Changes for the Better

MITSUBISHI ELECTRIC

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

May 2011

No. OCH447
REVISED EDITION-A

TECHNICAL & SERVICE MANUAL

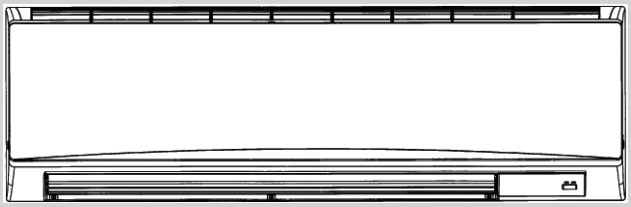
Series PKFY Wall Mounted R410A / R407C / R22

Indoor unit [Model names]	[Service Ref.]
PKFY-P63VKM-E	PKFY-P63VKM-E.TH
PKFY-P100VKM-E	PKFY-P100VKM-E.TH

Revision:
- 4. OUTLINES AND DIMENSIONS has been modified in REVISED EDITION-A.
- Some descriptions have been modified.

- Please void OCH447.

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 SAFETY PRECAUTION

CAUTIONS RELATED TO NEW REFRIGERANT

Cautions for units utilizing refrigerant R407C

Do not use the existing refrigerant piping.

The old refrigerant and lubricant in the existing piping contain a large amount of chlorine which may cause the lubricant deterioration of the new unit.

Use "low residual oil piping"

If there is a large amount of residual oil (hydraulic oil, etc.) inside the piping and joints, deterioration of the lubricant will result.

Store the piping to be used indoors during installation and both ends sealed until just before brazing.
(Store elbows and other joints in a plastic bag.)

If dust, dirt, or water enters the refrigerant cycle, deterioration of the oil and compressor trouble may result.

Use ESTR , ETHER or HAB as the lubricant to coat flares and flange connection parts.

If large amount of mineral oil enters, that can cause deterioration of refrigerant oil etc.

Use liquid refrigerant to charge the system.

If gas refrigerant is used to seal the system, the composition of the refrigerant in the cylinder will change and performance may drop.

Do not use a refrigerant other than R407C.

If another refrigerant (R22, etc.) is used, the chlorine in the refrigerant may cause the lubricant deterioration.

Use a vacuum pump with a reverse flow check valve.

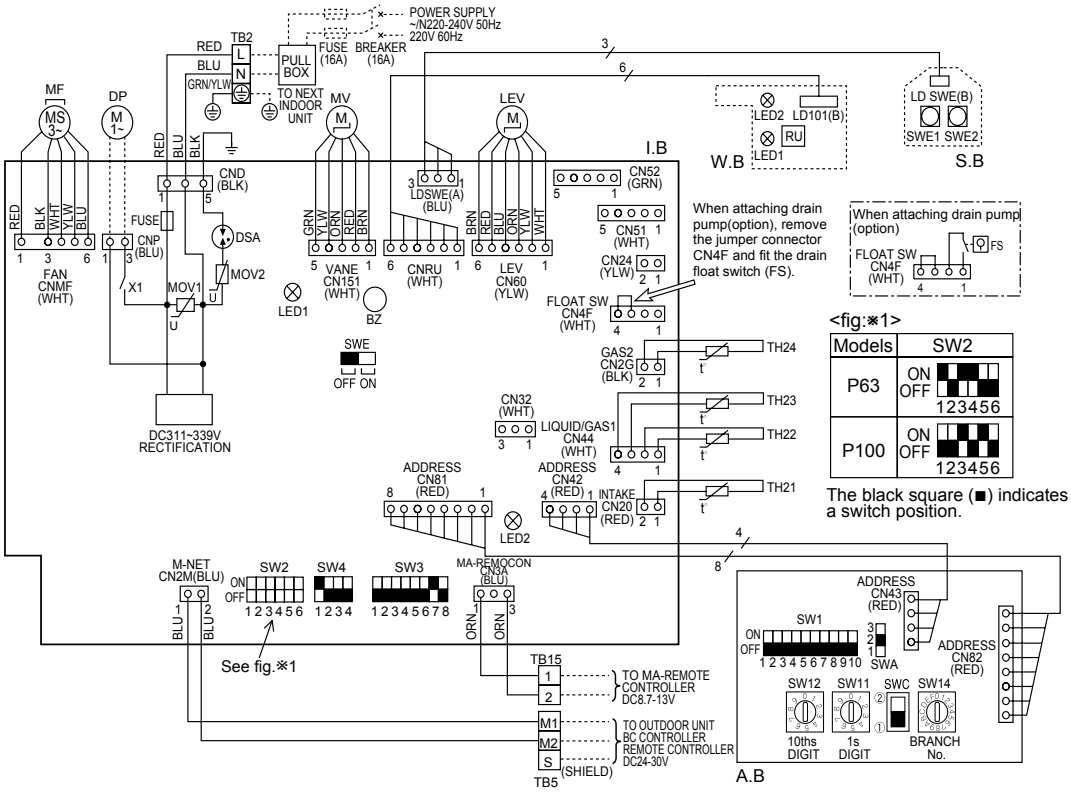
The vacuum pump oil may flow back into the refrigerant cycle and cause the lubricant deterioration.

Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, poisonous gases will be released.

5 WIRING DIAGRAM

PKFY-P63VKM-E.TH PKYF-P100VKM-E.TH

SYMBOL	NAME		SYMBOL	NAME	
I.B	INDOOR CONTROLLER BOARD		TH21	THERMISTOR	ROOM TEMP. DETECTION (0°C/15kΩ, 25°C/5.4kΩ)
CN32	CONNECTOR	REMOTE SWITCH	TH22		PIPE TEMP. DETECTION/LIQUID (0°C/15kΩ, 25°C/5.4kΩ)
CN51		CENTRALLY CONTROL	TH23		PIPE TEMP. DETECTION/GAS1 (0°C/15kΩ, 25°C/5.4kΩ)
CN52		REMOTE INDICATION	TH24		PIPE TEMP. DETECTION/GAS2 (0°C/15kΩ, 25°C/5.4kΩ)
BZ	BUZZER		A.B	ADDRESS BOARD	
DSA	SURGE ABSORBER		SWA	SWITCH	FAN SPEED SELECTOR
FUSE	FUSE (T3.15AL 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	S.B	SWITCH BOARD	
SW4		MODEL SELECTOR	SWE1	EMERGENCY OPERATION (HEAT)	
SWE		DRAIN PUMP (TEST MODE)	SWE2	EMERGENCY OPERATION (COOL)	
X1	AUX.RELAY	DRAIN PUMP (OPTION)	W.B	PCB FOR WIRELESS REMOTE CONTROLLER	
MOV 01.02	VARISTOR		LED1	LED (OPERATION INDICATOR: GREEN)	
LEV	LINEAR EXPANSION VALVE		LED2	LED (OPERATION FOR HEATING: ORANGE)	
MF	FAN MOTOR		RU	RECEIVING UNIT	
MV	VANE MOTOR		DP	DRAIN PUMP (OPTION)	
TB2	TERMINAL	POWER SUPPLY	FS	DRAIN FLOAT SWITCH (OPTION)	
TB5	BLOCK	TRANSMISSION			
TB15		MA-REMOTE CONTROLLER			



<fig:※1>

Models	SW2
P63	ON OFF 123456
P100	ON OFF 123456

The black square (■) indicates a switch position.

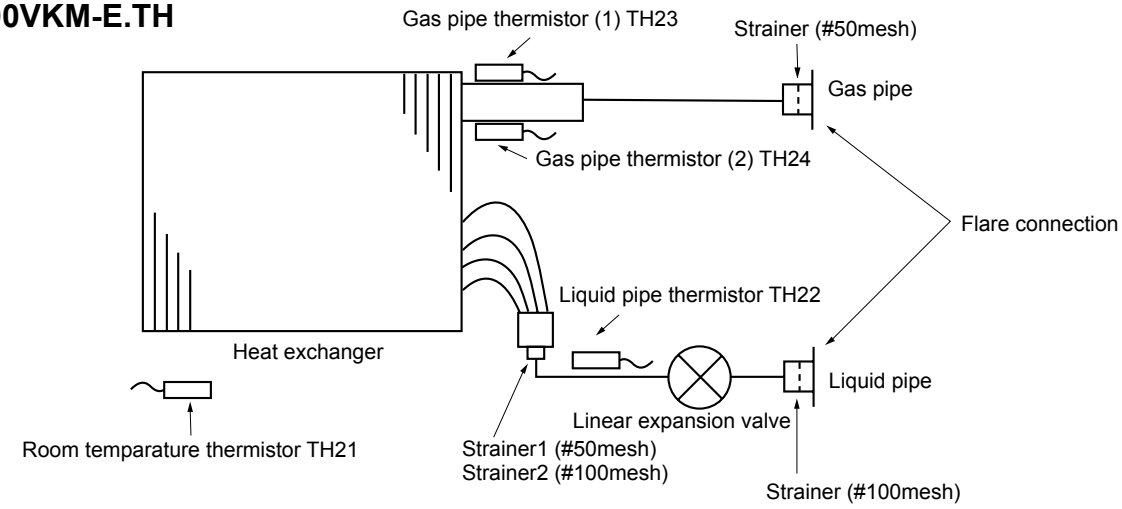
LED on indoor board for service

Mark	Meaning	Function
LED1	Main power supply	Main power supply (Indoor unit:220-240V) 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, ☐☐☐ :connecter.
6. The setting of the SW2 dip switches differs in the capacity. For the detail, refer to fig.※1.

6 REFRIGERANT SYSTEM DIAGRAM

PKFY-P63VKM-E.TH
PKFY-P100VKM-E.TH

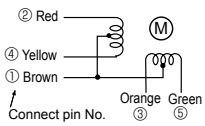
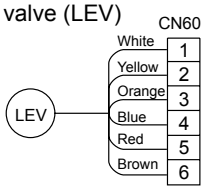


Unit : mm (inch)

Item \ Model	PKFY-P63VKM-E	PKFY-P100VKM-E
Gas pipe	ϕ15.88 (5/8)	ϕ15.88 (5/8)
Liquid pipe	ϕ9.52 (3/8)	ϕ9.52 (3/8)

7 TROUBLESHOOTING

7-1. HOW TO CHECK THE PARTS
PKFY-P63VKM-E.TH PKFY-P100VKM-E.TH

<table>
<tr><th>Parts name</th><th>Check points</th></tr>
<tr><td>Room temperature thermistor (TH21)
Liquid pipe temperature thermistor (TH22)
Gas pipe temperature thermistor (TH23 ,24)</td><td>Disconnect the connector then measure the resistance using a tester.
(At the ambient temperature 10℃~30℃)
<table><tr><th>Normal</th><th>Abnormal</th></tr><tr><td>4.3kΩ~9.6kΩ</td><td>Open or short</td></tr></table>Refer to the next page for the details.</td></tr>
<tr><td>Vane motor (MV)
  </td><td>Measure the resistance between the terminals using a tester. (Coil temperature 20℃)
<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">250Ω ± 7%</td></tr></table></td></tr>
<tr><td>Fan motor (MF)</td><td>Refer to 7-1-3.</td></tr>
<tr><td>Linear expansion valve (LEV)
  </td><td>Disconnect the connector then measure the resistance valve using a tester.
(Coil temperature 20℃)
<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></td></tr>
</table>

7-1-1. Thermistor

<Thermistor Characteristic graph>

Thermistor for lower temperature

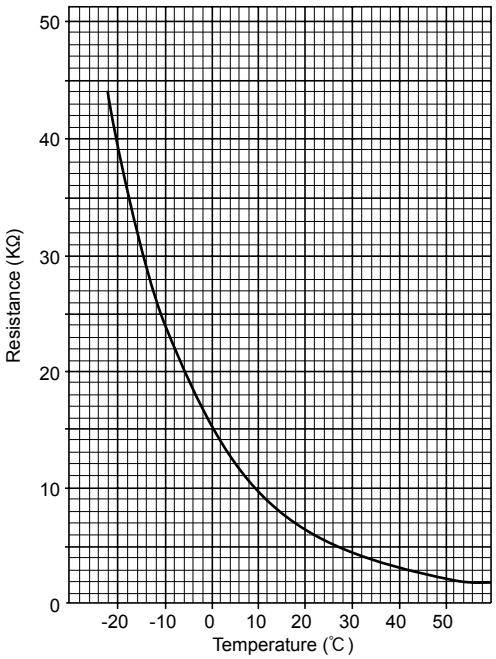
Room temperature thermistor (TH21)
Liquid pipe temperature thermistor (TH22)
Gas pipe temperature thermistor (TH23)
(TH24)

Thermistor R_0=15kΩ ± 3%
Fixed number of B=3480 ± 2%

$$Rt=15\exp\{3480(\frac{1}{273+t}-\frac{1}{273})\}$$

0℃	15kΩ
10℃	9.6kΩ
20℃	6.3kΩ
25℃	5.4kΩ
30℃	4.3kΩ
40℃	3.0kΩ

< Thermistor for lower temperature >

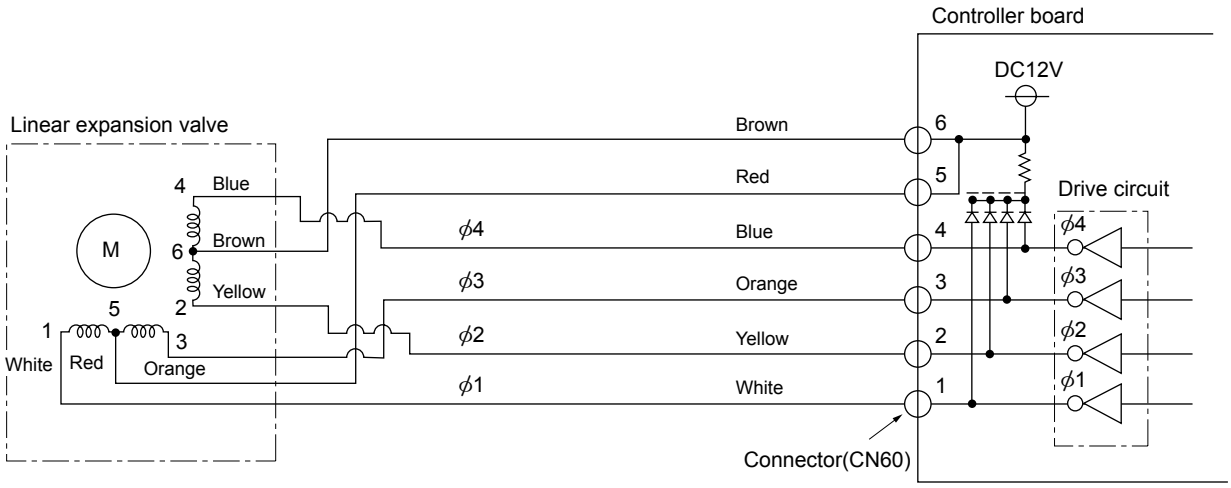


7-1-2. Liner expansion valve

① **Operation summary of the linear expansion valve**

• Linear expansion valve opens/closes 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 signal.

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



Note : Since the number of the connector at the controller board side and the relay connector are different, follow the color of the lead wire.

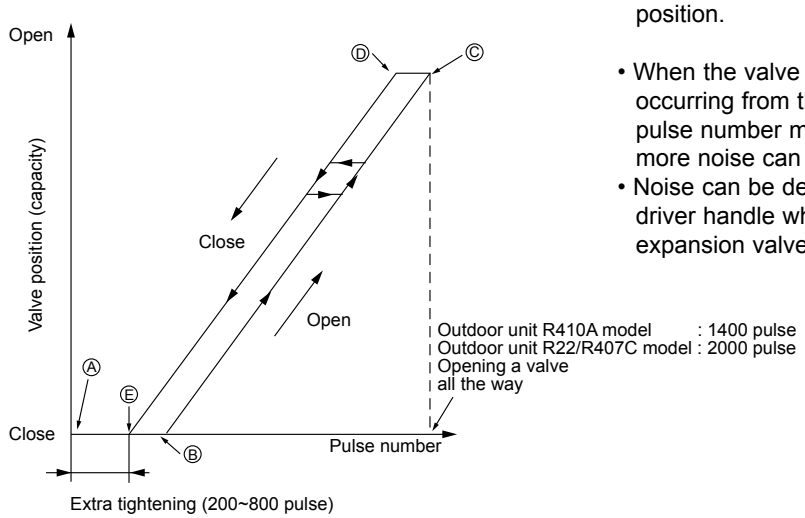
<Output pulse signal and the valve operation>

Output (Phase)	Output			
	1	2	3	4
ϕ1	ON	OFF	OFF	ON
ϕ2	ON	ON	OFF	OFF
ϕ3	OFF	ON	ON	OFF
ϕ4	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.

- 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.

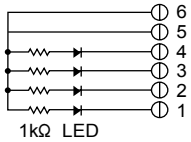
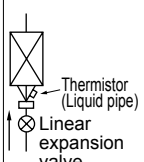
② Linear expansion valve operation



- When the switch is turned on, 2200 pulse closing valve signal will be sent till it goes to point Ⓐ in order to define the valve position.

- When the valve moves smoothly, there is no noise or vibration occurring from the linear expansion valves : however, when the pulse number moves from Ⓔ to Ⓐ or when the valve is locked, more noise can be heard than in a normal situation.
- Noise can be detected by placing the ear against the screw driver handle while putting the screw driver tip to the linear expansion valve.

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.  When power is turned on, pulse signals will 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 in case of 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.  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

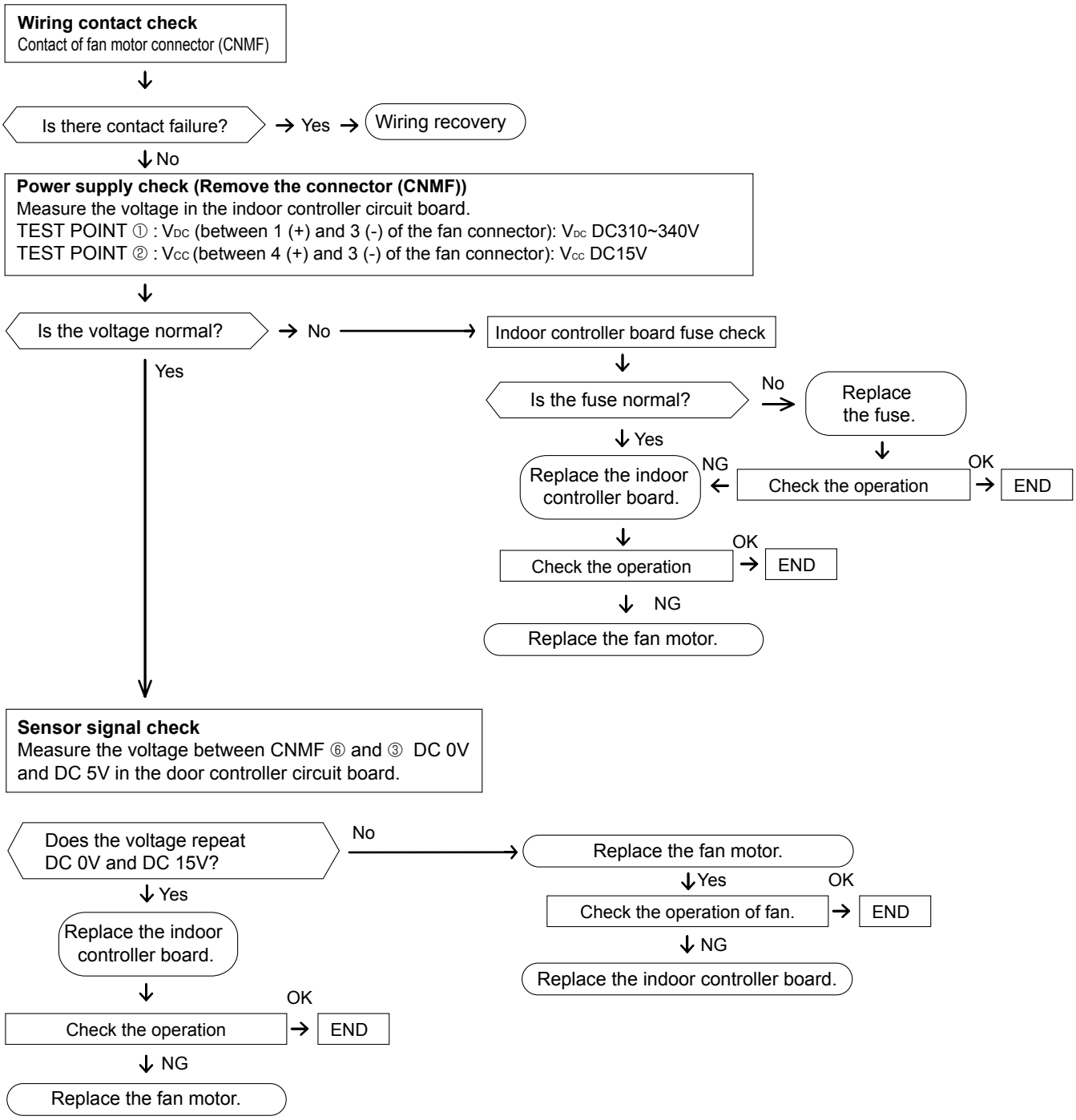
· High voltage is applied to the connecter (CNMF) for the fan motor. Pay attention to the service.

· 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.)

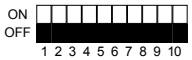
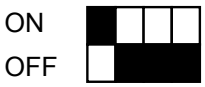
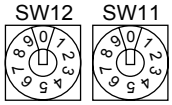
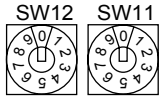
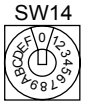
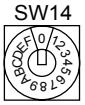
② Self check

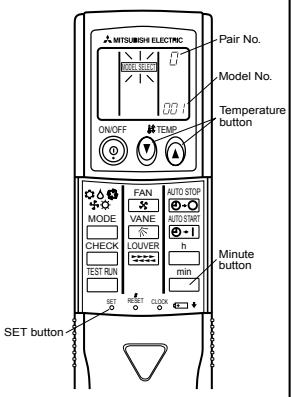
Symptom : The indoor fan cannot turn around.



7-2. Function of Dip switch

PKFY-P63VKM-E.TH PKFY-P100VKM-E.TH

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>  NOTE: ※1 SW1-7 / SW1-8 / Fan speed OFF / OFF / Extra low ON / OFF / Low OFF / ON / Setting air flow ON / ON / Stop ※2 It is impossible to intake the fresh air.
	2	Filter clogging detection	Provided	Not provided		
	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	 			Before power supply ON	Indoor controller board <Initial setting> Set for each capacity
SW3 Function selection	1	Heat pump/Cool only	Cooling only	Heat pump	Under suspension	Indoor controller board <Initial setting>  ※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 Select	1~4	 			Before power supply ON	Indoor controller board
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> 

<table>
<tr><th>Switch</th><th></th><th>Operation by switch</th><th>Effective timing</th><th>Remarks</th></tr>
<tr>
<td>J41, J42
Wireless remote controller Pair No.</td>
<td>Jumper</td>
<td>
• 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
1. 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).
2. Press the MINUTE button twice. The pair number appears flashing.
3. Press the temperature ▼ ▲ buttons to select the pair number to set.
4. Press the SET button (using a pointed implement). The set pair number is displayed (steadily-lit) for 3 seconds, then disappears.
<table>
<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>
<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>
</table>
※ Pair No.4-9 of wireless remote controller is setting pattern D.
</td>
<td>Under operation or suspension</td>
<td>
<Initial setting>
Pattern A


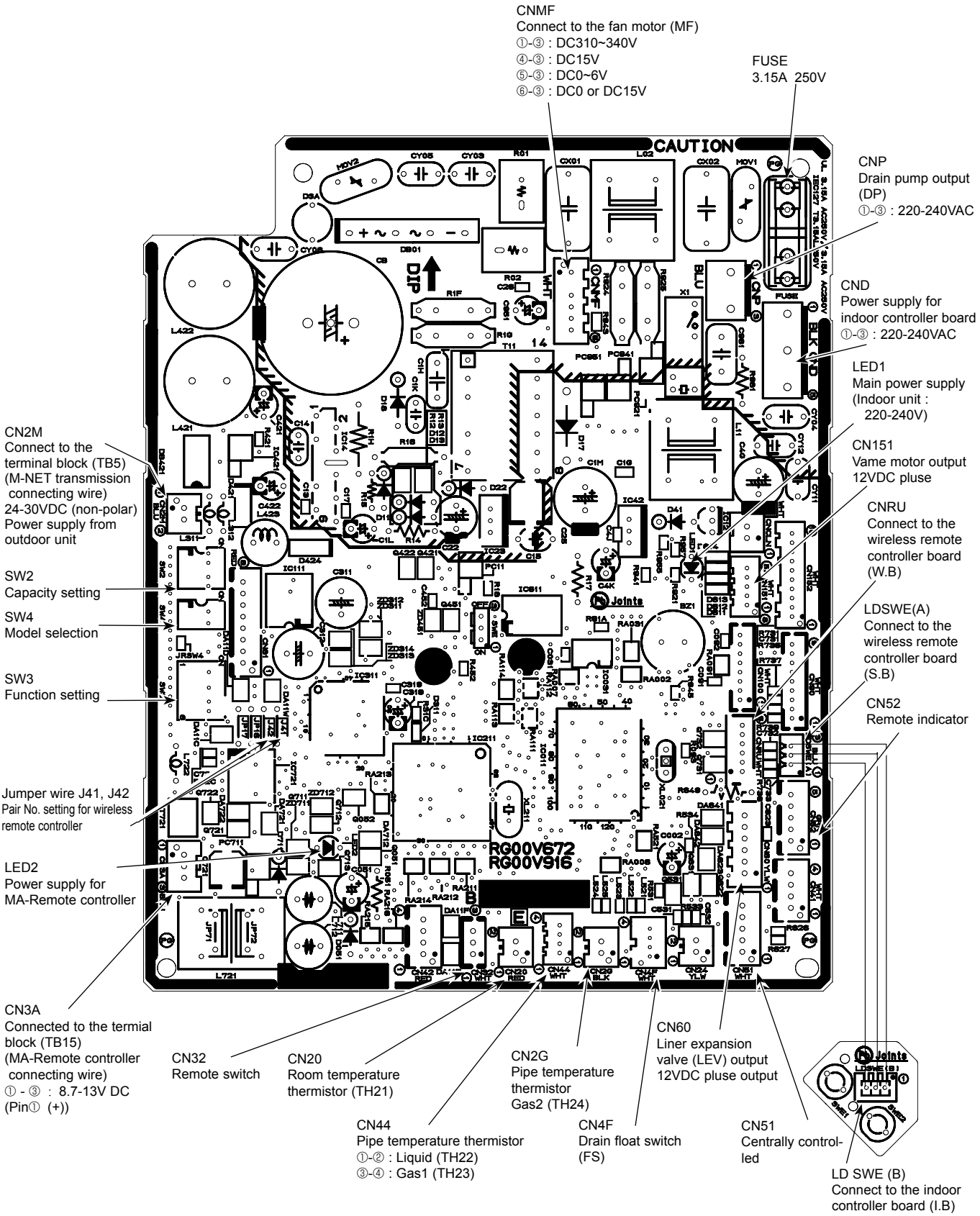
</td>
</tr>
</table>

7-3. TEST POINT DIAGRAM

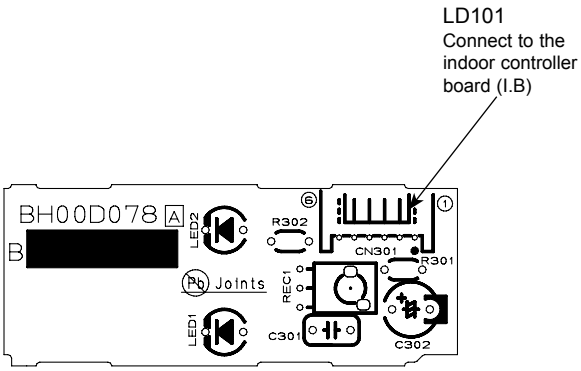
7-3-1. Indoor controller board

PKFY-P63VKM-E.TH

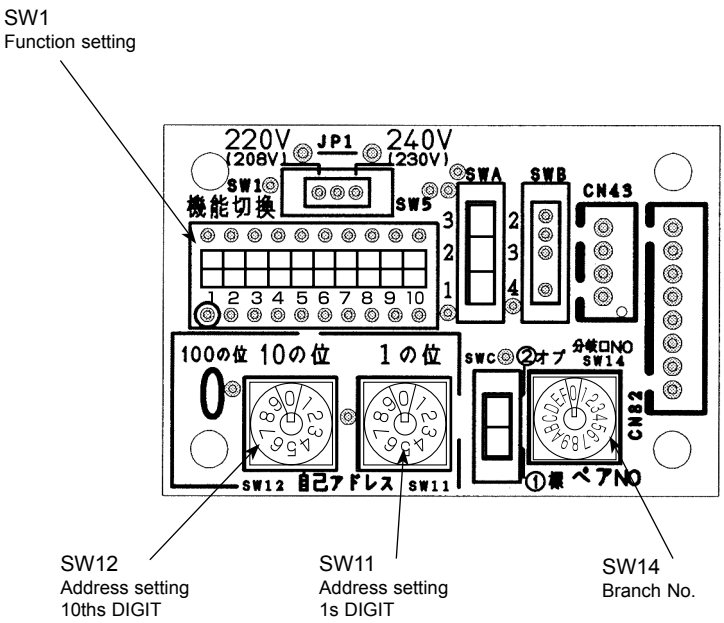
PKFY-P100VKM-E.TH



7-3-2. Wireless remote controller board
PKFY-P63VKM-E.TH
PKFY-P100VKM-E.TH



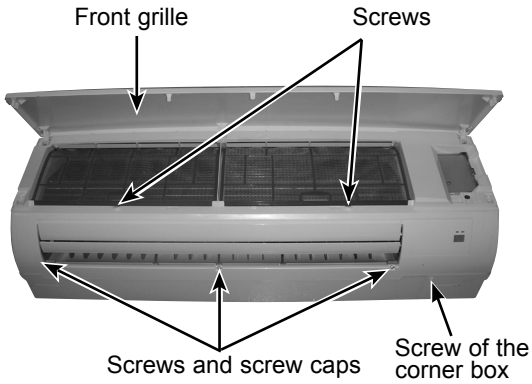
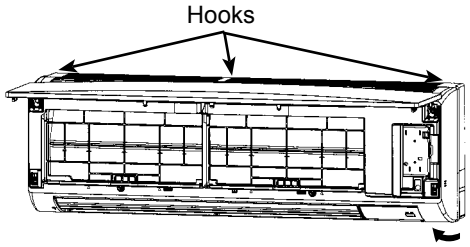
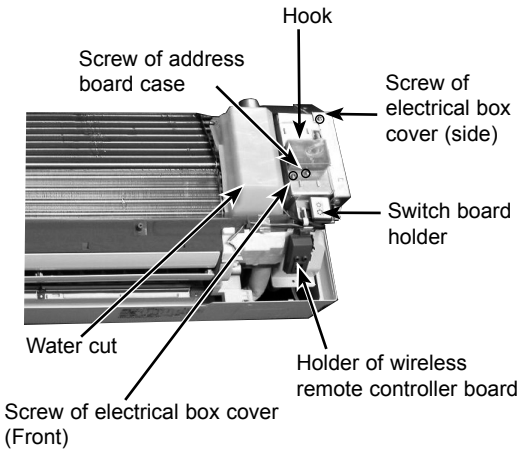
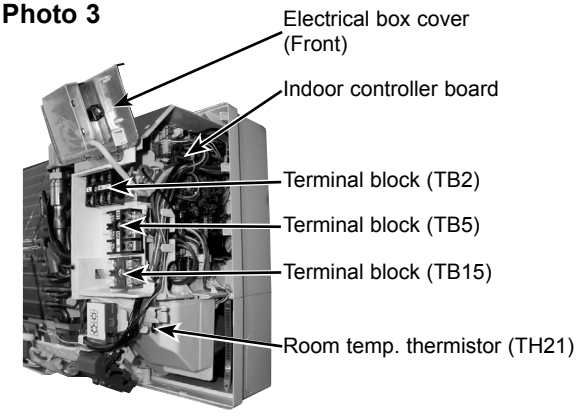
7-3-3. Address board
PKFY-P63VKM-E.TH
PKFY-P100VKM-E.TH

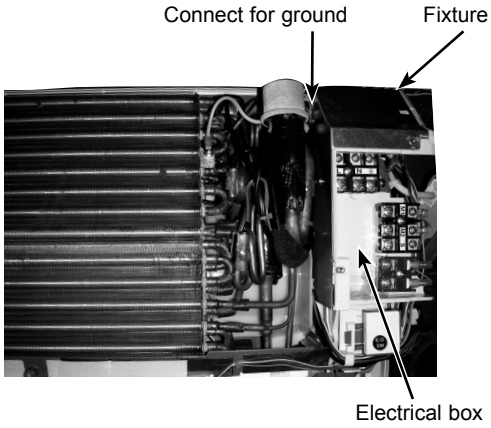
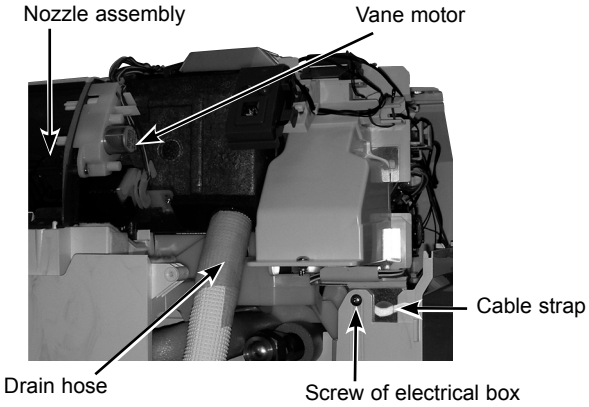
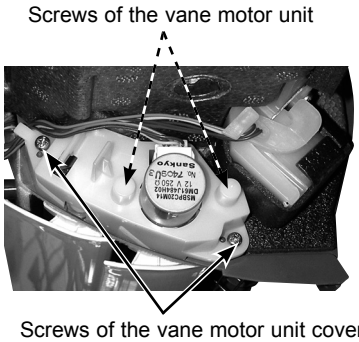


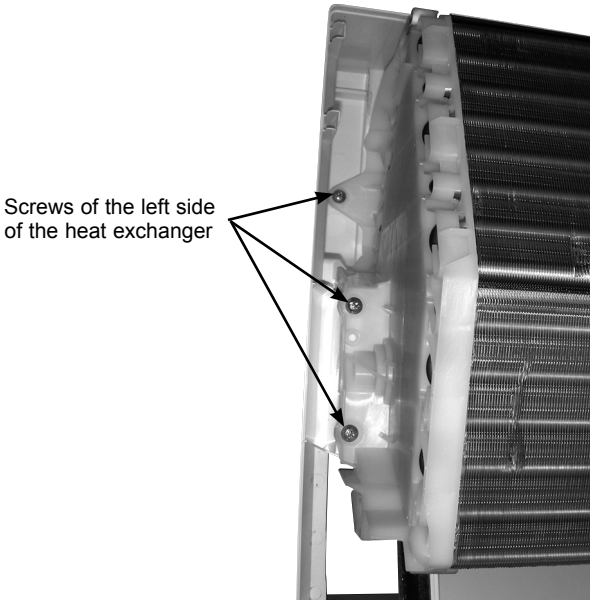
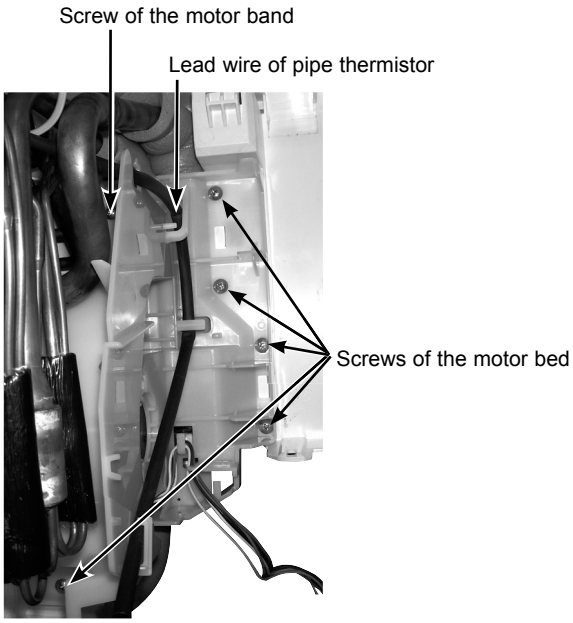
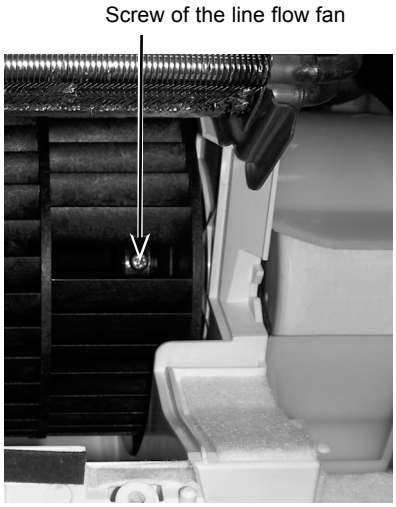
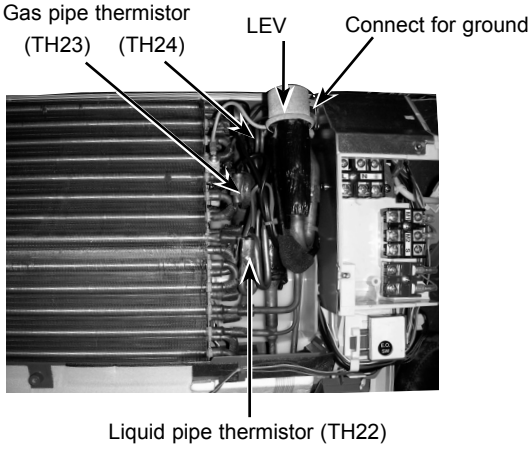
8 DISASSEMBLY PROCEDURE

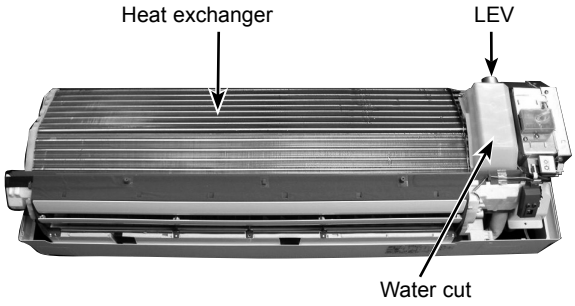
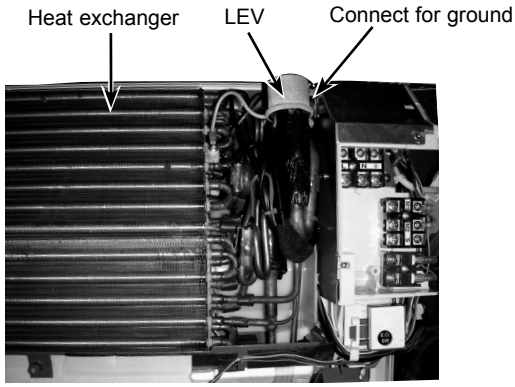
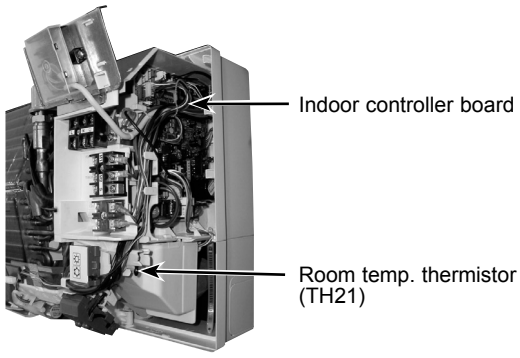
PKFY-P63VKM-E.TH PKFY-P100VKM-E.TH

Be careful when removing heavy parts.

OPERATION PROCEDURE	PHOTOS & ILLUSTRATIONS
1. REMOVING THE PANEL (1) Press and unlock the knobs on both sides of the front grille and lift the front grille until it is level. Pull the hinges forward to remove the front grille. (See Photo 1) (2) Remove 3 screw caps of the panel. Remove 5 screws. (See Photo 1) (3) Unfix 3 hooks. (See Figure 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. (5) Remove the screw of the corner box. (See Photo 1) Remove the corner box.	**Photo 1**  **Figure 1** 
2. REMOVING THE ADDRESS BOARD, THE INDOOR CONTROLLER BOARD, THE WIRELESS CONTROLLER BOARD (1) Remove the panel and the corner box. (Refer to 1.) (2) Remove the screw and hook of address board case. (See Photo 2) (3) Disconnect the connectors of address board. (4) Remove the front and side electrical box covers (each 1 screw). (5) Disconnect the connectors on the indoor controller board. (See Photo 3) (6) Remove the switch board holder and open the cover. (7) Pull out the indoor controller board toward you then remove the indoor controller board and switch board. (See Photo 3) (8) Remove the holder of wireless remote controller board. (9) Disconnect the connector of wireless remote controller board and remove the wireless remote controller board from the holder.	**Photo 2**  **Photo 3** 

OPERATION PROCEDURE	PHOTOS
3. REMOVING THE ELECTRICAL BOX (1) Remove the panel and the corner box. (Refer to 1.) (2) Remove the screw and hook of address board case. (3) Remove the front and side electrical box covers (each 1 screw). (4) Remove the transmission wiring of TB5, the power supply wiring of TB2 and the wiring of MA-remote controller (TB15). (5) Disconnect the connectors on the indoor controller board. (6) Disconnect the connector for ground wire. (7) Remove the screw on lower side of the electrical box. (See Photo 5) (8) Push up the upper fixture catch to remove the box, then remove it from the box fixture.	**Photo 4** 
4. REMOVING THE NOZZLE ASSEMBLY (with VANE and VANE MOTOR) AND DRAIN HOSE (1) Remove the panel and corner box. (Refer to 1.) (2) Remove the electrical box covers. (Refer to 2.) (3) Disconnect the vane motor connector (CN151) on the indoor controller board. (4) Pull out the drain hose from the nozzle assembly, and remove nozzle assembly. (See Photo 5)	**Photo 5** (see the bottom) 
5. REMOVING THE VANE MOTOR (1) Remove the nozzle assembly. (Refer to 4.) (2) Remove 2 screws of the vane motor unit cover, and pull out the vane motor unit. (3) Remove 2 screws of the vane motor unit. (4) Remove the vane motor from the vane motor unit. (5) Disconnect the connector from the vane motor.	**Photo 6** 

OPERATION PROCEDURE	PHOTOS
6. REMOVING THE INDOOR FAN MOTOR AND THE LINE FLOW FAN (1) Remove the panel and the corner box. (Refer to 1.) (2) Remove the electrical box (Refer to 2.) and the nozzle assembly (Refer to 3.). (3) Remove the water cut. (See Photo 2) (4) Remove the screw fixing the line flow fan. (See Photo 8) (5) Remove 5 screws fixing the motor bed. (See Photo 7) (6) Remove the lead wire of pipe thermistor from the hook of motor bed. (See Photo 7) (7) Remove the screw fixing motor band. (See Photo 7) (8) Remove the motor bed together with fan motor and motor band. (9) Remove 3 screws fixing the left side of the heat exchanger. (See Photo 9) (10) Lift the heat exchanger, and pull out the line flow fan to the lower-left. **Photo 9**  	**Photo 7**  **Photo 8** 
7. REMOVING THE LIQUID PIPE THERMISTOR AND GAS PIPE THERMISTOR (1) Remove the panel and the corner box. (Refer to 1) (2) Remove the electrical box covers. (Refer to 2.) (3) Remove the water cut. (See Photo 2) (4) Remove the liquid pipe thermistor and gas pipe thermistors. (5) Disconnect the connector (CN44) (CN2G) on the indoor controller board. (TH22 and TH23/CN44, TH24/CN2G)	**Photo 10** 

OPERATION PROCEDURE	PHOTOS
8. REMOVING THE HEAT EXCHANGER AND LEV (1) Remove the panel and the corner box. (Refer to 1.) (2) Remove the electrical box (Refer to 3.) and the nozzle assembly (Refer to 4.). (3) Remove the water cut. (4) Remove the pipe thermistors (Refer to 7.). (5) Disconnect the connector (CN60) on the indoor controller board and the connector for ground wire. (6) Remove 3 screws fixing the left side of the heat exchanger. (See Photo 9) (7) Remove the heat exchanger with LEV.	**Photo 11**  **Photo 12** 
9. REMOVING THE ROOM TEMPERATURE THERMISTOR (1) Remove the panel and corner box. (Refer to 1.) (2) Remove the electrical box covers. (3) Remove the room temperature thermistor. (4) Disconnect the connector (CN20) on the indoor controller board.	**Photo 13** 

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