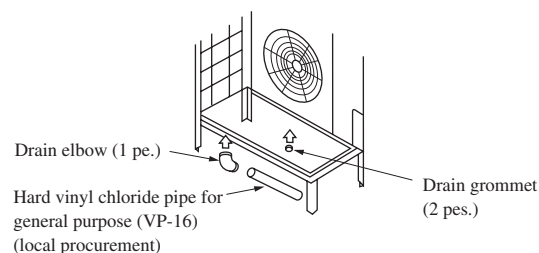
(5) Drain piping work

- Execute drain piping by using a drain elbow and drain grommets supplied separately as optional parts, where water drained from the outdoor unit is a problem.
- There are 3 drain holes provided on the bottom plate of an outdoor unit to discharge condensed water.
- When condensed water needs to be led to a drain, etc., install the unit on a flat base (supplied separately as an optional part) or concrete blocks.
- Connect a drain elbow as shown in the illustration and close the other two drain holes with grommets.

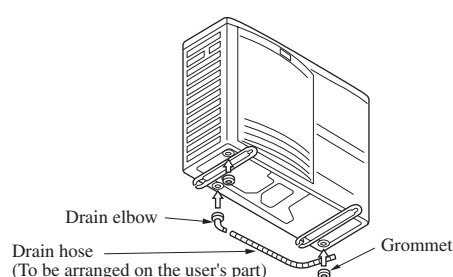
● **Models FDCVA201, 251**



● **Models FDCVA402 ~ 602**



● **Model FDCVA302**



(6) Electrical wiring

Electrical installation work must be performed by an electrical installation service provider qualified by a power provider of the country. Electrical installation work must be executed according to the technical standards and other regulations applicable to electrical installations in the country.

① Do not use any supply cord lighter than one specified in parentheses for each type below.

- braided cord (code designation 60245 IEC 51),
- ordinary tough rubber sheathed cord (code designation 60245 IEC 53)
- flat twin tinsel cord (code designation 60227 IEC 41);

Do not use anything lighter than polychloroprene sheathed flexible cord (code designation 60245 IEC57) for supply cords of parts of appliances for outdoor use.

② Ground the unit. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod or telephone grounding wire.

If improperly grounded, an electric shock or malfunction may result.

③ A grounding wire must be connected before connecting the power cable. Provide a grounding wire longer than the power cable.

④ The installation of an impulse withstanding type earth leakage breaker is necessary. A failure to install an earth leakage breaker can result in an accident such as an electric shock or a fire.

⑤ Do not turn on the power until the electrical work is completed.

⑥ Do not use a condensive capacitor for power factor improvement under any circumstances. (It does not improve power factor, while it can cause an abnormal overheat accident)

⑦ For power supply cables, use conduits.

⑧ Do not lay electronic control cables (remote control and signaling wires) and other cables together outside the unit. Laying them together can result in the malfunctioning or a failure of the unit due to electric noises.

⑨ Fasten cables so that may not touch the piping etc.

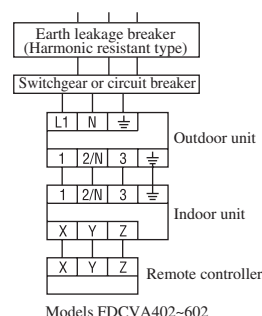
⑩ When cables are connected, please make sure that all electrical components within the electrical component box are free of loose connector coupling or terminal connection and then attach the cover securely. (Improper cover attachment can result in malfunctioning or a failure of the unit, if water penetrates into the box.)

Power cable, indoor-outdoor connecting wires

- Always perform grounding system installation work with the power cord unplugged.

⚠ CAUTION

Always use an earth leakage circuit breaker designed for inverter circuits to prevent a faulty operation.



Model	Power source	Power cable thickness (mm ²)	Max. over current (A)	Cable length (m)	Grounding wire thickness	Indoor-outdoor wire thickness × number
FDCVA201	1 phase 220 ~ 240V 50Hz	2.0	15	19	ø1.6 mm	ø1.6 mm × 3
FDCVA251						
FDCVA302	1 phase 220 ~ 240V 50Hz/ 220V 60Hz	3.5	16	20		
FDCVA402			17			
FDCVA502			5.5	22		
FDCVA602		23		24		

Notes (1) The specifications shown in the above table are for units without heaters. For units with heaters, refer to the installation instructions or the construction instructions of the indoor unit.

(2) Switchgear or circuit breaker capacity which is calculated from MAX. over current should be chosen along the regulations in each country.

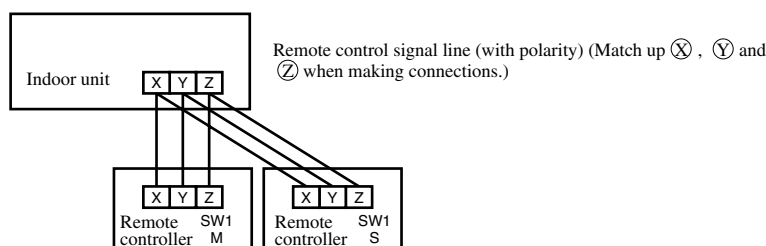
(3) The cable specifications are based on the assumption that a metal or plastic conduit is used with no more than three cables contained in a conduit and a voltage drop is 2%. For an installation falling outside of these conditions, please follow the internal cabling regulations. Adapt it to the regulation in effect in each country.

(a) Remote controller wiring and connection procedure

1) Master-slave settings when using multiple remote controllers

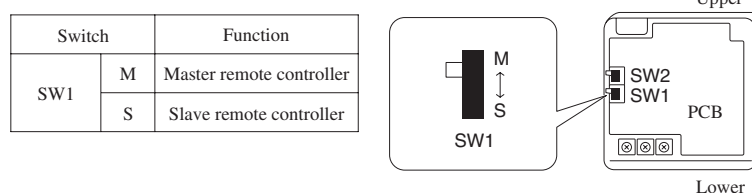
- Up to 2 remote controllers can be connected for each indoor unit (or group).

a) There are two methods, one where the remote controller signal line (3-wire) for the slave remote controller is taken from the indoor unit and the other where the signal lines are taken from the master remote controller.



- b) Set the SW1 select switch on the slave remote controller on the Slave setting. (It is set on the Master setting at the factory.)

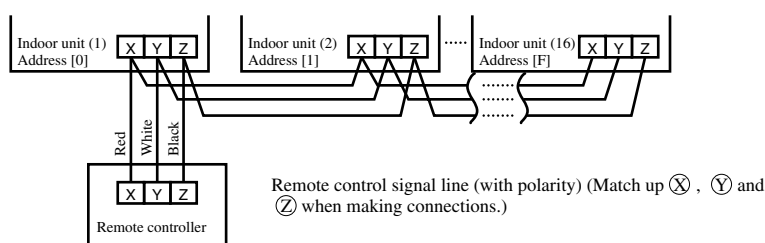
Note (1) Remote controller sensor activation settings are possible only with the master remote controller. Install the master remote controller in a location where it can sense the room temperature.



2) Controlling multiple indoor units using a single remote controller.

- Up to 16 indoor units can be controlled with a single remote controller.

- Run 3-wire remote control lines between each of the indoor units. See “Precaution in extending the remote controller cord” on page 78 concerning extended remote control lines.
- Set the remote controller communications address on “0” ~ “F” using rotary switch SW2 on the indoor unit’s control board, taking care not to overlap the addresses of any of the units.



- After turning the power on, press the AIR CON No. button to display the indoor unit’s address. Be sure to confirm that the settings are displayed correctly in the remote controller by using the ▲ and ▼ buttons to display the address of each connected indoor unit.

(7) Setting functions using the wired remote controller

- (a) The default settings of this unit's functions are as follows: If you want to change a setting, follow the procedure found in the installation manual and set to your desired setting.

For the method of setting, please refer to the installation manual of a remote controller unit.

① Remote controller unit functions (FUNCTION ▼)

Function number (A)	Function description (B)	Setting (C)	Default setting
01	GRILLE ↑↓ SET (Grille lift panel setting)	↑↓ INVALID	○
		50Hz AREA ONLY	
		60Hz AREA ONLY	
02	AUTO RUN SET	AUTO RUN ON	*
		AUTO RUN OFF	
03	☑/☒ TEMP S/W	☑/☒ VALID	○
		☑/☒ INVALID	
04	⏻ MODE S/W	⏻ VALID	○
		⏻ INVALID	
05	① ON/OFF S/W	① VALID	○
		① INVALID	
06	⚙ FANSPEED S/W	⚙ VALID	○
		⚙ INVALID	
07	⚙ LOUVER S/W	⚙ VALID	*
		⚙ INVALID	
08	⌚ TIMER S/W	⌚ VALID	○
		⌚ INVALID	
09	📡 SENSOR S/W (Remote control sensor setting)	📡 SENSOR OFF (Invalid)	○
		📡 SENSOR ON (Valid)	
10	POWER FAILURE COMPENSATION SET	INVALID	○
		VALID	
11	VENTI SET	NO VENTI	○
		VENTI LINK SET	
		NO VENTI LINK	
12	TEMP RANGE SET	DISP CHANGE	○
		NO DISP CHANGE	
13	I/U FAN SPEED (Indoor unit fan speed setting)	3 FAN SPEED	*
		2 FAN SPEED	
		1 FAN SPEED	
14	MODEL TYPE	HEAT PUMP	*
		COOLING ONLY	
15	EXTERNAL CONTROL SET	INDIVIDUAL OPERATION	○
		SAME OPERATION FOR ALL UNITS	
16	ERROR DISP SET	ERROR DISP	○
		NO ERROR DISP	
17	⚙ POSITION (Louver control setting)	FIX (1 OF 4) (4 position stop)	○
		IN MOTION (Free stop)	
18	°C/°F SET	°C	○
		°F	

② Indoor unit functions (I/U FUNCTION ▲)

Function number (A)	Function description (B)	Setting (C)	Default setting
01	Hi CEILING SET	STANDARD (Mild mode)	*
		Hi CEILING 1 (Powerful mode)	
03	FILTER SIGN SET	NO DISPLAY	*
		AFTER 180H	
		AFTER 600H	
		AFTER 1000H	
04	⚙ POSITION (Louver control setting)	1000H→STOP	○
		FIX (1 OF 4) (4 position stop)	
05	EXTERNAL INPUT SET	IN MOTION (Free stop)	○
		LEVEL INPUT	
06	OPERATION PERMISSION PROHIBITED	PULSE INPUT	○
		NORMAL OPERATION	
07	☀ ROOM TEMP OFFSET (Heating room temperature offset)	VALID	○
		TEMP SHIFT +3°C	
08	☀ FAN CONTROL (Heating fan control)	NORMAL OPERATION	○
		TEMP SHIFT +3°C	
09	FREEZE PREVENT TEMP	LOW FAN	*
		STOP→LOW FAN (Intermittent operation)	
10	FREEZE PREVENT CONTROL	TEMP Hi	○
		TEMP Lo	
10	FREEZE PREVENT CONTROL	FAN CONTROL ON	○
		FAN CONTROL OFF	

Notes(1) Setting marked with [○] are the default setting.

- (2) Setting marked with [*] are those that are set automatically according to an indoor unit or an outdoor unit connected. Please check default settings with the indoor unit's installation manual.

Notes(1) Setting marked with [○] are the default setting.

- (2) Setting marked with [*] are those that are set automatically according to an indoor unit or an outdoor unit connected. Please check default settings with the indoor unit's installation manual.
- (3) When Item 17 : “⚙ POSITION” is changed, please also change Item 04 “⚙ POSITION” setting found in “Indoor unit functions”.

(b) Function setting method

- 1) Stop the air conditioner
- 2) Press the SET and MODE buttons simultaneously for 3 seconds or longer.

The screen display will be switched as follows:

“ SELECT ITEM” →

“ SET” →

“FUNCTION SET ▼”



- 3) Press the SET button.
The unit will enter the function setting mode. The screen display will change to “ FUNCTION ▼”.
- 4) Check which category your desired setting belongs to, “ FUNCTION ▼ (Remote controller unit function)” or “I/U FUNCTION ▲” (Indoor unit function).
- 5) Press either or button.
Select either “ FUNCTION ▼” or “I/U FUNCTION ▲”.



- 6) Press the SET button.

- 7) When “ FUNCTION ▼” is selected.

- ① “DATA LOADING” (blinking) → “ FUNCTION” →

“01 GRILLE ↑↓ SET” (Function number: ①, Function description: ②)

The screen display will be switched like this.

- ② Press either or button.

“Function number: ①, Function description: ②” from the list of remote controller unit functions will be displayed one by one. Select a desired function.

- ③ Press the SET button.

The screen display will be switched as follows:

“ SETTING” → “Setting: ③” (ex. “AUTO RUN ON”)

- ④ Press either or button.

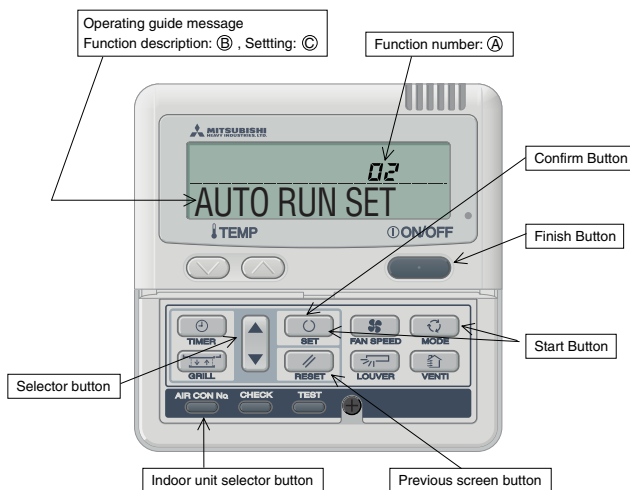
A list of “Settings: ③” will be displayed one by one. Select your desired setting.

- ⑤ Press the SET button.

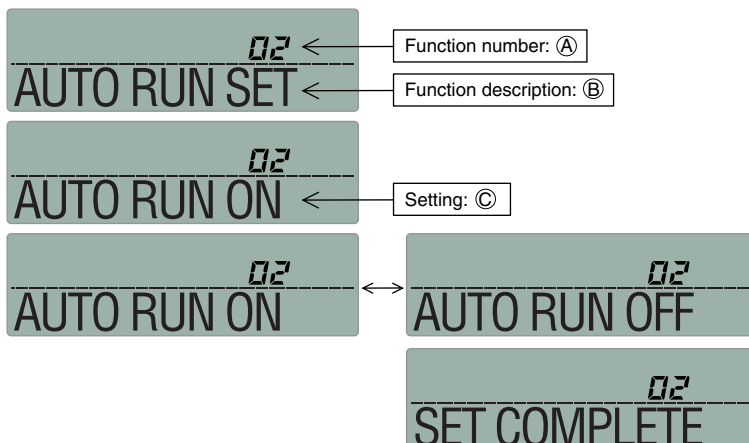
The selected setting is displayed for 2 seconds, then followed by “SET COMPLETE” and the function setting process is completed.

Then the screen display will be switched to “Function number: ①, Function description: ②,” so if you want to continue to set another function, repeat the steps as explained above.

To finish the function setting process, please proceed to Step 8).



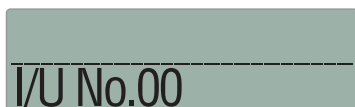
* When “02 AUTO RUN SET” is selected.



When "I/U FUNCTION ▲" is selected.

- ① The screen display will be switched as follows:

"◆ I/U SELECT" → "○ SET" → "I/U No.00" (blinking)



- ② Press either ▲ or ▼ button.

Select the indoor unit number that you want to change settings. If only one indoor unit is connected, the indoor unit number will not change, so please proceed to Step ③.

If "ALL I/U ▼" is selected while indoor group control is in effect, you can set all units to the same settings.

- ③ Press the SET button.

Indoor unit number indication will change from blinking to lit continuously. The screen display will be switched as follows:

"DATA LOADING" (blinking for about 2 to 23 seconds) → "◆ I/U FUNCTION" → "01 Hi CEILING SET"

(Function number: ①, Function description: ②)

* When "01 Hi CEILING SET" is selected.

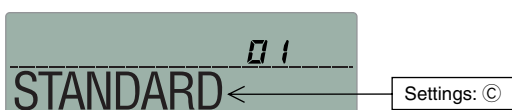


- ④ Press either ▲ or ▼ button.

"Function number: ①, Function description: ②" from the list of indoor unit functions will be displayed one by one. Select a desired function.

- ⑤ Press the SET button.

The screen display will be switched as follows: "◆ I/U SETTING" → "Setting: ③" (ex. "STANDARD")



- ⑥ Press either ▲ or ▼ button.

A list "Setting: ③" will be displayed one by one. Select your desired setting.

- ⑦ Press the SET button.

The selected setting is displayed for 2 seconds, then followed by "SET COMPLETE" and the function setting process is completed.

Then the screen display will be switched to "Function number: ①, Function description: ②" so if you want to continue to set another function, repeat the steps as explained above. To finish the function setting process, please proceed to Step 8).

- ⑧ Press AIR CON No. button.

The screen display will go back to the indoor unit selection screen (ex. "I/U No.00").

If you want to continue to set another indoor unit, please follow the steps explained above.

- 8) Press the ON/OFF button.

This ends a function setting process. Even if a function setting process is not completed, this ends the process.

Please note that any setting that is not completed will become void.

- **Pressing the RESET button during a function setting process will allow you to go back the previous step. Please note that any setting that is not completed will become void.**

- **Method of checking the current setting**

While following the above mentioned step, the setting that appears when the SET button is pressed for each "Function number: ①, Function description: ②" is the current setting "Setting: ③". (When "ALL I/U ▼" is selected, the setting of the indoor unit with the lowest number is displayed)

- **Settings are stored in the controller and not lost even a power outage occurs.**

(c) Changing the remote control set temperature range

- 1) It is possible to change the set temperature range using the remote control.
 - a) The upper and lower set temperature limits can be set from the remote control.
Upper limit value setting: Effective during heating. The temperature can be set within a range of 20~30°C.
Lower limit value setting: Effective when running in modes other than the heating mode (AUTO, COOL, FAN, DRY): The temperature can be set within a range of 18~26°C.
 - b) If the upper and lower limits are set using this function, the following controls are active.
- 2) When and ⑫TEMP RANGE SET under “ FUNCTION” the function setting mode is DISP CHANGE
 - a) If you are setting the upper limit,
 - ① If a temperature that is greater than the upper limit during heating is set from the remote control.
The unit runs for 30 minutes at the set temperature, then it automatically transmits the upper limit temperature. The display on the remote control also approaches that temperature.
 - ② During heating, if the upper limit value is set at a temperature below the upper limit value:
The set temperature is transmitted.
 - b) If the lower limit is set
 - ① If a temperature that is lower than the lower limit value is set from the remote control. When running in an operation mode other than the heating mode: the unit runs at the set temperature for 30 minutes, then it automatically transmits the lower limit temperature.
 - ② If a temperature that is higher than the lower limit value is set when running in a mode other than the heating mode:
It transmits the set temperature.
- 3) When and ⑫TEMP RANGE SET under the “ FUNCTION” the function setting mode is NO DISP CHANGE.
 - a) If the upper limit is set
 - ① During heating, if a temperature that is higher than the upper limit is set from the remote control:
The upper limit value is transmitted. However, the remote control display does not approach the upper limit value, but remains on the set temperature.
 - ② During heating, if the temperature is set at a value lower than the upper limit value:
The set temperature is transmitted.
 - b) If the lower limit is set
 - ① When in an operating mode other than the heating mode, if a temperature that is lower than the lower limit value is set from the remote control:
The lower limit value is transmitted. However, the remote control display does not approach the lower limit value, but remains on the set temperature.
 - ② When in an operating mode other than the heating mode, if a temperature that is higher than the lower limit value is set:
The set temperature is transmitted.
- 4) Setting the upper and lower limit values
 - a) Stop the air conditioner, then press the SET and MODE buttons simultaneously for 3 seconds or longer. If you press “ SELECT ITEM” → “ SET” → “FUNCTION SET ▼” the display changes.
 - b) Press the button, then change the “TEMP RANGE ▲” display.
 - c) Press the SET button and enter the temperature range setting mode.
 - d) Using the buttons, select the “Hi LIMIT SET ▼” or “Lo LIMIT SET ▲,” then fix it by pressing SET.
 - e) If you selected “Hi LIMIT SET,” (enabled during heating)
 - ① “ SET UP” → “Hi LIMIT 28°C ” (blinking) is displayed.
 - ② Using the “ ” temperature setting buttons, select the upper limit value. Display Example: “Hi LIMIT 26°C ” (blinking)
 - ③ Press the SET button to fix the setting. Display example: “Hi LIMIT 26°C” (lights up for 2 seconds)
After the fixed upper limit value lights up for 2 seconds, the display returns to the “Hi LIMIT SET ▼” display in item d).
 - f) If “Lo LIMIT SET ▲” was selected (enabled during COOL, DRY and FAN)
 - ① “ SET UP” → “Lo LIMIT 20°C ” (blinking) is displayed.
 - ② Using the “ ” temperature setting buttons, select the lower limit. Display example: “Lo LIMIT 24°C ” (blinking)
 - ③ Press the SET button to fix the setting. Display example: “Lo LIMIT 24°C” (lights up for 2 seconds)
After the fixed lower limit value lights up for 2 seconds, the display returns to the “Lo LIMIT SET ▲” display in item d).
 - g) Pressing the ON/OFF button stops the operation.
(Operation stops even if the ON/OFF button is pressed during setting, and the stopped state returns. However, if setting is not completed, it is not valid, so use caution.)
- ◆ If the RESET button is pressed during setting, the previous setting screen is displayed.

- If the RESET button is pressed during a setting operation, the display returns to the previously displayed setting screen. However, settings which have not been fixed become invalid, so exercise caution.
- * If “NO DISP CHANGE” is selected in No. 12, “TEMP RANGE SET” of the remote controller’s functions, of the function setting modes, the remote controller’s display does not change even if the temperature range has been changed.

(Example) If the upper limit is set at 28°C

Function No. A	Function Contents B	Setting Contents C	Control Contents
12	TEMP RANGE SET	DISP CHANGE	The remote controller’s display and sent data upper limit changes to 28°C.
		NO DISP CHANGE	The remote controller’s display upper limit remains at 30°C and only the upper limit of the sent data is changed to 28°C.

(8) Checking operation data

Operation data can be checked with remote controller unit operation.

- ① Press the CHECK button.

The display change from “ SELECT ITEM” → “ SET” → “OPERATION DATA ▼”.

- ② Press the SET button while “OPERATION DATA ▼” is displayed.

- ③ The display will change to “I/U No. 00 ▲” (blinking indication).

Select the indoor unit number you want to have data displayed with the button.

(When only one indoor unit connected, the indoor unit number displayed on the screen will not change.)

- ④ Determine the indoor unit number will the SET button.

(The indoor unit number changes from blinking indication to continuous indication.)

“DATA LOADING” (A blinking indication appears while data is loaded)



“OPERATION DATA ” appears and data number 01 is displayed.


- ⑤ Upon operation of the button, the current operation data is displayed in order from Data number 01.

The items displayed are as follows:

* Depending on models, the items that do not have corresponding data are not displayed.

- ⑥ To display the data of a different indoor unit, press the AIR CON No. button, which allows you to go back to the indoor unit selection screen.
- ⑦ Pressing the ON/OFF button will stop displaying data.

Pressing the RESET button during remote controller unit operation will undo your last operation and allow you to go back to the previous screen.

Number	Data item
01	 (Operation mode)
02	SET TEMP
03	RETURN AIR
04	I/U HEAT EXCH 1 (Indoor unit heat exchanger temperature 1)
05	I/U HEAT EXCH 2 (Indoor unit heat exchanger temperature 2)
07	I/U FAN (Indoor unit fan speed)
11	TOTAL I/U RAN (Indoor unit operation hours)
21	OUTDOOR (Outside air temperature)
22	O/U HEAT EXCH 1 (Outdoor unit heat exchanger temperature 1)
23	O/U HEAT EXCH 2 (Outdoor unit heat exchanger temperature 2)
24	COMP HERTZ
27	DISCHARGE (Discharge pipe temperature)
28	DOME BOTTOM
29	CT
31	O/U FAN (Outdoor unit fan speed)
32	SILENT MODE ON/OFF
34	63H1 ON/OFF
35	DEFROST ON/OFF
36	TOTAL COMP RUN (Compressor operation hours)
37	EEV 1 (Expansion valve opening 1)

(9) Test run

(a) Test run from an outdoor unit.

• Models FDCVA201, 251

1) Test run method

- A test run can be initiated from an outdoor unit by using SW9 and SW5-4 for on-site setting.
- When SW9 (press button switch) is pressed for 1 second and then released, the compressor will start operation approximately 5 seconds later.
- The unit will start a cooling operation, when SW5-4 is OFF, or a heating operation, when SW5-4 is ON.
- When a test run is completed, press SW9 (push-button switch) again for one second and then release it.

2) Checking the state of the unit in operation

Check discharge pressure and suction pressure, using the check joint provided inside the outdoor unit and the gas charge valve charge port. The check joint in the unit is provided on the pipe connecting the four-way valva and the heat exchanger, and these points offer different pressure measurements depending on a cooling or heating operation as summarized in the table below.

	Check joint in the unit	Gas servis valve charge port
Cooling	Discharge pressure (high pressure)	Suction pressure (low pressure)
Heating	Suction pressure (low pressure)	Discharge pressure (high pressure)

3) Setting SW5-1, SW5-2 on-site

a) Defrost control switching (SW5-1)

- When this switch is turned on, the unit will run in the defrost mode more frequently.
- Please set this switch to ON, when installed in a region where outdoor temperaure falls below zero during the thermistor the unit is run for a heating operation.

b) Snow guard fan control (SW5-2)

- When this switch is turned on, the outdoor unit fan will run for 10 seconds in every 10 minutes, when outdoor temperature falls to 3°C or lower and the compressor is not running.
- When the unit is used in a very snowy country, please set this switch to ON.

● **Models FDCVA302 ~ 602**

⚠ WARNING

- Before conduct a test run, do not fail to make sure that the service valves are closed.
- Turn on power 6 hours prior to a test run to energize the crank case heater.
- Always give a 3-minute or longer interval before you start the unit again whenever it is stopped.
- Removing the service panel will expose high-voltage live parts and high-temperature parts, which are quite dangerous. Take utmost care not to incur an electric shock or burns. Do not leave the unit with the service panel open.

A failure to observe these instructions can result in a compressor break-down.

⚠ CAUTION

- When you operate switches (SW3, SW5) for on-site setting, be careful not to touch a live part.
- You cannot check discharge pressure from the liquid operation valve charge port.
- The 4-way valve (20S) is energized during a heating operation.
- When power supply is cut off to reset the unit, give 3 or more minutes before you turn on power again after power is cut off. If this procedure is not observed in turning on power again, “E-5” (communication error) may occur.

1) Test run method

- A test run can be initiated from an outdoor unit by using SW3-3 (SW5-3) and SW3-4 (SW5-4) for on-site setting.
- Switching SW3-3 (SW5-3) to ON will start the compressor.
- The unit will start a cooling operation, when SW3-4 (SW5-4) is OFF, or a heating operation, when SW3-4 (SW5-4) in ON.
- Do not fail to switch SW3-3 (SW5-3) to OFF when a test run is completed.

SW3-3 (SW5-3)	SW3-4 (SW5-4)	
ON	OFF	Cooling during a test run
	ON	Heating during a test run
OFF	—	Normal or After the test operation

Note (1) Values in () show in the case of the 302 model.

2) Checking the state of the unit in operation

Use check joints provided on the piping before and after the 4-way valve installed inside the outdoor unit for checking discharge pressure and suction pressure.

As indicated in the table shown on the right, pressure detected at each point will vary depending on whether a cooling or heating operation has been selected.

	Check joint of the pipe	Charge port of the gas service valve
Cooling operation	Discharge pressure (High pressure)	Suction pressure (Low pressure)
Heating operation	Suction pressure (Low pressure)	Discharge pressure (High pressure)

3) Setting SW3-1, SW3-2 on site or open J7 (SW7-1)

- Defrost control switching [SW3-1]
 - When this switch is turned ON, the unit will run in the defrost mode more frequency.
 - Set this switch to ON, when installed in a region where outdoor temperature falls below zero during the season the unit is run for a heating operation.
- Snow guard fan control [SW3-2]
 - When this switch is turned on, the outdoor unit fan will run for 10 seconds in every 10 minutes, when outdoor temperature falls to 3°C or lower and the compressor is not running.
 - When the unit is used in a very snowy country, set this switch to ON.
- High pressure control [J7 (SW7-1)]
 - When the option parts that change air flow from outlet are used, open J7.

4) Failure diagnosis in a test run

Error indicated on the remote control unit	Printed circuit board LED (They cycles of 5 seconds)		Failure event	Action
	RED LED	GREEN LED		
E39	1 time flash	Keeps flashing	Open phase	Check power cables for loose contact or disconnection
E40	1 time flash	Keeps flashing	63H1 actuation or operation with service valve shut (occurs mainly during a heating operation)	1. Check whether the service valves are open. 2. If an error has been canceled when 3 minutes have elapsed since a compressor stop, you can restart the unit by effecting check result from the remote control unit.
E49	1 time flash	Keeps flashing	Low pressure error or operation with service valves shut (occurs mainly during a cooling operation)	

5) The state of the electronic expansion valve.

The following table illustrates the steady states of the electronic expansion valve.

	When power is turned on	When the unit comes to a normal stop		When the unit comes to an abnormal stop	
		During a cooling operation	During a heating operation	During a cooling operation	During a heating operation
Valve for a cooling operation	Complete shut position	Complete shut position	Full open position	Full open position	Full open position
Valve for a heating operation	Full open position	Full open position	Complete shut position	Full open position	Full open position

(b) Test run from an wired remote controller.

1) Cooling test operation procedure

Carry out the following test operation procedure using the remote controller.

a) Starting the cooling test operation

- ① Press the ON/OFF button to start operation.
- ② Press the MODE button and select “❄️ (COOL)”.
- ③ Press the TEST button continuously for 3 seconds or longer.
The display changes from “❄️ SELECT ITEM” → “❄️ SET” → “❄️ TEST RUN ▼”.
- ④ When “❄️ TEST RUN ▼” is displayed, press the SET button to begin the cooling test operation.
The display shows “❄️ TEST RUN.”

b) Canceling the cooling test operation

Pressing the ON/OFF button or the TEMP (▼) (▲) button ends the cooling test operation.

The “❄️ TEST RUN” display is cleared.

1.6 MAINTENANCE DATA

1.6.1 Servicing

(1) Evacuation

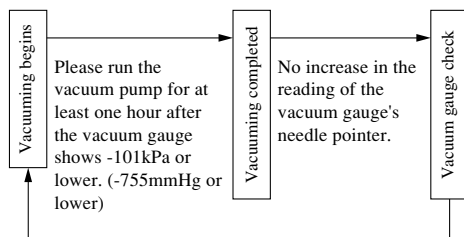
The evacuation is a procedure to purge impurities, such as noncondensable gas, air, moisture from the refrigerant equipment by using a vacuum pump. Since the refrigerant R410A is very insoluble in water, even a small amount of moisture left in the refrigerant equipment will freeze, causing what is called ice clogging.

Evacuation procedure

Make sure that the both service valves of gas and liquid line are fully opened.

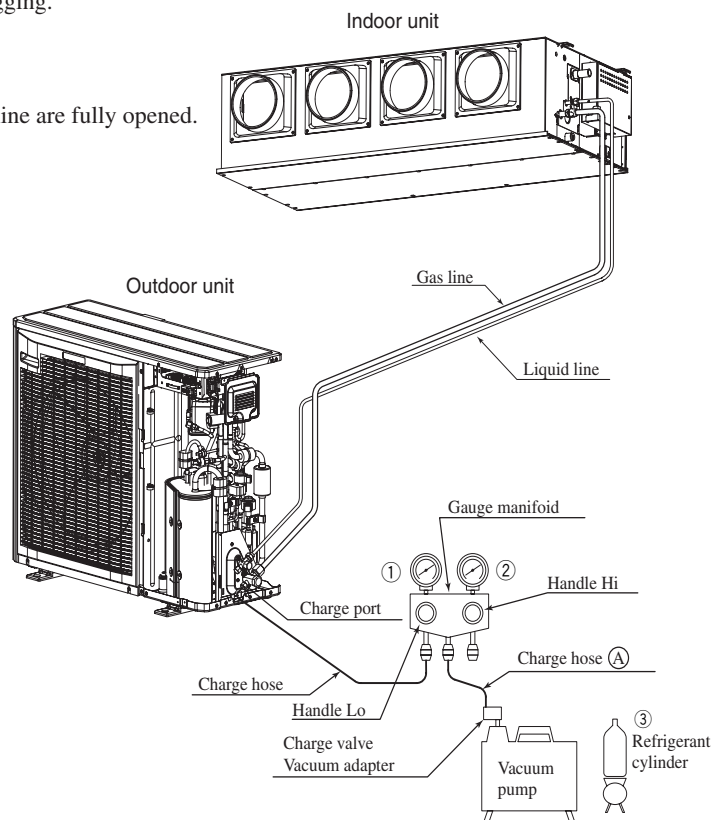
- Check to ensure that there is no internal pressure in the unit. If there is an internal pressure, it should be relieved through the service port.
- Connect the charging hose of the gauge manifold to the service port of the gas piping. Close high pressure valve ② of gauge manifold.
- Connect the charging hose ① to a vacuum pump.

Repeat evacuation in the following sequence.



When the vacuum gauge's needle pointer creeps up, there is moisture left in the system or a leak. Pull air again after you have checked the system for a leak and rectified it. Use a reverse flow stop adapter to prevent the vacuum pump's lubricant oil from flowing into the refrigerant system.

- Notes
- Do not use the refrigerant pressure to expel air.
 - Do not use the compressor for evacuation.
 - Do not operate the compressor in a vacuum condition.



(2) Refrigerant charging

- (a) After the evacuation shown in the above, change the connection of the charge hose ④ to the refrigerant cylinder.
- (b) Purge air from the charge hose ④.

First loosen the connecting portion of the charge hose at the gauge manifold side and open valve ③ for a few seconds, and then immediately retighten it after observing that gas has blown out from loosened connecting portion.

- (c) Open valves ① and ③ then gas refrigerant begins flowing from the cylinder into the unit.

When refrigerant has been charged into the unit to some extent, refrigerant flow becomes stagnant. When that happens, start the compressor in cooling cycle until the system is filled with the specified amount of gas, then close valves ① and ③ and remove the gauge manifold. Cover the service port with caps and tighten them securely.

- (d) Check for gas leakage by applying a gas leak detector around the piping connection.
- (e) Start the air conditioner and make sure of its operating condition.

1.6.2 Trouble shooting for refrigerant circuit

(1) Judgement of operating condition by operation pressure and temperature difference

Making an accurate judgement requires a skill that is acquired only after years of experience, one trouble may lead to another trouble from a single trouble source and several other troubles may exist at the same time which comes from an undetected different trouble source.

Filtering out the trouble sources can be done easier by comparing with daily operating conditions. Some good guides are to judge the operating pressure and the temperature difference between suction air and delivery air.

Following are some pointers,

Circuit	Pressure						Trouble cause
	Indi- cation	Too low	A little low	Normal	A little high	Too high	
High side						●	1) Excessive overcharging of refrigerant 2) Mixture of non condensable gas (air etc.)
Low side						●	
High side		●					Ineffective compression (defective compressor)
Low side						●	
High side			●				1) Insufficient refrigerant in circuit 2) Clogging of strainer 3) Gas leakage 4) Clogging of air filter (in cooling) 5) Decrease in heat load (in cooling) 6) Locking of indoor fan (in cooling)
Low side		●					
High side						●	
Low side					●		
High side					●		
Low side						●	
High side					●		1) Locking of outdoor unit fan (in cooling) 2) Dirty outdoor heat exchanger (in cooling) 3) Mixture of non condensable gas (air etc.)
Low side						●	
High side					●		1) Too high temperature of room
Low side						●	

(1) Selfdiagnosis function

(a) Check Indicator Table

Whether a failure exists or not on the indoor unit and outdoor unit can be know by the contents of remote controller error code, indoor/outdoor unit green LED (power pilot lamp and microcomputer normality pilot lamp) or red LED (check pilot lamp).

1) Indoor unit side

Remote controller error code	Indoor unit LED		Outdoor unit LED		Cause
	Green	Red	Green	Red	
No-indication	Keeps flashing	Stays OFF	Keeps flashing	Stays OFF	Normal
	Stays OFF	Stays OFF	Stays OFF	Stays OFF	Power OFF, L phase wiring is open, power source failure
	Keeps flashing	*3 time flash	Keeps flashing	Stays OFF	Remote controller wires X and Y are reversely connected. *For wire breaking at power ON, the LED is OFF. Remote controller wire is open. (X wire breaking : A beep is produced and no indication is made. Z wire breaking : No beep and no indication) The remote controller wires Y and Z are reversely connected.
LCD flashes continuously or is off.	Keeps flashing	Stays OFF	Keeps flashing	2 time flash	Poor connection or disconnection in wires connecting the indoor and outdoor units.
E1	Keeps flashing	Stays OFF	Keeps flashing	Stays OFF	When multiple remote controllers are used for control, the power supply to some indoor units is OFF.
	Stay OFF or Lights continuously	Stay OFF	Keeps flashing	Stays OFF	Indoor unit PCB fault
E5	Keeps flashing	2 time flash	Keeps flashing	2 time flash	Indoor / outdoor transmission error.
	Keeps flashing	2 time flash	Stays OFF	Stays OFF	Outdoor unit control PCB is faulty when the power is turned on, or the inverter parts are faulty.
	Keeps flashing	2 time flash	Keeps flashing	Stays OFF	Outdoor unit microcomputer failure
E6	Keeps flashing	1 time flash	Keeps flashing	Stays OFF	Indoor unit heat exchanger thermistor failure
E7	Keeps flashing	1 time flash	Keeps flashing	Stays OFF	Indoor unit return air thermistor failure
E8	Keeps flashing	1 time flash	Keeps flashing	Stays OFF	Heating overload (indoor heat exchanger temperature is abnormally high) and indoor heat exchanger thermistor is faulty.
E9	Keeps flashing	1 time flash	Keeps flashing	Stays OFF	The float SW operates (with FS only). Drain up kit wiring fault.
E10	Keeps flashing	Stays OFF	Keeps flashing	Stays OFF	When multi-unit control by remote controller is performed, the number of units is over (more than 17 units). Two remote controller are provided for one controller is performed.
E14	Keeps flashing	3 time flash	Keeps flashing	Stays OFF	Communications are faulty between master and slave indoor units
E28	Keeps flashing	Stays OFF	Keeps flashing	Stays OFF	Remote controller thermistor failure

Note (1) The green LED in the outdoor unit is used in the FDCVA302~1002 models.

2) Outdoor unit side

Remote controller error code	Indoor unit LED		Outdoor unit LED		Cause
	Green	Red	Green	Red	
E33	Keeps flashing	Stays OFF		1 time flash	Inverter primary side current is abnormal (FDCVA201, 251)
E34	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Outdoor unit power supply open phase, Noise filter defect (FDCVA302~1002)
E35	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Outdoor heat exchanger temperature is high or outdoor heat exchanger thermistor is faulty.
E36	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Discharge temperature abnormality.
E37	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Outdoor unit heat exchanger thermistor failure
E38	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Outdoor air temperature thermistor failure
E39	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Discharge pipe thermistor failure
E40	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	63H1 operation, Operation with service valve open (FDCVA302~1002)
E41	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Power transistor overheat (FDCVA402~1002)
E42	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Current (Abnormalities in a compressor over current), Operation with service valve closed
E45	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Inverter communications error (FDCVA302~1002)
E47	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Inverter over-voltage trouble (FDCVA201, 251)
					Inverter A/F module overcurrent trouble (FDCVA302)
E48	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	DC fan motor abnormal.
E49	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Low voltage abnormal or low voltage sensor disconnected (FDCVA302~1002)
E51	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Inverter PCB abnormal (FDCVA302~1002)
E53	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Suction pipe temperature thermistor disconnected (FDCVA302~1002)
E54	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Low pressure sensor disconnected or abnormal (FDCVA302~1002)
E55	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Compressor under-dome temperature thermistor disconnected (FDCVA802,1002)
E56	Keeps flashing	Stays OFF		1 time flash	Power transistor thermistor is faulty or disconnection or connector connections are poor (FDCVA201,251)
E57	Keeps flashing	Stays OFF		1 time flash	Insufficient refrigerant (FDCVA201, 251)
E59	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Compressor startup error (FDCVA201, 251)
				2 time flash	
				3 time flash	
				5 time flash	Compressor startup error (FDCVA302~1002)
E60	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Compressor loader position detection error (FDCVA201, 251)

Note (1) The green LED in the outdoor unit is used in the FDCVA302~1002 models.



(b) Display sequence of error, inspection display lamp

- 1) One kind error
Display corresponding to the error is shown.
- 2) More than one errors.

Section	Display section
Error code of remote controller	• Displays the error of higher priority (When plural errors are persisting)
Inspection LED (red) of indoor unit PCB	<i>E1 > E5 > E10 > E32 E60</i>
Inspection LED (red) of outdoor unit PCB	• Displays the present errors. (When a new error has occurred after the former error was reset.)

3) Timing of error detection

• Indoor unit side.

Error detail	Error code	Timing of error detection
Drain error (float switch motion)	<i>E9</i>	Normally, 30 seconds after the power is turned ON.
Wrong connection between the indoor and outdoor units.	“  WAIT  ”	No communications even once with the outdoor unit.
Transmission error of remote controller indoor unit	<i>E1</i>	After 1 or more communications of the indoor unit with the remote controller following power on, transmission errors cause an interruption for 2 minutes.
Transmission error between indoor/outdoor units	<i>E5</i>	After communications with the outdoor unit 1 or more times, communications are abnormal continuously for 2 minutes.
The number of connected indoor units exceeds the connection limit (when multiple units are control by a single remote controller).	<i>E10</i>	Normally after the power is turned ON (during communications).
Broken wire of indoor unit return air thermistor	<i>E7</i>	When an input temperature of -50°C or lower is measured by the return air thermistor is measured for 5 seconds or longer within 60 minutes after the first detection.
Broken wire of heat exchanger thermistor	<i>E6</i>	When an input temperature of -50°C or lower is measured by the heat exchanger thermistor is measured for 5 seconds or longer within 60 minutes after the first detection.

• Outdoor unit side.

Error detail	Error code	Timing of error detection
Broken wire of outdoor air temperature thermistor	<i>E38</i>	When a thermistor input temperature of -30°C or lower is measured for 5 seconds or longer 3 times within 40 minutes after the 1st detection between 2 minutes and 2 minutes 20 seconds after compressor operation starts.
Broken wire of heat exchanger thermistor	<i>E37</i>	When a thermistor input temperature of -50°C or lower is measured for 5 seconds or longer 3 times within 40 minutes after the 1st detection between 2 minutes and 2 minutes 20 seconds after compressor operation starts.
Broken wire of discharge pipe thermistor	<i>E39</i>	When a thermistor input temperature of -10°C or lower is measured for 5 seconds or longer 3 times within 40 minutes after the 1st detection between 10 minutes and 10 minutes 20 seconds after compressor operation starts.
Broken wire of suction pipe thermistor	<i>E53</i>	When a thermistor input temperature of -50°C or lower is measured for 5 seconds or longer 3 times within 40 minutes after the 1st detection between 10 minutes and 10 minutes 20 seconds after compressor operation starts.
Broken wire of low pressure sensor	<i>E54</i>	When a sensor is OV or lower or 3.49V or higher continuously for 5 seconds or longer 3 times within 40 minutes after the 1st detection between 2 minutes and 2 minutes 20 seconds after compressor operation starts.
Broken wire of under the under-dome thermistor	<i>E55</i>	When the under-dome thermistor input temperature of -50°C is measured for 5 seconds or longer 3 times within 40 minutes after the 1st detection between 10 minutes and 10 minutes 20 seconds after compressor operation starts.

4) Recording and reset of error

Error display	Memory	Reset
Error code of remote controller	• Saves in memory the mode ⁽¹⁾ of higher priority	<ul style="list-style-type: none"> • Stop the unit operation by pressing the ON/OFF switch of remote controller. • Operation can be started again if the error has been reset.
Indoor unit inspection lamp (red)	• Cannot save in memory	
Outdoor unit inspection lamp (red)	• Saves in memory the mode ⁽¹⁾ of higher priority	

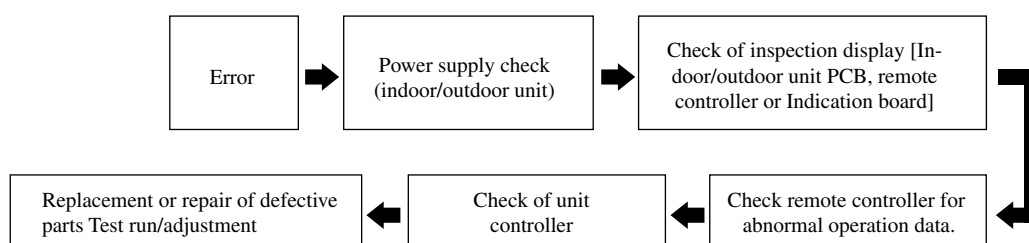
Note (1) Priority is in the order of E1 > ... > E10 > ... > E60.

Indoor unit : Press the ON/OFF button on the remote controller. Or disconnect and reconnect the power supply connector (CNW1 or CNW0) on the indoor unit control PCB or turn the main power supply OFF.

Outdoor unit : Turn the main power supply OFF.

(2) Procedures of trouble diagnosis

When any error occurs, inspect in following sequence. Detailed explanation on each step is given later in this text.



(3) Error diagnosis procedures at the indoor unit side

To diagnose the error, measure the voltage (AC, DC), resistance, etc. at each connector around the PCB of indoor unit based on the inspection display or the operation state of unit (no operation of compressor or blower, no switching of 4-way valve, etc.) If any defective parts are discovered, replace with the assembly of parts as shown below.

(a) Single-unit replacement parts for PCB of indoor unit. (Peripheral electric parts for circuit board.)

Indoor unit printed circuit board, thermistor (air return, heat exchanger), operating switches, limit switches, transformers, fuses.

Note (1) Use normal inspection methods to determine the condition of strong electrical circuits and frozen cycle parts.

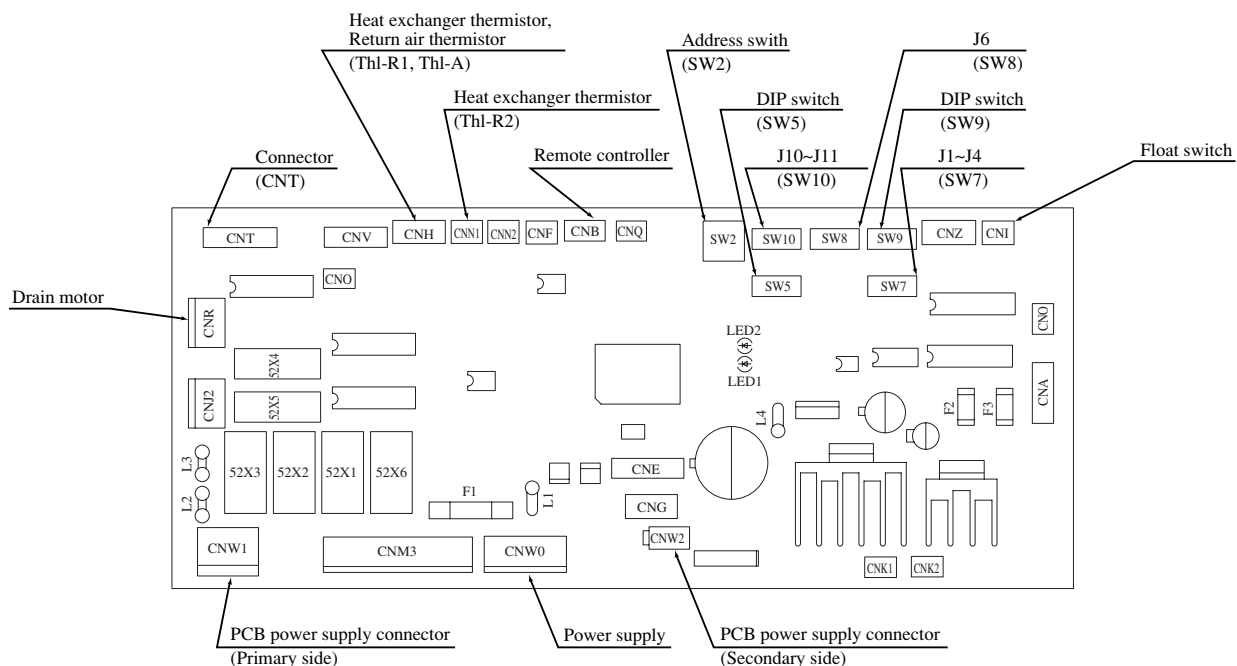
(b) Replacement procedure of indoor unit microcomputer printed circuit board

Microcomputer printed circuit board can be replaced with following procedure.

(i) Confirm the parts numbers.

Model	Parts number
FDUM	PJA505A131ZC

Parts layout on the indoor unit PCB



● Change by the jumper wire

Name	With	Function
J1 (SW7-1)	With	Input signal - Reverse invalid
	None ⁽¹⁾	Input signal - Run stop
J2 (SW7-2)	With	Heating thermostat OFF-Lo
	None ⁽¹⁾	Heating thermostat OFF-Stop, Lo
J3 (SW7-3)	With	Normal operation operable
	None ⁽¹⁾	Operation permission prohibited
J4 (SW7-4)	With	Normal
	None ⁽¹⁾	Heating temp. +3
J6 (SW8-2)	With	Freeze prevention fan control activated
	None ⁽¹⁾	Freeze prevention fan control deactivated

Notes (1) "None" means that jumper wire is not provided on the PCB or the connection is cut.

(2) The replacement PCB is not equipped with jumpers J1 ~ J4, J6. Instead, SW7 and 8, with the same functions as jumpers J1~J4, J6, are used in the position where the jumpers were previously. Set SW7 and 8 locally in accordance with the above table.

● Control change switch (SW5, SW9, SW10)

Function of DIP switch SW5 (Usually all turned OFF)

Switch	Function
SW5-1	ON Slave c
	OFF Slave b
	ON Slave a
	OFF Master
SW5-3	ON Setting time : 1000hrs. (Unit stop)
	OFF Setting time : 1000hrs. (Display)
	ON Setting time : 600hrs. (Display)
	OFF Setting time : 180hrs. (when shipped from factory)

Function of DIP switch SW9 (Usually all turned OFF)

Switch	Function
SW9-3	ON Emergency operation
	OFF Normal
SW9-4	ON Fan control : High speed (High Ceiling)
	OFF Fan control : Standard

Function of DIP switch SW10 (Usually all turned OFF)

Switch	Function
SW10-2 (J10)	OFF Remote controller air flow -
	ON Remote controller air flow 1 speed
	OFF Remote controller air flow 2 speed
	ON Remote controller air flow 3 speed

(c) Check method when the error code is display

Remote controller or indication board: Inspection LED, error code

Indoor unit PCB: Red LED (inspection display), Green LED (CPU. normal display)

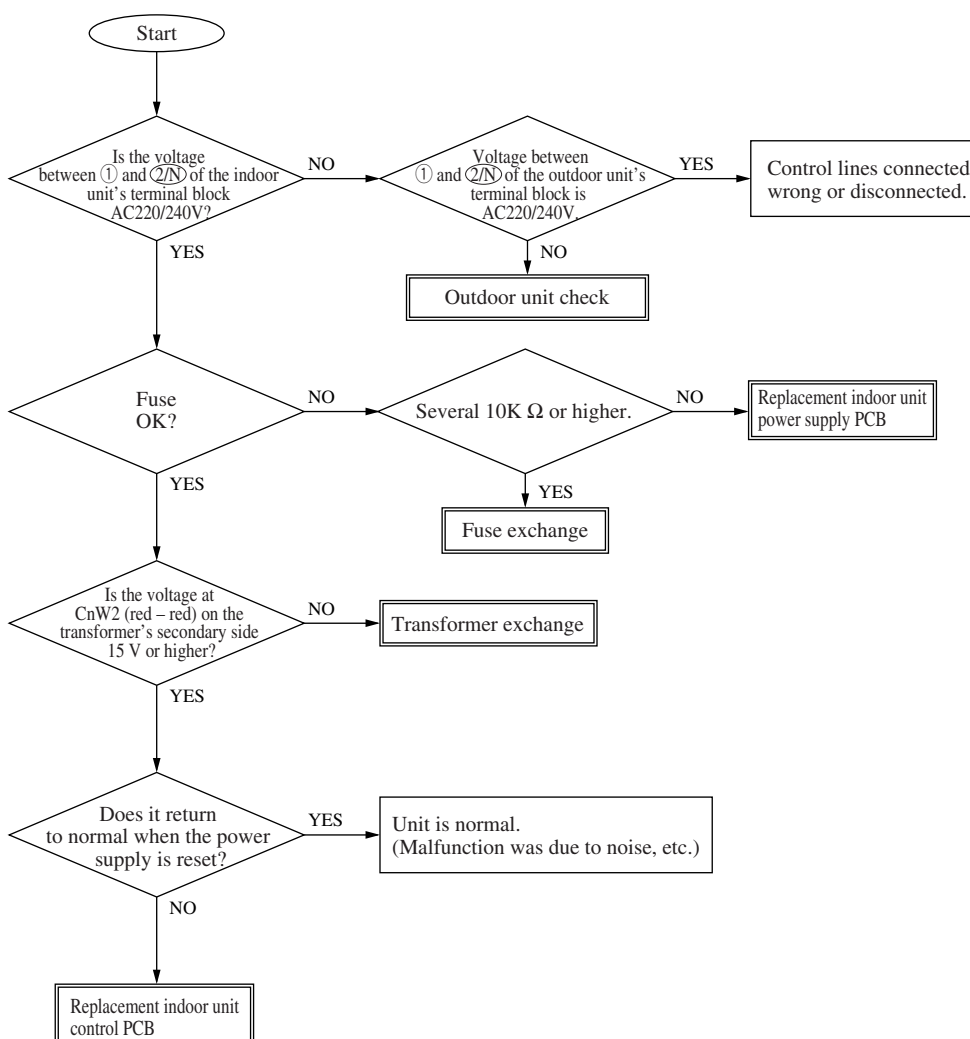
Outdoor unit PCB: Red LED (inspection display), Green LED (CPU. normal display)

1

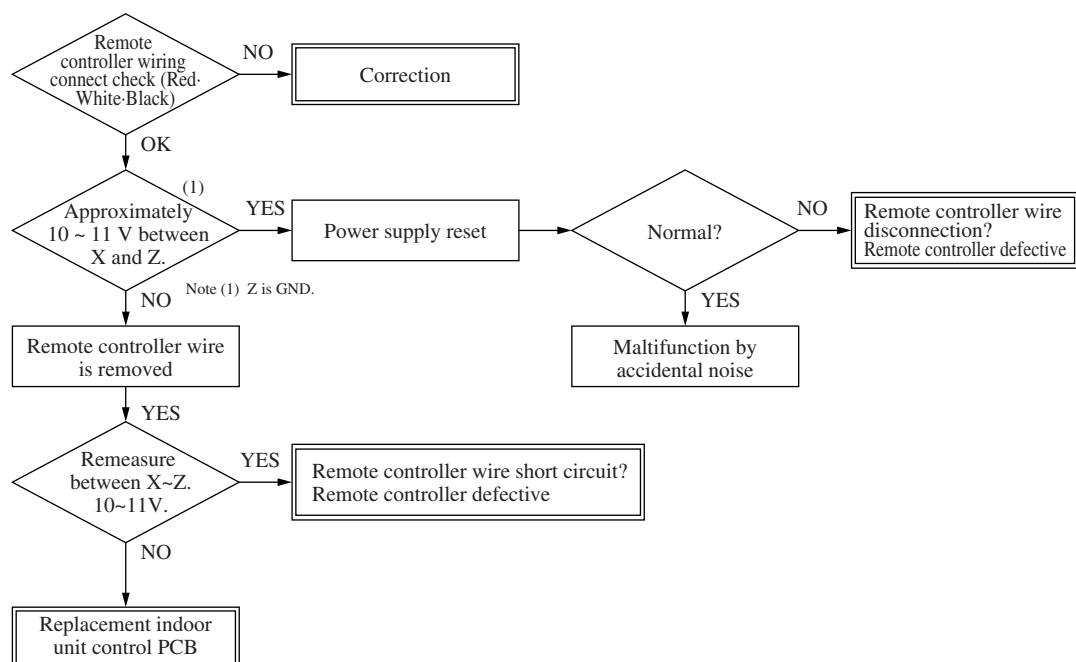
Error display : No display
LCD display : No display

[Power supply line error]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Stays OFF
Green LED	Stays OFF	Green LED	Stays OFF



Indoor unit		Outdoor unit	
Red LED	3 time flash	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



2

Error display “WAIT”

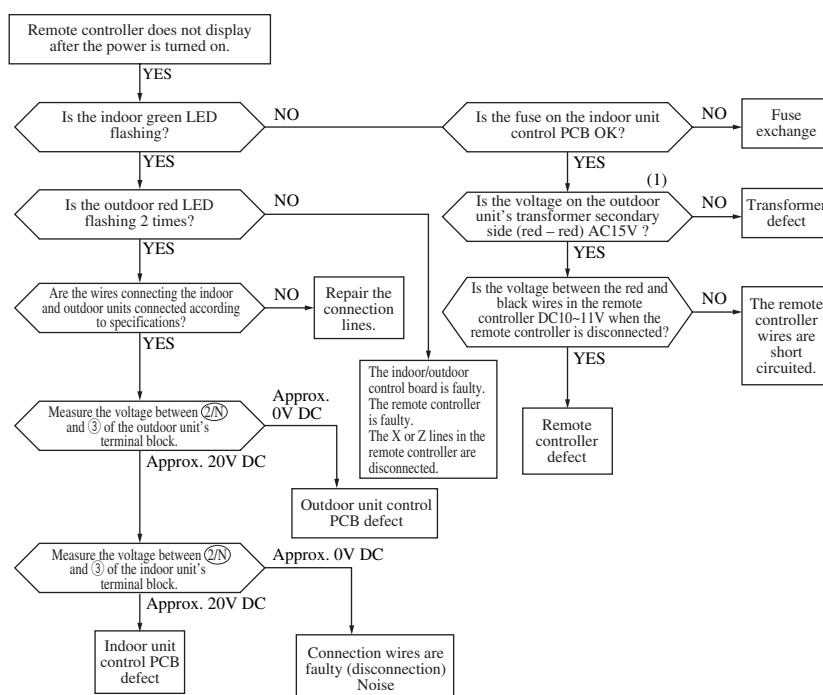
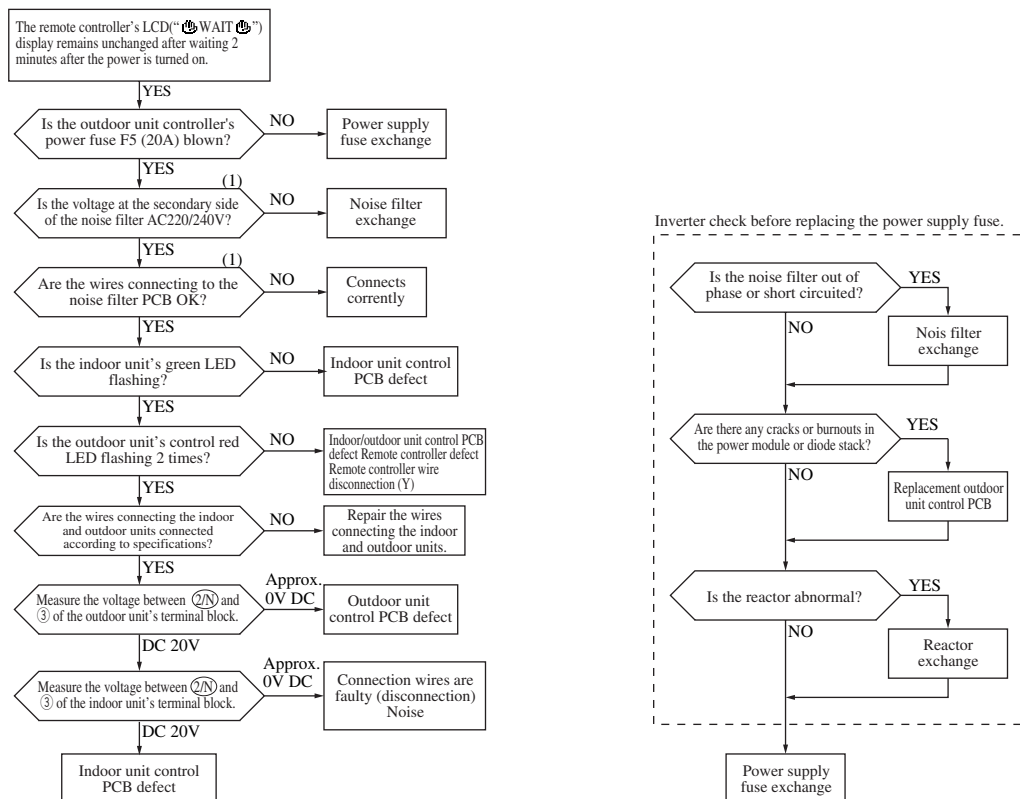
Indoor – outdoor communications trouble (Initial (when the power is turned on))

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	2 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing

If the power supply breaker is turned on again in a short time (within 1 minute) the message “WAIT” may be displayed. In this case, turn the breaker off, then wait 3 minutes before turning it on again.

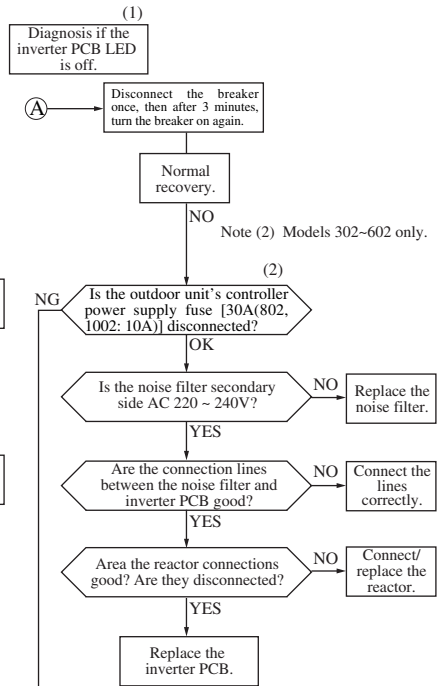
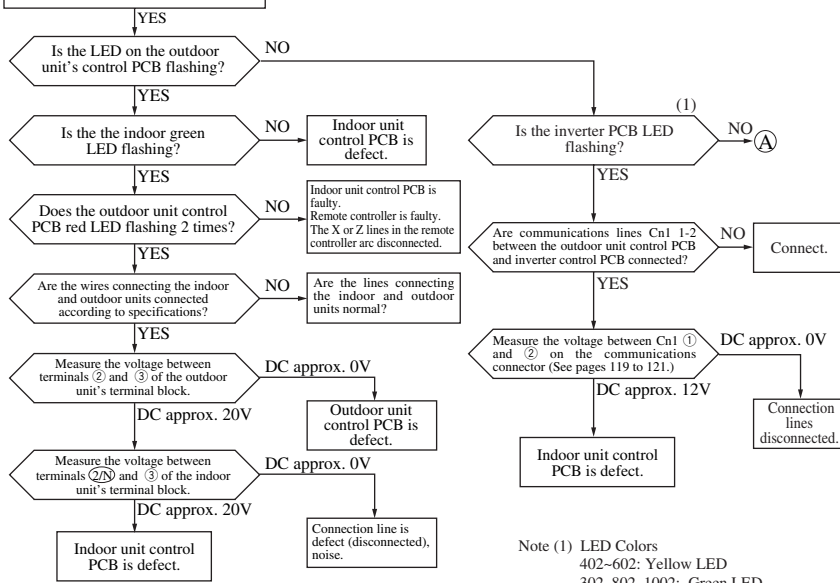
Note (1) If trouble occurs during communications, the error code E5 is displayed (Outdoor, Red LED flashes 2 times). The check procedure is as shown below. (However, excluding connection related problems) Also, if the power supply is reset after E5 occurs, if the trouble is intermittent, it will be displayed in the LCD (“WAIT”).

● Models FDCVA201, 251

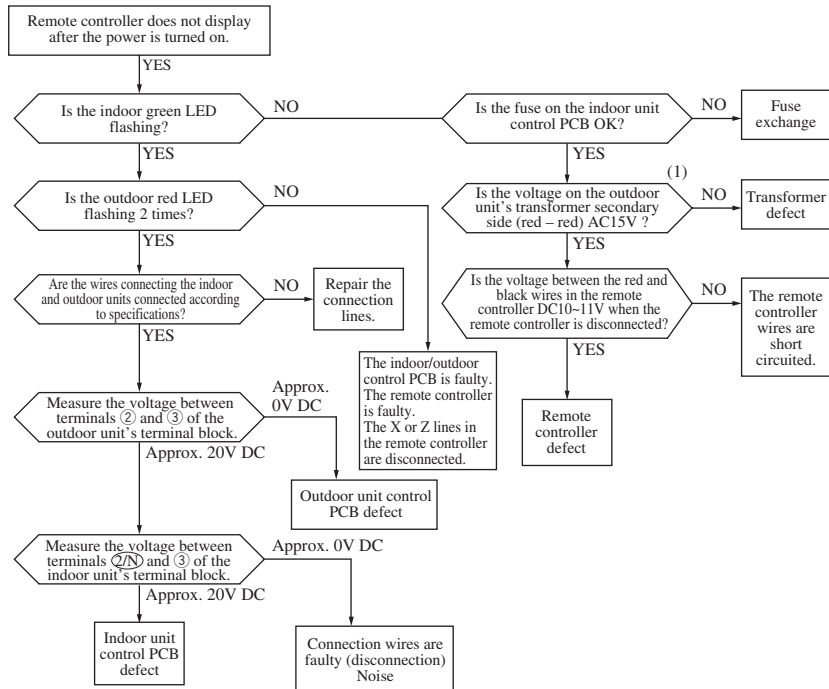
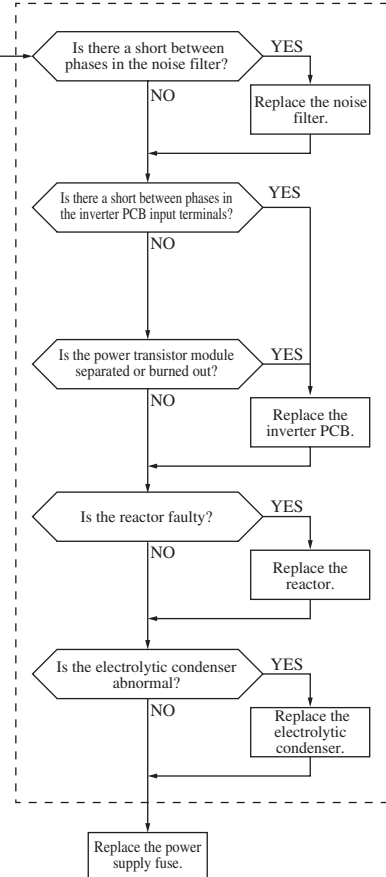


● Models FDCVA302~1002

The "WAIT" display remains the same in the remote controller's LCD even after the power supply has been turned on 2 minutes.



Check the inverter before replacing the power fuse.



● Check display when there are 3-wire wrong connections.

No.	Item	Wrong connection example	Check display
1	① and ②/N reversing		Remote Control: "WAIT" Indoor: Run LED keeps flashing. Check LED stays OFF. Outdoor: Run LED keeps flashing. Check LED 2 time flash.
2	① and ③ reversing		Remote Control: No-indication. Indoor: Run LED stays OFF. Check LED stays OFF. Outdoor: Run LED keeps flashing. Check LED 2 time flash. The power supply is not supplied to the indoor unit's controller.
3	②/N and ③ reversing		Remote Control: "WAIT" Indoor: Run LED keeps flashing. Check LED stays OFF. Outdoor: Run LED keeps flashing. Check LED 2 time flash.
4	①, ②/N and ③, wrongly connected		Remote Control: No-indication. Indoor: Run LED stays OFF. Check LED stays OFF. Outdoor: Run LED keeps flashing. Check LED 2 time flash. The power supply is not supplied to the indoor unit's controller.
5	①, ②/N and ③, wrongly connected		Remote Control: "WAIT" Indoor: Run LED keeps flashing. Check LED stays OFF. Outdoor: Run LED keeps flashing. Check LED 2 time flash.

Remarks: If the remote control wires (red and black wires) are connected, the green indoor unit LED is stays OFF and the remote controller does not work.

● Operation when address setting is wrong

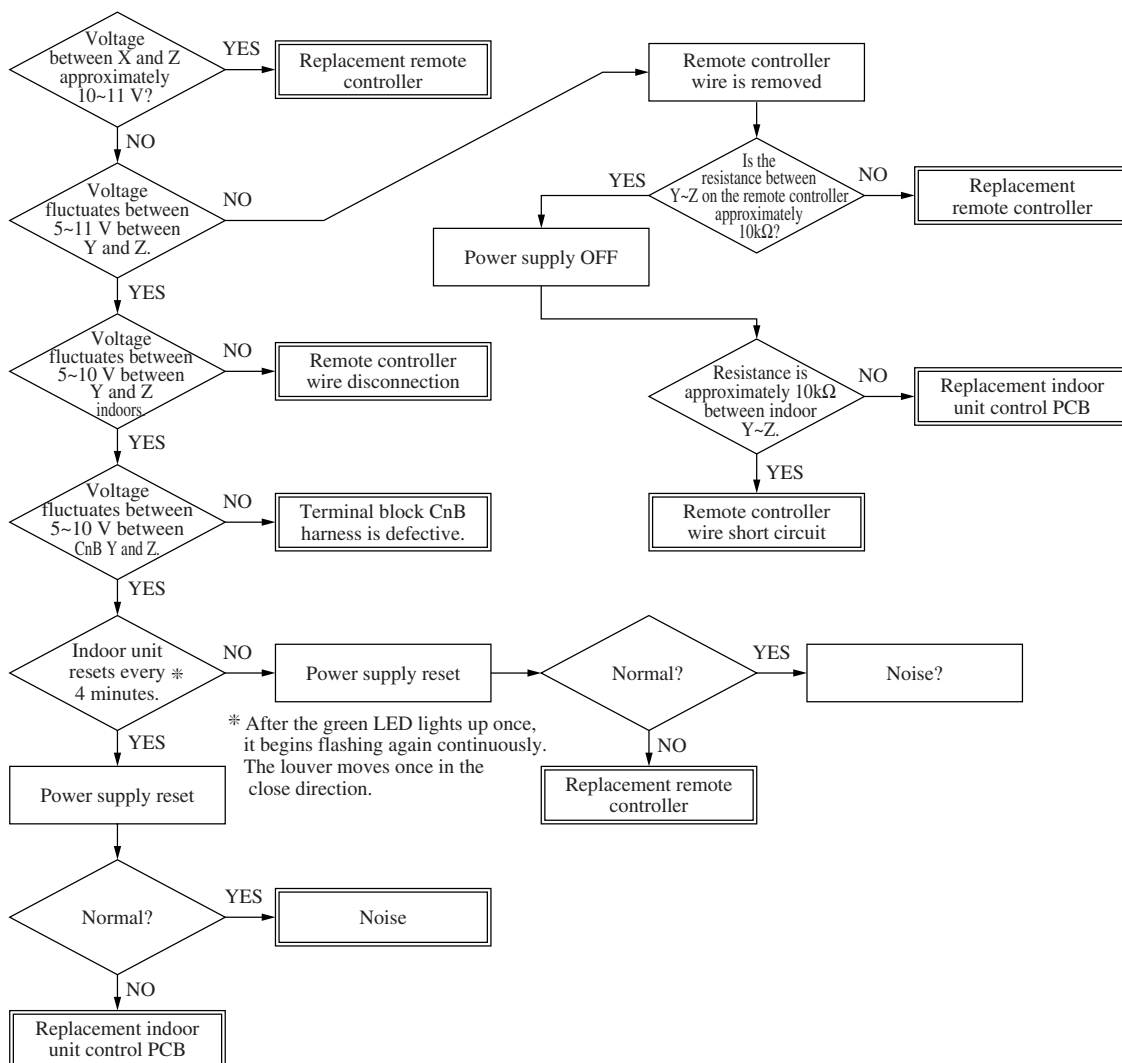
No.	Setting Method	Result	No.	Setting Method	Result
1	If address setting is forgotten when there are multiple slave units. 	<ul style="list-style-type: none"> Remote controller display is normal. Only those indoor units that are connected directly to the outdoor unit run. <p>Outdoor unit runs normally.</p> <p>Press the check SW and check the indoor units that are registered.</p>	5	If indoor unit address setting was forgotten when controlling multiple indoor units with one remote controller. 	<p>Remote controller continues to show "WAIT".</p> <p>Remote controller display is normal.</p> <p>Press the check SW and check the registered indoor units.</p>
2	If address setting is forgotten when there are multiple slave units. 	<ul style="list-style-type: none"> Remote controller continues to show "WAIT". <p>The outdoor check LED 2 time flash.</p>	6	If the address setting method for multiples slave units was mistaken. 	<ul style="list-style-type: none"> The remote controller display is normal. Only the indoor units that are connected directly to the outdoor unit operate. <p>The outdoor unit operates normally.</p> <p>Press the check SW and check the registered indoor units.</p>
3	If slave remote controller address setting was forgotten. 	<ul style="list-style-type: none"> Remote controller continues to show "WAIT". 	7	If the method for setting multiple slave unit addresses was mistaken. 1 of 3 wires between indoor units. 	<ul style="list-style-type: none"> Remote controller continues to show "WAIT". <p>The outdoor unit's check LED 2 time flash.</p>
4	If multiple slave units are set for a single unit. 	<ul style="list-style-type: none"> Remote controller continues to show "WAIT". <p>Indoor unit's check LED 3 time flash (E14).</p>	8	If the method for setting multiple slave unit addresses was mistaken. 	<ul style="list-style-type: none"> Remote controller display is normal. Only the indoor units that are connected directly to the outdoor unit operate. <p>The outdoor unit operates normally.</p> <p>Press the check SW and check the registered indoor units.</p>

3

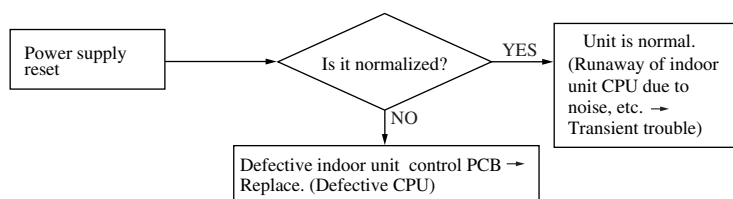
Error display : *E1*

[Communication error between remote controller~Indoor unit]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Stays OFF
Green LED	Stays OFF or Lights continuously	Green LED	Keeps flashing

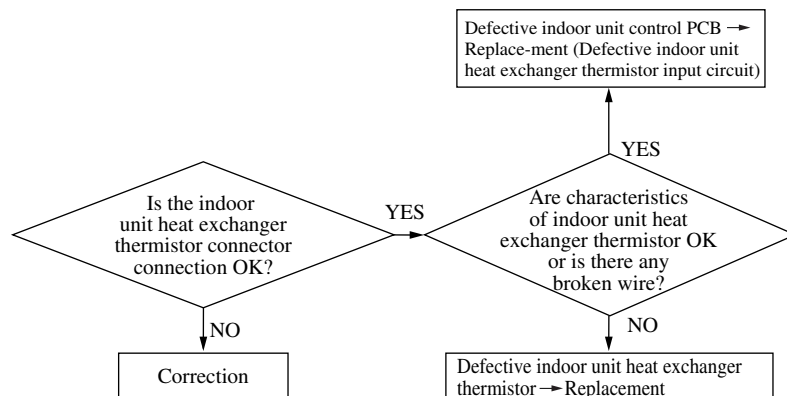


4

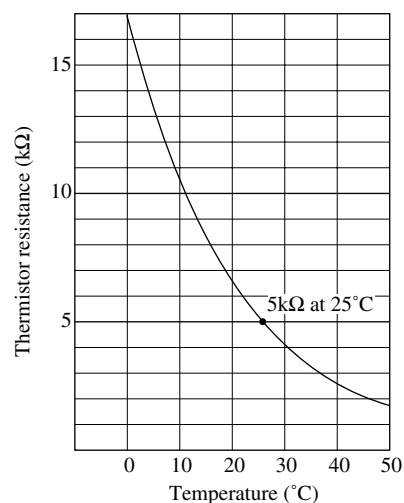
Error display : E6

[Defective indoor unit heat exchanger thermistor]

Indoor unit		Outdoor unit	
Red LED	1 time flash	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



Air return thermistor (Th:A)
Indoor unit heat exchanger thermistor (Th:R1, R2)
Resistance temperature characteristics



Note (1) 22.5 kΩ at -6°C

- Display condition

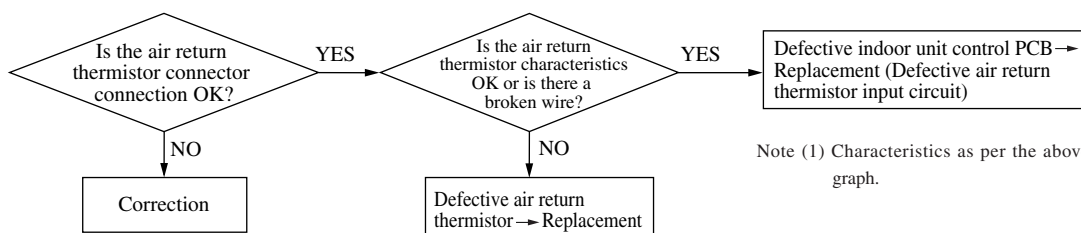
If a temperature of -50°C or lower is detected continuously for 5 seconds or longer by the thermistor, the compressor stops. After a 3 minute delay, the compressor restarts. If this state is detected again within 60 minutes after the first detection.

5

Error display : E7

[Detective air return thermistor]

Indoor unit		Outdoor unit	
Red LED	1 time flash	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



Note (1) Characteristics as per the above graph.

- Display condition

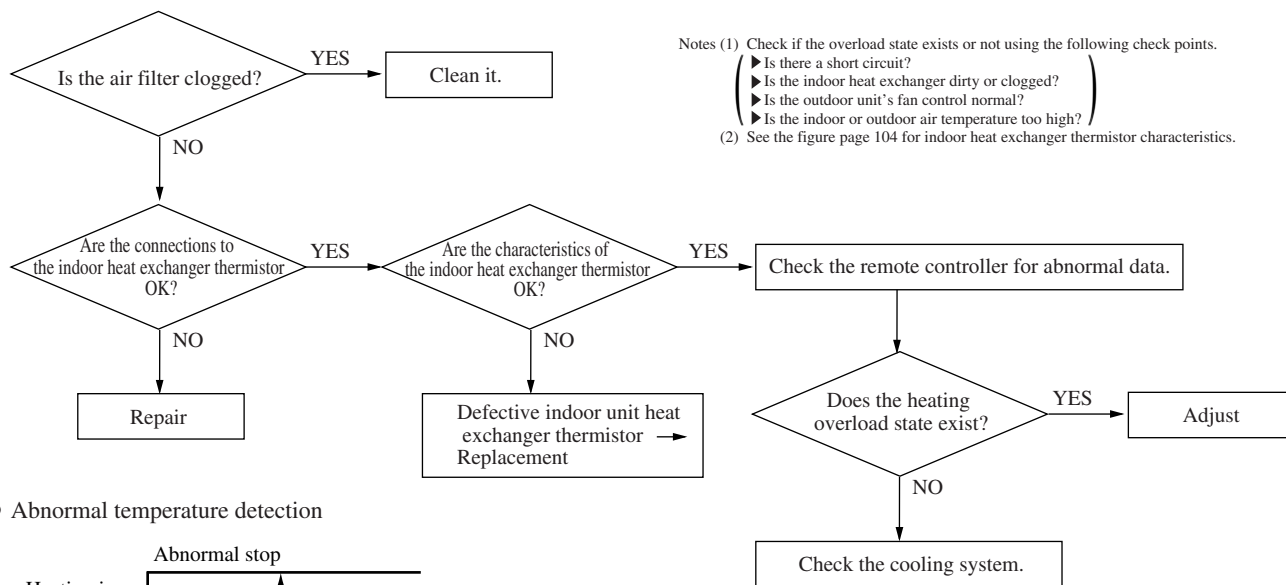
If a temperature of -50°C or lower is detected continuously for 5 seconds or longer by the thermistor, the compressor stops. After a 3 minute delay, the compressor restarts. If this state is detected again within 60 minutes after the first detection.

6

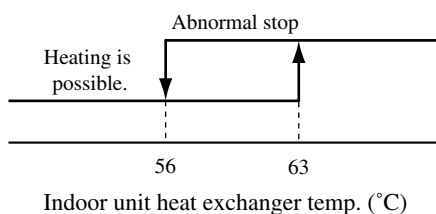
Error display : **EB**

[Heating overload]

Indoor unit		Outdoor unit	
Red LED	1 time flash	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



● Abnormal temperature detection



● Display condition

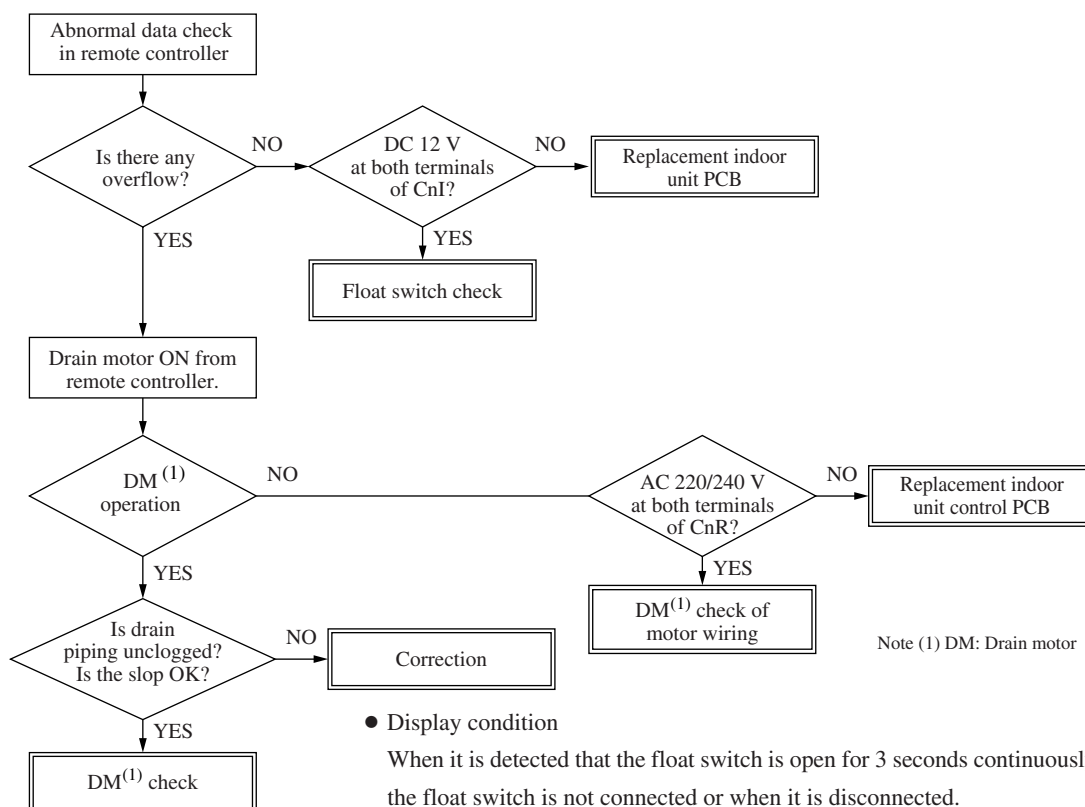
An abnormal stop occurs if this state is detected 5 times within 60 minutes of the first detection, or if the overload state is detected continuously for 6 minutes.

7

Error display : **E9**

[Drain trouble]

Indoor unit		Outdoor unit	
Red LED	1 time flash	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



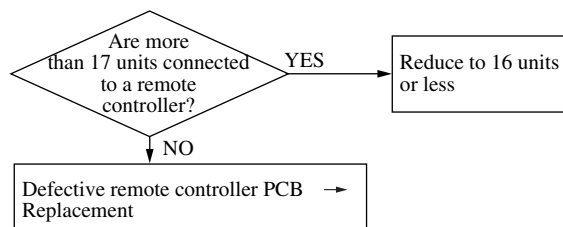
● Display condition

When it is detected that the float switch is open for 3 seconds continuously, when the float switch is not connected or when it is disconnected.

8

Error display : *E10*[Control of 1 remote controller VS multiple units –
Excessive number of units (more than 17 units)]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing

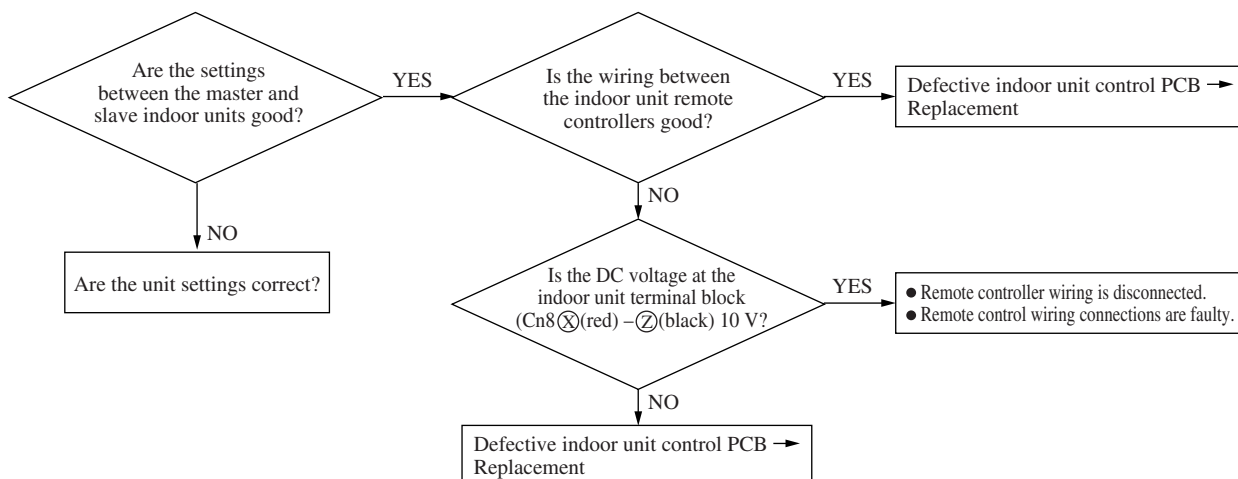


9

Error display : *E14*

[Communications are faulty between master and slave indoor units]

Indoor unit		Outdoor unit	
Red LED	3 time flash	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



Note (1) Set DIP switches SW5-1 and SW5-2 on the indoor unit control PCB as shown in the following table.

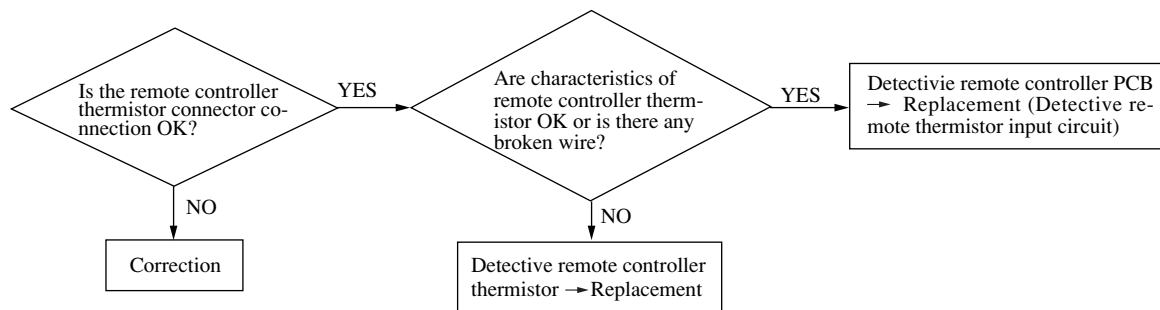
Master setting at time of factory shipment		Indoor unit			
		Master	Slave a	Slave b	Slave c
DIP switch	SW5-1	OFF	OFF	ON	ON
	SW5-2	OFF	ON	OFF	ON

10

Error display : *E28*

[Directive remote controller thermistor.]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing



Resistance-temperature characteristic of remote controller thermister

Temperature(°C)	Resistance value (kΩ)	Temperature(°C)	Resistance value (kΩ)	Temperature(°C)	Resistance value (kΩ)	Temperature(°C)	Resistance value (kΩ)
0	65	14	33	30	16	46	8.5
1	62	16	30	32	15	48	7.8
2	59	18	27	34	14	50	7.3
4	53	20	25	36	13	52	6.7
6	48	22	23	38	12	54	6.3
8	44	24	21	40	11	56	5.8
10	40	26	19	42	9.9	58	5.4
12	36	28	18	44	9.2	60	5.0

(4) Error diagnosis procedures at the outdoor unit side

At the error diagnosis related to the outdoor unit, check at first the error code of remote controller and the illumination patterns of normal and inspection display lamps in the same manner as the case of indoor unit.

Then estimate the outline, the cause and the location of error based on the pattern and proceed to the inspection and repair.

Since the self diagnosis function by means of the microcomputers of indoor/outdoor units provide the judgement of error of microcomputers themselves irregularity power supply line, overload, etc. caused by the installation space, inadequate volume of refrigerant etc., the location and cause of trouble will be discovered without difficulty.

In addition, the display lamps error code of indoor/outdoor unit is kept flashing, (except when the power supply is interrupted) after the irregularity is automatically recovered to give irregularity information to the service personnel. If any mode of higher priority than the error retained in memory occurs after the reset of error, it is switched to that mode and saved in the memory.

(a) Replacement parts assembly related to the outdoor unit controller

Outdoor unit PCB, power transistor module, capacitor, noise filter, thermistor, (heat exchanger, discharge pipe, outdoor temperature, power transistor), fuse, transformer, etc.

(b) Replacement procedure of outdoor unit microcomputer printed circuit board.

Microcomputer printed circuit board can be replaced with following procedure.

- 1) Confirm the parts numbers.

Parts No.	Applicable Model
PCA505A093Z	FDCVA201HENR, 251HENR
PCA505A102ZZ	FDCVA302HENR
PCA505A089ZA	FDCVA402HENR, 502HENR, 602HENR
PCA505A089ZD	FDCVA802HESR, 1002HESR

- 2) Set the model using the model setting switch

- FDCVA201, 251 model : SW6
- FDCVA302 model : SW4
- FDCVA402~1002 model : JSW1

Switch setting table (All switches are set in the OFF position when shipped from the factory.)

Model	201HENR	251HENR	302HENR	402HENR	502HENR	602HENR	802HESR	1002HESR
Switch setting table								
Set the switches ON or OFF for each switch No.								
(■ ON, □ OFF)								

- 3) Set the control select switch to match the previously set settings on the previous PCB.

If the previously set settings were set with jumper wires, the control select switch should be set in the ON position if there was a jumper wire and in the OFF position if there wasn't a jumper wire.

- 4) Connect the faston terminals and connectors to the control PCB.

When connecting the wires to the faston terminals, connect each wire to the terminal printed with the same color on the PCB.

Note (1) When connecting the faston terminals to the control PCB, connect them so that there is no deformation of the far end of the PCB.

(c) Outdoor unit inverter PCB

• Replacement procedure of outdoor unit inverter PCB

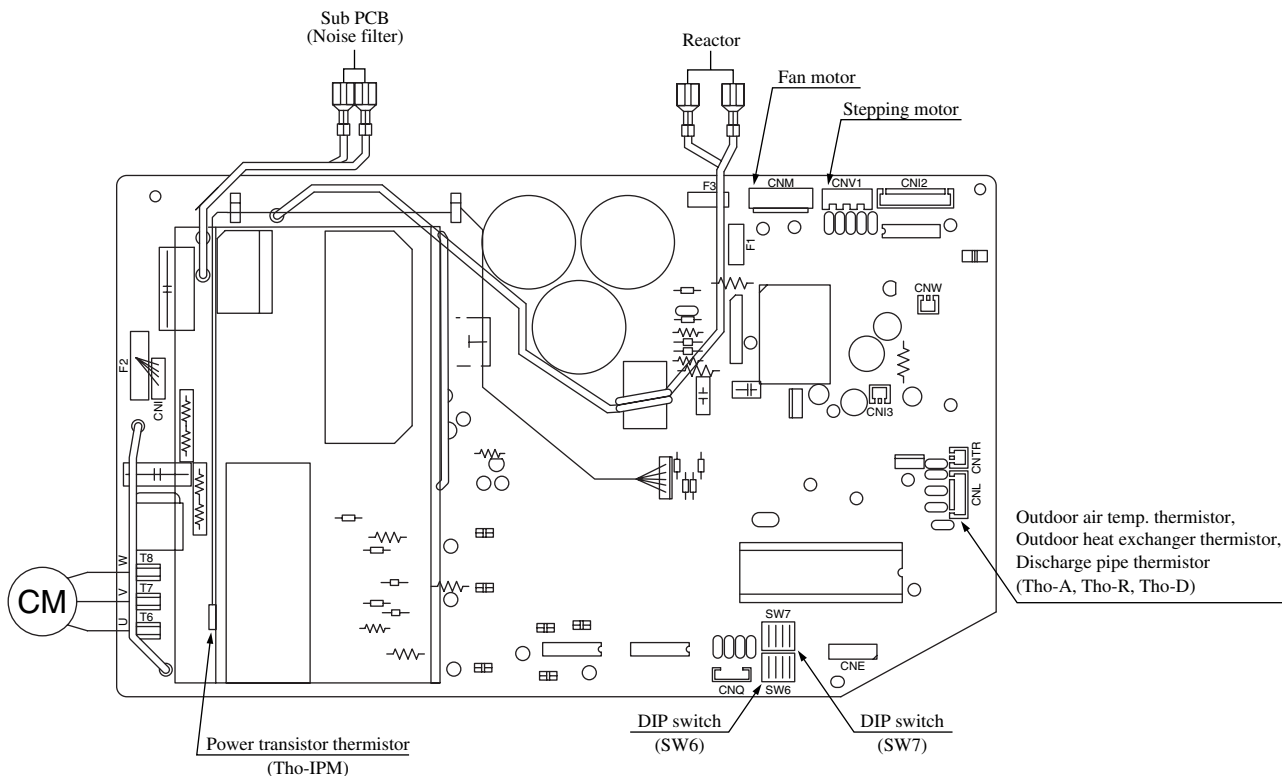
Inverter PCB can be replaced with following procedure.

- 1) Confirm the parts numbers.

Parts No.	Model
PCA505A103ZY	FDCVA302HENR
PCA505A094A	FDCVA402HENR, 502HENR, 602HENR
PCB505A044ZG	FDCVA802HESR, 1002HESR

Parts layout on the outdoor unit PCB

Models FDCVA201, 251HENR



● Change by the jumper wire

Model	201	251
J1 (SW7-1)	None	None
J5 (SW6-1)	None	None
J6 (SW6-2)	With	None
J7 (SW6-3)	None	With
J8 (SW6-4)	With	With

Notes (1) "None" means that jumper wire is not provided on the PCB or the connection is cut

(2) The replacement PCB is not equipped with jumper wire J1 and J5~J8. Instead, SW6 and 7 are mounted in the same position and have the same functions as jumper wires J1 and J5~J8. Carry out the local settings in accordance with the table using SW6 and 7.

● Function of DIP switches (SW5) (Usually all turned OFF)

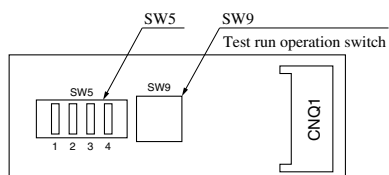
Switch	Function
SW5-1	ON Defrost setting select for cold regions. OFF Normal
SW5-2	ON Snow-guard fan control-Effective OFF Snow-guard fan control-Invalid
SW5-3	ON Low refrigerant protection control-Effective OFF Low refrigerant protection control-Invalid
SW5-4	ON Test run operation-Heating OFF Test run operation-Cooling

● Change by the J3

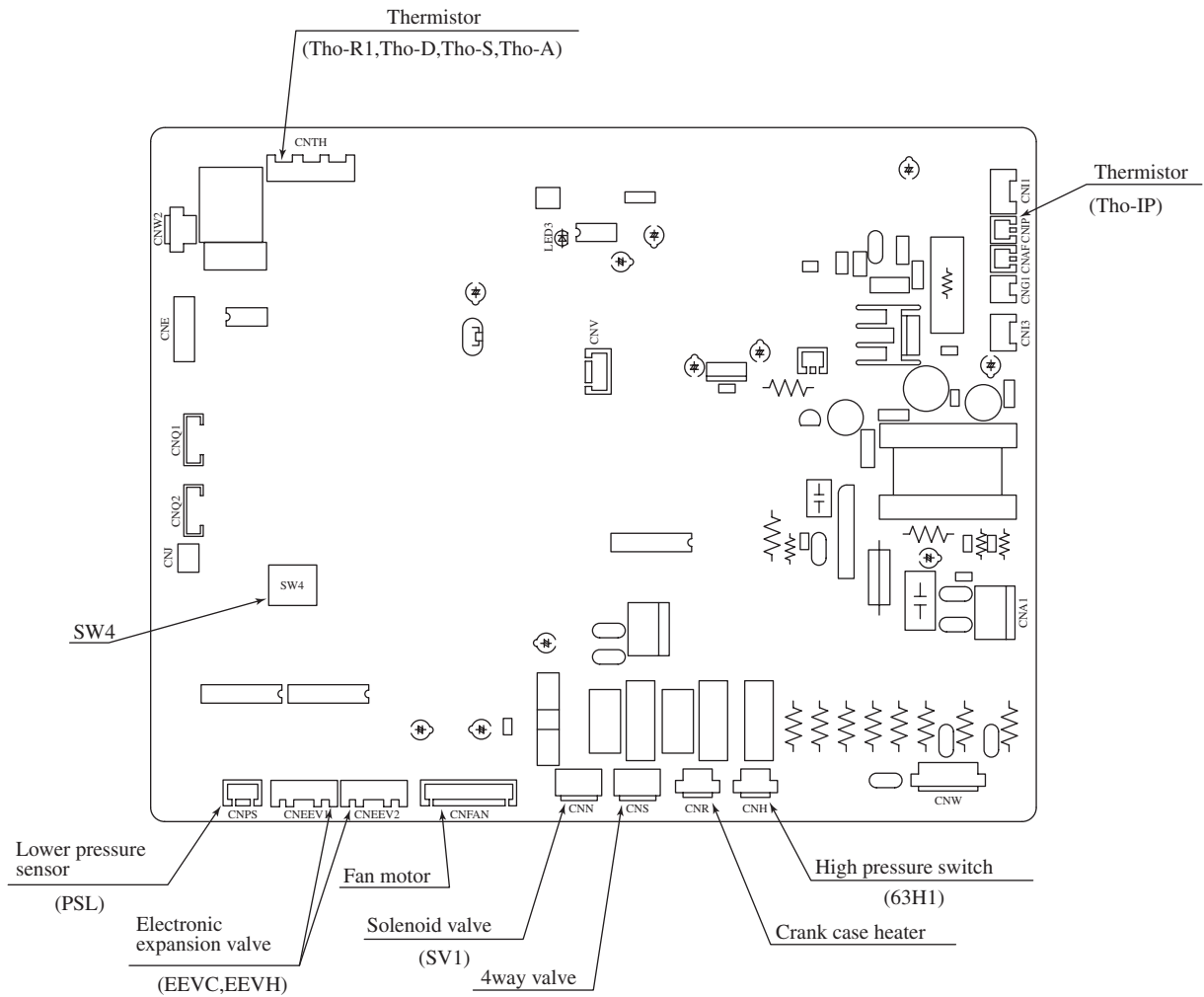
Switch	Function
J3	with Model selection-Energy saving
(SW7-3)	None Model selection-Standard

Note (1) "None" means that jumper wire is not provided on the PCB or the connection is cut.

External PCB



Model FDCVA302HENR



● Function of DIP switch (SW3, 5, 7, 8)

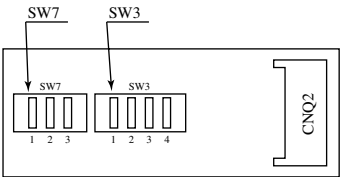
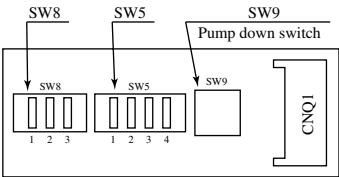
Switch	Function
SW3-1	ON Defrost setting select for Cold regions OFF Defrost setting select for Normal
SW3-2	ON Snow-guard fan control Effective OFF Snow-guard fan control Invalid
SW3-4	ON Defrost prohibited temperature 37 min. OFF Defrost prohibited temperature 45 min.
SW5-3	ON Test run operation OFF Normal
SW5-4	ON Test run operation Heating OFF Test run operation Cooling

Note (1) Usually all turned OFF.

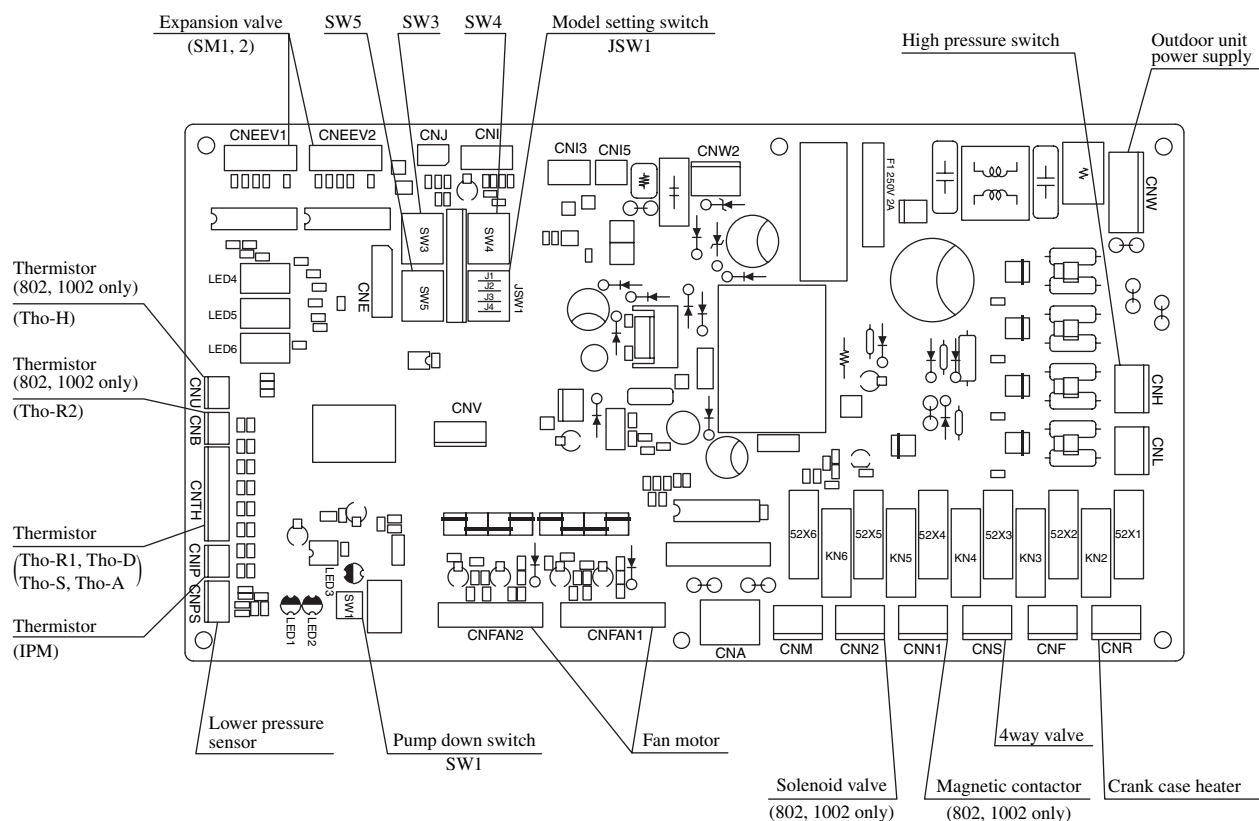
Switch	Function
SW7-1	ON Changes the fan control at installation of wind direction duct. OFF Normal
SW7-2	ON Anti-defrost : Enabled OFF Anti-defrost : Disabled
SW8-2	ON Cancels compressor dilution protection timer. OFF Normal
SW8-3	ON Cancels compressor starter III. OFF Normal

Note (1) Usually all turned OFF.

External PCB



Models FDCVA402HENR, 502HENR, 602HENR, 802HESR, 1002HESR



● Function of DIP switch (SW3) (Usually all turned OFF)

Switch	Function
SW3-1	ON Defrost setting select for Cold regions
	OFF Defrost setting select for Normal
SW3-2	ON Snow-guard fan control Effective
	OFF Snow-guard fan control Invalid
SW3-3	ON Test run operation Effective
	OFF Test run operation Invalid
SW3-4	ON Test run operation Heating
	OFF Test run operation Cooling

● Function of DIP switch (SW4) (Usually all turned OFF)

Switch	Function
SW4-4	ON Defrost prohibited temperature 37 min.
	OFF Defrost prohibited temperature 45 min.

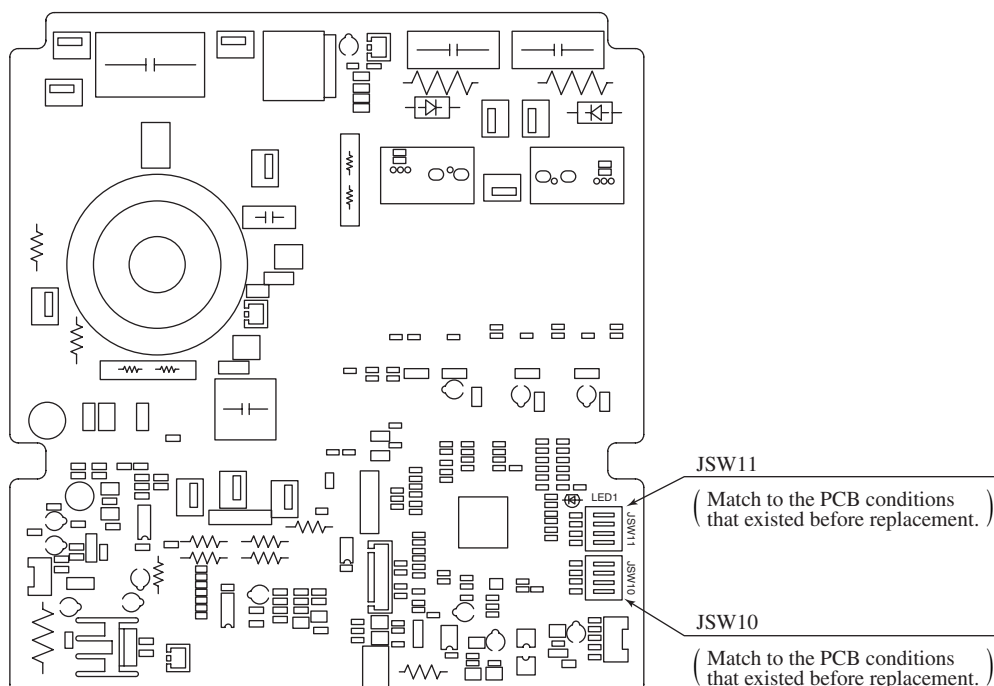
Note (1) Set SW4-4 as normally ON.

● Function of DIP switch (SW5) (Usually all turned OFF)

Switch	Function
SW5-1	ON Corresponds to already set piping Effective
	OFF Corresponds to already set piping Invalid

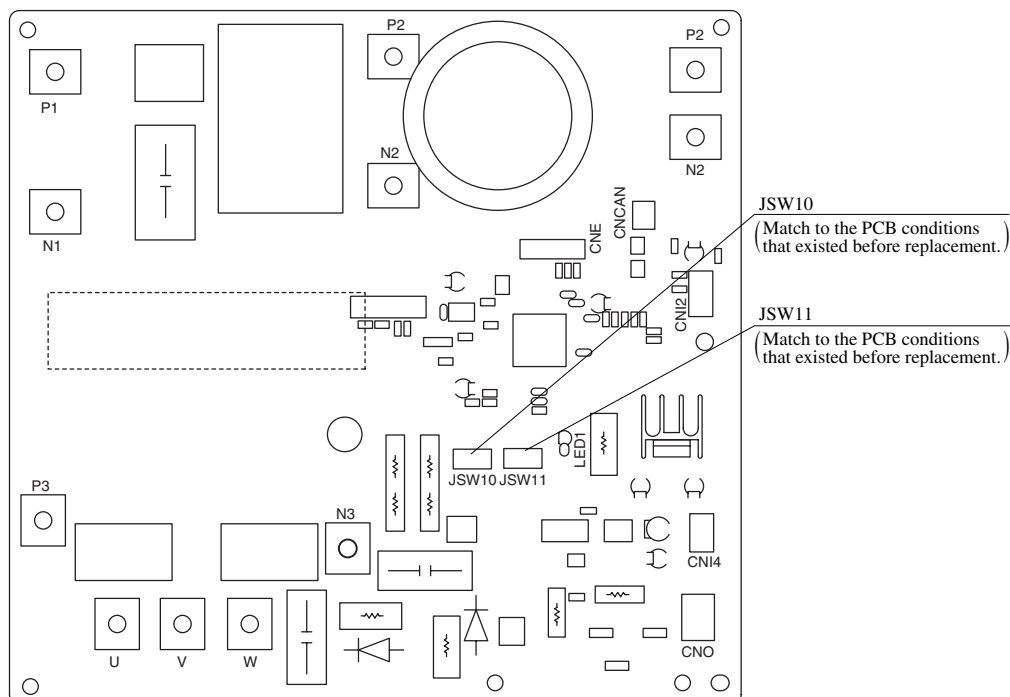
Parts layout on the outdoor unit inverter PCB

Model FDCVA302HENR



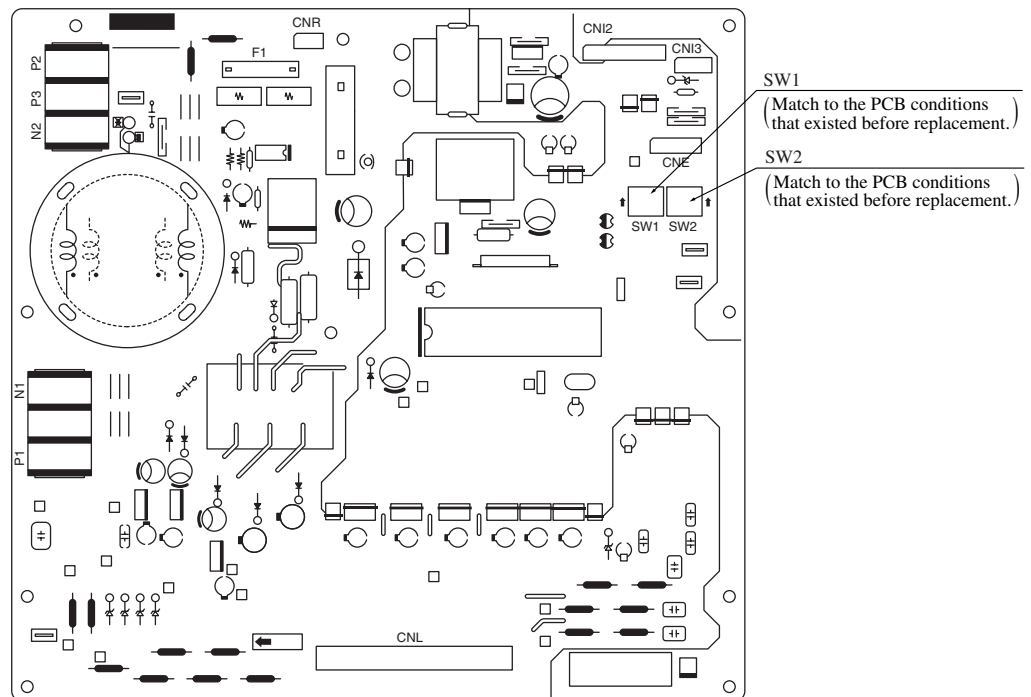
- Notes (1) Apply the silicone grease supplied with the component uniformly to the surface of the power transistor on the new PCB, then mount it on the PCB. If the grease is not applied, the power transistor may be damaged. Use all the silicone grease.
- (2) Tighten the power transistor mounting screws of the inverter PCB, and connect the terminal block, faston terminals and connectors. After connection, make sure tightening was not forgotten and parts were not partially inserted only. In particular, make sure the power transistor is not loose by tightening the mounting screws securely. If they are not tightened, the power transistor may be damaged.

Models FDCVA402HENR, 502HENR, 602HENR



- Notes (1) Apply the silicone grease supplied with the component uniformly to the surface of the power transistor on the new PCB, then mount it on the PCB. If the grease is not applied, the power transistor may be damaged. Use all the silicone grease.
- (2) Tighten the power transistor mounting screws of the inverter PCB, and connect the terminal block, faston terminals and connectors. After connection, make sure tightening was not forgotten and parts were not partially inserted only. In particular, make sure the power transistor is not loose by tightening the mounting screws securely. If they are not tightened, the power transistor may be damaged.

Models FDCVA802HESR, 1002HESR



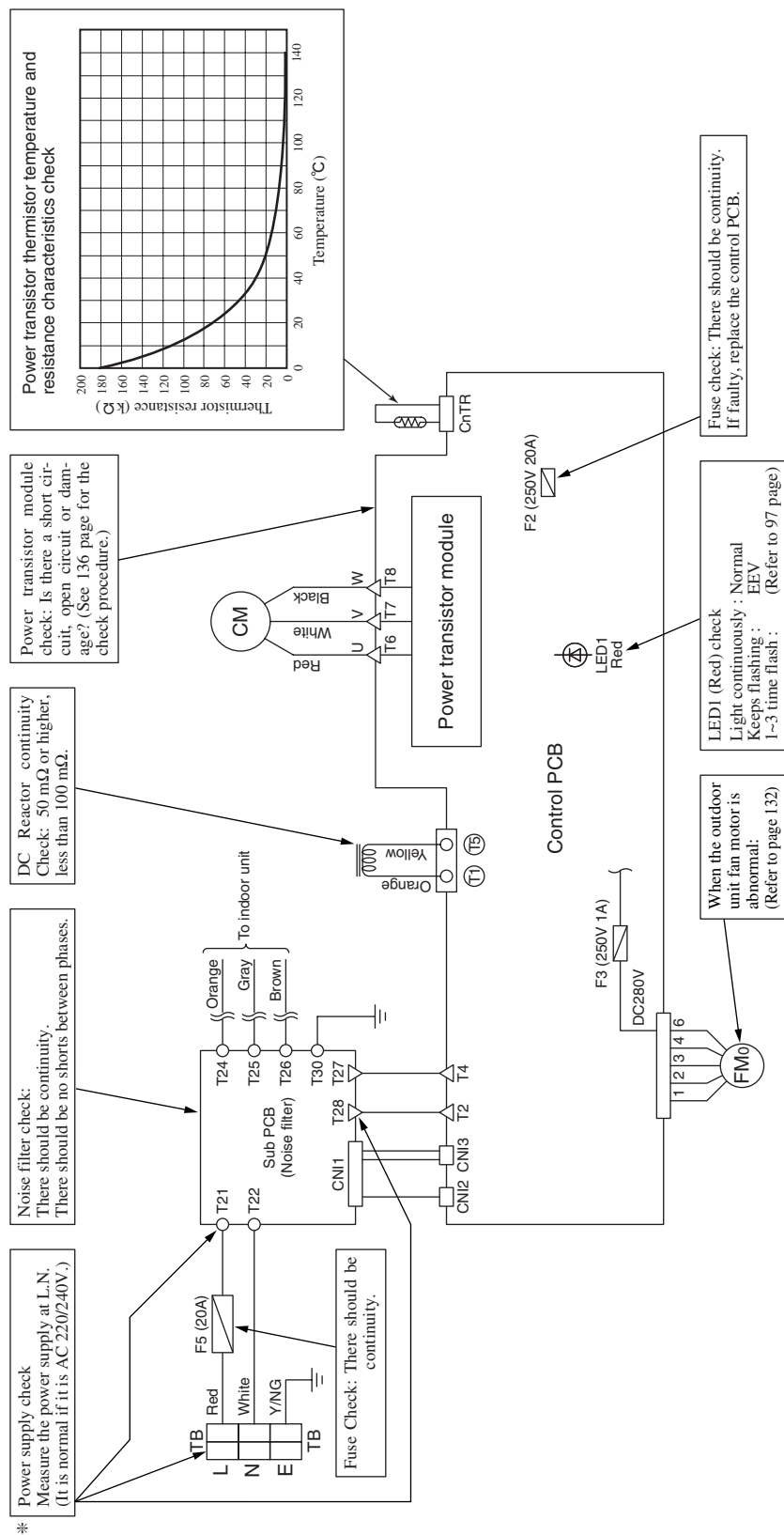
- Notes (1) Apply the silicone grease supplied with the component uniformly to the surface of the power transistor on the new PCB, then mount it on the PCB. If the grease is not applied, the power transistor may be damaged. Use all the silicone grease.
- (2) Tighten the power transistor mounting screws of the inverter PCB, and connect the terminal block, faston terminals and connectors. After connection, make sure tightening was not forgotten and parts were not partially inserted only. In particular, make sure the power transistor is not loose by tightening the mounting screws securely. If they are not tightened, the power transistor may be damaged.

Outdoor Unit controller failure diagnosis circuit diagram

Models FDCVA201, 251HENR

● Outdoor unit check points

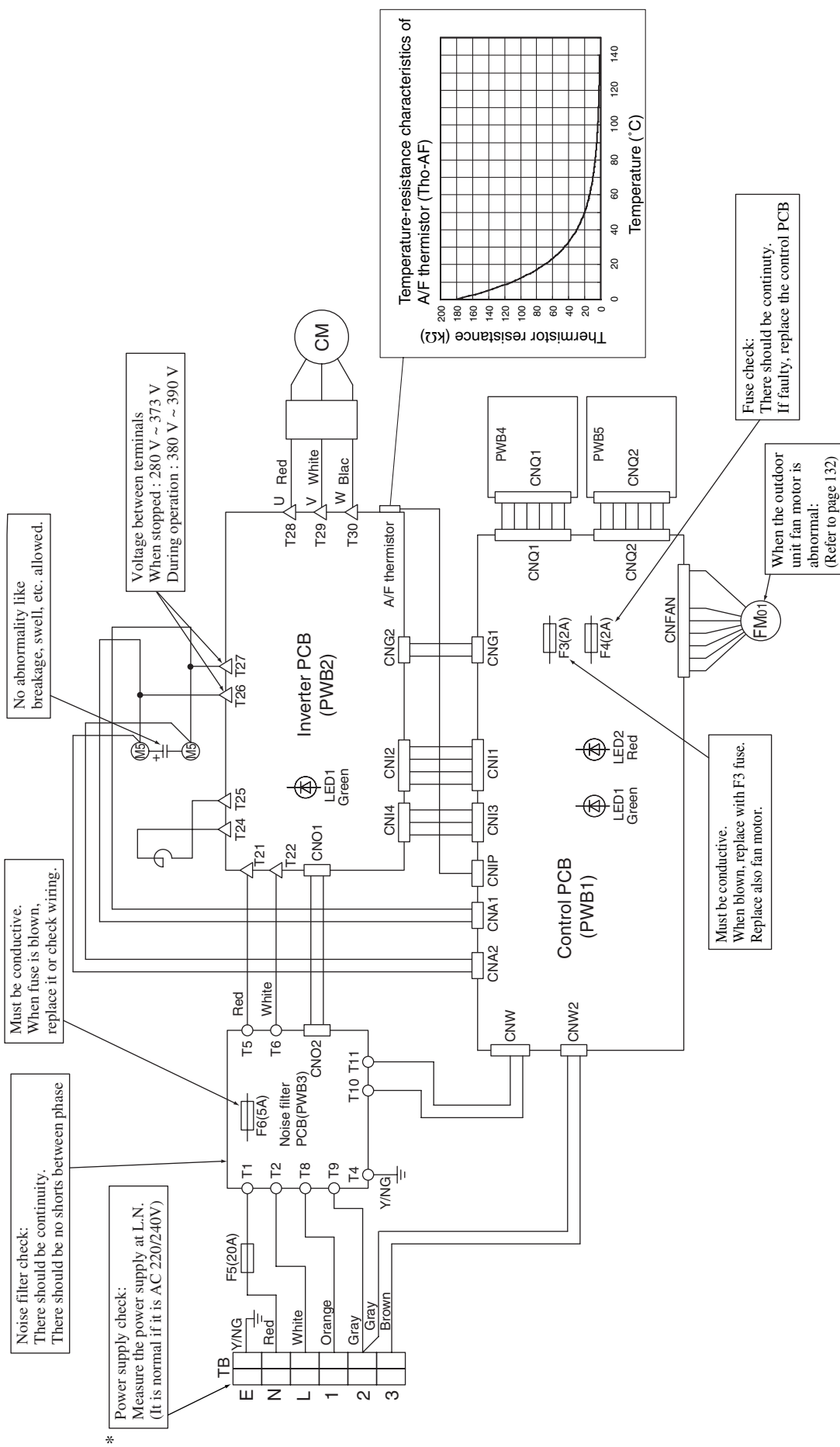
Check items with the *mark when the power is ON.



Model FDCVA302HENR

Outdoor unit check points

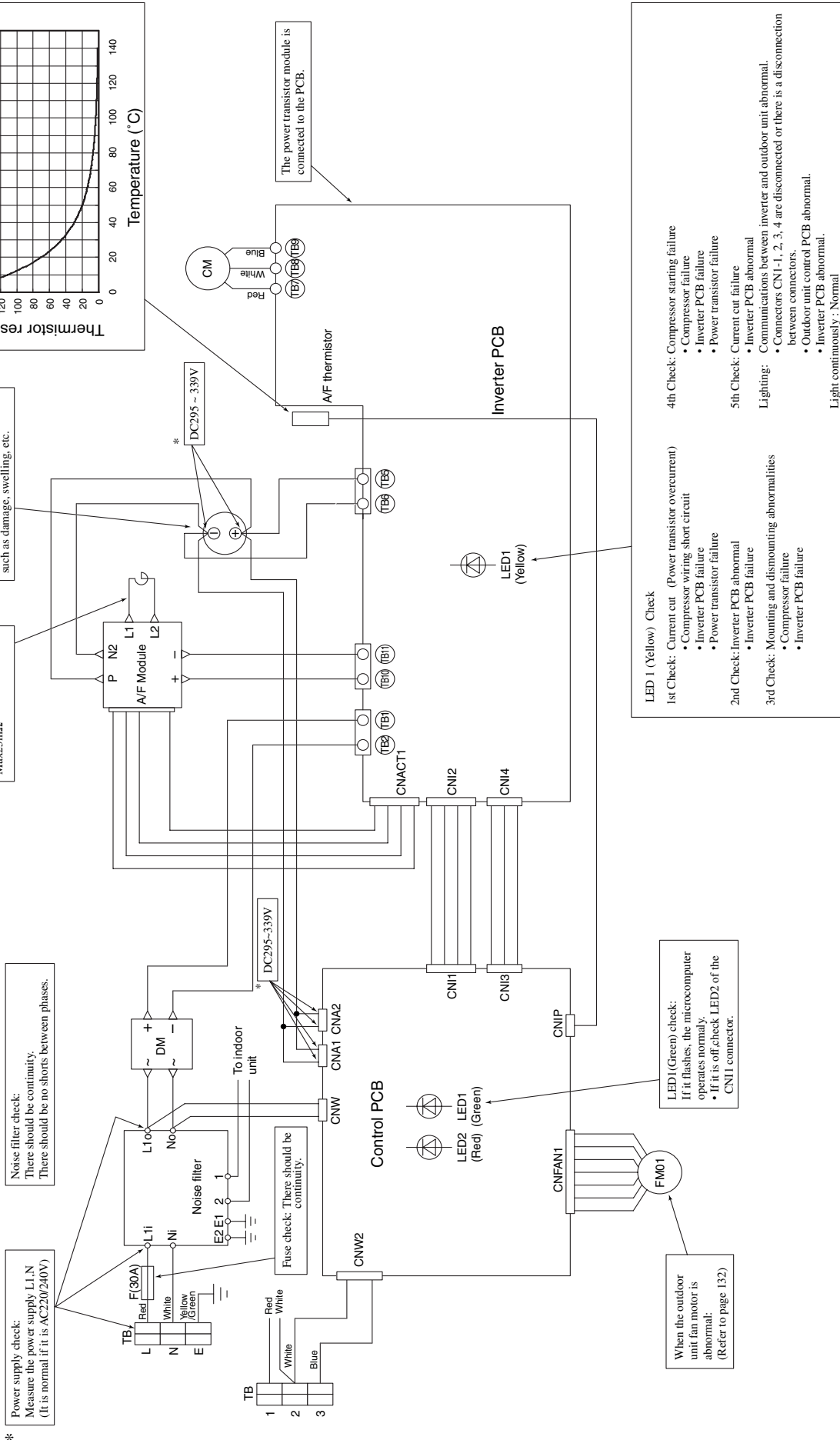
- Check items with the *mark when the power is ON.



Models FDCVA402~602HENR

Outdoor unit check points

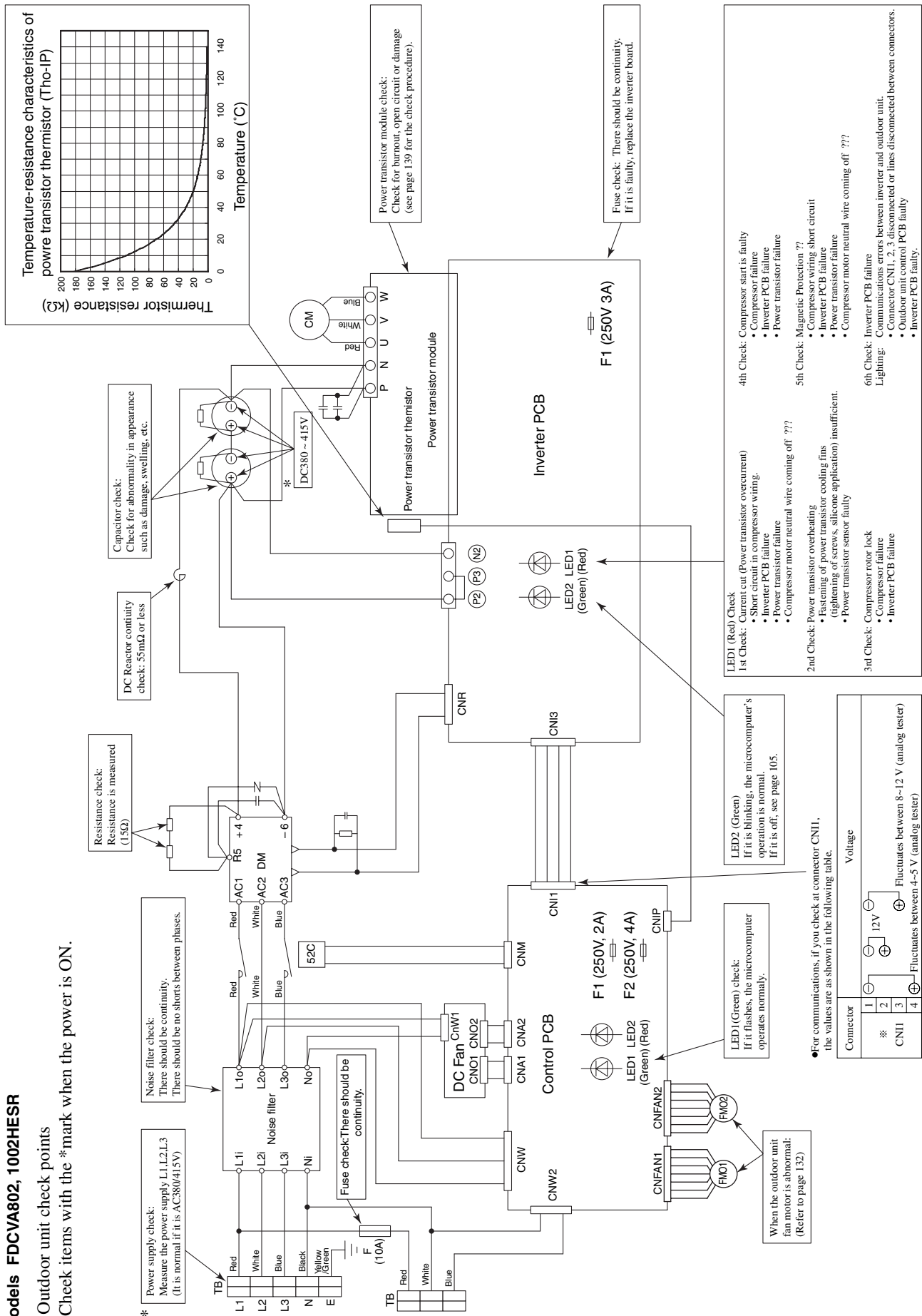
Check items with the *mark when the power is ON.



Models FDCVA802, 1002HESR

Outdoor unit check points

Check items with the * mark when the power is ON.

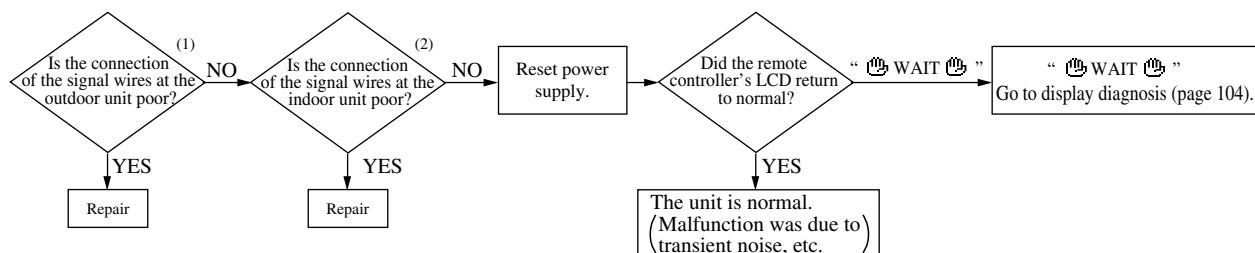


1

Error display : E5

[Communications error during operation]

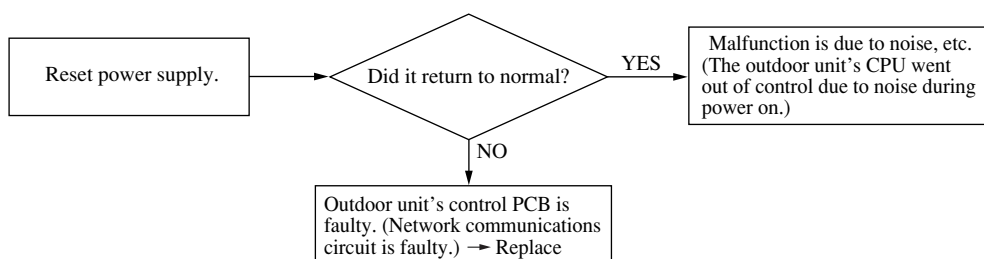
Indoor unit		Outdoor unit	
Red LED	2 time flash	Red LED	2 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



Notes (1) Check for poor connections (disconnection, looseness) on the outdoor unit's terminal block.

(2) Check for poor connections or disconnection of the signal lines between the indoor and outdoor units.

Indoor unit		Outdoor unit	
Red LED	2 time flash	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing

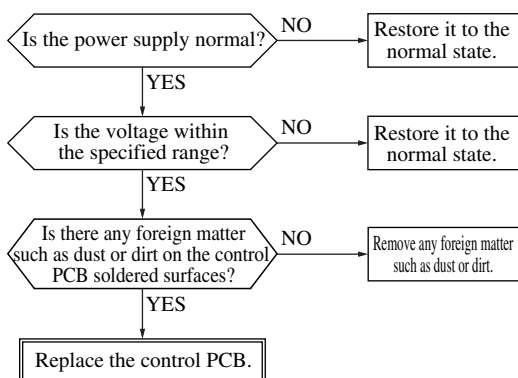


2

Error display : E33

[Inverter primary current abnormal] [Only case of 201, 251 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing		



● Display conditions

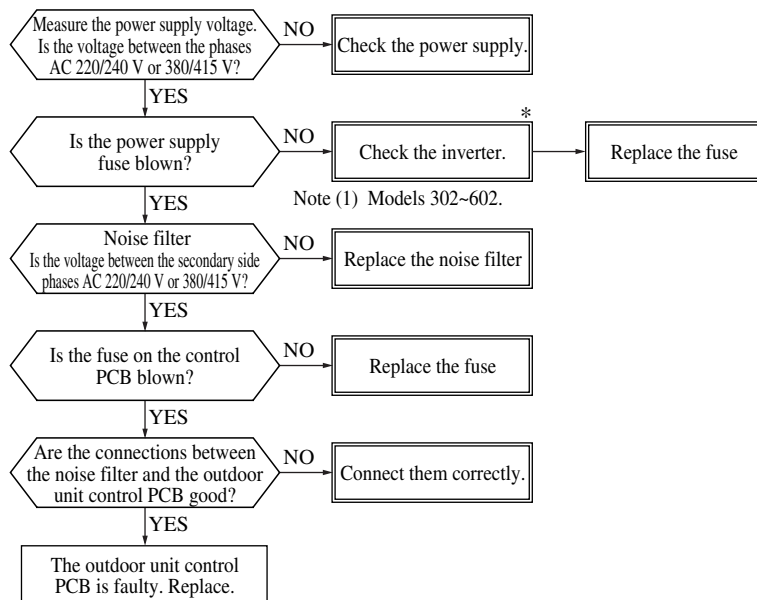
If the inverter's primary current exceeds the set value for 3 seconds, the compressor stops. After a 3 minute delay, it restarts, but when this occurs 5 times within 60 minutes.

3

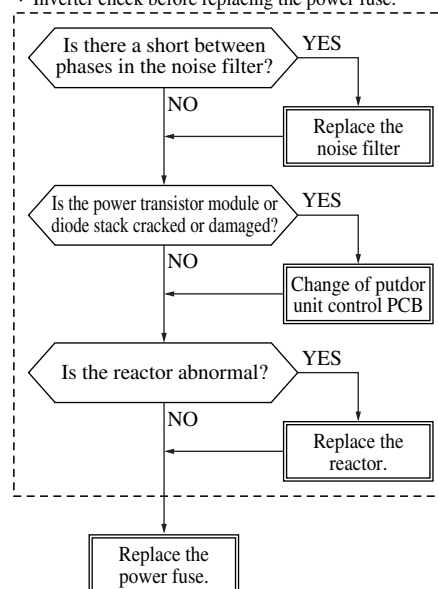
Error display : E34

[Power supply open phase] [Only case of 302~1002 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



* Inverter check before replacing the power fuse.

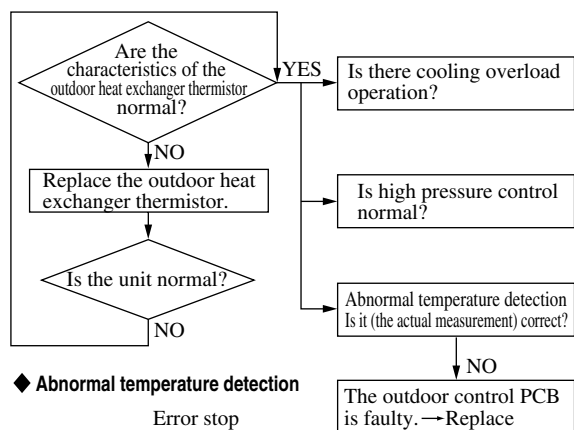


• Display Conditions

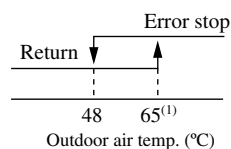
After the power goes ON, if the power supply is 0 V at either L1, N phase (302 ~ 602), L1, L2, L3 phase (802, 1002).

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing

●Models FDCVA201, 251



◆ Abnormal temperature detection



Note (1) The abnormal stop temperature differs depending on the compressor's speed.

Compressor speed (rps)	Indoor heat exchanger temperature (°C)
less than 88	65 or more
88 to less than 108	60 or more
108 or higher	55 or more

Check the unit side.

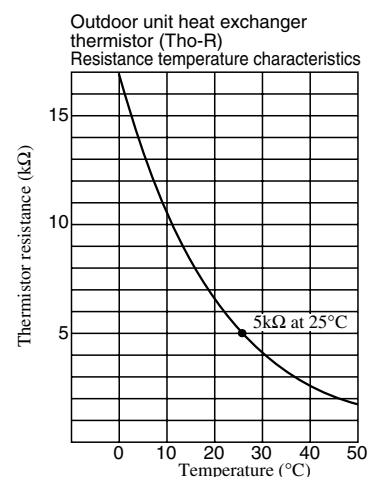
- Is there a short circuit in the outdoor unit?
- Is the installation space proper?
- Is the refrigerant level too high?
- Is the heat exchanger dirty or clogged?

- (1) The compressor's speed drops when all the following conditions are met.
- ① Outdoor heat exchanger temperature: A°C or higher
 - ② Outdoor air temperature: 41°C or higher
 - ③ The outdoor unit's fan runs at 7 speed continuously for 30 seconds or longer.
- (2) Control is cancelled when the temperature drops to B°C or lower.

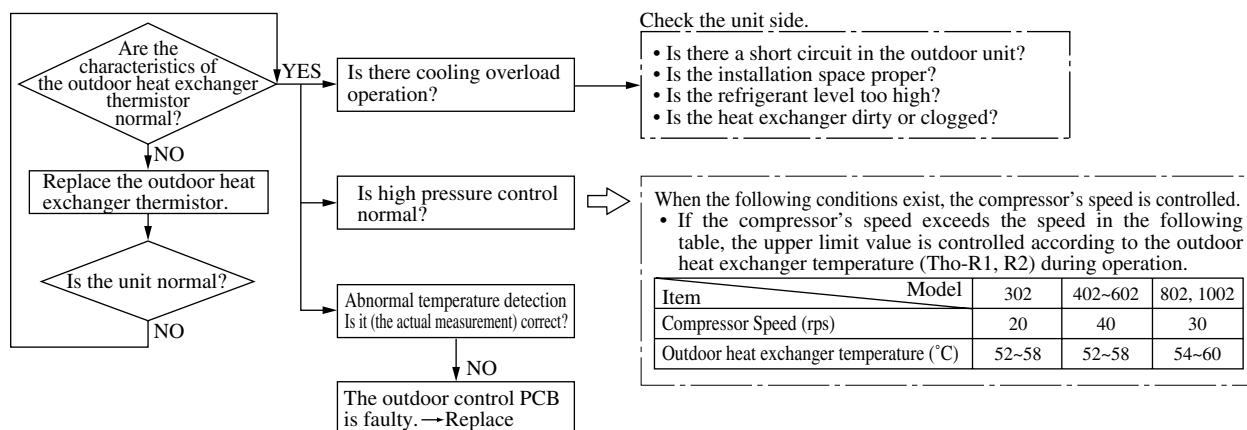
Model		Item		
201, 251	Compressor speed (rps)	less than 88	A	B
		88 to less than 108	58.5	53.5
		108 or higher	53.5	48.5

● Display conditions

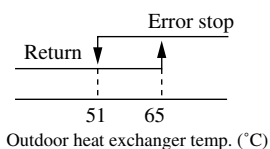
If the outdoor heat exchanger temperature becomes 65°C 5 times within 60 minutes, including while the compressor is stopped, or if it continues at that temperature for 10 minutes or longer.



●Models FDCVA302~1002

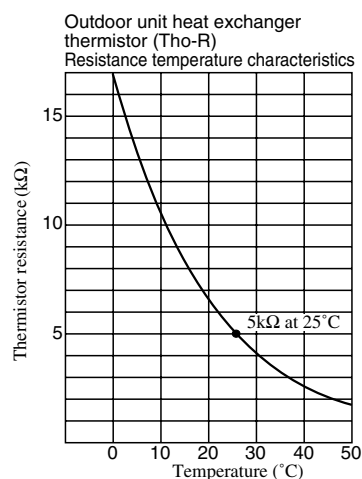


◆ Abnormal temperature detection

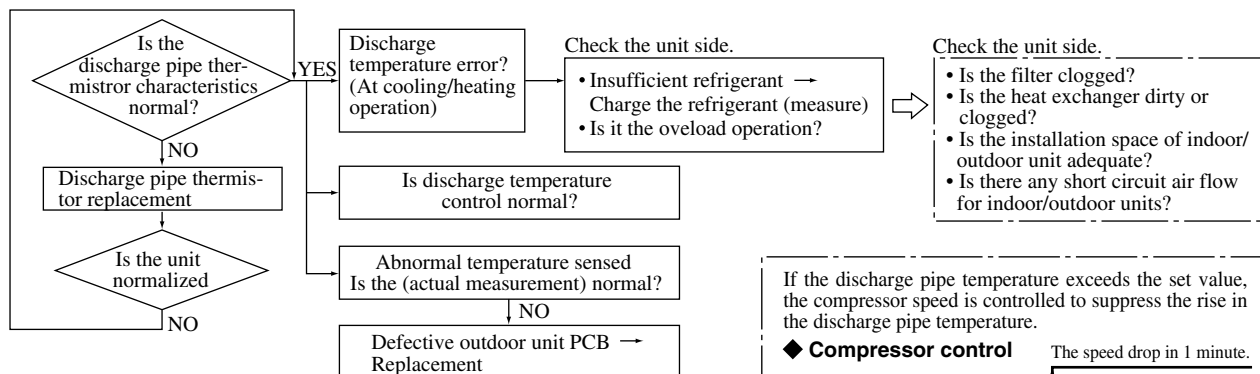


● Display Conditions

If the outdoor heat exchanger is abnormal 5 times within 60 minutes, or is 65°C or higher continuously for 60 minutes, including when the compressor is stopped.



Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing

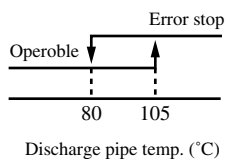


● Display conditions

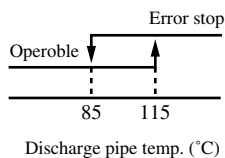
If the discharge temperature is as shown at left 2 times within 60 minutes, or continuously for 60 minutes, including when the compressor is stopped.

◆ Abnormal temperature detection

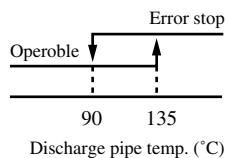
201, 251 models



302~602 models



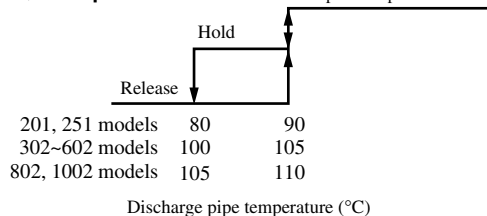
802, 1002 models



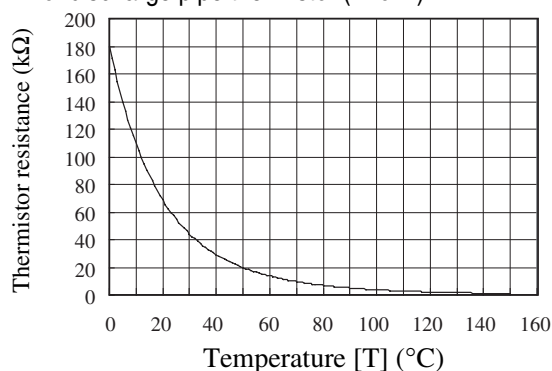
If the discharge pipe temperature exceeds the set value, the compressor speed is controlled to suppress the rise in the discharge pipe temperature.

◆ Compressor control

The speed drop in 1 minute.



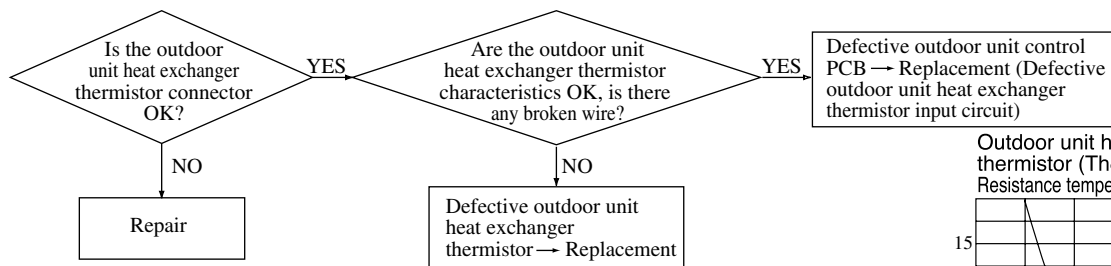
Temperature-resistance characteristics of discharge pipe thermistor (Tho-D)



6

Error display : E37 [Defective outdoor unit heat exchanger thermistor]

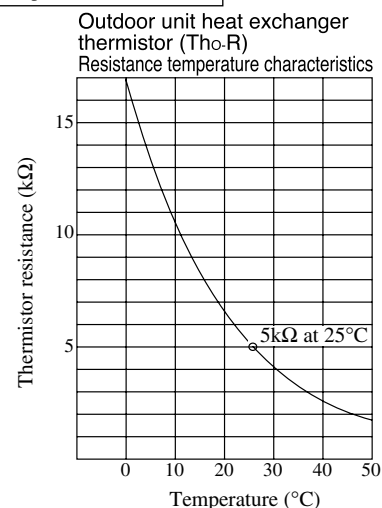
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



● Display conditions

If the temperature sensed by the thermistor is -50 (-30) $^{\circ}\text{C}$ or lower continuously for 5 seconds between 2 minutes and 2 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3 minute delay, the compressor restarts. If this state is detected 3 times in 40 minutes.

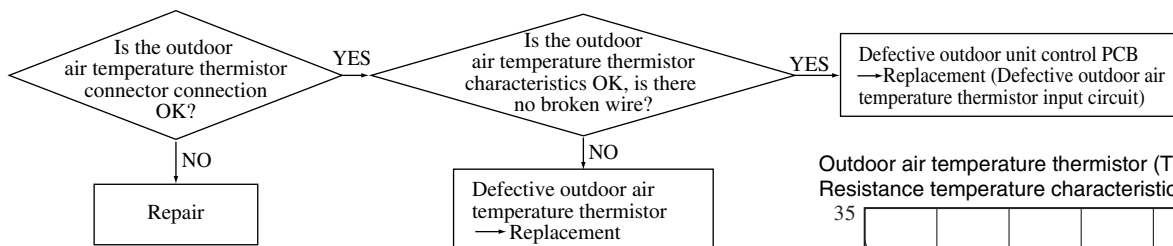
Note (1) Values in () show for the case of the 201, 251 models.



7

Error display : E38 [Defective outdoor air temperature thermistor]

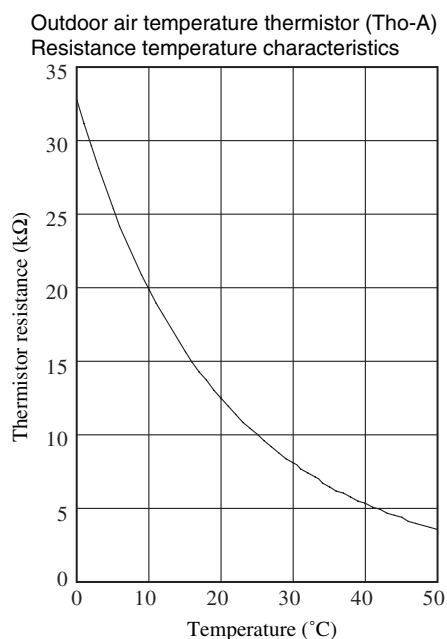
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



● Display conditions

If the temperature sensed by the thermistor is -30°C or lower continuously for 5 seconds between 2 minutes and 2 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3 minute delay, the compressor restarts. If this state is detected 3 times in 40 minutes.

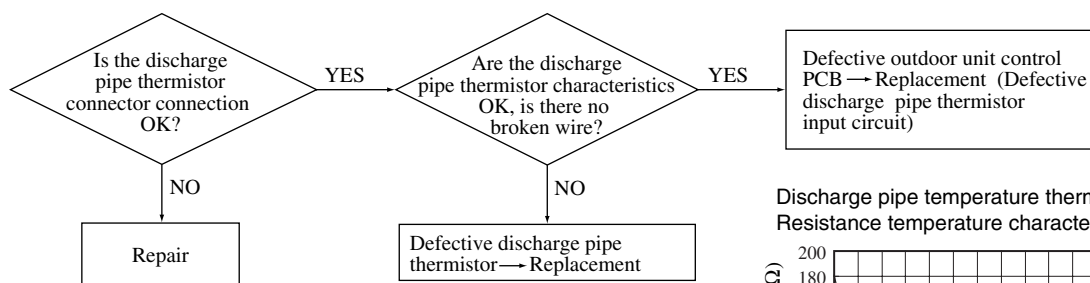
Note (1) The figure at right shows the outdoor air temperature thermistor (Tho-A) (Temperature – Resistance Characteristics) for the 402 ~ 1002 models. See the figure above for the 201, 251 and 302 models.



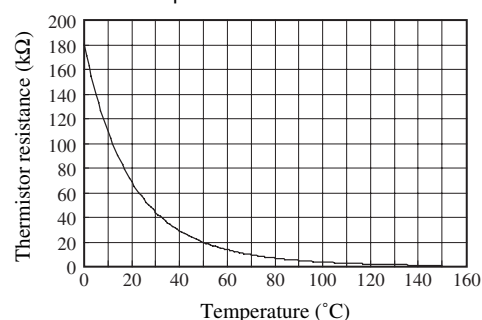
8

Error display : E39 [Defective discharge pipe thermistor]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



Discharge pipe temperature thermistor (Tho-D)
Resistance temperature characteristics



● Display conditions

If the temperature sensed by the thermistor is -30 (-10) $^{\circ}\text{C}$ or lower continuously for 5 seconds between 10 minutes and 10 minutes 20 seconds (2minutes and 2minutes 20seconds) after the compressor goes ON, the compressor stops. After a 3 minute delay, the compressor restarts. If this state is detected 3 times in 40 minutes.

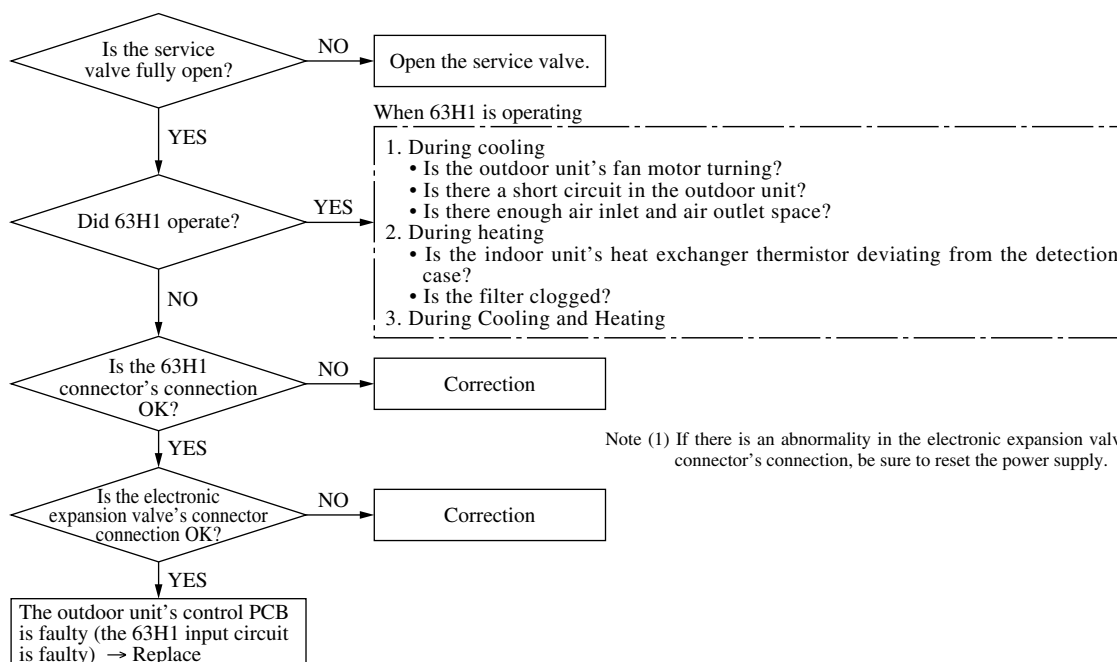
Note (1) Values in () show for the case of the 201, 251 models.

9

Error display : E40 [63H1 operation] [Only case of 302~1002 models]

If the power supply breaker is turned from OFF to ON quickly, E40 may be displayed. This is not abnormal.

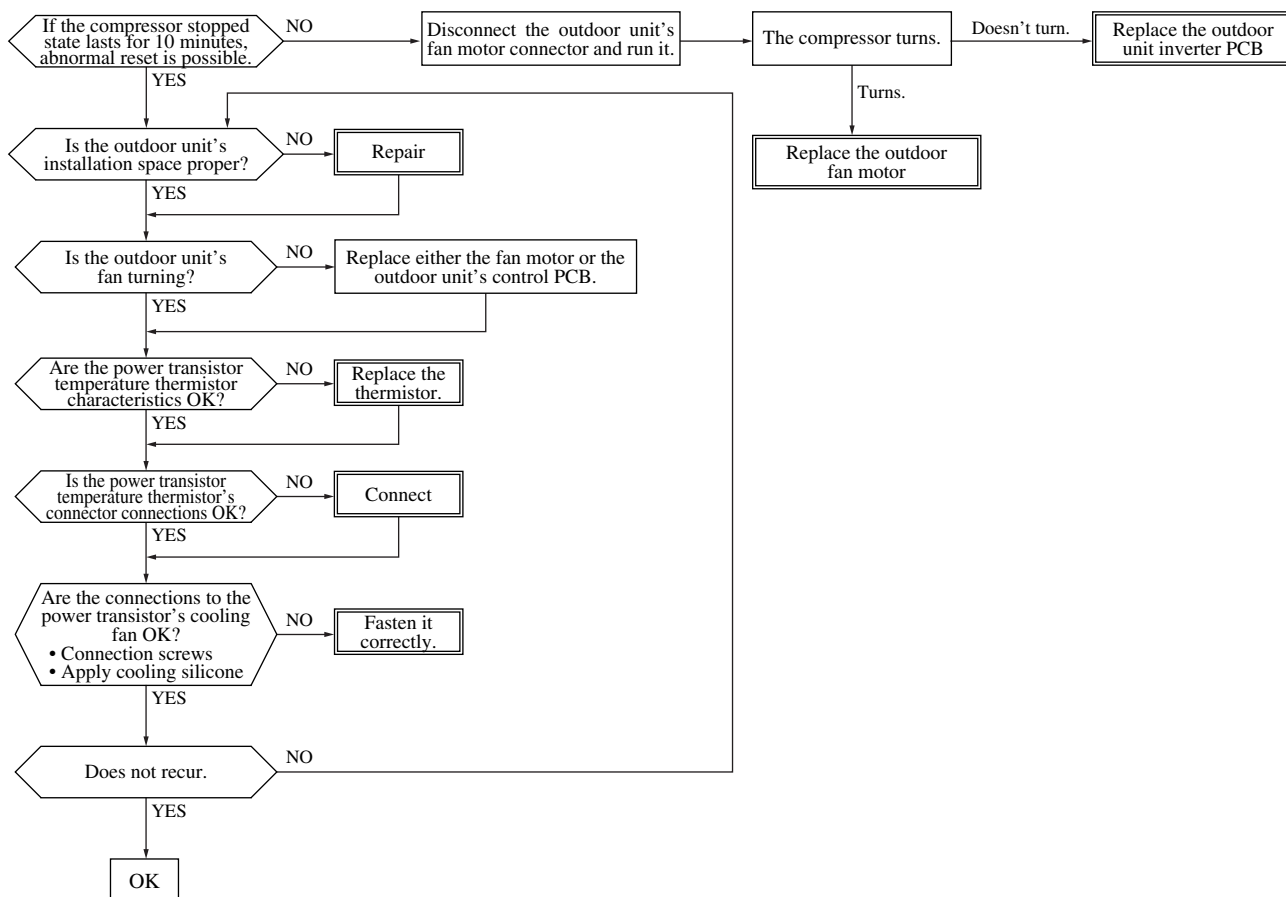
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



Note (1) If there is an abnormality in the electronic expansion valve connector's connection, be sure to reset the power supply.

10 Error display : E4! [Power transistor is overheating] [Only case of 402~1002 models]

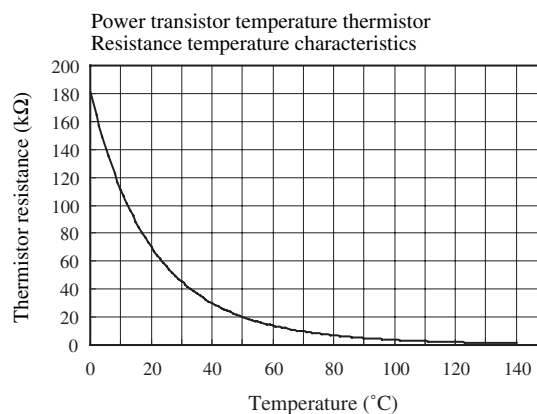
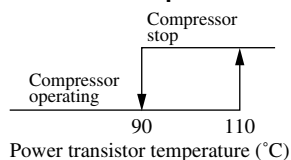
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



• Display conditions

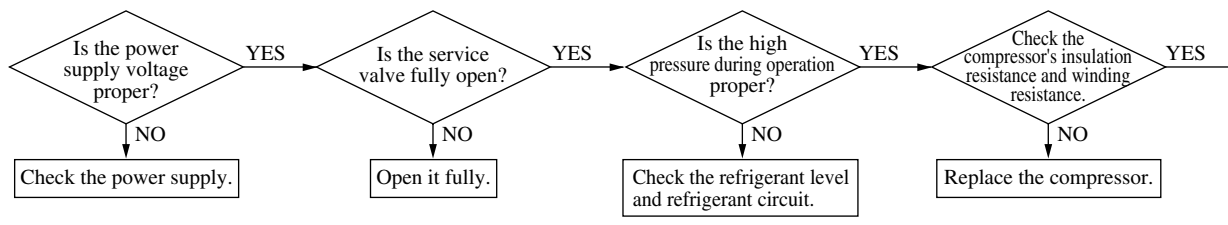
If the power transistor's temperature exceeds the set temperature, the compressor stops.
If the temperature drops below 90°C, the compressor restarts, but when it happens 5 times within 1 hour.

• Abnormal temperature detection



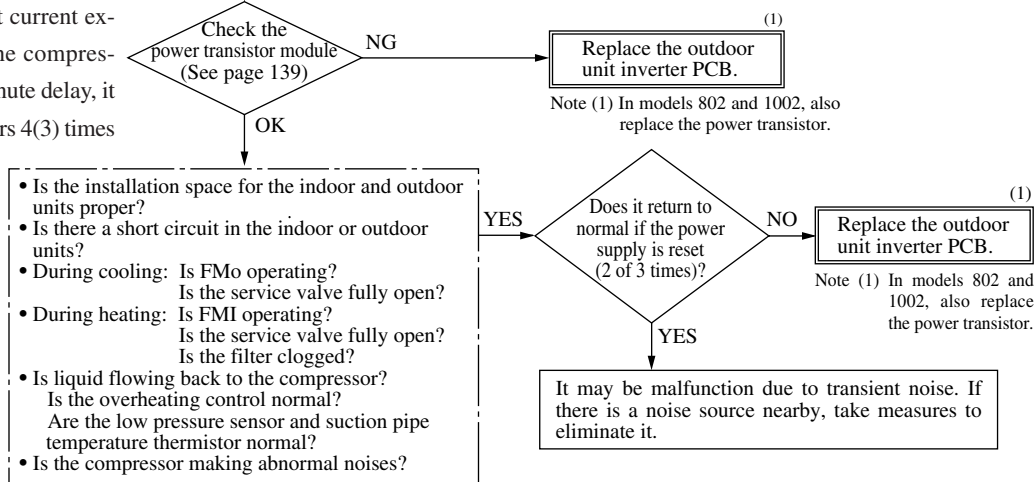
11 Error display : E42 [Current cut]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



● Display conditions

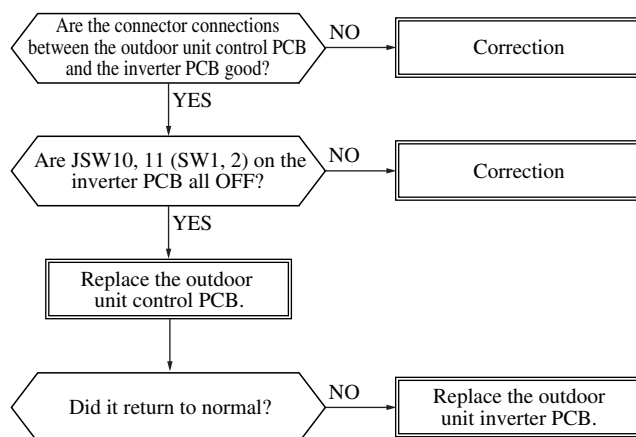
If the inverter's output current exceeds the set value, the compressor stops. After a 3-minute delay, it restarts, but if this occurs 4(3) times within 30 minutes.



Note (1) Values in () show for the case of the 201, 251 models.

12 Error display : E45 [Inverter communications are abnormal] [Only case of 302~1002 models]

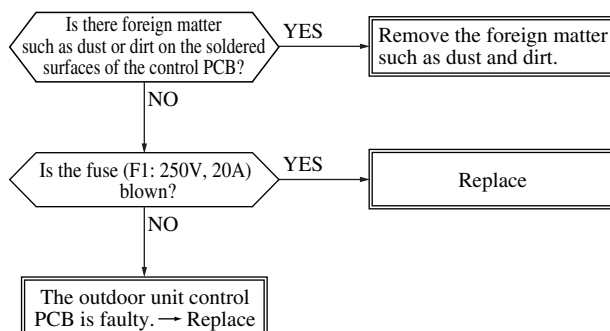
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



Note (1) Values in () show for the case of the 802, 1002 models.

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing

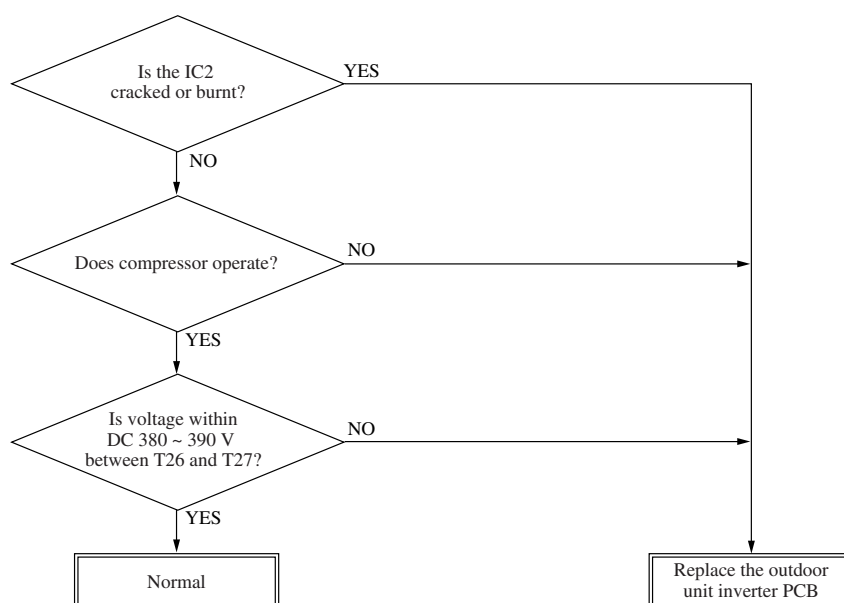
●Models FDCVA201, 251 [Inverter over-voltage trouble]



● Display conditions

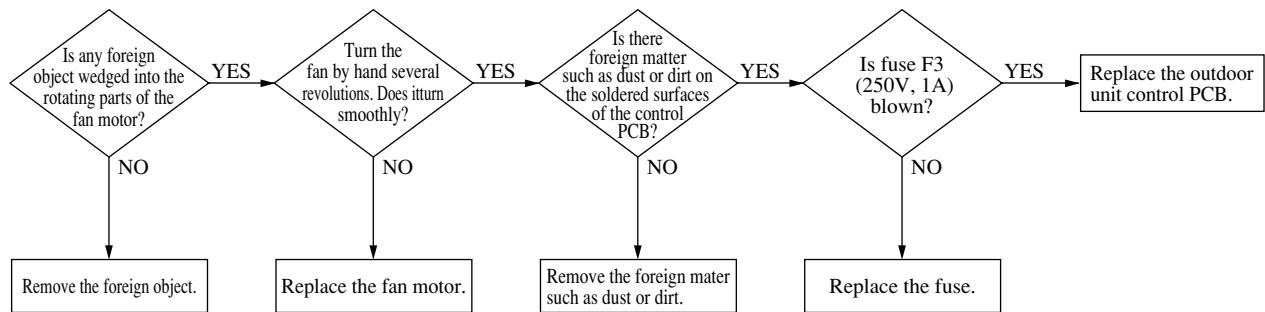
If the inverter voltage exceeds 340V, (3 times in 20 minutes), this error is displayed. After 3 minutes passes, it can be reset using the remote controller.

●Model FDCVA302 [Over-current error on A/F (active filter) module]



Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing

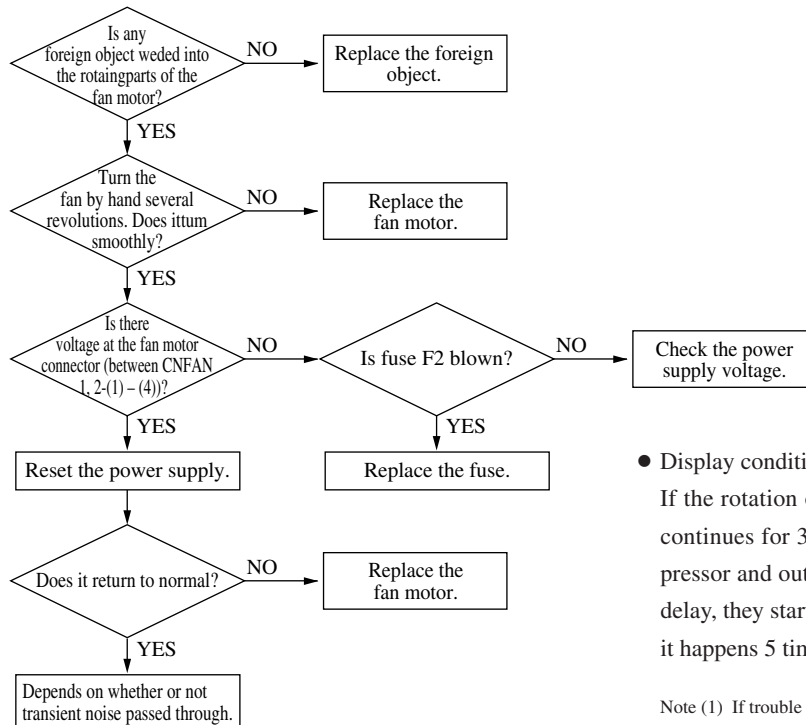
●Models FDCVA201, 251



● Display conditions

When the DC fan motor's output is ON, if the fan motor's speed drops to 75 rpm or lower continuously for 30 seconds or longer, the compressor stops. After a 3-minute delay, the compressor is restarted, but if this state is detected 5 times within 60 minutes.

●Models FDCVA302~1002



● Display conditions

If the rotation of the outdoor unit's fan motor (FM01, 2) continues for 30 seconds at 100 min⁻¹ or lower, the compressor and outdoor unit fan motor stop. After a 3-minute delay, they start again automatically, but in the case where it happens 5 times within 60 minutes.

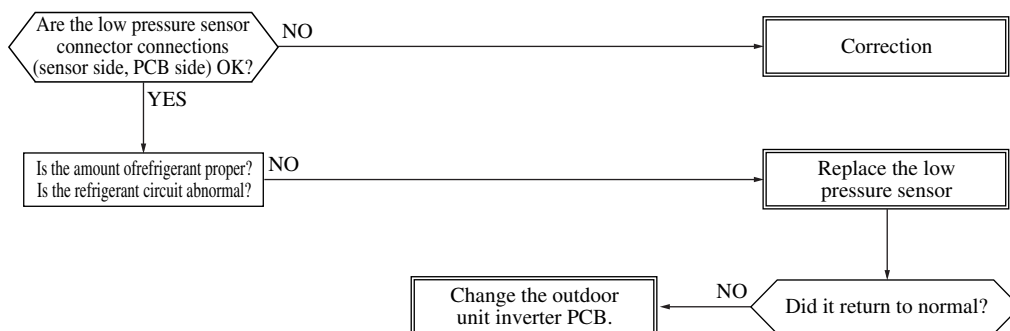
Note (1) If trouble occurs even when the fan motor is replaced, replace the control board.

15

Error display : E49

[Low pressure abnormal or low pressure sensor disconnected.]
[Only case of 302~1002 models]

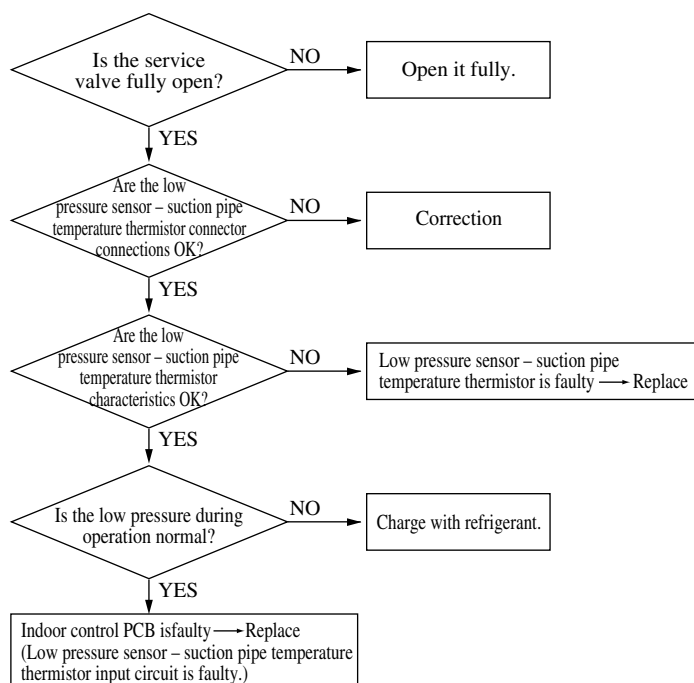
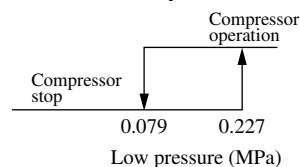
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



• Display Conditions

If the pressure sensed by the low pressure sensor is 0.079 MPa or lower continuously for 15 seconds, the compressor stops.
After a 3-minute delay, the compressor starts again, but if it happens 3 times within 60 minutes.

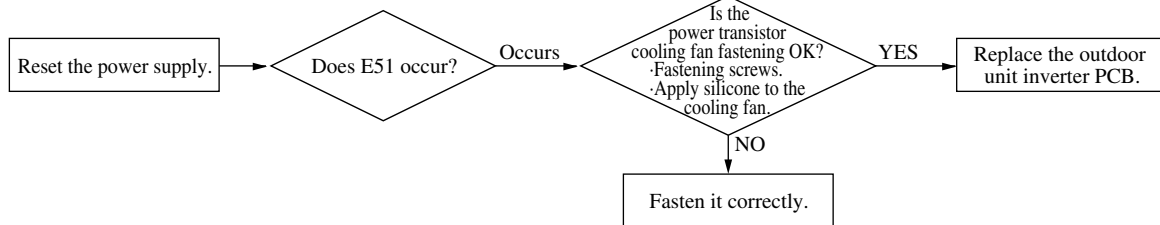
• Abnormal temperature detection



16

Error display : *E51* [Inverter, fan motor abnormal] [Only case of 302~1002 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Lights contiously
Green LED	Keeps flashing	Green LED	Keeps flashing



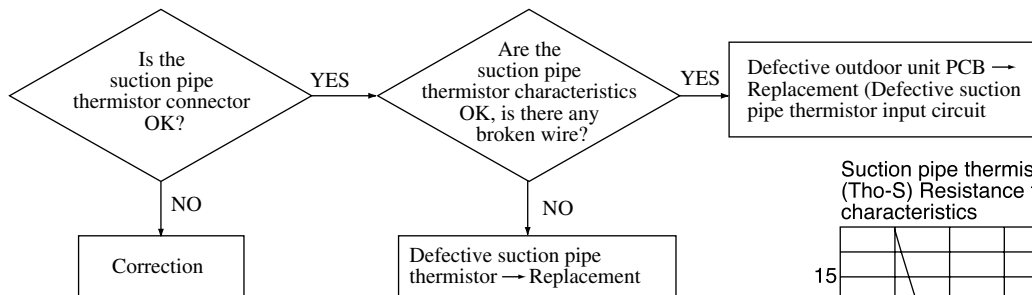
● Display conditions

When the power transistor temperature is 110°C or higher continuously for 15 minutes.

17

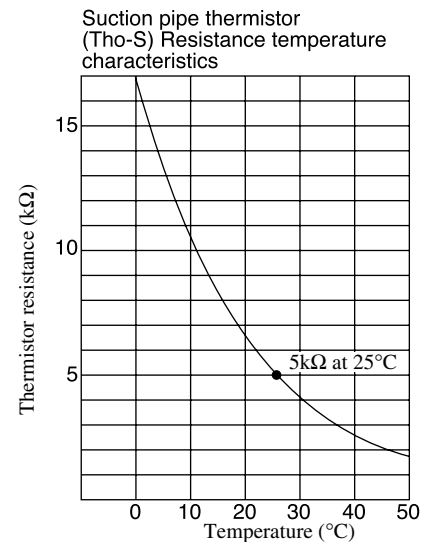
Error display : *E53* [Defective suction pipe temperature thermistor] [Only case of 302~1002 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



● Display conditions

If the temperature detected by the thermistor is -50°C or lower continuously for 5 seconds between 10 minutes and 10 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3 minute delay, the compressor restarts. If this condition is detected 3 times within 40 minutes.

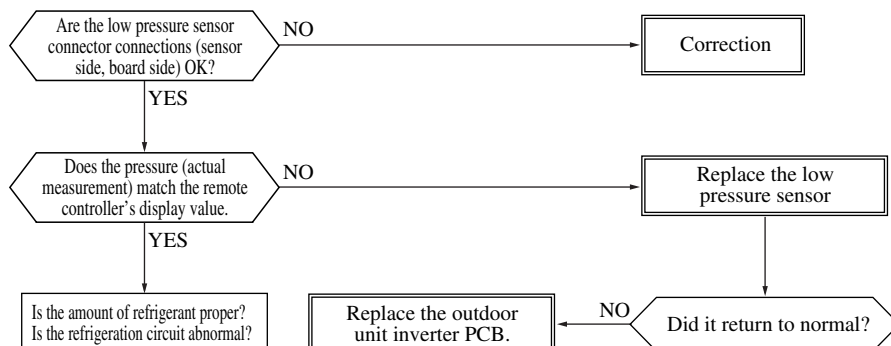


18

Error display : *E54*

[Low pressure sensor is faulty] [Only case of 302~1002 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



Note (1) See page 140 concerning the operation data display method in the remote controller.

● Display Conditions

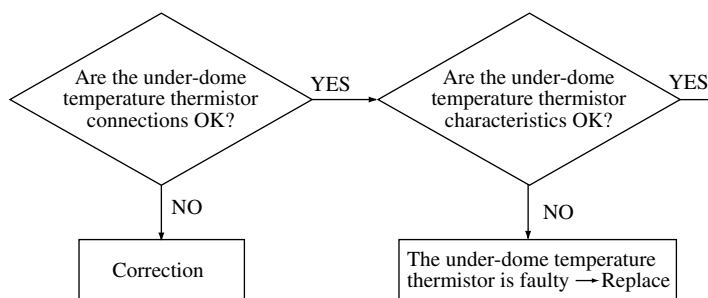
If the voltage sensed by the voltage sensor is 0 V or lower, or 3.49 V or higher continuously for 5 seconds between 2 minutes and 2 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3-minute delay, the compressor starts again, but if it occurs 3 times in 40 minutes.

19

Error display : *E55*

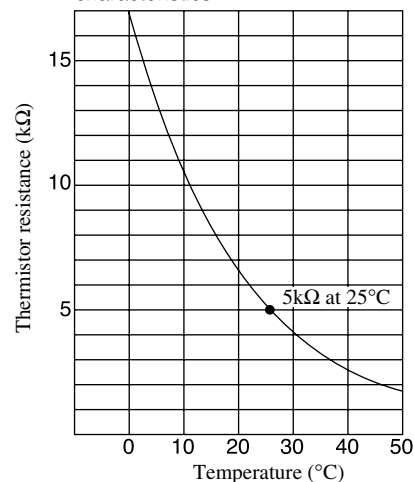
[Under-dome temperature thermistor is faulty] [Only case of 802, 1002 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing



The outdoor unit control PCB is faulty → Replace (The under-dome temperature thermistor input circuit is faulty.)

Under-dome temperature thermistor (Tho-H)
Resistance temperature characteristics



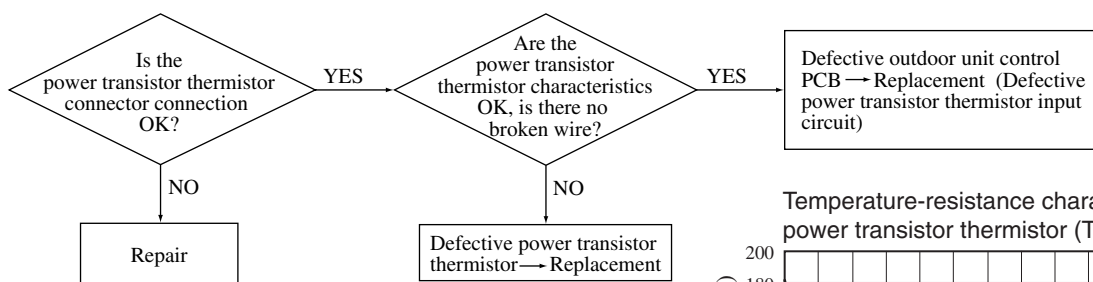
● Display conditions

If the temperature sensed by the temperature thermistor is -50°C or lower continuously for 5 seconds between 10 minutes and 10 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3-minute delay, the compressor is restarted, but if it happens 3 times within 40 minutes.

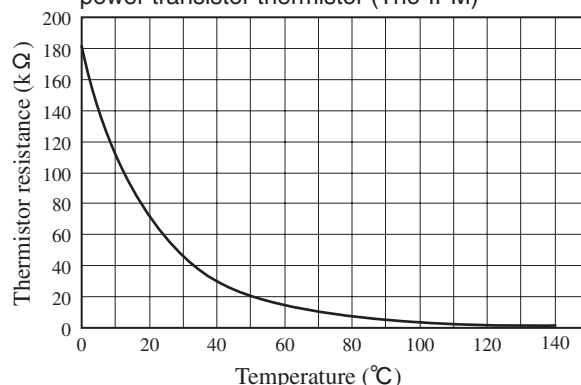
20

Error display : E56 [Power transistor thermistor faulty.] [Only case of 201, 251 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing		



Temperature-resistance characteristics of power transistor thermistor (Tho-IPM)



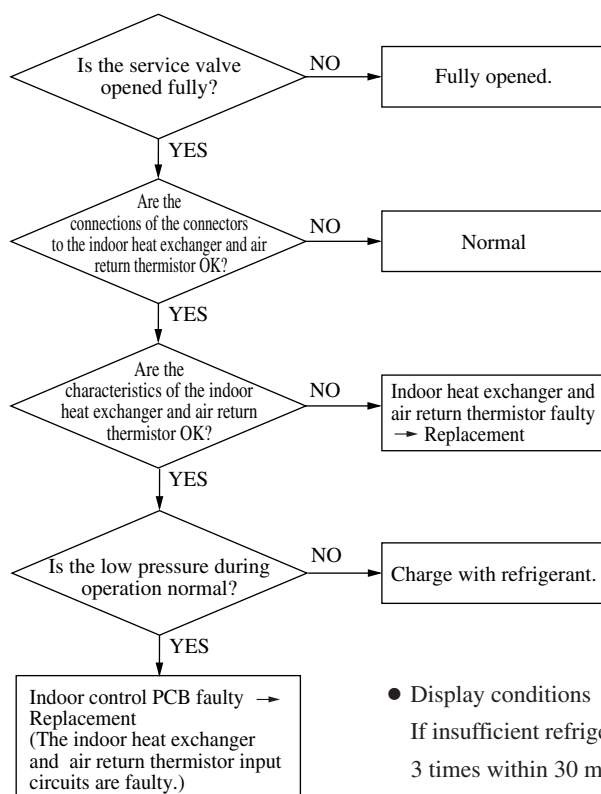
● Display conditions

If the temperature sensed by the thermistor is -10°C or lower continuously for 5 seconds between 10 minutes and 10 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3 minute delay, the compressor restarts. If this state is detected 3 times in 40 minutes.

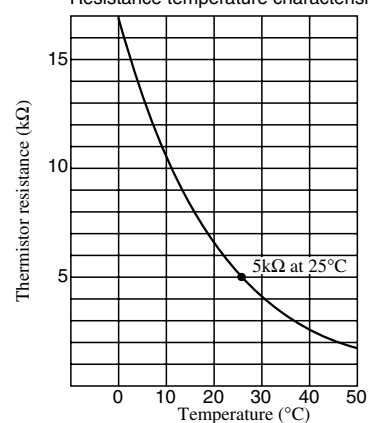
21

Error display : E57 [Insufficient refrigerant volume.] [Only case of 201, 251 models]

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	



Air return thermistor (Thi-A)
Indoor unit heat exchanger thermistor (Thi-R1, R2)
Resistance temperature characteristics

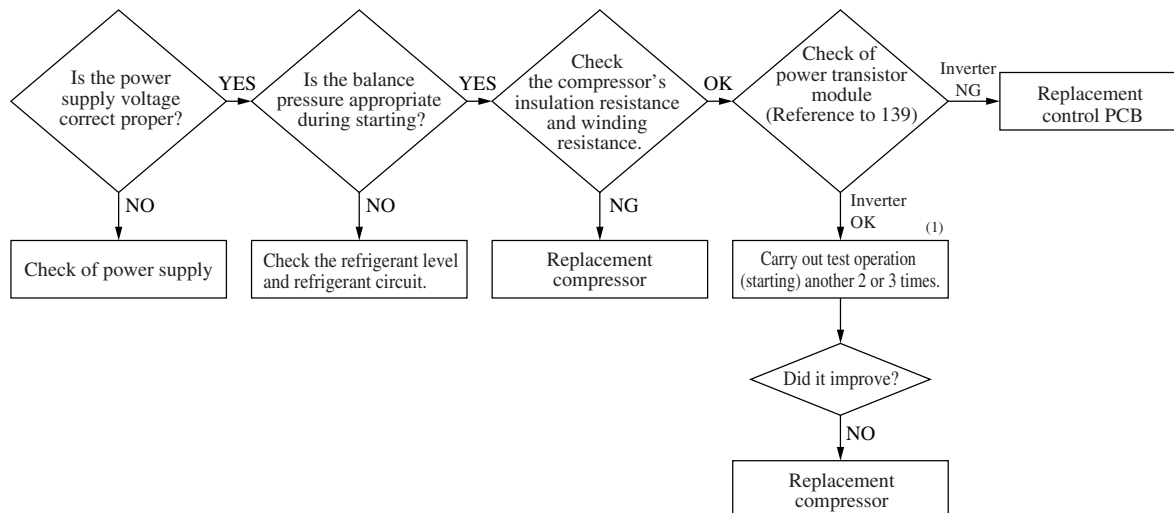


● Display conditions

If insufficient refrigerant protection (See page 56) is implemented 3 times within 30 minutes.

●Models FDCVA201, 251

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time, 2 time, 3 time flash
Green LED	Keeps flashing		



Note (1) If the test operation is repeated 2 or 3 times, the liquid refrigerant inside the compressor may be expelled from the compressor may recover from its starting abnormality.

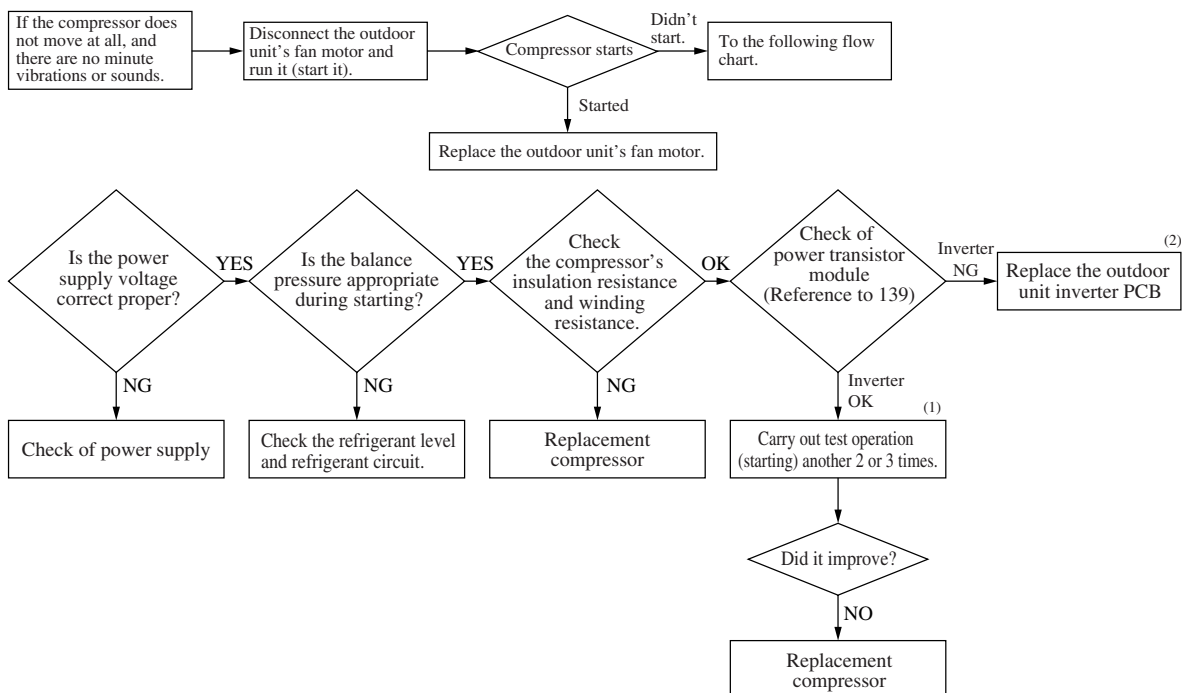
● Display conditions

- (1) If it won't start 2 times out of 7 attempted starts.
- (2) Remote controller reset is possible after 3 minutes have passed.

●Models FDCVA302~1002

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	5 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing

Note (1) Check if the power supply system is normal.



Note (1) If the test operation is repeated 2 or 3 times, the liquid refrigerant inside the compressor may be expelled from the compressor may recover from its starting abnormality.

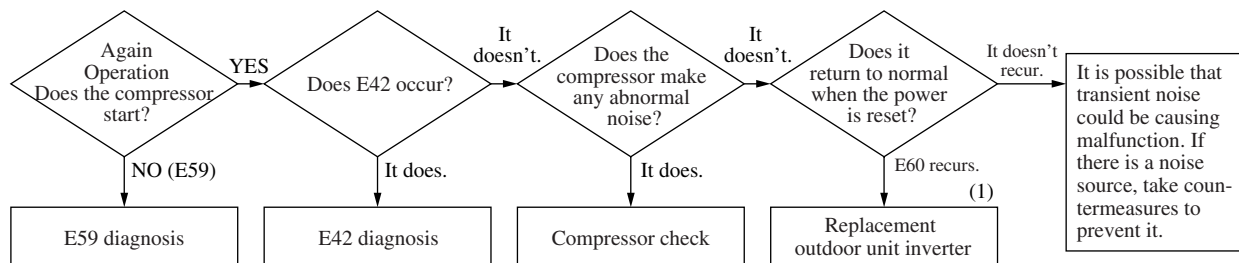
(2) In models 802 and 1002, also replace the power transistor.

● Display conditions

- (1) If it won't start 10 times out of 20 attempted starts.
- (2) Remote controller reset is possible after 3 minutes have passed.

Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing		

Note (1) Check if the power supply system is normal.

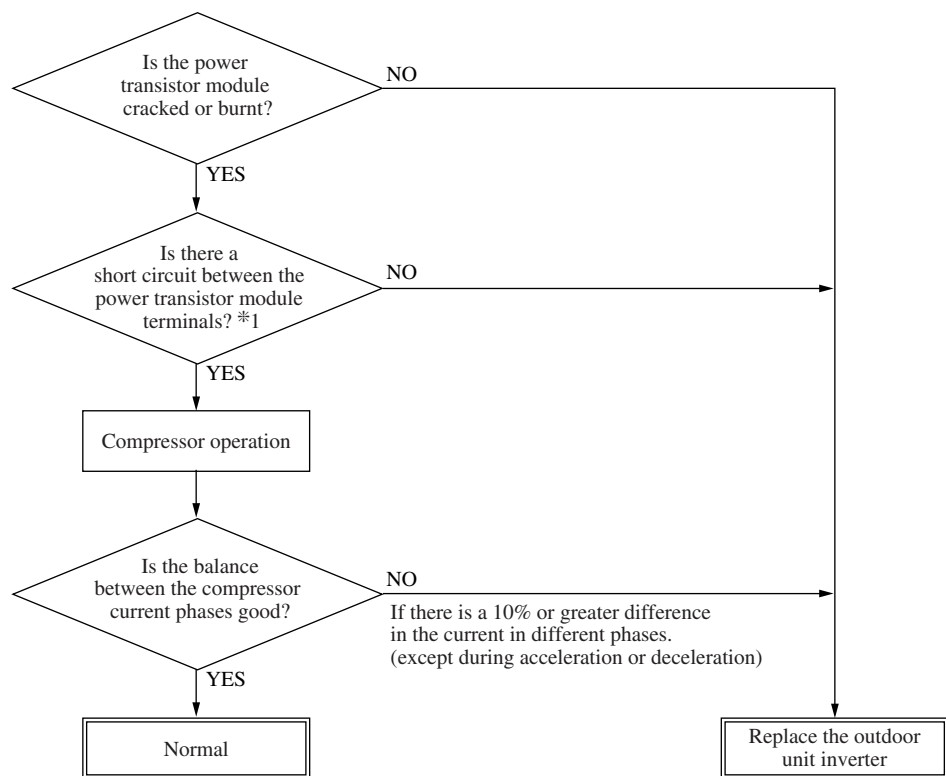


Note (1) Replace the power transistor.

● Display conditions

- (1) If a rotor position detection operation is conducted, then the rotor position cannot be detected again after that (4 times in 15 minutes), an abnormal state is displayed.
- (2) After 3 minutes passes, it is reset with the remote controller is possible.

Power transistor module (including drive circuit) check method



Note (1) In models 802 and 1002, also replace the power transistor.

*1 Power transistor module terminal short circuit check procedure

Disconnect the compressor wiring, then conduct a short circuit check.

P-U, P-V, P-W

N-U, N-V, N-W

Check between the P-N terminals.

Bring the tester probes in contact with the following places on each terminal.

P: Power transistor P terminal,

N: Power transistor N terminal,

U: End of red harness to compressor

V: End of white harness to compressor

W: End of black or blue harness to compressor

Check for a power transistor short circuit.

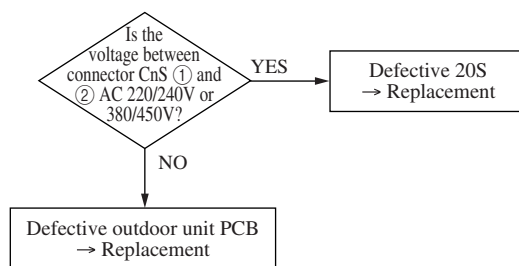
- When you do not have a diagnostic checker for judging if the inverter is defective, measure between the terminals of the power transistor parts, judge whether the power transistor is defective or not.
- Disconnect the compressor, then measure with the controller incorporated.

Tester		Normal values (Ω)		
Terminal (+)	Terminal (-)	201, 251	302 ~ 602	802, 1002
P	N	0 ~ (Numerical value rises.)	0 ~ (Numerical value rises.)	0 ~ (Numerical value rises.)
N	P			
P	U	Several M (Numerical value rises.)	Several M (Numerical value rises.)	Approx. 500 k
P	V			
P	W			
N	U	Approx. 180 k	Approx. 650 k	Approx. 500 k
N	V			
N	W			
U	P	Approx. 160 k	Approx. 670 k	Approx. 500 k
V	P		Approx. 4.4 M	
W	P		Approx. 4.4 M	
U	N	Approx. 240 k	Approx. 650 k	Approx. 500 k
V	N		Approx. 4.8 M	
W	N		Approx. 4.9 M	

If the measured values range from 0 ~ several kΩ, there is a possibility that the elements are damaged, so replace the power transistor parts.

(5) Check method in the case of the failure display in the wired remote controller

4 way valve does not switch during heating operation



(6) Check abnormal operation data with the wired remote controller

Operation data are recorded when there is an abnormal state and these data can be displayed in the remote controller by operating the remote controller buttons.

- (1) Press the CHECK button.

The display will change from “ FUNCTION” → “ SET ” → “OPERATION DATA ”

- (2) Press the button once. The display will change to “ERROR DATA ”.

- (3) Press the SET button to enter the abnormal operation data display mode.

- (4) If there are abnormalities from the past, they will be displayed by an error code and unit No.

(Example) “E8” (Lighted up)

“I/U No. 00 ” (Flashing)

- (5) Using the or button, select the indoor unit No. you want to display the error data for.

If only one indoor unit is connected, the indoor unit No. does not change.

- (6) Fix the selection using the SET button. (The displayed indoor unit No. will change from flashing to light up continuously.)

(Example) “E8”

“DATA LOADING” (This message flashes while data are being read.)

↓

“E8”

“ERROR DATA ”

The data are then displayed beginning with item No. 01.

Displayed items are as shown below.

- (7) Display the other data for when the error occurred in order from the currently displayed operation data No. 01 using the or button.

* Depending on the model, items for which corresponding data do not exist are not displayed.

- (8) To change the indoor unit, press the AIR CON No. button and return to the indoor unit selection display.

- (9) Press the ON/OFF button to end the abnormal operation data check.

If you press the RESET button during the settings, the display returns to the previous setting screen.

No.	Data item
01	※ (Operation mode)
02	SET TEMP
03	RETURN AIR
04	I/U HEAT EXCH1
05	I/U HEAT EXCH2
07	I/U FAN
11	TOTAL I/U RUN
21	OUTDOOR
22	O/U HEAT EXCH1
23	O/U HEAT EXCH2 (802, 1002 only)
24	COMP HERTZ
26	Lo PRESSURE
27	DISCHARGE
28	DOME BOTTOM (802, 1002 only)
29	CT
31	O/U FAN
32	SILENT MODE ON/OFF
34	63H1 ON/OFF
35	DEFROST ON/ OFF
36	TOTAL COMP RUN
37	EEV1

2. MULTI-TYPE (V MULTI) PACKAGED AIR-CONDITIONER

CONTENTS

2.1 GENERAL INFORMATION.....	144
2.1.1 Specific features	144
2.1.2 How to read the model name	144
2.1.3 Table of models	145
2.1.4 Table of system combinations	145
2.2 SELECTION DATA	146
2.2.1 Specifications	146
(1) Indoor unit	146
(2) Outdoor unit	148
(3) Operation chart	151
2.2.2 Range of usage & limitations	153
2.2.3 Exterior dimensions	155
(1) Indoor unit	155
(2) Remote controller (Optional parts)	158
(3) Outdoor unit	159
2.2.4 Inside view	162
2.2.5 Exterior appearance	164
2.2.6 Piping system	165
2.2.7 Selection chart	168
2.2.8 Characteristics of fan	169

2.2.9 Noise level	171
(1) Indoor unit	171
(2) Outdoor unit	172
2.3 ELECTRICAL DATA	173
2.3.1 Electrical wiring	173
(1) Indoor unit	173
(2) Outdoor unit	174
2.4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER	176
2.5 APPLICATION DATA	176
2.5.1 Installation of indoor unit	177
2.5.2 Installation of wired remote controller	177
2.5.3 Installation of outdoor unit	177
(1) Haulage and installation	177
(2) Refrigerant piping work	179
(3) Air tightness test and air purge	183
(4) Additional refrigerant charge	184
(5) Drain piping work	185
(6) Electrical wiring	185
(7) Setting functions using the wired remote controller	188
(8) Checking operation data	192
(9) Test run	193
2.6 MAINTENANCE DATA	194

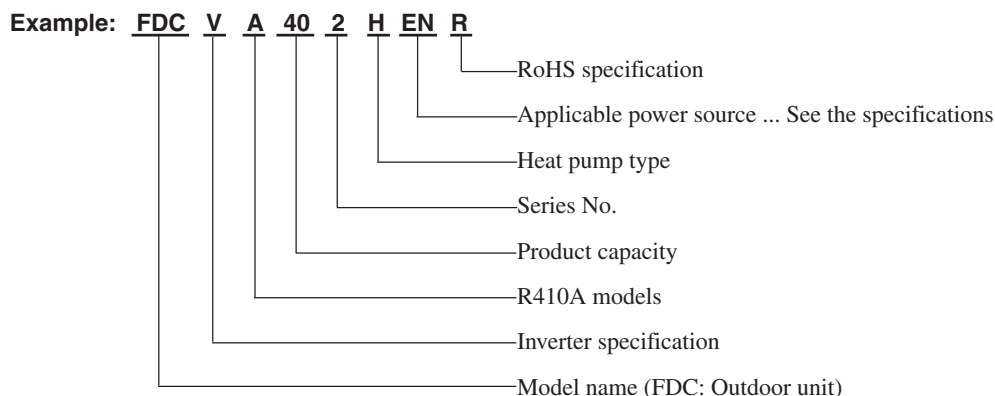
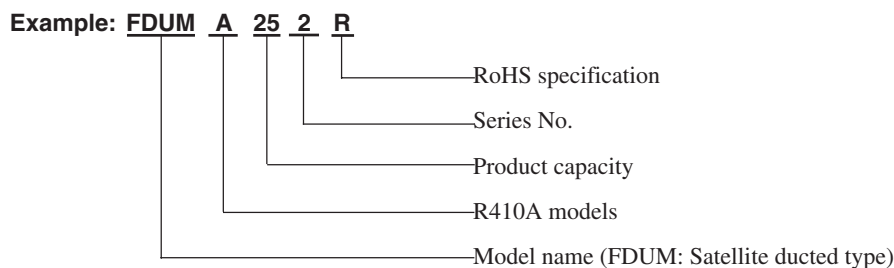
2.1 GENERAL INFORMATION

2.1.1 Specific features

Ideal for the installation conditions characteristic of larger rooms and L-shaped or other non-standard-shaped rooms, the Multi-Type V series allows an extensive degree of flexibility in the selection of indoor units. Specifically, the selection of indoor units with differing capacities and differing or similar types is supported, as is the selection of indoor units with similar capacities and differing types. Furthermore, a maximum of up to four individual indoor units can be operated in synchrony with a single outdoor unit.

- (1) A new refrigerant, R410A, which causes no damage to the earth's ozone layer, is used. R410A is a pseudoazeotropic refrigerant, so there is little formation of separate vapor and liquid layers, and it is possible to add refrigerant on-site.
- (2) Less refrigerant charge amount due to use of double phase refrigerant flow system. The total refrigerant charge amount has been reduced by more than 50%.
- (3) The microcomputer chip is installed in the indoor unit and outdoor unit. There is no need for the unit to communicate between the outdoor and indoor units so the unit is more resistant to electromagnetic noise thus the incidence of microcomputer malfunction has been reduced. The compressor in the outdoor unit has its own self protection function, that reacts according to abnormal high pressure and excessive high temperature.
- (4) There are only three power lines between the outdoor and indoor unit. One cable with 3 wires encased in one sheath is enough for conducting the wiring work between the outdoor unit and the indoor unit. This contributes to simpler wiring work in the field.
- (5) All models have service valves protruding from the outdoor unit for faster flare connection (FDCVA802, 1002: Only a gas side is brazing) work in the field.
- (6) Compared to the previous models, a single fan is used in the 402 ~ 602 outdoor unit models and forward blowing is used in the 802 and 1002 models, resulting in markedly reduced weight and greater compactness. In addition, use of an inverter makes these units much more economical compared to the previous fixed speed units.

2.1.2 How to read the model name



2.1.3 Table of models

Model \ Capacity	15	20	25	30	40	50
Ceiling recessed type (FDT)	○	○	○	○	○	○
Ceiling suspended type (FDEN)	○	○	○	○	○	○
Wall mounted type (FDKN)	○	○	○			
Satellite ducted type (FDUM)		○	○	○	○	○
Outdoor unit to be combined (FDC)	FDCVA402HENR (4 Horse Power) FDCVA502HENR (5 Horse Power) FDCVA602HENR (6 Horse Power) FDCVA802HESR (8 Horse Power) FDCVA1002HESR (10 Horse Power)					

Notes (1) This item, shows the data related to FDUM. For other indoor units, see Manual No. 06-PAC-T-102.

2.1.4 Table of system combinations

Outdoor unit	Type	Indoor unit assembly capacity	Branch pipe set (Optional)
FDCVA402HENR	Twin	20+20 15+25	DIS-WA1
FDCVA502HENR		25+25 20+30	
FDCVA602HENR	Twin	30+30	
	Triple	20+20+20	DIS-TA1
FDCVA802HESR	Twin	40+40	DIS-WB1
		30+50	
	Triple	30+30+30	DIS-TB1
	Double twin	20+20+20+20	DIS-WA1 × 2set DIS-WB1 × 1set
FDCVA1002HESR	Twin	50+50	DIS-WB1
	Triple	20+40+40	DIS-TB1
		25+25+50	
		30+30+40	
	Double twin	25+25+25+25	DIS-WA1 × 2set DIS-WB1 × 1set

Notes (1) It is possible to use different models (FDT, FDUM, FDEN) when combining indoor units.
(2) Always use the branch piping set (optional) at branches in the refrigerant piping.
(3) If wireless specifications are used, use 1 wireless indoor unit in combination with wired indoor units.

2.2 SELECTION DATA

2.2.1 Specifications

(1) Indoor unit

Satellite ducted type (FDUM)

Models FDUMA202R, 252R, 302R

Models		FDUMA202R	FDUMA252R	FDUMA302R
Item				
Nominal cooling capacity* ¹	kW	5.0	5.6	7.1
Nominal heating capacity* ²	kW	5.4	6.4	8.0
Power source		1 Phase 220-240V 50Hz/220V 60Hz		
Noise level	dB(A)	Hi: 34 Me: 31 Lo: 28		Hi: 35 Me: 32 Lo: 29
Exterior dimensions Height × Width × Depth	mm	299 × 750 × 635	299 × 950 × 635	
Net weight	kg	34	40	
Refrigerant equipment Heat exchanger		Louver fin & inner grooved tubing		
Refrigerant control		Electronic expansion valve		
Air handling equipment Fan type & Q'ty		Centrifugal fan × 2		
Motor	W	55×1	90×1	100×1
Starting method		Direct line start		
Air flow(Standard)	CMM	Hi: 14 Me: 12 Lo: 11	Hi: 18 Me: 16 Lo: 14	Hi: 20 Me: 18 Lo: 15
Available static pressure (at Hi)	Pa	Standard:50, Hi speed:85		
Outside air intake		-		
Air filter, Q'ty		-		
Shock & vibration absorber		Rubber sleeve(for fan motor)		
Insulation (noise & heat)		Polyurethane foam		
Operation control Operation switch		Wired remote control switch (Optional:RC-E1R) Wireless kit (Optional:RCND-KIT-HER)		
Room temperature control		Thermostat by electronics		
Safety equipment		Internal thermostat for fan motor. Frost protection thermostat		
Installation data Refrigerant piping size	mm(in)	Liquid line:φ6.35(1/4") Gas line:φ12.7(1/2")	Liquid line:φ6.35(1/4") Gas line:φ15.88(5/8")	Liquid line:φ9.52(3/8") Gas line:φ15.88(5/8")
Connecting method		Flare piping		
Drain hose		Connectable with VP25(I.D.25mm, O.D.32mm)		
Insulation for piping		Necessary (both Liquid & Gas lines)		
Accessories		Mounting kit, Drain hose		
Optional parts		Filter kit		

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

Operation	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling*1	27℃	19℃	35℃	24℃	ISO-T1
Heating*2	20℃	—	7℃	6℃	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

●Filter kit

Model	Item	Filter kit No.
FDUMA202R		UM-FL1E
FDUMA252R,302R		UM-FL2E

Models FDUMA402R, 502R

Item		Models	FDUMA402R	FDUMA502R
Nominal cooling capacity* ¹	kW		10.0	12.5
Nominal heating capacity* ²	kW		11.2	14.0
Power source			1 Phase 220-240V 50Hz/220V 60Hz	
Noise level	dB(A)		Hi: 37 Me: 35 Lo: 32	Hi: 38 Me: 36 Lo: 33
Exterior dimensions Height × Width × Depth	mm		350 × 1370 × 635	
Net weight	kg		59	
Refrigerant equipment Heat exchanger			Louver fin & inner grooved tubing	
Refrigerant control			Electronic expansion valve	
Air handling equipment Fan type & Q'ty			Centrifugal fan × 3	
Motor	W		45 × 1, 90 × 1	50 × 1, 100 × 1
Starting method			Direct line start	
Air flow(Standard)	CMM		Hi: 28 Me: 25 Lo: 22	Hi: 34 Me: 31 Lo: 27
Available static pressure (at Hi)	Pa		Standard:60, Hi speed:90	Standard:60, Hi speed:85
Outside air intake			—	
Air filter, Q'ty			—	
Shock & vibration absorber			Rubber sleeve(for fan motor)	
Insulation (noise & heat)			Polyurethane foam	
Operation control Operation switch			Wired remote control switch (Optional:RC-E1R) Wireless kit (Optional:RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat	
Installation data Refrigerant piping size	mm(in)		Liquid line:φ 9.52(3/8"), Gas line:φ 15.88(5/8")	
Connecting method			Flare piping	
Drain hose			Connectable with VP25(I.D.25mm, O.D.32mm)	
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Filter kit	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling* ¹	27℃	19℃	35℃	24℃	ISO-T1
Heating* ²	20℃	—	7℃	6℃	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

●Filter kit

Model	Item	Filter kit No.
FDUMA402R,502R		UM-FL3E

(2) Outdoor unit

Models FDCVA402HENR

Item	Model	FDCVA402HENR
Power source		1 Phase, 220-240V 50Hz/220V 60Hz
Nominal cooling capacity ⁽¹⁾	kW	10.0 [6.1~11.2]
Nominal heating capacity ⁽¹⁾	kW	11.2 [5.6~12.5]
Noise level	dB(A)	50
Exterior dimensions Height × Width × Depth	mm	845 × 970 × 370
Net weight	kg	63
Refrigerant equipment compressor type & Q'ty		RM-B5125MD11 × 1
Starting method		Direct line start
Crankcase heater	W	20
Heat exchanger		Straight fin & inner grooved tubing
Refrigerant control		Electronic expansion valve
Refrigerant		R410A
Quantity	kg	3.8 (Pre-charged up to the piping length of 30m)
Refrigerant oil	ℓ	0.7 (M-MA68)
Defrost control		Microcomputer controlled de-icer
Air handling equipment Fan type & Q'ty		Propeller fan × 1
Motor	W	120 × 1
Starting method		Direct line start
Air flow(Standard)	CMM	Cooling: 75, Heating: 73
Shock & vibration absorber		Rubber mount (for compressor)
Safety equipment		Internal thermostat for fan motor. Abnormal discharge temperature protection.
Installation data Refrigerant piping size	mm(in)	Liquid line: φ 9.52 (3/8") Gas line: φ 15.88 (5/8")
Connecting method		Flare piping
Drain		Hole for drain (φ 20 × 3pcs.)
Insulation for piping		Necessary (both Liquid & Gas lines)
Accessories		Edging

Notes (1) The cooling and heating capabilities imply the values when the indoor unit of rated capacity is connected under the condition specified in ISO-T1.

(2) The refrigerant quantity in the connecting pipe is not included. Charge it additionally at the site.

(3) Values in [~] show the minimum and maximum capacities.

Models FDCVA502HENR, 602HENR

Model		FDCVA502HENR	FDCVA602HENR
Item			
Power source		1 Phase, 220-240V 50Hz/220V 60Hz	
Nominal cooling capacity ⁽¹⁾	kW	12.5 [6.5~14.0]	14.0 [6.7~14.8]
Nominal heating capacity ⁽¹⁾	kW	14.0 [6.2~16.0]	16.0 [6.3~16.8]
Noise level	dB(A)	52	53
Exterior dimensions Height × Width × Depth	mm	845 × 970 × 370	
Net weight	kg	63	
Refrigerant equipment compressor type & Q'ty		RM-B5125MD11	
Starting method		Direct line start	
Crankcase heater	W	20	
Heat exchanger		Straight fin & inner grooved tubing	
Refrigerant control		Electronic expansion valve	
Refrigerant		R410A	
Quantity	kg	3.8 (Pre-charged up to the piping length of 30m)	
Refrigerant oil	ℓ	0.7 (M-MA68)	
Defrost control		Microcomputer controlled de-icer	
Air handling equipment Fan type & Q'ty		Propeller fan × 1	
Motor	W	120 × 1	
Starting method		Direct line start	
Air flow(Standard)	CMM	Cooling: 75, Heating: 73	
Shock & vibration absorber		Rubber mount (for compressor)	
Safety equipment		Internal thermostat for fan motor. Abnormal discharge temperature protection.	
Installation data Refrigerant piping size	mm(in)	Liquid line: φ 9.52 (3/8") Gas line: φ 15.88 (5/8")	
Connecting method		Flare piping	
Drain		Hole for drain (φ 20 × 3pcs.)	
Insulation for piping		Necessary (both Liquid & Gas lines)	
Accessories		Edging	

Notes (1) The cooling and heating capabilities imply the values when the indoor unit of rated capacity is connected under the condition specified in ISO-T1.

(2) The refrigerant quantity in the connecting pipe is not included. Charge it additionally at the site.

(3) Values in [~] show the minimum and maximum capacities.

Model FDCVA802HESR, 1002HESR

Model		FDCVA802HESR	FDCVA1002HESR
Item			
Power source		3 Phase, 380-415V 50Hz/380V 60Hz	
Nominal cooling capacity⁽¹⁾	kW	20.0 [7.0~22.4]	25.0 [10.6~28.0]
Nominal heating capacity⁽¹⁾	kW	22.4 [7.6~25.0]	28.0 [9.5~31.5]
Noise level	dB(A)	57	Cooling: 57, Heating: 58
Exterior dimensions Height × Width × Depth	mm	1300 × 970 × 370	1505 × 970 × 370
Net weight	kg	122	140
Refrigerant equipment compressor type & Q' ty		GT-C5150ND79	
Starting method		Direct line start	
Crankcase heater	W	40	
Heat exchanger		Straight fin & inner grooved tubing	
Refrigerant control		Electronic expansion valve	
Refrigerant		R410A	
Quantity	kg	5.4 (Pre-charged up to the piping length of 30m)	7.2 (Pre-charged up to the piping length of 30m)
Refrigerant oil	<i>ℓ</i>	1.45 (M-MA32R)	
Defrost control		Microcomputer controlled de-icer	
Air handling equipment Fan type & Q'ty		Propeller fan × 2	
Motor	W	120 × 2	
Starting method		Direct line start	
Air flow(Standard)	CMM	Cooling: 150, Heating: 145	
Shock & vibration absorber		Rubber mount (for compressor)	
Safety equipment		Internal thermostat for fan motor. Abnormal discharge temperature protection.	
Installation data Refrigerant piping size	mm(in)	Liquid line: φ 9.52 (3/8") Gas line: φ 25.4 (1")	Liquid line: φ 12.7 (1/2") Gas line: φ 25.4 (1")
Connecting method		Liquid line: Flare piping, Gas line: Brazing	
Drain		Hole for drain (φ20 × 6pcs.)	
Insulation for piping		Necessary (both Liquid & Gas lines)	
Accessories		Reducer kit (Please see page 181)	

Notes (1) The cooling and heating capabilities imply the values when the indoor unit of rated capacity is connected under the condition specified in ISO-T1.

(2) The refrigerant quantity in the connecting pipe is not included. Charge it additionally at the site.

(3) Values in [~] show the minimum and maximum capacities.

(3) Operation chart

The Multi-Type V series is a system that allows for different models and capacities of indoor units to be connected so the individual operating characteristics of the indoor and outdoor are provided. Use the procedure shown in Item (c) to calculate the combined operating characteristics.

(a) Operating characteristic of outdoor unit

(230V 50Hz/220V 60Hz)

Item	Model	FDCVA402HENR	FDCVA502HENR	FDCVA602HENR
Cooling power consumption	kW	2.82/2.82	4.15/4.15	4.64/4.64
Heating power consumption		2.97/2.97	4.19/4.19	4.44/4.44
Cooling running current	A	12.3/12.3	18.3/18.3	20.4/20.4
Heating running current		13.0/13.0	18.4/18.4	19.5/19.5
Inrush current (L.R.A)	A	5		

(400V 50Hz/220V 60Hz)

Item	Model	FDCVA802HESR	FDCVA1002HESR
Cooling power consumption	kW	6.34/6.34	8.71/8.71
Heating power consumption		6.20/6.20	7.75/7.75
Cooling running current	A	9.1/9.1	12.7/12.7
Heating running current		9.0/9.0	11.4/11.4
Inrush current (L.R.A)	A	5	

Note (1) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

(b) Operating characteristic of indoor unit

FDUM Series

(230V 50Hz/220V 60Hz)

Item	Model	FDUM Series				
		202	252	302	402	502
Power consumption (kW)		0.15/0.15	0.16/0.16	0.18/0.18	0.26/0.26	0.30/0.30
Running current (A)		0.66/0.66	0.70/0.70	0.79/0.79	1.14/1.14	1.31/1.31

Notes(1) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

(2) The values shown in the above table are common to both cooling and heating operations.

(c) Calculation of total operation characteristics

Since the operation characteristics of series Multi depend on combination of indoor unit, calculate the total operation characteristics of the system by using the formulas below according to specifications of each indoor unit or outdoor unit.

1) 1 Phase models

a) Total power consumption

Total power consumption (kW) = Power consumption of outdoor unit + \sum (Power consumption of indoor unit)

b) Total running current

Total running current (A) = Running current of outdoor unit + \sum (Running current of indoor unit)

c) Total power factor

Total power factor (%) = [Total power consumption (W) / Total running current (A) \times Power source] \times 100

Total operation characteristics = Operation characteristic value of outdoor unit + Operation characteristic value of indoor unit

[Example]

(Conditions) Operation Voltage Indoor unit: 230 V, 50 Hz
 Outdoor unit: 230 V, 50 Hz
 Operation mode Cooling and Heating
 Unit..... Outdoor unit: FDCVA602HENR \times 1 unit
 Indoor unit: FDUMA302R \times 2 units

Operation characteristics of each unit

(Cooling/Heating)

Item \ Model	FDCVA602HENR	FDUMA302R
Power consumption (kW)	4.64/4.44	0.18/0.18
Running current (A)	20.4/19.5	0.79/0.79

① Total power consumption (kW)

$$\text{(Cooling)} 4.64 + (0.18 \times 2) = 5.00 \text{ (kW)}$$

$$\text{(Heating)} 4.44 + (0.18 \times 2) = 4.80 \text{ (kW)}$$

② Total running current (A)

$$\text{(Cooling)} 20.4 + (0.79 \times 2) = 22.0 \text{ (A)}$$

$$\text{(Heating)} 19.5 + (0.79 \times 2) = 21.1 \text{ (A)}$$

③ Total power factor (%)

$$\text{(Cooling)} \frac{5.00 \times 1000}{22.0 \times 230} \times 100 \approx 99 \%$$

$$\text{(Heating)} \frac{4.80 \times 1000}{21.1 \times 230} \times 100 \approx 99 \%$$

2) 3 Phase models

a) Total power consumption

Total power consumption (kW) = Power consumption of outdoor unit + Σ (Power consumption of indoor unit)

b) Total running current

Total running current (A) = Running current of outdoor unit + $[\Sigma (\text{Running current of indoor unit}) \times 1/3]$

c) Total power factor

Total power factor (%) = $[\text{Total power consumption (W)} / \sqrt{3} \times \text{Total running current (A)} \times \text{Power source}] \times 100$

Total operation characteristics = Operation characteristic value of outdoor unit + Operation characteristic value of indoor unit

[Example]

(Conditions) Operation Voltage Indoor unit: 230 V, 50 Hz
 Outdoor unit: 400 V, 50 Hz
 Operation mode Cooling and Heating
 Unit..... Outdoor unit: FDCVA802HESR \times 1 unit
 Indoor unit: FDUMA302R \times 1 units, FDUMA502R \times 1 units

Operation characteristics of each unit

(Cooling/Heating)

Item \ Model	FDCVA802HESR	FDUMA302R	FDUMA502R
Power consumption (kW)	6.34/6.20	0.18/0.18	0.30/0.30
Running current (A)	9.1/9.0	0.79/0.79	1.31/1.31

① Total power consumption (kW)

$$\text{(Cooling)} 6.34 + 0.18 + 0.30 = 6.82 \text{ (kW)}$$

$$\text{(Heating)} 6.20 + 0.18 + 0.30 = 6.68 \text{ (kW)}$$

② Total running current (A)

$$\text{(Cooling)} 9.1 + \left[(0.79 + 1.31) \times \frac{1}{3} \right] \approx 10.3 \text{ (A)}$$

$$\text{(Heating)} 9.0 + \left[(0.79 + 1.31) \times \frac{1}{3} \right] \approx 10.2 \text{ (A)}$$

③ Total power factor (%)

$$\text{(Cooling)} \frac{6.82 \times 1000}{\sqrt{3} \times 10.3 \times 400} \times 100 \approx 96 \%$$

$$\text{(Heating)} \frac{6.68 \times 1000}{\sqrt{3} \times 10.2 \times 400} \times 100 \approx 95 \%$$

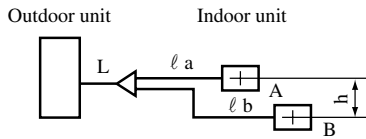
2.2.2 Range of usage & limitations

Item		Models	402 ~ 602	802, 1002
Limitations Return air temp.	Cooling		Indoor unit : 18~32°C.D.B, Outdoor unit : -15~43°C.D.B	
	Heating		Indoor unit : 10~30°C.D.B, Outdoor unit : -10~24°C.D.B	
Indoor unit atmosphere (behind ceiling) temperature and humidity			Dew point temperature: 28°C or less, relative humidity: 80% or less	
Refrigerant line (one way) length			Max. 50m	Max. 70m*
Vertical height difference between outdoor unit and indoor unit			Max. 30m (Outdoor unit is higher) Max. 15m (Outdoor unit is lower)	
Power source voltage			Rating ± 10%	
Voltage at starting			Min. 85% of rating	
Compressor stop/start Frequency	Cycle Time		7 minutes or more (4 minutes or more from start to stop) or (3 minutes or more from stop to start)	
	Stop Time		3 minutes or more	

Note (1) When ø22, 22 gas pipe is used for piping lengths with the * mark, let the maximum one-way length be 30 m.

Height and length restrictions for refrigerant piping

Twin type



402, 502, 602 models

One-way pipe length (m) $L + \ell a + \ell b \leq 50$

Branch pipe length (m) $|\ell a - \ell b| \leq 10, \ell a \leq 20, \ell b \leq 20$

Difference in height between indoor units (m) $h=0.5$ or less

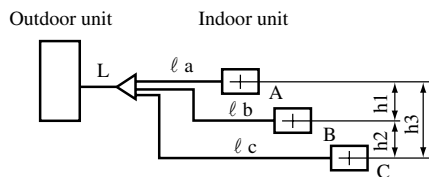
802, 1002 models

One-way pipe length (m) $L + \ell a \leq 70, L + \ell b \leq 70$

Branch pipe length (m) $|\ell a - \ell b| \leq 10, \ell a \leq 30, \ell b \leq 30$

Difference in height between indoor units (m) $h=0.5$ or less

Triple type



602 model

One-way pipe length (m) $L + \ell a + \ell b + \ell c \leq 50$

Branch pipe length (m) $|\ell a - \ell b| \leq 10, |\ell a - \ell c| \leq 10, |\ell b - \ell c| \leq 10$
 $\ell a \leq 20, \ell b \leq 20, \ell c \leq 20$

Difference in height between indoor units (m) $h1=0.5$ or less, $h2=0.5$ or less, $h3=0.5$ or less

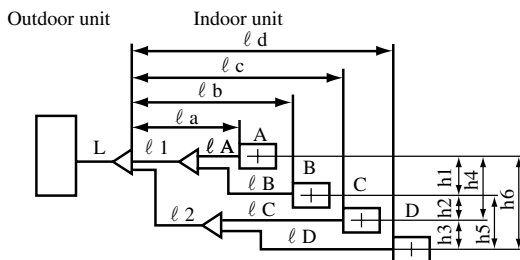
802, 1002 models

One-way pipe length (m) $L + \ell a \leq 70, L + \ell b \leq 70, L + \ell c \leq 70$

Branch pipe length (m) $|\ell a - \ell b| \leq 10, |\ell a - \ell c| \leq 10, |\ell b - \ell c| \leq 10$
 $\ell a \leq 30, \ell b \leq 30, \ell c \leq 30$

Difference in height between indoor units (m) $h1=0.5$ or less, $h2=0.5$ or less, $h3=0.5$ or less

Double-twin type



802, 1002 models

One-way pipe length (m) $L + \ell a \leq 70, L + \ell b \leq 70, L + \ell c \leq 70, L + \ell d \leq 70$

Branch pipe length (m) $|\ell a - \ell b| \leq 10, |\ell a - \ell c| \leq 10, |\ell b - \ell c| \leq 10$
 $|\ell a - \ell d| \leq 10, |\ell b - \ell d| \leq 10, |\ell c - \ell d| \leq 10$
 $\ell a \leq 30, \ell b \leq 30, \ell c \leq 30, \ell d \leq 30$
 $\ell A + \ell B \leq 15, \ell C + \ell D \leq 15$

Difference in height between indoor units (m) $h1=0.5$ or less, $h2=0.5$ or less
 $h3=0.5$ or less, $h4=0.5$ or less
 $h5=0.5$ or less, $h6=0.5$ or less

In the illustration the L is main piping and $\ell a, \ell b, \ell c$, and ℓd are branch piping.

Request

- When the capacity of the indoor unit to be connected is 202 and 252 or less, be sure to use a pipe diameter of $\phi 9.52$ for the size of the liquid piping of branch piping (between branch and indoor units). (for double-twin only)
For connections to indoor units (liquid piping side dia. $\phi 6.35$) use the different diameter adapter coupling that is included in the branch piping kit.
- For the branch be sure to select the specified branch pipe set (sold separately) and then to follow the directions of the instruction manual included in the branch pipe set when installing the piping. Be sure to install the branch piping so that the branch is level.

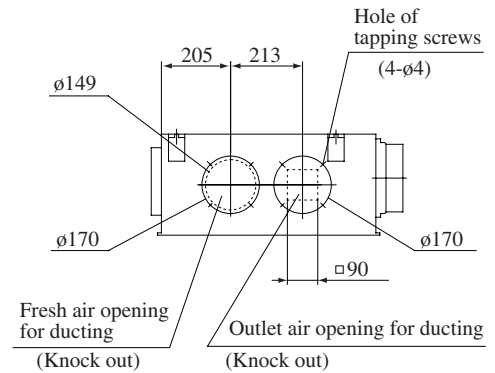
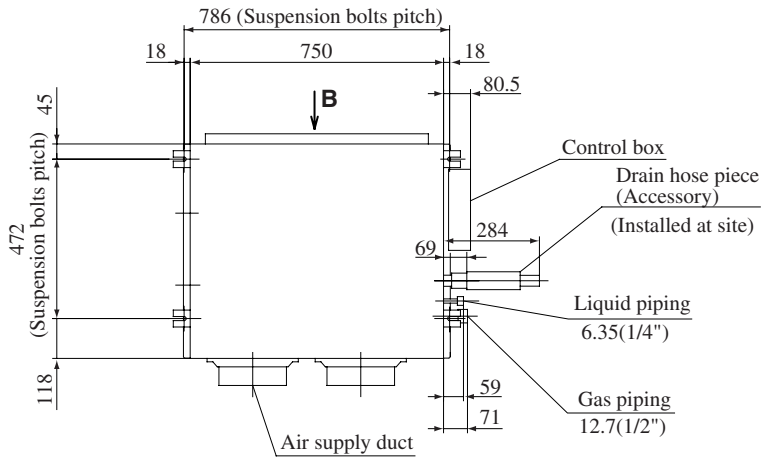
2.2.3 Exterior dimensions

(1) Indoor unit

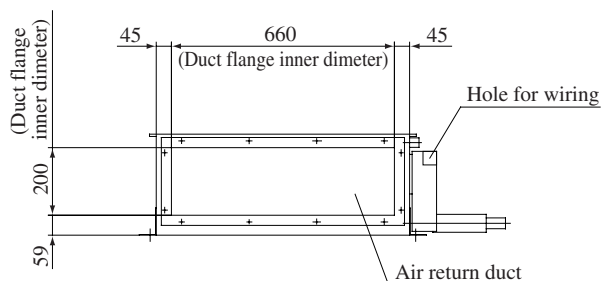
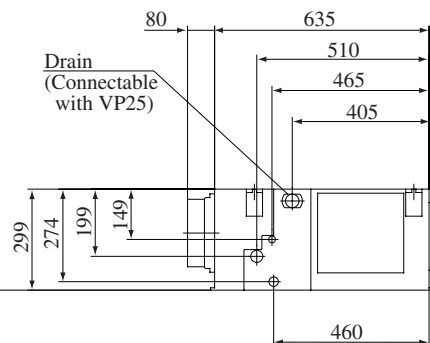
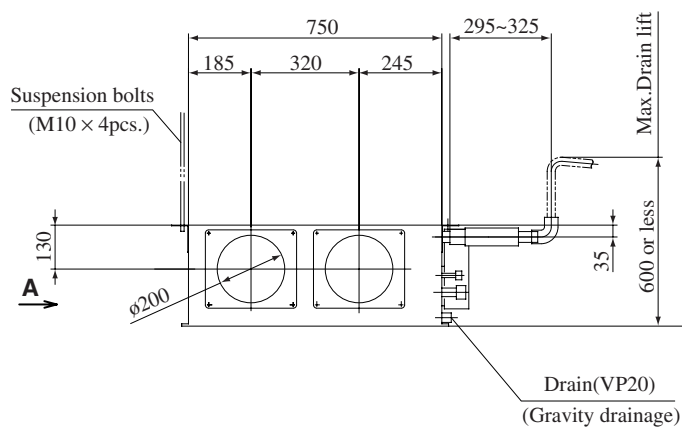
Satellite ducted type (FDUM)

Model FDUMA202R

Unit : mm

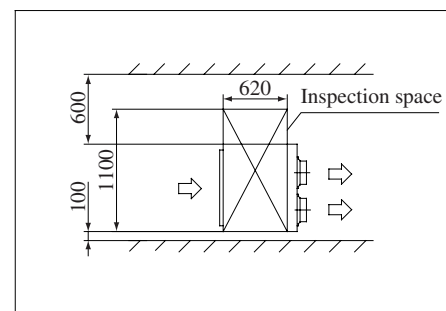


VIEW A



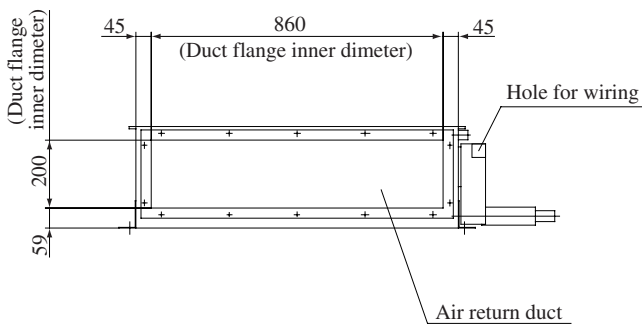
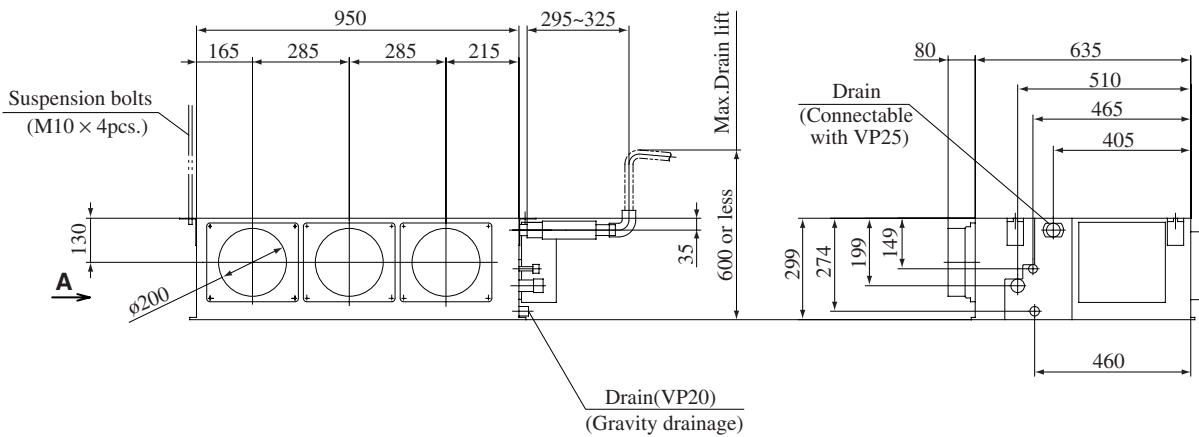
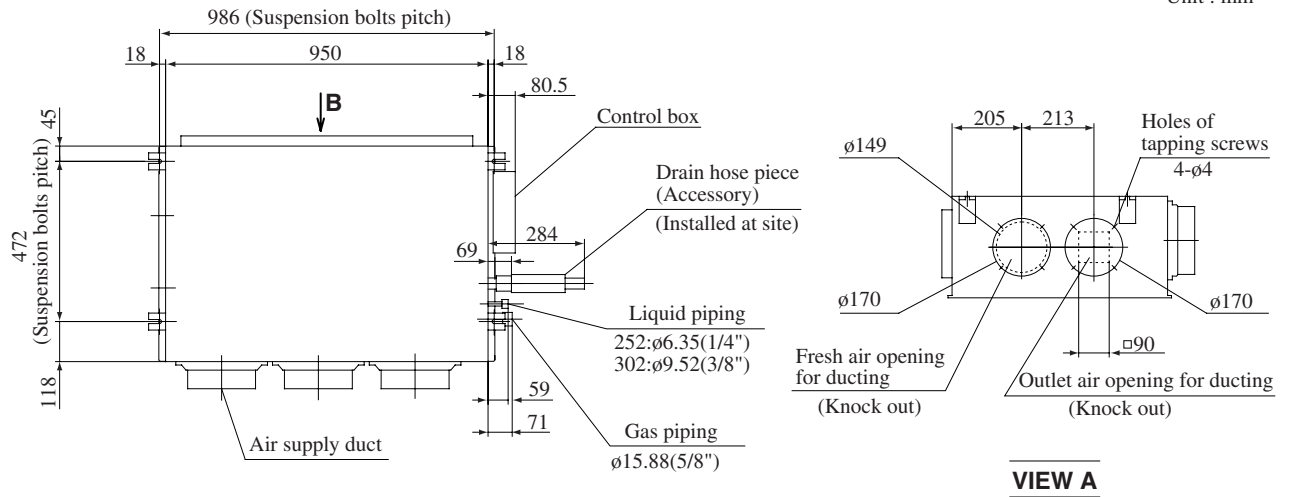
VIEW B

Space for installation and service



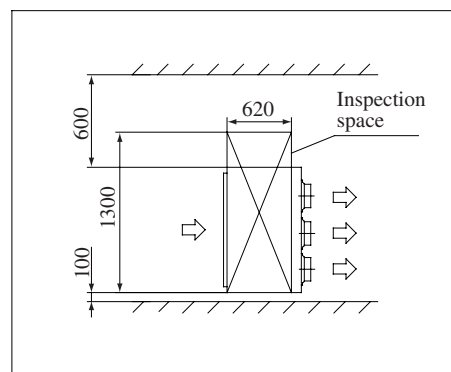
Models FDUMA252R, 302R

Unit : mm



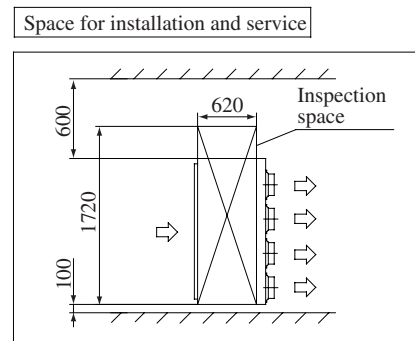
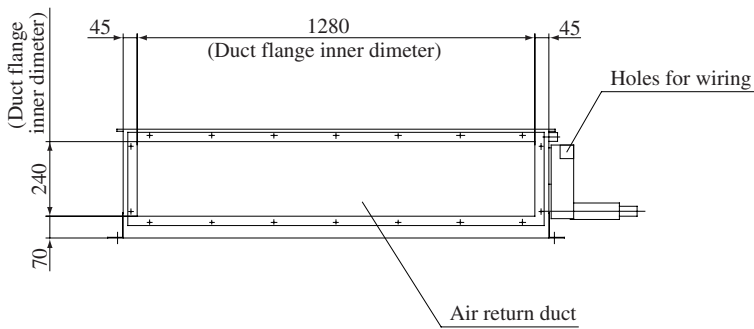
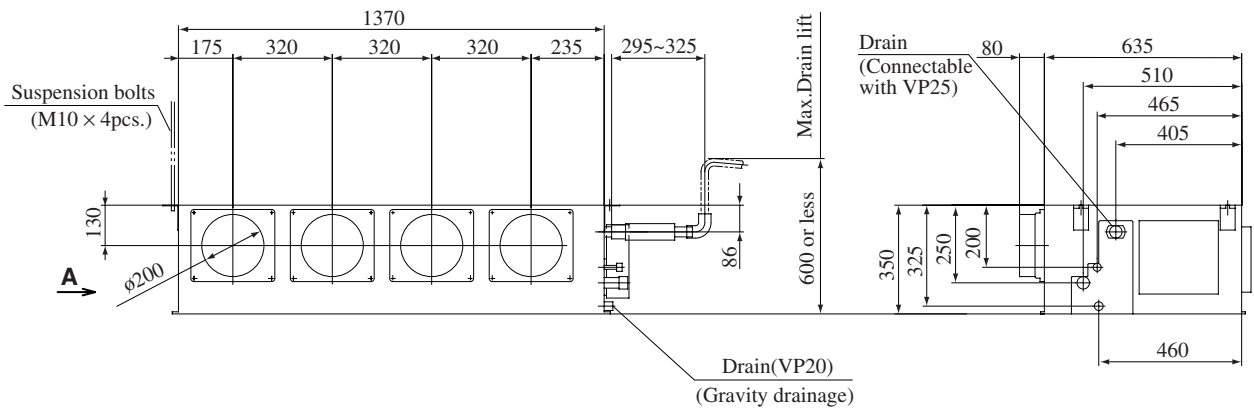
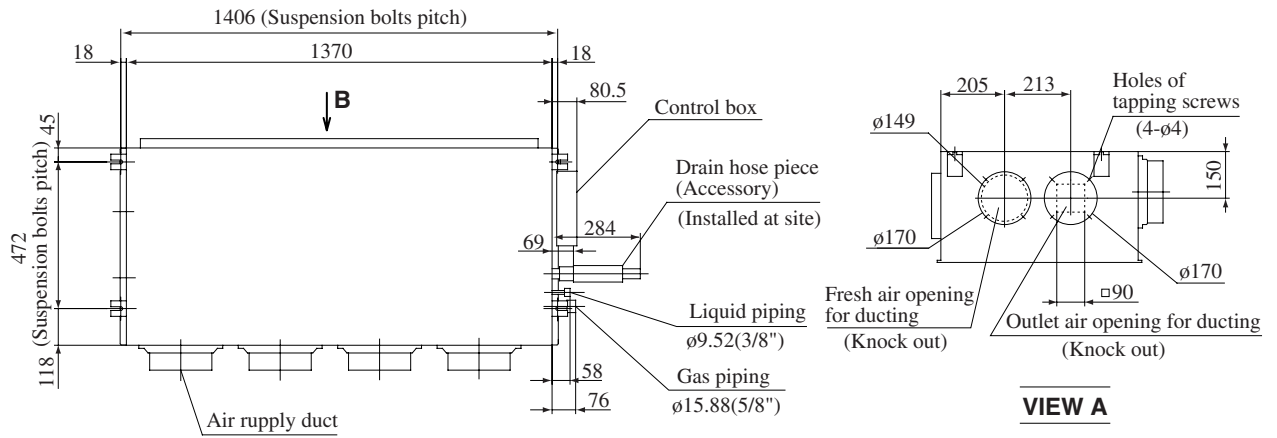
VIEW B

Space for installation and service



Models FDUMA402R, 502R

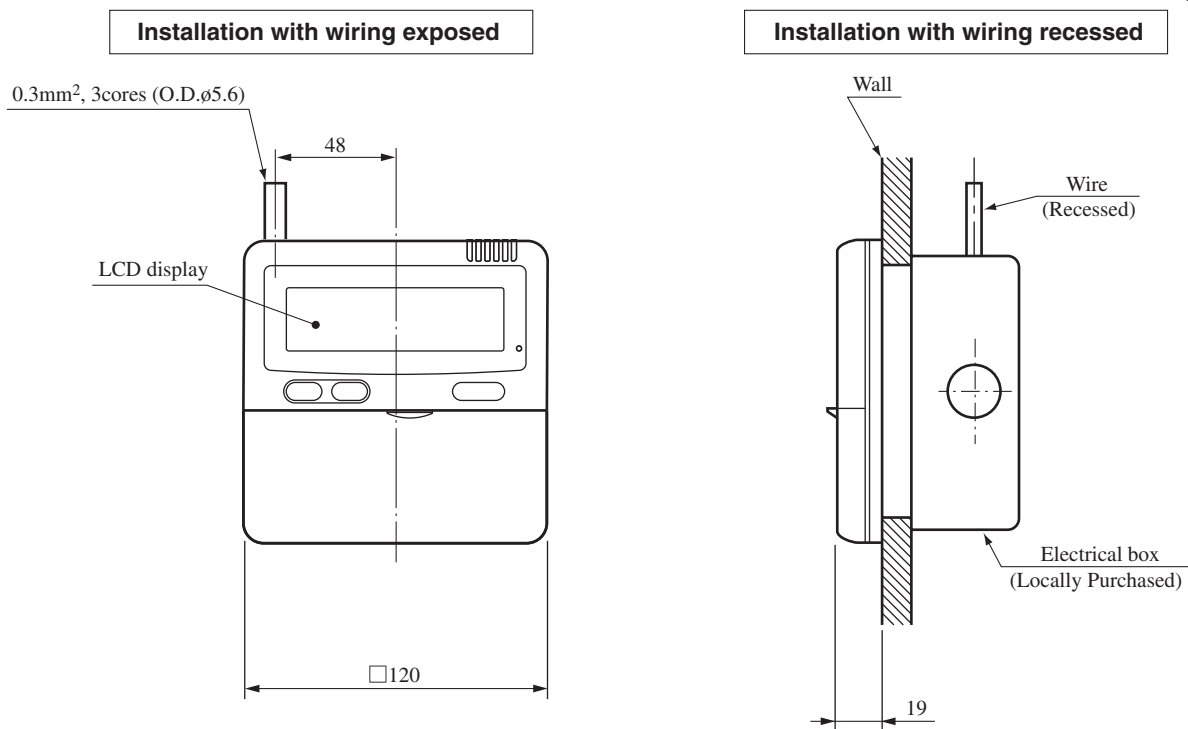
unit : mm



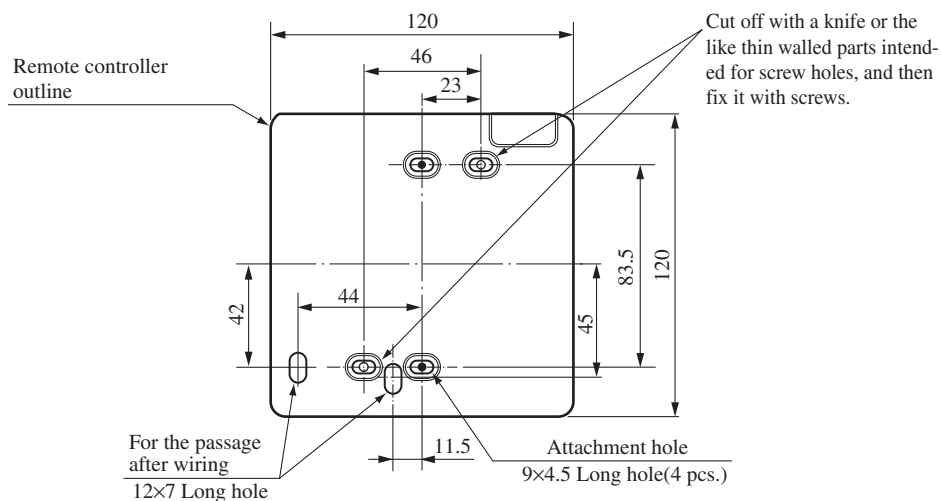
(2) Remote controller (Optional parts)

Wired remote controller

Unit : mm



Remote controller mounting dimensions



Precaution in Extending the Remote control cord

► Maximum total extension 600m.

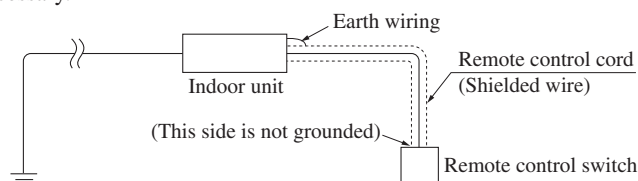
The cord should be a shielded wire.

● For all types : 0.3mm² × 3 cores

Note: (1) Use cables up to 0.5mm² (maximum) for those laid inside the remote control unit casing and connect to a different size cable at a vicinity point outside the remote control unit, if necessary.

Within 100-200m.....	0.5 mm ² × 3 cores
Within 300m.....	0.75 mm ² × 3 cores
Within 400m.....	1.25 mm ² × 3 cores
Within 600m.....	2.0 mm ² × 3 cores

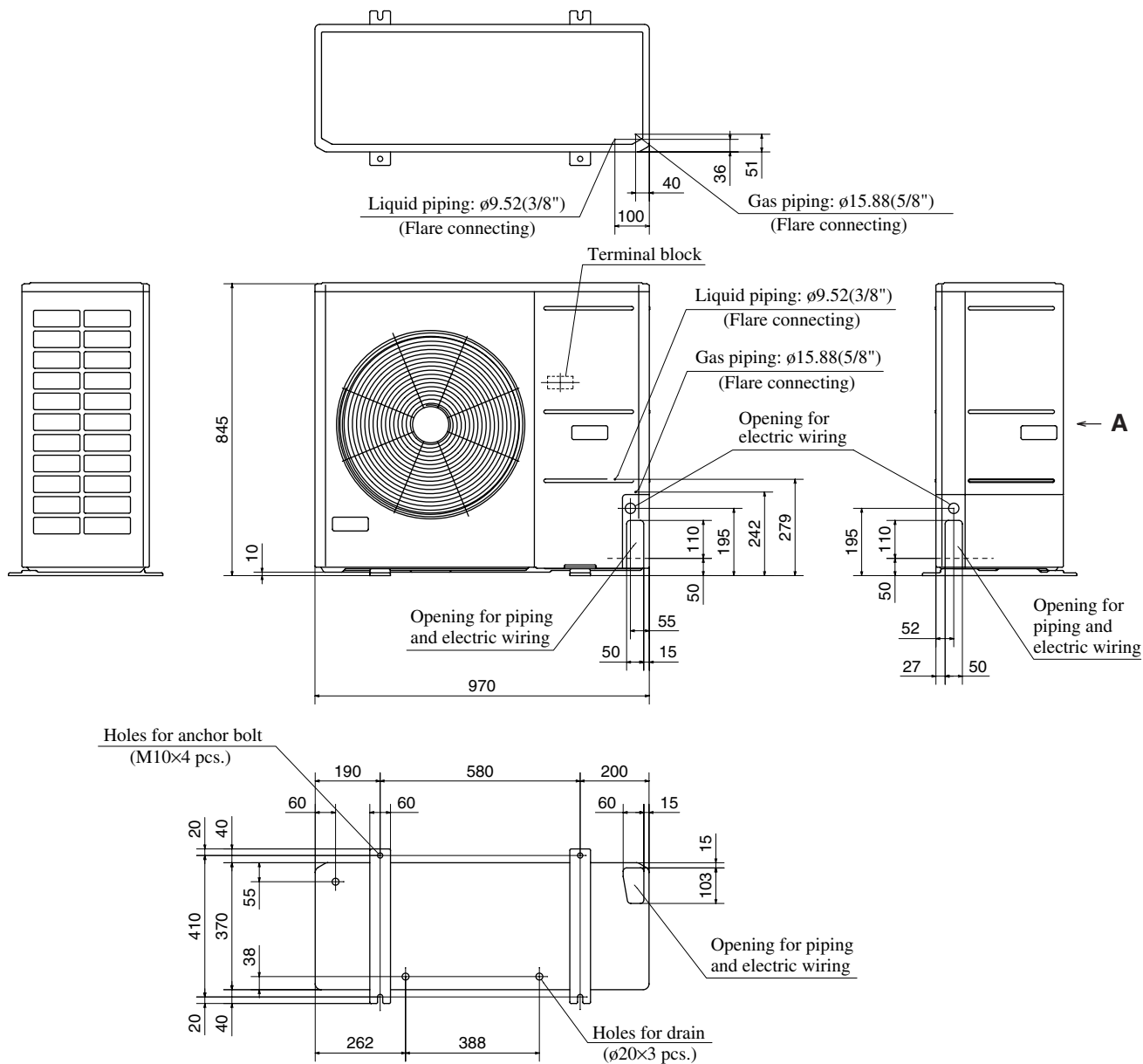
● The shielded wire should be grounded at one side only.



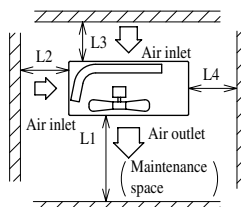
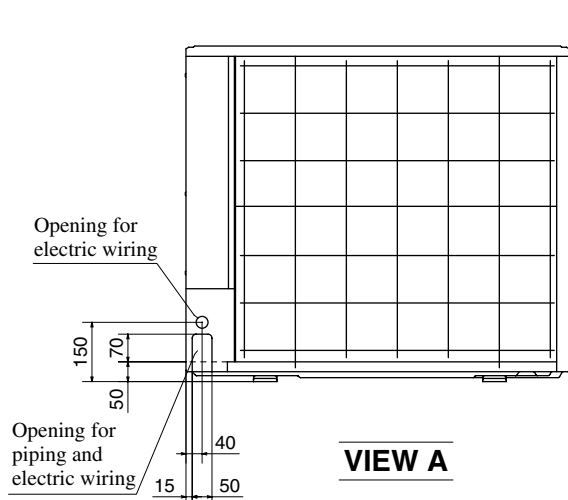
(3) Outdoor unit

Models FDCVA402HENR, 502HENR, 602HENR

Unit : mm



Minimum allowable space to the obstacles



Unit : mm

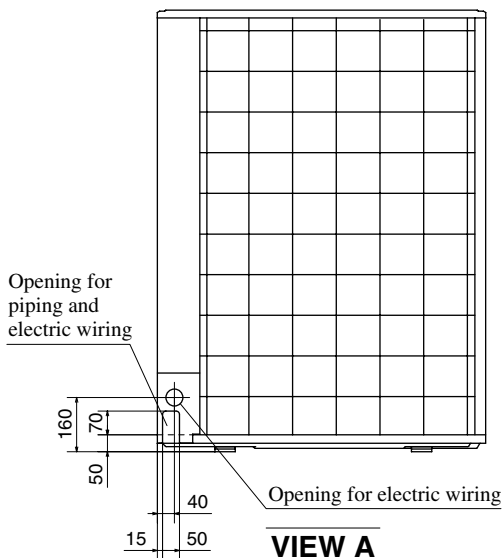
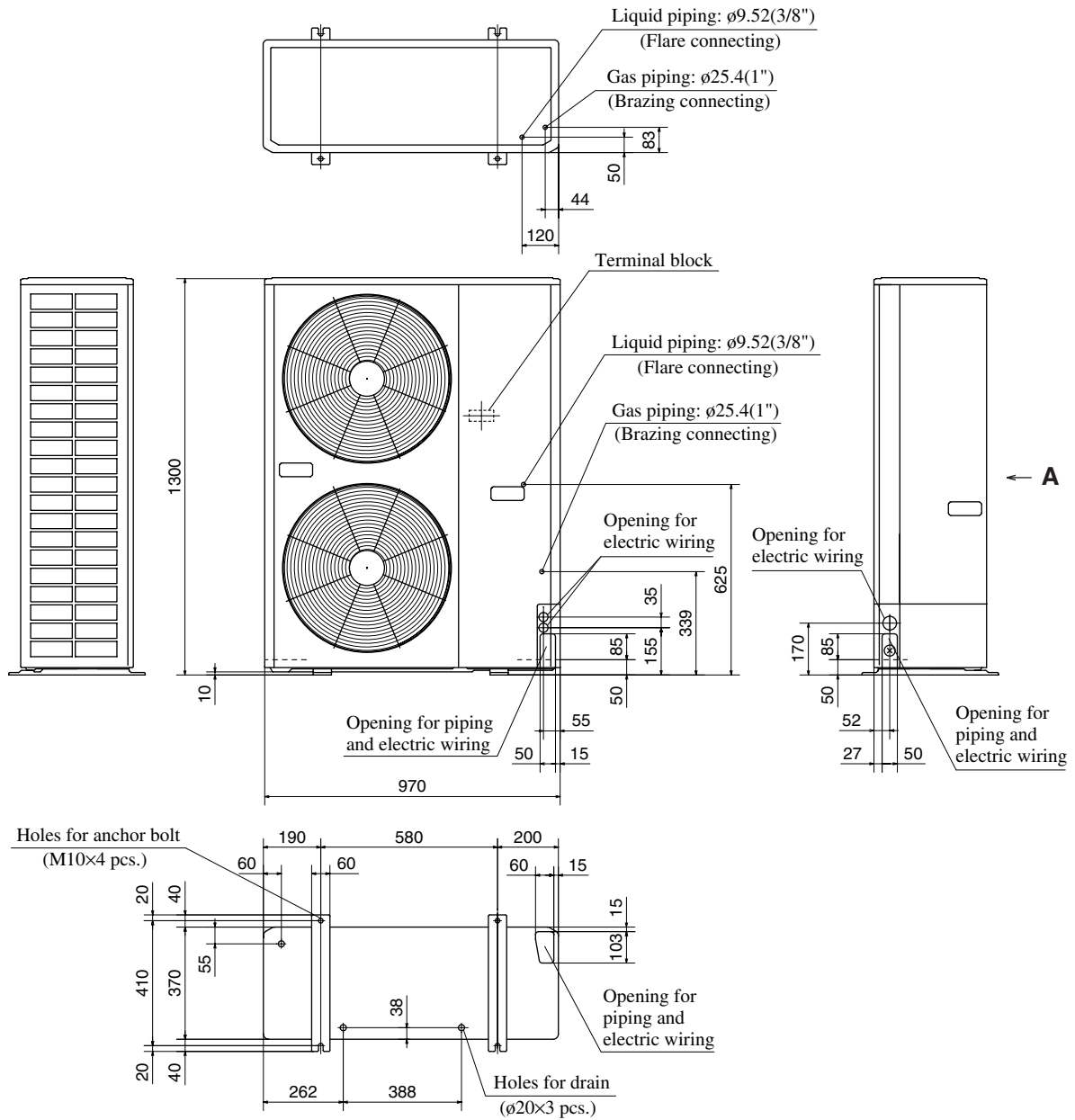
Installation type	I	II	III
Mark			
L1	Open	Open	500
L2	300	5	Open
L3	150	300	150
L4	5	5	5

Notes

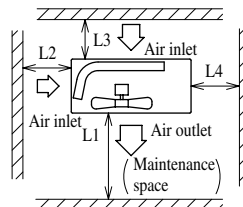
- (1) It is prohibited to install in a space enclosed with walls at four sides.
- (2) Unit must be secured with anchor bolts.
Anchor bolt should not protrude more than 15 mm above the surface.
- (3) Where strong winds blow, the blow outlet must be oriented at right angle against the wind direction.
- (4) Secure a space of 1 m or more above the unit.
- (5) Barrier standing in front of the blow outlet must be lower than the height of unit.

Model FDCVA802HESR

Unit : mm



Minimum allowable space to the obstacles



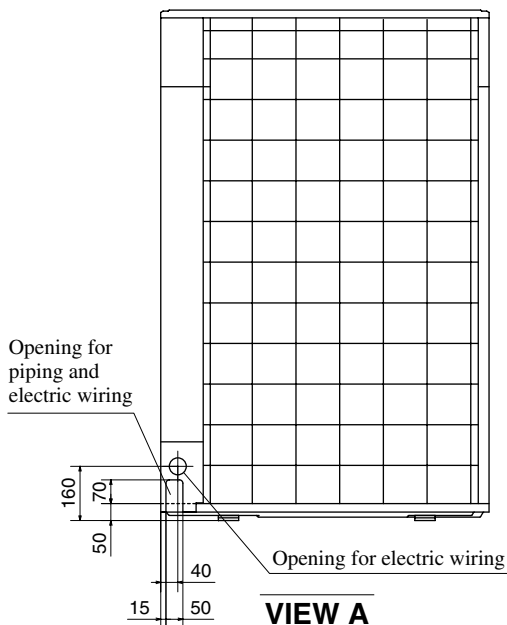
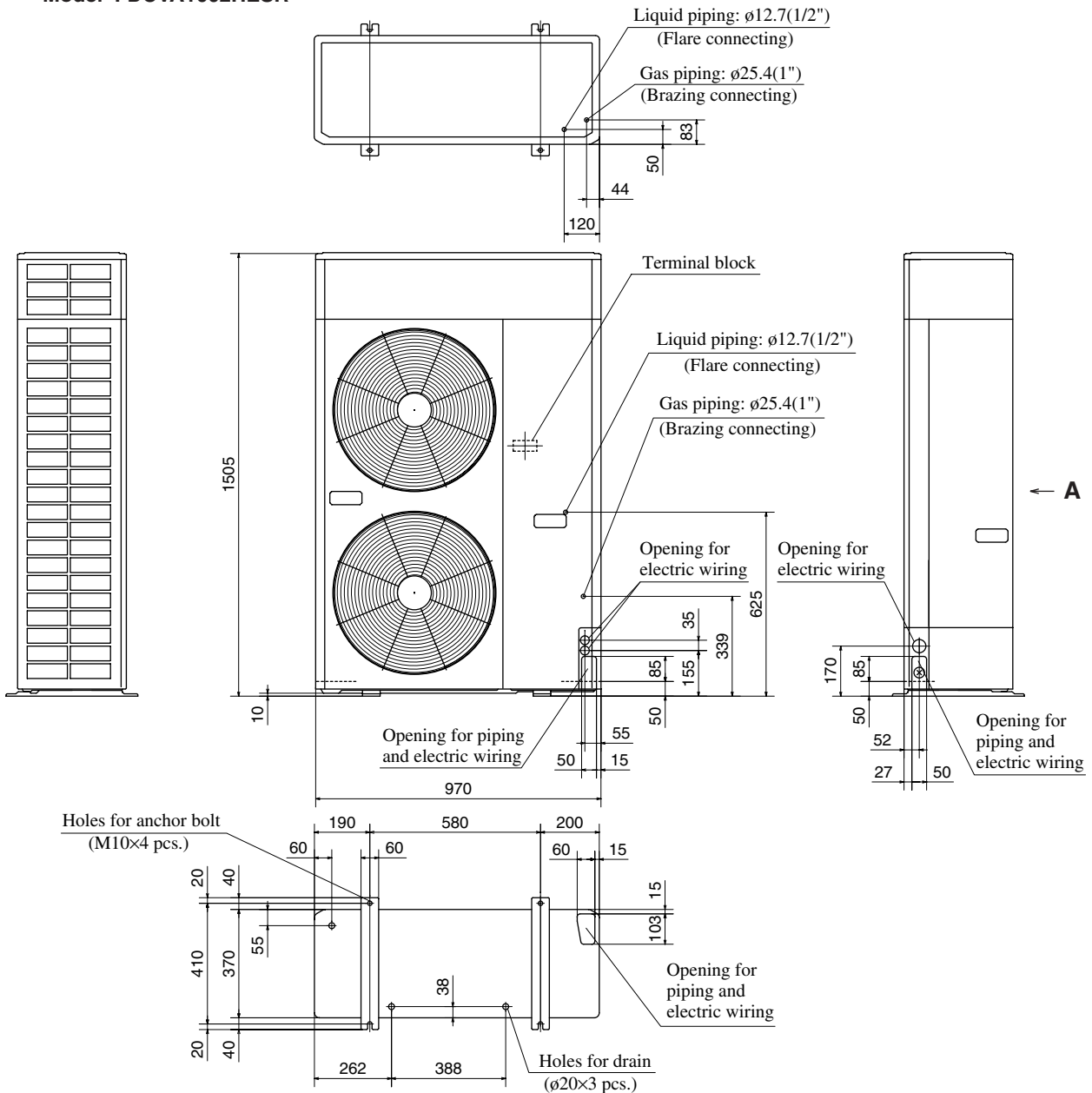
Unit : mm			
Installation type	I	II	III
Mark			
L1	Open	Open	500
L2	300	5	Open
L3	150	300	150
L4	5	5	5

Notes

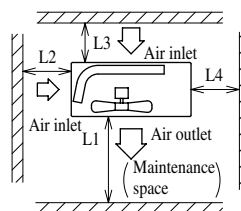
- (1) It is prohibited to install in a space enclosed with walls at four sides.
- (2) Unit must be secured with anchor bolts.
Anchor bolt should not protrude more than 15 mm above the surface.
- (3) Where strong winds blow, the blow outlet must be oriented at right angle against the wind direction.
- (4) Secure a space of 1 m or more above the unit.
- (5) Barrier standing in front of the blow outlet must be lower than the height of unit.

Model FDCVA1002HESR

Unit : mm



Minimum allowable space to the obstacles



Unit : mm

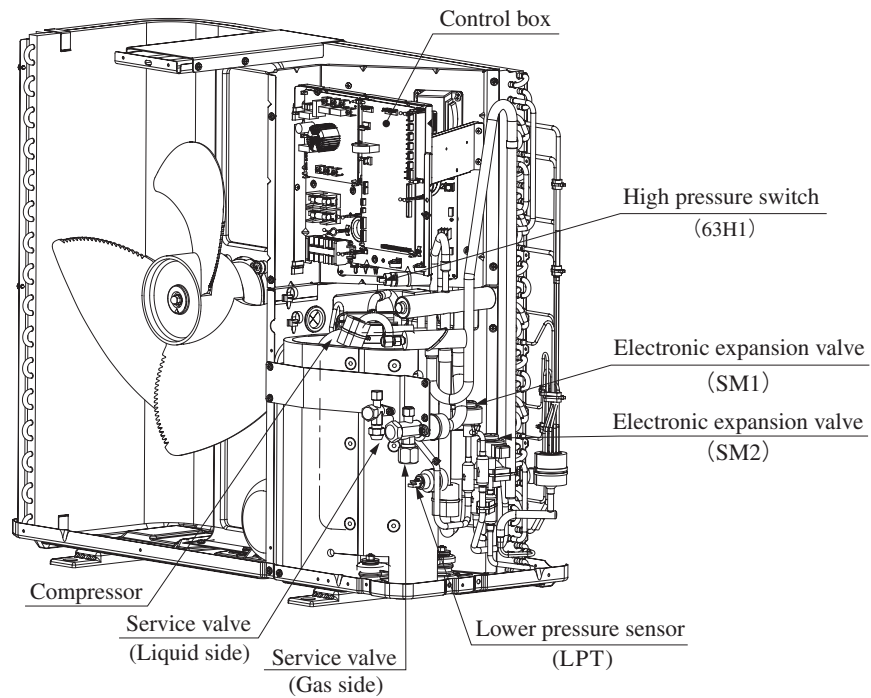
Installation type	I	II	III
Mark			
L1	Open	Open	500
L2	300	5	Open
L3	150	300	150
L4	5	5	5

Notes

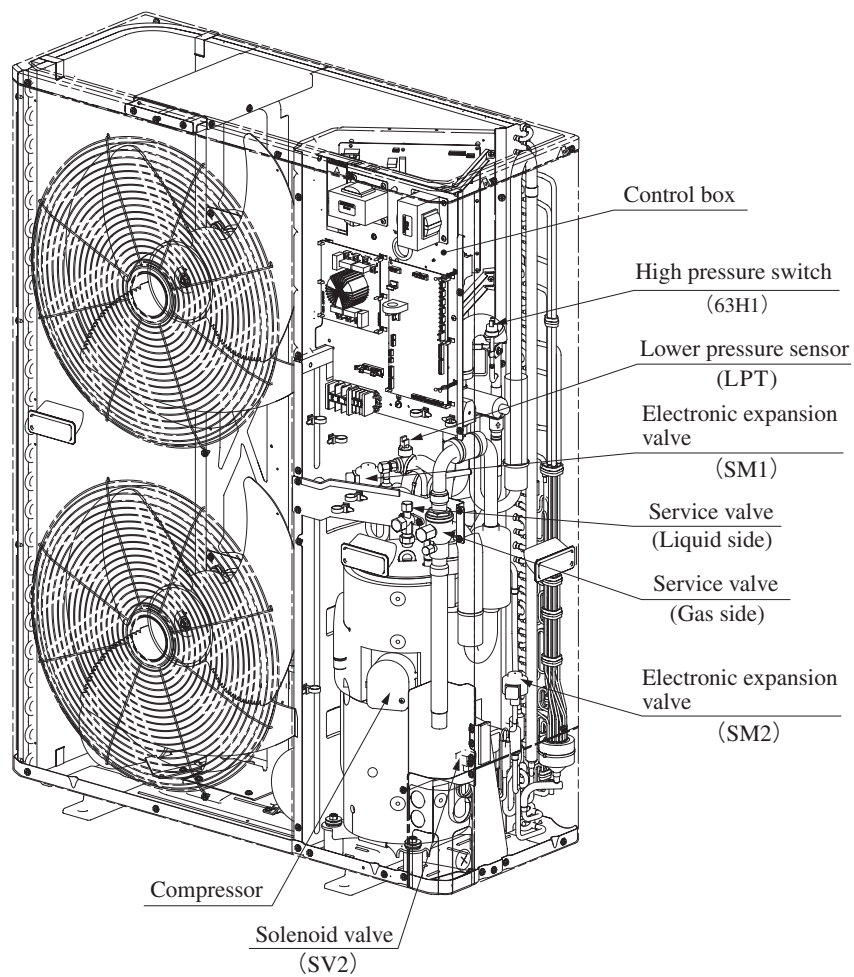
- (1) It is prohibited to install in a space enclosed with walls at four sides.
- (2) Unit must be secured with anchor bolts.
Anchor bolt should not protrude more than 15 mm above the surface.
- (3) Where strong winds blow, the blow outlet must be oriented at right angle against the wind direction.
- (4) Secure a space of 1 m or more above the unit.
- (5) Barrier standing in front of the blow outlet must be lower than the height of unit.

2.2.4 Inside view

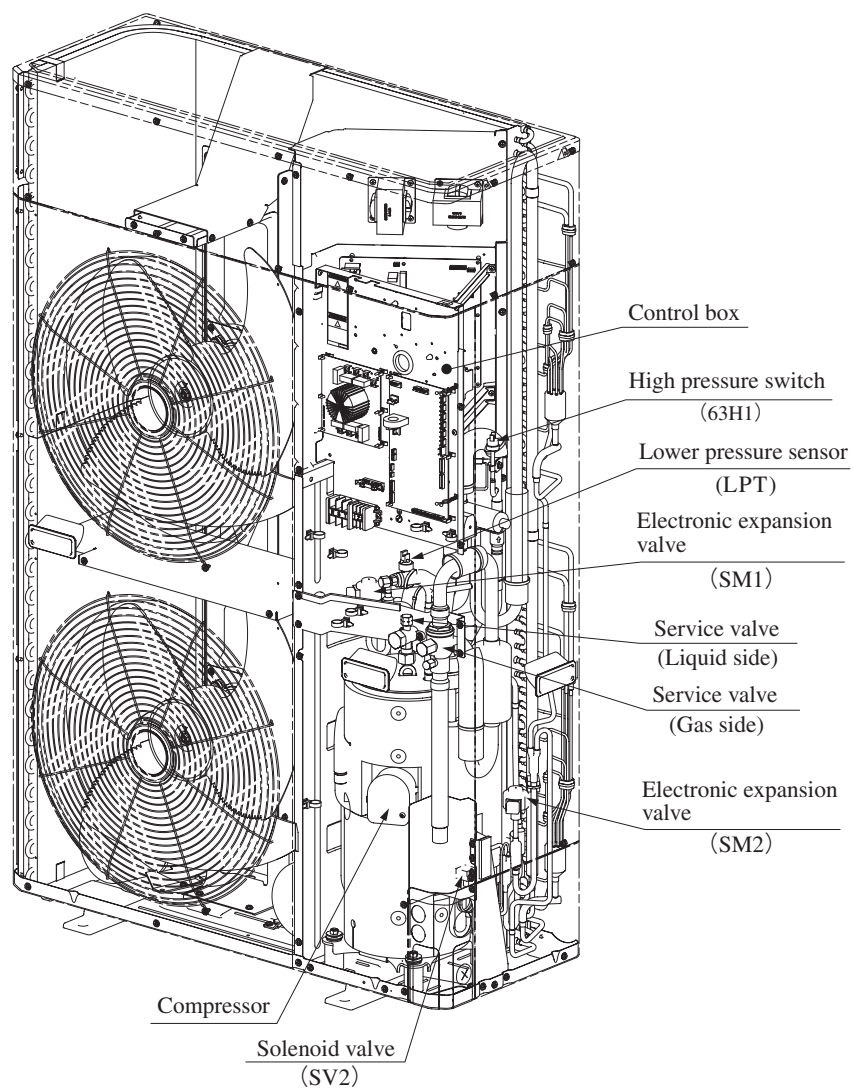
Models FDCVA402HENR, 502HENR, 602HENR



Model FDCVA802HESR



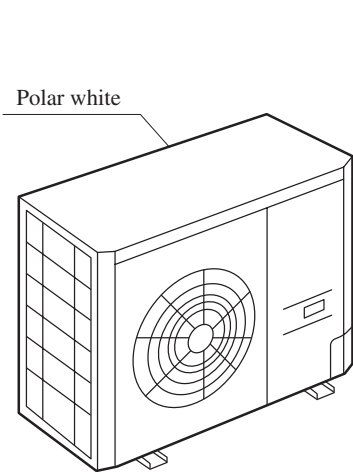
Model FDCVA1002HESR



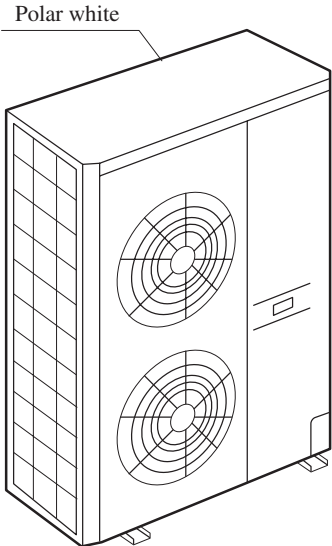
2.2.5 Exterior appearance

- (1) Indoor unit
Satellite ducted type (FDUM) Zinc steel plate

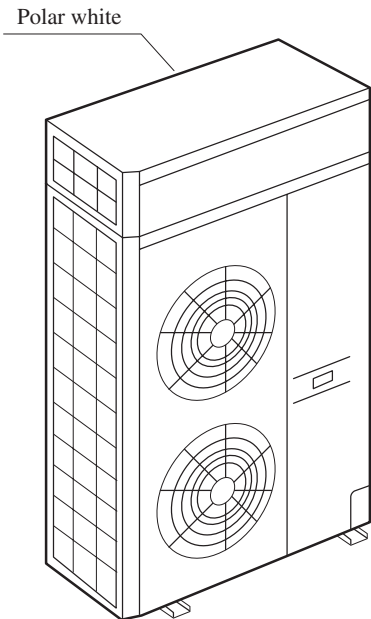
- (2) Outdoor unit
Models FDCVA402, 502, 602HENR



Model FDCVA802HESR



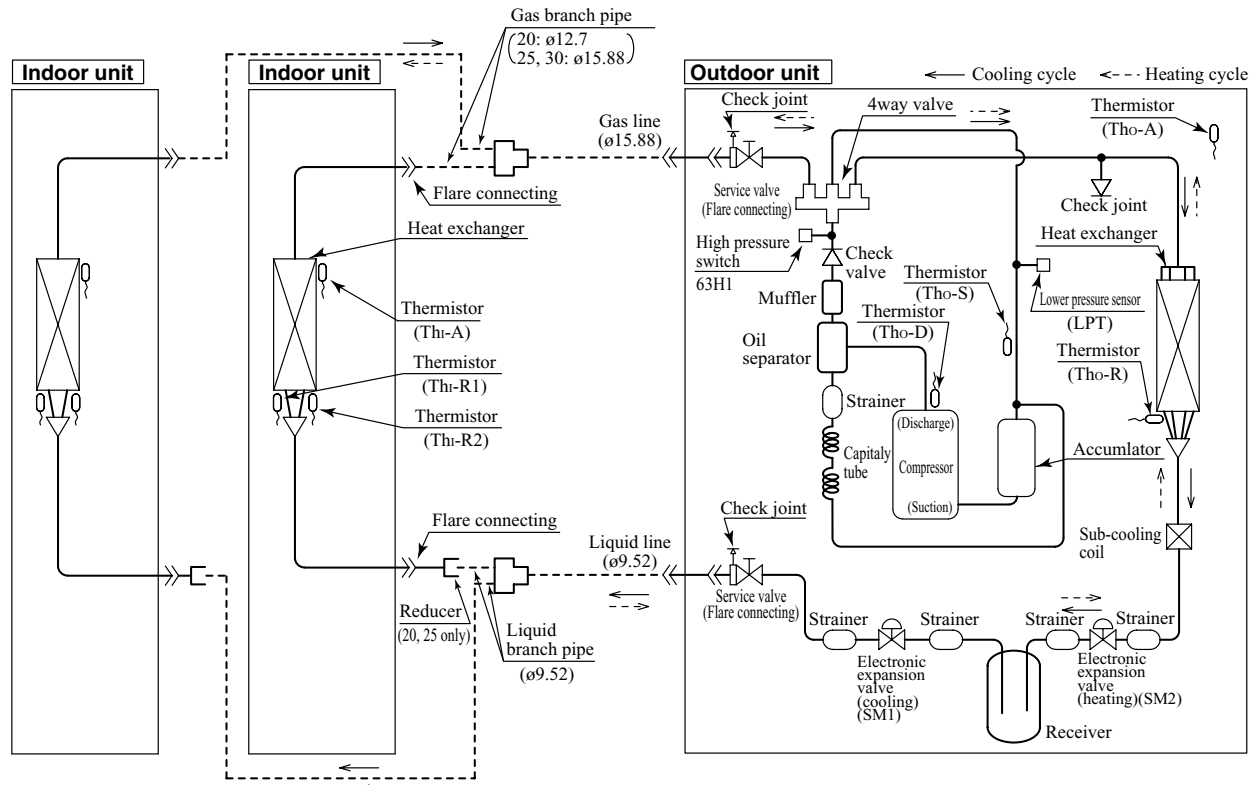
Model FDCVA1002HESR



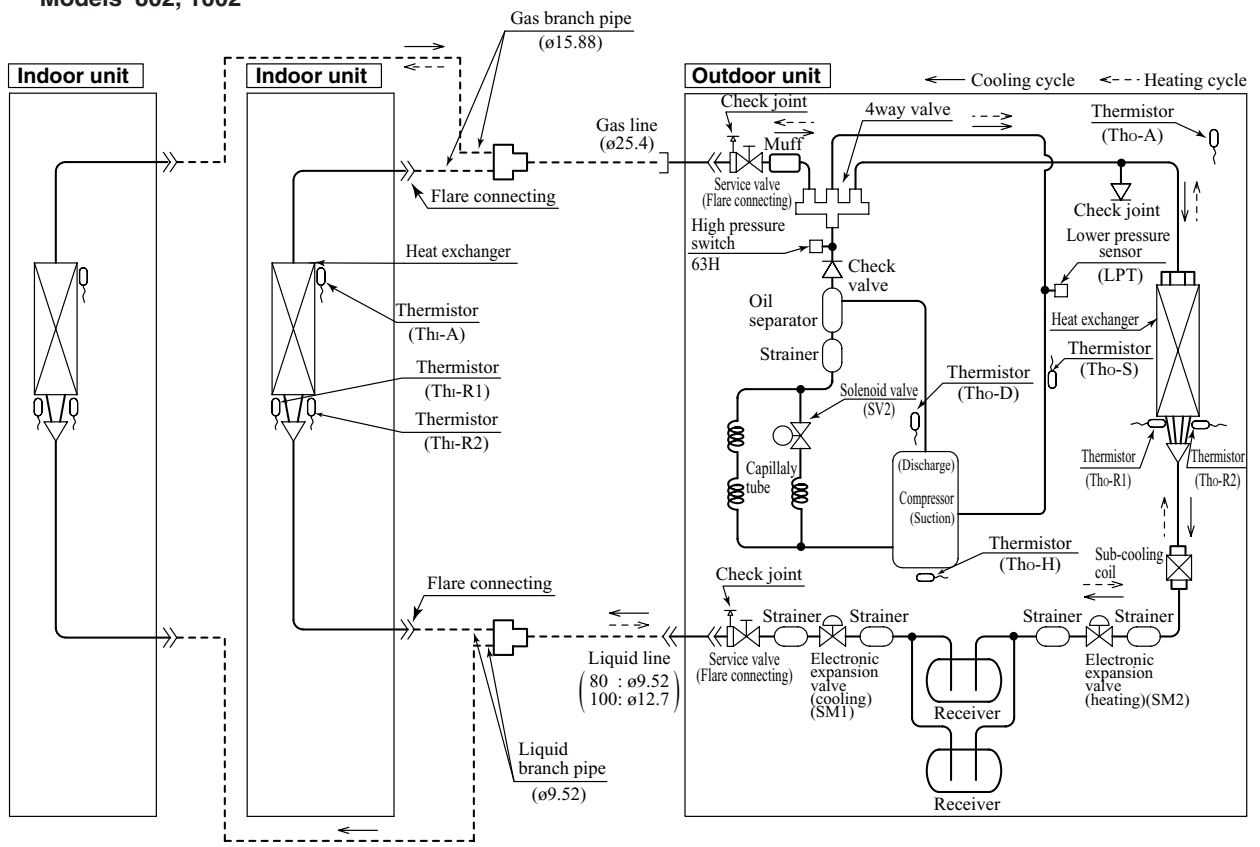
2.2.6 Piping system

(1) Twin type

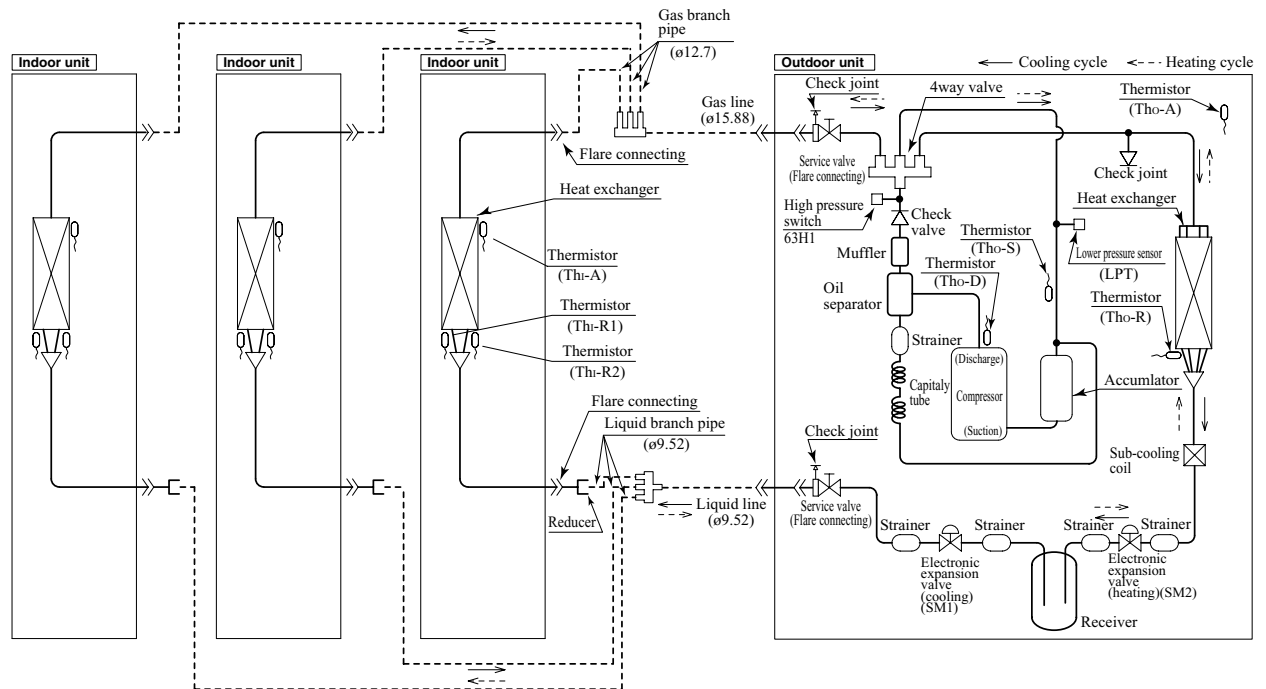
Models 402, 502, 602



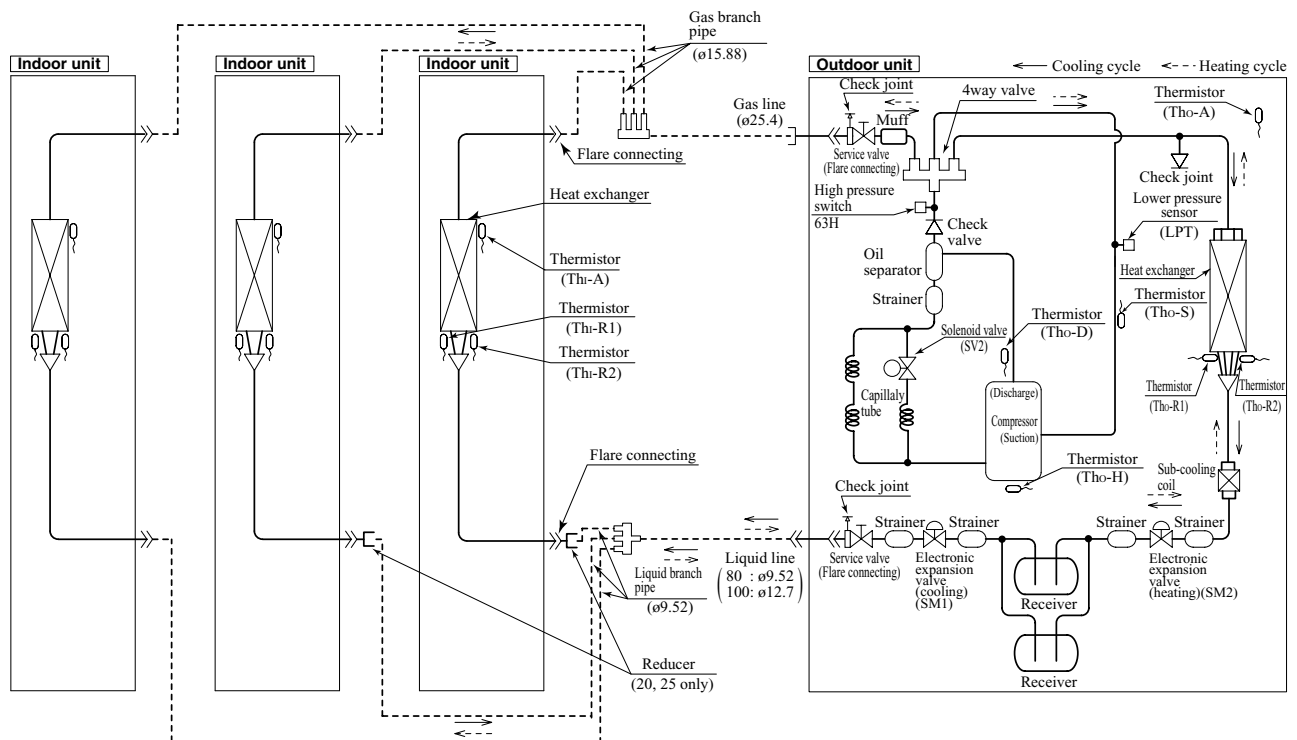
Models 802, 1002



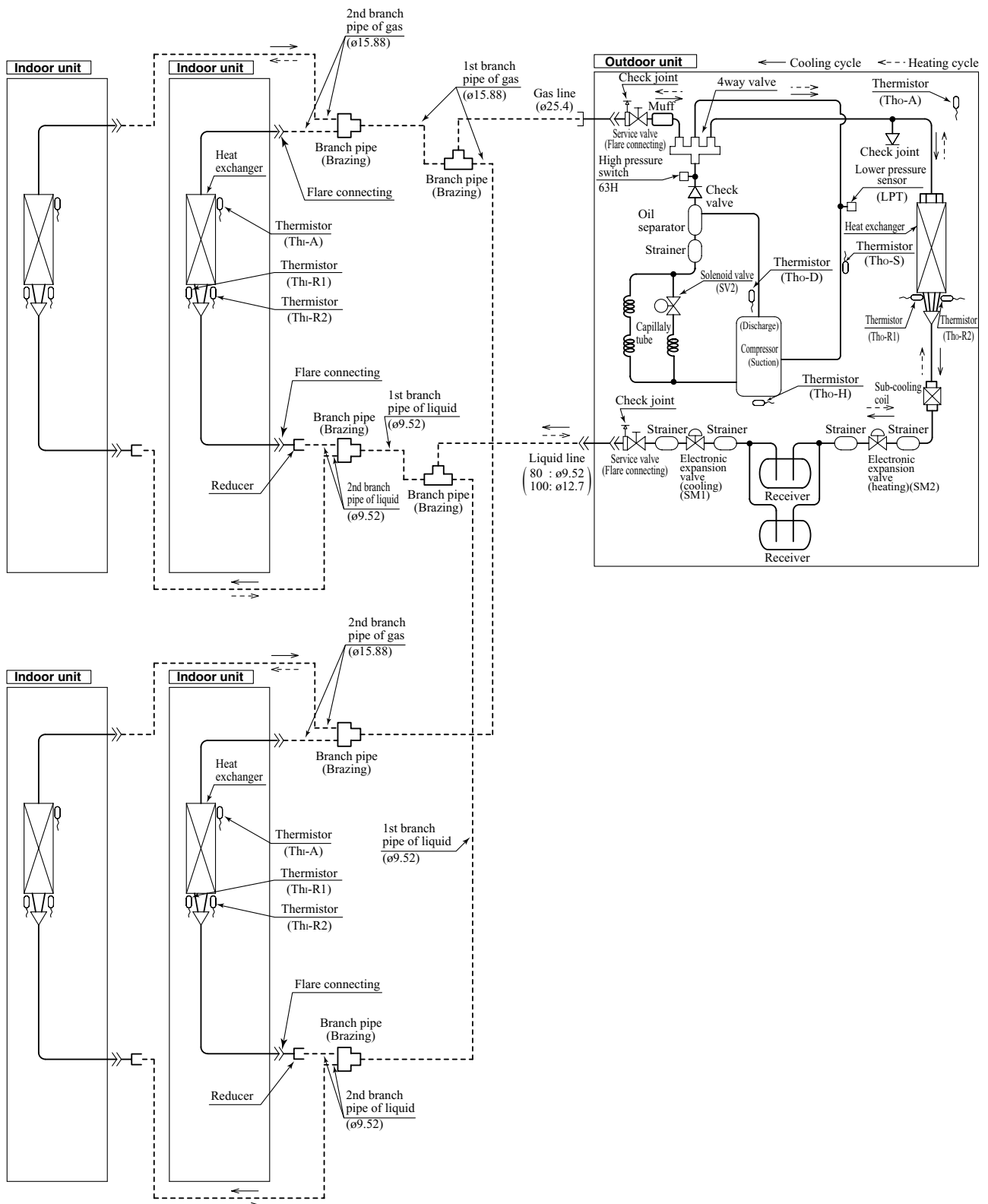
(2) Triple type
Model 602



Models 802, 1002



(3) Double twin type
Models 802, 1002



Preset point of the protective devices

Parts name	Mark	Equipped unit	402, 502, 602 models	802, 1002 models
Thermistor (for protection over-loading in heating)	Thi-R	Indoor unit	ON 63°C OFF 56°C	
Thermistor (for frost prevention)			ON 1.0°C OFF 10°C	
Thermistor (for detecting discharge pipe temp.)	Tho-D	Outdoor unit	ON 115°C OFF 85°C	ON 135°C OFF 90°C
High pressure switch (for protection)	63H1	Outdoor unit	Open 4.15MPa Closed 3.15MPa	
Low pressure sensor (for protection)	LPT	Outdoor unit	OFF 0.227MPa ON 0.079MPa	

2.2.7 Selection chart

Details are the same as in chapter 1.2.7. see page 25.

2.2.8 Characteristics of fan

Satellite ducted type (FDUM)

- External static pressure table

Unit : Pa

Model	Duct specs. Air flow (m ³ /min)	1 spot closing		Standard		Square duct	
		Stan- dard	High ⁽⁴⁾ speed	Stan- dard	High ⁽⁴⁾ speed	Stan- dard	High ⁽¹⁾ speed
FDUMA202	14	-	-	50	85	50	90
FDUMA252	18	35	70	50	85	55	90
FDUMA302	20	30	65	50	85	55	90
FDUMA402	28	50	80	60	90	65	95
FDUMA502,602	34	50	75	60	85	65	95

Notes(1) 1 spot closing: Round duct flange at center is removed and shield with a special panel (option).

(2) Standard: ø200 duct are installed at all blowout holes.

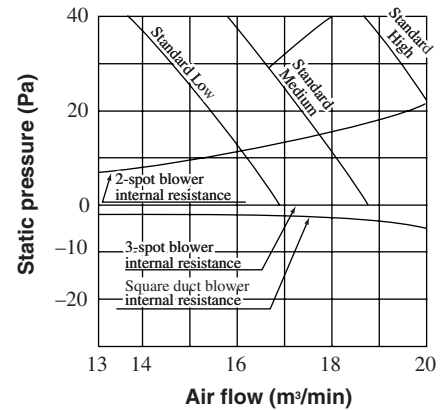
(3) Square duct: All round ducts are removed and replaced with special square duct flanges (option).

(4) When using the high speed setting, turn the dip switch SW9-4 on the indoor PCB to the ON position.

(When setting from the remote controller, select "Hi CEILNG 1")

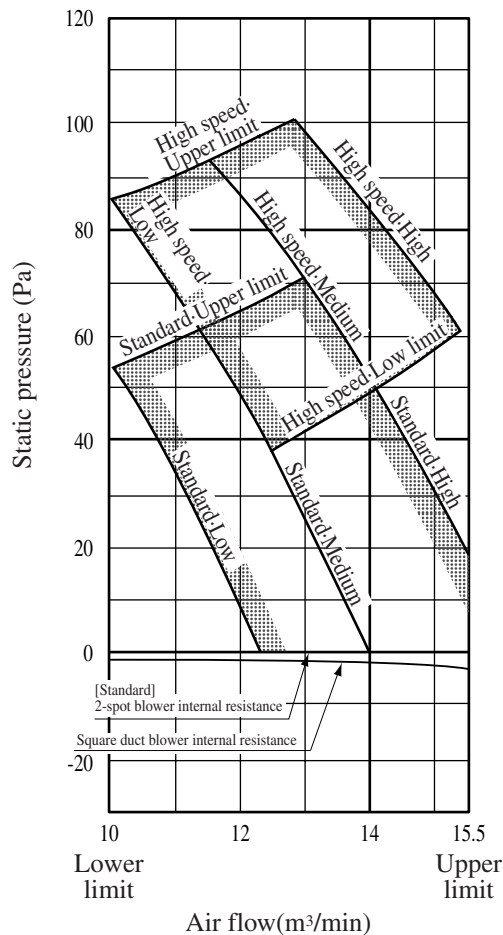
How to interpret the blower characteristics table

Example : Case of FDUMA252R

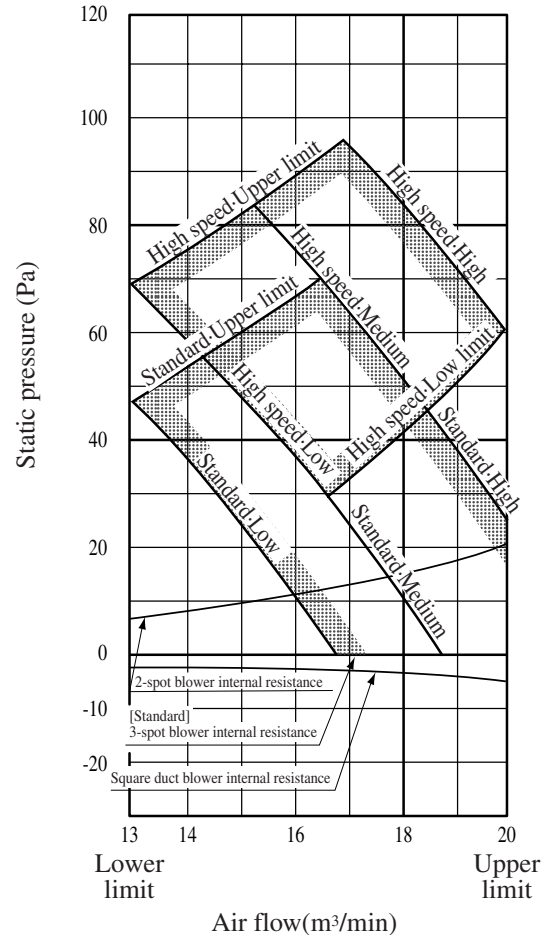


- ① 2-spot blowout.....
Internal resistance increases more than the standard 3-spot blowout. Approx. 14Pa at 17m³/min
- ② Square duct blowout.....
Internal resistance decreases more than the standard round duct (ø200 3-spot). 3Pa at 17m³/min. (External static pressure increases in reverse.)

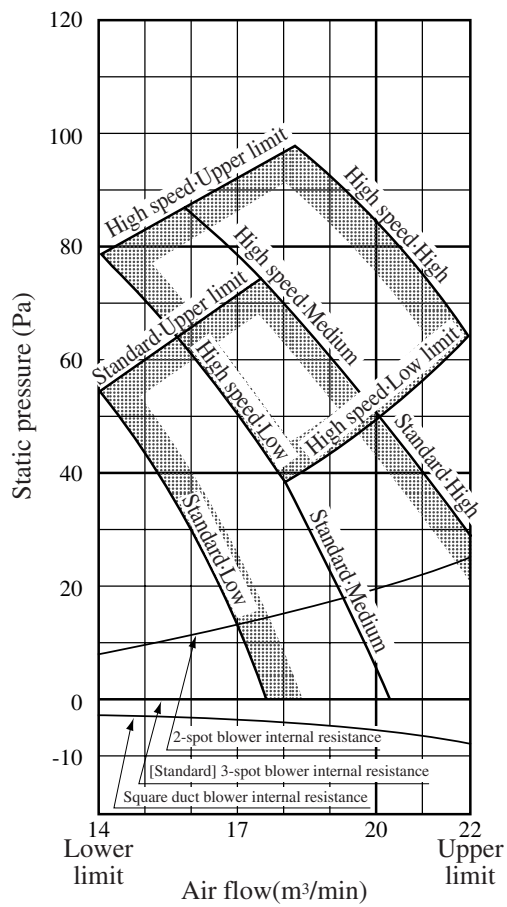
FDUMA202R



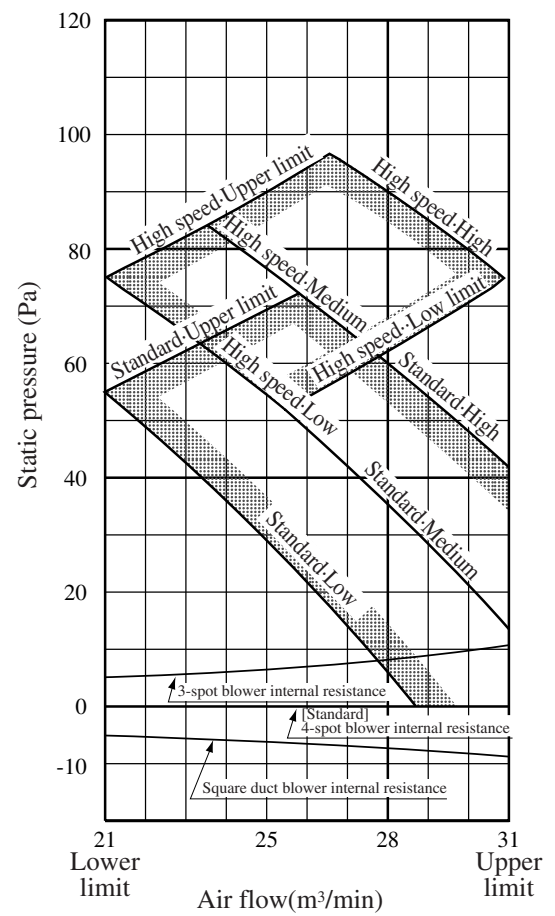
FDUMA252R



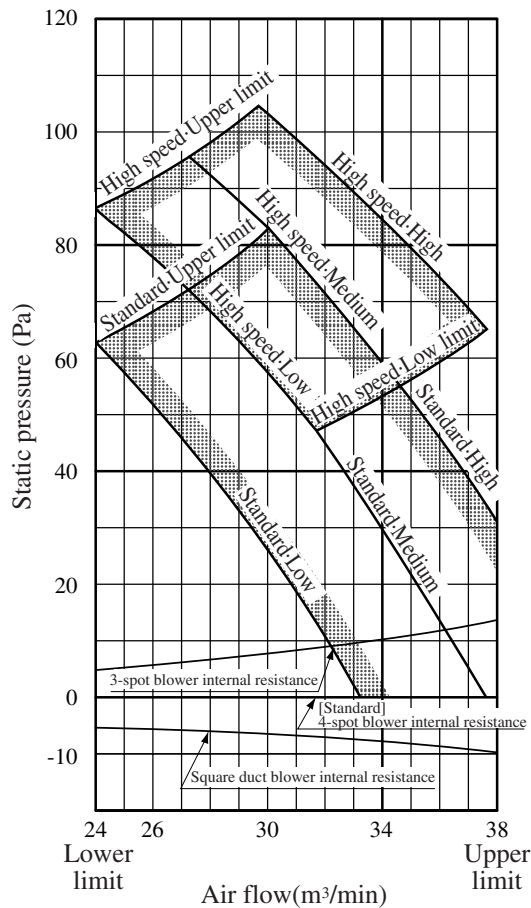
FDUMA302R



FDUMA402R



FDUMA502R



2.2.9 Noise level

Notes (1) The data are based on the following conditions.

Ambient air temperature: Indoor unit 27°C DB, 19°C WB. Outdoor unit 35°C DB.

(2) The data in the chart are measured in an anechoic room.

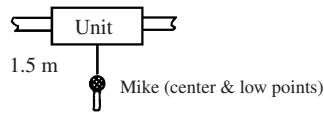
(3) The noise levels measured in the field are usually higher than the data because of reflection.

(1) Indoor unit

Satellite ducted type (FDUM)

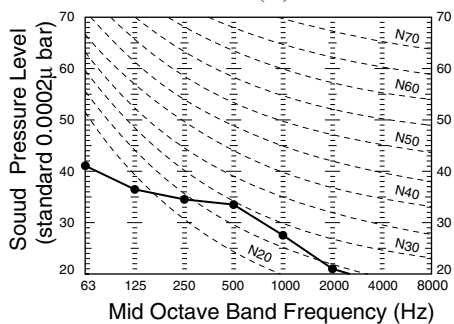
Measured based on JIS B 8616

Mike position as right



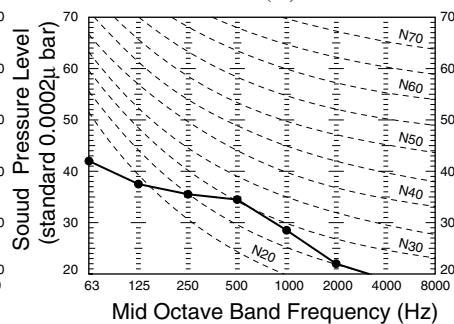
Models FDUMA202R, 252R

Noise level 34 dB (A) at HIGH
31 dB (A) at MEDIUM
28 dB (A) at LOW



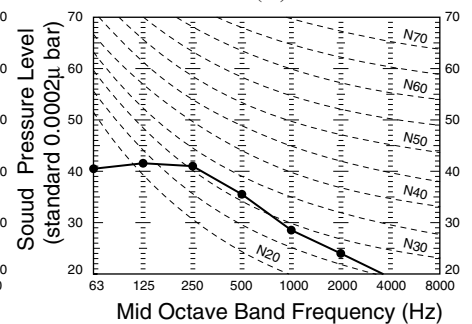
Model FDUMA302R

Noise level 35 dB (A) at HIGH
32 dB (A) at MEDIUM
29 dB (A) at LOW



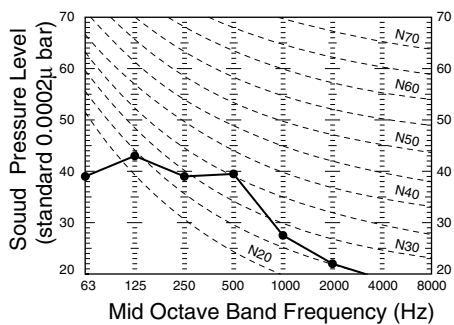
Model FDUMA402R

Noise level 37 dB (A) at HIGH
35 dB (A) at MEDIUM
30 dB (A) at LOW



Model FDUMA502R

Noise level 38 dB (A) at HIGH
36 dB (A) at MEDIUM
33 dB (A) at LOW



(2) Outdoor unit

Measured based on JIS B 8616

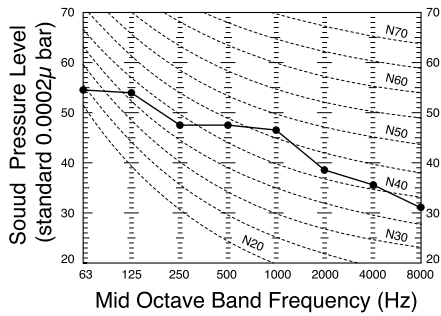
Mike position: at highest noise level in position as below

Distance from front side 1m

Height 1m

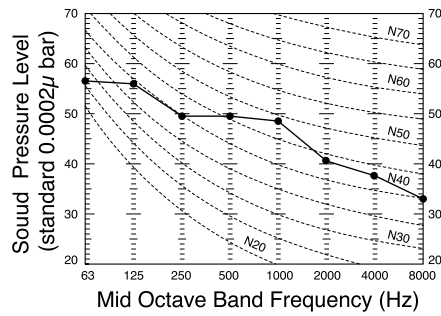
Model FDCVA402HENR

Noise level 50 dB (A)



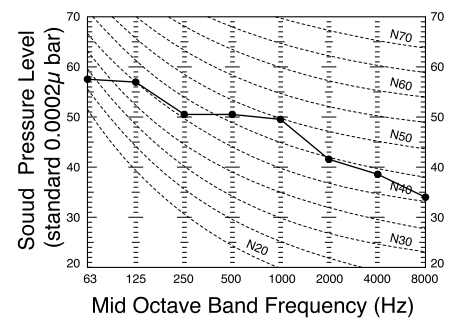
Model FDCVA502HENR

Noise level 52 dB (A)



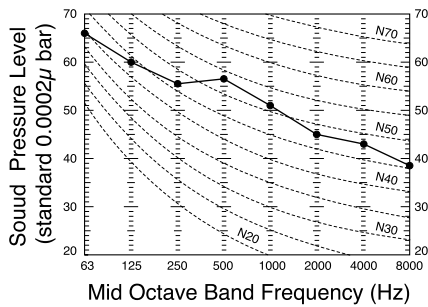
Model FDCVA602HENR

Noise level 53 dB (A)



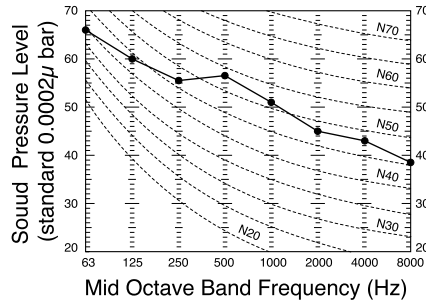
Model FDCVA802HESR

Noise level 57 dB (A)

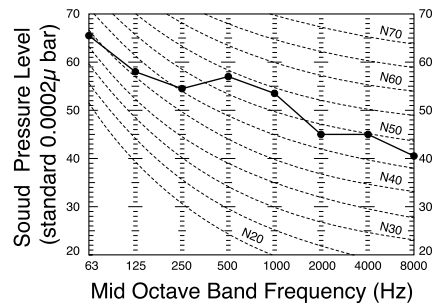


Model FDCVA1002HESR

Cooling Noise level 57 dB (A)



Heating Noise level 58 dB (A)



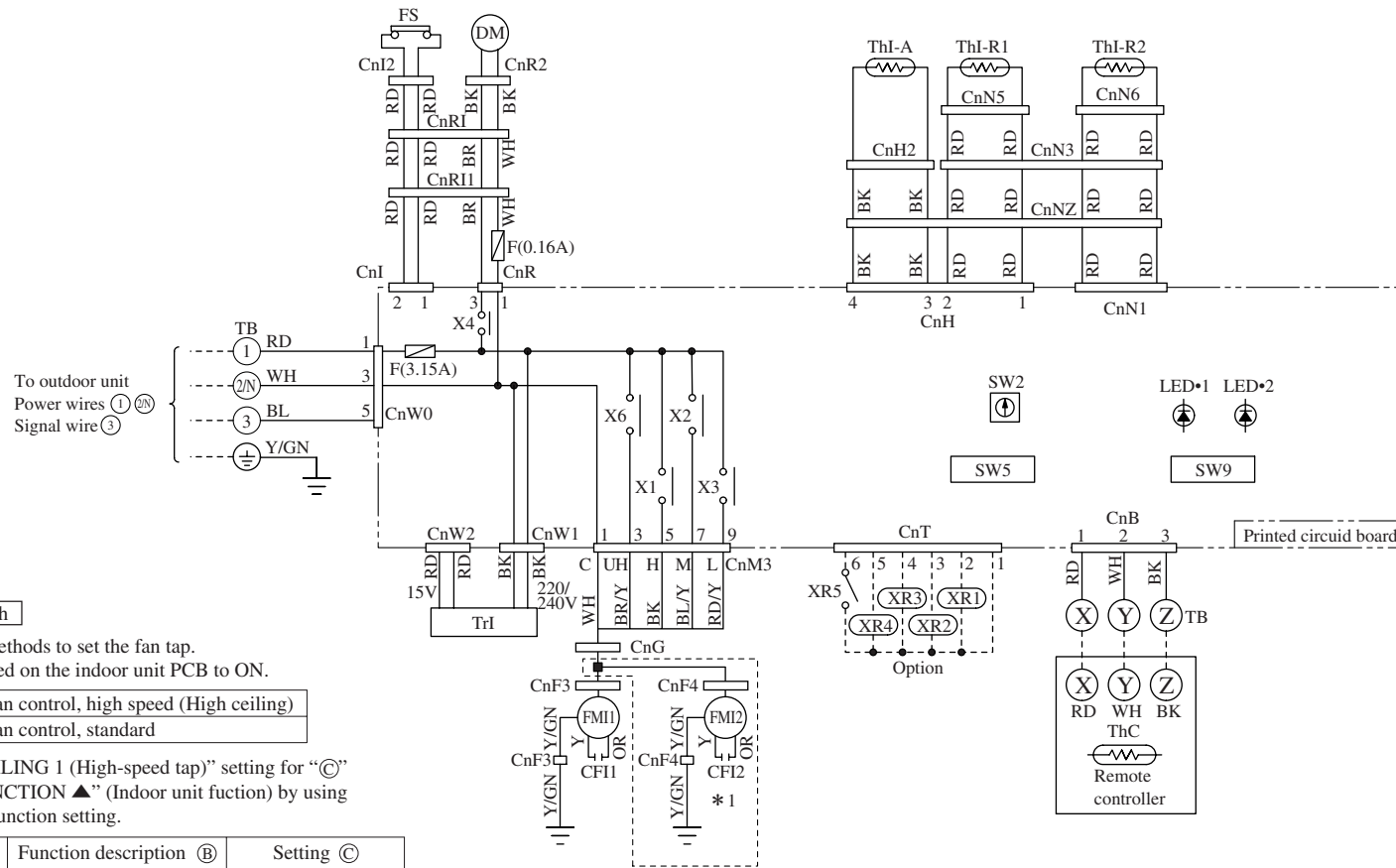
2.3 ELECTRICAL DATA

2.3.1 Electrical wiring

(1) Indoor unit

Satellite ducted type (FDUM)

Model All models



Blower fan tap switch

Use one of the two methods to set the fan tap.

① Set SW9-4 provided on the indoor unit PCB to ON.

SW9-4	ON	Fan control, high speed (High ceiling)
	OFF	Fan control, standard

② Select the “Hi CEILING 1 (High-speed tap)” setting for “©” in #01 of “I/U FUNCTION ▲” (Indoor unit function) by using remote controller function setting.

Function number ①	Function description ②	Setting ③
01	Hi CEILING SET	Hi CEILING 1

Note (1) * 1 FMI2 is equipped only for FDUMA402, 502, 602R.

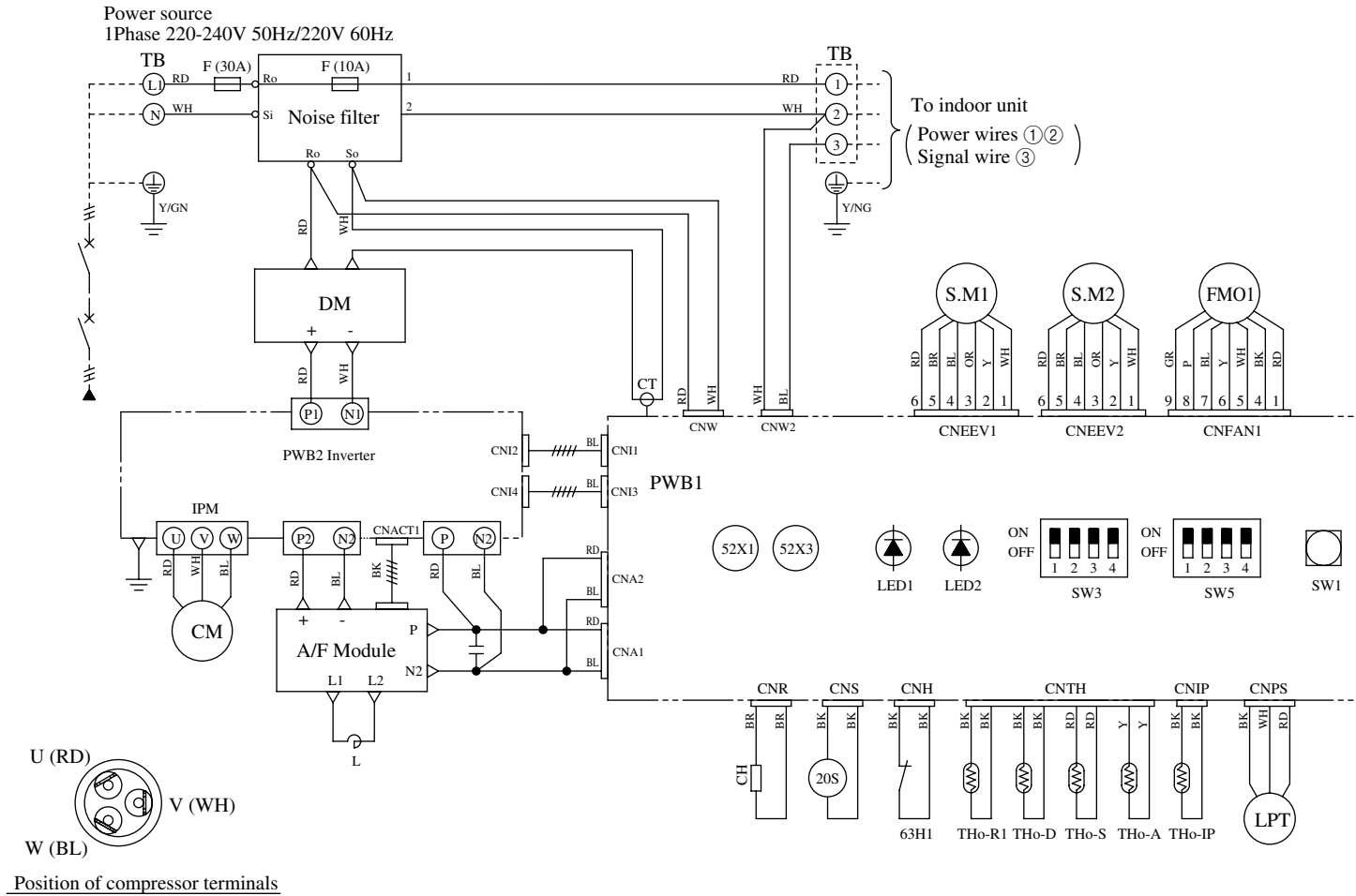
Meaning of marks

Mark	Parts name	Mark	Parts name	Mark	Parts name
FMI1,2	Fan motor	SW5-3,4	Filter sign	XR4	Inspection output (DC12V output)
CFI1,2	Capacitor for FMI	SW9-3	Emergency operation	XR5	Remote operation input (volt-free contact)
DM	Drain motor	Tr1	Transformer	X1,2,3,6	Auxiliary relay (For FM)
FS	Float switch	F	Fuse	X4	Auxiliary relay (For DM)
ThI-A	Thermistor	LED-1	Indication lamp (Red:inspection)	TB	Terminal block (○ mark)
ThI-R1	Thermistor	LED-2	Indication lamp (Green:normal operation)	CnA~Z	Connector (□ mark)
ThI-R2	Thermistor	XR1	Operation output (DC12V output)	■mark	Closed-end connector
ThC	Thermistor	XR2	Heating output (DC12V output)		
SW2	Remote control communications address	XR3	Thermo ON output (DC12V output)		

Color marks

Mark	Color	Mark	Color
BK	Black	RD	Red
BL	Blue	RD/Y	Red/Yellow
BL/Y	Blue/Yellow	WH	White
BR	Brown	Y	Yellow
BR/Y	Brown/Yellow	Y/GN	Yellow/Green
OR	Orange		

(2) Outdoor unit
Models FDCVA402HENR, 502HENR, 602HENR

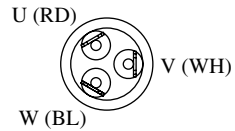
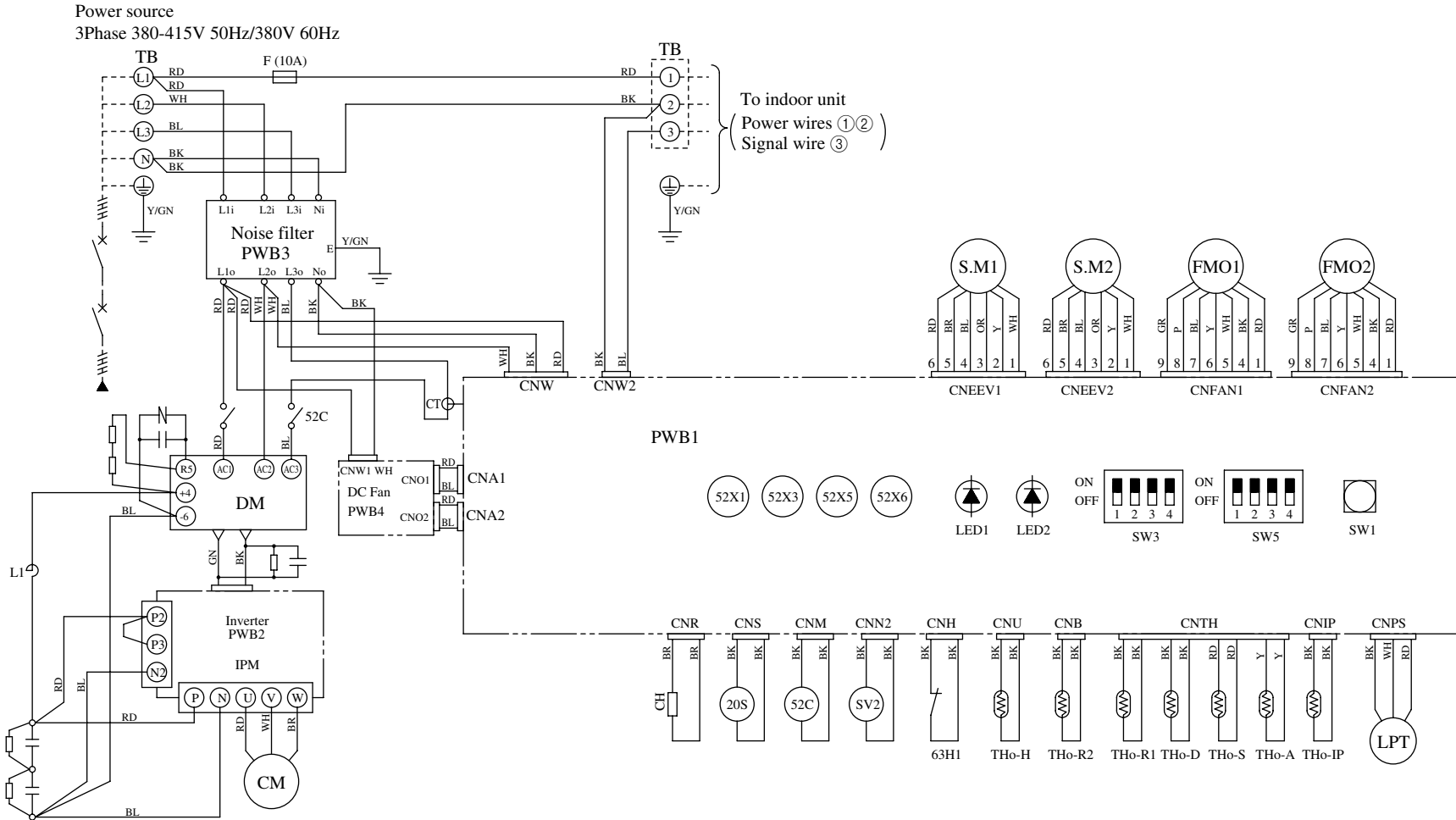


Meaning of marks

Mark	Parts name	Mark	Parts name	Mark	Parts name
CM	Compressor motor	SM2	Expansion valve for heating	TB	Terminal block
FMO1	Fan motor	63H1	High pressure switch	F	Fuse
52C	Magnetic contactor for CM	Tho-A	Thermistor (Outdoor air temp.)	CnA~Z	Connector
CH	Crankcase heater	Tho-H	Thermistor (dome temp.)	SW1	Pump down switch
52X1	Auxillary relay (for CH)	Tho-D	Thermistor (discharge temp.)	SW3,5	Local setting switch
52X3	Auxillary relay (for 20S)	Tho-R1,2	Thermistor (H.X. temp.)	LED1	Indication lamp (RED)
52X5	Auxillary relay (for SV2)	Tho-S	Thermistor (suction temp.)	LED2	Indication lamp (GREEN)
52X6	Auxillary relay (for 52C)	Tho-IP	Thermistor (IPM)	DM	Diode module
20S	Solenoid valve for 4 way valve	LPT	Low pressure sensor	L	Reactor
SM1	Expansion valve for cooling	CT	Current sensor		

Color marks

Mark	Color
BK	Black
BL	Blue
BR	Brown
OR	Orange
RD	Red
WH	White
Y	Yellow
Y/GN	Yellow/Green
GR	Gray
P	Pink



Position of compressor terminals

Meaning of marks

Mark	Parts name	Mark	Parts name	Mark	Parts name
CM	Compressor motor	SM2	Expansion valve for heating	CT	Current sensor
FMO1,2	Fan motor	SV2	Solenoid valve (oil separator)	TB	Terminal block
52C	Magnetic contactor for CM	63H1	High pressure switch	F	Fuse
CH	Crankcase heater	Tho-A	Thermistor (Outdoor air temp.)	CnA-Z	Connector
52X1	Auxillary relay (for CH)	Tho-H	Thermistor (dome temp.)	SW1	Pump down switch
52X3	Auxillary relay (for 20S)	Tho-D	Thermistor (discharge temp.)	SW3,5	Local setting switch
52X5	Auxillary relay (for SV2)	Tho-R1,2	Thermistor (H.X. temp.)	LED1	Indication lamp (RED)
52X6	Auxillary relay (for 52C)	Tho-S	Thermistor (suction temp.)	LED2	Indication lamp (GREEN)
20S	Solenoid valve for 4 way valve	Tho-IP	Thermistor (IPM)	DM	Diode module
SM1	Expansion valve for cooling	LPT	Low pressure sensor	L	Reactor

Color marks

Mark	Color
BK	Black
BL	Blue
BR	Brown
OR	Orange
RD	Red
WH	White
Y	Yellow
Y/GN	Yellow/Green
GR	Gray
P	Pink

2.4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

Details are the same as in chapter 1.4. see page 44.

2.5 APPLICATION DATA

SAFETY PRECAUTIONS

- Please read these “Safety Precautions” first then accurately execute the installation work.
- Though the precautionary points indicated herein are divided under two headings, **⚠ WARNING** and **⚠ CAUTION**, those points which are related to the strong possibility of an installation done in error resulting in death or serious injury are listed in the **⚠ WARNING** section. However, there is also a possibility of serious consequences in relationship to the points listed in the **⚠ CAUTION** section as well.

In either case, important safety related information is indicated, so by all means, properly observe all that is mentioned.

- After completing the installation, along with confirming that no abnormalities were seen from the operation tests, please explain operating methods as well as maintenance methods to the user (customer) of this equipment, based on the owner’s manual. Moreover, ask the customer to keep this sheet together with the owner’s manual.



WARNING

- Installation should be performed by the dealer or a company specializing in this type of installation. If you install the equipment yourself, installation errors could result in water leaks, electric shock, and/or a fire, as well as other hazards.
- Conduct installation work in accordance with the instructions in this installation manual. Installation errors could result in water leaks, electric shock, or fire.
- Sling the unit at the specified points with ropes properly rated for the weight in lifting it for portage. An improper manner of portage can result in a fail of the unit resulting in an accident involving personal death or injury.
- When installing a unit in a small rooms, take measure so that if the refrigerant leaks, it does not exceed the concentration limit. For information regarding measures to prevent the concentration limit from being exceed, please contact the dealer.
- If refrigerant leaks and the concentration limit is exceeded, suffocation could occur.
- Install the equipment in a location that can sufficiently support the weight of the equipment. If the area is not strong enough, an accident could result from the unit falling.
- Install the equipment in a location that can withstand strong winds, such as typhoons, and earthquakes. If the installation is not secure, an accident could result from the unit falling.
- Always turn off power before work is performed inside the unit such as for installation or servicing. A failure to observe this instruction can cause a danger or electric shock.
- Electrical work should be done by a licensed electrician who shall do the work in accordance with the Technical Standards Regarding Electrical Equipment. Indoor Wiring Provisions, and this installation manual. The electrician shall use specified circuits for the equipment. If the power supply circuit capacity is insufficient or the work is not done correctly, it could result in electric shock or a fire.
- For wiring, the specified cable should be used, the connections should be secure, and the fixtures shall be strong enough to prevent cables from being pulled out from the terminal connections. Incorrect connections or work fixtures could result in heat generation or a fire.
- In cabling, arrange cables suitably so that they may not get off their support and then fix the service panel securely. Improper installation can cause heat generation and a resultant fire. Please prevent any substance other than the specified refrigerant (R410A) such as air from entering the refrigerant cycle in installing or moving the air conditioning system. Contamination by air or a foreign substance can cause an abnormal pressure build-up inside the refrigerant cycle and a resultant explosion and personally injury.
- Use only parts supplied with the unit and specified supply parts for installation. The use of unauthorized parts may cause the leaking of water or electricity causing a danger of electric shock or a fire, a refrigerant leak, performance degradation, and control failures.
- Do not open operation valves (either liquid or gas or both) until refrigerant piping, an air-tightness test and an air purge are completed. When a leak of refrigerant gas occurs during piping work, stop brazing pipes and ventilate the room. Refrigerant gas, when it comes into contact with bare fire, can generate a toxic gas.
- When installation is completed, check for refrigerant gas leaks. If the refrigerant gas leaks indoors, it could come in contact with a fan heater, burner, or hot plate, which could generate a poisonous gas.



CAUTION

- Ground the equipment. Do not connect the ground wire to gas piping, water piping, a lightning rod, or telephone ground wires. If grounding is not performed correctly electric shock could occur.
- Depending on the installation location, a circuit breaker may need to be installed. If a circuit breaker is not installed, electric shock may occur.
- Please follow this manual faithfully in performing installation work. Improper installation work can cause abnormal vibrations and noise generation.
- Do not install the equipment in areas where there is danger of flammable gas leaks. If such gas does leak it could collect around the units and cause a fire.
- Install the drain piping in accordance with the installation manual so that it properly discharges waste water and is maintained at a temperature that prevents condensation.
- Do not install the outdoor unit where winds from its fan blow directly onto a plant, etc. Winds can affect adversely to the plant, etc.
- Secure a space for inspection and maintenance as specified in the manual. An insufficient space can result in an accident such as a fall from the installation point and a resultant personal injury.
- When the outdoor unit is installed on a roof or at an elevated point, provide permanent ladders and handrails along the access route and fences and handrails around the outdoor unit.
- In tightening a flare nut, use a double spanner and observe the specified tightening torque. Care must be taken so as not to over-tighten a nut and damage the flare part. (Please refer to the tightening torque) The loosening or damage of the flare part can cause a refrigerant gas leak and a resultant lack-of-oxygen accident.
- Please dress the refrigerant piping with a heat insulation material for prevention of dew condensation. Improper heat insulation for prevention of dew condensation can cause the leaking or dripping of water and a resultant soaking of household effects.
- When refrigerant piping is completed, check its air-tightness with nitrogen gas to make sure it does not have a leak. A leak of refrigerant gas in a narrow room beyond the safety limit concentration can cause a lack-of oxygen accident.
- If the humidity exceeds 80% or the drain or piping become clogged, condensation from the indoor unit could drip and cause damage. Please do not install the indoor units above items of furniture, etc. that you do not want to get wet. Also, do not place items that you do not want to get wet underneath the indoor units.



2.5.1 Installation of indoor unit

Details are the same as in chapter 1.5.1. see page 71.

2.5.2 Installation of wired remote controller

Details are the same as in chapter 1.5.2. see page 78.

2.5.3 Installation of outdoor unit

Notabilia as a unit designed for R410A

- Do not use any refrigerant other than R410A. R410A will rise to pressure about 1.6 times higher than that of a conventional refrigerant.
- A unit designed for R410A has adopted a different size indoor unit operation valve charge port and a different size check joint provided in the unit to prevent the charging of a wrong refrigerant by mistake. The processed dimension of the flared part of a refrigerant pipe and a flare nut's parallel side measurement have also been altered to raise strength against pressure. Accordingly, you are required to arrange dedicated R410A tools listed in the table on the right before installing or servicing this unit.
- Do not use a charge cylinder. The use of a charge cylinder will cause the refrigerant composition to change, which results in performance degradation.
- In charging refrigerant, always take it out from a cylinder in the liquid phase.
- All indoor units must be models designed exclusively for R410A. Please check connectable indoor unit models in a catalog, etc. (A wrong indoor unit, if connected into the system, will impair proper system operation)

	Dedicated R410A tools
a)	Gauge manifold
b)	Charge hose
c)	Electric scale for refrigerant charging
d)	Torque wrench
e)	Flare tool
f)	Protrusion control copper pipe gauge
g)	Vacuum pump adapter
h)	Gas leak detector

- (1) **Haulage and installation (Take particular care in carrying in or moving the unit, and always perform such an operation with two or more persons.)**

CAUTION

When a unit is hoisted with slings for haulage, take into consideration the offset of its gravity center position. If not properly balanced, the unit can be thrown off-balance and fall.

(a) Delivery

- 1) Deliver the unit as close as possible to the installation site before removing it from the package.
- 2) When some compelling reason necessitates the unpacking of the unit before it is carried in, use nylon slings or protective wood pieces so as not to damage the unit by ropes lifting it.

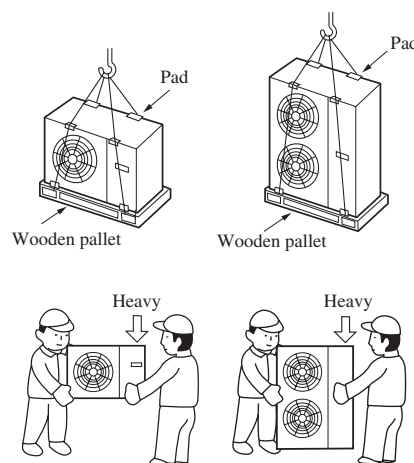
(b) Portage

The right hand side of the unit as viewed from the front (diffuser side) is heavier. A person carrying the right hand side must take heed of this fact. A person carrying the left hand side must hold with his right hand the handle provided on the front panel of the unit and with his left hand the corner column section.

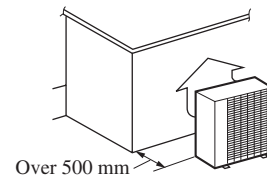
(c) Selecting the installation location

Be careful of the following conditions and choose an installation place.

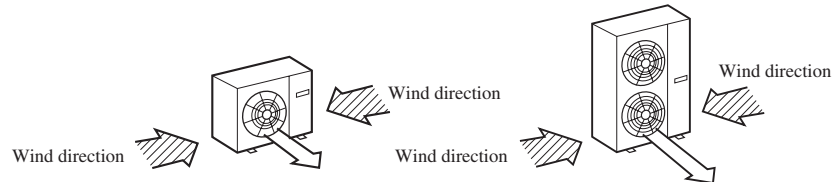
- ☐ Where air is not trapped.
- ☐ Where the installation fittings can be firmly installed.
- ☐ Where wind does not hinder the intake and outlet pipes.
- ☐ Out of the heat range of other heat sources.
- ☐ A place where stringent regulation of electric noises is applicable.
- ☐ Where it is safe for the drain water to be discharged.
- ☐ Where noise and hot air will not bother neighboring residents.
- ☐ Where snow will not accumulate.
- ☐ Where strong winds will not blow against the outlet pipe.
- ☐ A place where no TV set or radio receiver is placed within 5 m.
(If electrical interference is caused, seek a place less likely to cause the problem)
- ☐ Where it is likely that the unit is subjected to strong winds, provide wind guards according to the following guidelines.
Strong winds can cause performance degradation, an accidental stop due to a rise of high pressure and broken fan.



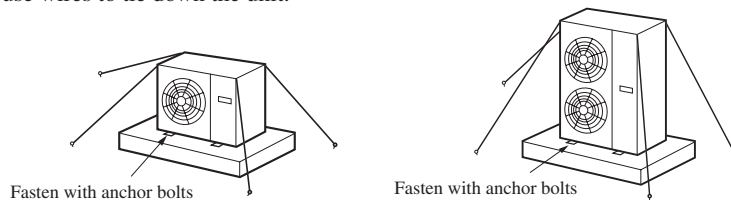
- 1) Place the unit outlet pipe perpendicular to the wind direction.



- 2) Please install so the direction of the air from the blowing outlet will be perpendicular to the direction of the wind.



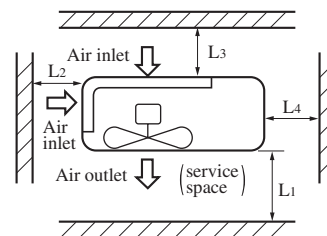
- 3) When the foundation is not level, use wires to tie down the unit.



(d) Installation space

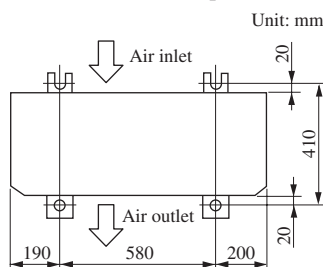
- Walls surrounding the unit in the four sides are not acceptable.
- There must be a 1-meter or larger space in the above.
- Where a danger of short-circuiting exists, install guide louvers.
- When more than one unit are installed, provide sufficient intake space consciously so that short-circuiting may not occur.
- Where piling snow can bury the outdoor unit, provide proper snow guards.

		Unit: mm		
Size	Example installation	I	II	III
L1	Open	Open	Open	500
L2	300	5	Open	
L3	150	300	150	
L4	5	5	5	

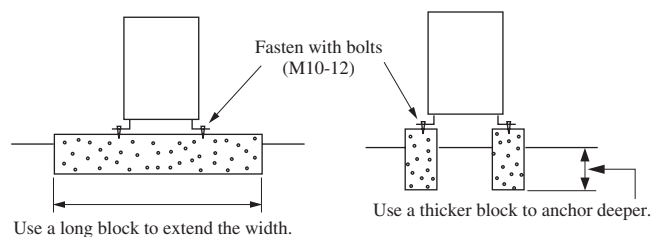


(e) Installation

① Anchor bolt fixed position



② Notabilia for installation



- In installing the unit, fix the unit's legs with bolts specified on the left.
- The protrusion of an anchor bolt on the front side must be kept within 15 mm.
- Securely install the unit so that it does not fall over during earthquakes or strong winds, etc.
- Refer to the left illustrations for information regarding concrete foundations.
- Install the unit in a level area. (With a gradient of 5 mm or less.)
- Improper installation can result in a compressor failure, broken piping within the unit and abnormal noise generation.

(2) Refrigerant piping work

Select the piping specification to fit the specification of Indoor unit and installation location.

(a) Decision of piping specification

Piping specification

Unit : mm

Outdoor unit model	Gas pipe	Liquid pipe
FDCVA402, 502, 602	φ 15.88 × t1.0	φ 9.52 × t0.8
FDCVA802	φ 25.4 × t1.0	φ 9.52 × t0.8
FDCVA1002	φ 25.4 × t1.0	φ 12.7 × t0.8

Maximum one way length

FDCVA402~602 : L=50 m or less

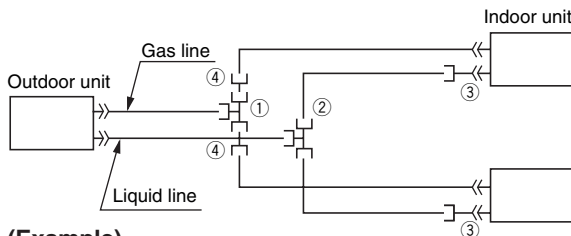
FDCVA802, 1002 : L=70 m or less

Height difference

- When the position of outdoor unit is higher than that of the indoor unit, keep the difference H=30 m or less.
- When the position of outdoor unit is lower than that of the indoor unit, keep the difference H=15 m or less.

(i) Twin type

Models FDCVA402~602 [Branch pipe set : DIS-WA1]



(Example)

Item Model	Indoor unit combinations	Liquid pipe		Gas pipe	
		Main pipe	Branch pipe	Main pipe	Branch pipe
FDCVA402	20 + 20				φ 12.7 × t0.8
FDCVA502	25 + 25	φ 9.52 × t0.8	φ 9.52 × t0.8	φ 15.88 × t1.0	φ 15.88 × t1.0
FDCVA602	30 + 30				φ 15.88 × t1.0

Notes (1) If you are using this model in combination with the 20,25 models indoor units, use the irregular fittings ③ supplied with the branch piping set and make the branch piping (branch ~ indoor unit) liquid piping size φ9.52.

(2) Mark is ④ to FDCVA402 only.

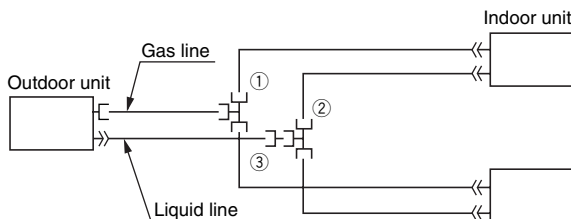
Chart of shapes of branch piping parts (DIS-WA1)

Gas pipe	Mark	Liquid pipe	Mark	Reducer	Mark
	①		②		③
					④

Notes (1) ① to ④ in the drawing include parts provided in the branch piping set. It shows the codes for the shapes of different-diameter connections.

(2) Branch piping should always be arranged to have level or perpendicular branch. (See the next page.)

Models FDCVA802, 1002 [Branch pipe set : DIS-WB1]



(Example)

Item Model	Indoor unit combinations	Liquid pipe		Gas pipe	
		Main pipe	Branch pipe	Main pipe	Branch pipe
FDCVA802	40 + 40	φ 9.52 × t0.8	φ 9.52 × t0.8	φ 25.4 × t1.0	φ 15.88 × t1.0
FDCVA1002	50 + 50	φ 12.7 × t0.8			

Notes (1) For model FDCVA802, always use φ12.7 mm liquid pipes, when the length of the main "L" exceeds 40 m. If φ9.52 mm pipes are used in an installation having over 40 m piping, they can cause performance degradation and/or water leaks from an indoor unit.

When the pipes length measures 60 m or longer for the model FDCVA802, we recommend the use of a φ12.7 mm liquid main.

(2) One-way pipe length should measure 5 m at a minimum. If the pipe length measures less than 5 m, then reduce the quantity of charged refrigerant. If you need to recover or recharge refrigerant, contact our sales agent found in your neighborhood.

Chart of shapes of branch piping parts (DIS-WB1)

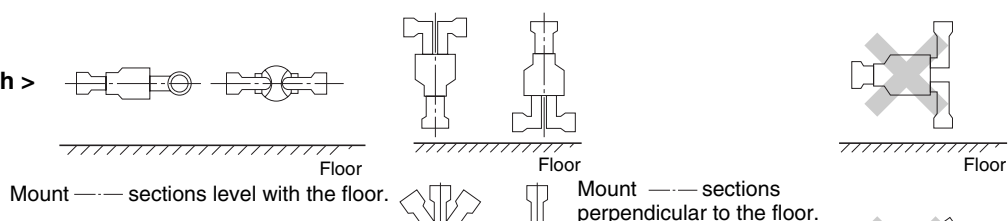
Gas pipe	Mark	Liquid pipe	Mark	Reducer	Mark
	①		②		③

Notes (1) ① to ③ in the drawing include parts provided in the branch piping set. It shows the codes for the shapes of different-diameter connections.

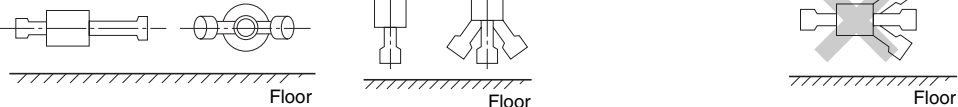
(2) Branch piping should always be arranged to have level or perpendicular branch. (See the next page.)

- The branch piping (both gas and liquid lines) should always be arranged to have a level or perpendicular branch.

< 2-Way Branch >



< 3-Way Branch >



(ii) Triple type

Model FDCVA602 [Branch pipe set : DIS-TA1]

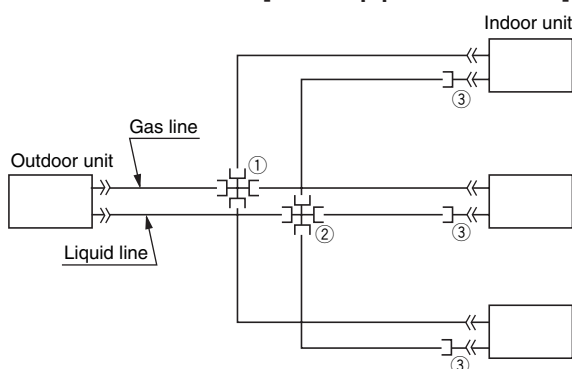


Chart of shapes of branch piping parts (DIS-TA1)

Gas pipe	Mark	Liquid pipe	Mark	Reducer	Mark
	①		②		③

- Notes (1) ① to ③ in the drawing include parts provided in the branch piping set. It shows the codes for the shapes of different-diameter connections.
 (2) Branch piping should always be arranged to have level or perpendicular branch. (See the above figure.)

Item Model	Indoor unit combinations	Liquid pipe		Gas pipe	
		Main pipe	Branch pipe	Main pipe	Branch pipe
FDCVA602	20+20+20	φ 9.52×t 0.8	φ 9.52×t 0.8	φ 15.88×t 1.0	φ 12.7×t 0.8

- Notes (1) Use the irregular fittings ③ supplied with the branch piping set on the indoor unit side, and make the branch piping (branch ~ indoor unit) liquid piping size φ9.52.

Model FDCVA802 [Branch pipe set : DIS-TB1]

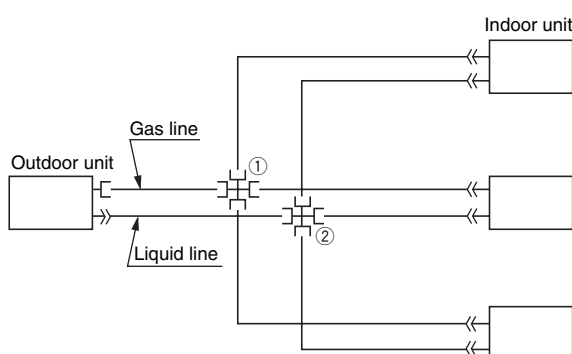


Chart of shapes of branch piping parts (DIS-TB1)

Gas pipe	Mark	Liquid pipe	Mark	Reducer	Mark
	①		②		—

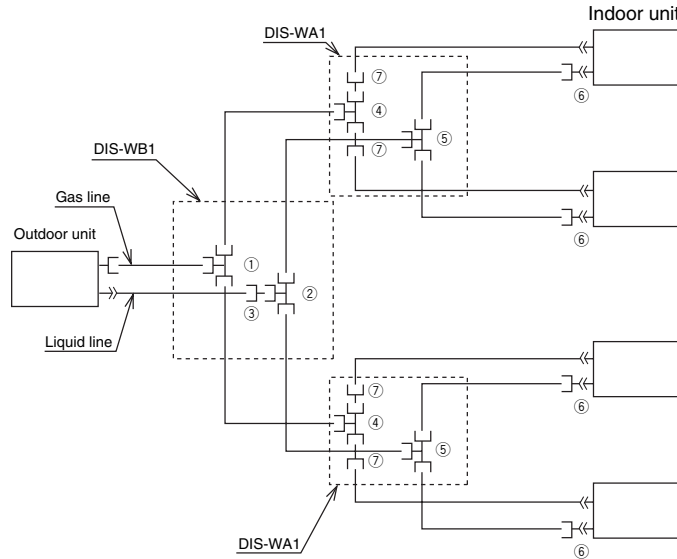
Reducer	Mark	Reducer	Mark
	—		—

- Notes (1) ① to ② in the drawing include parts provided in the branch piping set. It shows the codes for the shapes of different-diameter connections.
 (2) Branch piping should always be arranged to have level or perpendicular branch. (See the above figure.)

- Notes (1) For model FDCVA802, always use φ12.7 mm liquid pipes, when the length of the main “L” exceeds 40 m. If φ9.52 mm pipes are used in an installation having over 40 m piping, they can cause performance degradation and/or water leaks from an indoor unit.
 When the pipe length measures 60 m or longer for the model FDCVA802, we recommend the use of a φ12.7 mm liquid main.
 (2) One-way pipe length should measure 5 m at a minimum. If the pipe length measures less than 5 m, then reduce the quantity of charged refrigerant. If you need to recover or recharge refrigerant, contact our sales agent found in your neighborhood.

(iii) Double twin type

Models FDCVA802, 1002 [Branch pipe set : DIS-WA1 × 2set, DIS-WB1 × 1set]



Item Model	Indoor unit combinations	Liquid pipe			Gas pipe		
		Main pipe	1st branch pipe	2st branch pipe	Main pipe	1st branch pipe	2st branch pipe
FDCVA802	20+20+20+20	φ 9.52 × t 0.8	φ 9.52 × t 0.8	φ 9.52 × t 0.8	φ 25.4 × t 1.0	φ 15.88 × t 1.0	φ 12.7 × t 0.8
FDCVA1002	25+25+25+25	φ 12.7 × t 0.8					φ 15.88 × t 1.0

Notes (1) Use the irregular fittings ⑥ supplied with the branch piping set on the indoor unit side, and make the branch piping (branch - indoor unit) liquid piping size φ9.52.
(2) Mark is ⑦ to FDCVA802 only.

Chart of shapes of branch piping parts (DIS-WB1)

Gas pipe	Mark	Liquid pipe	Mark	Reducer	Mark
	①		②		③

Chart of shapes of branch piping parts (DIS-WA1)

Gas pipe	Mark	Liquid pipe	Mark	Reducer	Mark
	④		⑤		⑥
					⑦

Notes (1) ① to ⑦ in the drawing include parts provided in the branch piping set. It shows the codes for the shapes of different-diameter connections.
(2) Branch piping should always be arranged to have level or perpendicular branch. (Refer to the 180 page for details.)
(3) Mark ③ shows for the FDCVA802 model only.

Notes (1) For model FDCVA802, always use φ12.7 mm liquid pipes, when the length of the main "L" exceeds 40 m. If φ9.52 mm pipes are used in an installation having over 40 m piping, they can cause performance degradation and/or water leaks from an indoor unit.

When the pipes length measures 60 m or longer for the model FDCVA802, we recommend the use of a φ12.7 mm liquid main.

(2) One-way pipe length should measure 5 m at a minimum. If the pipe length measures less than 5 m, then reduce the quantity of charged refrigerant. If you need to recover or recharge refrigerant, contact our sales agent found in your neighborhood.

(b) How to use pipe reducer (Attached to FDCVA802, 1002 only)

- φ22.22 (OD) size of the refrigerant gas pipe can be used by using this kit, although φ25.4 (OD) size of the refrigerant gas pipe is standard.

(When φ25.4 (OD) size of the refrigerant gas pipe is used, this kit doesn't be needed.)

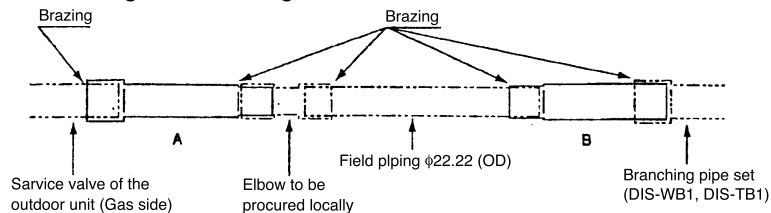
(*) OD: Outer diameter.

● This kit includes the following parts.

A	B

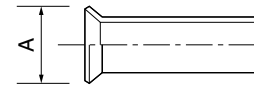
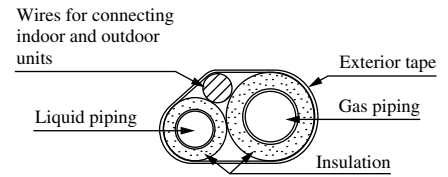
(*) ID: Inner diameter.

● Install this kit according to the following.



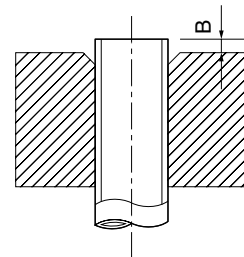
(c) Points for attention in installing refrigerant piping

- 1) Use pipes made of the following material
Material: Phosphorus deoxidized copper seamless pipes (C1220T, JIS H3300)
- 2) Please dress the refrigerant piping (both gas and liquid pipes) with a heat insulating material for prevention of dew condensation. Improper heat insulation incapable of preventing dew condensation can cause the leaking or dripping of water and a resultant soaking of household effects.
- 3) Use only a good heat insulating material (120°C or higher) for heat insulation. A poor heat insulating material offers only poor heat insulation and can cause cable deterioration.
 - a) The gas pipes can cause dew condensation during a cooling operation, which may become drain water causing a water-leak accident, or a risk of burns during a heating operation, if touched accidentally, with its surface reaching a high temperature because of discharged gas flowing inside. So, do not fail to dress it with a heat insulating material to prevent such mishap.
 - b) Dress the flare joints of the indoor units with a heat insulating material (pipe covers) (for both gas and liquid pipes).
 - c) Dress both gas and liquid pipes with a heat insulating material. In doing so, leave no gaps between the pipe and the heat insulating material and wrap them, together with the connecting cable, with a dressing tape.
 - d) If the unit is used in a place where dew point in the ambient atmosphere is 28°C or higher, and the relative humidity is 80% or higher, dress 20 mm or more of insulation.
- 4) When you need to bend a pipe, bend it to the largest possible radius (R100-R150) permitted. Do not bend a pipe repeatedly in an effort to shape it appropriately.
- 5) In laying pipes, take care to avoid debris, chips or water from entering the piping system.
- 6) A unit and a refrigerant pipe are to be flare connected. Flare a pipe after you have attached a flare nut to the pipe. The dimensions of flaring for R410A are different from those for the conventional R407C refrigerant. Although we recommend the use of flare tools developed specifically for R410A, conventional flare tools can also be used, if the measurement of protrusion B is adjusted with a protrusion control copper pipe gauge.
- 7) Tighten a flare joint securely with double spanners. Observe the following tightening torque values for flare nuts:
- 8) A branching pipe set (option part supplied separately) and refrigerant piping should be connected by brazing.
- 9) In brazing pipes, keep nitrogen gas flowing inside the pipes so that an oxide film may not form on the inner surfaces of the pipes.
- 10) Tighten a flare joint securely with a double spanner.
 - a) Do not apply force beyond proper fastening torque in tightening the flare nut.
 - b) Fix both liquid and gas service valves at the valve main bodies as illustrated on the lower, and then fasten them, applying appropriate fastening torque.



Flared pipe end: A (mm)

Copper pipe outer diameter	A
	0 -0.4
ø6.35	9.1
ø9.52	13.2
ø12.7	16.6
ø15.88	19.7



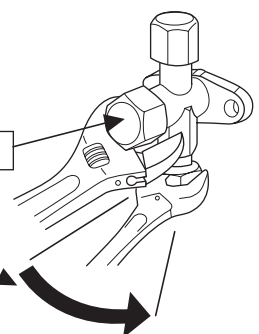
Copper pipe protrusion for flaring: B (mm)

Copper pipe outer diameter	In the case of a rigid (clutch) type	
	With an R410A tool	With a conventional tool
ø6.35	0~0.5	0.7~1.3
ø9.52		
ø12.7		
ø15.88		

Operation valve size (mm)	Tightening torque (N·m)	Tightening angle (°)	Recommended length of a tool handle (mm)
ø6.35 (1/4")	14~18	45~60	150
ø9.52 (3/8")	34~42	30~45	200
ø12.7 (1/2")	49~61	30~45	250
ø15.88 (5/8")	68~82	15~20	300

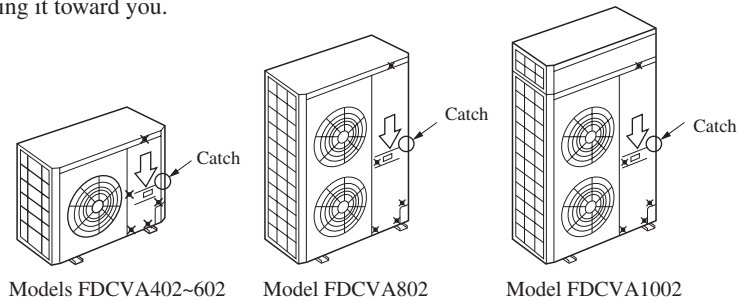
Do not hold the valve cap area with a spanner.

Please use a torque wrench. If a torque wrench is not available, fasten the flare nut manually first and then tighten it further, using the left table as a guide.



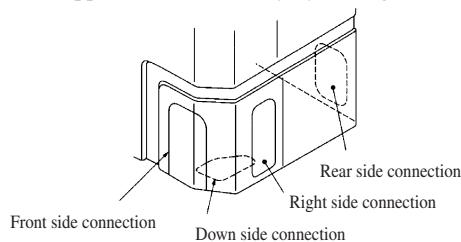
(d) How to remove the service panel

First remove the five screws (× mark) of the service panel and push it down into the direction of the arrow mark and then remove it by pulling it toward you.



(e) Refrigerant pipe connection

- 1) The pipe can be laid in any of the following directions: side right, front, rear and downward.
- 2) Remove a knock-out plate provided on the pipe penetration to open a minimum necessary area and attach an edging material supplied as an accessory by cutting it to an appropriate length before laying a pipe.



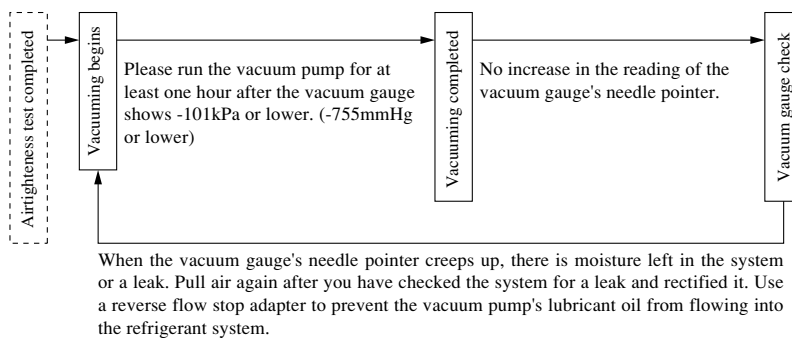
(3) Air tightness test and air purge

- Always use a vacuum pump to purge air trapped within an indoor and the refrigerant piping.

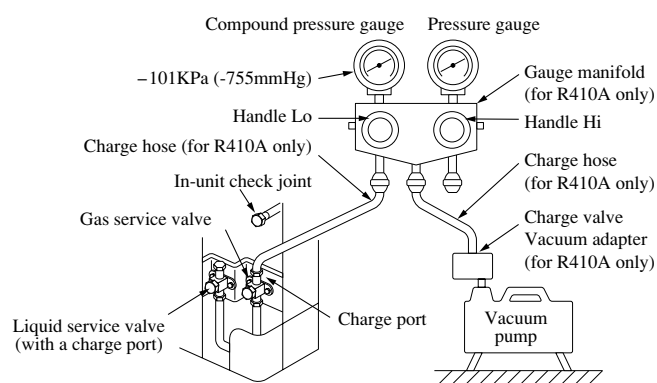
(a) Air tightness test

- 1) When all the flare nuts on both indoor and outdoor unit sides are fastened. Conduct an air-tightness test from the service valves (on both liquid and gas sides) closed tightly to check whether the system has no leaks.
- 2) Use nitrogen gas in the air-tightness test. Do not use gas other than nitrogen gas under any circumstances. Conduct the air-tightness test by applying 4.15MPa of pressure.
- 3) Do not apply the specified pressure at once, but increase pressure gradually.
 - a) Raise the pressure to 0.5 MPa, and then stop. Leave it for five minutes to see if the pressure drops.
 - b) Then raise the pressure to 1.5 MPa, and stop. Leave it for five more minutes to see if the pressure drops.
 - c) Then raise the pressure to the specified level (4.15 MPa), and record the ambient temperature and the pressure.
 - d) If the pressure does not drop after the units is left for approximately one day, the airtightness is acceptable. When the ambient temperature changes 1°C, the pressure also changes approximately 0.01 MPa. The pressure, if changed, should be compensated for.

(b) Air purge

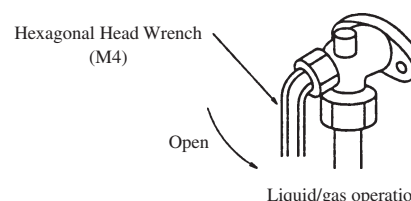


When a vacuum air purge is completed, remove the valve rod cap nuts and open the service valves (both liquid and gas sides) as illustrated below. After you have made sure that the valves are in the full-open position, lighten the cap nuts (for the valve rods and charge ports).



- You can purge air with either liquid service valve or gas service valve.

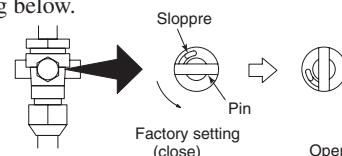
► Hexagonal wrench type



- Open the valve rod until it touches the stopper. You need not apply force to push it further.
- When an operation is completed, replace the cap nut and tighten it as before.

► Pin type (only case of FDCVA802, 1002 models)

Remove the hexagon cap nut, set it as illustrated in the drawing below.



- When a pin setting operation is completed, replace the cap nut and tighten it as before.

(4) Additional refrigerant charge

(a) Please calculate a required refrigerant charge volume from the following table.

Item Model	Standard refrigerant charge volume (kg)	Additional charge volume (kg) per meter of refrigerant piping (liquid pipe)		Refrigerant volume charged for shipment at the factory (kg)	Installation's pipe length (m) covered without additional refrigerant charge
FDCVA402	2.0	0.06		3.8	30
FDCVA502					
FDCVA602					
FDCVA802	3.6	Liquid piping ø9.52 (mm)	0.06	5.4	
		Liquid piping ø12.7 (mm)	0.12		
FDCVA1002	3.6	0.12		7.2	

- A standard refrigerant charge volume means a refrigerant charge volume for an installation with 0 m long refrigerant piping.
- This unit contains factory charged refrigerant covering 30 m of refrigerant piping and additional refrigerant charge on the installation site is not required for an installation with up to 30 m refrigerant piping. When refrigerant piping exceeds 30 m, please additionally charge an amount calculated from the pipe length and the above table for the portion in excess of 30 m.

Formula to calculate the volume of additional refrigerant required

Model FDCVA402~602		Additional charge volume (kg) = [Main length (m) - Factory charged volume 30 (m)] × 0.06 (kg/m) + Total length of branch pipes (m) × 0.06 (kg/m)
Model	In the case of ø9.52 mm liquid piping	
FDCVA802	In the case of ø12.7 mm liquid piping	Additional charge volume (kg) = [Main length (m) - Factory charged volume 30 (m)] × 0.12 (kg/m) + Total length of branch pipes (m) × 0.06 (kg/m)
Model FDCVA1002		

Notes (1) When an additional charge volume calculation result is negative, it is not necessary to charge refrigerant additionally.

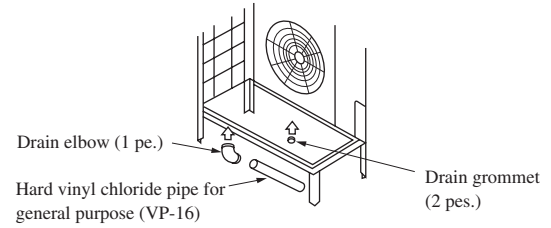
(b) Charging refrigerant

- Since R410A refrigerant must be charged in the liquid phase, you should charge it, keeping the container cylinder upside down or using a refrigerant cylinder equipped with a siphon tube.
- Charge refrigerant always from the liquid side service port with the service valve shut. When you find it difficult to charge a required amount, fully open the outdoor unit valves on both liquid and gas sides and charge refrigerant from the gas (suction) side service port, while running the unit in the cooling mode. In doing so, care must be taken so that refrigerant may be discharged from the cylinder in the liquid phase all the time. When the cylinder valve is throttled down or a dedicated conversion tool to change liquid-phase refrigerant into mist is used to protect the compressor, however, adjust charge conditions so that refrigerant will gasify upon entering the unit.
- In charging refrigerant, always charge a calculated volume by using a scale to measure the charge volume.
- When refrigerant is charged with the unit being run, complete a charge operation within 30 minutes. Running the unit with an insufficient quantity of refrigerant for a long time can cause a compressor failure.

PLEASE NOTE Please put down the refrigerant volume calculated from the pipe length onto the caution label attached on the back side of the service panel.

(5) Drain piping work

- Execute drain piping by using a drain elbow and drain grommets supplied separately as optional parts, where water drained from the outdoor unit is a problem.
- There are 3 drain holes provided on the bottom plate of an outdoor unit to discharge condensed water.
- When condensed water needs to be led to a drain, etc., install the unit on a flat base (supplied separately as an optional part) or concrete blocks.
- Connect a drain elbow as shown in the illustration and close the other two drain holes with grommets.



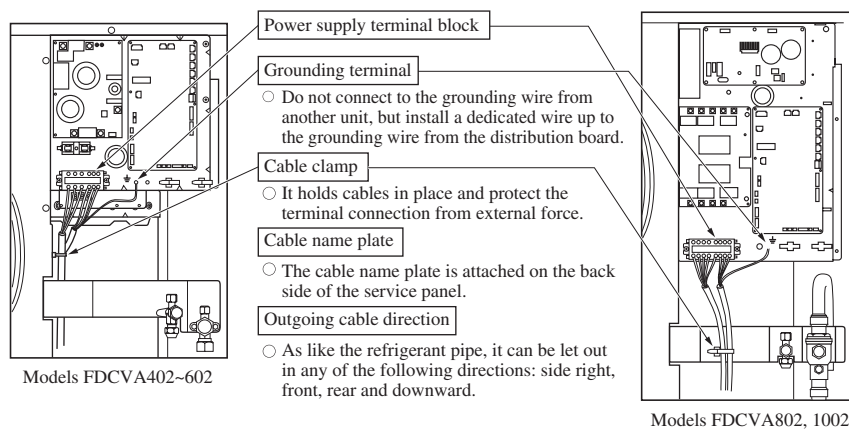
(6) Electrical wiring

Electrical installation work must be performed by an electrical installation service provider qualified by a power provider of the country. Electrical installation work must be executed according to the technical standards and other regulations applicable to electrical installations in the country.

- ① Do not use any supply cord lighter than one specified in parentheses for each type below.
 - braided cord (code designation 60245 IEC 51),
 - ordinary tough rubber sheathed cord (code designation 60245 IEC 53)
 - flat twin tinsel cord (code designation 60227 IEC 41);

Do not use anything lighter than polychloroprene sheathed flexible cord (code designation 60245 IEC57) for supply cords of parts of appliances for outdoor use.
- ② Ground the unit. Do not connect the grounding wire to a gas pipe, water pipe, lightning rod or telephone grounding wire. If improperly grounded, an electric shock or malfunction may result.
- ③ A grounding wire must be connected before connecting the power cable. Provide a grounding wire longer than the power cable.
- ④ The installation of an impulse withstanding type earth leakage breaker is necessary. A failure to install an earth leakage breaker can result in an accident such as an electric shock or a fire.
- ⑤ Do not turn on the power until the electrical work is completed.
- ⑥ Do not use a condensive capacitor for power factor improvement under any circumstances. (It does not improve power factor, while it can cause an abnormal overheat accident)
- ⑦ For power supply cables, use conduits.
- ⑧ Do not lay electronic control cables (remote control and signaling wires) and other cables together outside the unit. Laying them together can result in the malfunctioning or a failure of the unit due to electric noises.
- ⑨ Fasten cables so that may not touch the piping etc.
- ⑩ When cables are connected, please make sure that all electrical components within the electrical component box are free of loose connector coupling or terminal connection and then attach the cover securely. (Improper cover attachment can result in malfunctioning or a failure of the unit, if water penetrates into the box.)

- (a) Connect a pair bearing a common terminal number with an indoor-outdoor connecting wire.
- (b) In cabling, fasten cables securely with cable clamps so that no external force may work on terminal connections.
- (c) Grounding terminals are provided in the control box.

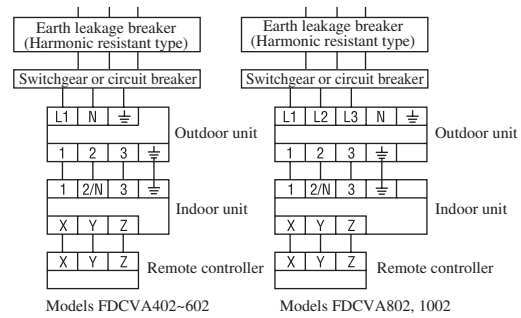


Power cable, indoor-outdoor connecting wires

- Always perform grounding system installation work with the power cord unplugged.

CAUTION

Always use an earth leakage circuit breaker designed for inverter circuits to prevent a faulty operation.



Model	Power source	Power cable thickness (mm ²)	Max. over current (A)	Cable length (m)	Grounding wire thickness	Indoor-outdoor wire thickness × number
FDCVA402	Single phase 220-240V 50Hz/ 220V 60Hz	3.5	17	20	ø1.6 mm	ø1.6 mm × 3
FDCVA502		5.5	22	25		
FDCVA602			23	24		
FDCVA802	3 phase 380-415V 50Hz/ 380V 60Hz	3.5	17	20	ø1.6 mm	ø1.6 mm × 3
FDCVA1002		5.5	20	28		

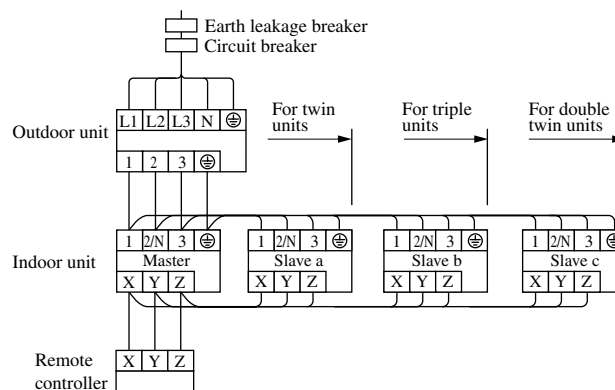
Notes (1) The specifications shown in the above table are for units without heaters. For units with heaters, please refer to the installation instructions or the construction instructions of the indoor unit.

(2) Switchgear or circuit breaker capacity which is calculated from MAX. over current should be chosen along the regulations in each country.

(3) The cable specifications are based on the assumption that a metal or plastic conduit is used with no more than three cables contained in a conduit and a voltage drop is 2%. For an installation falling outside of these conditions, please follow the internal cabling regulations. Adapt it to the regulation in effect in each country.

(d) Wiring diagram

- This diagram shows wiring for a 3-phase motor.



- Between master and slave indoor units, connect between the same numbers ①, ②N, ③ and ④, ⑤, ⑥ on the respective terminal blocks.
- Set the same address for the master and slave indoor units as the communications address for the remote controller using rotary switch SW2 on the indoor units' control PCB.
- Set slave a, slave b and slave c using DIP switch SW5-1 and SW5-2 on the control PCB of the respective indoor slave units.
- Be sure to press the AIR CON No. button on the remote controller after turning on the power, then check if the indoor master and slave unit No. is displayed in the remote controller.

The indoor unit address is displayed when the AIR CON No. button is pressed. After that, pressing the ▲ or ▼ key displays the unit No. beginning from the lowest No.

8) Plural Master / Slave setting

Set the plural address switches SW5-1 and SW5-2 on the indoor control PCB as shown in the table right.

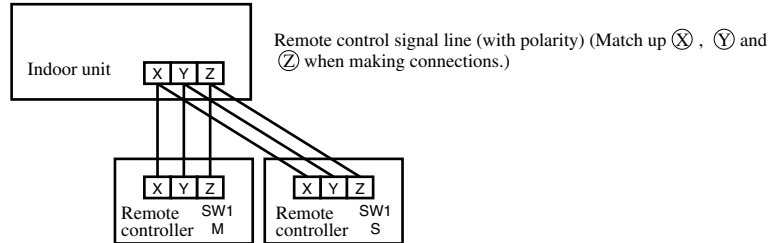
Master setting at time of factory shipment		Indoor unit			
		Master	Slave a	Slave b	Slave c
DIP switch	SW5-1	OFF	OFF	ON	ON
	SW5-2	OFF	ON	OFF	ON

(e) Remote controller wiring and connection procedure

1) Master-slave settings when using multiple remote controllers

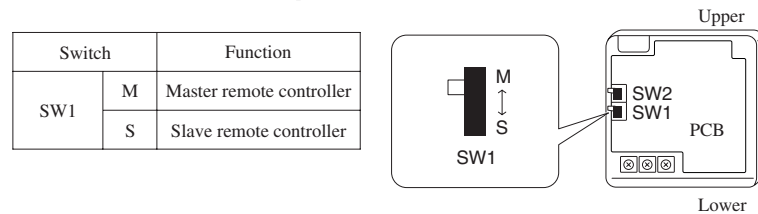
- Up to 2 remote controllers can be connected for each indoor unit (or group).

- a) There are two methods, one where the remote controller signal line (3-wire) for the slave remote controller is taken from the indoor unit and the other where the signal lines are taken from the master remote controller.



- b) Set the SW1 select switch on the slave remote controller on the Slave setting. (It is set on the Master setting at the factory.)

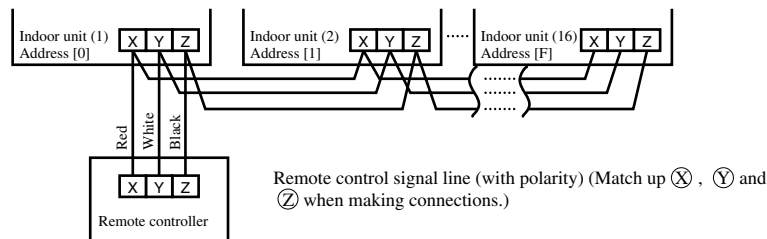
Note (1) Remote controller sensor activation settings are possible only with the master remote controller. Install the master remote controller in a location where it can sense the room temperature.



2) Controlling multiple indoor units using a single remote controller.

- Up to 16 indoor units can be controlled with a single remote controller.

- a) Run 3-wire remote control lines between each of the indoor units. See “Precaution in extending the remote controller cord” on page 78 concerning extended remote control lines.
- b) Set the remote controller communications address on “0” ~ “F” using rotary switch SW2 on the indoor unit’s control board, taking care not to overlap the addresses of any of the units.



- c) After turning the power on, press the AIR CON No. button to display the indoor unit’s address. Be sure to confirm that the settings are displayed correctly in the remote controller by using the ▲ and ▼ buttons to display the address of each connected indoor unit.

(7) Setting functions using the wired remote controller

- (a) The default settings of this unit's functions are as follows: If you want to change a setting, follow the procedure found in the installation manual and set to your desired setting.

For the method of setting, please refer to the installation manual of a remote controller unit.

① Remote controller unit functions (FUNCTION ▼)

Function number (A)	Function description (B)	Setting (C)	Default setting
01	GRILLE ↑↓ SET (Grille lift panel setting)	↑↓ INVALID	○
		50Hz AREA ONLY	
		60Hz AREA ONLY	
02	AUTO RUN SET	AUTO RUN ON	*
		AUTO RUN OFF	
03	☑/☒ TEMP S/W	☑/☒ VALID	○
		☑/☒ INVALID	
04	⏻ MODE S/W	⏻ VALID	○
		⏻ INVALID	
05	① ON/OFF S/W	① VALID	○
		① INVALID	
06	⚙ FANSPEED S/W	⚙ VALID	○
		⚙ INVALID	
07	🔧 LOUVER S/W	🔧 VALID	*
		🔧 INVALID	
08	⌚ TIMER S/W	⌚ VALID	○
		⌚ INVALID	
09	📡 SENSOR S/W (Remote control sensor setting)	📡 SENSOR OFF (Invalid)	○
		📡 SENSOR ON (Valid)	
10	POWER FAILURE COMPENSATION SET	INVALID	○
		VALID	
11	VENTI SET	NO VENTI	○
		VENTI LINK SET	
		NO VENTI LINK	
12	TEMP RANGE SET	DISP CHANGE	○
		NO DISP CHANGE	
13	I/U FAN SPEED (Indoor unit fan speed setting)	3 FAN SPEED	*
		2 FAN SPEED	
		1 FAN SPEED	
14	MODEL TYPE	HEAT PUMP	*
		COOLING ONLY	
15	EXTERNAL CONTROL SET	INDIVIDUAL OPERATION	○
		SAME OPERATION FOR ALL UNITS	
16	ERROR DISP SET	ERROR DISP	○
		NO ERROR DISP	
17	🔧 POSITION (Louver control setting)	FIX (1 OF 4) (4 position stop)	○
		IN MOTION (Free stop)	
18	°C/°F SET	°C	○
		°F	

② Indoor unit functions (I/U FUNCTION ▲)

Function number (A)	Function description (B)	Setting (C)	Default setting
01	Hi CEILING SET	STANDARD (Mild mode)	*
		Hi CEILING 1 (Powerful mode)	
03	FILTER SIGN SET	NO DISPLAY	*
		AFTER 180H	
		AFTER 600H	
		AFTER 1000H	
04	🔧 POSITION (Louver control setting)	1000H→STOP	○
		FIX (1 OF 4) (4 position stop)	
05	EXTERNAL INPUT SET	IN MOTION (Free stop)	○
		LEVEL INPUT	
06	OPERATION PERMISSION PROHIBITED	PULSE INPUT	○
		NORMAL OPERATION	
07	☀ ROOM TEMP OFFSET (Heating room temperature offset)	VALID	○
		NORMAL OPERATION	
08	☀ FAN CONTROL (Heating fan control)	TEMP SHIFT +3°C	*
		LOW FAN	
09	FREEZE PREVENT TEMP	STOP→LOW FAN (Intermittent operation)	○
		TEMP Hi	
10	FREEZE PREVENT CONTROL	TEMP Lo	○
		FAN CONTROL ON	
		FAN CONTROL OFF	

Notes(1) Setting marked with [○] are the default setting.

- (2) Setting marked with [*] are those that are set automatically according to an indoor unit or an outdoor unit connected. Please check default settings with the indoor unit's installation manual.

Notes(1) Setting marked with [○] are the default setting.

- (2) Setting marked with [*] are those that are set automatically according to an indoor unit or an outdoor unit connected. Please check default settings with the indoor unit's installation manual.
- (3) When Item 17 : “🔧 POSITION” is changed, please also change Item 04 “🔧 POSITION” setting found in “Indoor unit functions”.

(b) Function setting method

- 1) Stop the air conditioner
- 2) Press the SET and MODE buttons simultaneously for 3 seconds or longer.

The screen display will be switched as follows:

“ SELECT ITEM” →

“ SET” →

“FUNCTION SET ▼”



- 3) Press the SET button.
The unit will enter the function setting mode. The screen display will change to “ FUNCTION ▼”.
- 4) Check which category your desired setting belongs to, “ FUNCTION ▼ (Remote controller unit function)” or “I/U FUNCTION ▲” (Indoor unit function).
- 5) Press either or button.
Select either “ FUNCTION ▼” or “I/U FUNCTION ▲”.



- 6) Press the SET button.

- 7) When “ FUNCTION ▼” is selected.

- ① “DATA LOADING” (blinking) → “ FUNCTION” →

“01 GRILLE ↑↓ SET” (Function number: ①, Function description: ②)

The screen display will be switched like this.

- ② Press either or button.

“Function number: ①, Function description: ②” from the list of remote controller unit functions will be displayed one by one. Select a desired function.

- ③ Press the SET button.

The screen display will be switched as follows:

“ SETTING” → “Setting: ③” (ex. “AUTO RUN ON”)

- ④ Press either or button.

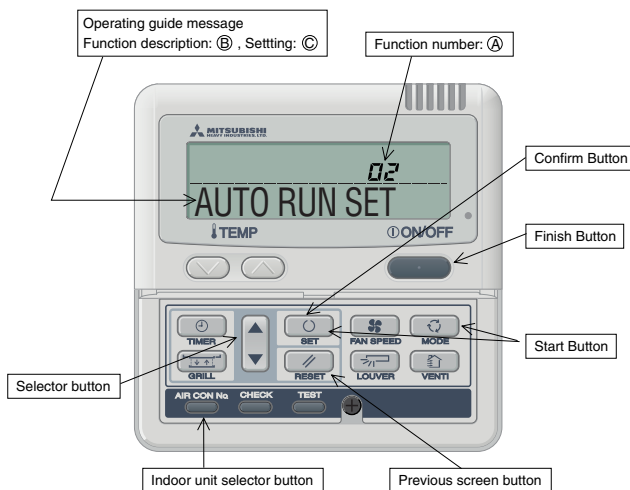
A list of “Settings: ③” will be displayed one by one. Select your desired setting.

- ⑤ Press the SET button.

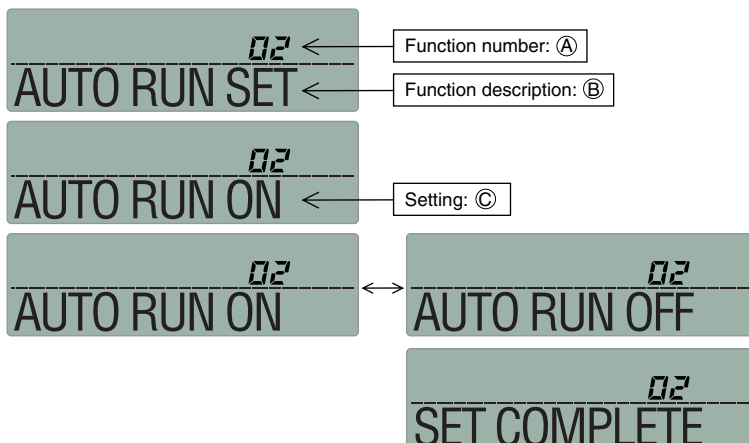
The selected setting is displayed for 2 seconds, then followed by “SET COMPLETE” and the function setting process is completed.

Then the screen display will be switched to “Function number: ①, Function description: ②,” so if you want to continue to set another function, repeat the steps as explained above.

To finish the function setting process, please proceed to Step 8).



* When “02 AUTO RUN SET” is selected.



When "I/U FUNCTION ▲" is selected.

- ① The screen display will be switched as follows:

"◆ I/U SELECT" → "○ SET" → "I/U No.00" (blinking)



- ② Press either ▲ or ▼ button.

Select the indoor unit number that you want to change settings. If only one indoor unit is connected, the indoor unit number will not change, so please proceed to Step ③.

If "ALL I/U ▼" is selected while indoor group control is in effect, you can set all units to the same settings.

- ③ Press the SET button.

Indoor unit number indication will change from blinking to lit continuously, The screen display will be switched as follows:

"DATA LOADING" (blinking for about 2 to 23 seconds) → "◆ I/U FUNCTION" → "01 Hi CEILING SET"

(Function number: ①, Function description: ②)

* When "01 Hi CEILING SET" is selected.

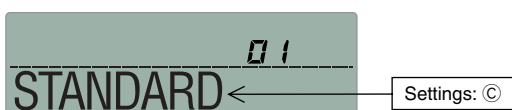


- ④ Press either ▲ or ▼ button.

"Function number: ①, Function description: ②" from the list of indoor unit functions will be displayed one by one. Select a desired function.

- ⑤ Press the SET button.

The screen display will be switched as follows: "◆ I/U SETTING" → "Setting: ③" (ex. "STANDARD")



- ⑥ Press either ▲ or ▼ button.

A list "Setting: ③" will be displayed one by one. Select your desired setting.

- ⑦ Press the SET button.

The selected setting is displayed for 2 seconds, then followed by "SET COMPLETE" and the function setting process is completed.

Then the screen display will be switched to "Function number: ①, Function description: ②" so if you want to continue to set another function, repeat the steps as explained above. To finish the function setting process, please proceed to Step 8).

- ⑧ Press AIR CON No. button.

The screen display will go back to the indoor unit selection screen (ex. "I/U No.00").

If you want to continue to set another indoor unit, please follow the steps explained above.





















- 8) Press the ON/OFF button.

This ends a function setting process. Even if a function setting process is not completed, this ends the process.

Please note that any setting that is not completed will become void.

- **Pressing the RESET button during a function setting process will allow you to go back the previous step. Please note that any setting that is not completed will become void.**
- **Method of checking the current setting**
While following the above mentioned step, the setting that appears when the SET button is pressed for each "Function number: ①, Function description: ②" is the current setting "Setting: ③". (When "ALL I/U ▼" is selected, the setting of the indoor unit with the lowest number is displayed)
- **Settings are stored in the controller and not lost even a power outage occurs.**

(c) Changing the remote control set temperature range

- 1) It is possible to change the set temperature range using the remote control.
 - a) The upper and lower set temperature limits can be set from the remote control.
 Upper limit value setting: Effective during heating. The temperature can be set within a range of 20~30°C.
 Lower limit value setting: Effective when running in modes other than the heating mode (AUTO, COOL, FAN, DRY): The temperature can be set within a range of 18~26°C.
 - b) If the upper and lower limits are set using this function, the following controls are active.
- 2) When and ⑫TEMP RANGE SET under “ FUNCTION” the function setting mode is DISP CHANGE
 - a) If you are setting the upper limit,
 - ① If a temperature that is greater than the upper limit during heating is set from the remote control.
 The unit runs for 30 minutes at the set temperature, then it automatically transmits the upper limit temperature. The display on the remote control also approaches that temperature.
 - ② During heating, if the upper limit value is set at a temperature below the upper limit value:
 The set temperature is transmitted.
 - b) If the lower limit is set
 - ① If a temperature that is lower than the lower limit value is set from the remote control. When running in an operation mode other than the heating mode: the unit runs at the set temperature for 30 minutes, then it automatically transmits the lower limit temperature.
 - ② If a temperature that is higher than the lower limit value is set when running in a mode other than the heating mode:
 It transmits the set temperature.
- 3) When and ⑫TEMP RANGE SET under the “ FUNCTION” the function setting mode is NO DISP CHANGE.
 - a) If the upper limit is set
 - ① During heating, if a temperature that is higher than the upper limit is set from the remote control:
 The upper limit value is transmitted. However, the remote control display does not approach the upper limit value, but remains on the set temperature.
 - ② During heating, if the temperature is set at a value lower than the upper limit value:
 The set temperature is transmitted.
 - b) If the lower limit is set
 - ① When in an operating mode other than the heating mode, if a temperature that is lower than the lower limit value is set from the remote control:
 The lower limit value is transmitted. However, the remote control display does not approach the lower limit value, but remains on the set temperature.
 - ② When in an operating mode other than the heating mode, if a temperature that is higher than the lower limit value is set:
 The set temperature is transmitted.
- 4) Setting the upper and lower limit values
 - a) Stop the air conditioner, then press the SET and MODE buttons simultaneously for 3 seconds or longer. If you press “ SELECT ITEM” → “ SET” → “FUNCTION SET ▼ ” the display changes.
 - b) Press the  button, then change the “TEMP RANGE ▲” display.
 - c) Press the SET button and enter the temperature range setting mode.
 - d) Using the   buttons, select the “Hi LIMIT SET ▼ ” or “Lo LIMIT SET ▲,” then fix it by pressing SET.
 - e) If you selected “Hi LIMIT SET,” (enabled during heating)
 - ① “  SET UP” → “Hi LIMIT 28°C  ” (blinking) is displayed.
 - ② Using the “  ” temperature setting buttons, select the upper limit value. Display Example: “Hi LIMIT 26°C  ” (blinking)
 - ③ Press the SET button to fix the setting. Display example: “Hi LIMIT 26°C” (lights up for 2 seconds)
 After the fixed upper limit value lights up for 2 seconds, the display returns to the “Hi LIMIT SET ▼” display in item d).
 - f) If “Lo LIMIT SET ▲” was selected (enabled during COOL, DRY and FAN)
 - ① “  SET UP” → “Lo LIMIT 20°C  ” (blinking) is displayed.
 - ② Using the “  ” temperature setting buttons, select the lower limit. Display example: “Lo LIMIT 24°C   ” (blinking)
 - ③ Press the SET button to fix the setting. Display example: “Lo LIMIT 24°C” (lights up for 2 seconds)
 After the fixed lower limit value lights up for 2 seconds, the display returns to the “Lo LIMIT SET ▲” display in item d).
 - g) Pressing the ON/OFF button stops the operation.
 (Operation stops even if the ON/OFF button is pressed during setting, and the stopped state returns. However, if setting is not completed, it is not valid, so use caution.)
- ◆ If the RESET button is pressed during setting, the previous setting screen is displayed.

- If the RESET button is pressed during a setting operation, the display returns to the previously displayed setting screen. However, settings which have not been fixed become invalid, so exercise caution.
- * If “NO DISP CHANGE” is selected in No. 12, “TEMP RANGE SET” of the remote controller’s functions, of the function setting modes, the remote controller’s display does not change even if the temperature range has been changed.

(Example) If the upper limit is set at 28°C

Function No. A	Function Contents B	Setting Contents C	Control Contents
12	TEMP RANGE SET	DISP CHANGE	The remote controller’s display and sent data upper limit changes to 28°C.
		NO DISP CHANGE	The remote controller’s display upper limit remains at 30°C and only the upper limit of the sent data is changed to 28°C.

(8) Checking operation data

Operation data can be checked with remote controller unit operation.

- ① Press the CHECK button.

The display change from “ SELECT ITEM” → “ SET” → “OPERATION DATA ▼”.

- ② Press the SET button while “OPERATION DATA ▼” is displayed.
- ③ The display will change to “I/U No. 00 ▲” (blinking indication).

Select the indoor unit number you want to have data displayed with the button.

(When only one indoor unit connected, the indoor unit number displayed on the screen will not change.)

- ④ Determine the indoor unit number will the SET button.

(The indoor unit number changes from blinking indication to continuous indication.)

“DATA LOADING” (A blinking indication appears while data is loaded)

↓

“OPERATION DATA ” appears and data number 01 is displayed.


- ⑤ Upon operation of the button, the current operation data is displayed in order from Data number 01.

The items displayed are as follows:

* Depending on models, the items that do not have corresponding data are not displayed.

- ⑥ To display the data of a different indoor unit, press the AIR CON No. button, which allows you to go back to the indoor unit selection screen.
- ⑦ Pressing the ON/OFF button will stop displaying data.

Pressing the RESET button during remote controller unit operation will undo your last operation and allow you to go back to the previous screen.

Number	Data item
01	 (Operation mode)
02	SET TEMP
03	RETURN AIR
04	I/U HEAT EXCH 1 (Indoor unit heat exchanger temperature 1)
05	I/U HEAT EXCH 2 (Indoor unit heat exchanger temperature 2)
07	I/U FAN (Indoor unit fan speed)
11	TOTAL I/U RAN (Indoor unit operation hours)
21	OUTDOOR (Outside air temperature)
22	O/U HEAT EXCH 1 (Outdoor unit heat exchanger temperature 1)
23	O/U HEAT EXCH 2 (Outdoor unit heat exchanger temperature 2)
24	COMP HERTZ
27	DISCHARGE (Discharge pipe temperature)
28	DOME BOTTOM
29	CT
31	O/U FAN (Outdoor unit fan speed)
32	SILENT MODE ON/OFF
34	63H1 ON/OFF
35	DEFROST ON/OFF
36	TOTAL COMP RUN (Compressor operation hours)
37	EEV 1 (Expansion valve opening 1)

(9) Test run

(a) Test run from an outdoor unit.

WARNING

- Before conduct a test run, do not fail to make sure that the service valves are closed.
 - Turn on power 6 hours prior to a test run to energize the crank case heater.
 - Always give a 3-minute or longer interval before you start the unit again whenever it is stopped.
 - Removing the service panel will expose high-voltage live parts and high-temperature parts, which are quite dangerous.
- Take utmost care not to incur an electric shock or burns. Do not leave the unit with the service panel open.

A failure to observe these instructions can result in a compressor breakdown.

CAUTION

- When you operate switches (SW3, SW5) for on-site setting, be careful not to touch a live part.
 - You cannot check discharge pressure from the liquid operation valve charge port.
 - The 4-way valve (20S) is energized during a heating operation.
 - When power supply is cut off to reset the unit, give 3 or more minutes before you turn on power again after power is cut off.
- If this procedure is not observed in turning on power again, "E-5" (communication error) may occur.

1) Test run method

- A test run can be initiated from an outdoor unit by using SW3-3 and SW3-4 for on-site setting.
- Switching SW3-3 to ON will start the compressor.
- The unit will start a cooling operation, when SW3-4 is OFF, or a heating operation, when SW3-4 in ON.
- Do not fail to switch SW3-3 to OFF when a test run is completed.

SW3-3	SW3-4	
ON	OFF	Cooling during a test run
	ON	Heating during a test run
OFF	—	Normal or After the test operation

2) Checking the state of the unit in operation

Use check joints provided on the piping before and after the 4-way valve installed inside the outdoor unit for checking discharge pressure and suction pressure.

As indicated in the table shown on the right, pressure detected at each point will vary depending on whether a cooling or heating operation has been selected.

	Check joint of the pipe	Charge port of the gas service valve
Cooling operation	Discharge pressure (High pressure)	Suction pressure (Low pressure)
Heating operation	Suction pressure (Low pressure)	Discharge pressure (High pressure)

3) Setting SW3-1, SW3-2 on site

- Defrost control switching (SW3-1, SW3-2, Setup of Jumper wire J7)
 - When this switch is turned ON, the unit will run in the defrost mode more frequency.
 - Set this switch to ON, when installed in a region where outdoor temperature falls below zero during the season the unit is run for a heating operation.
- Snow guard fan control (SW3-2)
 - When this switch is turned on, the outdoor unit fan will run for 10 seconds in every 10 minutes, when outdoor temperature falls to 3°C or lower and the compressor is not running.
 - When the unit is used in a very snowy country, set this switch to ON.
- High pressure control (J7)
 - When the option parts that change air flow from outlet are used, open J7.

4) Failure diagnosis in a test run

Error indicated on the remote control unit	Printed circuit board LED (They cycles of 5 seconds)		Failure event	Action
	RED LED	GREEN LED		
E39	1 time flash	Keeps flashing	Open phase	Check power cables for loose contact or disconnection
E40	1 time flash	Keeps flashing	63H1 actuation or operation with service valve shut (occurs mainly during a heating operation)	1. Check whether the service valves are open. 2. If an error has been canceled when 3 minutes have elapsed since a compressor stop, you can restart the unit by effecting check result from the remote control unit.
E49	1 time flash	Keeps flashing	Low pressure error or operation with service valves shut (occurs mainly during a cooling operation)	

5) The state of the electronic expansion valve.

The following table illustrates the steady states of the electronic expansion valve.

	When power is turned on	When the unit comes to a normal stop		When the unit comes to an abnormal stop	
		During a cooling operation	During a heating operation	During a cooling operation	During a heating operation
Valve for a cooling operation	Complete shut position	Complete shut position	Full open position	Full open position	Full open position
Valve for a heating operation	Full open position	Full open position	Complete shut position	Full open position	Full open position

(b) Test run from an wired remote controller.

1) Cooling test operation procedure

Carry out the following test operation procedure using the remote controller.

a) Starting the cooling test operation

- ① Press the ON/OFF button to start operation.
- ② Press the MODE button and select “❄️ (COOL)”.
- ③ Press the TEST button continuously for 3 seconds or longer.
The display changes from “❄️ SELECT ITEM” → “❄️ SET” → “❄️ TEST RUN ▼”.
- ④ When “❄️ TEST RUN ▼” is displayed, press the SET button to begin the cooling test operation.
The display shows “❄️ TEST RUN.”

b) Canceling the cooling test operation

Pressing the ON/OFF button or the TEMP (☑️) (⏏️) button ends the cooling test operation.
The “❄️ TEST RUN” display is cleared.

2.6 MAINTENANCE DATA

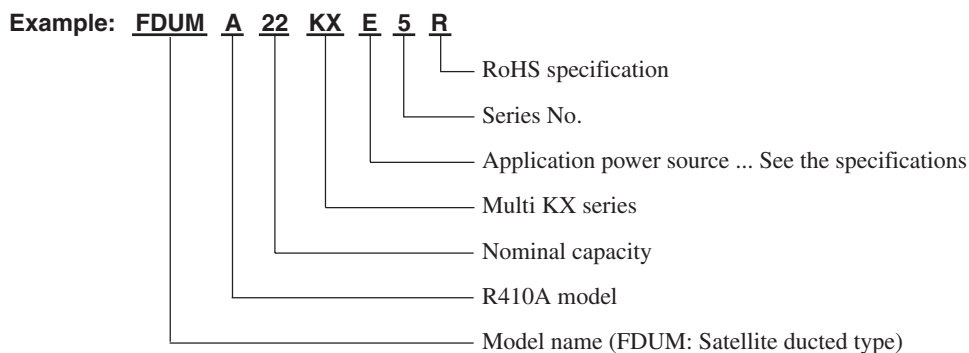
Details are the same as in chapter 1.6. see page 95.

3. INVERTER DRIVEN MULTI-INDOOR UNIT CLIMATE CONTROL SYSTEM

CONTENTS

3.1 SELECTION DATA	196
3.1.1 Specifications	196
3.1.2 Exterior dimensions	200
3.1.3 Characteristics of fan	204
3.1.4 Exterior appearance	206
3.1.5 Noise level	207
3.1.6 Electrical wiring	208
3.1.7 Sensible heat capacity	209
3.2 APPLICATION DATA	212

●How to read the model name



This chapter are written concerning the (FDUM-KXE5R) indoor unit. See Manual No. '06·KX, KXR-T-108 concerning other indoor and outdoor units.

3.1 SELECTION DATA

3.1.1 Specifications

Satellite ducted type (FDUM)

Models FDUMA22KXE5R, 28KXE5R

Item		Models	FDUMA22KXE5R	FDUMA28KXE5R
Nominal cooling capacity* ¹	kW		2.2	2.8
Nominal heating capacity* ²	kW		2.5	3.2
Power source			1 Phase 220-240V 50Hz/220V 60Hz	
Noise level	dB(A)		Hi: 33 Me: 31 Lo: 28	Hi: 34 Me: 32 Lo: 29
Exterior dimensions Height × Width × Depth	mm		299 × 750 × 635	
Net weight	kg		33	34
Refrigerant equipment Heat exchanger			Louver fin & inner grooved tubing	
Refrigerant control			Electronic expansion valve	
Air handling equipment Fan type & Q'ty			Centrifugal fan × 2	
Motor	W		40 × 1	50 × 1
Starting method			Direct line start	
Air flow(Standard)	CMM		Hi: 10 Me: 9 Lo: 8	Hi: 12 Me: 11 Lo: 10
Available static pressure (at Hi)	Pa		Standard:50, Hi speed:85	
Outside air intake			—	
Air filter, Q'ty			—	
Shock & vibration absorber			Rubber sleeve(for fan motor)	
Insulation (noise & heat)			Polyurethane foam	
Operation control Operation switch			Wired remote control switch (Optional:RC-E1R) Wireless kit(Optional:RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat	
Installation data Refrigerant piping size	mm(in)		Liquid line: φ6.35(1/4"), Gas line: φ12.7(1/2")	
Connecting method			Flare piping	
Drain hose			Connectable with VP25(I.D.25mm, O.D.32mm)	
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Filter kit(UM-FL1E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling* ¹	27℃	19℃	35℃	24℃	ISO-T1
Heating* ²	20℃	—	7℃	6℃	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

●Operating characteristic (220-240V 50Hz/220V 60Hz)

Item	Model	FDUMA22KXE5R	FDUMA28KXE5R
Power consumption (kW)		0.09-0.11/0.09	0.11-0.13/0.11
Running current (A)		0.41-0.46/0.41	0.51-0.56/0.51

Models FDUMA36KXE5R, 45KXE5R, 56KXE5R

Item		Models	FDUMA36KXE5R	FDUMA45KXE5R	FDUMA56KXE5R
Nominal cooling capacity* ¹	kW		3.6	4.5	5.6
Nominal heating capacity* ²	kW		4.0	5.0	6.3
Power source		1 Phase 220-240V 50Hz/220V 60Hz			
Noise level	dB(A)		Hi: 34 Me: 32 Lo: 29	Hi: 35 Me: 32 Lo: 29	
Exterior dimensions Height × Width × Depth	mm	299 × 750 × 635			
Net weight	kg	34			
Refrigerant equipment Heat exchanger		Louver fin & inner grooved tubing			
Refrigerant control		Electronic expansion valve			
Air handling equipment Fan type & Q'ty		Centrifugal fan × 2			
Motor	W		50× 1	55× 1	
Starting method		Direct line start			
Air flow(Standard)	CMM		Hi: 12 Me: 11 Lo: 10	Hi: 14 Me: 12 Lo: 11	
Available static pressure (at Hi)	Pa	Standard:50, Hi speed:85			
Outside air intake		—			
Air filter, Q'ty		—			
Shock & vibration absorber		Rubber sleeve(for fan motor)			
Insulation (noise & heat)		Polyurethane foam			
Operation control Operation switch		Wired remote control switch (Optional:RC-E1R) Wireless kit (Optional:RCND-KIT-HER)			
Room temperature control		Thermostat by electronics			
Safety equipment		Internal thermostat for fan motor. Frost protection thermostat			
Installation data Refrigerant piping size	mm(in)	Liquid line:φ6.35(1/4"),Gas line:φ12.7(1/2")			
Connecting method		Flare piping			
Drain hose		Connectable with VP25(I.D.25mm, O.D.32mm)			
Insulation for piping		Necessary (both Liquid & Gas lines)			
Accessories		Mounting kit, Drain hose			
Optional parts		Filter kit(UM-FL1E)			

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling* ¹	27℃	19℃	35℃	24℃	ISO-T1
Heating* ²	20℃	—	7℃	6℃	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

●Operating characteristic

(220-240V 50Hz/220V 60Hz)

Item	Model	FDUMA36KXE5R	FDUMA45KXE5R	FDUMA56KXE5R
Power consumption (kW)		0.11-0.13/0.11	0.14-0.16/0.14	
Running current (A)		0.51-0.56/0.51	0.63-0.67/0.63	

Models FDUMA71KXE5R, 90KXE5R

Item		Models	FDUMA71KXE5R	FDUMA90KXE5R
Nominal cooling capacity ^{*1}	kW		7.1	9.0
Nominal heating capacity ^{*2}	kW		8.0	10.0
Power source			1 Phase 220-240V 50Hz/220V 60Hz	
Noise level	dB(A)		Hi: 35 Me: 32 Lo: 29	Hi: 36 Me: 33 Lo: 30
Exterior dimensions Height × Width × Depth	mm		299 × 950 × 635	
Net weight	kg		40	
Refrigerant equipment Heat exchanger			Louver fin & inner grooved tubing	
Refrigerant control			Electronic expansion valve	
Air handling equipment Fan type & Q'ty			Centrifugal fan × 2	
Motor	W		90×1	100×1
Starting method			Direct line start	
Air flow(Standard)	CMM		Hi: 18 Me: 16 Lo: 14	Hi: 20 Me: 18 Lo: 15
Available static pressure (at Hi)	Pa		Standard:50, Hi speed:85	
Outside air intake			—	
Air filter, Q'ty			—	
Shock & vibration absorber			Rubber sleeve(for fan motor)	
Insulation (noise & heat)			Polyurethane foam	
Operation control Operation switch			Wired remote control switch (Optional:RC-E1R) Wireless kit (Optional:RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat	
Installation data Refrigerant piping size	mm(in)		Liquid line:φ9.52(3/8"),Gas line:φ15.88(5/8")	
Connecting method			Flare piping	
Drain hose			Connectable with VP25(I.D.25mm, O.D.32mm)	
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Filter kit(UM-FL2E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling ^{*1}	27℃	19℃	35℃	24℃	ISO-T1
Heating ^{*2}	20℃	—	7℃	6℃	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

●Operating characteristic (220-240V 50Hz/220V 60Hz)

Item	Model	FDUMA71KXE5R	FDUMA90KXE5R
Power consumption (kW)		0.15-0.17/0.15	0.16-0.19/0.16
Running current (A)		0.68-0.71/0.71	0.73-0.79/0.73

Models FDUMA112KXE5R, 140KXE5R

Item		Models	FDUMA112KXE5R	FDUMA140KXE5R
Nominal cooling capacity* ¹		kW	11.2	14.0
Nominal heating capacity* ²		kW	12.5	16.0
Power source			1 Phase 220-240V 50Hz/220V 60Hz	
Noise level		dB(A)	Hi: 38 Me: 35 Lo: 32	Hi: 39 Me: 37 Lo: 34
Exterior dimensions Height × Width × Depth		mm	350 × 1370 × 635	
Net weight		kg	59	59
Refrigerant equipment Heat exchanger			Louver fin & inner grooved tubing	
Refrigerant control			Electronic expansion valve	
Air handling equipment Fan type & Q'ty			Centrifugal fan × 3	
Motor		W	45 × 1, 90 × 1	50 × 1, 100 × 1
Starting method			Direct line start	
Air flow(Standard)		CMM	Hi: 28 Me: 25 Lo: 22	Hi: 34 Me: 31 Lo: 27
Available static pressure (at Hi)		Pa	Standard:60, Hi speed:90	Standard:60, Hi speed:85
Outside air intake			—	
Air filter, Q'ty			—	
Shock & vibration absorber			Rubber sleeve(for fan motor)	
Insulation (noise & heat)			Polyurethane foam	
Operation control Operation switch			Wired remote control switch (Optional:RC-E1R) Wireless kit (Optional:RCND-KIT-HER)	
Room temperature control			Thermostat by electronics	
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat	
Installation data Refrigerant piping size		mm(in)	Liquid line:φ 9.52(3/8"), Gas line:φ 15.88(5/8")	
Connecting method			Flare piping	
Drain hose			Connectable with VP25(I.D.25mm, O.D.32mm)	
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit, Drain hose	
Optional parts			Filter kit(UM-FL3E)	

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

Item	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Operation					
Cooling* ¹	27℃	19℃	35℃	24℃	ISO-T1
Heating* ²	20℃	—	7℃	6℃	

(2) This packaged air-conditioner is manufactured and tested in conformity with the following standard.
ISO-T1 "UNITARY AIR-CONDITIONERS"

●Operating characteristic (220-240V 50Hz/220V 60Hz)

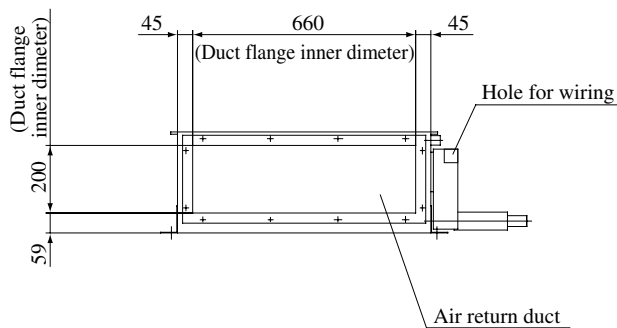
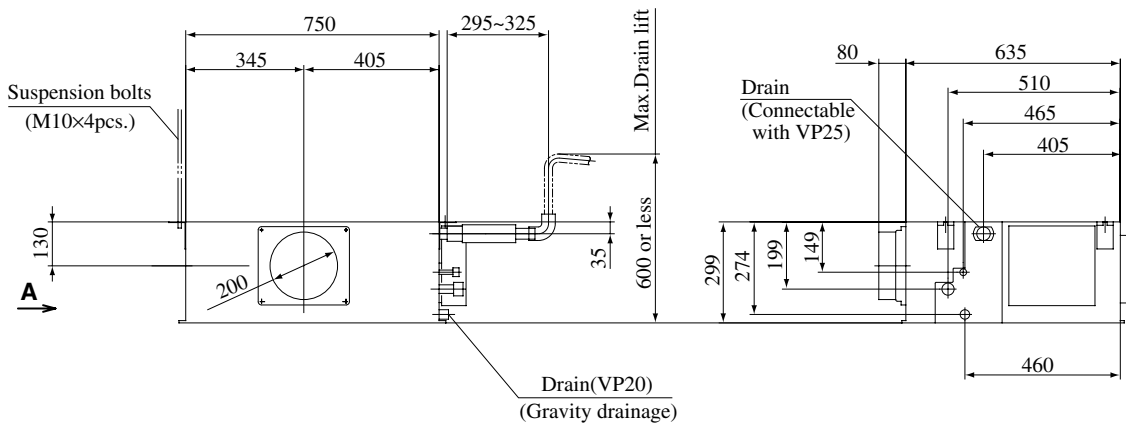
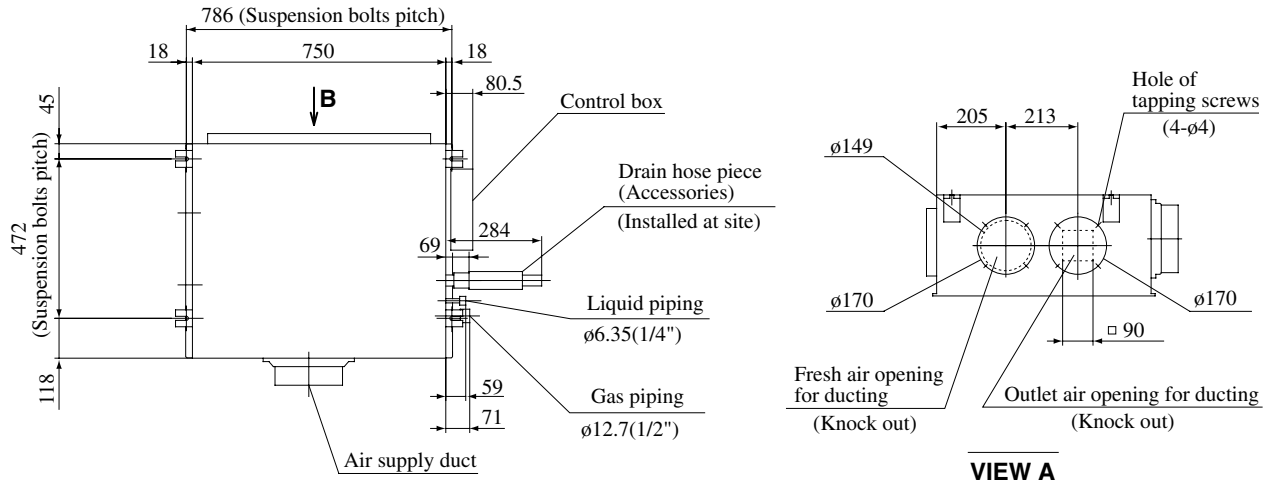
Item	Model	FDUMA112KXE5R	FDUMA140KXE5R
Power consumption (kW)		0.24-0.28/0.24	0.28-0.32/0.32
Running current (A)		1.07-1.17/1.07	1.28-1.32/1.28

3.1.2 Exterior dimensions

Satellite ducted type (FDUM)

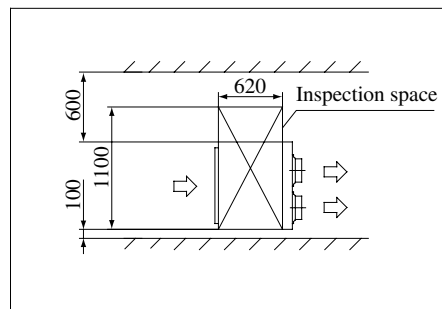
Model FDUMA22KXE5R

Unit : mm



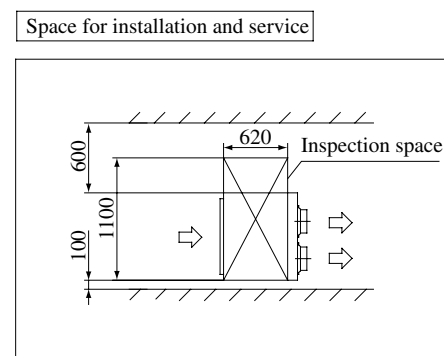
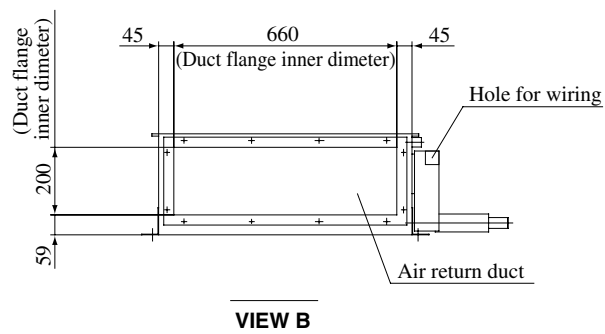
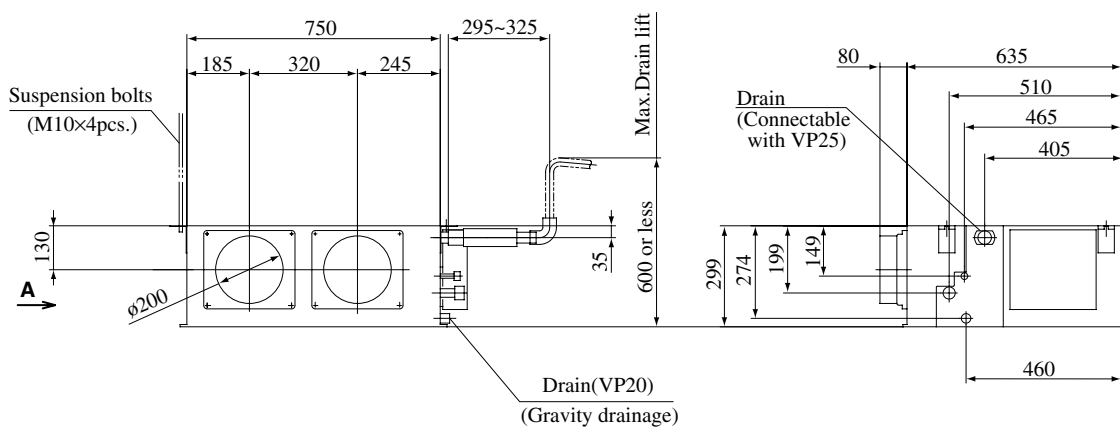
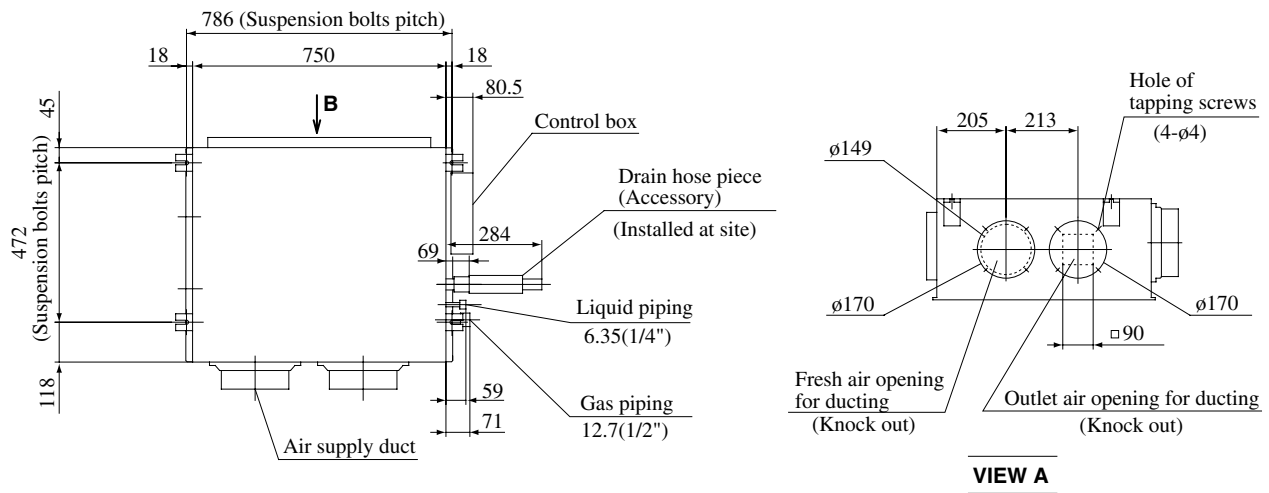
VIEW B

Space for installation and service



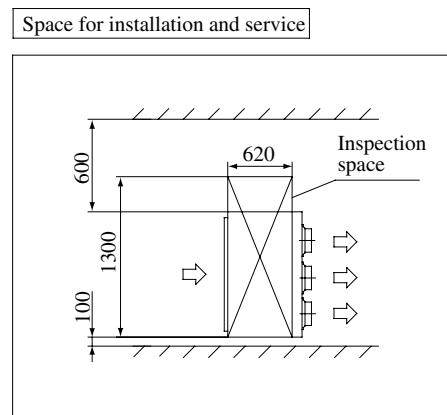
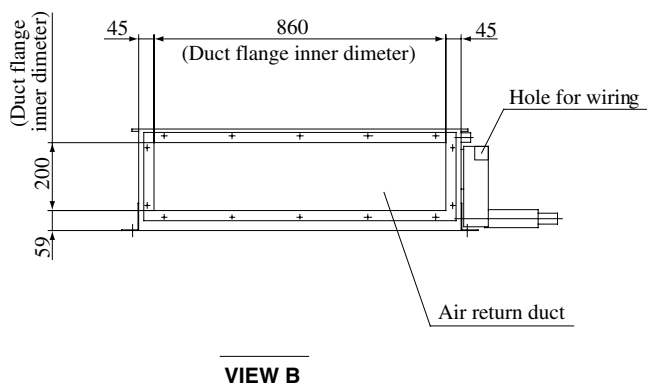
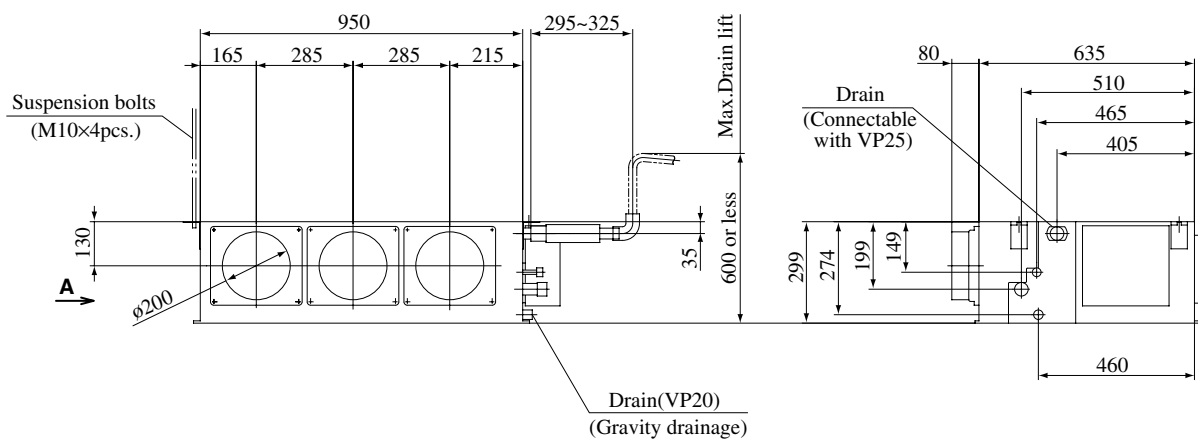
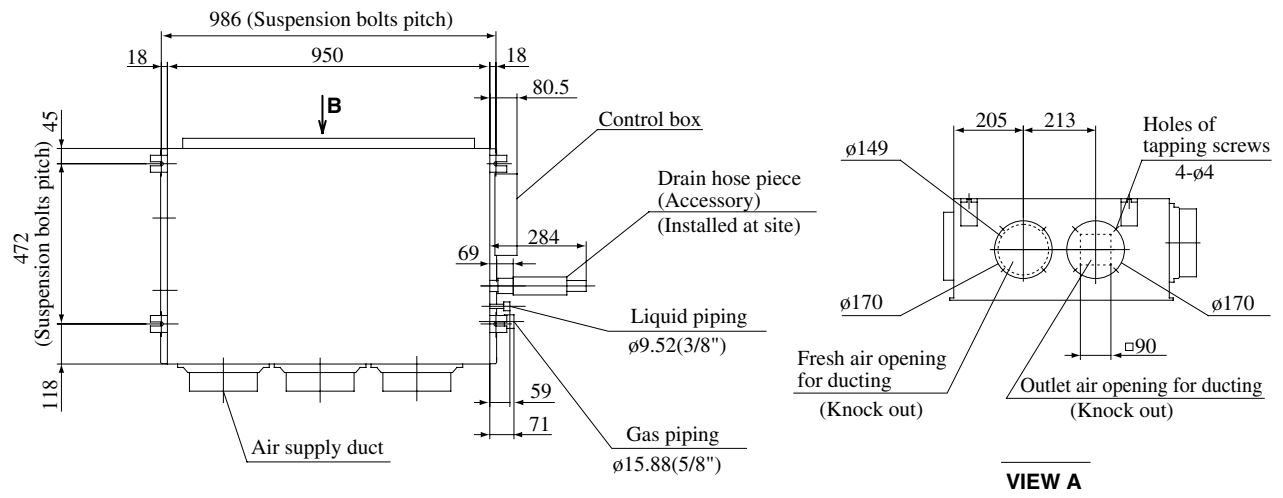
Models FDUMA28KXE5R, 36KXE5R, 45KXE5R, 56KXE5R,

Unit : mm



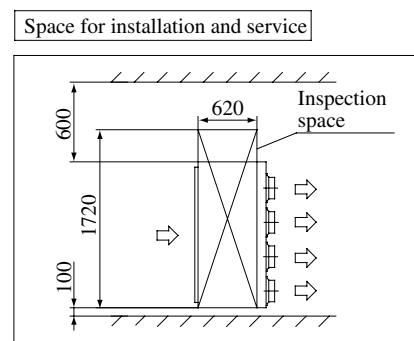
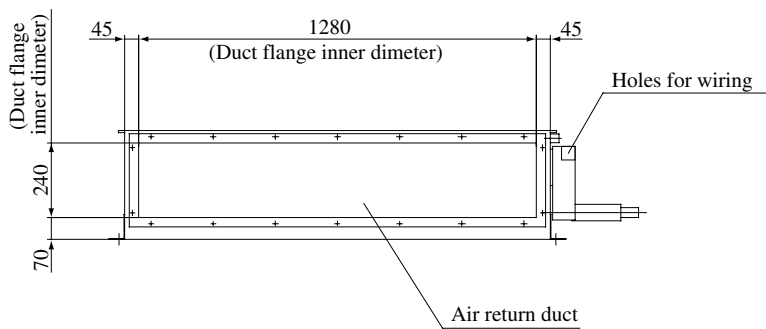
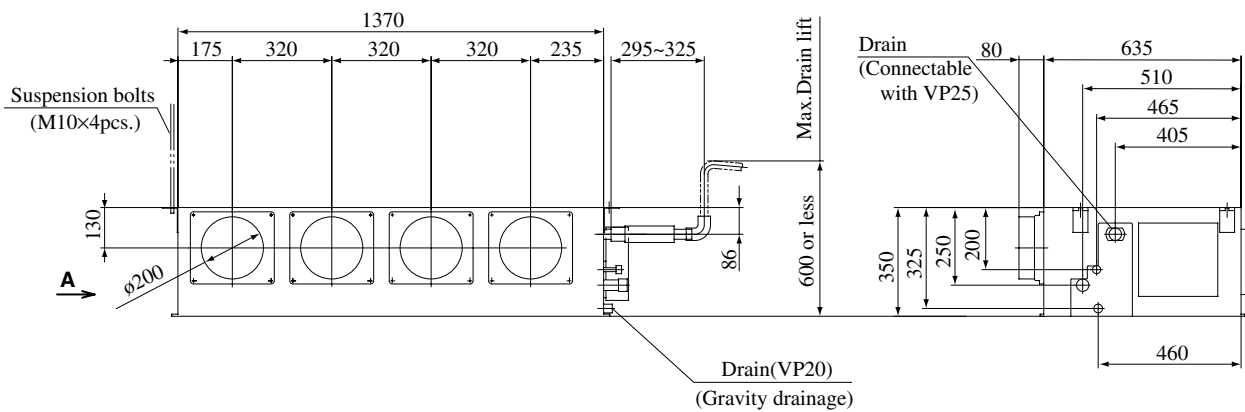
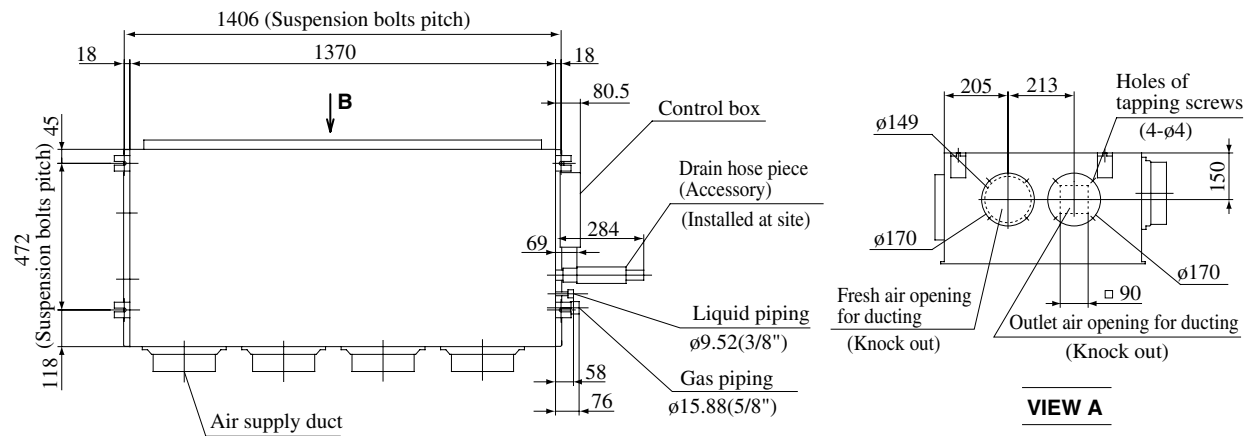
Models FDUMA71KXE5R, 90KXE5R

Unit : mm



Models FDUMA112KXE5R, 140KXE5R

Unit : mm



3.1.3 Characteristics of fan

Satellite ducted type (FDUM)

- External static pressure table

Unit : Pa

Model	Duct specs. Air flow (m ³ /min)	1 spot closing		Standard		Square duct	
		Stan- dard	High ⁽⁴⁾ speed	Stan- dard	High ⁽⁴⁾ speed	Stan- dard	High ⁽¹⁾ speed
FDUMA22	10	-	-	50	85	50	85
FDUMA28,36	12	-	-	50	85	50	85
FDUMA45,56	14	-	-	50	85	50	90
FDUMA71	18	35	70	50	85	55	90
FDUMA90	20	30	65	50	85	55	90
FDUMA112	28	50	80	60	90	65	95
FDUMA140	34	50	75	60	85	65	95

Notes(1) 1 spot closing: Round duct flange at center is removed and shield with a special panel (option).

(2) Standard: ø200 duct are installed at all blowout holes.

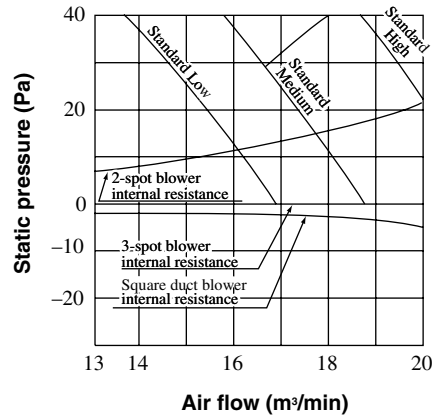
(3) Square duct: All round ducts are removed and replaced with special square duct flanges (option).

(4) When using the high speed setting, turn the dip switch SW9-4 on the indoor PCB to the ON position.

(When setting from the remote controller, select "Hi CEILNG 1")

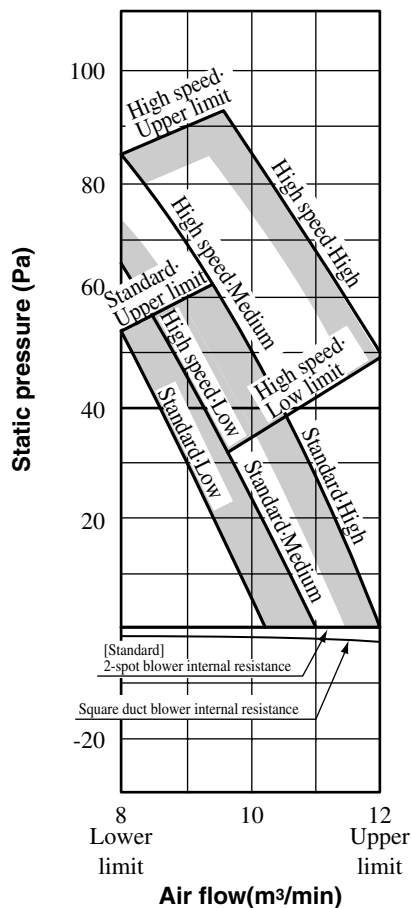
How to interpret the blower characteristics table

Example : Case of FDUMA71KXE5R

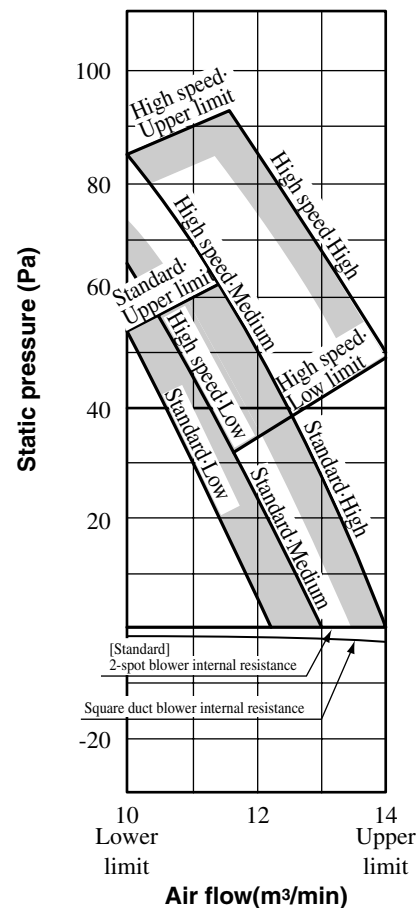


- ① 2-spot blowout.....
Internal resistance increases more than the standard 3-spot blowout.Approx. 14Pa at 17m³/min
- ② Square duct blowout.....
Internal resistance decreases more than the standard round duct (ø200 3-spot). 3Pa at 17m³/min. (External static pressure increases in reverse.)

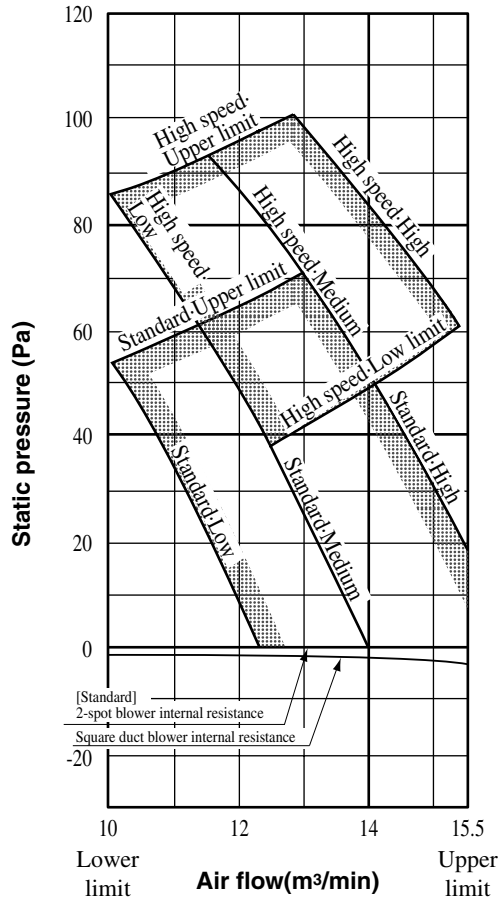
Model FDUMA22KXE5R



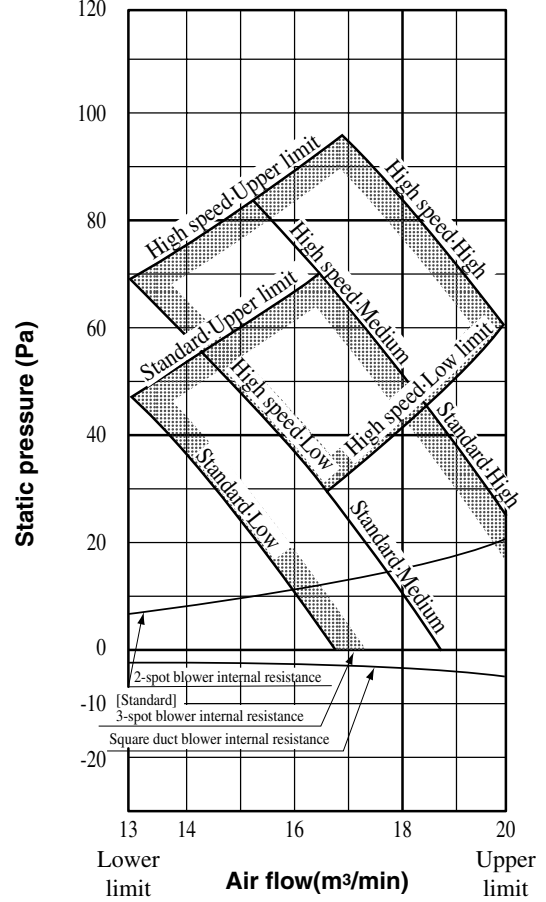
Models FDUMA28KXE5R,36KXE5R



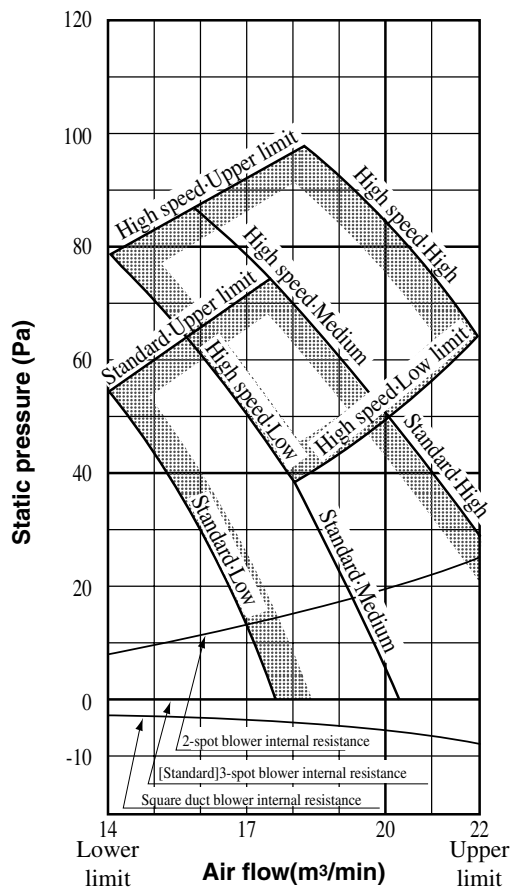
Models FDUMA45KXE5R,56KXE5R



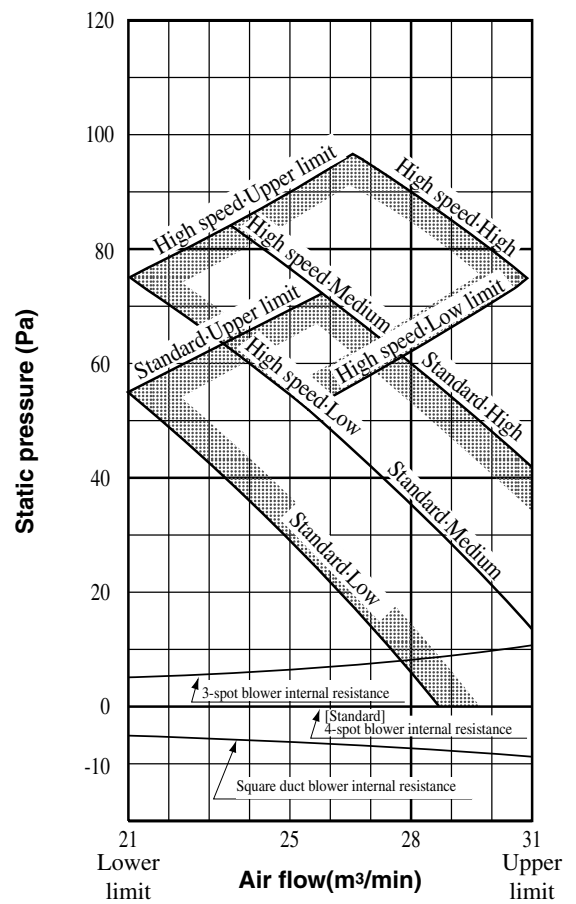
Model FDUMA71KXE5R



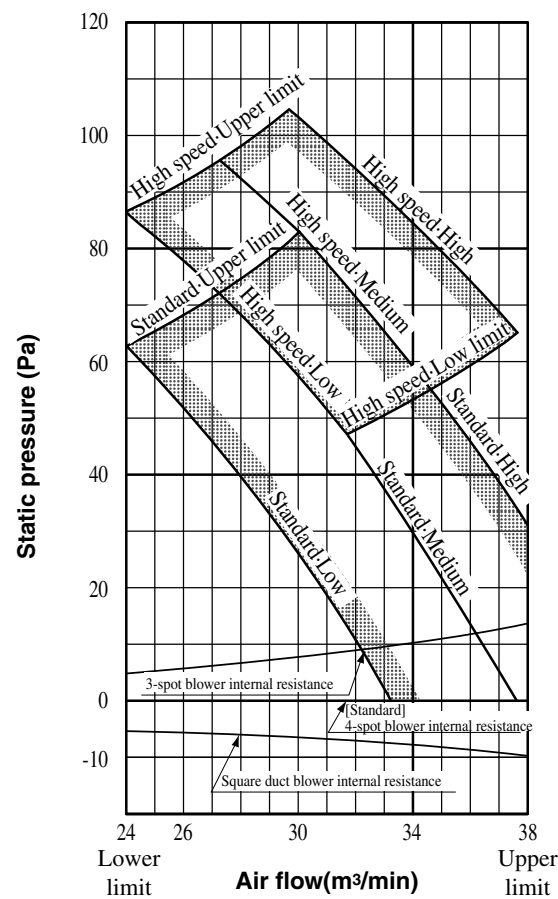
Model FDUMA90KXE5R



Model FDUMA112KXE5R



Model FDUMA140KXE5R



3.1.4 Exterior appearance

Satellite ducted type (FDUM) Zinc steel plate

3.1.5 Noise level

Notes (1) The data are based on the following conditions.

Ambient air temperature: Indoor unit 27°C DB, 19°C WB. Outdoor unit 35°C DB.

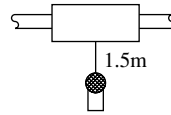
(2) The data in the chart are measured in an anechoic room.

(3) The noise levels measured in the field are usually higher than the data because of reflection.

Satellite ducted type (FDUM)

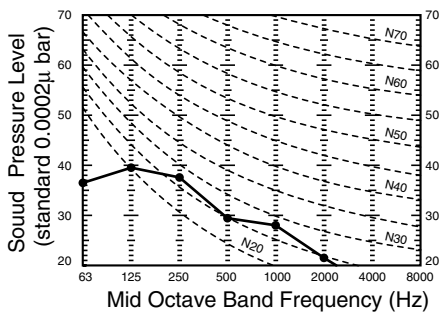
Measured based on JIS B 8616

Mike position as right



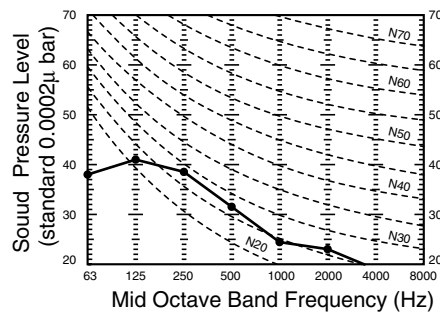
Model FDUMA22KXE5R

Noise level 33dB(A) at HIGH
31dB(A) at MEDIUM
28dB(A) at LOW



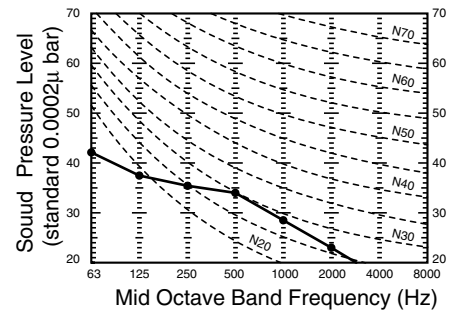
Models FDUMA28KXE5R,36KXE5R

Noise level 34dB(A) at HIGH
32dB(A) at MEDIUM
29dB(A) at LOW



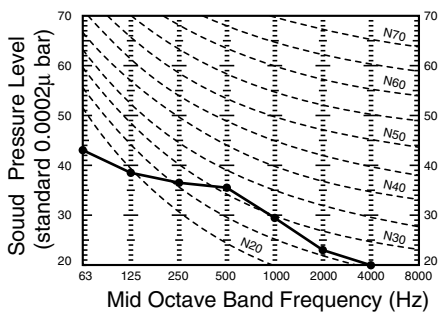
Models FDUMA45KXE5R,56KXE5R 71KXE5R

Noise level 35dB(A) at HIGH
32dB(A) at MEDIUM
29dB(A) at LOW



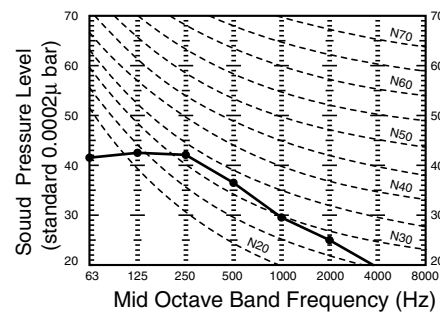
Model FDUMA90KXE5R

Noise level 36dB(A) at HIGH
33dB(A) at MEDIUM
30dB(A) at LOW



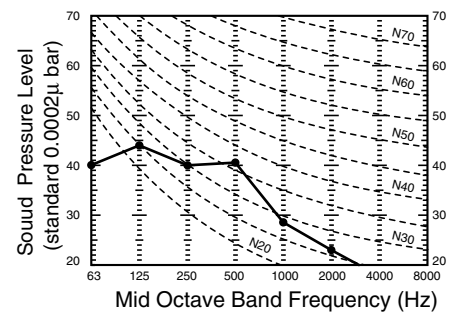
Model FDUMA112KXE5R

Noise level 38dB(A) at HIGH
35dB(A) at MEDIUM
32dB(A) at LOW



Model FDUMA140KXE5R

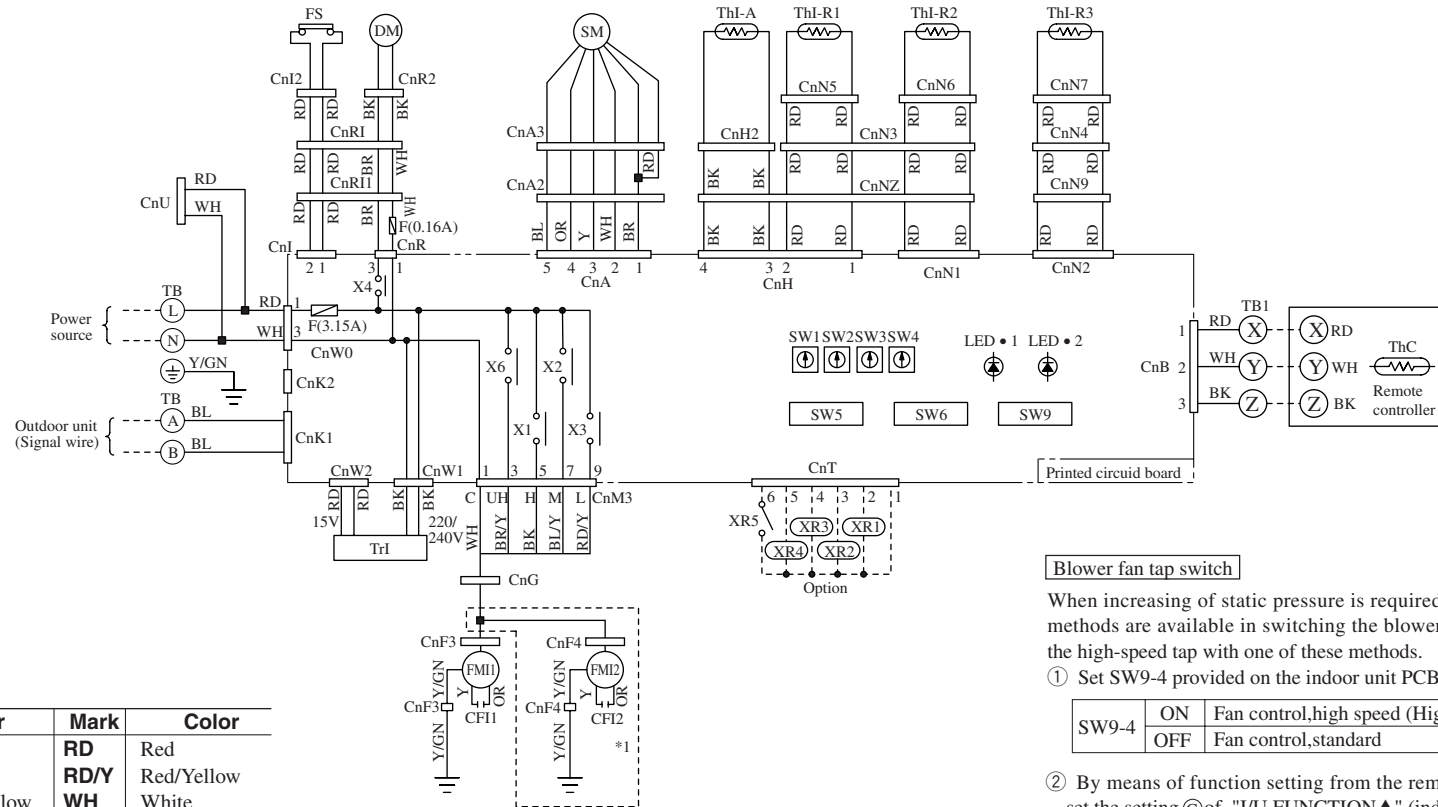
Noise level 39dB(A) at HIGH
37dB(A) at MEDIUM
34dB(A) at LOW



3.1.6 Electrical wiring

Satellite ducted type (FDUM)

Model All models



Color marks

Mark	Color	Mark	Color
BK	Black	RD	Red
BL	Blue	RD/Y	Red/Yellow
BL/Y	Blue/yellow	WH	White
BR	Brown	Y	Yellow
BR/Y	Brown/yellow	Y/GN	Yellow/Green
OR	Orange		

Note(1) A one-motor type installation does not have the circuits shown in an area *1 delineated by a dotted line.

Meaning of marks

Mark	Parts name	Mark	Parts name	Mark	Parts name
FMI1,2	Fan motor	SW1	Indoor unit address ten's place	XR2	Heating output(DC12V output)
CFI1,2	Capacitor for FMI	SW2	Indoor unit address unit's place	XR3	Thermo ON output(DC12V output)
DM	Drain motor	SW3	Outdoor unit address ten's place	XR4	Inspection output(DC12V output)
FS	Float switch	SW4	Outdoor unit address unit's place	XR5	Remote operation input(volt-free contact)
SM	Stepping motor(For Exp.v)	SW6	Model capacity setting	X1,2,3,6	Auxiliary relay(For FM)
ThI-A	Thermistor	TrI	Transformer	X4	Auxiliary relay(For DM)
ThI-R1	Thermistor	F	Fuse	TB	Terminal block(○ mark)
ThI-R2	Thermistor	LED1	Indication lamp(Red)	CnA~Z	Connector
ThI-R3	Thermistor	LED2	Indication lamp(Green)	■mark	Closed-end connector
ThC	Thermistor	XR1	Operation output(DC12V output)		

Blower fan tap switch

When increasing of static pressure is required, the following two methods are available in switching the blower fan tap. Switch to the high-speed tap with one of these methods.

- ① Set SW9-4 provided on the indoor unit PCB to ON.

SW9-4	ON	Fan control, high speed (High ceiling)
	OFF	Fan control, standard

- ② By means of function setting from the remote controller unit, set the setting ③ of "I/U FUNCTION▲" (indoor unit function) to "Hi CEILING 1" (high-speed tap).

Function number ①	Function description ②	Setting ③
01	Hi CEILING SET	Hi CEILING 1

Function of switches

Mark	Function
SW5-1	ON: Test run of condensate pump motor OFF: Normal
SW5-3	ON: Input Reverse Invalid OFF: signal Run stop
SW5-4	ON: Emergency stop signal: valid OFF: Emergency stop signal: Invalid

3.1.7 Sensible heat capacity

Satellite ducted type (FDUM)

Model FDUMA22KXE5R

Air Flow	Outdoor Temp °CDB	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	1.91	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.65	2.14	2.88	2.14
	12	—	—	1.91	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.65	2.14	2.88	2.14
	14	—	—	1.91	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.65	2.14	2.88	2.14
	16	—	—	1.91	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.65	2.14	2.88	2.14
	18	—	—	1.91	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.65	2.14	2.88	2.14
	20	—	—	1.90	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.65	2.14	2.88	2.13
	22	—	—	1.90	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.65	2.14	2.88	2.13
	24	—	—	1.90	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.64	2.14	2.86	2.13
	26	1.60	1.54	1.90	1.79	2.16	1.97	2.29	1.99	2.42	2.00	2.63	2.14	2.84	2.12
	28	1.60	1.53	1.90	1.78	2.15	1.97	2.27	1.98	2.40	1.99	2.60	2.13	2.79	2.11
	30	1.60	1.53	1.90	1.78	2.14	1.96	2.26	1.98	2.38	1.98	2.56	2.12	2.75	2.10
	32	1.59	1.53	1.88	1.78	2.11	1.96	2.23	1.96	2.35	1.97	2.52	2.11	2.70	2.09
	34	1.59	1.52	1.86	1.77	2.09	1.94	2.20	1.95	2.32	1.96	2.48	2.09	2.65	2.07
	35	1.58	1.52	1.85	1.77	2.07	1.94	2.20	1.95	2.30	1.96	2.47	2.09	2.63	2.06
	36	1.58	1.52	1.83	1.76	2.06	1.93	2.18	1.94	2.29	1.95	2.45	2.08	2.61	2.06
	38	1.58	1.52	1.81	1.74	2.04	1.92	2.15	1.94	2.26	1.94	2.41	2.07	2.57	2.05
	39	1.58	1.51	1.80	1.73	2.02	1.92	2.13	1.93	2.24	1.93	2.39	2.06	2.55	2.04

Model FDUMA28KXE5R

Air Flow	Outdoor Temp °CDB	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	2.42	2.16	2.76	2.38	2.92	2.40	3.09	2.41	3.38	2.59	3.67	2.59
	12	—	—	2.42	2.16	2.76	2.38	2.92	2.40	3.09	2.41	3.38	2.59	3.67	2.59
	14	—	—	2.42	2.16	2.76	2.38	2.92	2.40	3.09	2.41	3.38	2.59	3.67	2.59
	16	—	—	2.42	2.16	2.76	2.38	2.92	2.40	3.09	2.41	3.38	2.59	3.67	2.59
	18	—	—	2.42	2.16	2.76	2.38	2.92	2.40	3.09	2.41	3.38	2.59	3.67	2.59
	20	—	—	2.42	2.16	2.76	2.38	2.92	2.40	3.09	2.41	3.38	2.59	3.67	2.59
	22	—	—	2.42	2.16	2.75	2.38	2.92	2.40	3.09	2.41	3.38	2.59	3.67	2.59
	24	—	—	2.42	2.16	2.75	2.38	2.91	2.39	3.08	2.41	3.36	2.58	3.64	2.57
	26	2.04	1.96	2.42	2.16	2.75	2.37	2.91	2.39	3.07	2.41	3.34	2.57	3.61	2.57
	28	2.03	1.95	2.42	2.15	2.74	2.37	2.89	2.39	3.05	2.40	3.30	2.56	3.55	2.54
	30	2.03	1.95	2.41	2.15	2.72	2.37	2.88	2.38	3.03	2.39	3.26	2.54	3.50	2.53
	32	2.02	1.94	2.39	2.14	2.69	2.34	2.84	2.36	2.99	2.38	3.21	2.53	3.43	2.51
	34	2.02	1.94	2.36	2.13	2.66	2.33	2.80	2.35	2.95	2.37	3.16	2.51	3.37	2.48
	35	2.02	1.94	2.35	2.13	2.64	2.32	2.80	2.35	2.93	2.35	3.14	2.50	3.35	2.48
	36	2.02	1.94	2.34	2.12	2.62	2.31	2.77	2.32	2.91	2.35	3.12	2.50	3.32	2.47
	38	2.01	1.93	2.31	2.10	2.59	2.30	2.73	2.31	2.87	2.34	3.07	2.48	3.26	2.45
	39	2.01	1.93	2.29	2.10	2.57	2.30	2.71	2.31	2.85	2.31	3.05	2.47	3.24	2.44

Model FDUMA36KXE5R

Air Flow	Outdoor Temp °CDB	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
		TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	3.12	2.77	3.54	3.06	3.75	3.08	3.97	3.11	4.34	3.31	4.72	3.30
	12	—	—	3.12	2.77	3.54	3.06	3.75	3.08	3.97	3.11	4.34	3.31	4.72	3.30
	14	—	—	3.12	2.77	3.54	3.06	3.75	3.08	3.97	3.11	4.34	3.31	4.72	3.30
	16	—	—	3.12	2.77	3.54	3.06	3.75	3.08	3.97	3.11	4.34	3.31	4.72	3.30
	18	—	—	3.12	2.77	3.54	3.06	3.75	3.08	3.97	3.11	4.34	3.31	4.72	3.30
	20	—	—	3.11	2.77	3.54	3.06	3.75	3.08	3.97	3.11	4.34	3.31	4.71	3.30
	22	—	—	3.11	2.77	3.54	3.06	3.75	3.08	3.97	3.11	4.34	3.31	4.71	3.30
	24	—	—	3.11	2.77	3.54	3.06	3.75	3.08	3.96	3.10	4.32	3.31	4.68	3.29
	26	2.62	2.52	3.11	2.77	3.53	3.05	3.74	3.08	3.95	3.10	4.30	3.30	4.64	3.28
	28	2.61	2.51	3.11	2.77	3.52	3.05	3.72	3.07	3.92	3.09	4.25	3.28	4.57	3.26
	30	2.61	2.51	3.10	2.77	3.50	3.04	3.70	3.06	3.90	3.08	4.19	3.26	4.50	3.24
	32	2.60	2.50	3.07	2.75	3.46	3.03	3.65	3.04	3.84	3.06	4.13	3.24	4.41	3.21
	34	2.60	2.49	3.04	2.74	3.42	3.01	3.60	3.03	3.79	3.04	4.06	3.22	4.33	3.19
	35	2.59	2.49	3.02	2.73	3.39	3.00	3.60	3.02	3.77	3.03	4.04	3.21	4.30	3.18
	36	2.59	2.49	3.00	2.73	3.37	2.99	3.56	3.01	3.74	3.02	4.01	3.20	4.27	3.17
	38	2.58	2.48	2.97	2.71	3.33	2.97	3.51	2.99	3.69	3.00	3.95	3.18	4.20	3.15
	39	2.58	2.48	2.95	2.70	3.31	2.96	3.49	2.98	3.67	2.99	3.92	3.17	4.17	3.14

Note (1) Symbols are as follows :

TC :Total cooling capacity (kw)
SHC :Sensible heat capacity (kw)

Model FDUMA45KXE5R

Air Flow	Outdoor Temp	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
	°CDB	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	3.90	3.32	4.43	3.65	4.69	3.69	4.96	3.72	5.43	3.97	5.90	3.96
	12	—	—	3.90	3.32	4.43	3.65	4.69	3.69	4.96	3.72	5.43	3.97	5.90	3.96
	14	—	—	3.90	3.32	4.43	3.65	4.69	3.69	4.96	3.72	5.43	3.97	5.90	3.96
	16	—	—	3.90	3.32	4.43	3.65	4.69	3.69	4.96	3.72	5.43	3.97	5.90	3.96
	18	—	—	3.90	3.32	4.43	3.65	4.69	3.69	4.96	3.72	5.43	3.97	5.90	3.96
	20	—	—	3.89	3.32	4.43	3.65	4.69	3.69	4.96	3.72	5.43	3.97	5.89	3.96
	22	—	—	3.89	3.32	4.42	3.65	4.69	3.69	4.96	3.72	5.43	3.97	5.89	3.96
	24	—	—	3.89	3.32	4.42	3.65	4.68	3.69	4.95	3.72	5.40	3.96	5.85	3.95
	26	3.28	3.14	3.89	3.32	4.41	3.65	4.68	3.68	4.94	3.71	5.37	3.95	5.80	3.93
	28	3.27	3.14	3.88	3.31	4.40	3.64	4.65	3.67	4.91	3.69	5.31	3.93	5.71	3.91
	30	3.26	3.13	3.88	3.31	4.37	3.63	4.62	3.66	4.87	3.68	5.24	3.91	5.62	3.88
	32	3.25	3.12	3.84	3.30	4.32	3.61	4.56	3.64	4.81	3.66	5.16	3.88	5.52	3.85
	34	3.24	3.11	3.80	3.28	4.27	3.59	4.50	3.61	4.74	3.64	5.08	3.85	5.42	3.81
	35	3.24	3.11	3.78	3.27	4.24	3.58	4.50	3.61	4.71	3.62	5.04	3.84	5.38	3.80
	36	3.24	3.11	3.75	3.26	4.22	3.57	4.45	3.59	4.68	3.61	5.01	3.83	5.33	3.78
	38	3.23	3.10	3.71	3.24	4.16	3.54	4.39	3.57	4.62	3.58	4.93	3.80	5.25	3.76
	39	3.23	3.10	3.69	3.23	4.14	3.53	4.36	3.56	4.59	3.57	4.90	3.79	5.21	3.75

Model FDUMA56KXE5R

Air Flow	Outdoor Temp	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
	°CDB	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	4.85	3.85	5.51	4.25	5.84	4.29	6.17	4.33	6.75	4.62	7.34	4.61
	12	—	—	4.85	3.85	5.51	4.25	5.84	4.29	6.17	4.33	6.75	4.62	7.34	4.61
	14	—	—	4.85	3.85	5.51	4.25	5.84	4.29	6.17	4.33	6.75	4.62	7.34	4.61
	16	—	—	4.85	3.85	5.51	4.25	5.84	4.29	6.17	4.33	6.75	4.62	7.34	4.61
	18	—	—	4.85	3.85	5.51	4.25	5.84	4.29	6.17	4.33	6.75	4.62	7.34	4.61
	20	—	—	4.84	3.85	5.51	4.25	5.84	4.29	6.17	4.33	6.75	4.62	7.33	4.61
	22	—	—	4.84	3.85	5.50	4.24	5.84	4.29	6.17	4.33	6.75	4.62	7.33	4.61
	24	—	—	4.84	3.85	5.50	4.24	5.83	4.29	6.16	4.33	6.72	4.60	7.27	4.59
	26	4.08	3.66	4.84	3.85	5.49	4.24	5.82	4.28	6.15	4.32	6.69	4.59	7.22	4.57
	28	4.07	3.65	4.83	3.85	5.47	4.23	5.78	4.27	6.10	4.30	6.61	4.56	7.11	4.53
	30	4.06	3.65	4.83	3.84	5.44	4.22	5.75	4.25	6.06	4.28	6.52	4.52	6.99	4.50
	32	4.05	3.64	4.78	3.82	5.38	4.19	5.68	4.22	5.98	4.25	6.42	4.49	6.87	4.44
	34	4.04	3.64	4.73	3.80	5.31	4.16	5.61	4.19	5.90	4.22	6.32	4.45	6.74	4.40
	35	4.03	3.64	4.70	3.79	5.28	4.15	5.60	4.19	5.86	4.20	6.28	4.43	6.69	4.39
	36	4.03	3.64	4.67	3.78	5.25	4.13	5.54	4.17	5.82	4.19	6.23	4.42	6.64	4.37
	38	4.02	3.63	4.61	3.75	5.18	4.10	5.47	4.14	5.75	4.16	6.14	4.38	6.53	4.33
	39	4.02	3.63	4.59	3.74	5.15	4.09	5.43	4.12	5.71	4.14	6.09	4.37	6.48	4.32

Model FDUMA71KXE5R

Air Flow	Outdoor Temp	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
	°CDB	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	6.15	4.93	6.99	5.42	7.41	5.47	7.82	5.52	8.56	5.89	9.30	5.89
	12	—	—	6.15	4.93	6.99	5.42	7.41	5.47	7.82	5.52	8.56	5.89	9.30	5.89
	14	—	—	6.15	4.93	6.99	5.42	7.41	5.47	7.82	5.52	8.56	5.89	9.30	5.89
	16	—	—	6.15	4.93	6.99	5.42	7.41	5.47	7.82	5.52	8.56	5.89	9.30	5.89
	18	—	—	6.15	4.93	6.99	5.42	7.41	5.47	7.82	5.52	8.56	5.89	9.30	5.89
	20	—	—	6.14	4.92	6.99	5.42	7.41	5.47	7.82	5.52	8.56	5.89	9.29	5.89
	22	—	—	6.13	4.92	6.98	5.42	7.41	5.47	7.82	5.52	8.56	5.89	9.29	5.89
	24	—	—	6.13	4.92	6.97	5.41	7.39	5.47	7.81	5.51	8.52	5.87	9.22	5.86
	26	5.17	4.66	6.13	4.92	6.97	5.41	7.38	5.47	7.80	5.51	8.48	5.86	9.15	5.83
	28	5.15	4.66	6.13	4.92	6.94	5.40	7.33	5.45	7.74	5.48	8.38	5.82	9.01	5.79
	30	5.15	4.65	6.12	4.92	6.90	5.38	7.29	5.43	7.68	5.46	8.27	5.78	8.87	5.74
	32	5.13	4.65	6.06	4.89	6.82	5.35	7.20	5.39	7.58	5.42	8.14	5.74	8.70	5.68
	34	5.12	4.64	5.99	4.86	6.74	5.32	7.11	5.35	7.48	5.39	8.02	5.69	8.55	5.63
	35	5.11	4.64	5.96	4.84	6.70	5.30	7.10	5.35	7.43	5.37	7.96	5.67	8.48	5.61
	36	5.11	4.64	5.92	4.83	6.65	5.28	7.02	5.32	7.38	5.35	7.90	5.64	8.41	5.59
	38	5.10	4.63	5.85	4.80	6.57	5.25	6.93	5.28	7.28	5.31	7.78	5.60	8.28	5.53
	39	5.09	4.63	5.81	4.78	6.52	5.23	6.88	5.26	7.23	5.29	7.72	5.58	8.21	5.51

Note (1) Symbols are as follows :

TC :Total cooling capacity (kw)
SHC :Sensible heat capacity (kw)

Model FDUMA90KXE5R

Air Flow	Outdoor Temp	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
	°CDB	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	7.79	5.91	8.86	6.48	9.39	6.56	9.92	6.63	10.85	7.05	11.79	7.05
	12	—	—	7.79	5.91	8.86	6.48	9.39	6.56	9.92	6.63	10.85	7.05	11.79	7.05
	14	—	—	7.79	5.91	8.86	6.48	9.39	6.56	9.92	6.63	10.85	7.05	11.79	7.05
	16	—	—	7.79	5.91	8.86	6.48	9.39	6.56	9.92	6.63	10.85	7.05	11.79	7.05
	18	—	—	7.79	5.91	8.86	6.48	9.39	6.56	9.92	6.63	10.85	7.05	11.79	7.05
	20	—	—	7.79	5.90	8.86	6.48	9.39	6.56	9.92	6.63	10.85	7.05	11.78	7.05
	22	—	—	7.78	5.90	8.85	6.48	9.39	6.56	9.92	6.63	10.85	7.05	11.78	7.05
	24	—	—	7.78	5.90	8.84	6.47	9.37	6.56	9.90	6.62	10.80	7.02	11.69	7.02
	26	6.55	5.57	7.78	5.90	8.83	6.47	9.36	6.55	9.88	6.61	10.75	7.00	11.60	6.99
	28	6.53	6.56	7.77	5.89	8.79	6.45	9.30	6.53	9.81	6.58	10.62	6.96	11.42	6.92
	30	6.53	6.56	7.76	5.89	8.75	6.44	9.24	6.50	9.74	6.55	10.49	6.90	11.24	6.85
	32	6.51	5.55	7.68	5.85	8.64	6.39	9.13	6.46	9.61	6.50	10.32	6.84	11.03	6.78
	34	6.49	5.54	7.60	5.82	8.54	6.35	9.01	6.40	9.49	6.45	10.16	6.78	10.84	6.71
	35	6.48	5.54	7.55	5.80	8.49	6.32	9.00	6.39	9.42	6.43	10.09	6.75	10.76	6.68
	36	6.48	5.54	7.51	5.78	8.43	6.30	8.90	6.35	9.36	6.40	10.02	6.72	10.67	6.65
	38	6.46	5.53	7.42	5.73	8.33	6.25	8.78	6.30	9.23	6.34	9.86	6.66	10.49	6.58
	39	6.45	5.52	7.37	5.71	8.27	6.23	8.72	6.28	9.17	6.32	9.79	6.64	10.41	6.55

Model FDUMA112KXE5R

Air Flow	Outdoor Temp	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
		°CDB	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC
Hi	10	—	—	9.70	7.75	11.02	8.53	11.68	8.62	12.34	8.69	13.51	9.26	14.67	9.27
	12	—	—	9.70	7.75	11.02	8.53	11.68	8.62	12.34	8.69	13.51	9.26	14.67	9.27
	14	—	—	9.70	7.75	11.02	8.53	11.68	8.62	12.34	8.69	13.51	9.26	14.67	9.27
	16	—	—	9.70	7.75	11.02	8.53	11.68	8.62	12.34	8.69	13.51	9.26	14.67	9.27
	18	—	—	9.70	7.75	11.02	8.53	11.68	8.62	12.34	8.69	13.51	9.26	14.67	9.27
	20	—	—	9.69	7.75	11.02	8.53	11.68	8.62	12.34	8.69	13.51	9.26	14.66	9.27
	22	—	—	9.68	7.74	11.01	8.53	11.68	8.62	12.34	8.69	13.51	9.26	14.66	9.27
	24	—	—	9.68	7.74	11.00	8.52	11.66	8.61	12.32	8.68	13.44	9.24	14.55	9.23
	26	8.15	7.36	9.68	7.74	10.99	8.52	11.65	8.61	12.30	8.67	13.37	9.22	14.44	9.18
	28	8.13	7.35	9.67	7.74	10.94	8.50	11.57	8.57	12.21	8.64	13.22	9.16	14.21	9.10
	30	8.12	7.35	9.65	7.74	10.89	8.48	11.50	8.55	12.12	8.60	13.05	9.10	13.99	9.02
	32	8.10	7.33	9.55	7.69	10.75	8.42	11.36	8.49	11.96	8.54	12.85	9.02	13.73	8.94
	34	8.08	7.32	9.45	7.65	10.63	8.36	11.21	8.43	11.80	8.48	12.64	8.95	13.48	8.85
	35	8.06	7.32	9.40	7.62	10.56	8.33	11.20	8.42	11.73	8.45	12.56	8.92	13.38	8.82
	36	8.06	7.32	9.34	7.60	10.49	8.30	11.08	8.37	11.65	8.42	12.47	8.88	13.27	8.78
	38	8.04	7.31	9.23	7.55	10.36	8.24	10.93	8.32	11.49	8.36	12.28	8.82	13.06	8.71
	39	8.03	7.30	9.17	7.52	10.29	8.22	10.85	8.29	11.41	8.33	12.19	8.78	12.96	8.68

Model FDUMA140KXE5R





Air Flow	Outdoor Temp	Indoor Temp													
		14°CWB		16°CWB		18°CWB		19°CWB		20°CWB		22°CWB		24°CWB	
	°CDB	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC	TC	SHC
Hi	10	—	—	12.12	9.54	13.78	10.49	14.60	10.60	15.43	10.69	16.88	11.40	18.34	11.39
	12	—	—	12.12	9.54	13.78	10.49	14.60	10.60	15.43	10.69	16.88	11.40	18.34	11.39
	14	—	—	12.12	9.54	13.78	10.49	14.60	10.60	15.43	10.69	16.88	11.40	18.34	11.39
	16	—	—	12.12	9.54	13.78	10.49	14.60	10.60	15.43	10.69	16.88	11.40	18.34	11.39
	18	—	—	12.12	9.54	13.78	10.49	14.60	10.60	15.43	10.69	16.88	11.40	18.34	11.39
	20	—	—	12.11	9.53	13.78	10.49	14.60	10.60	15.43	10.69	16.88	11.40	18.33	11.38
	22	—	—	12.10	9.53	13.76	10.48	14.60	10.60	15.43	10.69	16.88	11.40	18.33	11.38
	24	—	—	12.10	9.53	13.75	10.48	14.57	10.59	15.40	10.68	16.80	11.36	18.19	11.34
	26	10.19	9.01	12.10	9.53	13.73	10.47	14.56	10.58	15.37	10.67	16.72	11.33	18.05	11.29
	28	10.16	9.00	12.08	9.52	13.68	10.45	14.46	10.54	15.26	10.62	16.52	11.26	17.77	11.19
	30	10.15	9.00	12.07	9.51	13.61	10.42	14.38	10.51	15.15	10.58	16.31	11.18	17.49	11.10
	32	10.12	8.98	11.94	9.46	13.44	10.35	14.20	10.43	14.95	10.50	16.06	11.07	17.16	10.99
	34	10.09	8.97	11.82	9.40	13.29	10.27	14.01	10.36	14.76	10.42	15.81	10.98	16.86	10.86
	35	10.08	8.96	11.75	9.37	13.20	10.23	14.00	10.35	14.66	10.38	15.69	10.94	16.73	10.82
	36	10.08	8.96	11.68	9.31	13.12	10.20	13.85	10.29	14.56	10.35	15.58	10.90	16.59	10.78
	38	10.05	8.95	11.54	9.25	12.95	10.13	13.66	10.22	14.36	10.27	15.34	10.82	16.32	10.69
	39	10.04	8.94	11.47	9.22	12.87	10.09	13.57	10.18	14.27	10.23	15.23	10.77	16.20	10.64

Note (1) Symbols are as follows :

TC :Total cooling capacity (kw)
SHC :Sensible heat capacity (kw)

3.2 APPLICATION DATA


SAFETY PRECAUTIONS

- Please read these “Safety Precautions” first then accurately execute the installation work.
 - Though the precautionary points indicated herein are divided under two headings,  **WARNING** and  **CAUTION**, those points which are related to the strong possibility of an installation done in error resulting in death or serious injury are listed in the  **WARNING** section. However, there is also a possibility of serious consequences in relationship to the points listed in the  **CAUTION** section as well.
- In either case, important safety related information is indicated, so by all means, properly observe all that is mentioned.
- After completing the installation, along with confirming that no abnormalities were seen from the operation tests, please explain operating methods as well as maintenance methods to the user (customer) of this equipment, based on the owner’s manual. Moreover, ask the customer to keep this sheet together with the owner’s manual.

WARNING

- Installation should be performed by the dealer or a company specializing in this type of installation. If you install the equipment yourself, installation errors could result in water leaks, electric shock, and/or a fire, as well as other hazards.
- Conduct installation work in accordance with the instructions in this installation manual. Installation errors could result in water leaks, electric shock, or fire.
- Sling the unit at the specified points with ropes properly retied for the weight in lifting it for portage. An improper manner of portage can result in a fail of the unit resulting in an accident involving personal death or injury.
- When installing a unit in a small room, take measure so that if the refrigerant leaks, it does not exceed the concentration limit. For information regarding measures to prevent the concentration limit from being exceeded, please contact the dealer.
- If refrigerant leaks and the concentration limit is exceeded, suffocation could occur.
- Install the equipment in a location that can sufficiently support the weight of the equipment. If the area is not strong enough, an accident could result from the unit falling.
- Install the equipment in a location that can withstand strong winds, such as typhoons, and earthquakes. If the installation is not secure, an accident could result from the unit falling.
- Always turn off power before work is performed inside the unit such as for installation or servicing. A failure to observe this instruction can cause a danger or electric shock.
- Electrical work should be done by a licensed electrician who shall do the work in accordance with the Technical Standards Regarding Electrical Equipment, Indoor Wiring Provisions, and this installation manual. The electrician shall use specified circuit for the equipment. If the power supply circuit capacity is insufficient or the work is not done correctly, it could result in electric shock or a fire.
- For wiring, the specified cable should be used, the connections should be secure, and the fixtures shall be strong enough to prevent cables from being pulled out from the terminal connections. Incorrect connections or work fixtures could result in heat generation or a fire.
- In cabling, arrange cables suitably so that they may not get off their support and then fix the service panel securely. Improper installation can cause heat generation and a resultant fire. Please prevent any substance other than the specified refrigerant (R410A) such as air from entering the refrigerant cycle in installing or moving the air conditioning system. Contamination by air or a foreign substance can cause an abnormal pressure build-up inside the refrigerant cycle and a resultant explosion and personal injury.
- Use only parts supplied with the unit and specified supply parts for installation. The use of unauthorized parts may cause the leaking of water or electricity causing a danger of electric shock or a fire, a refrigerant leak, performance degradation, and control failures.
- Do not open operation valves (either liquid or gas or both) until refrigerant piping, an air-tightness test and an air purge are completed. When a leak of refrigerant gas occurs during piping work, stop brazing pipes and ventilate the room. Refrigerant gas, when it comes into contact with bare fire, can generate a toxic gas.
- When installation is completed, check for refrigerant gas leaks. If the refrigerant gas leaks indoors, it could come in contact with a fan heater, burner, or hot plate, which could generate a poisonous gas.

CAUTION

- Ground the equipment. Do not connect the ground wire to gas piping, water piping, a lightning rod, or telephone ground wires. If grounding is not performed correctly electric shock could occur. 
- Depending on the installation location, a circuit breaker may need to be installed. If a circuit breaker is not installed, electric shock may occur.
- Please follow this manual faithfully in performing installation work. Improper installation work can cause abnormal vibrations and noise generation.
- Do not install the equipment in areas where there is danger of flammable gas leaks. If such gas does leak it could collect around the units and cause a fire.
- Install the drain piping in accordance with the installation manual so that it properly discharges waste water and is maintained at a temperature that prevents condensation.
- Do not install the outdoor unit where winds from its fan blow directly onto a plant, etc. Winds can affect adversely to the plant, etc.
- Secure a space for inspection and maintenance as specified in the manual. An insufficient space can result in an accident such as a fall from the installation point and a resultant personal injury.
- When the outdoor unit is installed on a roof or at an elevated point, provide permanent ladders and handrails along the access route and fences and handrails around the outdoor unit.
- In tightening a flare nut, use a double spanner and observe the specified tightening torque. Care must be taken so as not to over-tighten a nut and damage the flare part. (Please refer to the tightening torque) The loosening or damage of the flare part can cause a refrigerant gas leak and a resultant lack-of-oxygen accident.
- Please dress the refrigerant piping with a heat insulation material for prevention of dew condensation. Improper heat insulation for prevention of dew condensation can cause the leaking or dripping of water and a resultant soaking of household effects.
- When refrigerant piping is completed, check its air-tightness with nitrogen gas to make sure it does not have a leak. A leak of refrigerant gas in a narrow room beyond the safety limit concentration can cause a lack-of oxygen accident.
- If the humidity exceeds 80% or the drain or piping become clogged, condensation from the indoor unit could drip and cause damage. Please do not install the indoor units above items of furniture, etc. that you do not want to get wet. Also, do not place items that you do not want to get wet underneath the indoor units.

(i) **Satellite ducted type (FDUM)**

(i) **Selection of installation location**

1) Avoid installation and use at those places listed below.

a) Places exposed to oil splashes or steam (e.g. kitchens and machine plants).

Installation and use at such places will incur deteriorations in the performance or corrosion with the heat exchanger or damage in molded synthetic resin parts.

b) Places where corrosive gas (such as sulfurous acid gas) or inflammable gas (thinner, gasoline, etc.) is generated or remains. Installation and use at such places will cause corrosion in the heat exchanger and damage in molded synthetic resin parts.

c) Places adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals. Generated noise may cause malfunctioning of the controller.

2) Select places for installation satisfying the following conditions and, at the same time, obtain the consent on the part of your client user,.

a) Places where chilled or heated air circulates freely. When the installation height exceeds 3m, warmed air stays close to the ceiling. In such cases, suggest your client users to install air circulators.

b) Places where perfect drainage can be prepared and sufficient drainage gradient is available.

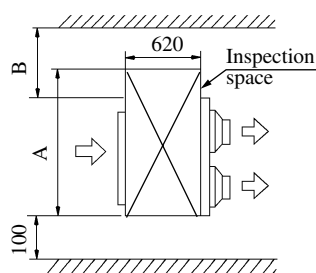
c) Places free from air disturbances to the return air port and supply hole of the indoor unit, places where the fire alarm may not malfunction to short circuit.

d) Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%.

(This unit is tested under ISO installation conditions to make sure that there are no defects. However, if it is operated under conditions of high humidity that exceed the conditions above, there is danger of condensate falling from the unit. If there is a possibility that the unit will be used under such conditions, dress 10~20 mm of insulation on the entire unit body, the piping and drain pipe.)

3) Check if the selected place for installation is rigid enough to stand the weight of the unit.

Otherwise, apply reinforcement using boards and beams before starting the installation work.



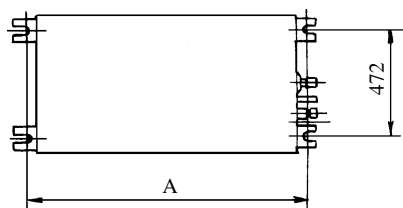
Unit : mm

Models	Mark	A	B
FDUMA22, 28, 36, 45, 56		1100	600
FDUMA71, 90		1300	600
FDUMA112, 140		1720	600

(ii) Suspension

Be sure to observe the finished length of the suspension bolts given below.

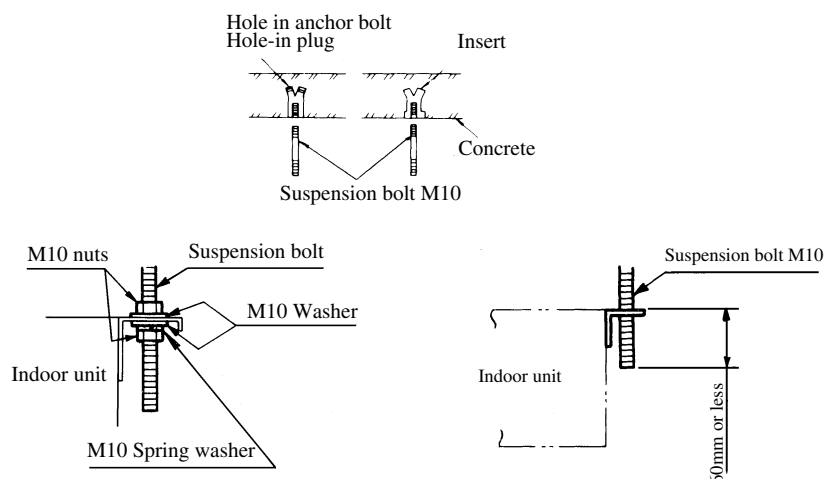
Unit : mm



Models	Mark	A
FDUMA22, 28, 36, 45, 56		786
FDUMA71, 90		986
FDUMA112, 140		1406

1) Fixing the suspension bolt (customer ordered parts M10)

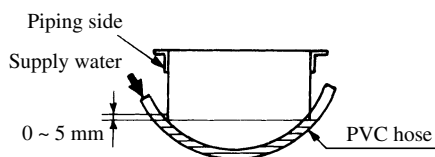
Securely fix the suspension bolt as illustrated below or in another way.



2) Adjusting the unit's levelness

a) Adjust the out-levelness using a level vial or by the following method.

- Make adjustment so that the relation between the lower surface of the indoor unit proper and water level in the hose becomes given below.



Bring the piping side slightly lower

b) Unless the levelness is adjusted properly, the malfunction of the float switch will occur.

3) Blower fan tap switch

The following two methods are available in switching the blower fan tap. Switch to the high-speed tap with one of these methods.

- ① Set SW9-4 provided on the indoor unit PCB to ON.
- ② By means of function setting from the remote control unit, set the setting ③ of "I/U FUNCTION ▲" (indoor unit function) to "Hi CEILING 1" (high-speed tap) as shown right.

For the details of operating procedures, please refer to the installation manual of your remote control unit.

SW9-4	ON	Fan control,high speed (High ceiling)
	OFF	Fan control,standard

Function number ①	Function description ②	Setting ③
01	Hi CEILING SET	Hi CEILING 1

(iii) Duct work

① Supply air duct

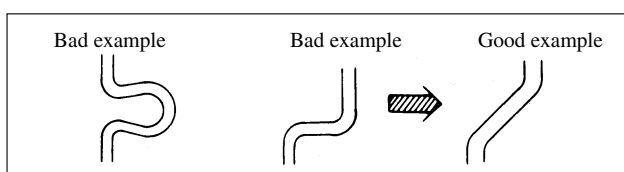
- 1-spot, 2-spot, 3-spot and 4-spot with $\varnothing 200$ type duct are the standard specifications. Determine the number of spots based on following table.

FDUMA22	FDUMA28, 36, 45, 56	FDUMA71, 90	FDUMA112, 140
1-spot	2-spot	2 ~ 3-spot ⁽¹⁾	3 ~ 4-spot ⁽²⁾

Notes (1) Shield the central supply air port for 2-spot.

(2) Shield the supply air port around the center for 3-spot.

- Limit the difference in length between spots at less than 2:1.
- Reduce the length of duct as much as possible.
- Reduce the number of bends as much as possible. (Corner R should be as larger as possible.)



- Use a band, etc. to connect the indoor unit and the supply air duct flange.
- Conduct the duct installation work before finishing the ceiling.

② Access door

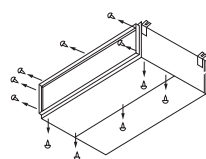
Access door must be provided without fail.

• Dimensions of access door and service space

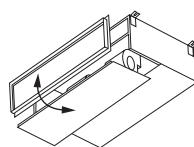
(See exterior dimensions in page 200 to 203.)

③ Return air port

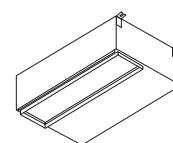
- When shipped, the return air port lies on the back.
- When connecting the duct to the return air port, remove the air filter if it is fitted to return air port.
- When placing the return air port to carry out suction from the bottom side, use the following procedure to replace the return air duct joint and the bottom plate.



- Remove the screws which fasten the bottom plate and the duct joint on the return air port of the unit.



- Replace the removed bottom plate and duct joint.

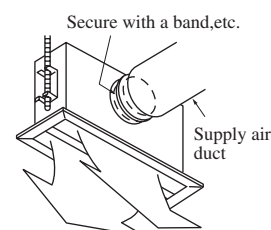


- Fit the duct joint with a screw, fit the bottom plate.

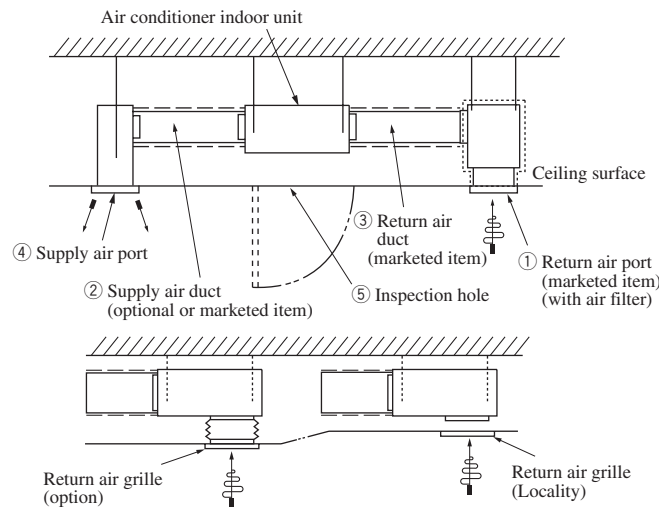
- Make sure to insulate the duct to prevent dewing on it.

④ Install the specific supply air duct in a location where the air will circulate to the entire room.

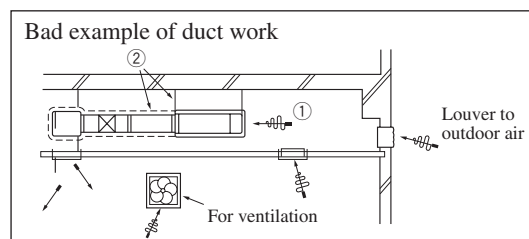
- The duct connection is specific to the 200 circular duct.
- Conduct the installation of the specific supply air hole and the connection of the duct before attaching them to the ceiling.
- Insulate the area where the duct is secured by a band for dew condensation prevention.



- ⑤ Make sure provide an inspection hole on the ceiling. It is indispensable to service electric equipment, motor, functional components and cleaning of heat exchanger.



- ⑥ If a duct is not provided at the return air side but it is substituted with the space over the ceiling, humidity in the space will increase by the influence of capacity of ventilation fan, strength of wind blowing against the outdoor air louver, weather (rainy day) and others.
- Moisture in air is likely to condense over the external plates of the unit and to drip on the ceiling. Unit should be operated under the conditions as listed in the above table and within the limitation of wind volume. When the building is a concrete strucially immediately after the construction, humidity tends to rise if the space over the ceiling is not substituted in place of a duct. In such occasion, it is necessary to insulate the entire unit with glass wool (25mm). (Use a wire net or equivalent to hold glass wool in place.)
 - It may run out the allowable limit of unit operation (Example: When outdoor air temperature is 35°C D.B, return air temperature is 27°C W.B) and it could result in such troubles as compressor overload, etc..
 - There is a possibility that the supply air volume may exceed the allowable range of operation due to the capacity of ventilation fan or strength of wind blowing against external air louver so that drainage from be heat exchanger may fail to reach the drain pan leak outside (e.g. drip on to the ceiling) with consequential water leakage in the room.



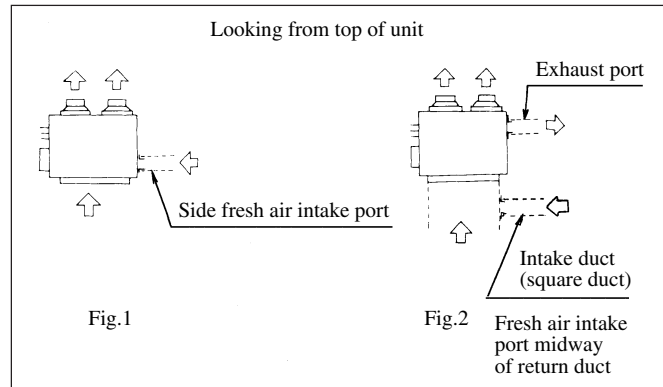
Notice: Aspecific cover plate is available when changing the 4 spot to the 3 spot, or when changing the 3 spot to the 2 spot.

Note (1) Do not change from 2 spot to 1 spot.

⑦ **Return air duct: Use square duct.**

⑧ **Return air port with canvas duct**

1) Connection of intake and exhaust ducts.



2) Duct connecting position.

< Fresh air intake >

a) Use side air intake port.

b) In case of simultaneous intake and exhaust, the side air intake port cannot be used, therefore, take air from the midway air intake port along the intake duct.

< Exhaust > Make sure to use suction as well.

c) Use a side exhaust port.

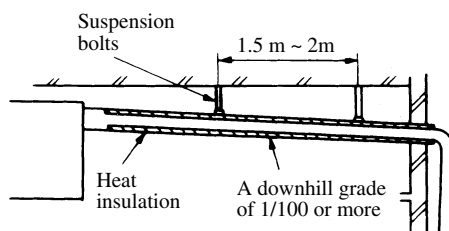
3) Duct connection

Use intake and exhaust duct flange of separately sold (for connection of $\varnothing 125\text{mm}$ round duct) to connect $\varnothing 125\text{mm}$ round duct. The duct clamped by bands must be thermally insulated to prevent dew condensation.

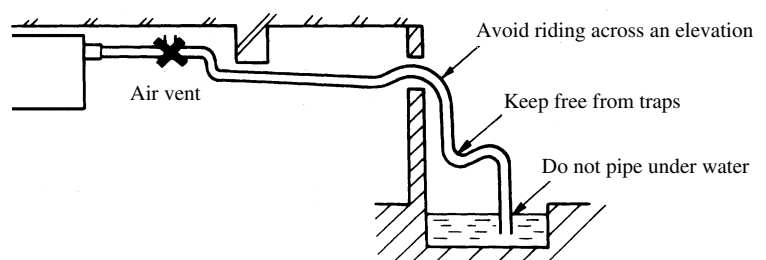
(iv) Drain piping

1) Drain piping should always be in a downhill grade (1/50-1/100) and avoid riding across an elevation or making traps.

• Good piping



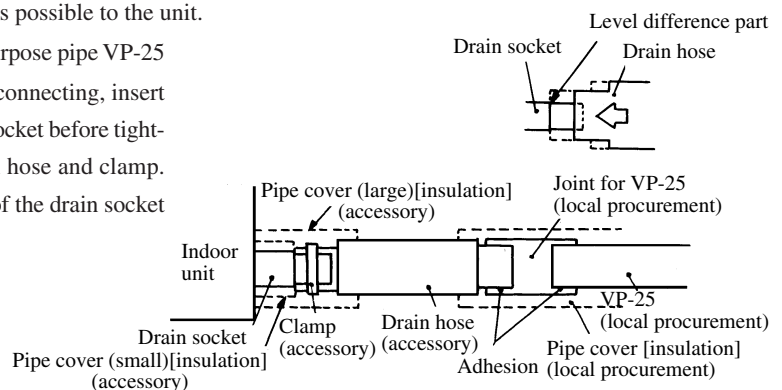
• Improper piping



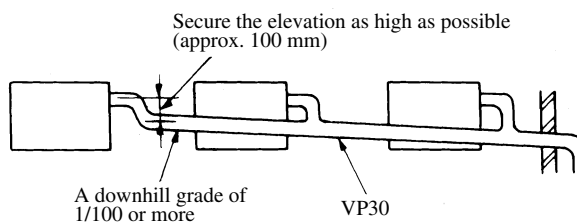
2) When connecting the drain pipe to the unit, pay sufficient attention not to apply excess force to the piping on the unit side.

Also, fix the piping at a point as close as possible to the unit.

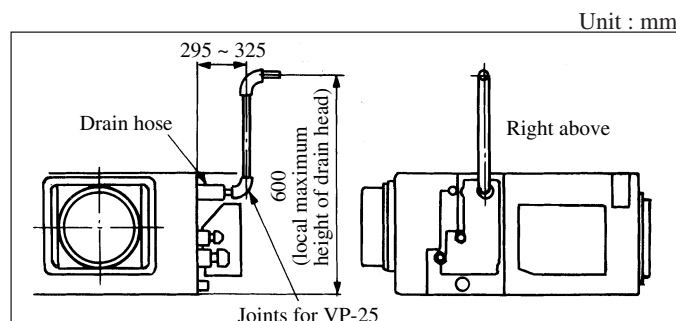
3) For drain pipe, use hard PVC general purpose pipe VP-25 which can be purchased locally. When connecting, insert a PVC pipe end securely into the drain socket before tightening securely using the attached drain hose and clamp. Adhesive must not be used connection of the drain socket and drain hose (accessory).



- 4) When constructing drain piping for several units, position the common pipe about 100 mm below the drain outlet of each unit as shown in the sketch below. Use VP-30 or thicker pipe for this purpose.



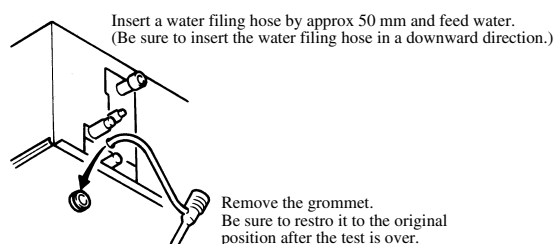
- 5) Be sure to provide heat insulation to hard PVC pipes of indoor placement.
- 6) Do not ever provide an air vent.
- 7) The height of the drain head may be elevated up to a point 600 mm from the bottom of unit and, when an obstacle exists in the ceiling space, elevate the piping to avoid the obstacle using an elbow or corresponding gadget. When doing this, if the stretch for the needed height is too high, the back-flow quantity of drain at the time of interruption of the operation gets too much and it may cause overflow at the drain pan. Therefore, make the height of the drain pipe withing the distance given in the drawing below.



- 8) Avoid positioning the drain piping outlet at a place where generation of odor may stimulated. Do not lead the drain piping direct into a sewer from where sulfur gas may generate.

9) Drainage test

- a) During trial operation, make sure that drainage is properly executed and check that leakage is not found at connections.
- b) Be sure to carry out a drainage test when installing the system during a heating season.
- c) When installing the system in a building under construction, carry out the drainage test before ceiling tiles are installed.



- ① Supply approx 1000cc of water through the outlet of the unit using a feed water pump.
- ② Make sure that drainage is proceeding properly at the see-through outlet of the unit.
* Also confirm the revolving sound of the condensate motor when checking the drainage.
- ③ Then remove the drain plug at lower section of the unit to drain water off. After making sure water is not left, restore the drain plug to the original position.

Forced drain pump operation

◆ Setup from a unit side.

- ① Turn on DIP switch SW5-1 on the PCB of the indoor unit. The drain pump operates continuously.
- ② After the test, be sure to turn off the DIP switch.

(When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet)
and check leaks and drain conditions of the pipe.

◆ Setup from a remote controller side.

Drain pump operation from a remote controller unit is possible. Operate a remote controller unit by following the steps described below.

1. To start a forced drain pump operation

- ① Press the TEST button for three seconds or longer.

The display will change from “ SELECT ITEM” → “ SET” → “ TEST RUN ▼”

- ② Press the button once while “ TEST RUN ▼” is displayed, and cause “DRAIN PUMP ◆” to be displayed.

- ③ When the SET button is pressed, a drain pump operation will start.

Display: “DRAIN PUMP RUN” → “ → STOP”

2. To cancel a drain pump operation.

- ① If either SET or ON/OFF button is pressed, a forced drain pump operation will stop.

The air conditioning system will become OFF.

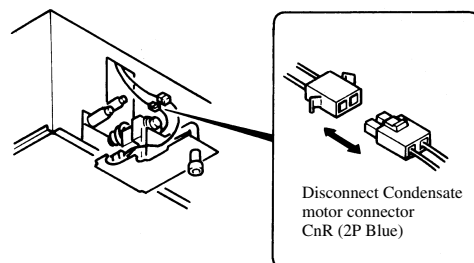
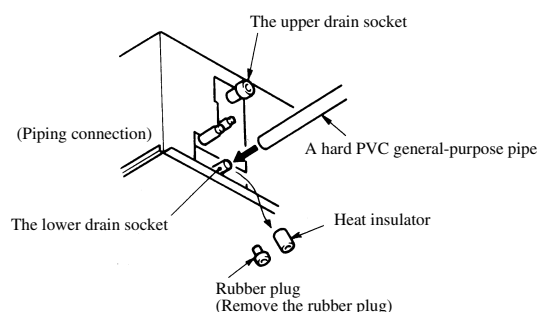
10) Drainage from the lower drain socket

Only if the drain pipe can be installed in a downhill grade (1/50-1/100), the lower drain socket can be used for connecting to the drain pipe as illustrated.

(Disconnect the connector for the drain motor)

As shown in the sketch to the right, disconnect the drain motor connector CnR (blue color coding).

If the system is started with this connector connected as is, drain water is discharged out of the upper drain socket causing a heavy water leakage.



4. WIRELESS KIT (OPTIONAL PARTS)

This product is dedicated for heat pump unit. Never install on the unit dedicated for cooling.

SAFETY PRECAUTIONS

- Always read these “Safety Precautions” thoroughly before starting installation work.
- These precautions describe important information related to safety. Always observe these precautions.
- Refer to the installation manual enclosed with the indoor unit for the indoor unit installation methods.
- After completing the installation, carry out a test operation, and confirm that there are no abnormalities.

Also, explain the usage method to the user. Have the user store this manual for future reference.



WARNING

- Contact the installation to your dealer or a specialist. Incorrect installation by the user could cause electric shocks and fires.
- Always follow this instruction manual and accurately carry out the installation work. Incorrect installation could cause electric shocks and fires.
- The electric work must be carried out by a qualified electrician according to the Electrical Installation Technical Standards, Wiring Regulations and Instruction Manual. Incorrect work could cause electric shocks or fires.
- Use the designated cable for the wiring and make sure that it is securely connected. Fix the cable so that the external force of the cable is not applied on the terminal connection section. Incomplete connections or fixing could cause heating and fires.
- Always use the enclosed parts and designated parts for the installation work parts. Use of parts not designated by Mitsubishi could cause electric shocks or fires.

(1) Wireless kit model

RCND-KIT-HER

(2) Accessories (Confirm the following accessories).

① Light detection adaptor		1
② Wiring (3m)		1
③ Parts set (A)		1
④ Parts set (B)		1
⑤ Parts set (C)		1
⑥ Wireless remote controller		1
⑦ User's manual		1

① Screw for light detection adaptor		2
② Fixing band		1
③ Clamp		5
④ Screw for clamp		5

① Remote controller holder		1
② Screw for holder		2
③ Dry cell for remote controller		1

① Light detection section installation bracket		1
② Screw for the bracket		2
③ Installation fitting		2

(3) Setting of jumper wire

a) Method to prevent the malfunction due to the interference

Perform both procedures ① and ②.

This setting is made to prevent the interference with other household electric appliances or the interference occurred when two light detection adaptors are located closely.

① Setting change of the wireless remote controller

While pressing the button, press button or load the battery. The setting changes to the interference prevention setting.

② Modification of light detection adaptor substrate

Turn SW1-1 OFF (remote).

b) Changeover of Master/slave remote controller

When you use the wireless remote controller as the slave remote controller, Turn light detection adaptor SW1-2 OFF (slave).

c) How to set the 3 air-blow speeds

To change to 3-speed air blow, press the switch while holding down the button; or insert the batteries in the remote control while holding down the button. (In that case, set the temperature range from 16 to 30°C if using the heating mode; or set from 18 to 30°C if not using the heating mode.)

Note (1) To cancel all the remote control settings, press the switch. All remote control settings are then reset to initial (factory) settings.

The diagram shows the control panel of the humidifier. It features a digital display at the top. Below the display are buttons for 'HI MED LO' (humidity level), 'FAN SPEED' (with a fan icon), 'ON OFF' (power), and 'AIR FLOW' (with a leaf icon). Below these are 'FILTER' and 'MODE' buttons. In the center is a large button with 'TEMP' and a thermometer icon. Below this is a 'TIMER' button. At the bottom are 'ON', 'OFF', and 'CANCEL' buttons. A 'TIME SET UP' button is located at the very bottom left, and an 'AQL' button is at the bottom right.

SW1-2
(Master/slave switching)

SW1-1	Prevention of malfunction from mixed signals	O N : Normal OFF : Remote
SW1-2	Receiver master/slave switching	O N : Master OFF : Slave

All switches are turned ON when the product is shipped from the factory.

* When the battery is once removed, the setting returns to the initial setting condition (setting at factory shipping). Therefore, when the battery has been removed, perform the above mentioned wireless remote controller setting change work again.

Ensure to explain the handling method to the customer.
(The handling method is also mentioned in the operation manual.)

△ Avoid installing the receiver amp in the following positions, as faults may occur or light detection adaptor may be obstructed.

- ① Places subject to direct sunlight.
- ② Places near heat generating appliances.
- ③ Places with high humidity levels or where water may come in contact.
- ④ Places with bumpy surfaces.
- ⑤ Places near fluorescent lights (especially the inverter type) or where light may directly contact the light detection surface.
- ⑥ Places hidden by the indoor unit, etc., when looking from the wireless remote controller operation positions.
- ⑦ Places subject to the air blow off by the indoor unit.

<Installation method>

- Installation with enclosed bracket.
- Direct installation onto the ceiling with wood screws.

Drill the light detection adaptor installation holes with the following dimensions at a the ceiling position where wires can be connected.

(A) Installation with enclosed bracket.	108 mm (H) × 108 mm (W)
(B) Direct installation onto with wood screws.	88 mm (H) × 101 mm (W)

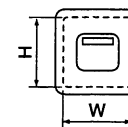


Diagram illustrating the connection of the indoor unit terminal block to the wiring adaptor:

- Indoor unit terminal block (X Red, Y White, Z Black)
- Wiring
- Adaptor

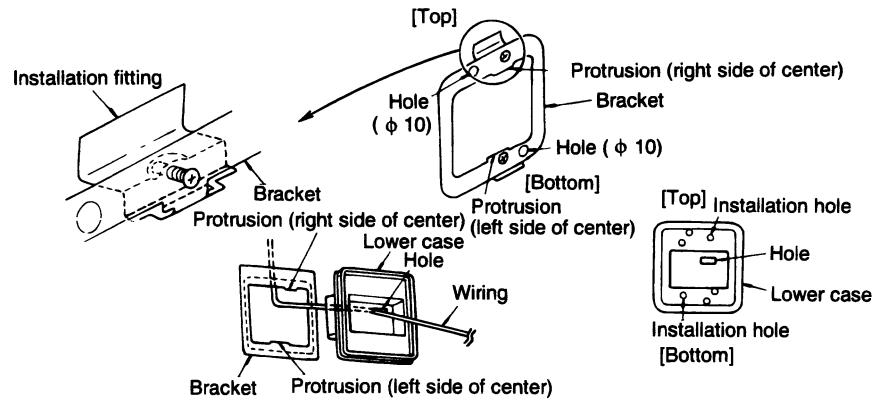
► Be careful of the wiring polarity. Ensure to connect the wire by matching the color of the wire with the color shown on the terminal block.

Do not connect the wiring to the power supply part of the terminal block.
If it is connected, printed board will be damaged.

Remove the screw on the side of the light detection adaptor, and sprit it into the upper case and lower case. Install the receiver with one of the four installation methods d) or e) shown next page.

d) Installation with enclosed bracket

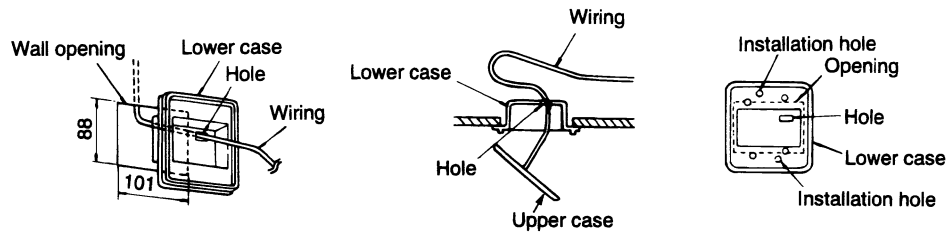
Use this method when installing onto a gypsum board (7 or 18 mm), etc.



- ① Catch the two protrusion of the enclosed bracket onto the fitting as shown above, and temporarily fix with the screws.
(The bracket has an up/down and front/back orientation. Confirm the top/bottom protrusion positions and the positional relation of the $\phi 10$ holes on the bracket and the installation hole on the lower case with the above drawing.)
- ② Insert the end of the installation fitting into the back of the ceiling from the opening, and tighten the screws to fix the bracket onto the ceiling.
- ③ Pass the wiring from the rear side through the hole on the lower case.
- ④ Fit the lower case onto the bracket, and fix the lower case to the bracket using the two installation holes shown above.
(The other four holes are not used.)
- ⑤ Follow steps ① to ③ for e) to complete the installation.

e) Direct installation onto the ceiling with wood screws

▷ Use this installation method when the ceiling is wooden, and there is no strength-wise problem in installing directly with wood screws.



- ① Fit the lower case into the ceiling opening. Make sure that the convex section on the back of the lower case and the clearance with the ceiling opening are as equal as possible on both sides.
- ② Using the two installation holes shown above, fix the lower case onto the ceiling with the enclosed wood screws.
(The other four holes are not used.)
- ③ Fit the upper case onto the lower case, and tighten the screw.

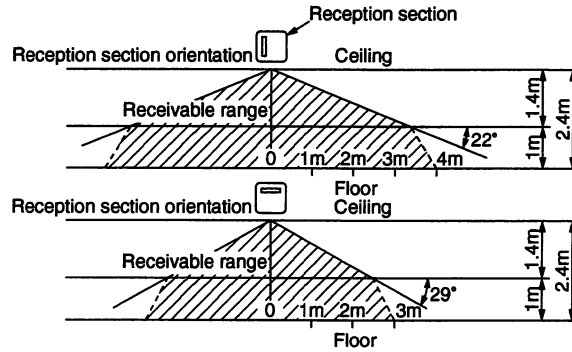
(5) Wireless remote controller operation distance

a) When installed on ceiling

① standard reception distance

Conditions

Reception section illuminance 300 lux (When there are no lights on the ceiling within 1 m or the reception adaptor in a general office.)



② Relation of reception section illuminance and reception distance looking from flat plane

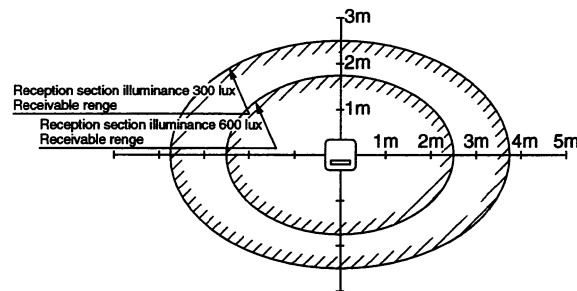
Conditions

Relation of the reception section illuminance and reception distance when the remote controller is operated at a height of 1 m from the floor with a ceiling height of 2.4 m.
The reception distance becomes 2/3 when the illuminance is double.

b) When installed on wall

Conditions

Reception section illuminance 800 lux

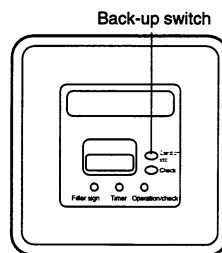


(6) Installation of remote controller

- Refer to the installation manual of remote controller

(7) Trial run of cooling operation

- While pressing the back-up switch on the receiver unit, transmit the signal of cooling operation from the wireless remote controller.



- If the unit does not operate normally at the trial run, check the unit referring to the inspection items shown on the wiring diagram plate stuck on the indoor and outdoor unit.

**PACKAGED AIR-CONDITIONER.
MULTI-TYPE (V-MULTI)
PACKAGED AIR-CONDITIONER.
INVERTER DRIVEN MULTI-INDOOR-UNIT
CLIMATE CONTROL SYSTEM.**



Air-Conditioning & Refrigeration Systems Headquarters
16-5, 2-chome, Kounan, Minato-ku, Tokyo, 108-8215, Japan
Fax : (03) 6716-5926