

November 2008

**No. OCH418
REVISED EDITION-A**

TECHNICAL & SERVICE MANUAL

Series PKFY Wall Mounted R410A / R407C / R22
**Indoor unit
[Model names]**

PKFY-P15VBM-E

PKFY-P20VBM-E

PKFY-P25VBM-E

[Service Ref.]

PKFY-P15VBM-E
PKFY-P20VBM-E
PKFY-P20VBM-ER1
PKFY-P25VBM-E
PKFY-P25VBM-ER1

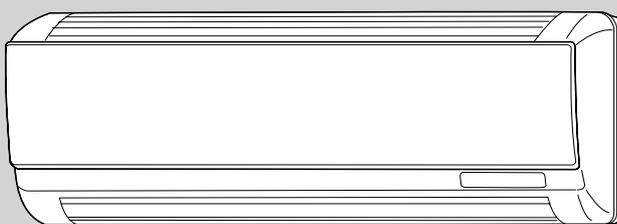
Revision:

- PKFY-P15VBM-E and PKFY-P20/25VBM-ER1 are added in REVISED EDITION-A.
- Some descriptions have been modified.

- Please void OCH418.

Note:

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



INDOOR UNIT

 Model name
indication

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PARTS CATALOG (OCB418)

1

TECHNICAL CHANGES

PKFY-P20VBM-E → PKFY-P20VBM-ER1

PKFY-P25VBM-E → PKFY-P25VBM-ER1

INDOOR CONTROLLER BOARD (I.B.) has been changed.

2

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.

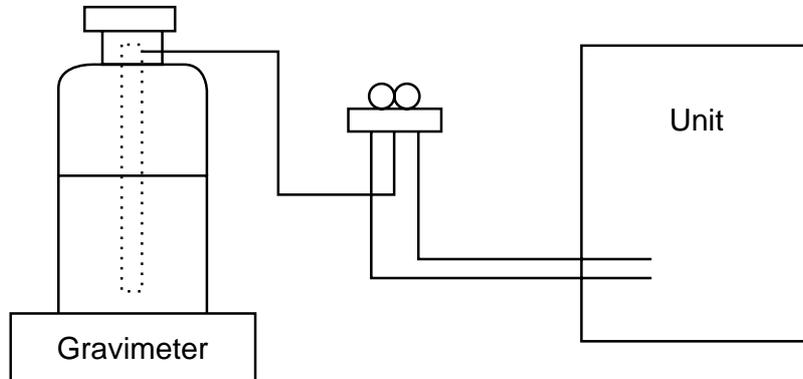
[1] Cautions for service

- After recovering the all refrigerant in the unit, proceed to working.
- Do not release refrigerant in the air.
- After completing the repair service, recharge the cycle with the specified amount of liquid refrigerant.

[2] Refrigerant recharging

(1) Refrigerant recharging process

- ① Direct charging from the cylinder.
 - R407C cylinder available on the market has a syphon pipe.
 - Leave the syphon pipe cylinder standing and recharge it.
 - (By liquid refrigerant)



(2) Recharge in refrigerant leakage case

- After recovering the all refrigerant in the unit, proceed to working.
- Do not release the refrigerant in the air.
- After completing the repair service, recharge the cycle with the specified amount of liquid refrigerant.

[3] Service tools

Use the below service tools as exclusive tools for R407C refrigerant.

No.	Tool name	Specifications
①	Gauge manifold	·Only for R407C
		·Use the existing fitting SPECIFICATIONS. (UNF7/16)
		·Use high-tension side pressure of 3.43MPa·G or over.
②	Charge hose	·Only for R407C
		·Use pressure performance of 5.10MPa·G or over.
③	Electronic scale	_____
④	Gas leak detector	·Use the detector for R134a or R407C.
⑤	Adapter for reverse flow check	·Attach to vacuum pump.
⑥	Refrigerant charge base	_____
⑦	Refrigerant cylinder	·For R407C
		·Top of cylinder (Brown) ·Cylinder with syphon
⑧	Refrigerant recovery equipment	_____

Cautions for units utilizing refrigerant R410A

Do not use the existing refrigerant piping.

The old refrigerant and lubricant in the existing piping contains 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 of the piping sealed until just before brazing. (Leave elbow joints, etc. in their packaging.)

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Use ester oil, ether oil or alkylbenzene oil (small amount) as the refrigerant oil applied to flares and flange connections.

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

Charge refrigerant from liquid phase of gas cylinder.

If the refrigerant is charged from gas phase, composition change may occur in refrigerant and the efficiency will be lowered.

Do not use refrigerant other than R410A.

If other refrigerant (R22 etc.) is used, chlorine in refrigerant can cause deterioration of refrigerant oil etc.

Use a vacuum pump with a reverse flow check valve.

Vacuum pump oil may flow back into refrigerant cycle and that can cause deterioration of refrigerant oil etc.

Use the following tools specifically designed for use with R410A refrigerant.

The following tools are necessary to use R410A refrigerant.

Tools for R410A	
Gauge manifold	Flare tool
Charge hose	Size adjustment gauge
Gas leak detector	Vacuum pump adaptor
Torque wrench	Electronic refrigerant charging scale

Handle tools with care.

If dirt, dust or moisture enters into refrigerant cycle, that can cause deterioration of refrigerant oil or malfunction of compressor.

Do not use a charging cylinder.

If a charging cylinder is used, the composition of refrigerant will change and the efficiency will be lowered.

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

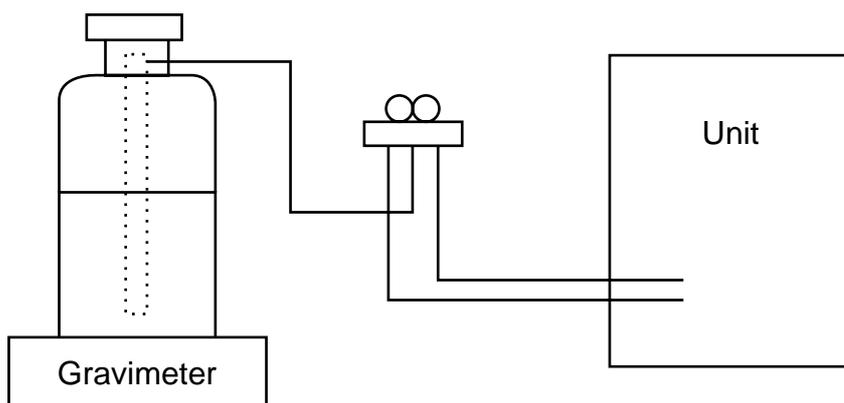
[1] Cautions for service

- (1) Perform service after collecting the refrigerant left in unit completely.
- (2) Do not release refrigerant in the air.
- (3) After completing service, charge the cycle with specified amount of refrigerant.
- (4) When performing service, install a filter drier simultaneously.
Be sure to use a filter drier for new refrigerant.

[2] Additional refrigerant charge

When charging directly from cylinder

- Check that cylinder for R410A on the market is syphon type.
- Charging should be performed with the cylinder of syphon stood vertically. (Refrigerant is charged from liquid phase.)

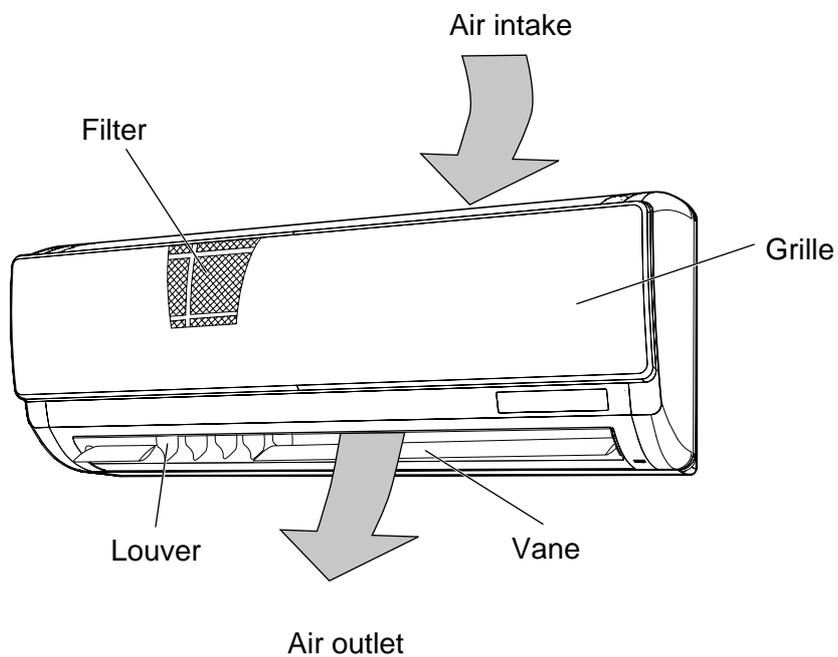


[3] Service tools

Use the below service tools as exclusive tools for R410A refrigerant.

No.	Tool name	Specifications
①	Gauge manifold	·Only for R410A
		·Use the existing fitting specifications. (UNF1/2)
		·Use high-tension side pressure of 5.3MPa-G or over.
②	Charge hose	·Only for R410A
		·Use pressure performance of 5.09MPa-G or over.
③	Electronic scale	—
④	Gas leak detector	·Use the detector for R134a, R407C or R410A.
⑤	Adaptor for reverse flow check	·Attach to vacuum pump.
⑥	Refrigerant charge base	—
⑦	Refrigerant cylinder	·Only for R410A
		·Top of cylinder (Pink) ·Cylinder with syphon
⑧	Refrigerant recovery equipment	—

● Indoor unit



● 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.

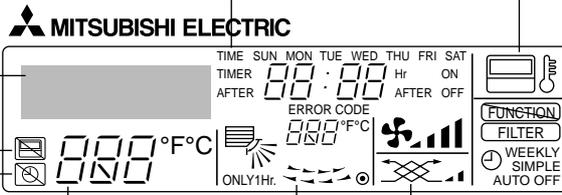
“Centrally Controlled” indicator
Indicates that operation from the remote controller has been prohibited by a master controller.

“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.



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 8–39°C. The display blinks if the temperature is less than 8°C or 39°C 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.

“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.

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)

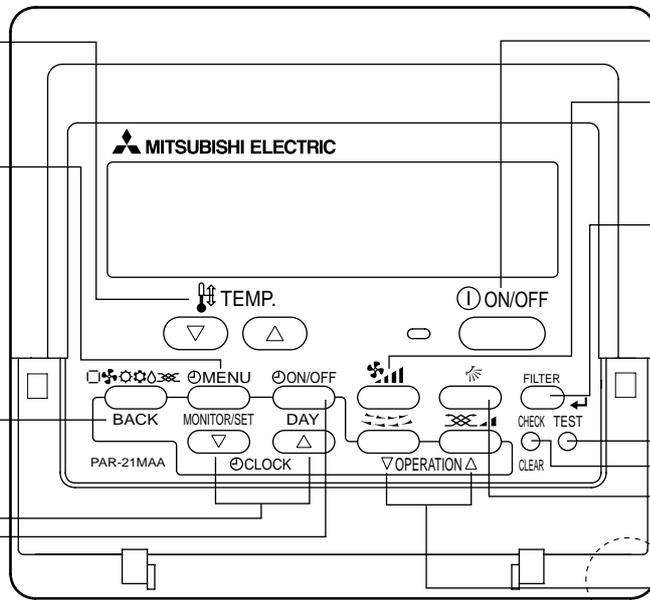
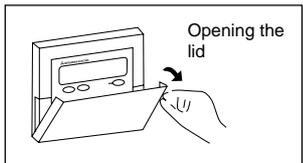
Airflow Up/Down button

Louver button (▽ Operation button)

▽ To return operation number

Ventilation button (△ Operation button)

△ To go to next operation number

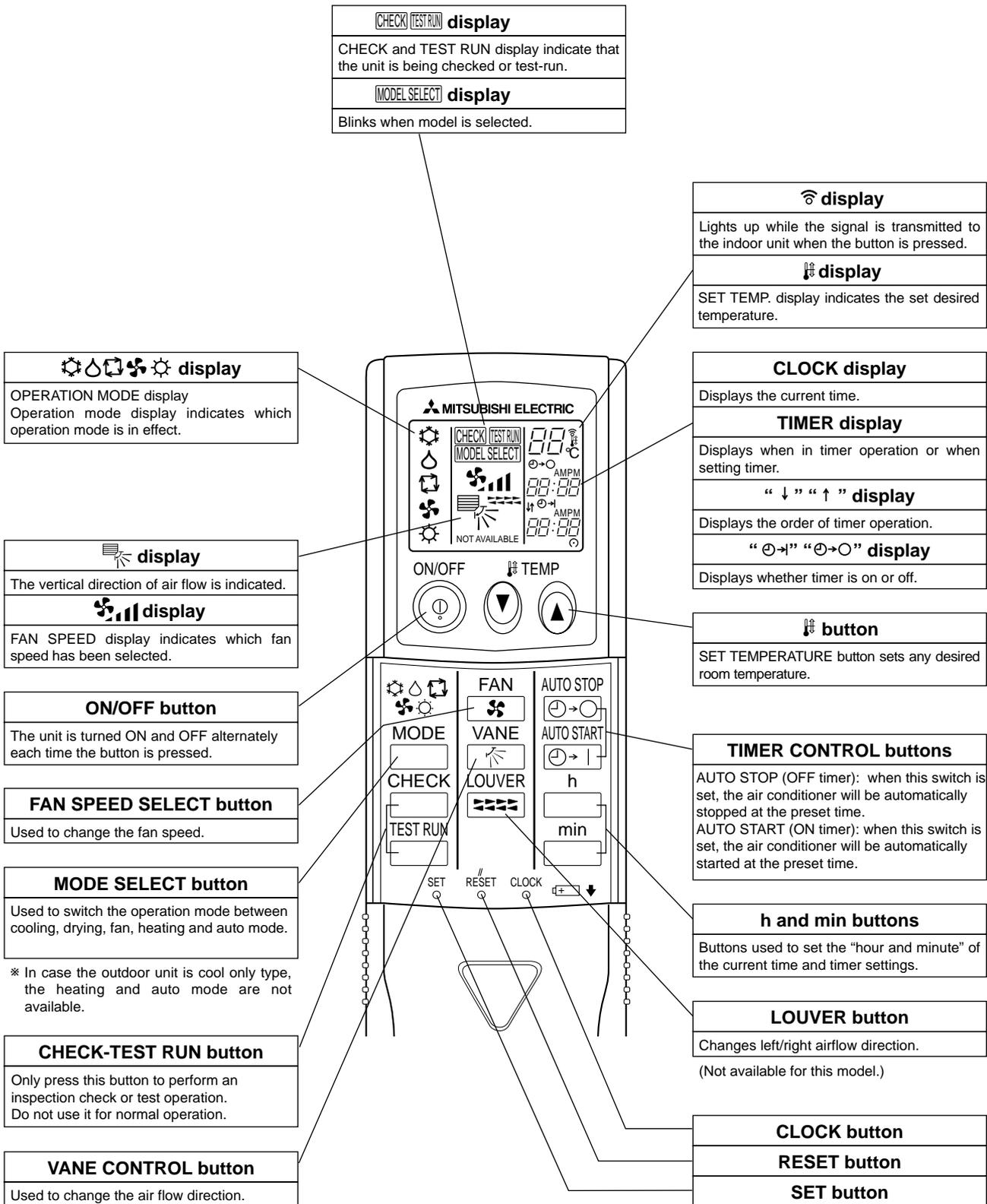


Built-in temperature sensor

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.

● **Wireless remote controller**



4

SPECIFICATION

4-1. SPECIFICATIONS

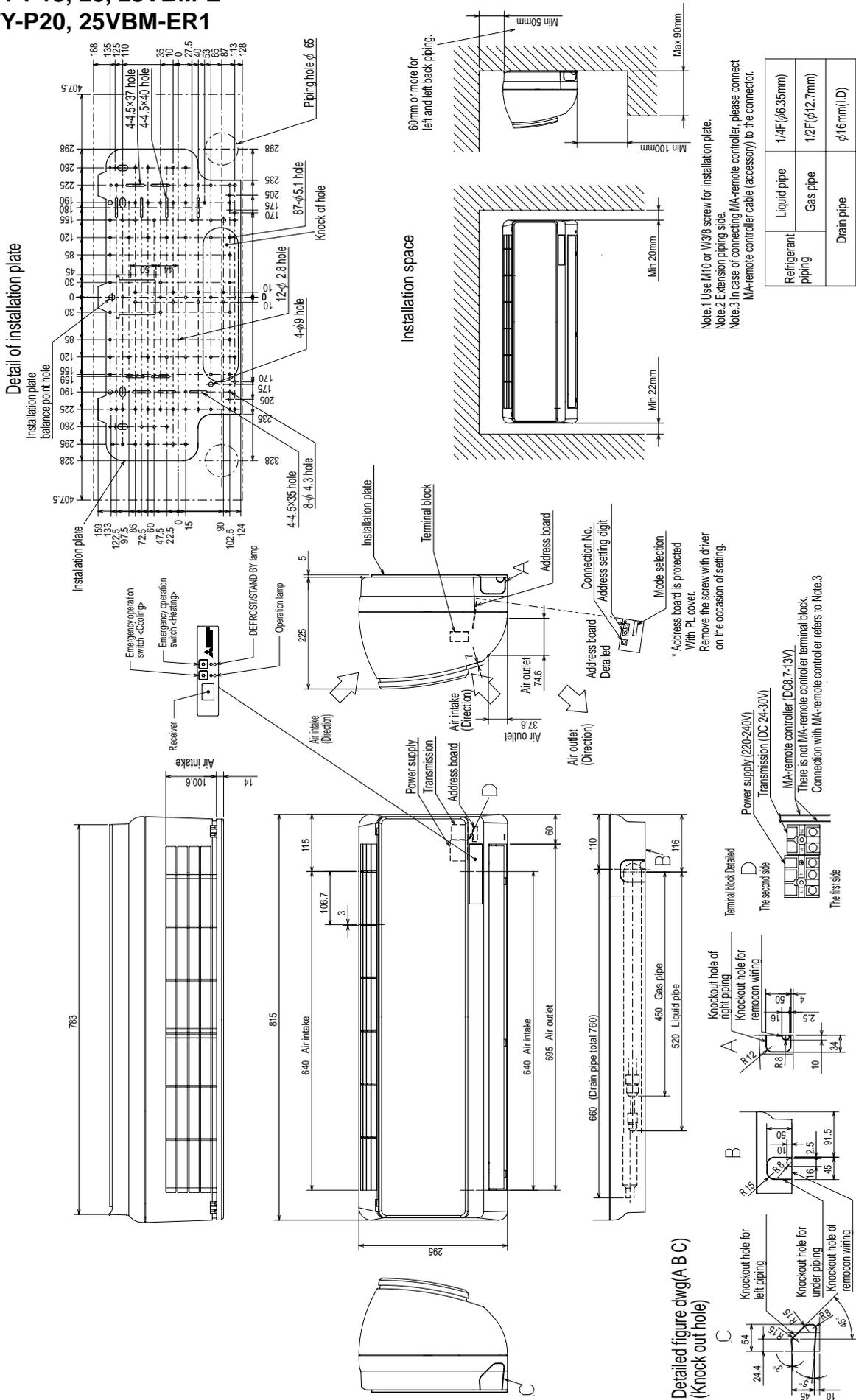
Model			PKFY-P15VBM-E	PKFY-P20VBM-E(R1)	PKFY-P25VBM-E(R1)
Power source			1-phase 220-240V 50Hz, 1-phase 220V 60Hz		
Cooling capacity (Nominal)	*1	kW	1.7	2.2	2.8
	*1	kcal/h	1,450	1,900	2,400
	*1	Btu/h	5,800	7,500	9,600
	*2	kcal/h	1,500	2,000	2,500
	Power input	kW	0.04	0.04	0.04
	Current input	A	0.20	0.20	0.20
Heating capacity (Nominal)	*3	kW	1.9	2.5	3.2
	*3	kcal/h	1,600	2,200	2,800
	*3	Btu/h	6,500	8,500	10,900
	Power input	kW	0.04	0.04	0.04
	Current input	A	0.20	0.20	0.20
External finish			Plastic, MUNSELL (1.0Y 9.2/0.2)		
External dimension H x W x D		mm	295 x 815 x 225	295 x 815 x 225	295 x 815 x 225
		in.	11-5/8" x 32-1/8" x 8-7/8"	11-5/8" x 32-1/8" x 8-7/8"	11-5/8" x 32-1/8" x 8-7/8"
Net weight		kg (lb)	10 (23)	10 (23)	10 (23)
Heat exchanger			Cross fin (Aluminum fin and copper tube)		
Fan	Type x Quantity		Line flow fan x 1	Line flow fan x 1	Line flow fan x 1
	External static press.	Pa	0	0	0
		mmH ₂ O	0	0	0
	Motor type		1-phase induction motor		
	Motor output	kW	0.017	0.017	0.017
	Driving mechanism		Direct-driven by motor		
	Airflow rate (Low-Mid2-Mid1-High)	m ³ /min	4.9 - 5.0 - 5.2 - 5.3	4.9 - 5.2 - 5.6 - 5.9	4.9 - 5.2 - 5.6 - 5.9
L/s		82 - 83 - 87 - 88	82 - 87 - 93 - 98	82 - 87 - 93 - 98	
cfm		173 - 177 - 184 - 187	173 - 184 - 198 - 208	173 - 184 - 198 - 208	
Noise level (Low-Mid2-Mid1-High) (measured in anechoic room)		dB <A>	29 - 31 - 32 - 33	29 - 31 - 34 - 36	29 - 31 - 34 - 36
Insulation material			Polyethylene sheet		
Air filter			PP honeycomb		
Protection device			Fuse		
Refrigerant control device			LEV		
Connectable outdoor unit			R410A, R407C, R22 CITY MULTI		
Diameter of refrigerant pipe	Liquid (R410A) (R22, R407C)	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	ø6.35 (ø1/4") Flare
	Gas (R410A) (R22, R407C)	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	ø12.7 (ø1/2") Flare
Field drain pipe size		mm (in.)	I.D. 16mm (5/8")	I.D. 16mm (5/8")	I.D. 16mm (5/8")
Standard attachment	Document	Installation Manual, Instruction Book			
Remark	Accessory				
	Optional parts				
	External LEV Box		PAC-SG95LE-E	PAC-SG95LE-E	PAC-SG95LE-E
Installation		Details on foundation work, duct work, insulation work, electrical wiring, power source switch, and other items shall be referred to the Installation Manual.			
Note :		*1 Nominal cooling conditions	*2 Nominal cooling conditions	*3 Nominal heating conditions	Unit converter
Indoor :		27°CDB/19°CWB (81°FDB/66°FWB)	27°CDB/19.5°CWB (81°FDB/67°FWB)	20°CDB (68°FDB)	kcal/h = kW x 860
Outdoor :		35°CDB (95°FDB)	35°CDB (95°FDB)	7°CDB/6°CWB (45°FDB/43°FWB)	Btu/h = kW x 3,412
Pipe length :		7.5 m (24-9/16 ft)	5 m (16-3/8 ft)	7.5 m (24-9/16 ft)	cfm = m ³ /min x 35.31
Level difference :		0 m (0 ft)	0 m (0 ft)	0 m (0 ft)	lb = kg/0.4536
		* Nominal conditions *1, *3 are subject to JIS B8615-1.			*Above specification data is subject to rounding variation.
		* Due to continuing improvement, above specification may be subject to change without notice.			

4-2. ELECTRICAL PARTS SPECIFICATIONS

Model Parts name	Symbol	PKFY-P15VBM-E	PKFY-P20VBM-E(R1)	PKFY-P25VBM-E(R1)
Room temperature thermistor	TH21	Resistance 0°C/15kΩ, 10°C/9.6kΩ, 20°C/6.3kΩ, 25°C/5.4kΩ, 30°C/4.3kΩ, 40°C/3.0kΩ		
Liquid pipe thermistor	TH22	Resistance 0°C/15kΩ, 10°C/9.6kΩ, 20°C/6.3kΩ, 25°C/5.4kΩ, 30°C/4.3kΩ, 40°C/3.0kΩ		
Gas pipe thermistor	TH23	Resistance 0°C/15kΩ, 10°C/9.6kΩ, 20°C/6.3kΩ, 25°C/5.4kΩ, 30°C/4.3kΩ, 40°C/3.0kΩ		
Fuse (Indoor controller board)	FUSE	250V 6.3A		
Fan motor (with thermal fuse)	MF	4-Pole Output 17W / PS4V17-KB		
Fan motor capacitor	C1	1.5μF x 440V		
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	(L, N, ⊕) 250V 20A		
Transmission terminal block	TB5	(M1, M2) 250V 10A		

PKFY-P15, 20, 25VBM-E
PKFY-P20, 25VBM-ER1

Unit : mm



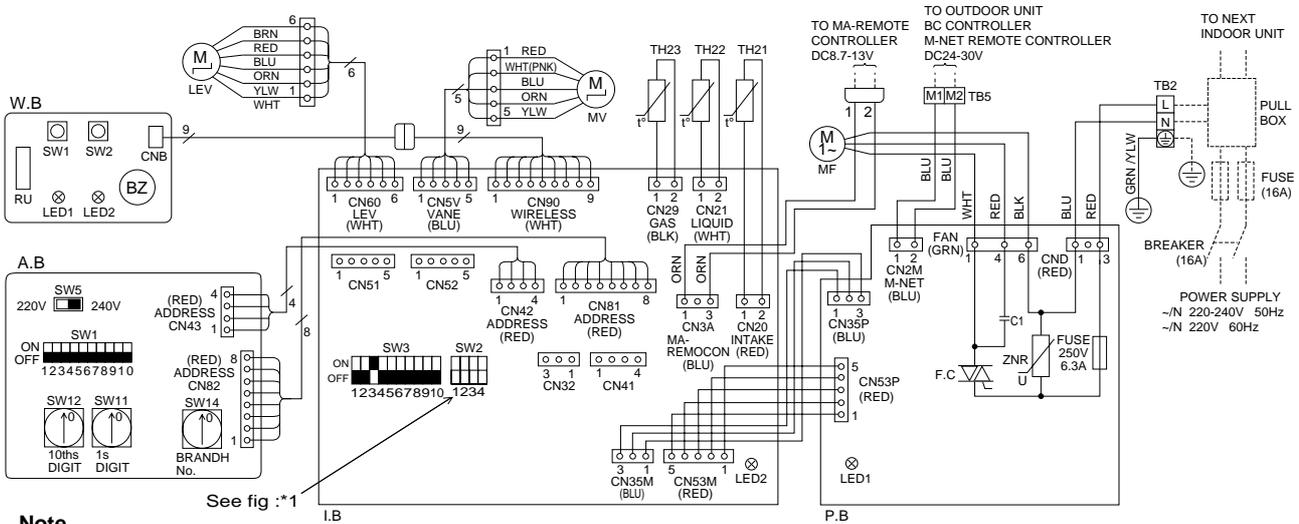
Refrigerant piping	Liquid pipe 1/4F (φ6.35mm)
	Gas pipe 1/2F (φ12.7mm)
	Drain pipe φ16mm(LD)

Note.1 Use M10 or W38 screw for installation plate.
Note.2 Extension piping side.
Note.3 In case of connecting MA-remote controller, please connect MA-remote controller cable (accessory) to the connector.

PKFY-P20, 25VBM-E

Legend

Symbol	Name	Symbol	Name	Symbol	Name
I.B	Indoor controller board	MV	Vane motor	SW5	Switch
CN32	Connector	LEV	Linear expansion valve	SW11	Address setting 1s digit
CN51	Centrally control	TB2	Terminal block	SW12	Address setting 10ths digit
CN52	Remote indication	TB5	Transmission	SW14	Connection No.
SW2	Switch	TH21	Thermistor	W.B	Wireless remote controller board
SW3	Capacity code		Room temp.detection (0°C/15kΩ,25°C/5.4kΩ)	RU	Receiving unit
P.B	Indoor power board	TH22	Pipe temp.detection/liquid (0°C/15kΩ,25°C/5.4kΩ)	BZ	Buzzer
ZNR	Varistor	TH23	Pipe temp.detection/Gas (0°C/15kΩ,25°C/5.4kΩ)	LED1	LED (Operation indicator: Green)
FUSE	Fuse (6.3A 250V)	A.B	Address board	LED2	LED (Preparation for heating: Orange)
F.C	Fan phase control	SW1	Switch	SW1	Emergency operation (Heat)
C1	Capacitor (fan motor)		Mode selection	SW2	Emergency operation (Cool)
MF	Fan motor				



Note

- At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
- In case of connecting MA-remote controller, please connect MA-remote controller cable in an accessory to the connector 1 2 . (Remote controller wire is non-polar.)
- In case of using M-NET, please connect to TB5 (Transmission line is non-polar.)
- Symbols used in wiring diagram above are, : terminal block, : connector
- The setting of the SW2 dip switches differs in the capacity. For the detail, refer to the fig :*1.
- Please set the switch SW5 according to the power supply voltage.
Set SW5 to 240V side when the power supply is 230 and 240 volts.
When the power supply is 220 volts, set SW5 to 220V side.

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

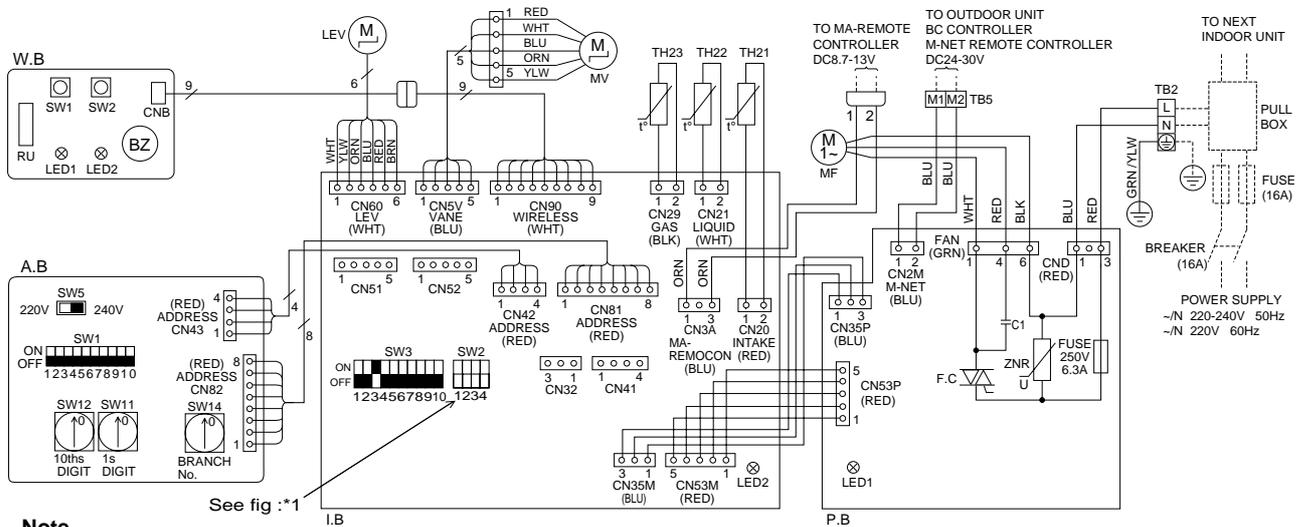
<*1>

MODELS	SW2	MODELS	SW2
P20		P25	

PKFY-P15VBM-E PKFY-P20, 25VBM-ER1

Legend

Symbol	Name	Symbol	Name	Symbol	Name
I.B	Indoor controller board	MV	Vane motor	SW5	Switch
CN32	Connector	LEV	Linear expansion valve	SW11	Address setting 1s digit
CN51	Centrally control	TB2	Terminal block	SW12	Address setting 10ths digit
CN52	Remote indication	TB5	Transmission	SW14	Connection No.
SW2	Switch	TH21	Thermistor	W.B	Wireless remote controller board
SW3	Capacity code		Room temp.detection (0°C/15kΩ,25°C/5.4kΩ)	RU	Receiving unit
	Mode selection		Pipe temp.detection/Liquid (0°C/15kΩ,25°C/5.4kΩ)	BZ	Buzzer
P.B	Indoor power board	TH22		LED1	LED (Operation indicator: Green)
ZNR	Varistor	TH23		LED2	LED (Preparation for heating: Orange)
FUSE	Fuse (T6.3AL 250V)		Pipe temp.detection/Gas (0°C/15kΩ,25°C/5.4kΩ)	SW1	Emergency operation (Heat)
F.C	Fan phase control	A.B	Address board	SW2	Emergency operation (Cool)
C1	Capacitor (Fan motor)	SW1	Switch		
MF	Fan motor		Mode selection		



Note

- At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
- In case of using MA-remote controller, please connect MA-remote controller cable in an accessory to the connector . (Remote controller wire is non-polar.)
- In case of using M-NET, please connect to TB5 (Transmission line is non-polar.)
- Symbols used in wiring diagram above are, : terminal block, : connector
- The setting of the SW2 dip switches differs in the capacity. For the detail, refer to the fig. :*1.
- Please set the switch SW5 according to the power supply voltage.
Set SW5 to 240V side when the power supply is 230 and 240 volts.
When the power supply is 220 volts, set SW5 to 220V side.

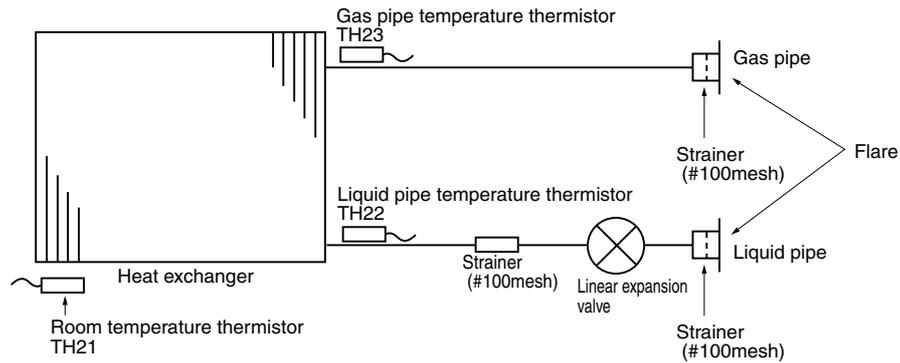
LED on indoor board for service

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

<*1>

MODELS	SW2	MODELS	SW2	MODELS	SW2
P15	ON OFF	P20	ON OFF	P25	ON OFF

PKFY-P15VBM-E
 PKFY-P20VBM-E(R1)
 PKFY-P25VBM-E(R1)



Unit: mm(inch)

Item	Models	PKFY-P15VBM-E	PKFY-P20VBM-E(R1)	PKFY-P25VBM-E(R1)
Gas pipe			φ12.7 (1/2")	
Liquid pipe			φ6.35 (1/4")	

8-1. HOW TO CHECK THE PARTS

PKFY-P15VBM-E PKFY-P20VBM-E(R1) PKFY-P25VBM-E(R1)

Parts name	Check points														
Room temperature thermistor (TH21) Liquid pipe temperature thermistor (TH22) Gas pipe temperature thermistor (TH23)	Disconnect the connector then measure the resistance using a tester. (At the ambient temperature 10°C ~30°C) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th>Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>4.3kΩ~9.6kΩ</td> <td>Open or short</td> </tr> </tbody> </table> Refer to the next page for the details.	Normal	Abnormal	4.3kΩ~9.6kΩ	Open or short										
Normal	Abnormal														
4.3kΩ~9.6kΩ	Open or short														
Vane motor (MV)	Measure the resistance between the terminals using a tester. (At the ambient temperature 25°C) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="4">Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>①-② Red-Pink or White</td> <td>①-③ Red-Blue</td> <td>①-④ Red-Orange</td> <td>①-⑤ Red-Yellow</td> <td rowspan="2">Open or short</td> </tr> <tr> <td colspan="4" style="text-align: center;">400Ω 7%</td> </tr> </tbody> </table>	Normal				Abnormal	①-② Red-Pink or White	①-③ Red-Blue	①-④ Red-Orange	①-⑤ Red-Yellow	Open or short	400Ω 7%			
Normal				Abnormal											
①-② Red-Pink or White	①-③ Red-Blue	①-④ Red-Orange	①-⑤ Red-Yellow	Open or short											
400Ω 7%															
Fan motor (MF)	Measure the resistance between the terminals using a tester. (At the ambient temperature 20°C) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="2">Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <tr> <td>White-Black</td> <td>286Ω</td> <td rowspan="2">Open or short</td> </tr> <tr> <td>Red-Black</td> <td>200Ω</td> </tr> </tbody> </table>	Normal		Abnormal	White-Black	286Ω	Open or short	Red-Black	200Ω						
Normal		Abnormal													
White-Black	286Ω	Open or short													
Red-Black	200Ω														
Linear expansion valve (LEV)	Disconnect the connector then measure the resistance valve using a tester. (Coil temperature 20°C) <table border="1" style="margin-left: 20px;"> <thead> <tr> <th colspan="4">Normal</th> <th>Abnormal</th> </tr> </thead> <tbody> <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" style="text-align: center;">150Ω 10%</td> </tr> </tbody> </table>	Normal				Abnormal	(1)-(5) White-Red	(2)-(6) Yellow-Brown	(3)-(5) Orange-Red	(4)-(6) Blue-Brown	Open or short	150Ω 10%			
Normal				Abnormal											
(1)-(5) White-Red	(2)-(6) Yellow-Brown	(3)-(5) Orange-Red	(4)-(6) Blue-Brown	Open or short											
150Ω 10%															

<Thermistor Characteristic graph>

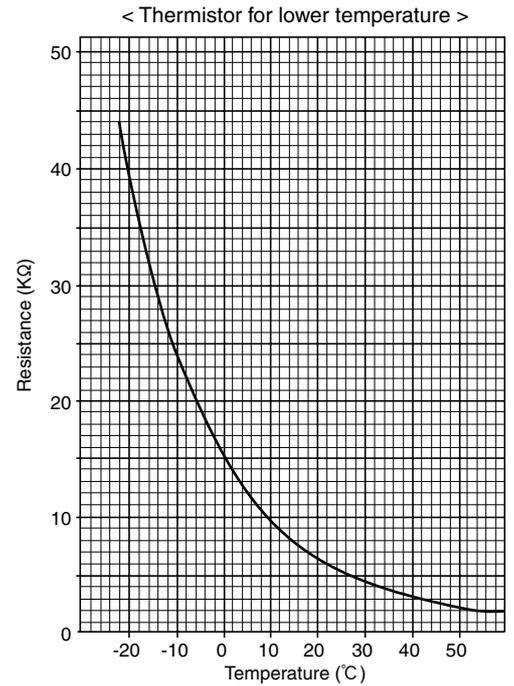
Thermistor for lower temperature

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

Thermistor $R_0=15k\Omega \pm 3\%$
Fixed number of $B=3480 \pm 2\%$

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

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

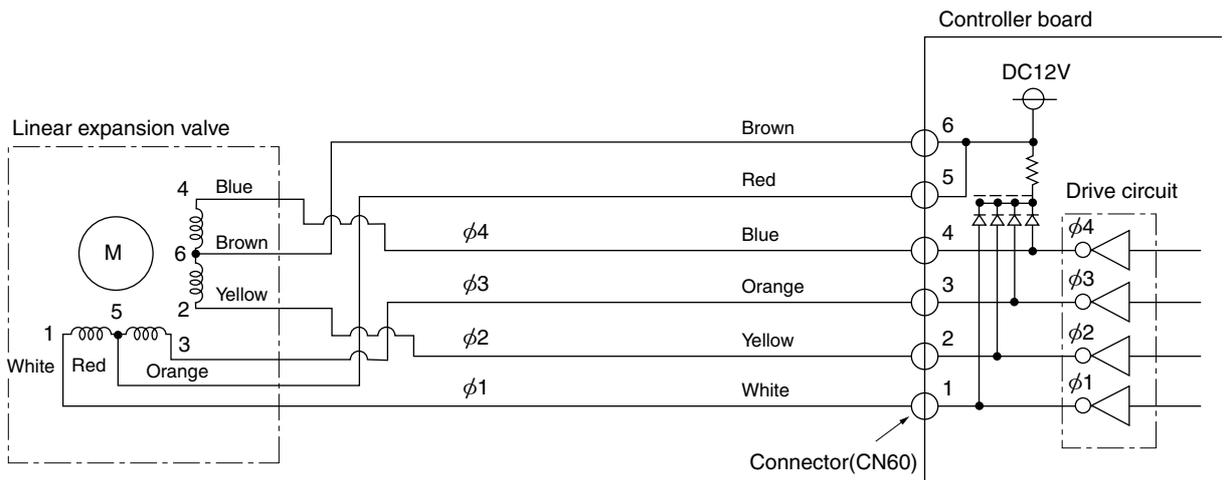


Linear expansion valve

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
$\phi 1$	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.

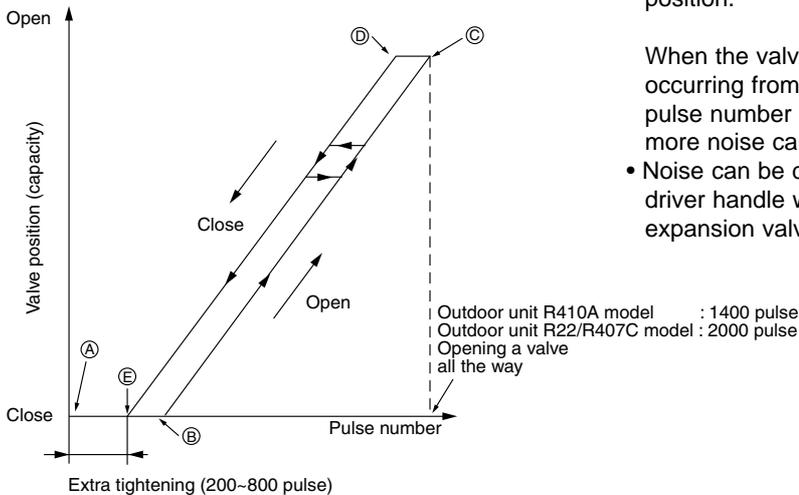
- When linear expansion valve operation stops, all output phase become OFF.
- At phase interruption or when phase does not shift in order, motor does not rotate smoothly and motor will lock and vibrate.

- When the switch is turned on, 2200 pulse closing valve signal will be sent till it goes to point ㉞ in order to define the valve position.

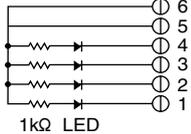
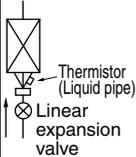
When the valve moves smoothly, there is no noise or vibration occurring from the linear expansion valves : however, when the pulse number moves from ㉞ to ㉞ or when the valve is locked, more noise can be heard than in a normal situation.

- Noise can be detected by placing the ear against the screw driver handle while putting the screw driver tip to the linear expansion valve.

② Linear expansion valve operation

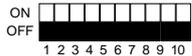
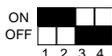
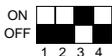
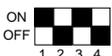
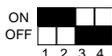
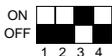
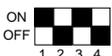
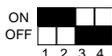
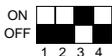
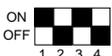


③ Troubleshooting

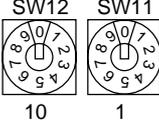
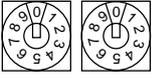
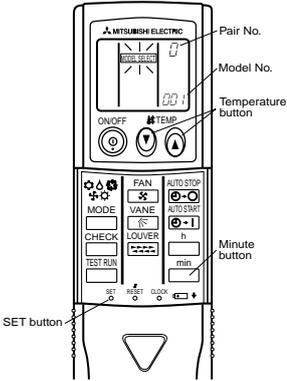
Symptom	Check points	Countermeasures
Operation circuit failure of the micro processor	Disconnect the connector on the controller board, then connect LED for checking.  When power is turned on, pulse signals will output for 10 seconds. There must be some defects in the operation circuit if the LED does not light while the signals are output or keeps lighting even after the signals stop.	Exchange the indoor controller board 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 $150\Omega \pm 10\%$.	Exchange the linear expansion valve.
Valve doesn't 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.

8-2. FUNCTION OF DIP SWITCH

PKFY-P15VBM-E PKFY-P20VBM-E(R1) PKFY-P25VBM-E(R1)

Switch	Pole	Function	Operation by switch		Effective timing	Remarks															
			ON	OFF																	
SW1 Mode selection	1	Thermistor<Intake temperature> position	Built-in remote controller	Indoor unit	Under suspension	<div style="border: 1px solid black; padding: 5px;"> Address board <Initial setting> ON OFF  1 2 3 4 5 6 7 8 9 10 NOTE: *1 <table border="1" style="font-size: small;"> <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. </div>	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	Provide	Not provide																	
	3	Filter sign indication	2,500 hr	100 hr																	
	4	Air intake ※2	Not effective	Not effective																	
	5	Remote indication switching	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	Effective	Not effective																		
SW2 Capacity code switch	1~4	<table border="1" style="width: 100%; text-align: center;"> <thead> <tr> <th>MODEL</th> <th>SW2</th> </tr> </thead> <tbody> <tr> <td>PKFY-P15VBM-E</td> <td>ON OFF  1 2 3 4</td> </tr> <tr> <td>PKFY-P20VBM-E</td> <td>ON OFF  1 2 3 4</td> </tr> <tr> <td>PKFY-P25VBM-E</td> <td>ON OFF  1 2 3 4</td> </tr> </tbody> </table>		MODEL	SW2	PKFY-P15VBM-E	ON OFF  1 2 3 4	PKFY-P20VBM-E	ON OFF  1 2 3 4	PKFY-P25VBM-E	ON OFF  1 2 3 4	Before power supply ON	<div style="border: 1px solid black; padding: 5px;"> Indoor controller board <Initial setting> Set for each capacity. </div>								
		MODEL	SW2																		
		PKFY-P15VBM-E	ON OFF  1 2 3 4																		
PKFY-P20VBM-E	ON OFF  1 2 3 4																				
PKFY-P25VBM-E	ON OFF  1 2 3 4																				
1	Heat pump/Cool only	Cooling only	Heat pump																		
2	Louver	—	—																		
SW3 Function selection	3	Vane	Available	Not available	Under suspension	<div style="border: 1px solid black; padding: 5px;"> Indoor controller board <Initial setting> ON OFF  1 2 3 4 5 6 7 8 9 10 *1 At cooling mode, each angle can be used only 1 hour. *2 Please do not use SW3-9,10 as trouble might be caused by the usage condition. *3 Second setting is the same as first setting. </div>															
	4	Vane swing	—	—																	
	5	Vane horizontal angle	Second setting ※3	First setting																	
	6	Vane cooling limit angle setting ※1	Horizontal angle	Down B,C																	
	7	Changing the opening of linear expansion valve	Effective	Not effective																	
	8	Heating 4 degree up	Not effective	Effective																	
	9	Superheat setting temperature ※2	—	—																	
	10	Subcool setting temperature ※2	—	—																	



Switch		Operation by switch	Effective timing	Remarks																											
SW11 1s digit address setting SW12 10ths digit address setting	Rotary switch	 <p>How to set address Example : If address is "3", remain SW12 (for over 10) at "0", and match SW11 (for 1 to 9) with "3".</p>	Before power supply ON	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">Address board</div> <p><Initial setting></p> 																											
SW14 Branch No. Setting	Rotary switch	 <p>How to set branch number 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".</p>		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">Address board</div> <p><Initial setting></p> 																											
SW5 Voltage selection	2	<p>220V 240V</p>  <p>If the unit is used at the 230V or 240V area, set the voltage to 240V. If the unit is used at the 220V, set the voltage to 220V.</p>		<div style="border: 1px solid black; padding: 5px; width: fit-content; margin-bottom: 10px;">Address board</div> <p><Initial setting></p> <p>220V 240V</p> 																											
J41, J42 Wireless remote controller Pair No.	Jumper	<ul style="list-style-type: none"> To operate each indoor unit by each remote controller when installed 2 indoor units or more are near, Pair No. setting is necessary. <ul style="list-style-type: none"> 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. <ul style="list-style-type: none"> Setting for indoor unit Jumper wire J41, J42 on the indoor controller board are cut according to the table below. Wireless remote controller pair number: Setting operation <ol style="list-style-type: none"> Press the SET button (using a pointed implimaent). 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 (TEMP) buttons to select the pair number to set. Press the SET button (using a pointed implemet). The set pair number is displayed (steadily-lit) for 3 seconds, then disappears. 	Under operation of suspension	<p><Initial setting> Pattern A</p> 																											
		<table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <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> <p>* Pair No.4-9 of wireless remote controller is setting pattern D.</p>	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	—		
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	—																											

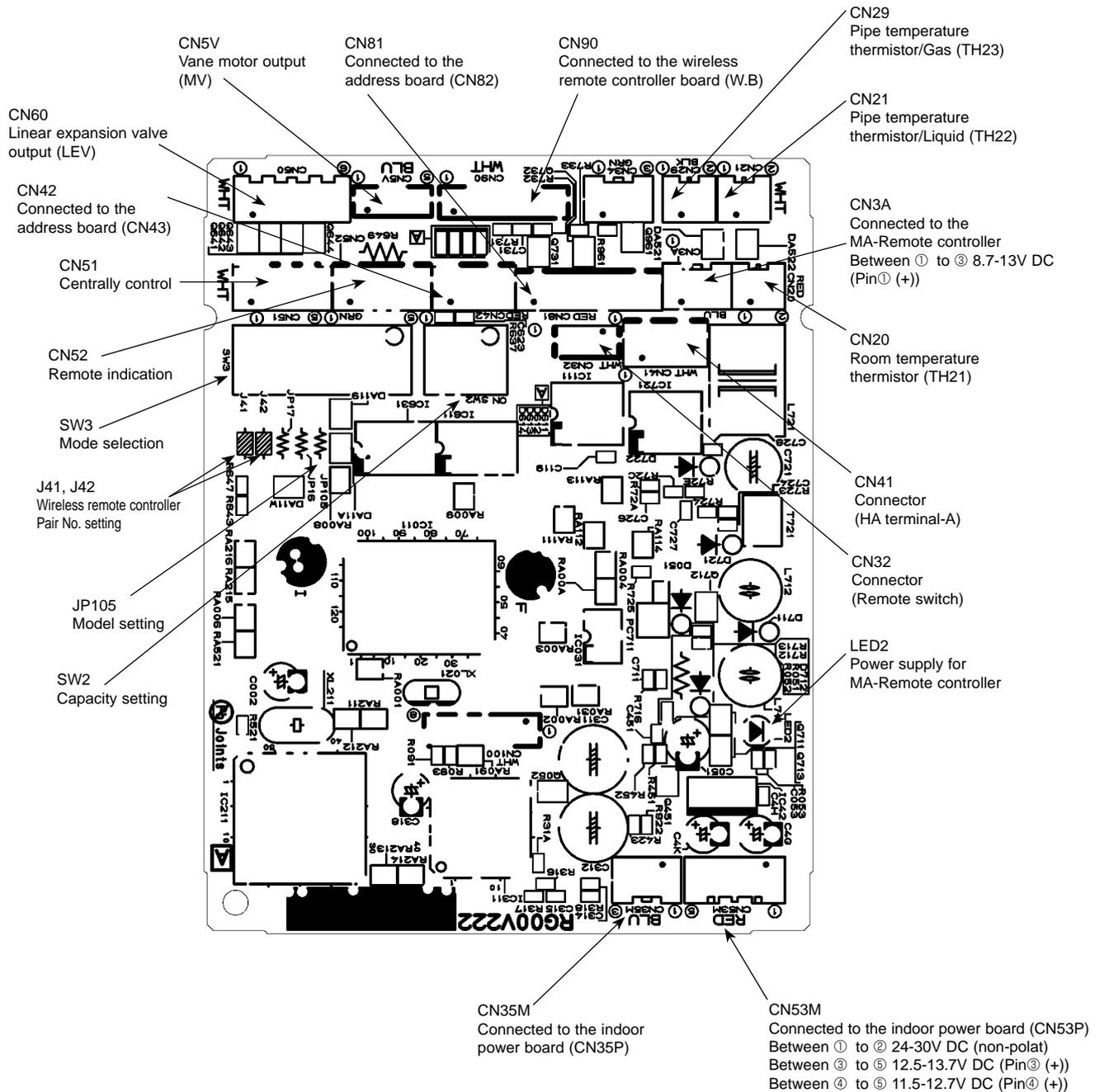
8-3. TEST POINT DIAGRAM

8-3-1. Indoor controller board

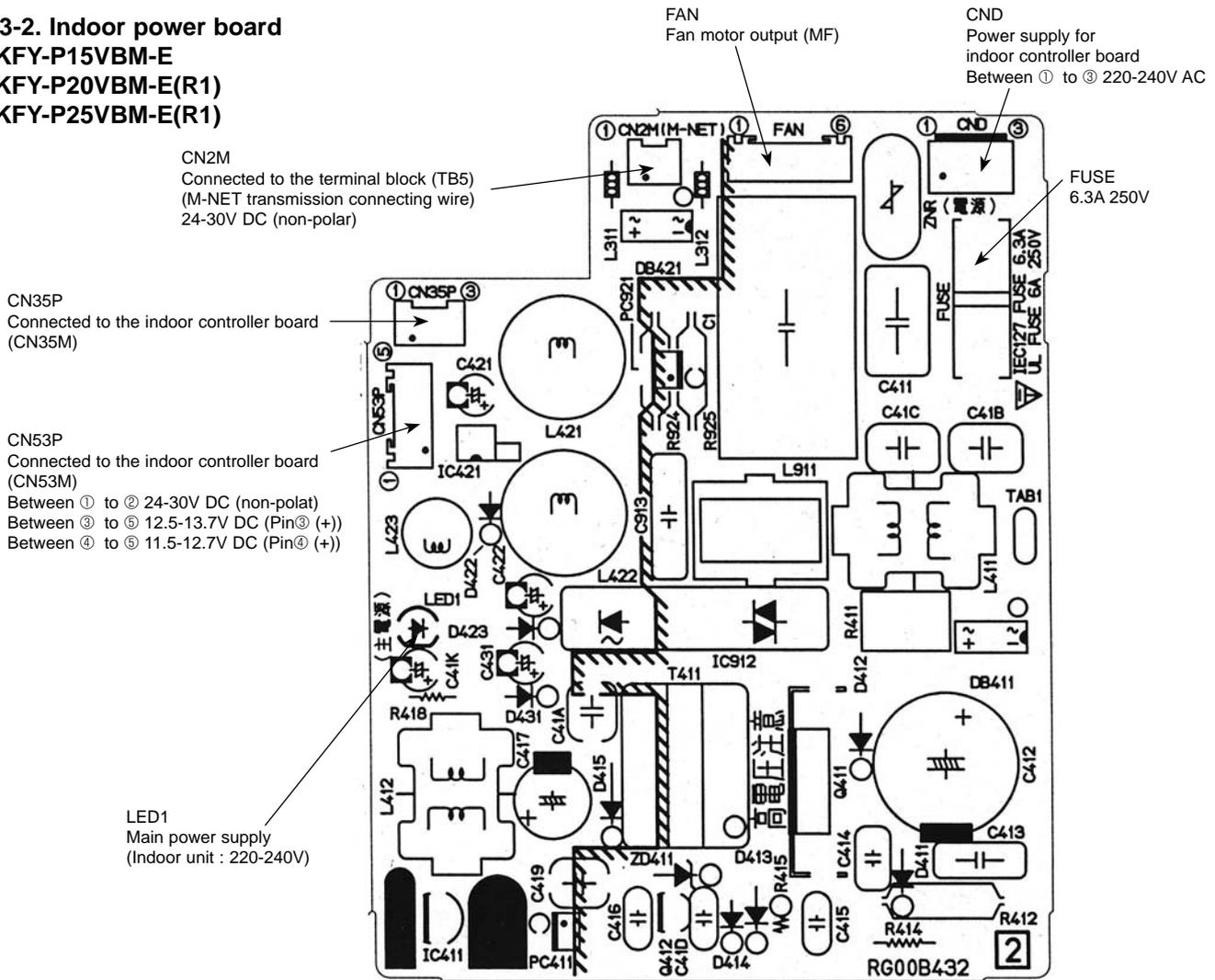
PKFY-P15VBM-E

PKFY-P20VBM-E(R1)

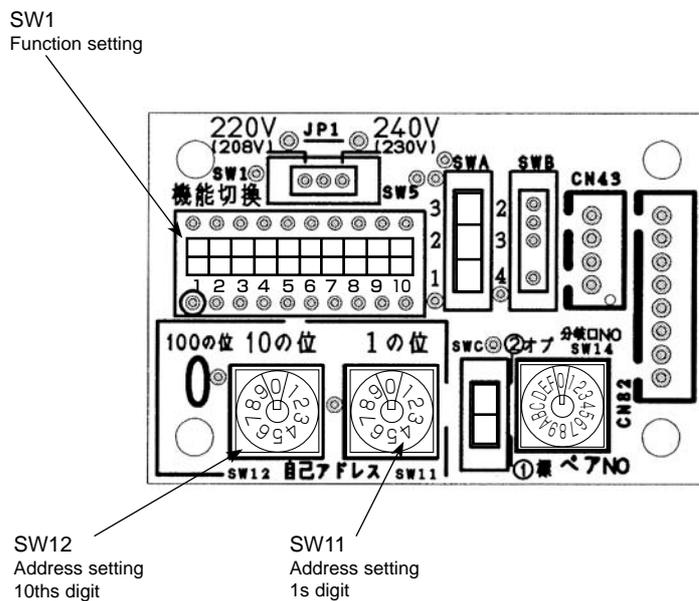
PKFY-P25VBM-E(R1)



8-3-2. Indoor power board
PKFY-P15VBM-E
PKFY-P20VBM-E(R1)
PKFY-P25VBM-E(R1)

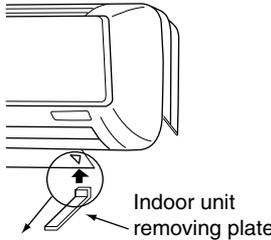
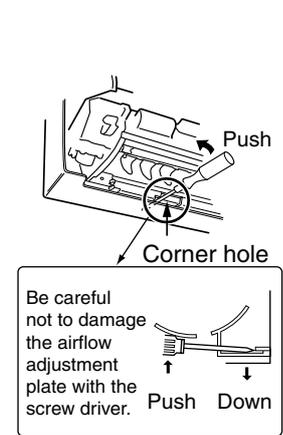
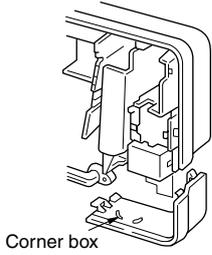
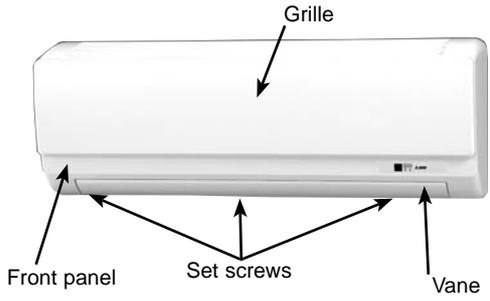
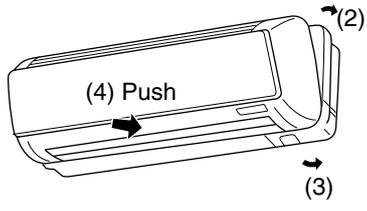


8-3-3. Address board
PKFY-P15VBM-E
PKFY-P20VBM-E(R1)
PKFY-P25VBM-E(R1)



PKFY-P15VBM-E PKFY-P20VBM-E(R1) PKFY-P25VBM-E(R1)

Be careful when removing heavy parts.

OPERATION PROCEDURE	PHOTOS & ILLUSTRATIONS
<p>1. REMOVING THE LOWER SIDE OF THE INDOOR UNIT FROM THE INSTALLATION PLATE</p> <p>When there is removing plate</p> <ol style="list-style-type: none"> (1) Remove the corner box at right lower side of the indoor unit and remove the removing plate from the corner box. (Figure 3) (2) Insert the removing plate at the back side of the corner box to remove the indoor unit. (3) Remove the hook by pulling the lower side of the indoor unit down as shown in the Figure 1. <p>When there is no removing plate or it cannot be used for some reason.</p> <ol style="list-style-type: none"> (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 2. (3) Push it up, then pull down the lower side of indoor unit and remove the hook. 	<p>Figure 1</p>  <p>Figure 2</p>  <p>Figure 3</p> 
<p>2. REMOVING THE FRONT PANEL</p> <p>* Before removing the front panel, leave the open space at upper side of the vane approximately 2 to 3 cm.</p> <ol style="list-style-type: none"> (1) Remove the 3 screw caps then remove the 3 set screws. (Refer to the Photo 1) (2) Remove the grille. (3) Remove the left side of the front panel, then right side. (4) After removing the lower side of the front panel a little, remove it as pulling the upper side toward you. <p>* Please pay attention to the nozzle assembly.</p> <p>INSTALLING THE FRONT PANEL</p> <ol style="list-style-type: none"> (1) Insert the lower side of the front panel under the vane. (2) Set the upper side of the front panel. (Figure 4) (3) Set the lower side of the front panel then fix it with the screws. (4) Press the area indicated as arrow sign and set it to the air conditioner unit. (5) Attach the screw caps. 	<p>Photo 1</p>  <p>Figure 4</p> 

OPERATION PROCEDURE

PHOTOS & ILLUSTRATIONS

3. REMOVING THE INDOOR CONTROLLER BOARD AND INDOOR POWER BOARD

- (1) Remove the front panel. (Refer to 2)
- (2) Remove the electrical box cover (screw 4 x 10). (Refer to the Photo 2)

INDOOR CONTROLLER BOARD

- (1) Disconnect the following connectors on the indoor controller board. (connector in front of)
 - CN60, CN5V, CN90, CN29, CN21
 - CN42, CN81, CN3A, CN20
- (2) Pull out the indoor controller board toward you, then disconnect the rest of connectors.
 - CN53M, CN35M (See the Photo 3)

INDOOR POWER BOARD

- (1) Disconnect the following connectors on the indoor power board.
 - FAN, CN53P, CN35P, CN2M, CND
- (2) Remove the earth wire for TAB1.
- (3) Pull out the indoor power board toward you. (See the Photo 3)

Photo 2

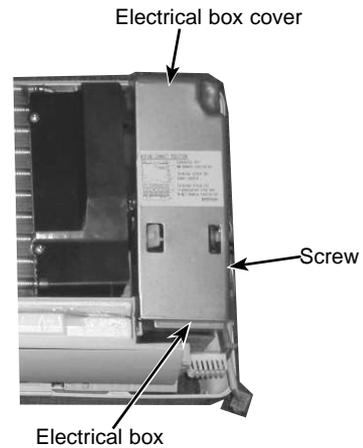
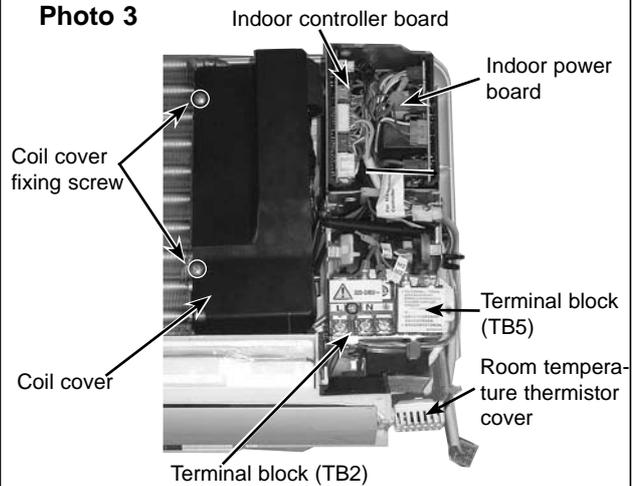


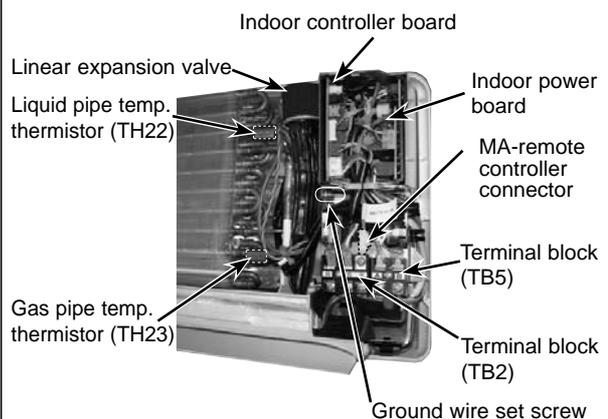
Photo 3



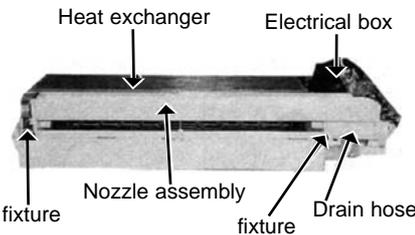
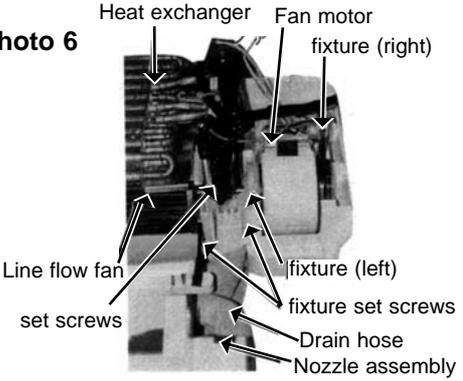
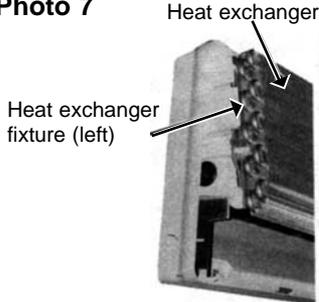
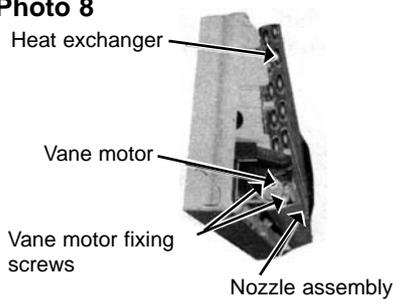
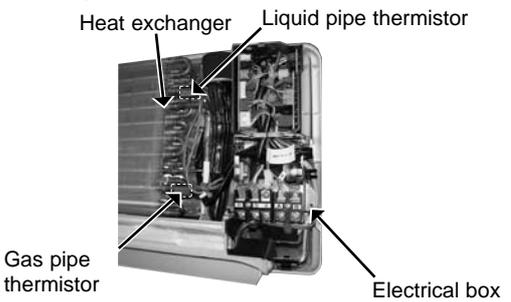
4. REMOVING THE ELECTRICAL BOX

- (1) Remove the front panel. (Refer to 2)
- (2) Remove the electrical box cover. (See the Photo 2)
- (3) Pull the nozzle assembly toward you as opening the catch of the nozzle assembly. (See the Photo 5)
- (4) Disconnect the indoor/outdoor transmission wiring of TB5.
- (5) Disconnect the power supply wiring of TB2.
- (6) Disconnect the relay connector of MA-remote controller.
- (7) Disconnect the following connector on the indoor controller board.
 - CN60, CN5V, CN29, CN21, CN90, (CN3A)
- (8) Disconnect the connector (FAN) on the indoor power board.
- (9) Remove the ground wire fixing screw.
- (10) Pull the disconnected lead wire out from the electrical box.
- (11) Push up the upper fixture catch to remove the box, then pull the lower fixture and remove it from the box fixture.

Photo 4





OPERATION PROCEDURE	PHOTOS & ILLUSTRATIONS
<p>5. REMOVING THE NOZZLE ASSEMBLY AND DRAIN HOSE</p> <ol style="list-style-type: none">(1) Remove the front panel (Refer to 2).(2) Remove the electrical box cover.(3) Disconnect the connector (CN5V) on the indoor controller board.(4) After unhook the right side of the corner box, press the upper left side and remove the corner box.(5) Remove the nozzle assembly from the fixture. (See the Photo 5)(6) Remove the drain hose.	<p>Photo 5</p>  <p>Heat exchanger Electrical box</p> <p>fixture Nozzle assembly fixture Drain hose</p>
<p>6. REMOVING THE LINE FLOW FAN AND THE FAN MOTOR</p> <ol style="list-style-type: none">(1) Remove the front panel. (Refer to 2)(2) Remove the nozzle assembly. (Refer to 5)(3) Remove the electrical parts box.(4) Remove the fixture while pressing the right side of motor fixture catch. (See the Photo 6)(5) Remove the left side of the motor fixture.(6) Loosen the screw which fixes the line flow fan to the fan motor, then remove the fan motor by sliding it to the right side. (See the Photo 6)(7) Pull the left-hand side of the heat exchanger toward you. (See the Photo 7)(8) Remove the line flow fan.	<p>Photo 6</p>  <p>Heat exchanger Fan motor fixture (right)</p> <p>Line flow fan fixture (left) fixture set screws</p> <p>set screws Drain hose Nozzle assembly</p> <p>Photo 7</p>  <p>Heat exchanger</p> <p>Heat exchanger fixture (left)</p>
<p>7. REMOVING THE VANE MOTOR</p> <ol style="list-style-type: none">(1) Remove the front panel.(2) Remove the screw of the electrical parts box cover, and remove the cover.(3) Remove the 2 screws of the vane motor. Disconnect the relay connector and remove the motor from the shaft.(4) Disconnect the vane motor connector (CN5V) on the indoor controller board.	<p>Photo 8</p>  <p>Heat exchanger</p> <p>Vane motor</p> <p>Vane motor fixing screws</p> <p>Nozzle assembly</p>
<p>8. REMOVING THE LIQUID PIPE THERMISTOR AND GAS PIPE THERMISTOR</p> <ol style="list-style-type: none">(1) Remove the front panel. (Refer to 2)(2) Remove the electrical box cover.(3) Remove the coil cover.(4) Cut the wiring fixed band.(5) Remove the liquid pipe thermistor and gas pipe thermistor. (See the Photo 9)(6) Disconnect the connector (CN29) (CN21) on the indoor controller board.	<p>Photo 9</p>  <p>Heat exchanger Liquid pipe thermistor</p> <p>Gas pipe thermistor Electrical box</p>

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