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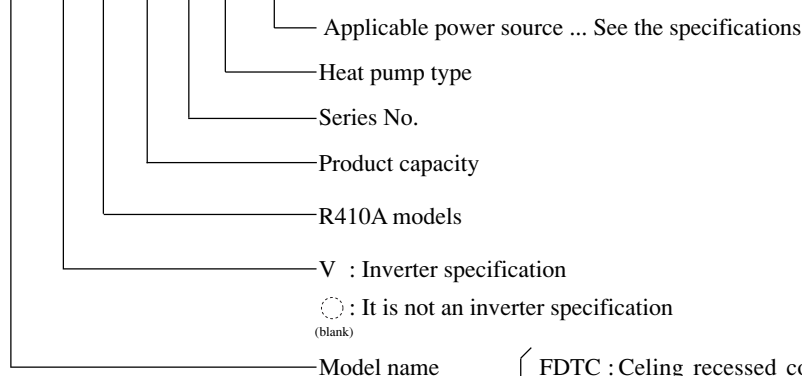
1 GENERAL INFORMATION

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) All air supply ports have auto swing louvers. (Only case of FDTC model). The indoor fan motor has three speeds of high, medium and low.
- (6) All models have service valves protruding from the outdoor unit for faster flare connection work in the field.
- (7) The size and weight of the outdoor units in the 151, 201 series have been greatly reduced. Use of an inverter has also improved energy conservation and economy.

1.2 How to read the model name

Example: **FDTC V A 20 1 H EN**



FDTC : Ceiling recessed compact type unit
with wired remote controller
FDU : High static pressure duct type unit
with wired remote controller
FDC : Outdoor unit

2 SELECTION DATA

2.1 Specifications

(1) Ceiling recessed compact type (FDTC)

Model FDTCVA151HEN

Item		Model	FDTCVA151HEN	
			FDTCVA151	FDCVA151HEN
Nominal cooling capacity ⁽¹⁾		W	4000 [1800~4700]	
Nominal heating capacity ⁽¹⁾		W	4500 [2000~5400]	
Power source			1 Phase, 220/230/240V 50Hz	
Operation data ⁽³⁾	Cooling input	kW	1.15 [0.40~1.47]	
	Running current (Cooling)	A	5.1 [1.9~6.5]	
	Power factor (Cooling)	%	98	
	Heating input	kW	1.20 [0.44~1.48]	
	Running current (Heating)	A	5.3 [2.0~6.5]	
	Power factor (Heating)	%	98	
	Inrush current (L.R.A)	A	5	
Noise level		dB(A)	Powerful mode Hi:46 Me:42 Lo:38 Mild mode Hi:42 Me:38 Lo:35	48
Exterior dimensions			Unit 248 × 570 × 570	
Height × Width × Depth		mm	Panel 35 × 700 × 700	
Net weight		kg	19.5 (Unit:16 Panel:3.5)	
Refrigerant equipment			—	
Compressor type & Q'ty			5CS102XFD × 1	
Motor		kW	—	
Starting method			—	
Heat exchanger			Louver fins & inner grooved tubing	Slitted fins & 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			MC controlled de-icer	
Air handling equipment			Turbo fan × 1	
Fan type & Q'ty			Propeller fan × 1	
Motor		W	50 × 1	
Starting method			Line starting	
Air flow		CMM	Powerful mode Hi:13.5 Me:11.5 Lo:10 Mild mode Hi:11.5 Me:10 Lo:8	41
Fresh air intake			Available	
Air filter, Q'ty			Long life filter ×1 (washable)	
Shock & vibration absorber			Rubber sleeve (for fan motor)	
Electric heater		W	—	
Operation control			Wired remote control switch (Optional : RC-E1)	
Operation switch			— (Indoor unit side)	
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			Decorative Panel	

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 FDTCA201HEN

Item		Model	FDTCA201HEN	
			FDTCA201	FDCVA201HEN
Nominal cooling capacity ⁽¹⁾		W	5000 [2200~5600]	
Nominal heating capacity ⁽¹⁾		W	5400 [2500~6300]	
Power source			1 Phase, 220/230/240V 50Hz	
Operation data ⁽³⁾	Cooling input	kW	1.62 [0.54~2.10]	
	Running current (Cooling)	A	7.1 [2.4~9.4]	
	Power factor (Cooling)	%	99	
	Heating input	kW	1.53 [0.57~1.96]	
	Running current (Heating)	A	6.7 [2.6~8.6]	
	Power factor (Heating)	%	99	
	Inrush current (L.R.A)	A	5	
Noise level		dB(A)	Powerful mode Hi:46 Me:42 Lo:38 Mild mode Hi:42 Me:38 Lo:35	48
Exterior dimensions				
Height × Width × Depth		mm	Unit 248 × 570 × 570 Panel 35 × 700 × 700	595 × 780 (+67) × 290
Net weight		kg	19.5 (Unit:16 Panel:3.5)	
Refrigerant equipment				
Compressor type & Q'ty			–	
Motor		kW	–	
Starting method			–	
Heat exchanger			Louver fins & inner grooved tubing	Slitted fins & 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			MC controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Turbo fan × 1	Propeller fan × 1
Motor		W	50 × 1	34 × 1
Starting method			Line starting	Line starting
Air flow		CMM	Powerful mode Hi:13.5 Me:11.5 Lo:10 Mild mode Hi:11.5 Me:10 Lo:8	41
Fresh air intake			Available	
Air filter, Q'ty			Long life filter ×1 (washable)	
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	20 (Crank case heater)
Operation control				
Operation switch			Wired remote control switch (Optional : RC-E1)	– (Indoor unit side)
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		
Refrigerant piping size		(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			Decorative Panel	

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.

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

(2) High static pressure type (FDU)

Model FDU801HES

Item		Model	FDUA801HES	
			FDUA801	FDCA801HES
Nominal cooling capacity⁽¹⁾		W	20000	
Nominal heating capacity⁽¹⁾		W	22400	
Power source			3 Phase, 380/400/415V 50Hz	
Operation data⁽³⁾	Cooling input	kW	7.08	
	Running current (Cooling)	A	11.9	
	Power factor (Cooling)	%	86	
	Heating input	kW	6.92	
	Running current (Heating)	A	11.8	
	Power factor (Heating)	%	85	
	Inrush current (L.R.A)	A	58	
	Noise level	dB(A)	48	57
Exterior dimensions				
Height × Width × Depth		mm	360 × 1570 × 830	1690 × 1350 × 720
Net weight		kg	92	210
Refrigerant equipment				
Compressor type & Q'ty			–	GU-C5176MS56 × 1
Motor		kW	–	6.0
Starting method			–	Line starting
Heat exchanger			Louver fins & inner grooved tubing	Straight fins & inner grooved tubing
Refrigerant control			Electronic expansion valve	
Refrigerant			R410A	
Quantity		kg	–	6.6 [Pre-charged up to the piping length of 5m]
Refrigerant oil		ℓ	–	1.9 (M-MA32R)
Defrost control			MC controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Multiblade centrifugal fan × 4	Propeller fan × 2
Motor		W	200 × 2	100 × 2
Starting method			Line starting	Line starting
Air flow (Standard)		CMM	51	Cooling: 220, Heating: 180
Available static pressure		Pa	Standard: 100, Max 200	–
Fresh air intake			Available	–
Air filter, Q'ty			Field purchased	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	40 (Crank case heater)
Operation control				
Operation switch			Wired remote control switch (Optional: RC-E1)	– (Indoor unit side)
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: φ25.4 (1")	
Refrigerant piping size		(in)	Liquid line: Flare piping, Gas line: Brazing	
Connecting method			Liquid line: Flare piping, Gas line: Brazing	
Drain hose			Connectable with VP25 (I.D. 25mm, O.D. 32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit	
Optional parts			–	

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 400V 50Hz.

Model FDUA1001HES

Item		Model	FDUA1001HES	
			FDUA1001	FDCA1001HES
Nominal cooling capacity⁽¹⁾		W	25000	
Nominal heating capacity⁽¹⁾		W	28000	
Power source			3 Phase, 380/400/415V 50Hz	
Operation data⁽³⁾	Cooling input	kW	8.22	
	Running current (Cooling)	A	13.3	
	Power factor (Cooling)	%	89	
	Heating input	kW	7.95	
	Running current (Heating)	A	13.2	
	Power factor (Heating)	%	87	
	Inrush current (L.R.A)	A	58	
	Noise level	dB(A)	49	57
Exterior dimensions				
Height × Width × Depth		mm	360 × 1570 × 830	1690 × 1350 × 720
Net weight		kg	92	225
Refrigerant equipment				
Compressor type & Q'ty			–	GU-C5192MS56 × 1
Motor		kW	–	6.7
Starting method			–	Line starting
Heat exchanger			Louver fins & inner grooved tubing	Straight fins & inner grooved tubing
Refrigerant control			Electronic expansion valve	
Refrigerant			R410A	
Quantity		kg	–	7.9 [Pre-charged up to the piping length of 5m]
Refrigerant oil		ℓ	–	1.9 (M-MA32R)
Defrost control			MC controlled de-icer	
Air handling equipment				
Fan type & Q'ty			Multiblade centrifugal fan × 4	Propeller fan × 2
Motor		W	230 + 270	100 × 2
Starting method			Line starting	Line starting
Air flow (Standard)		CMM	68	Cooling: 220, Heating: 180
Available static pressure		Pa	Standard: 100, Max 200	–
Fresh air intake			Available	–
Air filter, Q'ty			Field purchased	–
Shock & vibration absorber			Rubber sleeve (for fan motor)	Rubber mount (for compressor)
Electric heater		W	–	40 (Crank case heater)
Operation control				
Operation switch			Wired remote control switch (Optional: RC-E1)	– (Indoor unit side)
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: φ12.7 (1/2") Gas line: φ25.4 (1")	
Refrigerant piping size		(in)		
Connecting method			Liquid line: Flare piping, Gas line: Brazing	
Drain hose			Connectable with VP25 (I.D. 25mm, O.D. 32mm)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit.	
Optional parts			–	

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 400V 50Hz.

2.2 Range of usage & limitations

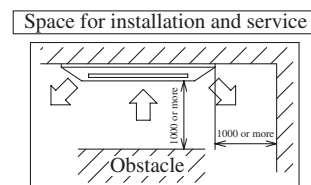
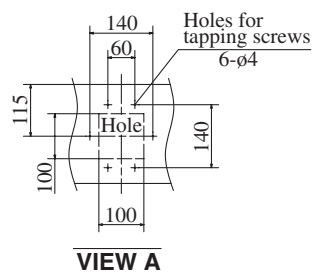
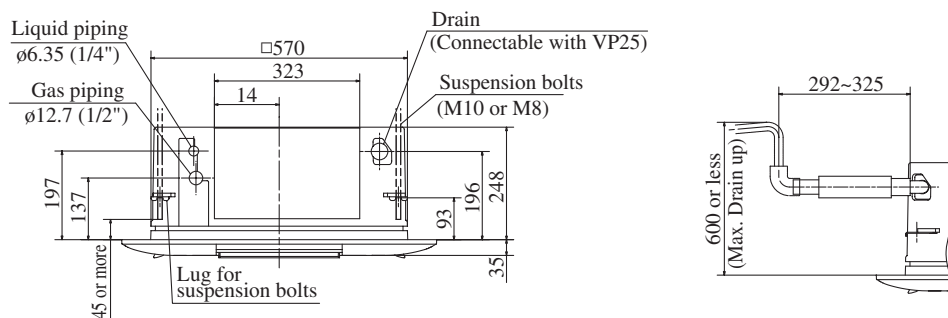
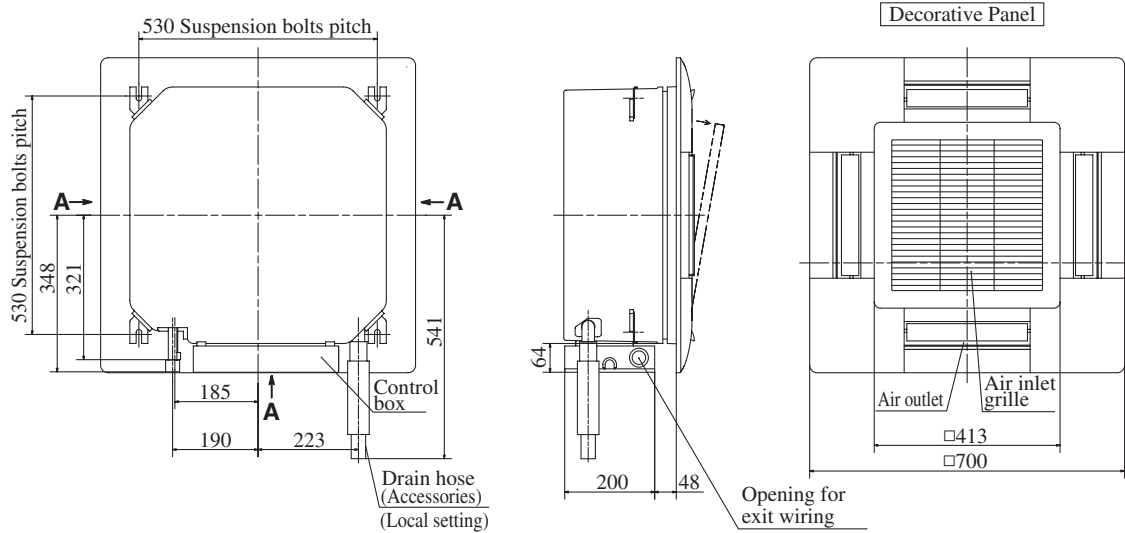
Models		151, 201 models	801, 1001 models
Item			
Indoor return air temperature (Upper, lower limits)		Refer to the selection chart (See page 16)	
Outdoor air temperature (Upper, lower limits)			
Indoor unit atmosphere (behind ceiling) temperature and humidity		Dew point temperature: 28°C or less, relative humidity: 80% or less	
Refrigerant line (one way) length		Max. 40m	Max. 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 \pm 10%	
Voltage at starting		Min. 85% of rating	
Compressor ON-OFF Frequency	Cycle Time	6 minutes or more (from ON to ON) or (from OFF to OFF)	
	Stop Time	3 minutes or more	

2.3 Exterior dimensions

(1) Ceiling recessed compact type (FDTC)

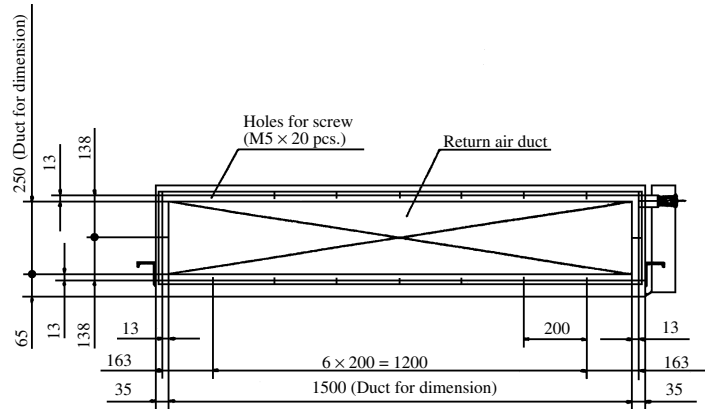
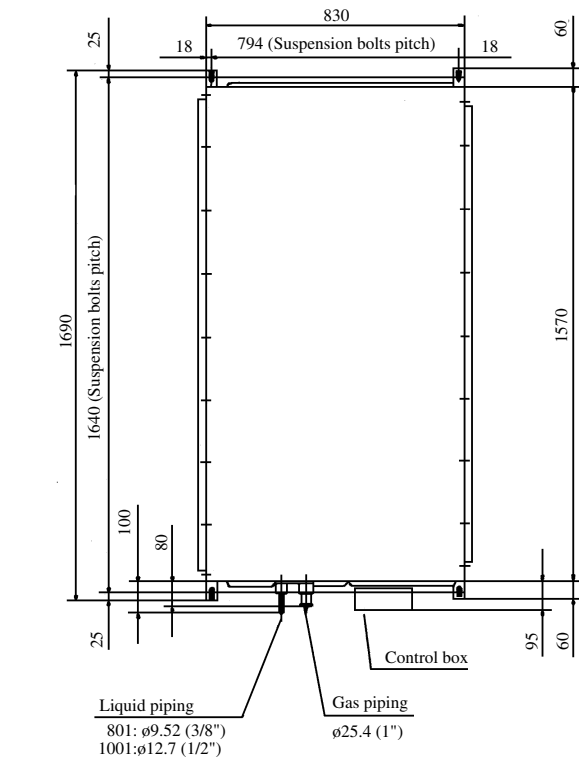
Models FDTCA151, 201

Unit:mm

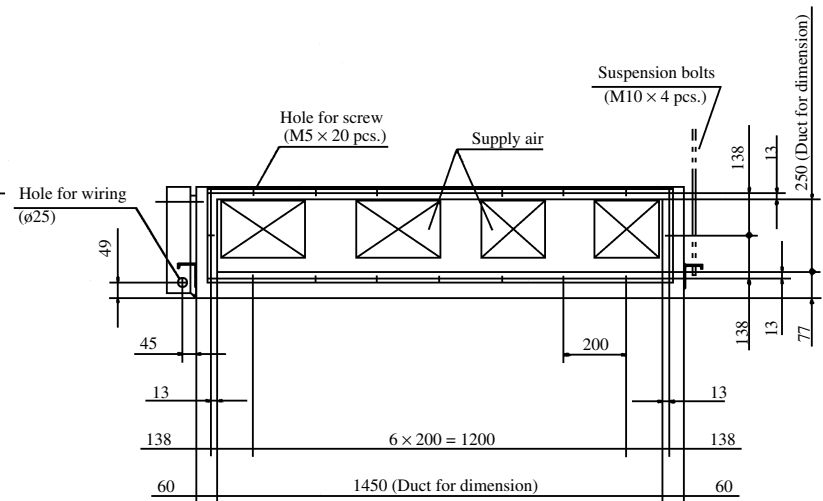
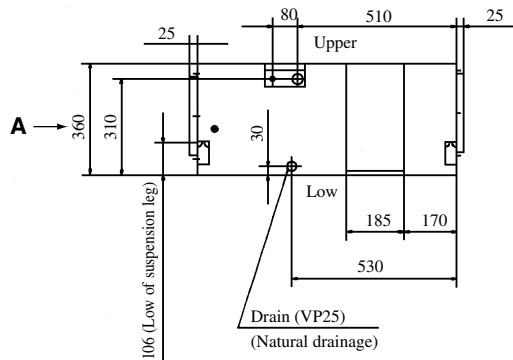


(2) High static pressure duct type (FDU)

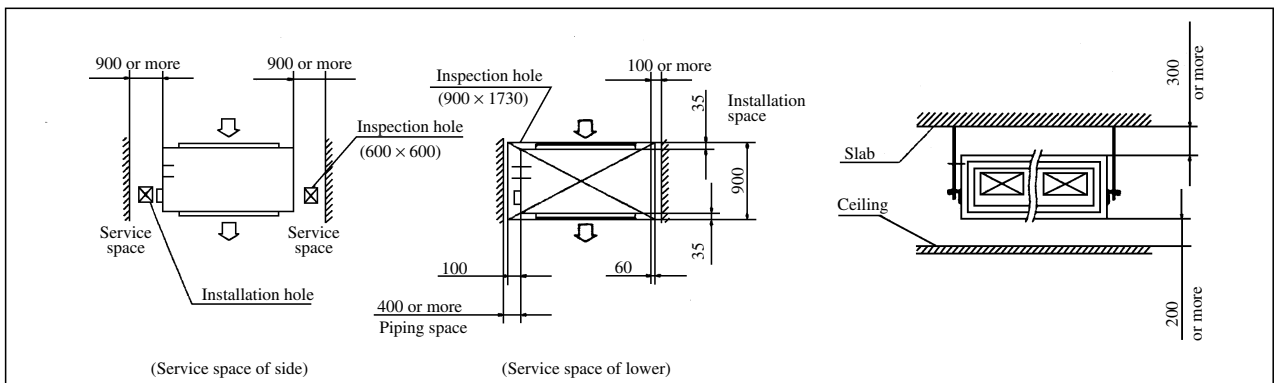
Models FDU801, 1001



VIEW A

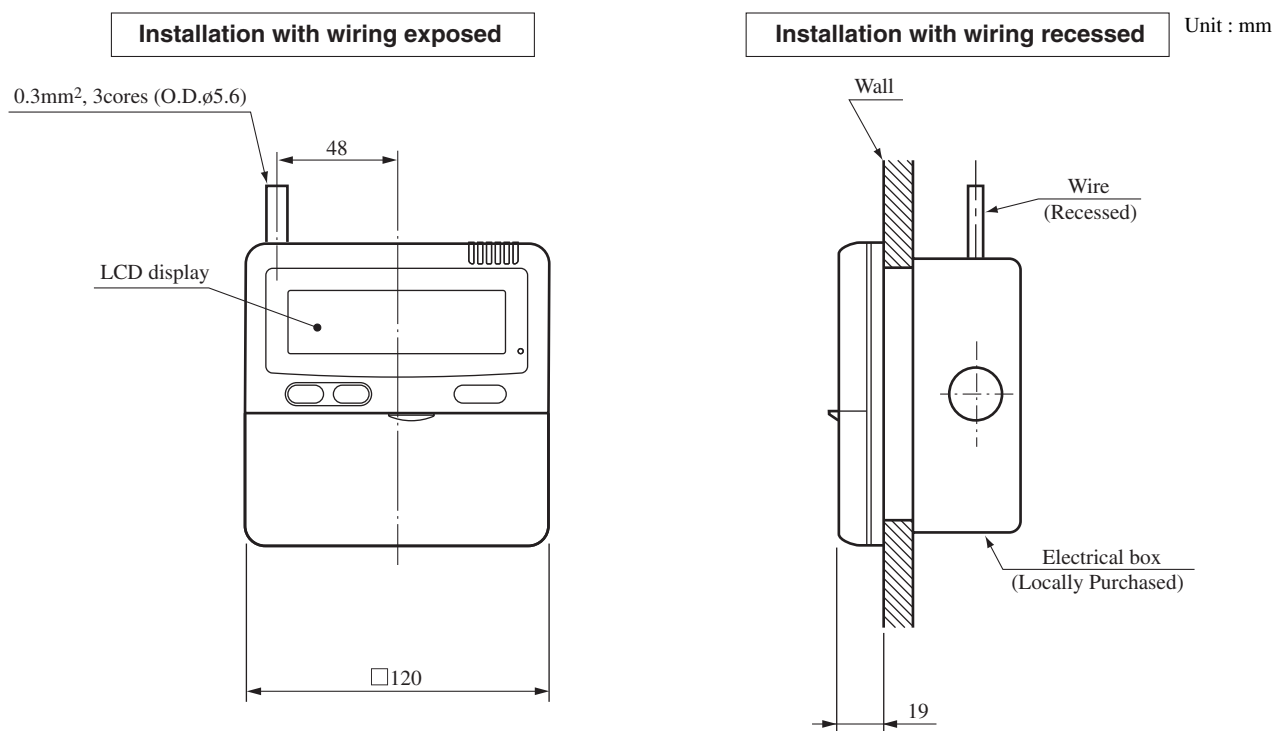


Space for installation and service

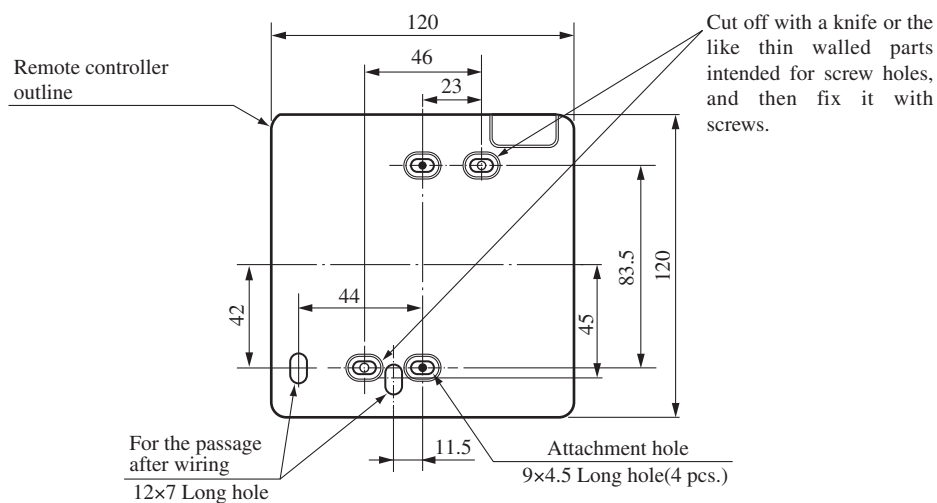


(3) Remote controller (Optional parts)

(a) Wired remote controller



Remote controller mounting dimensions



Precation in Extending the Remote control cord

► Maximum total extension 600m.

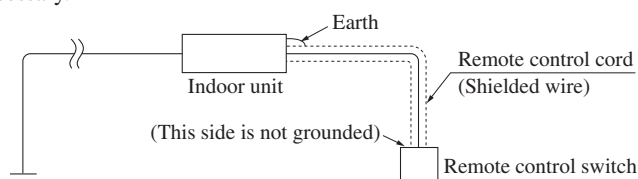
The cord should be a shielded wire.

● 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

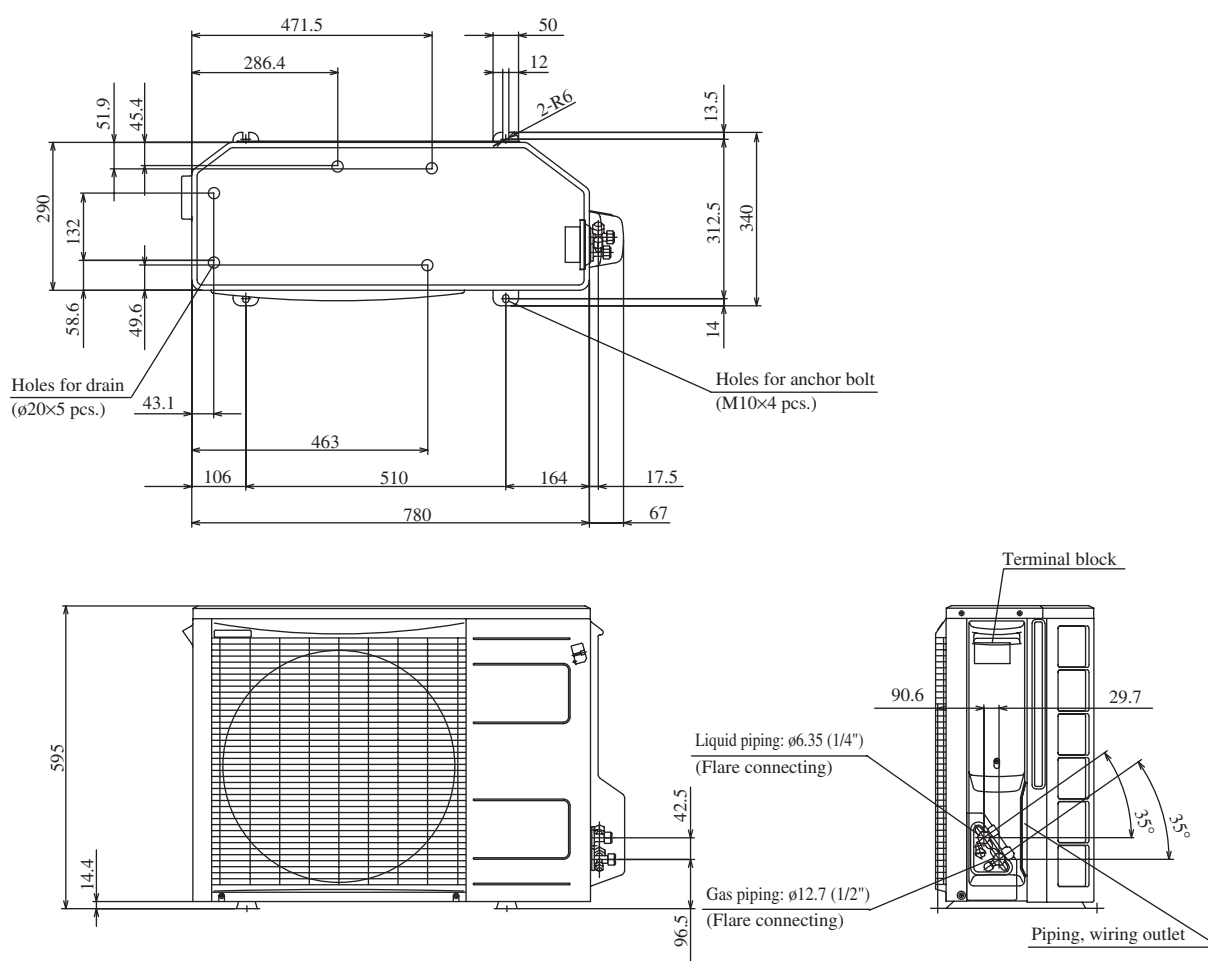
● The shielded wire should be grounded at one side only.



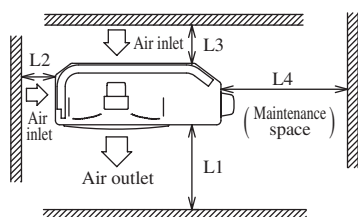
(4) Outdoor unit

Models FDCVA151HEN, 201HEN

Unit: mm



Required space for maintenance and air flow



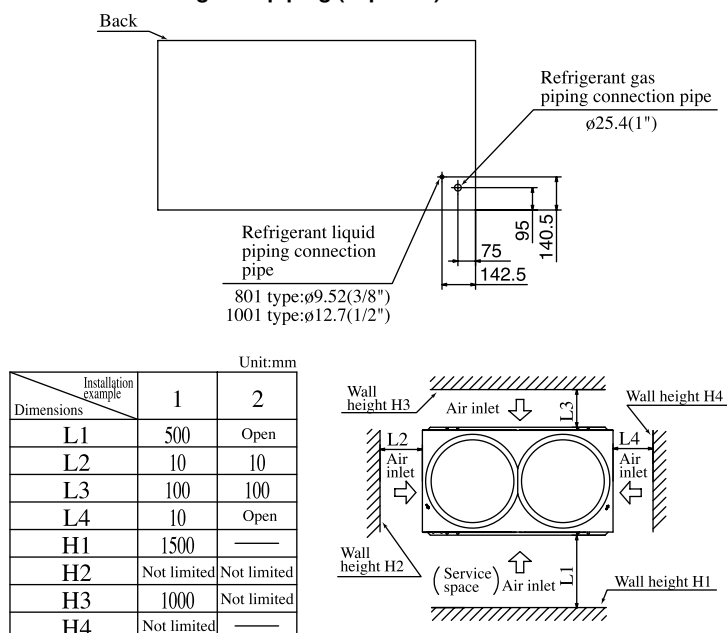
Minimum allowable space to the obstacles

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.

Unit : mm

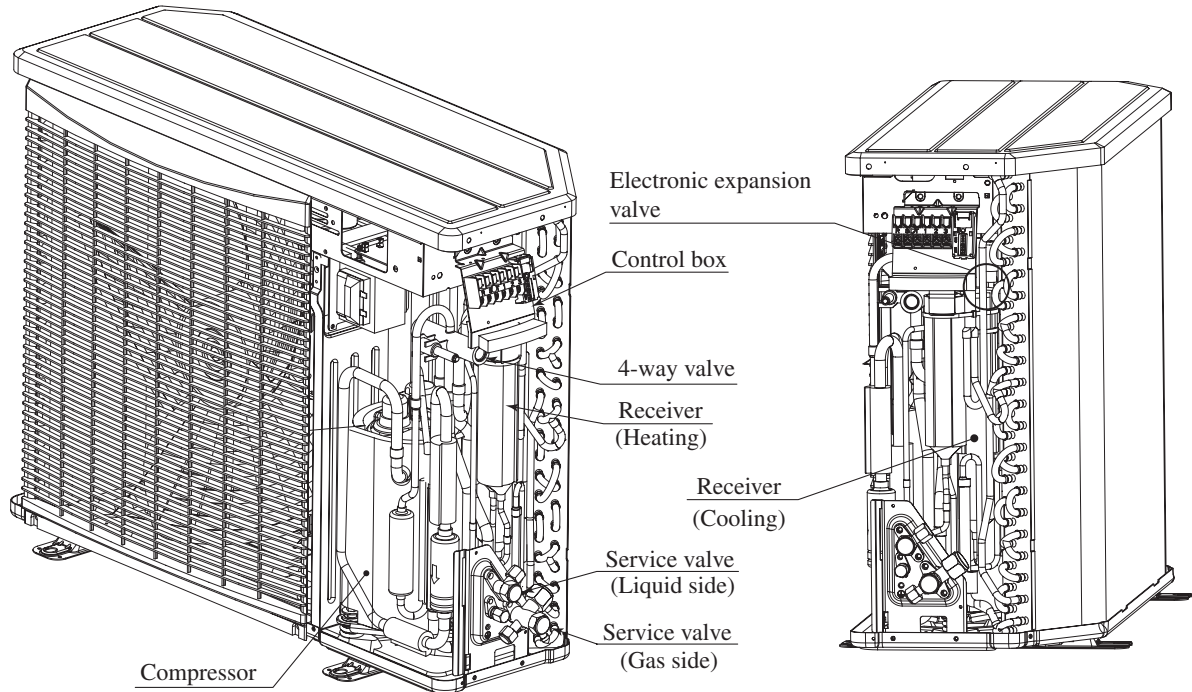


2.4 Inside view

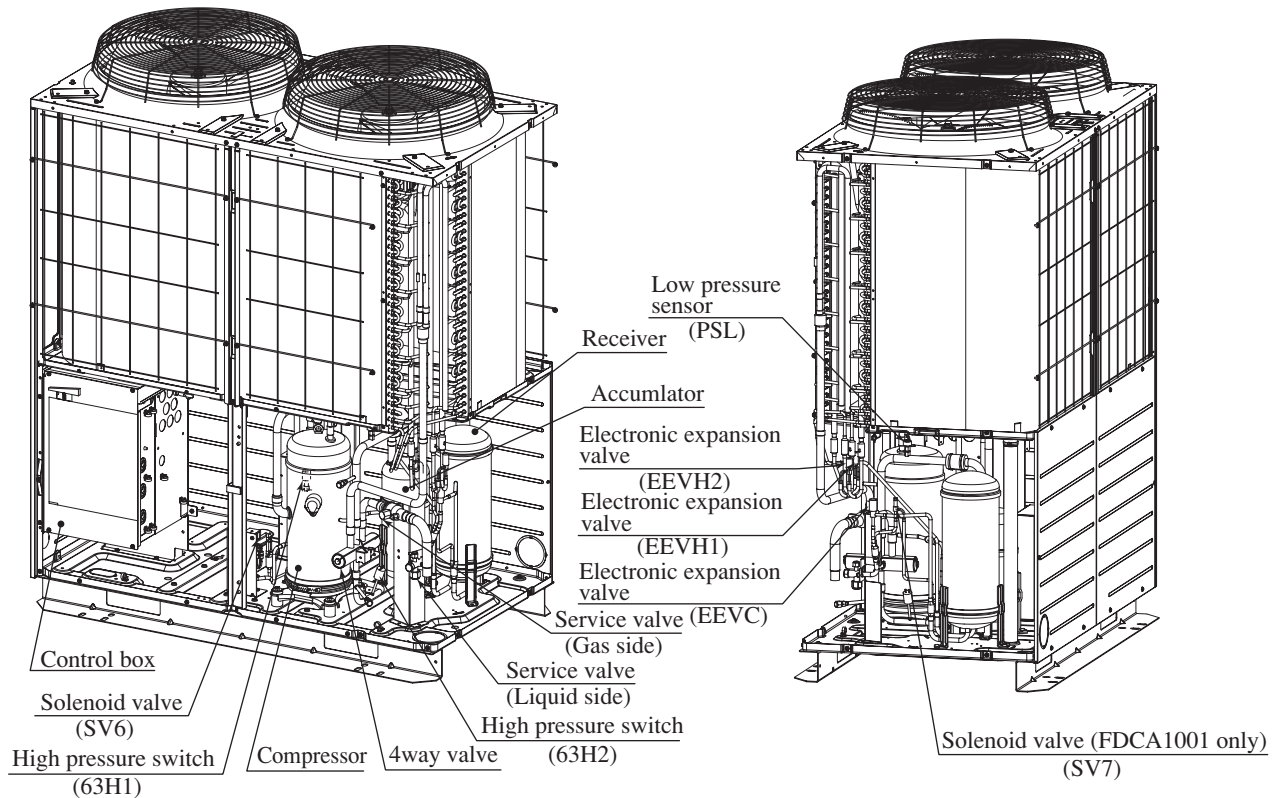
(1) Outdoor unit

Models FDCVA151HEN, 201HEN

unit : mm



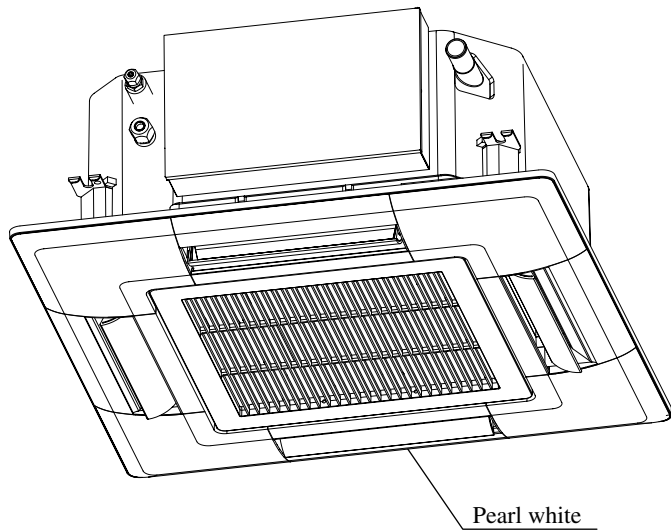
Models FDCA801HES, 1001HES



2.5 Exterior appearance

(1) Indoor unit

(a) Ceiling recessed compact type (FDTC)

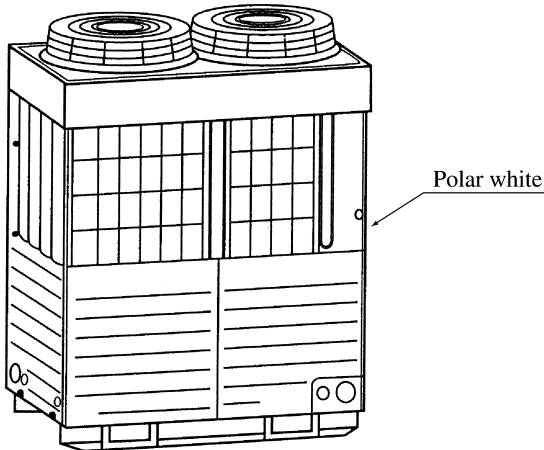
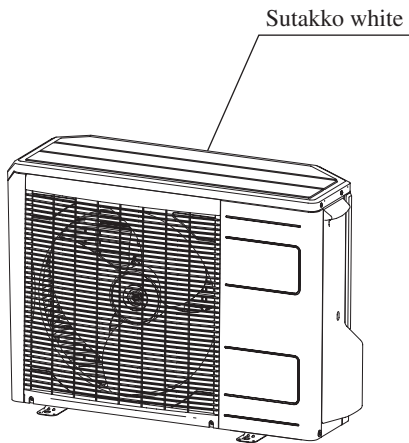


(b) High static pressure duct type (FDU)..... Zinc steel plate

(2) Outdoor unit

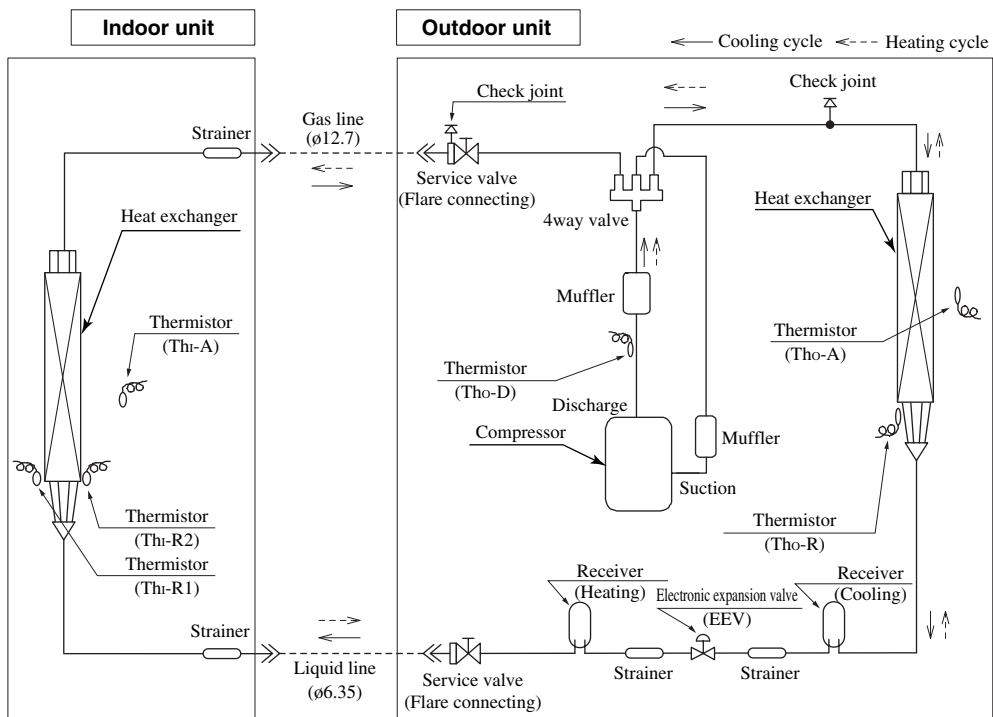
Models FDCVA151HEN, 201HEN

Models FDCA801HES, 1001HES

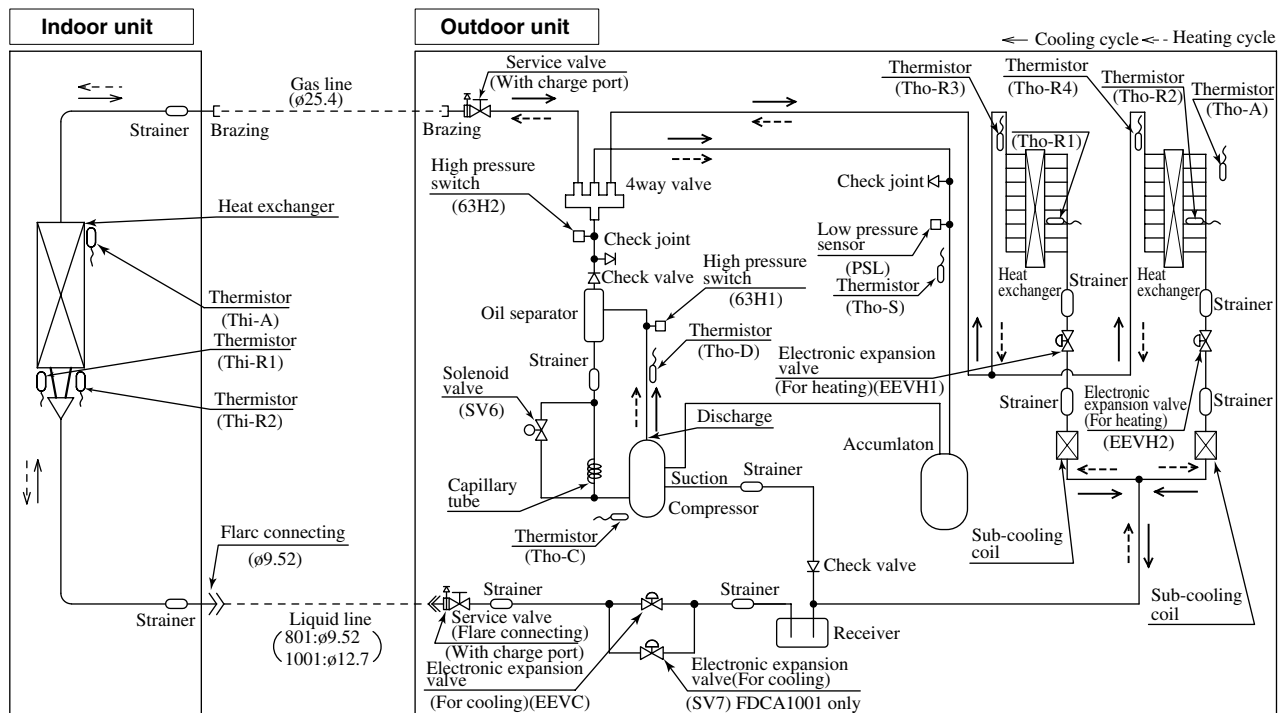


2.6 Piping system

Models 151, 201 models



Models 801, 1001 models



Preset point of the protective devices

Parts name	Mark	Equipped unit	151, 201 models	801, 1001 models
Thermistor (for protection over-loading in heating)	Th-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 105°C OFF 80°C	ON 135°C OFF 90°C
High pressure switch (for protection)	63H1	Outdoor unit	—	Open 4.15MPa Closed 3.15MPa

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) Coefficient of cooling and heating capacity in relation to temperatures

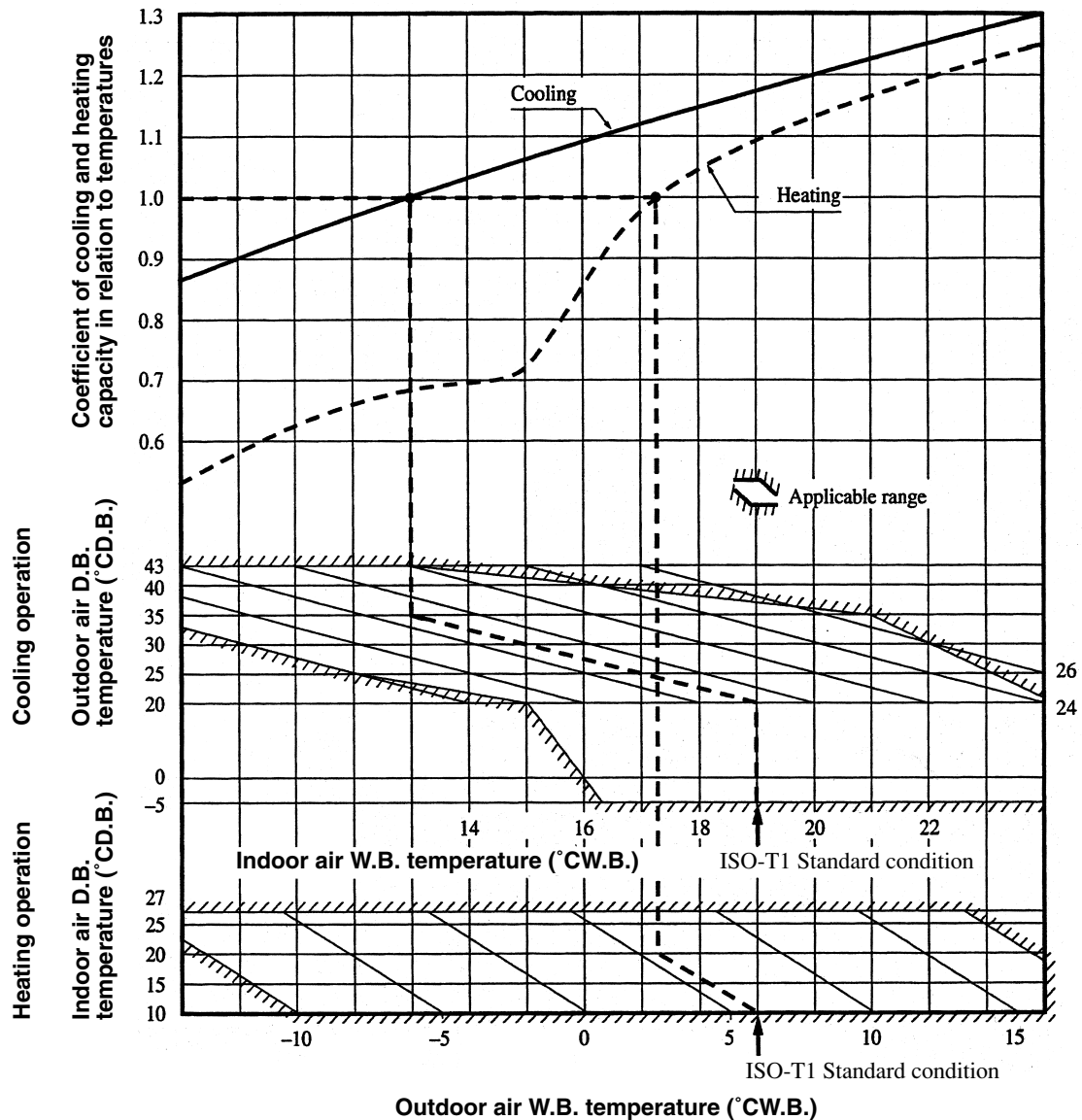


Table of bypass factor (FDTC series figures show the bypass factor when in the Powerful mode.)

Model FDTC type

Model		FDTC type
Item	Model	FDTC type
Air flow	Hi	0.047
	Me	0.037
	Lo	0.029

Model FDU type

Model		FDUA801	FDUA1001
Item	Model	FDUA801	FDUA1001
Air flow	Upper limit	0.040	0.063
	Standard	0.025	0.043
	Lower limit	0.013	0.025

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

Coefficient: 1.00 at High, 0.95 at Low

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

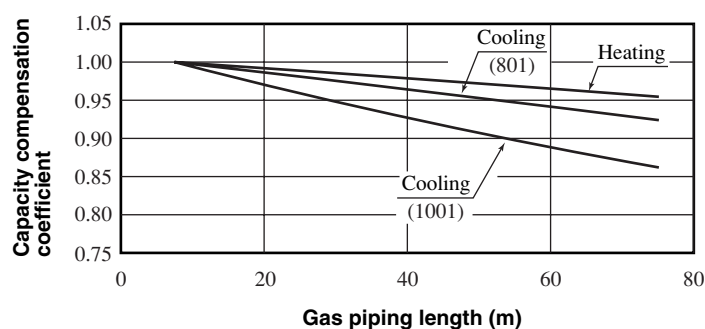
It is necessary to correct the cooling and heating capacity in relation to the one way equivalent piping length between the indoor and outdoor units.

Models 151, 201

Equivalent piping length ⁽¹⁾ m		7.5	10	15	20	25	30	35	40	45
Heating		1	0.995	0.992	0.990	0.987	0.984	0.981	0.978	0.975
Cooling	151 model	1	0.997	0.991	0.985	0.980	0.974	0.968	0.962	0.956
	201 model	1	0.996	0.989	0.981	0.973	0.966	0.958	0.951	0.943

Models 801, 1001

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	0.992	0.986	0.980	0.974	0.968	0.962	0.956	0.951	0.945	0.939	0.933	0.927	0.921
Cooling	801 model	1	0.997	0.984	0.972	0.960	0.949	0.937	0.926	0.916	0.906	0.896	0.886	0.877	0.869	0.860
	1001 model	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



- Note (1) Calculate the equivalent length using the following formula.
However, install the piping so that the equivalent length is within +5 m of the piping distance limit (actual length) for each respective piping system.
- Equivalent Length = Actual Length + (equivalent length of bends x number of bends in the piping)
- Equivalent Length for 1 Bend

Gas Pipe Diameter (mm)	ø9.52	ø12.7	ø15.88	ø19.05	ø25.4
Bend Equivalent Length	0.15	0.20	0.25	0.30	0.40

- (4) 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

Model	151, 201 models	801, 1001 models
Item		
Max. one way piping length	40m	70m
Max. vertical height difference	Outdoor unit is higher 30m	Outdoor unit is lower 15m

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

How to obtain the cooling and heating capacity

Example : The net cooling capacity of the model FDTCA201HEN 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

$$\text{Net cooling capacity} = \underset{\substack{\uparrow \\ \text{FDTCA201HEN}}}{5000} \times \underset{\substack{\uparrow \\ \text{Air flow} \\ \text{“High”}}}{1.00} \times \underset{\substack{\uparrow \\ \text{Length 15m.} \\ \text{Height difference 5 m}}}{(0.989 - 0.01)} \times \underset{\substack{\uparrow \\ \text{Factor by air} \\ \text{temperatures}}}{1.0} = 4895 \text{ w}$$

2.8 Characteristics of fan

(1) High static pressure duct type (FDU)

How to interpret the blower characteristics table

Example ● What is the Fan Controller's Volume Number setting if, at the high operation speed of FDUA801, it is required to have 120Pa outside static pressure at 56m³/min airflow volume as the operation point?

Move the 120Pa outside static pressure point to the right as shown in the diagram below. The “ a -point”, i.e. where this intersects with the solid curve tracing the 56m³/min airflow volume upwards, is the appropriate Volume Number. In this example the appropriate Volume Number is “No. 3”.

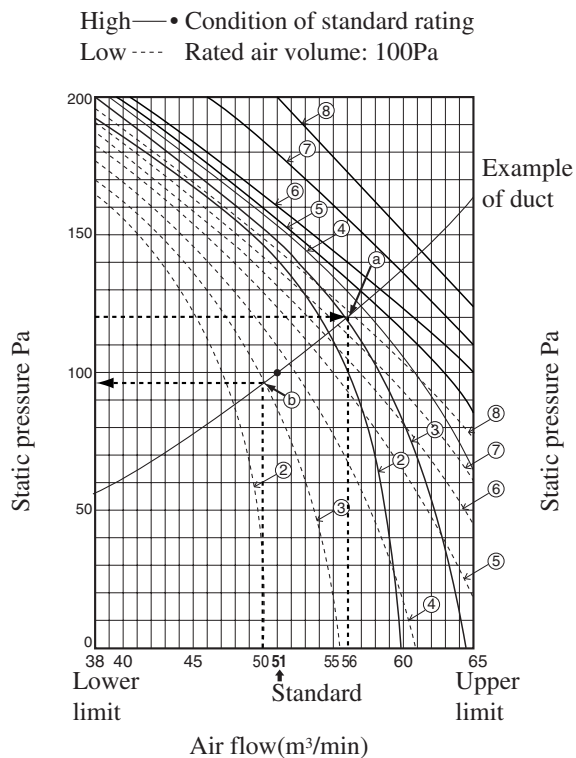
- In this situation, a condition of 50m³/min airflow volume at 96Pa outside static pressure can be predicated at Low Tap and it can be concluded that operation is possible.

Always follow the procedure in “ b -point” to verify that the condition at Low Tap is not outside the Feasible Operation Airflow Volume Range.

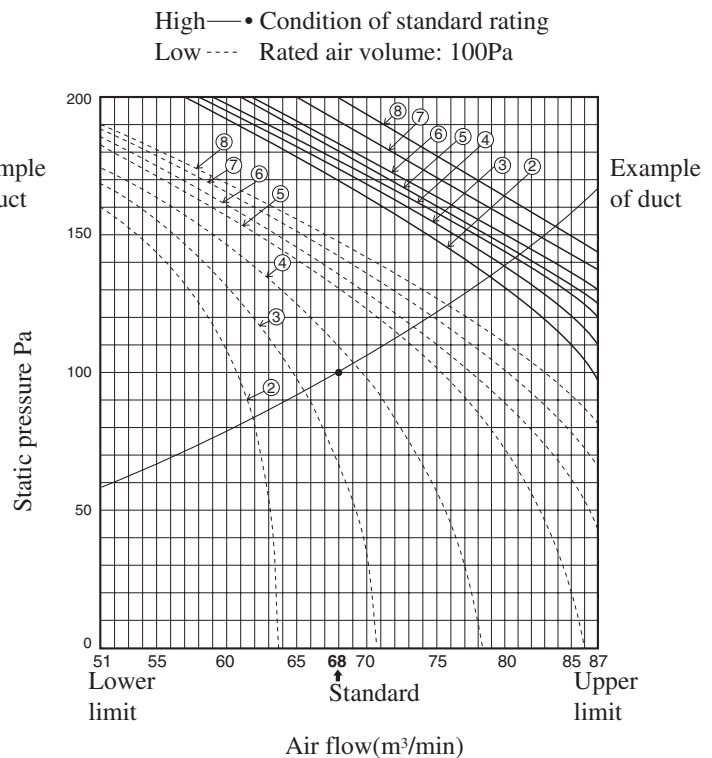
Notes (1) Circled values in the Special Feature Table indicate Fan Controller Volume Numbers. Volume Numbers with no entry are outside the Feasible Operation Airflow Volume Range and therefore operation is not possible.

(2) The Fan Controller Volume Number is set at “No.5” when shipped from the assembly plant.

Model FDUA801



Model FDUA1001



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.

(4) Noise levels for the FDTC series show the noise level when in the Powerful mode.

(1) Indoor unit

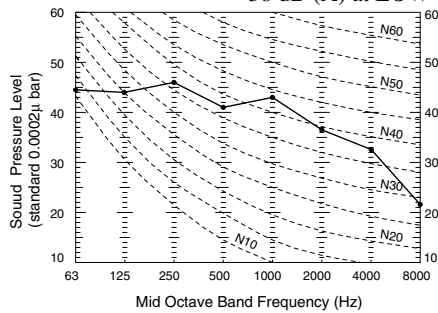
(a) Ceiling recessed compact type (FDTC)

Models FDTCA151, 201

Noise level 46 dB (A) at HIGH

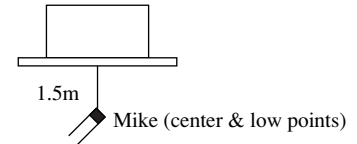
42 dB (A) at MEDIUM

38 dB (A) at LOW



Measured based on JIS B 8616

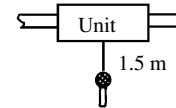
Mike position as right



(b) High static pressure duct type (FDU)

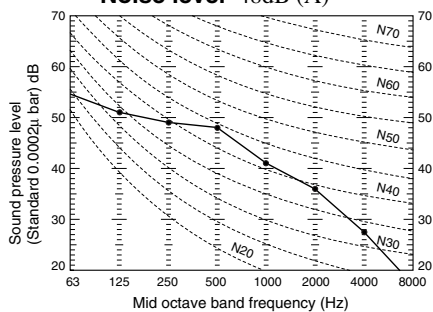
Measured based on JIS B 8616

Mike position as right



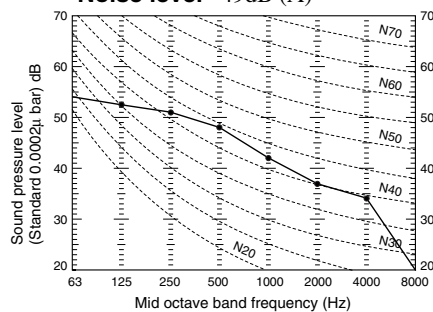
Model FDUA801

Noise level 48dB (A)



Model FDUA1001

Noise level 49dB (A)



(2) Outdoor unit

Measured based on JIS B 8616

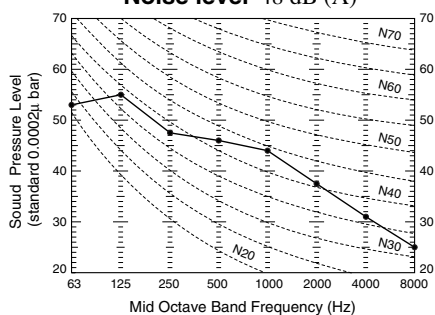
Mike position: at highest noise level in position as below

Distance from front side 1m

Height 1m

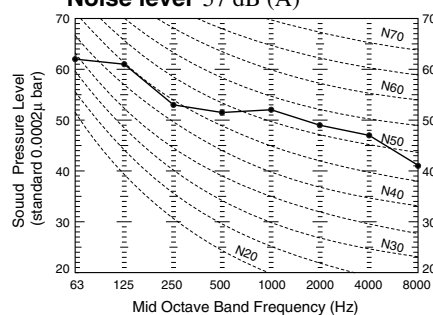
Models FDCVA151HEN, 201HEN

Noise level 48 dB (A)



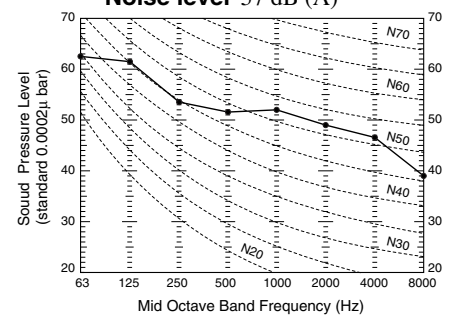
Model FDCA801HES

Noise level 57 dB (A)



Model FDCA1001HES

Noise level 57 dB (A)

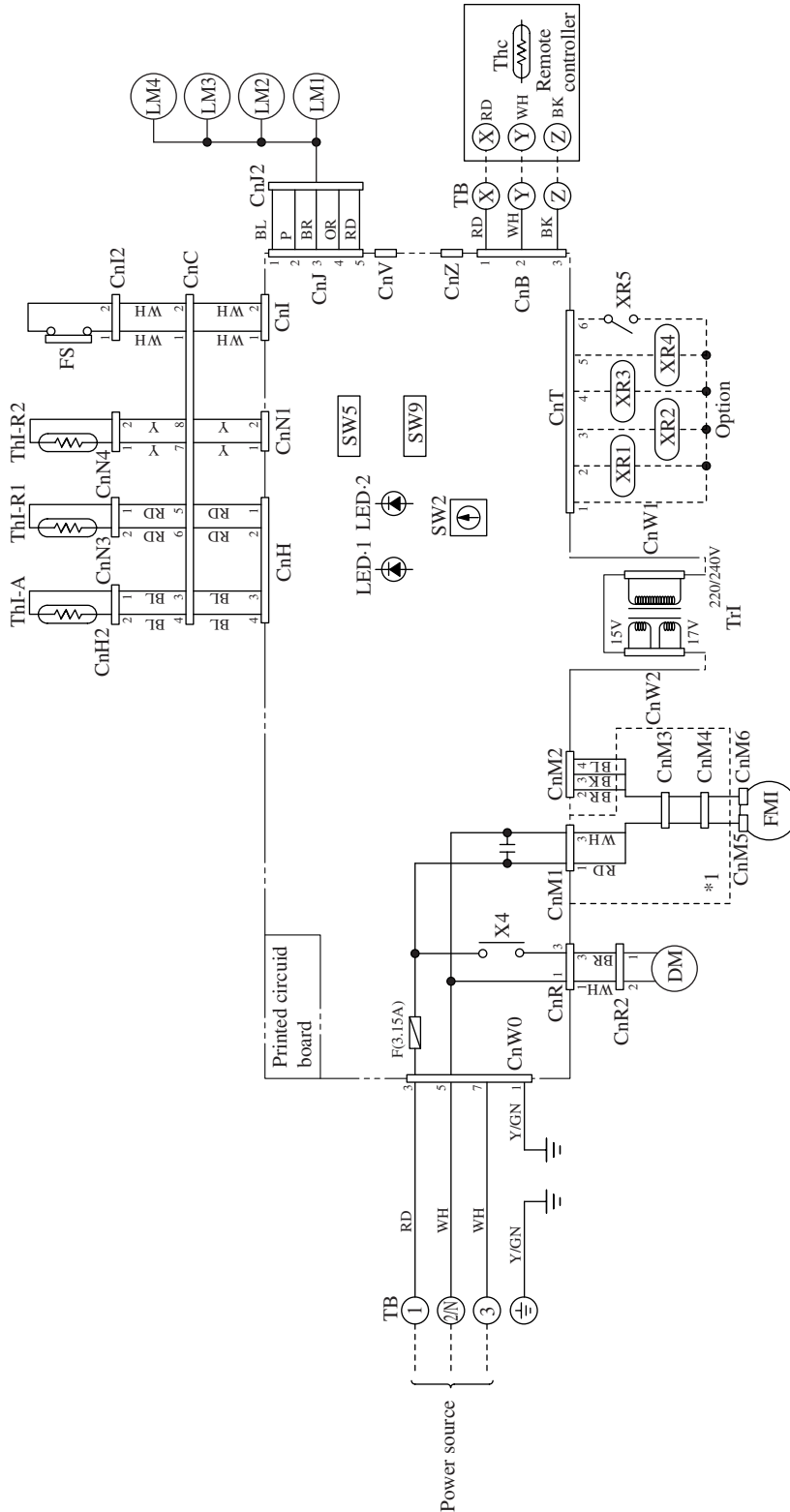


3 ELECTRICAL DATA

3.1 Electrical wiring

(1) Ceiling recessed compact type (FDTC)

Models FDTCA151, 201



Note (1) Always turn off power before you unplug the fan motor connector shown in an area *1 delineated by a dotted line, otherwise a breakdown of the fan motor may result.

Color marks		
Mark	Color	Mark
BK	Black	WHY
BL	Blue	P
BR	Brown	Y/GN
OR	Orange	
RD	Red	

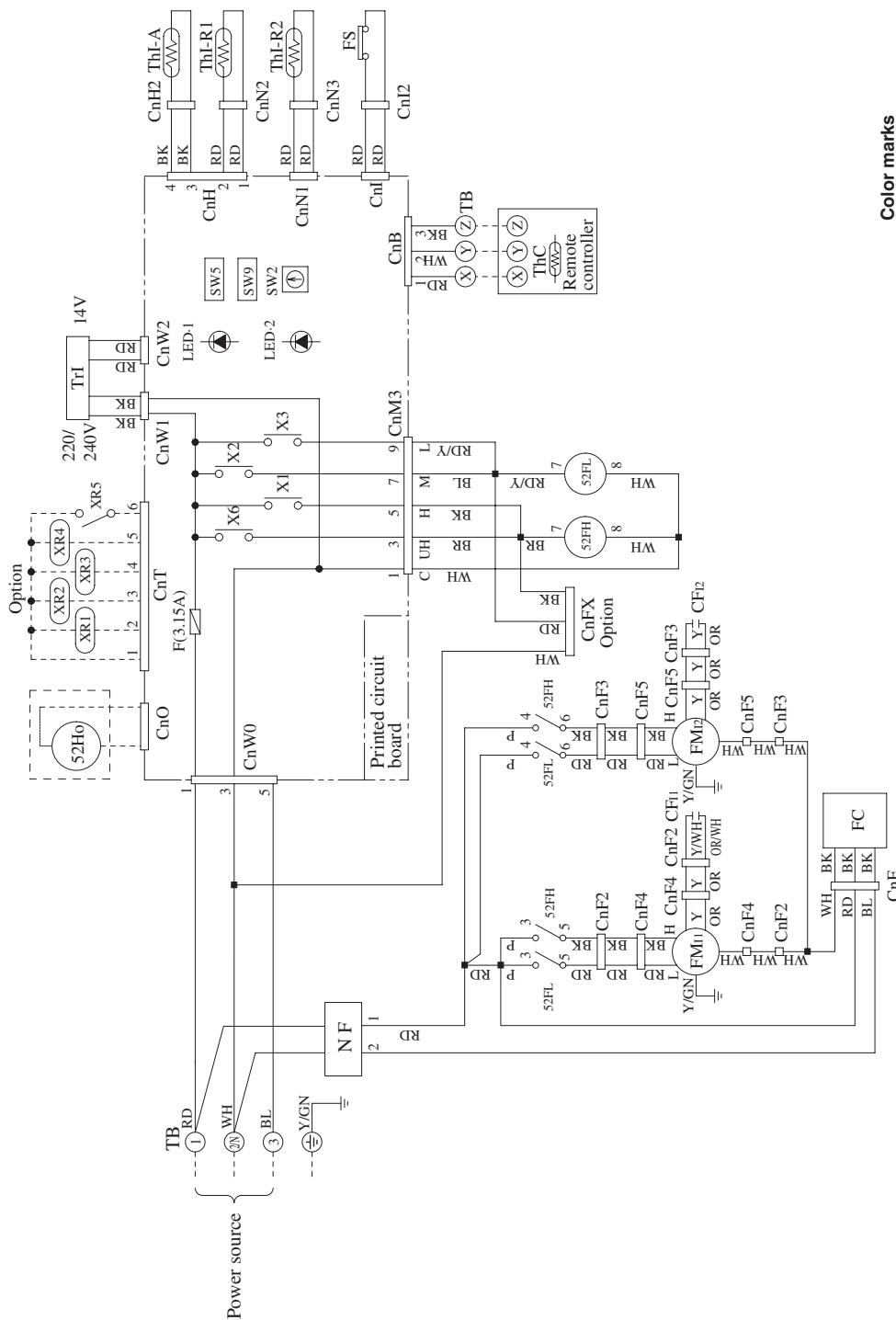
Function of switches

Mark	Function
SW9-3	Emergency stop signal:Invalid
SW9-4	Emergency stop signal:valid
SW9-4	High ceiling
SW9-4	Standard

Meaning of marks

Mark	Parts name	Mark	Parts name	Parts name
FMI	Fan motor	SW2	Remote controller communications address setting	Inspection output(DC12V output)
DM	Drain motor	Tr1	Transformer	Remote operation input(volt-free contact)
FS	Float switch	F	Fuse	Auxiliary relay(For DM)
LM1-4	Louver motor	LED1	Indication lamp(Red)	Terminal block(○ mark)
Thl-A	Thermistor	LED2	Indication lamp(Green)	Connector
Thl-R1	Thermistor	XR1	Operation output(DC12V output)	Closed-end connector
Thl-R2	Thermistor	XR2	Heating output(DC12V output)	
Thc	Thermistor	XR3	Thermo ON output(DC12V output)	

(2) High static pressure duct type (FDU)
Models FDU A801, 1001



Color marks

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

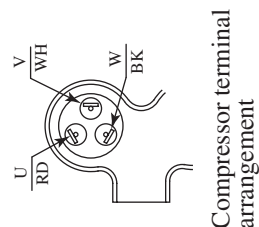
Function of switches

Mark	Function
ON	Emergency stop signal:Invalid
SW9-3	Emergency stop signal:valid

Meaning of marks

Mark	Parts name	Mark	Parts name
FMI1.2	Fan motor	Thc	Thermistor
52FL,FH	FMI condenser	SW2	Remote controller communications address setting
CFI1.2	Electromagnetic contactor for FMI	Tr1	Transformer
FS	Float switch	F	Fuse
FC	Fan controller	LED1	Indication lamp(Red)
NF	Noise filter	LED2	Operation lamp(Green)
Th1-A	Thermistor	XR1	Heating output(DC12V output)
Th1-R1	Thermistor	XR2	Thermo ON output(DC12V output)
Th1-R2	Thermistor	XR3	Thermo ON output(DC12V output)

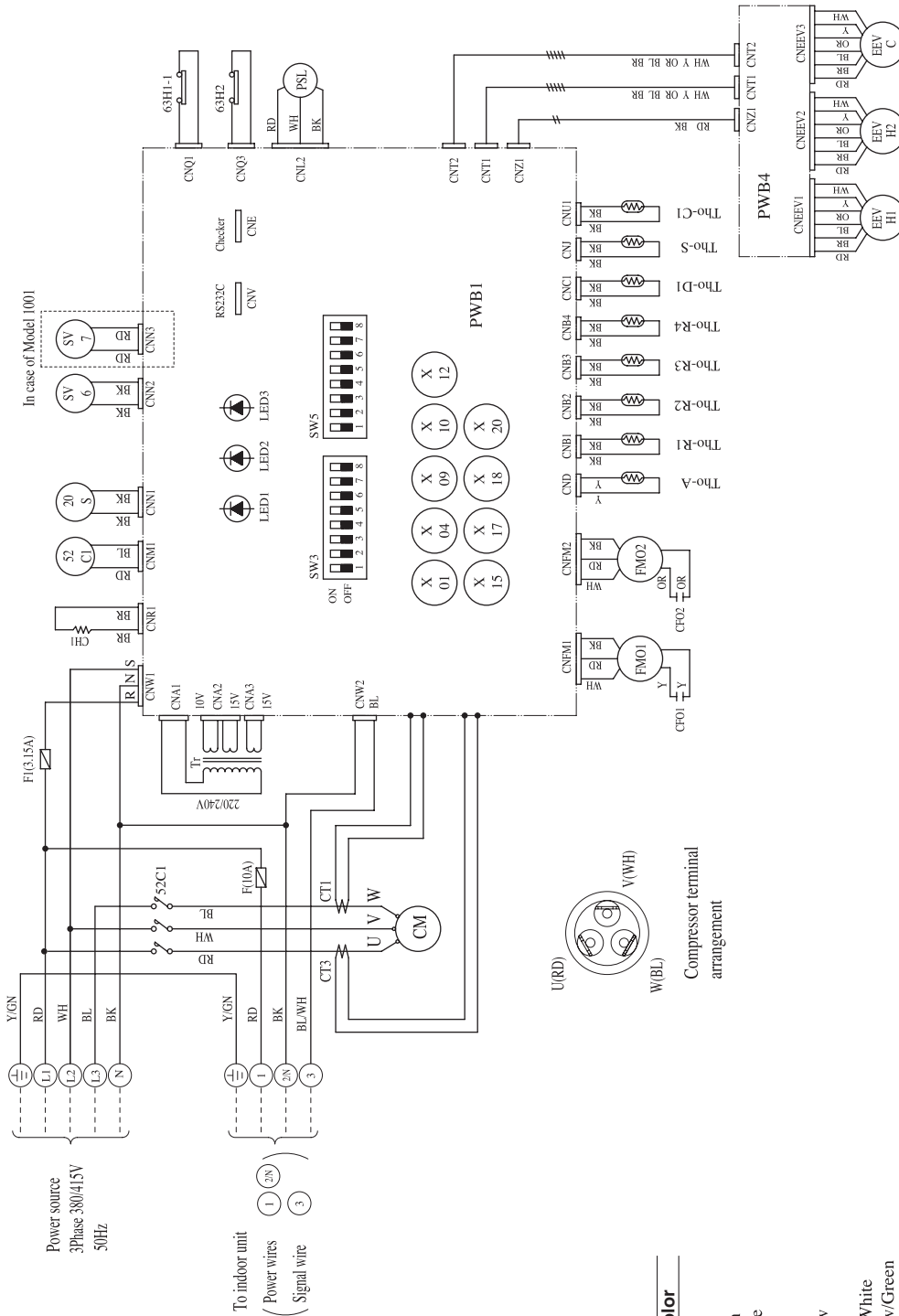
Models FDCVA151HEN, 201HEN



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

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

Models FDCA801HES, 1001HES



Meaning of marks

Mark	Parts name	Mark	Parts name
CM	Compressor motor	Tho-S	thermistor (suction temp.)
FMO1,2	Fan motor	PSL	Low pressure sensor
52C1	Magnetic contactor for CM	CT1,CT3	Current sensor
CH1	Crankcase heater	Tr	Transformer
CFO1,2	Fan motor condenser	TB1	Terminal block (O mark)
X01	Auxiliary relay (for 52C1)	FF1	Fuse
X04	Auxiliary relay (for 20S)	CnA-Z	Connector (□ mark)
X09	Auxiliary relay (for SV6)	PWB1,4	Printed wiring board
X10	Auxiliary relay (for SV7)	LED1	Indication lamp (red)
X12	Auxiliary relay (for CH1)	LED2	Indication lamp (green)
X15,17	Auxiliary relay (for FMO1)	LED3	Indication lamp (green for service)
X18,20	Auxiliary relay (for FMO2)		

Function of switches

Mark	Function	Mark	Function
SW3-1	Defrosting-Cold weather region	SW5-1	Renewal switch
SW3-2	OFF	SW5-2	Normal
SW3-3	OFF	SW5-3	Reserve
SW3-4	OFF	SW5-4	LED reset
SW3-5	OFF	SW5-5	Normal
SW3-6	OFF	SW5-6	Test mode

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

Operation/Stop 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

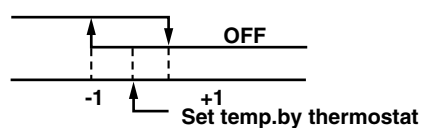
Press this switch while making settings to go back to the previous operation. This switch is also used to reset the "FILTER CLEANING" message display. (Press this switch after cleaning the air filter.)

*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

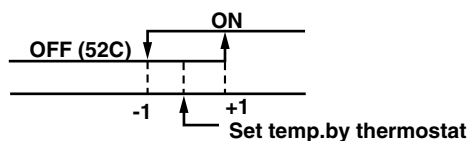
(a) Room temperature control (Differential of thermostat)

Heating operation



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

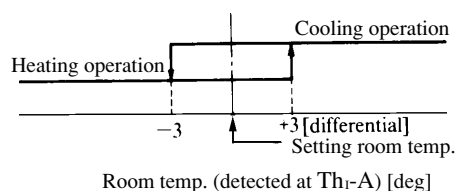
Cooling operation



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

(b) Automatic operation

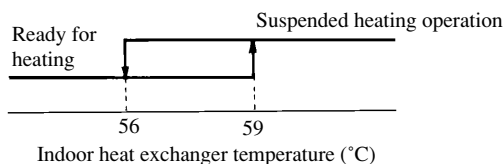
If the Auto mode is selected on the remote control device, the selection of cooling or heating can be made automatically depending on the room temperature (and the temperature of indoor heat exchanger). (When the switching between the cooling and the heating is made within 3 minutes, the compressor will 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.



Room temp. (detected at Th1-A) [deg]

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.



Indoor heat exchanger temperature (°C)

(c) Control parts operation during cooling and heating

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

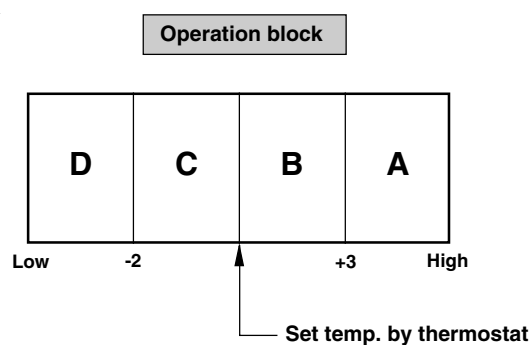
Note (1) ○:ON

×: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

CM, FM_o: ON 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).

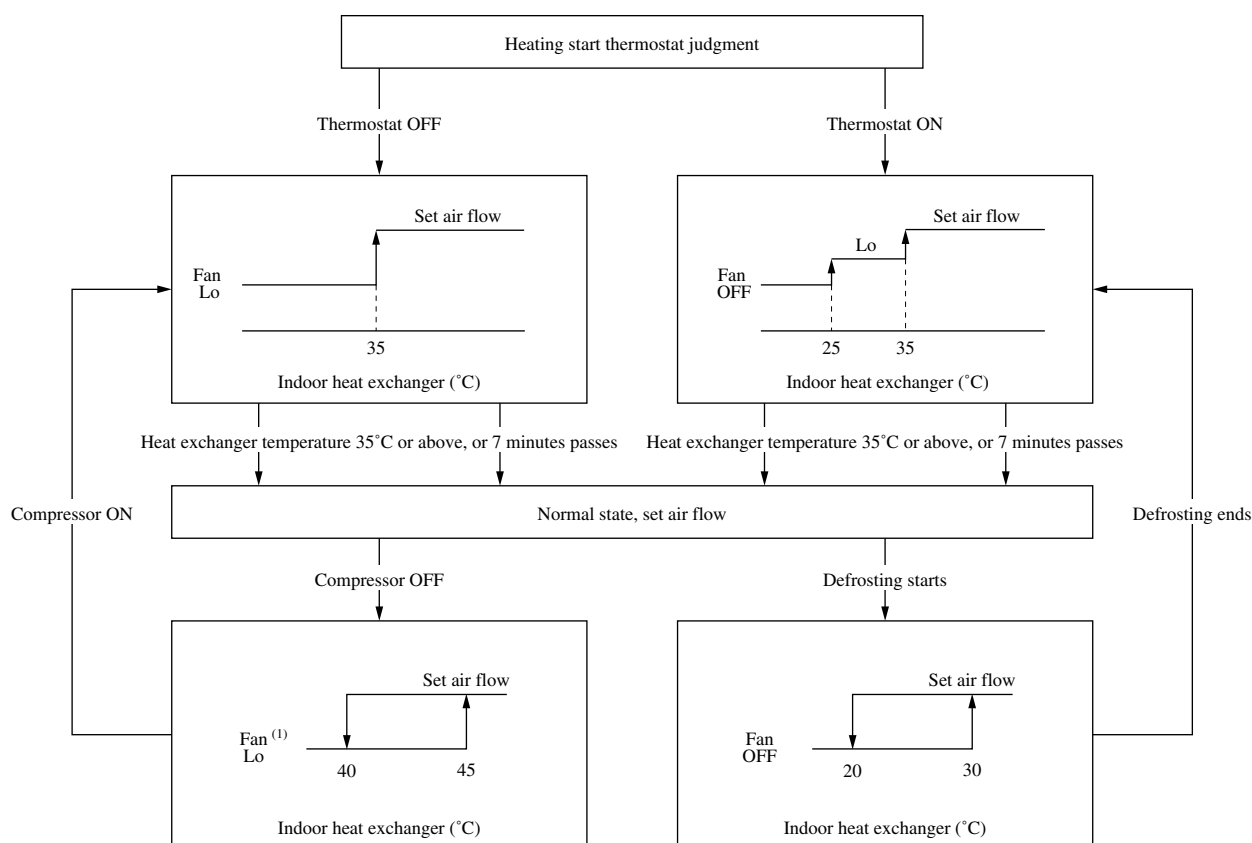
5) Possible joint use timer operation setting combinations

	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.

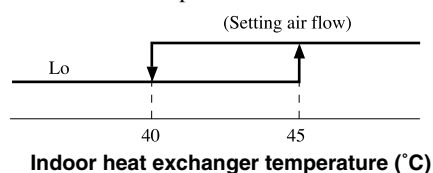


Notes (1) If J2 starts, it changes from OFF to Lo for 5 minutes.

(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)

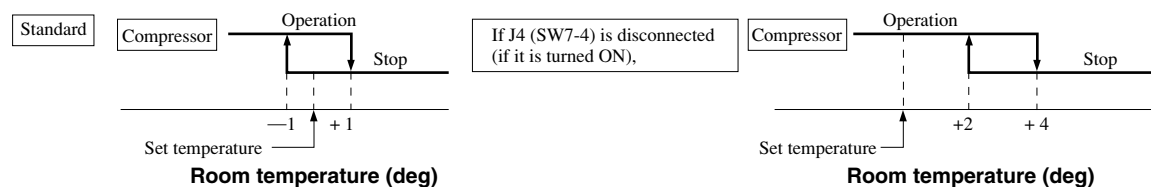
In order to prevent a cold draft while the heating thermostat is turned off, the indoor blower is controlled in response to the temperature of the indoor heat exchanger as illustrated below. It should be noted that if jumper wire J2 (SW7-2) on the indoor PCB is turned off, the indoor blower will stop 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) Auto swing control (Except the FDU model)

1) Louver Control

- While the air conditioner is operating, press the “LOUVER” switch.
“AUTO 1-□ ” is displayed for 3 seconds and the swing louvers move up and down continuously.
- When fixing the position of the swing louvers, press the “LOUVER” switch once while the swing louvers are moving.
4 stop positions are displayed in sequence at 1-second intervals. (ex. “SELECT 1-□ ”)
When the display comes to the position where you would like to stop the louvers, press the “LOUVER” switch once more. The display will stop the message (ex. “STOP 1-□ ”) will be displayed for 3 seconds, then the swing louvers will stop.
- Louver operation when the louver 4-position controller’s power goes On
When the power is turned ON, the louvers automatically swing 1 time automatically (without remote control operation).
This is done so that the microcomputer can confirm the louver’s position and input the louver motor’s (LM) position to the microcomputer.

2) Auto louver horizontal set during heating

During display of “☀️” (Heating Preparation) (during hot start and heating thermostat OFF), the louvers are in the horizontal position regardless of the operation of the auto swing switch (auto swing and louver stop). (In order to prevent cold drafts.) Also, the louver position display LCD continues the previous display from before this control started.

If the “☀️” (Heating Preparation) display goes off, the LCD display also returns to the original display.

3) Louver free stop control

Setting an open circuit with jumper wire J5 (SW8-1), used for setting louver free stop, causes the louver motor to stop if there is a stop signal from the remote control unit and saves the position of the louver in memory. Then if there is an auto swing signal from the remote control unit, auto swing control starts from the previous stop position.

(k) Condensate pump motor (DM) Control [FDTC model only]

- (a) 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.
- (b) 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.

(l) Air flow mode control (FDTC model only)

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

DIP SW Item	SW9-4 OFF (Mild Mode Control)	SW9-4 ON (Powerful mode Control)
Air flow mode	Hi, Me, Lo	UHi, Hi, Me

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

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

(m) 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.

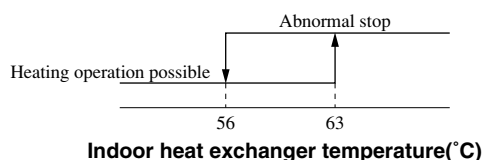
2) 3-minute forced operation timer

- a) 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.
- b) 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.

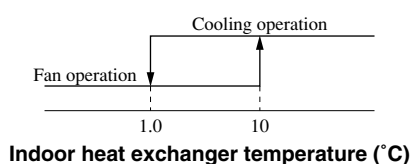
(n) Heating overload protection

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.



(o) 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.



(p) Thermistor (Return air, 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).

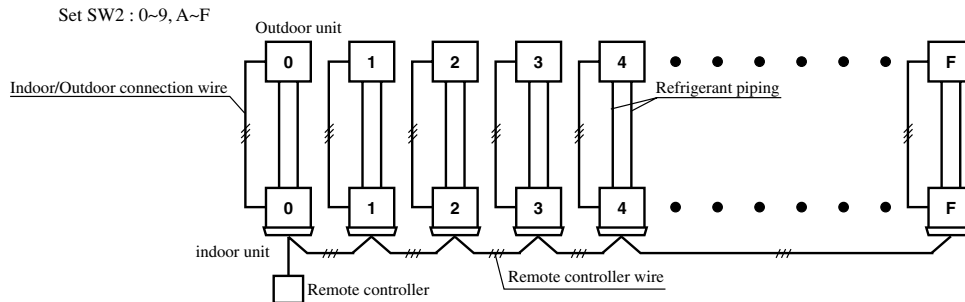
(q) Using 1 remote controller to control multiple units (indoor units - up to 16 units)

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 number is set by a switch (SW2) on the circuit board for the indoor unit.



(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.

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

1) External control (remote display) output

Following output connectors (CnT) are provided on the control circuit board 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

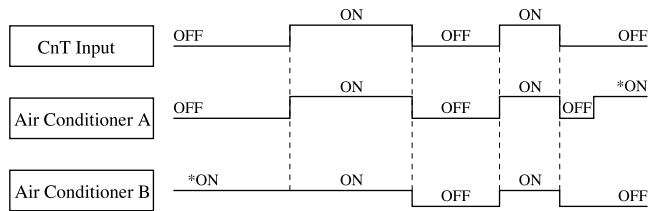
(Make sure to connect the standard remote control unit. Control of input signal is not available without the standard remote controller.)

Control of input signal (switch input, timer input) connectors (CnT) are provided on the control circuit board 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

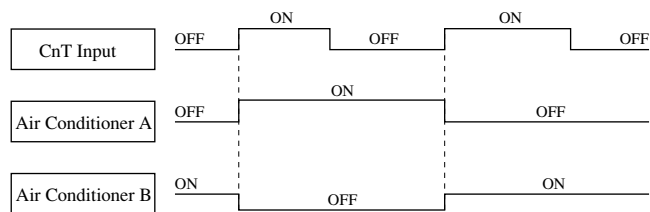
- Input signal to CnT OFF → ON [Edge input] ... Air conditioner ON
- Input signal to CnT ON → OFF [Edge input] ... Air conditioner OFF



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

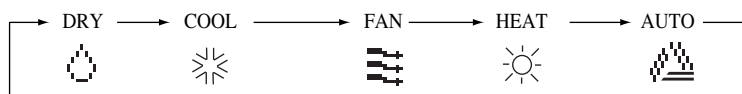
b) When J1 on the PCB of indoor unit is turned on at the field.

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 switch 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.

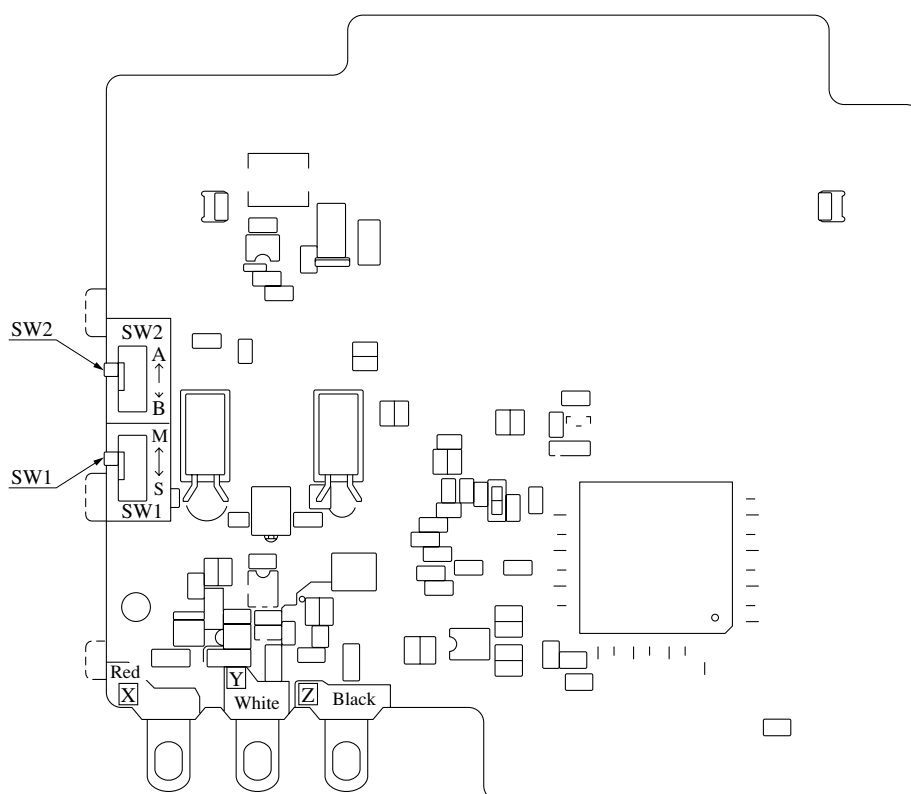
(c) Power failure compensation function

This function is activated by setting “Activate Power Failure Compensation” using the remote control function settings.

Normally, the remote control’s state is recorded in memory and after recovery following a power failure, operation is re-started in accordance with the contents in memory. However, the auto swing stop position, and the timer mode are cancelled,

However the weekly timer setting is reset with the “Holiday setting” set for all day.

Remote controller board 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

◆ FDCVA151, 201HEN models

(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

Item \ Model	Outdoor unit	
	151 model	201 model
Maximum required speed	75	105
Minimum required speed	30	30

2) Heating operation

Units: rps

Item \ Model	Outdoor unit	
	151 model	201 model
Maximum required speed	80	95
Minimum required speed	30	30

(b) Compressor soft start control

1) Compressor protective start I

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

- a) 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.
 - ① The compressor begins synchronous operation 5 seconds after the thermostat ON conditions have been established.
 - ② The bottom limit compressor speed is 30 rps, and the upper limit is 64 rps. If the compressor's speed is increased, it is increased by 6 rps/30 seconds.
 - ③ This control is terminated 3 minutes after the compressor has started.

2) Compressor protective start II

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

- a) 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.
- b) 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.
 - 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/30 sec. for 6 minutes after the compressor is started.

Lower limit value	Upper limit value
30	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.

Lower limit value	Upper limit value
30	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

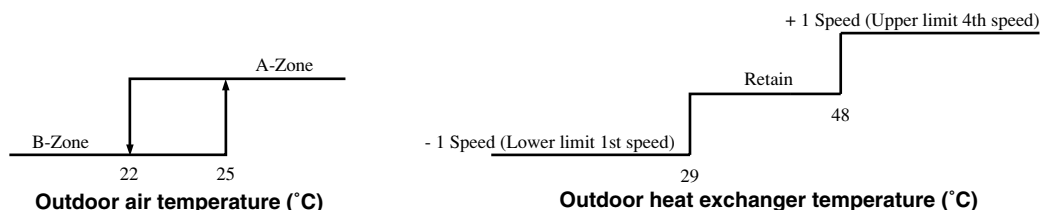
(i) Outdoor fan tap and fan motor control contents during control

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)

(ii) Outdoor unit fan tap control

1) Fan tap control during low outdoor temperature cooling

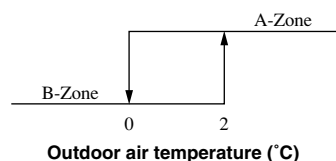
The outdoor unit's fan is controlled in accordance with the outdoor heat exchanger temperature (sensed by Tho-R) and the outdoor air temperature (sensed by Tho-A).



- 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 48°C or higher, this control is cancelled.

2) Outdoor unit fan tap control during heating

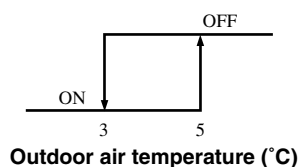
If the outdoor air temperature (sensed by Tho-A) is detected in the B-Zone for 5 minutes continuously, the outdoor fan tap speed is increased by 2 speeds and thereafter, this may be repeated, but the upper limit is made 7th speed.



- 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.

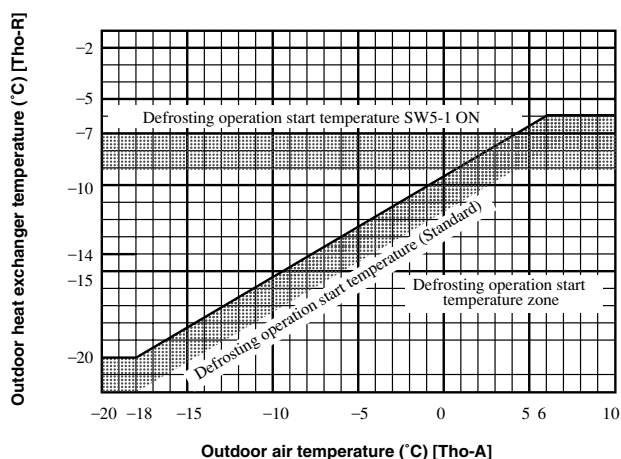


(f) Defrosting

1) Defrosting start conditions

Defrosting operation starts when all the following conditions are satisfied.

- a) If 45 minutes 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)
- b) If 5 minutes have passed since the compressor went ON.
- c) 5 minutes of outdoor fan operation have passed.
- d) After all the above conditions have been satisfied, 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 shown in the graph at right.



2) Defrosting start temperature change procedure

Turn SW5-1 on the outdoor unit PCB ON.

- a) A cumulative total of 30 minutes of compressor operating time has passed since defrosting ended.
- b) 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.
- c) 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.

- a) If 10 minutes ⁽¹⁾ have passed since defrosting started.
- b) If the temperature at the outdoor heat exchanger thermistor (Tho-R) is 12°C or higher continuously for 2 seconds.

Notes (1) This setting can be changed to 12 minutes by turning SW5-1 on the outdoor unit PCB ON.

(2) When SW-1 on the outdoor unit's control board is ON, or when JA4 is open, raise the defrosting end temperature and carry out forced defrosting.

(g) Compressor protection control

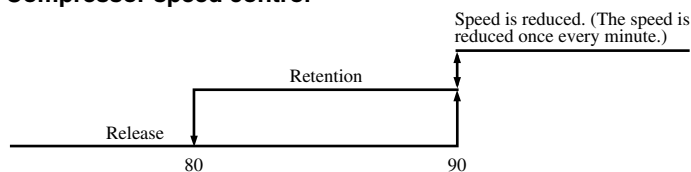
(i) Compressor overcurrent protection

- 1) If a value at or higher than the set value is detected continuously for approximately 0.5 second in the L1 and L2 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).
- 2) 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

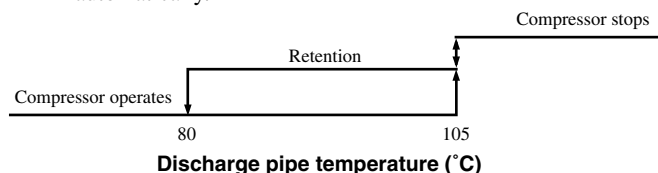
If the discharge pipe temperature (sensed by Tho-D) exceeds the set value, the compressor speed is controlled to prevent the discharge pipe temperature from rising. If it continues to rise anyway, the compressor is stopped.

1) Compressor speed 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 (30 seconds) 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°C 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.

Compressor speed (rps)	Indoor heat exchanger temperature (°C)
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.

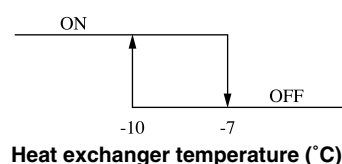
Compressor speed (rps)	Indoor heat exchanger temperature (°C)
less than 88	58.5 or more
88 to less than 108	53.5 or more
108 or higher	48.5 or more

- 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.

Compressor speed (rps)	Indoor heat exchanger temperature (°C)
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, 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, 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) Operation is at a speed that is lower than the outdoor fan control speed item (d).

(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) 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 during test operation.		

- 2) Test operation control

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

Capacity Mode	Remote control unit settings, display contents
Cooling operation	Cooling. The initial setting temperature is 5°C. The temperature at the indoor unit's heat exchanger is displayed in the return air temperature display.
Heating operation	The initial set temperature for heating (preparation) is 30°C and the return air temperature is displayed in the return air temperature display.

FDCA801, 1001HES models

(a) Compressor Starting Control

The controls in 1) and 2) are performed at the moment when compressor operating conditions are met.

- 1) If the operating mode is the same as the mode the first time the compressor started after the power was turned ON or the same as the operating mode the previous time.

The oil return solenoid valve (SV6) and expansion valve auxiliary solenoid valve (SV7 (in the 1001 model only)) go ON, then the compressor starts 5 seconds later.

- 2) If the operating mode changes from the previous operating mode.

The 4-way valve switches after 10 seconds, each solenoid valve in item 1) goes ON, then 20 seconds later, the compressor starts.

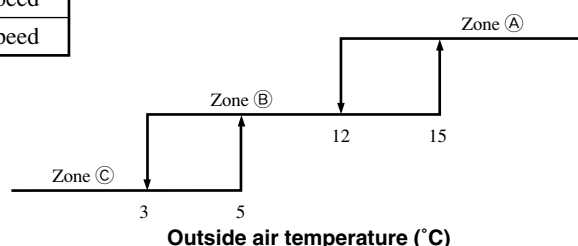
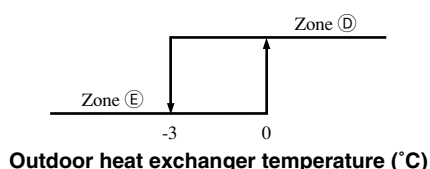
(b) Outdoor fan control

1) Fan speed and fan motor control contents during control

Fan speed	FM01	FM02
4 th speed	Hi	Hi
3 th speed	Hi	Lo
2 th speed	Lo	Lo
1 th speed	Lo	OFF
0 th speed	OFF	OFF

- 2) During heating operation, the fan speed is controlled in accordance with the outdoor heat exchanger temperature (detected by Tho-R) and the outside air temperature (detected by Tho-A).

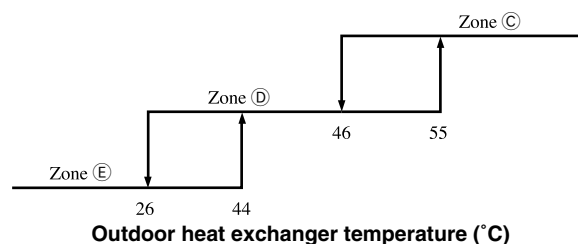
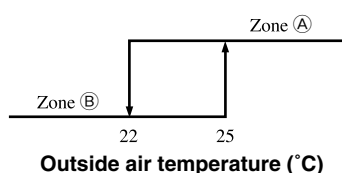
Tho-R \ Tho-A	Zone (A)	Zone (B)	Zone (C)
Zone (D)	1th speed	4th speed	4th speed
Zone (E)	1th speed	4th speed	4th speed



Notes (1) The temperature at whichever outdoor heat exchanger temperature thermistor (Tho-R1 or R2) has the lowest reading is detected.

- 3) The fan speed is controlled in accordance with the outdoor heat exchanger temperature (detected by Tho-R) and the outside air temperature (detected by Tho-A) during cooling or dehumidifying.

Tho-R \ Tho-A	Zone (A)	Zone (B)
Zone (C)	4th speed	4th speed
Zone (D)	4th speed	2th speed
Zone (E)	2th speed	1th speed



Notes (1) The temperature at whichever outdoor heat exchanger temperature thermistor (Tho-R1 or R2) has the highest reading is detected.

4) Outdoor fan speed control during heating

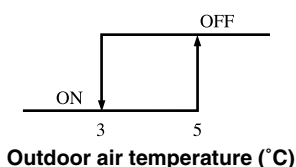
- a) If the fan starts when the outside air temperature (detected by Tho-A) is 12°C or higher, the outdoor fan motor runs at speed A for 4 minutes, then after 4 minutes control switches to the outdoor fan speed control in item 2).

Model \ Control speed	Speed A
801H	1th speed
1001H	0th speed

- b) Even if the outside air temperature (detected by Tho-A) drops below 12°C during operation with the outdoor fan motor OFF, the outdoor fan motor continues to run at 2th speed for 4 minutes.

(c) Snow protection fan control

If SW3-2 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 4th speed once every 10 minutes.

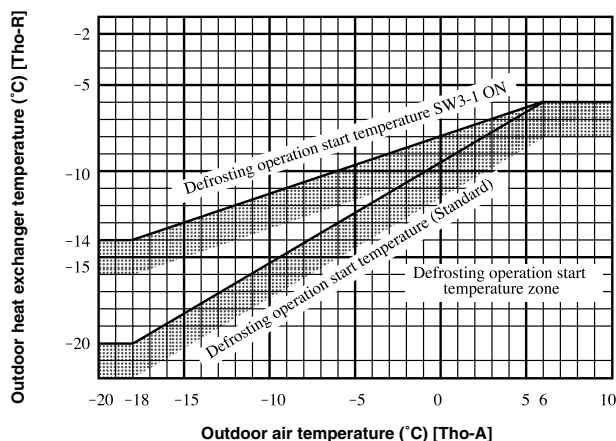


(d) Defrosting

1) Defrosting start conditions

Defrosting operation starts when all the following conditions are satisfied.

- If 45 minutes 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 15 seconds and drops below the dehumidifying operation start temperature shown in the figure at right.



2) Defrosting start temperature change procedure

Turn SW3-1 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 15 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.

- When 10 minutes 20 seconds have passed since dehumidifying started.
- When the outdoor heat exchanger thermistor (Tho-R) senses a temperature of 12°C or higher continuously for 10 seconds.

(e) Compressor protection control

(i) Compressor overcurrent protection

- If an overcurrent of 20A or greater is detected 5 times in 60 minutes after the compressor goes ON, or if an overcurrent of 20A or greater is detected continuously for 60 minutes while the compressor is stopped, an abnormal stop (E33) occurs.
- If the overcurrent is detected to be 1.5 ~ 2A, operation recovers automatically.

(ii) Reverse phase and out of phase detection

1) Reverse phase protection

The phase sequence in the 52C secondary side is detected, and in cases other than those shown below, reverse phase is judged and the unit is subjected to an abnormal stop (E32).

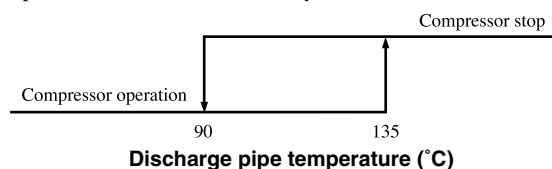
Terminal block display	L1 · L2 · L3 · N
Wire connections	L1 · L2 · L3 · N
	L3 · L1 · L2 · N
	L2 · L3 · L1 · N

2) Out of phase detection (Detected by the T-phase)

If a current of 1.5 ~ 2A or lower is detected continuously for 4 seconds during compressor operation, the compressor is stopped. If it is detected again within 60 minutes after it is detected the first time, and if it is detected while the compressor is ON within 10 minutes after the power is turned ON, an abnormal stop (E34) occurs.

(iii) Abnormal discharge pipe temperature

- 1) If the discharge pipe temperature rises to 135°C or higher, the compressor stops. If the temperature drops to 90°C or lower, the compressor recovers automatically.



- 2) If the discharge pipe temperature is abnormal 5 times within 60 minutes, including when the compressor is stopped, or is 135°C or higher continuously for 60 minutes, then unit undergoes an abnormal stop (E36).

(iv) High pressure control

1) High pressure control during heating

- a) When the pressure at the high pressure switch (63H2) during operation in the heating mode is 3.24 MPa or higher, the outdoor fan and electronic expansion valve (EEVH1, 2) for heating are controlled and increases in the high pressure are prevented.
- b) When either of the following conditions exists
 - ① This control ends when pressure at the high pressure switch (63H2) drops to 2.65 MPa or lower.
 - ② If this control continues intermittently for 30 minutes, this control ends and the compressor is stopped.

2) Abnormality detection control using the high pressure switch (63H1)

If the high pressure switch (63H1) is open (4.15 MPa), the compressor stops. After a 3-minute delay, when the high pressure switch (63H1) recovers (3.15 MPa), the compressor is restarted. If this condition is detected 5 times within 60 minutes after it is detected the first time, an abnormal stop occurs and an error message (E40) is displayed.

3) Abnormal high pressure control using the outdoor heat exchanger temperature (Tho-R1, R2)

- a) If the outdoor heat exchanger temperature sensors Tho-R1 or Tho-R2 detect a temperature of 65°C or higher in the cooling mode during compressor operation, stop control is carried out. This control ends when the outdoor heat exchanger temperature drops to 48°C or lower.
- b) When an outdoor heat exchanger temperature of 65°C or higher (Tho-R1, R2) is detected 5 times in 60 minutes, or if it is detected continuously for 60 minutes, including when the compressor is stopped, an abnormal stop (E35) occurs.

(v) Abnormal low pressure detection control

- 1) The compressor is stopped when the following conditions are satisfied.
 - ① When the low pressure sensor detects a pressure of 0.079 MPa or lower continuously for 15 seconds after the compressor starts operating.
 - ② When a low pressure sensor (PSL) pressure of 0.120 MPa or lower is detected continuously for 60 seconds or longer after 10 minutes have passed since the compressor was started.
- 2) The compressor recovers when the pressure detected by the low pressure sensor rises to 0.128 MPa or higher.
- 3) If the condition in ① or ② of item 1) above is detected 3 times within 60 minutes, or if a pressure of 0.079 MPa or lower is detected continuously for 5 minutes or longer by the low pressure sensor, an abnormal stop (E49) occurs.

(f) Detection of disconnected wires in temperature thermistors (outdoor heat exchanger, outside air temperature, discharge pipe, suction pipe, under-dome) and low pressure sensor.

1) Outdoor heat exchanger temperature thermistor, outside air temperature thermistor and low pressure sensor

If the following conditions are detected 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 is restarted, but if the same condition is detected 3 times within 60 minutes (within 40 min.), an abnormal stop occurs.

Note (1) For 3 minutes after dehumidifying and defrosting are finished (2 min ~ 2 min. 20 seconds), there is no detection.

- Outdoor heat exchanger temperature thermistor: -50 °C or lower.
- Outside air temperature thermistor: -30°C or lower
- Low pressure sensor thermistor: 0V or lower, or 3.49 V or higher

2) Discharge pipe temperature thermistor, suction pipe temperature thermistor, under-dome temperature thermistor

If the following conditions are detected 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 the same condition is detected 3 times within 40 minutes, an abnormal stop occurs.

Note (1) For 3 minutes after dehumidifying and defrosting are finished, there is no detection.

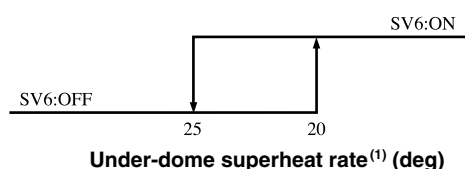
- Discharge pipe temperature thermistor: -10°C or lower
- Suction pipe temperature thermistor: -50°C or lower
- Under-dome temperature thermistor: -50°C or lower

(g) 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.

(h) Oil return solenoid valve (SV6) control

During compressor operation, signals from the under-dome temperature sensor are sent to the oil return solenoid valve (SV6) to control the dilution rate inside the compressor.



Note (1) The under-dome superheat rate is the under-dome sensor value. It is a value determined by the intake pressure saturation temperature.

(i) Test operation

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

SW3-3	After pressing continuously for 1 second	SW3-4	OFF	Cooling test operation
			ON	Heating test operation
			Test operation is ended by pressing SW3 during test operation.	

2) Test operation control

- a) Each protective control and abnormal sensing control is activated.
- b) If SW3-4 is switched back during test operation, stop control is implemented and the cooling and heating operations are toggled.
- c) Remote control unit settings and displays during test operation

Mode	Capacity	Remote control unit settings, display contents
Cooling operation		Cooling. The initial setting temperature is 5°C. The temperature at the indoor unit's heat exchanger is displayed in the return air temperature display.
Heating operation		The initial set temperature for heating (preparation) is 30°C and the return air temperature is displayed in the return air temperature display.

(j) **Pump down control**

If the pump down switch (SW3-5) is turned ON during an operation stop or during an abnormal stop (except when the thermostat is OFF), pump down operation starts. (This control is invalid during indoor unit operation. It is valid during indoor unit abnormal stop or when the indoor units are OFF.)

1) Control contents

- a) The compressor starts in the cooling mode.
- b) The red and green (LED's) on the outdoor unit PCB keeps flashing.
- c) Each protective and abnormal detection control is valid except low pressure control.
- d) The outdoor fan is controlled as normal.
- e) The electronic expansion valve (cooling, heating) is fully open.

2) Control end conditions





Stop control is executed when any of the following conditions exists.

- a) A low pressure of 0.87 MPa or lower is detected (PSL).
 - Ⓐ Red LED: Lights continuously, Green LED: Flashing; shows a remote control stop.
 - Ⓑ When the low pressure (PSL) rises above 0.87 MPa, it is possible to restart.
 - Ⓒ The electronic expansion valve (cooling, heating) is fully open.
- b) Stopped by Error Detection Control
 - Ⓐ Red LED: Keep flashing, Green LED: Flashing.
 - Ⓑ Restarting is impossible. Reset the power supply to resume normal operation.
 - Ⓒ The electronic expansion valve (cooling, heating) is fully open.
- c) The compressor's cumulative operating time under pump down control becomes 5 minutes.
 - Ⓐ Red LED: Stays off, Green LED: Flashing, Remote control stop.
 - Ⓑ Resumption of pump down control is possible.
 - Ⓒ The electronic expansion valve (cooling, heating) is fully open.

Caution: Communications with the indoor units is cancelled when the pump down switch is pressed, so E5, "Transmission Error" is displayed by the indoor units and the remote controller. However, there is no error.

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 retied for the weight in lifting it for portage. An improper manner of portage can result in a fall 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 can 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.

5.1 Installation of indoor unit

(a) Ceiling recessed compact type (FDTC)

(i) Selection of installation location

- 1) Select location where the space above ceiling is larger than those mentioned below and perfect draining can be assured.
- 2) With the customer's consent, select a location with following suitable conditions.
 - a) Where cool air or hot air can easily pass through.
If the height of the location exceeds 3 m, hot air will gather in the ceiling. Suggest to the customer to also install a circulator.
 - b) Where water can be completely drained. A sloping location for drainage.
 - c) Where there are no wind disturbances to the suction inlet and blowing outlet, where the fire alarm will not be set off erroneously, where no short circuits occur.
 - d) Where there is no direct sunlight.
 - e) If the humidity above the ceiling exceeds 80% or the condensation temperature above the ceiling exceeds 28°C, affix polyurethane foam (with a thickness to 10 or greater) above the insulation in the ceiling panels.

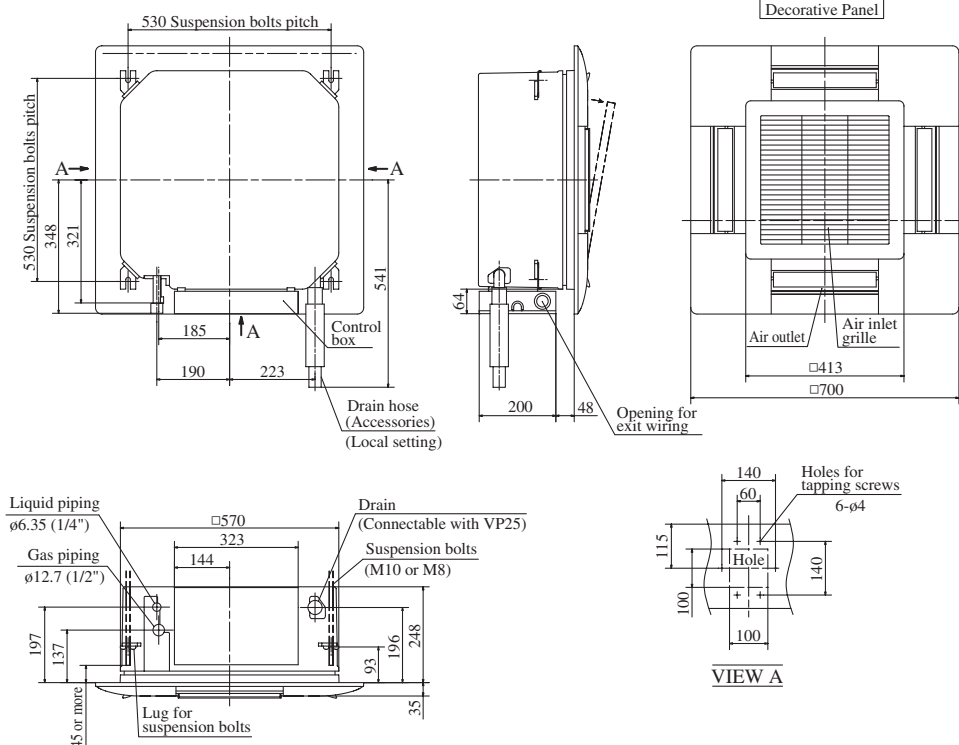
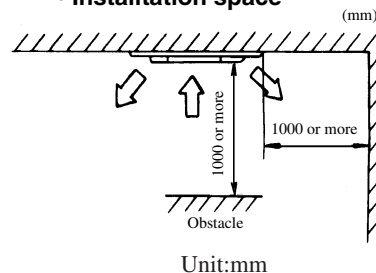
Carry out tests of the main unit under the above conditions and confirm that there is no failure. However, if the environment where the unit is installed exceeds the above conditions and the unit is operated in high humidity conditions, there is danger of water drops dripping down. If there is a possibility that the unit will be used under such conditions, install 10 to 20 mm of insulation material to the main unit, piping and drain pipes.

- 3) Consider the supporting strength of the location. If the strength is not sufficient to sustain the unit weight, use reinforcing materials.

(b) Installation space for unit

- a) When a sufficient interval cannot be secured between the unit and a wall or another unit, shut up diffusers on that side to block winds and make sure that no short-circuiting is occurring. (A wind blocking material is available as an optional part)
- Do not use the unit in the "Lo" wind mode, when winds are blown into two or three directions.

• Installation space

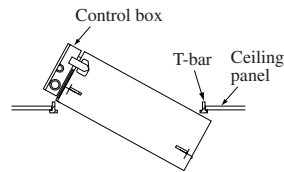
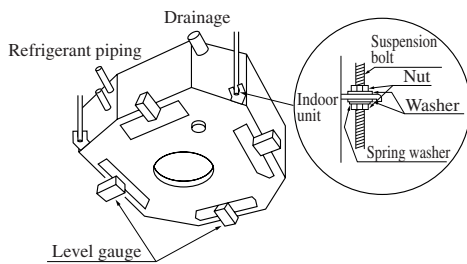


(c) Suspension

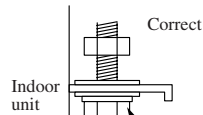
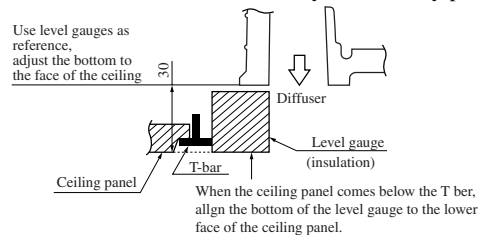
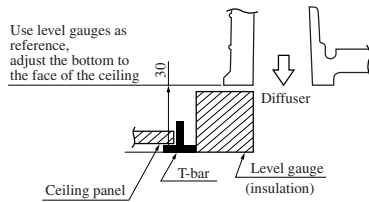
- Please arrange four sets of a suspension bolt (M10 or M8), a nut matching the bolt, a flat washers and a spring washer on the installation site.

When suspension from the ceiling

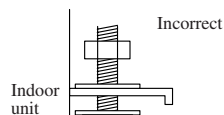
- This unit is designed for installation on a 2×2 grid ceiling.
If necessary, please detach the T bar temporarily before you install it.
(When it is installed on a ceiling other than 2×2 grid ceiling, please do not fail to provide an inspection port on the control box side.)
- Determine the positions of suspension bolts (530×530).
- Use four suspension bolts, each fastened in such a manner that it can withstand pull force of 50kgf.
- Make suspension bolts to the length that leaves approximately 45mm of them above the ceiling. In hoisting the unit main body in, temporarily fasten the four lower nuts of the suspension bolts approx. 93 mm from the ceiling and the four upper nuts at positions sufficiently far from the lower nuts so that they may not hamper installation work when the unit is hoisted in or the height is adjusted.
- Put in the unit on an angle.



- After hoisting in the unit, attach level gauges supplied as accessories and determine the unit position (height). To adjust height, use the four lower nuts with the four upper nuts left loose. Please make sure that the unit's four hanging fixtures touch the four lower nuts and washers evenly without any play.



Touch the lower nut and washer without any play



Play is left between the fixture and the lower nut and washer

- Please make sure that the unit main body is installed levelly. Level must be checked with a level or a clear hose filled with water. (A tolerable height difference at an end of the unit is within 3 mm)
- After you have adjusted the height and level of the unit, fasten the four upper nuts to fix the unit.

Note (1) Do not adjust the height with the upper nuts. It may cause deformation due to excessive force working on the unit main body, which can result in such problems that you cannot attach the panel or noises are generated from the interfering fan.

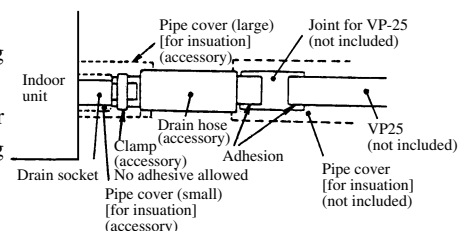
When embedded into ceiling

- Determine the positions of hanging bolts (530×530).
 - The pitch center of a suspension bolt must accord with the center of the unit.
- Use four suspension bolts, each fastened in such a manner that it can withstand pull force of 50 kgf.
- Fix the unit as per (iii) 5) and 7) above.

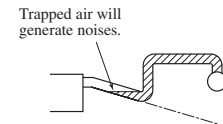
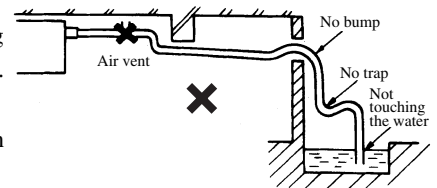
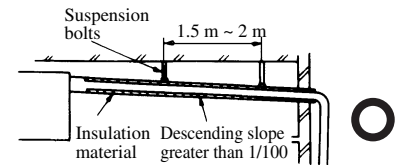
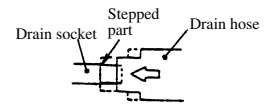
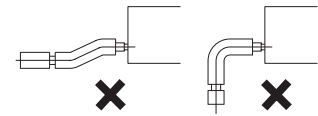
Note (1): When a suspension bolt exceeds 1.3 m in length, use an M10 bolt and give it reinforcements such as braces.

(d) Drain Piping

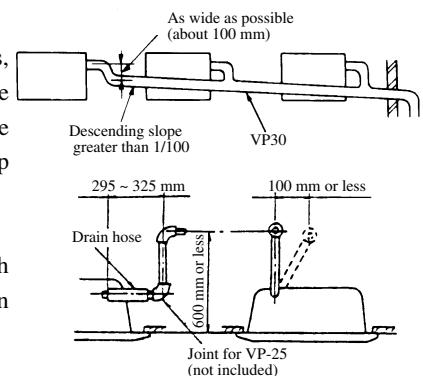
- Glue the drain hose supplied as an accessory and a VP-25 joint before lifting the unit.
- The drain hose is to provide a buffer to absorb a slight dislocation of the unit or the drain piping during installation work. If it is subject to abuse such as being bent or pulled deliberately, it may break, which will result in a water leak.



- 3) Care must be taken so as not to allow an adhesive to run into the drain hose. When it is hardened, it can cause a breakage of a flexible part, if the flexible part receives stress.
- 4) Use VP-25 general-purpose hard PVC pipes for drain piping.
- 5) Insert the drain hose supplied as an accessory (soft PVC end) to the stepped part of the unit's drain socket and then fasten it with the clamp also supplied as an accessory.
- 6) Adhesive must not be used.
 - a) Glue a VP-25 joint (to be procured locally) to joint it with the drain hose (hard PVC end) and then glue a VP-25 (to be procured locally) to the joint.
 - b) Give the drain piping a descending grade (1/50-1/100) and never create a bump to go over or a trap.
 - c) In connecting drain pipes, care must be taken so as not to apply force to the unit side piping and fix the pipe at a point as close to the unit as possible.
 - d) Do not create an air vent under any circumstances.
 - e) When drain piping is implemented for more than one unit, provide a collecting main about 100 mm below the units' drain outlets from which it collects drain. Use a VP-30 or larger pipe for a collecting main.
 - f) Do not fail to provide heat insulation at the following two points because they can cause dew condensation and a resultant water leak.

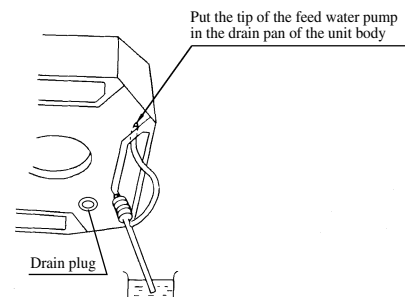


- 7) Drain socket
After a drain test is completed, apply a pipe cover (small: accessory) onto the drain socket, cover the pipe cover (small), the clamp and part of the drain hose with a pipe cover (large: accessory) and wrap it with a tape completely without leaving any gaps. (Cut pipe covers into appropriate shapes)
- 8) Hard PVC pipes laid indoor
 - a) Since a drain pipe outlet can be raised up to 600 mm from the ceiling, use elbows, etc. to install drain pipes, if there are obstacles preventing normal drain pipe arrangement. When the drain pipe is raised at a point far from a unit, it can cause an overflow due to a back flow of drain upon stoppage, so arrange piping to keep the dimensions specified in the illustration shown on the left.
 - b) Install the drain pipe outlet where no odor is likely to be generated.
 - c) Do not lead the drain pipe into a ditch where the generation of harmful gas such as sulfuric gas or flammable gas is expected. A failure to observe this instruction may cause such harmful or flammable gas to flow into the room.



Drainage test

- ① Check that water is draining thoroughly during test run, and that there are no water leaks from the joints and the drain pan.
- ② The test has to be performed even if the unit is installed in the season when the unit is used for heating.
- ③ In a new house, perform the test before the ceiling is fitted.
 - Using a water pump, pour about 1000 cc of water to the drain pan through the blowing outlet.
 - Check the transparent drain-out section of the drain hose for normal flow of drainage.
 - * While observing the noise from the drain motor, test drain operation.
 - Take off the drain plug to release the water. After the water is drained, place the drain plug back where it was..
 - * Be careful not to get splashed when pulling the drain plug.



Forced drain pump operation

- ◆ Set up from a unit side.
- ① Turn DIP switch SW9-3 on the indoor unit's PCB ON, then after disconnecting the remote control's communications line CnB connector, turn the power ON again.
 - ② After the test, be sure to turn off the DIP switch. Also restore the remote control communications line's CnB connector to its original condition.
- (When electrical work is not completed, connect a convex joint to the drain pipe joint area, arrange an inlet and check leaks and drain connections 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.

(e) Panel installation

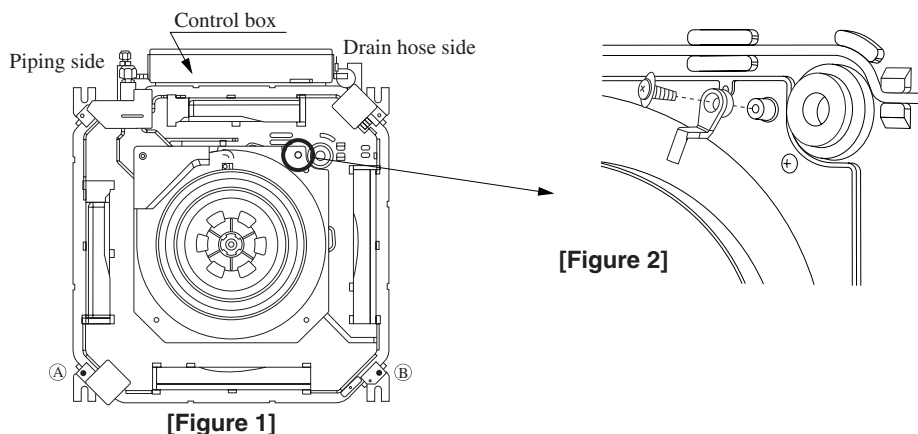
1) Accessories (It is attach to the panel)

1	Hook		1 piece	For fixing temporarily
2	Chain		2 piece	
3	Screw		4 piece	For hoisting the panel
4	Screw		1 piece	For attaching a hook
5	Screw		2 piece	For attaching a chain

- 2) Make sure that the unit main body is positioned at the correct height and the opening on the ceiling is made to the correct dimensions with the level gauge supplied with the main body.

Remove the level gauge before you attach the panel.

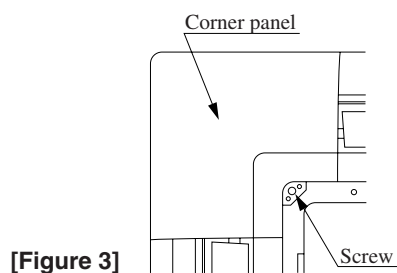
- 3) Screw in two bolts out of the four supplied with the panel by about slightly less than 5mm. (● mark (A)(B)) [Figure 1]



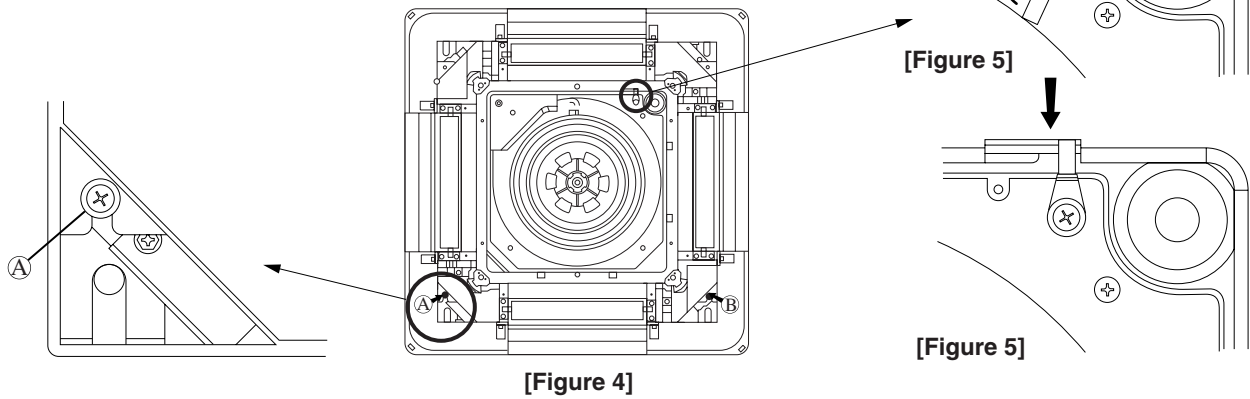
- 4) Attach the hook supplied with the panel to the main body with the hook fixing screw (1 screw). [Figure 2]

- 5) Open the air inlet grille.

- 6) Please remove the screw of a corner panel and remove a corner panel. (four places) [Figure 3]



7) A panel is hooked on two bolts (● mark (A)(B)) [Figure 4]



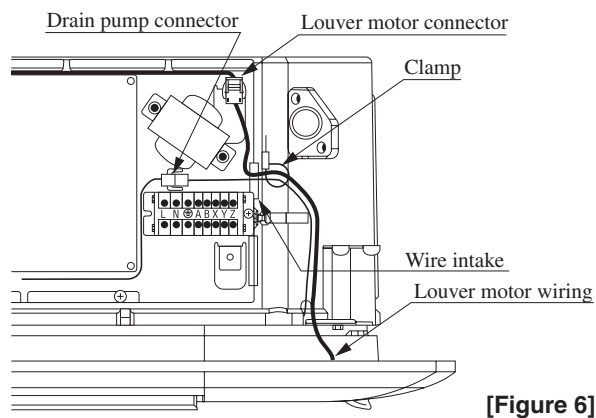
8) Please rotate a hook, put in the slot on the panel, and carry out fixing the panel temporarily. [Figure 5]

9) Tighten the two bolts used for fixing the panel temporarily and the other two.

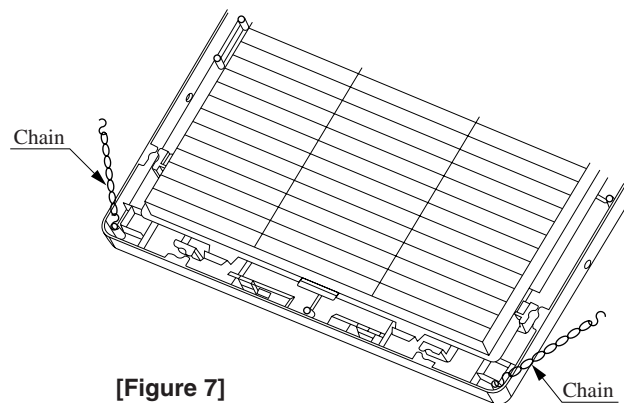
10) Please open the lid of a control box.

11) Like drain pump wiring, please band together by the clamp and put in louver motor wiring into a control box. [Figure 6]

12) Please connect a louver motor connector. [Figure 6]



13) Attach two chains to the air inlet grille with two screws. [Figure 7]



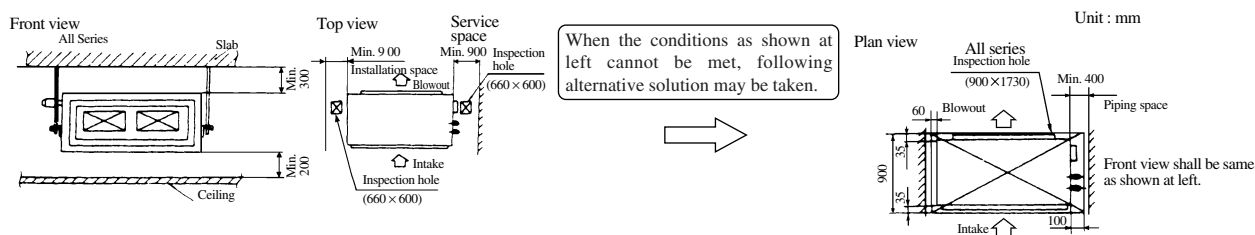
14) Replace the corner panels. Please also close a chain with a screw together then.

15) Close the air inlet grille.

(2) High static pressure duct type (FDU)

(a) Selection of installation location

- 1) Install the unit at a place as shown below and which meets the conditions as shown by the following table.



Air conditions, limitation of air volume

	Air volume (m ³ /min)			Indoor unit suction air temperature		Ambient temperature around indoor unit
	Rating	Lower limit	Upper limit	Cooling	Heating	
224model	51	38	65	Upper limit 26°CWB When outdoor temperature is 35°C	Upper limit 27°CDB Outdoor temperature is below 20°CWB	Dew point temperature below 23°C
280model	68	51	87	Lower limit 16.5°CWB When outdoor temperature is 15°C	Lower limit 10°CDB Outdoor temperature is above 10°CWB	
For further details refer to the engineering data which						

- 2) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
- 3) Places free from air disturbances to the air inlet and outlet of the indoor unit.
- 4) If the humidity above the ceiling exceeds 80% or the condensation temperature above the ceiling exceeds 28°C, affix polyurethane foam (with a thickness to 10 or greater) above the insulation in the ceiling panels.

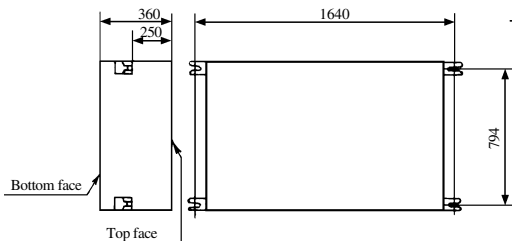
Carry out tests of the main unit under the above conditions and confirm that there is no failure. However, if the environment where the unit is installed exceeds the above conditions and the unit is operated in high humidity conditions, there is danger of water drops dripping down. If there is a possibility that the unit will be used under such conditions, install 10 to 20 mm of insulation material to the main unit, piping and drain pipes.
- 5) Do not place where the unit is exposed to oil splashes or steam (e.g. kitchens and machine plants).
(Installation and use at such places will cause the performance drop, corrosion in the heat exchanger and damage in molded synthetic resin parts.)
- 6) Do not place 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.
- 7) Do not place adjacent to equipment generating electromagnetic waves or high-frequency waves such as in hospitals, Generated noise may cause malfunctioning of the controller.

(b) Installation

<Delivery>

- When delivering the package, move the package to the installation as close as possible.
- When it is unpacked and then moved to the installation place, sufficient care must be taken not to damage the unit during transfer.

<Hanging bolt location>

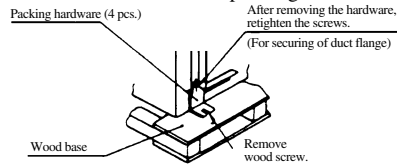


- To adjust the level, use a level gauge or adjust as shown by the left figure.

Note: Unless the level is adjusted properly, the float switch may malfunction or operate improperly.

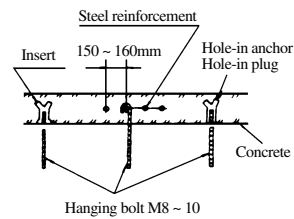
<Packing hardware>

Four pieces of packing hardware are used.
Discard them after unpacking.

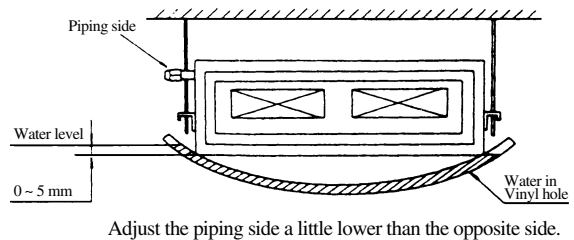


<Securing of Hanging Bolt>

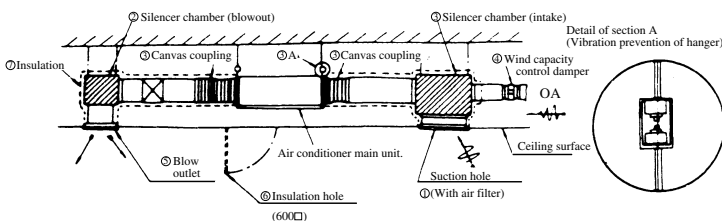
Secure the hanging bolts by either one of following methods.



<Adjustment level>

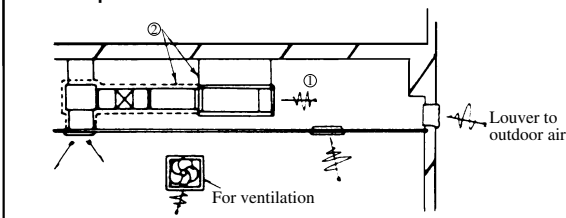


(c) Duct work



- ③ In order not to transmit vibration from the main unit of air conditioner to the ceiling or slab, it is necessary to provide means to prevent vibration, for example, a canvas coupling on the duct or rubber cushion on the main unit of air conditioner.
- ④ A damper to control air volume should be installed on the joint of OA duct to facilitate control of air capacity after the installation.
- ⑤ Location and from of blow outlet should be selected so that air from the outlet will be distributed all over the room, and equipped with a device to control air volume.
- ⑥ Make sure to provide an inspection hole on the ceiling. It is indispensable to service electric equipment, motor, functional components and cleaning of heat exchanger.
- ⑦ Make sure to insulate the duct to prevent dewing on it.
Thickness of insulating material is 65 mm minimum.

Bad example of duct work



- ① If a duct is not provided at the suction 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.

- a) 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.

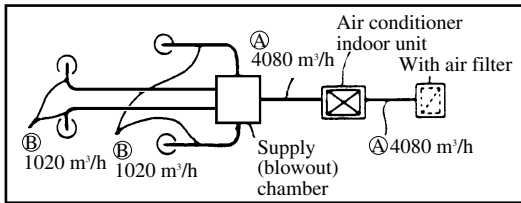
When the building is a concrete structure, especially immediately after the construction, humidity tends to rise even if the space over the ceiling is not substituted in place of a duct.

In such occasion, it is necessary to insulate the entire unit with glass wool (25 mm).
(Use a wire net or equivalent to hold the glass wool in place.)

- b) It may run out the allowable limit of unit operation (Example: When outdoor air temperature is 35°CDB, suction air temperature is 27°CWB) and it could result in such troubles as compressor overload, etc.
 - c) There is a possibility that the blow 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 the heat exchanger may fail to reach the drain pan but leak outside (e.g. drip onto the ceiling) with consequential water leakage in the room.
- ② Unless vibration isolation is provided between the unit and duct and between the unit and the slab, vibration will be transmitted to the duct so that vibration noise may generate from between the ceiling and blow outlet or vibration may be transmitted to the slab. Make sure to provide an effective vibration prevention means.

<Simplified method for determination of duct dimensions>

In the following method, it is assumed that the friction resistance per unit length of duct is 1 Pa/m (0.1 mm Aq/m) and a side of duct is 250 mm.
Air volume rating is assumed to be FDU A801.



○ Calculation of duct resistance
(Use following simplified calculations.)

	Air volume	Duct (mm × mm)
Section A	4080m³/h (68m³/min)	250 × 830
Section B	1020m³/h (17m³/min)	250 × 270

Linear pipe section	Calculate based on 1 Pa per 1 m in length 1 Pa/m.
Curved pipe section	Take a curved section as equivalent to 3 ~4 m in straight line.
Blowout section	Calculate based on 25 Pa.
Chamber	Calculate by taking 1 pc. as 50Pa.
Suction grill (with filter)	Calculate by taking 1 pc. as 40Pa.

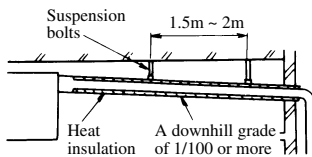
<Table of simplified selection of duct dimensions>

Air volume	Item	Duct form	Square duct
			Dimensions
m³/h(m³/min)			(mm × mm)
100			250 × 60
200			250 × 90
300			250 × 120
400			250 × 140
500			250 × 170
600(10)			250 × 190
800			250 × 230
1,000			250 × 270
1,200(20)			250 × 310
1,400			250 × 350
1,600			250 × 390
1,800(30)			250 × 430
2,000			250 × 470
2,400			250 × 560
3,000(50)			250 × 650
3,500			250 × 740
4,000			250 × 830
4,500			250 × 920
5,000			250 × 1000
5,500			250 × 1090
6,000(100)			250 × 1180

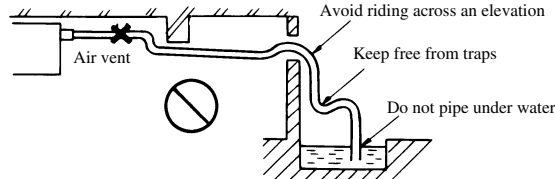
(d) Drain Piping

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

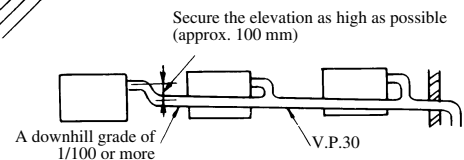


• Improper piping

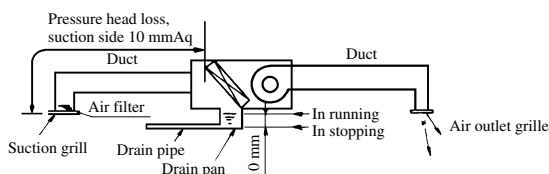


- 2) When connecting the drain pipe to unit, pay sufficient attention not to apply excess force to the piping on the unit side. Also, fix the piping at a point as close as possible to the unit.
- 3) For drain pipe, use hard PVC general purpose pipe VP-25(I.D.1") which can be purchased locally.

- 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. Use VP-30 (1 1/4") or thicker pipe 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) 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.



If the duct is connected and then the blower is operated, inside air pressure will become negative compared with the atmospheric pressure.

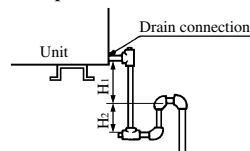


Example: If the pressure loss at the suction side, such as the suction grill, air filter and duct, is 100 Pa, the level of drain water will rise approx. 10 mm higher than the state of operation stop.

<Provision of trap>

Since the drain outlet is disposed at a position that makes the pressure negative, it is necessary to provide a trap (during the piping work) in order to prevent water leakage due to rising of water level in the drain pan.

Trap must be so constructed to facilitate cleaning. It should be better to employ a "T" joint as shown below. In addition, the height of trap should be as specified below. The trap should be provided close to the unit.

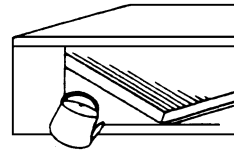


- Provide a trap on way of the drain pipe as shown at left.
- H₁=100 mm or static pressure of blower
- H₂=1/2 H₁ or 50 ~ 100 mm

(e) Drain Test

When the drain piping work is over, inject water to inspect if the piping is arranged properly or not.

- Remove the side panel and supply gradually 1,000 cc of water to see if water is drained smoothly or not. Check also for water leakage.



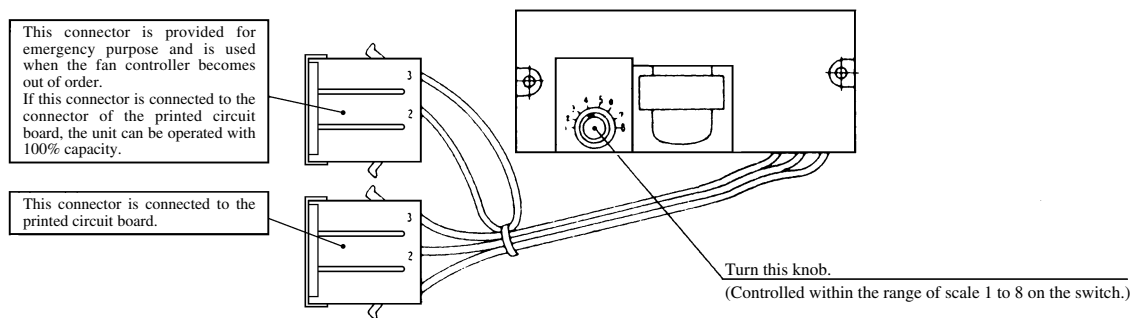
(f) Operating method of fan controller

- This unit allows to continuously adjust the air volume with the fan controller switch which is built the electric equipment box. It is not necessary to control the air volume (outside unit static pressure adjustment) with the damper, etc. at the duct side. Select the point of operation so that it will be within the range of air volume withch can be operated. (Refer to the limitation of air capacity as shown below.)

Location of the fan controller in the electric equipment box and the operating method are shown below.

- Refer in advance to the blower characteristics quoted in the separate engineering data, and select the number on the scale of fan controller switch.

Referring to the figure below, adjust the number on the scale of fan controller switch at the number selected during the test run after completion of electrical work and check if the intended air volume is obtained or not.



Operation of fan controller

Note(1) Make sure to turn power off before operating the fan controller because there is risk of contacting charged sections.

5.2 Installation of remote controller

(a) Selection of installation location

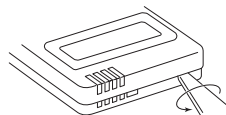
Avoid the following locations

- 1) Direct sunlight.
- 2) Close to heating device.
- 3) Highly humid or water splashing area.
- 4) Uneven surface.

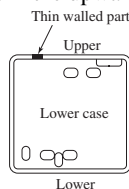
(b) Installation procedure

a) Exposed fitting

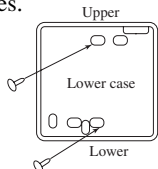
- 1) Open the remote controller cover and unscrew the screw located beneath the switch.
- 2) Open the remote controller case.



- 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.
- 3) The cord of a remote controller can only be pulled out in the upward direction.

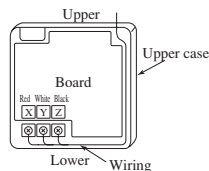


- Cut off with nippers or a knife a thin walled part made on the upper end of the remote controller bottom casing, and then remove burrs with a file or the like.
- 4) Fix the remote controller bottom casing onto a wall with two wood screws supplied as accessories.

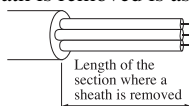


- 5) Connect the remote controller to the terminal block. Connect the terminals of the remote controller to the indoor unit with the same numbers. Because the terminal block has polarity, the device becomes inoperative if there are wrong connections.

Terminals: (X) Red wire, (Y) White wire, (Z) Black wire



- Use a cord of 0.3mm^2 (recommended) - 0.5mm^2 (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:



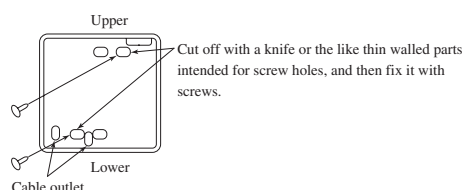
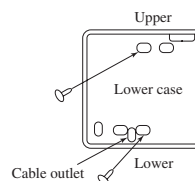
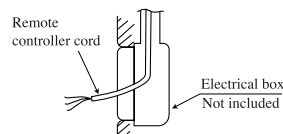
Black: 195mm, White: 205mm, Red: 125mm

- 6) Replace the top casing as before.

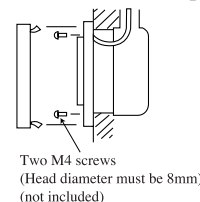
- 7) Use a cord clamp to attach the remote controller cord to the wall.
- 8) Set the functions according to the types of indoor unit. See Section "Function Setting".

(b) Recessed fitting

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



- 2) Remove the upper case to the remote controller.
- 3) 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.
- 4) Connect the remote controller cord to the remote controller.
- Refer to [Exposed fitting].
- 5) Installation work is completed by replacing the top casing onto the bottom casing as before.
- 6) Set the function switch according to the type of the indoor unit. (Refer to 66 page)



Precaution in Extending the Remote controller cord

- Maximum total extension 600m.

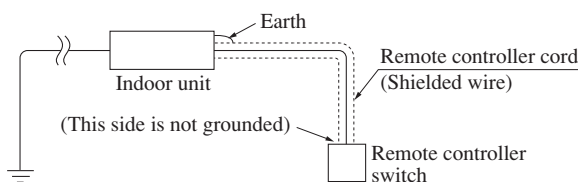
The cord should be a shielded wire.

- For all types : $0.3\text{mm}^2 \times 3$ cores

Note (1) Use cables up to 0.5mm^2 (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.....	$0.55\text{mm}^2 \times 3$ cores
Within 300m.....	$0.75\text{mm}^2 \times 3$ cores
Within 400m.....	$1.25\text{mm}^2 \times 3$ cores
Within 600m.....	$2.05\text{mm}^2 \times 3$ cores

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



5.3 Installation of outdoor unit

Special instructions for R410A air conditioning systems

- Use only R410A refrigerant. R410A refrigerant is operated at about 1.6 times as high pressure as the conventional refrigerant is.
- Air conditioning systems using R410A are equipped with different-diameter outdoor unit service valve charge ports and check joints provided in the units so as to prevent wrong refrigerant from being charged by mistake. To achieve higher strength resistible to refrigerant pressure, the dimensions of flaring and the across-the-flats measurement of a flare nut have been changed for refrigerant piping. Therefore, please arrange dedicated R410A tools as listed in the table shown on the below before you set to installation or service work.
- Do not use a charge cylinder. The use of a charge cylinder will cause the refrigerant composition to change, resulting in performance degradation falling short of the rated capacity.
- In charging refrigerant, always take out refrigerant from a cylinder in the liquid phase.

Dedicated R410 tools	
①	Gauge manifold
②	Charge hose
③	Electronic scale for refrigerant charging
④	Torque wrench
⑤	Flare tool
⑥	Protrusion control copper pipe gauge
⑦	Vacuum pump adapter
⑧	Gas leak sensor

(1) Installation

◆ Models FDCVA151, 201 only

(a) Selection of installation location

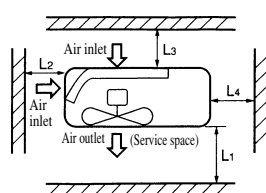
Select the installation location after obtaining the approval of customer.

- 1) The place where the foundation can bear the weight of outdoor unit.
- 2) The place where there is no concern about leakage of combustible gas.
- 3) The place where it is not stuffy.
- 4) The place where free from thermal radiation of other thermal source.
- 5) The place where flow of drain is allowed.
- 6) The place where noise and hot air blast do not trouble neighboring houses.
- 7) The place where there is no obstruction of wind at the air inlet port and air outlet port.
- 8) A place where it is not subject to strict rules regulating electrical noises.
- 9) A place at least 5m away from a TV or radio set. (If electrical noises interfere with such an instrument, move it further away from it)
- 10) When the unit is installed at the particular location as shown below, corrosion or failure may be caused. Please consult the dealer from which you purchased the air-conditioner.
 - a) The place where corrosive gas is generated (hot spring, etc.).
 - b) The place where wind containing salt blows (seaside area).
 - c) The place where enveloped by oil mist.
 - d) The place where there is a machine that radiates electromagnetic wave.

(b) The minimum space for installation

Select the space considering the direction of refrigerant piping.

- Restrict the height of obstruction wall in front of the air outlet port to the height of unit or less.
- Do not enclose around the unit by the obstruction. Secure the top space for 1 m or more.
- When more than one unit are installed side by side, provide a 250mm or wider interval between them as a service space. In order to facilitate servicing of controllers, please provide a sufficient space between units so that their top plates can be removed easily.
- When installing the unit where there is a concern about the short circuit, attach the guide louver in front of air outlet port to prevent the short circuit.
- When installing plural units in a group, secure sufficient air inlet space to prevent the short circuit.
- When installing the unit where it is covered by snow, provide appropriate snow break means.



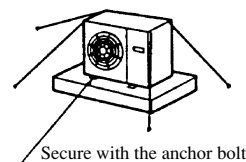
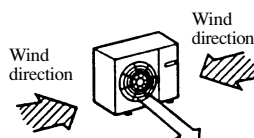
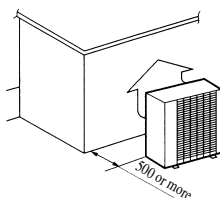
Unit : mm			
Installation example Distance	FDCVA151, 201		
	I	II	III
L1	Open space	280	280
L2	100	75	Open space
L3	100	80	80
L4	250	Open space	250

(c) Location where strong wind blows against the unit

- Where the unit is likely to be subjected to strong winds, guard it from winds with the following measures.

A failure to give protection against winds may cause performance degradation, a rise of high pressure resulting in an operation interruption, a broken fan, etc.

- 1) Install the unit directing the discharge air port to the wall.
- 2) Install the unit directing the air outlet port at a right angle to the wind direction.
- 3) Where the foundation is not stable, secure the unit with wire, etc.

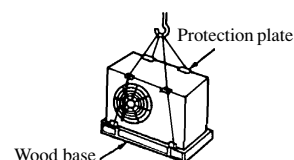


(d) Carry-in and installation of unit

Pay sufficient attention to the carry-in and moving work of the unit, and always execute work by two persons or more.

1) Carry-in

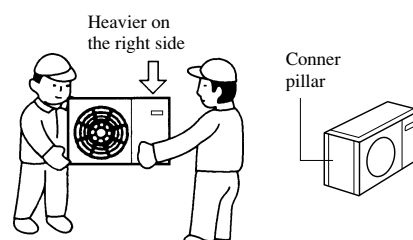
- When carrying-in the unit, carry it in as packed condition to the installation site as near as possible.
- If you are compelled to carry-in the unit unpacked condition, lift the unit by the rope using a nylon sling or applying protection plates so that the unit is not marred.



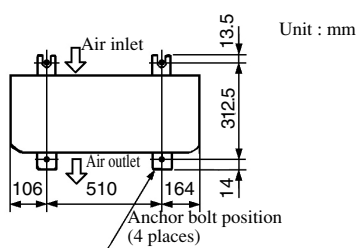
CAUTION • Rope the unit taking the discrepancy of center of gravity into consideration.

2) Moving

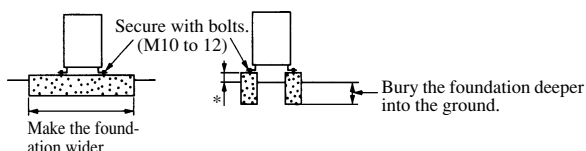
- The unit is heavier on the right side looking from the front of unit (air outlet port side). Therefore, sufficient caution is required for the person who carries the right side of unit. The person who carries the left side must hold the handle of front panel and the corner pillar with both hands.



3) Bolt securing position



- To install the unit, secure the legs of unit by below mentioned bolts without fail.



- Limit the protrusion height of front side anchor bolts to 15 mm at the maximum.
- Install the unit firmly so that it does not fall by earthquake and strong wind.
- Make the concrete foundation by referring the above illustration.
- Install the unit in level. (The height difference between right and left is within 5 mm.)
- In an area where temperature drops below zero for several days in a row, install the unit on the concrete base of which top is elevated by 30mm or more from the ground level (measurement marked with * in the drawing).

◆ Models FDCA801, 1001 only

(a) Selecting the installation location

- 1) Where air is not trapped.
- 2) Where the installation fittings can be firmly installed.
- 3) Where wind does not hinder the intake and outlet pipes.
- 4) Out the heat range of other heat sources.
- 5) Where it is safe for the drain water to be discharged.
- 6) Where noise and hot air will not bother neighboring residents.
- 7) Where snow will not accumulate.
- 8) Where strong winds will not blow against the outlet pipe.

Notes(1) A four-sided enclosure cannot be used. Leave a space of at least 1m above the unit.

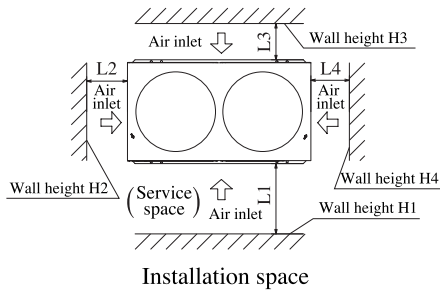
- (2) If there is a danger of a short-circuit, then install a wind direction variable adapter.
- (3) When installing multiple units, provide sufficient intake space so that a short-circuit does not occur.
- (4) In areas where there is snowfall, install the unit in a frame or under a snow hood to prevent snow from accumulating on it.
(Inhibition of collective drain discharge in a snowy country)
- (5) Do not install the equipment in areas where there is a danger of flammable gas leaks.

* Please ask your distributor about optional parts such as wind vane adapters, snow guard hoods, etc.

(b) Installation space (service space) example

Please secure sufficient clearance (room for maintenance work, passage, draft and piping). (If your installation site does not fulfill the installation condition requirements set out on this drawing, please consult with your distributor or the manufacturer)

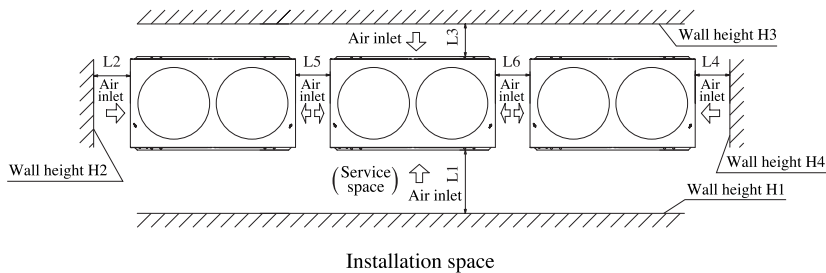
1) When one unit is installed



Unit: mm

Example installation	I	II
Dimensions		
L1	500	Open
L2	10	10
L3	100	100
L4	10	Open
H1	1500	—
H2	No limit	No limit
H3	1000	No limit
H4	No limit	—

2) When more than one unit are installed.



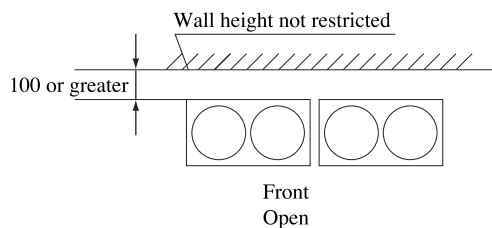
Unit: mm

Example installation	I	II
Dimensions		
L1	500	Open
L2	10	200
L3	100	300
L4	10	Open
L5	0	400
L6	0	400
H1	1500	No limit
H2	No limit	No limit
H3	1000	No limit
H4	No limit	No limit

3) Multiple unit installation (Multiple longitudinal and vertical and horizontal rows installed)

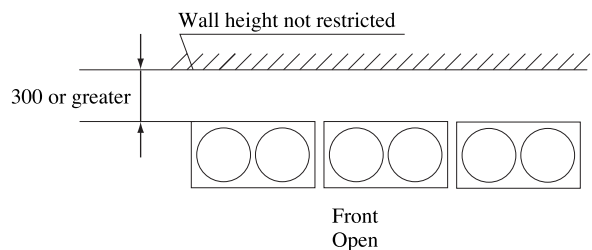
• Pattern 1

3-side Intake Example 1 (2 units)



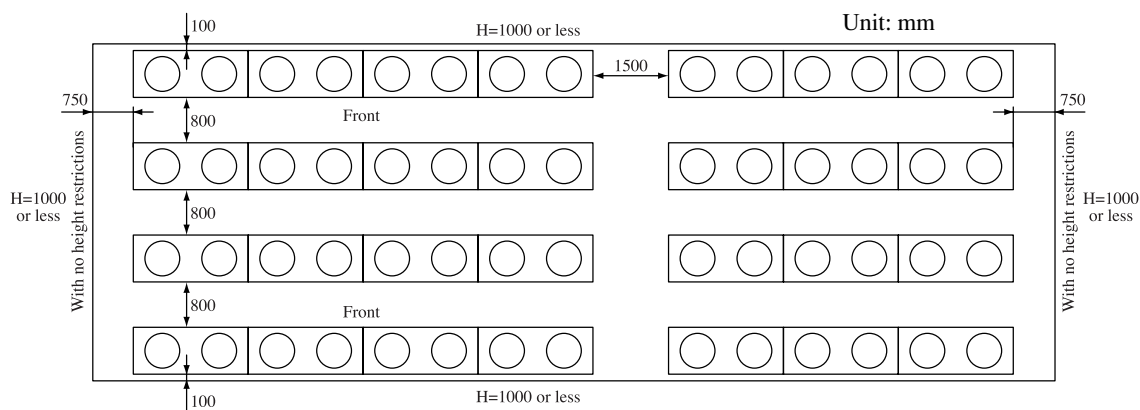
• Pattern 2

3-side Intake Example 2 (3 units)



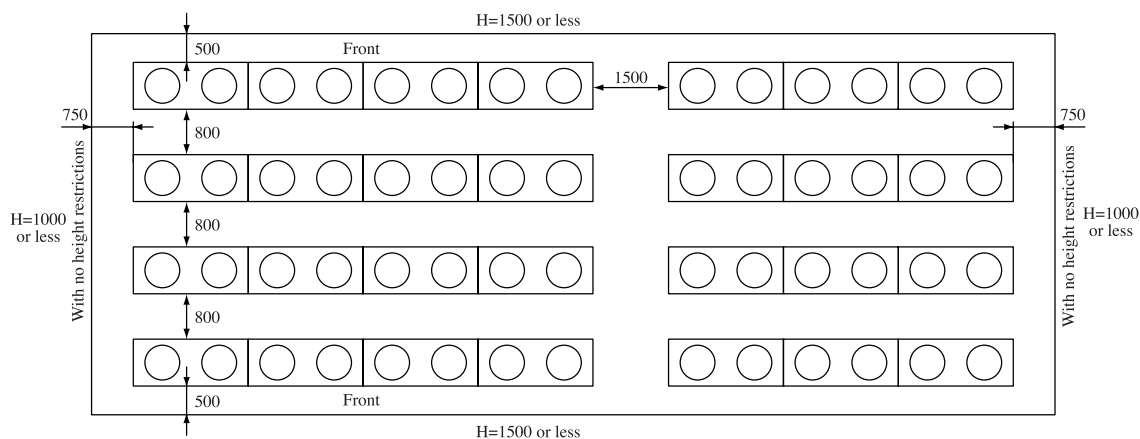
• Pattern 3

Multiple longitudinal and vertical and horizontal rows installed



• Pattern 4

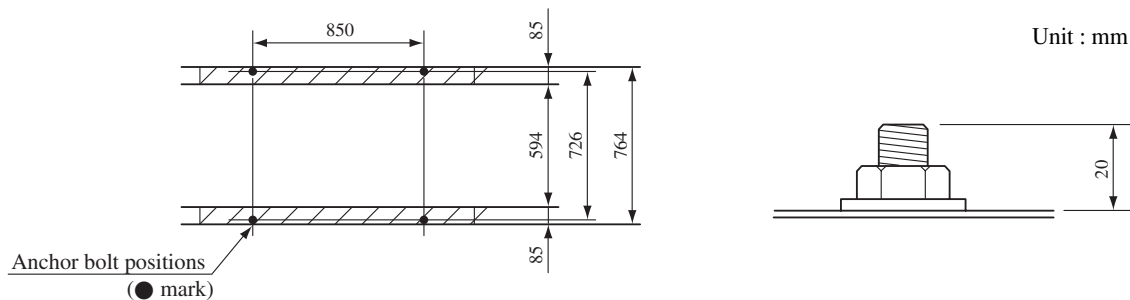
Multiple longitudinal and vertical and horizontal rows installed



(c) Notabilia for installation

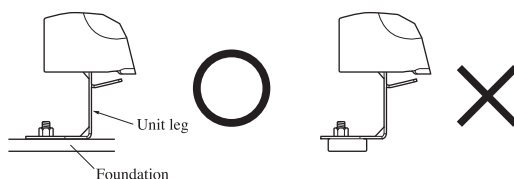
1) Anchor bolt positions

- a) Use four anchor bolts (M10) to fix an outdoor unit's anchoring legs at all times. Ideally, an anchor bolt should protrude 20mm.



b) Base

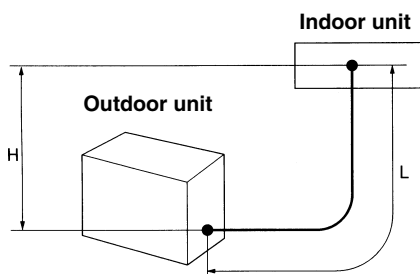
- Install the unit so that it does not vibrate and doesn't make noise. Make sure the base is strong and that it is installed level.
- Provide a foundation that is at least as wide as the area shown by the shaded portion in the diagram above (wider than the width between the front surface of the anchoring legs of the outdoor unit).



(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
FDCVA151, 201	ø 12.7 × t0.8	ø 6.35 × t0.8
FDCA801	ø 25.4 × t1.0	ø 9.52 × t0.8
FDCA1001	ø 25.4 × t1.0	ø 12.7 × t0.8

Maximum one way length

FDCVA151, 201 : L=40 m or less

FDCA801, 1001 : L=70 m or less

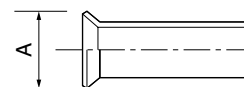
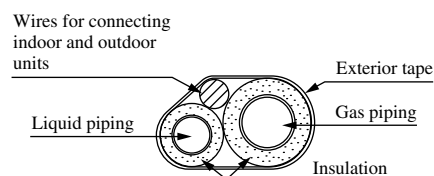
Note (1) In the case of the FDCA801. If the length of the pipe exceeds 40 m, make the liquid piping size ø12.7.

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.

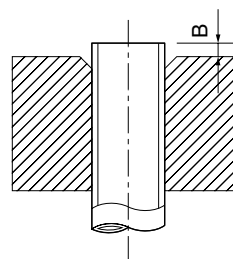
(b) Points for attention in installing refrigerant piping

- 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.
- 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:
- A branching pipe set (option part supplied separately) and refrigerant piping should be connected by blazing.
- In blazing pipes, keep nitrogen gas flowing inside the pipes so that an oxide film may not form on the inner surfaces of the pipes.



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



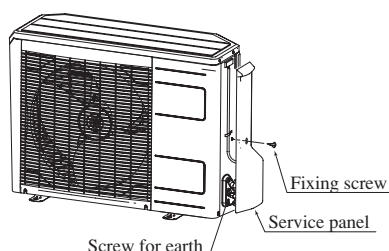
Copper pipe protrusion for flaring: B (mm)

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	1.0~1.5
ø9.52		
ø12.7		
ø15.88		

(c) How to remove the service panel

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

Models FDCVA151, 201



(3) Air tightness test and air purge

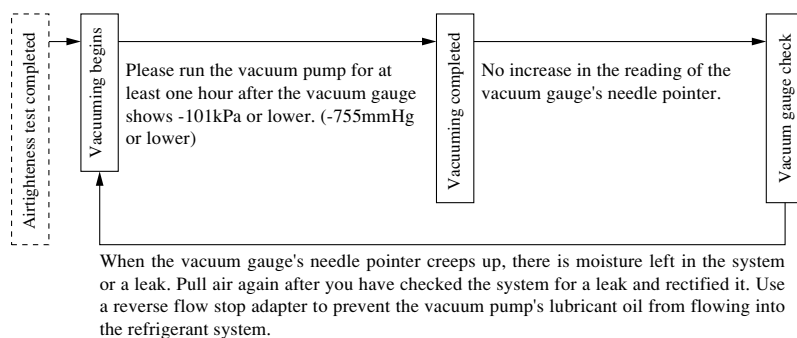
- Always use a vacuum pump to purge air trapped within an indoor and the refrigerant piping.

(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.

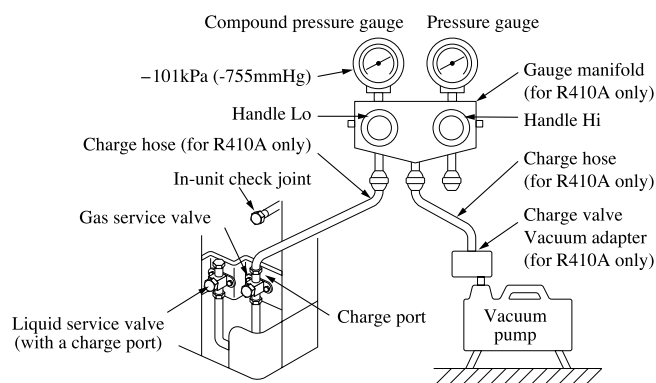
(b) Air purge



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, tighten the cap nuts (for the valve rods and charge ports).

Pay attention to the following points in addition to the above for the R410A and compatible machines.

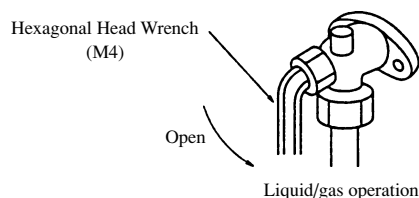
- To prevent a different oil from entering, please assign dedicated tools, etc. to each refrigerant type. Under no circumstances must a gauge manifold and a charge hose in particular be shared with other refrigerant types (R22, R470C, etc.).
- Use a counterflow prevention adapter to prevent vacuum pump oil from entering the refrigerant system.



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

◆ Models FDCVA151, 201

► 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.

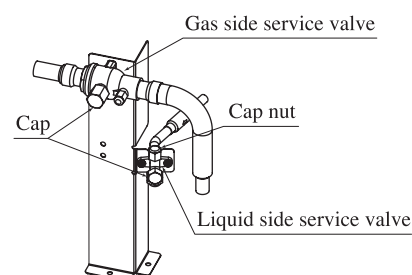
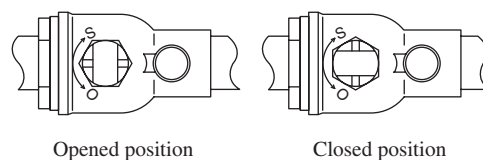
◆ Models FDCA801, 1001

Method of opening/closing a valve

- Remove the cap, turn the gas pipe side until comes to the “Closed” position as indicated in the drawing on the right.
- For the liquid side pipe, turn with a hexagonal wrench until the shaft stops. If excessive force is applied, the valve main body can be damaged. Always use a dedicated special tool.
- Tighten the cap securely.

For tightening torque, refer to the table below.

	Tightening torque N · m		
	Shaft (valve main body)	Cap (lid)	Cap nut (check joint section)
For gas pipes	7 or less	30 or less	13
For liquid pipes	7.85 (MAX 15.7)	29.4 (MAX 39.2)	8.8 (MAX 14.7)



(4) Refrigerant charge

(a) Models FDCVA151, 201

- The outdoor unit is charged with enough refrigerant for a piping length of 30 m when it is shipped from the factory, and additional charging is not necessary in the case of a system with 30 m or piping or less.
- If the system's piping exceeds 30 m, charge with an amount of additional refrigerant corresponding to the additional length of piping in the system.

Item	Model
Factory Charge Amount (for 30 m of pipe) (kg)	FDCA151, 201
Standard Charge Amount (for 15 m of pipe) (kg)	1.55
Additional Charge Amount (for each 1 m of piping) (kg/m)	1.25
	0.020

(b) Models FDCA801, 1001

Additional charge amount

Item Model	Standard refrigerant charge volume (kg) ⁽¹⁾	Additional charge volume per meter of refrigerant piping (kg) ⁽²⁾	Charge volume when shipped from factory (kg)	Local piping length for which additional charge is not required. (m)	Limit length of refrigerant piping (m)
			Outdoor unit		
FDCA801	6.3	Liquid piping φ 9.52 : 0.06 Liquid piping φ 12.7 : 0.12	6.6	5	70
FDCA1001	7.3	0.12	7.9		

Notes (1) The standard refrigerant charge volume shows the charge volume with the length of refrigerant piping is 0 m.

(2) Concerning the additional charge per meter of piping and the refrigerant charge volume when the unit is shipped from the factory, as shown in the above the unit is charged with a portion of the refrigerant needed for the local piping, so be sure to calculate the amount of additional charge that is needed and charge the system locally.

(c) If the system is recharged during servicing, etc., recharge in accordance with the following.

1) Models 151, 201

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 the exceeds 15 m.

(Example) If the model FDCVA151HEN, with a piping length of 40 m is being recharged:

$$\text{Recharge Amount: } 1.75 \text{ kg} = 1.55 \text{ kg} + (40 - 30) \text{ m} \times 0.020 \text{ kg/m}$$

2) Models 801, 1001

If the piping length is 30 m or less, recharge the system with the standard charge in the above table. If the piping length is greater than 30 m, charge with the factory charge amount plus an additional charge amount corresponding to the length of piping the exceeds 30 m.

(Example) If the model FDUA1001HES, with a piping length of 50 m is being recharged:

$$\text{Recharge Amount: } 13.3 \text{ kg} = 7.9 \text{ kg} + (50 - 30) \text{ m} \times 0.12 \text{ kg/m}$$

(5) Heating and condensation prevention

- 1) Dress refrigerant pipes (both gas and liquid pipes) for heat insulation and prevention of dew condensation.

Improper heat insulation/anti-dew dressing can result in a water leak or dripping causing damage to household effects, etc.

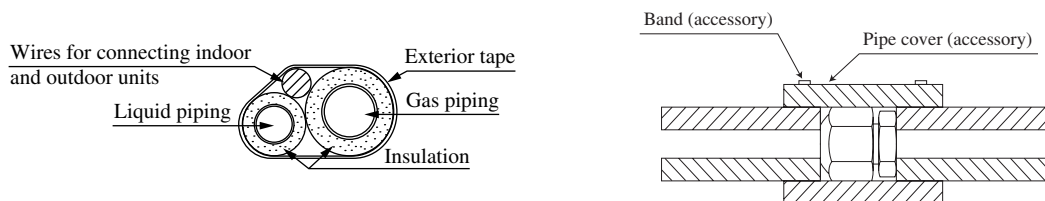
- 2) Use a heat insulating material that can withstand 120°C or a higher temperature. Poor heat insulating capacity can cause heat insulation problems or cable deterioration.

a) The gas pipe can cause during a cooling operation dew condensation, which will become drain water causing a possible water-leak accident, or reach during a heating operation as high a temperature as 60°C to 110°C, posing a risk of burns, when touched accidentally. So, do not fail to dress it with a heat insulation material.

b) Wrap indoor unit's flare joints with heat insulating parts (pipe cover) for heat insulation (both gas and liquid pipes).

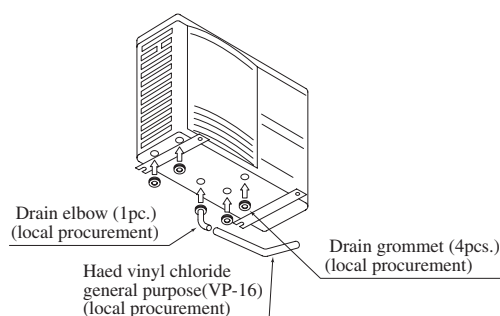
c) Give heat insulation to both gas and liquid side pipes. Bundle a heat insulating material and a pipe tightly together so that no gaps may be left between them and wrap them together with a connecting cable by a dressing tape.

- d) Although this air conditioning unit has been tested under the JIS condensation test conditions, the dripping of water may occur when it is operated in a high-humidity atmosphere (23°C or a higher dew point temperature). In such a case, apply an additional heat insulation material of 10 to 20 mm thick to dress an indoor unit body, piping and drain pipes.



(6) Drain piping work (Models FDCVA151, 201 only)

- Execute drain piping by using a drain elbow and drain grommets supplied separately as optional parts, where water drained from the outdoor units 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.



(7) Electrical wiring

- This air conditioning system should be notificated to supply authority before connection to power supply system.
- (a) Selection of size of power supply and interconnecting wires.

⚠ IMPORTANT

- Electric wiring work should be conducted only by authorized personnel.
- Use copper conductor only.
- Power source wires and Interconnecting wires shall not be lighter than polychloroprene sheathed flexible cord (design HO5RN-F IEC 57).
- Do not connect more than three wires to the terminal block.
- Use round type crimped terminal lugs with insulated grip on the end of the wires.

- Select wire sizes and circuit protection from Table 2.

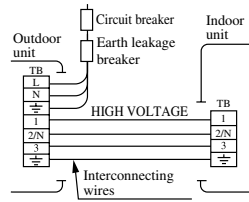
Table 2

Item Model	Phase	Earth leakage breaker	Circuit breaker		Power source wires (minimum)	Interconnecting and grounding wires (minimum)
			Switch breaker (A)	Over-current protector rated capacity (A)		
FDCVA151HEN	1	15A, 30mA, 0.1 sec or less	30	15	2.0mm ²	ø 1.6
FDCVA201HEN						
FDCA801HES	3	40A, 6mA, 0.04 sec or less	60	40	5.5mm ²	Interconnecting wire: ø1.6 Grounding wire: 3.5mm ²
FDCA1001HES						

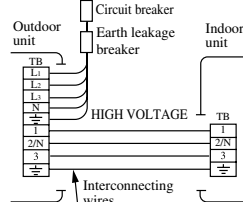
(b) Wiring connection.

- 1) Connect the same terminal number between the Indoor unit and Outdoor unit as shown in the following diagram.
- 2) Secure the wiring with wiring clamp so that no external force is transmitted to the connecting portion of terminal.
- 3) There is a ground (Earth) terminal in the control box.

(a) 1 phase model



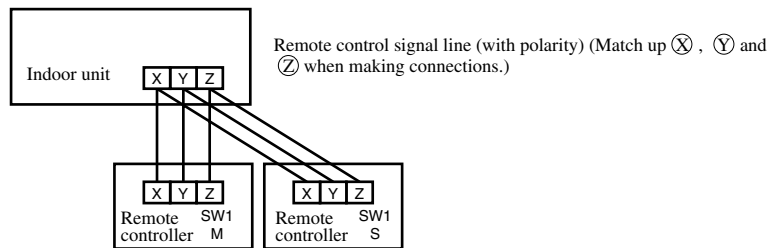
(b) 3 phase model



(c) Remote controller wiring and connection procedure

1) Master-slave settings when using multiple remote controllers

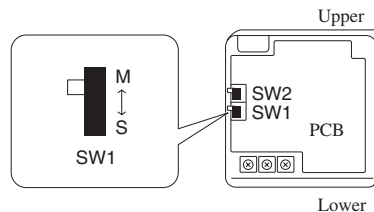
- Up to 2 remote controllers can be connected for each indoor unit (or group).
- a) There are two methods, one where the remote controller signal line (3-wire) for the slave remote controller is taken from the indoor unit and the other where the signal lines are taken from the master remote controller.



- 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.)

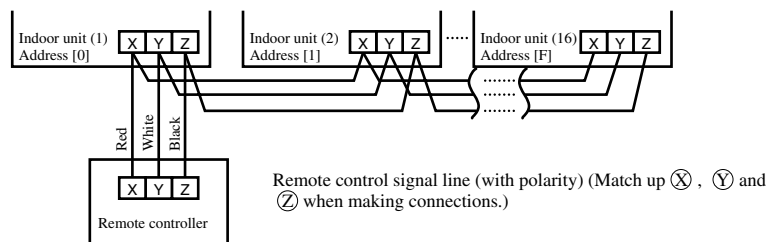
Note (1) Remote controller sensor activation settings are possible only with the master remote controller. Install the master remote controller in a location where it can sense the room temperature.

Switch		Function
SW1	M	Master remote controller
	S	Slave remote controller



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 “Cautions when extending remote control lines” on page 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.

(8) Setting functions using the 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 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 1000H→STOP	*
04	🌀 POSITION (Louver control setting)	FIX (1 OF 4) (4 position stop) IN MOTION (Free stop)	○
05	EXTERNAL INPUT SET	LEVEL INPUT PULSE INPUT	○
06	OPERATION PERMISSION PROHIBITED	NORMAL OPERATION VALID	○
07	☀️ ROOM TEMP OFFSET (Heating room temperature offset)	NORMAL OPERATION TEMP SHIFT +3°C	○
08	☀️ FAN CONTROL (Heating fan control)	LOW FAN STOP→LOW FAN (Intermittent operation)	*
09	FREEZE PREVENT TEMP	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.

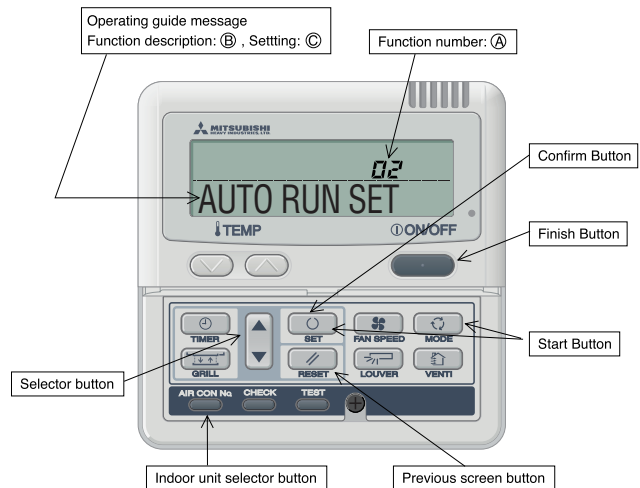
When “ FUNCTION ▼ ” is selected.

- 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.

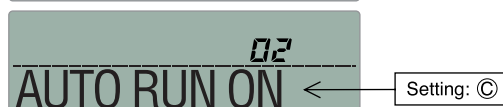
The selected setting is displayed for 2 seconds, then followed by “SET COMPLETE” and the function setting process is completed.

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 (c).



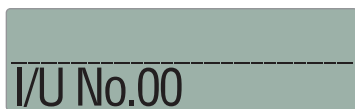
* When “02 AUTO RUN SET ” is selected.



When "I/U FUNCTION ▲" is selected.

- ① The screen display will be switched as follows:

"I/U SELECT" → "I/U 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.

(c) 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.**

(d) Changing the remote controller's temperature setting range

- 1) The temperature setting range of the remote controller can be changed.

Through remote controller button operations, the upper limit and lower limit set temperature values can be changed individually.

During heating operation, the changed upper limit value becomes valid and at times other than during heating operation, (during cooling, dehumidification, auto and fan operation), the changed lower limit value becomes valid.

Range of Possible Changes

Upper Limit Value: 22~30°C (valid during heating) Lower Limit Value: 18 ~ 26°C (valid at times other than during heating)
- 2) Operation
 - a) With the remote controller in the stopped state, press the SET and MODE buttons simultaneously for 3 seconds or longer. The display will changed from “ SELECT ITEM” → “ SET” → “FUNCTION SET ▼ ”
 - b) Press the button once. The display will change to TEMP RANGE ▲ .
 - c) Press the SET button to enter the temperature range setting mode.
 - d) Using the or button, select “Hi LIMIT SET ▼ ” or “Lo LIMIT SET ▲ ,” the press the SET button.
 - e) If “Hi LIMIT SET” is selected,
 - ① The display changes from “ SET UP” → “Hi LIMIT 22°C ” (flashing).
 - ② Using the “ ” button, select the upper limit value. Display example: “Hi LIMIT 22°C ” (flashing)
 - ③ Press the SET button to fix the setting. Display example: “Hi LIMIT 22°C” (lighted up)
 - f) If “Lo LIMIT SET” is selected,
 - ① The display changes from “ SET UP” → “Lo LIMIT 26°C ” (flashing).
 - ② Using the “ ” button, select the upper limit value. Display example: “Lo LIMIT 26°C ” (flashing)
 - ③ Press the SET button to fix the setting. Display example: “Lo LIMIT 26°C” (lighted up)
 - g) Press the ON/OFF button to end the setting procedure.

(The procedure also ends if the ON/OFF button is pressed during the setting operation. However, settings which have not been fixed become invalid, so exercise caution.)
- 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.

(9) Test run

(a) Carry out test operation from outdoor units.

Models FDCVA151, 201

1) Test run method

- a) A test run can be initiated from an outdoor unit by using SW9 and SW5-4 for on-site setting.
- b) When SW9 (press button switch) is pressed for 1 second and then released, the compressor will start operation approximately 5 seconds later.
- c) The unit will start a cooling operation, when SW5-4 is OFF, or a heating operation, when SW5-4 is ON.
- d) When a test run is completed, press SW2 (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 operation 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 conteol switching (SW5-1)
 - ① When this switch is turned on, the unit will run in the defrost mode more frequently.
 - ② Please set this switch to ON, when installed in a region where outdoor temperaure falls below zero during the season the unit is run for a heating operation.
- b) Snow guard fan control (SW5-2)
 - ① 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.
 - ② When the unit is used in a very snowy country, please set this switch to ON.

Models FDCA801, 1001

- a) Trial operation can be performed using the local setting switches SW3-3 and SW3-4.
 - ① Turning SW3-3 ON operates the compressor.
 - ② Turning SW3-4 OFF starts cooling. Turning SW3-4 ON starts heating.
- Note (1) Be sure to turn SW3-3 OFF when trial operation is finished.

(b) Trial operation from a 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.

(10) 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 with 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)
08	REQUEST FREQUENCY
09	RESPONSE FREQUENCY
10	EXPANSION VALVE OPENING ANGLE
11	INDOOR OPERATION TIME
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
25	HIGH PRESSURE
26	LOW PRESSURE
27	DISCHARGE (Discharge pipe temperature)
28	DOMESTIC 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)
38	EEV 2 (Expansion valve opening 2)

6 MAINTENANCE DATA

6.1 Servicing

(1) Evacuation

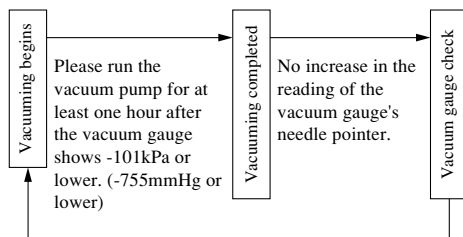
The evacuation is a procedure to purge impurities, such as noncondensable gas, air, moisture from the refrigerant equipment by using a vacuum pump. Since the refrigerant R410A is very insoluble in water, even a small amount of moisture left in the refrigerant equipment will freeze, causing what is called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

Evacuation procedure

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

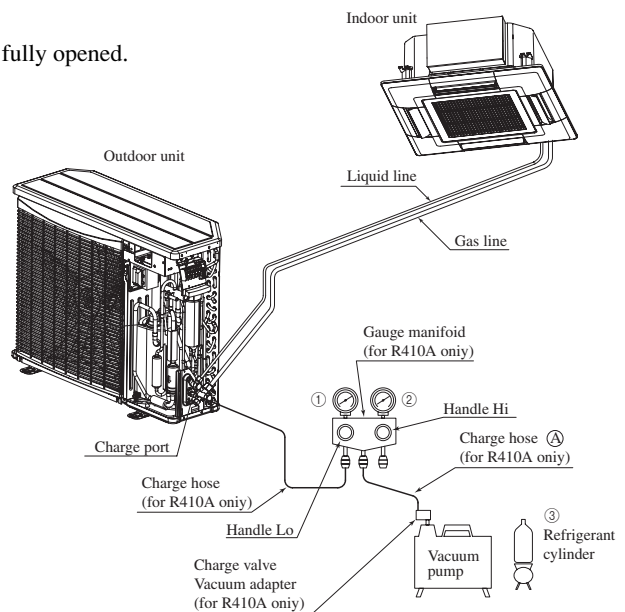
- Check to ensure that there is no internal pressure in the unit. If there is an internal pressure, it should be relieved through the service port.
- Connect the charging hose of the gauge manifold to the service port of the gas piping. Close high pressure valve ② of gauge manifold.
- Connect the charging hose ④ 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 (1) Do not use the refrigerant pressure to expel air.
 (2) Do not use the compressor for evacuation.
 (3) Do not operate the compressor in a vacuum condition.



- Notes (1) Refer to the exterior-view drawing for the position of the service valve.
 (2) When connecting of their service valve, flare connection for both the indoor and outdoor unit.

(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.

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
Low side						●	2) Mixture of non condensable gas (air etc.)
High side		●					Ineffective compression
Low side						●	(defective compressor)
High side			●				1) Insufficient refrigerant in circuit
Low side		●					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)
High side						●	1) Locking of outdoor unit fan (in cooling)
Low side					●		2) Dirty outdoor heat exchanger (in cooling)
							3) Mixture of non condensable gas (air etc.)
High side					●		
Low side						●	1) Too high temperature of room

6.3 Diagnosing of microcomputer circuit

(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
	Keeps flashing	Stay OFF	Keeps flashing	Stays OFF	The remote controller wire Y is open. The remote controller wires X and Y are reversely connected. Noise is penetrating the remote control lines. The remote controller or indoor control PCB is faulty. (The communications circuit is faulty.)
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 (FDCVA 151, 201 type).
	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	—	Stays OFF	The float SW operates (with FS only). Drain up kit wiring fault. (FDTC type)
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.
E16	Keeps flashing	Stays OFF	—	Stays OFF	Fan motor is faulty (FDTC type).
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 FDCA801, 1001 models only.

2) Outdoor unit side

Remote controller error code	Indoor unit LED		Outdoor unit LED		Cause
	Green	Red	Green	Red	
E32	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Wiring is open or reversal phase (FDCA 801, 1001 type)
E33	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Inverter primary side current is abnormal. (FDCVA 151, 201 type) Abnormal current cut of compressor (FDCA 801, 1001 type)
E34	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	52C secondary side L3-phase wiring is open. (FDCA 801, 1001 type)
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 (FDCA 801, 1001 type)
E42	Keeps flashing	Stays OFF	—	1 time flash	Current (Abnormalities in a compressor over current) (FDCVA 151, 201 type)
E47	Keeps flashing	Stays OFF	—	1 time flash	Inverter Over-voltage Trouble. (FDCVA 151, 201 type)
E48	Keeps flashing	Stays OFF	—	1 time flash	DC fan motor abnormal. (FDCVA 151, 201 type)
E49	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Low pressure error or gas low error. Service valve closes operation (FDCA801, 1001 type)
E52	Keeps flashing	Stays OFF	Keeps flashing	Lights continuously	52C abnormal. (FDCA 801, 1001 type)
E55	Keeps flashing	Stays OFF	Keeps flashing	1 time flash	Defective under-doom thermistor.
E56	Keeps flashing	Stays OFF	—	1 time flash	Power transistor thermistor is faulty or disconnection or connector connections are poor. (FDCVA 151, 201 type)
E57	Keeps flashing	Stays OFF	—	1 time flash	Insufficient refrigerant. (FDCVA 151, 201 type)
E59	Keeps flashing	Stays OFF	—	1 time flash	Compressor startup error (FDCVA 151, 201 type)
				2 time flash	
				3 time flash	
E60	Keeps flashing	Stays OFF	—	1 time flash	Compressor loader position detection error. (FDCVA 151, 201 type)

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.

(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 (60) 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 -30°C or lower is measured for 5 seconds or longer 3 times within 40 (60) 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 (60) minutes after the 1st detection between 10 minutes and 10 minutes 20 seconds (between 2 minutes and 2 minutes 20 seconds) after compressor operation starts.
Broken wire of under-dome thermistor	<i>E55</i>	When the under-dome thermistor input temperature of -10°C is measured for 5 seconds or longer 3 times within 60 minutes after the 1st detection between 10 minutes and 10 minutes 20 seconds after compressor operation starts.

Notes (1) Values in () show for the FDCA801, 1001 models.

(2) The power transistor temperature sensor is used in the FDCVA151, 201 models only.

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	

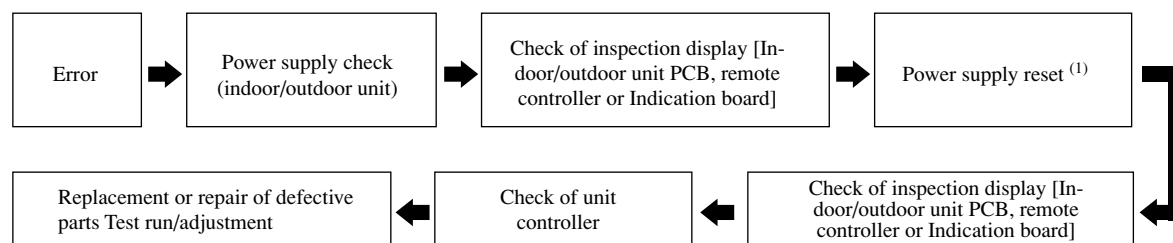
Notes (1) Priority is in the order of E1 > ... > E10 > ... > E60.

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.



Note (1) It means the operation to turn off the power and back on again more than 1 min. later in order to reset the malfunction of microcomputer due to the effect of power supply conditions or accidental noise.

(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 circuit board 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 circuit board of indoor unit. (Peripheral electric parts for circuit board.)

Indoor unit printed circuit board, thermistor (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.

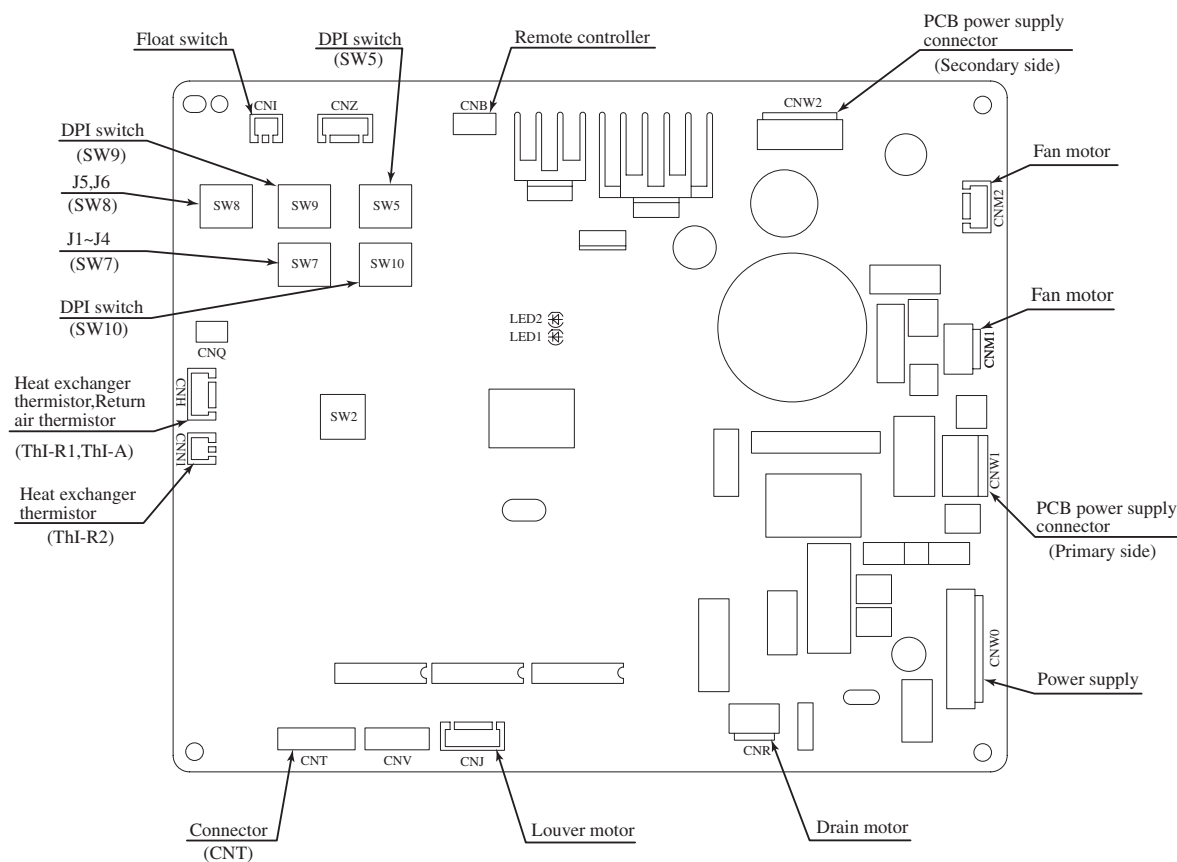
(b) Replacement procedure of indoor unit microcomputer printed circuit board

Microcomputer printed circuit board can be replaced with following procedure.

(i) Confirm the parts numbers. (Refer to the following parts layout drawing for the location of parts number.)

Model	Parts number
FDTC	PJA505A142ZA
FDU	PJA505A131ZC

Model: FDTC series



Name		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
J5 (SW8-1)	With	Louver free stop control - Invalid
	None ⁽¹⁾	Louver free stop control - Effective
J6 (SW8-2)	With	Freeze prevention fan control activated.
	None ⁽¹⁾	Freeze prevention fan control deactivated.

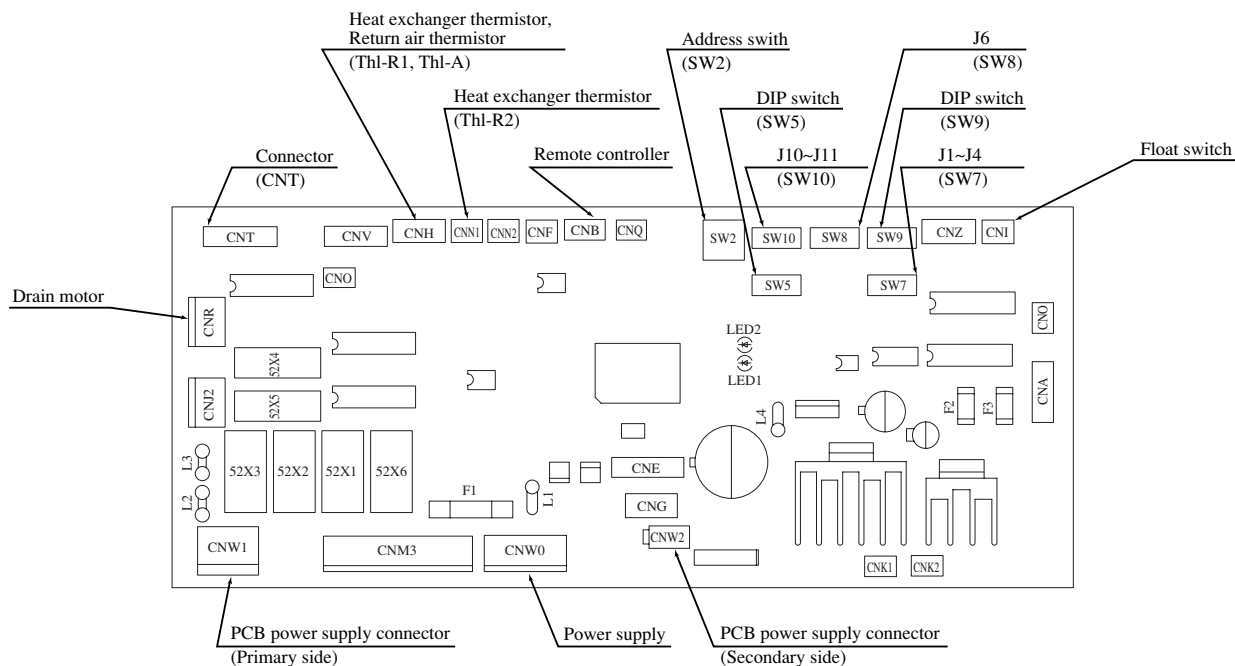
(2) The replacement board is not equipped with jumpers J1 ~ J6. Instead, SW7 and 8, with the same functions as jumpers J1~J6, are used in the position where the jumpers were previously. Set SW7 and 8 locally in accordance with the above table.

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

Switch		Function
SW9-3	ON	Emergency operation
	OFF	Normal
SW9-4	ON	Fan control : Powerful mode
	OFF	Fan control : Mild mode

Switch			Function	
SW10-1 (J9)			OFF	Auto swing function - None
			ON	Auto swing function - With
SW10-2 (J10)	OFF	SW10-3 (J11)	OFF	Remote controller air flow -
			ON	Remote controller air flow 1 speed
	ON		OFF	Remote controller air flow 2 speed
			ON	Remote controller air flow 3 speed

Model: FDU series



● 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

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

(2) The replacement board 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
SW5-3	ON
	SW5-4
	ON
	OFF
SW5-3	ON
	SW5-4
	ON
	OFF
Setting time : 1000hrs. (Unit stop)	
Setting time : 1000hrs. (Display)	
Setting time : 600hrs. (Display)	
Setting time : 180hrs. (when shipped from factory)	

Function of DIP switch SW9 (Usually all turned OFF)

Switch	Function
SW9-3	ON
	OFF
Emergency operation	
Normal	

Function of DIP switch SW10 (Usually all turned OFF)

Switch	Function
SW10-2 (J10)	OFF
	SW10-3 (J11)
	ON
	OFF
SW10-2 (J10)	ON
	SW10-3 (J11)
	ON
	OFF
Remote controller air flow -	
Remote controller air flow 1 speed	
Remote controller air flow 2 speed	
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: A Red LED (inspection display), Green LED (CPU. normal display)

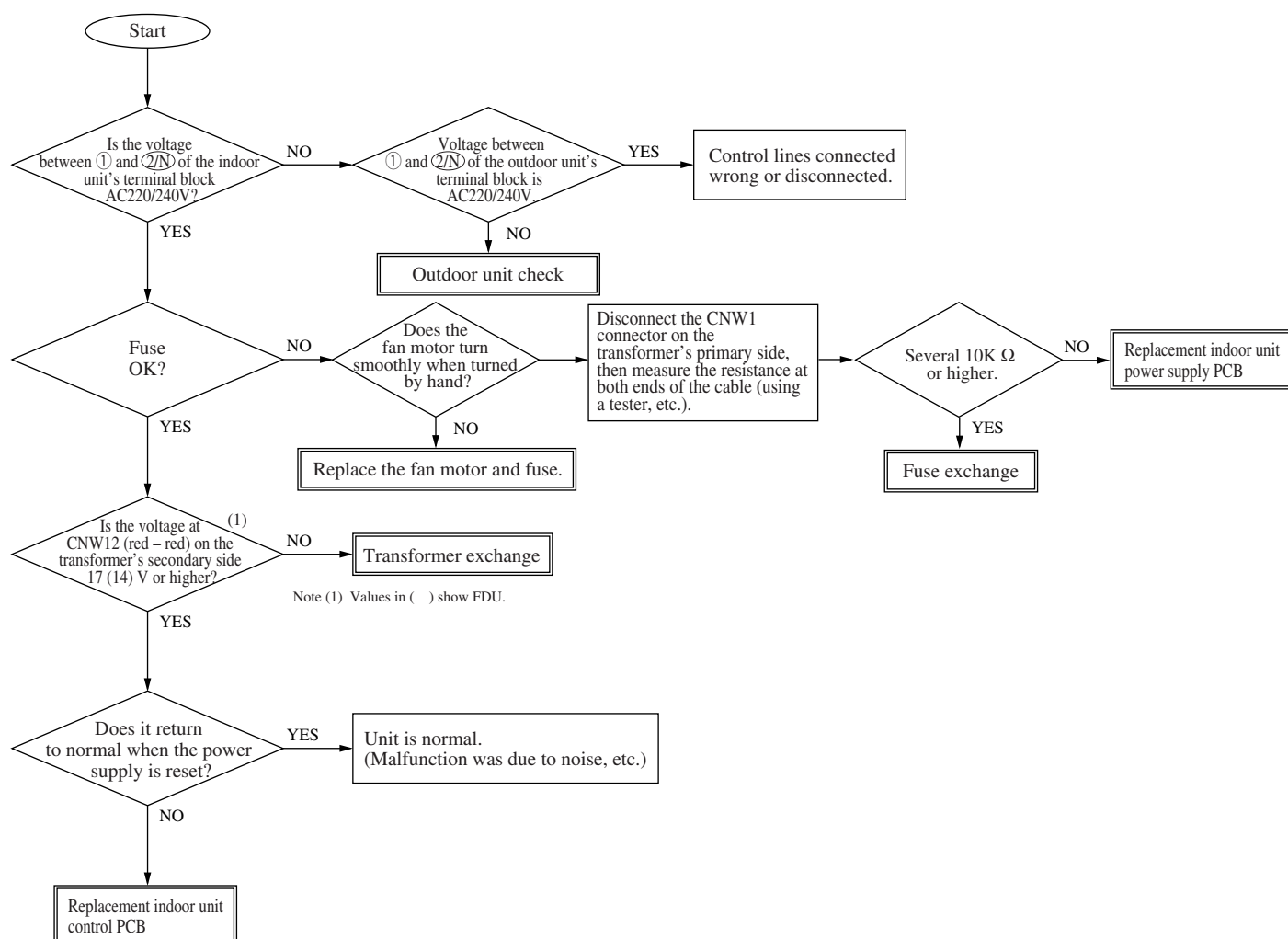
1

Error display : No display
LCD display : No display

[Power supply line error]

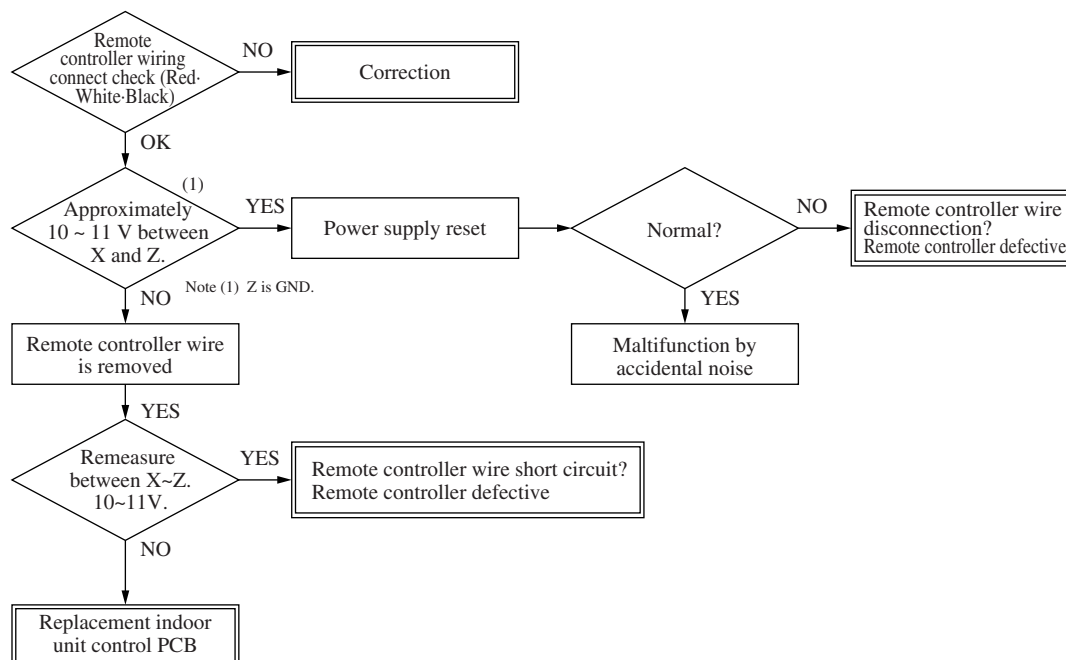
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Stays OFF
Green LED	Stays OFF	Green LED	Stays OFF

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



2

Error display “WAIT”

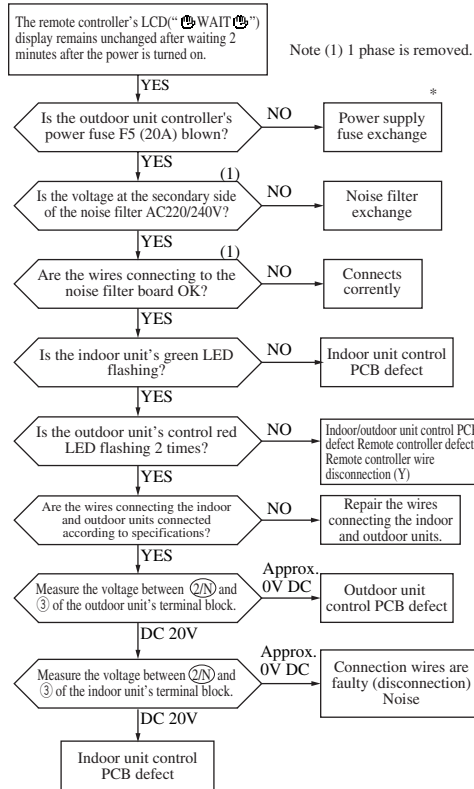
Indoor – outdoor communications trouble
(Initial (when the power is turned on))

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

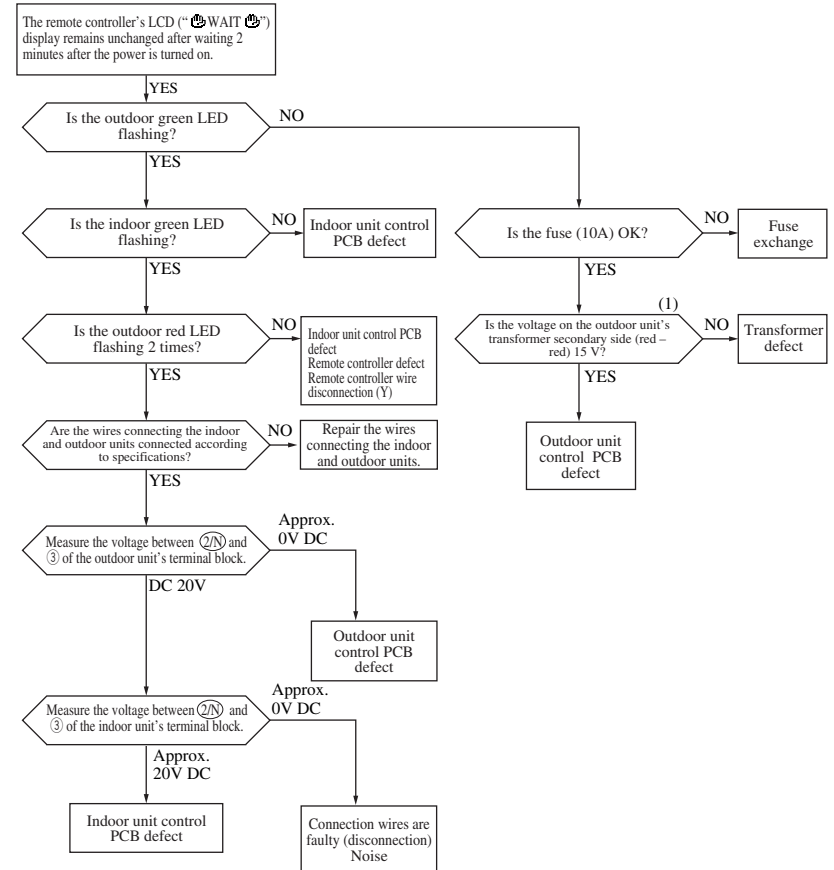
Notes (1) If trouble occurs during communications, the error code E5 is displayed (Outdoor, Red LED flashes 2 times). The check procedure is as shown below. (However, excluding connection related problems) Also, if the power supply is reset after E5 occurs, if the trouble is intermittent, it will be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

(2) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.

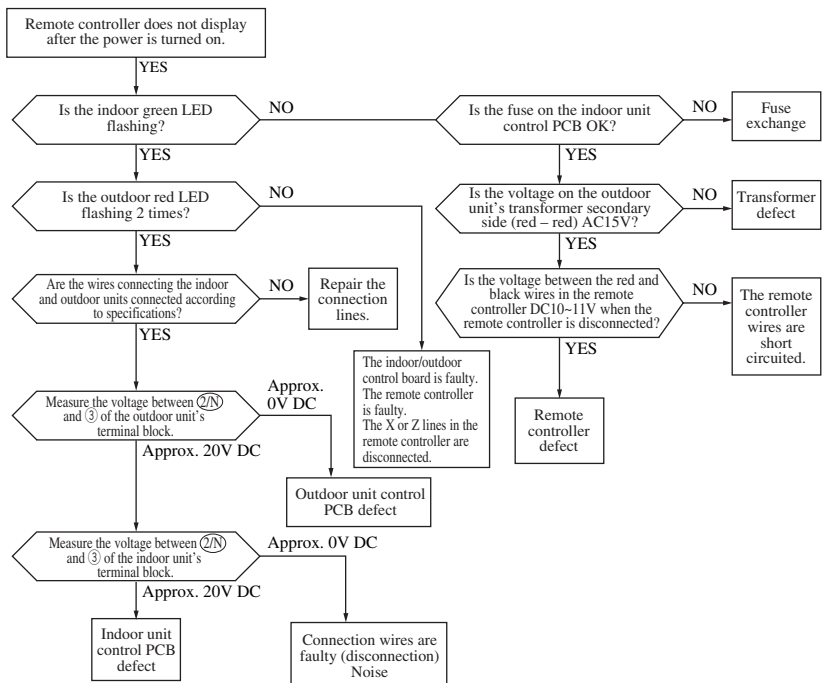
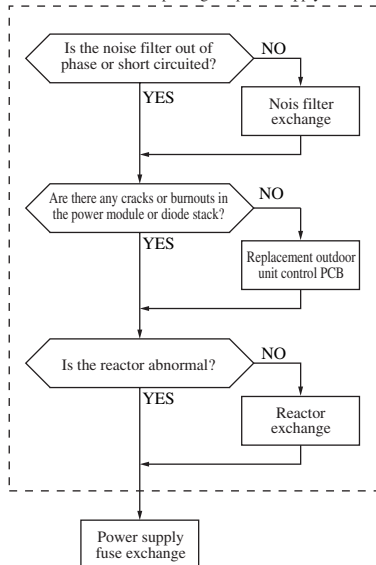
● 151, 201



● 801, 1001



Inverter check before replacing the power supply fuse.



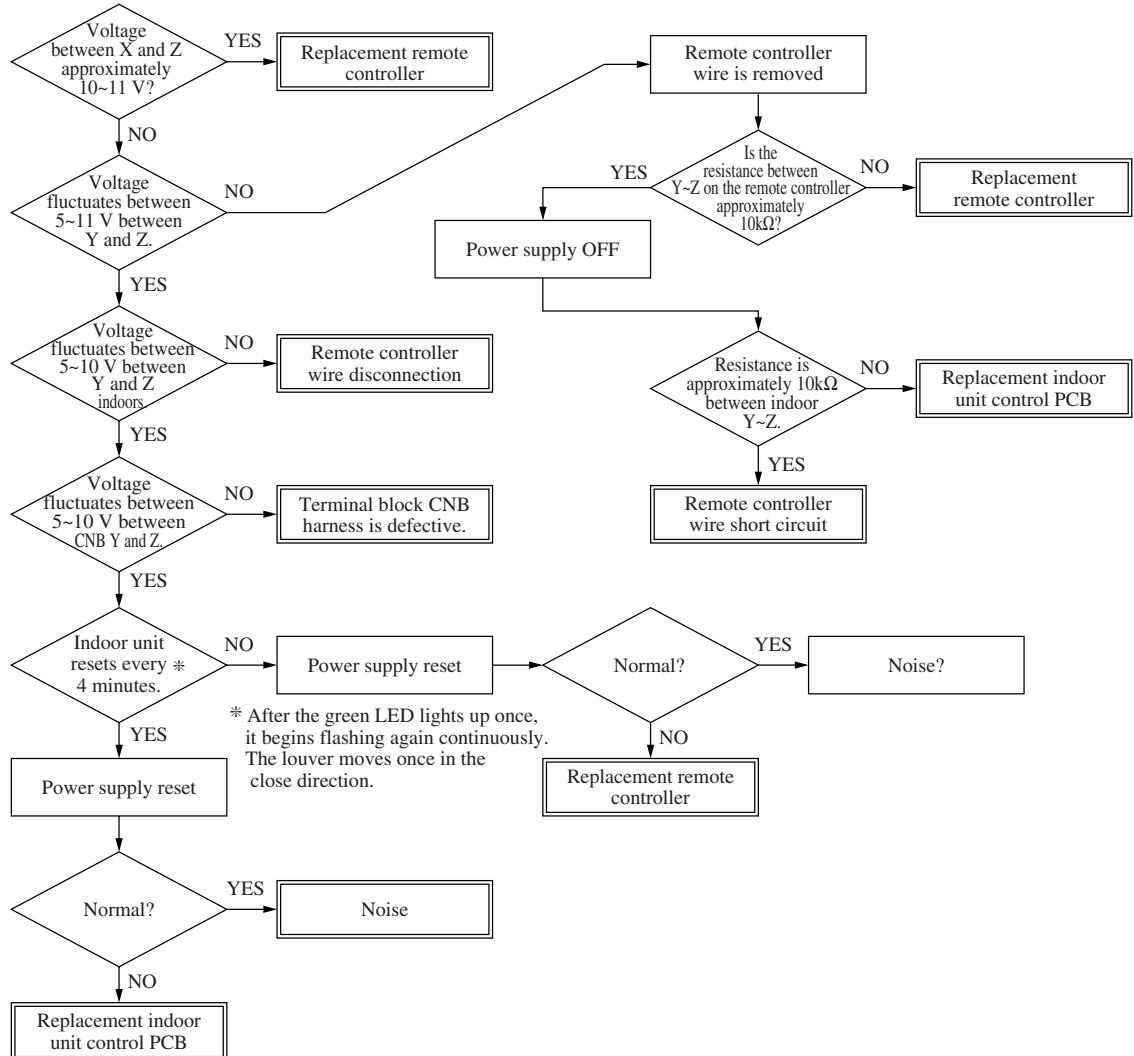
3

Error display : *E1*

[Communication error between remote controller-Indoor unit]

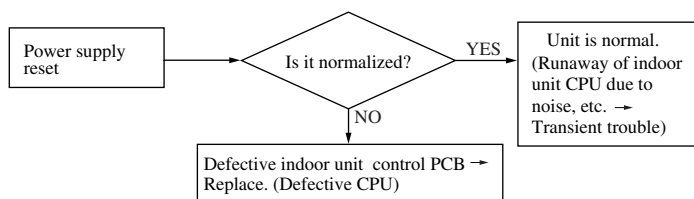
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	Stays OFF
Green LED	Keeps flashing	Green LED	Keeps flashing

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



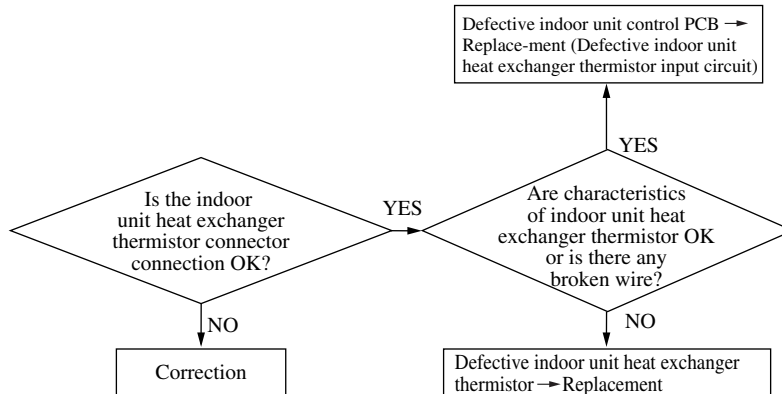
4

Error display : E6

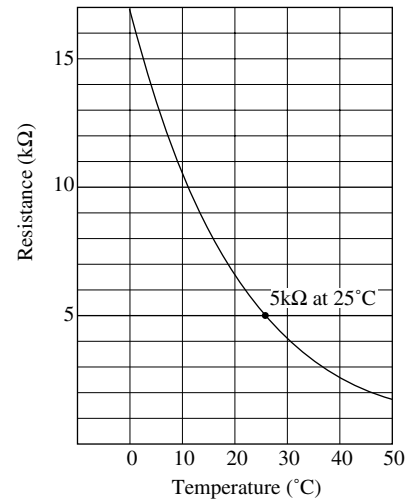
[Defective indoor unit heat exchanger thermistor]

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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



Return air 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.

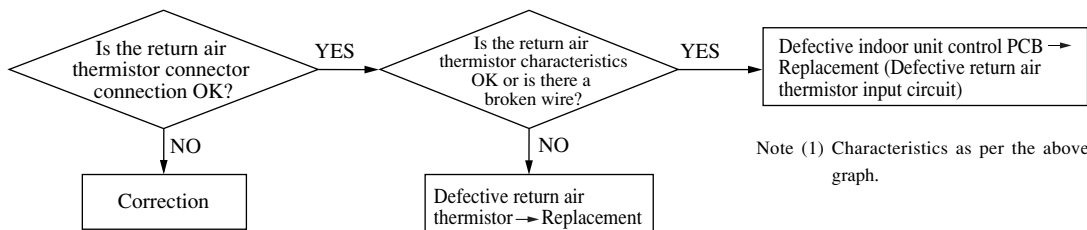
5

Error display : E7

[Detective return air thermistor]

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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



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.

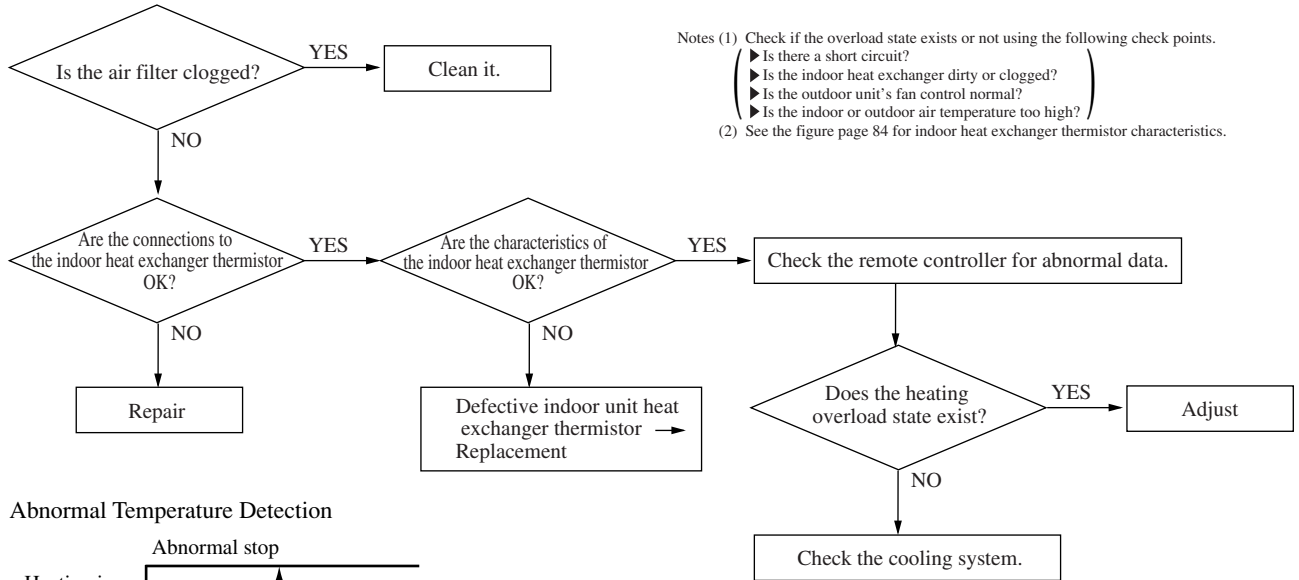
6

Error display : E8

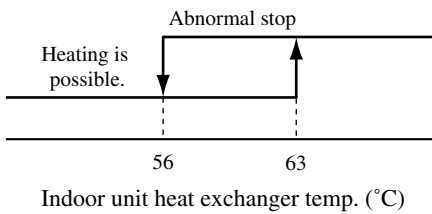
[Heating overload]

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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



● Abnormal Temperature Detection



● Display condition

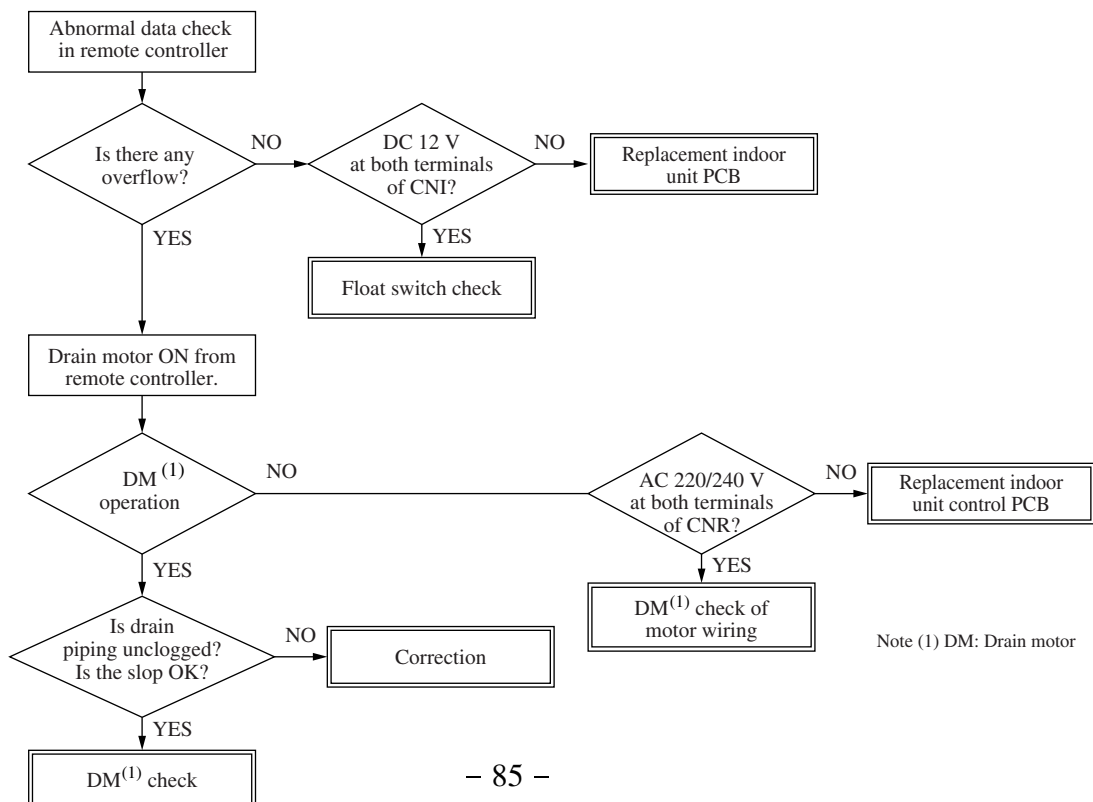
An abnormal stop occurs if this state is detected 5 times within 60 minutes of the first detection, or if the overload state is detected continuously for 6 minutes.

7

Error display : E9

[Drain trouble] (Only case of FDTC type)

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

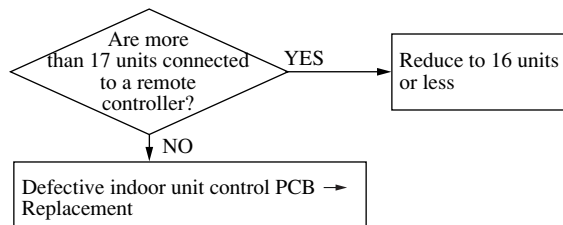


8

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

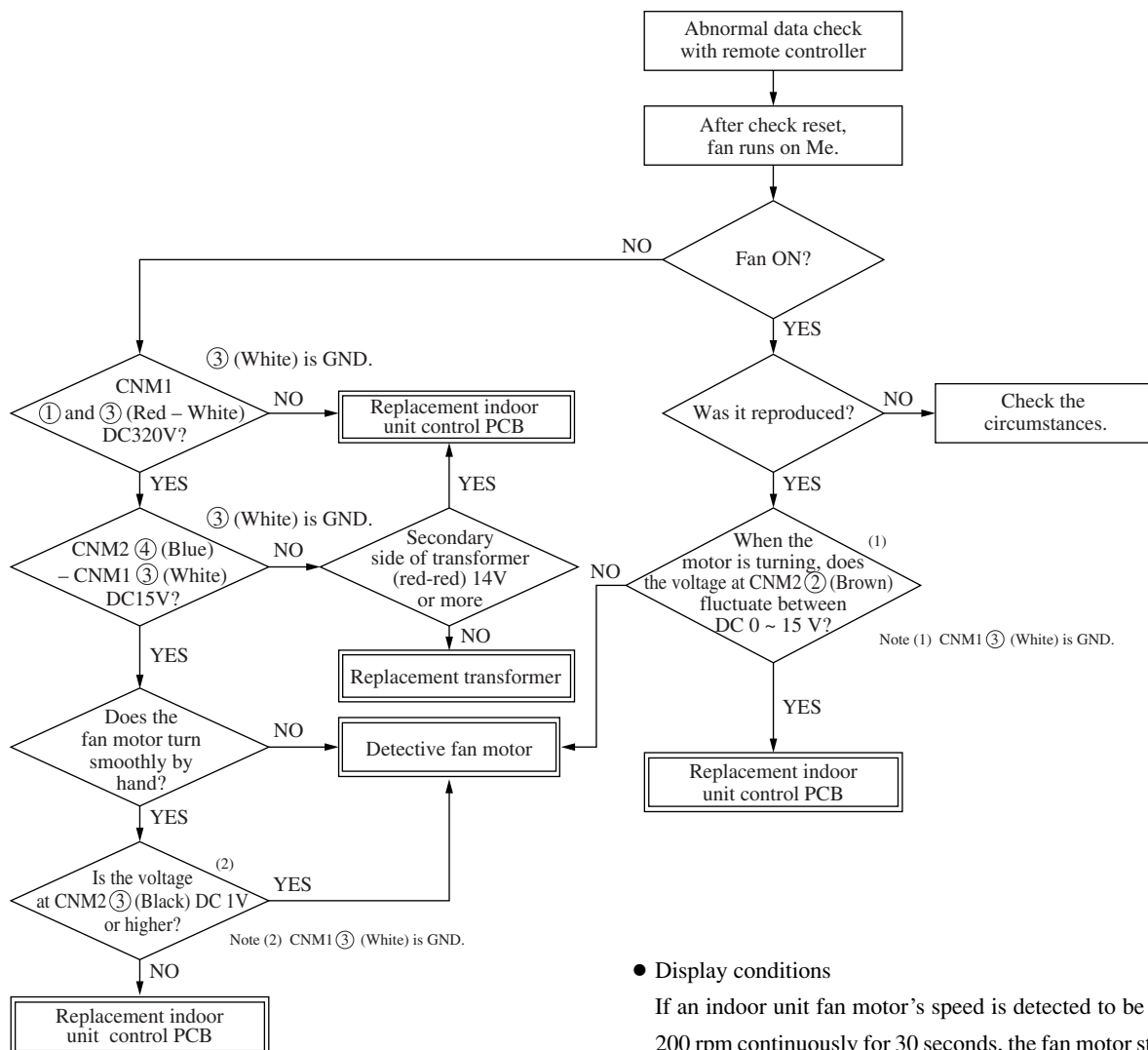
Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



9

Error display : E16**[Fan motor abnormalities] (Only case of FDTC type)**

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



- Display conditions

If an indoor unit fan motor's speed is detected to be less than 200 rpm continuously for 30 seconds, the fan motor stops for 2 seconds. After 2 seconds, it starts again, but this occurs 4 times within a period of 1 hour.

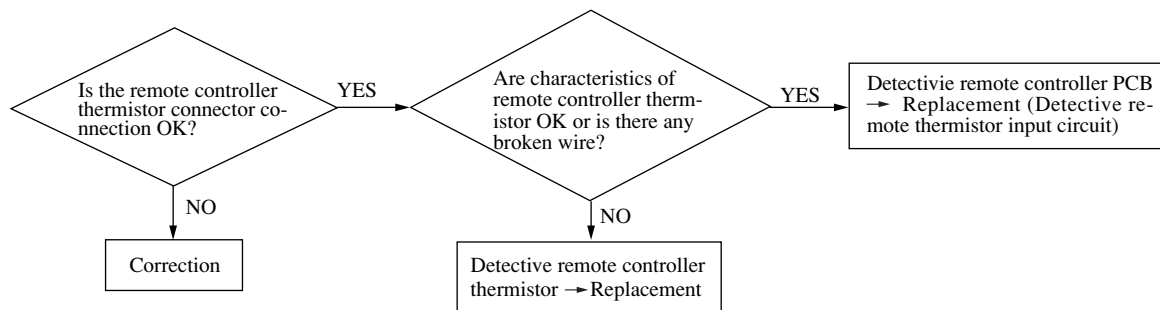
10

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

Note (1) The green LED in the outdoor unit is used in the FDCA301 ~ 601 models only.



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 units 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. (Refer to the following parts layout drawing for the location of parts number.)

Parts No.	Applicable Model
PCA505A080Z	FDCVA151HEN, 201HEN
PCB505A042PB	FDCA801HES, 1001HES

- 2) Set the model using the model setting switch (SW6). (In the case of the 151, 201 only).

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

Model	151	201
Switch Setting Table Set the switches ON or OFF for each switch No. (■ ON, □ OFF)	<div><input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input checked="" type="checkbox"/> 4</div>	<div><input checked="" type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input checked="" type="checkbox"/> 4</div>

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

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.

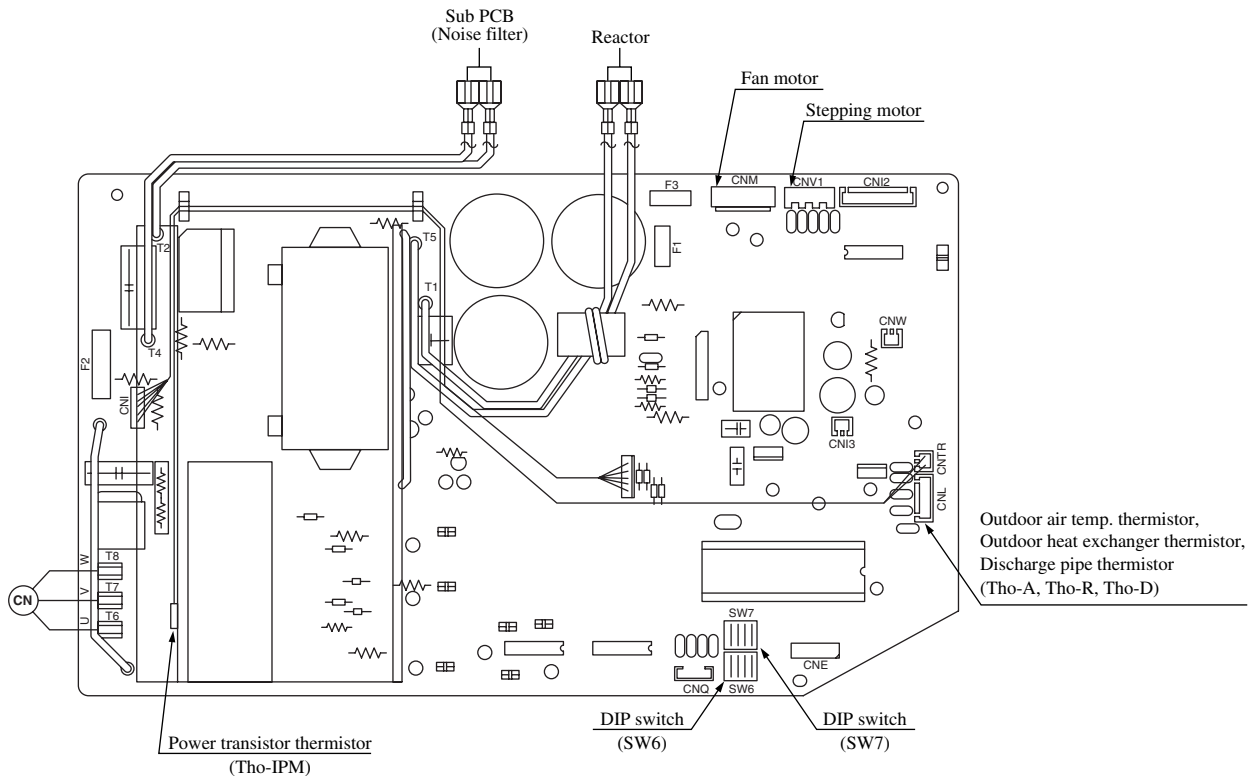
- 4) Connect the faston terminals and connectors to the control board.

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

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

Parts layout on the outdoor unit PCB

◆ FDCVA151, 201 type



● Change by the jumper wire

Model	151	201
JA1 (SW7-1)	None	None
JA5 (SW6-1)	None	None
JA6 (SW6-2)	None	With
JA7 (SW6-3)	None	None
JA8 (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 wires JA1 and JA5~JA8. Instead, SW6 and 7 are mounted in the same position and have the same functions as jumper wires JA1 and JA5~JA8. Carry out the local settings in accordance with the table using SW6 and 7.

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

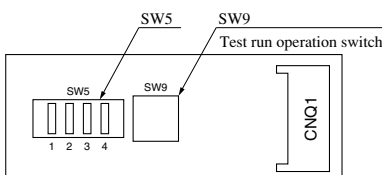
Switch	Function
SW5-1	ON Defrost Setting Select For cold regions. OFF Normal
SW5-2	ON Snow-guard fan control-Effective OFF Snow-guard fan control-Invalid
SW5-3	ON Low refrigerant protection control-Effective OFF Low refrigerant protection control-Invalid
SW5-4	ON Test run operation-Heating OFF Test run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

● Change by the JA3

Switch	Function
JA3	with Model selection-Energy saving
(SW7-3)	None Model selection-Standard

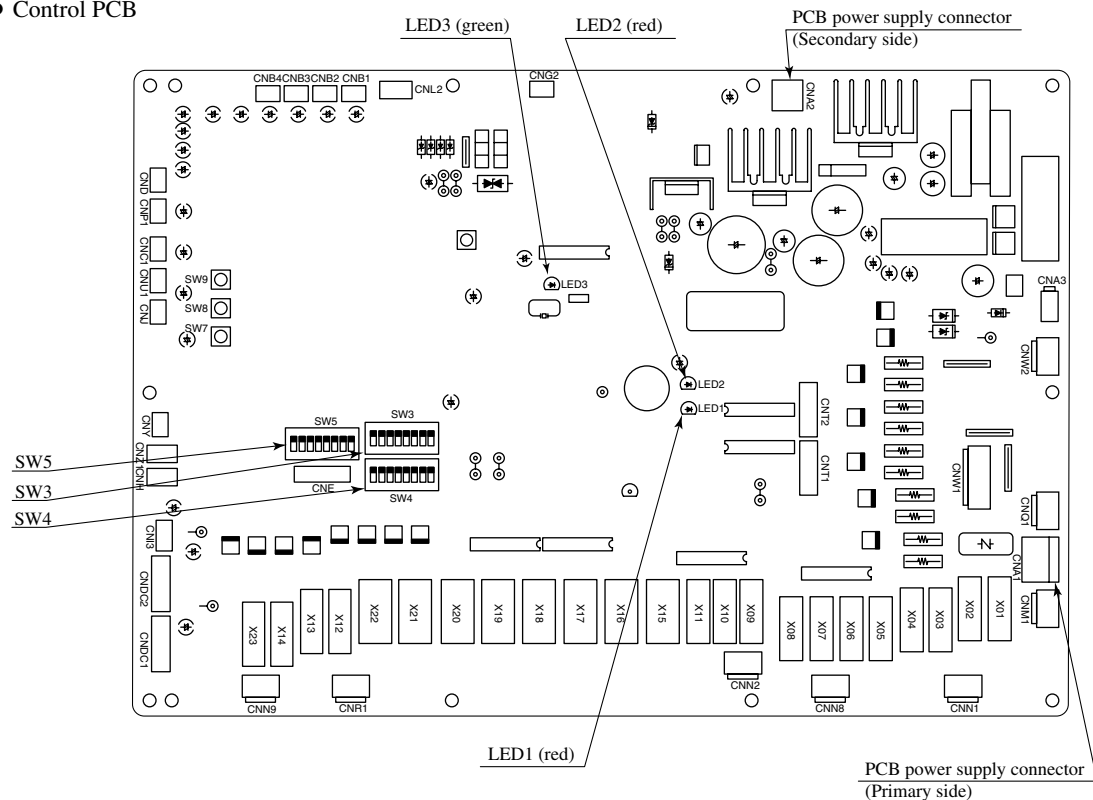
Note (1) "None" means that jumper wire is not provided on the PCB or the connection is cut.

External PCB



◆ Models FDCA801, 1001 type

● Control PCB



■ Control change switch (SW3, SW4, SW5)

● Function of switch SW3 (Usually all turned OFF)

Name	Function
SW3-1	ON Defrosting-Cold weather region
SW3-1	OFF Defrosting-Normal
SW3-2	ON Snow protection control-With
SW3-2	OFF Snow protection control-None
SW3-3	ON Test run operation switch: Test run
SW3-3	OFF Normal
SW3-4	ON Test run operation: Heating
SW3-4	OFF Test run operation: Cooling
SW3-5	ON Pump down
SW3-5	OFF Normal
SW3-6	ON Defrosting end operation change
SW3-6	OFF Normal

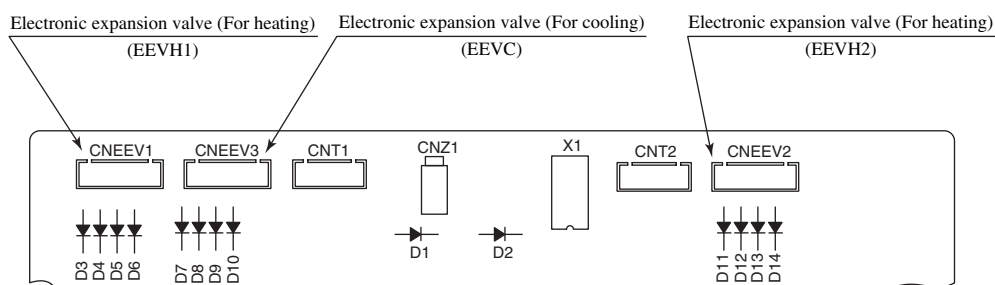
● Function of switch (SW5) (Usually all turned OFF)

Name	Function
SW5-1	ON Renewal switch
SW5-1	OFF Normal
SW5-2	ON Reserve
SW5-2	OFF Reserve
SW5-3	ON LED reset
SW5-3	OFF Normal
SW5-4	ON Test mode
SW5-4	OFF Normal

● Function of switch SW4

	FDCA801	FDCA1001
SW4-1	OFF	ON
SW4-2	OFF	OFF
SW4-3	ON	ON
SW4-4	ON	ON

● Electronic expansion valve PCB



Electronic expansion valve PCB parts number

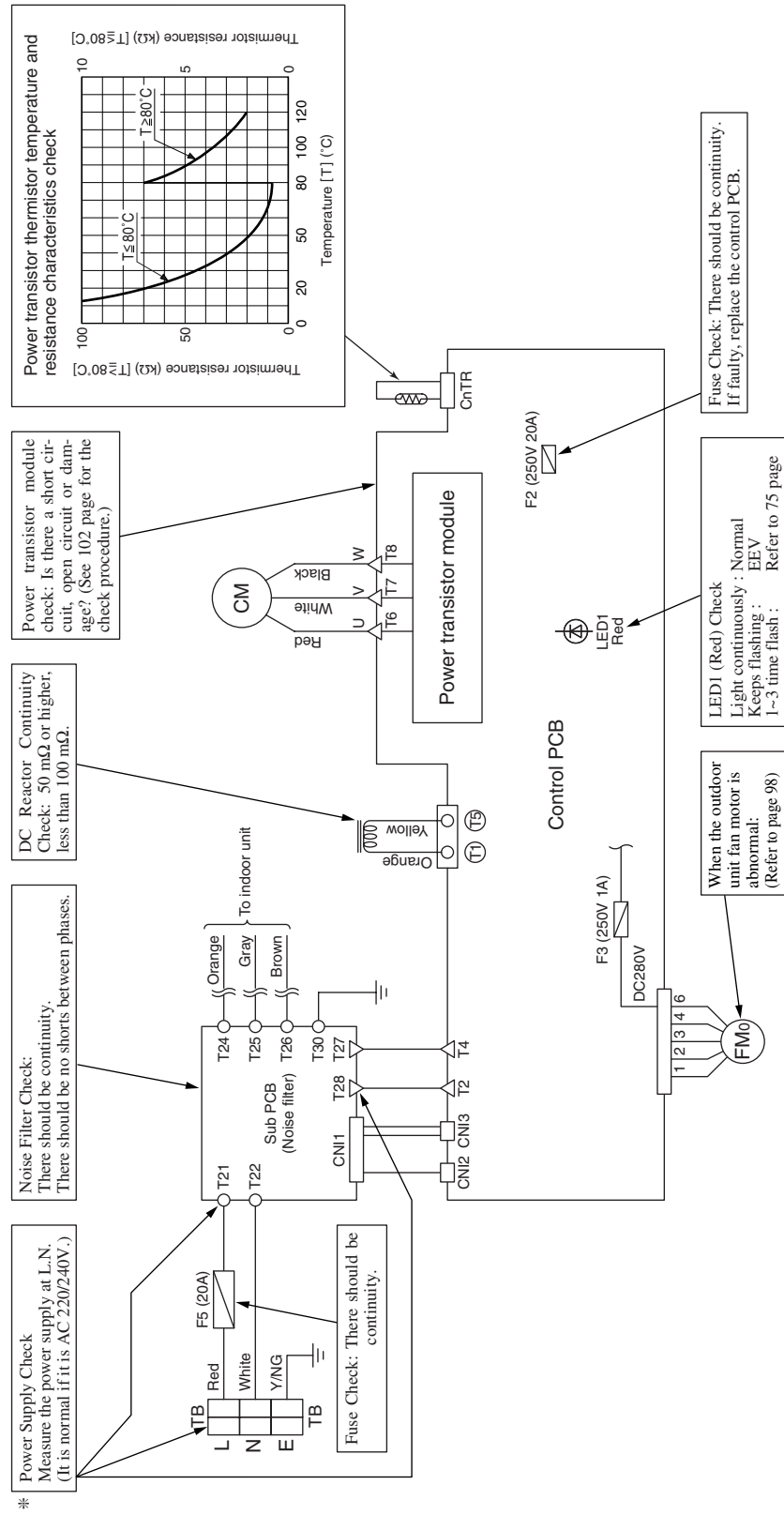
Parts No.	Applicable Model
PCB505A041ZA	FDCA801, 1001

Outdoor Unit controller failure diagnosis circuit diagram

◆ FDCVA151, 201 type

● Outdoor unit check points

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



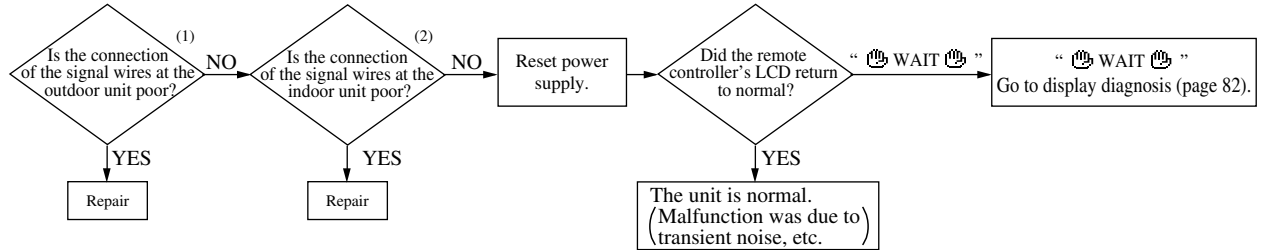
1

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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.

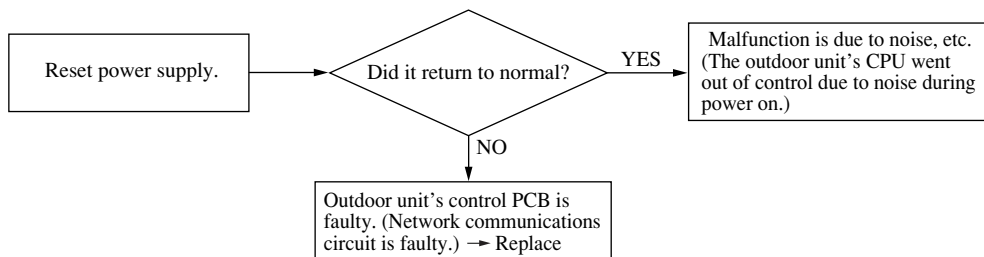


Notes (1) Check for poor connections (disconnection, looseness) on the outdoor unit's terminal block.

(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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.

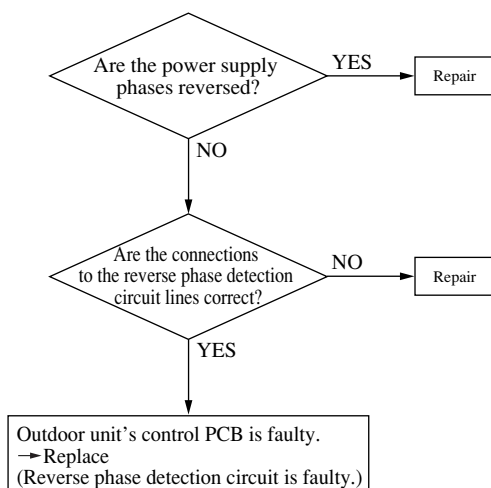


2

Error display : **E32**

[Power supply phases reversed] (Only case of 801, 1001 type)

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

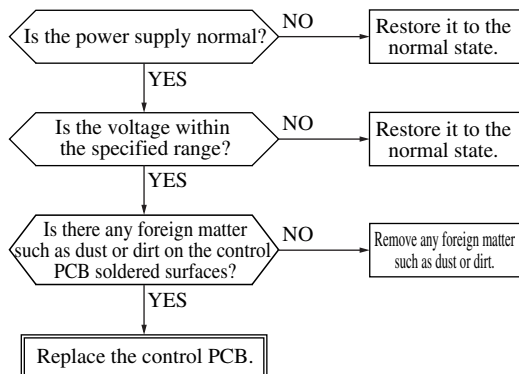


3

Error display : E33

[Inverter primary current abnormal] (Only case of 151, 201 type)

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

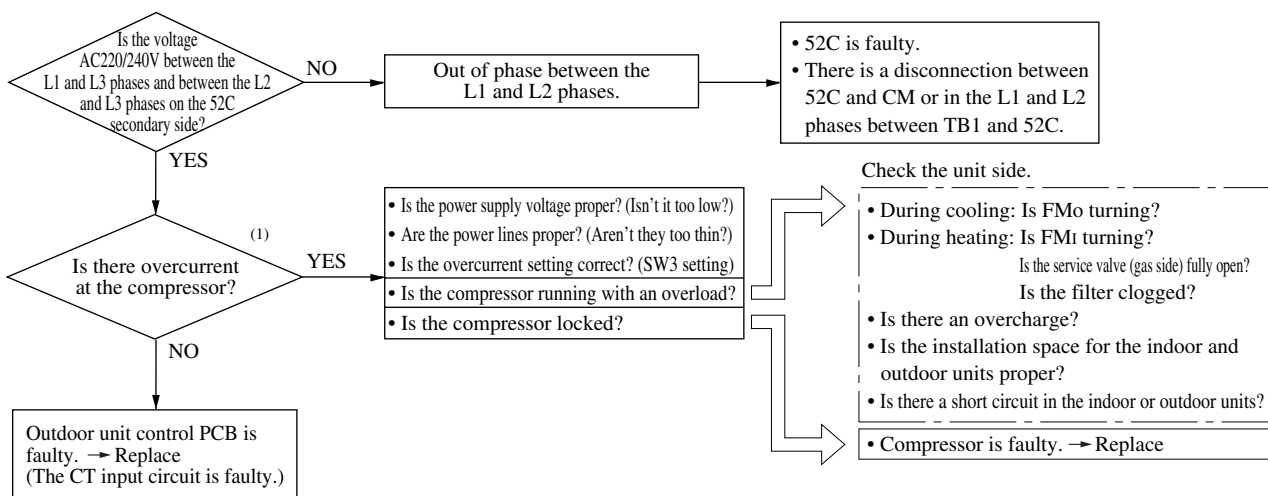


● Display Conditions

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.

[Compressor overcurrent trouble] (Only case of 801, 1001 type)

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



Notes (1) Measure the overcurrent value to make sure.

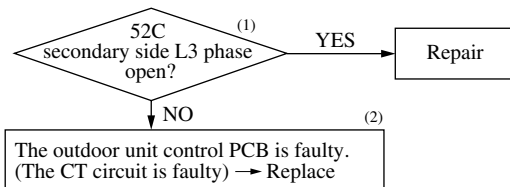
Also make sure the overcurrent setting set with SW3 and SW4-1 on the outdoor unit control PCB is not incorrect.

4

Error display : E34

[Open phase at L3 phase of 52C secondary side] (Only case of 801, 1001 type)

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



Notes (1) Also check if there is voltage at the L3 phase on the 52C primary side, but no voltage on the secondary side (coil wire disconnection or faulty contacts).

(2) If there is voltage at the L3 phase on the 52C primary side and it is not abnormal, the outdoor unit control PCB is faulty.

If the unit is operated with the service valve closed, 49C (internal thermostat) operates. E34 may also be displayed. Check the service valve.

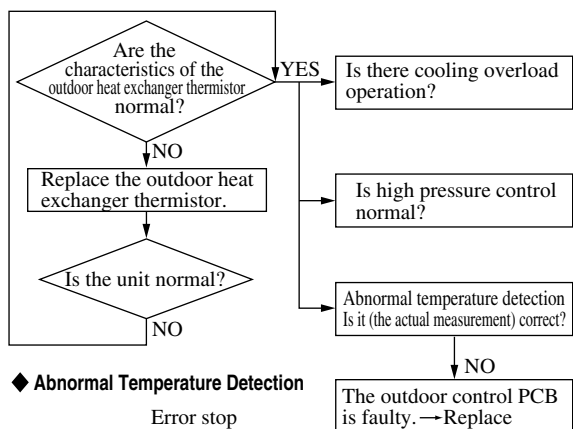
5

Error display : E35

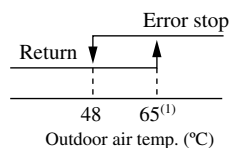
[Cooling overload operation]

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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



◆ Abnormal Temperature Detection

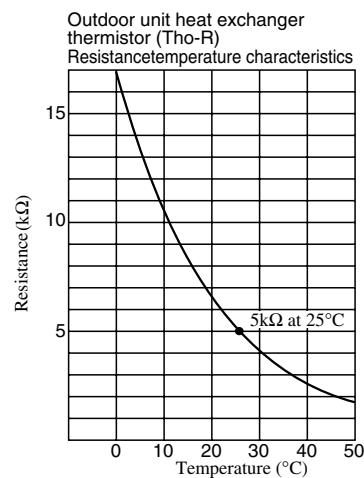


Note (1) In the case of the 151, 201, the abnormal stop temperature differs depending on the compressor's speed.

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

● 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.

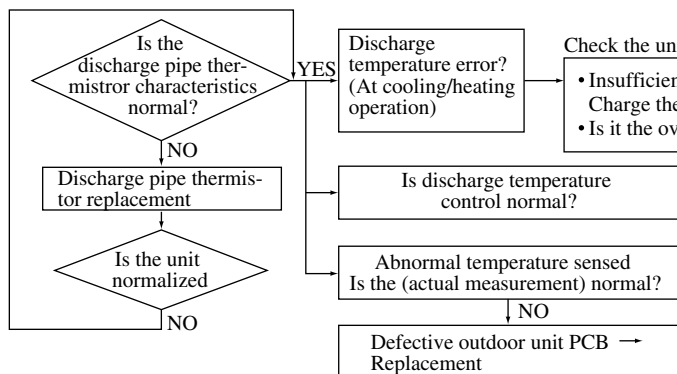


6

Error display : E36 [Discharge temperature error]

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

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



Check the unit side.

- Insufficient refrigerant → Charge the refrigerant (measure)
- Is it the overload operation?

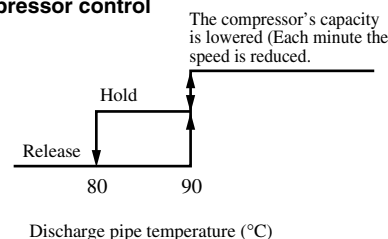
Check the unit side.

- During cooling: Is FM₀ operating?
- During heating: Is FM₁ operating?
- Are service valves (both liquid, gas) fully opened during both cooling and heating.
- Is the installation space of indoor/outdoor unit adequate?
- Is there any short circuit air flow for indoor/outdoor units?

151, 201 only

If the discharge pipe temperature exceeds the set value, the compressor's speed is controlled to prevent the discharge pipe temperature from rising.

◆ Compressor control



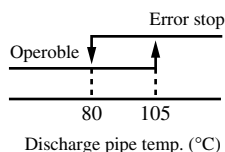
• Display conditions

If the discharge temperature is as shown at left 2 (5) times within 60 minutes, or continuously for 60 minutes, including when the compressor is stopped.

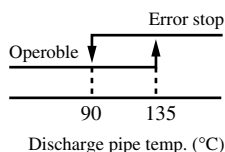
Note (1) Values in () show for the case of the 801, 1001 models.

◆ Abnormal Temperature Detection

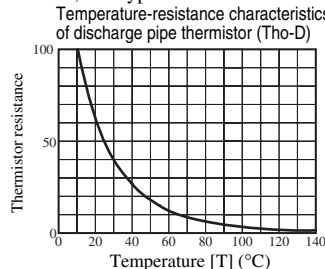
151, 201 type



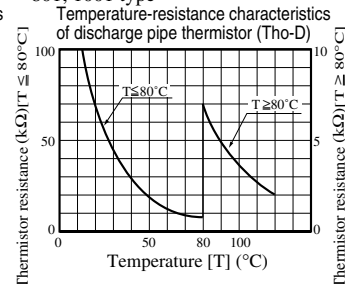
801, 1001 type



• 151, 201 type



• 801, 1001 type

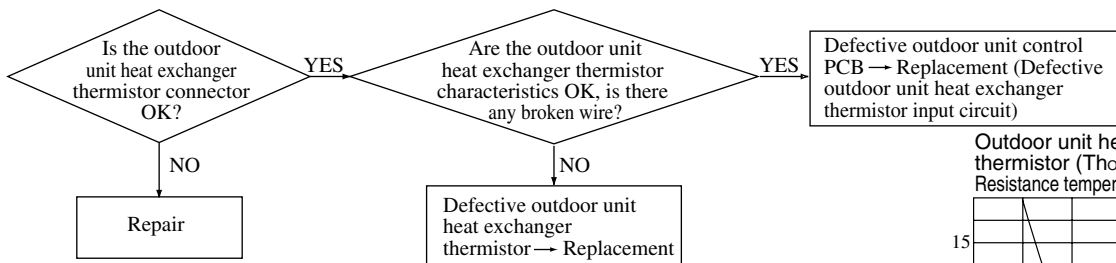


7

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

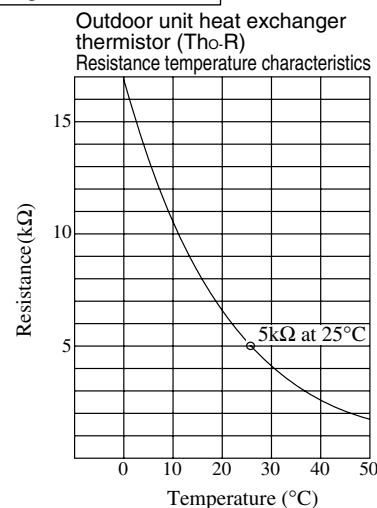
Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



• Display conditions

If the temperature sensed by the thermistor is -30 (-50) °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 801, 1001 models.

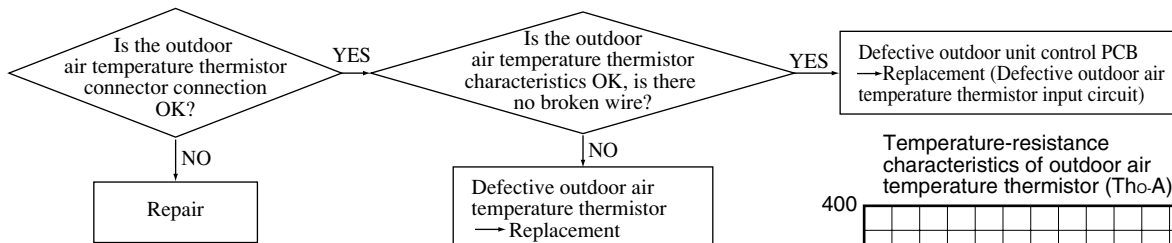


8

Error display : E38 [Defective outdoor air temperature thermistor]

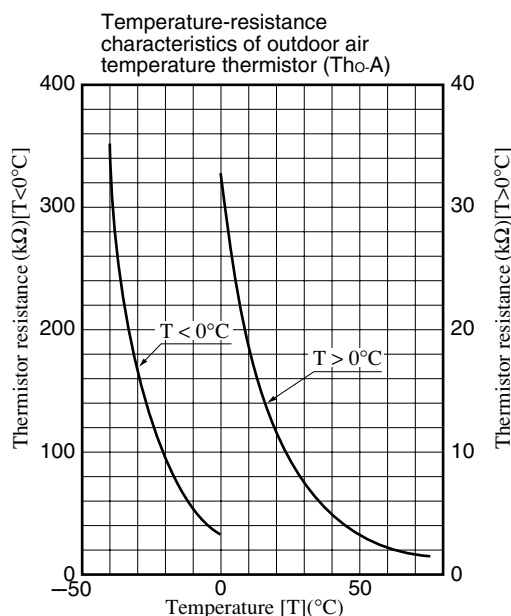
Indoor unit		Outdoor unit	
Red LED	Stays OFF	Red LED	1 time flash
Green LED	Keeps flashing	Green LED	Keeps flashing

Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



- 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.

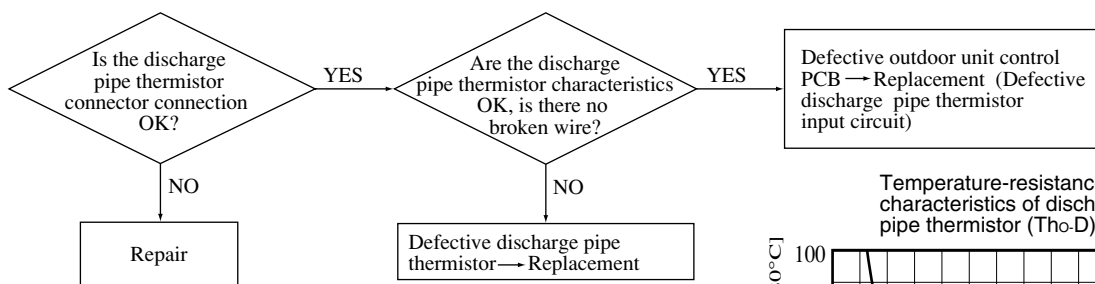


9

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

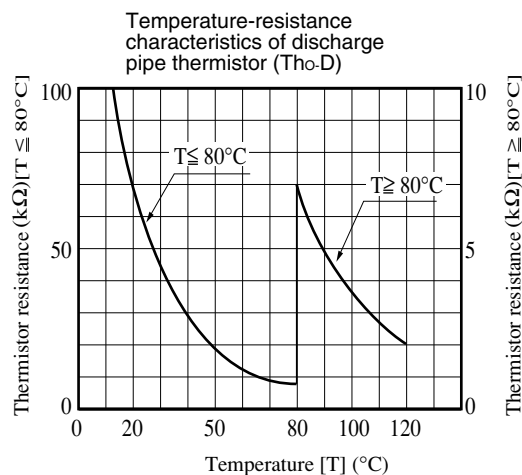
Note (1) The green LED in the outdoor unit is used in the FDCA801, 1001 models only.



- 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 (10minutes and 10minutes 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.

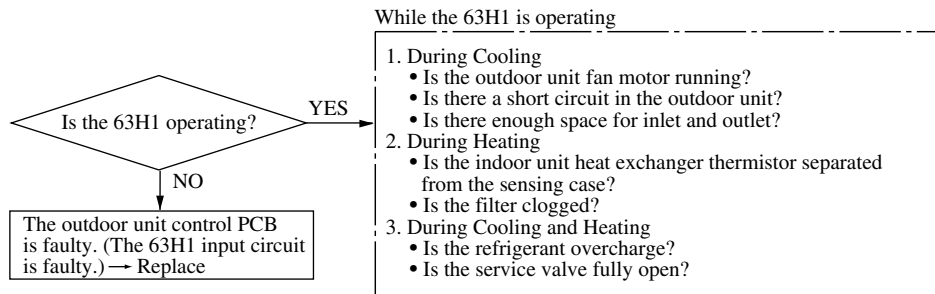
Note (1) Values in () show for the case of the 801, 1001 models.



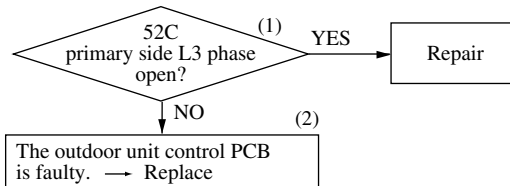
10

Error display : E40 [63H1 operation] (Only case of 801, 1001 type)

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

**[Open phase at L3-phase of 52C primary side]**

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



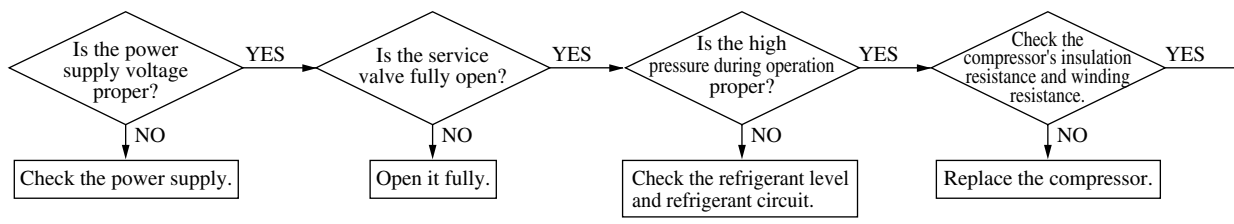
Notes (1) Also check if there is voltage at the L3 phase on the 52C primary side, but no voltage on the secondary side (coil wire disconnection or faulty contacts).

(2) If there is voltage at the L3 phase on the 52C primary side and it is not abnormal, the outdoor unit control PCB is faulty.

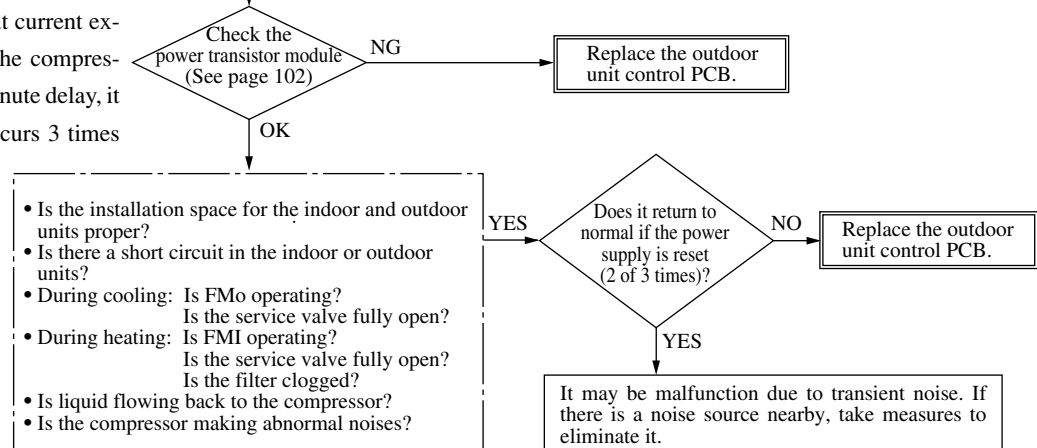
11

Error display : E42 [Current cut] (Only case of 151, 201 type)

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

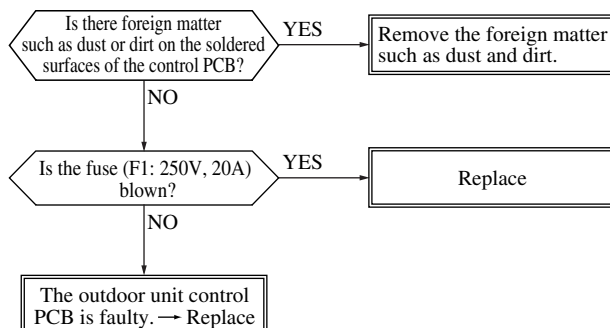
**● Display conditions**

If the inverter's output current exceeds the set value, the compressor stops. After a 3-minute delay, it restarts, but if this occurs 3 times within 20 minutes.



12 Error display : *E47* [Inverter over-voltage trouble] (Only case of 151, 201 type)

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

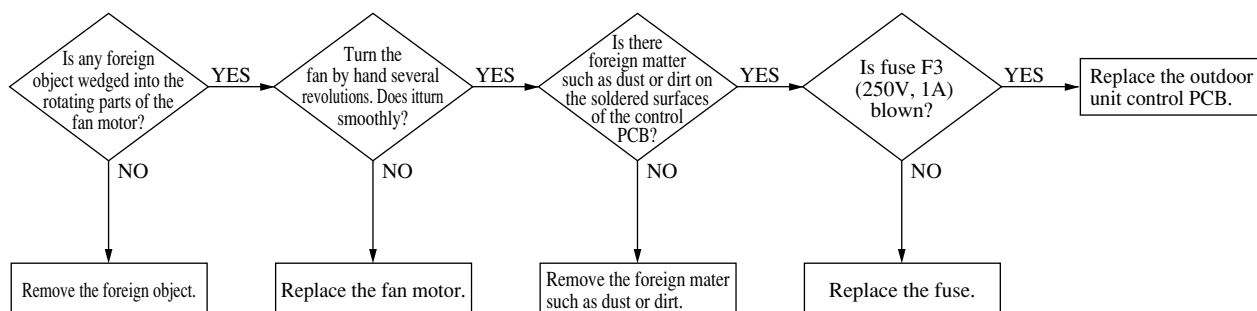


● Display Conditions

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.

13 Error display : *E4B* [DC Fan motor abnormal] (Only case of 151, 201 type)

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



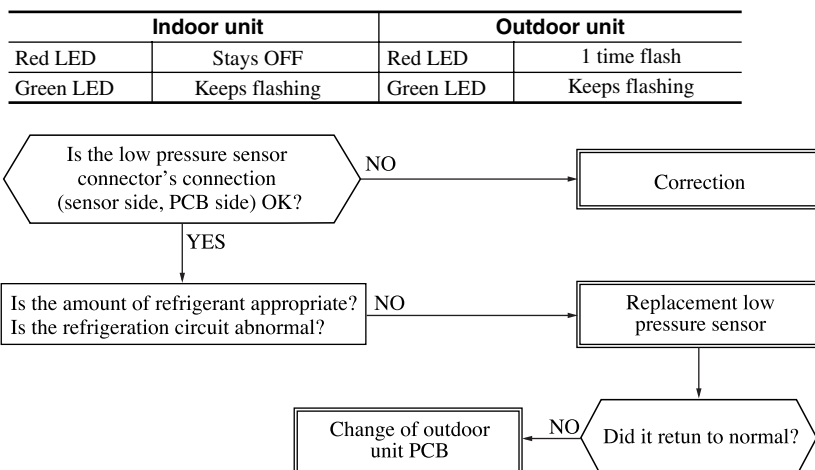
● Display conditions

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.

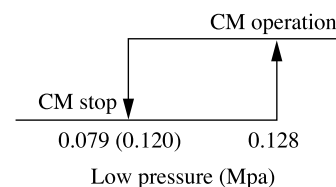
14

Error display : E49

[Abnormal low pressure or low pressure sensor wire disconnected]
(Only case of 801, 1001 type)



◆ Abnormal pressure detection



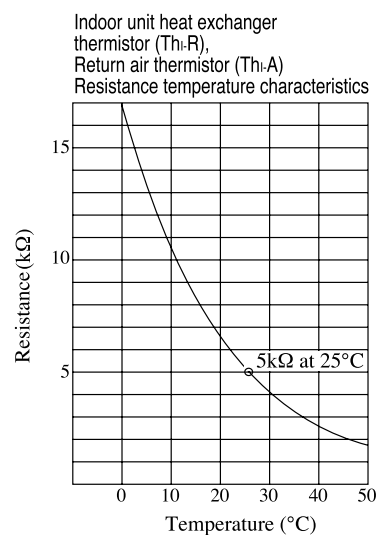
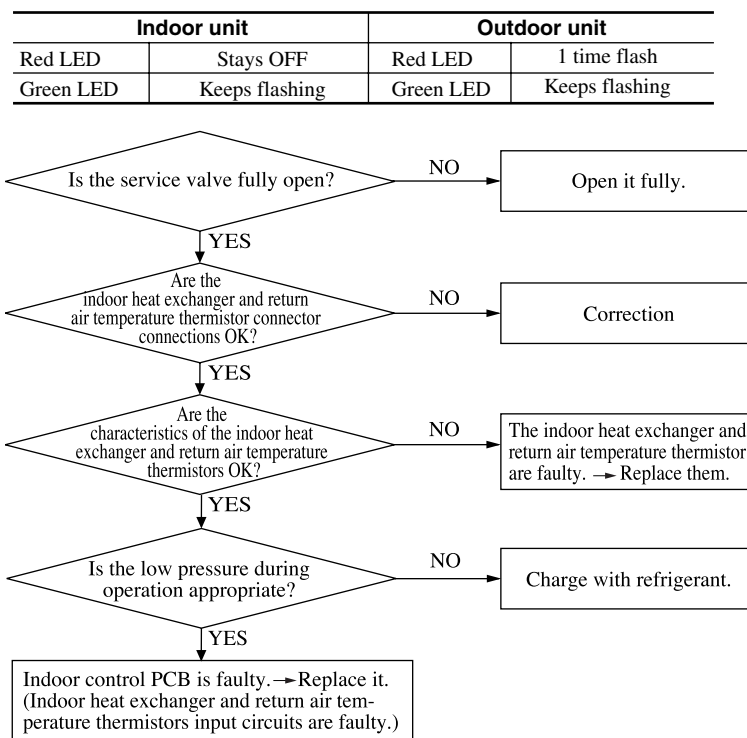
● Display Conditions

The compressor stops if the low pressure sensor detects a pressure of 0.079 (0.120) MPa or lower continuously for 15 seconds.

After a 3-minute delay, the compressor restarts, but if this occurs 3 times within 60 minutes.

Note (1) Values in () show in the case where 10 minutes or longer have passed since the compressor started.

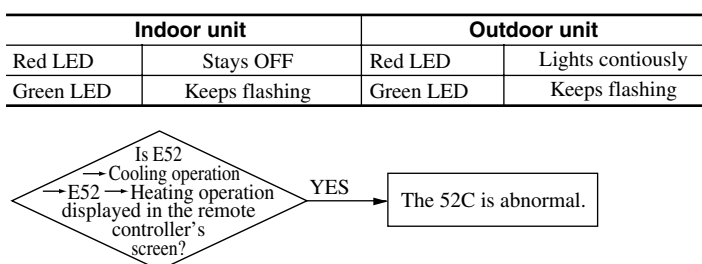
[Gas low error] (Only case of 801, 1001 type)



15

Error display : E52

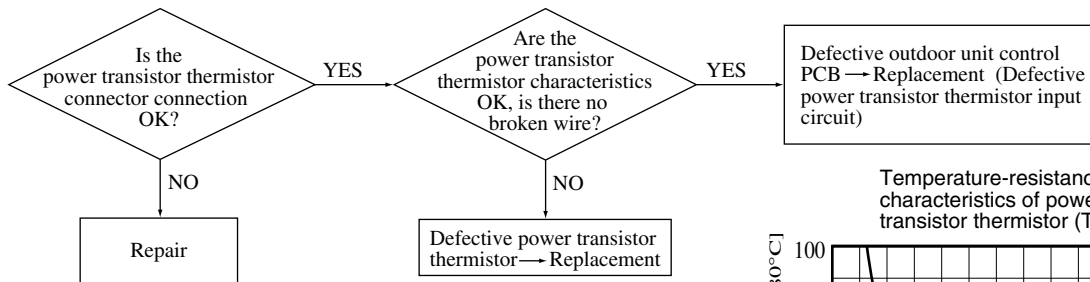
[52C Abnormal] (Only case of 801, 1001 type)



16

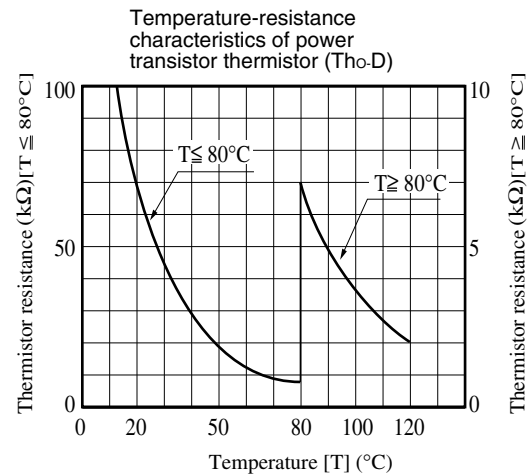
Error display : E56**[Power transistor thermistor faulty.] (Only case of 151, 201 type)**

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



- Display conditions

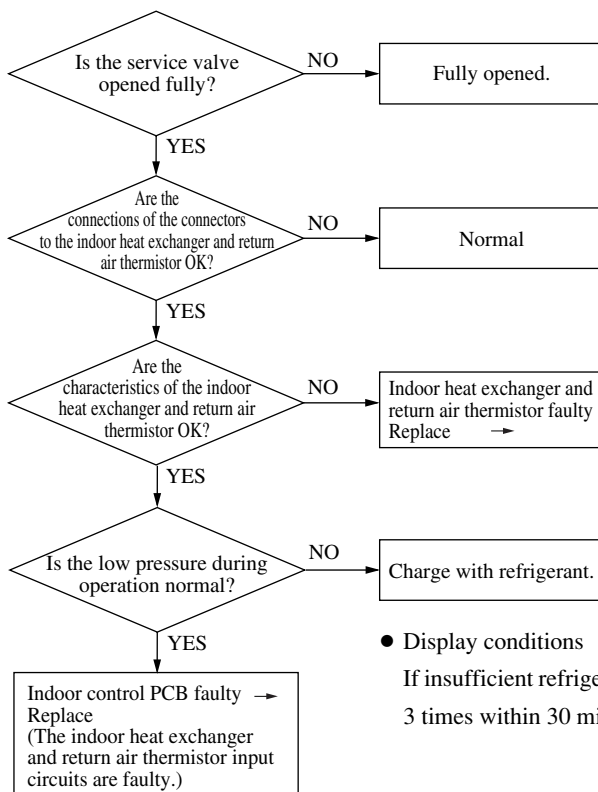
If the temperature sensed by the thermistor is -10°C or lower continuously for 5 seconds between 10 minutes and 10 minutes 20 seconds after the compressor goes ON, the compressor stops. After a 3 minute delay, the compressor restarts. If this state is detected 3 times in 40 minutes.



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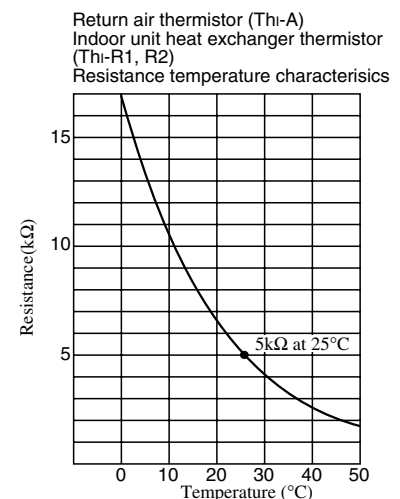
Error display : E57**[Insufficient refrigerant volume.] (Only case of 151, 201 type)**

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



- Display conditions

If insufficient refrigerant protection (See page 39) is implemented 3 times within 30 minutes.

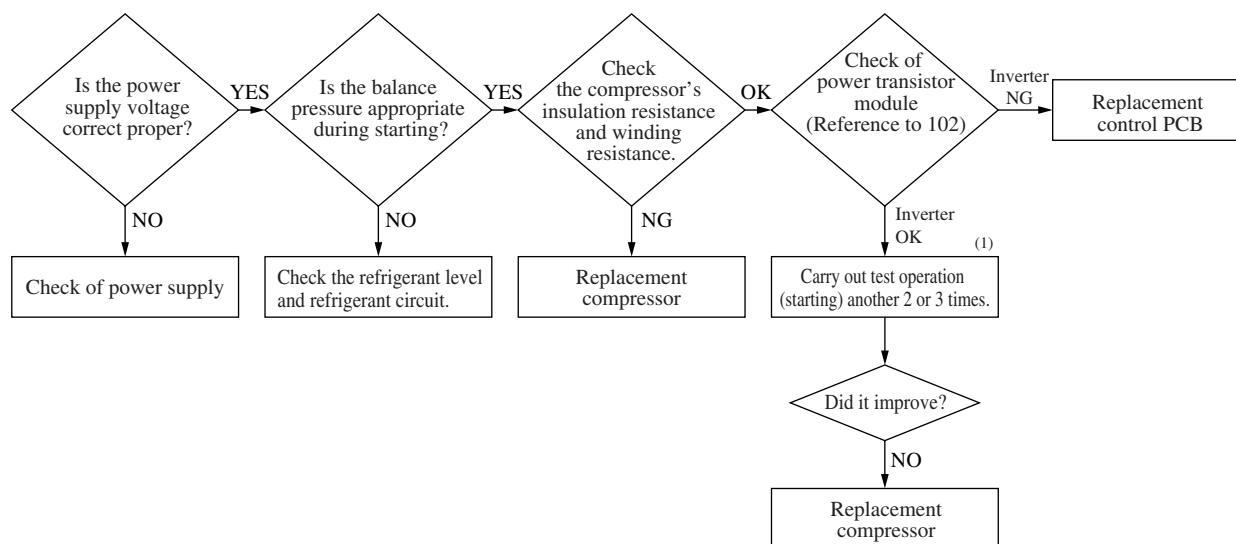


18

Error display : **E59**

[Abnormalities in compressor starting] (Only case of 151, 201 type)

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.

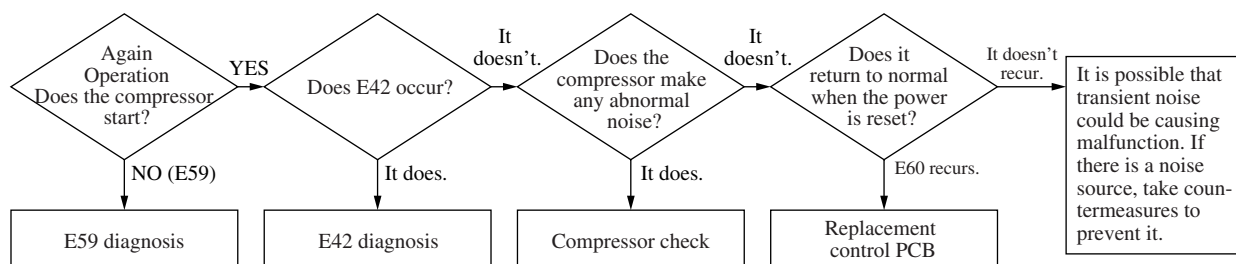
19

Error display : **E60**

[Compressor loader position detection error] (Only case of 151, 201 type)

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.

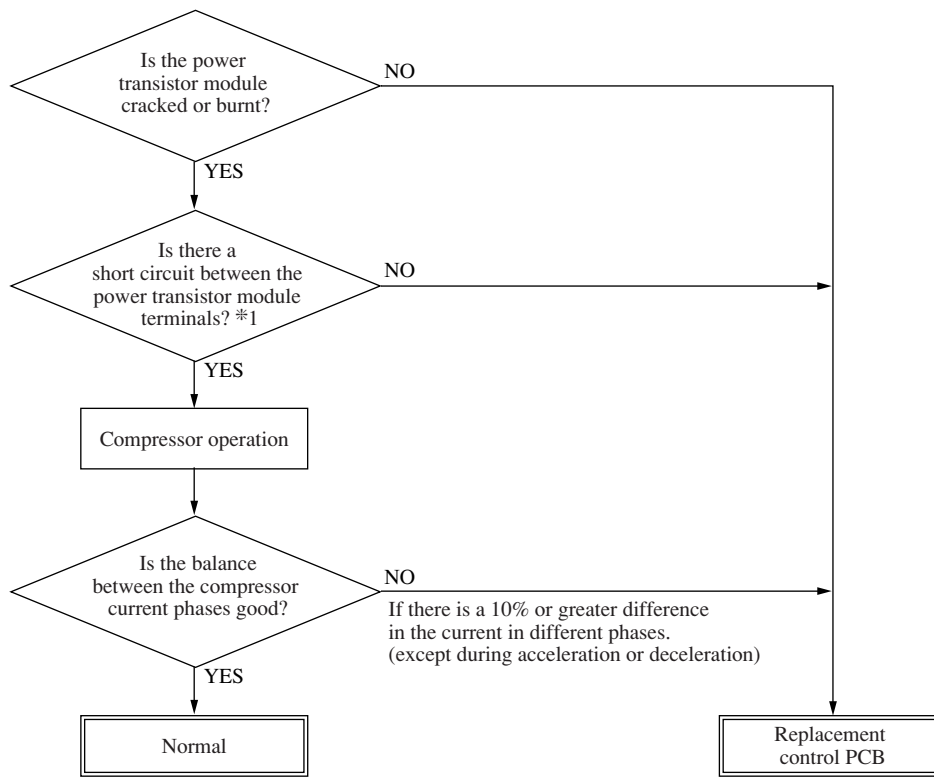


● Display conditions

- (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

Models FDCVA151, 201 only



*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,

U: End of red harness to compressor

N: Power transistor N terminal,

V: End of white harness to compressor

W: End of black harness to compressor

(4) Check abnormal operation data with the 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 27°C
03	RETURN AIR 28°C
04	I/U HEAT EXCH1 6°C
05	I/U HEAT EXCH2 5°C
06	I/U HEAT EXCH3 4°C
07	I/U FAN Hi
08	REQUIRED HERTZ 45Hz
09	SELECTED HERTZ 45Hz
10	EEV 480PULS
11	TOTAL I/U RUN 10500H
21	OUTDOOR 35°C
22	O/U HEAT EXCH1 55°C
23	O/U HEAT EXCH2 56°C
24	COMP HERTZ 85.0Hz
25	Hi PRESSURE 2.0MPa
26	Lo PRESSURE 0.40MPa
27	DISCHARGE 98°C
28	DOME BOTTOM 56°C
29	CT 26A
31	O/U FAN Hi
32	SILENT MODE ON
34	63H1 OFF
35	DEFROST OFF
36	TOTAL COMP RUN 8500H
37	EEV1 480PULS
38	EEV2 480PULS