

April 2009

No. OCH460

TECHNICAL & SERVICE MANUAL

Series PKFY Wall Mounted R410A / R22

Indoor unit
[Model names]

PKFY-P12NHMU-E

PKFY-P15NHMU-E

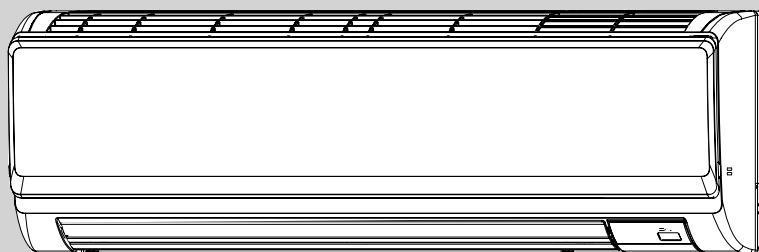
PKFY-P18NHMU-E

[Service Ref.]

PKFY-P12NHMU-E
PKFY-P15NHMU-E
PKFY-P18NHMU-E

Note:

- This manual describes only service data of the indoor units.
- RoHS compliant products have <G> mark on the spec name plate.



INDOOR UNIT

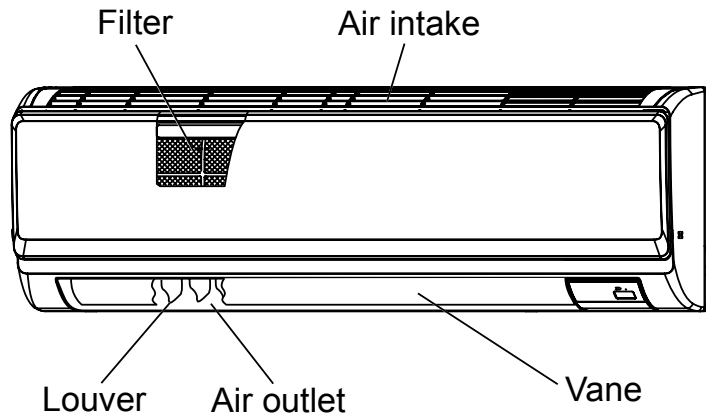
CONTENTS

1. PART NAMES AND FUNCTIONS	2
2. SPECIFICATION	4
3. OUTLINES AND DIMENSIONS	6
4. WIRING DIAGRAM	7
5. REFRIGERANT SYSTEM DIAGRAM	8
6. MICROPROCESSOR CONTROL	9
7. TROUBLESHOOTING	14
8. DISASSEMBLY PROCEDURE	21

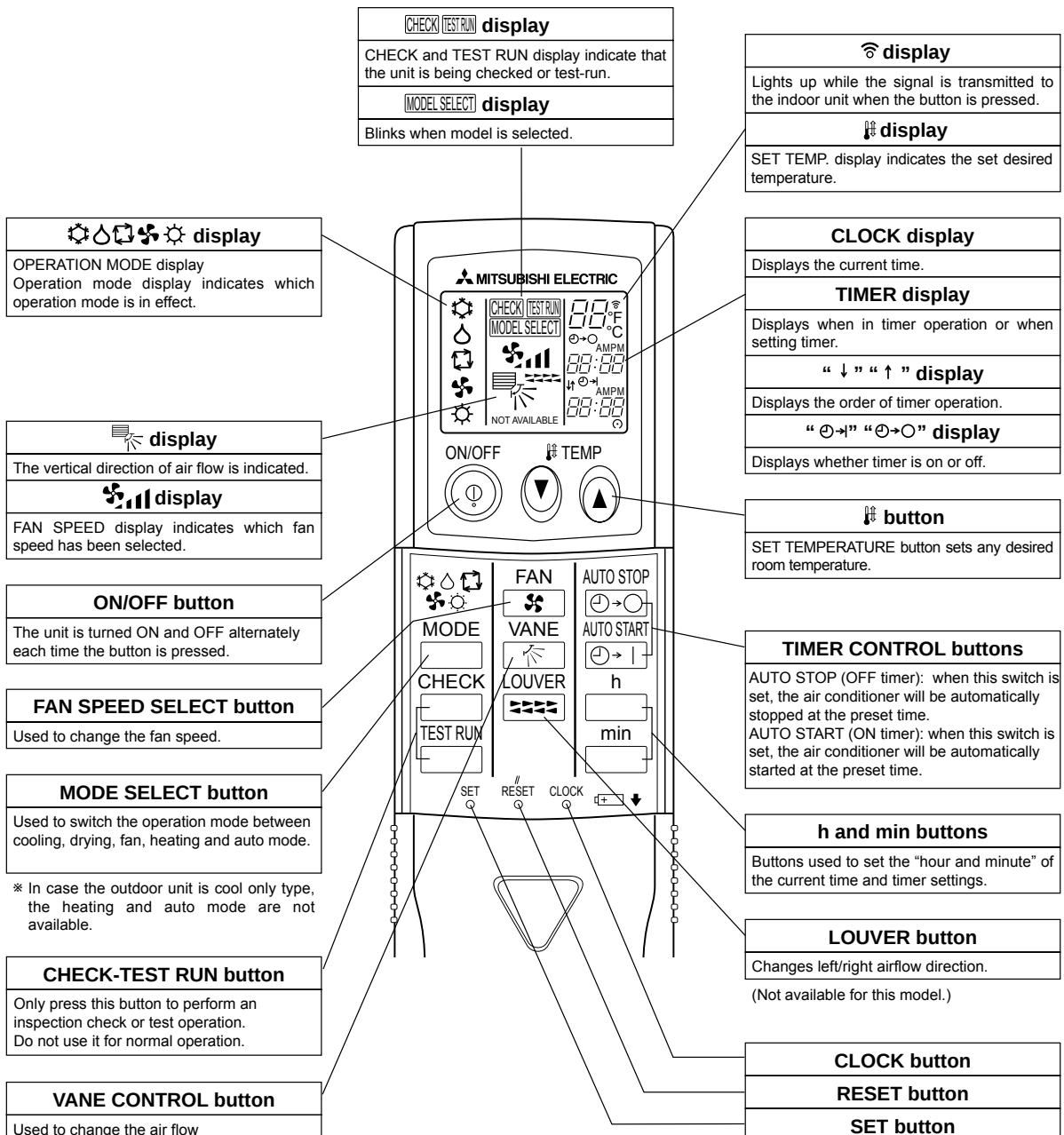
PARTS CATALOG (OCB460)


CITY MULTI

• Indoor unit



• Wireless remote controller



• Wired remote controller

Display Section

For purposes of this explanation, all parts of the display are shown as lit. During actual operation, only the relevant items will be lit.

Identifies the current operation

Shows the operating mode, etc.
*Multilanguage display is available.

"Centrally Controlled" indicator

Indicates that operation from the remote controller has been prohibited by a master controller.

"Timer is Off" indicator

Indicates that the timer is off.

Temperature Setting

Shows the target temperature.

Day-of-Week

Shows the current day of the week.

Time/Timer Display

Shows the current time, unless the simple or Auto Off timer is set.
If the simple or Auto Off timer is set, the time to be switched off is shown.

"Sensor" indication

Displayed when the remote controller sensor is used.

"Locked" indicator

Indicates that remote controller buttons have been locked.

"Clean The Filter" indicator

To be displayed on when it is time to clean the filter.

Timer indicators

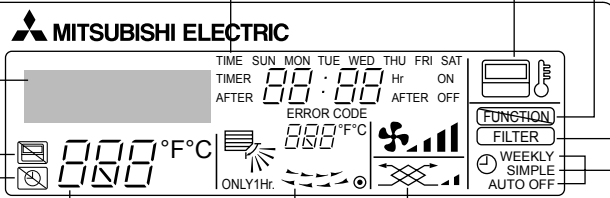
The indicator comes on if the corresponding timer is set.

Fan Speed indicator

Shows the selected fan speed.

Ventilation indicator

Appears when the unit is running in Ventilation mode.



Up/Down Air Direction indicator

The indicator \ shows the direction of the outgoing airflow.

"One Hour Only" indicator

Displayed if the airflow is set to Low or downward during COOL or DRY mode. (Operation varies according to model.)
The indicator goes off in one hour, at which time the airflow direction also changes.

Room Temperature display

Shows the room temperature. The room temperature display range is 46–102°F. The display blinks if the temperature is less than 46°F or 102°F or more.

Louver display

Indicates the action of the swing louver. Does not appear if the louver is not running.

● (Power On indicator)

Indicates that the power is on.

Operation Section

Temperature setting buttons

▽ Down
△ Up

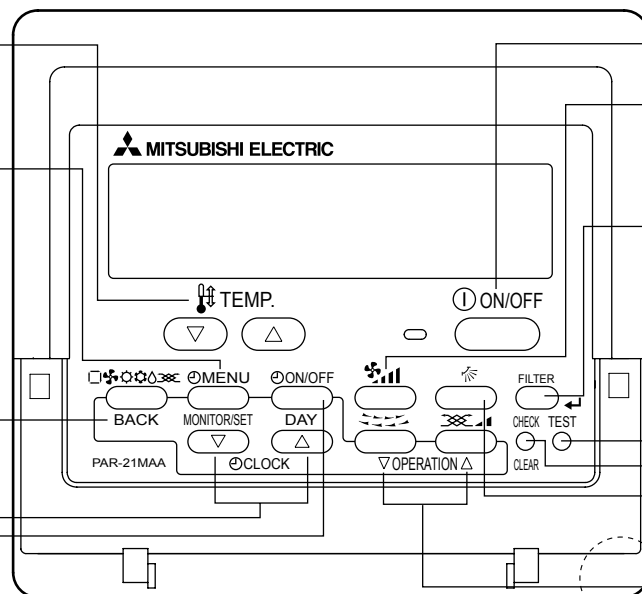
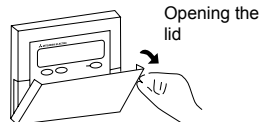
Timer Menu button (Monitor/Set button)

Mode button (Return button)

Set Time buttons

▽ Back
△ Ahead

Timer On/Off button (Set Day button)



ON/OFF button

Fan Speed button

Filter button (<Enter> button)

Test Run button

Check button (Clear button)

Airflow Up/Down button

Louver button (▽ Operation button)

▽ To return operation number

Ventilation button (△ Operation button)

△ To go to next operation number

Note:

- "PLEASE WAIT" message
This message is displayed for approximately 3 minutes when power is supplied to the indoor unit or when the unit is recovering from a power failure.
- "NOT AVAILABLE" message
This message is displayed if an invalid button is pressed (to operate a function that the indoor unit does not have).
If a single remote controller is used to operate multiple indoor units simultaneously that are different types, this message will not be displayed as far as any of the indoor units is equipped with the function.

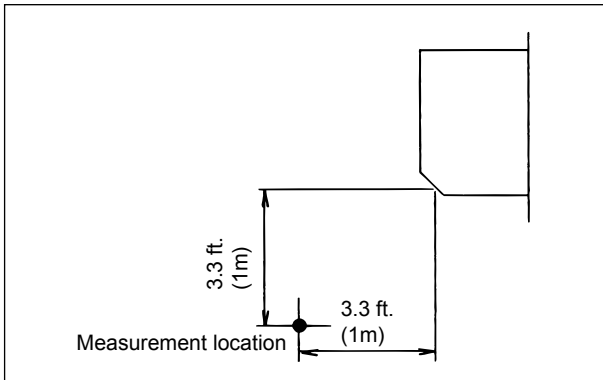
2-1. Specifications

Service Ref.			PKFY-P12NHMU-E	PKFY-P15NHMU-E	PKFY-P18NHMU-E
Power source			1-phase 208-230V 60Hz		
Cooling capacity (Nominal)	*1	kW	3.5	4.4	5.3
	*1	Btu/h	12,000	15,000	18,000
	Power input	kW	0.03	0.03	0.03
	Current input	A	0.30	0.30	0.30
Heating capacity (Nominal)	*2	kW	4.0	5.0	5.9
	*2	Btu/h	13,500	17,000	20,000
	Power input	kW	0.03	0.03	0.03
	Current input	A	0.30	0.30	0.30
External finish			Plastic, MUNSELL (1.0Y 9.2/0.2)		
External dimension H × W × D		mm	295 × 898 × 249		
		in.	11-5/8" × 35-3/8" × 9-13/16"		
Net weight		kg (lb)	13 (29)		
Heat exchanger			Cross fin (Aluminum fin and copper tube)		
Fan	Type × Quantity		Line flow fan × 1		
	External static press.	Pa	0		
		mmH ₂ O	0		
	Motor type		DC motor		
	Motor output		0.030		
	Driving mechanism		Direct-drive		
	Airflow rate (Low-Mid-High)	m ³ /min	9 - 10 - 11	9 - 10.5 - 11.5	9 - 10.5 - 12
		L/s	150 - 167 - 183	150 - 175 - 192	150 - 175 - 200
		cfm	320 - 355 - 390	320 - 370 - 405	320 - 370 - 425
Noise level (Low-Mid-High) (measured in anechoic room)		dB <A>	34 - 38 - 42	34 - 38 - 42	36 - 41 - 45
Insulation material			Polyethylene sheet		
Air filter			PP honeycomb		
Protection device			Fuse		
Refrigerant control device			LEV		
Connectable outdoor unit			R410A, R22 CITY MULTI		
Diameter of refrigerant pipe	Liquid (R410A) (R22)	mm (in.)	ø6.35 (ø1/4") Flare ø6.35 (ø1/4") Flare	ø6.35 (ø1/4") Flare ø6.35 (ø1/4") Flare	ø6.35 (ø1/4") Flare ø9.52 (ø3/8") Flare *3
	Gas (R410A) (R22)	mm (in.)	ø12.7 (ø1/2") Flare ø12.7 (ø1/2") Flare	ø12.7 (ø1/2") Flare ø12.7 (ø1/2") Flare	ø12.7 (ø1/2") Flare ø15.88 (ø5/8") Flare *3
Field drain pipe size		mm (in.)	I.D. 16mm (5/8")		
Standard attachment	Document		Installation Manual, Instruction Book		
	Accessory		—	—	—
Optional parts	External heater adapter		PAC-YU25HT		
Remarks	Installation		Details on foundation work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual.		
Note :			Unit converter		
*1 Nominal cooling conditions			*2 Nominal heating conditions		
Indoor : 80°FDB/67°F WB (26.7°CDB/19.4°CWB)			70°FDB(21°CDB)		
Outdoor : 95°FDB (35°CDB)			47°FDB/43°F WB (8.3°CDB/6.1°CWB)		
Pipe length : 25 ft. (7.6 m)			25 ft. (7.6 m)		
Level difference : 0 ft (0 m)			0 ft (0 m)		
* Due to continuing improvement, above specification may be subject to change without notice.			*Above specification data is subject to rounding variation.		

2-2. Electrical parts specifications

Service Ref. Parts name	Symbol	PKFY-P12NHMU-E	PKFY-P15NHMU-E	PKFY-P18NHMU-E
Room temperature thermistor	TH21	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ		
Liquid pipe thermistor	TH22	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ		
Gas pipe thermistor	TH23 TH24	Resistance 30°F/15.8kΩ, 50°F/9.6kΩ, 70°F/6.0kΩ, 80°F/4.8kΩ, 90°F/3.9kΩ, 100°F/3.2kΩ		
Fuse (Indoor controller board)	FUSE	250V 3.15A		
Fan motor	MF	8-Pole Output 30W / RCOJ30-CK		
Vane motor (with limit switch)	MV	MSFBC20 DC12V		
Linear expansion valve	LEV	DC12V Stepping motor drive Port φ3.2 (0~2000pulse)		
Power supply terminal block	TB2	(L1, L2, GR) 250V 20A		
Transmission terminal block	TB5	(M1, M2, S) 250V 20A		
MA remote controller terminal block	TB15	(1, 2) 250V 10A		

2-3. Sound levels



* Measured in anechoic room.

Sound level at anechoic room : Low-Middle-High

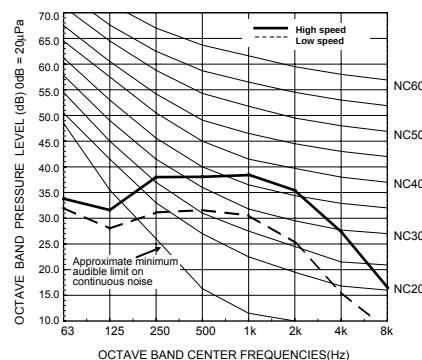
Service Ref.	Sound level dB (A)
PKFY-P12NHMU-E	34-38-42
PKFY-P15NHMU-E	34-38-42
PKFY-P18NHMU-E	36-41-45

2-4. NC curves

PKFY-P12, 15NHMU-E

External static pressure : 0Pa

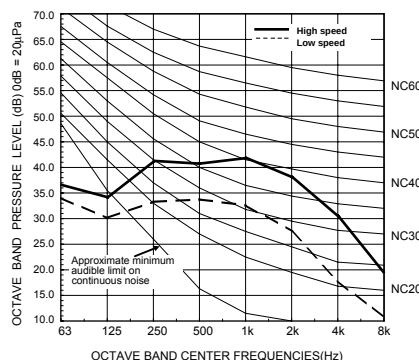
Power source : 208,230V, 60Hz



PKFY-P18NHMU-E

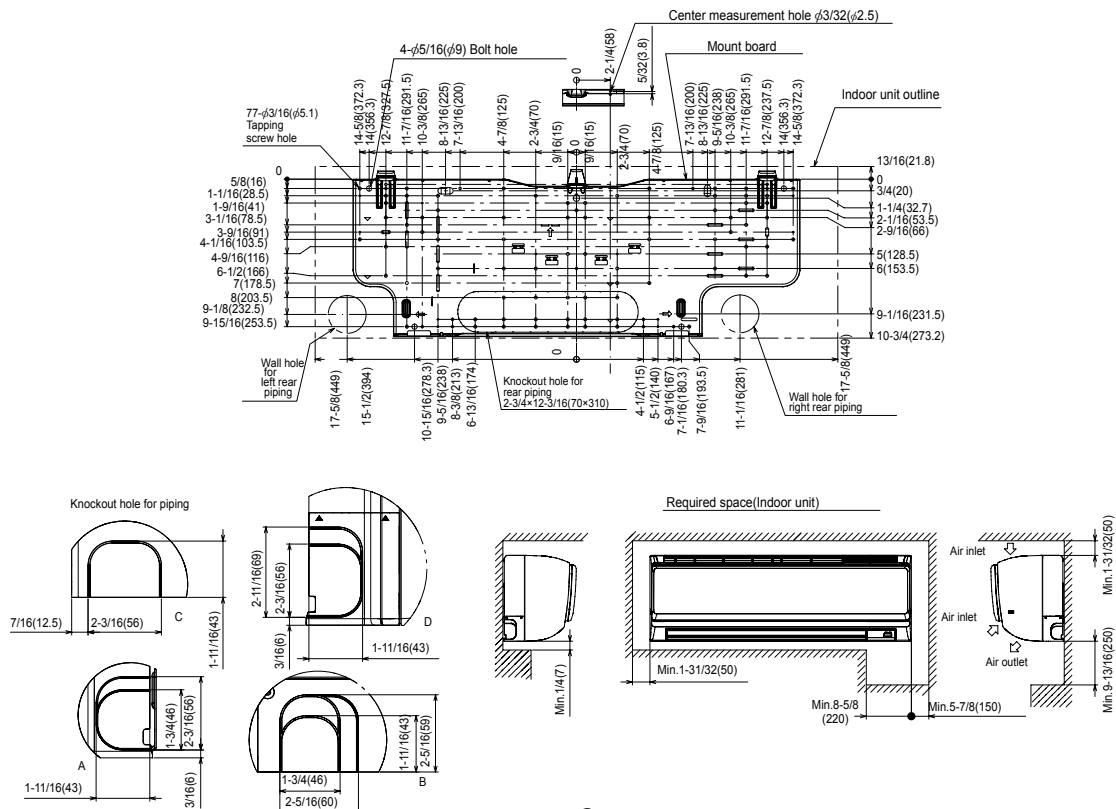
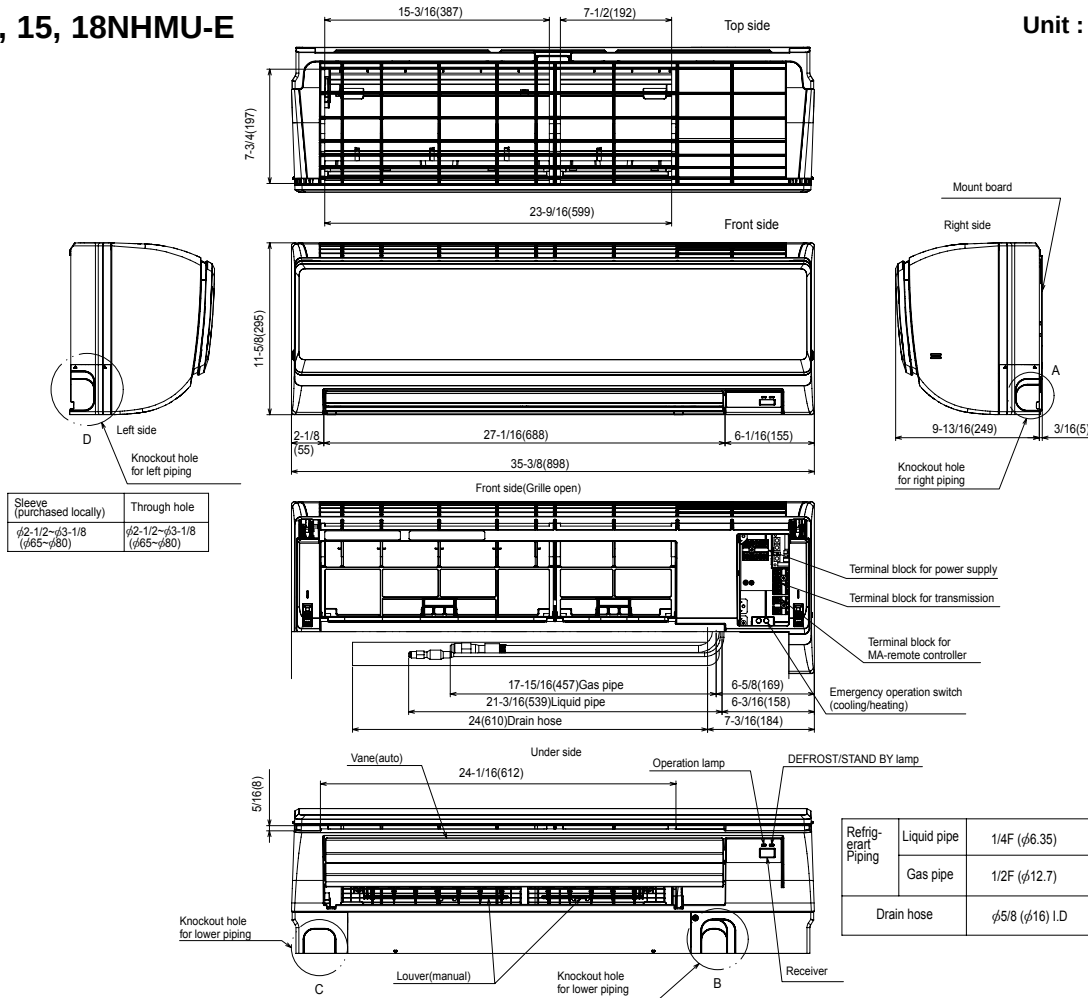
External static pressure : 0Pa

Power source : 208,230V, 60Hz



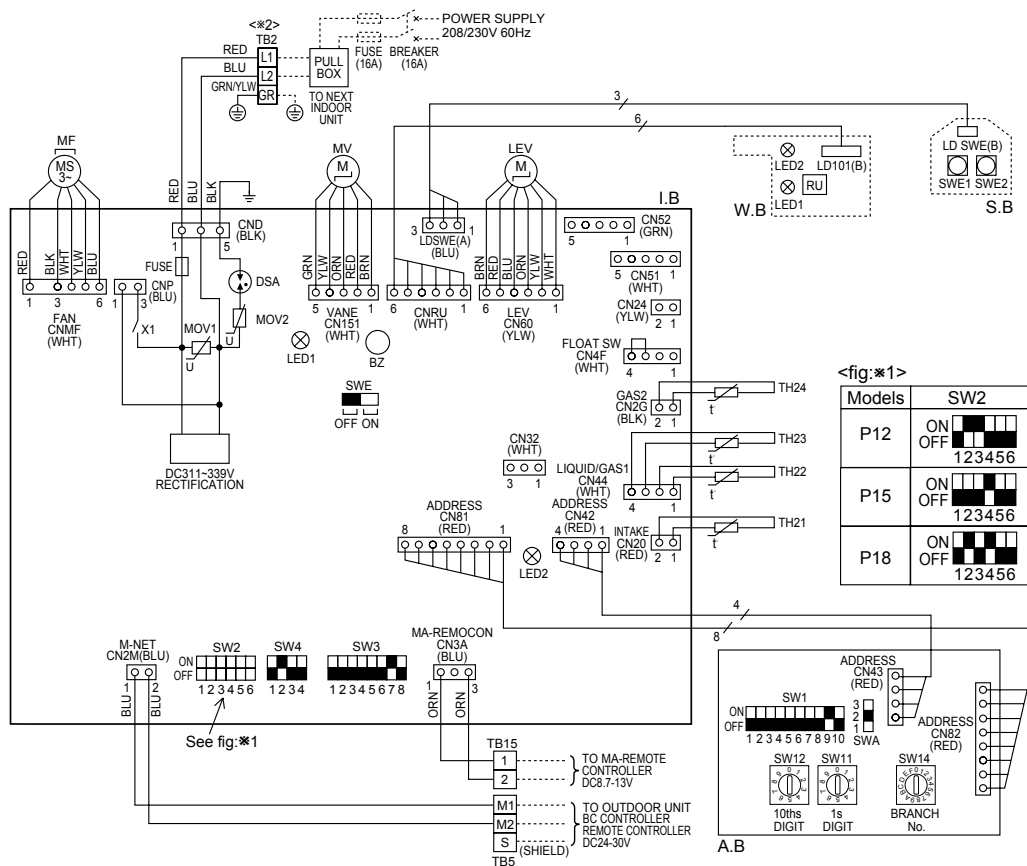
PKFY-P12, 15, 18NHMU-E

Unit : inch (mm)



PKFY-P12, 15, 18NHMU-E

SYMBOL	NAME	SYMBOL	NAME
I.B	INDOOR CONTROLLER BOARD	TH21	THERMISTOR ROOM TEMP. DETECTION (32°F/15kΩ, 77°F/5.4kΩ)
CN24	CONNECTOR EXTERNAL HEATER	TH22	PIPE TEMP. DETECTION / LIQUID (32°F/15kΩ, 77°F/5.4kΩ)
CN32	REMOTE SWITCH	TH23	PIPE TEMP. DETECTION / GAS1 (32°F/15kΩ, 77°F/5.4kΩ)
CN51	CENTRALLY CONTROL	TH24	PIPE TEMP. DETECTION / GAS2 (32°F/15kΩ, 77°F/5.4kΩ)
CN52	REMOTE INDICATION		
BZ	BUZZER	A.B	ADDRESS BOARD
DSA	SURGE ABSORBER	SWA	SWITCH FAN SPEED SELECTOR
FUSE	FUSE (T3.15A 250V)	SW1	MODE SELECTION
LED1	POWER SUPPLY (I.B)	SW11	ADDRESS SETTING 1s DIGIT
LED2	POWER SUPPLY (I.B)	SW12	ADDRESS SETTING 10ths DIGIT
SW2	SWITCH CAPACITY CODE	SW14	BRANCH No.
SW3	MODE SELECTION		
SW4	MODEL SELECTOR	S.B	SWITCH BOARD
SWE	DRAIN PUMP (TEST MODE)	SWE1	EMERGENCY OPERATION(HEAT)
X1	AUX.RELAY DRAIN PUMP (OPTION)	SWE2	EMERGENCY OPERATION(COOL)
MOV/01.02	VARISTOR	W.B	PCB FOR WIRELESS REMOTE CONTROLLER
LEV	LINEAR EXPANSION VALVE	LED1	LED(OPERATION INDICATOR:GREEN)
MF	FAN MOTOR	LED2	LED(OPERATION FOR HEATING :ORANGE)
MV	VANE MOTOR	RU	RECEIVING UNIT
TB2	TERMINAL POWER SUPPLY		
TB5	BLOCK TRANSMISSION		
TB15	MA-REMOTE CONTROLLER		



LED on indoor board for service

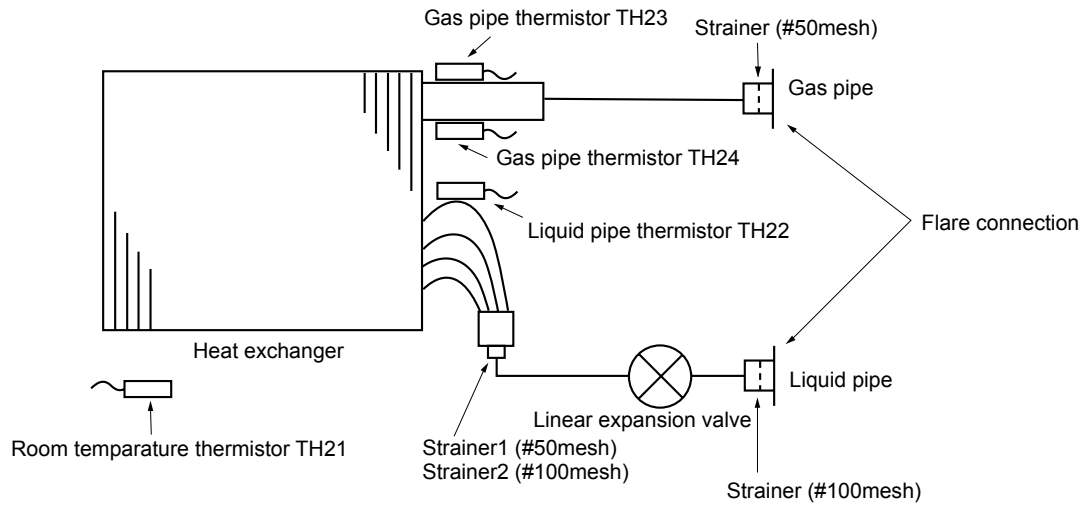
Mark	Meaning	Function
LED1	Main power supply	Main power supply (Indoor unit:208-230V) Power on → lamp is lit
LED2	Power supply for MA-Remote controller	Power supply for MA-Remote controller on → lamp is lit

NOTES:

- 1.At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
- 2.In case of using MA-Remote controller, please connect to TB15.
(Remote controller wire is non-polar.)
- 3.In case of using M-NET, please connect to TB5. (Transmission line is non-polar.)
- 4.Symbol [S] of TB5 is the shield wire connection.
- 5.Symbols used in wiring diagram above are, : terminal block, : connector.
- 6.The setting of the SW2 dip switches differs in the capacity. for the detail, refer to the fig.*1.

<*2>Use copper supply wires.

PKFY-P12, 15, 18NHMU-E

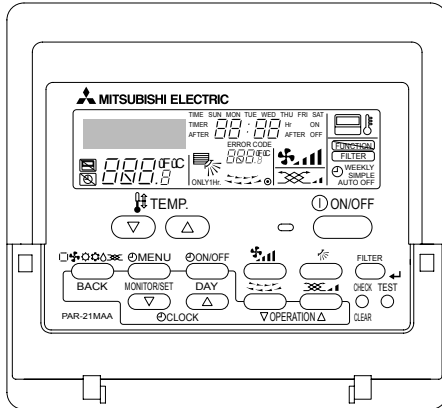


Unit : mm (inch)

Item	Service Ref.	PKFY-P12,15,18NHMU-E
Gas pipe		$\phi 12.7(1/2)$
Liquid pipe		$\phi 6.35(1/4)$

INDOOR UNIT CONTROL

6-1. COOL OPERATION



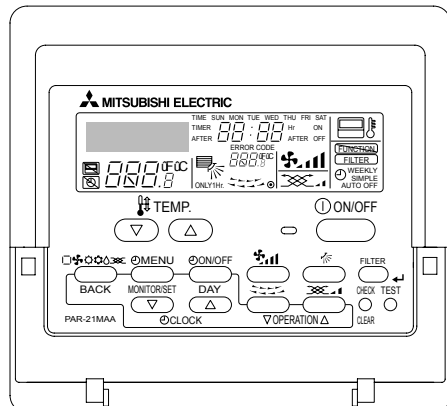
<How to operate>

- ① Press POWER ON/OFF button.
- ② Press the operation MODE button to display COOL.
- ③ Press the TEMP. button to set the desired temperature.

NOTE: The set temperature changes 2°F when the ∇ or Δ button is pressed one time. Cooling 67 to 87°F

Control modes	Control details	Remarks				
1. Thermoregulating function	1-1. Thermoregulating function (Function to prevent restarting for 3 minutes) - Room temperature $\geq$ desired temperature + 2°F ...Thermo ON - Room temperature $\leq$ desired temperature ...Thermo OFF					
	1-2. Anti-freezing control Detected condition : When the liquid pipe temp. (TH22) is 32°F or less in 16 minutes from compressors start up, anti-freezing control starts and the thermo OFF. Released condition : The timer which prevents reactivating is set for 3 minutes, and anti-freezing control is cancelled when any one of the following conditions is satisfied. ① Liquid pipe temp. (TH22) turns 50°F or above. ② The condition of the thermo OFF has become complete by thermoregulating, etc. ③ The operation modes became mode other than COOL. ④ The operation stopped.					
2. Fan	By the remote controller setting (switch of 3 speeds+Auto) <table border="1"><tr><td>Type</td><td>Fan speed notch</td></tr><tr><td>3 speeds + Auto type</td><td>[Low], [Mid], [High], [Auto]</td></tr></table> When [Auto] is set, fan speed is changed depending on the value of: Room temperature - Desired temperature	Type	Fan speed notch	3 speeds + Auto type	[Low], [Mid], [High], [Auto]	
Type	Fan speed notch					
3 speeds + Auto type	[Low], [Mid], [High], [Auto]					
3. Vane (up/down vane change)	(1)Initial setting: Start at COOL mode and horizontal vane. (2)Vane position: Horizontal →Downward A →Downward B →Downward C→Downward D→Swing→Auto  (3)Restriction of the downward vane setting When setting the downward vane A, B, C or D in [Mid], [Low] or [Auto] of the fan speed notch, the vane changes to horizontal position after 1 hour have passed.	· "ONLY 1 Hr" appears on the wired remote controller.				

6-2. DRY OPERATION



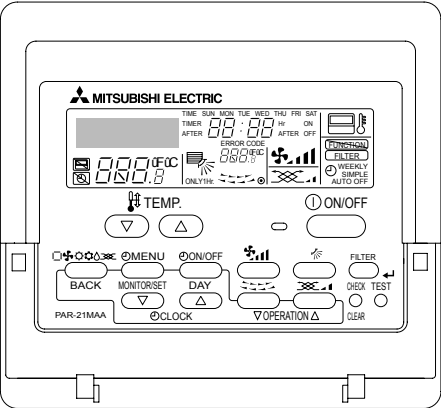
<How to operate>

- ① Press POWER ON/OFF button.
- ② Press the operation MODE button to display DRY.
- ③ Press the TEMP. button to set the desired temperature.

NOTE: The set temperature changes 2°F when the or button is pressed one time. Dry 67 to 87°F

Control modes	Control details	Remarks																															
1. Thermo regulating function	1-1. Thermo regulating function (Function to prevent restarting for 3 minutes) Setting the Dry thermo by the thermo regulating signal and the room temperature (TH21). Dry thermo ON Room temperature $\geq$ desired temperature + 2°F Dry thermo OFF Room temperature $\geq$ desired temperature <table><tr><th rowspan="2">Room temperature</th><th colspan="2">3 min. passed since starting operation</th><th rowspan="2">Dry thermo ON time (min)</th><th rowspan="2">Dry thermo OFF time (min)</th></tr><tr><th>Thermo regulating signal</th><th>Room temperature (T1)</th></tr><tr><td rowspan="4">Over 64°F</td><td rowspan="4">ON</td><td>T1 $\geq$ 83°F</td><td>9</td><td>3</td></tr><tr><td>83°F > T1 $\geq$ 79°F</td><td>7</td><td>3</td></tr><tr><td>79°F > T1 $\geq$ 75°F</td><td>5</td><td>3</td></tr><tr><td>75°F > T1</td><td>3</td><td>3</td></tr><tr><td></td><td>OFF</td><td>Unconditional</td><td>3</td><td>10</td></tr><tr><td>Less than 64°F</td><td colspan="4">Dry thermo OFF</td></tr></table>	Room temperature	3 min. passed since starting operation		Dry thermo ON time (min)	Dry thermo OFF time (min)	Thermo regulating signal	Room temperature (T1)	Over 64°F	ON	T1 $\geq$ 83°F	9	3	83°F > T1 $\geq$ 79°F	7	3	79°F > T1 $\geq$ 75°F	5	3	75°F > T1	3	3		OFF	Unconditional	3	10	Less than 64°F	Dry thermo OFF				
	Room temperature		3 min. passed since starting operation				Dry thermo ON time (min)	Dry thermo OFF time (min)																									
Thermo regulating signal		Room temperature (T1)																															
Over 64°F	ON	T1 $\geq$ 83°F	9	3																													
		83°F > T1 $\geq$ 79°F	7	3																													
		79°F > T1 $\geq$ 75°F	5	3																													
		75°F > T1	3	3																													
	OFF	Unconditional	3	10																													
Less than 64°F	Dry thermo OFF																																
	1-2. Freeze prevention control No control function																																
2. Fan	Indoor fan operation controlled depending on the compressor conditions. <table><tr><th>Dry thermo</th><th colspan="2">Fan speed notch</th></tr><tr><td>ON</td><td colspan="2">[Low]</td></tr><tr><td rowspan="2">OFF</td><td>Excluding the following</td><td>Stop</td></tr><tr><td>Room temp. < 64°F</td><td>[Low]</td></tr></table> Note: Remote controller setting is not acceptable.	Dry thermo	Fan speed notch		ON	[Low]		OFF	Excluding the following	Stop	Room temp. < 64°F	[Low]																					
Dry thermo	Fan speed notch																																
ON	[Low]																																
OFF	Excluding the following	Stop																															
	Room temp. < 64°F	[Low]																															
3. Vane (up/down vane change)	Same control as COOL operation																																

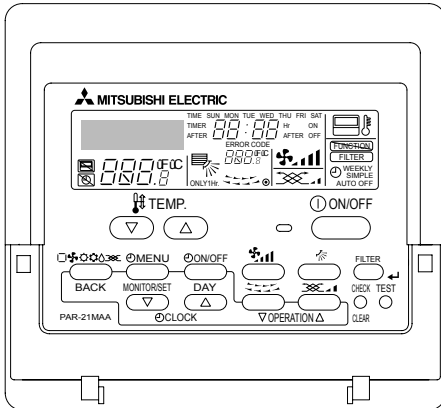
6-3. FAN OPERATION



- <How to operate>**
① Press POWER ON/OFF button.
② Press the operation MODE button to display FAN.

Control modes	Control details	Remarks				
1. Fan	Set by remote controller. <table><tr><td>Type</td><td>Fan speed notch</td></tr><tr><td>3 speeds + Auto type</td><td>[Low], [Mid], [High], [Auto]</td></tr></table> When [Auto] is set, fan speed becomes [Low].	Type	Fan speed notch	3 speeds + Auto type	[Low], [Mid], [High], [Auto]	
Type	Fan speed notch					
3 speeds + Auto type	[Low], [Mid], [High], [Auto]					
2. Vane (up/down vane change)	Same as the control performed during the COOL operation, but with no restriction on the vane's downward blow setting	· Same control as COOL operation				

6-4. HEAT OPERATION



<How to operate>

- ① Press POWER ON/OFF button.
- ② Press the operation MODE button to display HEAT.
- ③ Press the TEMP. button to set the desired temperature.

NOTE: The set temperature changes 2°F when the or button is pressed one time. Heating 63 to 83°F.

<Display in HEAT operation>

[DEFROST]

The [DEFROST] symbol is only displayed during the defrost operation.

[STANDBY]

The [STANDBY] symbol is only displayed during the hot adjust mode.

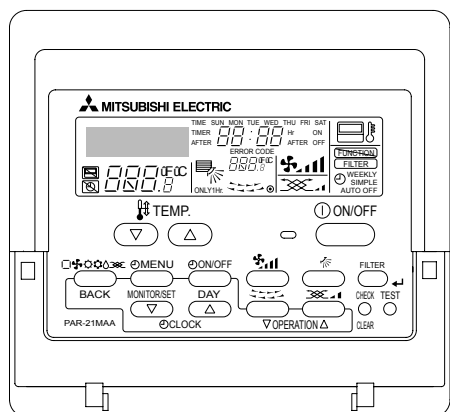
Control modes	Control details	Remarks				
1. Thermoregulating function	1-1. Thermoregulating function (Function to prevent restarting for 3 minutes) - Room temperature $\leq$ desired temperature -2°F ...Thermo ON - Room temperature $\leq$ desired temperature ...Thermo OFF					
2. Fan	By the remote controller setting (switch of 3 speeds+Auto) <table><tr><th>Type</th><th>Fan speed notch</th></tr><tr><td>3 speeds + Auto type</td><td>[Low], [Mid], [High], [Auto]</td></tr></table> When [Auto] is set, fan speed is changed depending on the value of: Desired temperature - Room temperature Give priority to under-mentioned controlled mode 2-1. Hot adjust mode 2-2. Residual heat exclusion mode 2-3. Thermo OFF mode (When the compressor off by the thermoregulating) 2-4. Cool air prevention mode (Defrosting mode)	Type	Fan speed notch	3 speeds + Auto type	[Low], [Mid], [High], [Auto]	
Type	Fan speed notch					
3 speeds + Auto type	[Low], [Mid], [High], [Auto]					
	2-1. Hot adjust mode The fan controller becomes the hot adjuster mode for the following conditions. ① When starting the HEAT operation ② When the thermoregulating function changes from OFF to ON. ③ When release the HEAT defrosting operation A: Hot adjust mode starts. B: 5 minutes have passed since the condition A or the indoor liquid pipe temperature turned 95°F or more. C: 2 minutes have passed since the condition B. (Terminating the hot adjust mode)	*1 "STAND BY" will be displayed during the hot adjust mode.				
	2-2. Residual heat exclusion mode When the condition changes the auxiliary heater ON to OFF (thermoregulating or operation stop, etc), the indoor fan operates in [Low] mode for 1 minute.	· This control is same for the model without auxiliary heater.				

To be continued on the next page.

From the preceding page

Control modes	Control details	Remarks
2. Fan	2-3. Thermo OFF mode When the thermoregulating function changes to OFF, the indoor fan operates in [Extra low].	
	2-4. Heat defrosting mode The indoor fan stops.	
3. Vane control (Up/down vane change)	(1) Initial setting: OFF → HEAT...[last setting] When the last setting is [Swing] ... [Downward D] When changing the mode from exception of HEAT to HEAT operation ...[Downward D] (2) Vane position: Horizontal → Downward A → Downward B → Downward C → Downward D → Swing → Auto (3) Restriction of vane position ① The vane is horizontally fixed for the following modes. (The control by the remote controller is temporally invalidated and control by the unit.) •Thermo OFF •Hot adjust [Extra low] mode •Heat defrost mode	

6-5. AUTO OPERATION [AUTOMATIC COOL/HEAT CHANGE OVER OPERATION]



<How to operate>

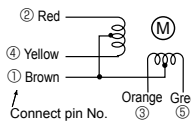
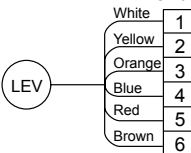
- ① Press POWER ON/OFF button.
- ② Press the operation MODE button to display AUTO.
- ③ Press the TEMP. button to set the desired temperature.

NOTE: The set temperature changes 2°F when the  or  button is pressed one time. Automatic 67 to 83°F

Control modes	Control details	Remarks
1. Initial value of operation mode	HEAT mode for room temperature < Desired temperature COOL mode for room temperature ≥ Desired temperature	
2. Mode change	(1) HEAT mode → COOL mode Room temperature ≥ Desired temperature + 3°F. or 3 min. has passed (2) COOL mode → HEAT mode Room temperature ≥ Desired temperature - 3°F. or 3 min. has passed	
3. COOL mode	Same control as cool operation	
4. HEAT mode	Same control as heat operation	

7-1. HOW TO CHECK THE PARTS

PKFY-P12, 15, 18NHMU-E

Parts name	Check points														
Room temperature thermistor (TH21)	Disconnect the connector then measure the resistance with a tester. (At the ambient temperature 50°F~86°F)														
Liquid pipe temperature thermistor (TH22)	Refer to the next page for the details.														
Gas pipe temperature thermistor (TH23 ,24)															
Vane motor (MV)	Measure the resistance between the terminals with a tester. (Coil temperature 77°F)														
	<table><tr><th colspan="4">Normal</th><th>Abnormal</th></tr><tr><td>①-② Brown-Red</td><td>①-③ Brown-Orange</td><td>①-④ Brown-Yellow</td><td>①-⑤ Brown-Green</td><td rowspan="2">Open or short</td></tr><tr><td colspan="4">350Ω ± 7%</td></tr></table>	Normal				Abnormal	①-② Brown-Red	①-③ Brown-Orange	①-④ Brown-Yellow	①-⑤ Brown-Green	Open or short	350Ω ± 7%			
Normal				Abnormal											
①-② Brown-Red	①-③ Brown-Orange	①-④ Brown-Yellow	①-⑤ Brown-Green	Open or short											
350Ω ± 7%															
Fan motor (MF)	Refer to 7-1-3.														
Linear expansion valve (LEV)	Disconnect the connector then measure the resistance value with a tester. (Coil temperature 68°F)														
	<table><tr><th colspan="4">Normal</th><th>Abnormal</th></tr><tr><td>(1)-(5) White-Red</td><td>(2)-(6) Yellow-Brown</td><td>(3)-(5) Orange-Red</td><td>(4)-(6) Blue-Brown</td><td rowspan="2">Open or short</td></tr><tr><td colspan="4">200Ω ± 10%</td></tr></table>	Normal				Abnormal	(1)-(5) White-Red	(2)-(6) Yellow-Brown	(3)-(5) Orange-Red	(4)-(6) Blue-Brown	Open or short	200Ω ± 10%			
Normal				Abnormal											
(1)-(5) White-Red	(2)-(6) Yellow-Brown	(3)-(5) Orange-Red	(4)-(6) Blue-Brown	Open or short											
200Ω ± 10%															

7-1-1. Thermistor

<Thermistor characteristic graph>

Thermistor for lower temperature

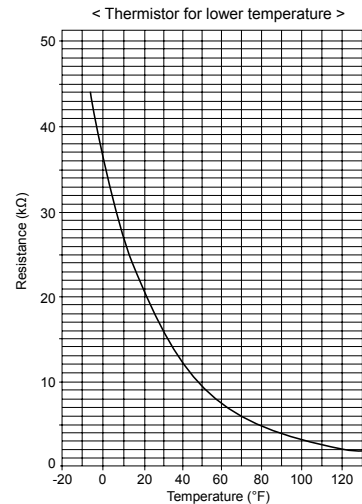
Room temperature thermistor (TH21)
Liquid pipe temperature thermistor (TH22)
Gas pipe temperature thermistor (TH23) (TH24)

Thermistor $R_0 = 15k\Omega \pm 3\%$

Fixed number of $B = 3480 \pm 2\%$

$$R_t = 15 \exp \left\{ 3480 \left(\frac{1}{273 + (t - 32)/1.8} - \frac{1}{273} \right) \right\}$$

30°F	15.8kΩ
50°F	9.6kΩ
70°F	6.0kΩ
80°F	4.8kΩ
90°F	3.9kΩ
100°F	3.2kΩ

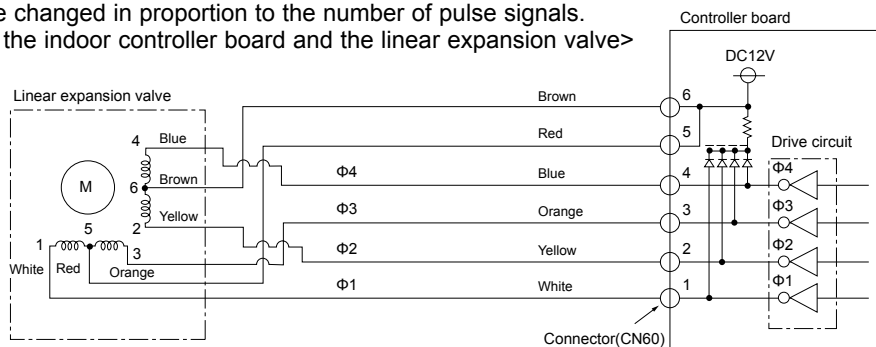


7-1-2. Liner expansion valve

① Operation summary of the linear expansion valve

- Linear expansion valve open/close through stepping motor after receiving the pulse signal from the indoor controller board.
- Valve position can be changed in proportion to the number of pulse signals.

<Connection between the indoor controller board and the linear expansion valve>



<Output pulse signal and the valve operation>

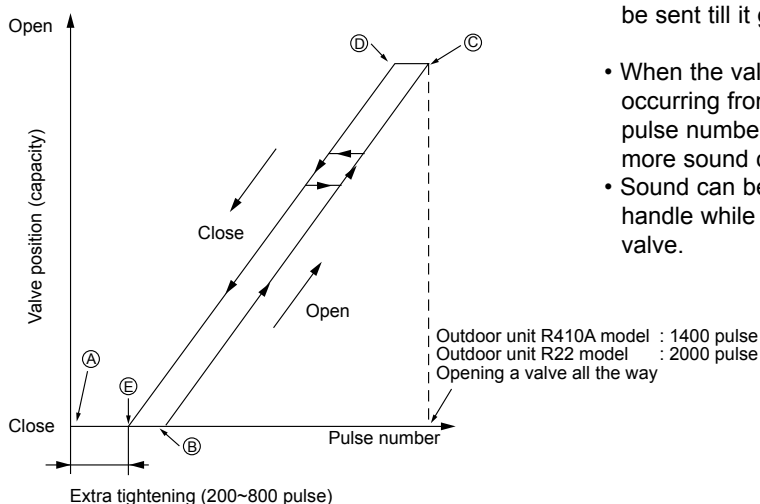
Output (Phase)	Output			
	1	2	3	4
$\phi 1$	ON	OFF	OFF	ON
$\phi 2$	ON	ON	OFF	OFF
$\phi 3$	OFF	ON	ON	OFF
$\phi 4$	OFF	OFF	ON	ON

Closing a valve : 1 → 2 → 3 → 4 → 1
 Opening a valve : 4 → 3 → 2 → 1 → 4
 The output pulse shifts in above order.

Note:

- When linear expansion valve operation stops, all output phase become OFF.
- At phase interruption or when phase does not shift in order, motor does not rotate smoothly and motor will lock and vibrate.
- When the switch is turned on, 2200 pulse closing valve signal will be sent till it goes to point A in order to define the valve position.
- When the valve moves smoothly, there is no sound or vibration occurring from the linear expansion valves, however, when the pulse number moves from E to A or when the valve is locked, more sound can be heard than in a normal situation.
- Sound can be detected by placing the ear against the screw driver handle while putting the screw driver tip to the linear expansion valve.

② Linear expansion valve operation



③ Trouble shooting

Symptom	Check points	Countermeasures
Operation circuit failure of the micro processor	Disconnect the connector on the controller board, then connect LED for checking. 1kΩ LED When power is turned on, pulse signals will be output for 10 seconds. There must be some defects in the operation circuit if the LED does not light while the signals are output or keeps lighting even after the signals stop.	Exchange the indoor controller board at drive circuit failure.
Linear expansion valve mechanism is locked.	Motor will idle and make a ticking noise when the motor is operated while the linear expansion valve is locked. This ticking sound is the sign of the abnormality.	Exchange the linear expansion valve.
Short or breakage of the motor coil of the linear expansion valve	Measure the resistance between each coil (white-red, yellow-brown, orange-red, blue-brown) using a tester. It is normal if the resistance is in the range of 200Ω ±10%.	Exchange the linear expansion valve.
Valve does not close completely.	To check the linear expansion valve, operate the indoor unit in fan mode and at the same time operate other indoor units in cooling mode, then check the pipe temperature <liquid pipe temperature> of the indoor unit by the outdoor multi controller board operation monitor. During fan operation, linear expansion valve is closed completely and if there is any leaking, detecting temperature of the thermistor will go lower. If the detected temperature is much lower than the temperature indicated in the remote controller, it means the valve is not closed all the way. Thermistor (Liquid pipe) Linear expansion valve It is not necessary to exchange the linear expansion valve, if the leakage is small and not affecting normal operation.	If large amount of refrigerant is leaked, exchange the linear expansion valve.
Wrong connection of the connector or contact failure	Check the color of lead wire and missing terminal of the connector.	Disconnect the connector at the controller board, then check the continuity.

7-1-3. DC Fan motor (fan motor/indoor controller circuit board)

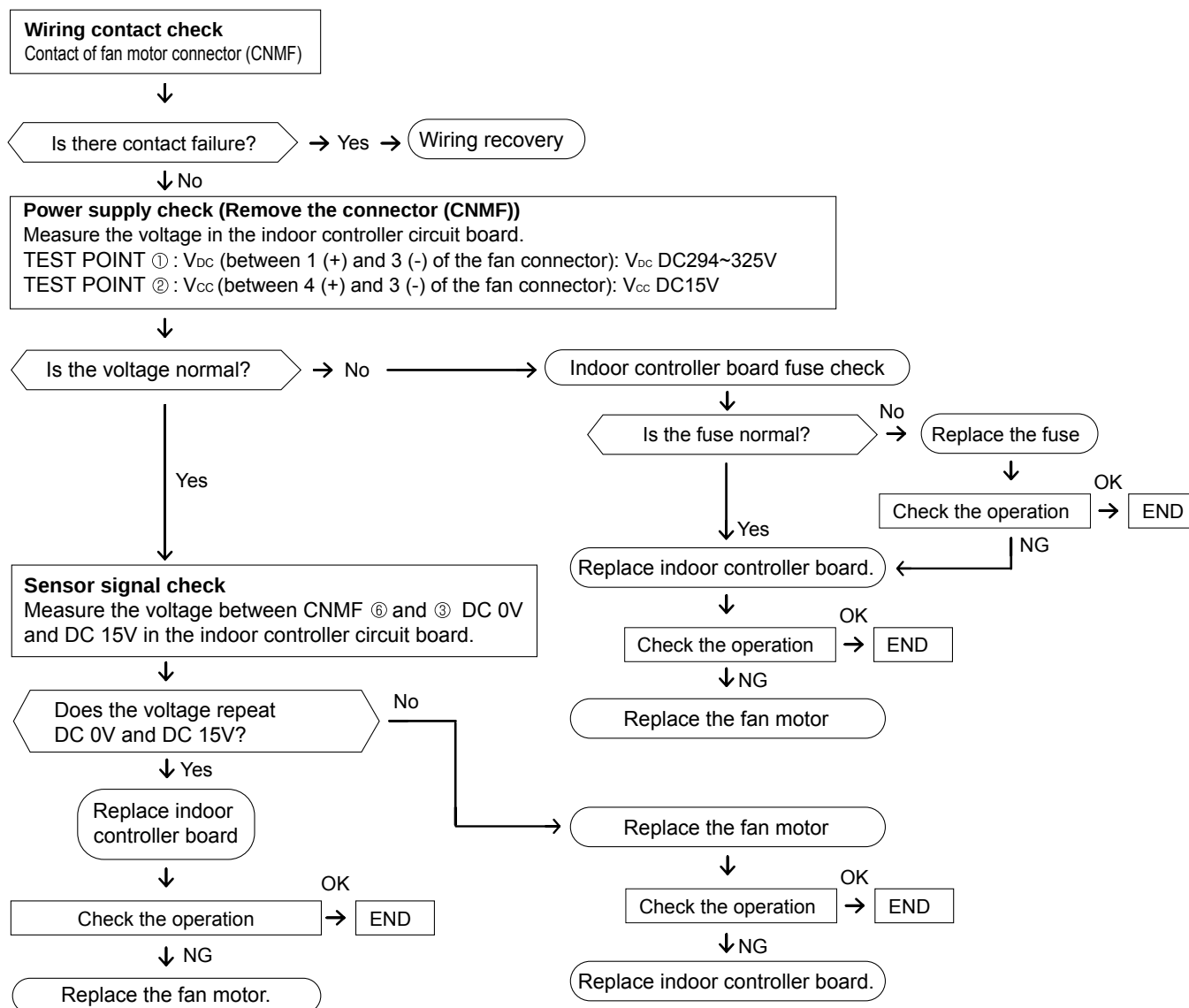
Check method of DC fan motor (fan motor/indoor controller circuit board)

① Notes

- High voltage is applied to the connector (CNMF) for the fan motor. Pay attention to the service.
- Do not pull out the connector (CNMF) for the motor with the power supply on.
(It causes trouble of the indoor controller circuit board and fan motor.)

② Self check

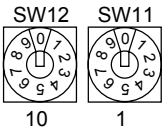
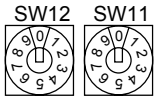
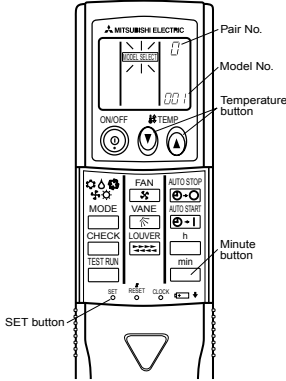
Symptom : The indoor fan cannot turn around.



7-2. Function of Dip switch

PKFY-P12, 15, 18NHMU-E

Switch	Pole	Function	Operation by switch		Effective timing	Remarks															
			ON	OFF																	
SW1 Mode selection	1	Thermistor<Room temperature> position	Built-in remote controller	Indoor unit	Under suspension	Address board <Initial setting> ON OFF 1 2 3 4 5 6 7 8 9 10 NOTE: ※1 <table><tr><td>SW1-7</td><td>SW1-8</td><td>Fan speed</td></tr><tr><td>OFF</td><td>OFF</td><td>Extra low</td></tr><tr><td>ON</td><td>OFF</td><td>Low</td></tr><tr><td>OFF</td><td>ON</td><td>Setting air flow</td></tr><tr><td>ON</td><td>ON</td><td>Stop</td></tr></table> ※2 It is impossible to intake the fresh air.	SW1-7	SW1-8	Fan speed	OFF	OFF	Extra low	ON	OFF	Low	OFF	ON	Setting air flow	ON	ON	Stop
	SW1-7	SW1-8	Fan speed																		
	OFF	OFF	Extra low																		
	ON	OFF	Low																		
	OFF	ON	Setting air flow																		
	ON	ON	Stop																		
	2	Filter clogging detection	Provide	Not provide																	
	3	Filter cleaning sign	2,500 hr	100 hr																	
	4	Fresh air intake ※2	Not effective	Not effective																	
	5	Switching remote controller display	Thermo ON signal indication	Fan output indication																	
6	Humidifier control	Fan operation at Heating mode	Thermo ON operation at heating mode																		
7	Air flow set in case of heat thermo OFF	Low ※1	Extra low ※1																		
8		Setting air flow ※1	Depends on SW1-7																		
9	Auto restart function	Effective	Not effective																		
10	Power ON/OFF by breaker	Effective	Not effective																		
SW2 Capacity code switch	1~6	<table><tr><th>Models</th><th>SW2</th></tr><tr><td>P12</td><td> ON OFF 123456 </td></tr><tr><td>P15</td><td> ON OFF 123456 </td></tr><tr><td>P18</td><td> ON OFF 123456 </td></tr></table>	Models	SW2	P12	ON OFF 123456	P15	ON OFF 123456	P18	ON OFF 123456	Before power supply ON	Indoor controller board									
Models	SW2																				
P12	ON OFF 123456																				
P15	ON OFF 123456																				
P18	ON OFF 123456																				
SW3 Function selection	1	Heat pump/Cool only	Cooling only	Heat pump	Under suspension	Indoor controller board <Initial setting> ON OFF 1 2 3 4 5 6 7 8 ※1 Second setting is same as first setting. ※2 Please do not use SW3-7,8 as trouble might be caused by the usage condition.															
	2	Not used	—	—																	
	3	Not used	—	—																	
	4	Vane horizontal angle	Second setting ※1	First setting																	
	5	Changing the opening of linear expansion valve during thermo OFF	Effective	Not effective																	
	6	Heating 4 degree up	Not effective	Effective																	
	7	Target superheat setting ※2	—	—																	
	8	Target subcool ※2	—	—																	
SW4 Model selection	1~4	In case of replacing the indoor controller board, make sure to set the switch to the initial setting, which is shown below.		Before power supply ON	Indoor controller board																
		ON OFF 1 2 3 4																			

Switch		Operation by switch	Effective timing	Remarks																											
SW11 1s digit address setting SW12 10ths digit address setting	Rotary Switch	 How to set addresses Example : If address is "3", remain SW12 (for over 10) at "0", and match SW11 (for 1 to 9) with "3".	Before power supply ON	Address board <Initial setting> 																											
SW14 Branch No. Setting	Rotary switch	 How to set branch numbers SW14 (Series R2 only) Match the indoor unit's refrigerant pipe with the BC controller's end connection number. Remain other than series R2 at "0".		Address board <Initial setting> 																											
J41, J42 Wireless remote controller Pair No.	Jumper	- To operate each indoor unit by each remote controller when installed 2 indoor units or more are near, Pair No. setting is necessary. - Pair No. setting is available with the 4 patterns (Setting patterns A to D). - Make setting for J41, J42 of indoor controller board and the Pair No. of wireless remote controller. - You may not set it when operating it by one remote controller. - Setting for indoor unit Cut jumper wire J41, J42 on the indoor controller board according to the table below. - Wireless remote controller pair number: Setting operation - Press the SET button (using a pointed implement). Check that the remote controller's display has stopped before continuing. MODEL SELECT flashes, and the model No. (3 digits) appears (steadily-lit). - Press the MINUTE button twice. The pair number appears flashing. - Press the temperature  buttons to select the pair number to set. - Press the SET button (using a pointed implement). The set pair number is displayed (steadily-lit) for 3 seconds, then disappears. <table border="1" data-bbox="284 1396 965 1600"> <thead> <tr> <th rowspan="2">Setting pattern</th><th colspan="2">Indoor controller jumper wire</th><th rowspan="2">Pair No. of wireless remote controller*</th><th rowspan="2"></th></tr> <tr> <th>J41</th><th>J42</th></tr> </thead> <tbody> <tr> <td>A</td><td>—</td><td>—</td><td>0</td><td>Initial setting</td></tr> <tr> <td>B</td><td>Cut</td><td>—</td><td>1</td><td>—</td></tr> <tr> <td>C</td><td>—</td><td>Cut</td><td>2</td><td>—</td></tr> <tr> <td>D</td><td>Cut</td><td>Cut</td><td>3</td><td>—</td></tr> </tbody> </table> * Pair No.4-9 of wireless remote controller is setting pattern D.	Setting pattern	Indoor controller jumper wire		Pair No. of wireless remote controller*		J41	J42	A	—	—	0	Initial setting	B	Cut	—	1	—	C	—	Cut	2	—	D	Cut	Cut	3	—	Under operation or suspension	<Initial setting> Pattern A 
Setting pattern	Indoor controller jumper wire			Pair No. of wireless remote controller*																											
	J41	J42																													
A	—	—	0	Initial setting																											
B	Cut	—	1	—																											
C	—	Cut	2	—																											
D	Cut	Cut	3	—																											

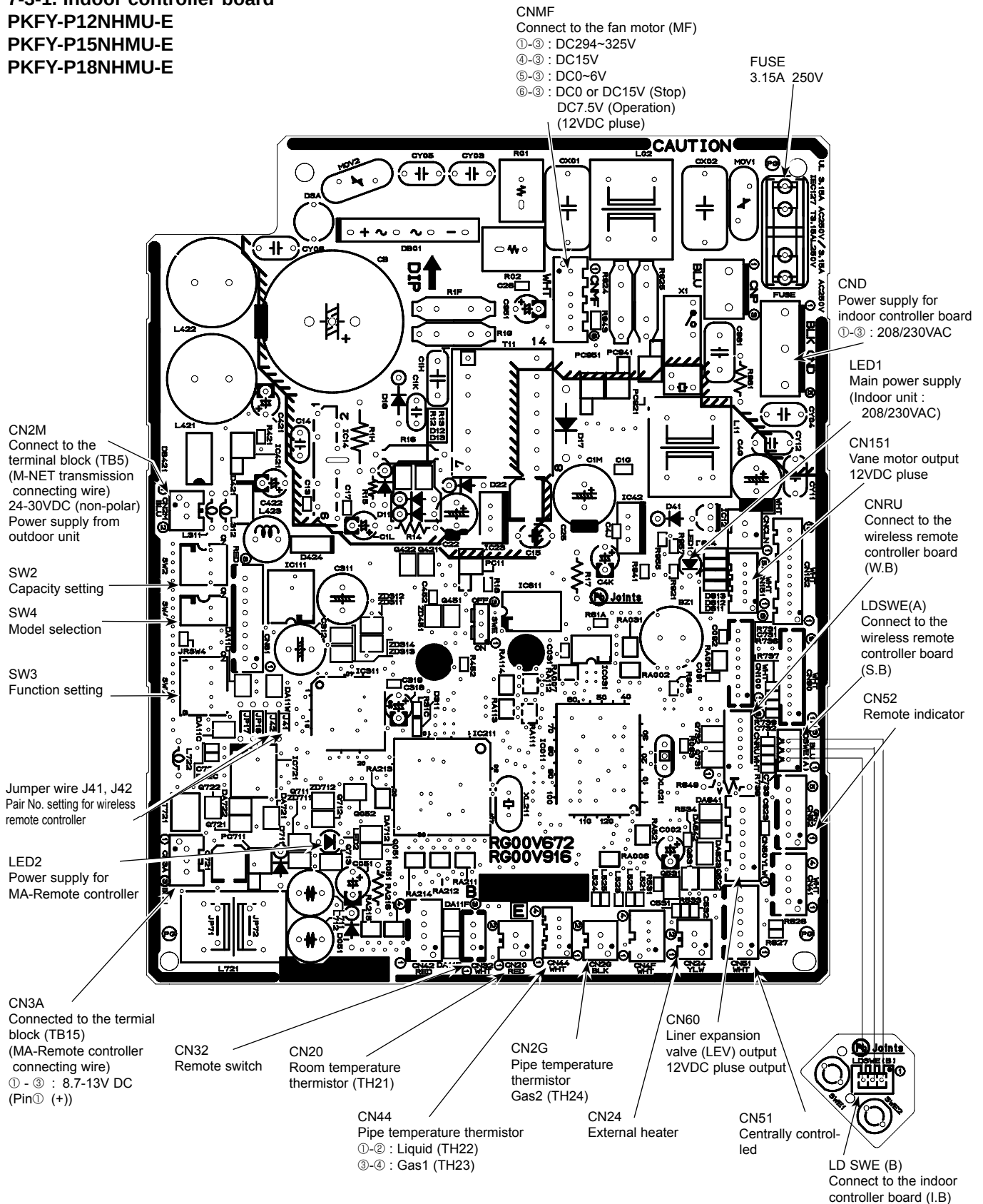
7-3. TEST POINT DIAGRAM

7-3-1. Indoor controller board

PKFY-P12NHMU-E

PKFY-P15NHMU-E

PKFY-P18NHMU-E

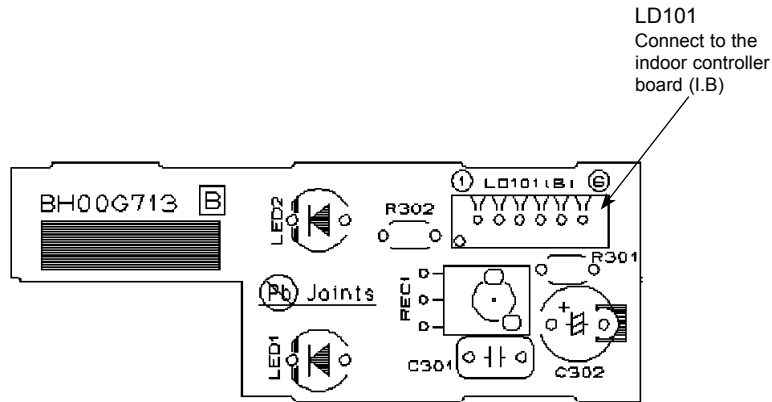


7-3-2. Wireless remote controller board

PKFY-P12NHMU-E

PKFY-P15NHMU-E

PKFY-P18NHMU-E



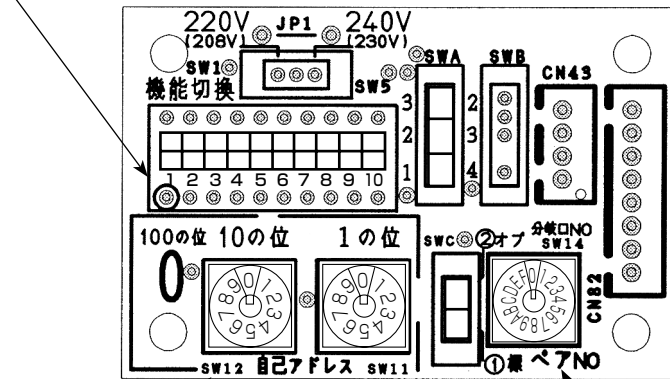
7-3-3. Address board

PKFY-P12NHMU-E

PKFY-P15NHMU-E

PKFY-P18NHMU-E

SW1
Function setting



SW12
Address setting
10ths DIGIT

SW11
Address setting
1s DIGIT

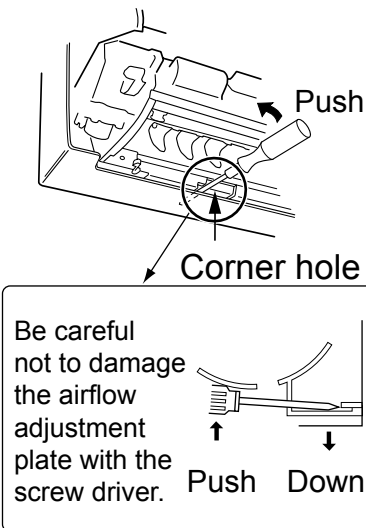
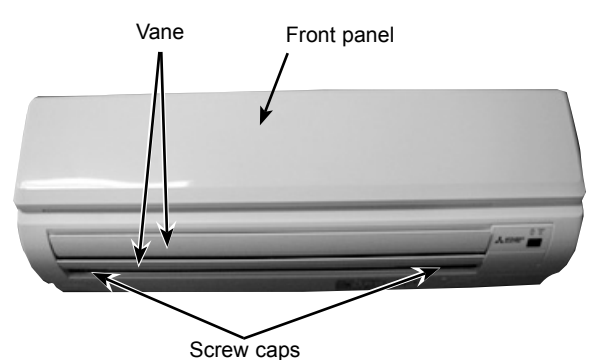
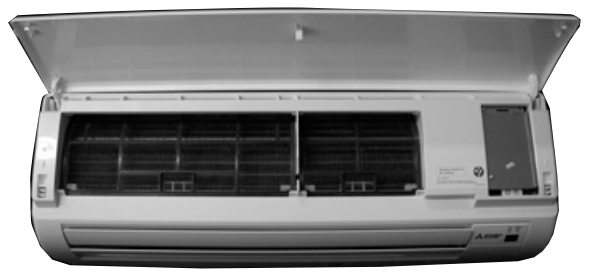
SW14
Branch No.

PKFY-P12NHMU-E

PKFY-P15NHMU-E

PKFY-P18NHMU-E

Be careful when removing heavy parts.

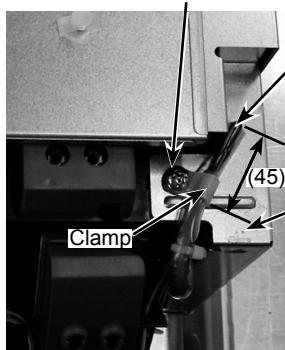
OPERATION PROCEDURE	PHOTOS & ILLUSTRATIONS
1. REMOVING THE LOWER SIDE OF THE INDOOR UNIT FROM THE INSTALLATION PLATE (1) Remove the front panel. (2) Insert the screw driver to the corner hole at both left and right side as shown in the figure 1. (3) Push it up, then pull down the lower side of indoor unit and remove the hook.	Figure 1 
2. REMOVING THE FRONT PANEL (1) Press and unlock the knobs on both sides of the front panel and lift the front panel until it is level. Pull the hinges forward to remove the front panel. (See Photo 2) (2) Move the horizontal vanes in a downward direction. (3) Remove the screw caps of the panel. Remove the screws. (See Photo 1) (4) Hold the lower part of both ends of the panel and pull it slightly toward you, and then remove the panel by pushing it upward.	Photo 1  Photo 2 

OPERATION PROCEDURE

3. REMOVING THE INDOOR CONTROLLER BOARD AND WIRELESS CONTROLLER BOARD

- (1) Remove the front panel. (Refer to 2.)
- (2) Remove the room temp. thermistor TH1. (see Photo 3)
- (3) Remove the electrical box covers (screw 4 × 12).
(See Photo 3)
- (4) Disconnect the connectors on the indoor controller board.
- (5) Remove the switch board cover.
- (6) Pull out the indoor controller board toward you, then disconnect the rest of connectors.
Remove the indoor controller board and switch board.
- (7) Remove the holder of wireless controller board.
- (8) Disconnect the connector of wireless controller board and remove the wireless controller board from the holder.

Photo 5 Screw of electrical box side cover & clamp



Room temp. thermistor (TH21)

(45)

Electrical box side cover

Clamp

Caution:

In the case that room temp. thermistor is fixed with the screw of electrical box side cover, keep 45mm (1-3/4 inch) between the bottom end of clamp and the top of room temp. thermistor as Photo 5.

4. REMOVING THE ELECTRICAL BOX

- (1) Remove the front panel. (Refer to 2.)
- (2) Remove the electrical box covers. (See Photo 3)
- (3) Remove the nozzle assembly. (Refer to 5.)
- (4) Disconnect the transmission wiring of TB5.
- (5) Disconnect the power supply wiring of TB2.
- (6) Disconnect the wiring of MA-remote controller (TB15).
- (7) Disconnect the connectors on the indoor controller board.
- (8) Disconnect the connector for the ground wire. (See Photo 6)
- (9) Pull the disconnected lead wire out from the electrical box.
- (10) Remove the screw of electrical box. (See Photo 7)
- (11) Push up the upper fixture (See Photo 6) catch to remove the box, then pull the right fixture (See Photo 4) and remove it from the box fixture.

PHOTOS

Photo 3

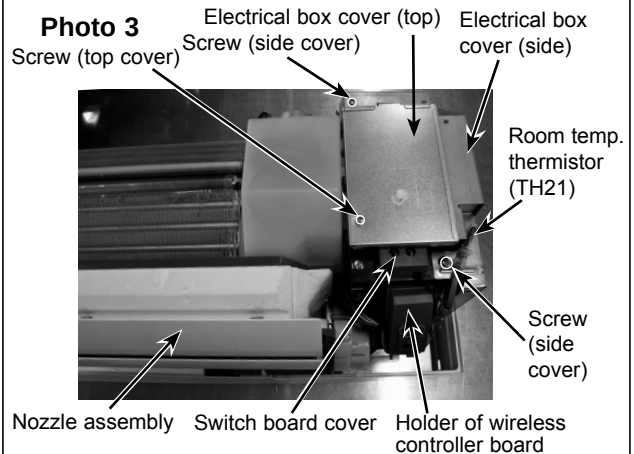


Photo 4

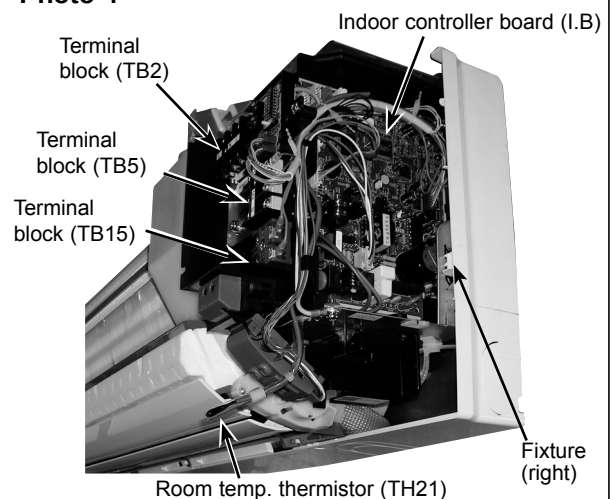
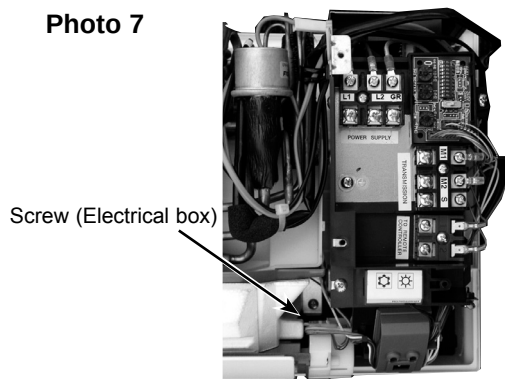
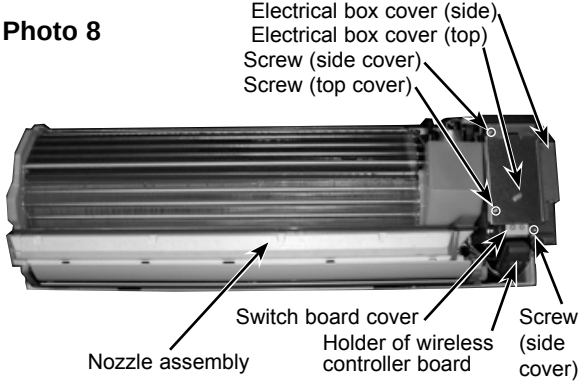
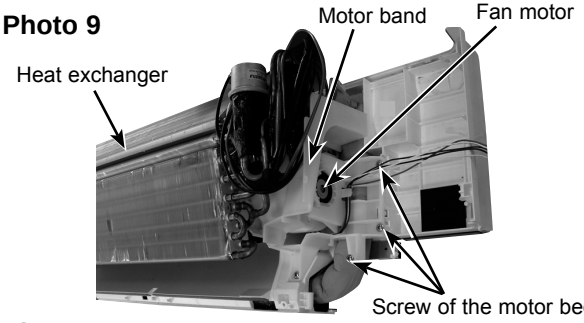
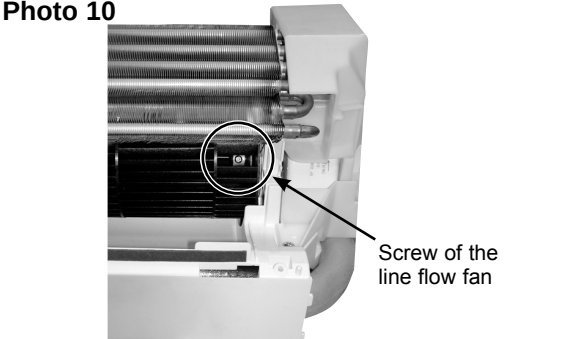
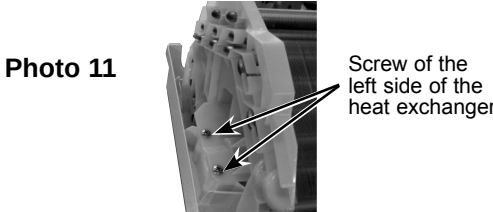
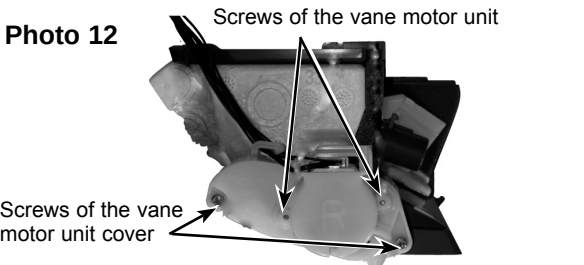
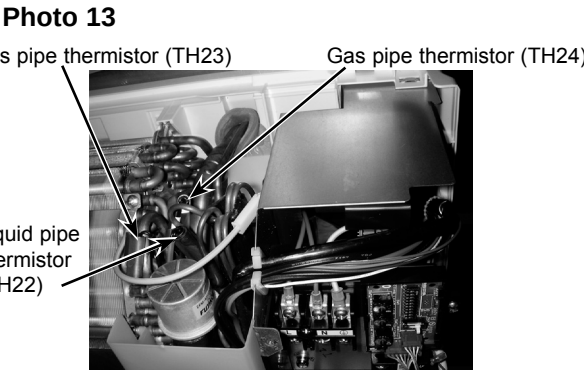


Photo 6



Photo 7



OPERATION PROCEDURE	PHOTOS
5. REMOVING THE NOZZLE ASSEMBLY (with VANE and VANE MOTOR) AND DRAIN HOSE (1) Remove the front panel (Refer to 2.). (2) Remove the electrical box cover. (3) Disconnect the vane motor connector (CN151) on the indoor controller board. (4) Remove the corner box. (5) Pull the nozzle assembly and detach. (6) Push the fixture and remove the drain hose.	Photo 8 
6. REMOVING THE INDOOR FAN MOTOR AND THE LINE FLOW FAN (1) Remove the front panel (Refer to 2.) and the corner box at right lower side. (2) Remove the electrical box (Refer to 4.) and the nozzle assembly (Refer to 5.). (3) Remove the screws fixing the motor bed. (See Photo 9) (4) Loosen the screw fixing the line flow fan. (See Photo 10) (5) Remove the motor bed together with fan motor and motor band. (6) Release the hooks of the motor band. Remove the motor band. Pull out the indoor fan motor. (7) Remove the screws fixing the left side of the heat exchanger. (See Photo 11) (8) Lift the heat exchanger, and pull out the line flow fan to the lower-left.	Photo 9  Photo 10  Photo 11 
7. REMOVING THE VANE MOTOR (1) Remove the nozzle assembly. (Refer to 5.) (2) Remove the screws of the vane motor unit, and pull out the vane motor unit. (3) Remove the screws of the vane motor unit cover. (4) Remove the vane motor from the vane motor unit. (5) Disconnect the connector from the vane motor.	Photo 12 
8. REMOVING THE LIQUID PIPE THERMISTOR AND GAS PIPE THERMISTOR (1) Remove the front panel. (Refer to 2) (2) Remove the electrical box cover. (3) Remove the motor band. (4) Cut the wiring fixed band. (5) Remove the liquid pipe thermistor and gas pipe thermistors. (6) Disconnect the connector (CN44) (CN2G) on the indoor controller board. (TH22 and TH23/CN44, TH24/CN2G)	Photo 13 

OPERATION PROCEDURE

9. REMOVING THE HEAT EXCHANGER AND LEV

- (1) Remove the front panel (Refer to 2.) and the corner panel at right lower side.
- (2) Remove the electrical box (Refer to 4.) and the nozzle assembly (Refer to 5.).
- (3) Remove the motor band.
- (4) Remove the pipe thermistors (Refer to 8.).
- (5) Disconnect the connector (CN60) on the indoor controller board and the connector for ground wire. (See Photo 5)
- (6) Remove the screws fixing the left side of the heat exchanger. (See Photo 11)
- (7) Remove the heat exchanger with LEV.

PHOTOS

Photo 14

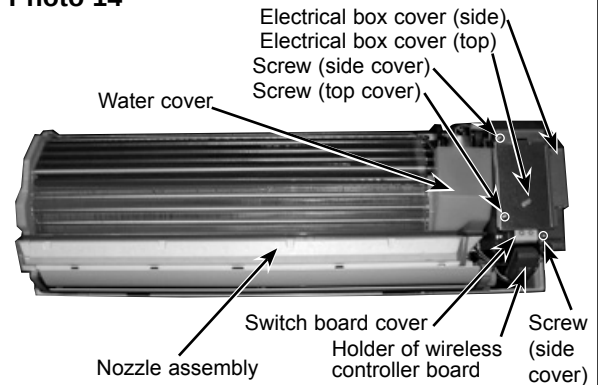


Photo 15

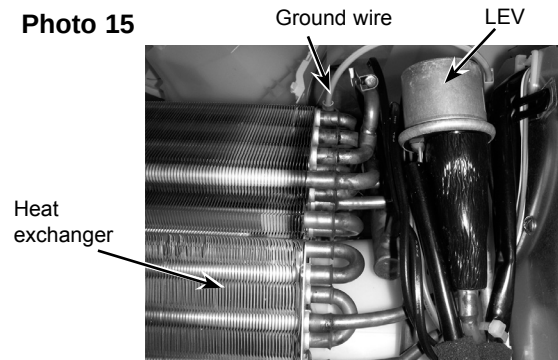
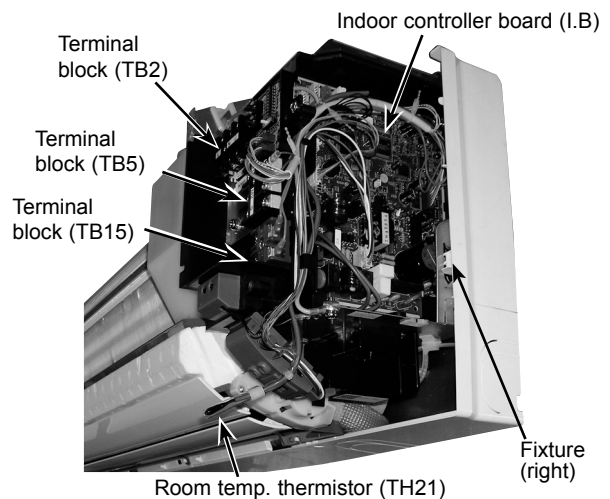


Photo 16

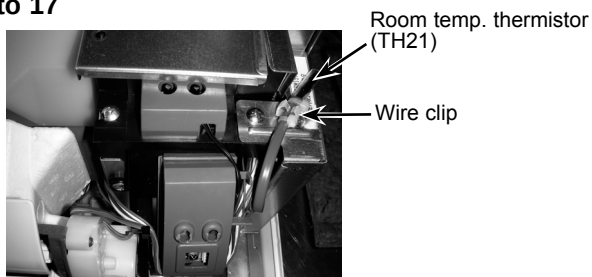


10. REMOVING THE ROOM TEMPERATURE THERMISTOR

- (1) Remove the front panel (Refer to 2.).
- (2) Remove the electrical box cover.
- (3) Remove the room temperature thermistor.
- (4) Disconnect the connector (CN20) on the indoor controller board.

NOTE: When room temp. thermistor is replaced, be sure to use service parts No. R01 N20 202.

Photo 17



MITSUBISHI ELECTRIC CORPORATION

HEAD OFFICE : TOKYO BLDG., 2-7-3, MARUNOUCHI, CHIYODA-KU TOKYO 100-8310, JAPAN