



# SERVICE MANUAL

## MICRO INVERTER PACKAGED AIR-CONDITIONERS (Split system, air to air heat pump type)

### CEILING CASSETTE-4 WAY TYPE

Single type	Twin type	Triple type
FDT100VNAWVH	FDT100VNAWPVH	FDT140VNAWTVH
100VSAWVH	100VSAWPVH	140VSAWTVH
125VNAWVH	125VNAWPVH	
125VSAWVH	125VSAWPVH	
140VNAWVH	140VNAWPVH	
140VSAWVH	140VSAWPVH	

### CEILING CASSETTE-4 WAY COMPACT TYPE

Twin type	Triple type
FDC100VNAWPVH	FDC140VNAWTVH
100VSAWPVH	140VSAWTVH
125VNAWPVH	
125VSAWPVH	

### DUCT CONNECTED-HIGH STATIC PRESSURE TYPE

Single type
FDU100VNAWVH
100VSAWVH
125VNAWVH
125VSAWVH
140VNAWVH
140VSAWVH

### DUCT CONNECTED-LOW/MIDDLE STATIC PRESSURE TYPE

Single type	Twin type	Triple type
FDUM100VNAWVH	FDUM100VNAWPVH	FDUM140VNAWTVH
100VSAWVH	100VSAWPVH	140VSAWTVH
125VNAWVH	125VNAWPVH	
125VSAWVH	125VSAWPVH	
140VNAWVH	140VNAWPVH	
140VSAWVH	140VSAWPVH	

### CEILING SUSPENDED TYPE

Single type	Twin type	Triple type
FDE100VNAWVH	FDE100VNAWPVH	FDE140VNAWTVH
100VSAWVH	100VSAWPVH	140VSAWTVH
125VNAWVH	125VNAWPVH	
125VSAWVH	125VSAWPVH	
140VNAWVH	140VNAWPVH	
140VSAWVH	140VSAWPVH	

### WALL MOUNTED TYPE

Single type	Twin type	Triple type
SRK100VNAWZR	SRK100VNAWPZSX	SRK140VNAWTZSX
100VSAWZR	100VSAWPZSX	140VSAWTZSX
	125VNAWPZSX	
	125VSAWPZSX	
	140VNAWPZR	
	140VSAWPZR	

### V Multi System

(OUTDOOR UNIT)	(INDOOR UNIT)	
FDC100VNA-W	FDT50VH	FDE50VH
100VSA-W	60VH	60VH
125VNA-W	71VH	71VH
125VSA-W		
140VNA-W		
140VSA-W		

## (i) Models FDC100VNA-W, 125VNA-W, 140VNA-W

PCA012D083 

## 1) Disassembly

- a) After the breaker is shut down, remove the service panel, top panel and rear panel. (Refer to Fig.1).
- b) Don't touch the main PCB until three minutes have passed after the breaker is shut down.  
(After having shut down the breaker, some capacitor is held by high voltage. It is very dangerous to touch the main PCB in this condition.)

In the situation that harnesses are connected to main PCB, **be sure to measure voltage (DC)** on main PCB, and **check that the voltage is discharged sufficiently (DC voltage 30 V or less)**. (Refer to Fig.2)

- c) Disconnect the connectors, faston terminals and round terminals from the main PCB as shown in Fig.2.  
And then remove the fixing screws (3 places) as shown in Fig.3.

After removing the main PCB, wipe off the heat conduction sheet neatly from the copper plate.

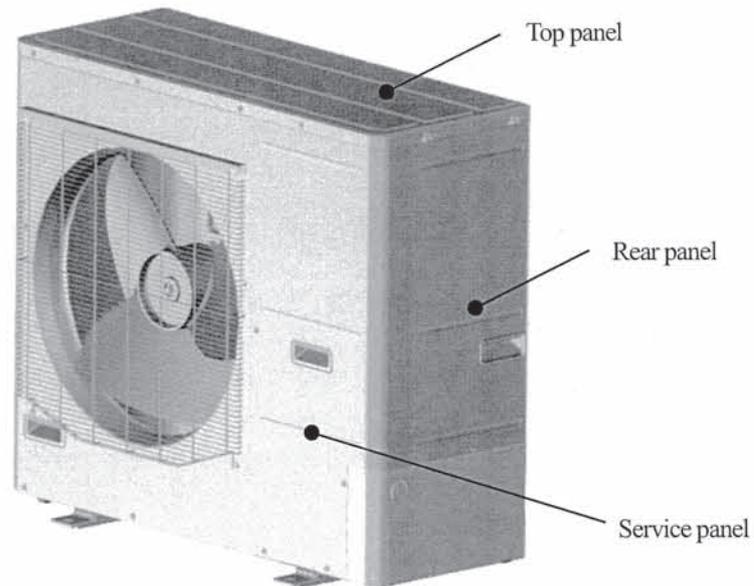


Fig.1 Outdoor unit overall view

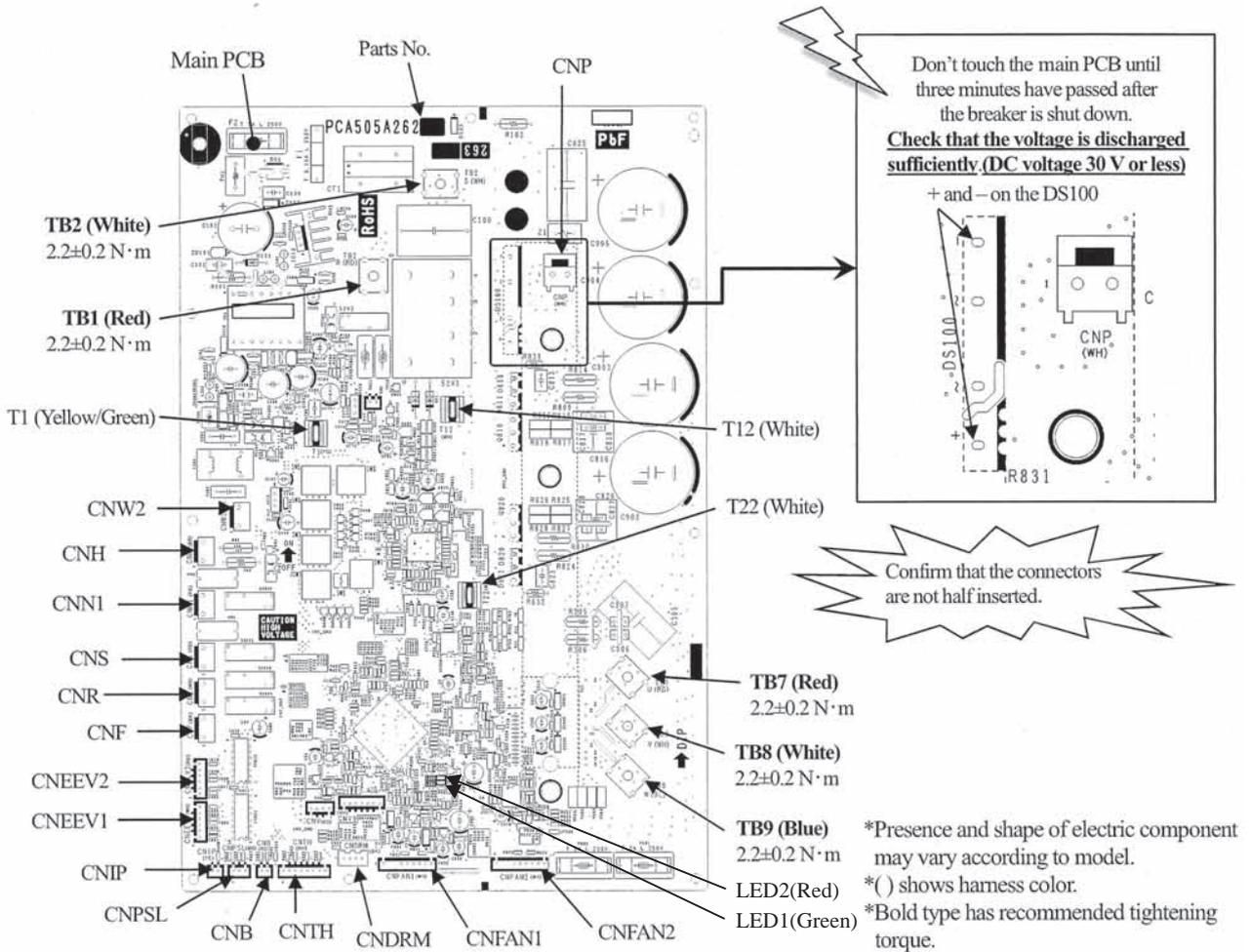


Fig.2 Parts arrangement view of main PCB and voltage measurement points

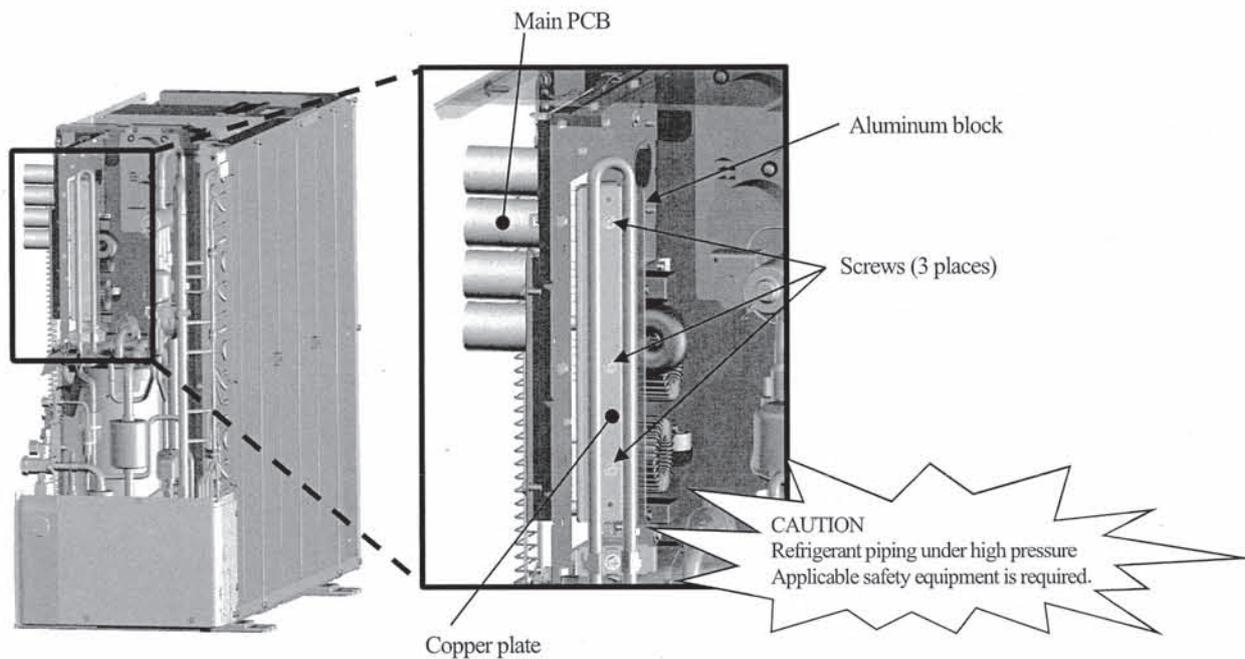


Fig.3 Outdoor unit side view

**2) Exchange**

- a) Match the setting of new main PCB switches (JSW1, SW3-7) with former main PCB. (Refer to Fig.4)
- b) Turn over the separator of new heat conduction sheet and paste the heat conduction sheet on the aluminum block. (Refer to Fig.5)
- c) Install the attached harness clip on the new main PCB as shown in Fig.6.

**3) Installation**

- a) Install the new main PCB on the control and tighten the screw as shown in Fig.7.
- b) Reconnect the connectors, faston terminals and round terminals to the main PCB as before. (Refer to Fig.2)  
(Confirm that the **connectors are not half inserted.**)

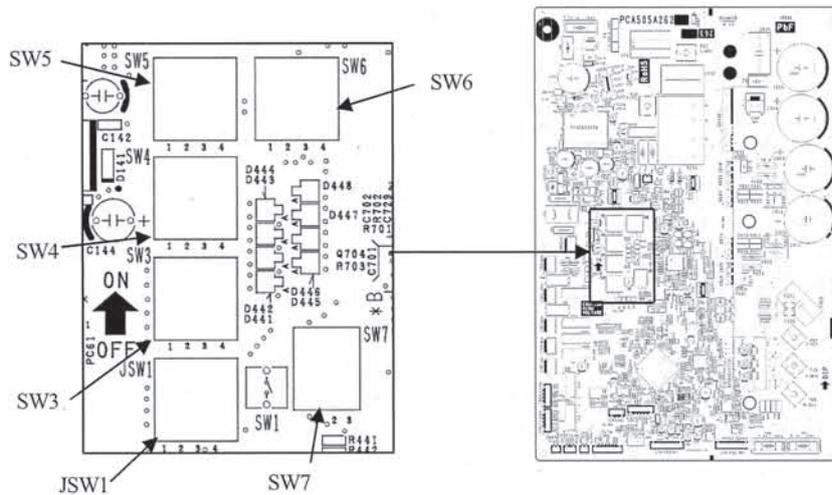


Fig.4 Switch position of main PCB

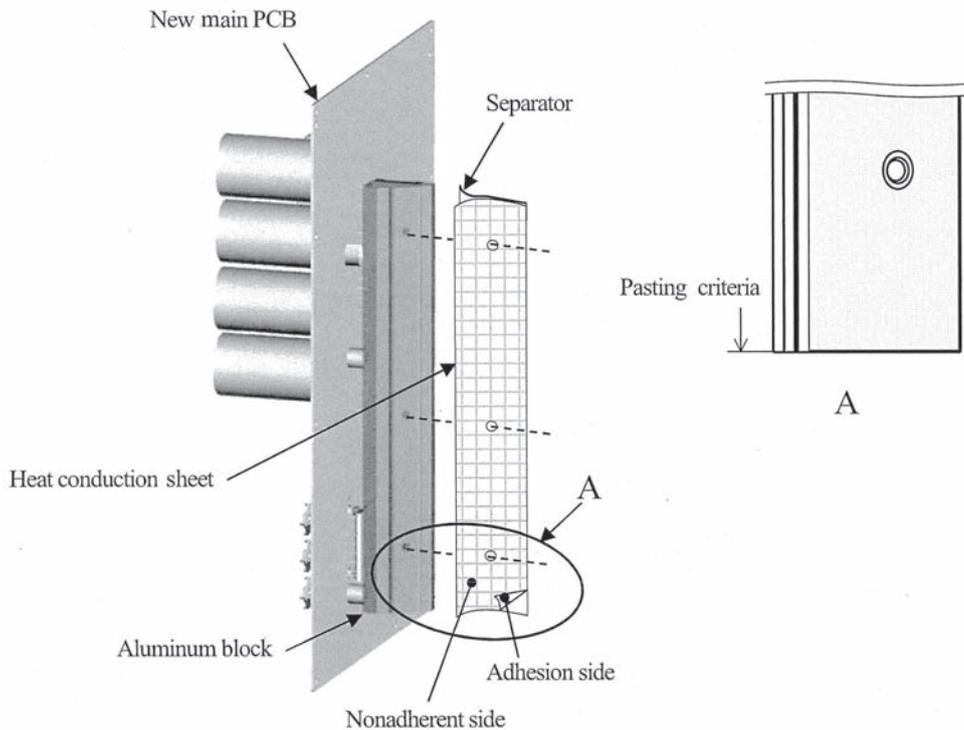


Fig.5 Detail of paste for the heat conduction sheet

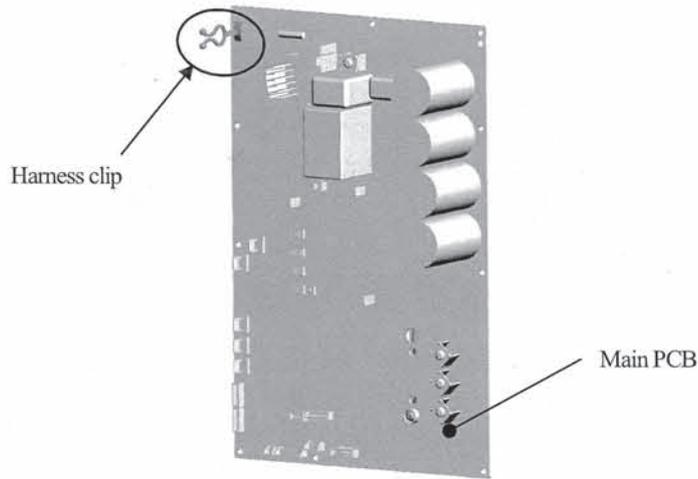


Fig.6 Install of the harness clip

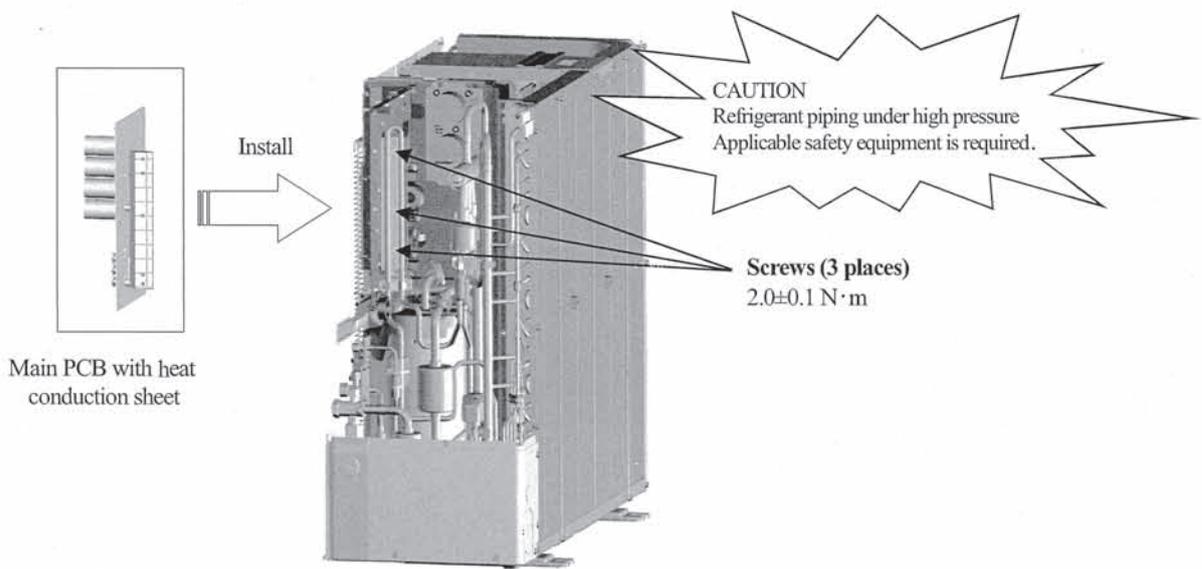
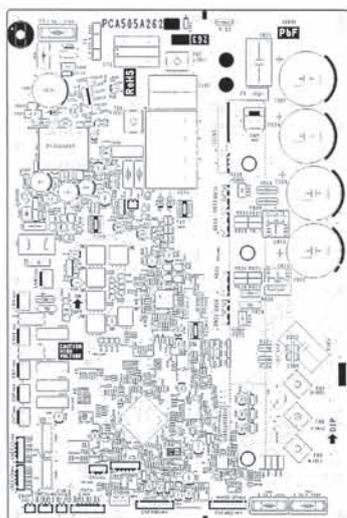


Fig.7 Install of the main PCB

● Accessories

Check the following accessories are packed in. (Except this manual)



Main PCB ×1



Heat conduction sheet  
×1



Harness clip  
×1

● DIP switch setting list (Outdoor unit)

Models FDC100, 125, 140VNA-W, 100, 125, 140VSA-W

Switch	Description	Default setting	Remark
SW1	(See table 1)	OFF	
JSW1-1	Model selection	As per model	See table 2
JSW1-2			
JSW1-3			
JSW1-4	Reserved	OFF	Keep OFF
SW3-1	Defrost condition	OFF	Refer to page 45
SW3-2	Snow protection control	OFF	Refer to page 44
SW3-3	Test run SW	OFF	Refer to page 48
SW3-4	Test run mode	OFF	Refer to page 48
SW4-1	Reserved	OFF	Keep OFF
SW4-2	Cancel measuring of refrigerant leak	OFF	Detection function of error in E57 refrigeration system protection (OFF: Detection / ON: Cancel to detect)
SW4-3	Reserved	OFF	Keep OFF
SW4-4	Reserved	OFF	Keep OFF
SW5-1	Utilization of existing piping control	OFF	See Note 1
SW5-2	Height difference of IU and OU control	OFF	When the outdoor unit is positioned higher than 30m (OFF : Normal / ON : high head)
SW5-3	Reserved	OFF	Keep OFF
SW5-4	Reserved	OFF	Keep OFF
SW6-1	Reserved	OFF	Keep OFF
SW6-2	Reserved	OFF	Keep OFF
SW6-3	Reserved	OFF	Keep OFF
SW6-4	Inverter checker mode	OFF	Refer to page 79
SW7-1	SW1 function selection	OFF	See table1
SW7-2	Frost protection by frequent external ON/OFF	OFF	In case external device switches ON/OFF frequently, switch to ON to start defrost operation even though short operation time.
SW7-3	Silent mode selection	OFF	Refer to page 48

\* Default setting

Table 1: SW1 function selection

0: OFF 1:ON

SW7-1	SW1 function	Remark
0	Pump down operation	Refer to page 49
1	Reset cumulative time of compressor operation	Reset of operation time after replacing a compressor

Table 2: Outdoor unit model selection with JSW1-1-JSW1-3

	0: OFF	1:ON
JSW1-1	100VNA   100VSA   125VNA   125VSA   140VNA   140VSA	140VNA   140VSA
JSW1-2	0   0   1   1   0   0	0   0
JSW1-3	0   0   0   0   1   1	1   1

Note 1: Utilization of existing pipe

- 1 In case of reusing annealed pipe  $\phi 19.05 \times t1.0$ , be sure to turn the DIP switch on the outdoor PCB ON as shown in the table because of its insufficient strength.  
If its material is 1/2H or its thickness is 1.2mm or more it is no necessary.
- 2 If bending radius of existing pipe is less than R70mm, be sure to turn the DIP switch on the outdoor PCB shown in the table due to its insufficient strength.

**(5) Check of anomalous operation data with the remote control**

**(a) In case of RC-EX3A remote control**

[Operating procedure]

① On the TOP screen, touch the buttons in the order of “Menu” → “Service setting” → “Service & Maintenance” → “Service password” → “Set” → “Error display” → “Error history”.

② When only one indoor unit is connected to the remote control, followings will be displayed.

1. When there is any anomaly: “Loading. Wait a while” is displayed, followed by the operation data at the occurrence of anomaly

Contents of display

- Error code
- Number and data item

2. When there is no anomaly: “No anomaly” is displayed, and this mode is terminated.

③ When two or more indoor units are connected to the remote control, followings will be displayed.

1. When there is any anomaly: If the unit having anomaly is selected on the “Select IU” screen, “Loading. Wait a while” is displayed, followed by the operation data at the occurrence of anomaly.

Contents of display

- Indoor unit No.
- Error code
- Number and data item

2. When there is no anomaly: “No anomaly” is displayed, and this mode is terminated.

Note (1) When the number of connected units cannot be shown in a page, select “Next”.

④ If you press [RUN/STOP] button, the display returns to the TOP screen.

☉ **If you touch “Back” button on the way of setting, the display returns to the last precious screen.**

Note (1) When two remote controls are used to control indoor units, the check of anomaly operation data can be made on the master remote control only. (It cannot be operated from the slave remote control.)

■ Anomaly operation data (Corresponding data may not be provided depending on models. Such items will not be displayed.)

Number	Data Item
01	非 (Operation Mode)
02	SET TEMP (Set Temperature)
03	RETURN AIR (Return Air Temperature)
04	SENSOR (Remote Control Temperature Sensor)
05	THI-R1 (Indoor Heat Exchanger Temperature Sensor / U Bend)
06	THI-R2 (Indoor Heat Exchanger Temperature Sensor / Capillary)
07	THI-R3 (Indoor Heat Exchanger Temperature Sensor / Gas Header)
08	I/U FANSPEED (Indoor Unit Fan Speed)
09	DEMAND Hz (Frequency Requirements)
10	ANSWER Hz (Response Frequency)
11	I/U EEV P (Pulse of Indoor Unit Expansion Valve)
12	TOTAL I/U RUN H (Total Running Hours of The Indoor Unit)
13	SUPPLY AIR (Supply Air Temperature)
21	OUTDOOR (Outdoor Air Temperature)
22	THO-R1 (Outdoor Heat Exchanger Temperature Sensor)
23	THO-R2 (Outdoor Heat Exchanger Temperature Sensor)
24	COMP Hz (Compressor Frequency)
25	HP MPa (High Pressure)
26	LP MPa (Low Pressure)
27	Td (Discharge Pipe Temperature)
28	COMP BOTTOM (Comp Bottom Temperature)
29	CT AMP (Current)
30	TARGET SH (Target Super Heat)
31	SH (Super Heat)
32	TDSH (Discharge Pipe Super Heat)
33	PROTECTION No. (Protection State No. of The Compressor)
34	O/U FANSPEED (Outdoor Unit Fan Speed)
35	63H1 (63H1 On/Off)
36	DEFROST (Defrost Control On/Off)
37	TOTAL COMP RUN H (Total Running Hours of The Compressor)
38	O/U EEV1 P (Pulse of The Outdoor Unit Expansion Valve EEVC)
39	O/U EEV2 P (Pulse of The Outdoor Unit Expansion Valve EEVH)

● **Details of compressor protection status No. 33**

No.	Contents of display	Reference page
"0"	Normal	
"1"	Discharge pipe temperature protection control	P.45, (6).(a).(i)
"2"	Discharge pipe temperature anomaly	P.45, (6).(a).(ii)
"3"	Current safe control of inverter primary current	P.47, (6).(f)
"4"	High pressure protection control	P.45, (6).(b).(i), P.45, (6).(c).(i)
"5"	High pressure anomaly	P.45, (6).(b).(ii)
"6"	Low pressure protection control	P.46, (6).(e).(i)
"7"	Low pressure anomaly	P.46, (6).(e).(ii)
"8"	Anti-frost prevention control	P.47, (6).(j)
"9"	Current cut	P.47, (6).(f)
"11"	Power transistor anomaly (Overheat)	P.47, (6).(h)
"13"	Spare	
"14"	Dewing prevention control	P.47, (6).(k)
"15"	Current safe control of inverter secondary current	P.46, (6).(f)
"16"	Stop by compressor rotor lock	
"17"	Stop by compressor startup failure	P.48, (6).(o)
"18"	Active filter anomaly	

Note(1) Operation data display on the remote control.

- Data is displayed until canceling the protection control.
- In case of multiple protections controlled, only the younger No. is displayed.

Note(2) Common item.

- ① In heating mode.  
During protection control by the command signal for reducing compressor frequency from indoor unit, No. "4" is displayed.
- ② In cooling and dehumidifying mode.  
During protection control by the command signal for reducing compressor frequency from indoor unit, No. "8" is displayed.

**(b) In case of RC-E5 remote control**

Operation data can be checked with remote control unit operation.

- ① Press the **CHECK** button.  
The display change “ OPER DATA ▼ ”
- ② Press the **(SET)** button while “ OPER DATA ▼ ” is displayed.
- ③ When only one indoor unit is connected to remote control, “ DATA LOADING ” is displayed (blinking indication during data loading).  
Next, operation data of the indoor unit will be displayed.  
Skip to step ⑦.

- ④ When plural indoor units are connected, the smallest address number of indoor unit among all connected indoor units is displayed.

[Example]:

“ SELECT I/U ” (blinking 1 seconds) → “ I/U000 ▲ ” blinking.

- ⑤ Select the indoor unit number you would like to have data displayed with the **▲ ▼** button.
- ⑥ Determine the indoor unit number with the **(SET)** button.  
(The indoor unit number changes from blinking indication to continuous indication)  
“ I/U000 ” (The address of selected indoor unit is blinking for 2 seconds.)

↓

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

Next, the operation data of the indoor unit is indicated.

- ⑦ Upon operation of the **▲ ▼** button, the current operation data is displayed in order from data number 01. The items displayed are in the above table.

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

- ⑧ To display the data of a different indoor unit, press the **AIR CON No.** button, which allows you to go back to the indoor unit selection screen.
- ⑨ Pressing the **ON/OFF** button will stop displaying data.  
Pressing the **(RESET)** button during remote control unit operation will undo your last operation and allow you to go back to the previous screen.
- If two (2) remote controls are connected to one (1) inside unit, only the master control is available for trial operation and confirmation of operation data. (The slave remote control is not available.)

● **Details of compressor protection status No. 33**

Refer to page 77.

Number	Data Item
01	(Operation Mode)
02	SET TEMP  (Set Temperature)
03	RETURN AIR  (Return Air Temperature)
04	SENSOR  (Remote Control Temperature Sensor)
05	THI-R1  (Indoor Heat Exchanger Temperature Sensor / U Bend)
06	THI-R2  (Indoor Heat Exchanger Temperature Sensor /Capillary)
07	THI-R3  (Indoor Heat Exchanger Temperature Sensor /Gas Header)
08	I/U FANSPEED  (Indoor Unit Fan Speed)
09	DEMAND  Hz (Frequency Requirements)
10	ANSWER  Hz (Response Frequency)
11	I/U EEV  P (Pulse of Indoor Unit Expansion Valve)
12	TOTAL I/U RUN  H (Total Running Hours of The Indoor Unit)
21	OUTDOOR  (Outdoor Air Temperature)
22	THO-R1  (Outdoor Heat Exchanger Temperature Sensor)
23	THO-R2  (Outdoor Heat Exchanger Temperature Sensor)
24	COMP  Hz (Compressor Frequency)
25	HP  MPa (High Pressure)
26	LP  MPa (Low Pressure)
27	Td  (Discharge Pipe Temperature)
28	COMP BOTTOM  (Compressor Bottom Temperature)
29	CT  AMP (Current)
30	TARGET SH  (Target Super Heat)
31	SH  (Super Heat)
32	TDSH  (Discharge Pipe Super Heat)
33	PROTECTION No.  (Protection State No. of The Compressor)
34	O/U FANSPEED  (Outdoor Unit Fan Speed)
35	63H1 (63H1 On/Off)
36	DEFROST (Defrost Control On/Off)
37	TOTAL COMP RUN  H (Total Running Hours of The Compressor)
38	O/U EEV1  P (Pulse of The Outdoor Unit Expansion Valve EEVC)
39	O/U EEV2  P (Pulse of The Outdoor Unit Expansion Valve EEVH)

**(6) Inverter checker for diagnosis of inverter output**

● Checking method

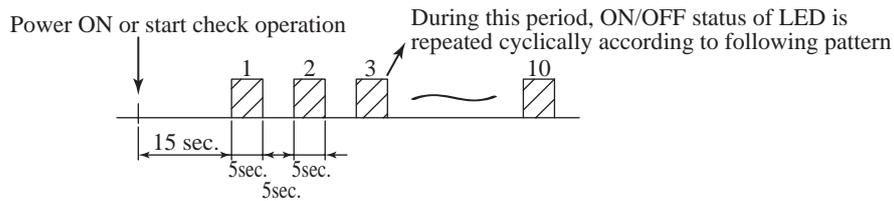
(a) Setup procedure of checker.

- 1) Power OFF (Turn off the breaker).
- 2) Remove the terminal cover of compressor and disconnect the wires (U, V, W) from compressor.
- 3) Connect the wires U (Red) , V (White) and W (Black) of checker to the terminal of disconnected wires (U, V, W) from compressor respectively.

(b) Operation for judgment.

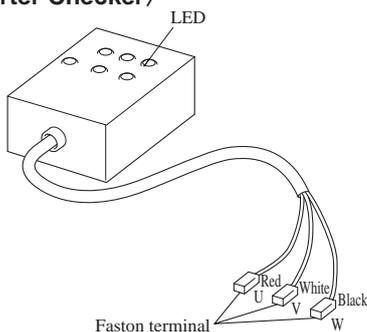
- 1) Power ON after SW6-4 on outdoor inverter PCB was turned ON.
- 2) After 15 seconds since power has turned ON, LED start ON/OFF for 5 seconds cyclically and it repeats 10 times.
- 3) Check ON/OFF status of 6 LED's on the checker.
- 4) Judge the PCB by ON/OFF status of 6 LED's on the checker.

ON/OFF status of LED	If all of LED are ON/OFF according to following pattern	If all of LED stay OFF or some of LED are ON/OFF
Inverter PCB	Normal	Anomalous

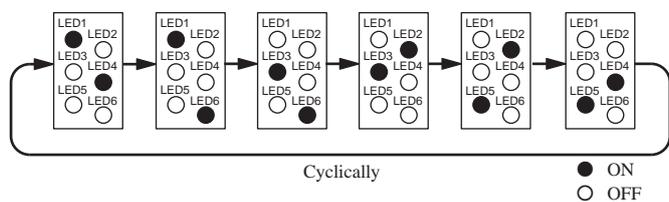


- 5) Be sure to turn off SW6-4 on outdoor inverter PCB, after finishing the check operation.

**<Inverter Checker>**



**LED ON/OFF pattern**



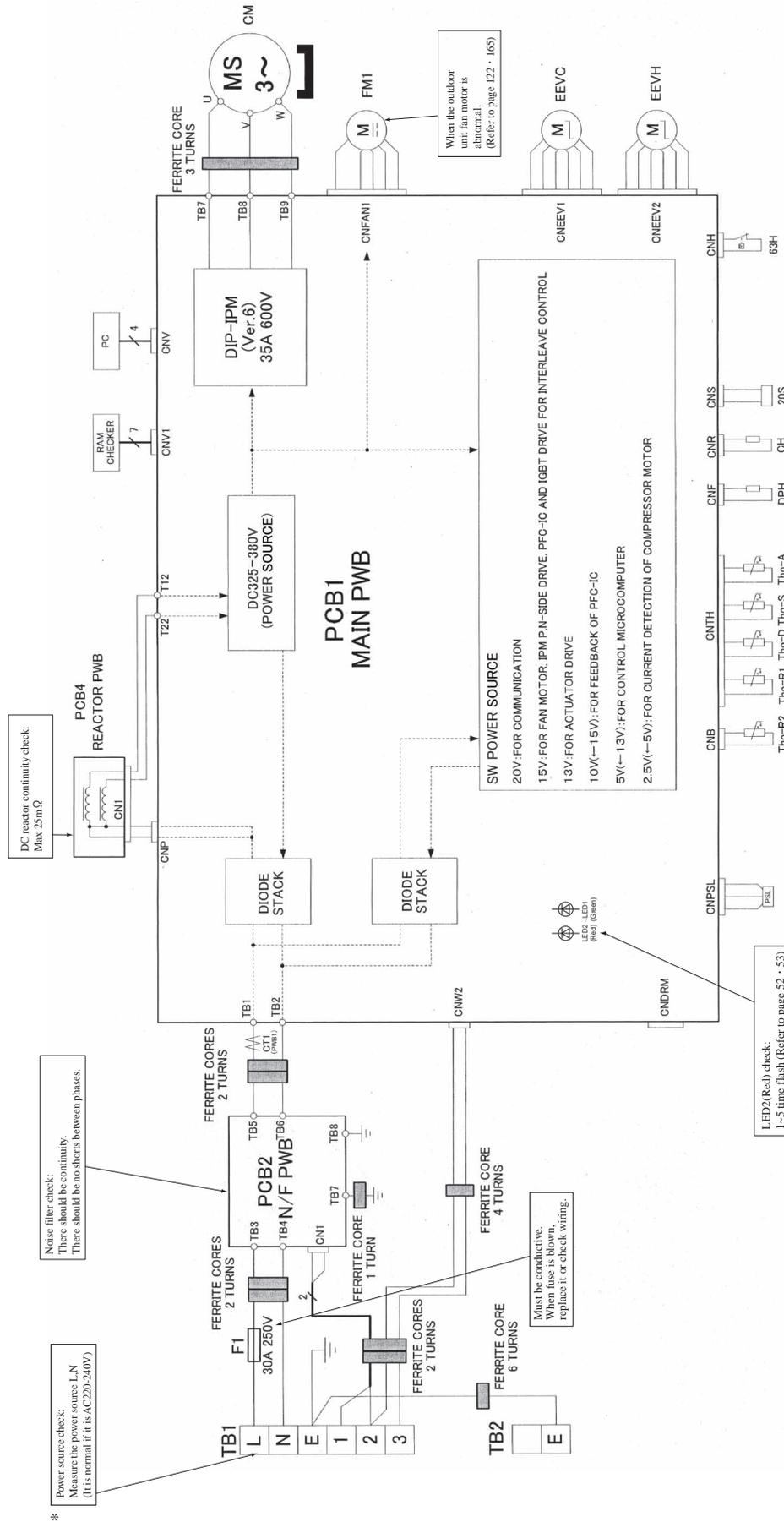
Connect to the terminal of the wires which are disconnected from compressor.

(7) Outdoor unit control failure diagnosis circuit diagram

Models FDC100, 125, 140VNA-W

● Outdoor unit check points

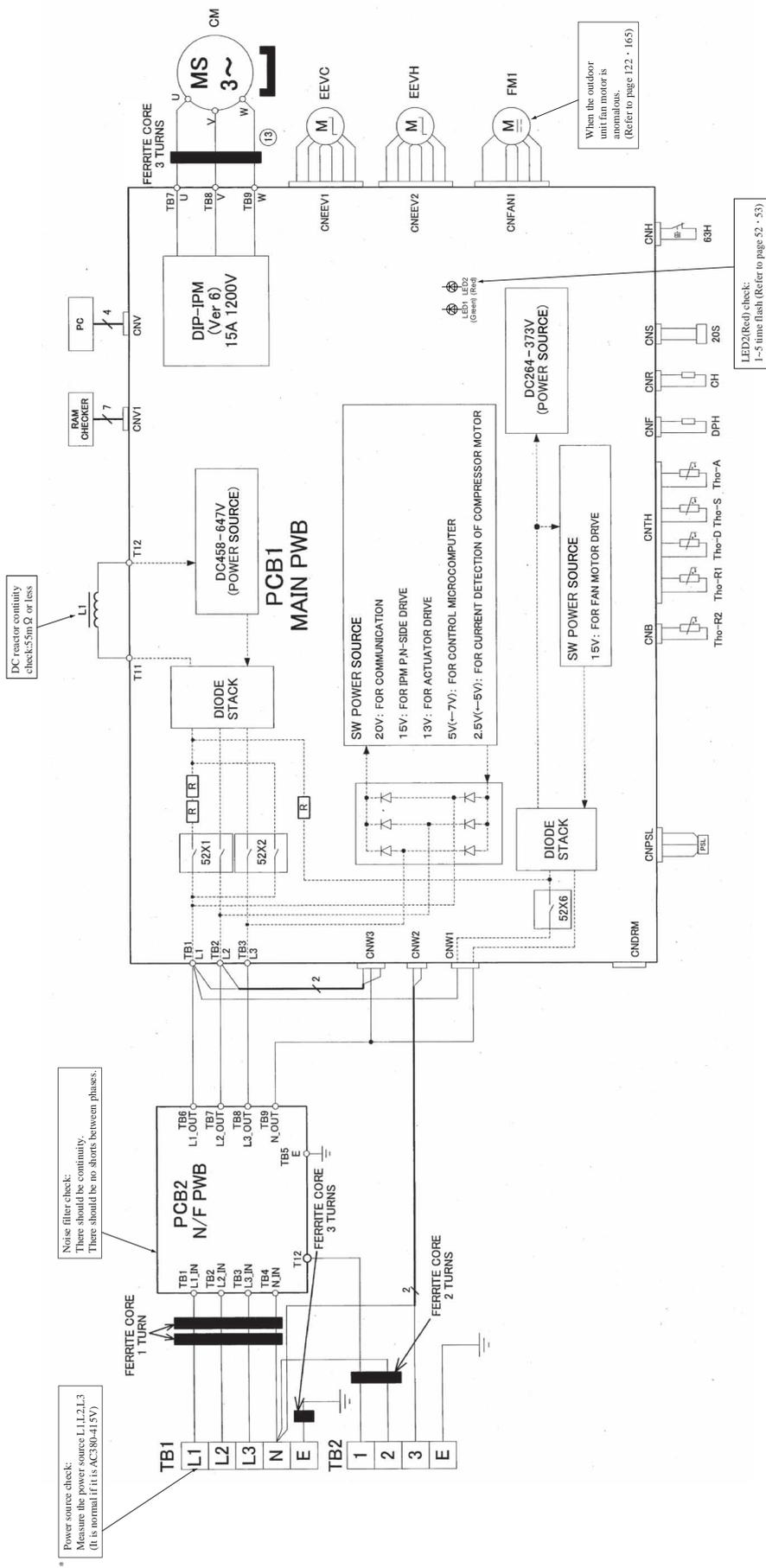
Check items with the \*mark when the power is ON.



**FDC100,125,140VSA-W**

● Outdoor unit check points

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



(2) Outdoor units

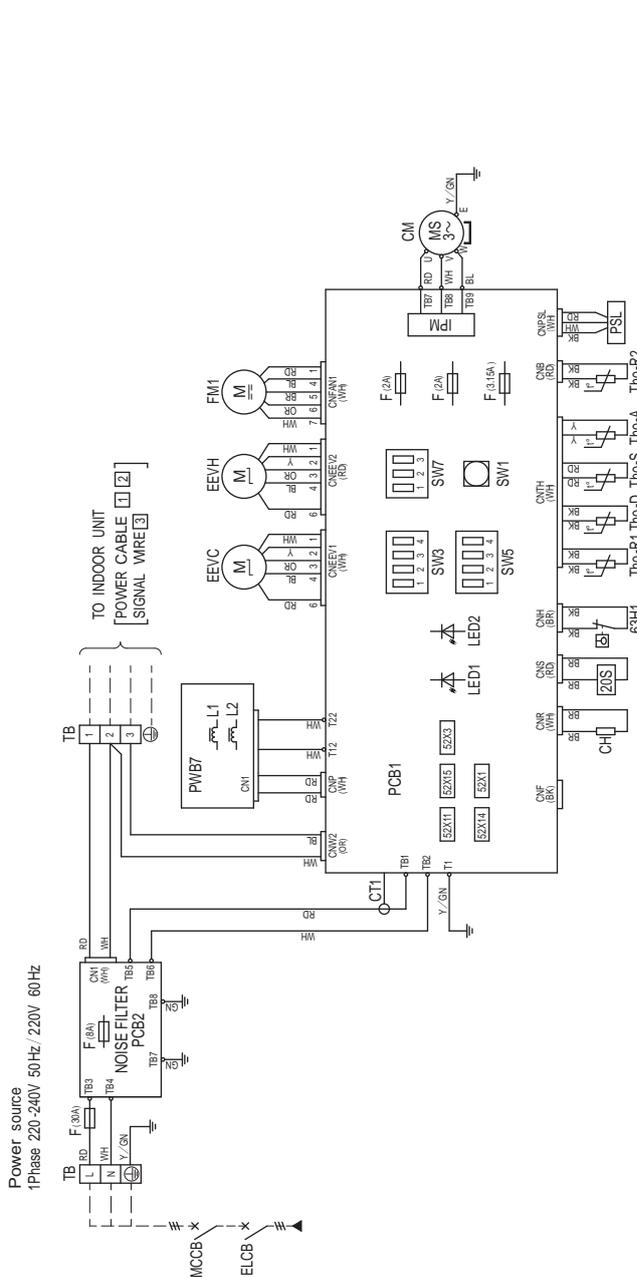
Models FDC100VNA-W, 125VNA-W, 140VNA-W

Meaning of marks

Item	Description
CH	Crankcase heater
CM	Compressor motor
CN	Connector
CT1	Current sensor
EEVC	Expansion valve for cooling
EEVH	Expansion valve for heating
F	Fuse
FM1	Fan motor
IPM	Intelligent power module
LED1	Indication lamp (GREEN)
LED2	Indication lamp (RED)
L1,2	Reactor
PSL	Low pressure sensor
SW1	Switch
SW3,5,7	Local setting switch
TB	Terminal block
Tho-A	Temperature sensor (Outdoor air)
Tho-D	Temperature sensor (Discharge pipe)
Tho-R1,R2	Temperature sensor (Heat exchanger)
Tho-S	Temperature sensor (Suction pipe)
20S	Solenoid valve for 4-way valve
52X1	Auxiliary relay
52X3	Auxiliary relay
52X11	Auxiliary relay (for 20S)
52X14	Auxiliary relay (for CH)
52X15	Auxiliary relay
63H1	High pressure switch

Color marks

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



Local setting switch SW3,5,7 (Set up at shipment OFF)

Item	Description
SW3-1	Defrost control change
SW3-2	Snow guard fan control
SW3-3,4	Trial operation
SW5-2	High height difference operation control
SW7-2	Defrost control change
SW7-3	Lower noise silent mode

Power cable, indoor-outdoor connecting wires

Model	MAX over current (A)	Power cable size (mm <sup>2</sup> )	Power cable length (m)	indoor-outdoor wire size x number	Earth wire size (mm)
100	24	5.5	22	φ 1.6mm x 3	φ 1.6
125	26	5.5	20	φ 1.6mm x 3	φ 1.6
140	27	5.5	20	φ 1.6mm x 3	φ 1.6

- The specifications shown in the above table are for units without heaters. For units with heaters, refer to the installation instructions or the construction instructions of the indoor unit.
- Switchgear of circuit breaker capacity which is calculated from MAX. over current should be chosen along the regulations in each country.
- The cable specifications are based on the assumption that a metal or plastic conduit is used with no more than three cables contained in a conduit and a voltage drop is 2%. For an installation falling outside of these conditions, please follow the internal cabling regulations. Adapt it to the regulation in effect in each country.

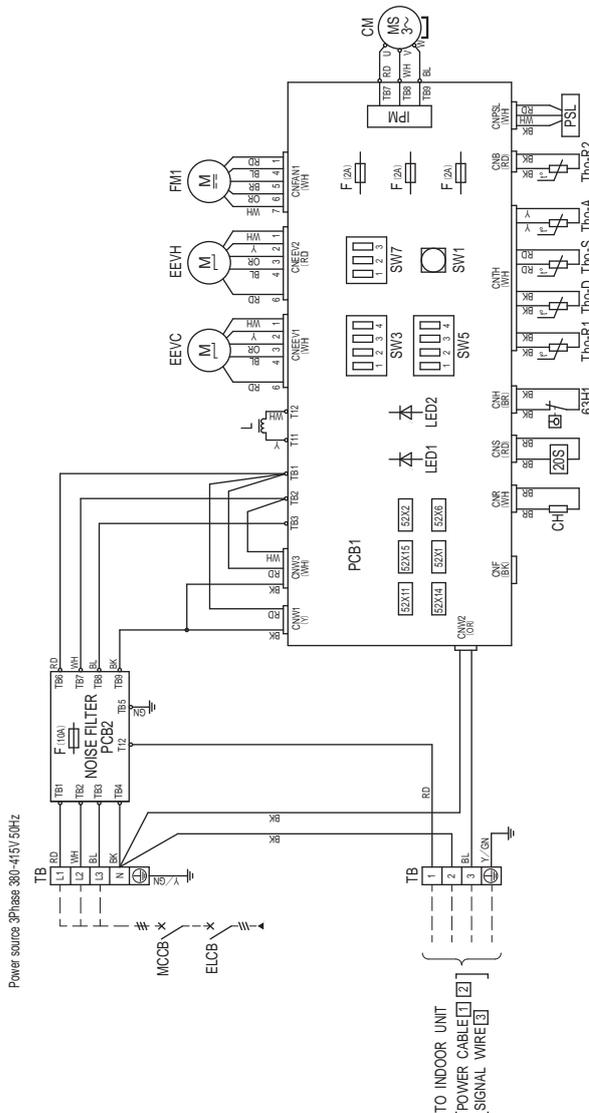
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Models FDC100VSA-W, 125VSA-W, 140VSA-W

Meaning of marks

Item	Description
CH	Crankcase heater
CM	Compressor motor
CN	Compressor
EEVC	Expansion valve for cooling
EEVH	Expansion valve for heating
F	Fuse
FM1	Fan motor
IPM	Intelligent power module
L	Reactor
LED1	Indication lamp (GREEN)
LED2	Indication lamp (RED)
PSL	Low pressure sensor
SW1	Switch
SW3.5.7	Local setting switch
TB	Terminal block
Tho-A	Temperature sensor (Outdoor air)
Tho-D	Temperature sensor (Discharge pipe)
Tho-R1	Temperature sensor (Heat exchanger)
Tho-S	Temperature sensor (Suction pipe)
20S	Solenoid valve for 4-way valve
52X1	Auxiliary relay
52X2	Auxiliary relay
52X6	Auxiliary relay (for FM1)
52X11	Auxiliary relay (for 20S)
52X14	Auxiliary relay (for CH)
52X15	Auxiliary relay
63H1	High pressure switch

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



Local setting switch SW3.5.7 (Set up at shipment OFF)

Item	Description
SW3-1	Defrost control change
SW3-2	Snow guard fan control
SW3-3,4	Trial operation
SW5-2	High height difference operation control
SW7-2	Defrost control change
SW7-3	Lower noise silent mode

Model	MAX over current (A)	Power cable size (mm <sup>2</sup> )	Power cable length (m)	indoor-outdoor wire size x number	Earth wire size (mm)
100	15	3.5	46	φ 1.6mm x 3	φ 1.6
125	17	3.5	40	φ 1.6mm x 3	φ 1.6
140	18	3.5	38	φ 1.6mm x 3	φ 1.6

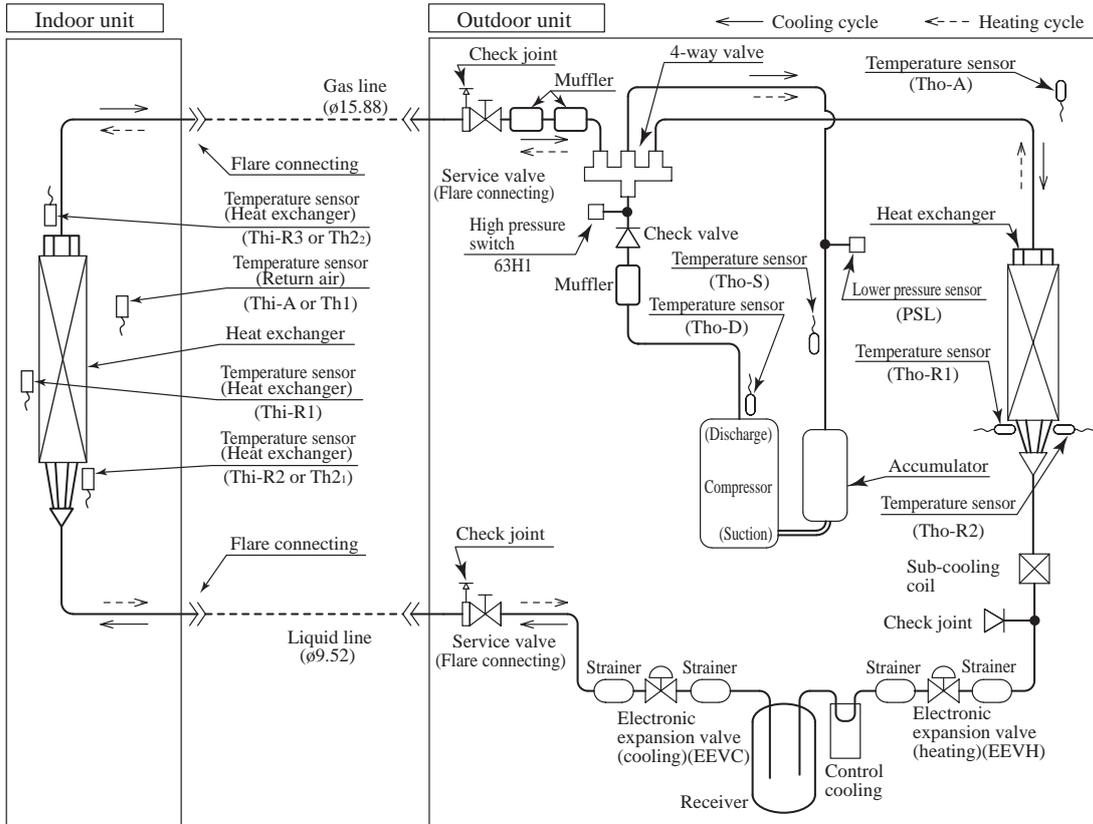
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# 1.5 PIPING SYSTEM

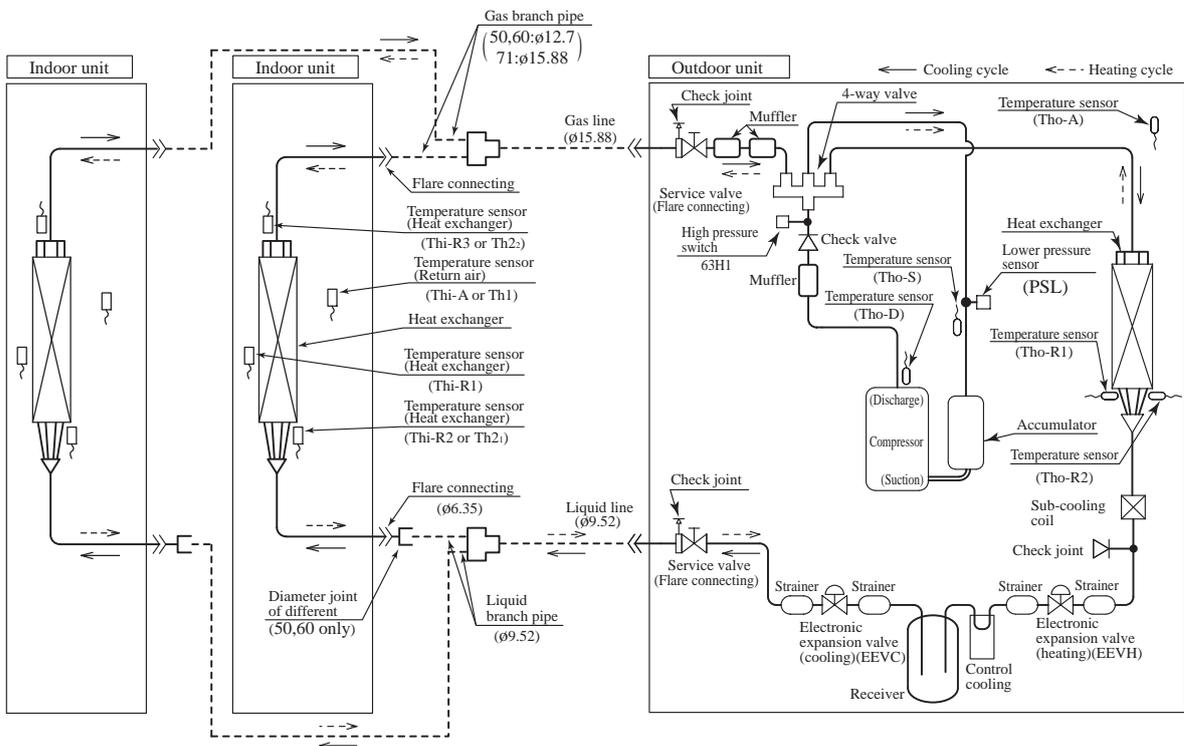
## (1) Single type

Models 100, 125, 140

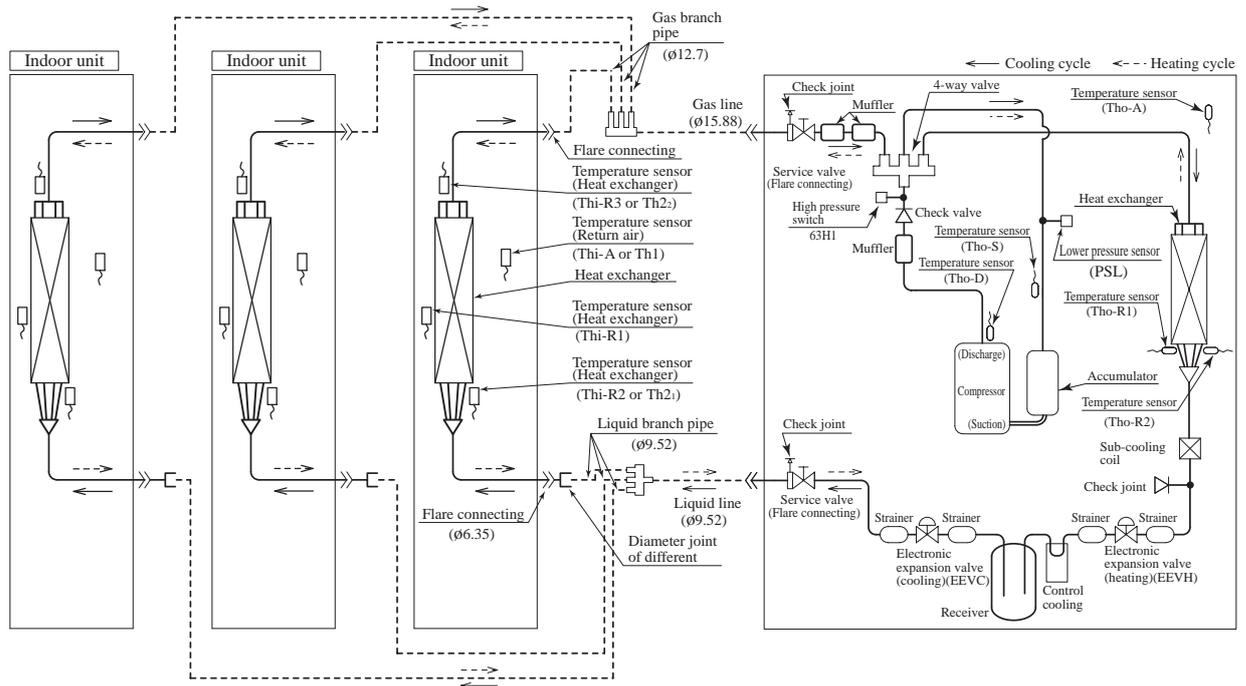


## (2) Twin type

Models 100, 125, 140



(3) Triple type  
Model 140



### Preset point of the protective devices

Parts name	Mark	Equipped unit	100, 125, 140 model
Temperature sensor (for protection over-loading in heating)	Thi-R (Tho-A)	Indoor unit	OFF 63°C (OFF 16°C) ON 56°C (ON 17°C)
Temperature sensor (for frost prevention)	Thi-R (Th2)		OFF 1.0°C (OFF 2.5°C) ON 10°C (ON 8°C)
Temperature sensor (for protection high pressure in cooling.)	Tho-R	Outdoor unit	OFF 51°C ON 65°C
Temperature sensor (for detecting discharge pipe temp.)	Tho-D	Outdoor unit	OFF 115°C ON 85°C
High pressure switch (for protection)	63H1	Outdoor unit	OFF 4.15MPa ON 3.15MPa
Low pressure sensor (for protection)	PSL	Outdoor unit	OFF 0.227MPa ON 0.079MPa

Note (1) Values in ( ) are for the SRK models.

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# **MICRO INVERTER PACKAGED AIR-CONDITIONERS**

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**MITSUBISHI HEAVY INDUSTRIES THERMAL SYSTEMS, LTD.**

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