MHI

TECHNICAL MANUAL

Collection data

Manual No. '03 • FDU -T-077

HIGH STATIC PRESSURE DUCT TYPE PACKAGED AIR-CONDITIONER

(Split system, Air to air heat pump type)

FDUP808HES-S, FDUP1008HES-S

MITSUBISHI HEAVY INDUSTRIES, LTD.

CONTENTS

1 GENERAL INFORMATION

1.1 Specific features

(1) 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%.

(2) The indoor outdoor interconnection signal wiring has been done away with. The microcomputer chip is installed in the indoor 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.

(3) There are only five power lines between the outdoor and indoor unit, As no signal wire is used there is no need to separate the power line from the signal line. One cab tyre cable with 6 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.

(4) The controls are wired residential split air conditioner type remote controller with 6 malfunction modes.

(5) All models have service valves protruding from the outdoor unit for faster flare (liquid side) and brazing (gas side) connection work in the field.

(6) Operation noise has been drastically reduced by increasing the number of high performance fans and by through sound insulation.

(7) When installing, the optimum outside static pressure can be set using the fan controller.

(8) With the height of all equipment made uniform at 360mm and neatly installed into the ceiling, the installation of equipment with different capacities into the same ceiling space is made easy.

1.2 How to read the model name

Example: FDU P 80 8 H ES-S

- ES-S: Applicable power source ... See the specifications
- H: Heat pump type
- 8: Series No.
- 80: Product capacity
- P: R407C models
- FDU: Model name
  - FDU: High static pressure duct type wired remote controller
  - FDC: Outdoor unit

2 SELECTION DATA

2.1 Specification

Model FDUP808HES-S

Item		Model	FDUP808HES-S	
			FDU808-A	**FDCP808HES3**
Nominal cooling capacity(1)		W	**20000**	
Nominal heating capacity(1)		W	**22400**	
Power source			**3 Phase, 380/415V 50Hz**	
Operation data(3)	Cooling input	kW	8.9/9.1	
	Running current (Cooling)	A	16.3/16.6	
	Power factor (Cooling)	%	83/76	
	Heating input	kW	7.9/8.0	
	Running current (Heating)	A	13.5/13.7	
	Power factor (Heating)	%	89/81	
	Inrush current (L.R.A)	A	99	
	Noise level	dB(A)	48	58
Exterior dimensions Height × Width × Depth		**mm**	**360 × 1570 × 830**	**1450 × 1350 × 600**
Net weight		**kg**	**92**	**195**
Refrigerant equipment Compressor type & Q'ty			–	**CB90H × 1**
	Motor	kW	–	**6.5**
	Starting method		–	Line starting
Heat exchanger			Louver fines & inner grooved tubing	Slitted fines & bare tubing
Refrigerant control			Capillary tube	Capillary tube
Refrigerant			**R407C**	
Quantity		**kg**	–	**4.95 [Pre-charged up to the piping length of 5m]**
Refrigerant oil		ℓ	–	**4.4 (MA32R)**
Defrost control			MC controlled de-icer	
High pressure control			High pressure switch	
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**	**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	–	70 (Crank case heater)
Operation control Operation switch			Remote control switch (Optional: RCD-H-E)	– (Indoor unit side)
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor High pressure protection switch
Installation data Refrigerant piping size		**mm (in)**	**Liquid line: ϕ12.7 (1/2″) Gas line: ϕ25.4 (1″)**	
Connecting method			**Brazing**	**Liquid line: Flare Gas line: Brazing**
Drain hose			(Connectable with VP25)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit.	
Optional parts			–	

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

Item / Operation	Indoor air temperature		Outdoor air temperature		Standards
	DB	WB	DB	WB	
Cooling	27˚C	19˚C	35˚C	24˚C	ISO-T1, JIS B8616
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 380V 50Hz/415V 50Hz respectively.

Model FDUP1008HES-S

Item		Model	FDUP1008HES-S	
			FDU1008-A	**FDCP1008HES3**
Nominal cooling capacity(1)		W	**25000**	
Nominal heating capacity(1)		W	**28000**	
Power source			**3 Phase, 380/415V 50Hz**	
Operation data(3)	Cooling input	kW	13.0/13.2	
	Running current (Cooling)	A	21.9/21.1	
	Power factor (Cooling)	%	90/87	
	Heating input	kW	11.8/11.9	
	Running current (Heating)	A	20.3/19.6	
	Power factor (Heating)	%	88/85	
	Inrush current (L.R.A)	A	154	
	Noise level	dB(A)	49	58
Exterior dimensions Height × Width × Depth		**mm**	**360 × 1570 × 830**	**1450 × 1350 × 600**
Net weight		**kg**	**92**	**205**
Refrigerant equipment Compressor type & Q'ty			–	**CB125H × 1**
	Motor	kW	–	**9.0**
	Starting method		–	Line starting
Heat exchanger			Louver fines & inner grooved tubing	Slitted fines & bare tubing
Refrigerant control			Capillary tube	Capillary tube
Refrigerant			**R407C**	
Quantity		**kg**	–	**7.1 [Pre-charged up to the piping length of 5m]**
Refrigerant oil		ℓ	–	**4.4 (MA32R)**
Defrost control			MC controlled de-icer	
High pressure control			High pressure switch	
Air handling equipment Fan type & Q'ty			Multiblade centrifugal fan × 4	Propeller fan × 2
	Motor	W	230 × 1, 270 × 1	100 × 2
	Starting method		Line starting	Line starting
Air flow (Standard)		**CMM**	**68**	**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	–	70 (Crank case heater)
Operation control Operation switch			Remote control switch (Optional: RCD-H-E)	– (Indoor unit side)
Room temperature control			Thermostat by electronics	–
Safety equipment			Internal thermostat for fan motor. Frost protection thermostat.	Internal thermostat for fan motor High pressure protection switch
Installation data Refrigerant piping size		**mm (in)**	**Liquid line: ϕ15.88 (5/8″) Gas line: ϕ28.58 (1 1/8″)**	
Connecting method			**Brazing**	**Liquid line: Flare Gas line: Brazing**
Drain hose			(Connectable with VP25)	–
Insulation for piping			Necessary (both Liquid & Gas lines)	
Accessories			Mounting kit.	
Optional parts			–	

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

Item / Operation	Indoor air temperature DB	Indoor air temperature WB	Outdoor air temperature DB	Outdoor air temperature WB	Standards
Cooling	27˚C	19˚C	35˚C	24˚C	ISO-T1, JIS B8616
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 380V 50Hz/415V 50Hz respectively.

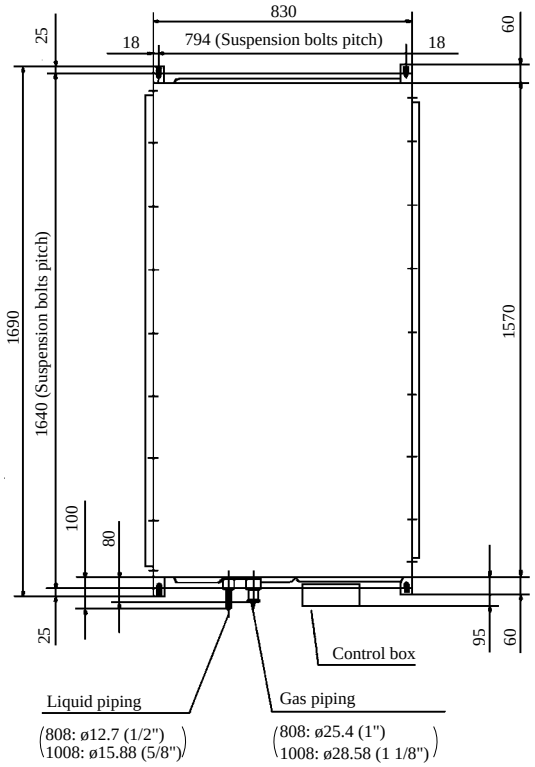
2.2 Range of usage & limitations

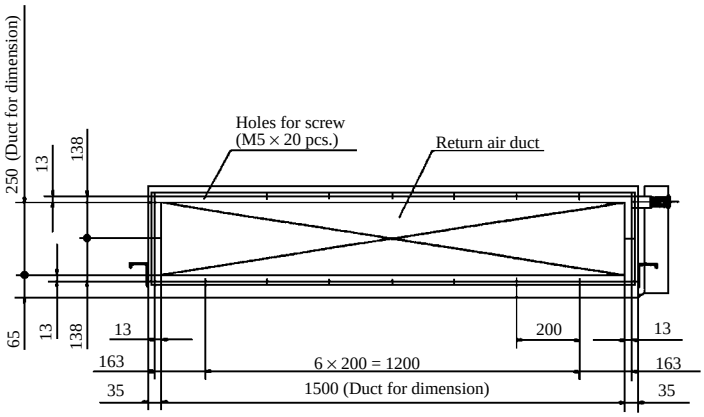
Item \ Models	All models
Indoor return air temperature (Upper, lower limits)	Refer to the selection chart
Outdoor air temperature (Upper, lower limits)	
Indoor unit atmosphere (behind ceiling) temperature and humidity	Dew point temperature: 28˚C or less, relative humidity: 80% or less
Refrigerant line (one way) length	**Max. 50m**
Vertical height difference between outdoor unit and indoor unit	**Max. 30m(Outdoor unit is higher)** **Max. 15m(Outdoor unit is lower)**
Power source voltage	Rating ± 10%
Voltage at starting	Min. 85% of rating
Frequency of ON-OFF cycle	**Max. 10 times/h**
ON and OFF interval	**Max. 3 minutes**

2.3 Exterior dimensions

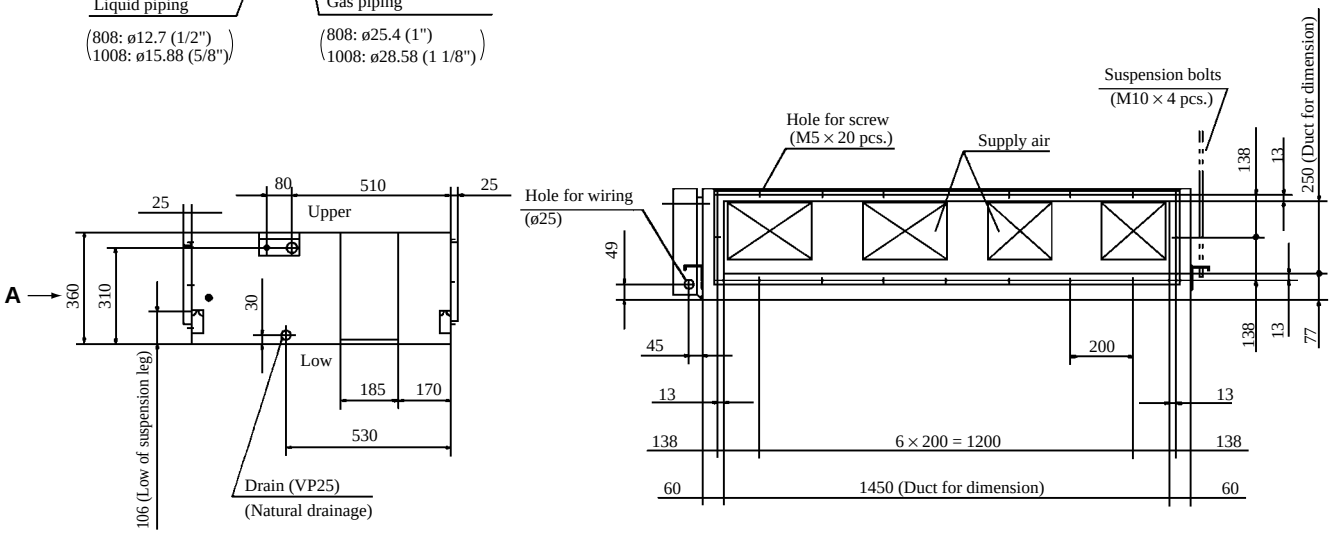
(1) Indoor unit

Models FDU808-A, 1008-A

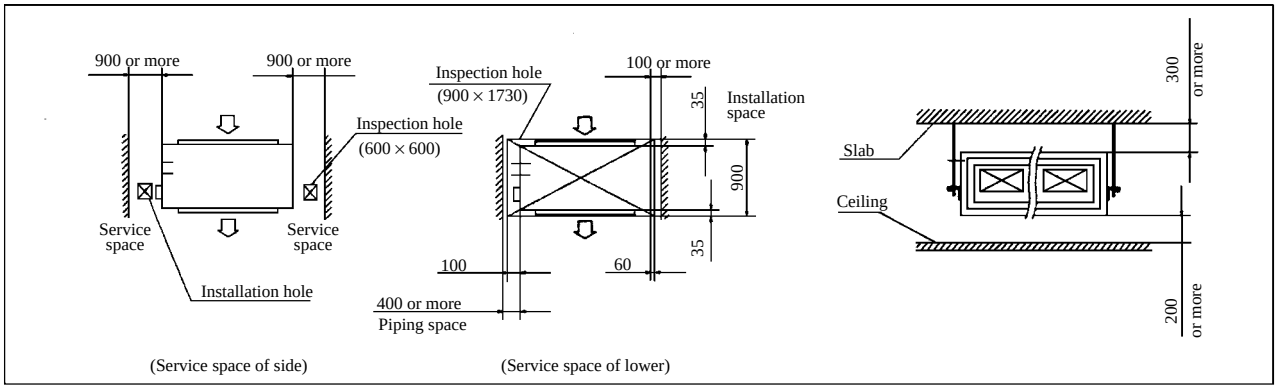




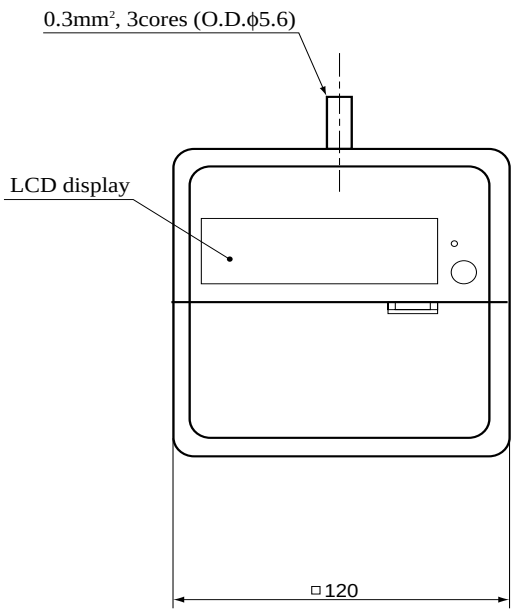
VIEW A

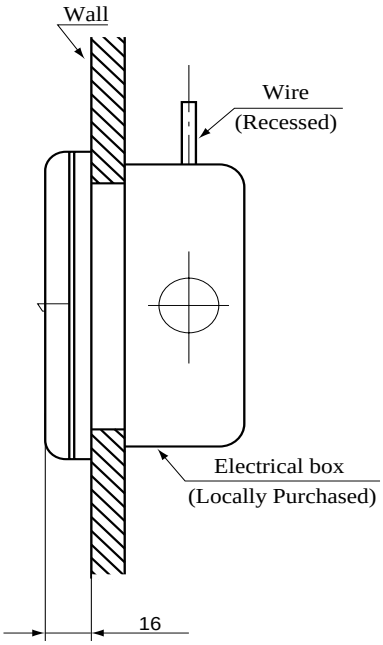


Space for installation and service

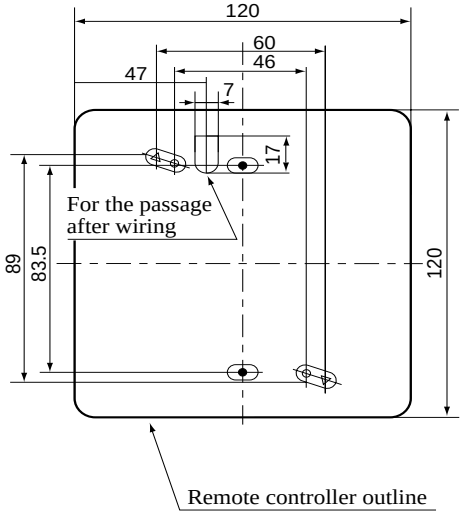


(2) Remote controller (Optional parts)





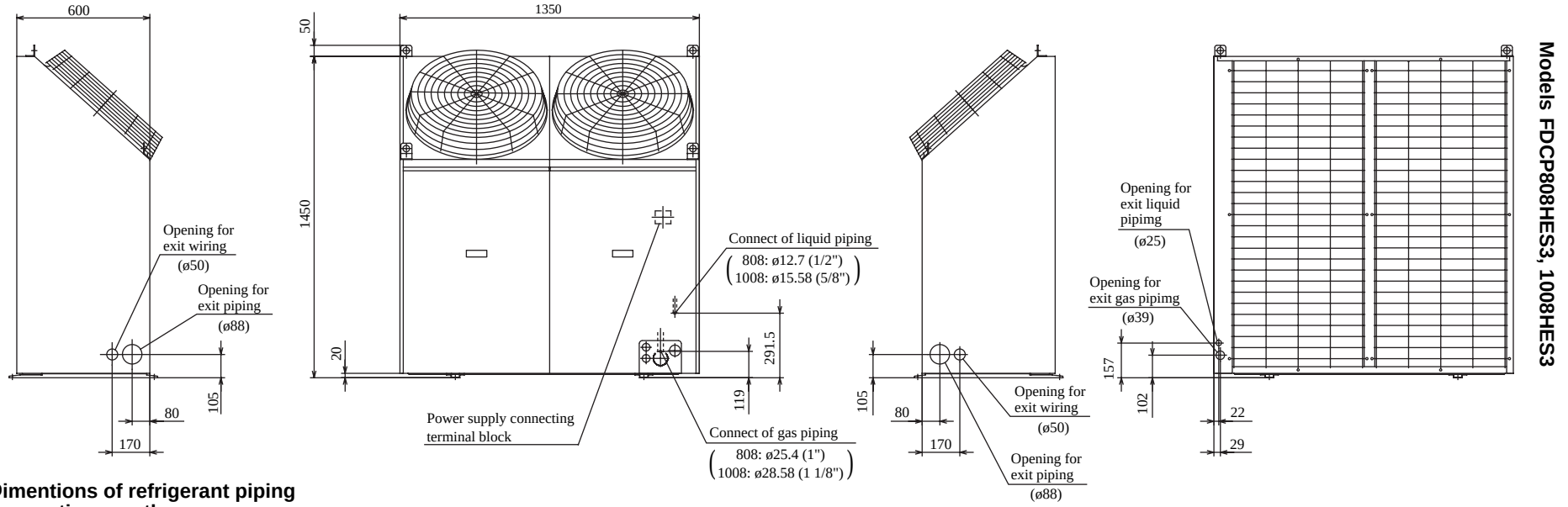
Remote controller mounting dimensions



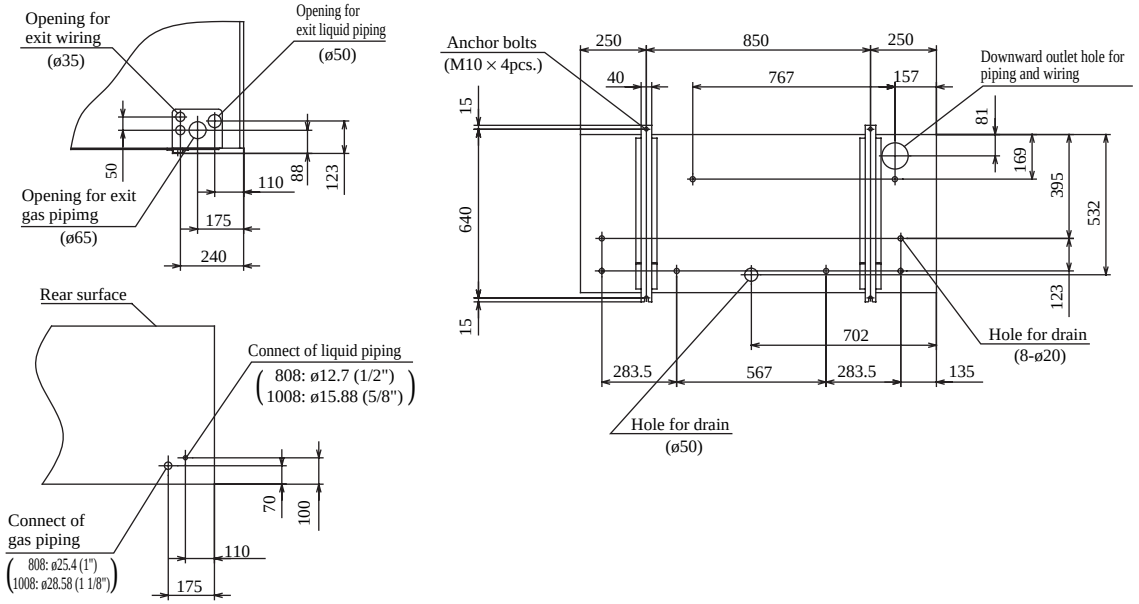
Notes (1) Allowable length of remote controller cable: 600 m

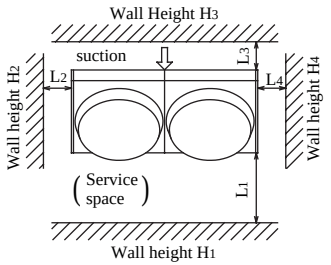
Allowable rang of wire thickness and length

Standard Within	0.3 mm²	× Within 100 m
	0.5 mm²	× Within 200 m
	0.75 mm²	× Within 300 m
	1.25 mm²	× Within 400 m
	2 mm²	× Within 600 m



Dimentions of refrigerant piping connecting mouth (Front)





(Unit:mm)

Installation example / Dimensions	I	II	III
L_1	Open	Open	500
L_2	0	0	0
L_3	300	300	300
L_4	Open	500	0
H_1	——	——	1000 or less
H_2	Not limited	Not limited	Not limited
H_3	Not limited	Not limited	700 or less
H_4	——	Not limited	Not limited

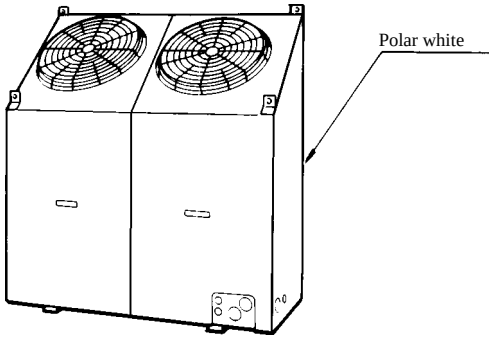
Notes (1) Make sure to secure the unit with anchor bolts.
(2) When the strong wind blows, place the unit so that discharge outlet faces the wind direction with right angle.
(3) Make sure to allow the space of 1 m or more above the unit.
(4) Connect the refrigerant piping (both gas side and liquid side) at local site.
(5) If the wall height H_1, H_3 of installation example III exceeds the limited value, make sure the value of L_1, L_3 are to be as follows.
$L_1 = H_1 - 500$
$L_3 = 300 + (H_3 - 700) / 2$, however, if L_3 exceeds 600, there is no limit for the wall height H_3.

2.4 Exterior appearance

(1) Indoor unit ·····Zinc steel plate

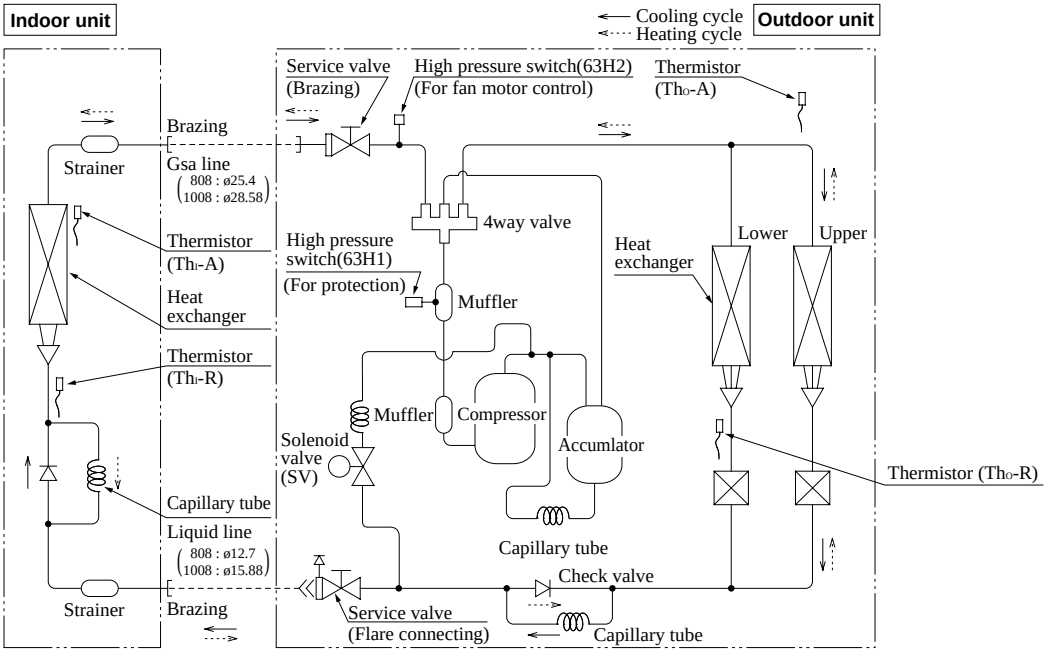
(2) Outdoor unit

Models FDCP808HES3,1008HES3



2.5 Pipng system

Models FDUP808HES-S,1008HES-S



Preset point of the protective devices

Parts name	Mark	Equipped unt	All models
Thermistor (for protection over-loading in heating)	**Thi-R**	Indoor unit	OFF68°C ON61°C
Thermistor (for frost prevention)			OFF2.5°C ON10°C
Thermistor (for detecting heat exchange temp.)	**Tho-R**	Outdoor unit	OFF70°C ON60°C
High pressure switch (for controlling FMo)	**63H2**	Outdoor unit	OFF 2.79 MPa ON 2.26 MPa
High pressure switch (for Protection)	**63H1**	Outdoor unit	OFF 3.24 MPa ON 2.65 MPa

2.6 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

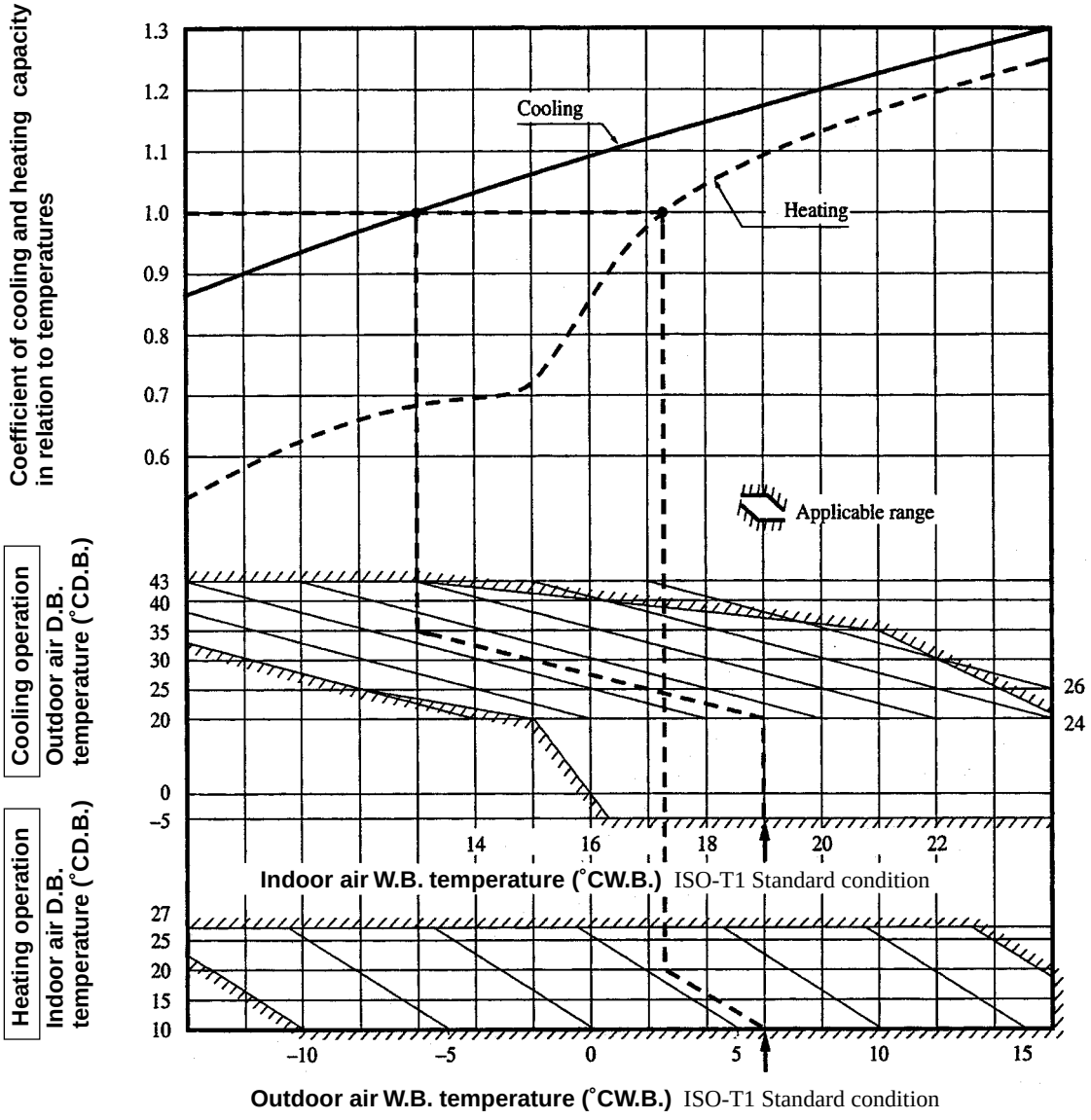


Table of bypass factor

Item \ Model		FDUP808HES-S	FDUP1008HES-S
Air flow	Upper limit	0.015	0.032
	Standard	0.033	0.050
	Lower limit	0.049	0.060

(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.

Equivalent piping length(1) m	7.5	10	15	20	25	30	35	40	45	50	55
Heating	1.0	1.0	1.0	1.0	1.0	0.998	0.998	0.99	0.993	0.988	0.988
Cooling	1.0	0.995	0.985	0.975	0.965	0.955	0.945	0.935	0.925	0.915	0.905

Note (1) Equivalent piping length can be obtained by calculating as follows.

808 [ø25.4 (1")]: Equivalent piping length = Real piping length + (0.40 × Number of bends in piping)

1008 [ø28.58 (1'/8")]: Equivalent piping length = Real piping length + (0.45 × Number of bends in piping)

[Equivalent piping length < Limitation length of piping + 5 m]

(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	5 m	10 m	15 m	20m	25 m	30 m
Adjustment coefficient	0.01	0.02	0.03	0.04	0.05	0.06

Piping length limitations

Item \ Model	All models
Max. one way piping length	50 m
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 capacity

Example: The net cooling capacity of the model FDUP808HES-S with the air flow "High", the piping length of 30 m, the outdoor unit located 5 m lower than the indoor unit, indoor wet-bulb temperature at 19.0°C and outdoor dry-bulb temperature 35°C is

Net cooling capacity = 20000 × 1.00 × (0.955-0.01) × 1.0 = **18900 W**

- 20000: FDUP808HES-S
- 1.00: Air flow "High"
- (0.955-0.01): Length 30 m. Height difference 5 m
- 1.0: Factor by air temperatures

2.7 Characteristics of fan

How to interpret the blower characteristics table

Example ● What is the Fan Controller's Volume Number setting if, at the high operation speed of FDU808-A, 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 " ⓐ -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".

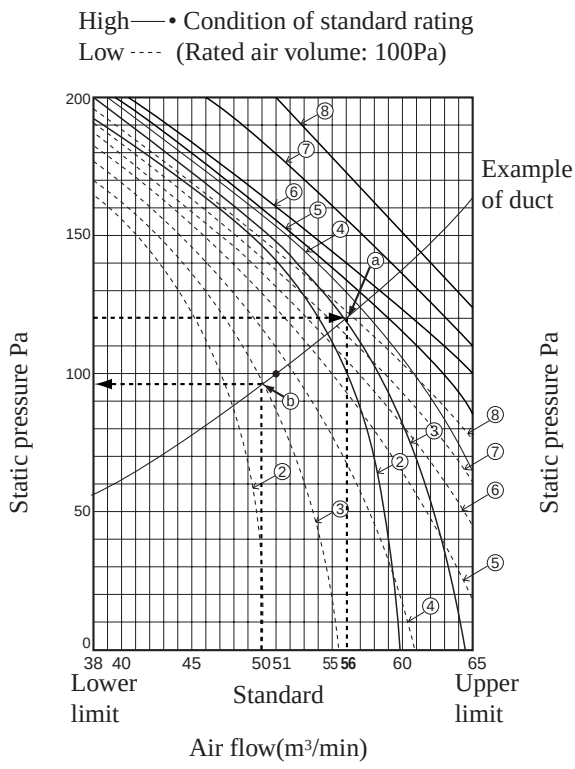
● In this situation, a condition of 50m³/min airflow volume at 96Pa outside static pressure can be predicated at Low Tap and it can be concluded that operation is possible.

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

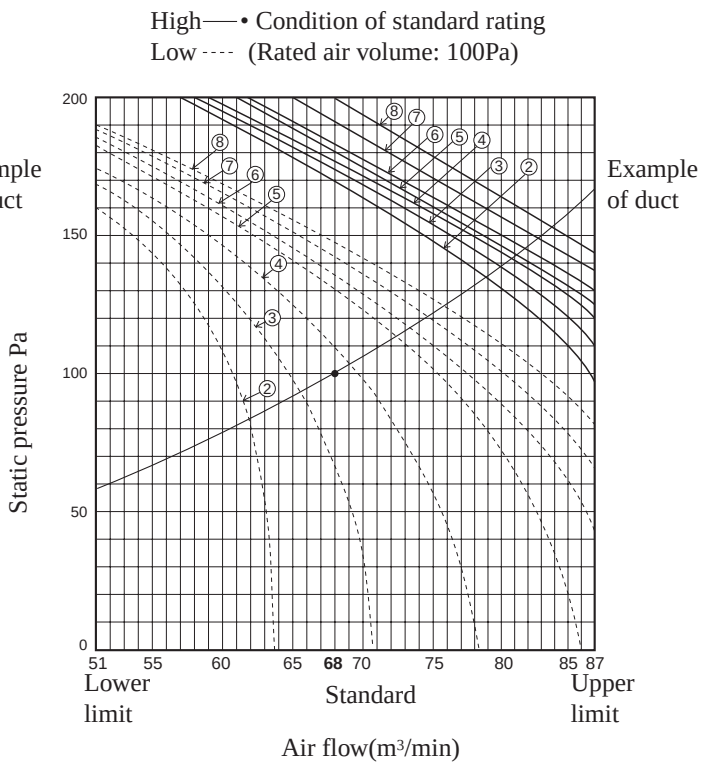
Notes (1) Circled values in the Special Feature Table indicate Fan Controller Volume Numbers. Volume Numbers with no entry are outside the Feasible Operation Airflow Volume Range and therefore operation is not possible.

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

Model FDU808-A



Model FDU1008-A



2.8 Noise level

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

Ambient air temperature:

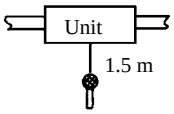
Indoor unit 27°C DB, 19°C WB

Outdoor unit 35°C DB,

Indoor unit

Measured based on JIS B 8616

Mike position as below



Outdoor unit

Measured based on JIS B 8616

Mike position: Front height is 1 meter

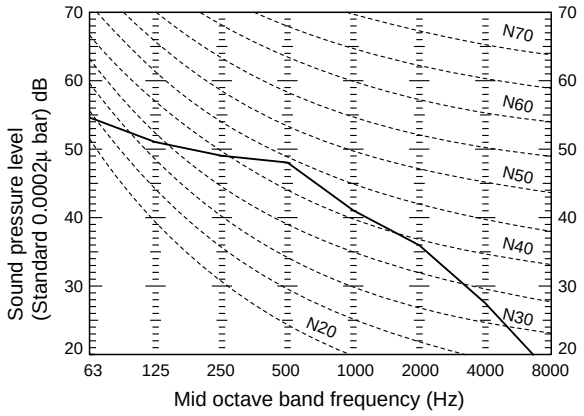
(2) The data in the chart are measured in an unechonic room.

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

(1) Indoor unit

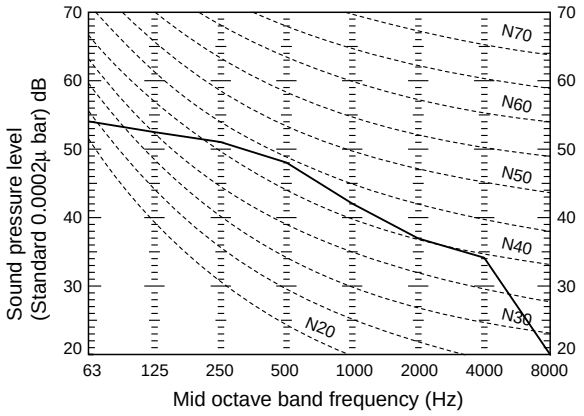
Model FDU808-A

Noise level 48dB (A)



Model FDU1008-A

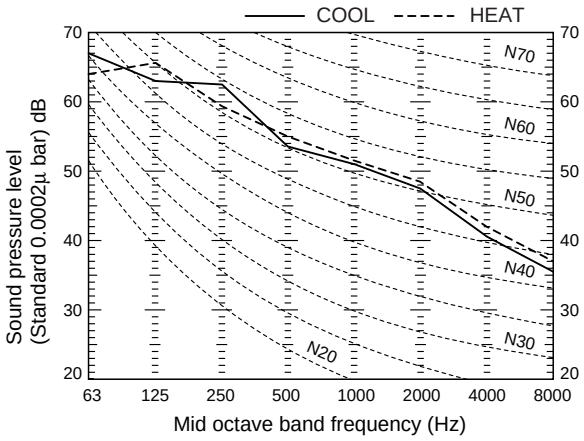
Noise level 49dB (A)



(2) Outdoor unit

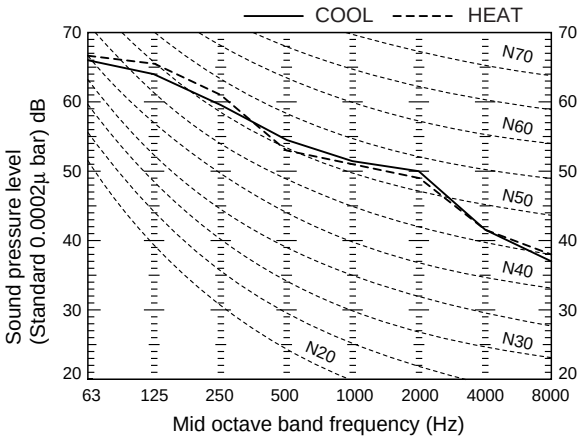
Model FDCP808HES3

Noise level 58dB (A)



Model FDCP1008HES3

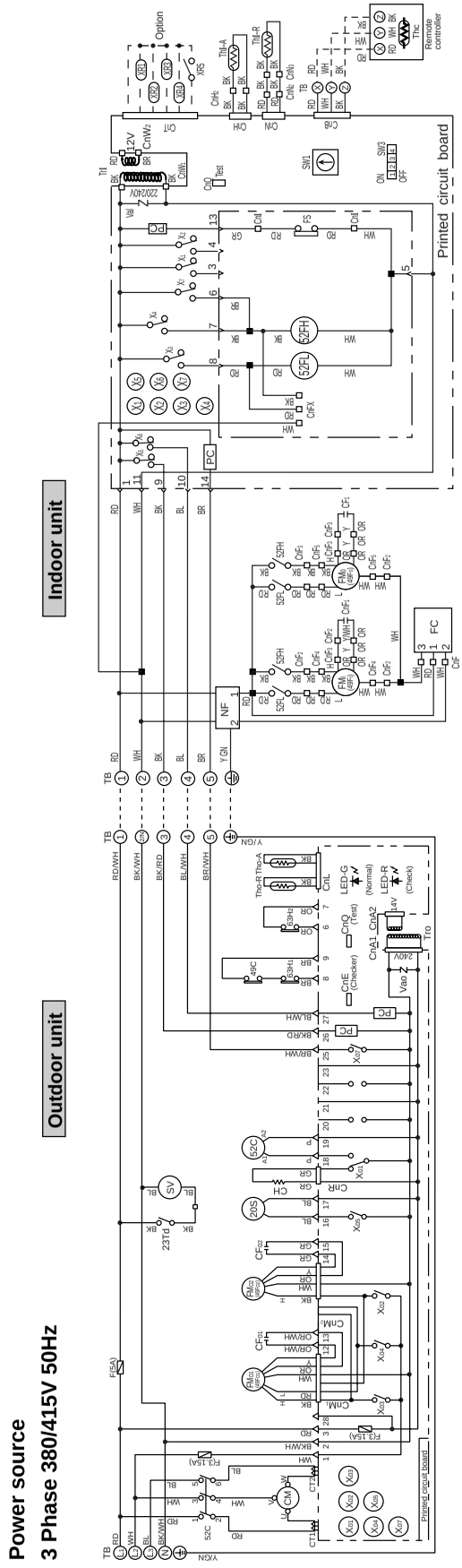
Noise level 58dB (A)



3 ELECTRICAL DATA

3.1 Electrical wiring

Models FDUP808HES-S,1008HES-S



Color mark

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

Meaning of marks

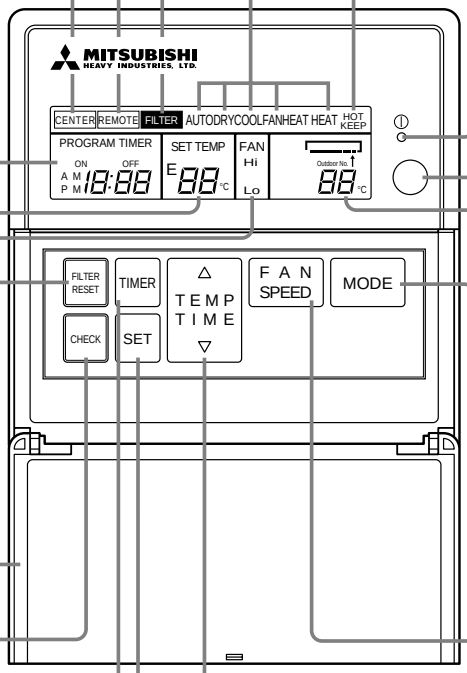
Mark	Parts name	Mark	Parts name
CF$_{1,2}$	Capacitor for FM$_I$	**Tr**	Transformer (Indoor unit)
CF$_{O1,2}$	Capacitor for FM$_O$	**Tro**	Transformer (Outdoor unit)
CH	Crankcase heater	**Val, Vao**	Varistor
CM	Compressor motor	**23Td**	Themostat
CnA ~ Z	Connector (□ mark)	**20S**	4-way valve solenoid
CT$_{1,2}$	Corrent sensor	**49F$_I$**	Internal thermostat for FM$_I$
F	Fuse	**49F$_{O1,2}$**	Internal thermostat for FM$_O$
FM$_{I1,2}$	Fan motor (Indoor unit)	**49C**	Internal thermostat for CM
FM$_{O1,2}$	Fan motor (Outdoor unit)	**52C**	Magnetic contactor for CM
FC	Fan controller	**52FL,FH**	Riley for FM$_{I1,2}$
FS	Float switch	**X1~7**	Auxiliary relay
NF	Noise filter	**X$_{01-07}$**	Auxiliary relay
PC	Photo coupler	**63H$_1$**	High pressure switch (for protection)
SW$_3$	Changeover switch	**63H$_2$**	High pressure switch (for control)
TB	Terminal block (○ mark)	**▽**	Terminal (F)
Thi-A	Thermistor	**■**	Connector
Thi-R	Thermistor	**LED-G**	Indication lamp (Green)
Tho-A	Thermistor	**LED-R**	Indication lamp (Red)
Tho-R	Thermistor	**SV**	Solenoid valve (for control)

4 OUTLINE OF OPERATION CONTROL BY MICROCOMPUTER

(1) Remote controller

Panel shown below will appear if you open the cover. All contents of display on the LCD are indicated simultaneously for the purpose of explanation.

Pull the knob on the cover to this side to open it downward.



Filter sign
When this sign is indicated, clean the filter.

Remote display
This is displayed when the unit is controlled with an individual controller during normal operation. (Also displayed when the air conditioner is stopped.)

Central display
This is displayed when the unit is controlled with the optional central console.

Timer operation display
Contents of timer operation are displayed. (Also displayed when the air conditioner is stopped.)

Setting temperature display
Displays the temperature that has been set.

Fan speed display
Displays the fan speed that has been set.

Filter reset switch
Use this switch to reset (erase) the filter sign display.
(Press the switch after cleaning the air filter.)

Cover

Inspection switch
Use this switch when servicing the unit.

Timer switch
Use this switch when selecting contents of timer operation.

Set switch
Use this switch to set a time for the timer.

Operation mode display
Displays the operation mode that has been selected.

Heating preparation display

Operation/ Inspection indicator lamp
During operation: Green lamp flashes.
In case of error: Red lamp flashes.

On/Off switch
Use this switch to start or stop the air conditioner.First push on the switch starts the unit and second push stops it. (The switch can be operated without opening the cover.)

Return air temperature display
Displays the return air temperature.

Note

Indicated value may be different from actual reading on a thermometer or other instrument but this is not necessarily an error.

Mode switch
Use this switch to select operation modes.

Fan speed switch
Use this switch to set a fan speed.

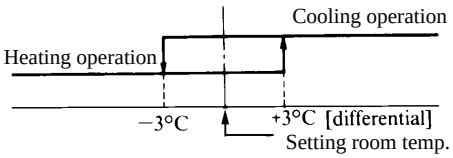
Temperature/ Time setting switch
Use this switch to set the room temperature or time on the timer.

(2) Outline of microcomputer control function

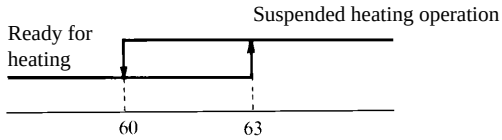
(a) Operation control function by the indoor controller

1) 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.



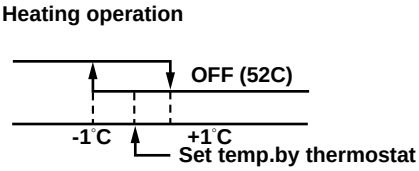
Room temp. (detected at Thı-A) [deg]



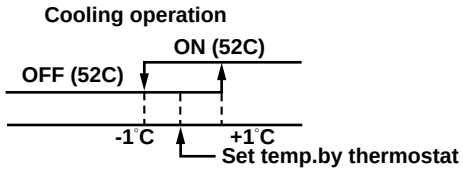
Indoor heat exchanger temperature (˚C)

Notes (1) During the automatic switching of cooling/heating the room temperature is controlled based on the setting of room temperature (DIFF:±}1 deg)
(2) If the temperature of indoor heat exchanger rises beyond 63˚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.

2) Room temperature control (Differential of thermostat)



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



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

3) Control parts operation during cooling and heating

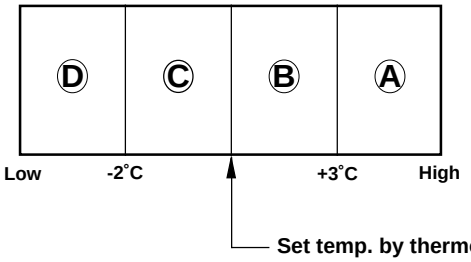
Function / Control part	Cooling		Fan	Heating				Dry	
	Thermostat ON	Thermostat OFF	–	Thermostat ON	Thermostat OFF	Defrost	HOT START	Thermostat ON	Thermostat OFF
Compressor	○	×	×	○	×	○	○	○	×
4-way valve	×	×	×	○	×	×	○	×	×
Outdoor fan	○	×	×	○	×	×	○	○	×
Indoor fan	○		○	○/×				○	

Note(1) ○ :ON
× :OFF
○/× :According to control other than temperature control.

4) Dehumidifying operation ("THERMAL DRY")

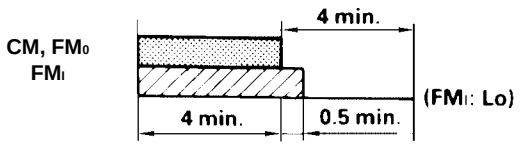
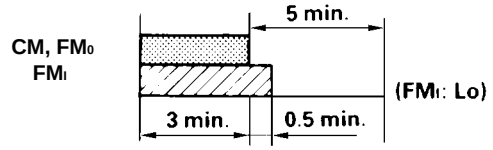
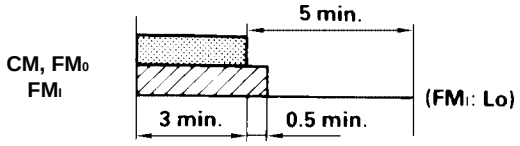
The compressor, the indoor fan motor and the outdoor fan motor are operated intermittently under thermistor (ThI-A) control according to the appropriate operation block, to provide cooling operation for the dehumidifying.

Operation block



Pattern of operation

CM, FM_O: ON FM_I: ON

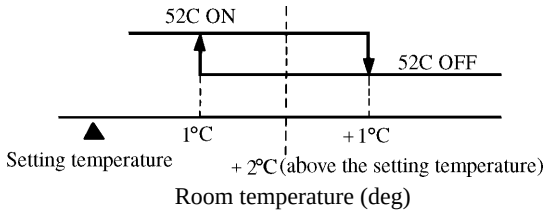
Operation block	Thermal drying starting (for 8 or 16 minutes after operation started)	Normal thermal dry operation (after completion of thermal drying)
Ⓐ	(16 minutes)	(8 minutes) Continuous cooling operation (FM_I:Lo)
Ⓑ	• Cooling operation (Thermostat ON) • Indoor fan operating with the setting air flow. • When the thermostat is turned off, the indoor fan operates for 30 seconds with the Lo operation in the wind blowing mode and then stops.	(8 minutes) 
Ⓒ	(8 minutes) 	(8 minutes) 
Ⓓ		(8 minutes) All stoppage

Notes (1)**Operation block ⒶⒷ : Normal cooling operation for 16 minutes after operation is started.**
Operation stops by thermostat when the set temperature is reached.
After 16 minutes, normal thermal drying operation starts.
Operation block ⒸⒹ : Operation as above is performed for 8 minutes.
After 8 minutes, normal thermal drying operation starts.

(2)**In normal operation, the temperature is checked at 8 minute intervals** after normal thermal drying operation is started, **to determine which operation block is to the selected.**
Operation block Ⓐ thermal drying is carried out if the thermostat set temperature is constant.

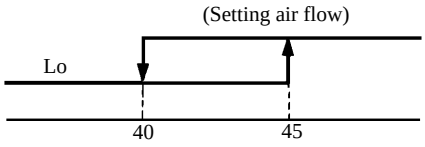
5) Hot spurt

In the hot spurt mode, the control is conducted at the level 2 ˚C higher than the setting temperature at the start of heating operation. The hot spurt is canceled either after the initial thermostat OFF, when the indoor heat exchanger temperature reaches 61˚C or 60 minutes after the start of the mode.



6) 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 SW3-4 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.



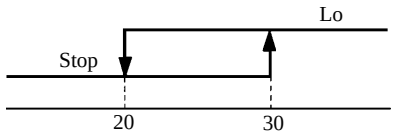
Note (1) After the thermostat is reset, it returns to the hot start control.

7) Hot start (Cold draft prevention during heating)

1) If the indoor heat exchanger temperature is lower than 30˚C when the heating operation has started, the following indoor blower control is performed.
   (1) In case of the thermostat off condition: Lo operation
   (2) In case of the thermostat on condition : Stop
   (3) If the indoor heat exchanger temperature exceeds 30˚C or 7 minutes after the beginning of hot start, the hot start terminates and it returns to the setting airflow of the blower.
2) If the indoor heat exchanger temperature is lower than 30˚C when the unit is heating under the thermo-ON condition, the indoor fan operates in the Lo mode. As the temperature rises higher than 30 ˚C or 7 minutes after the beginning of hot start, the hot start terminates and it returns to the setting air flow.

8) Indoor fan control during defrost operation

1) The indoor fan operation is changed from the setting airflow to the Lo operation 40 seconds before the start of defrost operation (when the defrost thermostat is turned ON) and stops if the indoor heat exchanger temperature drops below 20˚C.
2) After the stop as described in 1)-above, the control will be conducted as illustrated below depending on the indoor heat exchanger temperature.



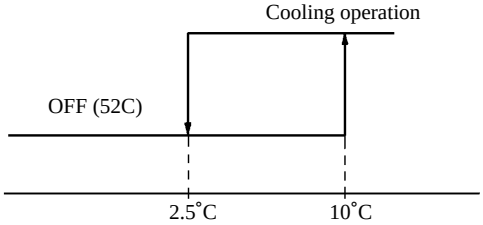
Indoor heat exchanger temperature(˚C)

3) If the indoor heat exchanger temperature rises beyond 30˚C of 7 minutes after the end of defrosting, the indoor fan control related to the defrosting is completed.

9) Frost prevention during cooling (For indoor heat exchanger)

In order to prevent the frosting during cooling operation, the temperature of indoor unit heat exchanger (detected by Th_I-R) is checked 9 min, after the compressor operation start and the unit operation.

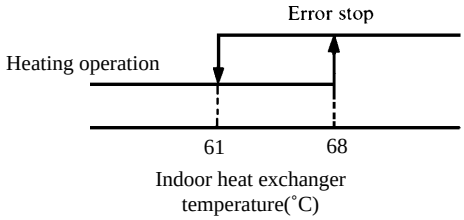
This cycle is not operated for 9 min. after the resetting of this frost prevention mechanism.



Indoor heat exchanger (Th_I-R)

10) Overload protection during heating

If an overload condition has been detected by the indoor heat exchanger temperature and it has continued for more than 2 seconds during heating, the compressor is stopped. The compressor is started after a delay of 3 minutes and, if the overload condition is detected again whithin 60 minutes after the initial detection, the compressor is stopped with the error stop.



11) Automatic restart control

If there is interruption of power while the unit is operating, the unit operates after power restoration under the same condition as prior to the power interruption. However the compressor will only be able to start three minutes after the power restoration. Furthermore, if the timer was operating prior to the power interruption, the unit remains stopped even after the restoration of service.

Note (1) Becomes invalid if the dip switch SW3-1 on the indoor PCB is at OFF (SW3-1 is set at ON when unit is shipped from the factory).

12) Thermistor disconnection detection control

a) Detection of indoor return air thermistor disconnection

- If there is detection of a disconnection on the return air thermistor in 10 seconds after turning the power ON, the compressor is stopped. If there is a second disconnection on the return air thermistor detected within 60 minutes, there is emergency stop.

Note (1) If the first disconnection on the return air thermistor is detected for a period of 6 continuous minutes, there is emergency stop. If there is no detection of a second disconnection on the return air thermistor whithin 60 minutes, the first detection becomes invalid.

b) Detection of heat exchanger thermistor disconnection

- If a disconnection is detected on the heat exchanger thermistor in 20 seconds after the compressor has been operating for 2 minutes, the compressor is stopped. If a second disconnection on the heat exchanger thermistor line is detected within 60 minutes, there is emergency stop.

Note (1) If the first disconnection on the heat exchanger thermistor is detected for a period 6 continuous minutes, there is emergency stop.
If there is no detection of second disconnection on the heat exchanger thermistor within 60 minutes, the first detection becomes invalid.

13) Low voltage guard control

If the power source voltage remains at a value of 80% of rating or less for 3 continuous minutes during operation of the compressor, the compressor stops (52C OFF). Furthermore, if the power source voltage remains at a figure of 15% of rating or greater after 3 minutes have elapsed since stopping the compressor, there is restarting of the compressor (52C ON). Moreover, during stoppage of the compressor.

Note (1) When starting the compressor for the first time after turning the operational switch ON, there is starting regardless of the power source voltage. Furthermore, if dip switch SW 3-2 on the internal substrate is OFF, this becomes invalid. (Switch SW 3-2 is set to ON upon shipment from the factory).

14) Refrigerant shortage error

When 52C is ON when operating in cooling (including automatic cooling), if heat exchanger thermistor temperature for the indoor unit (Th_1 -R) does not drop to 25 °C or less for 40 minutes 5 minutes or more after the start of operation, an abnormal stop due to insufficient refrigerant is performed.

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

- **External control (remote display) output**

Following output connectors (CNT) are provided on the printed circuit board of indoor unit.

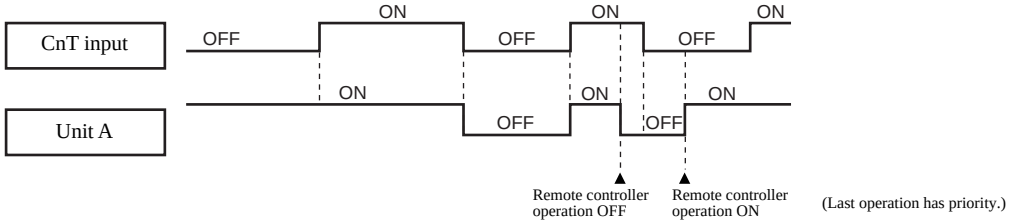
- Operation output: Power to engage DC 12V relay (provided by the customer) is outputted during operation.
- Heating output: Power to engage DC 12V relay (provided by the customer) is outputted during the heating operation.
- Compressor ON output: Power to engage DC 12V relay (provided by the customer) 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.

- **Control of input signal**

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

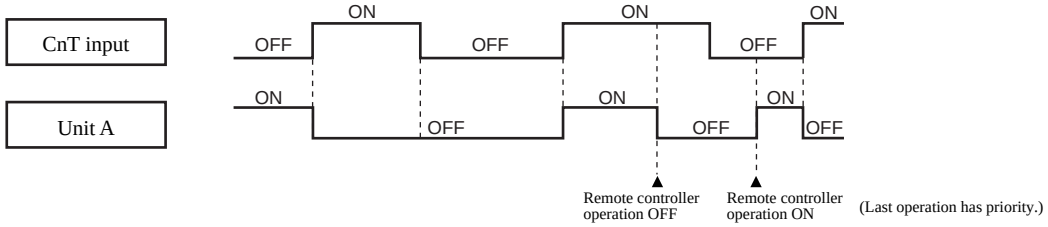
Control of input signal (switch input, timer input) connectors (CNT) are provided on the printed circuit board of the indoor unit. However, when the operation of air conditioner is under the Center Mode, the remote control by CnT is invalid.

- At shipping from factory (SW5-2 [J5] 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



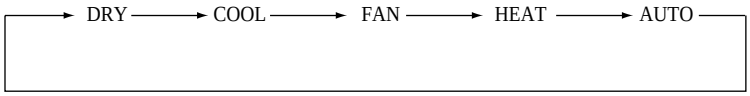
- When SW5-2 (J5) on the PCB of indoor unit is turned on at the field.

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



(b) Operation control function by the wired remote controller

(i) The following is the sequence of operation for the remote controller operation mode switch.



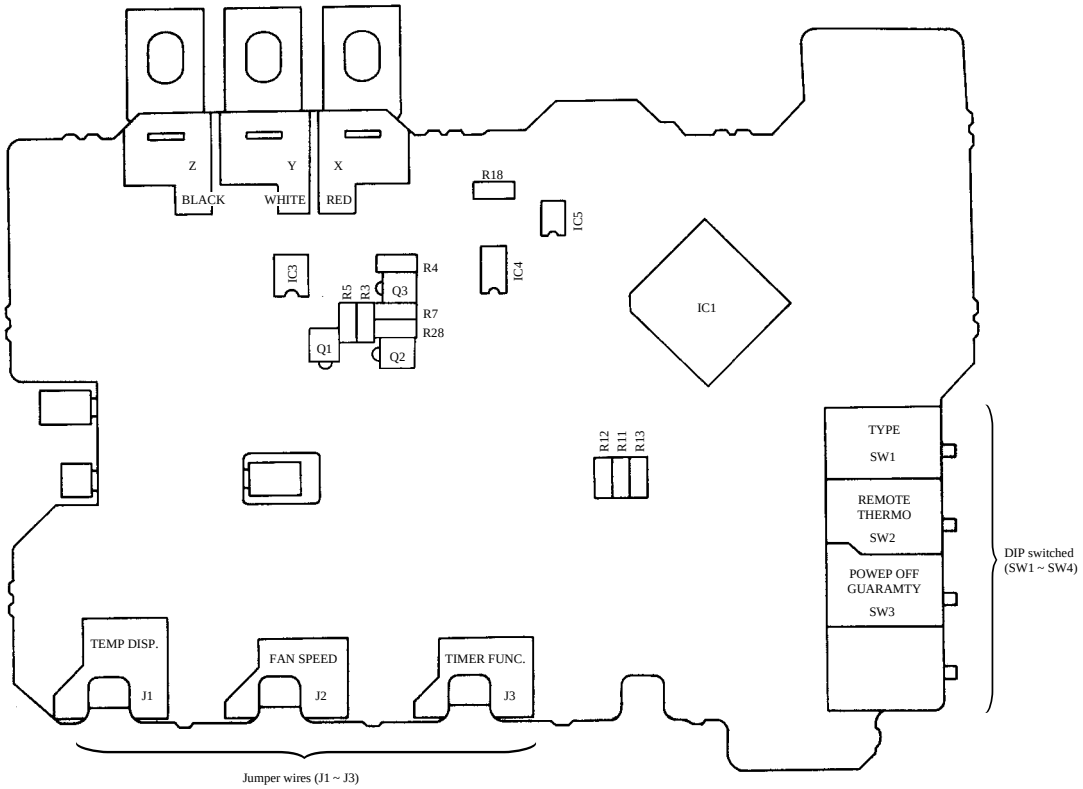
(ii) CPU reset

This functions when the " inspection " and " filter reset switch " on the remote controller are pushed simultaneously. It operates in the same manner as the power reset.

(iii) Power outage compensation function.

- This is enabled by setting dip switch SW3 on the remote control circuit board to ON.
- It records the normally used remote control modes. Once power has been restored, it restarts operation by using the contents of the memory. Note that the stop positions for auto swing and the timer mode are cancelled.

Parts layout on the remote controller PCB



• Function of DIP switched

Switch		Function
SW1	ON	Cooling only type
	OFF	Heat pump type
SW2	ON	Remote control sensor - Enabled
	OFF	Remote control sensor - Disabled
SW3	ON	Power outage compensation - ON
	OFF	Power outage compensation - OFF

• Function of Jumper wires

Switch		Function
J1	Wich	Inlet temperature display - Enabled
	None (1)	Inlet temperature display - Disabled
J2	Wich	Fan display - 3 speeds
	None (1)	Fan display - 2 speeds
J3	Wich	Timer function - Enabled (Normal)
	None (1)	Timer function - Disabled

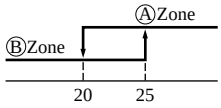
Note (1) 'None' means that jumper wire is not provided on the PCB or the connection ic cut.

(c) Operation control function by the outdoor controller

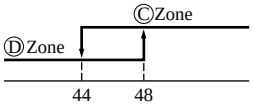
1) Control for outdoor unit fan

a) Cooling Operation

The speed of the fan for the outdoor unit is controlled by the temperature of the heat exchanger (Tho-R detection) and the outdoor air temperature (Tho-A).



Outdoor air temperature (°C)



Heat exchanger temperature (°C)

Fan motor			FMo1 (Left)	FMo2 (Right)
Zone	Ⓐ Zone		Hi	Hi
	Ⓑ Zone	Ⓒ Zone	Hi	OFF
		Ⓓ Zone	Lo	OFF

b) Heating Operation

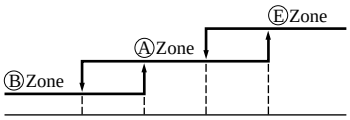
① Stop control for outdoor fan

When the high pressure switch (63H2) operates, the fan for the outdoor unit is stopped to control the high pressure switch.

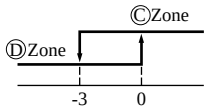
63H2 settings: 2.79 OFF/2.26 ON (MPa)

② Tap control for outdoor fan

When the high pressure switch (63H2) is closed, the outdoor fan is controlled by the detected heat of the outdoor heat exchanger thermistor (Tho-R) and the detected heat of the outdoor air temperature thermistor (Tho-A).



Outdoor air temperature (°C)



Heat exchanger temperature (°C)

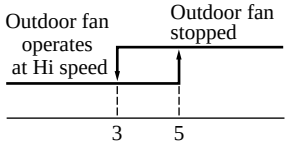
Description on control for fan for outdoor unit

Fan motor			FMo1 (Left)	FMo2 (Right)
Zone	Ⓐ Zone	Ⓒ Zone	Hi	OFF
		Ⓓ Zone	Hi	Hi
	Ⓑ Zone		Hi	Hi
	Ⓔ Zone	Ⓒ Zone	Hi	OFF
		Ⓓ Zone	Hi	Hi

Note (1) When the fan for the outdoor unit is started when the outdoor air temperature is more than 12 °C, it will operate at high speed for 3 seconds and then switch to low speed. After operating a low speed for 4 minutes, it will be transferred to controlled speed.

2) Snow protection fan control

If DIP switch SW5-2 on the printed circuit board for the outdoor unit is set to on, the fan on the outdoor unit which has been stopped will operate for 10 seconds at Hi speed every 10 minutes when the outdoor air temperature is 3 °C or less.

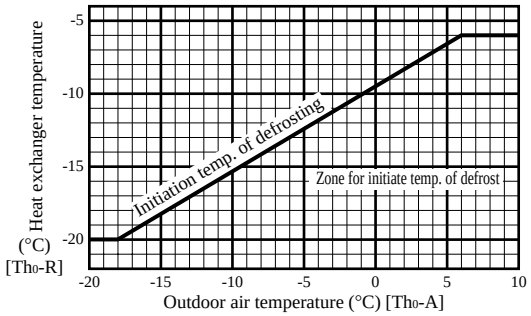


Outdoor air temperature (°C)

3) Defrost control

Defrost operation will start when the temperature of the heat exchanger for the outdoor unit (Tho-R detection) and the outdoor air temperature (Tho-A detection) enter the start of defrost range shown in the figure below.

Initiation temp. of defrosting (Detected by Tho-R, Tho-A)



Note (1) If DIP switch SW5-1 on the printed circuit board for the outdoor unit is set to on, defrost operation will begin when temperature of the heat exchanger for the outdoor unit reaches -7 °C.

a) Defrost finished

(i) Once defrost operation has started, it will finish after the cumulative operating time of the compressor has reached 12 minutes (factory setting: SW5-1 OFF).

Note (1) This time will become 14 minutes if the DIP switch (SW5-1) on the printed circuit board on the outdoor unit is set to on.

(ii) Patterns of defrost control can be changed by changing the setting of J18 on the PCB of outdoor unit.

- J18 (SW6-2) with: Normal defrost control
- J18 (SW6-2) none: Forced defrost control

4) Compressor protecting function (Microcomputer and phase protection relay)

a) Overcurrent control

(i) When a 52C secondary L_1-phase continues for 0.5 seconds and when it is more than the set value (detection at current sensor CT), the compressor is stopped. The compressor is restarted after a 3-minute delay if the detection current is less than 1.5 to 2A. If this condition is re-detected 5 times within 60 minutes of the first occurrence, an abnormal stop of the unit is performed.

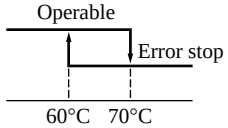
(ii) If 60 minutes passes and the detected current after the first to the fourth stoppage is not less than 1.5~2A, an abnormal stop of the unit is performed.

b) Open-phase Protection

When a 52C secondary detection current continues for 4 seconds when the compressor is on and when it is less than 1.5 to 2 A, it is determined to be a open-phase of the 52C secondary N-phase, and the compressor is stopped. The compressor is restarted after a 3-minute delay and if this condition is re-detected within 60 minutes of the first occurrence, an abnormal stop of the unit is performed.

c) Cooling overload protection

State of overload during cooling operation is detected (with Tho-R) based on the temperature of outdoor heat exchanger and the unit operation is stopped / Immediate reset after repair



Outdoor heat exchanger temp.

d) Thermistor (Heat exchanger and outdoor air thermistor) disconnected wire

(i) If there is a disconnected wire or if there is a big difference in performance characteristics, an abnormal stop of the unit is performed. ⇨ Restore after repairing.

5) Abnomal high pressure rise protection

a) If the pressure rises and 63H1 is operated (opened), the compressor is stopped. After a 3-minute delay, the compressor is restarted. An abnormal stop is performed when 63H1 is opened five times within 60 minutes of the first operation. ⇨ Restore after repairing.

b) An abnormal stop is performed at the first occurrence if 63H1 remains open after 60 minutes have passed from the first time the compressor was stopped.

Note (1) Once 63H1 has been restored after an abnormal stop, the unit can be restarted using the remote control.

6) Compressor motor protection

The same detection control as 63H1 will be performed when the internal thermostat 49C operates due to a rise in the windings of the compressor motor. The setting values of the internal thermostat 49C are 90 °C open and 73 °C close.

7) Control of the closing and opening of the service valve

a) When the compressor is ON for the first time after turning on the power, the heating operation starts regardless of any setting.

b) If the 63H2 turns OFF(open) within 10 seconds after the compressor is ON, the power will turn off as abnormal stop.

c) To recover from the abnormal stop, turn on the power again after the 63H2 is ON(closed).

d) If the 63H2 doesn't turn OFF(open) within 10 seconds after the compressor is ON, the operation immediately changes to the “set mode” to start normal operation.

8) Test run

a) For a test run, it is possible to use the dip switches SW5-3 and SW5-4 on the printed circuit board in the outdoor unit.

SW5-3	ON	SW5-4	OFF	Test run for cooling
			ON	Test run for heating
	OFF	Normal		

b) Test run time is 30 minutes. Protective devices are effectively controlled.

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

- This system should be applied to places of office, restaurant, residence and the like. Application to inferior environment such as engineering shop could cause equipment malfunction.
- Please entrust installation to either the company which sold you the equipment or to a professional contractor. Defects from improper installations can be the cause of water leakage, electric shocks and fires.
- Execute the installation accurately, based on following the installation manual. Again, improper installations can result in water leakage, electric shocks and fires.
- When a large air-conditioning system is installed to a small room, it is necessary to have a prior planned countermeasure for the rare case of a refrigerant leakage, to prevent the exceeding of threshold concentration.
  In regards to preparing this countermeasure, consult with the company from which you perchased the equipment, and make the installation accordingly. In the rare event that a refrigerant leakage and exceeding of threshold concentration does occur, there is the danger of a resultant oxygen deficiency accident.
- For installation, confirm that the installation site can sufficiently support heavy weight. When strength is insufficient, injury can result from a falling of the unit.
- Execute the prescribed installation construction to prepare for earthquakes and the strong winds of typhoons and hurricanes, etc. Improper installations can result in accidents due to a violent falling over of the unit.
- For electrical work, please see that a licensed electrician executes the work while following the safety standards related to electrical equipment, and local regulations as well as the installation instructions, and that only exclusive use circuits are used.
  Insufficient power source circuit capacity and defective installment execution can be the cause of electric shocks and fires.
- Accurately connect wiring using the proper cable, and insure that the external force of the cable is not conducted to the terminal connection part, through properly securing it. Improper connection or securing can result in heat generation or fire.
- Take care that wiring does not rise upward, and accurately install the lid/service panel. Its improper installation can also result in heat generation or fire.
- When setting up or moving the location of the air conditioner, do not mix air etc. or anything other than the designated refrigerant (R407C) within the refrigeration cycle.
  Rupture and injury caused by abnormal high pressure can result from such mixing.
- Always use accessory parts and authorized parts for installation construction. Using parts not authorized by this company can result in water leakage, electric shock, fire and refrigerant leakage.

⚠ CAUTION

- Execute proper grounding. Do not connect the ground wire to a gas pipe, water pipe, lightning rod or a telephone ground wire. Improper placement of ground wires can result in electric shock.
- The installation of an earth leakage breaker is necessary depending on the established location of the unit. Not installing an earth leakage breaker may result in electric shock.
- Do not install the unit where there is a concern about leakage of combustible gas.
  The rare event of leaked gas collecting around the unit could result in an outbreak of fire.
- For the drain pipe, follow the installation manual to insure that it allows proper drainage and thermally insulate it to prevent condensation. Inadequate plumbing can result in water leakage and water damage to interior items.

⚠ NOTICE

All Wiring of this installation must comply with NATIONAL, STATE AND LOCAL REGULATION. These instructions do not cover all variations for every kind of installation circumstance. Should further information be desired or should particular problems occur, the matter should be referred to Mitsubishi Heavy Industries, Ltd. through your local distributor.

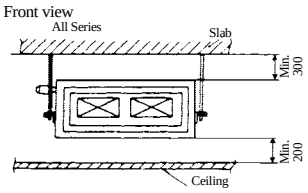
⚠ WARNING

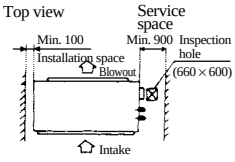
BE SURE TO READ THESE INSTRUCTIONS CAREFULLY BEFORE BEGINNING INSTALLATION. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD CAUSE SERIOUS INJURY OR DEATH. EQUIPMENT MALFUNCTION AND/OR PROPERTY DAMAGE.

5.1 Installation of indoor unit

(1) Selection of installation location

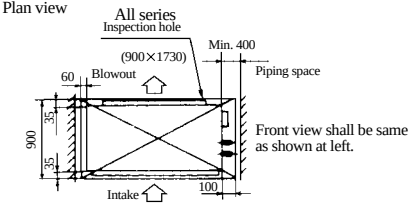
(a) Install the unit at a place as shown below and which meets the conditions as shown by the following table.





When the conditions as shown at left cannot be met, following alternative solution may be taken.

(Unit : mm)



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	
FDU808-A	51	38	65	Upper limit 27°CWB at ambient temperature 35°C Lower limit 15.5°CWB at ambient temperature 10°C	Upper limit 27°CDB at ambient temperature 24°CWB Lower limit higher than 10°CDB	Upper limit Dew point temperature not higher than 28°C and Relative humidity not higher than 80% Lower limit 0°CDB
FDU1008-A	68	51	87			

For further details refer to the engineering data which

(b) Places where perfect drainage can be prepared and sufficient drainage gradient is available.
(c) Places free from air disturbances to the air inlet and outlet of the indoor unit.
(d) Places with the environmental dew-point temperature is lower than 28°C and the relative humidity is less than 80%.
(When installing at a place under a high humidity environment, pay sufficient attention to prevention of dewing such as thermally insulating the unit properly.)
(e) *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.)
(f) 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.
(g) 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.

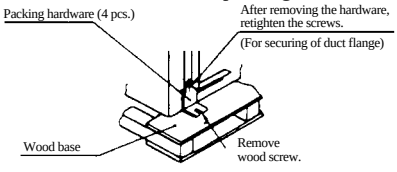
(2) Installation

<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.

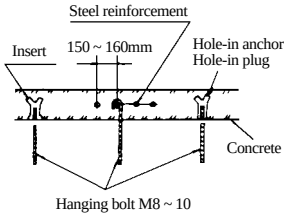
(Packing hardware)

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

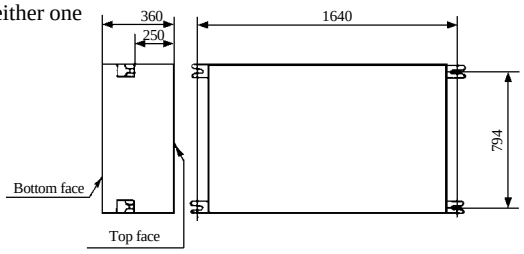


<Securing of Hanging Bolt>

Secure the hanging bolts by either one of following methods.

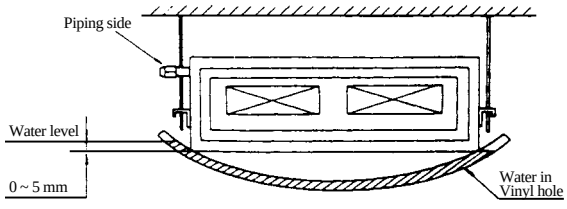


<Hanging bolt location>



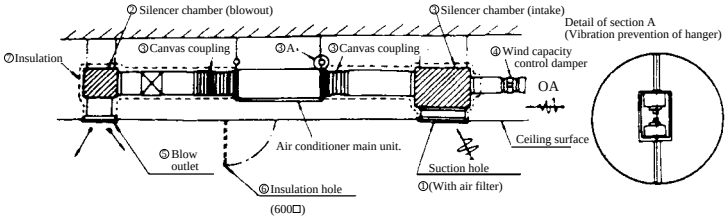
○ To adjust the level, use a level gauge or adjust as shown by the left figure.
Note: Unless the level is adjusted properly, the float switch may malfunction or operate improperly.

<Adjustment level>



Adjust the piping side a little lower than the opposite side.

(3) Duct work



① Air filter is not installed in the main unit of air conditioner.
Air filter should be installed in the suction grill which allows an ample access for cleaning.

② Silencer chamber(s) may be necessary depending on the noise level allowed in the room where the air conditioner is installed.
Additional silencer may be necessary where a particularly low noise is required.
(Provision of silencer is a must at offices and a meeting room.)

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.

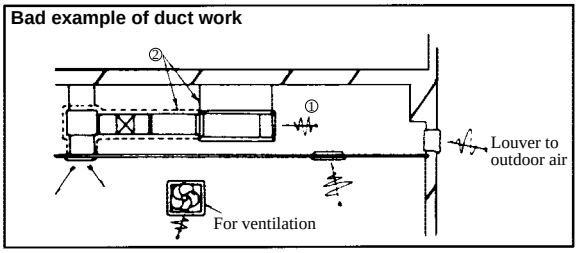
④ A damper to control air volume should be installed on the joint of OA duct to facilitate control of air capacity after the installation.

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.)

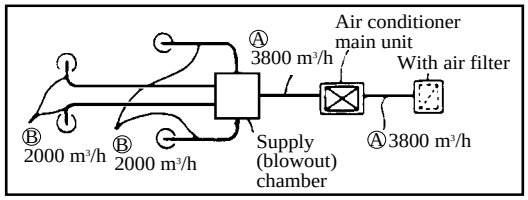
b) It may run out the allowable limit of unit operation (Example: When outdoor air temperature is 35°CDB, suction air temperature is 27°CWB) and it could result in such troubles as compressor overload, etc.

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 and a side of duct is 250 mm.
Air volume rating is assumed to be FDU808-A.



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

	Air volume	Duct (mm × mm)
Section Ⓐ	3800m³/h (63m³min)	250 × 830
Section Ⓑ	2000m³/h (33m³min)	250 × 470

Linear pipe section	Calculate based on 1 Pa (0.1 mm Aq) per 1 m in length 1 Pa/m (0.1 mmAq/m).
Curved pipe section	Take a curved section as equivalent to 3 ~4 m in straight line.
Blowout section	Calculate based on 25 Pa (2.5 mmAq).
Chamber	Calculate by taking 1 pc. as 50Pa (5 mmAq).
Suction grill (with filter)	Calculate by taking 1 pc. as 40Pa (4 mmAq).

<Table of simplified selection of duct dimensions>

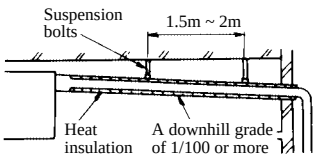
Air volume \ Item / Duct form	Square duct
	Dimensions
m³/h(m³/min)	(mm × mm)
100	250 × 60
200	250 × 90
300	250 × 120
400	250 × 140
500	250 × 170
600(10)	250 × 190
800	250 × 230
1,000	250 × 270
1,200(20)	250 × 310
1,400	250 × 350
1,600	250 × 390
1,800(30)	250 × 430
2,000	250 × 470
2,400	250 × 560
3,000(50)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

Section Ⓑ: 600(10) – 2,000
Section Ⓐ: 2,000 – 4,000

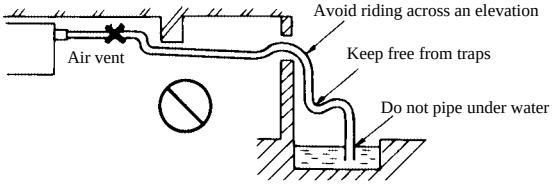
(4) Drain Piping

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

- Good piping

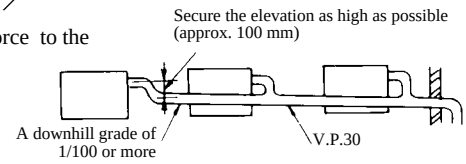


- Improper piping



(b) 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.

(c) For drain pipe, use hard PVC general purpose pipe VP-25(I.D.1″) which can be purchased locally.



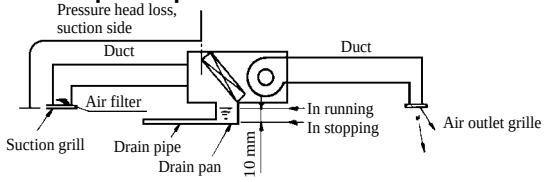
(d) When constructing drain piping for several units, position the common pipe about 100 mm below the drain outlet of each unit as shown in the sketch. Use VP-30 (11/4″) or thicker pipe this purpose.

(e) Be sure to provide heat insulation to hard PVC pipes of indoor placement.

(f) Do not ever provide an air vent.

(g) Avoid postitioning 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.

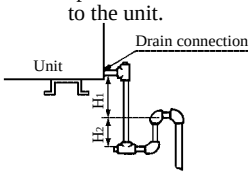


Example: If the pressure loss at the suction side, such as the suction grill, air filter and duct, is 100 Pa, the level of drain water will rise approx. 10 mm higher than the state of operation stop.

<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.

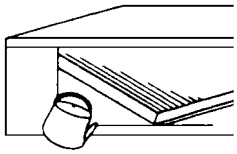
H_1=100 mm or static pressure of blower

H_2=1/2 H_1 or 50 ~ 100 mm

(5) Drain Test

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

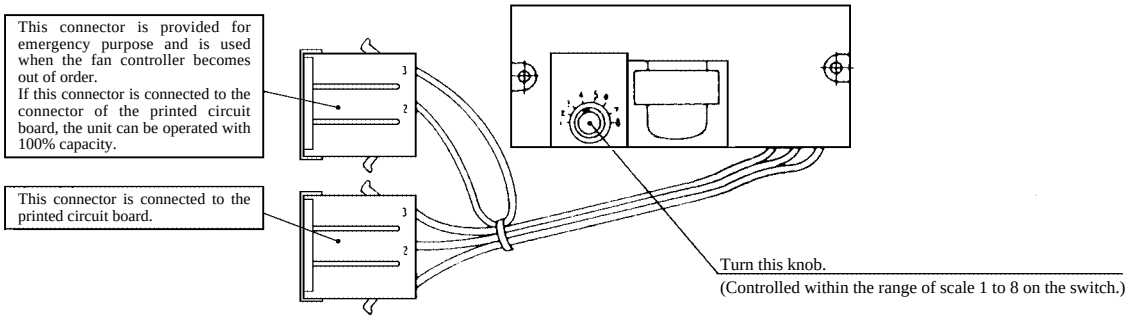
○ Remove the side panel and supply gradually 1,000 cc of water to see if water is drained smoothly or not. Check also for water leakage.



(6) 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 (Optional parts)

(1) Selection of installation location

Following locations should be avoided:

(a) Where exposed to direct sunlight

(b) Near the heat source

(c) Highly humid area or where splashed with water

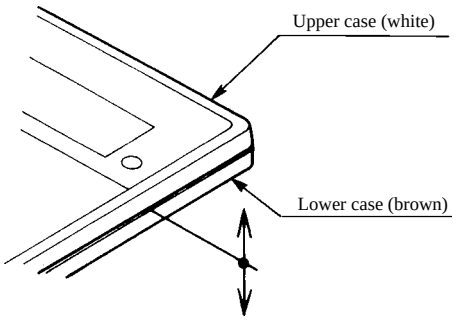
(d) Uneven installation surface

(2) Selection of installation location

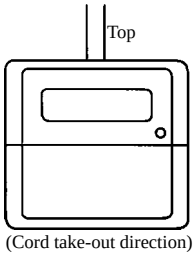
Exposed installation

(a) Remove the remote controller case.

- Insert finger nails between the upper (white) and lower (brown) cases and ply them to open.

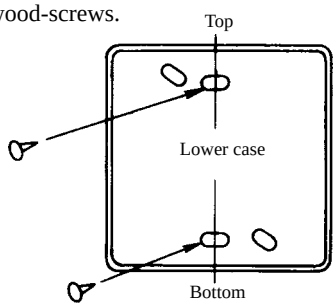


(b) Remote controller cords can be taken out upward only as shown below.



- Cut the remote controller lower case off at the top and thin section with a nipper, knife or other and remove burrs from the cut with a file or other.

(c) Secure the remote controller lower case on the wall with 2 pieces of wood-screws.



(d) Connect the remote controller cords with the terminal block. Make sure to align the terminal numbers on the indoor unit and the remote controller. Polarities are specified on the terminal block so that the unit will not be operated if the cords are connected improperly.

Terminals: (X) red wire, (Y) white wire, (Z) black wire

1) Set necessary functions in accordance with the model of indoor unit.

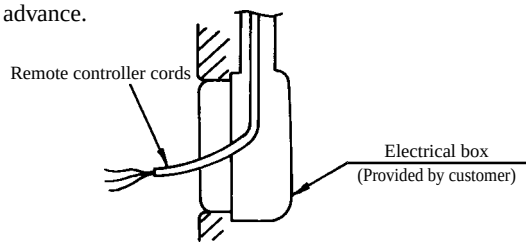
Refer to (c) for the setting of functions.

2) Couple the upper case with the lower case as they were.

3) Secure the remote controller cords on the wall or other using cord clamps.

Embedded installation

1) Have a Electrical box and remote controller cords (use shielding wires or twisted pair wires for extension) embedded in the wall in advance.



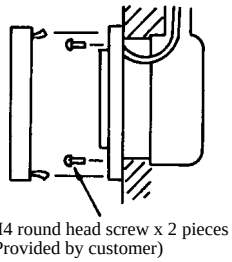
2) Remove the upper case from the remote controller.

3) Secure the remote controller body on the Electrical box with 2 pieces of M4 round head screw (provided by customer).

4) Connect remote controller cords with the remote controller.

(Refer to the section regarding the exposed installation.)

5) Couple the upper case with the lower case as it was to finish up the installation.



Cautions for extension of remote controller cords

- **Make sure to use shielding wires only.**
  - **All models: 0.3 mm² x 3 core wires [MVVS3C, products of Keihan Cables]**

Note (1) When the extension distance exceeds 100 m, change the wire size as follows:

100 ~ 200 m ... 0.50 mm² × 3 core wires

~ 300 m ... 0.75 mm² × 3 core wires

~ 400 m ... 1.25 mm² × 3 core wires

~ 600 m ... 2.00 mm² × 3 core wires

- **Make sure to ground one side only of the shielding wire.**

5.3 Installation of outdoor unit

⚠WARNING

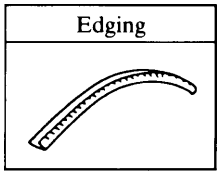
BE SURE TO READ THESE INSTRUCTIONS CAREFULLY BEFORE BEGINNING INSTALLATION. FAILURE TO FOLLOW THESE INSTRUCTIONS COULD CAUSE SERIOUS INJURY OR DEATH, EQUIPMENT MALFUNCTION AND/OR PROPERTY DAMAGE.

(1) Installation

(a) Accessories

Confirm accessories shown below are attached in the bag with this installation manual.

1) "Edging" for protection of electric wires from opening edge.

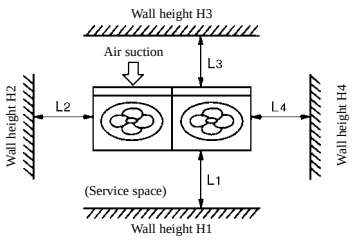


(b) Selection of installation location

1) Select the installation location after obtaining the approval of customer.

a) The place where the foundation can bear the weight of Outdoor unit.
b) The place where there is no concern about leakage of combustible gas.
c) The place where it is not stuffy.
d) The place where free from thermal radiation of other thermal source.
e) The place where flow of drain is allowed.
f) The place where noise and hot air blast do not trouble neighboring houses.
g) The place where there is no obstruction of wind at the intake air port and discharge air port.
h) 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.
The place where corrosive gas is generated (hot spring, etc.).
The place where wind containing salt blows (seaside area).
The place where enveloped by oil mist.
The place where there is a machine that radiates electromagnetic wave.

2) Installation space



Unit:mm

Example installation / Dimensions	I	II	III
L1	Open	Open	500
L2	0	0	0
L3	300	300	300
L4	Open	500	0
H1	–	–	1000 or less
H2	No limit	No limit	No limit
H3	No limit	No limit	700 or less
H4	–	No limit	No limit

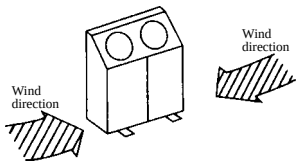
Note (1)
If the wall heightH1 and H3 in installation example III exceed the limit, make L1 and L3 as follow.
L1 = H1 - 500
L3 = 300 + (H3 - 700) / 2
However, if L3 is larger than 600, there is no limit on wall height H3.

Request

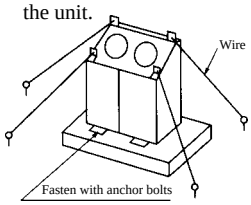
- Restrict the height of obstruction wall in front of the discharge air port to the height of unit or less.
- Do not enclose around the unit by the obstruction. Secure the top space for 1 m or more.
- When installing the unit where there is a concern about the short circuit, attach the guide louver in front of discharge air port to prevent the short circuit.
- When installing plural units in a group, secure sufficient intake space to prevent the short circuit.
- When installing the unit where it is covered by snow, provide appropriate snow break means.
- When installing the unit where it is subject to strong wind, execute wind-breaking work.

3) When strong winds occur

① Place the unit blower vents perpendicular to the wind direction.



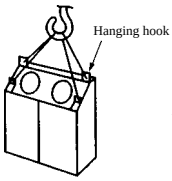
② When the foundation is not level, use wires to tie down the unit.



(2) Carry-in and installation of unit

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

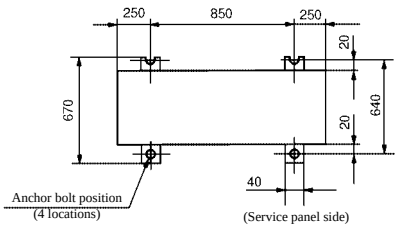
(a) Carry-in



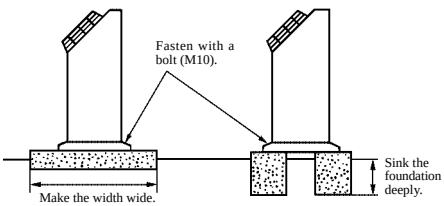
- During delivery, transport the unit as close as possible to the installation site before removing it from the packaging.
- When the unit must be transported after the packaging is removed, use a rope to lift the unit to prevent it from being damaged.

Attention:
· Do not lift the unit with only two points.
· Do not ride on the unit while lifting.

(b) Bolt fastening positions



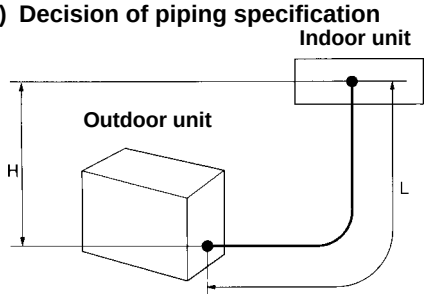
- ○ Use anchor bolts (M10) to secure the unit's legs.
- ○ Securely install the unit so that it dose not fall over during earthquakes or strong winds, etc.
- ○ Refer to the above illustrations for information regarding concrete foundations.
- ○ Install the unit in a level area. (With a gradient of 1/100 or less.)



(3) Refrigerant piping work

(Select the piping specification to fit the specification of Indoor unit and installation location.)

(a) Decision of piping specification



Maximum one way length

L = 50 m or less

Height difference

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

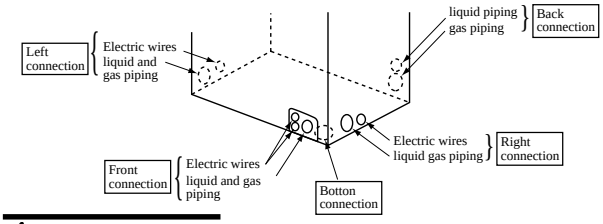
(b) Piping work

Request

- Use the pipe made of following material. Moreover, it is very convenient for you to use the separately sold piping kit. Material: Phosphor deoxidized seamless copper tube (C1220T, JIS H3300)
- In the case of this unit, condensation water is also generated on the liquid piping. Insulate both of the liquid piping and gas piping perfectly.
- In the case of heat pump type unit, the maximum temperature of the gas piping reaches approx. 120˚C, therefore use the insulation material which has sufficient heat resistance.
- When bending the pipe, bend it with large radius as much as possible. Do not bend the same portion of pipe repeatedly.
- Do not let dust, chips or water enter the pipe while pipe working.
- In the case of brazing connection, perform brazing while flowing nitrogen gas in the pipe to prevent generation of oxide film inside the pipe without fail.

(C) Refrigerant pipe connection

- As shown in the figure at right, 5 connection directions are possible.
- Select the optimum connection direction for the outdoor unit installation conditions and the indoor unit positioning.
- When connecting the piping to the operation valve, first connect the gas piping and then connect the liquid piping.



⚠ IMPORTANT

- **Remove the knock out plate of the through hole on the outer plate during on-site piping. For a back connection, be careful that the knock out plate dose not hit the piping in the unit when removing the knock out plate.**

(d) Leak test and air purge

Perform the procedure according to the following instructions.

Request

- Perform the air purge of Indoor unit and refrigerant piping by vacuuming method without fail.

Leak test

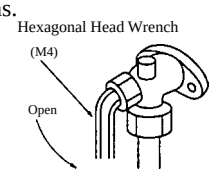
(1) The unit's air-tightness test has been conducted but after completing the piping connections conduct an air-tightness test of the connected piping and the indoor units using the outdoor gas side service valve check joint. Be sure to conduct this test with the service valve closed.
- ① When the pressure has been increased to 0.5 MPa stop increasing the pressure and maintain this state for at least 5 min. to check if the pressure drops.
- ② Next, increase the pressure to 1.5 MPa and again maintain this state for at least 5 min. to check if the pressure drops.
- ③ Then increase the pressure to 3.3 MPa and maintain this state for approx. one day to check if the pressure drops.

Use nitrogen gas for the air-tightness check.

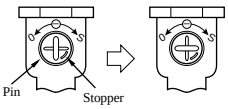
Air purge

(2) Extract air from the service valve charge port with the outdoor unit service valves (both liquid and gas sides) shut until the pressure drops to -101 kPa (-755mmHg) or lower, and continue to extract air for at least one hour thereafter.

(3) After completion of vacuuming, remove the cap nut for the valve stem and fully open the service valve (for both of liquid and gas) as shown in the right illustration. After confirming that the valve is fully open, tighten the cap nuts (for valve stem and charge port).



Liquid service valve



gas service valve

(e) Refrigerant charge

1) Outdoor unit is pre-charged R22 refrigerant at a factory as shown in Table 1.
2) Indoor unit is pre-charged only a small amount of nitrogen gas for prevention of the air entry.
3) Additional charge on site is required when the pipe length is longer than that of restricted value (Which is varied wirh the type of Indoor unit) as shown in Table 1.

Table 1

Item / Model	Factory charge amount (kg)	Additional charge amount (kg/m)	Pipe length that additional charge is not required (m)	Maximum piping length (m)
FDCP808HES3	4.95	0.045	5	50
FDCP1008HES3	7.1	0.07		

- In the case of recharge the refrigerant for service, calculate the proper amount of refrigerant depending on the piping length on site.

  Example : In the case that FDUP808HES-S with piping length of 45m is fully recharged in service.

  4.95(kg) + (45 – 5) (m) × 0.045 (kg/m)= 6.75 (kg)

  - Recharge amount.
  - Additional charge amount per 1m.
  - Length that additional charge is not required.
  - Total length of the piping (one way).
  - Factory charge amount for FDUP808HES-S.

(4) 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 (This table shows 20m length wires with less than 2% voltage drop.)

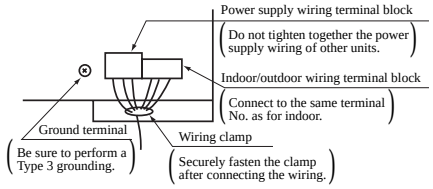
Item / Model	Phase	Circuit breaker		Power source wires (minimum)	Interconnecting and grounding wires(minimum)
		Switch breaker (A)	Over-current protector rated capacuty(A)		
FDCP808HES3	3	50	50	5.5mm²	2.0mm
FDCP1008HES3				8.0mm²	

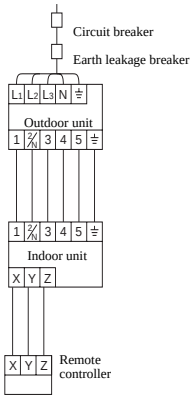
(b) Wiring connection.

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

(c) Wiring out take direction

- The four directions of front, left, right, and bottom are possible.





- When connecting piping on site, remove the outside panel's knock out plate. After removing the knock out plate, install the included edging around the edge of the hole in the panel.

(5) Test run

⚠ CAUTION

THIS UNIT WILL BE STARTED INSTANTLY WITHOUT "ON" OPERATION WHEN ELECTRIC POWER IS SUPPLIED.
BE SURE TO EXECUTE "OFF" OPERATION BEFORE ELECTRIC POWER IS DISCONNECTED FOR SERVICING.

- This unit has a function of automatic restart system after recovering power stoppage.

DO NOT LEAVE OUTDOOR UNIT WITH THE SERVICE PANEL OPENED.

- When the service panel is removed, high voltage portion and high temperature areas are exposed.

⚠ IMPORTANT

- **Check that the service valves are fully opened without fail before operation.**
- **Turn on the power for over 12 hours to energize the crankcase heater in advance of operation.**
- **Wait more than 3 minutes to restart the unit after stop.**

- Run the unit continuously for about 30 minutes, and check the following.
  - ○ Suction pressure at check joint on the compressor suction pipe.
  - ○ Discharge pressure at check joint on the compressor discharge pipe.
  - ○ Temperature difference between return air and supply air for Indoor unit.
- Refer to “Check Indicator Table” on wiring diagram of Outdoor unit or “User’s manual” of Indoor unit for diagnosis of operation failure.

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 R407C is very insoluble in water, even a small amount of moisture left in the refrigerant equipment will freeze, causing what is called ice clogging.

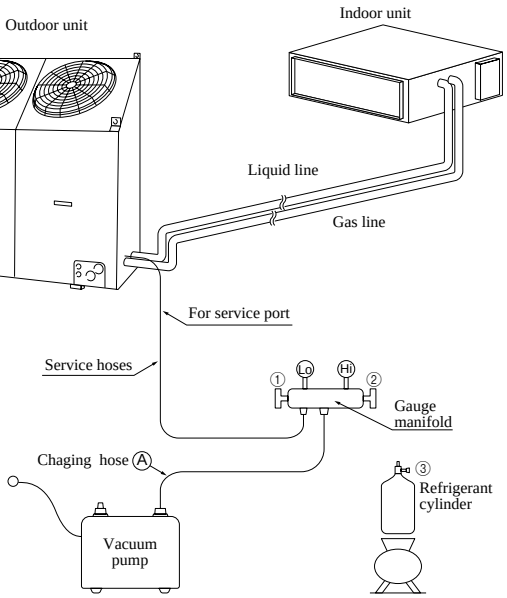
Evacuation procedure

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

(a) Check to ensure that there is no internal pressure in the unit. If there is an internal pressure, it should be relived through the service port.

(b) Connect the charging hose of the gauge manifold to the service port of the gas piping.
Close high pressure valve ② of gange manifold.

(c) Connect the charging hose Ⓐ to a vecuum pump.
Repeat evacuation in the following sequence.



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

Start the vacuum pump.

⇩

Compond pressure gauge indicates -101 kPa (-755 mmHg)

⇩

Operate the vacuum pump for more than 10 minutes after -101 kPa (-755 mmHg) Hg is indicated.

⇩

Close low pressure valves ① of gauge manifold.

⇩

Stop the vacuum pump.

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.

(2) Refrigerant charging

(a) After the evacuation shown in the above, change the connection of the charge hose Ⓐ to the refrigerant cylinder.

(b) Purge air from the charge hose Ⓐ .

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 an another trouble from a single trouble source and several other troubles may exist at the same time which comes from a 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,

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

(a) Required tools and measurement equipment

For unit disassembling

Small and large Philips screw driver, Flat head screw driver, Wrench

For diagnosis

Tester (A general tester will do)

(Diagnosis tools and equipment for refrigeration circuit should be prepared if necessary.)

(2) Selfdiagnosis function

(a) Indoor unit side

Table of inspection items based on error codes

Error Code	Location of Problem	Cause
E1	Control switch wire (signal noise)	• Defective connection or broken wire for control switch signal wire. • Signal noise has entered the control switch wire.
	Circuit board for control switch or indoor unit	• Is the circuit board for the control switch or the circuit board for the indoor unit is defective (communication circuit defective)?
E6	Indoor unit heat exchanger thermistor	• Indoor unit heat exchanger thermistor defective (element defective or broken wire). Defective connection of connector for thermistor.
	Indoor unit circuit board	• Indoor unit circuit board defective (defective thermistor input circuit)?
E7	Indoor unit air inlet thermistor	• Indoor unit return thermistor defective (element defective or broken wire). Defective connection of connector for thermistor.
	Indoor unit circuit board	• Indoor unit circuit board defective (defective thermistor input circuit)?
E8	Installation and operating conditions	• Heating overload (temperature of heat exchanger for indoor unit abnormally high)
	Indoor unit heat exchanger thermistor	• Indoor unit heat exchanger thermistor defective (short circuit).
	Indoor unit circuit board	• Indoor unit circuit board defective (defective thermistor input circuit)?
E9	Float switch	• Malfunctioning of the float switch (erroneous functioning)
	Indoor circuit board	• Indoor unit circuit board defective (defective float switch input circuit)
E10	Number of indoor units connected	• 1 Remote controller for multiple unit control, 17 or more indoor units connected
E57	Insufficient refrigerant	• Gas leak.
	Indoor unit heat exchanger thermistor	• Indoor unit heat exchanger thermistor defective (short circuit).
	Indoor unit circuit board	• Indoor unit circuit board defective (defective thermistor input circuit)?

(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.

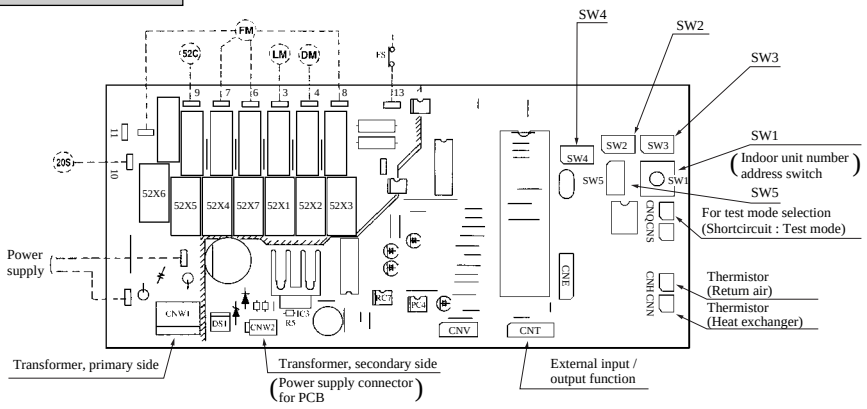
(b) Replacement procedure of indoor unit microcomputer printed circuit board

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
FDU808-A,1008-A	PJA505A092Z

Parts layout on the indoor unit PCB



- Function of jumper wires

Name		Function
J4(SW5-1)	With	1 Phase model
	None	3 Phase model
J5(SW5-2)	With	Step input
	None	Pulse input
J1(SW4-1)	With	Antifrost 2.5˚C
	None	Antifrost 1˚C
J2(SW4-2)	With	With abnormality resetting
	None	Without abnormality resetting

- Function of DIP switched (SW3)

Switch		Function
SW3-1	ON	Power off guaranteed
	OFF	No power off guaranteed
SW3-2	ON	With low-voltage detection control
	OFF	Without low-voltage detection control
SW3-3	ON	Power up mode (UHi-Lo)
	OFF	Mild mode (Hi-Lo)
SW3-4	ON	Indoor fan is Lo when heating thermostat is OFF.
	OFF	Indoor fan is OFF when heating thermostat is OFF.

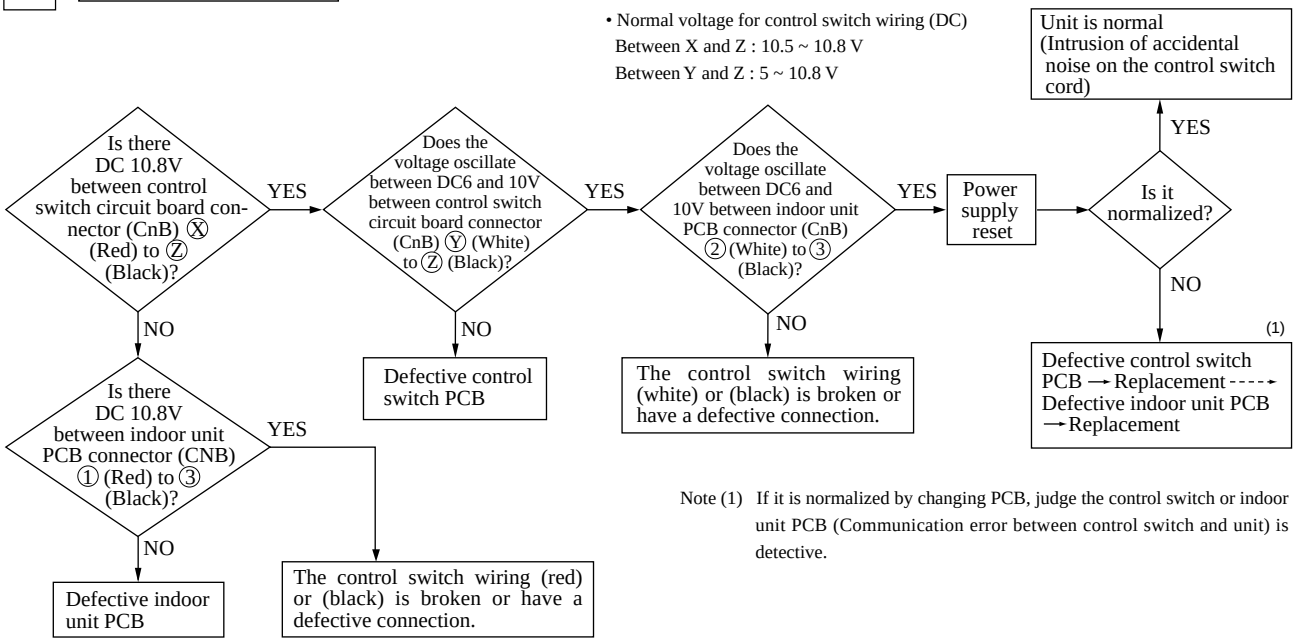
(ii) Please match the settings of control switching switches (SW3, SW4, SW5) to the settings they had before they were replaced. With these switches, if the printed circuit had a jumper wire before being replaced, set to jumper wire ON if there was a jumper wire and jumper OFF is these was not.

(iii) Connect the fast-on terminals and connectors that are to the circuit board for the micro-computer.
Connect by matching the wire color of the fast-on terminal with the color printed on the circuit board for the micro-computer.

Note (1) When connecting to the fast-on connection for the circuit board for the micro-computer, use care so as not to excessively distort the circuit board.

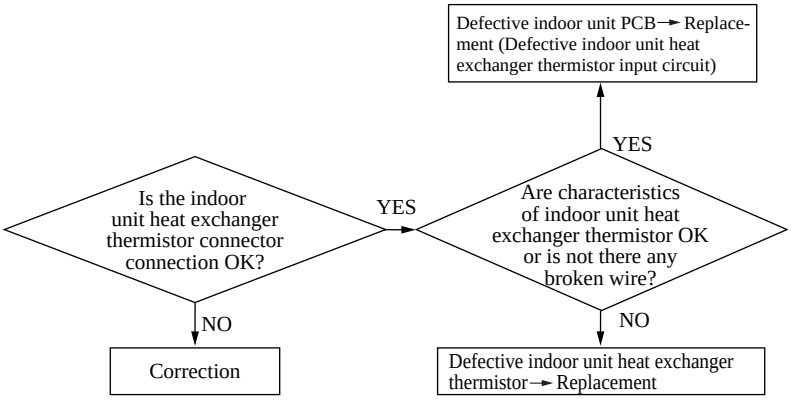
(c) Inspection method when error code is displayed.

1 **Error display : E1** **[Communication error between control switch ~ Indoor unit PCB]**

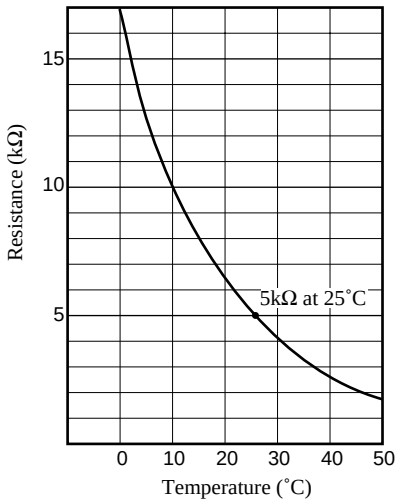


Note (1) If it is normalized by changing PCB, judge the control switch or indoor unit PCB (Communication error between control switch and unit) is detective.

2 Error display : E6 [Defective indoor unit heat exchanger thermistor]



Return air thermistor (Th_R-A)
Indoor unit heat exchanger thermistor (Th_R-R)
Resistance temperature characteristics



Note (1) 22.5 kΩ at -6˚C

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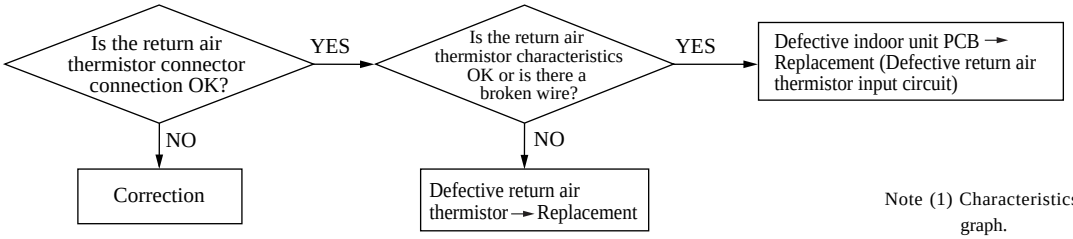
3 Error display : E7 [Defective return air thermistor]



Note (1) Characteristics as per the above graph.

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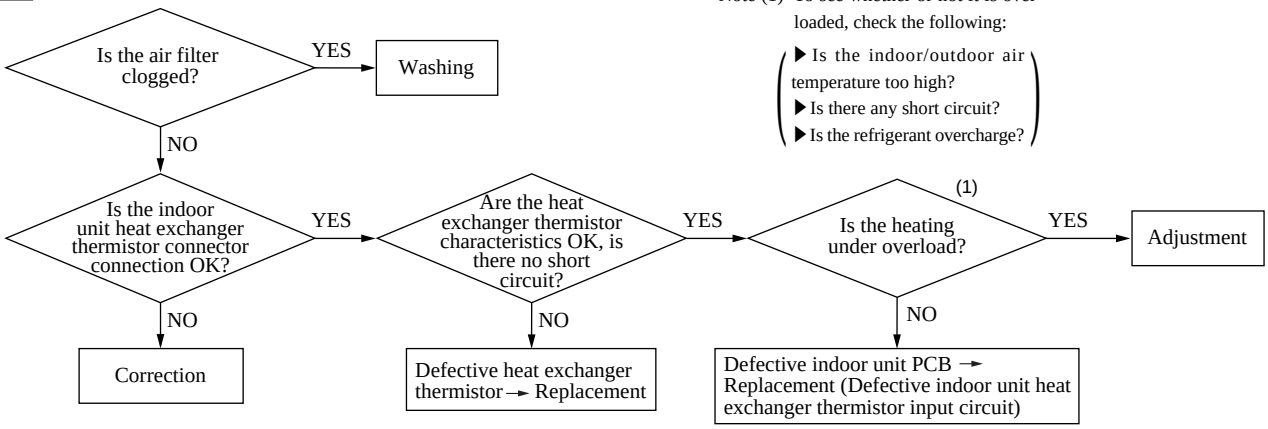
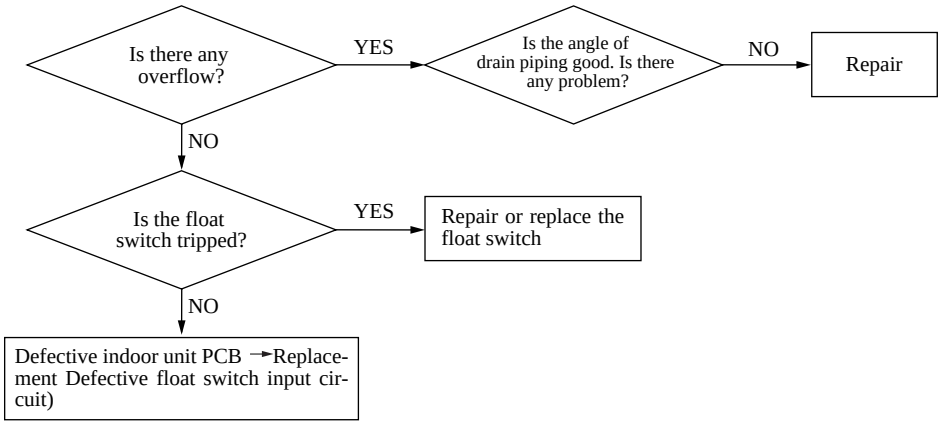
4 Error display : E8 [Heating overload]

Note (1) To see whether or not it is overloaded, check the following:
- ▶ Is the indoor/outdoor air temperature too high?
- ▶ Is there any short circuit?
- ▶ Is the refrigerant overcharge?



5 Error display : E9 [Failure in drainage]



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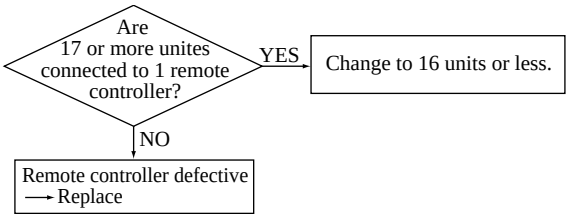
6 Error display : E10 [1 Remote controller for multiple unit control ⇨ Exceeding connected units (17 units or more)]



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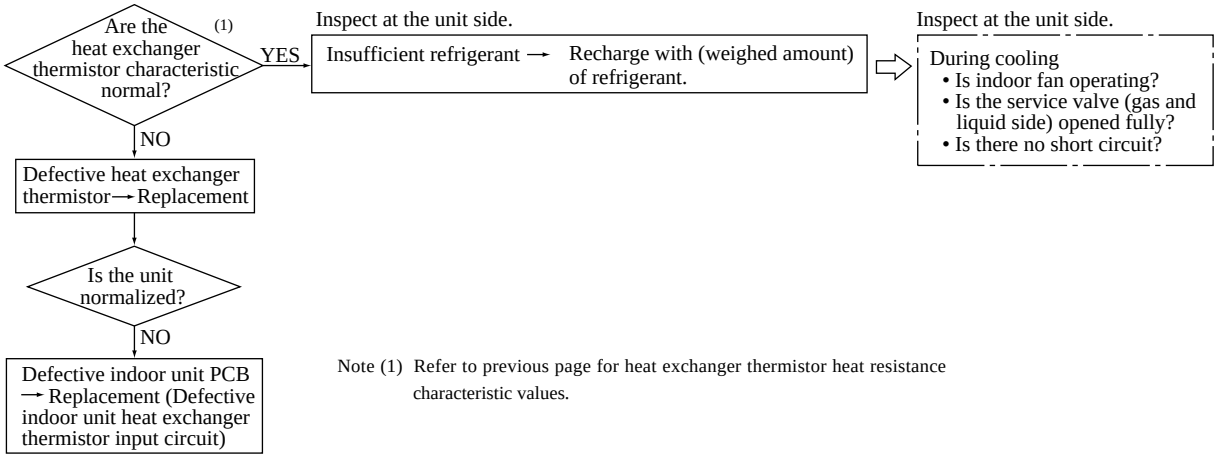
7 Error display : E57 [Insufficient refrigerant]



Note (1) Refer to previous page for heat exchanger thermistor heat resistance characteristic values.

(4) Outdoor unit side.

Check Indicator Table

Failure mode on the outdoor unit is indicated by flashing both Green LED (LED-G) and Red LED (LED-R) on the printed circuit board.

Outdoor unit LED		Failure at:	Contents of the failure
Green	Red		
Keeps flashing	Stays OFF	————	Normal/Power is supplied.
Stays OFF	2 time flashes	Installation or operation status	• Over current of the compressor motor. • Open phase at L2 phase (secondary wiring of 52C) of compressor. • Defective outdoor unit PCB.
Stays OFF	3 time flashes	CM wiring	• The wiring (secondary wiring of 52C) to the compressor is open.
Stays OFF	4 time flashes	Installation or operation status	• The outdoor heat exchanger temperature is too high [70°C or over].
		Outdoor heat exchanger thermistor	• Failure with the outdoor heat exchanger thermistor.
1 time flash	1 time flash	Outdoor heat exchanger thermistor	• Failure or open circuit with the outdoor heat exchanger thermistor or imperfect connection of the connector.
1 time flash	2 time flashes	Outdoor temperature thermistor	• Failure or open circuit with the outdoor temperature thermistor or imperfect connection of the connector.
1 time flash	4 time flashes	Installation or operation status	• The high pressure is too high or it went up (63H1, 49C)
1 time flash	5 time flashes	Failure to open the service valve	• Closing of the service valve on the liquid/gas side.

"Check Indicator" is resetted when power supply is turned off once and the failure is fixed.

(a) Procedure for diagnosing trouble for outdoor unit.

When diagnosing trouble for the outdoor unit, check the flashing and turns of the inspection indicator lamp (red LED) and fault indicator lamp (green LED) to obtain a general concept of the nature of the problem. Then inspect and perform repair.

1) Unit replacement parts related to printed circuit board for outdoor unit.

Micro-computer for outdoor unit, microcomputer, printed circuit board, thermistor (heat exchanger and outdoor air), fuses and transformer.

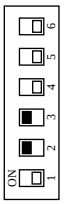
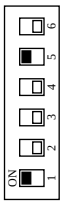
2) Summary of replacement for micro-computer for outdoor unit.

a) Check the following part number.

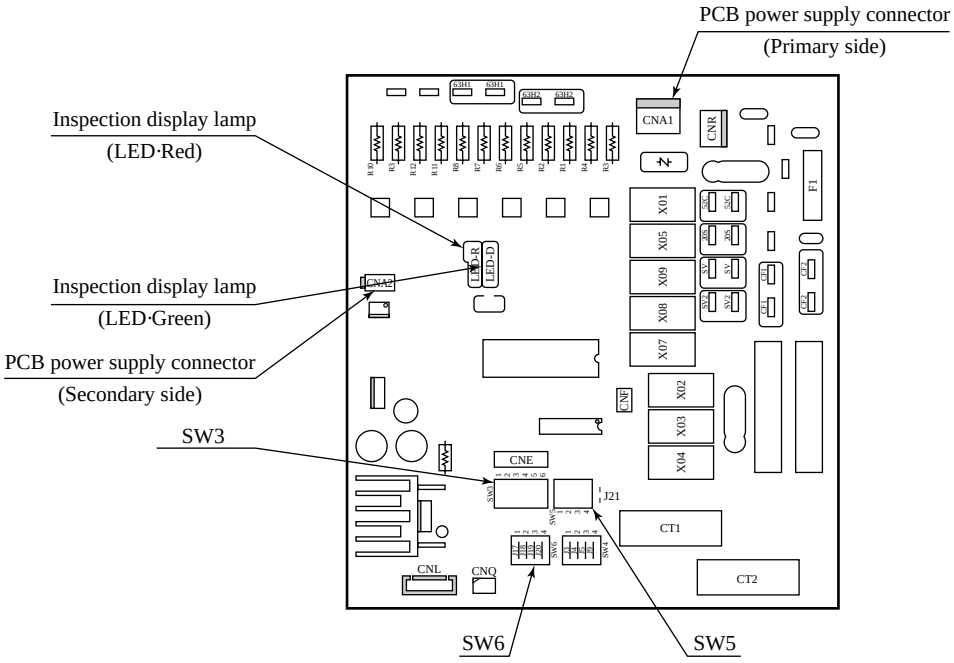
Model	Parts No.
FDCP808HES3, 1008HES3	PCA505A046ZD

b) Set the overcurrent value using the overcurrent setting switch (SW3) for CM. Refer to the following table at the setting.

- **Table of switch (SW3) setting**

Model	FDCP808HES3	FDCP1008HES3
Setting value (A)	24	34
Table of switch setting Make ON/OFF setting for each switch No. (■: ON, ○: OFF)		

Parts layout on the outdoor unit PCB



• Function of DIP switched (SW6)

SW6		Function	
2 (J18)	ON	Defrost control switching	Normal defrost control
	OFF		Forced defrost control
3 (J19)	ON	63HI Abnormal detection switching	Enabled
	OFF		Disabled
4 (J20)	ON	3 minute delay when power is turned on Switching	Enabled
	OFF		Disabled

• Function of DIP switched (SW5)

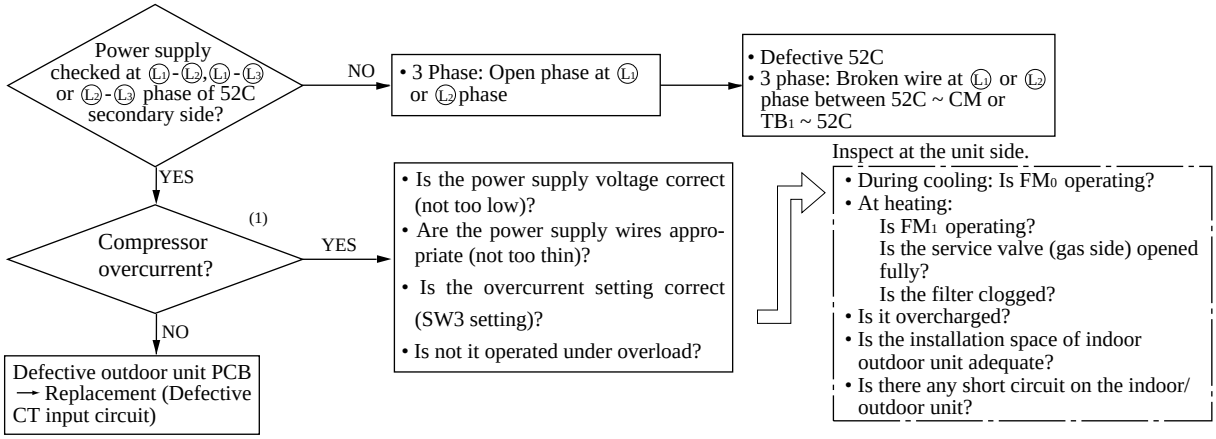
SW5		Function	
1	ON	Defrost Switching	Actual spot
	OFF		Ordinary
2	ON	Snow protection control	Enabled
	OFF		Disabled
3	ON	Test run Switch	Test run
	OFF		Normal
4	ON		Test run for heating
	OFF		Test run for cooling

• Function of jumper wire

Name		Function
J21	With	Service valve open/close check control enabled.
	None	Service valve open/close check control disabled.

1 Overcurrent of the compressor motor

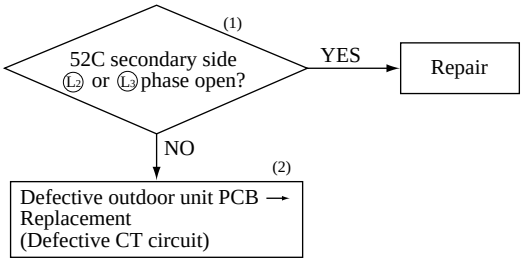
Outdoor unit	
Red LED	2 time flashes
Green LED	Stays OFF



Note (1) Measure and check the current value.
Confirm that the overcurrent setting by SW3 of outdoor unit PCB is correct.

2 The wiring (secondary wiring of 52C) to the compressor is open.

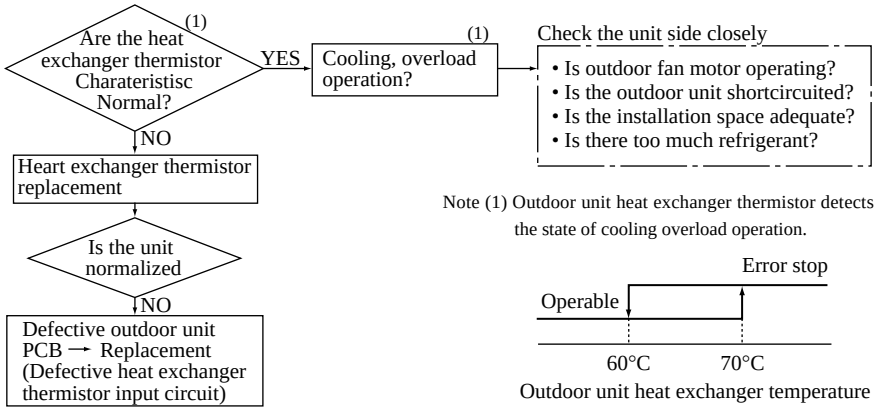
Outdoor unit	
Red LED	3 time flashes
Green LED	Stays OFF



Notes (1) When voltage is detected at 52C primary side L2 or L3 phase but not at the secondary side, check also 52C (broken coil, poor contact).
(2) When voltage is detected at 52C primary side L2 or L3 phase and there is no error at 52C (52C is energized if TB1 L2 or L3 terminal and 52C coil secondary side connector are short circuited), the outdoor unit PCB (defective X01 circuit or X01) .

3 The outdoor heat exchanger temperature is too high (70°C or over)

Outdoor unit	
Red LED	4 time flashes
Green LED	Stays OFF

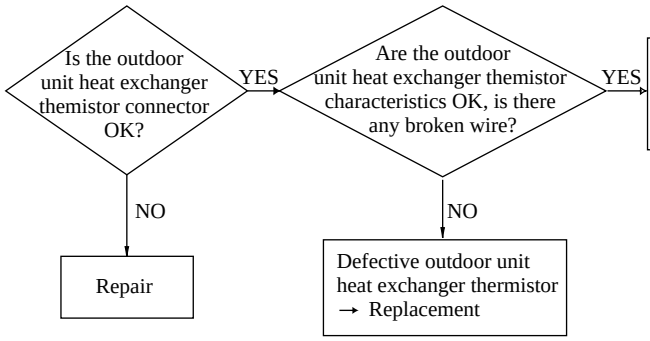


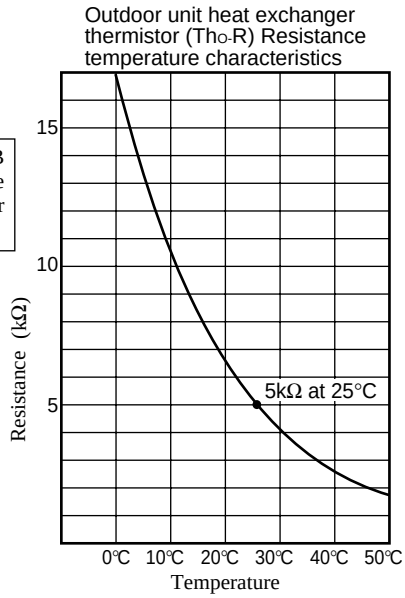
Note (1) Outdoor unit heat exchanger thermistor detects the state of cooling overload operation.

Outdoor unit heat exchanger temperature

4 Defective outdoor unit heat exchanger thermistor

Outdoor unit	
Red LED	1 time flash
Green LED	1 time flash

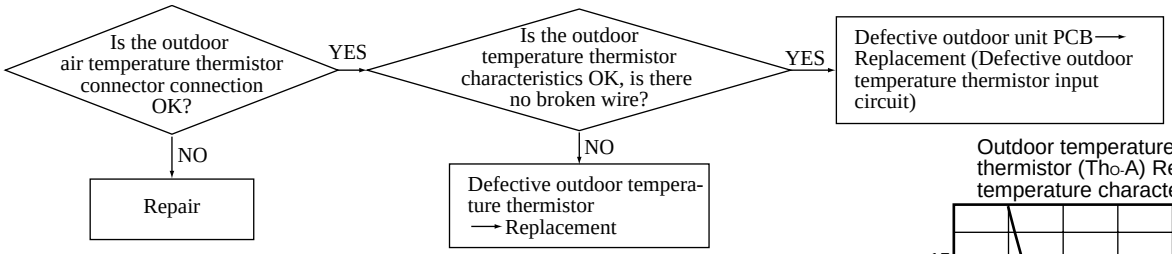


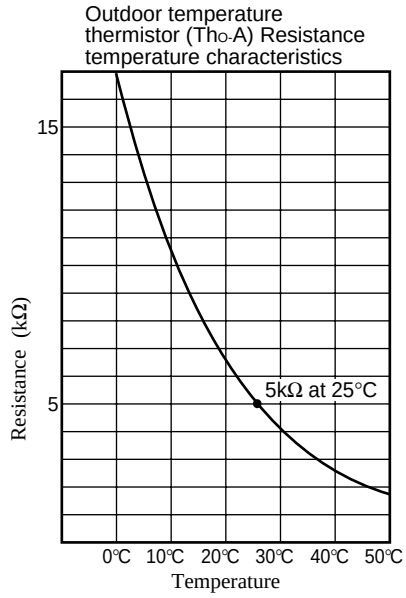


Note (1) 22kΩ at -6°C

5 Defective outdoor temperature thermistor

Outdoor unit	
Red LED	2 time flashes
Green LED	1 time flash

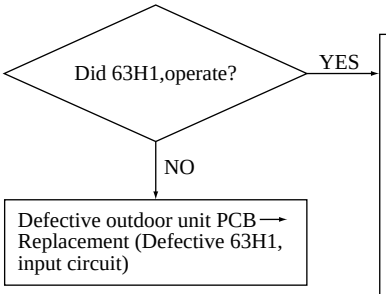




Note (1) 22kΩ at -6°C

6 63H1, 49C operation

	Outdoor unit
Red LED	4 time flashes
Green LED	1 time flash



At 63H1 operation

1. During cooling
- Is the outdoor unit fan motor operating?
- Is there no short circuit air circulation for thr outdoor unit?
- Is there sufficient space for air inlet & outlet?

2. During heating
- Is the gas side service valve fully opened?
- Is the indoor unit heat exchanger thermistor detached from the detector case?
- Is the filter clogged?
- Is the outdoor unit fan controlled by due to defective 63H2?

3. During colling/heating
- Is the refrigerant overcharge?

At 49C operation

During cooling/heating
- Isn't there insufficient refrigerant? (Isn't there gas leakage?)
- Isn't there a missing phase (L1 or L2 phase)?

7 Failure to open the service valve

	Outdoor unit
Red LED	5 time flashes
Green LED	1 time flash

This abnormality will be indicated only when the compressor is ON for the time after turning on the power. (Refer to page 23)