Changes for the Better

MITSUBISHI ELECTRIC

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

December 2012

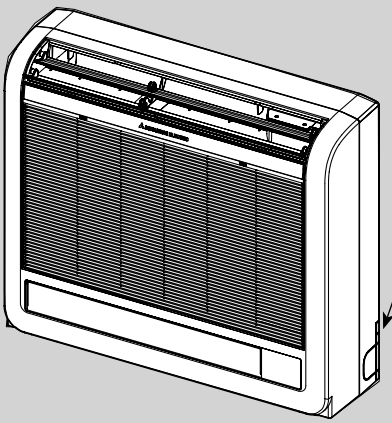
No. OCH537

TECHNICAL & SERVICE MANUAL

Series PFFY Floor Standing R410A

Indoor unit [Model names]	[Service Ref.]
PFFY-P20VKM-E2	PFFY-P20VKM-E2
PFFY-P25VKM-E2	PFFY-P25VKM-E2
PFFY-P32VKM-E2	PFFY-P32VKM-E2
PFFY-P40VKM-E2	PFFY-P40VKM-E2

Note:
- This service manual describes technical data of the indoor units.
- As for outdoor units refer to outdoor unit's service manual.



INDOOR UNIT

CONTENTS

PARTS CATALOG (OCB537)

1 SAFETY PRECAUTION

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 indoors, and both ends of the piping sealed until just before brazing. (Leave elbow joints, etc. in their packaging.)

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

The refrigerant oil applied to flare and flange connections must be ester oil, ether oil or alkylbenzene oil in a small amount.

If large amount of mineral oil enter, 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 enter 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.

Use the specified refrigerant only.

Never use any refrigerant other than that specified.
Doing so may cause a burst, an explosion, or fire when the unit is being used, serviced, or disposed of.
Correct refrigerant is specified in the manuals and on the spec labels provided with our products.
We will not be held responsible for mechanical failure, system malfunction, unit breakdown or accidents caused by failure to follow the instructions.

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

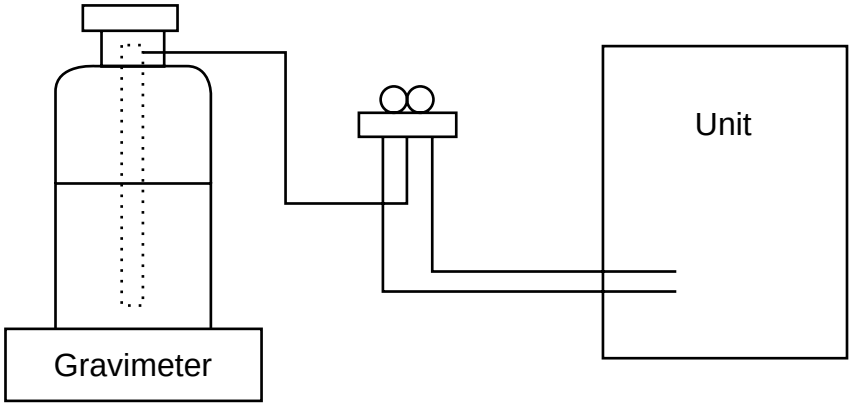
[1] Cautions for service

(1) Perform service after recovering 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.)



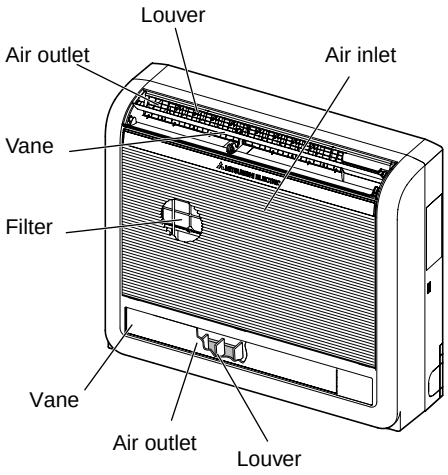
[3] Service tools

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 on vacuum pump.
⑥	Refrigerant charge base	—
⑦	Refrigerant cylinder	· Only for R410A · Top of cylinder (Pink) · Cylinder with syphon
⑧	Refrigerant recovery equipment	—

2 PART NAMES AND FUNCTIONS

2-1. Indoor Unit



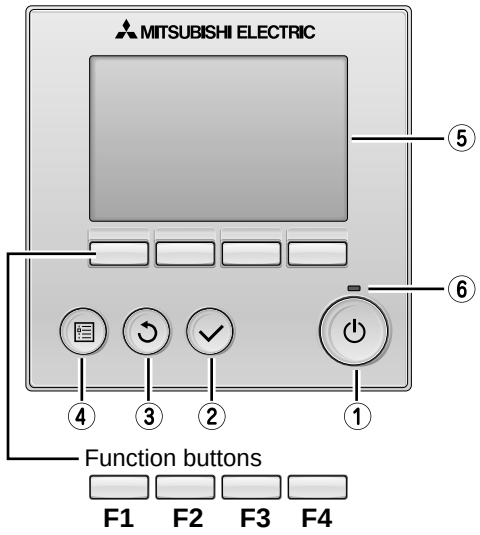
2-2. WIRED REMOTE CONTROLLER <PAR-30MAA/PAR-31MAA>

Wired remote controller function

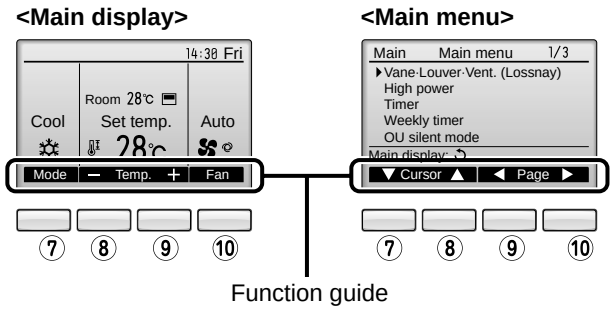
* The functions which can be used are restricted according to the model.

○ : Supported × : Unsupported

	Function	PAR-30MAA/PAR-31MAA		PAR-21MAA
		Slim	City multi	
Body	Product size H × W × D (mm)	120 × 120 × 19		120 × 130 × 19
	LCD	Full Dot LCD		Partial Dot LCD
	Backlight	○		×
Energy-saving	Energy-saving operation schedule	○	×	×
	Automatic return to the preset temperature	○		×
Restriction	Setting the temperature range restriction	○		○
Function	Operation lock function	○		○
	Weekly timer	○		×
	On / Off timer	○		○
	High Power	○	×	×
	Manual vane angle	○		○



The functions of the function buttons change depending on the screen. Refer to the button function guide that appears at the bottom of the LCD for the functions they serve on a given screen.
When the system is centrally controlled, the button function guide that corresponds to the locked button will not appear.



① ON / OFF button

Press to turn ON/OFF the indoor unit.

② SELECT button

Press to save the setting.

③ RETURN button

Press to return to the previous screen.

④ MENU button

Press to bring up the Main menu.

⑤ Backlit LCD

Operation settings will appear.
When the backlight is off, pressing any button turns the backlight on and it will stay lit for a certain period of time depending on the screen.

When the backlight is off, pressing any button turns the backlight on and does not perform its function. (except for the ⏻ (ON / OFF) button)

⑥ ON / OFF lamp

This lamp lights up in green while the unit is in operation. It blinks while the remote controller is starting up or when there is an error.

⑦ Function button F1

Main display : Press to change the operation mode.
Main menu : Press to move the cursor down.

⑧ Function button F2

Main display : Press to decrease temperature.
Main menu : Press to move the cursor up.

⑨ Function button F3

Main display : Press to increase temperature.
Main menu : Press to go to the previous page.

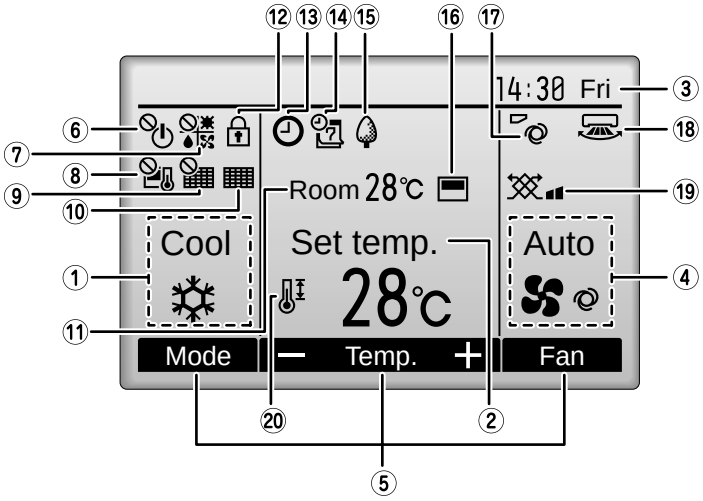
⑩ Function button F4

Main display : Press to change the fan speed.
Main menu : Press to go to the next page.

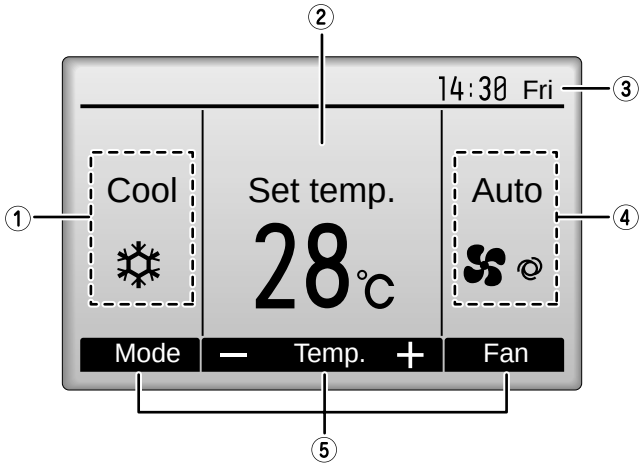
The main display can be displayed in two different modes: "Full" and "Basic".
The factory setting is "Full". To switch to the "Basic" mode, change the setting on the Main display setting.

<Full mode>

* All icons are displayed for explanation.



<Basic mode>



① Operation mode

Indoor unit operation mode appears here.

② Preset temperature

Preset temperature appears here.

③ Clock (See the Installation Manual.)

Current time appears here.

④ Fan speed

Fan speed setting appears here.

⑤ Button function guide

Functions of the corresponding buttons appear here.

⑥

Appears when the ON/OFF operation is centrally controlled.

⑦

Appears when the operation mode is centrally controlled.

⑧

Appears when the preset temperature is centrally controlled.

⑨

Appears when the filter reset function is centrally controlled.

⑩

Indicates when filter needs maintenance.

⑪ Room temperature (See the Installation Manual.)

Current room temperature appears here.

⑫

Appears when the buttons are locked.

⑬

Appears when the On/Off timer or Night setback function is enabled.

⑭

Appears when the Weekly timer is enabled.

⑮

Appears while the units are operated in the energy-save mode.

⑯

Appears when the built-in thermistor on the remote controller is activated to monitor the room temperature.
appears when the thermistor on the indoor unit is activated to monitor the room temperature.

⑰

Indicates the vane setting.

⑱

Indicates the louver setting.

⑲

Indicates the ventilation setting.

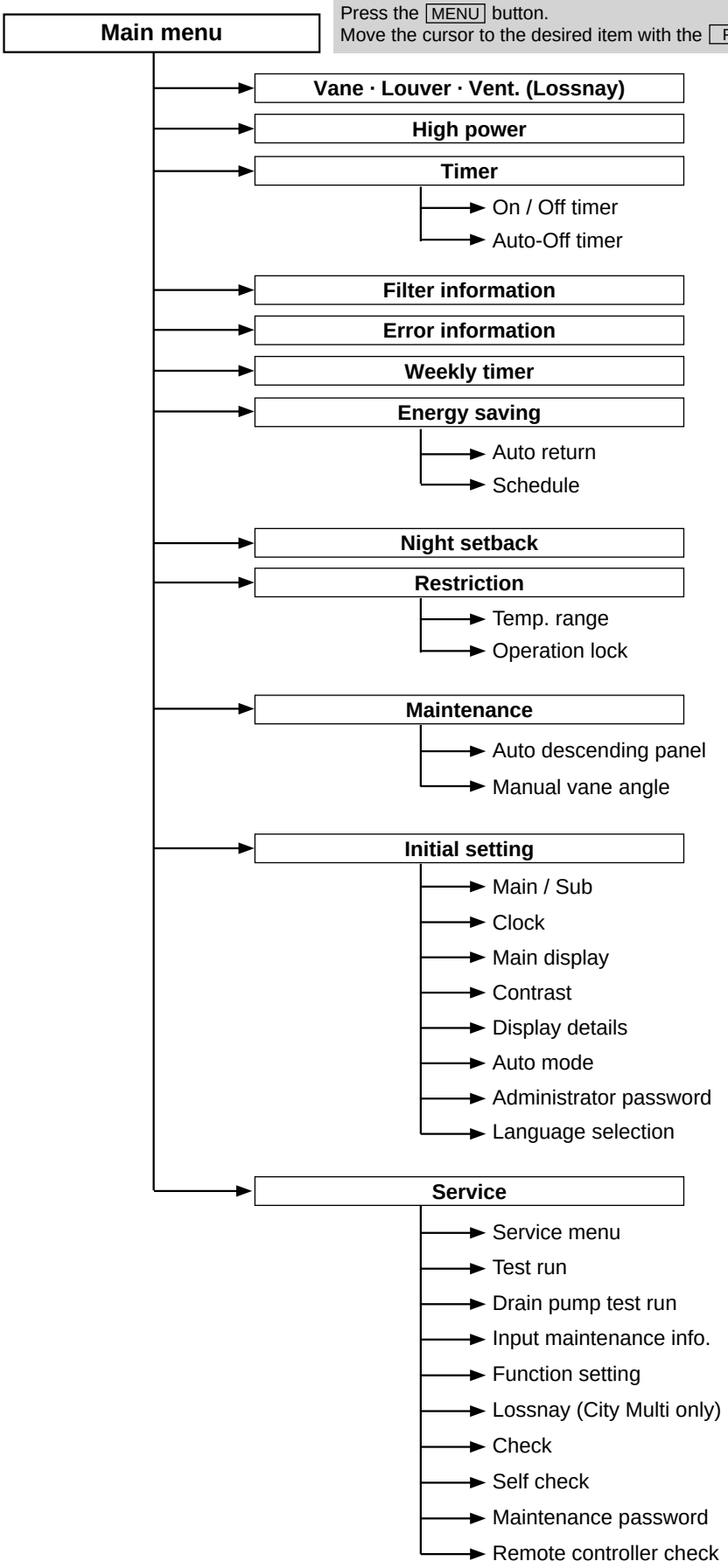
⑳

Appears when the preset temperature range is restricted.

Most settings (except ON / OFF, mode, fan speed, temperature) can be made from the Menu screen.

Menu structure

Press the MENU button.
Move the cursor to the desired item with the F1 and F2 buttons, and press the SELECT button.



Not all functions are available on all models of indoor units.

Main menu list

Setting and display items		Setting details
Vane · Louver · Vent. (Lossnay)		**Use to set the vane angle.** • Select a desired vane setting from five different settings. **Use to turn ON / OFF the louver.** • Select a desired setting from "ON" and "OFF." **Use to set the amount of ventilation.** • Select a desired setting from "Off," "Low," and "High."
High power		**Use to reach the comfortable room temperature quickly.** • Units can be operated in the High-power mode for up to 30 minutes.
Timer	**On/Off timer**	**Use to set the operation On/Off times.** • Time can be set in 5-minute increments. * Clock setting is required.
	Auto-Off timer	**Use to set the Auto-Off time.** • Time can be set to a value from 30 to 240 in 10-minute increments.
Filter information		**Use to check the filter status.** • The filter sign can be reset.
Error information		**Use to check error information when an error occurs.** • Error code, error source, refrigerant address, unit model, manufacturing number, contact information (dealer's phone number) can be displayed. * The unit model, manufacturing number, and contact information need to be registered in advance to be displayed.
Weekly timer		**Use to set the weekly operation On / Off times.** • Up to eight operation patterns can be set for each day. * Clock setting is required. * Not valid when the On/Off timer is enabled.
Energy saving	**Auto return**	**Use to get the units to operate at the preset temperature after performing energy-save operation for a specified time period.** • Time can be set to a value from 30 and 120 in 10-minute increments. * This function will not be valid when the preset temperature ranges are restricted.
	Schedule	**Set the start/stop times to operate the units in the energy-save mode for each day of the week, and set the energy-saving rate.** • Up to four energy-save operation patterns can be set for each day. • Time can be set in 5-minute increments. • Energy-saving rate can be set to a value from 0% or 50 to 90% in 10% increments. * Clock setting is required.
Night setback		**Use to make Night setback settings.** • Select "Yes" to enable the setting, and "No" to disable the setting. The temperature range and the start/stop times can be set. * Clock setting is required.
Restriction	**Temp. range**	**Use to restrict the preset temperature range.** • Different temperature ranges can be set for different operation modes.
	Operation lock	**Use to lock selected functions.** • The locked functions cannot be operated.
Maintenance	**Auto descending panel**	**Auto descending panel (Optional parts) Up / Down you can do.**
	Manual vane angle	**Use to set the vane angle for each vane to a fixed position.**
Initial setting	**Main/Sub**	**When connecting two remote controllers, one of them needs to be designated as a sub controller.**
	Clock	**Use to set the current time.**
	Main display	**Use to switch between "Full" and "Basic" modes for the Main display.** • The default setting is "Full."
	Contrast	**Use to adjust screen contrast.**

Setting and display items		Setting details
Initial setting	**Display details**	**Make the settings for the remote controller related items as necessary.** **Clock:** The factory settings are "Yes" and "24h" format. **Temperature:** Set either Celsius (°C) or Fahrenheit (°F). **Room temp. :** Set Show or Hide. **Auto mode:** Set the Auto mode display or Only Auto display.
	Auto mode	**Whether or not to use the AUTO mode can be selected by using the button.** **This setting is valid only when indoor units with the AUTO mode function are connected.**
	Administrator password	**The administrator password is required to make the settings for the following items.** • Timer setting • Energy-save setting • Weekly timer setting • Restriction setting • Outdoor unit silent mode setting • Night set back
	Language selection	**Use to select the desired language.**
Service	**Test run**	**Select "Test run" from the Service menu to bring up the Test run menu.** • Test run • Drain pump test run
	Input maintenance	**Select "Input maintenance Info." from the Service menu to bring up the Maintenance information screen.** **The following settings can be made from the Maintenance Information screen.** • Model name input • Serial No. input • Dealer information input
	Function setting	**Make the settings for the indoor unit functions via the remote controller as necessary.**
	LOSSNAY setting (City Multi only)	**This setting is required only when the operation of City Multi units is interlocked with LOSSNAY units.**
	Check	**Error history:** Display the error history and execute delete error history. **Refrigerant leak check:** Refrigerant leaks can be judged. **Smooth maintenance:** The indoor and outdoor maintenance data can be displayed. **Request cord:** Details of the operation data including each thermistor temperature and error history can be checked.
	Self check	**Error history of each unit can be checked via the remote controller.**
	Maintenance password	**Take the following steps to change the maintenance password.**
	Remote controller check	**When the remote controller does not work properly, use the remote controller checking function to troublushoot the problem.**

2-3. WIRED REMOTE CONTROLLER <PAR-21MAA>

Display Section

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

Day-of-Week
Shows the current day of the week.

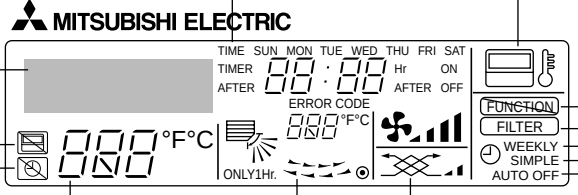
Time/Timer Display
Shows the current time, unless the simple or Auto Off timer is set.
If the simple or Auto Off timer is set, the time to be switched off is shown.

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.



"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 outcoming airflow.

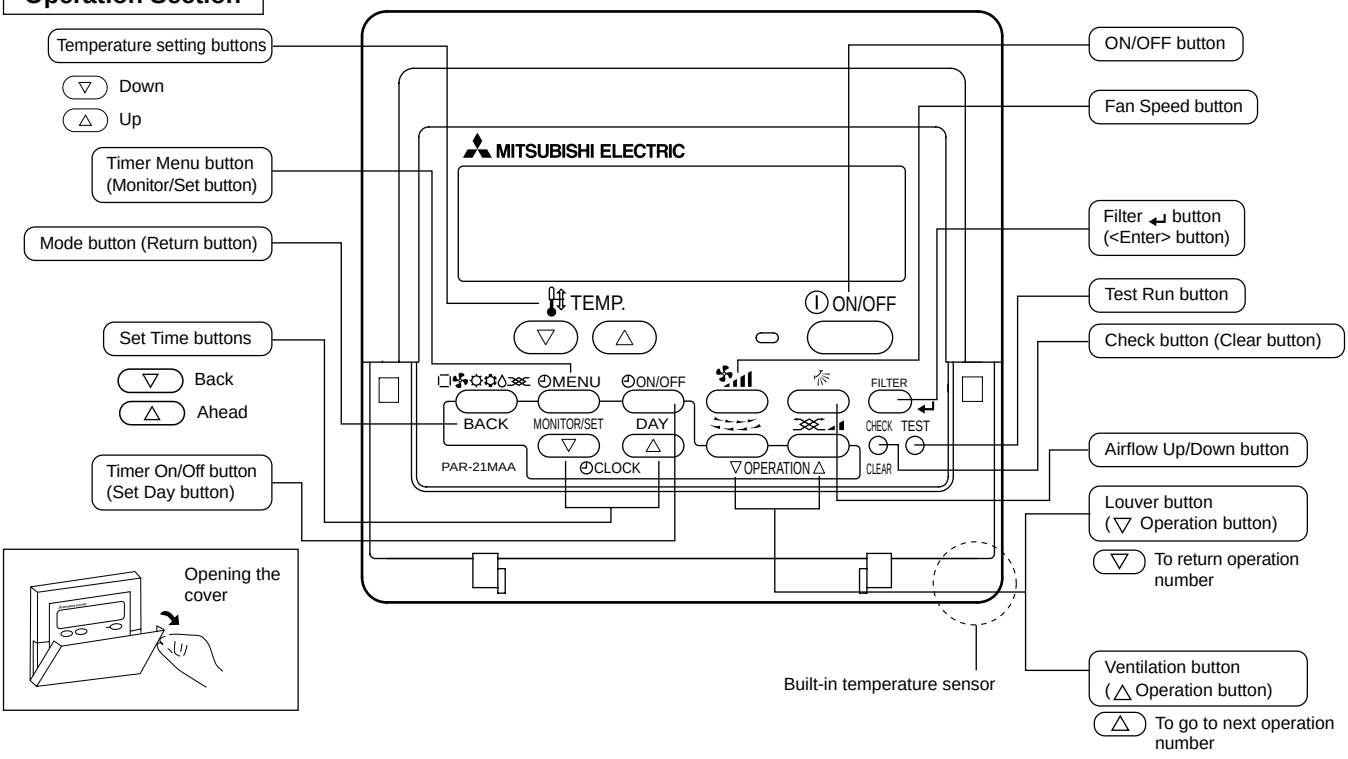
"One Hour Only" indicator
Displayed if the airflow is set to low or downward during COOL or DRY mode. (Operation varies according to model.)
The indicator goes off in 1 hour, when the airflow direction also changes.

Room Temperature display
Shows the room temperature. The room temperature display range is 8 – 39℃. The display blinks if the temperature is less than 8℃ or 39℃ 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.

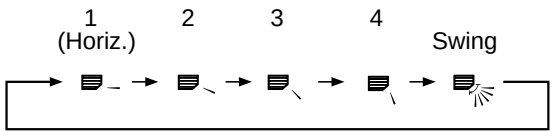
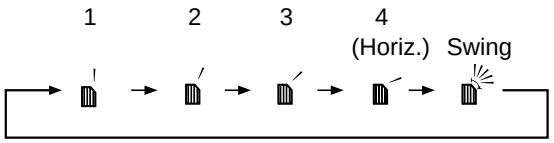
Operation Section



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.

Caution

- Only the Power on indicator lights when the unit is stopped and power supplied to the unit.
- If you press a button for a feature that is not installed at the indoor unit, the remote controller will display the “Not Available” message.
  If you are using the remote controller to drive multiple indoor units, this message will appear only if he feature is not present at every unit connected.
- When power is turned ON for the first time, it is normal that “PLEASE WAIT” is displayed on the room temperature indication (For max. 2 minutes). Please wait until this “PLEASE WAIT” indication disappear then start the operation.
- For the PFFY-P·VKM series, the airflow direction displayed on the remote controller is different from the actual airflow direction. Refer to the following table.

Display	
Actual	

- The airflow direction for the lower air outlet vane cannot be set. The airflow direction is automatically controlled by a computer.

3 SPECIFICATION

3-1. Specification

Item			PFFY-P20VKM-E2	PFFY-P25VKM-E2	PFFY-P32VKM-E2	PFFY-P40VKM-E2
Power source			1-phase 220-240V 50Hz			
Cooling capacity		kW	2.2	2.8	3.6	4.5
Heating capacity		kW	2.5	3.2	4.0	5.0
Power consumption	Cooling	kW	0.025	0.025	0.025	0.028
	Heating	kW	0.025	0.025	0.025	0.028
Current	Cooling	A	0.20	0.20	0.20	0.24
	Heating	A	0.20	0.20	0.20	0.24
Dimension	Height	mm	600	600	600	600
	Width	mm	700	700	700	700
	Depth	mm	200	200	200	200
Weight		kg	15	15	15	15
Heat exchanger			Cross fin (Aluminum plate fin and copper tube)			
Fan	Type		Line flow fan × 2			
	Airflow rate *2	m^3/min	5.9 - 6.8 - 7.6 - 8.7	6.1 - 7.0 - 8.0 - 9.1	6.1 - 7.0 - 8.0 - 9.1	8.0 - 9.0 - 9.5 - 10.7
	External static pressure	Pa	0			
Motor	Type		DC motor			
	Output	kW	0.03 × 2			
Air filter			PP honeycomb fabric (Catechin air filter)			
Refrigerant pipe dimension	Gas (Flare)	ϕmm	ϕ12.7			
	Liquid (Flare)	ϕmm	ϕ6.35			
Field drain pipe size		ϕmm	I.D.16 (PVC pipe VP-16 connectable)			
Noise level *2		dB(A)	27 - 31 - 34 - 37	28 - 32 - 35 - 38	28 - 32 - 35 - 38	35 - 38 - 42 - 44

Note 1. Rating conditions (JIS B 8616)

Cooling :Indoor : D.B. 27°C W.B. 19.0°C
outdoor :D.B. 35°C
Heating : Indoor : D.B. 20°C
outdoor :D.B. 7°C W.B. 6°C

*2. Air flow and the noise level are indicated as Low - Medium2 - Medium1 - High.

3-2. Electrical parts specifications

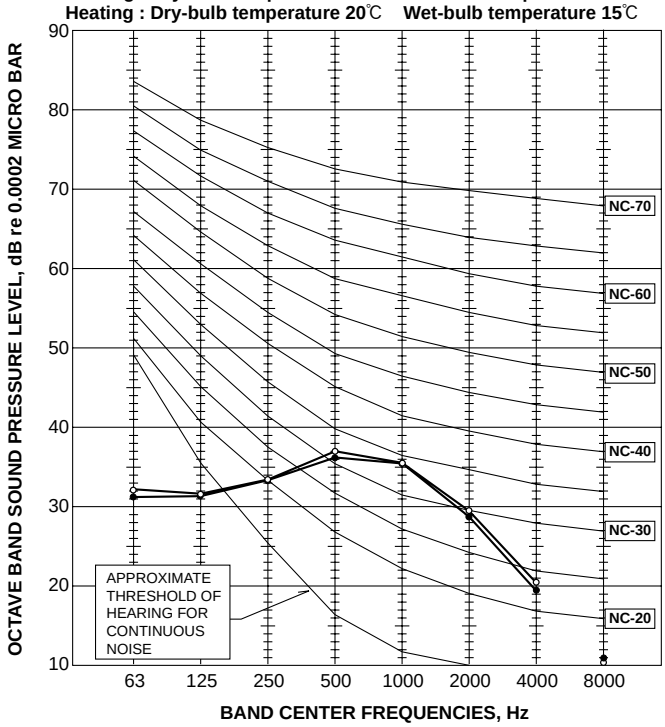
Model / Parts name	Symbol	PFFY-P20VKM-E2	PFFY-P25VKM-E2	PFFY-P32VKM-E2	PFFY-P40VKM-E2
Thermistor (Room temperature detection)	TH21	Resistance 0℃/15kΩ, 10℃/9.6kΩ, 20℃/6.3kΩ, 25℃/5.4kΩ, 30℃/4.3kΩ, 40℃/3.0kΩ			
Thermistor (Pipe temperature detection/Liquid)	TH22	Resistance 0℃/15kΩ, 10℃/9.6kΩ, 20℃/6.3kΩ, 25℃/5.4kΩ, 30℃/4.3kΩ, 40℃/3.0kΩ			
Thermistor (Pipe temperature detection/Gas)	TH23	Resistance 0℃/15kΩ, 10℃/9.6kΩ, 20℃/6.3kΩ, 25℃/5.4kΩ, 30℃/4.3kΩ, 40℃/3.0kΩ			
Fuse (Indoor controller board)	FUSE	250V 6.3A			
Fan motor (Upper)	MF1	OUTPUT 30W ARW40Z8P30MS			
Fan motor (Lower)	MF2	OUTPUT 30W ARW40Y8P30MS			
Vane motor	MV1	MP20Z DC12V			
Vane motor	MV2	MP35EA DC12V			
Linear expansion valve [coil]	LEV	DC12V Stepping motor drive Port dimension ϕ5.2 (0~2000 pulse) EFM-40YGME			
Power supply terminal block	TB2	(L, N, ⏚) 330V 30A			
Transmission terminal block	TB5	(M1, M2, S) 250V 20A			

4 NOISE CRITERIA CURVES

PFFY-P20VKM-E2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	COOLING	37	●—●
	HEATING	37	○—○

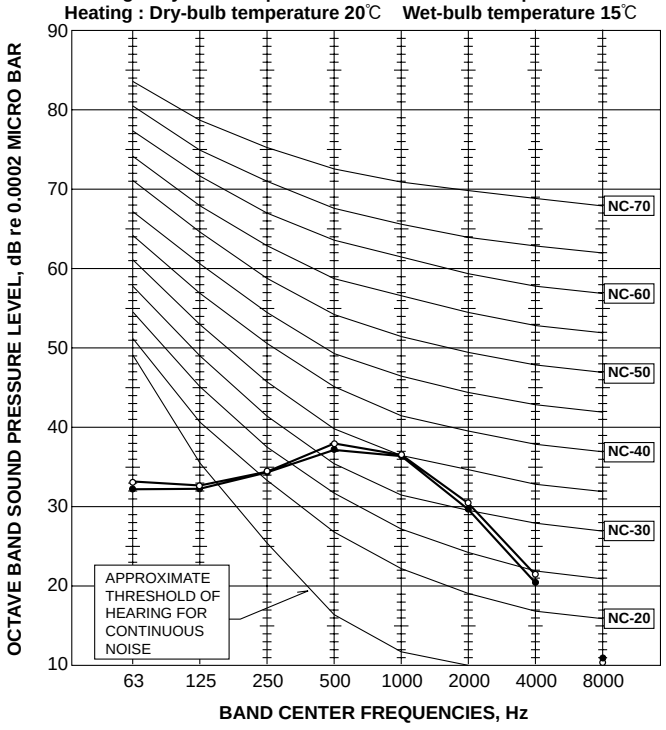
Test conditions,
Cooling : Dry-bulb temperature 27℃ Wet-bulb temperature 19℃
Heating : Dry-bulb temperature 20℃ Wet-bulb temperature 15℃



PFFY-P25VKM-E2
PFFY-P32VKM-E2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	COOLING	38	●—●
	HEATING	38	○—○

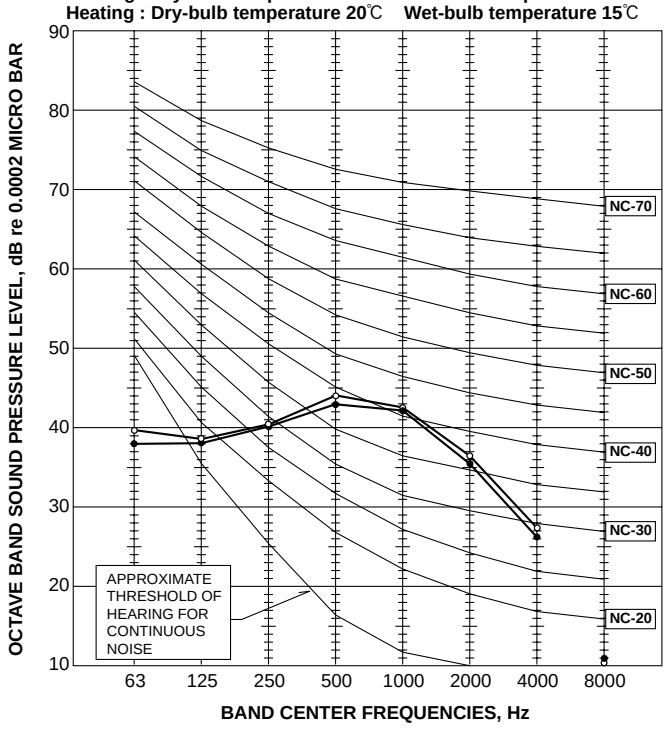
Test conditions,
Cooling : Dry-bulb temperature 27℃ Wet-bulb temperature 19℃
Heating : Dry-bulb temperature 20℃ Wet-bulb temperature 15℃

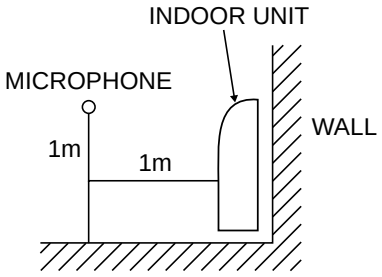


PFFY-P40VKM-E2

FAN SPEED	FUNCTION	SPL(dB(A))	LINE
High	COOLING	44	●—●
	HEATING	44	○—○

Test conditions,
Cooling : Dry-bulb temperature 27℃ Wet-bulb temperature 19℃
Heating : Dry-bulb temperature 20℃ Wet-bulb temperature 15℃





5 AIR OUTLET SELECTION

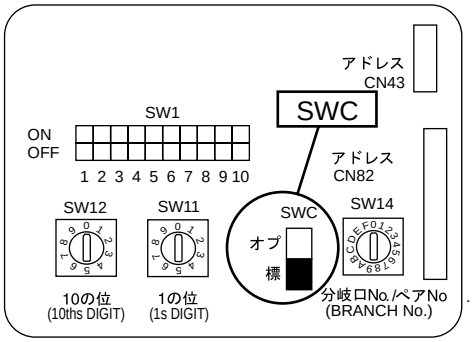
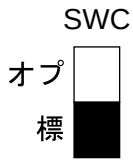
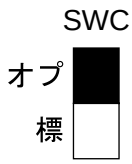


Fig. 4-1

With this function, air comes out simultaneously from the upper and lower air outlets so that the room can be cooled or heated effectively. This function is set using the switch SWC on the address board.



How to set to blow out air from the upper and lower air outlets:
▸ Set the SWC to lower side ("標"). (Initial setting)
Air blows out automatically from the upper and lower air outlet as shown in the table below.



How to set to blow out air from the upper air outlet only:
▸ Set the SWC to upper side ("オプ").

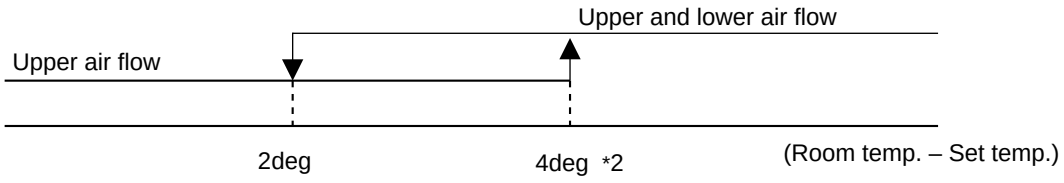
Note:
Be sure to operate with the main power turned off.

Description of operation

Operation	COOL		DRY	HEAT		FAN
Air flow	Upper and lower air flow	Upper air flow	Upper air flow only	Upper and lower air flow	Upper air flow	Upper and lower air flow
Conditions	Room temperature and set temperature are different. *1	Room temperature is close to set temperature or thermo-off. *1	—	(Normal condition (in heating))	During defrosting operation, start of operation, thermo-off	—

• Be sure to keep the area around the vane of the lower air outlet free of any objects.

*1



*2

DIP SW3-2 (on indoor controller board) : OFF (Initial Setting)
If the air conditioner has operated for 2hours with upper and lower air flow, it changes to 8deg for next 30minutes. After 30minutes it changes back to 4deg.

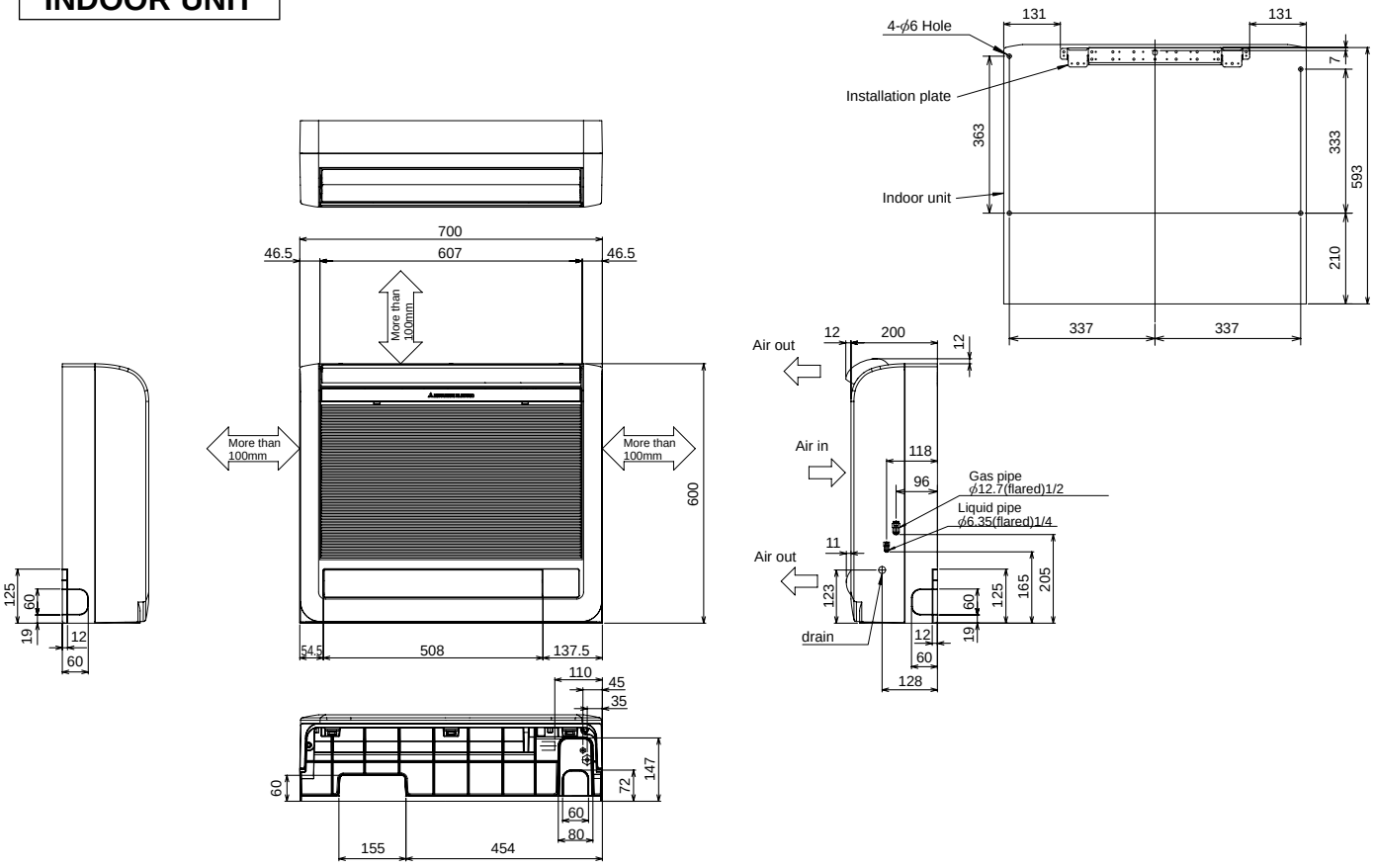
DIP SW3-2 (on indoor controller board) : ON
Remains to be 4deg.

6 OUTLINES AND DIMENSIONS

PFFY-P20VKM-E2
PFFY-P25VKM-E2
PFFY-P32VKM-E2
PFFY-P40VKM-E2

Unit : mm

INDOOR UNIT



7 WIRING DIAGRAM

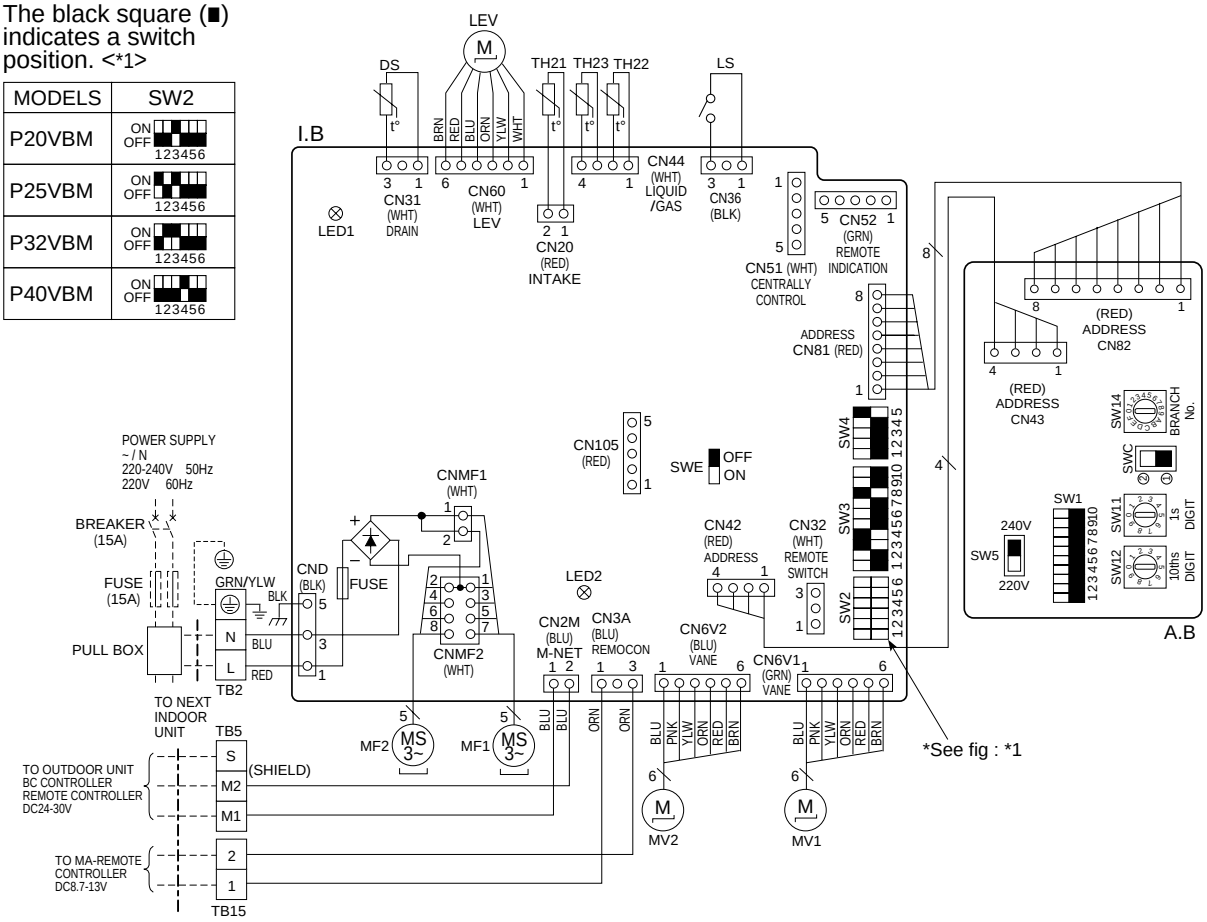
PFFY-P20VKM-E2 PFFY-P25VKM-E2 PFFY-P32VKM-E2 PFFY-P40VKM-E2

[LEGEND]

SYMBOL	NAME		SYMBOL	NAME		SYMBOL	NAME	
I. B	INDOOR CONTROLLER BOARD		MF1	FAN MOTOR (UPPER)		TH23		PIPE TEMP, DETECTION/GAS (0°C/15kΩ, 25°C/5.4kΩ)
CN32	CONNECTOR	REMOTE SWITCH	MF2	FAN MOTOR (LOWER)				
CN51		CENTRALLY CONTROL	MV1	VANE MOTOR 1		A. B	ADDRESS BOARD	
CN52		REMOTE INDICATION	MV2	VANE MOTOR 2		SW1	SWITCH	MODE SELECTION
CN105		IT TERMINAL	LS	LIMIT SWITCH (CLOSE)		SW11		ADDRESS SETTING 1s DIGIT
SW2	SWITCH	CAPACITY CODE	LEV	LINEAR EXPANSION VALVE		SW12		ADDRESS SETTING 10ths DIGIT
SW3		MODE SELECTION	TB2	TERMINAL BLOCK	POWER SUPPLY	SW14		BRANCH NO.
SW4		MODEL SELECTOR	TB5		TRANSMISSION	SWC		OPTION SELECTOR
FUSE	FUSE (T6.3AL250V)		TH21	THERMISTOR	ROOM TEMP, DETECTION (0°C/15kΩ, 25°C/5.4kΩ)			
LED1	POWER SUPPLY (I.B)							
LED2	POWER SUPPLY (I.B)		TH22		PIPE TEMP, DETECTION/LIQUID (0°C/15kΩ, 25°C/5.4kΩ)			

The black square (■) indicates a switch position. <*1>

MODELS	SW2
P20VBM	ON OFF 123456
P25VBM	ON OFF 123456
P32VBM	ON OFF 123456
P40VBM	ON OFF 123456



NOTES:

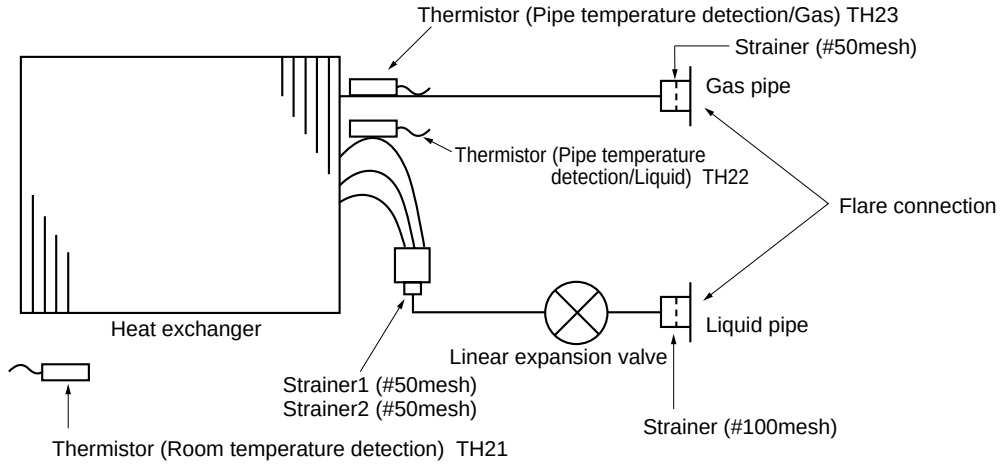
1. At servicing for outdoor unit,always follow the wiring diagram of outdoor unit.
2. In case of using MA-Remote controller, please connect to TB15.
   (Remote controller wire is non-polar.)
3. In case of using M-NET, please connect to TB5. (Transmission line is non-polar.)
4. Symbol [S] of TB5 is the 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 the table below.
7. 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

8 REFRIGERANT SYSTEM DIAGRAM

PFFY-P20VKM-E2
PFFY-P25VKM-E2
PFFY-P32VKM-E2
PFFY-P40VKM-E2



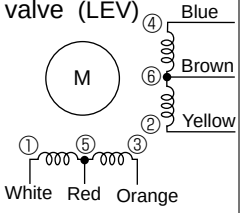
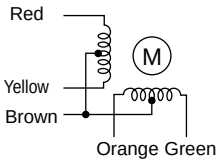
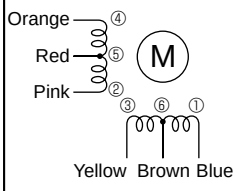
Unit: mm

Item \ Capacity	PFFY-P20,P25,P32,P40VKM-E2
Gas pipe	ϕ12.7(1/2")
Liquid pipe	ϕ6.35(1/4")

9 TROUBLE SHOOTING

9-1. HOW TO CHECK THE PARTS

PFFY-P20VKM-E2 PFFY-P25VKM-E2 PFFY-P32VKM-E2 PFFY-P40VKM-E2

<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)</td><td>Disconnect the connector then measure the resistance with a tester.
(Surrounding 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 a detail.)</td></tr>
<tr><td>Fan motor (MF1,2)</td><td>Refer to 9-2.</td></tr>
<tr><td>Linear expansion valve (LEV)
  </td><td>Disconnect the connector then measure the resistance valve with a tester.
(Surrounding 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>(Refer to the next page for a detail.)</td></tr>
<tr><td>Vane motor (MV1)
  </td><td>Measure the resistance between the terminals with a tester.
(Surrounding temperature 20℃ - 30℃)
<table><tr><th>Connector</th><th>Normal</th><th>Abnormal</th></tr><tr><td>Brown — Red</td><td rowspan="4">282~306Ω</td><td rowspan="4">Open or short</td></tr><tr><td>Brown — Orange</td></tr><tr><td>Brown — Yellow</td></tr><tr><td>Brown — Blue</td></tr></table></td></tr>
<tr><td>Vane motor (MV2)
  </td><td>Measure the resistance between the terminals with a tester.
(Surrounding temperature 20℃ - 30℃)
<table><tr><th>Connector</th><th>Normal</th><th>Abnormal</th></tr><tr><td>Brown — Yellow</td><td rowspan="4">186~214Ω</td><td rowspan="4">Open or short</td></tr><tr><td>Brown — Blue</td></tr><tr><td>Red — Orange</td></tr><tr><td>Red — Pink</td></tr></table></td></tr>
</table>

<Thermistor Characteristic graph>

Thermistor for lower temperature

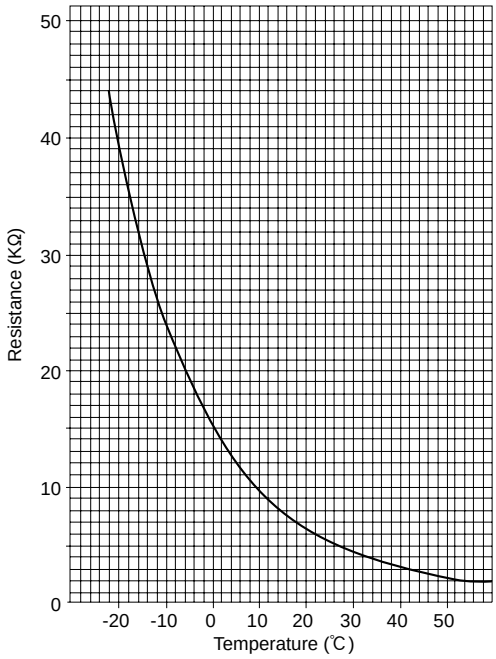
Room temperature thermistor (TH21)
Liquid pipe temperature thermistor (TH22)
Gas pipe temperature thermistor (TH23)

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℃	5.2kΩ
30℃	4.3kΩ
40℃	3.0kΩ

< Thermistor for lower temperature >

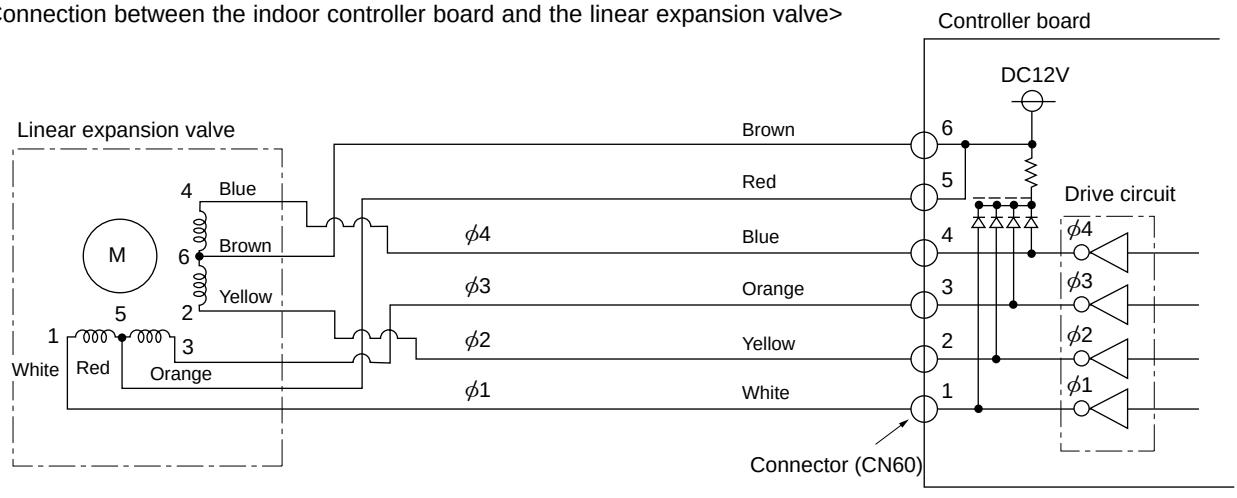


Linear expansion valve

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 signal.

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



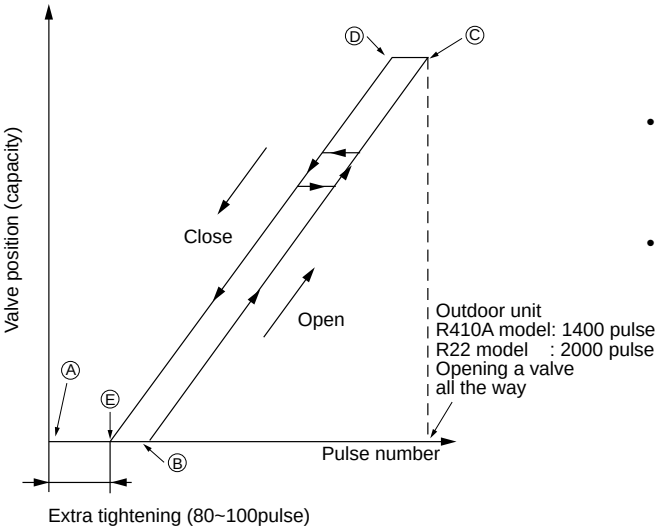
<Output pulse signal and the valve operation>

Output (Phase)	Output			
	1	2	3	4
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 locks and vibrates.

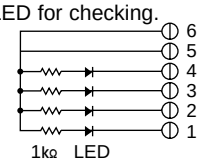
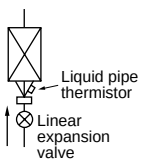
② Linear expansion valve operation



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

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

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.  Pulse signal will be sent out for 10 seconds as soon as the main switch is turned on. If there is LED with lights on or lights off, it means the operation circuit is abnormal.	Exchange the indoor controller board at drive circuit failure.
Linear expansion valve mechanism is locked.	Motor will idle and make ticking noise when motor is operated while the linear expansion valve is locked. This ticking sound is the sign of the abnormality.	Exchange the linear expansion vale.
Short or breakage of the motor coil of the linear expansion valve.	Measure the resistance between the each coil (red-white, red-orange, brown-yellow, brown-blue) using a tester. It is normal if the resistance is in the range of 150Ω±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 are some 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 making any trouble.	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.

9-2. FAN MOTOR

Check method of indoor fan motor (fan motor/control P.C.board)

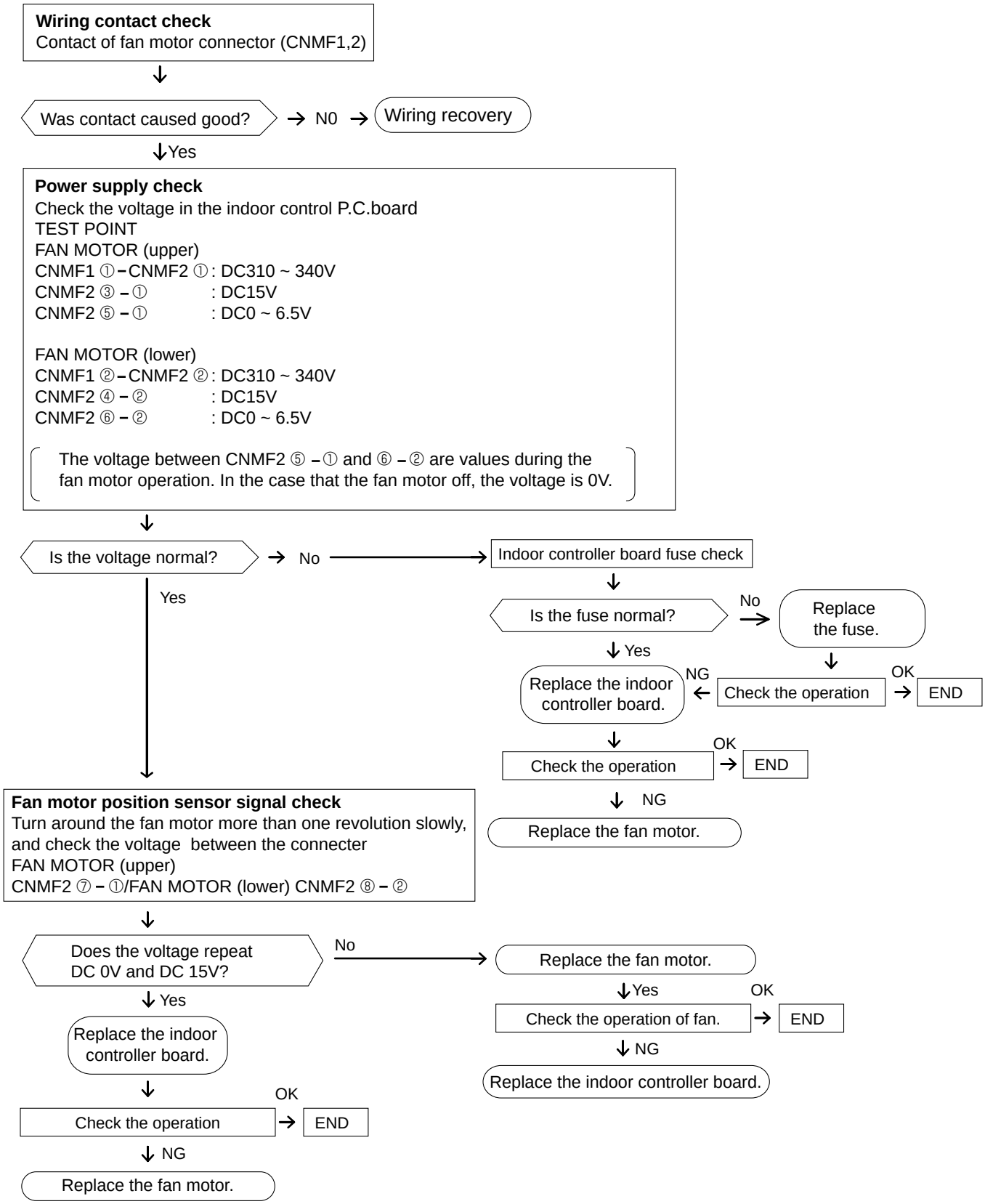
① Notes

· High voltage is applied to the connecter (CNMF1) for the fan motor. Pay attention to the service.

· Do not pull out the connector (CNMF1,2) for the motor with the power supply on.
(It causes trouble of the control P.C.board)

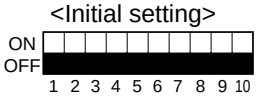
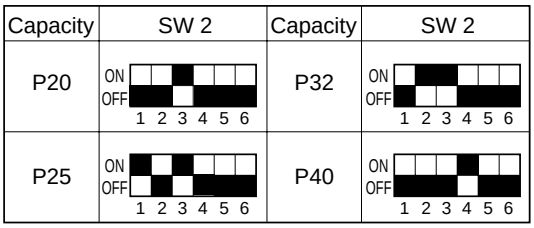
② Self check

Conditions : The indoor fan cannot turn around.

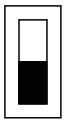
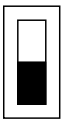
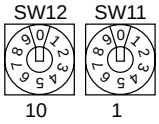
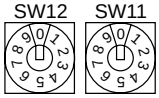


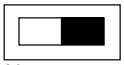
9-3. FUNCTION OF DIP SWITCH

The black square (■) indicates a switch position.

Switch	Pole	Function	Operation by switch		Effective timing	Remarks
			ON	OFF		
SW1 Function setting	1	Thermistor <Room temperature detection> position	Built-in remote controller	Indoor unit	Under suspension	Address board <Initial setting>  Note : *1 Fan operation at Heating mode. *2 Thermo ON operation at heating mode. *3 SW 1-7=OFF, SW 1-8=ON → Setting air flow. SW 1-7=ON, SW 1-8=ON → Indoor fan stop.
	2	Filter clogging detection	Provided	Not provided		
	3	Filter cleaning	2,500hr	100hr		
	4	Fresh air intake	Effective	Not effective		
	5	Switching remote controller display	Indicating if the thermostat is ON	Indicating fan operation ON/OFF		
	6	Humidifier control	Always operated while the heat in ON *1	Operated depends on the condition *2		
	7	Air flow set in case of Heat thermostat OFF	Low *3	Extra low *3		
	8		Setting air flow *3	Depends on SW1-7		
	9	Auto restart function	Effective	Not effective		
	10	Power ON/OFF by breaker	Effective	Not effective		
SW2 Capacity code setting	1~6	 			Before power supply ON	Indoor controller board Set while the unit is off. <Initial setting> Set for each capacity.
SW3 Function setting	1	Heat pump/Cooling only	Cooling only	Heat pump	Under suspension	Indoor controller board Set while the unit is off. <Initial setting>  Note : *4 Refer to "6. AIR OUTLET SELECTION" *5 At cooling mode, each angle can be used only 1 hour. *6 Please do not change SW3-9, 3-10. *7 Second setting is the same as first setting.
	2	Limitation at time of vane open operation *4	Not effective	Effective		
	3	Vane	Available	Not available		
	4	Vane swing function	Available	Not available		
	5	Vane horizontal angle	Second setting *7	First setting		
	6	Vane cooling limit angle setting *5	Horizontal angle	Down B, C		
	7	Changing the opening of linear expansion valve during thermo OFF	Effective	Not effective		
	8	Heat 4degrees up	Not effective	Effective		
	9	Superheat setting temperature *6	—	—		
	10	Sub cool setting temperature *6	—	—		
SW4 Model Selection (Setting for PFFY series)	1~5	When 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

The black square (■) indicates a switch position.

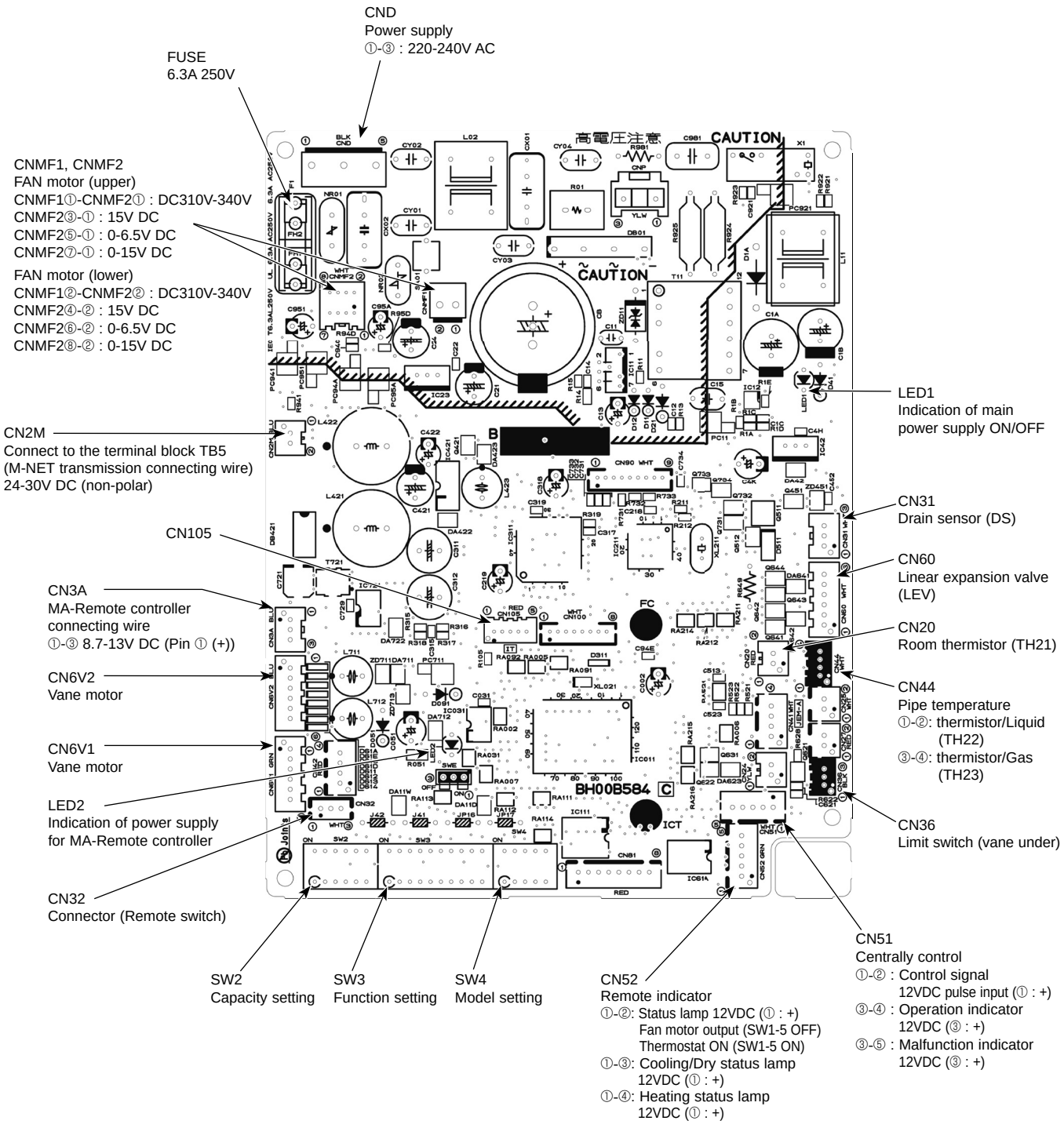
Switch	Pole	Operation by switch	Effective timing	Remarks
SWC Air outlet selector	2	オプ (Option) 標 (Standard)  Refer to 5. AIR OUTLET SELECTION.		Address board <Initial setting> Option Standard 
SW11 1s digit address setting SW12 10ths digit address setting	Rotary switch	 How to set address Example : If address is "3", remain SW12 (for over 10) at "0", and match SW11 (for 1 to 9) with "3".	Before power supply ON	Address board Address can be set while the unit is stopped. <Initial setting> 
SW14 Branch No. setting	Rotary switch	 How to set branch number SW14 (Series R2 only) Match the indoor unit's refrigerant pipe with the BC contoller's end connection number Remain other than series R2 at "0".		Address board <Initial setting> 

Connector	Setting by connector	Remarks
SWE No function	 Please do not change the setting to SWE.	Indoor controller board

9-4. TEST POINT DIAGRAM

9-4-1. Indoor controller board

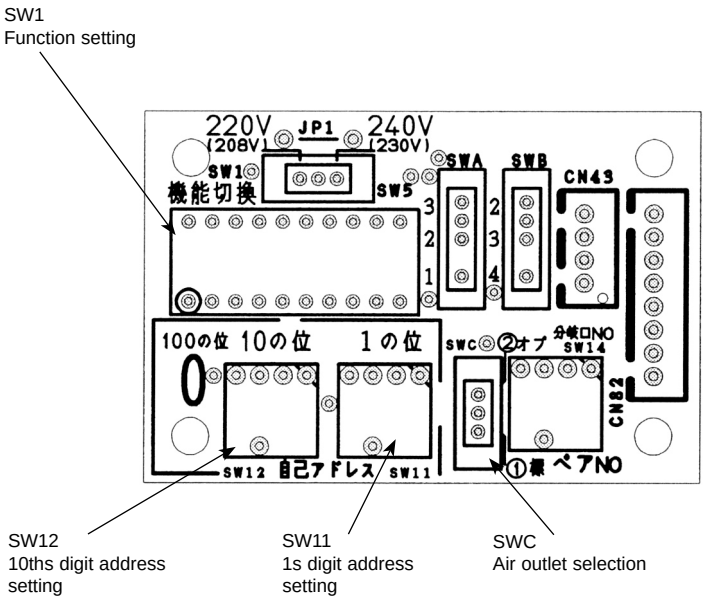
PFFY-P20VKM-E2
PFFY-P25VKM-E2
PFFY-P32VKM-E2
PFFY-P40VKM-E2



* The voltage range of DC12V above is between DC11.5 V to DC 13.7 V.

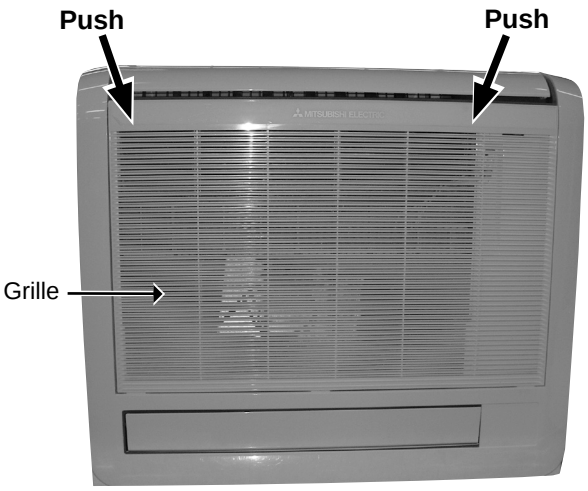
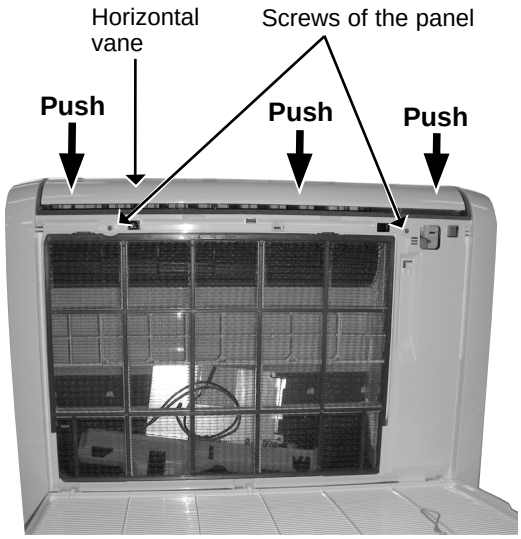
9-4-2. Address board

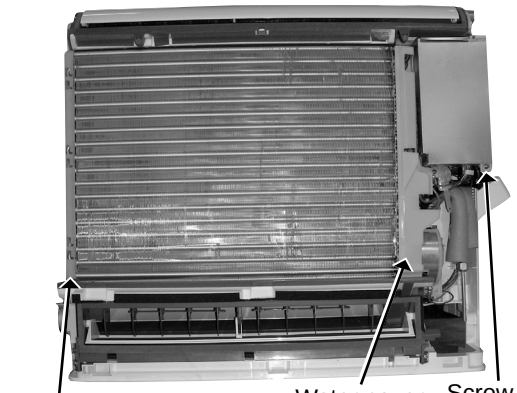
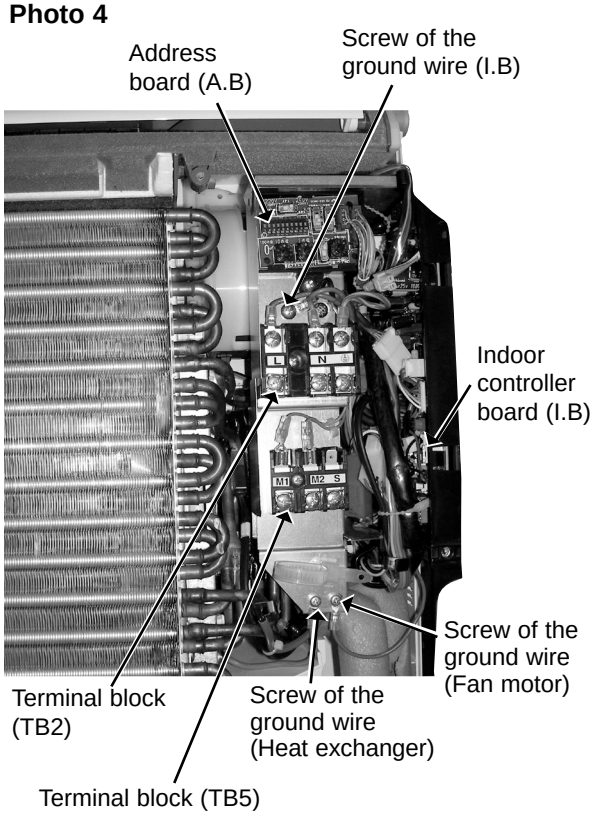
PFFY-P20VKM-E2
PFFY-P25VKM-E2
PFFY-P32VKM-E2
PFFY-P40VKM-E2

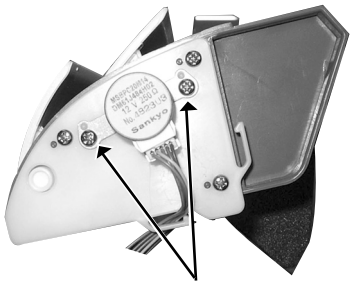
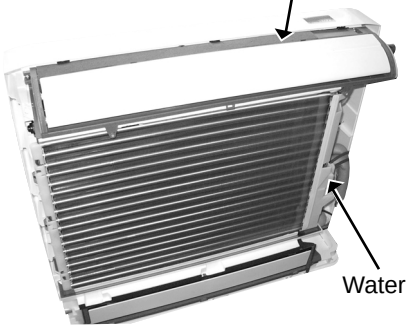
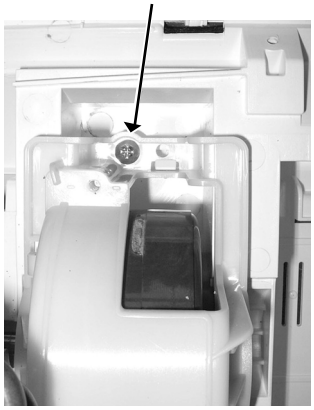


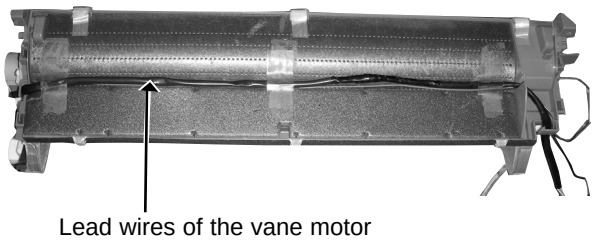
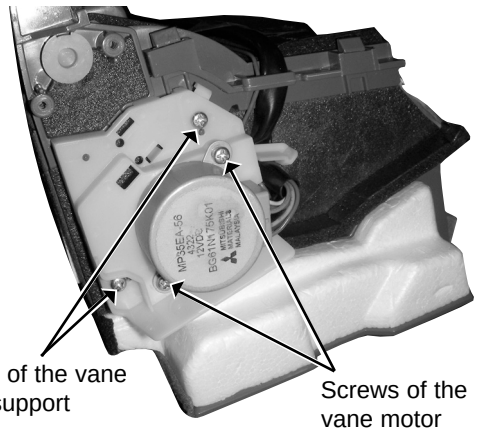
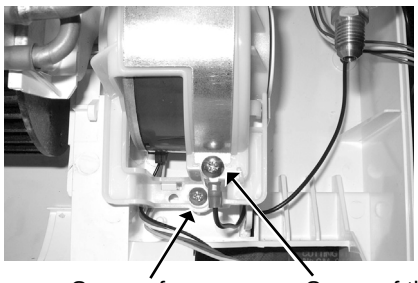
10 DISASSEMBLY PROCEDURE

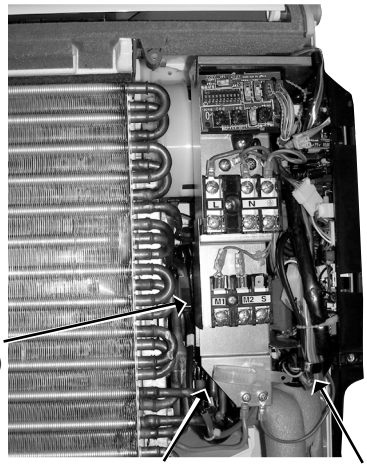
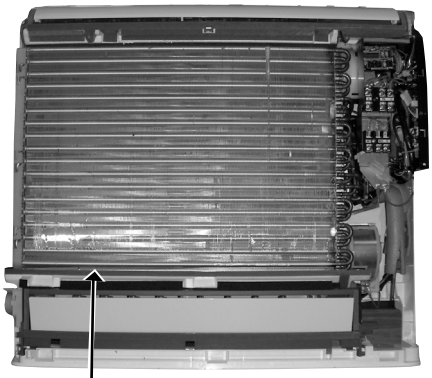
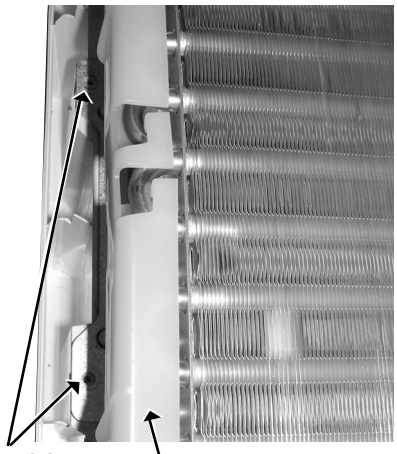
PFFY-P20VKM-E2 PFFY-P25VKM-E2 PFFY-P32VKM-E2 PFFY-P40VKM-E2

OPERATING PROCEDURE	PHOTOS
1. Removing the panel (1) Push both sides of the upper part of the front grille and pull the front grille open, and then remove the front grille from the panel. (See Photo 1) (2) Remove the screws of the panel. (See Photo 2) (3) Open the horizontal vane and push the left, right and middle of the upper part of the panel, and pull the panel toward you. (See Photo 2) (4) Lift up the panel and remove it from the box.	**Photo 1**  **Photo 2** 

OPERATING PROCEDURE	PHOTOS
2. Removing the indoor controller board and address board (1) Remove the panel. (Refer to procedure 1) (2) Remove the screw of the electrical cover, and then the electrical cover. (See Photo 3) (3) Remove the screw of the ground wires connected to the indoor fan motor (lower), and then the ground wires. (See Photo 4) (4) Remove the screw of the ground wires connected to the indoor heat exchanger, and then the ground wires. (See Photo 4) (5) Disconnect all the connectors on the address board and remove the screw of the address board case. (6) Remove the screw of the ground wire connected to the indoor controller board, and then the ground wire. (See Photo 4) (7) Pull the indoor controller board case slightly toward you from the electrical box, and disconnect all the connectors on the indoor controller board. (8) Pull out the indoor controller board case from the electrical box.	**Photo 3** 
3. Removing the electrical box (1) Remove the panel. (Refer to procedure 1) (2) Remove the electrical cover. (Refer to procedure 2) (3) Remove the ground wires from the electrical box. (Refer to procedure 2) (4) Remove the ground wires connected to the indoor fan motor and ones connected to the indoor heat exchanger. (See Photo 4.) (5) Remove the screw of the electrical box. (See Photo 4.) (6) Disconnect the following connectors on the indoor controller board. • Fan motor connectors <CNMF1, 2> • Vane motor connector <CN6V1, 2> • Pipe temperature thermistor connector <CN44> • Limit switch (vane under) connector <CN36> (7) Unhook the electrical box from the upper catch and pull out the electrical box from the box.	**Photo 4** 

OPERATING PROCEDURE	PHOTOS
4. Removing the vane motor (MV1) (1) Remove the panel. (Refer to procedure 1) (2) Remove the screws of the vane motor and pull out the vane motor. (See Photo 5) (3) Disconnect the connector from the vane motor.	**Photo 5**  Screws of vane motor
5. Removing the indoor fan motor (upper) (1) Remove the panel. (Refer to procedure 1) (2) Remove the electrical box. (Refer to procedure 3) (3) Remove the nozzle (upper). (See Photo 6) (4) Unhook the water cover from the catches and remove the water cover. (See Photo 6) (5) Removing the screw of the motor band, and then the motor band. (See Photo 7) (6) Remove the line flow fan and the indoor fan motor (upper) from the box.	**Photo 6** Nozzle <Upper>  Water cover **Photo 7** Screw of motor band 

OPERATING PROCEDURE	PHOTOS
6. Removing the vane motor and the limit switch (vane under) (1) Remove the panel. (Refer to procedure 1) (2) Remove the screws of the nozzle assembly (lower). (See Photo 8) (3) Remove the drain hose from the nozzle assembly (lower) and pull out the nozzle assembly (lower) toward you. (4) Remove the tape fixing the lead wires of the vane motor from the nozzle assembly <lower>. (See Photo 9) (5) Remove the screws of the vane motor support, and then the vane motor support. (6) Remove the screws of the vane motor, and then the vane motor from the vane motor support. (7) Disconnect the connector from the vane motor. (8) Remove the limit switch (vane under) (LS).	**Photo 8** 
7. Removing the indoor fan motor (1) Remove the panel. (Refer to procedure 1) (2) Remove the nozzle assembly (lower) and the drain hose. (Refer to procedure 6) (3) Remove the screw of the ground wire of the indoor fan motor (lower), and then the ground wire. (See Photo 11) (4) Remove the screw of the motor band, and then the motor band. (See Photo 11) (5) Remove the line flow fan and the indoor fan motor (lower) from the box.	**Photo 9**  **Photo 10**  **Photo 11** 

OPERATING PROCEDURE	PHOTOS
8. Removing the pipe temperature detection (liquid and gas) thermistors and room temperature thermistor (1) Remove the panel. (Refer to procedure 1) (2) Remove the screw of the electrical cover, and then the electrical cover. (See Photo 3) (3) Remove the pipe temperature detection (liquid and gas) thermistors from the holders. (4) Disconnect the connector CN44 on the indoor controller board. (5) Loosen the room temperature thermistor wire clamp under the electrical box. (6) Disconnect the connector CN20 on the indoor controller board.	**Photo 12** 
9. Removing the heat exchanger and linear expansion valve (1) Remove the panel. (Refer to procedure 1) (2) Remove the hair pin cover and water cover (See Photo 3) (3) Remove the 2 screws of the heat exchanger. (See Photo 14) (4) Unhook the heat exchanger from 2 catches (electrical box side). (5) Pull out the heat exchanger and linear expansion valve.	**Photo 13**  **Photo 14** 

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