Changes for the Better

MITSUBISHI ELECTRIC

SPLIT-TYPE, HEAT PUMP AIR CONDITIONERS

November 2008

No. OC404
REVISED EDITION-A

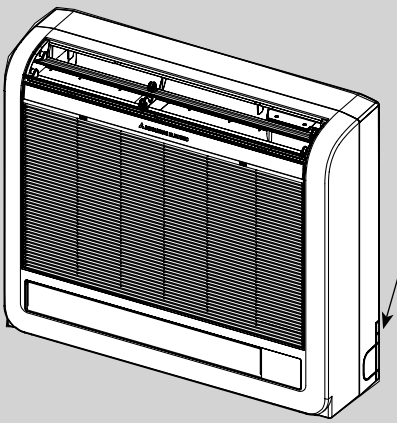
TECHNICAL & SERVICE MANUAL

Series PFFY Floor Standing R410A / R407C / R22

Indoor unit [Model names]	[Service Ref.]
PFFY-P20VKM-E	PFFY-P20VKM-E
	PFFY-P20VKM-ER1
PFFY-P25VKM-E	PFFY-P25VKM-E
	PFFY-P25VKM-ER1
PFFY-P32VKM-E	PFFY-P32VKM-E
	PFFY-P32VKM-ER1
PFFY-P40VKM-E	PFFY-P40VKM-E
	PFFY-P40VKM-ER1

Revision:
- PFFY-P20/25/32/40 VKM-ER1 are added in REVISED EDITION-A.
- Some descriptions have been modified.

- Please void OC404.



INDOOR UNIT

NOTE:
This service manual describes technical data of the indoor units.
- As for outdoor units refer to outdoor unit's service manual.
- RoHS compliant products have <G> mark on the spec name plate.

CONTENTS

1 TEHNICAL CHANGES

PFFY-P20VKM-E → PFFY-P20VKM-ER1
PFFY-P25VKM-E → PFFY-P25VKM-ER1
PFFY-P32VKM-E → PFFY-P32VKM-ER1
PFFY-P40VKM-E → PFFY-P40VKM-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 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 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 enter, that can cause deterioration of refrigerant oil etc.

Use liquid refrigerant to seal 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.

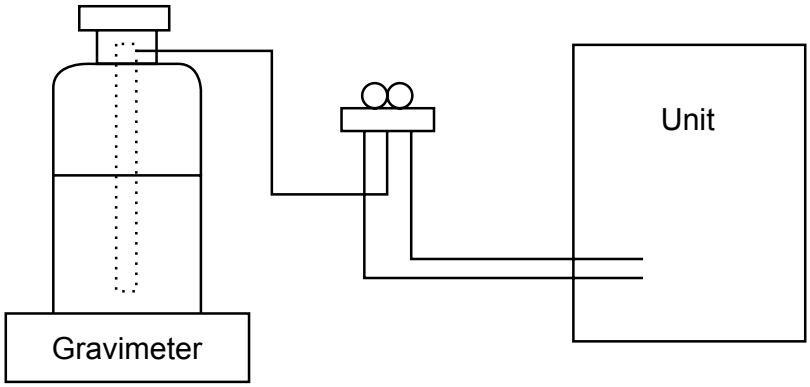
Ventilate the room if refrigerant leaks during operation. If refrigerant comes into contact with a flame, poisonous gases will be released.

[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
①Direct charging from the cylinder.
·R407C cylinder are 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 on 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 enter 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 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.

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

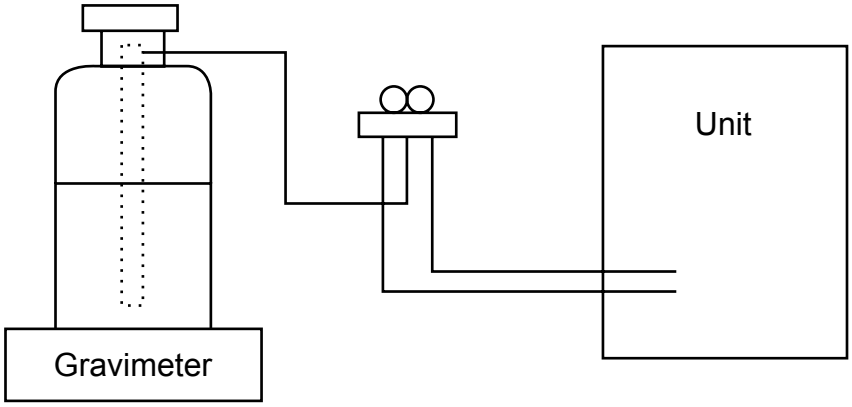
[1] Cautions for service

(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.)



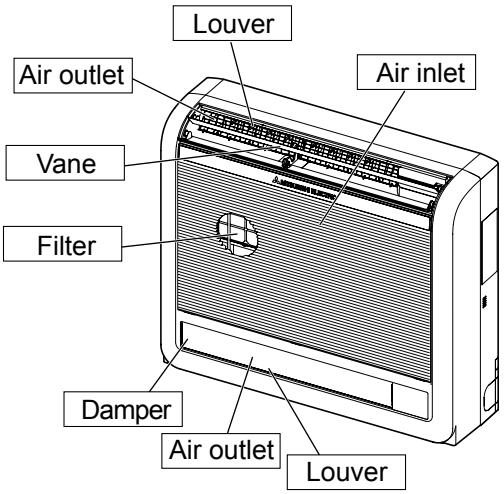
[3] Service tools

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

3 PART NAMES AND FUNCTIONS

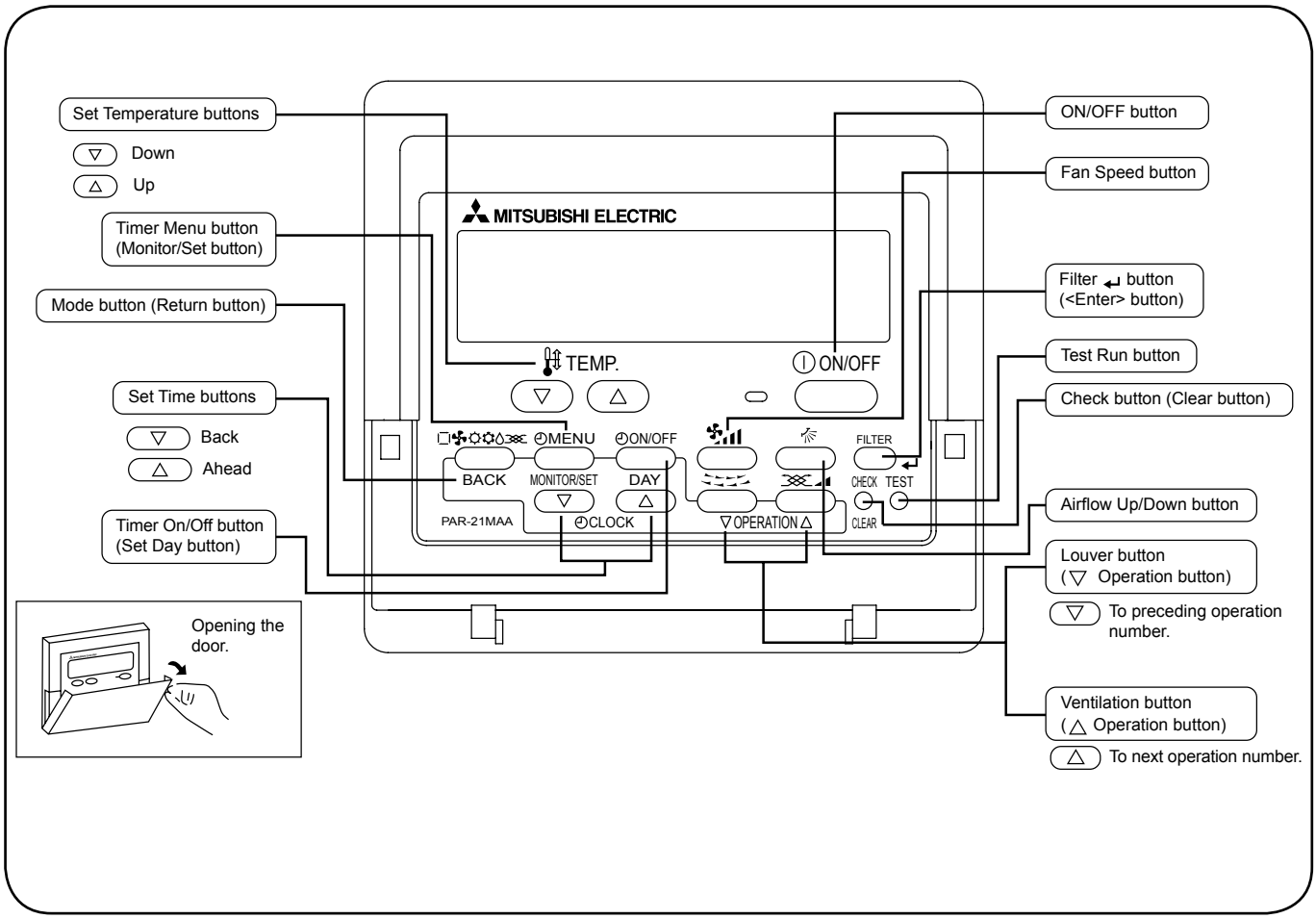
● **Indoor Unit**



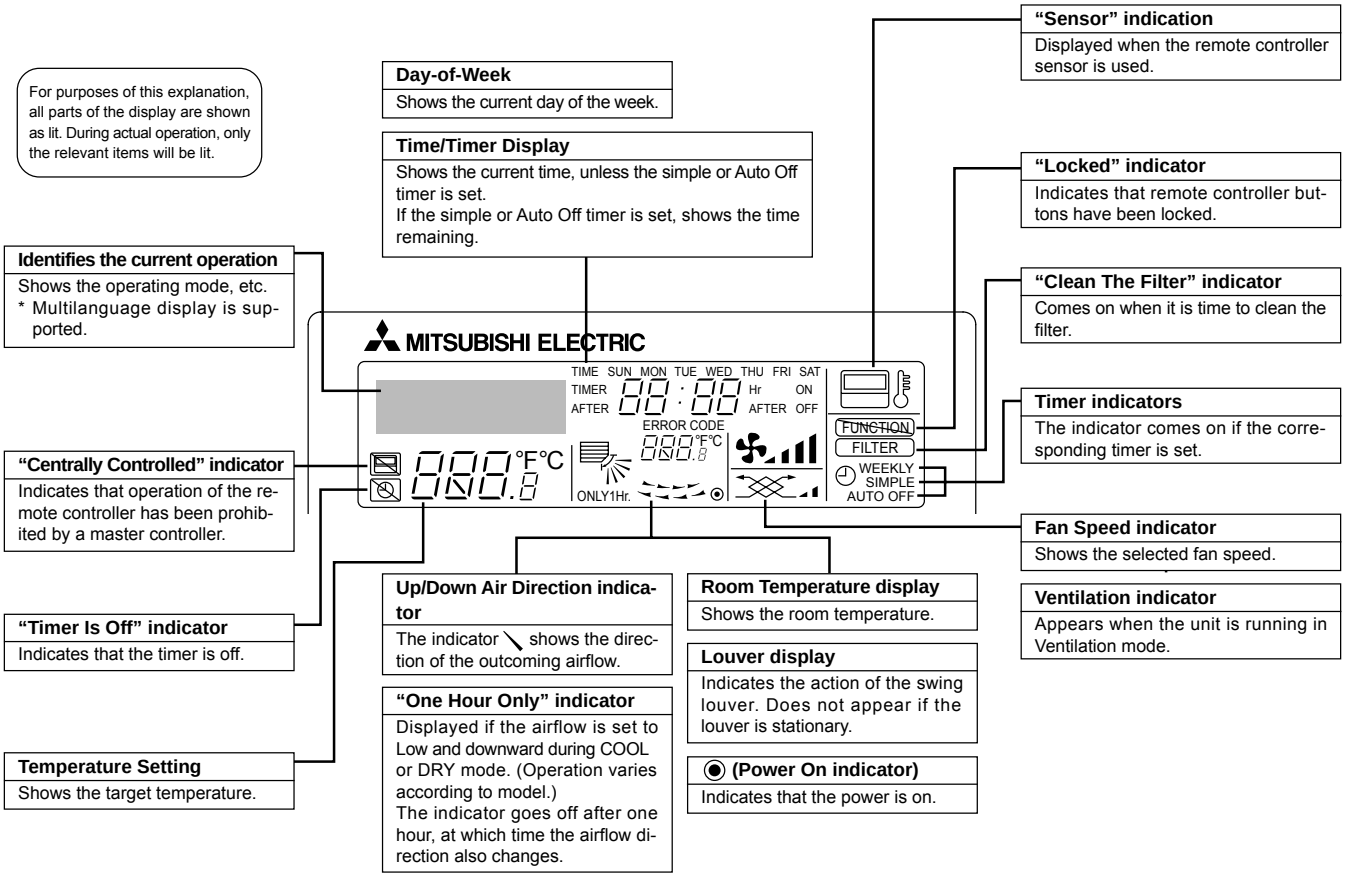
● Wired remote controller

Once the controls are set, the same operation mode can be repeated by simply pressing the ON/OFF button.

● Operation buttons

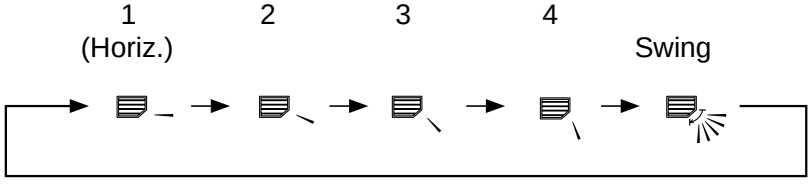
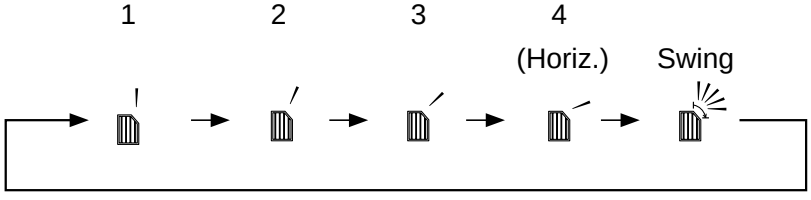


● Display



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. 2minutes). 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 damper cannot be set. The airflow direction is automatically controlled by a computer.

4 SPECIFICATION

4-1. Specification

Item			PFFY-P20VKM-E PFFY-P20VKM-ER1	PFFY-P25VKM-E PFFY-P25VKM-ER1	PFFY-P32VKM-E PFFY-P32VKM-ER1	PFFY-P40VKM-E PFFY-P40VKM-ER1
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 High-Medium1-Medium2-Low.

4-2. Electrical parts specifications

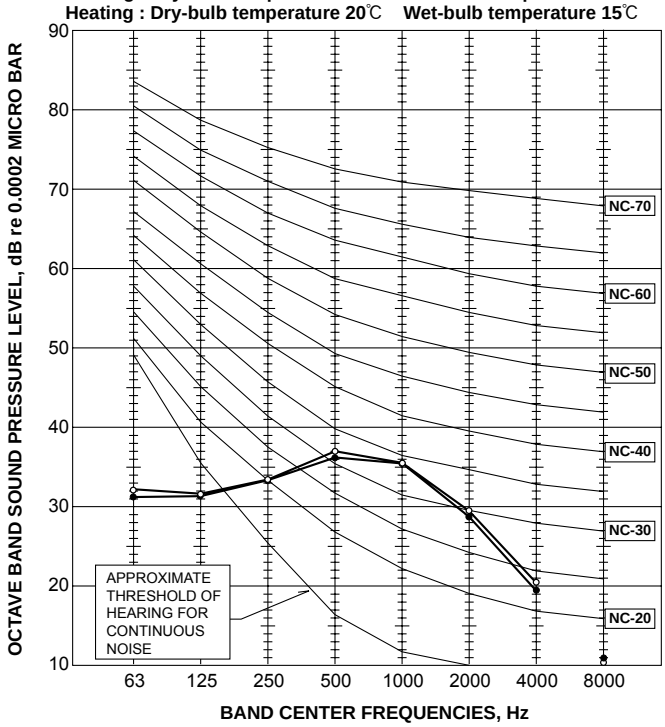
Model / Parts name	Symbol	PFFY-P20VKM-E PFFY-P20VKM-ER1	PFFY-P25VKM-E PFFY-P25VKM-ER1	PFFY-P32VKM-E PFFY-P32VKM-ER1	PFFY-P40VKM-E PFFY-P40VKM-ER1
Thermistor (Room temperature detection)	TH21	Resistance 0℃/15kΩ, 10℃/9.6kΩ, 20℃/6.3kΩ, 25℃/5.4kΩ, 30℃/4.3kΩ, 40℃/3.0kΩ			
Thermistor (Pipe temperature detection/Liquid)	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			
Damper 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			

5 NOISE CRITERIA CURVES

PFFY-P20VKM-E PFFY-P20VKM-ER1

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

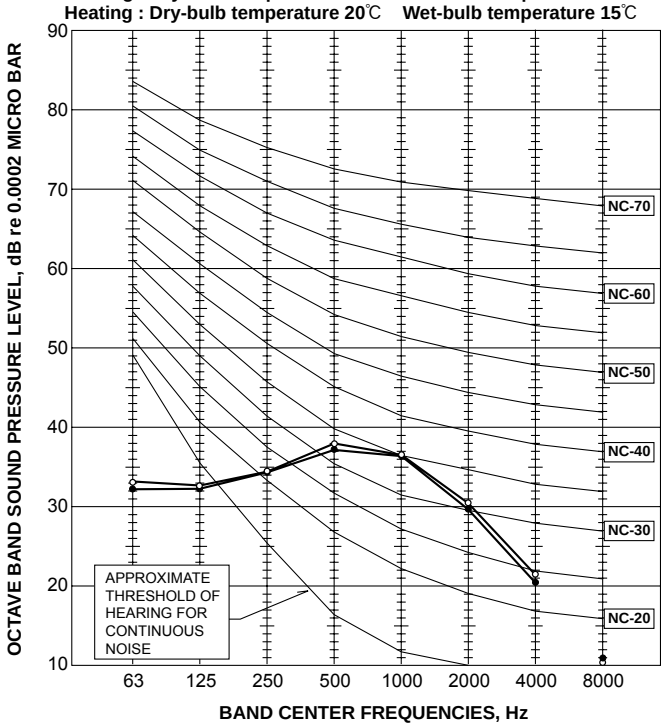
Test conditions,
Cooling : Dry-bulb temperature 27℃ Wet-bulb temperature 19℃
Heating : Dry-bulb temperature 20℃ Wet-bulb temperature 15℃



PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1

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

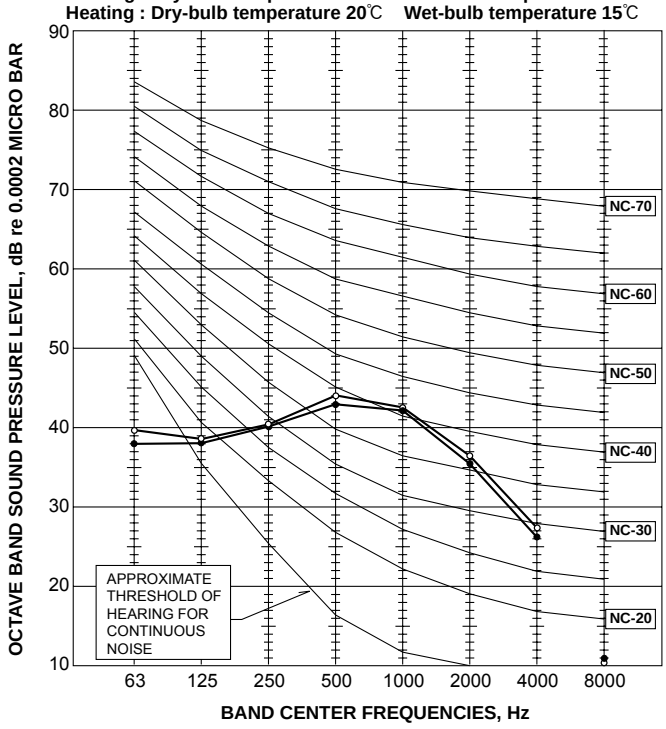
Test conditions,
Cooling : Dry-bulb temperature 27℃ Wet-bulb temperature 19℃
Heating : Dry-bulb temperature 20℃ Wet-bulb temperature 15℃

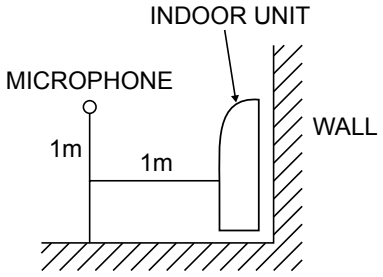


PFFY-P40VKM-E PFFY-P40VKM-ER1

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℃





6 AIR OUTLET SELECTION

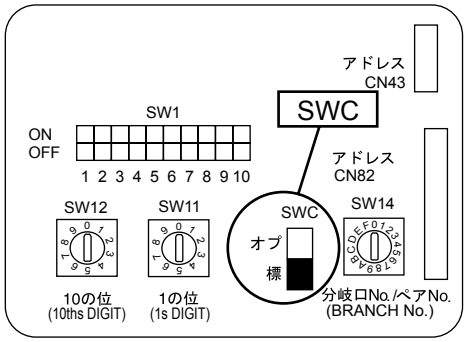
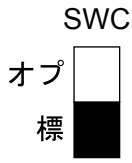
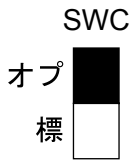


Fig. 4-1

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").

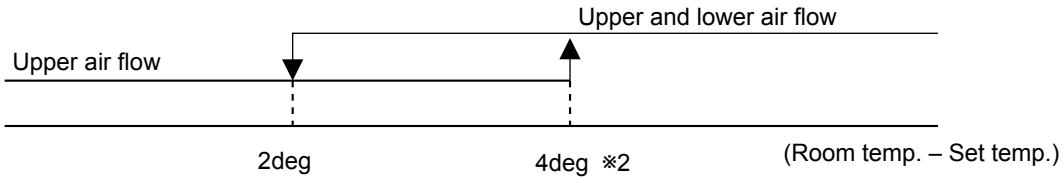
Note:
Be sure to operate with the main power turned off.

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 damper 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.

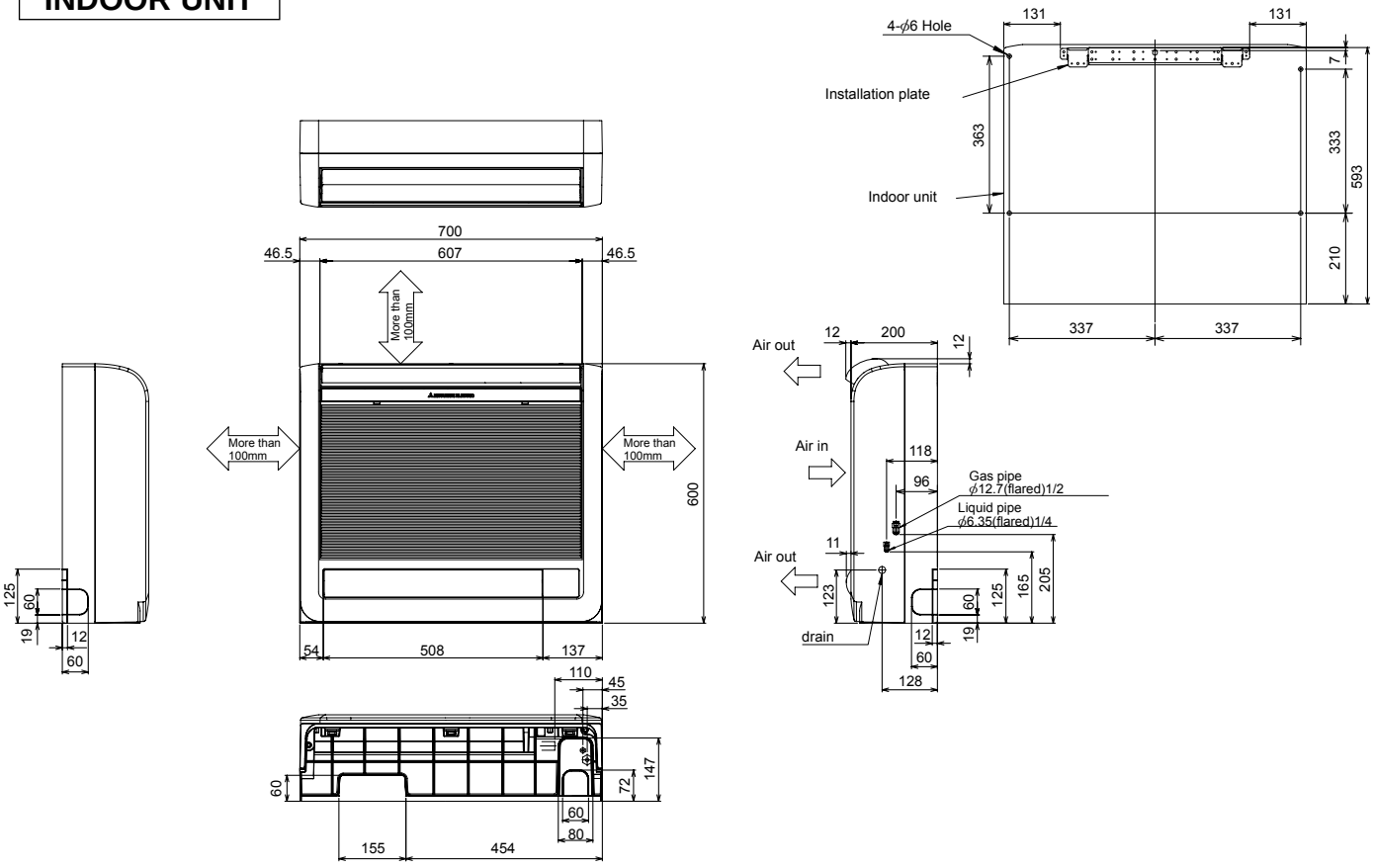
DIP SW3-2 (on indoor controller board) : ON
Remains to be 4deg.

7 OUTLINES AND DIMENSIONS

PFFY-P20VKM-E PFFY-P20VKM-ER1
PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1
PFFY-P40VKM-E PFFY-P40VKM-ER1

Unit : mm

INDOOR UNIT



8 WIRING DIAGRAM

PFFY-P20VKM-E PFFY-P20VKM-ER1
PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1
PFFY-P40VKM-E PFFY-P40VKM-ER1

[LEGEND]

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

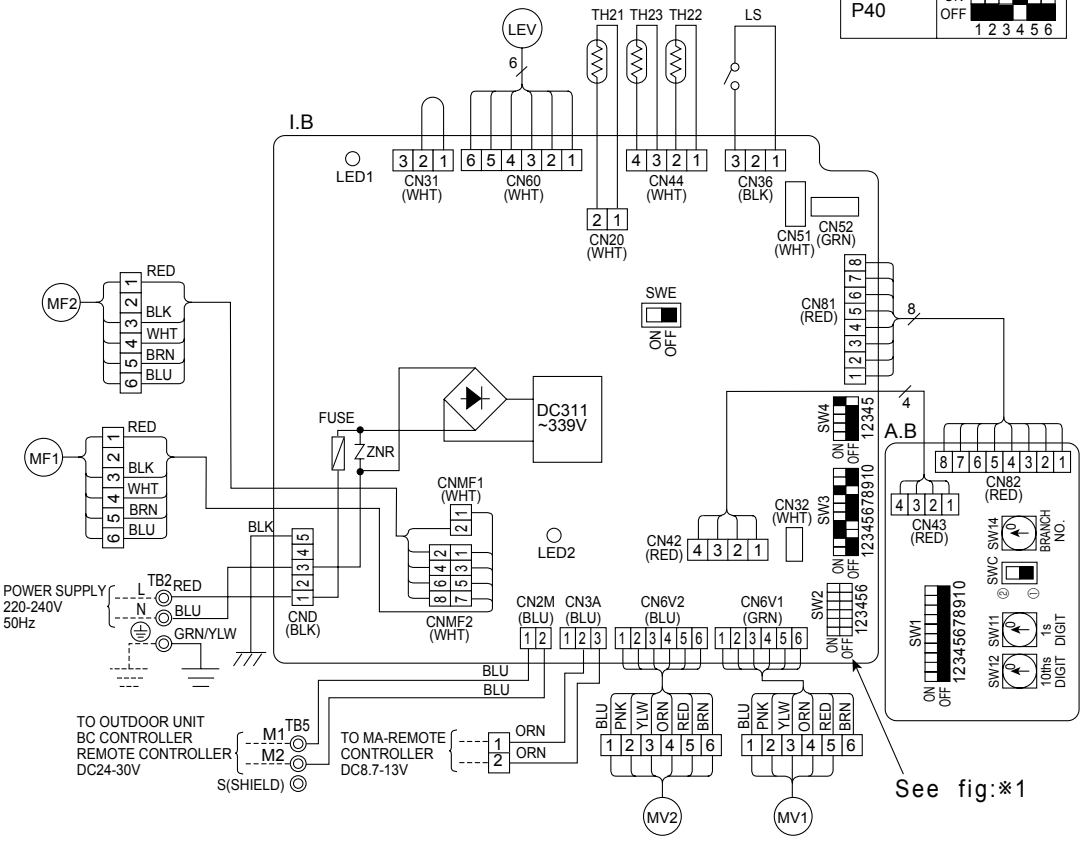
NOTES
1. At servicing for outdoor unit, always follow the wiring diagram of outdoor unit.
2. In case of connecting MA-Remote controller, please connect MA remote controller cable in an accessory to the connecter 1 2. (Remote controller wire is non-polar.)
3. In case of using M-NET, please connect to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

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

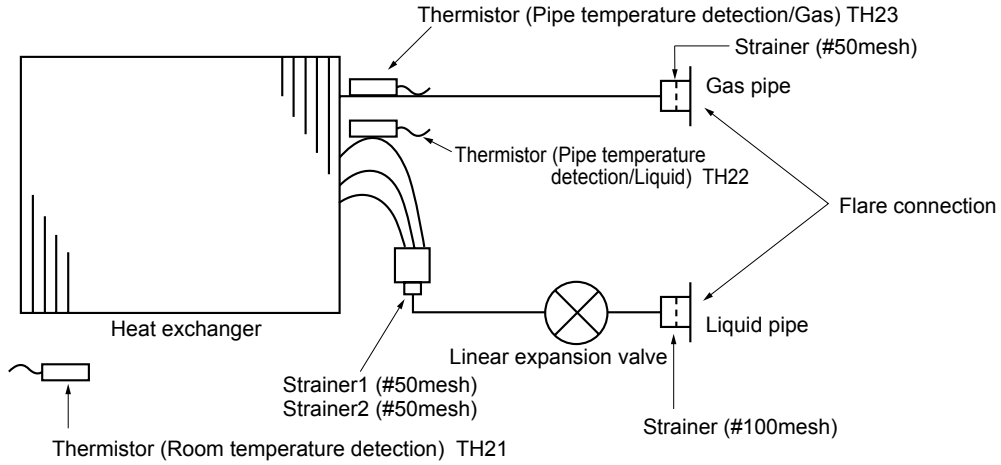
<fig. ※1>

MODELS	SW2
P20	ON OFF 1 2 3 4 5 6
P25	ON OFF 1 2 3 4 5 6
P32	ON OFF 1 2 3 4 5 6
P40	ON OFF 1 2 3 4 5 6



9 REFRIGERANT SYSTEM DIAGRAM

PFFY-P20VKM-E PFFY-P20VKM-ER1
PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1
PFFY-P40VKM-E PFFY-P40VKM-ER1



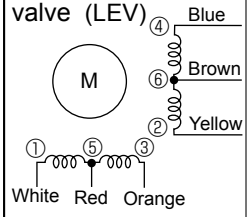
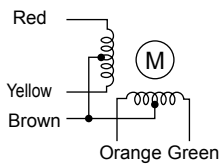
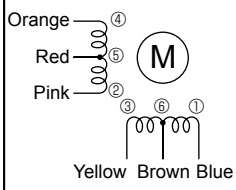
Unit: mm

Item \ Capacity	PFFY-P20,P25,P32,P40VKM-E(R1)
Gas pipe	ϕ12.7(1/2")
Liquid pipe	ϕ6.35(1/4")

10 TROUBLE SHOOTING

10-1. HOW TO CHECK

PFFY-P20VKM-E PFFY-P32VKM-E PFFY-P25VKM-E PFFY-P40VKM-E
PFFY-P20VKM-ER1 PFFY-P32VKM-ER1 PFFY-P25VKM-ER1 PFFY-P40VKM-ER1

<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 using 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>Check 10-2.</td></tr>
<tr><td>Linear expansion valve (LEV)
  </td><td>Disconnect the connector then measure the resistance valve using 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 using 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>Damper motor (MV2)
  </td><td>Measure the resistance between the terminals using 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

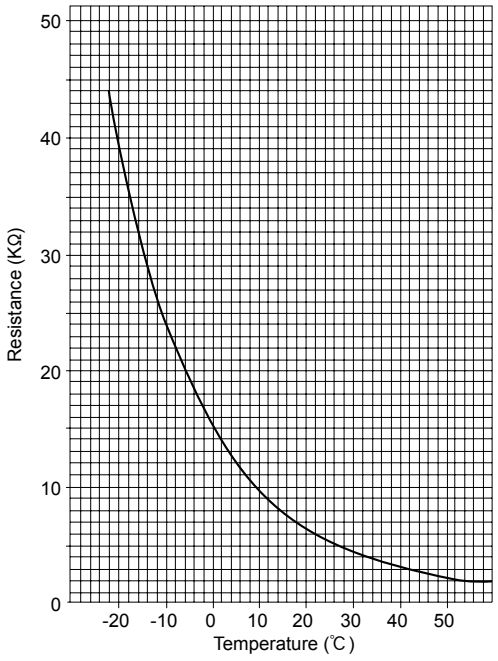
Room temperature thermistor (TH21)
Liquid pipe temperature thermistor (TH22)
Gas pipe temperature thermistor (TH23)

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 >

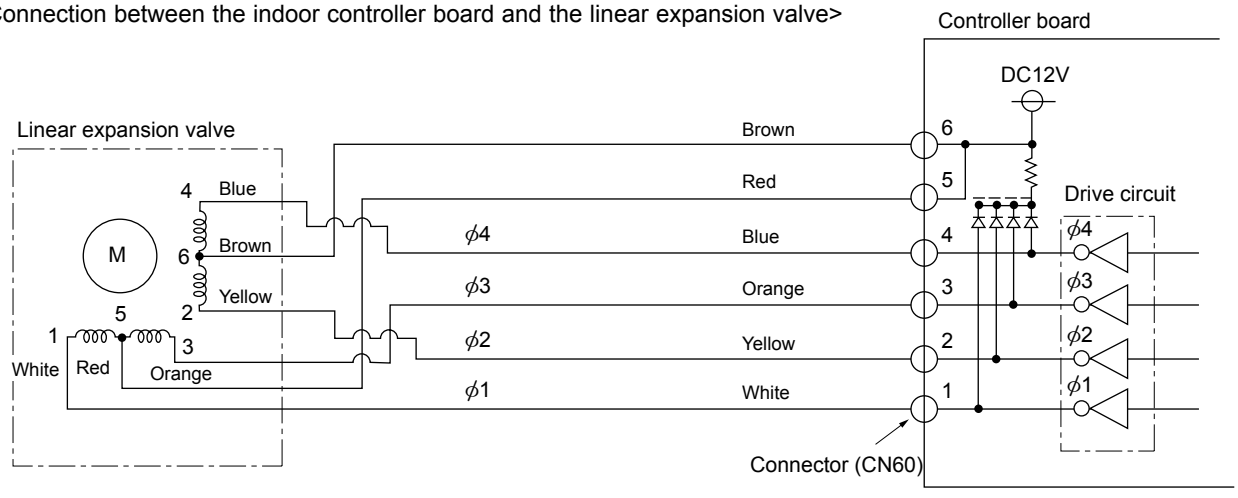


Linear expansion valve

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>



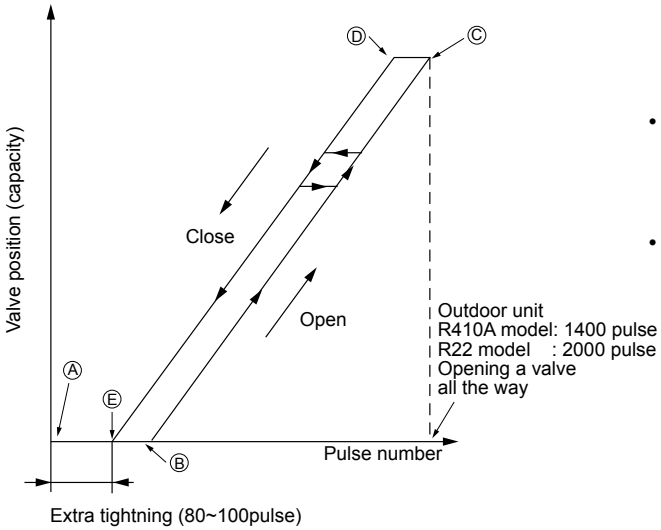
<Output pulse signal and the valve operation>

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.

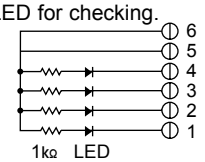
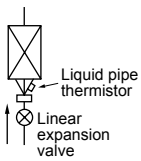
② Linear expansion valve operation



- 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 Trouble shooting

Symptom	Check points	Countermeasures
Operation circuit failure of the micro processor.	Disconnect the connector on the controller board, then connect LED for checking.  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.

10-2. FAN MOTOR

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

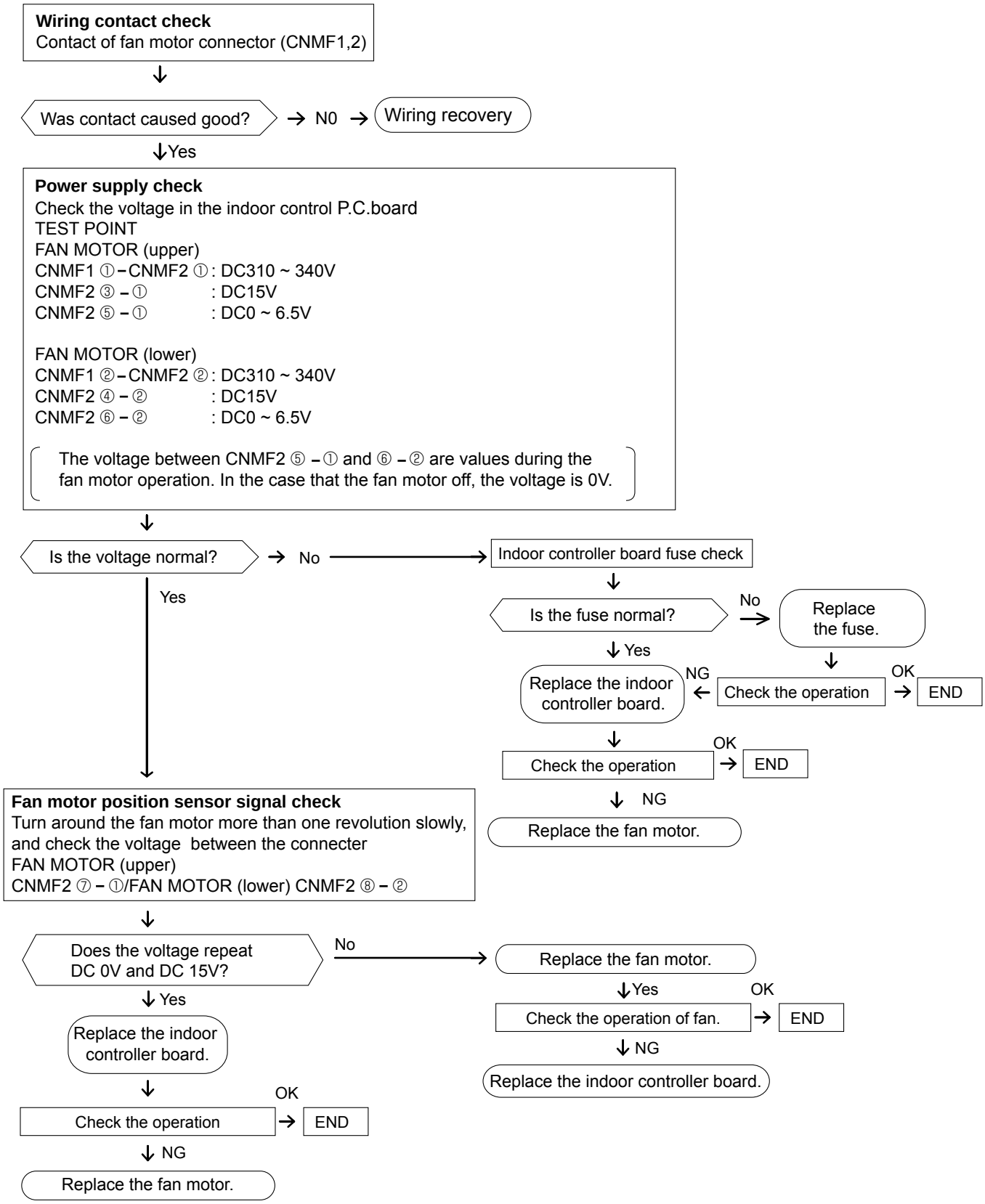
① Notes

· 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)

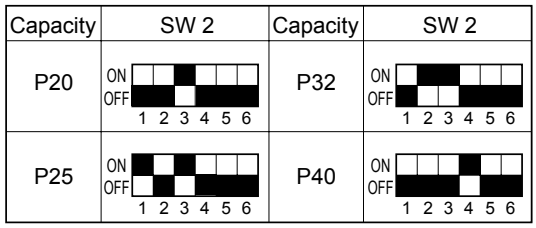
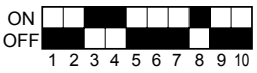
② Self check

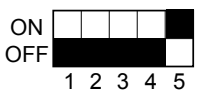
Conditions : The indoor fan cannot turn around.

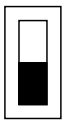
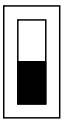
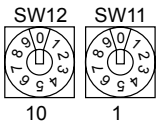
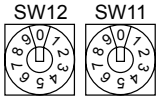
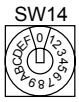
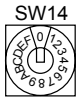


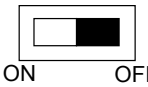
10-3. FUNCTION OF DIP SWITCH

<table>
<tr><th rowspan="2">Switch</th><th rowspan="2">Pole</th><th rowspan="2">Function</th><th colspan="2">Operation by switch</th><th rowspan="2">Effective timing</th><th rowspan="2">Remarks</th></tr>
<tr><th>ON</th><th>OFF</th></tr>
<tr><td rowspan="10">SW1
Function setting</td><td>1</td><td>Thermistor <Room temperature detection> position</td><td>Built-in remote controller</td><td>Indoor unit</td><td rowspan="10">Under suspension</td><td rowspan="10">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.</td></tr>
<tr><td>2</td><td>Filter clogging detection</td><td>Provided</td><td>Not provided</td></tr>
<tr><td>3</td><td>Filter cleaning</td><td>2,500hr</td><td>100hr</td></tr>
<tr><td>4</td><td>Fresh air intake</td><td>Effective</td><td>Not effective</td></tr>
<tr><td>5</td><td>Switching remote controller display</td><td>Indicating if the thermostat is ON</td><td>Indicating fan operation ON/OFF</td></tr>
<tr><td>6</td><td>Humidifier control</td><td>Always operated while the heat in ON ※1</td><td>Operated depends on the condition ※2</td></tr>
<tr><td>7</td><td rowspan="2">Air flow set in case of Heat thermostat OFF</td><td>Low ※3</td><td>Extra low ※3</td></tr>
<tr><td>8</td><td>Setting air flow ※3</td><td>Depends on SW1-7</td></tr>
<tr><td>9</td><td>Auto restart function</td><td>Effective</td><td>Not effective</td></tr>
<tr><td>10</td><td>Power ON/OFF by breaker</td><td>Effective</td><td>Not effective</td></tr>
<tr><td>SW2
Capacity code setting</td><td>1~6</td><td colspan="3"> 
</td><td>Before power supply ON</td><td>Indoor controller board
Set while the unit is off.
<Initial setting>
Set for each capacity.</td></tr>
<tr><td rowspan="10">SW3
Function setting</td><td>1</td><td>Heat pump/Cooling only</td><td>Cooling only</td><td>Heat pump</td><td rowspan="10">Under suspension</td><td rowspan="10">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 use SW3-9,10.
※7 Second setting is the same as first setting.</td></tr>
<tr><td>2</td><td>Limitation at time of damper open operation ※ 4</td><td>Not effective</td><td>Effective</td></tr>
<tr><td>3</td><td>Vane</td><td>Available</td><td>Not available</td></tr>
<tr><td>4</td><td>Vane swing function</td><td>Available</td><td>Not available</td></tr>
<tr><td>5</td><td>Vane horizontal angle</td><td>Second setting ※7</td><td>First setting</td></tr>
<tr><td>6</td><td>Vane cooling limit angle setting ※5</td><td>Horizontal angle</td><td>Down B, C</td></tr>
<tr><td>7</td><td>Changing the opening of linear expansion valve during thermo OFF</td><td>Effective</td><td>Not effective</td></tr>
<tr><td>8</td><td>Heat 4degrees up</td><td>Not effective</td><td>Effective</td></tr>
<tr><td>9</td><td>Superheat setting temperature ※6</td><td>—</td><td>—</td></tr>
<tr><td>10</td><td>Sub cool setting temperature ※6</td><td>—</td><td>—</td></tr>
<tr><td>SW4
Model Selection (Setting for PFFY series)</td><td>1~5</td><td colspan="3">In case replacing the indoor controller board, make sure to set the switch to the factory-preset status, which is shown below.
 
</td><td>Before power supply ON</td><td>Indoor controller board</td></tr>
</table>

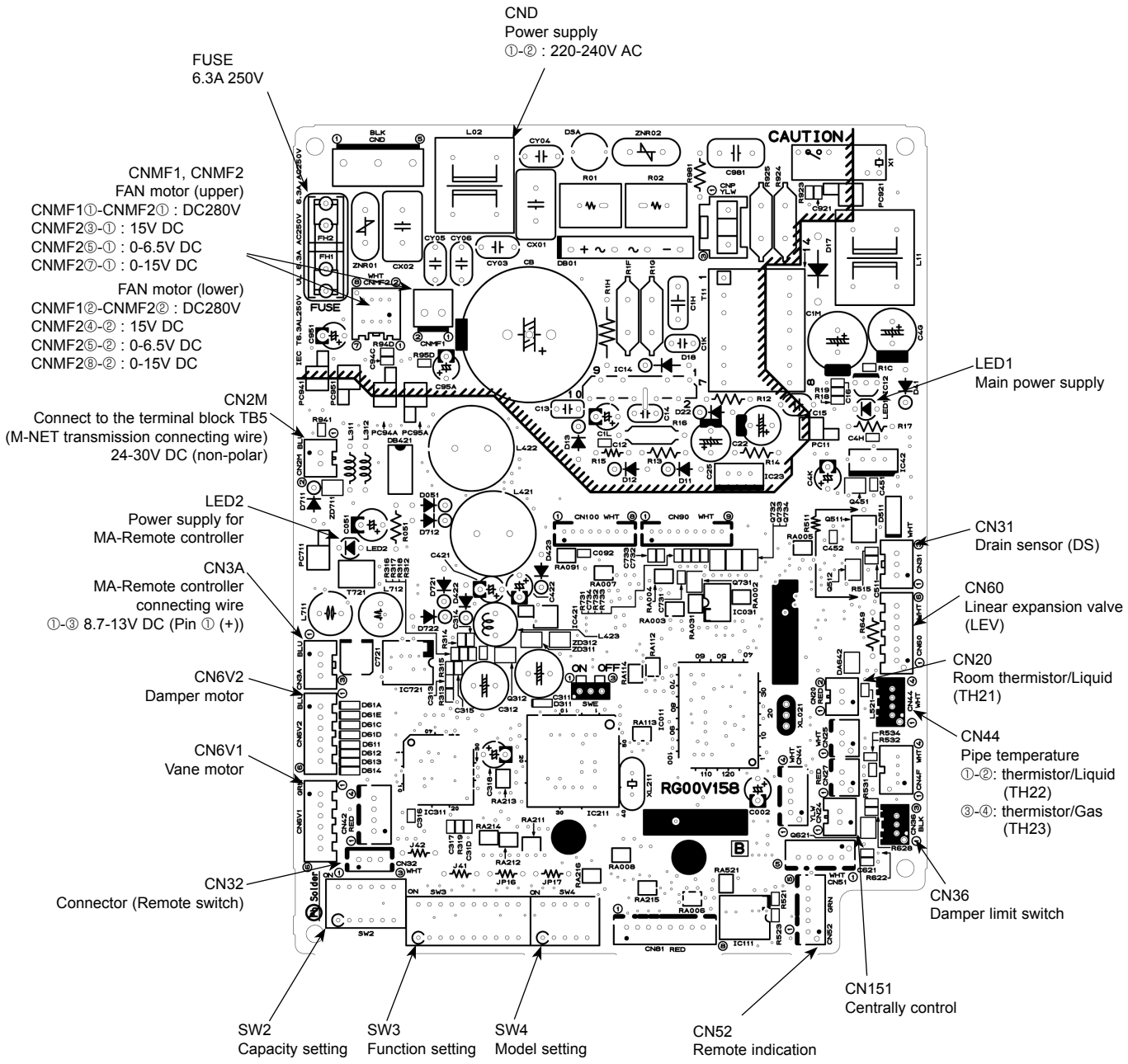
Switch	Pole	Operation by switch	Effective timing	Remarks
SWC Air outlet selector	2	オプ (Option) 標 (Standard)  Refer to 6. AIR OUTLET SELECTION.		Address board <Initial setting> Option Standard 
SW11 1s digit address setting SW12 10ths digit address setting	Rotary switch	 How to set address Example : If 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

10-4. TEST POINT DIAGRAM

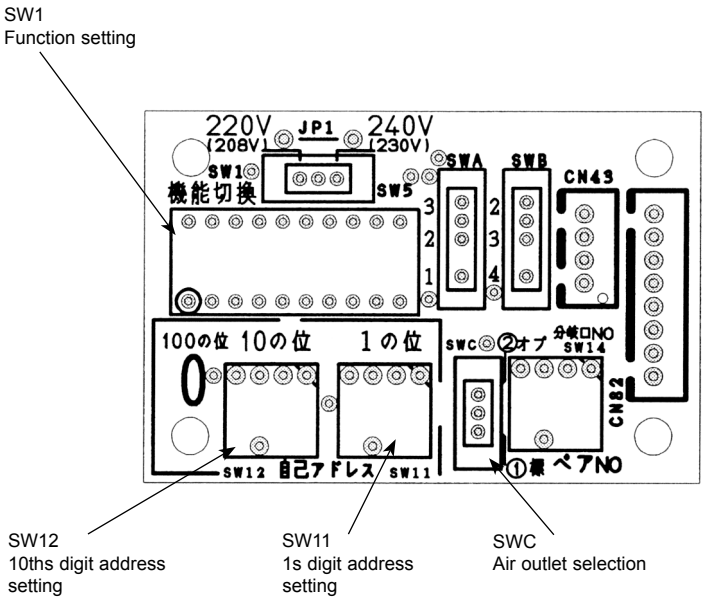
10-4-1. Indoor controller board

PFFY-P20VKM-E PFFY-P20VKM-ER1
PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1
PFFY-P40VKM-E PFFY-P40VKM-ER1



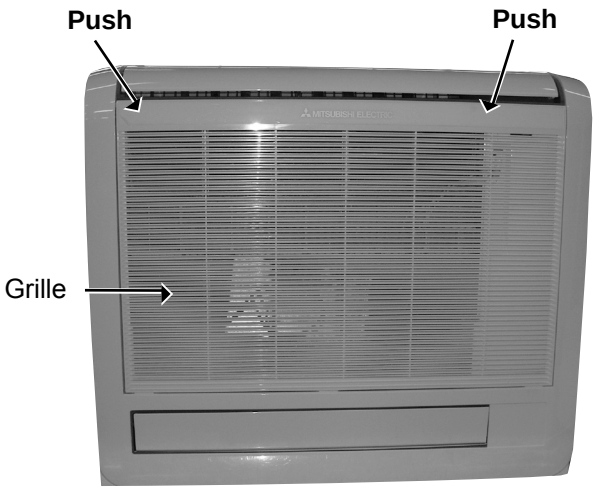
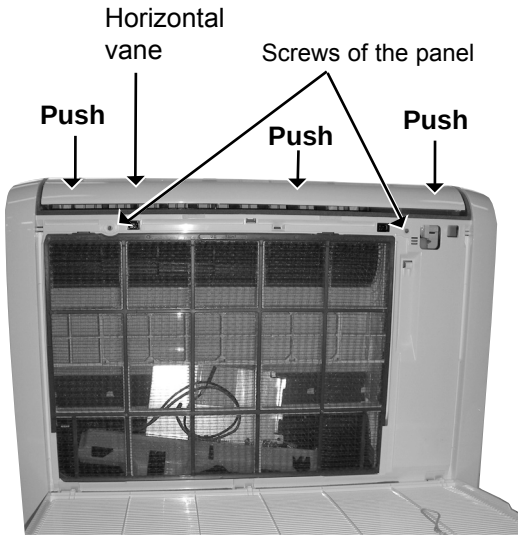
10-4-2. Address board

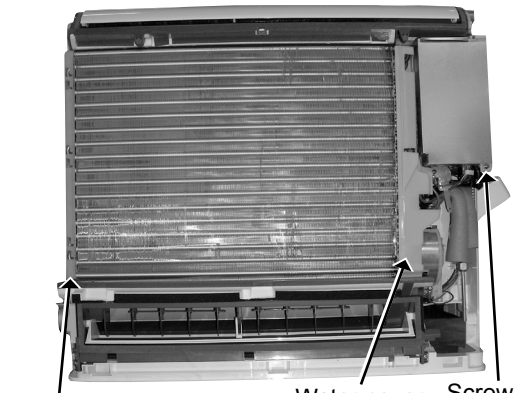
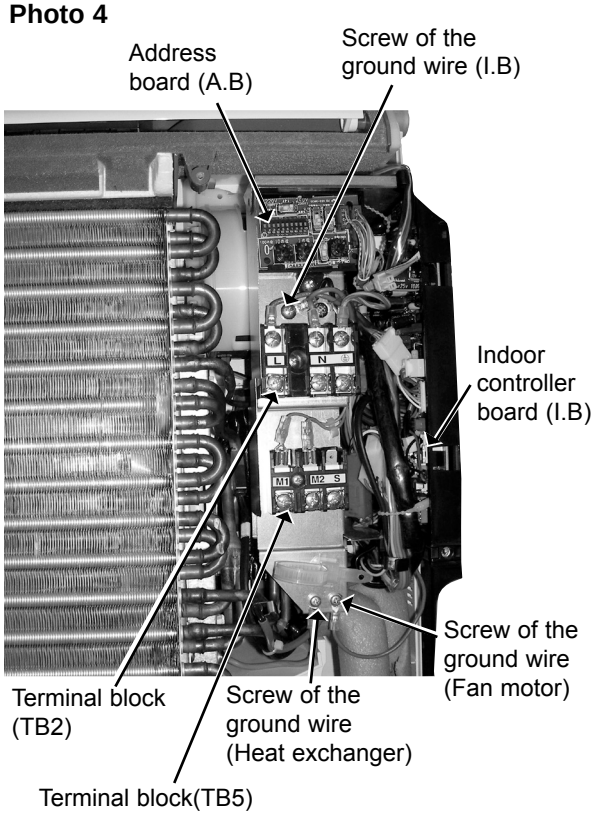
PFFY-P20VKM-E PFFY-P20VKM-ER1
PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1
PFFY-P40VKM-E PFFY-P40VKM-ER1

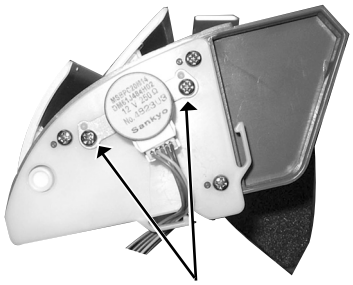
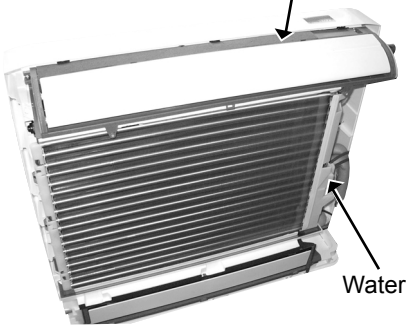
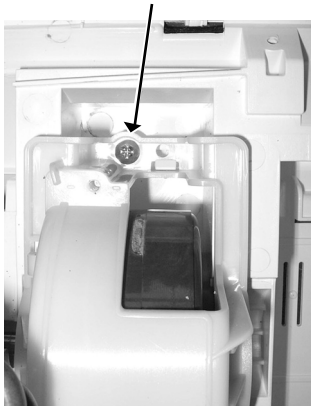


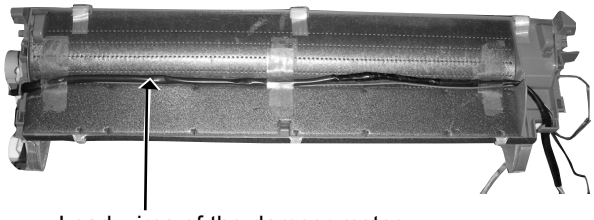
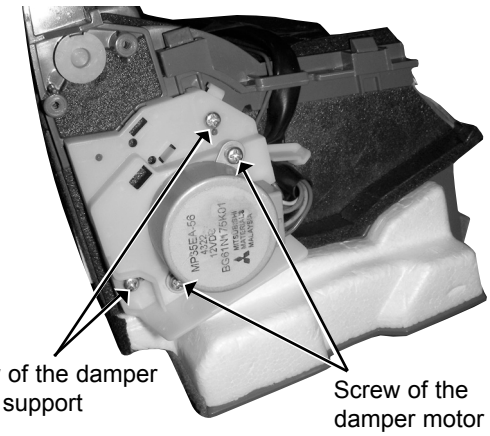
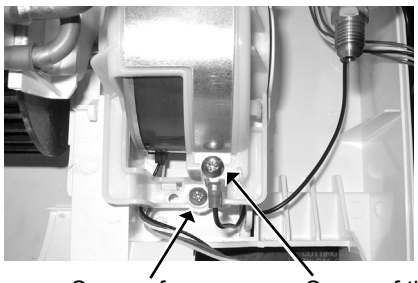
11 DISASSEMBLY PROCEDURE

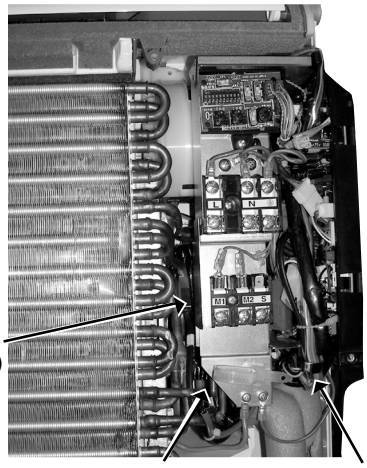
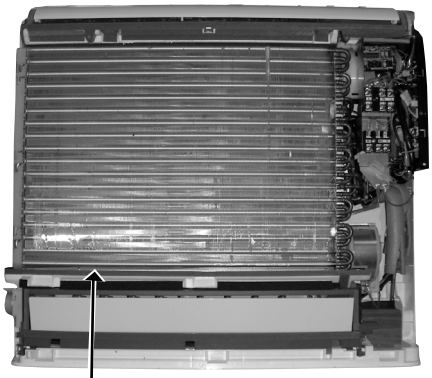
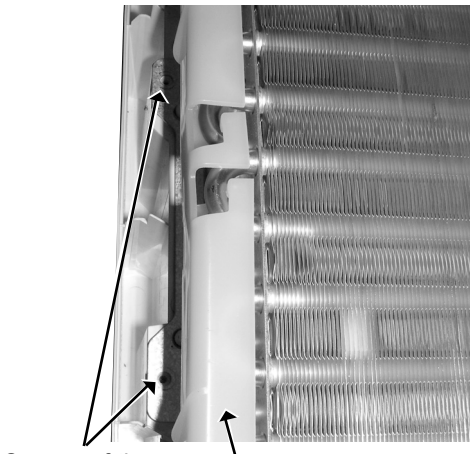
PFFY-P20VKM-E **PFFY-P32VKM-E** **PFFY-P25VKM-E** **PFFY-P40VKM-E**
PFFY-P20VKM-ER1 **PFFY-P32VKM-ER1** **PFFY-P25VKM-ER1** **PFFY-P40VKM-ER1**

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 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 1.) (2) Remove the electrical cover. (Refer to 2.) (3) Remove the ground wires from the electrical box. (Refer to 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> • Damper motor connector <CN6V2> • Pipe temperature thermistor connector <CN44> • Damper limit switch 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 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**  Screw of vane motor
5. Removing the indoor fan motor (upper) (1) Remove the panel. (Refer to 1.) (2) Remove the electrical box. (Refer to 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 

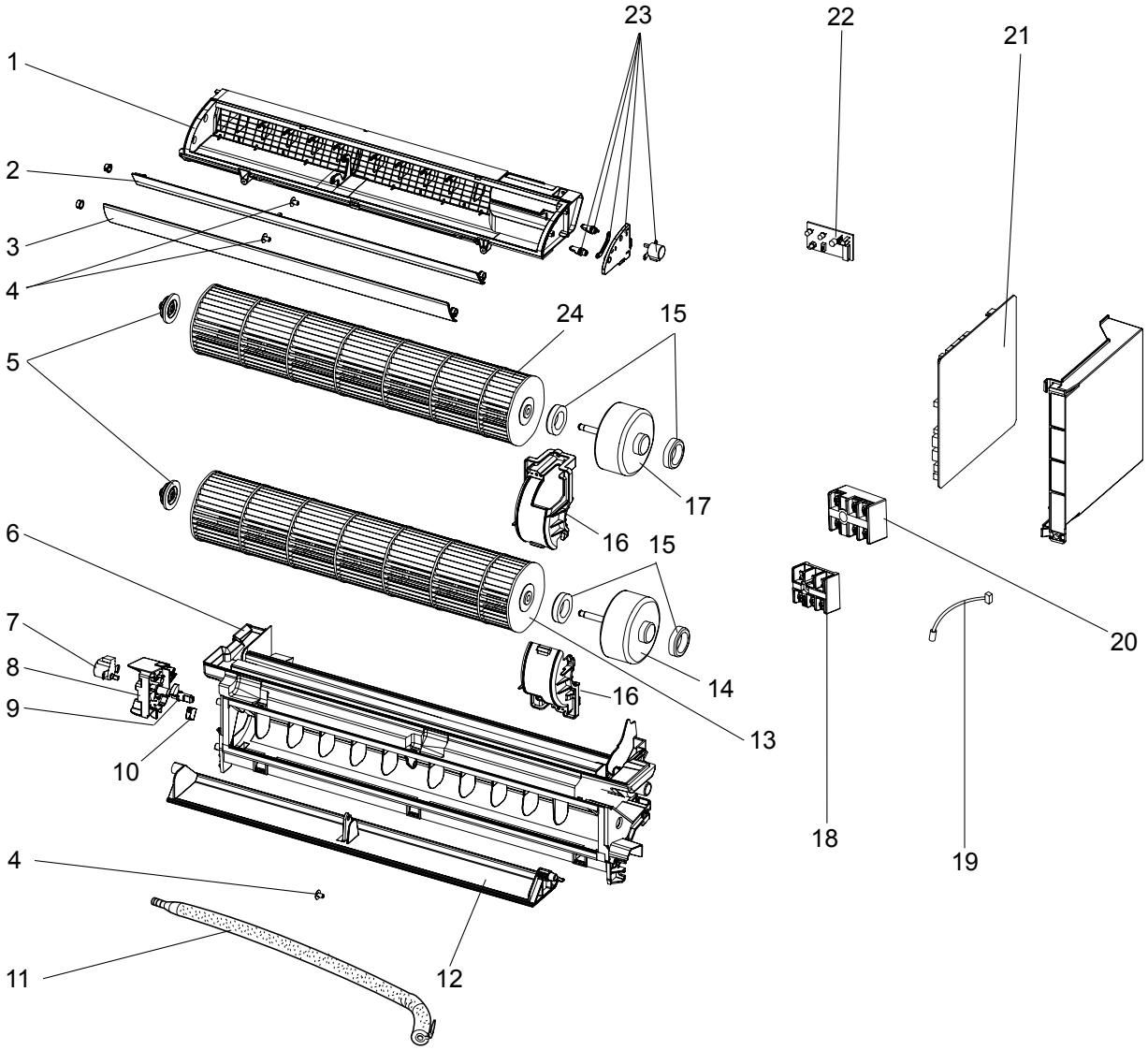
OPERATING PROCEDURE	PHOTOS
6. Removing the damper motor and the damper limit switch (1) Remove the panel. (Refer to 1.) (2) Remove the screws of the nozzle assembly (lower). (See Photo 8.) (3) Remove the drain hose from the nozzle assembly (lower) and pull out the nozzle assembly (lower) toward you. (4) Remove the tape fixing the lead wires of the damper motor from the nozzle assembly <lower>. (See Photo 9.) (5) Remove the screws of the damper motor support, and then the damper motor support. (6) Remove the screws of the damper motor, and then the damper motor from the damper motor support. (7) Disconnect the connector from the damper motor. (8) Remove the damper limit switch. (LS).	**Photo 8** 
7. Removing the indoor fan motor (1) Remove the panel. (Refer to 1.) (2) Remove the nozzle assembly (lower) and the drain hose. (Refer to 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 Photo11.) (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 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 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** 

12 RoHS PARTS LIST

12-1. INDOOR UNIT ELECTRICAL PARTS AND FUNCTIONAL PARTS

PFFY-P20VKM-E **PFFY-P20VKM-ER1**
PFFY-P25VKM-E **PFFY-P25VKM-ER1**
PFFY-P32VKM-E **PFFY-P32VKM-ER1**
PFFY-P40VKM-E **PFFY-P40VKM-ER1**



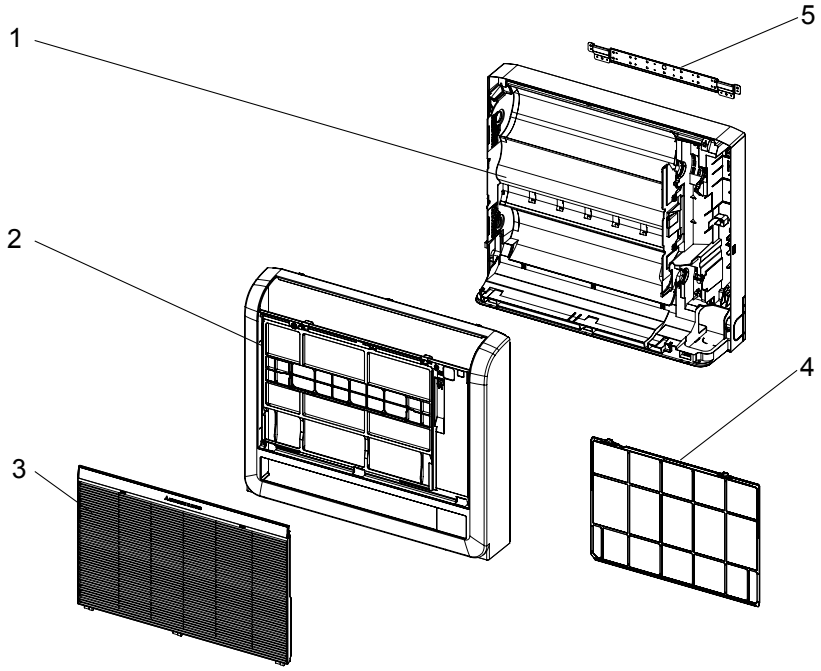
12-1. INDOOR UNIT ELECTRICAL PARTS AND FUNCTIONAL PARTS

Part number that is circled is not shown in the illustration.

No.	RoHS	Part No.	Part name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
					PFFY-P20/25/32/40		
					VKM-E	VKM-ER1	
1	G	T7W E00 530	NOZZLE ASSEMBLY (UPPER)		1	1	
2	G	T7W E07 002	HORIZONTAL VANE (UPPER)		1	1	
3	G	T7W E06 002	HORIZONTAL VANE (LOWER)		1	1	
4	G	T7W E01 103	VANE SLEEVE		3	3	
5	G	T7W E00 103	BEARING ASSEMBLY		2	2	
6	G	T7W E01 530	NOZZLE ASSEMBLY (LOWER)		1	1	
7	G	T7W E08 223	DAMPER MOTOR	MV2	1	1	UP & DOWN
8	G	T7W E09 130	VANE MOTOR SUPPORT		1	1	
9	G	T7W E00 170	SM SHAFT		1	1	
10	G	T7W E00 272	DAMPER LIMIT SWITCH (CLOSE)	LS	1	1	
11	G	T7W E03 527	DRAIN HOSE		1		
	G	R01 E09 527	DRAIN HOSE			1	
12	G	T7W E08 002	VANE UNDER		1	1	
13	G	T7W E04 114	LINE FLOW FAN (LOWER)		1	1	
14	G	T7W E26 762	INDOOR FAN MOTOR (LOWER)	MF2	1	1	ARW40Y8P30MS
15	G	T7W E00 105	RUBBER MOUNT (L,R)		2	2	
16	G	T7W E08 130	MOTOR BAND		2	2	
17	G	T7W E25 762	INDOOR FAN MOTOR (UPPER)	MF1	1	1	ARW40Z8P30MS
18	G	R01 E27 246	TERMINAL BLOCK	TB5	1	1	3P (M1, M2, S)
19	G	R01 H18 202	ROOM TEMPERATURE THERMISTOR	TH21	1		
	G	R01 H08 202	ROOM TEMPERATURE THERMISTOR	TH21		1	
20	G	T7W E37 716	TERMINAL BLOCK	TB2	1	1	3P (L, N, ⏚)
21	G	T7W E55 310	INDOOR CONTROLLER BOARD	I.B	1		
	G	T7W E80 310	INDOOR CONTROLLER BOARD	I.B		1	
22	G	T7W E01 294	ADDRESS BOARD	A.B	1	1	
23	G	T7W E07 223	VANE MOTOR (SET)	MV1	1	1	UP&DOWN
24	G	T7W E03 114	LINE FLOW FAN (UPPER)		1	1	
㉕	G	R01 E06 239	FUSE	FUSE	1	1	6.3A
㉖	G	T7W E04 304	ADDRESS CABLE		1	1	

12-2. STRUCTURAL PARTS

PFFY-P20VKM-E PFFY-P20VKM-ER1
PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1
PFFY-P40VKM-E PFFY-P40VKM-ER1

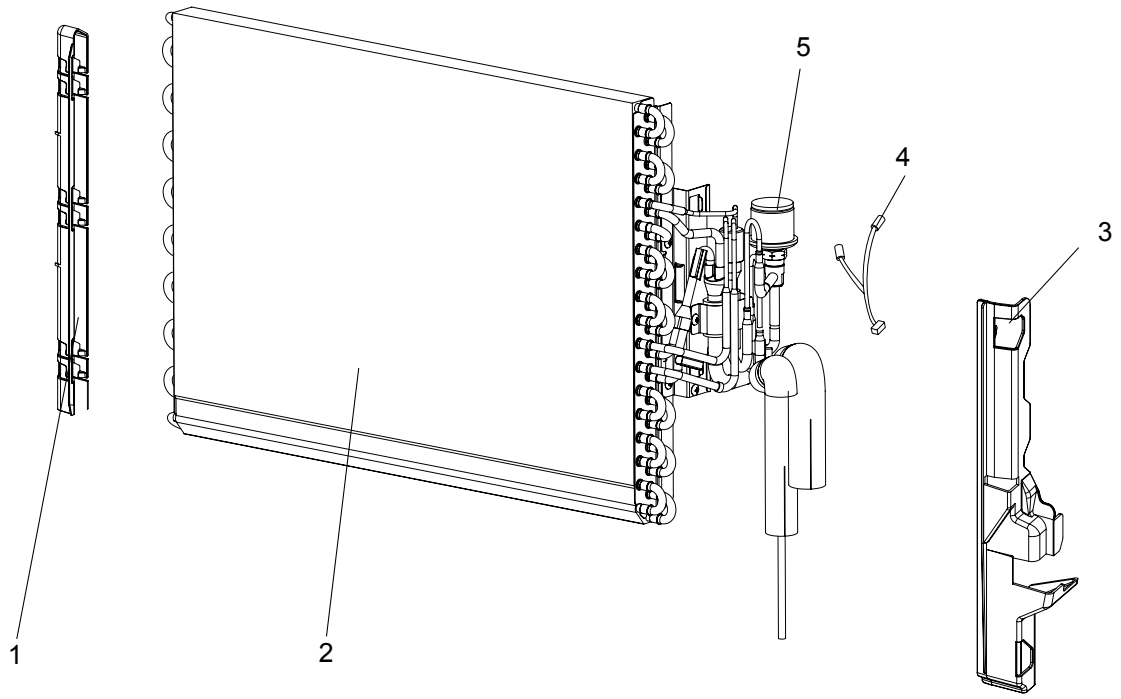


12-2. STRUCTURAL PARTS

No.	RoHS	Part No.	Part name	Symbol in Wiring Diagram	Q'ty/unit	Remarks
					PFFY-P20/25/32/40VKM-E PFFY-P20/25/32/40VKM-ER1	
1	G	T7W E01 635	BOX		1	
2	G	T7W E06 651	PANEL ASSEMBLY		1	
3	G	T7W E05 691	FRONT PANEL		1	
4	G	T7W E01 500	CATECHIN AIR FILTER		1	
5	G	T7W E01 808	BACK PLATE		1	

12-3. INDOOR UNIT HEAT EXCHANGER

PFFY-P20VKM-E PFFY-P20VKM-ER1
PFFY-P25VKM-E PFFY-P25VKM-ER1
PFFY-P32VKM-E PFFY-P32VKM-ER1
PFFY-P40VKM-E PFFY-P40VKM-ER1



12-3. INDOOR UNIT HEAT EXCHANGER

No.	RoHS	Part No.	Part name	Symbol in Wiring Diagram	Q'ty/unit		Remarks
					PFFY-P20/25/32/40		
					VKM-E	VKM-ER1	
1	G	T7W E00 031	HAIR PIN COVER		1	1	
2	G	T7W H56 480	INDOOR HEAT EXCHANGER		1	1	
3	G	T7W E01 031	WATER COVER		1	1	
4	G	T7W E16 202	PIPE TEMPERATURE THERMISTOR	TH22,TH23	1	1	
5	G	T7W E19 401	EXPANSION VALVE	LEV	1		
	G	R01 H23 401	EXPANSION VALVE	LEV		1	

CITY MULTI™

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